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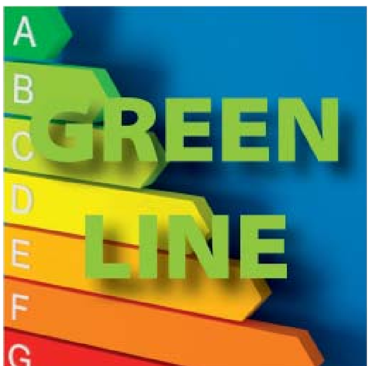
RHOSS

TCHEY-THHEY 115÷240
Low consumption Y-Flow range

Water chillers and heat pumps with reversible cooling cycle with water cooled condensation and R410A refrigerant fluid.
Range with hermetic Scroll compressors.



Contents

General Features

Recommended operating conditions

TCHEY units are packaged water chillers with water-cooled condensation.
THHEY units are packaged heat pumps with reversible cooling cycle and water-cooled evaporation/condensation.

They are designed to be used in air conditioning systems requiring chilled water (TCHEY) or chilled and hot water (THHEY), not for human consumption.
NOTE:
For evaporator outlet water at less than 4°C or geothermal applications with temperatures below 4°C, is MANDATORY when ordering specify the working temperature of the unit (water inlet / outlet condenser and evaporator) to allow a correct set-up of the unit itself.

The units are designed for indoor installation.

The units comply with the following Directives:
- Machinery Directive 2006/42/CE (MD);
- Low Voltage Directive 2006/95/CE (LVD);
- Electromagnetic Compatibility Directive 2004/108/CE (EMC);
- Pressure Equipment Directive 97/23/CEE (PED).

Guide to reading the code

"SERIES" code **"MODEL" code**

T	C	H	E	Y	1	15÷40
Water production unit	Cooling only	Water-cooled condensation	Hermetic scroll compressors	R410A refrigerant fluid	No. of compressors	Approx. cooling capacity (in kW)
	H				**2**	
	Heat pump				No. of compressors	

Available set-ups:

Standard:
Set-up without pump or hydraulic accessories.

Pump:
P1 – Set-up with pump and hydraulic accessories on installation side.
P2 – Set-up with high-head pump and hydraulic accessories on installation side.
PS1 – Set-up with pump regulated by phase cutting on supply side (for geothermal applications on TCHEY and THHEY and DryCooler on TCHEY).

Example: TCHEY 125
- Cold water only unit
- Water-cooled condensation
- 1 hermetic scroll compressor
- Without circulating pump
- R410A refrigerant fluid
- Nominal cooling capacity approx. 25 kW

Control Logic

AdaptiveFunction Plus

TCHEY-THHEY 115÷240 with iDRHOSS control

The new **AdaptiveFunction Plus** adaptive control is an exclusive *RHOSS* patent resulting from a years-long partnership with the *University of Padua*. The algorithm development operations were implemented and validated on units of the Y-Flow range in the *RHOSS* Research & Development Laboratory through numerous test campaigns. The innovative **AdaptiveFunction Plus** control logic allows optimal levels of comfort in all working conditions, and the best possible performance in terms of energy efficiency during seasonal operation. **AdaptiveFunction Plus** means comfort and energy saving!

LOW CONSUMPTION water chillers and heat pumps

The "**Economy**" function of **AdaptiveFunction Plus** combines comfort with reduced energy consumption. By adjusting the set-points, the function optimizes compressor operation according to the actual working conditions.
This makes it possible to achieve considerable seasonal energy savings compared to water chillers and heat pumps of equivalent power governed by traditional control logics.

HIGH PRECISION water chillers and heat pumps

The "**Precision**" function of **AdaptiveFunction Plus** makes it possible to achieve the smallest possible mean deviation, at partial capacities, from the temperature set-point of the water delivered to users.

Guaranteed reliability, even with water in the pipes only

Thanks to the "**Virtual Tank**" function, Y-Flow units with **AdaptiveFunction Plus** can work in systems with low water content (2 litres/kW) even without a water buffer tank, while still ensuring the units' reliability over time and the system's proper operation.

Acquiring system thermal inertia data

Y-Flow units with **AdaptiveFunction Plus** are able to "learn" the characteristics of the thermal inertia regulating the system's dynamics. This is possible thanks to the "**ACM Autotuning**" function, which processes water temperature data and determines the best values for the control parameters.

Continuous system self-diagnosis

The learning function is always active and quickly adapts the control parameters to every change in the water circuit and thus in the system's water content.

Purpose

- To guarantee the unit's optimal operation at all times in the system in which it is installed. ***Advanced adaptive logic.***
- To obtain the best performance from the chiller in terms of energy efficiency at both full and partial capacities. ***Low consumption chiller.***

Operating logic

In general the control logics used on water chillers/heat pumps do not consider the characteristics of the systems in which the units are installed; they are mainly designed to regulate the return water temperature and ensure proper chiller operation, giving less priority to the system's requirements.
The new **AdaptiveFunction Plus** adaptive logic is different in that it is designed to optimize chiller operation on the basis of the system's characteristics and the actual heat load. The controller regulates the delivery water temperature and adjusts itself, as and when required, to the operating conditions, using:

- information on the return and delivery water temperature to estimate the working conditions, thanks to a special mathematical formula;
- a special adaptive algorithm that uses the above estimate to adjust the values and positions of compressor start-up and switch-off thresholds; optimizing compressor start-up ensures a high degree of accuracy on the temperature of the water delivered to users, with small variations around the set-points.

AdaptiveFunction Plus - Main functions

Efficiency or Precision?

Thanks to the advanced control the chiller can be made to run on **two different regulation settings** to obtain either the best performance in terms of energy efficiency (and thus considerable seasonal savings) or maximum accuracy in delivery water temperature:

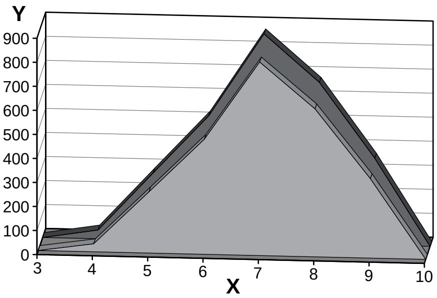
1. Low consumption chiller: "Economy" function

It is well known that chillers work at full capacity for just a very small percentage of their operating time, while they work at partial capacity for most of the season. Therefore, the power they need to supply generally differs from the nominal design power, and operating at partial capacity has a noticeable effect on seasonal energy performance and consumption.

This makes it necessary to run the unit so that it is as efficient as possible at partial capacity. The controller, therefore, ensures that the delivery water temperature is as high as possible (when working in chiller mode) or as low as possible (when working in heat pump mode) compatibly with the actual heat loads, meaning that, unlike traditional systems, the unit works with a sliding scale. This prevents wasting energy in pointlessly maintaining temperatures that are burdensome for the chiller, while ensuring that the ratio between power supplied and energy used is always at an optimum level.

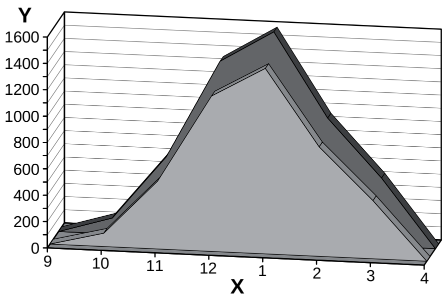
Finally the right level of comfort for everyone!

Summer season: A unit working with a sliding set-point allows seasonal energy savings of about 8% compared to a traditional unit that operates with a fixed set-point.



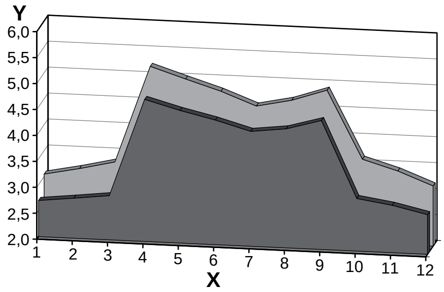
X Year divided into months (1 January, 2 February, etc.).
Y Power consumption (kWh).
Unit with fixed set-point
Unit with sliding set-point

Winter season: A unit working with a sliding set-point allows seasonal energy savings of about 13% compared to a traditional unit that operates with a fixed set-point. Calculations show that seasonal consumption is equivalent to that of a **CLASS A** machine.



X Year divided into months (1 January, 2 February, etc.).
Y Power consumption (kWh).
Unit with fixed set-point
Unit with sliding set-point

Year-round: Efficiency during the annual operation of the unit in heat pump mode. ***AdaptiveFunction Plus***, with the "***Economy***" function, allows the chiller to run on energy-saving programmes while still providing the required level of service.



X Year divided into months (1 January, 2 February, etc.).
Y Energy efficiency kWh supplied/kWh absorbed.
Unit with fixed set-point
Unit with sliding set-point

*Analysis carried out by comparing the operation of a Y-Flow heat pump unit with **AdaptiveFunction Plus** logic working with a fixed set-point (7°C in the summer and 45°C in the winter) or with a sliding set-point (range between 7 and 14 °C in the summer and between 35 and 45°C in the winter) for an office building in Milan.*

PLUS Seasonal Efficiency Index

The University of Padua has developed the ESEER+ seasonal efficiency index which takes into account the adaptation of the chiller's set-points to different partial loads. This index characterizes the seasonal behaviour of a chiller with **Adaptive Function Plus** better than the traditional ESEER index.

The ESEER+ index can therefore be used for a quick evaluation of seasonal energy consumption of units with **Adaptive Function Plus** instead of the more complex analyses on the building/installation system, which are usually difficult to carry out.

Simplified method for calculating energy savings with Adaptive Function Plus

The dynamic analyses used to calculate the energy consumption of chillers in a building/installation system are usually too complicated to use for a quick comparison of different cooling units, since they require a range of data that is not always available.
For a quick estimate of what the energy savings could be with a unit equipped with Adaptive Function Plus software compared, to a machine with traditional control, we suggest using a simplified method based on the following formulae:

$$E = \frac{0.54 \times N \times C}{ESEER+}$$

E	power absorbed by chiller equipped with Adaptive Function Plus software (kWh)
N	number of chiller operating hours
C	nominal cooling capacity of chiller (kW)
ESEER+	average seasonal efficiency of chiller equipped with Adaptive Function Plus software

$$E = \frac{0.54 \times N \times C}{ESEER}$$

E	power absorbed by chiller equipped with Adaptive Function Plus software (kWh)
N	number of chiller operating hours
C	nominal cooling capacity of chiller (kW)
ESEER	European seasonal EER (European average seasonal energy efficiency)

In two units having the same nominal cooling capacity and the same number of working hours but equipped with different controls, the lower the seasonal efficiency the higher the absorbed power. To simplify matters, in the example below a traditional-control Rhoss unit is compared with a unit equipped with Adaptive Function Plus control:

Example:

TCHEY 240 equipped with traditional control:
Nominal cooling capacity = 41.9 kW
N = 8 hours/day x (5 months x 30 days/month) = 1200 hours
ESEER = 6.17

$$E = \frac{0.54 \times 1200 \times 41.9}{6.17} = \mathbf{4400.5\ kW/h}$$

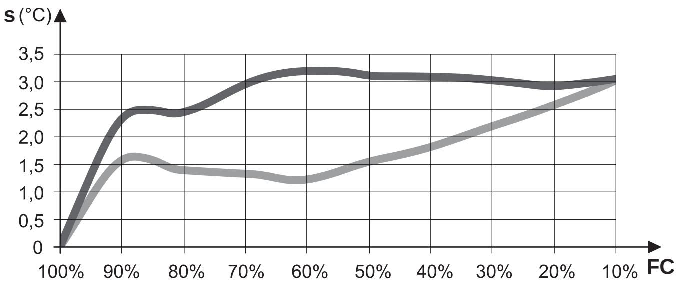
TCHEY 240 equipped with **Adaptive Function Plus** control:
Nominal cooling capacity = 41.9 kW
N = 8 hours/day x (5 months x 30 days/month) = 1200 hours
ESEER+ = 6.91

$$E = \frac{0.54 \times 1200 \times 41.9}{6.91} = \mathbf{3929.3\ kW/h}$$

The energy saved with **Adaptive Function Plus** is therefore **11%**.

2. High precision: "Precision" function

In this operating mode the unit works with a fixed set-point and, thanks to the delivery water temperature control and the advanced control logic, at capacities between 50% and 100% the unit guarantees a mean deviation in delivery water temperature of approximately ± 1.5°C from the set-point, against mean deviations of approximately ±3°C normally achieved by a standard return control.
The "**Precision**" function provides accuracy and reliability in all applications that need a regulator to ensure accurate delivery water temperature and where there are particular requirements of humidity control. However, in process applications it is always advisable to install a water buffer tank in order to provide a larger system water content and greater system thermal inertia.

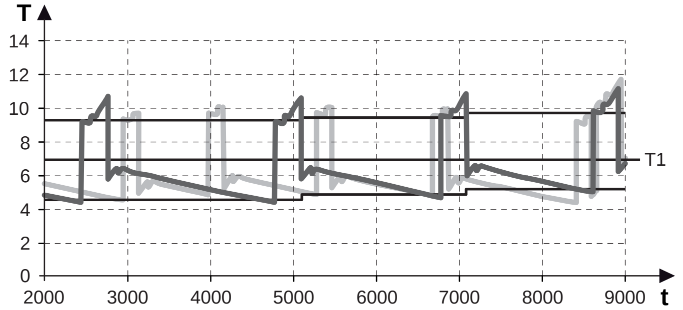


s	Deviation
FC	Capacity
(dark grey)	Unit with water buffer tank, 4 litres/kW in the system and return control.
(light grey)	Unit with water buffer tank, 2 litres/kW in the system and delivery control with **AdaptiveFunction Plus** "***Precision***" function

*The chart shows the deviation of the water temperature from the set-point at various operating capacities, showing how a unit with delivery control and **AdaptiveFunction Plus** "**Precision**" function ensures greater precision in delivery water temperature.*

Virtual Tank: Guaranteed reliability, even with water in the pipes only

Low water content in the system can cause chiller/heat pump units to work inconsistently, causing system instability and poor performance. Thanks to the **Virtual Tank** function, this is no longer a problem. The unit can work in systems with just **2 litres/kW** in the pipes, since the control compensates for the lack of inertia typical of a water buffer tank by damping the control signal, preventing the compressor from switching on and off in an untimely manner and reducing the mean deviation from the set-point value.



T Water temperature (°C)
t Time (s)
T1 Set-point temperature
Delivery temperature with Virtual Tank
Delivery temperature without Virtual Tank

*The chart shows the various chiller outlet temperatures referred to an operating capacity of 80%. We can see how the temperatures of the unit with **AdaptiveFunction Plus** logic and **Virtual Tank** function is far less varied and more stable over time, with average temperatures closer to the working set-point compared to the unit without the **Virtual Tank** function. We can also see how the unit with **AdaptiveFunction Plus** logic and **Virtual Tank** function switches the compressor on less often over the same period of time, with obvious advantages in terms of energy consumption and system reliability.*

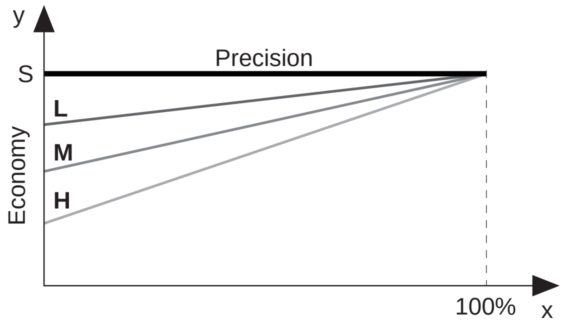
ACM Autotuning compressor management

AdaptiveFunction Plus enables Y-Flow units to adapt to the system they are serving so as to always use the best compressor operating parameters in different working conditions.
During the initial operating phase, the special "**Autotuning**" function enables Y-Flow units with **AdaptiveFunction Plus** to learn the heat inertia characteristics that regulate the system's dynamics. The function, which is automatically activated when the unit is switched on for the first time, performs a number of operating cycles during which it processes the information relative to the water temperatures. It can then estimate the physical characteristics of the system and identify the optimal values for the parameters to use for control functions. In this phase it is normal for the delivery temperature to drop below the set-point even by several degrees, remaining however above the antifreeze set-point.
At the end of the initial self-learning phase, the "**Autotuning**" function remains active, allowing the control parameters to quickly adapt to every change in the water circuit and thus in the system's water content.

Set-point Compensation

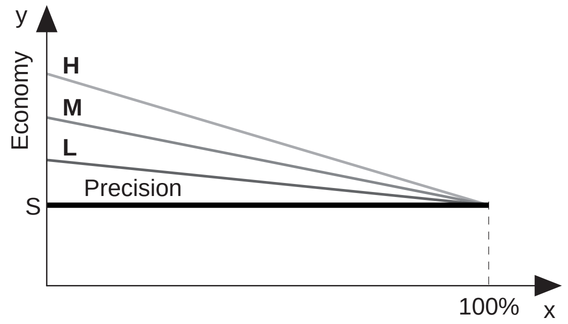
The Economy function allows the chiller to run on energy-saving programmes while still providing the required level of comfort.
This function controls the maximum delivery temperature with sliding set-points, changing the set-point according to the system's actual heat load.
When the summer load decreases, the set-point increases, and when the winter load decreases, the set-point decreases.
This function is intended for cooling applications, and is designed to control energy consumption while always respecting the actual demands on the system's capacity. Within the Economy function it is possible to select one of three different set-point adaptation curves depending on the type of system.

