TCHE-THHE 105÷140
TCEE 105÷140
Q-Flow range

Microsystem
6,1÷65,3 kW
7,4÷78,1 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

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Standard use conditions

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

ATTENTION!

In order to operate, TCEE 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		

"MODEL" code

1 No. compressors	**05 - 40** Approximate cooling capacity (in kW)

Example: THHE 105

○ Water cooled heat pump unit.
○ No. 1 hermetic Scroll compressor.
○ Nominal cooling capacity of roughly 5 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.
105 - 140	1 / 1	1

with insulation with close cellular expanded synthetic rubber.
○ Differential pressure switch on the evaporator (TCHE-TCEE) or on the evaporator and condenser (THHE), 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. Complete with filter drier, charge connections, H.P. switch, L.P. switch, liquid and moisture sight-glass, thermostatic expansion valves, safety valves in compressor discharge and suction, cycle inverter valve (for THCE), non-return valve (for THCE), cocks equipped with threaded connections for flared pipes on the liquid and discharge lines.
○ The TCHE and THHE units are complete with R407C refrigerant charge.
○ The TCEE 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.
Complete with:
• electrical wiring arranged for power supply 400V-3ph+N-50Hz; (230V-1ph-50Hz for TCHE-THHE-TCEE 105);
• auxiliary power supply: 230V-1ph-50Hz;
• control power supply: 24V-1ph-50Hz;
• power contactor;
• main power supply switch with safety door interlocking isolator;
• automatic compressor protection switch;
• automatic protection switch on auxiliary power circuit;
• removable unit control;
• arrangement for management of remote condenser (TCEE).
○ Programmable microprocessor electronic board regulated with the keyboard built into the units.
This electronic board controls the following functions:
• control and management of inlet/outlet water temperature set points, of the safety delays, of the hour-run-meter of compressor, of the circulation or user system pump, of the condenser side circulation pump; of the automatically activated antifreeze protection with machine off (if the antifreeze heating element is present); of all the functions that control the working interventions of the unit devices;
• 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.

Accessories factory fitted

○ **PSC** - Low ambient fan speed control of the CCAM remote condensers (only TCEE in conjuction with CCAM units).
○ **GM** - High and low pressure gauges complete with capillary.

Accessories supplied loose

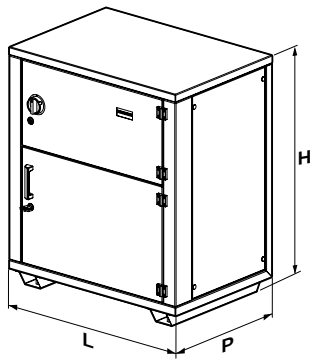
○ **KSA** - Rubber anti-vibration mountings.
○ **KVP** - Pressure regulating valve (TCHE only).
The kit KVP consists of a pressure valve which modulates the water flow to the condenser, keeping the condensation pressure constant. The use of the accessory is recommended in the following cases:
• in general 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 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 KVP.
○ **KTR1** - Remote keyboard and display with the same functions as the one built into the unit.
○ **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: technical features

MODEL **TCHE**		**105**	**115**	**120**	**125**	**135**	**140**
Technical data							
Nominal cooling capacity (*)	kW	6,1	12,9	19,0	26,5	35,0	40,8
Condenser heat rejection (*)	kW	7,7	16,0	23,6	32,9	43,2	50,1
E.E.R. (*)		3,30	3,58	3,52	3,58	3,68	3,74
Refrigerant circuits	n.	1	1	1	1	1	1
Scroll compressor / steps	n.	1 / 1	1 / 1	1 / 1	1 / 1	1 / 1	1 / 1
Sound power level (*)	dB(A)	51	57	60	64	67	68
Evaporator nominal water flow (*)	L/h	1.050	2.220	3.270	4.560	6.020	7.020
Evaporator nominal pressure drops (*)	kPa	30	33	33	36	29	23
Evaporator water connections	∅	1¹/₄" G	1¹/₄" G	1¹/₄" G	1¹/₄" G	1¹/₄" G	1¹/₄" G
Condenser nominal water flow (*)	L/h	1.325	2.750	4.060	5.660	7.430	8.620
Condenser nominal pressure drops (*)	kPa	53	57	73	84	69	50
Condenser water connections	∅	1¹/₄" G	1¹/₄" G	1¹/₄" G	1¹/₄" G	1¹/₄" G	1¹/₄" G
Heat exchanger water contents	L	0,5 / 0,5	0,9 / 0,9	1,4 / 1,2	1,9 / 1,6	2,8 / 2,4	3,8 / 3,3
R407C refrigerant charge (*****)	kg	0,90	1,00	1,20	1,70	2,20	2,50
Polyester oil charge	L	0,70	1,55	3,25	3,25	3,30	6,60
Electrical data							
Total power input (*)	kW	1,85	3,60	5,40	7,40	9,50	10,90
Power supply	V-ph-Hz	230-1-50	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	230-1-50
Control power supply	V-ph-Hz	12-1-50	12-1-50	12-1-50	12-1-50	12-1-50	12-1-50
Nominal current	A	8,6	7,2	10,2	14,4	17,4	20,2
Max. current	A	11,7	9,0	12,8	18,1	23,5	26,6
Starting current	A	62	66	98	130	175	175
Dimensions							
Length	**L** mm	750	750	750	750	750	750
Height	**H** mm	869	869	869	869	869	869
Depth	**P** mm	567	567	567	567	567	567

(*) 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: technical features

MODEL **THHE**		**105**	**115**	**120**	**125**	**135**	**140**
Technical data							
Nominal heating capacity (***)	kW	7,4	15,2	22,4	31,4	41,0	47,7
Nominal cooling capacity (**)	kW	6,1	12,9	19,0	26,5	35,0	40,8
C.O.P. (***)		3,15	3,38	3,34	3,34	3,50	3,51
Refrigerant circuits	n.	1	1	1	1	1	1
Scroll compressor / steps	n.	1 / 1	1 / 1	1 / 1	1 / 1	1 / 1	1 / 1
Sound power level (***)	dB(A)	51	57	60	64	67	68
Condenser nominal water flow (***)	L/h	1.270	2.615	3.850	5.400	7.050	8.200
Condenser nominal pressure drops (***)	kPa	44	46	46	51	40	31
Condenser water connections (***)	∅	1¼" G	1¼" G	1¼" G	1¼" G	1¼" G	1¼" G
Evaporator nominal water flow (***)	L/h	895	1.925	2.820	3.955	5.260	6.120
Evaporator nominal pressure drops (***)	kPa	24	28	27	30	25	17
Evaporator water connections (***)	∅	1¼" G	1¼" G	1¼" G	1¼" G	1¼" G	1¼" G
Evaporator/condenser water contents	L	0,5 / 0,5	0,9 / 0,9	1,4 / 1,2	1,9 / 1,6	2,8 / 2,4	3,8 / 3,3
R407C refrigerant charge (*****)	kg	0,90	1,00	1,20	1,70	2,20	2,50
Polyester oil charge	L	0,70	1,55	3,25	3,25	3,30	6,60
Electrical data							
Winter working total absorbed power (***)	kW	2,35	4,50	6,70	9,40	11,7	13,60
Summer working total absorbed power (**)	kW	1,85	3,60	5,40	7,40	9,50	10,90
Power supply	V-ph-Hz	230-1-50	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	230-1-50
Control power supply	V-ph-Hz	12-1-50	12-1-50	12-1-50	12-1-50	12-1-50	12-1-50
Nominal current (****)	A	10,6	8,2	11,7	16,6	20,2	24,2
Max. current	A	11,7	9,0	12,8	18,1	23,5	26,6
Starting current	A	62	66	98	130	175	175
Dimensions							
Length	**L** mm	750	750	750	750	750	750
Height	**H** mm	869	869	869	869	869	869
Depth	**P** mm	567	567	567	567	567	567

(**) 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.

