Heating and cooling solutions from Alfa Laval

Everything you need for your HVAC application

Alfa Laval Comfort mission statement

Alfa Laval's goal is to be the preferred brand for leading HVAC companies. We provide energy-saving heating & cooling solutions using compact heat exchangers as core technology.

Together with our partners, we do this in all buildings on all continents. By doing this, we help create a better standard of living.

To help you find the right product for your HVAC application we have developed this Heating and Application Handbook. It is also available as an App for tablets, in digital format on alfalaval.com/hvac and on our eBusiness portal.

Whichever format you choose to learn more about our products – we have made sure it is as easy as possible for you to find the information you are looking for.

Welcome to Alfa Laval

Chapter 1

Our mission

We optimize the performance of our customers' processes.

Time and time again.

Pure Performance

Alfa Laval focuses closely on offering its customers solutions that pay off.

This is clearly reflected in our mission:

To optimize the performance of our customers'processes. Time and time again.

This is a never-ending commitment. Every improvement we achieve creates a new platform for the next step on the improvement ladder.

Our aim is to stay in pole position at all times.

High-tech performance

The Alfa Laval brand stands for technical expertise, reliable products, efficient service and the finest possible process-engineering skills.

Our reputation is based on our unique knowledge and experience in three key technologies:

- Separation
- Heat transfer
- Fluid handling

These are technologies that play major roles in most sectors of industry.

Our company

A global brand
Our equipment, systems and service are hard at work in more than 100 countries.
In 2011 Alfa Laval had 37 major production units and 99 service centres all over the world. The proximity to the market is vital to the company's success, for it is only by working closely with our customers that we can respond to their needs.

129 years young
The origin of the company dates back to 1883, when Gustaf de Laval founded Alfa Laval to exploit his pioneering invention of the centrifugal separator.
Gustav de Laval was a great technical genius who registered 92 patents in his lifetime. His innovative spirit has always been the guiding star for Alfa Laval and remains so to this day.

3.2 billion euros in sales
During 2011, Alfa Laval posted sales of 3.2 billion euros.
Europe is the biggest geographical market in terms of sales volume – roughly twice the size of both Asia and the American continent.

14,700 employees
Alfa Laval has nearly 14,700 highly qualified employees worldwide. Their basic mission is to assist industries of almost every kind to refine and improve their products and to optimise the performance of their processes. Thereby we help create better living conditions and a cleaner, safer environment for all mankind.

Ten customer segments
To create a clear focus on different types of customer, Alfa Laval's business is divided into ten segments.
Each segment is dedicated to working closely with specific customer groups. This gives us insight into their special needs and the power to develop the best possible solutions to fulfil them.

Technical leadership
Alfa Laval holds world-leading market positions in its fields of technical expertise.
Its success is based on an average investment of 2.5% of annual turnover in Research & Development.
The work of our almost 300 dedicated R&D specialists results in 35-40 new product releases every year.

Our key areas

Separation
Alfa Laval has led the development of separation technology since the company was formed in 1883. Today Alfa Laval is the world's largest supplier of separation technologies.

Heat transfer
Alfa Laval is the world leader in plate and spiral heat exchangers.
It also offers the market's most extensive range of refrigeration equipment.

Fluid handling
Alfa Laval produces flow equipment for industries requiring high standards of hygiene and reliable, continuous process flows.

Heat transfer

Plate heat exchangers
Alfa Laval has the most comprehensive range in the market for industrial, sanitary and heating applications.

Air heat exchangers, evaporators and condensers
Designed for refrigeration.

Shell-and-tube heat exchangers
An extensive range of heat exchangers dedicated to pharmaceutical, food and refrigeration applications.

Spiral heat exchangers
Tailored for viscous and particulate products that can cause severe fouling or corrosion.

Finned tube heat exchangers
Alfa Laval's range covers most types of refrigerants and most cooling applications.

Separation

High-speed separators
Primarily used for separating fluids and sludges containing up to 30% of solid particles.

Membrane filtration
Alfa Laval's wide range of filters covers reverse osmosis, nanofiltration, ultra-filtration and microfiltration.

Decanter centrifuges
For separating solids from liquids: a key function in countless industrial, food and treatment processes.

Fluid handling

Valves
Sanitary mixproof valves.
Intelligent control equipment. For example:
Butterfly valves.
Seat valves.
Aseptic diaphragm valves.

Pumps
We cover every need for gentle, precision pumping of all kinds of fluids of all viscosities in sanitary applications.

Tank equipment
We offer the widest range of sanitary applications for the marine/offshore business – supplying everything except the tank itself.

Installation material
Our promise: You can always find the right installation material, in the right quantity, for the right application.

Focus on customer segments

Marine industry
More than half of the world's ships are equipped with Alfa Laval products and solutions.

Vegetable oils industry
Our equipment and systems produce tons of extra virgin olive oil every day.

Beverage industry
We manage the vital balance between flavour, food safety and manufacturing efficiency. Our equipment handles millions of litres of wine and beer every year.

Wastewater
Alfa Laval has unique knowledge in the increasingly critical areas of effluent treatment and recycling.

Energy
Alfa Laval is involved throughout the long process from the extraction of raw materials to the production and use of energy.

The process industries
Alfa Laval's equipment and solutions are critical for performing and optimizing many industrial processes.

Starch industry
More than half of the 60 million tons of starch produced in the world every year comes from our products and processes.

Pharmaceutical and biotech industry
We offer a wide range of products to satisfy the industry's exceptional demands for precision, safety and cleanliness.

Comfort/HVAC and refrigeration
Alfa Laval is a leader in climate control, providing an optimized balance of heating and cooling.

Food industry
Our equipment helps the food industry to turn quality raw materials into equally high-quality products.

Chapter 2

Heating and cooling solutions from Alfa Laval

The Alfa Laval Business Unit Comfort/HVAC applies heat-transfer technology to heating and cooling systems, helping you to be more efficient in obtaining the ideal temperature in any area.

Customers in more than 60 countries have made Alfa Laval the world market leader in heat exchangers and thermal solutions. Over 60 years of dedicated research and development in the field of heat-exchanger solutions, together with field experience from some 500,000 heating installations around the world, are your assurance that we have the solutions you are looking for.

There are many different ways to achieve comfortable, economic climate control. That's why a thorough understanding of each individual situation, the available resources and the real needs is the first step towards success.

Global experience always near you

In a world of constant change, it can be comforting to know that some essentials will remain the same. One such essential is the local presence of Alfa Laval through our local sales companies and network of authorized distributors, who can meet all your needs and help you optimize your systems' performance.

Many of our customers are engaged in building a modern infrastructure based on proven, effective and sophisticated technology.

This calls for customized design to meet specifications that address local conditions and specific needs.

Others are expanding current plants or designing next generation systems. This means analyzing the application benefits that new technology has to offer, locating opportunities for even faster return on investment, ensuring lower than ever total cost of ownership, and reducing environmental impact. Globalization is an obligation – the obligation to adapt global experience to meet local needs.

Alfa Laval is fully equipped to meet any project requirements from day one with fast answers and timely suggestions for improvements. These are the success factors that lead to a rewarding, long-term customer supplier relationship.

Time is money: that's why it's easy to do business with us
Speed and simplicity are essential for us, because a company's leadership derives not just from the quality of its products, but also from its organization and the services it offers. This is why we provide our customers with all the tools they need to do business with us easily and efficiently. Contact our local representative to learn more about the latest available tools.

We know because we have been there
Alfa Laval customers always benefit from our first-hand experience in hundreds of projects in different countries and climates all over the world. You can access our experience through our global team of Alfa Laval experts and partners. Your Alfa Laval agent is just a phone call away, while contact details for all countries are continually updated on our website at www.alfalaval.com

Fast, timely delivery
Experienced planning means superior logistics. At Alfa Laval, we believe that deliveries should not merely be in time. They should be just in time in order to save money and storage space for our customers. This is one of our major strengths together with supplying and supporting the resources needed at each different stage of a project.

From a single product to the complexity of a power plant
Close collaboration with the customer and every one of his partners and advisors is essential. We contribute actively and constructively from the very first enquiry in order to assure you the best possible solution – whether you need a single product or a full-scale project.

Advanced design
Alfa Laval's extensive product development work has led to technologically advanced plates for heat exchangers that make it possible to adopt our "close approach" to energy efficiency. The optimized plate corrugation pattern not only increases heat transfer, but also reduces the risk of fouling thanks to highly turbulent flow. Plates are available in different materials and configurations to suit the customer's needs.

Alfa Laval's innovative heating and cooling systems are certified according to ISO 9001 and we have the possibility to control every component. As the interaction between all components is thoroughly tested, you can be sure to receive a reliable and cost-efficient system, ensuring lowest cost of ownership.

Leveraging local energy sources
The availability of local energy is an important cost parameter in designing a system. By using heat exchangers from Alfa Laval, you can choose one or several of a wide variety of energy sources in order to maximize economic benefits and minimize environmental impact.

Global expertise for local projects
District-heating system projects typically span a period of several year. These projects are complex processes that are often split up into several stages. Each of these starts with a pilot project, and is minutely documented as a basis for improvements and refining specifications for coming stages.

This meticulous process is even more critical when external financing and approvals need to be obtained.
At first it may seem daunting, but it is part of our global experience and everyday work.

Full documentation
We provide documentation and specifications for local authorities, consultants and contractors. We can customize throughout the project – down to the smallest details of three-dimensional drawings.

Innovative solutions
Alfa Laval pursues an active research and development policy at laboratories around the world. All Alfa Laval development projects are based on an analysis of the benefits of applying new technologies and the opportunities for even faster return on investment, reducing both the total operating cost and environmental impact.

We're closer than you think
Alfa Laval is represented in most countries by local sales companies, and a network of regional authorized distributors are responsible for serving our customers at all times. All of our authorized distributors and sales companies are able to perform dimensioning of heat exchangers based on application, heat load and available space, and to provide installation guidelines together with full pricing details.

We understand and meet your needs
There are many different ways to achieve comfortable, economic climate control. A thorough understanding of each individual situation, the available resources and the real needs is always the first step towards success.

Power and performance
Alfa Laval has a full range of products catering for every need, however large or small. We offer versatile, compact and easy-to-install products that ensure high efficiency and low maintenance costs. Alfa Laval is your assurance of reliable operation, unsurpassed operating life span, fast return on investment and low cost of ownership.

Chapter 3

Applications

In this chapter, we will illustrate a number of common applications of heat exchangers and heat-exchanger systems in HVAC installations.

The diagrams and other information provided are intended only to clarify the operating principle. Actual systems must thus be completed with the components and accessories envisaged by current regulations.

For a more tailor-made design, contact your local Alfa Laval representative, who will be happy to provide you with professional assistance in selecting the best heat exchanger or heat-exchanger system for the job (see contact details at www.alfalaval.com).

At www.alfalaval.com/HVAC you can check out our reference library and read about installations we have completed within all applications in different places all over the world.

District heating/Community heating

Space heating

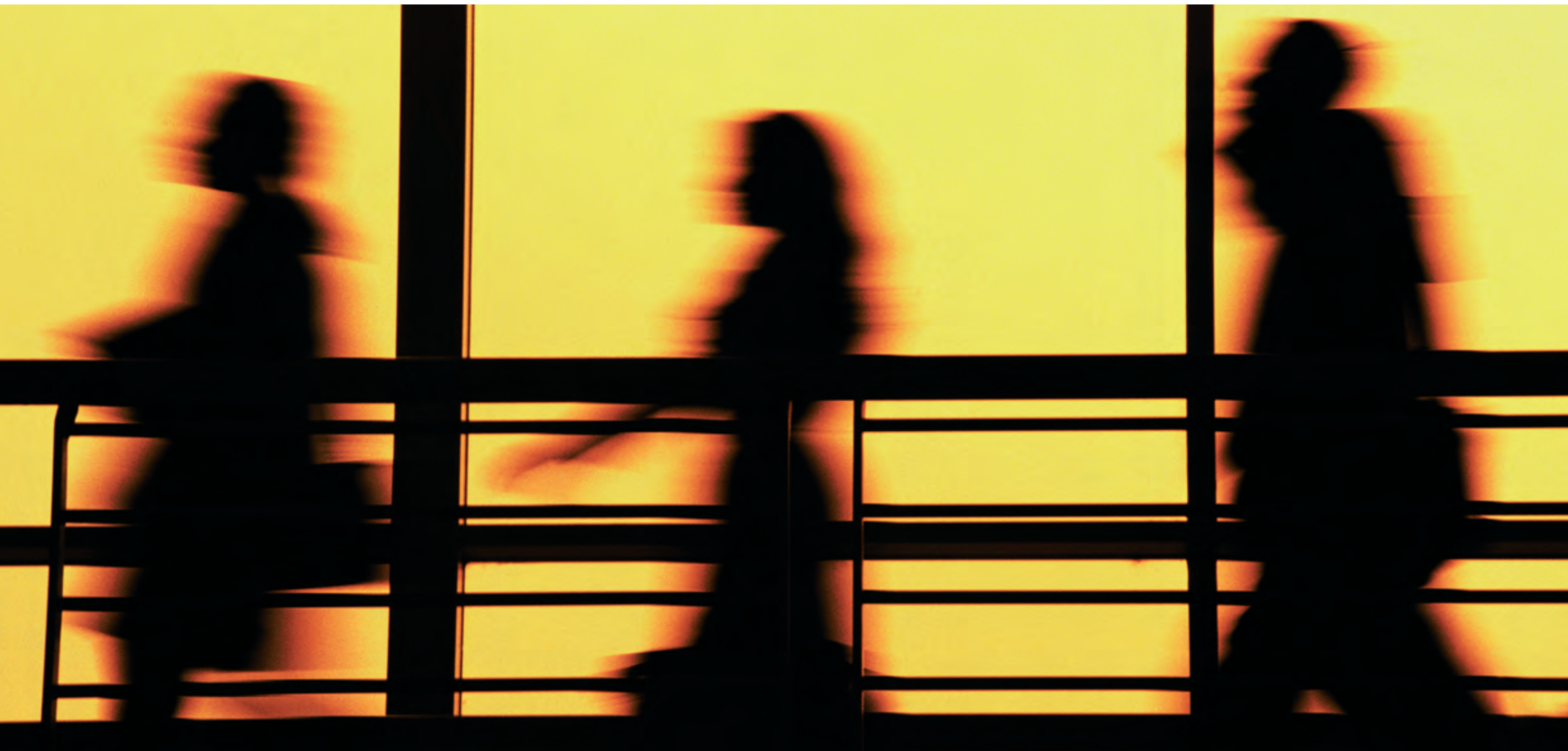
Heating, in most cases, is a matter of providing a comfortable indoor environment, whether at home, at work or in a public facility. Heating can also involve tapwater heating, swimming pools, greenhouses etc.

Space heating
The use of hot water for space heating is very common. The methods used to transfer energy from the water to a comfortable indoor environment vary. Using radiators is one common method.

An alternative to radiators is under-floor heating, where heat circuits are placed under the floor. The floor-heating circuit can be connected to the radiator circuit.

An air heater, blowing hot air into a room, is more commonly used in public buildings. Very often a combination is used, with for example radiators and floor heating, or radiators and air heaters via a separate mixing loop.

The objective of space heating is usually to achieve a comfortable indoor temperature. The heat can be transferred using radiators, floor heating or air heaters.



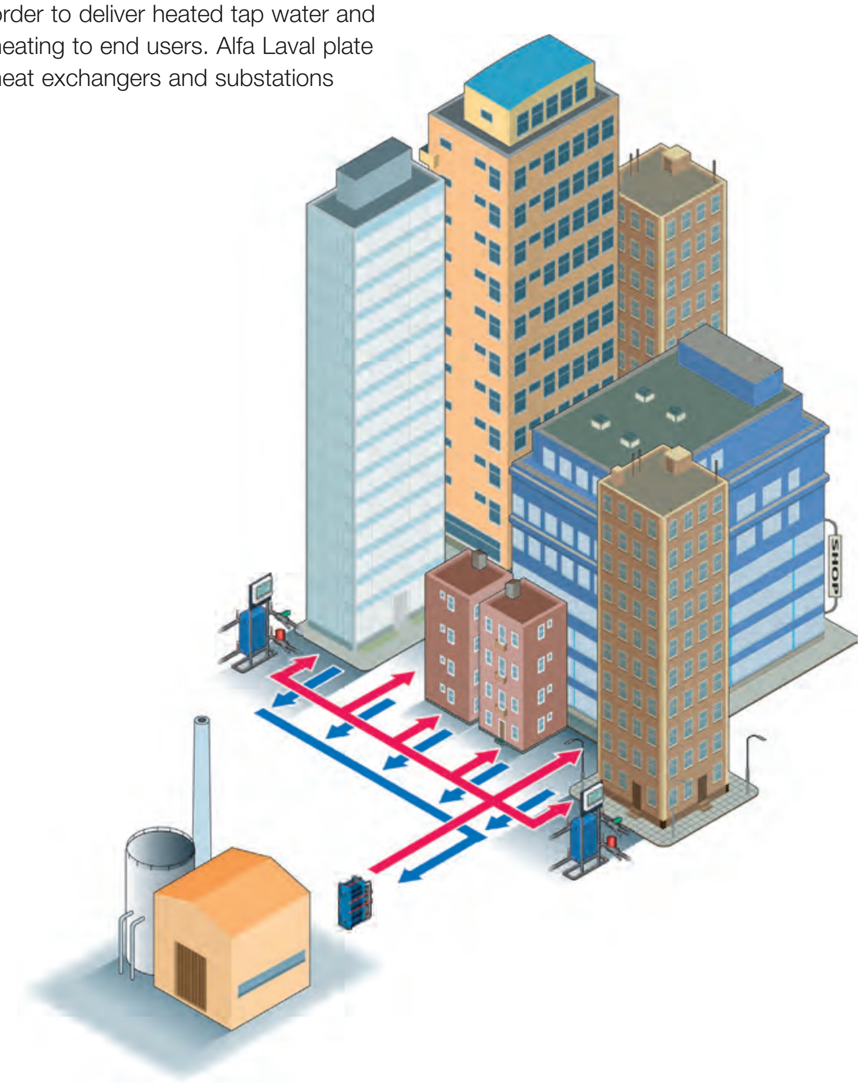
What is district and community heating?

District heating and community heating are environmentally friendly and energy-efficient methods of delivering hot tapwater and radiator heating. Heat generated in a central boiler plant is transferred to several buildings through pipes. A very wide range of energy sources, including combustion of oil, natural gas, biofuel or renewable energy, can provide the heat. A successful energy company will have 6-8 heating sources that they can combine and utilize according to their priorities – fuel cost, emissions, etc. The possibilities of using waste heat from industry, surplus heat from waste incineration, industrial processes and sewage, purpose-built heating plants or co-generation plants in district heating make it a flexible and energy-efficient choice. You can optimise costs as prices change, and maximize environmental protection.

For the consumer, district or community heating means a trouble-free way of receiving energy. The heating sources of a district or community heating system are more convenient and more efficient than small individual space-heating systems. Combustion techniques and exhaust cleaning will decrease the negative impact on the environment.

Plate heat exchangers and heat-exchanger systems, substations, play a major role in enabling efficient heat transfer between the two systems in order to deliver heated tap water and heating to end users. Alfa Laval plate heat exchangers and substations deliver the preferred solution in district- or community-heating systems throughout the world today.

Alfa Laval currently offers different types of plate heat exchangers and substations in district- and community-heating applications.

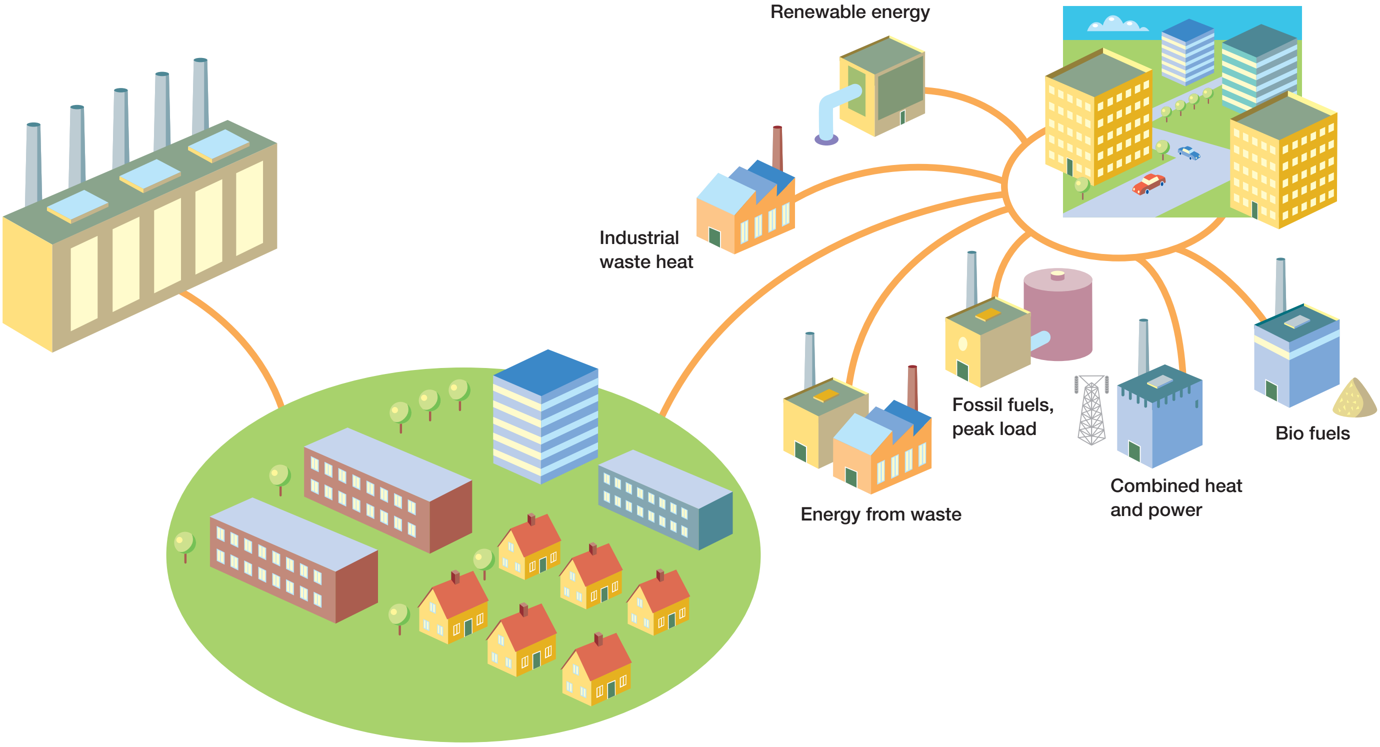


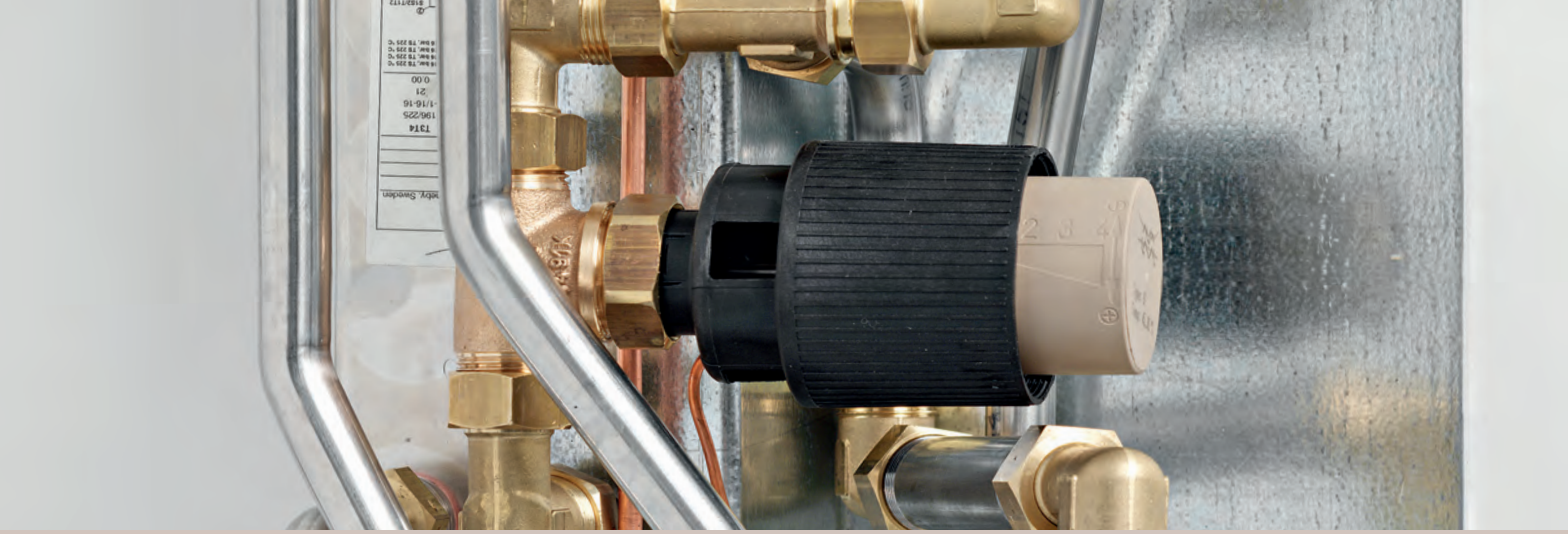
Community heating

Community heating is based on the same technology as a "standard" district-heating network but on a smaller scale. Even in networks consisting of a relatively small number of houses or apartments, the technology developed for district heating offers some obvious benefits. One central boiler will replace several of small boilers. Fuel from different local sources – e.g. industrial waste energy, garbage or solar – can be used.

In many cases, small-scale community heating networks can be integrated into more comprehensive district-heating networks, thus creating economies of scale while some of the initial investments in equipment are already taken.

Substations are the brain of the community-heating concept. The challenge is to achieve the ideal temperature while simultaneously reducing energy consumption and paying attention to environmental issues. During the last few years, compact and very efficient units have been developed specifically for small-scale applications. As metering can be set individually, residents are offered an incentive to save energy, while sensors adjust the indoor temperature in relation to temperature fluctuations outdoors.



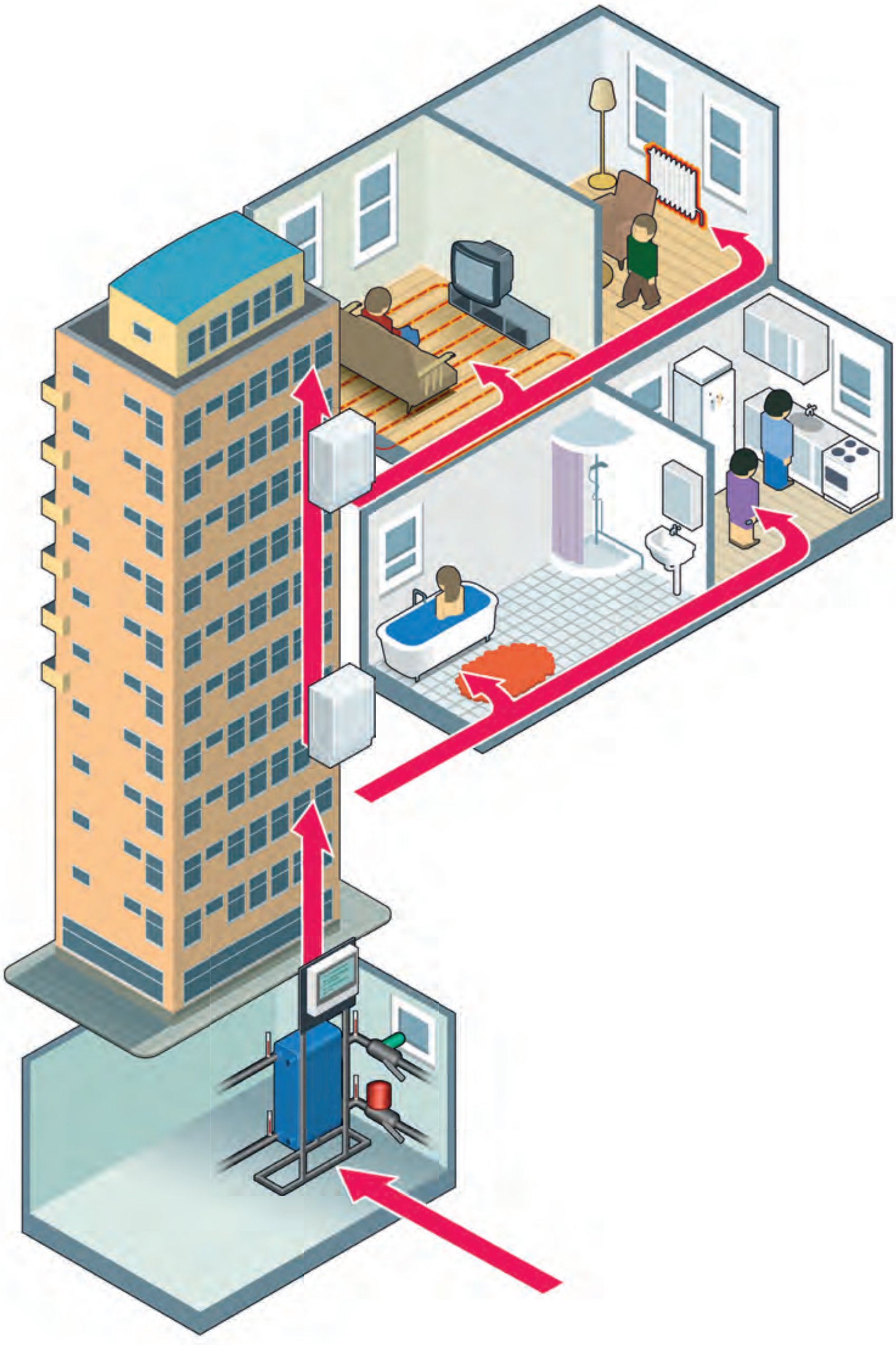


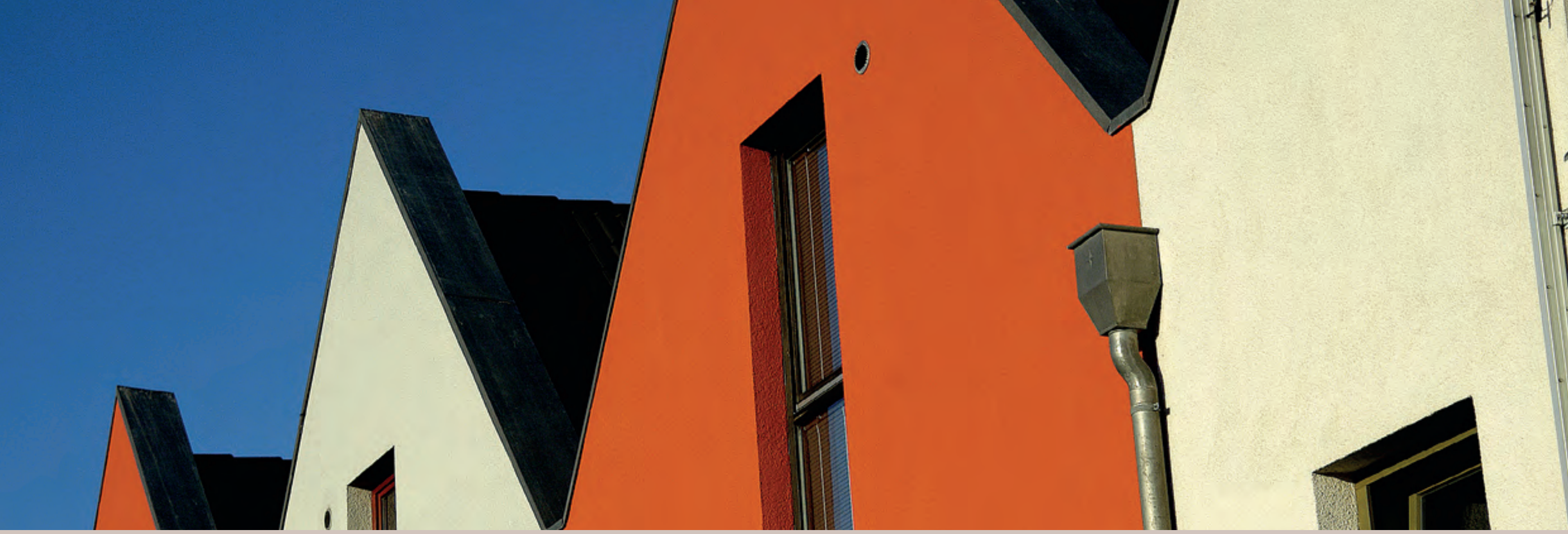
Energy savings in district/community heating

Today, the district- and community heating application is moving from "production-driven" towards "demand-driven". In a production-driven system the production plant regulates the volumes of heat delivered to residents. The residents have no technical means of regulating the heat reaching their apartments, as the system temperature can only be set at the heat source.

In a demand-driven system, each building is furnished with an individual substation equipped with a weather sensor. The sensor and control equipment adjust the supply temperature automatically, taking into account the specific heating needs of the building. Therefore, the substation will capture only the heat needed from the network. A refined regulation of the ambient temperature also means that the temperature gap between the supply and return temperatures can be expanded. As a result, pipe dimensions can be kept relatively small, thus cutting investment costs and pumping costs.

One substation in every building (even every apartment) has proven to provide the best result, enabling individual control and superior economy.





District and community heating must be viewed as a total system, and as all systems, it requires a holistic approach – optimising and working with the total system and not only focusing on parts. For district and community heating it is crucial to have products and components in the system that work together as well as separately in an optimal way.

Strategy

- Two pipe systems
- Eliminating leaking pipes and waste of water
- A substation in every building
- All buildings need its own metering
- Individual measuring of use of energy for every apartment
- Connecting small district- and community-heating networks to the main city networks
- Analysis of optional energy supply
- Individual building efficiency

Keeping waste heat from going to waste

In many companies and industries there are untapped sources of waste heat or surplus heat. Such heat can be found in many forms, whether it is steam going out into the air or hot water going out into the ocean. By utilizing the waste heat in district heating, the same fuel achieves twice the work, thereby doubling fuel efficiency.

Huge heat losses appear in power plants, oil refineries and industrial processes. Much of this heat could be retrieved and distributed by district heating systems to heat urban buildings. District-heating systems provide the necessary heat load for high-efficiency combined heat and power plants while at the same time, allowing the use of renewable energy.

Connection principles

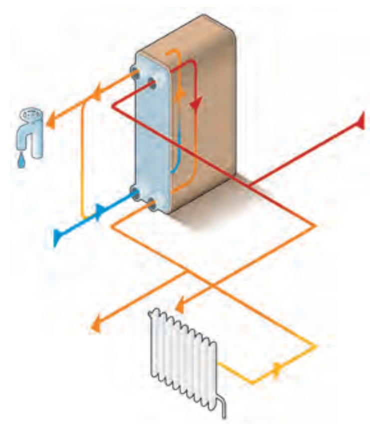
There are many different ways to connect district heating/community heating to buildings. The most common principles are:

1. Direct connection
2. Indirect parallel connection
3. Indirect two-step connection

The direct-connection system includes a heat exchanger for the domestic tap water circuit but there is no heat exchanger between the heating network and the customer heating circuit. The same heating water is inside the secondary network (radiators, underfloor heating etc.).

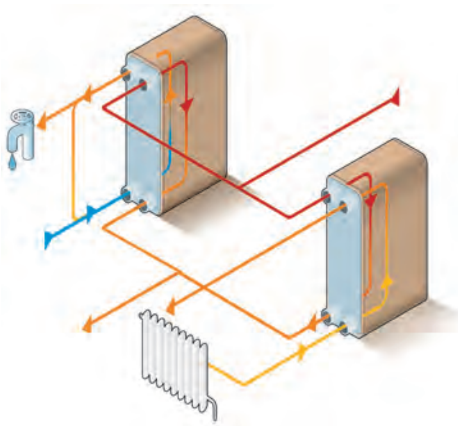
The indirect parallel-connection system includes a heat exchanger for the domestic hot water circuit and a heat exchanger separating the district- or community-heating network from the customer heating circuit.

The indirect two-step connection includes a two-step heat exchanger for the domestic hot water circuit and a heat exchanger separating the district- or community-heating network from the customer heating circuit. The heating flow from space heating flows through the pre-heater of the domestic tap water exchanger and improves the total cooling of the district- or community heating system.



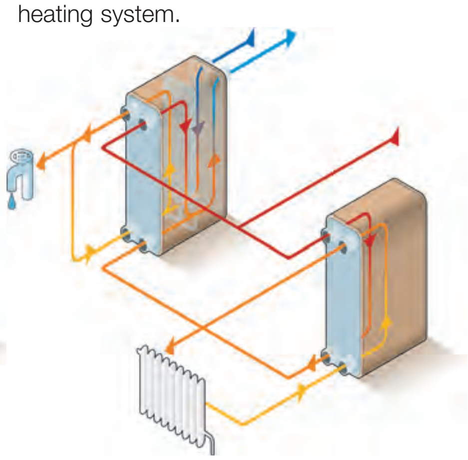
Direct connection

A direct connection system needs a differential pressure controller in order to decrease pressure on the secondary side and is recommended for low-pressure systems.



Indirect parallel system

In the indirect parallel connection system, a differential pressure controller can be used in some cases.



Indirect two-step system

The indirect two-step connection means maximum utilization of heat and a low return temperature during tap water consumption.

Environmental aspects

Combined Heat & Power (CHP) is a key technology for district and community heating. It will almost double fuel efficiency and at the same time reduce the need for additional heating sources. This reduces the impact on the climate and environment and increases the energy efficiency.

Wherever district or community heating is established, the surrounding environment benefits. One large plant has better combustion and cleaner emissions than many smaller plants.
District and community heating enables the utilization of waste heat from industries and garbage from both households and industries; energy that would otherwise be lost.

Large or small-scale district and community heating open up for using local fuels and switching between different heat sources, thus making renewable energy sources an attractive alternative.

Tap water heating

Hot tap water is a convenience and comfort that most people take for granted in modern society. For cleaning, washing and personal hygiene, we're used to turning a tap and getting as much hot water as we need – quickly and reliably. And we do use lots of it!

Close to 40% of all energy consumed by households in Europe goes to heating tap water. Hot tap water can be produced in a variety of ways, depending on the type of energy employed (electricity, gas, solar or other fuels) and the users needs. Essentially, tap water heating systems can be either instantaneous, without a storage tank, or semi-instantaneous, using a tank storage.

Which method is best for any particular application is determined by weighing the advantages and disadvantages of each solution. The main factors involved are:

- available capacity (kW) on site
- temperatures needed on the primary and secondary sides
- available energy on site
- available place in the boiler room
- local preferences and/or habits

Instantaneous

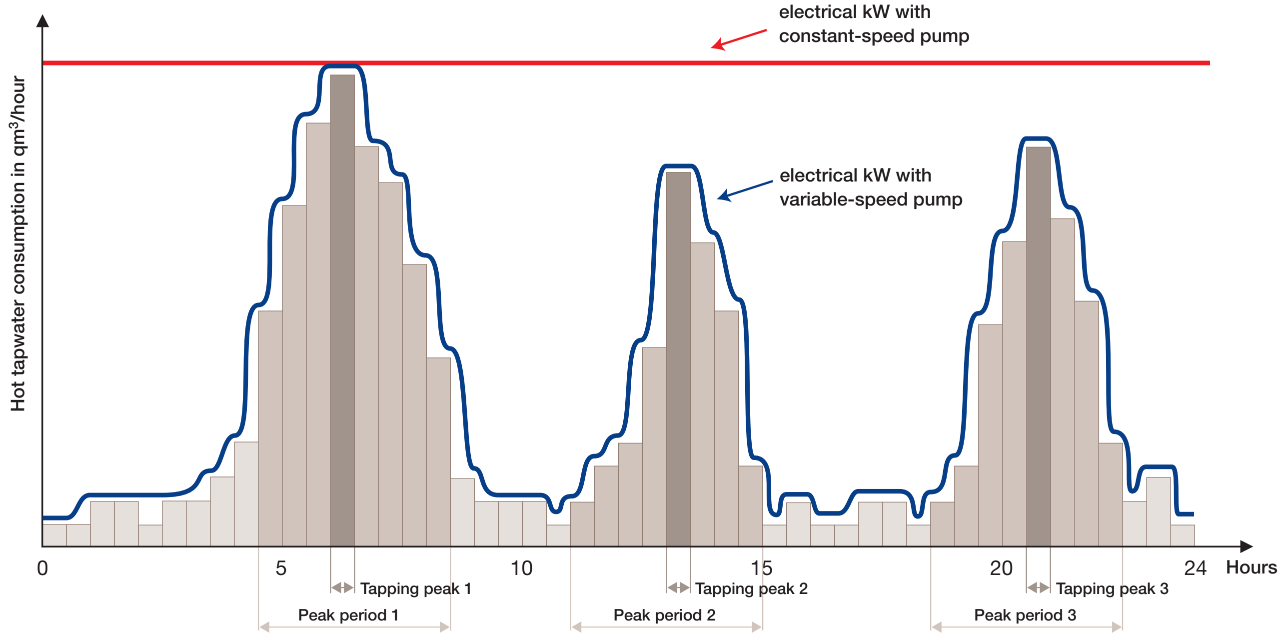
&

Semi-instantaneous

Some of the key requirements that are considered in selecting a system are as follows:

Indicator	Benefits
Cost efficiency	Low up-front investment, operating and maintenance cost
Energy efficiency	Low energy consumption
Space efficiency	Using minimal floor and room space
Installation efficiency	Simple and quick to install, test and start up
Service efficiency	Easy to clean and maintain; long maintenance intervals with short service shut-downs
Comfort	No waiting for hot water; and appropriate temperature levels, no risk of scalding at the tap
Dependability	Hot water available at the right moment
Health	No build-up bacteria cultures
Sufficiency	Enough hot water even during peak-consumption hours

Tap water demand



Modern buildings are designed to consume less and less energy. If building losses can thus be brought down to very low levels, the same cannot be said of domestic hot water production: it is not possible to reduce the heat needed to produce hot water significantly, as it depends on quantity and distribution characteristics.

In order to keep energy consumption low, it is thus essential to optimise the hot water production system, where tap-water systems from Alfa Laval play a fundamental role.

A tap-water system is much more than a heat exchanger; it combines the Alfa Laval know-how of heat exchangers with a perfect knowledge of quality material and professional skills in order to offer a complete ready-to-use hot-water system to the customer.

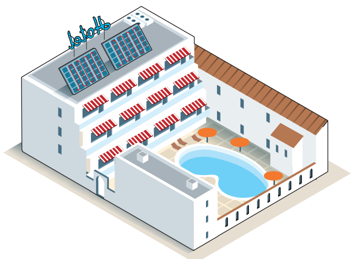
Alfa Laval offers:
- Instantaneous systems
- Semi-instantaneous systems
- Anti-legionella systems
- Multi functional electronic controlbox
- Choice of gasketed, brazed and fusion-bonded heat exchangers
- Choice of 2-port, 3-port and 4-port valves on the primary side

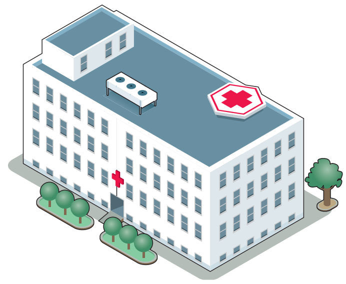
These systems are the best solution for anywhere where hot water is needed in large volumes in a short time:

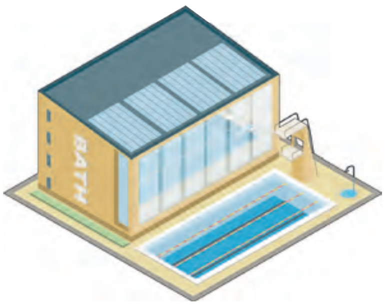
- For any collective application:
- Apartment blocks
- Hotels
- Hospitals
- Sports facilities
- Retirement homes
- Schools & universities
- Prisons

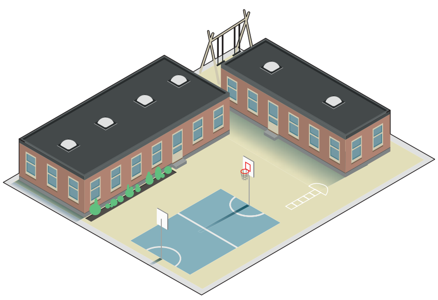
- For any heating source:
- Local boiler
- District heating
- Community heating
- Renewable energies

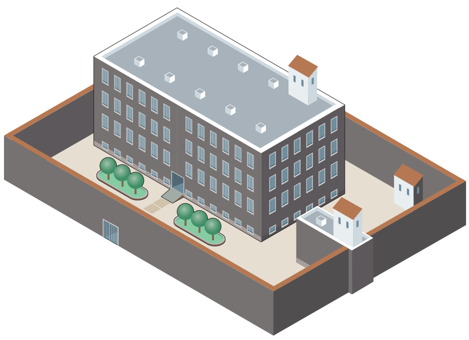
- For any functionality:
- Simple product range
- Standard product range
- Smart product range









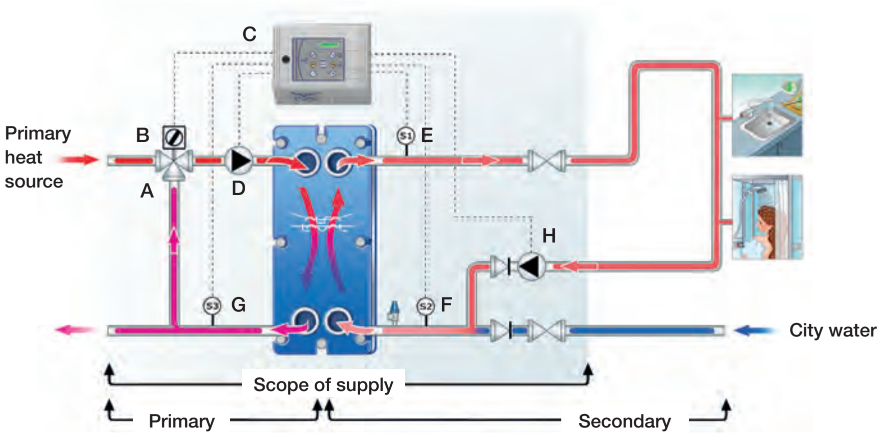


Instantaneous hot water production

An instantaneous tap water system heats the water at the moment it is needed by the user.
The working principle is very simple: connected to the hot water distribution pipe works, the heat exchanger provides controllable domestic hot water directly to the consumption taps in large volumes and at very fast pace.
The primary side can be fed by different heating sources such as:

- A local boiler
- A district-heating system
- A community-heating system
- A system using renewable energy: solar, heat pumps etc.

Working principle instantaneous, 3-port valve



The system operates with a 2-, 3- or 4-port *control valve* on the primary side (A). The valve is connected to an *actuator (B)* and the *control box (C).*

The *temperature sensor S1(E)*, located at the secondary outlet, checks the temperature and adjusts the control valve accordingly, via the control box, in order to supply domestic hot water at the right temperature.

The *primary pump (D)* maintains a constant flow rate whereas the temperature entering the heat exchanger is continuously adapted to the demand detected at sensor S1(E).

Advantages of an instantaneous tap water system:

- It is simple, reliable and easy to install (plug & play)
- It provides domestic hot water in large quantities, up to 1220kW, in a very short time
- It comfortably keeps up with peak consumption without having a tank on site; cost and space saving
- With no stagnant water, there is no less risk of legionella
- Limited lime scaling thanks to the mixing valve on the primary side and turbulent flow through the plate heat exchanger
- Extremely compact
- One instantaneous tap water system has the muscle to replace several storage tanks

This eliminates thermal shock in the plate heat exchanger and reduces the build-up of lime scale on the tap-water side.

Sensor S2 (F) indicates if circulating water has reached 70°C minimum for thermal treatment.
Sensor S3 (G) indicates a decrease of the heat-exchanger efficiency due to scaling.

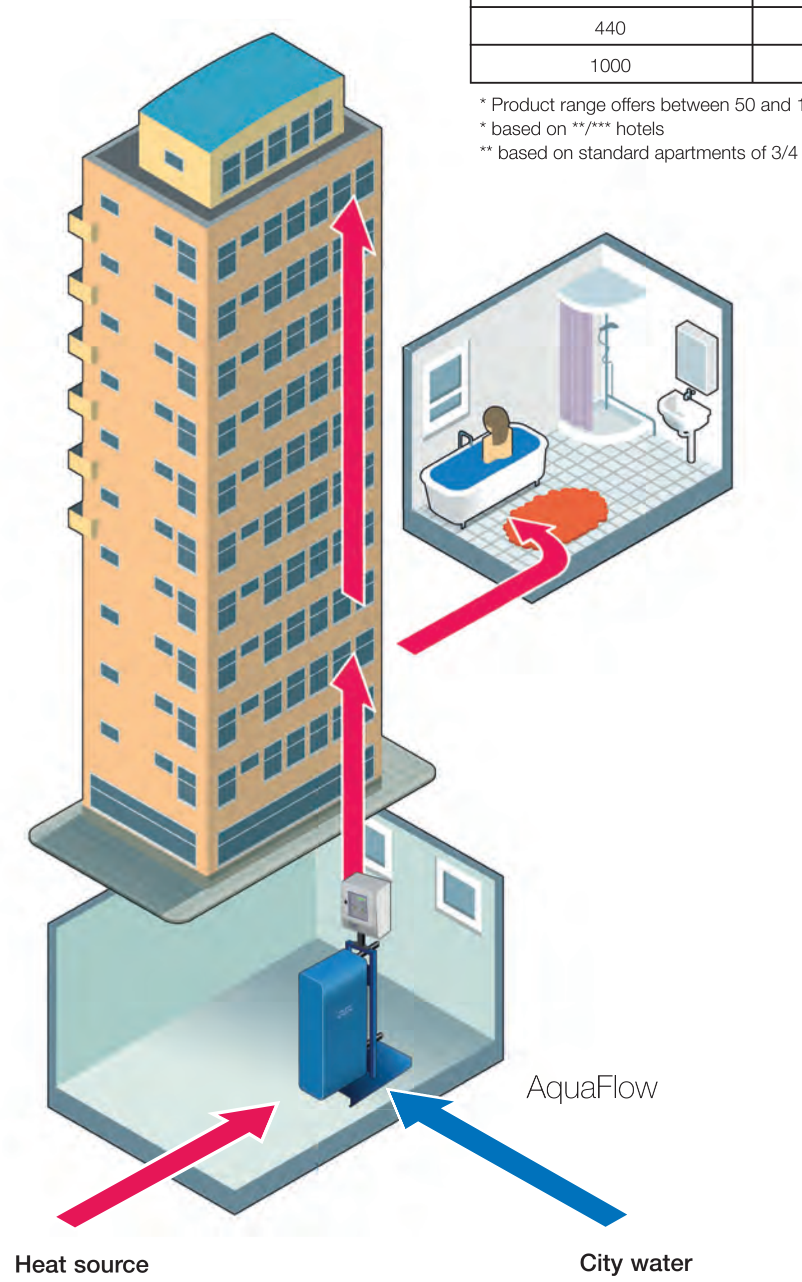
The *circulation pump (H)* maintains a minimum flow rate through the entire network.

An instantaneous tap water system must be sized to cope with peak consumption which means that both the plate heat exchanger and the boiler capacity (or heating network) must be larger than for a semi-instantaneous system (see next section).

Application examples for one single instantaneous tap water system:

Nominal capacity of the system (kW)*	number of hotel rooms**	number of apartments***
70	8	5
150	25	20
440	100	130
1000	320	500

* Product range offers between 50 and 1220kW
* based on **/*** hotels
** based on standard apartments of 3/4 rooms



Semi-instantaneous hot water production

In a semi-instantaneous tap-water system, the heated domestic hot water is stored in a buffer tank on the secondary side. The stored hot water is only used for peak periods when the domestic hot water demand is higher than the energy supply.
Contrary to instantaneous systems these systems can operate with a smaller boiler (or heating network).

The primary side can be fed by different heating sources:

- A local boiler
- A district-heating system
- A community-heating system
- A system using renewable energy: solar, heat pumps etc.

The system operates with a 2-, 3- or 4-port *control valve* on the primary side (A). The valve is connected to an *actuator (B)* and the *control box (C).*

The *temperature sensor S1(E),* located at the secondary outlet, checks the temperature and adjusts the control valve accordingly, via the control box, in order to supply domestic hot water at the right temperature.

The *primary pump (D)* maintains a constant flow rate whereas the temperature entering the heat exchanger is continuously adapted to the demand detected at sensor S1. This eliminates thermal shock in the plate heat exchanger and reduces the build-up of limescale on the tap-water side.

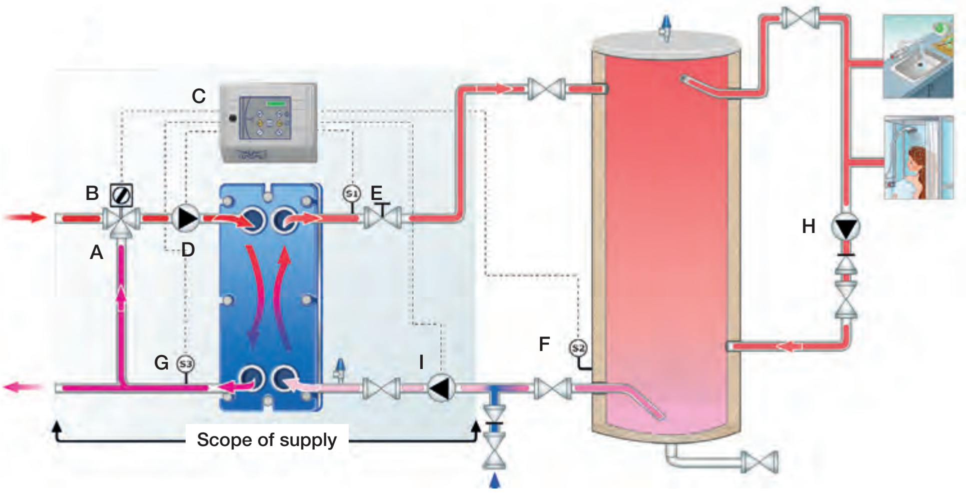
Sensor S2 (F) indicates if circulating water has reached 70°C minimum for thermal treatment.
Sensor S3 (G) indicates a decrease of the plate heat-exchanger efficiency due to scaling.

The *circulation pump (H)* maintains a minimum flow rate through the entire network.

The *charging pump (I)* on the secondary side is used to store hot water in the storage tank.
When there is no or limited tapping of domestic hot water, the storage vessel is gradually heated up to the set point temperature. When tapping occurs, hot water is being drawn from the top of the storage tank.

The only feature difference between an instantaneous and a semi-instantaneous tap water system is the charging pump (I) on the secondary side.

Working principle semi-instantaneous, 3-port valve



Advantages of a semi-instantaneous tap-water system:

- It is simple, reliable and easy to install (plug & play)
- Even where hot water demand is not constant, it comfortably keeps up with sudden peak consumption thanks to the buffer tank
- No need for a large boiler capacity on site
- No need for a very large heat exchanger
- Any combination of power output (50-1220kW) and tank size (150 to 4000L) is possible, thus providing large quantities of hot water
- To avoid legionella proliferation the semi-instantaneous systems are equipped with a thermal treatment function which raises the temperature to 70°C in order to kill the bacteria
- Limited lime scaling thanks to the mixing valve on the primary side and turbulent flow through the plate heat exchanger

Applications

Application examples for one single semi-instantaneous tap water system combined with one 300L storage tank:

Nominal capacity of the system (kW)*	number of hotel rooms**	number of apartments***
70	25	20
150	50	45
440	130	200
1000	350	620

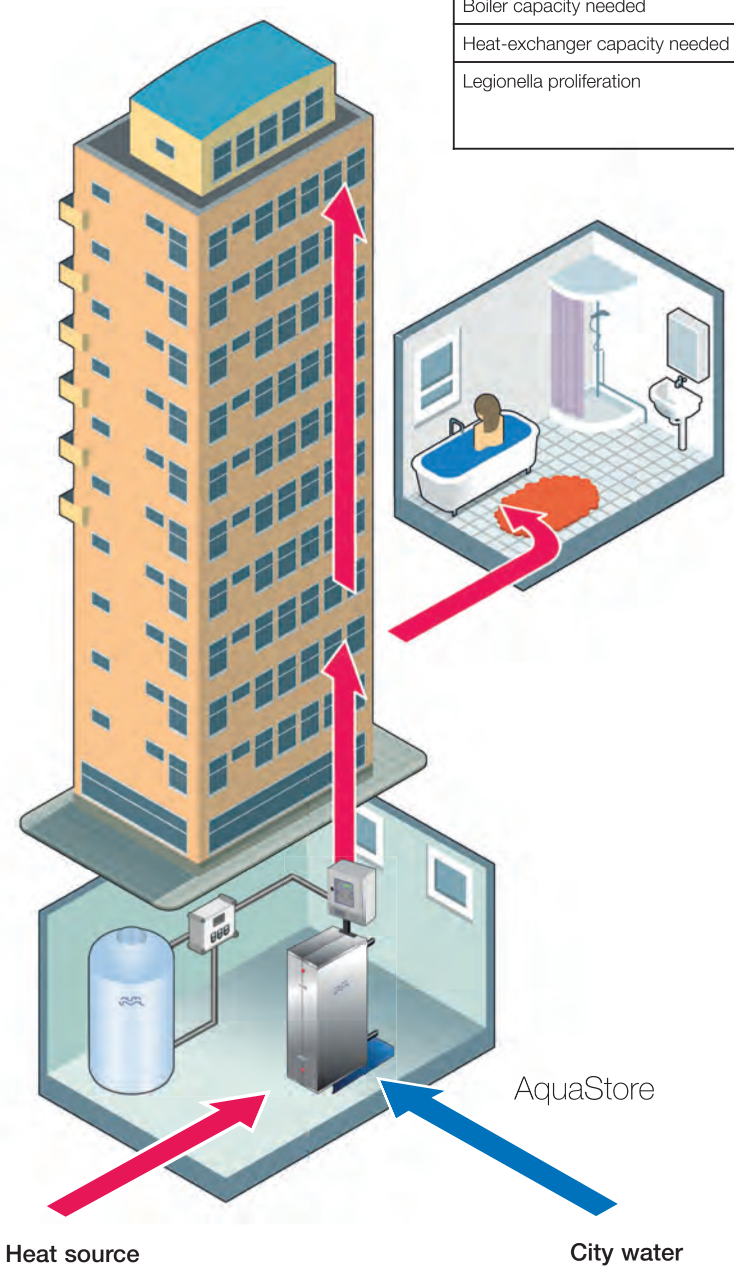
* Product range offers between 50 and 1220kW
** based on **/*** hotels
*** based on standard apartments of 3/4 rooms

Application examples for one single semi-instantaneous tap water system combined with one 2000L storage tank:

Nominal capacity of the system (kW)*	number of hotel rooms**	number of apartments***
150	100	120
440	320	430
1000	580	950

Comparison Instantaneous versus Semi-instantaneous

	Instantaneous	Semi-instantaneous
Features	No charging pump	One or two charging pumps
Tank needed	No	Yes
Boiler capacity needed	High	Mid to Low
Heat-exchanger capacity needed	High	Mid to Low
Legionella proliferation	No stagnant water, reduced risk, possibility for thermal treatment function	Stagnant water in tank but possibility for thermal treatment function

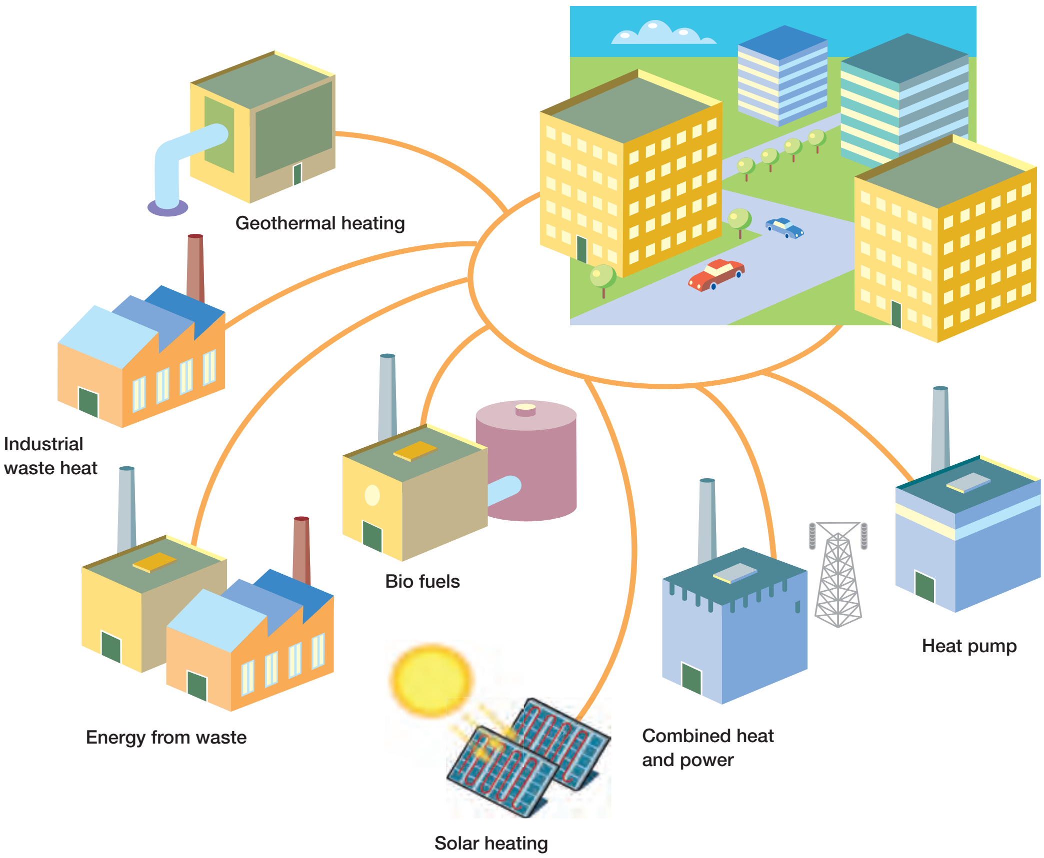


Renewable energies

The fact that reserves of fossil fuels (e.g. coal, petroleum and natural gas) are depleted much faster than they develop, and that CO_2 emissions need to be reduced, poses a giant challenge within multiple fields of technological evolution. Renewable energies represent a “technology of the future”, and Alfa Laval has developed solutions for heating systems based on alternative energies as heating sources.

A major characteristic of a modern district- and community-heating system is flexibility – also when it comes to fuels. Switching from one fuel to another can be done without adjustment or change of equipment in the houses or apartments of the subscribers. The preparedness for future changes of energy source is built into the system.

A district- or community-heating network can be integrated with local recycling energy sources, such as industrial waste, garbage and biomass. There is also a possibility to use geothermal or solar energy as an energy source.



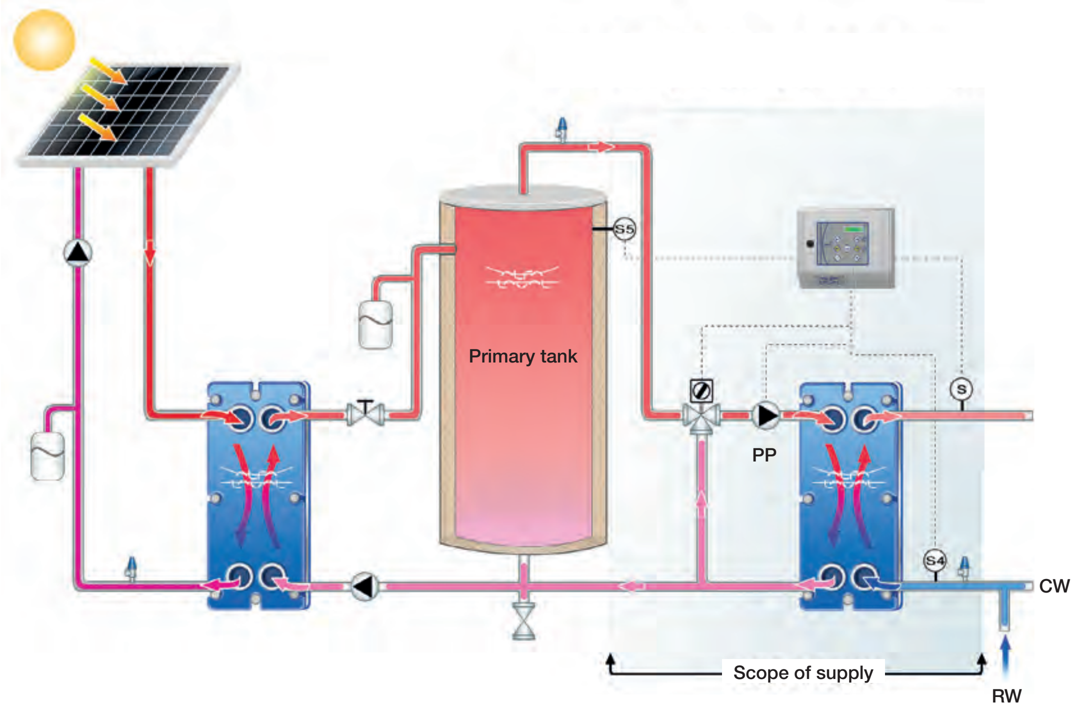
Solar heating

Transferring heat from solar collector panels is an ideal way of using the sun's energy. The sun's heat is absorbed on a flat surface, and then transferred to a fluid. The hot fluid can be used for heating domestic tap water and for radiator heating.

Solar heating is a renewable energy that works well as an alternative or supplement to other energy sources in a district-heating plant. During peak loads, or during seasons when the number of sunshine hours are not sufficient, other energy sources can be used as a complement.

It is advisable to separate the primary and secondary circuits with a plate heat exchanger and a heat exchanger system. For heating of domestic tap water, a storage tank can be used to cover the peak load demand. Alfa Laval offers suitable products for solar heating of both domestic tap water and radiators.

Working principle SolarFlow



Working principle
On the primary side, SolarFlow is connected to a primary tank that is heated by renewable energy.

A temperature sensor (S4) located at the secondary inlet checks the temperature of the water entering into SolarFlow.

The water can come from the water main (CW) or from the circulation loop (RC). This temperature is compared to the temperature checked by a sensor (S5) located on top of the primary tank.

Renewable energy vs. fossil
If water heated by renewable energy is available in the primary tank (S5>S4), then SolarFlow regulation is engaged.

A temperature sensor (S), located at the secondary side outlet, checks the temperature and adjusts the control valve (VA) accordingly in order to always maintain domestic hot water as close as possible to the set-point temperature.

If water heated by renewable energy is not available in the primary tank (S5<S4), SolarFlow goes to stand-by mode. The valve is closed, the pump (PP) is switched off and the energy consumption of SolarFlow equals zero. In that case, the tap water will have to be heated using different source of energy.

Economy mode
To generate further energy savings, SolarFlow can switch to an economy mode that will limit the electricity consumption of the pump when the network temperature is stable.

SolarFlow offers electronic control equipment that provides several user-definable functions to customize the system and ensure precise temperature control in order to reduce the build-up of limescale.

Geothermal heating

Geothermic is the science that studies the earth's heat. The earth´s heat content (enthalpy) is 10^{31} Joule and the energy the earth sends out in the atmosphere is double that what we consume. Today we only use a small fraction (0,07%) of the available geothermal energy available. A great untapped resource is at our disposal.

By using heat from geothermal water we have a cheap and environmentally friendly method for heat generation.

The ground is an inexhaustible source of heat and the seasonal variations in the soil temperature is reduced as depth increases.

At depths of 15 to 18 meters, the ground's temperature will remain absolutely constant year round at 9-12 °C. As we go deeper, the temperature will not only remain constant, but will increase by an average of 3 °C every 100 meters.

Geothermal heat is used in two major areas of application:

- Direct use of geothermal energy, involving geological anomalies or volcanic activity that provide a source of steam (which can be used to produce electricity) or hot water for heating buildings and tap water
- Low enthalpy geothermal energy, where the subsoil or ground water is used as a thermal reservoir in combination with heat pumps.

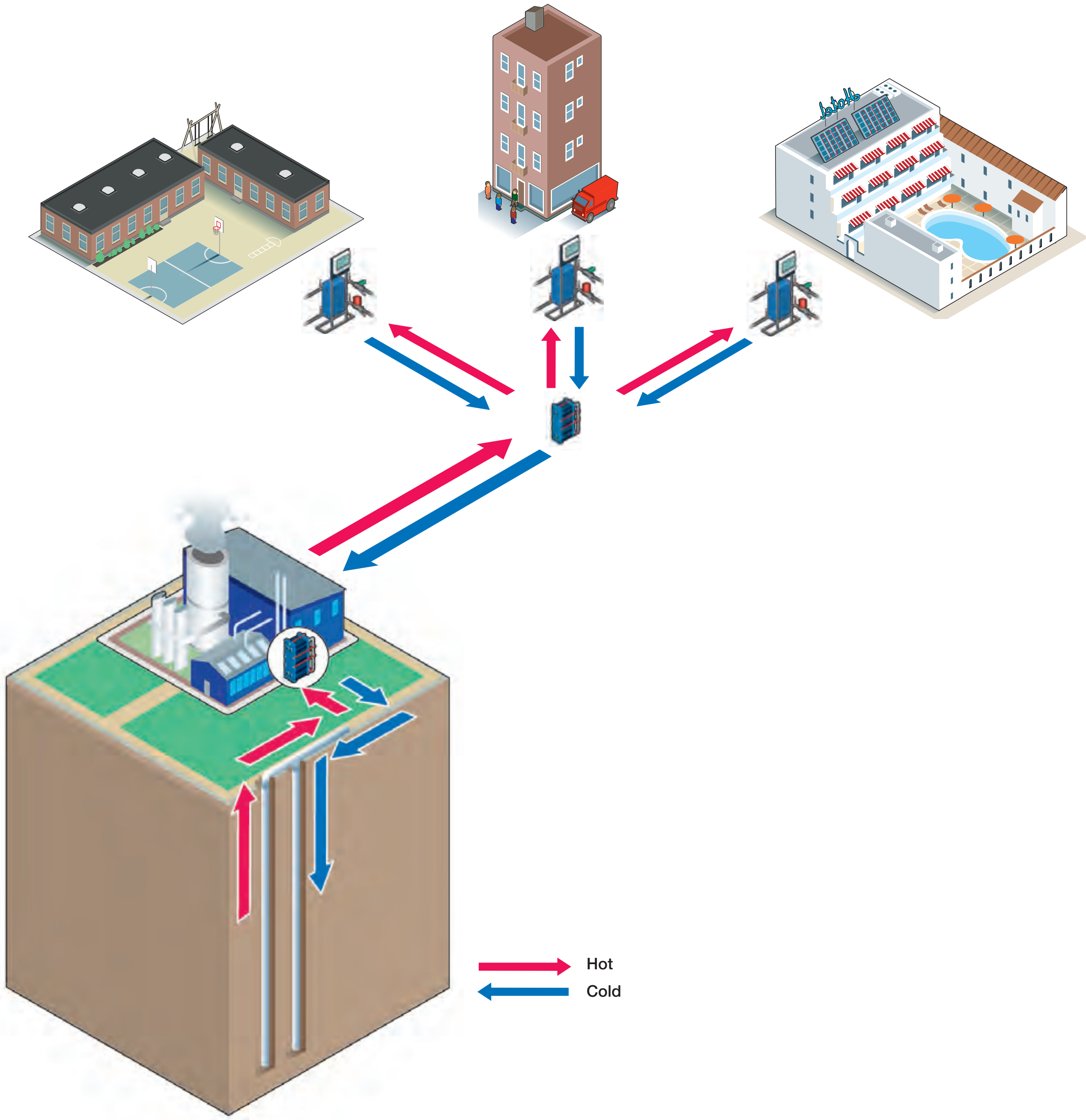
Especially in the low enthalpy geothermal energy, growth has been spurred by the availability of increasingly efficient heat pumps. With current technologies, using heat pumps is very safe and requires no additional energy from other sources (e.g. natural gas boilers) to cover consumption peaks or situations where performance is reduced.

Since the geothermal water often contains chemicals and solid particles aggressive to the plate it is important to select suitable plate materials for the main heat exchanger. Titanium or SMO are often used because of high content of calcium. Gasketed plate heat exchangers are often the preferred solution due to good serviceability, maximum heat transfer, high capacities and possibilities to increase or decrease the capacity.

The supply of geothermal heat is the same as district and community heating; it is only the heat source that differs.

Typical end users of geothermal heat are single and multi-family houses often using a heat exchanger system.

Other common applications using geothermal heat are fish farms, green houses, thermal spas and industrial applications.



Other heating applications

Steam heating

Steam has been used as a carrier of heat since the Industrial Revolution and continues to be a modern, flexible and versatile tool wherever heating is needed. It is produced by the evaporation of water; a relatively inexpensive and plentiful commodity that is environmentally friendly. Its temperature can be adjusted very accurately by the control of its pressure and it carries a large amount of energy in a small mass.

Steam is commonly used in HVAC applications as the primary heat source, heating water in the secondary circuit:

- Heat generation: Boiler plants, Combined heat and power plants
- Heat usage: Tap water heating, space heating and maintaining temperature in tanks/pools.

Some industries use a lot of steam in their processes. Surplus steam may be used for space heating and tap water heating locally, or sold for use in district- and community-heating systems.

Alfa Laval can offer different types of equipment for steam duties:

Gasketed plate heat exchangers
It is usually the temperature performance of the gaskets that sets the limits of its use. Their elastic mechanical design makes them resistant to pressure pulsation and thermal fatigue. Alfa Laval has developed a range of steam plate heat exchangers, the TS-M Series, for heating water with industrial steam

All-welded plate heat exchangers
In the all-welded heat exchanger, the gaskets have been replaced by laser-welds. This raises the performance limits considerably and makes it a very good choice for large capacities, high pressures and high temperatures.

Tubular heat exchanger
The tubular heat exchanger, Cetecoil, is well suited in steam systems due to flexibility in connections and low pressure drops on the shell side, as well as high temperature performance.

Swimming-pool heating

Using plate heat exchangers to heat swimming pools has become common practice because of its unquestioned thermodynamic advantages and low cost compared to conventional shell-and-tube heat exchangers.

At heat transfer level, the problem is maintaining temperatures steady. Accordingly, it is important that the heat exchanger be dimensioned as suggested in our selection tables.

It's important to remember that additions of chlorine should take place after the water has passed the heat exchanger to avoid a high concentration of chlorine flowing through the exchanger from coming into contact with the plates and causing cracking.

Alfa Laval offers a compact system for reheating and maintaining the temperature of water in swimming pools of any dimension – the AquaPool.

The AquaPool can be connected to any primary heat source, such as a local boiler, a solar installation, a heat pump etc.

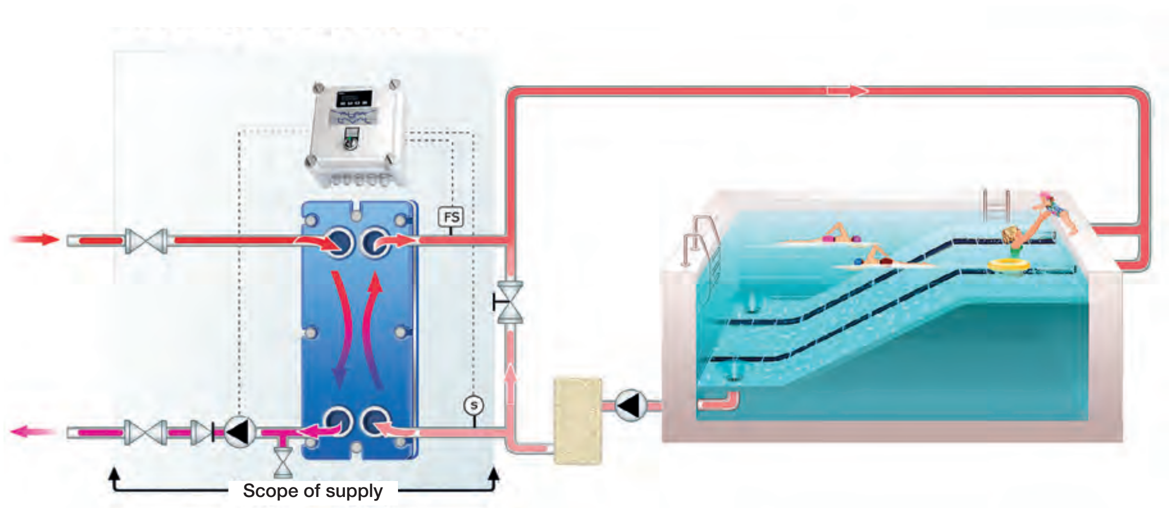
The AquaPool system consists of a gasketed plate heat exchanger, with plates in either stainless steel or titanium, an electronic control panel, a primary pump and various valves.

The AquaPool is extremely simple to use, robust, compact and highly reliable.

3 key parameters for the right AquaPool selection:

1. Volume of the swimming pool
2. Temperature rises necessary
3. Time required to heat up the pool

Working principle AquaPool



AquaPool selection tables

Model	90°C					80°C					70°C					55 °C				
	kW	Primary		Swim. pool		kW	Primary		Swim. pool		kW	Primary		Swim. pool		kW	Primary		Swim. pool	
		m³/h	kPa	m³/h	kPa		m³/h	kPa	m³/h	kPa		m³/h	kPa	m³/h	kPa		m³/h	kPa	m³/h	kPa
AquaPool-7	30	0,5	44	1,3	41	30	0,9	24	1,3	41	30	1,2	6	1,3	41	17	1,2	6	0,7	18
AquaPool-11	52	0,9	41	2,2	43	51	1,4	25	2,2	41	50	1,8	5	2,2	41	30	1,8	5	1,3	19
AquaPool-17	82	1,3	36	3,5	43	79	1,9	19	3,4	40	76	2,5	6	3,3	38	46	2,5	6	2	18
AquaPool-23	111	1,7	30	4,8	43	104	2,3	18	4,5	38	96	2,9	6	4,1	33	58	2,9	6	2,5	16
AquaPool-29	140	2,2	26	6,0	43	125	2,7	18	5,4	34	111	3,2	6	4,8	28	69	3,2	6	3	14
AquaPool-35	166	2,6	22	7,1	42	144	3,0	15	6,2	32	123	3,5	5	5,3	27	78	3,5	5	3,4	12
AquaPool-41	194	3,1	16	8,3	42	164	3,4	11	7,1	30	134	3,6	6	5,8	21	84	3,6	6	3,6	11
AquaPool-49	222	3,5	11	9,5	41	184	3,6	11	7,9	28	146	3,8	5	6,3	19	96	3,8	5	4,1	9
AquaPool-55	246	3,8	5	10,6	41	199	3,8	5	8,6	27	151	3,8	5	6,5	16					

Note: Secondary conditions: 27/47°C (if primary at 70°C, 80°C or 90°C)
20/40°C (if primary at 55°C)

Waste heat recovery

For many energy companies and municipalities there are untapped opportunities for using waste heat or surplus heat. Such heat can be found in many forms, whether it is steam going out into the air or hot water going out into the ocean.

A lot of heat is lost in power plants, oil refineries and industrial processes. Many of these losses could be retrieved and distributed by district-heating systems to heat buildings. The same fuel achieves twice the work, thereby doubling fuel efficiency.

District-heating systems provide the necessary heat load for high-efficiency combined heat and power plants, while at the same time enabling the use of renewable energy. It demonstrates fantastic opportunities for other communities from a financial as well as an environmental point of view.

A residential building in Belgium, heated by surplus energy from a waste incineration facility.

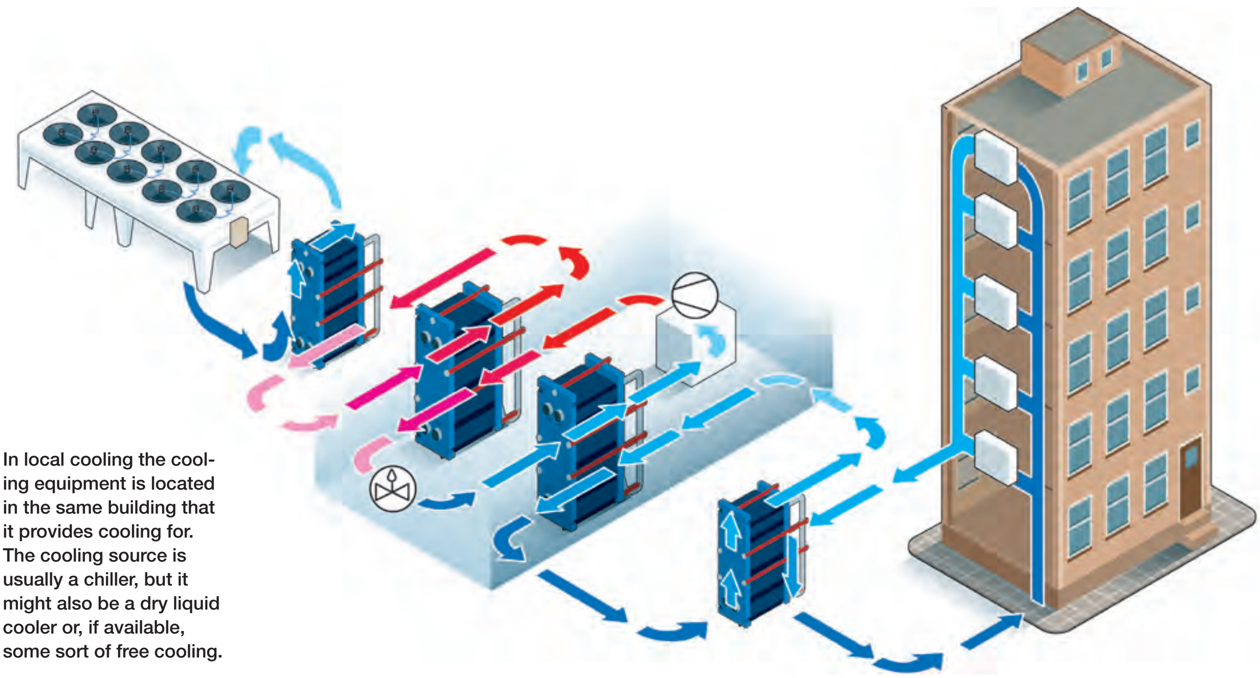
Local and district cooling

Local cooling

Local cooling is the most common cooling system globally. The local cooling system provides cooling for a single building, for example a hotel, conference center, sports center, hospital, or an office block. The chiller plant and the storage facility are located inside each building, the cooling source usually being a chiller. Depending on availability some sort of free cooling might be used, alone or in combination with the chiller. The cold from the source water is transferred to the building's internal cooling system through a plate heat exchanger.

OLA (Optimization Liquid Air), Alfa Laval's new special software, will let you calculate an optimized combination of two heat exchangers, for example a dry liquid cooler and a plate heat exchanger. This optimized package will make your system work at just the right capacity. A fine-tuned system will run smoother and minimize maintenance. It will also enable you to choose the most economical cooling source solution for each season, for example free cooling in the wintertime.

Another application is installing plate heat exchangers at different stories in tall buildings to solve the cooling system's pressure problems. These heat exchangers act as pressure interceptors, transferring the cold between the separate zones, and also protecting the air handling units and other equipment from excessive pressure.



In local cooling the cooling equipment is located in the same building that it provides cooling for. The cooling source is usually a chiller, but it might also be a dry liquid cooler or, if available, some sort of free cooling.

District cooling

The concept of district cooling is becoming more and more widespread all over the world. The idea, as for district heating, is to use one central source instead of local systems for each building. This will create both economic and environmental benefits.

The district-cooling system offers operating flexibility, since each building can use as much or as little cooling as needed, without worrying about chiller size or capacity. The installation will be very comfortable and convenient for the customer, with the possibility of using the same supplier for electricity, heating and cooling. The installation of a district cooling system is greatly facilitated if combined with an existing district-heating system, or one built at the same time, since the costs can be shared between the two systems.

One of the benefits for the customer is the saving of space at the location as there is no chiller. The investment cost will also be less than when having to invest in a chiller. There will be no need to re-place chiller, cooling towers or pumps due to wear or CFC/HCFC phase-out, as the CFC/HCFC handling problem will be taken care of. With centrally produced comfort cooling there will be no noise or vibrations. Maintenance and running costs will be lower, and a better level of equipment redundancy and round-the-clock expert management, which individual buildings cannot match, will be achieved.

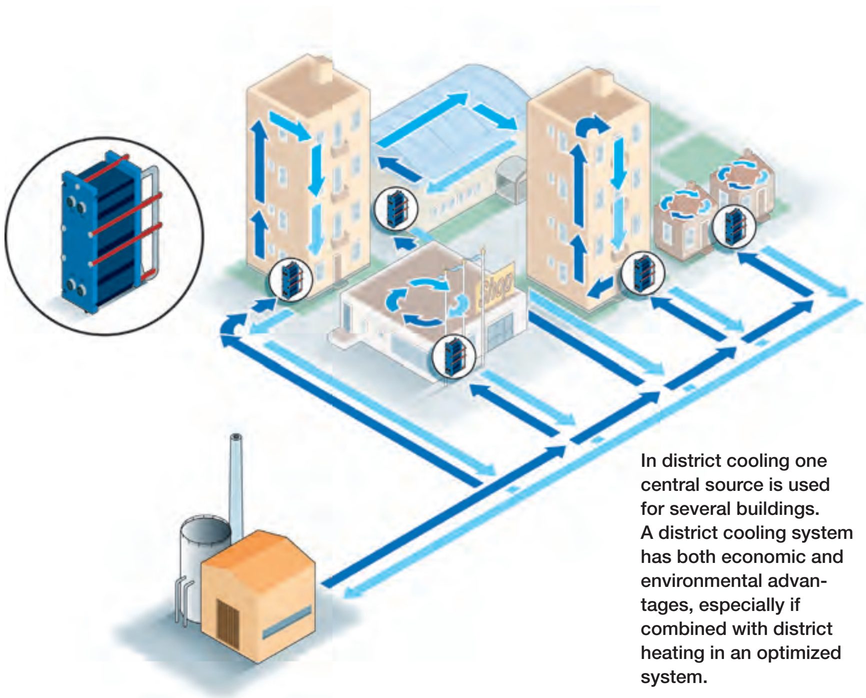
Direct and indirect cooling systems

In cooling systems the distribution can be either direct or indirect. If direct, the cooling water goes directly into the internal piping system of a building. In an indirect system, a heat exchanger separates the internal from the external system. Today this is the most common system, and the indirect system provides several benefits.

Leakage will be easier to detect, and if it does occur, will create minimum damage. There is no risk of one system contaminating another. In a district cooling system the responsibility line will be clearer, and the regulation and sales are easier to monitor with clear borders. With separate circuits the customers may experience fewer fluctuations and disturbances, should the central system expand or need maintenance.

In an indirect system the heat exchanger will also decrease the static pressure, thus working as a pressure interceptor. Noise from valves can be eliminated when the pressure in the pipes is decreased. In the indirect system solution the dimensions of the consumer's in-home system will be smaller, and thus cheaper.

Installing Alfa Laval plate heat exchangers in an indirect cooling system ensures minimal energy loss throughout the system. Alfa Laval's "close approach" enables temperature exchange approaches of no more than 0.5°C/<0.9°F.



In district cooling one central source is used for several buildings. A district cooling system has both economic and environmental advantages, especially if combined with district heating in an optimized system.

Pressure interceptor

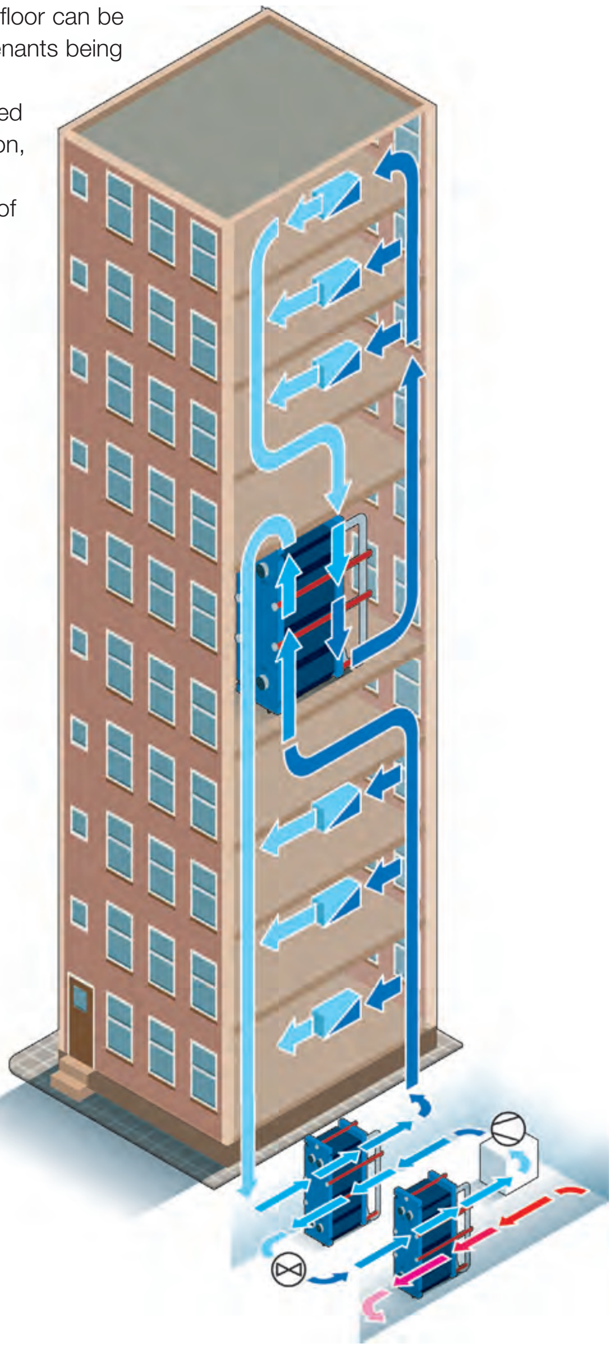
In skyscrapers, the static head creates a pressure that may exceed what the chiller condenser or room air conditioners can handle. A plate heat exchanger will then split the circuit in order to keep the pressure at an acceptable level. It is possible to put plate heat exchangers on different levels throughout the building, thus limiting the pressure and the corresponding requirements on, for example, pumps, piping and valves.

Depending on the size of a skyscraper there might be many plate heat exchangers acting as pressure interceptors. It is very important that cold is not wasted in the cooling system. Alfa Laval's "close approach" when it comes to energy efficiency means that the heat exchangers will transfer practically all cold to the top of the building with minimum loss.

Advantages of plate heat exchangers as pressure interceptors

The entire chilled water system will be designed for low pressure, for example 10 bar (150 psig). This means cost savings in the chiller as well as in the selection of air handling units and other system equipment. Instead of having many chillers in a building, plate heat exchangers can be placed on several floors as pressure interceptors. This has a positive effect on building design:

- They are very compact and only require normal room height, i.e <3 m/10 ft, and only a third of the floor space of a chiller with identical capacity. This makes them easy to install, even in buildings with limited space.
- They do not cause any vibrations or noise. This will save money for the owner as the rest of the floor can be rented out without the tenants being disturbed.
- They do not normally need any maintenance attention, apart from a planned maintenance consisting of a gasket replacement approximately every 10-12 years.



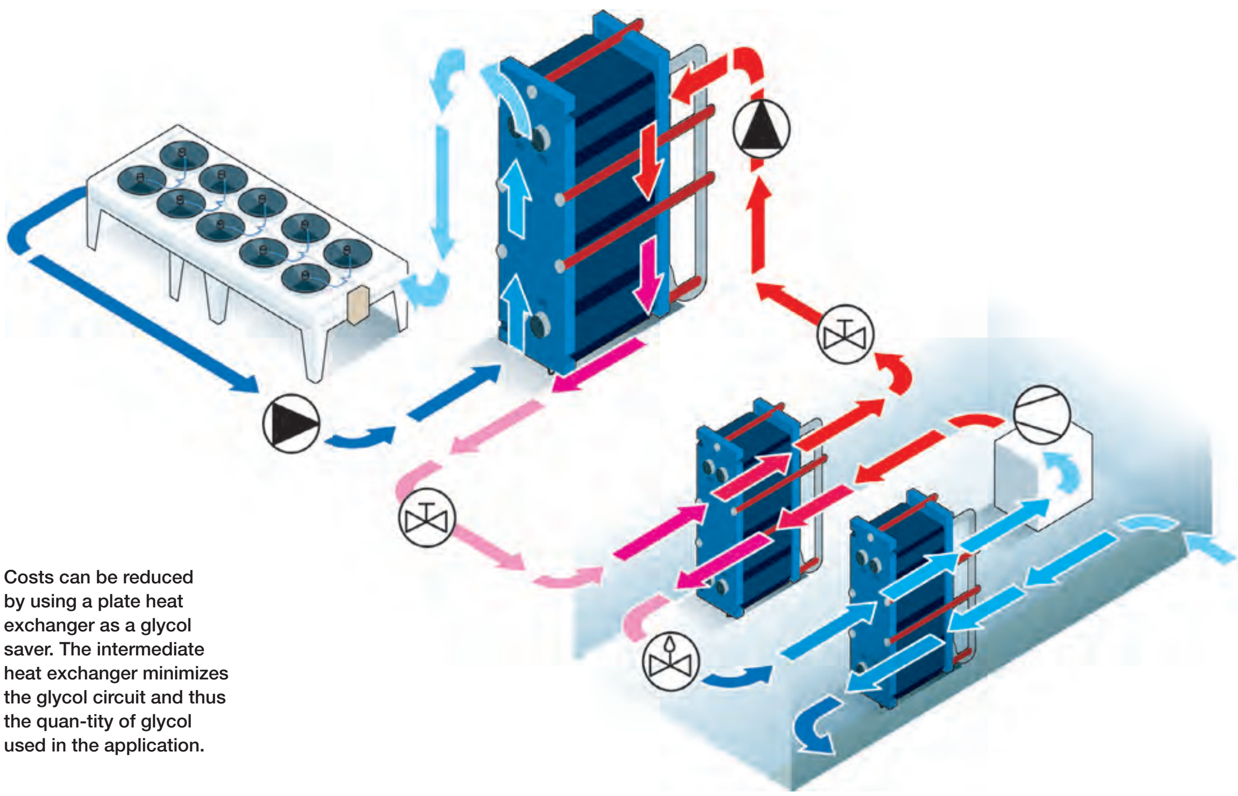
PHEs used as pressure interceptors in tall buildings protect other equipment like chillers and air condition units from excessive pressure. It is a compact, low-noise, no-worries solution.

Glycol saving

Glycol is used in systems with outside piping when there is a risk of the ambient temperature dropping below 0°C/32°F. Another cooling application for plate heat exchangers is to use them as glycol savers.

The sketch above shows an example where a dry liquid cooler is used instead of a cooling tower.
In order to avoid the risk of bacteria in the cooling tower water, this is increasingly required by law in many countries.

In cases where the dry liquid cooled condenser is situated far away from the chiller and glycol is used, the amount of glycol that has to be added to the system is high and so is the cost. An intermediate plate heat exchanger will minimize the glycol circuit, thus acting as a glycol saver and cutting expenses.



Costs can be reduced by using a plate heat exchanger as a glycol saver. The intermediate heat exchanger minimizes the glycol circuit and thus the quan-tity of glycol used in the application.

Cooling sources

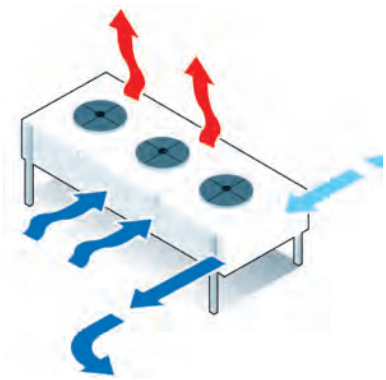
Cooling tower

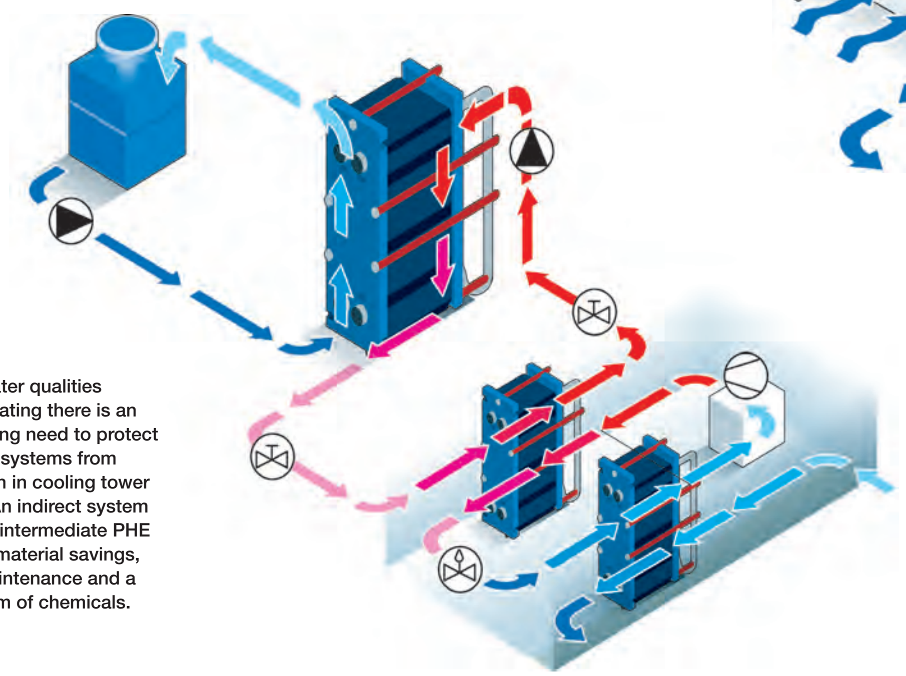
Today water qualities are deteriorating because of different kinds of pollution. This increases the risk of chiller shut-downs due to operation problems of the condenser. The condenser is subject to attacks from either chlorides that will cause corrosion or impurities or biological activities in the water that will cause fouling. As the expectations of trouble-free cooling operations have increased, it has become more and more interesting to look at alternative solutions where these problems can be avoided.

One solution is an indirect system using a heat exchanger in combination with an open cooling tower. The advantages of this are:

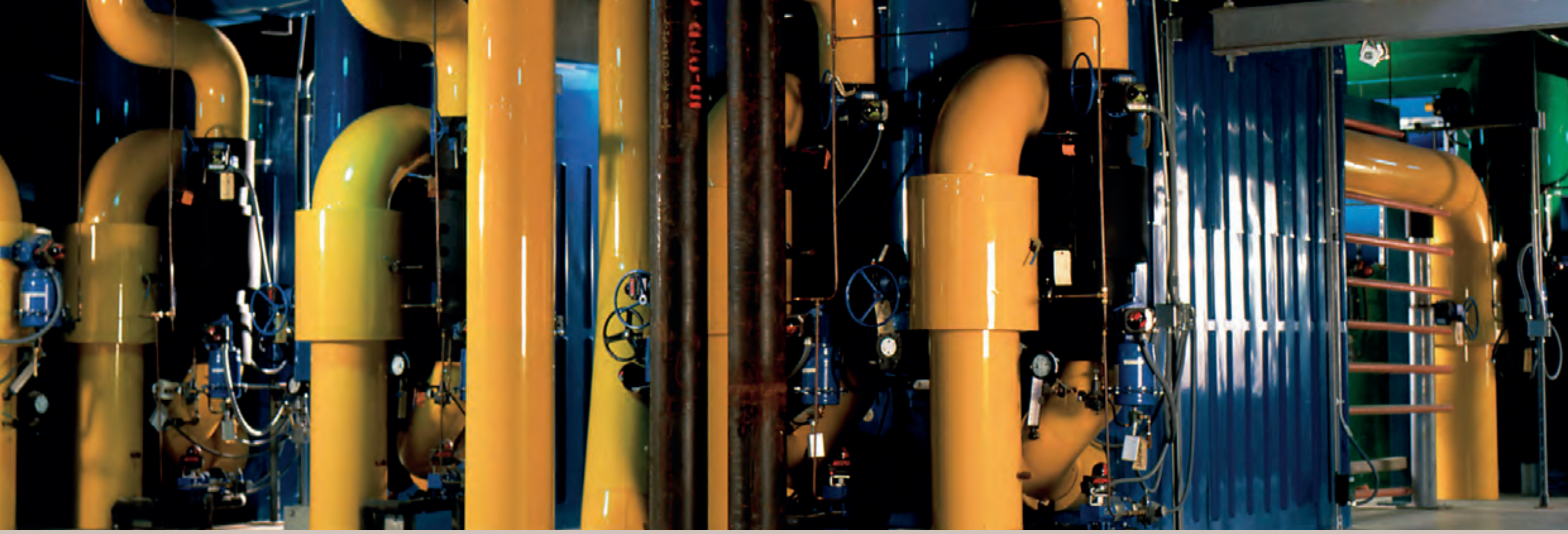
- Low system cost: Cost calculations show that the payback period of the heat exchanger is very short.
- Material savings in the condenser: Less expensive materials can be used.
- With an intermediate heat exchanger, chillers as well as cooling towers can be run at an optimal temperature.
- An intermediate heat exchanger means that the use of water treatment chemicals, for example chromates used for the cooling tower water, can be minimized.
- Less maintenance of the condenser.

**For smaller or medium-sized cooling applications a dry liquid cooler is an energy-saving option that might be a source of free cooling when the temperature drops.
Alfa Laval offers a wide range of high-quality dry liquid coolers.**





With water qualities deteriorating there is an increasing need to protect cooling systems from pollution in cooling tower water. An indirect system with an intermediate PHE means material savings, less maintenance and a minimum of chemicals.



Free cooling

Free cooling combines an environment-friendly alternative for producing cold with economical benefits. Cooling applications relying on free cooling have been installed with good results in many countries around the world.

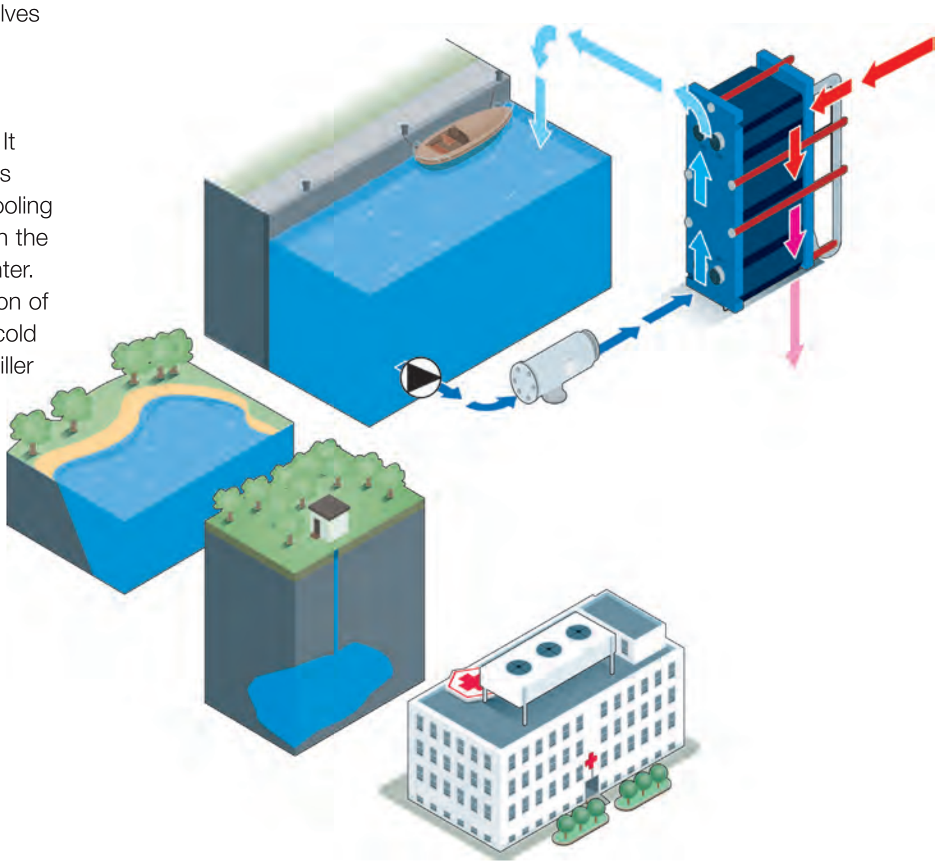
When utilizing free cooling as a cooling source in an application, the use of ecologically harmful refrigerants can be reduced. Free cooling is also a way to cut down on electricity costs – in some cases the reduction might exceed 75 percent, resulting in great savings. Reduction in electricity consumption also has positive environmental effects, as electricity production often involves air pollution.

Free cooling is used mainly for air conditioning and process cooling. It can cover the cooling requirements during the period when the free cooling source has lower temperature than the cold water, for example during winter. In spring and autumn a combination of free cooling and chiller-produced cold is used. In the summertime the chiller supplies the total cooling requirement. Suitable free cooling sources are water from for example rivers, lakes, (deep) oceans or ground water, ice and snow storage, or air.

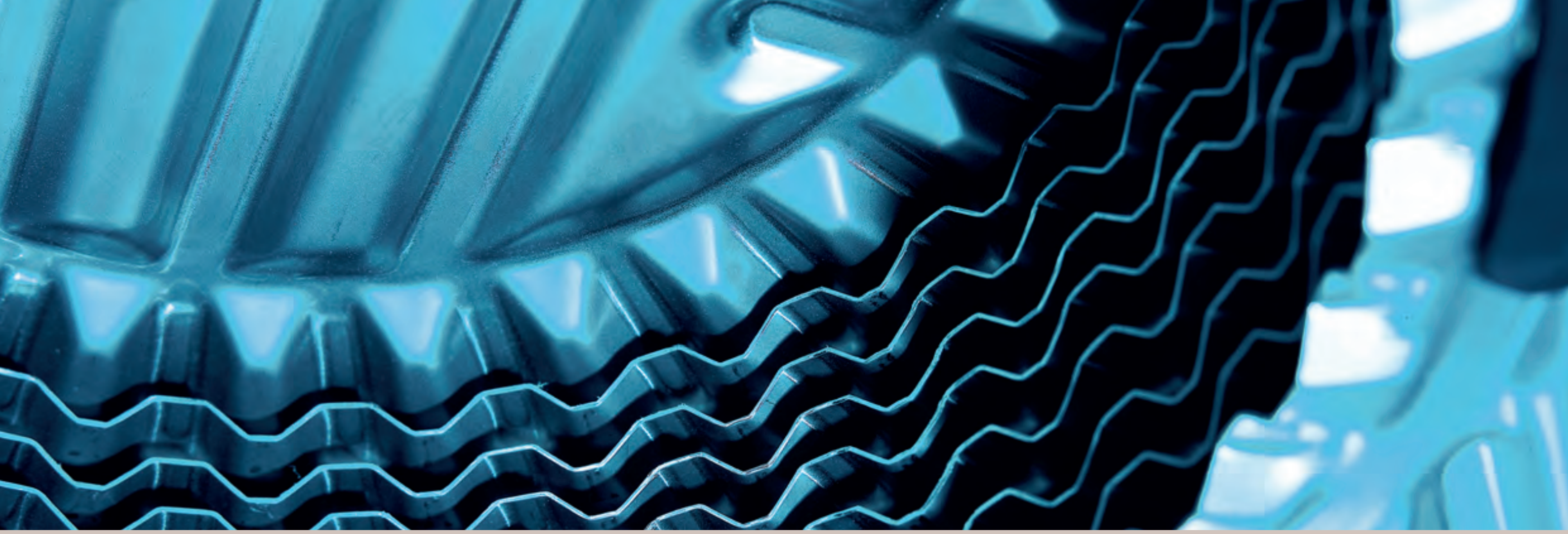
Products for free cooling

Alfa Laval's continuous research and development strategy means we are able to supply products for any cooling application, regardless of cooling media and cooling source. This makes it possible to utilize aggressive cooling media such as sea-water, brackish water, or water from rivers and wells.

By installing a plate heat exchanger, the chilled water loop can be totally isolated from sensitive equipment like air conditioners, thereby eliminating corrosion, scaling and constant maintenance. In seawater and fresh-water applications, installation of a filter for protecting the heat exchanger is recommended.
A cooling system using free cooling in combination with a plate heat exchanger will also require less space, creating an extremely compact solution.
But Alfa Laval is more than outstanding products and optimized systems. Based on our vast experience we are always able to provide quality solutions.



Free cooling has many economical and environmental advantages. Alfa Laval's knowledge about for example corrosive media has resulted in products that can handle aggressive cooling media like seawater and brackish water.

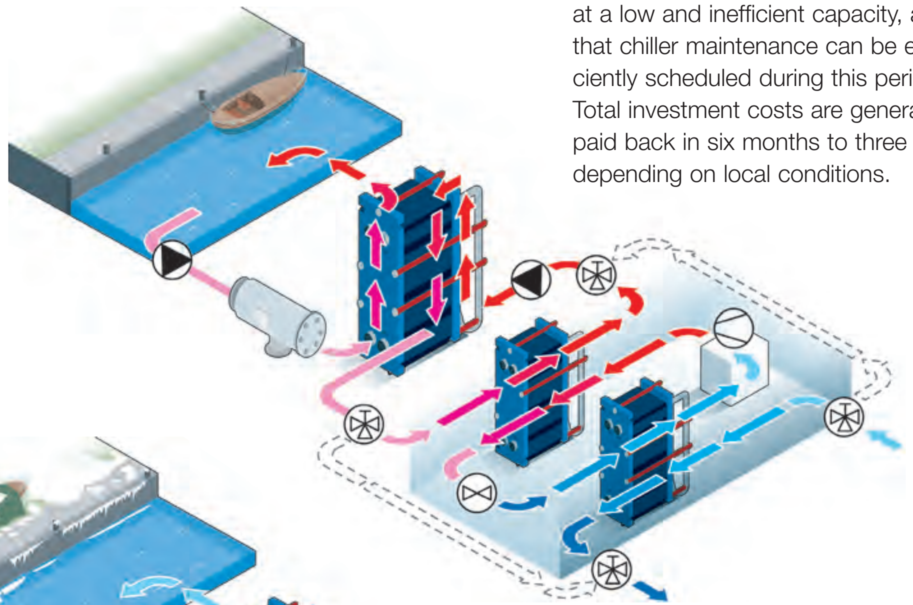


Chiller bypass

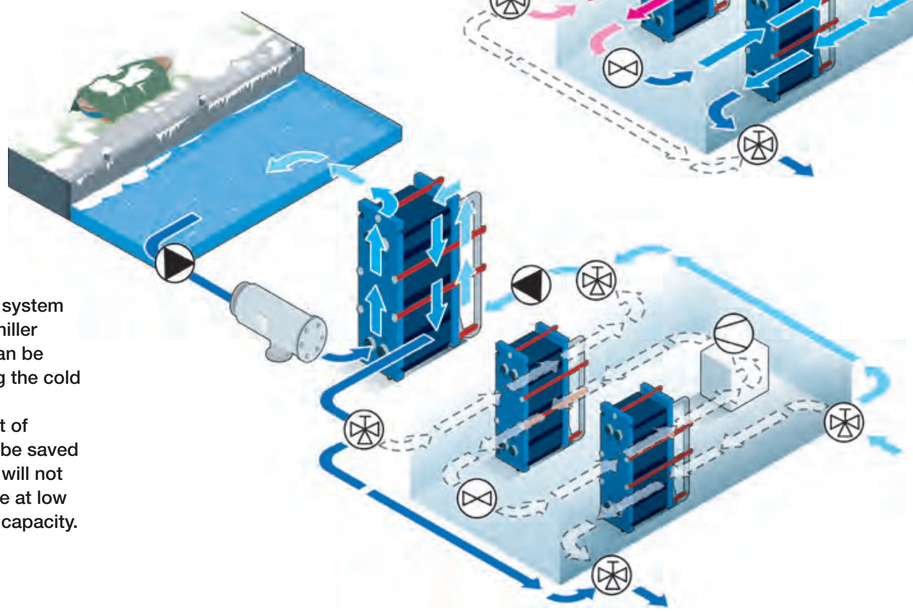
Traditionally the chiller in an air conditioning system runs continuously during the entire cooling season, even when full capacity is not required. Previously, the only alternative to constant chiller operation has been a chiller bypass system using a strainer. This strainer removes impurities, but at the same time it requires costly maintenance, chlorination and other chemical treatment.

By installing a plate heat exchanger – and sometimes a filter to protect it – in the chiller bypass system, corrosion, scaling and constant maintenance can be virtually eliminated. Another advantage is that this system can use any type of cooling, such as a cooling tower or free cooling with river or well water, even seawater or brackish water, without ruining sensitive equipment like air conditioners.

As soon as the bulb drops below the required condenser temperature (min. 1°C/1.8°F), the heat exchanger makes it possible to reduce the chiller temperature. This means that a large amount of electricity can be saved during the cold season. It also means that the chiller will not have to operate at a low and inefficient capacity, and that chiller maintenance can be efficiently scheduled during this period. Total investment costs are generally paid back in six months to three years, depending on local conditions.



Chiller bypass system (summer). The chilled water is isolated from the other cooling equipment. This minimizes costly maintenance and the system can use aggressive cooling media.



Chiller bypass system (winter). The chiller temperature can be reduced during the cold season. A large amount of electricity can be saved and the chiller will not have to operate at low and inefficient capacity.

Ice accumulator/storage

An ice accumulator/storage is a tank where ice can be accumulated during one period, stored and then thawed and used during another. There are two main reasons for using an ice accumulator/storage:

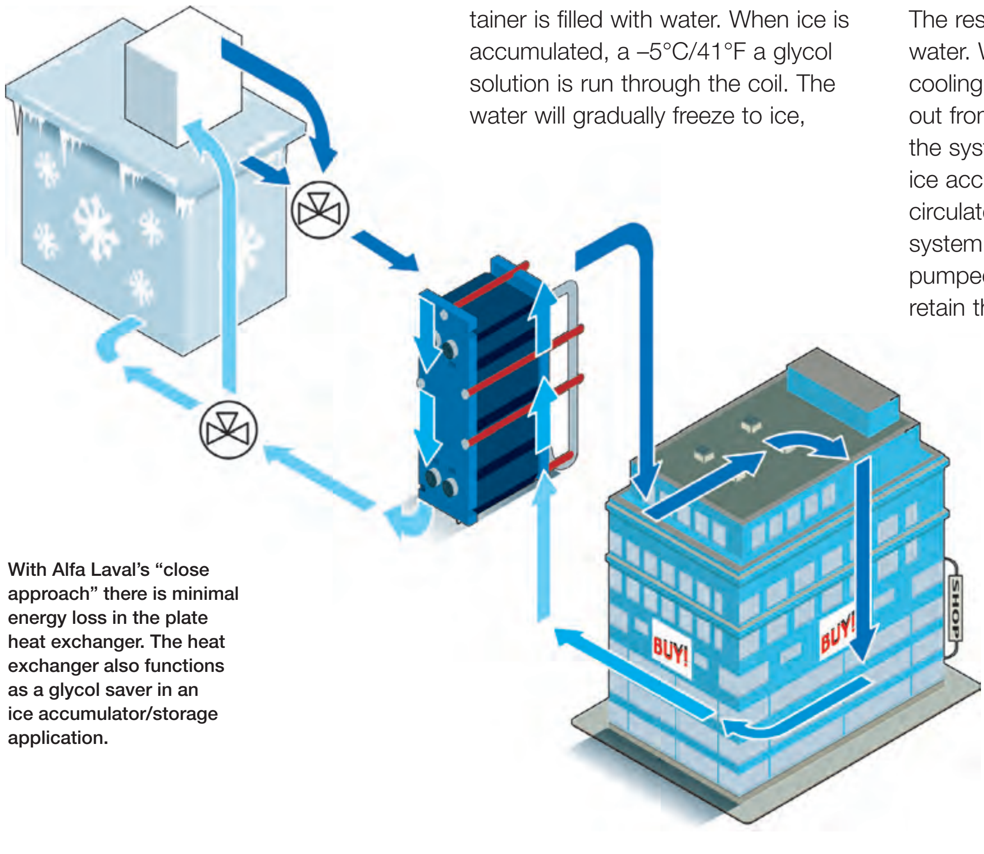
- Where the cooling requirements vary during the day a smaller chiller can be used. As a result the initial cost of cooling equipment can be reduced considerably.
- Cooling energy can be purchased during the night or off-peak hours. In many countries this means that it can be obtained at a lower price.

Since it has been shown that payback periods for ice accumulators will be as low as two years, it is an increasingly worthwhile investment. There are two main applications for ice accumulators: air conditioning and industry. Especially in industry, the cooling demand is often variable, for example in a dairy where the milk will be brought in in the morning.

Types of ice accumulators

There are two main types of ice accumulator systems:

- Systems with internal melting consist of a polyethylene tank containing coils of the same material. The container is filled with water. When ice is accumulated, a –5°C/41°F a glycol solution is run through the coil. The water will gradually freeze to ice, first around the coils and then further and further out in the tank. When the extra cooling capacity is required, the glycol solution in the coils will be led through the system and returned to the tank at a higher temperature. The ice accumulated in the tank will then melt, and the glycol solution will be recooled until all the ice is consumed.
- In systems with external melting the tank is made of steel or concrete. Here too are coils with glycol or a CFC/HCFC coolant, and ice is accumulated to a thickness of 35 mm/1.4 inches around each coil. The rest of the tank will be filled with water. When there is a need for cooling energy, ice water is pumped out from the bottom of the tank to the system. When it returns to the ice accumulator it will be forced to circulate around the ice. In this system, the ice water that is pumped into the system will always retain the same temperature.



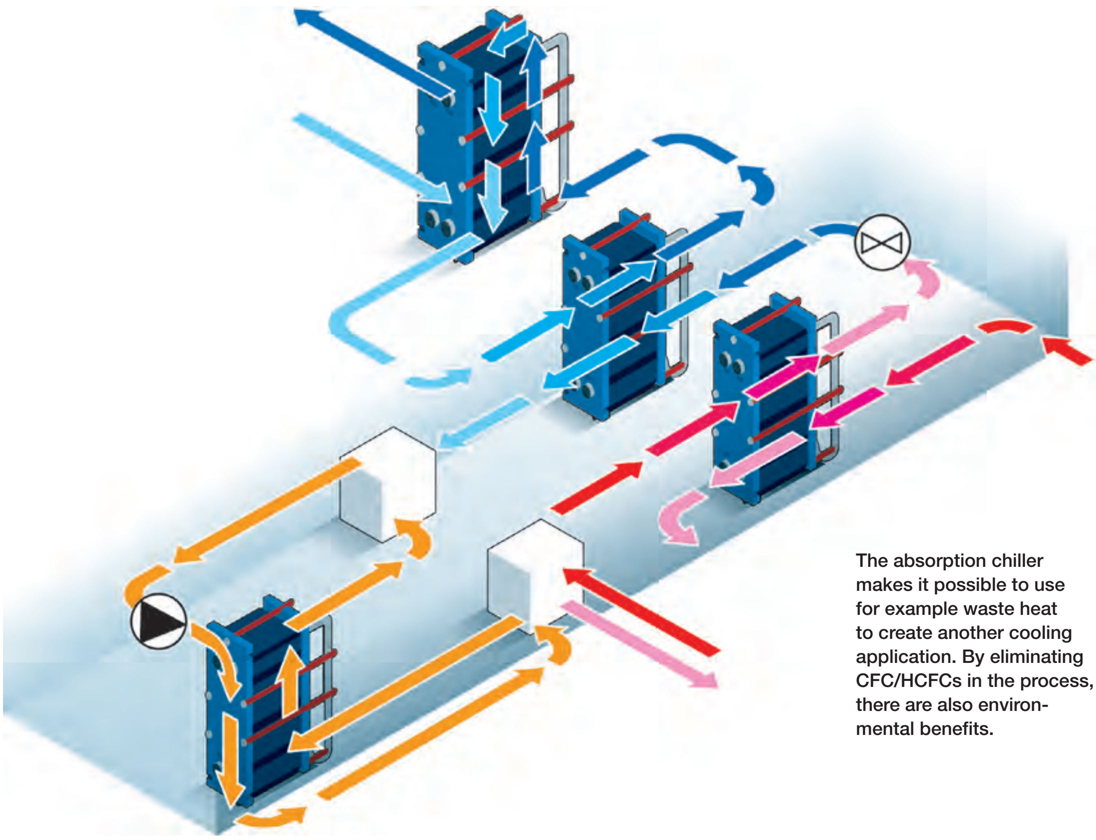
With Alfa Laval's "close approach" there is minimal energy loss in the plate heat exchanger. The heat exchanger also functions as a glycol saver in an ice accumulator/storage application.

Other cooling applications

Absorption chiller

If district heat or waste heat is available, for example from waste disposal, there is another possibility for comfort cooling with an absorption chiller. This is an example of the kind of system optimization that Alfa Laval excels in. We have the knowledge and just the right equipment for providing solutions with both economical and environmental benefits.

In this application the CFC/HCFCs influencing the ozone are replaced with for example water and lithium bromide, both environment-friendly. In the evaporator the refrigerant (water) takes up heat/energy from the connected system, thus cooling the air conditioning circuit in a heat exchanger. The refrigerant enters the absorber as low-pressure vapor, where the liquid solvent (lithium bromide) absorbs it. The pump increases the pressure and the mixture continues to the interchanger where it is preheated in for example a plate heat exchanger. Using the district heat, the refrigerant is boiled off from the solvent in the regenerator. The high-pressure vapor is sent to the condenser, where heat is emitted during the refrigerant's condensation.



The absorption chiller makes it possible to use for example waste heat to create another cooling application. By eliminating CFC/HCFCs in the process, there are also environmental benefits.

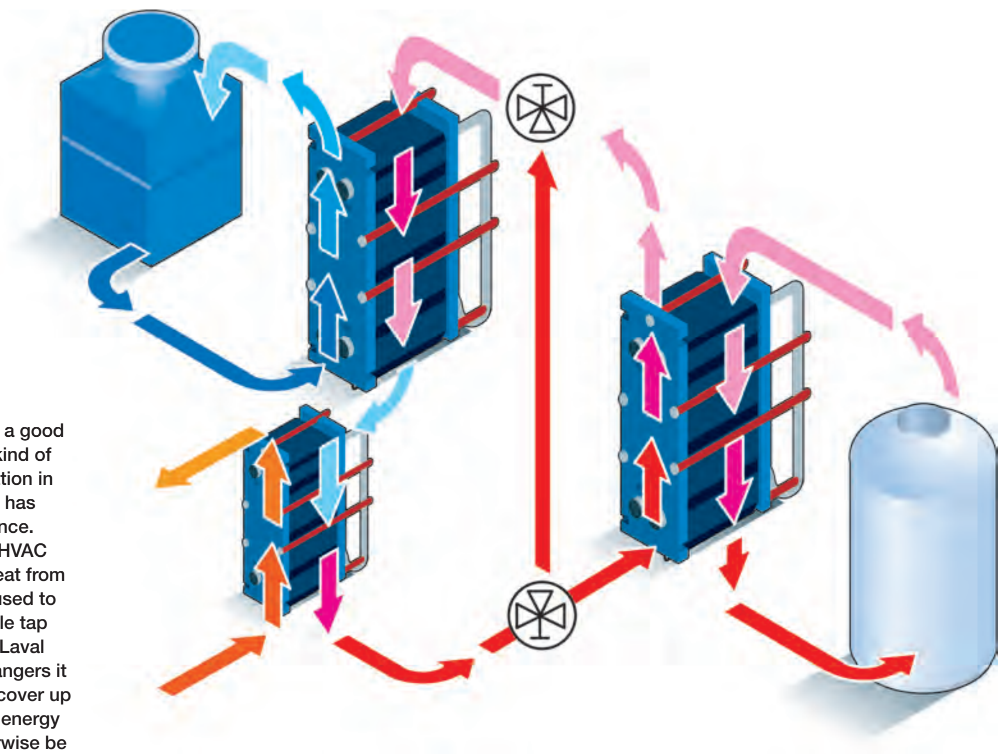
Heat recovery

In an optimized HVAC system, cooling and heating are integrated and waste heat and cold will be re-utilized in the system. Heat recovery is one often-neglected area where plate heat exchangers can be profitably used.

There are large potential savings as soon as there is a demand for hot tap water or other types of heating at the same time as the cooling system is running. Some types of buildings where this may be the case are hospitals and hotels, or different production facilities, for example in the chemical, pharmaceutical and beverage industries.

Alfa Laval has many years' experience from both cooling and heating applications and from customizing this kind of optimized system.

The heat-recovery plate heat exchanger will be installed between the condenser and the cooling tower, recouping part of the energy that would otherwise be let out in the air. While recovering heat for pre-heating tap water, for example, the cooling need decreases on the condenser side. Thus the savings will not only be the energy recovered in the heating system, but also the energy not wasted in the cooling system. Due to the extreme efficiency of the plate heat exchanger it is possible to recover up to 95 percent of the energy that would otherwise be wasted. This is often more than enough to offset the capital and operating costs of the plate heat exchanger. In this case the heat exchanger should be of the double-wall type, with double walls between the condenser circuit and the tap water, to give extra protection against contamination.



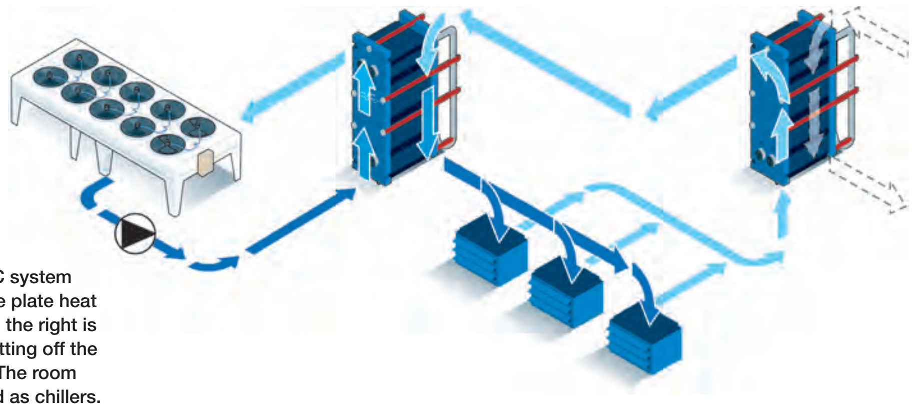
Heat recovery is a good example of the kind of system optimization in which Alfa Laval has years of experience. In an optimized HVAC system waste heat from cooling can be used to warm for example tap water. With Alfa Laval plate heat exchangers it is possible to recover up to 95 percent of energy that would otherwise be wasted.

Reversible air conditioning system

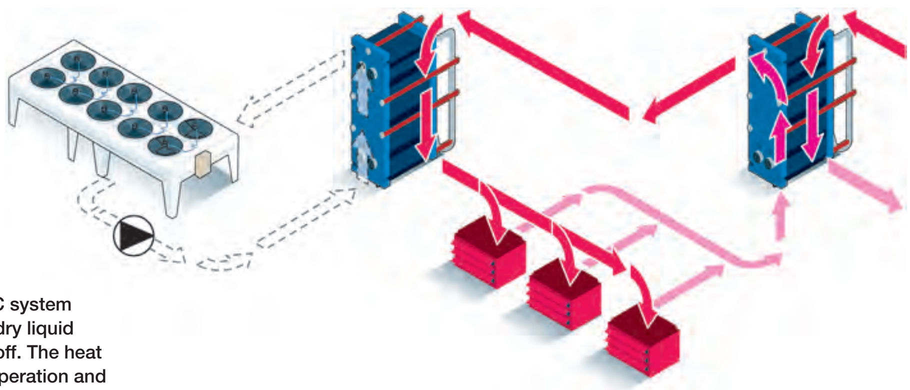
Another system where heating and cooling is integrated is the reversible air conditioning system. In this particular type of condenser cooling system there are separate small cooling units in each room of, for example, an office building. These chillers can be used as either chillers or heat pumps, depending on the season and the climate. They are all connected to a main pipe that carries water through the system. This pipe is connected both to the cooling source and to the heat source of the building.

During summer, the heat source is cut off and the water will flow directly through the plate heat exchanger on the heat-source side. The water of the main pipe will cool the condensers of the room units and transport the excess energy to the cooling source via the heat exchanger on the cooling-source side.

During winter, the cooling source is cut off and the water will flow through the plate heat exchanger on the cooling-source side with no change of temperature. Instead the heat source will now be in operation, and the water will be heated when passing the plate heat exchanger on the heat-source side. The room units will now be reversed, so that the hot water will go into the evaporators and transfer the heat to the rooms. The room units are now heat pumps.



Reversible AC system (summer). The plate heat exchanger on the right is bypassed, cutting off the heat source. The room units are used as chillers.



Reversible AC system (winter). The dry liquid cooler is cut off. The heat source is in operation and the room units are used as heat pumps.

