K20132EN ed.5

TECHNICAL NOTE

R410A

Compact-Y MD HT65

THAEY 238÷260

EasyPACK HT65

THAETY-THAESY

269÷296

Packaged air-cooled reversible heat pumps for high-temperature hot water production, with axial fans. Range with hermetic Scroll compressors and refrigerant R410A.

RHOSS

RHOSS USEFUL FOR LEED

LEED certification - which stands for "Leadership in Energy and Environmental Design" - is now the most internationally established protocol for defining and assessing the environmental sustainability of buildings. It was introduced in 1998 by the U.S. Green Building Council (USGBC) and was subsequently established internationally.

It is voluntary certification based on the consent that provides investors and all stakeholders with precise references for the design, construction and management of high performance green buildings.

LEED is a flexible system that can be applied to all types of buildings, both new and existing, and covers the entire life cycle of the building.

LEED certification is aimed at promoting a constructive transformation of the industry to achieve seven main objectives [LEED Version 4 - BD+C Guide]:

- Invert the contribution to climate change
- Improve individual health and well-being
- Protect and restore water resources
- Protect, enhance and restore ecosystems and biodiversity
- Promote procurement cycles of sustainable and regenerative materials
- Create "green economy"
- Improve social equity, public health and quality of life

Since LEED is certification dedicated to buildings, products, technologies or building materials cannot be LEED certified and can only help meet the criteria of specific pre-requisites and credits of the LEED reference guide and help the building increase its score.

However, making an informed choice of certain products and technologies other than others may have a significant impact on the total score of the building; an impact that can reach 50% of the total.

For this reason, the manufacturer may have an important role in the certification process and provide concrete support to the parties involved. The role of the manufacturer will be basically consist of two activities:

- Provide precise mapping of products and/or technologies, aimed at identifying which products can be used in a LEED project and which pre-requisite criteria and credits do these products help fulfil
- Offer services and expertise that simplify and facilitate certain activities, which are specifically required by LEED standards

RHOSS units have been analysed according to the criteria described in Version 4 of the LEED certification, published in November 2013 and currently still flanked by Version 3 of 2009, with particular attention paid to the LEED Building Design and Construction guide.

With regards to the minimum energy efficiency criteria, aimed at determining whether a particular model can be used in a LEED project, the reference standard of Version 4 is ASHRAE Standard 90.1-6.8, section 90.1 - 2010 and table 6.8.1C, which replaces ASHRAE Standard 6.4-2007 used as a reference for LEED certification Version 3. Clearly, all RHOSS models that meet the minimum efficiency criteria of Version 4 also automatically meet the criteria of Version 3.

RHOSS SpA is a member of USGBC and actively supports the awareness of the principles of the sustainable design in the world.

GLOSSARY

GWP = Global Warming Potential - An index that expresses the greenhouse effect caused by gas emission into the atmosphere. Each substance has a definite potential in relation to CO2, which has been conventionally defined as a potential equal to 1.

LCGWP = Life Cycle Global Warming Potential - An index which defines the global warming potential of the entire life cycle of the product. This index depends on: GWP of the refrigerant used, useful life of the product, estimated annual loss of refrigerant and end of life, amount of unit refrigerant.

LCODP = Life Cycle Ozone Depletion Potential - The index which defines the potential destruction of the stratospheric ozone layer of refrigerant used throughout the life cycle of the product. This index is 0 for refrigerants of the HFC family (R134a and R410A).

General features

Declared conditions of use

THAEY, THAETY and THAESY units are packaged reversible heat pumps on a cooling circuit with air evaporation/condensation and axial fans for high-temperature applications of the water produced.

They are suitable in air conditioning installations and industrial processes where chilled and hot water is required, not for human consumption.

The units are designed for outdoor installation

Guide to reading the code — Compact-Y and EasyPACK HT65

T	Water production unit		
H	Heat pump		
A	Air cooling		
E	Scroll-type hermetic compressors		
T	High efficiency/temperature (for EasyPACK range)	S	Silenced (for EasyPACK range)
Y	R410A refrigerant gas		

2	Number of compressors
38÷94	Approximate cooling power (in Kw)

The power value used to identify the model is approximate, for the exact value, identify the machine and consult the Technical Data

Available installations

Standard	Set-up without pump or tank
PUMP	
P1	Installation with pump
P2	Installation with increased static pressure pump
DP1	Installation with double pump, including an automatically activated pump in stand-by
DP2	Installation with increased static pressure double pump, including an automatically activated pump in stand-by
TANK&PUMP	
ASP1	Installation with pump and water buffer tank
ASP2	Installation with increased static pressure pump and water buffer tank
ASDP1	Installation with double pump, including an automatically activated pump in stand-by and storage
ASDP2	Installation with increased static pressure double pump, including an automatically activated pump in stand-by and storage

Example: **THAEY HT65 260 ASP1**

- Water production unit
- Heat pump
- Air-cooled
- 2 Scroll-type hermetic compressors
- R410A refrigerant fluid
- Approximate nominal cooling capacity 60 kW
- Installation with pump and water buffer tank

Compact-Y MD and EasyPACK HT65

HIGH EFFICIENCY AIR-COOLED REVERSIBLE HEAT PUMPS IN R410A FOR PRODUCTION OF HIGH TEMPERATURE WATER

HT65: heating, cooling and domestic hot water with just one product!

HT65 is the series of Rhoss high-temperature heat pumps, ideal as a unique solution for heating, cooling and the production of domestic hot water for central heating systems such as hotels, condominiums and collective applications in general.

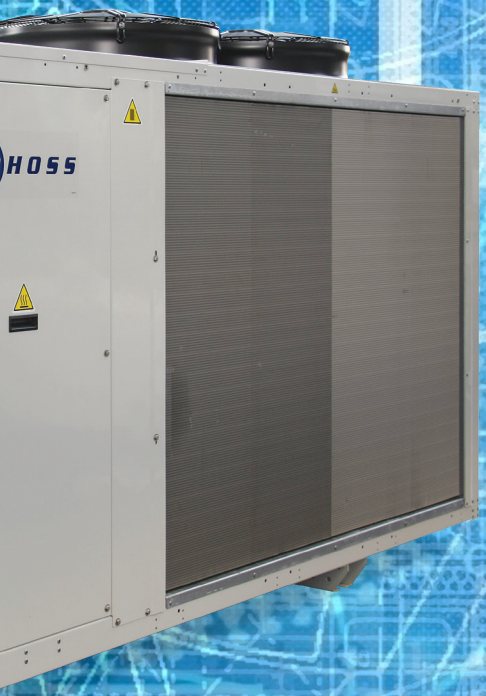
HT65 is efficient!

HT65 heat pumps are equipped with 2 scroll compressors installed on the same cooling circuit to obtain 2 cooling and heating capacity steps that allow adjustment flexibility and greater operating efficiency with partial loads. The efficiency of these units is also enhanced by the innovative **AdaptiveFunction Plus** control logic, with which the range is supplied. Besides optimising compressor activation and the relative operating cycles, the control, developed by RHOSS in collaboration with the University of Padua, allows optimal comfort levels to be achieved in all load conditions and the best performance in terms of energy efficiency during seasonal operation. **AdaptiveFunction Plus** guarantees comfort and energy saving!

HT65 meets the system's requirements during all seasons of the year!

Compact-Y MD and EasyPack HT65 were specially designed to address issues of refitting and the efficiency of existing systems. They simplify the system by using a single generator for heating and cooling thus eliminating the risks and costs of mandatory maintenance for traditional combustion systems.

They are ideal for all types of systems, including radiator systems with the temperature of the hot water produced up to 65°C, and guarantee operation with outdoor air temperature from -20°C to +40°C.



BRUSHLESS DC

ERP READY

AdaptiveFunction Plus

The new AdaptiveFunction Plus adaptive control logic is an exclusive RHOSS S.p.a. patent and the result of a long collaboration with the University of Padua

The various algorithm processing and development operations have been implemented and tested on the EasyPACK-I range of units in the RHOSS S.p.a. Research&Development Laboratory by means of numerous test campaigns

Objectives

- To always guarantee optimal unit operation in the system in which it is installed
  Evolved adaptive logic
- To achieve the best performance from a chiller and a heat pump in terms of energy efficiency with full and partial loads
  Low consumption chillers

Operating logic

In general, the actual control logics on chillers/heat pumps do not consider the features of the system in which the units are installed
they usually control the return water temperature and there aim is to guarantee the operation of the chillers, giving less priority to the system requirements
The new AdaptiveFunction Plus adaptive logic contrasts these logics with the objective of optimising chiller operation according to the system characteristics and the actual thermal load
The controller regulates the flow water temperature and adjusts itself according to the operating conditions using:

- the information contained in the return and flow water temperature to estimate the load conditions, thanks to a particular mathematical function
- a special adaptive algorithm that uses this estimate to vary the values and the start-up and switch-off limit values of the compressors; the optimised compressor start-up management guarantees a precision water supply to the user, reducing the fluctuation around the set-point value

Main functions

Efficiency or Precision

Thanks to the advanced control, the chiller can run on two different regulation settings in order to obtain the best possible performance in terms of energy efficiency and significant seasonal savings or high water temperature precision:

1. **Low consumption chillers: "Economy" option**
   It is known that chillers work at full load for only a very small percentage of their operating time and at partial load for most of the season
   Therefore, the power they must supply generally differs from the nominal design power, and partial load operation significantly affects seasonal energy performance and consumption
   This makes it necessary for the unit to run as efficiently as possible with partial loads
   The controller therefore ensures that the water flow temperature is as high as possible (when operating as a chiller) or as low as possible (when operating as a heat pump) whilst being compatible with the thermal loads, which means it shifts, unlike traditional systems
   This prevents energy waste associated with the unnecessarily onerous chiller temperature levels being maintained, thereby guaranteeing that the ratio between the power to be supplied and the energy to be used to produce it is always optimised
   The right level of comfort is finally available to everyone!

1. **High precision: "Precision" option**
   With this operating method, the unit works at a fixed set-point
   Therefore, the "Precision" option guarantees precision and reliability in all applications that require a controller that guarantees a more accurate constant water supply temperature, and where particular humidity control is required
   However, it is always recommended to use a storage tank with greater system water content in process applications to guarantee high system thermal inertia

Set-point composition

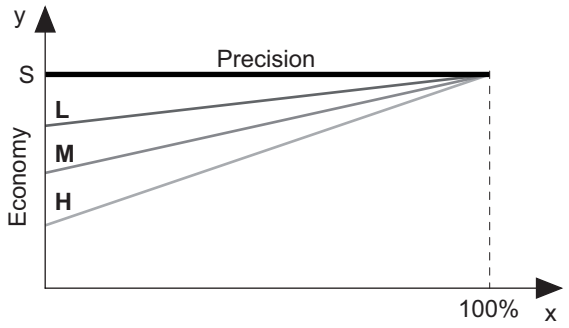
The Economy function allows the chiller to run on energy-saving programmes while still providing the required level of comfort

This function controls the maximum delivery temperature with sliding set-points, changing the set-point according to the system's actual heat load; when the summer load decreases, the set-point increases, and when the winter load decreases, the set-point decreases

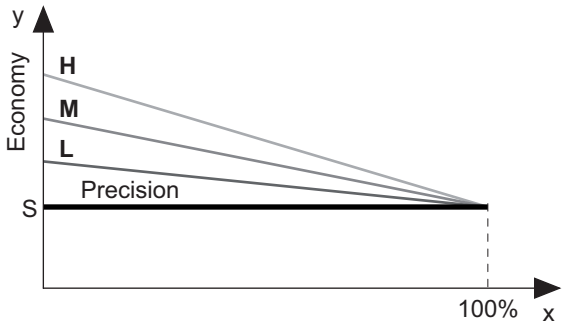
This function is intended for cooling applications, and is designed to control energy consumption while always respecting the actual demands on the system's capacity

Within the Economy function it is possible to select one of three different set-point adaptation curves depending on the type of system

"Economy" function in Winter mode



"Economy" function in Summer mode



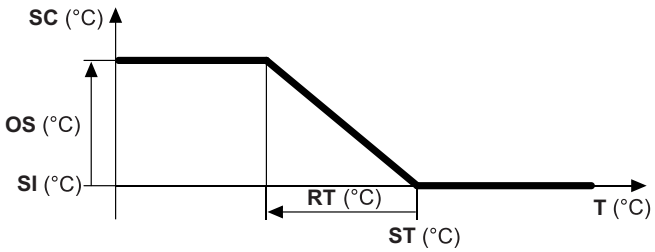
x	Load percentage (%)
y	Set-point (°C)
S	Set-point entered by user
L	Buildings with very unbalanced loads
M	Intermediate situation between L and H (default)
H	Buildings with well-distributed loads. High efficiency

For the Compact-Y MD HT65 range, as an alternative to modifying the Set-point according to the actual system load (Economy option), the Set-point can be compensated for according to the outdoor air temperature (air probe already present on unit as per standard)

This function changes the set-point depending on the temperature of the outdoor air. Based on this value, the set-point is calculated by adding (winter cycle) or subtracting (summer cycle) an offset value to the set-point used (see examples below)

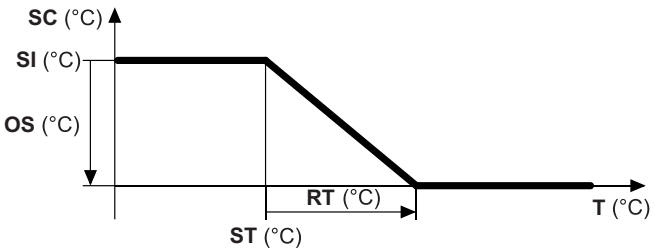
This function is active both in winter mode and summer mode. The function must be activated from the keyboard

Winter cycle



OS	8°C
RT	25°C
ST	20°C

Summer cycle



OS	8°C
RT	15°C
ST	15°C

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

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

Additionally, set-point compensation can be enabled in one cycle and the Economy function in the other

Structural features THAEY HT65 238÷260

- Load-bearing structure and panelling in galvanised and RAL 9018 painted sheet steel; base in galvanised sheet steel
- Hermetic, Scroll-type rotary compressors complete with an electronic management board and valve for liquid injection with internal thermal protection and crankcase resistance automatically activated when the unit stops (as long as the unit is powered).
- Adequately insulated, braze-welded plate water side heat exchange in stainless steel complete with anti-freeze heater.
- Air side heat exchanger composed of a coil with copper pipes and aluminium fins, complete with protection grille.
- Dual electric helical fans with external rotor supplied with internal thermal protection and complete with protection mesh.
- Proportional electronic device for pressure and continuous adjustment of the fan rotation speed, down to a minimum outdoor air temperature of -10°C when operating as a chiller, and up to a maximum outdoor air temperature of 40°C when operating as a heat pump.
- Male threaded hydraulic connections.
- Differential pressure switch that protect the unit from any water flow interruptions.
- Cooling circuit made of annealed copper pipe (EN 12735-1-2) complete with: cartridge dryer filter, load connections, high pressure side manual reset safety pressure switch, LP and HP pressure transducer, safety valve, valve stream of filter, liquid indicator, intake line isolation, thermostatic expansion valve, cycle inversion valve, liquid receiver and check valves (no. of 2 for THAEY), gas separator
- Unit with IP24 protection rating.
- The unit is complete with a charge of R410A refrigerant.

Available installations

Standard Set-up without pump or tank

In this case it is compulsory to use the pump cables contained in the unit's terminal block to manage the external pump provided by the user.

Refer to the specific section on "Electrical connections" for details.