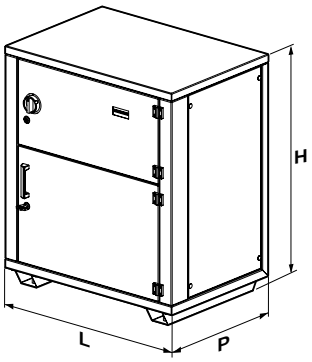
(*****) Indicative value: the correct value is stated on the data plate on board the machine.

TCEE: technical features

MODEL **TCEE**		**105**	**115**	**120**	**125**	**135**	**140**
Technical data							
Nominal cooling capacity (*)	kW	5,5	11,6	17,2	24,3	31,8	37,1
Condenser heat rejection (*)	kW	7,3	15,3	22,5	31,7	41,4	48,3
E.E.R. (*)		2,75	2,83	2,87	2,89	2,94	2,92
Refrigerant circuits	n.	1	1	1	1	1	1
Scroll compressor / steps	n.	1 / 1	1 / 1	1 / 1	1 / 1	1 / 1	1 / 1
Sound power level (**)	dB(A)	51	57	60	64	67	68
Evaporator nominal water flow (*)	L/h	950	2.000	2.950	4.180	5.470	6.380
Evaporator nominal pressure drops (*)	kPa	25	27	27	30	24	19
Evaporator water contents	L	0,5	0,9	1,4	1,9	2,8	3,8
Evaporator water connections	∅	1¼" G	1¼" G	1¼" G	1¼" G	1¼" G	1¼" G
Refrigerant connections	Tipo	A cartella	A cartella	A cartella	A cartella	A cartella	A cartella
Refrigerant connection: gas lines	mm	12,7	12,7	15,9	22,2	22,2	22,2
Refrigerant connection: liquid lines	mm	9,52	12,7	15,9	15,9	15,9	15,9
R407C refrigerant charge (***)	kg	0,90	1,00	1,20	1,70	2,20	2,50
Polyester oil charge	L	0,70	1,55	3,25	3,25	3,30	6,60
Electrical data							
Total power input (*)	kW	2,0	4,1	6,0	8,4	10,8	12,7
Power supply	V-ph-Hz	230-1-50	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	230-1-50
Control power supply	V-ph-Hz	12-1-50	12-1-50	12-1-50	12-1-50	12-1-50	12-1-50
Nominal current	A	9,4	7,8	11,0	15,6	19,1	22,4
Max. current	A	11,7	9,0	12,8	18,1	23,5	26,6
Starting current	A	62	66	98	130	175	175
Dimensions							
Length	**L** mm	750	750	750	750	750	750
Height	**H** mm	869	869	869	869	869	869
Depth	**P** mm	615	615	615	615	615	615

TCEE: suggested pairings with CCAM remote condensers (optionals)

MODEL **TCEE**		**105**	**115**	**120**	**125**	**135**	**140**
Version N "Normal"							
MODEL **CCAM**		**–**	**–**	**120 N**	**125 N**	**135 N**	**140 N**
Electrical power input (****)	kW	–	–	0,78	1,10	1,10	1,56
Sound pressure level (*****)	dB(A)	–	–	51	48	48	54
Version S "Silenced"							
MODEL **CCAM**		**105 S**	**115 S**	**120 S**	**125 S**	**135 S**	**140 S**
Electrical power input (****)	kW	0,18	0,32	0,55	0,64	0,66	1,38
Sound pressure level (*****)	kW	45	42	45	45	42	49
Version Q "Super silenced"							
MODEL **CCAM**		**105 Q**	**115 Q**	**120 Q**	**125 Q**	**135 Q**	**140 Q**
Electrical power input (****)	kW	0,15	0,18	0,24	0,36	0,38	0,80
Sound pressure level (*****)	dB(A)	33	32	35	35	34	38



(*) 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 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