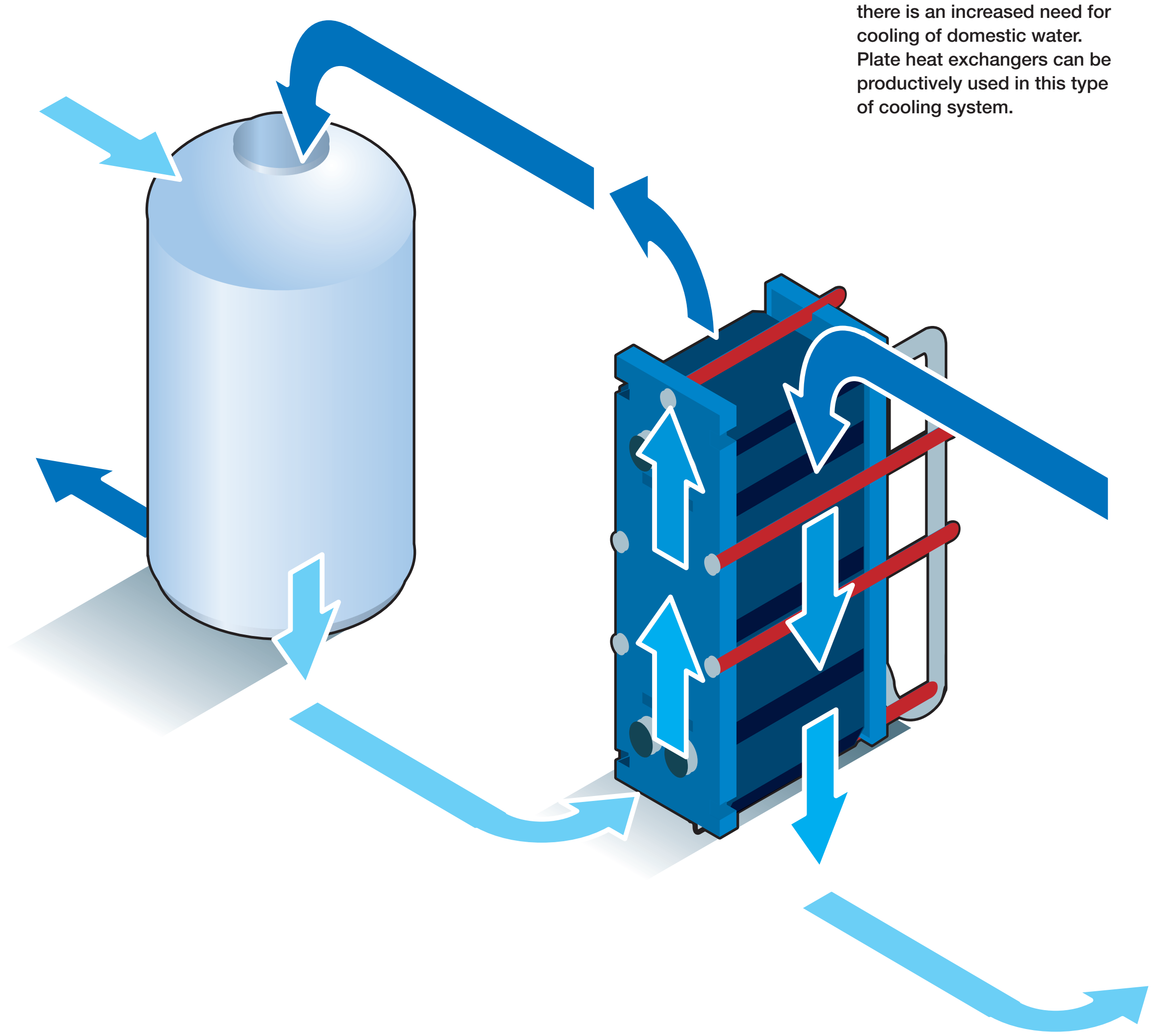
Tap water cooling

In hot geographical regions, where the atmospheric temperatures are in the range of 40–45°C/104–113°F, cooling plays a vital role in an individual's daily life. With such an atmospheric temperature one can easily imagine the water supply temperature to be in the range of 35°C/95°F.

This gives rise to the need for domestic water cooling.

This is achieved by having domestic water flowing through one side of the heat exchanger. The other medium flowing through the heat exchanger is chilled water.

In regions with extremely hot atmospheric temperatures there is an increased need for cooling of domestic water. Plate heat exchangers can be productively used in this type of cooling system.

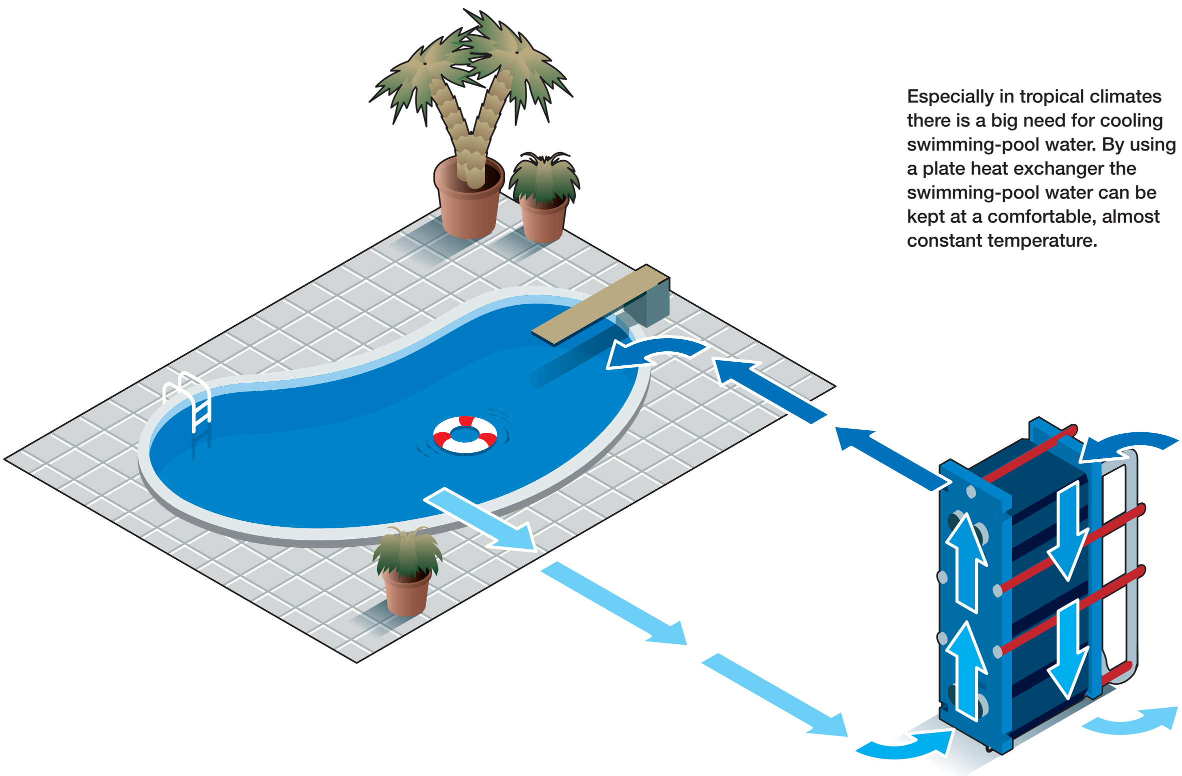


Swimming pool cooling

Plate heat exchangers can be used to maintain a nearly constant temperature in swimming pools all year round.

In hot geographical regions where the atmospheric temperatures are in the range of 40–45°C/104–113°F, there is a need to cool the incoming water temperature (~40°C/104°F) to more suitable pool temperatures (~26°C/79°F).

The swimming pool water is one of the media that flows through the heat exchanger. Chilled water is used as the other medium.



Especially in tropical climates there is a big need for cooling swimming-pool water. By using a plate heat exchanger the swimming-pool water can be kept at a comfortable, almost constant temperature.

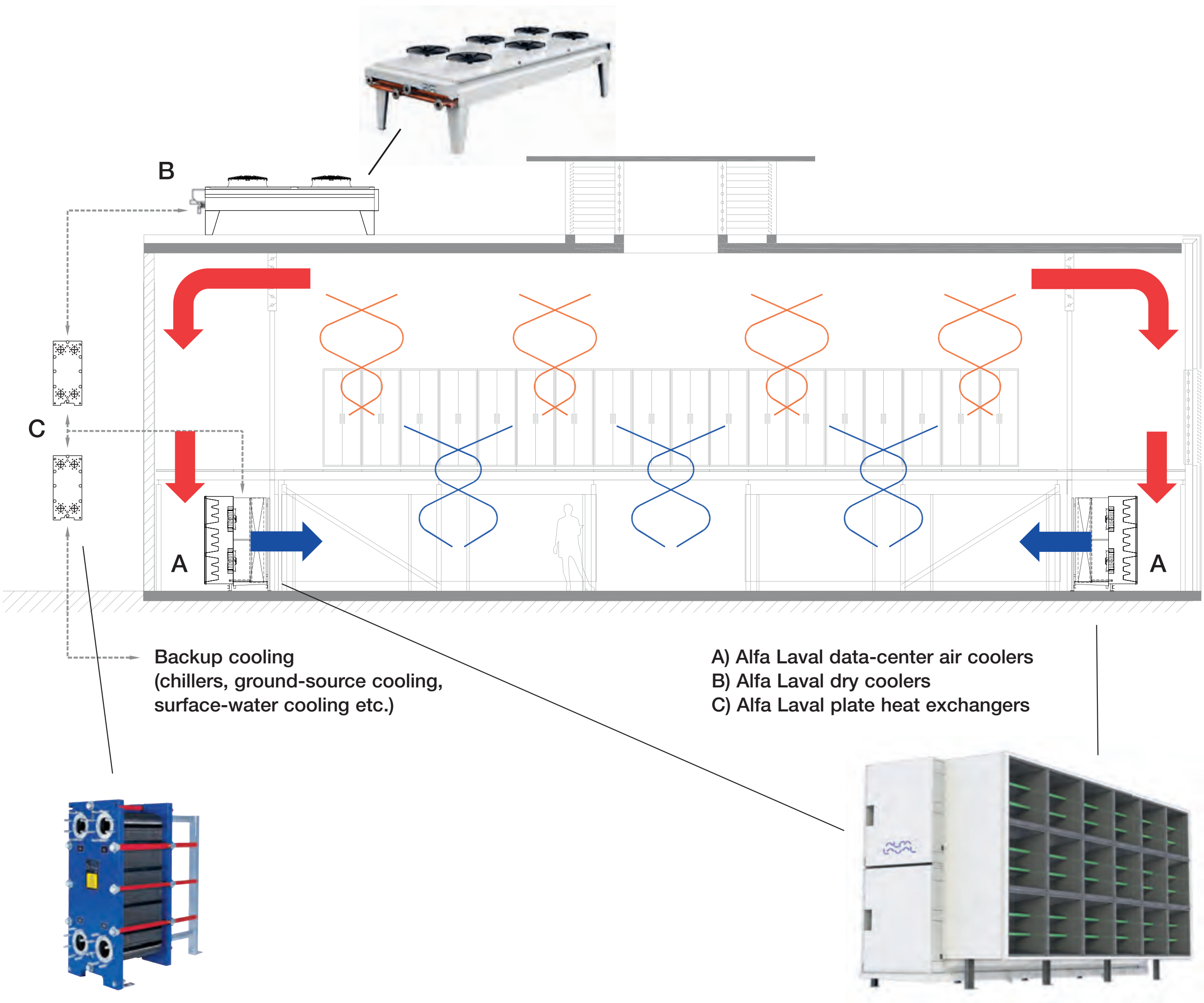
Data-center cooling

The data-center industry is a big industry in full expansion. Their needed cooling capacities grow fast, especially driven by the latest trend in cloud computing.

Typically, data-center owners and operators are looking for reliable, cost-efficient equipment with long lifetime, energy savings, elimination of hot spots in their servers and minimum maintenance.

The Low Speed Ventilation concept for data centers is a completely integrated building ventilation/recirculation system. It dissipates heat from the servers by means of low-speed controlled-air recirculation. As a result, hot spots are avoided at the lowest energy consumption possible (-30%).

Example of data-center design



Additional benefits of the Low Speed Ventilation Datacenter™ concept are:

- Lower investment compared with traditional Computer Room Air Conditioning units (CRAC): CAPEX -15%
- Very low maintenance cost (OPEX)
- Maintenance happens outside the whitespace, avoiding unauthorized people entering this sensitive area
- Suitable for both cold and hot containment
- Optimal temperature and humidity conditions at any server position
- Possibility to re-use dissipated heat
- No dust accumulation

Alfa Laval products used in the Low Speed Ventilation Datacenter™ concept

- **Alfa Laval THOR LSV Air Cooler**

THOR LSV air coolers are heavy duty industrial air coolers specifically designed for cooling servers in data centers that have been built according to "Low Speed Ventilation". LSV air coolers operate with low fan speed, low air velocities and minimal pressure differences along the route of the air flow. This is achieved by the building itself being part of the system. For this reason all THOR-LSV air coolers have been designed with a nominal of 12 Pa air-sided pressure drop and a sensible heat factor of 1.0. In case direct fresh air is used in the computer room the THOR LSV air cooler contains an F7 or F9 filter, with a pressure drop of just 25 Pa.

- **Alfa Laval plate heat exchangers**

Plate heat exchangers are used for general heating and cooling duties.

- **Alfa Laval dry coolers**

Alfa Laval dry coolers are mainly used for free cooling duties.

Alfa Laval THOR LSV Air Cooler

Alfa Laval plate heat exchangers

Alfa Laval dry coolers

Chapter 4

The theory behind heat transfer

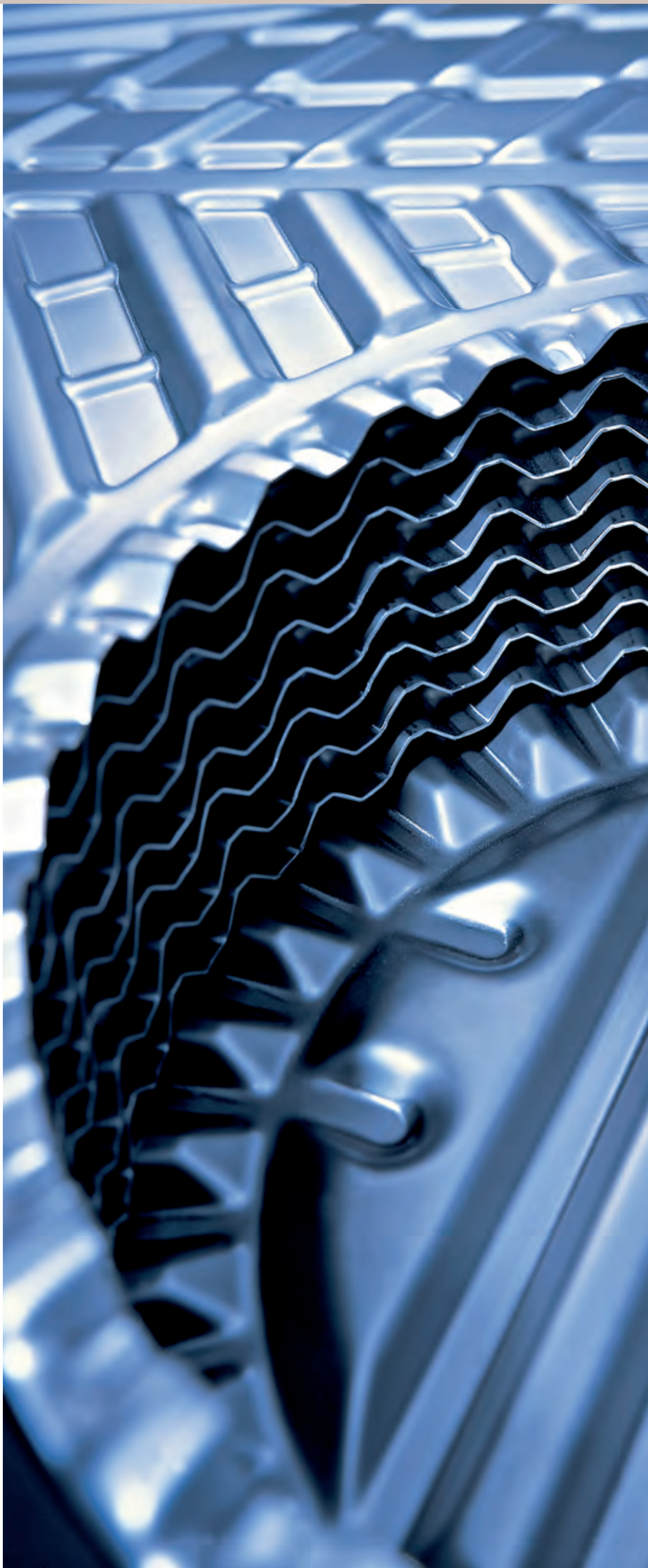
The following pages will help you gain a better understanding of how heat exchangers work.

The basic principles of heat transfer will be clearly and simply illustrated.

The natural laws of physics always allow the driving energy in a system to flow until equilibrium is reached. Heat leaves the warmer body or the hottest fluid, as long as there is a temperature difference, and will be transferred to the cold medium.

A heat exchanger follows this principle in its endeavour to reach equalization. With a plate type heat exchanger, the heat penetrates the surface, which separates the hot medium from the cold one very easily. It is therefore possible to heat or cool fluids or gases which have minimal energy levels.

The difference in temperature is the heat exchanger's "driving energy".



Heat transfer theory

The theory of heat transfer from one media to another, or from one fluid to another, is determined by several basic rules.

- Heat will always be transferred from a hot medium to a cold medium.
- There must always be a temperature difference between the media.
- The heat lost by the hot medium is equal to the amount of heat gained by the cold medium, except for losses to the surroundings.

Heat exchangers
A heat exchanger is a piece of equipment that continually transfers heat from one medium to another.

There are two main types of heat exchangers.

- Direct heat exchanger, where both media are in direct contact with each other. It is taken for granted that the media are not mixed together.

An example of this type of heat exchanger is a cooling tower, where water is cooled through direct contact with air.

- Indirect heat exchanger, where the two media are separated by a wall through which heat is transferred.

Heat transfer theory
Heat can be transferred by three methods.

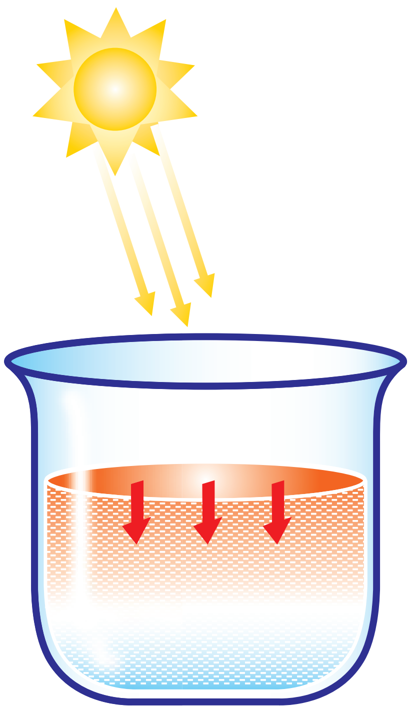
- **Radiation** – Energy is transferred by electromagnetic radiation. One example is the heating of the earth by the sun.
- **Conduction** – Energy is transferred between solids or stationary fluids by the movement of atoms or molecules.
- **Convection** – Energy is transferred by mixing part of a medium with another part.

a) Natural convection, where the movement of the media depends entirely upon density difference, and temperature differences are evened out.

b) Forced convection, where the movement of the media depends entirely or partly upon the results of an outside influence. One example of this is a pump causing movement in a fluid.

Heat exchanger types
In this context only indirect heat exchangers are discussed, i.e. those where the media are not mixed, but where the heat is transferred through heat-transfer surfaces.

Temperature losses through radiation can be disregarded when considering heat exchangers in this context.
Indirect heat exchangers are available in several main types (plate, shell-and-tube, spiral etc.) In most cases the



Radiation

plate type is the most efficient heat exchanger. Generally it offers the best solution to thermal problems, giving the widest pressure and temperature limits within the constraint of current equipment. The most notable advantages of a plate heat exchanger are:

- Takes up much less space than a traditional shell-and-tube heat exchanger.

- Thin material for the heat transfer surface – this gives optimum heat transfer, since the heat only has to penetrate thin material.

- High turbulence in the medium – this gives a higher convection, which results in efficient heat transfer between the media. The consequence of this higher heat transfer coefficient per unit area is not only a smaller surface area requirement but also a more efficient operation.

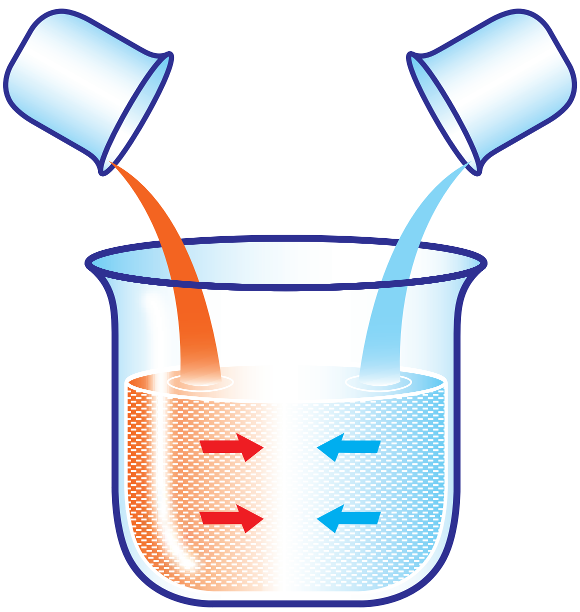
The high turbulence also gives a self-cleaning effect. Therefore, when compared to the traditional shell-and-tube heat exchanger, the fouling of the heat transfer surfaces is considerably reduced. This means that the plate heat exchanger can remain in service far longer between cleaning intervals.

- Flexibility – the plate heat exchanger consists of a framework containing several heat transfer plates. It can easily be extended to increase capacity. Furthermore, it is easy to open for the purpose of cleaning. (This only applies to gasketed heat exchangers, and not to brazed or fusion-bonded units.)

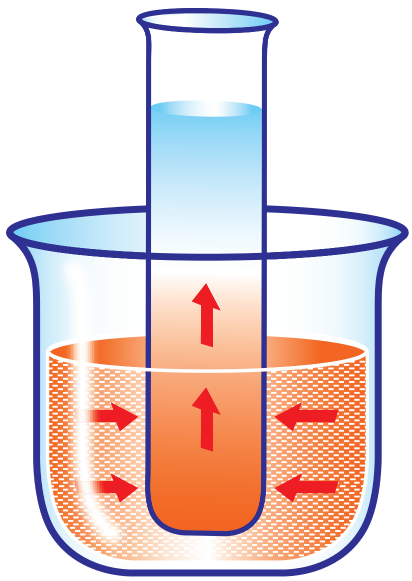
- Variable thermal length – most of the plate heat exchangers manufactured by Alfa Laval are available with two different pressing patterns. When the plate has a narrow pattern, the pressure drop is higher and the heat exchanger is more effective. This type of heat exchanger has a long thermal channel.

When the plate has a wide pattern, the pressure drop is smaller and the heat transfer coefficient is accordingly somewhat smaller. This type of heat exchanger has a short thermal channel.

When two plates of different pressing patterns are placed next to each other, the result is a compromise between long and short channels as well as between pressure drop and effectiveness.

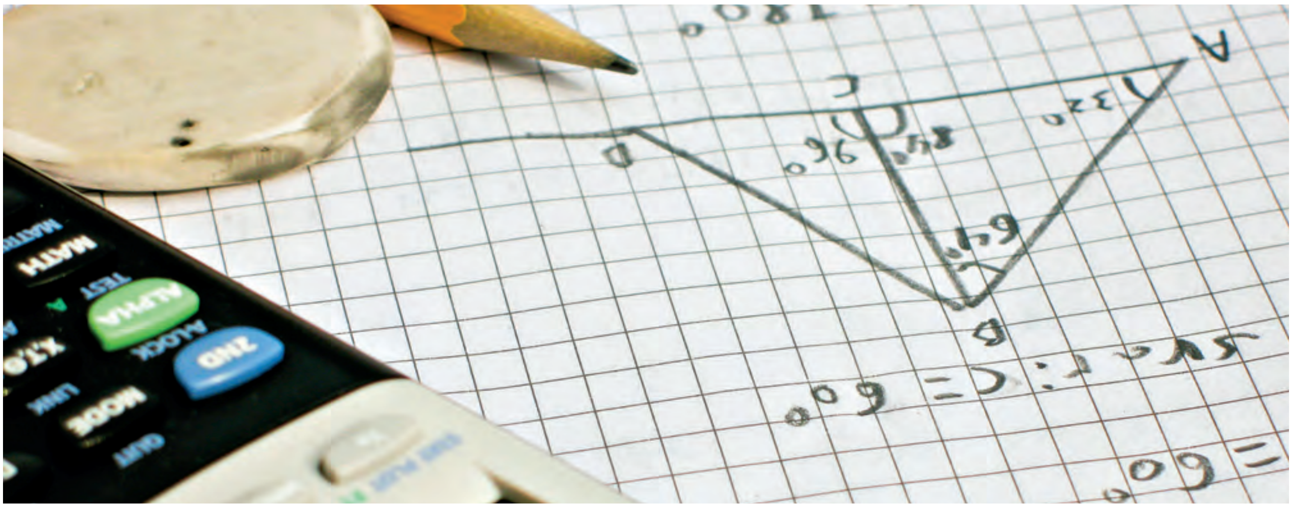


Convection



Conduction

Calculation method



To solve a thermal problem, we must know several parameters. Further data can then be determined. The six most important parameters are the following:

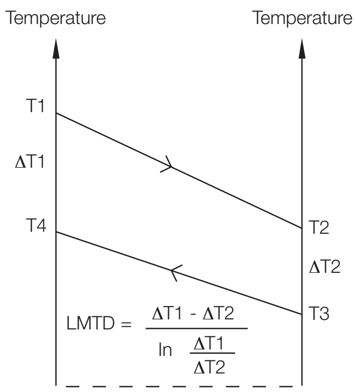
- The amount of heat to be transferred (heat load).
- The inlet and outlet temperatures on the primary and secondary sides.
- The maximum allowable pressure drop on the primary and secondary sides.
- The maximum operating temperature.
- The maximum operating pressure.
- The flow rate on the primary and secondary sides.

If the flow rate, specific heat and temperature difference on one side are known, the heat load can be calculated. See also page 4:6.

Temperature program
This means the inlet and outlet temperatures of both media in the heat exchanger.

T1 = Inlet temperature – hot side
T2 = Outlet temperature – hot side
T3 = Inlet temperature – cold side
T4 = Outlet temperature – cold side

The temperature program is shown in the diagram below.



Heat load
Disregarding heat losses to the atmosphere, which are negligible, the heat lost (heat load) by one side of a plate heat exchanger is equal to the heat gained by the other. The heat load (P) is expressed in kW or kbtu/h.

Logarithmic mean temperature difference
Logarithmic mean temperature difference (LMTD) is the effective driving force in the heat exchanger. See diagram to the left.

Thermal length
Thermal length (Θ) is the relationship between temperature difference δt on one side and LMTD.

$$\Theta = \frac{\delta t}{\text{LMTD}}$$

Thermal length describes how difficult a duty is from a thermal perspective.

Density
Density (ρ) is the mass per unit volume and is expressed in kg/m^3 or lb/ft^3.

$$P = m \times c_p \times \delta t$$

Where;

P = Heat load (btu/h)

m = Mass flow (lb/hr)

c_p = Specific heat (btu/lb °F)

δt = Difference between inlet and outlet temperatures on one side (°F)

Cooling
For some duties, cooling applications for example, the temperature program is very tight with close approaches on the different temperatures. This gives what we refer to as high theta duties and requires high theta units. High theta duties are duties that have $\Theta > 1$ and are characterized by:

- Long plate, longer time for the fluid to be cooled

- Low pressing depth that gives less fluid per plate to be cooled

Plate heat exchangers are superior compared to shell-and-tube heat exchangers when it comes to theta values. Shell-and-tube heat exchangers can go up to a maximum value of theta ~1 while plate heat exchangers reach theta values of 10 and more. For a shell-and-tube to climb over theta value of 1 or more, several units need to be installed in a series.

Flow rate
This can be expressed in two different terms, either by weight or by volume. The units of flow by weight are in lb/h or kg/h, the units of flow by volume in m^3/h or gpm. To convert units of volume into units of weight, it is necessary to multiply the volume flow by the density.

The maximum flow rate usually determines which type of heat exchanger is the appropriate one for a specific purpose. Alfa Laval plate heat exchangers can be used for flow rates from 400 lb/hr to 11,110,000 lb/hr. In terms of volume, this equates to 0.8 gpm to 22,000 gpm in a water application. If the flow rate is in excess of this, please consult your local Alfa Laval representative.

Pressure drop
Pressure drop (Δp) is in direct relationship to the size of the plate heat exchanger. If it is possible to increase the allowable pressure drop, and incidentally accept higher pumping costs, then the heat exchanger will be smaller and less expensive. As a guide, allowable pressure drops between 3 and 14.5 psi are accepted as normal for water/water duties.

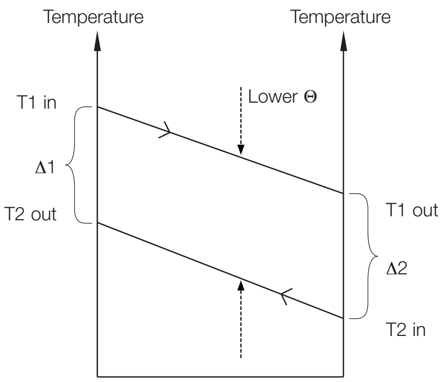
Specific heat
Specific heat (c_p) is the amount of energy required to raise 1 kg of a substance by one degree centigrade. The specific heat of water at 68 °F is 1.0 btu/lb °F.

Viscosity
Viscosity is a measure of the ease of flow of a liquid. The lower the viscosity, the more easily it flows.

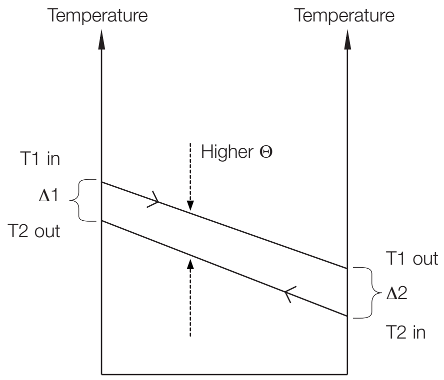
Viscosity is expressed in centiPoise (cP) or centiStoke (cSt).

Overall heat transfer coefficient
Overall heat transfer coefficient (k) is a measure of the resistance to heat flow, made up of the resistances caused by the plate material, amount of fouling, nature of the fluids and type of exchanger used.

Overall heat transfer coefficient is expressed as W/m^2 °C or Btu/ft^2, h, °F.



The diagram shows that large temperature differences result in low theta.



The diagram shows that small temperature differences result in high theta.

Calculation method

The heat load of a heat exchanger can be derived from the following two formulas:

1. Heat load, Theta and LMTD calculation

$$P = m \cdot c_p \cdot \delta t \quad (m = \frac{P}{c_p \cdot \delta t}\ ;\ \delta t = \frac{P}{m \cdot c_p})$$

$$P = k \cdot A \cdot LMTD$$

Where:

P = heat load (btu/h)
m = mass flow rate (lb/h)
c_p = specific heat (btu/lb °F)
δt = temperature difference between inlet and outlet on one side (°F)
k = heat transfer coefficient (btu/ft^2 h °F)
A = heat transfer area (ft^2)
LMTD = log mean temperature difference

$$\Theta = \text{Theta-value} = \frac{\delta t}{LMTD} = \frac{k \cdot A}{m \cdot c_p}$$

T1 = Temperature inlet – hot side
T2 = Temperature outlet – hot side
T3 = Temperature inlet – cold side
T4 = Temperature outlet – cold side

LMTD can be calculated by using the following formula, where $\Delta T1 = T1–T4$ and $\Delta T2 = T2–T3$

$$LMTD = \frac{\Delta T1 - \Delta T2}{\ln \dfrac{\Delta T1}{\Delta T2}}$$

2. Heat transfer coefficient and design margin

The total overall heat transfer coefficient k is defined as:

Where: $$\frac{1}{k} = \frac{1}{\alpha_1} + \frac{1}{\alpha_2} + \frac{\delta}{\lambda} + R_f = \frac{1}{k_c} + R_f$$

The design margin (M) is calculated as: $$M = \frac{k_c - k}{k}$$

α_1 = The heat transfer coefficient between the warm medium and the heat transfer surface (btu/ft^2 h °F)
α_2 = The heat transfer coefficient between the heat transfer surface and the cold medium (btu/ft^2 h °F)
δ = The thickness of the heat transfer surface (ft)
R_f = The fouling factor (ft^2 h °F/btu)
λ = The thermal conductivity of the material separating the medias (btu/ft^2 h °F)
k_c = Clean heat transfer coefficient (Rf=0) (btu/ft^2 h °F)
k = Design heat transfer coefficient (btu/ft^2 h °F)
M = Design Margin (%)

Combination of these two formulas gives: $M = k_c \cdot R_f$

i.e the higher k_c value, the lower R_f-value to achieve the same design margin.

$$\mathrm{LMTD} = \frac{\Delta T1 - \Delta T2}{\ln \dfrac{\Delta T1}{\Delta T2}}$$

$$\frac{1}{k} = \frac{1}{\alpha_1} + \frac{1}{\alpha_2} + \frac{\delta}{\lambda} + R_f = \frac{1}{k_c} + R_f$$

Every parameter in the equation above can influence the choice of heat exchanger. The choice of materials does not normally influence the efficiency, only the strength and corrosion properties of the unit.

In a plate heat exchanger, we have the advantages of small temperature differences and plate thicknesses of between 0.3 and 0.6 mm. The alpha values are products of the very high turbulence, and the fouling factor is usually very small. This gives a k-value which under favourable circumstances can be in the order of 1,400 btu/ft^2 h °F.

With traditional shell-and-tube heat exchangers, the k-value will be below 440 btu/ft^2 h °F.

Important factors to minimize the heat exchanger cost:

1. Pressure drop
The larger allowed pressure drop, the smaller the heat exchanger.

2. LMTD
The larger the temperature difference between the media, the smaller the heat exchanger.

Manufacturing materials
High-quality AISI 316 stainless steel plates are used in most Alfa Laval heat exchangers for water/water applications. When the chloride content does not require AISI 316, the less expensive stainless steel material AISI 304 may sometimes be used. Several other plate materials are also available for various applications. For Alfa Laval brazed and fusion bonded plate heat exchangers AISI 316 is always used. For salt and brackish water only titanium should be used.

Pressure and temperature limitations
The maximum allowed temperature and pressure influence the cost of the heat exchanger. As a general rule, the lower the maximum temperature and maximum pressure are, the lower the cost of the heat exchanger will be.

Fouling and fouling factors
Fouling allowance can be expressed either as a design margin (M), i.e. an additional percentage of heat transfer area, or as a fouling factor (R_f) expressed in the units m² °C/W or ft^2 h °F/btu. R_f should be much lower for a plate heat exchanger than for a shell-and-tube exchanger. There are two main reasons for this.

Higher k-values means lower fouling factors
The design of plate heat exchangers gives much higher turbulence, and thereby thermal effeciency, than a shell-and-tube exchanger. A typical k-value (water/water) for a plate heat exchanger is 1050-1300 btu/ft^2 h °F while a typical shell-and-tube exchanger gives only 350-440 btu/ft^2 h °F. A typical R_f-value used for shell-and-tube exchangers is 5.68 ft^2 h °F/btu. With k-values 350-440 btu/ft^2 h °F this gives a Margin of 20-25%. ($M = k_c \times R_f$). To achieve M = 20-25% in the plate heat exchanger with 1050-1300 btu/ft^2 h °F the R_f-value should only be 1.87 x 10^{-4} ft^2 h °F/btu.

Difference in how margin is added
In a shell-and-tube heat exchanger margin is often added by increasing the tube length, keeping the same flow through each tube. In a plate heat exchanger however, margin is added by adding parallell channels, i.e. lowering the flow per channel. This results in lower turbulence/efficiency, increasing the risk for fouling. A too high fouling factor can result in increased fouling!

For a plate heat exchanger in a water/water duty a Margin of 0-15% depending on water quality is normally enough.

Chapter 5

Product range

Alfa Laval has a full range of heat exchangers, heat exchanger systems and accessories catering to every need, however large or small.

Alfa Laval is your assurance of quality in terms of compactness, ease of installation, low maintenance costs, high energy efficiency, confidence and flexibility.

In other words, reliable operation, unsurpassed operating life span and fast return on investment.

Alfa Laval product range

Gasketed Plate Heat Exchangers	Brazed Plate Heat Exchangers	Fusion-bonded plate heat exchangers, AlfaNova
Read all about it in chapter 6	Read all about it in chapter 7	Read all about it in chapter 8
		
Heating and Cooling systems	**Tap Water Systems**	**All Welded Heat Exchangers**
Read all about it in chapter 9	Read all about it in chapter 10	Read all about it in chapter 11
		
Filters		
Read all about it in chapter 12		
		

Chapter 6

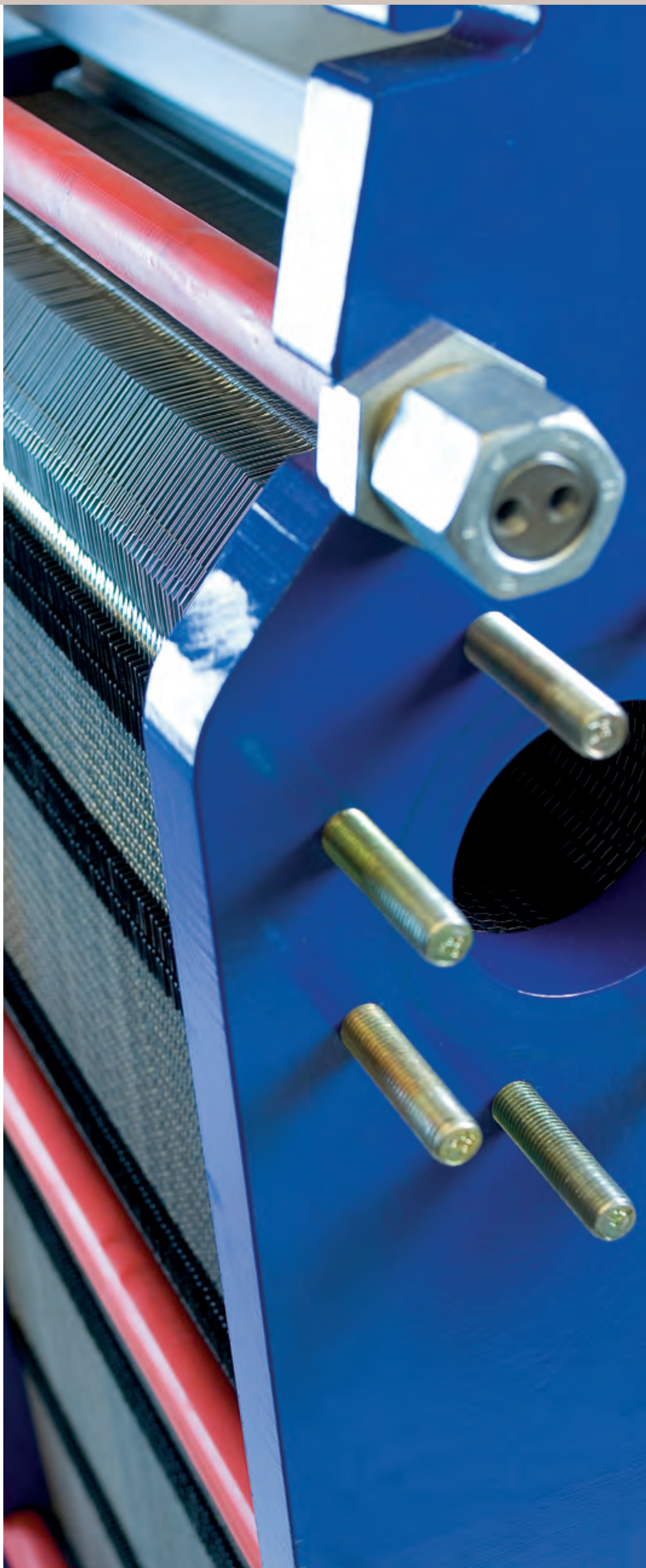
Gasketed plate heat exchangers

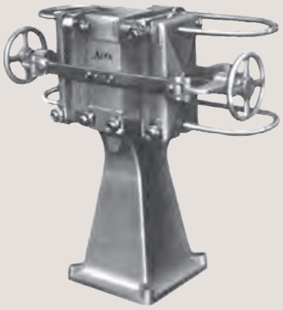
Alfa Laval gasketed plate heat exchangers are the most cost-effective solution available for HVAC heating and cooling applications.

Our gasketed plate heat exchanger range is the result of decades of experience, research and development in heat transfer technology. By combining innovative design with high quality we guarantee maximum performance with minimum operating costs.

At a quick glance the design may seem traditional, but when studying the plates, gaskets and frames in detail the superiority of Alfa Laval gasketed plate heat exchangers becomes obvious. Attention to detail is what gives Alfa Laval the winning edge.

Our products and our sales and service organization make Alfa Laval the ideal business partner, as well as the unquestioned world market leader.





Alfa Laval supplied the first plate heat exchangers to the dairy industry in 1931. Plates were 5-10 mm thick with a milled pattern, compared to 0.4 mm today. In developing our range of plate heat exchangers, we have focused on cost-efficiency.

Reasons to buy gasketed plate heat exchangers from the market leader

Alfa Laval's gasketed plate heat exchangers are designed to meet the highest expectations when it comes to energy efficiency, compactness and reliable performance.

High energy efficiency
With innovative plate design, we provide superior flow distribution across the entire plate surface. This results in excellent heat transfer and high energy efficiency thanks to the elimination of stagnant zones and reduced risk of fouling.

Compact size
The compact design of our gasketed plate heat exchangers makes it easy to fit compact spaces. They come equipped with all features needed for easy installation and quick start-up.

Reliable performance over time
Depending on fluid types, pressures and temperatures, Alfa Laval gasketed plate heat exchangers are tailored to meet highest expectations on performance and lifetime. Alfa Laval gasketed plate heat exchangers are also available as AHRI performance certified versions called Alfa Laval AQ-series. The performance certification is according to AHRI Standard 400 and is verified in the AHRI Liquid to Liquid Heat Exchanger certification program, LLHE.

Easy and safe maintenance
Our gaskets and plate pack alignment design provides easy and cost effective maintenance. The frame is equipped with features that support the unit and secure safe opening and closing during service.

Alfa Laval gasketed plate heat exchangers provide heating and cooling for Federation Complex Towers, Moscow, Russia.

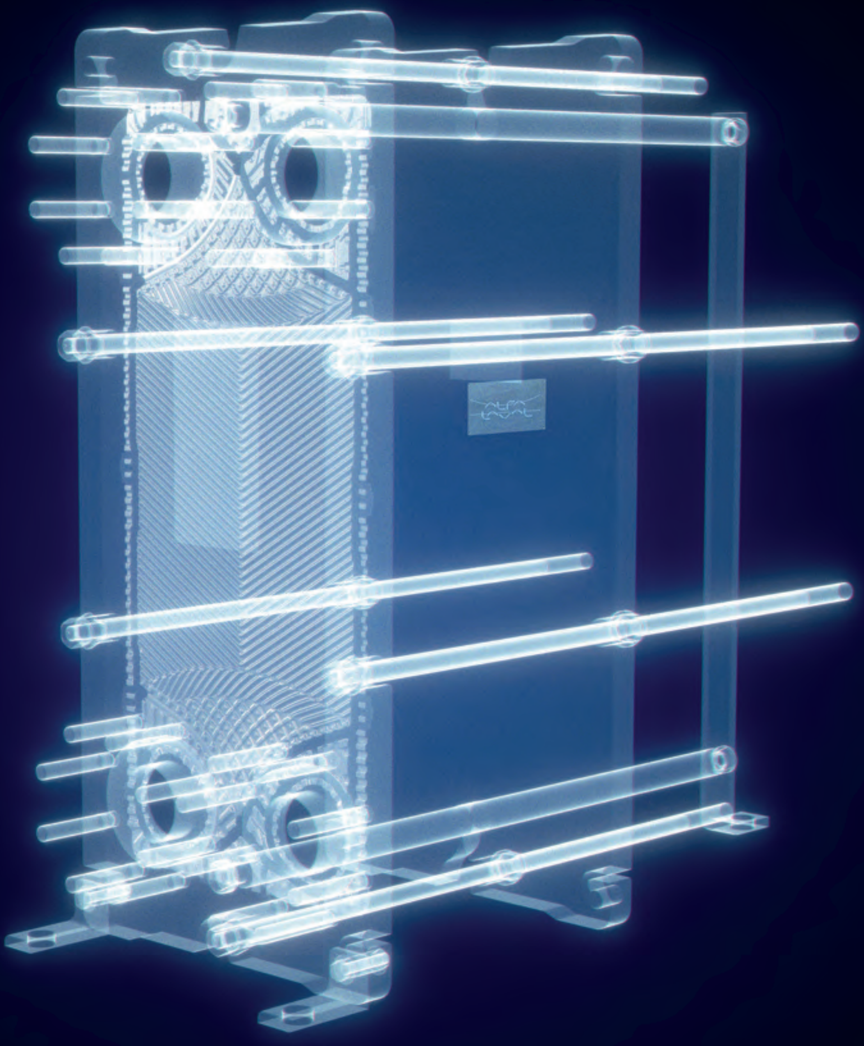
Insights

You need to put quality and reliability in an economic context. It's about how to make processes more efficient, while saving energy. About how optimized performance gives customers the best operating economy. And about how to minimize impact on the environment and climate change.

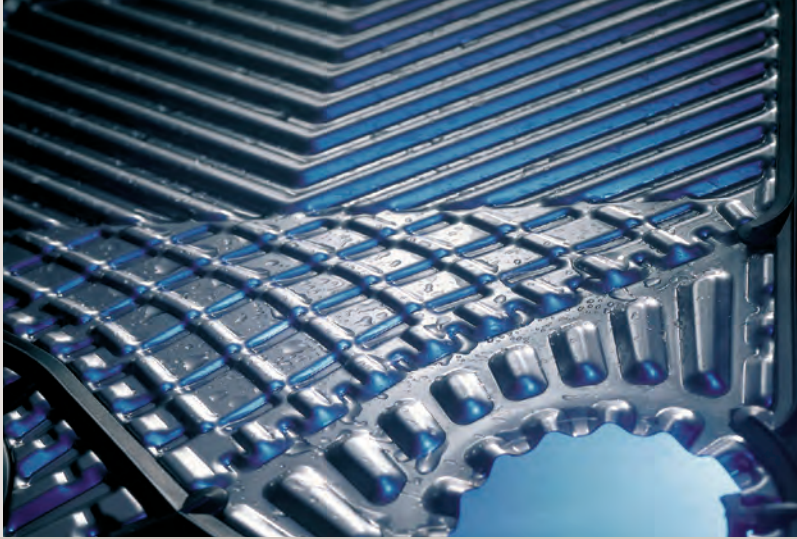
Above all it is tackling the need to build long life into equipment to minimize total cost of ownership and maximize profitability. Why governs how.

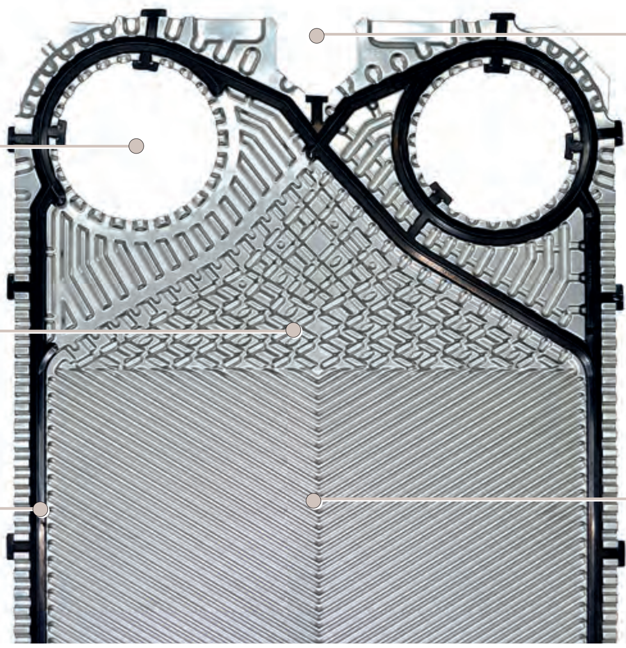
These are the insights Alfa Laval is using to build gasketed plate heat exchangers. Take a closer look behind the surface. There's more to see than what meets the eye – actually there's a whole story to tell.

Energy efficiency at its peak



Plates





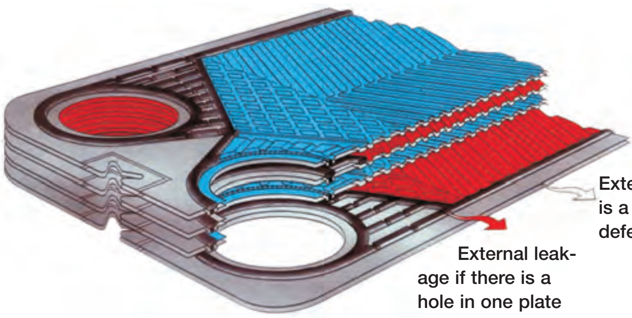
The heat-transfer surface
The heat exchanger plates are pressed in a so-called herringbone corrugation pattern. When two plates are superimposed with opposing herringbone patterns, this type of corrugation generates a helix-like flow with very high turbulence, thus producing the essential condition for achieving high transfer coefficients and effective heat exchanger self-cleaning. By changing the plate corrugation pattern, the heat exchanger can be used in different processes, even those with very dirty media.

The distribution area
The plate distribution is pressed in a so called chocolate pattern, an Alfa Laval innovation. This type of corrugation has numerous advantages. Among the most important are; it optimises flow distribution over the entire transfer surface, ensuring highest energy efficiency. Dead spots, that are the main cause of corrosion and fouling, are eliminated. Customers will benefit from reduced maintenance cost and increased uptime.

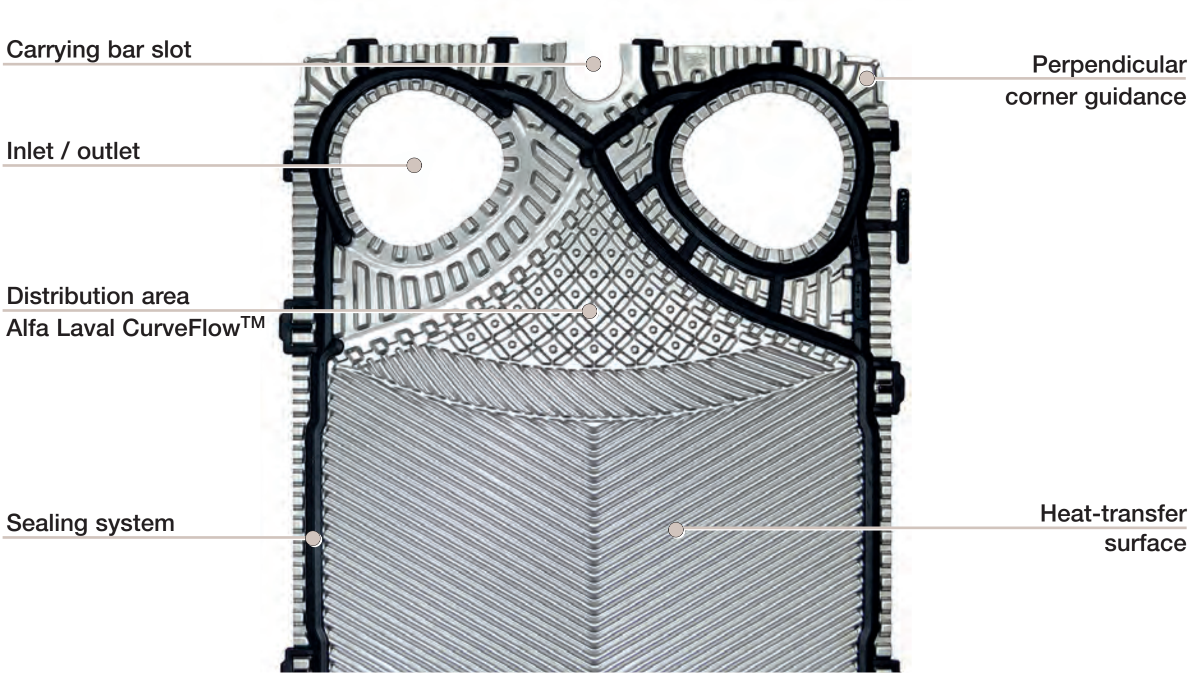
Special plates

Double-wall plates
Double-wall gasketed plate heat exchangers are ideal for use with fluids that must not be allowed to mix.
Pairs of identical plates are laser-welded around the ports. The gasket is installed in the conventional manner and the welded plate pairs are assembled in a plate pack in the same way as ordinary single plates.

In the unlikely event of leakage through a plate because of a puncture or crack, the leaking fluid will never come into contact with the fluid in the other circuit, as it will be stopped by the double plate and flow outside the heat exchanger.



The world's tallest building stays cool in the scorching desert sun thanks to an innovative thermal ice-storage system and Alfa Laval gasketed plate heat exchangers. Burj Khalifa, Dubai, United Arab Emirates.



New plate innovations

Alfa Laval CurveFlow™
The new design of the distribution area means superior flow distribution and more of the available pressure drop over the main heat transfer area.
This results in a number of benefits for the customer:

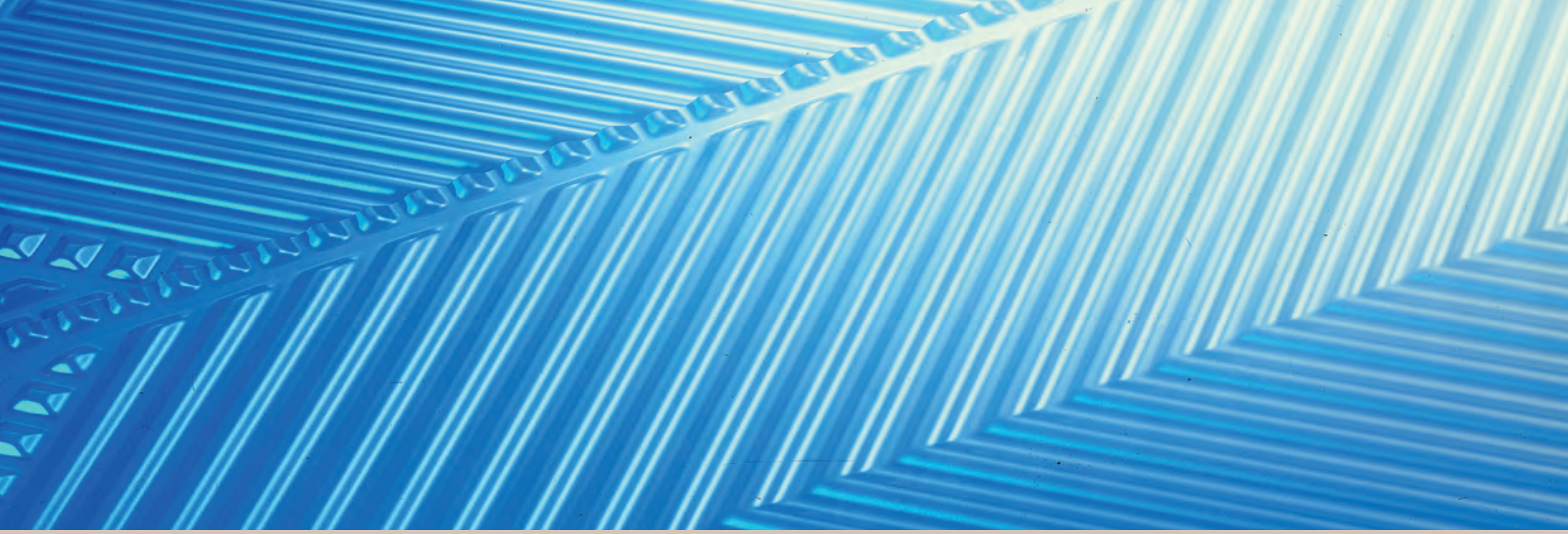
- A more compact heat exchanger – less plates needed.
- Increased energy efficiency – better flow distribution reduces the risk of fouling build up, reducing the need for increased pumping power to compensate for higher pressure drop.
- Reduced maintenance costs – fewer plates mean faster cleaning and low cost for spares.

Up to 15% higher efficiency
With the new Alfa Laval CurveFlow™ design the media is more optimal distributed over the entire plate width. Additionally, the cross corrugation pattern between the distribution surface and the main heat transfer area gives improved heat transfer. Compared to a traditional plate design it is also possible to use thinner plates at high pressures. Total improvement of the heat transfer efficiency is up to 15%.

Higher flow capacity
Thanks to the non-circular ports, the port area in the plate has increased compared to a conventional circular design. This equals to higher flow capacity at the same velocity, allowing higher utilization.

Up to 40% improvement in self-cleaning capability
Thanks to the new Alfa Laval CurveFlow™ design the media will have up to 20% higher velocity at the far end of the plate width. This will improve the shear stress over the heat transfer area by up to 40%, thus minimizing the risk of fouling build-up at the most critical part of the plate.

Perpendicular corner guiding
The new corner guiding design ensures that the plate pack is perfectly aligned independent of the number of plates. A perfect alignment ensures a reliable performance of the heat exchanger and faster closing of the unit after service.



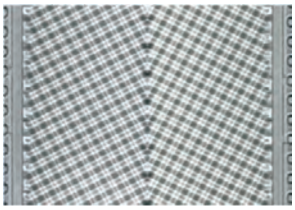
Channel types

We have two plate corrugations (L and H)
These form three different channels (L, M, H)

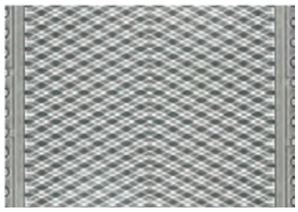
L: Low theta

H: High theta

L + L = L channel



L + H = M channel



H + H = H channel

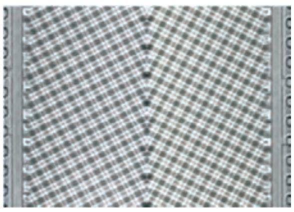
Optimal channel type is selected on the basis of the temperature program to be satisfied and the maximum permissible pressure drop

Channel characteristics

Low turbulence and pressure drop

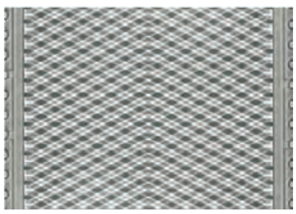
"L" channels

Medium turbulence and pressure drop



"M" channels

High turbulence and pressure drop



"H" channels

Advantages

- Efficient heat transfer
- High turbulence
- Variable thermal length
- Low pressure drop

Benefits

- Increased heat recovery
- High self-cleaning coefficients
- Low heat-transfer surface area
- Low pumping costs

Gaskets

The gaskets in Alfa Laval gasketed plate heat exchangers are parts of an advanced hydraulic sealing system designed for high performance and long operating life.

Our gasket profiles produce a highly efficient seal, minimizing the risk of leakage.

The performance of a heat exchanger is influenced by different components and places very high demands on the gasket system. To obtain highest performance, it is important that the plate and gasket are designed together.

A correctly designed gasket has a high enough sealing force to prevent leakage, but not too high in order to prevent gasket and gasket groove damages. Alfa Laval offers gaskets which are based on the roof top gasket profile, as this has proven to be most effective.

The rib top gasket family is the next generation gasket developed by Alfa Laval. It is a further development of the traditional roof top gasket profile.

The roof on this next generation gasket is less edgy and there is a rib on top of it. The rib top profile with less rubber mass gives an outstanding sealing performance, reducing the risk of gasket and plate damages and leakages due to plate misalignment.

All gaskets are made from a single uniform rubber by the best suppliers. In addition, they are moulded in one piece, guaranteeing exact gasket geometry with no weak links from vulcanisation. Gaskets are available in a wide range of elastomers, the most common being Nitrile rubber and EPDM.

Alfa Laval was the first heat-exchanger manufacturer to develop and use the glue-free clip-on system that makes it easier to replace gaskets during maintenance, thus saving time. Recently Alfa Laval introduced a new glue-free system called Alfa Laval ClipGrip™ which improves the gasket fastening and sealing reliability even further.

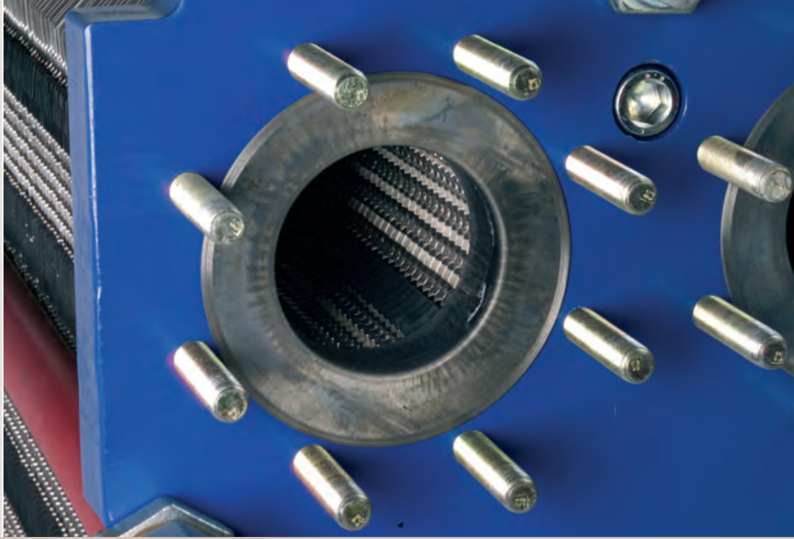
Gasket groove design ensures minimum contact between the gasket and the media, helping extend the heat exchanger's operating life. The groove on the plate and the gasket match perfectly, ensuring that the gasket is fully supported.

Examples of Alfa Laval roof/rib top gasket family

Glue-free ClipGrip™ system

Glue-free Clip-on system

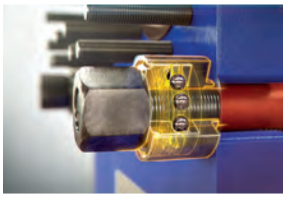
Frame



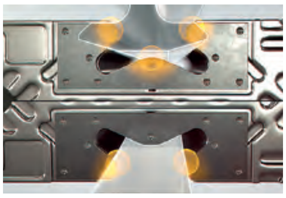
Designed with lowest cost of ownership
The frame features will ensure:
- Reduced maintenance cost
- Reduced spare part costs
- Staff safety
- Time savings

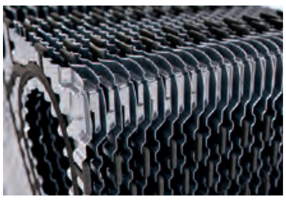
Alfa Laval gasketed plate heat exchangers of all sizes can be opened quickly and easily for inspection and gasket replacement by one man using standard tools. They are reassembled just as easily. Our large units feature Alfa Laval's 5-point alignment system. Precise positioning of the plates horizontally and vertically ensures efficient sealing throughout the plate pack. A roller on the pressure plate, and bearing boxes on the four tightening bolts, make opening and closing an easy task.

Simpler in design, our smaller gasketed plate heat exchangers are equally service-friendly, while keeping costs to a minimum. During reassembly, alignment of the plate pack is achieved using the round carrying and guide bar. Corner guides lock the plates in position and ensure perfect final alignment.

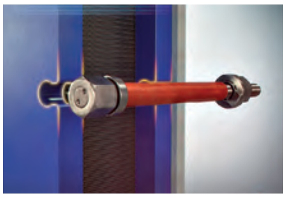


Bearing box – makes opening and closing the heat exchanger easier – will reduce maintenance time and increase staff safety.

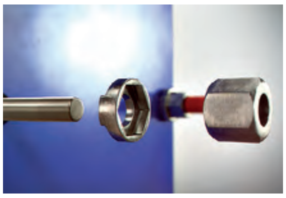




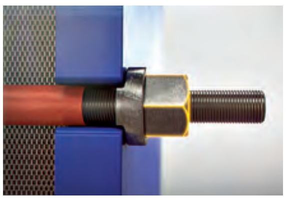
5-point alignment system and **perpendicular corner guidance**. Perfect plate alignment avoiding plate pack leakages and additional necessary openings & closings of the plate heat exchanger – will reduce maintenance time and spare part cost.



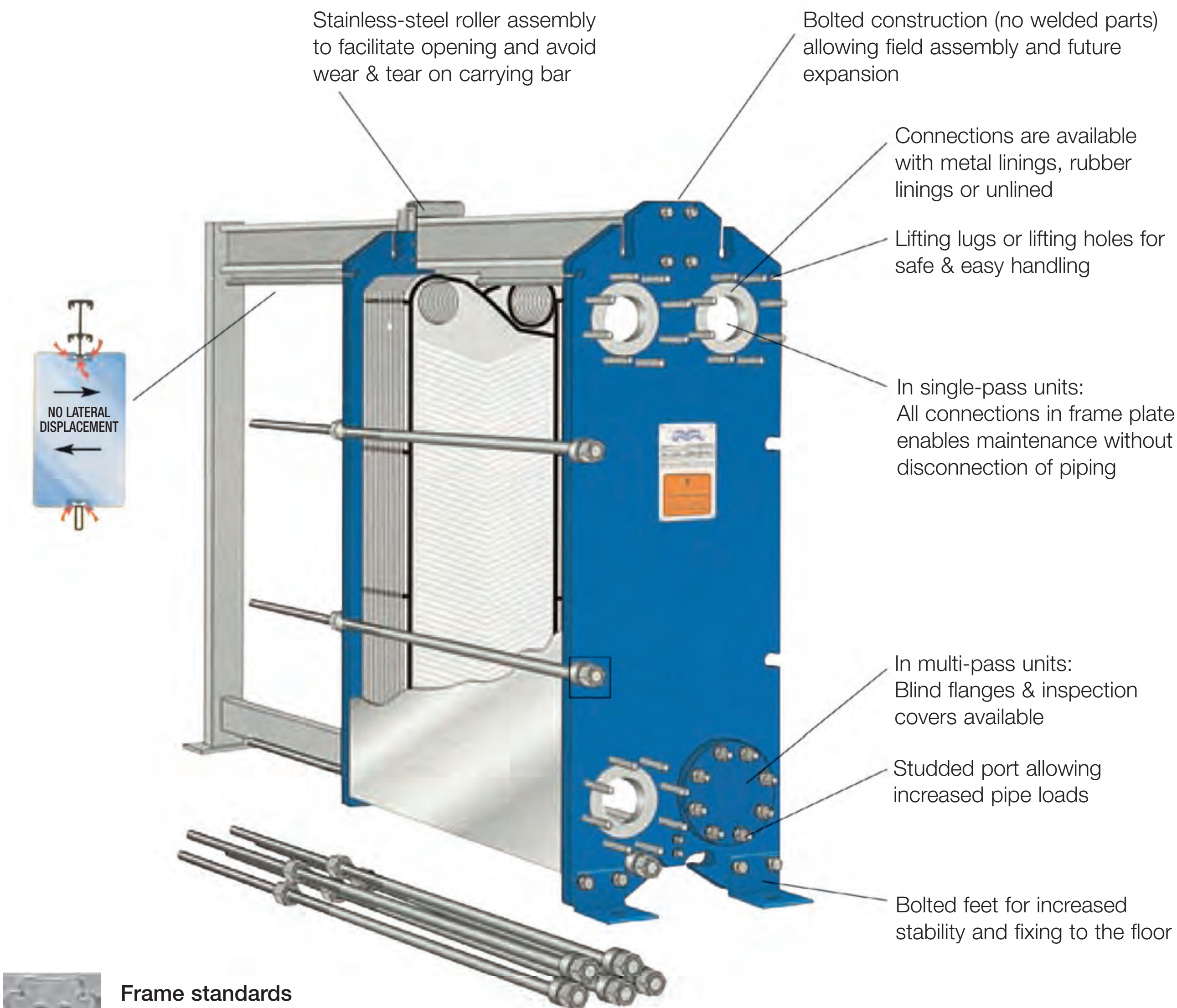
Key hole bolt opening reduce risk of tightening bolts falling out and allows bolt to be removed sideways – will reduce installation and maintenance cost and ensure staff safety.



Lock washer requires one man instead of two to loosen the tightening bolts and reduce the risk of bolts falling out – will reduce maintenance cost and increase staff safety.



Elongated nuts reduce nuts seizing on tightening bolt – will reduce cost for maintenance and spare parts.



Frame standards
- ASME, U and UM
- PED/CE marking
- Alfa Laval standard for other, local PV rules.

When performance is crucial

Alfa Laval AlfaQ™ AHRI-certified gasketed plate heat exchangers

When performance is crucial, each component of an HVAC system must be optimized to perform exactly as specified.

The Air Conditioning, Heating and Refrigeration Institute (AHRI) Standard 400 certification is an independent, third-party verification of thermal performance. AHRI 400 is now a global standard, assuring customers worldwide that the heat exchangers they choose will perform according to specification.

Performance certification verifies that the product performs in accordance with the manufacturer's published ratings, and is particularly useful in applications such as district-cooling substations, ice-storage systems, data centres and free-cooling systems.

Alfa Laval was the first to offer a broad range of heat exchanger innovations – the AlfaQ™ range – that are certified to AHRI 400.

Certification leads the "green" wave
AHRI-certified heat exchangers can meet the Leadership in Energy and Environmental Design (LEED) standards for heating and cooling applications. LEED is an internationally recognized mark, providing building owners and operators with a framework for identifying and implementing practical and measurable green building design, construction, operations and maintenance solutions.
Through its certification program and standards, AHRI strives to help customers save energy, improve their productivity and contribute to a better environment.

AHRI Certification Procedures and Benefits
Performance deficiencies in an HVAC system are difficult to detect and can result in much higher energy costs. Certification of all components assures the buyer that the system will perform optimally.

To certify a product to AHRI standards, the manufacturer submits specifications and performance data to AHRI for performance evaluation and potential certification.

The certification assures buyers and users that:
– The gasketed plate heat exchanger will perform in accordance with the manufacturer's published ratings.
– Product performance can be easily compared for their specific application.

Alfa Laval has accomplished a 100% success rate in the AHRI performance certification program for more than a decade.

Cost-effective for everyone involved
Consultants
– Allows for the design of a system in which all the major components are independently performance certified, ensuring that targets on power consumption and climate control can be met.
– Provides a verifiable basis for heat exchanger selection.
– Protects the owner and consulting engineer from performance concerns during commissioning and after installation.

Contractors
– Eliminates field acceptance tests of each component, thereby reducing payment hold-back times after commissioning.
– Ensures that all certified gasketed plate heat exchangers included in proposals will deliver the stated thermal performance.
– Reduces troubleshooting time during commissioning and after start-up.

End users
– Reduces lifetime operating costs significantly by assuring a more energy-efficient system.
– Ensures full investment value by reducing costs for field tests and additional component performance margins.

Alfa Laval AlfaQ™ gasketed plate heat exchangers, the optimal choice

Alfa Laval's broad range of heat exchangers for HVAC applications include gasketed, semi-welded, fully-welded, double-wall plate, and brazed heat exchangers. The AlfaQ™ Series are part of our gasketed plate heat exchanger portfolio.

AlfaQ™ gasketed plate heat exchangers are available to meet most heat-transfer requirements – whether large or small – and include a three-year warranty, demonstrating our commitment to optimizing the performance of our customers' processes.

AlfaQ™ Series is the optimal choice when performance is crucial.

Insulation

Insulation

Insulation, designed for HVAC applications, is available for most gasketed plate heat exchanger models. There are two different types of insulation – heating and cooling insulation.

The reason for having two different types is that the mineral wool will be wet from condensing water if used when the heat exchanger temperature is lower than the surrounding temperature. Polyurethane is more expensive than mineral wool, but technically the cooling insulation can be used for heating duties as well.

Drip tray

The Alfa Laval drip tray insulates the heat exchanger from the floor, and it also collects any condensate formed on the outside of the heat exchanger. The drip tray also collects any remaining water (after drainage) in the gasketed plate heat exchanger when the unit is opened for inspection or maintenance. The drip tray consists of 0.75 mm hot galvanized steel plates, 50 mm polyurethane foam, supports of waterproof wood, and a draining valve.

Heating insulation
Heating insulation consists of 65 mm of mineral wool, cladded with a 1 mm aluminium sheet on the outside and aluminium foil on the inside. It covers all sides of the gasketed plate heat exchanger including the frame and pressure plate, except downwards. The different parts are held together with snap catches.

Cooling insulation
Cooling insulation consists of 60 mm of polyurethane, cladded with a 1 mm aluminium sheet on the outside and aluminium foil on the inside. It covers all sides of the gasketed plate heat exchanger including the frame and pressure plate, except down wards, where there is a galvanized drip tray. The different parts are held together with snap catches.

Protection sheet

A protection sheet is a device covering all sides of the plate pack except downwards. It is used to prevent persons from getting injured if a sudden leak of hot, corrosive or toxic media should occur. The Alfa Laval protection sheet consists of one or more aluminium or stainless-steel (AISI 304) sheet(s) formed to fit the gasketed plate heat exchanger.
On most frames the sheet is fitted between the plate pack and the tightening bolts.

Alfa Laval Service

Extending performance

Alfa Laval's global service network ensure optimal performance of your Alfa Laval equipment throughout its life cycle. To bring you maximum uptime and return on investment, our committed team draws on 130 years of process and application knowledge.

Our goal is to optimize the performance of your process by for instance redesigning your gasketed plate heat exchanger to match your new process requirements or reconditioning it to a good-as-new state, thus making sure to maximize uptime.

But we go even further. We also ensure our top-class service engineers are with you when and where you need them, at your site or in our service centres.

Complete 360° Service Portfolio for gasketed plate heat exchangers

Start-up
- Installation
- Commissioning

Maintenance
- Reconditioning
- Cleaning services
- Service tools
- Spare parts

Support
- Telephone support
- Exclusive stock
- Training
- Troubleshooting
- Technical documentation

Improvements
- Equipment upgrades
- Redesign
- Replacement & Retrofit

Monitoring
- Performance Audit
- Condition Audit

Reconditioning
Reconditioning your gasketed plate heat exchanger can extend its lifetime; minimize operational costs; ensure safety, quality and productivity; and satisfy new environmental legislation by improving energy efficiency.

You can choose from a number of predefined reconditioning packages, or customize a package from the complete list of Alfa Laval reconditioning services, to match your requirements for turnaround time, budget, brand and/or application.

Spare parts
Correct material quality can make a huge difference to your process. By using genuine Alfa Laval Spare Parts you can rest assured that the correct material is specified according to its intended use.

Alfa Laval genuine plates are made using a single-step pressing method ensuring uniform plate strength and thickness over the entire plate – dramatically reducing the risk of fatigue cracking.

Alfa Laval genuine rubber gaskets ensure tighter seals, longer life and more uptime for gasketed plate heat exchangers.

Uptime – skilled experts assist you with proper service that prevents unplanned interruptions, using certified materials.

Availability – we are committed to providing easy access to specialist support and the right parts for your Alfa Laval equipment.

Optimization – our innovative services and solutions are available to help your existing equipment adapt to your evolving needs.

Ten top tips

To keep your gasketed plate heat exchanger in tip top condition

1 Make sure that the operating conditions (temperatures and flow rates) comply with the design specifications.

2 At start-up, vent the heat exchanger but open and close the valves slowly to avoid pressure surges and water hammer.

3 Use upstream filters and strainers to remove particulate fouling and protect the heat exchanger.

4 On a daily basis check for any changes in temperature or pressure and check for any signs of external leaks.

5 On a regular basis keep the tightening bolts clean and well-lubricated.

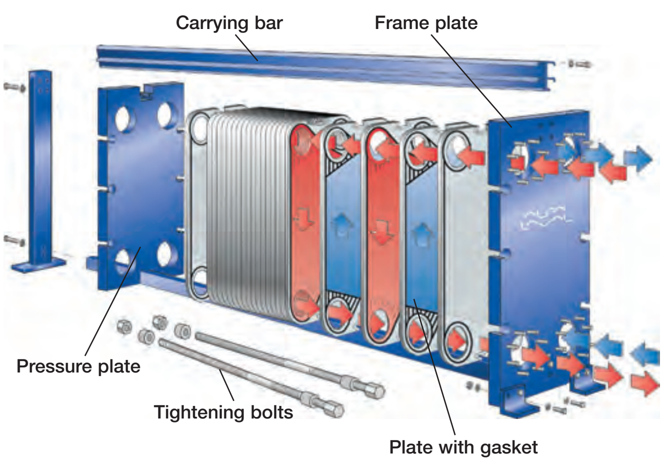
6 Use condition monitoring techniques to avoid having to open the gasketed plate heat exchanger for inspection.

7 Use Cleaning-In-Place (CIP) to avoid the need to open the heat exchanger for cleaning.

8 Always keep stand-by units clean and dry. If a heat exchanger is taken out of service, flush with fresh water and drain it completely.

9 Protect heat exchangers from water splash and rain. Avoid exposure to ultra violet rays and ozone typically generated from electrical sources.

10 Only use genuine spare parts for guaranteed performance, reliability and equipment life. Maintain a stock of essential spare parts and follow the storage instructions.

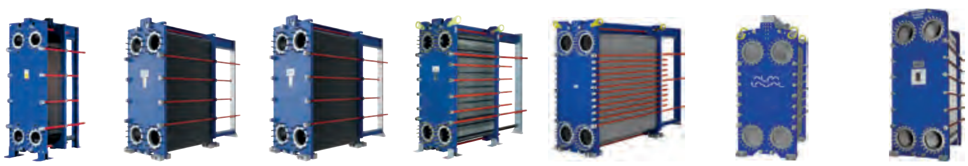


Alfa Laval Service
Extending Performance

Technical specifications Industrial line

Model	T2	M3	TL3	T5	M6	TL6	TS6
Max. flow rate kg/s/GPM	2/30	4/60	5/80	14/220	16/250	20/300	20/300
Max. temperature C° (PED) /F° (ASME)	180/-	180/300	180/350	180/350	180/350	180/350	180/350
Max. design pressure bar (PED) /psi (ASME)	16/-	16/150	16/150	16/150	25/300	25/300	25/300
Read all about it on page	6:17	6:19	6:21	6:23	6:25	6:27	6:29

Model	T8	M10	TL10	M15	TL15	TS20	T20
Max. flow rate kg/s/GPM	30/475	50/800	50/800	80/1300	120/1900	190/3040	225/3600
Max. temperature C° (PED) /F° (ASME)	180/350	180/350	180/350	180/350	180/350	180/350	180/350
Max. design pressure bar (PED) /psi (ASME)	16/150	25/300	25/400	30/300	30/400	30/400	30/400
Read all about it on page	6:31	6:33	6:35	6:37	6:39	6:41	6:43

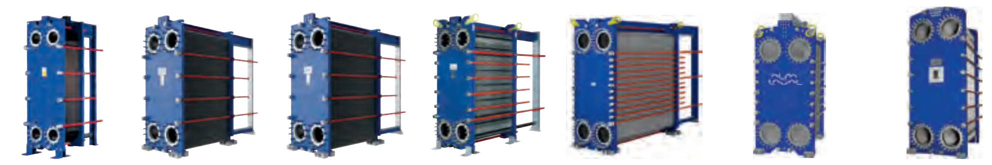


Model	MX25	TS35	T35	TL35	T45	TS50	T50
Max. flow rate kg/s/GPM	350/5600	550/8700	550/8700	650/10400	1000/16000	1300/20800	1300/20800
Max. temperature C° (PED) /F° (ASME)	180/350	180/350	180/350	180/350	250/350	180/350	180/350
Max. design pressure bar (PED) /psi (ASME)	30/400	25/400	25/400	30/400	16/250	25/300	25/300
Read all about it on page	6:45	6:47	6:49	6:51	6:53	6:55	6:57

Technical specifications AlfaQ

Model	AQ1A	AQ1	AQ1L	AQ2A	AQ2	AQ2L	AQ2S
Max. flow rate kg/s/GPM	2/30	4/60	5/80	14/220	16/250	20/300	20/300
Max. temperature C° (PED) /F° (ASME)	180/-	180/300	180/350	180/350	180/350	180/350	180/350
Max. design pressure bar (PED) /psi (ASME)	16/-	16/150	16/150	16/150	25/300	25/300	25/300
Read all about it on page	**6:59**	**6:61**	**6:63**	**6:65**	**6:67**	**6:69**	**6:71**

Model	AQ3	AQ4	AQ4L	AQ6	AQ6L	AQ8S	AQ8
Max. flow rate kg/s/GPM	30/475	50/800	50/800	80/1300	120/1900	190/3040	225/3600
Max. temperature C° (PED) /F° (ASME)	180/350	180/350	180/350	180/350	180/350	180/350	180/350
Max. design pressure bar (PED) /psi (ASME)	16/150	25/300	25/400	30/300	30/400	30/400	30/400
Read all about it on page	**6:73**	**6:75**	**6:77**	**6:79**	**6:81**	**6:83**	**6:85**



Model	AQ10	AQ14S	AQ14	AQ14L	AQ18	AQ20S	AQ20
Max. flow rate kg/s/GPM	350/5600	550/8700	550/8700	650/10400	1000/16000	1300/20800	1300/20800
Max. temperature C° (PED) /F° (ASME)	180/350	180/350	180/350	180/350	250/350	180/350	180/350
Max. design pressure bar (PED) /psi (ASME)	30/400	25/400	25/400	30/400	16/250	25/300	25/300
Read all about it on page	**6:87**	**6:89**	**6:91**	**6:93**	**6:95**	**6:97**	**6:99**

Alfa Laval T2

Gasketed plate-and-frame heat exchanger

T2B-FG

Applications
General heating and cooling duties.

Standard design
The plate heat exchanger consists of a pack of corrugated metal plates with portholes for the passage of the two fluids between which heat transfer will take place.

The plate pack is assembled between a fix frame plate and a movable pressure plate and compressed by tightening bolts. The plates are fitted with a gasket which seals the interplate channel and directs the fluids into alternate channels. The number of plates is determined by the flow rate, physical properties of the fluids, pressure drop and temperature program. The plate corrugations promote fluid turbulence and support the plates against differential pressure.

The plate and the pressure plate are suspended from an upper carrying bar and located by a lower guiding bar.

Connections are located in the frame plate or, if either or both fluids make more than a single pass within the unit, in the frame and pressure plates.

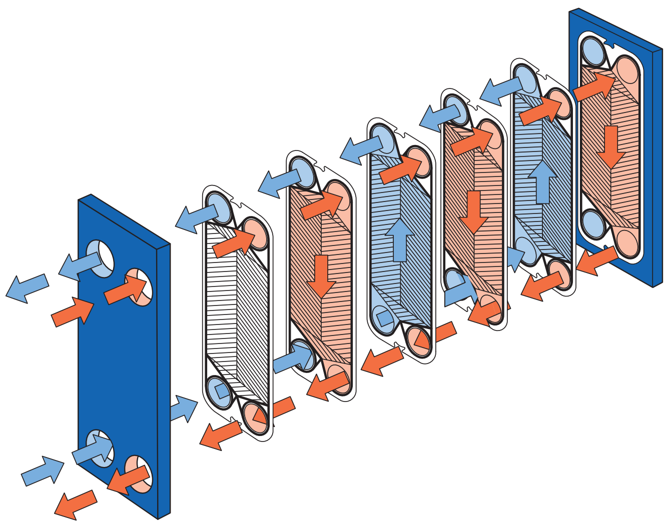
Typical capacities

Liquid flow rate
Up to 2 kg/s (30 gpm), depending on media, permitted pressure drop and temperature program.

Plate types
T2-B

Frame types
FG

Working principle
Channels are formed between the plates and the corner ports are arranged so that the two media flow through alternate channels. The heat is transferred through the plate between the channels, and complete counter-current flow is created for highest possible efficiency. The corrugation of the plates provides the passage between the plates, supports each plate against the adjacent one and enhances the turbulence, resulting in efficient heat transfer.



Flow principle of a plate heat exchanger

STANDARD MATERIALS

Frame plate
Mild steel, Epoxy painted

Nozzles
Pipe: Stainless steel, Titanium

Plates
Stainless steel Alloy 316, Titanium

Gaskets
Nitrile, EPDM

TECHNICAL DATA

Pressure vessel code pvcALS™

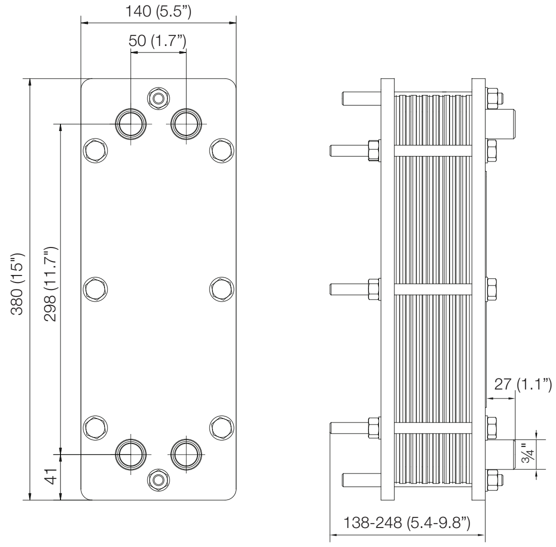
Mechanical design pressure (g) / temperature
FG 1.6 MPa / 180°C

Maximum heat transfer surface
1.0 m² (10.76 sq. ft)

Connections
Straight pipe thread ISO-R ¾"

Particulars required for quotation
- Flow rates or heat load
- Temperature program
- Physical properties of liquids in question (if not water)
- Desired working pressure
- Maximum permitted pressure drop

Dimensions mm (inch)



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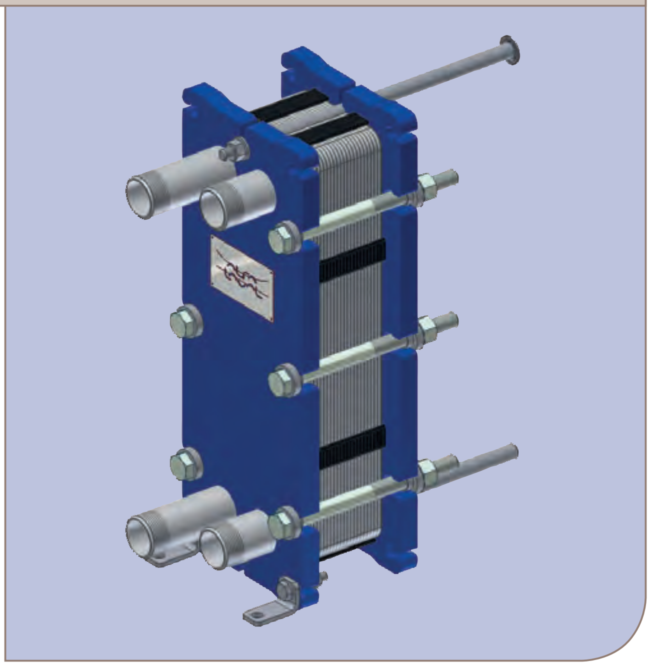
Alfa Laval M3

Gasketed plate-and-frame heat exchanger



M3-FG

Applications
General heating and cooling duties. Heating by means of steam.

Standard design
The plate heat exchanger consists of a pack of corrugated metal plates with portholes for the passage of the two fluids between which heat transfer will take place.

The plate pack is assembled between a fix frame plate and a movable pressure plate and compressed by tightening bolts. The plates are fitted with a gasket which seals the interplate channel and directs the fluids into alternate channels. The number of plates is determined by the flow rate, physical properties of the fluids, pressure drop and temperature program. The plate corrugations promote fluid turbulence and support the plates against differential pressure.

The plate and the pressure plate are suspended from an upper carrying bar and located by a lower guiding bar.

Connections are located in the frame plate or, if either or both fluids make more than a single pass within the unit, in the frame and pressure plates.

Typical capacities
Liquid flow rate
Up to 4 kg/s (60 gpm), depending on media, permitted pressure drop and temperature program.

Plate types
M3 and M3-X, where M3 provides parallel and M3-X diagonal flow (see figures on the next page).
M3D, double wall plates.

Frame types
FG

Water heating by steam
50 to 250 kw

Working principle
Channels are formed between the plates and the corner ports are arranged so that the two media flow through alternate channels. The heat is transferred through the plate between the channels, and complete counter-current flow is created for highest possible efficiency. The corrugation of the plates provides the passage between the plates, supports each plate against the adjacent one and enhances the turbulence, resulting in efficient heat transfer.

STANDARD MATERIALS
Frame plate
Mild steel, Epoxy painted

Nozzles
Carbon steel
Pipe: Stainless steel, Titanium

Plates
Stainless steel Alloy 316, Titanium

Gaskets (Clip-on)
Nitrile, EPDM, Viton®
Other grades and material available on request.

TECHNICAL DATA

Pressure vessel codes PED, ASME, pvcALS™
Mechanical design pressure (g) / temperature

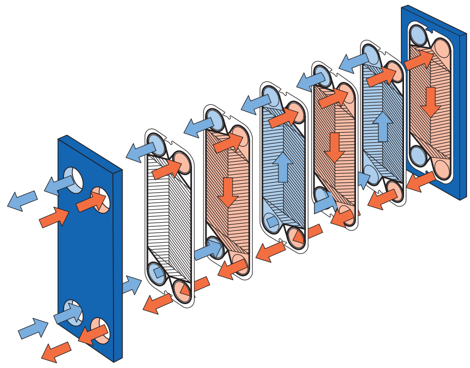
FG	PED, pvcALS™	1.6 MPa / 180°C
FG	ASME	150 psig / 350°F

Maximum heat transfer surface
3.9 m^2 (40 sq. ft)

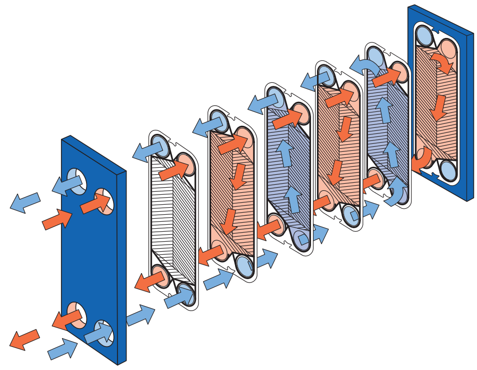
Connections

FG	PED	Size 1¼"	Pipe, thread ISO-R 1¼"
FG	pvcALS™	Size 1¼"	Pipe, thread ISO-R 1¼"
FG	pvcALS™	Size 1¼"	Internal thread ISO-G 1¼", carbon steel
FG	ASME	Size 1¼"	Pipe, thread NPT 1¼"

Particulars required for quotation
- Flow rates or heat load
- Temperature program
- Physical properties of liquids in question (if not water)
- Desired working pressure
- Maximum permitted pressure drop
- Available steam pressure

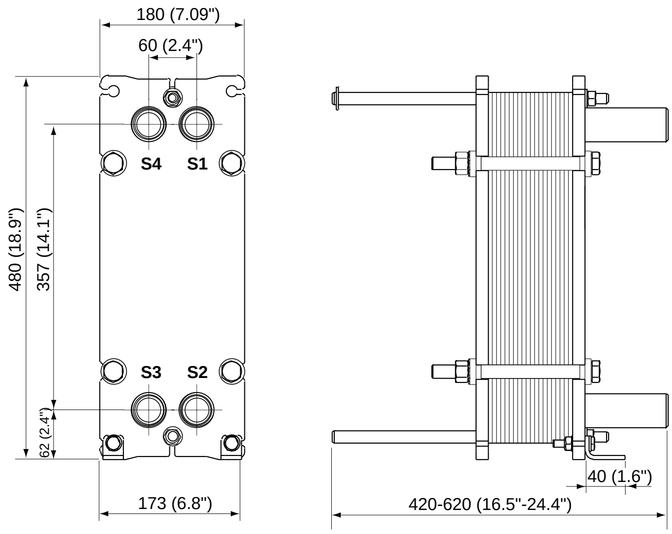


Flow principle of an M3 plate heat exchanger



Flow principle of an M3X plate heat exchanger

Dimensions



Measurements mm (inch)
The number of bolts may vary depending on pressure rating.

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Alfa Laval TL3

Gasketed plate-and-frame heat exchanger

TL3-FG

Applications
General heating and cooling duties.

Standard design
The plate heat exchanger consists of a pack of corrugated metal plates with portholes for the passage of the two fluids between which heat transfer will take place.

The plate pack is assembled between a fix frame plate and a movable pressure plate and compressed by tightening bolts. The plates are fitted with a gasket which seals the interplate channel and directs the fluids into alternate channels. The number of plates is determined by the flow rate, physical properties of the fluids, pressure drop and temperature program. The plate corrugations promote fluid turbulence and support the plates against differential pressure.

The plate and the pressure plate are suspended from an upper carrying bar and located by a lower guiding bar.

Connections are located in the frame plate or, if either or both fluids make more than a single pass within the unit, in the frame and pressure plates.

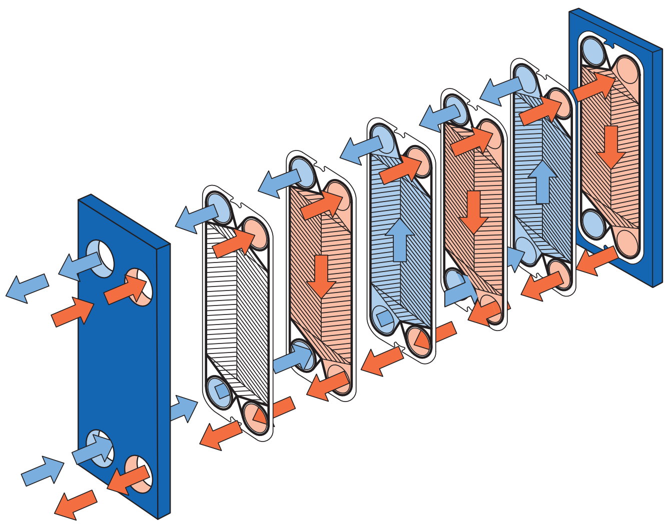
Typical capacities

Liquid flow rate
Up to 5 kg/s (80 gpm), depending on media, permitted pressure drop and temperature program.

Plate types
TL3-B, TL3-P
TL3-BD, double wall plates

Frame types
FG

Working principle
Channels are formed between the plates and the corner ports are arranged so that the two media flow through alternate channels. The heat is transferred through the plate between the channels, and complete counter-current flow is created for highest possible efficiency. The corrugation of the plates provides the passage between the plates, supports each plate against the adjacent one and enhances the turbulence, resulting in efficient heat transfer.



Flow principle of a plate heat exchanger

STANDARD MATERIALS

Frame plate
Mild steel, Epoxy painted

Nozzles
Carbon steel
Pipe: Stainless steel, Titanium

Plates
Stainless steel: Alloy 316 / Alloy 304, Titanium, Alloy 254 SMO.

Gaskets
Nitrile, EPDM, Viton®
Other grades and material available on request.

TECHNICAL DATA

Pressure vessel codes PED, ASME, pvcALS™

Mechanical design pressure (g) / temperature

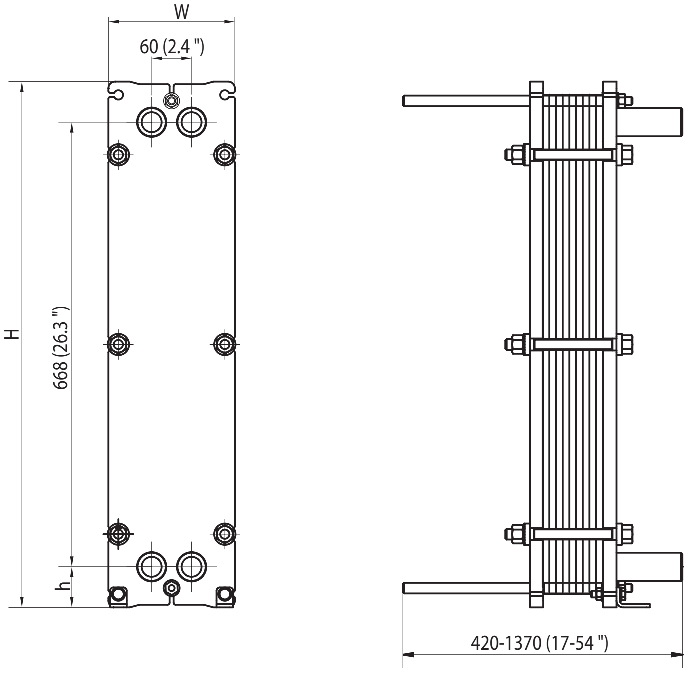
FG	pvcALS™	1.6 MPa / 180ºC
FG	PED	1.6 MPa / 180ºC
FG	ASME	150 psig / 356ºF

Maximum heat transfer surface
10.9 m² (117.3 sq.ft)

Connections

FG	PED	Size 1¼”	Pipe, thread ISO-R 1¼”
FG	pvcALS™	Size 1¼”	Pipe, thread ISO-R 1¼” and NPT 1¼”
FG	pvcALS™	Size 1¼”	Internal thread ISO-G 1¼”, carbon steel
FG	ASME	Size 1¼”	Pipe, thread NPT 1¼”

Dimensions



Measurements mm (inch)

Type	H	W	h
TL3-FG	790 (31.1")	190 (7.5")	61 (2.4")

Particulars required for quotation
- Flow rates or heat load
- Temperature program
- Physical properties of liquids in question (if not water)
- Desired working pressure
- Maximum permitted pressure drop

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Alfa Laval T5

Gasketed plate-and-frame heat exchanger

T5-FG

Applications
General heating and cooling duties.

Standard design
The plate heat exchanger consists of a pack of corrugated metal plates with portholes for the passage of the two fluids between which heat transfer will take place.

The plate pack is assembled between a fix frame plate and a movable pressure plate and compressed by tightening bolts. The plates are fitted with a gasket which seals the interplate channel and directs the fluids into alternate channels. The number of plates is determined by the flow rate, physical properties of the fluids, pressure drop and temperature program. The plate corrugations promote fluid turbulence and support the plates against differential pressure.

The plate and the pressure plate are suspended from an upper carrying bar and located by a lower guiding bar.

Connections are located in the frame plate or, if either or both fluids make more than a single pass within the unit, in the frame and pressure plates.

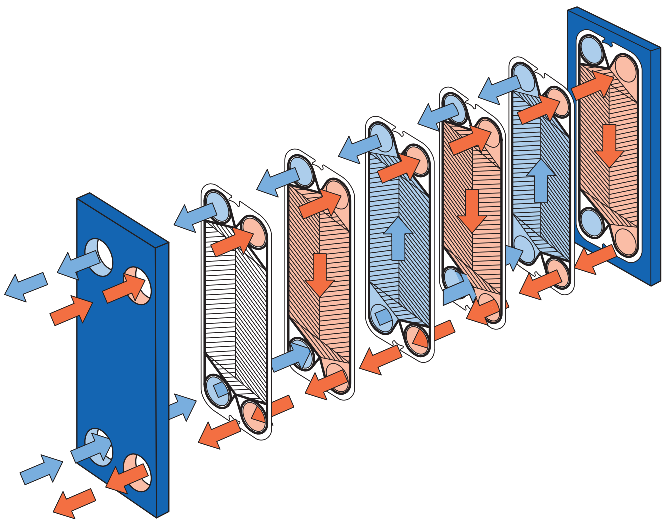
Typical capacities

Liquid flow rate
Up to 14 kg/s (222 gpm), depending on media, permitted pressure drop and temperature program.

Plate types
T5-B, T5-M

Frame types
FG

Working principle
Channels are formed between the plates and the corner ports are arranged so that the two media flow through alternate channels. The heat is transferred through the plate between the channels, and complete counter-current flow is created for highest possible efficiency. The corrugation of the plates provides the passage between the plates, supports each plate against the adjacent one and enhances the turbulence, resulting in efficient heat transfer.



Flow principle of a plate heat exchanger

STANDARD MATERIALS

Frame plate
Mild steel, Epoxy painted

Nozzles
Carbon steel
Pipe: Stainless steel, titanium

Plates
Stainless steel Alloy 316 / Alloy 304
Titanium

Gaskets
Nitrile, EPDM

TECHNICAL DATA

Pressure vessel codes PED, ASME, pvcALS™
Mechanical design pressure (g) / temperature

FG	pvcALS™	1.6 MPa / 180ºC
FG	PED	1.6 MPa / 160ºC
FG	ASME	150 psig / 356ºF

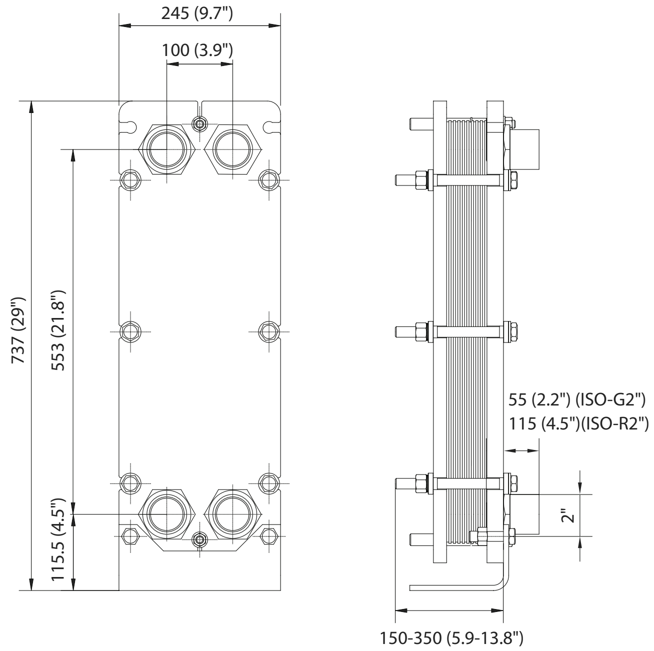
Maximum heat transfer surface

T5-B	7.1 m² (76.4 sq.ft)
T5-M	4.4 m² (47.4 sq.ft)

Connections

Straight threaded	Size 50 mm ISO G2"
Tapered threaded	Size 50 mm ISO R2", NPT2"
Threaded inlet port	Size 50 mm ISO-G2"

Dimensions



Measurements mm (inch)

Type	H	W	h
T5-FG	737 (29.0")	245 (9.6")	115.5 (4.5")

Particulars required for quotation
- Flow rates or heat load
- Temperature program
- Physical properties of liquids in question (if not water)
- Desired working pressure
- Maximum permitted pressure drop

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Alfa Laval M6

Gasketed plate-and-frame heat exchanger

M6-FG

Applications
General heating and cooling duties. Heating by means of steam.

Standard design
The plate heat exchanger consists of a pack of corrugated metal plates with portholes for the passage of the two fluids between which heat transfer will take place.

The plate pack is assembled between a fix frame plate and a movable pressure plate and compressed by tightening bolts. The plates are fitted with a gasket which seals the interplate channel and directs the fluids into alternate channels. The number of plates is determined by the flow rate, physical properties of the fluids, pressure drop and temperature program. The plate corrugations promote fluid turbulence and support the plates against differential pressure.

The frame plate and the pressure plate are suspended from an upper carrying bar and located by a lower guiding bar, both of which are fixed to a support column.

Connections are located in the frame plate or, if either or both fluids make more than a single pass within the unit, in the frame and pressure plates.

Typical capacities

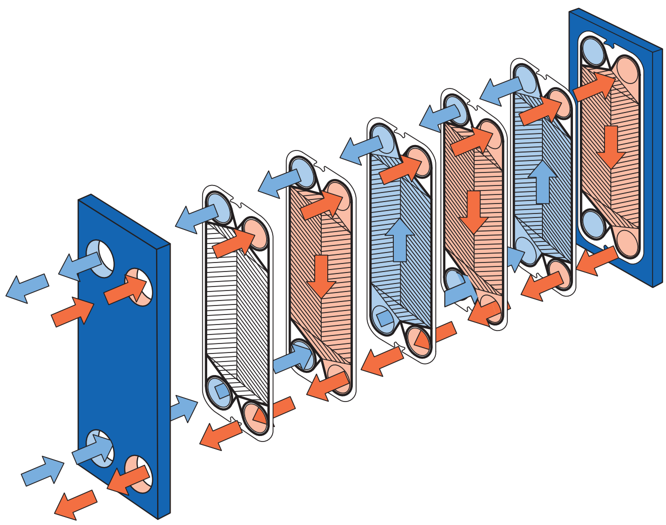
Liquid flow rate
Up to 16 kg/s (250 gpm), depending on media, permitted pressue drop and temperature program.

Water heating by steam
300 to 800 kW

Plate types
M6, M6-M and M6-MD

Frame types
FM, FG and FD

Working principle
Channels are formed between the plates and the corner ports are arranged so that the two media flow through alternate channels. The heat is transferred through the plate between the channels, and complete counter-current flow is created for highest possible efficiency. The corrugation of the plates provides the passage between the plates, supports each plate against the adjacent one and enhances the turbulence, resulting in efficient heat transfer.



Flow principle of a plate heat exchanger

STANDARD MATERIALS

Frame plate
Mild steel, Epoxy painted

Nozzles
Carbon steel
Metal lined: Stainless steel, Titanium, Alloy 254 SMO, Alloy C276
Rubber lined: Nitrile, EPDM

Plates
Stainless steel: Alloy 316, Alloy 304. Alloy 254 SMO, Alloy C276, Titanium

Gaskets
Nitrile, EPDM, Viton®
Other grades and material available on request.

TECHNICAL DATA

Pressure vessel codes, PED, ASME, pvcALS™
Mechanical design pressure (g) / temperature

FM	pvcALS™	1.0 MPa / 180°C
FG	PED	1.6 MPa / 180°C
FG	ASME	162 psig / 482°F
FG	pvcALS™	1.6 MPa / 180°C
FD	PED, pvcALS™	2.5 MPa / 180°C
FD	ASME	351 psig / 482°F

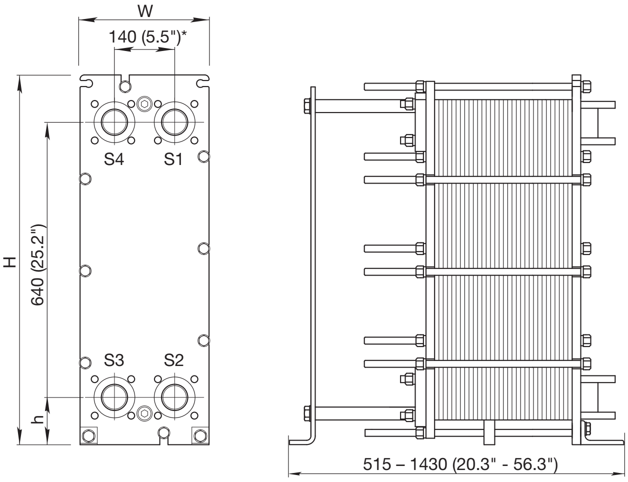
Connections
Pipe connections (not for frame type FD)

	Size:	
Straight threaded	50 mm	ISO G2"
Tapered threaded	50 mm	ISO R2", NPT2"
Straight weld	50 mm	
Threaded inlet port	50 mm	ISO G2"
Grooved pipe	50 mm	2"

Flange connections

		Size:	
FM	pvcALS™	50 mm	DIN/GB/GOST PN10, ASME Cl. 150, JIS 10K
FG	PED	50 mm	DIN PN16, ASME Cl. 150
FG	ASME	2"	ASME Cl. 150
FG	pvcALS™	50 mm	DIN/GB/GOST PN16, ASME Cl. 150, JIS 16K
FD	PED	50 mm	DIN PN25, ASME Cl. 300
FD	ASME	2"	ASME Cl. 300
FD	ALS	50 mm	DIN, GB, GOST PN25, JIS 20K

Dimensions



* Displacement of some connection types occur.

Measurements mm (inch)

Type	H	W	h
M6-FM	920 (36.2")	320 (12.6")	140 (5.5")
M6-FG	920 (36.2")	320 (12.6")	140 (5.5")
M6-FD	940 (37.0")	330 (13.0")	150 (5.9")

The number of tightening bolts may vary depending on pressure rating.

Maximum heat transfer surface
38 m² (400 sq. ft)

Particulars required for quotation
- Flow rates or heat load
- Temperature program
- Physical properties of liquids in question (if not water)
- Desired working pressure
- Maximum permitted pressure drop
- Available steam pressure

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Alfa Laval TL6

Gasketed plate-and-frame heat exchanger

TL6-FG

Applications
General heating and cooling duties.

Standard design
The plate heat exchanger consists of a pack of corrugated metal plates with portholes for the passage of the two fluids between which heat transfer will take place.

The plate pack is assembled between a fix frame plate and a movable pressure plate and compressed by tightening bolts. The plates are fitted with a gasket which seals the interplate channel and directs the fluids into alternate channels. The number of plates is determined by the flow rate, physical properties of the fluids, pressure drop and temperature program. The plate corrugations promote fluid turbulence and support the plates against differential pressure.

The plate and the pressure plate are suspended from an upper carrying bar and located by a lower guiding bar, both of which are fixed to a support column.

Connections are located in the frame plate or, if either or both fluids make more than a single pass within the unit, in the frame and pressure plates.

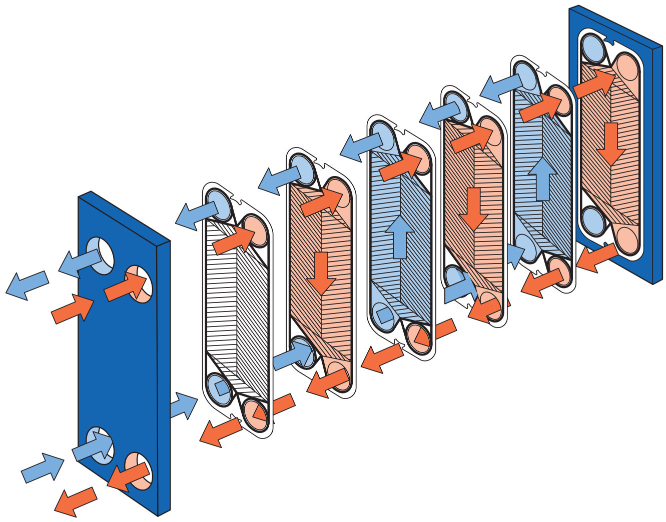
Typical capacities

Liquid flow rate
Up to 20 kg/s (317 gpm), depending on media, permitted pressure drop and temperature program.

Plate types
TL6-B

Frame types
FM, FG and FD

Working principle
Channels are formed between the plates and the corner ports are arranged so that the two media flow through alternate channels. The heat is transferred through the plate between the channels, and complete counter-current flow is created for highest possible efficiency. The corrugation of the plates provides the passage between the plates, supports each plate against the adjacent one and enhances the turbulence, resulting in efficient heat transfer.



Flow principle of a plate heat exchanger

STANDARD MATERIALS

Frame plate
Mild steel, Epoxy painted

Nozzles
Carbon steel
Metal lined: Stainless steel, Titanium
Rubber lined: Nitrile, EPDM
Pipe: Stainless steel

Plates
Stainless steel Alloy 316 / Alloy 304, Titanium, Alloy 254 SMO, Alloy C276

Gaskets
Nitrile, EPDM, Viton®
Other grades and material available on request

TECHNICAL DATA

Pressure vessel codes, PED, ASME, pvcALS™

Mechanical design pressure (g) / temperature

FM	pvcALS™	1.0 MPa / 180ºC
FM	PED	1.0 MPa / 180ºC
FG	pvcALS™	1.6 MPa / 180ºC
FG	PED	1.6 MPa / 180ºC
FG	ASME	150 psig / 482ºF
FD	pvcALS™	2.5 MPa / 180ºC
FD	PED	2.5 MPa / 180ºC
FD	ASME	300 psig / 482ºF

Connections

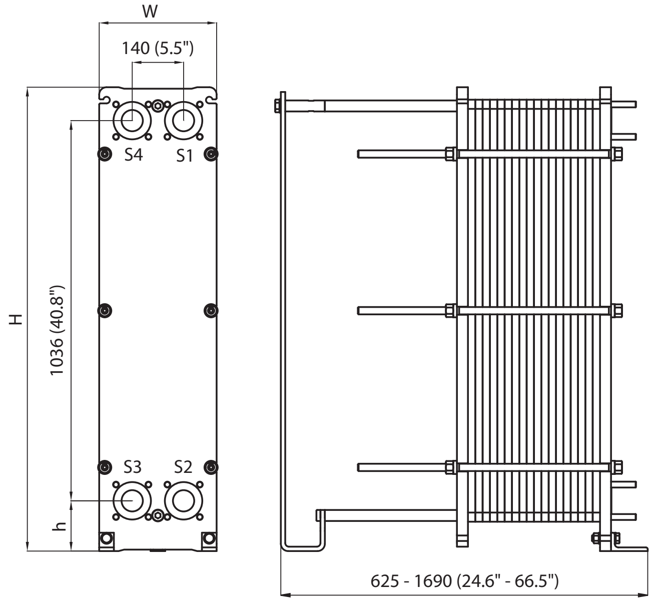
Pipe connections (not for frame type FD)

Straight threaded	Size 50 mm	ISO G2”, NPT 2”
Threaded inlet port	Size 50 mm	ISO G2”

Flange connections

		Size:	
FM	pvcALS™	50/65 mm	DIN/GB/GOST PN16, ASME Cl.150, JIS 10K
FM	PED	50/65 mm	DIN PN16, ASME Cl. 150
FG	pvcALS™	50/65 mm	DIN/GB/GOST PN16, ASME Cl. 150, JIS 10K, JIS 16K
FG	PED	50/65 mm	DIN PN16, ASME Cl. 150
FG	ASME	2-2½” in	ASME Cl.150
FD	pvcALS™	50/65 mm	DIN/GB/GOST PN40, ASME Cl.300, JIS 20K
FD	PED	50/65 mm	DIN PN40, ASME Cl. 300
FD	ASME	2-2½” in	ASME Cl. 300

Dimensions



Measurements mm (inch)

Type	H	W	h
TL6-FM / PED / pvcALS™	1264 (49.8")	320 (12.6")	137 (5.4")
TL6-FG / PED / pvcALS™	1264 (49.8")	320 (12.6")	137 (5.4")
TL6-FG / ASME	1299 (51.1")	320 (12.6")	142 (5.6")
TL6-FD / PED / pvcALS™	1264 (49.8")	330 (13.0")	137 (5.4")
TL6-FD / ASME	1308 (51.5")	330 (13.0")	142 (5.6")

The number of tightening bolts may vary depending on pressure rating.

Maximum heat transfer surface
102.0 m² (1097 sq.ft)

Particulars required for quotation
- Flow rates or heat load
- Temperature program
- Physical properties of liquids in question (if not water)
- Desired working pressure
- Maximum permitted pressure drop

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Alfa Laval TS6

Gasketed plate-and-frame heat exchanger

TS6-MFG

Applications
General heating and cooling duties. Heating by means of steam.

Standard design
The plate heat exchanger consists of a pack of corrugated metal plates with portholes for the passage of the two fluids between which heat transfer will take place.

The plate pack is assembled between a fix frame plate and a movable pressure plate and compressed by tightening bolts. The plates are fitted with a gasket which seals the interplate channel and directs the fluids into alternate channels. The number of plates is determined by the flow rate, physical properties of the fluids, pressure drop and temperature program. The plate corrugations promote fluid turbulence and support the plates against differential pressure.

The plate and the pressure plate are suspended from an upper carrying bar and located by a lower guiding bar, both of which are fixed to a support column.

Connections are located in the frame plate or, an additional auxiliary connection for steam may be mounted on the pressure plate to handle high capacities.

Typical capacities
Liquid flow rate
Up to 20 kg/s (300 gpm), depending on media, permitted

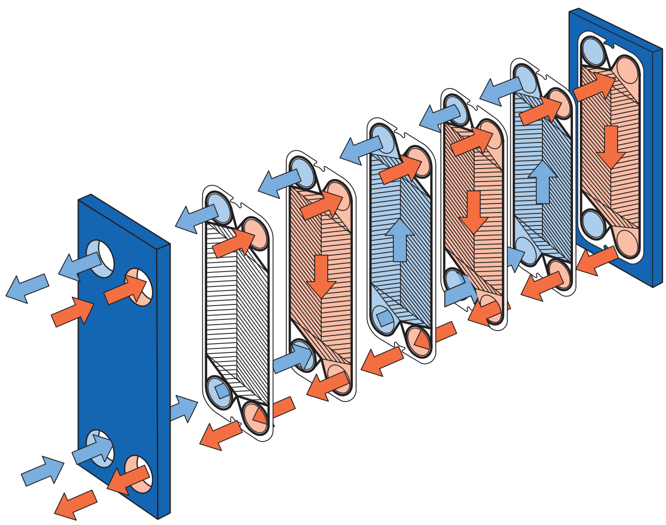
pressue drop and temperture program.

Water heating by steam
200-1800 kW

Plate types
TS6-M

Frame types
FG and FD

Working principle
Channels are formed between the plates and the corner ports are arranged so that the two media flow through alternate channels. The heat is transferred through the plate between the channels, and complete counter-current flow is created for highest possible efficiency. The corrugation of the plates provides the passage between the plates, supports each plate against the adjacent one and enhances the turbulence, resulting in efficient heat transfer.



Flow principle of a plate heat exchanger

STANDARD MATERIALS

Frame plate
Mild steel, Epoxy painted

Nozzles
Carbon steel
Metal lined: Stainless steel, Titanium

Plates
Stainless steel Alloy 316, Titanium

Gaskets
Nitrile, EPDM, Viton®
Other grades and material available on request.

TECHNICAL DATA

Pressure vessel codes, PED, ASME, pvcALS™
Mechanical design pressure (g) / temperature

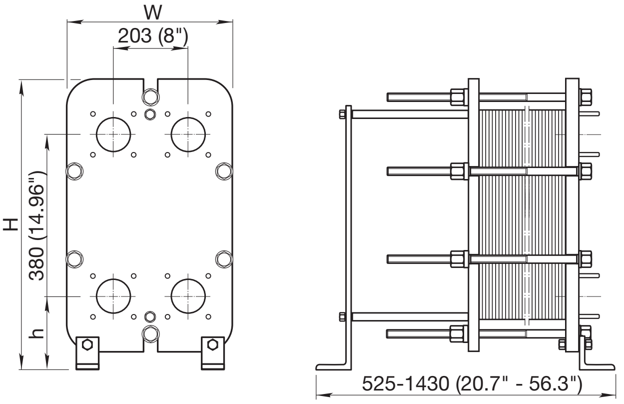
FG	PED	1.6 MPa / 180°C *)
FG	pvcALS™	1.6 MPa / 180°C
FG	ASME	207 psig / 482°F
FD	PED	2.5 MPa / 180°C
FD	ASME	300 psig / 482°F

*) Frame FG also approved for 1.2 MPa / 200ºC to allow use in steam systems without safety valves.

Connections

	Size:	
FG PED	DN65, NPS 3	DIN PN16, ASME Cl. 150
FG pvcALS™	DN65, NPS 3, 65A	DIN/GB/GOST PN16, JIS 10 K, JIS 16 K
FG ASME	NPS 3	ASME Cl. 150
FD PED	DN65, NPS 2½	DIN PN25, ASME Cl. 300
FD pvcALS™	DN65, NPS 2½, 65A	DIN/GB/GOST PN25, JIS 10 K, JIS 20 K
FD ASME	NPS 2½"	ASME Cl. 300

Dimensions



Measurements mm (inch)

Type	H	W	h
TS6-FG	704 (27.7")	400 (15.7")	188 (7.4")
TS6-FD	704 (27.7")	410 (16.1")	188 (7.4")

The number of tightening bolts may vary depending on pressure rating.

Maximum heat transfer surface

13 m^2 (140 sq. ft)

Particulars required for quotation

- Flow rates or heat load
- Temperature program
- Physical properties of liquids in question (if not water)

EPM00002EN 1505

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Alfa Laval T8

Gasketed plate-and-frame heat exchanger

Application
The Alfa Laval industrial line of plate heat exchangers is well suited for a wide range of heating and cooling duties.

Benefits
- High serviceability - Easy to open
- Compact design
- Easy to install
- Flexible heat transfer area configuration
- High energy efficiency - Low operating cost

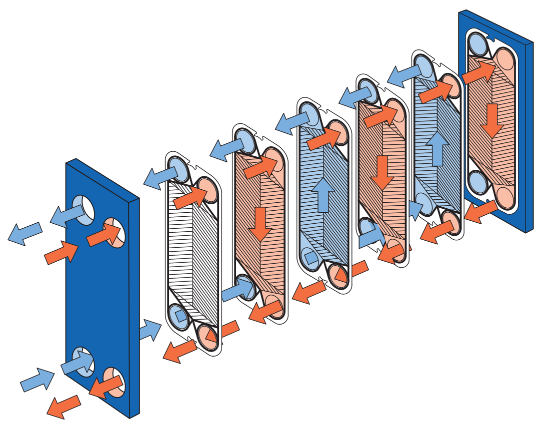
Design
The plate heat exchanger consists of a package of corrugated metal plates with portholes for the passage of the two fluids between which heat transfer will take place.

The number of plates is determined by the flow rates, physical properties of the fluids, pressure drops and temperature program. The plate corrugations promote fluid turbulence and support the plates against differential pressure.

The materials of gaskets are selected for safe use depending on media type and temperature. The attachment of the gasket rings is glue-free, which makes them easy to replace even with the plates still hanging in the frame.

The carrying bar and guiding bar are fixed to the stationary frame plate and the supporting column. The pressure plate and plate package is movable along the upper carrying bar and located by the lower guiding bar. Connections are located in the frame plate. Depending on the application, connections can also be located in the pressure plate.

Working principle
Channels are formed between the plates and the corner ports are arranged so that the two media flow through alternate channels. The heat is transferred through the plates between the channels. Complete counter-current or co-current flow, depending on the application, is created for highest possible efficiency. The corrugation of the plates provides the passage between the plates, supports each plate against the adjacent one and enhances the turbulence, resulting in efficient heat transfer.



Flow principle of a plate heat exchanger.

STANDARD MATERIALS

Frame plate
Mild steel, epoxy painted

Connections
Metal lined: Stainless steel and Titanium.
Rubber lined: Nitrile (FM only)

Plates
Stainless steel Alloy 304, Alloy 316 and Titanium

Gaskets
Field gaskets:	Nitrile, EPDM
Ring gaskets:	Nitrile, EPDM

Other grades and materials available upon request.

TECHNICAL DATA

Design pressure (g)

FM	pvcALS™	1.034 MPa
FM	PED	1.034 MPa
FG	pvcALS™	1.60 MPa
FG	PED	1.60 MPa
FG	ASME	150 psi

Design temperature
Determined by gasket material.

Plate types
T8-B and T8-M

Connection size
DN80 / NPS 3 / 80A

Maximum heat transfer surface
35 m^2 (377 sqft)

Maximum liquid flow rates
Up to 30 kg/s (475 gpm), depending on media, permitted pressure drop and temperature program.

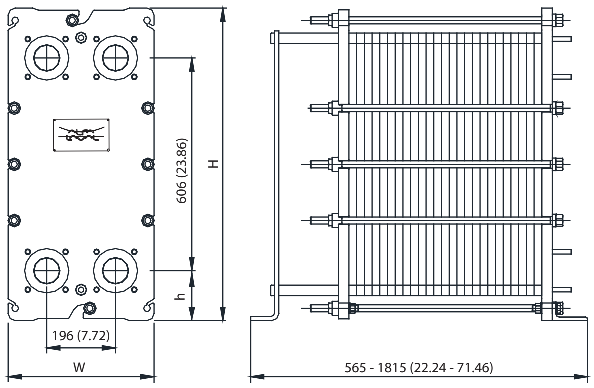
Connection standard

FM	pvcALS™	EN 1092-1 PN10, ASME B16.5 Class 150, JIS B2220 10K
FM	PED	EN 1092-1 PN10, ASME B16.5 Class 150
FG	pvcALS™	EN 1092-1 PN16 and PN10, ASME B16.5 Class 150, JIS B2220 16K and 10K
FG	PED	EN 1092-1 PN16, ASME B16.5 Class 150
FG	ASME	ASME B16.5 Class 150

Standard EN 1092-1 corresponds to GOST 12815-80 and GB/T 9115.

Particulars required for quotation
To receive a quotation for plate heat exchangers that meet your requirements, please provide Alfa Laval representatives with:

- Flow rates or heat load
- Temperature program
- Physical properties of liquids in question (if not water)
- Design pressure and design temperature
- Maximum permitted pressure drop



Measurements mm (inch)

Type	H	W	h
T8-FM (ALS,PED,ASME)	890 (35.04)	400 (15.78)	142 (5.59)
T8-FG (ALS,PED)	890 (35.04)	400 (15.78)	142 (5.59)
T8-FG (ASME)	890 (35.04)	416 (16.38)	142 (5.59)

The number of tightening bolts may vary depending on type.

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Alfa Laval M10

Gasketed plate-and-frame heat exchanger

M10-BFG

Applications
General heating and cooling duties. Heating by means of steam.

Standard design
The plate heat exchanger consists of a pack of corrugated metal plates with portholes for the passage of the two fluids between which heat transfer will take place.

The plate pack is assembled between a fix frame plate and a movable pressure plate and compressed by tightening bolts. The plates are fitted with a gasket which seals the interplate channel and directs the fluids into alternate channels. The number of plates is determined by the flow rate, physical properties of the fluids, pressure drop and temperature program. The plate corrugations promote fluid turbulence and support the plates against differential pressure.

The plate and the pressure plate are suspended from an upper carrying bar and located by a lower guiding bar, both of which are fixed to a support column.

Connections are located in the frame plate or, if either or both fluids make more than a single pass within the unit, in the frame and pressure plates.

Typical capacities

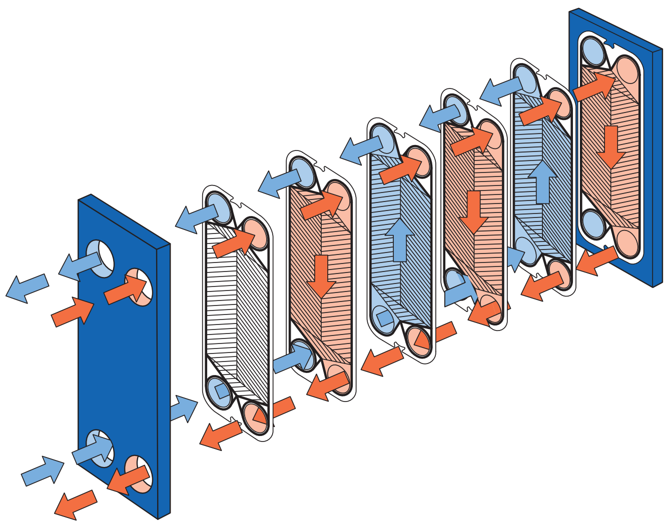
Liquid flow rate
Up to 50 kg/s (800 gpm), depending on media, permitted pressure drop and temperature program.

Water heating by steam
0.7 to 3.0 MW

Plate types
M10-B, M10-M and M10-BD, double wall plates.

Frame types
FM, FG and FD

Working principle
Channels are formed between the plates and the corner ports are arranged so that the two media flow through alternate channels. The heat is transferred through the plate between the channels, and complete counter-current flow is created for highest possible efficiency. The corrugation of the plates provides the passage between the plates, supports each plate against the adjacent one and enhances the turbulence, resulting in efficient heat transfer.



Flow principle of a plate heat exchanger

STANDARD MATERIALS

Frame plate
Mild steel, Epoxy painted

Nozzles
Carbon steel
Metal lined: Stainless steel, Titanium
Rubber lined: Nitrile, EPDM

Plates
Stainless steel Alloy 316/Alloy 304, Titanium, Alloy 254 SMO, Alloy C276

Gaskets (Clip-on, glued)
Nitrile, EPDM, Viton®
Other grades and material available on request.

TECHNICAL DATA

Pressure vessel codes, PED, ASME, pvcALS™
Mechanical design pressure (g) / temperature

FL pvcALS™	0.6 MPa / 130ºC
FM pvcALS™	1.0 MPa / 180ºC
FM PED	1.0 MPa / 180ºC
FG pvcALS™	1.6 MPa / 180ºC
FG PED	1.6 MPa / 180ºC *
FG ASME	150 psig / 356ºF
FD PED pvsALS™	2.5 MPa / 180ºC
FD ASME	389 psig / 482ºF

*) Frame FG also approved for 1.2 MPa / 200°C to allow use in steam systems without safety valves.

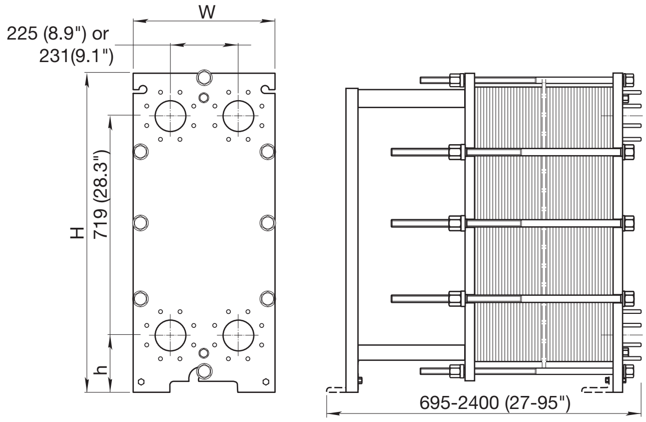
Connections

Size: DN100 / NPS 4 / 100A

FL	pvcALS™	EN 1092-1 PN10, JIS B2220 10K
FM	pvcALS™	EN 1092-1 PN10, ASME B16.5 Class 150, JIS B2220 10K,
FM	PED	EN 1092-1 PN10, ASME B16.5 Class 150
FG	pvcALS™	EN 1092-1 PN16, ASME B16.5 Class 150, JIS B2220 10K, JIS B2220 16K,
FG	PED	EN 1092-1 PN16, ASME B16.5 Class 150
FG	ASME	ASME B16.5 Class 150
FD	PED	EN 1092-1 PN25, ASME B16.5 Class 150, ASME B16.5 Class 300
FD	ASME	ASME B16.5 Class 300

Standard EN 1092-1 corresponds to GOST 12815-80 and GB/T 9115.

