

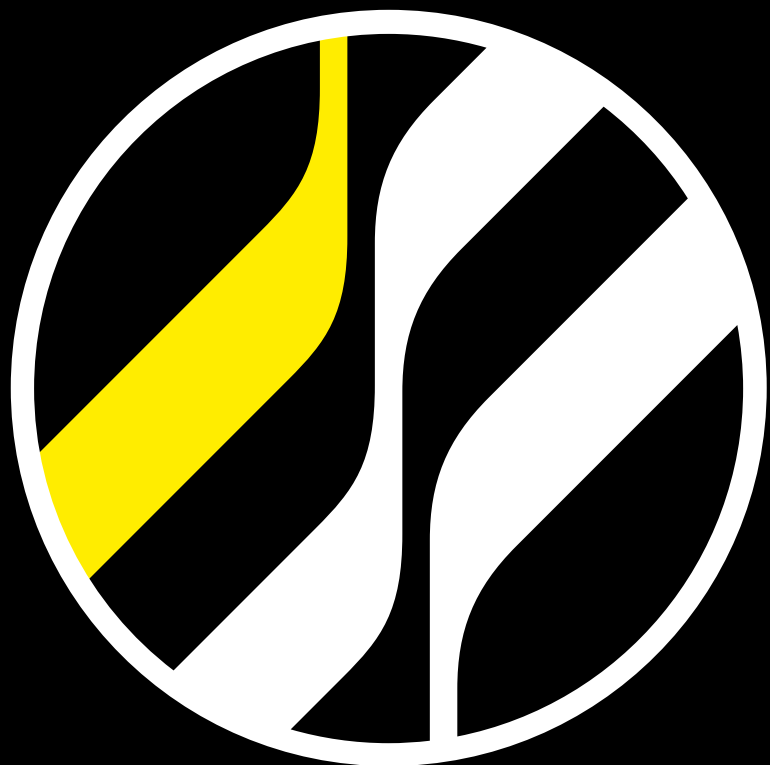
Kelvion



Product Line: Welded Plate Heat Exchangers

# **HIGH PERFORMANCE MODEST SPACE REQUIREMENTS**





# EXPERTS IN HEAT EXCHANGE – SINCE 1920

Welcome to Kelvion! Where Heat Exchange is our Business. We are one of the leading global manufacturers of heat exchangers and have been providing solutions for almost every industrial application imaginable since the 1920s, specializing in customized solutions suitable for extreme environmental conditions - as of 2015 under the name of Kelvion.

With one of the most extensive selections of heat exchangers in the world, we are a well-known partner in many industries, including transportation, energy, oil and gas, chemical, marine as well as food and beverage, data center and the HVAC and refrigeration technology sector. Our products include Compact Fin Heat Exchangers, Plate Heat Exchangers, Single Tube Heat Exchangers, Transformer Cooling Systems, Cooling Towers and Shell & Tube Heat Exchangers.

Our many years of experience and in-depth expertise have made us specialists in this field. Our heat exchangers are designed specifically to meet the needs of the respective machine or equipment system, ensuring outstanding energy efficiency and reliability in any market segment. This gives our customers a cutting-edge over their competitors while also reducing operating costs over the long term.

As your heat exchange partner, we understand that outstanding and reliable after-sales services are critical for you, our customer, and we work alongside with you in close partnership supporting you throughout the full life cycle of your plant and equipment to ensure lasting business success.

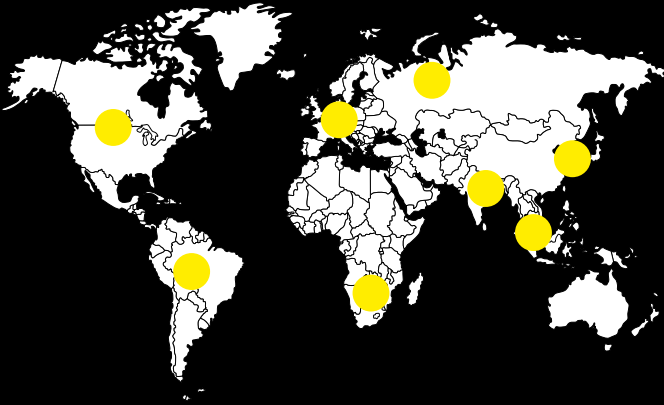
Kelvion – Experts in Heat Exchange.

## KELVION – A TRIBUTE TO LORD KELVIN (1824 - 1907)

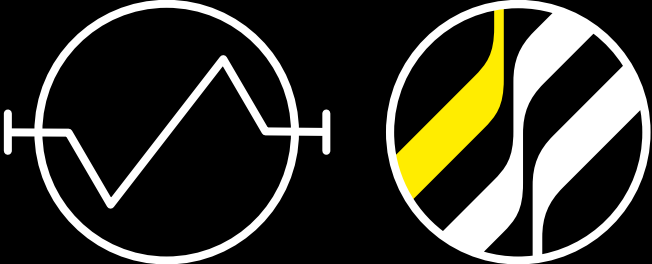


Lord Kelvin formulated the laws of thermodynamics and absolute units of temperature are stated in kelvin, in his honor.

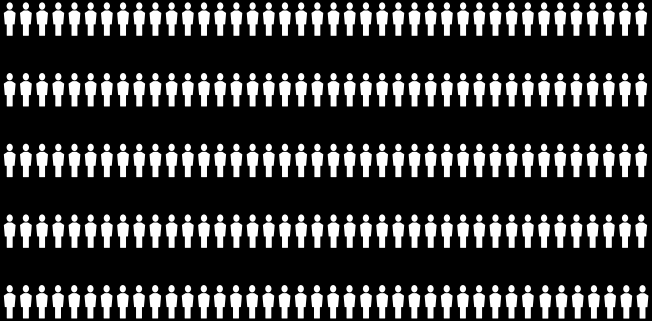
## 67 BRANCHES AND SALES PARTNERS WORLDWIDE



## OUR LOGO – INSPIRED FROM THE SCHEMATIC FOR HEAT EXCHANGER



## 5,000 EMPLOYEES WORLDWIDE



## YOUR MARKETS ARE OUR MARKETS

Chemicals

Data Center

Food & Beverage

HVAC

Refrigeration

Marine

Oil & Gas

Power

Transportation

... and more

## KELVION HAS A LONG HISTORY

2015

With the new name, the former GEA Heat Exchangers is writing its own history as Kelvion.

2014

GEA sells the Heat Exchangers Segment to Triton.

2010

Reorganization of GEA's 9 Divisions into technologically distinct Segments. The largest segment is the Heat Exchangers Segment.

1999

In April 1999, GEA was acquired by mg technologies AG

1920

Foundation of GEA in Bochum by Otto Happel sen. (Born 1882)

# TAILOR-MADE SOLUTIONS

As the worldwide technology leader in the manufacture and development of plate heat exchangers, we have one of the most extensive product ranges on the market. Our product diversity varies from gasketed to brazed and welded plate heat exchangers. This includes process-optimised series that are unique in their number and special functions. This makes us absolute specialists when it comes to developing tailor-made solutions for your applications.

