HITACHI

TECHNICAL CATALOGUE

SAMURAI SERIES
CONDENSER LESS WATER CHILLERS
MODULAR R134a - SCREW TYPE



MODEL
RCME-(40-60)CLH1

Cooling & Heating

air

TCGB0121 rev.3 - 11/2021

HITACHI

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1. General information

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1.1 General notes

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If you have any questions, contact your service contractor of Hitachi.

Check and make sure that the explanations of each part of this Technical Catalogue correspond to your water chiller model.

Refer to the models codification to confirm the main characteristics of your system.

Signal words (DANGER, CAUTION and NOTE) are used to identify levels of hazard seriousness. Definitions for identifying hazard levels are provided in the next chapter below with their respective signal words.

It is assumed that this unit will be operated and serviced by English speaking people. If this is not the case, the customer should add safety, caution and operating signs in the native language of the personal.

This water chiller has been designed for the working range described in the corresponding chapter.

1.2 Safety and applied symbols

During normal air to water heat pump system design work or unit installation, greater attention must be paid in certain situations requiring particular care in order to avoid damage to the unit, the installation or the building or property.

Situations that pose a risk to the safety of those in the surrounding area or to the unit itself are clearly indicated in this manual.

A series of special symbols are used to clearly identify these situations.

Pay close attention to these symbols and to the messages following them, as your safety and that of others depends on it

DANGER

- ***The text following this symbol contains information and instructions relating directly to your safety.***
- ***Not taking these instructions into account could lead to serious, very serious or even fatal injuries to you and others.***

In the texts following the danger symbol you can also find information on safety procedures during unit installation.

CAUTION

- *The text following this symbol contains information and instructions relating directly to your safety.*
- *Not taking these instructions into account could lead to minor injuries to you and others.*
- *Not taking these instructions into account could lead to unit damage.*

In the texts following the caution symbol you can also find information on safety procedures during unit installation.

NOTE

- *The text following this symbol contains information or instructions that may be of use or that require a more thorough explanation.*
- *Instructions regarding inspections to be made on unit parts or systems may also be included.*

1.3 Norms and Regulations

Following Regulation EU No. 517/2014 on Certain Fluorinated Greenhouse gases, it is mandatory to fill in the label attached to the unit with the total amount of refrigerant charged on the installation.

Do not vent R134a into the atmosphere: R134a are fluorinated greenhouse gases covered by the Kyoto protocol global warming potential (GWP): R134a = 1430.

Tn of CO2 equivalent of fluorinated greenhouse gases contained is calculated by indicated:
GWP multiply by Total Charge (in kg) indicated in the product label and divided by 1000.

Appropriate refrigerant

The refrigerant used in each unit is identified on the specification label and manuals of the unit. Hitachi shall not be held liable for any failure, trouble, malfunction or accident caused by units illegally charged with refrigerants other than the specified one.

Consequences of charging non-specified refrigerant

It may cause mechanical failure, malfunction and other accidents. It may cause operational failure of protection and safety devices of air conditioners. It may also cause lubrication failure of the sliding part of the compressor due to deterioration of refrigerant oil.

In particular, hydrocarbon refrigerants (such as propane, R441A, R443A, GF-08, etc.) are not allowed, since these are combustible and may cause major accidents such as fire and explosion in case of improper handling.

Once a non-specified refrigerant has been charged, no further servicing (including draining of refrigerant) shall be performed, even in case of malfunction. Improper handling of refrigerant may be a cause of fire and explosion, and servicing in such cases may be considered an illegal act.

End clients and costumers shall be informed that servicing is not approved, and the installer who charged the non specified refrigerant shall be asked to fix the unit.

Hitachi will accept no responsibility for units that have been charged with non-specified refrigerant once.

1.4 Product guide

1.4.1 Classification of water chiller models

◆ Basic modules

Unit type (Modular water chiller): RCM						
	E = Made in Europe					
		Position-separating hyphen (fixed)				
			Capacity (HP): 40, 50, 60			
				CL = Condenser Less		
					H = R134a refrigerant	
						Seires 1
RCM	E	–	XX	CL	H	1

1.4.2 Product guide: Water chillers

◆ Basic modules

❄	
3N~ 400V 50Hz	
	
Unit	Code
RCME-40CLH1	8E042341
RCME-50CLH1	8E052341
RCME-60CLH1	8E062341

2. Features and benefits

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2.1 New condenser less water chiller RCME-CLH1

Hitachi is a world leader in technology and with continual product research and development, which offers the new screw type **condenser less water chillers** RCME-CLH1 series from 135 kW to 1720 kW.

◆ Unit picture



◆ New product line

The new product line, with 3 basic modules of 40HP, 50HP and 60HP, does not only increase the capacity range of the Hitachi Water Chillers but also the Seasonal Efficiency to respond to the needs of the market..

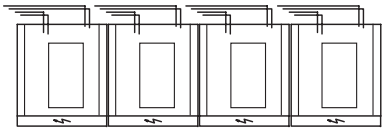
◆ Flexible space installation

Modular concept provides greater flexibility at the time of installation.

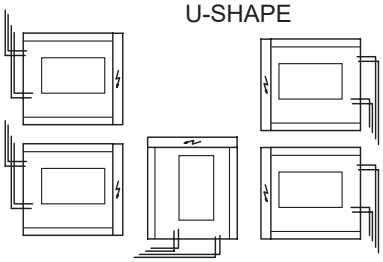
The only restriction is to keep the service space.

Some installation examples are as follows:

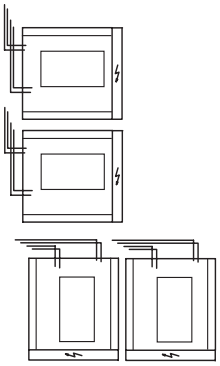
TYPICAL



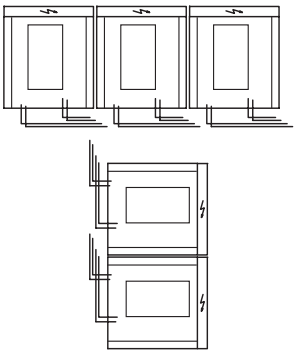
U-SHAPE



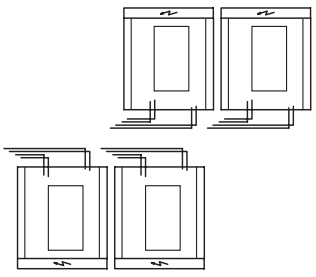
L-SHAPE



T-SHAPE



Z-SHAPE



2.2 Modules combination (at site)

3 basic modules are available: 40HP, 50HP and 60HP.

By combining these 3 modules higher capacity units can be achieved. In such units one module will be set as Master and the rest as Slaves. All the modules will operate as one single system.

NOTE

Possible module combinations are: 40HP with 50HP and 50HP with 60HP. Other combinations will be not allowed due to possible poor water distribution.

The maximum number of modules to be combined is 8, without any additional controller.



◆ Operating modes

There are 2 running modes available as standard, through unit setting:

Standard mode:

- Steady water outlet temperature: all compressors running at the same load.

High efficiency mode:

- Compressors start/stop smart control.

◆ Modules combination advantages

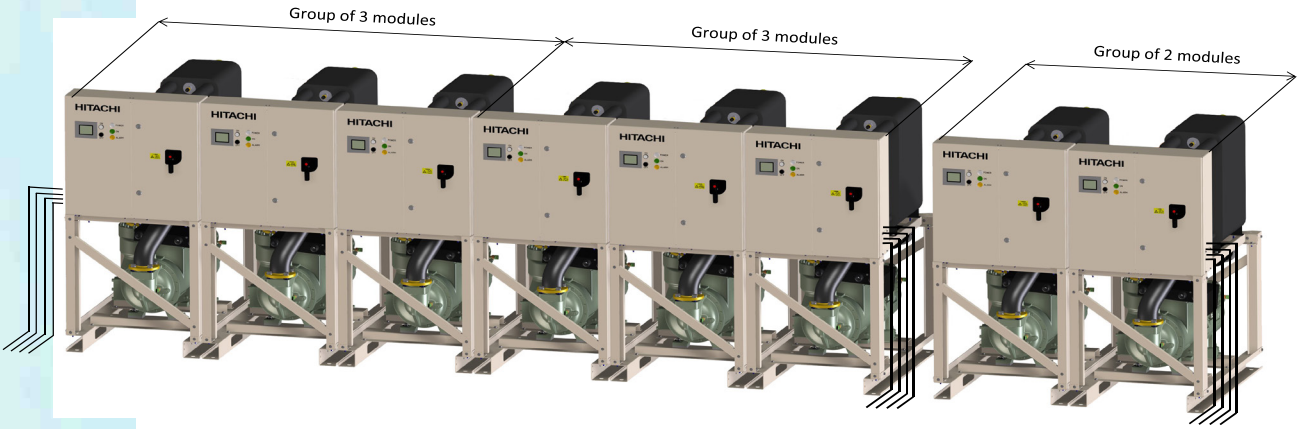
Modules combination system offers several advantages

- Optimisation of the efficiency at any load by stopping/starting up to 8 infinity capacity control compressors through a smart unit control. (if High efficiency mode is selected).
- Customer can “customize” the unit based on energy saving, price or installation space.
- Flexibility in running mode: customer can put priority on efficiency or on stable water outlet temperature by unit setting.
- Possibility to add modules and expand the total capacity of the unit if installation load is increased later on.
- Redundancy: each module has its own compressor, refrigerant circuit and controller, therefore in case of 1 module failure, the rest can keep on running.

2.2.1 On-site module combinations

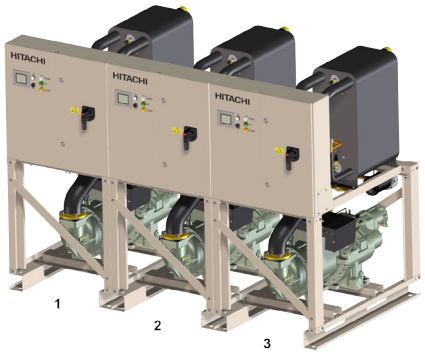
Up to 8 modules can be connected on-site.

To minimize power cable sizing it is advisable to feed up to a maximum of 3 modules from 1 power source cable as illustrated in the below example:

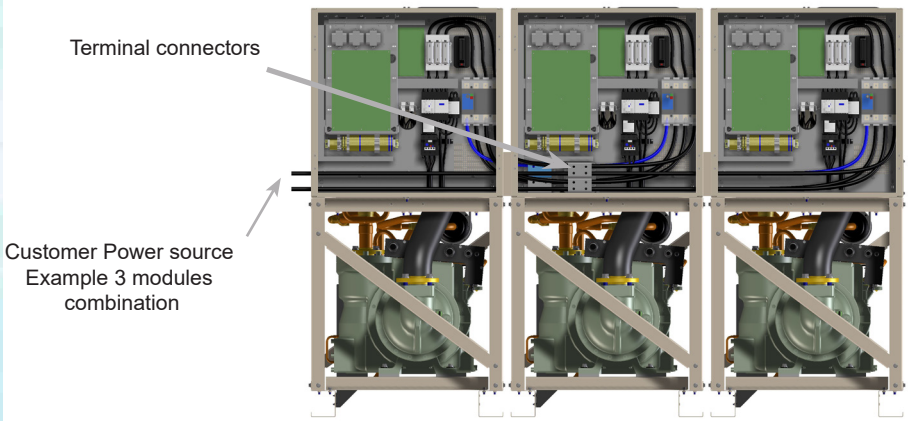


Power source could by connect individually, but when customer is required connect power source cables only in one module, proceed as follow:

- If 2 modules: connect to module No.1
- If 3 modules: connect to module No.2



Power wirings and control wiring between modules are field built. Common water pipe is also available as an accessory upon request (not factory fitted).



See *"6. Drawings"* Chapter in order to proceed with the installation properly.

◆ The following units and units combinations can be installed on site

NOTE

Possible module combinations are: 40HP with 50HP, 50HP with 60HP. Other combinations will be not allowed due to possible poor water distribution.

	HP	Number 1	Number 2	Number 3	Number 4
Individual	40	RCME-40CLH1			
	50	RCME-50CLH1			
	60	RCME-60CLH1			
2 - modules	80	RCME-40CLH1	RCME-40CLH1		
	90	RCME-40CLH1	RCME-50CLH1		
	100	RCME-50CLH1	RCME-50CLH1		
	110	RCME-50CLH1	RCME-60CLH1		
	120	RCME-60CLH1	RCME-60CLH1		
3 - modules	120	RCME-40CLH1	RCME-40CLH1	RCME-40CLH1	
	130	RCME-40CLH1	RCME-40CLH1	RCME-50CLH1	
	140	RCME-40CLH1	RCME-50CLH1	RCME-50CLH1	
	150	RCME-50CLH1	RCME-50CLH1	RCME-50CLH1	
	160	RCME-50CLH1	RCME-50CLH1	RCME-60CLH1	
	170	RCME-50CLH1	RCME-60CLH1	RCME-60CLH1	
	180	RCME-60CLH1	RCME-60CLH1	RCME-60CLH1	
4 - modules	160	RCME-40CLH1	RCME-40CLH1	RCME-40CLH1	RCME-40CLH1
	170	RCME-40CLH1	RCME-40CLH1	RCME-40CLH1	RCME-50CLH1
	180	RCME-40CLH1	RCME-40CLH1	RCME-50CLH1	RCME-50CLH1
	190	RCME-40CLH1	RCME-50CLH1	RCME-50CLH1	RCME-50CLH1
	200	RCME-50CLH1	RCME-50CLH1	RCME-50CLH1	RCME-50CLH1
	210	RCME-50CLH1	RCME-50CLH1	RCME-50CLH1	RCME-60CLH1
	220	RCME-50CLH1	RCME-50CLH1	RCME-60CLH1	RCME-60CLH1
	230	RCME-50CLH1	RCME-60CLH1	RCME-60CLH1	RCME-60CLH1
	240	RCME-60CLH1	RCME-60CLH1	RCME-60CLH1	RCME-60CLH1

	HP	Number 1	Number 2	Number 3	Number 4	Number 5	Number 6
5 - modules	200	RCME-40CLH1	RCME-40CLH1	RCME-40CLH1	RCME-40CLH1	RCME-40CLH1	
	210	RCME-40CLH1	RCME-40CLH1	RCME-40CLH1	RCME-40CLH1	RCME-50CLH1	
	220	RCME-40CLH1	RCME-40CLH1	RCME-40CLH1	RCME-50CLH1	RCME-50CLH1	
	230	RCME-40CLH1	RCME-40CLH1	RCME-50CLH1	RCME-50CLH1	RCME-50CLH1	
	240	RCME-40CLH1	RCME-50CLH1	RCME-50CLH1	RCME-50CLH1	RCME-50CLH1	
	250	RCME-50CLH1	RCME-50CLH1	RCME-50CLH1	RCME-50CLH1	RCME-50CLH1	
	260	RCME-50CLH1	RCME-50CLH1	RCME-50CLH1	RCME-50CLH1	RCME-60CLH1	
	270	RCME-50CLH1	RCME-50CLH1	RCME-50CLH1	RCME-60CLH1	RCME-60CLH1	
	280	RCME-50CLH1	RCME-50CLH1	RCME-60CLH1	RCME-60CLH1	RCME-60CLH1	
	290	RCME-50CLH1	RCME-60CLH1	RCME-60CLH1	RCME-60CLH1	RCME-60CLH1	
	300	RCME-60CLH1	RCME-60CLH1	RCME-60CLH1	RCME-60CLH1	RCME-60CLH1	
6 - modules	240	RCME-40CLH1	RCME-40CLH1	RCME-40CLH1	RCME-40CLH1	RCME-40CLH1	RCME-40CLH1
	250	RCME-40CLH1	RCME-40CLH1	RCME-40CLH1	RCME-40CLH1	RCME-40CLH1	RCME-50CLH1
	260	RCME-40CLH1	RCME-40CLH1	RCME-40CLH1	RCME-40CLH1	RCME-50CLH1	RCME-50CLH1
	270	RCME-40CLH1	RCME-40CLH1	RCME-40CLH1	RCME-50CLH1	RCME-50CLH1	RCME-50CLH1
	280	RCME-40CLH1	RCME-40CLH1	RCME-50CLH1	RCME-50CLH1	RCME-50CLH1	RCME-50CLH1
	290	RCME-40CLH1	RCME-50CLH1	RCME-50CLH1	RCME-50CLH1	RCME-50CLH1	RCME-50CLH1
	300	RCME-50CLH1	RCME-50CLH1	RCME-50CLH1	RCME-50CLH1	RCME-50CLH1	RCME-50CLH1
	310	RCME-50CLH1	RCME-50CLH1	RCME-50CLH1	RCME-50CLH1	RCME-50CLH1	RCME-60CLH1
	320	RCME-50CLH1	RCME-50CLH1	RCME-50CLH1	RCME-50CLH1	RCME-60CLH1	RCME-60CLH1
	330	RCME-50CLH1	RCME-50CLH1	RCME-50CLH1	RCME-60CLH1	RCME-60CLH1	RCME-60CLH1
	340	RCME-50CLH1	RCME-50CLH1	RCME-60CLH1	RCME-60CLH1	RCME-60CLH1	RCME-60CLH1
	350	RCME-50CLH1	RCME-60CLH1	RCME-60CLH1	RCME-60CLH1	RCME-60CLH1	RCME-60CLH1
	360	RCME-60CLH1	RCME-60CLH1	RCME-60CLH1	RCME-60CLH1	RCME-60CLH1	RCME-60CLH1

	HP	Number 1	Number 2	Number 3	Number 4	Number 5	Number 6	Number 7	Number 8
7 - modules	280	RCME-40CLH1	RCME-40CLH1	RCME-40CLH1	RCME-40CLH1	RCME-40CLH1	RCME-40CLH1	RCME-40CLH1	
	290	RCME-40CLH1	RCME-40CLH1	RCME-40CLH1	RCME-40CLH1	RCME-40CLH1	RCME-40CLH1	RCME-50CLH1	
	300	RCME-40CLH1	RCME-40CLH1	RCME-40CLH1	RCME-40CLH1	RCME-40CLH1	RCME-50CLH1	RCME-50CLH1	
	310	RCME-40CLH1	RCME-40CLH1	RCME-40CLH1	RCME-40CLH1	RCME-50CLH1	RCME-50CLH1	RCME-50CLH1	
	320	RCME-40CLH1	RCME-40CLH1	RCME-40CLH1	RCME-50CLH1	RCME-50CLH1	RCME-50CLH1	RCME-50CLH1	
	330	RCME-40CLH1	RCME-40CLH1	RCME-50CLH1	RCME-50CLH1	RCME-50CLH1	RCME-50CLH1	RCME-50CLH1	
	340	RCME-40CLH1	RCME-50CLH1	RCME-50CLH1	RCME-50CLH1	RCME-50CLH1	RCME-50CLH1	RCME-50CLH1	
	350	RCME-50CLH1	RCME-50CLH1	RCME-50CLH1	RCME-50CLH1	RCME-50CLH1	RCME-50CLH1	RCME-50CLH1	
	360	RCME-50CLH1	RCME-50CLH1	RCME-50CLH1	RCME-50CLH1	RCME-50CLH1	RCME-50CLH1	RCME-60CLH1	
	370	RCME-50CLH1	RCME-50CLH1	RCME-50CLH1	RCME-50CLH1	RCME-50CLH1	RCME-60CLH1	RCME-60CLH1	
	380	RCME-50CLH1	RCME-50CLH1	RCME-50CLH1	RCME-50CLH1	RCME-60CLH1	RCME-60CLH1	RCME-60CLH1	
	390	RCME-50CLH1	RCME-50CLH1	RCME-50CLH1	RCME-60CLH1	RCME-60CLH1	RCME-60CLH1	RCME-60CLH1	
	400	RCME-50CLH1	RCME-50CLH1	RCME-60CLH1	RCME-60CLH1	RCME-60CLH1	RCME-60CLH1	RCME-60CLH1	
	410	RCME-50CLH1	RCME-60CLH1	RCME-60CLH1	RCME-60CLH1	RCME-60CLH1	RCME-60CLH1	RCME-60CLH1	
	420	RCME-60CLH1	RCME-60CLH1	RCME-60CLH1	RCME-60CLH1	RCME-60CLH1	RCME-60CLH1	RCME-60CLH1	
8 - modules	320	RCME-40CLH1	RCME-40CLH1	RCME-40CLH1	RCME-40CLH1	RCME-40CLH1	RCME-40CLH1	RCME-40CLH1	RCME-40CLH1
	330	RCME-40CLH1	RCME-40CLH1	RCME-40CLH1	RCME-40CLH1	RCME-40CLH1	RCME-40CLH1	RCME-40CLH1	RCME-50CLH1
	340	RCME-40CLH1	RCME-40CLH1	RCME-40CLH1	RCME-40CLH1	RCME-40CLH1	RCME-40CLH1	RCME-50CLH1	RCME-50CLH1
	350	RCME-40CLH1	RCME-40CLH1	RCME-40CLH1	RCME-40CLH1	RCME-40CLH1	RCME-50CLH1	RCME-50CLH1	RCME-50CLH1
	360	RCME-40CLH1	RCME-40CLH1	RCME-40CLH1	RCME-40CLH1	RCME-50CLH1	RCME-50CLH1	RCME-50CLH1	RCME-50CLH1
	370	RCME-40CLH1	RCME-40CLH1	RCME-40CLH1	RCME-50CLH1	RCME-50CLH1	RCME-50CLH1	RCME-50CLH1	RCME-50CLH1
	380	RCME-40CLH1	RCME-40CLH1	RCME-50CLH1	RCME-50CLH1	RCME-50CLH1	RCME-50CLH1	RCME-50CLH1	RCME-50CLH1
	390	RCME-40CLH1	RCME-50CLH1	RCME-50CLH1	RCME-50CLH1	RCME-50CLH1	RCME-50CLH1	RCME-50CLH1	RCME-50CLH1
	400	RCME-50CLH1	RCME-50CLH1	RCME-50CLH1	RCME-50CLH1	RCME-50CLH1	RCME-50CLH1	RCME-50CLH1	RCME-50CLH1
	410	RCME-50CLH1	RCME-50CLH1	RCME-50CLH1	RCME-50CLH1	RCME-50CLH1	RCME-50CLH1	RCME-50CLH1	RCME-60CLH1
	420	RCME-50CLH1	RCME-50CLH1	RCME-50CLH1	RCME-50CLH1	RCME-50CLH1	RCME-50CLH1	RCME-60CLH1	RCME-60CLH1
	430	RCME-50CLH1	RCME-50CLH1	RCME-50CLH1	RCME-50CLH1	RCME-50CLH1	RCME-60CLH1	RCME-60CLH1	RCME-60CLH1
	440	RCME-50CLH1	RCME-50CLH1	RCME-50CLH1	RCME-50CLH1	RCME-60CLH1	RCME-60CLH1	RCME-60CLH1	RCME-60CLH1
	450	RCME-50CLH1	RCME-50CLH1	RCME-50CLH1	RCME-60CLH1	RCME-60CLH1	RCME-60CLH1	RCME-60CLH1	RCME-60CLH1
	460	RCME-50CLH1	RCME-50CLH1	RCME-60CLH1	RCME-60CLH1	RCME-60CLH1	RCME-60CLH1	RCME-60CLH1	RCME-60CLH1
	470	RCME-50CLH1	RCME-60CLH1	RCME-60CLH1	RCME-60CLH1	RCME-60CLH1	RCME-60CLH1	RCME-60CLH1	RCME-60CLH1
	480	RCME-60CLH1	RCME-60CLH1	RCME-60CLH1	RCME-60CLH1	RCME-60CLH1	RCME-60CLH1	RCME-60CLH1	RCME-60CLH1

2.3 Operation modes

There are 2 available running modes by unit setting as standard:

- Standard mode: all compressors running at the same load.
- High efficiency: compressors start/stop smart control.

Modules combination system offers several advantages:

- Optimisation of the efficiency at any load by stopping/starting up to 8 continuous capacity control compressors through a smart unit control (if High efficiency mode is selected).
- Flexibility in running mode: customer can put priority on efficiency or on stable water outlet temperature by unit setting.
- Possibility to add modules and expand the total capacity of the unit if installation load is increased later on.
- Redundancy: each module has its own compressor, refrigerant circuit and controller, therefore in case of 1 module failure, the remaining modules can keep on running.

2.4 Increased capacity

The new RCME-CLH1 series are designed with an optimized refrigerant cycle resulting in increased capacity:

	RCME-CLH	RCME-CLH1	
	Nominal Capacity (kW)	Nominal Capacity (kW)	
40 HP	135	135	=
50 HP	170	175	+ 3%
60 HP	205	215	+ 5 %

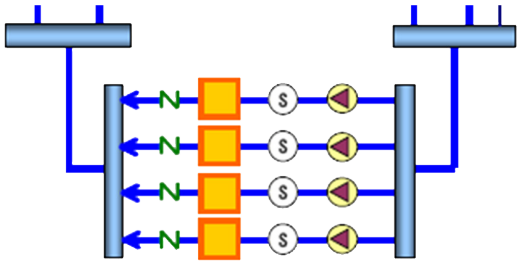
2.5 High efficiency

All modules are Eurovent A class in terms of EER. Full load and partial load efficiencies for the individual modules are as follows:

	EER
	without Pump
RCME-40CLH1	4.22
RCME-50CLH1	4.19
RCME-60CLH1	4.10

2.5.1 High efficiency mode (on site combination)

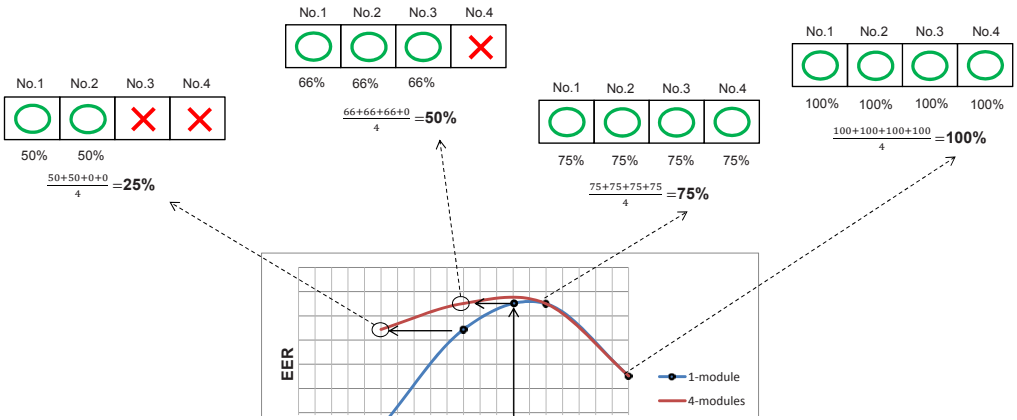
Oriented to optimize the seasonal efficiency. Individual water pump shall be installed for each module.



Smart unit control

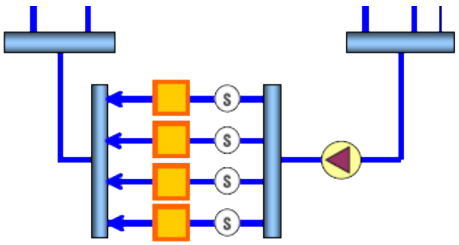
The control is stopping and starting compressors in order to ensure that the compressors which are running are at the optimum load in terms of efficiency.

Example of 4-modules unit:



2.5.2 Standard mode (on site combination)

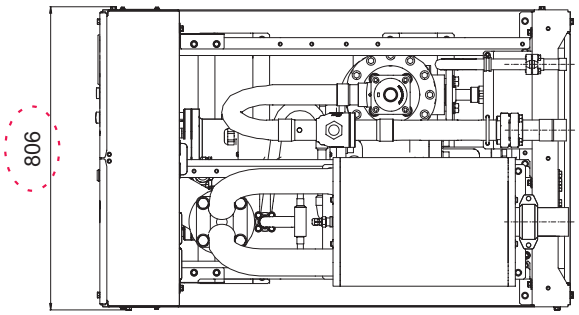
Oriented to put priority on achieving steady water outlet temperature. 1 water pump shall be installed for all the modules.



2.6 Compact unit

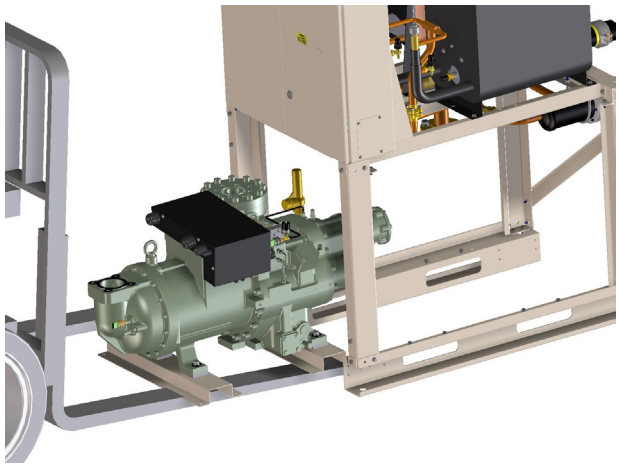
The structural design of the RCME-CLH1 series was conceived not only considering the smallest operational footprint, but also to make it easier to access the machinery rooms through the doors.

RCUE-CLH1



2.7 Small service space

The compressor is located in the down position, which allow to disassemble for maintenance easily from the front side of the unit and therefore the service space is reduced.

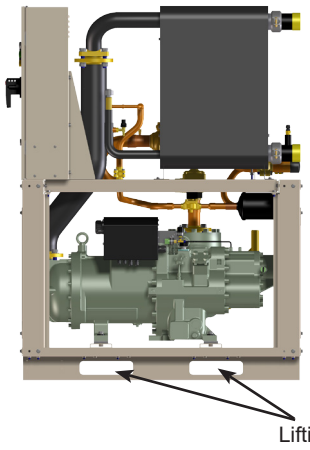


2.8 Unit handling

Frame structure of the new RCME-CLH1 modules incorporates holes designed to facilitate lifting of the unit with a forklift once the wooden base has been removed.

The lifting method using hosting slings is also possible.

See the lifting instructions in the Installation and Operation Manual for further details.



2.9 Control

Hitachi Controls have been developed to achieve the best performance of the units and the interaction with the user. Additional control features are available in the new RCME-CLH1 modules.:

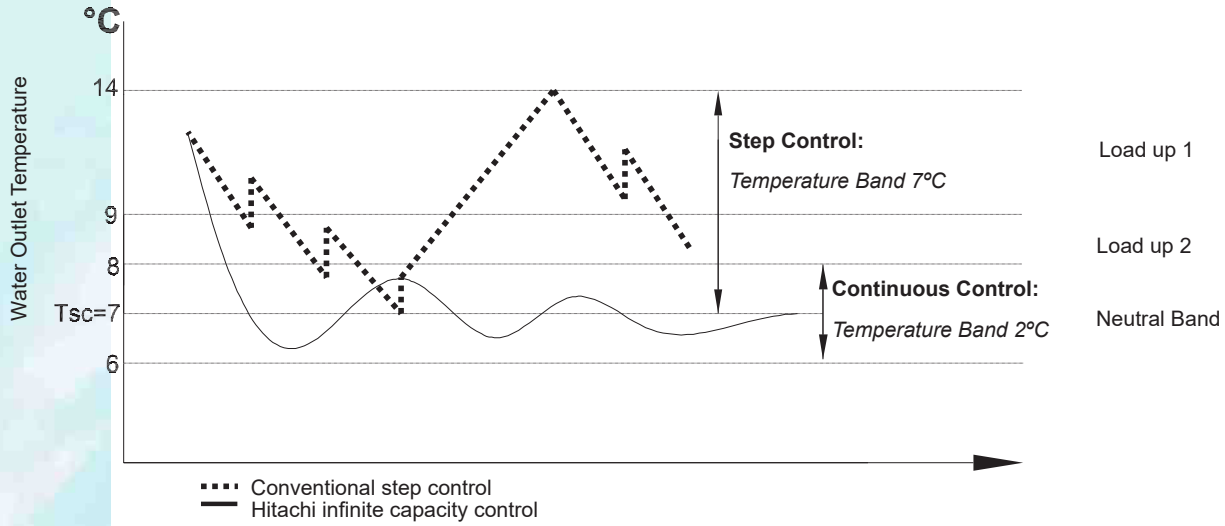
◆ Many functions

1 Water flow meter input.
2 Additional thermo-off by water inlet.
3 Leak detector input.
4 Power demand input (limitation of the total unit current).
5 Periodic Pump operation, with 2 different modes: Mode I, used mainly for systems composed of 1 chiller unit, or those with fixed flow (single pump) & Mode II, used mainly for systems containing multiple chiller units, or those with variable flow.
6 Water set point by 4-20 mA input.
7 Alarm Log
   a. Up to 10 alarms are registered.
   b. Operation details are stored from the last 3 alarms:
      i. At the moment of the alarm.
      ii. 10 seconds before the alarm.
      iii. 20 seconds before the alarm.
8 Caution Log
9 Chiller module with Caution status can keep running in operation.
10 Up to 10 cautions are registered.
11 230 V output, to connect computer, light, etc. to the unit.

◆ Precise temperature control

Combinations of “Infinite capacity control compressor” and “Hitachi’s unique electronic controls” enable the Chiller to control outlet water temperature precisely, independent of cooling load.

This control benefits not only Air-conditioning but also industrial process use.



2.10 LCD touch panel

Each Hitachi module of RCME-CLH1 series is equipped with a user-friendly colour touch panel which allows:

a. Visualize the unit parameters like unit status, cycle temperatures and pressures, compressor running hours, alarm codes and descriptions, etc…

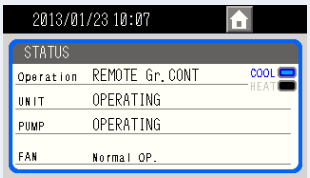
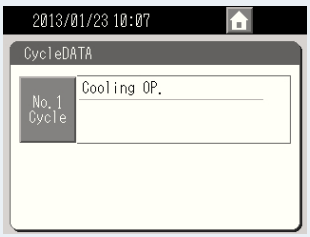
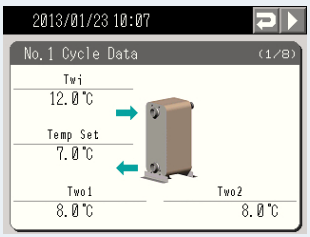
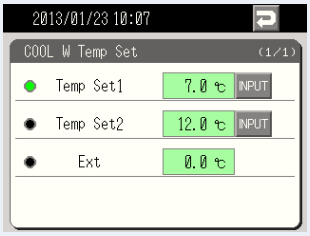
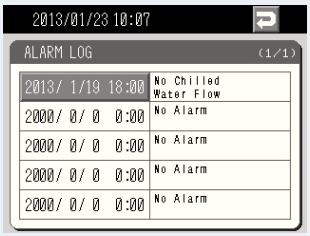
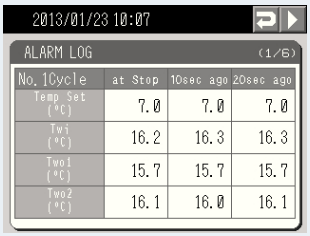
b. Set the unit configuration: water outlet temperature, high efficiency mode, etc… for adapting the unit to each specific application and thus optimizing the performance of the unit.

◆ Main specifications

- 3.5” display size
- TFT display type
- 320 x 240 pixels (QVGA)
- 65.536 colours
- 8-level brightness
- Available in several languages:
-



◆ Main functions

1 Display status of the unit, pump, alarm, warnings			
2 Display unit conditions: temperature, pressure, etc…		⇒	
3 Adjust settings using up/down arrow keys		⇒	
4 Display up to 10 recent alarms and store detailed condition for the last 3 ones		⇒	

2.11 R134a refrigerant

The unit will be charged with R134a refrigerant.

Main advantages against R407C:

- This refrigerant has no fractionation (change in composition of a refrigerant mixture by e.g. evaporation of the more volatile component(s) or condensation of the less volatile component(s)).
- Lower Global Warming Power (GWP):

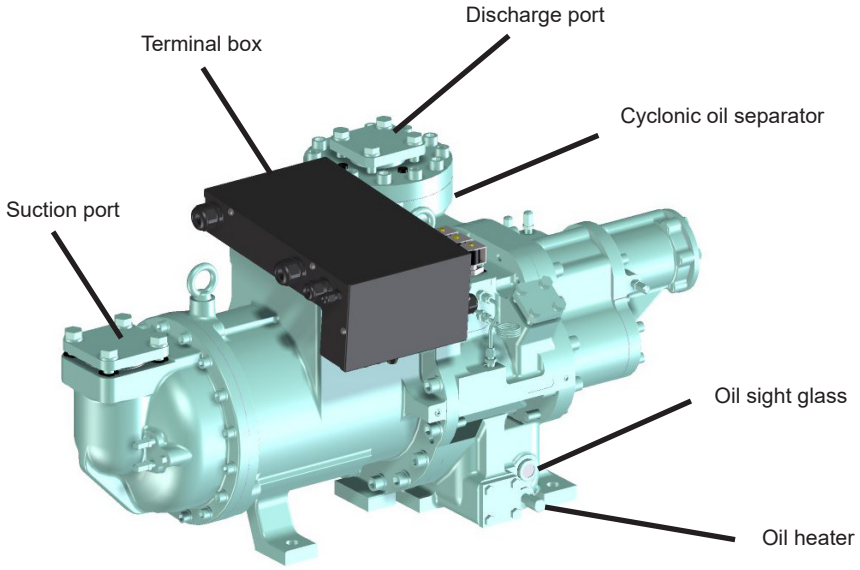
R410A	R407C	R134a
2088	1771	1430

2.12 New compressor

The Hitachi Samurai range incorporates a new twin screw compressor optimized for R134a refrigerant and the latest development of Hitachi's screw compressor technology with the Hitachi's infinite capacity control from 25% to 100%.

Thanks to this modulation the compressor load is always matching with the requested load, and thus accurate chilled water temperature is achieved without expensive inverter devices.

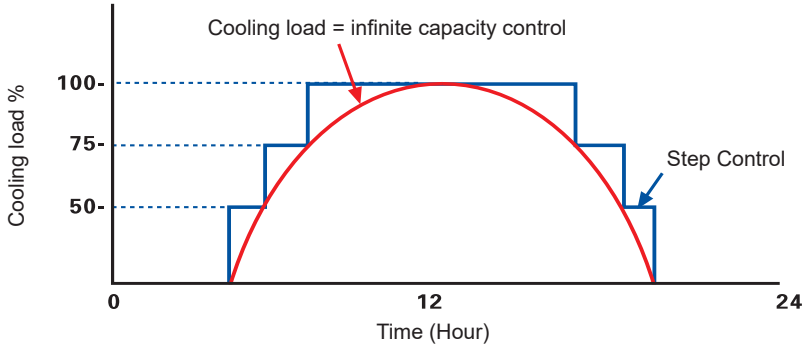
- Cyclonic oil separator to reduce oil carry over and increase efficiency
- The bearing has been improved and the recommended overhaul timing is now expanded from 24.000h to 40.000h.
- Additional oil port.
- New rotor
- Light casing



◆ Infinite capacity control

Hitachi´s Infinite Capacity Control system uses advanced electronic controls to position the infinitely variable slide valve within each compressor.

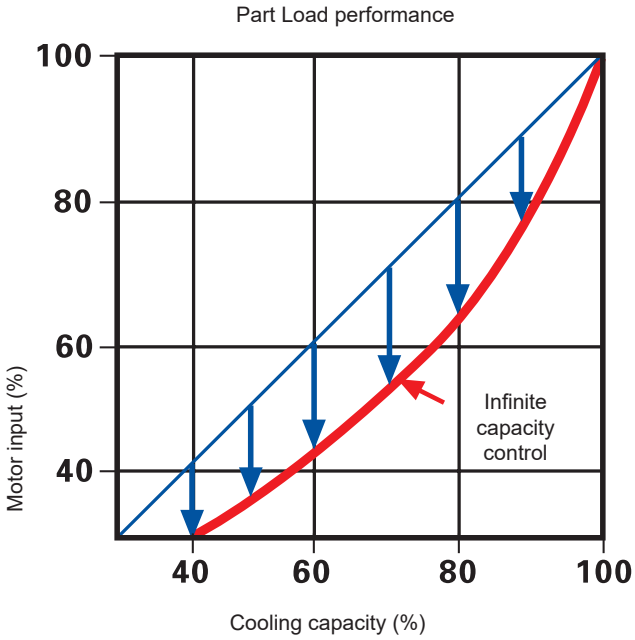
This modulation allows exact load control and accurate chilled water temperature without the need for expensive inverters.



◆ Energy Saving

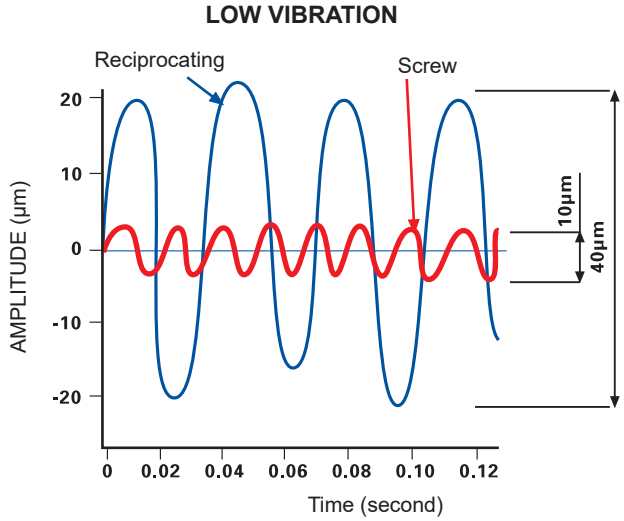
Thanks to infinite capacity control, 15~20% energy saving is possible compared with current step control systems due to the following:

- The cooling load can be more closely matched
- Infinite capacity control takes advantage of high efficiency part load performance.
- Frequent compressor starts and stops are eliminated.

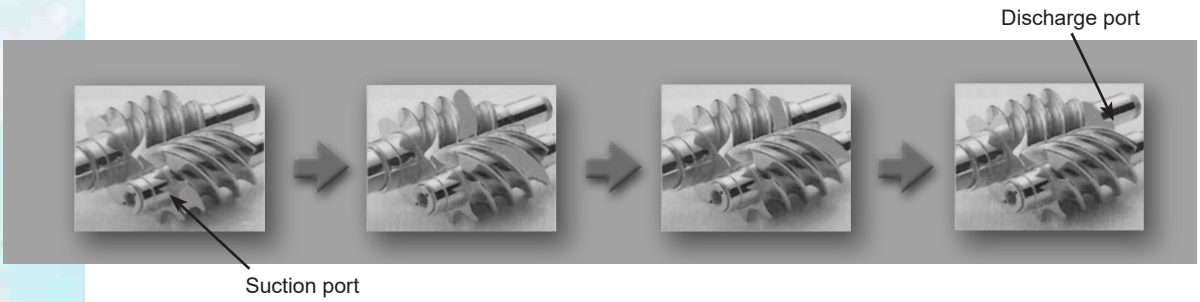


◆ Twin screw compressor

By having so few moving parts, it has become highly reliable with very low noise level and low vibration.



◆ Principle of compression

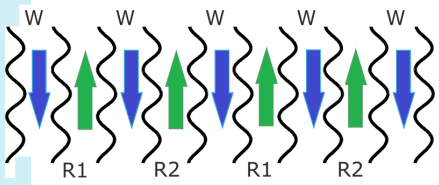


2.13 New true dual brazed plate heat exchangers

The new RCME-CLH1 series is designed with a cooler brazed plate heat exchanger "true dual type" system, which have 2 refrigerant inlets to improve the distribution of the gas/liquid mixture inside the evaporator.

Highly efficient and very compact solution for cooling systems, allowing an accurate control of evaporation temperature.

Cross-section view of the channels inside a True Dual Type.



W: Water

Refrigerant lines are separated in two lines (R1 and R2) for each module.

- R1: Refrigerant circuit 1
- R2: Refrigerant circuit 2

Additionally the pressure drop is reduced significantly. Low pressure drop on the water side, low pump input power, giving improved ESEER and EER figures.

Made of stainless steel AISI316 for higher corrosion resistance.

Easier disassemble thanks to flange connections on refrigerant side and screw couplings on water side.



2.14 Double electronic expansion valve

The electronic expansion valve provides reduced power consumption compared to the classical system of thermostatic expansion valve types, and combined with sophisticated control it offers an accurate adjustment of the refrigerant circuit at any condition.

The double electronic expansion valves system ensures equal distribution to both inlets of the plate heat exchanger.

New RCME-CLH1 chiller are designed with an improved expansion valve with higher torque coil for better endurance and bigger precision due to the 5960 pulse (vs previous 656).

Hitachi furnishes electronic expansion valves as standard, whereas it is usually an optional extra in the case of competitors.