PUMP

The unit can be equipped with a single or double electric pump and have an expansion tank, air vent valves, safety valve and water pressure gauge. The electric pumps can be selected from the following:

P1	Installation with pump
P2	Installation with increased static pressure pump
DP1	Installation with double pump, including an automatically activated pump in stand-by
DP2	Installation with increased static pressure double pump, including an automatically activated pump in stand-by

TANK&PUMP

The unit can be equipped with a pump unit complete with an inertial buffer tank, expansion tank, air vent valves, safety valve, pressure gauge on the water side and a single or double electric pump. The pump unit can be chosen from the following:

ASP1	Installation with pump and water buffer tank
ASP2	Installation with increased static pressure pump and water buffer tank
ASDP1	Installation with double pump, including an automatically activated pump in stand-by and storage
ASDP2	Installation with increased static pressure double pump, including an automatically activated pump in stand-by and storage

Electrical control board

- Electrical panel can be accessed by opening the front panel, in compliance with IEC Standards in force, fitted with opening and closing via specific tool.
- Complete with:
  - electrical wiring for 400V-3ph+N-50Hz power supply voltage
  - auxiliary circuit power supply 230V-1ph+N-50Hz drawn from a transformer;
  - main power supply switch with interlocking safety door isolator;
  - circuit breaker switch protecting the compressor, pumps and fans
  - protection fuse for the auxiliary circuit
  - compressor power contactor for the pumps and fans
  - remote machine controls: ON/OFF and summer/winter selector;
  - remote machine controls: compressor operating lights and general lock lights
- Programmable microprocessor electronic board handled by the keyboard inserted in the machine.
- This electronic board performs the following functions:
  - adjusts and controls the temperature settings of the water exiting the machine partialisation steps; of cycle inversion; safety delays; of the circulation pump; of the compressor operating hour meter and the system pump hour meter; of the pressurised defrosting cycles; of the electronic antifreeze protection that is automatically activated when the machine is off; of the functions that control the intervention mode of the individual parts forming the machine
  - complete protection of the unit, possible shutdown and display of all the triggered alarms;
  - compressor protection phase sequence monitor;
  - protection of unit against a phase power failure
  - display of the settings implemented on the display; of the in/out water temperature on the display; the condensation and evaporation; of the alarms on the display; of operation of the chiller or heat pump by means of display
  - self-diagnosis with continuous monitoring of the unit functioning status.
  - multilingual menu user interface
  - automatic pump operating time balance (DP1-DP2, ASDP1- ASDP2 installations)
  - automatic activation of the pump in standby in the event of an alarm (DP1-DP2, ASDP1-ASDP2 set ups);
  - alarm code and description
  - Management of alarms log
- In particular, each alarm memorises:
  - date and time of intervention
  - alarm code and description
  - in/out water temperature values as soon as the alarm was triggered
  - alarm delay time from the switch-on of the connected device
  - compressor status at the time of the alarm
- Advanced functions:
  - Pump Energy-Saving management
  - evaporator pump control KPE, in the case of external supply of electric pumps (to be installed by the installer). For the unit to operate properly, activation of the recovery pump, by the installer, must be controlled by means of a specific discrete output provided in the board on the unit;
  - Hi-Pressure Prevent function with forced cooling capacity partialisation for a high outdoor temperature (in summer mode)
  - set-up for serial connection (SS, FTT10, KBE, KBM, KUSB accessory)
  - possibility to have a digital input for remote management of double set point (DSP)
  - possibility of having a discrete input for production of domestic hot water by means of the 3-way diverter valve (VDEV). In this case, there is the possibility of using a temperature probe instead of the discrete input (see specific section for more information)

- possibility to have an analogue input for the shifting Set-point (CS) via a 4-20mA remote signal;
- management of time bands and operation parameters with the possibility of daily/weekly functioning programs;
- check-up and verification of the scheduled maintenance status
- computer-assisted unit testing
- self-diagnosis with continuous monitoring of the unit functioning status.
- MASTER/SLAVE management logic integrated in single systems (SIR - Sequenziatore Integrato Rhoss - Rhoss Integrated Sequencer) -Refer to the specific section for more details

° Set-point regulation via the AdaptiveFunction Plus with two options:

- fixed set-point (Precision option)
- set-point sliding (Economy option)

Accessories

Factory Fitted Accessories

P1	Single electric pump with a standard head pressure.
P2	Single electric pump with increased head pressure
DP1	Double electric pump with standard head pressure, one of which in standby with automatic activation
DP2	Double electric pump with increased head pressure, one of which in standby with automatic activation
ASP1	Inertial buffer tank and a single electric pump with standard head pressure
ASP2	Inertial buffer tank and a single electric pump with increased head pressure
ASDP1	Inertial buffer tank and double electric pump with standard head pressure, one of which in standby with automatic activation
ASDP2	Inertial buffer tank and double electric pump with increased head pressure, one of which in standby with automatic activation
SIL	Silenced set-up (sound-proof compressor compartment + compressor ear muff)
SFS	Compressors soft starter
RAP	Unit with pre-painted copper-aluminium coils
BRR	Unit with copper-tinned copper condensation coils
RAS	Antifreeze heater on the tank
RAE	Electric pump antifreeze heater
RAB	Antifreeze heater electrical resistance base
FDL	Forced Download Compressors. Compressor switch-off to limit the absorbed current and power
GM	Refrigerant circuit high and low pressure gauges
DSP	Double set-point via digital consensus (incompatible with the CS accessory)
CS	Scrolling set point via analogue signal 4-20 mA (incompatible with the DSP accessory).

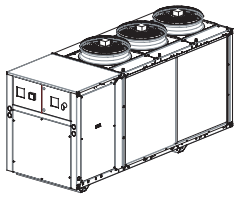
Accessories supplied separately

KFA	Water filter
KRIT	Additional electrical resistance for heat pump, managed by regulation
KVDEV	3-way deviator valve for DHW production, managed by regulation
KSA	Rubber anti-vibration mountings
KTRD	Thermostat with display
KTR	Remote keypad for control at a distance with LCD display and same functions as the machine. Connection must be made with a 6-wire telephone cable (maximum distance 50 m) or with KRJ1220/KRJ1230 accessories. For greater distances up to 200 m, use an AWG 20/22 shielded cable (4 wires+shield, not supplied) and the KR200 accessory
KRJ1220	Connection cables for KTR (20 m length)
KRJ1230	Connection cables for KTR (30 m length)
KR200	Remote control kit for the KTR accessory for distances greater than 50 m and up to 200 m (AWG shielded cable not supplied)
KRS485	RS485 interface for serial dialogue with other devices (proprietary control; protocol Modbus RTU)
KFTT10	LON interface for serial communication with other devices (LON protocol)
KBE	Ethernet interface for serial communication with other devices (BACnet IP protocol)
KBM	RS485 interface for serial communication with other devices (BACnet MS/TP protocol)
KUSB	RS485/USB serial converter (USB cable supplied)

Refer to the price list or contact Rhoss S.p.A. to verify the compatibility of any accessory

Structural features THAETY-THAESY HT65 269÷296

- Load-bearing structure and panelling in galvanised and RAL 9018 painted sheet steel; base in galvanised sheet steel
- The structure consists of two sections:
- technical compartment that houses the compressors, the electrical panel and the main components of the cooling circuit
- aeraulic circuit dedicated to housing the heat exchanger coils and electric fans



- Hermetic, Scroll-type rotary compressors complete with internal circuit breaker protection and crankcase resistance automatically activated when the unit stops (as long as the unit is powered)
- Adequately insulated, braze-welded plate water side heat exchanger in stainless steel
- Air side exchanger composed of coil with copper pipes and aluminium fins
- Electric helical fans with external rotor, supplied with internal circuit breaker protection and complete with protection mesh
- Proportional electronic device for pressure and continuous adjustment of the fan rotation speed, down to a minimum outdoor air temperature of -10°C when operating as a chiller, and up to a maximum outdoor air temperature of 40°C when operating as a heat pump.
- Victaulic-type hydraulic connections
- Differential pressure switch that protect the unit from any water flow interruptions.
- Cooling circuit made with annealed copper pipes (EN 12735-1-2) equipped with: dryer filter cartridge, load connections, high pressure side manual reset safety pressure switch, LP and HP pressure transducer, safety valve(s), valve upstream of the filter, liquid indicator, intake line isolation, thermostatic or electronic expansion valve (optional), cycle inversion and liquid receiver valve, check valves, compressor intake gas separator and solenoid valve on the liquid line
- Unit with IP24 protection rating.
- Control with AdaptiveFunction Plus operation
- The unit is complete with a charge of R410A refrigerant.

Versions

T High temperature/high efficiency version, with oversized condensing section (THAETY)

S The silenced version is complete with soundproofed compressor compartment and low fan speed (THAESY). The fan speed is automatically increased when the external temperature increases significantly

Available installations

Standard Set-up without pump or tank

In this case it is compulsory to use the pump cables contained in the unit's terminal block to manage the external pump provided by the user.

Refer to the specific section on "Electrical connections" for details.

PUMP

P1	Installation with pump
P2	Installation with increased static pressure pump
DP1	Installation with double pump, including an automatically activated pump in stand-by
DP2	Installation with increased static pressure double pump, including an automatically activated pump in stand-by

TANK&PUMP

ASP1	Installation with pump and water buffer tank
ASP2	Installation with increased static pressure pump and water buffer tank
ASDP1	Installation with double pump, including an automatically activated pump in stand-by and storage
ASDP2	Installation with increased static pressure double pump, including an automatically activated pump in stand-by and storage

In addition to what is supplied with the Pump, the unit also has: inertial buffer tank in delivery, vent valve, water drain valve, expansion tank, safety valve electrical resistance connection, water pressure gauge

Electrical control board

- Electrical panel can be accessed by opening the front panel, in compliance with IEC Standards in force, fitted with opening and closing via specific tool.
- Complete with:
- electrical wiring for 400V-3ph+N-50Hz power supply voltage
- auxiliary circuit power supply 230V-1ph-50Hz derived from main power supply
- main power supply switch with interlocking safety door isolator;
- circuit breaker switch protecting the compressor, pumps and electric fans
- protection fuse for the auxiliary circuit
- compressor, pumps and fans power contactor
- remote machine controls: ON/OFF and summer/winter selector;
- remote machine controls: compressor operating lights and general lock lights
- Programmable microprocessor electronic board handled by the keyboard inserted in the machine.
- This electronic board performs the following functions:
- adjusts and controls the temperature settings of the water exiting the machine of cycle inversion; safety delays; of the circulation pump; of the compressor operating hour meter and the system pump hour meter; of the defrosting cycles; of the electronic antifreeze protection that is automatically activated when the machine is off; of the functions that control the intervention mode of the individual parts forming the machine
- complete protection of the unit, possible shutdown and display of all the triggered alarms;
- compressor protection phase sequence monitor;
- unit protection against low or high phase power supply voltage (CMT accessory)
- display of the settings implemented on the display; of the in/out water temperature on the display; the condensation and evaporation; of the alarms on the display; of operation of the chiller or heat pump by means of display

- user interface menu
- automatic pump operating time balance (DP1-DP2, ASDP1- ASDP2 installations)
- automatic activation of the pump in standby in the event of an alarm (DP1-DP2, ASDP1-ASDP2 set ups);
- alarm code and description
- Management of alarms log
  - In particular, each alarm memorises:
    - date and time of intervention
    - in/out water temperature values as soon as the alarm was triggered
    - the evaporation and condensation pressure values at the time of the alarm
    - alarm delay time from the switch-on of the connected device
    - compressor status at the time of the alarm
  - Advanced functions:
    - Pump Energy-Saving management
    - evaporator pump control KPE, in the case of external supply of electric pumps (to be installed by the installer). For the unit to operate properly, activation of the recovery pump, by the installer, must be controlled by means of a specific discrete output provided in the board on the unit;
    - Hi-Pressure Prevent function with forced cooling capacity partialisation for a high outdoor temperature (in summer mode)
    - set-up for serial connection (SS, FTT10, KBE, KBM, KUSB accessory)
    - possibility to have a digital input for remote management of double set point (DSP)
    - possibility of having a discrete input for production of domestic hot water by means of the 3-way diverter valve (VDEV). In this case, there is the possibility of using a temperature probe instead of the discrete input (see specific section for more information)
    - possibility to have an analogue input for the shifting Set-point (CS) via a 4-20mA remote signal;
    - management of time bands and operation parameters with the possibility of daily/weekly functioning programs;
    - check-up and verification of the scheduled maintenance status
    - computer-assisted unit testing
    - self-diagnosis with continuous monitoring of the unit functioning status.
    - MASTER/SLAVE management logic integrated in single systems (SIR - Sequenziatore Integrato Rhoss - Rhoss Integrated Sequencer) -Refer to the specific section for more details
  - Set-point regulation via the AdaptiveFunction Plus with two options:
    - fixed set-point (Precision option)
    - set-point sliding (Economy option)

Accessories

Factory Fitted Accessories

P1 Installation with pump

P2 Installation with increased static pressure pump

DP1 Installation with double pump, including an automatically activated pump in stand-by

DP2 Installation with increased static pressure double pump, including an automatically activated pump in stand-by

ASP1 Installation with pump and storage tank

ASDP1 Installation with double pump, including an automatically activated pump in standby and storage tank

ASP2 Installation with an increased head pump and storage tank

ASDP2 Installation with and increased head double pump, including an automatically activated pump in standby and storage tank

CAC Compressor aphonic ear muffs

INS Compressor technical compartment soundproofing (standard in the S version)

INS60 Compressor technical compartment soundproofing with high acoustic impedance

RS Cooling circuit intake and flow taps

FI15 Modulating condensation control with fans with EC motor (Brushless) for continuous operation as a chiller up to -15°C outdoor air temperature

FIAP Condensing control with over-pressured fans with EC motor (Brushless) and available static head according to the following table:

	Unit with a Ø630mm fan
Available static head	Up to 130 Pa
Single fan absorption	Max 1.25 kW
Average increase in noise of the unit	2 dBA

SFS Soft Starter compressors

CR Power factor correction capacitors (cosφ>0.94)

EEV Electronic thermostatic valve

FDL Forced Download Compressors. Compressor switch-off to limit the absorbed current and power (digital input)

FNR-S Forced Noise Reduction. Forced reduction of noise (digital input or time band management) - See specific section for more information

GM Refrigerant circuit high and low pressure gauges

RQE Electrical panel resistance (recommended for low outdoor air temperature)

RA Evaporator anti-freeze resistance; used to prevent the risk of ice forming inside the heat exchanger when the machine is switched off (provided the unit is not disconnected from the power supply)

RAE1 Antifreeze electric heater for motor-driven pump (available for P1-P2-ASP1-ASP2 set ups); used to prevent the risk of the water inside the pump from freezing when the machine is switched off (provided the unit is not disconnected from the power supply)

RAE2 Antifreeze electric heater for double motor-driven pumps (available for DP1-DP2-ASDP1-ASDP2 set ups); used to prevent the risk of the water inside the pump from freezing when the machine is switched off (provided the unit is not disconnected from the power supply)

RAS 300W storage tank antifreeze resistor (available for ASP1-ASDP1-ASP2-ASDP2 set ups) to prevent the risk of ice formation inside the inertial storage tank when the machine is switched off (as long as the unit is not disconnected from the power supply)

RIS Integrative electrical resistances and the Antifreeze storage tank (only with Tank&Pump - incompatible with RAS) - See specific section for more information)

RAB Antifreeze heater electrical resistance base

LKD Refrigerant leakage detector

DSP Double set-point via digital consensus (incompatible with the CS accessory)

CS	Scrolling set point via analogue signal 4-20 mA (incompatible with the DSP accessory).
CMT	Check the MIN/MAX values of the power supply voltage
SS	Interface RS485 for serial dialogue with other devices (proprietary protocol, Modbus RTU protocol)
EEM	Energy Meter. Measure and display values of the electrical units - See specific section for more information
EEO	Energy Efficiency Optimizer. Energy efficiency optimisation – Refer to the specific section for further details
FTT10	LON interface for serial communication with other devices (LON protocol)
RPB	Coil protection nets with accident prevention function (to be used as an alternative to the FMB accessory)
FMB	Mechanical filters to protect the coils, with leaf protection function (to be used as an alternative to the RPB accessory)
RAP	Unit with copper/pre-painted aluminium condensation coils
BRR	Unit with copper/copper condensation coils
IMB	Protective packaging
DVS	High pressure double safety valve with exchanger tap (the valve is only on the outlet branch
SAG	Rubber anti-vibration mounts (supplied not installed)

Accessories supplied separately

KVDEV	3-way diverter valve for the production of domestic hot water, managed by regulation
KTRD	Thermostat with display
KTR	Remote keypad for control at a distance with LCD display and same functions as the machine. Connection must be made with a 6-wire telephone cable (maximum distance 50 m) or with KRJ1220/KRJ1230 accessories. For greater distances up to 200 m, use an AWG 20/22 shielded cable (4 wires+shield, not supplied) and the KR200 accessory
KRJ1220	Connection cables for KTR (20 m length)
KRJ1230	Connection cables for KTR (30 m length)
KR200	KTR remote control Kit (distance between 50 and 200m)
KBE	Ethernet interface for serial communication with other devices (BACnet IP protocol)
KBM	RS485 interface for serial communication with other devices (BACnet MS/TP protocol, Modbus, TCP/IP)
KUSB	RS485/USB serial converter (USB cable supplied)

Refer to the price list or contact Rhoss S.p.A. to verify the compatibility of any accessory