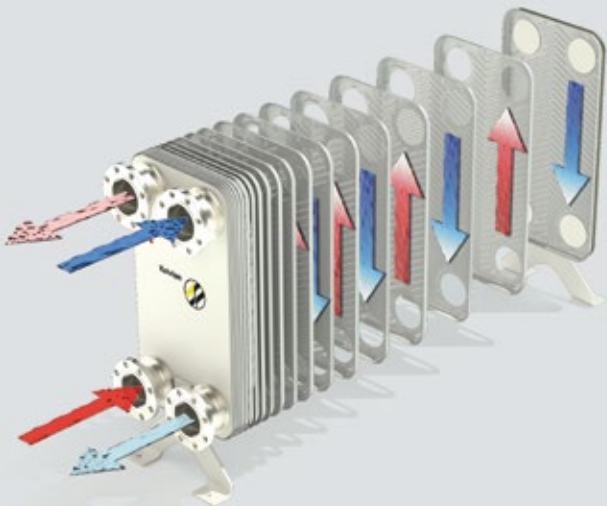
At Kelvion, we invest extensively in research and development. This enables us to continuously develop efficient plate types for new fields of application.

This commitment secures and extends our core competencies, to the benefit of our customers.

## BRAZED PLATE HEAT EXCHANGERS

The product range of our brazed series offers the widest variety and flexibility in terms of size, brazing material, different connections, flow arrangements and accessories.

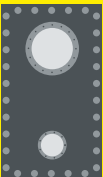
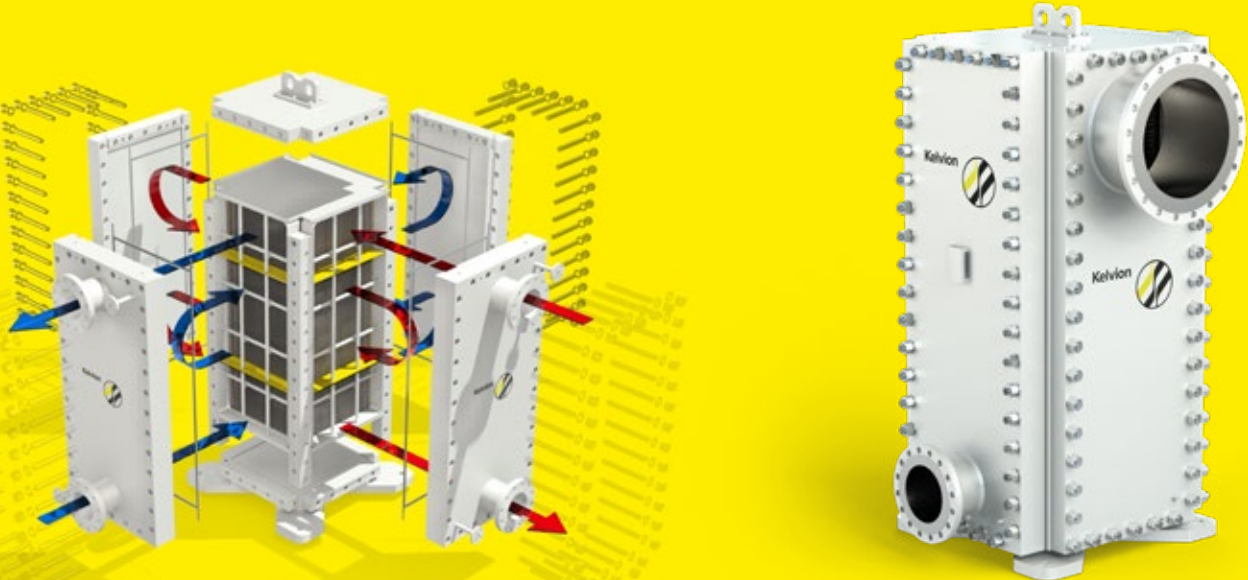
- Tailor-made economical design for the most varied applications
- Long lifetime
- Highest efficiency
- Highest quality



## WELDED PLATE HEAT EXCHANGERS

Combining high heat transfer coefficients of a plate heat exchanger with the advantages of rugged welded design, they are the perfect partner for demanding applications with medium to large volume flows.

- **K°Bloc:** Oil and gas, chemical and petrochemicals use. Withstands high temperatures and pressures.
- **K°Flex:** Efficient, turbulent heat transfer for power stations or applications in the sugar industry requiring high output density.
- **REKULUVO/REKUGAVO:** High-efficiency heat recovery for Gas/Gas Applications.



## GASKETED PLATE HEAT EXCHANGERS

Designed with ease of maintenance in mind, our gasketed plate heat exchangers can be adjusted if requirements change and can easily be opened for cleaning – suitable for a wide range of applications with medium to large volume flows.

- High efficiency at low operating costs
- Wide application spectrum at lower investment costs
- High range of plate corrugations, connection sizes, plate widths and lengths
- Maintenance-friendly assembly and sealing technologies





APPLICATIONS



Chemicals



District Heating



Food & Beverages



Heavy Industry



HVAC



Oil & Gas



Paper Industry



Power



Refrigeration



Sugar

Welded Plate Heat Exchangers

LEADING TECHNOLOGY FOR ALL APPLICATIONS



Your global Partner providing all Industries with trusted Plate Heat Exchanger Technology and Service where Expertise is needed. Reliable. Sustainable. Efficient.

Our welded plate heat exchangers make a convincing case due to their minimal size, outstanding thermal transmission coefficients and comparatively minimal investment costs. They are particularly robust and require only minimal cleaning and servicing. The design advantages thus come into play in areas in which in addition to the output, load capacity is also required. In addition, each series has its specific advantages and areas of application.

The conclusion: Developed for the challenges of specific applications, the EcoWeld product line offers convincing performance even under the most difficult circumstances.

Two different plate corrugations

The compact, welded heat exchanger can be equipped with two different plate corrugations, as required by their application. The chevron corrugation assures highly efficient heat transfer, the double-dimple corrugation is most suited to demanding media with solids/fibres, high viscosity or for vacuum condensation.



WHY CHOOSE KELVION?