2.15 New filter drier

New RCME-CLH1 series use a Filter Drier with replaceable solid core. This system offers protection by filtering small dirt particles on the refrigerant circuit and adsorbing the moisture in the system.

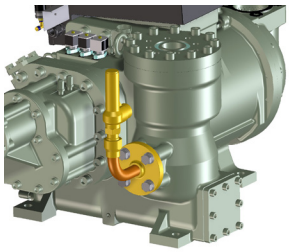
Also this system makes easier the maintenance of the unit (bolted assembly).



2.16 Compressor safety valve

With new series RCME-CLH1 chiller it is not necessary to request the option to get a safety element for the compressor.

Safety valve is assembled to the compressor as a standard feature

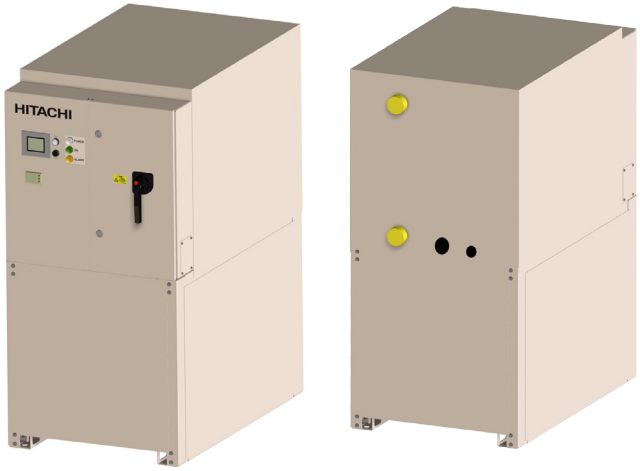


2.17 Options and accessories

2.17.1 Low noise

6dB(A) less compared to the standard unit, without any decrease in performance or operating range.

All the surface of the water chiller is covered with panels with special acoustic material to reduce the sound transmission as well as the sound absorption. (Except electrical box).



2.17.2 Super Low noise

Sandwich panels composed by an external plate, an internal plate with different diameter holes, and an insulation material between both plates. Thanks to the holes on the internal plates and the acoustic material inside, 16dB(A) of sound reduction is achieved.

2.17.3 Leak detection input signal (Standard)

When the unit receive the input signal indicating a leakage, the unit is stopped and refrigerant confined inside brazed plate heat exchangers

2.17.4 Power meter

Assembled at factory (inside electrical box).

With hour counter integrated.

Communication port protocol Modbus, RS 485 interface is available.

This device is used to visualize electrical data of the unit like:

- Power Consumption (active/reactive).
- Voltage (V) voltage phase to phase and phase to neutra
- Current (I), frequency (Hz), power factor, etc…
- Average, maximum and instant values.
- Hour counter integrated.
- etc…



2.17.5 High water outlet temperature option

The maximum water outlet temperature is increased from 15°C up to 25°C ~30°C .

The software will automatically change the superheat target aiming to decrease the suction pressure and optimise the performance.

The water pipe is changed from carbon steel to stainless steel to reduce pipes erosion. An additional 2 litres charge of oil is made to protect the compressor, especially under overload conditions.

2.17.6 Magnetic circuit breaker

Application of Thermal Magnetic Circuit Breaker (MCB) instead of Fuses to protect the Compressor motor.

MCB offers better magnetic protection as these devices are adjustable, as well as complementary thermal protection to the overcurrent relay.

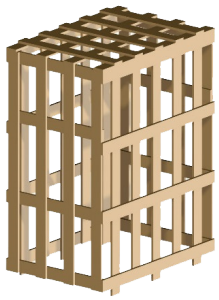
Thanks to this option, in case of some trouble, it is not necessary to change any part, just reset the MCB device and start the unit again (after to solve the problem).



2.17.7 Wooden Crate

Additional Wooden cage (not fully closed) to protect the unit during transportation.

Shipping dimensions slightly bigger.



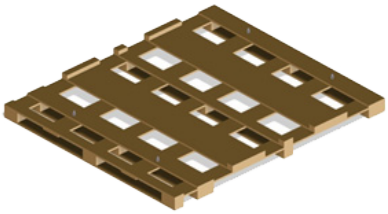
2.17.8 Wooden base as standard

Additional Wooden Base under the unit (130mm height).

Thanks to the Wooden Base it is possible to load/unload the whole unit using a fork lift.

NOTE

Wooden base is required when removal of the chiller unit from the transport vehicle by crane is not possible.



2.17.9 Compressor dual safety valve

Additional Safety Valve assembled to the compressor discharge chamber, together with a Changeover Valve that controls the two safety devices, and so arranged that only one can be made inoperative at any one time.

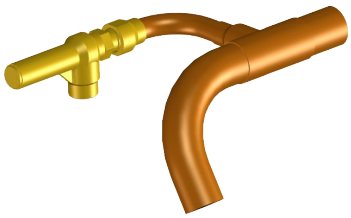
Thanks to this option one safety valve can be taken out (for servicing, repairing, etc…) without emptying the refrigerant circuit, while the other valve is enabled and therefore protecting the unit against high pressure condition.



2.17.10 Suction Safety valve

Additional Safety Valve assembled to the compressor suction line.

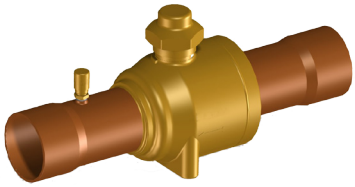
Extra protection to the low pressure side of the refrigerant circuit.



2.17.11 Discharge valve (standard) and suction valve

Assemble Shut-off valve on the compressor discharge and suction line, just after the Check Valve.

Thanks to this option the refrigerant cycle can be closed and compressor maintenance made easier.



2.17.12 Water cooler heater

This option includes an electric heater installed around the Plate Heat Exchanger to heat up the internal water volume and protect them against freezing.

The heater is activated when the unit is stopped, and is protecting the Plate Heat Exchanger in case of low ambient temperatures as well as low water temperatures.



2.17.13 Stainless steel water pipe

Application of stainless steel to the water piping of the unit instead of using carbon steel pipes.

Corrosion of the water pipes will be considerably reduced.

Less potential erosion of the pipes due to the greater hardness of the stainless steel against carbon steel.



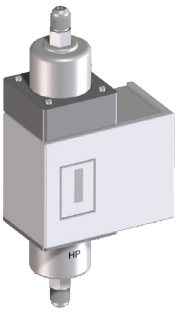


2.17.14 Differential water pressure switch

The differential pressure Switch is a safety device used to avoid the chiller running when the system water flow is insufficient, and therefore avoid water freezing inside the Plate Heat Exchanger.

It measures the water pressure difference between water inlet and water outlet.

Thanks to this device, the unit can be protected under several conditions like pump stopped or locked, pipe clogging, dirty Plate Heat Exchanger, etc…



2.17.15 Water pressure port

Additional pressure port on both water inlet and water outlet.

It facilitates easy on site rough measurement and evaluation of the pressure drop across the PHE to ensure it is not experiencing restricted flow rate due to contamination and clogging.





2.17.16 Brine

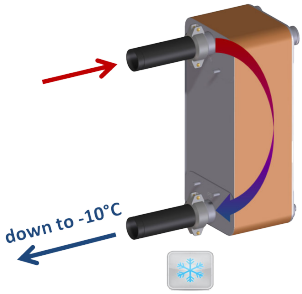
The minimum Chiller water outlet temperature is decreased from +5ºC down to -10ºC.

3 different categories, depending on the minimum chilled water outlet temperature requested:

1) Brine (Low1): from +5ºC down to 0ºC

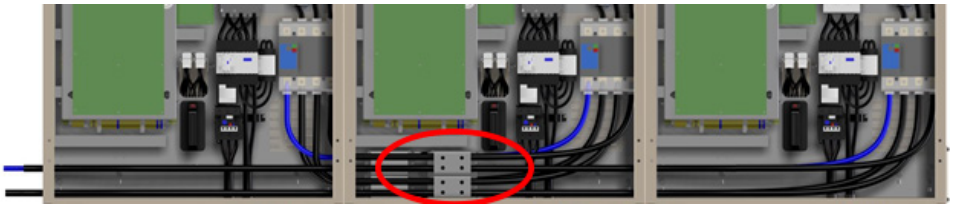
2) Brine (Low2): from 0ºC down to -5ºC

3) Brine (Low3): from -5ºC down to -10ºC



2.17.17 Kit for power cable routing

Kit of for electrical power connections for simplifying the electrical connections module-to-module (Maximum 3 modules).



2.17.18 LCD Language

The LCD used for setting and monitoring the chiller parameters accepts 3 differents languages. The standard unit has embedded the 3 following languages: English, French, Spanish.

The one set as default from factory is ENGLISH.

In case of interest in having other languages, the following packs are offered:

Option Pack 1 ENG/RUS/FIN (LP1): English, Russian, Finnish

Option Pack 2 ENG/GER/HUN (LP2): English, German, Hungarian

Option Pack 3 ENG/DUT/POL (LP3): English, Dutch, Polish

Option Pack 4 ENG/IT/GRE (LP4): English, Italian, Greek.



2.17.19 Water PN16

Increase the maximum working pressure at water side from 10 to 16bar.

Typical applications: process cooling in high pressure chemical plants, air conditioning in tall buildings, etc…



2.17.20 Witness test

Possibility for the customer to attend a real performance test on their unit at the factory where the unit is manufactured.



2.17.21 Water flow switch

The Water Flow Switch is a safety device used to avoid the chiller running when the system water flow is insufficient or stopped, and therefore avoid water freezing inside the Plate Heat Exchanger.

Thanks to this device, the unit can be protected under several conditions like pump stopped or locked, pipe clogging, dirty Plate Heat Exchanger, and so on.

It shall be installed at site at the water pipe of the customer (either inlet or outlet pipe).

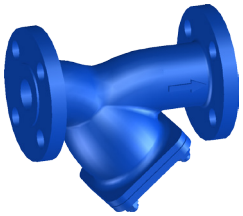


2.17.22 Water strainer

Units equipped with Plate Heat Exchangers are very sensitive to clogging and consequently could potentially freeze and be permanently damaged unless special care is taken.

The Water Strainer is a safety device used to protect the Plate Heat Exchanger against dirty water.

It shall be installed on site at the inlet water pipe of the system.



2.17.23 Common water pipe

The Common Water Pipe collects water from each module (2 modules for the 8E500030, and 3 modules for the 8E500031), providing a single water inlet and outlet connections.

Thanks to this accessory the water distribution is equal to each module, avoiding bad water distribution that could cause unit malfunction.

The maximum allowable pressure is 16bar.



2.17.24 Antivibration rubber mat

The Antivibration Rubber Mat is a set of 2 pieces of rubber used to reduce the transmission of the unit vibrations to the ground.

Thanks to this accessory, the vibration isolation grade achieved will be between 70% and 85%, depending on the model.

It shall be installed at site between the base of the unit and the ground.



2.17.25 Antivibration spring system

The Antivibration Spring System is used to reduce the transmission of the unit vibrations to the ground.

Thanks to this accessory, the vibration isolation grade achieved will be 95%.

It shall be installed at site between the base of the unit and the ground.



2.17.26 Water flange connection

The Water Flange Connection (2" 1/2) is a set of 4 steel flanges that converts the standard water pipe connection type (both Victaulic type and welded type) into flange connection.

It shall be installed at site on both the unit water pipes and customer water pipes (both inlet and outlet pipes).

The maximum allowable pressure is 16bar.



2.17.27 Modbus BMS gateway

This device is used to integrate the chiller units in a building management system (BMS) using MODBUS communication protocol.

Possible to manage:

• Switch unit ON/OFF

• Fix setting temperature

• Select cooling/heating

• Several units data monitoring



2.17.28 Bacnet BMS gateway

This device is used to integrate the chiller units in a building management system (BMS) using BACNET communication protocol.

Possible to manage:

• Switch unit ON/OFF

• Fix setting temperature

• Select cooling/heating

• Several units data monitoring



3. General data

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3.1 General Data

3.1.1 General notes for RCME-CLH1

The following considerations are identified in the General Data tables by their corresponding number:

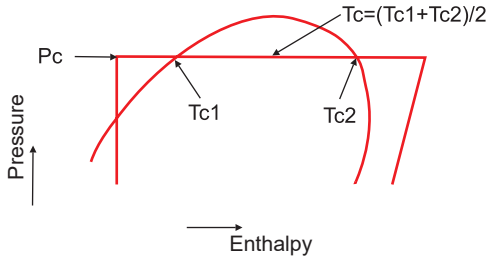
- *(1) Data is based on the following conditions:*

  Pump input not included

  In cooling operation

  Chilled Water Inlet / Outlet Temperature: 12 / 7ºC.

  Condensing Temperature (Tc): 45ºC.
- *(2) Low water temperature option requires Brine (antifreeze mixture of ethylene glycol type or propylene glycol type)..*
- *(3) Condensing temperature calculation:*



- *All Sound Pressure Level data are measured at 10 m from the unit.*

3.1.2 Hitachi Air-Cooled Water Chiller units RCME-(40-60)CLH1

Model			RCME-40CLH1	RCME-50CLH1	RCME-60CLH1
Electrical power supply		-	3N~ 400V 50Hz		
Cooling Capacity (1)		kW	135	175	215
Total Input power (1)		kW	32.0	41.8	52.4
EER (1)		-	4.22	4.19	4.10
Outer dimension	Height	mm	1681		
	Width	mm	806		
	Depth	mm	1271		
Cabinet colour		-	Natural Grey (Textured)		
Shipping weight		kg	750	810	875
Operating weight		kg	765	835	900
Compressor	Type	-	Hitachi Semi-Hermetic Twin Screw		
	Model	-	G40ASF-Z	G50ASF-Z	G60ASF-Z
	Quantity	-	1		
	Oil Heater	W	150		
	Capacity control	-	Infinite Capacity Control		
	Working range	%	25~100		
Evaporator heat exchanger		-	Brazed Plate Heat Exchanger		
Condenser heat exchanger		-	Remote (field supplied)		
Refrigerant	Type	-	R134a		
	Quantity	kg	(Factory charged) 1		
Flow control		-	Twin Electronic Expansion Valve per Circuit		
Number of circuits		-	1		
Nominal water flow		m^3/h	23.2	30.1	37.0
Water pressure drop		kPa	18.7	20.4	18.9
Permissible water pressure max.		MPa	1.0		
Water flow range	Min.	m^3/h	14.5	18.8	23.1
	Max.	m^3/h	50.5	65.4	80.4
Minimum internal system water volume		m^3	0.49	0.63	0.78
Water pipe connection	Size and type	in	2.1/2” Victaulic		
	Quantity	-	1 × Inlet, 1 × Outlet		
Refrigerant pipe connection	Gas	in / mm	2 1/8" / 53.98 (Outer Diameter)		
	Liquid	in / mm	1 1/8" / 28.6 (Outer Diameter)		
Control system		-	Hitachi Micro-Processor Control		
Chilled water outlet temperature	Standard	ºC	+5 ~ +15		
	Low (option) (2)	ºC	-5 ~ +5		
	High (option)	ºC	-15 ~ +25		
Condensing Temperature (Tc) (3)		ºC	+30 ~ +60		
Sound power level		dB(A)	88	89	90
Sound pressure level		dB(A)	60	61	62
Ip rating		-	IP2X		

3.2 Sound Data

3.2.1 Sound Power

Model	Sound Power level (dB)								Overall (dBA)
	Frequency Band (Hz)								
	63	125	250	500	1000	2000	4000	8000	
RCME-40CLH1	77	74	72	88	83	77	67	61	88
RCME-50CLH1	78	75	73	89	84	78	68	62	89
RCME-60CLH1	79	76	74	90	85	79	69	63	90

Model	Low Noise Sound Power level (dB)								Overall (dBA)
	Frequency Band (Hz)								
	63	125	250	500	1000	2000	4000	8000	
RCME-40CLH1	82	75	70	82	78	71	60	55	82
RCME-50CLH1	83	76	71	83	79	72	61	56	83
RCME-60CLH1	84	77	72	84	80	73	62	57	84

Model	Super Low Noise Sound Power level (dB)								Overall (dBA)
	Frequency Band (Hz)								
	63	125	250	500	1000	2000	4000	8000	
RCME-40CLH1	88	73	63	72	68	58	46	41	72
RCME-50CLH1	89	74	64	73	69	59	47	42	73
RCME-60CLH1	90	75	65	74	70	60	48	43	74

3.2.2 Sound Pressure (Standard)

Model	Sound Pressure level at 1m (dB)								Overall (dBA)
	Frequency Band (Hz)								
	63	125	250	500	1000	2000	4000	8000	
RCME-40CLH1	64	61	59	75	70	64	54	48	75
RCME-50CLH1	65	62	60	76	71	65	55	49	76
RCME-60CLH1	66	63	61	77	72	66	56	50	77

Model	Sound Pressure level at 10m (dB)								Overall (dBA)
	Frequency Band (Hz)								
	63	125	250	500	1000	2000	4000	8000	
RCME-40CLH1	49	46	44	60	55	49	39	33	60
RCME-50CLH1	50	47	45	61	56	50	40	34	61
RCME-60CLH1	51	48	46	62	57	51	41	35	62

Model	Sound Pressure level at 30m (dB)								Overall (dBA)
	Frequency Band (Hz)								
	63	125	250	500	1000	2000	4000	8000	
RCME-40CLH1	39	36	35	50	46	39	29	24	50
RCME-50CLH1	40	37	36	51	47	40	30	25	51
RCME-60CLH1	41	38	37	52	48	41	31	26	52

NOTE

Sount data according to ISO 9614-1

3.3 Water Chillers options and accessories

3.3.1 Included as standard

Specifications		Remarks
Compressor	Oil Heater	150 W
	Cyclonic Oil Separator	
Control system	Current Limiter	
	Star-Delta starting	For compressors
	Main Isolator Switch	
	LCD touch panel	
	Local/Remote Changeover Switch	
	Individual Alarm	By Alarm Code
	Compressor Operation Hour Meter	Display on LCD
	Pressure Sensor (High and Low)	
	Pump freeze protection operation	Pump ON/OFF Operation
	Pump Operation Circuit	Pump ON/OFF Contact
	Non Voltage Contact for Remote indication	Pump, Operation, Alarm
	DC24V External Control	Level or pulse
	Short Period Power OFF Protection	
	Reverse phase protection	
	Power Failure Recover Control	
	2 Different Temperatures Setting	
	Remote Control switch (Field Supplied) socket	1~ 230V
	Electrical Power estimation	Display on LCD
	% of instantaneous load estimation	Display on LCD
	Power source terminals	1~ 230V
	Output ON/OFF signal for free cooling	
	Input Signal for Forcing Compressor Load	
Refrigerant cycle	Insulation on refrigerant pipes	Low pressure side
	Discharge valve	
	Compressor Safety Valve	
	Pressure Display (High and Low)	Display on Operation Panel (LCD)
	Leak Detection input signal	
Water system	10 bar Water Pressure	
Others	Wood Base	Only for single modules
	Numbered cables	

3.3.2 Options

NOTE

Options (on order) are factory built. They shall be ordered together with the Chiller unit.

Specifications		Remarks
General	Low Noise add-on	
	Super low noise	
Working range	High water outlet temperature	Outlet temperature: +15 ~ +25ºC (High1)
	Low water outlet temperature	Outlet temperature: 0 ~ -5ºC (Low1)
		Outlet temperature: -1 ~ -5ºC (Low2)
		Outlet temperature: -5 ~ -10ºC (Low3)
Control system	Compressor Magnetic Circuit Breaker Protector	
	Power meter	Optionally factory installed
Compressor	Suction Valve	
	Suction Safety Valve	
	Compressor Dual Safety Valve	
Water cooler	Water Cooler Heater	
Water system	Differential Water Pressure Switch	
	Stainless Steel Water Pipe	AISI 304. Included in “high Water Outlet Temperature” option
Others	Wooden Crate	
	Power cable routing (Kit for electrical power connections)	
	Witness Test	
	Water pressure port	
	LCD Language Pack 1	English, Russian, Finnish
	LCD Language Pack 2	English, German, Hungarian
	LCD Language Pack 3	English, Dutch, Polish
	LCD Language Pack 4	English, Italian, Greek

NOTE

Incompatibilities: Stainless Steel Water Pipe Option + Common Water Pipe Accessory.

3.3.3 Accessories

Description	Specifications	Code	Remarks: number of accessories
CHL-WFS-01	Water Flow Switch	8E500001	RCME-(40-70)CLH1: 1 per module With Common Water Pipe: 1 per group of modules
CHL-WST-01	Water Strainer 2.1/2"	8E500002	RCME-(40-70)CLH1: 1 per module With Common Water Pipe: 1 per group of modules
CHL-WST-04	Water Strainer 5”	8E500005	RCME-(40-70)CLH1: 1 Applies only to a group of 2 modules, and only if Common Water Pipe Accessory is also assembled
CHL-WST-05	Water Strainer 6”	8E500014	RCME-(40-70)CLH1: 1 Applies only to a group of 3 modules, and only if Common Water Pipe Accessory is also assembled
CHL-FLA-01	Water Flange Connection 2.1/2"	8E500011	RCME-(40-70)CLH1: 1 per module
CHL-CWP-05	Common Water Pipe	8E500030	RCME-(40-70)CLH1: 1 In case of connecting 2 modules
CHL-CWP-06	Common Water Pipe	8E500031	RCME-(40-70)CLH1: 1 In case of connecting 3 modules
CHL-AVR-02	Antivibration Rubber Mat	8E500041	RCME-(40-70)CLH1: 1 set per module
CHL-AVS-04	Antivibration Spring System	8E500029	RCME-(40-70)CLH1: 1 set per module
CHL-MBS-02	Modbus BMS Gateway	8E500021	RCME-(40-70)CLH1: 1 per Master unit
CHL-BAC-01	Bacnet BMS Gateway	8E500027	RCME-(40-70)CLH1: 1 per Master unit
CHL-PMM-04	Power Meter (200A)	8E500033	RCME-(40-70)CLH1: 1
CHL-PMM-05	Power Meter (400A)	8E500034	Depending on the maximum current of the system, when it is used a combination of modules
CHL-PMM-06	Power Meter (1000A)	8E500035	

NOTE

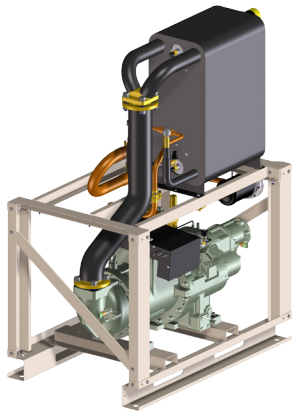
Accessories are field installed. They shall be ordered separately.

3.4 Components data

3.4.1 Compressor

Model			G40ASF-Z	G50ASF-Z	G60ASF-Z
Type			Hitachi semi-hermetic screw type		
	Revolution	rpm	2880		
	Displacement	m^3/h	211.7	272.0	340.1
	Capacity Control	%	25 ~ 100		
Pneumatic Pressure					
	High Side	MPa	2.02		
	Low Side	MPa	2.02		
Motor	Type		Special Squirrel Cage Three-Phase Motor		
	Starting Method		Star-Delta Starting		
	Nominal Output	kW	30	37	45
	Poles		2		
	Insulation		E		
Oil	Name		JX Nippon Oil & Energy, Ze-GLES RB 68		
	Charge	Litre	6		
Net Weight		kg	440	485	510

3.4.2 Brazed plate heat exchanger (Cooler)



			Water Cooler (evaporator) Brazed plate heat exchanger type		
			RCME-40CLH1	RCME-50CLH1	RCME-60CLH1
Dimensions	Height (H)	mm	694	694	694
	Width (W)	mm	304	304	304
	Depth (D)	mm	265	332	447
Maximum permissible pressure	Refrigerant side	MPa	2.7	2.7	2.7
	Water side	MPa	2.5	2.5	2.5
Internal volume	Refrigerant side	Litre	21.1	26.8	32.7
	Water side	Litre	22.3	28.2	34.0
Material			AISI316		
Net weight (without water)			83.2	101.4	132.6

3.5 Electrical Data

NOTE

1 *This data is based on the following conditions:*
Chilled Water Inlet/Outlet Temperature: 12/7ºC. Condensing temperature : 45ºC.

2 *The "Maximum Unit Current" shown in the above table is the maximum total unit running current at the following conditions: Supply Voltage: 90% of the rated voltage. Unit Capacity: 100% at max. operating conditions.*

3 *The power supply cables must be sized to cover this maximum current value.*

4 *Compressor motor is star-delta starting.*

◆ Factory built

Model	Unit main power			Applicable instantaneous voltage (V)		Rated conditions				Maximum unit (for power supply installation sizing)	
						Compressor motor					
							Cooling			Current	IPT
	Ph	(V)	(Hz)	Max	Min	STC (A)	RNC (A)	MC (A)	IPT (kW)	(A)	(kW)
RCME-40CLH1	3N~	400	50	440	360	179	54.3	72.7	32.0	72.7	42.8
RCME-50CLH1	3N~	400	50	440	360	240	69.3	92.7	41.8	92.7	55.9
RCME-60CLH1	3N~	400	50	440	360	240	86.9	116	52.4	116	70.0

STC: Starting Current (A) RNC: Running Current (A) MC: Maximum Current IPT: Input (kW) Ph: Number of phases

4. Model selection

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4.1 Performance table (standard cooling operation at full load)

(Pump not included)

NOTE

- *Pump not included*
- *The following abbreviation are used in the performance tables for cooling operation:*

CT: Condensing Temperature (ºC)
COT: Chilled Water outlet Temperature (ºC)
CAP: Cooling Capacity (kW)
CFR: Chilled Water Flow Rate at ΔT 5ºC (m^3/h)
CPD: Water Cooler Pressure Drop (kPa)
HRJ: Heat Rejection (kW)
IPT: Compressor Input power (kW)

1kW= 860 kcal/h
1kW=3412 Btu/h
1kPa=0.102 mAq

◆ Calculation example for multiple combination

For multiple module combinations, use the data combining individual module data to provide the final chiller performance.

3 modules combination example (at CT: 45ºC / COT 10ºC)

Combination	CAP	CFR	CPD	HRJ	IPT
RCME-40CLH1	145.5	25.0	21.4	178,3	32,9
RCME-40CLH1	145.5	25.0	21.4	178,3	32,9
RCME-50CLH1	188,6	32,4	23,4	231,5	42,9
	145.5 + 145.5 + 188.6 =	25.0 + 25.0 + 32.4 =	(21.4 + 21.4 + 23.4) / 3	178.3 + 178.3 + 231.5 =	32.9 + 32.9 + 42.9 =
Final performance	**479.6**	**82.4**	**22.07**	**588.1**	**108.7**

5 modules combination example (at CT: 35ºC / COT 10ºC)

Combination	CAP	CFR	CPD	HRJ	IPT
RCME-50CLH1	207.0	35.6	27.8	242.8	35.8
RCME-50CLH1	207.0	35.6	27.8	242.8	35.8
RCME-50CLH1	207.0	35.6	27.8	242.8	35.8
RCME-60CLH1	254.3	43.7	25.8	299.2	44.8
RCME-60CLH1	254.3	43.7	25.8	299.2	44.8
	207.0 + 207.0 + 207.0 + 254.3 + 254.3 =	35.6 + 35.6 + 35.6 + 43.7 + 43.7 =	(27.8 + 27.8 + 27.8 + 25.8 + 25.8) / 5 =	242.8 + 242.8 + 242.8 + 299.2 + 299.2 =	35.8 + 35.8 + 35.8 + 44.8 + 44.8 =
Final performance	**1129.6**	**194.2**	**27.0**	**1326.8**	**197.0**

Performance table (standard cooling operation at full load) (Pump not included)

CT	COT	RCME-40CLH1					RCME-50CLH1					RCME-60CLH1				
		CAP	CFR	CPD	HRJ	IPT	CAP	CFR	CPD	HRJ	IPT	CAP	CFR	CPD	HRJ	IPT
30	5	147,5	25,4	22,0	170,9	23,4	191,2	32,9	24,0	221,8	30,6	234,9	40,4	22,3	273,3	38,4
	6	151,4	26,0	23,0	175,0	23,7	196,2	33,8	25,2	227,1	30,9	241,1	41,5	23,4	279,8	38,8
	7	155,2	26,7	24,1	179,2	23,9	201,2	34,6	26,4	232,5	31,2	247,2	42,5	24,5	286,4	39,2
	8	159,1	27,4	25,2	183,3	24,2	206,2	35,5	27,6	237,8	31,6	253,4	43,6	25,6	292,9	39,6
	9	163,0	28,0	26,4	187,4	24,4	211,2	36,3	28,9	243,1	31,9	259,5	44,6	26,8	299,5	40,0
	10	166,8	28,7	27,5	191,5	24,6	216,3	37,2	30,1	248,4	32,2	265,7	45,7	28,0	306,0	40,4
	11	170,7	29,4	28,7	195,6	24,9	221,3	38,1	31,4	253,8	32,5	271,8	46,8	29,2	312,6	40,8
	12	174,6	30,0	29,9	199,7	25,1	226,3	38,9	32,8	259,1	32,8	278,0	47,8	30,4	319,1	41,2
	13	178,4	30,7	31,1	203,8	25,4	231,3	39,8	34,1	264,4	33,2	284,1	48,9	31,7	325,7	41,6
	14	182,3	31,4	32,4	207,9	25,6	236,3	40,6	35,5	269,8	33,5	290,3	49,9	33,0	332,3	42,0
	15	186,1	32,0	33,7	212,0	25,9	241,3	41,5	36,9	275,1	33,8	296,4	51,0	34,3	338,8	42,4
35	5	141,0	24,3	20,2	167,1	26,1	182,8	31,4	22,1	216,9	34,1	224,6	38,6	20,5	267,3	42,7
	6	144,8	24,9	21,2	171,1	26,4	187,6	32,3	23,2	222,1	34,4	230,5	39,7	21,5	273,7	43,1
	7	148,5	25,5	22,2	175,1	26,6	192,5	33,1	24,3	227,2	34,8	236,5	40,7	22,5	280,1	43,6
	8	152,2	26,2	23,3	179,1	26,9	197,3	33,9	25,5	232,4	35,1	242,4	41,7	23,6	286,4	44,0
	9	156,0	26,8	24,3	183,1	27,1	202,2	34,8	26,6	237,6	35,4	248,4	42,7	24,7	292,8	44,4
	10	159,7	27,5	25,4	187,1	27,4	207,0	35,6	27,8	242,8	35,8	254,3	43,7	25,8	299,2	44,8
	11	163,4	28,1	26,5	191,1	27,6	211,9	36,4	29,0	248,0	36,1	260,3	44,8	26,9	305,6	45,3
	12	167,2	28,8	27,6	195,1	27,9	216,7	37,3	30,3	253,2	36,5	266,2	45,8	28,1	311,9	45,7
	13	170,9	29,4	28,8	199,1	28,2	221,6	38,1	31,5	258,4	36,8	272,2	46,8	29,3	318,3	46,1
	14	174,7	30,0	29,9	203,1	28,4	226,4	38,9	32,8	263,5	37,1	278,2	47,8	30,5	324,7	46,5
	15	178,4	30,7	31,1	207,1	28,7	231,3	39,8	34,1	268,7	37,5	284,1	48,9	31,7	331,1	47,0
40	5	134,5	23,1	18,5	163,3	28,8	174,4	30,0	20,3	211,9	37,6	214,2	36,8	18,8	261,3	47,1
	6	138,1	23,8	19,5	167,2	29,0	179,1	30,8	21,3	217,0	37,9	220,0	37,8	19,7	267,5	47,5
	7	141,7	24,4	20,4	171,1	29,3	183,7	31,6	22,3	222,0	38,3	225,7	38,8	20,7	273,7	48,0
	8	145,4	25,0	21,4	174,9	29,6	188,4	32,4	23,4	227,1	38,6	231,5	39,8	21,7	279,9	48,4
	9	149,0	25,6	22,4	178,8	29,9	193,1	33,2	24,5	232,1	39,0	237,3	40,8	22,7	286,1	48,9
	10	152,6	26,2	23,4	182,7	30,1	197,8	34,0	25,6	237,2	39,4	243,0	41,8	23,7	292,3	49,3
	11	156,2	26,9	24,4	186,6	30,4	202,5	34,8	26,7	242,2	39,7	248,8	42,8	24,8	298,5	49,8
	12	159,8	27,5	25,4	190,5	30,7	207,2	35,6	27,9	247,2	40,1	254,5	43,8	25,8	304,7	50,2
	13	163,4	28,1	26,5	194,4	31,0	211,8	36,4	29,0	252,3	40,4	260,3	44,8	26,9	311,0	50,7
	14	167,0	28,7	27,6	198,3	31,2	216,5	37,2	30,2	257,3	40,8	266,0	45,8	28,0	317,2	51,1
	15	170,6	29,4	28,7	202,2	31,5	221,2	38,0	31,4	262,4	41,2	271,8	46,7	29,2	323,4	51,6
45	5	128,0	22,0	16,9	159,4	31,4	166,0	28,5	18,5	207,0	41,0	203,9	35,1	17,1	255,3	51,5
	6	131,5	22,6	17,8	163,2	31,7	170,5	29,3	19,5	211,9	41,4	209,4	36,0	18,0	261,4	51,9
	7	135,0	23,2	18,7	167,0	32,0	175,0	30,1	20,4	216,8	41,8	215,0	37,0	18,9	267,4	52,4
	8	138,5	23,8	19,6	170,8	32,3	179,5	30,9	21,4	221,7	42,2	220,6	37,9	19,8	273,4	52,9
	9	142,0	24,4	20,5	174,6	32,6	184,0	31,7	22,4	226,6	42,6	226,1	38,9	20,7	279,5	53,3
	10	145,5	25,0	21,4	178,3	32,9	188,6	32,4	23,4	231,5	42,9	231,7	39,8	21,7	285,5	53,8
	11	149,0	25,6	22,4	182,1	33,2	193,1	33,2	24,5	236,4	43,3	237,2	40,8	22,7	291,5	54,3
	12	152,4	26,2	23,3	185,9	33,5	197,6	34,0	25,5	241,3	43,7	242,8	41,8	23,7	297,5	54,8
	13	155,9	26,8	24,3	189,7	33,7	202,1	34,8	26,6	246,2	44,1	248,3	42,7	24,7	303,6	55,2
	14	159,4	27,4	25,3	193,4	34,0	206,7	35,5	27,7	251,1	44,5	253,9	43,7	25,7	309,6	55,7
	15	162,9	28,0	26,4	197,2	34,3	211,2	36,3	28,9	256,0	44,8	259,4	44,6	26,8	315,6	56,2
50	5	121,5	20,9	15,4	155,6	34,1	157,5	27,1	16,8	202,1	44,5	193,5	33,3	15,5	249,4	55,8
	6	124,9	21,5	16,2	159,3	34,4	161,9	27,8	17,7	206,8	44,9	198,9	34,2	16,4	255,2	56,3
	7	128,3	22,1	17,0	163,0	34,7	166,3	28,6	18,6	211,6	45,3	204,3	35,1	17,2	261,1	56,8
	8	131,6	22,6	17,8	166,6	35,0	170,6	29,3	19,5	216,3	45,7	209,6	36,1	18,0	266,9	57,3
	9	135,0	23,2	18,7	170,3	35,3	175,0	30,1	20,4	221,1	46,1	215,0	37,0	18,9	272,8	57,8
	10	138,3	23,8	19,5	174,0	35,6	179,3	30,8	21,4	225,9	46,5	220,3	37,9	19,8	278,6	58,3
	11	141,7	24,4	20,4	177,6	35,9	183,7	31,6	22,3	230,6	46,9	225,7	38,8	20,7	284,5	58,8
	12	145,1	25,0	21,3	181,3	36,2	188,1	32,3	23,3	235,4	47,3	231,0	39,7	21,6	290,4	59,3
	13	148,4	25,5	22,2	185,0	36,5	192,4	33,1	24,3	240,1	47,7	236,4	40,7	22,5	296,2	59,8
	14	151,8	26,1	23,1	188,6	36,8	196,8	33,8	25,3	244,9	48,1	241,7	41,6	23,5	302,1	60,3
	15	155,2	26,7	24,1	192,3	37,1	201,1	34,6	26,4	249,6	48,5	247,1	42,5	24,5	307,9	60,8
55	5	115,0	19,8	13,9	151,8	36,7	149,1	25,6	15,2	197,1	48,0	183,2	31,5	14,0	243,4	60,2
	6	118,3	20,3	14,6	155,3	37,1	153,3	26,4	16,0	201,7	48,4	188,4	32,4	14,8	249,1	60,7
	7	121,5	20,9	15,4	158,9	37,4	157,5	27,1	16,8	206,4	48,8	193,5	33,3	15,5	254,7	61,2
	8	124,7	21,5	16,1	162,5	37,7	161,7	27,8	17,7	211,0	49,3	198,7	34,2	16,3	260,4	61,8
	9	128,0	22,0	16,9	166,0	38,0	165,9	28,5	18,5	215,6	49,7	203,8	35,1	17,1	266,1	62,3
	10	131,2	22,6	17,7	169,6	38,4	170,1	29,3	19,4	220,2	50,1	209,0	35,9	17,9	271,8	62,8
	11	134,5	23,1	18,5	173,1	38,7	174,3	30,0	20,3	224,8	50,5	214,1	36,8	18,8	277,5	63,3
	12	137,7	23,7	19,4	176,7	39,0	178,5	30,7	21,2	229,4	50,9	219,3	37,7	19,6	283,2	63,9
	13	140,9	24,2	20,2	180,3	39,3	182,7	31,4	22,1	234,1	51,4	224,5	38,6	20,5	288,8	64,4
	14	144,2	24,8	21,1	183,8	39,6	186,9	32,1	23,0	238,7	51,8	229,6	39,5	21,3	294,5	64,9
	15	147,4	25,4	21,9	187,4	40,0	191,1	32,9	24,0	243,3	52,2	234,8	40,4	22,2	300,2	65,4
60	5	108,5	18,7	12,5	148,0	39,4	140,7	24,2	13,7	192,2	51,5	172,9	29,7	12,6	237,4	64,5
	6	111,7	19,2	13,2	151,4	39,7	144,7	24,9	14,4	196,7	51,9	177,8	30,6	13,3	242,9	65,1
	7	114,8	19,7	13,9	154,9	40,1	148,8	25,6	15,2	201,1	52,4	182,8	31,4	14,0	248,4	65,6
	8	117,9	20,3	14,6	158,3	40,4	152,8	26,3	15,9	205,6	52,8	187,7	32,3	14,7	253,9	66,2
	9	121,0	20,8	15,3	161,7	40,8	156,8	27,0	16,7	210,1	53,2	192,7	33,1	15,4	259,4	66,7
	10	124,1	21,3	16,0	165,2	41,1	160,9	27,7	17,5	214,6	53,7	197,6	34,0	16,2	264,9	67,3
	11	127,2	21,9	16,7	168,6	41,4	164,9	28,4	18,3	219,0	54,1	202,6	34,8	16,9	270,4	67,8
	12	130,3	22,4	17,5	172,1	41,8	168,9	29,1	19,1	223,5	54,6	207,6	35,7	17,7	276,0	68,4
	13	133,4	23,0	18,3	175,5	42,1	173,0	29,8	20,0	228,0	55,0	212,5	36,6	18,5	281,5	68,9
	14	136,6	23,5	19,1	179,0	42,4	177,0	30,4	20,9	232,4	55,4	217,5	37,4	19,3	287,0	69,5
	15	139,7	24,0	19,9	182,4	42,8	181,1	31,1	21,7	236,9	55,9	222,4	38,3	20,1	292,5	70,0

4.1.1 Cooling capacity tables at partial load (cooling operation)

◆ RCME-40CLH1

Condensing temperature (°C)	Performance	Compressor load 25-99%								Full load		
60	Capacity	25	30	40	50	60	70	75	80	85	-	
	Input	82	81	83	87	92	99	102	109	125	-	
	EER	31	37	48	58	65	71	73	73	68	-	
55	Capacity	25	30	40	50	60	70	75	80	90	-	
	Input	69	69	72	76	82	89	94	100	117	-	
	EER	36	43	55	65	73	78	80	80	77	-	
50	Capacity	25	30	40	50	60	70	75	80	90	95	
	Input	57	58	62	67	73	80	83	88	99	108	
	EER	44	51	64	75	83	88	90	91	91	88	
45	Capacity	25	30	40	50	60	70	75	80	90	100	
	Input	46	47	51	55	60	67	71	75	86	100	
	EER	54	63	79	91	100	105	106	107	105	100	
40	Capacity	25	30	40	50	60	70	75	80	90	100	105
	Input	36	39	45	50	57	64	67	72	82	94	92
	EER	70	77	90	99	106	110	111	112	110	106	115
35	Capacity	25	30	40	50	60	70	75	80	90	100	110
	Input	29	32	37	42	48	54	57	61	68	76	83
	EER	85	94	107	118	126	131	132	132	132	131	132
30	Capacity	25	30	40	50	60	70	75	80	90	100	115
	Input	20	22	27	31	35	41	44	48	56	63	75
	EER	123	134	150	162	169	171	170	167	162	158	154

◆ RCME-50CLH1

Condensing temperature (°C)	Performance	Compressor load 25-99%								Full load		
60	Capacity	25	30	40	50	60	70	75	80	85	-	
	Input	73	74	76	80	86	94	99	107	125	-	
	EER	34	41	53	62	70	74	76	75	68	-	
55	Capacity	25	30	40	50	60	70	75	80	90	-	
	Input	63	64	67	71	77	85	89	95	117	-	
	EER	40	47	60	70	78	82	84	84	77	-	
50	Capacity	25	30	40	50	60	70	75	80	90	95	
	Input	52	54	58	63	68	76	80	85	97	108	
	EER	48	55	69	80	88	92	94	94	93	88	
45	Capacity	25	30	40	50	60	70	75	80	90	100	
	Input	44	45	49	54	59	66	70	75	86	100	
	EER	57	66	81	93	101	106	107	107	105	100	
40	Capacity	25	30	40	50	60	70	75	80	90	100	105
	Input	34	37	42	48	53	60	64	68	78	91	92
	EER	73	81	95	105	112	116	117	117	115	110	115
35	Capacity	25	30	40	50	60	70	75	80	90	100	110
	Input	27	29	33	37	42	48	51	55	64	74	83
	EER	93	104	122	135	143	147	147	145	140	135	132
30	Capacity	25	30	40	50	60	70	75	80	90	100	115
	Input	21	23	27	32	36	42	45	48	56	63	75
	EER	122	131	147	158	165	167	167	165	162	158	154

◆ RCME-60CLH1

Condensing temperature (°C)	Performance	Compressor load 25-99%								Full load	
60	Capacity	25	30	40	50	60	70	75	80	85	-
	Input	73	73	75	79	84	92	97	107	125	-
	EER	34	41	54	63	71	76	77	75	68	-
55	Capacity	25	30	40	50	60	70	75	80	90	-
	Input	62	63	65	70	76	83	88	94	117	-
	EER	41	48	61	72	79	84	85	85	77	-
50	Capacity	25	30	40	50	60	70	75	80	90	95
	Input	52	53	57	61	67	74	78	83	95	108
	EER	48	56	71	82	90	94	96	96	94	88
45	Capacity	25	30	40	50	60	70	75	80	90	100
	Input	43	44	48	53	58	65	69	74	85	100
	EER	58	68	83	95	103	108	109	109	106	100
40	Capacity	25	30	40	50	60	70	75	80	90	100	105
	Input	34	36	41	46	52	58	62	66	75	88	92
	EER	74	83	97	109	116	121	122	122	119	114	115
35	Capacity	25	30	40	50	60	70	75	80	90	100	110
	Input	26	28	32	37	41	47	51	55	64	74	83
	EER	96	107	124	137	145	148	148	147	141	136	132
30	Capacity	25	30	40	50	60	70	75	80	90	100	115
	Input	20	22	26	31	35	41	44	47	55	63	75
	EER	126	135	152	163	170	173	172	170	165	159	154

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NOTE

1 The previous table shows the % of the amount of reduction or increase in capacity, input and EER from a reference 100% value.