Technical Data

THAEY HT65			238	245	250	260
Nominal cooling capacity	(*)	kW	38.8	42.6	50.6	58.2
EER			3.06	2.54	2.74	2.69
ESEER+			4.12	4.38	4.98	5.04
Nominal cooling capacity EN 14511:2018	(*) (°)	kW	38.5	42.3	50.3	57.8
EER EN 14511:2018	(*) (°)		2.95	2.49	2.68	2.64
ESEER EN 14511:2018			3.54	3.68	4.2	4.26
Nominal heating capacity	(**)	kW	41.7	47.8	55.8	62.2
COP			3.26	2.89	3	3.04
Nominal heating capacity EN 14511:2018	(**) (°)	kW	42.1	48.1	56.1	62.5
COP EN 14511:2018	(**) (°)		3.19	2.85	2.97	3
Heating capacity	(***)	kW	41.5	47.5	55.2	61.9
COP			2.4	2.17	2.2	2.23
Sound pressure	(****) (Δ)	dB(A)	54	56	56	57
Sound power	(*****) (Δ)	dB(A)	79	80	80	81
Scroll/step compressor		n°	2/2	2/2	2/2	2/2
Circuits		n°	1	1	1	1
Fans		n°xKw	2x0.6	2x0.6	2x0.6	2x0.6
Fan nominal air flow		m^3/h	20200	20800	20800	20200
Heat exchanger water content		l	3.2	3.8	4.4	5.1
Heat exchanger	Type		Plates			
Heat exchanger nominal flow water side (*)	(*)	m^3/h	6674	7300	8700	10000
Nominal pressure drops on the water side exchanger	(*)	kPa	56	32	32	33
Nominal pressure drops on the water side exchanger	(**)	kPa	66	37	37	35
Residual head P1/P2	(*)	kPa	130/227	125/198	115/191	105/186
Residual head ASP1/ASP2	(*)	kPa	87/184	118/190	105/181	90/166
Tank water content ASP1/ASP2		l	150	150	150	150
Amount of R410A refrigerant	(+)	Kg	13.6	14.2	17.5	23.1
Polyester oil charge		Kg	2x3	2x3.3	2x3.3	2x3.3

Electrical data			238	245	250	260
Absorbed power in summer mode	(*) (■)	kW	12.7	16.8	18.5	21.6
Absorbed power in winter mode	(**) (■)	kW	12.8	16.6	18.6	20.5
Pump absorbed power (P1/ASP1)/(P2/ASP2)		kW	0.7/1.5	0.7/1.5	0.7/1.5	0.7/1.5
Electrical power supply		V-ph-Hz	400-3+N-50			
Auxiliary power supply		V-ph-Hz	230-1-50			
Summer operation nominal current	(*) (■)	A	28	25.5	30.6	36.2
Winter operating nominal current	(**) (■)	A	26	25.2	29	33.7
Maximum current	(■)	A	38	44	48	52
Starting current	(■)	A	120	167	169	176
Starting current with SFS	(■)	A	80	109	111	116
Pump absorbed current (P1ASP1 - P2/ASP2)		A	2.2/3.5	2.2/3.5	2.2/3.5	2.2/3.5

Dimensions			238	245	250	260
Height		mm	1570	1570	1570	1570
Width		mm	1000	1000	1000	1000
Length		mm	2260	2260	2260	2260
Heat exchanger inlet/outlet connections		Ø	2"	2"	2"	2"

Weight			238	245	250	260
THAEY HT65		kg	580	580	615	635

(*)	At the following conditions: condenser inlet air temperature 35°C; cooled water temperature 7°C; temperature differential at the evaporator 5°C.	**(Δ)**	For the machines with the SIL accessory installed, sound pressure must be corrected by -3dB(A)
(**)	At the following conditions: evaporator inlet air temperature 7°C B.S., 6°C B.U.; hot water temperature 45°C; condenser temperature differential 5°C;	**(■)**	Absorbed current/absorbed power value without electric pump
(***)	At the following conditions: evaporator inlet air temperature 7°C B.S., 6°C B.U.; hot water temperature 65°C; condenser temperature differential 5°C;	**ESEER**	(European Seasonal EER) European average seasonal energy efficiency
(****)	Sound pressure level in dB(A), referring to a 5 m distance from the unit, with directionality factor = 2	**ESEER+**	with AdaptiveFunction Plus logic
(*****)	Sound power level in dB(A) on the basis of measurements taken in accordance with UNI EN-ISO 9614 and Eurovent 8/1 Standards. The noise data refers to the units without the electric pump	**(°)**	Data calculated in accordance with EN 14511:2018 under nominal conditions

The refrigerant charge values are indicative. Refer to the serial number plate

THAETY HT65			269	279	289	296
Nominal cooling capacity	(*)	kW	67.5	77	87	94
EER			2.99	3.05	3	2.97
ESEER+			4.86	4.78	4.91	4.85
Nominal cooling capacity EN 14511:2018	(*) (°)	kW	67.2	76.7	86.6	93.6
EER EN 14511:2018	(*) (°)		2.94	2.99	2.95	2.92
ESEER EN 14511:2018			4.19	4.07	4.13	4.11
Nominal heating capacity	(**)	kW	73	82	92	100
COP			3.39	3.4	3.34	3.32
Nominal heating capacity EN 14511:2018	(**) (°)	kW	73.4	82.4	92.4	100.5
COP EN 14511:2018	(**) (°)		3.35	3.36	3.31	3.28
Heating capacity	(***)	kW	67.4	76.3	84.8	91.8
COP			2.18	2.16	2.13	2.11
Sound pressure	(****) (*)	dB(A)	50	51	51	51
Sound power	(*****) (*)	dB(A)	82	83	83	83
Sound power with FNR-S accessory	(*****) (*)	dB(A)	78	79	79	79
Scroll/step compressor		n°	2/2	2/2	2/2	2/2
Circuits		n°	1	1	1	1
Fans		n°xKw	2x0.69	3x0.69	3x0.69	3x0.69
Fan nominal air flow		m^3/h	21100	30100	30100	29600
Heat exchanger	Type		Plates			
Heat exchanger nominal flow water side (*)	(*)	m^3/h	11.6	13.2	15	16.2
Nominal pressure drops on the water side exchanger	(*)	kPa	30	31	30	33
Residual head P1	(*)	kPa	151	142	110	106
Residual head P2	(*)	kPa	212	212	212	209
Residual head ASP1	(*)	kPa	144	133	99	93
Residual head ASP2	(*)	kPa	206	203	202	196
Tank water content ASP1/ASP2		l	230	230	230	230
Amount of R410A refrigerant		Kg	31	31	32	41
Total oil charge of compressors		Kg	6.5	6.5	7.1	7.1

Electrical data			269	279	289	296
Absorbed power in summer mode	(*) (■)	kW	22.6	25.2	29	31.6
Absorbed power in winter mode	(**) (■)	kW	21.5	24.1	27.5	30.1
Pump absorbed power (P1/ASP1)/(P2/ASP2)		kW	1.1/2.2	1.1/2.2	1.5/2.2	1.5/2.2
Electrical power supply		V-ph-Hz	400-3+N-50			
Auxiliary power supply		V-ph-Hz	230-1+N-50			
Summer operation nominal current	(*) (■)	A	37.5	41.9	48.2	52.5
Maximum current	(■)	A	58.5	65.6	75.6	75.6
Starting current	(■)	A	177	193	237	237
Starting current with SFS	(■)	A	119	130	158	158
Pump absorbed current (P1ASP1 - P2/ASP2)		A	2.4/4.5	2.4/4.5	3.2/4.5	3.2/4.5

Dimensions			269	279	289	296
Height		mm	1700	1700	1700	1700
Width		mm	1210	1210	1210	1210
Length		mm	3250	3250	3250	3250
Heat exchanger inlet/outlet connections		Ø	2"Vic	2"Vic	2"Vic	2"Vic

Weight			269	279	289	296
THAETY		kg	915	930	935	980

(*)	At the following conditions: condenser inlet air temperature 35°C; cooled water temperature 7°C; temperature differential at the evaporator 5°C.
(**)	At the following conditions: evaporator inlet air temperature 7°C B.S., 6°C B.U.; hot water temperature 45°C; condenser temperature differential 5°C;
(***)	At the following conditions: evaporator inlet air temperature 7°C B.S., 6°C B.U.; hot water temperature 65°C; condenser temperature differential 5°C;
(****)	Average sound pressure level in dB (A) calculated at a distance of 10 m from the unit, in free field and with a directional factor Q = 2 according to ISO 3744. The noise data refers to the units without the electric pump
(*****)	Sound power level in dB(A) on the basis of measurements taken in accordance with UNI EN-ISO 9614 and Eurovent 8/1 Standards. The noise data refers to the units without the electric pump
(■)	Absorbed current/absorbed power value without electric pump
ESEER	(European Seasonal EER) European average seasonal energy efficiency
ESEER+	with AdaptiveFunction Plus logic
(°)	Data calculated in accordance with EN 14511:2018 under nominal conditions

The refrigerant charge values are indicative. Refer to the serial number plate

THAESY HT65			269	279	289	296
Nominal cooling capacity	(*)	kW	66.5	75	86	90
EER			2.9	2.96	2.9	2.85
ESEER+			4.97	4.86	4.94	4.87
Nominal cooling capacity EN 14511:2018	(*) (°)	kW	66.2	74.7	85.7	89.6
EER EN 14511:2018	(*) (°)		2.85	2.91	2.85	2.8
ESEER EN 14511:2018			4.24	4.11	4.18	4.13
Nominal heating capacity	(**)	kW	70.5	80	90	97.5
COP			3.36	3.4	3.34	3.33
Nominal heating capacity EN 14511:2018	(**) (°)	kW	70.8	80.4	90.4	98
COP EN 14511:2018	(**) (°)		3.32	3.36	3.31	3.29
Heating capacity	(***)	kW	65.4	75.2	83.8	90.5
COP			2.15	2.16	2.14	2.12
Sound pressure	(****) (*)	dB(A)	46	47	47	47
Sound power	(*****) (*)	dB(A)	78	79	79	79
Scroll/step compressor		n°	2/2	2/2	2/2	2/2
Circuits		n°	1	1	1	1
Fans		n°xKw	2x0.48	3x0.48	3x0.48	3x0.48
Fan nominal air flow		m^3/h	16900	23900	23900	23400
Heat exchanger	Type		Plates			
Heat exchanger nominal flow water side (*)	(*)	m^3/h	11.4	12.9	14.8	15.5
Nominal pressure drops on the water side exchanger	(*)	kPa	28	31	27	31
Residual head P1	(*)	kPa	155	144	113	109
Residual head P2	(*)	kPa	214	212	215	212
Residual head ASP1	(*)	kPa	149	136	103	97
Residual head ASP2	(*)	kPa	208	204	205	200
Tank water content ASP1/ASP2		l	230	230	230	230
Amount of R410A refrigerant		Kg	31	31	32	41
Total oil charge of compressors		Kg	6.5	6.5	7.1	7.1

Electrical data			269	279	289	296
Absorbed power in summer mode	(*) (■)	kW	22.9	25.3	29.7	31.6
Absorbed power in winter mode	(**) (■)	kW	21	23.5	26.9	29.3
Pump absorbed power (P1/ASP1)/(P2/ASP2)		kW	1.1/2.2	1.1/2.2	1.5/2.2	1.5/2.2
Electrical power supply		V-ph-Hz	400-3+N-50			
Auxiliary power supply		V-ph-Hz	230-1+N-50			
Summer operation nominal current	(*) (■)	A	38	42	49.3	52.5
Maximum current	(■)	A	58.5	65.6	75.6	75.6
Starting current	(■)	A	177	193	237	237
Starting current with SFS	(■)	A	119	130	158	158
Pump absorbed current (P1ASP1 - P2/ASP2)		A	2.4/4.5	2.4/4.5	3.2/4.5	3.2/4.5

Dimensions			269	279	289	296
Height		mm	1700	1700	1700	1700
Width		mm	1210	1210	1210	1210
Length		mm	3250	3250	3250	3250
Heat exchanger inlet/outlet connections		Ø	2"Vic	2"Vic	2"Vic	2"Vic

Weight			269	279	289	296
THAESY		kg	930	945	950	995

(*)	At the following conditions: condenser inlet air temperature 35°C; cooled water temperature 7°C; temperature differential at the evaporator 5°C.	**(■)**	Absorbed current/absorbed power value without electric pump
(**)	At the following conditions: evaporator inlet air temperature 7°C B.S., 6°C B.U.; hot water temperature 45°C; condenser temperature differential 5°C;	**ESEER**	(European Seasonal EER) European average seasonal energy efficiency
(***)	At the following conditions: evaporator inlet air temperature 7°C B.S., 6°C B.U.; hot water temperature 65°C; condenser temperature differential 5°C;	**ESEER+**	with AdaptiveFunction Plus logic
(****)	Average sound pressure level in dB (A) calculated at a distance of 10 m from the unit, in free field and with a directional factor Q = 2 according to ISO 3744. The noise data refers to the units without the electric pump	**(°)**	Data calculated in accordance with EN 14511:2018 under nominal conditions
(*****)	Sound power level in dB(A) on the basis of measurements taken in accordance with UNI EN-ISO 9614 and Eurovent 8/1 Standards. The noise data refers to the units without the electric pump		

The refrigerant charge values are indicative. Refer to the serial number plate

Energy efficiency at partial loads. ESEER and IPLV index

The E.E.R. index represents an estimate of the energy efficiency of the cooling unit in nominal design conditions. In reality, the operating time of a chiller in nominal conditions is usually less than the operating time in partial load conditions.

The IPLV (Integrated Part Load Value) and ESEER indexes (European Seasonal EER) are those that estimate the average seasonal energy efficiency of the cooling unit on four load and outdoor air temperature conditions. In general, two chillers that have the same EER value can have different IPLV or ESEER values. In fact, for an air- cooled cooling unit, the average energy efficiency depends on the design choices and the temperature of the air entering the condensing coil.

The IPLV and ESEER indexes, introduced respectively by the ARI (American Refrigeration Institute - ARI standard 550/590) and the European Community (EECCAC Energy Efficiency and Certification of Central Air Conditioners project), have the same formulation, but differ due to outdoor air temperatures and for the energy weights that are assigned to the four load conditions considered for the calculation: 100%, 75%, 50% and 25% and for Tw produced (6.7°C IPLV / 7°C ESEER).

IPLV (1*EER100%+42*EER75%+45*EER50%+12*EER25%) / 100 **ESEER** (3*EER100%+33*EER75%+41*EER50%+23*EER25%) / 100

where EER100% EER75% EER50% EER25% represent the efficiencies of the cooling unit in the four load conditions and at the temperatures indicated in table "Load and temperatures conditions"

Load and temperatures conditions

Load	IPLV	ESEER
100%	35°C	35°C
75%	26.7°C	30°C
50%	18.3°C	25°C
25%	12.8°C	20°C

New seasonal efficiency indices according to EN 14825: SCOP and SEER

Standard EN 14825 defines the calculation method to determine the summer (SEER) and winter (SCOP) seasonal efficiency indices of heat pumps, summing the machine's performance in one value that considers the temperature variations of outdoor air, water produced, and partialisation degree of the compressor.

These indices are useful to calculate the system's building system energy efficiency that services the unit.

SCOP heating seasonal efficiency of an air-water heat pump in compliance with EN 14825, is according to the following variables:

Variable	Description
Project temperature:	Europe divided into 3 climate bands: Colder (Helsinki climate): -22°C Average (Strasbourg climate): -10°C Warmer (Athens climate): 2°C
User side water temperature:	Radiant panel: 35°C fixed or variable according to the outdoor air temperature Fan coil: 45°C fixed or variable according to the outdoor air temperature Radiators: 55°C fixed or variable according to the outdoor air temperature
Compressor partialisation degree	The standard considers, with due coefficient corrective features, the inefficiency of partial loads with "On-Off" operation of the heat pumps.
Outdoor air temperature frequency occurrence	The number of hours of occurrence of each outdoor air temperature value expressed in degrees, during the heating season.
Bivalent T	Temperature at which pdc fulfils the load at 100%. Colder (Helsinki climate): -7°C or lower Average (Strasburgo climate): 7°C or lower Warmer (Athens climate): 2°C o più bassa

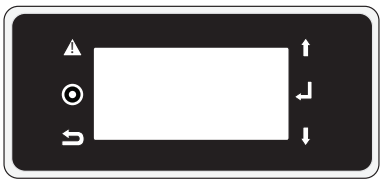
SCOP is calculated by using the Bin Method as an average weight of efficiency (COP) of the heat pump on the frequency of occurrence of outdoor air temperature.