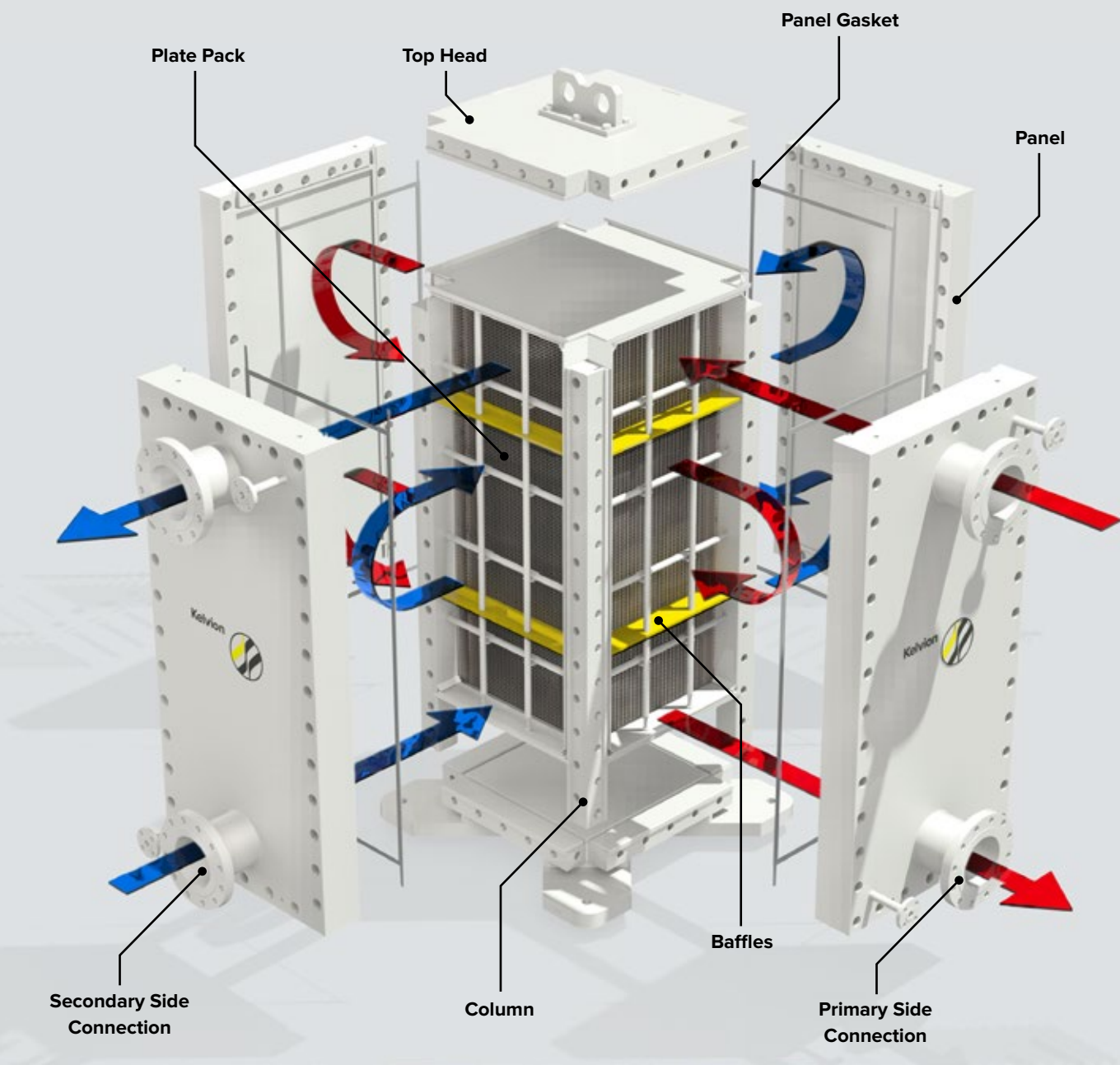
- Global Application Sales & Service Network
- High Application & Product Competence
- Reliable Partner
- Sustainable
- Efficient



Welded Plate Heat Exchangers

KELVION K°BLOC

The K°Bloc is a welded plate heat exchanger that is used above all in the oil and gas industry, the chemical industry as well as in the petrochemical sector.



The solidly bolted frame consists of four columns, top and bottom heads as well as four side panels. These side panels can be detached swiftly and allow free access all the way around for the thorough and easy cleaning of the welded plate package.

Two different plate corrugations are available. Chevron corrugation enables effective heat transfer. In contrast, double dimple corrugation is the first choice for highly viscous or solid containing media as well as for vacuum applications.



+400 °C

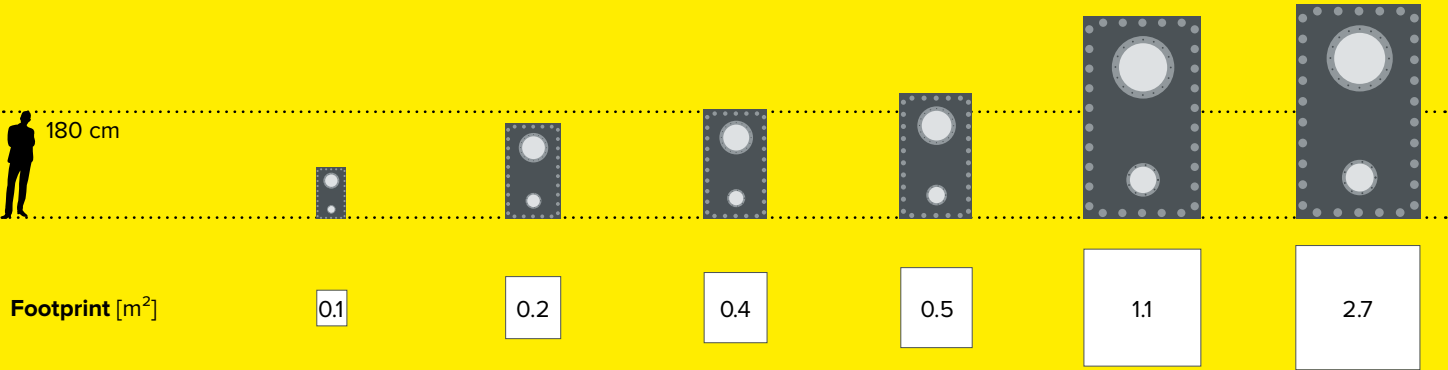
-50 °C



+50 barg

-1 barg

SPECIFICATIONS



	BT20	BT30	BT40	BT50	BT75	BT120
Surface/Plate	0.061 m <sup>2</sup> 0.66 ft <sup>2</sup>	0.108 m <sup>2</sup> 1.16 ft <sup>2</sup>	0.164 m <sup>2</sup> 1.77 ft <sup>2</sup>	0.270 m <sup>2</sup> 2.91 ft <sup>2</sup>	0.639 m <sup>2</sup> 6.88 ft <sup>2</sup>	1.720 m <sup>2</sup> 18.51 ft <sup>2</sup>
Plate Dimension	200 x 200 mm 7.9 x 7.9"	300 x 300 mm 11.8 x 11.8"	400 x 400 mm 15.7 x 15.7"	500 x 500 mm 19.7 x 19.7"	750 x 750 mm 29.5 x 29.5"	1200 x 1200 mm 47.2 x 47.2"
Max. Unit Height	818 mm 32.2"	1643 mm 64.7"	1824 mm 71.8"	2092 mm 82.4"	3386 mm 133.3"	3586 mm 141.2"
Connection Sizes	50 - 150 DN 2 - 6"	50 - 250 DN 2 - 10"	50 - 300 DN 2 - 12"	50 - 400 DN 2 - 16"	80 - 600 DN 3 - 24"	150 - 900 DN 6 - 36"
Max. Plate Amount	100	200	240	300	500	500

MATERIALS

TYPE	AISI	TRADE NAME	
1.4306	304L		✓
1.4404	316L		☑
1.4547	S31254	SMO 254	☑
1.4539	904L		✓
2.4068	N02201	Nickel 201	✓
2.4602	N06022	Alloy C22	✓
2.4675	N06200	Alloy C2000	✓
2.4819	N10276	Alloy C276	☑
3.7025	B265 Gr1	Titan Gr.1	☑

Our K°Bloc is available in various materials for a wide range of different applications.

- ☑ Standard plate materials
- ✓ Further plate materials

Other materials are availabe upon request.