Capacity (%)	100
Input (%)	100
EER (%)	100

2 The values for a 100% rate in capacity, input and EER correspond to the values in the Performance Table (cooling operation at full load), and for the following conditions:

- *Ambient temperature (CT): 45 ºC*
- *Chilled Water outlet Temperature target (COT) (ºC) (from 5 to 15ºC)*
- *Water flow rate constant*
- *Capacity: cooling capacity (kW)*
- *Input (IPT): total input power (compressors + fans) (kW)*
- *ERR: Capacity / Input (kW/kW)*

Example

Model RCME-50CLH1

Working conditions:

- *Condensing Temperature 40 (ºC)*
- *Chilled Water outlet Temperature 10 (ºC)*
- *Partial Load 70 %*

100 % rate calculation:

According to Performance Table (cooling operation at full load) and the following conditions:

- *Condensing Temperature 45 (ºC)*
- *Chilled Water outlet Temperature 10 (ºC)*

Capacity (CCAP) (kW)	188,6
Input (IPT) (kW)	42,9
EER (CCAP / IPT)	188.6 / 42.9 = 4.4

Performance at partial load calculation:

According to Cooling capacity tables at partial load:

- *Condensing Temperature 40 (ºC)*
- *Partial Load 70 %*

Capacity (%)	70%	188.6 x 70% = 132.0
Input (%)	60%	42.9 x 60% = 25.7
EER (%)	116%	4.40 x 116% = 5.1

4.1.2 Calculation example

a. Determine the system requirements

- Condensing Temperature: 50 °C
- Chilled Water Inlet Temperature:12 °C
- Chilled Water Outlet Temperature:7 °C
- Cooling Load: 190.0 kw

b. Select Model and Read the Performance

From the cooling capacity table, model RCME-60CLH1 can be selected with the following performance.

- Cooling Capacity: 204.3 kw
- Heat Rejection: 261.1 kw
- Chilled Water Flow Rate: 35.1 m³/h
- Water Cooler Pressure Drop: 17.2 kPa
- Compressor Input Power: 56.8 kW

c. Determine a Matching Remote Condenser.

From the above heat rejection requirements, select a matching remote condenser according to the manufacturer's data.

d. Check the Balancing Condensing Temperature.

Determine the final balancing point at the designed conditions, and confirm that the condensing temperature balanced at the maximum temperature conditions does not exceed the permissible condensing temperature range specified in *"5. Working range"*.

NOTE

The condensing temperature can generally be predetermined by adding approximately 15ºC to the condenser water outlet temperature for water-cooled condensers.

e. Correct the Data

- Flow Rate

When the water Inlet/Outlet temperature difference is not 5°C, correct the flow rate by the following formula:

Corrected Flow Rate = 5(°C) x Tabulated Flow Rate (CFR) / Given Temp. Difference(°C)

The corrected Flow Rate must be confirmed to be within the working range.

- Ethylene Glycol Application-

When the fouling factor is taken into consideration, the cooling capacity and the compressor input will be different from the value indicated in the cooling capacity table. See Chapter *"5. Working range"*.

f. Water Pressure Drop

See chapter *"4.2 Chiller Pressure drop calculation"*.

4.2 Chiller Pressure drop calculation

Formula: $CPD = \alpha * CFR^{\beta}$

CPD: Chiller Pressure Drop (kPa)

CFR: Chilled water flow rate (m^3/h)

	Cooler	
	α	β
40 HP	0.0580	1.8359
50 HP	0.0390	1.8390
60 HP	0.0233	1.8552

In case of more than 1 module, the total pressure drop of the unit will be the average of the pressure drop of the modules

Example

3x50HP + 1x60HP (CT = 45 ºC; COT = 7 ºC)

	Evaporator			
	CFR (m^3/h)	α	β	PD_{evap} (kPa)
In case of 50 HP	30.1	0.0390	1.839	$0.039 * 29.2^{1.839} = 20.4$
In case of 60 HP	37.0	0.0233	1.8552	$0.0233 * 35.3^{1.8552} = 18.9$
Total pressure drop at evaporator	(3 x 20.4) + (1 x 18.9) / 4 = 20.04 kPa			

4.3 High water outlet temperature option

Performance table (high water operation at full load) (Pump not included)

CT	COT	RCME-40CLH1					RCME-50CLH1					RCME-60CLH1				
		CAP	CFR	CPD	HRJ	IPT	CAP	CFR	CPD	HRJ	IPT	CAP	CFR	CPD	HRJ	IPT
30	15,0	186,1	32,0	33,6	221,2	25,9	234,4	40,3	35,0	278,5	32,8	282,7	48,6	31,4	344,7	40,4
	16,0	188,2	32,4	34,3	223,9	26,4	236,5	40,7	35,5	281,3	33,3	284,8	49,0	31,8	347,5	40,9
	17,0	190,1	32,7	35,0	226,4	26,9	238,4	41,0	36,1	283,8	33,8	286,7	49,3	32,2	350,1	41,4
	18,0	191,7	33,0	35,5	228,7	27,4	240,0	41,3	36,5	286,0	34,3	288,3	49,6	32,6	352,3	41,9
	19,0	193,1	33,2	36,0	230,6	27,9	241,4	41,5	36,9	288,0	34,8	289,7	49,8	32,8	354,3	42,4
	20,0	194,2	33,4	36,4	232,3	28,4	242,5	41,7	37,2	289,7	35,3	290,8	50,0	33,1	356,1	42,9
	21,0	195,1	33,6	36,7	233,8	28,9	243,4	41,9	37,5	291,1	35,8	291,7	50,2	33,3	357,6	43,4
	22,0	195,7	33,7	36,9	235,0	29,4	244,0	42,0	37,6	292,3	36,3	292,3	50,3	33,4	358,8	43,9
	23,0	196,1	33,7	37,0	235,9	29,9	244,4	42,0	37,7	293,2	36,8	292,7	50,3	33,5	359,7	44,4
	24,0	196,2	33,7	37,1	236,6	30,5	244,5	42,1	37,8	293,9	37,4	292,8	50,4	33,5	360,4	45,0
	25,0	196,1	33,7	37,0	237,0	31,0	244,4	42,0	37,7	294,3	37,9	292,7	50,3	33,5	360,8	45,5
35	15,0	178,4	30,7	31,1	216,1	28,7	224,6	38,6	32,3	272,1	36,4	270,9	46,6	29,0	336,8	44,8
	16,0	180,5	31,0	31,8	218,8	29,2	226,7	39,0	32,9	274,8	36,9	273,0	47,0	29,4	339,6	45,3
	17,0	182,4	31,4	32,4	221,3	29,7	228,6	39,3	33,4	277,3	37,4	274,9	47,3	29,8	342,2	45,8
	18,0	184,0	31,6	33,0	223,6	30,2	230,2	39,6	33,8	279,5	37,9	276,5	47,6	30,1	344,4	46,3
	19,0	185,4	31,9	33,4	225,5	30,7	231,6	39,8	34,2	281,5	38,4	277,9	47,8	30,4	346,4	46,8
	20,0	186,5	32,1	33,8	227,2	31,2	232,7	40,0	34,5	283,2	38,9	279,0	48,0	30,6	348,2	47,3
	21,0	187,4	32,2	34,1	228,7	31,7	233,6	40,2	34,7	284,7	39,4	279,9	48,1	30,8	349,7	47,8
	22,0	188,0	32,3	34,3	229,9	32,2	234,2	40,3	34,9	285,8	39,9	280,5	48,2	30,9	350,9	48,3
	23,0	188,4	32,4	34,4	230,8	32,7	234,6	40,3	35,0	286,8	40,4	280,9	48,3	31,0	351,8	48,8
	24,0	188,5	32,4	34,4	231,4	33,3	234,7	40,4	35,0	287,4	41,0	281,0	48,3	31,0	352,5	49,4
	25,0	188,4	32,4	34,4	231,9	33,8	234,6	40,3	35,0	287,8	41,5	280,9	48,3	31,0	352,9	49,9

CT	COT	RCME-40CLH1					RCME-50CLH1					RCME-60CLH1				
		CAP	CFR	CPD	HRJ	IPT	CAP	CFR	CPD	HRJ	IPT	CAP	CFR	CPD	HRJ	IPT
40	15,0	170,6	29,3	28,7	210,9	31,5	214,9	37,0	29,8	265,7	40,0	259,1	44,6	26,7	328,9	49,2
	16,0	172,7	29,7	29,3	213,6	32,0	217,0	37,3	30,3	268,5	40,5	261,2	44,9	27,1	331,7	49,7
	17,0	174,6	30,0	29,9	216,1	32,5	218,9	37,6	30,8	271,0	41,0	263,1	45,2	27,5	334,3	50,2
	18,0	176,2	30,3	30,4	218,3	33,0	220,5	37,9	31,2	273,2	41,5	264,7	45,5	27,8	336,5	50,7
	19,0	177,6	30,5	30,9	220,3	33,5	221,9	38,2	31,6	275,2	42,0	266,1	45,8	28,1	338,6	51,2
	20,0	178,7	30,7	31,2	222,0	34,0	223,0	38,4	31,9	276,9	42,5	267,2	46,0	28,3	340,3	51,7
	21,0	179,6	30,9	31,5	223,5	34,5	223,9	38,5	32,1	278,3	43,0	268,1	46,1	28,4	341,8	52,2
	22,0	180,2	31,0	31,7	224,6	35,0	224,5	38,6	32,3	279,5	43,5	268,7	46,2	28,6	343,0	52,7
	23,0	180,6	31,1	31,8	225,6	35,5	224,9	38,7	32,4	280,4	44,0	269,1	46,3	28,6	343,9	53,2
	24,0	180,7	31,1	31,9	226,2	36,1	225,0	38,7	32,4	281,1	44,6	269,2	46,3	28,7	344,6	53,8
	25,0	180,6	31,1	31,8	226,6	36,6	224,9	38,7	32,4	281,5	45,1	269,1	46,3	28,6	345,0	54,3
45	15,0	162,9	28,0	26,3	205,8	34,3	205,1	35,3	27,3	259,2	43,5	247,4	42,5	24,5	321,1	53,6
	16,0	165,0	28,4	27,0	208,5	34,8	207,2	35,6	27,9	261,9	44,0	249,5	42,9	24,9	323,9	54,1
	17,0	166,9	28,7	27,5	211,0	35,3	209,1	36,0	28,3	264,4	44,5	251,4	43,2	25,2	326,5	54,6
	18,0	168,5	29,0	28,0	213,2	35,8	210,7	36,2	28,7	266,6	45,0	253,0	43,5	25,5	328,8	55,1
	19,0	169,9	29,2	28,5	215,2	36,3	212,1	36,5	29,1	268,6	45,5	254,4	43,8	25,8	330,8	55,6
	20,0	171,0	29,4	28,8	216,9	36,8	213,2	36,7	29,4	270,3	46,0	255,5	43,9	26,0	332,5	56,1
	21,0	171,9	29,6	29,1	218,3	37,3	214,1	36,8	29,6	271,7	46,5	256,4	44,1	26,2	334,0	56,6
	22,0	172,5	29,7	29,3	219,5	37,8	214,7	36,9	29,7	272,9	47,0	257,0	44,2	26,3	335,2	57,1
	23,0	172,9	29,7	29,4	220,5	38,3	215,1	37,0	29,8	273,8	47,5	257,4	44,3	26,4	336,1	57,6
	24,0	173,0	29,8	29,4	221,1	38,9	215,2	37,0	29,9	274,5	48,1	257,5	44,3	26,4	336,8	58,2
	25,0	172,9	29,7	29,4	221,5	39,4	215,1	37,0	29,8	274,9	48,6	257,4	44,3	26,4	337,2	58,7
50	15,0	155,2	26,7	24,1	200,6	37,1	195,4	33,6	25,0	252,8	47,1	235,6	40,5	22,4	313,2	58,0
	16,0	157,3	27,1	24,7	203,4	37,6	197,5	34,0	25,5	255,5	47,6	237,7	40,9	22,8	316,0	58,5
	17,0	159,2	27,4	25,3	205,9	38,1	199,4	34,3	26,0	258,0	48,1	239,6	41,2	23,1	318,6	59,0
	18,0	160,8	27,7	25,7	208,1	38,6	201,0	34,6	26,3	260,3	48,6	241,2	41,5	23,4	320,9	59,5
	19,0	162,2	27,9	26,1	210,1	39,1	202,4	34,8	26,7	262,2	49,1	242,6	41,7	23,6	322,9	60,0
	20,0	163,3	28,1	26,5	211,8	39,6	203,5	35,0	27,0	263,9	49,6	243,7	41,9	23,8	324,6	60,5
	21,0	164,2	28,2	26,7	213,2	40,1	204,4	35,2	27,2	265,4	50,1	244,6	42,1	24,0	326,1	61,0
	22,0	164,8	28,3	26,9	214,4	40,6	205,0	35,3	27,3	266,6	50,6	245,2	42,2	24,1	327,3	61,5
	23,0	165,2	28,4	27,0	215,3	41,1	205,4	35,3	27,4	267,5	51,1	245,6	42,2	24,2	328,2	62,0
	24,0	165,3	28,4	27,1	216,0	41,7	205,5	35,3	27,4	268,1	51,7	245,7	42,3	24,2	328,9	62,6
	25,0	165,2	28,4	27,0	216,4	42,2	205,4	35,3	27,4	268,5	52,2	245,6	42,2	24,2	329,3	63,1
55	15,0	147,4	25,3	21,9	195,5	40,0	185,6	31,9	22,8	246,3	50,7	223,9	38,5	20,4	305,4	62,4
	16,0	149,5	25,7	22,5	198,3	40,5	187,7	32,3	23,2	249,1	51,2	226,0	38,9	20,7	308,2	62,9
	17,0	151,4	26,0	23,0	200,8	41,0	189,6	32,6	23,7	251,6	51,7	227,9	39,2	21,0	310,8	63,4
	18,0	153,0	26,3	23,5	203,0	41,5	191,2	32,9	24,0	253,8	52,2	229,5	39,5	21,3	313,1	63,9
	19,0	154,4	26,6	23,9	205,0	42,0	192,6	33,1	24,4	255,8	52,7	230,9	39,7	21,6	315,1	64,4
	20,0	155,5	26,7	24,2	206,7	42,5	193,7	33,3	24,6	257,5	53,2	232,0	39,9	21,8	316,8	64,9
	21,0	156,4	26,9	24,4	208,1	43,0	194,6	33,5	24,8	258,9	53,7	232,9	40,1	21,9	318,3	65,4
	22,0	157,0	27,0	24,6	209,3	43,5	195,2	33,6	25,0	260,1	54,2	233,5	40,2	22,0	319,5	65,9
	23,0	157,4	27,1	24,7	210,2	44,0	195,6	33,6	25,1	261,0	54,7	233,9	40,2	22,1	320,5	66,4
	24,0	157,5	27,1	24,8	210,9	44,6	195,7	33,7	25,1	261,7	55,3	234,0	40,2	22,1	321,1	67,0
	25,0	157,4	27,1	24,7	211,3	45,1	195,6	33,6	25,1	262,1	55,8	233,9	40,2	22,1	321,5	67,5

CT	COT	RCME-40CLH1					RCME-50CLH1					RCME-60CLH1				
		CAP	CFR	CPD	HRJ	IPT	CAP	CFR	CPD	HRJ	IPT	CAP	CFR	CPD	HRJ	IPT
60	15,0	139,7	24,0	19,9	190,4	42,8	175,9	30,3	20,6	240,0	54,3	212,1	36,5	18,4	297,5	66,8
	16,0	141,8	24,4	20,4	193,2	43,3	178,0	30,6	21,1	242,7	54,8	214,2	36,8	18,8	300,3	67,3
	17,0	143,7	24,7	20,9	195,6	43,8	179,9	30,9	21,5	245,2	55,3	216,1	37,2	19,1	302,9	67,8
	18,0	145,3	25,0	21,4	197,9	44,3	181,5	31,2	21,8	247,4	55,8	217,7	37,4	19,3	305,2	68,3
	19,0	146,7	25,2	21,7	199,8	44,8	182,9	31,5	22,1	249,4	56,3	219,1	37,7	19,6	307,2	68,8
	20,0	147,8	25,4	22,0	201,6	45,3	184,0	31,6	22,4	251,1	56,8	220,2	37,9	19,7	308,9	69,3
	21,0	148,7	25,6	22,3	203,0	45,8	184,9	31,8	22,6	252,5	57,3	221,1	38,0	19,9	310,4	69,8
	22,0	149,3	25,7	22,5	204,2	46,3	185,5	31,9	22,7	253,7	57,8	221,7	38,1	20,0	311,6	70,3
	23,0	149,7	25,7	22,6	205,1	46,8	185,9	32,0	22,8	254,7	58,3	222,1	38,2	20,1	312,6	70,8
	24,0	149,8	25,8	22,6	205,8	47,4	186,0	32,0	22,8	255,3	58,9	222,2	38,2	20,1	313,2	71,4
	25,0	149,7	25,7	22,6	206,2	47,9	185,9	32,0	22,8	255,7	59,4	222,1	38,2	20,1	313,7	71,9

4.4 Brine application option

4.4.1 Application in low ambient temperature

There are cases in which the unit and the piping may be exposed to freezing damage during shutdown periods, if the ambient temperature becomes too low in winter.

Pump operation is an effective measure to prevent freezing. This Chiller has a pump ON/OFF operation control to prevent freezing. This control becomes available by connecting the Pump Operation circuit. (See chapter *"6.3.4 Customer wiring of control circuit for RCME-CLH1"*).

Additionally, an antifreeze mixture of ethylene glycol may be used in cases in which water pumping may not be sufficient to prevent freezing.

The following table shows the percentage of ethylene glycol suggested for different temperature values.

The table also includes correction factors, since the performance in units with antifreeze mixture is slightly different compared to those with no glycol.

Example:

- Cooling Capacity with ethylene glycol = Kc × Cooling Capacity without glycol obtained form de performance table at design temperatures (CT/COT)
- Input Power, Flow Rate and Pressure Drop are calculated in the same way as Cooling Capacity

(Water Outlet Temperature: ≥ +5 °C)

Minimum Ambient Temperature	°C	-3	-7	-13	-22
Required Ethylene Glycol Percentage	wt%	10	20	30	40
Cooling Capacity Correction Factor (CCAP)	Kc	0.99	0.98	0.97	0.96
Input Power Correction Factor (IPT)	Ki	1.00	0.99	0.99	0.98
Flow Rate Correction Factor (CFR)	Kf	1.00	1.01	1.04	1.08
Pressure Drop Correction Factor (CPD)	Kp	1.04	1.11	1.18	1.29

4.4.2 Low Water Temperature Application (Option)

The use of an antifreezing mixture of ethylene glycol is required when water temperature is lower than 5 ºC.

The low water temperature option is divided in several levels, depending on water outlet temperature. Therefore, please specify the level when ordering .

The freeze protection thermostat has been set in the factory.

The table shows the minimum percentage of ethylene glycol and propylene glycol required for each level.

Low water temperature option

Category	Outlet Water Temperature (°C)	Ethylene Glycol		Propylene Glycol	
		Required % (wt%)	Freezing Temperature (°C)	Required % (wt%)	Freezing Temperature (°C)
Low 1	0 ~ +5 ºC	20	-7	20	-6
Low 2	-5 ~ -0 ºC	30	-13	30	-11
Low 3	-10 ~ -5 ºC	40	-22	40	-19

For the performance, each value can be given by using following table.

Ethylene glycol (wt%)	Chilled Water Outlet Temp. (°C)	Flow Rate correction factor (Kf)	Pressure Drop correction factor (Kp)	Condensing Temperature (°C)													
				30		35		40		45		50		55		60	
				CAP (%)	IPT (%)	CAP (%)	IPT (%)	CAP (%)	IPT (%)	CAP (%)	IPT (%)	CAP (%)	IPT (%)	CAP (%)	IPT (%)	CAP (%)	IPT (%)
20	4	1.01	1.15	97	79	94	89	91	98	88	108	85	117	81	126	78	136
	3		1.16	94	79	91	88	88	98	85	107	82	117	79	127	76	136
	2		1.17	92	78	89	88	86	97	82	107	79	117	76	127	72	136
	1		1.18	90	78	86	87	83	97	80	107	76	116	74	126	70	135
	0		1.19	87	77	84	87	81	97	77	106	74	116	70	126	67	135
30	4	1.04	1.20	96	79	93	88	90	97	87	107	84	116	80	125	77	134
	3		1.22	93	78	90	87	87	97	84	106	81	116	78	125	75	135
	2		1.24	91	77	88	87	85	96	81	106	78	116	75	125	72	135
	1		1.26	89	77	86	86	82	96	79	106	76	115	73	125	69	134
	0		1.28	86	76	83	86	80	96	76	105	73	115	70	124	66	134
	-1		1.30	85	76	81	86	78	96	74	106	71	116	68	126	64	135
	-2		1.32	82	76	79	86	75	96	72	106	68	116	64	126	61	136
	-3		1.34	80	75	76	85	73	95	69	105	65	115	62	126	58	136
	-4		1.36	78	75	74	85	70	95	66	105	63	115	59	125	55	135
	-5		1.38	75	74	71	84	68	95	64	105	60	115	56	125	53	135
40	4	1.08	1.30	95	78	92	87	89	96	86	105	83	115	80	124	76	133
	3		1.32	92	77	90	86	87	96	83	105	80	115	77	124	74	134
	2		1.34	90	77	87	86	84	95	81	105	78	114	74	124	71	133
	1		1.36	88	76	85	85	82	95	78	104	75	114	72	123	69	133
	0		1.38	85	76	82	85	79	95	75	104	72	114	69	123	65	133
	-1		1.40	84	76	81	85	77	95	74	105	70	115	67	124	64	134
	-2		1.42	82	75	78	85	75	95	71	104	67	114	64	125	60	135
	-3		1.44	79	75	76	84	72	94	68	104	65	114	61	125	57	135
	-4		1.46	77	74	73	84	70	94	66	104	62	114	58	124	54	134
	-5		1.48	74	73	71	84	67	94	63	103	59	113	56	124	52	134
	-6		1,50	73	74	69	84	65	94	61	104	57	114	53	124	50	135
	-7		1,52	70	73	67	83	62	94	58	104	54	114	50	124	46	134
	-8		1,54	68	72	64	83	60	93	56	103	52	114	48	123	44	134
	-9		1,56	66	72	62	83	57	93	53	103	49	113	45	124	40	134
	-10		1,58	63	71	59	82	55	93	50	103	46	113	42	124	37	134

NOTE

- *CAP: Cooling Capacity, IPT: Input*
- *The percentages are applied to the Capacity and Input at nominal data. Capacity and input ratio shall be applied to the Capacity and input figures at standard condition:*
  - *Ambient temperature: 35°C*
  - *Chilled water outlet temperature: 12/7°C*
- *Water flow rate and pressure drop can be calculated by the Correction Factor Kf and Kp.*

Propylene glycol (wt%)	Chilled Water Outlet Temp. (°C)	Flow Rate correction factor (Kf)	Pressure Drop correction factor (Kp)	Condensing Temperature (°C)													
				30		35		40		45		50		55		60	
				CAP (%)	IPT (%)	CAP (%)	IPT (%)	CAP (%)	IPT (%)	CAP (%)	IPT (%)	CAP (%)	IPT (%)	CAP (%)	IPT (%)	CAP (%)	IPT (%)
20	4	1,01	1,15	94	79	91	88	88	98	85	107	82	117	79	127	76	136
	3		1,16	92	78	89	88	86	97	82	107	79	117	76	127	72	136
	2		1,17	90	78	86	87	83	97	80	107	76	116	74	126	70	135
	1		1,18	87	77	84	87	81	97	77	106	74	116	70	126	67	135
	0		1,19	85	77	81	86	78	96	74	106	71	116	67	125	64	135
30	4	1,04	1,20	93	78	90	87	87	97	84	106	81	116	78	125	75	135
	3		1,22	91	77	88	87	85	96	81	106	78	116	75	125	72	135
	2		1,24	89	77	86	86	82	96	79	106	76	115	73	125	69	134
	1		1,26	86	76	83	86	80	96	76	105	73	115	70	124	66	134
	0		1,28	85	76	81	86	78	96	74	106	71	116	68	126	64	135
	-1		1,30	82	76	79	86	75	96	72	106	68	116	64	126	61	136
	-2		1,32	80	75	76	85	73	95	69	105	65	115	62	126	58	136
	-3		1,34	78	75	74	85	70	95	66	105	63	115	59	125	55	135
	-4		1,36	75	74	71	84	68	95	64	105	60	115	56	125	53	135
	-5		1,38	73	74	69	84	65	94	61	104	57	114	54	125	50	135
40	4	1,08	1,30	92	77	90	86	87	96	83	105	80	115	77	124	74	134
	3		1,32	90	77	87	86	84	95	81	105	78	114	74	124	71	133
	2		1,34	88	76	85	85	82	95	78	104	75	114	72	123	69	133
	1		1,36	85	76	82	85	79	95	75	104	72	114	69	123	65	133
	0		1,38	84	76	81	85	77	95	74	105	70	115	67	124	64	134
	-1		1,40	82	75	78	85	75	95	71	104	67	114	64	125	60	135
	-2		1,42	79	75	76	84	72	94	68	104	65	114	61	125	57	135
	-3		1,44	77	74	73	84	70	94	66	104	62	114	58	124	54	134
	-4		1,46	74	73	71	84	67	94	63	103	59	113	56	124	52	134
	-5		1,48	73	74	69	84	65	94	61	104	57	114	53	124	50	135
	-6		1,50	70	73	67	83	62	94	58	104	54	114	50	124	46	134
	-7		1,52	68	72	64	83	60	93	56	103	52	114	48	123	44	134
	-8		1,54	66	72	62	83	57	93	53	103	49	113	45	124	40	134
	-9		1,56	63	71	59	82	55	93	50	103	46	113	42	124	37	134
	-10		1,58	61	71	57	82	52	92	48	103	43	113	39	124	35	134

NOTE

- *CAP: Cooling Capacity, IPT: Input*
- *The percentages are applied to the Capacity and Input at nominal data. Capacity and input ratio shall be applied to the Capacity and input figures at standard condition:*
  - *Ambient temperature: 35°C*
  - *Chilled water outlet temperature: 12/7°C*
- *Water flow rate and pressure drop can be calculated by the Correction Factor Kf and Kp.*

5. Working range

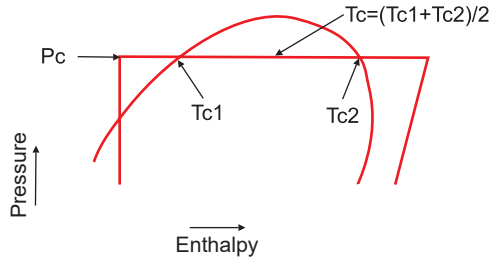
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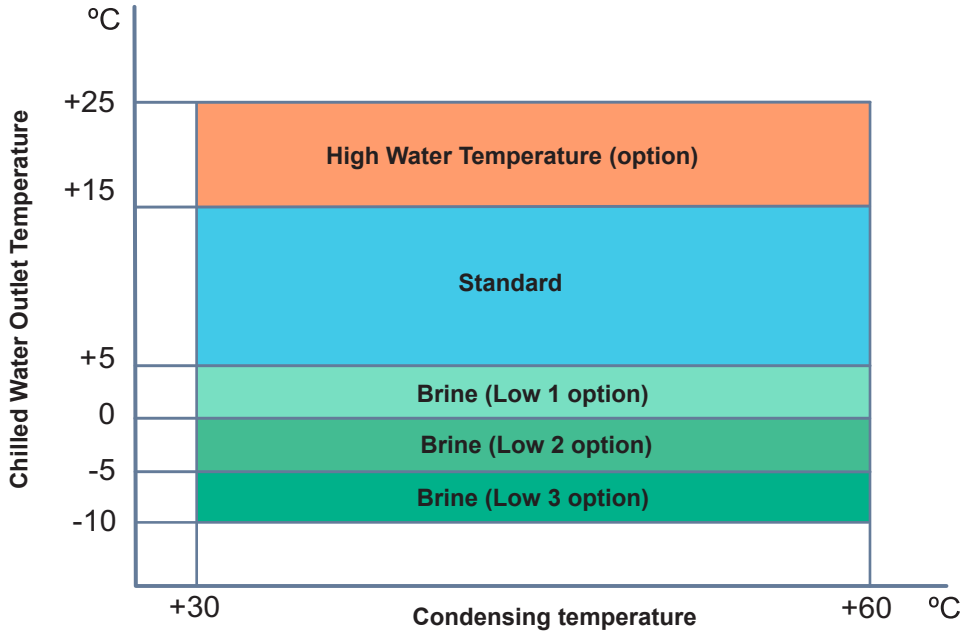
5.1 Condenser less water chiller units RCME-CLH1 Range 50

5.1 Condenser less water chiller units RCME-CLH1 Range

Item		Description
Power Supply	Working Voltage	90%~110% of Rated Voltage
	Voltage Imbalance	Within ±3% Deviation from Each Voltage at Compressor Terminals
	Starting Voltage	Higher than 85% of Rated Voltage
Chilled water outlet temperature	Standard	+5 ~ +15 ºC
	Low 1 option (2)	0 ~ +5 ºC
	Low 2 option (2)	-5 ~ 0 ºC
	Low 3 option (2)	-10 ~ -5 ºC
	High water temperature option	+15 ~ +25 ºC
Condensing Temperature (Tc) (3)		30 ~ 60 ºC
Maximum Permissible Water Pressure		1.0 MPa
Humidity		≤ 50% (40 °C) (1)
Altitude		≤ 1000 m (1)

- *(1) Minimum working range requirements according to EN60204-1. In case of different working range conditions, ask conformity to Hitachi Distributor.*
- *(2) Low water temperature option requires Brine (antifreeze mixture of ethylene glycol type or propylene glycol type)..*
- *(3) Condensing temperature (Tc) calculation:*





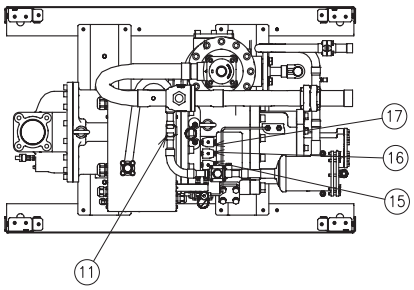
6. Drawings

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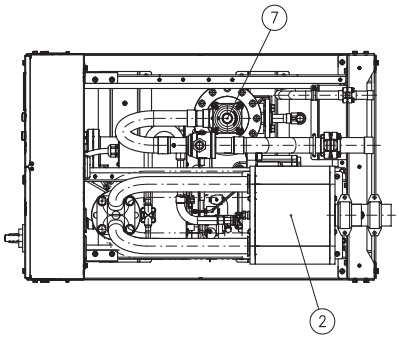
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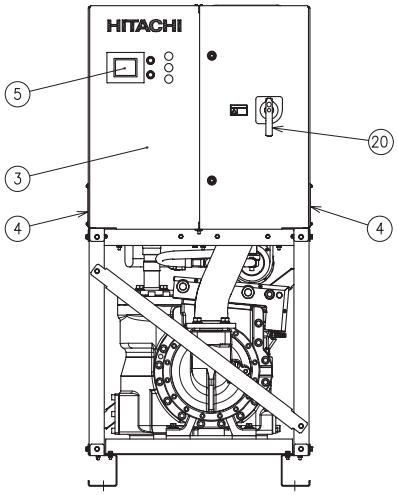
6.1 Structure drawing

Top view of the lower part

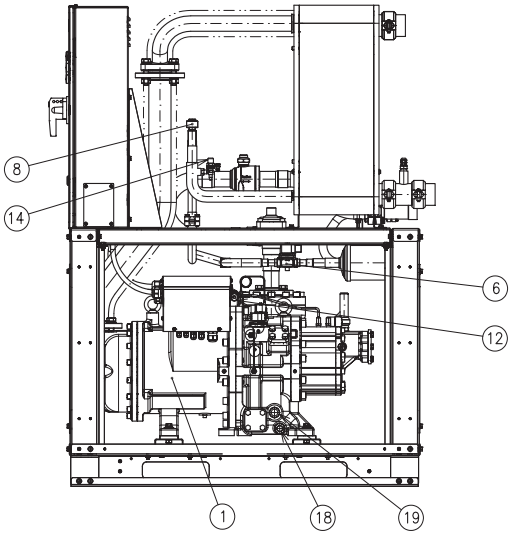


Top view of the upper part

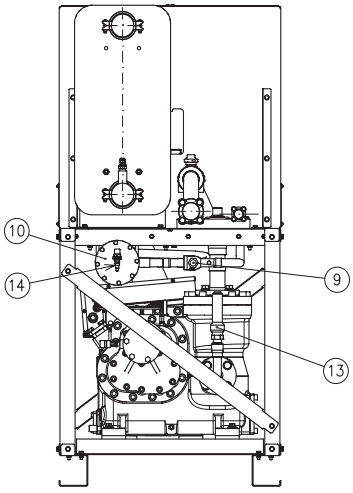




Front view



Right side view



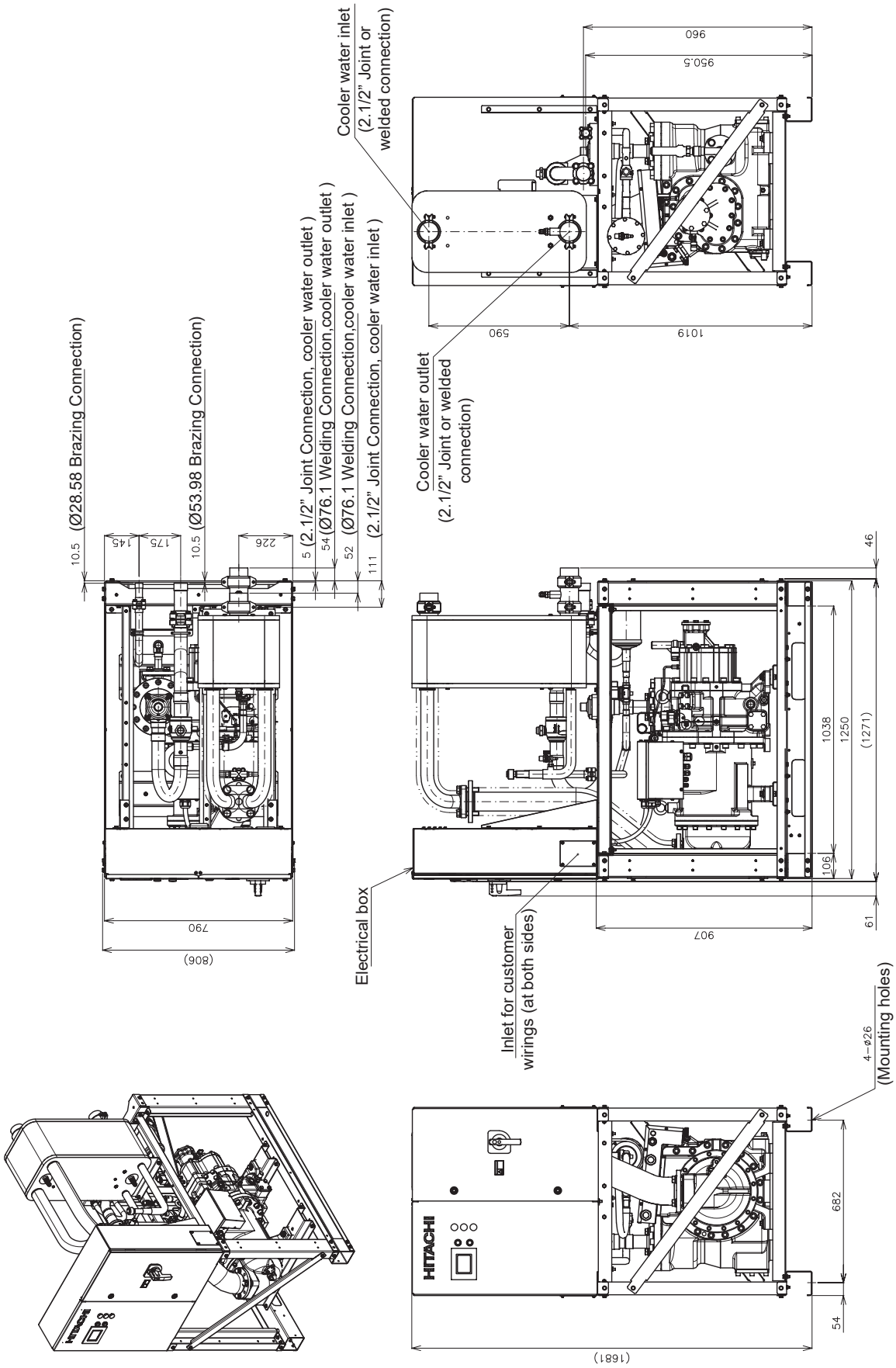
Rear view

XEKS1867

Number	Name
1	Compressor
2	Water cooler
3	Electrical box
4	Power wiring supply
5	Operation switch
6	Solenoid valve
7	Check valve
8	Electronic expansion valve (x2)
9	Liquid line stop valve
10	Filter drier
11	Liquid sight glass

Number	Name
12	High pressure switch
13	Pressure relief valve
14	Service valve (x3)
15	Compressor solenoid valve A
16	Compressor solenoid valve B
17	Compressor solenoid valve C
18	Compressor oil heater
19	Compressor oil sight glass
20	Main switch handle