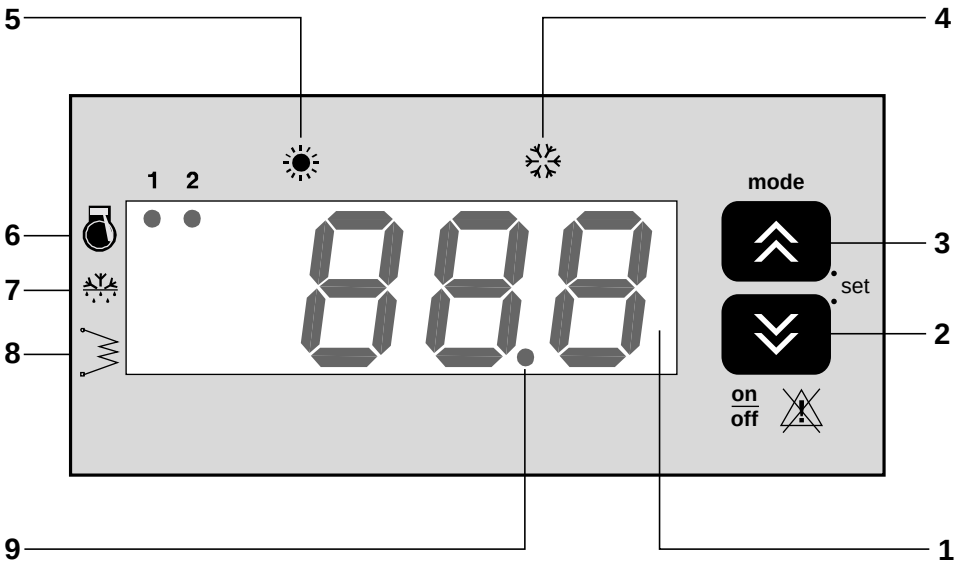


fig. 1

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

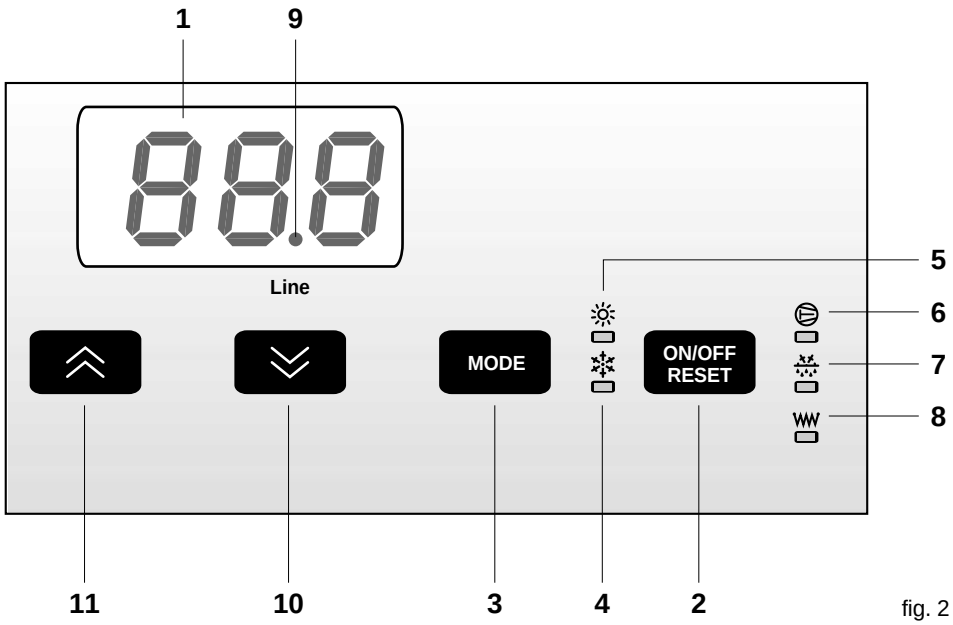


fig. 2

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, KTR 1 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 and THHE 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 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 and THHE 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 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 13), 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 “**M**” 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 and THHE in the summer cycle (operation as a chiller): in respect of the permitted temperature differentials (see page 13) it is possible to extrapolate other values for the pressure drops.
○ Tables “**H**”” and “**I**” indicate the values of the pressure drops of the exchanger which functions as condenser on models TCHE and THHE in the summer cycle (operation as a chiller): in respect of the permitted temperature differentials (see page 13) it is possible to extrapolate other values for the pressure drops.
○ Table “**L**” indicates the values of the pressure drops of the evaporator on TCEE models
○ Table “**N**” contains the values of the sound power level emitted by the individual model in the standard version.

Example:

○ Design conditions for a water-cooled chiller:
• Cooling capacity required = 34 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 135 satisfies the requirement with:
QF = 35 kW ; P = 9,5 kW;
QT = 43,2 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 = (35 x 860) ÷ 5 = 6.020 (L/h);
G (L/h) condenser = (QT x 860) ÷ ΔT = (43,2 x 860) ÷ 5 = 7.430 (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 = 29 kPa;
Δpw condenser = 69 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 = 35 x 1,016 = 35,6 kW;
P^{I} = P x kct P = 9,5 x 0,969 = 9,2 kW;
QT^{I} = (QF^{I} + P^{I}) x 0,97 = (35,6 + 9,2) x 0,97 = 43,5 kW.
The new water flows G to send to the exchangers are obtained using the following formulae:
G^{I} (L/h) evaporator = (35,6 x 860) ÷ 5 = 6.123 (L/h);
G^{I} (L/h) condenser = (43,5 x 860) ÷ 10 = 7.482 (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 = Δpw x $(G^{I} \div G)^2$ = 29 x $(6.123 \div 6.020)^2$ = 30 kPa;
Δpw^{I} condenser = Δpw x $(G^{I} \div G)^2$ = 69 x $(7.482 \div 7.430)^2$ = 70 kPa.

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

MODEL	Tue °C	Tuct (°C)														
		30			**35**			**40**			**45**			**50**		
		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
105	**5**	5,9	7,2	1,6	5,5	7,1	1,8	5,2	7,1	2,0	4,8	6,9	2,4	4,3	6,7	2,7
	7	6,5	7,8	1,6	**6,1**	**7,7**	**1,8**	5,7	7,5	2,1	**5,2**	**7,4**	**2,4**	4,8	7,3	2,6
	10	7,1	8,4	1,6	6,7	8,3	1,8	6,3	8,1	2,1	5,8	7,9	2,4	5,3	7,8	2,7
	13	8,0	9,3	1,6	7,5	9,1	1,8	7,0	8,8	2,1	6,5	8,6	2,4	6,1	8,5	2,7
	15	8,6	9,9	1,6	8,1	9,6	1,8	7,5	9,3	2,1	7,1	9,1	2,4	6,6	9,0	2,6
115	**5**	12,7	15,3	3,1	11,8	14,9	3,6	11,0	14,5	4,0	10,2	14,2	4,4	9,4	13,8	4,9
	7	13,7	16,4	3,2	**12,9**	**16,0**	**3,6**	12,0	15,6	4,1	**11,2**	**15,2**	**4,5**	10,3	14,9	5,0
	10	15,2	17,9	3,3	14,3	17,4	3,7	13,4	17,0	4,1	12,5	16,5	4,6	11,6	16,1	5,0
	13	17,0	19,7	3,3	16,0	19,2	3,7	15,0	18,6	4,2	14,1	18,2	4,7	13,1	17,7	5,2
	15	18,2	20,9	3,3	17,1	20,3	3,8	16,1	19,7	4,2	15,1	19,2	4,7	14,1	18,7	5,2
120	**5**	18,6	22,6	4,7	17,4	22,1	5,3	16,3	21,5	5,9	15,0	21,0	6,6	13,8	20,5	7,3
	7	20,2	24,2	4,7	**19,0**	**23,6**	**5,4**	17,7	23,0	6,0	**16,4**	**22,4**	**6,7**	15,1	21,8	7,4
	10	22,3	26,3	4,8	21,0	25,7	5,4	19,8	25,0	6,0	18,4	24,4	6,7	17,0	23,7	7,4
	13	25,0	28,9	4,8	23,5	28,1	5,5	22,1	27,3	6,1	20,6	26,6	6,8	19,1	25,8	7,5
	15	26,6	30,5	4,9	25,1	29,6	5,5	23,6	28,8	6,1	22,0	27,9	6,8	20,4	27,1	7,6
125	**5**	26,0	31,5	6,5	24,4	30,8	7,4	22,8	30,1	8,3	21,0	29,4	9,3	19,2	28,7	10,4
	7	28,2	33,7	6,5	**26,5**	**32,9**	**7,4**	24,8	32,1	8,3	**23,0**	**31,4**	**9,4**	21,2	30,6	10,4
	10	31,1	36,5	6,6	29,3	35,7	7,5	27,5	34,8	8,4	25,5	33,9	9,4	23,6	33,1	10,5
	13	34,9	40,2	6,6	32,9	39,1	7,5	30,8	38,0	8,4	28,7	37,0	9,5	26,6	36,0	10,5
	15	37,0	42,3	6,6	34,9	41,1	7,5	32,8	40,0	8,4	30,6	38,9	9,5	28,3	37,8	10,6
135	**5**	34,3	41,4	8,4	32,3	40,5	9,4	30,2	39,5	10,5	28,0	38,5	11,7	25,8	37,5	12,9
	7	37,1	44,2	8,5	**35,0**	**43,2**	**9,5**	32,8	42,1	10,6	**30,6**	**41,0**	**11,7**	28,3	40,0	12,9
	10	41,1	48,2	8,5	38,8	46,9	9,6	36,4	45,7	10,7	34,0	44,5	11,9	31,5	43,3	13,1
	13	46,0	53,0	8,6	43,5	51,6	9,7	41,0	50,2	10,8	38,3	48,8	12,0	35,7	47,5	13,2
	15	49,1	56,0	8,7	46,4	54,5	9,8	43,8	53,0	10,8	41,1	51,6	12,1	38,3	50,1	13,3
140	**5**	40,1	48,1	9,6	37,7	47,0	10,8	35,3	46,0	12,1	32,7	44,8	13,5	30,1	43,7	15,0
	7	43,3	51,4	9,6	**40,8**	**50,1**	**10,9**	38,3	48,9	12,2	**35,6**	**47,7**	**13,6**	32,8	46,5	15,1
	10	47,9	55,9	9,7	45,2	54,5	11,0	42,4	53,1	12,3	39,5	51,7	13,8	36,6	50,3	15,2
	13	53,6	61,5	9,8	50,6	59,9	11,1	47,6	58,2	12,4	44,5	56,6	13,9	41,3	55,0	15,4
	15	57,1	65,0	9,9	53,9	63,1	11,2	50,7	61,3	12,5	47,5	59,6	14,0	44,2	57,9	15,5