WELDING

- ▶ 3 decades of welding expertise on all special alloys ensure a long lifetime
- ▶ Sustainable, high quality welds
- ▶ TIG (GTAW) Welding
  - ▶ Just one welding process for complete plate bundle
  - ▶ State of the art technology
  - ▶ Process controlled and reliable
  - ▶ Available all over the world
- ▶ Automized plate welding





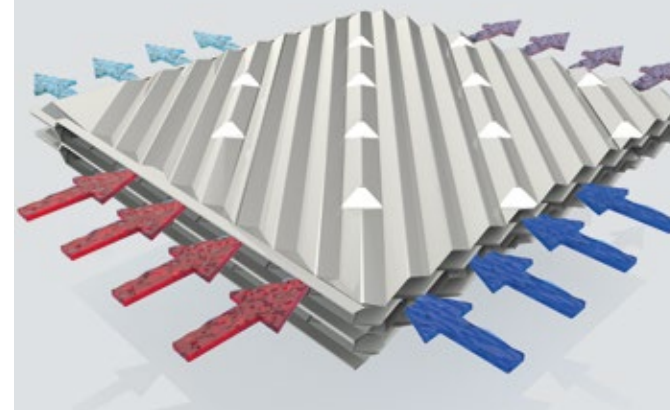


## PLATE FEATURES

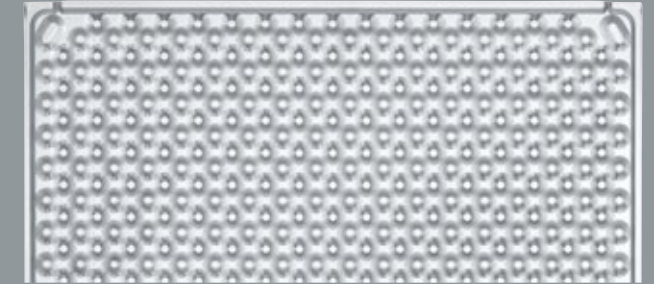
### CHEVRON CORRUGATION



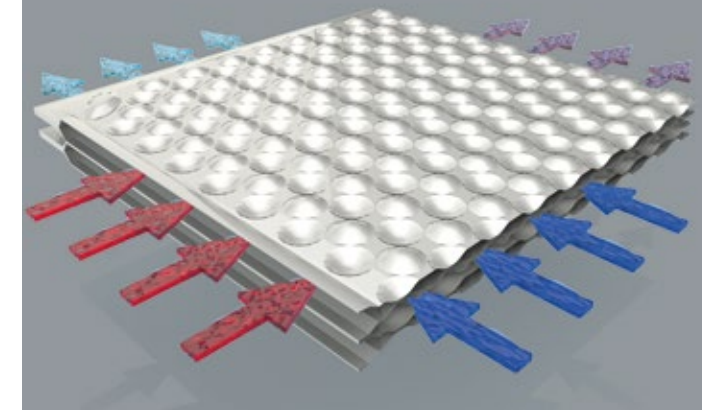
- ▶ High efficiency and pressure resistance
- ▶ Best compromise between high heat recovery services and CAPEX
- ▶ 5 mm (0.20") pressing depth
- ▶ High turbulence (reduce fouling)
- ▶ Higher pressure drop



### DOUBLE DIMPLE CORRUGATION



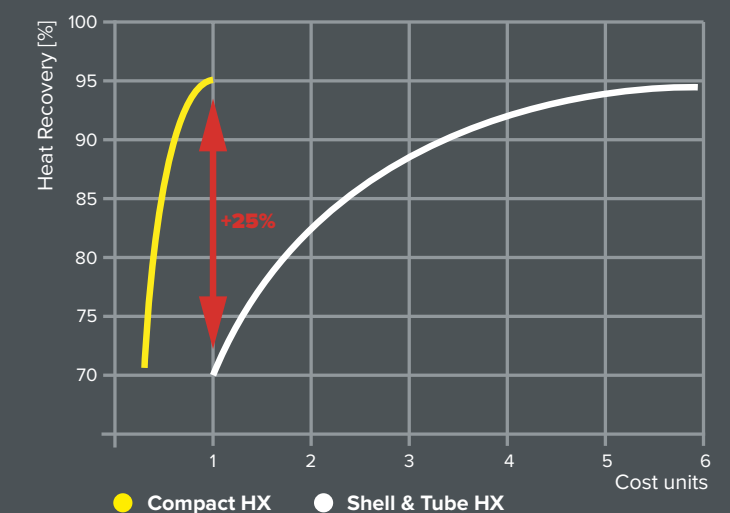
- ▶ For high viscous media or solids/fibres containing fluids
- ▶ Best compromise between pressure drop and heat recovery when dealing with severe fouling media
- ▶ For applications with low pressure drop requirements
- ▶ 5 mm (0.20") clear gap on both sides



### BETTER HEAT TRANSFER DUE TO HIGHER TURBULENCE

- ▶ Higher k-values due to corrugation
- ▶ Self cleaning effect
  - Less fouling, less cleaning
- ▶ 5 mm channel gap
  - Turbulent flow with smaller flow velocities
- ▶ High Shear Stress: 3-10 times higher than conventional Shell & Tube Heat Exchangers
- ▶ Corrugated plate heat exchangers enhancing heat recovery without impacting CAPEX severely
- ▶ Higher turbulence allows higher heat transfer coefficients

### HEAT RECOVERY VS COST UNIT



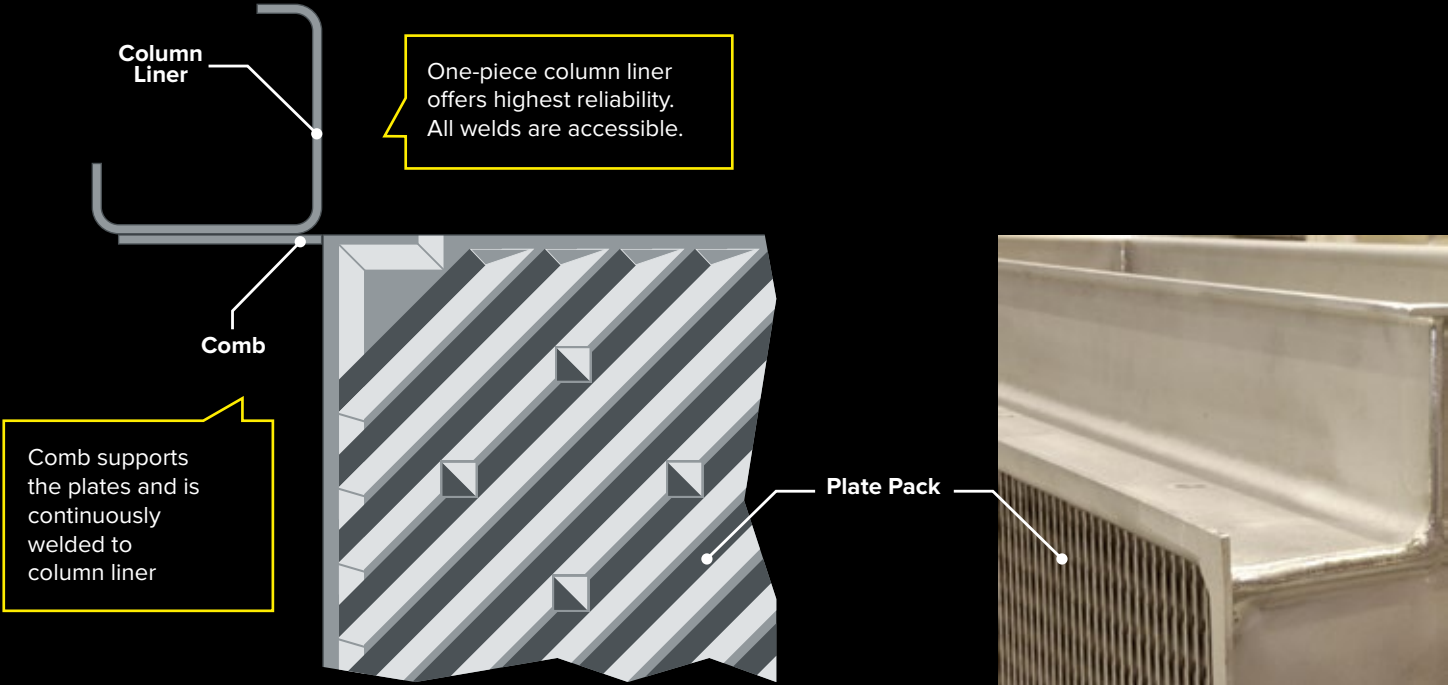


# FRAME FEATURES

A one-piece column liner combined with the unique K°Bloc comb and corner design offer the highest reliability for most challenging conditions