Dimensions



Measurements mm (inch)

Type	H	W	h
M10-FM	1084 (42.7")	470 (18.5")	215 (8.5")
M10-FG	1084 (42.7")	470 (18.5")	215 (8.5")
M10-FD	981 (38.6")	470 (18.5")	131 (5.2")
M10-FD ASME	1084 (42.7")	470 (18.5")	215 (8.5")

The number of tightening bolts may vary depending on pressure rating.

Maximum heat transfer surface

M10-B 90 m^2 (970 sq. ft)
M10-M 60 m^2 (650 sq. ft)

Particulars required for quotation

- Flow rates or heat load
- Temperature program
- Physical properties of liquids in question (if not water)
- Desired working pressure
- Maximum permitted pressure drop
- Available steam pressure

PCT00099EN 1505

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Alfa Laval TL10

Gasketed plate-and-frame heat exchanger

TL10-BFG

Applications
General heating and cooling duties.

Standard design
The plate heat exchanger consists of a pack of corrugated metal plates with portholes for the passage of the two fluids between which heat transfer will take place.

The plate pack is assembled between a fix frame plate and a movable pressure plate and compressed by tightening bolts. The plates are fitted with a gasket which seals the interplate channel and directs the fluids into alternate channels. The number of plates is determined by the flow rate, physical properties of the fluids, pressure drop and temperature program. The plate corrugations promote fluid turbulence and support the plates against differential pressure.

The plate and the pressure plate are suspended from an upper carrying bar and located by a lower guiding bar, both of which are fixed to a support column.

Connections are located in the frame plate or, if either or both fluids make more than a single pass within the unit, in the frame and pressure plates.

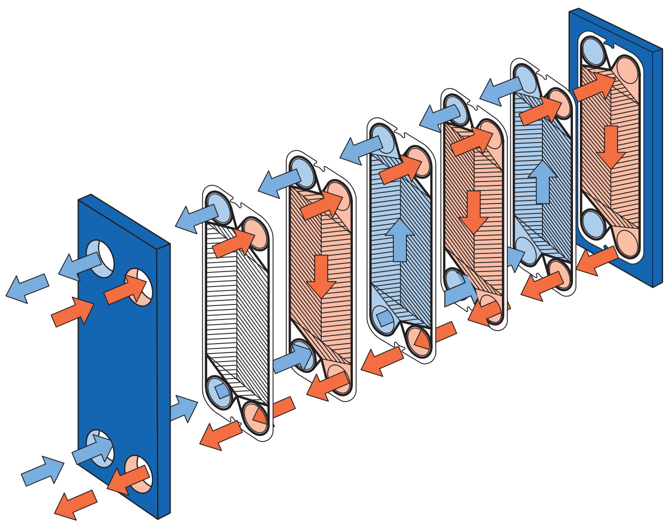
Typical capacities

Liquid flow rate
Up to 50 kg/s (800 gpm), depending on media, permitted pressure drop and temperature program.

Plate types
TL10-B, TL10-P

Frame types
FM, FG and FS

Working principle
Channels are formed between the plates and the corner ports are arranged so that the two media flow through alternate channels. The heat is transferred through the plate between the channels, and complete counter-current flow is created for highest possible efficiency. The corrugation of the plates provides the passage between the plates, supports each plate against the adjacent one and enhances the turbulence, resulting in efficient heat transfer.



Flow principle of a plate heat exchanger

STANDARD MATERIALS

Frame plate
Mild steel, Epoxy painted

Nozzles
Carbon steel
Metal lined: Stainless steel, Titanium, Alloy 254, Alloy C276, Nickel
Rubber lined: Nitrile, EPDM

Plates
Stainless steel: Alloy 304, Alloy 316. Alloy 254, Alloy C276
Nickel, Titanium

Gaskets
Nitrile, EPDM, Viton®
Other grades and material available on request

TECHNICAL DATA

Pressure vessel codes, PED, ASME, pvcALS™
Mechanical design pressure (g) / temperature

FM	pvcALS™	1.0 MPa / 180°C
FG	PED, pvcALS™	1.6 MPa / 180°C
FG	ASME	150 psig / 482°F
FD	PED	2.5 MPa / 180°C
FS	ASME	400 psig / 482°F

Connections

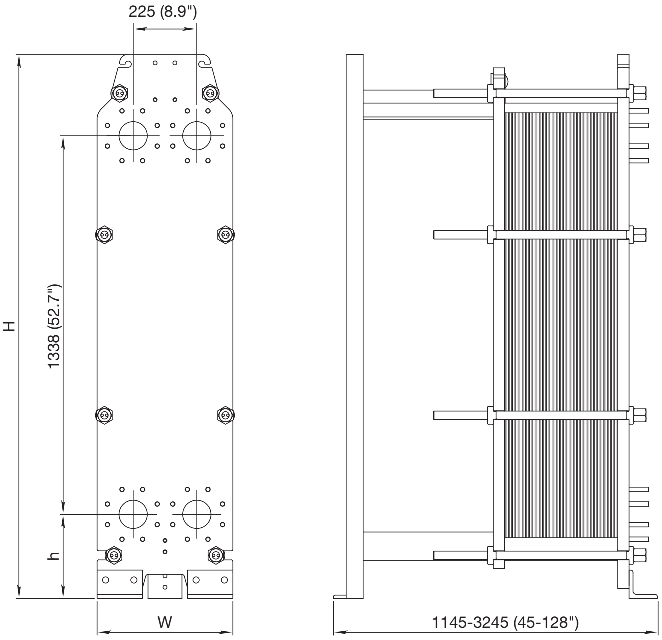
Size: DN100 / NPS 4 / 100A

FM	pvcALS™	EN 1092-1 PN10, ASME B16.5 Class 150, JIS B2220 10K
FG	PED	EN 1092-1 PN10, ASME B16.5 Class 150
FG	pvcALS™	EN 1092-1 PN16, ASME B16.5 Class 150, JIS B2220 16K
FG	ASME	ASME B16.5 Class 150
FD	PED	EN 1092-1 PN25, ASME B16.5 Class 300, Special square flange
FD	pvcALS™	EN 1092-1 PN25, ASME B16.5 Class 150, JIS B2220 20K
FS	ASME	Special square flange

Standard EN 1092-1 corresponds to GOST 12815-80 and GB/T 9115.

Maximum heat transfer surface
250 m² (2700 sq. ft)

Dimensions



Measurements mm (inch)

Type	H	W	h
TL10-FM	1885 (74.2")	480 (18.9")	255 (10")
TL10-FG	1981 (78")	480 (18.9")	297 (11.7")
TL10-FD	1981 (78")	480 (18.9")	297 (11.7")
TL10-FS	1981 (78")	510 (20.1")	297 (11.7")

The number of tightening bolts may vary depending on pressure rating.

Particulars required for quotation
- Flow rates or heat load
- Temperature program
- Physical properties of liquids in question (if not water)
- Desired working pressure
- Maximum permitted pressure drop

PCT00117EN 1505

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Alfa Laval M15

Gasketed plate-and-frame heat exchanger

M15-BFM

Applications
General heating and cooling duties.

Standard design
The plate heat exchanger consists of a pack of corrugated metal plates with portholes for the passage of the two fluids between which heat transfer will take place.

The plate pack is assembled between a fix frame plate and a movable pressure plate and compressed by tightening bolts. The plates are fitted with a gasket which seals the interplate channel and directs the fluids into alternate channels. The number of plates is determined by the flow rate, physical properties of the fluids, pressure drop and temperature program. The plate corrugations promote fluid turbulence and support the plates against differential pressure.

The plate and the pressure plate are suspended from an upper carrying bar and located by a lower guiding bar, both of which are fixed to a support column.

Connections are located in the frame plate or, if either or both fluids make more than a single pass within the unit, in the frame and pressure plates.

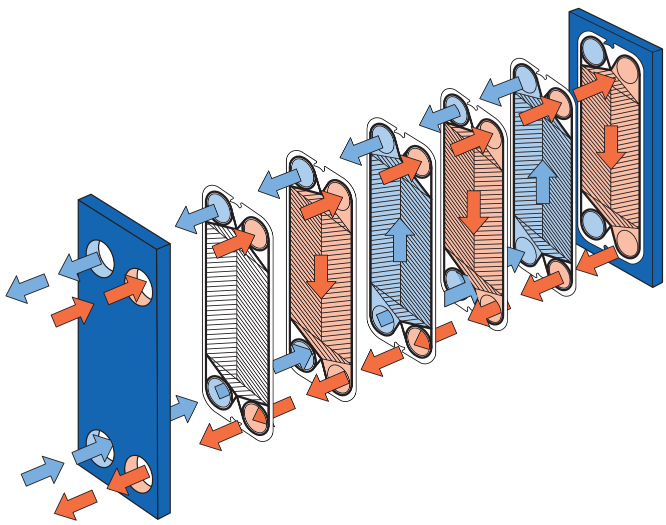
Typical capacities

Liquid flow rate
Up to 80 kg/s (1300 gpm), depending on media, permitted pressure drop and temperature program.

Plate Types
M15-B, M15-M and M15-BD, double wall plates

Frame types
FL, FM, FG and FD

Working principle
Channels are formed between the plates and the corner ports are arranged so that the two media flow through alternate channels. The heat is transferred through the plate between the channels, and complete counter-current flow is created for highest possible efficiency. The corrugation of the plates provides the passage between the plates, supports each plate against the adjacent one and enhances the turbulence, resulting in efficient heat transfer.



Flow principle of a plate heat exchanger

STANDARD MATERIALS

Frame plate
Mild steel, Epoxy painted

Nozzles
Carbon steel
Metal lined: Stainless steel, Titanium
Rubber lined: Nitrile, EPDM

Plates
Stainless steel: Alloy 304, Alloy 316, Alloy C276, Alloy 254 SMO, Titanium

Gaskets (Clip-on/tape-on, glued)
Nitrile, EPDM, Viton®
Other grades and material available on request.

TECHNICAL DATA

Pressure vessel codes, PED, ASME, pvcALS™
Mechanical design pressure (g) / temperature

FL	pvcALS™	0.6 MPa / 130°C
FM	PED, pvcALS™	1.0 MPa / 180°C
FG	PED, pvcALS™	1.6 MPa / 180°C
FG	ASME	170 psig / 482°F
FD	PED, pvcALS™	3.0 MPa / 180°C
FD	ASME	300 psig / 356°F

Connections

Size: DN150 / NPS 6 / 150A

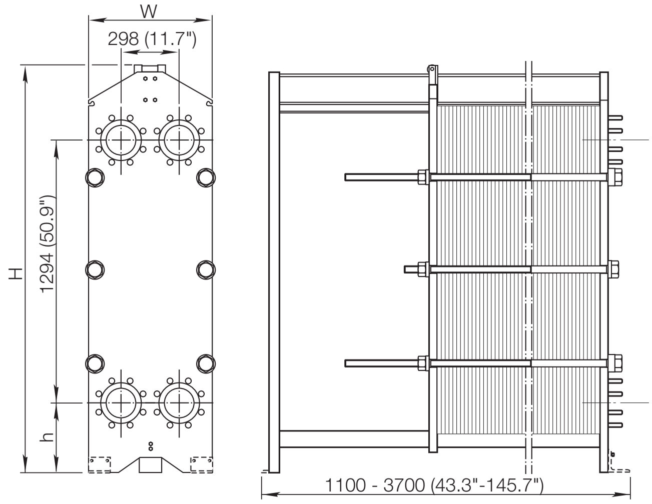
FL	pvcALS™	EN 1092-1 PN10, JIS B2220 10K
FM	PED	DIN PN10, ASME B16.5 Class 150
FM	pvcALS™	DIN PN10, ASME B16.5 Class 150, JIS B2220 10K
FG	PED	DIN PN16, ASME B16.5 Class 150
FG	pvcALS™	DIN PN16, ASME B16.5 Class 150, JIS B2220 16K
FG	ASME	ASME B16.5 Class 150
FD	PED	DIN PN25, ASME B16.5 Class 300
FD	ASME	ASME B16.5 Class 300

Standard EN 1092-1 corresponds to GOST 12815-80 and GB/T 9115.

Maximum heat transfer surface

390 m² (4200 sq. ft)

Dimensions



Measurements mm (inch)

Type	H	W	h
M15-FL	1815 (71.5")	610 (24")	275 (10.8")
M15-FM	max. 1941 (76.4")	610 (24")	275 (10.8")
M15-FG	max. 1941 (76.4")	650 (25.6")	275 (10.8")
M15-FD	max. 2036 (80.2")	650 (25.6")	370 (14.6")

The number of tightening bolts may vary depending on pressure rating.

Particulars required for quotation

- Flow rates or heat load
- Temperature program
- Physical properties of liquids in question (if not water)
- Desired working pressure
- Maximum permitted pressure drop
- Available steam pressure

PCT00098EN 1505

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Alfa Laval TL15

Gasketed plate-and-frame heat exchanger

TL15-FG

Applications
General heating and cooling duties.

Standard design
The plate heat exchanger consists of a pack of corrugated metal plates with portholes for the passage of the two fluids between which heat transfer will take place.

The plate pack is assembled between a fix frame plate and a movable pressure plate and compressed by tightening bolts. The plates are fitted with a gasket which seals the interplate channel and directs the fluids into alternate channels. The number of plates is determined by the flow rate, physical properties of the fluids, pressure drop and temperature program. The plate corrugations promote fluid turbulence and support the plates against differential pressure.

The plate and the pressure plate are suspended from an upper carrying bar and located by a lower guiding bar, both of which are fixed to a support column.

Connections are located in the frame plate or, if either or both fluids make more than a single pass within the unit, in the frame and pressure plates.

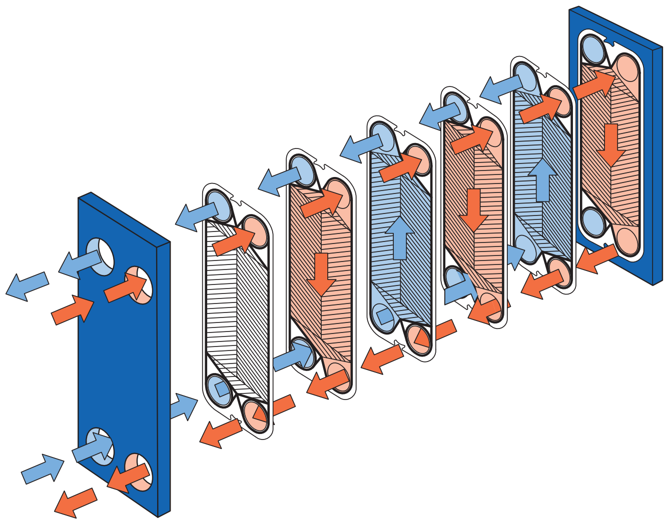
Typical capacities

Liquid flow rate
Up to 120 kg/s (1900 gpm), depending on media, permitted pressure drop and temperature program.

Plate types
TL15-B

Frame types
FM, FG, FD and FS

Working principle
Channels are formed between the plates and the corner ports are arranged so that the two media flow through alternate channels. The heat is transferred through the plate between the channels, and complete counter-current flow is created for highest possible efficiency. The corrugation of the plates provides the passage between the plates, supports each plate against the adjacent one and enhances the turbulence, resulting in efficient heat transfer.



Flow principle of a plate heat exchanger

STANDARD MATERIALS

Frame plate
Mild steel, Epoxy painted

Nozzles
Carbon steel
Metal lined: Stainless steel, Titanium
Rubber lined: Nitrile, EPDM

Plates
Stainless steel: Alloy 304, Alloy 316. Titanium

Gaskets
Nitrile, EPDM

TECHNICAL DATA

Pressure vessel codes, PED, ASME, pvcALS™
Mechanical design pressure (g) / temperature*

FM	pvcALS™	1.0 MPa / 180ºC
FG	pvcALS™	2.0 MPa / 50°C
FG	PED	2.0 MPa / 50°C
FG	ASME	150 psig / 482°F
FD	ASME	300 psig / 482ºF
FS	pvcALS™	3.5 MPa / 50°C
FS	PED	3.5 MPa / 50°C
FS	ASME	460 psig / 482ºF

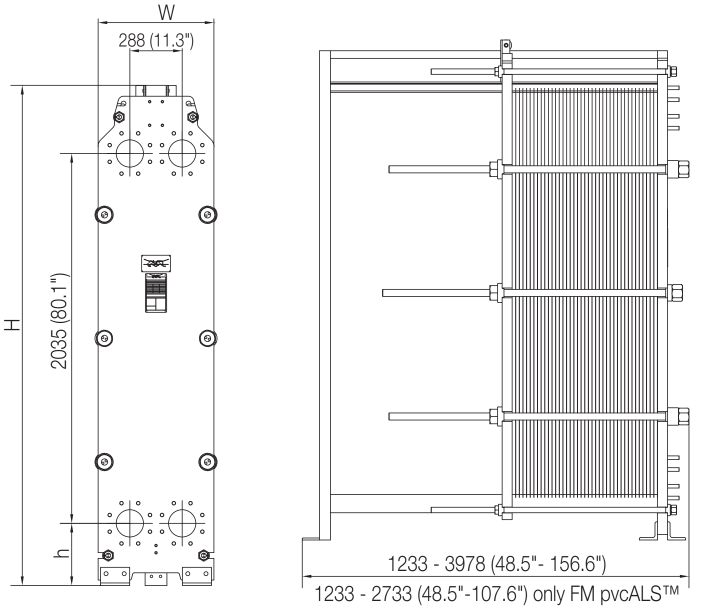
* All PED and ALS units, except FM, are optimised for a design temperature of 50ºC (122ºF).
All PED and ALS units are also available for of multi range temperatures 50, 100, 150, 180 and 200ºC with corresponding lower design pressure.

Connections

Size: DN150 / NPS 6 / 150A

FM	pvcALS™	EN 1092-1 PN10, ASME B16.5 Class 150, JIS B2220 10K
FG	pvcALS™	DIN/GB/GOST PN16, PN25, ASME Cl. 150, JIS 10K, JIS 16K
FG	PED	EN 1092-1 PN16, EN 1092-1 PN25, ASME B16.5 Class 150
FG	ASME	ASME B16.5 Class 150
FD	ASME	ASME B16.5 Class 300
FS	pvcALS™	EN 1092-1 PN25, EN 1092-1 PN40, ASME B16.5 Class 300 JIS 10K, JIS 20K
FS	PED	EN 1092-1 PN25, EN 1092-1 PN40, ASME B16.5 Class 300
FS	ASME	ASME B16.5 Class 300

Standard EN 1092-1 corresponds to GOST 12815-80 and GB/T 9115.



Measurements mm (inch)

Type	H	W	h
TL15-FM/pvcALS™	2752 (108.3")	610 (24.0")	342 (13.5")
TL15-FG/PED/pvcALS™	2752 (108.3")	637 (25.1")	342 (13.5")
TL15-FG/ASME	2752 (108.3")	646 (25.4")	342 (13.5")
TL15-FD/ASME	2752 (108.3")	646 (25.4")	342 (13.5")
TL15-FS/PED/pvcALS™	2752 (108.3")	646 (25.4")	342 (13.5")
TL15-FS/ASME	2752 (108.3")	646 (25.4")	342 (13.5")

The number of tightening bolts may vary depending on pressure rating and Pressure Vessel Code (PVC) requirements.

Maximum heat transfer surface

990 (1.1 x 900) m² (10660 sq.ft)

Particulars required for quotation

- Flow rates or heat load
- Temperature program
- Physical properties of liquids in question (if not water)
- Desired working pressure
- Maximum permitted pressure drop
- Available steam pressure

PCT00108EN 1505

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Alfa Laval TS20

Gasketed plate-and-frame heat exchanger

TS20-MFG

Applications
General heating and cooling duties. Heating by means of steam.

Standard design
The plate heat exchanger consists of a pack of corrugated metal plates with portholes for the passage of the two fluids between which heat transfer will take place.

The plate pack is assembled between a fix frame plate and a movable pressure plate and compressed by tightening bolts. The plates are fitted with a gasket which seals the interplate channel and directs the fluids into alternate channels. The number of plates is determined by the flow rate, physical properties of the fluids, pressure drop and temperature program. The plate corrugations promote fluid turbulence and support the plates against differential pressure.

The plate and the pressure plate are suspended from an upper carrying bar and located by a lower guiding bar, both of which are fixed to a support column.

Connections are located in the frame plate or, if either or both fluids make more than a single pass within the unit, in the frame and pressure plates.

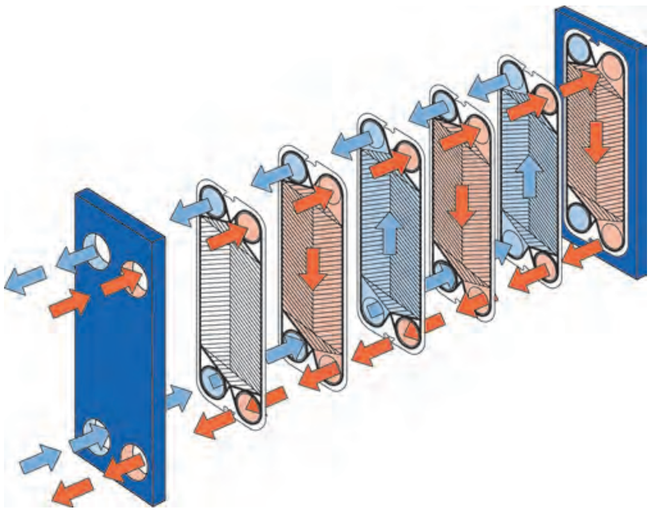
Typical capacities
Liquid flow rate
Up to 190 kg/s (3040 gpm), depending on media, permitted pressue drop and temperature program.

Water heating by steam
2.5-15 MW at a steam condensation temperature of 150°C
2.5-9 MW at a steam condensation temperature of 120°C

Plate types
TS20-M plates

Frame types
FM, FG and FS

Working principle
Channels are formed between the plates and the corner ports are arranged so that the two media flow through alternate channels. The heat is transferred through the plate between the channels, and complete counter-current flow is created for highest possible efficiency. The corrugation of the plates provides the passage between the plates, supports each plate against the adjacent one and enhances the turbulence, resulting in efficient heat transfer.



STANDARD MATERIALS

Frame plate
Mild steel, Epoxy painted

Nozzles
Carbon steel
Metal lined: Stainless steel, Titanium, Alloy C-276
Rubber lined: Nitrile, EPDM

Plates
Stainless steel Alloy 316 (Alloy 254, Alloy C-276 or Titanium
Other grades and material available on request.

Gaskets
Nitrile, EPDM, Viton or HeatSealF™
Other grades and material available on request.

TECHNICAL DATA

Pressure vessel codes, PED, ASME, pvcALS™
Mechanical design pressure (g) / temperature

FM	PED	10 MPa / 210°C
FM	pvcALS™	1.0 MPa / 180°C
FG	PED	1.6 MPa / 180°C *)
FG	ASME	150 psig / 350°F
FG	pvcALS™	1.6 MPa / 180°C
FS	PED	3.0 MPa / 160°C
FS	ASME	460 psig / 350°F

*) Frame FG also approved for 1.2 MPa / 200ºC to allow use in steam systems without safety valves.

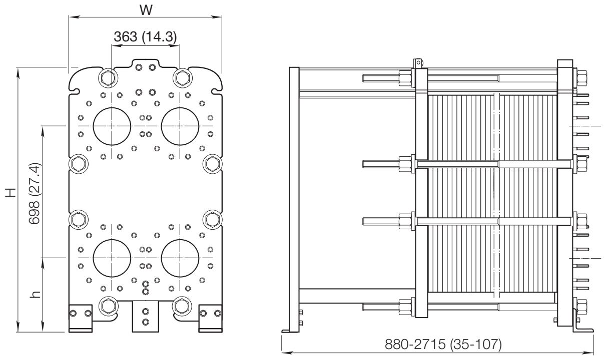
Connections

Size: DN200 / NPS 8 / 200A

FM	PED	EN 1092-1 PN10, ASME B16.5 Class 150
FM	pvcALS™	EN 1092-1 PN10, ASME B16.5 Class 150, JIS B2220 10K
FG	PED	EN 1092-1 PN16, ASME B16.5 Class 150
FG	ASME	ASME B16.5 Class 150
FG	pvcALS™	EN 1092-1 PN10, ASME B16.5 Class 150, JIS B2220 10K, JIS B2220 16K
FS	PED	EN 1092-1 PN25, EN 1092-1 PN40, ASME Cl. 300
FS	ASME	ASME B16.5 Class 150, ASME B16.5 Class 300

Standard EN 1092-1 corresponds to GOST 12815-80 and GB/T 9115.

Dimensions



Measurements mm (inch)

Type	H	W	h
TS20-MFM	1405 ($55^{5}/_{16}$)	740 (29⅛)	360 (14⅛)
TS20-MFG	1405 ($55^{5}/_{16}$)	800 (31½)	360 (14⅛)
TS20-MFS	1435 (56½)	800 (31½)	390 (14⅛)

The number of tightening bolts may vary depending on pressure rating.

Maximum heat transfer surface
85 m² (910 sq. ft)

Particulars required for quotation
- Flow rates or heat load
- Temperature program
- Physical properties of liquids in question (if not water)
- Desired working pressure
- Maximum permitted pressure drop
- Available steam pressure

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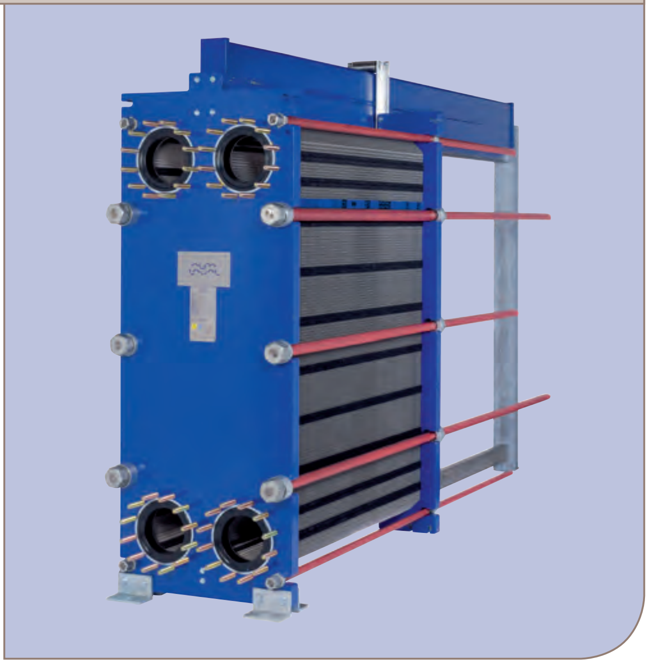
Alfa Laval T20

Gasketed plate-and-frame heat exchanger



Applications
General heating and cooling duties

Standard design
The plate heat exchanger consists of a pack of corrugated metal plates with portholes for the passage of the two fluids between which heat transfer will take place.

The plate pack is assembled between a fix frame plate and a movable pressure plate and compressed by tightening bolts. The plates are fitted with a gasket, which seals the interplate channel and directs the fluids into alternate channels. The number of plates is determined by the flow rate, physical properties of the fluids, pressure drop and temperature program. The plate corrugations promote fluid turbulence and support the plates against differential pressure.

The frame plate and the pressure plate are suspended from an upper carrying bar and located by a lower guiding bar, both of which are fixed to a support column.

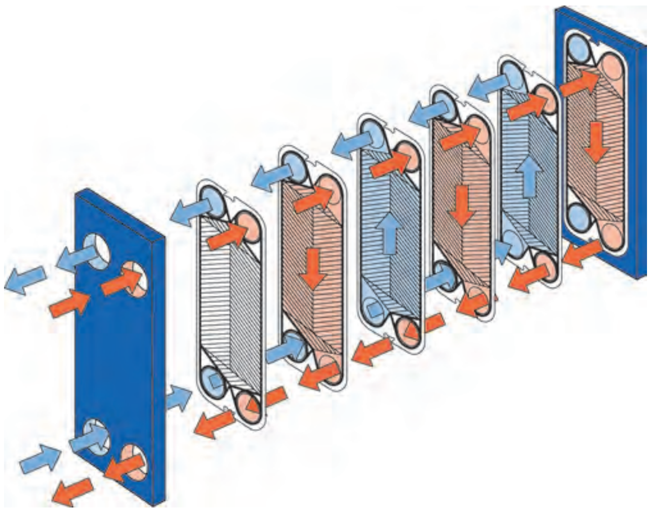
Connections are located in the frame plate or, if either or both fluids make more than a single pass within the unit, in the frame and pressure plates.

Typical capacities
Liquid flow rate
Up to 225 kg/s (3600 gpm), depending on media, permitted pressure drop and temperature program.

Plate types
T20-P, T20-B and T20-M plates

Frame types
FM, FG and FS

Working principle
Channels are formed between the plates and the corner ports are arranged so that the two media flow through alternate channels. The heat is transferred through the plate between the channels, and complete counter-current flow is created for highest possible efficiency. The corrugation of the plates provides the passage between the plates, supports each plate against the adjacent one and enhances the turbulence, resulting in efficient heat transfer.



Flow principle of a plate heat exchanger

STANDARD MATERIALS

Frame plate
Mild steel, Epoxy painted

Nozzles
Rubber lined
Carbon steel
Metal lined: Stainless steel, Titanium, Alloy C-276

Plates
Stainless steel Alloy 304, Stainless steel Alloy 316, Alloy 254 SMO, Alloy C-276 or Titanium Other grades and material available on request.

Gaskets
Nitrile, EPDM or Viton
Other grades and material available on request.

TECHNICAL DATA

Mechanical design pressure (g) / temperature

FM	pvcALS™	1.0 MPa / 180°C
FG	pvcALS™	1.6 MPa / 180°C
FG	PED	1.6 MPa / 180°C
FG	ASME	150 psig / 480°F
FD	ASME	300 psig / 480°F
FS	PED	3.0 MPa / 160°C
FS	ASME	400 psig / 480°F

CONNECTIONS

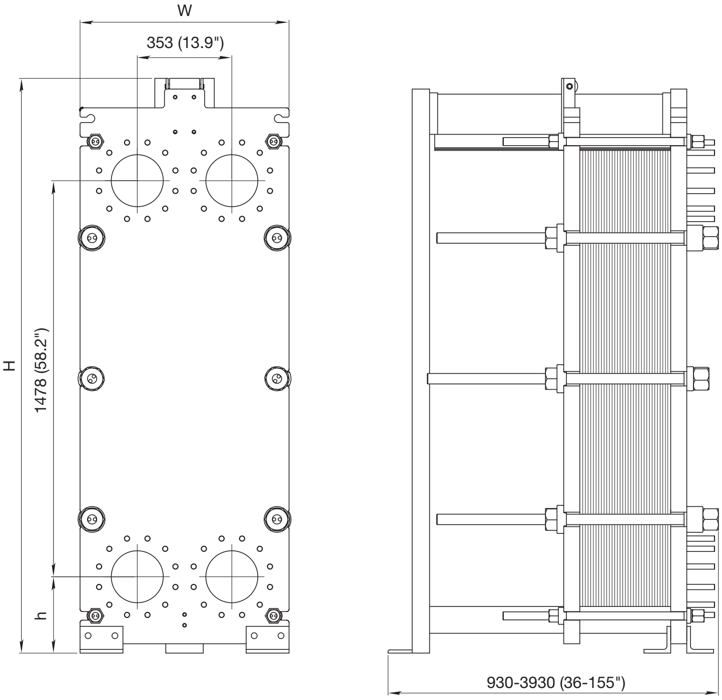
Size: DN200 / NPS 8 / 200A

FM	pvcALS™	EN 1092-1 PN10, ASME B16.5 Class 150, JIS B2220 10K
FG	pvcALS™	EN 1092-1 PN16, , ASME B16.5 Class 150, JIS B2220 10K, JIS B2220 16K
FG	PED	EN 1092-1 PN10; EN 1092-1 PN16, EN 1092-1 PN25, ASME B16.5 Class 150
FG	ASME	ASME B16.5 Class 150
FD	ASME	ASME B16.5 Class 150, ASME B16.5 Class 300
FS	pvcALS™	EN 1092-1 PN25, EN 1092-1 PN40, ASME B16.5 Class 300 ASME B16.5 Class 400, JIS B2220 20K
FS	PED	EN 1092-1 PN25, EN 1092-1 PN40, ASME B16.5 Class 300 ASME B16.5 Class 400
FS	ASME	ASME B16.5 Class 300, ASME B16.5 Class 400

Standard EN 1092-1 corresponds to GOST 12815-80 and GB/T 9115.

Maximum heat transfer surface
630 m^2 (7000 sq. ft)

Dimensions



Measurements mm (inch)

Type	H	W	h
T20-FM	2145 (84 ½")	780 (30 11/16")	285 (11 7/32)
T20-FG	2145 (84 ½")	780 (30 11/16")	285 (11 7/32)
T20-FS	2183 (84 ½")	780 (30 11/16")	323 (12 11/16)

The number of tightening bolts may vary depending on pressure rating.

Particulars required for quotation
- Flow rates or heat load
- Temperature program
- Physical properties of liquids in question (if not water)
- Desired working pressure
- Maximum permitted pressure drop
- Available steam pressure

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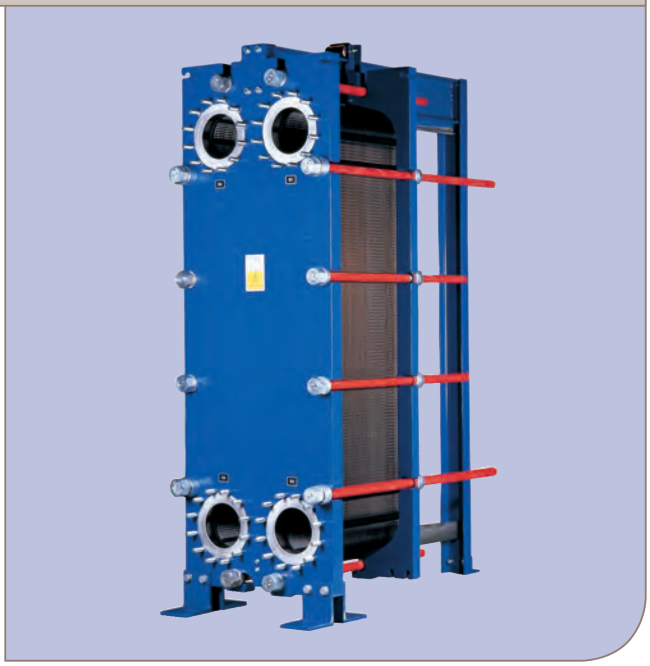
Alfa Laval MX25

Gasketed plate-and-frame heat exchanger



MX25-BFG

Applications
Plate heat exchanger for general heating and cooling duties.

Standard design
The plate heat exchanger consists of a pack of corrugated metal plates with portholes for the passage of the two fluids between which heat transfer will take place.

The plate pack is assembled between a fix frame plate and a movable pressure plate and compressed by tightening bolts. The plates are fitted with a gasket, which seals the interplate channel and directs the fluids into alternate channels. The number of plates is determined by the flow rate, physical properties of the fluids, pressure drop and temperature program. The plate corrugations promote fluid turbulence and support the plates against differential pressure.

The plate and the pressure plate are suspended from an upper carrying bar and located by a lower guiding bar, both of which are fixed to a support column.

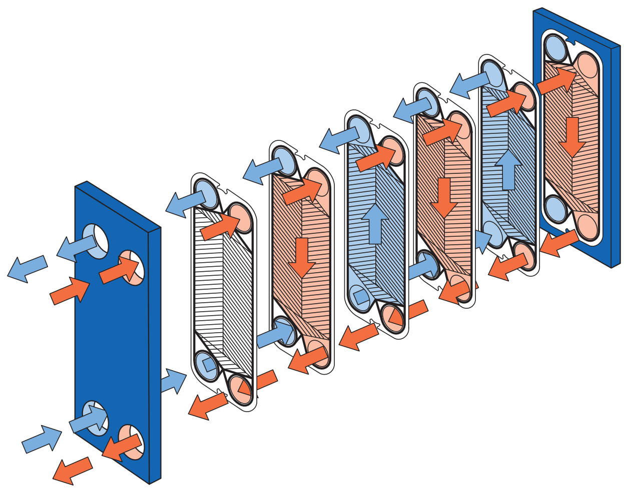
Connections are located in the frame plate or, if either or both fluids make more than a single pass within the unit, in the frame and pressure plates.

Typical capacities
Liquid flow rate.
Up to 350 kg/s (5600 gpm), depending on media, permitted pressure drop and temperature program.

Plate types
MX25B and MX25M plates

Frame types
FMS, FGS, FG, FD and FS

Working principle
Channels are formed between the plates and the corner ports are arranged so that the two media flow through alternate channels. The heat is transferred through the plate between the channels, and complete counter-current flow is created for highest possible efficiency. The corrugation of the plates provides the passage between the plates, supports each plate against the adjacent one and enhances the turbulence, resulting in efficient heat transfer.



Flow principle of a plate heat exchanger

STANDARD MATERIALS

Frame plate
Mild steel, Epoxy painted

Nozzles
Carbon steel
Metal lined: Stainless steel, Titanium, Alloy C276, Rubber lined: Nitrile, EPDM

Plates
Stainless steel Alloy 316, Alloy C276, Alloy 254 SMO or Titanium Other grades and material available on request.

Gaskets
Nitrile, EPDM or Viton
Other grades and material available on request.

TECHNICAL DATA

Pressure vessel codes PED, ASME, pvcALS™

Mechanical design pressure (g) / temperature

FMS PED, pvcALS™	1.0 MPa / 180°C
FGS PED, pvcALS™	1.6 MPa / 180°C
FGS ASME	150 psig / 350°F
FG PED, pvcALS™	1.6 MPa / 200°C
FG ASME	150 psig / 350°F
FD PED, pvcALS™	2.5 MPa / 210°C
FD ASME	300 psig / 350°F
FS ASME	400 psig / 350°F

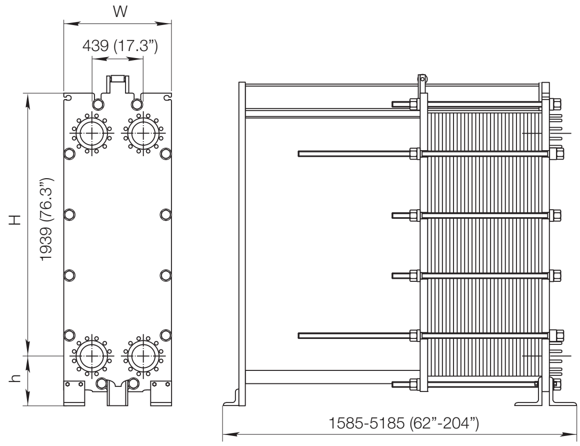
Connections

Size: DN200 / DN250 / NPS 8 / NPS 10 / 200A / 250A

FMS PED	EN 1092-1 PN10, ASME B16.5 Class 150
FMS pvcALS™	EN 1092-1 PN10, ASME B16.5 Class 150, JIS B2220 10K
FGS PED	EN 1092-1 PN16, ASME B16.5 Class 150
FGS pvcALS™	EN 1092-1 PN16, ASME B16.5 Class 150, JIS B2220 10K, JIS B2220 16K
FGS ASME	ASME B16.5 Class 150
FG PED	EN 1092-1 PN16, ASME B16.5 Class 150
FG pvcALS™	EN 1092-1 PN16, ASME B16.5 Class 150, JIS B2220 10K, JIS B2220 16K
FG ASME	ASME B16.5 Class 150
FD PED	EN 1092-1 PN25, ASME B16.5 Class 300
FD pvcALS™	EN 1092-1 PN25, ASME B16.5 Class 300, JIS B2220 20K
FD ASME	ASME B16.5 Class 300
FS ASME	ASME B16.5 Class 400

Maximum heat transfer surface
940 m² (10000 sq. ft)

Dimensions



Measurements mm (inch)

Type	H	W	h
MX25-FMS	2595 (102")	920 (36.2")	325 (12.8")
MX25-FGS	2595 (102")	920 (36.2")	325 (12.8")
MX25-FG	max 3103 (122.2")	920 (36.2")	435 (17.1")
MX25-FD	max 3103 (122.2")	940 (37")	435 (17.1")
MX25-FS	max 3103 (122.2")	940 (37")	435 (17.1")

The number of tightening bolts may vary depending on the pressure rating

Particulars required for quotation
- Flow rates or heat load
- Temperature program
- Physical properties of liquids in question (if not water)
- Desired working pressure
- Maximum permitted pressure drop
- Available steam pressure

PCT00038EN 1505

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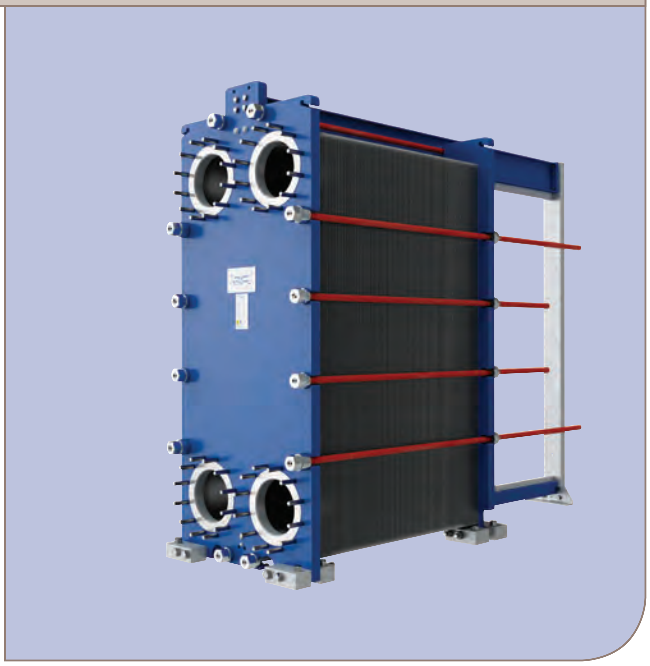
Alfa Laval TS35

Gasketed plate-and-frame heat exchanger



TS35

Applications
General heating and cooling duties.

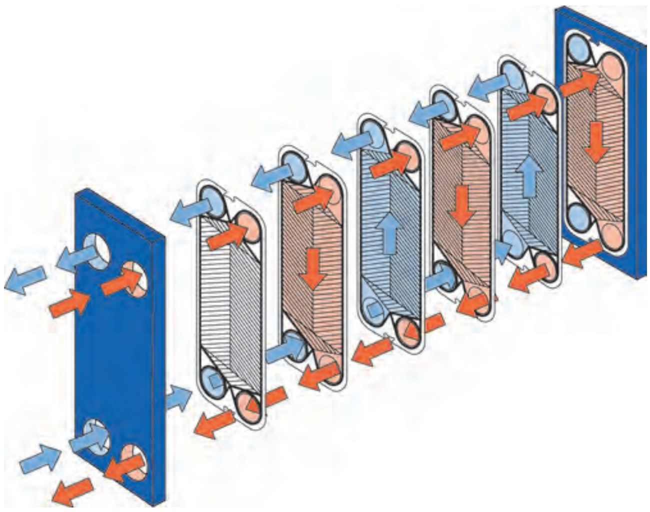
Standard design
The plate heat exchanger consists of a pack of corrugated metal plates with port holes for the passage of the two fluids between which heat transfer will take place.

The plate pack is assembled between a fixed frame plate and a movable pressure plate and compressed by tightening bolts. The plates are fitted with gaskets, which seal the interplate channels and direct the fluid into alternate channels. The number of plates is determined by the flow rate, physical properties of the fluids, pressure drop and temperature program. The plate corrugations promote fluid turbulence and support the plates against differential pressure.

The frame plate and the pressure plate are suspended from an upper carrying bar and located by a lower guiding bar, both of which are fixed to a support column.

Connections are located in the frame plate or, if either or both fluids make more than a single pass within the unit, in the frame and pressure plate.

Working principle
Channels are formed between the plates and the corner ports are arranged so that the two fluids flow through alternate channels. The heat is transferred through the plate between the channels, and complete counter-current flow is created for highest possible efficiency. The corrugation of the plates provides the passage between the plates, supports each plate against the adjacent one and enhances the turbulence, resulting in efficient heat transfer.



Flow principle of a plate heat exchanger

STANDARD MATERIAL

Frame/pressure plate
Mild steel, coated with water-based epoxy paint

Customized paint systems may be available on request.

Nozzles/Connections
Carbon steel
Metal lined: Stainless steel Alloy 316, Titanium

Other materials may be available on request.

Plates
Stainless steel Alloy 304, Alloy 316, Titanium
Other materials may be available on request.

Gaskets
Nitrile, EPDM or Viton
Other grades and materials may be available on request.

TECHNICAL DATA

Design pressure (g)

FM	pvcALS™	1.034 MPa
FM	PED	1.034 MPa
FG	pvcALS™	1.6 MPa
FG	PED	1.6 MPa
FG	ASME	150 psig
FD	pvcALS™	2.5 MPa
FD	PED	2.5 MPa
FD	ASME	300 psig
FS	ASME	400 psig

Higher pressures may be available on request.

Design temperature
Determined by gasket material.

Plate types
TS35-P

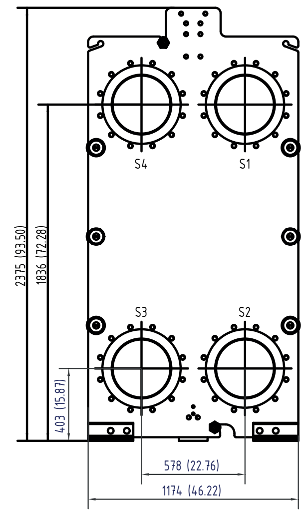
Connection size
DN350 / NPS 14 / 350A
DN300 / NPS 12 / 300A

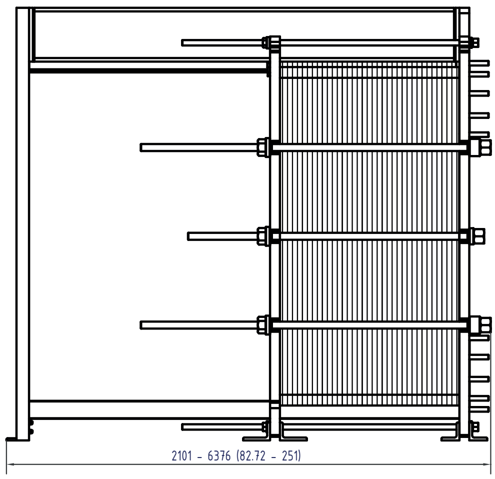
Connection standard

FM	pvcALS™	EN 1092-1 PN10, ASME B16.5 Class 150, JIS B2220 10K
FM	PED	EN 1092-1 PN10, ASME B16.5 Class 150
FG	pvcALS™	EN 1092-1 PN16, ASME B16.5 Class 150, JIS B2220 16K
FG	PED	EN 1092-1 PN16, ASME B16.5 Class 150
FG	ASME	ASME B16.5 Class 150
FD	pvcALS™	EN 1092-1 PN25, ASME B16.5 Class 300, JIS B2220 20K
FD	PED	EN 1092-1 PN25, ASME B16.5 Class 300
FD	ASME	ASME B16.5 Class 300
FS	ASME	ASME B16.5 Class 400

Standard EN 1092-1 corresponds to GOST 12815-80 and GB/T 9115.
Extended connections are available for ASME B16.5 Class 150, Class 300, Class 400 size NPS 14.

Particulars required for quotation
- Flow rates or heat load
- Temperature program
- Physical properties of fluids in question
- Desired working pressure and temperature
- Allowable pressure drops





The number of tightening bolts may vary depending on pressure rating.

Alfa Laval reserves the right to change specifications without prior notification.

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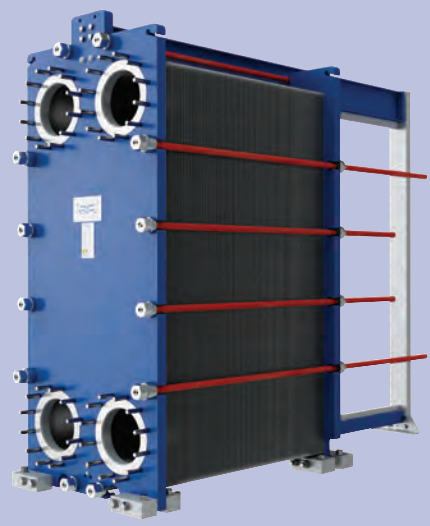
Alfa Laval T35

Gasketed plate-and-frame heat exchanger


T35

Applications
General heating and cooling duties.

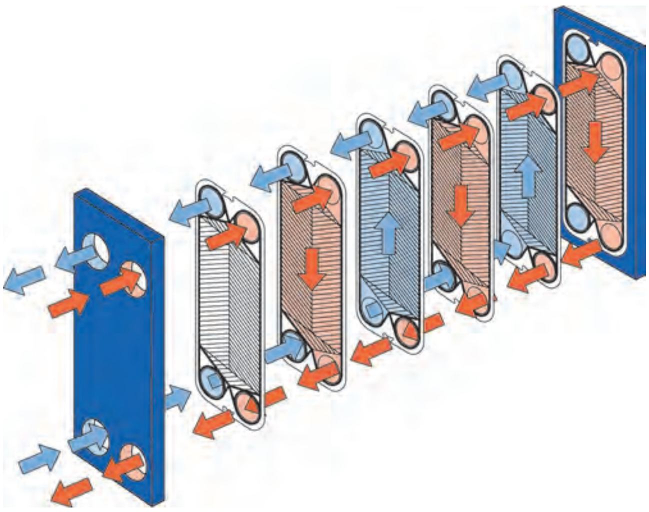
Standard design
The plate heat exchanger consists of a pack of corrugated metal plates with port holes for the passage of the two fluids between which heat transfer will take place.

The plate pack is assembled between a fixed frame plate and a movable pressure plate and compressed by tightening bolts. The plates are fitted with gaskets, which seal the interplate channels and direct the fluid into alternate channels. The number of plates is determined by the flow rate, physical properties of the fluids, pressure drop and temperature program. The plate corrugations promote fluid turbulence and support the plates against differential pressure.

The frame plate and the pressure plate are suspended from an upper carrying bar and located by a lower guiding bar, both of which are fixed to a support column.

Connections are located in the frame plate or, if either or both fluids make more than a single pass within the unit, in the frame and pressure plate.

Working principle
Channels are formed between the plates and the corner ports are arranged so that the two fluids flow through alternate channels. The heat is transferred through the plate between the channels, and complete counter-current flow is created for highest possible efficiency. The corrugation of the plates provides the passage between the plates, supports each plate against the adjacent one and enhances the turbulence, resulting in efficient heat transfer.


Flow principle of a plate heat exchanger

STANDARD MATERIAL

Frame/pressure plate
Mild steel, coated with water-based epoxy paint

Customized paint systems may be available on request.

Nozzles/Connections
Carbon steel
Metal lined: Stainless steel Alloy 316, Titanium

Other materials may be available on request.

Plates
Stainless steel Alloy 304, Alloy 316, Titanium
Other materials may be available on request.

Gaskets
Nitrile, EPDM or Viton
Other grades and materials may be available on request.

TECHNICAL DATA

Design pressure (g)

FL	pvcALS™	0.6 MPa
FM	pvcALS™	1.034 MPa
FM	PED	1.034 MPa
FG	pvcALS™	1.6 MPa
FG	PED	1.6 MPa
FG	ASME	150 psig
FD	pvcALS™	2.5 MPa
FD	PED	2.5 MPa
FD	ASME	300 psig
FS	ASME	400 psig

Design temperature
Determined by gasket material.

Plate types
T35-P

Connection size
DN350 / NPS 14 / 350A
DN300 / NPS 12 / 300A

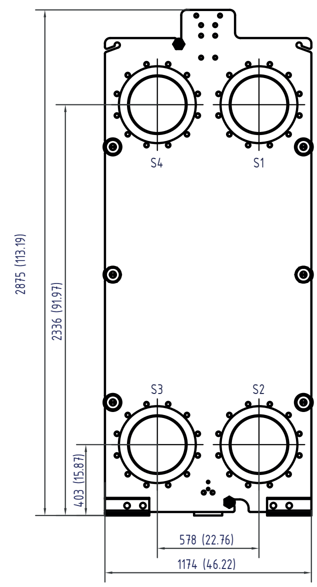
Connection standard

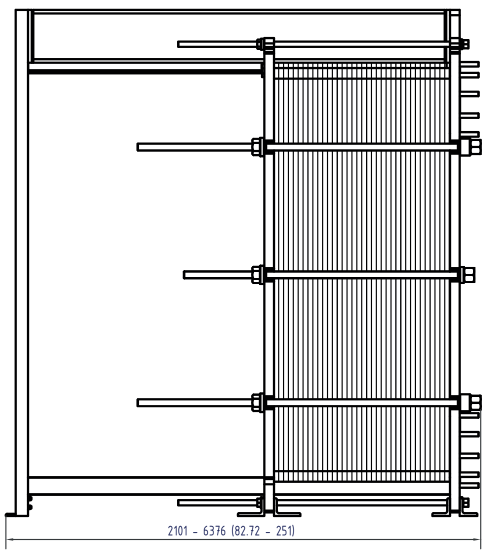
FL	pvcALS™	EN 1092-1 PN10, ASME B16.5 Class 150, JIS B2220 10K
FM	pvcALS™	EN 1092-1 PN10, ASME B16.5 Class 150, JIS B2220 10K
FM	PED	EN 1092-1 PN10, ASME B16.5 Class 150
FG	pvcALS™	EN 1092-1 PN16, ASME B16.5 Class 150, JIS B2220 16K
FG	PED	EN 1092-1 PN16, ASME B16.5 Class 150
FG	ASME	ASME B16.5 Class 150
FD	pvcALS™	EN 1092-1 PN25, ASME B16.5 Class 300, JIS B2220 20K
FD	PED	EN 1092-1 PN25, ASME B16.5 Class 300
FD	ASME	ASME B16.5 Class 300
FS	ASME	ASME B16.5 Class 400

Standard EN 1092-1 corresponds to GOST 12815-80 and GB/T 9115.
Extended connections are available for ASME B16.5 Class 150, Class 300, Class 400 size NPS 14.

Particulars required for quotation
- Flow rates or heat load
- Temperature program
- Physical properties of fluids in question
- Desired working pressure and temperature
- Allowable pressure drops

Higher pressures may be available on request.





The number of tightening bolts may vary depending on pressure rating.

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Alfa Laval TL35

Gasketed plate-and-frame heat exchanger

TL35-FD

Applications
General heating and cooling duties.

Standard design
The plate heat exchanger consists of a pack of corrugated metal plates with portholes for the passage of the two fluids between which heat transfer will take place.

The plate pack is assembled between a fix frame plate and a movable pressure plate and compressed by tightening bolts. The plates are fitted with a gasket, which seals the interplate channel and directs the fluids into alternate channels. The number of plates is determined by the flow rate, physical properties of the fluids, pressure drop and temperature program. The plate corrugations promote fluid turbulence and support the plates against differential pressure.

The frame plate is stationary, while the pressure plate is movable along the upper carrying bar, which also holds the plate pack. The pressure plate and the plate pack are located by the lower guiding bar. The carrying bar is supported by the frame at one end and a support column at the other which are bolted to the foundation.

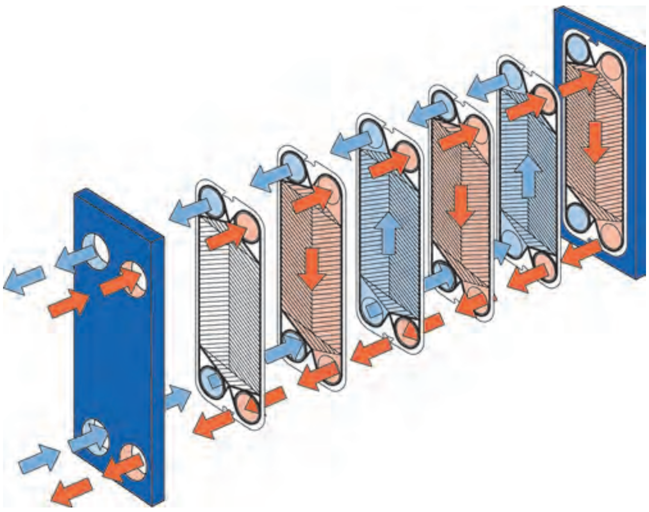
Connections are located in the frame plate or, if either or both fluids make more than a single pass within the unit, in the frame and pressure plates.

Typical capacities
Liquid flow rate
Up to 650 kg/s (10400 gpm), depending on media, permitted pressure drop and temperature program.

Plate types
TL35-B

Frame types
FM, FG, FD and FS

Working principle
Channels are formed between the plates and the corner ports are arranged so that the two media flow through alternate channels. The heat is transferred through the plate between the channels, and complete counter-current flow is created for highest possible efficiency. The corrugation of the plates provides the passage between the plates, supports each plate against the adjacent one and enhances the turbulence, resulting in efficient heat transfer.



Flow principle of a plate heat exchanger

STANDARD MATERIALS

Frame plate
Mild steel, Epoxy painted

Nozzles
Carbon steel
Metal lined: Stainless steel, Titanium, C276

Plates
Stainless steel Alloy 316 / Alloy 304 / Alloy 254 / Alloy C276 / Titanium
Other grades and material available on request.

Gaskets
Nitrile, EPDM or Viton
Other grades and material available on request.

TECHNICAL DATA

Pressure vessel codes, PED, ASME, pvcALS™
Mechanical design pressure (g) / temperature

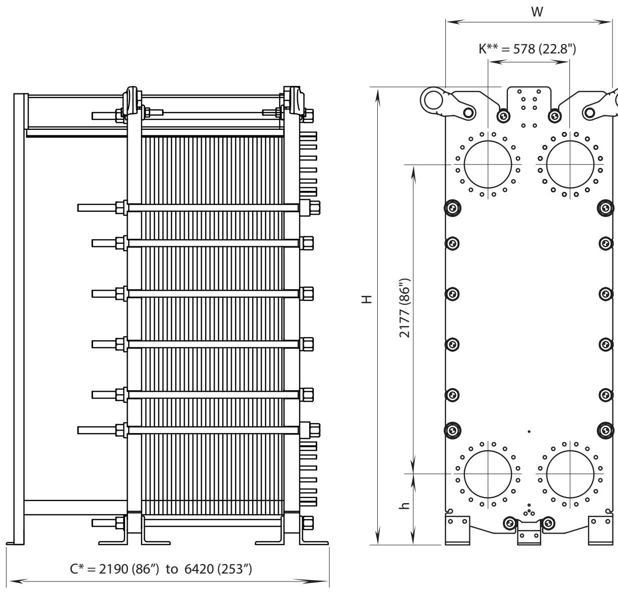
FM	PED / pvcALS™	1.0 MPa / 180°C
FM	ASME	100 psig / 350°F
FG	PED / pvcALS™	1.6 MPa / 180°C
FG	ASME	150psig / 350°F
FD	PED	2.5 MPa / 180°C
FD	ALS	2.5 MPa / 160°C
FD	ASME	300 psig / 350°F
FS	PED	3.0 MPa / 180°C
FS	ASME	400 psig / 350°F

Connections

		Size: DN350 / NPS 14 / 350A DN300 / NPS 12 / 300A
FM	pvcALS™	EN 1092-1 PN10, ASME B16.5.Class 150, JIS B2220 10K
FM	PED	EN 1092-1 PN10, ASME B16.5.Class 150
FM	ASME	ASME B16.5.Class 150
FG	pvcALS™	EN 1092-1 PN16, ASME B16.5.Class 150, JIS B2220 16K
FG	PED	EN 1092-1 PN16, ASME B16.5.Class 150
FG	ASME	ASME B16.5.Class 150
FD	PED	EN 1092-1 PN25, ASME B16.5.Class 150, ASME B16.5.Class 300
FD	ALS	EN 1092-1 PN25, ASME B16.5.Class 150, ASME B16.5.Class 300
		JIS B2220 20K
FD	ASME	ASME B16.5.Class 150, ASME B16.5.Class 300
FS	PED	EN 1092-1 PN25,EN 1092-1 PN40, ASME B16.5.Class 300
		ASME B16.5.Class 400
FS	ASME	ASME B16.5.Class 300, ASME B16.5.Class 400

Standard EN 1092-1 corresponds to GOST 12815-80 and GB/T 9115.

Dimensions



Measurements mm (inch)

Type	H	W	h
TL35-FM	3210 (126.4")	1154 (45.4")	488 (19.2")
TL35-FG	3210 (126.4")	1154 (45.4")	488 (19.2")
TL35-FD	3218 (126.7")	1174 (46.2")	496 (19.5")
TL35-FS	3218 (126.7")	1174 (46.2")	496 (19.5")

The number of tightening bolts may vary depending on pressure rating.
C* = Larger design available on request.

K** = 578 mm (22.8 inches) except following cases

584 (23.0") FS PED	Size 350 DN PN40
589 (23.2") FD PED/pvcALS™ ASME	Size 14" ASME CI.300
589 (23.2") FS PED/ASME	Size 14" ASME CI 300 or 400

Particulars required for quotation
- Flow rates or heat load
- Temperature program
- Physical properties of liquids in question (if not water)
- Desired working pressure
- Maximum permitted pressure drop
- Available steam pressure

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Alfa Laval T45

Gasketed plate-and-frame heat exchanger

Applications
General heating and cooling duties.

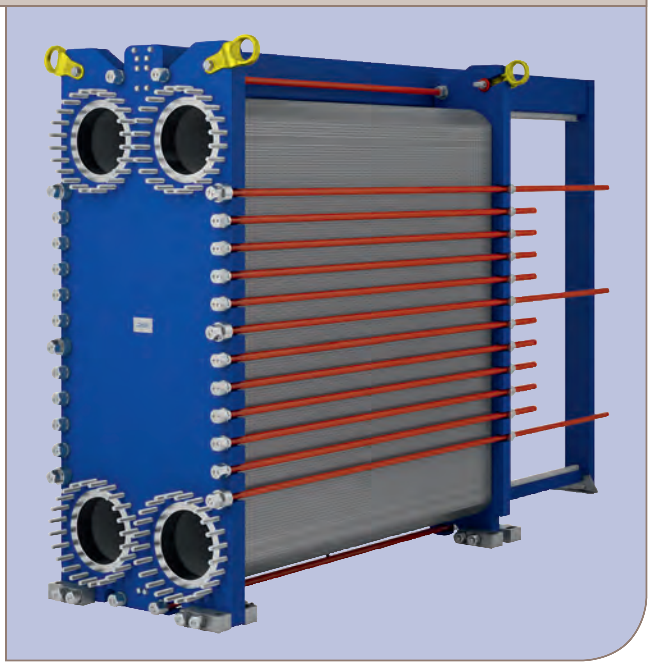
Standard design
The plate heat exchanger consists of a pack of corrugated metal plates with port holes for the passage of the two fluids between which heat transfer will take place.

The plate pack is assembled between a fixed frame plate and a movable pressure plate and compressed by tightening bolts. The plates are fitted with gaskets, which seal the interplate channels and direct the fluid into alternate channels. The number of plates is determined by the flow rate, physical properties of the fluids, pressure drop and temperature program. The plate corrugations promote fluid turbulence and support the plates against differential pressure.

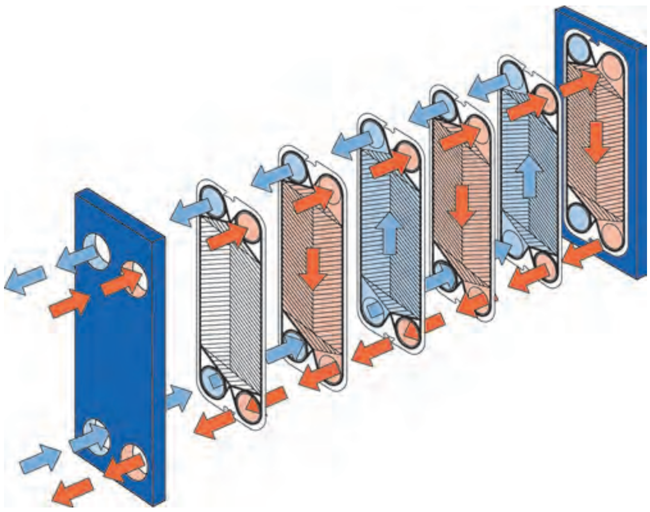
The frame plate and the pressure plate are suspended from an upper carrying bar and located by a lower guiding bar, both of which are fixed to a support column.

Connections are located in the frame plate or, if either or both fluids make more than a single pass within the unit, in the frame and pressure plate.

Working principle
Channels are formed between the plates and the corner ports are arranged so that the two fluids flow through alternate channels. The heat is transferred through the plate between the channels, and complete counter-current flow is created for highest possible efficiency. The corrugation of the plates provides the passage between the plates, supports each plate against the adjacent one and enhances the turbulence, resulting in efficient heat transfer.



T45-M



Flow principle of a plate heat exchanger

STANDARD MATERIAL

Frame/pressure plate
Mild steel, coated with water-based epoxy paint

Nozzles/Connections
Carbon steel
Metal lined: Stainless steel Alloy 316, Alloy 254, Titanium

Plates
Stainless steel Alloy 316, Alloy 254, Titanium
Other materials may be available on request.

Gaskets
Nitrile, EPDM or Viton
Other materials may be available on request.

TECHNICAL DATA

Design pressure (g)

FM	pvcALS™	1.0 MPa
FG	PED	1.6 MPa
FG	pvcALS™	1.6 MPa
FG	ASME	150 psig
FD	ASME	250 psig

Higher pressures may be available on request.

Design temperature
Determined by gasket material.

Maximum liquid flow rate
Up to 1000 kg/s (16000 gpm)

Maximum standard heat transfer surface
2360 m² (25400 sq. ft)
Larger non-standard design available on request.

Plate types
T45-M

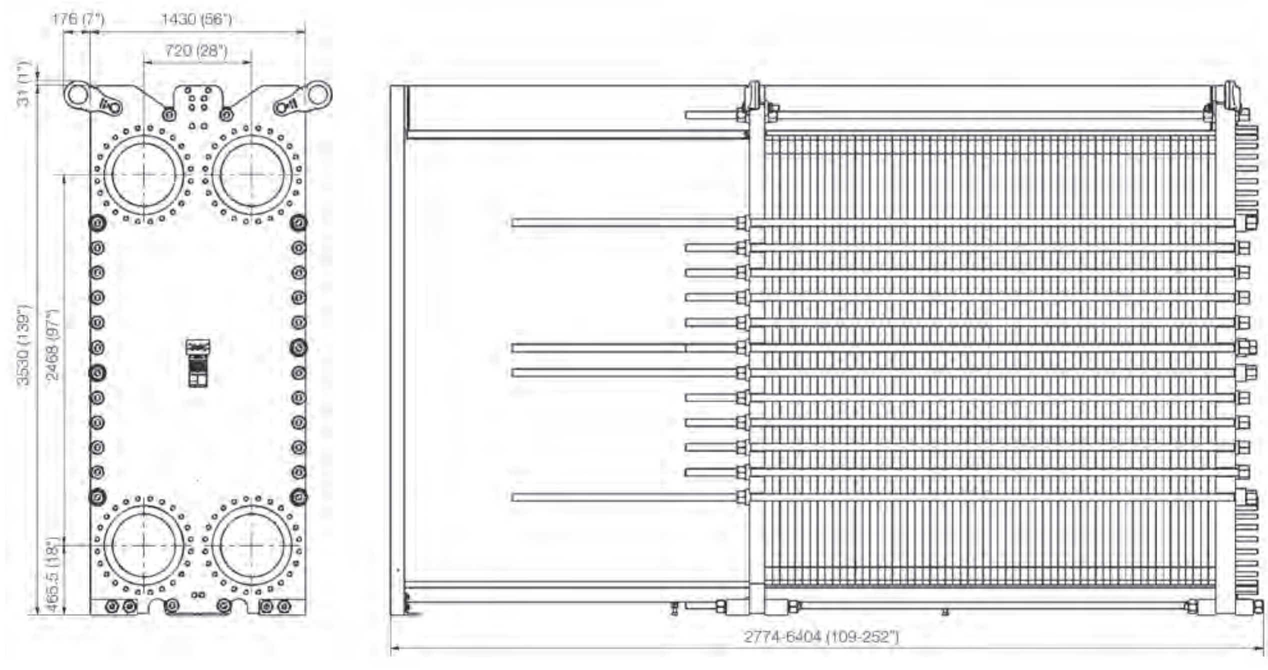
Connection size
DN450 / NPS 18 / 450A

Connections

FM	pvcALS™	EN 1092-1 PN10, ASME B16.5 Class 150, JIS B2220 10K
FG	PED	EN 1092-1 PN16, ASME B16.5 Class 150
FG	pvcALS™	EN 1092-1 PN16, ASME B16.5 Class 150, JIS B2220 16K
FG	ASME	ASME B16.5 Class 150
FD	ASME	ASME B16.5 Class 300

Standard EN 1092-1 corresponds to GOST 12815-80 and GB/T 9115.

Particulars required for quotation
- Flow rates or heat load
- Temperature program
- Physical properties of fluids in question
- Desired working pressure and temperature
- Allowable pressure drops



The number of tightening bolts may vary depending on pressure rating.

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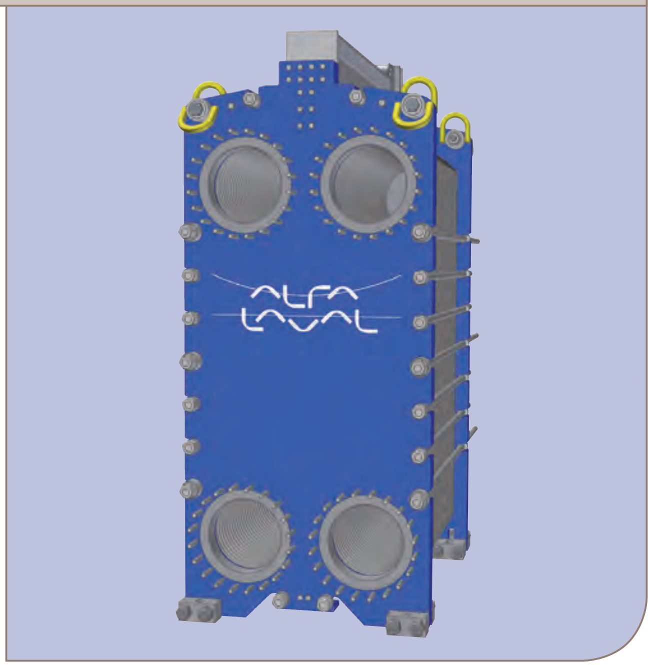
Alfa Laval TS50

Gasketed plate-and-frame heat exchanger



TS50-M

Applications
General heating and cooling duties

Standard design
The plate heat exchanger consists of a pack of corrugated metal plates with portholes for the passage of the two fluids between which heat transfer will take place.

The plate pack is assembled between a fix frame plate and a movable pressure plate and compressed by tightening bolts. The plates are fitted with a gasket, which seals the interplate channel and directs the fluids into alternate channels. The number of plates is determined by the flow rate, physical properties of the fluids, pressure drop and temperature program. The plate corrugations promote fluid turbulence and support the plates against differential pressure.

The frame plate and the pressure plate are suspended from an upper carrying bar and located by a lower guiding bar, both of which are fixed to a support column.

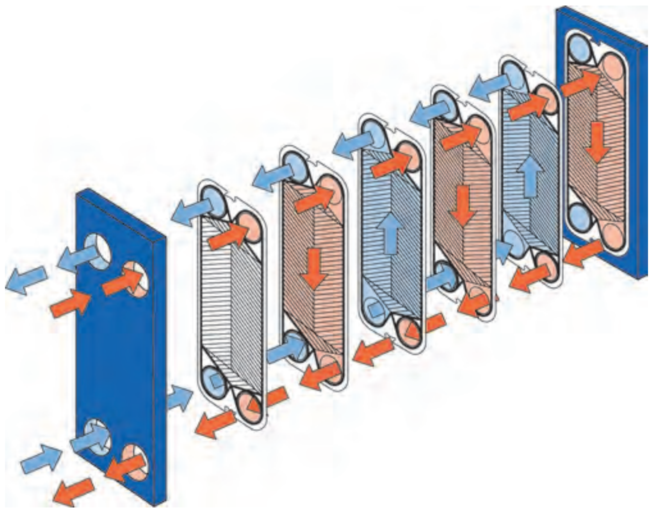
Connections are located in the frame plate or, if either or both fluids make more than a single pass within the unit, in the frame and pressure plates.

Typical capacities
Liquid flow rate
Up to 1300kg/s (20800 gpm), depending on media, permitted pressure drop and temperature program.

Plate types
TS50-M

Frame types
FM, FG and FD

Working principle
Channels are formed between the plates and the corner ports are arranged so that the two media flow through alternate channels. The heat is transferred through the plate between the channels, and complete counter-current flow is created for highest possible efficiency. The corrugation of the plates provides the passage between the plates, supports each plate against the adjacent one and enhances the turbulence, resulting in efficient heat transfer.



Flow principle of a plate heat exchanger

STANDARD MATERIALS

Frame plate
Mild steel, Epoxy painted

Nozzles
Carbon steel
Metal lined: Stainless steel, Titanium

Plates
Stainless steel Alloy 316or Titanium.

Gaskets
Nitrile or EPDM

TECHNICAL DATA

Mechanical design pressure (g) / temperature

FM	pvcALS™	1.0 MPa / 150°C
FG	PED	1.6 MPa / 180°C
FG	ASME	150 psig / 350°F
FD	PED	2.5 MPa / 180°C
FD	ASME	300 psig / 350°F

CONNECTIONS

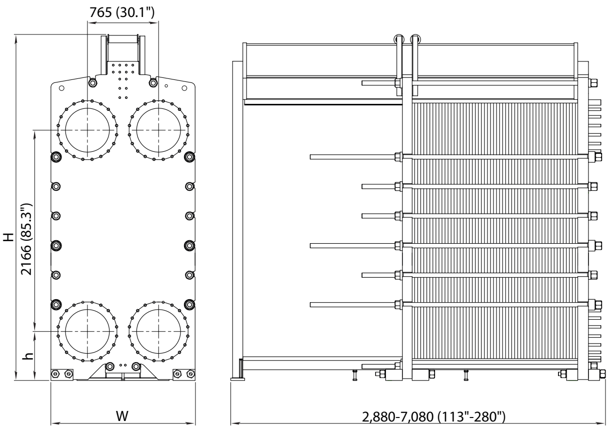
Size: DN500 / NPS 20

FM	pvcALS™	EN1092-1 PN10
		ASME B16.5 Class 150
FG	PED	EN1092-1 PN10, EN1092-1 PN16
		ASME B16.5 Class 150
FG	ASME	ASME B16.5 Class 150
FD	PED	EN1092-1 PN25
		ASMEB16.5 Class 300
FD	ASME	ASME B16.5 Class 150, ASME Cl. 300

Standard EN 1092-1 corresponds to GOST 12815-80 and GB/T 9115.

Maximum heat transfer surface
2100 m^2 (22700 sq. ft)

Dimensions



Measurements mm (inch)

Type	H	W	h
TS50-MFM	3433(135 4/25")	1550 (61")	467(18 3/8")
TS50-MFG	3723(146 9/16")	1550 (61")	467(18 3/8")
TS50-MFD	3723(146 9/16")	1550 (61")	467(18 3/8")

The number of tightening bolts may vary depending on pressure rating.

Particulars required for quotation
- Flow rates or heat load
- Temperature program
- Physical properties of liquids in question
- Desired working pressure
- Maximum permitted pressure drop
- Available steam pressure

PCT00116EN 1505

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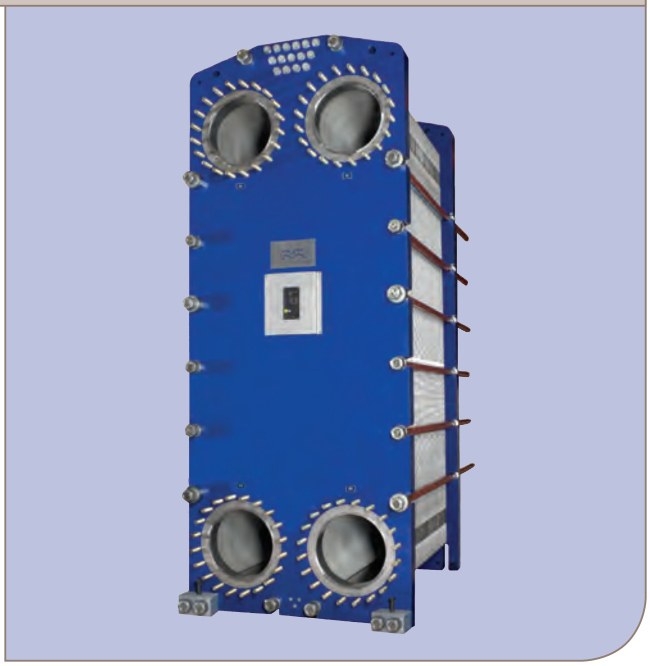
Alfa Laval T50

Gasketed plate-and-frame heat exchanger



T50-M

Applications
General heating and cooling duties

Standard design
The plate heat exchanger consists of a pack of corrugated metal plates with portholes for the passage of the two fluids between which heat transfer will take place.

The plate pack is assembled between a fix frame plate and a movable pressure plate and compressed by tightening bolts. The plates are fitted with a gasket, which seals the interplate channel and directs the fluids into alternate channels. The number of plates is determined by the flow rate, physical properties of the fluids, pressure drop and temperature program. The plate corrugations promote fluid turbulence and support the plates against differential pressure.

The frame plate and the pressure plate are suspended from an upper carrying bar and located by a lower guiding bar, both of which are fixed to a support column.

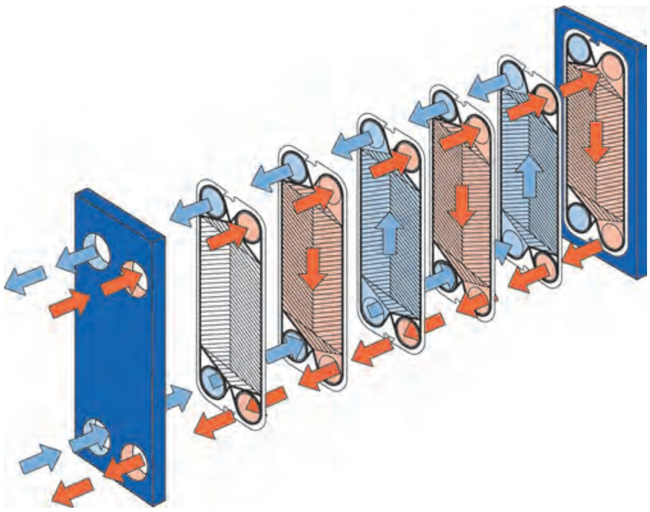
Connections are located in the frame plate or, if either or both fluids make more than a single pass within the unit, in the frame and pressure plates.

Typical capacities
Liquid flow rate
Up to 975 kg/s (15500 gpm), depending on media, permitted pressure drop and temperature program.

Plate types
T50-M

Frame types
FM, FG and FD

Working principle
Channels are formed between the plates and the corner ports are arranged so that the two media flow through alternate channels. The heat is transferred through the plate between the channels, and complete counter-current flow is created for highest possible efficiency. The corrugation of the plates provides the passage between the plates, supports each plate against the adjacent one and enhances the turbulence, resulting in efficient heat transfer.



Flow principle of a plate heat exchanger

STANDARD MATERIALS

Frame plate
Mild steel, Epoxy painted

Nozzles
Carbon steel
Metal lined: Stainless steel, Titanium

Plates
Stainless steel Alloy 316, Alloy 254 or Titanium.

Gaskets
Nitrile or EPDM

TECHNICAL DATA

Mechanical design pressure (g) / temperature

FM	pvcALS™	1.0 MPa / 150°C
FG	PED	1.6 MPa / 180°C
FG	ASME	150 psig / 350°F
FD	PED	2.5 MPa / 180°C
FD	ASME	300 psig / 350°F

CONNECTION STANDARD

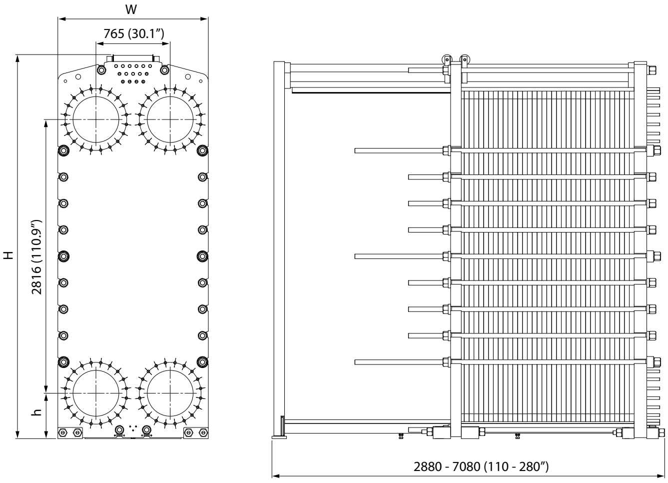
Size: DN500 / NPS 20

FM	pvcALS™	EN 1092-1 PN10
		ASMEB16.5 Class. 150
FG	PED	EN 1092-1 PN10, EN 1092-1 PN16
		ASME B16.5 Class 150
FG	ASME	ASME B16.5 Class 150
FD	PED	EN 1092-1 PN25
		ASME B16.5 Class 300
FD	ASME	ASME B16.5 Class 150, ASME B16.5 Class 300

Standard EN 1092-1 corresponds to GOST 12815-80 and GB/T 9115.

Maximum heat transfer surface
2880 m^2 (31018 sq. ft)

Dimensions



Measurements mm (inch)

Type	H	W	h
T50-MFM	4095(161 7/8")	1550 (61")	467(18 3/8")
T50-MFG	3951(155 9/16")	1550 (61")	467(18 3/8")
T50-MFD	3951(155 9/16")	1550 (61")	467(18 3/8")

The number of tightening bolts may vary depending on pressure rating.

Particulars required for quotation
- Flow rates or heat load
- Temperature program
- Physical properties of liquids in question
- Desired working pressure
- Maximum permitted pressure drop
- Available steam pressure

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Alfa Laval AQ1A

AlfaQ^{TM} AHRI-certified plate heat exchanger

Applications
General heating and cooling duties.

Standard design
The plate heat exchanger consists of a pack of corrugated metal plates with portholes for the passage of the two fluids between which heat transfer will take place.

The plate pack is assembled between a fix frame plate and a movable pressure plate and compressed by tightening bolts. The plates are fitted with a gasket which seals the interplate channel and directs the fluids into alternate channels. The number of plates is determined by the flow rate, physical properties of the fluids, pressure drop and temperature program. The plate corrugations promote fluid turbulence and support the plates against differential pressure.

The plate and the pressure plate are suspended from an upper carrying bar and located by a lower guiding bar.

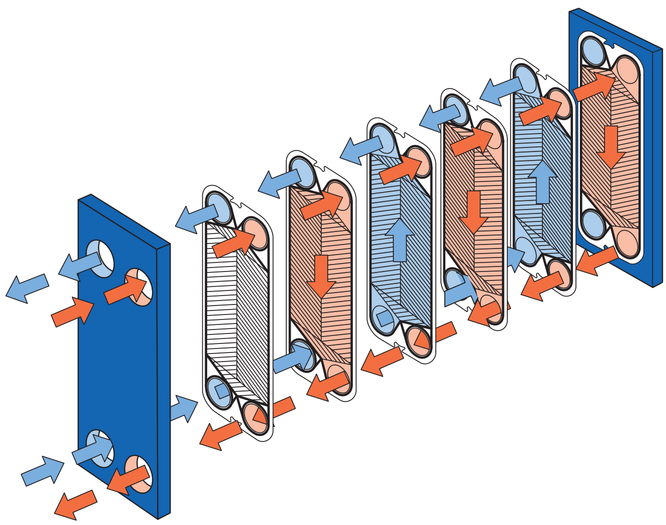
Connections are located in the frame plate or, if either or both fluids make more than a single pass within the unit, in the frame and pressure plates.

Typical capacities
Liquid flow rate
Up to 2 kg/s (30 gpm), depending on media, permitted pressure drop and temperature program.

Plate types
AQ1A-B plates

Frame types
FG

Working principle
Channels are formed between the plates and the corner ports are arranged so that the two media flow through alternate channels. The heat is transferred through the plate between the channels, and complete counter-current flow is created for highest possible efficiency. The corrugation of the plates provides the passage between the plates, supports each plate against the adjacent one and enhances the turbulence, resulting in efficient heat transfer.



Flow principle of a plate heat exchanger

STANDARD MATERIALS

Frame plate
Mild steel, Epoxy painted

Nozzles
Pipe: Stainless steel, Titanium

Plates
Stainless steel Alloy 316, Titanium

Gaskets
Nitrile, EPDM

TECHNICAL DATA

Pressure vessel code pvcALS™

Mechanical design pressure (g) / temperature
FG 1.6 MPa / 180°C

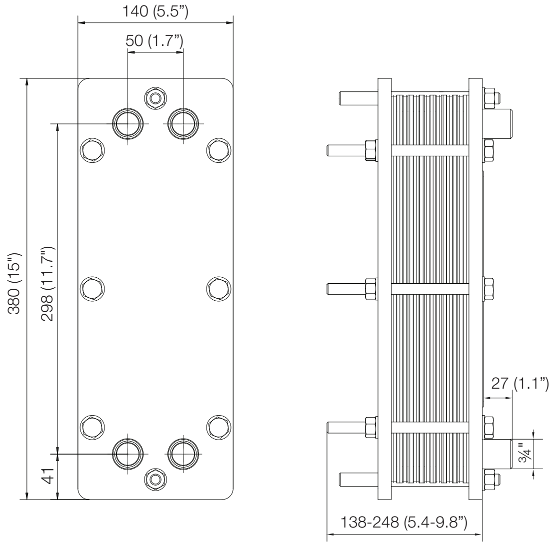
Maximum heat transfer surface
1.0 m² (10.76 sq. ft)

Connections
Straight pipe thread ISO-R ¾"

Particulars required for quotation

- Flow rates or heat load
- Temperature program
- Physical properties of liquids in question (if not water)
- Desired working pressure
- Maximum permitted pressure drop

Dimensions mm (inch)



The thermal performance is third party certified through the AHRI Liquid to Liquid Heat Exchangers certification program

AHRI CERTIFIED™
www.ahridirectory.org
Liquid to Liquid Heat Exchangers
AHRI Standard 400

ECF00496EN 1506

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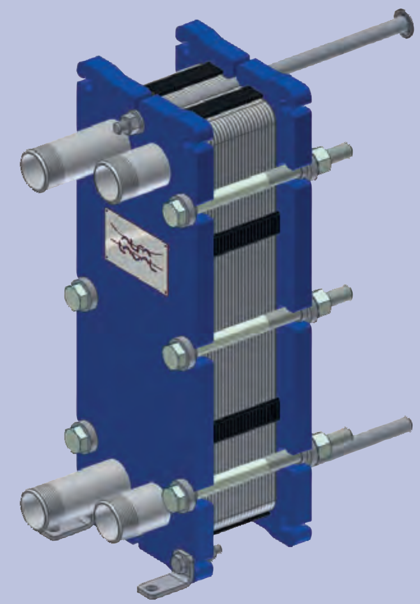
Alfa Laval AQ1

AlfaQ^{TM} AHRI-certified plate heat exchanger



Applications
General heating and cooling duties. Heating by means of steam.

Standard design
The plate heat exchanger consists of a pack of corrugated metal plates with portholes for the passage of the two fluids between which heat transfer will take place.

The plate pack is assembled between a fix frame plate and a movable pressure plate and compressed by tightening bolts. The plates are fitted with a gasket which seals the interplate channel and directs the fluids into alternate channels. The number of plates is determined by the flow rate, physical properties of the fluids, pressure drop and temperature program. The plate corrugations promote fluid turbulence and support the plates against differential pressure.

The plate and the pressure plate are suspended from an upper carrying bar and located by a lower guiding bar.

Connections are located in the frame plate or, if either or both fluids make more than a single pass within the unit, in the frame and pressure plates.

Typical capacities

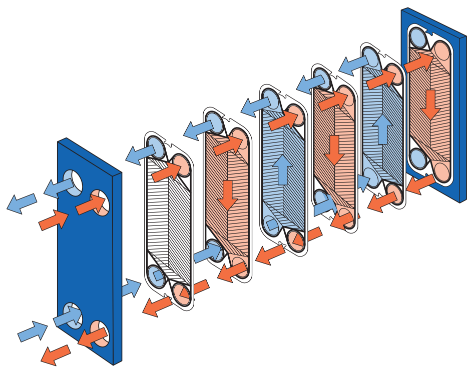
Liquid flow rate
Up to 4 kg/s (60 gpm), depending on media, permitted pressure drop and temperature program.

Plate types
AQ1, AQ1D - double wall plates

Frame types
FG

Water heating by steam
50 to 250 kw

Working principle
Channels are formed between the plates and the corner ports are arranged so that the two media flow through alternate channels. The heat is transferred through the plate between the channels, and complete counter-current flow is created for highest possible efficiency. The corrugation of the plates provides the passage between the plates, supports each plate against the adjacent one and enhances the turbulence, resulting in efficient heat transfer.



Flow principle of a plate heat exchanger

STANDARD MATERIALS

Frame plate
Mild steel, Epoxy painted

Nozzles
Carbon steel
Pipe: Stainless steel, Titanium

Plates
Stainless steel Alloy 316, Titanium

Gaskets (Clip-on)
Nitrile, EPDM, Viton®
Other grades and material available on request.

TECHNICAL DATA

Pressure vessel codes PED, ASME, pvcALS™
Mechanical design pressure (g) / temperature

FG	PED, pvcALS™	1.6 MPa / 180ºC
FG	ASME	150 psig / 350ºF

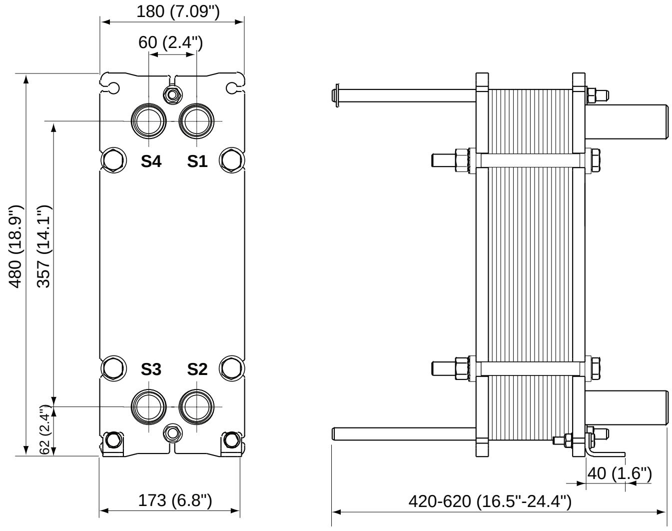
Maximum heat transfer surface
3.9 m^2 (40 sq. ft)

Connections

FG	PED	Size 1¼”	Pipe, thread ISO-R 1¼”
FG	pvcALS™	Size 1¼”	Pipe, thread ISO-R 1¼”
FG	pvcALS™	Size 1¼”	Internal thread ISO-G 1¼”, carbon steel
FG	ASME	Size 1¼”	Pipe, thread NPT 1¼”

Particulars required for quotation
- Flow rates or heat load
- Temperature program
- Physical properties of liquids in question (if not water)
- Desired working pressure
- Maximum permitted pressure drop
- Available steam pressure

Dimensions



Measurements mm (inch)
The number of bolts may vary depending on pressure rating.

The thermal performance is third party certified through the AHRI Liquid to Liquid Heat Exchangers certification program

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Alfa Laval AQ1L

AlfaQ^{TM} AHRI-certified plate heat exchanger

Applications
General heating and cooling duties.

Standard design
The plate heat exchanger consists of a pack of corrugated metal plates with portholes for the passage of the two fluids between which heat transfer will take place.

The plate pack is assembled between a fix frame plate and a movable pressure plate and compressed by tightening bolts. The plates are fitted with a gasket which seals the interplate channel and directs the fluids into alternate channels. The number of plates is determined by the flow rate, physical properties of the fluids, pressure drop and temperature program. The plate corrugations promote fluid turbulence and support the plates against differential pressure.

The plate and the pressure plate are suspended from an upper carrying bar and located by a lower guiding bar.

Connections are located in the frame plate or, if either or both fluids make more than a single pass within the unit, in the frame and pressure plates.

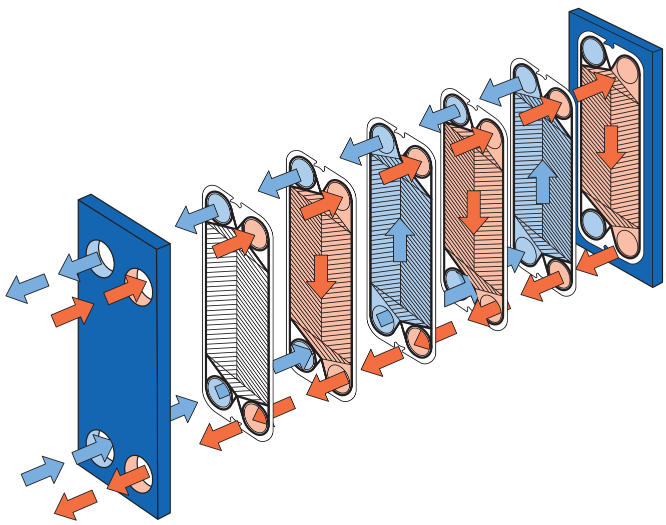
Typical capacities

Liquid flow rate
Up to 5 kg/s (80 gpm), depending on media, permitted pressure drop and temperature program.

Plate types
AQ1L, AQ1LP, AQ1LD - double wall plates

Frame types
FG

Working principle
Channels are formed between the plates and the corner ports are arranged so that the two media flow through alternate channels. The heat is transferred through the plate between the channels, and complete counter-current flow is created for highest possible efficiency. The corrugation of the plates provides the passage between the plates, supports each plate against the adjacent one and enhances the turbulence, resulting in efficient heat transfer.



Flow principle of a plate heat exchanger

STANDARD MATERIALS

Frame plate
Mild steel, Epoxy painted

Nozzles
Carbon steel
Pipe: Stainless steel, Titanium

Plates
Stainless steel: Alloy 316 / Alloy 304, Titanium, Alloy 254 SMO.

Gaskets
Nitrile, EPDM, Viton®
Other grades and material available on request.

TECHNICAL DATA

Pressure vessel codes PED, ASME, pvcALS™

Mechanical design pressure (g) / temperature

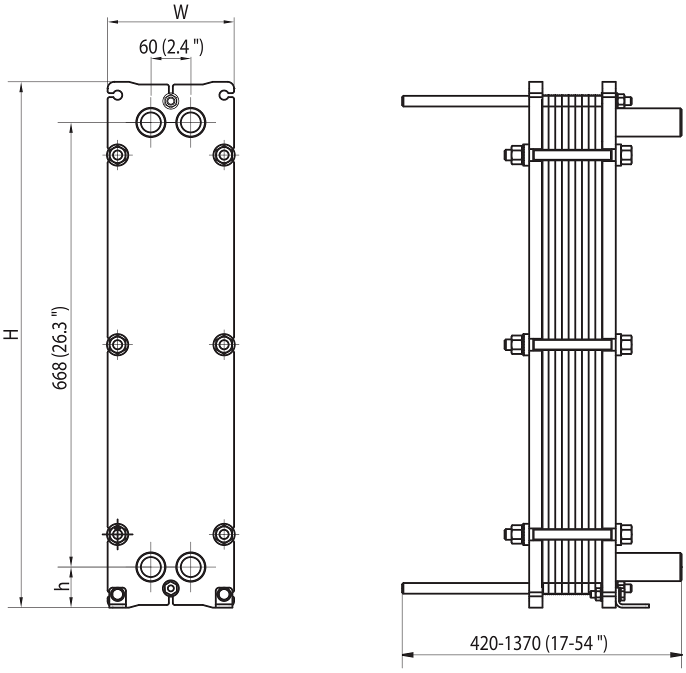
FG	pvcALS™	1.6 MPa / 180ºC
FG	PED	1.6 MPa / 180ºC
FG	ASME	150 psig / 356ºF

Maximum heat transfer surface
10.9 m² (117.3 sq.ft)

Connections

FG	PED	Size 1¼”	Pipe, thread ISO-R 1¼”
FG	pvcALS™	Size 1¼”	Pipe, thread ISO-R 1¼” and NPT 1¼”
FG	pvcALS™	Size 1¼”	Internal thread ISO-G 1¼”, carbon steel
FG	ASME	Size 1¼”	Pipe, thread NPT 1¼”

Dimensions



Measurements mm (inch)

Type	H	W	h
AQ1L-FG	790 (31.1")	190 (7.5")	61 (2.4")

Particulars required for quotation

- Flow rates or heat load
- Temperature program
- Physical properties of liquids in question (if not water)
- Desired working pressure
- Maximum permitted pressure drop

The thermal performance is third party certified through the AHRI Liquid to Liquid Heat Exchangers certification program

AHRI CERTIFIED™
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Liquid to Liquid Heat Exchangers
AHRI Standard 400

ECF00363EN 1506

Alfa Laval reserves the right to change specifications without prior notification.

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Alfa Laval AQ2A

AlfaQ^{TM} AHRI-certified plate heat exchanger

Applications
General heating and cooling duties.

Standard design
The plate heat exchanger consists of a pack of corrugated metal plates with portholes for the passage of the two fluids between which heat transfer will take place.

The plate pack is assembled between a fix frame plate and a movable pressure plate and compressed by tightening bolts. The plates are fitted with a gasket which seals the interplate channel and directs the fluids into alternate channels. The number of plates is determined by the flow rate, physical properties of the fluids, pressure drop and temperature program. The plate corrugations promote fluid turbulence and support the plates against differential pressure.

The plate and the pressure plate are suspended from an upper carrying bar and located by a lower guiding bar.

Connections are located in the frame plate or, if either or both fluids make more than a single pass within the unit, in the frame and pressure plates.

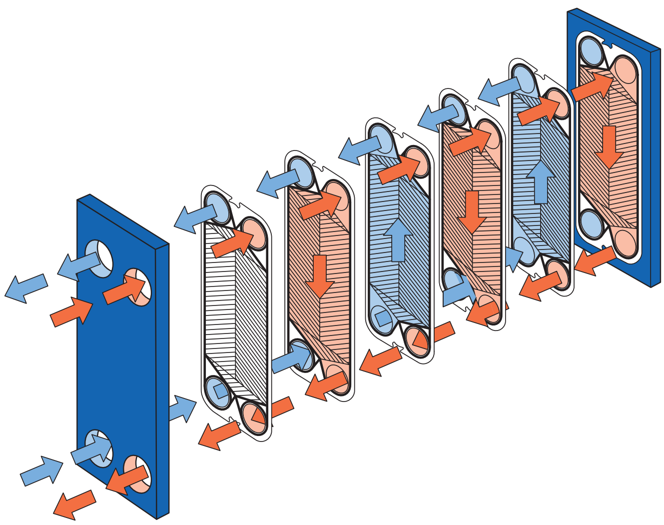
Typical capacities

Liquid flow rate
Up to 14 kg/s (222 gpm), depending on media, permitted pressure drop and temperature program.

Plate types
AQ2A-B, AQ2A-M plates

Frame types
FG

Working principle
Channels are formed between the plates and the corner ports are arranged so that the two media flow through alternate channels. The heat is transferred through the plate between the channels, and complete counter-current flow is created for highest possible efficiency. The corrugation of the plates provides the passage between the plates, supports each plate against the adjacent one and enhances the turbulence, resulting in efficient heat transfer.



Flow principle of a plate heat exchanger

STANDARD MATERIALS

Frame plate
Mild steel, Epoxy painted

Nozzles
Carbon steel
Pipe: Stainless steel, titanium

Plates
Stainless steel Alloy 316 / Alloy 304
Titanium

Gaskets
Nitrile, EPDM

TECHNICAL DATA

Pressure vessel codes PED, ASME, pvcALS™
Mechanical design pressure (g) / temperature

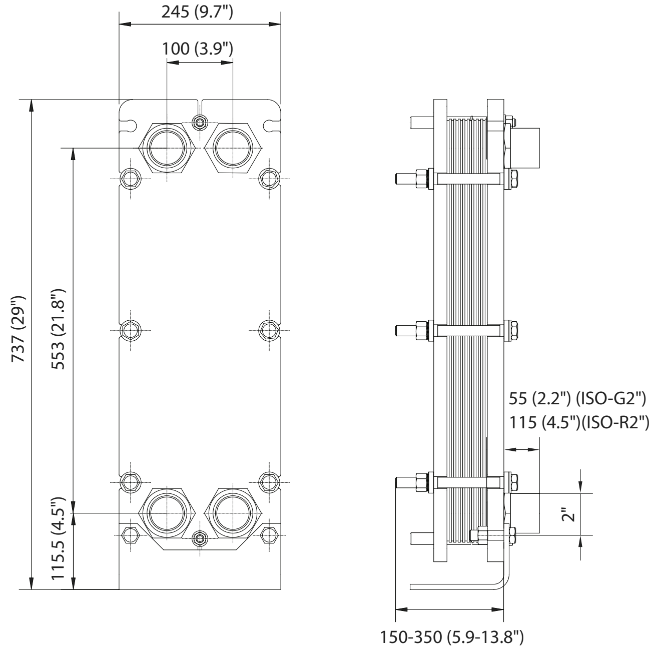
FG	pvcALS™	1.6 MPa / 180ºC
FG	PED	1.6 MPa / 160ºC
FG	ASME	150 psig / 356ºF

Maximum heat transfer surface

AQ2A-B	7.1 m² (76.4 sq.ft)
AQ2A-M	4.4 m² (47.4 sq.ft)

Connections	
Straight threaded	Size 50 mm ISO G2”
Tapered threaded	Size 50 mm ISO R2”, NPT2”
Threaded inlet port	Size 50 mm ISO-G2”

Dimensions



Measurements mm (inch)

H	W	h
737 (29.0")	245 (9.6")	115.5 (4.5")

Particulars required for quotation

- Flow rates or heat load
- Temperature program
- Physical properties of liquids in question (if not water)
- Desired working pressure
- Maximum permitted pressure drop

The thermal performance is third party certified through the AHRI Liquid to Liquid Heat Exchangers certification program

AHRI CERTIFIED™
www.ahridirectory.org
Liquid to Liquid Heat Exchangers
AHRI Standard 400

ECF00495EN 1506

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Alfa Laval AQ2

AlfaQ^{TM} AHRI-certified plate heat exchanger

Applications
General heating and cooling duties. Heating by means of steam.

Standard design
The plate heat exchanger consists of a pack of corrugated metal plates with portholes for the passage of the two fluids between which heat transfer will take place.

The plate pack is assembled between a fix frame plate and a movable pressure plate and compressed by tightening bolts. The plates are fitted with a gasket which seals the interplate channel and directs the fluids into alternate channels. The number of plates is determined by the flow rate, physical properties of the fluids, pressure drop and temperature program. The plate corrugations promote fluid turbulence and support the plates against differential pressure.

The frame plate and the pressure plate are suspended from an upper carrying bar and located by a lower guiding bar, both of which are fixed to a support column.

Connections are located in the frame plate or, if either or both fluids make more than a single pass within the unit, in the frame and pressure plates.

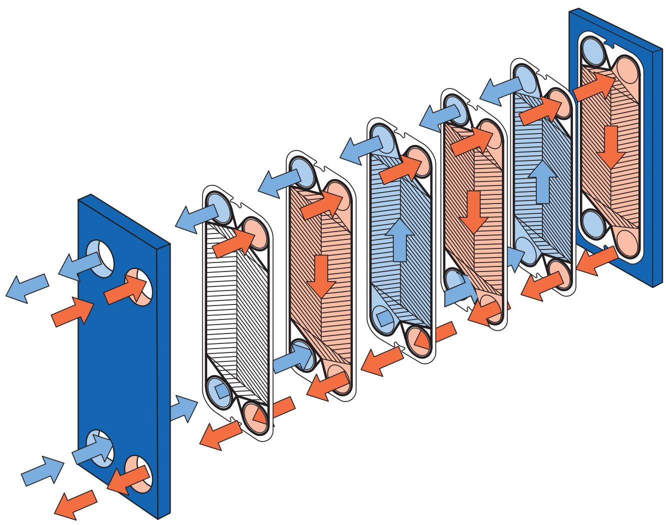
Typical capacities
Liquid flow rate
Up to 16 kg/s (250 gpm), depending on media, permitted pressue drop and temperature program.

Water heating by steam
300 to 800 kW

Plate types
AQ2, AQ2M and AQ2MD

Frame types
FM, FG and FD

Working principle
Channels are formed between the plates and the corner ports are arranged so that the two media flow through alternate channels. The heat is transferred through the plate between the channels, and complete counter-current flow is created for highest possible efficiency. The corrugation of the plates provides the passage between the plates, supports each plate against the adjacent one and enhances the turbulence, resulting in efficient heat transfer.



Flow principle of a plate heat exchanger

STANDARD MATERIALS

Frame plate
Mild steel, Epoxy painted

Nozzles
Carbon steel
Metal lined: Stainless steel, Titanium, Alloy 254 SMO, Alloy C276
Rubber lined: Nitrile, EPDM

Plates
Stainless steel: Alloy 316, Alloy 304. Alloy 254 SMO, Alloy C276, Titanium

Gaskets
Nitrile, EPDM, Viton®
Other grades and material available on request.

TECHNICAL DATA

Pressure vessel codes, PED, ASME, pvcALS™
Mechanical design pressure (g) / temperature

FM	pvcALS™	1.0 MPa / 180°C
FG	PED	1.6 MPa / 180°C
FG	ASME	162 psig / 482°F
FG	pvcALS™	1.6 MPa / 180°C
FD	PED, pvcALS™	2.5 MPa / 180°C
FD	ASME	351 psig / 482°F

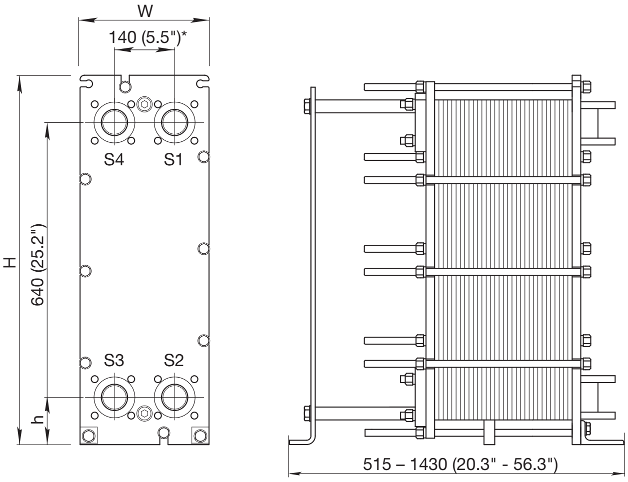
Connections
Pipe connections (not for frame type FD)

	Size:	
Straight threaded	50 mm	ISO G2"
Tapered threaded	50 mm	ISO R2", NPT2"
Straight weld	50 mm	
Threaded inlet port	50 mm	ISO G2"
Grooved pipe	50 mm	2"

Flange connections

		Size:	
FM	pvcALS™	50 mm	DIN/GB/GOST PN10, ASME Cl. 150, JIS 10K
FG	PED	50 mm	DIN PN16, ASME Cl. 150
FG	ASME	2"	ASME Cl. 150
FG	pvcALS™	50 mm	DIN/GB/GOST PN16, ASME Cl. 150, JIS 16K
FD	PED	50 mm	DIN PN25, ASME Cl. 300
FD	ASME	2"	ASME Cl. 300
FD	ALS	50 mm	DIN, GB, GOST PN25, JIS 20K

Dimensions



* Displacement of some connection types occur.

Measurements mm (inch)

Type	H	W	h
AQ2-FM	920 (36.2")	320 (12.6")	140 (5.5")
AQ2-FG	920 (36.2")	320 (12.6")	140 (5.5")
AQ2-FD	940 (37.0")	330 (13.0")	150 (5.9")

The number of tightening bolts may vary depending on pressure rating.

Maximum heat transfer surface
38 m² (400 sq. ft)

Particulars required for quotation
- Flow rates or heat load
- Temperature program
- Physical properties of liquids in question (if not water)
- Desired working pressure
- Maximum permitted pressure drop
- Available steam pressure

The thermal performance is third party certified through the AHRI Liquid to Liquid Heat Exchangers certification program

ECF00364EN 1506

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Alfa Laval AQ2L

AlfaQ™ AHRI-certified plate heat exchanger

Applications
General heating and cooling duties.

Standard design
The plate heat exchanger consists of a pack of corrugated metal plates with portholes for the passage of the two fluids between which heat transfer will take place.

The plate pack is assembled between a fix frame plate and a movable pressure plate and compressed by tightening bolts. The plates are fitted with a gasket which seals the interplate channel and directs the fluids into alternate channels. The number of plates is determined by the flow rate, physical properties of the fluids, pressure drop and temperature program. The plate corrugations promote fluid turbulence and support the plates against differential pressure.

The plate and the pressure plate are suspended from an upper carrying bar and located by a lower guiding bar, both of which are fixed to a support column.

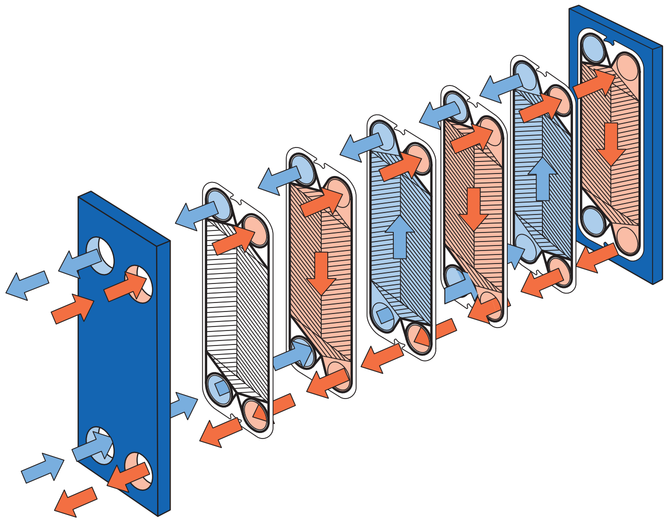
Connections are located in the frame plate or, if either or both fluids make more than a single pass within the unit, in the frame and pressure plates.

Typical capacities
Liquid flow rate
Up to 20 kg/s (317 gpm), depending on media, permitted pressure drop and temperature program.

Plate types
AQ2L

Frame types
FM, FG and FD

Working principle
Channels are formed between the plates and the corner ports are arranged so that the two media flow through alternate channels. The heat is transferred through the plate between the channels, and complete counter-current flow is created for highest possible efficiency. The corrugation of the plates provides the passage between the plates, supports each plate against the adjacent one and enhances the turbulence, resulting in efficient heat transfer.



Flow principle of a plate heat exchanger

STANDARD MATERIALS

Frame plate
Mild steel, Epoxy painted

Nozzles
Carbon steel
Metal lined: Stainless steel, Titanium
Rubber lined: Nitrile, EPDM
Pipe: Stainless steel

Plates
Stainless steel Alloy 316 / Alloy 304, Titanium, Alloy 254 SMO, Alloy C276

Gaskets
Nitrile, EPDM, Viton®
Other grades and material available on request

TECHNICAL DATA

Pressure vessel codes, PED, ASME, pvcALS™
Mechanical design pressure (g) / temperature

FM	pvcALS™	1.0 MPa / 180ºC
FM	PED	1.0 MPa / 180ºC
FG	pvcALS™	1.6 MPa / 180ºC
FG	PED	1.6 MPa / 180ºC
FG	ASME	150 psig / 482ºF
FD	pvcALS™	2.5 MPa / 180ºC
FD	PED	2.5 MPa / 180ºC
FD	ASME	300 psig / 482ºF

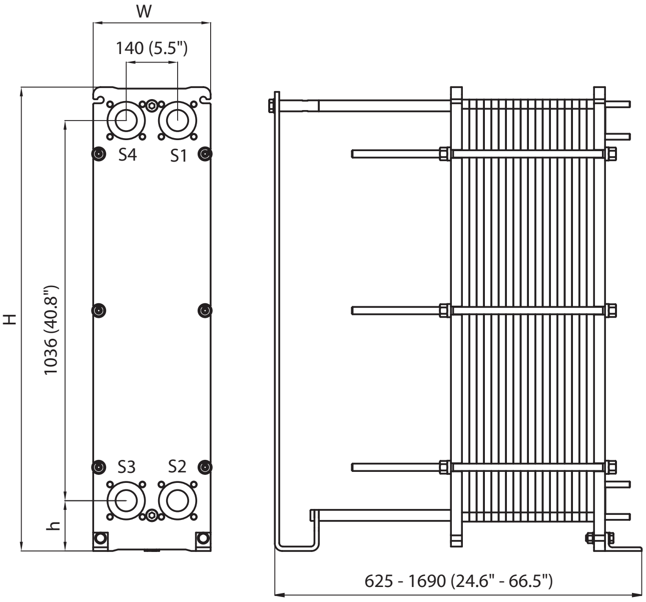
Connections
Pipe connections (not for frame type FD)

Straight threaded	Size 50 mm	ISO G2", NPT 2"
Threaded inlet port	Size 50 mm	ISO G2"

Flange connections

		Size:	
FM	pvcALS™	50/65 mm	DIN/GB/GOST PN16, ASME Cl.150, JIS 10K
FM	PED	50/65 mm	DIN PN16, ASME Cl. 150
FG	pvcALS™	50/65 mm	DIN/GB/GOST PN16, ASME Cl. 150, JIS 10K, JIS 16K
FG	PED	50/65 mm	DIN PN16, ASME Cl. 150
FG	ASME	2-2½" in	ASME Cl.150
FD	pvcALS™	50/65 mm	DIN/GB/GOST PN40, ASME Cl.300, JIS 20K
FD	PED	50/65 mm	DIN PN40, ASME Cl. 300
FD	ASME	2-2½" in	ASME Cl. 300

Dimensions



Measurements mm (inch)

Type	H	W	h
AQ2L-FM / PED / pvcALS™	1264 (49.8")	320 (12.6")	137 (5.4")
AQ2L-FG / PED / pvcALS™	1264 (49.8")	320 (12.6")	137 (5.4")
AQ2L-FG / ASME	1299 (51.1")	320 (12.6")	142 (5.6")
AQ2L-FD / PED / pvcALS™	1264 (49.8")	330 (13.0")	137 (5.4")
AQ2L-FD / ASME	1308 (51.5")	330 (13.0")	142 (5.6")

The number of tightening bolts may vary depending on pressure rating.

Maximum heat transfer surface
102.0 m² (1097 sq.ft)

Particulars required for quotation
- Flow rates or heat load
- Temperature program
- Physical properties of liquids in question (if not water)
- Desired working pressure
- Maximum permitted pressure drop

The thermal performance is third party certified through the AHRI Liquid to Liquid Heat Exchangers certification program

AHRI CERTIFIED™
www.ahridirectory.org
Liquid to Liquid Heat Exchangers
AHRI Standard 400

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Alfa Laval AQ2S

AlfaQ™ AHRI-certified plate heat exchanger

Applications
General heating and cooling duties. Heating by means of steam.

Standard design
The plate heat exchanger consists of a pack of corrugated metal plates with portholes for the passage of the two fluids between which heat transfer will take place.

The plate pack is assembled between a fix frame plate and a movable pressure plate and compressed by tightening bolts. The plates are fitted with a gasket which seals the interplate channel and directs the fluids into alternate channels. The number of plates is determined by the flow rate, physical properties of the fluids, pressure drop and temperature program. The plate corrugations promote fluid turbulence and support the plates against differential pressure.

The plate and the pressure plate are suspended from an upper carrying bar and located by a lower guiding bar, both of which are fixed to a support column.

Connections are located in the frame plate or, an additional auxiliary connection for steam may be mounted on the pressure plate to handle high capacities.

Typical capacities
Liquid flow rate
Up to 20 kg/s (300 gpm), depending on media, permitted

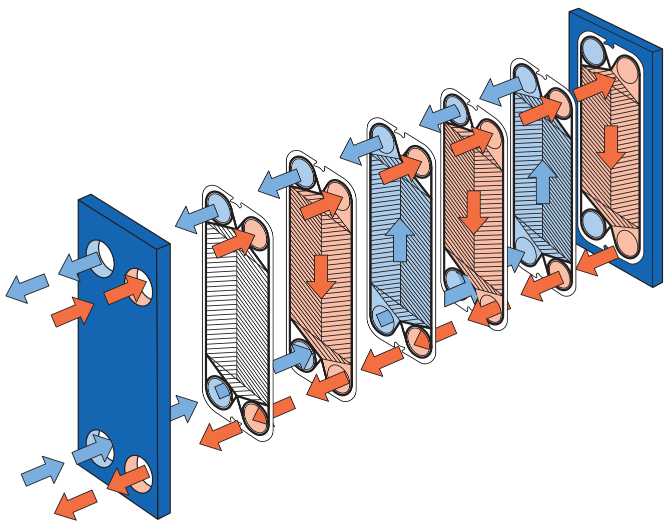
pressue drop and temperture program.

Water heating by steam
200-1800 kW

Plate types
AQ2S

Frame types
FG and FD

Working principle
Channels are formed between the plates and the corner ports are arranged so that the two media flow through alternate channels. The heat is transferred through the plate between the channels, and complete counter-current flow is created for highest possible efficiency. The corrugation of the plates provides the passage between the plates, supports each plate against the adjacent one and enhances the turbulence, resulting in efficient heat transfer.



Flow principle of a plate heat exchanger

STANDARD MATERIALS

Frame plate
Mild steel, Epoxy painted

Nozzles
Carbon steel
Metal lined: Stainless steel, Titanium

Plates
Stainless steel Alloy 316, Titanium

Gaskets
Nitrile, EPDM, Viton®
Other grades and material available on request.

TECHNICAL DATA

Pressure vessel codes, PED, ASME, pvcALS™
Mechanical design pressure (g) / temperature

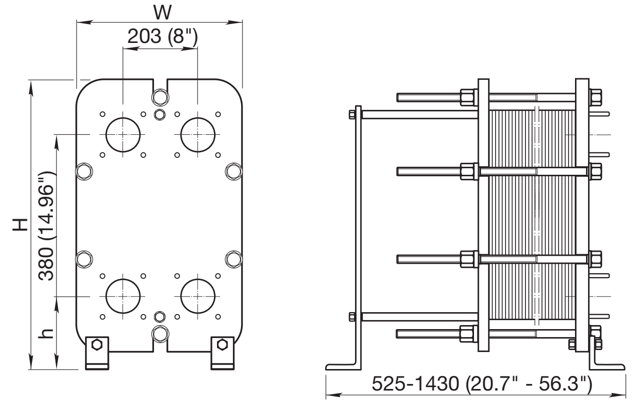
FG	PED	1.6 MPa / 180°C *)
FG	pvcALS™	1.6 MPa / 180°C
FG	ASME	207 psig / 482°F
FD	PED	2.5 MPa / 180°C
FD	ASME	300 psig / 482°F

*) Frame FG also approved for 1.2 MPa / 200ºC to allow use in steam systems without safety valves.

Connections

	Size:	
FG PED	DN65, NPS 3	DIN PN16, ASME Cl. 150
FG pvcALS™	DN65, NPS 3, 65A	DIN/GB/GOST PN16, JIS 10 K, JIS 16 K
FG ASME	NPS 3	ASME Cl. 150
FD PED	DN65, NPS 2½	DIN PN25, ASME Cl. 300
FD pvcALS™	DN65, NPS 2½, 65A	DIN/GB/GOST PN25, JIS 10 K, JIS 20 K
FD ASME	NPS 2½"	ASME Cl. 300

Dimensions



Measurements mm (inch)

Type	H	W	h
AQ2S-FG	704 (27.7")	400 (15.7")	188 (7.4")
AQ2S-FD	704 (27.7")	410 (16.1")	188 (7.4")

The number of tightening bolts may vary depending on pressure rating.

Maximum heat transfer surface
13 m² (140 sq. ft)

Particulars required for quotation
- Flow rates or heat load
- Temperature program
- Physical properties of liquids in question (if not water)

The thermal performance is third party certified through the AHRI Liquid to Liquid Heat Exchangers certification program

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Alfa Laval AQ3

AlfaQ^{TM} AHRI-certified plate heat exchanger

Application
The Alfa Laval industrial line of plate heat exchangers is well suited for a wide range of heating and cooling duties.

Benefits
- High serviceability - Easy to open
- Compact design
- Easy to install
- Flexible heat transfer area configuration
- High energy efficiency - Low operating cost

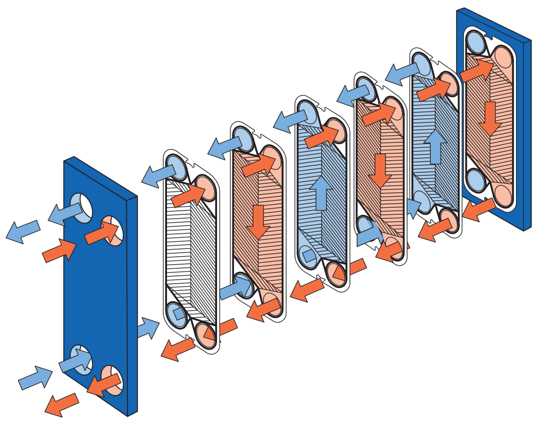
Design
The plate heat exchanger consists of a package of corrugated metal plates with portholes for the passage of the two fluids between which heat transfer will take place.

The number of plates is determined by the flow rates, physical properties of the fluids, pressure drops and temperature program. The plate corrugations promote fluid turbulence and support the plates against differential pressure.

The materials of gaskets are selected for safe use depending on media type and temperature. The attachment of the gasket rings is glue-free, which makes them easy to replace even with the plates still hanging in the frame.

The carrying bar and guiding bar are fixed to the stationary frame plate and the supporting column. The pressure plate and plate package is movable along the upper carrying bar and located by the lower guiding bar. Connections are located in the frame plate. Depending on the application, connections can also be located in the pressure plate.

Working principle
Channels are formed between the plates and the corner ports are arranged so that the two media flow through alternate channels. The heat is transferred through the plates between the channels. Complete counter-current or co-current flow, depending on the application, is created for highest possible efficiency. The corrugation of the plates provides the passage between the plates, supports each plate against the adjacent one and enhances the turbulence, resulting in efficient heat transfer.



Flow principle of a plate heat exchanger.

STANDARD MATERIALS

Frame plate
Mild steel, epoxy painted

Connections
Metal lined: Stainless steel and Titanium.
Rubber lined: Nitrile (FM only)

Plates
Stainless steel Alloy 304, Alloy 316 and Titanium

Gaskets

Field gaskets:	Nitrile, EPDM
Ring gaskets:	Nitrile, EPDM

Other grades and materials available upon request.

TECHNICAL DATA

Design pressure (g)

FM	pvcALS™	1.034 MPa
FM	PED	1.034 MPa
FG	pvcALS™	1.60 MPa
FG	PED	1.60 MPa
FG	ASME	150 psi

Design temperature
Determined by gasket material.

Plate types
AQ3-B and AQ3-M

Connection size
DN80 / NPS 3 / 80A

Maximum heat transfer surface
35 m^2 (377 sqft)

Maximum liquid flow rates
Up to 30 kg/s (475 gpm), depending on media, permitted pressure drop and temperature program.

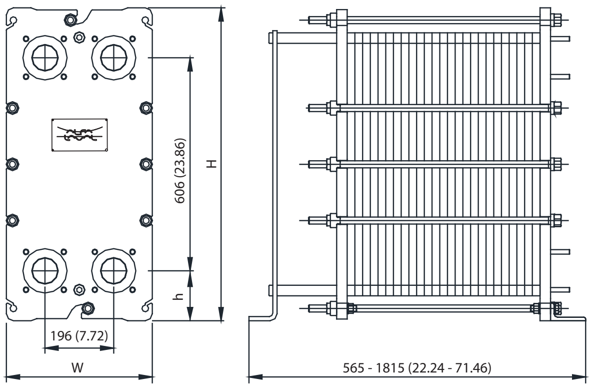
Connection standard

FM	pvcALS™	EN 1092-1 PN10, ASME B16.5 Class 150, JIS B2220 10K
FM	PED	EN 1092-1 PN10, ASME B16.5 Class 150
FG	pvcALS™	EN 1092-1 PN16 and PN10, ASME B16.5 Class 150, JIS B2220 16K and 10K
FG	PED	EN 1092-1 PN16, ASME B16.5 Class 150
FG	ASME	ASME B16.5 Class 150

Standard EN 1092-1 corresponds to GOST 12815-80 and GB/T 9115.

Particulars required for quotation
To receive a quotation for plate heat exchangers that meet your requirements, please provide Alfa Laval representatives with:

- Flow rates or heat load
- Temperature program
- Physical properties of liquids in question (if not water)
- Design pressure and design temperature
- Maximum permitted pressure drop



Measurements mm (inch)

Type	H	W	h
AQ3-FM (ALS,PED,ASME)	890 (35.04)	400 (15.78)	142 (5.59)
AQ3-FG (ALS,PED)	890 (35.04)	400 (15.78)	142 (5.59)
AQ3-FG (ASME)	890 (35.04)	416 (16.38)	142 (5.59)

The number of tightening bolts may vary depending on type.

The thermal performance is third party certified through the AHRI Liquid to Liquid Heat Exchangers certification program

PCT00209EN 1506

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Alfa Laval AQ4

AlfaQ^{TM} AHRI-certified plate heat exchanger

Applications
General heating and cooling duties. Heating by means of steam.

Standard design
The plate heat exchanger consists of a pack of corrugated metal plates with portholes for the passage of the two fluids between which heat transfer will take place.

The plate pack is assembled between a fix frame plate and a movable pressure plate and compressed by tightening bolts. The plates are fitted with a gasket which seals the interplate channel and directs the fluids into alternate channels. The number of plates is determined by the flow rate, physical properties of the fluids, pressure drop and temperature program. The plate corrugations promote fluid turbulence and support the plates against differential pressure.

The plate and the pressure plate are suspended from an upper carrying bar and located by a lower guiding bar, both of which are fixed to a support column.

Connections are located in the frame plate or, if either or both fluids make more than a single pass within the unit, in the frame and pressure plates.

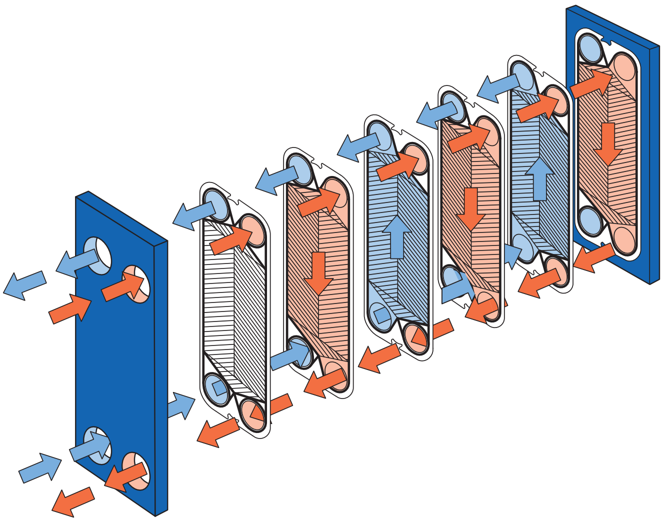
Typical capacities
Liquid flow rate
Up to 50 kg/s (800 gpm), depending on media, permitted pressure drop and temperature program.

Water heating by steam
0.7 to 3.0 MW

Plate types
AQ4, AQ4-M and AQ4-D, double wall plates.

Frame types
FM, FG and FD

Working principle
Channels are formed between the plates and the corner ports are arranged so that the two media flow through alternate channels. The heat is transferred through the plate between the channels, and complete counter-current flow is created for highest possible efficiency. The corrugation of the plates provides the passage between the plates, supports each plate against the adjacent one and enhances the turbulence, resulting in efficient heat transfer.



Flow principle of a plate heat exchanger

STANDARD MATERIALS

Frame plate
Mild steel, Epoxy painted

Nozzles
Carbon steel
Metal lined: Stainless steel, Titanium
Rubber lined: Nitrile, EPDM

Plates
Stainless steel Alloy 316/Alloy 304, Titanium, Alloy 254 SMO, Alloy C276

Gaskets (Clip-on, glued)
Nitrile, EPDM, Viton®
Other grades and material available on request.