The seasonal efficiency in SEER cooling mode depends on a unique design temperature of 35°C and is indicated for 2 types of distribution:

- Radiant panel (Water T at a fixed point equivalent to 18°C).
- Fan coil (water T at a fixed point equivalent to 7°C or variable according to the outdoor air temperature

Electronic controls

Electronic control panel display on the machine



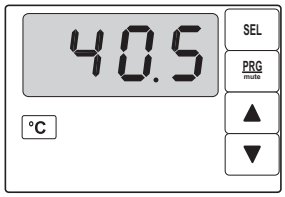
The keyboard with display makes it possible to view the working temperature and all the unit process variables, as well as providing access to setting parameters for the operating set points and their modification; at a technical assistance level, it allows modifying the unit management parameters by entering a password (access allowed only to authorised personnel).

KTR - Remote keyboard

The remote keyboard with display (KTR) allows the remote control and display of all of the unit's digital and analogue process variables. It is therefore possible to control all the machine functions directly in the room. It allows setting and management of time periods.

The temporary presence of two devices, on-board machine keyboard and remote keyboard, will cause the on-board machine terminal to be disabled

KTRD - Thermostat with display



Inserting the optional thermostat with KTRD display in the machine makes it possible to regulate the DHW call consent activation set point of the unit, thanks to the supplied probe which the installer must position at the most appropriate point (e.g. storage tank)

Serial Connection

All units are equipped with an electronic controller to communicate with an external BMS via a serial communication line by means of the SS RS485 serial interface accessory (proprietary protocol or ModBus® RTU) and the following converters:

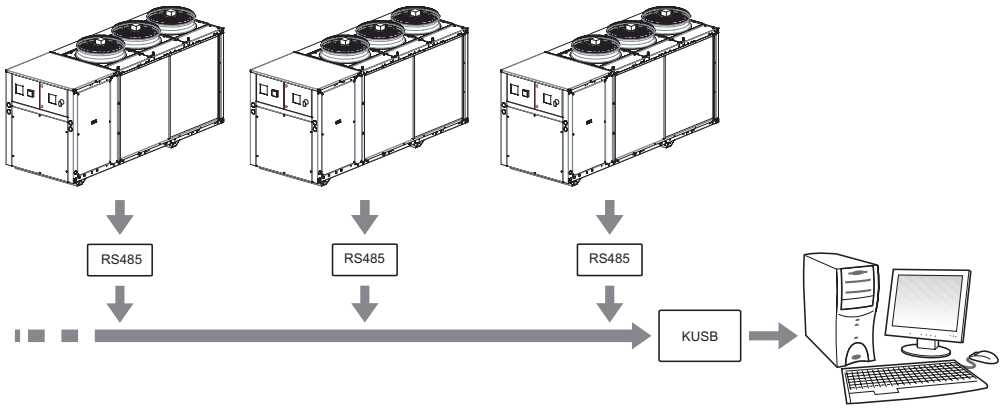
- KUSB - RS485/USB serial converter

Also available are FTT10 accessory (LON protocol), KBE accessory (Ethernet interface), KBM accessory, RS485 interface (BACnet MS/TP protocol)

Supervision

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

- Making all settings which are accessible through the keyboard
- Reading all process variables of the inputs and outputs, whether digital or analogue
- Reading the various alarm codes which are present, and resetting them as necessary



Clock card

The clock card (standard in the Compact-Y MD HT65 and EasyPACK HT65 units) enhances unit flexibility and efficiency, displaying the date/time and allowing machine management with daily and weekly start/stop time bands, with the possibility of changing the set points

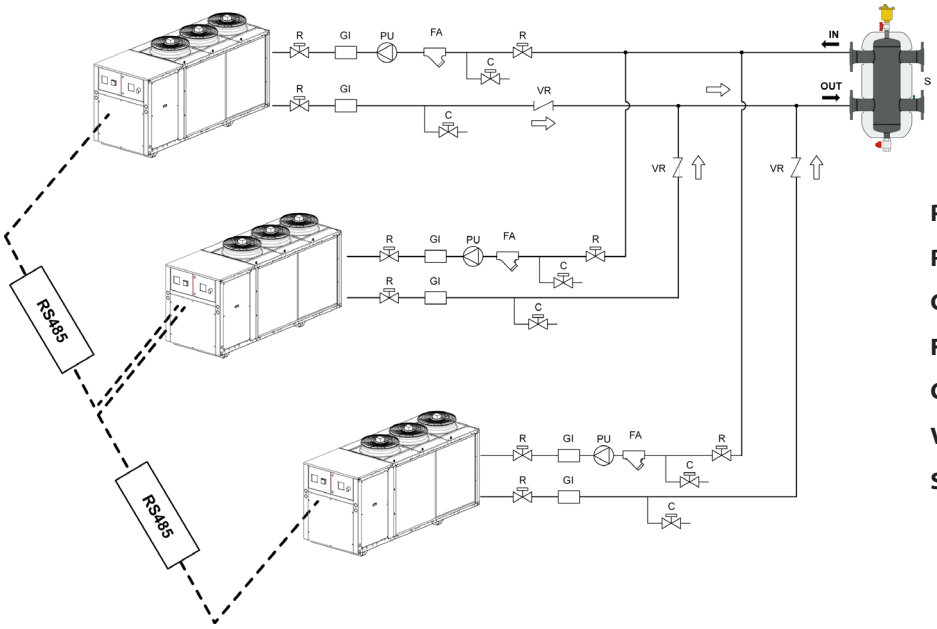
The time bands are set and managed via the keyboard.

Rhoss Integrated Sequencer

A new function has been introduced in the units making it possible to control up to 4 identical units (chillers or heat pumps), function (standard, high efficiency, silenced), size and accessories

This operating mode allows the management logic to maintain the maximum precision in satisfying the system load.

The Rhoss Integrated Sequencer (SIR) offers control through master-slave logic of the units connected in hydraulic parallel without the use of external devices or hardware other than serial card RS485 (accessory).



PU	Pump
RI	Shut-off tap
GI	Antivibration connection
FA	Mesh filter
C	Supply/drain tap
VR	Check Valve
S	Separator

Identified as the MASTER unit of the group, the other units are addressed as SLAVES.

The MASTER unit has the task of controlling all of the SLAVE units and assessing, based on the system's load demand, how many and which units to be turned on to fulfil it.

If there is a failure on the network, the SLAVE units can be programmed to continue operation based on the last outputs received from the MASTER, or switch off while waiting for the connection to come back or, also, switch on and work independently

The mode is defined when the sequencer is switched on

Each unit controls its own pump (PUMP or TANK&PUMP accessory) which is only switched on if the unit requires at least one compressor to be switched on If, on the other hand, the system load is such that it does not require any compressor to be switched on, the unit pump remains active nonetheless, ready to start up to monitor the unit's regulating temperature.

If the units are acquired without PUMP or TANK&PUMP accessory, the user can install external pumps (individually for each unit or for the group of machines); in this case the units manage the pump or the installed pumps through a signal

It is possible to choose the water temperature control mode, through global regulation on the return or delivery to the group.

It is not necessary to install additional probes on the shared sections of the pipes in the system because the sequencer is in charge of assessing the system load based on the average of the values of the probes of the machines that are active at that time.

Balancing the operating hours of the group is another important aspect of the SIR sequencer. Unit and compressor rotation is guaranteed based on the accumulated hours of operation

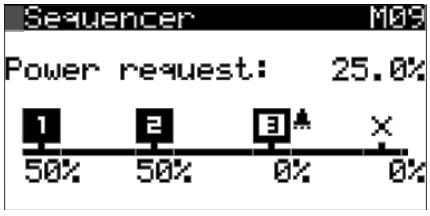
The sequencer is able to assess the type of alarm, using the units based on the respective percentages of availability, without blocking the entire unit if, for example, only one compressor is affected by an alarm.

If the units are supplied with the FDL accessory, there is the possibility of limiting the delivered power as a global percentage of the group. The algorithm dynamically determines how many machines need to be switched on and at what percentage, without limiting all of the machines at the same power in a fixed manner, and therefore only using some of them

The Rhoss integrated sequencer (SIR), does not perform sequenced management of DHW (domestic hot water) in the presence of the 3-way diverter valve

On the screen of the individual unit, the respective operating information is displayed and on the MASTER it is also possible to view a mimic panel that summarises the operating status of the connected units.

The unit group, controlled by SIR sequencer, cannot be supervised.



Example: the system requires a total amount of 25% of the group's cooling capacity

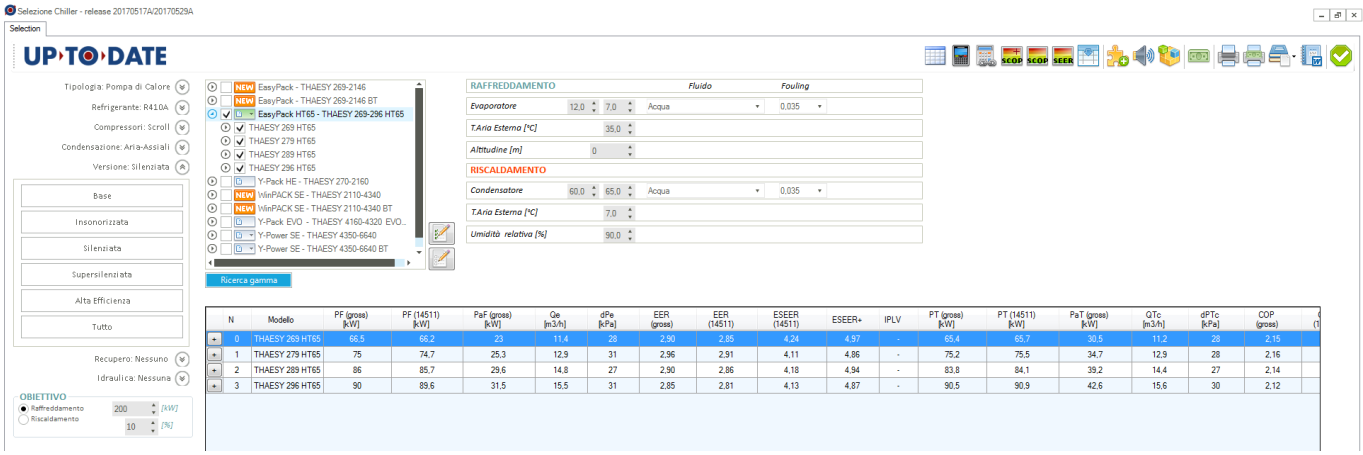
- Units 1 and 2 are on at 50%
- Unit 3 is affected by an alarm
- Unit 4 is disconnected from the network

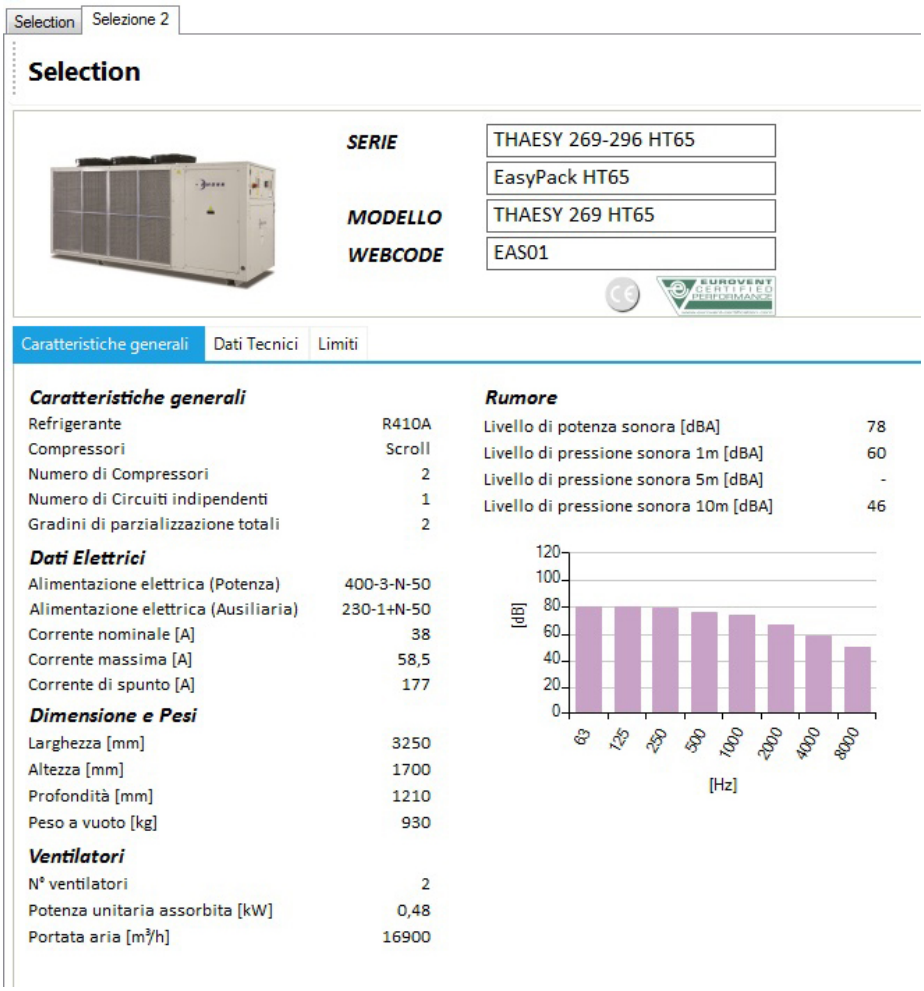
NOTE: compulsory start-up is not required for the SIR sequencer. Contact Rhoss Service for more information on how to enable the function or for start-ups followed by authorised technical staff

Perfomance

By means of the RHOSS Up To Date software selection, you are able to obtain:

- Unit performance data under the project conditions
- Technical data of the selected unit, heat exchanger pressure drops and residual head if the unit is supplied with pumps





Sound power and pressure levels

Models			Sound power level in dB for octave bands									Average sound pressure level in dB (A)
			63 Hz	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	8000 Hz	Lw dB(A)	Lp (5m)
THAEY	238	1	90	87	79	74	73	73	64	61	79	54
	245	1	91	85	78	76	74	74	64	61	80	56
	250	1	91	86	79	76	74	74	64	61	80	56
	260	1	92	87	81	78	75	74	64	61	81	57

Models			Sound power level in dB for octave bands									Average sound pressure level in dB (A)	
			63 Hz	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	8000 Hz	Lw dB(A)	Lp (10m)	Lp (1m)
THAETY	269	2-3	85	85	84	81	77	68	60	55	82	50	65
	279	2-3	86	86	85	82	78	69	61	56	83	51	65
	289	2-3	86	86	85	82	78	69	61	56	83	51	65
	296	2-3	86	86	85	82	78	69	61	56	83	51	65

Models			Sound power level in dB for octave bands									Average sound pressure level in dB (A)	
			63 Hz	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	8000 Hz	Lw dB(A)	Lp (10m)	Lp (1m)
THAESY (•)	269	4	80	80	79	76	74	67	58	50	78	46	60
	279	4	81	81	80	77	75	68	59	51	79	47	61
	289	4	81	81	80	77	75	68	59	51	79	47	61
	296	4	81	81	80	77	75	68	59	51	79	47	61

Lw Total sound power level in dB(A) on the basis of the measurements made in compliance with the UNI EN-ISO9614 and Eurovent 8/1 Standards

Lp Mean sound pressure levels in dB(A)

1 If the SIL (soundproofed compressor compartment + compressors soundproof enclosures) accessory is present, the sound power decreases by 3 dB(A)

2 If the INS (Technical compartment soundproofing) accessory is supplied, the sound power decreases by 1 dB(A) Standard in version S

3 If the INS60 (increased soundproofing in the technical compartment) accessory is supplied, the sound power decreases by 2 dB(A).

4 If the INS60 (increased soundproofing in the technical compartment) accessory is supplied, the sound power decreases by 1 dB(A).