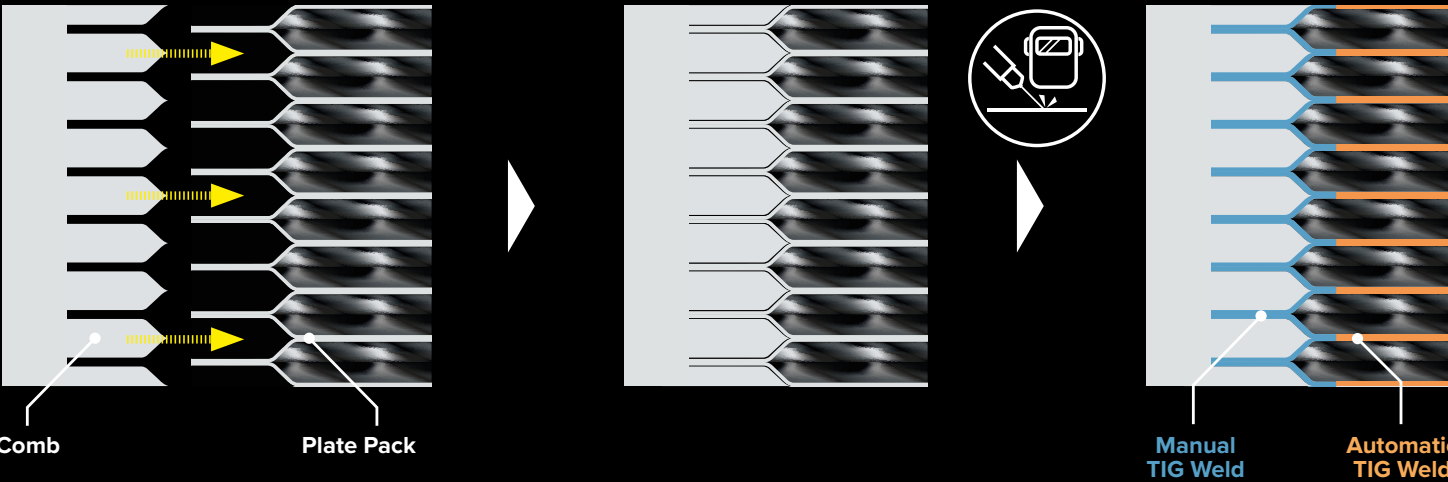
## CORNER DESIGN & COLUMN LINER

- ▶ Strong connection between plate pack and pressure vessel
- ▶ Robust Corner design for longer lifetime and reliable operation up to 50 barg
- ▶ Pre-compression of plate pack result in perfect contact between the single plates



## COMB

- ▶ 3 mm comb design provides a boost on robustness of the most crucial edge area within our K°Bloc
- ▶ Comb material not weakened by tremendous cold forming steps
- ▶ Welded with support of filler metal



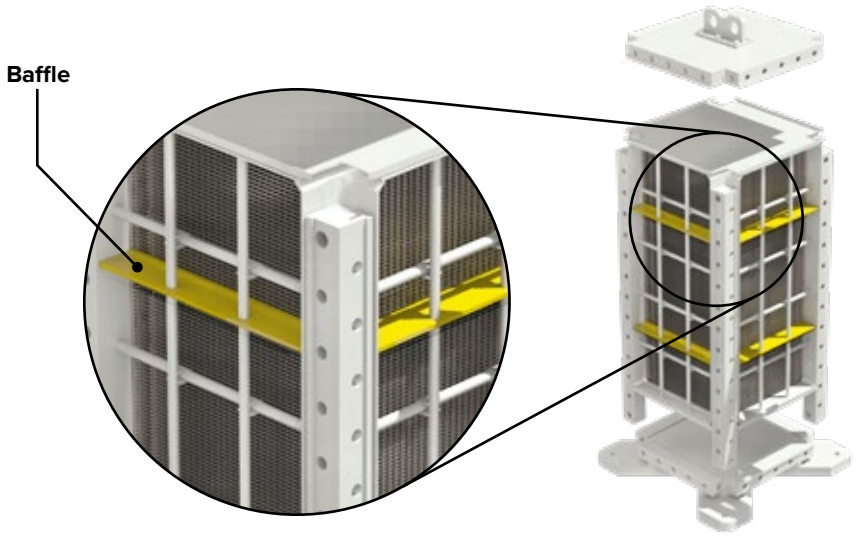
# BAFFLES

## WHY IS A BAFFLE REQUIRED?

Baffles allow multi pass designs for thermal plate length extension

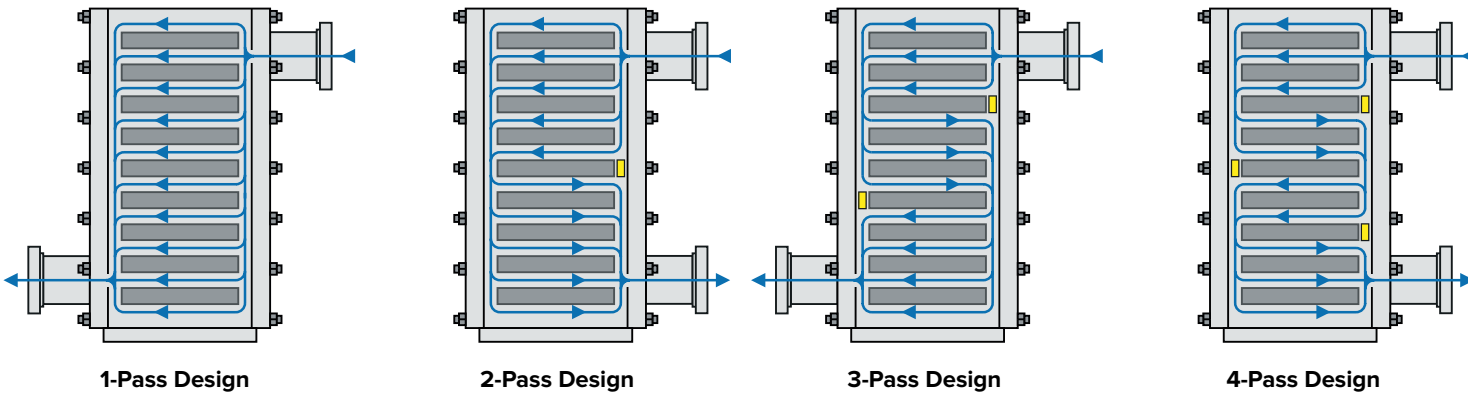
## FUNCTION AND FACTS

- ▶ Odd pass designs have inlet connection on one panel and the outlet connection on opposite panel
- ▶ Even pass designs have inlet and outlet connections on one panel
- ▶ Pass configuration allows dealing with non symmetrical flows



