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TSL

# HiRef

Innovators above  
the standards

SERVICES

DATA CENTER

INDUSTRY



## Class A chillers and heat pumps

# TSL

air condensed with scroll compressors

Range: 276.9–1003.8 kW

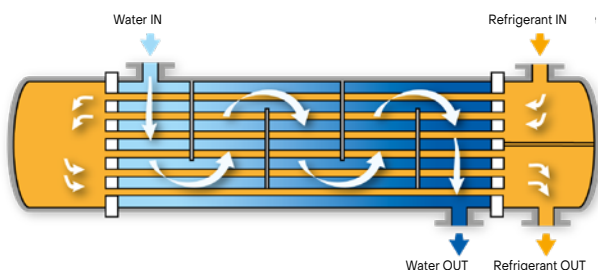


The new TSL range chillers and heat pumps are air/water units in energy class A for both cooling and heating, available for use with R410A refrigerant or, in the “A2L” version, with low environmental impact R454B refrigerant. The TSL range is designed to manage the conditioning of industrial plants and thermal loads in technological applications, where 24/7 reliability in all working conditions, one of the assets of these units, is a critically important requirement. The TSL range uses latest generation scroll compressors, shell and tube water heat exchangers optimised for use with high pressure refrigerants (R410A/R454B) and axial fans suitable for outdoor installation.

## Main advantages

### Easy maintenance

To carry out maintenance of the condensing coil manifolds and refrigeration circuit components, which are located behind the electrical panel, the TSL range is supplied as standard with the Hi-Rail sliding guide. This allows the control panel to be easily removed, resulting in extra space for unscheduled maintenance, without impacting the footprint required for normal operation of the unit.



### Reliability: shell and tube

The use of shell and tube heat exchangers with exchange water flow on the shell side implies a lower risk of blocking the flow due to exchanger clogging compared to units with plate heat exchangers. This is thanks to the larger throughsections, the exchanged power being the same. Additionally, the dual-pass heat exchanger ensures high heat exchange efficiency both in “chiller” and in “heat pump” modes, with lower consumption figures for the user.

### Maximised energy efficiency

The units of the TSL range belong to the energy efficiency class A, both in the chilling only version and in the heat pump version. This is thanks to a careful selection of internal components, which also includes the adoption of innovative high efficiency scroll compressors with direct start, permanent magnet motor technology. The high modulation range guaranteed by the multi-scroll technology allows cooling/heating requirements to be met at any time, minimising energy waste and increasing seasonal efficiency.



## Technological components



### Multi-protocol communication interface

HiRef units can be integrated with the customer's external supervision Building Management System (BMS), using the most popular communication protocols, including Modbus RTU, Modbus/IP, BacNet, LonWorks, SNMP.



### Fast restart

The fast restart function (on request) allows the unit to restart quickly after a mains power outage. This optional feature is available with dual power to minimise restart times.



### Corrosion resistant material

The HiRef outdoor units are protected by a metal structure resistant to corrosion and weathering. They are also made of galvanised steel sheet, with epoxy-polyester powder coating, oven-polymerised at 180°C, to offer a C3 degree of protection. On request, it is possible to order specific paint finishing treatments or a metalwork structure built entirely in stainless steel, to obtain a higher degree of protection from high impact adverse weather events.



### Class A

Internal high-tech components suitably chosen and sized allow the units to operate with outstanding levels of efficiency.



### Low GWP refrigerant

The Global Warming Potential (GWP) index is a numerical indicator that identifies the environmental impact of a substance. It measures the extent to which a gas contributes to the greenhouse effect, in relation to carbon dioxide (CO<sub>2</sub>) whose baseline value is equal to 1. This parameter is used to determine the amount in kilograms of CO<sub>2</sub> corresponding to the environmental impact of the release of a refrigerant gas into the atmosphere. The use of low GWP refrigerants, such as R513A, R454B, R1234ze, CO<sub>2</sub>, allows the environmental impact of air conditioning systems to be significantly reduced.



### Scroll compressors

Scroll compressors include a mobile scroll, driven by the motor, which completes orbital revolutions and a fixed scroll that is coupled to it. The orbital motion creates a series of gas pockets that move from one scroll to the other. When moving closer to the centre of the scroll, where exhaust takes place, the gas is compressed to smaller and smaller volumes until the desired delivery pressure is reached. Scroll technology improves volumetric efficiency and flow continuity, reduces noise and leakage and eliminates harmful volumes and downtime.



### Shell and tube heat exchanger

Some chiller and heat pump product ranges are equipped with a shell and tube exchanger. These heat exchangers are ideally suitable for units to be installed in high-tech industrial sites, thanks to their high reliability and operating stability. Their large volumes also make them less sensitive to thermal stress and capable of ensuring unit operation stability. Finally, the dual-pass exchanger configuration allows both cooling and heat pump operation to be optimised. According to the range chosen, it is possible to have either dry expansion tube exchangers or flooded shell and tube exchangers with spray technology.

