TCHE-THHE 155÷2130
TCEE 155÷2130
Q-Flow range

Macrosystem
50,2÷124,5 kW

TCHE-THHE - Water cooled water chillers and heat pumps units with environmentally friendly refrigerant. Range with hermetic Scroll compressors.

R407C

TCEE - Condenserless units with environmentally friendly refrigerant. Range with hermetic Scroll compressors.

RHOSS
CLIMA EVOLUTION

main features

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Standard use conditions

The TCHE-TCHEI units are packaged water cooled water chillers.
The THHE-THHEI units are packaged water cooled heat pumps, reversible on the refrigerant cycle with water evaporation/ condensation.
The TCEE-TCEEI units are condenserless water chillers.
They are intended for use in industrial processing or conditioning plants where a supply of chilled water (TCHE-TCHEI - TCEE-TCEEI) or chilled and hot water (THHE-THHEI) is required.
The machine is designed for indoor installation.

ATTENTION!

In order to operate, TCEE-TCEEI condenserless units must be connected to a remote condenser.
The CCAM range of RHOSS remote condensers is available on request. They are manufactured in several versions so as to meet the different system needs concerning the noise levels (for further information, see TECHNICAL NOTE for CCAM units).

The units comply with the following Directives:
• Machine Directive 89/392/CEE (MD);
• Low Voltage Directive 73/23/CEE (LVD);
• Electromagnetic Compatibility Directive 89/336/CEE (EMC);
• Pressurised Equipment Directive 97/23/CEE (PED).

Code guide

"RANGE" code

T Water chiller or heat pump	**C** Cooling only	**H** Water cooled	**E** Scroll hermetic compressors	**B** Standard version
	H Heat pump	**E** Condenserless		**I** Soundproofed version

"MODEL" code

1 or **2** No. compressors	**55 - 130** Approximate cooling capacity (in kW)

Example: THHE 2130

○ Water cooled heat pump unit.
○ 2 Scroll hermetic compressors
○ Nominal cooling capacity of roughly 130 kW.

Features

○ Structure made of painted sheet steel with sound insulating material.
○ Scroll type rotary hermetic compressors complete with internal thermal protection
○ Capacity step control according to the following table:
○ Stainless steel plate exchangers complete

MODEL	Compressors/Steps no.	Circuits no.
155 - 165	1 / 1	1
280 - 2130	2 / 2	1

with insulation with close cellular expanded synthetic rubber.
○ **High and low pressure gauges complete with capillaries (standard on models 280 - 2130, optional for models 155-165).**
○ Differential pressure switch on the evaporator (TCHE-TCHEI - TCEE-TCEEI) or on the evaporator and condenser (THHE-THHEI), to protect the unit as the water flow stops.
○ Phase monitor to protect the compressor.
○ Male threaded hydraulic connections.
○ Refrigerant circuit with mild copper tubes and silver alloy welding.
It is complete with: filter drier, charge connections, high and low pressure gauges, liquid moisture indicator, thermostatic expansion valves, compressor discharge and suction safety valves, cycle inversion valve (for THHE-THHEI), non-return valve (for THHE-THHEI), cocks equipped with threaded connection for flanged pipes on the discharge and liquid lines.
○ The TCHE-TCHEI - THHE-THHEI units are complete with R407C refrigerant charge.
○ The TCEE-TCEEI units are pre-charged with R407C refrigerant with the purpose of protecting the refrigerant circuit. The correct charge must be established by the installer based on the length of the lines between the condenserless and the remote condenser.

Electrical board

○ Electrical board accessible from the front panel, in accordance with IEC standards, lockable with special key.
Board (models 155 - 165) or sealed box (models 280 - 2130), equipped with special lock and complete with:
• electrical wiring arranged for power supply 400V-3ph+N-50Hz;
• auxiliary power supply: 230V-1ph-50Hz;
• control power supply: 12V-1ph-50Hz;
• power contactors;
• main power supply switch with safety door interlocking isolator;
• automatic protection switch(es) for compressor(s)
• automatic compressor protection switch;
• automatic protection switch on auxiliary power circuit;
• arrangement for management of remote condenser (TCEE-TCEEI).
○ Programmable microprocessor electronic board regulated with the keyboard built into the units.
This electronic board controls the following functions:
• adjustment and control of temperature set points of water inlet/outlet of the machine; of the safety delays; of the time-run-meter of the compressor(s); of the automatic sequence inversion of the compressors (only for models with dual compressors); of the circulation or use service pump; of the condenser side circulation pump; of the electronic anti-freeze protection which starts automatically with the machine off (if anti-freeze heating element is present); of the functions which control the intervention mode of the single organs which comprise the machine;
• complete protection of the unit, possible cut off of the machine and display of the active alerts;
• visualisation: of set values, of inlet/outlet water temperatures and of alerts, by display; of working devices and chiller or heat pump operation by led;
• self-diagnosis with continual checking of the machine oeprational status
○ Advanced functions:
• arranged for serial connection, with RS485 outlet for logical dialogue with building automation, centralized systems and supervision networks.
• testing of the units assisted by computer.

Versions

○ **B** - Standard version (TCHE-THHE).
○ **I** - Soundproofed version, with soundproof jackets on compressors (TCHEI-THHEI only for models 280, 2110 and 2130).

Accessories factory fitted

○ **PSC** - Condensation by means of regulation fan speed control of the CCAM remote condensers (only TCEE-TCEEI versions in conjuction with CCAM units supplied by RHOSS S.P.A.).
○ **GM** - High and low pressure gauges for refrigerant circuit, complete with capillary tubes (accessories only for models 155 - 165).

Accessories supplied loose

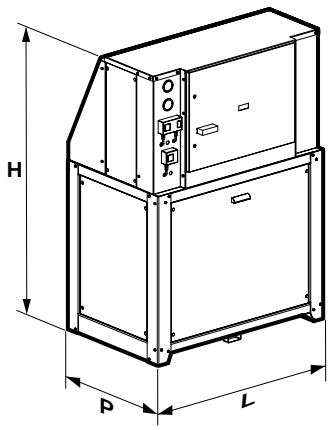
○ **KSA** - Rubber anti-vibration mountings.
○ **KVP** - Pressure regulating valve (TCHE-TCHEI only).
The kit KVP consists of a pressure valve which modulates the water flow to the condenser, keeping the condensation pressure constant. The use of the accessory is recommended in the following cases:
• in general when the machine is made to work with set-points much lower than the design set-point without adapting the water flow and/or the inlet water temperature at the condenser to the effective heat to be rejected;
• when the city water entering the condenser has a temperature lower than 15°C (the permitted temperature differential ΔT across the condenser for city water is within the range 12 ÷ 18°C);
• when the water entering the condenser has a temperature lower than 25°C with ΔT less than 12°C (the permitted temperature differential ΔT across the condenser for water is within the range 5 ÷ 15°C: the temperature of the condenser outlet water must however not exceed 50°C).
○ **KVPS** - Pressure regulating valve and water solenoid valve (THHE-THHEI only).
The kit KVPS consists of a pressure valve paired with a solenoid valve installed in hydraulic parallel.
In operation as a chiller, the solenoid valve is closed, allowing the condensation water to pass through the pressure valve which then performs its function as explained in the description of kit KVPS.
○ **KTR1** - Remote keyboard and display with the same functions as the one built into the unit (models 155 - 165).
○ **KTR** - Remote keyboard and display with the same functions as the one built into the unit (models 280 - 2130).
○ **KIS** - RS 485 serial interface for logical dialogue with building automation, centralized systems and supervision networks.
○ **KCH** - RS232 hardware key to be connected to supervision systems, to combine with one or more KIS serial interface modules in the case of central unit management.
○ **CCAM** - Remote condenser (for further information, see CCAM unit TECHNICAL UNIT)

TCHE-TCHEI: technical features

MODEL **TCHE-TCHEI**		**155**	**165**	**280**	**2110**	**2130**
Technical data						
Nominal cooling capacity (*)	kW	52,7	65,3	78,5	106,1	131,1
Condenser heat rejection (*)	kW	66,1	81,5	98,0	132,8	163,4
E.E.R. (*)		3,40	3,49	3,47	3,44	3,51
Refrigerant circuits	No.	1	1	1	1	1
Scroll compressor / steps	No.	1 / 1	1 / 1	2 / 2	2 / 2	2 / 2
Sound power level (*)	dB(A)	71	72	71	74	75
Evaporator nominal water flow (*)	L/h	9.065	11.230	13.500	18.250	22.550
Evaporator nominal pressure drops (*)	kPa	28	28	25	27	28
Evaporator water connections	∅	2" G	2" G	2" G	2" G	2" G
Condenser nominal water flow (*)	L/h	11.370	14.020	16.850	22.850	28.100
Condenser nominal pressure drops (*)	kPa	43	44	40	43	44
Condenser water connections	∅	2" G	2" G	2" G	2" G	2" G
Heat exchanger water contents	L	4,0	5,0	6,5	8,6	10,7
R407C refrigerant charge (*****)	kg	3,3	4,0	5,0	6,6	8,0
Polyester oil charge	L	8,0	8,0	6,6 x 2	8,0 x 2	8,0 x 2
Electrical data						
Total power input (*)	kW	15,5	18,7	22,6	30,8	37,4
Power supply	V-ph-Hz	400/3+N/50	400/3+N/50	400/3+N/50	400/3+N/50	400/3+N/50
Auxiliary power supply	V-ph-Hz	230/1/50	230/1/50	230/1/50	230/1/50	230/1/50
Control power supply	V-ph-Hz	12/1/50	12/1/50	12/1/50	12/1/50	12/1/50
Nominal current	A	26,6	32,7	41,2	53,2	65,4
Max. current	A	34,6	42,4	53,2	69,2	84,8
Starting current	A	215	270	202	250	313
Dimensions						
Length	**L** mm	987	987	1.214	1.214	1.214
Height	**H** mm	869	869	1.703	1.703	1.703
Depth	**P** mm	639	639	873	873	873

(*) At the following conditions: evaporator inlet/outlet water temperature 12°C / 7°C; condenser inlet/outlet water temperature 30°C / 35°C.

(*****) Indicative value: the correct value is stated on the data plate on board the machine.



THHE-THHEI: technical features

MODEL **THHE-THHEI**		**155**	**165**	**280**	**2110**	**2130**
Technical data						
Nominal heating capacity (***)	kW	63,1	78,1	93,4	126,6	156,4
Nominal cooling capacity (**)	kW	52,7	65,3	78,5	106,1	131,1
C.O.P. (***)		3,30	3,37	3,30	3,33	3,37
Refrigerant circuits	No.	1	1	1	1	1
Scroll compressor / steps	No.	1 / 1	1 / 1	2 / 2	2 / 2	2 / 2
Sound power level (***)	dB(A)	71	72	71	74	75
Condenser nominal water flow (***)	L/h	10.850	13.430	16.065	21.775	26.900
Condenser nominal pressure drops (***)	kPa	40	40	35	38	40
Condenser water connections (***)	∅	2" G	2" G	2" G	2" G	2" G
Evaporator nominal water flow (***)	L/h	7.895	9.855	11.696	15.910	19.763
Evaporator nominal pressure drops (***)	kPa	20	22	20	21	22
Evaporator water connections (***)	∅	2" G	2" G	2" G	2" G	2" G
Heat exchanger water contents	L	4,0	5,0	6,5	8,6	10,7
R407C refrigerant charge (*****)	kg	3,3	4,0	5,0	6,6	8,0
Polyester oil charge	L	8,0	8,0	6,6 x 2	8,0 x 2	8,0 x 2
Electrical data						
Winter working total absorbed power (***)	kW	19,1	23,2	28,3	38,0	46,4
Summer working total absorbed power (**)	kW	15,5	18,7	22,6	30,8	37,4
Power supply	V-ph-Hz	400/3+N/50	400/3+N/50	400/3+N/50	400/3+N/50	400/3+N/50
Auxiliary power supply	V-ph-Hz	230/1/50	230/1/50	230/1/50	230/1/50	230/1/50
Control power supply	V-ph-Hz	12/1/50	12/1/50	12/1/50	12/1/50	12/1/50
Nominal current (****)	A	31,1	38,0	48,2	62,2	76,4
Max. current	A	34,6	42,4	53,2	69,2	84,8
Starting current	A	215	270	202	250	313
Dimensions						
Length	**L** mm	987	987	1.214	1.214	1.214
Height	**H** mm	869	869	1.703	1.703	1.703
Depth	**P** mm	639	639	873	873	873

(**) At the following conditions: operation as chiller, evaporator inlet/outlet water temperature 12°C / 7°C; condenser inlet/outlet water temperature 30°C / 35°C.