"Economy" function in Winter mode



x	Load percentage (%)
y	Set-point (°C)
S	Set-point entered by user
L	Buildings with very unbalanced loads.
M	Intermediate situation between L and H (default).
H	Buildings with well-distributed loads. High efficiency.

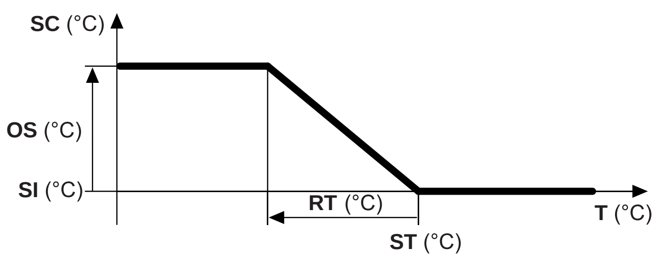
"Economy" function in Summer mode



x	Load percentage (%)
y	Set-point (°C)
S	Set-point entered by user
L	Buildings with highly unbalanced loads.
M	Intermediate situation between L and H (default).
H	Buildings with well-distributed loads. High efficiency.

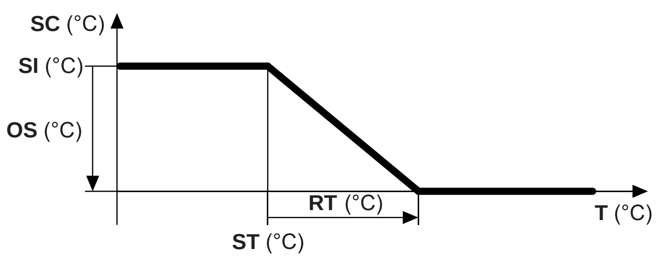
As an alternative to changing the set-point according to the actual load conditions (Economy function), you can choose to compensate the set-point according to the outdoor temperature by installing the KEAP accessory.
This function changes the set-point depending on the temperature of the outdoor air. Based on this value, the set-point is calculated by adding (winter cycle) or subtracting (summer cycle) an offset value to the set-point used (see examples below).
This function is active both in winter mode and summer mode. It can be enabled only if the KEAP accessory is installed.

Winter cycle



OS = 7°C
RT = 25°C
ST = 20°C

Summer cycle



OS = 8°C
RT = 15°C
ST = 15°C

T (°C)	Outdoor air temperature
SC (°C)	Calculated set-point temperature
OS (°C)	Offset set-point (calculated value)
SI (°C)	Entered set-point
RT (°C)	Outdoor air temperature set-point compensation
ST (°C)	Outdoor temperature set-point

The user can decide whether to activate the function in both operating modes or in one only. If set-point compensation to outdoor temperature is enabled, the Economy function will be automatically disabled.
Additionally, set-point compensation can be enabled in one cycle and the Economy function in the other.

Standard Construction Features

○ Structure in galvanized steel sheet painted with RAL 9018, internally lined with sound-absorbing material.
○ Hermetic rotary scroll compressors complete with internal thermal circuit-breaker and casing heater activated automatically at unit switch-off (provided the unit remains powered).
○ Plate type heat-exchangers in stainless steel with closed-cell polyurethane rubber foam insulation, complete with antifreeze heaters.
○ Differential pressure switch on primary heat exchanger for TCHEY models; on primary exchanger and rejection device for THHEY units to protect the unit from interruptions in the water supply.
○ Male-threaded hydraulic connections.
○ Refrigerant circuit made with fine-alloy welded pipes. Complete with: reversing valve (THHEY), filter dryer, thermostatic valve (2 on THHEY models), check valves (THHEY), charging connectors, manually resettable safety pressure switch on high-pressure side, automatically-resetting pressure switch on low pressure side, models 122 to 240 with safety valve(s), sight glass and insulated intake line.
○ Rejection circuit made with fine-alloy welded pipes. Complete with: manual air-relief valve and drain valve.
○ Primary circuit made with fine-alloy welded pipes. Complete with: manual air-relief valve, drain valves.
○ Unit protection rating IP21.
• iDRHOSS compatible, with AdaptiveFunction Plus.
○ Unit fully charged with R410A refrigerant fluid.

Available set-ups

Standard:
Set-up without pump or hydraulic accessories.
Pump:
P1 – Set-up with pump.
P2 – Set-up with high-head pump.
PS1 – Set-up with pump regulated by phase cutting on supply side (for use with geothermal probes on TCHEY and THHEY units and with DryCooler TCHEY units) to control the condensation temperature during summer operation.
The primary circuits on set-ups P1 and P2 include: expansion tank, safety valve (3 barg), water pressure gauge, fill valve, drain valve and manual air-relief valves. Set-up PS1 is complete with drain valve and manual air-relief valves.

Power Panel

Option with iDRHOSS compatible control

○ Power panel accessible through the front panel, conforming with current IEC standards; opened and closed using a specific tool.
○ Complete with:
• electrical wiring set up for supply voltage (400V-3ph+N-50Hz);
• auxiliary power supply 230V-1ph+N-50Hz drawn from main power supply;
• main load-break switch, complete with door interlocking isolator;
• automatic compressor protection switch;
• protection fuse for auxiliary circuit;
• compressor power contactor;
• automatic pump protection switch (for three-phase pump only);
• pump power contactor (for three-phase pump only);
• remote unit controls.
○ Programmable electronic board with microprocessor, controlled by the keypad on the unit.
○ The electronic board performs the following functions:
• regulation and control of delivery water temperature set-points; of cycle inversion (THHEY); of safety timers; of circulation pump; of compressor operation and system pump operation hour counter; of electronic antifreeze protection (automatically enabled at unit switch-off); of the functions governing the operation of single unit components;
• complete unit protection, automatic emergency shutdown and display of any alarms triggered;
• phase sequence monitor protecting the compressor;
• unit protection against low or high phase power supply voltage;
• programmed set-points shown on display; in/out water temperatures shown on display; alarms shown on display; chiller or heat pump operation shown on display;
• self-diagnosis with continuous monitoring of unit operation;
• user interface menu;
• alarm code and description;
• alarm log management (menu protected by factory-set password).
○ The following data are stored for each alarm:
• date and time of intervention (if KSC accessory is installed);
• alarm code and description;
• in/out water temperatures when the alarm was triggered;
• alarm delay time from the switch-on of the connected device;
• compressor status at time of alarm.
○ Advanced functions:
• the water shutoff solenoid completely closes the hydraulic circuit on the supply side when the compressors are switched off, with delays set on the electronic board (when using well water or mains water);
• control of 3-way valve for domestic hot water;
• configured for serial connection (KRS485, KFTT10, KRS232 and KUSB accessories);
• configured for installation of digital input for remote management of double set-point (contact *RHOSS* pre-sales);
• configured for installation of analog input for sliding set-point through a remote 4-20mA signal (contact *RHOSS* pre-sales);
• configured for management of operating times and parameters with programming of daily/weekly operation (KSC accessory);
• check-up and monitoring of scheduled maintenance status;
• computer-assisted unit testing;
• self-diagnosis with continuous monitoring unit operation status.
○ Set-point regulation through ***AdaptiveFunction Plus*** with two options:
• fixed set-point (***Precision*** function);
• sliding set-point (***Economy*** function).

Accessories

Factory-fitted accessories

VP – (For well water or mains water) Pressure valve with water shutoff solenoid (for TCHEY models only) regulating the water flow to the condenser and maintaining a constant condensation pressure; this is generally useful when the unit works with a set point that is greatly inferior to the design value, without adjusting the water flow rate and/or the condenser inlet water temperature to the actual amount of heat to be rejected; when the well water or mains water (if allowed by local regulations) entering the condenser has a temperature below 15°C (the temperature differential ΔT allowed for well water through the condenser is 12÷18°C); when the temperature of the water entering the condenser is below 25°C with ΔT less than 12°C (the temperature differential ΔT allowed for water through the condenser is 5÷15°C) the temperature of the condenser outlet must however not exceed 55°C (see *Operating Limits*).
The water shutoff solenoid completely closes the hydraulic circuit on the supply side when the compressors are switched off, with delays set on the electronic board (when using well water or mains water).
WARNING: TCHEY units equipped with a KFRC accessory and a condensation pressure valve require using the VPS accessory for TCHEY units (configured for a bypass valve) instead of the VP accessory.
VPS – (For well water or mains water) Pressure valve with water shutoff solenoid and hydraulic bypass solenoid valve (for THHEY models only). Hydraulic solenoid valve installed in hydraulic parallel to pressure valve (see VP accessory). In chiller mode the solenoid valve is closed, allowing the condensation water to pass through the pressure valve which then performs its function of flow rate regulation. In heat pump mode the solenoid valve is completely open (this offsets the function of the pressure valve).
The water shutoff solenoid completely closes the hydraulic circuit on the supply side when the compressors are switched off, with delays set on the electronic board (when using well water or mains water).
HPH – The HPH accessory can be installed only on versions without a circulating pump (both on user and rejection side) and without the VP-VPS accessory. Set-up for operation of cooling-only units (TCHEY) as heat pumps by inverting the water circuit for the production of hot water for civil or industrial use.
DSP – Double set-point via digital accept signal (not compatible with CS accessory) with ***Precision*** function. Handled as a special feature by our pre-sales office.
CS – Sliding set-point via 4-20 mA analog signal (not compatible with DSP and KEAP accessories) with Precision function. Handled as a special feature by our pre-sales office.
SFS – Soft-Start device.
SIL – Low-noise set-up with double sound-absorbing lining.

Accessories supplied separately

KVDEV – 3-way diverter valve for managing the production of domestic hot water.
KFRC – Free-Cooling kit. Free-cooling module works only when compressors are off.
Free-Cooling directly utilizes the cooling energy available in the ground (well water or mains water, where allowed) for summer air-conditioning (typically radiant). The kit consists of a plate-type heat exchanger and a 3-way diverter valve connected as shown in the diagrams attached. The device is sized to work with a maximum water temperature of 16.5°C (supply); it can be switched on automatically or manually at unit start-up, typically to integrate summer radiant temperature. It requires mounting a Y filter on the inlet, both on the supply side and the installation side. This accessory is not a circuit breaker; it is important to make sure that the supply water is clean.
See the tables attached for information on pressure drops.
KSA – Rubber anti-vibration mountings.
KFA – Water filter.
KTR – Remote control keypad, with backlit LCD (same functions as the keypad on the unit).
KRIT – Supplementary electric heater for heat pump, controlled by adjustment settings.
KEAP – External air probe for set-point compensation (not compatible with CS accessory).
KSC – Clock card for displaying date/time and setting the unit's daily/weekly start/stop times, if necessary changing the set-points using the KTR keypad.
KRS232 – RS485/RS232 serial converter for interconnection between RS485 serial network and supervision systems, with serial connection to PC via RS232 serial port (RS232 cable supplied).
KUSB – RS485/USB serial converter for interconnection between RS485 serial network and supervision systems, with serial connection to PC via USB port (USB cable supplied).
KRS485 – RS485 serial interface card to create interconnection networks between cards (max. 200 units at max. distance of 1000 m) and building automation, external supervision systems or *RHOSS* supervision systems (supported protocols: proprietary protocol; Modbus® RTU).
KFTT10 – FTT10 serial interface card for connection to supervision systems (LonWorks® system compliant with Lonmark® 8090-10 protocol with chiller profile).
KISI – CAN bus serial interface (Controller Area Network compatible with advanced ***iDRHOSS*** hydronic system for integrated comfort control (protocol supported: CanOpen®).
KMDM – GSM 900-1800 modem kit to be connected to the unit for remote control of parameters or alarm signals. The kit consists of a GSM modem with relative RS232 card.
Requires purchasing a SIM data card, not supplied by *RHOSS*.
KRS – *RHOSS* supervision software for remote unit monitoring and management. The kit consists of a CD-Rom and a dongle.

None of the following set-ups or accessories can be used or installed with any other of them: PS1, HPH, KFRC; VP, VPS and HPH.

Technical Data

Table "A": Technical Data

TCHEY model		**115**	**118**	**122**	**125**	**230**	**240**
Nominal cooling capacity (¹)	kW	15,58	18,49	22,83	26,36	30,58	41,89
Power consumption at condenser (¹)	kW	18,7	21,8	27,1	31,2	36,9	49,6
E.E.R. (¹)		4,87	5,43	5,19	5,37	4,7	5,3
E.S.E.E.R.		5,71	6,18	6,10	6,15	5,51	6,17
E.S.E.E.R.+		6,28	6,80	6,77	6,83	6,17	6,91
Nominal evaporator flow rate (¹)	l/h	2679	3180	3927	4534	5260	7205
Nominal evaporator pressure drop (¹)	kPa	16	18	17	16	20	20
Nominal pump external static pressure at evaporator (¹) (P1)	kPa	84	79	75	110	98	101
Nominal pump external static pressure at evaporator (¹) (P2)	kPa	157	141	163	135	119	127
Nominal condenser flow rate (¹)	l/h	3216	3751	4661	5366	6346	8531
Nominal condenser pressure drop (¹)	kPa	19	23	21	20	24	25
Nominal external static pressure at condenser with pump at full speed (¹) (PS1)	kPa	56	39	123	112	93	100
Nominal cooling capacity (5)	kW	22,17	25,88	31,80	36,67	43,50	59,06
Nominal evaporator flow rate (5)	l/h	3813	4451	5470	6307	7482	10158
Nominal evaporator pressure drop (5)	kPa	28	33	32	30	36	37
Nominal pump external static pressure at evaporator (5) (P1)	kPa	66	56	50	73	47	49
Nominal pump external static pressure at evaporator (5) (P2)	kPa	112	85	125	76	74	87
Power consumption at condenser (5)	kW	25,4	29,3	36,3	41,8	50	67,3
Nominal condenser flow rate (5)	l/h	4364	5040	6244	7190	8600	11576
Nominal condenser pressure drop (5)	kPa	31	37	36	33	40	42
Nominal external static pressure at condenser with pump at full speed (5) (PS1)	kPa	20	-	86	65	35	36
E.E.R. (5)		6,69	7,31	6,85	6,99	6,46	6,55
Scroll/step compressor	no.	1/1	1/1	1/1	1/1	2/2	2/2
Circuits	no.	1	1	1	1	1	1
Low-noise set-up sound power level (6) (¹)	dB(A)	53	53	57	58	59	62
Standard unit sound power level (6) (¹)	dB(A)	58	58	62	63	64	67
Water content of heat exchangers (condenser/evaporator)	l	1,6	1,6	2,2	2,6	2,8	3,7
R410A refrigerant charge		See serial no. plate					
Polyester oil charge		See compressor plate					

Electrical Data							
Absorbed power (¹)	kW	3,20	3,40	4,40	4,90	6,50	7,90
Absorbed power (5)	kW	3,30	3,54	4,64	5,20	6,70	8,40
Circulating pump absorbed power (P1)	kW	0,40	0,40	0,40	0.75	0,75	0,75
Circulating pump absorbed power (P2)	kW	0,55	0,55	0,37	0,37	1,12	1,12
Circulating pump absorbed power at max. speed (PS1)	kW	0,40	0,40	0,75	0,75	0,75	0,75
Electrical power supply	V-ph-Hz	400-3+N-50					
Auxiliary power supply	V-ph-Hz	230-1-50					
Circulating pump absorbed current (P1)	A	1,5	1,5	1,5	1,9	1,9	1,9
Circulating pump absorbed current (P2)	A	2,5	2,5	3	3	2,2	2,2
Circulating pump absorbed current at max. speed (PS1)	A	1,5	1,5	1,85	1,85	1,85	1,85
Nominal current (without circulating pump) (¹)	A	5,7	5,9	8,7	9,1	11,5	13,9
Max. current (without circulating pump)	A	9,4	10,2	14,3	15,2	18,8	24,2
Starting current	A	64	64	101	95	74	87

Dimensions							
Width (L)	mm	700	700	700	700	700	700
Height (H)	mm	1100	1100	1100	1100	1100	1100
Depth (P)	mm	560	560	780	780	780	780
Water connections	Ø	1-1/2"GM					

(1) In the following conditions: water temperature at condenser inlet/outlet 30-35°C; chilled water outlet temperature 7°C; temperature differential at evaporator 5°C.

(5) In the following conditions: water temperature at condenser inlet/outlet 30-35°C; chilled water outlet temperature 18°C; temperature differential at evaporator 5°C.

(6) Total sound power level in dB(A) measured in accordance with standard ISO 3744 and Eurovent 8/1. Noise data refers to pumpless units.

E.S.E.E.R. European Seasonal EER (European average seasonal energy efficiency).
E.S.E.E.R. + with AdaptiveFunction Plus logic.

Note:
The pumps' available static pressure and the exchangers' pressure drops are obtained from the charts on page 21.

Power consumption data does not take into account pump consumption (unless stated otherwise).