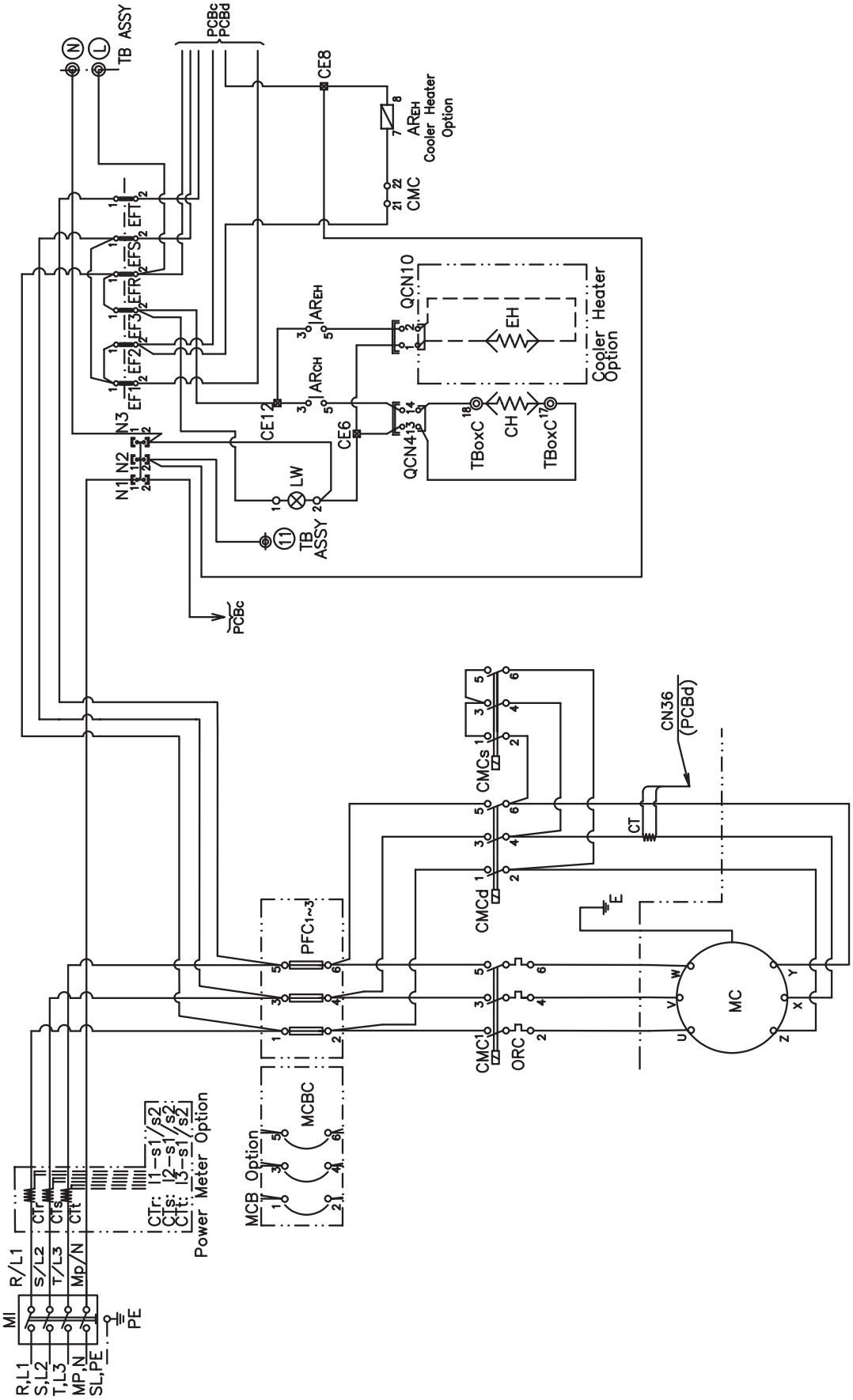
6.2 Dimensional drawing



XEKS1853

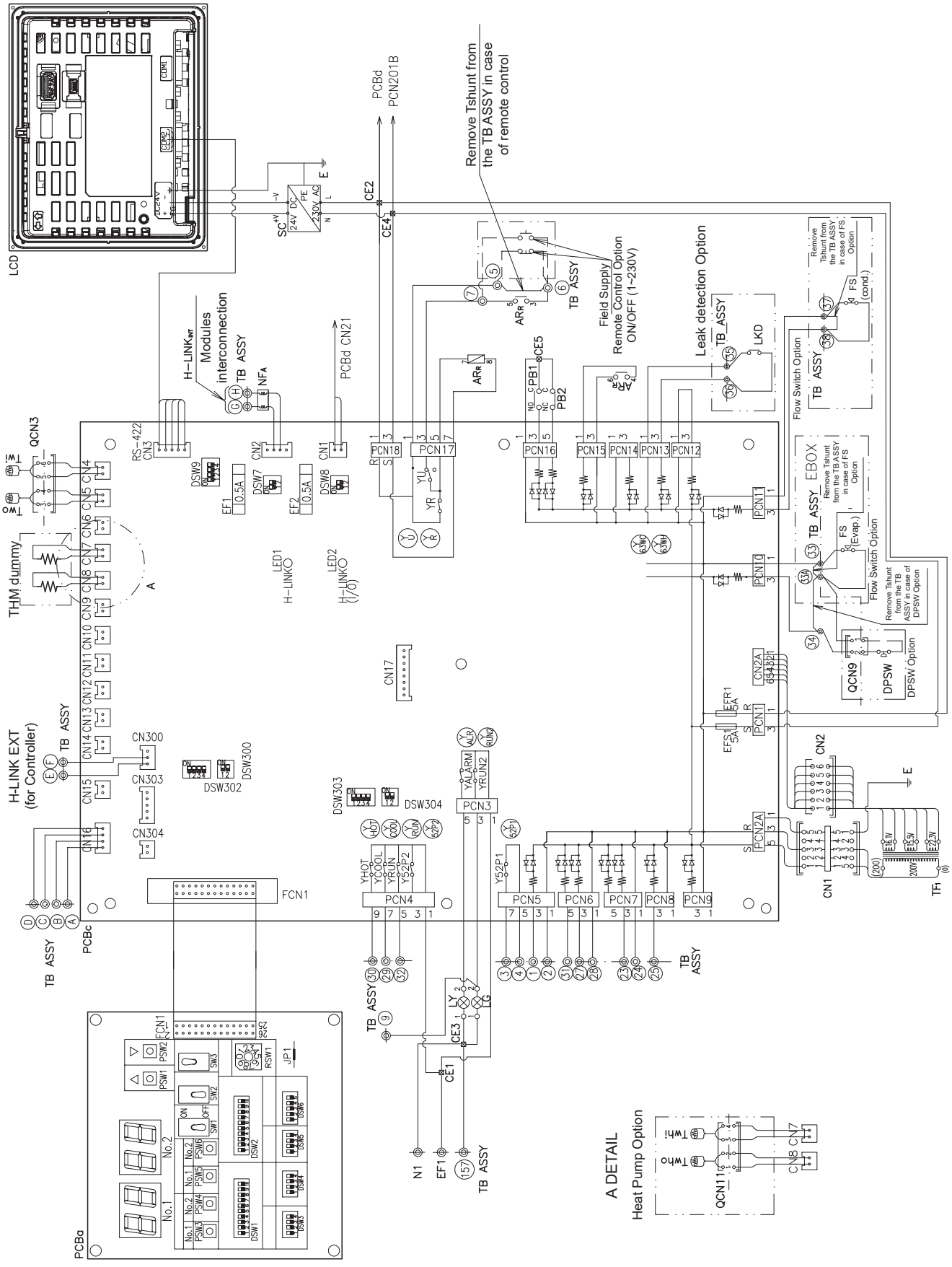
6.3 Wiring diagram

6.3.1 Power circuit for RCME-CLH1



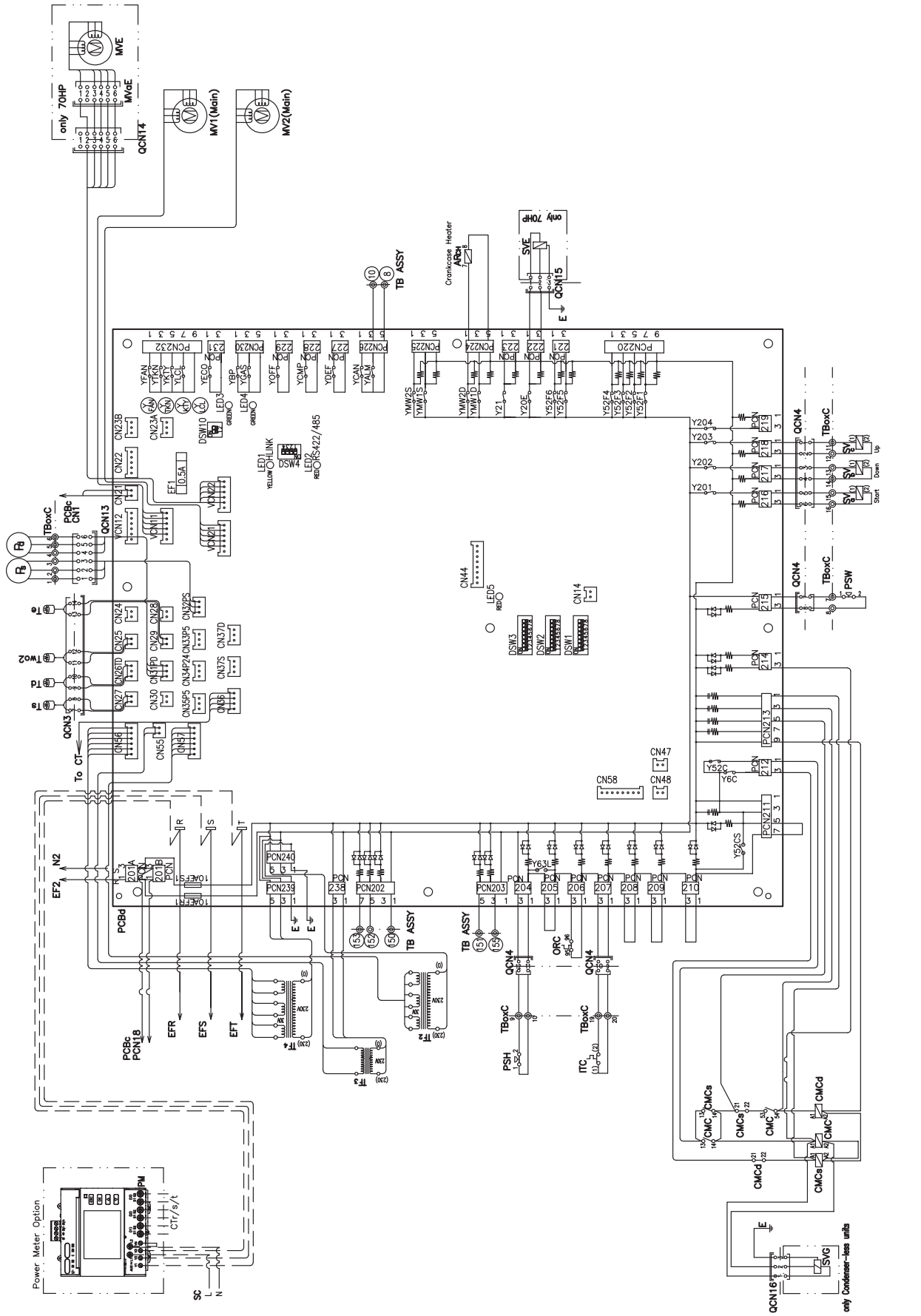
XEKS1686

6.3.2 Control circuit for RCME-CLH1

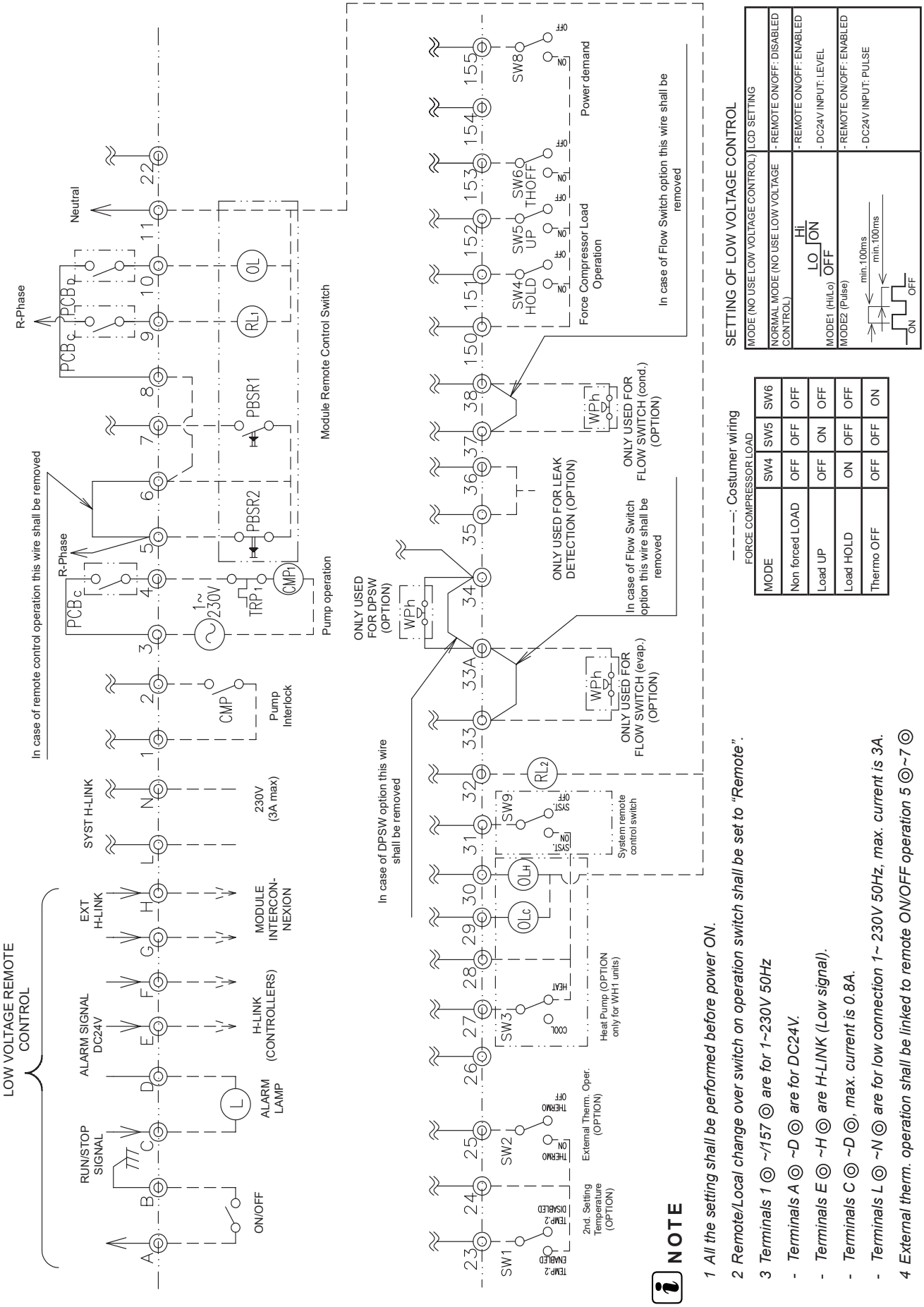


XEKS1687

6.3.3 I/O circuit for RCME-CLH1



6.3.4 Customer wiring of control circuit for RCME-CLH1



NOTE

1 *All the setting shall be performed before power ON.*

2 *Remote/Local change over switch on operation switch shall be set to "Remote".*

3 *Terminals 1 ◎ ~/157 ◎ are for 1~230V 50Hz*

- *Terminals A ◎ ~D ◎ are for DC24V.*
- *Terminals E ◎ ~H ◎ are H-LINK (Low signal).*
- *Terminals C ◎ ~D ◎, max. current is 0.8A.*
- *Terminals L ◎ ~N ◎ are for low connection 1~ 230V 50Hz, max. current is 3A.*

4 *External therm. operation shall be linked to remote ON/OFF operation 5 ◎~7 ◎*

XEKS1689

6

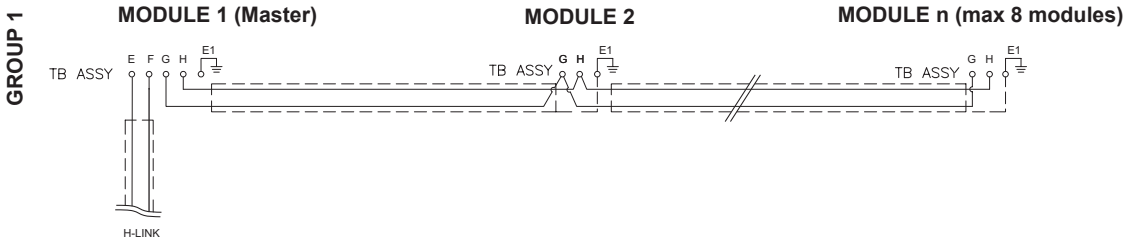
6.3.5 Symbol table

Mark	Name
$AR_{R,EH,CH}$	Auxiliary relays: Remote control, compressor and evaporator heaters
CE_n	Connector (1, 2, 3, 4, 5, 6, 8, 12)
CH	Crankcase heater on compressor
CMC	Direct contactor motor compressor
CMC_d	Delta contactor motor compressor
CMC_s	Star contactor motor compressor
CE1,2	Connector
CT	Current transformer (Sensor)
$CT_{r,s,t}$	Current transformer (Optional)
DPSW	Differential water pressure switch (Optional)
E	Earth connection point
EBOX	Electrical box (main)
$EF_{1,2,3,R,S,T}$	Electric fuse (6A)
EH	Electric heater on cooler (Optional)
FS	Flow switch (Optional)
$H\text{-}LINK_{EXT.}$	PCB for controller
$H\text{-}LINK_{INT}$	PCB for modules interconnection
ITC	Internal thermostat on compressor
LCD	Liquid cristal display
LG	Green lamp compressor operation indicator
LKD	Leak detection (Optional)
LW	White lamp power supply indicator
LY	Yellow lamp alarm indicator
MC	Motor compressor
MCBC	Magnetic circuit breaker for compressor (Optional)
MI	Main switch
$MV_{1,2,E}$	Electronic expansion valve (main and economizer)
$N_{1,2,3}$	Neutral terminals
NF_A	Ring core (noise filter)

Mark	Name
ORC	Overcurrent relay compressor
PB1,2	Push button for local ON/OFF (White/Black)
PCBa	Printed circuit board (setting)
PCBc	Printed circuit board (main)
PCBd	Printed circuit board (cycle)
Pd	Discharge pressure sensor
PE	Unit connection point to installation earth line
$PFC_{1\sim3}$	Protection fuse for compressor
PM	Power meter (Optional)
Ps	Suction pressure sensor
PSH	High pressure switch
PSW	Pressure switch for economizer
QCN_n	Quick connector (3, 4, 9, 10, 11, 13, 15, 16)
SC	Source converter AC/DC
SVa,b,c	Solenoid valve on compressor
SVE	Solenoid valve for economizer
SVG	Solenoid valve (only condenser-less units)
TB ASSY	Terminal board assy
TBOX	Compressor terminal box
TBoxC	Terminal board on compressor terminal box
Td	Thermistor (discharge)
Te	Thermistor (evaporation)
$TF_{1\sim4}$	Transformer
Ts	Thermistor (suction)
Twhi	Thermistor (condenser water inlet)
Twho	Thermistor (condenser water outlet)
Twi	Thermistor (water inlet)
Two	Thermistor (water outlet)
Two2	Thermistor (back cooler)
---	Options wiring

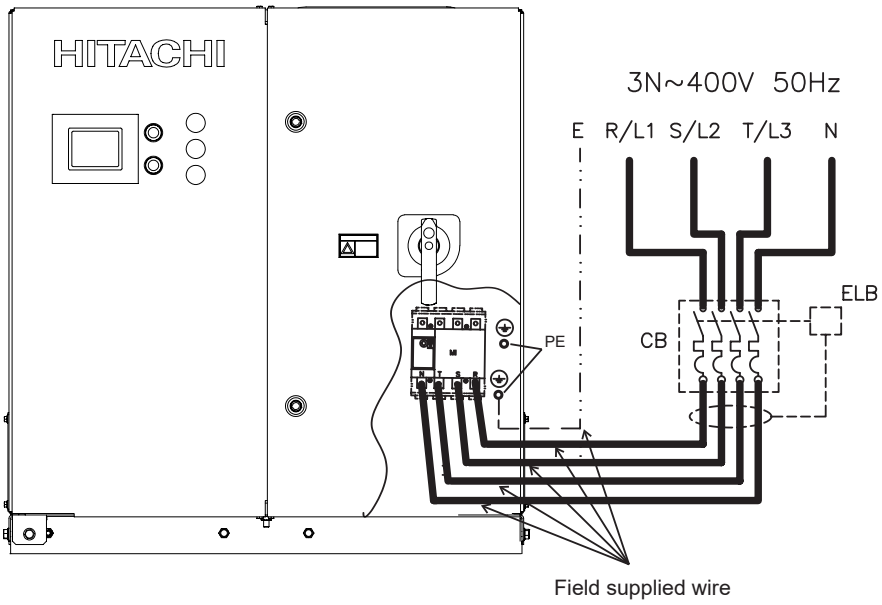
XEKS1690

6.3.6 Wiring diagram for H-LINK communication



6.3.7 Wiring diagram for power circuit

◆ **Individual module**



◆ **On-site module combinations**

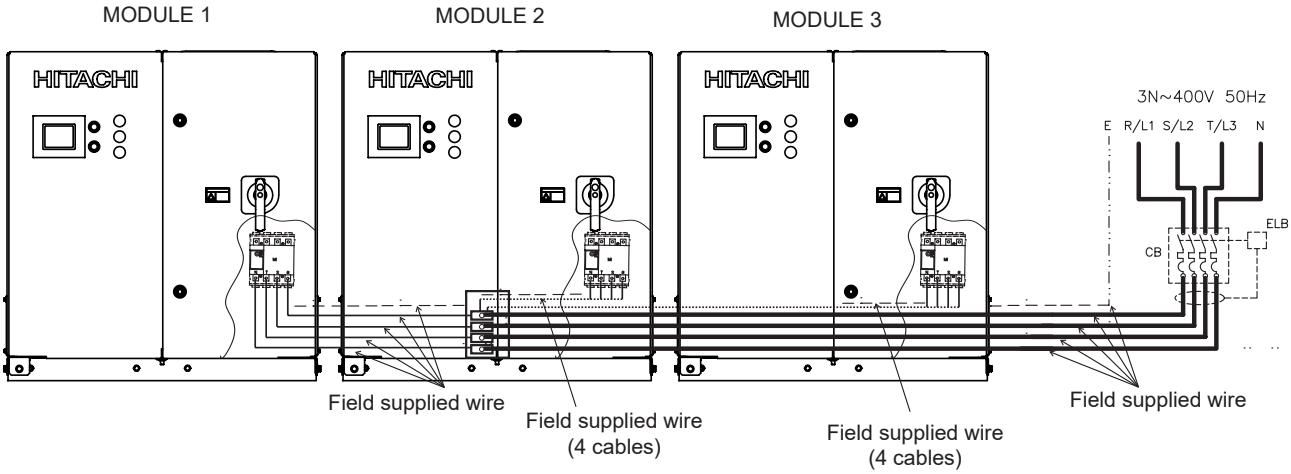
The power line for on-site combinations can be connected either:

1 Individually (recommended)

Each module is supplied with its own power line (follow “Individual module” diagram)

2 Between modules (interconnections)

To minimize power cable sizing it is advisable to feed up to a maximum of 3 modules from 1 power source cable as illustrated below (as an example for a combination with of 8 modules):



Hitachi provides a specific connection kit for this purpose as an option.

Power cable routing is available as an option.

NOTE

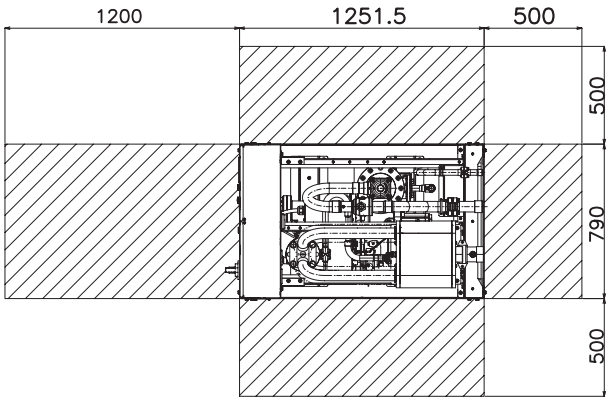
- *Select the size of the field supplied cables according to the total combined requirements of the water chiller modules. Ensure that the field-supplied electrical components (mains power switches, circuit breakers, wires, connectors and wire terminals) have been properly selected according to the electrical data indicated. Make sure that they comply with national and regional electrical codes.*
- *Follow the H-Link connection according to the contents of chapter “6.3.6 Wiring diagram for H-LINK communication”*

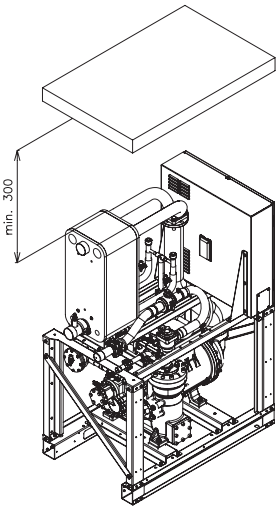
6.4 Service space

Minimum service space for power circuit connection.

When several modules are combined, it is necessary to pay attention to the necessary service space according to the power circuit connection selected for each combination. In the following service space drawing, it is indicated with ➡ the power cables entrance in the module's group.

The minimum measurements to follow when installing an independent unit are detailed in the following drawing.

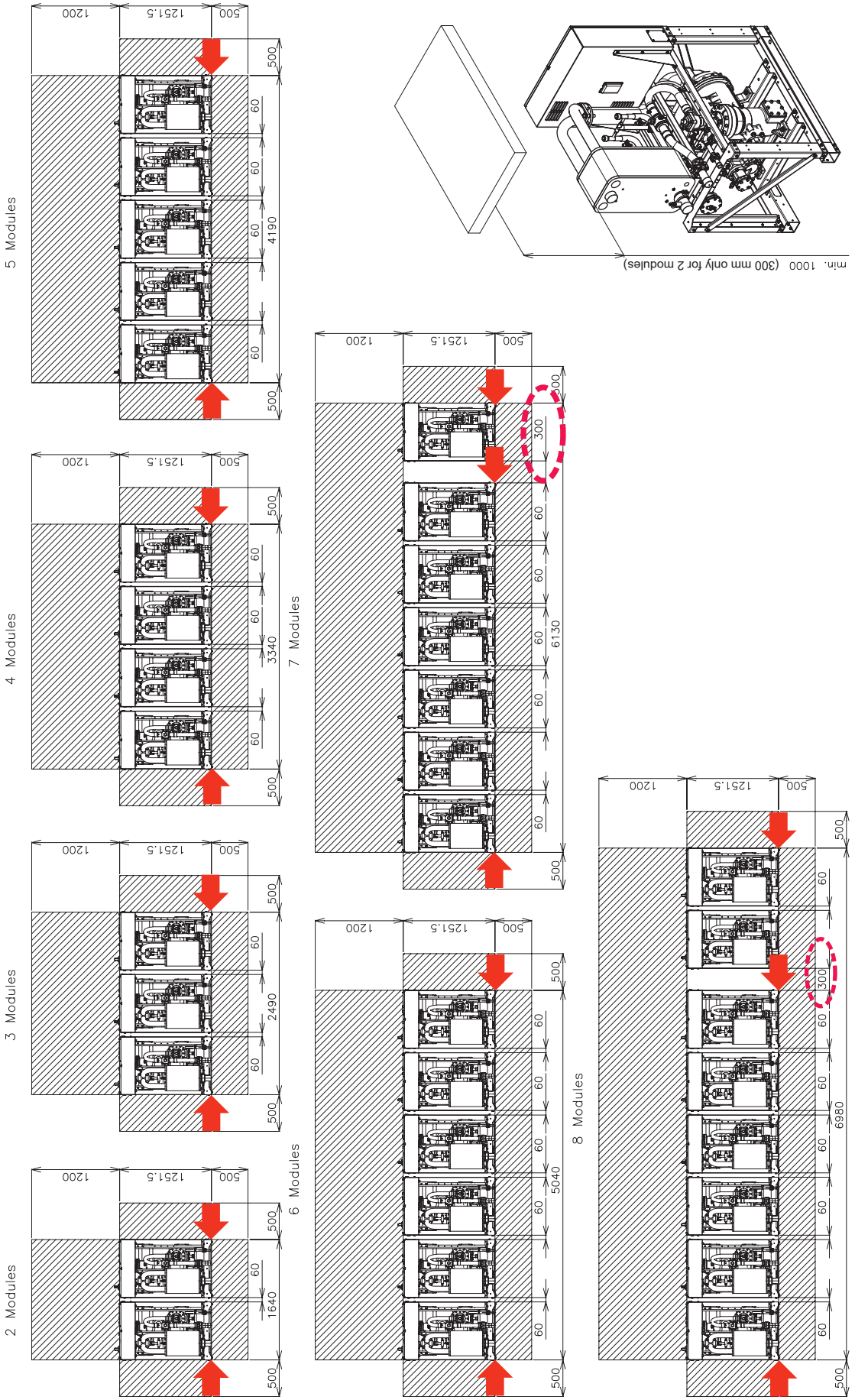




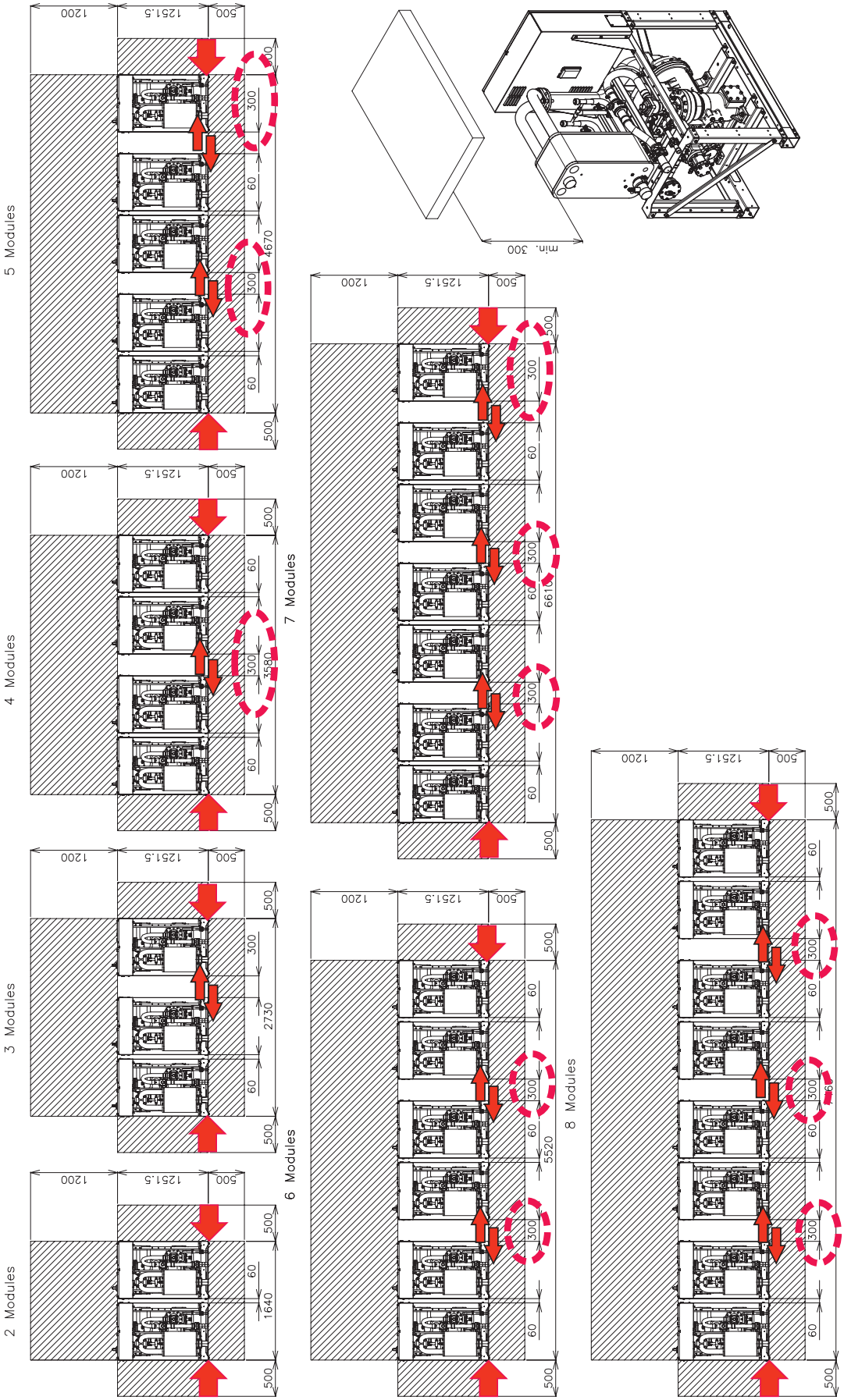
NOTE

- *The height of the wall shall be smaller than that of the unit cabinet.*
- *Pay special attention to measures when installing more than one unit together.*

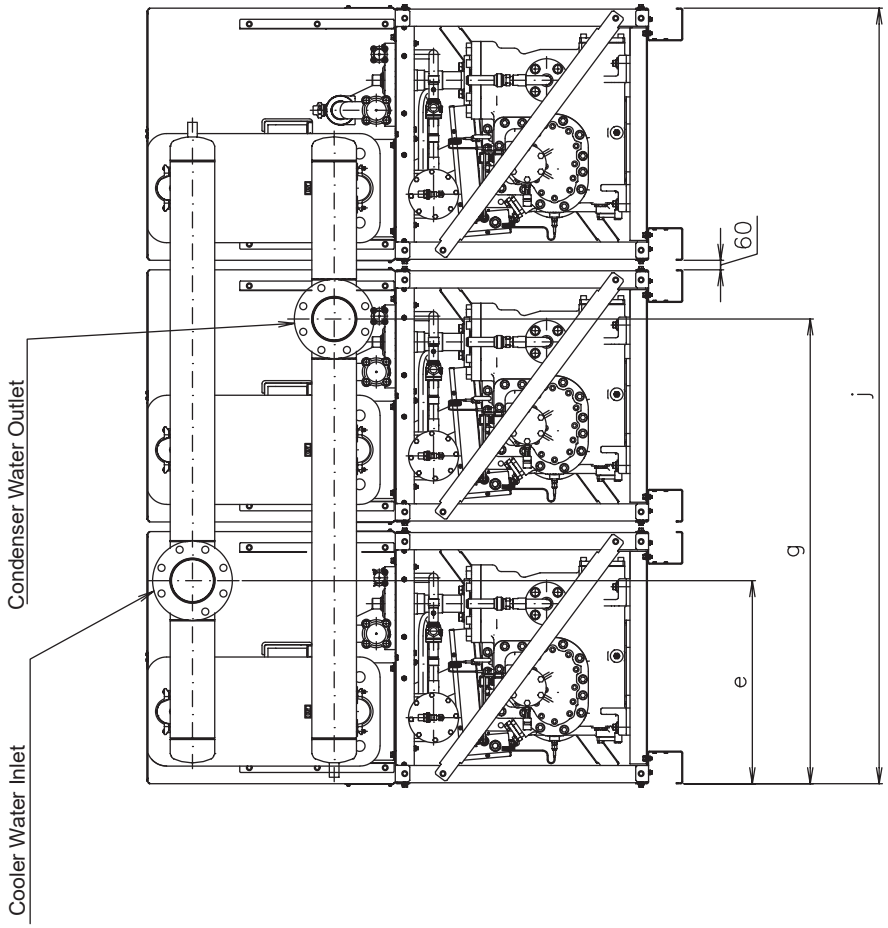
◆ Modules combination with common power cable (in groups of 3 Modules)



◆ Modules combination with individual power cable

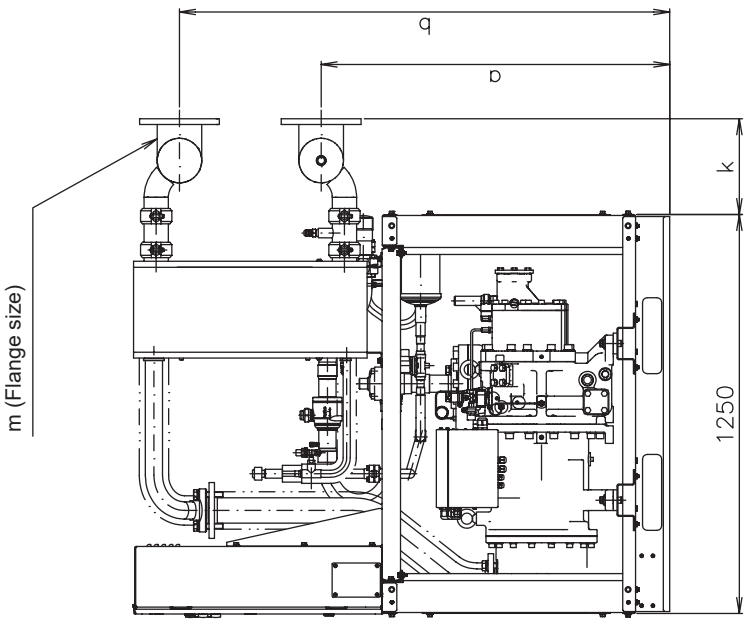


6.4.1 Typical common water pipe



Dimensions table

Model / Dim.	a	b	e	g	j	k	m
2 Modules	1081	1547	651	651	1640	300	5" (Ø139.7)
3 Modules	1092	1536	651	1501	2490	333	6" (Ø168.3)



NOTE

Depending on the installation, some kind of structure might be needed to support the weight of the piping.

6

7. Optional functions

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7.1 LCD optional functions setting

NOTE

Detailed information in Service Manual SMxx0083

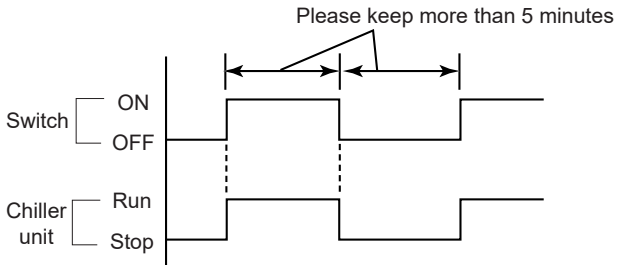
7.1.1 DC24V Input

The procedure to control operation from the DC24V contact of the local central controller is through:

- Level input
- Pulse input (1 switch)
- Pulse input (2 switches)

Arrange the settings and additional wiring necessary for each of them. Available only in remote mode during independent operation of the chiller unit.

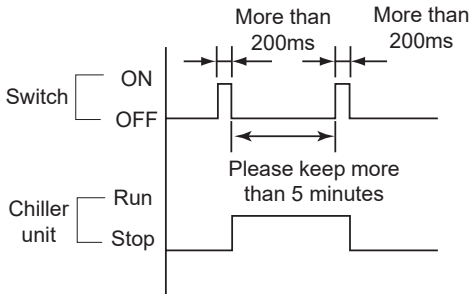
◆ **Level input - Time chart**



NOTE

Level input indicates a continuation of switch ON status when the system is in operation as shown in the diagram above.

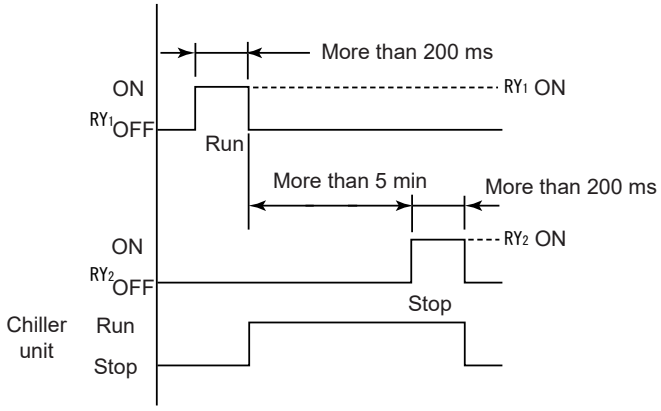
◆ **a)-Pulse input -Time chart**



NOTE

Pulse input indicates an ON input of the same switch when changing the status of the chiller unit, as shown in the diagram above.

◆ **b)-Pulse input - Time chart**



NOTE

- *Please do not bundle the additional wiring together with other control circuits, and in particular with wiring for 200V or 400V.*
- *Please put the additional wiring separately inside a metallic pipe, or use a shielded wire.*

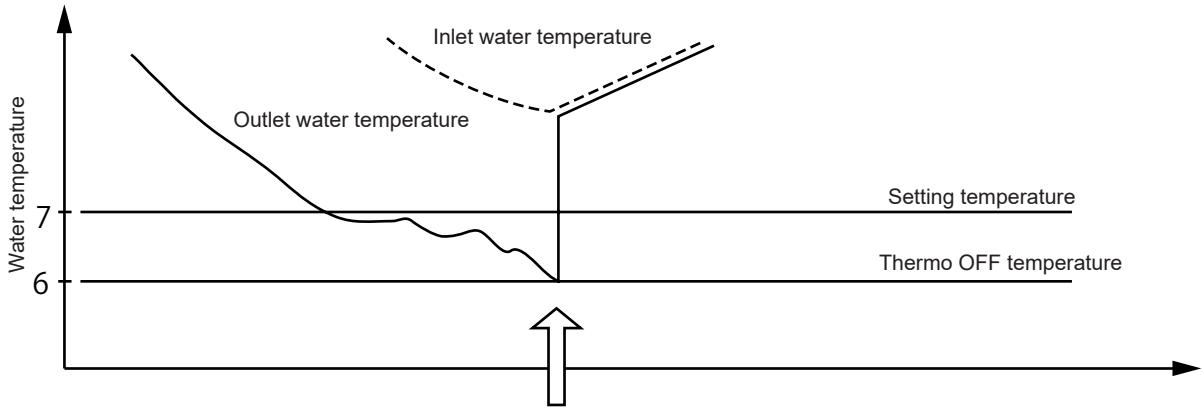
7.1.2 Remote alarm reset

The release of an alarm in case that the chiller unit has stopped due to an alarm is achieved by stop control (it is possible to stop both from the stop button of the main unit or from remote stop control). But it is possible to configure this alarm release to make it valid only from the stop button on the main unit (alarm cannot be released by remote stop control). This function is valid for places where there is a remote device for automatic stop order when an alarm is emitted.

7.1.3 Thermo OFF Delay

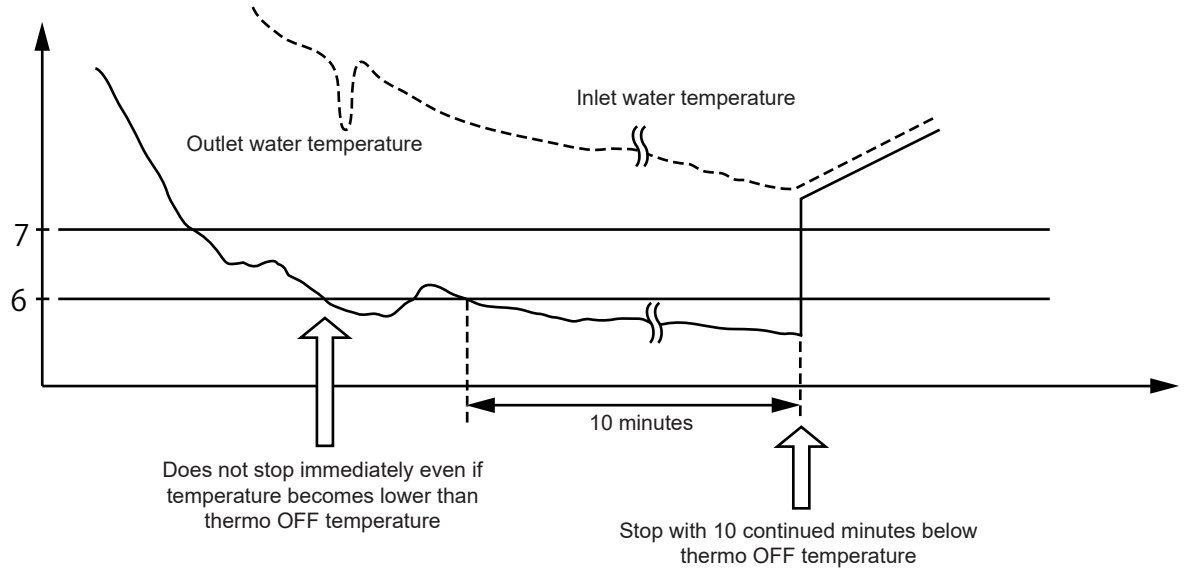
This function prevents thermo OFF of the chiller unit due to sudden changes of temperature or flow.

Example of standard settings:



Stop with 10 continued seconds at thermo OFF temperature

Example of thermo OFF judgement extension



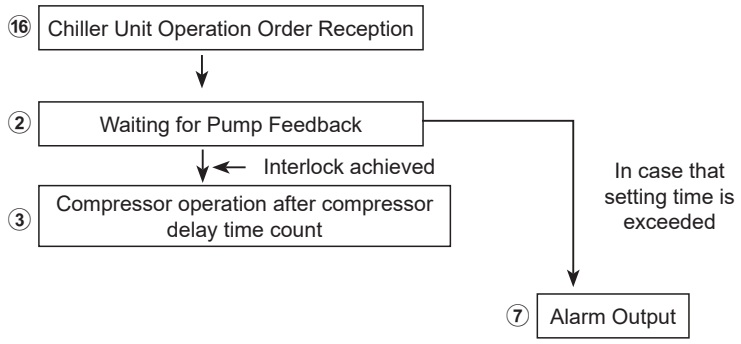
This function is used in cases in which the water flow is reduced temporarily, such as when opening and closing the valves installed in the water piping system, or when switching the number of cold (hot) water circulating pumps in operation. However, in case that water temperature reaches the limit of the working range, thermo-OFF occurs even within 10 minutes.

7.1.4 Water temperature control operation

It is possible to select which water temperature to use for capacity control and thermo OFF judgement, either “Inlet” or “Outlet”. Please use the outlet water temperature (factory default setting) in normal conditions.

7.1.5 Pump feed back waiting time

Limitation setting for pump feedback waiting time.



The flow in the upper figure is followed upon start of operation of the chiller unit.

The state of ② is kept in case that there is no input of pump feedback signal between ② and ③, or when the difference between inlet and outlet temperature of cold water is too large. This function shifts to ⑦ “Alarm” in case that the state of ② continues for a certain amount of time.

Initial value for the standard specification:

- Unlimited
- Initial value for the specification with pump mounted: 5 minutes
- Setting range: 1~30 minutes

The display at this time is:

LCD: Pump interlock abnormality

Segment: 5P-5P

7.1.6 Current limit setting

It is possible to operate below a maximum current limitation ratio previously set at the LCD screen. The selection to enable or release the setting value is performed with the order signal from the local control board.

Also, the overcurrent protection control is always enabled, even in a state where this function is disabled.

It is possible to adjust Current limit ratio. Taking in account the “Base current” the “Current limit value” is calculated (= Base current x current limit ratio)

7.1.7 Thermo OFF detection by IN Temp (Tw1 CO) (Tw2 CO)

Normally thermo OFF judgement is carried out from outlet water temperature, but when enabling this setting, the judgement of thermo OFF is carried out also from inlet water temperature. (Thermo OFF judgement by outlet water temperature is also enabled)(Water temperature control is carried out from outlet water temperature even in case that this function is enabled).

It is effective when there is the need to set thermo OFF with the return water temperature from the load.

7.2 PCB optional functions setting

7.2.1 Status recovery after power failure

PCBa Settings

Optional Function C:  DSW5	 Status recovery after power failure disabled	 Status recovery after power failure enabled

NOTE

- *In case of small power supply failure (13msec – 2 sec) unit restarts automatically*
- *If power failure is longer than 2 sec, it is possible to choose to restart or not according to the settting of DSW5 pin1.*
- *The restart time of the modules may vary depending on delay time settings*

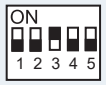
7.2.2 Remote control by H-link

PCBa Settings

Optional Function C:  DSW5	 Standard	 Remote control by H-LINK (To apply with optional H-LINK control devices)

7.2.3 Module control (single/multiple)

PCBa Settings

Optional Function D:  DSW6	 Single Module Control (RCME-(40/50/60)CLH1)
	 Multiple Module Control

8. Options

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8.1 Options vs units

Unit \ Option	Wooden Base	Wooden Crate	Refrigerant R134a	Refrigerant R513A	Magnetic Circuit Breaker (MCB)	Dual Safety Valve	Suction Safety Valve	Discharge Valve	Suction Valve	Water Cooler Heater	Stainless Steel Water Pipe	Power Meter	Low Noise	Super Low Noise	Differential Water Pressure Switch	High Water Outlet Temperature	Power Cable Routing	Water Pressure Port	Brine (Low 1)	Brine (Low 2)	Brine (Low 3)	LCD Language (LP1)	LCD Language (LP2)	LCD Language (LP3)	LCD Language (LP4)	Water PN16
RCME-40CLH1	**STD**	✓	**STD**	✓	✓	✓	✓	**STD**	✓	✓	✓	✓	✓	✓	✓	✓	✓(1)	✓	✓	✓	✓	✓	✓	✓	✓	✓
RCME-50CLH1	**STD**	✓	**STD**	✓	✓	✓	✓	**STD**	✓	✓	✓	✓	✓	✓	✓	✓	✓(1)	✓	✓	✓	✓	✓	✓	✓	✓	✓
RCME-60CLH1	**STD**	✓	**STD**	✓	✓	✓	✓	**STD**	✓	✓	✓	✓	✓	✓	✓	✓	✓(1)	✓	✓	✓	✓	✓	✓	✓	✓	✓

STD: Standard

✓(2):Apply to one module (1/2 or 1/3)

NOTE

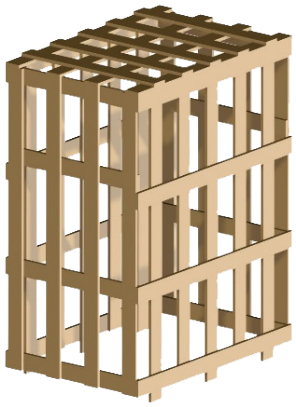
- *Options are factory assembled. They shall be ordered together with the chiller unit.*
- *There are several incompatibilities between certain options. Check de incompatibilities table.*
- *Witness test: the possibility to attend a performance test of the unit in factory is also available as an option.*

8.2 Incompatibilities

Unit \ Option	Wooden Base	Wooden Crate	Refrigerant R134a	Refrigerant R513A	Magnetic Circuit Breaker (MCB)	Dual Safety Valve	Suction Safety Valve	Discharge Valve	Suction Valve	Water Cooler Heater	Stainless Steel Water Pipe	Power Meter	Low Noise	Super Low Noise	Differential Water Pressure Switch	High Water Outlet Temperature	Power Cable Routing	Water Pressure Port	Brine (Low 1)	Brine (Low 2)	Brine (Low 3)	LCD Language (LP1)	LCD Language (LP2)	LCD Language (LP3)	LCD Language (LP4)	Water PN16	Witness Test
Wooden Base	■																										
Wooden Crate		■																									
Refrigerant R134a			■																								
Refrigerant R513A				■																							
Magnetic Circuit Breaker (MCB)					■																						
Dual Safety Valve						■																					
Suction Safety Valve							■																				
Discharge Valve								■																			
Suction Valve									■																		
Water Cooler Heater										■																	
Stainless Steel Water Pipe											■					A											
Power Meter												■															
Low Noise													■	■													
Super Low Noise													■	■													
Differential Water Pressure Switch															■											■	
High Water Outlet Temperature											B					■			X	X	X						
Power Cable Routing																	■										
Water Pressure Port																		■									
Brine (Low 1)																X			■	■	■						
Brine (Low 2)																X			■	■	■						
Brine (Low 3)																X			■	■	■						
LCD Language (LP1)																						■	■	■	■		
LCD Language (LP2)																						■	■	■	■		
LCD Language (LP3)																						■	■	■	■		
LCD Language (LP4)																						■	■	■	■		
Water PN16															■											■	
Witness Test																											■

■ Not compatible
X Cannot run simultaneously
A A is included with B
B B is included with A

8.3 Wooden Crate Option

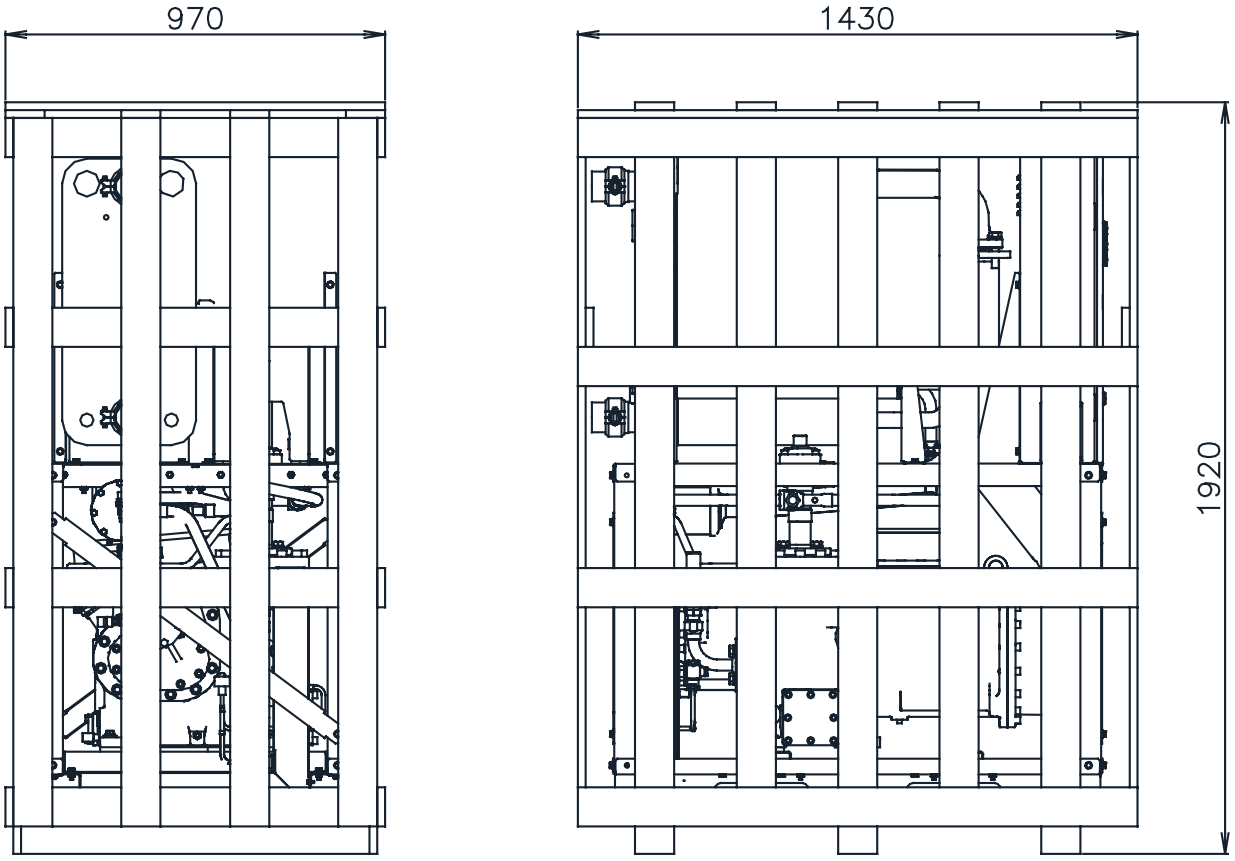


Additional Wooden cage (not fully closed) to protect the unit during transportation.