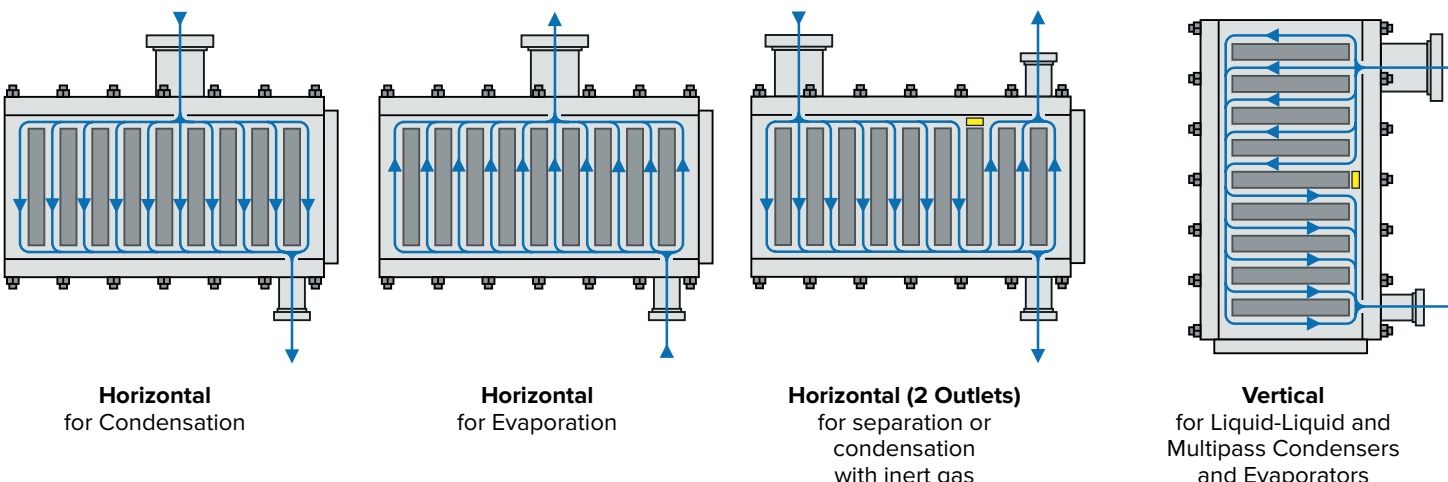
# MULTI PASS OPTIONS

Possibility of implementing several different multi-pass options to perfectly match the heat exchanger design to customer requirements in terms of thermal performance and pressure drop characteristics



# APPLICATION OPTIONS

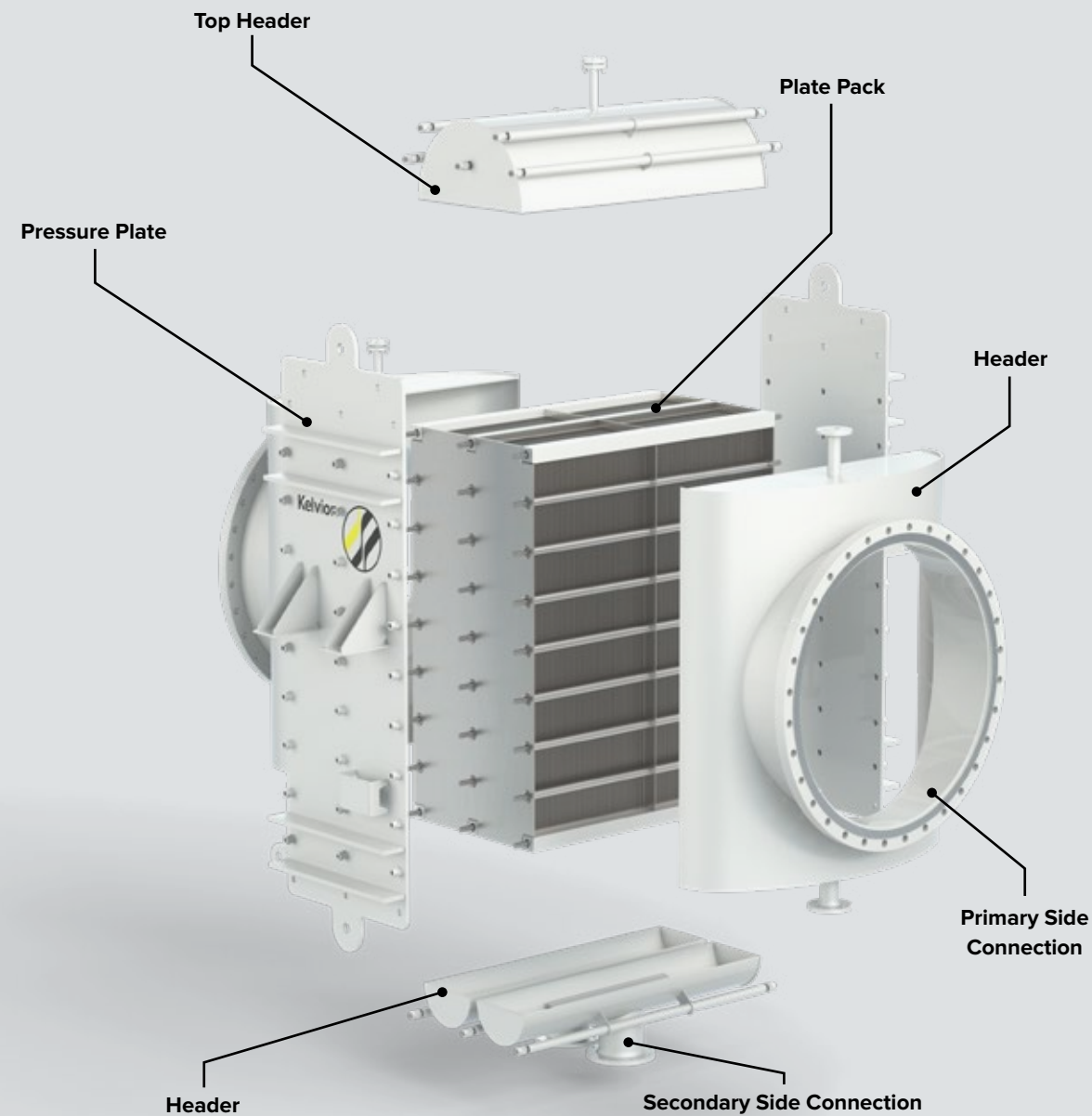
Different orientations in combination with specific pass options are available to achieve the best solutions for different customer applications.



Welded Plate Heat Exchangers

KELVION K°FLEX

The K°Flex combines the advantages of Shell & Tube and Plate Heat Exchangers in a single unit. The asymmetrical flow gap (tube/wave) makes it a strong player as condenser, evaporator and heat exchanger for the thermal treatment of two-phase mixtures in the chemical industry, in petrochemical plants as well as in the oil and gas industry. The biggest units are installed worldwide as evaporators in the sugar industry.



With tube diameters of 6 or 9 mm fluids with particles and high fouling risk can be handled. The wide and open cross section of the tubular side is most advantageous for condensation under vacuum, as a head condenser, for large gas volume flow rates and two-phase applications like gas heating or gas cooling with partial condensation (gas drying).

Longtime experience, e.g. in power plants since 1992, and proven liability of the mechanical design ensure carefree and long-standing operation of the K°Flex.