(***) At the following conditions: operating as heat pump, condenser inlet/outlet water temperature 40°C / 45°C; evaporator inlet/outlet water temperature 12°C / 7°C.

(****) The nominal current data are the maximum value between the summer and the winter working.

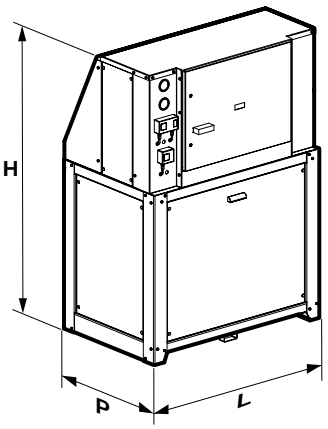
(*****) Indicative value: the correct value is stated on the data plate on board the machine.

TCEE-TCEEI: technical features

MODEL **TCEE-TCEEI**		**155**	**165**	**280**	**2110**	**2130**
Technical data						
Nominal cooling capacity (*)	kW	50,2	62,2	74,2	100,4	124,5
Condenser heat rejection (*)	kW	65,3	80,6	96,7	130,6	161,2
E.E.R. (*)		2,94	2,99	2,92	2,94	2,99
Refrigerant circuits	No.	1	1	1	1	1
Scroll compressor / steps	No.	1 / 1	1 / 1	2 / 2	2 / 2	2 / 2
Sound power level (**)	dB(A)	71	72	71	74	75
Evaporator nominal water flow (*)	L/h	8.630	10.700	12.760	17.270	21.410
Evaporator nominal pressure drops (*)	kPa	25	25	22	24	25
Evaporator water contents	L	4,0	5,0	6,5	8,6	10,7
Evaporator water connections	∅	2" G	2" G	2" G	2" G	2" G
Refrigerant connections	Type	Flange joints	Flange joints	Flange joints	Flange joints	Flange joints
Refrigerant connection: gas lines	mm	28	28	35	35	35
Refrigerant connection: liquid lines	mm	22	22	22	22	22
R407C refrigerant charge (***)	kg	3,3	4,0	5,0	6,6	8,0
Polyester oil charge	L	8,0	8,0	6,6 x 2	8,0 x 2	8,0 x 2
Electrical data						
Total power input (*)	kW	17,1	20,8	25,4	34,2	41,7
Power supply	V-ph-Hz	400/3+N/50	400/3+N/50	400/3+N/50	400/3+N/50	400/3+N/50
Auxiliary power supply	V-ph-Hz	230/1/50	230/1/50	230/1/50	230/1/50	230/1/50
Control power supply	V-ph-Hz	12/1/50	12/1/50	12/1/50	12/1/50	12/1/50
Nominal current (*)	A	28,8	35,4	44,8	57,6	70,8
Max. current	A	34,6	42,4	53,2	69,2	84,8
Starting current	A	215	270	202	250	313
Dimensions						
Length	**L** mm	987	987	1.214	1.214	1.214
Height	**H** mm	869	869	1.703	1.703	1.703
Depth	**P** mm	636	636	873	873	873

TCEE-TCEEI: suggested pairings with CCAM remote condensers (optionals)

MODEL **TCEE-TCEEI**		**155**	**165**	**280**	**2110**	**2130**
Version N "Normal"						
MODEL **CCAM**		**155 N**	**165 N**	**280 N**	**2110 N**	**2130 N**
Electrical power input (****)	kW	1,65	2,34	3,80	5,70	5,40
Sound pressure level (*****)	dB(A)	50	56	62	64	59
Version S "Silenced"						
MODEL **CCAM**		**155 S**	**165 S**	**280 S**	**2110 S**	**2130 S**
Electrical power input (****)	kW	0,99	2,07	2,07	2,76	2,70
Sound pressure level (*****)	kW	44	51	51	52	52
Version Q "Super silenced"						
MODEL **CCAM**		**155 Q**	**165 Q**	**280 Q**	**2110 Q**	**2130 Q**
Electrical power input (****)	kW	0,66	0,66	1,32	1,32	1,88
Sound pressure level (*****)	dB(A)	40	40	45	43	45



(*) At the following conditions: evaporator inlet/outlet water temperature 12°C / 7°C; dew point 50°C .

(**) At the following conditions: evaporator inlet/outlet water temperature 12°C / 7°C; dew point 45°C .

(***) Indicative value: the correct value is stated on the data plate on board the machine.

(****) At the following conditions: outdoor temperature 35°C D.B., 24°C W.B.; dew point 50°C , subcooling 3°K, desuperheating 25°K; fans at maximum speed

(*****) Sound pressure level in dB(A) is referred to measures in open place at 10 m. distance.

ATTENTION!

○ The TCEE-TCEEI condenserless units must be connected to the remote condensers; their installation and the realization of the refrigerant circuit are to be handled by the installer and must be performed properly.
○ Poor execution of the refrigerant circuit may substantially reduce the machine's performance and compromise its life cycle.
○ The above data refer only to the condenserless unit, prior to pressure drops due to the condensation refrigerant circuit.
○ RHOSS S.P.A. shall not be held responsible for any malfunctions of the machine resulting from problems connected with the realization of the condensation refrigerant circuit,which is the responsibility of the user.

Keyboard and display description for models 155 - 165

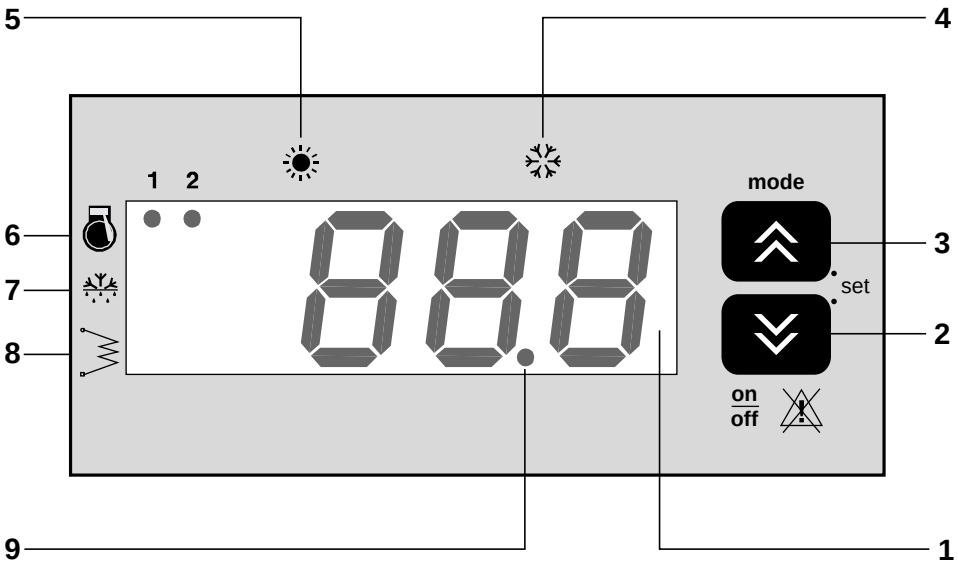


fig. 1

The keyboard with display makes it possible to view the working temperature and all process variables of the unit, the access to the setting parameters of the set working values and their modification. For technical service, it makes it possible, with a password, to access the unit management parameters (access allowed only for authorized personnel)

KTR1 - Remote keyboard with display for remote control for models 155 - 165

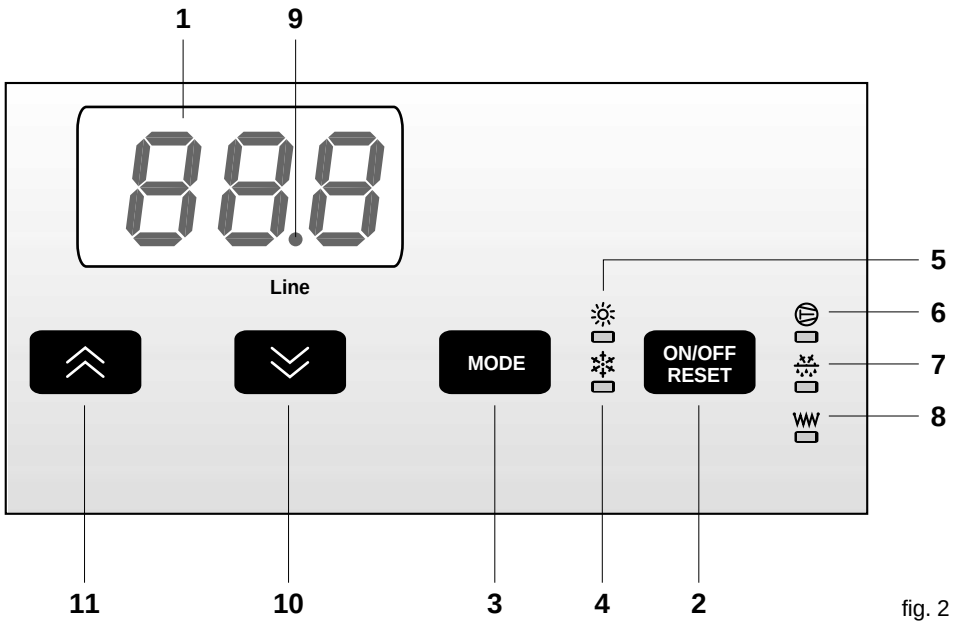


fig. 2

The remote keyboard with display (KTR1), allows the remote control and display of all the process variables, both digital and analog, of the unit.
It is therefore possible to control all functions of the unit directly in the room.

1 = **DISPLAY:**
it displays the value of all the parameters (ex. outlet water temperature etc.), the codes of the possible alarms and the status of all resources.

2 = **ON/OFF, RESET - DOWN key:**
it allows to switch ON, OFF and reset possible alarms of the unit. Furthermore it allows to scroll down the value of the parameters.

3 = **MODE - UP key:**
it allows to select the unit operation (stand-by, summer or winter cycle). Furthermore it allows to roll up the value of the parameters.

4 = **Summer LED:**
it indicates that the unit is working in cooling cycle.

5 = **Winter LED:**
it indicates that the unit is working in heating cycle.

6 = **Compressor LED:**
indicates that the compressor is running or that it is in time-delay mode.

7 = **Defrosting LED:**
this led is not enabled.

8 = **Plate exchanger heater LED:**
this led is not enabled.

9 = **Power supply LED:**
it indicates the presence of power supply to the unit.

10/11 = **▲ (up), ▼ (down) keys, KTR1 only**
used to scroll through the list of parameters and any triggered alarms; can also be used to change the programmed set points.