• INS Standard

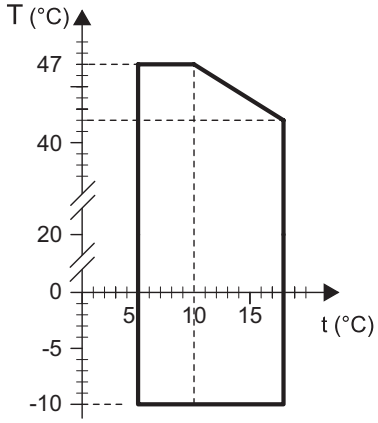
The CAC (compressors soundproof enclosures for 269÷296 models) accessory decreases the sound power by 1 dB(A)
It is only possible to install it on units equipped with the INS-INS60 accessory, when not already standard installed

NOTE

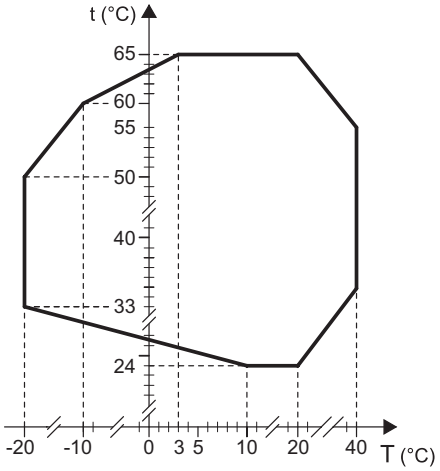
The Eurovent certification refers to the sound power value in dB(A) and it is the only binding acoustic data
The mean sound pressure levels refer to the values calculated by the sound power for units installed in free field with a directionality factor Q = 2
In brackets is the measurement distance in metres
It is not possible to extrapolate sound pressure values for different distances
With outdoor air temperatures below 35°C, or in the presence of the FI10 (standard) and FI15 accessories, the machine decreases its noise to a value below the nominal value indicated in the table

Functioning limits

THAEY 238÷260 in summer mode

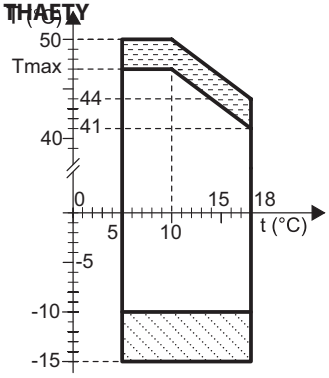


THAEY 238÷260 in winter mode

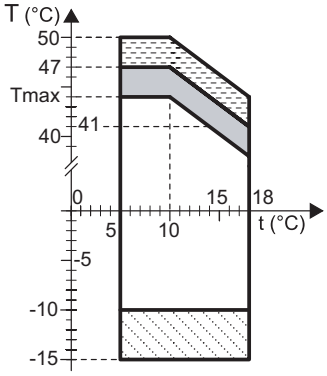


269÷296 in summer mode:

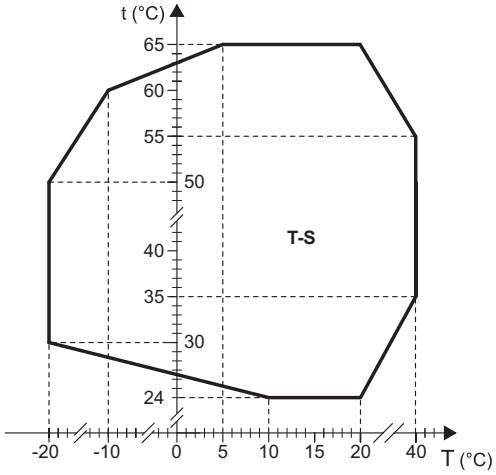
THAETY



THAESY



269÷296 in winter mode



In summer mode:
Maximum inlet water temperature 23°C.
Minimun water pressure 0,5 Barg
Maximum water pressure 3 Barg. for THAEY 238-260
Maximum water pressure 10 BARG./6 Barg. with ASP for THAEY 269÷296

In winter mode:
Maximum inlet water temperature 60°C.

Permitted temperature differentials through the heat exchangers
Temperature differential at the evaporator ΔT = 3 ÷ 8°C for "Standard" machines.
The maximum and minimum temperature differential for the Pump and Tank&Pump machines is related to the performance of the pumps that must always be verified via RHOSS software.

T (°C) Outdoor air temperature (B.S.)

t (°C) Temperature of the water produced

Standard functioning

Summer operation with condensing control FI15

Functioning with partialised cooling capacity

Functioning not silenced

Model	269÷296	269÷296
Versions	T	S
	Tmax = 47°C (1) (2)	Tmax = 44°C (1) (3)
	Tmax = 50°C (1) (4)	Tmax = 47°C (1) (2)
		Tmax = 50°C (1) (4)

1 Evaporator water temperature (IN/OUT) 12/7 °C

2 Maximum outdoor air temperature with unit in standard operation running on full

3 Maximum outdoor air temperature with unit in silenced mode

4 Maximum outdoor air temperature with unit in partialised cooling capacity

If the water inlet temperature to the condensers is lower than the permitted values, it is recommended to use a three-way modulating valve to guarantee the minimum water temperature required.
Operation with minimum inlet temperatures that are lower than expected, can compromise functionality and consequent damage to the unit.

Evaporator water flow rate limits

Type of heat exchanger		Plates	
		Min	Max
238	m³/h	5.5	11.5
245	m³/h	5.5	12.5
250	m³/h	5.5	14.5
260	m³/h	7.5	17
269	m³/h	8.5	24.5
279	m³/h	9	26
289	m³/h	10.5	27.5
296	m³/h	10.5	27.5

Use of antifreeze solutions

- The use of ethylene glycol is recommended if you do not wish to drain the water from the hydraulic system during the winter stoppage. The addition of glycol changes the physical properties of the water and consequently the performance of the unit. The proper percentage of glycol to be added to the system can be obtained from the most demanding functioning conditions from those shown below.
- Table "H" shows the multipliers which allow the changes in performance of the units to be determined in proportion to the required percentage of ethylene glycol.
- The multipliers refer to the following conditions: condenser inlet air temperature 35°C; cooled water temperature 7°C; temperature differential at the evaporator 5°C.
- For different functioning conditions, the same coefficients can be used as their variations are negligible
- The resistance of the water side primary and secondary heat exchanger (RA accessory), of the electric pump unit (RAE-RAR accessory), prevents undesired effects due to freezing during the operating breaks in winter (provided the unit remains powered)

ATTENTION

- Besides the 20% glycol, check the pump absorption limits (in P1-P2, DP1-DP2, ASP1-ASP2, ASDP1-ASDP2 versions).

Table "H"

Design air temperature in °C	2	0	-3	-6	-10	-15	-20
% glycol in weight	10	15	20	25	30	35	40
Freezing temperature °C	-5	-7	-10	-13	-16	-20	-25
fc G	1.025	1.039	1.054	1.072	1.093	1.116	1.140
fc Δpw	1.085	1.128	1.191	1.255	1.319	1.383	1.468
fc QF	0.975	0.967	0.963	0.956	0.948	0.944	0.937
fc P	0.993	0.991	0.990	0.988	0.986	0.983	0.981

fc G Correction factor of the glycol water flow to the evaporator

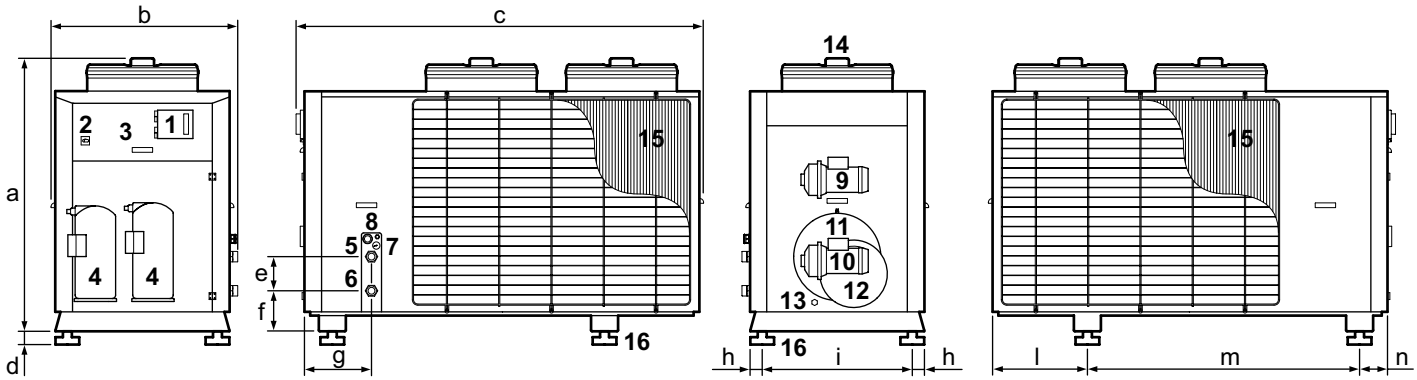
fc Δpw Correction factor of the pressure drops in the evaporator

fc QF Cooling capacity correction factor

fc P Correction factor for the total absorbed electrical current

Hydraulic overall dimensions, size and connections

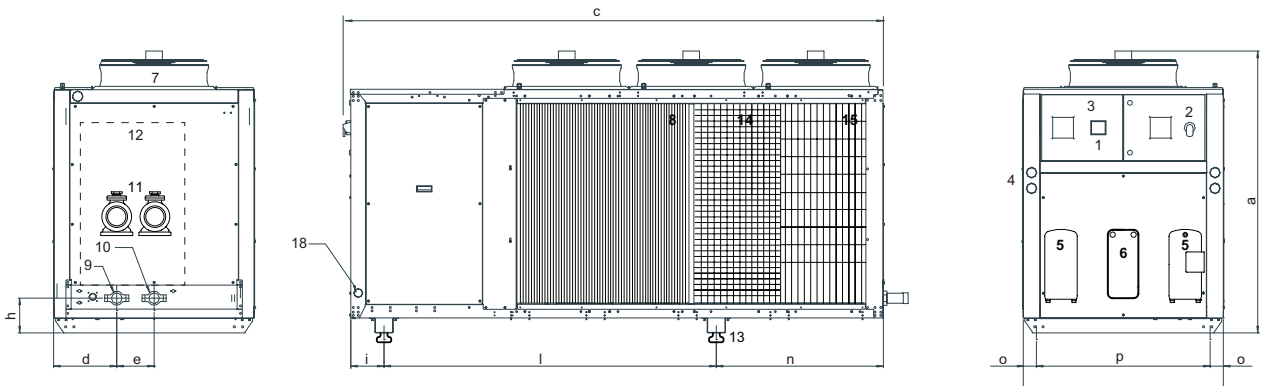
THAEY 238÷260



1 Control panel
2 Isolator
3 Electrical control board
4 Compressor
5 Water inlet
6 Water outlet
7 Manometer
8 Power supply inlet
9 Pump housing (ASDP set up)
10 Pump housing (P-ASDP set up)
11 Tank (ASP–ASDP set ups)
12 Expansion vessel
13 Water system drain
14 Fan
15 Finned coil
16 Anti-vibration support (KSA accessory)

THAEY		238	245	250	260
a	mm	1565	1565	1565	1565
b	mm	1070	1070	1070	1070
c	mm	2315	2315	2315	2315
d	mm	75	75	75	75
e	mm	195	195	195	195
f	mm	233	233	233	233
g	mm	385	385	385	385
h	mm	28	28	28	28
i	mm	942	942	942	942
l	mm	544	544	544	544
m	mm	1562	1562	1562	1562
n	mm	160	160	160	160
Heat exchanger inlet/outlet connections	Ø	2"	2"	2"	2"

THAETY-THAESY 269÷296

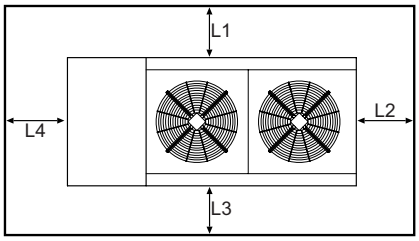


1 Control panel
2 Isolator
3 Electrical control board
4 Cooling circuit pressure gauges (GM accessory)
5 Compressor
6 Evaporator
7 Fan
8 Finned coil
9 Main heat exchanger water inlet
10 Main heat exchanger water outlet
11 Electric pump
12 Storage tank
13 Anti-vibration mounts (SAG accessory)
14 Metal filter (FMB accessory)
15 Coil protection mesh (accessory RPB)
18 Power supply inlet

THAETY		269	279	289	296
a (*)	mm	1700	1700	1700	1700
b	mm	1210	1210	1210	1210
c	mm	3250	3250	3250	3250
d	mm	380	380	380	380
e	mm	225	225	225	225
h	mm	209	209	209	209
i	mm	200	200	200	200
l	mm	2000	2000	2000	2000
n	mm	1006	1006	1006	1006
o	mm	80	80	80	80
p	mm	1050	1050	1050	1050
Heat exchanger inlet/outlet connections	∅	2"Vic	2"Vic	2"Vic	2"Vic

(*) ATTENTION
With the FIAP accessory, add 70mm

Clearance and positioning



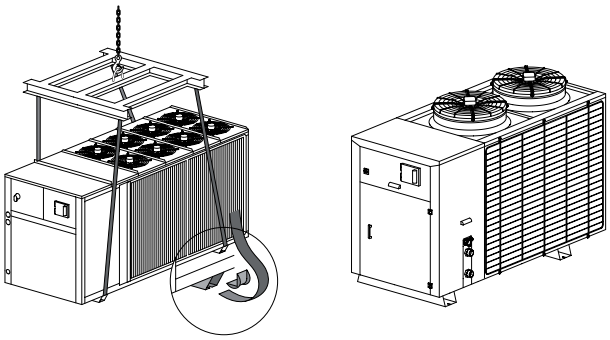
Models		238÷260	269÷296
L1	mm	1000	1500
L2	mm	800	1000
L3	mm	1000	1500
L4	mm	800	1000

N.B.

L2 is the minimum distance to remove the pump unit and the relative tank.

Handling and storage

- Movement of the unit must be performed with care, in order to avoid damage to the external structure and to the internal mechanical and electrical components.
- Do not stack units.
- The temperature limits for storage are: -20 ÷ 50°C
- The position of the lifting belts must be checked according to the model and accessories installed
- During lifting and handling, make sure that the unit is horizontal at all times



Installation and connection to the system

- The unit is designed for outdoor installation
- The unit is fitted with male threaded hydraulic connections (238÷260 models) or Victaulic hydraulic connections on the air conditioning system water inlet and outlet. It is also fitted with carbon steel fittings for welding (269÷296 models)
- Fence off the unit if it is installed in areas accessible to persons under 14 years of age
- The unit must be positioned to comply with the minimum recommended technical spaces, bearing in mind the access to water and electrical connections.
- The unit can be equipped with anti-vibration mounts upon request (SAG, KSA)
- Shut-off valves must be installed that isolate the unit from the rest of the system. Elastic connection joints and system/machine drain taps also need to be fitted.
- It is mandatory to install a square metal mesh filter (longest side = 0.8 mm) of adequate size and pressure drops on the unit return pipes.
- However it is installed, the coil inlet air temperature (ambient air) must remain within the set limits.
- The water flow through the heat exchanger must not go below the value corresponding to a temperature differential of 8°C (with all compressors on, and must, in any case, comply with the limit values reported in the section Operation limits.)
- The unit cannot be installed on brackets or shelving.
- Correct installation and positioning includes levelling the unit on a surface capable of bearing its weight.
- It is advisable to drain the water from the system during long periods of inactivity.
- It is possible to avoid draining the water by adding ethylene glycol to the water circuit (see "Use of antifreeze solutions").
- The expansion tank is sized to contain the machine water only. The size of an additional expansion tank must be calculated by the installer depending on the system. In the event of models without a pump, the pump must be installed with the supply pressing against the machine's water intake.

NOTE

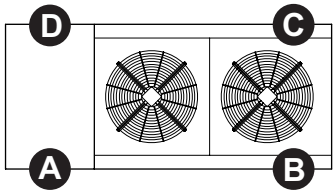
The space above the unit must be free from obstacles.

If the unit is completely surrounded by walls, the distances specified are still valid, provided that at least two adjacent walls are not higher than the unit itself.

There must be a minimum gap of at least 3.5m between the top of the unit and any obstacles above it.

If more than one unit is installed, the minimum distance between the finned coils should be at least 2 m.