TECHNICAL DATA

Pressure vessel codes, PED, ASME, pvcALS™
Mechanical design pressure (g) / temperature

FL pvcALS™	0.6 MPa / 130ºC
FM pvcALS™	1.0 MPa / 180ºC
FM PED	1.0 MPa / 180ºC
FG pvcALS™	1.6 MPa / 180ºC
FG PED	1.6 MPa / 180ºC *
FG ASME	150 psig / 356ºF
FD PED pvsALS™	2.5 MPa / 180ºC
FD ASME	389 psig / 482ºF

*) Frame FG also approved for 1.2 MPa / 200°C to allow use in steam systems without safety valves.

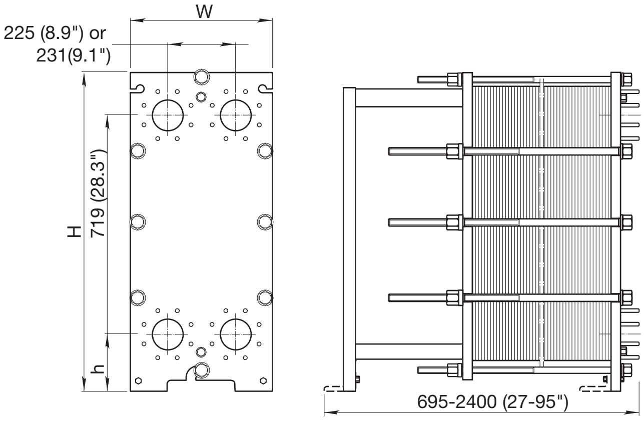
Connections

Size: DN100 / NPS 4 / 100A

FL	pvcALS™	EN 1092-1 PN10, JIS B2220 10K
FM	pvcALS™	EN 1092-1 PN10, ASME B16.5 Class 150, JIS B2220 10K,
FM	PED	EN 1092-1 PN10, ASME B16.5 Class 150
FG	pvcALS™	EN 1092-1 PN16, ASME B16.5 Class 150, JIS B2220 10K, JIS B2220 16K,
FG	PED	EN 1092-1 PN16, ASME B16.5 Class 150
FG	ASME	ASME B16.5 Class 150
FD	PED	EN 1092-1 PN25, ASME B16.5 Class 150, ASME B16.5 Class 300
FD	ASME	ASME B16.5 Class 300

Standard EN 1092-1 corresponds to GOST 12815-80 and GB/T 9115.

Dimensions



Measurements mm (inch)

Type	H	W	h
AQ4-FM	1084 (42.7")	470 (18.5")	215 (8.5")
AQ4-FG	1084 (42.7")	470 (18.5")	215 (8.5")
AQ4-FD	981 (38.6")	470 (18.5")	131 (5.2")
AQ4-FD ASME	1084 (42.7")	470 (18.5")	215 (8.5")

The number of tightening bolts may vary depending on pressure rating.

Maximum heat transfer surface

AQ4-B 90 m^2 (970 sq. ft)
AQ4 60 m^2 (650 sq. ft)

Particulars required for quotation

- Flow rates or heat load
- Temperature program
- Physical properties of liquids in question (if not water)
- Desired working pressure
- Maximum permitted pressure drop
- Available steam pressure

The thermal performance is third party certified through the AHRI Liquid to Liquid Heat Exchangers certification program

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Liquid to Liquid Heat Exchangers
AHRI Standard 400

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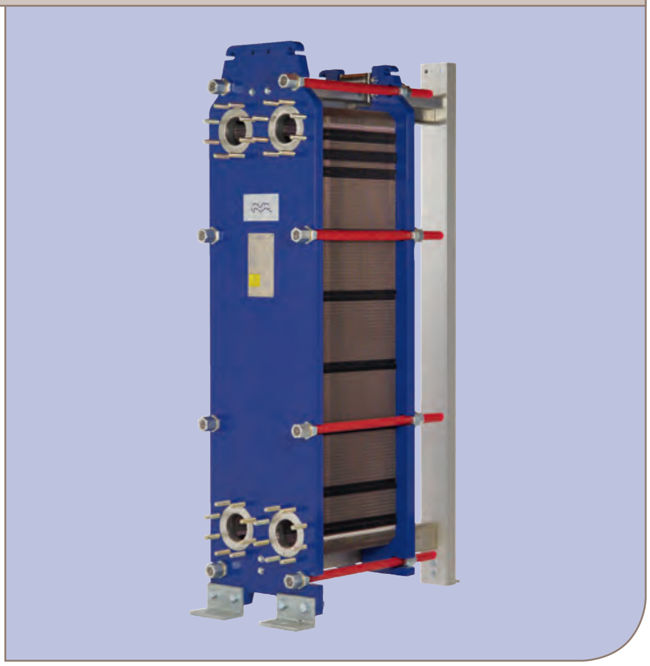
Alfa Laval AQ4L

AlfaQ™ AHRI-certified plate heat exchanger



Applications
General heating and cooling duties.

Standard design
The plate heat exchanger consists of a pack of corrugated metal plates with portholes for the passage of the two fluids between which heat transfer will take place.

The plate pack is assembled between a fix frame plate and a movable pressure plate and compressed by tightening bolts. The plates are fitted with a gasket which seals the interplate channel and directs the fluids into alternate channels. The number of plates is determined by the flow rate, physical properties of the fluids, pressure drop and temperature program. The plate corrugations promote fluid turbulence and support the plates against differential pressure.

The plate and the pressure plate are suspended from an upper carrying bar and located by a lower guiding bar, both of which are fixed to a support column.

Connections are located in the frame plate or, if either or both fluids make more than a single pass within the unit, in the frame and pressure plates.

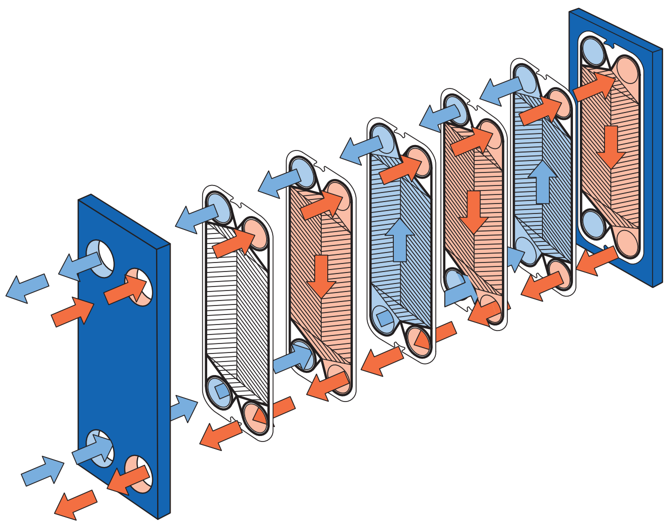
Typical capacities

Liquid flow rate
Up to 50 kg/s (800 gpm), depending on media, permitted pressure drop and temperature program.

Plate types
AQ4L, AQ4L-P

Frame types
FM, FG and FS

Working principle
Channels are formed between the plates and the corner ports are arranged so that the two media flow through alternate channels. The heat is transferred through the plate between the channels, and complete counter-current flow is created for highest possible efficiency. The corrugation of the plates provides the passage between the plates, supports each plate against the adjacent one and enhances the turbulence, resulting in efficient heat transfer.



Flow principle of a plate heat exchanger

STANDARD MATERIALS

Frame plate
Mild steel, Epoxy painted

Nozzles
Carbon steel
Metal lined: Stainless steel, Titanium, Alloy 254, Alloy C276, Nickel
Rubber lined: Nitrile, EPDM

Plates
Stainless steel: Alloy 304, Alloy 316. Alloy 254, Alloy C276
Nickel, Titanium

Gaskets
Nitrile, EPDM, Viton®
Other grades and material available on request

TECHNICAL DATA

Pressure vessel codes, PED, ASME, pvcALS™
Mechanical design pressure (g) / temperature

FM	pvcALS™	1.0 MPa / 180°C
FG	PED, pvcALS™	1.6 MPa / 180°C
FG	ASME	150 psig / 482°F
FD	PED	2.5 MPa / 180°C
FS	ASME	400 psig / 482°F

Connections

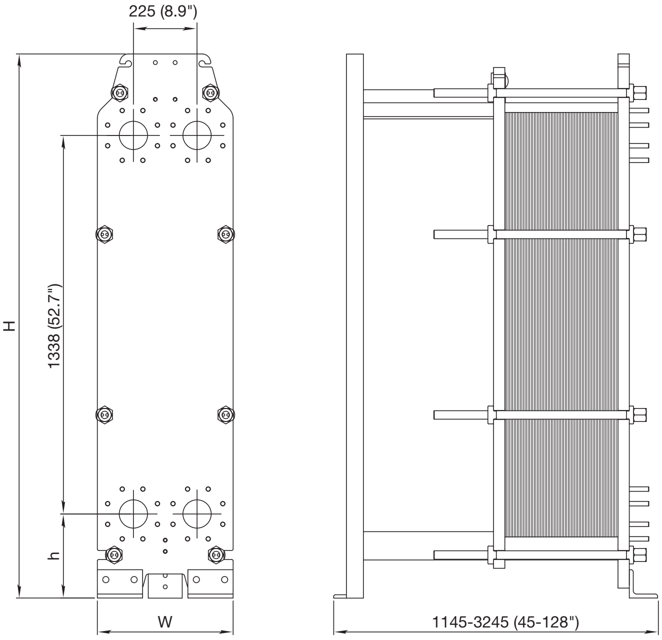
Size: DN100 / NPS 4 / 100A

FM	pvcALS™	EN 1092-1 PN10, ASME B16.5 Class 150, JIS B2220 10K
FG	PED	EN 1092-1 PN10, ASME B16.5 Class 150
FG	pvcALS™	EN 1092-1 PN16, ASME B16.5 Class 150, JIS B2220 16K
FG	ASME	ASME B16.5 Class 150
FD	PED	EN 1092-1 PN25, ASME B16.5 Class 300, Special square flange
FD	pvcALS™	EN 1092-1 PN25, ASME B16.5 Class 150, JIS B2220 20K
FS	ASME	Special square flange

Standard EN 1092-1 corresponds to GOST 12815-80 and GB/T 9115.

Maximum heat transfer surface
250 m^2 (2700 sq. ft)

Dimensions



Measurements mm (inch)

Type	H	W	h
AQ4L-FM	1885 (74.2")	480 (18.9")	255 (10")
AQ4L-FG	1981 (78")	480 (18.9")	297 (11.7")
AQ4L-FD	1981 (78")	480 (18.9")	297 (11.7")
AQ4L-FS	1981 (78")	510 (20.1")	297 (11.7")

The number of tightening bolts may vary depending on pressure rating.

Particulars required for quotation

- Flow rates or heat load
- Temperature program
- Physical properties of liquids in question (if not water)
- Desired working pressure
- Maximum permitted pressure drop

The thermal performance is third party certified through the AHRI Liquid to Liquid Heat Exchangers certification program

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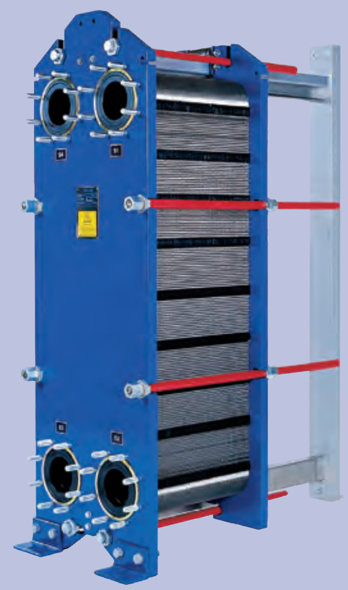
Alfa Laval AQ6

AlfaQ^{TM} AHRI-certified plate heat exchanger



Applications
General heating and cooling duties.

Standard design
The plate heat exchanger consists of a pack of corrugated metal plates with portholes for the passage of the two fluids between which heat transfer will take place.

The plate pack is assembled between a fix frame plate and a movable pressure plate and compressed by tightening bolts. The plates are fitted with a gasket which seals the interplate channel and directs the fluids into alternate channels. The number of plates is determined by the flow rate, physical properties of the fluids, pressure drop and temperature program. The plate corrugations promote fluid turbulence and support the plates against differential pressure.

The plate and the pressure plate are suspended from an upper carrying bar and located by a lower guiding bar, both of which are fixed to a support column.

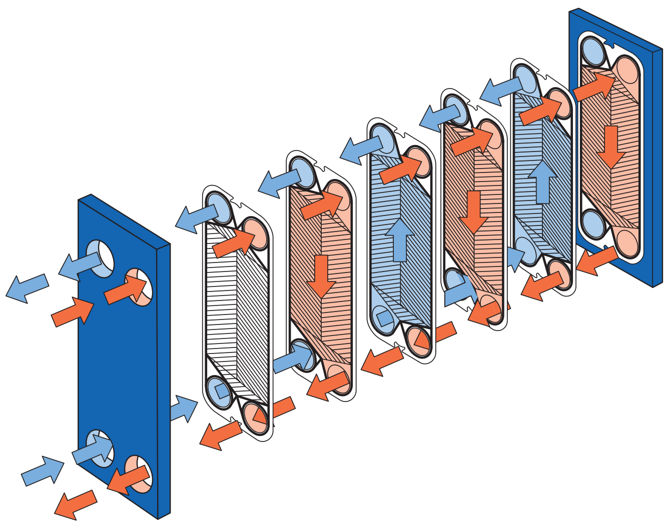
Connections are located in the frame plate or, if either or both fluids make more than a single pass within the unit, in the frame and pressure plates.

Typical capacities
Liquid flow rate
Up to 80 kg/s (1300 gpm), depending on media, permitted pressure drop and temperature program.

Plate Types
AQ6, AQ6M and AQ6D, double wall plates

Frame types
FL, FM, FG and FD

Working principle
Channels are formed between the plates and the corner ports are arranged so that the two media flow through alternate channels. The heat is transferred through the plate between the channels, and complete counter-current flow is created for highest possible efficiency. The corrugation of the plates provides the passage between the plates, supports each plate against the adjacent one and enhances the turbulence, resulting in efficient heat transfer.



Flow principle of a plate heat exchanger

STANDARD MATERIALS

Frame plate
Mild steel, Epoxy painted

Nozzles
Carbon steel
Metal lined: Stainless steel, Titanium
Rubber lined: Nitrile, EPDM

Plates
Stainless steel: Alloy 304, Alloy 316, Alloy C276, Alloy 254 SMO, Titanium

Gaskets (Clip-on/tape-on, glued)
Nitrile, EPDM, Viton®
Other grades and material available on request.

TECHNICAL DATA

Pressure vessel codes, PED, ASME, pvcALS™
Mechanical design pressure (g) / temperature

FL	pvcALS™	0.6 MPa / 130°C
FM	PED, pvcALS™	1.0 MPa / 180°C
FG	PED, pvcALS™	1.6 MPa / 180°C
FG	ASME	170 psig / 482°F
FD	PED, pvcALS™	3.0 MPa / 180°C
FD	ASME	300 psig / 356°F

Connections

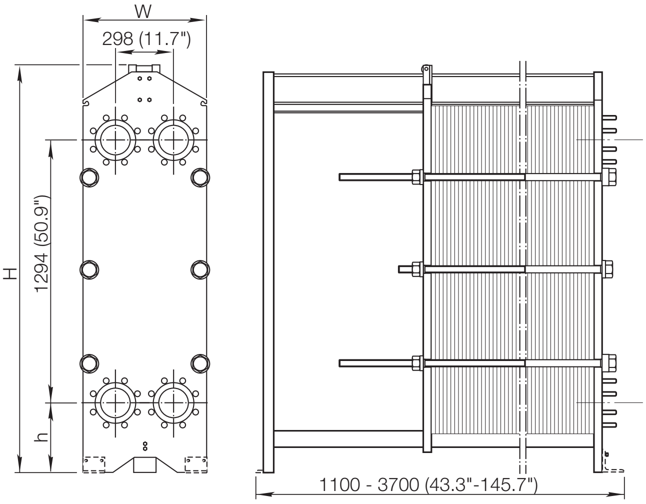
Size: DN150 / NPS 6 / 150A

FL	pvcALS™	EN 1092-1 PN10, JIS B2220 10K
FM	PED	DIN PN10, ASME B16.5 Class 150
FM	pvcALS™	DIN PN10, ASME B16.5 Class 150, JIS B2220 10K
FG	PED	DIN PN16, ASME B16.5 Class 150
FG	pvcALS™	DIN PN16, ASME B16.5 Class 150, JIS B2220 16K
FG	ASME	ASME B16.5 Class 150
FD	PED	DIN PN25, ASME B16.5 Class 300
FD	ASME	ASME B16.5 Class 300

Standard EN 1092-1 corresponds to GOST 12815-80 and GB/T 9115.

Maximum heat transfer surface
390 m² (4200 sq. ft)

Dimensions



Measurements mm (inch)

Type	H	W	h
AQ6-FL	1815 (71.5")	610 (24")	275 (10.8")
AQ6-FM	max. 1941 (76.4")	610 (24")	275 (10.8")
AQ6-FG	max. 1941 (76.4")	650 (25.6")	275 (10.8")
AQ6-FD	max. 2036 (80.2")	650 (25.6")	370 (14.6")

The number of tightening bolts may vary depending on pressure rating.

Particulars required for quotation
- Flow rates or heat load
- Temperature program
- Physical properties of liquids in question (if not water)
- Desired working pressure
- Maximum permitted pressure drop
- Available steam pressure

The thermal performance is third party certified through the AHRI Liquid to Liquid Heat Exchangers certification program

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ECF00369EN 1506

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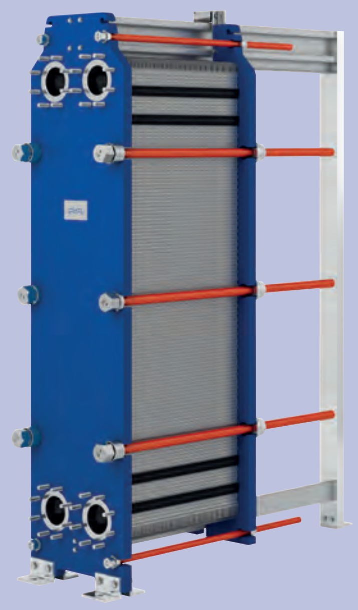
Alfa Laval AQ6L

AlfaQ^{TM} AHRI-certified plate heat exchanger



Applications
General heating and cooling duties.

Standard design
The plate heat exchanger consists of a pack of corrugated metal plates with portholes for the passage of the two fluids between which heat transfer will take place.

The plate pack is assembled between a fix frame plate and a movable pressure plate and compressed by tightening bolts. The plates are fitted with a gasket which seals the interplate channel and directs the fluids into alternate channels. The number of plates is determined by the flow rate, physical properties of the fluids, pressure drop and temperature program. The plate corrugations promote fluid turbulence and support the plates against differential pressure.

The plate and the pressure plate are suspended from an upper carrying bar and located by a lower guiding bar, both of which are fixed to a support column.

Connections are located in the frame plate or, if either or both fluids make more than a single pass within the unit, in the frame and pressure plates.

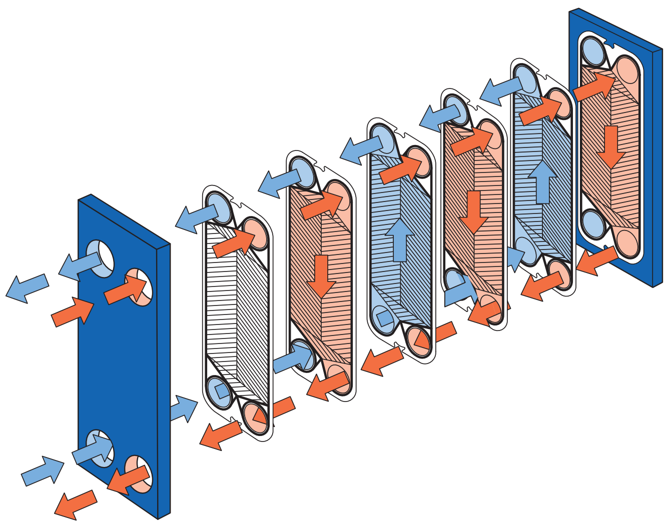
Typical capacities

Liquid flow rate
Up to 120 kg/s (1900 gpm), depending on media, permitted pressure drop and temperature program.

Plate types
AQ6L

Frame types
FM, FG, FD and FS

Working principle
Channels are formed between the plates and the corner ports are arranged so that the two media flow through alternate channels. The heat is transferred through the plate between the channels, and complete counter-current flow is created for highest possible efficiency. The corrugation of the plates provides the passage between the plates, supports each plate against the adjacent one and enhances the turbulence, resulting in efficient heat transfer.



Flow principle of a plate heat exchanger

STANDARD MATERIALS

Frame plate
Mild steel, Epoxy painted

Nozzles
Carbon steel
Metal lined: Stainless steel, Titanium
Rubber lined: Nitrile, EPDM

Plates
Stainless steel: Alloy 304, Alloy 316. Titanium

Gaskets
Nitrile, EPDM

TECHNICAL DATA

Pressure vessel codes, PED, ASME, pvcALS™
Mechanical design pressure (g) / temperature*

FM	pvcALS™	1.0 MPa / 180ºC
FG	pvcALS™	2.0 MPa / 50°C
FG	PED	2.0 MPa / 50°C
FG	ASME	150 psig / 482°F
FD	ASME	300 psig / 482ºF
FS	pvcALS™	3.5 MPa / 50°C
FS	PED	3.5 MPa / 50°C
FS	ASME	460 psig / 482ºF

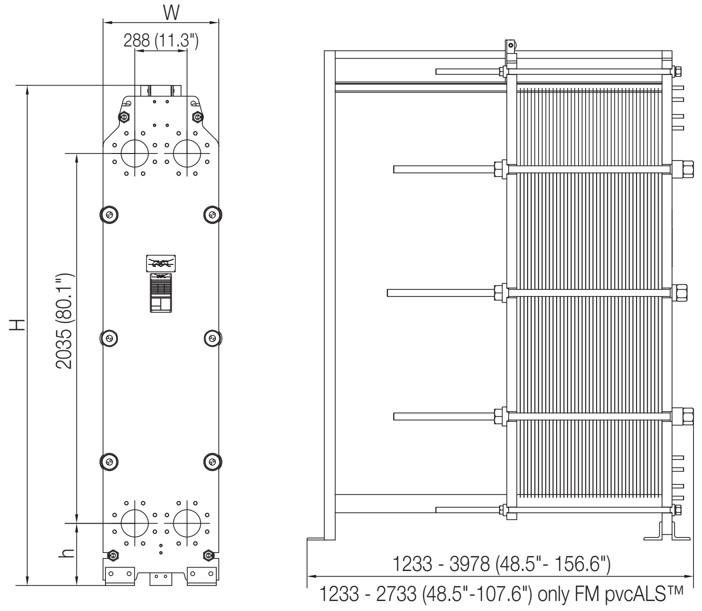
* All PED and ALS units, except FM, are optimised for a design temperature of 50ºC (122ºF).
All PED and ALS units are also available for of multi range temperatures 50, 100, 150, 180 and 200ºC with corresponding lower design pressure.

Connections

Size: DN150 / NPS 6 / 150A

FM	pvcALS™	EN 1092-1 PN10, ASME B16.5 Class 150, JIS B2220 10K
FG	pvcALS™	DIN/GB/GOST PN16, PN25, ASME Cl. 150, JIS 10K, JIS 16K
FG	PED	EN 1092-1 PN16, EN 1092-1 PN25, ASME B16.5 Class 150
FG	ASME	ASME B16.5 Class 150
FD	ASME	ASME B16.5 Class 300
FS	pvcALS™	EN 1092-1 PN25, EN 1092-1 PN40, ASME B16.5 Class 300 JIS 10K, JIS 20K
FS	PED	EN 1092-1 PN25, EN 1092-1 PN40, ASME B16.5 Class 300
FS	ASME	ASME B16.5 Class 300

Standard EN 1092-1 corresponds to GOST 12815-80 and GB/T 9115.



Measurements mm (inch)

Type	H	W	h
AQ6L-FM/pvcALS™	2752 (108.3")	610 (24.0")	342 (13.5")
AQ6L-FG/PED/pvcALS™	2752 (108.3")	637 (25.1")	342 (13.5")
AQ6L-FG/ASME	2752 (108.3")	646 (25.4")	342 (13.5")
AQ6L-FD/ASME	2752 (108.3")	646 (25.4")	342 (13.5")
AQ6L-FS/PED/pvcALS™	2752 (108.3")	646 (25.4")	342 (13.5")
AQ6L-FS/ASME	2752 (108.3")	646 (25.4")	342 (13.5")

The number of tightening bolts may vary depending on pressure rating and Pressure Vessel Code (PVC) requirements.

Maximum heat transfer surface

990 (1.1 x 900) m² (10660 sq.ft)

Particulars required for quotation

- Flow rates or heat load
- Temperature program
- Physical properties of liquids in question (if not water)
- Desired working pressure
- Maximum permitted pressure drop
- Available steam pressure

The thermal performance is third party certified through the AHRI Liquid to Liquid Heat Exchangers certification program

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Alfa Laval AQ8S

AlfaQ™ AHRI-certified plate heat exchanger

Applications
General heating and cooling duties. Heating by means of steam.

Standard design
The plate heat exchanger consists of a pack of corrugated metal plates with portholes for the passage of the two fluids between which heat transfer will take place.

The plate pack is assembled between a fix frame plate and a movable pressure plate and compressed by tightening bolts. The plates are fitted with a gasket which seals the interplate channel and directs the fluids into alternate channels. The number of plates is determined by the flow rate, physical properties of the fluids, pressure drop and temperature program. The plate corrugations promote fluid turbulence and support the plates against differential pressure.

The plate and the pressure plate are suspended from an upper carrying bar and located by a lower guiding bar, both of which are fixed to a support column.

Connections are located in the frame plate or, if either or both fluids make more than a single pass within the unit, in the frame and pressure plates.

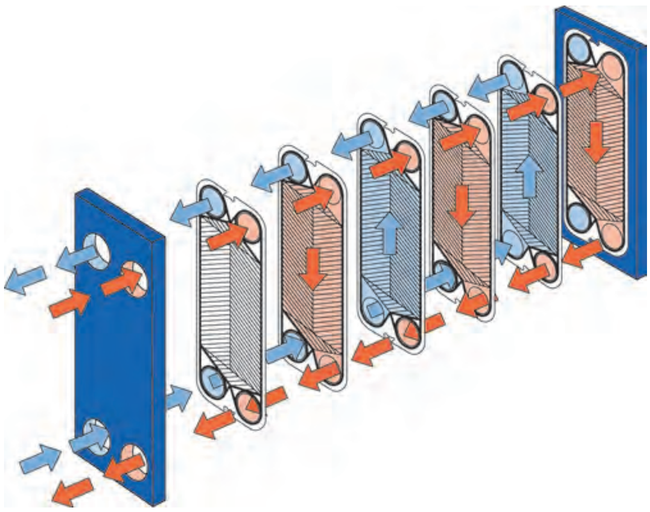
Typical capacities

Liquid flow rate
Up to 190 kg/s (3040 gpm), depending on media, permitted pressue drop and temperature program.

Water heating by steam
2.5-15 MW at a steam condensation temperature of 150°C
2.5-9 MW at a steam condensation temperature of 120°C

Plate types
AQ8S plates

Frame types
FM, FG and FS



Working principle
Channels are formed between the plates and the corner ports are arranged so that the two media flow through alternate channels. The heat is transferred through the plate between the channels, and complete counter-current flow is created for highest possible efficiency. The corrugation of the plates provides the passage between the plates, supports each plate against the adjacent one and enhances the turbulence, resulting in efficient heat transfer.

STANDARD MATERIALS

Frame plate
Mild steel, Epoxy painted

Nozzles
Carbon steel
Metal lined: Stainless steel, Titanium, Alloy C-276
Rubber lined: Nitrile, EPDM

Plates
Stainless steel Alloy 316 (Alloy 254, Alloy C-276 or Titanium
Other grades and material available on request.

Gaskets
Nitrile, EPDM, Viton or HeatSealF™
Other grades and material available on request.

TECHNICAL DATA

Pressure vessel codes, PED, ASME, pvcALS™
Mechanical design pressure (g) / temperature

FM	PED	10 MPa / 210°C
FM	pvcALS™	1.0 MPa / 180°C
FG	PED	1.6 MPa / 180°C *)
FG	ASME	150 psig / 350°F
FG	pvcALS™	1.6 MPa / 180°C
FS	PED	3.0 MPa / 160°C
FS	ASME	460 psig / 350°F

*) Frame FG also approved for 1.2 MPa / 200ºC to allow use in steam systems without safety valves.

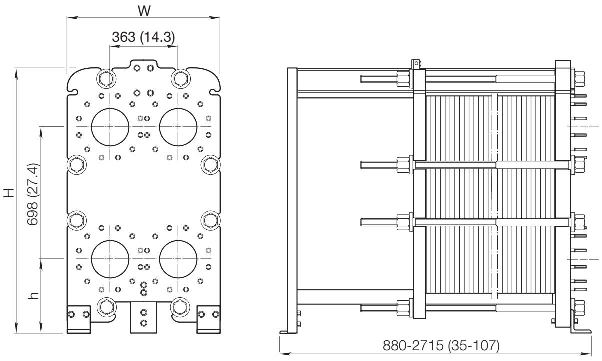
Connections

Size: DN200 / NPS 8 / 200A

FM	PED	EN 1092-1 PN10, ASME B16.5 Class 150
FM	pvcALS™	EN 1092-1 PN10, ASME B16.5 Class 150, JIS B2220 10K
FG	PED	EN 1092-1 PN16, ASME B16.5 Class 150
FG	ASME	ASME B16.5 Class 150
FG	pvcALS™	EN 1092-1 PN10, ASME B16.5 Class 150, JIS B2220 10K, JIS B2220 16K
FS	PED	EN 1092-1 PN25, EN 1092-1 PN40, ASME Cl. 300
FS	ASME	ASME B16.5 Class 150, ASME B16.5 Class 300

Standard EN 1092-1 corresponds to GOST 12815-80 and GB/T 9115.

Dimensions



Measurements mm (inch)

Type	H	W	h
AQ8S-FM	1405 (55 5/16)	740 (29⅛)	360 (14⅛)
AQ8S-FG	1405 (55 5/16)	800 (31½)	360 (14⅛)
AQ8S-FS	1435 (56½)	800 (31½)	390 (14⅛)

The number of tightening bolts may vary depending on pressure rating.

Maximum heat transfer surface
85 m² (910 sq. ft)

Particulars required for quotation
- Flow rates or heat load
- Temperature program
- Physical properties of liquids in question (if not water)
- Desired working pressure
- Maximum permitted pressure drop
- Available steam pressure

The thermal performance is third party certified through the AHRI Liquid to Liquid Heat Exchangers certification program

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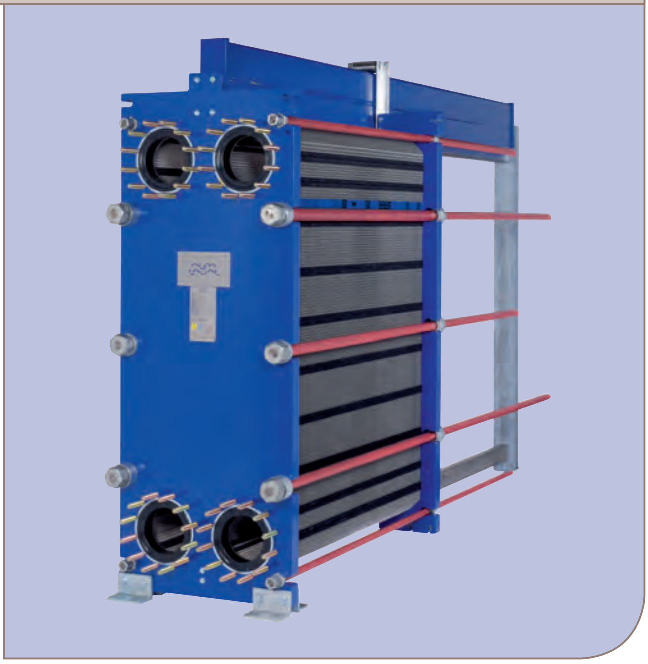
Alfa Laval AQ8

AlfaQ^{TM} AHRI-certified plate heat exchanger



Applications
General heating and cooling duties

Standard design
The plate heat exchanger consists of a pack of corrugated metal plates with portholes for the passage of the two fluids between which heat transfer will take place.

The plate pack is assembled between a fix frame plate and a movable pressure plate and compressed by tightening bolts. The plates are fitted with a gasket, which seals the interplate channel and directs the fluids into alternate channels. The number of plates is determined by the flow rate, physical properties of the fluids, pressure drop and temperature program. The plate corrugations promote fluid turbulence and support the plates against differential pressure.

The frame plate and the pressure plate are suspended from an upper carrying bar and located by a lower guiding bar, both of which are fixed to a support column.

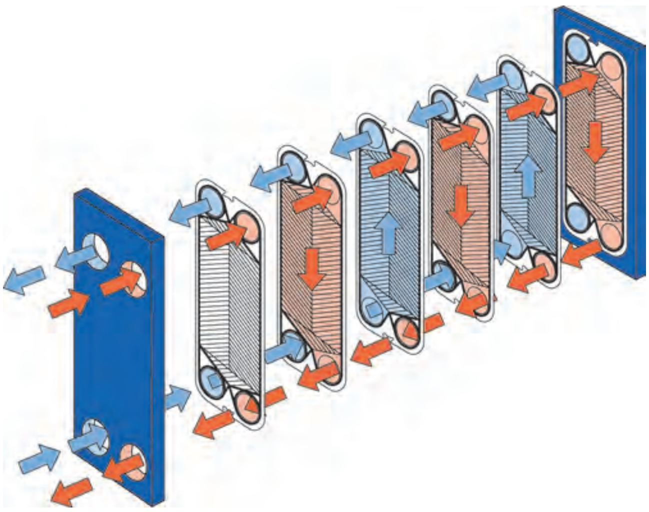
Connections are located in the frame plate or, if either or both fluids make more than a single pass within the unit, in the frame and pressure plates.

Typical capacities
Liquid flow rate
Up to 225 kg/s (3600 gpm), depending on media, permitted pressure drop and temperature program.

Plate types
AQ8, AQ8M and AQ8P plates

Frame types
FM, FG and FS

Working principle
Channels are formed between the plates and the corner ports are arranged so that the two media flow through alternate channels. The heat is transferred through the plate between the channels, and complete counter-current flow is created for highest possible efficiency. The corrugation of the plates provides the passage between the plates, supports each plate against the adjacent one and enhances the turbulence, resulting in efficient heat transfer.



Flow principle of a plate heat exchanger

STANDARD MATERIALS

Frame plate
Mild steel, Epoxy painted

Nozzles
Rubber lined
Carbon steel
Metal lined: Stainless steel, Titanium, Alloy C-276

Plates
Stainless steel Alloy 304, Stainless steel Alloy 316, Alloy 254 SMO, Alloy C-276 or Titanium Other grades and material available on request.

Gaskets
Nitrile, EPDM or Viton
Other grades and material available on request.

TECHNICAL DATA

Mechanical design pressure (g) / temperature

FM	pvcALS™	1.0 MPa / 180°C
FG	pvcALS™	1.6 MPa / 180°C
FG	PED	1.6 MPa / 180°C
FG	ASME	150 psig / 480°F
FD	ASME	300 psig / 480°F
FS	PED	3.0 MPa / 160°C
FS	ASME	400 psig / 480°F

CONNECTIONS

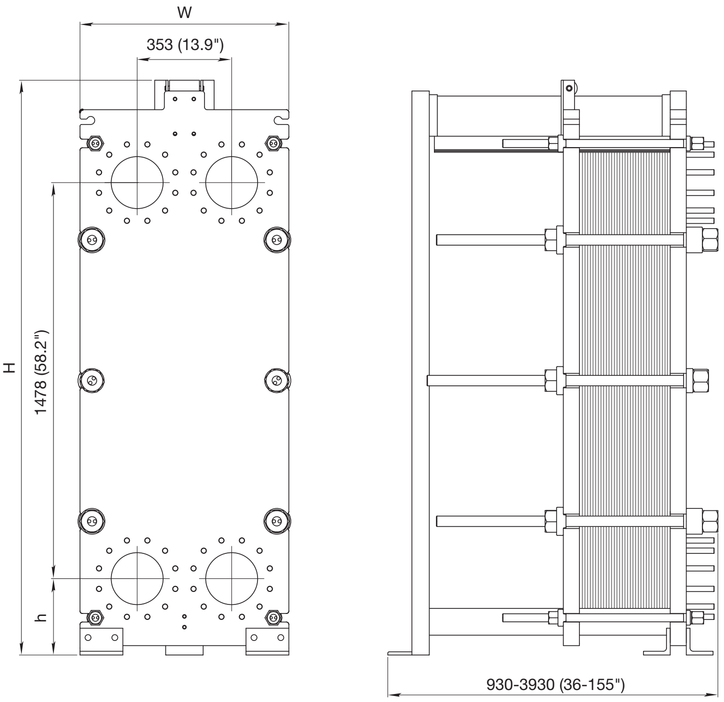
Size: DN200 / NPS 8 / 200A

FM	pvcALS™	EN 1092-1 PN10, ASME B16.5 Class 150, JIS B2220 10K
FG	pvcALS™	EN 1092-1 PN16, , ASME B16.5 Class 150, JIS B2220 10K, JIS B2220 16K
FG	PED	EN 1092-1 PN10; EN 1092-1 PN16, EN 1092-1 PN25, ASME B16.5 Class 150
FG	ASME	ASME B16.5 Class 150
FD	ASME	ASME B16.5 Class 150, ASME B16.5 Class 300
FS	pvcALS™	EN 1092-1 PN25, EN 1092-1 PN40, ASME B16.5 Class 300 ASME B16.5 Class 400, JIS B2220 20K
FS	PED	EN 1092-1 PN25, EN 1092-1 PN40, ASME B16.5 Class 300 ASME B16.5 Class 400
FS	ASME	ASME B16.5 Class 300, ASME B16.5 Class 400

Standard EN 1092-1 corresponds to GOST 12815-80 and GB/T 9115.

Maximum heat transfer surface
630 m^2 (7000 sq. ft)

Dimensions



Measurements mm (inch)

Type	H	W	h
AQ8-FM	2145 (84 ½")	780 (30 11/16")	285 (11 7/32)
AQ8-FG	2145 (84 ½")	780 (30 11/16")	285 (11 7/32)
AQ8-FS	2183 (84 ½")	780 (30 11/16")	323 (12 11/16)

The number of tightening bolts may vary depending on pressure rating.

Particulars required for quotation
- Flow rates or heat load
- Temperature program
- Physical properties of liquids in question (if not water)
- Desired working pressure
- Maximum permitted pressure drop
- Available steam pressure

The thermal performance is third party certified through the AHRI Liquid to Liquid Heat Exchangers certification program

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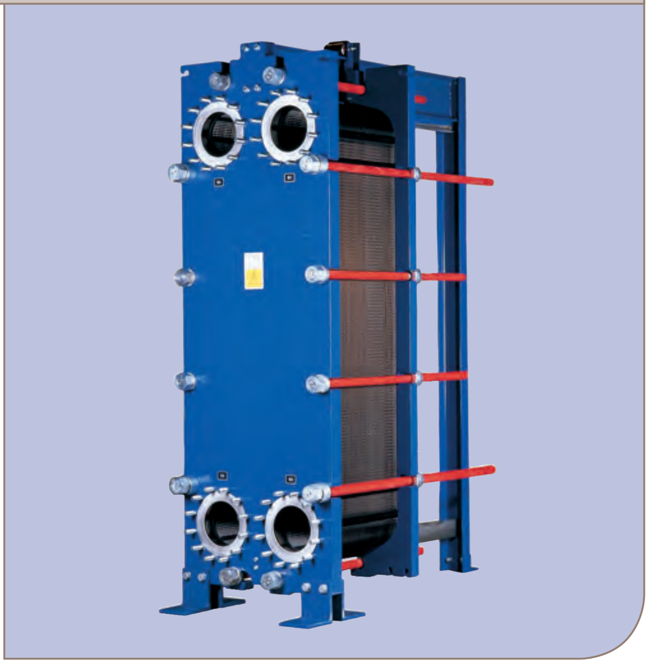
Alfa Laval AQ10

AlfaQ^{TM} AHRI-certified plate heat exchanger



Applications
Plate heat exchanger for general heating and cooling duties.

Standard design
The plate heat exchanger consists of a pack of corrugated metal plates with portholes for the passage of the two fluids between which heat transfer will take place.

The plate pack is assembled between a fix frame plate and a movable pressure plate and compressed by tightening bolts. The plates are fitted with a gasket, which seals the interplate channel and directs the fluids into alternate channels. The number of plates is determined by the flow rate, physical properties of the fluids, pressure drop and temperature program. The plate corrugations promote fluid turbulence and support the plates against differential pressure.

The plate and the pressure plate are suspended from an upper carrying bar and located by a lower guiding bar, both of which are fixed to a support column.

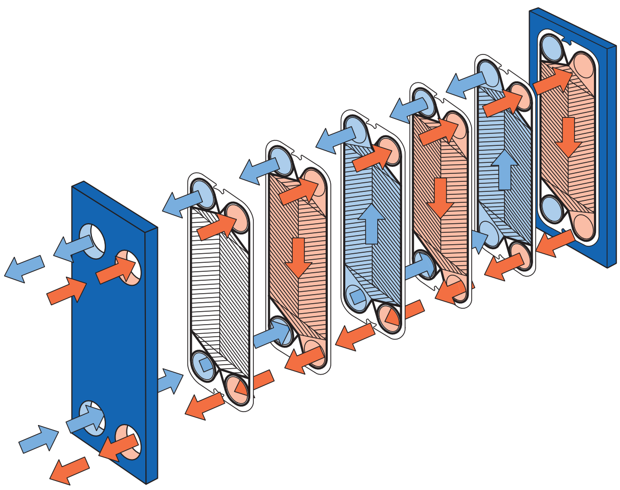
Connections are located in the frame plate or, if either or both fluids make more than a single pass within the unit, in the frame and pressure plates.

Typical capacities
Liquid flow rate.
Up to 350 kg/s (5600 gpm), depending on media, permitted pressure drop and temperature program.

Plate types
AQ10, AQ10M plates

Frame types
FMS, FGS, FG, FD and FS

Working principle
Channels are formed between the plates and the corner ports are arranged so that the two media flow through alternate channels. The heat is transferred through the plate between the channels, and complete counter-current flow is created for highest possible efficiency. The corrugation of the plates provides the passage between the plates, supports each plate against the adjacent one and enhances the turbulence, resulting in efficient heat transfer.



Flow principle of a plate heat exchanger

STANDARD MATERIALS

Frame plate
Mild steel, Epoxy painted

Nozzles
Carbon steel
Metal lined: Stainless steel, Titanium, Alloy C276, Rubber lined: Nitrile, EPDM

Plates
Stainless steel Alloy 316, Alloy C276, Alloy 254 SMO or Titanium Other grades and material available on request.

Gaskets
Nitrile, EPDM or Viton
Other grades and material available on request.

TECHNICAL DATA

Pressure vessel codes PED, ASME, pvcALS™

Mechanical design pressure (g) / temperature

FMS PED, pvcALS™	1.0 MPa / 180°C
FGS PED, pvcALS™	1.6 MPa / 180°C
FGS ASME	150 psig / 350°F
FG PED, pvcALS™	1.6 MPa / 200°C
FG ASME	150 psig / 350°F
FD PED, pvcALS™	2.5 MPa / 210°C
FD ASME	300 psig / 350°F
FS ASME	400 psig / 350°F

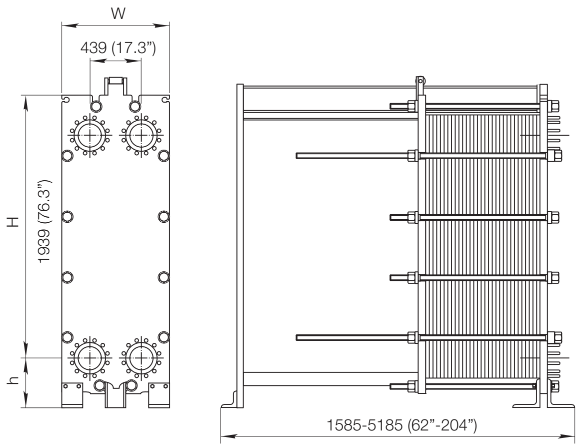
Connections

Size: DN200 / DN250 / NPS 8 / NPS 10 / 200A / 250A

FMS PED	EN 1092-1 PN10, ASME B16.5 Class 150
FMS pvcALS™	EN 1092-1 PN10, ASME B16.5 Class 150, JIS B2220 10K
FGS PED	EN 1092-1 PN16, ASME B16.5 Class 150
FGS pvcALS™	EN 1092-1 PN16, ASME B16.5 Class 150, JIS B2220 10K, JIS B2220 16K
FGS ASME	ASME B16.5 Class 150
FG PED	EN 1092-1 PN16, ASME B16.5 Class 150
FG pvcALS™	EN 1092-1 PN16, ASME B16.5 Class 150, JIS B2220 10K, JIS B2220 16K
FG ASME	ASME B16.5 Class 150
FD PED	EN 1092-1 PN25, ASME B16.5 Class 300
FD pvcALS™	EN 1092-1 PN25, ASME B16.5 Class 300, JIS B2220 20K
FD ASME	ASME B16.5 Class 300
FS ASME	ASME B16.5 Class 400

Maximum heat transfer surface
940 m² (10000 sq. ft)

Dimensions



Measurements mm (inch)

Type	H	W	h
AQ10-FMS	2595 (102")	920 (36.2")	325 (12.8")
AQ10-FGS	2595 (102")	920 (36.2")	325 (12.8")
AQ10-FG	max 3103 (122.2")	920 (36.2")	435 (17.1")
AQ10-FD	max 3103 (122.2")	940 (37")	435 (17.1")
AQ10-FS	max 3103 (122.2")	940 (37")	435 (17.1")

The number of tightening bolts may vary depending on the pressure rating

Particulars required for quotation
- Flow rates or heat load
- Temperature program
- Physical properties of liquids in question (if not water)
- Desired working pressure
- Maximum permitted pressure drop
- Available steam pressure

The thermal performance is third party certified through the AHRI Liquid to Liquid Heat Exchangers certification program

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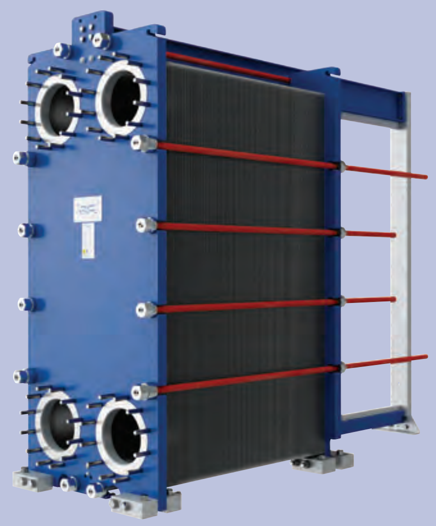
Alfa Laval AQ14S

AlfaQ^{TM} AHRI-certified plate heat exchanger



Applications
General heating and cooling duties.

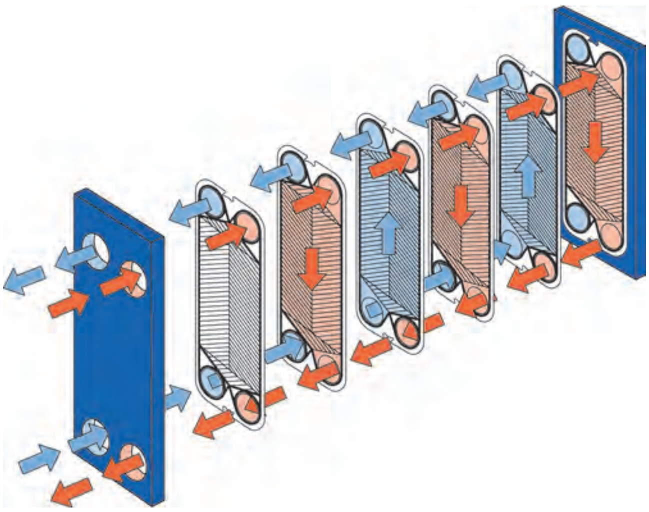
Standard design
The plate heat exchanger consists of a pack of corrugated metal plates with port holes for the passage of the two fluids between which heat transfer will take place.

The plate pack is assembled between a fixed frame plate and a movable pressure plate and compressed by tightening bolts. The plates are fitted with gaskets, which seal the interplate channels and direct the fluid into alternate channels. The number of plates is determined by the flow rate, physical properties of the fluids, pressure drop and temperature program. The plate corrugations promote fluid turbulence and support the plates against differential pressure.

The frame plate and the pressure plate are suspended from an upper carrying bar and located by a lower guiding bar, both of which are fixed to a support column.

Connections are located in the frame plate or, if either or both fluids make more than a single pass within the unit, in the frame and pressure plate.

Working principle
Channels are formed between the plates and the corner ports are arranged so that the two fluids flow through alternate channels. The heat is transferred through the plate between the channels, and complete counter-current flow is created for highest possible efficiency. The corrugation of the plates provides the passage between the plates, supports each plate against the adjacent one and enhances the turbulence, resulting in efficient heat transfer.



Flow principle of a plate heat exchanger

STANDARD MATERIAL

Frame/pressure plate
Mild steel, coated with water-based epoxy paint

Customized paint systems may be available on request.

Nozzles/Connections
Carbon steel
Metal lined: Stainless steel Alloy 316, Titanium

Other materials may be available on request.

Plates
Stainless steel Alloy 304, Alloy 316, Titanium
Other materials may be available on request.

Gaskets
Nitrile, EPDM or Viton
Other grades and materials may be available on request.

TECHNICAL DATA

Design pressure (g)

FM	pvcALS™	1.034 MPa
FM	PED	1.034 MPa
FG	pvcALS™	1.6 MPa
FG	PED	1.6 MPa
FG	ASME	150 psig
FD	pvcALS™	2.5 MPa
FD	PED	2.5 MPa
FD	ASME	300 psig
FS	ASME	400 psig

Higher pressures may be available on request.

Design temperature
Determined by gasket material.

Plate types
AQ14SP

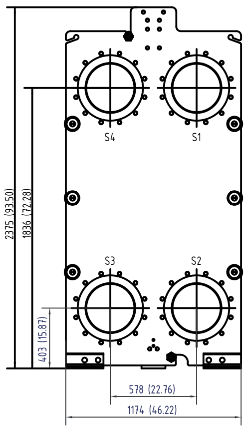
Connection size
DN350 / NPS 14 / 350A
DN300 / NPS 12 / 300A

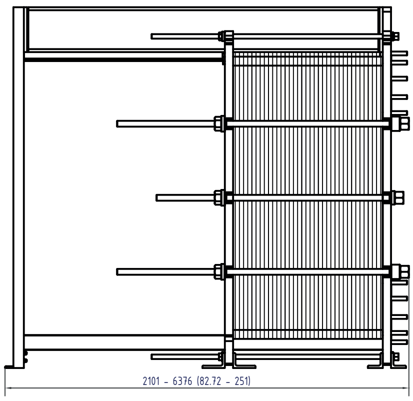
Connection standard

FM	pvcALS™	EN 1092-1 PN10, ASME B16.5 Class 150, JIS B2220 10K
FM	PED	EN 1092-1 PN10, ASME B16.5 Class 150
FG	pvcALS™	EN 1092-1 PN16, ASME B16.5 Class 150, JIS B2220 16K
FG	PED	EN 1092-1 PN16, ASME B16.5 Class 150
FG	ASME	ASME B16.5 Class 150
FD	pvcALS™	EN 1092-1 PN25, ASME B16.5 Class 300, JIS B2220 20K
FD	PED	EN 1092-1 PN25, ASME B16.5 Class 300
FD	ASME	ASME B16.5 Class 300
FS	ASME	ASME B16.5 Class 400

Standard EN 1092-1 corresponds to GOST 12815-80 and GB/T 9115.
Extended connections are available for ASME B16.5 Class 150, Class 300, Class 400 size NPS 14.

Particulars required for quotation
- Flow rates or heat load
- Temperature program
- Physical properties of fluids in question
- Desired working pressure and temperature
- Allowable pressure drops





The number of tightening bolts may vary depending on pressure rating.

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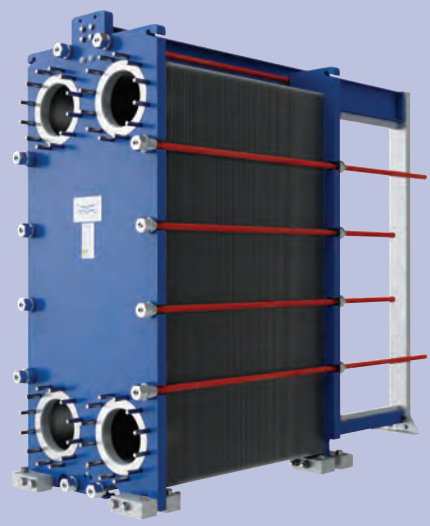
Alfa Laval AQ14

AlfaQ™ AHRI-certified plate heat exchanger



Applications
General heating and cooling duties.

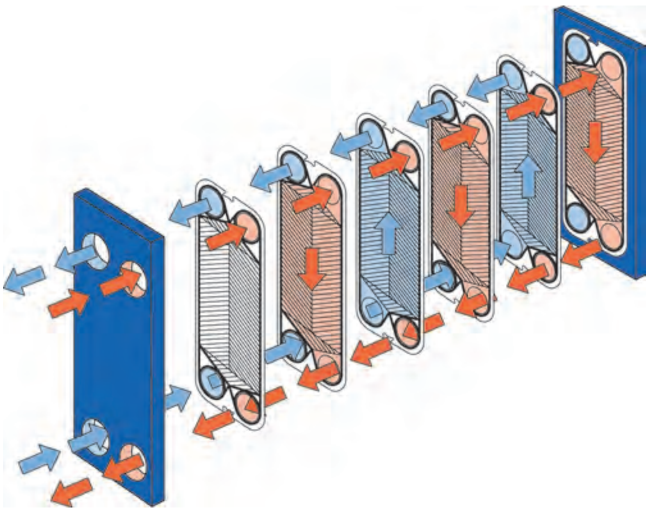
Standard design
The plate heat exchanger consists of a pack of corrugated metal plates with port holes for the passage of the two fluids between which heat transfer will take place.

The plate pack is assembled between a fixed frame plate and a movable pressure plate and compressed by tightening bolts. The plates are fitted with gaskets, which seal the interplate channels and direct the fluid into alternate channels. The number of plates is determined by the flow rate, physical properties of the fluids, pressure drop and temperature program. The plate corrugations promote fluid turbulence and support the plates against differential pressure.

The frame plate and the pressure plate are suspended from an upper carrying bar and located by a lower guiding bar, both of which are fixed to a support column.

Connections are located in the frame plate or, if either or both fluids make more than a single pass within the unit, in the frame and pressure plate.

Working principle
Channels are formed between the plates and the corner ports are arranged so that the two fluids flow through alternate channels. The heat is transferred through the plate between the channels, and complete counter-current flow is created for highest possible efficiency. The corrugation of the plates provides the passage between the plates, supports each plate against the adjacent one and enhances the turbulence, resulting in efficient heat transfer.



Flow principle of a plate heat exchanger

STANDARD MATERIAL

Frame/pressure plate
Mild steel, coated with water-based epoxy paint

Customized paint systems may be available on request.

Nozzles/Connections
Carbon steel
Metal lined: Stainless steel Alloy 316, Titanium

Other materials may be available on request.

Plates
Stainless steel Alloy 304, Alloy 316, Titanium
Other materials may be available on request.

Gaskets
Nitrile, EPDM or Viton
Other grades and materials may be available on request.

TECHNICAL DATA

Design pressure (g)

FL	pvcALS™	0.6 MPa
FM	pvcALS™	1.034 MPa
FM	PED	1.034 MPa
FG	pvcALS™	1.6 MPa
FG	PED	1.6 MPa
FG	ASME	150 psig
FD	pvcALS™	2.5 MPa
FD	PED	2.5 MPa
FD	ASME	300 psig
FS	ASME	400 psig

Higher pressures may be available on request.

Design temperature
Determined by gasket material.

Plate types
AQ14P

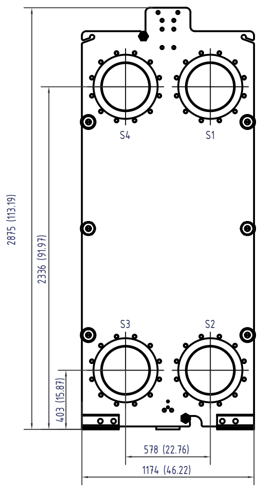
Connection size
DN350 / NPS 14 / 350A
DN300 / NPS 12 / 300A

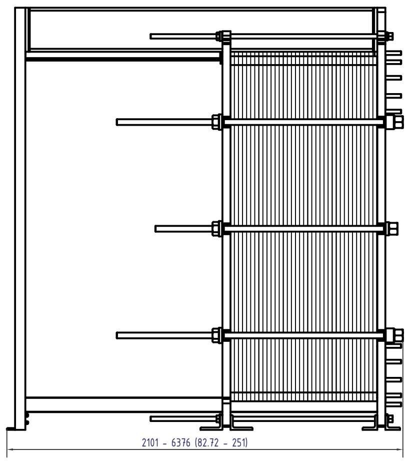
Connection standard

FL	pvcALS™	EN 1092-1 PN10, ASME B16.5 Class 150, JIS B2220 10K
FM	pvcALS™	EN 1092-1 PN10, ASME B16.5 Class 150, JIS B2220 10K
FM	PED	EN 1092-1 PN10, ASME B16.5 Class 150
FG	pvcALS™	EN 1092-1 PN16, ASME B16.5 Class 150, JIS B2220 16K
FG	PED	EN 1092-1 PN16, ASME B16.5 Class 150
FG	ASME	ASME B16.5 Class 150
FD	pvcALS™	EN 1092-1 PN25, ASME B16.5 Class 300, JIS B2220 20K
FD	PED	EN 1092-1 PN25, ASME B16.5 Class 300
FD	ASME	ASME B16.5 Class 300
FS	ASME	ASME B16.5 Class 400

Standard EN 1092-1 corresponds to GOST 12815-80 and GB/T 9115.
Extended connections are available for ASME B16.5 Class 150, Class 300, Class 400 size NPS 14.

Particulars required for quotation
- Flow rates or heat load
- Temperature program
- Physical properties of fluids in question
- Desired working pressure and temperature
- Allowable pressure drops





The number of tightening bolts may vary depending on pressure rating.

The thermal performance is third party certified through the AHRI Liquid to Liquid Heat Exchangers certification program

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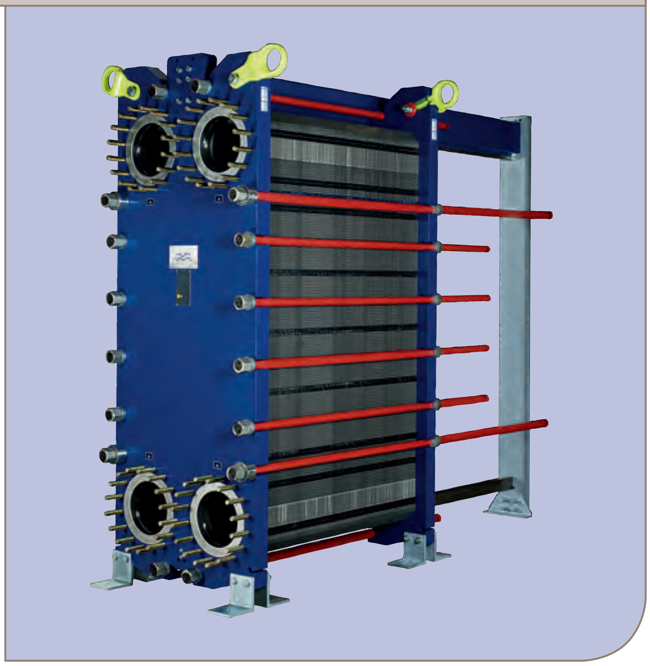
Alfa Laval AQ14L

AlfaQ^{TM} AHRI-certified plate heat exchanger



Applications
General heating and cooling duties.

Standard design
The plate heat exchanger consists of a pack of corrugated metal plates with portholes for the passage of the two fluids between which heat transfer will take place.

The plate pack is assembled between a fix frame plate and a movable pressure plate and compressed by tightening bolts. The plates are fitted with a gasket, which seals the interplate channel and directs the fluids into alternate channels. The number of plates is determined by the flow rate, physical properties of the fluids, pressure drop and temperature program. The plate corrugations promote fluid turbulence and support the plates against differential pressure.

The frame plate is stationary, while the pressure plate is movable along the upper carrying bar, which also holds the plate pack. The pressure plate and the plate pack are located by the lower guiding bar. The carrying bar is supported by the frame at one end and a support column at the other which are bolted to the foundation.

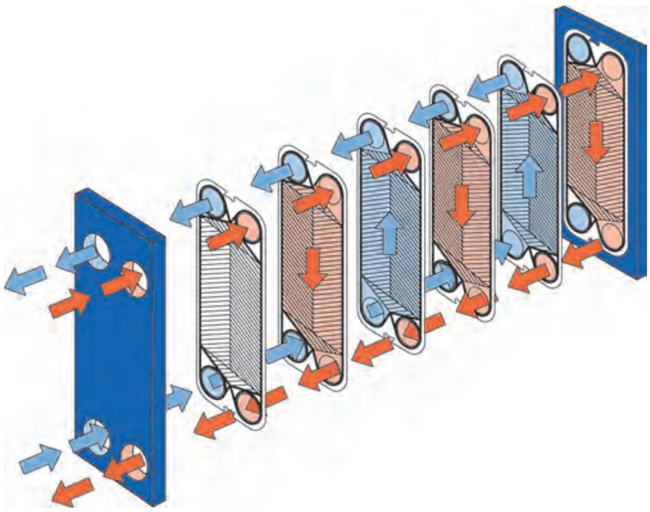
Connections are located in the frame plate or, if either or both fluids make more than a single pass within the unit, in the frame and pressure plates.

Typical capacities
Liquid flow rate
Up to 650 kg/s (10400 gpm), depending on media, permitted pressure drop and temperature program.

Plate types
AQ14L plates

Frame types
FM, FG, FD and FS

Working principle
Channels are formed between the plates and the corner ports are arranged so that the two media flow through alternate channels. The heat is transferred through the plate between the channels, and complete counter-current flow is created for highest possible efficiency. The corrugation of the plates provides the passage between the plates, supports each plate against the adjacent one and enhances the turbulence, resulting in efficient heat transfer.



Flow principle of a plate heat exchanger

STANDARD MATERIALS

Frame plate
Mild steel, Epoxy painted

Nozzles
Carbon steel
Metal lined: Stainless steel, Titanium, C276

Plates
Stainless steel Alloy 316 / Alloy 304 / Alloy 254 / Alloy C276 / Titanium
Other grades and material available on request.

Gaskets
Nitrile, EPDM or Viton
Other grades and material available on request.

TECHNICAL DATA

Pressure vessel codes, PED, ASME, pvcALS™
Mechanical design pressure (g) / temperature

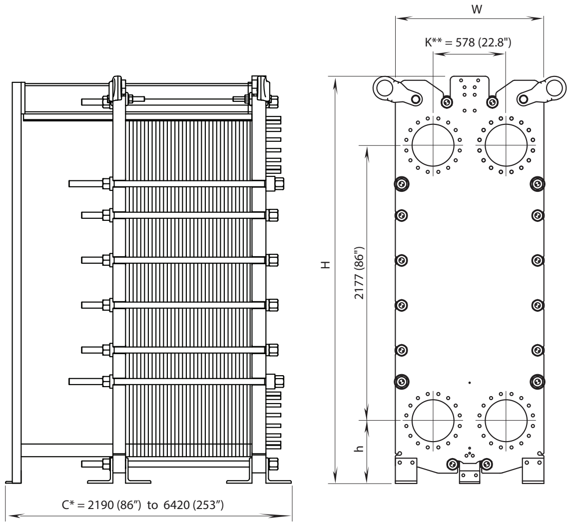
FM	PED / pvcALS™	1.0 MPa / 180°C
FM	ASME	100 psig / 350°F
FG	PED / pvcALS™	1.6 MPa / 180°C
FG	ASME	150psig / 350°F
FD	PED	2.5 MPa / 180°C
FD	ALS	2.5 MPa / 160°C
FD	ASME	300 psig / 350°F
FS	PED	3.0 MPa / 180°C
FS	ASME	400 psig / 350°F

Connections

		Size: DN350 / NPS 14 / 350A DN300 / NPS 12 / 300A
FM	pvcALS™	EN 1092-1 PN10, ASME B16.5.Class 150, JIS B2220 10K
FM	PED	EN 1092-1 PN10, ASME B16.5.Class 150
FM	ASME	ASME B16.5.Class 150
FG	pvcALS™	EN 1092-1 PN16, ASME B16.5.Class 150, JIS B2220 16K
FG	PED	EN 1092-1 PN16, ASME B16.5.Class 150
FG	ASME	ASME B16.5.Class 150
FD	PED	EN 1092-1 PN25, ASME B16.5.Class 150, ASME B16.5.Class 300
FD	ALS	EN 1092-1 PN25, ASME B16.5.Class 150, ASME B16.5.Class 300
		JIS B2220 20K
FD	ASME	ASME B16.5.Class 150, ASME B16.5.Class 300
FS	PED	EN 1092-1 PN25,EN 1092-1 PN40, ASME B16.5.Class 300
		ASME B16.5.Class 400
FS	ASME	ASME B16.5.Class 300, ASME B16.5.Class 400

Standard EN 1092-1 corresponds to GOST 12815-80 and GB/T 9115.

Dimensions



Measurements mm (inch)

Type	H	W	h
AQ14L-FM	3210 (126.4”)	1154 (45.4”)	488 (19.2”)
AQ14L-FG	3210 (126.4”)	1154 (45.4”)	488 (19.2”)
AQ14L-FD	3218 (126.7”)	1174 (46.2”)	496 (19.5”)
AQ14L-FS	3218 (126.7”)	1174 (46.2”)	496 (19.5”)

The number of tightening bolts may vary depending on pressure rating.
C* = Larger design available on request.

K** = 578 mm (22.8 inches) except following cases	
584 (23.0") FS PED	Size 350 DN PN40
589 (23.2") FD PED/pvcALS™ ASME	Size 14" ASME Cl.300
589 (23.2") FS PED/ASME	Size 14" ASME Cl 300 or 400

Particulars required for quotation

- Flow rates or heat load
- Temperature program
- Physical properties of liquids in question (if not water)
- Desired working pressure
- Maximum permitted pressure drop
- Available steam pressure

The thermal performance is third party certified through the AHRI Liquid to Liquid Heat Exchangers certification program

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ECF00375EN 1506

Alfa Laval reserves the right to change specifications without prior notification.

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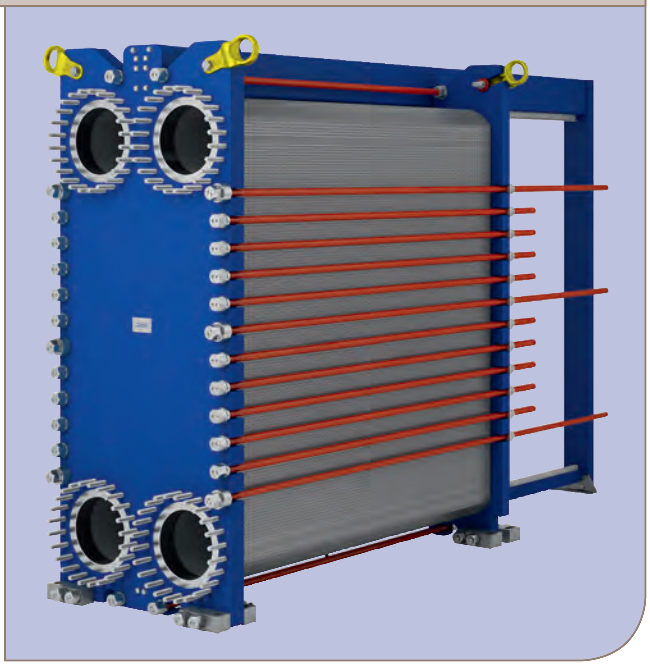
Alfa Laval AQ18

AlfaQ^{TM} AHRI-certified plate heat exchanger



Applications
General heating and cooling duties.

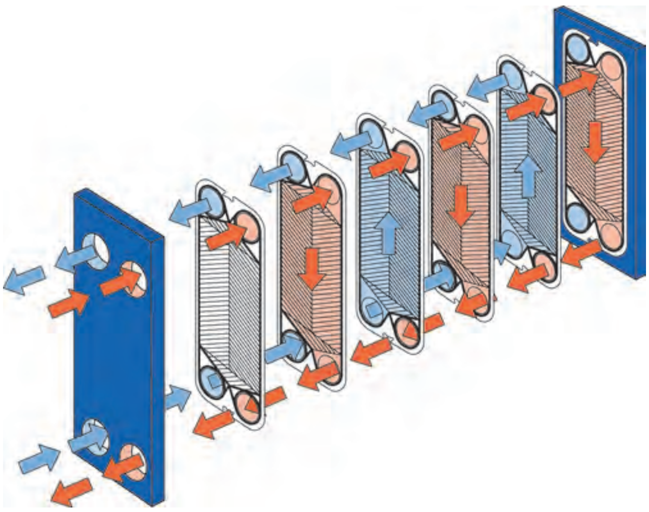
Standard design
The plate heat exchanger consists of a pack of corrugated metal plates with port holes for the passage of the two fluids between which heat transfer will take place.

The plate pack is assembled between a fixed frame plate and a movable pressure plate and compressed by tightening bolts. The plates are fitted with gaskets, which seal the interplate channels and direct the fluid into alternate channels. The number of plates is determined by the flow rate, physical properties of the fluids, pressure drop and temperature program. The plate corrugations promote fluid turbulence and support the plates against differential pressure.

The frame plate and the pressure plate are suspended from an upper carrying bar and located by a lower guiding bar, both of which are fixed to a support column.

Connections are located in the frame plate or, if either or both fluids make more than a single pass within the unit, in the frame and pressure plate.

Working principle
Channels are formed between the plates and the corner ports are arranged so that the two fluids flow through alternate channels. The heat is transferred through the plate between the channels, and complete counter-current flow is created for highest possible efficiency. The corrugation of the plates provides the passage between the plates, supports each plate against the adjacent one and enhances the turbulence, resulting in efficient heat transfer.



Flow principle of a plate heat exchanger

STANDARD MATERIAL

Frame/pressure plate
Mild steel, coated with water-based epoxy paint

Nozzles/Connections
Carbon steel
Metal lined: Stainless steel Alloy 316, Alloy 254, Titanium

Plates
Stainless steel Alloy 316, Alloy 254, Titanium
Other materials may be available on request.

Gaskets
Nitrile, EPDM or Viton
Other materials may be available on request.

TECHNICAL DATA

Design pressure (g)

FM	pvcALS™	1.0 MPa
FG	PED	1.6 MPa
FG	pvcALS™	1.6 MPa
FG	ASME	150 psig
FD	ASME	250 psig

Higher pressures may be available on request.

Design temperature
Determined by gasket material.

Maximum liquid flow rate
Up to 1000 kg/s (16000 gpm)

Maximum standard heat transfer surface
2360 m² (25400 sq. ft)
Larger non-standard design available on request.

Plate types
AQ18

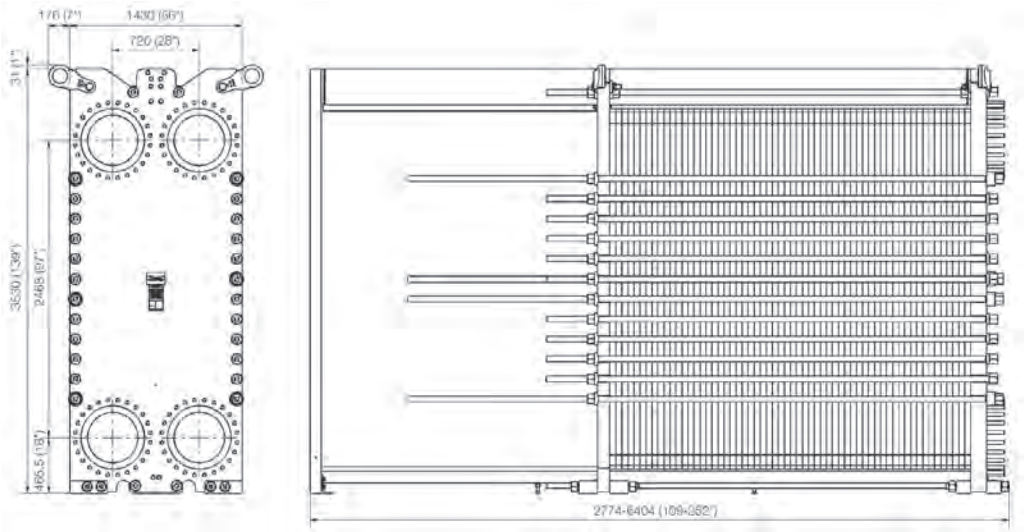
Connection size
DN450 / NPS 18 / 450A

Connections

FM	pvcALS™	EN 1092-1 PN10, ASME B16.5 Class 150, JIS B2220 10K
FG	PED	EN 1092-1 PN16, ASME B16.5 Class 150
FG	pvcALS™	EN 1092-1 PN16, ASME B16.5 Class 150, JIS B2220 16K
FG	ASME	ASME B16.5 Class 150
FD	ASME	ASME B16.5 Class 300

Standard EN 1092-1 corresponds to GOST 12815-80 and GB/T 9115.

Particulars required for quotation
- Flow rates or heat load
- Temperature program
- Physical properties of fluids in question
- Desired working pressure and temperature
- Allowable pressure drops



The number of tightening bolts may vary depending on pressure rating.

The thermal performance is third party certified through the AHRI Liquid to Liquid Heat Exchangers certification program

PCT00217EN 1506

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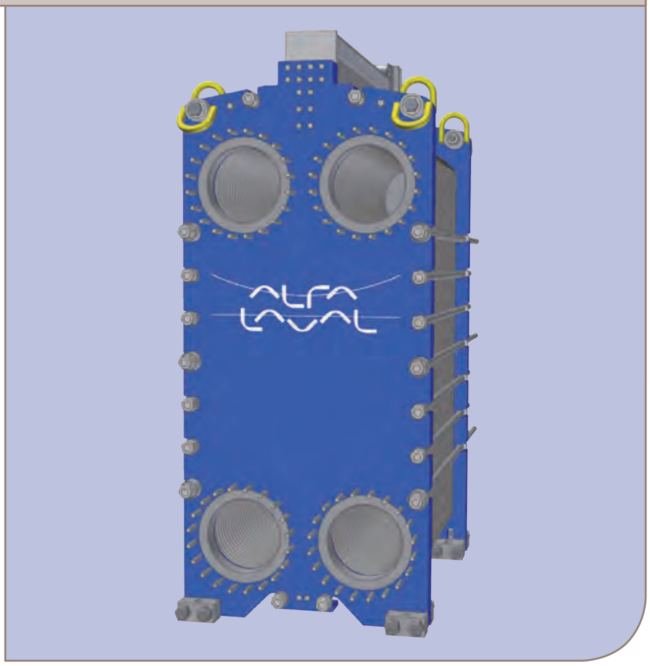
Alfa Laval AQ20S

AlfaQ^{TM} AHRI-certified plate heat exchanger



Applications
General heating and cooling duties

Standard design
The plate heat exchanger consists of a pack of corrugated metal plates with portholes for the passage of the two fluids between which heat transfer will take place.

The plate pack is assembled between a fix frame plate and a movable pressure plate and compressed by tightening bolts. The plates are fitted with a gasket, which seals the interplate channel and directs the fluids into alternate channels. The number of plates is determined by the flow rate, physical properties of the fluids, pressure drop and temperature program. The plate corrugations promote fluid turbulence and support the plates against differential pressure.

The frame plate and the pressure plate are suspended from an upper carrying bar and located by a lower guiding bar, both of which are fixed to a support column.

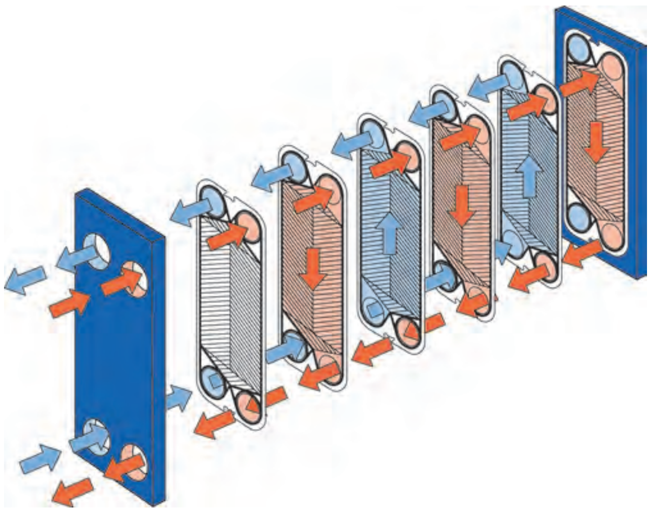
Connections are located in the frame plate or, if either or both fluids make more than a single pass within the unit, in the frame and pressure plates.

Typical capacities
Liquid flow rate
Up to 1300kg/s (20800 gpm), depending on media, permitted pressure drop and temperature program.

Plate types
AQ20SM

Frame types
FM, FG and FD

Working principle
Channels are formed between the plates and the corner ports are arranged so that the two media flow through alternate channels. The heat is transferred through the plate between the channels, and complete counter-current flow is created for highest possible efficiency. The corrugation of the plates provides the passage between the plates, supports each plate against the adjacent one and enhances the turbulence, resulting in efficient heat transfer.



Flow principle of a plate heat exchanger

STANDARD MATERIALS

Frame plate
Mild steel, Epoxy painted

Nozzles
Carbon steel
Metal lined: Stainless steel, Titanium

Plates
Stainless steel Alloy 316or Titanium.

Gaskets
Nitrile or EPDM

TECHNICAL DATA

Mechanical design pressure (g) / temperature

FM	pvcALS™	1.0 MPa / 150°C
FG	PED	1.6 MPa / 180°C
FG	ASME	150 psig / 350°F
FD	PED	2.5 MPa / 180°C
FD	ASME	300 psig / 350°F

CONNECTIONS

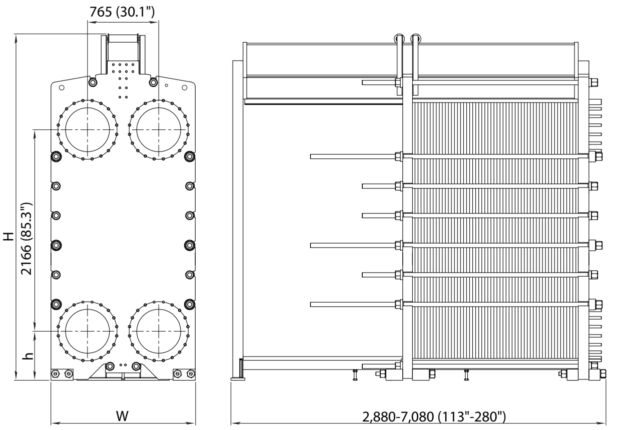
Size: DN500 / NPS 20

FM	pvcALS™	EN1092-1 PN10
		ASME B16.5 Class 150
FG	PED	EN1092-1 PN10, EN1092-1 PN16
		ASME B16.5 Class 150
FG	ASME	ASME B16.5 Class 150
FD	PED	EN1092-1 PN25
		ASMEB16.5 Class 300
FD	ASME	ASME B16.5 Class 150, ASME Cl. 300

Standard EN 1092-1 corresponds to GOST 12815-80 and GB/T 9115.

Maximum heat transfer surface
2100 m^2 (22700 sq. ft)

Dimensions



Measurements mm (inch)

Type	H	W	h
AQ20S-FM	3433(135 $^4/_{25}$")	1550 (61")	467(18 $^3/_8$")
AQ20S-FG	3723(146 $^9/_{16}$")	1550 (61")	467(18 $^3/_8$")
AQ20S-FD	3723(146 $^9/_{16}$")	1550 (61")	467(18 $^3/_8$")

The number of tightening bolts may vary depending on pressure rating.

Particulars required for quotation
- Flow rates or heat load
- Temperature program
- Physical properties of liquids in question
- Desired working pressure
- Maximum permitted pressure drop
- Available steam pressure

The thermal performance is third party certified through the AHRI Liquid to Liquid Heat Exchangers certification program

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AHRI Standard 400

PCT00214EN 1506

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Alfa Laval AQ20

AlfaQ^{TM} AHRI-certified plate heat exchanger

Applications
General heating and cooling duties

Standard design
The plate heat exchanger consists of a pack of corrugated metal plates with portholes for the passage of the two fluids between which heat transfer will take place.

The plate pack is assembled between a fix frame plate and a movable pressure plate and compressed by tightening bolts. The plates are fitted with a gasket, which seals the interplate channel and directs the fluids into alternate channels. The number of plates is determined by the flow rate, physical properties of the fluids, pressure drop and temperature program. The plate corrugations promote fluid turbulence and support the plates against differential pressure.

The frame plate and the pressure plate are suspended from an upper carrying bar and located by a lower guiding bar, both of which are fixed to a support column.

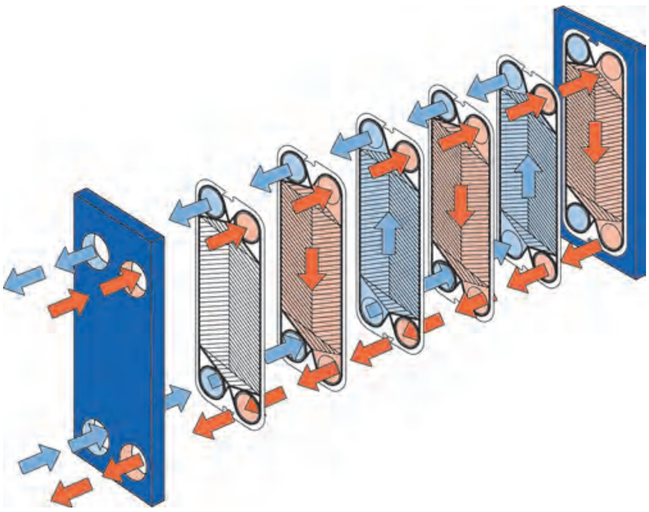
Connections are located in the frame plate or, if either or both fluids make more than a single pass within the unit, in the frame and pressure plates.

Typical capacities
Liquid flow rate
Up to 975 kg/s (15500 gpm), depending on media, permitted pressure drop and temperature program.

Plate types
AQ20M

Frame types
FM, FG and FD

Working principle
Channels are formed between the plates and the corner ports are arranged so that the two media flow through alternate channels. The heat is transferred through the plate between the channels, and complete counter-current flow is created for highest possible efficiency. The corrugation of the plates provides the passage between the plates, supports each plate against the adjacent one and enhances the turbulence, resulting in efficient heat transfer.



Flow principle of a plate heat exchanger

STANDARD MATERIALS

Frame plate
Mild steel, Epoxy painted

Nozzles
Carbon steel
Metal lined: Stainless steel, Titanium

Plates
Stainless steel Alloy 316, Alloy 254 or Titanium.

Gaskets
Nitrile or EPDM

TECHNICAL DATA

Mechanical design pressure (g) / temperature

FM	pvcALS™	1.0 MPa / 150°C
FG	PED	1.6 MPa / 180°C
FG	ASME	150 psig / 350°F
FD	PED	2.5 MPa / 180°C
FD	ASME	300 psig / 350°F

CONNECTION STANDARD

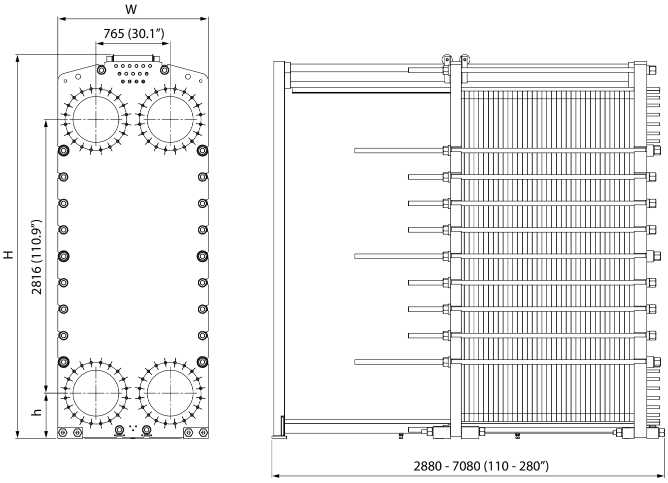
Size: DN500 / NPS 20

FM	pvcALS™	EN 1092-1 PN10
		ASMEB16.5 Class. 150
FG	PED	EN 1092-1 PN10, EN 1092-1 PN16
		ASME B16.5 Class 150
FG	ASME	ASME B16.5 Class 150
FD	PED	EN 1092-1 PN25
		ASME B16.5 Class 300
FD	ASME	ASME B16.5 Class 150, ASME B16.5 Class 300

Standard EN 1092-1 corresponds to GOST 12815-80 and GB/T 9115.

Maximum heat transfer surface
2880 m^2 (31018 sq. ft)

Dimensions



Measurements mm (inch)

Type	H	W	h
AQ20-FM	4095($161\frac{7}{8}$")	1550 (61")	467($18\frac{3}{8}$")
AQ20-FG	3951($155\frac{9}{16}$")	1550 (61")	467($18\frac{3}{8}$")
AQ20-FD	3951($155\frac{9}{16}$")	1550 (61")	467($18\frac{3}{8}$")

The number of tightening bolts may vary depending on pressure rating.

Particulars required for quotation

- Flow rates or heat load
- Temperature program
- Physical properties of liquids in question
- Desired working pressure
- Maximum permitted pressure drop
- Available steam pressure

The thermal performance is third party certified through the AHRI Liquid to Liquid Heat Exchangers certification program

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AHRI Standard 400

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Plate heat exchanger

Heating insulation

Standard design

The Alfa Laval heating insulation is designed to insulate the heat exchanger at operating temperatures up to 180°C. It is delivered in sections (panels) in a separate box along with the heat exchanger. The system of panels ensures simple assembly and disassembly. Most insulation types are equipped with connecting spring locks in galvanized steel.

Benefits

The insulation saves energy and provides protection against the heat of the plate pack. It also assures a dry and comfortable working climate in the operating room. The graph below shows the effect (W) lost to the environment for un-insulated plate heat exchangers as function of the difference (Δt) between the temperature inside the plate heat exchanger and the ambient temperature.

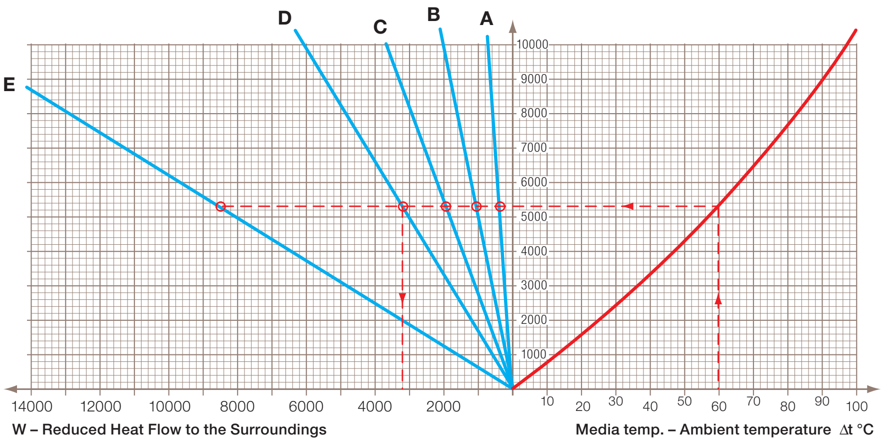
Availability

Heating insulations are available for most of the Alfa Laval plate heat exchangers. The table on the next page shows measurements for standard types.

A = M3 60 plts
B = M6 100 plts
C = M10 200 plts
D = M15 150 plts
E = MX25 300 plts

W = Heat released from different sizes of Alfa Laval plate heat exchangers.

Δt = The difference between the average temperature inside the plate heat exchanger and the environment.



Example: M15-BFG 150 plates
1*M15-B Alloy 316 0.50 mm
Load = 12927 LMTD = 19.9 k = 7045
Water T = 110.0->70.0 1*75 L S1->S2
Water T = 90.2<-50.0 1*75 L S4<-S3
Average temperature inside the PHE (110 + 70 + 50 + 90) / 4 = 80°C.

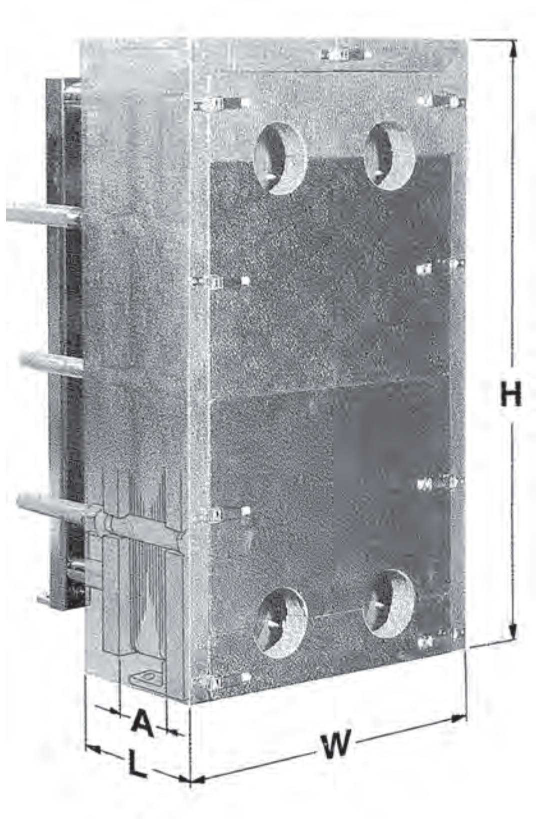
Ambient temperature 20°C.
delta t = 80-20 = 60°C
The heat released will then be 3200 W or 3.2 kW.
This is less than 0.3 promille of the total heat exchanged in the PHE.

Dimensions

Measurements in mm (inch)*.

PHE type	$L_{min-max}$	W_{max}	H_{max}
T2	240-350 (9.45-13.78)	220 (8.66)	380 (14.96)
M3	380-640 (14.96-25.20)	260 (10.24)	520 (20.47)
TL3	440-890 (17.32-35.04)	270 (10.63)	830 (32.68)
T5	300-480 (11.81-18.90)	380 (14.96)	800 (31.50)
TS6	360-825 (14.17-32.48)	545 (21.46)	760 (29.92)
M6	300-850 (11.81-33.46)	450 (17.72)	1005 (39.57)
TL6	300-850 (11.81-33.46)	450 (17.72)	1315 (51.78)
M10	450-1160 (17.72-45.67)	600 (23.62)	1095 (43.11)
TL10	450-1960 (17.72-77.16)	640 (25.20)	2100 (82.67)
M15	450-1960 (17.72-77.16)	820 (32.28)	2250 (88.58)
TL15	500-2900 (19.68-114.17)	820 (32.28)	2880 (113.39)
TS20	500-1850 (19.68-72.83)	930 (36.61)	1600 (62.99)
T20	530-2560 (20.87-100.79)	920 (36.22)	2400 (94.49)
MX25	550-2580 (21.65-101.57)	1070 (45.13)	3200 (125.98)
TL35	950-4120 (37.40-162.20)	1320 (51.97)	3300 (129.92)

*) For exact dimensions frame type including A-measurement must be specified.



Technical specification

Item	All PHE types excl. type T2, M3, TL3, T5	PHE type T2, M3, TL3, T5
Plating	Alustucco 1 mm (0.039 in)	Alustucco 1 mm (0.039 in)
Insulation material	Mineral wool 65 mm (2.56 in)	Mineral wool 40 mm (1.57 in)
Inside layer	Aluminum folie 0.05 mm (0.002 in)	Aluminum folie 0.05 mm (0.002 in)
Panel fixation	Snap locks galvanized	Screws

Particulars required for quotation

- Frame type
- A-measurement
- Tightening bolt length
- Type of connections
- Connection positions

PCT00065EN 1203

Alfa Laval reserves the right to change specifications without prior notification.

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Bolt protection sleeves

Genuine spare parts

Extending the working life of a heat exchanger means taking care of every single part, and making sure that they serve their function efficiently.

Plastic sleeves that slide over the tightening bolts keep the threads free from dirt and other deposits, and make it easier to open and close the heat exchanger for maintenance and cleaning, all of which ensures less downtime.

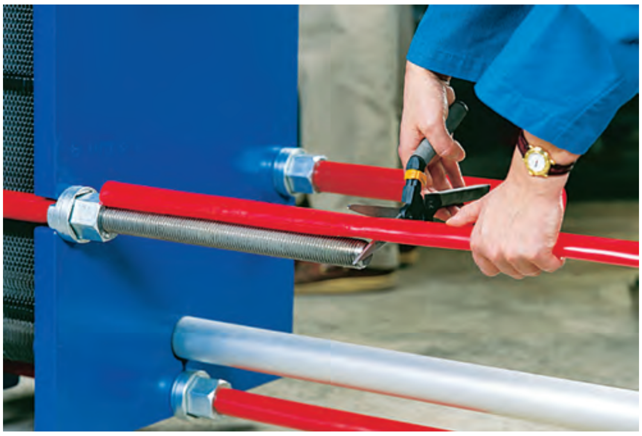
The bright red colour makes the sleeves easily visible, aids checks and helps prevent accidents. When ordering, please specify the bolt dimensions and total length.

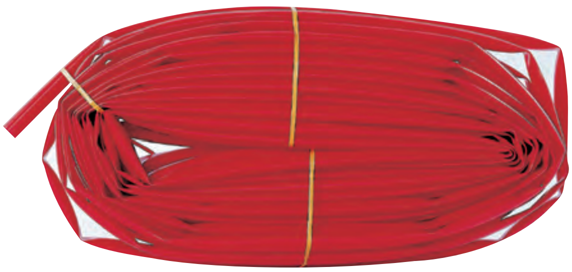
Bolt sleeves are available by specified length in meters.

Benefits
Using Alfa Laval genuine spare parts means you can be sure that the plastic bolt protection sleeves fit perfectly, and work exactly as intended.

Ordering information

Part number	Size	Measurements
1995-101-097	M20	18 x 20 mm
1995-101-096	M24	24 x 22 mm
1995-101-086	M24	26 x 28 mm
1995-101-082	M30	32 x 34 mm
1995-101-079	M39	41 x 43 mm
1995-101-081	M48	51 x 53 mm





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Pneumatic tightening device – PHETD80

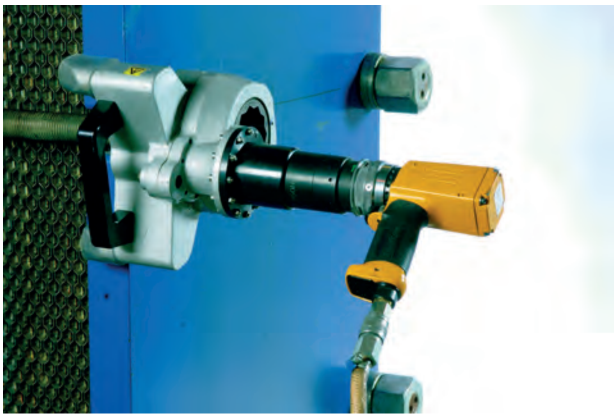
Maintenance tools

The Alfa Laval PHETD80 is an automatic two-speed pneumatic tightening device designed to make it easy to open and close plate heat exchangers. Available in both single and twin models, this device spins the nut down at high speed, while the final tightening is automatically geared down to low speed.

The PHETD80 is easy to handle and work with, and ensures excellent operator safety. It works from both the nut side and the head side of the bolt. The handle of the drive unit can be rotated freely, in order to ensure that the user can use it while in the operating position that is most comfortable. Another operator safety feature is the low level of vibration.

The air connectors are of the ErgoQIC type, which limits energy loss and makes it easy to disconnect the hose, with no air blow out.

The PHETD80 is delivered complete with an air handling unit that includes a water separator, mist lubricator and air flow regulator, with a 5-metre length of air hose connecting the air handling unit and tightening device. All the components are packed in a sturdy wooden case for transporting and storing the device safely.



Features
- Purpose-built for plate heat exchangers
- Modular design with variable socket keys
- Continuous twin motor operation with automatic changeover
- Sturdy design
- Easy to operate, and low level of vibration
- Optional extras: socket keys in different sizes (NW36, 46, 50, 55, 60, 65 and 75)

Benefits
- Can be used on bolt head or nut at either end of plate heat exchanger
- One single tool for all bolt sizes
- No hammering effect avoids damaging equipment and bolts
- Reliable operation
- Reduced downtime

Technical specifications

Socket key size	NW80 (with inserts for smaller sizes)
Maximum torque	3,270 Nm (2390 ftlb)
Maximum air pressure	6.3 barg (91.4 psig)
Minimum air pressure	3.0 barg (43.5 psig)
Air consumption at free speed	19 l/s (40 cfm)
Oil volume mist lubricator	0.2 l (12 in^3)
Weight	17 kg (37 lbs)
L x W	54 x 25 cm (21 x 10 in)
Measured sound pressure level	79 dB(A)
Measured vibration value	<2.5 m/s^2
Air hose length	5 m (16 ft)

Ordering information

Art. no.	Component
32840-421-01	Tightening device PHETD80, complete*
32840-433-01	Tightening device PHETD80, double, complete

Socket keys

32840-004-01	Socket key reducer 80/75
32840-004-02	Socket key reducer 80/60
32840-004-03	Socket key reducer 80/46
32840-004-04	Socket key reducer 80/36
32840-004-05	Socket key reducer 80/65
32840-004-06	Socket key reducer 80/55

* Complete unit includes: Atlas Copco pneumatic wrench unit, fitted with special Alfa Laval gearbox air handling unit with regulator, filter and mist lubricator, 5-metre air hose with ErgoQIC connectors, socket key NW80, 1 litre lubricating oil, packing and storage box, fitted with carrying handles.

The handle of the drive unit can be rotated freely to ensure the most comfortable operating position.

PPS00015EN 1202

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Electric tightening device – PHE-ETD80

Maintenance tools

The Plate Heat Exchanger Electric Tightening Device unit, type PHE-ETD80 is an all-current appliance designed for easy opening and closing of plate heat exchangers. The high safety factor of IP 54 and the multi voltage and frequency motor ensures a safe and versatile tool that can operate on most mains net work or generators.

Its ease of handle includes the choice of free or fixed joint between the motor drive unit and the gear unit. By this feature the most comfortable handle position can be selected depending on which side of the plate heat exchanger the opening or tightening takes place.

Rotation direction is selected by the double function trigger; there is no need to change the hand grip. This together with a power supply switch ensures a high operator safety. The tightening device is equipped with an automatic safety monitoring function to protect the motor against damages in case of a possible overload.

Features

- Purpose-built for plate heat exchangers
- Modular design with variable socket keys
- Free joint or fixed connection between drive and gear box
- Double function trigger for clock wise or counter clock wise rotation
- Automatic temperature controlled overload protection
- Continual rotational speed
- Optional extras: Socket inserts in various sizes

Benefits

- Can be used on bolt head or nut at either end of plate heat exchanger
- One tool for all sizes of tightening bolts
- Easy and comfortable operation
- No hammering effect avoids damaging equipment and bolts
- Comfortable operation
- Reduced downtime

Technical specification

Socket key size	NW80 mm (inserts for smaller sizes)
Maximum torque	3300 Nm (2430 lbft)
Current	10 Amps
Electrical connection	100-250 V; 45-66 Hz
Protection	IP 54
Idle speed	6 rpm
Weight	21 kg (46 lb)
LxW	62x32 cm (25x13 in)
Sound pressure level	max. 86 dB(A)

Ordering data

Art no	Component
32840435-01	Electric Tightening Device PHE-ETD80
32840004-01	Socket key reducer NW 80/75
32840004-02	Socket key reducer NW 80/60
32840004-03	Socket key reducer NW 80/46
32840004-04	Socket key reducer NW 46/36
32840004-05	Socket key reducer NW 80/65
32840004-06	Socket key reducer NW 80/55

PPS00016EN 0603

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Pneumatic nutrunner & thread cleaner - PHENR80

Maintenance tools

Pneumatic tool for improved service efficiency of plate heat exchangers

The Alfa Laval Nutrunner & Thread Cleaner is a compressed air powered service tool designed to transport nuts on long threads and to efficiently clean bolt threads from rust and dirt.

When opening and tightening a PHE that has been in service for some time it is a common problem that the threads on the tightening bolts have been attacked by corrosion or that dirt deposits have been formed. Bolts have to be cleaned from this before the nuts can be loosened, a very time-consuming manual work. With large plate packs fitted, the loosened nuts must be moved long distances, a tiring and time-consuming work.

The Thread Cleaner has knives that effectively clean the bolt threads in a fraction of the time it takes to do the job manually. Keeping threads clean and free from surface rust minimizes wear and tear on the bolts during the tightening operation, thus prolonging bolt lifetimes. The thread cleaner can handle bolt sizes from M30 to M52.

For increased safety and ease of handle, the Nutrunner is equipped with a safety ring to which a balancing block may be connected.

Features
- Transport nuts on long threads
- Efficiently cleans bolt threads
- Excellent ergonomics
- Fit bolt sizes M30-M52

Benefits
- Increased service efficiency
- Lower service cost
- Lower tool costs
- Longer life time of tightening bolts

The PHENR80 is the ideal complement to the Pneumatic Tightening Device PHETD80.

Technical specification

Socket key size	NW 80 for M39, M48 and M52 bolt size
Socket key insert sizes	NW 65 for M42 bolt size
	NW 46 for M30 bolt size
Air consumption at free speed	10 l/s free air
Max air pressure	7 bar
Connection compressed air	¼" female
Nut runner speed	Max 210 rpm
Thread cleaning capacity cutting edge A	M38-M52
Thread cleaning capacity cutting edge B	M30-M38
Mechanical connection drive unit	½" square
Weight complete with drive unit	3.7 kg
Material housing	Alumina and stainless steel
Material cutting edges	Steel
Air motor	Steel

Ordering information

Art. No.	Component
32840468-01	Kit Nut Runner, Thread Cleaner & Drive Unit
32840468-02	Kit Nut Runner & Drive Unit
32840468-08	Spare kit washers and o-rings for thread cleaner
32840468-09	Spare kit cutting edges for thread cleaner
32840468-12	Socket key 80/46
32840468-14	Socket key 80/65

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Chapter 7

Brazed plate heat exchangers (BHE)

Alfa Laval's first plate heat exchanger was introduced to the dairy industry in 1931. As a development from the traditional gasketed plate heat exchanger, Alfa Laval introduced the world's first brazed plate heat exchanger in 1977. Since then, continuous developments have been made to optimize its performance and reliability.

Brazed plate heat exchangers offer multiple benefits. The brazing technology eliminates the need for seals and thick frame plates and the design offers excellent resistance to pressure and thermal fatigue in a wide range of heating and cooling applications.

Brazed plate heat exchangers from Alfa Laval are frequently a natural first alternative all over the world.

Alfa Laval invented the world's first BHE in 1977 and since then, continuous developments have been made to optimise its performance and reliability.

Five reasons to buy your BHEs from the market leader

1. Designed to withstand exhausting conditions
As the world-leading BHE manufacturer, Alfa Laval has long experience in designing BHEs that will withstand exhausting pressure and temperature fatigue conditions. Years of R&D, unique patented solutions and innovative product design, coupled with an extensive testing program, ensure that the durability and lifetime of an Alfa Laval BHE will be hard to match.

2. A wide range of solutions
Alfa Laval BHEs come in a wide range of sizes and capacities. Different plate patterns and connections are available for various duties and performance specifications, and the BHE can be designed as a one-pass, two-pass or multipass unit. We have the ideal solution for every specific need. You can choose a standard configuration BHE, or a unit designed according to your own specific needs. The choice is entirely yours.

3. Full compliance with PED
All Alfa Laval BHEs comply with the European Pressure Vessel Safety Directive, PED, in terms of mechanical and materials specifications. They can also be delivered according to other relevant standards. Various national codes are also available.

4. Fast deliveries and service worldwide
Alfa Laval is truly a global company. Our regional distribution centres serve Alfa Laval facilities and distributors worldwide, ensuring fast delivery to customers. Wherever you are, talk to us, we're only a phone call away.

5. A partner you can trust
Genuine application know-how and long experience make Alfa Laval the ideal business partner for heating and cooling. Rely on us to supply the most cost-effective solution for your specific needs – we won't let you down.

Choosing Alfa Laval makes sound financial sense!

A few benefits of using brazed plate heat exchangers

Low capital investments
Thanks to the high heat-transfer coefficients, the required plate surface area can be quite small. Reducing the amount of material used makes for significant savings.

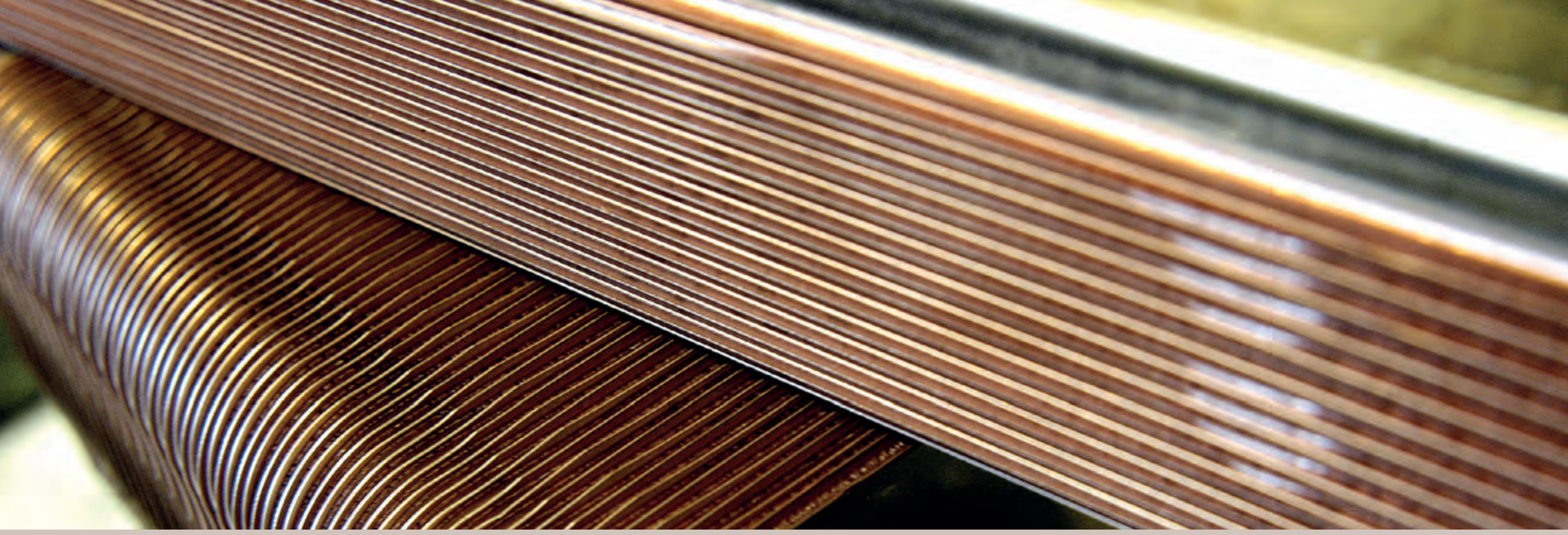
Small footprint
With its compact design, the brazed plate heat exchanger has a smaller footprint than any other comparable solution.

Low installation costs
Parallel and counter-current flow connections make installation easy, reducing costs for pipes and valves.

Minimum downtime
Thanks to a perfect plate corrugation design, high turbulence inside the heat exchanger optimizes the self-cleaning effect and thus reduces scaling. As there are no gaskets, the risk of leakage is virtually non-existent.

Maximum reliability
The brazed plate heat exchangers are individually leak- and pressure-tested to ensure first-class quality and Alfa Laval has approvals form all major certification bodies.

Save energy!
Save time!
Save money!



- Fouling is minimized by the turbulent flow, resulting in a self-cleaning effect
- All BHEs are leak- and pressure-tested before delivery
- 75 years of heat-transfer technology experience included in each BHE

Design
The brazed plate heat exchanger consists of thin corrugated stainless steel plates (AISI 316) which are vacuum-brazed together using copper as the brazing material.

Brazing the stainless-steel plates together eliminates the need for sealing gaskets and thick frame plates.
The brazing material seals as well as holds the plates together at the contact points. Alfa Laval's brazed plate heat exchangers are always brazed at all contact points, which ensures optimal heat-transfer efficiency and pressure resistance.

The plates are designed to achieve maximum possible lifetime.
Since virtually all the material is used for heat transfer, the BHE is very compact in size, has low weight and a small hold-up volume.

Compact, reliable
and cost efficient

Focus on fatigue
The expected lifetime of the heat exchanger is influenced by many factors, especially temperature and pressure variations in load conditions. In the case of high loads (pressure peaks, fast temperature changes), this can lead to fatigue failures, with a leaking BHE as the consequence.

Alfa Laval has extensive test facilities for pressure and temperature fatigue. The fatigue characteristics of each model are measured and analysed over and over again. With the help of the statistical data from our Fatigue Analysis Program we can estimate the lifetime of a BHE in a certain application.

The plate material in the heat exchanger is designed to match the demands on pressability as well as “brazeability” and fatigue durability. Metallurgical and design factors influencing fatigue are areas of constant focus for Alfa Laval’s R&D engineers when developing BHEs.

Years of continuing studies of the fatigue phenomena has put Alfa Laval in the forefront when it comes to developing and producing long lasting BHEs.

Production
Alfa Laval leads the development towards top quality. We do it by advanced production technology in high volumes. We do it with new technology, through constant research and development. We do it in delivery and service. As a leading global manufacturer we do it by offering a complete product range of heat exchangers. Our knowledge gives you the best solutions, products with higher technical performance and a focus on energy savings.

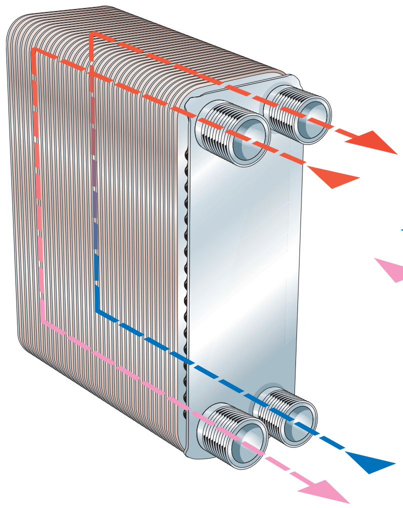
Quality must prevail through the whole chain from development to after sales. The brazed plate heat exchangers are individually leak- and pressure-tested to ensure first-class quality, and Alfa Laval has approvals from all major certification bodies.

- Small footprint and low weight, 10-20% of a traditional shell & tube
- High temperature and pressure durability
- Excellent fatigue resistance

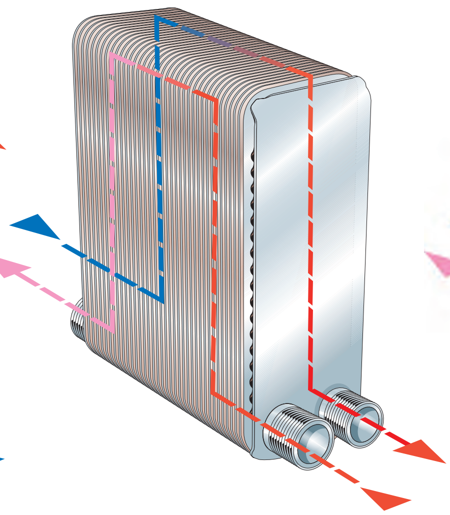
Design options
The design options of the brazed heat exchanger are extensive. Different plate patterns are available for various duties and performance specifications. The BHE can be designed as a one-pass, two-pass or multi-pass unit. A wide range of connections are available, and there is also the option of choosing the placement of the connection.

Alfa Laval offers a wide range of standard heat exchanger models and sizes, tailor-made for HVAC applications and district heating, that are available from stock. Customer-specific designs can be offered when requested.

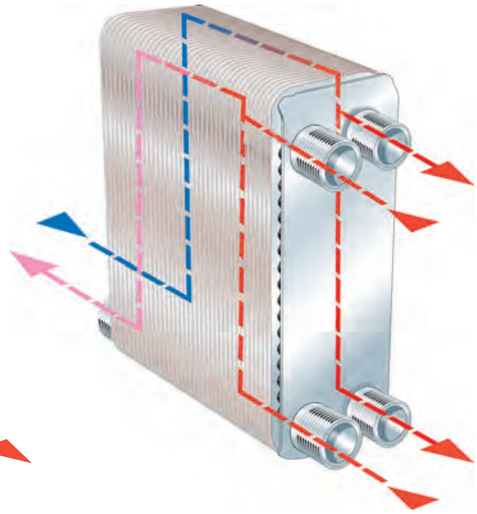
Flow principle
The basic flow principle in a brazed heat exchanger for HVAC applications is parallel and counter-current to achieve the most efficient heat-transfer process. In a standard single-pass design all connections are located on one side of the heat exchanger, making installation very easy.



One-pass



Two-pass



Pre/post heater

Accessories

Cleaning-In-Place (CIP)

All types of heat exchangers need to be cleaned regularly to remove deposits such as scale, sludge and microorganisms. Alfa Laval CIP is a convenient solution that carefully removes the deposit on all heat transfer surfaces in the heat exchanger. Alfa Laval CIP 200L and CIP 400L are manufactured in stainless steel using high-quality components (pumps, valves etc.) according to ISO 9001 and with the CE-mark. The smaller units, Alfa Laval CIP 20 and CIP 40, are made of industrial-grade plastic. Alfa Laval CIP is mobile due to its compact design. The units have reversible flow, and Alfa Laval CIP 200L and CIP 400L also have a built-in heater. All cleaning detergents used by Alfa Laval are environmentally friendly and do not damage the equipment.

Couplings for welding or soldering

The couplings fit on the threaded connections of the units. Future service is then facilitated by dismantling the heat exchanger from the pipes via the couplings. This connection is approved in most countries when weld or flange connection is required. A flat washer is used as sealing between the coupling and the connections.

Insulation

The heat exchanger insulation is easily assembled and dismantled. The Alfa Laval insulation provides protection from the heat pack and the climate in the operating room will be dry and not too hot. Alfa Laval insulations are available for both heating and cooling applications as well as for various temperature requirements.

Feet and mounting brackets

Larger units can be delivered with feet or mounting brackets. These make the installation work easier and minimize stresses in the connected pipes. The unit can also be bolted to the floor. CB30 and CB60 can be wall-mounted using the standard feet frame. CB200, CB300 and CB400 are always supplied with feet and a lifting hook to ensure safe and functional installation.

Insulation

Feet and mounting brackets

Instructions for use

Start-up procedure

1. Before starting any pump, check whether instructions exist stating which pump should be started first.
2. Check that the valve between the pump and the heat exchanger is closed.
3. Check that the valve at the exit, if there is one, is fully open.
4. Open the ventilation.
5. Start the pump.
6. Open the valve slowly.
7. When all the air is out, close the ventilation.
8. Repeat the procedure for the other side.

Shut-down procedure

1. First establish whether instructions exist as to which side should be stopped first.
2. Slowly close the valve controlling the flow rate of the pump you are about to stop.
3. When the valve is closed, stop the pump.
4. Repeat the procedure for the other side.

Installation instructions

In HVAC applications it is, from a performance point of view, recommended to install the heat exchanger so that a counter-current flow is obtained. It does not matter if the heat exchanger is mounted vertically or horizontally, as long as no change of phase takes place (evaporation/condensation). If drainage of the heat exchanger is needed for some reason, please take this into consideration when positioning the heat exchanger. The heat exchanger can be mounted with brackets or standing on feet supplied by Alfa Laval. It is important to minimize vibrations or pulsations from the pipes to the heat exchanger. The usage of flexible hoses is one way of reducing stresses caused by vibrations, and stresses from the piping system.

Operation

Adjustments in flow rates to maintain correct temperatures or pressure drops should be made slowly in order to prevent pressure shocks to the system. Therefore fast-closing valves should not be used unless the pipes in the system are very short. Problems with keeping the performance of the heat exchanger may be caused by changing temperature conditions, changing flow rates or by fouling.

Service efficiency

The heat transfer through the plates can be seriously reduced by the formation of deposits of various kinds on the plate surfaces. Even if the highly turbulent flow gives a strong resistance to the formation of deposits the turbulence can not completely eliminate fouling. Thanks to CIP (Cleaning In Place) it is possible to remove calcium deposits and other forms of scaling from the plate surfaces in an easy and effective way. Different cleaning solutions can be used depending on the type of deposits. Alfa Laval has a worldwide service organisation. Service is available in 130 countries at 15 major service centres and a network of service stations around the globe.

Technical specifications

Brazed plate heat exchanger (BHE) data and dimensions

	CBH16	CBH18	CB20	CB30	CB60
Channel type	H, A	H, A	H	H, M, L	H, M, L
Max./min. design temperature (ºC)	225/-160	150/-50	225/-196	225/-196	175/-196
Max. design pressure at 150° C (S3-S4/S1-S2) (bar) *	32/32	32/32	16/16	36/36	36/36
Volume/channel (S3-S4/S1-S2) (litres)	0.027 (H) 4)	0.038 (H) 5)	0.028	0.054	0.103 (H) 6)
Max. flowrate (S3-S4/S1-S2) (m^3/h) **	3.6	3.6	8.9	14.5	14.5
Height, a (mm)	211	316	324	313	527
Width, b (mm)	74	74	94	113	113
Vertical connection distance, c (mm)	172	278	270	250	466
Horizontal connection distance, d (mm)	40	40	46	50	50
Plate pack length, A (mm)	(n x 2.16) + 8	(n x 2.16) + 8	(n x 1.5) + 8	(n x 2.31) + 13	(n x 2.35) + 13
Weight empty (kg) ***	(n x 0.04) + 0.27	(n x 0.07) + 0.4	(n x 0.08) + 0.6	(n x 0.1) + 1.2	(n x 0.18) + 2.1
Standard connection, external thread (in)	3/4"	3/4"	1"	1 1/4" / 1"	1 1/4" / 1"
Plate material	AISI 316	AISI 316	AISI 316	AISI 316	AISI 316
Connection material	AISI 316	AISI 316	AISI 316	AISI 316	AISI 316
Brazing material	Copper	Copper	Copper	Copper	Copper
Max. number of plates	60	60	110	150	150

	CB110 8)	CB112	CB200 (CBH200)	CB300	CB400
Channel type	H, L, M	H, L, M, AM, AH	H, L, M	H, L, M	H, L
Max./min. design temperature (ºC)	225/-196	225/-196	225/-196	225/-196	225/-196
Max. design pressure at 150° C (S3-S4/S1-S2) (bar) *	32/32	32/32	26/26	27/16	32/27
Volume/channel (S3-S4/S1-S2) (litres)	0.21	0.18 7)	0.51	0.58/0.69	0.74
Max. flowrate (S3-S4/S1-S2) (m^3/h) **	51	34/63	128	200	200
Height, a (mm)	491	618	740	990	990
Width, b (mm)	250	191	323	365	390
Vertical connection distance, c (mm)	378	519	622	816/861	825
Horizontal connection distance, d (mm)	138	92	205	213.5	225
Plate pack length, A (mm)	(n x 2.2) + 12	(n x 2.05) + 15	(n x 2.7) + 11 / (n x 2.7) + 14)	(n x 2.62) + 11	(n x 2.56) + 14
Weight empty (kg) ***	(n x 0.38) + 13	(n x 0.35) + 4.8	(n x 0.6) + 12 / (n x 0.6) + 14)	(n x 1.26) + 21	(n x 1.35) + 24
Standard connection, external thread (in)	ISOG2"/2 1/2"	3" weld/2"	3"	4"/2 1/2"	4"
Plate material	AISI 316	AISI 316	AISI 316	AISI 316	AISI 316
Connection material	AISI 316	AISI 316	AISI 316	AISI 316	AISI 316
Brazing material	Copper	Copper	Copper	Copper	Copper
Max. number of plates	300	300	230	250	270

*) According to PED
**) Water at 5 m/s (connection velocity)
') excluding connections
n = number of plates
1) M and L channels 29/28 bar
2) E channel 0.18/0.18; A channel 0.18/0.25
3) A channels (n x 2.5) + 10, E channels (n x 2.2) + 10
4) A channel (0.030/0.024)
5) A channel (0.042/0.035)
6) L and M channels 0.13
7) AH and AM channels 0.20/0.16
8) Released during 2012

Brazed plate heat exchangers range

CB16/CBH16

Read all about it on page 7:11

CB18/CBH18

Read all about it on page 7:13

CB20

Read all about it on page 7:15

CB30/CBH30

Read all about it on page 7:17

CB60/CBH60

Read all about it on page 7:19

CB110/CBH110

Read all about it on page 7:21

CB112/CBH112

Read all about it on page 7:23

CB200/CBH200

Read all about it on page 7:25

CB300/CBH300

Read all about it on page 7:27

CB400

Read all about it on page 7:29

CB16 / CBH16

Brazed Plate Heat Exchanger

General information
Alfa Laval introduced its first brazed plate heat exchanger (BHE) in 1977 and has since continuously developed and optimized its performance and reliability.

Brazing the stainless steel plates together eliminates the need for gaskets and thick frame plates. The brazing material seals and holds the plates together at the contact points ensuring optimal heat transfer efficiency and pressure resistance. The plate design guarantees the longest possible life.

The design options of the brazed heat exchanger are extensive. Different plate patterns are available for various duties and performance specifications. You can choose a standard configuration BHE, or a unit designed according to your own specific needs. The choice is entirely yours.

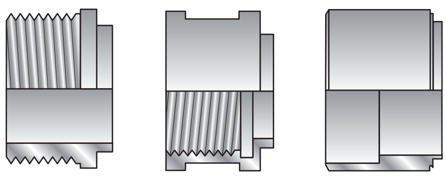
Typical applications
- HVAC heating/cooling
- Refrigerant applications
- Industrial cooling/heating
- Oil cooling

Working principles
The heating surface consists of thin corrugated metal plates stacked on top of each other. Channels are formed between the plates and corner ports are arranged so that the two media flow through alternate channels, usually in countercurrent flow for the most efficient heat transfer process.

Standard design
The plate pack is covered by cover plates. Connections are located in the front or rear cover plate. To improve the heat transfer design, the channel plates are corrugated.

Particulars required for quotation
To enable Alfa Laval's representative to make a specific quotation, specify the following particulars in your enquiry:
- Required flow rates or heat load
- Temperature program
- Physical properties of liquids in question
- Desired working pressure
- Maximum permitted pressure drop

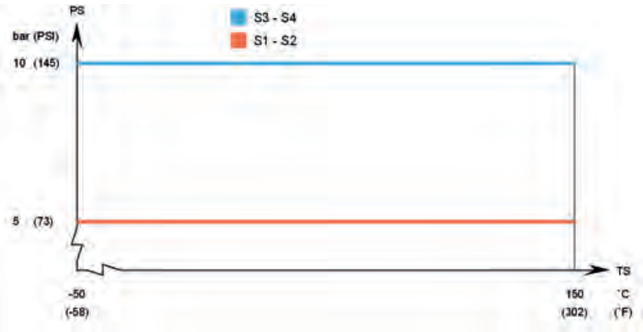
Examples of connections*



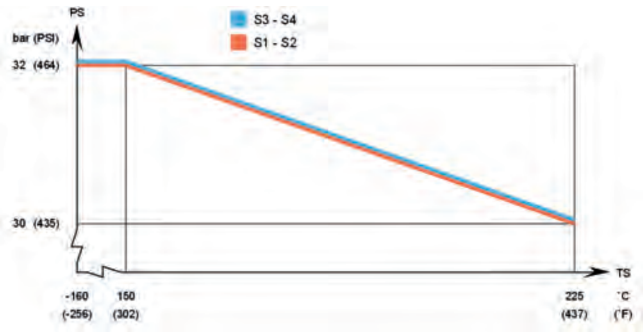
External threaded | Internal threaeded | Soldering

* More connections are available on request.

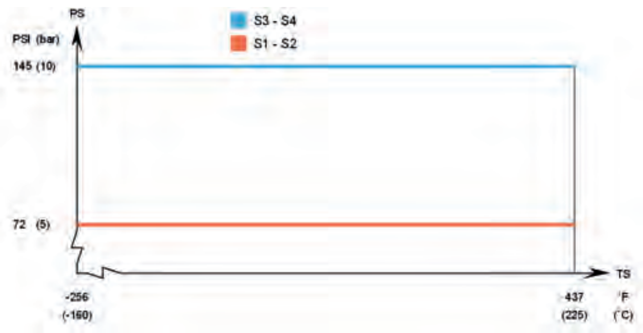
CB16 - PED approval pressure/temperature graph*



CBH16 - PED approval pressure/temperature graph*



CB16 - UL approval pressure/temperature graph*



CBH16 - UL approval pressure/temperature graph*

Standard dimensions and weight*

CB16

A measure mm	=	7 + (2.16 * n) (+/-2 %)
A measure inch	=	0.28 + (0.09 * n) (+/-2 %)
Weight** kg	=	0.14 + (0.04 * n)
Weight** lb	=	0.3 + (0.09 * n)

CBH16

A measure mm	=	8 + (2.16 * n) (+/-2 %)
A measure inch	=	0.31 + (0.09 * n) (+/-2 %)
Weight** kg	=	0.27 + (0.04 * n)
Weight** lb	=	0.59 + (0.09 * n)

(n = number of plates)
* Excluding connections

Standard data

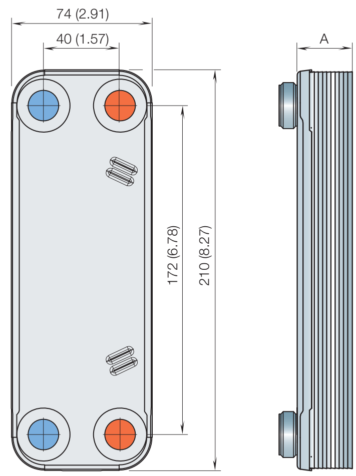
Min. working temperature	see graph
Max. working temperature	see graph
Min. working pressure	vacuum
Max. working pressure	see graph
Volume per channel H, litres (ga)	0.027 (0.0070)
Volume per channel A, litres (ga)	0.030 (0.0078) 0.024 (0.0063)
Max. flowrate* m^3/h (gpm)	3.62 (15.93)
Min. nbr of plates	4
Max. nbr of plates	60

* Water at 5 m/s (16.4 ft/s) (connection velocity)

Standard materials

Cover plates	Stainless steel
Connections	Stainless steel
Plates	Stainless steel
Brazing filler	Copper

Standard dimensions
mm (inch)



For exact values please contact your local Alfa Laval representative

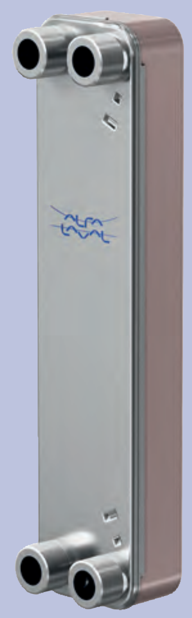
PCT00148EN 1112

Alfa Laval reserves the right to change specifications without prior notification.

How to contact Alfa Laval
Up-to-date AlfaLaval contact details for all countries are always available on our website on www.alfalaval.com

CB18 / CBH18

Brazed Plate Heat Exchanger



General information
Alfa Laval introduced its first brazed plate heat exchanger (BHE) in 1977 and has since continuously developed and optimized its performance and reliability.

Brazing the stainless steel plates together eliminates the need for gaskets and thick frame plates. The brazing material seals and holds the plates together at the contact points ensuring optimal heat transfer efficiency and pressure resistance. The plate design guarantees the longest possible life.

The design options of the brazed heat exchanger are extensive. Different plate patterns are available for various duties and performance specifications. You can choose a standard configuration BHE, or a unit designed according to your own specific needs. The choice is entirely yours.

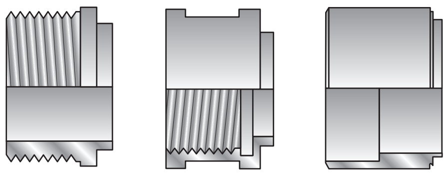
Typical applications
- HVAC heating/cooling
- Refrigerant applications
- Industrial cooling/heating
- Oil cooling

Working principles
The heating surface consists of thin corrugated metal plates stacked on top of each other. Channels are formed between the plates and corner ports are arranged so that the two media flow through alternate channels, usually in countercurrent flow for the most efficient heat transfer process.

Standard design
The plate pack is covered by cover plates. Connections are located in the front or rear cover plate. To improve the heat transfer design, the channel plates are corrugated.