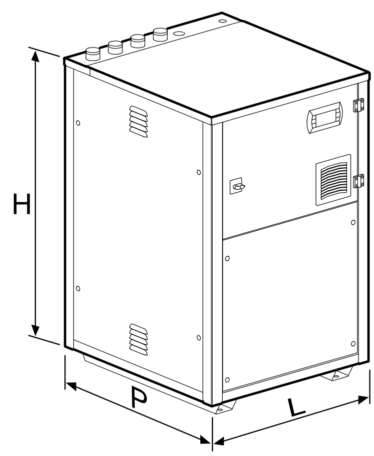


Table "B": Technical Data

THHEY model		115	118	122	125	230	240
Nominal heating capacity (²)	kW	17,31	20,07	24,96	28,76	35,73	44,91
Nominal cooling capacity (¹)	kW	13,98	16,42	20,06	23,16	27,44	36,02
Nominal cooling capacity (5)	kW	19,89	22,98	27,94	32,21	39,02	50,78
E.E.R. (¹)		3,88	4,23	4,23	4,26	3,87	4,16
E.E.R. (5) (*)		5,53	5,50	5,41	5,38	5,46	5,31
E.S.E.E.R.		5,00	5,37	5,26	5,38	5,55	5,60
E.S.E.E.R.+		5,50	5,91	5,84	5,97	6,22	6,27
C.O.P. (²)		4,47	4,65	4,56	4,65	4,53	4,53
Heating capacity (³)	kW	18,50	21,36	26,50	30,64	38,29	47,72
C.O.P. (³)		5,79	6,20	6,11	6,23	5,94	6,05
Heating capacity (geothermal) (4)	kW	14,10	16,10	19,50	22,50	28,60	35,40
Cooling capacity (4)	kW	11,00	12,71	15,52	17,84	22,3	27,93
C.O.P. (geothermal) (4)		4,41	4,60	4,76	4,69	4,40	4,60
Nominal condenser flow rate (²)	l/h	2977	3452	4293	4946	6145	7724
Nominal condenser pressure drop (²)	kPa	22	28	23	23	39	28
Nominal pump external static pressure at condenser (²) (P1)	kPa	76	67	67	97	75	85
Nominal pump external static pressure at condenser (²) (P2)	kPa	142	121	151	116	97	115
Nominal evaporator flow rate (²)	l/h	2965	3553	4390	5065	5794	8057
Nominal evaporator pressure drop (²)	kPa	19	22	21	20	23	25
Nominal evaporator flow rate (¹)	l/h	2404	2824	3450	3983	4720	6195
Nominal evaporator pressure drop (¹)	kPa	13	14	14	13	16	15
Nominal pump external static pressure at evaporator (¹) (P1)	kPa	89	85	82	119	109	115
Nominal pump external static pressure at evaporator (¹) (P2)	kPa	167	155	174	151	128	137
Nominal condenser flow rate (¹)	l/h	3005	3472	4243	4891	5903	7639
Nominal condenser pressure drop (¹)	kPa	16	19	17	16	20	20
Nominal condenser flow rate (³)	l/h	3182	3674	4558	5270	6586	8208
Nominal condenser pressure drop (³)	kPa	24	32	25	26	34	31
Nominal pump external static pressure at condenser (³) (P1)	kPa	73	63	63	91	64	80
Nominal pump external static pressure at condenser (³) (P2)	kPa	134	111	145	106	88	109
Nominal evaporator flow rate (³)	l/h	4085	4837	5966	6907	7982	11046
Nominal evaporator pressure drop (³)	kPa	34	39	37	35	41	44
Nominal condenser flow rate (4)	l/h	2425	2769	3354	3870	4919	6088
Nominal condenser pressure drop (4)	kPa	15	19	14	15	20	18
Nominal evaporator flow rate (4)	l/h	3438	3973	4854	5580	6971	8734
Nominal evaporator pressure drop (4)	kPa	27	29	26	24	34	30
Nominal external static pressure at evaporator with pump at full speed (4) (PS1)	kPa	43	25	110	97	63	86
Nominal evaporator flow rate (5)	l/h	3421	3952	4806	5540	6711	8734
Nominal evaporator pressure drop (5)	kPa	22	26	25	23	29	27
Nominal pump external static pressure at evaporator (5) (P1)	kPa	74	67	62	91	68	78
Nominal pump external static pressure at evaporator (5) (P2)	kPa	129	109	142	103	92	109
Power consumption at condenser (5)	kW	23,28	26,90	32,78	37,85	45,69	59,71
Nominal condenser flow rate (5)	l/h	4003	4627	5638	6509	7859	10271
Nominal condenser pressure drop (5)	kPa	26	31	29	27	34	33
Scroll/step compressor	no.	33	10	102	85	55	68
Nominal external static pressure at evaporator with pump at full speed (5) (PS1)	kPa	1/1	1/1	1/1	1/1	2/2	2/2
Circuits	no.	1	1	1	1	1	1
Low-noise set-up sound power level (6) (¹)	dB(A)	53	53	57	58	59	62
Standard unit sound power level (6) (¹)	dB(A)	58	58	62	63	64	67
Water content of heat exchangers (condenser/evaporator)	l	1,6	1,6	2,2	2,6	2,8	3,7
R410A refrigerant charge		See serial no. plate					
Polyester oil charge		See compressor plate					

Electrical Data		**115**	**118**	**122**	**125**	**230**	**240**
Absorbed power (¹)	kW	3.60	3.88	4.75	5.44	7.09	8.65
Absorbed power (²)	kW	3.87	4.31	5.48	6.19	7.89	9.92
Absorbed power (³)	kW	3.19	3.44	4.34	4.92	6.45	7.89
Absorbed power (⁴)	kW	3.20	3.50	4.10	4.80	6.50	7.70
Absorbed power (⁵)	kW	3.49	4.04	4.99	5.81	6.88	9.21
Circulating pump absorbed power (P1)	kW	0.40	0.40	0.40	0.75	0.75	0.75
Circulating pump absorbed power (P2)	kW	0.55	0.55	0.37	0.37	1.12	1.12
Circulating pump absorbed power at max. speed (PS1)	kW	0.40	0.40	0.75	0.75	0.75	0.75
Electrical power supply	V-ph-Hz	400-3+N-50					
Auxiliary power supply	V-ph-Hz	230-1-50					
Circulating pump absorbed current (P1)	A	1.5	1.5	1.5	1.9	1.9	1.9
Circulating pump absorbed current (P2)	A	2.5	2.5	3	3	2.2	2.2
Circulating pump absorbed current at max. speed (PS1)	A	1.5	1.5	1.85	1.85	1.85	1.85
Nominal current (¹) (without circulating pump)	A	6.1	6.4	9.3	9.8	12.2	14.9
Nominal current (²) (without circulating pump)	A	7.1	7.6	10.7	11.1	14.2	17.5
Max. current (without circulating pump)	A	9.4	10.2	14.3	15.2	18.8	24.2
Starting current	A	64	64	101	95	74	87
Dimensions							
Width (L)	mm	700	700	700	700	700	700
Height (H)	mm	1100	1100	1100	1100	1100	1100
Depth (P)	mm	560	560	780	780	780	780
Water connections	Ø	1-½"GM					

(1) In the following conditions: water temperature at condenser inlet/outlet 30-35°C; chilled water outlet temperature 7°C; temperature differential at evaporator 5°C.

(2) In the following conditions: water temperature at condenser inlet/outlet 40-45°C; evaporator inlet water temperature 10°C at same flow rate of summer operation.

(3) In the following conditions: water temperature at condenser inlet/outlet 35-30°C; evaporator inlet water temperature 10°C at same flow rate of summer operation.

(4) In the following conditions: water temperature at condenser inlet/outlet 30-35°C; evaporator inlet/outlet water temperature 0/-3°C with 30% glycol.

(5) In the following conditions: water temperature at condenser inlet/outlet 30-35°C; chilled water outlet temperature 18°C; temperature differential at evaporator 5°C.

(6) Total sound power level in dB(A) measured in accordance with standard ISO 3744 and Eurovent 8/1. Noise data refers to pumpless units.

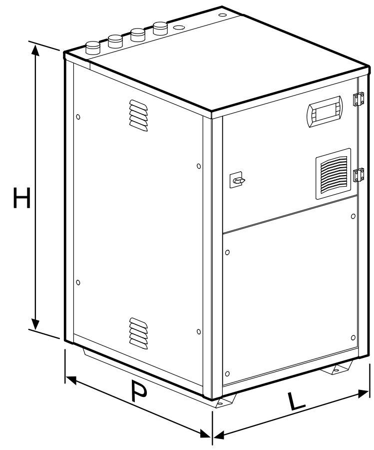
(*) Energy indices for standard set-ups calculated in accordance with standard EN 14511:2004; in the conditions prescribed by the Financial Act (D.M. 6 August 2009) for the Italian market.

E.S.E.E.R. European Seasonal EER (European average seasonal energy efficiency).
E.S.E.E.R. + with AdaptiveFunction Plus logic.

The pumps' available static pressure and the exchangers' pressure drops are obtained from the charts on page 24.

The calculations for the E.E.R. and C.O.P. indices do not take into account pump consumption (unless stated otherwise).

Power consumption data does not take into account pump consumption (unless stated otherwise).



Energy efficiency at partial loads - ESEER index

○ The E.E.R. index represents an estimate of the cooling unit's energy efficiency under nominal design conditions. In reality, the operating time of a chiller in nominal conditions is usually less than the operating time in partial load conditions.
○ The E.S.E.E.R. (European Seasonal E.E.R.) is an index that estimates the cooling unit's average seasonal energy efficiency in four load and water temperature conditions. In general, two water chillers with the same E.E.R. may have different E.S.E.E.R. values. In a water-cooled chiller the average energy efficiency depends both on design and on the temperature of the inlet water at the condensing heat exchanger.
○ The E.S.E.E.R. energy index introduced by the European Community (Project E.E.C.C.A.C. - Energy Efficiency and Certification of Central Air Conditioners) is characterized by water temperature (see Table "**C**") and by the energy weights assigned to the four load conditions considered in the calculation: 100%, 75%, 50% and 25%.

$$ESEER = \frac{3xEER_{100\%} + 33xEER_{75\%} + 41xEER_{50\%} + 23xEER_{25\%}}{100}$$

where EER100%, EER75%, EER50% and EER25% are the efficiencies of the cooling unit in the four load conditions at the temperatures indicated in Table "**C**".
The data is calculated using the Eurovent method. The power consumption of the circulation pump (if present) is not considered.

Table "C": Load and temperature conditions

	Inlet water temperature at condenser
Load	**E.S.E.E.R.**
100%	30°C
75%	26°C
50%	22°C
25%	18°C

○ Table "**D**" shows the E.E.R. and E.S.E.E.R. values for each model. The high values of energy efficiency at partial loads were achieved thanks to optimization of the heat exchangers.

Table "D": EER – ESEER for TCHEY

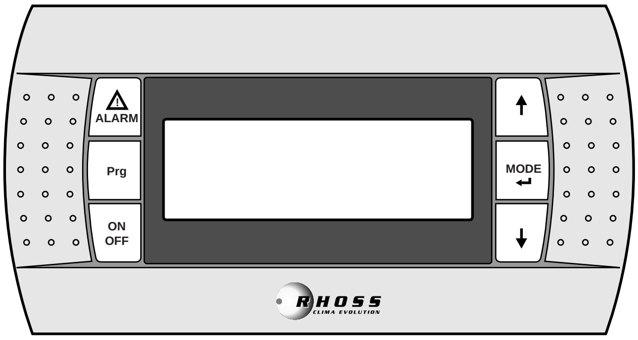
Model	E.E.R.	E.S.E.E.R.
115	4.56	5.71
118	5.02	6.18
122	4.86	6.10
125	4.95	6.15
230	4.41	5.51
240	4.95	6.17

Table "E": EER – ESEER for THHEY

Model	E.E.R.	E.S.E.E.R.
115	3.88	5.00
118	4.23	5.37
122	4.23	5.26
125	4.26	5.38
230	3.87	5.55
240	4.16	5.60

Electronic control

The keyboard/display shows the operating temperature and all the unit's process variables, as well as providing access to setting parameters for the working set-points and allowing their modification. For purposes of technical assistance, it allows password-protected access to the unit's management parameters (access for authorized personnel only).



DISPLAY
Displays the numbers and values of all the parameters (i.e. outlet water temperature etc.), any alarm codes and the current status of all the resources available by means of strings.

ALARM key
Displays the alarm codes and resets the alarms.

PRG key
Lets you programme the unit's main operating parameters.

ON/OFF key
Switches the unit on and off.

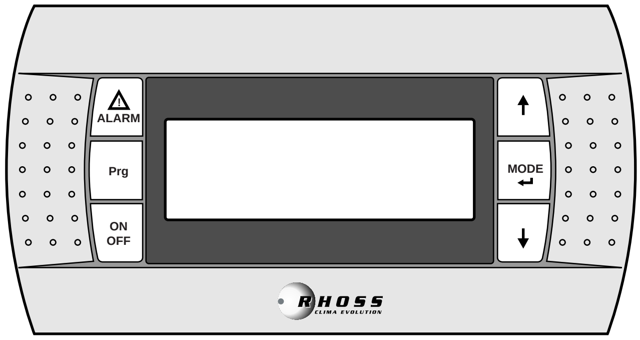
UP key
Lets you scroll through the list of parameters, statuses and alarms and change the set-points.

MODE - ENTER key
Switches from chiller to heat pump operation and vice versa.

DOWN key
Lets you scroll through the list of parameters, statuses and alarms and change the set-points.

KTR – Remote keypad for iDRHOSS compatible control

The remote keyboard/display (KTR) allows the remote control and viewing of all of the unit's digital and analog process variables. This makes it possible to control all the unit's functions directly inside the room. It also allows setting and managing the time periods (if the KSC accessory is installed).



DISPLAY
Displays the numbers and the values of all the parameters (i.e. outlet water temperature etc.), any alarm codes and the current status of all the resources available by means of strings.

ALARM key
Displays the alarm codes and resets the alarms.

PRG key
Lets you programme the unit's main operating parameters.

ON/OFF key
Switches the unit on and off.

UP key
Lets you scroll through the list of parameters, statuses and alarms and change the set-points.

MODE - ENTER key
Switches from chiller to heat pump operation and vice versa.

DOWN key
Lets you scroll through the list of parameters, statuses and alarms and change the set-points.

Note:
The simultaneous presence of both devices (on-board keypad and remote keypad) will cause the on-board terminal to be disabled.

Serial Connection

Serial connection for iDRHOSS compatible control

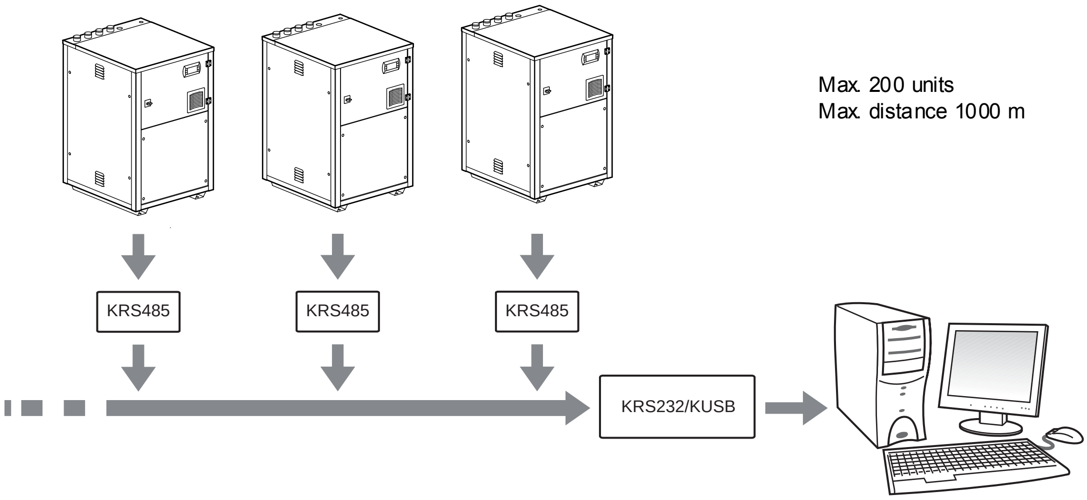
All units are equipped with an electronic controller set up to interface with an external BMS via a serial communication line by means of the KRS485 serial interface accessory (proprietary protocol or ModBus® RTU) and the following converters:

- **KRS232** – RS485/RS232 converter for connection to supervision systems;
- **KUSB –** RS485/USB converter for connection to supervision systems.
- A FTT10 LonWorks® compatible interface is also available.

Supervision

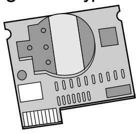
In general, a supervision system allows access to all unit functions, such as:

- making all the settings that can be accessed through the keypad;
- viewing all process variables of the inputs and outputs, whether digital or analog;
- viewing any alarm codes that may have been activated, and resetting them as necessary.



KSC – Clock card

The clock card (KSC)helps you use the unit flexibly and efficiently. It displays the date/time and lets you set daily or weekly start/stop time periods, as well as changing the set-points. The time periods are set and managed using the keypad.