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)

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 and THHE in the summer cycle performance data (condensation with city water with ΔT = 12°C at condenser and with ΔT = 5°C at evaporator)

MODEL	Tue °C	Tucp (°C)								
		24 (*)			**27**			**30**		
		QF	QT	P	QF	QT	P	QF	QT	P
		kW	kW	kW	kW	kW	kW	kW	kW	kW
105	**5**	6,5	7,5	1,3	6,3	7,3	1,4	6,1	7,2	1,5
	7	6,9	7,9	1,4	6,7	7,7	1,5	6,6	7,7	1,6
	10	7,8	8,7	1,4	7,6	8,6	1,5	7,3	8,4	1,6
	13	–	–	–	8,4	9,4	1,5	8,1	9,2	1,6
	15	–	–	–	–	–	–	8,7	9,7	1,6
115	**5**	13,7	16,7	2,7	13,2	16,4	2,9	12,8	16,2	3,1
	7	14,9	17,9	2,7	14,4	17,7	2,9	14,0	17,4	3,1
	10	16,5	19,6	2,7	16,0	19,3	3,0	15,4	19,0	3,2
	13	–	–	–	17,9	21,2	3,0	17,4	20,9	3,2
	15	–	–	–	–	–	–	18,6	22,2	3,2
120	**5**	20,1	22,9	4,0	19,5	22,6	4,3	19,0	22,3	4,5
	7	21,9	24,7	4,1	21,2	24,3	4,3	20,5	23,9	4,6
	10	24,2	26,9	4,1	23,5	26,5	4,4	22,8	26,0	4,6
	13	–	–	–	26,3	29,1	4,4	25,5	28,7	4,7
	15	–	–	–	–	–	–	27,0	30,2	4,7
125	**5**	28,1	32,0	5,5	27,4	31,6	5,9	26,5	31,2	6,3
	7	30,5	34,3	5,6	29,6	33,8	6,0	28,8	33,3	6,3
	10	33,8	37,4	5,6	32,8	36,8	6,0	31,7	36,2	6,4
	13	–	–	–	36,5	40,4	6,0	35,5	39,8	6,4
	15	–	–	–	–	–	–	37,7	41,9	6,5
135	**5**	36,9	42,0	7,2	35,9	41,4	7,7	34,9	40,9	8,1
	7	40,0	45,0	7,3	38,9	44,4	7,7	37,8	43,7	8,2
	10	44,2	49,0	7,4	43,0	48,3	7,8	41,7	47,5	8,3
	13	–	–	–	48,2	53,3	7,9	46,7	52,4	8,4
	15	–	–	–	–	–	–	49,9	55,5	8,5
140	**5**	43,2	48,9	8,2	42,1	48,2	8,7	40,8	47,6	9,3
	7	46,8	52,4	8,3	45,5	51,6	8,8	44,2	50,9	9,4
	10	51,7	57,1	8,4	50,2	56,2	8,9	48,8	55,3	9,5
	13	–	–	–	56,1	61,9	9,0	54,6	60,9	9,6
	15	–	–	–	–	–	–	58,0	64,3	9,6

(*) 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 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
105	**5**	5,7	7,1	1,6	5,4	7,0	1,8	5,0	6,8	2,1	4,6	6,7	2,3	4.4	6.9	2.7
	7	6,3	7,7	1,6	5,9	7,5	1,8	**5,5**	**7,3**	**2,0**	5,1	7,2	2,3	4.8	7.2	2.7
	10	7,1	8,4	1,6	6,7	8,2	1,8	6,2	8,0	2,0	5,7	7,8	2,3	–	–	–
	13	8,0	9,3	1,6	7,6	9,1	1,8	7,0	8,8	2,0	6,5	8,5	2,3	–	–	–
	15	8,6	9,9	1,6	8,1	9,6	1,8	7,6	9,3	2,0	7,0	9,0	2,3	–	–	–
115	**5**	12,3	15,1	3,3	11,4	14,7	3,7	10,6	14,3	4,1	9,7	13,9	4,6	9.3	14.0	5.1
	7	13,4	16,2	3,3	12,5	15,7	3,7	**11,6**	**15,3**	**4,1**	10,7	14,8	4,6	10.2	14.9	5.1
	10	15,0	17,8	3,3	14,1	17,2	3,7	13,1	16,7	4,1	12,1	16,2	4,6	–	–	–
	13	17,0	19,7	3,3	16,0	19,1	3,7	14,9	18,5	4,2	13,8	17,9	4,6	–	–	–
	15	18,3	21,0	3,3	17,2	20,3	3,7	16,0	19,6	4,2	14,9	18,9	4,7	–	–	–
120	**5**	18,1	22,3	4,8	17,0	21,7	5,4	15,8	21,1	6,0	14,5	20,5	6,7	13,1	19,9	7,5
	7	19,7	23,8	4,8	18,5	23,2	5,4	**17,2**	**22,5**	**6,0**	15,8	21,8	6,7	14,3	21,2	7,5
	10	22,1	26,1	4,8	20,7	25,3	5,4	19,3	24,5	6,0	17,8	23,7	6,7	16,1	22,9	7,5
	13	25,0	28,9	4,8	23,5	28,0	5,4	21,9	27,1	6,0	20,2	26,1	6,7	18,4	25,1	7,5
	15	26,8	30,6	4,8	25,2	29,7	5,4	23,5	28,7	6,0	21,7	27,6	6,7	19,8	26,5	7,5
125	**5**	25,7	31,4	6,7	24,0	30,6	7,5	22,3	29,8	8,4	20,5	29,0	9,5	18,5	28,3	10,7
	7	27,9	33,5	6,7	26,1	32,6	7,5	**24,3**	**31,7**	**8,4**	22,3	30,8	9,5	20,3	30,0	10,7
	10	31,1	36,6	6,7	29,2	35,5	7,5	27,2	34,5	8,4	25,0	33,4	9,4	22,7	32,4	10,6
	13	35,0	40,4	6,6	33,0	39,2	7,4	30,7	37,9	8,4	28,4	36,6	9,4	25,9	35,4	10,6
	15	37,5	42,8	6,6	35,3	41,4	7,4	33,0	40,1	8,3	30,5	38,6	9,4	27,8	37,2	10,6
135	**5**	33,4	40,9	8,7	31,4	39,9	9,7	29,2	38,8	10,8	26,9	37,8	12,0	24,5	36,7	13,4
	7	36,3	43,7	8,8	34,1	42,5	9,7	**31,8**	**41,4**	**10,8**	29,3	40,1	12,0	26,7	38,9	13,4
	10	40,5	47,8	8,8	38,1	46,4	9,7	35,6	45,0	10,8	32,9	43,6	12,1	30,0	42,1	13,4
	13	45,7	52,9	8,8	43,1	51,3	9,8	40,3	49,6	10,9	37,3	47,9	12,1	34,1	46,1	13,4
	15	49,0	56,0	8,8	46,2	54,3	9,8	43,2	52,5	10,9	40,1	50,6	12,1	36,7	48,6	13,5
140	**5**	39,1	47,7	10,1	36,7	46,6	11,3	34,1	45,4	12,7	31,4	44,2	14,2	28,4	43,0	15,9
	7	42,5	51,1	10,2	39,9	49,8	11,4	**37,1**	**48,3**	**12,7**	34,2	46,9	14,2	31,1	45,6	15,9
	10	47,3	55,8	10,2	44,5	54,2	11,4	41,4	52,5	12,7	38,2	50,8	14,2	34,8	49,2	15,9
	13	53,3	61,6	10,2	50,2	59,8	11,4	46,8	57,7	12,7	43,3	55,9	14,3	39,5	53,8	16,0
	15	57,0	65,2	10,2	53,7	63,1	11,4	50,2	61,0	12,7	46,4	58,9	14,3	42,4	56,6	16,0