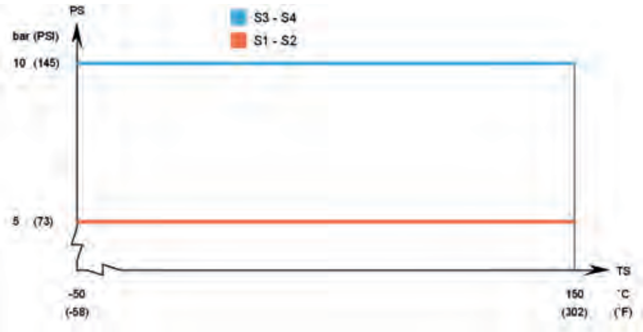
Particulars required for quotation
To enable Alfa Laval's representative to make a specific quotation, specify the following particulars in your enquiry:
- Required flow rates or heat load
- Temperature program
- Physical properties of liquids in question
- Desired working pressure
- Maximum permitted pressure drop

Examples of connections*

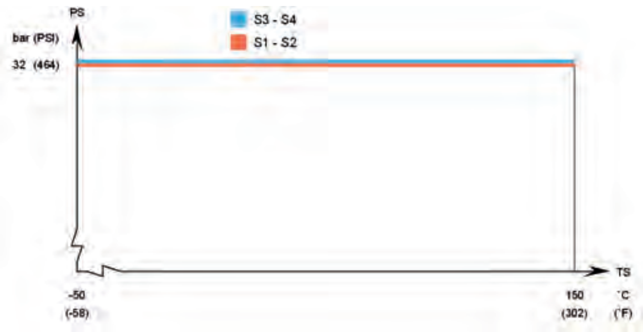


* More connections are available on request.

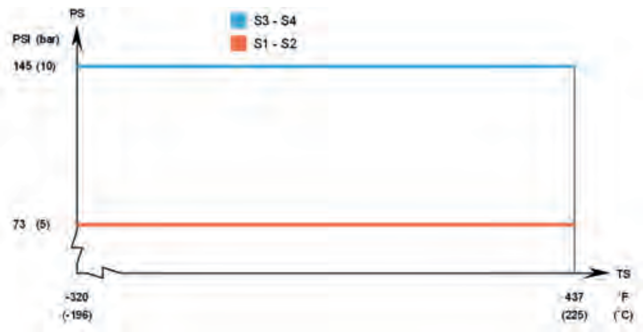
CB18 - PED approval pressure/temperature graph* H, A



CBH18 - PED approval pressure/temperature graph* H



CB18 - UL approval pressure/temperature graph*



CBH18 - UL approval pressure/temperature graph*

Standard dimensions and weight*

CB18

A measure mm	=	7 + (2.16 * n) (+/-2 %)
A measure inch	=	0.28 + (0.09 * n) (+/-2 %)
Weight** kg	=	0.22 + (0.07 * n)
Weight** lb	=	0.48 + (0.15 * n)

CBH18

A measure mm	=	8 + (2.16 * n) (+/-2 %)
A measure inch	=	0.31 + (0.09 * n) (+/-2 %)
Weight** kg	=	0.4 + (0.07 * n)
Weight** lb	=	0.88 + (0.15 * n)

(n = number of plates)
* Excluding connections

Standard data

Min. working temperature	see graph
Max. working temperature	see graph
Min. working pressure	vacuum
Max. working pressure	see graph
Volume per channel H, litres (ga)	0.038 (0.010)
Volume per channel A, litres (ga)	0.042 (0.011) 0.035 (0.009)
Max. particle size mm (inch)	1.1 (0.04)
Max. flowrate* m^3/h (gpm)	3.62 (15.93)
Min. nbr of plates	4
Max. nbr of plates	60

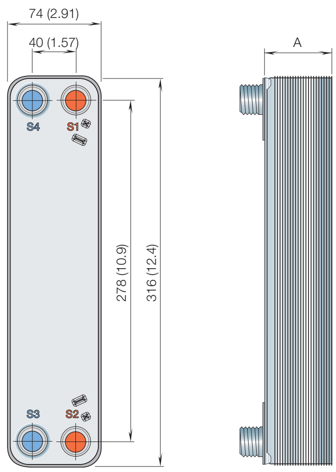
* Water at 5 m/s (16.4 ft/s) (connection velocity)

Standard materials

Cover plates	Stainless steel
Connections	Stainless steel
Plates	Stainless steel
Brazing filler	Copper

Standard dimensions

mm (inch)



For exact values please contact your local Alfa Laval representative

PCT00125EN 1112

How to contact Alfa Laval
Up-to-date AlfaLaval contact details for all countries are always available on our website on www.alfalaval.com

CB20

Brazed Plate Heat Exchanger

General information
Alfa Laval introduced its first brazed plate heat exchanger (BHE) in 1977 and has since continuously developed and optimized its performance and reliability.

Brazing the stainless steel plates together eliminates the need for gaskets and thick frame plates. The brazing material seals and holds the plates together at the contact points ensuring optimal heat transfer efficiency and pressure resistance. The plate design guarantees the longest possible life.

The design options of the brazed heat exchanger are extensive. Different plate patterns are available for various duties and performance specifications. You can choose a standard configuration BHE, or a unit designed according to your own specific needs. The choice is entirely yours.

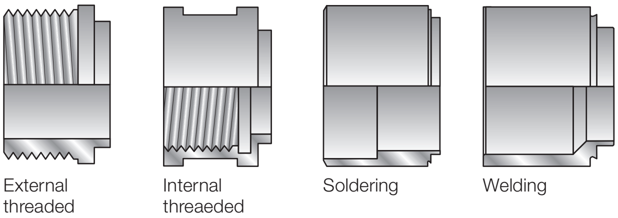
Typical applications
- HVAC heating/cooling
- Refrigerant applications
- Industrial cooling/heating
- Oil cooling

Working principles
The heating surface consists of thin corrugated metal plates stacked on top of each other. Channels are formed between the plates and corner ports are arranged so that the two media flow through alternate channels, usually in countercurrent flow for the most efficient heat transfer process.

Standard design
The plate pack is covered by cover plates. Connections are located in the front or rear cover plate. To improve the heat transfer design, the channel plates are corrugated.

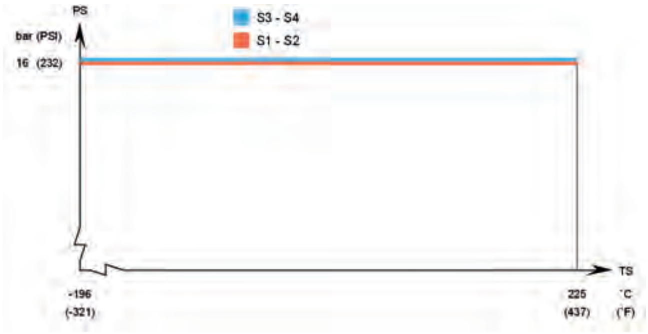
Particulars required for quotation
To enable Alfa Laval's representative to make a specific quotation, specify the following particulars in your enquiry:
- Required flow rates or heat load
- Temperature program
- Physical properties of liquids in question
- Desired working pressure
- Maximum permitted pressure drop

Examples of connections



* More connections are available on request.

CB20 - PED approval pressure/temperature graph*



Standard dimensions and weight*

A measure mm	=	8 + (1.5 * n) (+/-3 mm)
A measure inch	=	0.31 + (0.06 * n) (+/-0.12 inch)
Weight** kg	=	0.6 + (0.08 * n)
Weight** lb	=	1.32 + (0.18 * n)

(n = number of plates)
* Excluding connections

Standard data

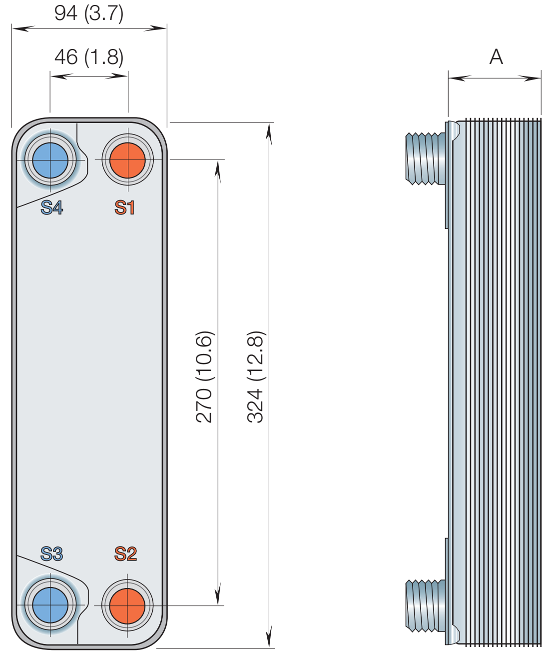
Min. working temperature	see graph
Max. working temperature	see graph
Min. working pressure	vacuum
Max. working pressure	see graph
Volume per channel, litres (ga)	0.028 (0.007)
Max. particle size mm (inch)	0.6 (0.02)
Max. flowrate* m^3/h (gpm)	8.9 (39.16)
Min. nbr of plates	10
Max. nbr of plates	110

* Water at 5 m/s (16.4 ft/s) (connection velocity)

Standard materials

Cover plates	Stainless steel
Connections	Stainless steel
Plates	Stainless steel
Brazing filler	Copper

Standard dimensions
mm (inch)



For exact values please contact your local Alfa Laval representative

How to contact Alfa Laval
Up-to-date AlfaLaval contact details for all countries are always available on our website on www.alfalaval.com

CB30 / CBH30

Brazed Plate Heat Exchanger

General information
Alfa Laval introduced its first brazed plate heat exchanger (BHE) in 1977 and has since continuously developed and optimized its performance and reliability.

Brazing the stainless steel plates together eliminates the need for gaskets and thick frame plates. The brazing material seals and holds the plates together at the contact points ensuring optimal heat transfer efficiency and pressure resistance. The plate design guarantees the longest possible life.

The design options of the brazed heat exchanger are extensive. Different plate patterns are available for various duties and performance specifications. You can choose a standard configuration BHE, or a unit designed according to your own specific needs. The choice is entirely yours.

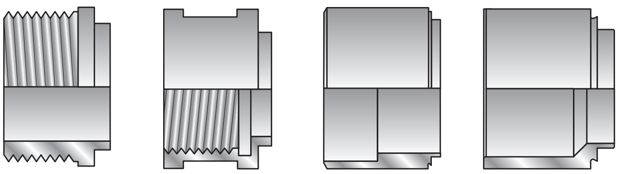
Typical applications
- HVAC heating/cooling
- Refrigerant applications
- Industrial cooling/heating
- Oil cooling

Working principles
The heating surface consists of thin corrugated metal plates stacked on top of each other. Channels are formed between the plates and corner ports are arranged so that the two media flow through alternate channels, usually in countercurrent flow for the most efficient heat transfer process.

Standard design
The plate pack is covered by cover plates. Connections are located in the front or rear cover plate. To improve the heat transfer design, the channel plates are corrugated.

Particulars required for quotation
To enable Alfa Laval's representative to make a specific quotation, specify the following particulars in your enquiry:
- Required flow rates or heat load
- Temperature program
- Physical properties of liquids in question
- Desired working pressure
- Maximum permitted pressure drop

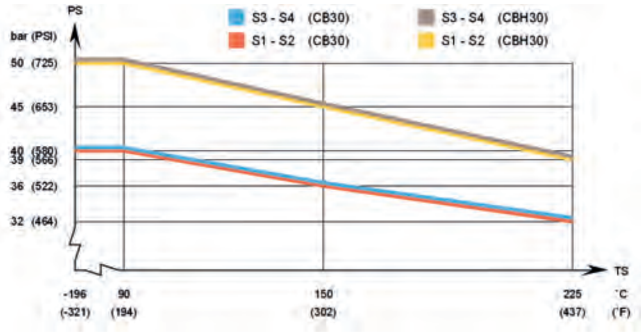
Examples of connections



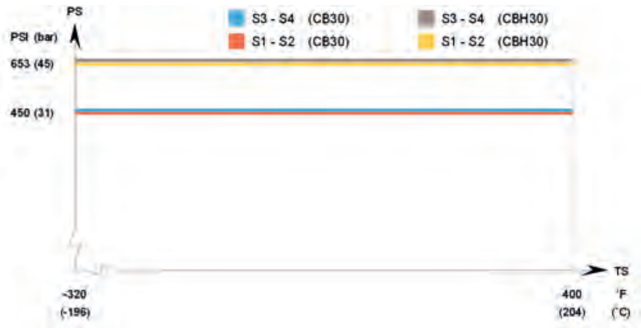
External threaded   Internal threaeded   Soldering   Welding

* More connections are available on request.

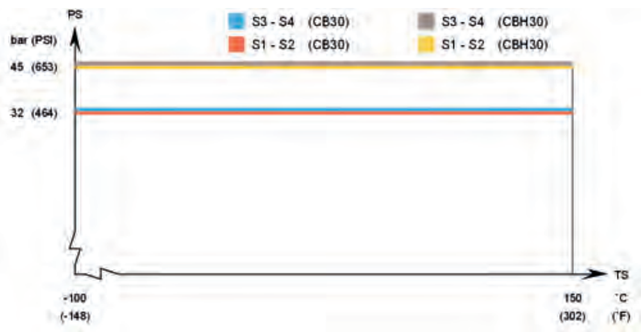
CB30 / CBH30 - PED approval pressure/temperature graph*



CB30 / CBH30 - UL approval pressure/temperature graph*



CB30 / CBH30 - KHK and KRA approval pressure/temperature graph*



Standard data

Min. working temperature	see graph
Max. working temperature	see graph
Min. working pressure	vacuum
Max. working pressure	see graph
Volume per channel, litres (ga)	0.054 (0.014)
Max. particle size mm (inch)	1 (0.04)
Max. flowrate* m^3/h (gpm)	14.5 (63.7)
Min. nbr of plates	4
Max. nbr of plates	150

* Water at 5 m/s (16.4 ft/s) (connection velocity)

Standard materials

Cover plates	Stainless steel
Connections	Stainless steel
Plates	Stainless steel
Brazing filler	Copper

Standard dimensions and weight*

CB30

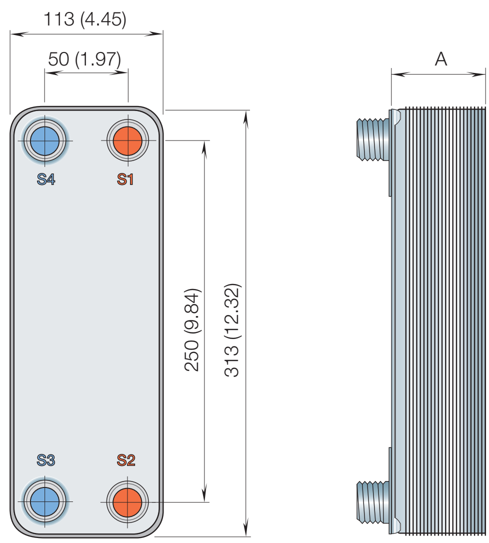
A measure mm	=	13 + (2.31 * n) (+/-2 mm or +/-1.5 %)
A measure inch	=	0.51 + (0.09 * n) (+/-0.08 inch or +/-1.5 %)
Weight** kg	=	1.2 + (0.11 * n)
Weight** lb	=	2.65 + (0.24 * n)

CBH30

A measure mm	=	15 + (2.31 * n) (+/-1.5 %)
A measure inch	=	0.59 + (0.09 * n) (+/-1.5 %)
Weight** kg	=	1.35 + (0.11 * n)
Weight** lb	=	2.98 + (0.24 * n)

(n = number of plates)
* Excluding connections

Standard dimensions
mm (inch)



For exact values please contact your local Alfa Laval representative

PCT000126EN 1202

Alfa Laval reserves the right to change specifications without prior notification.

How to contact Alfa Laval
Up-to-date AlfaLaval contact details for all countries are always available on our website on www.alfalaval.com

CB60 / CBH60

Brazed Plate Heat Exchanger

General information
Alfa Laval introduced its first brazed plate heat exchanger (BHE) in 1977 and has since continuously developed and optimized its performance and reliability.

Brazing the stainless steel plates together eliminates the need for gaskets and thick frame plates. The brazing material seals and holds the plates together at the contact points ensuring optimal heat transfer efficiency and pressure resistance. The plate design guarantees the longest possible life.

The design options of the brazed heat exchanger are extensive. Different plate patterns are available for various duties and performance specifications. You can choose a standard configuration BHE, or a unit designed according to your own specific needs. The choice is entirely yours.

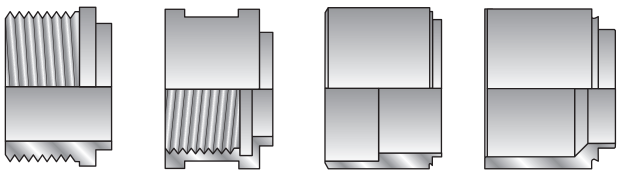
Typical applications
- HVAC heating/cooling
- Refrigerant applications
- Industrial cooling/heating
- Oil cooling

Working principles
The heating surface consists of thin corrugated metal plates stacked on top of each other. Channels are formed between the plates and corner ports are arranged so that the two media flow through alternate channels, usually in countercurrent flow for the most efficient heat transfer process.

Standard design
The plate pack is covered by cover plates. Connections are located in the front or rear cover plate. To improve the heat transfer design, the channel plates are corrugated.

Particulars required for quotation
To enable Alfa Laval's representative to make a specific quotation, specify the following particulars in your enquiry:
- Required flow rates or heat load
- Temperature program
- Physical properties of liquids in question
- Desired working pressure
- Maximum permitted pressure drop

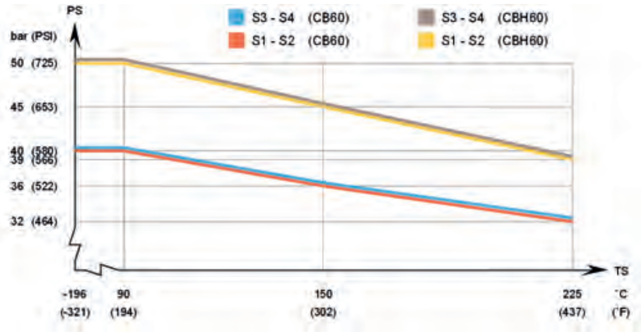
Examples of connections



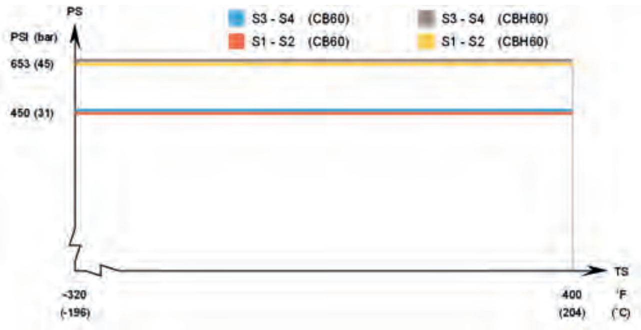
External threaded | Internal threaeded | Soldering | Welding

* More connections are available on request.

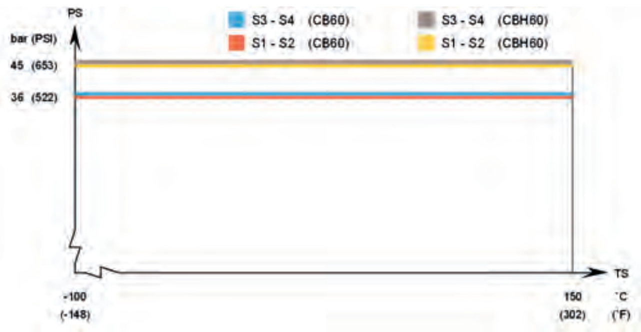
CB60 and CBH60 - PED approval pressure/temperature graph*



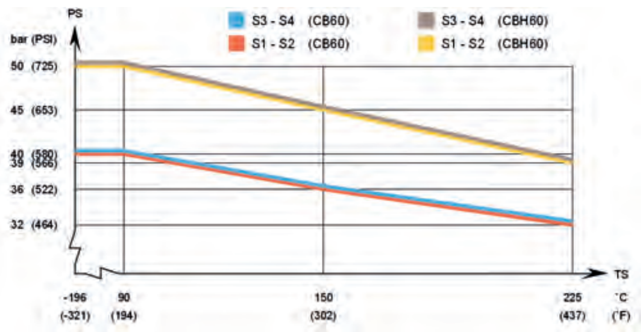
CB60 and CBH60 - UL approval pressure/temperature graph*



CB60 / CBH60 - KHK and KRA approval pressure/temperature graph*



CB60 / CBH60 - CRN approval pressure/temperature graph*



Standard data

Min. working temperature	see graph
Max. working temperature	see graph
Min. working pressure	vacuum
Max. working pressure	see graph
Volume per channel, litres (ga)	0.10 (0.027)
Max. particle size mm (inch)	1 (0.04)
Max. flowrate* m^3/h (gpm)	14.5 (63.7)
Min. nbr of plates	4
Max. nbr of plates	150

* Water at 5 m/s (16.4 ft/s) (connection velocity)

Standard materials

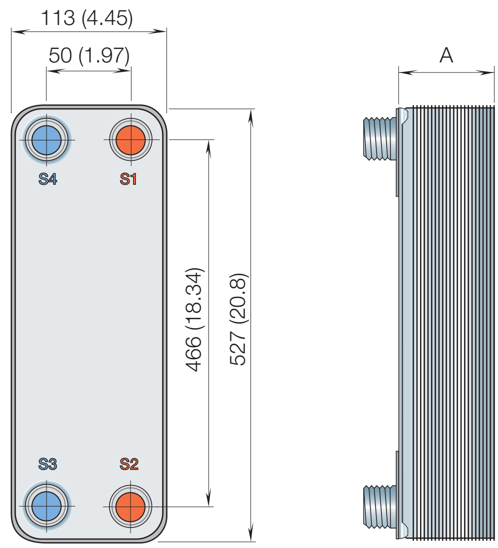
Cover plates	Stainless steel
Connections	Stainless steel
Plates	Stainless steel
Brazing filler	Copper

Standard dimensions and weight*

A measure mm	=	13 + (2.35 * n) (+/-1.5 %)
A measure inch	=	0.51 + (0.09 * n) (+/-1.5 %)
Weight** kg	=	2.1 + (0.18 * n)
Weight** lb	=	4.63 + (0.4 * n)

(n = number of plates)
* Excluding connections

Standard dimensions
mm (inch)



For exact values please contact your local Alfa Laval representative

How to contact Alfa Laval
Up-to-date AlfaLaval contact details for all countries are always available on our website on www.alfalaval.com

CB110 / CBH110 (Preliminary)

Brazed Plate Heat Exchanger

General information
Alfa Laval introduced its first brazed plate heat exchanger (BHE) in 1977 and has since continuously developed and optimized its performance and reliability.

Brazing the stainless steel plates together eliminates the need for gaskets and thick frame plates. The brazing material seals and holds the plates together at the contact points ensuring optimal heat transfer efficiency and pressure resistance. The plate design guarantees the longest possible life.

The design options of the brazed heat exchanger are extensive. Different plate patterns are available for various duties and performance specifications. You can choose a standard configuration BHE, or a unit designed according to your own specific needs. The choice is entirely yours.

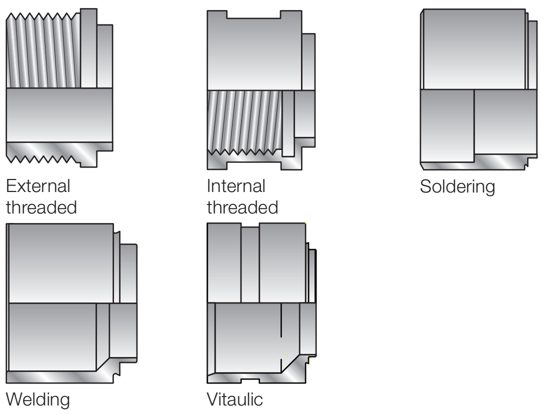
Typical applications
- HVAC heating/cooling
- Industrial heating/cooling
- Condensing
- Tap water
- Oil cooling
- Air dryer
- Solar heating

Working principles
The heating surface consists of thin corrugated metal plates stacked on top of each other. Channels are formed between the plates and corner ports are arranged so that the two media flow through alternate channels, usually in countercurrent flow for the most efficient heat transfer process.

Standard design
The plate pack is covered by cover plates. Connections are located in the front or rear cover plate. To improve the heat transfer design, the channel plates are corrugated.

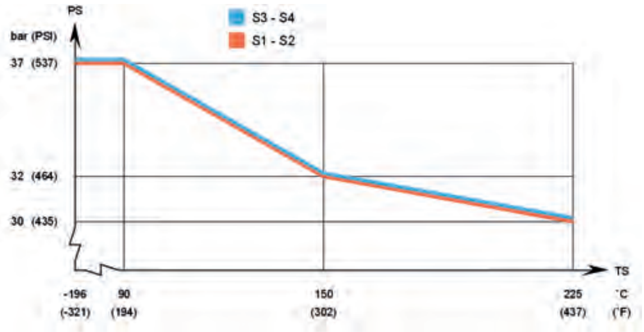
Particulars required for quotation
To enable Alfa Laval's representative to make a specific quotation, specify the following particulars in your enquiry:
- Required flow rates or heat load
- Temperature program
- Physical properties of liquids in question
- Desired working pressure
- Maximum permitted pressure drop

Examples of connections*

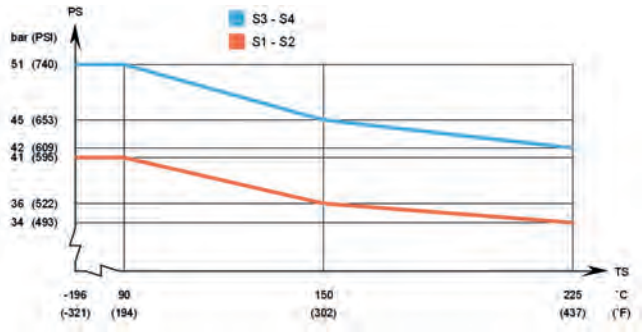


* More connections are available on request.

CB110 - PED approval pressure/temperature graph*



CBH110 - PED approval pressure/temperature graph*



Standard dimensions and weight*

CB110

A measure mm	=	15 + (2.51 * n) (+/-2 mm or +/-1.5 %)
A measure inch	=	0.59 + (0.1 * n) (+/-0.08 inch or +/-1.5 %)
Weight** kg	=	4.82 + (0.28 * n)
Weight** lb	=	10.63 + (0.62 * n)

CBH110

A measure mm	=	19 + (2.51 * n) (+/-2 mm or +/-1.5 %)
A measure inch	=	0.75 + (0.1 * n) (+/-0.08 inch or +/-1.5 %)
Weight** kg	=	5.68 + (0.28 * n)
Weight** lb	=	12.52 + (0.62 * n)

(n = number of plates)

* Excluding connections

Standard data

Min. working temperature	see graph
Max. working temperature	see graph
Min. working pressure	vacuum
Max. working pressure	see graph
Volume per channel H, L, M, litres (ga)	0.21 (0.054)
Max. particle size mm (inch)	1.2 (0.05)
Max. flowrate* m^3/h (gpm)	51 (224)
Min. nbr of plates	10
Max. nbr of plates	300

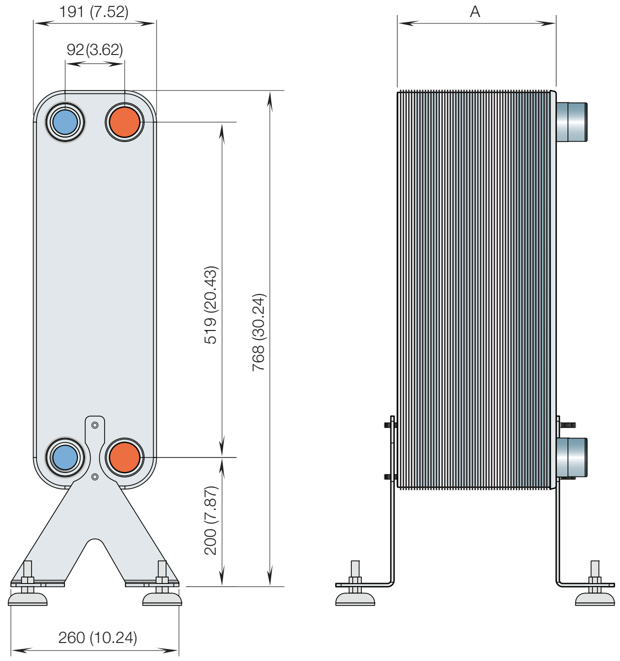
* Water at 5 m/s (16.4 ft/s) (connection velocity)

Standard materials

Cover plates	Stainless steel
Connections	Stainless steel
Plates	Stainless steel
Brazing filler	Copper

Standard dimensions

mm (inch)



For exact values please contact your local Alfa Laval representative

PCT00152EN 1112

Alfa Laval reserves the right to change specifications without prior notification.

How to contact Alfa Laval

Up-to-date AlfaLaval contact details for all countries are always available on our website on www.alfalaval.com

CB112 / CBH112

Brazed Plate Heat Exchanger

General information
Alfa Laval introduced its first brazed plate heat exchanger (BHE) in 1977 and has since continuously developed and optimized its performance and reliability.

Brazing the stainless steel plates together eliminates the need for gaskets and thick frame plates. The brazing material seals and holds the plates together at the contact points ensuring optimal heat transfer efficiency and pressure resistance. The plate design guarantees the longest possible life.

The design options of the brazed heat exchanger are extensive. Different plate patterns are available for various duties and performance specifications. You can choose a standard configuration BHE, or a unit designed according to your own specific needs. The choice is entirely yours.

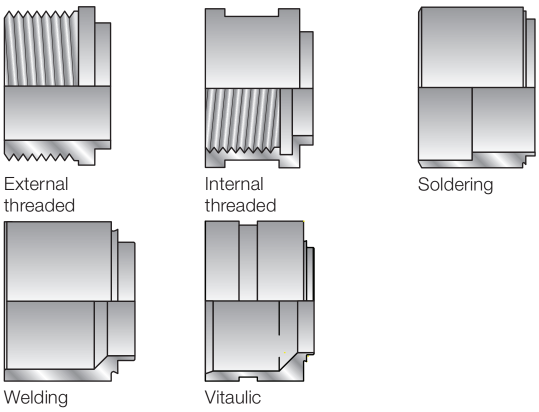
Typical applications
- HVAC heating/cooling
- Industrial heating/cooling
- Condensing
- Tap water
- Oil cooling
- Air dryer
- Solar heating

Working principles
The heating surface consists of thin corrugated metal plates stacked on top of each other. Channels are formed between the plates and corner ports are arranged so that the two media flow through alternate channels, usually in countercurrent flow for the most efficient heat transfer process.

Standard design
The plate pack is covered by cover plates. Connections are located in the front or rear cover plate. To improve the heat transfer design, the channel plates are corrugated.

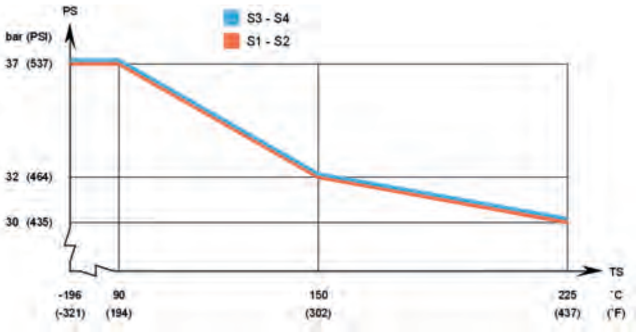
Particulars required for quotation
To enable Alfa Laval's representative to make a specific quotation, specify the following particulars in your enquiry:
- Required flow rates or heat load
- Temperature program
- Physical properties of liquids in question
- Desired working pressure
- Maximum permitted pressure drop

Examples of connections*

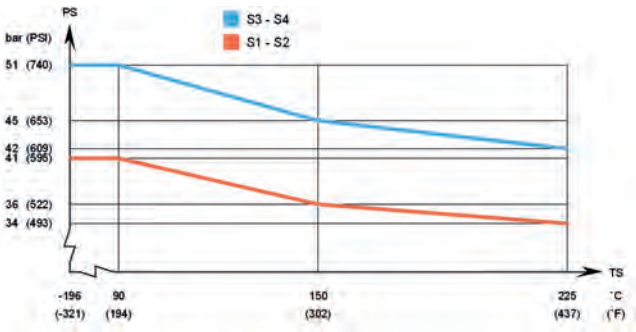


* More connections are available on request.

CB112 - PED approval pressure/temperature graph*



CBH112 - PED approval pressure/temperature graph*



Standard dimensions and weight*

CB112

A measure mm = 15 + (2.05 * n) (+/-2 mm or +/-1.5 %)
A measure inch = 0.59 + (0.08 * n) (+/-0.08 inch or +/-1.5 %)
Weight** kg = 4.82 + (0.35 * n)
Weight** lb = 10.63 + (0.77 * n)

CBH112

A measure mm = 19 + (2.05 * n) (+/-2 mm or +/-1.5 %)
A measure inch = 0.75 + (0.08 * n) (+/-0.08 inch or +/-1.5 %)
Weight** kg = 5.68 + (0.35 * n)
Weight** lb = 12.52 + (0.77 * n)

(n = number of plates)
* Excluding connections

Standard data

Min. working temperature	see graph
Max. working temperature	see graph
Min. working pressure	vacuum
Max. working pressure	see graph
Volume per channel H, L, M, litres (ga)	0.18 (0.046)
Volume per channel AH, AM, litres (ga)	0.20 (0.052) 0.16 (0.041)
Max. particle size mm (inch)	1 (0.04)
Max. flowrate* m^3/h (gpm)	51 (223.9)
Min. nbr of plates	10
Max. nbr of plates	300

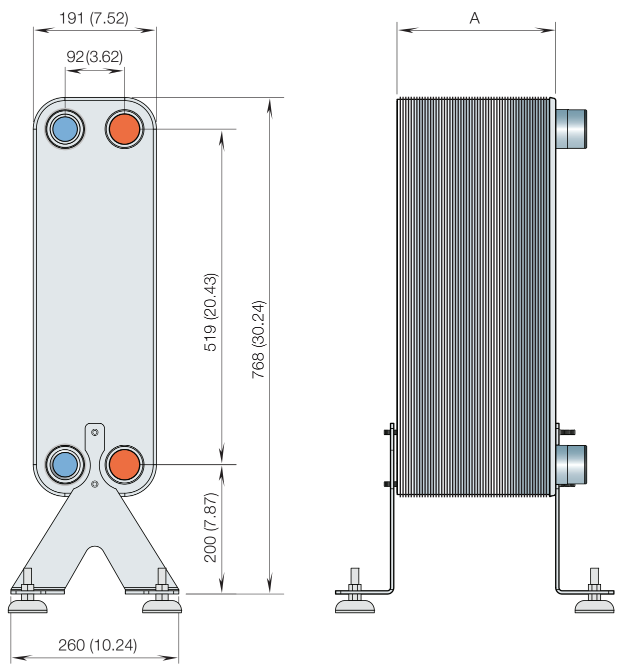
* Water at 5 m/s (16.4 ft/s) (connection velocity)

Standard materials

Cover plates	Stainless steel
Connections	Stainless steel
Plates	Stainless steel
Brazing filler	Copper

Standard dimensions

mm (inch)



For exact values please contact your local Alfa Laval representative

How to contact Alfa Laval
Up-to-date AlfaLaval contact details for all countries are always available on our website on www.alfalaval.com

CB200 / CBH200

Brazed Plate Heat Exchanger

General information
Alfa Laval introduced its first brazed plate heat exchanger (BHE) in 1977 and has since continuously developed and optimized its performance and reliability.

Brazing the stainless steel plates together eliminates the need for gaskets and thick frame plates. The brazing material seals and holds the plates together at the contact points ensuring optimal heat transfer efficiency and pressure resistance. The plate design guarantees the longest possible life.

The design options of the brazed heat exchanger are extensive. Different plate patterns are available for various duties and performance specifications. You can choose a standard configuration BHE, or a unit designed according to your own specific needs. The choice is entirely yours.

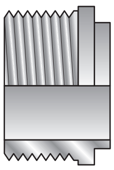
Typical applications
Liquid/liquid applications:
- HVAC heating/cooling
- Process heating/cooling
- Hydraulic oil cooling
- Oil cooling

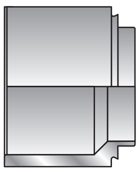
Working principles
The heating surface consists of thin corrugated metal plates stacked on top of each other. Channels are formed between the plates and corner ports are arranged so that the two media flow through alternate channels, usually in countercurrent flow for the most efficient heat transfer process.

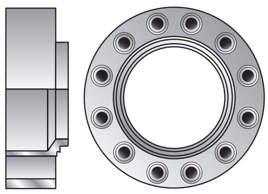
Standard design
The plate pack is covered by cover plates. Connections are located in the front or rear cover plate. To improve the heat transfer design, the channel plates are corrugated.

Particulars required for quotation
To enable Alfa Laval's representative to make a specific quotation, specify the following particulars in your enquiry:
- Required flow rates or heat load
- Temperature program
- Physical properties of liquids in question
- Desired working pressure
- Maximum permitted pressure drop

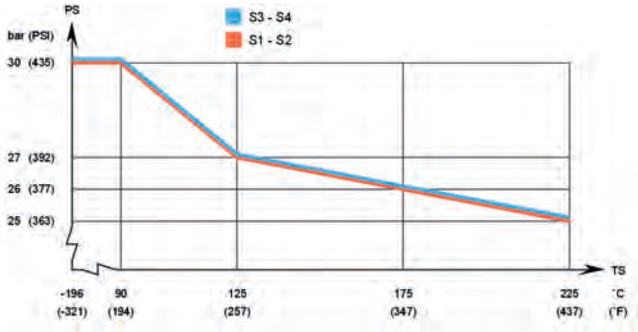
Examples of connections


External threaded

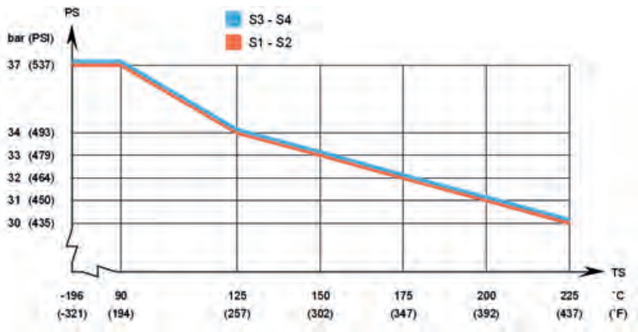

Welding


Compact flanges

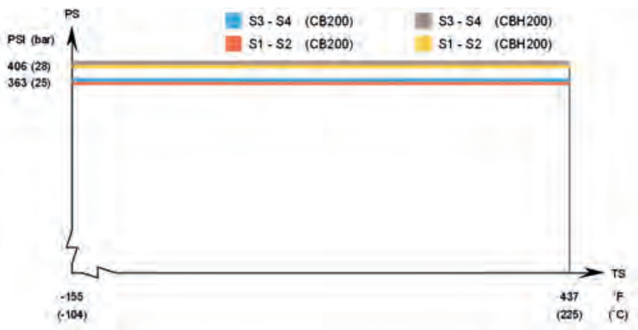
CB200 - PED approval pressure/temperature graph*



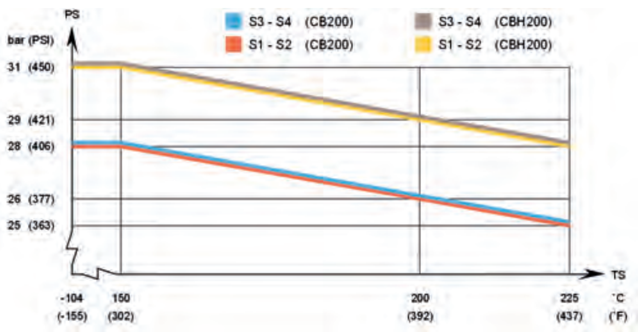
CBH200 - PED approval pressure/temperature graph*



CB200 / CBH200 - ASME approval pressure/temperature graph*



CB200 / CBH200 - CRN approval pressure/temperature graph*



Standard dimensions and weight*

CB200

A measure mm	=	11 + (2.7 * n) (+/-10 mm)
A measure inch	=	0.43 + (0.11 * n) (+/-0.39 inch)
Weight** kg	=	12 + (0.6 * n)
Weight** lb	=	26.46 + (1.32 * n)

CBH200

A measure mm	=	14 + (2.7 * n) (+/-10 mm)
A measure inch	=	0.55 + (0.11 * n) (+/-0.39 inch)
Weight** kg	=	14 + (0.6 * n)
Weight** lb	=	30.86 + (1.32 * n)

(n = number of plates)
* Excluding connections

Standard data

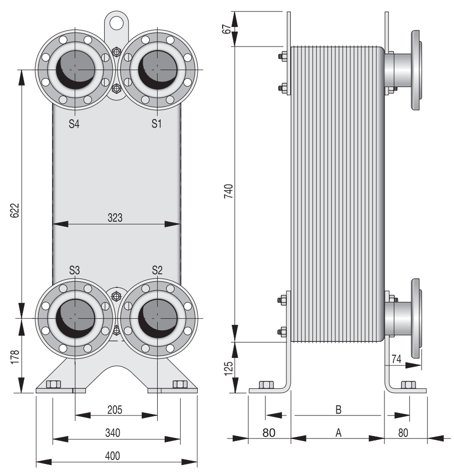
Min. working temperature	see graph
Max. working temperature	see graph
Min. working pressure	vacuum
Max. working pressure	see graph
Volume per channel, litres (ga)	0.51 (0.13)
Max. particle size mm (inch)	1.8 (0.07)
Max. flowrate* m^3/h (gpm)	128 (561)
Min. nbr of plates	10
Max. nbr of plates	230

* Water at 5 m/s (16.4 ft/s) (connection velocity)

Standard materials

Cover plates	Stainless steel
Connections	Stainless steel
Plates	Stainless steel
Brazing material	Copper

Standard dimensions
mm (inch)



For exact values please contact your local Alfa Laval representative

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How to contact Alfa Laval
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CB300 / CBH300

Brazed Plate Heat Exchanger

General information
Alfa Laval introduced its first brazed plate heat exchanger (BHE) in 1977 and has since continuously developed and optimized its performance and reliability.

Brazing the stainless steel plates together eliminates the need for gaskets and thick frame plates. The brazing material seals and holds the plates together at the contact points ensuring optimal heat transfer efficiency and pressure resistance. The plate design guarantees the longest possible life.

The design options of the brazed heat exchanger are extensive. Different plate patterns are available for various duties and performance specifications. You can choose a standard configuration BHE, or a unit designed according to your own specific needs. The choice is entirely yours.

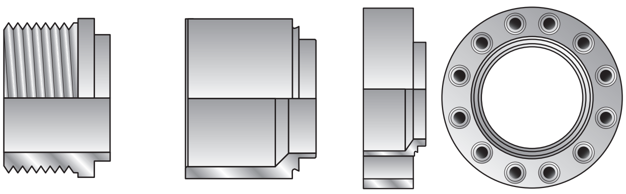
Applications
Liquid/liquid applications:
- HVAC heating/cooling
- Process heating/cooling
- Hydraulic oil cooling
- Oil cooling

Working principles
The heating surface consists of thin corrugated metal plates stacked on top of each other. Channels are formed between the plates and corner ports are arranged so that the two media flow through alternate channels, usually in countercurrent flow for the most efficient heat transfer process.

Standard design
The plate pack is covered by cover plates. Connections are located in the front or rear cover plate. To improve the heat transfer design, the channel plates are corrugated.

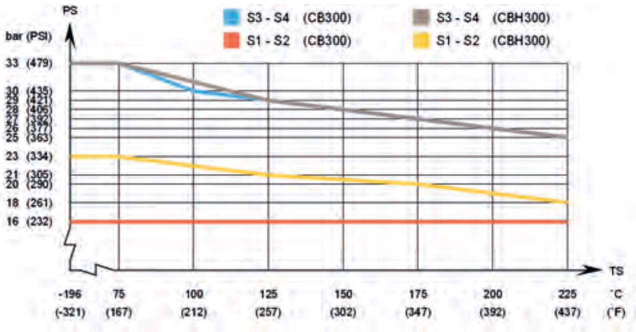
Particulars required for quotation
To enable Alfa Laval's representative to make a specific quotation, specify the following particulars in your enquiry:
- Required flow rates or heat load
- Temperature program
- Physical properties of liquids in question
- Desired working pressure
- Maximum permitted pressure drop

Examples of connections

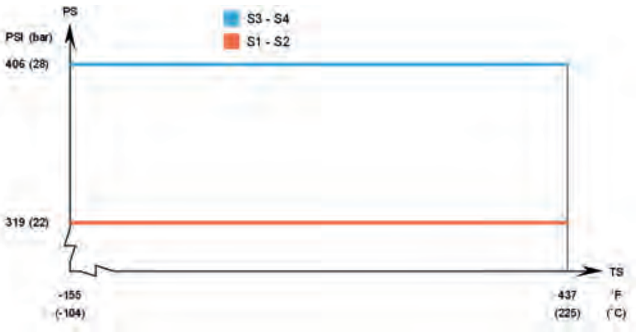


External threaded Welding Compact flanges

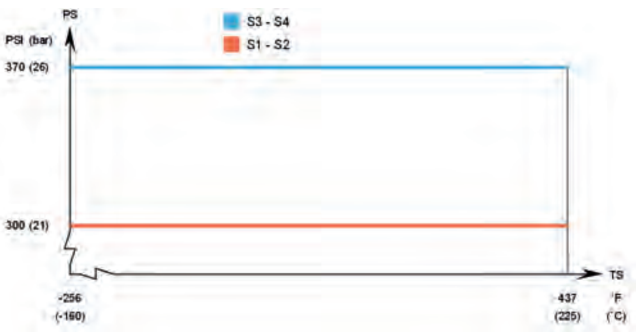
CB300 / CBH300 - PED approval pressure/temperature graph*



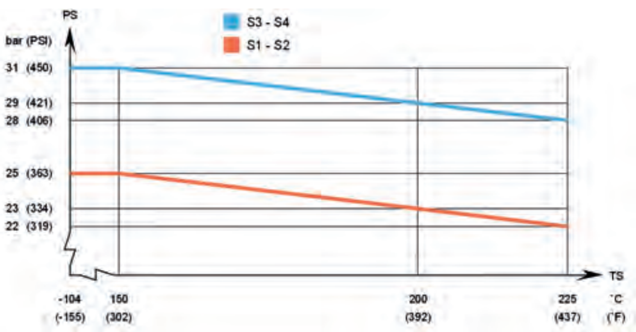
CB300 - ASME approval pressure/temperature graph*



CB300 - UL approval pressure/temperature graph*



CB300 - CRN approval pressure/temperature graph*



Standard data

Min. working temperature	see graph
Max. working temperature	see graph
Min. working pressure	vacuum
Max. working pressure	see graph
Volume per channel S1/S2, litres (ga)	0.69 (0.18)
Volume per channel S3/S4, litres (ga)	0.58 (0.15)
Max. particle size mm (inch)	1.8 (0.07)
Max. flowrate S1/S2 m^3/h (gpm)*	200 (881)
Min. nbr of plates	10
Max. nbr of plates	250

* Water at 5 m/s (16.4 ft/s) (connection velocity)

Standard materials

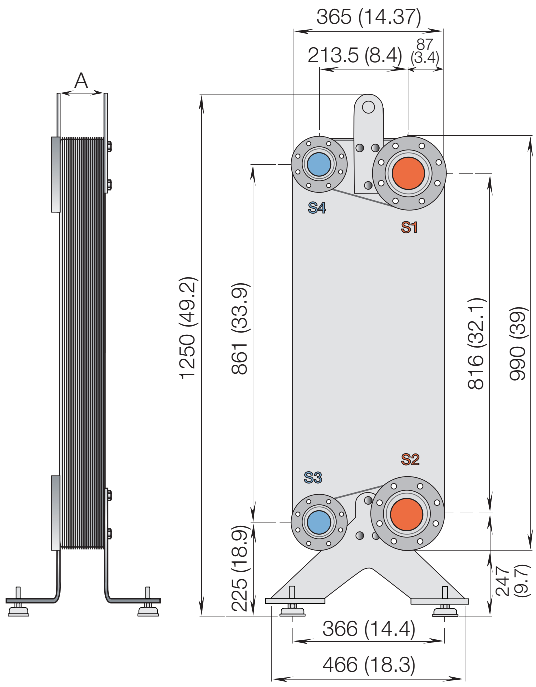
Cover plates	Stainless steel
Connections	Stainless steel
Plates	Stainless steel
Brazing material	Copper

Standard dimensions and weight*

A measure mm	=	11 + (2.62 * n) (+/-10 mm)
A measure inch	=	0.43 + (0.1 * n) (+/-0.39 inch)
Weight** kg	=	21 + (1.26 * n)
Weight** lb	=	46.3 + (2.78 * n)

(n = number of plates)
* Excluding connections

Standard dimensions
mm (inch)



For exact values please contact your local Alfa Laval representative

How to contact Alfa Laval
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CB400

Brazed Plate Heat Exchanger

General information
Alfa Laval introduced its first brazed plate heat exchanger (BHE) in 1977 and has since continuously developed and optimized its performance and reliability.

Brazing the stainless steel plates together eliminates the need for gaskets and thick frame plates. The brazing material seals and holds the plates together at the contact points ensuring optimal heat transfer efficiency and pressure resistance. The plate design guarantees the longest possible life.

The design options of the brazed heat exchanger are extensive. Different plate patterns are available for various duties and performance specifications. You can choose a standard configuration BHE, or a unit designed according to your own specific needs. The choice is entirely yours.

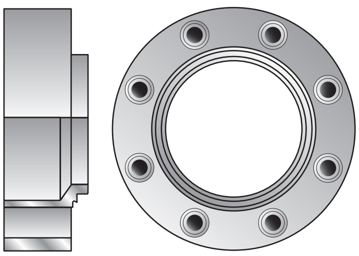
Typical applications
- HVAC heating/cooling
- Process heating/cooling
- Hydraulic oil cooling
- Oil cooling

Working principles
The heating surface consists of thin corrugated metal plates stacked on top of each other. Channels are formed between the plates and corner ports are arranged so that the two media flow through alternate channels, usually in countercurrent flow for the most efficient heat transfer process.

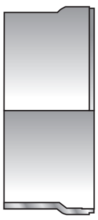
Standard design
The plate pack is covered by cover plates. Connections are located in the front or rear cover plate. To improve the heat transfer design, the channel plates are corrugated.

Particulars required for quotation
To enable Alfa Laval's representative to make a specific quotation, specify the following particulars in your enquiry:
- Required flow rates or heat load
- Temperature program
- Physical properties of liquids in question
- Desired working pressure
- Maximum permitted pressure drop

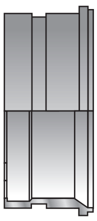
Examples of connections



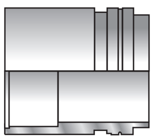
Compact flanges



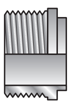
Welding



Clamp

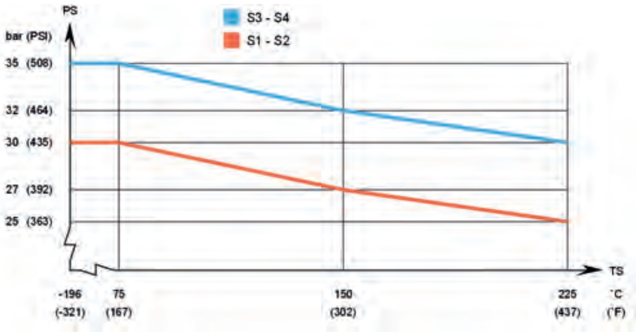


Soldering

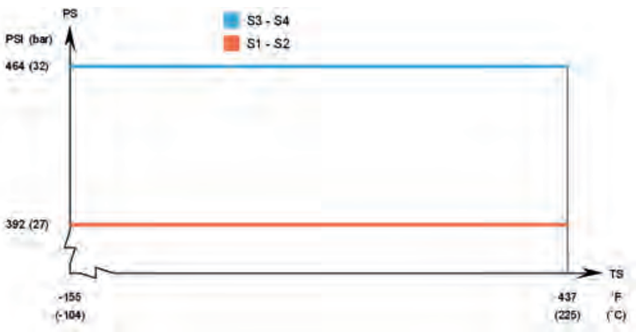


External threaded

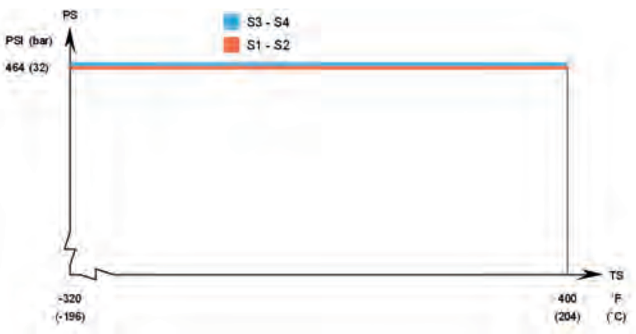
CB400 - PED approval pressure/temperature graph*



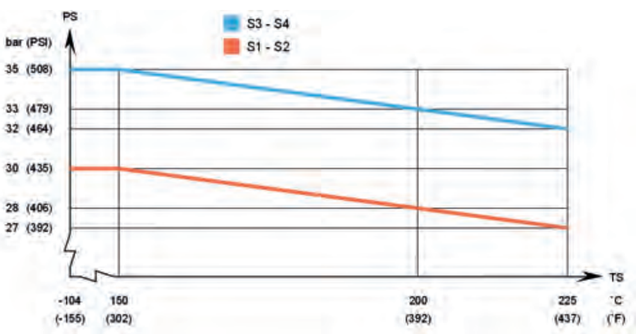
CB400 - ASME approval pressure/temperature graph*



CB400 - UL approval pressure/temperature graph*



CB400 - CRN approval pressure/temperature graph*



Standard dimensions and weight*

A measure mm	=	14 + (2.56 * n) (+/-10 mm)
A measure inch	=	0.55 + (0.1 * n) (+/-0.39 inch)
Weight** kg	=	24 + (1.35 * n)
Weight** lb	=	52.91 + (2.98 * n)

(n = number of plates)
* Excluding connections

Standard data

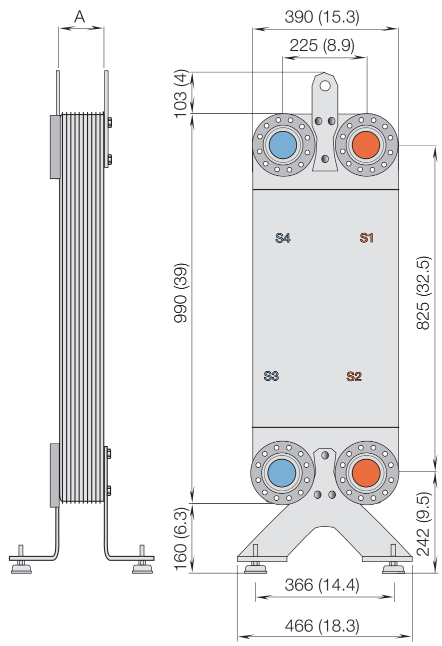
Min. working temperature	see graph
Max. working temperature	see graph
Min. working pressure	vacuum
Max. working pressure	see graph
Volume per channel, litres (ga)	0.74 (0.19)
Max. particle size mm (inch)	1.8 (0.07)
Max. flowrate* m^3/h (gpm)	200 (881)
Min. nbr of plates	10
Max. nbr of plates	270

* Water at 5 m/s (16.4 ft/s) (connection velocity)

Standard materials

Cover plates	Stainless steel
Connections	Stainless steel
Plates	Stainless steel
Brazing filler	Copper

Standard dimensions
mm (inch)



For exact values please contact your local Alfa Laval representative

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How to contact Alfa Laval
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Couplings and Counter Flanges

Brazed and Fusion-bonded Heat Exchangers

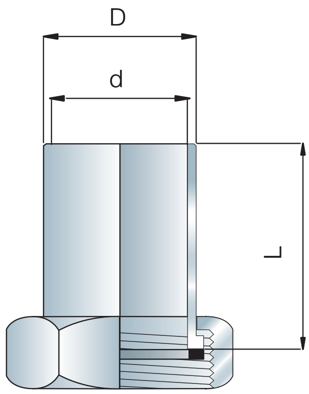
Alfa Laval offers a wide range of accessories to our products. This leaflet shows the couplings and counter compact flanges available directly from our stock.

The couplings are available in different standard dimensions and in different materials for welding or soldering installation.

The counter compact flanges fit our compact flanges and are available in different material for different applications.

Coupling DN20 / ¾"

Type	Nut Material	Pipe Material	Size	L (mm)	D (mm)	d (mm)	Item nbr.
Welding	Carbon steel	Carbon steel	DN15	23	21.3	-	162623509
Soldering	Carbon steel	Brass	Cu18	16	18	15	3456105403



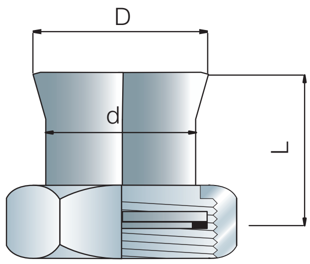
DN 20, 40, 54

Coupling DN25 / 1"

Type	Nut Material	Pipe Material	Size	L (mm)	D (mm)	d (mm)	Item nbr.
Welding	Carbon steel	Carbon steel	DN20	33	26.9	-	162623507
Welding	Carbon steel	Carbon steel	DN25	31	33.7	26.9	162623512
Soldering	Carbon steel	Brass	Cu22	20	25	22.1	3456105402
Soldering	Carbon steel	Brass	Cu28/Cu35	66	32	28	3456156701

Coupling DN32 / 1¼"

Type	Nut Material	Pipe Material	Size	L (mm)	D (mm)	d (mm)	Item nbr.
Welding	Carbon steel	Carbon steel	DN25	50	33.7	-	162623504
Welding	Carbon steel	Carbon steel	DN32	43	42.4	33.7	162623511
Soldering	Carbon steel	Brass	Cu28	50	31.9	28	162623506



DN 25, 32, 50, 65

Coupling DN40 / 2"

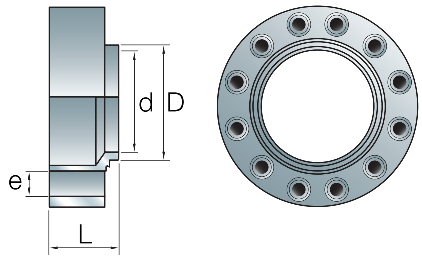
Type	Nut Material	Pipe Material	Size	L (mm)	D (mm)	d (mm)	Item nbr.
Welding	Carbon steel	Carbon steel	DN40	50	48.3	-	162623510
Welding	Carbon steel	Carbon steel	DN50	50	60.3	52	162623501
Soldering	Carbon steel	Brass	Cu42	44	48	42.1	3456105401
Soldering	Carbon steel	Brass	Cu54	50	50.9	44.5	162623503

Coupling DN50 / 2½"

Type	Nut Material	Pipe Material	Size	L (mm)	D (mm)	d (mm)	Item nbr.
Welding	Carbon steel	Carbon steel	DN50	65	60.3	-	3456040603
Welding	Carbon steel	Carbon steel	DN65	65	76.1	60.3	3456040601

Counter compact flange

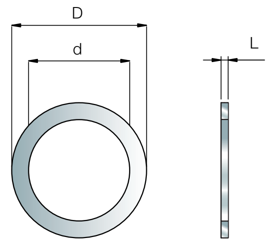
Size	Nut Material	Flange	L (mm)	D (mm)	d (mm)	e	Item nbr.
DN65	Stainless steel	Stainless steel	33.5	76.1	70.3	13.5	3456325101
DN65	Carbon steel	Stainless steel	33.5	76.1	70.3	13.5	3456325102
DN80	Stainless steel	Stainless steel	33.5	88.9	82.5	13.5	3456325103
DN80	Carbon steel	Stainless steel	33.5	88.9	82.5	13.5	3456325104
DN100	Stainless steel	Stainless steel	33.5	114.3	107.1	13.5	3456325105
DN100	Carbon steel	Stainless steel	33.5	114.3	107.1	13.5	3456325106



Extra gasket fitting

In the above couplings the gasket is included.

Size	Thickness	L (mm)	D (mm)	d (mm)	Item nbr.
DN15	1.5	1.5	24	46	162635005
DN20	1.5	1.5	30	23	162635002
DN25	1.5	1.5	39	30	162635001
DN40	1.5	1.5	56.5	46	162635003
DN50	1.5	1.5	72	63	162635004
DN65	1.5	1.5	90	70	3456287002
DN80	1.5	1.5	106	83	3456287003
DN100	1.5	1.5	132	107	3456287004



Extra gasket fitting

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Feet

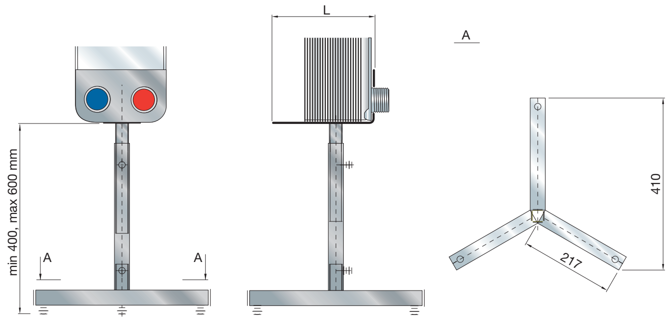
Brazed and Fusion-bonded Heat Exchangers

Alfa Laval offers a wide range of accessories to our products. This leaflet shows the feet and floor support kits available from stock.

Floor suppport kit, height adjustable

Material: Black painted steel

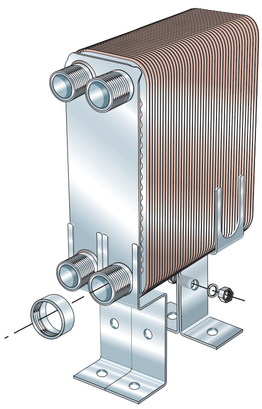
CB30, CB60, AlfaNova 27 (Fits connections 1¼" and smaller)		
Nbr. of plates	**L**	**Item nbr.**
10-60	45	3456089801
61-100	130	3456089802
101-150	200	3456089803
CB76, CB110, CB112, AlfaNova 76 (Fits connections 2½" and smaller)		
Nbr. of plates	**L**	**Item nbr.**
10-60	190	3456090801
61-90	260	3456090804
91-120	350	3456090802
121-150	350	3456090803



Floor suppport kit

Material: Galvanized steel

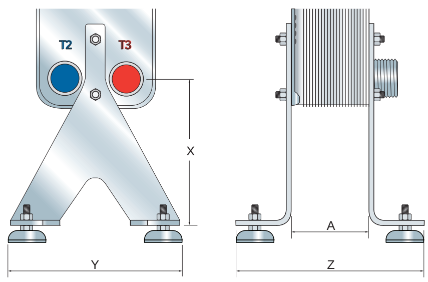
CB30, CB60, AlfaNova 27 (Fits connections 1" and smaller)		
Nbr. of plates	**L**	**Item nbr.**
Max. 30 plates	55	162965401
Max. 150 plates	110	162965402
CB76, CB110, CB112, AlfaNova 76		
Nbr. of plates	**L**	**Item nbr.**
Max. 30 plates	190	162965501
Max. 150 plates	190	162965502



Rigid feet

Require studbolts welded on the heat exchanger.
Material: Galvanized steel

Model	X	Y	Z	Item nbr.
CB76, AlfaNova 76				
CB110, CB112, AC112	199	269	A + 180	3456544501
CB200	178	400	A + 160	Incl. in the heat exchanger
CB300	217 (S2) / 194.5 (S3)	466	A + 260	Incl. in the heat exchanger
CB400, AlfaNova 400	242	466	A + 260	Incl. in the heat exchanger



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Heating Insulation

Brazed and Fusion-bonded Plate Heat Exchangers

The Alfa Laval heating insulations for brazed and fusion bonded plate heat exchangers are easily assembled and dismantled. The heating insulation provides protection from the heat pack and keeps the climate in the operating room dry and not too hot.

For the smaller sizes, up to CB100, the insulations can only be ordered as extras. For the larger sizes, the insulations are customized and assembled at the factory and are therefore ordered as a part of the heat exchanger.

There are different types of heating insulations to fit each demand:

Type A Heating
- Blue plastic cover with CFC-free polyurethane foam
- Thickness 30 mm
- Thermal conductivity: 0.031 w/mK
- Max. temperature: 140°C
- Fire class rating: Class F, DIN 4102 B3

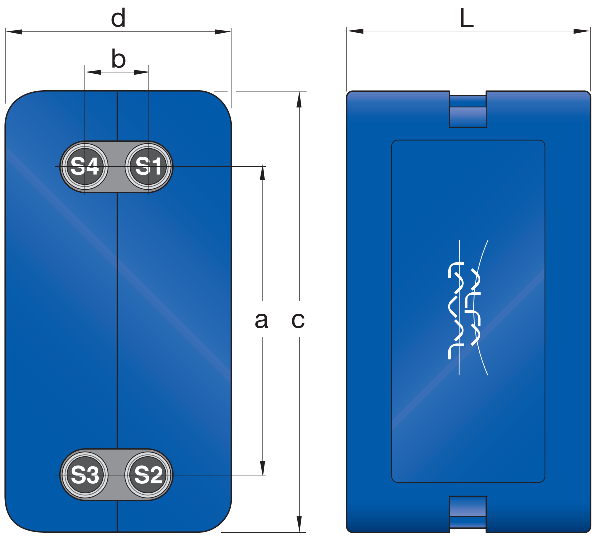
Type B Heating
- Black EPP - polypropylen (no cover)
- Thickness 20 mm
- Thermal conductivity: 0.039 w/mK
- Max. temperature: 110 °C

Type W Heating
- Insulation: 65 mm mineral wool covered with 0.05 mm alu foil on the inside
- Cladding sheet: 1 mm Alustucco
- Lock: Galvanized steel
- Thermal conductivity: 0.024 w/mK
- Max. temperature: 200°C
- Fire class rating: A1 acc. To RD 19/12/1997
- Class 1 according to BS 476 Part 7
- Class 1 according to FM approval Standard 4450
- Euroclass D according to EN 13501-1

Type A Heating

Model	c	d	a	b	L
AC18/CB18/CB20	384	157	270	46	*)
CB30/AlfaNova 27	360	182	250	50	*)
CB60/AlfaNova 52	588	182	466	50	*)
CB110/CB112/AlfaNova 76	670	240	520	92	*)
CB100	555	315	378	138	*)
CB200	832	370	522	205	*)
CB300	1094	470	**)	213.5	*)
CB400/AlfaNova 400	1055	520	825	225	*)
AlfaNova 400					

*) Sizes to fit all standard sizes
**) Side S1, S2 = 816 mm. Side S3, S4 = 861 mm.



Type B Heating

Model	c	d	a	b	L
CB14/CB16/AlfaNova 14	248	120	172	42	*)
CB18/CB20	366	137	272	46	*)
CB30/AlfaNova 27	354	156	250	50	*)
CB60/AlfaNova 52	570	156	466	50	*)

*) Sizes to fit all standard item sizes

Type W Heating

Model	c	d	a	b	L
CB400/AlfaNova 400	1055	570	825	255	*)

*) Sizes to fit all standard item sizes

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Cooling Insulation Type P

Brazed and Fusion Bonded plate heat exchanger

Alfa Laval offers a wide range of accessories to our products. This leaflet describes the Type P cooling insulation. Type P is a flexible cooling insulation in soft material which is easy to install and adjust to your specific heat exchanger.

Description
Prefabricated insulation jacket with 19 mm thickness closed cell expanded elastomer and with 0.5 mm external PVC protection layer.

The diffusion tight insulation is intended for Alfa Laval brazed and fusion bonded plate heat exchangers and is suitable for cooling and low temperatures.

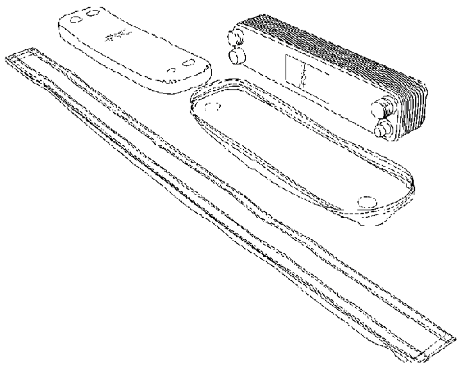
Max temperature: 100°C
Min temperature: -45°C

The insulation kit is composed by three parts: one lateral and two back and front pieces together with an installation manual.

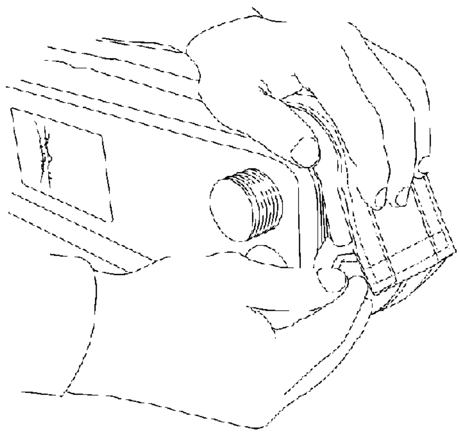
Advantages
- Easy to install
- Can be mounted also after the connections have been mounted, thanks to the pre-cut S3 and S4 holes
- Available from stock
- Suitable for 6 connections thanks to the pre-cut T1 and T2 holes

Properties	Reference values	Reference regulation
Density		
	• 60 kg/m^3	DIN 53420
Working temperatures		
Max. temperature	+100°C	
Min. temperature	-45°C	
Thermal conductivity λ		
-40°C	0.028 W/(m•K)	DIN 56613
-20°C	0.030 W/(m•K)	DIN 56613
0°C	0.033 W/(m•K)	DIN 56613
+20°C	0.036 W/(m•K)	DIN 56613
+50°C	0.040 W/(m•K)	DIN 56613
Permeability		
Resistance to the steam diffusion μ	> 7000	DIN 52616
Fire resistance		
Italy	Class 1	UNI 9174 - UNI 8457
France	Class M1	AFNOR NF P92 501
Sweden	Klass II	NTF 036
Norway	Klass II	NTF 036
Finland	Klass II	NTF 036
Finland	Klass 1	NTF002
Switzerland	BKZ	-
Ozone resistance		
	Excellent	UNI 4905
Dimensional stability		
	0.3 - 0.5% shrinkage	

Complete insulation Type P set
An installation manual is also included in the set.



Easy to install
It is not needed to use special tools.



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Alfa Laval CIP 20 and Alfa Laval CIP 40

Cleaning in Place Unit for Heat Exchangers

A problem frequently encountered in almost all applications is the build-up of deposits on heat transfer surfaces. Alfa Laval supplies a wide range of cleaning agents suitable for removing most of these troublesome deposits and restoring performance to optimal levels. The time-consuming work of opening plate heat exchangers can thus often be avoided by using an Alfa Laval Cleaning in Place (CIP) unit.

Alfa Laval CIP units are available in a wide range of standard sizes, with optional extras that include reversible flow and explosion-proof capabilities. Alfa Laval CIP units can be used for all types of heat exchangers, including spiral heat exchangers, shell-and-tube heat exchangers and gasketed, welded and brazed plate heat exchangers.

Concept

Alfa Laval CIP units are simplicity itself:

- Connect the Alfa Laval CIP unit to the heat exchanger
- Mix the cleaning agent with water in the tank
- Circulate the cleaning solution a couple of hours
- Drain and rinse
- Disconnect the CIP unit
- The heat exchanger is back to full performance capacity

Alfa CIP 40

Alfa CIP 20

Alfa Laval CIP units are a cost-effective way to achieve better performance, and the cleaning agents used are, of course, environmentally friendly.

In addition to boosting the performance of all kinds of heat exchangers, Alfa Laval cleaning agents extend the operating time between cleaning cycles as well as prolonging the overall lifetime of the heat exchangers, without damaging the plates or gaskets.

Features & benefits

- Connected directly to inlet and outlet. This avoids any need to open the heat exchanger, which in turn minimizes downtime and prolongs the working life of the gasket.
- High-quality equipment that is CE marked.
- Valves for reversible flow direction. This makes it possible to remove the solid particles rapidly, and is easy to operate without needing to rearrange the connection hoses.

Technical specifications

	Alfa Laval CIP 20	Alfa Laval CIP 40/50 Hz	Alfa Laval CIP 40/60 Hz
Pump	Centrifugal	Centrifugal	Centrifugal
Max. flow rate	2.1 m^3/h (8.7 gpm)	2.4 m^3/h (10.6 gpm)	2.1 m^3/h (8.7 gpm)
At pumping head	8 m	15 m	15 m
Motor power	170 W	400 W	400 W
Voltage	230 V/1 phase/50 Hz	230 V/1 phase/50 Hz	110 V/1 phase/60 Hz
Max. operating temp	60°C (140°F)	60°C (140°F)	60°C (140°F)
Volume	20 litres (5.3 US gallons)	40 litres (10.6 US gallons)	40 litres (10.6 US gallons)
Weight	8 kg	15 kg	15 kg
Length	500 mm	730 mm	730 mm
Width	250 mm	320 mm	320 mm
Height	350 mm	530 mm	530 mm
Number of hoses	2	2	2
Hose length	2.6 m	2.6 m	2.6 m
Hose material	PVC reinforced	PVC reinforced	PVC reinforced
Connection	ISO 228 ¾”	ISO 228 ¾”	ISO 228 ¾”
Pump wetted parts	PP (Polypropylene)	PP (Polypropylene)	PP (Polypropylene)
Pump gaskets	NBR	NBR	NBR
Hose connection gaskets	EPDM	EPDM	EPDM
Material for wetted parts	PE (Polyethylene)	PE (Polyethylene)	PE (Polyethylene)
Protection class	IP54	IP54	IP54
Eexd (explosion-proof)	No	No	No
Art. no.	32840005-01	32840000-01	32840436-01

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Alfa Laval CIP 200L and CIP 400L

Stainless Steel Cleaning in Place Units for Heat Exchangers

A problem frequently encountered in almost all applications is the build-up of deposits on heat transfer surfaces. Alfa Laval supplies a wide range of cleaning agents suitable for removing most of these troublesome deposits and restoring performance to optimal levels. The time-consuming work of opening plate heat exchangers can thus often be avoided by using an Alfa Laval Cleaning in Place (CIP) unit. These are available in a wide range of standard sizes that include reversible flow capability. Alfa Laval CIP units can be used for all types of heat exchangers, including spiral heat exchangers, shell-and-tube heat exchangers and gasketed welded and brazed plate heat exchangers.

Concept
Alfa Laval CIP units are simplicity itself:

- Connect the Alfa Laval CIP unit to the heat exchanger
- Mix the cleaning agent with water in the tank and heat it up
- Circulate the cleaning solution a few of hours
- Drain and rinse
- Disconnect the CIP unit
- The heat exchanger is back to full performance capacity

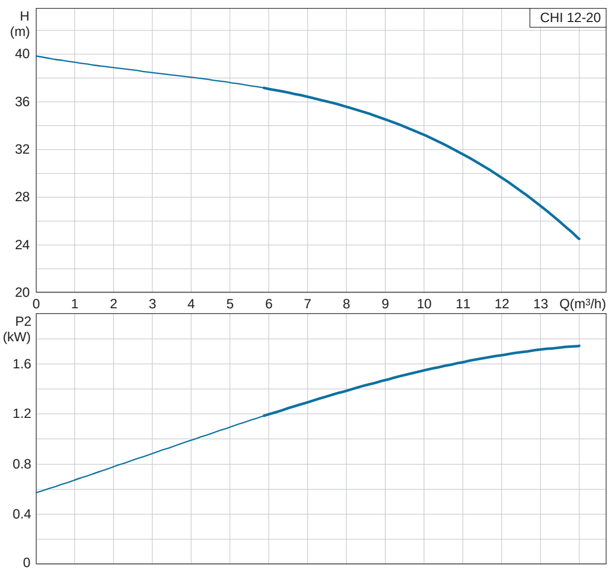
Alfa Laval CIP units are a cost-effective way to achieve better performance, and the cleaning agents used are, of course, environmentally friendly.

In addition to boosting the performance of all kinds of heat exchangers, Alfa Laval cleaning agents extend the operating time between cleaning cycles as well as prolonging the overall lifetime of the heat exchangers, without damaging the plates or gaskets.

Features and benefits
- Connected directly to inlet and outlet. This avoids any need to open the heat exchanger, which in turn minimizes downtime and prolongs the working life of the gasket.
- Wetted parts in the operating unit, as well as the pump and valves, are made of AISI 304 or AISI 316 stainless steel to ensure maximum working life.
- Rapid cleaning at optimal temperatures, due to built-in electric heater.
- Valve arrangement for reversible flow direction. This makes it possible to remove the solid particles rapidly, and is easy to operate without the need to rearrange the connection hoses.

Technical specifications

	Alfa Laval CIP 200L	Alfa Laval CIP 400L
Circulation pump	Centrifugal stainless steel	Centrifugal stainless steel
Pump capacity max. at 3.2 bar head	10 m^3/h	10 m^3/h
Voltage	380–440V/3-phase/50 Hz	380–420V/3-phase/50 Hz
	440–480V/3-phase/60 Hz	440–480V/3-phase/60 Hz
Pump motor size (50/60Hz)	2.3/4.2 kW	2.3/4.2 kW
Total heating power	6 alt. 12 kW	12 kW
Max. operating temp	85°C	85°C
	(185°F)	(185°F)
Volume	200 litres	400 litres
	(53 US gallons)	(106 US gallons)
Modules	1 pump + 1 tank	1 pump + 2 tanks
Weight empty module, pump + tank(s)	55+90 kg = 145 kg	55+90+90 kg = 235 kg
Size pump module (H x W x L)	1345 x 475 x 775 mm	1345 x 475 x 775 mm
Size per each tank module (H x W x L)	1345 x 475 x 1035 mm	1345 x 475 x 1035 mm
Number of hoses	4	6
Hose length	4 m	4 m
Hose material inside/outside	UPE/EPDM	UPE/EPDM
Connection standard	DIN 11851/DN 40	DIN 11851/DN 40
Material for wetted parts	Stainless steel AISI 304/316	Stainless steel AISI 304/316
Pump gaskets	EPDM	EPDM
Pump seal	C/SiC	C/SiC
Hose connection gaskets	EPDM	EPDM
Eexd (explosion-proof)	On request	On request



Pump graph (50 Hz).

Optionals

Item no	
96994900-03	Welding piece for CIP connection to PHE pipe <DN40
96994900-04	Welding piece for CIP connection to PHE pipe >=DN40
96995110-14	Spanner DN40
96995110-16	Adapter DN40/BSP 11/2"
96995110-17	Isolation valve at PHE pipe connection DN40 butterfly valve AISI 304
96995110-18	Manometer 0–10 bar
96995110-19	Thermometer 0–200°C
96995110-20	96995110-20 Hose DN40, 6 m

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Alfa Laval CIP 800L

Stainless Steel Cleaning in Place Unit for Heat Exchangers

A problem frequently encountered in almost all applications is the build-up of deposits on heat transfer surfaces. Alfa Laval supplies a wide range of cleaning agents suitable for removing most of these troublesome deposits and restoring performance to optimal levels. The time-consuming work of opening plate heat exchangers can thus often be avoided by using an Alfa Laval Cleaning in Place (CIP) unit. These are available in a wide range of standard sizes that include reversible flow capability. Alfa Laval CIP units can be used for all types of heat exchangers, including spiral heat exchangers, shell-and-tube heat exchangers and gasketed, welded and brazed plate heat exchangers.

Concept

Alfa Laval CIP units are simplicity itself:

- Connect the Alfa Laval CIP unit to the heat exchanger
- Mix the cleaning agent with water in the tank and heat it up
- Circulate the cleaning solution a couple of hours
- Drain and rinse
- Disconnect the CIP unit
- The heat exchanger is back to full performance capacity

Alfa Laval CIP units are a cost-effective way to achieve better performance, and the cleaning agents used are, of course, environmentally friendly.

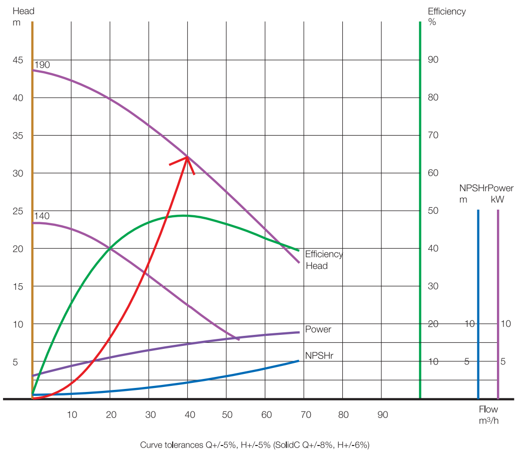
In addition to boosting the performance of all kinds of heat exchangers, Alfa Laval cleaning agents extend the operating time between cleaning cycles as well as prolonging the overall lifetime of the heat exchangers, without damaging the plates or gaskets.

Features and benefits

- Connected directly to inlet and outlet. This avoids any need to open the heat exchanger, which in turn minimizes downtime and prolongs the working life of the gasket.
- Wetted parts in the operating unit, as well as the pump and valves, are made of AISI 316 stainless steel to ensure maximum working life.
- Rapid cleaning at optimal temperatures, due to built-in electric heaters.
- Valve arrangement for reversible flow direction. This makes it possible to remove the solid particles rapidly, and is easy to operate without needing to rearrange the connection hoses.

Technical specifications

	Alfa Laval CIP 800
Circulation pump	Centrifugal sanitary
Pump capacity max. at 3.2 bar head	40 m^3/h
Voltage	380–420V/3-phase/50 Hz 440–480V/3-phase/60 Hz
Pump motor size (50/60Hz)	7.5/8.6 kW
Total heating power	12 kW alt. 24 kW
Heating time in tank, approx.	12 kW/4 h alt. 24 kW/2 h
Max. operating temperature	85°C (185°F)
Volume	800 litres (212 US gallons)
Weight empty module	300 kg
Size module (H x W x L)	1735 x 2160 x 1260 mm
Number of hoses	2
Hose length	4 m
Hose material inside/outside	UPE/EPDM
Connection standard	DIN 11851/DN 65
Material for wetted parts	Stainless steel AISI 304/316
Pump gaskets	EPDM
Pump seal	C/SiC
Hose connection gaskets	EPDM
Eexd (explosion-proof)	On request



Pump graph (50 Hz).

Optionals

Item no

96994900-05	Welding piece for CIP connection to PHE pipe >=DN65
96995310-14	Spanner DN 65 DIN union
96995310-16	Adapter DN 65/BSP 21/2"
96995310-17	Isolation valve at PHE pipe connection DN65 butterfly valve AISI 304
96995310-18	Manometer 0-10 bar
96995310-19	Thermometer 0-200°C
96995310-20	Hose DN65, 6 m

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Alfa Laval CIP 1800L and CIP 2800L

Stainless Steel Cleaning in Place Units for Heat Exchangers

A problem frequently encountered in almost all applications is the build-up of deposits on heat transfer surfaces. Alfa Laval supplies a wide range of cleaning agents suitable for removing most of these troublesome deposits and restoring performance to optimal levels. The time-consuming work of opening plate heat exchangers can thus often be avoided by using an Alfa Laval Cleaning in Place (CIP) unit. These are available in a wide range of standard sizes that include reversible flow capability. Alfa Laval CIP units can be used for all types of heat exchangers, including spiral heat exchangers, shell-and-tube heat exchangers and gasketed, welded and brazed plate heat exchangers.

Concept
Alfa Laval CIP units are simplicity itself:

- Connect the Alfa Laval CIP unit to the heat exchanger
- Mix the cleaning agent with water in the tank and heat it up
- Circulate the cleaning solution a couple of hours
- Drain and rinse
- Disconnect the CIP unit
- The heat exchanger is back to full performance capacity

Alfa Laval CIP units are a cost-effective way to achieve better performance, and the cleaning agents used are, of course, environmentally friendly.

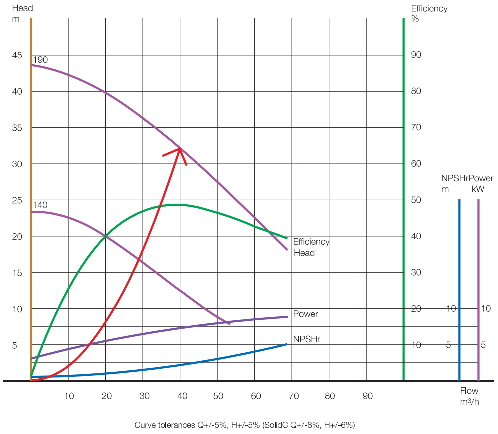
In addition to boosting the performance of all kinds of heat exchangers, Alfa Laval cleaning agents extend the operating time between cleaning cycles as well as prolonging the overall lifetime of the heat exchangers, without damaging the plates or gaskets.

Features and benefits
- Connected directly to inlet and outlet. This avoids any need to open the heat exchanger, which in turn minimizes downtime and prolongs the working life of the gasket.
- Wetted parts in the operating unit, as well as the pump and valves, are made of AISI 304 or AISI 316 stainless steel to ensure maximum working life.
- Rapid cleaning at optimal temperatures, due to built-in electric heaters.
- Valve arrangement for reversible flow direction. This makes it possible to remove the solid particles rapidly, and is easy to operate without the need to rearrange the connection hoses.

Technical specifications

	Alfa Laval CIP 1800L	Alfa Laval CIP 2800L
Circulation pump	Centrifugal sanitary	Centrifugal sanitary
Voltage	380–420 V/3-phase/50 Hz 440–480 V/3-phase/60 Hz	380–420 V/3-phase/50 Hz 440–480 V/3-phase/60 Hz
Pump motor size (50/60 Hz)	7.5/8.6 kW	7.5/8.6 kW
Total heating power	24 kW alt. 48 kW	48 kW
Heating time in tank, approx.	24 kW/4 h alt. 48 kW/2 h	48 kW/3.5 h
Max. operating temp	85°C (185°F)	85°C (185°F)
Volume	1800 litres (477 US gallons)	2800 liters (742 US gallons)
Modules	1 pump/tank + 1 tank	1 pump/tank + 2 tanks
Weight empty module, pump + tank(s)	300+150 kg = 450 kg	300+150+150 kg = 600 kg
Size module incl. tank (H x W x L)	1735 x 2160 x 1260 mm	1735 x 2160 x 1260 mm
Size per each additional tank module (H x W x L)	1483 x 960 x 960 mm	1483 x 960 x 960 mm
Number of hoses	4	6
Hose length	4 m	4 m
Hose material inside/outside	UPE/EPDM	UPE/EPDM
Connection standard	DIN 11851/DN 65	DIN 11851/DN 65
Material for wetted parts	Stainless steel AISI 304/316	Stainless steel AISI 304/316
Pump gaskets	EPDM	EPDM
Pump seal	C/SiC	C/SiC
Hose connection gaskets	EPDM	EPDM
Eexd (explosion-proof)	On request	On request

* See pump curve for flow rate and pumping head



Pump graph (50 Hz).

Optionals

Item no	
96994900-05	Welding piece for CIP connection to PHE pipe >=DN65
96995310-14	Spanner DN 65 DIN union
96995310-16	Adapter DN 65/BSP 21/2"
96995310-17	Isolation valve at PHE pipe connection DN65 butterfly valve AISI 304
96995310-18	Manometer 0–10 bar
96995310-19	Thermometer 0–200°C
96995310-20	96995310-20 Hose DN65, 6 m

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Chapter 8

Fusion-bonded plate heat exchangers, AlfaNova

From the extreme heat in our furnaces comes AlfaNova, the world's first 100% stainless-steel plate heat exchanger.

The AlfaNova can handle high temperatures and has good resistance to pressure fatigue compared to a conventional brazed plate heat exchanger.

The secret is AlfaFusion, a unique bonding technology patented by Alfa Laval. Resulting in the world's first fusion-bonded plate heat exchanger, AlfaFusion has stunned specialists in the brazing field.

AlfaNova is a new class of plate heat exchangers, available only from Alfa Laval.

AlfaNova takes heat-transfer technology to the extreme

100% stainless steel

AlfaNova consists of a number of corrugated stainless steel plates, a frame plate, a pressure plate and connections – all in stainless steel of type 316. All components are bonded together by AlfaFusion, a new technology patented by Alfa Laval.

The result is the fusion-bonded plate heat exchanger, a whole new class offering extremely high mechanical strength.

It is also hygienic, corrosion-resistant and fully recyclable.

Unbeatable reliability
Years of research and testing have confirmed AlfaNova's high mechanical strength and unbeatable reliability.

The AlfaFusion technology creates a plate heat exchanger with possibilities to go much higher in temperature than conventional brazed units.

Its 100% stainless-steel design allows AlfaNova to withstand temperatures of up to 550°C (1,020°F).

Corrosion-resistant
The AlfaNova's pure stainless-steel design also ensures high resistance to corrosion.

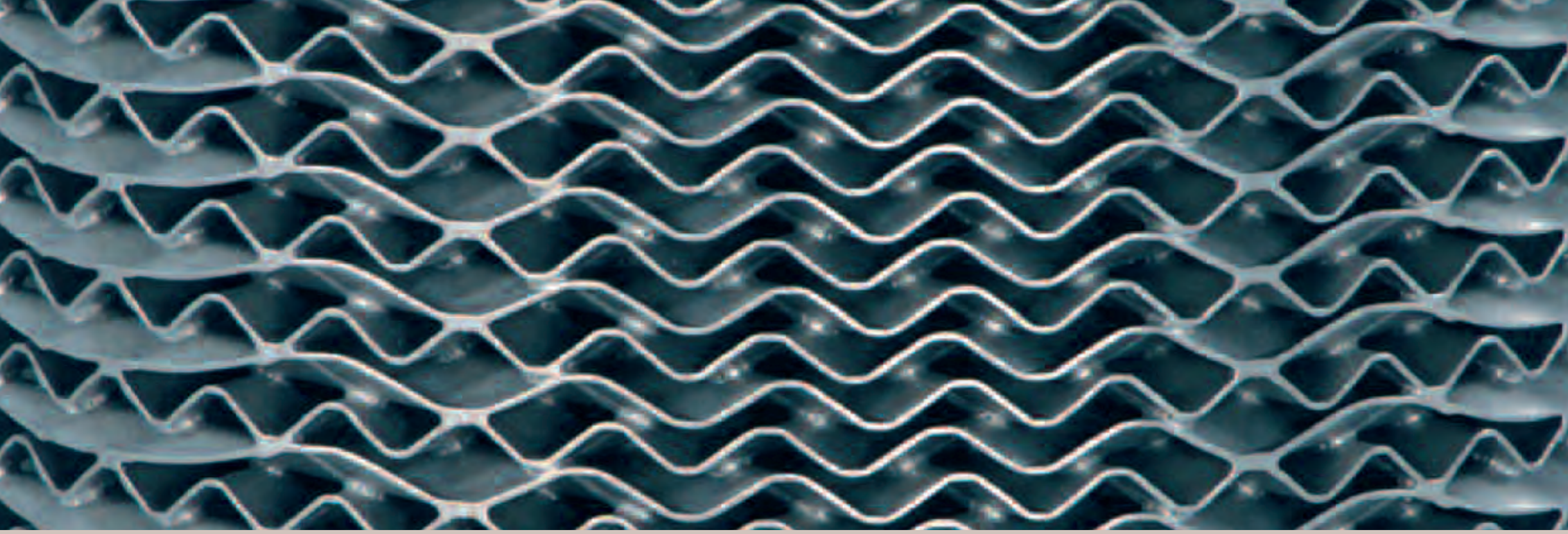
Thus, it represents a major breakthrough for refrigeration system builders using natural refrigerants such as ammonia.

It is also the perfect choice for district heating installations in areas with corrosive water or applications utilizing corrosive liquids.

Maximum purity
Purity is the subject of increasingly stringent legislation in many countries.

Applications affected are clean-water chillers in refrigeration systems, tap water heating systems, and a long list of other hygienic areas.

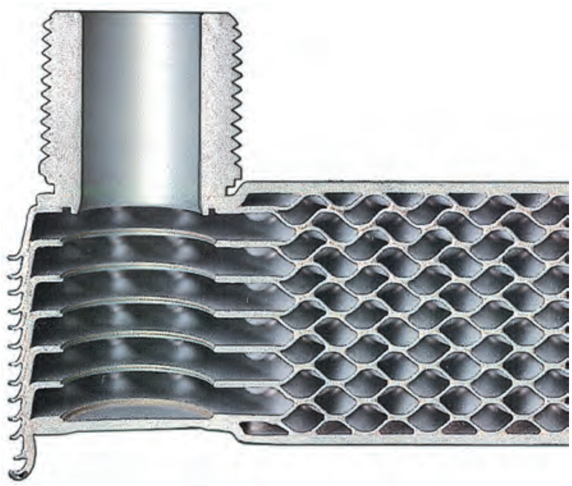
For these applications, the 100% stainless-steel AlfaNova, with its clean, hygienic heat-transfer channels and high mechanical strength, will be the heat exchanger of the future, challenging other types of heat exchangers.



Three different technologies...

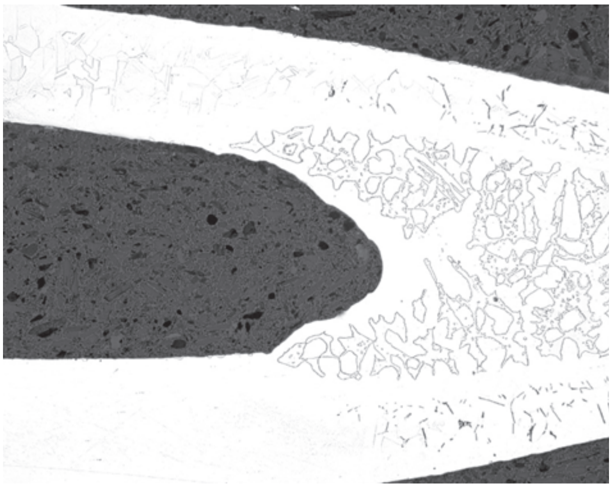
AlfaFusion

Patented by Alfa Laval, AlfaFusion™ is a peak-performance, one-material process that results in an all-stainless steel, fusion-bonded plate heat exchanger.

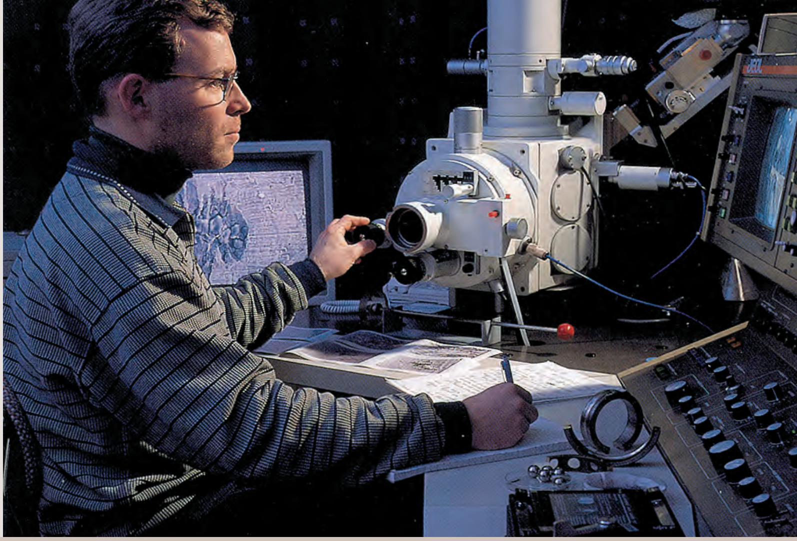


The result is closer to welding than brazing. It is based on Alfa Laval´s new, revolutionary technology, AlfaFusion, the art of joining stainless-steel components together. The two stainless-steel components melt in the contact points between the corrugated plates, and a fusion zone is created.

This zone is also stainless steel and has properties similar to the plates in terms of corrosion resistance and durability. Success lies in precise temperature control to achieve the correct melting depth and to avoid melting through the plates.

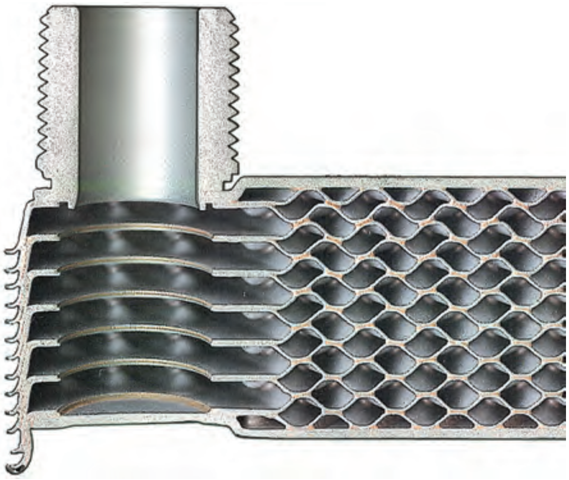


Due to the properties of the fusion zone, AlfaFusion gives a homogenous plate heat exchanger with a high level of corrosion resistance and higher resistance to mechanical and thermal fatigue than other technologies.



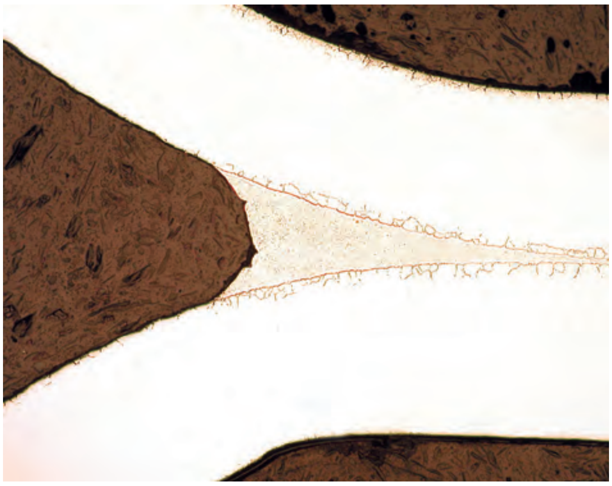
Traditional copper brazing

A two-material process, copper brazing is an efficient, cost-effective method of manufacturing plate heat exchangers.



It involves using copper filler to join stainless steel plates together by brazing them in a furnace.
At the contact points between the corrugated plates, a thin layer of copper is melted at high temperature.
Since copper has good capillary action, i.e., good capability to wet the plate and fill crevices, the filler gathers where the plates have contact, thus sealing and strengthening the plate pack.
Although copper brazing causes adhesion between the copper and the stainless steel, there is no surface reaction between the materials.

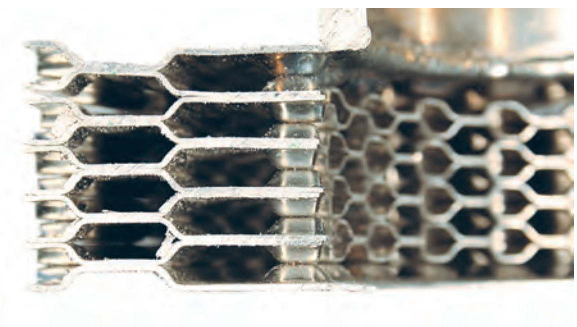
The combination of stainless steel and copper offers good ductility.

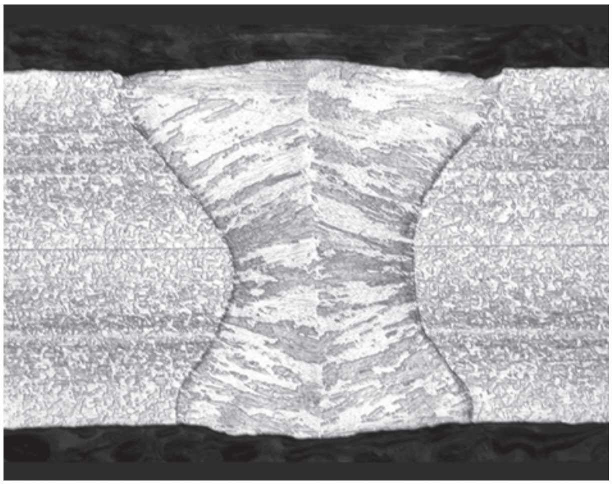


Under pressure, substantial material deformation can occur before splitting occurs.
The build-up of stress in the material causes it to change direction, thus relieving the mechanical load.
While copper brazing results in a high-quality plate heat exchanger, the brazing process must be carefully controlled, as copper may otherwise penetrate the stainless steel.
This results in liquid metal embrittlement, a known metallurgical phenomenon which reduces the strength of the heat exchanger.

Laser welding

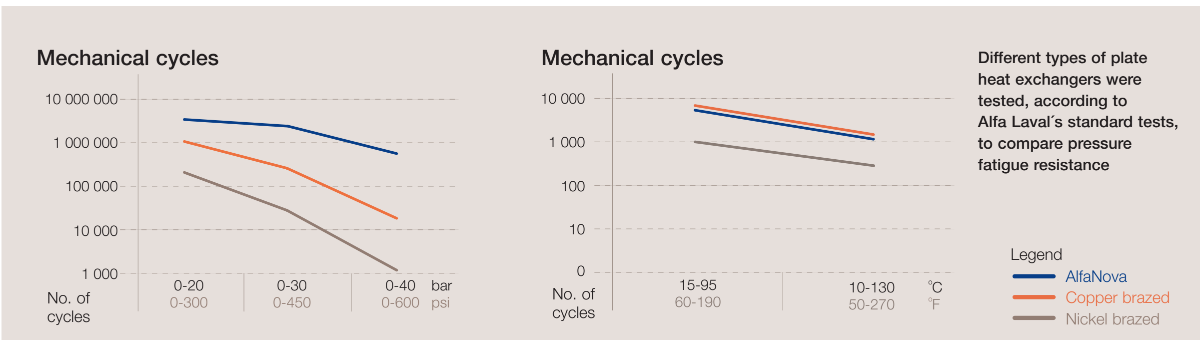
Laser welding is an effective method of joining stainless steel plates together in the manufacture of plate heat exchangers.





During the process, the corrugated stainless-steel plates are placed against each other and a laser is used to melt the material at the points of contact. As the stainless steel hardens there is diffusion of the metal on the plate surfaces. Since the stainless steel has gained a different micro-structure orientation during hardening, the resulting joints may be different in appearance. However, they possess the same properties as the rest of the plate material in terms of ductility and corrosion resistance.

A fully welded heat exchanger has good mechanical properties and can comfortably withstand high temperature, high pressure and aggressive media. A disadvantage is that it is sometimes necessary to adapt the design of the product to the limitations of the welding technique. It is also an expensive method. The process must take place in an inert atmosphere, otherwise it will react with the oxygen in the air, resulting in less successful welds. The equipment required for the process is also expensive.

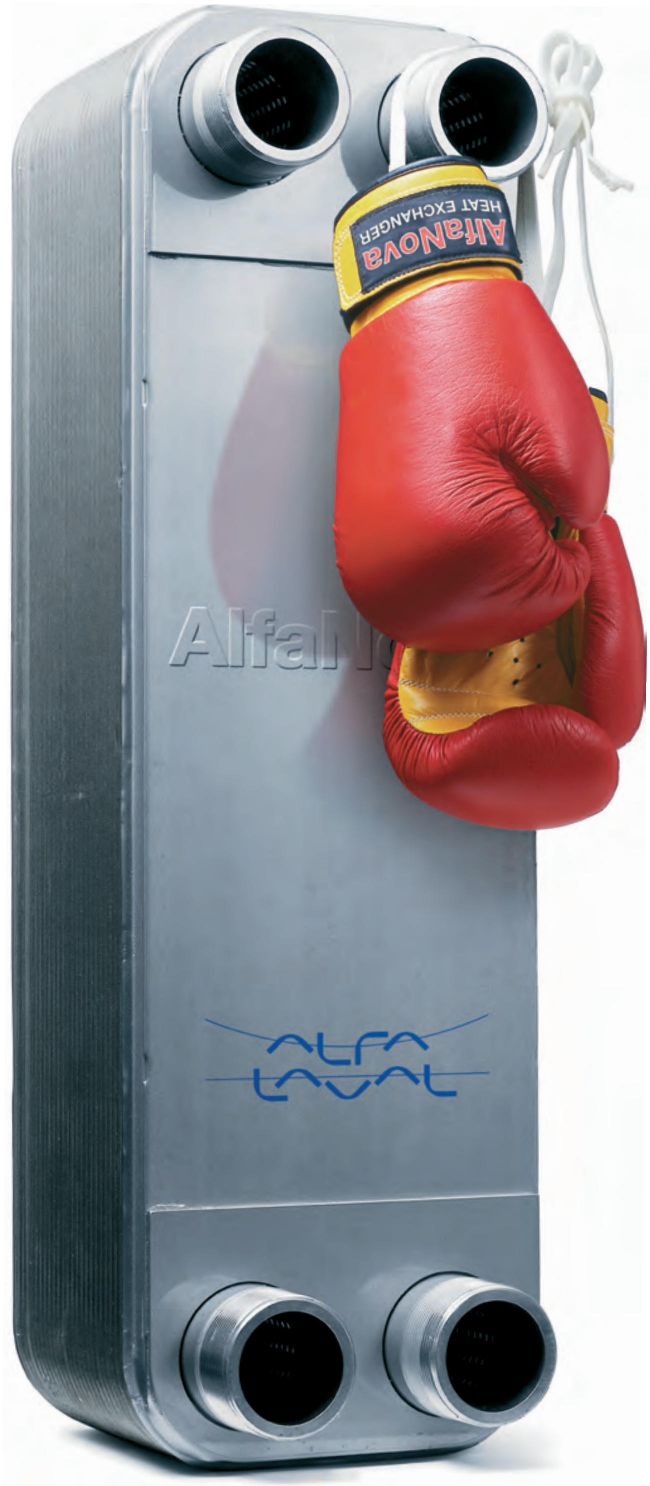


Applications

Tap water heating
The copper-free AlfaNova is the perfect solution for builders of tap-water heating systems striving to comply with increasingly stringent hygiene legislation.

District heating
The fusion-brazed, all-steel AlfaNova will easily withstand the high temperatures and pressures that are common in district-heating networks.

100% stainless steel
Due to its high level of corrosion resistance, AlfaNova is a major breakthrough for builders of modules for district-heating substations in areas with corrosive water.



Technical specifications

Fusion-bonded plate heat exchangers, data and dimensions

	AlfaNova 14	AlfaNova 27	AlfaNova 52	AlfaNova 76	AlfaNova 400
Channel type	H	H, L	H, L	H, A, E, L	H, L
Max./min. design temperature (°C)	160/-175	160/-175	160/-175	160/-175	160/-175
Max. design pressure S3-S4/S1-S2 (bar) *)	21/21	27/22	27/22	27/22	17/17
Volume/channel (litres)	0.02	0.05	0.095	0.25[1]/0.25	0.74
Max. flowrate (m^3/h) **)	4.6	14	14	37	200
Height, a (mm)	207	310	526	618	990
Width, b (mm)	77	111	111	191	390
Vertical connection distance, c (mm)	172	250	466	519	825
Horizontal connection distance, d (mm)	42	50	50	92	225
Plate pack length, A (mm)	n x 2.48 + 8	(n x 2.42) + 11	(n x 2.48) + 11	(n x 2.85) + 11***	(n x 2.65) + 14
Weight empty (kg)	(n x 0,07) + 0.4	(n x 0.13) + 1	(n x 0.22) + 1.9	(n x 0.49) + 8	(n x 1.4) + 22
Standard connection, external thread (in)	3/4"	1 1/4"/1"	1 1/4"/1"	2"	4"
Plate material	Stainless steel	Stainless steel	Stainless steel	Stainless steel	Stainless steel
Connection material	Stainless steel	Stainless steel	Stainless steel	Stainless steel	Stainless steel
Bounding material	Stainless steel	Stainless steel	Stainless steel	Stainless steel	Stainless steel
Max. number of plates	50	100	150	150	270
Radiator heating, capacity (kW)[2]	90	400	500	1200	3300
Tap water heating, capacity (kW)[3]	60	180	380	700	2700

*) According to PED **) Water at 5 m/s (connection velocity) ***) H-channel n=number of plates
1) E channel 0.18/0.18; A channel 0.18/0.25
2) Varies from country to country depending on temperature duty. Given values are for typical district heating installations.
3) Valid for H-plate

AlfaNova plate heat exchangers range

AlfaNova 14	AlfaNova 27	AlfaNova 52	AlfaNova 76
Read all about it on page 8:9	Read all about it on page 8:11	Read all about it on page 8:13	Read all about it on page 8:15
			

AlfaNova 400
Read all about it on page 8:19


AlfaNova 14

Fusion plate heat exchanger

General information
AlfaNova is a plate heat exchanger made of 100% stainless steel. It is based on Alfa Laval's new revolutionary technology, AlfaFusion, the art of joining stainless steel components together.

AlfaNova heat exchangers are well suited in applications which put high demand on cleanliness, applications where ammonia is used or applications where copper or nickel contamination is not accepted. Its high resistance to corrosion makes it both hygienic and environmental friendly.

It is extremely compact compared to its capacity to withstand great strains in demanding heat transfer applications.

Applications

Within refrigeration:
- Oil cooler
- Condenser
- Economizer
- Desuperheater
- Absorption systems

Other main applications:
- Domestic hot water heater
- Process cooling
- Hydraulic oil cooling
- Laser cooling
- Hygienic/sanitary application
- Water/water cooling & heating

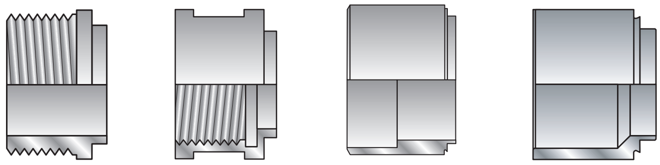
Working principles
The heating surface consists of thin corrugated metal plates stacked on top of each other. Channels are formed between the plates and corner ports are arranged so that the two media flow through alternate channels, always in counter-current flow. The media are kept in the unit by a bonded seal around the edge of the plates. The contact points of the plates are also bonded to withstand the pressure of the media handled.

Standard design
The plate pack is covered by cover plates. Connections are located in the front or rear cover plate. The channel plates are corrugated to improve heat transfer design.

Particulars required for quotation
To enable Alfa Laval's representative to make a specific quotation, enquiries should be accompanied by the following particulars:

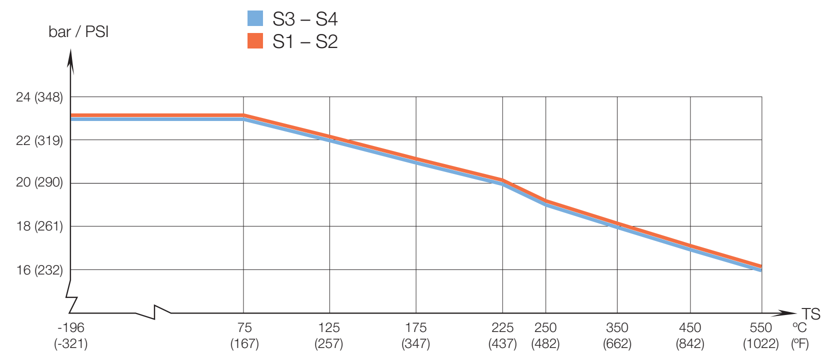
– flow rates or heat load required
– temperature program
– physical properties of liquids in question
– desired working pressure
– maximum permitted pressure drop

Examples of connections

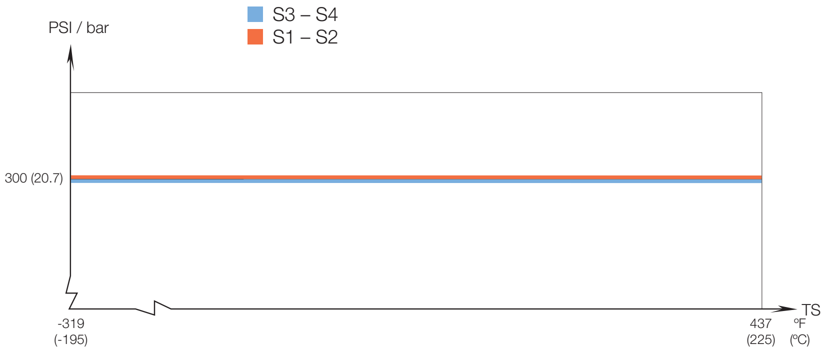


Outside threaded | Inside threaded | Soldering | Welding

AlfaNova 14 – PED approval pressure/temperature graph*



AlfaNova 14 - UL approved pressure/temperature graph*



* For exact values please contact your local Alfa Laval representative.

Standard dimensions*

A measure mm	=	8 + (n x 2.35) ± 3
A measure inch	=	0.31 + (n x 0.093) ± 0.12
Weight kg	=	0.74 + (n x 0.046)
Weight lb	=	1.63 + (n x 0.10)

(n = number of plates)

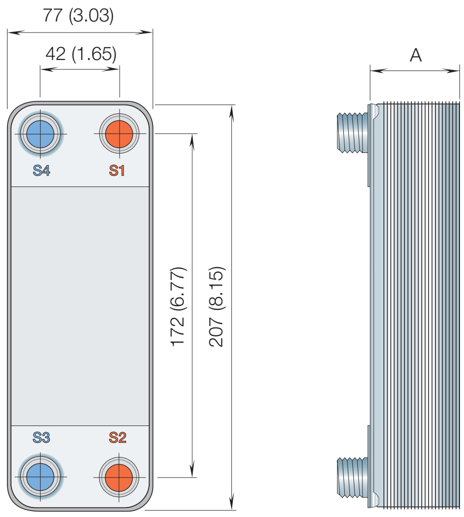
Standard data

Min. working temperature	see graph
Max. working temperature	see graph
Min. working pressure	vacuum
Max. working pressure	see graph
Volume per channel, litres (ga)	0.02 (0.0053)
Max particle size mm (inch)	1.2 (0.05)
Max flowrate* m^3/h (gpm)	4.5 (20)
Min no of plates	4
Max no of plates	50

*) Water at 5 m/s (16.4 ft/s) (connection velocity)

Standard materials

Cover plates	Stainless steel
Connections	Stainless steel
Plates	Stainless steel
AlfaFusion filler	Stainless steel



How to contact Alfa Laval
Up-to-date Alfa Laval contact details for all countries are always available on our website at www.alfalaval.com.

AlfaNova 27 / AlfaNova HP 27

Fusion plate heat exchanger

General information

AlfaNova is a plate heat exchanger made of 100% stainless steel. It is based on Alfa Laval's new revolutionary technology, AlfaFusion, the art of joining stainless steel components together.

AlfaNova heat exchangers are well suited in applications which put high demand on cleanliness, applications where ammonia is used or applications where copper or nickel contamination is not accepted. Its high resistance to corrosion makes it both hygienic and environmental friendly.

It is extremely compact compared to its capacity to withstand great strains in demanding heat transfer applications.

Applications

Within refrigeration:
- Oil cooler
- Condenser
- Evaporator
- Economizer
- Desuperheater
- Absorption systems

Other main applications:
- Domestic hot water heater
- Process cooling
- Hydraulic oil cooling
- Laser cooling
- Hygienic/sanitary application
- Water/water cooling & heating

Working principles

The heating surface consists of thin corrugated metal plates stacked on top of each other. Channels are formed between the plates and corner ports are arranged so that the two media flow through alternate channels, always in counter-current flow. The media are kept in the unit by a bonded seal around the edge of the plates. The contact points of the plates are also bonded to withstand the pressure of the media handled.

Standard design

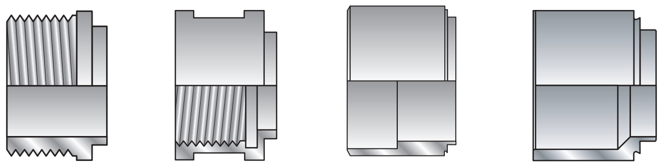
The plate pack is covered by cover plates. Connections are located in the front or rear cover plate. The channel plates are corrugated to improve heat transfer design.

Particulars required for quotation

To enable Alfa Laval's representative to make a specific quotation, enquiries should be accompanied by the following particulars:

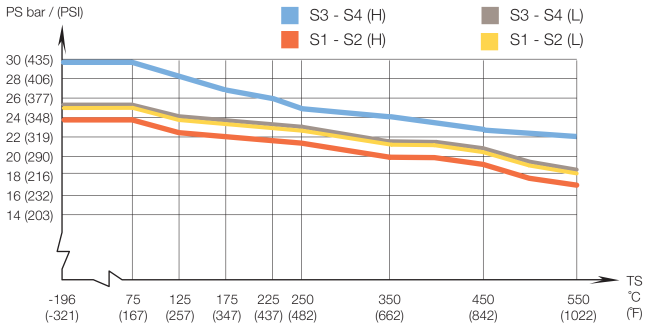
– flow rates or heat load required
– temperature program
– physical properties of liquids in question
– desired working pressure
– maximum permitted pressure drop

Examples of connections



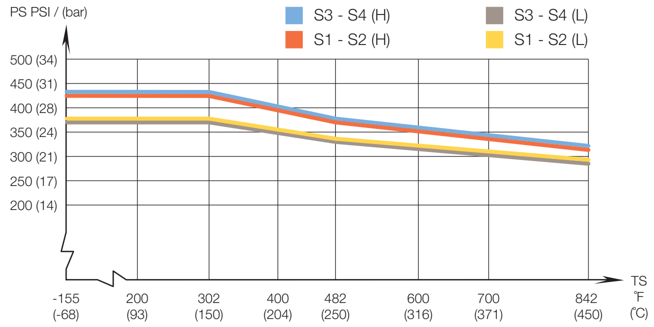
Outside threaded | Inside threaded | Soldering | Welding

AlfaNova 27 – PED approval pressure/temperature graph*



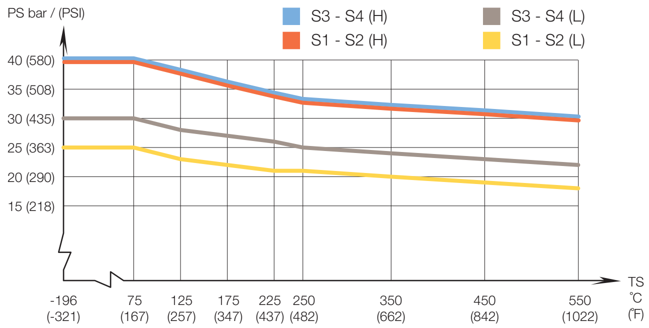
Min temperature -10 °C (14 °F) with connection tube made of carbon steel.

AlfaNova 27 - ASME approval prerssure/temperature graph*



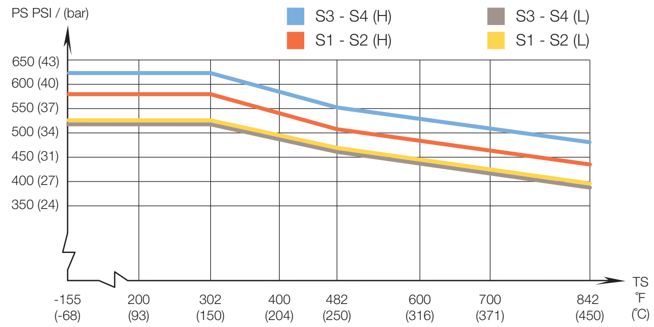
Min temperature -49 °F (-45 °C) with connection tube made of carbon steel.

AlfaNova HP27 – PED approval pressure/temperature graph*



Min temperature -10 °C (14 °F) with connection tube made of carbon steel.

AlfaNova HP27 - ASME approval pressure/temperature graph*



Min temperature -49 °F (-45 °C) with connection tube made of carbon steel.

* For exact values please contact your Alfa Laval representative.

Standard data

Min. working temperature	see graph
Max. working temperature	see graph
Min. working pressure	Vacuum
Max. working pressure	see graph
Volume per channel H, L, litres (ga)	0.05 (0.01)
Max particle size mm (inch)	1.2 (0.05)
Max. flowrate * m³/h (gpm)	7.5 (33)
Min no of plates	6
Max no of plates	100

*) Water at 5 m/s (16.4 ft/s) (connection velocity)

Standard materials

Cover plates	Stainless steel
Connections	Stainless steel
Plates	Stainless steel
AlfaFusion filler	Stainless steel

Standard dimensions*

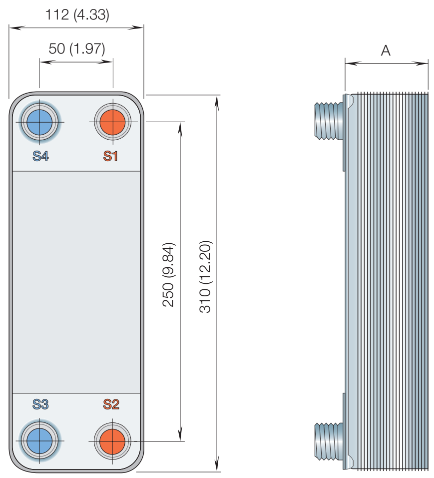
AlfaNova 27

A measure mm	=	11 + (n x 2.42) ± 4.5
A measure inch	=	0.43 + (n x 0.095) ± 0.18
Weight kg	=	1 + (n x 0.13)
Weight lb	=	2.2 + (n x 0.29)

AlfaNova 27 HP

A measure mm	=	13 + (n x 2.42) ± 4.5
A measure inch	=	0.51 + (n x 0.095) ± 0.18
Weight kg	=	1.5 + (n x 0.13)
Weight lb	=	3.3 + (n x 0.29)

(n = number of plates)



How to contact Alfa Laval
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AlfaNova 52 / AlfaNova HP 52

Fusion plate heat exchanger

General information

AlfaNova is a plate heat exchanger made of 100% stainless steel. It is based on Alfa Laval's new revolutionary technology, AlfaFusion, the art of joining stainless steel components together.

AlfaNova heat exchangers are well suited in applications which put high demand on cleanliness, applications where ammonia is used or applications where copper or nickel contamination is not accepted. Its high resistance to corrosion makes it both hygienic and environmental friendly.

It is extremely compact compared to its capacity to withstand great strains in demanding heat transfer applications.

Applications

Within refrigeration:
- Oil cooler
- Condenser
- Evaporator
- Economizer
- Desuperheater
- Absorption systems

Other main applications:
- Domestic hot water heater
- Process cooling
- Hydraulic oil cooling
- Laser cooling
- Hygienic/sanitary
- Water/water cooling & heating

Working principles

The heating surface consists of thin corrugated metal plates stacked on top of each other. Channels are formed between the plates and corner ports are arranged so that the two media flow through alternate channels, always in counter-current flow. The media are kept in the unit by a bonded seal around the edge of the plates. The contact points of the plates are also bonded to withstand the pressure of the media handled.

Standard design

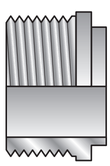
The plate pack is covered by cover plates. Connections are located in the front or rear cover plate. The channel plates are corrugated to improve heat transfer design.

Particulars required for quotation

To enable Alfa Laval's representative to make a specific quotation, enquiries should be accompanied by the following particulars:

– flow rates or heat load required
– temperature program
– physical properties of liquids in question
– desired working pressure
– maximum permitted pressure drop

Examples of connections



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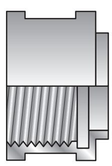
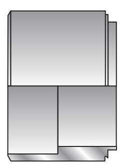
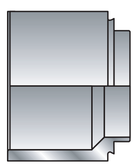


Inside threaded

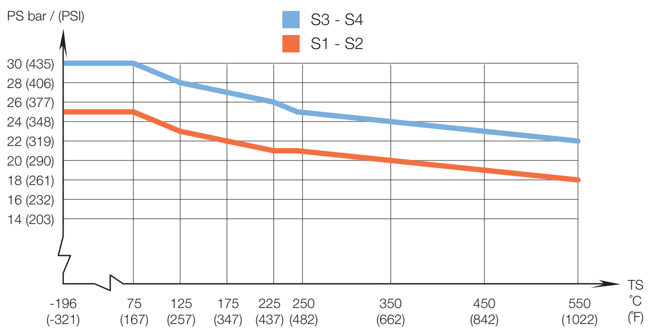


Soldering



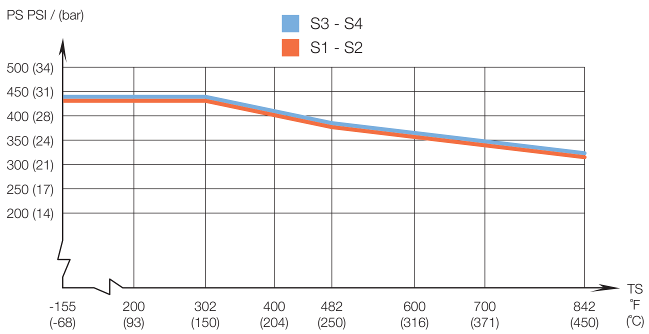
Welding

AlfaNova 52 – PED approval pressure/temperature graph*



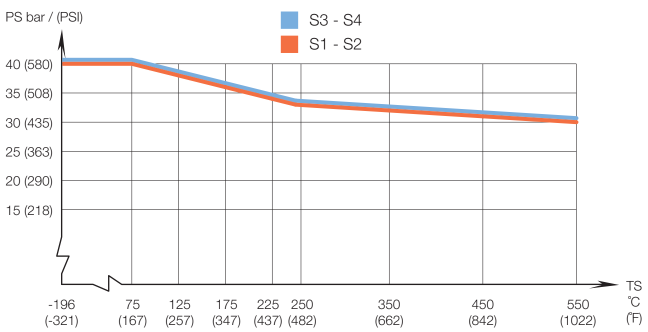
Min temperature -10 °C (14 °F) with connection tube made of carbon steel.

AlfaNova 52 – ASME approval prerssure/temperature graph*



Min temperature -49 °F (-45 °C) with connection tube made of carbon steel.

AlfaNova HP 52 – PED approval pressure/temperature graph*



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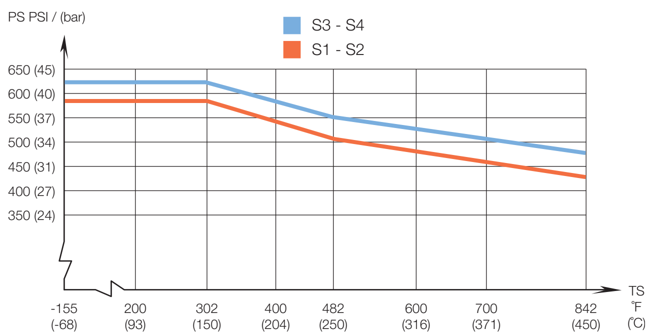
AlfaNova HP 52 – ASME approval pressure/temperature graph*



Min temperature -49 °F (-45 °C) with connection tube made of carbon steel.

* For exact values please contact your local Alfa Laval representative.

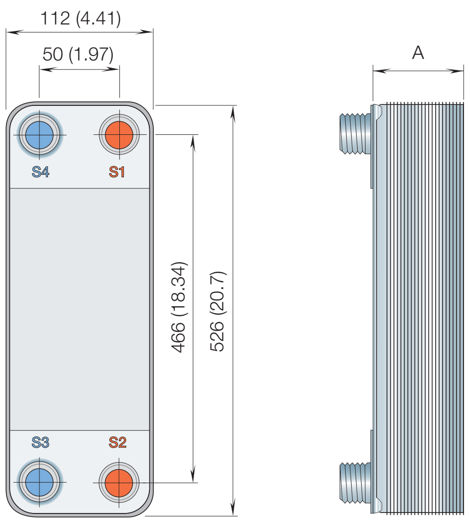
Standard data

Min. working temperature	see graph
Max. working temperature	see graph
Min. working pressure	Vacuum
Max. working pressure	see graph
Volume per channel H, L, litres (ga)	0.095 (0.025)
Max particle size mm (inch)	1.2 (0.05)
Max. flowrate * m^3/h (gpm)	14.5 (64)
Min no of plates	6
Max no of plates	150

*) Water at 5 m/s (16.4 ft/s) (connection velocity)

Standard materials

Cover plates	Stainless steel
Connections	Stainless steel
Plates	Stainless steel
AlfaFusion filler	Stainless steel



Standard dimensions*

AlfaNova 52

A measure mm = 11 + (n x 2.48) ± 4.5
A measure inch = 0.43 + (n x 0.098) ± 0.18
Weight kg = 1.9 + (n x 0.22)
Weight lb = 4.19 + (n x 0.48)

AlfaNova 52 HP

A measure mm = 13 + (n x 2.48) ± 4.5
A measure inch = 0.51 + (n x 0.098) ± 0.18
Weight kg = 2.3 + (n x 0.22)
Weight lb = 5.07 + (n x 0.49)

(n = number of plates)

How to contact Alfa Laval
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AlfaNova 76 / AlfaNova HP 76

Fusion plate heat exchanger

General information

AlfaNova is a plate heat exchanger made of 100% stainless steel. It is based on Alfa Laval's new revolutionary technology, AlfaFusion, the art of joining stainless steel components together.

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It is extremely compact compared to its capacity to withstand great strains in demanding heat transfer applications.

Applications

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- Condenser
- Evaporator
- Economizer
- Desuperheater
- Absorption systems

Other main applications:
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- Process cooling
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- Laser cooling
- Hygienic/sanitary
- Water/water cooling & heating

Working principles

The heating surface consists of thin corrugated metal plates stacked on top of each other. Channels are formed between the plates and corner ports are arranged so that the two media flow through alternate channels, always in counter-current flow. The media are kept in the unit by a bonded seal around the edge of the plates. The contact points of the plates are also bonded to withstand the pressure of the media handled.