Keyboard and display description for models 280 - 2130

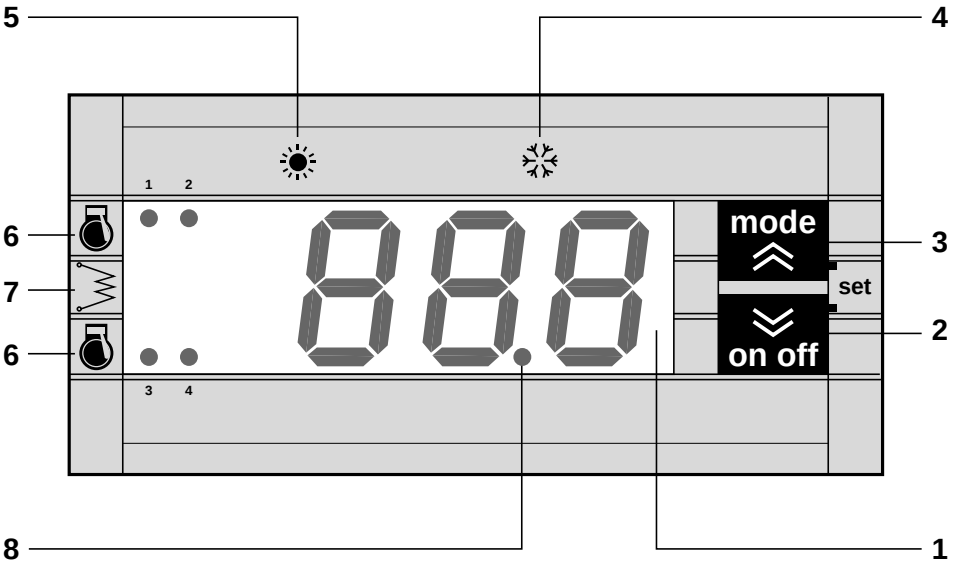


fig. 3

The keyboard with display makes it possible to view the working temperature and all process variables of the unit, the access to the setting parameters of the set working values and their modification. For technical service, it makes it possible, with a password, to access the unit management parameters (access allowed only for authorized personnel)

KTR - Remote keyboard with display for remote control for models 280 - 2130

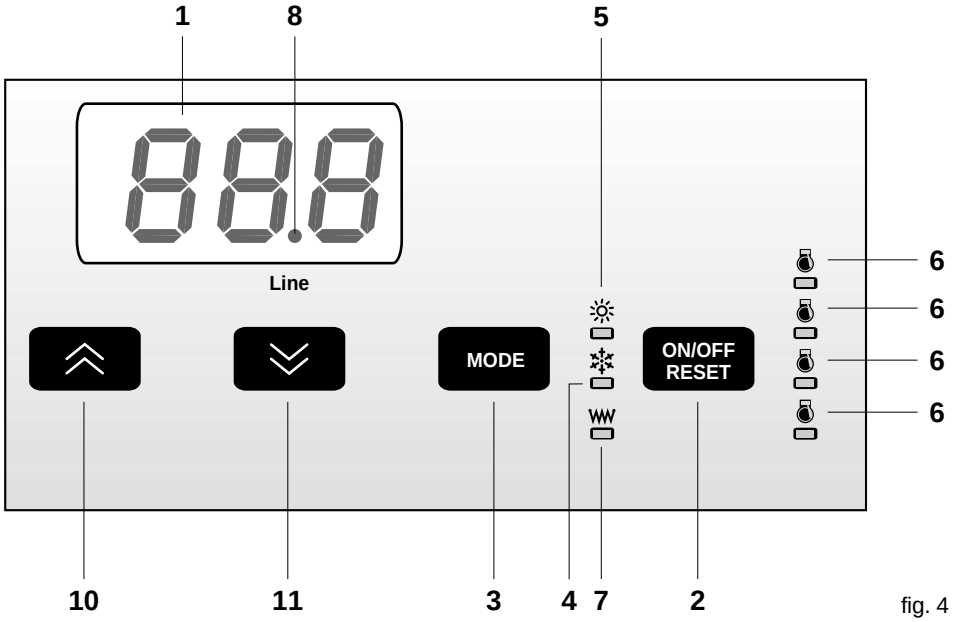


fig. 4

The remote keyboard with display (KTR), allows the remote control and display of all the process variables, both digital and analog, of the unit.
It is therefore possible to control all functions of the unit directly in the room.

1 = **DISPLAY:**
it displays the value of all the parameters (ex. outlet water temperature etc.), the codes of the possible alarms and the status of all resources.

2 = **ON/OFF, RESET - DOWN key:**
it allows to switch ON, OFF and reset possible alarms of the unit. Furthermore it allows to scroll down the value of the parameters.

3 = **MODE - UP key:**
it allows to select the unit operation (stand-by, summer or winter cycle). Furthermore it allows to roll up the value of the parameters.

4 = **Summer LED:**
it indicates that the unit is working in cooling cycle.

5 = **Winter LED:**
it indicates that the unit is working in heating cycle.

6 = **Compressor LED:**
indicates that the compressor is running or that it is in time-delay mode.

7 = **Plate exchanger heater LED:**
this led is not enabled.

8 = **Power supply LED:**
it indicates the presence of power supply to the unit.

10/11 = **▲ (up), ▼ (down) keys, KTR only**
used to scroll through the list of parameters and any triggered alarms; can also be used to change the programmed set points.

Selection of the chiller or heat pump and use of the performance tables

○ Table "**A**" gives, for each TCHE-TCHEI - THHE-THHEI model, the cooling capacity (QF), the total absorbed electrical power (P) and the heating power to reject (QT), as a function of the water temperature at the condenser outlet and at the evaporator outlet with constant temperature differentials ΔT = 5°C: in the case of THHE-THHEI models the value of QT is the value of the heating capacity available to the user in the winter cycle, i.e. when operating as a heat pump.
○ Table "**D**" gives, for each TCHE-TCHEI and THHE-THHEI model in the summer cycle, the values of QF, P and QT, as a function of the temperature of the well or city water at the condenser outlet with temperature differential ΔT = 12°C, and as a function of the user water temperature at the evaporator outlet with temperature differential ΔT = 5°C.
○ Table "**F**" gives, for each TCEE-TCEEI model, the cooling capacity (QF), the total absorbed electrical power (P) and the heating power to reject (QT) by means of a remote condenser (optional), as a function of the temperature of the evaporator outlet water with temperature differential ΔT = 5°C and as a function of the condensation temperature (dew point).
○ With respect to the operating limits (see page 14), the values of tables "**A**", "**D**" and "**F**" can allow interpolation of the performances, but extrapolation is not permitted.
○ Tables "**B**", "**C**" and "**E**" give the correction coefficients for the performances, for variations in the temperature differential ΔT between inlet and outlet water at the exchangers.
○ Table "**N**" gives the correction coefficients to be applied to the nominal values in the event of the use of water with ethylene glycol added.
○ Table "**G**" indicates the values of the pressure drops of the exchanger which functions as evaporator on models TCHE-TCHEI - THHE-THHEI in the summer cycle (operation as a chiller) and as condenser on models THHE-THHEI in the winter cycle (operation as a heat pump): in respect of the permitted temperature differentials (see page 14) it is possible to extrapolate other values for the pressure drops.
○ Table "**H**" indicates the values of the pressure drops of the exchanger which functions as condenser on models TCHE-TCHEI - THHE-THHEI in the summer cycle (operation as a chiller) and as evaporator on models THHE-THHEI in the winter cycle (operation as a heat pump): in respect of the permitted temperature differentials (see page 14) it is possible to extrapolate other values for the pressure drops.
○ Table "**I**" indicates the values of the pressure drops of the evaporator on TCEE-TCEEI models
○ Tables "**L**" and "**M**" contain the values of the sound power level emitted by the individual model in the standard and in the soundproofed version.

Example:

○ Design conditions for a water-cooled chiller:
• Cooling capacity required = 100 kW;
• Water temperature produced at the evaporator = 7°C;
• Temperature differential ΔT at the evaporator = 5°C;
• Inlet temperature at the condenser = 30°C.

Using the values indicated in table "**A**", and assuming a temperature differential ΔT = 5°C at the condenser, we see that model TCHE 2110 satisfies the requirement with:
QF = 106,1 kW ; P = 30,8 kW;
QT = 132,8 kW.
The water flows G to send to the exchangers are obtained by using the following formulae:
G (L/h) evaporator = (QF x 860) ÷ ΔT = (106,1 x 860) ÷ 5 = 18.250 (L/h);
G (L/h) condenser = (QT x 860) ÷ ΔT = (132,8 x 860) ÷ 5 = 22.850 (L/h).
From tables "**G**" and "**H**" we obtain the values of the pressure drops Δpw of the evaporator and the condenser respectively:
Δpw evaporator = 27 kPa;
Δpw condenser = 43 kPa.
To reduce the water flow to be sent to the condenser, we need to increase the temperature differential ΔT. Assuming therefore that we are working with a ΔT at the condenser of 10°C, for the same outlet water temperature at the condenser Tuct = 35°C the new inlet water temperature at the condenser is found to be:
Inlet temperature at the condenser = 35°C –10°C = 25°C.
○ Using the correction coefficients kct QF and kct P of table "**B**", we calculate the new values for QF^{I}, P^{I} and then QT^{I}:
QF^{I} = QF x kct QF = 106,1 x 1,016 = 107,8 kW;
P^{I} = P x kct P = 30,8 x 0,969 = 29,8 kW;
QT^{I} = (QF^{I} + P^{I}) x 0,97 = (107,8 + 29,8) x 0,97 = 133,5 kW.
The new water flows G to send to the exchangers are obtained using the following formulae:
G (L/h) evaporator = (107,8 x 860) ÷ 5 = 18.542 (L/h);
G (L/h) condenser = (133,5 x 860) ÷ 10 = 11.481 (L/h).
From tables "**G**" and "**H**" we can extrapolate the values of the pressure drops Δpw at the evaporator and at the condenser corresponding to the new flow rates.
Or we can use the following simplified formulae:
Δpw^{I} evaporator = $\Delta pw \times (G^{I} \div G)^2$ = 27 x (18.542 ÷ 18.250)² = 28 kPa;
Δpw^{I} condenser = $\Delta pw \times (G^{I} \div G)^2$ = 43 x (11.481 ÷ 22.850)² = 11 kPa.

Table “A”: TCHE-TCHEI - THHE-THHEI performance data (ΔT = 5°C at condenser; ΔT = 5°C at evaporator)