+650 °C

-200 °C



+100 barg

-1 barg

TECHNICAL DATA & FEATURES



	DS 1	DS 2-4	DS 4-HP	DS 5-7
PLATE & PLATE PACK DESIGN				
Plate corrugation	wave - tube	wave - tube	wave - tube	wave - tube
Tube diameter	[mm] 6.0 / 9.0	6.0 / 9.0	6.0	6.0
Plate thickness	[mm] 0.8	0.8	1.5	1.5
Plate width	[mm] 330	330	333	333
Plate length	[mm] 600 - 6000	600 - 6000	400 - 6000	400 - 6000
Max. dimensions of plate pack (LxWxH)	[mm] 6000 x 4,600 x 4800	6000 x 4,600 x 4800	6000 x 4,600 x 4800	6000 x 750 x 750
Maximum heat transfer area/unit	[m²] 12000	10000	8000	600

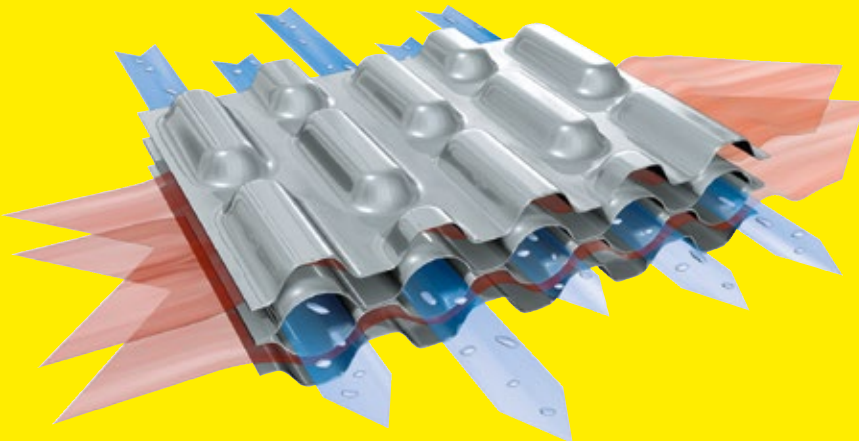
CASING & CONNECTIONS				
Casing (Standard)	Headers	Headers	Headers	Round shell
Casing (Option)	Round shell	Round shell	-	-
Connections	DN100 - DN3000	DN100 - DN1000	DN100 - DN1000	DN100 - DN800

DESIGN CONDITIONS				
Max. operating pressure on tube side	[barg] -1 / 1	6 / 16 / 25	63	25
Max. operating pressure on wave side	[barg] 10	16 / 25 / 45	63	60 / 80 / 100
Max. operating temperature	[°C] 650	350	350	250

MATERIALS EN (ASTM)	
Plate pack	1.4301 (304) / 1.4404 (316L)
Housing	1.4541 (321) / 1.4571 (316Ti)
Materials on request	1.4571 (316Ti) / 1.4539 (904L) / 1.4547 (254SMO) / 1.4462 (31803) / Nickel-alloys

K°FLEX PLATES

- ▶ Asymmetrical corrugation (tube/wave) allow for various applications, e.g. with remarkably different volume flow rates.
- ▶ Multi-pass arrangement possible on both sides
- ▶ Outstanding heat transfer values
- ▶ Low pressure drops at high flow rates
- ▶ Higher pressure resistance on the wave side
- ▶ Fluids with particles can be handled on the tube side

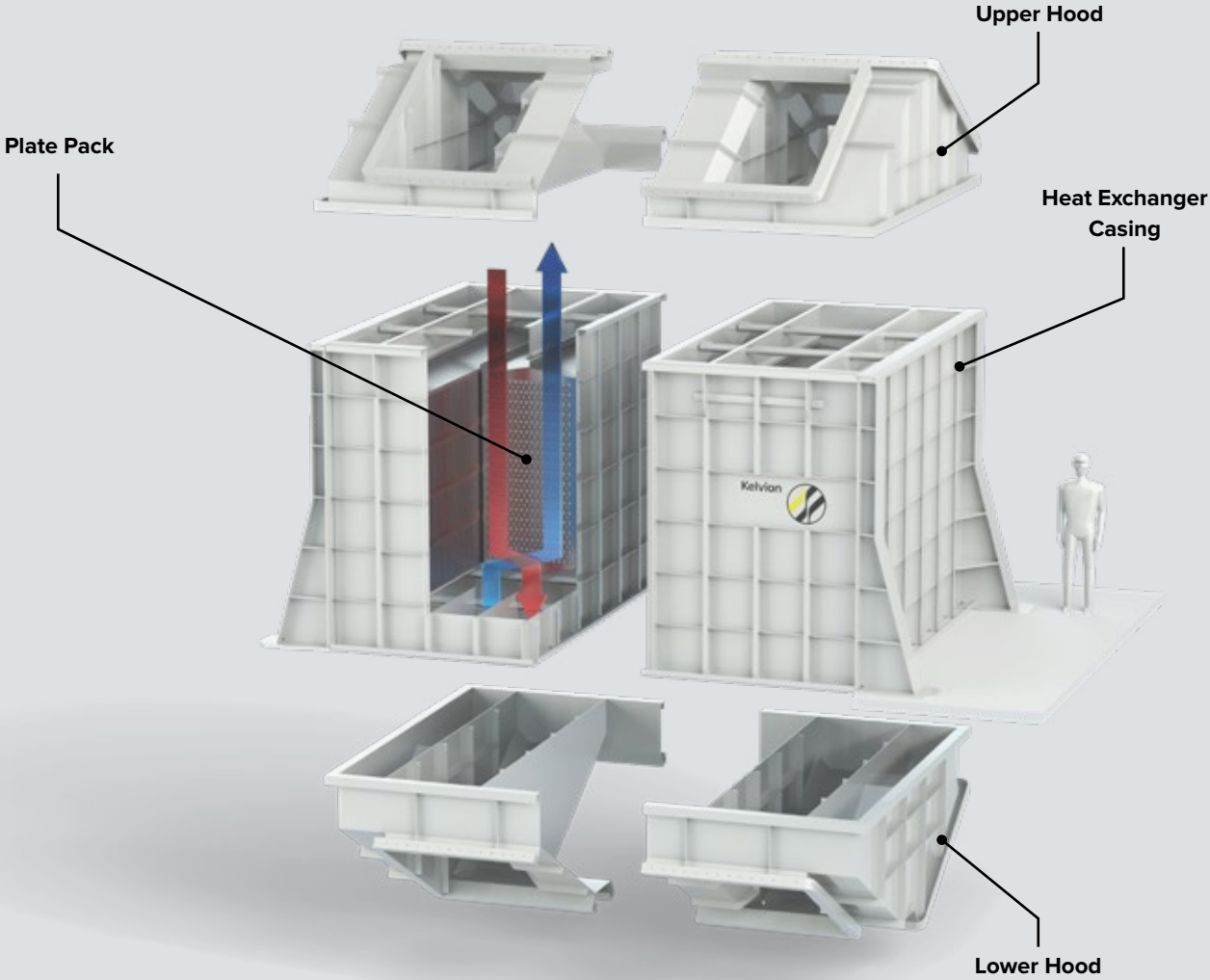




Welded Plate Heat Exchangers

# REKUGAVO AND REKULUVO

Whether in fossil-fuel power stations, in waste incineration and chemical plants, in refineries, steelworks, in wood processing and papermaking, whether in cement works or many other branches of industry: the recuperative Kelvion **REKUGAVO (gas preheater)** and **REKULUVO (air preheater)** heat exchangers are capturing the markets, particularly thanks to the significant technological advantages in comparison with conventional solutions.



The space-saving design allows fast installation, with short, vertical flow channels to simplify cleaning and can be perfectly adapted to every process-engineering or space situation. Easy handling and considerable potential savings – meaning genuine progress.