Standard design

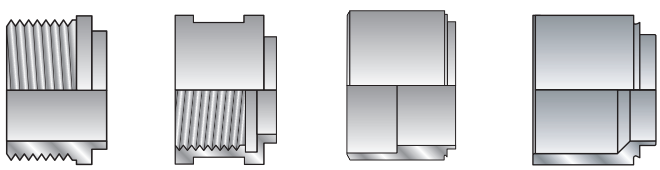
The plate pack is covered by cover plates. Connections are located in the front or rear cover plate. The channel plates are corrugated to improve heat transfer design.

Particulars required for quotation

To enable Alfa Laval's representative to make a specific quotation, enquiries should be accompanied by the following particulars:

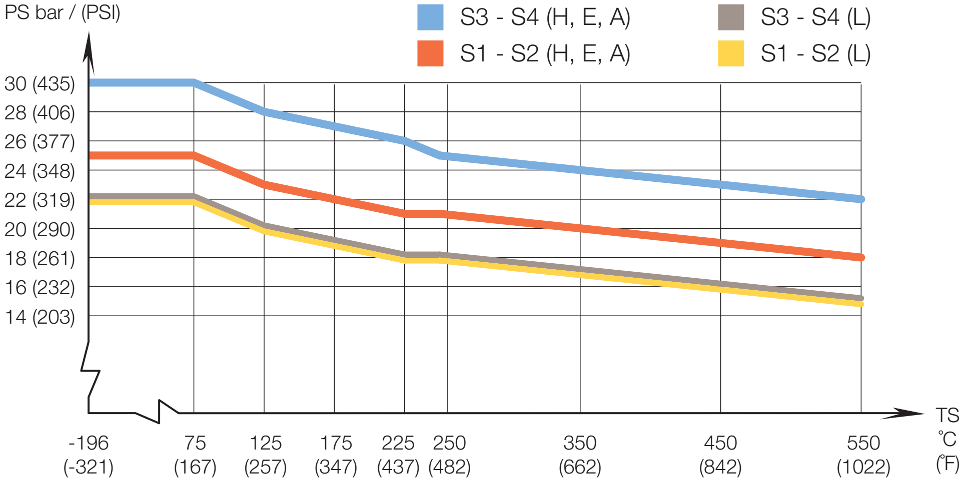
– flow rates or heat load required
– temperature program
– physical properties of liquids in question
– desired working pressure
– maximum permitted pressure drop

Examples of connections



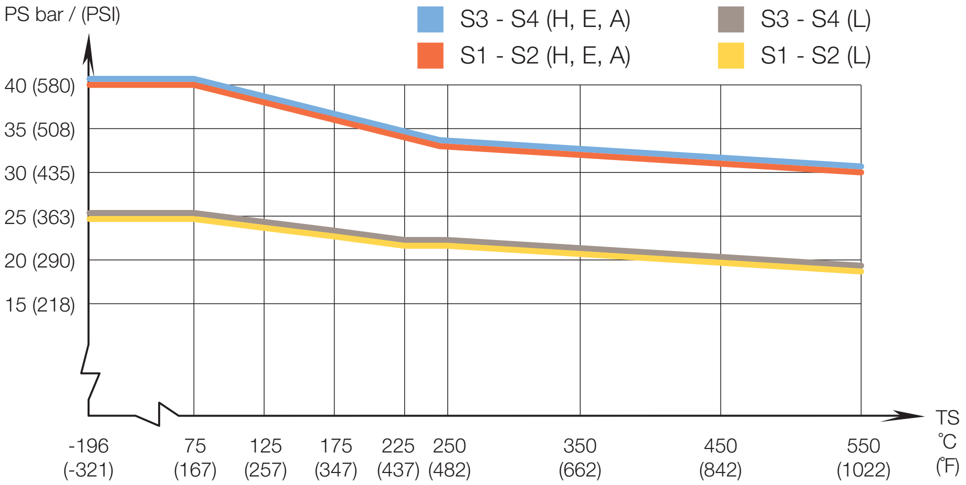
Outside threaded | Inside threaded | Soldering | Welding

AlfaNova 76 – PED approval pressure/temperature graph*



Min temperature -10 °C (14 °F) with connection tube made of carbon steel.

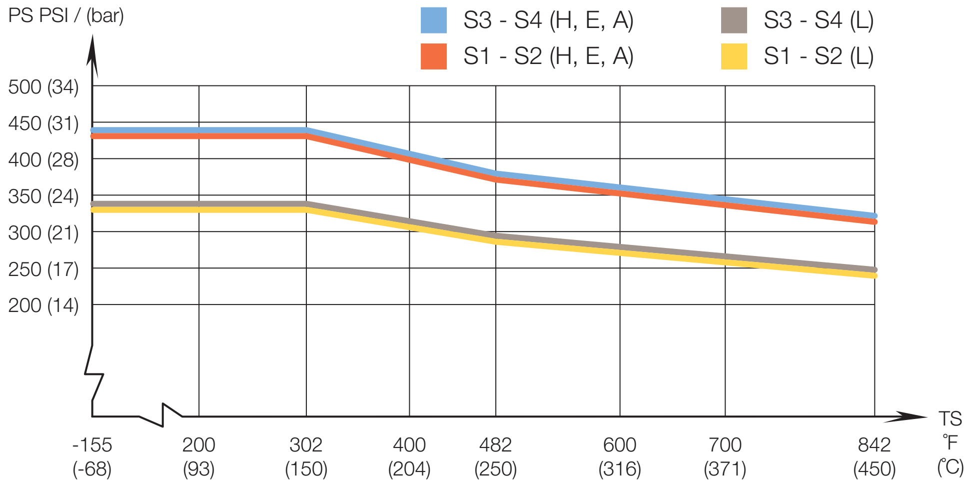
AlfaNova HP 76 – PED approval pressure/temperature graph*



Min temperature -10 °C (14 °F) with connection tube made of carbon steel.

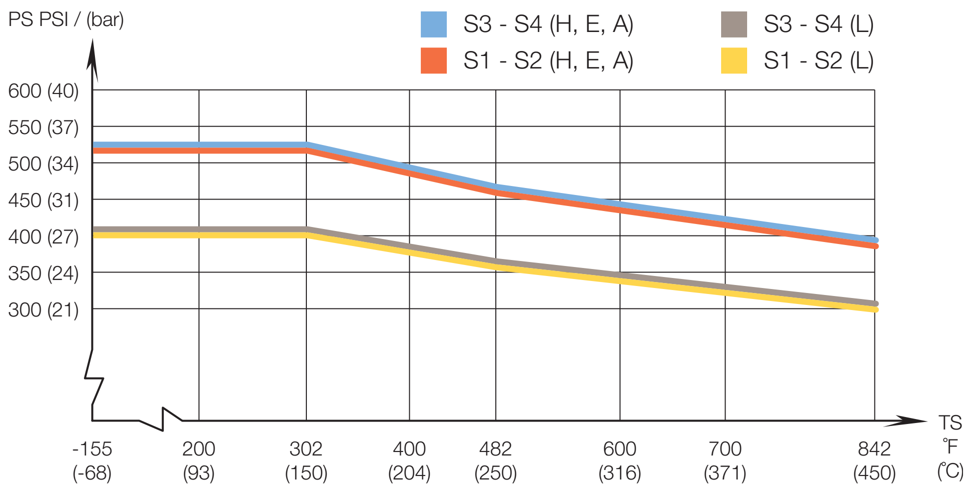
* For exact values please contact your local Alfa Laval representative.

AlfaNova 76 – ASME approval prerssure/temperature graph*



Min temperature -49 °F (-45 °C) with connection tube made of carbon steel.

AlfaNova HP 76 – ASME approval pressure/temperature graph*



Min temperature -49 °F (-45 °C) with connection tube made of carbon steel.

* For exact values please contact your local Alfa Laval representative.

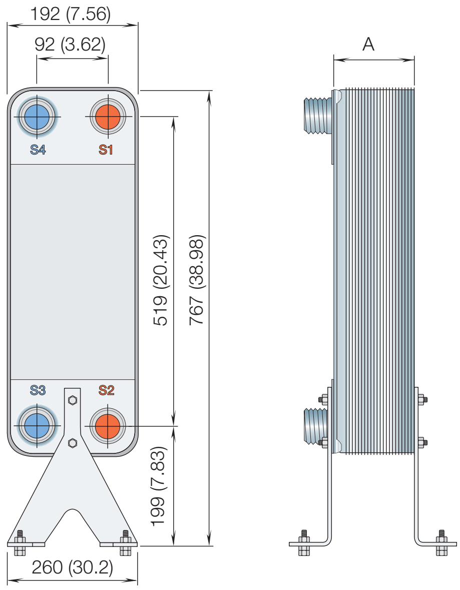
Standard data

Min. working temperature	see graph
Max. working temperature	see graph
Min. working pressure	Vacuum
Max. working pressure	see graph
Volume per channel A, H, L, litres (ga)	0.25 (0.07)
Volume per channel E, litres (ga)	0.18 (0.05)
Max particle size, mm (inch)	1.2 (0.047)
Max. flowrate* m^3/h (gpm)	34 (150)
Min no of plates	10
Max no of plates	150

*) Water at 5 m/s (16.4 ft/s) (connection velocity)

Standard materials

Cover plates	Stainless steel
Connections	Stainless steel
Plates	Stainless steel
AlfaFusion filler	Stainless steel



Standard dimensions

AlfaNova 76

H, L channels	A measure mm = 11 + (n x 2.85) ± 5
	A measure inch = 0.43 + (n x 0.11) ± 0.2
A channel	A measure mm = 11 + (n x 2.56) ± 5
	A measure inch = 0.43 + (n x 0.10) ± 0.2
E channel	A measure mm = 11 + (n x 2.29) ± 5
	A measure inch = 0.43 + (n x 0.09) ± 0.2

H, A, E channels	weight kg = 8 + (n x 0.49)
	weight lb = 17.6 + (n x 1.08)
L channels	weight kg = 8 + (n x 0.42)
	weight lb = 17.6 + (n x 0.93)

AlfaNova HP 76

H channel	A measure mm = 15 + (n x 2.85) ± 5
	A measure inch = 0.59 + (n x 0.11) ± 0.2
A channel	A measure mm = 15 + (n x 2.56) ± 5
	A measure inch = 0.59 + (n x 0.10) ± 0.2
E channel	A measure mm = 15 + (n x 2.29) ± 5
	A measure inch = 0.59 + (n x 0.09) ± 0.2
L channel	A measure mm = 17 + (n x 2.85) ± 5
	A measure inch = 0.67 + (n x 0.11) ± 0.2

H, A, E channels	weight kg = 10 + (n x 0.49)
	weight lb = 22 + (n x 1.08)
L channel	weight kg = 10 + (n x 0.42)
	weight lb = 22 + (n x 0.93)

(n = number of plates)

How to contact Alfa Laval
Up-to-date Alfa Laval contact details for all countries are always available on our website at www.alfalaval.com.

AlfaNova 400 / AlfaNova HP 400

Fusion plate heat exchanger

General information

AlfaNova plate heat exchangers are made of 100% stainless steel. It is based on Alfa Laval's new revolutionary technology, AlfaFusion, the art of joining stainless steel components together.

AlfaNova heat exchangers are well suited in applications which put high demand on cleanliness, applications where ammonia is used or applications where copper or nickel contamination is not accepted. Its high resistance to corrosion makes it both hygienic and environmental friendly.

It is extremely compact compared to its capacity to withstand great strains in demanding heat transfer applications.

Applications

– Evaporators
– Economizers
– Absorption systems
– Process cooling/heating

Working principles

The heating surface consists of thin corrugated metal plates stacked on top of each other. Channels are formed between the plates and corner ports are arranged so that the two media flow through alternate channels, normally in counter-current flow. The media are kept in the unit by a bonded seal around the edge of the plates. The contact points of the plates are also bonded to withstand the pressure of the media handled.

Standard design

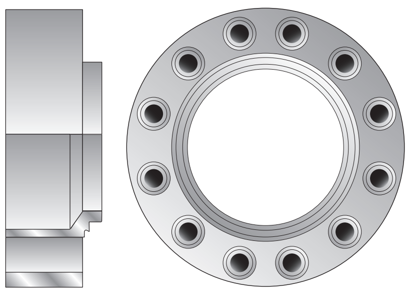
The plate pack is covered by cover plates. Connections are located in the front or rear cover plate. The channel plates are corrugated to improve heat transfer design.

Particulars required for quotation

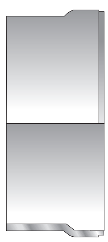
To enable Alfa Laval's representative to make a specific quotation, enquiries should be accompanied by the following particulars:

– flow rates or heat load required
– temperature program
– physical properties of liquids in question
– desired working pressure
– maximum permitted pressure drop

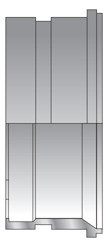
Examples of connections



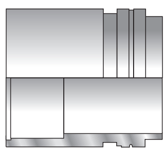
Compact flanges



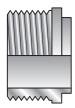
Welding



Clamp

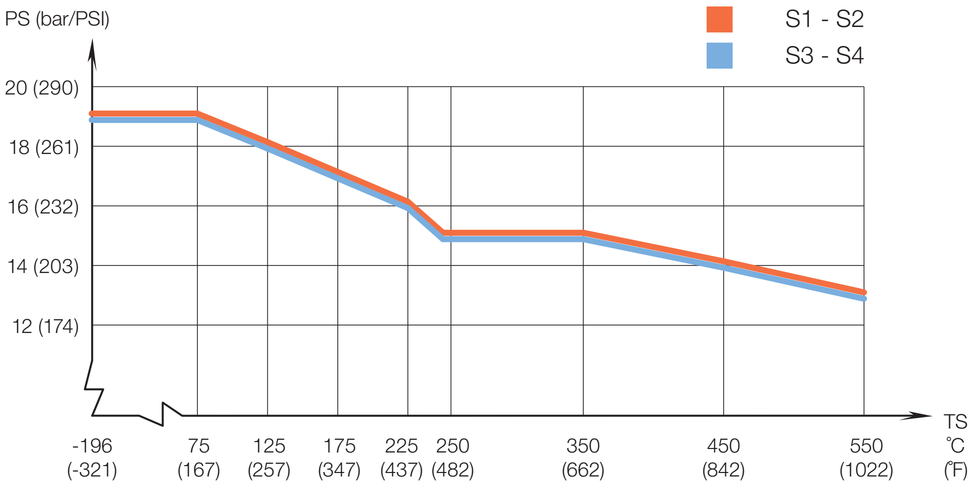


Soldering



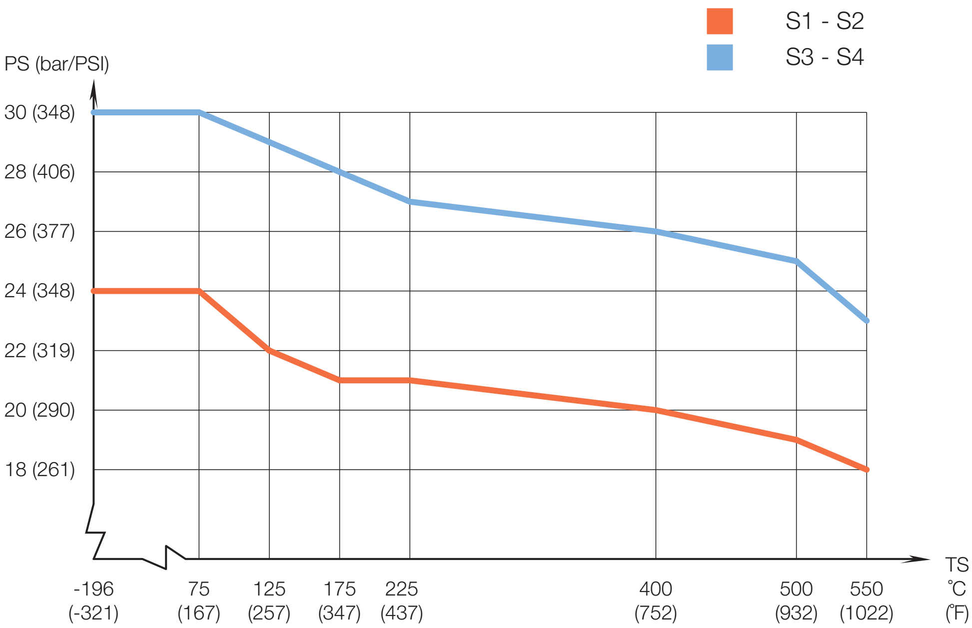
Outside threaded

AlfaNova 400 – PED approval pressure/temperature graph*



Min temperature -50 °C (-58 °F) with connection tubes made of carbon steel.

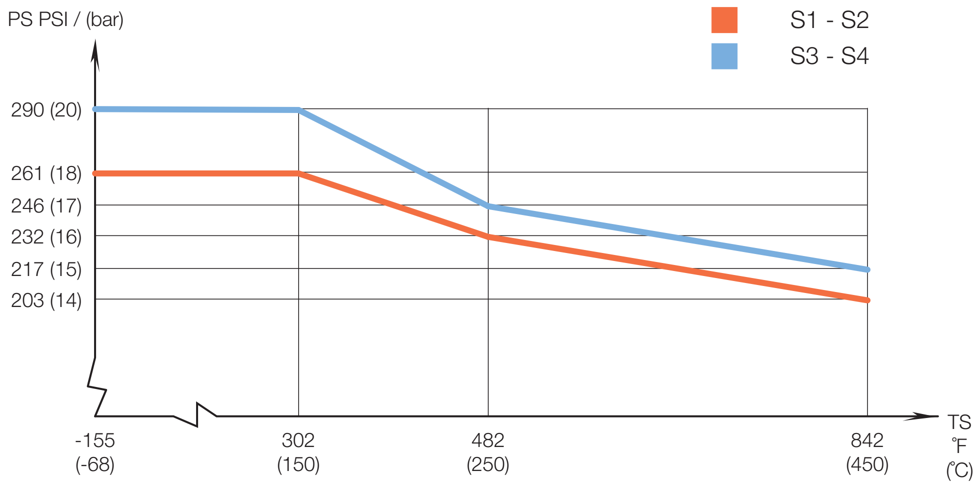
AlfaNova HP 400 – PED approval pressure/temperature graph*



Min temperature -50 °C (-58 °F) with connection tubes made of carbon steel.

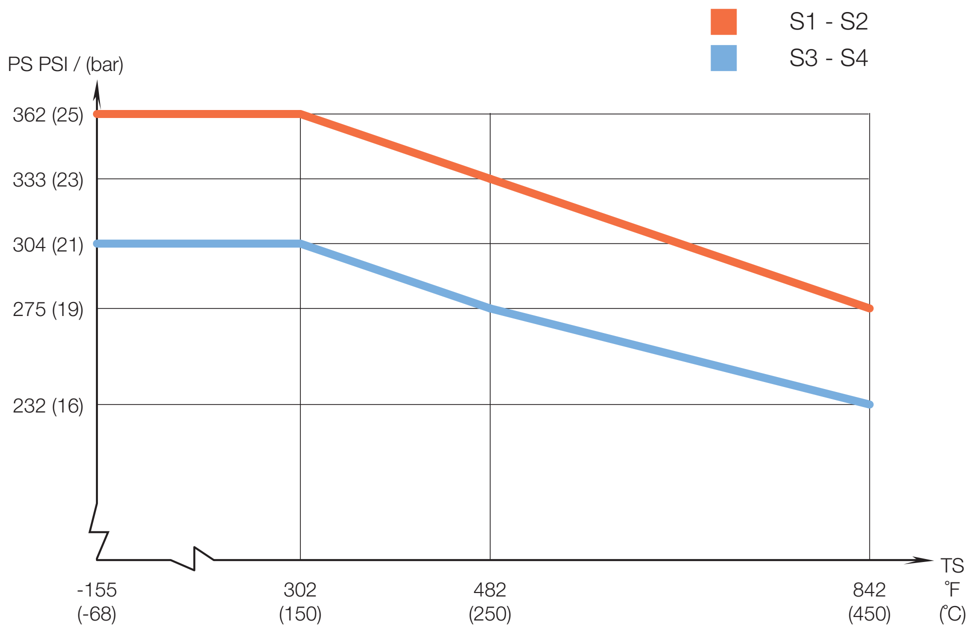
* For exact values please contact your local Alfa Laval representative.

AlfaNova 400 – ASME approval pressure/temperature graph*



Min temperature -49 ˚F (-45 ˚C) with connection tubes made of carbon steel.

AlfaNova HP 400 – ASME approval pressure/temperature graph*



Min temperature -49 ˚F (-45 ˚C) with connection tubes made of carbon steel.

* For exact values please contact your local Alfa Laval representative.

Standard data

Min. working temperature	see graph
Max. working temperature	see graph
Min. working pressure	Vacuum
Max. working pressure	see graph
Volume per channel, litres (ga)	0.74 (0.20)
Max. particle size mm (inch)	1.8 (0,07)
Max. flowrate * m^3/h (gpm)	170 (748)
Min no of plates	10
Max no of plates	270

*) Water at 5 m/s (16.4 ft/s) (connection velocity)

Standard materials

Cover plates	Stainless steel
Connections	Stainless steel
Plates	Stainless steel
AlfaFusion filler	Stainless steel

Standard dimensions

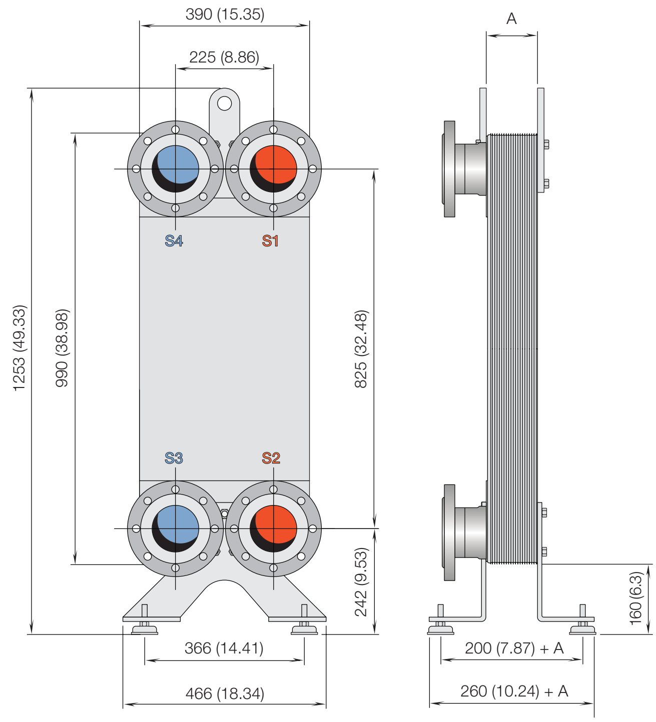
AlfaNova 400

A measure mm	=	14 + (n x 2.65) ± 10
A measure inch	=	0.55 + (n x 0.10) ± 0.4
Weight kg	=	62 + (n x 1.4)
Weight lb	=	136.7 + (n x 3.08)

AlfaNova HP 400

A measure mm	=	17 + (n x 2.65) ± 10
A measure inch	=	0.67 + (n x 0.10) ± 0.39
Weight kg	=	67 + (n x 1.4)
Weight lb	=	147.7 + (n x 3.08)

(n = number of plates)



Alfa Laval reserves the right to change specifications without prior notification.

How to contact Alfa Laval
Up-to-date Alfa Laval contact details for all countries are always available on our website at www.alfalaval.com.

Chapter 9

Heating and cooling systems

A holistic approach is the base of our system solution concept. The reason is clear and logical: in order to guarantee reliability, resource efficiency and performance in a system, all components must be designed to co-operate and they must have been thoroughly tested to ensure best possible performance in the application. Our system solutions are adapted to the specific needs of every application. They are customized in the true sense.

Alfa Laval has a unique, global experience when it comes to developing systems for heat transfer. We are also leading the ongoing development towards more cost-efficient heat exchangers. Therefore, we can offer customers unique, complete solutions.

All systems are certified according to ISO 9001. All components have been thoroughly tested with the most advanced test equipment available. Our customers can be sure to receive a reliable and cost-efficient system.

Heating and cooling systems range

Alfa Laval Micro DPC

Read all about it on page 9:5

Alfa Laval Micro RTC

Read all about it on page 9:9

Alfa Laval Micro STC

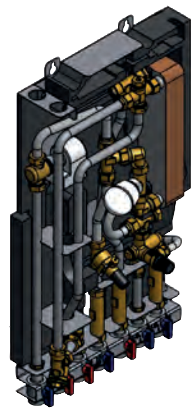
Read all about it on page 9:13

Alfa Laval Micro STC2

Read all about it on page 9:17

Alfa Laval Micro HTC

Read all about it on page 9:21

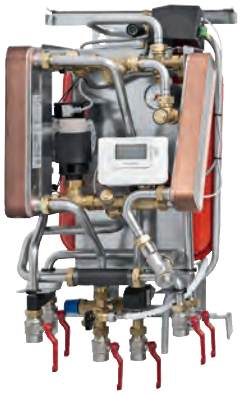


Mini City Indirect HTC

Read all about it on page 9:25

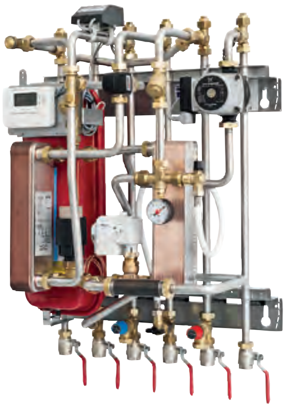
Mini City Indirect

Read all about it on page 9:29



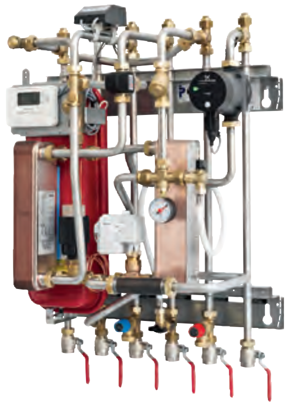
Mini

Read all about it on page 9:33



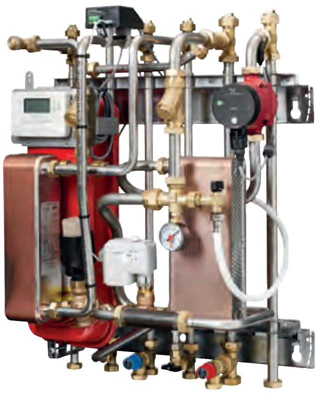
Mini ECO

Read all about it on page 9:37



Mini XL

Read all about it on page 9:41



Mini Plus

Read all about it on page 9:45

Alfa Laval Midi Wall

Read all about it on page 9:49

Midi Compact

Read all about it on page 9:53

Midi Compact IQHeat

Read all about it on page 9:57

Maxi

Read all about it on page 9:61

Maxi-IQHeat

Read all about it on page 9:65

Maxi C1

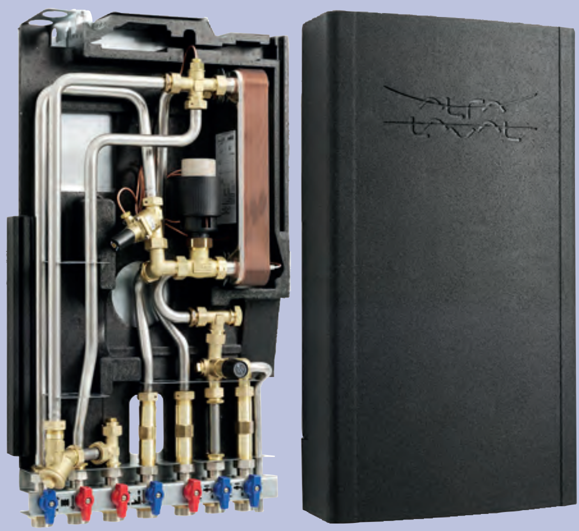
Read all about it on page 9:69

Maxi Cooling

Read all about it on page 9:73

Alfa Laval Micro DPC

Heating and domestic hot water substation for apartments and single family houses



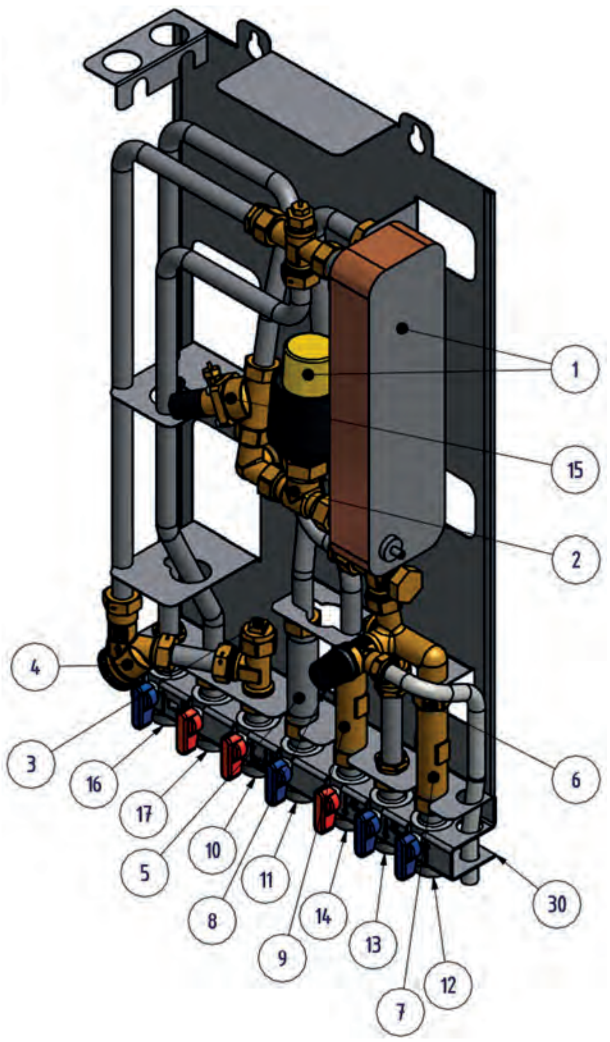
The Alfa Laval Micro DPC heating substation is installation-ready for complete central heating and hot water requirements. It is suitable for apartments and single family houses that are connected to a heating network. Alfa Laval has many years of experience in district heating technology, which is put to expert use in the Micro DPC, resulting in its practical function and ease of use. All components are easily accessible for inspection and future service when required.

High comfort
Micro DPC offers fully automatic temperature control for hot water. The hot water is heated by direct exchange with high capacity. This means that the hot water is always as fresh as the incoming cold water. The room temperature is regulated with the help of thermostatic radiator valves. Integral differential pressure regulation means that good comfort is maintained throughout the year in spite of variations in the pressure of the heating network..

Simple installation
Compact dimensions, light weight, well arranged plumbing and factory-complete internal wiring – all make installation very simple.

Micro DPC is mounted on an insulated frame and includes an insulated cover. Better insulation means less energy usage and better energy efficiency.

Long-term security
The Micro DPC represents the most modern technology, and provides the answer to stringent demands for longterm performance. The heat exchanger plates and all piping are manufactured in acid-resistant stainless steel. All components are closely matched and carefully tested for function in accordance with Alfa Laval's quality assurance system ISO 9001:2008. Micro DPC harmonizes with PED 97/23/EC.



Components
1. Heat exchanger and temperature controller for hot water
2. Control valve for hot water
3. Temperature sensor connection, heating media supply
4. Filter for heating media
5. Adapter for energy meter
6. Check valve for cold water
7. Adapter for Cold water flow meter
8. Safety valve for domestic hot water
9. Adapter for Hot water flow meter
10. Heating network media, supply
11. Heating network media, return
12. Cold water inlet (cw)
13. Cold water outlet (cw)
14. Hot water (hw)
15. Differential pressure controller
16. Heating circuit, return
17. Heating circuit, supply
30. First fix jig including shut-off valves (option)

Heating network – a good source of heat
A heating network is an efficient technology that meets the need for central heating and hot water in a simple, convenient and secure way.

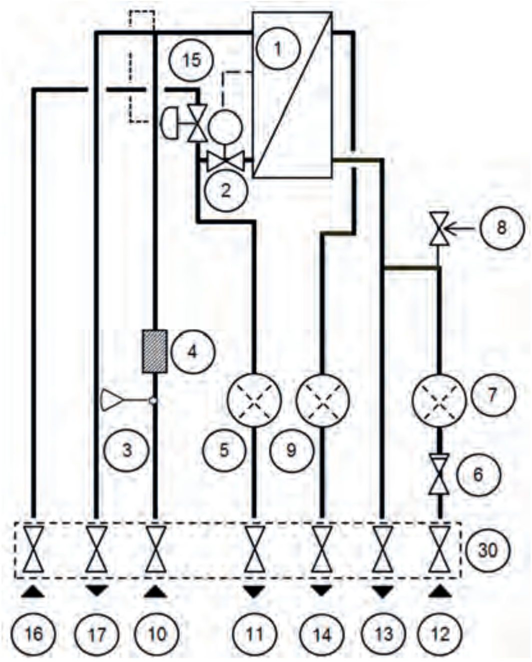
Operation
Micro DPC is used for the direct connection of apartments and single family houses to the heating network. With this kind of connection, the heating water from the heating network is used for heating the radiator system of the apartment or single family house.

A heat exchanger is used to transfer heat from the heating network medium to the hot water system. Heat is transferred through a package of thin, acid-resistant, stainless steel plates, which keeps the heating network medium separate from the domestic hot water system.

A self-sensing temperature regulator controls the hot water temperature. This measures the temperature of the hot water in the heat exchanger and automatically adjusts the outgoing flow. This patented, in-house Alfa Laval design gives a constant hot water temperature irrespective of volume and pressure flow.

The energy supplier registers use of energy. Measurement is done by recording the flow of heating network medium through the system, and by measuring the temperature difference between the medium's supply and return flow.

Diagrammatic flow chart for Micro DPC



For underfloor heating systems
The instructions of the underfloor heating supplier must also be checked.

Operating data

	Heating medium	Heating circuit	Hot water circuit
Design pressure, MPa	1.0	1.0	1.0
Design temperature, °C	100	100	100
Opening pressure, safety valve, MPa	-	-	0.9
Volume, l	0.34	-	0.36

Performance at available differential pressure 50-400 kPa

Designed temperature programme (°C)	Capacity (kW)	Primary flow (l/s)	Actual return temp. (°C)	Secondary flow (l/s)
Hot water circuit				
80-25/10-55	79	0.34	25	0.42
70-25/10-58	36	0.19	25	0.18
65-25/10-50	55	0.33	25	0.33
Heating circuit				
80-50	10	0.08	50	0.08

An easily manageable, economical and durable source of heat

The Micro DPC uses the heating network medium for heating the domestic hot water (providing an uninterrupted supply) as well as the water in the central heating system. The Micro DPC is a wall-mounted unit and is very compact. The unit is discreet and to minimize transmission of operational sounds, we recommend installing it on well insulated walls or on walls of concrete. Micro DPC requires no attendance or maintenance and has a very long operational life. In the event of requiring service or component exchange at some future date, all parts are easily accessible and individually replaceable.

To save time and efficiency the installation, Alfa Laval offers a first-fix- jig including shut-off valves.

Other information
Electrical data: -----------------------
Dimensions (cover): 430 mm width x 160 mm depth, 775 mm height
Dimensions (with out cover): 400 mm width x 120 mm depth, 630 mm height
Weight: 13 kg, cover 2 kg
Transport particulars: Total weight 20 kg, 0.08m³

Connections first-fix jig	Internal thread	External thread
Heating network media supply	G ¾	G 1
Heating network media return	G ¾	G 1
Heating circuit supply	G ¾	G 1
Heating circuit return	G ¾	G 1
Cold water inlet	G ¾	G 1
Cold water outlet	G ¾	G 1
Hot water	G ¾	G 1

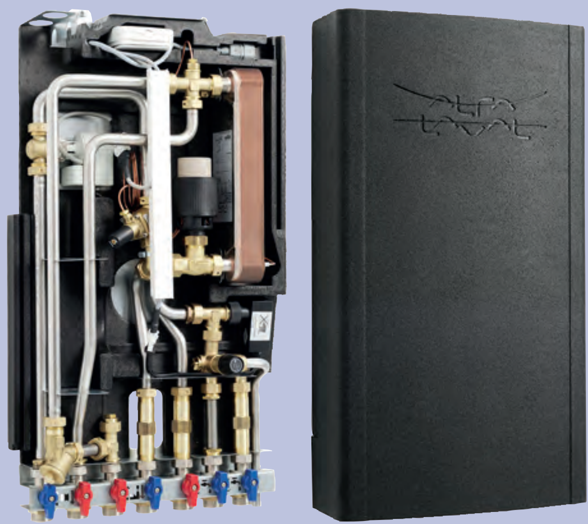
Option

First fix jig with shut-off valves.

How to contact Alfa Laval
Up-to-date AlfaLaval contact details for all countries are always available on our website on www.alfalaval.com

Alfa Laval Micro RTC

Heating and domestic hot water substation for apartments and single family houses



The Alfa Laval Micro RTC heating substation is installation-ready for complete central heating and hot water requirements. It is suitable for apartments and single family houses that are connected to a heating network.

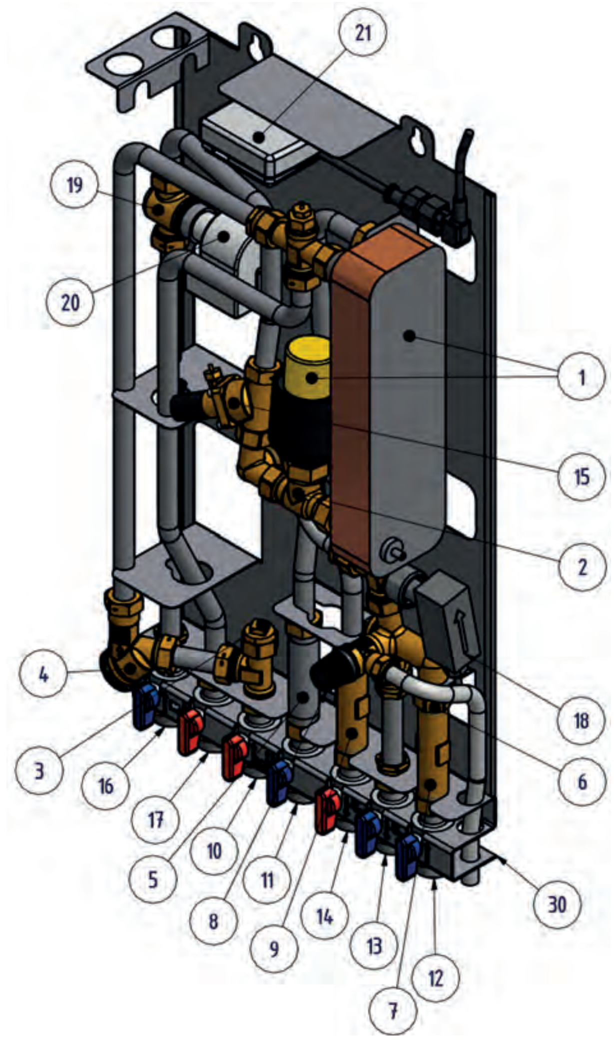
Alfa Laval has many years of experience in district heating technology, which is put to expert use in the Micro RTC, resulting in its practical function and ease of use. All components are easily accessible for inspection and future service when required.

High comfort
The Micro RTC has a fully automatic individual temperature setting for central heating and hot water. Heat is automatically regulated, depending on indoor temperature. Domestic hot water is heated separately in a high-capacity heat exchanger; thus ensuring that the hot water is always as fresh as the incoming cold water mains supply.

Simple installation
Compact dimensions, light weight, well arranged plumbing and factory-complete internal wiring – all make installation very simple. A pre-programmed control unit and a power cable already fitted with a plug make things even simpler to allow immediate start-up.

Micro RTC is mounted on an insulated frame and includes an insulated cover. Better insulation means less energy usage and better energy efficiency.

Long-term security
The Micro RTC represents the most modern technology, and provides the answer to stringent demands for longterm performance. The heat exchanger plates and all piping are manufactured in acid-resistant stainless steel. All components are closely matched and carefully tested for function in accordance with Alfa Laval's quality assurance system ISO 9001:2008. Micro RTC is built in compliance with PED 97/23/EC.



Components

1. Heat exchanger and temperature controller for hot water
2. Control valve for hot water
3. Temperature sensor connection, heating media supply
4. Filter for heating media
5. Adapter for energy meter
6. Check valve for cold water
7. Adapter for Cold water flow meter
8. Safety valve for domestic hot water
9. Adapter for Hot water flow meter
10. Heating network media, supply
11. Heating network media, return
12. Cold water inlet (cw)
13. Cold water outlet (cw)
14. Hot water (hw)
15. Differential pressure controller
16. Heating circuit, return
17. Heating circuit, supply
18. Flow switch for domestic hot water (option)
19. Control valve, heating circuit
20. Actuator, heating circuit
21. Connection box for electric power and sensors, heating circuit
22. Room thermostat/control panel
30. First fix jig including shut-off valves (option)

Heating network – a good source of heat

A heating network is an efficient technology that meets the need for central heating and hot water in a simple, convenient and secure way.

Operation

Micro RTC is used for the direct connection of apartments and single family houses to the heating network. With this kind of connection, the heating water from the heating network is used for heating the radiator system of the apartment or single family house.

A heat exchanger is used to transfer heat from the heating network medium to the hot water system. Heat is transferred through a package of thin, acid-resistant, stainless steel plates, which keeps the heating network medium separate from the domestic hot water system.

Micro RTC has automatic temperature control for central heating. The heating circuit is adjusted in relation to the required indoor temperature via a thermostatic control.

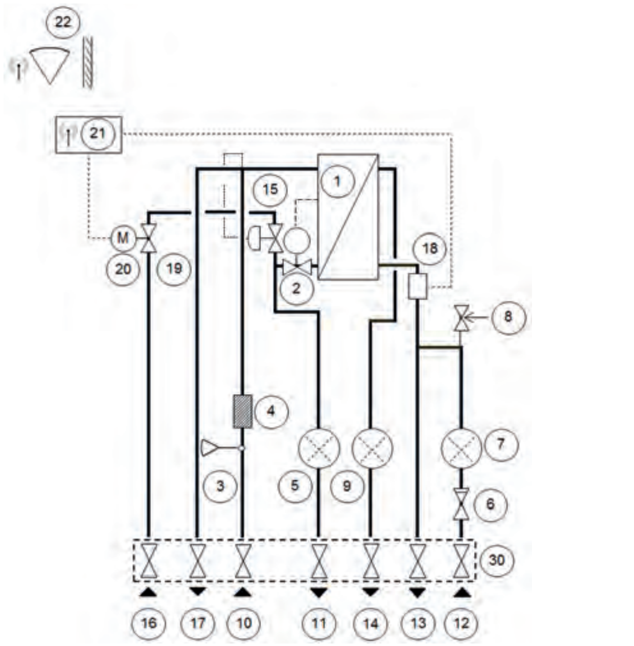
The indoor panel with the indoor sensor is always included and increase the comfort and saves energy.

The heating controller has an easy to use interface and built in energy saving functions.

A self-sensing temperature regulator controls the hot water temperature. This measures the temperature of the hot water in the heat exchanger and automatically adjusts the outgoing flow. This patented, in-house Alfa Laval design gives a constant hot water temperature irrespective of volume and pressure flow.

The energy supplier registers use of energy. Measurement is done by recording the flow of heating network medium through the system, and by measuring the temperature difference between the medium's supply and return flow.

Diagrammatic flow chart for Micro RTC



For underfloor heating systems
The instructions of the underfloor heating supplier must also be checked.

An easily manageable, economical and durable source of heat

The Micro RTC uses the heating network medium for heating the domestic hot water (providing an uninterrupted supply) as well as the water in the central heating system.
The Micro RTC is a wall-mounted unit and is very compact. The unit is discreet and to minimize transmission of operational sounds, we recommend installing it on well insulated walls or on walls of concrete. Micro RTC requires no attendance or maintenance and has a very long operational life. In the event of requiring service or component exchange at some future date, all parts are easily accessible and individually replaceable.

To save time and efficiency the installation, Alfa Laval offers a first-fix- jig including shut-off valves.

Other information
Electrical data: 230 V, 1-phase, 25 W
Dimensions (cover): 430 mm width x 160 mm depth, 775 mm height
Dimensions (with out cover): 400 mm width x 120 mm depth, 630 mm height
Weight: 14 kg, cover 2 kg
Transport particulars: Total weight 21 kg, 0.08 m³

Operating data	Heating medium	Heating circuit	Hot water circuit
Design pressure, MPa	1.0	1.0	1.0
Design temperature, °C	100	100	100
Opening pressure, safety valve, MPa	-	-	0.9
Volume, l	0.34	-	0.36

Connections first-fix jig	Internal thread	External thread
Heating network media supply	G ¾	G 1
Heating network media return	G ¾	G 1
Heating circuit supply	G ¾	G 1
Heating circuit return	G ¾	G 1
Cold water inlet	G ¾	G 1
Cold water outlet	G ¾	G 1
Hot water	G ¾	G 1

Performance at available differential pressure 50-400 kPa

Designed temperature programme (°C)	Capacity (kW)	Primary flow (l/s)	Actual return temp. (°C)	Secondary flow (l/s)
Hot water circuit				
80-25/10-55	79	0.34	25	0.42
70-25/10-58	36	0.19	25	0.18
65-25/10-50	55	0.33	25	0.33
Heating circuit				
80-50	10	0.08	50	0.08

Option

First fix jig with shut-off valves.

CE ISO 9001:2008

How to contact Alfa Laval
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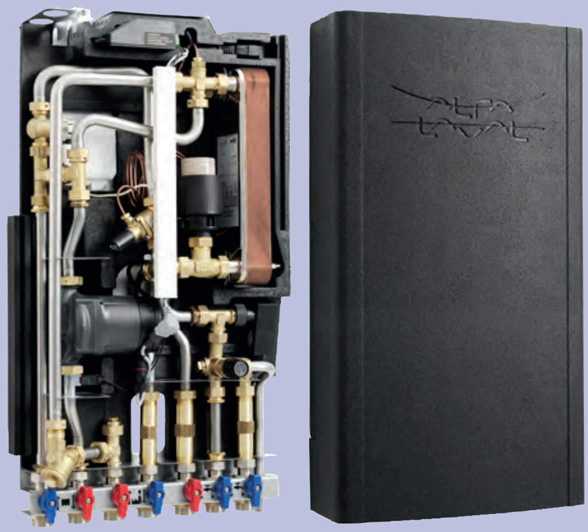
Alfa Laval Micro STC

Heating and domestic hot water substation for apartments and single family houses



The Alfa Laval Micro STC heating substation is installation-ready for complete central heating and hot water requirements. It is suitable for apartments and single family houses that are connected to a heating network.
Alfa Laval has many years of experience in district heating technology, which is put to expert use in the Micro STC, resulting in its practical function and ease of use.
All components are easily accessible for inspection and future service when required.

High comfort

The Micro STC has a fully automatic individual temperature setting for central heating and hot water. Heat is automatically regulated, depending on outdoor temperature and/or the temperature desired inside the dwelling. Domestic hot water is heated separately in a high-capacity heat exchanger; thus ensuring that the hot water is always as fresh as the incoming cold water mains supply.

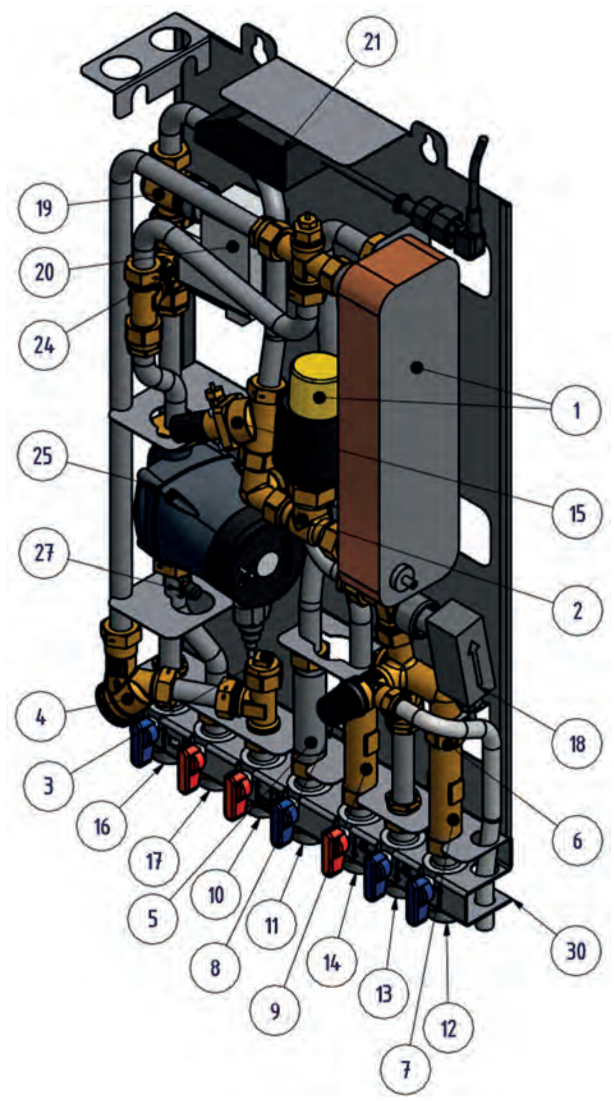
Simple installation

Compact dimensions, light weight, well arranged plumbing and factory-complete internal wiring – all make installation very simple. A pre-programmed control unit and a power cable already fitted with a plug make things even simpler to allow immediate start-up.

Micro STC is mounted on an insulated frame and includes an insulated cover. Better insulation means less energy usage and better energy efficiency.

Long-term security

The Micro STC represents the most modern technology, and provides the answer to stringent demands for longterm performance. The heat exchanger plates and all piping are manufactured in acid-resistant stainless steel. All components are closely matched and carefully tested for function in accordance with Alfa Laval's quality assurance system ISO 9001:2008. Micro STC is built in compliance with PED 97/23/EC.



Components
1. Heat exchanger and temperature controller for hot water
2. Control valve for hot water
3. Temperature sensor connection, heating media supply
4. Filter for heating media
5. Adapter for energy meter
6. Check valve for cold water
7. Adapter for Cold water flow meter
8. Safety valve for domestic hot water
9. Adapter for Hot water flow meter
10. Heating network media, supply
11. Heating network media, return
12. Cold water inlet (cw)
13. Cold water outlet (cw)
14. Hot water (hw)
15. Differential pressure controller
16. Heating circuit, return
17. Heating circuit, supply
18. Flow switch for domestic hot water (option)
19. Control valve, heating circuit
20. Actuator, heating circuit
21. Connection box for electric power and sensors, heating circuit
22. Room thermostat/control panel
23. Outdoor temperature sensor (option)
24. Check valve for heating circuit
25. Circulation pump, heating circuit
26. Underfloor heating thermostat (option)
27. Supply temperature sensor, heating circuit
30. First fix jig including shut-off valves (option)

Heating network – a good source of heat
A heating network is an efficient technology that meets the need for central heating and hot water in a simple, convenient and secure way.

Operation
Micro STC is used for the direct connection of apartments and single family houses to the heating network. With this kind of connection, the heating water from the heating network is used for heating the radiator system of the apartment or single family house.

A heat exchanger is used to transfer heat from the heating network medium to the hot water system. Heat is transferred through a package of thin, acid-resistant, stainless steel plates, which keeps the heating network medium separate from the domestic hot water system.

Micro STC has automatic temperature control for central heating. The heating circuit is adjusted in relation to the outdoor temperature and the required indoor temperature via a thermostatic control, outdoor sensor and/or indoor sensor.

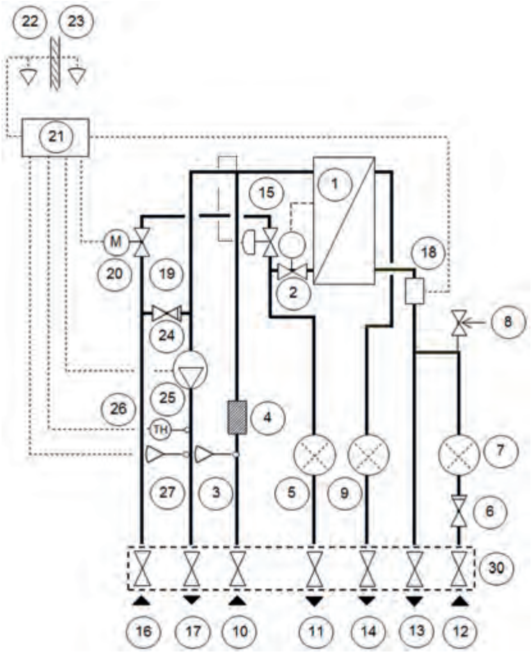
The indoor panel with the indoor sensor is always included and increase the comfort and saves energy.

When no heating flow is required, the heating circulation pump stops automatically, but is run occasionally to prevent seizing up due to standing still for a long time. The pump is energy optimized and comply with the EuP2015 directive. The heating controller has an easy to use interface and built in energy saving functions.

A self-sensing temperature regulator controls the hot water temperature. This measures the temperature of the hot water in the heat exchanger and automatically adjusts the outgoing flow. This patented, in-house Alfa Laval design gives a constant hot water temperature irrespective of volume and pressure flow.

The energy supplier registers use of energy. Measurement is done by recording the flow of heating network medium through the system, and by measuring the temperature difference between the medium's supply and return flow.

Diagrammatic flow chart for Micro STC



For underfloor heating systems
The instructions of the underfloor heating supplier must also be checked.

Operating data

	Heating medium	Heating circuit	Hot water circuit
Design pressure, MPa	1.0	1.0	1.0
Design temperature, °C	100	100	100
Opening pressure, safety valve, MPa	-	-	0.9
Volume, l	0.34	-	0.36

Performance at available differential pressure 50-400 kPa

Designed temperature programme (°C)	Capacity (kW)	Primary flow (l/s)	Actual return temp. (°C)	Secondary flow (l/s)
Hot water circuit				
80-25/10-55	79	0.34	25	0.42
70-25/10-58	36	0.19	25	0.18
65-25/10-50	55	0.33	25	0.33
Heating circuit				
80-50/50-70	10	0.08	50	0.12
80-60/60-70	7	0.08	60	0.16
80-45/45-60	12	0.08	45	0.19
80-30/30-35	7	0.03	30	0.33

An easily manageable, economical and durable source of heat

The Micro STC uses the heating network medium for heating the domestic hot water (providing an uninterrupted supply) as well as the water in the central heating system. The Micro STC is a wall-mounted unit and is very compact. Substations may generate sounds during operation caused by pumps,regulator systems, flow etc. The unit is discreet and to minimize transmission of operational sounds, we recommend installing it on well insulated walls or on walls of concrete. Micro STC requires no attendance or maintenance and has a very long operational life. In the event of requiring service or component exchange at some future date, all parts are easily accessible and individually replaceable.

To save time and efficiency the installation, Alfa Laval offers a first-fix- jig including shut-off valves.

Other information
Electrical data: 230 V, 1-phase, 50 W
Dimensions (cover): 430 mm width x 160 mm depth, 775 mm height
Dimensions (with out cover): 400 mm width x 120 mm depth, 630 mm height
Weight: 14 kg, cover 2kg
Transport particulars: Total weight 21 kg, 0.08 m³

Connections first-fix jig	Internal thread	External thread
Heating network media supply	G ¾	G 1
Heating network media return	G ¾	G 1
Heating circuit supply	G ¾	G 1
Heating circuit return	G ¾	G 1
Cold water inlet	G ¾	G 1
Cold water outlet	G ¾	G 1
Hot water	G ¾	G 1

Option

First fix jig with shut-off valves.

CE ISO 9001:2008

How to contact Alfa Laval
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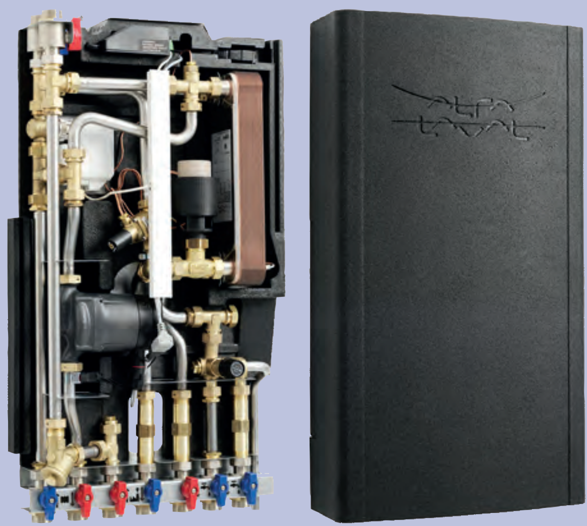
Alfa Laval Micro STC2

Heating and domestic hot water substation for apartments and single family houses



The Alfa Laval Micro STC2 heating substation is installation-ready for complete central heating and hot water requirements. It is suitable for apartments and single family houses that are connected to a heating network.

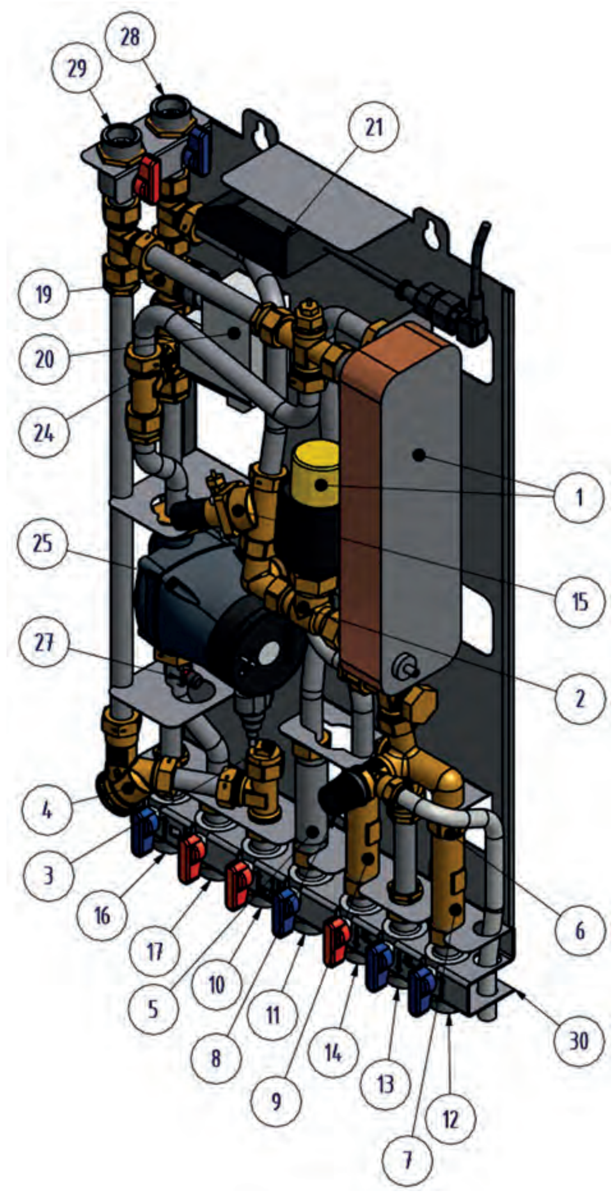
Alfa Laval has many years of experience in district heating technology, which is put to expert use in the Micro STC2, resulting in its practical function and ease of use. All components are easily accessible for inspection and future service when required.

High comfort
The Micro STC2 has a fully automatic individual temperature setting for central heating and hot water. Heat is supported for two separate circuits, one for high temperature (towel heaters, washing machines and radiators) and one that is automatically regulated, depending on outdoor temperature and/or the temperature desired inside the dwelling. Domestic hot water is heated separately in a high-capacity heat exchanger; thus ensuring that the hot water is always as fresh as the incoming cold water mains supply.

Simple installation
Compact dimensions, light weight, well arranged plumbing and factory-complete internal wiring – all make installation very simple. A pre-programmed control unit and a power cable already fitted with a plug make things even simpler to allow immediate start-up.

Micro STC2 is mounted on an insulated frame and includes an insulated cover. Better insulation means less energy usage and better energy efficiency.

Long-term security
The Micro STC2 represents the most modern technology, and provides the answer to stringent demands for longterm performance. The heat exchanger plates and all piping are manufactured in acid-resistant stainless steel. All components are closely matched and carefully tested for function in accordance with Alfa Laval's quality assurance system ISO 9001:2008. Micro STC2 is built in compliance with PED 97/23/EC.



Components

1. Heat exchanger and temperature controller for hot water
2. Control valve for hot water
3. Temperature sensor connection, heating media supply
4. Filter for heating media
5. Adapter for energy meter
6. Check valve for cold water
7. Adapter for Cold water flow meter
8. Safety valve for domestic hot water
9. Adapter for Hot water flow meter
10. Heating network media, supply
11. Heating network media, return
12. Cold water inlet(cw)
13. Cold water outlet (cw)
14. Hot water (hw)
15. Differential pressure controller
16. Heating circuit, return
17. Heating circuit, supply
19. Control valve, heating circuit
20. Actuator, heating circuit
21. Connection box for electric power and sensors, heating circuit
22. Room thermostat/control panel
23. Outdoor temperature sensor (option)
24. Check valve for heating circuit
25. Circulation pump, heating circuit
26. Underfloor heating thermostat (option)
27. Supply temperature sensor, heating circuit
28. Heating circuit primary temp, return
29. Heating circuit primary temp, supply
30. First fix jig including shut-off valves (option)

Heating network – a good source of heat
A heating network is an efficient technology that meets the need for central heating and hot water in a simple, convenient and secure way.

Operation
Micro STC2 is used for the direct connection of apartments and single family houses to the heating network. With this kind of connection, the heating water from the heating network is used for heating the radiator system of the apartment or single family house.

A heat exchanger is used to transfer heat from the heating network medium to the hot water system. Heat is transferred through a package of thin, acid-resistant, stainless steel plates, which keeps the heating network medium separate from the domestic hot water system.

Micro STC2 has two separate circuits for central heating. One circuit for high temperature connection of towel heaters, washing machines or radiators. The second circuit can be connected to under floor heating systems or radiators and has automatic temperature control for central heating. This heating circuit is adjusted in relation to the outdoor temperature and the required indoor temperature via a thermostatic control, outdoor sensor and/or indoor sensor.

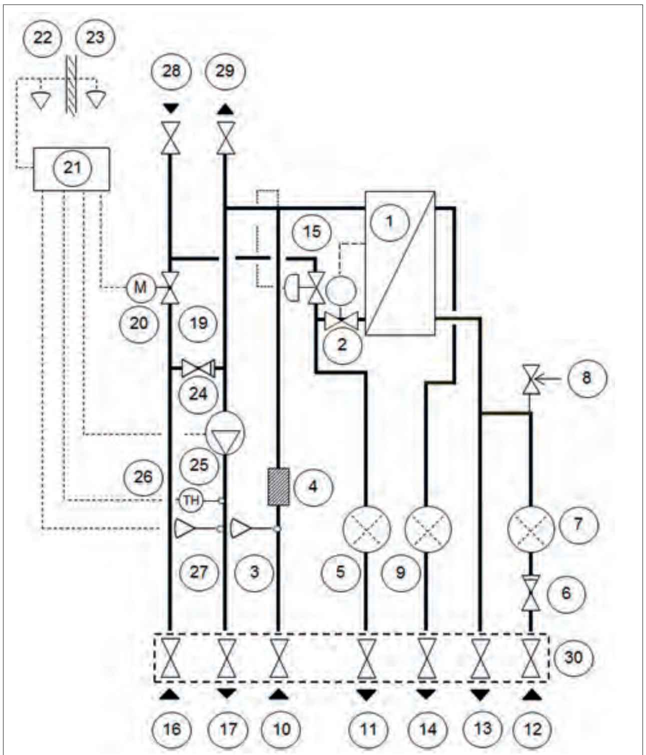
The indoor panel with the indoor sensor is always included and increase the comfort and saves energy.

When no heating flow is required, the heating circulation pump stops automatically, but is run occasionally to prevent seizing up due to standing still for a long time. The pump is energy optimized and comply with the EuP2015 directive. The heating controller has an easy to use interface and built in energy saving functions.

A self-sensing temperature regulator controls the hot water temperature. This measures the temperature of the hot water in the heat exchanger and automatically adjusts the outgoing flow. This patented, in-house Alfa Laval design gives a constant hot water temperature irrespective of volume and pressure flow.

The energy supplier registers use of energy. Measurement is done by recording the flow of heating network medium through the system, and by measuring the temperature difference between the medium's supply and return flow.

Diagrammatic flow chart for Micro STC2



For underfloor heating systems
The instructions of the underfloor heating supplier must also be checked.

Operating data

	Heating medium	Heating circuit	Hot water circuit
Design pressure, MPa	1.0	1.0	1.0
Design temperature, °C	100	100	100
Opening pressure, safety valve, MPa	-	-	0.9
Volume, l	0.34	-	0.36

Performance at available differential pressure 50-400 kPa

Designed temperature programme (°C)	Capacity (kW)	Primary flow (l/s)	Actual return temp. (°C)	Secondary flow (l/s)
Hot water circuit				
80-25/10-55	79	0.34	25	0.42
70-25/10-58	36	0.19	25	0.18
65-25/10-50	55	0.33	25	0.33
Heating circuit 1				
80-50/50-70	10	0.08	50	0.12
80-60/60-70	7	0.08	60	0.16
80-45/45-60	12	0.08	45	0.19
80-30/30-35	7	0.03	30	0.33
Heating circuit 2				
80-50	10	0.08	50	0.08

An easily manageable, economical and durable source of heat

The Micro STC2 uses the heating network medium for heating the domestic hot water (providing an uninterrupted supply) as well as the water in the central heating system. The Micro STC2 is a wall-mounted unit and is very compact. Substations may generate sounds during operation caused by pumps,regulator systems, flow etc. The unit is discreet and to minimize transmission of operational sounds, we recommend installing it on well insulated walls or on walls of concrete. Micro STC2 requires no attendance or maintenance and has a very long operational life. In the event of requiring service or component exchange at some future date, all parts are easily accessible and individually replaceable.

To save time and efficiency the installation, Alfa Laval offers a first-fix- jig including shut-off valves.

Other information
Electrical data: 230 V, 1-phase, 50 W
Dimensions (cover): 430 mm width x 160 mm depth, 775 mm height
Dimensions (with out cover): 400 mm width x 120 mm depth, 630 mm height
Weight: 15 kg, cover 2 kg
Transport particulars: Total weight 22 kg, 0.,08 m³

Connections first-fix jig	Internal thread	External thread
Heating network media supply	G ¾	G 1
Heating network media return	G ¾	G 1
Heating circuit supply 1	G ¾	G 1
Heating circuit return 1	G ¾	G 1
Cold water, inlet	G ¾	G 1
Cold water, outlet	G ¾	G 1
Hot water	G ¾	G 1

Connections Heating Circuit 2	Internal thread	External thread
Heating circuit supply 2	G ¾	G 1
Heating circuit return 2	G ¾	G 1

Option

First fix jig with shut-off valves.

CE ISO 9001:2008

ECF00457EN 1409

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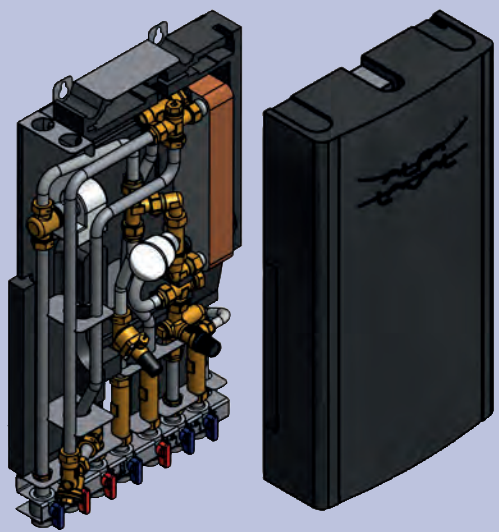
Alfa Laval Micro HTC

Heating and domestic hot water substation for apartments and single family houses



The Alfa Laval Micro HTC heating substation is ready for installation to meet the complete central heating and hot water requirements. It is suitable for apartments and single-family houses that are direct connected to a heating network.

Alfa Laval has many years of experience in district heating technology, which is put to expert use in the Micro HTC, resulting in its practical functionality and ease of use. All components are easily accessible for inspection and future servicing when required.

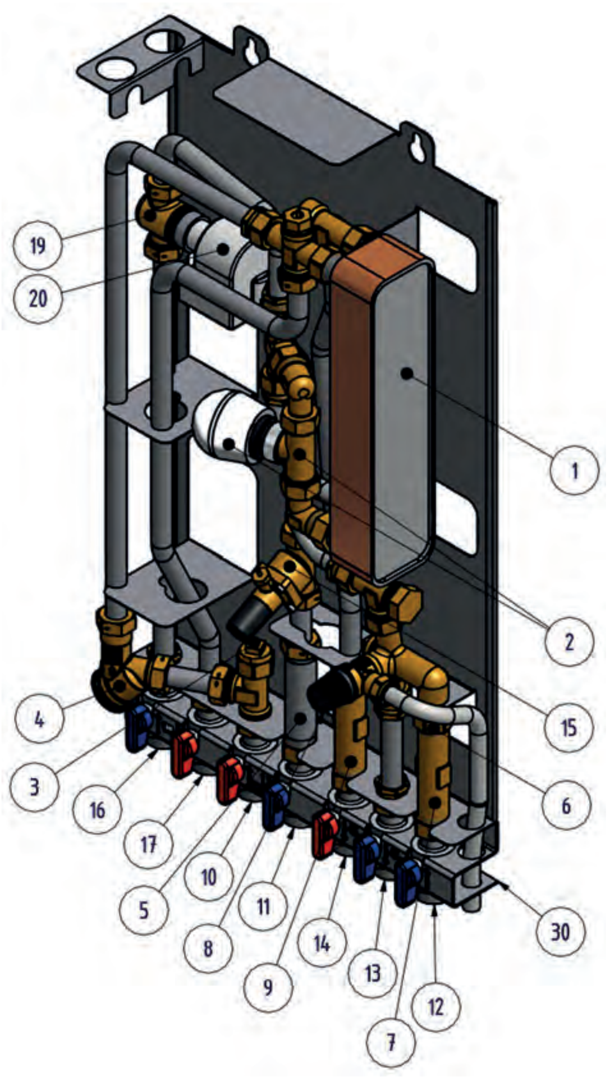
Comfort
The Micro HTC is the simplest model in the Micro family. It has an automatic individual temperature setting for hot water. Micro HTC is fully prepared for individual temperature control for central heating by its valve and actuator. Domestic hot water is heated separately in a high capacity heat exchanger, this ensuring that the hot water is always as fresh as the incoming cold water main supply.

Simple installation
Compact dimensions, light weight, well arranged plumbing and ready for connection to individual temperature control for heating.

Micro HTC is mounted on an insulated frame and includes an insulated cover. Better insulation means less energy usage and better energy efficiency.

Long-term security
The Micro HTC represents the most modern technology, and provides the answer to stringent demands for long-term performance. The heat exchanger plates and all piping are manufactured in acid-resistant stainless steel.
All components are closely matched and carefully tested for function in accordance with Alfa Laval's quality assurance system ISO 9001:2008.

Micro HTC is built in compliance with PED 97/23/EC.



Components

1. Heat exchanger for hot water
2. Control valve, thermostat and sensor for hot water
3. Temperature sensor connection, heating media supply
4. Filter for heating media
5. Adapter for energy meter
6. Check valve for cold water
7. Adapter for cold water flow meter
8. Safety valve for domestic hot water
9. Adapter for hot water flow meter
10. Heating network media, supply
11. Heating network media, return
12. Cold water, inlet (CW)
13. Cold water outlet (CW)
14. Hot water (HW)
15. Differential pressure controller
16. Heating circuit, return
17. Heating circuit, supply
19. Control valve, heating circuit
20. Actuator, heating circuit
30. First fix jig including shut-off valves (option)

Heating network – a good source of heat
A heating network is an efficient technology that meets the need for central heating and hot water in a simple, convenient and secure way.

Operation
Micro HTC is used for the direct connection of apartments and single family houses to the heating network. With this kind of connection, the heating water from the mains network is used for heating the radiator system of the apartment or single family house.

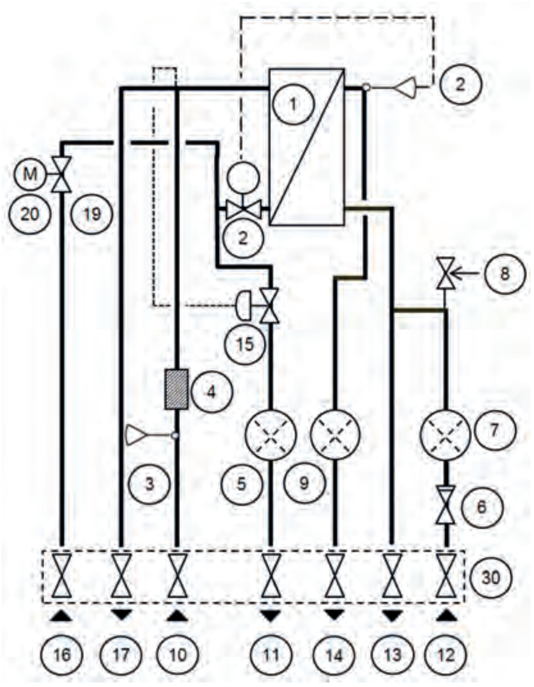
For connection to underfloor heating system, the unit should be completed with a special control equipment, suited for this purpose, or use Alfa Laval Micro STC.

A heat exchanger is used to transfer heat from the heating network medium to the hot water system. Heat is transferred through a package of thin, acid-resistant, stainless steel plates, which keeps the heating network medium separate from the domestic hot water system.

A self-sensing temperature regulator controls the hot water temperature. This measures the temperature of the hot water in the heat exchanger and automatically adjusts the outgoing flow.

The energy supplier registers the use of energy. Measurement is done by recording the flow of heating network medium through the system, and by measuring the temperature difference between the medium's supply and return flow.

Diagrammatic flow chart for Micro HTC



For underfloor heating systems
Underfloor heating systems must be separately controlled. The instructions of the underfloor heating supplier must also be checked.

Operating data

	Heating network	Heating circuit	Hot water circuit
Design pressure, MPa	1.0	1.0	1.0
Design temperature, °C	100	100	100
Relief valve opening pressure, MPa	-	-	0.9
Volume, l	0.34	-	0.38

Performance at available primary differential pressure 50-400 kPa

Designed temperature programme (°C)	Capacity (kW)	Primary flow (l/s)	Actual return temp. (°C)	Secondary flow (l/s)
Hot water circuit				
80-25/10-55	66	0.29	25	0.35
70-25/10-58	29	0.15	25	0.14
65-25/10-50	46	0.28	25	0.28
Heating circuit				
80-60	10	0.12	60	0.12

An easily manageable, economical and durable source of heat

The Micro HTC uses the heating network medium for heating the domestic hot water (providing an uninterrupted supply) as well as the water in the central heating system.

The Micro HTC is a wall-mounted unit and is very compact. The unit is discreet and to minimize transmission of operational sounds, we recommend installing it on well insulated walls or on walls of concrete.
Micro HTC requires no attendance or maintenance and has a very long operational life. In the event of requiring service or component exchange at some future date, all parts are easily accessible and individually replaceable.

To save time and efficiency the installation, Alfa Laval offers a first-fix- jig including shut-off valves.

Other information
Electrical data: 230 V, single phase, 25 W
Dimensions (cover): 430 mm width x 160 mm depth, 775 mm height
Dimensions (substation): 400 mm width x 120 mm depth x 630 mm height
Weight: 13 kg, cover 2 kg
Transport particulars: Total weight 20 kg, 0.08 m³

Connections first-fix jig	Internal thread	External thread
Heating network media supply	G ¾	G 1
Heating network media return	G ¾	G 1
Heating circuit supply	G ¾	G 1
Heating circuit return	G ¾	G 1
Cold water, inlet	G ¾	G 1
Cold water, outlet	G ¾	G 1
Hot water	G ¾	G 1

Option

First fix jig with shut-off valves.

How to contact Alfa Laval
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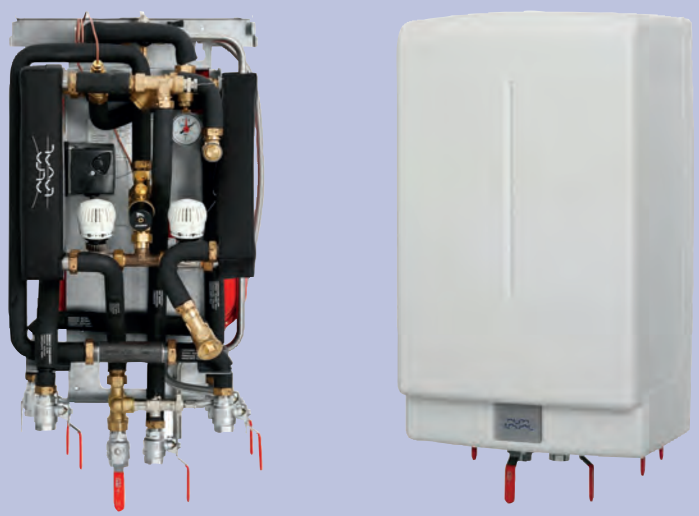
website on www.alfalaval.com

Mini City Indirect HTC

Heating and domestic hot water substation for apartments and single family houses

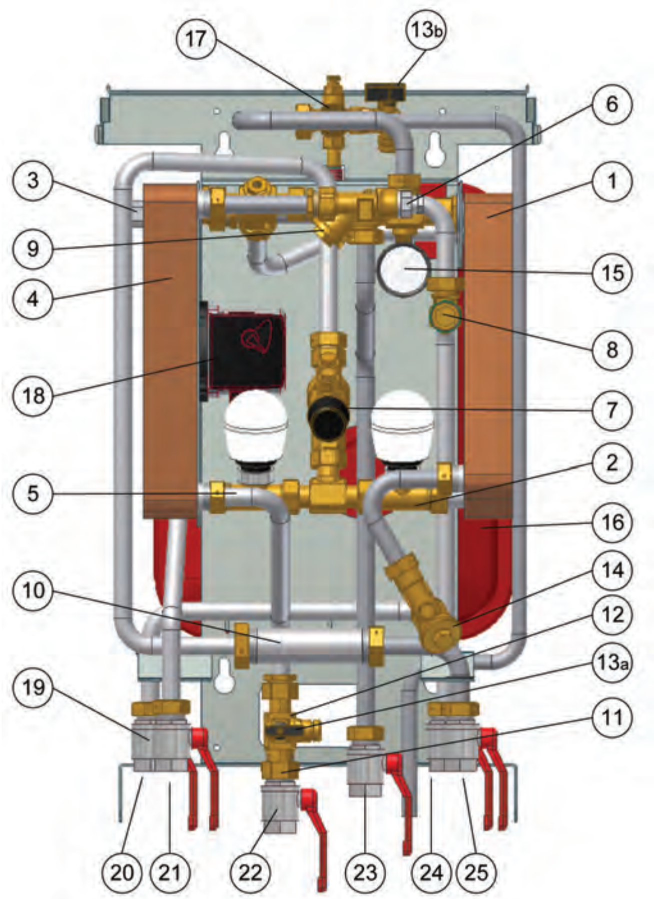


The Mini City heating substation is ready for installation to meet the complete central heating and hot water requirements. It is suitable for apartments and single-family houses that are connected to a heating network. Alfa Laval has many years of experience in district heating technology, which is put to expert use in the Mini City, resulting in its practical function and ease of use. All components are easily accessible for inspection and future servicing when required.

Comfort
The Mini City HTC is the step-in model of the Mini City family. It has an automatic individual temperature setting for hot water. Mini City is fully prepared for individual temperature control for central heating by its valve and actuator. Domestic hot water is heated separately in a high capacity heat exchanger, this ensuring that the hot water is always as fresh as the incoming cold water main supply.

Simple installation
Compact dimensions, light weight, well arranged plumbing and ready for correction to individual temperature control for heating.

Long-term security
The Mini City represents the most modern technology, and provides the answer to stringent demands for long-term performance. The heat exchanger plates and all piping are manufactured in acid-resistant stainless steel. All components are closely matched and carefully tested for function in accordance with Alfa Laval's quality assurance system ISO 9001:2008. Mini City HTC follows PED 97/23/EC.



Components

1. Heat exchanger for heating
2. Control valve for heating circuit
3. Heating water thermostat
4. Heat exchanger for hot water
5. Contorl valve for hot water
6. Hot water thermostat
7. Differential pressure controller
8. Temperature sensor connection, heating media supply
9. Filter for heating netword media
10. Energy meter or adapter for energy meter
11. Check valve for cold water
12. Safety valve for domestic hot water
13. Valve to top up the heating circuit and hose with possibility to disconnect
14. Filter for heating circuit
15. Pressure gauge for heating circuit
16. Expansion vessel, heating circuit
17. Safety valve for heating circuit
18. Pump for heating circuit
19. Shut-off valve (6 pcs)
20. Heating circuit, return
21. Heating circuit, supply
22. Cold water (cw)
23. Hot water (hw)
24. Heating network media, supply
25. Heating network media, return

Brass parts are hardened against dezincification. All connectors, DN20, internal threaded.

Heating network – a good source of heat
A heating network is an efficient technology that meets the need for central heating and hot water in a simple, convenient and secure way.

Operation
Mini City is used for the indirect connection of apartments and in single family houses to the heating network.

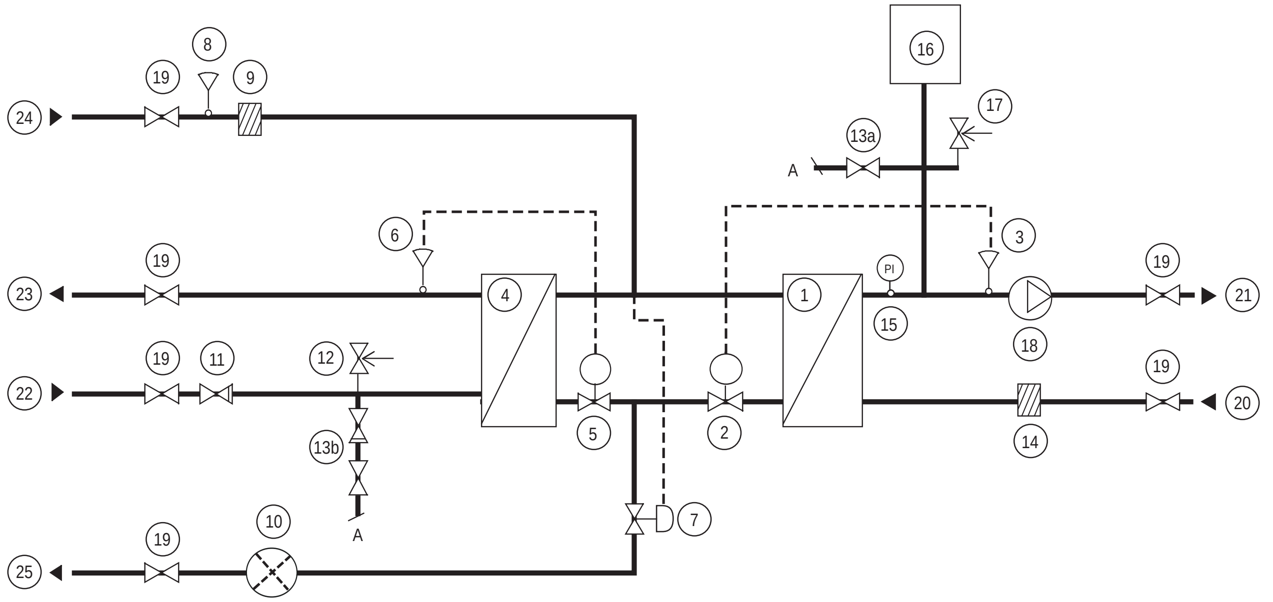
Heat exchangers are used to transfer heat from the heating netwok medium to the water in the dwelling's central heating and hot water system. Heat is transferred through a package of thin acid-resistant, stainless steel plates, which keep the heating network medium completely separate from the dwelling's own system.

Mini City is fully prepared for individual temperature control for central heating by its valve and actuator. The supply temperature can be set to a demanded supply temperature and can be used for underfloor heating systems as well as for traditionally radiator systems. With an external room controller installed, the heating circuit is adjusted in relation to the room temperature via a thermostatic control.

A self-sensing temperature regulator controls the hot water temperature. This measures the temperature of the hot water in the heat exchanger and automatically adjusts the outgoing flow.

The energy supplier registers the use of energy. Measurement is done by recording the flow of heating network medium through the system, and by measuring the temperature difference between the medium's supply and return flow.

Diagrammatic flow chart for Mini City Indirect HTC



For underfloor heating systems
Underfloor heating systems normally require a high-capacity circulation pump, preferably electronically controlled. An underfloor water flow greater than 0,25 l/s may require a special underfloor heating accessory. If combined with radiator circuits, the underfloor heating circuit must be separately controlled. The instructions of the underfloor heating supplier must also be checked.

An easily manageable, economical and durable source of heat

The Mini City uses the heating net work medium for heating the domestic hot water (providing an uninterrupted supply) as well as the water in the central heating system.

The Mini City is a wall-mounted unit and is very compact. Wherever the unit is located, it is quiet and discreet, requires no attendance or maintenance and has a very long operational life. In the event of requiring servicing or component exchange at some future date, all parts are easily accessible and individually replaceable.

Operating data

	Heating network	Heating circuit	Hot water circuit
Design pressure, MPa	1.0	0.6	1.0
Design temperature, °C	100	100	100
Relief valve opening pressure, MPa	-	0.25	0.9
Volume, l	0.32/0.35	0.35	0.39

Other information
Electrical data: 230 V, single phase, 30 W
Dimensions: 422 mm width x 330 mm depth, 721 mm height
Dimensions: Substation 413 mm width x 316 mm depth x 707 mm height
Weight: 26 kg, casing 2 kg
Transport particulars: Total weight 32 kg, 0.2 m³

Performance at available primary differential pressure 50-400 kPa*

Designed temperature programme (°C)	Capacity (kW)	Primary flow (l/s)	Actual return temp. (°C)	Secondary flow (l/s)
Hot water circuit				
80-30/10-55	57	0.27	30	0.30
80-25/10-55	37	0.16	25	0.20
65-25/10-50	25	0.15	25	0.15
75-25/10-50	42	0.20	25	0.25
70-25/10-50	34	0.18	25	0.20
Heating circuit				
80-63/60-70	12	0.17	63	0.29
85-47/45-60	12	0.08	47	0.19
80-61/60-70	5	0.07	61	0.12
85-46/45-60	5	0.03	46	0.08

Connections	Screws
Heating network media supply	G ¾
Heating network media return	G ¾
Heating circuit supply	G ¾
Heating circuit return	G ¾
Cold water	G ¾
Hot water	G ¾

ISO 9001:2008

How to contact Alfa Laval
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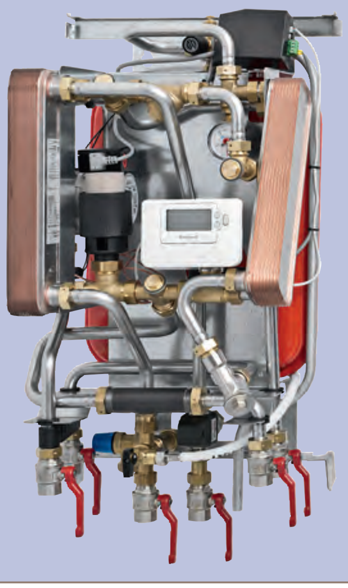
Mini City Indirect

Heating and domestic hot water substation for apartments and single family houses

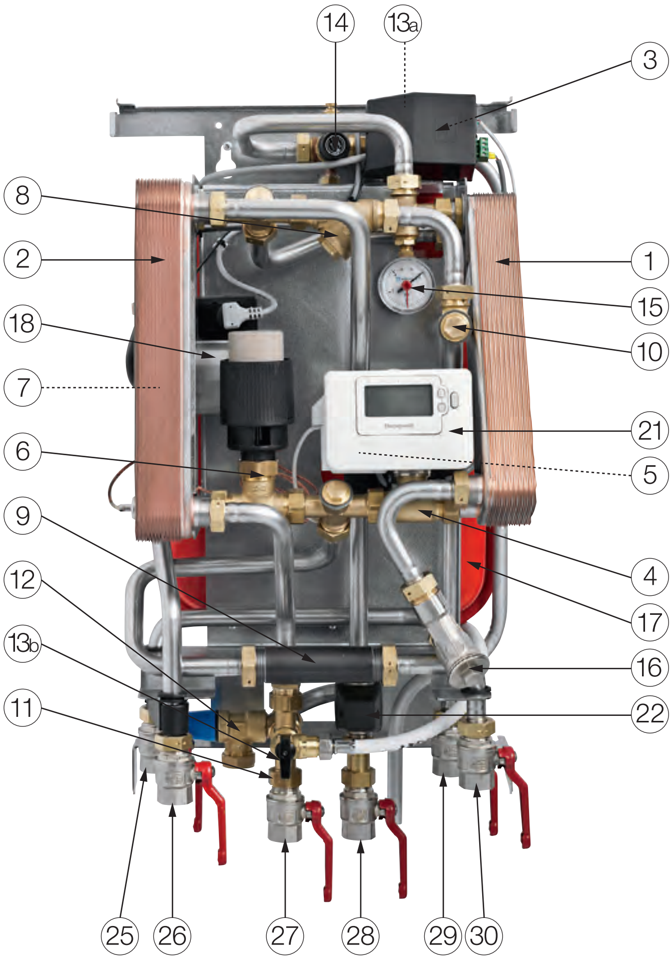


The Mini City heating substation is ready for installation to meet the complete central heating and hot water requirements. It is suitable for apartments and single-family houses that are connected to a community or district heating network. Alfa Laval has many years of experience in district heating technology, which is put to expert use in the Mini City, resulting in its practical function and ease of use. All components are easily accessible for inspection and future servicing when required.

High comfort
The Mini City has a fully automatic individual temperature setting for central heating and hot water. Heat is automatically regulated, depending on the temperature desired inside the dwelling. Domestic hot water is heated separately in a high-capacity heat exchanger; thus ensuring that the hot water is always as fresh as the incoming cold water mains supply.

Simple installation
Compact dimensions, light weight, well arranged plumbing and factory-complete internal wiring all make installation very simple. Moreover, the plumbing can be connected from the top or bottom depending on the layout on-site. A pre-programmed control unit and a power cable already fitted with a plug make things even simpler to allow immediate start-up.

Long-term security
The Mini City represents the most modern technology, and provides the answer to stringent requirements for long-term performance. The heat exchanger plates and all piping are manufactured in acid-resistant stainless steel. All components are closely matched and carefully tested for function in accordance with Alfa Laval's quality assurance system ISO 9001:2008. The Mini City is CE and P marked.



Brass parts are hardened against dezincification. All connectors, DN20, internal threaded.

Components

1. Heat exchanger for heating
2. Heat exchanger and temperature controller for hot water
3. Connection box for electrical power and sensors, heating circuit
4. Control valve for heating circuit
5. Actuator for heating circuit
6. Control valve for hot water
7. Temperature sensor, heat supply
8. Filter for heating network medium
9. Energy meter or adapter for energy meter
10. Temperature sensor connection, heating network medium supply
11. Check valve for cold water
12. Safety valve for domestic hot water
13. Valve to top up the heating circuit and hose with possibility to disconnect
14. Safety valve for heating circuit
15. Pressure gauge for heating circuit
16. Filter for heating circuit
17. Expansion vessel, heating circuit, 8 litres
18. Circulation pump for heating circuit
19. Shut-off valves
20. Outdoor temperature sensor (option)
21. Room thermostat/Control panel
22. Safety temperature limiter, domestic hot water (option)
23. Flow switch (option)
24. Differential pressure regulator (option)
25. Heating circuit, return
26. Heating circuit, supply
27. Cold water (cw)
28. Hot water (hw)
29. Heating network media, supply
30. Heating network media, return

Heating network – a good source of heat
A community or district heating network is an efficient technology that meets the need for central heating and hot water in a simple, convenient and secure way.

Operation
The incoming hot medium from the heating network is at very high pressure and temperature. Only the heat is used; the heating network medium does not mix with the water in the dwelling's heating and hot water system.

Heat exchangers are used to transfer heat from the heating network medium to the water in the dwelling's central heating and hot water system. Heat is transferred through a package of thin acid-resistant, stainless steel plates, which keep the heating network medium completely separate from the dwelling's own system.

Mini City has automatic temperature control for central heating. The heating circuit is adjusted in relation to the outdoor temperature and the required indoor temperature via a thermostatic control, outdoor sensor and/or indoor sensor.

The indoor panel with the indoor sensor is always includetd and increase the comfort and saves energy.

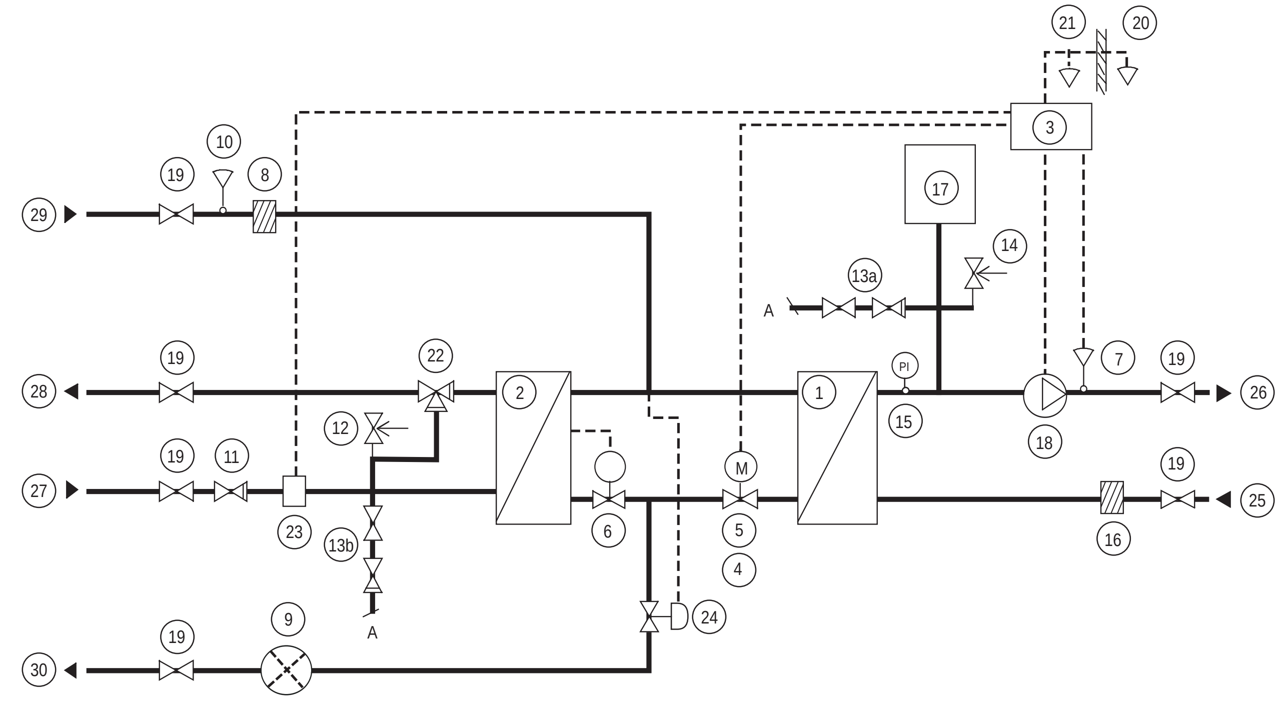
When no heating flow is required, the heating circulation pump stops automatically, but is run occasionally to prevent seizing up due to standing still for a long time. H737 has an easy to use interface and built in energy saving functions.

A self-sensing temperature regulator controls the hot water temperature. This measures the temperature of the hot water in the heat exchanger and automatically adjusts the outgoing flow. This patented, in-house Alfa Laval design gives a constant hot water temperature irrespective of volume and pressure flow.

Mini City can be offered with a differential pressure controller that keeps the differential pressure over the load constant. This secures accurate and stable modulating control, less risk of noise from control valves and easy balancing and commissioning.

The energy supplier registers use of energy. Measurement is done by recording the flow of heating network medium through the system, and by measuring the temperature difference between the medium's supply and return flow.

Diagrammatic flow chart for Mini City Indirect



For underfloor heating systems
Underfloor heating systems normally require a high-capacity circulation pump, preferably electronically controlled. An underfloor water flow greater than 0,3 l/s may require a special underfloor heating accessory. If combined with radiator circuits, the underfloor heating circuit must be separately controlled. The instructions of the underfloor heating supplier must also be checked.

An easily manageable, economical and durable source of heat

The Mini City uses the heating net work medium for heating the domestic hot water (providing an uninterrupted supply) as well as the water in the central heating system.

The Mini City is a wall-mounted unit and is very compact. Wherever the unit is located, it is quiet and discreet, requires no attendance or maintenance and has a very long operational life. In the event of requiring servicing or component exchange at some future date, all parts are easily accessible and individually replaceable.

Operating data

	Heating network	Heating circuit	Hot water circuit
Design pressure, MPa	1.0	0.6	1.0
Design temperature, °C	120	100	100
Relief valve opening pressure, MPa	-	0.25	0.9
Volume, l	0.2/0.5	0.2	0.5

Other information

Electrical data: 230 V, single phase, 30 W
Dimensions: 422 mm width x 330 mm depth, 721 mm height
Dimensions: Substation 413 mm width x 316 mm depth x 707 mm height
Weight: 26 kg, casing 2 kg
Transport particulars: Total weight 32 kg, 0.2 m³

Performance at available primary differential pressure 50-600 kPa*

Designed temperature programme (°C)	Capacity (kW)	Primary flow (l/s)	Actual return temp. (°C)	Secondary flow (l/s)
Hot water circuit				
80-25/10-60	42	0.17	22	0.2
80-25/10-55	56	0.23	22	0.3
65-25/10-50	50	0.29	24	0.3
Heating circuit				
100-63/60-80	12	0.08	63	0.14
80-63/60-70	12	0.17	63	0.29
85-47/45-60	12	0.08	47	0.19
80-63/60-70	5	0.06	62	0.12
85-47/45-60	5	0.03	46	0.08

Connections	Screws
Heating network media supply	G ¾
Heating network media return	G ¾
Heating circuit supply	G ¾
Heating circuit return	G ¾
Cold water	G ¾
Hot water	G ¾

ISO 9001:2008

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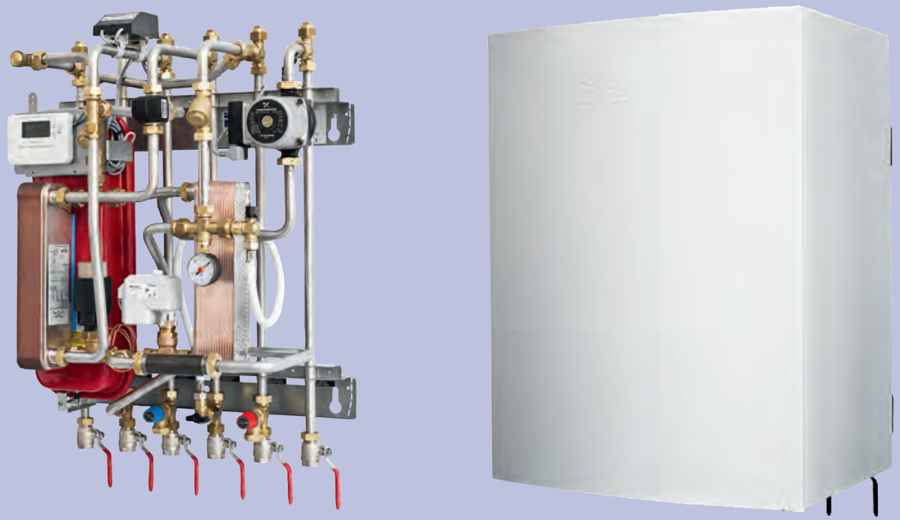
Mini

District heating substation for single-family houses

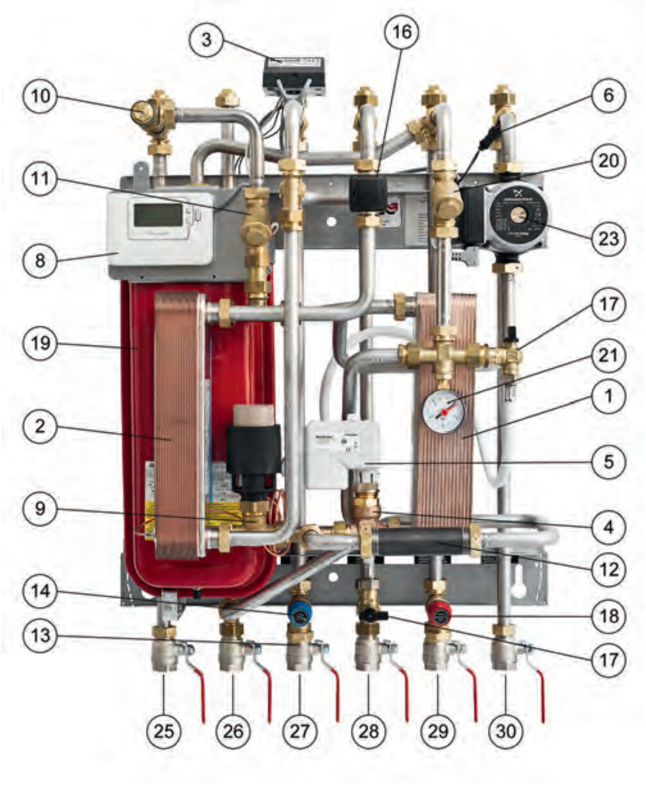


The Mini district heating substation is ready for installation to meet the complete central heating and hot water requirements. It is suitable for apartments and single-family houses that are connected to a heating network. Alfa Laval has many years of experience in district heating technology, which is put to expert use in the Mini, resulting in its practical function and ease of use. All components are easily accessible for inspection and future servicing when required.

High comfort
The Mini has fully automatic individual temperature setting for central heating and hot water. Heat is automatically regulated, depending on outdoor temperature and/or the temperature desired inside the dwelling. Domestic hot water is heated completely separately in a high-capacity heat exchanger; thus ensuring that the hot water is always as fresh as the incoming cold water mains supply.

Simple installation
Compact dimensions, lightweight, well planned pipe runs and factory installed interior electrical routing all makes installation very simple. In addition, the pipes can be connected up or down depending on the layout of the building. The preprogrammed control device and plug connection make life even simpler in that the system can be activated immediately.

Long-term security
The Mini represents the most modern technology, and provides the answer to stringent demands for long term performance. The heat exchanger plates and all piping are manufactured in acid-resistant stainless steel. All components are closely matched and carefully tested for function in accordance with Alfa Laval's quality assurance system ISO 9001:2008. The Mini is CE and P marked.



Components

1. Heat exchanger for heating
2. Heat exchanger and temperature controller for hot water
3. Connection box for electric power and sensors, heating circuit
4. Control valve, heating circuit
5. Actuator, heating circuit
6. Supply temperature sensor, heating circuit
7. Outdoor temperature sensor
8. Room thermostat/control panel
9. Control valve, hot water
10. Temperature sensor connection, district heating supply
11. Filter for district heating supply
12. Adapter for energy meter
13. Non-return valve for cold water
14. Safety valve, domestic hot water
15. Flow switch for tap water priority (option)
16. Safety temperature limiter, domestic hot water (option)
17. Valve to top up the heating circuit
18. Safety valve, heating circuit
19. Expansion vessel, heating circuit, 12 litres
20. Filter for heating circuit
21. Pressure gauge, heating circuit
22. Underfloor heating thermostat (option)
23. Circulation pump, heating circuit
24. Shut-off valves (6 pcs)
25. District heating media, supply
26. District heating media, return
27. Cold water (cw)
28. Hot water (hw)
29. Heating circuit, return
30. Heating circuit, supply

Brass components are dezincification resistant quality. All connections, DN20, internal threading. The pipes can be connected up and/or down. Shut-off valves are included, separately packed.

District heating – a good source of heat

District heating is an efficient technology that meets the need for central heating and hot water in a simple, convenient and secure way. The expansion of district heating to its current level has reduced emission of greenhouse gases from heating by about 20%. The economics of district heating are very competitive compared with other forms of heating.

Operation

The incoming hot medium from the district heating underground network is at very high pressure and temperature. Therefore, only the heat from this is used; the district heating medium does not mix with the water in the dwelling's heating and hot water system.

Heat exchangers are used to transfer heat from the district heating medium to the water in the dwelling's central heating and hot water system. Heat is transferred through a package of thin acid-resistant, stainless steel plates, which keep the district heating medium completely separate from the dwelling's own system.

Mini has automatic temperature control for central heating. The heating circuit is adjusted in relation to the outdoor temperature and the required indoor temperature via a thermostatic control, outdoor sensor and/or indoor sensor.

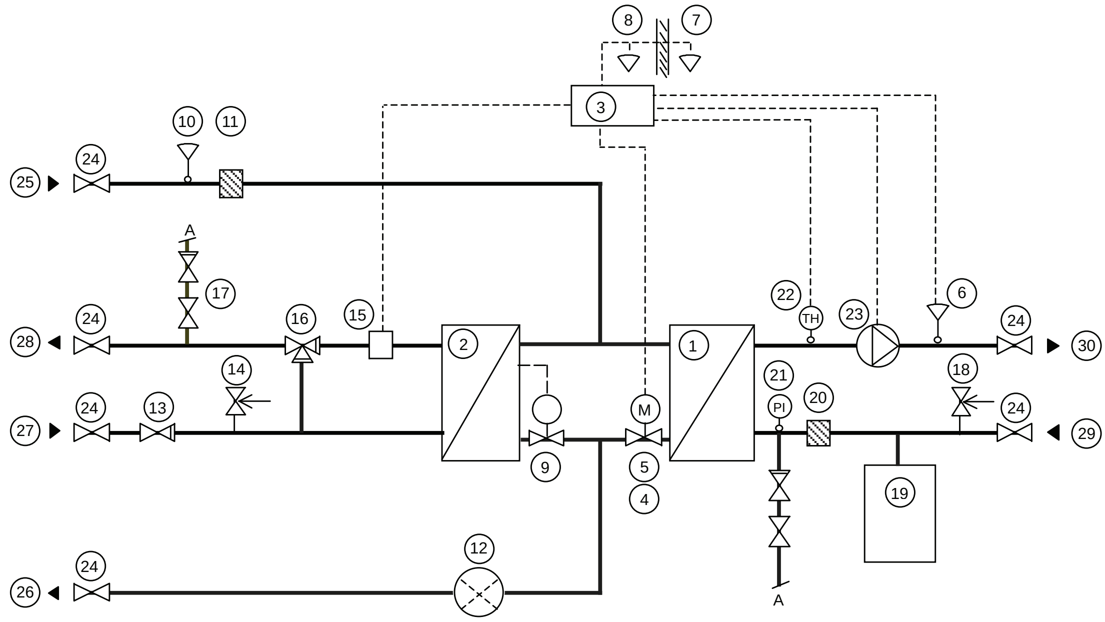
The indoor panel with the indoor sensor is always includetd and increase the comfort and saves energy.

When no heating flow is required, the heating circulation pump stops automatically, but is run occasionally to prevent seizing up due to standing still for a long time. H737 has an easy to use interface and built in energy saving functions.

A self-sensing temperature regulator controls the hot water temperature. This measures the temperature of the hot water in the heat exchanger and automatically adjusts the outgoing flow. This patented, in-house Alfa Laval design gives a constant hot water temperature irrespective of volume and pressure flow.

The district heating utility company registers use of energy. Measurement is done by recording the flow of district heating medium through the system, and by measuring the temperature difference between the medium's supply and return flow.

Diagrammatic flowchart for Mini



For underfloor heating systems
Underfloor heating systems normally require a high-capacity circulation pump, preferably electronically controlled. An under floor water flow greater than 0,30 l/s use underfloor heating version. If combined with radiator circuits, the underfloor heating circuit must be separately controlled. The instructions of the underfloor heating supplier must also be checked.

An easily manageable, economical and durable source of heat

The Mini uses the hot district heating medium for heating the domestic hot water (providing an uninterrupted supply) as well as the water in the central heating system. The Mini is a wall-hung unit and is very compact. Substations may generate sounds during operation caused by pumps, regulators systems, flow etc.

The unit is discreet and to minimize transmission of operational sounds, we recommend to install it on well insulated walls or on walls of concrete. Mini requires no attendance or maintenance and has a very long operational life. In the event of requiring service or component exchange at some future date, all parts are easily accessible and individually replaceable.

Operating data

	District heating network	Heating circuit	Hot water circuit
Design pressure, MPa	1.6	0.6	1.0
Design temperature, °C	120	100	100
Opening pressure, safety valve, MPa	-	0.25	0.9
Volume, l	0.55/0.45	0.59	0.48

Performance at available primary differential pressure 100-600 kPa

Designed temperature programme (°C)	Capacity (kW)	Primary flow (l/s)	Actual return temp. (°C)	Secondary flow (l/s)
Hot water circuit				
80-22/10-55	75	0.31	22	0.40
70-25/10-58	49	0.26	25	0.24
65-22/10-50	54	0.30	22	0.32
Heating circuit				
115-65/60-80	25	0.11	62	0.30
100-63/60-80	21	0.08	63	0.25
100-43/40-60	25	0.16	41	0.30
100-33/30-37	09	0.03	31	0.30
Underfloor heating				
115-33/30-37	18	0.05	31	0.60
100-33/30-37	18	0.06	31	0.60

Other information

Electrical data: 230 V, single phase, 100 W
Dimensions cover: 577 mm width x 458 mm depth, 770 mm height
Weight: 31 kg, cover 5 kg
Transport particulars: Total weight 40 kg, 0.23 m³

Connections	Screws
District heating media supply	G ¾"
District heating media return	G ¾"
Heating circuit supply	G ¾"
Heating circuit return	G ¾"
Cold water	G ¾"
Hot water	G ¾"

CE ISO 9001:2008

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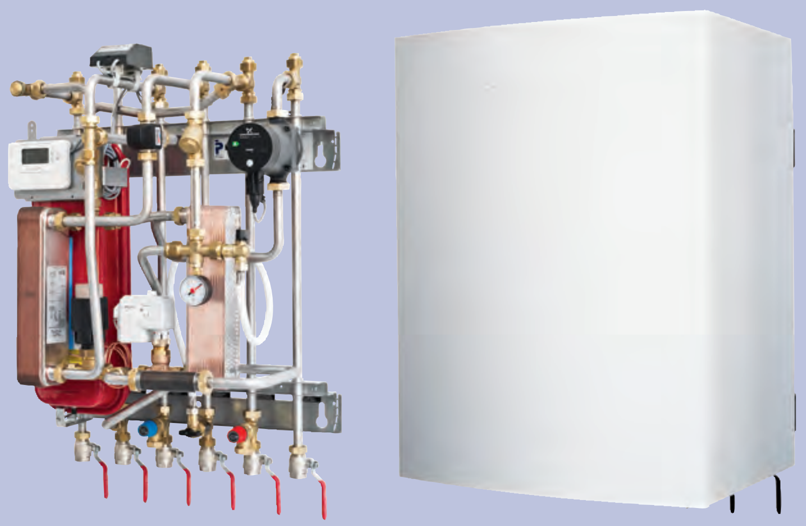
Mini ECO

District heating substation for single-family houses



The Mini ECO district heating substation is ready for installation to meet the complete central heating and hot water requirements. It is suitable for apartments and single-family houses that are connected to a heating network. Alfa Laval has many years of experience in district heating technology, which is put to expert use in the Mini ECO, resulting in its practical function and ease of use. All components are easily accessible for inspection and future servicing when required.

High comfort

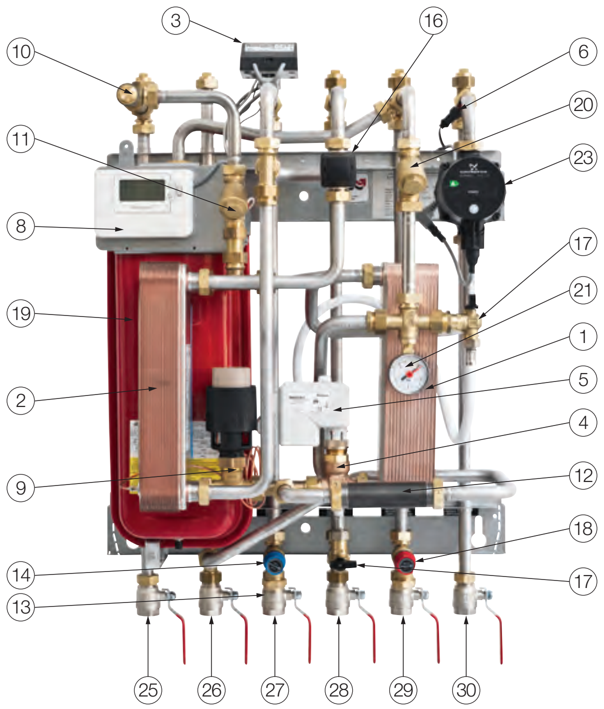
The Mini ECO has fully automatic individual temperature setting for central heating and hot water. Heat is automatically regulated, depending on outdoor temperature and/or the temperature desired inside the dwelling. Domestic hot water is heated completely separately in a high-capacity heat exchanger; thus ensuring that the hot water is always as fresh as the incoming cold water mains supply.

Simple installation

Compact dimensions, light weight, well planned pipe runs and factory installed interior electrical routing all makes installation very simple. In addition, the pipes can be connected up or down depending on the layout of the building. The pre-programmed control device and plug connection make life even simpler in that the system can be activated immediately.

Long-term security

The Mini ECO represents the most modern technology, and provides the answer to stringent demands for long term performance. The heat exchanger plates and all piping are manufactured in acid-resistant stainless steel. All components are closely matched and carefully tested for function in accordance with Alfa Laval's quality assurance system ISO 9001:2008. The Mini ECO is CE and P marked.



Components

1. Heat exchanger for heating
2. Heat exchanger and temperature controller for hot water
3. Connection box for electric power and sensors, heating circuit
4. Control valve, heating circuit
5. Actuator, heating circuit
6. Supply temperature sensor, heating circuit
7. Outdoor temperature sensor
8. Room thermostat/control panel
9. Control valve, hot water
10. Temperature sensor connection, district heating supply
11. Filter for district heating supply
12. Adapter for energy meter
13. Non return valve for cold water
14. Safety valve, domestic hot water
15. Flow switch for tap water priority (option)
16. Safety temperature limiter, domestic hot water (option)
17. Valve to top up the heating circuit
18. Safety valve, heating circuit
19. Expansion vessel, heating circuit, 12 litres
20. Filter for heating circuit
21. Pressure gauge, heating circuit
22. Underfloor heating thermostat (option)
23. Circulation pump, heating circuit
24. Shut off valves (6 pcs)
25. District heating media, supply
26. District heating media, return
27. Cold water (cw)
28. Hot water (hw)
29. Heating circuit, return
30. Heating circuit, supply

Brass component are of disinfection resistant quality. All connections, DN20, internal threaded. Plumbing connections up or down. Shut-off valves are included, separately packed.

District heating – a good source of heat
District heating is an efficient technology that meets the need for central heating and hot water in a simple, convenient and secure way. The expansion of district heating to its current level has reduced emission of greenhouse gases from heating by about 20%. The economics of district heating are very competitive compared with other forms of heating.

Operation
The incoming hot medium from the district heating underground network is at very high pressure and temperature. Therefore, only the heat from this is used; the district heating medium does not mix with the water in the dwelling's heating and hot water system. Heat exchangers are used to transfer heat from the district heating medium to the water in the dwelling's central heating and hot water system. Heat is transferred through a package of thin acid-resistant, stainless steel plates, which keep the district heating medium completely separate from the dwelling's own system.

Mini ECO has automatic temperature control for central heating. The heating circuit is adjusted in relation to the outdoor temperature and the required indoor temperature via a thermostatic control, outdoor sensor and/or indoor sensor.

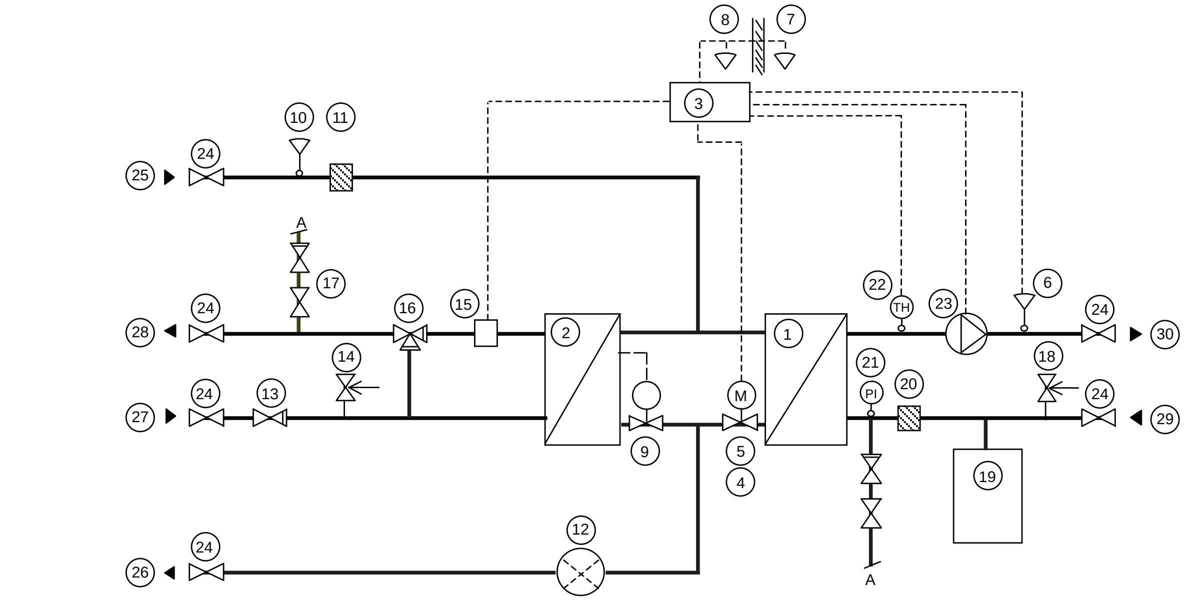
The indoor panel with the indoor sensor is always includetd and increase the comfort and saves energy.

When no heating flow is required, the heating circulation pump stops automatically, but is run occasionally to prevent seizing up due to standing still for a long time. H737 has an easy to use interface and built in energy saving functions.

A self-sensing temperature regulator controls the hot water temperature. This measures the temperature of the hot water in the heat exchanger and automatically adjusts the outgoing flow. This patented, in-house Alfa Laval design gives a constant hot water temperature irrespective of volume and pressure flow.

The district heating utility company registers use of energy. Measurement is done by recording the flow of district heating medium through the system, and by measuring the temperature difference between the medium's supply and return flow.

Diagrammatic flow chart for Mini ECO



For underfloor heating systems
Underfloor heating systems normally require a high-capacity circulation pump, preferably electronically controlled. An under floor water flow greater than 0.30 l/s use underfloor heating version. If combined with radiator circuits, the underfloor heating circuit must be separately controlled. The instructions of the under floorheating supplier must also be checked.

An easily manageable, economical and durable source of heat

The Mini ECO uses the hot district heating medium for heating the domestic hot water (providing an uninterrupted supply) as well as the water in the central heating system. The Mini ECO is a wall-hung unit and is very compact. Substations may generate sounds during operation caused by pumps, regulators systems, flow etc. The unit is discreet and to minimize transmission of operational sounds, we recommend to install it on well insulated walls or on walls of concrete. Mini ECO requires no attendance or maintenance and has a very long operational life. In the event of requiring service or component exchange at some future date, all parts are easily accessible and individually replaceable.

Operating data

	District heating network	Heating circuit	Hot water circuit
Design pressure, MPa	1.6	0.6	1.0
Design temperature, °C	120	100	100
Relief valve opening pressure, MPa	-	0.25	0.9
Volume, l	0.55/0.45	0.59	0.48

Performance at available primary differential pressure 100-600 kPa

Designed temperature programme (°C)	Capacity (kW)	Primary flow (l/s)	Actual return temp. (°C)	Secondary flow (l/s)
Hot water circuit				
80-22/10-55	75	0.31	22	0.40
70-25/10-58	49	0.26	25	0.24
65-22/10-50	54	0.30	22	0.32
Heating circuit				
115-65/60-80	25	0.11	62	0.30
100-63/60-80	21	0.14	63	0.25
100-43/40-60	25	0.08	41	0.30
100-33/30-37	9	0.03	31	0.30

Underfloor heating version				
115-33/30-37	18	0.05	31	0.6
100-33/30-37	18	0.06	31	0.6

Other information
Electrical data: 230 V, single phase, 100 W
Dimensions: 577 mm width x 458 mm depth, 770 mm height
Weight: 31 kg, casing 5 kg
Transport particulars: Total weight 40 kg, volume 0.23 m³

Connections	Screws
District heating media supply	G ¾
District heating media return	G ¾
Heating circuit supply	G ¾
Heating circuit return	G ¾
Cold water	G ¾
Hot water	G ¾

CE ISO 9001:2008

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Mini XL

District heating substation for single and multi-family houses (1-8 dwellings)

The Mini XL district heating substation is ready for installation to meet the complete central heating and hot water requirements. It is suitable for single-family houses and multi-family buildings (1-8 dwellings) that are connected to a heating network.

Alfa Laval has many years of experience in district heating technology, which is put to expert use in the Mini XL, resulting in its practical function and ease of use. All components are easily accessible for inspection and future servicing when required.

High comfort

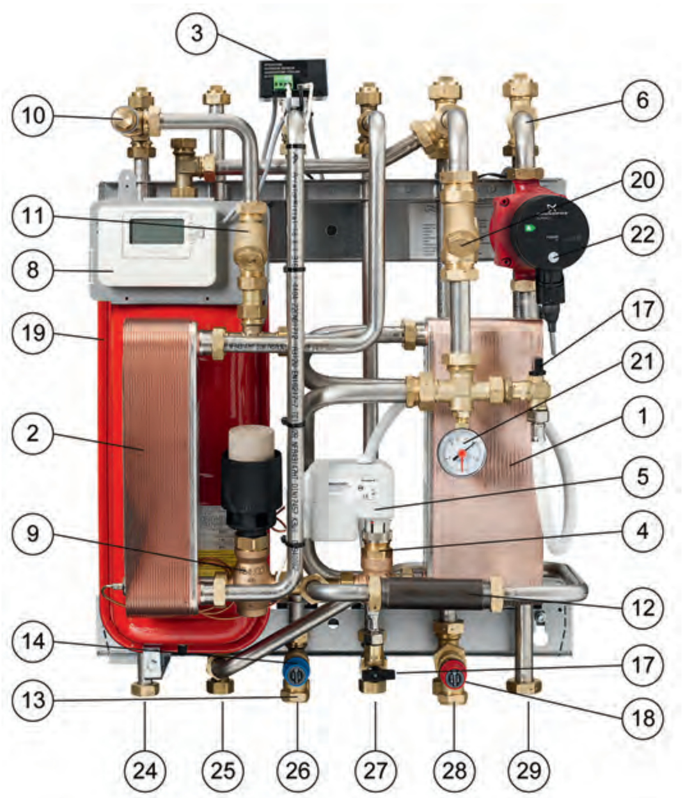
The Mini XL has a fully automatic individual temperature setting for central heating and hot water. Heat is automatically regulated, depending on outdoor temperature and/or the desired temperature inside the building. Domestic hot water is heated completely separately in a high-capacity heat exchanger; thus ensuring that the hot water is always as fresh as the incoming cold water mains supply.

Simple installation

Compact dimensions, lightweight, well-planned pipe runs and factory-installed interior electrical routing all make installation very simple. In addition, the pipes can be connected up or down depending on the layout of the building. The preprogrammed control device and plug connection make life even simpler in that the system can be activated immediately.

Long-term security

The Mini XL represents the most modern technology, and provides the answer to stringent demands for long-term performance. The heat exchanger plates and all piping are manufactured in acid-resistant stainless steel. All components are closely matched and carefully tested for function in accordance with Alfa Laval's quality assurance system ISO 9001:2008. The Mini XL is CE marked to certify that the substation conforms to international safety regulations.



Components

1. Heat exchanger for heating
2. Heat exchanger and temperature controller for hot water
3. Connection box for electric power and sensors, heating circuit
4. Control valve for heating circuit
5. Actuator, heating circuit
6. Supply temperature sensor, heating circuit
7. Outdoor temperature sensor
8. Room thermostat/control panel
9. Control valve for hot water
10. Temperature sensor connection, district heating supply
11. Filter for district heating supply
12. Adapter for energy meter
13. Non-return valve for cold water
14. Safety valve, domestic hot water
16. Safety temperature limiter, domestic hot water (option)
17. Valve to top up the heating circuit
18. Safety valve, heating circuit
19. Expansion vessel, heating circuit, 12 litres
20. Filter for heating circuit
21. Pressure gauge, heating circuit
22. Circulation pump, heating circuit
23. Shut-off valves (6 pcs)
24. District heating media, supply
25. District heating media, return
26. Cold water (cw)
27. Hot water (hw)
28. Heating circuit, return
29. Heating circuit, supply

Brass components are dezincification resistant quality. Connections for district heating and tap water DN20, internal threading. Connections for heating DN25, internal threading. The pipes can be connected up and/or down. Shut-off valves are included and come with the delivery.

District heating – an excellent heating method
District heating is an efficient technology that meets the need for central heating and hot water in a simple, convenient and secure way. The expansion of district heating to its current level has reduced the emission of greenhouse gases from heating by about 20%. The economics of district heating are very competitive compared with other forms of heating.

Operation
The incoming hot medium from the district heating underground network is at very high pressure and temperature. Therefore, only the heat from this is used; the district heating medium does not mix with the water in the dwelling's heating and hot water system.

Heat exchangers are used to transfer heat from the district heating medium to the water in the dwelling's central heating and hot water system. Heat is transferred through a package of thin acid-resistant, stainless steel plates, which keep the district heating medium completely separate from the dwelling's own system.

Mini XL has automatic temperature control for central heating. The heating circuit is adjusted in relation to the outdoor temperature and the required indoor temperature via a thermostatic control, outdoor sensor and/or indoor sensor.

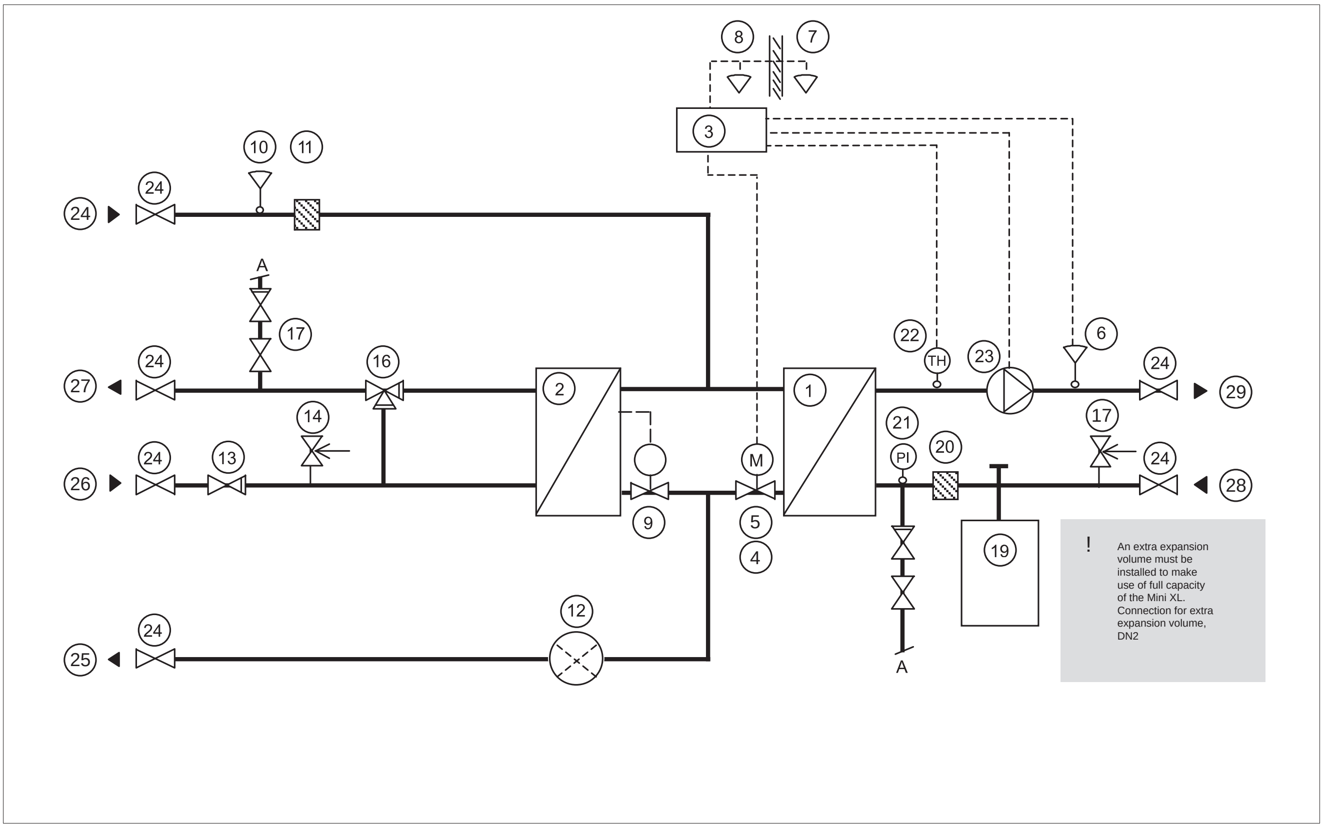
The indoor panel with the indoor sensor is always includedt and increase the comfort and saves energy.