	Tue (°C)	Tuc (°C)														
		30			**35**			**40**			**45**			**50**		
MODEL		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
155	**5**	51,8	63,5	13,6	48,7	62,1	15,3	45,6	60,7	17,0	42,2	59,3	18,9	38,8	57,8	20,8
	7	56,0	67,6	13,8	**52,7**	**66,1**	**15,5**	49,5	64,6	17,1	**45,9**	**63,1**	**19,1**	42,4	61,6	21,1
	10	62,0	73,7	14,0	58,4	71,9	15,7	54,7	70,0	17,4	50,9	68,2	19,4	47,1	66,5	21,4
	13	69,6	81,4	14,3	65,7	79,3	16,0	61,7	77,1	17,8	57,6	75,1	19,8	53,5	73,1	21,8
	15	74,3	86,1	14,5	70,1	83,8	16,2	66,0	81,5	18,0	61,7	79,3	20,1	57,4	77,1	22,1
165	**5**	64,0	77,9	16,4	60,4	76,5	18,5	56,8	75,0	20,5	52,7	73,3	22,8	48,7	71,6	25,1
	7	69,1	83,1	16,6	**65,3**	**81,5**	**18,7**	61,5	79,9	20,8	**57,3**	**78,1**	**23,2**	53,2	76,3	25,5
	10	76,2	90,3	16,9	72,1	88,5	19,1	68,0	86,6	21,2	63,6	84,6	23,6	59,2	82,6	26,0
	13	84,8	99,0	17,3	80,4	96,9	19,5	76,0	94,8	21,7	71,2	92,5	24,1	66,4	90,2	26,5
	15	90,2	104,5	17,6	85,6	102,2	19,8	81,1	100,0	22,0	76,0	97,5	24,4	71,0	94,9	26,9
280	**5**	77,2	94,0	19,7	72,4	91,9	22,4	67,5	89,8	25,0	62,3	87,7	28,1	57,1	85,5	31,1
	7	83,6	100,4	19,9	**78,5**	**98,0**	**22,6**	73,4	95,7	25,2	**68,0**	**93,4**	**28,3**	62,5	91,1	31,4
	10	92,4	109,2	20,2	86,9	106,5	22,9	81,3	103,7	25,6	75,5	101,1	28,7	69,7	98,5	31,8
	13	103,1	119,8	20,4	97,1	116,7	23,1	91,2	113,6	25,9	84,9	110,5	29,0	78,6	107,4	32,1
	15	109,8	126,4	20,6	103,5	123,0	23,3	97,2	119,6	26,1	90,6	116,3	29,2	84,1	113,0	32,4
2110	**5**	104,1	127,2	27,1	97,9	124,4	30,4	91,7	121,6	33,7	85,0	118,9	37,6	78,3	116,1	41,4
	7	112,8	136,0	27,5	**106,1**	**132,8**	**30,8**	99,5	129,6	34,1	**92,5**	**126,6**	**38,0**	85,5	123,6	41,9
	10	124,9	148,3	28,0	117,7	144,6	31,3	110,5	140,9	34,7	103,0	137,4	38,7	95,5	133,9	42,6
	13	139,8	163,2	28,5	131,8	158,8	32,0	123,8	154,5	35,4	115,8	150,5	39,4	107,7	146,6	43,4
	15	148,8	172,4	28,9	140,7	167,8	32,4	132,5	163,3	35,9	123,9	158,9	39,9	115,3	154,5	44,0
2130	**5**	126,9	154,6	32,5	119,6	151,7	36,8	112,2	148,7	41,1	105,1	146,3	45,7	98,0	143,8	50,2
	7	139,0	166,8	33,0	**131,1**	**163,4**	**37,4**	123,2	160,0	41,8	**114,9**	**156,4**	**46,4**	106,6	152,9	51,0
	10	152,9	180,9	33,6	144,3	176,9	38,1	135,8	173,0	42,6	126,9	168,9	47,3	118,0	164,9	51,9
	13	170,7	198,9	34,4	161,3	194,3	38,9	152,0	189,6	43,5	142,5	185,1	48,3	133,1	180,6	53,2
	15	181,6	209,9	34,8	171,9	205,0	39,4	162,2	200,1	44,1	152,2	195,2	49,0	142,2	190,2	53,9

Tue = Evaporator outlet water temperature (inlet/outlet ΔT = 5°C)
Tuc = Condenser outlet water temperature (ΔT inlet/outlet = 5°C)
QF = Cooling capacity
QT = Heating capacity
P = Total absorbed electrical power

Nominal summer operating conditions

evaporator water inlet/outlet 12°C / 7°C, condenser water inlet/outlet 30°C / 35°C

Nominal winter operating conditions (THHE-THHEI)

condenser water inlet/outlet 40°C / 45°C, evaporator water inlet/outlet 12°C / 7°C.

Table “B”: correction coefficients for water ΔT at condenser

For ΔT of the water at the condenser different from 5°C (minimum ΔT of 5 °C and maximum ΔT of 15 °C), at the same water outlet temperatures (respectively 30°C, 35°C, 40 °C, 45 °C and 50°C), apply the following correction coefficients to the data in the table (table “A”):

ΔT	kct QF	kct P
5°C	1,000	1,000
10°C	1,016	0,969
15°C	1,030	0,940

ATTENTION!

For water at the condenser inlet with a temperature of less than 25°C and ΔT lower than 12°C, installation of the accessory pressurestat valve is recommended.

Table “C”: correction coefficients for water ΔT at evaporator

For ΔT of the water at the evaporator different from 5°C, for the same water outlet temperatures (respectively 5°C, 7°C, 10°C, 13°C and 15°C), apply the following correction coefficients to the data in the table (table “A”):

ΔT	ket QF	ket 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

ATTENTION!

At the evaporator the temperature differential ΔT between the inlet water temperature and the outlet water temperature must be between 3°C and 8°C.

Table “D”: TCHE-TCHEI and THHE-THHEI in the summer cycle performance data (condensation with city water with ΔT = 12°C at condenser and with ΔT = 5°C at evaporator)

	Tue (°C)	Tuc (°C)								
		24 (*)			**27**			**30**		
MODELLO		QF	QT	P	QF	QT	P	QF	QT	P
		kW	kW	kW	kW	kW	kW	kW	kW	kW
155	**5**	56,3	64,8	11,9	54,7	63,9	12,5	53,0	62,9	13,2
	7	60,8	69,1	12,0	59,0	68,1	12,7	57,2	67,1	13,4
	10	67,1	75,3	12,2	65,3	74,3	12,9	63,2	73,1	13,7
	13	–	–	–	73,1	82,0	13,2	70,8	80,6	14,0
	15	–	–	–	–	–	–	75,5	85,2	14,2
165	**5**	68,3	78,0	13,8	66,7	77,4	14,8	65,0	76,8	15,8
	7	73,7	83,3	14,0	71,9	82,5	15,0	70,0	81,7	16,0
	10	81,5	90,9	14,2	79,5	90,1	15,3	77,5	89,1	16,4
	13	–	–	–	88,5	98,9	15,6	86,1	97,7	16,7
	15	–	–	–	–	–	–	91,7	103,2	16,9
280	**5**	83,5	95,5	17,0	81,3	94,3	18,0	78,8	93,0	19,2
	7	90,3	102,0	17,1	87,7	100,6	18,2	85,0	99,2	19,4
	10	99,9	111,4	17,3	97,2	109,8	18,4	94,3	108,2	19,6
	13	–	–	–	108,1	120,4	18,7	104,9	118,6	19,9
	15	–	–	–	–	–	–	111,4	125,0	20,1
2110	**5**	112,9	139,3	23,7	109,8	137,6	24,9	106,3	135,8	26,4
	7	121,9	148,6	23,9	118,5	146,6	25,2	114,7	144,6	26,8
	10	135,1	162,3	24,3	131,3	160,0	25,7	127,2	157,7	27,3
	13	–	–	–	146,7	176,0	26,2	142,0	173,1	27,9
	15	–	–	–	–	–	–	151,4	182,9	28,2
2130	**5**	135,1	154,4	27,4	131,8	153,2	29,5	128,3	151,8	31,5
	7	148,0	167,0	27,9	144,2	165,4	29,9	140,4	163,8	32,0
	10	162,9	181,8	28,4	158,8	179,9	30,5	154,7	178,0	32,6
	13	–	–	–	177,1	197,8	31,2	172,6	195,6	33,3
	15	–	–	–	–	–	–	183,7	206,6	33,8

(*) Fit the accessory pressurestat valve.

Tue = Evaporator outlet water temperature (inlet/outlet ΔT = 5°C)
Tuc = Condenser outlet water temperature (city water, ΔT inlet/outlet = 12°C)
QF = Cooling capacity
QT = Heating capacity
P = Total absorbed electrical power

Table “E”: correction coefficients for ΔT of city water at the condenser

For ΔT of city water different from 12°C, at the same inlet water temperatures (respectively 12°C, 15°C and 18°C), apply the following correction coefficients to the data in the table (table “D”):

ΔT	kcp QF	kcp P
12°C	1,000	1,000
15°C	0,980	1,040
18°C	0,975	1,050

QT = (QF + P) x 0,97

ATTENTION!

It is possible to use city water at the condenser with an inlet temperature between 12°C and 18°C and with minimum ΔT of 12°C and maximum ΔT of 18°C.
When the temperature of the condenser inlet water is below 15°C, installation of the accessory pressure valve is recommended.

Table “F”: TCEE-TCEEI performance data

MODEL	Tue (°C)	Tc (°C) 40			45			50			55			60		
		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
155	**5**	51,1	63,0	13,8	48,2	61,6	15,3	45,2	60,3	17,0	42,1	59,1	18,9	38,9	58,1	21,0
	7	56,6	68,4	13,9	53,4	66,8	15,4	**50,2**	**65,3**	**17,1**	46,8	63,8	19,0	43,4	62,6	21,1
	10	62,6	74,3	14,0	59,2	72,5	15,5	55,6	70,6	17,2	51,9	68,9	19,1	48,2	67,4	21,3
	13	69,0	80,6	14,1	65,3	78,5	15,6	61,4	76,4	17,3	57,5	74,4	19,2	53,3	72,5	21,4
	15	75,9	87,4	14,2	71,9	85,0	15,7	67,7	82,7	17,5	63,4	80,3	19,4	58,9	78,0	21,6
165	**5**	62,8	77,0	16,6	59,7	75,9	18,6	56,4	74,7	20,7	52,7	73,4	22,9	48,8	72,0	25,4
	7	69,3	83,5	16,7	66,0	82,2	18,7	**62,2**	**80,6**	**20,8**	58,3	79,0	23,1	54,1	77,4	25,7
	10	76,3	90,3	16,9	72,7	88,8	18,9	68,8	87,1	21,0	64,4	85,1	23,3	59,8	83,1	25,9
	13	83,8	97,8	17,0	79,9	95,9	19,0	75,6	93,9	21,2	71,0	91,7	23,5	66,0	89,3	26,1
	15	91,9	105,7	17,1	87,7	103,7	19,2	83,1	101,3	21,4	78,1	98,8	23,7	72,6	96,0	26,3
280	**5**	78,3	95,6	20,3	73,4	93,2	22,7	68,3	90,8	25,3	62,7	88,3	28,3	56,9	86,0	31,8
	7	84,9	102,1	20,3	79,8	99,4	22,7	**74,2**	**96,7**	**25,4**	68,3	93,8	28,4	62,2	91,1	31,8
	10	94,6	111,5	20,4	88,9	108,3	22,7	82,8	105,0	25,4	76,5	101,8	28,5	69,6	98,4	31,9
	13	106,6	123,1	20,4	100,4	119,4	22,8	93,7	115,6	25,5	86,6	111,6	28,5	79,0	107,6	31,9
	15	114,0	130,3	20,4	107,4	126,3	22,8	100,4	122,1	25,5	92,9	117,8	28,5	84,9	113,3	31,9
2110	**5**	102,2	125,9	27,7	96,4	123,2	30,6	90,4	120,6	33,9	84,2	118,3	37,7	77,8	116,2	42,0
	7	113,3	136,9	27,9	106,9	133,5	30,8	**100,4**	**130,6**	**34,2**	93,6	127,6	38,0	86,8	125,2	42,3
	10	125,2	148,7	28,0	118,4	144,9	31,0	111,1	141,1	34,4	103,9	137,8	38,2	96,4	134,8	42,6
	13	138,1	161,3	28,2	130,6	157,0	31,2	122,9	152,8	34,6	115,0	148,9	38,5	106,6	145,0	42,8
	15	151,7	174,7	28,4	143,8	170,0	31,4	135,5	165,3	35,0	126,7	160,5	38,7	117,8	156,1	43,1
2130	**5**	125,6	154,0	33,2	119,4	151,8	37,1	112,7	149,4	41,3	105,5	146,8	45,9	97,5	144,0	50,9
	7	138,6	166,9	33,5	132,0	164,3	37,4	**124,5**	**161,2**	**41,7**	116,6	158,0	46,3	108,2	154,8	51,3
	10	152,5	180,7	33,8	145,5	177,7	37,7	137,5	174,2	42,0	128,8	170,2	46,7	119,6	166,2	51,8
	13	167,7	195,7	34,0	159,8	191,9	38,0	151,2	187,8	42,4	142,0	183,4	47,1	132,0	178,7	52,2
	15	183,7	211,5	34,3	175,4	207,3	38,3	166,2	202,6	42,7	156,1	197,5	47,5	145,2	192,0	52,7

Tue = Evaporator outlet water temperature (inlet/outlet ΔT = 5°C)
Tc = Condensation temperature (dew point)
QF = Cooling capacity
QT = Condenser heat rejection
P = Total absorbed electrical power

ATTENTION!