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 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”: TCHE and THHE evaporator pressure drops (summer cycle - operation as chiller)

MODEL																	
105	G (l/h)	632	681	729	783	833	874	937	990	**1.050**	1.116	1.192	1.249	1.312	1.418	1.457	1.543
	Δpw (kPa	11	13	14	17	19	21	24	27	**30**	34	39	42	47	55	58	65
115	G (l/h)	1.337	1.441	1.541	1.656	1.761	1.849	1.981	2.093	**2.220**	2.360	2.521	2.641	2.774	2.998	3.082	3.263
	Δpw (kPa	12	14	16	18	21	23	26	29	**33**	37	43	47	52	60	64	71
120	G (l/h)	1.969	2.122	2.269	2.439	2.594	2.723	2.918	3.083	**3.270**	3.477	3.714	3.890	4.085	4.416	4.539	4.806
	Δpw (kPa	12	14	16	18	21	23	26	29	**33**	37	43	47	51	60	64	71
125	G (l/h)	2.746	2.960	3.165	3.401	3.617	3.798	4.070	4.300	**4.560**	4.849	5.180	5.426	5.698	6.159	6.331	6.703
	Δpw (kPa	13	15	17	20	23	25	29	32	**36**	41	46	51	56	66	69	78
135	G (l/h)	3.627	3.909	4.181	4.493	4.778	5.017	5.375	5.679	**6.020**	6.404	6.841	7.167	7.525	8.135	8.361	8.853
	Δpw (kPa	11	12	14	16	18	20	23	26	**29**	33	37	41	45	53	56	63
140	G (l/h)	4.227	4.557	4.873	5.237	5.570	5.848	6.266	6.620	**7.020**	7.466	7.975	8.354	8.772	9.483	9.747	10.320
	Δpw (kPa	8	10	11	13	14	16	18	20	**23**	26	30	33	36	42	44	50

Table “H”: TCHE condenser pressure drops

MODEL																	
105	G (l/h)	798	860	920	988	1.051	1.104	1.183	1.249	**1.325**	1.409	1.505	1.577	1.656	1.790	1.839	1.948
	Δpw (kPa)	19	22	26	29	33	37	42	47	**53**	60	68	75	83	97	102	115
115	G (l/h)	1.658	1.787	1.911	2.054	2.184	2.293	2.457	2.596	**2.750**	2.928	3.127	3.276	3.440	3.719	3.822	4.047
	Δpw (kPa)	21	24	28	32	36	40	46	51	**57**	65	74	81	89	104	110	123
120	G (l/h)	2.445	2.636	2.819	3.029	3.222	3.383	3.624	3.829	**4.060**	4.318	4.613	4.832	5.074	5.485	5.638	5.969
	Δpw (kPa)	26	31	35	41	46	51	58	65	**73**	83	94	103	114	133	141	158
125	G (l/h)	3.409	3.675	3.930	4.223	4.491	4.716	5.053	5.338	**5.660**	6.020	6.430	6.737	7.074	7.647	7.859	8.322
	Δpw (kPa)	30	35	40	47	53	58	67	75	**84**	95	108	119	131	153	162	182
135	G (l/h)	4.476	4.825	5.160	5.545	5.897	6.192	6.634	7.010	**7.430**	7.905	8.444	8.846	9.288	10.041	10.320	10.927
	Δpw (kPa)	25	29	33	38	43	48	55	61	**69**	78	89	98	108	126	133	149
140	G (l/h)	5.191	5.596	5.984	6.431	6.839	7.181	7.694	8.129	**8.620**	9.167	9.792	10.259	10.772	11.645	11.968	12.672
	Δpw (kPa)	18	21	24	28	31	35	40	44	**50**	57	65	71	78	91	96	108

Table “I”: THHE condenser pressure drops (summer cycle - operation as chiller)

MODEL																	
105	G (l/h)	798	860	920	988	1.051	1.104	1.183	1.249	**1.325**	1.409	1.505	1.577	1.656	1.790	1.839	1.948
	Δpw (kPa)	19	22	26	29	33	37	42	47	**53**	60	68	75	83	97	102	115
115	G (l/h)	1.658	1.787	1.911	2.054	2.184	2.293	2.457	2.596	**2.750**	2.928	3.127	3.276	3.440	3.719	3.822	4.047
	Δpw (kPa)	21	24	28	32	36	40	46	51	**57**	65	74	81	89	104	110	123
120	G (l/h)	2.445	2.636	2.819	3.029	3.222	3.383	3.624	3.829	**4.060**	4.318	4.613	4.832	5.074	5.485	5.638	5.969
	Δpw (kPa)	20	23	27	31	35	38	44	49	**55**	62	71	78	86	100	106	119
125	G (l/h)	3.409	3.675	3.930	4.223	4.491	4.716	5.053	5.338	**5.660**	6.020	6.430	6.737	7.074	7.647	7.859	8.322
	Δpw (kPa)	22	26	30	35	39	43	49	55	**62**	70	80	88	97	113	120	134
135	G (l/h)	4.476	4.825	5.160	5.545	5.897	6.192	6.634	7.010	**7.430**	7.905	8.444	8.846	9.288	10.041	10.320	10.927
	Δpw (kPa)	18	21	24	27	31	34	39	44	**49**	55	63	69	77	89	95	106
140	G (l/h)	5.191	5.596	5.984	6.431	6.839	7.181	7.694	8.129	**8.620**	9.167	9.792	10.259	10.772	11.645	11.968	12.672
	Δpw (kPa)	12	14	16	19	21	24	27	30	**34**	38	44	48	53	62	66	73

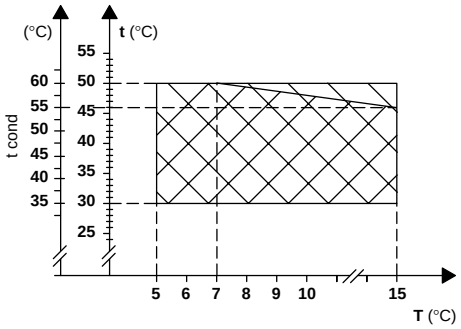
Table “L”: TCEE evaporator pressure drops

MODEL																	
105	G (l/h)	570	614	657	706	751	788	845	892	**950**	1.006	1.075	1.126	1.183	1.278	1.314	1.391
	Δpw (kPa)	9	11	12	14	16	17	20	22	**25**	28	32	35	39	46	48	54
115	G (l/h)	1.202	1.296	1.386	1.489	1.583	1.663	1.781	1.882	**2.000**	2.123	2.267	2.375	2.494	2.696	2.771	2.934
	Δpw (kPa)	10	11	13	15	17	19	22	24	**27**	31	35	38	42	49	52	58
120	G (l/h)	1.782	1.921	2.054	2.208	2.348	2.465	2.641	2.791	**2.950**	3.147	3.362	3.522	3.698	3.998	4.109	4.351
	Δpw (kPa)	10	11	13	15	17	19	22	24	**27**	31	35	38	42	49	52	58
125	G (l/h)	2.518	2.714	2.903	3.119	3.317	3.483	3.732	3.943	**4.180**	4.446	4.750	4.976	5.225	5.648	5.805	6.146
	Δpw (kPa)	11	13	14	17	19	21	24	27	**30**	34	39	43	47	55	58	65
135	G (l/h)	3.295	3.552	3.798	4.082	4.341	4.558	4.884	5.160	**5.470**	5.819	6.215	6.511	6.837	7.391	7.597	8.044
	Δpw (kPa)	9	10	12	13	15	17	19	21	**24**	27	31	34	38	44	46	52
140	G (l/h)	3.844	4.144	4.431	4.762	5.064	5.318	5.698	6.020	**6.380**	6.789	7.251	7.597	7.977	8.623	8.863	9.384
	Δpw (kPa)	7	8	9	11	12	13	15	17	**19**	22	25	27	30	35	37	41