Data displayed (example)

Performance

Selecting a chiller or heat pump and using the performance tables

○ Table “**E**” provides, for each model, the cooling capacity (**QF**), the total absorbed electric power (**P**) and the heating capacity to be rejected (**QT**), based on the condenser and evaporator outlet water temperatures, with constant temperature differential **ΔT** = 5°C. **QT** is also the value of the heating capacity available for use in the winter cycle.

○ Table “**H**” provides, for each model in the summer cycle, the values **QF**, **P** and **QT**, based on the well or mains water temperature at the outlet of the condenser, with temperature differential **ΔT** = 12°C, and on the evaporator outlet delivery water temperature, with temperature differential **ΔT** = 5°C.

○ Within the operating limits, the values in tables “**E**” and “**H**” allow interpolations of performance, although extrapolations are not allowed.

○ Tables “**F**”, “**G**” and “**I**” show the performance correction coefficients for varying temperature differentials **ΔT** between water inlet and outlet at the exchangers.

○ Table “**M**” shows the values of the correction coefficients to be applied to the nominal values if glycol is added to the water.

○ Graph “**1**” shows the pressure drops on the exchangers (with respect to the temperature differentials indicated).

○ Graph “**2**” shows the residual static pressure of the circulating pump(s) (if present).

○ Tables “**L**” and “**L1**” show the octave-band and total values of the sound power levels of each model, in their basic and low-noise versions.

Example

○ Design conditions for a water cooled chiller:

- Required cooling capacity = 33,8 kW;
- Temperature of water produced at evaporator = 10°C;
- Temperature differential **ΔT** at evaporator = 5°C;
- Condenser inlet temperature = 30°C.

Using the values given in Table “**E**” and assuming a temperature differential **ΔT**=5°C at the condenser, the TCHEY model 230 meets the requirements when:
QF=33,9 kW; **P**=6,9 kW;
QT=40,5 kW.
The water flow rates, **G**, to be sent to the exchangers are obtained from the following formulae:
G (l/h) evaporator =
(**QF**x860)÷**ΔT**=(33,9x860)÷5=5831 (l/h);
G (l/h) condenser =
(**QT**x860)÷**ΔT**=(40,5x860)÷5=6966 (l/h).
Graph “**1**” provides the values of the pressure drops Δpw on the evaporator and the condenser, respectively:
Δpw evaporator = 25 kPa;
Δpw condenser = 27,5 kPa.
To reduce the water flow rate to the condenser it is necessary to increase the temperature differential **ΔT**. Therefore, assuming a **ΔT** at the condenser of 10°C, with the same condenser outlet water temperature **Tuc** = 35°C, the new condenser inlet water temperature is:
Condenser inlet temperature =
35°C –10°C = 25°C.
We can then apply correction coefficients **kct QF** and **kct P** from Table “**F**” to calculate the new values for **QFI**, **PI** and hence QTI:
QFI=**QF** x **kct** **QF**=33,9x1,016=34,44 kW;
PI=**P** x **kct** **P**=6,90x0,969=6,68 kW;
QTI=**QFI**+(**PI**x0,97)=34,44+(6,68x0,97)=40,91 kW.
The new water flow rates, G, to be sent to the exchangers are obtained using the following formulae:
GI (l/h) evaporator =
(34,44x860)÷5=5924 (l/h);
GI (l/h) condenser =
(40,91x860)÷10=3518 (l/h).
The new pressure drops can be obtained using the following simplified formulae:
ΔpwI evaporator =
Δpw x (**GI**÷**G**)²= 25x(5924÷5831)²=25,8 kPa;
ΔpwI condenser =
Δpw x (**GI**÷**G**)²= 27,5x(3518÷6966)²=7,0 kPa.

Performance Data

Table "E": TCHEY performance data in cooling mode (ΔT = 5°C at condenser; ΔT = 5°C at evaporator)

Model	Tue (°C)	Tuc (°C)																	
		30			35			40			45			50			55		
		QF	QT	P	QF	QT	P	QF	QT	P	QF	QT	P	QF	QT	P	QF	QT	P
		kW	kW	kW	kW	kW	kW	kW	kW	kW	kW	kW	kW	kW	kW	kW	kW	kW	kW
115	-8	9,2	12,0	2,9	8,8	11,9	3,3	8,1	11,8	3,8	-	-	-	-	-	-	-	-	-
	-6	10,0	12,8	2,8	9,5	12,6	3,3	8,4	12,0	3,8	8,4	12,6	4,3	-	-	-	-	-	-
	-3	11,2	14,0	2,8	10,6	13,8	3,2	10,0	13,6	3,7	8,8	12,9	4,3	-	-	-	-	-	-
	1	13,0	15,7	2,8	12,4	15,5	3,2	11,6	15,2	3,7	10,8	14,9	4,2	9,4	14,1	4,9	-	-	-
	5	15,4	18,1	2,8	14,6	17,7	3,2	13,7	17,3	3,7	12,2	16,3	4,2	12,2	17,0	4,9	12,2	17,6	5,6
	7	16,5	19,2	2,8	15,6	18,7	3,2	14,7	18,2	3,7	13,7	17,8	4,2	12,6	17,3	4,9	12,6	18,0	5,6
	10	18,2	20,9	2,8	17,3	20,4	3,2	16,2	19,8	3,7	15,2	19,3	4,2	14,0	18,7	4,8	13,2	18,5	5,5
	13	20,1	22,8	2,8	19,0	22,2	3,2	17,9	21,5	3,7	16,7	20,9	4,3	15,5	20,2	4,8	-	-	-
	16	22,0	24,8	2,8	20,9	24,1	3,3	19,7	23,3	3,8	18,4	22,6	4,3	17,1	21,8	4,8	-	-	-
	18	23,4	26,2	2,9	22,2	25,4	3,3	20,9	24,6	3,8	19,6	23,8	4,3	18,2	22,9	4,8	-	-	-
	23	27,0	29,9	3,0	25,6	28,9	3,4	24,2	27,9	3,9	22,7	26,9	4,3	21,2	25,8	4,8	-	-	-
118	-8	11,0	13,8	2,9	10,4	13,4	3,2	9,0	12,4	3,5	-	-	-	-	-	-	-	-	-
	-6	11,9	14,7	2,9	11,2	14,3	3,2	10,5	13,9	3,5	9,2	13,0	3,9	-	-	-	-	-	-
	-3	13,3	16,2	3,0	12,6	15,8	3,2	11,8	15,3	3,6	10,9	14,7	3,9	-	-	-	-	-	-
	1	15,4	18,4	3,0	14,7	17,9	3,3	13,8	17,3	3,6	12,8	16,7	4,0	11,7	16,0	4,4	-	-	-
	5	18,2	21,2	3,1	17,3	20,6	3,4	16,3	19,9	3,7	15,2	19,2	4,1	14,1	18,4	4,5	13,0	17,9	5,0
	7	19,4	22,4	3,1	18,5	21,8	3,4	17,5	21,1	3,7	16,4	20,4	4,1	15,1	19,5	4,5	13,4	18,2	5,0
	10	21,3	24,4	3,1	20,4	23,7	3,4	19,3	23,0	3,8	18,2	22,2	4,2	16,8	21,3	4,6	15,4	20,3	5,0
	13	23,4	26,5	3,2	22,4	25,8	3,5	21,2	24,9	3,8	20,0	24,0	4,2	18,6	23,1	4,6	-	-	-
	16	25,5	28,7	3,2	24,4	27,9	3,5	23,2	27,0	3,9	21,9	26,0	4,2	20,4	24,9	4,7	-	-	-
	18	27,0	30,2	3,2	25,9	29,3	3,5	24,6	28,4	3,9	23,2	27,4	4,3	21,7	26,3	4,7	-	-	-
	23	30,9	34,1	3,3	29,7	33,2	3,6	28,3	32,1	3,9	26,7	30,9	4,3	25,0	29,6	4,7	-	-	-
122	-8	13,8	17,4	3,7	13,1	17,0	4,1	12,3	16,8	4,7	-	-	-	-	-	-	-	-	-
	-6	14,9	18,5	3,7	14,1	18,1	4,1	13,2	17,8	4,7	12,3	17,6	5,5	-	-	-	-	-	-
	-3	16,6	20,2	3,7	15,7	19,8	4,2	14,8	19,4	4,8	13,8	19,1	5,5	-	-	-	-	-	-
	1	19,1	22,8	3,8	18,2	22,3	4,3	17,1	21,8	4,8	16,0	21,3	5,5	14,8	20,9	6,2	-	-	-
	5	22,4	26,2	3,9	21,3	25,6	4,4	20,1	24,9	4,9	18,8	24,2	5,5	17,4	23,4	6,2	15,9	22,7	7,0
	7	23,9	27,8	3,9	22,8	27,1	4,4	21,5	26,3	4,9	20,1	25,5	5,5	18,6	24,7	6,2	17,1	23,8	7,0
	10	26,3	30,2	4,0	25,1	29,4	4,5	23,7	28,5	5,0	22,2	27,6	5,6	20,7	26,7	6,2	18,9	25,7	7,0
	13	28,8	32,8	4,1	27,5	31,9	4,5	26,0	30,9	5,0	24,4	29,9	5,6	22,8	28,9	6,3	-	-	-
	16	31,4	35,5	4,2	30,1	34,5	4,6	28,5	33,4	5,1	26,8	32,3	5,7	25,0	31,2	6,4	-	-	-
	18	33,3	37,4	4,2	31,8	36,3	4,6	30,2	35,2	5,2	28,5	34,0	5,7	26,6	32,8	6,4	-	-	-
	23	38,2	42,3	4,3	36,5	41,1	4,8	34,7	39,8	5,3	32,8	38,5	5,9	30,7	37,1	6,6	-	-	-
125	-8	16,0	19,9	4,0	15,0	19,4	4,5	14,0	19,0	5,2	-	-	-	-	-	-	-	-	-
	-6	17,3	21,2	4,1	16,3	20,7	4,6	15,2	20,2	5,2	14,0	19,8	5,9	-	-	-	-	-	-
	-3	19,3	23,3	4,1	18,3	22,8	4,6	17,1	22,2	5,2	15,9	21,6	6,0	-	-	-	-	-	-
	1	22,2	26,3	4,2	21,1	25,7	4,7	19,8	25,0	5,3	18,4	24,3	6,0	17,0	23,6	6,8	-	-	-
	5	26,0	30,2	4,3	24,7	29,4	4,8	23,3	28,6	5,4	21,7	27,7	6,1	20,0	26,7	6,9	18,1	25,6	7,8
	7	27,8	32,0	4,4	26,4	31,2	4,9	24,9	30,3	5,5	23,3	29,3	6,2	21,4	28,2	6,9	19,4	27,0	7,8
	10	30,4	34,8	4,5	29,0	33,9	5,0	27,5	32,8	5,6	25,7	31,7	6,2	23,8	30,6	7,0	21,6	29,2	7,9
	13	33,3	37,8	4,6	31,8	36,7	5,1	30,1	35,6	5,6	28,3	34,4	6,3	26,2	33,0	7,1	-	-	-
	16	36,2	40,8	4,7	34,7	39,7	5,2	32,9	38,5	5,7	30,9	37,1	6,4	28,7	35,7	7,2	-	-	-
	18	38,3	42,9	4,8	36,7	41,8	5,2	34,9	40,5	5,8	32,8	39,0	6,5	30,5	37,5	7,2	-	-	-
	23	43,7	48,5	5,0	42,0	47,2	5,4	39,9	45,7	6,0	37,7	44,1	6,6	35,2	42,3	7,4	-	-	-
230	-8	17,9	23,6	5,9	17,0	23,5	6,7	15,9	23,4	7,7	-	-	-	-	-	-	-	-	-
	-6	19,4	25,1	5,8	18,4	24,9	6,7	17,3	24,6	7,6	16,0	24,4	8,7	-	-	-	-	-	-
	-3	21,8	27,4	5,7	20,7	27,1	6,6	19,4	26,8	7,6	18,0	26,4	8,7	-	-	-	-	-	-
	1	25,4	30,9	5,7	24,1	30,4	6,5	22,6	29,9	7,5	21,1	29,4	8,6	19,3	28,9	9,9	-	-	-
	5	30,1	35,6	5,6	28,6	34,9	6,5	26,8	34,1	7,5	24,9	33,3	8,6	22,9	32,5	9,9	20,7	31,7	11,3
	7	32,3	37,8	5,6	30,6	36,9	6,5	28,7	36,0	7,5	26,8	35,1	8,6	24,6	34,2	9,9	22,3	33,2	11,3
	10	35,7	41,2	5,7	33,9	40,2	6,5	31,8	39,1	7,5	29,7	38,0	8,6	27,3	36,9	9,9	24,9	35,8	11,2
	13	39,4	44,9	5,7	37,3	43,7	6,6	35,1	42,4	7,6	32,8	41,2	8,7	30,3	39,8	9,8	-	-	-
	16	43,2	48,8	5,8	40,9	47,4	6,7	38,6	46,0	7,6	36,0	44,5	8,7	33,4	42,9	9,8	-	-	-
	18	45,9	51,6	5,8	43,5	50,0	6,7	41,0	48,4	7,7	38,3	46,7	8,7	35,6	45,0	9,8	-	-	-
	23	53,2	59,0	6,0	50,2	57,0	6,9	47,4	55,0	7,8	44,4	52,9	8,8	41,3	50,7	9,7	-	-	-
240	-8	25,1	31,4	6,5	23,8	30,8	7,3	22,3	30,3	8,2	-	-	-	-	-	-	-	-	-
	-6	27,1	33,5	6,6	25,7	32,8	7,4	24,1	32,2	8,3	22,5	31,5	9,3	-	-	-	-	-	-
	-3	30,3	36,8	6,7	28,8	36,0	7,5	27,0	35,1	8,4	25,2	34,3	9,4	-	-	-	-	-	-
	1	35,1	41,7	6,8	33,2	40,6	7,6	31,3	39,6	8,6	29,2	38,5	9,6	27,0	37,5	10,9	-	-	-
	5	41,3	48,1	7,0	39,1	46,7	7,8	36,9	45,4	8,8	34,4	44,0	9,9	31,8	42,6	11,1	29,0	41,2	12,5
	7	44,2	51,0	7,1	41,9	49,6	7,9	39,5	48,1	8,9	36,9	46,6	10,0	34,1	45,0	11,2	31,1	43,4	12,6
	10	48,7	55,7	7,2	46,2	54,0	8,0	43,6	52,3	9,0	40,7	50,6	10,1	37,7	48,8	11,4	34,6	47,0	12,8
	13	53,6	60,7	7,4	50,8	58,8	8,2	48,0	56,8	9,2	44,9	54,9	10,3	41,6	52,8	11,5	-	-	-
	16	58,6	65,9	7,5	55,7	63,8	8,3	52,6	61,6	9,3	49,3	59,4	10,4	45,7	57,0	11,7	-	-	-
	18	62,2	69,6	7,6	59,1	67,3	8,4	55,8	64,9	9,4	52,3	62,5	10,5	48,6	60,0	11,8	-	-	-
	23	71,6	79,3	7,9	68,1	76,6	8,7	64,4	73,8	9,7	60,5	70,9	10,7	56,3	67,9	11,9	-	-	-

Table “E”: THHEY performance data in cooling mode (ΔT = 5°C at condenser; ΔT = 5°C at evaporator)