○ The TCEE-TCEEI condenserless units must be connected to tthe remote condensers; their installation and the realization of the refrigerant circuit are to be handled by the installer and must be performed properly.
○ Poor execution of the refrigerant circuit may substantially reduce the machine’s performance and compromise its life cycle.
○ The above data refer only to the condenserless unit, prior to pressure drops due to the condensation refrigerant circuit.
○ RHOSS S.P.A. shall not be held responsible for any malfunctions of the machine resulting from problems connected with the realization of the condensation refrigerant circuit, which is the responsibility of the user.

Table “G”: pressure drops at evaporator TCHE-TCHEI - THHE-THHEI (summer cycle) and condenser THHE-THHEI (winter cycle - operation as heat pump)

MODEL																	
155	G (l/h)	5.440	5.890	6.340	6.790	7.240	7.690	8.140	8.590	**9.065**	9.670	10.270	10.870	11.470	12.070	12.670	13.270
	Δpw (kPa)	10	12	14	16	18	20	23	25	**28**	32	36	40	45	50	55	60
165	G (l/h)	6.740	7.300	7.860	8.420	8.980	9.540	10.100	10.660	**11.230**	11.980	12.730	13.480	14.230	14.980	15.730	16.480
	Δpw (kPa)	10	12	14	16	18	20	23	25	**28**	32	36	40	45	50	55	60
280	G (l/h)	8.100	8.780	9.460	10.140	10.820	11.500	12.180	12.860	**13.500**	14.400	15.300	16.200	17.100	18.000	18.900	19.800
	Δpw (kPa)	9	11	12	14	16	18	20	23	**25**	28	32	36	40	44	49	54
2110	G (l/h)	10.950	11.860	12.770	13.680	14.590	15.500	16.410	17.320	**18.250**	19.470	20.690	21.910	23.130	24.350	25.570	26.790
	Δpw (kPa)	10	11	13	15	17	19	22	24	**27**	31	35	39	43	48	53	58
2130	G (l/h)	13.530	14.660	15.790	16.920	18.050	19.180	20.310	21.440	**22.550**	24.050	25.550	27.050	28.550	30.050	31.550	33.050
	Δpw (kPa)	10	12	14	16	18	20	23	25	**28**	32	36	40	45	50	55	60

Table “H”: pressure drops at condenser TCHE-TCHEI - THHE-THHEI (summer cycle) and evaporator THHE-THHEI (winter cycle - operation as heat pump)

MODEL																	
155	G (l/h)	6.823	7.388	7.952	8.517	9.081	9.645	10.210	10.774	**11.370**	12.129	12.881	13.634	14.387	15.139	15.892	16.644
	Δpw (kPa)	15	18	21	24	27	31	35	39	**43**	49	55	62	69	76	84	92
165	G (l/h)	8.414	9.110	9.805	10.501	11.197	11.893	12.589	13.285	**14.020**	14.956	15.884	16.812	17.740	18.668	19.596	20.523
	Δpw (kPa)	16	19	22	25	28	32	35	40	**44**	50	56	63	70	78	86	94
280	G (l/h)	10.112	10.948	11.785	12.621	13.458	14.294	15.131	15.967	**16.850**	17.975	19.090	20.205	21.320	22.436	23.551	24.666
	Δpw (kPa)	14	17	20	22	26	29	32	36	**40**	46	51	58	64	71	78	86
2110	G (l/h)	13.713	14.847	15.981	17.115	18.250	19.384	20.518	21.653	**22.850**	24.375	25.887	27.400	28.912	30.425	31.937	33.449
	Δpw (kPa)	15	18	21	24	27	31	35	39	**43**	49	55	62	69	76	84	92
2130	G (l/h)	16.863	18.258	19.653	21.048	22.443	23.838	25.233	26.628	**28.100**	29.975	31.835	33.695	35.555	37.415	39.275	41.135
	Δpw (kPa)	16	18	21	24	28	31	35	39	**44**	49	56	63	70	77	85	93

Table “I”: evaporator pressure drops TCEE-TCEEI

MODEL																	
155	G (l/h)	5.201	5.607	5.996	6.444	6.853	7.195	7.709	8.146	**8.630**	9.186	9.812	10.279	10.793	11.668	11.992	12.698
	Δpw (kPa)	9	11	12	14	16	17	20	22	**25**	28	32	35	39	46	48	54
165	G (l/h)	6.445	6.947	7.429	7.984	8.491	8.915	9.552	10.093	**10.700**	11.381	12.157	12.736	13.373	14.457	14.859	15.733
	Δpw (kPa)	9	11	12	14	16	17	20	22	**25**	28	32	35	39	46	48	54
280	G (l/h)	7.688	8.287	8.863	9.524	10.129	10.635	11.395	12.040	**12.760**	13.577	14.503	15.193	15.953	17.246	17.726	18.768
	Δpw (kPa)	8	9	11	12	14	15	18	20	**22**	25	28	31	34	40	42	48
2110	G (l/h)	10.403	11.214	11.992	12.887	13.705	14.391	15.419	16.291	**17.270**	18.371	19.624	20.558	21.586	23.336	23.984	25.395
	Δpw (kPa)	9	10	12	13	15	17	19	21	**24**	27	31	34	38	44	46	52
2130	G (l/h)	12.900	13.905	14.871	15.981	16.995	17.845	19.120	20.202	**21.410**	22.781	24.334	25.493	26.768	28.938	29.742	31.491
	Δpw (kPa)	9	11	12	14	16	17	20	22	**25**	28	32	35	39	46	48	54

G = Water flow in L/h
Δpw = Pressure drops in kPa

Table “L”: sound power TCHE - THHE - TCEE standard version

MODEL	Sound power levels in dB per octave band and total sound power level in dB(A)								
	63 Hz	**125 Hz**	**250 Hz**	**500 Hz**	**1.000 Hz**	**2.000 Hz**	**4.000 Hz**	**8.000 Hz**	**Lw** (*)
155	38	70	55	68	68	60	56	53	71
165	35	70	73	70	68	60	55	52	72
280	39	67	58	68	68	63	57	54	71
2110	41	73	58	71	71	63	59	56	74
2130	38	73	76	73	71	63	58	55	75

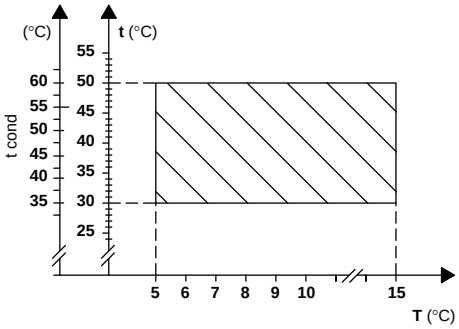
Lw = Total sound power level in dB(A)

(*) Sound power emitted in nominal conditions of summer operation: evaporator inlet/outlet water temperature 12°C / 7°C, condenser inlet/outlet water temperature 30°C / 35°C (TCHE-TCHEI - THHE-THHEI), condensation temperature (dew point) 45°C (TCEE-TCEEI).

Table “M”: sound power TCHEI - THHEI - TCEEI soundproofed version

MODEL	Sound power levels in dB per octave band and total sound power level in dB(A)								
	63 Hz	**125 Hz**	**250 Hz**	**500 Hz**	**1.000 Hz**	**2.000 Hz**	**4.000 Hz**	**8.000 Hz**	**Lw** (*)
280	37	65	56	66	66	61	55	52	69
2110	39	71	56	69	69	61	57	54	72
2130	36	71	74	71	69	61	56	53	73

TCHE-TCHEI - THHE-THHEI - TCEE-TCEEI: cooling operation

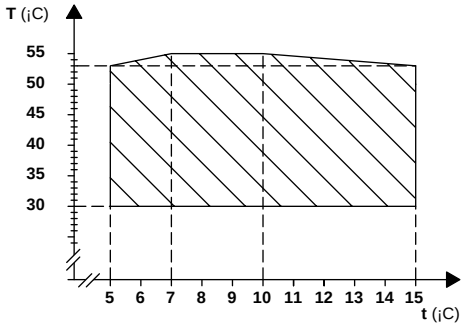


T (°C) = evaporator outlet temperature
t (°C) = condenser outlet temperature
t_{cond} (°C) = dew-point temperature, only for TCEE-TCEEI

Standard operation R407C.

○ **The graphs of the operating limits are valid for temperature differentials ΔT at the evaporator (TCHE-TCHEI - THHE-THHEI - TCEE-TCEEI) and at the condenser (TCHE-TCHEI - THHE-THHEI) of 5°C.**
○ We can also provide units on demand to supply chilled water at less than 5°C.

THHE-THHEI: heat pump operation



T (°C) = condenser outlet temperature
t (°C) = evaporator outlet temperature

Standard operation R407C.

Permitted temperature differentials across the exchangers:

○ Temperature differential at the evaporator ΔT = 3 ÷ 8°C
○ Temperature differential at the condenser (table "**B**"): ΔT = 5 ÷ 15°C
○ Temperature differential at the condenser (city water - table "**E**"): ΔT = 12 ÷ 18°C

ATTENTION!

○ Water at condenser inlet with temperature below 25°C and ΔT below 12°C: installation of the accessory pressurestat valve is recommended.
○ It is possible to use city water at the condenser with inlet temperature between 12°C and 18°C. When the temperature of the condenser inlet water is below 15°C, installation of the accessory pressurestat valve is recommended.

ATTENTION!

○ The machines are designed and planned **exclusively for indoor installation**.
If outdoor installation is required, it will necessitate modifications which must be evaluated by our technical office.

Use of antifreeze solutions

○ Use of ethylene glycol is a must when water discharge at the hydraulic system is not foreseen during winter or whenever the unit has to supply chilled water at temperatures lower than 5°C. The addition of glycol changes the physical properties of the water and consequently the unit performances. The proper glycol percentage to be put into the system can be obtained from the most demanding operation conditions chosen among those hereunder detailed.

○ Table "**N**" show the multipliers to obtain the changes of the unit performances according to the necessary percentages of ethylene glycol.
• The multipliers refer to the following conditions: condenser water inlet temperature 30°C, chilled water temperature 7°C; temperature differential at evaporator and condenser 5°C.
• For different operating conditions the same multipliers can be used since the amount of their change is neglectable.