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

operation limits, use of antifreeze solutions, sound power level

TCHE-THHE-TCEE: cooling operation



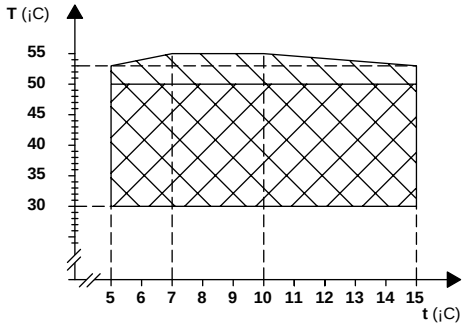
T (°C) = evaporator outlet temperature
t (°C) = condenser outlet temperature
t_{cond} (°C) = dew-point temperature, only for TCEE

Standard operation R407C for the model 120 ÷ 140.

Standard operation R407C for the model TCEE 105 - 115.

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

THHE: heat pump operation



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

Standard operation R407C for the model 120 ÷ 140.

Standard operation R407C for the model 105 - 115.

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 "M" - TCHE-THHE 105 ÷ 140

% 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	1316
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

Table "N": TCHE - THHE - TCEE sound power

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** (*)
105	-	50,3	52,9	42,0	44,9	43,5	44,8	31,0	51
115	-	47,5	61,8	51,4	52,0	47,2	47,5	31,0	57
120	59,5	32,4	37,9	55,6	55,3	53,4	50,1	32,0	60
125	62,5	36,4	41,9	59,6	59,3	57,4	54,1	35,0	64
135	63,5	39,9	45,4	63,1	62,8	60,9	57,6	37,0	67
140	66,7	37,2	52,4	63,4	62,4	62,9	59,8	42,0	68

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 - THHE), condensation temperature (dew point) 45°C (TCEE).

TCHE-THHE: dimensional and installation characteristics

TCHE-THHE 105 - 140

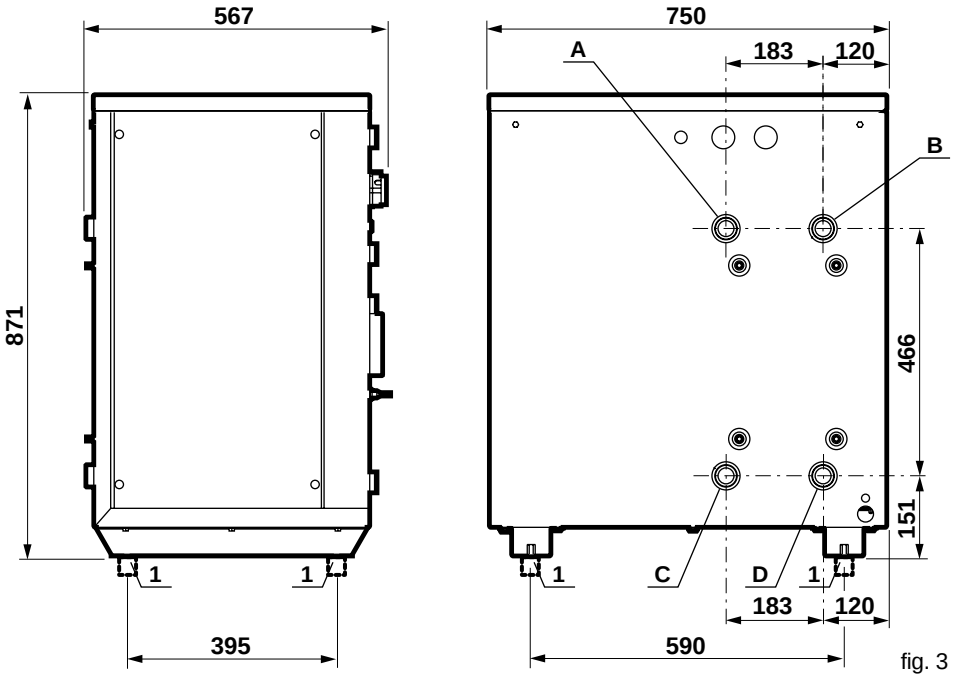


fig. 3

TCHE

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

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	1 1/4" G

Distribution of the weights on the fixing points and clearance spaces

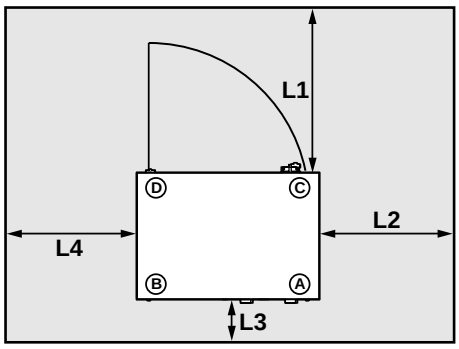


fig. 4

Plan view with KSA anti-vibration supports

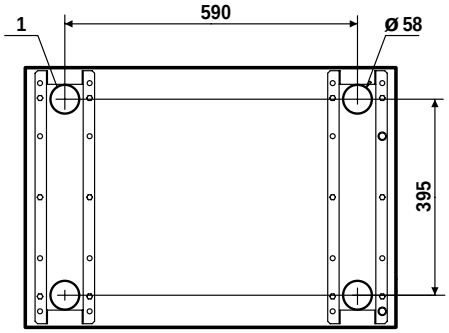


fig. 5

TCHE: weight distribution

MODEL		105	115	120	125	135	140
Weight	kg	157	177	217	232	258	281
Support point							
A	kg	43	48	56	62	70	80
B	kg	46	54	72	78	88	96
C	kg	32	35	38	40	42	44
D	kg	36	40	51	54	58	62

THHE: weight distribution

MODEL		105	115	120	125	135	140
Weight	kg	167	187	227	242	268	291
Support point							
A	kg	45	50	59	65	72	82
B	kg	48	57	75	81	90	98
C	kg	35	37	40	42	45	47
D	kg	39	43	53	56	61	64

TCHE-THHE: technical spaces clearance

MODEL		105	115	120	125	135	140
Service spaces							
L1	mm	800	800	800	800	800	800
L2	mm	500	500	500	500	500	500
L3	mm	200	200	200	200	200	200
L4	mm	500	500	500	500	500	500

N.B.:
Dimensions on the drawing are in mm.