When no heating flow is required, the heating circulation pump stops automatically, but is run occasionally to prevent seizing up due to standing still for a long time. H737 has an easy to use interface and built in energy saving functions.

A self-sensing temperature regulator controls the hot water temperature. This measures the temperature of the hot water in the heat exchanger and automatically adjusts the outgoing flow. This patented, in-house Alfa Laval design gives a constant hot water temperature irrespective of volume and pressure flow.

The district heating utility company registers use of energy. Measurement is done by recording the flow of the district heating medium through the system, and by measuring the temperature difference between the medium's supply and return flow.

Diagrammatic flow chart for Mini XL



An easily manageable, economical and durable source of heat

The Mini XL uses the hot district heating medium for heating the domestic hot water (providing an uninterrupted supply) as well as the water in the central heating system. The Mini XL is a wall-hung unit and is very compact. Substations may generate sounds during operation caused by pumps, regulator systems, flow, etc. The unit is discreet and to minimise the transmission of operational sounds, we recommend installing it on well-insulated walls or on walls of concrete. The Mini XL requires no attendance or maintenance and has a very long operational life. In the event of requiring service or component exchange at a later date, all parts are easily accessible and individually replaceable.

Operating data

	District heating medium	Heating circuit	Hot water circuit
Design pressure, MPa	1.6	0.6	1.0
Design temperature, °C	120	100	100
Opening pressure, safety valve, MPa	-	0.25	0.9
Volume, l	1.0/0.62	1.05	0.64

Performance at available primary differential pressure 100-600 kPa

Designed temperature programme (°C)	Capacity (kW)	Primary flow (l/s)	Actual return temp. (°C)	Sec-ondary flow (l/s)
Hot water circuit				
80-22/10-55	113	0.47	22	0.60
70-25/10-58	70	0.37	25	0.35
65-22/10-50	75	0.45	22	0.42
Heating circuit				
115-65/60-80	50	0.22	61	0.60
100-63/60-80	50	0.32	63	0.60
100-43/40-60	50	0.20	41	0.60

Other information
Electrical data: 230 V, single phase, 100 W
Dimensions (cover): 577 mm width x 458 mm depth, 700 mm height
Weight: 33 kg, casing 5 kg
Transport particulars: Total weight 42 kg, 0.23 m³

Connections	Screws
District heating media supply	G ¾”
District heating media return	G ¾”
Heating circuit supply	G1”
Heating circuit return	G1”
Cold water	G ¾”
Hot water	G ¾”

CE ISO 9001:2008

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Mini Plus

District heating substation for single-family houses and multi-family buildings

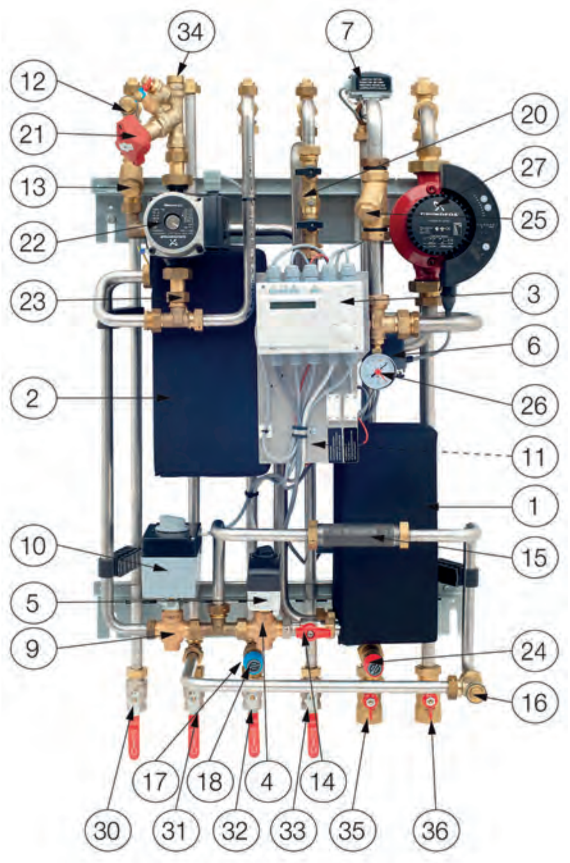
The Mini Plus district heating substation is ready for installation to meet the complete central heating and hot water requirements. It can be used for single-family houses or multi-family buildings (1-12 dwellings).

Alfa Laval has many years of experience in district heating technology, which is put to expert use in the Mini Plus, resulting in its practical function and ease of use. All components are easily accessible for inspection and future servicing when required.

High comfort
The Mini Plus has a fully automatic individual temperature setting for central heating and hot water. Heat is automatically regulated, depending on outdoor temperature and the desired temperature inside the building. Domestic hot water is heated completely separately in a high-capacity heat exchanger, thus ensuring that the hot water is always as fresh as the incoming cold water from the mains supply.

Simple installation
Compact dimensions, lightweight, well-planned pipe runs and factory-installed interior electrical routing all make installation very simple. In addition, the pipes can be connected up or down depending on the layout of the building. The pre-programmed control device and plug connection make life even simpler in that the system can be activated immediately.

Long-term security
The Mini Plus represents the most modern technology, and provides the answer to stringent demands for long-term performance. The heat exchanger plates and all piping are manufactured in acid-resistant stainless steel. All components are closely matched and carefully tested for function in accordance with Alfa Laval's quality assurance system ISO 9001:2008. The Mini Plus is CE-marked to certify that the substation confirms to international safety regulations.



Components

1. Heat exchanger for heating
2. Heat exchanger for domestic hot water
3. Operator control panel with connection box
4. Control valve, heating circuit
5. Actuator, heating circuit
6. Supply temperature sensor, heating circuit
7. Return temperature sensor, heating circuit
8. Outdoor temperature sensor
9. Control valve for domestic hot water
10. Actuator, domestic hot water
11. Supply temperature sensor, domestic hot water
12. Temperature sensor connection, district heating supply
13. Filter for district heating supply
14. Summer shut-off valve, heating
15. Adapter for energy meter
16. Temperature sensor connection, district heating return
17. Check valve for cold water
18. Safety valve for domestic hot water
19. Flow switch (option)
20. Topping-up heating
21. Balancing valve DHWC
22. Circulation pump for DHWC
23. Check valve for DHWC
24. Safety valve for heating circuit
25. Filter for heating circuit
26. Pressure gauge for heating circuit
27. Circulation pump for heating circuit
28. Underfloor heating thermostat (option)
29. Shut-off valve
30. District heating media, supply
31. District heating media, return
32. Cold water
33. Hot water
34. Domestic hot water circulation
35. Heating circuit, return
36. Heating circuit, return

Brass components are of dezincification-resistant quality. Connections for district heating and tap water DN20, internal threading. Connections for heating DN25, internal threading. The pipes can be connected up and/or down. Shut-off valves are included and come with the delivery.

District heating – an excellent heating method
District heating is an efficient technology that satisfies the need for central heating and hot water in a simple, convenient and secure way. The expansion of district heating to its current level has reduced emission of greenhouse gases from heating by about 20%. The financial aspects of district heating are very competitive compared with other forms of heating.

Operation
The incoming hot medium from the district heating underground network is at very high pressure and temperature. Therefore, only the heat from this is used; the district heating medium does not mix with the water in the heating and hot water system in the building. Heat exchangers are used to transfer heat from the district heating medium to the water in the dwelling's central heating and hot water system.

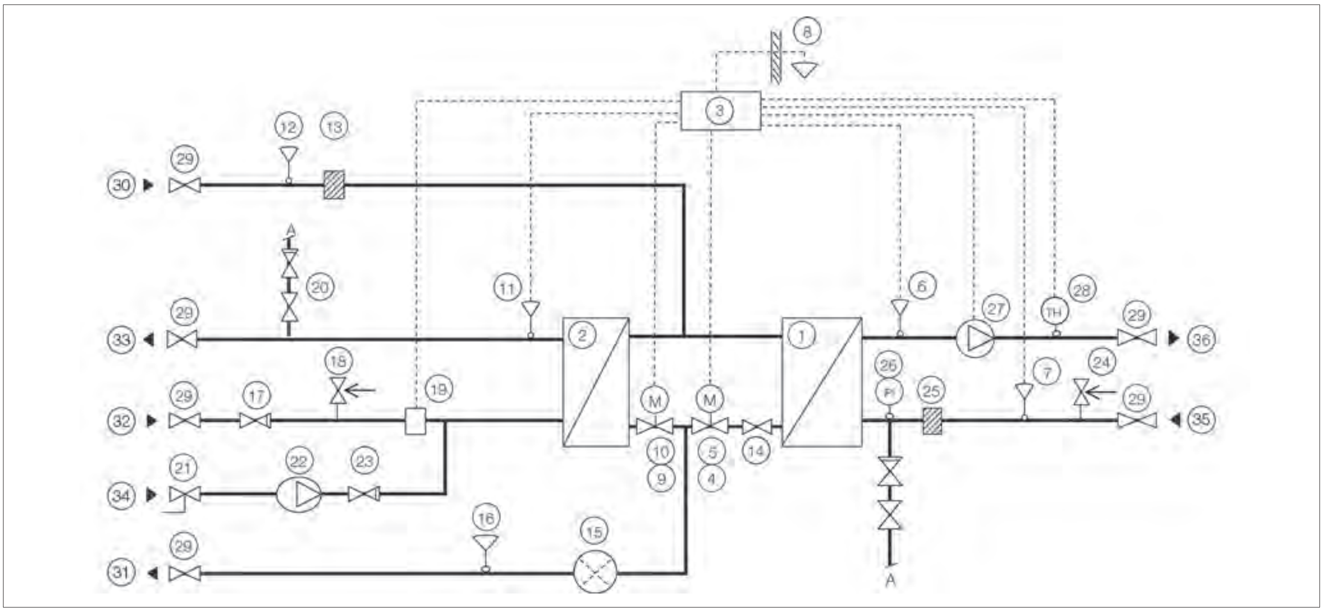
Heat is transferred through a package of thin acid-resistant, stainless steel plates, which keep the district heating medium completely separate from the building's own system.

Mini Plus has automatic temperature control for central heating and hot water. The heating circuit is adjusted in relation to the outdoor temperature and the required indoor temperature via a thermostatic control and outdoor temperature sensor. When no heating flow is required, the heating circulation pump stops automatically, but is run occasionally to prevent seizing up due to long standstill.

An automatic temperature regulator controls the hot water temperature. This measures the temperature of the hot water in the heat exchanger and automatically adjusts the outgoing flow.

The district heating utility company registers use of energy. Measurement is done by recording the flow of the district heating medium through the system, and by measuring the temperature difference between the medium's supply and return flow.

Diagrammatic flow chart for Mini Plus



An easily manageable, economical and durable source of heat

The Mini Plus uses the hot district heating medium for heating domestic hot water (providing an uninterrupted supply) as well as the water in the central heating system. The Mini Plus is a wall-hung unit and is very compact. Substations may generate noise during operation caused by pumps, regulators systems, flow etc.

The unit is discreet, and to minimize transmission of operational noise we recommend installing it on well insulated walls or on walls of concrete. Mini Plus requires no attendance or maintenance and has a very long operational life. In the event service is required or components need to be exchanged at some future date, all parts are easily accessible and individually replaceable.

Operating data

	District heating medium	Heating circuit	Hot water circuit
Design pressure, MPa	1.6	1.0	1.0
Design temperature, °C	120	100	100
Opening pressure, safety valve, MPa	-	0.25	0.9
Volume, l	1.01/1.47	1.05	1.62

Performance at available primary differential pressure 100-600 kPa

Designed temperature programme (°C)	Capacity (kW)	Primary flow (l/s)	Actual return temp. (°C)	Secondary flow (l/s)
Hot water circuit				
80-22/10-55	113	0.42	16	0.60
70-25/10-58	100	0.48	20	0.50
65-22/10-55	113	0.63	22	0.60
65-22/10-55	82	0.43	20	0.43
Heating circuit				
115-65/60-80	66*	0.30	62	0.79
100-63/60-80	57*	0.37	63	0.68
100-53/50-70	65*	0.33	52	0.78
100-33/30-37	23*	0.08	31	0.79

* With Magna circulation pump

Other information

Electrical data: 230 V, 1-phase, 120 W
Dimensions (cover): 600 mm width x 470 mm depth, 1000 mm height
Weight: 33 kg, casing 5 kg
Transport particulars: Total weight 45 kg, 0.4 m³

Connections	Screws
District heating media supply	G ¾"
District heating media return	G ¾"
Heating circuit supply	G1"
Heating circuit return	G1"
Cold water	G ¾"
Hot water	G ¾"

CE ISO 9001:2008

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Alfa Laval Midi Wall

District heating substation for multi-family houses (10-30 dwellings)

Alfa Laval Midi Wall is a complete, ready-to-install district heating substation for heating and hot water. Midi Wall is available in three sizes. The sizes offered are 70, 100 and 135 kW heating, with matching hot water output.

Alfa Laval has many years of experience in district heating technology, which is put to expert use in the Midi Wall, resulting in well-planned pipe-work and with all components easily accessible for inspection and future servicing.

Comfort

Midi Wall has fully automatic temperature control for heating and hot water. The outside temperature is used to control heating. The hot water temperature is set and maintained at the desired temperature.

To achieve the very best control performance and lowest return temperature, Midi Wall has been equipped with a DHW Heat Exchanger in two stroke.

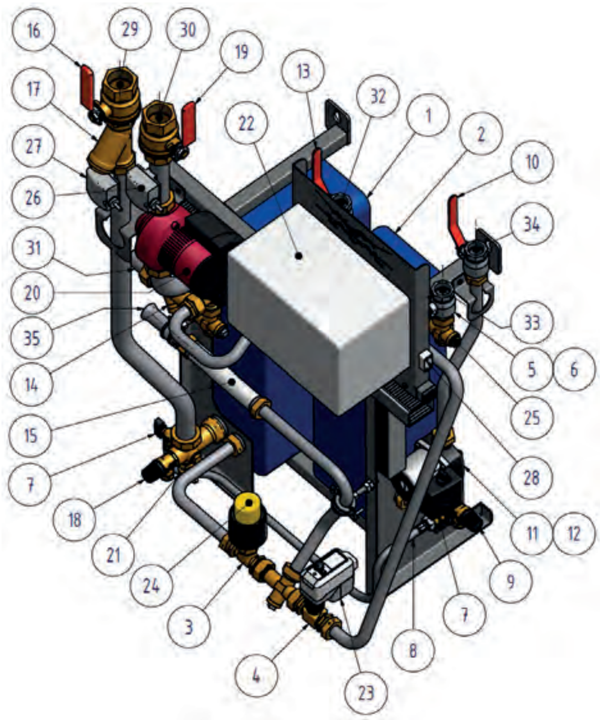
Simple installation

Compact dimensions, light weight, well-planned pipe runs and factory-installed interior electrical routing all make installation very simple. The pre-programmed control device and plug connection make life even simpler in that the system can be activated immediately.

Long-term security

The Midi Wall represents the most modern technology, and provides the answer to stringent demands for long-term performance. The heat exchanger plates and all piping are manufactured in acid-resistant stainless steel. All components are closely matched and carefully tested for function in accordance with Alfa Laval's quality assurance system ISO 9001:2008.

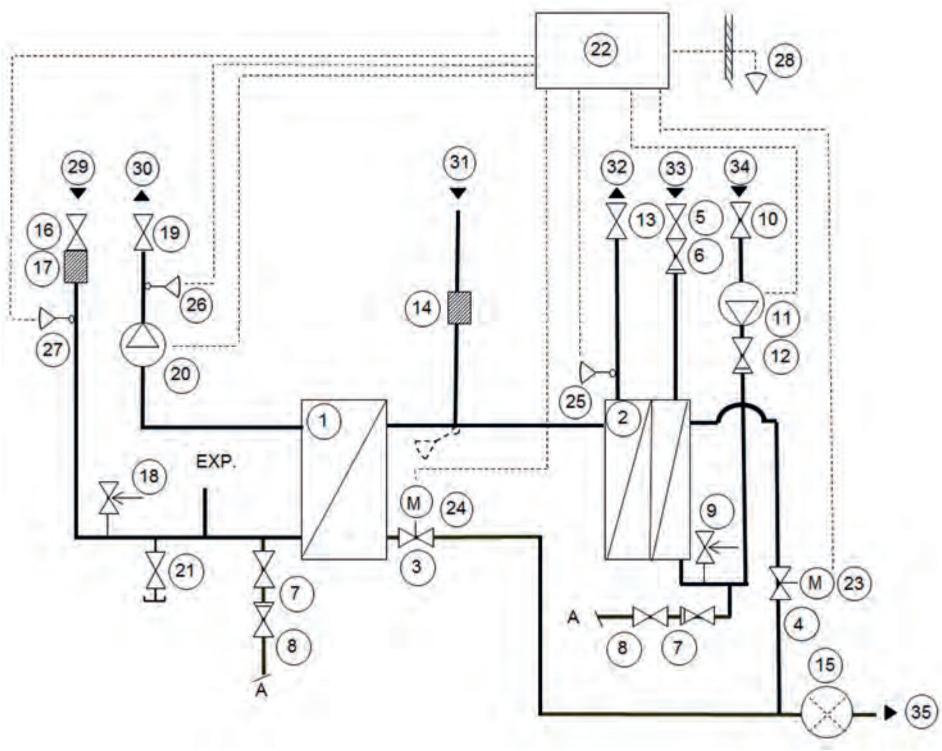
Midi Wall is CE-marked to certify that the substation conforms to international safety regulations. To maintain the validity of the CE marking, only identical replacement parts may be used.



Components

1. Heat exchanger, heating
2. Heat exchanger, DHW
3. Control valve, heating
4. Control valve, DHW
5. Shut-off valve, CW
6. Non-return valve, CW
7. Topping up
8. Hose
9. Safety valve, CW
10. Shut-off valve, DHWC
11. Pump, DHWC
12. Non-return valve, DHWC
13. Shut-off valve, DHW
14. Strainer, primary in
15. Dummy, heat meter
16. Shut-off valve, heating return
17. Strainer, heating return
18. Safety valve, heating
19. Shut-off valve, heat supply
20. Pump, heating
21. Draining valve, heating return
22. Control center
23. Actuator, DHW
24. Actuator, heating
25. Temperature sensor, DHW supply
26. Temperature sensor, heating supply
27. Temperature sensor, heating return
28. Temperature sensor, outdoor
29. Heating return
30. Heating supply
31. District heating supply
32. DHW
33. CW
34. DHWC
35. District heating return

Connections for district heating are welded connections in DN25, for tap water side internal threaded connections in G 1" and for heating side internal threaded connections in G 1½".



Operating data	Primary side	Heating	DHW
Design pressure, PS	16 bar	6 bar	10 bar
Design temperature TS, °C	120	90	90
Relief pressure safety valve	-	3 bar	9 bar
Volume, heat exchanger, L	1.44-3.0/2.1	1.55-3.0	2.1

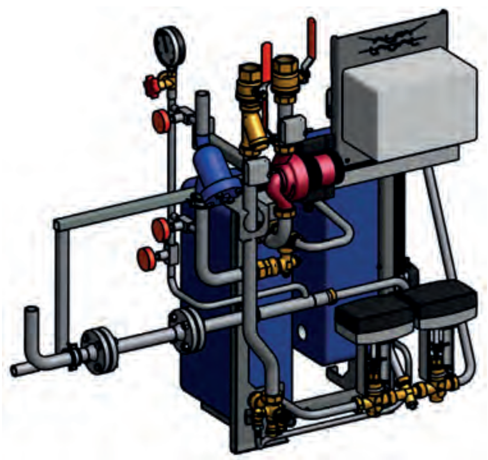
Performance at available primary differential pressure 100-600 kPa

Type	Temperature programme (°C)	Capacity (kW)	Primary flow (l/s)	Actual return temperature (°C)	Secondary flow (l/s)
Heating circuit					
Midi Wall 70	100-63/60-80 100-43/40-60	74 73	0.48 0.31	62.5 41.3	0.89 0.87
Midi Wall 100	100-63/60-80 100-43/40-60	119 116	0.77 0.49	62.2 40.6	1.42 1.39
Midi Wall 135	100-63/60-80 100-43/40-60	139 136	0.90 0.57	62.1 40.4	1.66 1.63
Hot water circuit					
Midi Wall 70	65-22/10-55 70-22/10-55 70-25/10-55	124 137 137	0.71 0.70 0.75	22 22 25	0.66 0.73 0.73
Midi Wall 100	65-22/10-55 70-22/10-55 70-25/10-55	124 137 137	0.71 0.70 0.75	22 22 25	0.66 0.73 0.73
Midi Wall 135	65-22/10-55 70-22/10-55 70-25/10-55	124 137 137	0.71 0.70 0.75	22 22 25	0.66 0.73 0.73

Connections	Weld	Thread
District heating supply	DN25	
District heating return	DN25	
Heating supply		G 1½"
Heating return		G 1½"
Cold water		G 1"
Hot water		G 1"
Hot water circulation		G 1"
Expansion vessel		G 3/4 "

Other information
Electrical data: 230 V 50 Hz, single phase, 290-315 W
Sound level: <70 dB(A), 1.6 meters above the floor and 1 meter from the sound source
Dimensions: 730 x 510 x 1115 mm (W x D x H)
Weight: 65-85 kg
Support leg is included in all deliveries

Options



3-point HB measurement
item. nr 738662

Floor stand
item nr FR-1183

- Underfloor heating thermostat
  item nr AM-1069
- Adjustable valve DHWC
  item. nr VAB-1013
- GENI Module
  item.nr SP-1104

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Midi Compact

District heating substation for multi-family houses (10-50 dwellings)

Midi Compact is a complete, ready-to-install district heating substation for heating and hot water. Midi Compact is available in four sizes. The sizes offered are 80, 100, 160 and 200 kW heating, with matching hot water output.

Alfa Laval has years of experience in district heating technology and has developed Midi Compact with well-planned pipe-work and with all components easily accessible for inspection and future servicing.

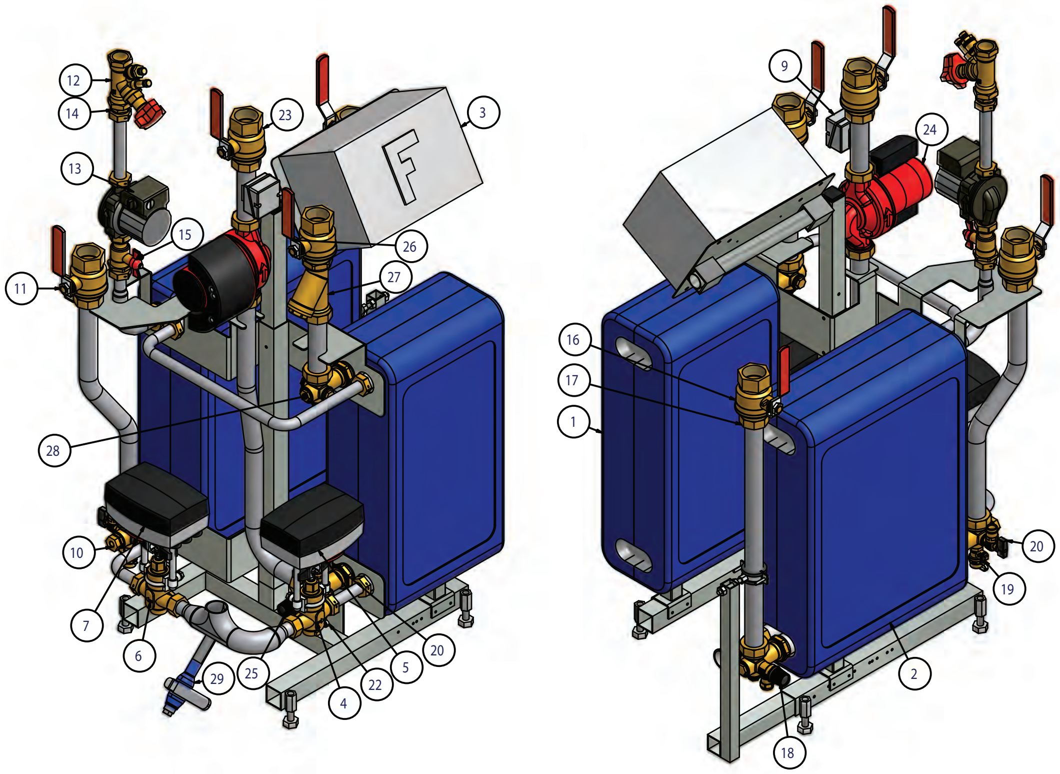
Comfort
Midi Compact has fully-automatic temperature control for heating and hot water. The outside temperature is used to control heating. The hot water temperature is set and maintained at the desired temperature. The unit has been designed with a two-step connection in order to have the best control performance and to optimize cooling on the primary return for best long term life cycle cost and performance.

Simple installation
Installation is easy due to well planned pipe-work and pre-wiring. A pre-programmed controller with plug connection, which makes it easy to start the substation without delay. With its small size and light weight, the Midi Compact is easy to carry in, mount and maintain in both new and renovated buildings.

Long-term security
The Midi Compact represents the most modern technology, and provides the answer to stringent demands for long-term performance. The heat exchanger plates and all piping are manufactured in acid-resistant stainless steel. All components are closely matched and carefully tested for function in accordance with Alfa Laval's quality assurance system ISO 9001:2008.

Midi Compact is CE-marked to certify that the substation conforms to international safety regulations. To maintain the validity of the CE marking, only identical replacement parts may be used.

Features and benefits
- Complete installation package - tap water and space heating available in four sizes.
- Optimized price/performance, Alfa Laval world class technology heat exchangers.
- Optimized parameter settings on the control loops and 2-step for lowest return temperature and best control performance.
- Short delivery time, shipment from warehouse - easy to install, just plug-and-play.
- Extremely small footprint, optimized compact design and low weight with good accessibility for service and maintenance.
- Best performance for longterm use - stainless steel piping.
- Reduces the use of energy - individual measuring of energy available.

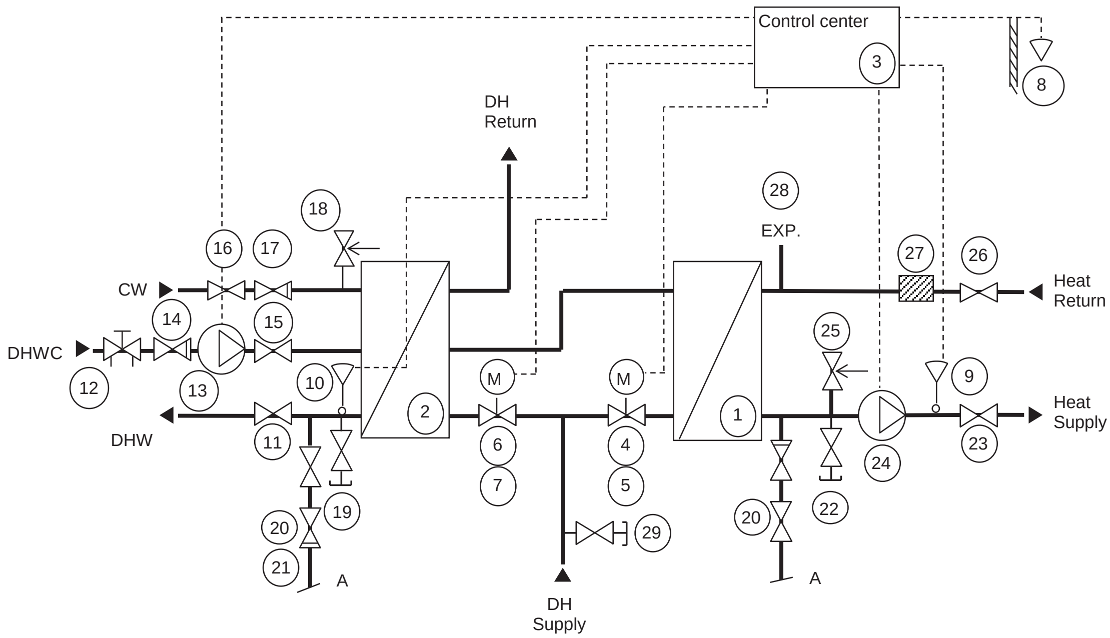


Connections for district heating are welded connections in DN32, for tap water circulation it is internal threaded connection in G 1" and for DHW & heating side internal threaded connections G 1½".

Components

1. Heat exchanger, heating
2. Heat exchanger, DHW
3. Control center *
4. Control valve, heating
5. Actuator, heating *
6. Control valve, DHW
7. Actuator, DHW *
8. Temperature sensor, outdoor *
9. Temperature sensor, heating supply *
10. Temperature sensor, DHW supply *
11. Shut-off valve, DHW
12. Balancing valve, DHWC
13. Pump, DHWC
14. Non return valve, DHWC
15. Shut-off valve, DHWC
16. Shut-off valve, CW
17. Non return valve, CW
18. Safety valve, CW
19. Draining valve, DHW supply
20. Topping up
21. Hose
22. Draining valve, heat supply
23. Shut-off valve, heat supply
24. Pump heating
25. Safety valve, heating
26. Shut-off valve, heating return
27. Strainer, heat return
28. Connection expansion vessel
29. Draining valve, DH supply

* Option



Operating data

	Primary side	Heating	DHW
Design pressure, PS	16 bar	6 bar	10 bar
Design temperature TS, °C	120	100	100
Relief pressure safety valve	-	3 bar	9 bar
Volume, heat exchanger, L	2.1-5.2 / 1.85-2.88	2.1-5.2	1.75-3.2

Performance at available primary differential pressure 100-600 kPa

Type	Temperature programme (°C)	Capacity (kW)	Primary flow (°C)	Actual return temperature (°C)	Secondary flow (l/s)
Heating circuit					
Midi Compact 80	100-63/60-80	82	0.55	63	1.00
	100-43/40-60	123	0.53	42.5	1.49
Midi Compact 100	100-63/60-80	105	0.71	63	1.28
	100-43/40-60	150	0.65	42.4	1.81
Midi Compact 160	100-63/60-80	162	1.09	63	1.97
	100-43/40-60	163	0.71	41.4	1.97
Midi Compact 200	100-63/60-80	209	1.41	62.9	2.55
	100-43/40-60	210	0.92	41.5	2.54
Hot water circuit					
Midi Compact 80	65-22/10-55	111	0.63	22	0.59
	70-25/10-55	126	0.69	19.9	0.67
Midi Compact 100	65-22/10-55	111	0.63	22	0.59
	70-25/10-55	126	0.64	19.9	0.67
Midi Compact 160	65-22/10-55	139	0.79	22	0.74
	70-25/10-55	156	0.85	19.8	0.83
Midi Compact 200	65-22/10-55	183	1.04	22	0.97
	70-25/10-55	198	1.08	19.5	1.05

Welded connections

District heating supply	DN32
District heating return	DN32

Threaded connections

Heating supply	G 1½”	DN40
Heating return	G 1½”	DN40
Cold water	G 1½”	DN40
Hot water	G 1½”	DN40
Hot water circulation	G 1”	DN25
Expansion vessel	G ¾”	DN20

Other information

Electrical data: 230 V 50Hz, single phase, 290-315 W
Sound level: <70 dB(A), 1.6 meters above the floor and 1 meter from the sound source
Dimensions: 800 mm width x 600 mm depth, 1300 mm height
Weight: 80-110 kg
Alfa Laval reserves the right to change specifications without prior notification.

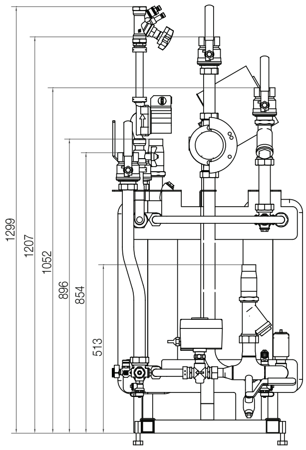
Midi Compact completed with different primary heat meter sections

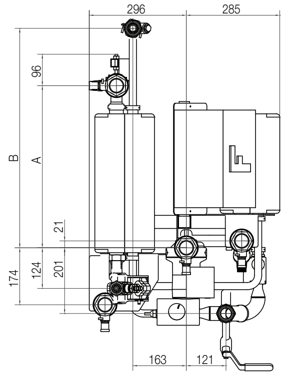
Integrated threaded vertical meter section

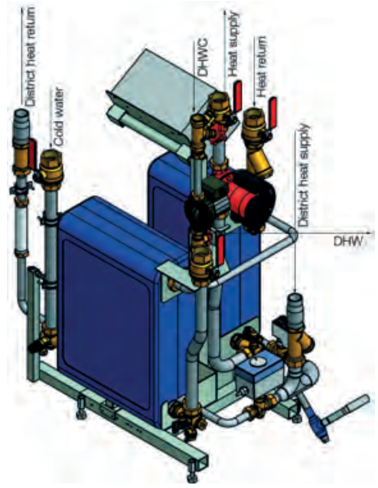
- Prefabricated place for heat meter integrated in the substation.
- Completed for measuring of heat metering.
- Vertical meter section with 5X before and 3X measure pipe DN after meter.
- Pressure norm PN16.
- Connection size welded DN32.

Consisting of:

- Filter with drain-off valve.
- Pocket for temperature sensor in DN15.
- Meter section for heat metering, threaded dummy DN25 L=190 mm.
- Drain-off valve in primary circuit.





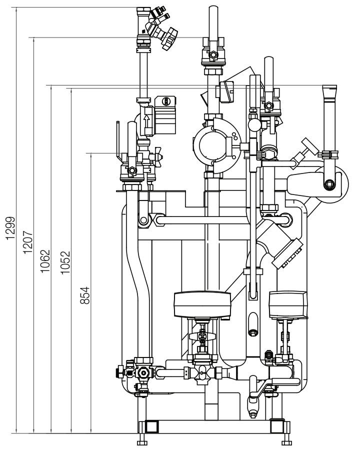


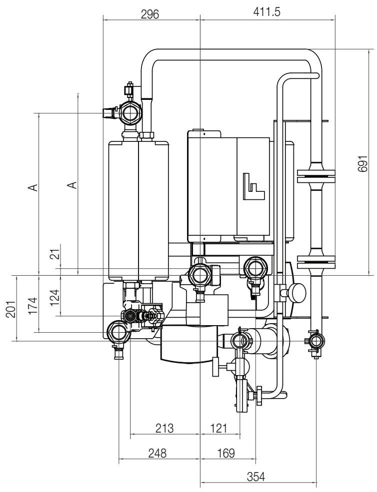
Integrated flanged horizontal meter section

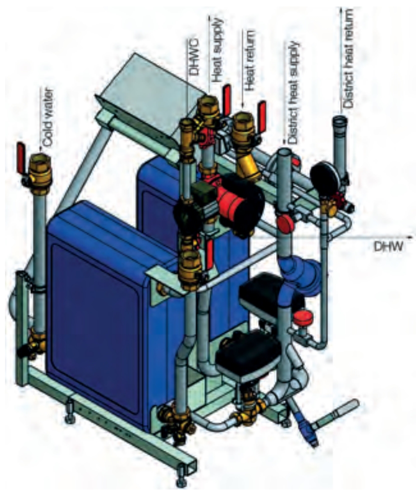
- Prefabricated place for heat meter integrated in the substation.
- Completed for measuring of heat metering.
- Horizontal meter section with 10X before and 5X measure pipe DN after meter.
- Pressure norm PN16.
- Connection size welded DN32.

Consisting of:

- Filter with drain-off valve.
- 3 points metering, over filter and before heat meter.
- Pocket for temperature sensor in DN15.
- Meter section for heat metering, flanged dummy DN25 L= 260 mm.
- Drain-off valve in primary circuit.







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Midi Compact IQHeat

District heating substation with communication for medium buildings

Midi Compact-IQHeat is a district heating substation for the connection of apartment blocks and other medium buildings to district heating networks. IQHeat is our most advanced substation. It comes with integrated DDC and web solution.

Midi Compact-IQHeat reduces heating costs and flow charges for the property owner and gives lower return temperatures for network.

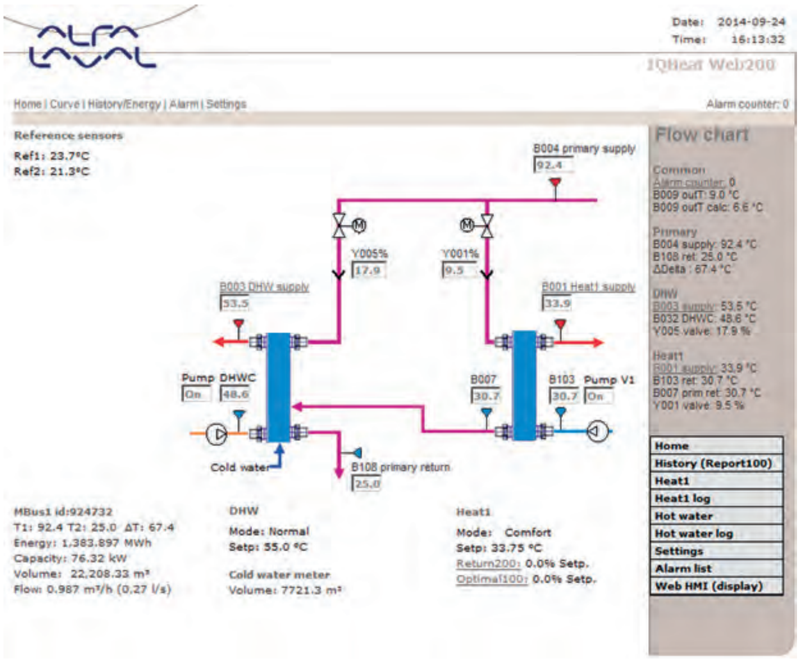
Midi Compact-IQHeat is manufactured and sold by Alfa Laval which has unique and world-leading expertise in the field of pre-fabricated district heating substations.

Complete and ready for operation upon delivery
Midi Compact-IQHeat comes ready for operation and complete with a DDC unit and web solution according to customer specifications.

The built-in simple Web solution can be used for easy connection to the internet. Basic software is installed and ready for operation. Communication and control takes place via the internet, ModBus or with a built-in operator panel.

Management, control and readings
IQHeat can be controlled and monitored using a standard PC with an internet connection or by an operator panel. With the Web200 option, all operating information is displayed graphically on the computer screen but is also stored as Excel files for cost accounting, statistics and more.

When connecting to existing property systems, IQHeat can communicate across different protocols, see Options. IQHeat always uses multiple sensors to ensure that troubleshooting and optimisation is possible remotely.



Flow Image via IQheat Web

In order to monitor and control one or more Midi Compact IQHeat district heating substations, no special equipment is required, just a standard web interface.

With IQWeb200 you download a flow image from IQHeat via the Internet to your computer screen or smart phone. If several substations are controlled from your computer, each substation has its own flow image. Here you get a quick overview of the district heating substation temperatures. If the values need to be adjusted, you do so on the following sides. This allows you to easily adjust, for example, for seasonal changes and to optimise operating costs.

Under the heading operation history, eight days of operation is displayed in the form of a curve chart. All operational history is continuously stored in XML files for Excel, and you can save up to 20 years of data. The operational history gives you transparent control of your adjustments and in so doing gives you both valuable feedback and statistics.

After the settings are made IQHeat automatically regulates flows and temperatures without any special supervision or control. The system has alarm functions for many parameters, such as overheating and scalding risk, operation of pumps and pressure in expansion vessels. Alarms can be sent as e-mails or SMS, see options.

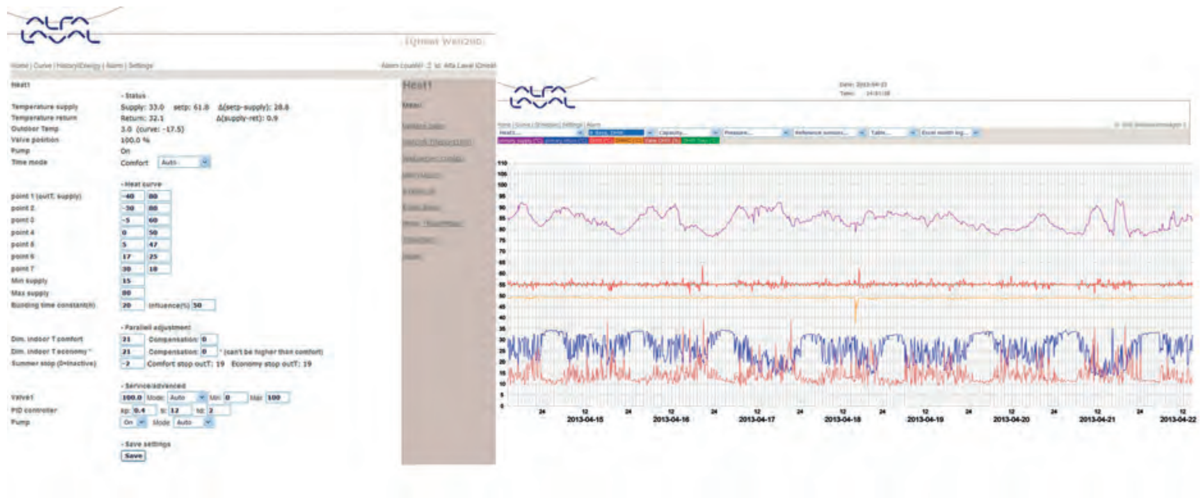
Weather forecast control, eGain forecasting™
IQHeat is prepared for direct communication with weather forecast services from eGain. With an IQHeat the communication of weather forecast for a building is done by WEB directly to eGain's servers holding data for each building. No extra hardware is needed, the IQWeb200 manage all communication.

Visit *http://egain.se/en-gb/* for more information of this unique weather forecasting, and its possibilities.

The major advantages with Midi Compact IQHeat is that the 2-step connected standardized substation, in four sizes, has a very small foot-print, short delivery time and several options for integrated primary circuits. It has been developed and configured to meet the optimum performance for heating and DHW. Low return temperature together with the energy saving functions makes Midi Compact IQHeat the very best choice in this range, with proven energy savings up to 15%. Midi Compact IQHeat is wired and tested from the factory, this provides optimum performance and also clear guarantee undertakings, all from one single supplier.

Midi Compact-IQHeat is design for one heating circuit and one hot water circuit, with integrated DDC control and ready to run default settings. Fully prepared for quick and easy installation.

Please contact Alfa Laval if you are interested of a quote or more information.



Heating settings and history via IQHeat Web

Basic version
An operator panel is included as standard, along with communications with ModBus, a simple Web solution with the same information as the operator panel.

Monitoring with choice
IQHeat comes with optional communications solution. Changeable also after installation by replacement or adding of communication modules.

- IQHeat Web200, web solution and a PC with Internet access is an effective solution for controlling and managing one or more Midi Compact IQHeat units. Complete with flow images.
- IQHeat, connection to existing building management system, BMS. If a property system is already in place with familiar functions and interfaces, IQHeat communicates via OPC, Modbus, LON or BacNet. This means that the plant is controlled locally by IQHeat during the construction period. When the external, master system is then connected, IQHeat will be controlled by the sent parameters.
- IQMeter200 provides the option of reading the heat meter values via Mbus. The functions such as capacity control in Web200 can then be activated to optimise operating costs.

Options
- IQAlarm. SMS alerts via Modem

Alfa Laval continuously works on improving existing functions in IQHeat, as well as developing new.

New versions of IQHeat applications can be downloaded through internet, for units that need update, or upgrading

How to contact Alfa Laval
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Maxi

Large district heating substation

Maxi is a district heating unit of high quality from Alfa Laval. It has defined base solutions that are made for the needs of space heating and tap water heating in larger buildings, or when special needs should be fulfilled.

Applications
Maxi heating units fits many requirements, from multifamily houses to factories, and for both new installations and replacing old. Maxi is designed from type of building and needs, temperatures and capacities in the heated building.

Many of the modularized functions in Maxi can be chosen and added to fit the needs even better. Possible is 1 to 3 heat exchangers for heating and 1 for heating tap water. From 20 to 2000 kW heating capacity is available in the modularized range. Almost any function, flow chart and capacity is available as an engineered solution.

Characteristics
Maxi is a heating unit based on brazed heat exchangers from Alfa Laval. Due to the modularized concept a MAXI has a relatively short delivery time. The units are compact, and ready to connect to any buildings pipe systems, as well as for the district heating pipe network.

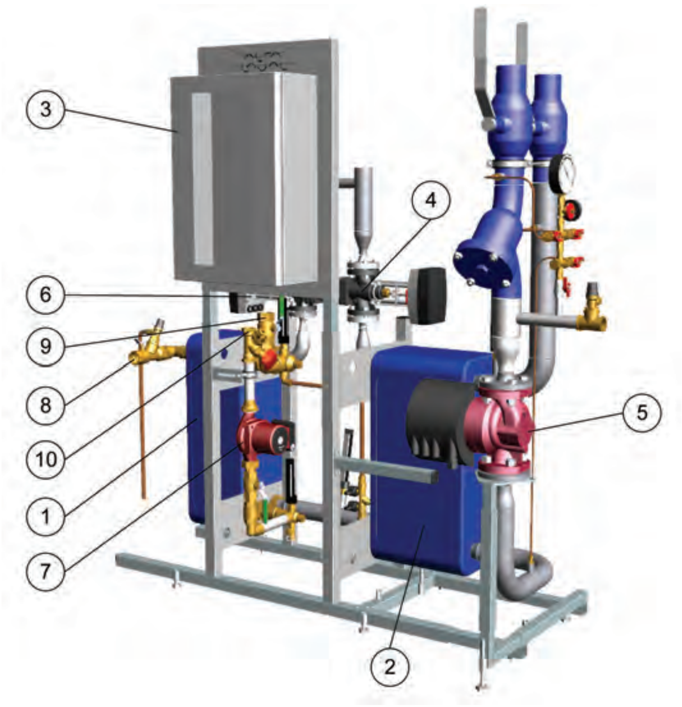
Design
A software is used to calculate and configure a MAXI. Basic functions wanted, design data, components calculation and choice, pipe sizes, pump calculation etc is main input to the design work. This tool is also available in a customer version, Alfa Select.

Components
All components and sizes are designed from input data like temperatures, capacities, pressure demands and other needs. Alfa Laval uses only well-known brands and high quality components in Maxi systems. Many pipe parts has been designed by Alfa Laval, to ensure quality and function.

Maxi can preferably be equipped with electronically controlled pumps to ensure optimal energy use. Maxi has a control cabinet with controller and pump switching functions. Depending on need of the customer or the building different brands and complexity of control equipment can be used. In a Maxi, Alfa Laval´s own IQHeat is a good choice of controller, with very good possibilities of communication and optimization from a distance, to manage best energy use possible.

Heat exchangers
In Maxi, Alfa Laval brazed heat exchangers are most often used, both for tap water and space heating. Also plate heat exchangers (PHE) can be used, if customer demands, or capacity requires so. In some areas PHE are used for the possibility to disassemble and clean the heat surfaces.

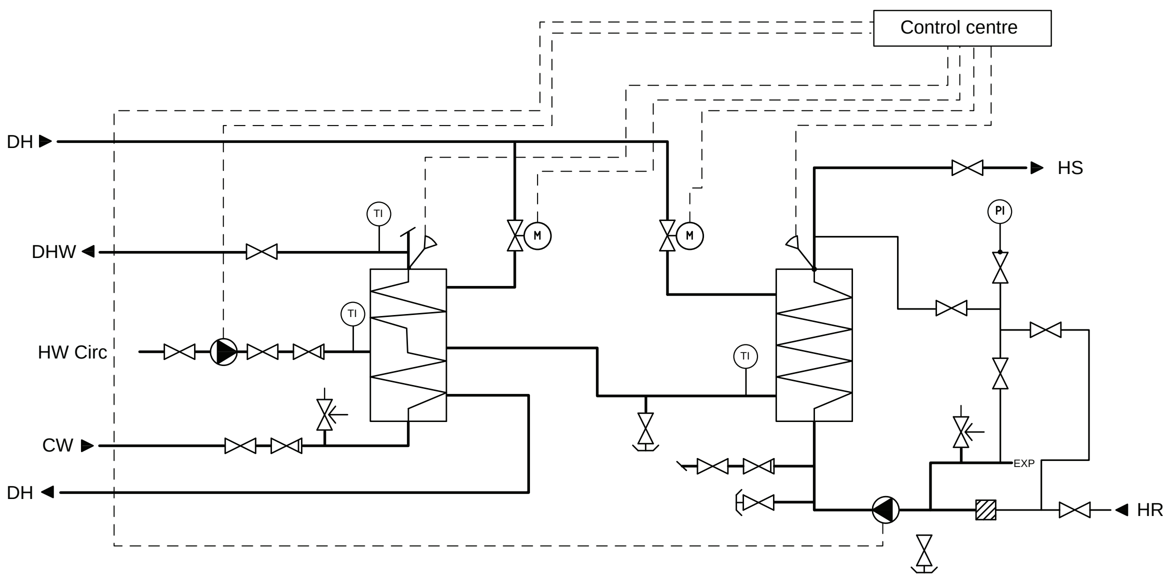
Our brazed heat exchangers are made in stainless steel and pure copper. We always use threaded or flanged connections on the heat exchangers in our systems, for easy demounting and service. Heat exchangers are insulated with 30 mm environmental friendly polyurethane foam with an ABS plastic surface.



Components

1. Heat exchanger (domestic hot water)
2. Heat exchanger (heating)
3. Controller cabinet
4. Control valve (heating)
5. Pump secondary (heating)
6. Control valve (domestic hot water)
7. Pump, domestic hot water circulation
8. Cold water inlet
9. Hot water outlet
10. Hot water circulation

Example of a flow chart for a Maxi with one circuit for hot water heating and one for space heating, 2-step connected.



Design data

	District heating	Domestic hot water	Heating
Design pressure PS	16-25 bar	10 bar	6 bar
Design temperature TS, °C	120	100	100

Maxi capacity and measure table

Dimensions of Maxi C1 with typical capacities

Capacity (kW)					
Hot water	**Heating**	**Length mm**	**Width mm**	**Height mm**	**Weight kg**
200	100	1500	660	1550	100
350	200	1650	660	1550	150
400	300	1650	660	1600	170
500	500	1750	700	1650	230

Typical design data, others on demand. Example measure table from a Maxi with tap water and space heating, pumps included. Other configuration or layout will influence measures and weight. Electrical panel height is about 1750 mm.

Tests and certifications
Our quality assurance system at Alfa Laval is in accordance with ISO9001. The systems are CE approved and manufactured in accordance with the Pressure Equipment Directive and its harmonized standards. All circuits are pressure tested with water at min 1,43 x PS. Electrical function and safety tests are performed on wired components

Advantages
- Open layout with a design that give good overview over its different components and circuits. This makes service and maintenance easier.
- Prefabricated optimized system with all components tested provides for less trouble during installation and startup, and better performance over many years of service.
- Compact design makes it easy to take unit in to installation room.

All documentation is placed in a binder behind electrical panel

AlfaSelect – calculation program
Available in a customer version for design of Maxi substations. User interface and printouts are available in many languages. Program is updated through internet. Contact Alfa Laval to get a free version of the program.

Adjustable feet simplifies installation

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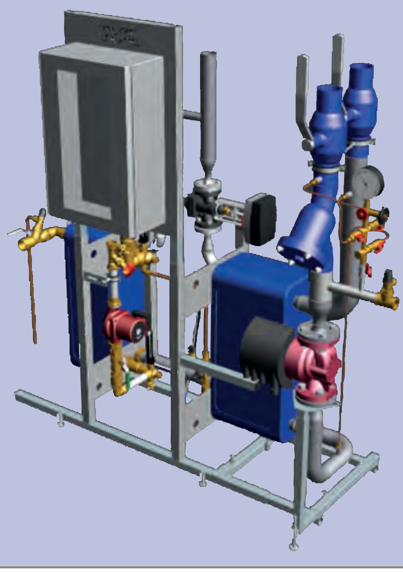
Maxi-IQHeat

District heating substation with communication for large buildings



Maxi-IQHeat is a district heating substation for the connection of apartment blocks and other large buildings to district heating networks. IQHeat is our most advanced substation. It comes with integrated DDC and web solution.

Maxi-IQHeat reduces heating costs and flow charges for the property owner and gives lower return temperatures for network.

Maxi-IQHeat is manufactured and sold by Alfa Laval which has unique and world-leading expertise in the field of pre-fabricated district heating substations.

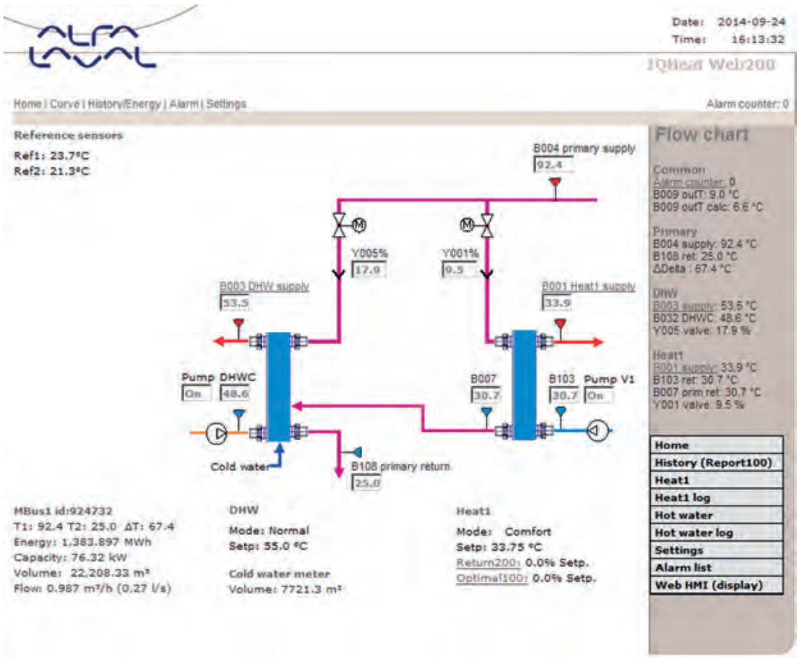
Complete and ready for operation upon delivery
Maxi-IQHeat comes ready for operation and complete with a DDC unit and web solution according to customer specifications. The primary and secondary sides can be supplied pre-assembled.

The built-in simple Web solution can be used for easy connection to the internet. Basic software is installed and ready for operation. Communication and control takes place via the internet, ModBus or with a built-in operator panel.

Right dimensioning
Each delivered Maxi IQHeat is "customised" with the components and software to exactly meet requirement specifications . IQHeat is available in several basic designs depending on the needs of the property for both heating and hot water.

Management, control and readings
IQHeat can be controlled and monitored using a standard PC with an internet connection or by an operator panel. With the Web200 option, all operating information is displayed graphically on the computer screen but is also stored as Excel files for cost accounting, statistics and more..

When connecting to existing property systems, IQHeat can communicate across different protocols, see options. IQHeat always uses multiple sensors to ensure that troubleshooting and optimisation is possible remotely



Flow Image via IQHeat Web

In order to monitor and control one or more Maxi IQHeat district heating substations, no special equipment is required, just a standard PC with internet access.

With IQWeb200 you download a flow image from IQHeat via the Internet to your computer screen. If several substations are controlled from your computer, each substation has its own flow image. Here you get a quick overview of the district heating substation temperatures. If the values need to be adjusted, you do so on the following sides. This allows you to easily adjust, for example, for seasonal changes and to optimise operating costs.

Under the heading operation history, eight days of operation is displayed in the form of a curve chart. All operational history is continuously stored in XML files for Excel, and you can save up to 20 years of data. The operational history gives you transparent control of your adjustments and in so doing gives you both valuable feedback and statistics.

After the settings are made IQHeat automatically regulates flows and temperatures without any special supervision or control. The system has alarm functions for many parameters, such as overheating and scalding risk, operation of pumps and pressure in expansion vessels. Alarms can be sent as e-mails or SMS, see options.

Weather forecast control, eGain forecasting™

IQHeat is prepared for direct communication with weather forecast services from eGain. With an IQHeat the communication of weather forecast for a building is done by WEB directly to eGain's servers holding data for each building. No extra hardware is needed, the IQWeb200 manage all communication.

Visit *http://egain.se/en-gb/* for more information of this unique weather forecasting, and its possibilities.

Customised in all sizes

One of the major advantages of Maxi-IQHeat is that the substation is already tailored at the factory to meet requirement specifications. This provides optimum performance and also clear guarantee undertakings, all from a single supplier.

Maxi-IQHeat comes in basic designs for one to three heating circuits and one hot water circuit. All with integrated DDC control and ready to run default settings. All fully prepared for quick and easy installation. IQHeat 50 also comes in a version for district cooling.

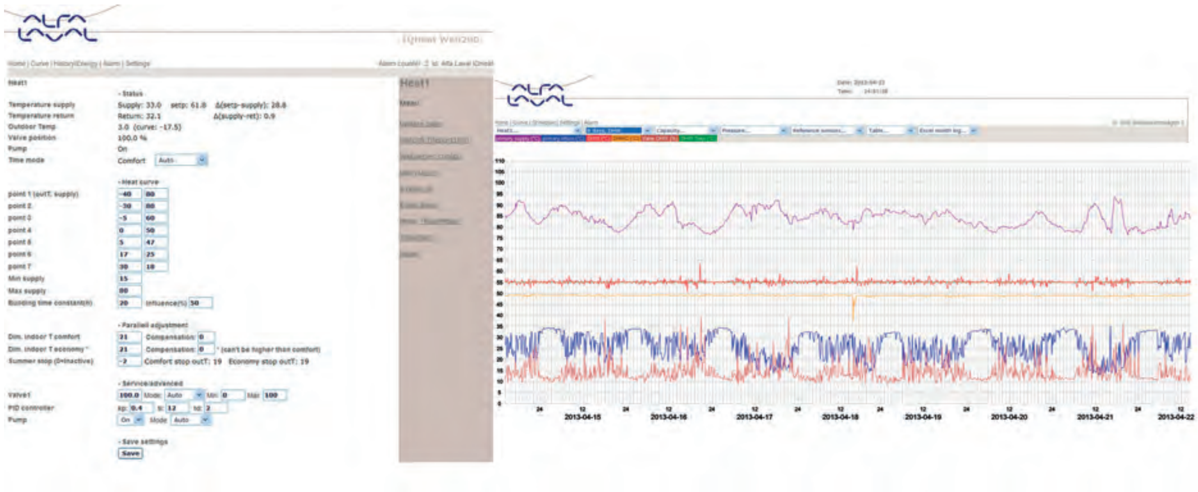
Easy to dimension correctly

The number of heating and hot water systems in your property will determine which model of Maxi-IQHeat you should choose, see table.

Model	Example of property	Heating system
IQHeat 100	Normal property, heating and hot water	One hot water One heating
IQHeat 110	Property with hot water, heating and ventilation circuits	One hot water Two heating
IQHeat 120	Property with hot water and three heating circuits	One hot water Three heating
IQHeat 50	Property with only one heating circuit	One heating
IQHeat 60	Larger premises, need of two separate heating circuits	Two heating

Operation cards are available for each model.

Please contact Alfa Laval if you are interested of a quote or more information.



Heating settings and history via IQHeat Web

Basic version
An operator panel is included as standard, along with communications with ModBus, a simple Web solution with the same information as the operator panel.

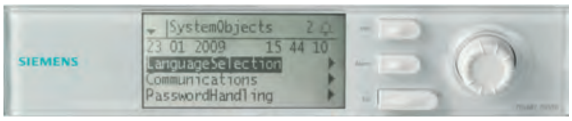
Monitoring with choice
IQHeat comes with optional communications solution. Changeable also after installation by replacement or adding of communication modules.

- IQHeat Web200, web solution and a PC with Internet access is an effective solution for controlling and managing one or more Maxi IQHeat units. Complete with flow images.

- IQHeat, connection to existing property system. If a property system is already in place with familiar functions and interfaces, IQHeat communicates via OPC, Modbus, LON or BacNet. This means that the plant is controlled locally by IQHeat during the construction period. When the external, master system is then connected, IQHeat will be controlled by the sent parameters. Flow images must be created in the master system.

- IQMeter200 provides the option of reading the heat meter values via Mbus. The functions such as capacity control in Web200 can then be activated to optimise operating costs.

Options
- IQAlarm. SMS alerts via Modem
- IQRefill. Upgrading an existing substation to the IQHeat standard



Alfa Laval continuously works on improving existing functions in IQHeat, as well as developing new.

New versions of IQHeat applications can be downloaded through internet, for units that need update, or upgrading.

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Maxi C1

District heating substation

The Maxi C1 is a high-quality and standardised district heating substation by Alfa Laval. It features readymade basic although configurable solutions for all heating and domestic hot water requirements.

Applications
The Maxi C1 District Heating Substation is appropriate for a wide range of uses from single small multi-family houses to blocks of multi-family houses as well as both new and renovated buildings. Maxi C1 is always built to dimensions appropriate to the site.

General features
Maxi C1 is a district heating substation based on limited component selection by Alfa Laval. Due to its standard component solutions, the delivery time is short. The dimensions of property doors have been taken into account in the construction of the unit, making it easy to move the Maxi C1 indoors and connect it to the building's heating system.

Dimension
In constructing the substation, the Alfa System Select calculation software is utilised. The selection of components is defined by, for instance, capacity, temperatures and the maximum pressure drops.

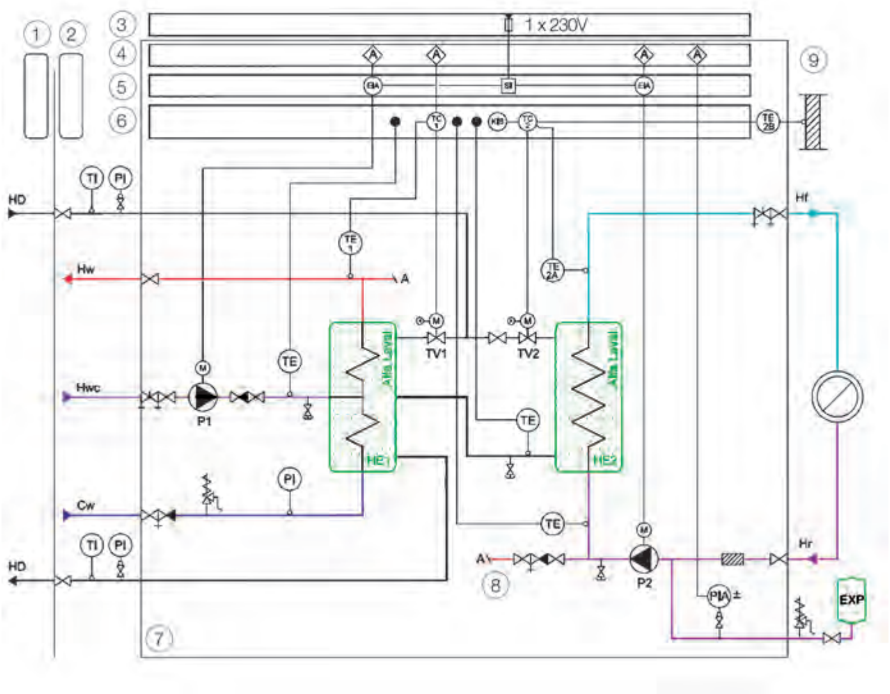
Components
All components and pipes are measured and selected according to the dimensions and requests from the designers and authorities. Alfa Laval uses only well-known components tested by themselves in its products. Most pipes and brass parts are developed by AL. Maxi C1 can be equipped with either a constant-curve or intelligent speed controlled E-pump for the heating side. Maxi C1 includes a Combibox solution which contains the control centre and pump switches in the same well protected (IP54) cabin. GSM modem accessory for remote control and the ability to read by SMS message can be added (dependant upon the control centre). Temperature measurements can be obtained from the control centre or by using normal thermometers.

Brazed heat exchangers
In Maxi C1 District Heating Substations, brazed plate heat exchangers are BHE, incorporated as standard. The BHE is made of acid-proof steel and is brazed with pure copper. Considering its size, the BHE is quite powerful, since practically all the material used within functions as a heat exchange surface. Due to the threaded and flanged coupling employed, the heat exchangers are always easy to detach. The heat exchangers are insulated with 30 mm environmentally- friendly, Freon-free polyurethane which can be easily opened, and are coated with hard ABS plastic.

Components

1. Heat exchanger (domestic hot water)
2. Heat exchanger (heating)
3. Combi-box including control centre and pump switches
4. Control valve, heating
5. Pump, heating
6. Control valve, domestic hot water
7. Pump, domestic hot water circulation
8. District heating, return
9. Cold water
10. Domestic hot water
11. Domestic hot water circulation
12. District heating supply
13. Heating, return
14. Heating, supply

Typical flow chart for Maxi C1. Components may vary due to individual calculaitons



1. Heat supplier
2. Customer
3. Electric main supply
4. Alarm centre
5. Pumps control centre
6. Control centre/temp. metering centre
7. Alfa Laval's Maxi C1 delivery limit
8. Filling
9. Control centre incl. alarm operation (with EH-203)

Operating data

	District heating	Domestic hot water	Heating
Design pressure	16 bar	10 bar	6 bar
Design temperature, °C	120	100	100

Approvals and reliability
Alfa Laval's quality system observes the ISO 9001 standard. All products are manufactured in accordance with CE and PED requirements. Maxi C1 fulfils all local and national authority requirements.

Dimensions of Maxi C1 with typical capacities

Type		Substation dimensions (mm) / Weight (kg)			
Domestic water	Heating	Length	Width	Height	Weight
200	100	1500	660	1550	100
350	200	1650	660	1550	150
400	300	1650	660	1600	170
500	500	1750	700	1650	230

Benefits
- With clear frame solutions it is possible to assemble the unit close to the wall. Service and maintenance work is also easy to carry out with all components situated at the front of substation.
- Modularised component and piping solutions aid installation, and options are easy to add.
- Strong and stable frame ensures unbreakable transportation and extended lifetime for the unit.
- Clear positions for primary and secondary sides.
- Due to the narrow construction the unit is easy to transfer to the technical room.

All documents, e.g. instructions, are placed in a box located behind the electrical panel.

Adjustable feel aid installation.

AlfaSelect – calculation tool for dimension work
For the design of the Maxi C1 unit Alfa Laval offers advanced calculation software. Some of the features can be found at AlfaSelect:
- Easy and fast to use
- Several languages are available for displays and printouts
- Internet updating
- Multiple printouts; technical specification, flow chart, measurement details etc.

To get this free software please contact Alfa Laval sales.

How to contact Alfa Laval
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Maxi Cooling

District cooling substation for larger buildings

Maxi Cooling substations are high-quality, district cooling substations designed by Alfa Laval. They feature ready-made basic, configurable solutions for all cooling requirements.

District cooling

There are many advantages of using district cooling. For instance, district cooling is an environmentally friendly way of producing and distributing cooling. Free sources of cooling like seawater or groundwater could be used for example.

As for property owners, district cooling is a simple and reliable method of creating a pleasant indoor climate. Another positive effect could be the reduction of noise in the building as there would be no need for noisy coolers connected.

Applications

A district cooling substation is suitable for a wide range of uses when connecting different types of buildings such as offices, public buildings, commercial buildings, etc. to the district cooling network. The dimensions of the unit can be adjusted to the site.

General features

Each unit is delivered as a ready-made module in a solid frame with flange connections for simple assembly with the heat exchanger. With concern for the customer, depending on its size and weight Alfa Laval can deliver the substation in sections. The PHE will then be delivered separately and the frame with the pipes will be delivered as one unit to be connected to the PHE. If Alfa Laval's IQHeat control unit is chosen, all electrical equipment will be internally connected to the control box and tested. Maxi Cooling substations have a compact design and leave a small footprint in relation to their capacity. They are easily installed and put into operation. The unit can be supplied with or without a meter section, secondary equipment and pump.

Dimensions

Thanks to its flexible design, the Maxi Cooling unit can be easily optimised for different temperature programmes, such as 6-16/17-7 or 6-16/18-8. Maxi Cooling units are dimensioned based on flow, temperature and pressure drop according to the table below.

Calculation data

The temperature programmes 6-16/7-17 ºC and 6-16/8-18 ºC are typical for district cooling.

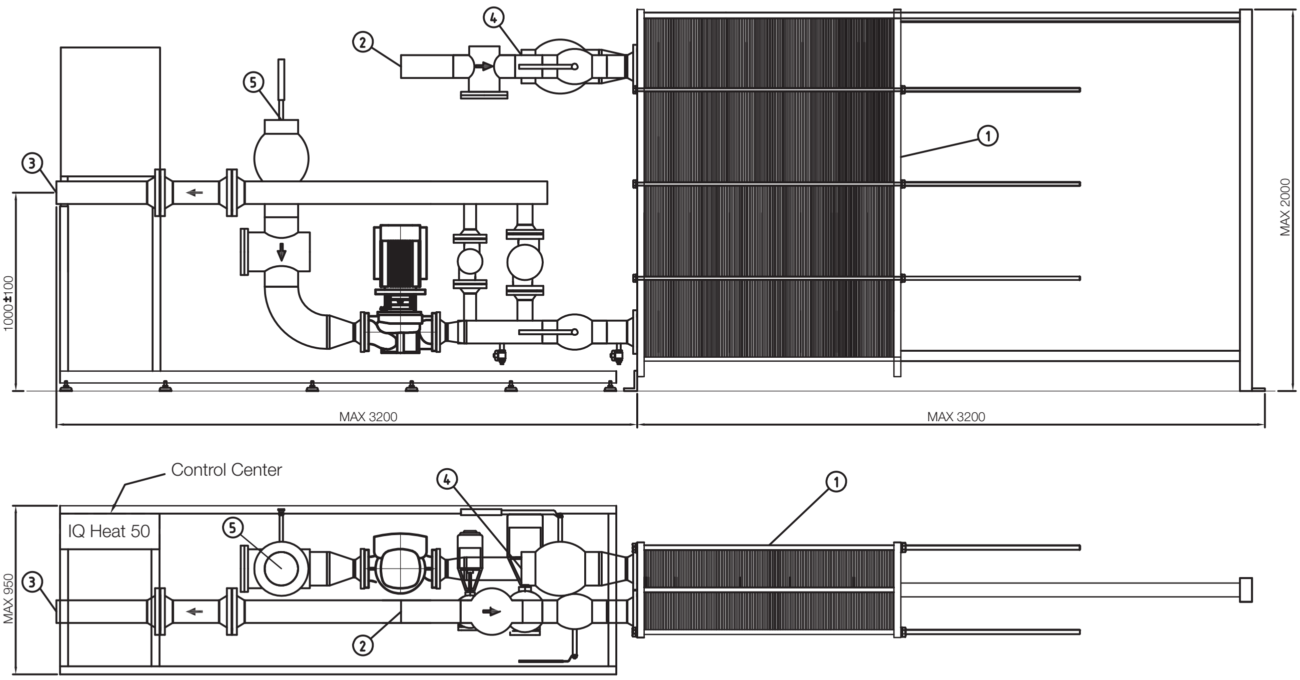
Type	Capacity kW	Temperature programme °C	Heat exchanger	Pipe connection P/S DN
Maxi Cooling	100	6-16 / 17-7	TL6B	50 / 65
Maxi Cooling	200	6-16 / 17-7	TL6B	65 / 65
Maxi Cooling	400	6-16 / 17-7	TL10B	80 / 100
Maxi Cooling	600	6-16 / 17-7	TL10B	100 / 125
Maxi Cooling	700	6-16 / 17-7	TL10B	100 / 125
Maxi Cooling	100	6-16 / 18-8	TL6B	50 / 65
Maxi Cooling	200	6-16 / 18-8	TL6B	65 / 65
Maxi Cooling	400	6-16 / 18-8	TL6B	80 / 100
Maxi Cooling	600	6-16 / 18-8	TL10B	100 / 125
Maxi Cooling	800	6-16 / 18-8	TL10B	100 / 125
Maxi Cooling	1000	6-16 / 18-8	TL10B	125 / 125
Maxi Cooling	1200	6-16 / 18-8	TL10B	125 / 150

The table above should be seen as a guideline: other combinations may apply depending on the conditions. Alfa Laval is able to provide customized solutions for any level of capacities.

Benefits

- Energy efficient and environmental friendly
- All Maxi Cooling substations include high-quality components
- The unit is designed for easy servicing and maintenance work
- Modularised component and piping solutions aid installation and options are easy to add
- Clear positions for primary and secondary sides
- Easy to transfer to the technical room and install due to the narrow design of the unit and the frame
- The heat exchangers are optimised for cooling applications
- Customised substations can be provided
- ISO 9001 and ISO 14001 certified
- Manufactured according to PED 97/23/EC

Maxi Cooling substation with maximum measurements based on TL10B



1. Heat exchanger cooling TL10
2. DC supply
3. DC return
4. Cooling supply
5. Cooling return

Components

All components and pipes are selected according to requests. Alfa Laval always uses well-known components for its products. All the pipes included can be supplied in either stainless steel or carbon steel, with the option of also being anti-corrosion treated.

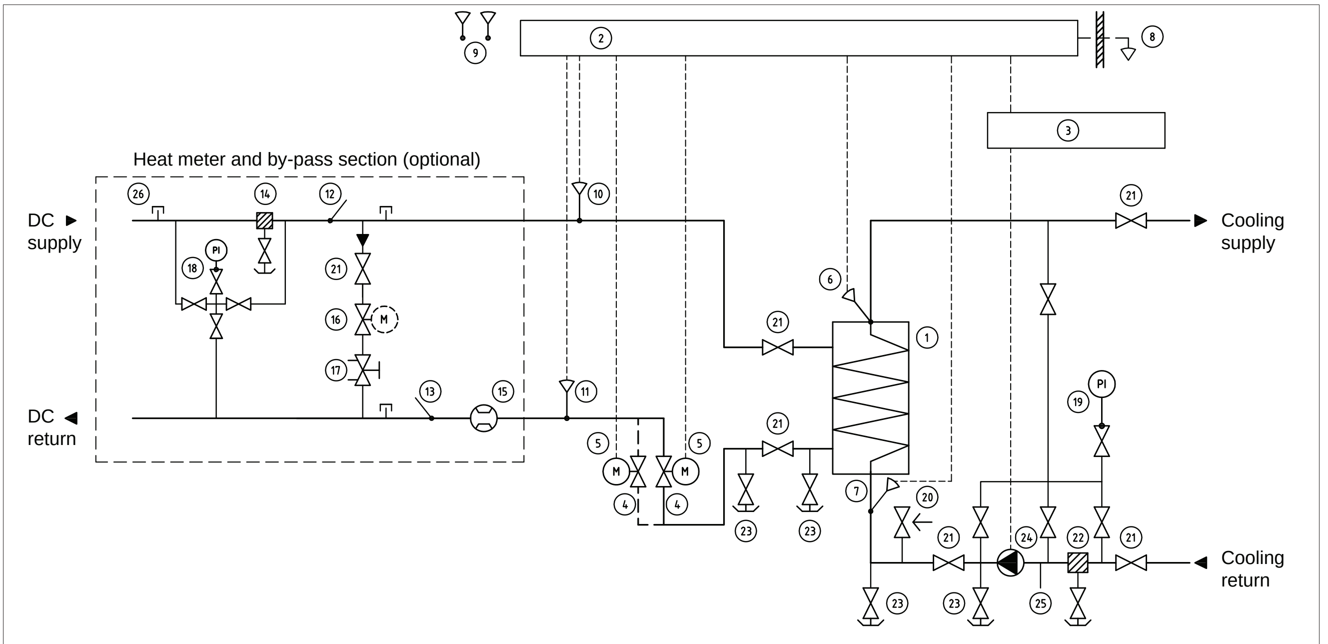
Alfa Laval's own IQHeat control unit is the standard control module. Alternatively, the Maxi Cooling substation can be delivered with valves and 0-10V actuators for DDCs chosen by the customer.

The Maxi Cooling substation can be delivered without a meter section, by-pass section and without secondary side equipment.

All units can be delivered with an optional drip tray for the condensate. All the components included can be easily reached for servicing and inspection. All Maxi Cooling substations can be equipped with capacity controlled pumps.

Design

The main component in the unit is Alfa Laval's TL6B or TL10B heat exchanger, with especially good thermal properties and a heat transfer ability suited to district cooling applications. Other heat exchangers may also be used in smaller and bigger capacities.



1. Heat exchanger cooling
2. Control center IQHeat
3. Pump control box
4. Control valve cooling *
5. Actuator cooling 0-10 V
6. Temp. sensor cooling supply
7. Temp. sensor cooling return
8. Temp. sensor outdoor
9. Temp. sensor reference 1,2 (optional)
10. Temp. sensor primary supply control centre
11. Temp. sensor primary return control centre
12. Temp. sensor primary supply energy meter
13. Temp. sensor primary return energy meter
14. Strainer district cooling with drain
15. Dummy for energy/flow meter
16. Magnetic valve/self acting valve
17. Flow adjuster valve
18. Manometer district cooling
19. Manometer cooling circuit
20. Safety valve
21. Shut-off valve
22. Strainer cooling return with drain
23. Drain valve (ball valve)
24. Circulation pump cooling circuit
25. Expansion connection
26. Air vent

* Depending on capacity the flow will be split over 1-3 valves

The flow chart shows an example of a typical cooling substation. The complete substation varies in size depending on its cooling capacity and what modules are chosen. Measures with TL10.

Max. width:	950 mm
Max. height:	2000 mm
Max. length:	Depending on capacity and chosen equipment

Operating data

	District cooling	Secondary side
Design pressure (bar)	PN10/16	10
Design temperature	0-60°C	0-60°C

IQHeat control unit

With Alfa Laval's own IQHeat control unit it is possible to add several applications for performance control. IQHeat is a ready-made intelligent control unit with potential for web-applications and support for communication with building management system protocols; OPC, BACnet/IP, TCP/IP, M-bus, and LON. There are several additional services that can be added to the control unit such as optimisations and alarm-handling.

Approvals and reliability

Alfa Laval's quality system is ISO 9001 and ISO 14001 certified. All products are manufactured in accordance with CE and PED requirements. Maxi Cooling substations fulfil all local and national requirements.

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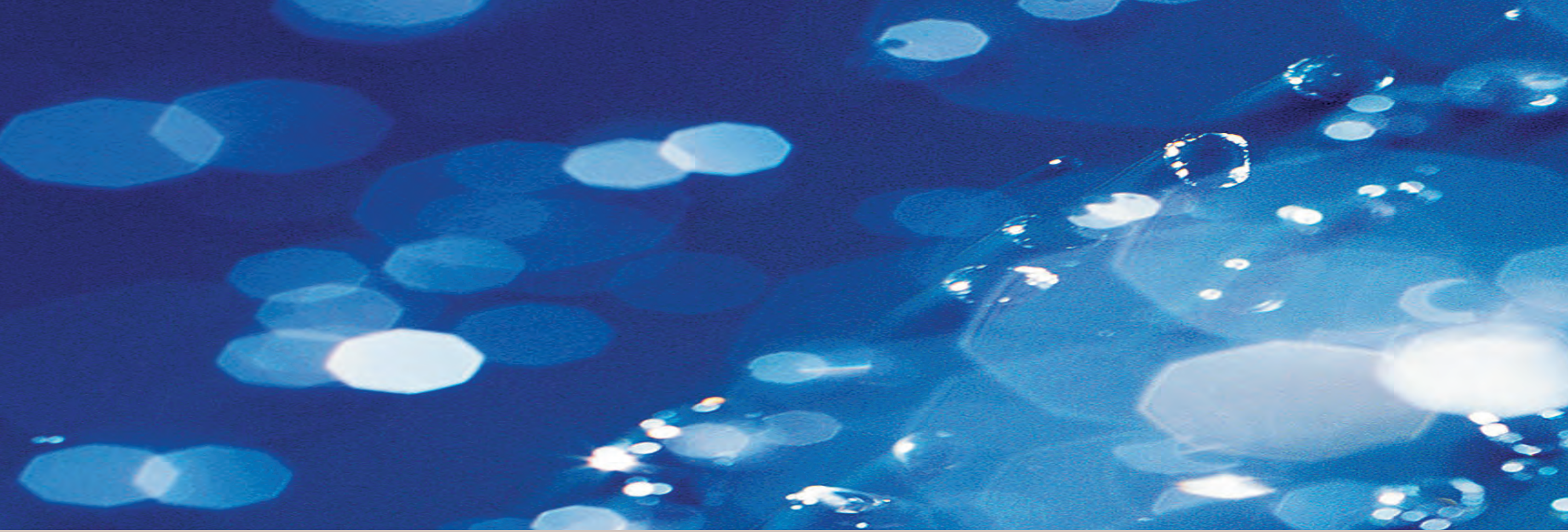
Chapter 10

Tap-water systems

Alfa Laval offers a wide range of tap-water systems for any collective use of domestic hot water.
With more than 30 years of experience, we can offer our customers not only the cost-effective but also the safest and healthiest solutions.
Our tap-water systems minimize the energy bill, eliminate any risk of legionella and are designed to keep sufficient hot water running during peak consumption.

A tap-water system is much more than a heat exchanger; it combines the Alfa Laval know-how of heat exchangers with a perfect knowledge of quality materials and professional skills, in order to offer a complete, ready-to-use hot-water system to the customer.

All Tap Water Systems are pre-assembled, pre-mounted, pre-wired, pre-tested and pre-set to customer needs by Alfa Laval. We offer hot water the fast and safe way, which means valuable time and quality are gained by the customer.



Ten good reasons to buy Alfa Laval's tap-water systems

1. Hot water the fast way
Alfa Laval´s tap-water systems are pre-assembled, pre-mounted, pre-wired, pre-tested and pre-set for our customer. He just needs to plug the system and connect it to his pipe work. It will take him just a few hours rather than several days. We offer hot water the fast way, which means valuable time and quality to gain for the customer.

2. Energy savings
No need to have high-volume storage tanks on site with immersion heaters or heating coils. Their heat transfer is poor by design, and the tank loses heat, just by being big.
This is not the case for Alfa Laval's tap-water systems. They are very compact and the heat transfer is extremely effective in their heat exchangers.

3. Reliable
In many places the availability of sufficient hot water at any time of day is critical. Tap-water systems are real value for money: it combines the Alfa Laval know-how of heat exchangers with a perfect knowledge of quality materials and professional skills to offer a complete ready-to-use hot-water system.

Hot water the slow way

Hot water the fast way

4. Health Security
Enclosed, warm storage vessels, pipe work with lots of blind spots and under-utilized water systems containing stagnant water provide an ideal environment for legionella bacteria to flourish.
Alfa Laval has designed a specific tap-water system – called AquaProtect – to eliminate any risk of legionella in customer premises.
Also our conventional tap-water units are equipped with a thermal treatment function in order to reduce the risk of legionella proliferation.

5. Reduced scaling
The turbulent flow through the heat exchanger reduces scaling considerably. The primary-side mixing valve also contributes to a minimum of scaling as it eliminates thermal shock in the heat exchanger.
Moreover, the controller's scaling function warns when scaling is threatening, so that cleaning can be planned in time – well before problems occur.

6. Extremely compact and powerful
A tap-water unit corresponds to only 10% of the volume of a 1,500-litre storage tank. Nevertheless, it supplies domestic hot water to more than 600 families living in an apartment block! Amazing, isn't? Small but powerful.

7. Suitable for all domestic hot-water pipe works
The tap-water systems are offered with gasketed, brazed or fusion bonded AlfaNova in 100% stainless steel plate heat exchangers. If the customer has copper piping or fear galvanic effects on site, the best solution is the gasketed plate heat exchanger or the AlfaNova which are both 100% copper free.

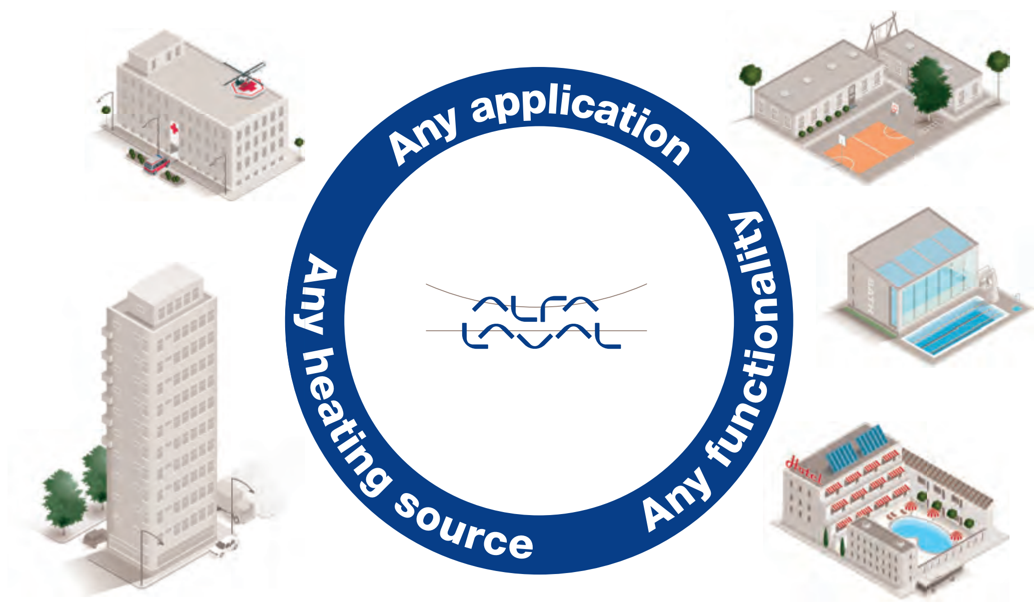
8. Minimum of maintenance
Cleaning of the heat exchanger is needed from time to time. Alfa Laval offers time-saving solutions:

- Gasketed plate heat exchangers: the clip-on gaskets are very easily removed and put back in place
- Brazed plate heat exchanger and AlfaNova: thanks to two extra connections on the heat exchanger the Alfa Laval Cleaning In Place (CIP) solution removes all kind of deposit, like scale, sludge and microorganisms.

9. Long operating life with After-Sales service
Spare parts are still available for tap-water units delivered more than 20 years ago, proving the robustness of these systems but also the customer-commitment of our After-Sales service.

10. A wide range of solutions
Alfa Laval offers a wide range of efficient solutions for heating tap water. They cover a variety of requirements in terms of temperatures, pressures, components, primary heating sources and functionalities.

Tap water systems for



Tap-water systems, product range

Alfa Laval suggests to modernize your hot-water system with a choice of 3 different levels of product functionality:

Solution	Alfa Laval Tap-water systems
Smart	 AquaStar  AquaMicro  AquaEfficiency  AlfaPilot  AquaProtect
Standard	 AquaFirst  AquaTank
Simple	 AquaCompact  Primary Tank

"Smart" range
These products are the top of the line, with clever functions for saving energy and water such as low-return-temperature units and anti-legionella systems.

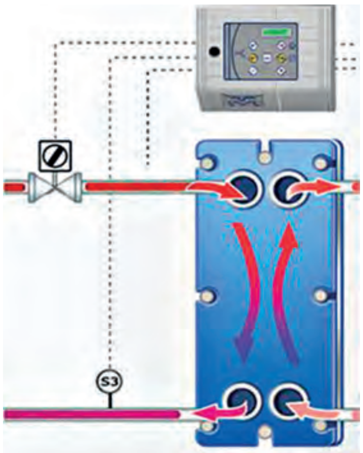
"Standard" range
These products are very competitive and robust; they have lots of features and are easy to order on Alfa Laval Anytime, our eBusiness for channel partners

"Simple" range
These products are strong and simple, but have the same high Alfa Laval quality as our other products.
The customer pays for what it gets – a product that supplies hot water.

Why a 2-Port or 3-Port valve?

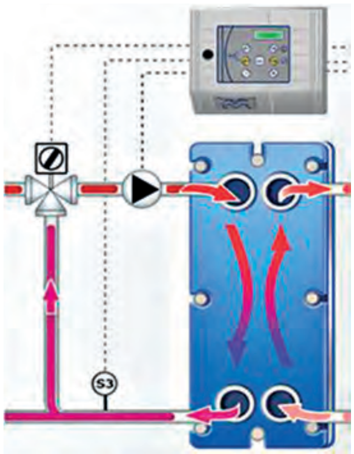
Alfa Laval's tap-water systems operate with a 2-port or 3-port control valve on the primary side.

2-Port valve version



- Suitable for district heating or community heating
- Variable flow rate as there is no primary pump
- Constant primary temperature inlet
- Risk of thermal shock
- Increased risk of lime scaling compared to a 3-port valve version
- Up to 20 bar and 130°C

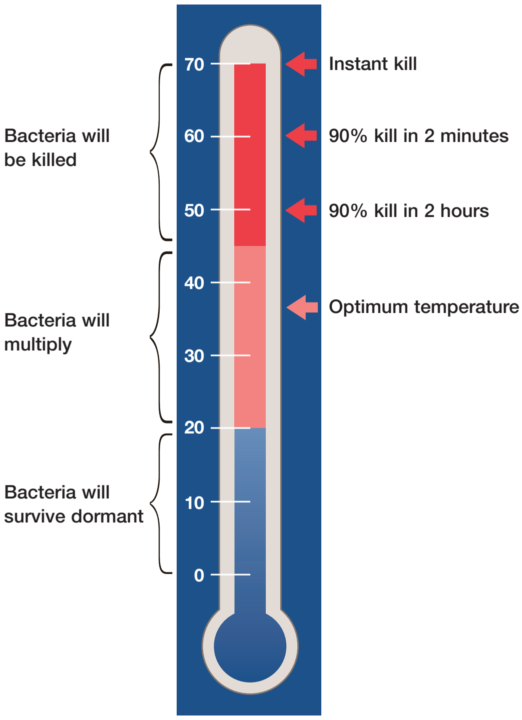
3-Port valve version



- Suitable for a local boiler or primary tank on site
- Constant flow rate thanks to a primary pump
- Regulates the primary temperature in the heat exchanger
- No risk of thermal shock
- Limited lime scaling
- Energy-efficient as only the energy needed is used
- Up to 10 bar and 110°C

Anti-legionella tap-water systems

Legionella bacteria
Legionella bacteria are common and can be found naturally in water sources such as rivers and lakes, usually in low numbers. From the natural source, the organism passes into water systems used in buildings. They pose a risk to humans if people are exposed to them through air conditioning or air-cooling systems, or through contaminated tap water used for baths, showers, spas etc.



How do they grow?
- In warm temperatures between 20°C and 45/50°C
- In stagnant water in pipes and vessels with little or no water flow
- In sediments, biofilms and micro-organisms in pipe networks
- In scale deposited in pipes, showers and taps

Where do they grow?
As stagnant water within the temperature range 20-50°C offers excellent conditions for growth, the risks are obvious in any tap-water system that is extensive and complex, or in any system where the tap-water consumption is periodically low. These types of systems are typically found in hospitals, apartment blocks, hotels, nursing homes, gyms, schools and other public buildings.

AquaProtect
Alfa Laval's tap-water system "AquaProtect" is developed specifically to prevent bacteria growth in hot-water systems. The AquaProtect range uses recovered heat to provide low-cost, energy-efficient and effective thermal disinfection. AquaProtect uses continuous thermal disinfection of incoming and circulating water to eliminate legionella bacteria in hot water.

The AquaProtect system has two plate heat exchangers. The first unit heats incoming water to 70°C to disinfect it, using hot water from a boiler.

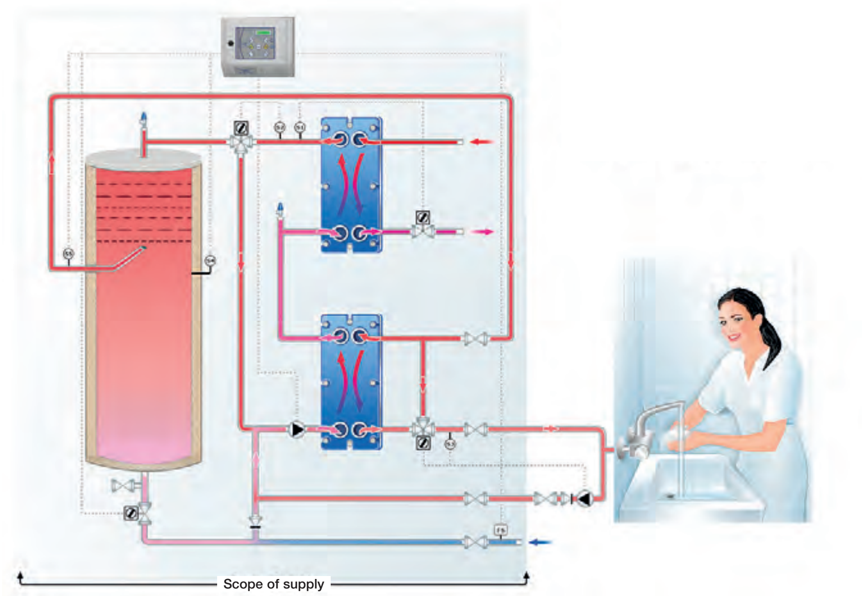
The second unit cools the disinfected water to the requested network temperature (60°C or lower), while pre-heating the incoming and circulating water before it enters the first heat exchanger. Between being heated and cooled again, the water passes through a storage tank, awaiting peak demand periods. This creates sufficient holding time to ensure total eradication of the bacteria.

The thermal disinfection consumes no extra energy as the energy is recovered in the second heat exchanger.

Saving energy and space

The AquaProtect solution offers many other advantages. It requires very little maintenance, and its compact size saves a lot of space in the boiler room. AquaProtect also comes with energy-saving insulation. So much energy is recovered in the heat exchangers that the thermal disinfection process consumes no extra energy. AquaProtect can be connected to alternative energy sources such as solar, heat pump, etc.

Working principle AquaProtect



AquaProtect T1

AquaProtect from Alfa Laval provides:

100% security

- Safe eradication of all legionella from entire hot water systems (incoming and circulating water)
- Temperature safety function
- Over-tapping protection
- Network disinfection on demand or at pre-determined intervals

Energy savings

- Energy is recovered in the heat exchanger so that thermal disinfection consumes no extra energy
- Can also be connected to alternative energy sources such as solar, heat pump etc

Comfort

- Compact system design
- Requires low maintenance
- Standardized systems for all water hardnesses
- Easy-to-use monitor and control system

Experience and expertise

- Maximum quality for maximum security

Key questions to select the right tap-water system

1) Available capacity on site in kW (local boiler, district heating and/or any renewable energy source)?

2) Temperatures on:
- Primary side inlet?
- Secondary side inlet & outlet?

If the capacity is not known:

1) Temperatures on:
   - Primary side inlet?
   - Secondary side inlet & outlet?

2) Secondary flow rate on site?
   or
   What is the application (hotel, hospital, leisure centre…) and how many rooms, beds, showers etc.?

The choice can be fine-tuned:

- Instantaneous	With or without Alfa Laval Primary Tank		
- Semi-instantaneous	Tank on site: … litres		
	Tank needed:	Stainless Steel	
		Enamel 7 bar	
- Heat exchanger:	Gasketed		
	Brazed		
	AlfaNova		
- Valve on Primary side	2-port		
	3-port		
- Pumps	Primary	single-headed	
		double-headed	
	Secondary	single-headed	cast iron
			stainless steel/bronze
		double-headed	cast iron
			stainless steel/bronze

Different selection tools are available – digital and on paper – to choose the right tap-water system.

Tap-water system range

AquaEfficiency
Read all about it on page 11:13

Alfa Laval AquaFirst
Read all about it on page 11:17

AquaProtect
Read all about it on page 11:21

AlfaPilot
Read all about it on page 11:25

AquaCompact
Read all about it on page 11:27

Alfa Laval AquaStar
Read all about it on page 11:29

Alfa Laval AquaMicro
Read all about it on page 11:31

Alfa Laval Primary tank (5 bar)
Read all about it on page 11:35

AquaTank 316Ti
Read all about it on page 11:39

AquaTank HC 316Ti	AquaTank EM (7 bar)	Pressosmart
Read all about it on page 11:41	Read all about it on page 11:43	Read all about it on page 11:45
		

KAB
Read all about it on page 11:49


AquaEfficiency

The most efficient tap water system

Applications
AquaEfficiency is a tap water system designed to meet the upcoming European legislation demanding low energy consuming pumps in tap water systems; the variable speed pumps. A further development has made the AquaEfficiency especially ideal for connecting to condensing boilers. Customer's benefits are:

- Savings of up to 2500 EUR a year in reduced electrical consumption, reduced thermal energy losses and increased boiler efficiency.
- Reduced CO_2 emissions by up to 18.000 Kg/year

AquaEfficiency supplies domestic hot water in large quantities for applications such as apartment buildings, hospitals, hotels, retirement homes, nursing homes, schools, sports centers, prisons etc.

Two different models of AquaEfficiency are available, to fit with any installation arrangement: Instantaneous and semi-instantaneous configuration operating both with a 3-port valve for connection to local boilers, primary tanks or solar systems.

When it comes to the selection of heat exchanger, AquaEfficiency offers three choices: Plates & Gaskets, Copper Brazed or AlfaNova®: exclusive to Alfa Laval (100% stainless steel, Fusion-bonded).

Dependable performance
Since 1923, Alfa Laval has been in the water heating business, and has become a leading manufacturer and supplier. AquaEfficiency incorporates a wealth of background experience for secure and reliable hot water production.

The components have been carefully selected and tested to perform well in combination with one another.

Working principle
In the tap water system, energy is exchanged through a heat exchanger from the primary to the secondary side.

On the primary side, both AquaEfficiency instantaneous and semi-instantaneous models have to be fed by a heating source that can be provided by a local boiler, a primary tank or a solar system for example. The temperature of the media entering the heat exchanger on the primary side is adapted to the demand detected on the domestic side. This eliminates themal shock in the heat exchanger and reduces the build-up of lime-scale in the secondary side.

On the secondary side, AquaEfficiency instantaneous is connected to the main water circuit and provides domestic hot water to the distribution pipe-work when tapping occurs.

A circulation pump - which is usually used to limit the time needed to deliver domestic hot water to the tap at the right temperature- maintains a constant flow rate through the heat exchanger and through the distribution pipe-work.

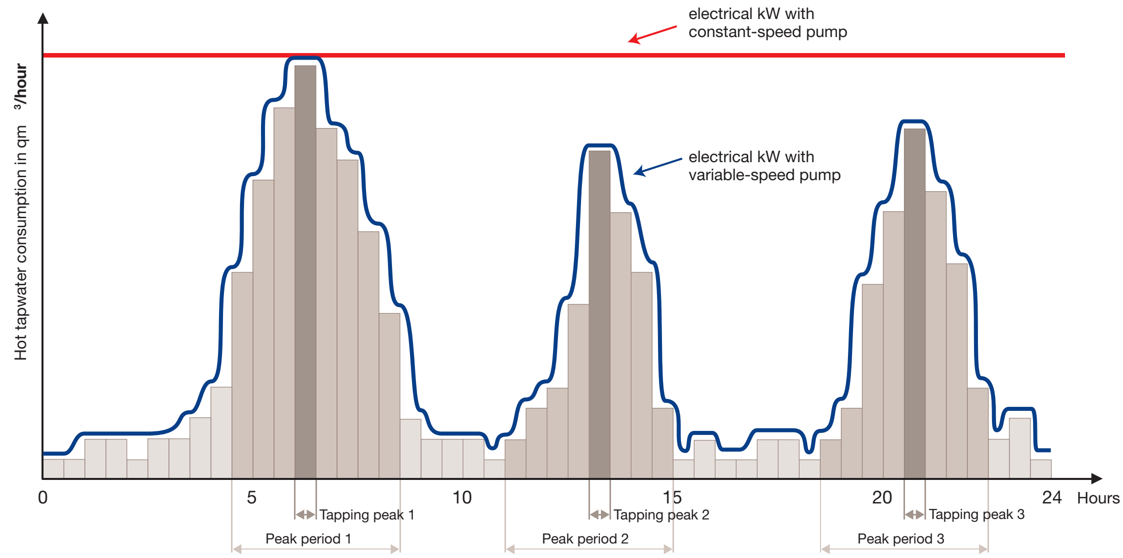
For AquaEfficiency semi-instantaneous a charging pump follows the variable flow rate through the heat exchanger according to the demand profile for the given installation, thus reducing the electrical energy consumption of the pumps.

AquaEfficiency offers electronic control equipment that provides several user-definable functions to customize the system and ensures precise temperature control.

Equipments

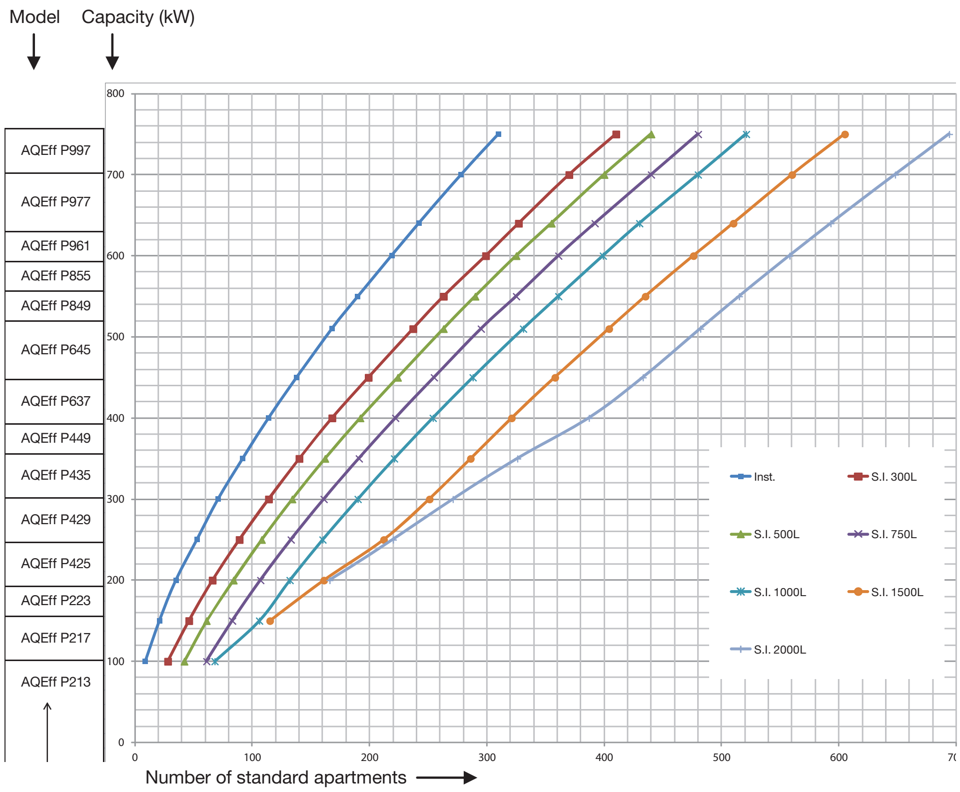
AquaEfficiency 3-Port	
Heat Exchanger	**Plates & Gaskets** • AISI 316 plates & EPDM Clip-on gaskets • Possibility to increase capacity • Compact design • Insulation **Copper Brazed** • Cost effective solution • Thermal efficiency for optimum comfort and reliability • Increased turbulence to increase heat transfer and reduce fouling • Temperature stability • Compact design (large heat transfer surface within a small footprint) • Insulation **Fusion-bonded** AlfaNova is the world's first and only heat exchanger made of 100% stainless steel • High heat transfer • Corrosion resistance • Maximum cleanliness • 100% copper free, suitable for all DHW pipeworks • Insulation
Control Valve	**3-Port Electronic** 24V 0-10V
Controller	**AquaBox Micro3000** Multi functional control box with possibility to connect to a l ocal Building Management System
Primary Pump	Variable Single or Double Head
Charging Pump	Variable Single or Double Head Flooded Rotor
Valves	Drain valve (primary), pressure relief valve (secondary)
Sensors	**Three temperature sensors** • Secondary outlet • Secondary inlet • Primary outlet

Example of tap water demand apartment block

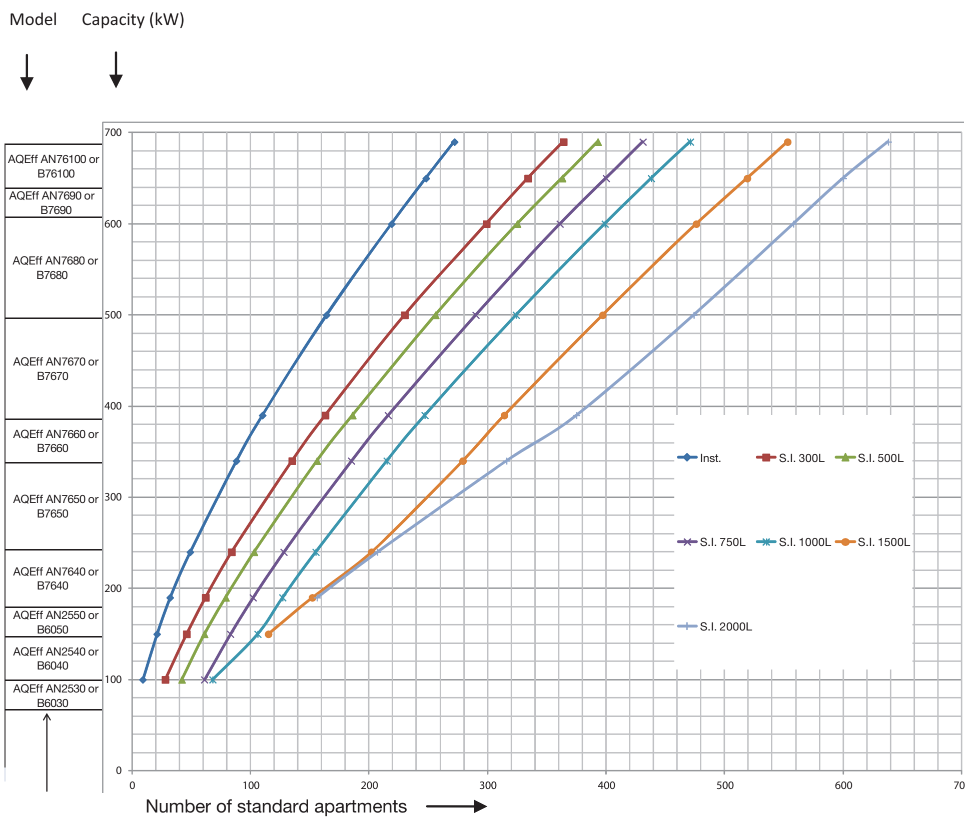


Temperature program	
Primary	70 - 30°C
Secondary	10 - 60°C

Example of selection curves - Plates & Gasket (instantaneous and semi-instantaneous)



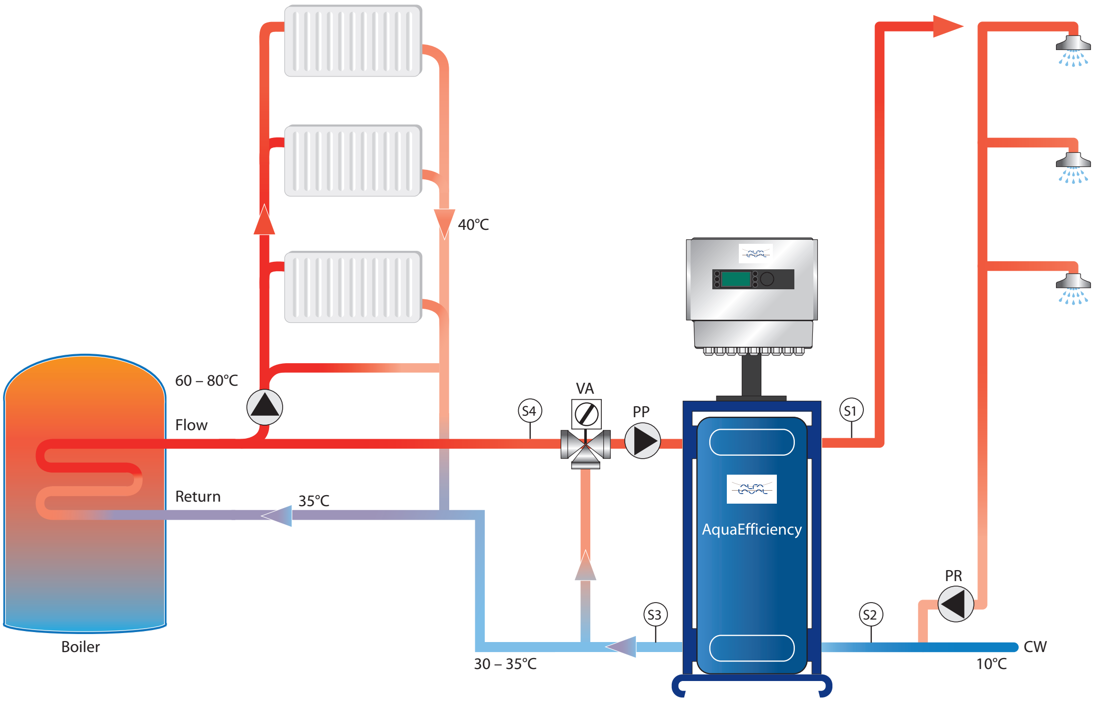
Example of selection curves - AlfaNova and Copper Brazed (instantaneous and semi-instantaneous)



Operating pressures and temperatures

AquaEfficiency 3-port		Primary	Secondary
Plates & Gaskets	Max. operating pressure	10 bar	10 bar
	Max. operating temperature	110°C	90°C
Copper Brazed	Max. operating pressure	10 bar	10 bar
	Max. operating temperature	110°C	90°C
AlfaNova	Max. operating pressure	10 bar	10 bar
	Max. operating temperature	110°C	90°C

AquaEfficiency flowchart



VA	Actuator	S1	DHW temperature sensor
PP	Primary Pump	S2	Thermal treatment sensor
PR	Circulation Pump	S3	Scaling control sensor
CW	Cold water	S4	Optional sensor

ECF00394EN 1204

How to contact Alfa Laval
Up-to-date AlfaLaval contact details for all countries are always available on our website on www.alfalaval.com

Alfa Laval AquaFirst

A newly designed domestic hot water unit to save time and money

Applications
Alfa Laval AquaFirst is an "easy to select" product designed to provide Domestic Hot Water (DHW) from 50kW up to 1000kW for:

- apartment blocks
- hospitals
- hotels
- retirement and nursing homes
- schools
- leisure centres...

Competitive, efficient and ready to be connected to any type of boiler, Alfa Laval AquaFirst has the possibility to connect to a local building Management System (slave ModBus).

Benefits
- Easy and simple to select
  - 16 Direct versions: no storage tank required
  - 24 Indirect versions: to be combined with a DHW storage tank

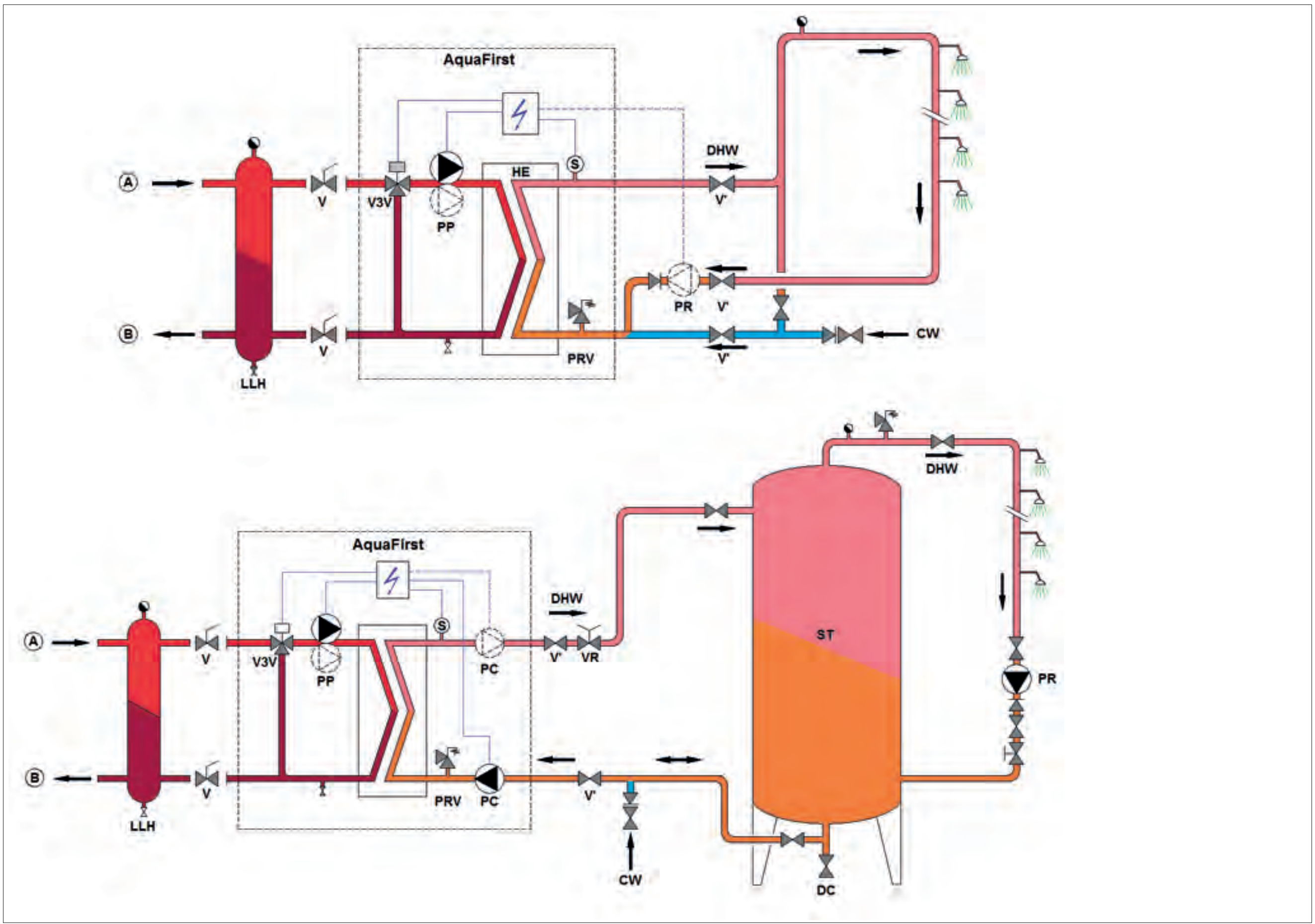
- Low energy class A pump(s) on primary
- Reduced risk of limescale build up
- Hot water in a split second thanks to 15 seconds fast response control valves
- Network capable controller (ModBus)
- Robust components
- Drinking water material conformity thanks to stainless steel 316 plates & EPDM FF clip-on gaskets
- Possibility to increase capacity by adding plates
- Quick and easy maintenance

Working principle
In the tap water system, energy is exchanged through a heat exchanger from the primary to the DHW side. On the primary side, the Alfa Laval AquaFirst has to be fed by a heating source that can be provided for example by a local boiler, a primary tank or a solar system. The temperature of the water entering the heat exchanger on the primary side is adapted to meet the demand detected on the domestic side. The mixing valve eliminates thermal shock in the heat exchanger and reduces the potential build-up of lime-scale on the secondary side.

On the secondary side, Alfa Laval AquaFirst Direct is connected to the main water circuit and provides domestic hot water to the distribution pipe-work when there is demand. A circulation pump - which is usually used to limit the time needed to deliver domestic hot water to the tap at the right temperature - maintains a minimum flow rate through the heat exchanger and through the distribution pipe-work.

For Alfa Laval AquaFirst Indirect a charging pump maintains - thanks to a constant flow rate -the supply of energy to the storage tank and the DHW network. This storage tank ensures DHW supply is met during peak demand periods.

Flowchart AquaFirst Direct & Indirect

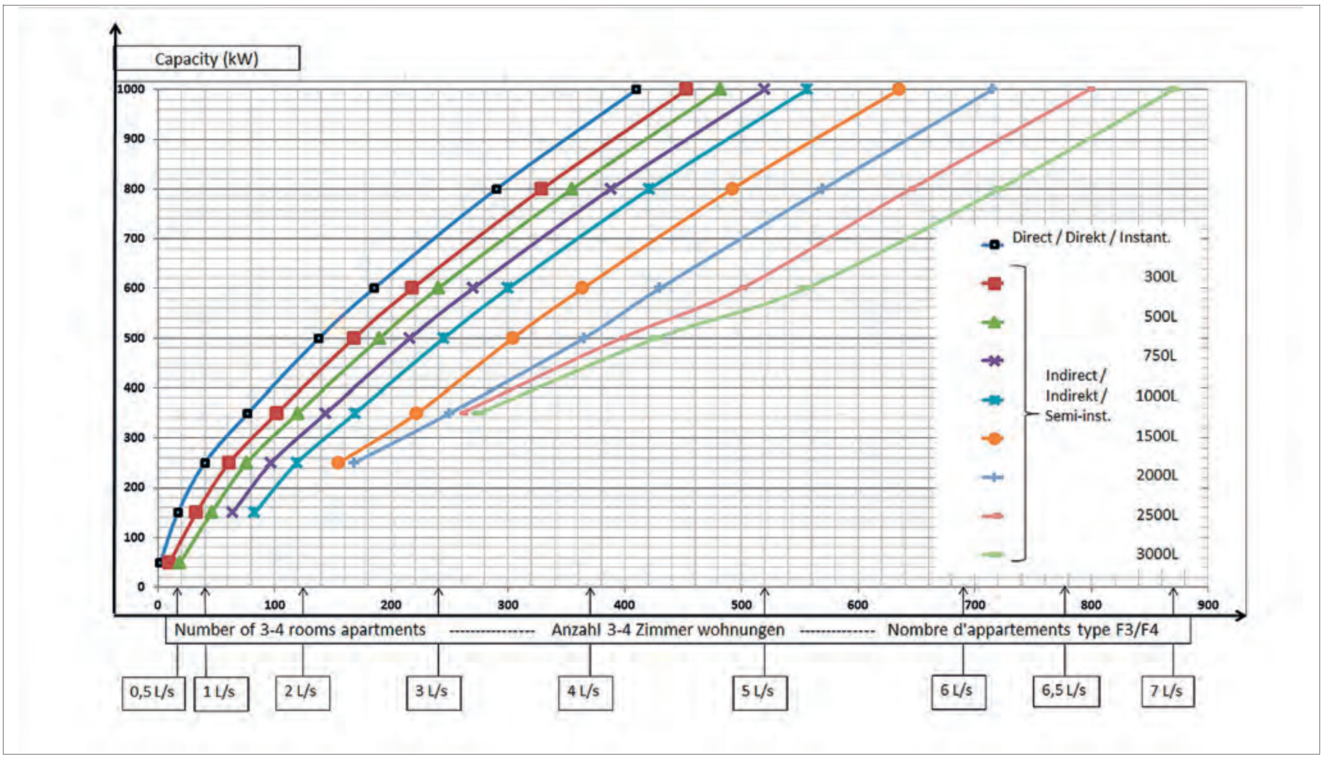


A	Primary inlet	PR	Recycling pump (on installation)
B	Primary outlet	PRV	Pressure relief valve
CW	Cold water inlet	S	DHW temperature sensor
DC	Draining valve	ST	Storage tank (Buffer vessel)
DHW	Domestic Hot Water	V	Manual gate valve
HE	Heat exchanger (PHE)	VR	Balancing valve
PC	Charging pump (one or two)	V3V	Mixing 3-port control valve with actuator
PP	Primary pump (single or double)		

Standard features

Heat exchanger	- Plates & Gasket heat exchanger; corrosion resistant stainless steel 316 plates & EPDMFF clip-on gaskets - Insulation as an option
Control system	- 3-port mixing electronic control valve - 24V 0-10V, 15 second speed actuator - ModBus RTU RS 485 Controller - Multi functional IP54 control box - NTC20K temperature sensors on secondary outlet with stainless steel sleeve
Pumps	- Primary class A flooded rotor pump: single or double head - Stainless steel charging flooded rotor pump: single or double head for Indirect solutions
Valves	- Drain valve (primary) - Pressure relief valve (secondary)

Selection chart (DHW flow rate: 10 - 60°C)



Quick selection table 1 – Direct version

Secondary: 10 - 55°C / free pressure available on primary: 5 Kpa

Primary	**Prim. 90°C**	Secondary		**Prim. 82°C**	Secondary		**Prim. 80°C**	Secondary		**Prim. 70°C**	Secondary		**Prim. 65°C**	Secondary		**Partnumber**	
flow rate m3/h	**cap. kW**	flow rate L/sec	pres. drop kPa	**cap. kW**	flow rate L/sec	pres. drop kPa	**cap. kW**	flow rate L/sec	pres. drop kPa	**cap. kW**	flow rate L/sec	pres. drop kPa	**cap. kW**	flow rate L/sec	pres. drop kPa	**single pump**	**double pump**
1,1	45	0,2	23	35	0,2	15	35	0,2	15	22	0,1	6	17	0,1	2	FI2007IS	FI2007ID
2,9	135	0,7	30	110	0,6	20	105	0,6	19	75	0,4	10	57	0,3	6	FI2017IS	FI2017ID
5,2	250	1,3	39	210	1,1	28	195	1,0	25	140	0,8	13	108	0,6	8	FI4027IS	FI4027ID
6,3	360	1,9	30	305	1,6	23	285	1,5	20	210	1,1	11	165	0,9	7	FI4045IS	FI4045ID
9,5	420	2,2	40	340	1,8	26	320	1,7	24	220	1,2	11	170	0,9	7	FI6011IS	FI6011ID
12	600	3,2	32	470	2,5	20	450	2,5	20	330	1,8	10	260	1,4	7	FI6017IS	FI6017ID
14	800	4,2	17	680	3,6	12	650	3,5	12	470	2,5	6	370	2,0	4	FI8031IS	FI8031ID
15,3	1000	5,3	10	850	4.5	7	800	4,3	7	600	3,2	7	485	2,6	3	FI8055IS	FI8055ID

Secondary: 10°C - 60°C / free pressure available on primary: 5 Kpa

Primary	**Prim. 90°C**	Secondary		**Prim. 82°C**	Secondary		**Prim. 80°C**	Secondary		**Prim. 70°C**	Secondary		**Prim. 65°C**	Secondary		**Partnumber**	
flow rate m3/h	**cap. kW**	flow rate L/sec	pres. drop kPa	**cap. kW**	flow rate L/sec	pres. drop kPa	**cap. kW**	flow rate L/sec	pres. drop kPa	**cap. kW**	flow rate L/sec	pres. drop kPa	**cap. kW**	flow rate L/sec	pres. drop kPa	**single pump**	**double pump**
1,1	40	0,2	15	30	0,2	9	30	0,2	9	18	0,1	4	12	0,1	2	FI2007IS	FI2007ID
2,9	125	0,6	21	100	0,5	14	95	0,5	13	60	0,3	5	42	0,2	3	FI2017IS	FI2017ID
5,2	235	1,1	29	190	0,9	19	175	0,8	16	115	0,6	8	80	0,4	4	FI4027IS	FI4027ID
6,3	340	1,6	23	280	1,4	16	260	1,3	14	175	0,8	7	125	0,6	4	FI4045IS	FI4045ID
9,8	400	1,9	29	320	1,5	19	295	1,4	16	185	0,9	7	120	0,6	3	FI6011IS	FI6011ID
12,2	565	2,7	23	460	2,2	16	430	2,1	14	260	1,2	5	180	0,9	3	FI6017IS	FI6017ID
14,3	770	3,7	13	640	3,1	9	600	2,9	8	400	1,9	4	280	1,3	2	FI8031IS	FI8031ID
15,4	950	4,6	7	790	3,8	6	750	3,6	5	520	2,5	3	380	1,8	2	FI8055IS	FI8055ID

Quick selection table 2 – Indirect version

Secondary: 10°C - 55°C / free pressure available on primary: 5 Kpa

Prim.	**Prim. 90°C**	Secondary		**Prim. 82°C**	Secondary		**Prim. 80°C**	Secondary		**Prim. 70°C**	Secondary		**Prim. 65°C**	Secondary		**Partnumber ***		
flow rate m3/h	**cap. kW**	flow rate L/sec	free pres. kPa	**cap. kW**	flow rate L/sec	free pres. kPa	**cap. kW**	flow rate L/sec	free pres. kPa	**cap. kW**	flow rate L/sec	free pres. kPa	**cap. kW**	flow rate L/sec	free pres. kPa	**single/single pumps**	**double/single pumps**	**double/double pumps**
1,1	45	0,2	50	35	0,2	59	35	0,2	59	22	0,1	69	17	0,1	73	FI2007SS	FI2007DS	FI2007DD
2,9	135	0,7	36	110	0,6	48	105	0,6	49	75	0,4	61	57	0,3	66	FI2017SS	FI2017DS	FI2017DD
5,2	250	1,3	14	210	1,1	30	195	1,0	35	140	0,8	52	108	0,6	60	FI4027SS	FI4027DS	FI4027DD
6,3	360	1,9	9	305	1,6	23	285	1,5	29	210	1,1	47	165	0,9	55	FI4045SS	FI4045DS	FI4045DD
9,5	390	2,1	5	340	1,8	16	320	1,7	21	220	1,2	46	170	0,9	55	FI6011SS	FI6011DS	FI6011DD
12	470	2,5	5	470	2,5	5	470	2,5	5	330	1,8	34	260	1,4	45	FI6017SS	FI6017DS	FI6017DD
13,1	700	3,7	5	680	3,6	7	650	3,5	13	470	2,5	49	370	2,0	65	FI8031SS	FI8031DS	FI8031DD
15,3	750	4,0	5	750	4,0	5	750	4,0	5	600	3,2	27	485	2,6	50	FI8055SS	FI8055DS	FI8055DD

Secondary: 10°C - 60°C / free pressure available on primary: 5 Kpa

Prim.	**Prim. 90°C**	Secondary		**Prim. 82°C**	Secondary		**Prim. 80°C**	Secondary		**Prim. 70°C**	Secondary		**Prim. 65°C**	Secondary		**Partnumber ***		
flow rate m3/h	**cap. kW**	flow rate L/sec	free pres. kPa	**cap. kW**	flow rate L/sec	free pres. kPa	**cap. kW**	flow rate L/sec	free pres. kPa	**cap. kW**	flow rate L/sec	free pres. kPa	**cap. kW**	flow rate L/sec	free pres. kPa	**single/single pumps**	**double/single pumps**	**double/double pumps**
1,1	**40**	0,2	59	**30**	0,2	65	**30**	0,2	65	**18**	0,1	71	**12**	0,1	74	FI2007SS	FI2007DS	FI2007DD
2,9	**125**	0,6	47	**100**	0,5	55	**95**	0,5	57	**60**	0,3	68	**42**	0,2	71	FI2017SS	FI2017DS	FI2017DD
5,2	**235**	1,1	28	**190**	0,9	43	**175**	0,8	47	**115**	0,6	60	**80**	0,4	67	FI4027SS	FI4027DS	FI4027DD
6,3	**340**	1,6	23	**280**	1,4	37	**260**	1,3	41	**175**	0,8	56	**125**	0,6	64	FI4045SS	FI4045DS	FI4045DD
9,8	**400**	1,9	11	**320**	1,5	30	**295**	1,4	36	**185**	0,9	56	**120**	0,6	65	FI6011SS	FI6011DS	FI6011DD
12,2	**520**	2,5	5	**460**	2,2	16	**430**	2,1	22	**260**	1,2	51	**180**	0,9	60	FI6017SS	FI6017DS	FI6017DD
14,3	**770**	3,7	5	**640**	3,1	30	**600**	2,9	37	**400**	1,9	66	**280**	1,3	80	FI8031SS	FI8031DS	FI8031DD
15,4	**820**	3,9	5	**790**	3,8	8	**750**	3,6	16	**520**	2,5	53	**380**	1,8	70	FI8055SS	FI8055DS	FI8055DD

* PH 6-9 and TH < 25°TH or 14°dH

Description table

Part number	Primary side			Heat exchanger		Secondary side		Electrical consumption		Dimensions	Weight
	Pump(s)	Control valve	Actuator	Number	Type	Pump(s)	Safety valve Barg	Pmax (W)	Imax (A)	L x W x H mm	Kg
FI2007IS	MAGNA1 32-40	HNW V5833 DN32 Kvs 16	HNW ML7430E	7	M3H	-	10	85	1.2	460x400x1040	70
FI2017IS				17							71
FI4027IS	MAGNA1 32-80			27				160	1.8		72
FI4045IS				45							73
FI2007ID	MAGNA1D 32-40	HNW V5833 DN32 Kvs 16	HNW ML7430E	7	M3H	-	10	85/ 160*	1.2 / 1.8*	460x400x1040	75
FI2017ID				17							76
FI4027ID	MAGNA1D 32-80			27				160 / 310*	1.8 / 3*		77
FI4045ID				45							78
FI2007SS	MAGNA1 32-40	HNW V5833 DN32 Kvs 16	HNW ML7430E	7	M3H	UPS32-80N	10	305	2.2	460x480x1040	75
FI2017SS				17							76
FI4027SS	MAGNA1 32-80			27				381	2.72		77
FI4045SS				45							78
FI2007DS	MAGNA1D 32-40	HNW V5833 DN32 Kvs 16	HNW ML7430E	7	M3H	UPS32-80N	10	305 / 380*	2.2 / 2.8*	460x480x1040	80
FI2017DS				17							81
FI4027DS	MAGNA1D 32-80			27				381 / 530*	2.72 / 4.5*		82
FI4045DS				45							83
FI2007DD	MAGNA1D 32-40	HNW V5833 DN32 Kvs 16	HNW ML7430E	7	M3H	2x UPS32-80N	10	305 / 380* / 500**	2.2 / 2,8* / 3,8**	460x480x1040	85
FI2017DD				17							86
FI4027DD	MAGNA1D 32-80			27				381 / 530* / 750**	2.72 / 4.5* / 5.72**		87
FI4045DD				45							88
FI6011IS	MAGNA1 40-100	HNW V5833 DN40 Kvs25	HNW ML7430E	11	M6M ML/MH	-	10	380	2.2	1000x500x1400	153
FI6017IS				17							158
FI8031IS				31							169
FI8055IS				55							192
FI6011ID	MAGNA1D 40-100	HNW V5833 DN40 Kvs25	HNW ML7430E	11	M6M ML/MH	-	10	380 / 750*	2.2 / 3.8*	1000x500x1400	171
FI6017ID				17							176
FI8031ID				31							187
FI8055ID				55							210
FI6011SS	MAGNA1 40-100	HNW V5833 DN40 Kvs25	HNW ML7430E	11	M6M ML/MH	UPS32-80N	10	600	3.15	1150x500x1400	161
FI6017SS				17							166
FI8031SS				31		UPS32-100N		725	3.67		177
FI8055SS				55							200
FI6011DS	MAGNA1D 40-100	HNW V5833 DN40 Kvs25	HNW ML7430E	11	M6M ML/MH	UPS32-80N	10	600 / 751*	3.15 / 4.15*	1150x500x1400	179
FI6017DS				17							184
FI8031DS				31		UPS32-100N		725 / 1095*	3.67 / 5.32*		195
FI8055DS				55							218
FI6011DD	MAGNA1D 40-100	HNW V5833 DN40 Kvs25	HNW ML7430E	11	M6M ML/MH	2x UPS32-80N	10	600 / 751*/ 971**	3.15 / 4.15* / 5.15**	1150x500x1400	187
FI6017DD				17							192
FI8031DD				31		2x UPS32-100N		725 / 1095* / 1440**	3.67 / 5.32* / 6.84**	1150x500x1400	203
FI8055DD				55							226

* with booster function activated

** with safety function activated

Operating limits	Primary	Secondary
Maximum operating pressure bar	10	10
Maximum operating temperature °C	110	100

ECF00441EN 1411

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AquaProtect

Anti-legionella tap water systems

The system to the left is AquaProtect T1 and the system to the right is AquaProtect T2 connected to a reaction tank.