Table "N" - TCHE-TCHEI - THHE-THHEI 155 ÷ 2130

% 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 = correction factor of the cooling capacity
fc P = correction factor of the total absorbed current
fc Δpw = correction factor of the pressure drops at the evaporator
fc G = correction factor of the glycol water flow at the evaporator

TCHE-TCHEI - THHE-THHEI 155 - 165: dimensional and installation characteristics

TCHE-TCHEI - THHE-THHEI 155 - 165

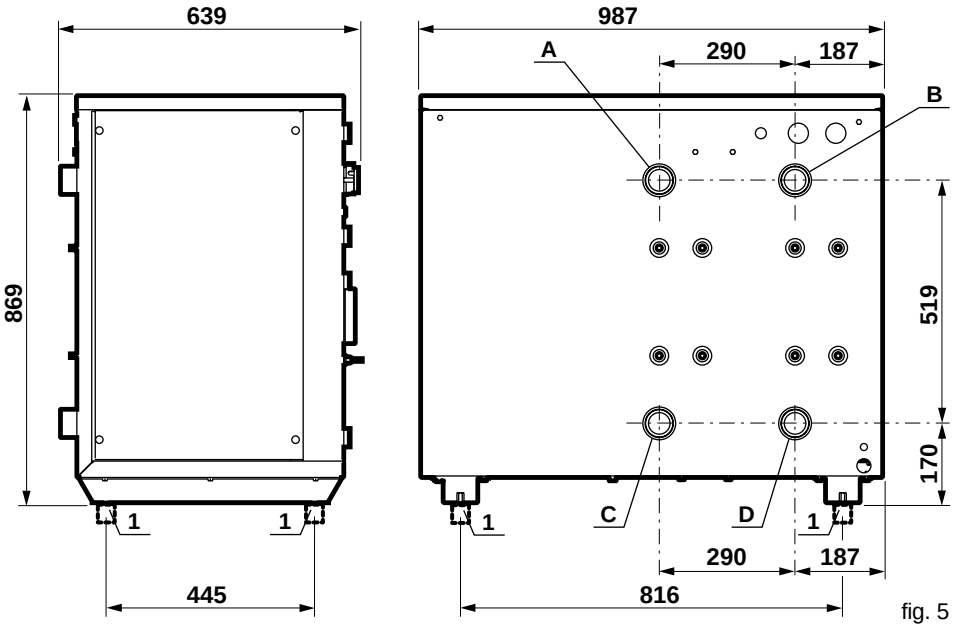


fig. 5

TCHE-TCHEI

A. Outlet to city water/cooling tower water/ dry cooler
B. Evaporator inlet
C. Inlet from city water/cooling tower water/ dry cooler
C. Inlet from city water/cooling tower water/ dry cooler
D. Evaporator outlet

THHE-THHEI

A. Outlet to city water
B. User side outlet water connections
C. Inlet from city water
D. User side inlet water connections

1. KSA rubber anti-vibration mountings (accessory)

Water connections

The unit is equipped with male threaded hydraulic connections on the plate exchangers

Exchanger water connections	2" G

Distribution of the weights on the fixing points and clearance spaces

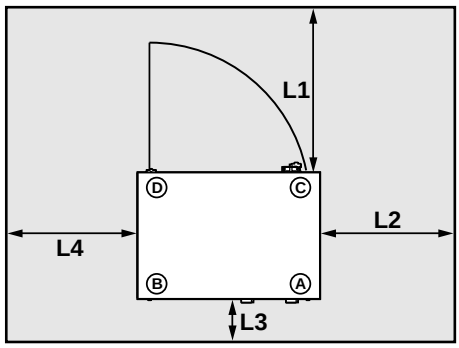


fig. 6

Plan view with KSA anti-vibration supports

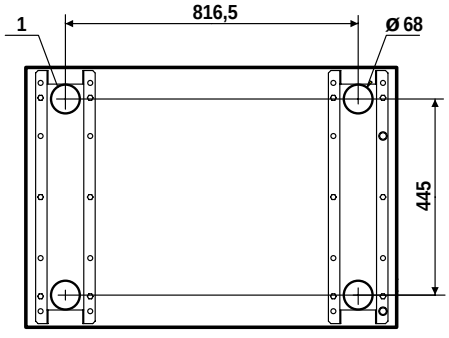


fig. 7

TCHE-TCHEI: weight distribution

MODEL		155	165
Weight	kg	510	530
Support point			
A	kg	120	125
B	kg	160	165
C	kg	110	115
D	kg	120	125

THHE-THHEI: weight distribution

MODEL		155	165
Weight	kg	550	570
Support point			
A	kg	130	135
B	kg	170	175
C	kg	120	125
D	kg	130	135

TCHE-TCHEI - THHE-THHEI: technical spaces clearance

MODEL		155	165
Service spaces			
L1	mm	1.000	1.000
L2	mm	500	500
L3	mm	200	200
L4	mm	500	500

N.B.:

Dimensions on the drawing are in mm.

TCHE-TCHEI - THHE-THHEI 280 - 2130: dimensional and installation characteristics

TCHE-TCHEI - THHE-THHEI 280 - 2130

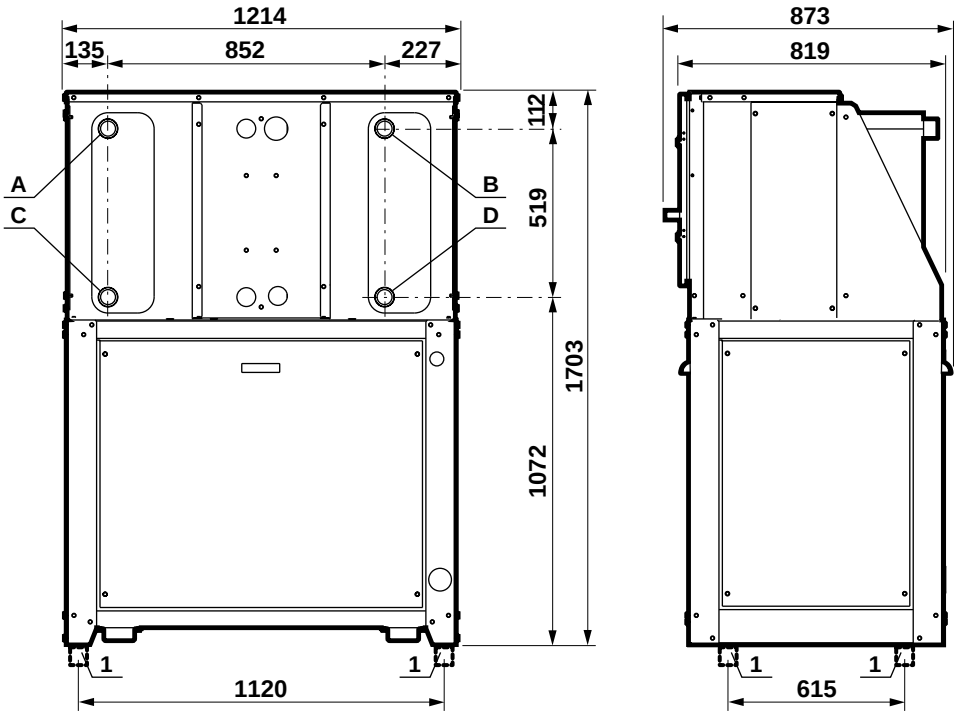


fig. 8

TCHE-TCHEI

A. Outlet to city water/cooling tower water/ dry cooler
B. Evaporator inlet
C. Inlet from city water/cooling tower water/ dry cooler
D. Evaporator outlet

THHE-THHEI

A. Outlet to city water
B. User side outlet water connections
C. Inlet from city water
D. User side inlet water connections

1. KSA rubber anti-vibration mountings (accessory)

Water connections

The unit is equipped with male threaded hydraulic connections on the plate exchangers

Exchanger water connections	2" G

Distribution of the weights on the fixing points and clearance spaces

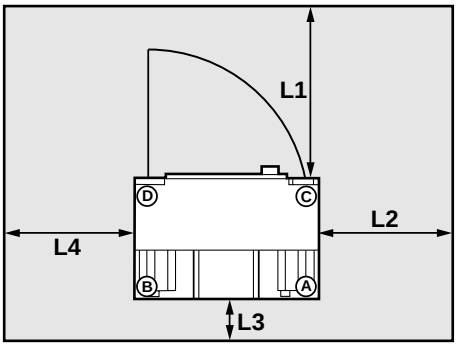


fig. 9

Plan view with KSA anti-vibration supports

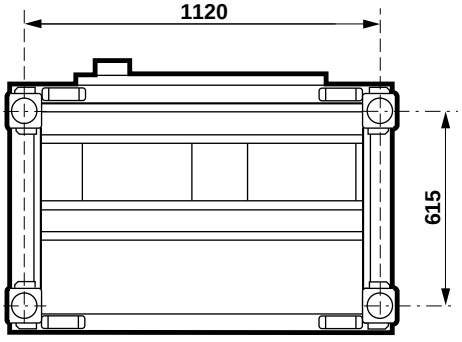


fig. 10

TCHE-TCHEI: weight distribution

MODEL		280	2110	2130
Weight	kg	675	825	850
Support point				
A	kg	190	235	238
B	kg	189	235	238
C	kg	148	178	187
D	kg	148	177	187

THHE-THHEI: weight distribution

MODEL		280	2110	2130
Weight	kg	690	840	865
Support point				
A	kg	194	239	242
B	kg	193	239	242
C	kg	152	182	191
D	kg	151	180	190

TCHE-TCHEI - THHE-THHEI: technical spaces clearance

MODEL		280	2110	2130
Service spaces				
L1	mm	1.000	1.000	1.000
L2	mm	500	500	500
L3	mm	200	200	200
L4	mm	500	500	500

N.B.:

Dimensions on the drawing are in mm.

TCEE-TCEEI 155 - 165:
dimensional and installation characteristics

TCEE-TCEEI 155 - 165

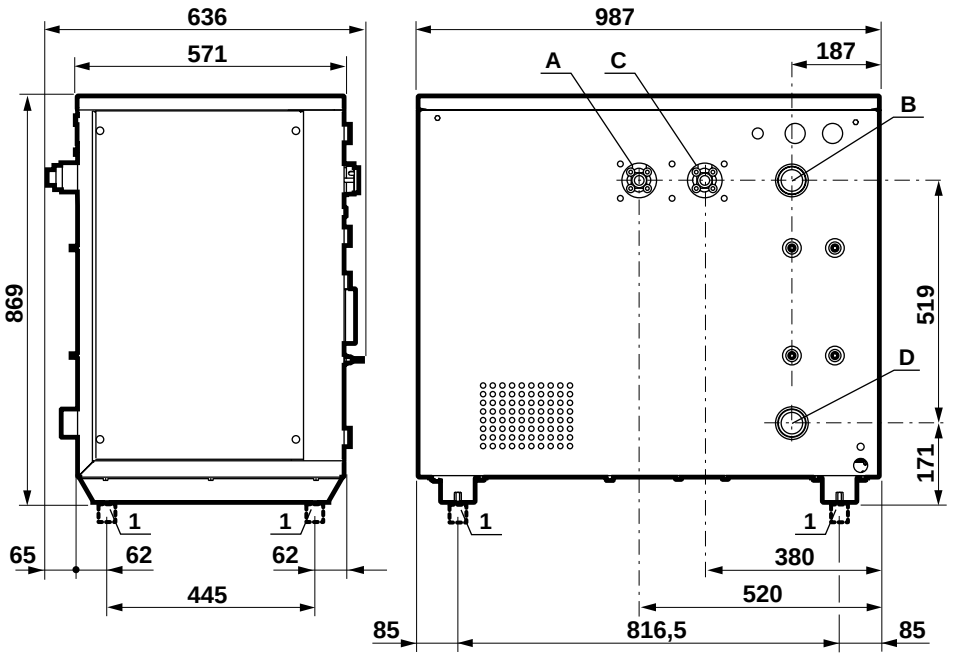


fig. 11

TCEE-TCEEI

A. Gas line (delivery towards condenser)
B. Evaporator inlet
C. Liquid line (return from condenser)
D. Evaporator outlet

1. KSA rubber anti-vibration mountings (accessory)

Water connections

The unit is provided with male threaded hydraulic connections on the evaporator.

Evaporator water connections	2" G

Refrigerant connections

The unit is provided with flanged refrigerant connections.
For further information refer to “O” on page 19.