TCEE 105 - 140

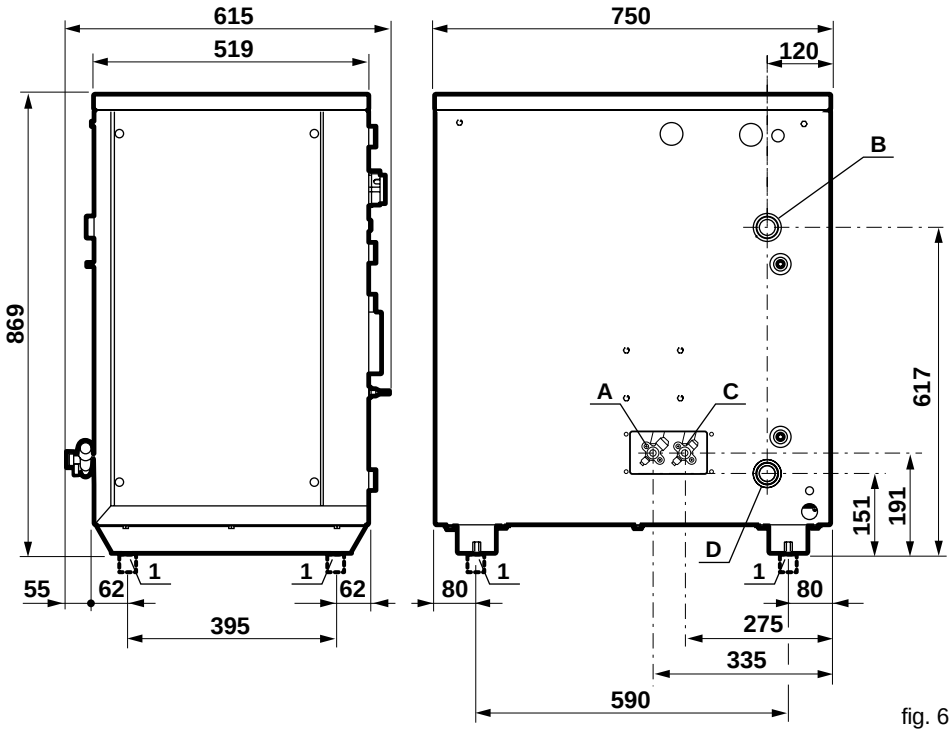


fig. 6

TCEE

A. Gas line (discharge 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 equipped with male threaded hydraulic connections on the evaporator.

Evaporator water connections	1 1/4" G

Refrigerant connections

The unit is supplied with flared refrigerant connections. For further information refer to “O” on page 16.

Distribution of the weights on the fixing points and clearance spaces

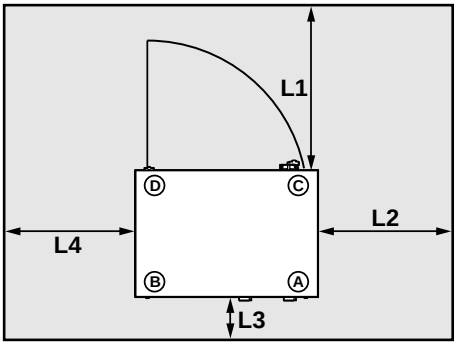


fig. 7

Plan view with KSA anti-vibration supports

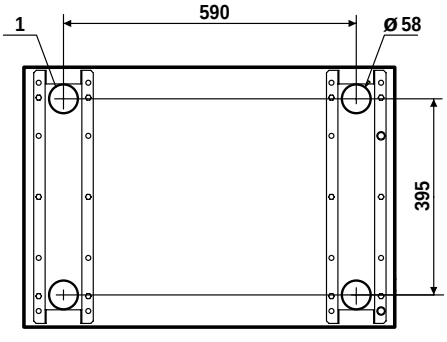


fig. 8

TCEE: distribution of the weights

MODEL		105	115	120	125	135	140
Weight	kg	154	172	211	224	247	270
Support point							
A	kg	41	44	54	58	66	75
B	kg	45	53	68	74	84	92
C	kg	32	35	38	39	41	43
D	kg	36	40	51	53	56	60

TCEE: technical spaces clearance

MODEL		105	115	120	125	135	140
Service spaces							
L1	mm	800	800	800	800	800	800
L2	mm	500	500	500	500	500	500
L3	mm	200	200	200	200	200	200
L4	mm	500	500	500	500	500	500

N.B.:

Dimensions on the drawing are in mm.

TCEE: refrigerant connection to remote condenser

ATTENTION!

○ The TCEE 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 connections of the TCEE 105 - 140 condenserless are the following:

Table "O"

TCEE	Connections		Diameter
105	Liquid	mm-inch	9,52 - 3/8"
	Gas	mm-inch	12,7 - 1/2"
115	Liquid	mm-inch	12,7 - 1/2"
	Gas	mm-inch	12,7 - 1/2"
120	Liquid	mm-inch	15,9 - 5/8"
	Gas	mm-inch	15,9 - 5/8"
125	Liquid	mm-inch	15,9 - 5/8"
	Gas	mm-inch	22,2 - 7/8"
135	Liquid	mm-inch	15,9 - 5/8"
	Gas	mm-inch	22,2 - 7/8"
140	Liquid	mm-inch	15,9 - 5/8"
	Gas	mm-inch	22,2 - 7/8"

○ The TCEE 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 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.

Diameter and length of refrigerant pipes

MODEL	Equivalent distance	m	2	10	15	20	25	30
CCAM	Line							
105	Liquid	mm	10 / 8	10 / 8	10 / 8	10 / 8	10 / 8	–
	Gas	mm	12 / 10	12 / 10	12 / 10	12 / 10	12 / 10	–
115	Liquid	mm	12 / 10	12 / 10	12 / 10	12 / 10	12 / 10	–
	Gas	mm	12 / 10	12 / 10	16 / 14	16 / 14	16 / 14	–
120	Liquid	mm	16 / 14	16 / 14	16 / 14	16 / 14	16 / 14	16 / 14
	Gas	mm	16 / 14	16 / 14	16 / 14	22 / 20	22 / 20	22 / 20
125	Liquid	mm	16 / 14	16 / 14	16 / 14	16 / 14	16 / 14	16 / 14
	Gas	mm	22 / 20	22 / 20	22 / 20	22 / 20	22 / 20	22 / 20
135	Liquid	mm	16 / 14	16 / 14	16 / 14	16 / 14	18 / 16	18 / 16
	Gas	mm	22 / 20	22 / 20	22 / 20	22 / 20	28 / 25	28 / 25
140	Liquid	mm	16 / 14	16 / 14	16 / 14	18 / 16	18 / 16	18 / 16
	Gas	mm	22 / 20	22 / 20	22 / 20	28 / 25	28 / 25	28 / 25

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

Refrigerant charge

○ The TCEE 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-THHE: electrical connections