## Available versions



COOLING ONLY



REVERSIBLE HEAT  
PUMP



FREE-COOLING

## Types of system



AIR/WATER



## Additional benefits

- 3 different soundproofing setups available: Standard, Low Noise and Super Low Noise
- Electric control panel with IP55 protection rating
- Class A units in both chiller and heat pump modes
- Radial EC motor fans (optional)
- Electronic expansion valve
- Easy accessibility thanks to the optimisation of the internal space
- Programmable microprocessor control with proprietary software
- Compliance with ERP regulations

## Technical table

TSL		294FS	324FS	374FS	404FS	454FS	496FS	556FS	596FS	636FS	676FS	748FS	808FS	868FS	900FS				
<b>USER WATER TEMPERATURE 12/7°C 20% ETHYLENE GLYCOL, OUTSIDE AIR 35°C, 40% R.H.</b>																			
<b>COOLING CAPACITY</b>	<b>kW</b>	276.9	319.4	354.2	383.2	422.9	478.9	545.6	585.7	608.1	648.6	725.3	791.8	848.6	910.9				
<b>TOTAL POWER INPUT</b>	<b>kW</b>	89.7	105.8	118.3	129.2	150.4	155.8	179.4	195.8	205.4	221.1	235.4	258.1	270.8	299.7				
<b>EER</b>	-	3.09	3.02	2.99	2.97	2.81	3.07	3.04	2.99	2.96	2.93	3.08	3.07	3.13	3.04				
<b>USER WATER VALUES 12/7°C, 35°C OUTSIDE AIR, 40% U.R.</b>																			
<b>COOLING CAPACITY</b>	<b>kW</b>	281.5	326.1	364.2	396.6	436.1	485.9	549.9	598.9	617.1	658.3	734.3	794.1	861.2	923.2				
<b>TOTAL POWER INPUT</b>	<b>kW</b>	88.7	104.2	117	127.6	148.6	153.7	176.9	193	202.7	218	232.5	254.7	267.6	295.7				
<b>EER</b>	-	3.18	3.13	3.11	3.11	2.93	3.16	3.11	3.1	3.04	3.02	3.16	3.12	3.22	3.12				
<b>SEPR</b>	-	5.46	5.62	5.38	5.49	5.74	5.56	5.64	5.79	5.67	5.75	5.53	5.58	5.65	5.71				
<b>SEER</b>	-	4.9	4.99	4.82	4.87	5.03	5.02	5.09	5.18	5.06	5.14	4.77	4.81	4.88	4.84				
<b>ESEER</b>	-	4.63	4.76	4.56	4.6	4.75	4.66	4.78	4.85	4.72	4.82	4.63	4.58	4.72	4.45				
<b>UTILITY WATER TEMPERATURE 12/7°C, ETHYLENE GLYCOL 20%</b>																			
<b>FULL FREE-COOLING TEMPERATURE</b>	<b>°C</b>	-8.7	-10.4	-6.4	-7.3	-8.6	-6.2	-8.1	-9.2	-6.7	-7.7	-6.8	-8.1	-7.1	-8				
<b>USER WATER VALUES 40/45°C, 7°C OUTSIDE AIR, 89% U.R.</b>																			
<b>THERMAL POWER</b>	<b>kW</b>	291.9	337	390.9	412.9	448.8	504.5	566	603.9	656.7	683.9	776.9	841	883.1	1003.8				
<b>TOTAL POWER INPUT</b>	<b>kW</b>	89.1	102.3	119.2	126	143.4	153.6	173.3	184.1	200.6	213.5	231.3	250.5	267.9	295.1				
<b>COP</b>	-	3.27	3.29	3.28	3.28	3.13	3.28	3.27	3.28	3.27	3.2	3.36	3.36	3.3	3.4				
<b>SEER</b>	-								5.19	5.1	5.2	4.63	4.69	4.73	4.63				
<b>SCOP</b>	-	4.01	4.17	4.1	4.1	4.24	3.82	3.99											
<b>SOUND POWER LEVEL</b>	<b>dB</b>	89		90		92	91	92	91			93			94				
<b>SOUND POWER LEVEL LOW NOISE</b>	<b>dB</b>	86		87		89	87	89	88			90			91				
<b>SOUND POWER LEVEL SUPER LOW NOISE</b>	<b>dB</b>	83		85		86	85	87	86			88		88	89				
<b>DIMENSIONI [LxHxD]</b>	<b>mm</b>	3865x2652x2256			4865x2652x2256			5860x2652x2256			6860x2652x2256			7865x2652x2256			8865x2652x2256		

20% Ethylene glycol | Also available with 60 Hz power supply | Data declared with use of R410A refrigerant

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