Distribution of the weights on the fixing points and clearance spaces

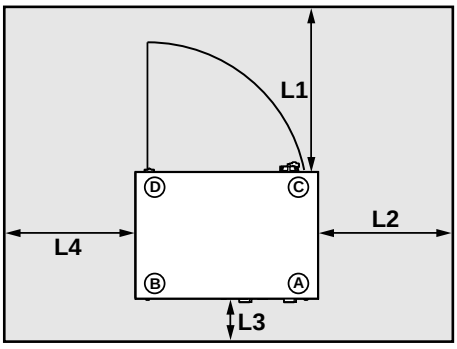


fig. 12

Plan view with KSA anti-vibration supports

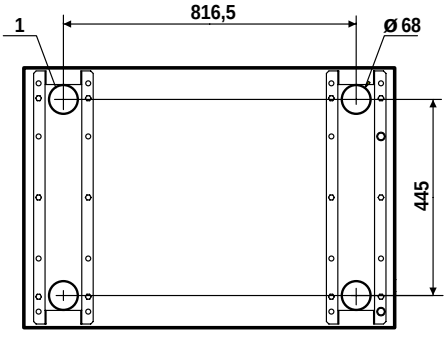


fig. 13

TCEE-TCEEI: distribution of the weights

MODEL		155	165
Weight	kg	490	505
Support point			
A	kg	110	115
B	kg	150	155
C	kg	110	110
D	kg	120	125

TCEE-TCEEI: technical spaces clearance

MODEL		155	165
Service spaces			
L1	mm	1.000	1.000
L2	mm	500	500
L3	mm	200	200
L4	mm	500	500

N.B.:

Dimensions on the drawing are in mm.

TCEE-TCEEI 280 - 2130:
dimensional and installation characteristics

TCEE-TCEEI 280 - 2130

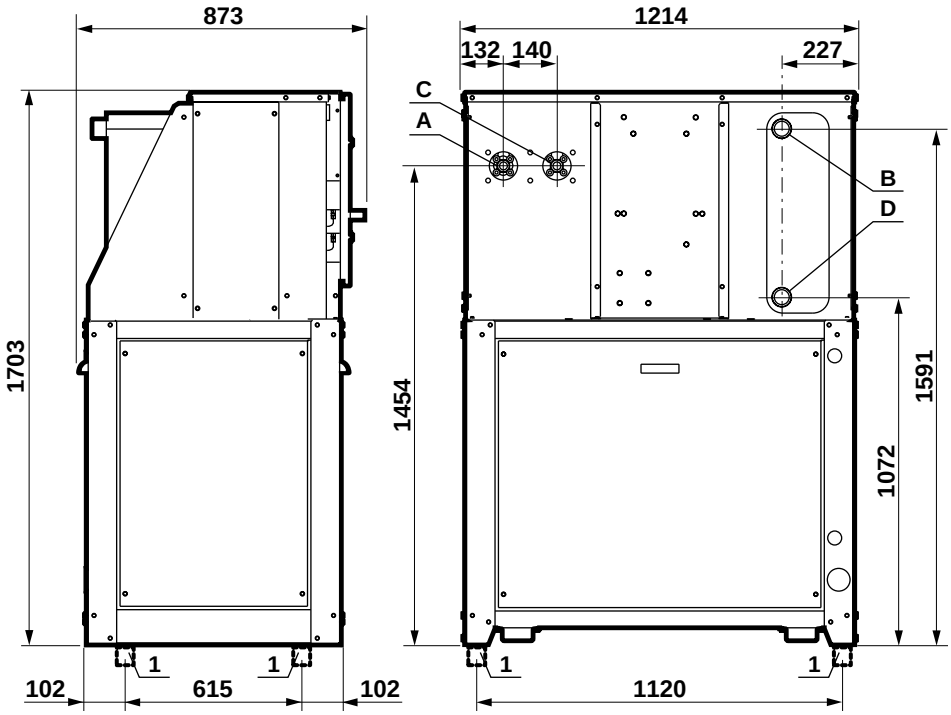


fig. 14

TCEE-TCEEI

A. Gas line (delivery towards condenser)
B. Evaporator inlet
C. Liquid line (return from condenser)
D. Evaporator outlet

1. KSA rubber anti-vibration mountings (accessory)

Water connections

The unit is provided with male threaded hydraulic connections on the evaporator.

Evaporator water connections	2" G

Refrigerant connections

The unit is provided with flanged refrigerant connections.
For further information refer to “O” on page 19.

Distribution of the weights on the fixing points and clearance spaces

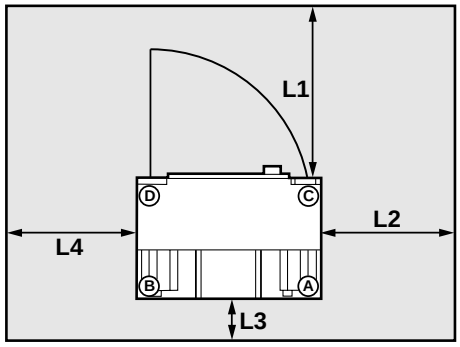


fig. 15

Plan view with KSA anti-vibration supports

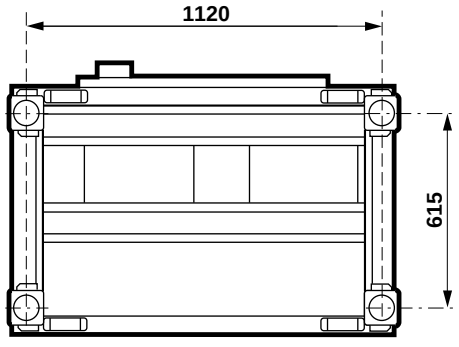


fig. 16

TCEE-TCEEI: distribution of the weights

MODEL		280	2110	2130
Weight	kg	645	790	808
Support point				
A	kg	180	220	230
B	kg	180	220	230
C	kg	143	175	174
D	kg	142	175	174

TCEE-TCEEI: technical spaces clearance

MODEL		280	2110	2130
Service spaces				
L1	mm	1.000	1.000	1.000
L2	mm	500	500	500
L3	mm	200	200	200
L4	mm	500	500	500

N.B.:

Dimensions on the drawing are in mm.

TCEE-TCEEI: refrigerant connection to remote condenser

ATTENTION!

○ The TCEE-TCEEI condenserless units must be connected to remote condensers; their installation and the realization of the refrigerant circuit are to be handled by the installer and must be properly executed, in compliance with current law (it is advisable to refer to standard EN 378-2 and subsequent modifications).
○ Poor execution of the refrigerant circuit may substantially reduce the machine's performance and compromise its life cycle.
○ RHOSS S.P.A. shall not be held responsible for any malfunctions of the machine resulting from problems connected with the realization of the condensation refrigerant circuit,which is the responsibility of the user.
○ The CCAM range of RHOSS remote condensers is available on request. They are manufactured in several versions so as to meet the different system needs concerning noise levels (for further information, see TECHNICAL NOTE for CCAM units).

Suggestions for proper refrigerant installation

○ The refrigerant lines for connection withthe condensing section must be made of copper pipes for refrigerant systems, type EN 12735-1-2, electrolytic, soft, degreased and de-oxidized. Also ensure that in the pipes there are no impurities or humidity, which are extremely damaging elements for the refrigerant circuit.
○ It is advisable to insulate the liquid line if the outdoor temperature (solar radiation) is higher than the temperature of the liquid itself.
○ It is advisable to insulate the gas discharge line so as to avoid the possiblity of burns due to accidental contact or to avoid heating of the indoor areas.
○ Size the refrigerant lines properly so as to obtain reduced pressure drops and refrigerant fluid speed that guarantees movement of the oil.
○ It is advisable to install, between the outlet of the condenserless unit and the remote condenser, an anti-vibration device and a silencer so as to reduce the transmission of noise and vibrations along the ducting.
○ The horizontal parts of the line must be inclined slightly downwards (in the direction of gas flow) so as to favor the flow of oil (inclination inclusive between 0,5% and 1%).
○ When the condenser is located above the compressor, at the compressor there must be a trap which runs down to floor level; the purpose is to reduce the risks of the return of condensed liquid refrigerant into the line to the compressor when not operating.
○ In the vertical parts of the discharge line there must be traps (for oil collection) every 5 metres.
○ It is advisable to insert, after previous evaluation, a non-return valve near the condenser.
○ It is advisable to install, down the line from the remote condenser, a liquid recipient of suitable capacity (compliant with current standards) in the case of long line length (roughly more than 20 m).
○ The maximum equivalent length of the refrigerant line is 30m. For greater lengths contact RHOSS technical service.

○ The flare refrigerant connections of the TCEE-TCEEI 155-2130 condenserless units are the following:

Table "O"

MODEL	Connections		Diameter
155	Liquid	mm	22
	Gas	mm	28
165	Liquid	mm	22
	Gas	mm	28
280	Liquid	mm	22
	Gas	mm	35
2110	Liquid	mm	22
	Gas	mm	35
2130	Liquid	mm	22
	Gas	mm	35

○ The TCEE-TCEEI units are not equipped with a solenoid valve on the liquid line. Its installation must be handled by the installer and is advisable when the condenser is located above the condenserless unit. For this purpose it is possible to use the connections provided in the electrical board of the TCEE-TCEEI condenserless unit. These are terminals (40 and 41) under current (230V/1ph/50Hz) managed by a contact of the compressor contactor which is normally open. This means that when the compressor is active there is current to the terminals.

Table "P": diameter and length of refrigerant pipes

MODEL	Equivalent distance	m	**2**	**10**	**15**	**20**	**25**	**30**
CCAM	Line							
155	Liquid	mm	22 / 20	22 / 20	22 / 20	22 / 20	22 / 20	22 / 20
	Gas	mm	28 / 25	28 / 25	28 / 25	28 / 25	28 / 25	28 / 25
165	Liquid	mm	22 / 20	22 / 20	22 / 20	22 / 20	22 / 20	22 / 20
	Gas	mm	28 / 25	28 / 25	28 / 25	28 / 25	35 / 32	35 / 32
280	Liquid	mm	22 / 20	22 / 20	22 / 20	22 / 20	28 / 25	28 / 25
	Gas	mm	35 / 32	35 / 32	35 / 32	35 / 32	35 / 32	35 / 32
2110	Liquid	mm	22 / 20	22 / 20	22 / 20	28 / 25	28 / 25	28 / 25
	Gas	mm	35 / 32	35 / 32	35 / 32	35 / 32	35 / 32	35 / 32
2130	Liquid	mm	22 / 20	22 / 20	28 / 25	28 / 25	28 / 25	28 / 25
	Gas	mm	35 / 32	35 / 32	35 / 32	35 / 32	42 / 39	42 / 39

The table shows the suggested dimensions for the connection pipes with the remote condenser (external/internal diameter).

Refrigerant charge

○ The TCEE-TCEEI units are pre-charged with R407C refrigerant for the purpose of protectign the refrigerant circuit.
The correct charge must be established by the installer based on the length of the refrigerant lines.
○ **The unit has a minimum pre-charge of refrigerant. Connecting the refrigerant pipes with the remote condenser it is essential to make the vacuum in the whole circuit and then to charge with refrigerant.**

Attention

The quantity of refrigerant added to the system for the length of the pipes may lead to an insufficent oil charge in the refrigerant circuit. It is therefore important to check the level of oil in the compressor carefully and if necessary to top it up (for the type of oil to use always refer to the instructions on the tag located on the compressor).