Model	Tue (°C)	Tuc (°C)																	
		30			35			40			45			50			55		
		QF	QT	P	QF	QT	P	QF	QT	P	QF	QT	P	QF	QT	P	QF	QT	P
		kW	kW	kW	kW	kW	kW	kW	kW	kW	kW	kW	kW	kW	kW	kW	kW	kW	kW
115	5	13,8	16,9	3,2	13,1	16,6	3,6	12,3	16,4	4,2	11,0	15,7	4,8	11,0	16,4	5,5	-	-	-
	7	14,8	17,8	3,1	14,0	17,5	3,6	13,2	17,2	4,1	12,3	16,9	4,8	11,3	16,6	5,5	-	-	-
	10	16,3	19,3	3,1	15,5	18,9	3,6	14,6	18,6	4,1	13,6	18,2	4,7	12,6	17,8	5,4	-	-	-
	13	18,0	21,0	3,1	17,1	20,5	3,5	16,1	20,0	4,1	15,0	19,5	4,6	13,9	19,0	5,3	-	-	-
	16	19,7	22,7	3,0	18,7	22,1	3,5	17,6	21,5	4,0	16,5	20,9	4,6	15,3	20,3	5,1	-	-	-
	18	21,0	23,9	3,0	19,9	23,3	3,5	18,7	22,6	4,0	17,6	22,0	4,5	16,3	21,2	5,1	-	-	-
118	5	16,1	19,5	3,5	15,3	19,1	3,8	14,5	18,6	4,2	13,5	18,0	4,7	12,5	17,4	5,1	-	-	-
	7	17,2	20,6	3,5	16,4	20,2	3,9	15,5	19,6	4,3	14,5	19,1	4,7	13,4	18,4	5,2	-	-	-
	10	18,9	22,4	3,6	18,1	21,9	3,9	17,1	21,3	4,3	16,1	20,7	4,8	14,9	20,0	5,2	-	-	-
	13	20,8	24,3	3,6	19,9	23,7	4,0	18,8	23,1	4,4	17,7	22,4	4,8	16,5	21,6	5,3	-	-	-
	16	22,7	26,2	3,7	21,7	25,6	4,0	20,6	24,9	4,4	19,5	24,2	4,8	18,1	23,3	5,3	-	-	-
	18	24,0	27,6	3,7	23,0	26,9	4,0	21,9	26,2	4,4	20,6	25,4	4,9	19,3	24,5	5,4	-	-	-
122	5	19,8	23,9	4,2	18,8	23,4	4,7	17,8	22,9	5,3	16,6	22,4	6,0	15,4	21,9	6,7	-	-	-
	7	21,1	25,2	4,3	20,1	24,7	4,8	19,0	24,1	5,3	17,8	23,6	6,0	16,4	22,9	6,7	-	-	-
	10	23,2	27,4	4,3	22,1	26,7	4,8	20,9	26,1	5,4	19,6	25,4	6,0	18,2	24,7	6,7	-	-	-
	13	25,3	29,6	4,4	24,2	28,9	4,9	22,9	28,2	5,4	21,5	27,4	6,1	20,0	26,6	6,8	-	-	-
	16	27,6	31,9	4,5	26,4	31,2	4,9	25,0	30,3	5,5	23,5	29,5	6,1	22,0	28,6	6,8	-	-	-
	18	29,2	33,6	4,5	27,9	32,7	5,0	26,5	31,9	5,5	25,0	31,0	6,2	23,3	30,0	6,9	-	-	-
125	5	22,9	27,6	4,8	21,7	27,0	5,4	20,5	26,4	6,0	19,1	25,7	6,8	17,6	25,0	7,7	-	-	-
	7	24,4	29,1	4,9	23,2	28,5	5,4	21,9	27,8	6,1	20,5	27,1	6,8	18,8	26,3	7,7	-	-	-
	10	26,7	31,6	5,0	25,5	30,9	5,5	24,1	30,1	6,2	22,6	29,3	6,9	20,9	28,4	7,8	-	-	-
	13	29,2	34,2	5,1	27,9	33,4	5,6	26,5	32,5	6,3	24,8	31,6	7,0	23,0	30,6	7,8	-	-	-
	16	31,8	36,9	5,2	30,5	36,0	5,7	28,9	35,1	6,4	27,1	34,0	7,1	25,2	32,9	7,9	-	-	-
	18	33,6	38,7	5,3	32,2	37,8	5,8	30,6	36,8	6,4	28,8	35,7	7,2	26,8	34,5	8,0	-	-	-
230	5	27,0	33,0	6,2	25,6	32,5	7,2	24,0	32,0	8,3	22,3	31,5	9,5	20,5	31,1	10,9	-	-	-
	7	28,9	34,9	6,2	27,4	34,3	7,1	25,7	33,7	8,2	24,0	33,1	9,4	22,0	32,5	10,8	-	-	-
	10	32,0	37,9	6,1	30,3	37,1	7,0	28,5	36,3	8,1	26,6	35,5	9,3	24,5	34,8	10,6	-	-	-
	13	35,3	41,1	6,0	33,4	40,1	6,9	31,4	39,2	8,0	29,4	38,2	9,1	27,1	37,2	10,4	-	-	-
	16	38,7	44,5	6,0	36,7	43,4	6,9	34,6	42,2	7,9	32,3	41,0	9,0	29,9	39,8	10,1	-	-	-
	18	41,2	47,0	6,0	39,0	45,7	6,9	36,7	44,4	7,9	34,3	43,0	8,9	31,9	41,6	10,0	-	-	-
240	5	35,5	42,9	7,7	33,6	41,9	8,6	31,7	41,0	9,6	29,6	40,1	10,8	27,3	39,1	12,2	-	-	-
	7	37,9	45,5	7,8	36,0	44,4	8,7	34,0	43,4	9,7	31,7	42,3	10,9	29,3	41,2	12,3	-	-	-
	10	41,9	49,5	7,9	39,7	48,2	8,8	37,5	47,0	9,9	35,0	45,7	11,1	32,4	44,5	12,5	-	-	-
	13	46,0	53,8	8,0	43,7	52,4	8,9	41,2	50,9	10,0	38,6	49,5	11,2	35,8	48,0	12,6	-	-	-
	16	50,4	58,3	8,2	47,9	56,7	9,1	45,2	55,1	10,2	42,4	53,4	11,4	39,3	51,7	12,8	-	-	-
	18	53,5	61,5	8,3	50,8	59,7	9,2	48,0	57,9	10,3	45,0	56,1	11,5	41,8	54,2	12,8	-	-	-

Table “E”: THHEY performance data in heating mode (ΔT = 5°C at condenser; ΔT = 5°C at evaporator)

Model	Tue (°C)	Tuc (°C)																	
		30			35			40			45			50			55		
		QF	QT	P	QF	QT	P	QF	QT	P	QF	QT	P	QF	QT	P	QF	QT	P
		kW	kW	kW	kW	kW	kW	kW	kW	kW	kW	kW	kW	kW	kW	kW	kW	kW	kW
115	-8	9,9	12,8	3,0	9,4	12,6	3,3	8,2	11,7	3,6	-	-	-	-	-	-	-	-	-
	-6	10,6	13,5	3,0	10,1	13,2	3,3	8,8	12,3	3,6	8,2	12,0	3,9	-	-	-	-	-	-
	-3	11,8	14,6	2,9	11,2	14,3	3,2	10,5	13,9	3,6	9,1	12,9	3,9	-	-	-	-	-	-
	1	13,4	16,3	2,9	12,7	15,8	3,2	12,0	15,4	3,6	11,2	15,0	3,9	9,7	13,8	4,3	-	-	-
	5	15,7	18,5	2,9	14,8	17,9	3,2	13,9	17,3	3,5	12,2	15,9	3,9	11,2	15,3	4,2	10,3	14,7	4,6
	7	16,6	19,4	2,9	15,7	18,8	3,2	14,7	18,1	3,5	13,8	17,5	3,9	12,0	16,1	4,2	11,0	15,4	4,6
	10	18,1	21,0	2,9	17,1	20,2	3,2	16,1	19,5	3,5	15,0	18,8	3,9	14,0	18,1	4,2	12,1	16,6	4,6
	13	19,7	22,6	2,9	18,6	21,8	3,2	17,5	21,0	3,6	16,4	20,2	3,9	15,3	19,3	4,2	-	-	-
	16	21,4	24,3	3,0	20,2	23,4	3,3	19,0	22,5	3,6	17,8	21,6	3,9	16,6	20,7	4,2	-	-	-
	18	22,5	25,5	3,0	21,2	24,5	3,3	20,0	23,5	3,6	18,8	22,6	3,9	17,5	21,6	4,2	-	-	-
	23	25,5	28,5	3,1	24,1	27,4	3,4	22,6	26,3	3,7	21,3	25,1	4,0	19,9	23,9	4,2	-	-	-
118	-8	11,5	14,6	3,2	10,8	14,3	3,5	9,2	13,1	4,0	-	-	-	-	-	-	-	-	-
	-6	12,4	15,4	3,2	11,6	15,1	3,5	10,8	14,7	4,0	9,1	13,4	4,5	-	-	-	-	-	-
	-3	13,7	16,7	3,2	12,9	16,3	3,5	12,1	15,9	4,0	11,1	15,4	4,4	-	-	-	-	-	-
	1	15,6	18,7	3,1	14,8	18,2	3,5	13,9	17,7	3,9	12,9	17,1	4,4	11,8	16,6	4,9	-	-	-
	5	18,3	21,3	3,1	17,4	20,7	3,4	16,3	20,1	3,9	15,2	19,4	4,3	14,0	18,7	4,8	11,6	16,9	5,5
	7	19,4	22,4	3,1	18,4	21,8	3,4	17,4	21,1	3,8	16,2	20,4	4,3	14,9	19,6	4,8	12,6	17,9	5,4
	10	21,2	24,2	3,1	20,2	23,5	3,4	19,1	22,8	3,8	17,8	21,9	4,3	16,5	21,1	4,8	15,0	20,2	5,4
	13	23,0	26,0	3,0	21,9	25,2	3,4	20,8	24,4	3,8	19,5	23,6	4,2	18,1	22,7	4,7	-	-	-
	16	25,0	27,9	3,0	23,8	27,1	3,4	22,6	26,2	3,8	21,2	25,3	4,2	19,7	24,3	4,7	-	-	-
	18	26,3	29,3	3,0	25,1	28,4	3,3	23,8	27,4	3,7	22,4	26,4	4,2	20,8	25,4	4,7	-	-	-
	23	29,8	32,7	3	28,5	31,7	3,3	27,1	30,7	3,7	25,5	29,4	4,1	23,8	28,2	4,6	-	-	-
122	-8	14,0	17,5	3,6	13,2	17,1	4,0	12,4	16,9	4,6	-	-	-	-	-	-	-	-	-
	-6	15,0	18,5	3,6	14,2	18,1	4,1	13,3	17,9	4,7	12,4	17,7	5,4	-	-	-	-	-	-
	-3	16,7	20,3	3,7	15,8	19,8	4,2	14,9	19,5	4,7	13,9	19,2	5,4	-	-	-	-	-	-
	1	19,2	22,8	3,8	18,2	22,3	4,2	17,1	21,8	4,8	16,0	21,3	5,5	14,8	20,8	6,2	-	-	-
	5	22,5	26,2	3,9	21,3	25,5	4,3	20,1	24,8	4,8	18,8	24,1	5,5	17,4	23,3	6,2	15,9	22,6	6,9
	7	24,0	27,8	3,9	22,8	27,0	4,4	21,4	26,2	4,9	20,1	25,4	5,5	18,6	24,6	6,2	17,0	23,7	6,9
	10	26,4	30,2	4,0	25,0	29,3	4,4	23,6	28,4	4,9	22,1	27,5	5,5	20,5	26,5	6,2	18,8	25,5	6,9
	13	28,8	32,7	4,1	27,4	31,8	4,5	25,9	30,8	5,0	24,2	29,7	5,6	22,5	28,6	6,3	-	-	-
	16	31,4	35,4	4,1	29,9	34,3	4,6	28,3	33,2	5,1	26,5	32,1	5,7	24,7	30,9	6,4	-	-	-
	18	33,2	37,3	4,2	31,6	36,1	4,6	29,9	34,9	5,1	28,1	33,7	5,7	26,2	32,4	6,4	-	-	-
	23	38	42,2	4,3	36,2	40,9	4,8	34,3	39,5	5,3	32,3	38,1	5,9	30,2	36,6	6,6	-	-	-
125	-8	16,0	20,2	4,3	15,1	19,7	4,8	14,2	19,4	5,4	-	-	-	-	-	-	-	-	-
	-6	17,3	21,5	4,3	16,3	21,0	4,8	15,3	20,6	5,5	14,2	20,2	6,2	-	-	-	-	-	-
	-3	19,3	23,5	4,3	18,3	22,9	4,8	17,1	22,4	5,5	15,9	21,9	6,2	-	-	-	-	-	-
	1	22,2	26,4	4,4	21,0	25,8	4,9	19,8	25,1	5,5	18,5	24,5	6,2	17,0	23,8	7,0	-	-	-
	5	26,0	30,3	4,4	24,7	29,5	4,9	23,3	28,6	5,5	21,8	27,8	6,2	20,1	26,9	7,0	18,2	25,8	7,8
	7	27,8	32,1	4,4	26,4	31,2	4,9	24,9	30,2	5,5	23,3	29,3	6,2	21,5	28,3	7,0	19,6	27,2	7,8
	10	30,4	34,8	4,5	29,0	33,8	5,0	27,4	32,8	5,6	25,6	31,7	6,2	23,8	30,5	7,0	21,7	29,3	7,8
	13	33,3	37,7	4,6	31,7	36,6	5,0	30,0	35,4	5,6	28,2	34,3	6,2	26,1	32,9	7,0	-	-	-
	16	36,2	40,7	4,6	34,6	39,5	5,1	32,8	38,3	5,6	30,8	36,9	6,3	28,6	35,5	7,0	-	-	-
	18	38,2	42,8	4,7	36,6	41,5	5,1	34,7	40,2	5,7	32,7	38,8	6,3	30,4	37,2	7,0	-	-	-
	23	43,7	48,3	4,8	41,8	46,9	5,2	39,8	45,4	5,8	37,5	43,7	6,4	35,0	41,9	7,1	-	-	-
230	-8	20,1	26,0	6,1	19,0	25,5	6,7	17,9	25,0	7,3	-	-	-	-	-	-	-	-	-
	-6	21,6	27,5	6,0	20,5	26,9	6,6	19,3	26,4	7,3	18,0	25,7	8,0	-	-	-	-	-	-
	-3	24,1	29,9	6,0	22,8	29,2	6,6	21,4	28,5	7,3	20,0	27,8	8,0	-	-	-	-	-	-
	1	27,7	33,5	5,9	26,2	32,5	6,5	24,6	31,6	7,2	23,0	30,7	8,0	21,2	29,8	8,8	-	-	-
	5	32,6	38,3	5,8	30,8	37,0	6,4	28,9	35,8	7,1	26,9	34,6	7,9	24,9	33,3	8,7	22,9	32,1	9,5
	7	34,8	40,5	5,8	32,8	39,1	6,5	30,8	37,7	7,1	28,7	36,3	7,9	26,5	34,9	8,7	24,4	33,6	9,5
	10	38,2	43,9	5,9	36,0	42,3	6,5	33,7	40,7	7,2	31,5	39,2	7,9	29,1	37,5	8,7	26,8	36,0	9,4
	13	41,8	47,6	5,9	39,4	45,8	6,6	36,9	43,9	7,2	34,4	42,1	7,9	31,9	40,3	8,7	-	-	-
	16	45,7	51,5	6,0	42,9	49,4	6,7	40,2	47,3	7,3	37,5	45,3	8,0	34,8	43,1	8,6	-	-	-
	18	48,3	54,2	6,1	45,4	51,9	6,7	42,5	49,7	7,4	39,6	47,4	8,0	36,8	45,2	8,6	-	-	-
	23	55,2	61,3	6,3	51,9	58,7	7,0	48,6	55,9	7,6	45,3	53,1	8,1	42,0	50,3	8,5	-	-	-
240	-8	24,9	31,6	6,9	23,7	31,2	7,7	22,3	30,6	8,6	-	-	-	-	-	-	-	-	-
	-6	26,8	33,5	6,9	25,4	32,9	7,7	23,9	32,3	8,7	22,3	31,7	9,7	-	-	-	-	-	-
	-3	29,7	36,5	7,0	28,3	35,8	7,8	26,6	35,0	8,7	24,8	34,3	9,8	-	-	-	-	-	-
	1	34,1	40,9	7,0	32,3	39,9	7,9	30,5	39,0	8,8	28,5	38,1	9,9	26,4	37,1	11,1	-	-	-
	5	40,1	46,9	7,1	38,0	45,6	7,9	35,8	44,3	8,8	33,5	43,0	9,9	31,0	41,8	11,1	28,4	40,5	12,5
	7	42,6	49,5	7,1	40,4	48,1	7,9	38,2	46,7	8,8	35,7	45,3	9,9	33,1	43,9	11,2	30,3	42,5	12,5
	10	46,8	53,7	7,2	44,3	52,1	8,0	41,8	50,5	8,9	39,2	48,9	10,0	36,3	47,2	11,2	33,4	45,6	12,6
	13	51,1	58,2	7,2	48,5	56,3	8,0	45,8	54,5	9,0	42,9	52,7	10,1	39,8	50,7	11,3	-	-	-
	16	55,7	62,8	7,3	52,9	60,8	8,1	49,9	58,6	9,0	46,8	56,6	10,1	43,4	54,4	11,3	-	-	-
	18	58,8	66,0	7,4	56,0	63,9	8,2	52,8	61,6	9,1	49,4	59,3	10,1	46,0	57,0	11,3	-	-	-
	23	67,3	74,7	7,6	64,0	72,0	8,3	60,4	69,3	9,2	56,6	66,5	10,2	52,7	63,7	11,3	-	-	-

Tue = Water temperature at evaporator outlet (ΔT inlet/outlet = 5 °C).
Tuc = Water temperature at condenser outlet (ΔT inlet/outlet = 5 °C).
QF = Cooling capacity (evaporator fouling factor 0.35 X 10^{-4} m²C/W).
QT = Heating capacity (evaporator fouling factor 0.35 X 10^{-4} m²C/W).
P = Absorbed electric power (pumps not considered).
Note:
With evaporator outlet water temperature (**Tue**) between - 8 and 3°C the calculation was made considering a 30% glycol solution

Nominal conditions of summer operation
Evaporator inlet/outlet water 12°C/7°C, condenser inlet/outlet water 30°C/35°C.

Nominal conditions of winter operation
Condenser inlet/outlet water 40°C/45°C, evaporator inlet water 10°C, water flow rate as for summer operation.

Table "F": Condenser water ΔT correction coefficients
For condenser water ΔT other than 5°C (min. ΔT 5°C and max. ΔT 15°C), with the same outlet water temperature (30°C, 35°C, 40°C, 45°C, 50°C and 55°C, respectively), apply the following correction coefficients to the values in Table "**E**".