Distribution of the weights



THAEY					
Weight		238	245	250	260
(*)	kg	580	580	615	635
Support					
A	kg	141	141	178	180
B	kg	98	98	133	142
C	kg	140	140	130	138
D	kg	202	202	174	175

THAETY-THAESY					
Weight		269	279	289	296
(*)	kg	930	945	950	995
Support					
A	kg	244	246	247	251
B	kg	231	238	238	257
C	kg	221	227	228	246
D	kg	233	235	237	241

With PUMP DP2 accessory

THAEY					
Weight		238	245	250	260
(*)	kg	645	645	680	700
Support					
A	kg	182	182	187	189
B	kg	145	145	158	166
C	kg	141	141	153	162
D	kg	177	177	182	183

THAETY-THAESY					
Weight		269	279	289	296
(*)	kg	1080	1095	1110	1155
Support					
A	kg	274	276	279	283
B	kg	276	283	286	305
C	kg	266	272	276	294
D	kg	263	265	269	273

With TANK&PUMP ASDP2 accessory

THAEY					
Weight		238	245	250	260
(*)	kg	715	715	750	770
(**)	kg	865	865	900	920
Support					
A	kg	306	306	234	235
B	kg	132	132	222	231
C	kg	129	129	216	225
D	kg	298	298	228	229

THAETY-THAESY					
Weight		269	279	289	296
(*)	kg	1175	1190	1210	1255
(**)	kg	1405	1420	1440	1485
Support					
A	kg	233	288	289	291
B	kg	459	462	473	494
C	kg	473	412	420	440
D	kg	240	257	257	260

(*) Weight of the unit when empty

(**) Weight of the units including the water present in the tank

NOTE

In THAETY units the weight includes the INS accessory which is standard in the THAESY units

INS accessory weight = 15 Kg (mod. 269÷296)

Accessories weight

THAEY 238÷260

Model		238	245	250	260
Accessory					
P1	kg	30	30	30	30
P2	kg	35	35	35	35
DP1	kg	60	60	60	60
DP2	kg	65	65	65	65
ASP1	kg	100	100	100	100
ASP2	kg	105	105	105	105
ASDP1	kg	130	130	130	130
ASDP2	kg	135	135	135	135

THAETY-THAESY 269÷296

Model		269	279	289	296
Accessory					
INS	kg	15	15	15	15
INS 60	kg	50	50	50	50
RPB	kg	25	25	25	25
FMB	kg	30	30	30	30
P1	kg	75	75	75	75
P2	kg	80	80	80	80
DP1	kg	140	140	145	145
DP2	kg	150	150	150	150
ASP1	kg	170	170	175	175
ASP2	kg	180	180	180	180
ASDP1	kg	230	230	235	235
ASDP2	kg	245	245	245	245

(*) Indicative weight. Contact Rhoss Spa for weights before ordering.

Water connections

Minimum hydraulic circuit contents

To ensure the unit works correctly, the system needs a minimum volume of water
The minimum water content is determined on the basis of the unit's cooling or heating capacity (for heat pumps/EXP) in the design of the unit, multiplied by the coefficient expressed in 10 l/kW (*)
If the water content of the system is below the minimum value calculated, install an additional tank
However, remember that a high water content in the system always goes to the advantage of comfort in the room, as it ensures a high thermal inertia of the system

* For heat pumps/air cooled EXP, also pay attention to the temperature difference generated during the natural defrosting cycles:

DT tank and/or DHW (by defrost effect)	K	7	6
Specific capacity	l/kW	10	12

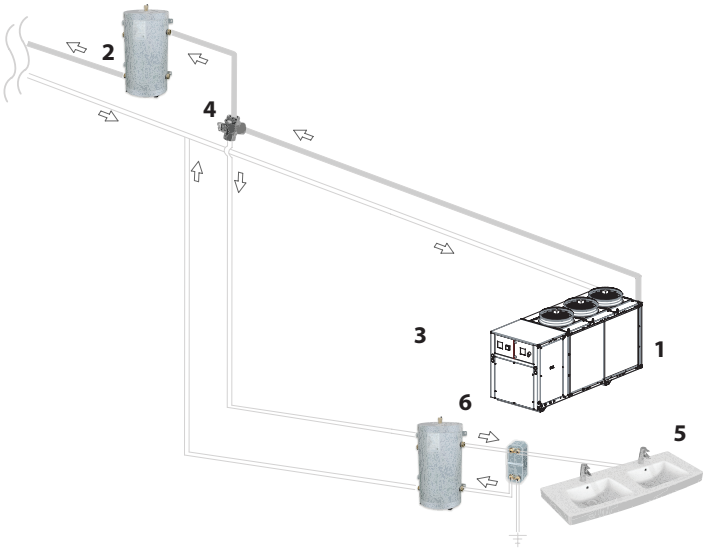
Exchanger water content

Model THAEY T-S		**238**	**245**	**250**	**260**	**269**	**279**	**289**	**296**
Hydraulic technical data									
Expansion tank capacity	l	14	14	14	14	12	12	12	12
Expansion tank pre-load	barg	1	1	1	1	2	2	2	2
Expansion vessel maximum pressure	barg	3	3	3	3	10	10	10	10
Safety valve	barg	3	3	3	3	6	6	6	6
Water contents THAEY T-S									
Plate heat exchangers	l	3.2	3.8	4.4	5.1	5.8	6.6	7.8	7.8
Tank water content (ASP/ASDP)	l	150	150	150	150	230	230	230	230

Information on the accessories

Applications and production of domestic hot water

Set-up of Heat pump with 3-way valve (KVDEV accessory) and domestic hot water (DHW) production



1 Heat pump
2 System user side storage tank
3 Pump
4 3-way valve (KVDEV accessory)
5 User-DHW
6 Technical water storage tank

With this type of system, the main circuit of the heat pump produces DHW (winter season) or DCW (summer season) for the user.

For the production of DHW by using the heat pump, use a technical water storage tank, which cannot be used directly for human consumption, and combine it to a DHW producer/intermediate heat exchanger.

Should a 3-way valve (KVDEV) system be envisaged, it can manage production of hot water to the DHW circuit in both the summer and winter seasons; in fact, the valve enables water flow deviation from the system to the technical water storage tank for the system to produce DHW for domestic use

The valve must be installed in proximity of the heat pump.

The pipes between the valve and the heat pump must be as short as possible.

The heat pump must also be set up in the basic versions or with a pump

The correct and effective functioning of the system is incompatible with the presence of inertial accumulations in the heat pump

Priority management and domestic hot water DHW request (3-way switch-over valve KVDEV)

How to manage the DHW request:

- by means of the digital input: the request is assigned by a thermostat assembled by the installer. When the thermostat closes, the unit understands that there is a DHW request and, once the conditions have been verified, the procedure is activated to meet the DHW requirements
- by means of temperature probe in the storage tank: a temperature probe is placed inside the storage tank, which is directly connected to the unit board The required set point can be configured from the panel together with the relative activation differential In this case, the probe must be accurately positioned and the maximum distance allowed respected due to the type of probes used

Type of probe

description	type of probe	features	β (25/85)
NTC150	NTC HT150	50kΩ@25°C	3977 (±1%)
NTC	NTC	10kΩ@25°C	3435 (±1%)

Integrative source management

It is possible to manage an integrative heat source (electrical resistance) from the machine's board.

Integrative thermal source (KRIT accessory for 238÷260 models)

An integrative thermal source is an electrical resistance that runs together with the heat pump in winter mode.

By means of the unit's control, it is possible to control start-up and switch-off according to the different variables: outdoor air temperature, delay in reaching the set-point set due to a high thermal load.

Resistance is always activated during the defrost cycle and when DHW production is requested.

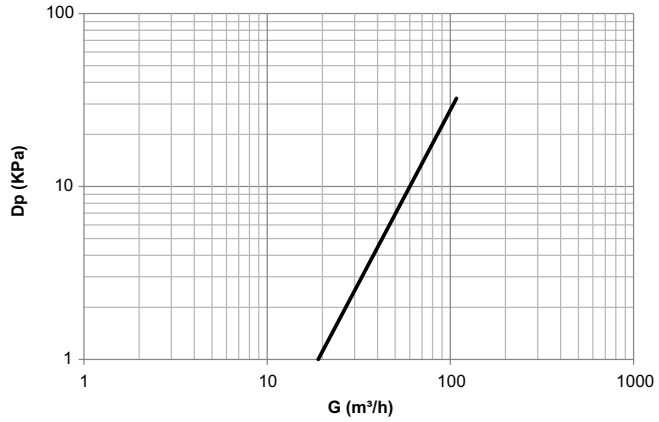
When there is a 3-way valve for KVDEV DHW production, the electrical resistance must be placed upstream of the valve, as illustrated in the figure.

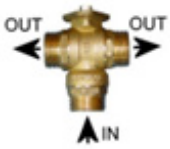
It is always recommended to accurately check the electrical power available when integrative electrical resistances are installed.

Accessory KVDEV - 3-way diverter valve for ACS

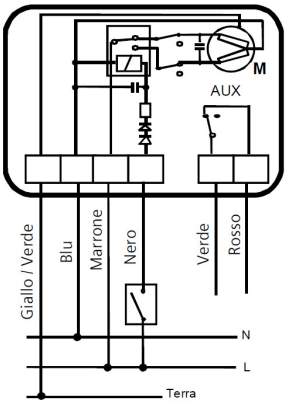
KVDEV 3-way diverter valve pressure drop

Dp 3-way valve 2"





Attention for the 3-way valves:
the common entry is always central



The electrical system must comply with current regulations and the connection diagram provided.

The connection cable must not be replaced: if it must be extended, use a junction box.

Brown	Phase
Black	Command
Blu	Neutral
Red+Green	Limit switch contact - 3° 250V AC
Yellow/Green	Earth

Accessory FNR - Forced Noise Reduction (269÷296 models)

The FNR-S accessory allows a variable acoustic layout of the unit, managing the silence in chiller mode according to the specific user needs

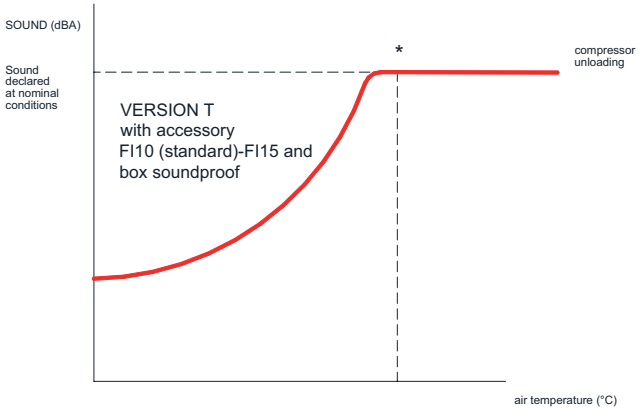
The accessory is available for THAETY reversible heat pumps, adequately fitted with some accessories described in the table below

EasyPACK HT65 heat pumps	Mandatory ACCESSORY	Mandatory ACCESSORY for soundproofing compressors	Mandatory ACCESSORY to adjust the fan speed
THAETY 269÷2146	FNR-S	INS	FI10 (standard equipment) or FI15

The silence of the unit is managed according to 3 modes that can be selected by actuating the control panel on the machine, using digital inputs and/or programming time bands.

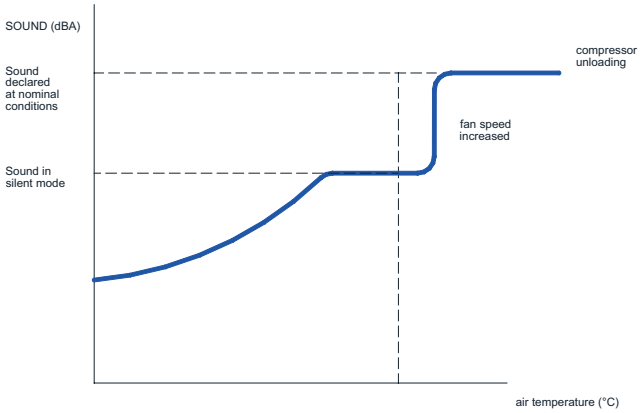
	Digital inputs	
	FNR1	FNR2
Mode 1	CONTACT OPEN	CONTACT OPEN
Mode 2	CONTACT CLOSED	CONTACT OPEN
Mode 3	CONTACT CLOSED	CONTACT CLOSED

Mode 1 - Unit operation with standard logic (T version) but with better "soundproofing"



(*) Performance and noise declared at the nominal operating conditions (water in/out 12/7°C and air temperature 35°C)

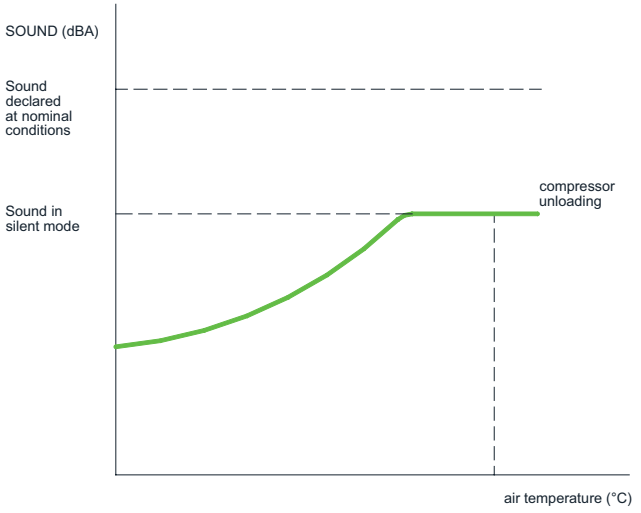
Mode 2 - Request to reduce noise at certain times of the day, night, etc. maintaining the "guaranteed supplied power" priority



The THAETY units with FNR-S accessory work in silence with performance and operating limits of THAESY, respectively.

For outdoor air temperatures exceeding the operating limits (refer to the section of the operating limits for more details), the units lose silence and guarantee the functions of the respective THAETY.

Mode 3 - Request to reduce noise at certain times of the day, night, etc. maintaining the "guaranteed max noise" priority



The THAETY units with FNR-S accessory work in silenced mode with performance and operating limits (refer to the section of the operating limits for more details) of THAESY, thus guaranteeing silence throughout their working range

EEM accessory - Energy Meter (269÷296 models)

The EEM accessory allows certain unit features, such as those below, to be measured and displayed:

- Power supply voltage and instantaneous current consumption of the unit
- Instantaneous electric power consumed by the unit
- Instantaneous power factor of the unit
- Electricity consumption (kWh)

If the unit is connected via a serial network to a BMS or external supervisory system, the trends of the measured parameters can be stored and the operating status of the unit itself checked.

FDL accessory - Forced download compressors

The FDL accessory (forced reduction of the power consumed by the unit) allows power consumption to be restricted according to the utility requirements.

The user can set the desired percentage on a special mask.

The function, which can be set from the unit display, can be enabled via a digital signal, using time bands or as an input in the case of a serial connection with an external BMS via Modbus.

In the presence of the EEM accessory (models 269÷296), which allows the power consumed to be instantaneously measured, a specific maximum consumed power value can be set and any utility requirement complied with.

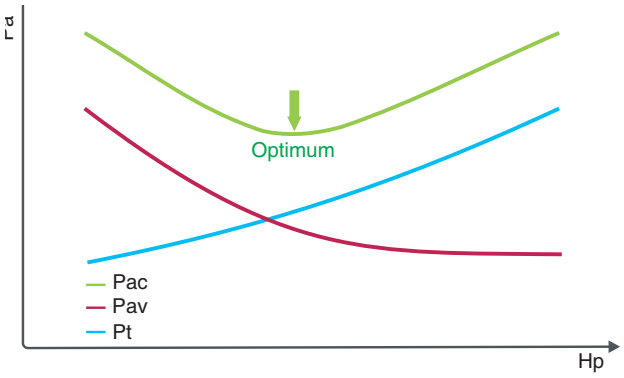
EEO accessory - Energy Efficiency Optimizer (269÷296 models)

The EEO accessory allows the unit efficiency to be optimised by acting on the electrical absorption, thereby minimising consumption.

The EEO accessory identifies the optimal point that minimises the total absorbed power (compressors+fans) of the unit by actuating the fan rotation speed.

It is particularly effective in the partial load operation, a situation which arises for most of the useful life of the chiller.

The energy efficiency index ESEER therefore, increases up to 5%.



Pac	Compressor consumed power
Pav	Fan consumed power
Pt	Total absorbed power
Pa	Absorbed power
Hp	Condensation pressure

The EEO accessory is available for chillers and heat pumps fitted with the condensation control accessory, with the EEM accessory (energy meter) and EEV (electronic expansion valve) according to the following table:

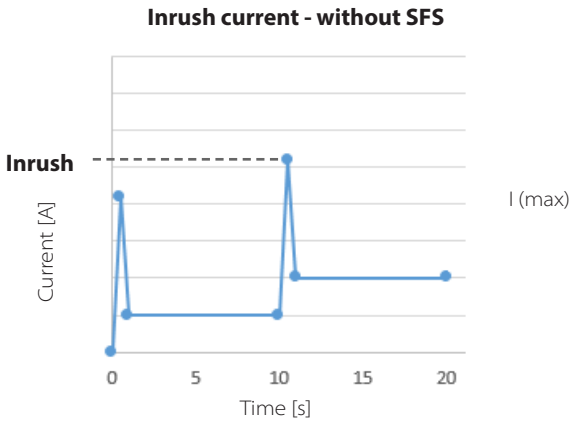
EasyPACK heat pumps	Mandatory ACCESSORY	Mandatory ACCESSORY	Mandatory ACCESSORY	Mandatory ACCESSORY
THAETY 269÷296	EEO	EEM	EEV	FI10 (standard equipment) or FI15
THAESY 269÷296	EEO	EEM	EEV	FI10 (standard equipment) or FI15

SFS accessory - Soft starter

The SFS accessory is used to reduce the start-up current peak, thereby achieving a soft and gradual start, with a noticeable benefit in terms of wear of the electric motor.