Both systems demonstrate their strengths in particular as heat recovery units between two gaseous media, e.g. for combustion air preheating, for catalytic denitrification plants in low-dust ranges, thermal gas scrubbing, drying, gas cooling or gas heating. Efficiency rates in excess of 90 % and leak tightness rates of 99.9 % are possible.



**+700 °C**

**-50 °C**



**+400 mbarg**

**-400 mbarg**

## TECHNICAL DATA

	MINIMUM VALUE	MAXIMUM VALUE
Suitable for a volume flow of approx.	5,000 m³/h (STP humid)	2,500,000 m³/h (STP humid)
Heat transfer surface approx.	400 m²	300,000 m²
Thermal performance approx.	250 kW	200 MW
Operating pressure	- 400 mbar	400 mbar
Difference pressure		400 mbar
Utility space approx.	1.5 m²	500 m²
Overall height total system approx.	1.5 m	20 m
Shipping weight total system approx.	1 t	2,000 t
Transport sizes (width x depth x height) approx.	(1.5 x 1 x 1.5) m	(3.5 x 12 x 4) m
Transport weights approx.	1 t	150 t

### REKULUVO RECUPERATIVE AIR PREHEATER



Energy is becoming synonymous with success. When a company manages to reduce its primary energy consumption, the positive effect on the balance sheet is very evident – as are the benefits to the environment. Heat recovery has proved to be the most effective way of exploiting existing energy in secondary systems and processes, thus minimizing primary energy input.

The REKULUVO recuperative air preheater features maximum performance – developed for systems where at least one of the two media is ambient air. In the waste gas line the REKULUVO, using a channel system with integrated shell-and-tube heat exchangers (waste heat recovery duct), transfers the waste gas heat to the combustion air, which is recycled directly to the combustion process.




### REKUGAVO RECUPERATIVE GAS PREHEATER









A fine example of how complex technology can effectively benefit nature and the industry at the same time: The REKUGAVO provides both budgetary and environmental advantages with its astonishing flexibility.

Suitable for use wherever both media streams are flue gases or industrial gases, this powerful gas preheater (flow rates of up to 2,500,000 m³) is used in a wide variety of industrial applications: in power stations, steelworks and cement factories, refineries, in waste incineration, etc.




# WELDED FOR ALL APPLICATIONS


OIL & GAS			
Gas Dehydration	★		
Gas Sweetening	●	★	
Crude Oil Stabilization	★	●	
Crude Oil Dehydration	●		
Gas Fractionation	★	●	
NGL Recovery	★	●	
Bitumen	●	★	●

REFINERY			
Crude Oil Preheating (CDU)	★	●	★
Gas Sweetening	★	●	
LGP Recovery	●		
Fluid Catalitic Cracking	★	●	●
Hydro Conversion Process	●	★	●
Sour Water Strippig	★	●	
Alkylation	●	★	
Isomeritation	★	●	


AGRICULTURAL NATURAL RESOURCES			
Sugar Refining		★	★
Biodiesel	●		★
Bioethanol		★	●
Bio Refineries	★	●	●
Deodorization	★	●	●

CHEMICALS			
Olefins (Ethylene, EO-EG, ...)	★	★	★
Aromatics	★	●	●
Sulfuric Acid	●		
Polymers	★	●	●
Caustic Evaporation	●	●	●
Methanol	●	★	★
Chlorine	★	●	●
Urea	●	●	★
Ammonia	●	★	★
Nitric Acid	●	●	●
Phenol	●	★	●


OTHERS			
Pulp and Paper	★	●	●
Refrigeration		●	
Renewable Energy	●	★	★
Energy Storage	●	★	★
Waste-to-Energy	●	★	★



**K°Bloc**  
(Main Process)





**K°Flex**  
(Main Process)







**Rekuluvo**  
(Waste Heat Recovery)

★ Recommended product for this application  
● Suitable product for this application


# MEDIA VERSATILITY

MEDIA			
Fresh Water	★	★	
Sea Water	★		
Sulfic Acid	●	●	
Amines / Solvents	★	★	
Hydrocarbons	★	★	
Brine	★	●	
Sodium Hydroxide	●	●	
Ethanol	●	●	
Biodiesel	●	●	


MEDIA			
Ammonia / Water Blends	●	★	
Steam	●	★	
Crude Oil	★	●	
Edible Oil	★	●	
Compressed / Pressurized Gases		★	
Combustion Gas			●
Fresh Air			●
Process Gas		●	●



**K°Bloc**  
(Main Process)



**K°Flex**  
(Main Process)



**Rekuluvo**  
(Waste Heat Recovery)

★ Recommended product for this media  
● Suitable product for this media



# OUR SERVICE IN THREE WORDS: PEACE OF MIND



## START-UP & ONSITE SERVICES

We ensure that our products are delivered safely and are fully validated to give a robust and reliable performance over as long a life cycle as possible.

And should you encounter an issue with your equipment after it is fully commissioned, our team of experienced Field Service technicians is at your disposal to come to your site to investigate and correct any malfunctions.

- Precise set up of equipment to make future operation and Service easier
- Supervision of installation by Kelvion experts



## REPAIRS, OVERHAULS & MAINTENANCE

Unscheduled downtime can be disastrous. That is why our trained engineers are ready to respond quickly in case of an emergency, and review and repair components while keeping any disruption to your production to a minimum. Any overhaul work is carried out quality-oriented in our service centers or on your site with the supervision of our qualified staff. Regular inspections and maintenance help to reduce costs, extend the lifetime of your Kelvion products and achieve reliable performance.

- Cleaning: Improvement of the thermodynamic performance and optimization of the efficiency
- Reconditioning: Recovery of the thermo-dynamic performance
- Reparation of the equipment
- Replacement of unsafe, worn, or damaged parts



## SPARE PARTS & SPARE PART SOLUTIONS

Even the best equipment shows signs of wear over time. We use only the highest quality spare parts, designed to match the excellence of the originals. This ensures that the optimum interaction between components is maintained. By safeguarding the original design, we offer maximum security of your investment.

- Supply of highest quality spare parts to match the excellence of the originals
- Exclusive stock: Reservation of critical spare parts to guarantee flexibility and quickest delivery



## MONITORING, CONSULTING & TRAINING

Knowledge of the equipment's condition allows you to secure reliable production, improve safety and energy efficiency, increase equipment lifetime and prevent breakdowns. We offer consultancy services that take into account the special features of your process, making use of our profound design knowledge of heat exchange equipment. And we work closely with you to develop the exact solution that is best tailored to your needs.

- Troubleshooting: Detection of the root cause of a major issue by applying our extensive product and process knowledge
- Performance audit: Performance tests on the actual operating performance
- Remote support: Hotline support with direct access to experts
- Training: Staff training to increase knowledge and competencies of your maintenance staff



## UPGRADES & REPLACEMENTS

We replace components to keep our heat exchangers running smoothly and to prevent downtime. Where parts or components have become obsolete due to age, we will suggest a suitable upgrade. In these cases, we can often also suggest new, state-of-the art technology which additionally enhances the performance and reliability of your process.

- Upgrades: Increase of capacity, cost reduction, extension of service intervals or achievement of more efficient heat transfer by redesigning your current solution
- Replacement of unsafe, worn, or damaged parts

## ALL BRAND SERVICE

Besides being experts in our own products and our former brands, we also have the expertise to service other brands.

## PERFORMANCE AGREEMENTS

We offer individually tailored service solutions for the services in our extensive portfolio. They maximize your return on investment, ensure continual performance excellence and make budgeting simpler.