Table "F"

ΔT	kct QF	kct P
5°C	1.000	1.000
10°C	1.016	0.969
15°C	1.030	0.940

IMPORTANT!
For condenser inlet water temperatures below 25°C and ΔT less than 12°C, it is advisable to install the pressure valve accessory (VP or VPS).

Table "G": Evaporator water ΔT correction coefficients
For evaporator water temperature differentials ΔT other than 5°C, with the same outlet water temperature (from -8 to 23 °C, respectively), apply the following correction coefficients to the values in Table "**E**".

Table "G"

ΔT	kct QF	kct P
3°C	0.97	0.99
5°C	1.00	1.00
8°C	1.01	1.01

QT = **QF** + (**P** x 0.97)

IMPORTANT!
The differential ΔT between the inlet and outlet water temperature at the evaporator should be between 3°C and 8°C.

Table "H": TCHEY performance data in summer cycle
(well water condensation with ΔT = 12°C at condenser and ΔT = 5°C at evaporator)

Model	Tue (°C)	Tuc (°C)								
		24 (*)			27			30		
		QF	QT	P	QF	QT	P	QF	QT	P
		kW	kW	kW	kW	kW	kW	kW	kW	kW
115	5	16,3	18,6	2,3	16,0	18,4	2,5	15,5	18,1	2,7
	7	17,5	19,8	2,3	17,1	19,5	2,5	16,6	19,2	2,7
	10	19,4	21,6	2,3	18,9	21,3	2,5	18,4	21,0	2,7
	13	21,4	23,6	2,3	20,8	23,2	2,5	20,2	22,9	2,7
	16	23,5	25,7	2,3	22,9	25,3	2,5	22,2	24,9	2,8
	18	25,0	27,2	2,3	24,3	26,8	2,5	23,6	26,3	2,8
118	5	19,2	21,8	2,7	18,8	21,6	2,9	18,3	21,2	3,0
	7	20,5	23,2	2,8	20,1	22,9	2,9	19,6	22,5	3,1
	10	22,5	25,2	2,8	22,0	24,9	2,9	21,5	24,5	3,1
	13	24,6	27,4	2,8	24,1	27,0	3,0	23,6	26,6	3,1
	16	26,9	29,7	2,9	26,3	29,3	3,0	25,8	28,8	3,2
	18	28,4	31,2	2,9	27,8	30,8	3,0	27,3	30,4	3,2
122	5	23,8	27,1	3,4	23,2	26,7	3,6	22,6	26,3	3,8
	7	25,4	28,7	3,5	24,8	28,3	3,7	24,1	27,9	3,9
	10	27,8	31,3	3,5	27,2	30,8	3,7	26,5	30,3	3,9
	13	30,5	34,0	3,6	29,8	33,4	3,8	29,1	33,0	4,0
	16	33,3	36,8	3,7	32,5	36,2	3,9	31,7	35,7	4,1
	18	35,2	38,8	3,7	34,4	38,2	3,9	33,6	37,6	4,1
125	5	27,6	31,3	3,8	27,0	30,9	4,0	26,2	30,4	4,3
	7	29,3	33,1	3,9	28,7	32,6	4,1	28,0	32,2	4,3
	10	32,1	35,9	4,0	31,4	35,5	4,2	30,7	35,0	4,4
	13	35,0	39,0	4,1	34,3	38,5	4,3	33,6	37,9	4,5
	16	38,1	42,2	4,2	37,4	41,7	4,4	36,6	41,1	4,6
	18	40,2	44,4	4,3	39,4	43,8	4,5	38,6	43,2	4,7
230	5	32,0	36,6	4,7	31,2	36,1	5,1	30,4	35,7	5,5
	7	34,3	38,9	4,7	33,5	38,4	5,1	32,6	37,9	5,5
	10	38,1	42,6	4,7	37,1	42,0	5,1	36,0	41,4	5,5
	13	42,0	46,5	4,7	40,9	45,8	5,1	39,7	45,1	5,6
	16	46,2	50,7	4,7	44,9	49,9	5,1	43,6	49,1	5,6
	18	49,1	53,7	4,7	47,8	52,8	5,2	46,3	51,8	5,7
240	5	43,9	49,9	6,1	42,8	49,1	6,5	41,6	48,3	6,9
	7	47,0	53,0	6,2	45,8	52,2	6,6	44,5	51,2	7,0
	10	51,7	57,9	6,4	50,4	56,9	6,7	49,0	55,9	7,1
	13	56,8	63,1	6,5	55,4	62,0	6,9	53,9	60,9	7,3
	16	62,2	68,6	6,6	60,6	67,4	7,0	59,0	66,2	7,4
	18	66,0	72,5	6,7	64,3	71,2	7,1	62,6	69,9	7,5

Tue = Water temperature at evaporator outlet (ΔT inlet/outlet = 5 °C).
Tuc = Water temperature at condenser outlet (ΔT inlet/outlet = 12 °C).
QF = Cooling capacity (evaporator fouling factor 0.35 X 10^{-4} m²C/W).
QT = Heating capacity (evaporator fouling factor 0.35 X 10^{-4} m²C/W).
P = Absorbed electric power (pumps not considered).

Table "I": Well water ΔT correction coefficients at condenser
For well water ΔT other than 12°C, with the same inlet water temperature (12°C, 15°C and 18°C, respectively), apply the following correction coefficients to the values in Table "**H**".

Table "I"

ΔT	kct QF	kct P
12°C	1.000	1.000
15°C	0.980	1.040
18°C	0.975	1.050

IMPORTANT!
It is possible to use well water at the condenser with inlet temperature between 12°C and 18°C, min. ΔT 12°C and max. ΔT 18°C.
For condenser inlet water temperatures below 15°C it is advisable to install the pressure valve accessory (VP or VPS)

(*) Provide for installation of the pressure valve accessory (VP or VPS).

Table “H”: THHEY performance data in summer cycle (well water condensation with ΔT = 12°C at condenser and ΔT = 5°C at evaporator)

Model	Tue (°C)	Tuc (°C)								
		24 (*)			27			30		
		QF	QT	P	QF	QT	P	QF	QT	P
		kW	kW	kW	kW	kW	kW	kW	kW	kW
115	5	14,7	17,2	2,6	14,3	17,1	2,9	13,9	16,9	3,1
	7	15,7	18,2	2,6	15,3	18,1	2,8	14,9	17,9	3,1
	10	17,4	19,9	2,6	17,0	19,6	2,8	16,5	19,4	3,0
	13	19,2	21,6	2,5	18,7	21,3	2,7	18,1	21,0	3,0
	16	21,1	23,5	2,5	20,5	23,1	2,7	19,9	22,8	3,0
	18	22,4	24,8	2,4	21,8	24,4	2,7	21,1	24,0	2,9
118	5	17,0	20,0	3,1	16,7	19,8	3,3	16,2	19,6	3,5
	7	18,2	21,2	3,2	17,8	21,0	3,3	17,3	20,7	3,5
	10	20,0	23,1	3,2	19,5	22,8	3,4	19,1	22,5	3,5
	13	21,8	25,0	3,2	21,4	24,7	3,4	20,9	24,4	3,6
	16	23,9	27,0	3,3	23,4	26,7	3,4	22,9	26,4	3,6
	18	25,2	28,5	3,3	24,7	28,1	3,5	24,2	27,7	3,6
122	5	21,0	24,6	3,7	20,5	24,3	3,9	20,0	24,0	4,1
	7	22,4	26,0	3,7	21,8	25,7	3,9	21,2	25,3	4,2
	10	24,5	28,2	3,8	23,9	27,8	4,0	23,3	27,5	4,3
	13	26,8	30,5	3,9	26,2	30,1	4,1	25,6	29,7	4,3
	16	29,2	33,0	3,9	28,5	32,5	4,1	27,9	32,1	4,4
	18	30,9	34,7	4,0	30,2	34,3	4,2	29,5	33,8	4,4
125	5	24,3	28,4	4,2	23,7	28,0	4,5	23,1	27,7	4,7
	7	25,8	29,9	4,3	25,2	29,6	4,5	24,6	29,2	4,8
	10	28,2	32,5	4,4	27,6	32,1	4,6	27,0	31,7	4,9
	13	30,7	35,1	4,5	30,1	34,8	4,8	29,5	34,3	5,0
	16	33,5	38,0	4,7	32,8	37,6	4,9	32,1	37,1	5,1
	18	35,3	39,9	4,8	34,6	39,4	5,0	33,9	38,9	5,2
230	5	28,7	33,7	5,2	27,9	33,4	5,6	27,2	33,1	6,1
	7	30,7	35,7	5,1	30,0	35,4	5,5	29,2	35,0	6,0
	10	34,1	39,0	5,0	33,2	38,5	5,5	32,3	38,0	5,9
	13	37,6	42,4	4,9	36,6	41,9	5,4	35,6	41,3	5,9
	16	41,4	46,1	4,9	40,2	45,4	5,3	39,1	44,7	5,8
	18	44,1	48,7	4,8	42,9	48,0	5,3	41,5	47,2	5,8
240	5	37,8	44,3	6,7	36,8	43,7	7,1	35,7	43,1	7,6
	7	40,4	47,0	6,8	39,3	46,3	7,2	38,2	45,6	7,6
	10	44,4	51,2	7,0	43,3	50,4	7,3	42,1	49,7	7,8
	13	48,8	55,7	7,1	47,6	54,8	7,5	46,3	54,0	7,9
	16	53,4	60,5	7,3	52,1	59,5	7,6	50,7	58,5	8,1
	18	56,7	63,9	7,4	55,3	62,8	7,8	53,8	61,7	8,2

Tue = Water temperature at evaporator outlet (ΔT inlet/outlet = 5 °C).
Tuc = Water temperature at condenser outlet (ΔT inlet/outlet = 12 °C).
QF = Cooling capacity (evaporator fouling factor 0.35 X 10^{-4} m²C/W).
QT = Heating capacity (evaporator fouling factor 0.35 X 10^{-4} m²C/W).
P = Absorbed electric power (pumps not considered).

Table “I”: Well water ΔT correction coefficients at condenser

For well water ΔT other than 12°C, with the same inlet water temperature (12°C, 15°C and 18°C, respectively), apply the following correction coefficients to the values in Table “**H**”.

Table “I”

ΔT	kct QF	kct P
12°C	1.000	1.000
15°C	0.980	1.040
18°C	0.975	1.050

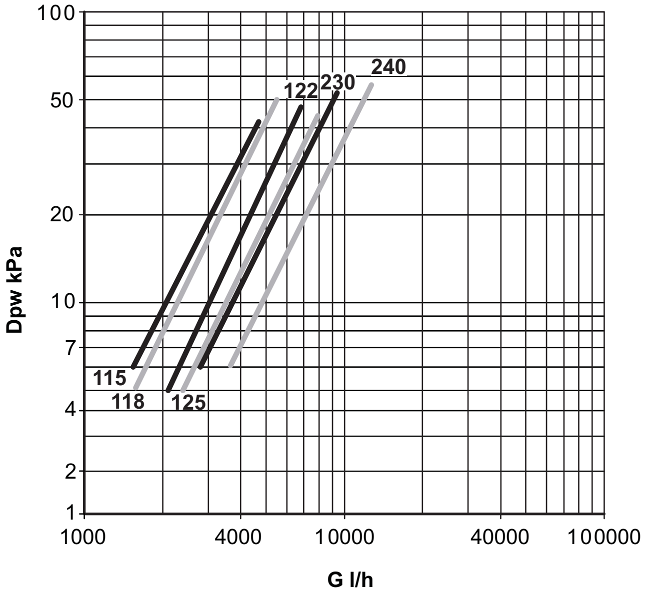
IMPORTANT!

It is possible to use well water at the condenser with inlet temperature between 12°C and 18°C, min. ΔT 12°C and max. ΔT 18°C.
For condenser inlet water temperatures below 15°C it is advisable to install the pressure valve accessory (VP or VPS)

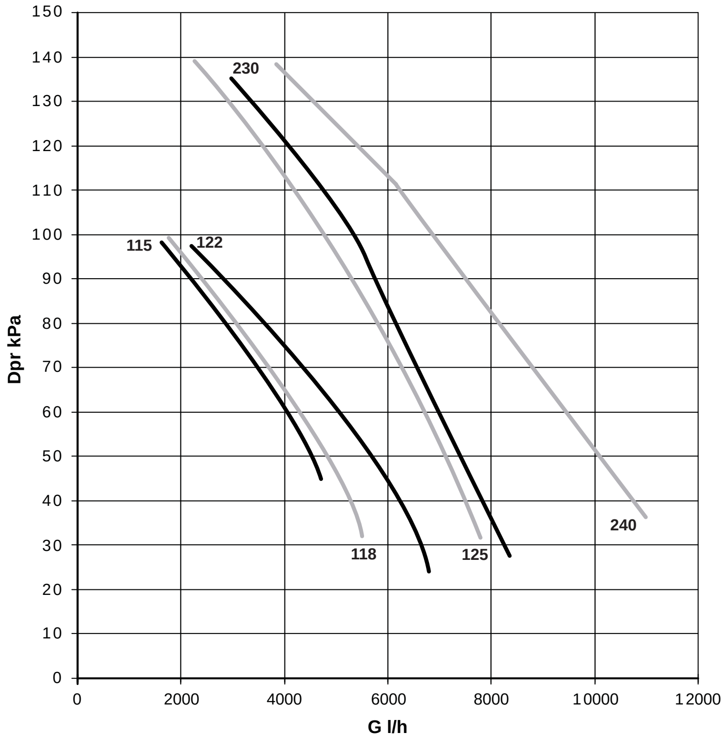
(*) Provide for installation of the pressure valve accessory (VP or VPS).

Pressure Drops and Residual Static Pressure

Graph "1": Pressure drops on heat exchangers – TCHEY-THHEY 115÷240



Graph "2": Residual static pressure – P1 TCHEBY-THHEBY 115÷240



Calculation of pressure drops

- ○ The water flow rate at the exchanger is calculated using the following formula:
- ○ G = (Q x 0.86) : ΔT
- where:

G (l/h) = water flow rate at exchanger;
Q (kW) = exchanged power, which can be QF (for the evaporator) or QT (for the condenser), depending on the exchanger in question;
ΔT (°C) = temperature differential.

- ○ The pressure drops can be obtained from the graph at left or calculated using the following formulae:
- ○ $\Delta pw = \Delta pw_{nom} \times (G : G_{nom})^2$
- where:

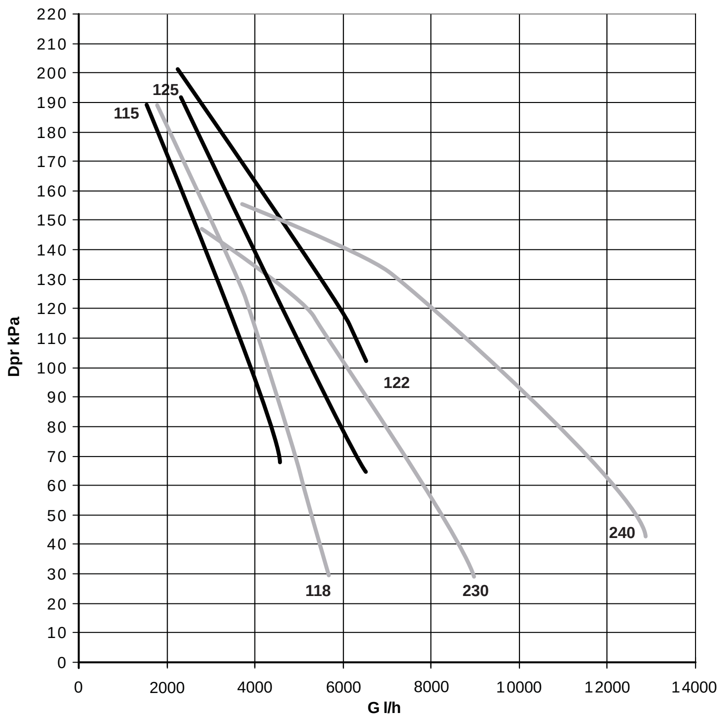
Δpw_{nom} (kPa) = nominal pressure drop at the exchanger in question (*Technical Data* Table)
G (l/h) = water flow rate at the exchanger in question;
G_{nom} (l/h) = nominal water flow rate at the exchanger in question (*Technical Data* Table).

Note:
For all units, always refer to the admissible operating limits and temperature differentials (ΔT).

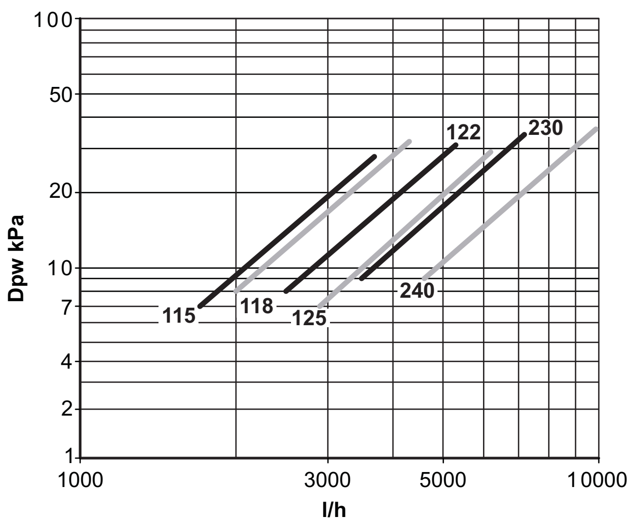
Calculation of residual static pressure
The residual static pressure can be obtained from graph "**2**" based on the measured flow rates.