Applications

AquaProtect is a tap water system which uses continuous thermal disinfection of incoming and circulating water to provide legionella-free domestic hot water for buildings such as hospitals, hotels, nursing homes, prisons and similar institutions.

Legionella bacteria occur in low numbers in natural environments such as rivers, lakes and reservoirs and can survive temperatures as low as 6°C and as high as 50°C. From these natural habitats, the bacteria can migrate into man-made water systems. Enclosed, warm storage vessels, blind spots in pipe-work and water systems containing stagnant water provide an ideal environment in which the bugs can flourish, particularly if sludge, sediment and scale are present for them to feed on. Studies have shown that many hot water systems contain legionella and other bacteria at various concentration rates.

Inhaled in tiny water droplets, legionella bacteria can cause legionnaire's disease which is potentially fatal to humans, especially those made more vulnerable because of age or illness.

AquaProtect uses recovered heat to disinfect hot water and no additional energy input is required.

Features and benefits

- Disinfection at 70°C of all incoming water.
- Continuous disinfection of the circulation loop.
- Adaptable holding time to comply with local rules.
- Domestic hot water supply at appropriate temperature (60°C) to avoid scalding at the tap.
- Up to 13 m^3/h of disinfected water.
- Continuous circulation through the system.
- Possibility to run thermal treatment of the network.
- Temperature safety function to ensure that only disinfected water enters the reaction tank (AquaProtect T2 only).
- Heat exchangers for all applications and conditions
- Electronic control.

Working principle
AquaProtect uses two heat exchangers. One is connected to the heat source (boiler, district heating network, etc) and is used to disinfect water at 70°C.

The other heat exchanger is used on one side to cool water from 70°C down to a suitable temperature for a hot tap water network (60°C). The heat recovered in the process is used to pre-heat incoming and circulating water before it enters the disinfection heat exchanger where it is heated to 70°C.

Once heated to 70°C, the disinfected water needs to be held at this temperature for a given time to ensure eradication of bacteria.

A range of tank sizes enables the appropriate tank to be selected to ensure that the hold time (1 minute, 6 minutes, etc) complies with local or national regulations. This can be achieved by using either a standard storage vessel or a reaction tank with a special internal configuration that controls the direction of flow.

In semi-instantaneous systems, disinfected water flows to a storage vessel where it is stored until the peak demand period occurs (a combined reaction tank can offer both functionalities. See hydraulic chart on the back page. AquaProtect T1 Instantaneous does not use a storage vessel but still need a holding tank).

From this storage vessel, disinfected water flows to the cooling heat exchanger. A mixing valve ensures that domestic hot water is provided at the right temperature (60°C) by mixing disinfected water at 70°C with cooled water coming from the storage vessel. To eliminate any risk of infection, only disinfected water is used.

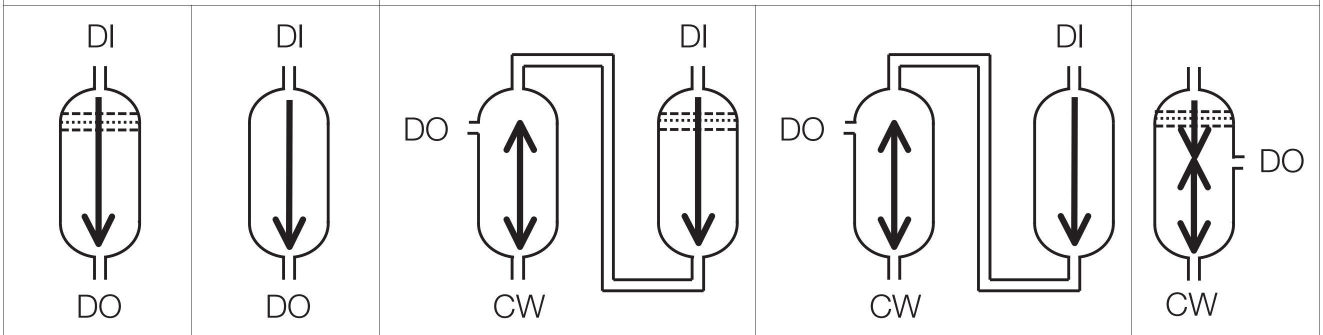
During peak periods, disinfected water is drawn off from the top of the storage vessel to the network by water entering the network.

When there is no or limited demand the water in the storage vessel is continuously replenished. Circulation through the system ensures that the water is drawn from the bottom of the storage vessel to be pre-heated and then disinfected before being stored.

AquaProtect T2 is supplied with a temperature safety function which ensures that only disinfected water enters the reaction tank. Water that hasn't attained the disinfection temperature is diverted to the beginning of the process to ensure that it finally reaches 70°C. This function can be very useful in cases of low capacity on the primary side, or in the event of scaling.

Possible tank combinations

AquaProtect T1 Instantaneous		AquaProtect T1 Semi-instantaneous & AquaProtect T2		AquaProtect T2 Combined
One reaction tank (holding tank)	One storage vessel used as holding tank	One storage vessel and one reaction tank (holding tank)	One storage vessel and one storage vessel used as holding tank	Combined reaction tank (holding tank and storage vessel)



DI Disinfected Water In
DO Disinfected Water Out
CW Cold Water In or To Pre-Heating HE

Equipment

<table>
<tr><td>Disinfection temperature</td><td colspan="5">70°C</td></tr>
<tr><td>Holding temperature</td><td colspan="5">70°C</td></tr>
<tr><td>Distribution temperature</td><td colspan="5">60°C</td></tr>
<tr><td>Circulation return continuous disinfection</td><td colspan="5">Yes</td></tr>
<tr><td>Periodic net disinfection</td><td colspan="5">Yes</td></tr>
<tr><td>By-pass renewable energy connection</td><td colspan="5">Optional</td></tr>
<tr><td></td><td colspan="2">AquaProtect T1</td><td colspan="2">AquaProtect T2</td><td>T2 Combined</td></tr>
<tr><td>Temperature safety function</td><td colspan="2">-</td><td colspan="3">Yes</td></tr>
<tr><td>Available controller</td><td colspan="2">Alfa Laval
Micro 2000 Special</td><td colspan="3">Samson 5479
with/without Communication Interface RS485</td></tr>
<tr><td>Heat exchanger</td><td colspan="2">Plates & Gaskets</td><td>Plates & Gaskets</td><td>Copper Brazed</td><td>Copper Brazed</td></tr>
<tr><td>Process</td><td>Instantaneous</td><td>Semi-instantaneous</td><td colspan="3">Semi-instantaneous</td></tr>
<tr><td>Holding tank</td><td colspan="2">Needed</td><td colspan="2">Needed</td><td rowspan="2">Combined reaction tank needed</td></tr>
<tr><td>Storage vessel</td><td>-</td><td>Needed</td><td colspan="2">Needed</td></tr>
<tr><td>Excessive tapping protection</td><td colspan="2">-</td><td colspan="3">Optional</td></tr>
<tr><td>Over-heating protection</td><td>-</td><td>Yes</td><td colspan="2">-</td><td>-</td></tr>
</table>

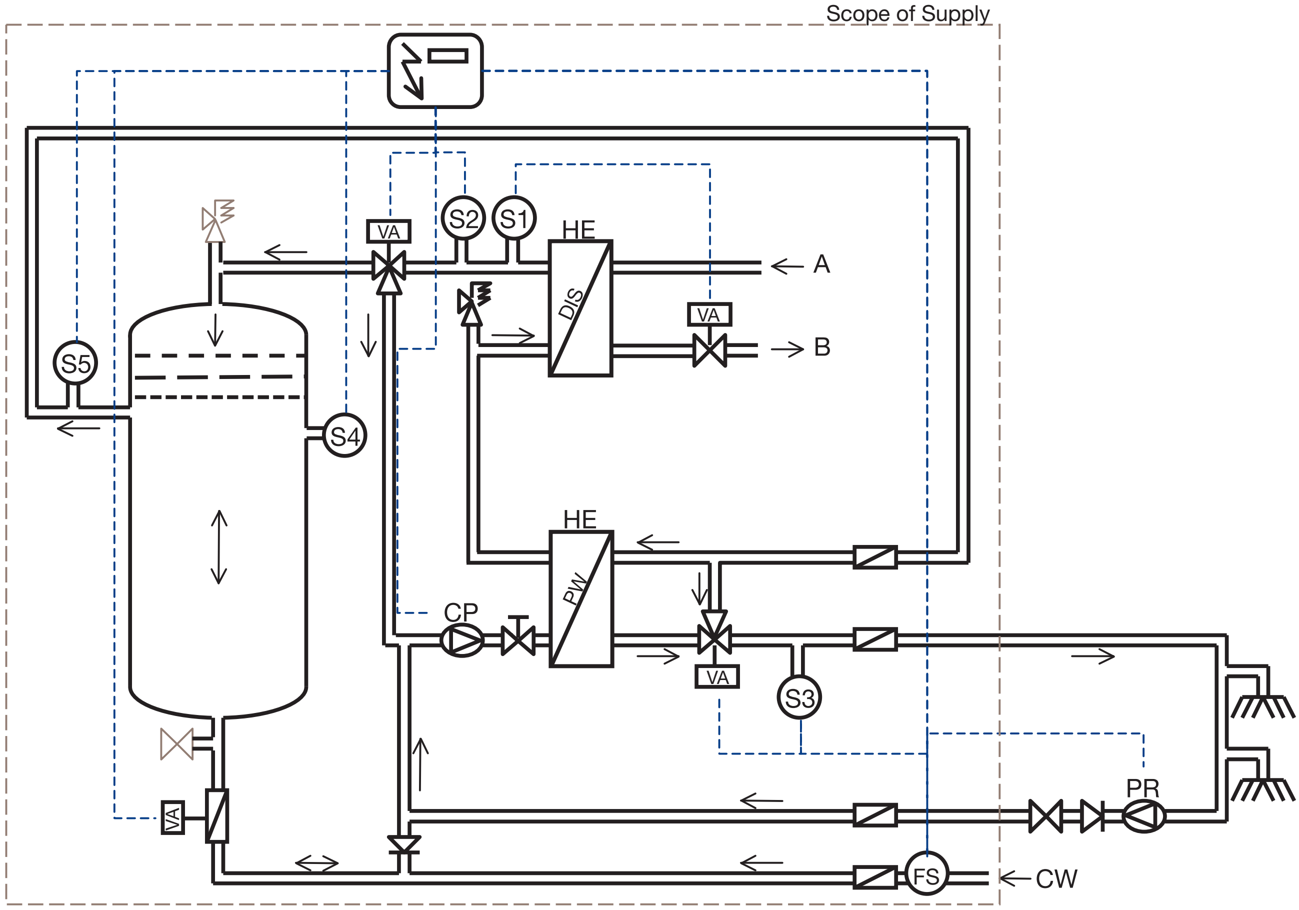
For additional features or AlfaNova Heat Exchanger, please consult.
AquaProtect T2 Combined can easily be connected to the Combined Reaction Tank which has a 6 min holding time.

Examples of holding time according to holding tank size:
For an AquaProtect providing 5 m^3/h flow rate of disinfected water

<table>
<tr><td>Holding tank</td><td>300 L</td><td>500 L</td><td>750 L</td></tr>
<tr><td>Holding time</td><td>3 min</td><td>6 min</td><td>9 min</td></tr>
<tr><td>Operating limits</td><td colspan="3">Primary</td></tr>
<tr><td>Maximum operating pressure</td><td colspan="3">25 Bar</td></tr>
<tr><td>Maximum operating temperature</td><td colspan="3">130°C</td></tr>
</table>

Maximum pressure and temperature differ according to model and type of heat exchanger.

Hydraulic chart



A	From District Heating Network / Boiler	**PW**	Pre-Heating HE	**VA**	Primary Control Valve
B	To District Heating Network / Boiler	**DIS**	Disinfecting HE	**FS**	Flow Switch
CW	Cold Water Inlet	**CP**	Charging Pump	**S**	Temperature Sensor
HE	Heat Exchanger	**PR**	Circulation Pump		

Note: The illustration above shows a semi-instantaneous system using a combined reaction tank. The use of 2 separate tanks may have to be considered for larger application. Tank(s) are not part of the AquaProtect Scope of Supply and should be ordered separately.

AquaProtect is also available with 2 or 3-port electronic control on the primary side of the disinfection heat exchanger.

Test requirements

AquaProtect is built in compliance with PED CE 97/23 Art 3.3 or PED 1 and CE 73/23 electrical regulation. AquaProtect is assembled, wired and tested prior to shipment.

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AlfaPilot

Multi-Energy-Pilot

AlfaPilot is a fluid navigation system that gives priority to renewables before any use of fossil energy. The Multi-Energy-Pilot AlfaPilot can be integrated into:
- Comfort heating systems
- Domestic Hot Water (DHW) systems
- Combined systems (comfort heating & DHW)

for any collective application as residential buildings, hospitals, schools, hotels, sport centers etc.

The simplicity and robustness of the AlfaPilot reduce installation and maintenance costs, ensuring reliable return on investment.
Installed on the heat return loop, parallel to a primary storage tank, AlfaPilot is dedicated for low primary return systems like:
- DHW systems "AquaEfficiency"
- Apartments comfort heating systems "Mini City"

Benefits of AlfaPilot
- Automatic navigation on available energy
- On-going priority given to the use of renewable energy
- Allows pre-heating, even at low temperatures
- Includes remote communication
- Supply of DHW during peak demands thanks to storage of energy accumulated in the primary tank
- Supplies also DHW at low demand periods during recycling
- Protects the user and the equipment during summer overheating periods on solar installations
- No scaling, legionella or DHW health issues, no risk of inter-circuit leakage between the solar and the DHW loop as the solar circuit is not in contact with DHW
- Ideal for renovating all systems fitted with AquaEfficiency and Mini City that are connected to a renewable energy source

Description
- Standard equipment:
  - 3-port diverting valve
  - three temperature sensors
  - IP54 control box with MICRO3000 regulator communicating in MODBUS
  - outdoor temperature sensor is available as an option

Selection tool
Four models to choose from depending on Primary flow rate:

Model	Valve		Flow	Pressure loss	Flow	Pressure loss	Flow	Pressure loss	Part number	W x D x H
	Diameter DN	Kvs	m3/h	Kpa	m3/h	Kpa	m3/h	Kpa		mm
25	25	10	2,0	4	2,5	6	3,6	13	ASTB25	680 x 260 x 315
32	32	16	3,0	4	4,0	6	7,2	20	ASTB32	720 x 260 x 315
40	40	25	5,0	4	6,0	6	15,0	36	ASTB40	730 x 260 x 315
50	50	40	8,0	4	13,0	11	22,0	30	ASTB50	800 x 260 x 315

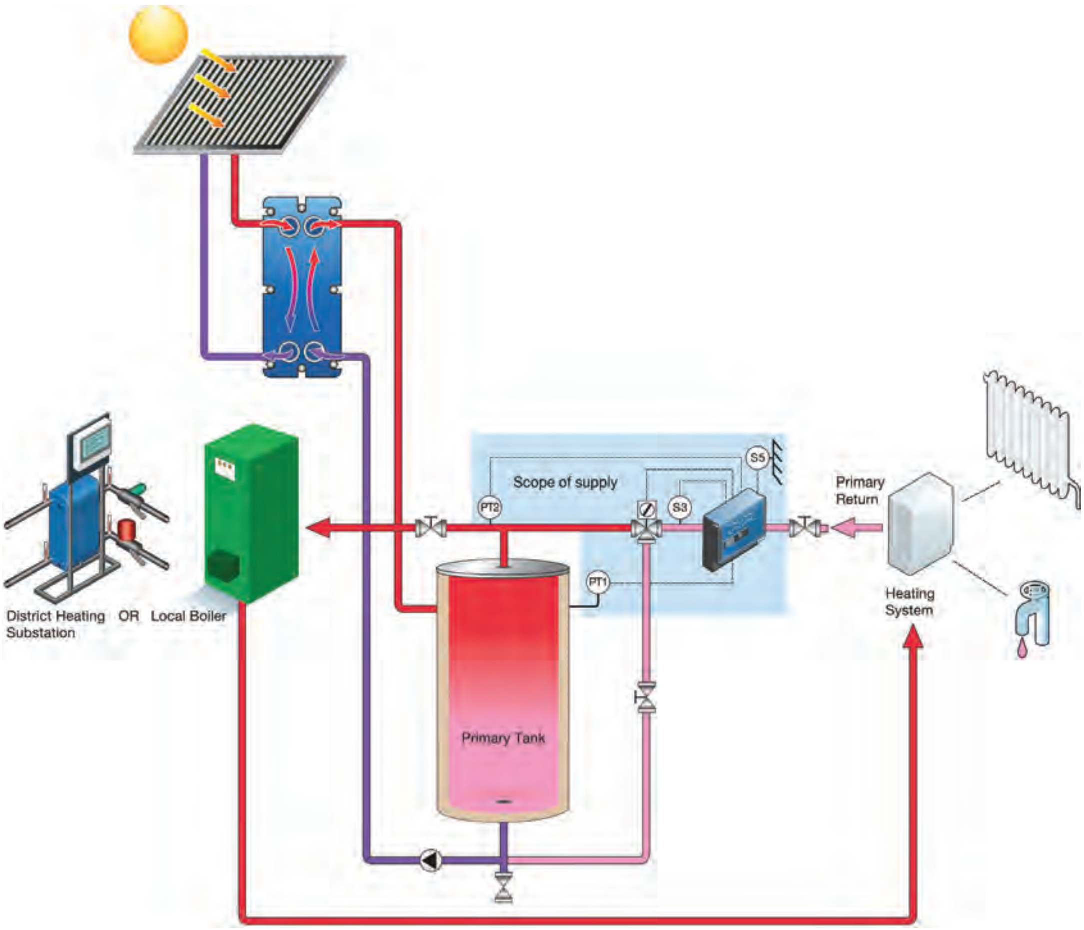
Operating limits	Maximum	Minimum
Temperature	110 °C	1 °C
Pressure	10 bar	1,5 bar

Working principle

AlfaPilot is a "plug and play" fluid navigation system based on comparative temperature measurements.
Example:

- If PT1 – S3 <Δ T: the fluid is guided straight away to the main power source
- If PT1 – S3 >Δ T: AlfaPilot navigates the fluid towards the bottom of the primary tank
- Sensor PT2 controls the 3-port valve and thus limits the outlet temperature of the system
- The optional outdoor sensor S5, permitting external influence on PT2 settings, gives the best out of AlfaPilot

AlfaPilot flow chart



Temperature sensors:
S3 = primary inlet sensor
S5 = outdoor sensor (optional)
PT1 = primary tank sensor
PT2 = sensor for additional hot water outlet - return local boiler or heating substation

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AquaCompact

Compact heat exchanger system

Applications
AquaCompact is a compact pre-assembled system. It is designed to provide domestic hot water in applications in which the demand is not constant such as apartment blocks, hotels, hospitals, schools, sport halls etc.

AquaCompact optimizes the necessary power rating and the hot water storage volume without reducing domestic hot water capacity. AquaCompact therefore offers best possible overall economy by minimizing installation and operating costs.

Dependable performance
Since 1923, Alfa Laval has been in the water heating business, and has become a leading manufacturer and supplier. AquaCompact incorporates a wealth of background experience for secure and reliable water heating. The components have been carefully selected and tested to perform well in combination with one another.

Different ready-made charging kits including the heat exchanger, charging pump, valves and piping are available up to 240 kW to easily meet different project designs and installation requirements.

AquaCompact can be selected with:
- a Copper Brazed heat exchanger
- a Plate and Gasket heat exchanger
- or with an AlfaNova 100% Stainless Steel heat exchanger

The kits can then be combined to storage vessels from 300L up to 1500L in stainless steel or enamel.

In its standard version AquaCompact is only delivered with the charging kit but several ready-made primary kits are offered as option. These optional kits allow choosing between 2-Port and 3-Port valve and comes self actuated or with an actuator operated by a fully equipped electronic control that offers many advanced functions.

Principle
AquaCompact combines the high efficiency of a heat exchanger with the storage capacity of a tank. The charging pump and charging circuit are continuously in operation and the system is therefore continuously prepared to meet high rates of domestic hot water demand. The hot water produced in the heat exchanger is led to the top of the storage vessel from where the hot water is drawn.

If the hot water demand is less than the energy supply the extra amount of hot water produced by the heat exchanger will be stored in the storage vessel. When the hot water demand corresponds to the energy supply, the heat exchanger compensates without affecting the quantity of stored hot water.

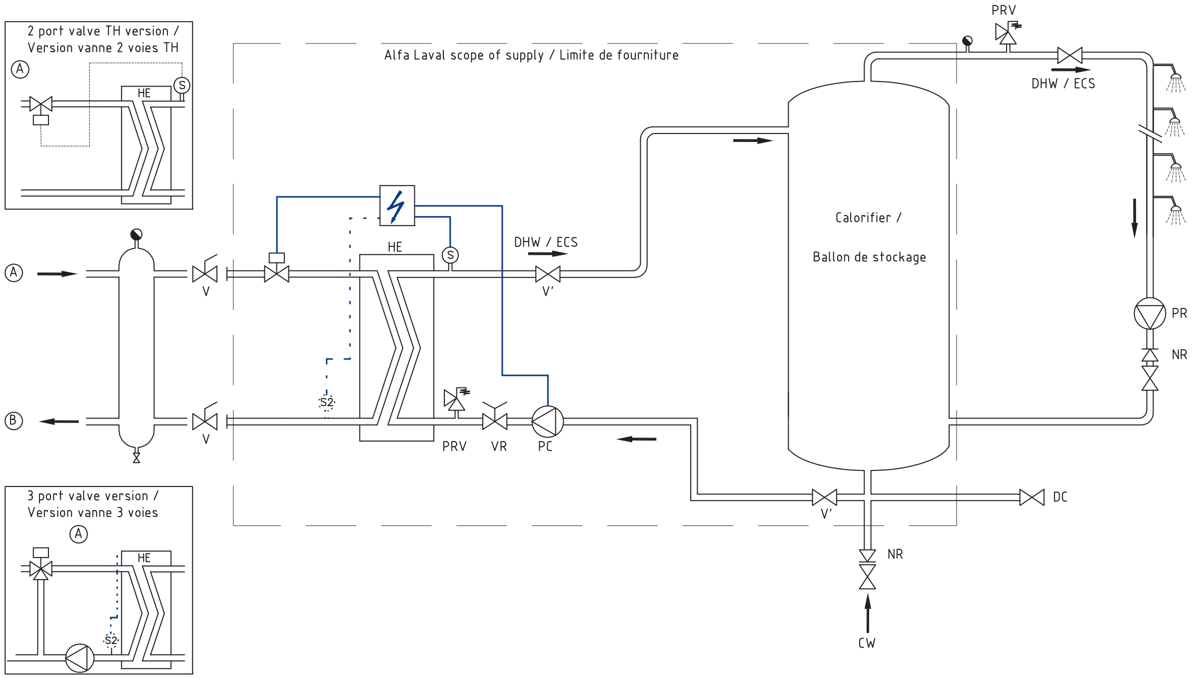
The stored hot water is only used for high hot water demands that are higher in terms of energy than the power supply. The storage vessel of the system serves as a buffer for medium or high domestic hot water demand. AquaCompact will always provide hot water at a rate corresponding to the energy input even if the storage vessel has been completely emptied of hot water.

A balancing valve is used to ensure the charging circuit will operate at the design request flow. This valve also includes a flow meter for simple adjustment.

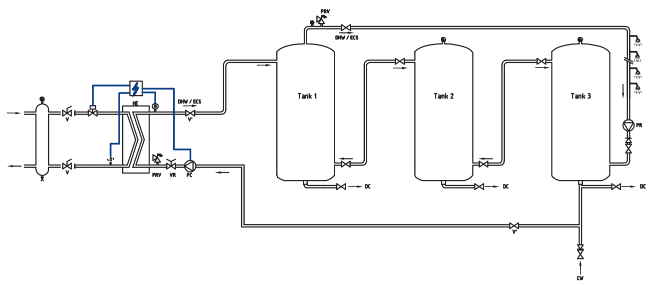
If the water hardness is high, temperature control should always be installed in order to avoid limescale deposits. The primary kit will control that only the necessary amount of hot water enters the heat exchanger and will limit thermal shocks and limescaling. In this case also the temperature set point on secondary side should be limited on the basis of local experience or best practice.

To help prevent lack of capacity due to lime-scaling the electronic primary kits provide you with an early warning message that will inform when the heat exchanger needs to be cleaned. For this purpose the Copper Brazed and AlfaNova heat exchangers are equipped with two extra connections to easily connect a Cleaning-In-Place system. Several isolating valves allow the easy maintenance of the different components used in AquaCompact without having to flush all the water stored into the tank.

AquaCompact, a compact system thought for the daily life.



A	Primary inlet	PC	Charging pump	S	Sensor
B	Primary outlet	PR	Installation recycling pump	V	Manual gate valve
CW	Cold water inlet	HE	Heat exchanger (AlfaNova / Brazed / PHE)	VR	Flow setting valve
DC	Drain cock / flooded	PRV	Pressure relief valve	S2	Scaling function / CIP optional sensor
NR	Return valve				



Principle to connect several storage vessels in serie.

	Primary side	Secondary side
Maximum operating pressure	16 bar	10 bar
Maximum operating temperature	110°C	80°C

Maximum operating temperature may differ due to local regulation.

PCT00032EN 1204

Alfa Laval reserves the right to change specifications without prior notification.

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Alfa Laval AquaStar

Domestic hot water unit for apartments

Alfa Laval AquaStar is a complete, installation-ready tap water unit. It is suitable for apartments and single family houses that are connected to a heating network.
Alfa Laval has long experience in district heating technology and has developed AquaStar with a well-considered function and simple operation. All components are readily accessible for maintenance and future servicing needs.

High comfort
AquaStar offers fully automatic temperature control for hot water. The hot water is heated by direct exchange with high capacity. This means that the hot water is always as fresh as the incoming cold water.

Simple installation
Small dimensions, low weight, and self-acting control equipment ensure simple installation.

AquaStar includes insulation to save energy.

Long-term security
AquaStar represents the very latest technology and meets very strict long-term performance specifications. The plates are made from acid-resistant, stainless steel. All components are mutually tuned and are subjected to detailed functional testing according to Alfa Laval's ISO 9001:2008 quality assurance system.
AquaStar is built in compliance with PED 97/23/EC.

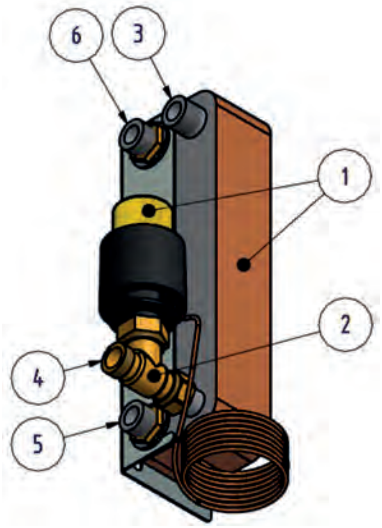
Heating network – a good source of heat
A heating network is an efficient technology that meets the need for hot water in a simple, convenient and secure way.

Operation
AquaStar is used for the indirect connection of apartments and single family houses to the heating network.

A heat exchanger is used to transfer heat from the heating network medium to the hot water system. Heat is transferred through a package of thin, acid-resistant, stainless steel plates, which keeps the heating network medium separate from the domestic hot water system.

A self-sensing temperature regulator controls the hot water temperature. This measures the temperature of the hot water in the heat exchanger and automatically adjusts the outgoing flow. This patented, in-house Alfa Laval design gives a constant hot water temperature irrespective of volume and pressure flow.

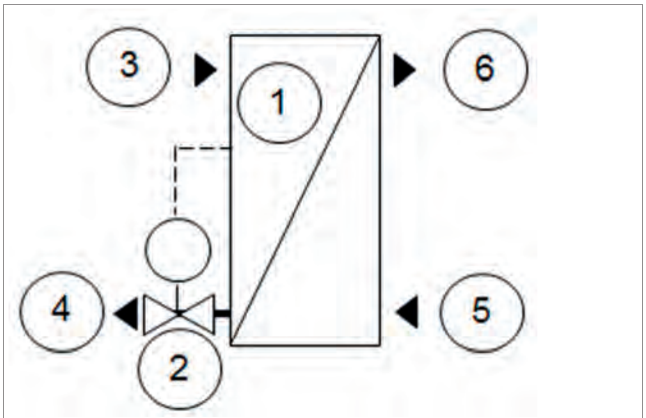
AquaStar includes insulation for better energy efficiency.



Components

1. Heat exchanger and temperature controller for hot water
2. Control valve for hot water
3. Heating network media, supply
4. Heating network media, return
5. Cold water (CW)
6. Hot water (HW)

Diagrammatic flow chart for AquaStar



Operating data	Heating medium	Hot water circuit
Design pressure, MPa	1.6	1.0
Design temperature, °C	120	100
Volume, l	0.34	0.36

Performance at available differential pressure 50-600 kPa

Designed temperature programme (°C)	Capacity (kW)	Primary flow (l/s)	Actual return temp. (°C)	Secondary flow (l/s)
Hot water circuit				
80-25/10-55	79	0.34	25	0.42
70-25/10-58	36	0.19	25	0.18
65-25/10-50	55	0.33	25	0.33

An easily manageable, economical and durable source of heat

The AquaStar uses the heating network medium for heating the domestic hot water.
The AquaStar is a wall-mounted unit and is very compact. The unit is discreet and to minimize transmission of operational sounds, we recommend installing it on well insulated walls or on walls of concrete.
AquaStar requires no attendance or maintenance and has a very long operational life. In the event of requiring service or component exchange at some future date, all parts are easily accessible and individually replaceable.

Other information
Electrical data: -----------------------
Dimensions (with out cover): 200 mm width x 120 mm depth, 350 mm height
Weight: 5 kg
Transport particulars: Total weight 8 kg, 0,01 m³

Connections	External thread
Heating network media supply	G ¾
Heating network media return	G ¾
Cold water	G ¾
Hot water	G ¾

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Alfa Laval AquaMicro

Domestic hot water unit for apartments

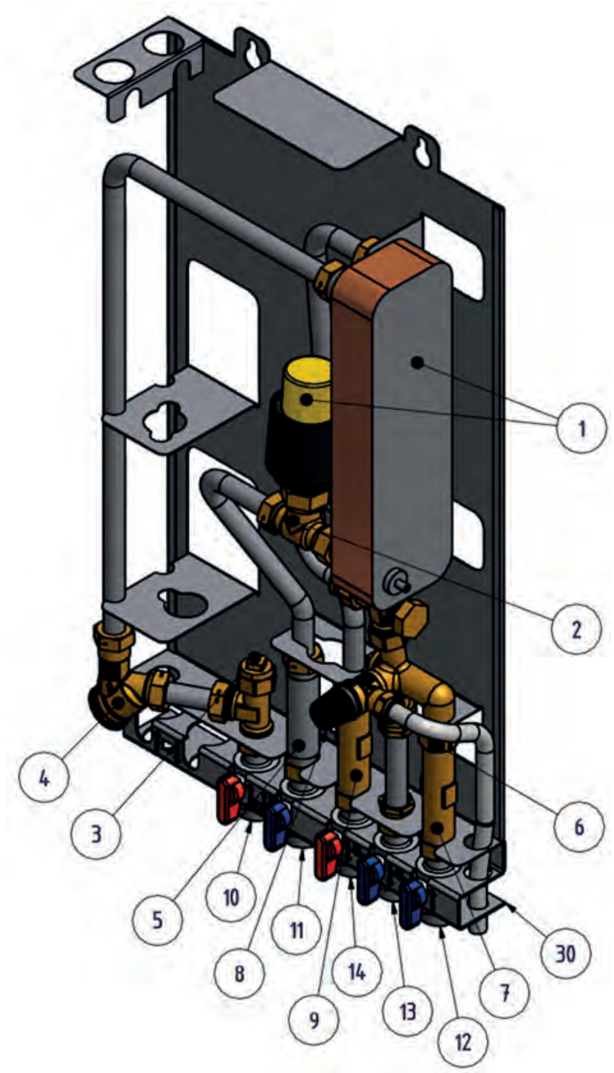
Alfa Laval AquaMicro is a complete, installation-ready district heating substation for domestic hot water. IIt is suitable for apartments and single family houses that are connected to a heating network. Alfa Laval has long experience in district heating technology and has developed AquaMicro with a well-considered function and simple operation. All components are readily accessible for maintenance and future servicing needs.

High comfort
AquaMicro offers fully automatic temperature control for hot water. The hot water is heated by direct exchange with high capacity. This means that the hot water is always as fresh as the incoming cold water.

Simple installation
Small dimensions, low weight, well-designed pipe routing and self-acting control equipment ensure simple installation.

AquaMicro is mounted on an insulated frame and includes an insulated cover. Better insulation means less energy usage and better energy efficiency.

Long-term security
AquaMicro represents the very latest technology and meets very strict long-term performance specifications. The plates and all the pipes in the unit are made from acid-resistant, stainless steel. All components are mutually tuned and are subjected to detailed functional testing according to Alfa Laval's ISO 9001:2008 quality assurance system. AquaMicro is built in compliance with PED 97/23/EC.



Components

1. Heat exchanger and temperature controller for hot water
2. Control valve for hot water
3. Temperature sensor connection, heating media supply
4. Filter for heating media
5. Adapter for energy meter
6. Check valve for cold water
7. Adapter for Cold water flow meter
8. Safety valve for domestic hot water
9. Adapter for Hot water flow meter
10. Heating network media, supply
11. Heating network media, return

12. Cold water inlet (cw)
13. Cold water outlet (cw)
14. Hot water (hw)
30. First fix jig including shut-off valves (option)

Heating network – a good source of heat
A heating network is an efficient technology that meets the need for hot water in a simple, convenient and secure way.

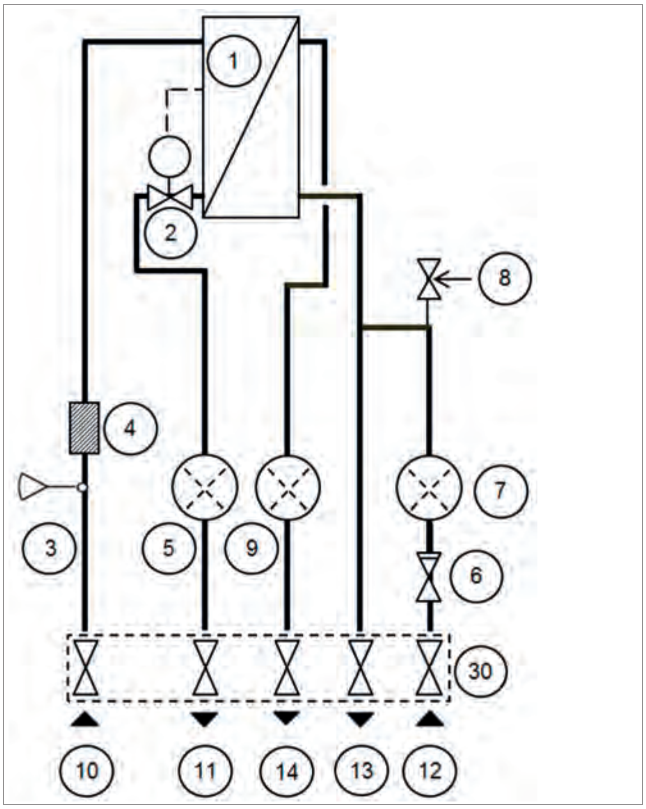
Operation
AquaMicro is used for the indirect connection of apartments and single family houses to the heating network.

A heat exchanger is used to transfer heat from the heating network medium to the hot water system. Heat is transferred through a package of thin, acid-resistant, stainless steel plates, which keeps the heating network medium separate from the domestic hot water system.

A self-sensing temperature regulator controls the hot water temperature. This measures the temperature of the hot water in the heat exchanger and automatically adjusts the outgoing flow. This patented, in-house Alfa Laval design gives a constant hot water temperature irrespective of volume and pressure flow.

The energy supplier registers use of energy. Measurement is done by recording the flow of heating network medium through the system, and by measuring the temperature difference between the medium's supply and return flow.

Diagrammatic flow chart for AquaMicro



Operating data		
	Heating medium	**Hot water circuit**
Design pressure, MPa	1.6	1.0
Design temperature, °C	120	100
Opening pressure, safety valve, MPa	-	0.9
Volume, l	0.34	0.36

Performance at available differential pressure 50-600 kPa				
Designed temperature programme (°C)	**Capacity (kW)**	**Primary flow (l/s)**	**Actual return temp. (°C)**	**Secondary flow (l/s)**
Hot water circuit				
80-25/10-55	79	0.34	25	0.42
70-25/10-58	36	0.19	25	0.18
65-25/10-50	55	0.33	25	0.33

An easily manageable, economical and durable source of heat

The AquaMicro uses the heating network medium for heating the domestic hot water. The AquaMicro is a wall-mounted unit and is very compact. The unit is discreet and to minimize transmission of operational sounds, we recommend installing it on well insulated walls or on walls of concrete. AquaMicro requires no attendance or maintenance and has a very long operational life. In the event of requiring service or component exchange at some future date, all parts are easily accessible and individually replaceable.

To save time and efficiency the installation, Alfa Laval offers a first-fix- jig including shut-off valves.

Other information
Electrical data: -----------------------
Dimensions (cover): 430 mm width x 160 mm depth, 775 mm height
Dimensions (with out cover): 400 mm width x 120 mm depth, 630 mm height
Weight: 12 kg, cover, 2kg
Transport particulars: Total weight 19 kg, 0.08 m³

Connections first-fix jig	Internal thread	External thread
Heating network media supply	G ¾	G 1
Heating network media return	G ¾	G 1
Cold water inlet	G ¾	G 1
Cold water oulet	G ¾	G 1
Hot water	G ¾	G 1

Option

First fix jig with shut-off valves.

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Alfa Laval Primary Tank 5 bar

Thermal storage vessel for Primary side / 300-3000 litres

Alfa Laval Primary Tank is suitable to store large quantities of heated **primary** water from different heat sources such as boilers, hydraulic networks, solar heaters or any other heat recovery system. The Tank is designed for use in combination with a tap water system like Alfa Laval AquaFirst, AquaEfficiency or AquaFlow/Store and also high efficient heat interface units, such as type Mini City.

Applications

The Primary Tank stores energy to generate hot primary water on demand in facilities where sudden high demands occur on a fairly regular basis such as:

- apartment blocks
- hospitals, retirement and nursing homes
- hotels
- schools
- leisure centres
- any other collective building

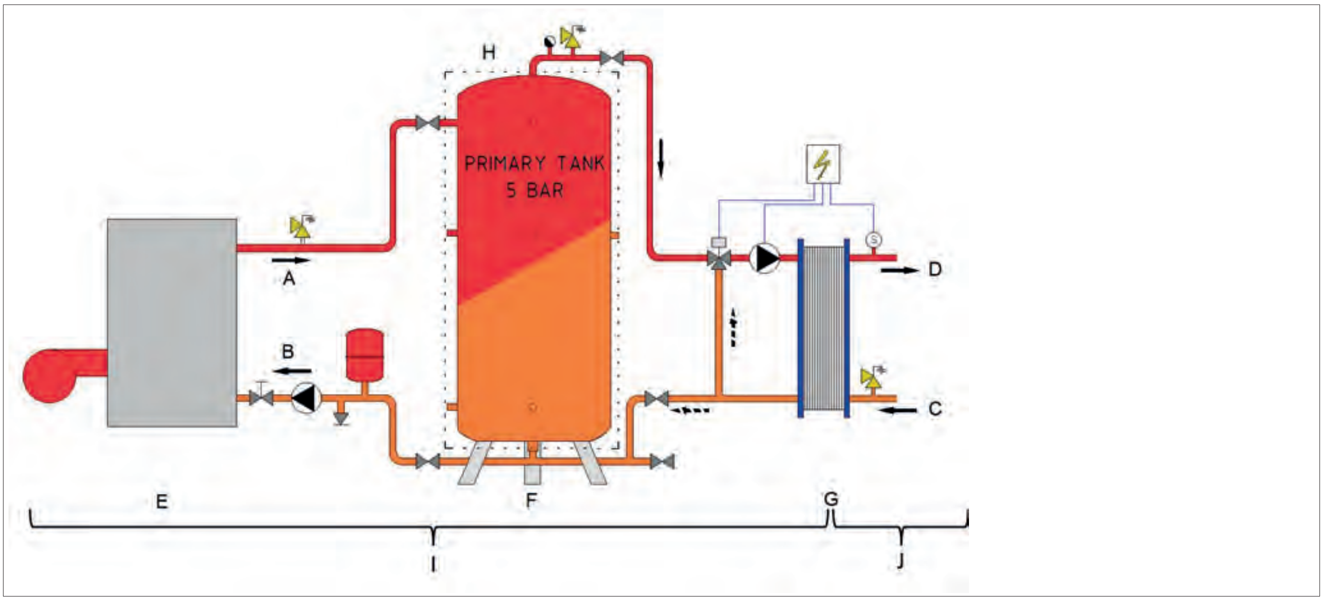
Benefits

- Energy saving solution as reduces the boiler or network capacity
- Hygienic solution: no riks of legionella, even at low temperature thanks to the water being stored on the primary side
- Maximum hot water production thanks to its specific internal tube arrangement avoiding mixing of the cold water return loop with the stored hot water
- Easy handling thanks to 2 ring bolts on top of the Primary Tank
- Delivered with feet to facilitate the cold water inlet connection and emptying, and to maximize the total available volume
- Insulation - standard 100mm - easy to remove and refit
- Reduces the risk of lime scaling if combined with the 3-port mixing valve of the AquaFirst, AquaEfficiency or AquaFlow/Store unit, especially if combined with thermal solar installation
- Additional connections to optimize condensation and the heating of boilers
- Low total cost of ownership

Charasteristics

Volumes	300 to 3000 litres
Material	Carbon steel, conform PED 97/23CE
Outer coating	Painted
Insulation	M1: 100mm glass wool covered with PVC jacket, European fireclass B
	M0: 100mm rockwool cladded with aluminium metal plate, European fireclass A
Maximum operation temperature	100°C
Maximum operating pressure bar gauge	5 bar g
Connections	All connections are female threads
	All 1/2" connections are dedicated for additional instruments like temperature sensors

Flowchart and working principle



A Primary heating water inlet
B Primary heating water outlet
C Secondary return from network
D Secondary outlet to network

E Local boiler
F Return from tap water system
G Tap water system
H To tap water system

I Primary side
J Secondary side

In the tap water system (G), energy is exchanged through a heat exchanger from the primary (I) to the DHW side (J). On the primary side, the DHW unit has to be fed by a heating source that can be provided for example by a local boiler (E) and the Alfa Laval Primary Tank 5 bar. In the case of the Primary Tank, the required DHW unit primary flow rate comes from the top of the Primary Vessel. This flow rate (H) is a combination of the flow rate coming from the bottom of the vessel (F) and the additional flow rate (A) coming from the boiler. This storage tank ensures that DHW primary flowrate supply is met during peak demand periods.

Sizing

The "total peak need for Domestic Hot Water" (DHW) = "nominal capacity of a tap water system" + "volume of the stored DHW" on secondary side used in 10min.
How to size an equivalent solution with the Primary Tank 5 bar?

- Design the DHW on the "total peak need for Domestic Hot Water" required
- Design the Primary Tank 5 bar with the above calculated "volume of the stocked DHW" X 1,4

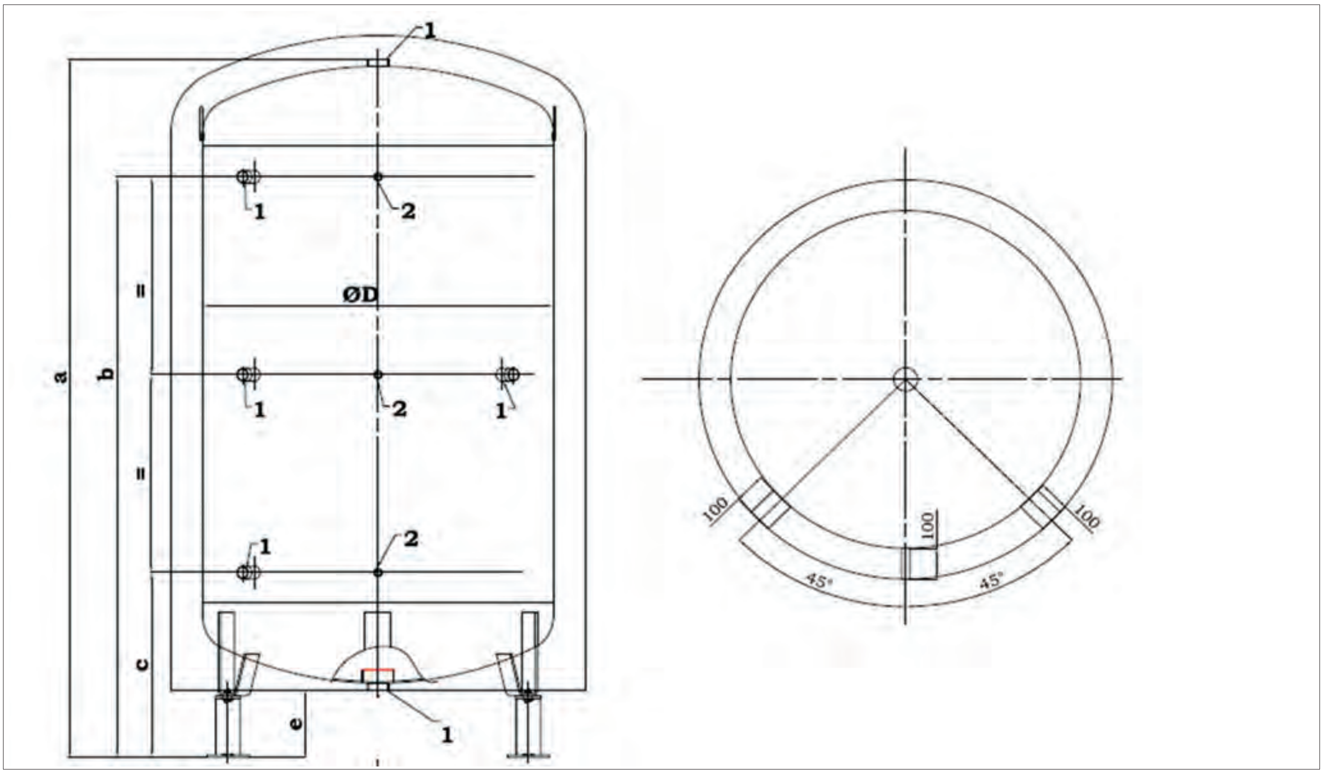
Example for 71 standard apartments:
Requested capacity for a Direct (Instantaneous) tap water system of 300 kW with an available capacity of the boiler of 100 kW:

- Offer for an Indirect (Semi-instantaneous) tap water system, 100 kW boiler and a secondary DHW storage tank would be:
  - Indirect (Semi-instantaneous) tap water system: 100 kW (G = E)
  - Volume DHW storage tank: **1000L**

- Offer with a Direct (Instantaneous) tap water system, 100 kW boiler and the Primary Tank 5 bar would be:
  - Direct (Instantaneous) tap water system: 300 kW
  - Volume of the Primary Tank 5 bar: 1,4 X 1000L = **1400L**

In this example the solution will be the Primary Tank 5 bar of 1500L (see next page).

Drawing & Selection table



Vol-ume (L)	Dimensions (mm)					Connection sizes (inch)		Insulations Cooling constant during 24 hours [(kWh/nb of litres)/ DeltaT]		Heat loss during 24 hours (kWh)		Article Numbers Primary Tank 5 bar with insulation M1	Dry weight	Article Numbers Primary Tank 5 bar with insulation M0	Dry weight
	a	b	c	D	e	1	2	M1	M0	M1	M0	M1	Kg	M0	Kg
300	1410	1150	458	630	200			0,00018	0,00011	2,7	1,7	AQTVP030M1	68	AQTVP030M0	98
500	2012	1753	464	630	205			0,00017	0,00011	4,1	2,6	AQTVP050M1	96	AQTVP050M0	130
750	1907	1600	500	790	193			0,00013	0,00008	4,9	3,2	AQTVP075M1	120	AQTVP075M0	160
1000	2260	1953	500	790	193	Rp 2”	Rp 1/2”	0,00011	0,00007	5,5	3,7	AQTVP100M1	160	AQTVP100M0	220
1500	2083	1699	599	1100	212			0,00008	0,00007	6,3	5	AQTVP150M1	244	AQTVP150M0	324
2000	2274	1887	599	1100	212			0,00008	0,00006	7,5	5,9	AQTVP200M1	264	AQTVP200M0	364
2500	2145	1679	679	1400	214			0,00007	0,00005	8,5	6,6	AQTVP250M1	367	AQTVP250M0	470
3000	2274	1809	679	1400	214			0,00006	0,00005	9,7	7,6	AQTVP300M1	398	AQTVP300M0	530

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AquaTank 316Ti

Hot water storage tank, 300-1000 litres

AquaTank 316Ti is our range of stainless steel hot water storage tanks for customers who prefer a high-alloy austenitic stainless steel. This leaflet describes cylinders available as standard in capacities between 300 and 1000 litres. Furthermore we offer also vessels up to 4000 litre capacity with standardized dimensions.

Pressure vessel code
AquaTank 316Ti meets the requirements of the PED 97/23/EEC code. Other pressure vessel codes can be offered on request.

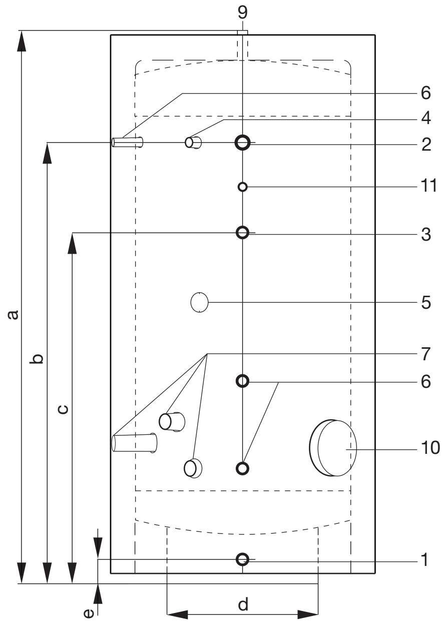
Charge heat exchangers reduce power demand
AquaTank 316Ti is designed for use in combination with charge heat exchangers. The AquaTank is then employed to store drinking quality water in facilities in which the water flow is not constant – where sudden high demands occur more or less regularly, such as in apartment houses, sports centres, schools, hotels and hospitals. With a charge heat exchanger, the power demand can be substantially reduced compared to a separate coil heater, since the AquaTank acts as a buffer to meet the power peaks occurring at high water flow rates. Following such high water demand, heating takes place very quickly, because the water that has been heated by the charge heat exchanger is stored at the top of the tank. The recovery period is short, unlike that of a traditional coil heater in which the entire heater volume must first be reheated, before the user obtains the domestic hot water comfort provided by an AquaTank with charge heat exchanger.

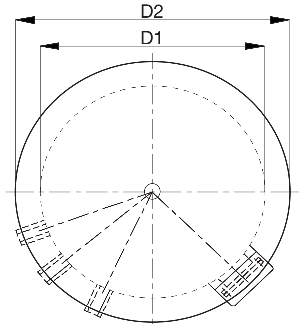
Flexible energy source
All types and sizes of the AquaTank 316Ti are equipped with threaded connections for electric immersion heaters. The immersion heater can be fitted directly to the connection, which simplifies the installation work.

High effectiveness for maximum hot water
The effectiveness of this type of storage tank from which hot water is drawn depends on its ability to keep the hot water separated from the cold water admitted into the tank. The AquaTank is particularly good in this respect because of its internal tube arrangement. The incoming cold water is distributed gently across the bottom of the tank, which prevents it from mixing with the hot water. The hot water then is drawn from the very top in the centre of the cylinder. Moreover, since vertical hot water storage tanks are more effective than horizontal ones, the AquaTank is of upright design.

Effective and environment-friendly insulation
The insulation is made of environment-friendly polyurethane foam that is produced without the use of Freons. The surface of the insulation is covered with an impact-resistant ABS plastic. The insulation is very easy to remove and refit, which makes the unit easy to transport into and out of the premises.

The special design of the insulation avoids the so called “chimney-effect” between insulation and cylinder surface and guarantees for the lowest heat losses. The insulation conforms to the strict energy saving demands made by the German EnEV law.





Connections (see table for sizes)

1. Cold water inlet
2. Hot water outlet
3. Hot water circulation
4. Charge heat exchanger
5. Support sleeve, 2”
6. Instrument connection, ¾”
7. Immersion heater, 2” (see table for number and rating of heaters)
8. Drain (to be put into connecting pipework)
9. Air vent, 1”
10. Inspection opening, 120 mm dia.
11. Instrument connection, ½”

Note: All connections have female threads, except the inspection openings. The capacity 300 litre has only three instrument connections.

Operating data

Max. operating pressure (gauge) 10 bar
Max. operating temperature 95°C

Tank capacity litres	Dimensions (mm)							Connection sizes (inch)				Heat loss kWh in 24h	Dry weight kg	Immersion heater rating kW
	a	b	c	d	D1	D2	e	1	2	3	4			
300	1505	1217	908	400	550	700	97	2	2	1	2	2.2	67	1 x 5.25
500	1815	1507	1158	450	650	800	97	2	2	1	2	3.1	89	1 x 9
500/2	1815	1507	1158	450	650	800	97	2	2	1	2	3.1	89	2 x 9
750	2105	1730	1360	600	750	900	97	2	2	1	2	3.8	144	2 x 12
750/3	2105	1730	1360	600	750	900	97	2	2	1	2	3.8	144	3 x 12
1000	2180	1763	1402	650	850	1040	97	2	2	1	2	4.2	197	3 x 12

Dimensions are target values. Binding figures are shown on the drawings.
The dimensions for the larger vessels up to 4000 litres are available on request.

ECF00105EN 1204

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AquaTank HC 316Ti

Storage water heater, 125-1000 litres

AquaTank HC 316Ti is our range of indirectly heated, unvented (closed) storage water heaters made of stainless steel. This leaflet describes standard cylinders available in capacities between 125 and 1000 litres.

Pressure vessel code
AquaTank HC 316Ti meets the requirements of the PED 97/23/EEC code. Other pressure vessel codes can be offered on request.

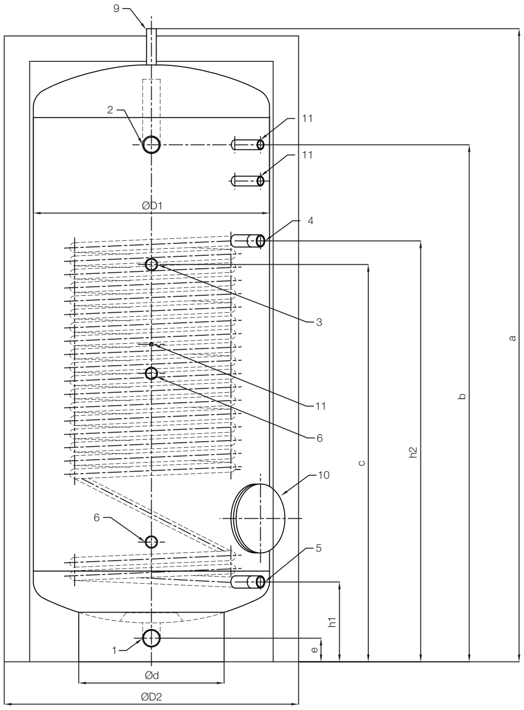
Heating coil reduces the power demand
AquaTank HC 316Ti is equipped with a stainless steel heating coil to charge the vessel. The AquaTank HC is then employed to store drinking water in facilities in which the water flow is not constant – where sudden high demands occur more or less regularly, such as in apartment houses, sports centres, schools, hotels and hospitals.

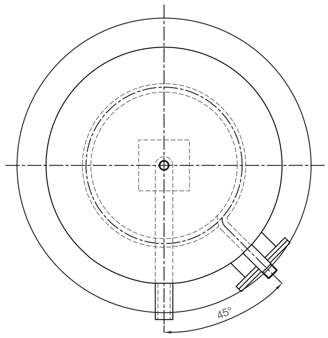
With a built in heating coil, the power demand can be substantially reduced compared to a direct water heater, since the AquaTank HC acts as a buffer to meet the power peaks occurring at high water flow rates. Following such high water demand, heating takes place very quickly, because the water that has been heated by the coil is stored at the top of the tank. The recovery period is short. The unique shape of the heating coil reaches down to the bottom and heats all of the water inside the vessel.

High effectiveness for maximum hot water
The effectiveness of this type of storage tank from which hot water is drawn depends on its ability to keep the hot water separated from the cold water admitted into the tank. The AquaTank HC is particularly good in this respect because of its internal tube arrangement. The incoming cold water is gently distributed across the bottom of the tank, which prevents it from mixing with the hot water. The hot water is then drawn from the very top in the centre of the cylinder. Moreover, since vertical hot water storage tanks are more effective than horizontal ones, the AquaTank HC is of upright design.

Effective and environment-friendly insulation
The insulation is made of environment-friendly CFC-free polyurethane foam, The surface of the insulation is covered with an impact-resistant ABS plastic. The insulation is very easy to remove and refit, making the unit easy to transport into and out of the premises. The special design of the insulation avoids the so called “chimney-effect” between insulation and cylinder surface guaranteeing for the lowest heat losses.

This insulation conforms to the strict energy saving demands stipulated by the German EnEV law.





Connections (see table for sizes)

1. Cold water inlet
2. Hot water outlet *
3. Hot water circulation *
4. Primary flow, male thread
5. Primary return, male thread
6. Instrument connection, ¾" **
8. Drain (to be put into connecting pipe work)
9. Air vent, 1/2" **
10. Inspection opening, 120 mm dia.***
11. Instrument connection, ½"

Note: All connections have female threads, except the primary connections.

Operating data

Vessel	Max. operating pressure (gauge)	10 bar
	Max. operating temperature	95°C
Coil	Max. operating pressure (gauge)	25 bar
	Max. operating temperature	200°C

Tank capacity litres	Dimensions (mm)									Connection sizes (inch)					Heat losses kWh in 24h	Dry weight kg
	a	b	c	h1	h2	d	D1	D2	e	1	2	3	4	5		
125	940	940	940	190	560	400	500	660	65	1	1	¾	1	1	1.8	40
160	1190	1190	1190	190	740	400	500	660	65	1	1	¾	1	1	1.9	50
200	1440	1440	1440	190	740	400	500	660	65	1	1	¾	1	1	2.2	58
350	1725	1425	1095	220	1280	400	550	710	65	1¼	1¼	¾	1	1	2.5	85
500	1745	1425	1095	220	1325	400	650	810	65	1¼	1¼	¾	1	1	3.1	95
750	1830	1470	1090	275	1155	600	800	1000	80	2	2	1	1	1	3.8	145
1000	2080	1705	1440	265	1080	700	850	1050	80	2	2	1	1	1	4.2	195

Dimensions are target values. Binding figures are shown on the drawings.
* For capacities between 125 and 200 litres, the connections are at the top of the vessel
** Only for capacities between 350 and 1000 litres
*** 2" female for capacities between 125 and 200 litres

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AquaTank EM (7 bar)

Hot water storage tank, 300-3000 litres

AquaTank EM is our range of enamelled (glass lined) hot water storage tanks for customers who prefer the hygienic coating of enamel which also allows operation with chlorinated water. This leaflet describes cylinders available as standard in capacities between 300 and 3000 litres. Furthermore we offer also vessels up to 1000 litre capacity rated for 10 bar operation pressure with standardized dimensions.

Pressure vessel code
AquaTank EM meets the requirements of the PED 97/23/EEC code. Other pressure vessel codes can be offered on request.

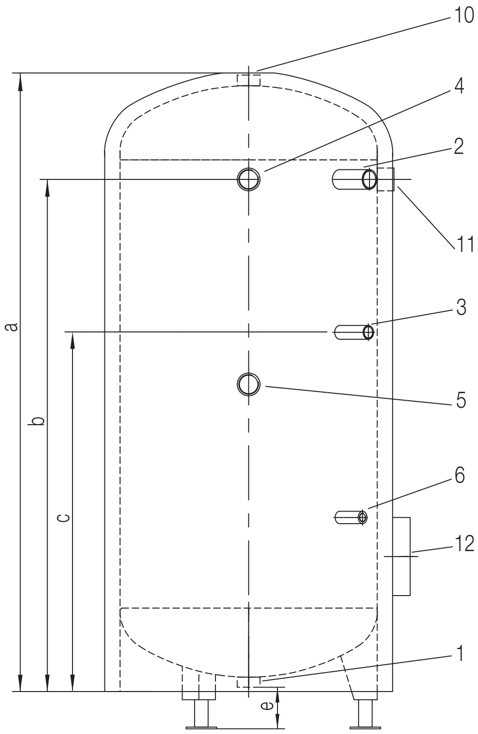
Charge heat exchangers reduce power demand
AquaTank EM is designed for use in combination with charge heat exchangers. The AquaTank is then employed to store drinking quality water in facilities in which the water flow is not constant – where sudden high demands occur more or less regularly, such as in apartment houses, sports centres, schools, hotels and hospitals.

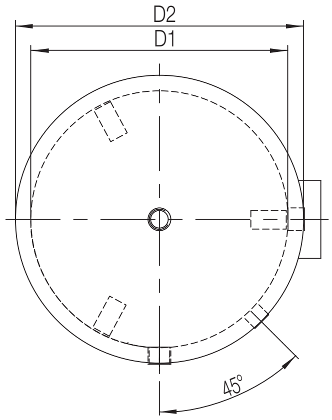
With a charge heat exchanger, the power demand can be substantially reduced compared to a separate coil heater, since the AquaTank acts as a buffer to meet the power peaks occurring at high water flow rates. Following such high water demand, heating takes place very quickly, because the water that has been heated by the charge heat exchanger is stored at the top of the tank. The recovery period is short, unlike that of a traditional coil heater in which the entire heater volume must first be reheated before the user obtains the domestic hot water comfort provided by an AquaTank with charge heat exchanger.

Flexible energy source
All types and sizes of the AquaTank EM can be equipped with electric immersion heaters. The immersion heater are fitted directly to the inspection opening/man hole, which simplifies the installation work.

High effectiveness for maximum hot water
The effectiveness of this type of storage tank from which hot water is drawn depends on its ability to keep the hot water separated from the cold water admitted into the tank. The AquaTank is particularly good in this respect because of its internal tube arrangement. The incoming cold water is distributed gently across the bottom of the tank, which prevents it from mixing with the hot water. The hot water then is drawn from the very top in the centre of the cylinder. Moreover, since vertical hot water storage tanks are more effective than horizontal ones, the AquaTank is of upright design.

Effective and environment-friendly insulation
The insulation is made of 50 mm mineral wool and covered with a PVC-jacket. As option we offer also 100 mm mineral wool and an aluminium-plate cladding. The insulation is very easy to remove and refit, which makes the unit easy to transport into and out of the premises.





Connections (see table for sizes)

1. Cold water inlet
2. Spare connection 2”
3. Hot water circulation
4. Charge heat exchanger
5. Support sleeve 2”
6. Instrument connection ¾”
9. Drain (to be put into connecting pipework)
10. Hot water outlet 2”
11. P&T connection 2”
12. Inspection opening, 110 mm dia.

Note: All connections have female threads, except the inspection opening.

Operating data

Max. operating pressure (gauge) 7 bar
Max. operating temperature 95°C

Tank capacity litres	Dimensions (mm)						Connection sizes (inch)				Heat losses kWh in 24h *	Heat losses kWh in 24h **	Dry weight kg
	a	b	c	D1	D2	e	1	2	3	4			
300	1718	1395	1074	549	660	216	2	2	1	2	5.3	3.2	107
500	2046	1748	959	630	740	210	2	2	1	2	6	3.7	137
750	1951	1599	1150	790	900	197	2	2	1	2	6.9	4.6	233
1000	2304	1954	1324	790	900	197	2	2	1	2	7	5.4	263
1500	2127	1700	1250	1100	1210	221	2	2	1	2	9.2	7.2	344

Dimensions are target values. Binding figures are shown on the separate drawings. The dimension drawings for larger vessels up to 3000 litre as well as the optional extras like manhole and immersion heater are available on request.

* heat losses 50 mm glass wool
** heat losses 50 mm rock wool

Insulation material

Standard delivery 50 mm glass wool with PVC-jacket.

Options:
- 100 mm glass wool with PVC-jacket
- 50 mm rock wool with aluminium-plate cladding
- 100 mm rock wool with aluminium-plate cladding

ECF00116EN 1204

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Pressosmart

Pressurisation set for heating systems, air conditioning and industrial applications

Application
Pressosmart is a pressurization set designed to maintain stable pressure in a closed water loop, such as those used in heating systems, air conditioning and a variety of industrial applications.

With its electronic controller, Pressosmart offers more accurate control than standard stand-alone membrane expansion technology and a considerably smaller equipment footprint.

Pressosmart can be connected to closed expansion vessels that prevent water from coming into contact with oxygen in the air. This reduces corrosion and pipeline maintenance, which extends the lifetime of the entire installation. Pressosmart can also be connected to open expansion vessels.

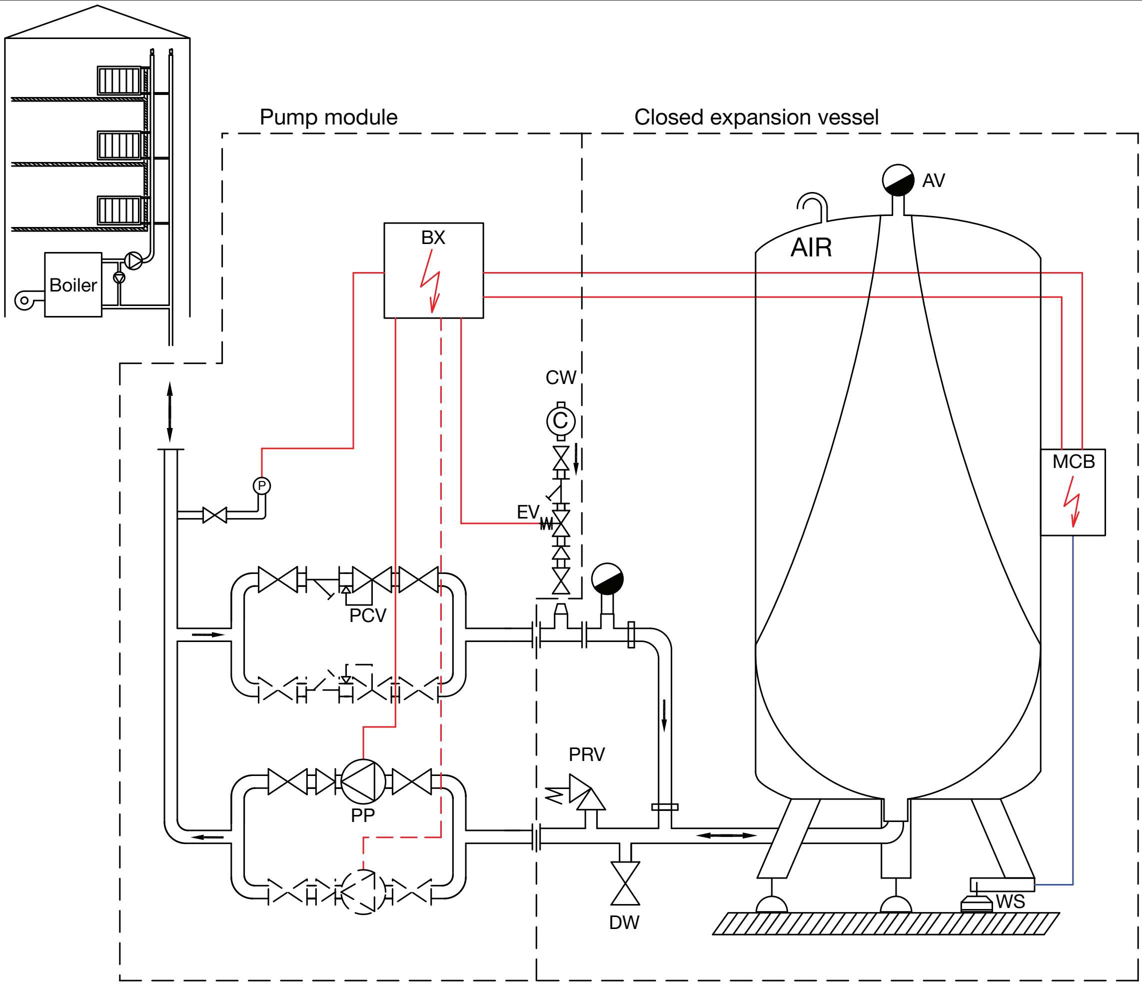
Working principle
When the temperature increases in a closed water loop, the water volume expands. When the temperature decreases, the opposite occurs.

The increased volume generated by thermal expansion in the closed loop will be discharged through the pressure control valve and stored in the expansion vessel. When the pressure sensor detects a pressure drop due to a temperature decrease, water will be pumped back into the loop. Stable and even pressure is thus continuously maintained in the closed loop.

Pressosmart automatically fills the installation when there is not enough water and also protects against overflow.

Renovation
Existing Pressosmart installations that use open expansion vessels can be easily upgraded to the closed expansion technology by simply replacing the existing vessel with a closed expansion vessel. The pump module does not need to be replaced.

Hydraulic chart



PP	Pressurization pump	CW	Cold water feed
PCV	Pressure control valve	EV	Electro-valve
P	Pressure sensor	MCB	Measure control box
BX	Control box	WS	Weight sensor
C	Filled up solenoid valve	AV	Air vent
PRV	Pressure relief valve	DW	Drain work connection

Options

- **Impulsion meter** to control the normal operation of the system by filling with water, and to alert and shut down the system in case of leakage. Included for closed expansion vessel.
- **Water-hammer damper**, for use when the length of pipeline between the Pressosmart and the installation may cause a water hammer.
- **Core-water strainer**, 89 µm, to protect the solenoid valve used to fill the expansion vessel.
- **Fill-up bypass** to enable a quick filling of the system via a manual valve.
- **Flood detector** to detect and warn of boiler room flooding.

Quick selection guide

The chart below should be used for closed-loop installations running low-pressure hot water at 90/70°C (mean temperature 80°C).

Example of use:
See chart below
- Installation capacity: 2500 kW
- Building static height: 40 m

Selection:
Possible choice: MP4N616, MP5N616, MP5N626, MP71016.
Connected to a 1000 L closed expansion vessel.
Alternative: 1000 L open expansion vessel.

Equipment

Installation Volume (m^3)	0	6	12	15	18	24	30	45	60	75	90	105	120	150	175
Installation Capacity P (kW)	0	500	1000	1250	1500	2000	2500	3750	5000	6250	7500	8750	10000	12500	14500

Closed exp. vessel	500 L	1000 L	2 x 1000L	Please consult

Open exp. vessel	200 L	400 L	600 L	800 L	1000 L	1800 L	2500 L	3000 L	3500 L	4000 L	5000 L	2 x 3000 L

75 m	MP71516	MP71516	MP71516	MP71516	MP71516	MP71516	MP71516						
	MP71526	MP71526	MP71526	MP71526	MP71526	MP71526	MP71526	MP71526	MP71526				
	MP71517	MP71517	MP71517	MP71517	MP71517	MP71517	MP71517	MP71517	MP71517				
	MP71527	MP71527	MP71527	MP71527	MP71527	MP71527	MP71527	MP71527	MP71527	MP71527			
65 m	MP5N816	MP5N816	MP5N816	MP5N816	MP5N816	MP5N816							
	MP5N826	MP5N826	MP5N826	MP5N826	MP5N826	MP5N826	MP5N826	MP5N826					
		MP71316	MP71316	MP71316	MP71316	MP71316	MP71316						
		MP71326	MP71326	MP71326	MP71326	MP71326	MP71326	MP71526	MP71526	MP71526	MP71526		
		MP71317	MP71317	MP71317	MP71317	MP71317	MP71317	MP71517	MP71517				
		MP71327	MP71327	MP71327	MP71327	MP71327	MP71327	MP71527	MP71527	MP71527	MP71527		
55 m	MP4N716	MP4N716	MP4N716	MP4N716	MP4N716								
	MP5N716	MP5N716	MP5N716	MP5N716	MP5N716								
	MP5N726	MP5N726	MP5N726	MP5N726	MP5N726	MP5N726	MP5N726	MP5N726					
		MP71016	MP71016	MP71016	MP71016	MP71016	MP71316						
		MP71026	MP71026	MP71026	MP71026	MP71026	MP71326	MP71326	MP71326	MP71526	MP71526		
		MP71017	MP71017	MP71017	MP71017	MP71017	MP71317	MP71317					
		MP71027	MP71027	MP71027	MP71027	MP71027	MP71327	MP71327	MP71327	MP71527	MP71527	MP71527	
45 m	MP195N S2												
	MP195N L2												
Building static height 40 m	MP4N616	MP4N616	MP4N616	MP4N616	MP4N616	MP4N616							
	MP5N616	MP5N616	MP5N616	MP5N616	MP5N616	MP5N616							
	MP5N626	MP5N626	MP5N626	MP5N626	MP5N626	MP5N626	MP5N726	MP5N726	MP5N726				
		MP71016	MP71016	MP71016	MP71016	MP71016	MP71016						
						MP71026	MP71026	MP71026	MP71326	MP71326	MP71326		
						MP71017	MP71017	MP71017	MP71317				
						MP71027	MP71027	MP71027	MP71327	MP71327	MP71327	MP71327	MP71327
35 m	MP195N S1												
	MP195N L1												
	MP4N516	MP4N516	MP4N516	MP4N516	MP4N516	MP4N516							
	MP5N516	MP5N516	MP5N516	MP5N516	MP5N516	MP5N516							
	MP5N526	MP5N526	MP5N526	MP5N526	MP5N526	MP5N526	MP5N526	MP5N526	MP5N526				
		MP71016	MP71016	MP71016	MP71016	MP71016	MP71016						
						MP71026	MP71026	MP71026	MP71026	MP71026	MP71326		
						MP71017	MP71017	MP71017	MP71017				
						MP71027	MP71027	MP71027	MP71027	MP71027	MP71327	MP71327	MP71327
25 m	MP195N S1												
	MP195N L1												
	MP4N416	MP4N416	MP4N416	MP4N416	MP4N416	MP4N416							
	MP5N416	MP5N416	MP5N416	MP5N416	MP5N416	MP5N416							
	MP5N426	MP5N426	MP5N426	MP5N426	MP5N426	MP5N426	MP5N426	MP5N426	MP5N426				
		MP71016	MP71016	MP71016	MP71016	MP71016	MP71016						
						MP71026	MP71026	MP71026	MP71026	MP71026	MP71026		
						MP71017	MP71017	MP71017	MP71017				
						MP71027	MP71027	MP71027	MP71027	MP71027	MP71027	MP71027	MP71027
15 m	MP195N S1												
	MP195N L1												
	MP4N316	MP4N316	MP4N316	MP4N316	MP4N316	MP4N316							
	MP5N316	MP5N316	MP5N316	MP5N316	MP5N316	MP5N316							
	MP5N326	MP5N326	MP5N326	MP5N326	MP5N326	MP5N326	MP5N326	MP5N326	MP5N326				
						MP71026	MP71026	MP71026	MP71026	MP71026	MP71026		
0 M													

For MP4/MP5/MP7 the last 2 digits indicate the number and type of pressure-control valve. Appropriate system configuration can be done in our electronic selection tool AlfaSelect.

Equipment

	Pump No.	PCV No. (1)	Static Height (m)	1 PCV		2 PCV		Connection to the pipeline
				Max. capacity (kW) (2)	Article number	Max. capacity (kW) (2)	Article number	
MP195	1	1	5-40	500	MP195NL			1”
			41-50	500	MP195NL4150			
MP4	1	1	5-15	4000	MP4N316			1”
			5-25	4000	MP4N416			
			5-35	3500	MP4N516			
			5-30	4000	MP4N616			
			31-50	1500	MP4N6163150			
			51-60	800	MP4N6165160			
			5-30	4000	MP4N716			
			31-50	3750	MP4N7163150			
			51-60	1000	MP4N7165160			
MP5	2	1 or 2	5-20	4000	MP5N316	7500	MP5N326	1½”
			5-30	4000	MP5N416	7500	MP5N426	
			5-30	4000	MP5N516	7500	MP5N526	
			31-40	4000	MP5N5163140	2000	MP5N5263140	
			5-30	4000	MP5N616	7500	MP5N626	
			31-50	3000	MP5N6163150	3000	MP5N6263150	
			5-30	4000	MP7N716	7500	MP7N726	
			31-50	4000	MP5N7163150	7500	MP5N7263150	
			51-60	2500	MP5N7165160	2000	MP5N7265160	
			5-30	4000	MP5N816	7500	MP5N826	
			31-50	4000	MP5N8163150	7500	MP5N8263150	
			51-70	2500	MP5N8165170	2000	MP5N8265170	
MP7	2	1 or 2	10-45	5000	MP71016	10000	MP71026	2”
			46-55	3750	MP710164555	5500	MP710264555	
			10-45	5000	MP71316	9500	MP71326	
			46-65	4650	MP713164565	8750	MP713264565	
			10-45	5000	MP71516	9500	MP71526	
			46-75	5000	MP715164575	8750	MP715264575	

(1) PCV (Pressure Control Valve) opens when pressure exceeds the set point.
(2) Max capacity given for Samson 44-6 PCV type. The use of Samson 44-7 type will increase these values (MP7).
(3) FLA (Full Load Amperage) when operating at full load conditions under 230 V 1Phase 50 Hz.
(4) Except for MP195 where an open expansion vessel is included.

All Pressosmart pump modules are equipped with Micro2000 controller, except MP195 type S which uses electro-mechanical pressure switches.

Electrical supply 230 V 1Phase 50 Hz. Pressosmart MP7 also exists for 400 V 3Phase 50 Hz power. Please consult our electronic selection tool.

Max. operating pressure 7.5
Max. operating temperature 95°C

Maximum operating pressure varies according to the model.

Closed expansion vessel

The closed expansion vessels of steel and an internal rubber bag are available in two configurations: one with the control equipment and one without control equipment to extend expansion capacities (always combine same volumes).

Two volumes are available: 500 L (775 mm x 1642 mm, 90 kg) and 1000 L (800 mm x 2465 mm, 150 kg). PPH open expansion vessels are also available from 200 L to 5000 L.

Pressosmart products are built in compliance with PED 97/23 Art. 3.3 and CE73/23 electrical regulation.

ECF00107EN 1203

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KAB

Sludge filter

Applications
KAB has been developed for the purpose of removing particles caused by corrosion of heating/cooling applications. This system is designed specifically for use in new and existing installations and networks.

Principle
Iron oxide can easily be identified in an installation. It settles out in the form of black sludge and is made of dissolved iron precipitated as hydroxide. This hydroxide releases hydrogen and turns into magnetised oxide Fe_3O_4 also called magnetite. The size (0.5 µ) and density of this product do not allow for an efficient settlement or centrifugal separation. KAB uses magnetic bars to remove these magnetised particles.

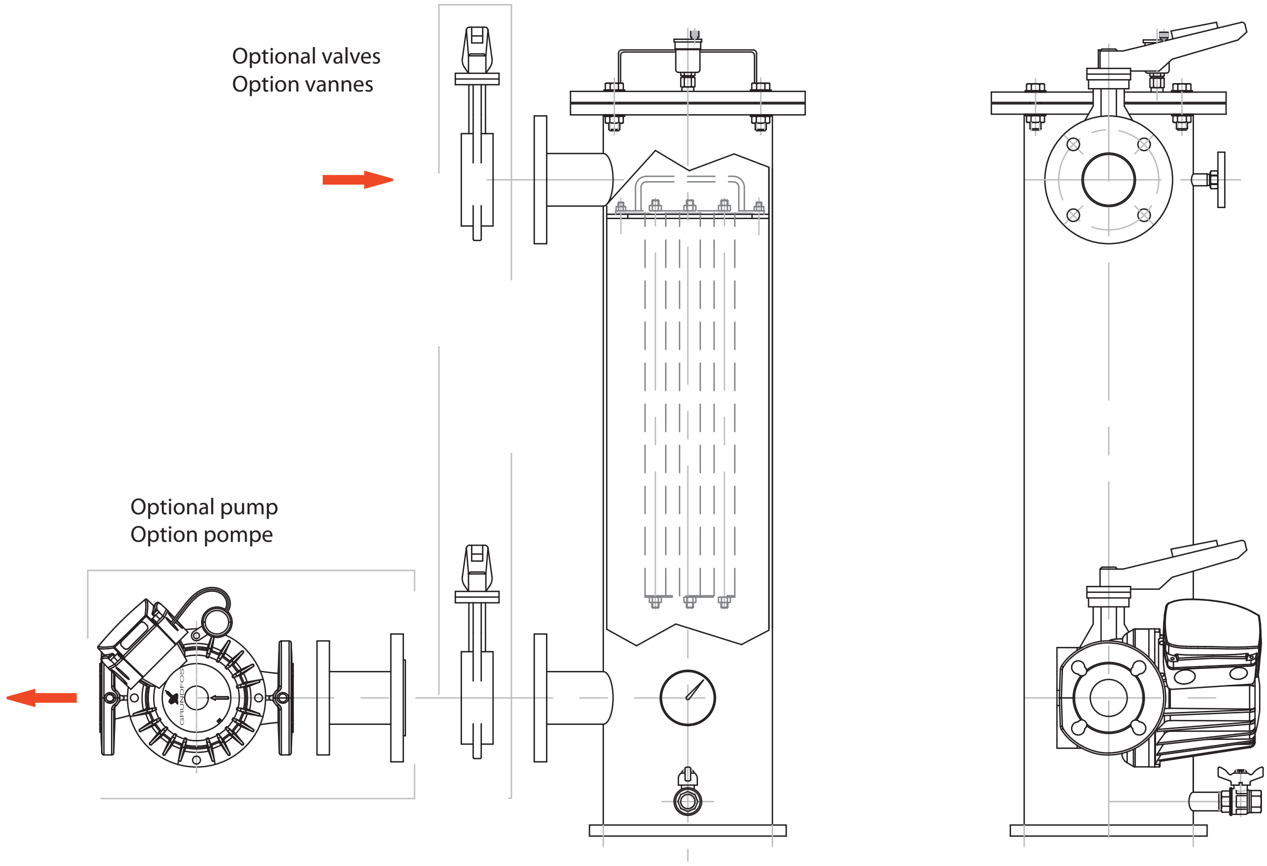
Working principle
The water held in the pipework is bypassed through a set of multi-field magnetic bars. The low speed flow and the laminar flow enable KAB to retain 99.9% of magnetised particles of less than 0.5 micron. The particles then agglomerate and form a deposit on the magnetic bars. This deposit then enables the trapping of the non-magnetised particles thanks to their position around the magnetic bars. This results in the settling of particles in the installations and circulation of treated water. KAB will bypass 20% of the water flow of the installation and may operate 24 hours a day.

Advantages
- Compact and easy to install.
- Easily cleaned by simply wiping the magnetic bars.
- High efficiency enabling the treatment of particles of less than 0.5µ.
- No risk of leakage or heating/cooling shutdown during treatment.
- With the optional isolating valve, minimal water loss while cleaning.
- It can be used as an injection cylinder when chemical treatment is required (ex: pH rectifier, oxygen reducer).

Options
50µm removable mesh strainer.
Feed pump to prevent disruption of an existing installation. Isolating valve.

Description
KAB is made of a carbon steel cylindrical body with a tangential water inlet at the top. The water outlet is located at the bottom. The multi-field magnetic bars are assembled radially in a gasket that can easily be removed for maintenance.

The shape and assembly of KAB creates a cyclonic effect where all the particles are driven to the magnetic bars and to the bottom of the body thanks to the rotational effect and gravity. The magnetic bars will catch the magnetite whereas the nonmagnetised particles will be trapped by settling.



Operating limits	**Water**
Max. operating pressure	10 bar
Max. operating temperature	110°C

Description	Heat load kW	Pipework content m³	Flow rate (m³/h)		Capacity kg	Hydraulic connection	Net weight kg	Article number
			Installation	KAB				
KAB03	350	5	15	3	0	1”	50	KAB0300
KAB07	820	10	35	7	1	DN65	90	KAB0700
KAB15	1750	25	75	15	2	DN65	105	KAB1500
KAB25	3000	40	125	25	4	DN65	120	KAB2500

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Chapter 11

All-welded heat exchangers

When the duty gets tougher and you still need a compact solution, you should consider an all-welded heat exchanger from Alfa Laval. They come in different shapes and forms to satisfy even the most demanding pressure and temperature requirements.

The *AlfaDisc* provides the exceptional thermal efficiency and compactness of a plate-and-frame unit under conditions that would normally require a bulky, traditional shell-and-tube unit.

The *AlfaRex* has all the benefits of a plate heat exchanger including a compact and flexible design, excellent heat-transfer abilities and very limited need of maintenance.

The *Compabloc* is a breakthrough plate heat exchanger design that combines a whole range of technological advantages in one compact unit. The all-welded plate pack does away with all gaskets between plates, and makes it possible to operate with a wide range of media and at high temperatures and pressures.

All welded heat exchangers range

AlfaDisc	AlfaRex - TM20	Compabloc
Read all about it on page 11.3	Read all about it on page 11:5	Read all about it on page 11:7
		

AlfaDisc

All-welded Plate Heat Exchanger

AlfaDisc 50

Applications
AlfaDisc is suitable for most of the applications, such as general cooling and heating duties, condensation, evaporation, reboiling and stream heating.

Standard design
AlfaDisc is built on the Plate & Shell concept. It is able to withstand higher design pressure, is more compact, is better developed for fatigue applications, has the possibility for asymmetric flow and is cleanable on one side. These features in combination with an attractive price give us a range of competitive advantages over other welded concepts.

The AlfaDisc all-welded plate heat exchanger provides the thermal efficiency and compactness of a plate and frame unit under conditions that would normally call for a shell and tube unit.

Designed for use with liquids, gases and two-phase mixtures at pressure up to 100 bars (PED & ASME) and at temperatures up to 538°C, the Plate & Shell unit works well with aggressive media, such as organic solvents, steam heaters and interchangers that are beyond the capability of a gasketed unit. The unit is also available with removable core design.

Typical capacities
Liquid flow rate
Up to 157 kg/s (2355 gpm) depending on media, permitted pressure drop and temperature program.

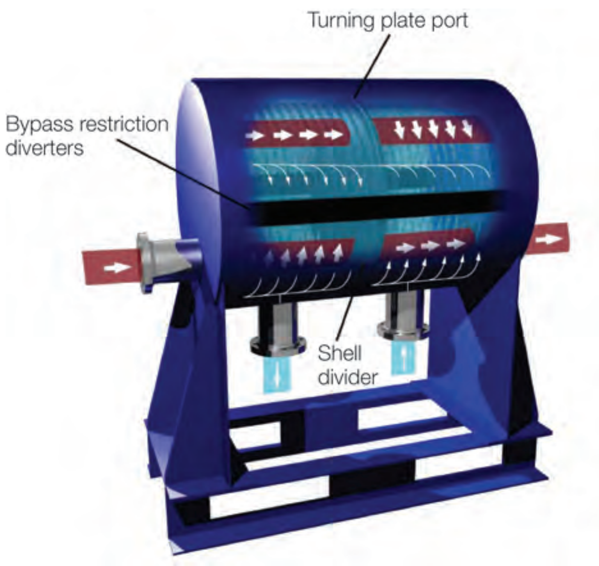
Sizes

AlfaDisc 25	AlfaDisc 100
AlfaDisc 50	AlfaDisc 150
AlfaDisc 80	AlfaDisc 200

Working principle
The unit features a plate side and a shell side, which offer high pressure ratings. It has alternating channels for hot and cold media, and can offer true counter-current or co-current flow. Number of passes could be up to 3 passes maximum on each side.

Nozzle sizes up to DN 700 can be accommodated on the shell side of the exchanger, offering higher steam and liquid flow rates. Nozzles on the plate side can be up to DN 200.

The AlfaDisc unit can be fabricated from dissimilar metals when only one side will be exposed to corrosive conditions.



Flow principle of a multi-pass AlfaDisc.

STANDARD MATERIALS

Shell material
Mild steel, Epoxy painted or stainless steel

Cover material
Mild steel, Epoxy painted or stainless steel

Nozzles
Stainless steel, Titanium and 254 SMO Could be combined with carbon steel flanges

Plate material
316L, Titanium and 254 SMO

TECHNICAL DATA

Design pressure

CE/PED	Vacuum to 100 bars
ASME	Vacuum to 100 bars

Design temperature

Carbon steel Shell	-45 - 538°C
Stainless steel Shell	-160 - 538°C

Maximum heat transfer surface

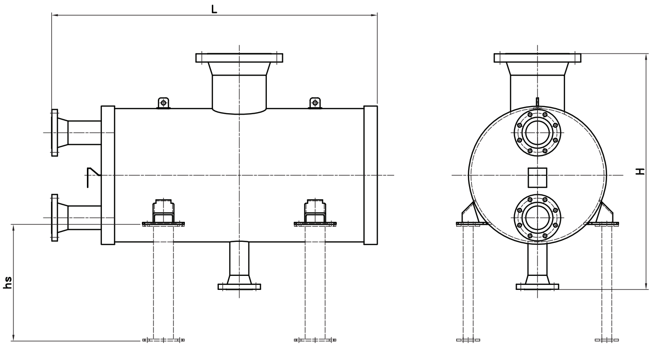
AlfaDisc 25	4.5 m^2	(48.5 ft^2)
AlfaDisc 50	35 m^2	(377 ft^2)
AlfaDisc 80	62 m^2	(667 ft^2)
AlfaDisc 100	125 m^2	(1345.5 ft^2)
AlfaDisc 150	220 m^2	(2368 ft^2)
AlfaDisc 200	380 m^2	(4090 ft^2)

STANDARD CONNECTIONS

	Sizes mm (inch)	
Model range	Plate side	Shell side
AlfaDisc25	25 (1)	20 - 100 (1 - 4)
AlfaDisc50	50 (2)	20 - 150 (1 - 6)
AlfaDisc80	80 (3)	25 - 250 (1 - 10)
AlfaDisc100	100 (4)	25 - 350 (1 - 14)
AlfaDisc150	150 (6)	25 - 500 (1 - 20)
AlfaDisc200	200 (8)	25 - 700 (1 - 28)

Pressure ratings

CE/PED	PN16, 25&40, PN63 and PN100
ASME	ASME cl. 150, 300 & 600 and Class 900



Dimensions (mm)

Model	H2 min/max		L min/max		hs1 min/max	
AD25	370	850	275	1945	260	740
AD50	630	1050	290	2010	450	790
AD80	790	1270	310	2070	540	1040
AD100	930	1450	340	2125	640	1220
AD150	1130	1700	380	2205	760	1530
AD200	1450	2400	430	2325	1000	1980

Dimensions (in)

Model	H2 min/max		L min/max		hs1 min/max	
AD25	15	33	11	77	10	29
AD50	25	41	11	79	18	31
AD80	31	50	12	81	21	41
AD100	37	57	13	84	25	48
AD150	44	67	15	87	30	60
AD200	57	94	17	92	39	78

[1] Dimensions vary with support type
[2] Dimensions vary with connection sizes and supports

Particulars required for quotation
- Flow rates or heat load
- Temperature program
- Physical properties of liquids in question (if not water)
- Desired working pressure
- Maximum permitted pressure drop
- Available steam pressure

PCT00064EN 1202

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AlfaRex - TM20

All-welded Plate Heat Exchanger

Totally gasket free, the TM20 is well suited for applications involving high temperature and/or high pressure with relatively clean media. The media can also be very corrosive (acids, NaOH, etc.).

The TM20 is particularly recommended for the following applications:

- Solvent recovery processes
- Gas dehydration plants
- Batch reactors
- Refrigeration duties

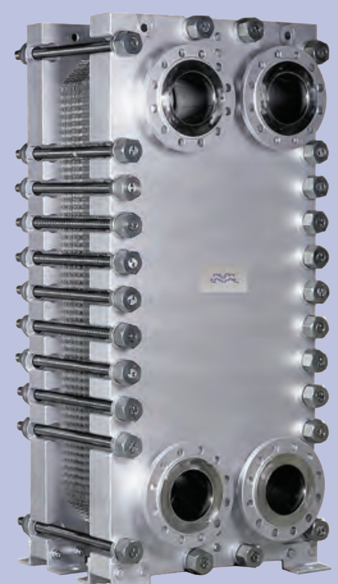
AlfaRex design
The TM20 consists of a laser welded pack of corrugated metal plates with portholes for the passage of the two fluids between which heat transfer takes place. The design has been achieved by laser welding the plates together one by one in alternate grooves to form a plate pack. The plate pack is installed in a frame consisting of a frame plate and a pressure plate compressed by tightening bolts. Extended connectors are located in the frame plate with bellow linings welded to the plate pack. The plate corrugations create high turbulence which results in very high thermal efficiency. This in turn leads to compactness and cost efficiency. The corrugations also support the plates against differential pressure and allow utilization of more expensive corrosion resistant materials.

Laser welding and fatigue resistance
The welding is performed using laser welding techniques. This means low heat input and a small heat affected zone. The highest quality is assured through a completely automated machine and welding control combined with a helium leakage test.

The construction only utilizes welding in the plane of the plate i.e. in two directions thereby avoiding welds in a third direction. This design ensures retained flexibility of the plate pack allowing for thermal and hydraulic expansions and contractions which will reduce the risk for fatigue cracks.

Working principle
The media in the heat transfer are led into the plate pack through portholes at the corners and are distributed into the passages between the plates by the arrangement of sealing welds.

The two media flow in alternate channels in full countercurrent flow, thereby making the exchanger equally suited for liquids as well as gas and two phase duties. Cleaning is done with CIP (Cleaning in Place).



AlfaRex TM20 - All welded plate heat exchanger

STANDARD MATERIALS

Frame Plates
Mild steel. High temperature painted

Extended Nozzles
Metal bellow linings in channel plate material

Channel Plates
Stainless steel AISI 316, AISI 316L, Titanium gr. 1, Nickel 200/201

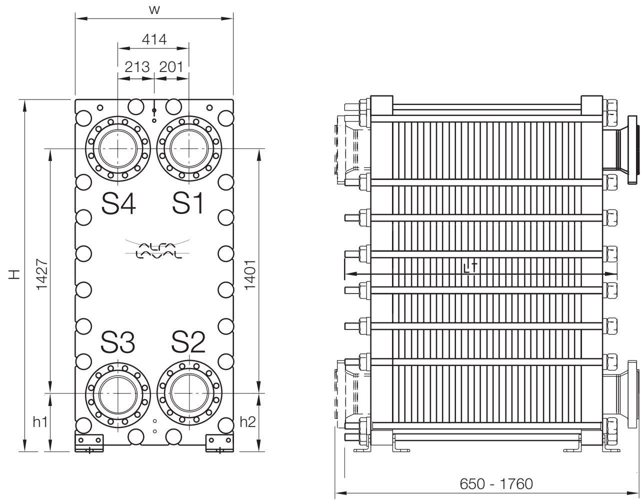
TECHNICAL DATA (Maximum design performance*)	
FB	up to 10 barg
FC	up to 16 barg
FF	up to 25 barg
FK	up to 40 barg
FN	up to 40 barg

Design temperature range	-50° to + 350°C
Maximum flow rate	700 m^3/h
Maximum heat transfer surface	250 m^2

* Depending on design temperature and pressure vessel code

CONNECTIONS	
FB – DN200/8”	DIN PN10 or ANSI 150
FC – DN200/8”	DIN PN10, PN16 or ANSI 150, ANSI 300
FF – DN200/8”	DIN PN16, PN25 or ANSI 150, ANSI 300
FK – DN200/8”	DIN PN25, PN40 or ANSI 300, ANSI 400
FN – DN200/8”	DIN PN40 or ANSI 300, ANSI 400

Dimensions



Type	H	W	h1	h2
TM20-BFB, -BFC	1990	865	301	314
TM20-BFF, -BFK, -BFN	2040	915	327	340

Measures are in millimeters

Particulars required for quotation
To enable Alfa Laval’s representative to make a specific quotation, please make sure your enquiry includes the following particulars:

- Flow rates required
- Temperature program
- Physical properties of media in question
- Desired working pressure
- Maximum permitted pressure drop
- Design pressure and temperature
- Pressure vessel code
- Data on cyclic variations in temperature and pressure

PPM00095EN 1202

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COMPABLOC Compact Heat Exchanger Range

High-performance Fully Welded Heat Exchanger for Process Industries

Application
The Alfa Laval Compabloc is a fully welded compact heat exchanger designed for the complete range of process and utility duties. The Compabloc range provides the most efficient, cost-effective, compact and cleanable heat exchanger solution available today. After 20 years on the market, the Compabloc has shown itself to be the market leader in terms of life-cycle costs and energy savings.

Design
Alfa Laval designed the Compabloc range of welded heat exchangers with a focus on performance, compactness, and serviceability.

The heart of the Compabloc is a stack of corrugated heat transfer plates in 316L stainless steel, or other high-grade material. The plates are laser welded (models CP30 and above) and form a compact core. This core is then enclosed and supported by four corner girders, top and bottom heads and four side panels (see Sectional view of Compabloc). These components are bolted together and can be quickly taken apart for inspection, service and cleaning.

The design can be configured in single or multi-pass arrangements in either co-current or counter-current operation, for liquid-to-liquid or two-phase duties.

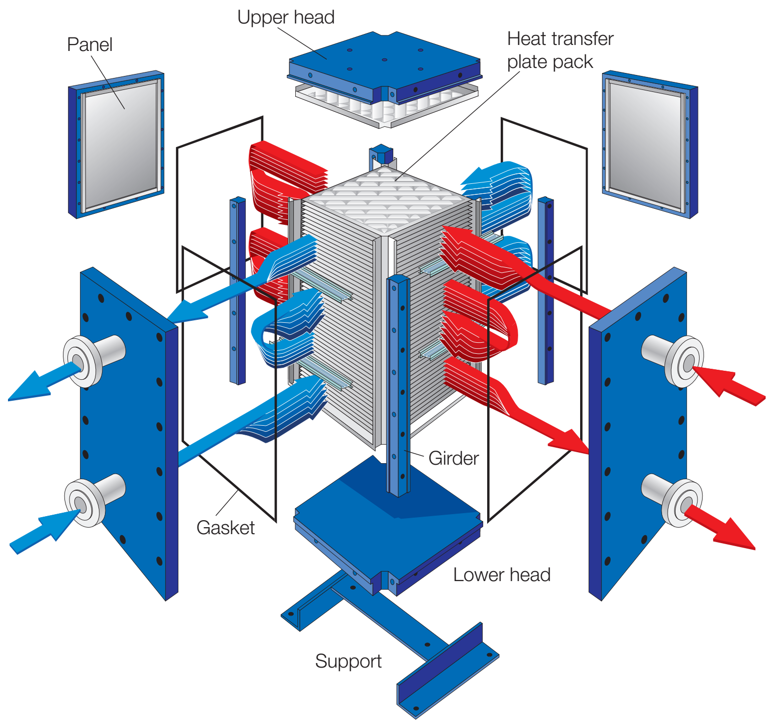
Operating Principles
The two media in the Compabloc heat exchanger flow in alternately welded channels between the corrugated plates. These corrugated plates promote high turbulence which provides high heat transfer efficiency and help minimize fouling. The media flows in a cross-flow arrangement within each pass (see figure below) while the overall flow arrangement is counter-current for a multi-pass unit (if required the unit can also be designed with overall co-current operation). Each pass is separated from the adjacent passes by a pressed baffle which forces the fluid to turn between the plate pack and the panel.

Compabloc's flexible pass arrangements make it suitable for liquid-to-liquid duties with dissimilar flow rates, or two phase condensation or reboiler applications.

Options
The Compabloc is available in virtually any material that can be pressed and welded, including:

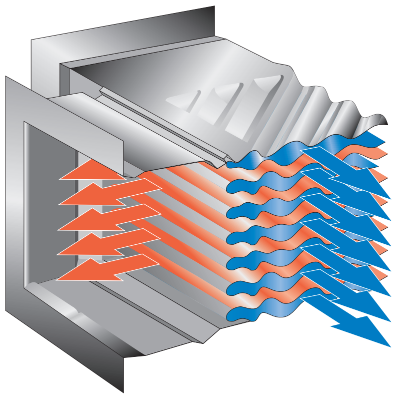
- 316L SST
- 254 SMO
- Titanium
- Alloy C-276
- 904L SST (UB6)
- Alloy B-2
- Alloy C-22
- Incoloy 825
- Inconel 600
- Tantalum

The panels and nozzles can be un-lined or lined using the same materials as the plate pack. The nozzle size is variable and can be selected independently for each side.



Sectional view of Compabloc

Process Optimization
Because of the Compabloc's unique design concept the possibilities for process optimization and flexibility are limitless. The Compabloc can be designed with both single-pass or multi-pass configurations. For condensation, reboiling and liquid-to-liquid duties without temperature cross, the singlepass configuration is suitable with its total cross-flow. The large cross flow area and short flow path fit low-pressure conden-sing duties and allow very low pressure drops. A multi-pass configuration is suitable for duties with temperature cross and close temperature approaches.



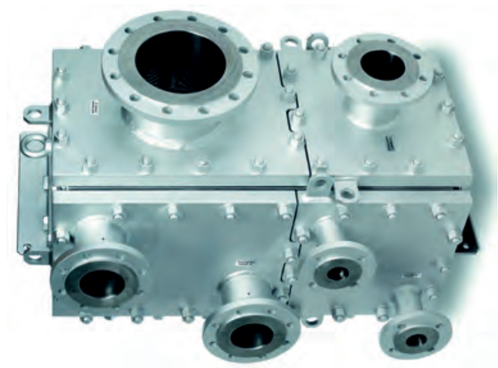
The two media flow in cross-flow in alternately welded channels.

The design concept allows a different number of passes on the two circuits thereby enabling large differences in flow rates between the hot side and the cold side. The baffling can easily be re-arranged to suit a new duty should the flow rates or temperatures change. Close temperature approaches down to 3ºC (5.4ºF) can be achieved.

The Compabloc can be mounted vertically, for normal liquidto-liquid duties, condensation with sub-cooling and gas cooling duties, or horizontally, for most condensation duties, reboiling or liquid-to-liquid duties where height is restricted.

There are currently seven plate family models with heat transfer areas ranging from 0.7 to 840 m2 per unit and each model is modularized with different numbers of plates to allow the best fits for any duty.

Special applications

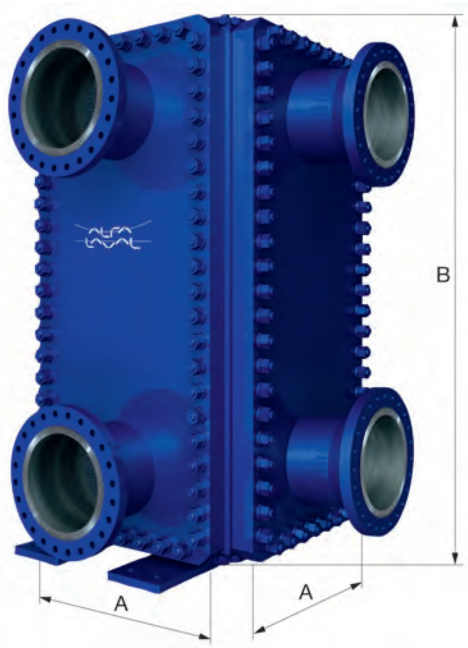


Special applications

For special applications, the Compabloc 2 cooling medium range is available which offers a two-section condenser with two different cooling medias.

Pressure vessel codes
The Compabloc is available as standard in accordance with international pressure vessel codes such as ASME (with or without U stamp) or ADM (code for PED and CE marking).

Dimensions



Technical Data

Model	Standard Pressure Range (bar) *	Standard Temp. Range (ºC)	*Code	Max. Dimensions (mm) *** A x A x B	Max. Weight (kg) ****
CP 15	FV - 32	-40 - 300	PED	280 x 280 x 540	250
CP 20	FV - 32	-40 - 300	PED	430 x 430 x 730	550
CP 30	FV - 32	-40 - 300	PED	500 x 500 x 1070	1160
CP 40	FV - 32	-40 - 300	PED	600 x 600 x 1400	2330
CP 50	FV - 32	-40 - 300	PED	840 x 840 x 2050	5940
CP 75	FV - 32	-40 - 300	PED	1240 x 1240 x 3600	17780
CP 120	FV - 42	-50 - 400	PED	2190 x 2190 x 3500	50000

* other pressures and temperatures may be available on request.
** ASME is also available
*** does not include nozzle length.
**** weight is determined by maximum number of plates and highest pressure rating.
Note: both vertical and horizontal configurations are available.

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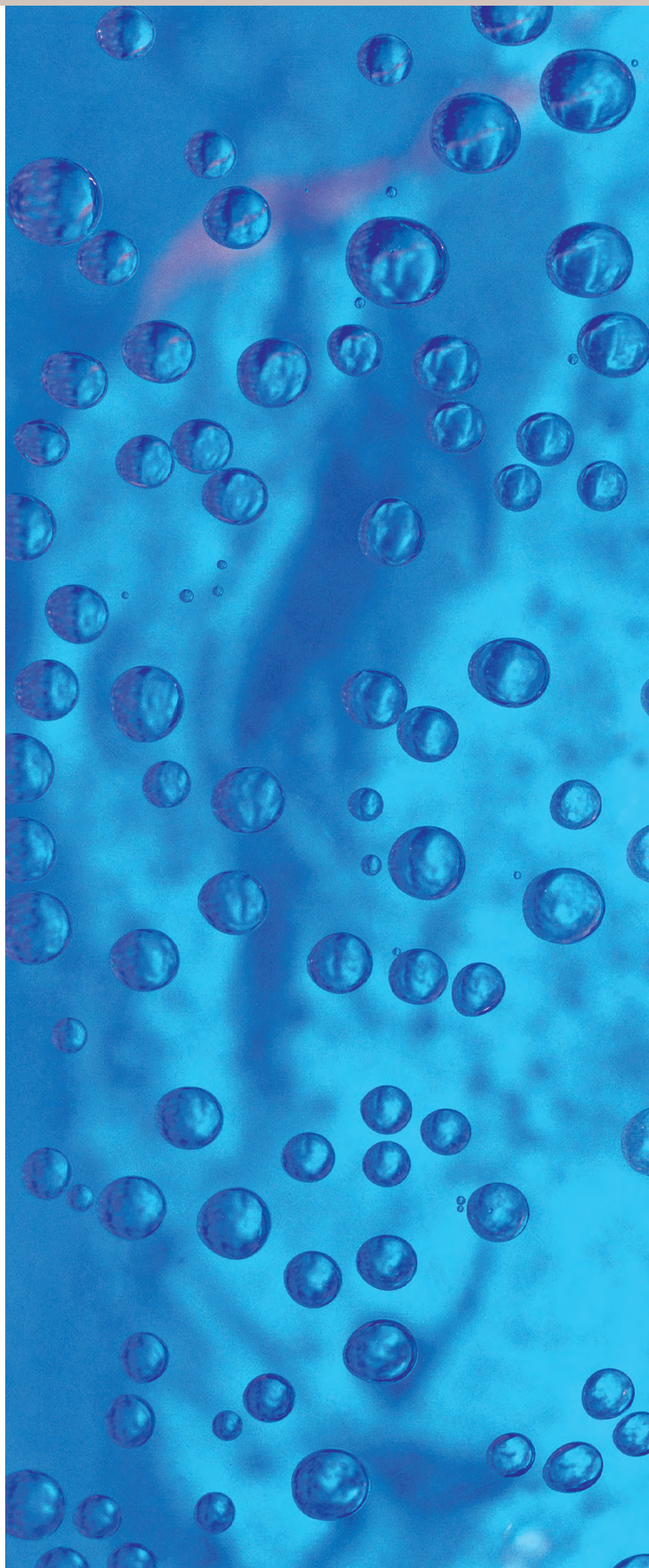
Chapter 12

Filters

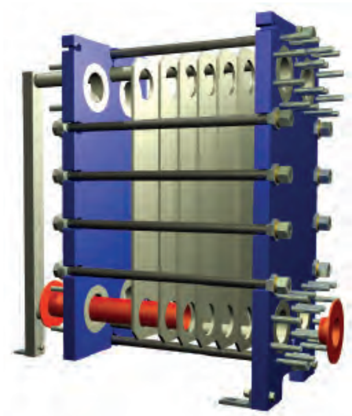


With diminishing supplies of water of sufficiently high quality to allow the plate heat exchangers in systems to operate efficiently, the need for cost-effective solutions to eliminate clogging by debris, marine life, fouling and impurities has become increasingly apparent.

The *ALF* filter is an automatic self-cleaning filter sized on the basis of the type of fouling encountered and the type of plate heat exchanger installed downstream.

The *Alfa Laval Port* filter is used to protect heat exchangers from intermittent fouling or to prevent foreign objects from entering the heat exchanger during a system startup.

Filter range

ALF	Alfa Port Filter
Read all about it on page 12:3	Read all about it on page 12:7
	

ALF – Alfa Laval Filter

Filtration for cooling systems using low-quality water

The use of inexpensive secondary cooling water from locations such as the sea, lakes or rivers has become a successful cooling solution that is now widely accepted in industry. Secondary cooling is in widespread use on ships, in power plants and in district heating and cooling systems.

However, such installations require large quantities of clean cooling water. With the supply of high-quality cooling water diminishing, the need for cost-effective solutions to eliminate clogging, fouling and corrosion has become increasingly more apparent. In a cooling system incorporating a heat exchanger and an Alfa Laval Filter, even polluted or corrosive water can be used to cool the most sensitive process equipment.

The Alfa Laval Filter (ALF) operates as an integral part of a cooling system, to remove debris that can foul and clog plate heat exchangers, tubular condensers, cooling tower spray nozzles or any similar equipment. In spite of effective screening at the water intake, mussels, seaweed and other forms of marine life can settle on the heat transfer surfaces.

Conditions are ideal for the growth of these forms of life and, as a result, they multiply rapidly. This then causes less effective heat transfer and even the complete breakdown of heat exchangers or other equipment.

If these kinds of blockages are severe, measures such as pesticides or chlorination are often no longer sufficient. In some cases, these simply cannot be used because they are prohibited by environmental legislation.

This is where Alfa Laval Filter technology comes in. It protects a wide range of sensitive equipment from clogging and fouling, and also prevents blockages in the cooling water system. An Alfa Laval Filter removes debris and marine life, and is automatically backflushed at regular intervals to keep it clean.

Standard control panel with PLC for one filter. Alternative configurations are available for controlling multiple filters.Options for remote control or high protection classes, such as ATEX, are also available.

Operation and design
The Alfa Laval Filter is a pressure filter with an automatic flushing arrangement. The design features a pressure vessel casing made of stainless steel (ALF-S), fibreglass reinforced polyester (ALF-P) or rubber-lined carbon steel (ALF-R). The internal cylindrical filter basket, along with other wetted parts, is usually made of stainless steel, super stainless steel (SMO) or titanium.

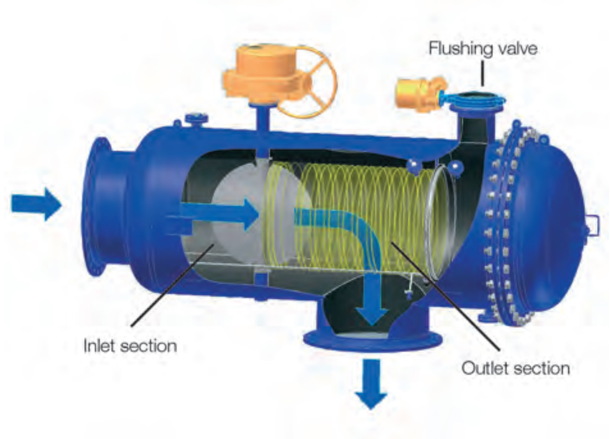
The filter system is available with connections ranging from 100 mm/4" to 800 mm/32" and is designed for placing directly in the pipe system. Because the automatic regeneration process is run by the inlet pressure, and the nozzles can be mounted in almost any way required, the Alfa Laval Filter can be mounted in almost any position.

The inlet is placed at one end and the main outlet at a 90° angle, making it suitable for installation on any 90° pipe bend close to the equipment to be protected. The inspection/service opening is placed on the opposite side of the inlet, thus providing easy service access with no need to remove the pipe connection.

Automatic flushing is carried out at regular intervals without interrupting the filtering process. The flushing arrangement is completely automatic and contains a flushing valve and a flow diverter valve. These are regulated using actuators controlled by a PLC in the control panel, which can be installed close to the filter.

The filter itself is divided into two sections by the flow diverter valve, the inlet section and the outlet section. A flushing valve for discharging the debris is located at the end of the outlet section.

Normal operation
During normal operation, liquid passes through the inlet into the filter basket, in which the flow diverter valve is open and the flushing valve closed. The liquid passes through the filter basket prior to being discharged at the main outlet.

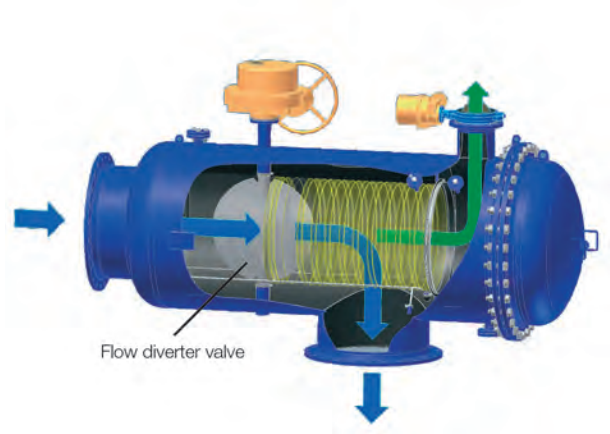


NORMAL OPERATION

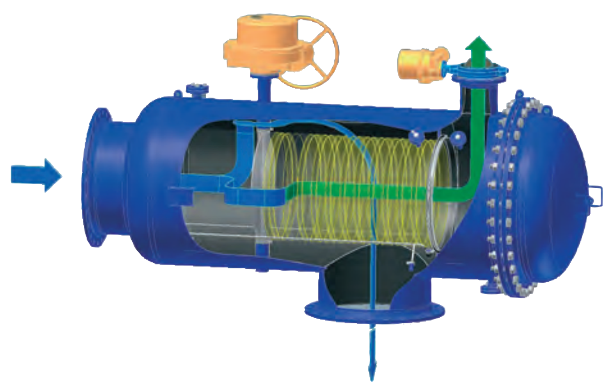
Regeneration
ALF units can be cleaned either automatically, using a timer, at predetermined intervals, or manually by pushing a button on the control panel. An optional differential pressure control system is available as a back-up and for monitoring the filter status.

1. Primary flushing
The flushing valve opens, thereby reducing the pressure drop and increasing velocity and total flow through the filter. Any debris sticking to the filter basket is dislodged and flushed out through the flushing valve. The liquid velocity is sufficient to remove any debris embedded in the inlet section of the basket.

2. Secondary flushing (backflushing)
The flow diverter valve closes, while the flushing valve remains open. The flow is diverted and forced to pass through the filter basket in the inlet section. The majority of the liquid is discharged through the main outlet, but the pressure in the filter draws part of the flow from the exterior to the interior of the outlet section. This provides a backflushing effect in this section of the filter. Any dislodged remnants are discharged through the flushing valve.



REGENERATION – primary flushing



REGENERATION – secondary flushing (backflushing)

Installation

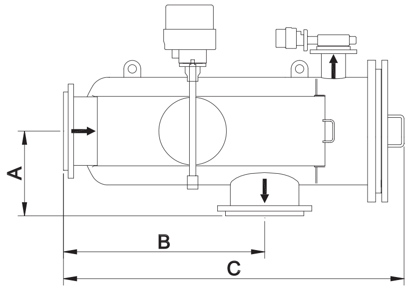
ALF units can be installed upstream of heat exchangers with shut-off valves placed upstream of the filter and downstream of the heat exchanger. This enables flexible servicing if many units are installed in parallel– for instance in a duty/standby installation or when installed on a bypass pipe, allowing the filter to be taken out of service separately.

Depending on pipe dimensions, flow rate and the premmissable pressure drop, one ALF filter can be installed to protect several heat exchangers. The filter(s) should preferably be mounted close to the heat exchanger(s) in order to minimize the risk of biological growth in the pipe system connecting the components.

Due to the flexible nozzle orientation, ALF filters can be installed in almost any position, horizontally as well as vertically. Alfa Laval recommends connecting the flushing outlet to the heat exchanger outlet when possible, and returning the debris to the natural water source. It is important that the filter is installed downstream of the feed pump(s), operating as a pressure filter.

Dimensions

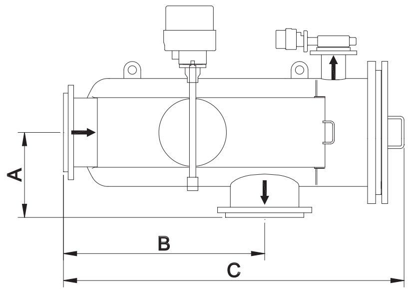
ALF-R with filter casing made of rubber lined carbon steel.



ALF-R

	A	B	C
ALF 20R	325	720	1230
ALF 30R	425	950	1610
ALF 40R	496	1150	1165
ALF 50R	600	1400	2380
ALF 60R	700	1650	2605
ALF 80R	905	2080	3720

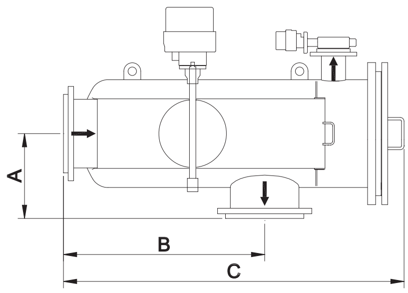
ALF-S with filter casing made of stainless steel.



ALF-S

	A	B	C
ALF 10S	175	450	740
ALF 15S	250	595	975
ALF 20S	300	720	1180
ALF 30S	400	950	1610

ALF-P with filter casing made of fibreglass reinforced polyester.



ALF-P

	A	B	C
ALF 10P	250	530	890
ALF 15P	300	685	1150
ALF 20P	350	840	1400
ALF 30P	520	1130	1820
ALF 40P	570	1150	2110

Pressure drop for Alfa Laval filters

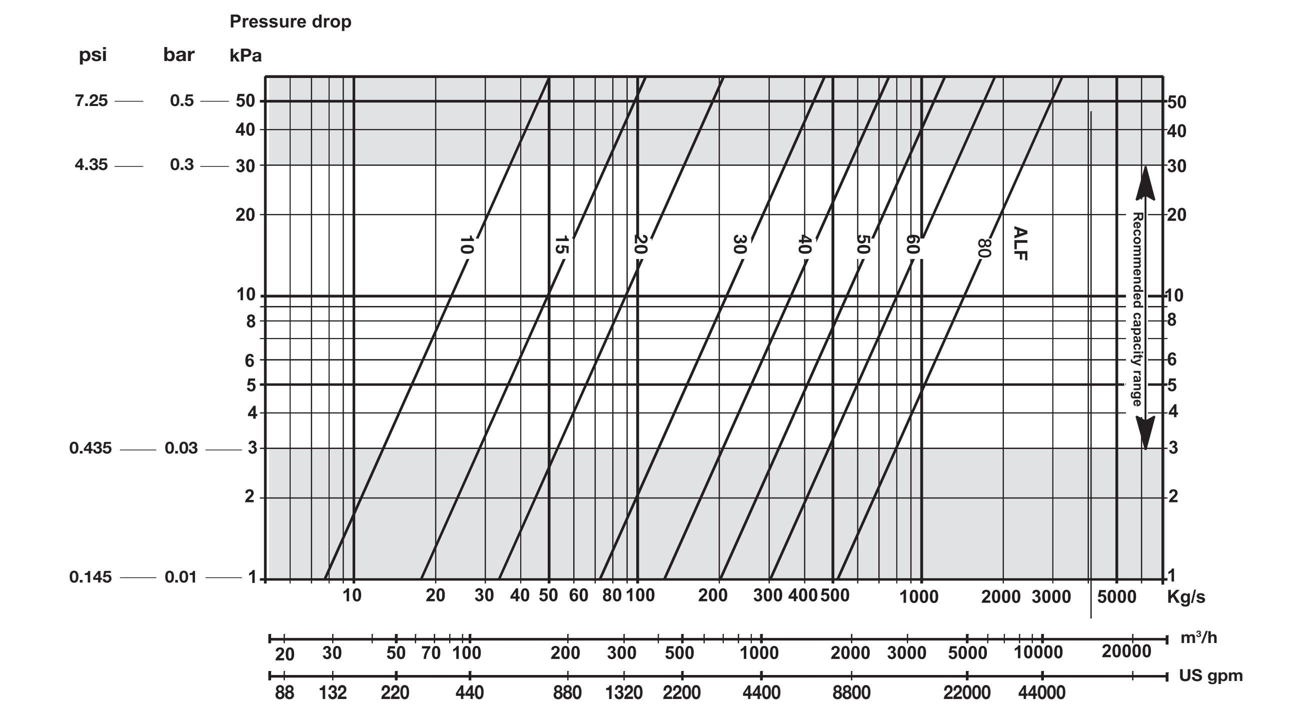


Fig. 3 Recommended pressure drop and capacity range

Technical data		
Connections	EN 1092.1/PN10	DN100-DN800
	ANSI B16.5/B16.47, B series, # 150	4"-32"
	JIS B2238/K10	DN100-DN800
Operation	Pneumatic, electric or hydraulic	Actuator controlled valves
Mesh size	Perforated plate design (Ø hole)	1.0-1.5-2.0-2.5 mm
	Wedge wire design (slot size)	0.3-0.5-1.0 mm
Materials	Filter body (ALF-R)	Rubber-lined carbon steel (EN P265 GH/ASTM A516 Gr60)
	Filter body (ALF-S)	Stainless steel EN 1.4404 ASTM 316
	Filter body (ALF-P)	Fibreglass reinforced polyester (GRP/FRP)
	Internal parts (wetted)	Stainless steel EN 1.4404 ASTM 316
	Internal parts (wetted)	Super stainless steel, EN 1.4547 / ASTM S31254 (SMO)
	Internal parts (wetted)	Titanium, EN 3.7025 / ASTM B265 Grade 3
Design code	EN13445 / ASME VIII, div.1/div.2	ALF-R / ALF-S
Design code	EN13121 / ASME X	ALF-P
Design pressure	10 bar (g) / 150 psi	Alternatives on request
Design temperature	65°C / 149°F	Alternatives on request
Control panel	PLC-based	Power supply: 1~ 100-250 V, 50-60 Hz

PEE00007EN 0811

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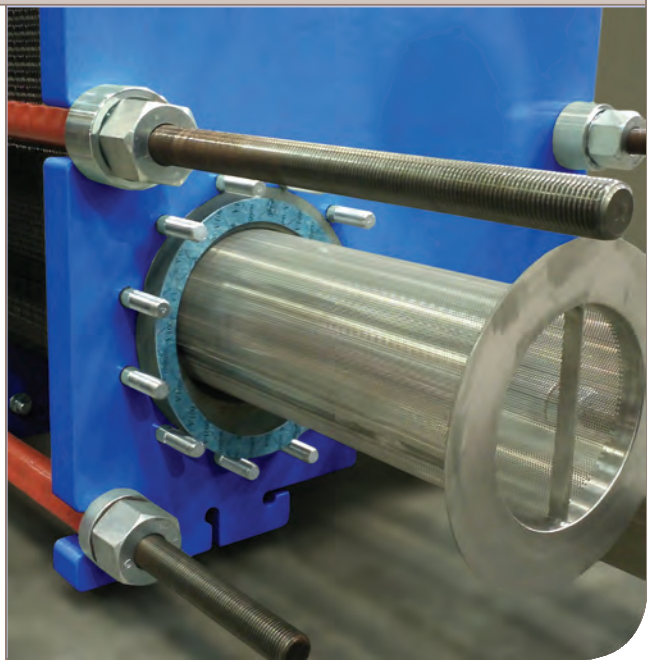
Plate Heat Exchanger

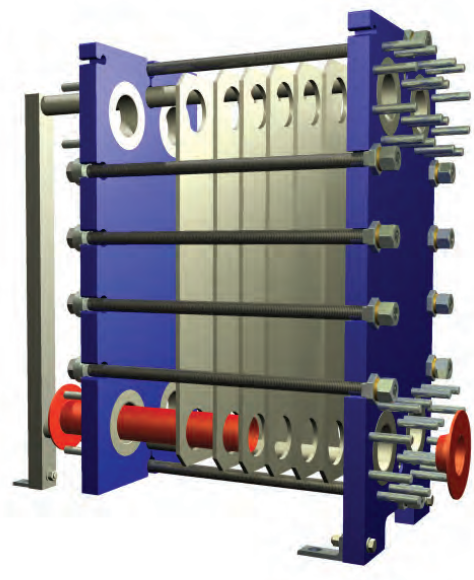
Port Filter



Application
The Alfa Laval port filter is used to ensure thermal efficiency of the heat exchanger by preventing foreign objects from entering and causing clogging of the unit. The filter is designed to operate in conditions involving sea water, process water, cooling tower water or any kind of water containing particles with potential risk of disrupting the performance of the system.

Design
The filter consists of a cylindrical meshed body extending the total length of the plate pack. A cone shaped guiding ring is inserted at the inlet of the port and keeps the filter fixed during operation as well as preventing debris from entering between filter body and plate pack. A welded ring in both ends provide a flat surface for gasket sealing against piping and inspection cover.

Installation and maintenance
The filter is inserted and accessed from an extra port placed at the opposite side where the media piping is connected. An inspection cover is mounted to seal the port and makes it easy to access the filter when maintenance is needed. Removal of the port filter for inspection or maintenance is possible without dismantling the inlet pipework.



Benefits
- Prevents clogging
- Extended operation time
- Easy installation
- Easy to service
- Minimized down-town

Technical data
Available for most standard heat exchanger types with connection size Ø100 mm (4 in) and larger.

Material:	Alloy 316L, Alloy 254 (standard for sea water applications) and titanium. Other materials available on request.
Mesh size:	Ø1.5-2.2 mm (0.06-0.09 in) with a corresponding pitch providing an open surface of 37%.
Body thickness:	1 mm (0.04 in)
Ring thickness:	3-5 mm (0.12-0.20 in)

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Alfa Laval in brief

Alfa Laval is a leading global provider of specialized products and engineered solutions.

Our equipment, systems and services are dedicated to helping customers to optimise the performance of their processes. Time and time again.

We help our customers to heat, cool, separate and transport products such as oil, water, chemicals, beverages, foodstuffs, starch and pharmaceuticals.

Our worldwide organization works closely with customers in almost 100 countries to help them stay ahead.

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