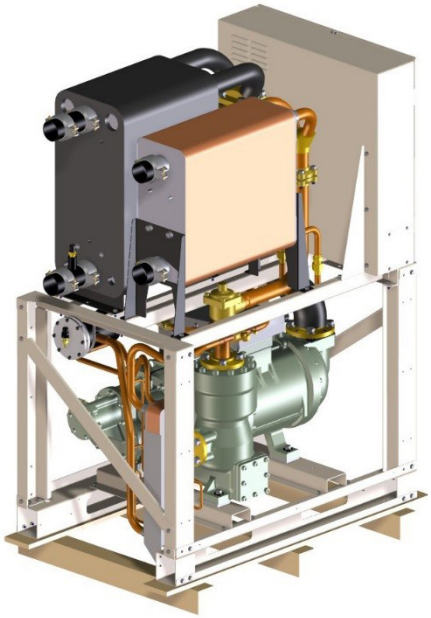
Shipping dimensions slightly bigger.

8.3.1 Main specifications

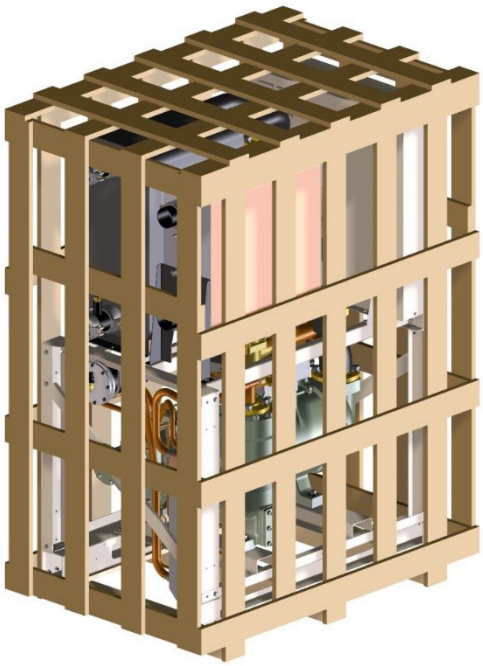
- Regulation NIMF 15 approved.
- Shipping dimensions (in mm):



8.3.2 Assembly detail



STANDARD



OPTION

NOTE

Pictures are for illustrative purpose only. Chiller model shown in the picture doesn't correspond to a RCME-CLH1. Above pictures are example of RCME-WH1 unit.

8.4 Refrigerant R513A Option

The Condenser-less RCME-CLH1 series can be ordered with one of the following 2 different refrigerants: standard R134a or R513A option.

While maintaining the same cooling capacities the R513A is a more environmentally friendly refrigerant due to its reduced Global Warming Potential (GWP) compared to the R134a.



8.4.1 Main specifications

◆ General data

NOTE

(1) Data are based on the following conditions:
Cooling operation

- *Chilled Water Inlet / Outlet Temperature: 12 / 7ºC.*
- *Condensing Temperature (T_c): 45ºC.*

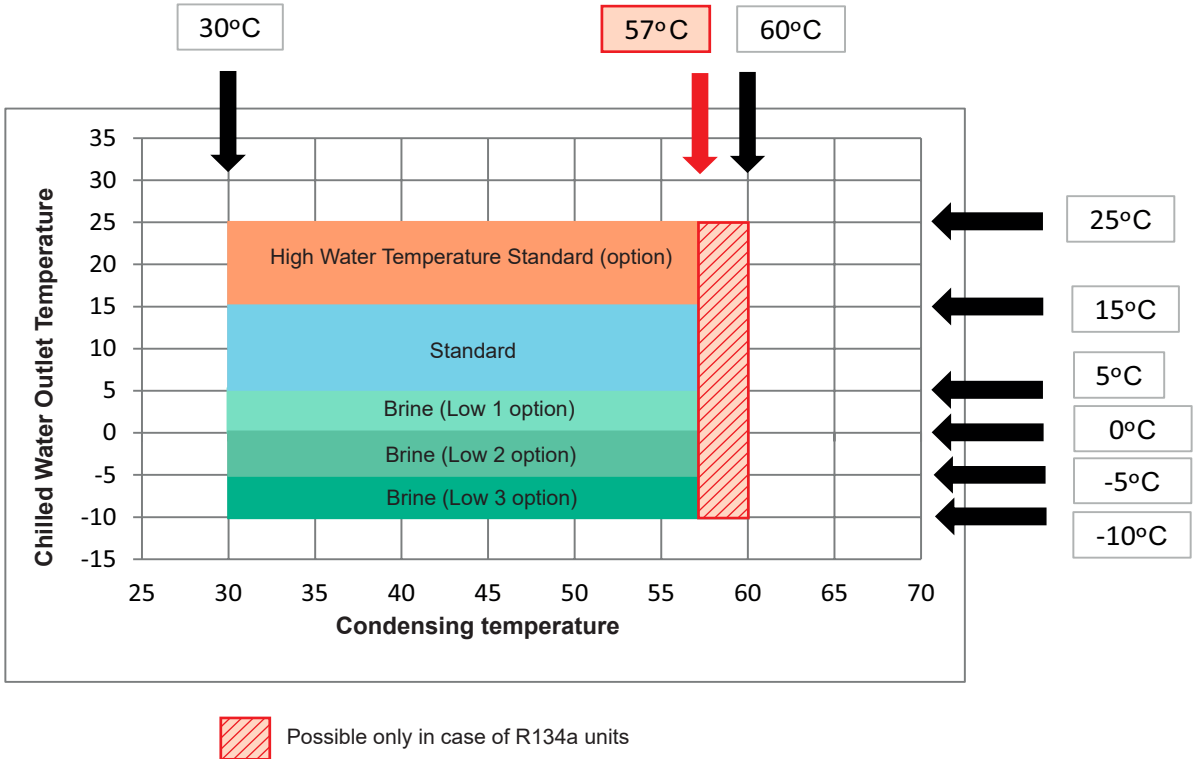
Data does not include the pump input.
(2) Sound Pressure: measured at 1.5m height, and at 1m distance from the control panel.

Model			RCME-40CLH1	RCME-50CLH1	RCME-60CLH1
Power supply		-	3N~400V 50Hz		
Cooling Capacity		kW	135	175	215
Input power		kW	32.0	41.8	52.4
EER		-	4.22	4.19	4.10
Outer dimension	Height	mm	1681		
	Width	mm	806		
	Depth	mm	1271		
Cabinet colour		-	Natural Grey (Textured)		
Shipping weight		kg	750	810	875
Operating weight		kg	765	835	900
Compressor	Type	-	Hitachi Semi-Hermetic Twin Screw		
	Model	-	G40ASF-Z	G50ASF-Z	G60ASF-Z
	Quantity	-	1		
	Oil Heater	W	150		
	Capacity control	-	Continuous Capacity Control		
	Working range	%	25~100		
Evaporator heat exchanger		-	Brazed Plate type		
Condenser heat exchanger		-	Brazed type		
Refrigerant		-	R513A		
Flow control		-	Twin Electronic Expansion Valve		
Number of circuits		-	1		
Chilled water flow		m^3/h	23.2	30.1	37.0
Water pressure drop		kPa	18.7	20.4	18.9
Maximum permissible water pressure	Standard	MPa	1.0		
	Water PN16 (option)	MPa	1.6		
Chiller water flow range	Min.	m^3/h	14.5	18.8	23.1
	Max.	m^3/h	50.5	65.4	80.4
Minimum internal system water volume		m^3	0.49	0.63	0.78
Water pipe connection	Size and type	inches	2.1/2” Victaulic		
	Quantity	-	1 × Inlet, 1 × Outlet		
Control system		-	Hitachi Micro-Processor Control		
Chilled water outlet temperature	Standard	ºC	+5 ~ +15		
	Low (option)	ºC	-10 ~ +5		
	High (option)	ºC	+15 ~ +25		
Condensing temperature		ºC	+30 ~ +27		
Sound power		dB(A)	88	89	90
Sound pressure		dB(A)	60	61	62

◆ Working range

The R513A is working at slightly higher pressures compared to the R134a. For that reason the working range is limited at the high condensing side.

- Cooling operation:



Possible only in case of R134a units

◆ Refrigerant quantities

The following refrigerant quantities (kg) will be charged from factory:

R134a	
Unit	kg
RCME-40CLH1	1
RCME-50CLH1	1
RCME-60CLH1	1

R513A	
Unit	kg
RCME-40CLH1	1
RCME-50CLH1	1
RCME-60CLH1	1

◆ Performance Table (at full load) (Pump not included)

HWOT	CWOT	RCME-40CLH1 (R513A)					RCME-50CLH1 (R513A)					RCME-60CLH1 (R513A)				
		CAP	CFR	CPD	HRJ	IPT	CAP	CFR	CPD	HRJ	IPT	CAP	CFR	CPD	HRJ	IPT
30	5.0	147.5	25.4	22.0	170.9	23.4	191.2	32.9	24.0	221.8	30.6	234.9	40.4	22.3	273.3	38.4
	6.0	151.4	26.0	23.0	175.0	23.7	196.2	33.8	25.2	227.1	30.9	241.1	41.5	23.4	279.8	38.8
	7.0	155.2	26.7	24.1	179.2	23.9	201.2	34.6	26.4	232.5	31.2	247.2	42.5	24.5	286.4	39.2
	8.0	159.1	27.4	25.2	183.3	24.2	206.2	35.5	27.6	237.8	31.6	253.4	43.6	25.6	292.9	39.6
	9.0	163.0	28.0	26.4	187.4	24.4	211.2	36.3	28.9	243.1	31.9	259.5	44.6	26.8	299.5	40.0
	10.0	166.8	28.7	27.5	191.5	24.6	216.3	37.2	30.1	248.4	32.2	265.7	45.7	28.0	306.0	40.4
	11.0	170.7	29.4	28.7	195.6	24.9	221.3	38.1	31.4	253.8	32.5	271.8	46.8	29.2	312.6	40.8
	12.0	174.6	30.0	29.9	199.7	25.1	226.3	38.9	32.8	259.1	32.8	278.0	47.8	30.4	319.1	41.2
	13.0	178.4	30.7	31.1	203.8	25.4	231.3	39.8	34.1	264.4	33.2	284.1	48.9	31.7	325.7	41.6
	14.0	182.3	31.4	32.4	207.9	25.6	236.3	40.6	35.5	269.8	33.5	290.3	49.9	33.0	332.3	42.0
	15.0	186.1	32.0	33.7	212.0	25.9	241.3	41.5	36.9	275.1	33.8	296.4	51.0	34.3	338.8	42.4
35	5.0	141.0	24.3	20.2	167.1	26.1	182.8	31.4	22.1	216.9	34.1	224.6	38.6	20.5	267.3	42.7
	6.0	144.8	24.9	21.2	171.1	26.4	187.6	32.3	23.2	222.1	34.4	230.5	39.7	21.5	273.7	43.1
	7.0	148.5	25.5	22.2	175.1	26.6	192.5	33.1	24.3	227.2	34.8	236.5	40.7	22.5	280.1	43.6
	8.0	152.2	26.2	23.3	179.1	26.9	197.3	33.9	25.5	232.4	35.1	242.4	41.7	23.6	286.4	44.0
	9.0	156.0	26.8	24.3	183.1	27.1	202.2	34.8	26.6	237.6	35.4	248.4	42.7	24.7	292.8	44.4
	10.0	159.7	27.5	25.4	187.1	27.4	207.0	35.6	27.8	242.8	35.8	254.3	43.7	25.8	299.2	44.8
	11.0	163.4	28.1	26.5	191.1	27.6	211.9	36.4	29.0	248.0	36.1	260.3	44.8	26.9	305.6	45.3
	12.0	167.2	28.8	27.6	195.1	27.9	216.7	37.3	30.3	253.2	36.5	266.2	45.8	28.1	311.9	45.7
	13.0	170.9	29.4	28.8	199.1	28.2	221.6	38.1	31.5	258.4	36.8	272.2	46.8	29.3	318.3	46.1
	14.0	174.7	30.0	29.9	203.1	28.4	226.4	38.9	32.8	263.5	37.1	278.2	47.8	30.5	324.7	46.5
	15.0	178.4	30.7	31.1	207.1	28.7	231.3	39.8	34.1	268.7	37.5	284.1	48.9	31.7	331.1	47.0
40	5.0	134.5	23.1	18.5	163.3	28.8	174.4	30.0	20.3	211.9	37.6	214.2	36.8	18.8	261.3	47.1
	6.0	138.1	23.8	19.5	167.2	29.0	179.1	30.8	21.3	217.0	37.9	220.0	37.8	19.7	267.5	47.5
	7.0	141.7	24.4	20.4	171.1	29.3	183.7	31.6	22.3	222.0	38.3	225.7	38.8	20.7	273.7	48.0
	8.0	145.4	25.0	21.4	174.9	29.6	188.4	32.4	23.4	227.1	38.6	231.5	39.8	21.7	279.9	48.4
	9.0	149.0	25.6	22.4	178.8	29.9	193.1	33.2	24.5	232.1	39.0	237.3	40.8	22.7	286.1	48.9
	10.0	152.6	26.2	23.4	182.7	30.1	197.8	34.0	25.6	237.2	39.4	243.0	41.8	23.7	292.3	49.3
	11.0	156.2	26.9	24.4	186.6	30.4	202.5	34.8	26.7	242.2	39.7	248.8	42.8	24.8	298.5	49.8
	12.0	159.8	27.5	25.4	190.5	30.7	207.2	35.6	27.9	247.2	40.1	254.5	43.8	25.8	304.7	50.2
	13.0	163.4	28.1	26.5	194.4	31.0	211.8	36.4	29.0	252.3	40.4	260.3	44.8	26.9	311.0	50.7
	14.0	167.0	28.7	27.6	198.3	31.2	216.5	37.2	30.2	257.3	40.8	266.0	45.8	28.0	317.2	51.1
	15.0	170.6	29.4	28.7	202.2	31.5	221.2	38.0	31.4	262.4	41.2	271.8	46.7	29.2	323.4	51.6
46	5.0	128.0	22.0	16.9	159.4	31.4	166.0	28.5	18.5	207.0	41.0	203.9	35.1	17.1	255.3	51.5
	6.0	131.5	22.6	17.8	163.2	31.7	170.5	29.3	19.5	211.9	41.4	209.4	36.0	18.0	261.4	51.9
	7.0	**135.0**	**23.2**	**18.7**	**167.0**	**32.0**	**175.0**	**30.1**	**20.4**	**216.8**	**41.8**	**215.0**	**37.0**	**18.9**	**267.4**	**52.4**
	8.0	138.5	23.8	19.6	170.8	32.3	179.5	30.9	21.4	221.7	42.2	220.6	37.9	19.8	273.4	52.9
	9.0	142.0	24.4	20.5	174.6	32.6	184.0	31.7	22.4	226.6	42.6	226.1	38.9	20.7	279.5	53.3
	10.0	145.5	25.0	21.4	178.3	32.9	188.6	32.4	23.4	231.5	42.9	231.7	39.8	21.7	285.5	53.8
	11.0	149.0	25.6	22.4	182.1	33.2	193.1	33.2	24.5	236.4	43.3	237.2	40.8	22.7	291.5	54.3
	12.0	152.4	26.2	23.3	185.9	33.5	197.6	34.0	25.5	241.3	43.7	242.8	41.8	23.7	297.5	54.8
	13.0	155.9	26.8	24.3	189.7	33.7	202.1	34.8	26.6	246.2	44.1	248.3	42.7	24.7	303.6	55.2
	14.0	159.4	27.4	25.3	193.4	34.0	206.7	35.5	27.7	251.1	44.5	253.9	43.7	25.7	309.6	55.7
	15.0	162.9	28.0	26.4	197.2	34.3	211.2	36.3	28.9	256.0	44.8	259.4	44.6	26.8	315.6	56.2
50	5.0	121.5	20.9	15.4	155.6	34.1	157.5	27.1	16.8	202.1	44.5	193.5	33.3	15.5	249.4	55.8
	6.0	124.9	21.5	16.2	159.3	34.4	161.9	27.8	17.7	206.8	44.9	198.9	34.2	16.4	255.2	56.3
	7.0	128.3	22.1	17.0	163.0	34.7	166.3	28.6	18.6	211.6	45.3	204.3	35.1	17.2	261.1	56.8
	8.0	131.6	22.6	17.8	166.6	35.0	170.6	29.3	19.5	216.3	45.7	209.6	36.1	18.0	266.9	57.3
	9.0	135.0	23.2	18.7	170.3	35.3	175.0	30.1	20.4	221.1	46.1	215.0	37.0	18.9	272.8	57.8
	10.0	138.3	23.8	19.5	174.0	35.6	179.3	30.8	21.4	225.9	46.5	220.3	37.9	19.8	278.6	58.3
	11.0	141.7	24.4	20.4	177.6	35.9	183.7	31.6	22.3	230.6	46.9	225.7	38.8	20.7	284.5	58.8
	12.0	145.1	25.0	21.3	181.3	36.2	188.1	32.3	23.3	235.4	47.3	231.0	39.7	21.6	290.4	59.3
	13.0	148.4	25.5	22.2	185.0	36.5	192.4	33.1	24.3	240.1	47.7	236.4	40.7	22.5	296.2	59.8
	14.0	151.8	26.1	23.1	188.6	36.8	196.8	33.8	25.3	244.9	48.1	241.7	41.6	23.5	302.1	60.3
	15.0	155.2	26.7	24.1	192.3	37.1	201.1	34.6	26.4	249.6	48.5	247.1	42.5	24.5	307.9	60.8

HWOT	CWOT	RCME-40CLH1 (R513A)					RCME-50CLH1 (R513A)					RCME-60CLH1 (R513A)				
		CAP	CFR	CPD	HRJ	IPT	CAP	CFR	CPD	HRJ	IPT	CAP	CFR	CPD	HRJ	IPT
55	5.0	115.0	19.8	13.9	151.8	36.7	149.1	25.6	15.2	197.1	48.0	183.2	31.5	14.0	243.4	60.2
	6.0	118.3	20.3	14.6	155.3	37.1	153.3	26.4	16.0	201.7	48.4	188.4	32.4	14.8	249.1	60.7
	7.0	121.5	20.9	15.4	158.9	37.4	157.5	27.1	16.8	206.4	48.8	193.5	33.3	15.5	254.7	61.2
	8.0	124.7	21.5	16.1	162.5	37.7	161.7	27.8	17.7	211.0	49.3	198.7	34.2	16.3	260.4	61.8
	9.0	128.0	22.0	16.9	166.0	38.0	165.9	28.5	18.5	215.6	49.7	203.8	35.1	17.1	266.1	62.3
	10.0	131.2	22.6	17.7	169.6	38.4	170.1	29.3	19.4	220.2	50.1	209.0	35.9	17.9	271.8	62.8
	11.0	134.5	23.1	18.5	173.1	38.7	174.3	30.0	20.3	224.8	50.5	214.1	36.8	18.8	277.5	63.3
	12.0	137.7	23.7	19.4	176.7	39.0	178.5	30.7	21.2	229.4	50.9	219.3	37.7	19.6	283.2	63.9
	13.0	140.9	24.2	20.2	180.3	39.3	182.7	31.4	22.1	234.1	51.4	224.5	38.6	20.5	288.8	64.4
	14.0	144.2	24.8	21.1	183.8	39.6	186.9	32.1	23.0	238.7	51.8	229.6	39.5	21.3	294.5	64.9
	15.0	147.4	25.4	21.9	187.4	40.0	191.1	32.9	24.0	243.3	52.2	234.8	40.4	22.2	300.2	65.4
57	5.0	112.4	19.3	13.3	150.3	37.8	145.8	25.1	14.6	195.1	49.4	179.1	30.8	13.5	241.0	61.9
	6.0	115.6	19.9	14.0	153.8	38.1	149.9	25.8	15.4	199.7	49.8	184.1	31.7	14.2	246.6	62.5
	7.0	118.8	20.4	14.8	157.3	38.5	154.0	26.5	16.1	204.3	50.2	189.2	32.5	14.9	252.2	63.0
	8.0	122.0	21.0	15.5	160.8	38.8	158.1	27.2	17.0	208.8	50.7	194.3	33.4	15.7	257.8	63.5
	9.0	125.2	21.5	16.2	164.3	39.1	162.3	27.9	17.8	213.4	51.1	199.4	34.3	16.4	263.4	64.1
	10.0	128.4	22.1	17.0	167.8	39.4	166.4	28.6	18.6	217.9	51.5	204.5	35.2	17.2	269.0	64.6
	11.0	131.6	22.6	17.8	171.3	39.8	170.5	29.3	19.5	222.5	52.0	209.5	36.0	18.0	274.7	65.1
	12.0	134.8	23.2	18.6	174.9	40.1	174.7	30.0	20.4	227.1	52.4	214.6	36.9	18.8	280.3	65.7
	13.0	137.9	23.7	19.4	178.4	40.4	178.8	30.8	21.2	231.6	52.8	219.7	37.8	19.7	285.9	66.2
	14.0	141.1	24.3	20.2	181.9	40.8	182.9	31.5	22.2	236.2	53.2	224.8	38.7	20.5	291.5	66.7
	15.0	144.3	24.8	21.1	185.4	41.1	187.1	32.2	23.1	240.7	53.7	229.8	39.5	21.4	297.1	67.3

◆ Electrical data

NOTE

1 This data is based on the following conditions:

- *Chilled Water Inlet/Outlet Temperature: 12/7°C.*
- *Condensing temperature: 45°C.*

2 The "Maximum Unit Current" shown in the above table is the maximum total unit running current at the following conditions:

- *Supply Voltage: 90% of the rated voltage.*
- *Unit Capacity: 100% at max. operating conditions.*

3 The power supply cables must be sized to cover this maximum current value.

*4 Starting Current (STC*1, STC*2) means as follows:*

- **1: Starting Current of the first Compressor.*
- **2: Maximum Starting Current of the unit when the last Compressor starts (Maximum current for the running compressors + STC for the last compressor to start operation).*

5 Compressor motor is star-delta starting.

Model	Unit			Applicable Instantaneous Voltage (V)		Rated Conditions Compressor data		
						STC*1	RNC	IPT
	Ph	(V)	(Hz)	Max.	Min.	(A)	(A)	(kW)
RCME-40CLH1	3N~	400	50	440	360	179	54.3	32.0
RCME-50CLH1	3N~	400	50	440	360	240	69.3	41.8
RCME-60CLH1	3N~	400	50	440	360	240	86.9	52.4

Model	Maximum Unit (for Power Supply installation sizing)		
	STC*2	MC	IPT
	(A)	(A)	(kW)
RCME-40CLH1	179	69.8	41.1
RCME-50CLH1	240	89.0	53.7
RCME-60CLH1	240	112	67.3

8.5 Magnetic Circuit Breaker (MCB) Option



Application of Thermal Magnetic Circuit Breaker (MCB) instead of Fuses to protect the Compressor motor.

MCB offers better magnetic protection as these devices are adjustable, as well as complementary thermal protection to the overcurrent relay.

Thanks to this option, in case of some trouble, it is not necessary to change any part, just reset the MCB device and start the unit again (after to solve the problem).

8.5.1 Applicable models

All RCME-CLH1: applicable to compressor protection.

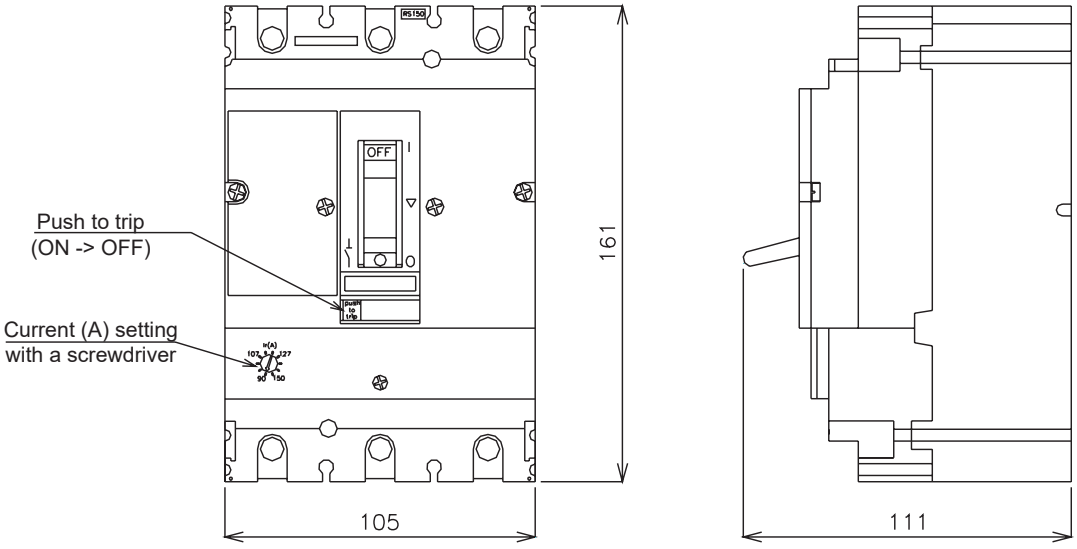
8.5.2 Main specifications

◆ Thermal Magnetic Circuit Breaker for COMPRESSOR motor (MCBC)

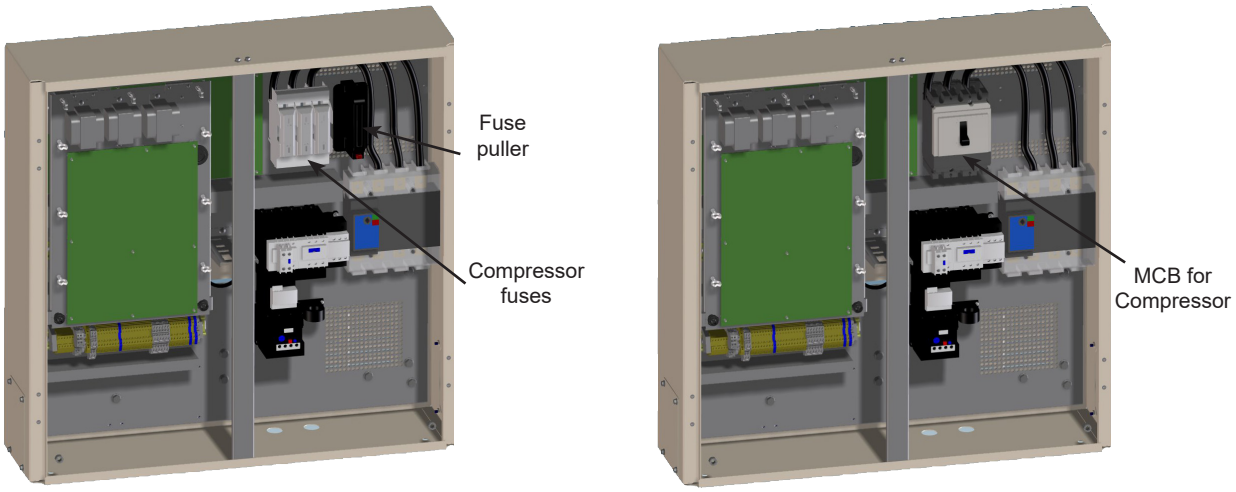
- Control type: rocker lever.
- Adjustment range: 90 ~ 150A.
- Factory setting:

Model	Cooling operation (A)	Heat Pump operation (Option) (A)
RCME-40CLH1	90	90
RCME-50CLH1	100	113
RCME-60CLH1	120	135

Overall dimensions (in mm):

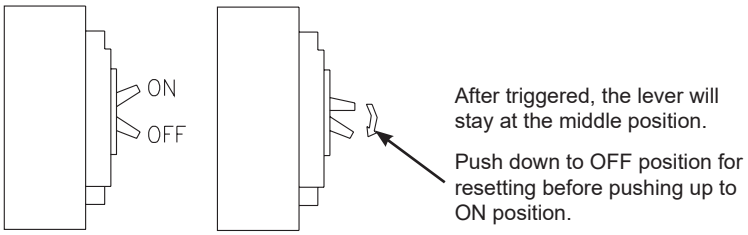


8.5.3 Assembly detail



STANDARD *OPTION*

8.5.4 How to reset the MCBC device



8.6 Dual Safety Valve Option



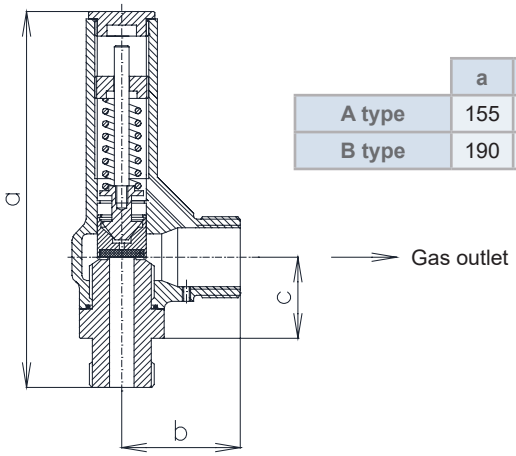
Additional Safety Valve assembled to the compressor discharge chamber, together with a Changeover Valve that controls the two safety devices, and so arranged that only one can be made inoperative at any one time.

Thanks to this option one safety valve can be taken out (for servicing, repairing, etc…) without emptying the refrigerant circuit, while the other valve is enabled and therefore protecting the unit against high pressure condition.

8.6.1 Main specifications

◆ Safety valve

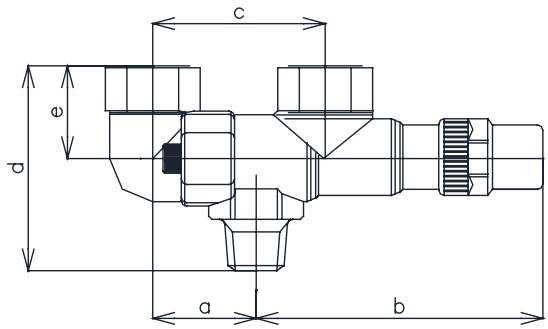
- Material: brass.
- Setting pressure: 22,5 bar.
- Overall dimensions (in mm):



	a	b	c	Inlet connection size	Outlet connection size
A type	155	49	33	3/4” NPT male	G 1” male
B type	190	59	40	1” NPT male	G 1.1/4” male

◆ Changeover Valve

- Material: brass.
- Overall dimensions (in mm):

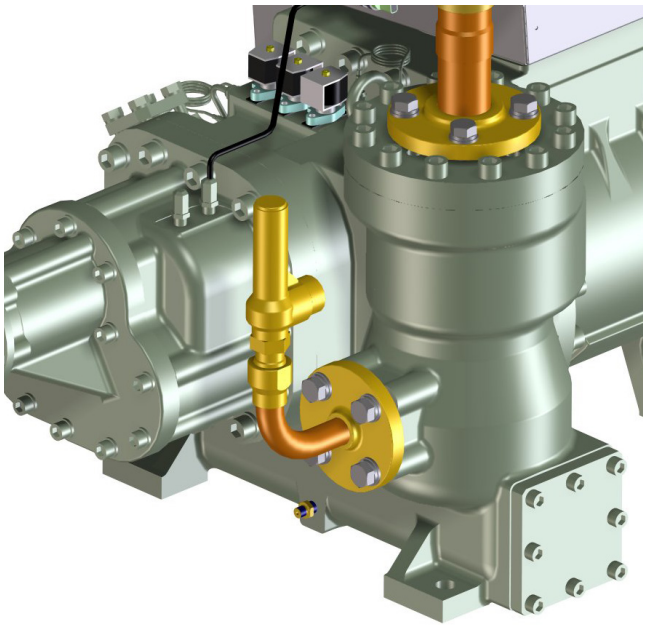


	a	b	c	d	e	Inlet and outlet connection size
A type	48	133	80	95	43	3/4” NPT male
B type	66	185	110	120	49	1” NPT

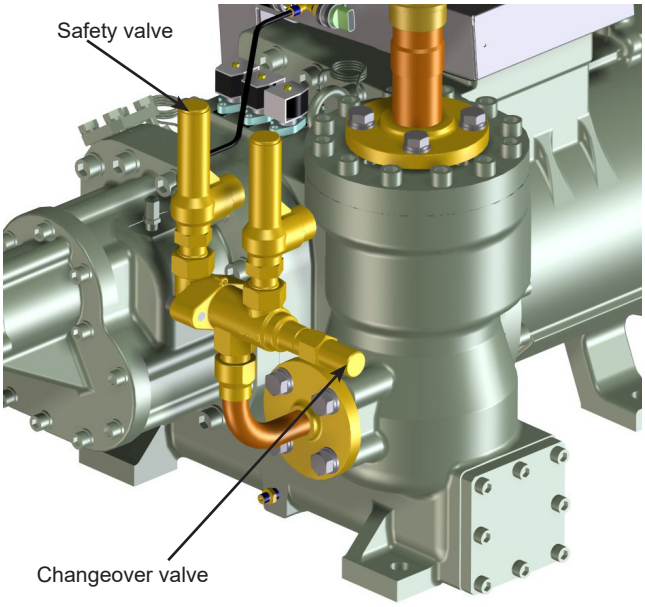
NOTE

- *The changeover valve shall be completely opened or completely closed so that one safety valve is enabled while the other one is disabled.*
- *A type : applicable to RCME-40/50CLH1.*
- *B type: applicable to RCME-60CLH1.*

8.6.2 Assembly detail

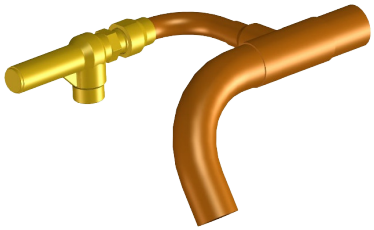


STANDARD



OPTION

8.7 Suction Safety Valve Option



Additional Safety Valve assembled to the compressor suction line.

Extra protection to the low pressure side of the refrigerant circuit.

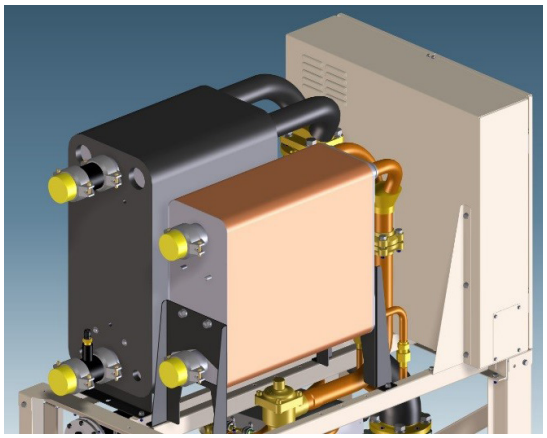
8.7.1 Main specifications

◆ Safety valve

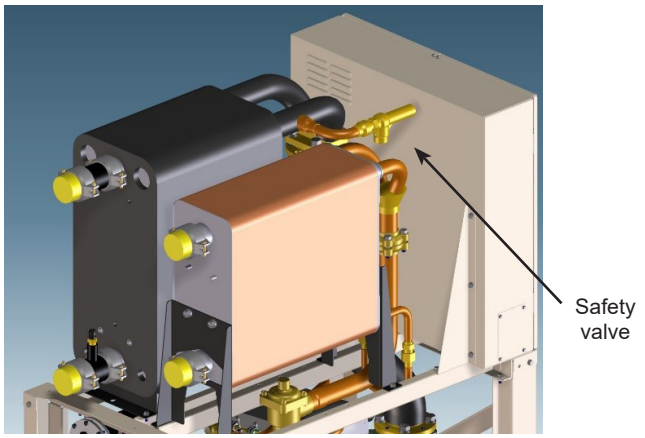
Same valve as the one used in “Dual Safety Valve” option.

- Setting pressure: 22,5 bar.

8.7.2 Assembly detail



STANDARD

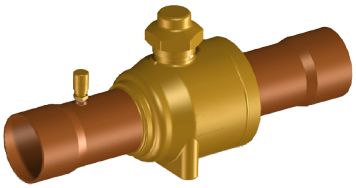


OPTION

NOTE

Pictures are for illustrative purpose only. Chiller model shown in the picture doesn’t correspond to a RCME-CLH1. Above pictures are example of RCME-WH1 unit.

8.8 Suction valve



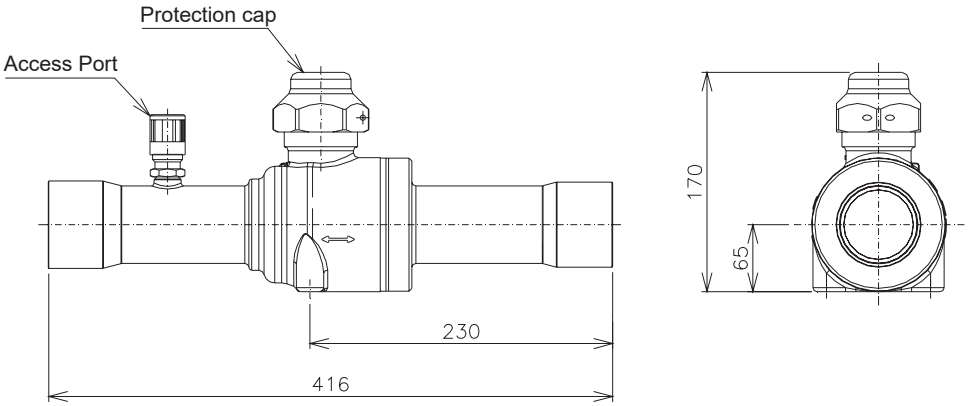
Suction Shut-off Valve is assembled on the compressor suction line.

This Option makes it possible to close the refrigeration cycle and facilitate easier compressor maintenance.

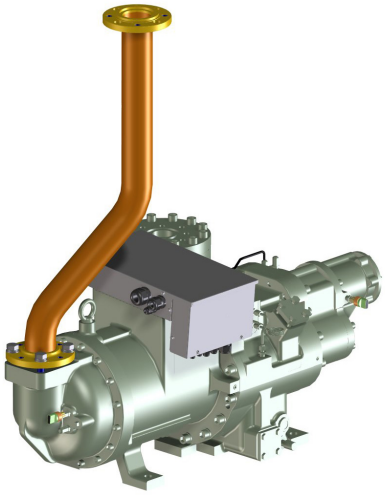
It is recommended to be combined together with “Discharge Valve OPTION”.

8.8.1 Main specifications

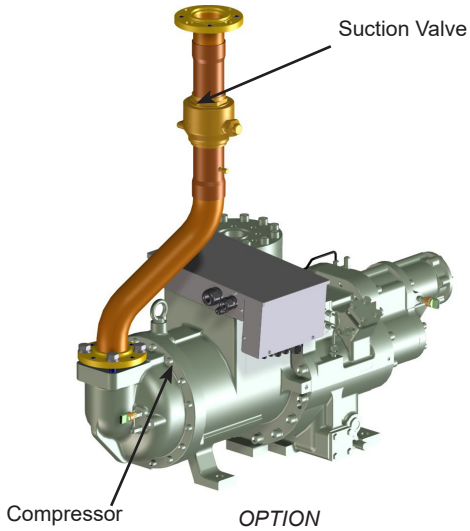
- Valve type: bi-directional ball valve. Full port type for lower pressure drop.
- Material: brass body with copper connections.
- Open-close rotation: ¼ turn from fully open to fully close.
- Access port with internal core valve is included.
- Overall dimensions (in mm):



8.8.2 Assembly detail



STANDARD



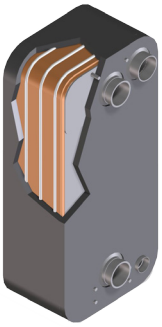
OPTION

8.8.3 How to operate the shut off valve

The unit is supplied with the Suction valve opened.

For servicing, close the valve by removing the protection cap and turning the shaft ¼ turn by means of a spanner.

8.9 Water Cooler Heater Option



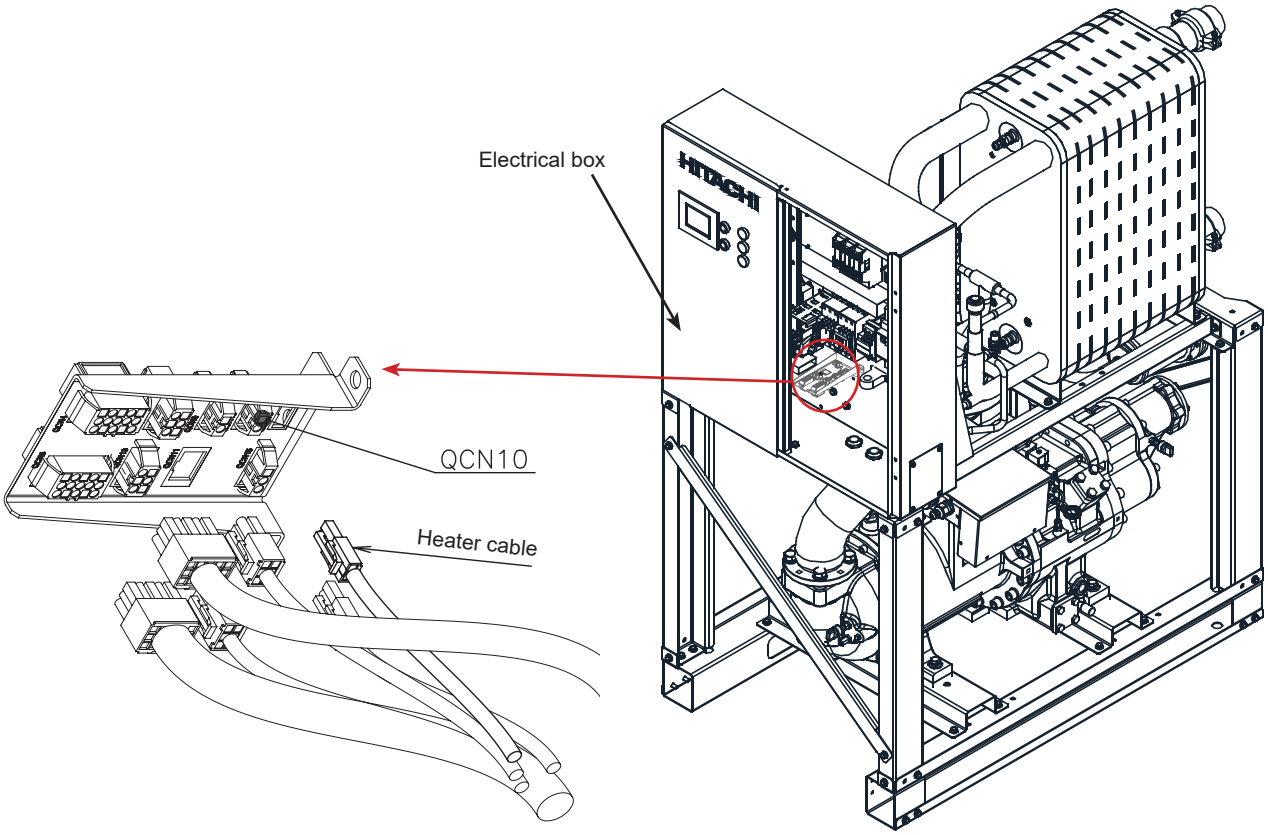
This option includes an electric heater installed around both Plate Heat Exchangers to heat up the internal water volume and protect them against freezing.