G = Water flow rate
Pc = Pressure drop
Pr = Residual static pressure

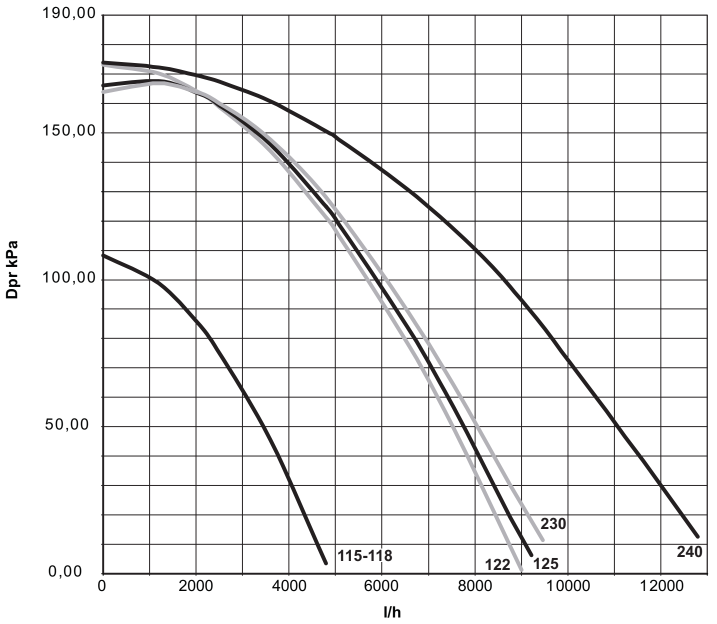
Graph "3": Residual static pressure – P2 TCHEBY-THHEBY 115÷240



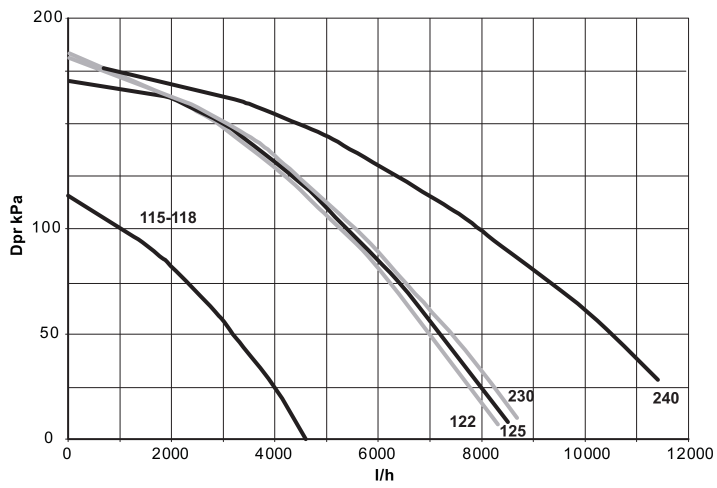
Graph "4": Pressure drop on heat exchangers – TCHEY-THHEY 115÷240, 30% glycol



Graph "5": PS1 residual static pressure (at max. speed) – TCHEBY-THHEBY 115÷240



Graph "6": PS1 residual static pressure (at max. speed) – TCHEBY-THHEBY 115÷240, 30% glycol



Sound Power Level

Table "L": Sound power levels in dB per octave band and total sound power level in dB(A) for standard models. The noise data refers to units without pump.

Model	115	118	122	125	230	240
125 Hz	49.4	49.4	51.7	52.3	52.9	54.6
250 Hz	59.3	59.3	62.7	63.6	64.5	67.1
500 Hz	57.5	58.0	58.5	59.4	61.0	63.7
1000 Hz	50.0	51.5	57.5	58.1	60.5	62.5
2000 Hz	48.0	49.5	54.0	54.9	56.8	58.5
4000 Hz	37.6	38.0	40.2	40.9	41.5	43.5
8000 Hz	31.6	32.5	33.7	34.2	34.7	36.3
Lw(*)	58	58	62	63	64	67
Lp (**)	47	47	51	52	53	57

Table "L1": Sound power and sound pressure levels in dB(A) on models with "SIL" set-up

Lw(*) SIL	53	53	57	58	59	62
Lp (**) SIL	42	42	46	47	48	52

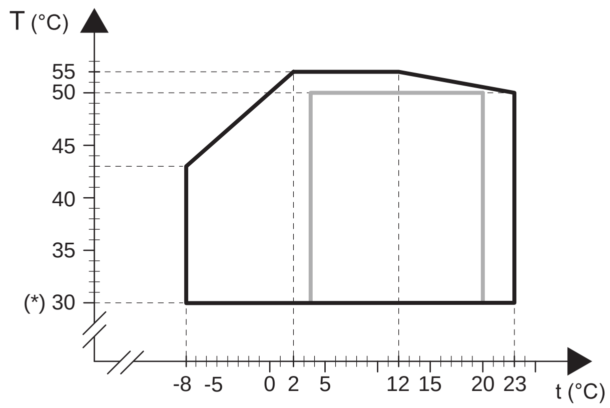
Lw = Total sound power level in dB(A).
Lp = Sound pressure level in dB(A).

(*) Sound power level emitted in nominal summer operating conditions: evaporator inlet/outlet water 12°C / 7°C, condenser inlet/outlet water temperature 30°C / 35°C.

(**) The sound pressure levels are referred to free-field measurements at a distance of 1 m from the unit, with directivity factor Q=2.

Operating limits

TCHEY-THHEY 115÷240



T (°C) = Condenser outlet temperature
t (°C) = Evaporator outlet temperature

TCHEY (in summer operation)
THHEY (in winter operation)

THHEY (in summer operation)

(*) Only the water output on the rejection side, working with well/aqueduct water, can drop to 24°C. Contact the pre-sales office for such conditions.

Temperature differentials permitted through the exchangers

- Temperature differential at evaporator ΔT = 3 ÷ 8°C
- Temperature differential at condenser (Table "**F**"): ΔT = 5 ÷ 15°C
- Temperature differential at condenser (well water - Table "**I**"): ΔT = 12 ÷ 18°C.

IMPORTANT!

- Water at condenser inlet below 25°C and ΔT less than 12°C: it is advisable to install the pressure valve accessory (VP or VPS).
- When the water at the condenser inlet is below 15°C (the temperature differential ΔT allowed for well water through the condenser can range from 12 to 18°C) it is advisable to install the pressure valve accessory (VP or VPS).

Maximum evaporator inlet water temperature 28°C for TCHEY and 25°C for THHEY, in summer mode.

Max. condenser inlet water temperature 50°C.

- Min. water pressure 0.5 barg (on installation side) 2 barg (water supply side).
- Max. water pressure 3 barg.

NOTE:
For evaporator outlet water at less than 5°C or geothermal applications with temperatures below 5°C, is MANDATORY when ordering specify the working temperature of the unit (water inlet / outlet condenser and evaporator) to allow a correct set-up of the unit itself.

Using Antifreeze Solutions

- Using ethylene glycol is recommended if you do not want to drain the water from the water circuit during the winter pause or if the unit has to supply chilled water at temperatures below 5 °C. Adding glycol changes the water's physical properties and consequently the unit's performance. The percentage of glycol to add to the system can be obtained from the most demanding operating conditions among those shown below.
- Table "**M**" shows the multipliers to apply to determine unit performance changes in relation to the required percentage of ethylene glycol.
- The multipliers refer to the following conditions: condenser inlet water temperature 30°C; chilled outlet water temperature 7°C; temperature differential at evaporator and condenser 5°C.
- For different operating conditions the same multipliers can be used, as their variations are negligible.

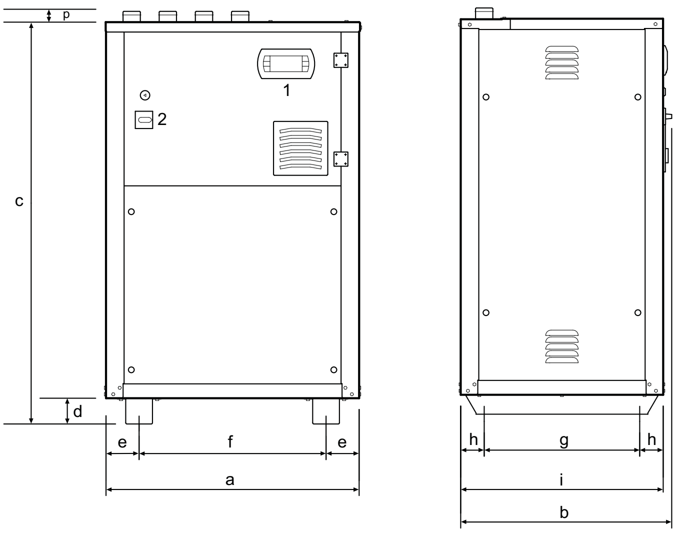
Table "M"

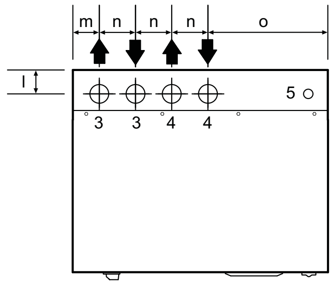
Glycol by weight	**10 %**	**15 %**	**20 %**	**25 %**	**30 %**
Freezing temperature °C	-5	-7	-10	-13	-16
fc QF	0.991	0.987	0.982	0.978	0.974
fc P	0.996	0.995	0.993	0.991	0.989
fc Δpw	1.053	1.105	1.184	1.237	1.316
fc G	1.008	1.028	1.051	1.074	1.100

fc QF = Cooling capacity correction factor.
fc P= Correction factor for absorbed electric power.
fc Δpw = Correction factor for pressure drop at evaporator.
fc G = Correction factor for glycol water flow to evaporator.

Dimensions and Footprints

TCHEY-THHEY 115÷240 dimensions and footprints



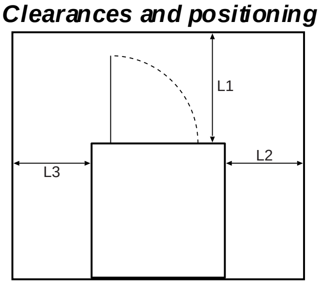


1. Control panel
2. Isolator
3. Heating/conditioning system (primary)
4. External network (rejection device)
5. Power supply inlet

Model		a	b	c	d	e	f	g	h	i	l	m	n	o	p
115	mm	700	585	1140	94	91.5	51.7	430	65	560	66	73	100	331	30
118	mm	700	585	1140	94	91.5	51.7	430	65	560	66	73	100	331	30
122	mm	700	805	1140	94	91.5	51.7	650	65	780	66	73	100	331	30
125	mm	700	805	1140	94	91.5	51.7	650	65	780	66	73	100	331	30
230	mm	700	805	1140	94	91.5	51.7	650	65	780	66	73	100	331	30
240	mm	700	805	1140	94	91.5	51.7	650	65	780	66	73	100	331	30

N.B.: Versions hph side system and the external network must be reversed.

Clearances and positioning



Model		115÷240
L1	mm	700
L2	mm	700
L3	mm	700

TCHEY Weights

Modello		115	118	122	125	230	240
Standard	kg	156	156	184	207	227	246
P1	kg	168	168	196	242	262	281
P2	kg	173	173	201	224	247	266
PS1	kg	164	164	202	225	245	264

THHEY Weights

Model		115	118	122	125	230	240
Standard	kg	159	159	187	210	232	251
P1	kg	171	171	199	245	267	286
P2	kg	176	176	204	227	252	271
PS1	kg	167	167	205	228	250	269

Weights refer to units without water.

Installation

○ The unit is intended for indoor installation. If outdoor installation is required, contact our pre-sales office.
○ The unit is equipped with male-threaded water connections.
○ The unit must be positioned leaving the minimum recommended clearances and allowing access to the hydraulic and electrical connections.
○ The unit can be equipped with anti-vibration mountings on request (KSA).
○ It is mandatory to install low pressure-drop mesh filters (KFA) on each water inlet on the unit.
○ Do not install the unit on brackets or shelves.
○ Level the unit and choose a supporting surface capable of bearing its weight.
○ Prevent access to the unit in case of installation in places open to children under 14 years of age.
○ Provide for the installation of shut-off valves isolating the unit from the rest of the system, flexible couplings and unit/system draining valves.
○ The water flow rate through the evaporator should not fall below a value corresponding to a temperature differential of 8°C (with the compressor – or both compressors, if present – running).
○ It is advisable to drain the water from the system during prolonged periods of inactivity.
○ Draining the system can be avoided by adding ethylene glycol to the water circuit.
○ The expansion tank is sized for the water content of the unit only. Any additional expansion tank should be sized by the installer based on the system as a whole.
○ In case of pumpless models, the pump must be installed with the delivery side facing the unit's water inlet.

Handling

○ The unit should be kept vertical during transportation and handled with care to avoid damaging the external structure or the internal mechanical and electrical components.
○ Do not stack units.
○ The temperature limits for storage are: -9°C ÷ 45°C. Do not expose the unit to direct sunlight, rain, wind or sand.
○ Exposure to direct sunlight can cause the pressure in the refrigerant circuit to reach dangerous levels and trigger the safety valves (if present).

Hydraulic data

Model		**115**	**118**	**122**	**125**	**230**	**240**
Expansion tank	l	7	7	7	7	7	7
Safety valve calibration	kPa	300	300	300	300	300	300
Max. allowable pressure	kPa	300	300	300	300	300	300
Water connection size	Ø	1-½"GM					
Charge connection size (whole)	Ø	½"GF					

Water Circuits

TCHEY-THHEY minimum water circuit content

In order for the units to operate properly, a minimum amount of water must be maintained at all times inside the water circuit. The minimum water content is determined on the basis of the unit's nominal cooling capacity (Table A – *Technical Data*) multiplied by the coefficient expressed in l/kW.

Range	Regulating system	Control	Specific capacity
TCHEY-THHEY	*AdaptiveFunction Plus*	iDRHOSS	2 l/kW

Example: TCHEY
The reference capacity to consider when calculating the water content on the primary side is the cooling capacity in design conditions. For example, if the capacity corresponds to the nominal conditions (Qf=41.89 kW), the minimum required water content can be calculated as follows:

If the unit is equipped with iDRHOSS control and ***AdaptiveFunction Plus***, the minimum system content should be:

Qf (kW) x 2 l/kW = 41.89 kW x 2 l/kW = 83.8 l

For design conditions that are different from the nominal conditions, the power data must be determined using Tables "E", which provide a list of the power values obtained at conditions other than nominal conditions. When doing the calculation, always refer to the maximum predictable power value (for THHEY models, in heating mode also).

Maximum content of water circuit

Units set up with P1 or P2 are equipped with an expansion tank that limits the maximum water content in the system.

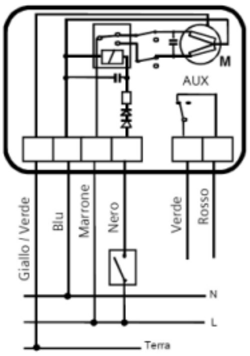
Maximum content		**115**	**118**	**122**	**125**	**230**	**240**
Water	l	243	243	243	243	243	243
Mixture with 10% ethylene glycol	l	212	212	212	212	212	212
Mixture with 20% ethylene glycol	l	196	196	196	196	196	196
Mixture with 30% ethylene glycol	l	182	182	182	182	182	182

If the water content exceeds the values shown, an additional expansion tank must be installed.