The following is a qualitative drawing as an example of a unit with 2 compressors fitted with and without the SFS accessory

The inrush current values with the SFS accessory are indicated in tables "A" Technical data.



LKD accessory - Leak Detector

The LKD accessory allows you to detect any refrigerant gas leaks.

If a refrigerant leak is detected, two different options are available:

1 - Management of a voltage-free contact (for the user):

- OPEN CONTACT -> Alarm triggered
- CLOSED CONTACT -> No alarm triggered

2 - Management, in addition to the voltage-free contact, of a default logic selected by the user on the control panel (see the Commands and controls manual for its configuration) which allows the unit to perform the following actions:

- triggering of an ALARM
- shutdown of the unit with PUMP DOWN
- shutdown and restart of unit with PUMP DOWN

RIS accessory - Additional storage tank resistances (269÷296 models)

The RIS accessory consists of adequately sized integrative resistances applied in the storage tank and an antifreeze resistance.

The control logic, implemented by Rhoss, involves the activation of the resistances by means of an outdoor air temperature value and according to the hot water set-point set in two STEPS described below in the table

Primarily, if the air T is between -5 and -1°C, the first step is initiated, whereas, if the air T is between -1 and -10°C, the second step is initiated

The resistances continue to work until the set hot water set-point is reached or if the defrost function is activated (to guarantee environmental comfort)

Note: the user is responsible for the supply to the electric resistances, by means of electrical wiring in the Electrical panel (IP55) outside the resistances

EasyPACK HT65 range		THAETY-THAESY	
SIZE		STEP 1	STEP 2
269	kW	6	18
279	kW	6	18
289	kW	6	24
296	kW	6	24

VPF accessory - Variable primary Flow

The energy used for the cooling unit to work is an important component in the system costs, and reducing the unit consumption, especially with partial load, is sometimes compromised by the pump unit operating constantly. The higher the absorption of the pumps used to maintain the proper flow of water in the pipes the more this effect is noticed.

A solution that compensates for the problem of the energy absorbed by the pump units is using pumps driven by inverter technology, able to modulate the flow rate G and reduce power consumption. This is how the systems with constant primary flow and secondary decoupled variable flow exist

The introduction of the VPF system simplifies the systems, using a single primary variable flow circuit, in which inverter controlled pumps are installed as the only pumps in the system; this solution generates complications related to the calibration, sizing of the venting section and system setting, which burden the client and indirectly could affect the reliability of the machine.

The solution proposed by Rhoss combines the simplification of the VPF system, the reliability of the system solution with primary-secondary variable flow circuits and the additional energy and cost savings derived from managing the primary with variable flow where energy saving depends on the variation in flow rate $\Delta Pa=f(\Delta G)^3$

The content of water in the primary circuit is very important since it stabilises system operation, the water temperature to the system and reliability of the cooling unit over time (recommended minimum content of 5L/kw)

The cooling circuit is equipped with pumps on the primary side with inverter adjustment and the option to manage the inverter pumps from the system side

In addition to significant energy savings, the solution with VPF technology by RHOSS also allows the design of the system's hydraulic circuit to be simplified and the operating costs to be decreased

The Rhoss solution offered for variable flow systems is innovative for several reasons:

- Stable flow rate modulation required by the system with guaranteed reliability for the chiller installed (even with system flow rate oscillation). The flow rate can be modulated up to 20% by using pumps with an EC-type of motor
- Simplified system calibration operations
- Simplified design of the solutions to be applied to the terminals (balancing the number of 3-way and 2-way valves with adequate sizing of the venting section)
- Maximising the efficiency of the cooling unit in each operating condition for the flow rate to be modulated on the system side following the route of the load, as well as on the primary side, thereby minimising the pumping energy required for it to operate correctly.
- Possibility of simplified and reliable management of several units in parallel (the known problems related to flow variations in traditional VPF systems when the cooling units are connected/switched off are avoided)

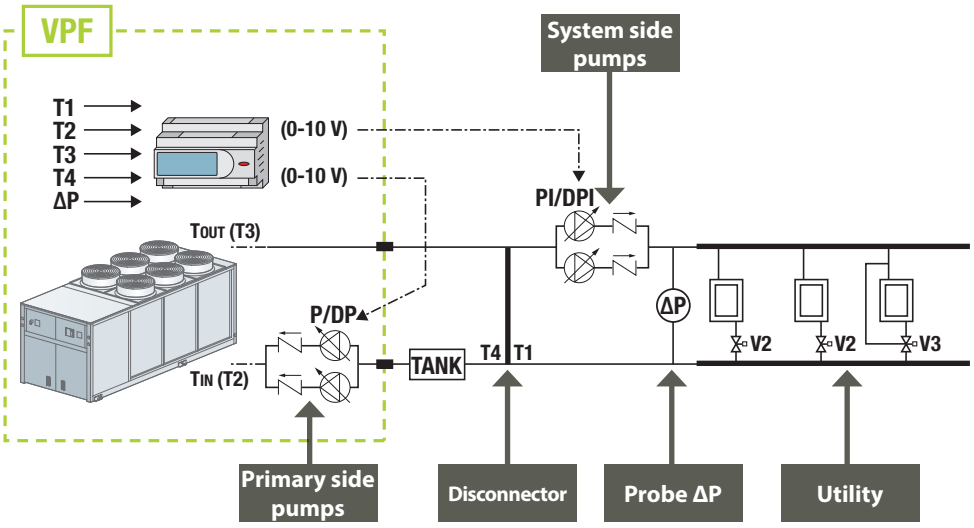
Below is a basic diagram of the VPF solution by RHOSS being used in the case of a single chiller

P/DP	Single or double pump controlled by a variable frequency inverter (pumps installed and controlled by Rhoss with a 0-10V signal)
PI/DPI	Single or double pump, controlled by a variable frequency inverter to service the system. Adjustment is carried out by means of flow modulation and is supplied by the user (with separate supply) and in this case, Rhoss is in charge of management via the analogue signal 0-10V
TANK	Storage tank
V2	2-way adjustment valve
V3	3-way adjustment valve
ΔP	Differential pressure transducer

NOTES on the installation:

1. If a cooling unit with VPF technology is installed, a tank must be installed to guarantee minimum water content of 5 l/kw on the primary side. At least 20% of the flow must be guaranteed on the system side by installing a minimum number of terminals fitted with 3-way valves V3
2. The probe to determine the ΔP pressure differential is a standard supply. The installer can set the probe remotely in the most appropriate point in the system
3. Probes T1 and T4 are supplied and must be installed on the return side of the system, as shown in the figure: T1 before the hydraulic disconnector and T4 after.

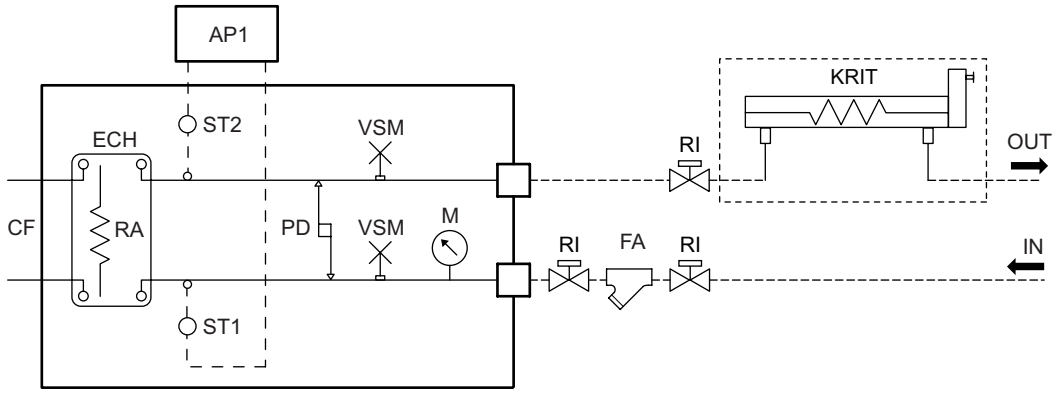
Rhoss VPF Solution (Variable Primary Flow)