The heater is activated when the unit is stopped, and is protecting the Plate Heat Exchangers in case of low ambient temperatures as well as low water temperatures.

8.9.1 Main specifications

- The heater is activated (ON) when unit is stopped (OFF).
- The heater is de-activated (OFF) when the unit is operating (ON).

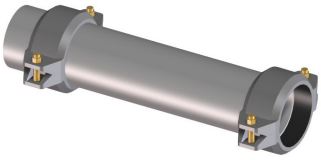
8.9.2 Assembly detail

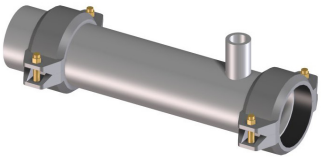


NOTE

The port for the heater cable inside the Electrical Box is the QCN10.

8.10 Stainless Steel Water Pipe Option





Application of stainless steel to the water piping of the unit instead of using carbon steel pipes.

Corrosion of the water pipes will be considerably reduced.

Less potential erosion of the pipes due to the greater hardness of the stainless steel against carbon steel.

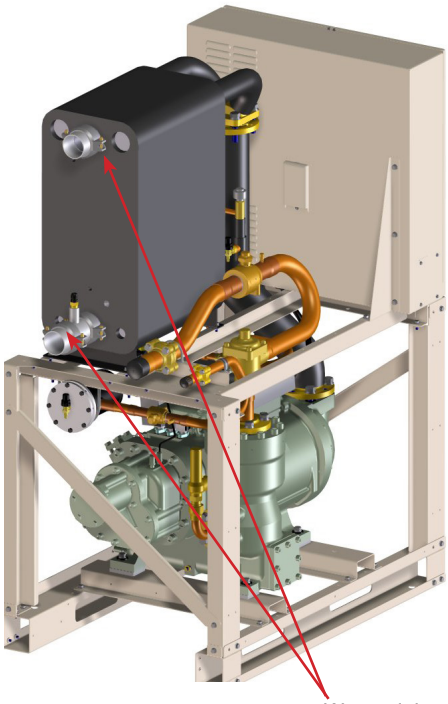
NOTE

This option can be requested together with the "Common Water Pipe ACCESSORY", but in that case please note that the Common Water Pipe is not made in stainless steel but carbon steel.

8.10.1 Main specifications

- Material: stainless steel AISI 304. Other materials are available upon request.
- Maximum water flow rate increases: 1.5 times compared to the Standard unit one.

8.10.2 Assembly detail



8.11 Power Meter Option



This device is used to capture and output electrical data of the unit such as: power consumption, current, frequency, power factor, voltage phase to phase and phase to neutral. Assembled at factory (inside electrical box).

With hour counter integrated.

Communication port protocol: Modbus, RS485 interface

This device is used to visualize electrical data of the unit like:

- Power Consumption (active/reactive).
- Voltage (V) voltage phase to phase and phase to neutral
- Current (I), frequency (Hz), power factor, etc…
- Average, maximum and instant values.
- Hour counter integrated.
- etc…

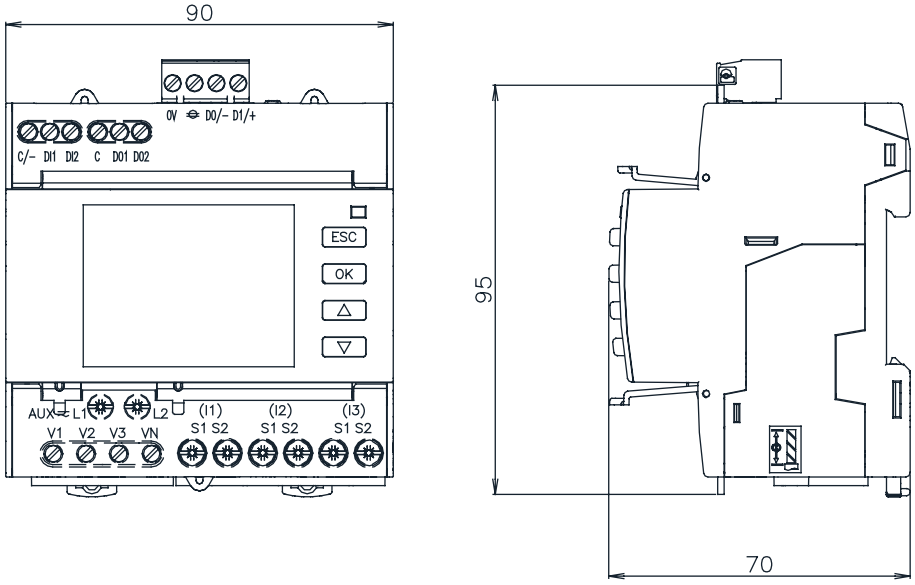
Communication port protocol Modbus, RS 485 interface is available.

NOTE

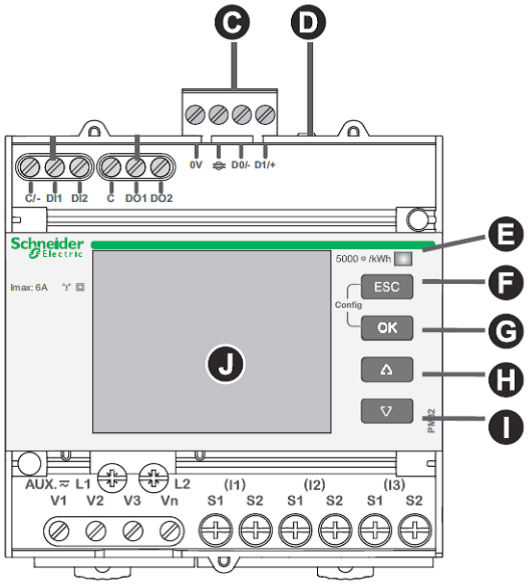
This option can be requested also as an ACCESSORY.

8.11.1 Main specifications

- Power supply: 1~230V ±10% 50Hz
- Overall dimensions (in mm):



- Communication port protocol: Modbus, RS 485 interface
- DIN rail mounting
- Protection grade: IP40 on front panel, IP20 on Power Meter body
- Operating temperature: -25 ºC ~ +55 ºC
- Weight: 0.26kg
- Layout:



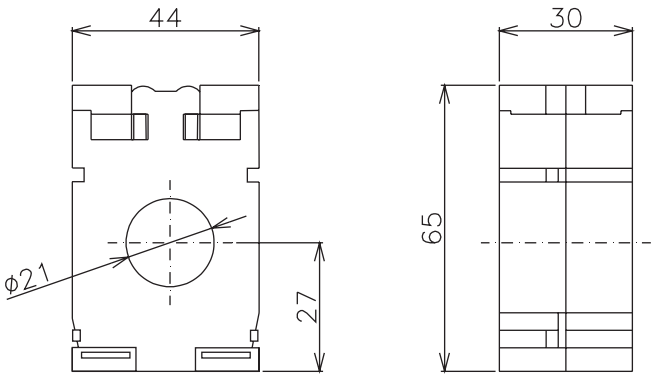
- **C** Communications port
- **D** Communications LED
- **E** Energy pulse LED (5000/kWh)
- **F** Cancellation
- **G** Confirmation
- **H** Up
- **I** Down
- **J** Display with white backlight

NOTE

For Power Meter device configuration see Product Manual PMML0349A.

◆ Current Transformers (CT)

- Overall dimensions (in mm):



8.11.2 Assembly detail

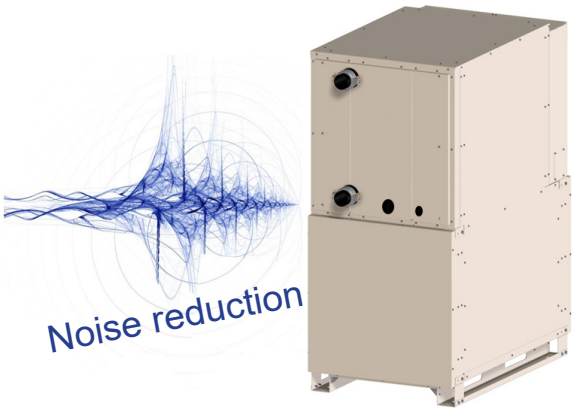


STANDARD



OPTION

8.12 Low Noise / Super Low Noise Option



Noise reduction compared to the standard unit, without any decrease in performance or operating range.

2 different noise levels:

1) Low Noise: -6dB(A)

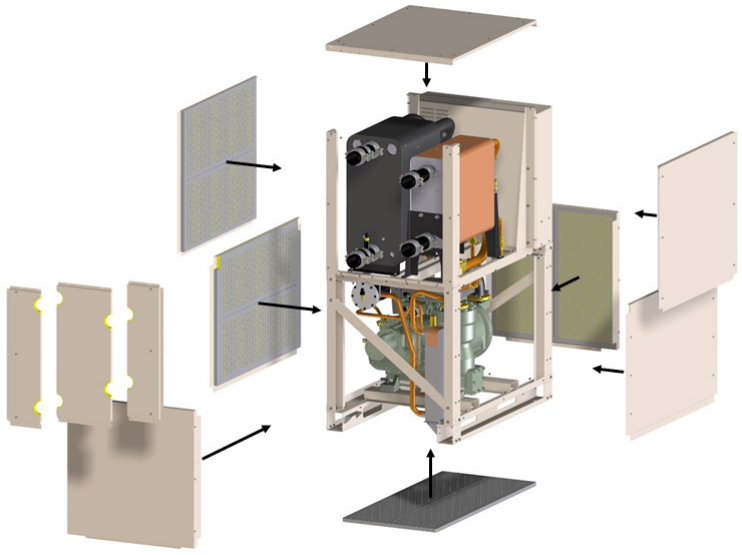
2) Super Low Noise: -16dB(A)

Full unit enclosure assembled for reducing the sound, mainly from the compressor.

8.12.1 Main specifications

Unit enclosure: specific design of the encapsulating plates, based on real compressor sound spectrum.

Panels fixed to the unit structure by bolts, easy to remove in case of servicing/maintenance.



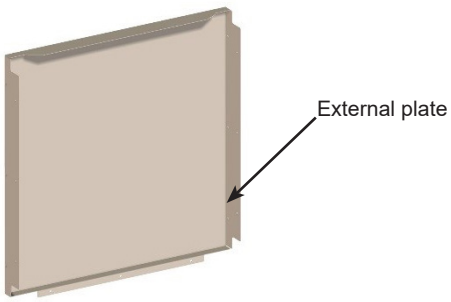
NOTE

Pictures are for illustrative purpose only. Chiller model shown in the picture doesn't correspond to a RCME-CLH1. Above picture is example of RCME-WH1 unit.

Encapsulating panels design:

- LOW NOISE:

  Simple panels around the whole unit, including the bottom side, to achieve 6dB(A) of sound reduction.

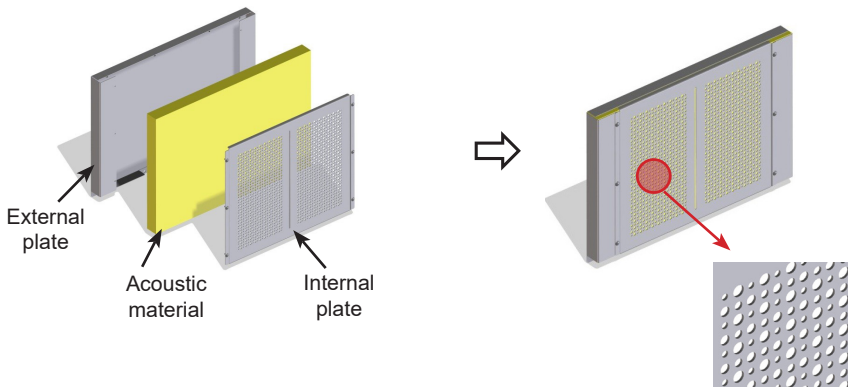


- SUPER LOW NOISE:

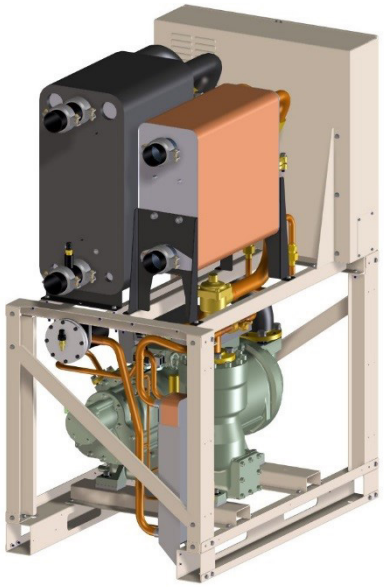
  Sandwich panels composed by an external plate, an internal plate with different diameter holes, and an insulation material between both plates.

  Thanks to the holes on the internal plates and the acoustic material inside, 16dB(A) of sound reduction is achieved.

  Example of a panel:



8.12.2 Assembly detail



STANDARD



OPTION

NOTE

Pictures are for illustrative purpose only. Chiller model shown in the picture doesn't correspond to a RCME-CLH1. Above pictures are example of RCME-WH1 unit.

8.12.3 Unit noise data

Model	"Low Noise verison"	Sound Power level (dB)								"Overall (dBA)"
		Frequency Band (Hz)								
		63	125	250	500	1000	2000	4000	8000	
RCME-40CLH1	LN	82	75	70	82	78	71	60	55	82
	SLN	88	73	63	72	68	58	46	41	72
RCME-50CLH1	LN	83	76	71	83	79	72	61	56	83
	SLN	89	74	64	73	69	59	47	42	73
RCME-60CLH1	LN	84	77	72	84	80	73	62	57	84
	SLN	90	75	65	74	70	60	48	43	74

8.12.4 Unit weight

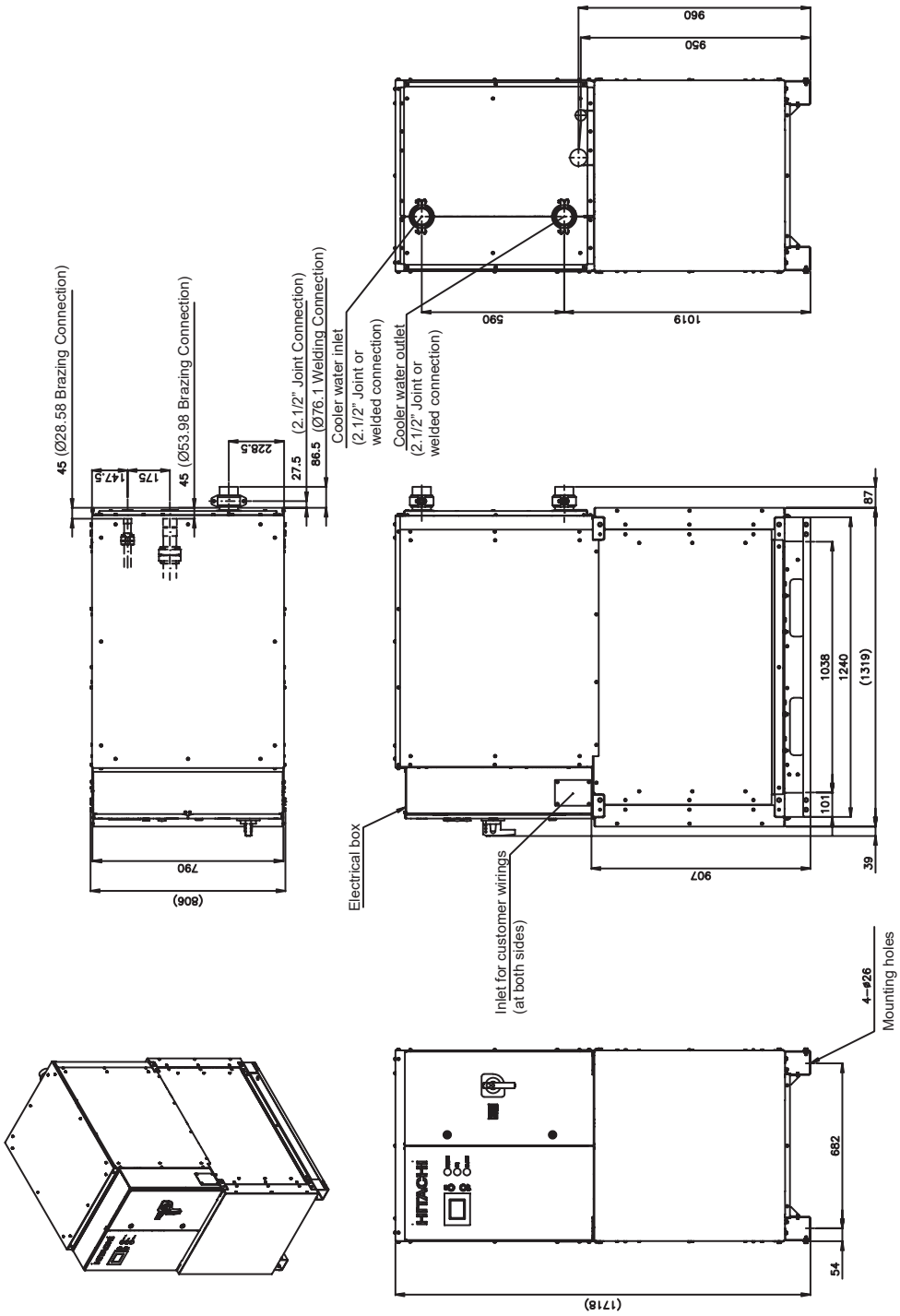
The weight of the unit is increased by 100kg (Low Noise) and 190kg (Super Low Noise) compared to the Standard unit:

Model	Shipping weight (kg)			Operating weight (kg)		
	Standard	Low Noise	Super Low Noise	Standard	Low Noise	Super Low Noise
RCME-40CLH1	750	850	940	765	865	955
RCME-50CLH1	810	910	1000	835	935	1025
RCME-60CLH1	875	975	1065	900	1000	1090

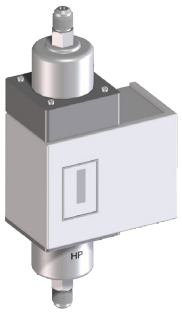
8.12.5 Unit dimensions

The external dimensions of RCME-CLH1 (in mm) change as follows:

	Standard unit	Low Noise / Super LN unit
Height	1681	1718
Width	806	806
Depth	1271	1319



8.13 Differential Water Pressure Switch Option



The differential pressure Switch is a safety device used to avoid the chiller running when the system water flow is insufficient, and therefore avoid water freezing inside the Plate Heat Exchanger.

It measures the water pressure difference between water inlet and water outlet.

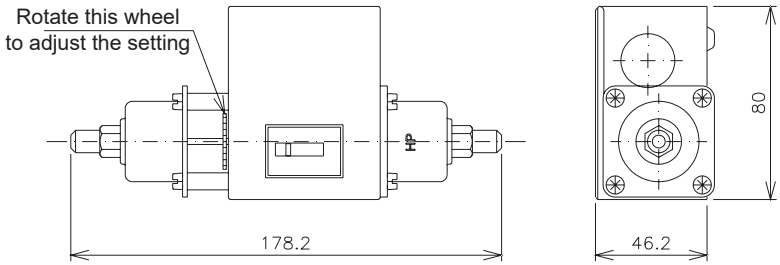
Thanks to this device, the unit can be protected under several conditions like pump stopped or locked, pipe clogging, dirty Plate Heat Exchanger, etc…

8.13.1 Main specifications

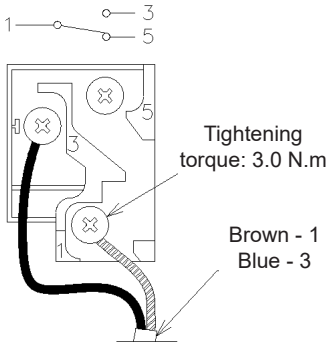
- Auto reset.
- Manually adjustable.
- Factory setting:

"Module (HP)"	Minimum Water Flow (m^3/h)
	RCME-CLH1
40HP	14.5
50HP	18.8
60HP	23.1

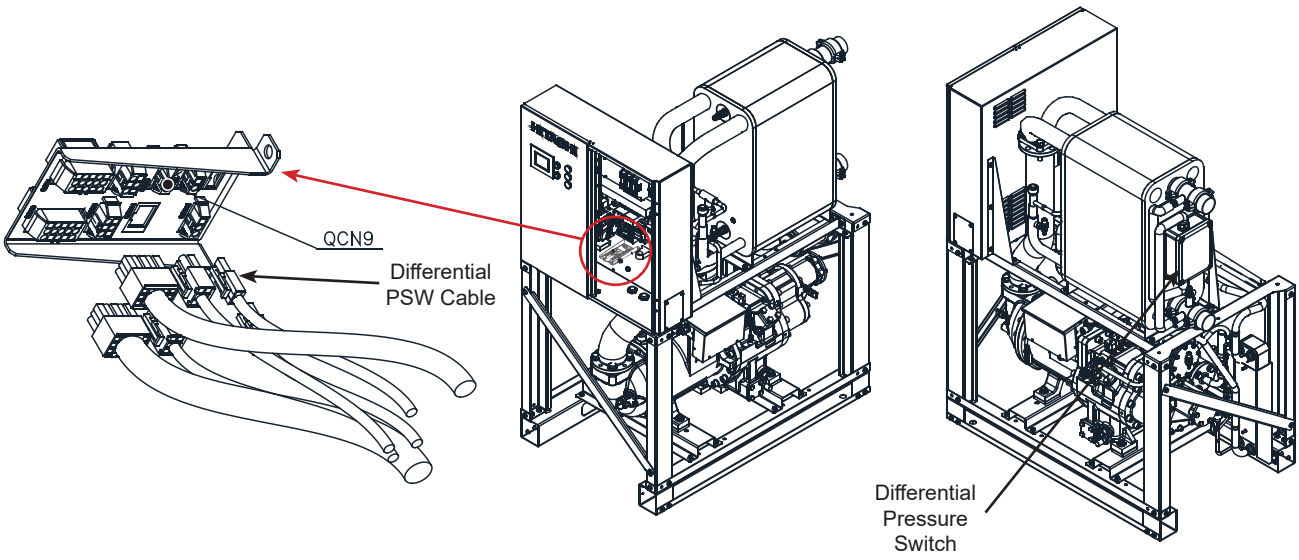
Overall dimensions (in mm):



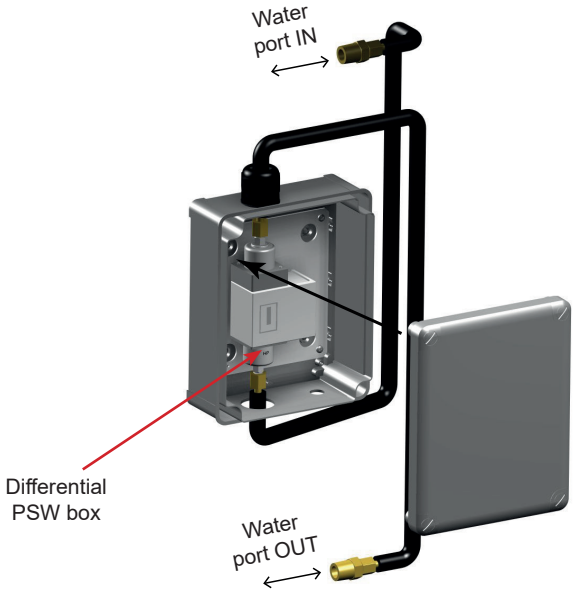
- Protection grade of the whole assembly: IP45.
- Electrical connections of the Differential pressure switch device:



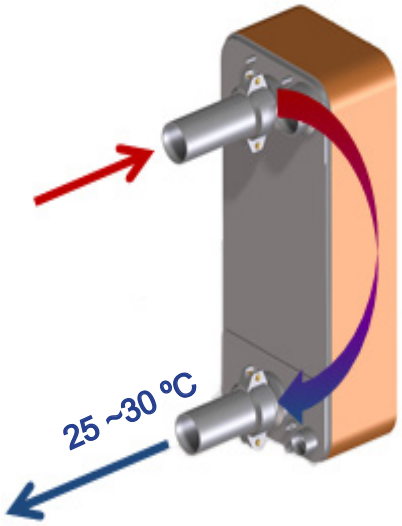
8.13.2 Assembly detail



Assembly detail: the differential pressure switch device is encapsulated in a Plastic Box.



8.14 High water outlet temperature option



The maximum water outlet temperature is increased from 15°C up to 25~30°C (depending on the unit type).

The software will automatically change the superheat target aiming to decrease the suction pressure and optimize the performance.

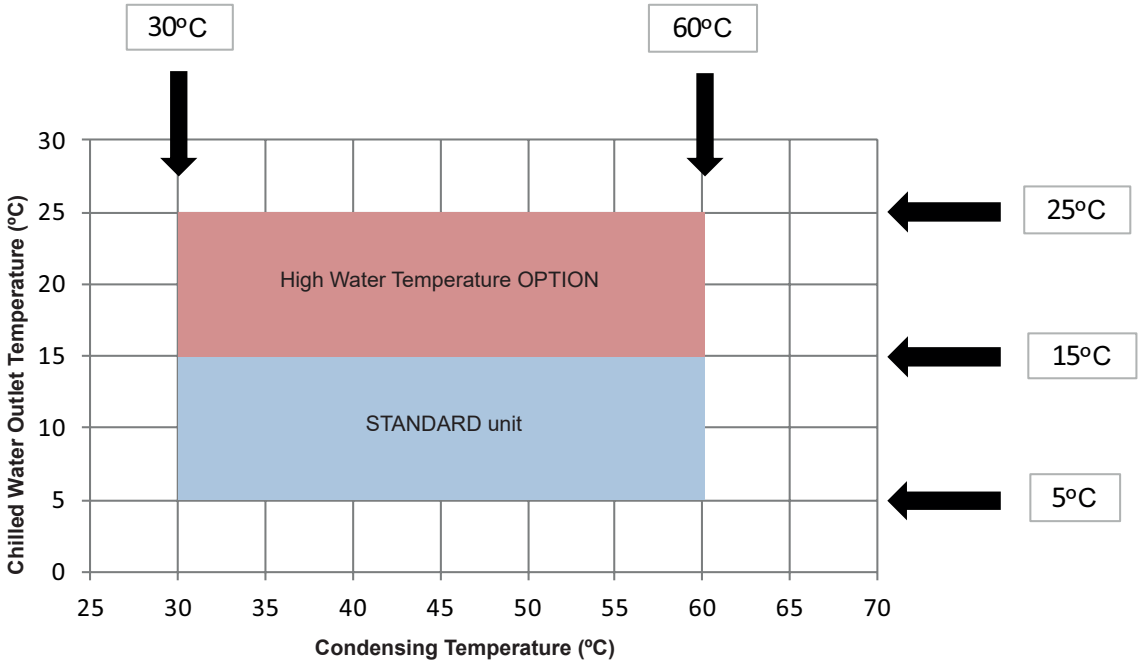
The water pipe is changed from carbon steel to stainless steel to reduce pipes erosion.

An additional 2 litres charge of oil is made to protect the compressor, especially under overload conditions.

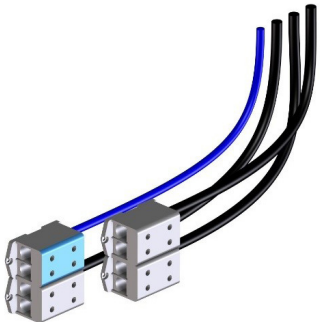
8.14.1 Main specifications

- Water pipe: changed from carbon steel to stainless steel AISI 304 to reduce pipes erosion.
- Maximum water flow rate increases: 1.5 times compared to the Standard unit one.
- Total oil charge for RCME-CLH1 series: 10 litres
- If customers do not wish to use stainless steel material for the pipes, Hitachi recommends to select a minimum size of 3” water pipes to avoid quick erosion.

8.14.2 New working range



8.15 Power Cable Routing Option



Additional connectors assembled inside the Electrical Box, for easier power module-to-module wiring connections.

Includes the cables from the Main switch to the connectors.

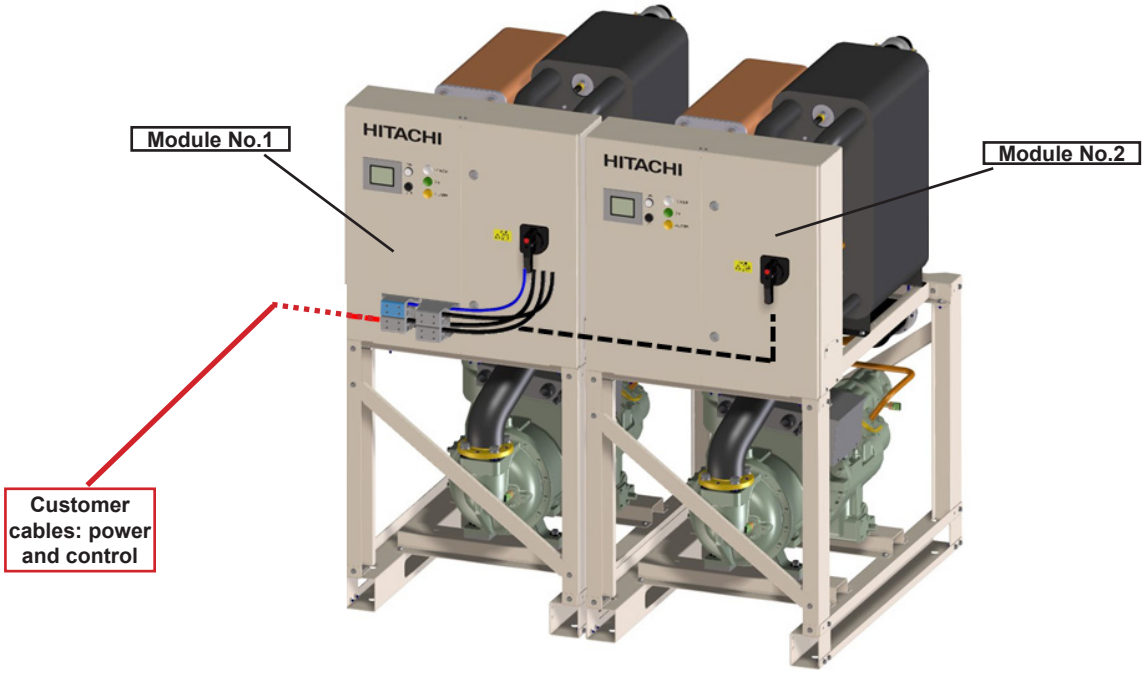
8.15.1 Main specifications

Possible configurations:

Maximum number of modules to be connected on site with these options: 3 modules.

However, only 1 module shall be ordered with this option. The other 1 or 2 modules shall be ordered as standard modules.

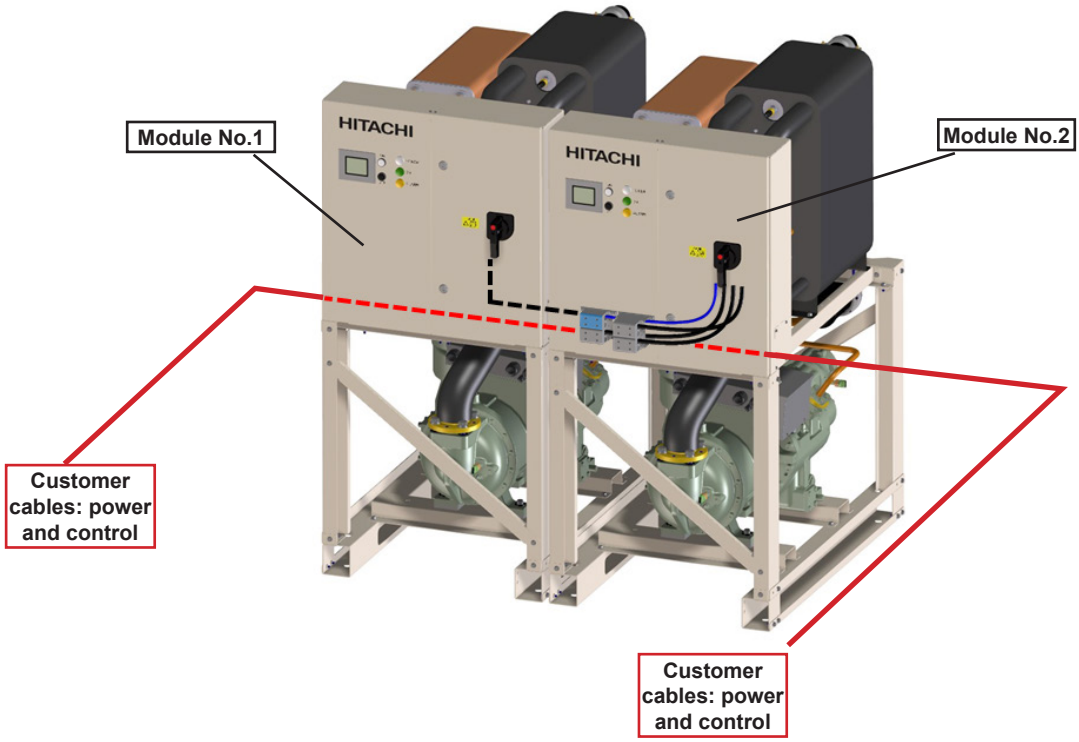
- In case of 2 modules:
  - OPTION A



Customer cables from left side.

Mod.	Option
Module number 1	Power Cable Routing
Module number 2	-

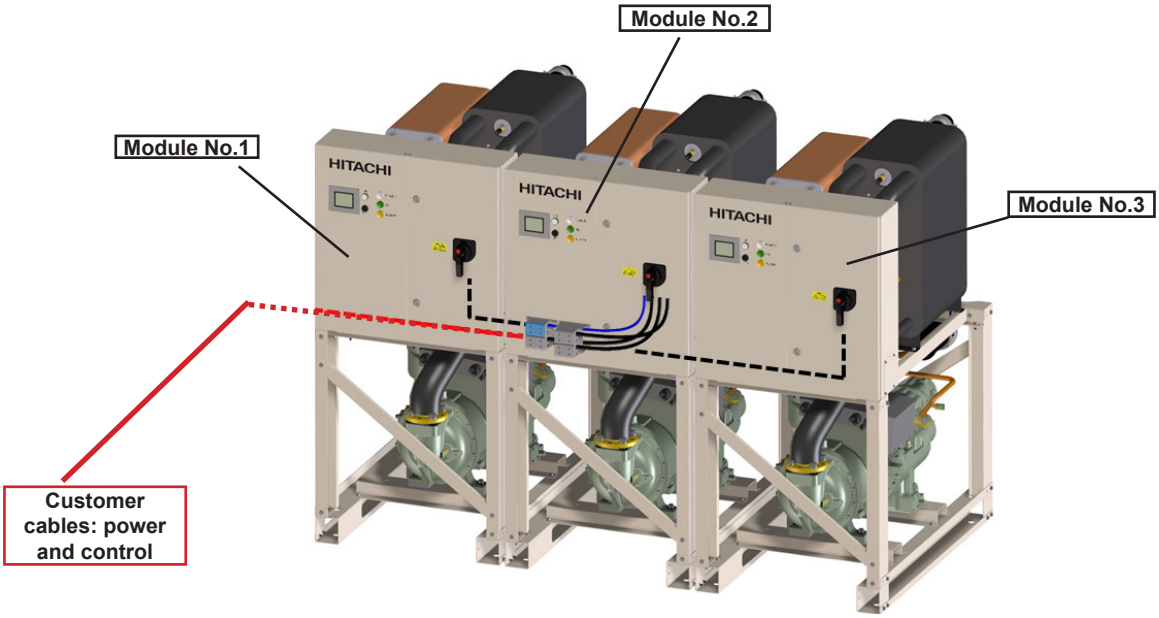
- OPTION B



Customer cables from left or right side.

Mod.	Option
Module No.1	-
Module No.2	Power Cable Routing

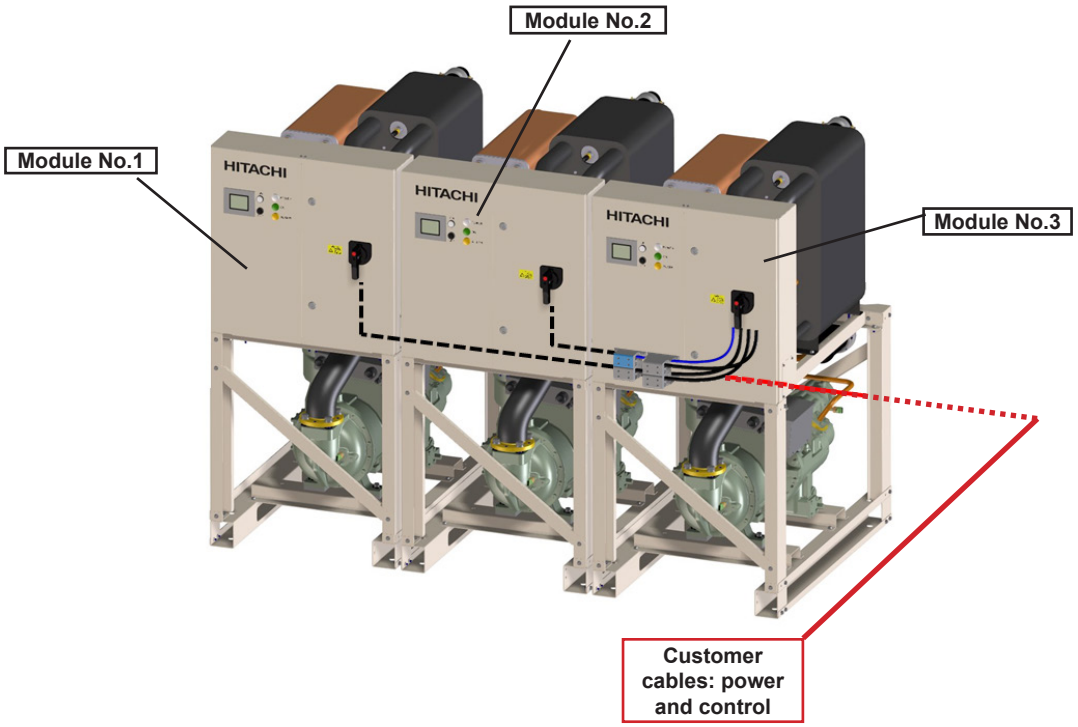
- In case of 3 modules:
  - OPTION A



Customer cables from left side.

Mod.	Option
Module number 1	-
Module number 2	Power Cable Routing
Module number 3	-

- OPTION B



Customer cables from right side.

Mod.	Option
Module number 1	-
Module number 2	-
Module number 3	Power Cable Routing

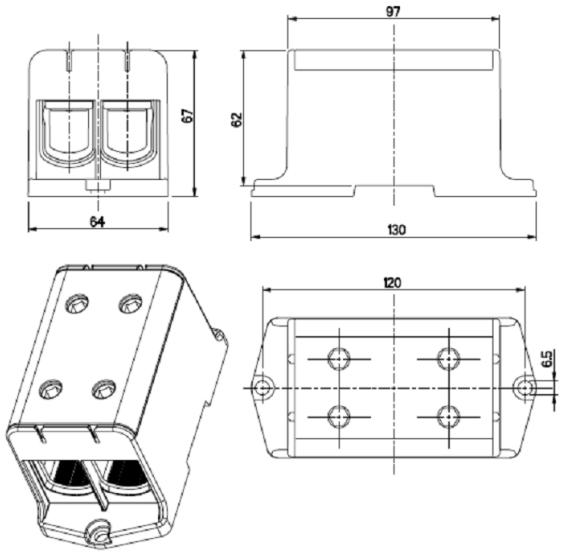
NOTE

Pictures are for illustrative purpose only. Chiller model shown in the picture doesn't correspond to a RCME-CLH1. Above pictures are example of RCME-WH1 unit.