Expansion tank		**115÷240**
Capacity	l	7
Precharge pressure	barg	1
Max. expansion tank pressure	barg	3
Calibration	barg	3

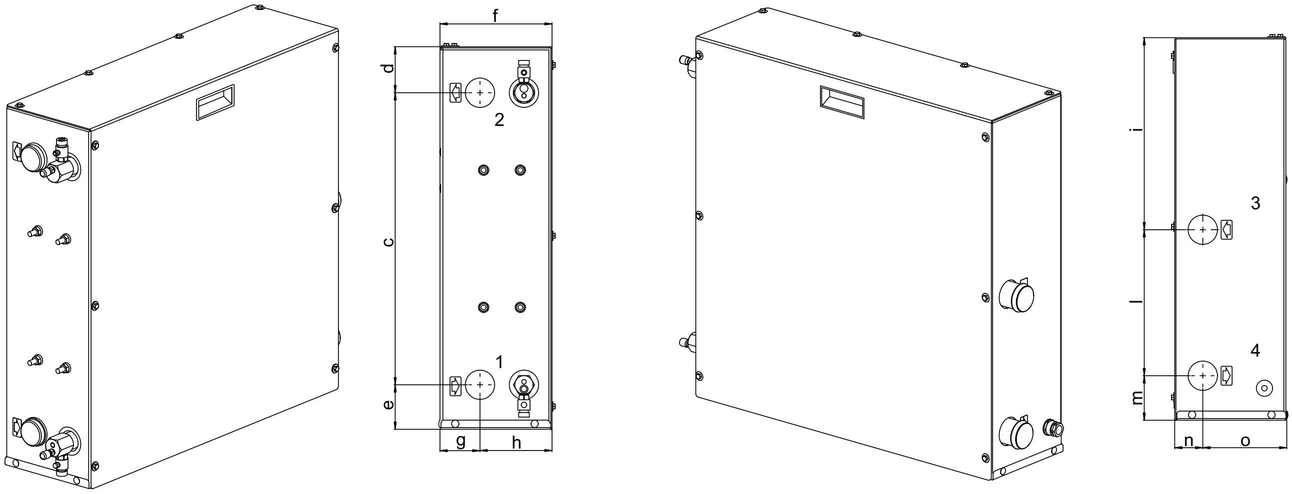
KFRC Free-Cooling kit accessory

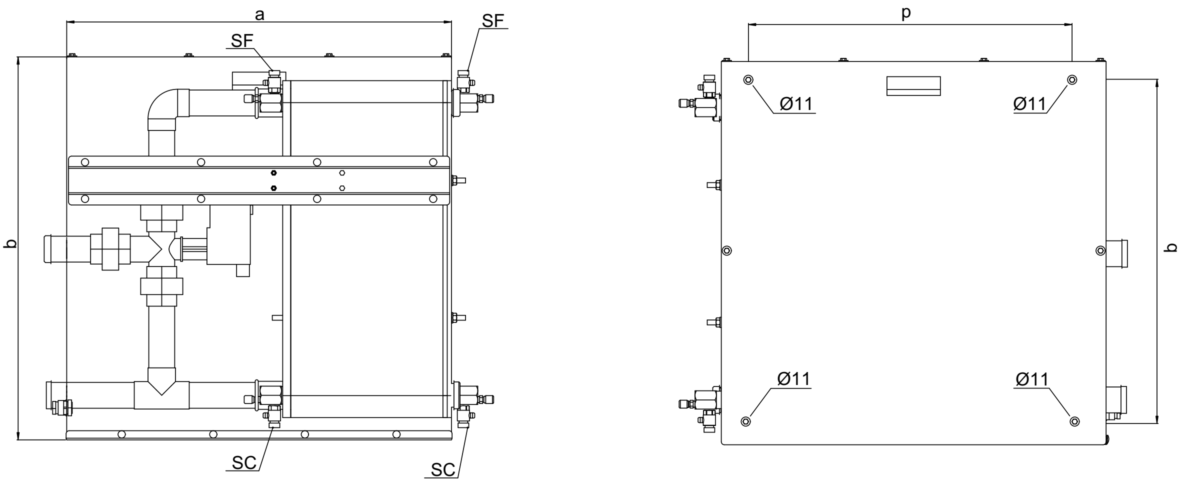
Free-cooling module works only when compressors are off.
This accessory consists of a plate-type heat exchanger and a 3-way on/off diverter valve (230Vac) without spring-back.
The 3-way valve is managed by the unit's electronic control; the installer should provide a 4x1mm^2 cable (F-N-contact ON-earth) for connection to the terminal board inside the power panel (see Wiring Diagram).



Technical data – Free-Cooling accessory

Model		115	118	122	125	230	240
Flow rate on installation side	l/h	3813	4451	5470	6307	7482	10158
System pressure drop	kPa	12	15	27	14	19	33
Flow rate on supply side	l/h	3738	4449	5694	5950	7334	10365
Pressure drop on supply side	kPa	13	16	32	16	24	45
Connection size	Ø	1-½"GM					
Exchanger water content (on each circuit)	l	3.2			6		





Modell		a	b	c	d	e	f	g	h	i	l	m	n	o	p	q
115	mm	630	627,5	479	75,5	73	183,5	65,5	118	315	239,5	73	46	137,5	500	570
118	mm	630	627,5	479	75,5	73	183,5	65,5	118	315	239,5	73	46	137,5	500	570
122	mm	630	627,5	479	75,5	73	183,5	65,5	118	315	239,5	73	46	137,5	500	570
125	mm	630	627,5	479	75,5	73	183,5	65,5	118	315	239,5	73	46	137,5	500	570
230	mm	630	627,5	479	75,5	73	183,5	65,5	118	315	239,5	73	46	137,5	500	570
240	mm	630	627,5	479	75,5	73	183,5	65,5	118	315	239,5	73	46	137,5	500	570

1 = Heating/conditioning system (primary).
2 = To the machine (primary system side).
3 = External network (external network side).
4 = To the machine (external network side).

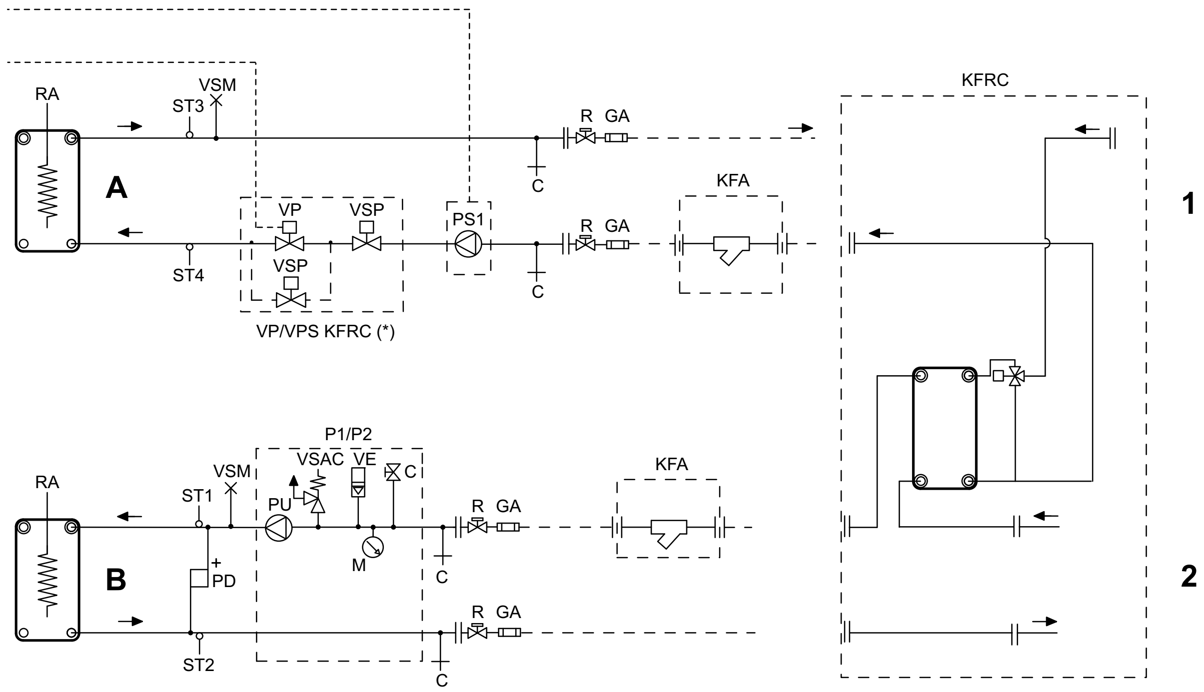
SF = Air-relief
SC = Draining

Equipment must be fixed to a supporting wall.
Drill 4 holes (min. 8 mm.) in the wall.
Secure using appropriate anchors for the wall pressure.

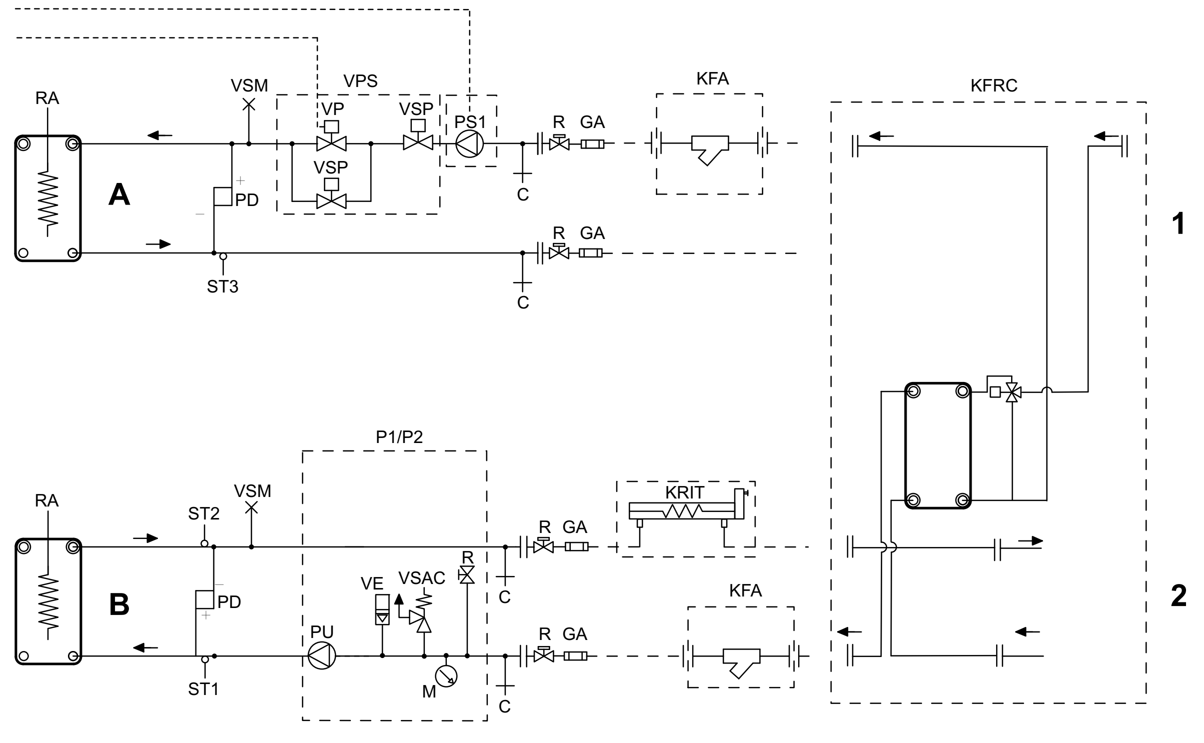
Weight

Modell		115÷122	125÷240
Standard	kg	60	75

TCHEY water circuit



THHEY water circuit



A = Condenser/evaporator/rejection device
B = Evaporator/condenser
1 = External network (rejection device)
2 = Heating/conditioning system (primary)
KFA = Water filter (accessory)
KFRC = Free-Cooling kit
KRIT = Supplementary electric heater (accessory)
M = Water pressure gauge
PD = Differential water pressure switch

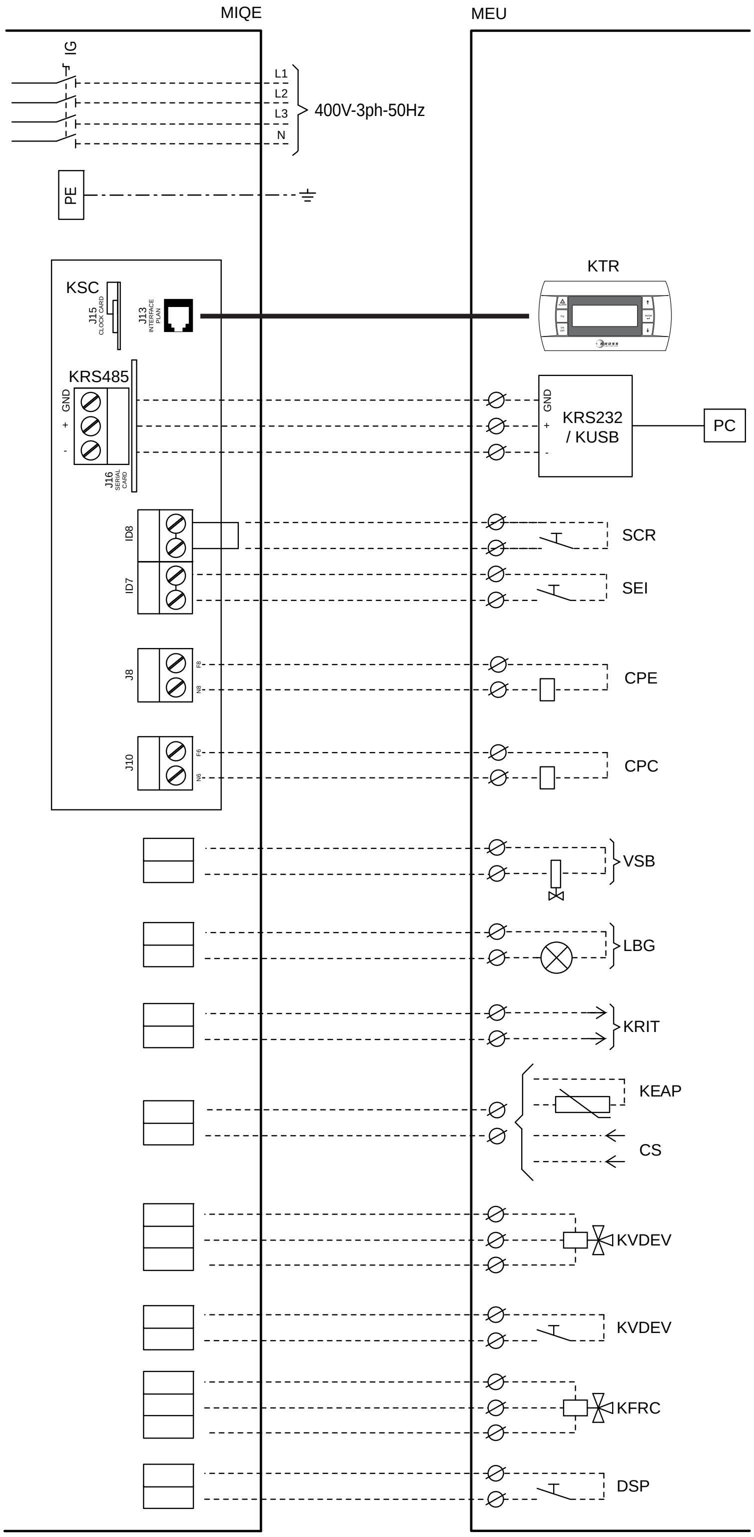
PD = Differential pressure switch
PS1 = Variable-speed pump (accessory)
P1/P2 = Pump set-up (accessory)
R = Valve;
ST1 = Temperature probe and system inlet
ST2 = Antifreeze summer/winter safety operating temperature probe
ST3 = External network outlet temperature probe

ST4 = Present only on HPH versions
VE = Expansion tank
VP = Pressure valve
VSAC = Safety water valve
VSM = Manual air-relief valve
VSP = Water solenoid valve

(*) VPS with Free-Cooling kit (requires VPS valve)
- - - - Connections to be made by installer

TCHEY-THHEY 115÷240
Power supply 400V – 3ph+N – 50Hz

MIQE = Terminal board inside power panel
MEU = External terminal board for user
IG = Main isolating switch
LBG = General blockage light (power supply 230 Vac, max. load 0.5A AC1)
J13 = 6-pin telephone connector (RJ12)
J15 = Connector for plugging in KSC accessory
J16 = Connector for plugging in KRS485, KFTT10, KISI accessories
KSC = Clock card (accessory)
KRS485 = RS485 serial interface (accessory)
KRS232 = RS485/RS232 converter (accessory)
KUSB = RS485/USB converter (accessory)
KTR = Remote keypad (accessory)
L1 = Line 1
L2 = Line 2
L3 = Line 3
N = Neutral
PC = Personal computer
PE = Earth clamp
SCR = Remote control switch (dry contact control)
SEI = Summer/winter switch (dry contact control)
KRIT = KRIT control (supplementary electric heater for heat pump) (accept signal voltage 230Vac, max. load 0.5A AC1)
KEAP = External air probe for set-point compensation
KVDEV = Domestic hot water diverter valve control (accept signal voltage 230Vac, max. load 0.5A AC1) and DHW accept signal (dry contact)
KFRC = Free-Cooling diverter valve control (accept signal voltage 230Vac, max. load 0.5A AC1)
CPC = Condenser pump control (accept signal voltage 230Vac, max. load 0.5A AC1)
CPE = Evaporator pump control for standard set-up (accept signal voltage 230Vac, max. load 0.5A AC 1);
CS = Scrolling Set-point (4-20 mA);
DSP = Remote double Set-point (control with potential free contact);
VSB = Water shutoff valve solenoid (accept signal voltage 230Vac, max. load 0.5A AC1);
- - - - = Connection to be made by installer
▬▬ = 6-wire telephone cable (max. distance 50 m, for longer distances contact *RHOSS* Customer Service)



○ The power panel is accessible from the front of the unit.
○ Connections must be made by qualified personnel in compliance with local regulations and following the diagrams supplied.
○ Always install an automatic general isolator in a protected area near the unit with a delayed characteristic curve of suitable capacity and breaking capacity. Make sure the isolator has a 3 mm minimum opening distance between contacts.
○ Earth connection is compulsory by law to ensure user safety when the unit is in use.

IMPORTANT!
The diagrams show only the connections that must be made by the installer.

Cable section		115	118	122	125	230	240
Line section	mm²	2.5	2.5	4	4	6	6
PE section	mm²	2.5	2.5	4	4	6	6
Remote control section	mm²	1.5	1.5	1.5	1.5	1.5	1.5

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TCHEY-THHEY 115÷240
Low consumption Y-Flow range

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