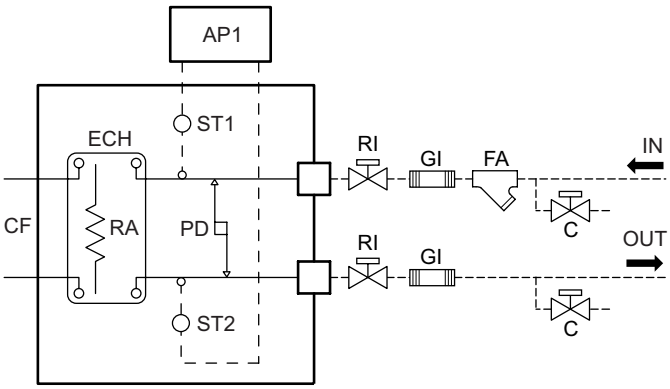
Hydraulic circuit

Standard set-up

THAEY HT65 238÷260

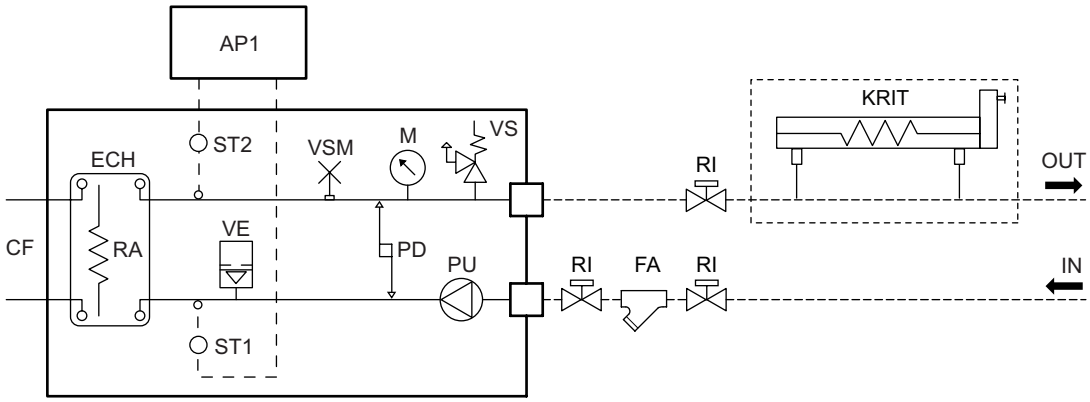


THAETY-THAESY HT65 269÷296

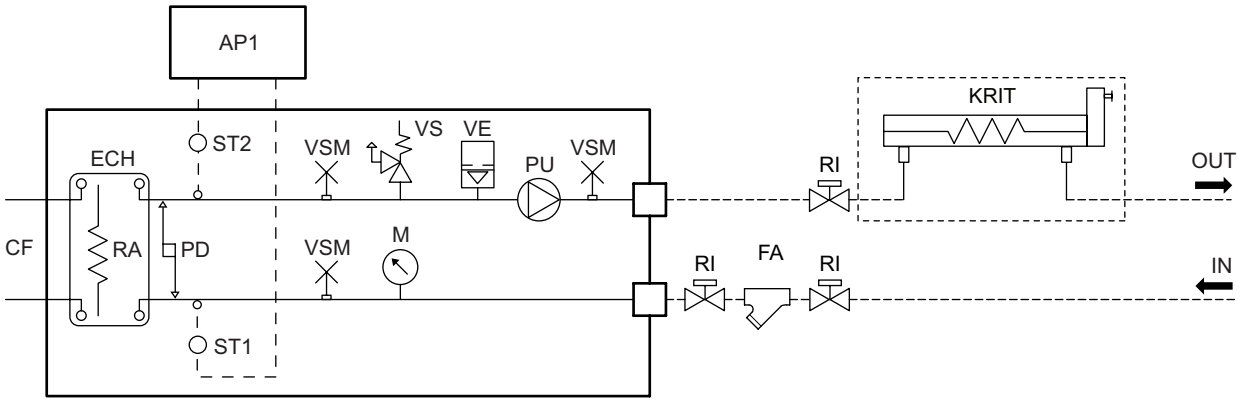


installation P1-P2

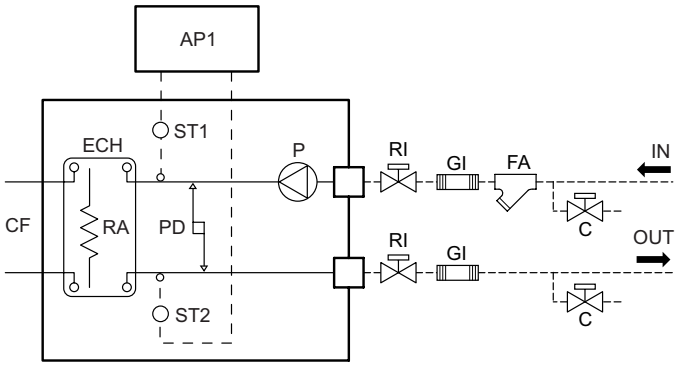
THAEY HT65 238



THAEY HT65 245÷260

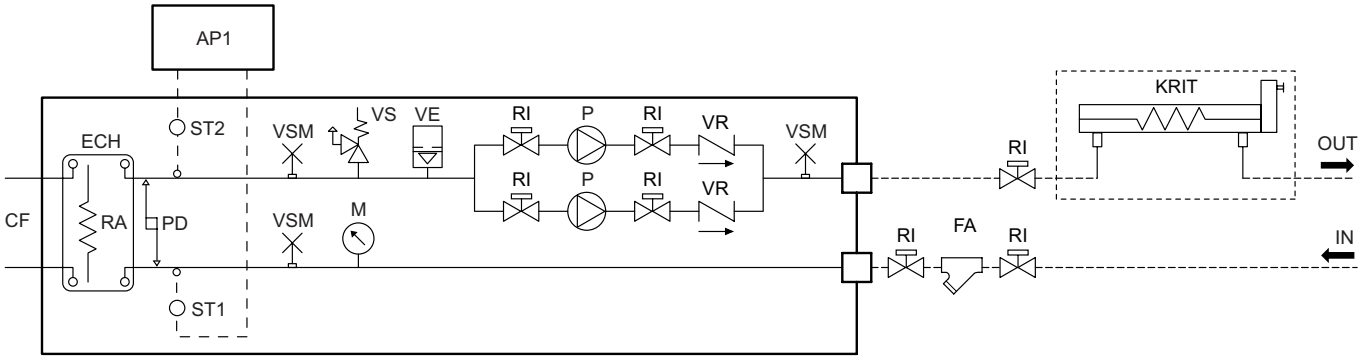


THAETY-THAESY HT65 269÷296

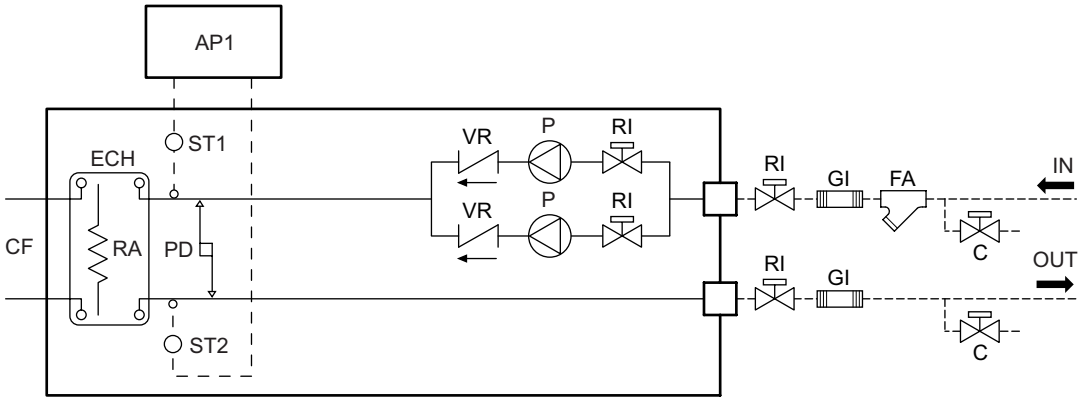


Installation DP1-DP2

THAEY HT65 238÷260

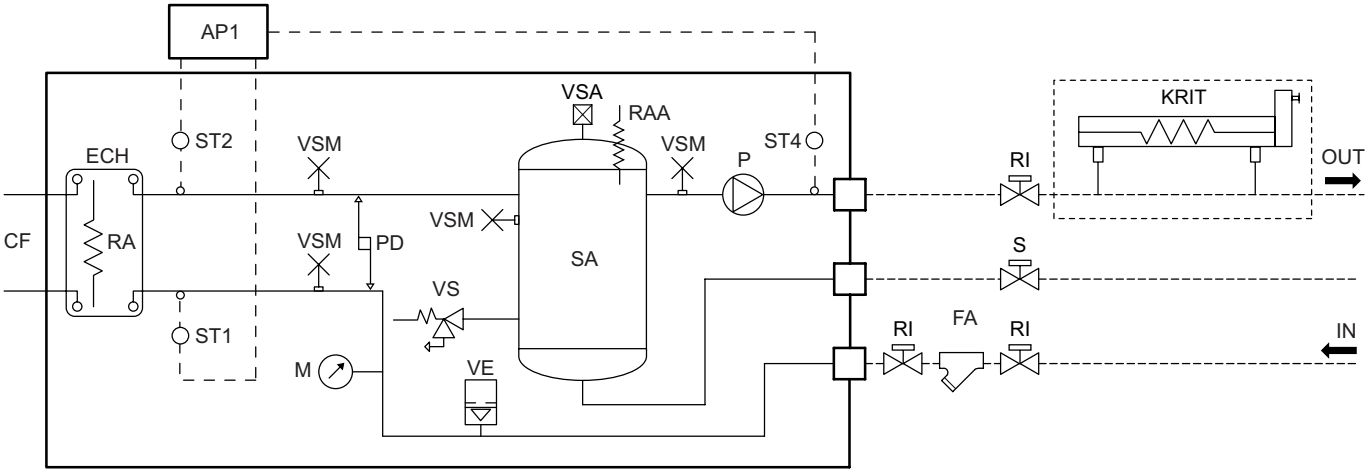


THAETY-THAESY HT65 269÷296

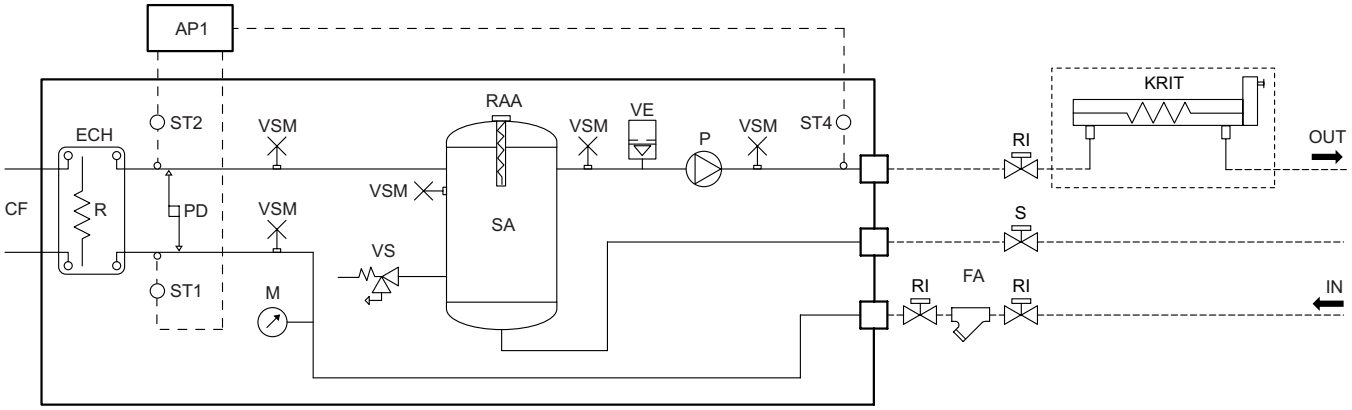


Installation ASP1-ASP2

THAEY HT65 238 installation ASP



THAETY HT65 245÷260 installation ASP



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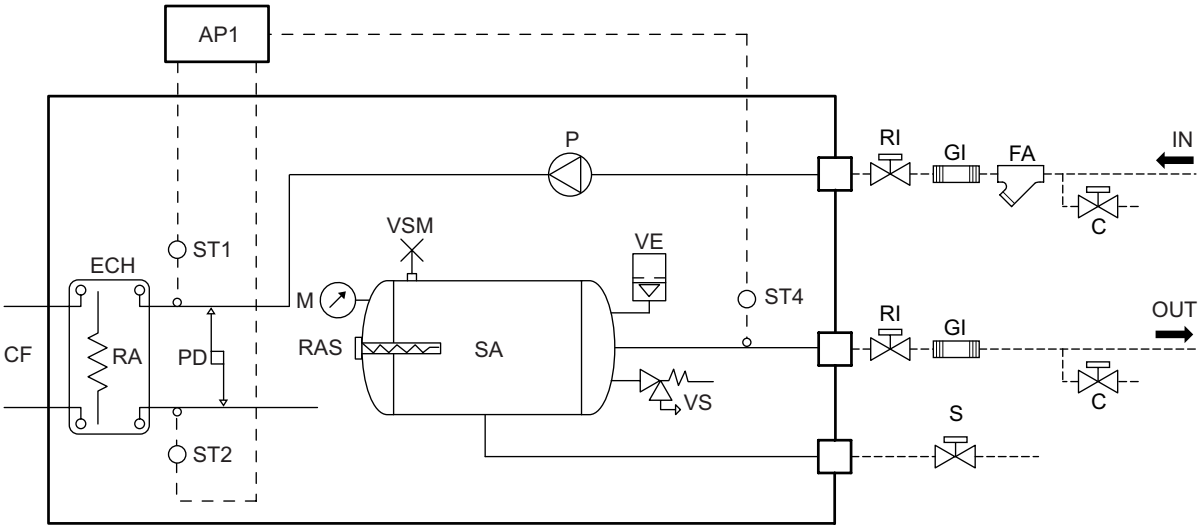
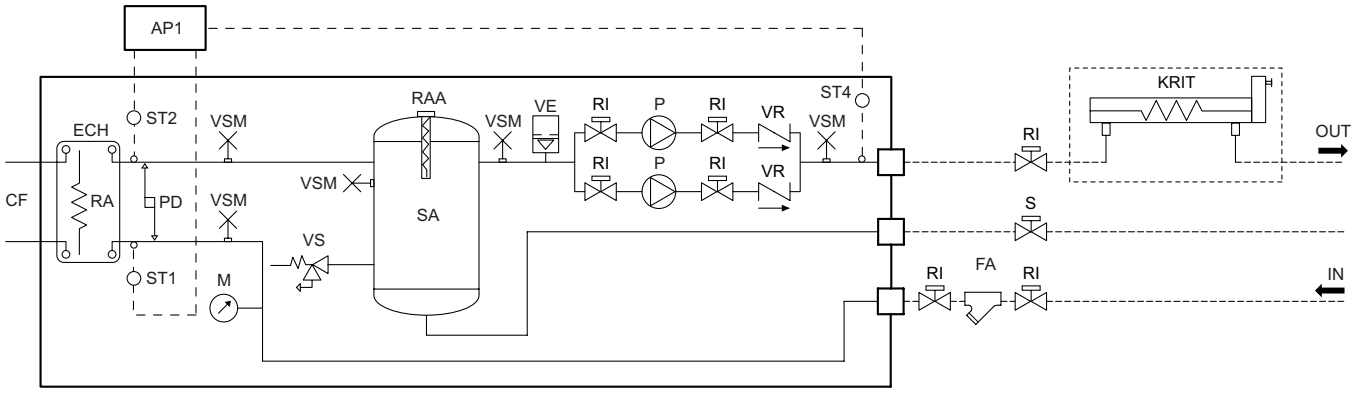
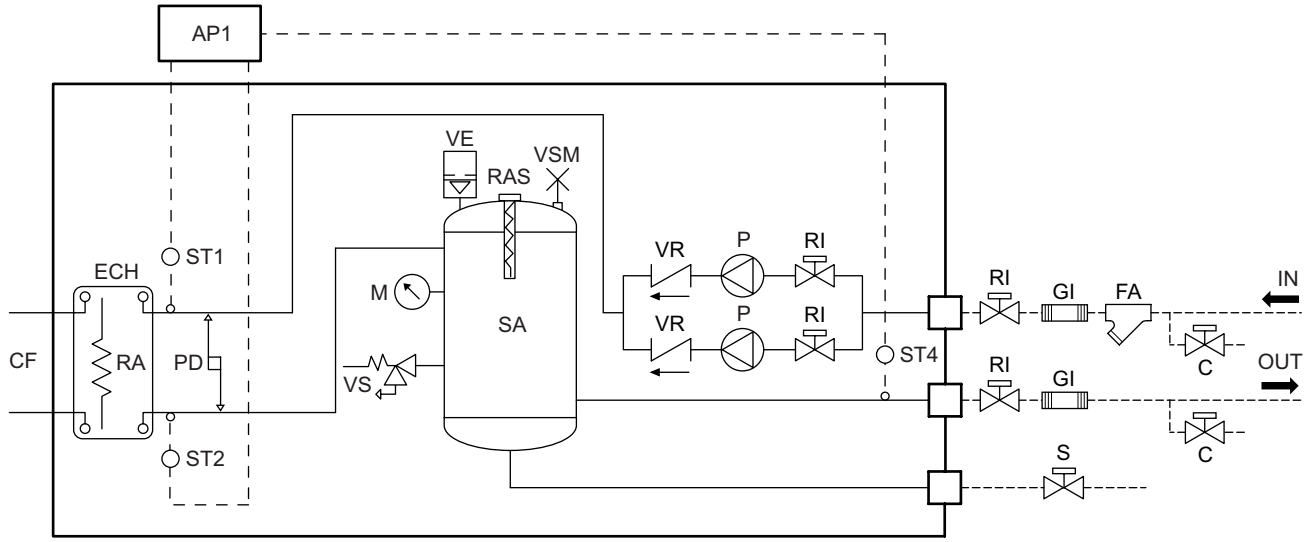


Installation ASDP1-ASDP2

THAEY HT65 238÷260



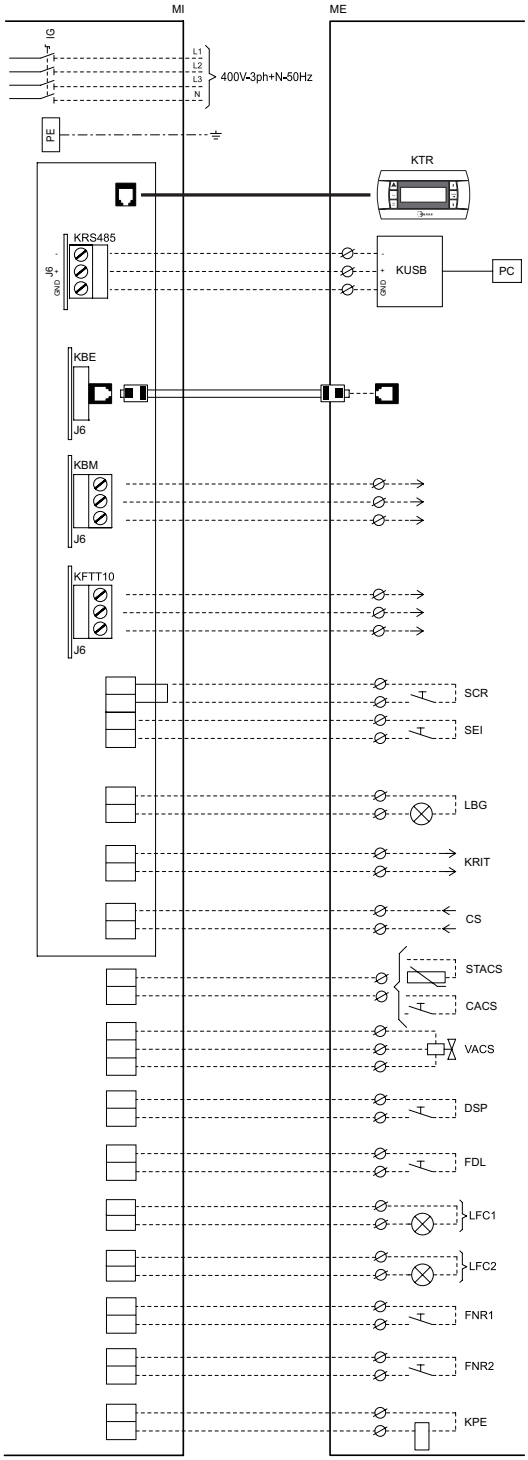
THAETY-THAESY HT65 269÷296



CF	Refrigerant circuit
ECH	Plate evaporator
RA	Heat exchanger/anti-freeze
PD	Differential water pressure switch
VSM	Manual bleed valve
VS	Safety valve
AP1	Electronic controls
ST1	Primary inlet temperature probe
ST2	Primary outlet temperature probe
	- work and antifreeze for Standard and Pump set-ups
	- antifreeze for Tank & Pump set-ups
ST4	Storage tank outlet temperature probe (only with RIS accessory)
ST8	Secondary outlet temperature probe (recovery)

VE	Expansion tank
RAS	Storage tank resistance (accessory)
FA	Mesh filter (set up by the installer)
SA	Storage tank
STE	Tube and shell exchanger (accessory)
M	Manometer
P	Pump
VR	Check Valve
S	Water drain
C	Supply/drain tap
RI	Shut-off tap
GI	Antivibration connection
- - - -	Connections by installer

Electrical connections



MI	Internal terminal board
ME	External terminal board
L	Line
N	Neutral
PE	Earth connection
IG	Manoeuvre isolator switch
KRS485	RS485 serial interface (accessory)
KUSB	RS485/USB converter (accessory)
KFTT10	Lonworks serial interface (accessory)
KBE	Bacnet Ethernet interface (accessory)
KBM	Bacnet MS/TP interface (accessory)
J6	Connector to insert the KRS485, KFTT10, KBM, KBE accessories;
KTR	Remote keyboard (accessory)
PC	Personal Computer
SCR	Remote control selector (control with clean contact)
SEI	Summer/winter selector (control with clean contact)
LBG	Machine general block light (24 Vac)
KRIT	KRIT control (additional electric resistance for heat pump) (230 Vac, maximum load 0.5A AC1) - For 238÷260 only
CS	Shifting set point via signal 4÷20 mA (incompatible with the DSP accessory)
CACS	VACS consent (control with potential-free contact)
DSP	Double set-point via digital consensus (incompatible with the CS and CACS accessory)
VACS	3-way diverter valve for managing the production of domestic hot water (KVDEV) (230 Vac, maximum load 0.5A AC1)
STACS	Domestic hot water temperature probe (not supplied, set up by the installer) - an alternative to domestic hot water consent CACS
FDL	Forced download compressors (FDL accessory) (control with clean contact)
LFC1 LFC2	Compressor functioning light (consensus in voltage 230 Vac, maximum load 0.5A AC1)
FNR	Forced Noise Reduction 1-2 (only for 269÷296)
KPE	Mandatory evaporator pump command (consensus at voltage 230 Vac)
- - -	Connection by installer
——	6-wire telephone cable (maximum distance 50 m, for greater distances use the KR200 accessory and the shielded cable)

- The electrical board can be accessed from the front panel of the unit
- Connections must be made in compliance with current standards and with the diagrams provided with the machine
- Machine earthing is legally compulsory
- Always install a main automatic switch or fuses with adequate capacity and blackout power in a protected area or near the machine

ATTENTION!
The diagrams only show the connections to be carried out by the installer
For the electrical connections of the unit and accessories, refer to the relative wiring diagram

Models		Line Section	PE section	Section commands and controls
238	mm²	10	10	1.5
245	mm²	10	10	1.5
250	mm²	16	16	1.5
260	mm²	16	16	1.5
269	mm²	16	16	1.5
279	mm²	16	16	1.5
289	mm²	16	16	1.5
296	mm²	25	16	1.5

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

RHOSS France
19, chemin de la Plaine - 69390 Vourles - France
tél. +33 (0)4 81 65 14 06 - fax +33 (0)4 72 31 86 30
exportsales@rhoss.it

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

RHOSS GULF DMCC
Suite No: 3004, Platinum Tower
Jumeirah Lakes Towers, Dubai - UAE
ph. +971 4 44 12 154 - fax +971 4 44 10 581
e-mail: info@rhossgulf.com

Uffici commerciali Italia:
Codroipo (UD)
33033 Via Oltre Ferrovia, 32
tel. +39 0432 911611 - fax +39 0432 911600

Nova Milanese (MB)
20834 Via Venezia, 2 - p. 2
tel. +39 039 6898394 - fax +39 039 6898395

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K20132EN ed.5 - 01.20