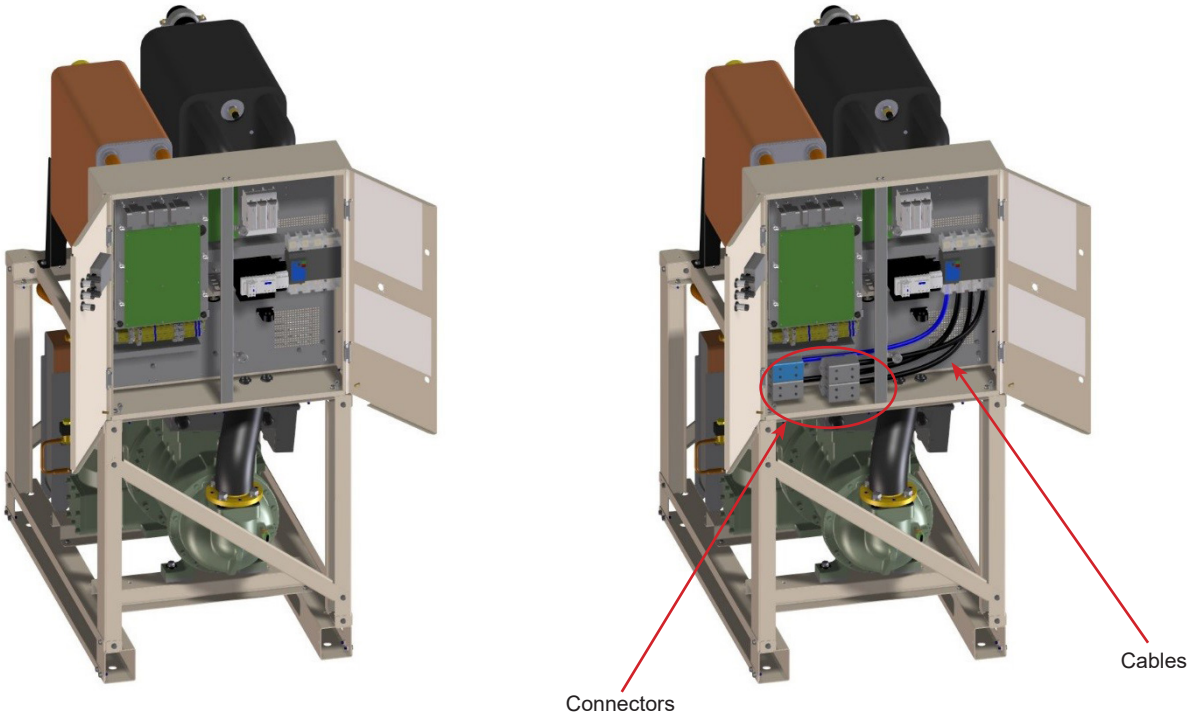
8.15.2 Terminal connectors

Terminal connectors:

- Cable size to be connected: 35 ~ 240mm².
- Colour: grey for R,S,T phases; light blue for Neutral.
- Tightening torque: 12N·m (35~70mm²); 45N·m (95~240mm²).
- Overall dimensions (in mm):



8.15.3 Assembly detail

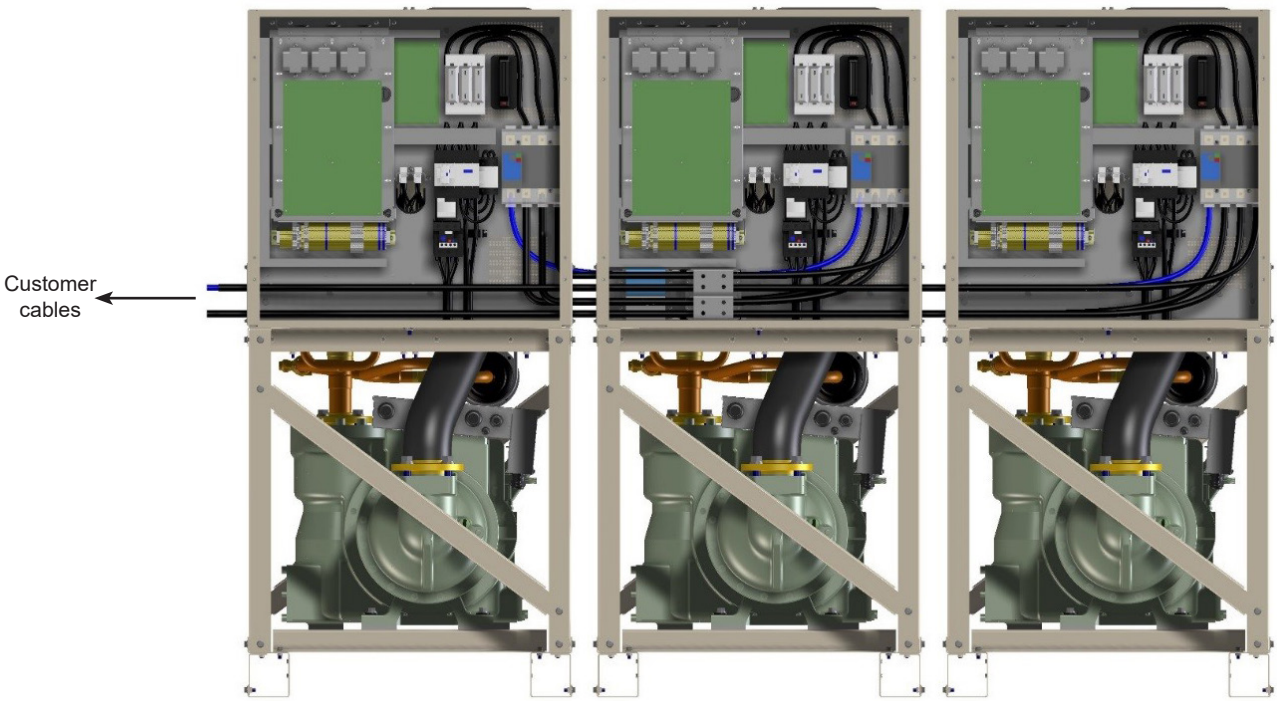


STANDARD *OPTION*

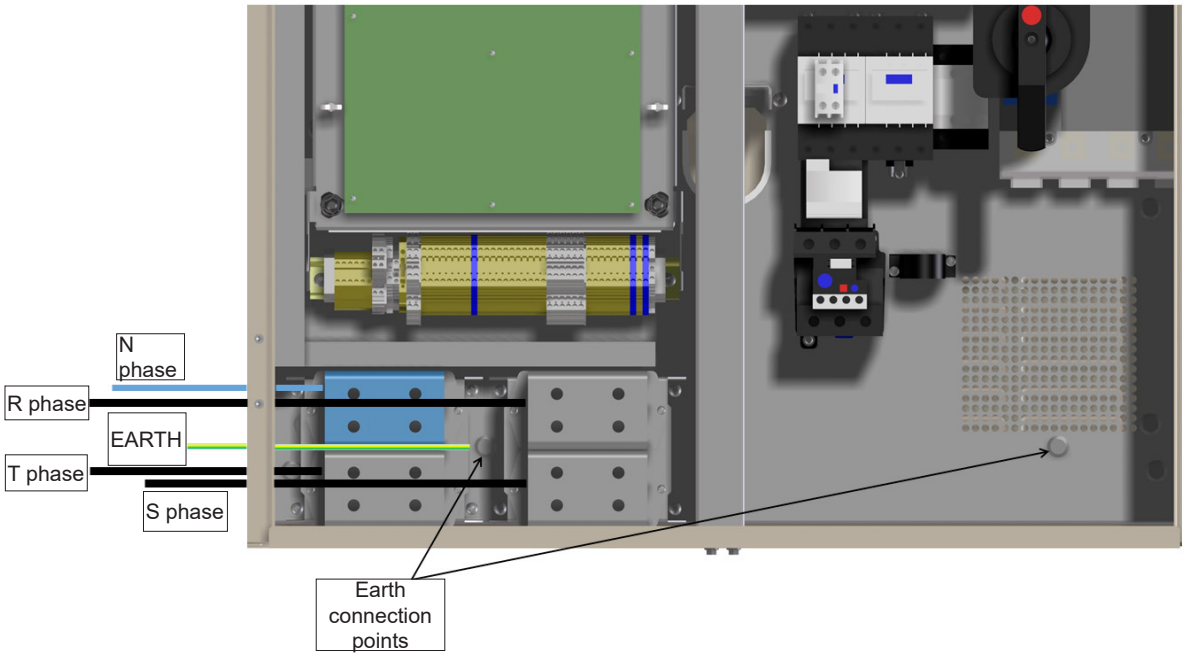
NOTE

Pictures are for illustrative purpose only. Chiller model shown in the picture doesn't correspond to a RCME-CLH1. Above pictures are example of RCME-WH1 unit.

◆ **Example of 3 modules (frontal view)**



8.15.4 Customer cables connecting points



- Recommended tightening torques:
- Earth: 24.5 N·m
- N,R,S,T phases: depending on the cable size:
- 35~70mm² : 12 N·m
- 95~240mm² : 45 N·m

8.16 Water Pressure Port Option



Additional pressure port on both water inlet and water outlet.

It facilitates easy on site rough measurement and evaluation of the pressure drop across the PHE to ensure it is not experiencing restricted flow rate due to contamination and clogging.

8.16.1 Main specifications

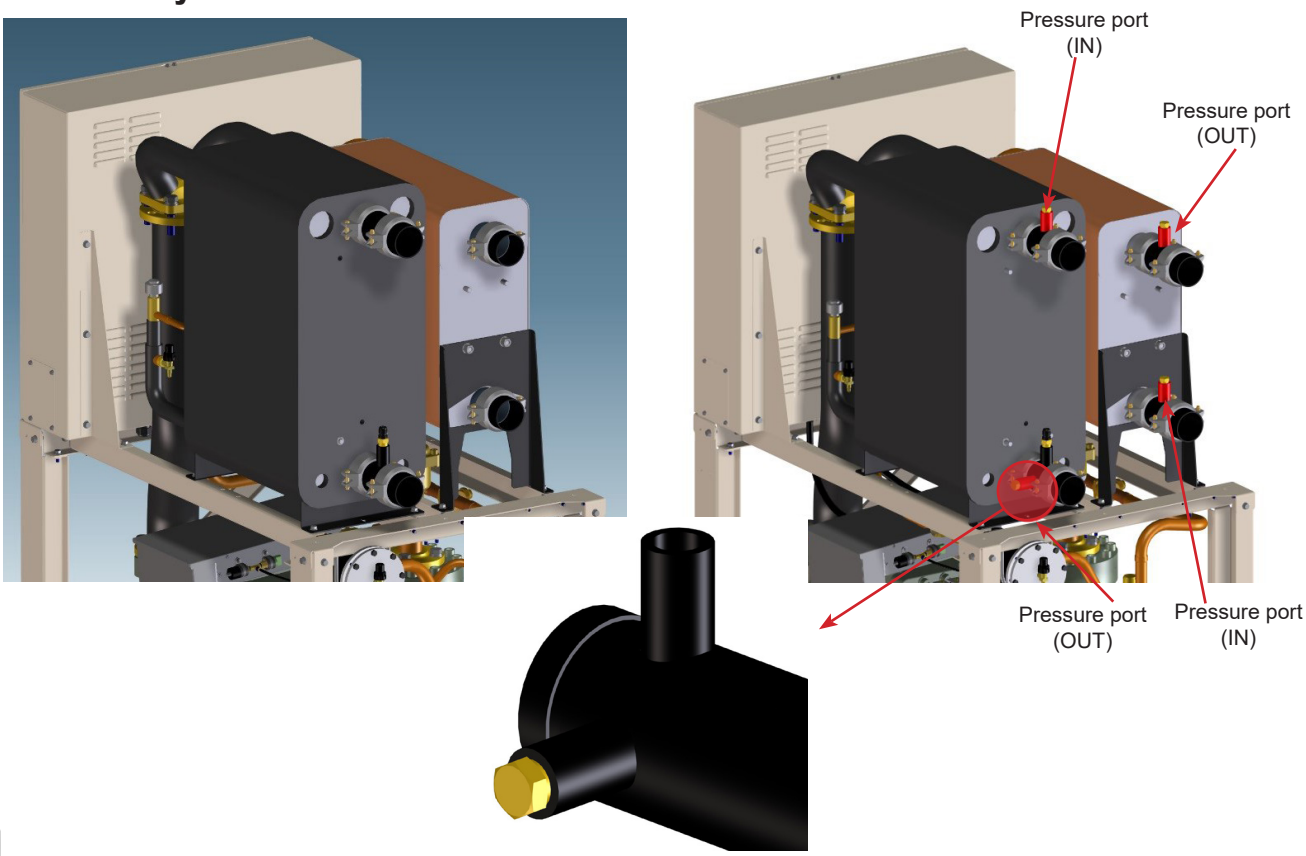
Port size: NPT 1/2” (female)

Both ports will be closed by a brass plug from factory.

NOTE

- *These ports are suitable only for rough measurements of the unit’s pressure drop.*
- *If high accuracy is requested, it is recommended to keep a straight pipe with a length of 5 times the outlet diameter (5xØD) before and after the measuring point.*

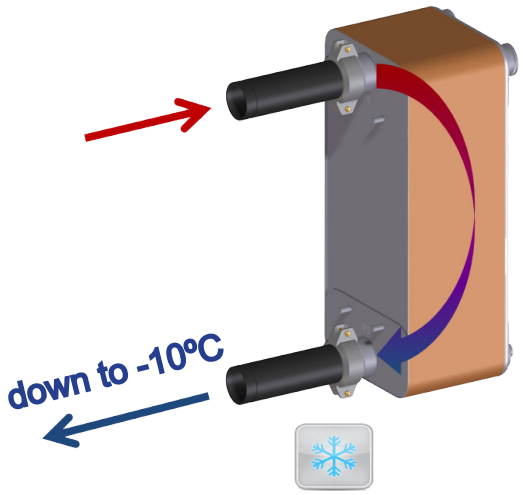
8.16.2 Assembly detail



NOTE

Pictures are for illustrative purpose only. Chiller model shown in the picture doesn't correspond to a RCME-CLH1. Above pictures are example of RCME-WH1 unit.

8.17 Brine Option



The minimum Chiller water outlet temperature is decreased from +5ºC down to -10ºC.

3 different categories, depending on the minimum chilled water outlet temperature requested:

- Brine (Low1): from +5ºC down to 0ºC
- Brine (Low2): from 0ºC down to -5ºC
- Brine (Low3): from -5ºC down to -10ºC

8.17.1 Main specifications

When water temperatures are lower than 5°C, anti-freezing mixture of Ethylene/Propylene glycol shall be added in the system to avoid water freezing and thus possible malfunction/damage of the components of the water piping, including

the water pipes itself.

The minimum glycol/water ratio shall be based according to the following table:

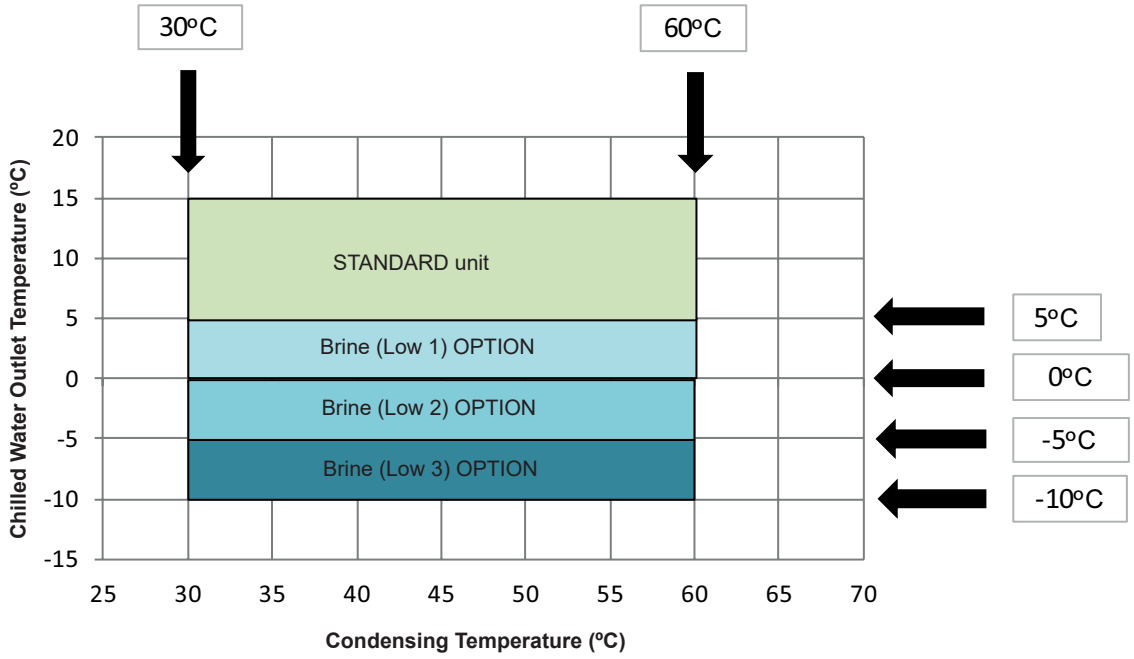
Category	"Water Outlet temperature (°C)"	"Minimum required Ethylene Glycol (wt%)"	"Freezing point (°C)"	"Minimum required Propylene Glycol (wt%)"	"Freezing point (°C)"
Low 1	5 ~ 0	20	-7	20	-6
Low 2	0 ~ -5	30	-13	30	-11
Low 3	-5 ~ -10	40	-22	40	-19

NOTE

Higher percentages shall be applied when due to low ambient temperature it exists a restriction stronger than the water temperature restriction itself.

The unit operating software will automatically change the freeze protection point based on the water outlet temperature setting point, so that the Plate Heat Exchanger will be protected against freezing.

8.17.2 New working range



8.18 LCD Language



Translation of the texts shown in the LCD to several languages rather than English, French and Spanish.

8.18.1 Main specifications

The LCD used for setting and monitoring the chiller parameters accepts 3 different languages. The standard unit has embedded the 3 following languages: English, French, Spanish.

The one set as default from factory is ENGLISH.

In case of interest in having other languages, the following packs are offered:

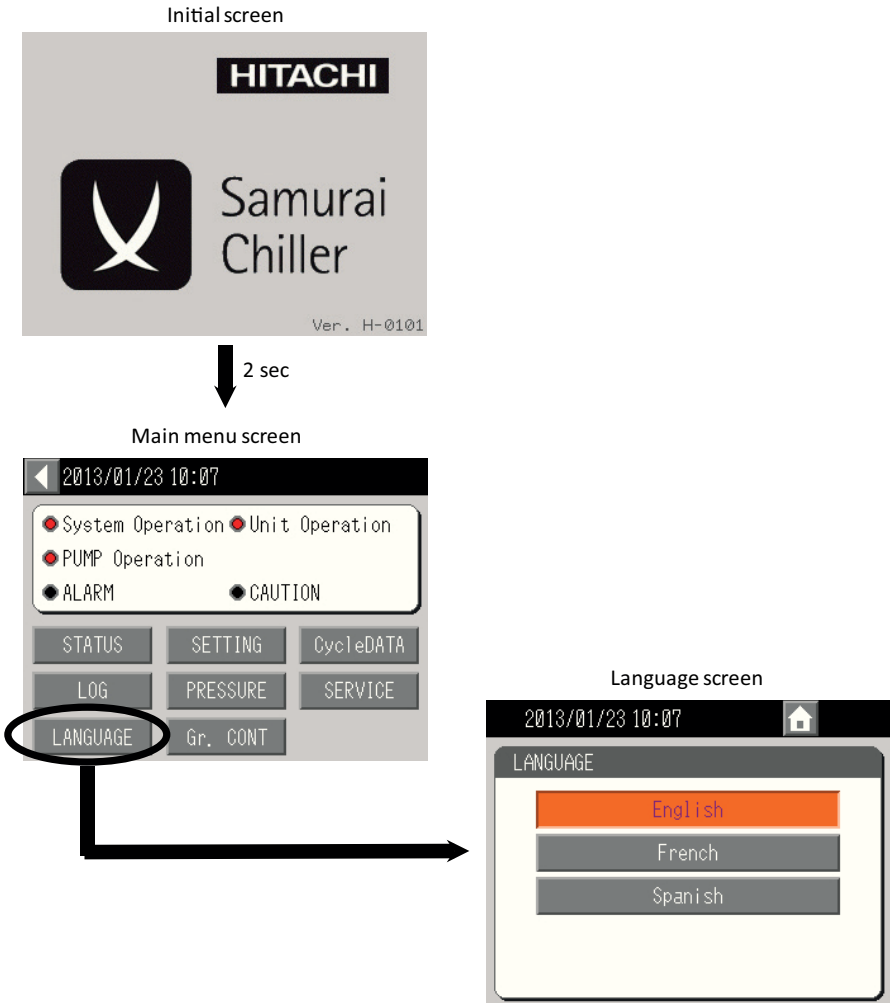
Option Pack 1 ENG/RUS/FIN (LP1): English, Russian, Finnish

Option Pack 2 ENG/GER/HUN (LP2): English, German, Hungarian

Option Pack 3 ENG/DUT/POL (LP3): English, Dutch, Polish

Option Pack 4 ENG/IT/GRE (LP4): English, Italian, Greek.

8.18.2 How to set up the language



NOTE

See more detailed information in the Product Manual of the unit.

8.19 Water PN16



Increase the maximum working pressure at water side from 10 to 16bar.

Typical applications: process cooling in high pressure chemical plants, air conditioning in tall buildings, etc…

8.19.1 Applicable models

All RCME-CLH1 units.

8.19.2 Main specifications

Maximum Working pressure at water side (shown in the unit's Specification Plate):

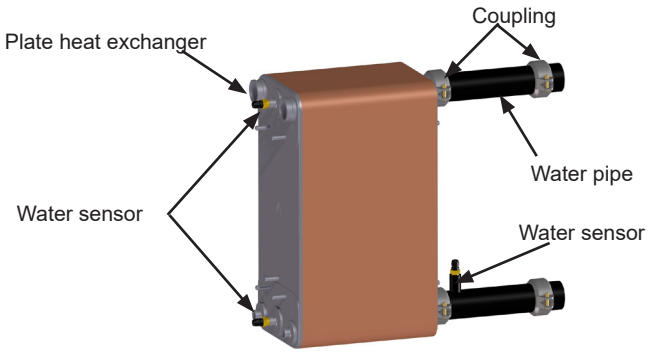
Standard	Water PN16
10 bar	16 bar

8.19.3 Incompatibilities

This option is not compatible with Flow Switch ACCESSORY, since the maximum working pressure of that device is 10bar.

8.19.4 Affected components

The components of the water system inside the Chiller units are the Plate Heat Exchanger, the Water Pipes, the Water Sensors, and the Couplings.



8.20 Witness test



Possibility for the customer to attend a real performance test on their unit at the factory where the unit is manufactured.

8.20.1 Applicable models

All RCME-CLH1 units.

8.20.2 Main specifications

Quantity/Type of tests to be performed shall be previously discussed and agreed between the Customer and Johnson Controls-Hitachi. Tests will be as follows:

- Working conditions: ambient temperature, inlet/outlet water temperatures, full/partial load, etc… to be informed in advance.
- Duration: it will depend on which and how many tests are required. Minimum: 1 day.
- Location: the tests will be performed in Johnson Controls-Hitachi facilities, in Barcelona.

Restrictions:

- Performance: some tests cannot be done because of testing facilities restrictions. For example, specific ambient temperature may not be achievable depending on the season.
- Capacity: maximum capacity of the test facility is 360kW. Test could be possible for Capacities between 360kW and 600kW in case of low flow rate (big delta T).
- Sound: sound test is not available.
- Brine: test at low water leaving temperature (below 4°C) is not available.

For further details please contact Johnson Controls-Hitachi distributor.

9. Accessories

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9.1 Accessories list

The following table shown the list and number of accessories to install according to the system characteristics.

	Water Flow Switch	Water Strainer 2.1/2"	Water Strainer 5"	Water Strainer 6"	Water Flange Connection 2.1/2" (PN16)	Common Water pipe (2 modules)	Common Water pipe (3 modules)	Antivibration Rubber Mat	Antivibration Spring System	Modbus BMS Gateway	Bacnet adaptor	Power Meter (200A)	Power Meter (400A)	Power Meter (1000A)
	CHL-WFS-01	CHL-WST-01	CHL-WST-04	CHL-WST-05	CHL-FLA-01	CHL-CWP-05	CHL-CWP-06	CHL-AVR-02	CHL-AVS-04	CHL-MBS-02	CHL-BAC-02	CHL-PMM-04	CHL-PMM-05	CHL-PMM-06
Unit	8E500001	8E500002	8E500005	8E500014	8E500011	8E500030	8E500031	8E500041	8E500029	8E500021	8E500043	8E500033	8E500034	8E500035
RCME-40CLH1	1 (a)	1	1 (b)	1 (c)	1	1 (b)	1 (c)	2	1	1 (d)	1 (d)	1	1 (f)	1 (g)
RCME-50CLH1	1 (a)	1	1 (b)	1 (c)	1	1 (b)	1 (c)	2	1	1 (d)	1 (d)	1	1 (f)	1 (g)
RCME-60CLH1	1 (a)	1	1 (b)	1 (c)	1	1 (b)	1 (c)	2	1	1 (d)	1 (d)	1	1 (f)	1 (g)

NOTE

(a) Quantity is 1 accessory per module. With common water pipe accessory only need 1 per each group of 2 or 3 modules.

(b) Applies only to each group of 2 modules, and only if Common Water Pipe Accessory is also assembled (1 per each group of 2 modules).

(c) Applies only to each group of 3 modules, and only if Common Water Pipe Accessory is also assembled (1 per each group of 3 modules).

(d) Quantity is 1 accessory per each module configured as a master.

(f) Quantity is 1 and applies only to each group of 2 modules.

(g) Quantity is 1 and applies only to each group of 3 modules.

9.2 Water flow switch



The Water Flow Switch is a safety device used to avoid the chiller running when the system water flow is insufficient or stopped, and therefore avoid water freezing inside the Plate Heat Exchanger.

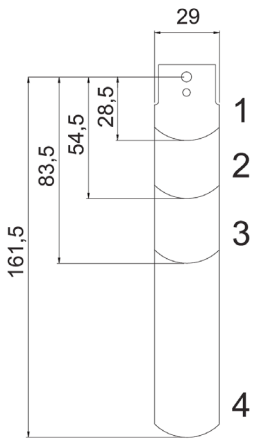
Thanks to this device, the unit can be protected under several conditions like pump stopped or locked, pipe clogging, dirty Plate Heat Exchanger, and so on.

It shall be installed at site at the water pipe of the customer (either inlet or outlet pipe).

9.2.1 Paddle selection

The size of the paddle shall be selected based on the pipe size in the following table:

"Pipe diameter (inch)"	"Paddle size"
1"	1
1.1/4"	1
1.1/2"	1
2"	1 , 2
2.1/2"	1 , 2
3"	1 , 2 , 3
4"	1 , 2 , 3
5"	1 , 2 , 3
6"	1 , 2 , 3
8"	1 , 2 , 3

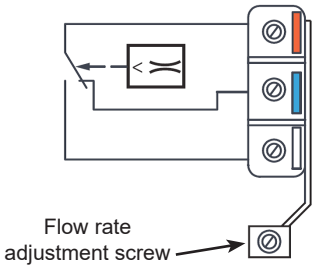


Paddle sizes (in mm)

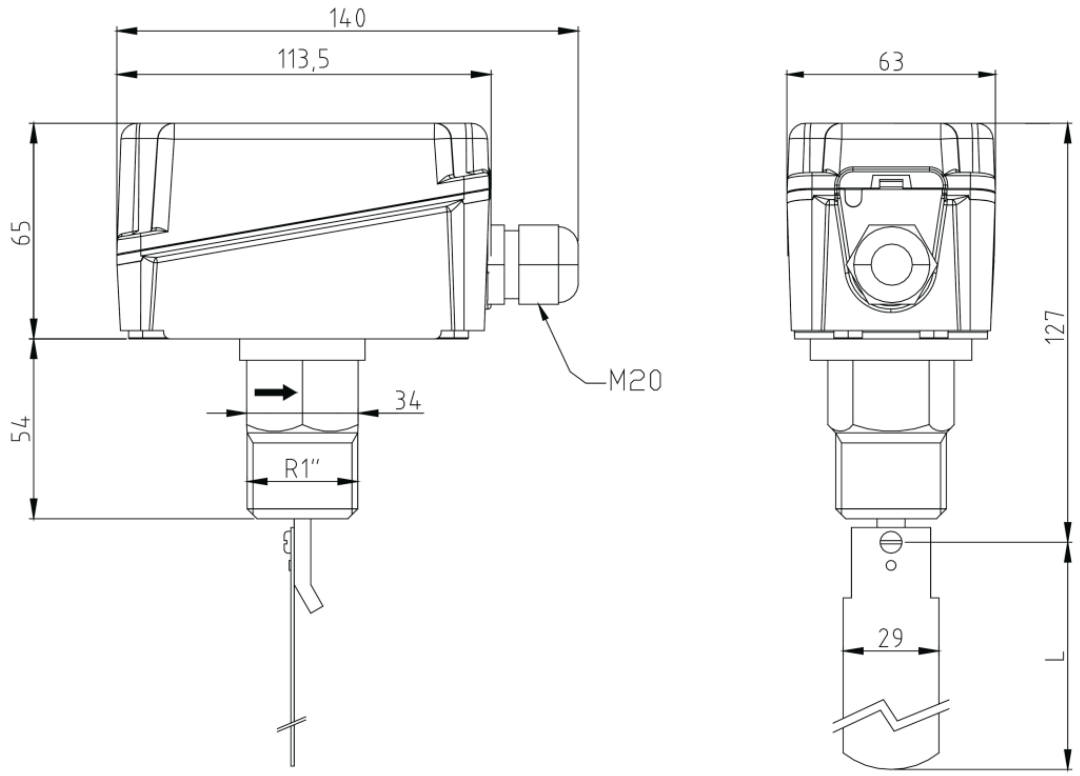
9.2.2 Flow rate adjustment

The setting of the flow rate shall be adjusted based on the minimum flow rate of the unit . Depending on the paddle size, the flow rate that can be adjusted will be between maximum and minimum values shown in next table:

"Pipe diameter (inch)"	"Minimum flow rate (m^3/h)"		"Maximum flow rate (m^3/h)"	
	cut-off	cut-in	cut-off	cut-in
1"	0,6	1,0	2,0	2,1
1.1/4"	0,8	1,3	2,8	3,0
1.1/2"	1,1	1,7	3,7	4,0
2"	2,2	3,1	5,7	6,1
2.1/2"	2,7	4,0	6,5	7,0
3"	4,3	6,2	10,7	11,4
4"	11,4	14,7	27,7	29,0
5"	22,9	28,4	53,3	55,6
6"	35,9	43,1	81,7	85,1
8"	72,6	85,1	165,7	172,5



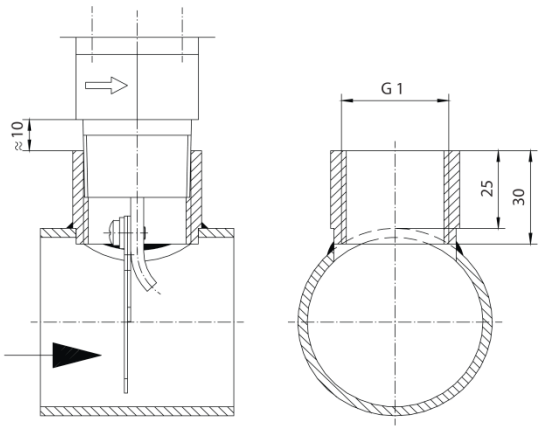
9.2.3 Dimensional drawing



9.2.4 Main specifications

- Voltage: 24V~240V
- Maximum working pressure: 10bar
- Protection grade: IP65
- Suitable pipe size: 1~8”
- Connection thread size: R1”
- Packing gland size: M20x1.5 (for cable of Ø6~9 mm approx.)

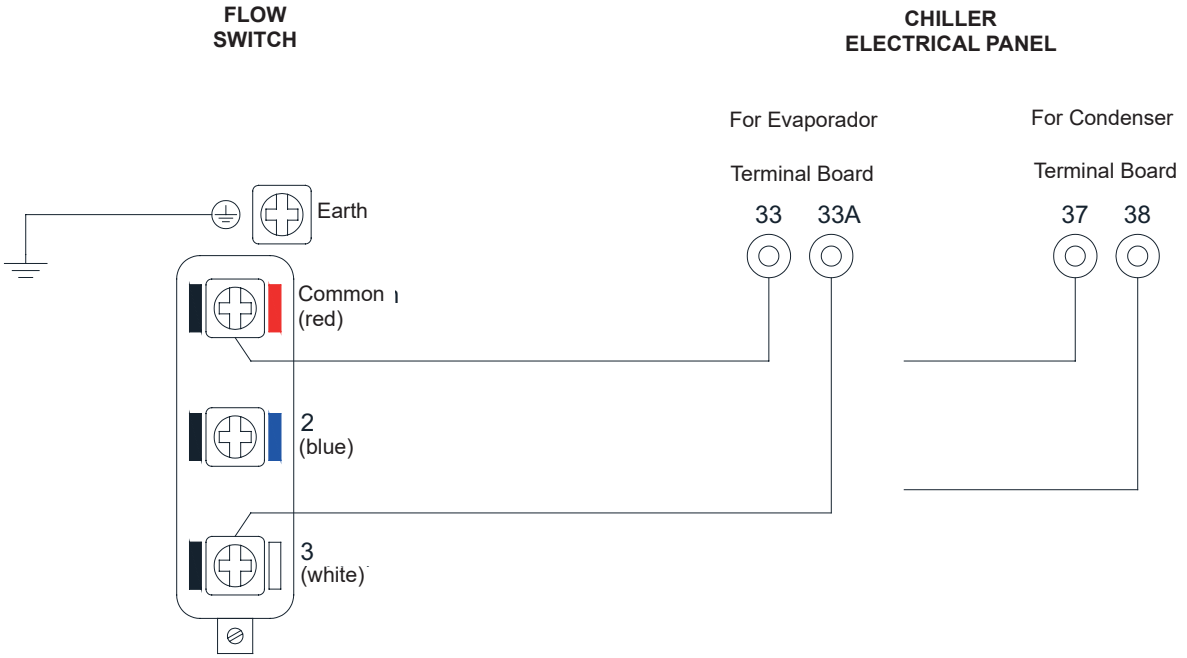
9.2.5 Installation instructions



- The Flow Switch shall be installed in a straight portion of pipe, at least five times the diameter of the pipe both upstream and downstream from elbows, narrowing, filters, valves, and so on.
- It shall be positioned with the arrow (marked on the body) on the flow direction.
- If the pipe is vertical, reset range to balance paddle weight.
- For easier maintenance it is recommended to install shut-off valves before and after the Flow Switch.

9.2.6 Electrical wiring connection

The following diagram shows the connections:



At the Flow Switch side, the wirings shall be connected at the position “Common” (red) and “3” (white).

At the Chiller Electrical Panel, the wirings shall be connected at the positions 33 & 33A of the terminal board (for the Evaporator) and 37 & 38 (for the Condenser).

Terminal recommended: JST TT-75, JST FVPC-1.25 or similar.

Previously, the bridge between these terminals shall be removed.

Earth wire shall be installed.

9.2.7 Alarm

In case of water flow rate below setting, alarm will appear at the 7-segments display, inside the Chiller Electrical Panel, and the unit will be stopped:



(condenser side, in case of Water-cooled units)

The units are also equipped with an LCD inside the electrical panel. In addition to the 7-segments, the LCD will also inform about the alarm by turning into red its background colour and showing the following message:

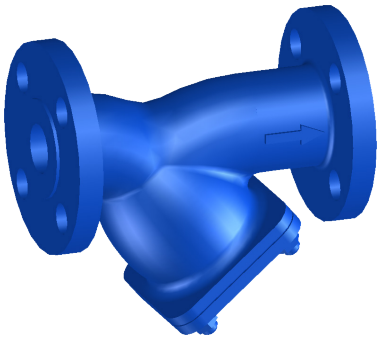
“No chilled water flow”: in case of cooling operation

“No hot water flow”: in case of heating operation

9.2.8 Incompatibilities

This accessory is not compatible with Water PN16 OPTION, since the maximum working pressure of the Flow Switch is 10bar.

9.3 Water Strainer



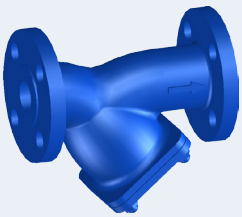
Units equipped with Plate Heat Exchangers are very sensitive to clogging and consequently could potentially freeze and be permanently damaged unless special care is taken.

The Water Strainer is a safety device used to protect the Plate Heat Exchanger against dirty water.

It shall be installed on site at the inlet water pipe of the system.

9.3.1 Parts list

The following parts are included in the accessory kit:

Part		Q'ty
Strainer		1
Flange		2
Gasket		2
Bolt		8 / 16 (*)
Nut		8 / 16 (*)
Plain Washer		8 / 16 (*)
Spring Washer		8 / 16 (*)

(*) The quantity is 8xM16 (2.1/2") , 16xM16 (5") , 16xM20 (6").

9.3.2 Size selection

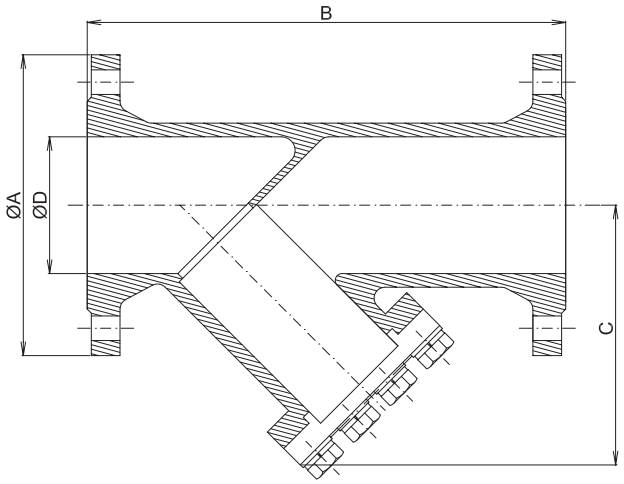
Several sizes are available from 2.1/2” up to 6”:

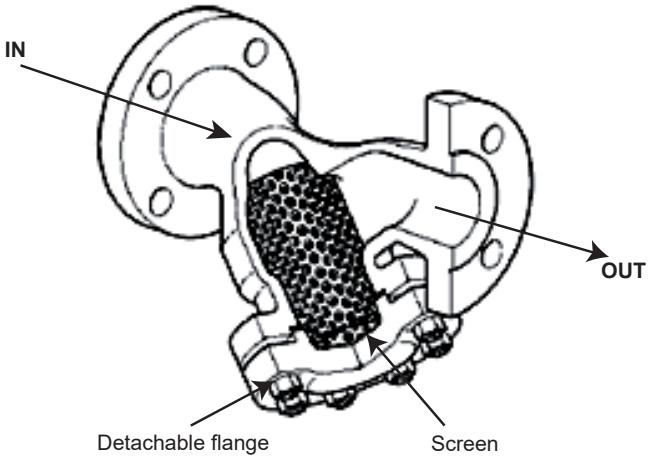
The following table shows the available sizes and their equivalences among inches, nominal diameter and external diameter of the pipe:

Size (in)	DN (mm)	External diameter (mm)	kv factor (m^3/h)
2.1/2”	65	76.1	108.2
5”	125	139.7	394.5
6”	150	168.3	573.1

The size shall be selected based on the size of the inlet water pipe of the unit.

9.3.3 Dimensional drawing





Dimension (mm)	2.1/2”	5”	6”
A	185	250	285
B	290	400	480
C	141	223	295
D	65	125	150

9.3.4 Main specifications

- Y-shape, detachable screen
- Connection type: flange
- Connection size: 2.1/2”, 5”, 6” (depending on the model)
- Orifice size: 1mm (2.1/2”) , 1.6mm (5”, 6”)
- Maximum working pressure: 16bar
- Screen and bolts for fixing detachable flange made of stainless steel
- Body made of cast iron, painted with epoxy powder coating

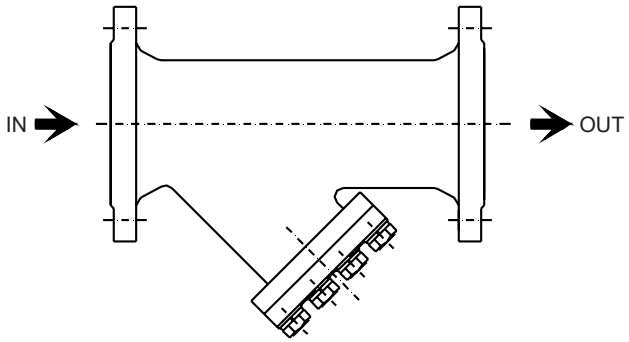
9.3.5 Installation instructions

Introduce the customer water pipe to within approximately 10mm of the flange and make the welding.

After welding, it is recommended to protect the Flanges by using polyester base painting or any other equivalent method in order to protect it against oxidation.

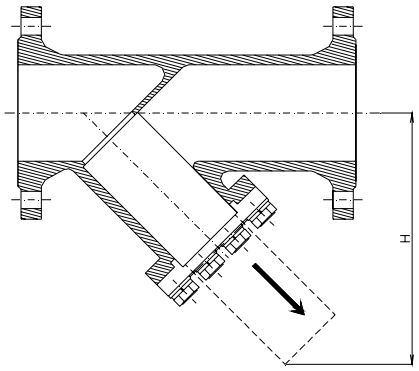
Connect the Strainer to the flanges by using M16/M20 bolts, washers and nuts. Recommended tightening torque: 160N·m (for M16) , 300N·m (for M20).

Pay attention to the direction of the flow:



Keep a minimum service space: distance “H” shown in the figure below shall be considered to make possible the removal of the screen.

“Dimension (mm)”	2.1/2”	5”	6”
H	178	310	405



It is necessary to clean periodically the Water Strainer screen according to its clogging degree.

For easier maintenance it is recommended to install shut-off valves before and after the Water Strainer.

9.4 Water flange connection

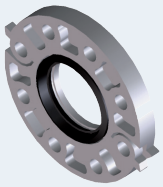
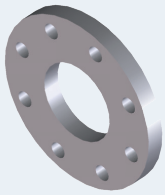
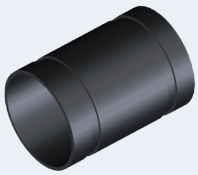


The Water Flange Connection (PN16) is a set of 4 steel flanges that converts the standard water pipe connection type (both Victaulic type and welded type) into flange connection.

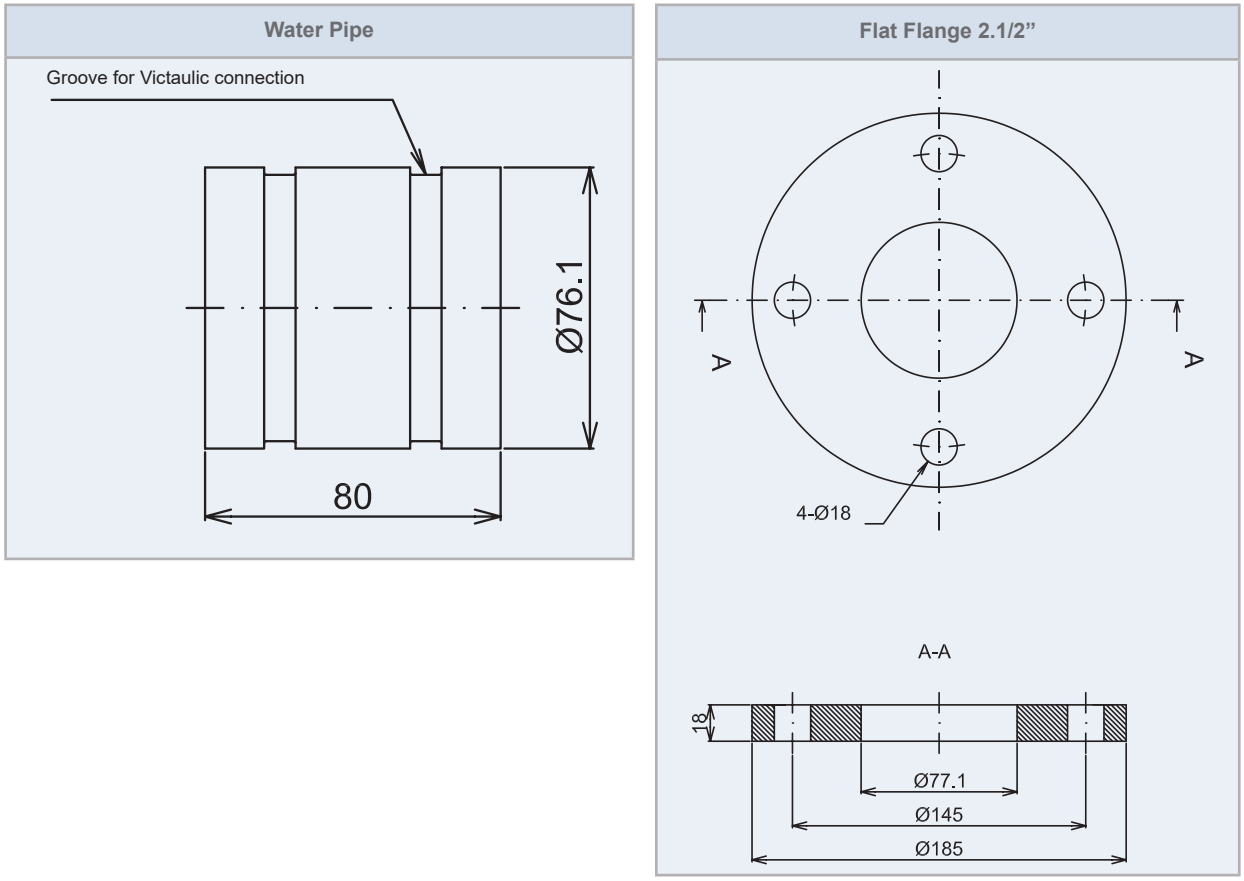
It shall be installed at site on both the unit water pipes and customer water pipes (both inlet and outlet pipes).

The maximum allowable pressure is 16bar.

9.4.1 Parts list

Accessory		Q'ty
Flange for Victaulic groove		2
Flat Flange		2
Water Pipe		2
M16 Bolt		8
Nut		8
Plain Washer		8
Spring Washer		8

9.4.2 Dimensional drawing



9.4.3 Main specifications

- Maximum allowable pressure: 16bar.
- Flat Flange made of steel, without surface treatment.
- Flange for Victaulic groove made of steel, with hot-dip galvanised treatment.
- Bolts and washers made of steel with triple Deltaprotekt coating.

9.4.4 Incompatibilities

Incompatible with:

- “Common Water Pipe” accessory, since this accessory already includes the Flanges at the edges of the water pipes.
- “Stainless Steel Water Pipe” option, since the Water pipe included in the accessory is not made of stainless steel.

9.4.5 Installation instructions

For both inlet and outlet water pipe sides, loosen the last Victaulic joint of the unit and replace the last water pipe of the unit by the Water Pipe supplied in the accessory kit.

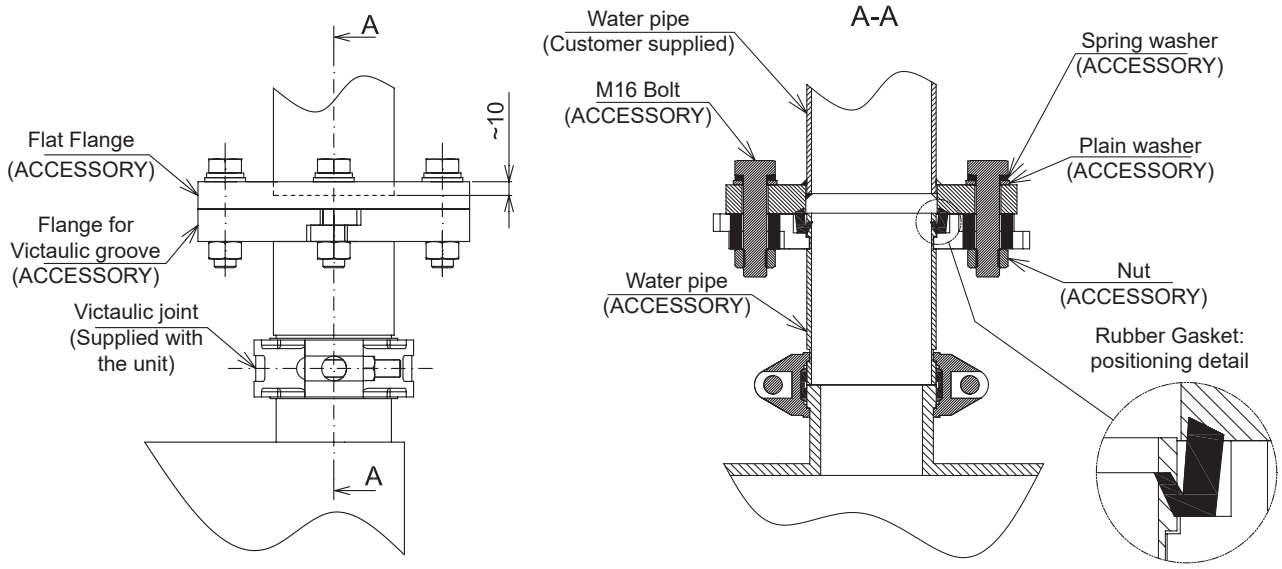
Install the Flange for Victaulic groove (together with its rubber gasket) at the end of the supplied Water Pipe.