TCHE-THHE 105

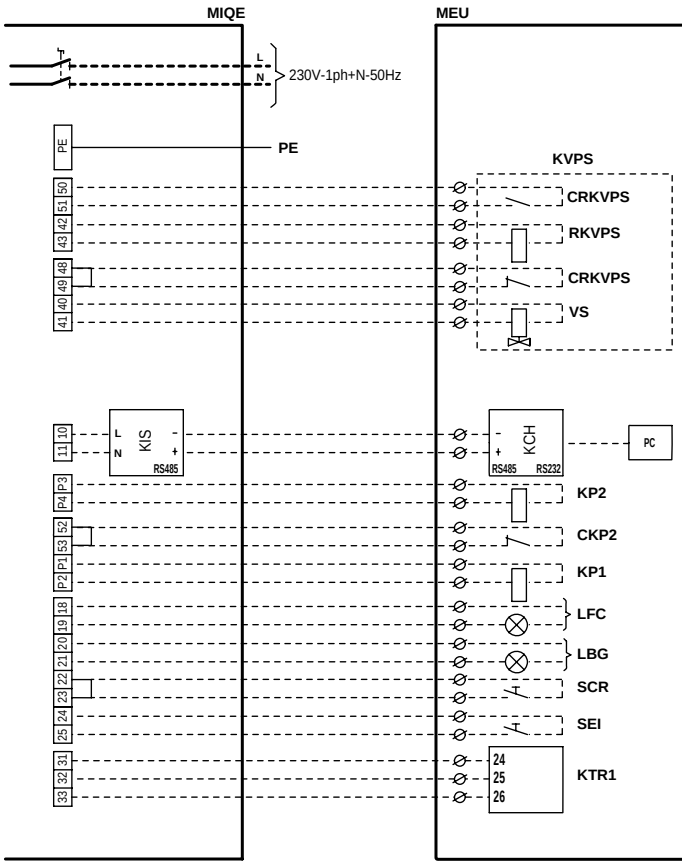


fig. 9

TCHE-THHE 115 - 120 - 125 - 135 - 140

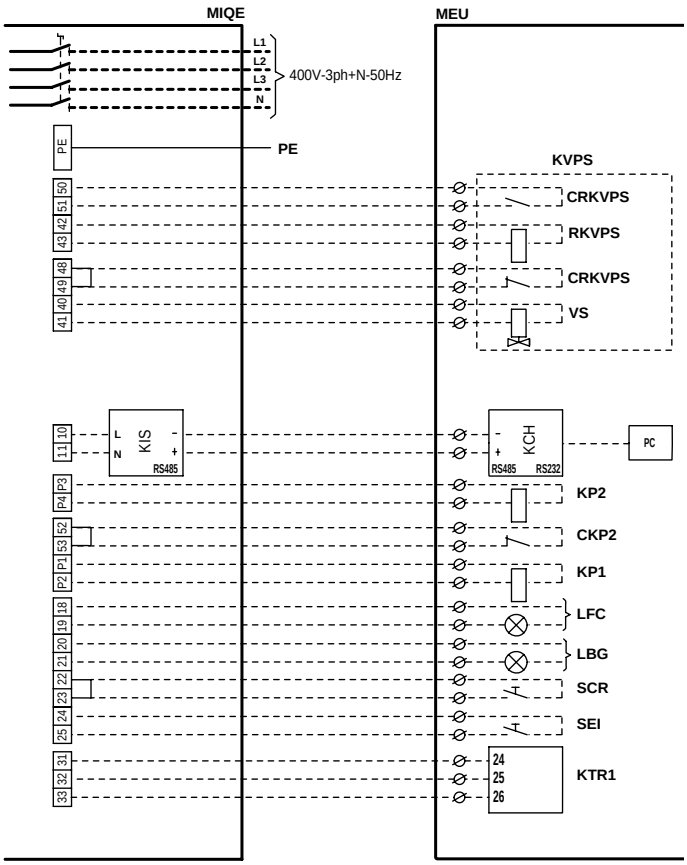


fig. 10

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)
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		105	115	120	125	135	140
Electrical data							
Line sections	mm²	4	4	6	6	10	10
PE section	mm²	4	4	6	6	10	10
Remote control line section	mm²	1,5	1,5	1,5	1,5	1,5	1,5
Maximum absorbed current	A	11,7	9,0	12,8	18,0	23,5	26,6
Starting current	A	62	66	98	130	175	175

TCEE: electrical connections

TCEE 105

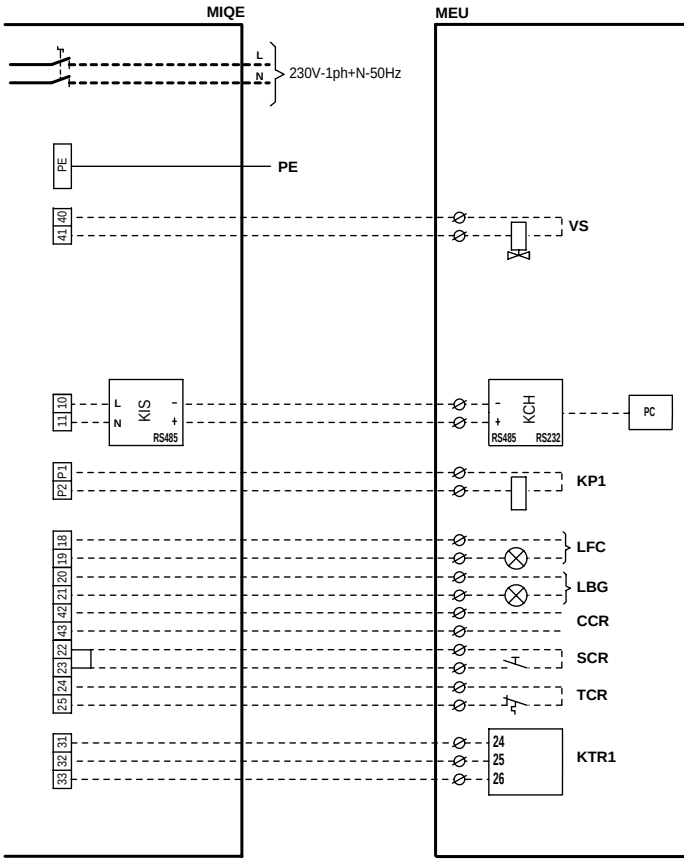


fig. 11

TCEE 115 - 120 - 125 - 135 - 140

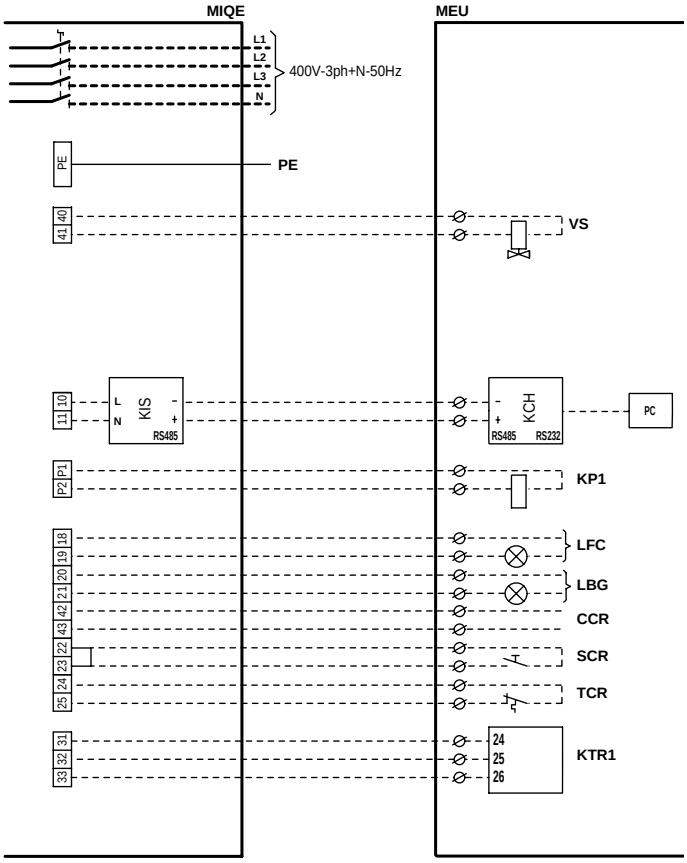


fig. 12

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 = 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		**105**	**115**	**120**	**125**	**135**	**140**
Electrical data							
Line sections	mm²	4	4	6	6	10	10
PE section	mm²	4	4	6	6	10	10
Remote control line section	mm²	1,5	1,5	1,5	1,5	1,5	1,5
Maximum absorbed current	A	11,7	9,0	12,8	18,0	23,5	26,6
Starting current	A	62	66	98	130	175	175

NOTES

TCHE-THEE 105÷140
TCEE 105÷140
Q-Flow range

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