TCHE-TCHEI - THHE-THHEI: electrical connections

TCHE-TCHEI - THHE-THHEI 155-165

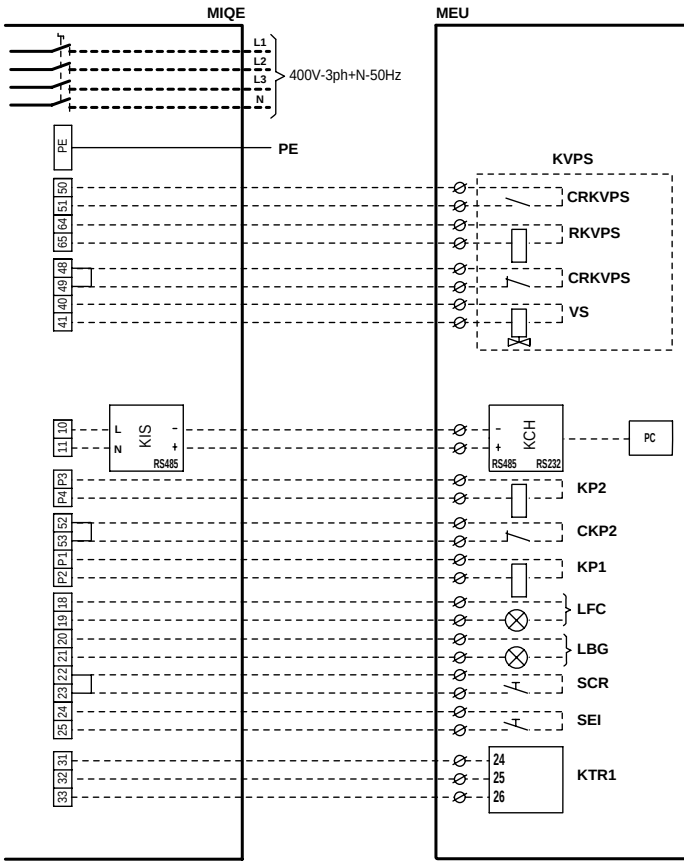


fig. 17

TCHE-TCHEI - THHE-THHEI 280-2110-2130

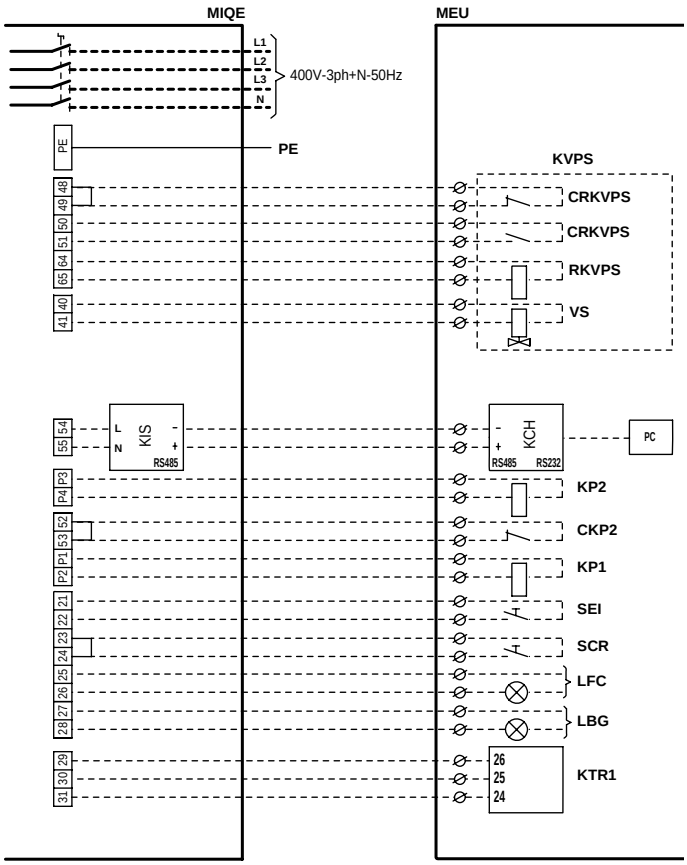


fig. 18

Electrical connections

○ The access to the electrical board is possible through the front panel of the unit.
○ The connections have to be carried out as per rules in force and electrical wiring diagram included.
○ Earthing is compulsory by law.
○ Suitable fuses or a main switch of an adequate capacity and switching power must be installed in a sheltered place near the unit.

MIQE = Terminal board inside the electric cabinet
MEU = User external terminal board
KVPS = Accessory (only THHE-THHEI)
CRKVPS = KVPS relay contact
RKVPS = KVPS control relay
VS = Solenoid valve
CKP2 = Condenser pump relay contact
KIS = Serial contact
KP1 = System pump relay
KP2 = Condenser pump relay
KTR1 = Remote keyboard
LBG = General main alarm lamp (24 Vac supply)
LFC = Compressor working lamp (24 Vac supply)
L = Lines
N = Neutral
PE = Earth clamp
SCR = Remote control switch (dry contact control)
SEI = Summer/winter switch (dry contact control)
---- = Connection by the installer

ATTENTION!

The tables show only connections to be made by the installer.

MODEL		155	165	280	2110	2130
Electrical data						
Line sections	mm^2	16	25	16	25	35
PE section	mm^2	16	16	16	16	16
Remote control line section	mm^2	1,5	1,5	1,5	1,5	1,5
Maximum absorbed current	A	34,6	42,4	53,2	69,2	84,8
Starting current	A	215	270	202	250	313

TCEE-TCEEI: electrical connections

TCEE-TCEEI 155-165

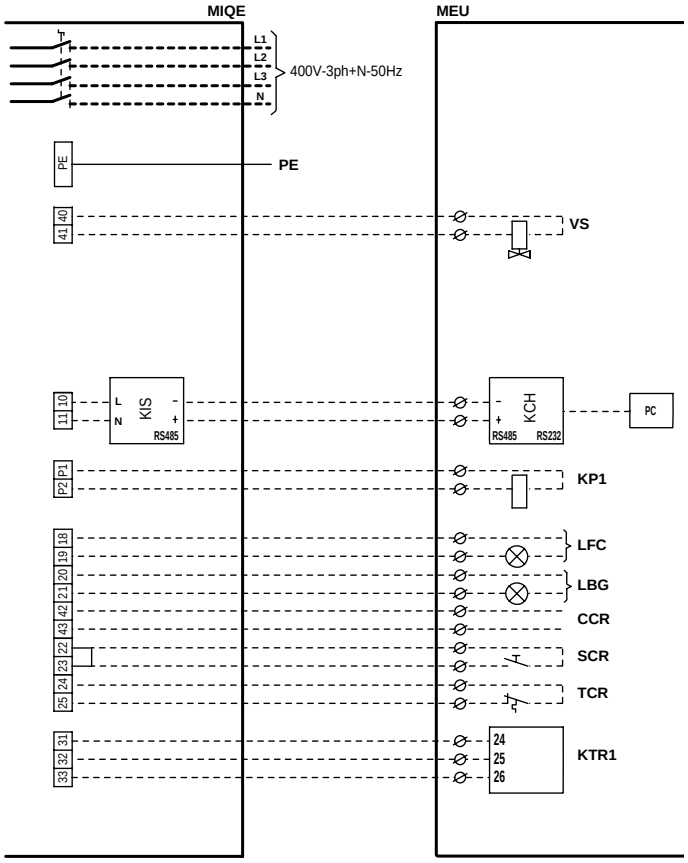


fig. 19

TCEE-TCEEI 280-2110-2130

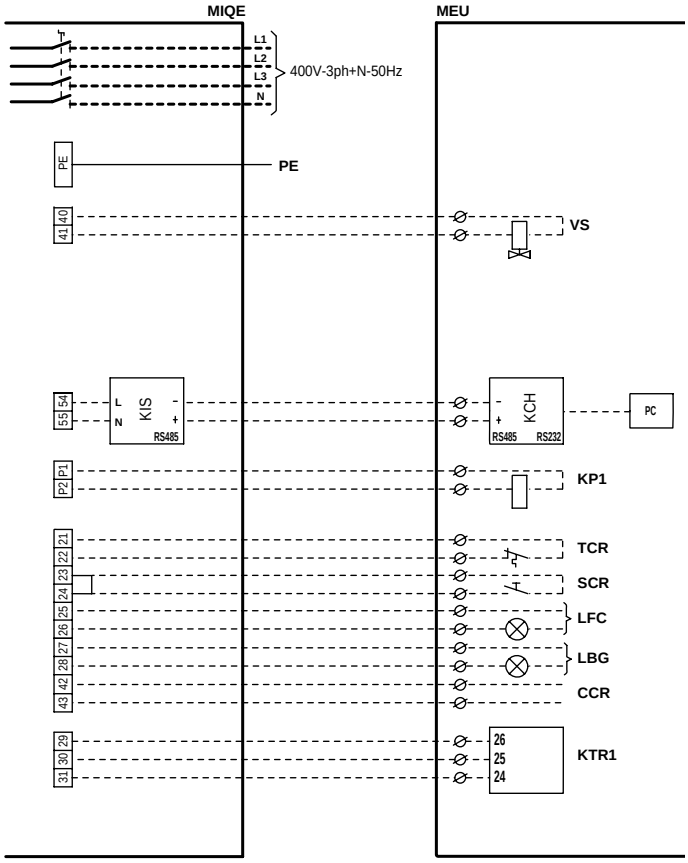


fig. 20

Electrical connections

○ The access to the electrical board is possible through the front panel of the unit.
○ The connections have to be carried out as per rules in force and electrical wiring diagram included.
○ Earthing is compulsory by law.
○ Suitable fuses or a main switch of an adequate capacity and switching power must be installed in a sheltered place near the unit.

MIQE = Terminal board inside the electric cabinet
MEU = User external terminal board
CCR = Remote condenser control (dry contact)
KIS = Serial connection
KP1 = System pump relay
KTR1 / KTR = Remote keyboard
LBG = General main alarm lamp (24 Vac supply)
LFC = Compressor working lamp (24 Vac supply)
L = Lines
N = Neutral
PE = Earth clamp
SCR = Remote control switch (dry contact control)
TCR = Remote condenser thermal protection
VS = Solenoid valve (by client)
---- = Connection by the installer

ATTENTION!

The tables show only connections to be made by the installer.

MODEL		155	165	280	2110	2130
Electrical data						
Line sections	mm^2	16	25	16	25	35
PE section	mm^2	16	16	16	16	16
Remote control line section	mm^2	1,5	1,5	1,5	1,5	1,5
Maximum absorbed current	A	34,6	42,4	53,2	69,2	84,8
Starting current	A	215	270	202	250	313

NOTES

NOTES

TCHE-THHE 155÷2130
TCEE 155÷2130
Q-Flow range

RHOSS s.p.a.
Via Oltre Ferrovia, 32 - 33033 Codroipo (UD) - Italy
tel. +39 0432 911611 - fax +39 0432 911600
rhoss@rhoss.it - www.rhoss.it - www.rhoss.com

IRSAP-RHOSS Clima Integral S.L.
C/ Leonardo da Vinci, 4 - Pol. Ind. Camí Ral
08850 Gavà (Barcelona) - Spain
telf. +34 93 6334733 - fax +34 93 6334734
rhoss@irsap-rhoss.com - www.rhoss.es

Ir Group S.A.S.
7 rue du Pont à Lunettes - 69390 Vourles - France
tél. +33 (0)4 72318631 - fax +33 (0)4 72318632
irsaprhoss@irgroup.fr

RHOSS Deutschland GmbH
Hölzlestraße 23, D-72336 Balingen, OT Engstlatt - Germany
tel. +49 (0)7433 260270 - fax +49 (0)7433 2602720
info@rhoss.de - www.rhoss.de

Sedi commerciali Italia: / Italy branch offices:

Area Nord-Est: 33033 Codroipo (UD) - Via Oltre Ferrovia, 32
tel. +39 0432 911611 - fax +39 0432 911600

Area Nord-Ovest: 20041 Agrate Brianza (MI)
Centro Colleoni - Palazzo Taurus, 1
tel. +39 039 6898394 - fax +39 039 6898395

Area Nord-Ovest - Uffici di Firenze:
50127 Firenze - Via F. Baracca, 148/R
tel. +39 055 4360492 - fax +39 055 413035

Area Centro-Sud: 00199 Roma - Viale Somalia, 148
tel. +39 06 8600699-707 - fax +39 06 8600747

Area Sud - Filiale di Napoli:
80143 Napoli - Via G. Porzio - Centro Direzionale - Isola G8
tel. +39 081 7879121 - fax +39 081 7879135

Area Sud - Uffici di Bari:
70124 Bari - Via Lucarelli, 60/N
tel. +39 080 5013644 - fax +39 080 5021159

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