On the other hand, weld the Flat Flange to the customer water pipe. It is not necessary to take care about the rotation of the holes of the Flange, since the counter-flange is a grooved type flange and therefore can be rotated and positioned at any angle.

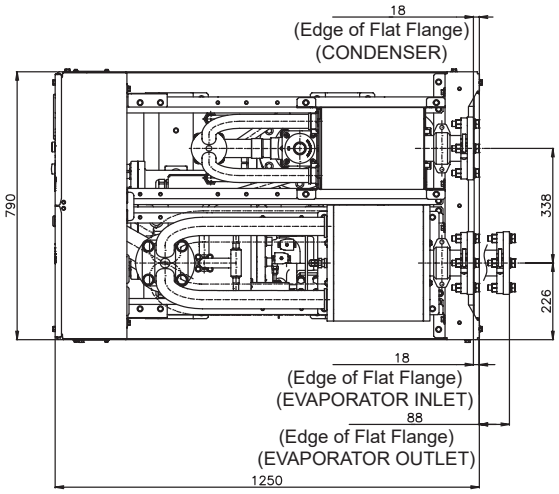
Connect both flanges (Flat Flange and Flange for Victaulic groove) by using M16 bolts, washers and nuts. Recommended tightening torque: 160N·m.

Note: in all the cases, after welding, the Flat Flange shall be protected from oxidation by applying polyester base painting or any other equivalent method.

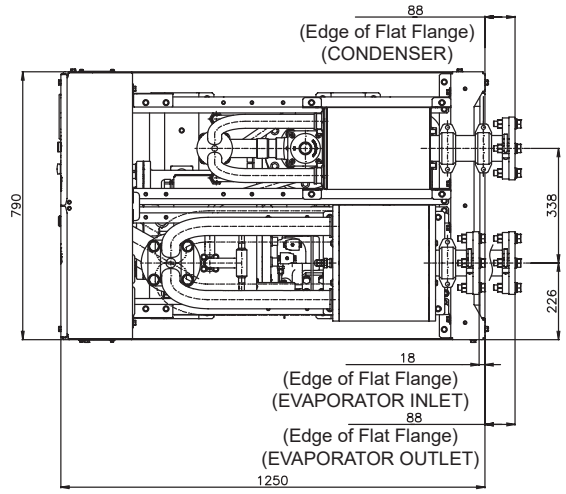
The following drawing shows in detail how to install the Water Flange to the Chiller unit in general.



Without HEAT PUMP option



With HEAT PUMP option



NOTE

Dimensions referred to the condenser are applicable only to RCME-WH1.

9.5 Common Water Pipe



The Common Water Pipe collects water from each module (2 modules for the 8E500030, and 3 modules for the 8E500031), providing a single water inlet and outlet connections.

Thanks to this accessory the water distribution is equal to each module, avoiding bad water distribution that could cause unit malfunction.

The maximum allowable pressure is 16bar.

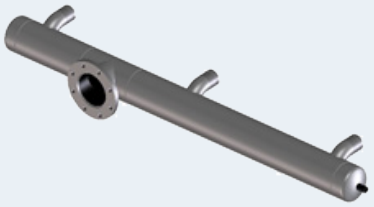
9.5.1 Parts list

The following parts are included in the accessory kit:

◆ **In case of 8E500030**

Part		Q'ty
Common water pipe		2
Companion Flange		2
Gasket		2
Water pipe		2
Victaulic joint		2
M16 Bolt		16
M16 Nut		16
Plain Washer		16
Spring Washer		16

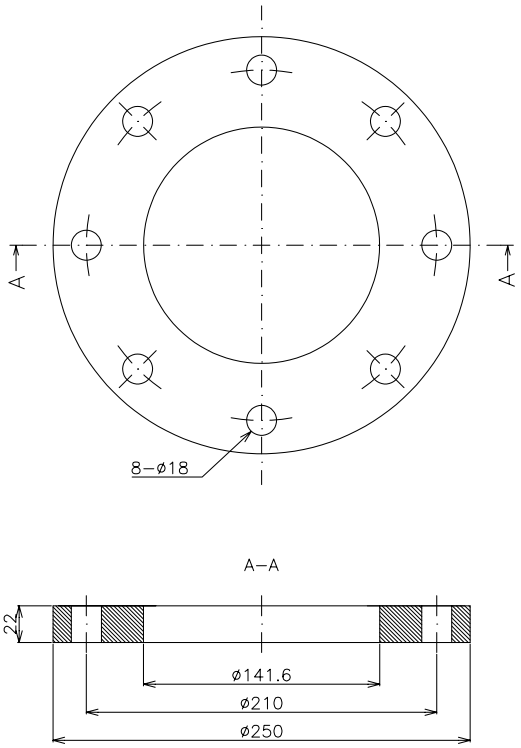
◆ In case of 8E500031

Part		Q'ty
Common water pipe		2
Companion Flange		2
Gasket		2
Water pipe		3
Victaulic joint		3
M20 Bolt		16
M20 Nut		16
Plain Washer		16
Spring Washer		16

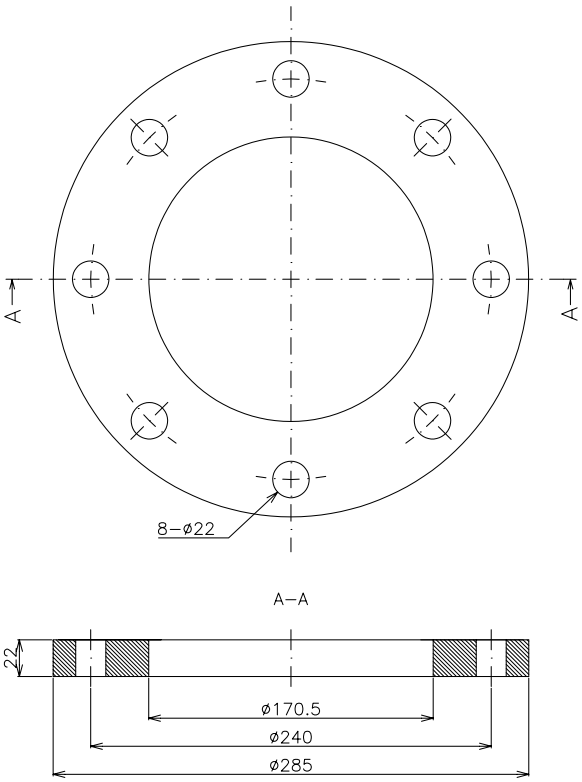
9.5.2 Dimensional drawing (in mm)

◆ **Flat flange**

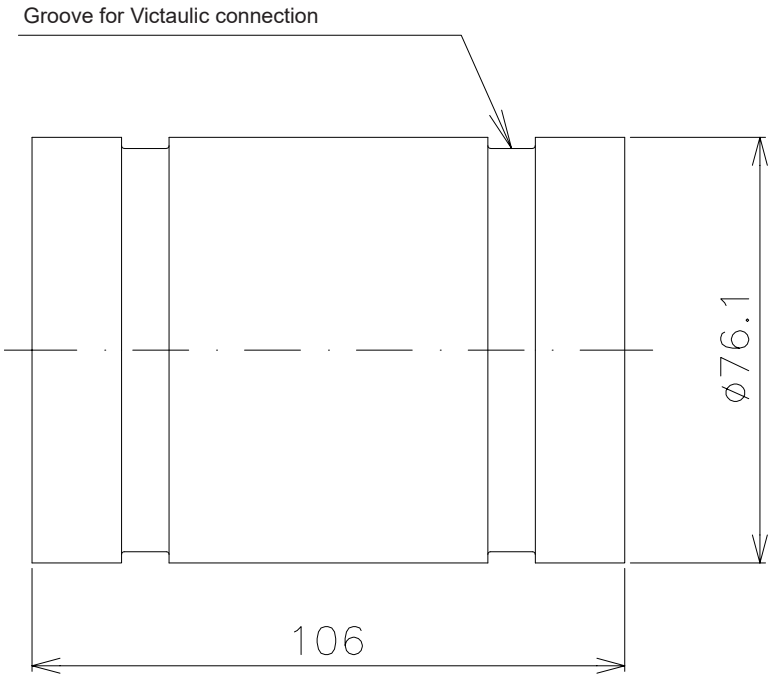
Companion Flange (5”)
(only 8E500030)



Companion Flange (6”)
(only 8E500031)



◆ **Water pipe**



9.5.3 Main specifications

- Connection type and size: 5” flange (8E500030), 6” flange (8E500031).
- Maximum working pressure: 16bar.
- M16 & M20 Bolts, nuts and washers made of steel with triple Deltaprotekt coating.
- Water pipes have cataphoresis treatment.
- Companion Flange made of steel. To be painted after welding at site.
- Water pipes are thermal insulated.

9.5.4 Installation instructions

Use the Common Water Pipe accessories as follows:

- 8E500030 - when joining 2 modules of RCME-CLH1
- 8E500031 - when joining 3 modules of RCME-CLH1

NOTE

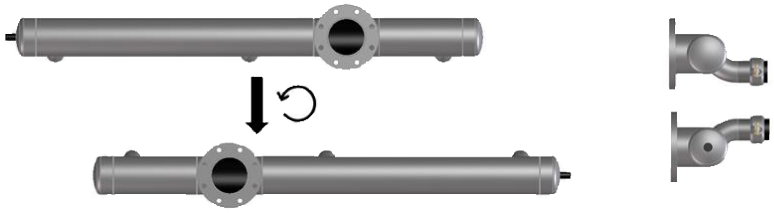
Both accessories are designed for a separation (gap) between modules of 60mm.

Remove the protection caps of the water pipes. Just before connecting the water pipes to the unit, make sure that there is no dirt inside.

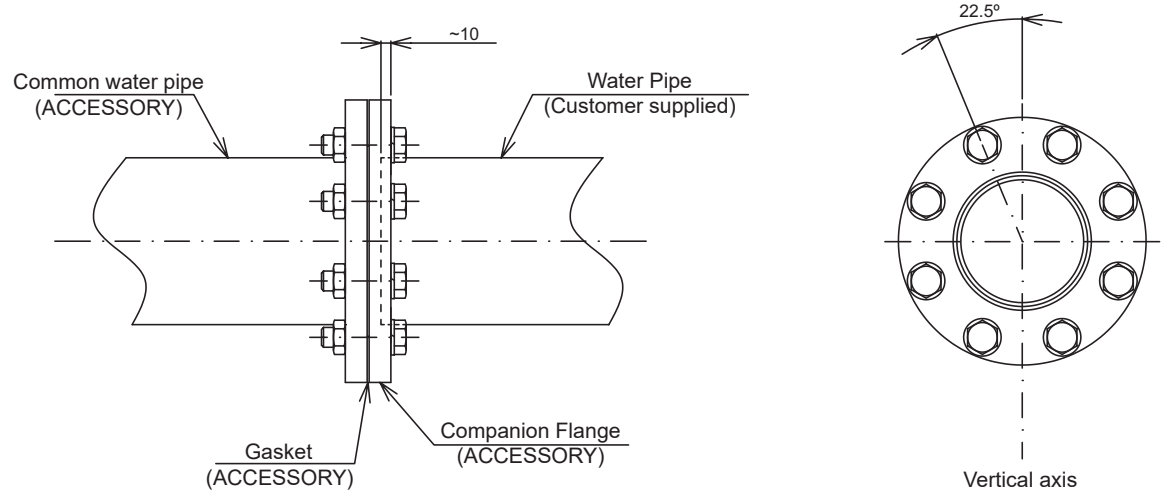
For all inlet and outlet water pipe locations, loosen the last Victaulic joint of the unit.

At the Evaporator side, throw away the last water pipe of the unit and connect the Common water pipe using the same Victaulic joint.

When connecting the Common water pipes to the unit, take care about the orientation of the Common water pipes: all Common water pipes are equal dimensionally, but when assembling them at the Condenser side, they shall be installed upside-down (rotate 180°) , as shown at below pictures:



Introduce the customer water pipe in the Companion Flange 10mm approximately, and make the welding. Before welding, take care about the rotation of the holes of the Companion Flange to match them later on with the flange welded on the common water pipe.



NOTE

After welding, both flanges and companion flanges shall be protected from oxidation by applying epoxy base painting or any other equivalent method.

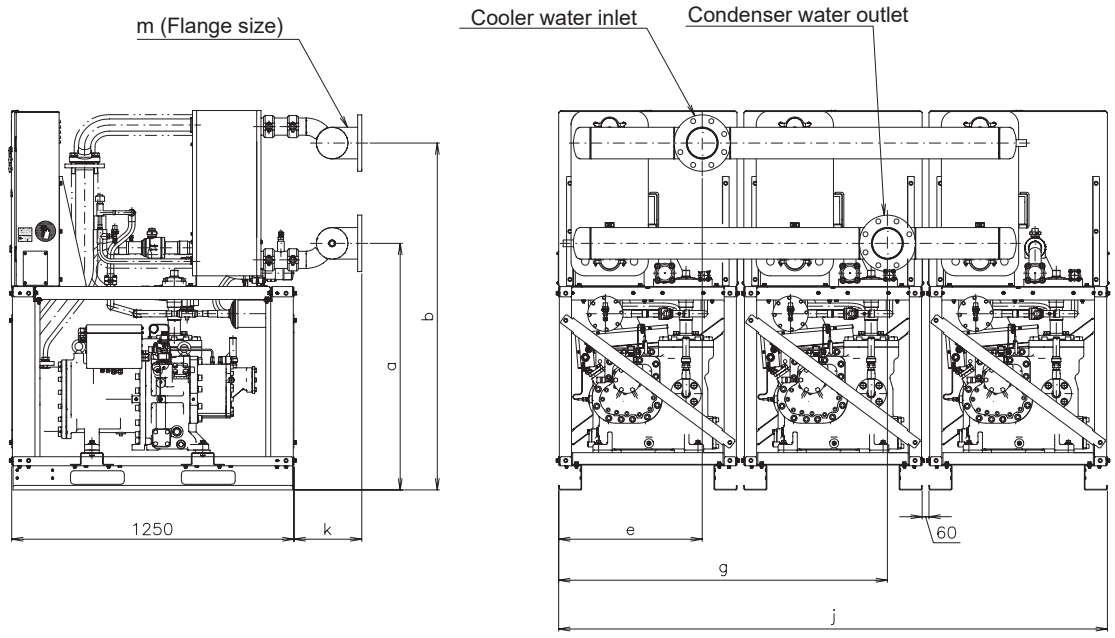
Connect the customer water pipe to the Common Water Pipe by using M16/M20 bolts, washers and nuts.

Recommended tightening torque: 160N·m (for M16), 300N·m (for M20). Do not forget to put between both flanges the Gasket provided with the accessory (see previous scheme).

NOTE

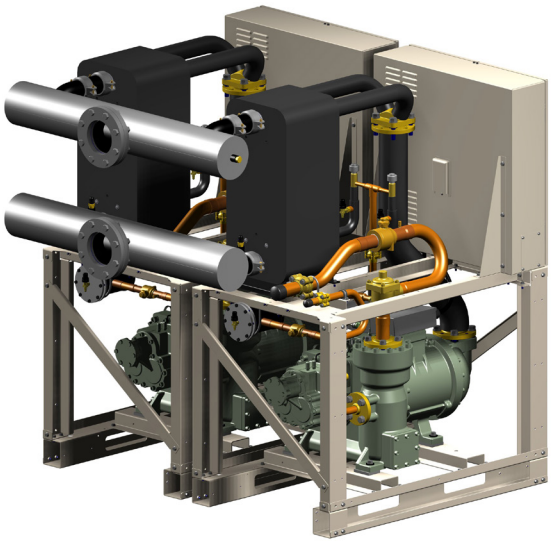
Additional support installed at site to sustain all the pipes once the accessory is assembled might be considered depending on the already existing supports on the customer pipes.

The following scheme shows the Accessory once it is completely assembled:

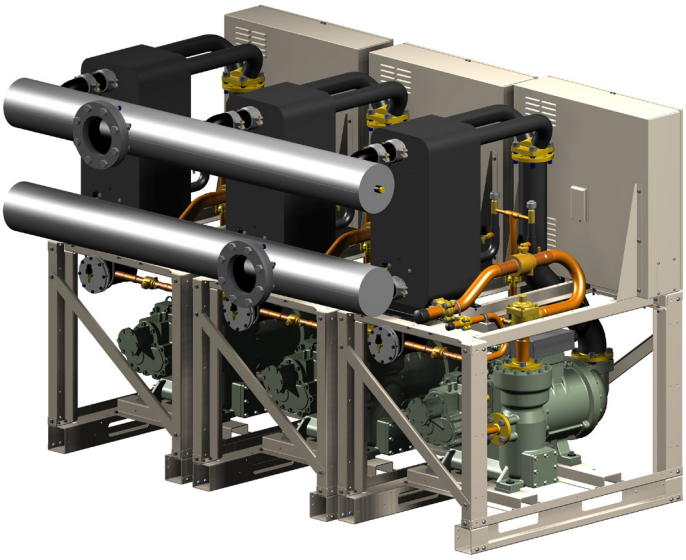


- Dimensions table

Dimensions / Model	a	b	e	g	j	k	m
2 modules	1081	1547	651	651	1640	300	5” (ø139.7)
3 modules	1092	1536	651	1501	2490	333	6” (ø168.3)



Example of 2 modules



Example of 3 modules

9.6 Antivibration Rubber Mat

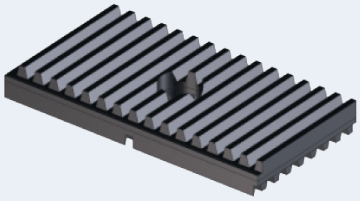


The Antivibration Rubber Mat is a set of 2 pieces of rubber used to reduce the transmission of the unit vibrations to the ground.

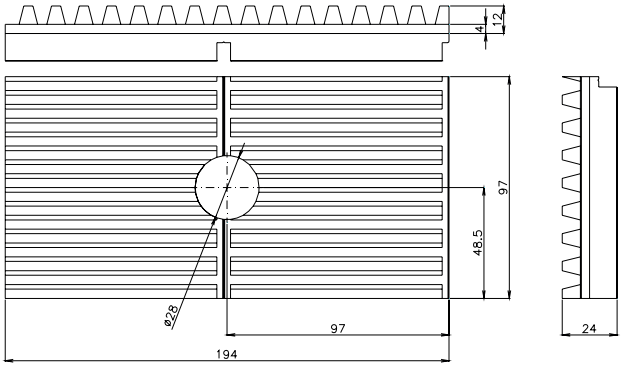
Thanks to this accessory, the vibration isolation grade achieved will be between 70 % and 85 %, depending on the model.

It shall be installed at site between the base of the unit and the ground.

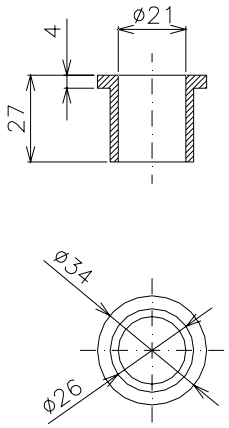
9.6.1 Parts list

Part		Q'ty
Rubber bush		2
Rubber_mat		2

9.6.2 Dimensional drawing (in mm)



Rubber mat



Rubber bush

9.6.3 Main specifications

Model	Vibration Isolation Grade
CLH1 Series	85 %

9.6.4 Installation instructions

Make a hole on the ground for a M20 bolt.

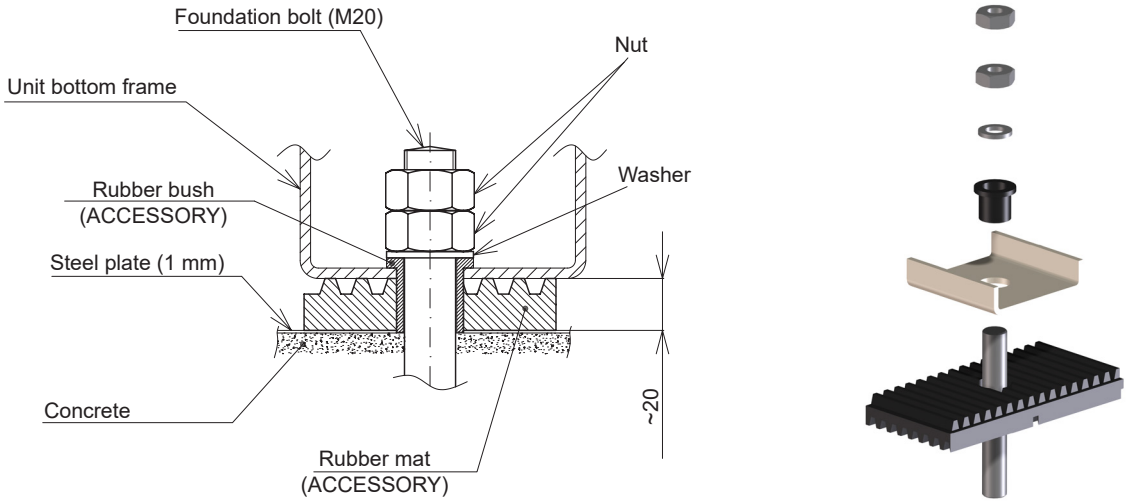
Put the Rubber mat on the ground, aligned with the hole made previously.

Recline the unit on the Rubber mats. Make sure that the existing holes on the unit base frame (ϕ26mm) are aligned with the hole on the Rubber mat.

Insert the Rubber bush to the Rubber mat through the Unit bottom frame hole.

Put a plain washer and fix the system with a double M20 nut to avoid loosening due to unit vibration.

See the following scheme for more detail.



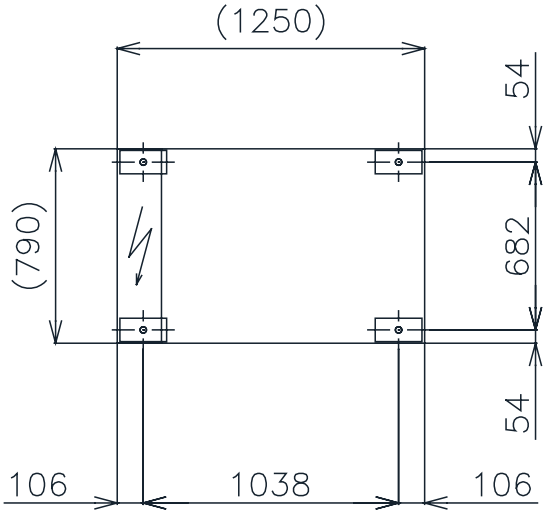
It is recommended to use stainless steel bolts, nuts and washers if the units will be installed outdoors.

Do not stand below the unit while it is lifted.

9.6.5 Mounting locations

The Rubber mats and Rubber bushes shall be mounted at different locations depending on the unit type and model.

Refer to the following upper views of the unit bases for detailed information.



9.7 Antivibration Spring System



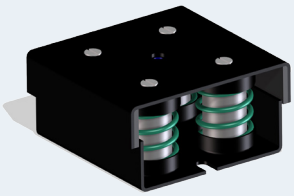
The Antivibration Spring System is used to reduce the transmission of the unit vibrations to the ground.

Thanks to this accessory, the vibration isolation grade achieved will be 95%.

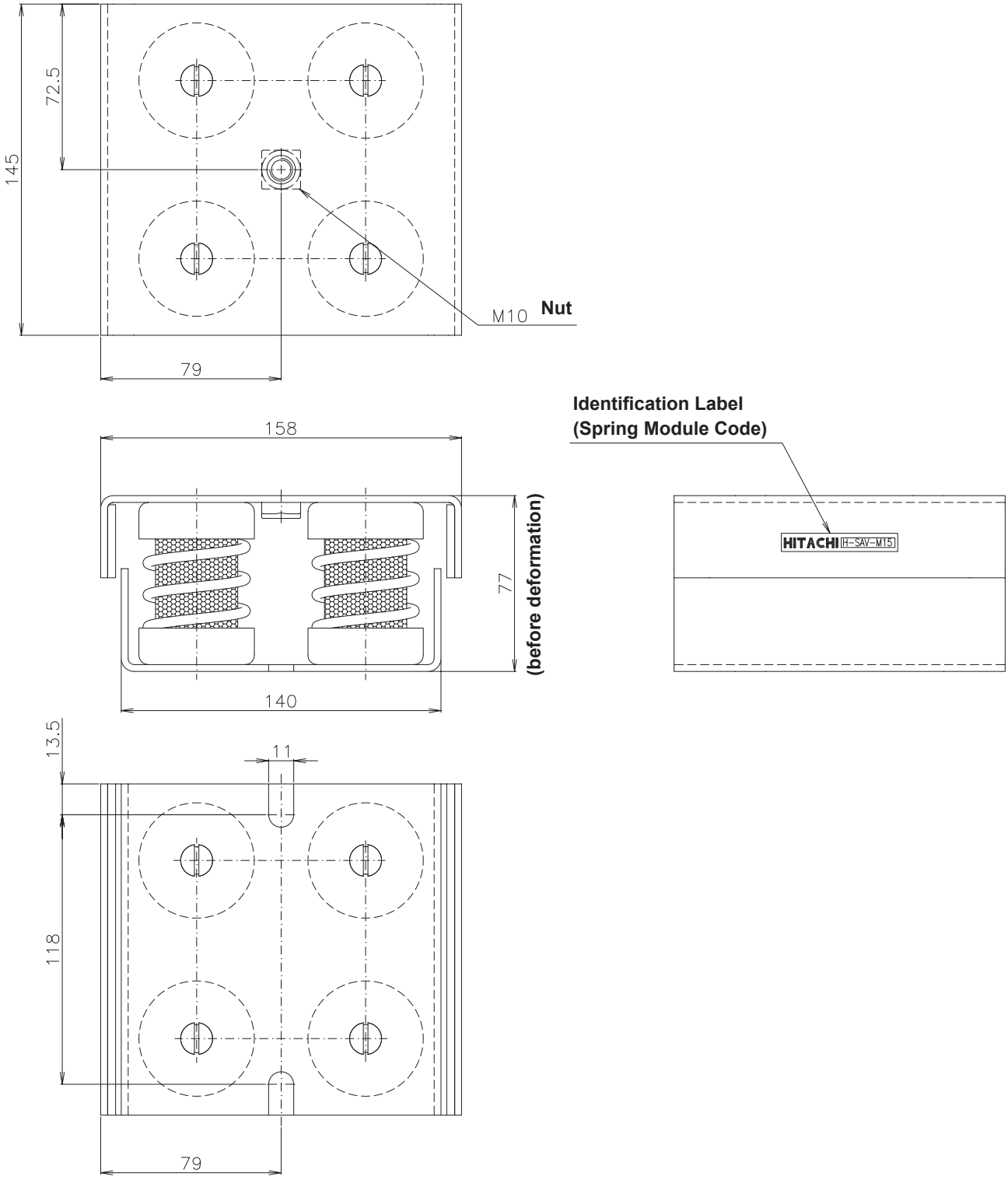
It shall be installed at site between the base of the unit and the ground.

9.7.1 Parts list

The following parts are included in the accessory kit:

Accessory		Q'ty
Spring System		4
M10 Bolt		12
Plain Washer		12
Spring Washer		12
Plain Washer		4

9.7.2 Dimensional drawing (in mm)



9.7.3 Main specifications

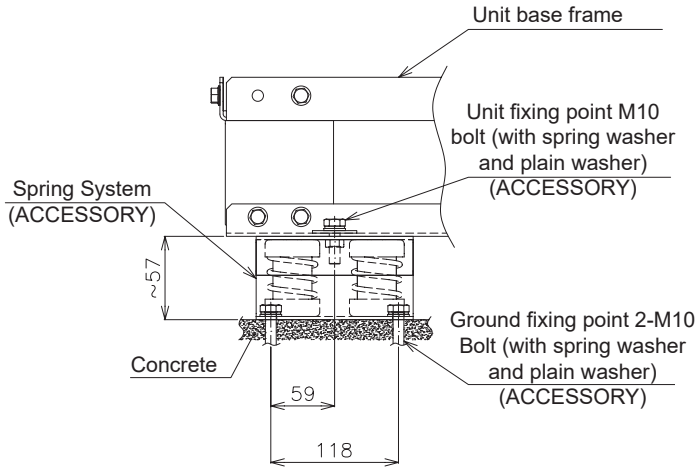
- Vibration isolation grade: until 99%
- Bolts and washers made of steel with Zn coating.
- Plates and springs made of steel, painted with epoxy powder coating.

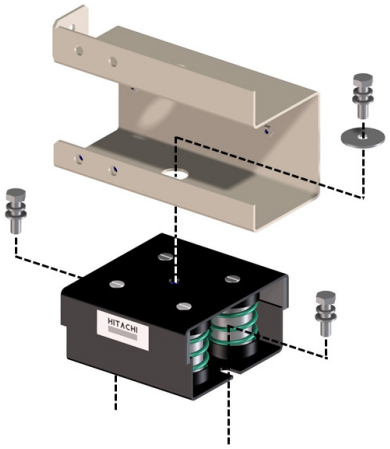
9.7.4 Installation instructions

1 Lift the unit and fix the Spring System to the base frame of the unit by using 1xM10 bolt (insert plain and spring washer).
2 Pay attention to the Identification label on the spring modules since each one is different. The location of each spring module shall follow the mounting location shown in the following chapter *"9.7.5 Mounting locations"*
3 Make two holes on the ground for a 2xM10 bolt.
4 Recline the unit on the ground, making sure that the 2-Ø10.5mm hole of the bottom plate of the Spring System is aligned with the M10 holes previously done.
5 Fix the Spring System to the ground by using 2xM10 bolts (insert plain and spring washer).

See the following scheme for a more detail.

◆ **Example of unit foundation**



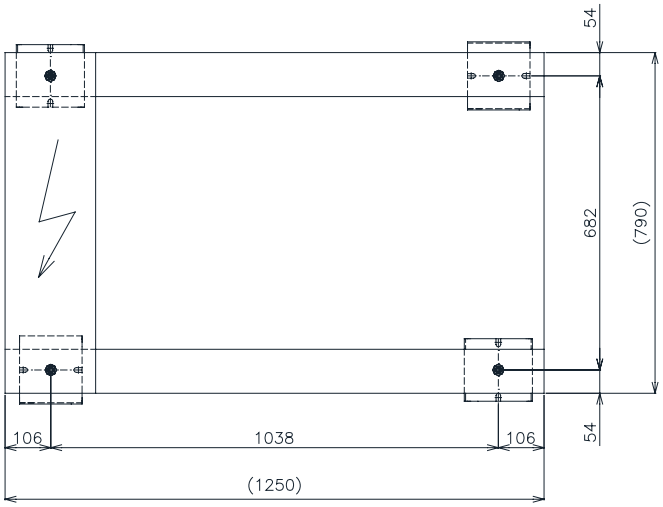


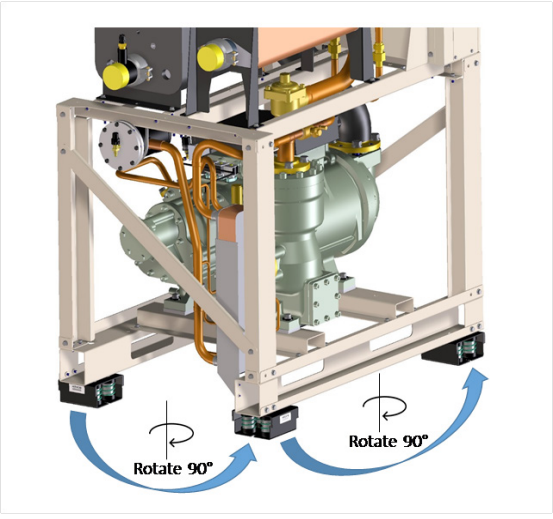
DANGER

Do not stand below the unit while it is lifted.

9.7.5 Mounting locations

The mounting locations of the 4 Spring Systems is shown in the next upper view of the unit base:





NOTE

When installing the Spring Systems, it is recommended to alter the orientation of each one by 90° as shown above.

9.8 Modbus BMS Gateway



This device is used to integrate the chiller units in a building management system (BMS) using MODBUS communication protocol.

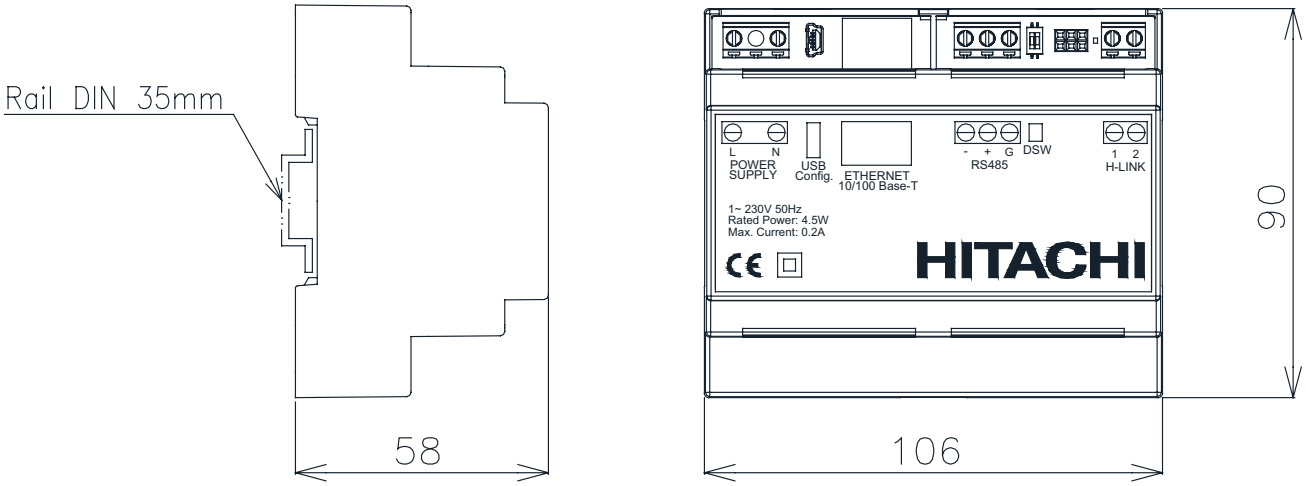
Possible to manage:

- Switch unit ON/OFF
- Fix setting temperature
- Select cooling/heating
- etc…

9.8.1 Parts list

Accessory		Q'ty
Gateway device		1
Memory stick		1

9.8.2 Dimensional drawing



Connecting wirings shall be field supplied.

9.8.3 Main specifications

- Power supply: 1~230V ±10% 50Hz
- Power consumption: 4.5W (max)
- Weight: 165g
- Assembling conditions: indoors
- Ambient Temperature: 0 ~ 60°C
- Maximum number of Chillers: 1 Chiller (up to 8 modules)

9.8.4 Others

For further information like wiring restrictions, installation instructions, service space, DIP switch setting, available data, alarm code list, troubleshooting, etc… see Product Manual PMML0324 B.

9.9 Bacnet Adaptor



This device is used to integrate the chiller units in a building management system (BMS) using BACNET communication protocol.

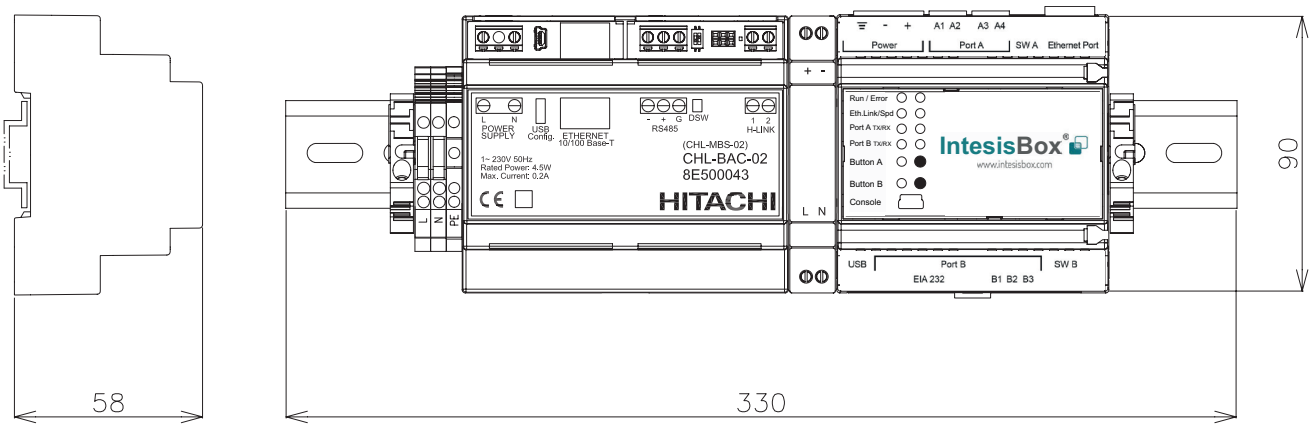
Possible to manage:

- Switch unit ON/OFF
- Fix setting temperature
- Select cooling/heating
- etc…

9.9.1 Parts list

Accessory		Q'ty
Gateway device		1
Cable for PC console		1
Memory stick		1

9.9.2 Dimensional drawing



Connecting wirings shall be field supplied.

9.9.3 Main specifications

- Power supply: 1~230V ±10% 50Hz
- Power consumption: 10W (max)
- Weight: 615g
- Assembling conditions: indoors
- Ambient Temperature: 0 ~ 60°C
- Maximum number of Chillers: 1 Chiller (6~8 modules)

9.9.4 Others

For further information like wiring restrictions, installation instructions, service space, DIP switch setting, available data, alarm code list, troubleshooting, etc… see APN-2020016 or Product Manual PMML0298 A.

9.10 Power meter



This device is used to visualize electrical data of the unit like:

- Power Consumption (active/reactive).
- Voltage (V), current (I), frequency (Hz), power factor, etc…
- Average, maximum and instant values.
- Hour counter.
- etc…

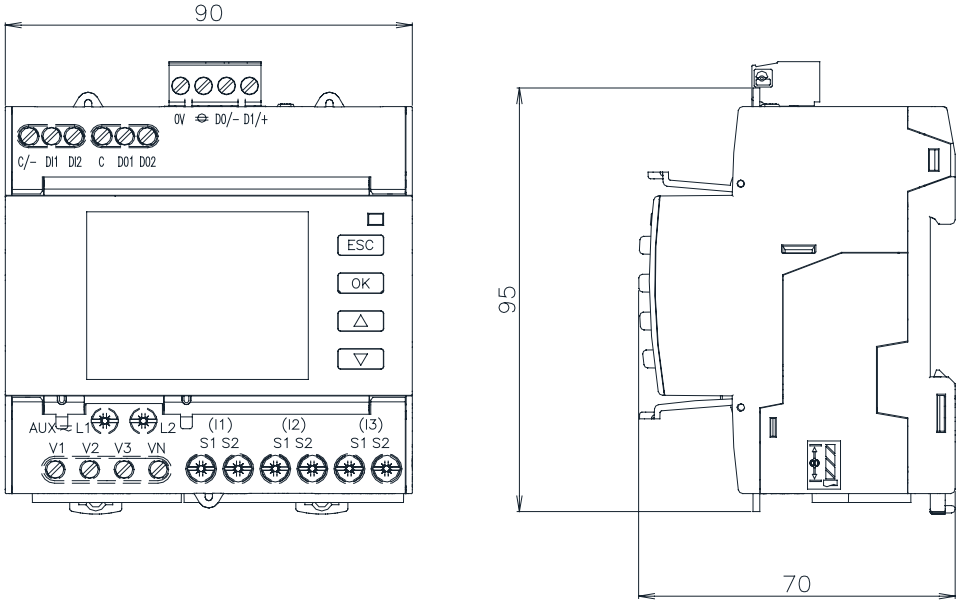
Communication port protocol Modbus, RS 485 interface is available.

9.10.1 Parts list

The following parts are included in the accessory kit:

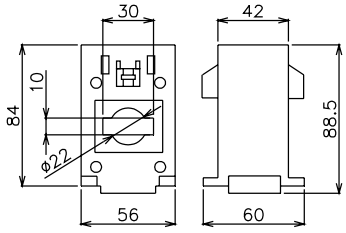
Part		Qty.
Power Meter		1
Current Transformer		3

9.10.2 Dimensional drawing

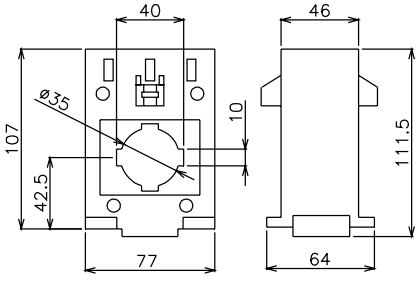


◆ **Current transformers**

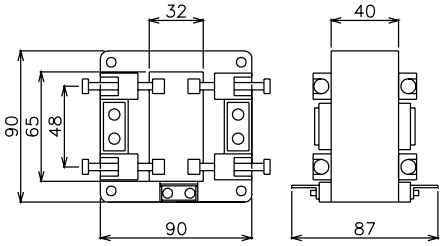
8E500033



8E500034



8E500035



9.10.3 Main specifications

- Current Transformers:
- Protection grade: IP20
- Operating temperature: -25ºC ~ +60ºC
- Other specifications according to next table:

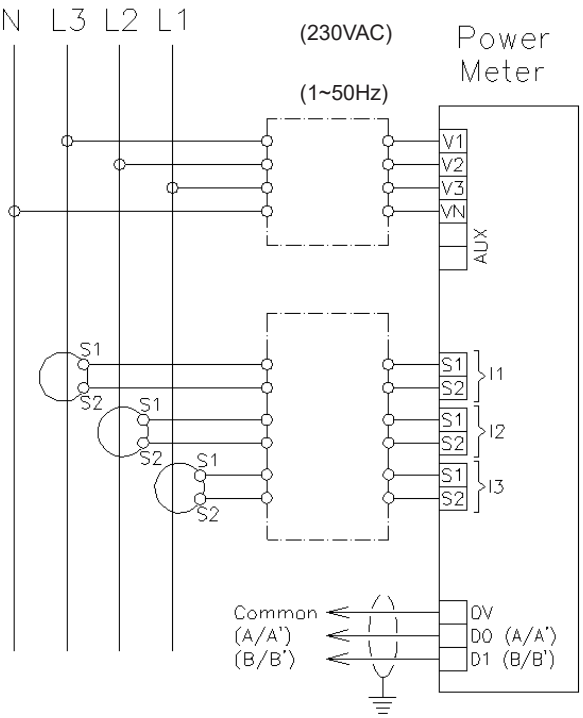
Accessory code	Rating IP/5A	Insulated cable:		Opening dimension for bars (mm)	Adapter for DIN rail	Mouting plate	Insulated locking screw	Weight (g)
		max. diameter (mm)	max. cross-section (mm^2)					
8E500033	200 A	22	150	30 x 10	■	■	■	270
8E500034	400 A	35	240	40 x 10	■	■	■	430
8E500035	1000 A	-	-	65 x 32	-	-	■	600

◆ Power meter

- Power supply: 1~230V ±10% 50Hz
- Communication port protocol: Modbus, RS 485 interface
- DIN rail mounting
- Protection grade: IP52 on front side
- Operating temperature: -25ºC ~ +55ºC
- Weight: 0.26kg

9.10.4 Installation instructions

Connect the Current Transformers and Power Meter device as shown in the next scheme:



9.10.5 Others

For Power Meter device configuration see Power Meter Installation and Operation Manual.

HITACHI

Hitachi certifies that our products have met EU consumer safety, health and environmental requirements.

Johnson Controls-Hitachi Air Conditioning Spain, S.A.U. is certified with:
ISO 9001 of AENOR, Spain for its Quality Management accordance with the standard.
ISO 14001 of AENOR Spain for its Environmental Management systems accordance with the standard.

ER-0198/1996 GA-1999/0044

Hitachi participates in the Eurovent Certification Programme; the certified data of certified models are listed in the Eurovent Certification Online Directory (www.eurovent-certification.com).

Cooling & Heating

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