

Data Book

Data Book

DB_ME_MECH-iB-G07 15Y - 40Y_062024_EN_rev00 R32

ELCA_Engine ver.4.8.5.2



MECH-iB-G07 15Y - 40Y

14,9-38,2 kW

Chiller, air source for outdoor installation



R R32

SCROLL

P PLATES

(The photo of the unit is indicative and may vary depending on the model)

- ✓ LOW GWP REFRIGERANT
- ✓ WIDE OPERATING RANGE
- ✓ VARIABLE PRIMARY FLOW
- ✓ INTEGRATED HYDRONIC MODULE
- ✓ EXTREME COMPACTNESS
- ✓ HIGH EFFICIENCY AT PARTIAL LOAD

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The units highlighted in this publication contain R32 [GWP₁₀₀ 677] fluorinated greenhouse gases.

LEGEND

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Functions

 **COOLING** Cooling

Refrigerant

 **R32** R32

Compressors

 **SCROLL** Scroll compressor

Fan

 **EC AXIAL** EC axial fan

Exchangers

 **PLATES** Plates heat exchanger

1.1 Product certifications



1.2 Voluntary product certifications



Check ongoing validity of certificate:
www.eurovent-certification.com
or
www.certiflash.com

1.3 System certifications



Environmental Management System complying with the requirements of UNI EN ISO 14001 regulation



Quality System complying with the requirements of UNI EN ISO 9001 regulation



Occupational Health and Safety Management System complying with the requirements of UNI ISO 45001

2.1 PRODUCT FEATURES

AIR-COOLED MONOBLOCK AND PLUG&PLAY CHILLER SUITABLE FOR COMFORT,PROCESS AND IT COOLING APPLICATIONS

The chiller units are used in many applications, even completely different from each other, for the versatility and flexibility that distinguishes them. MEHITS long-time experience combined with know-how, design procedures and technical support from MELCO allow to develop a monoblock chiller ideal for low capacity applications, where easy installation (Plug&Play solution, thanks to the embedded hydronic module) and high seasonal efficiencies are required.

COMFORT Applications

- Top-level performance especially at partial load
- Extremely compact unit
- Plug&play solution, with the easy installation typical of hydronic plants

PROCESS Applications

- Extended operating range, water supply down to -12°C and operation down to -20°C outside air
- External dry-cooler management
- Extremely reliable components
- Easy to maintain, by quickly removing the front panel
- Dedicated accessories available: high head pump and antifreeze piping and pump.

IT COOLING Applications

- Extended operating range, water supply up to 24°C and operation up to 50°C outside air with Delta T up to 10°C
- Dedicated accessories available: External dry-cooler management, ATS, HPC and high prevalence pump



3.1 Green certification relevant

FOCUS ON GREEN CERTIFICATION RELEVANT

Mitsubishi Electric Hydronics & IT Cooling Systems S.p.A., as a major player in the world HVAC market and a leading manufacturer of energy efficient, sustainable HVAC solutions, recognizes and supports the diffusion of green certification systems, as an effective way to deliver high performance buildings and improve the quality and the sustainability of the built environment.

Since the first certification system was introduced at the beginning of the 1990s, the demand for certified buildings has grown considerably, as well as the number of standards, rating and certification programs. Operating worldwide Mitsubishi Electric Hydronics & IT Cooling Systems S.p.A., has extensive experience with many of them and is active member of Green Building Council Italy.

Mitsubishi Electric Hydronics & IT Cooling Systems S.p.A., commitment to develop responsible and sustainable HVAC solutions, is reflected by a full range of premium efficiency products and systems, designed with special care to improve building energy performance ratings, according to major certification protocols, including LEED, BREAM, GREENSTAR, BCA, NABERS, DGNB, HQE and BEAM.

To find out more about how our products contribute to enhanced green certification rating and energy performance of a building, please refer to:
https://www.melcohit.com/EN/Environment/green_certifications/



3.2 Unit Description

Outdoor unit for chilled water production equipped with inverter scroll compressors, R32 refrigerant, brazed plate heat exchanger and variable speed fans (inverter driven). Thanks to its extended operating limits and many dedicated accessories, the range is highly versatile and suitable for any type of application, even for mission critical ones. The monoblock solution is a compact, plug-and-play unit that is easy to transport, install in any context and maintain. Inverter technology applied to the main components (compressor, fan and water pump) ensures the optimization of operation to achieve high efficiencies under all operating conditions.

3.3 Key Features

LOW GWP REFRIGERANT

The pure refrigerant R32 is an extraordinary eco-sustainable alternative to traditional refrigerant R410A, offering a 66% reduction in terms of GWP, a higher efficiency and a lower refrigerant charge.

WIDE OPERATING RANGE

Wide operating range that allows water supply from -12°C to 24°C and operation with outside air temperatures from -20°C to 50°C.

VARIABLE PRIMARY FLOW

Energy savings due to variable pump speed management based on load demand and the variable flow ensures the units also function in critical working conditions.

INTEGRATED HYDRONIC MODULE

The integrated hydronic module includes all the water circuit components (anti-freeze electrical heater on plate heat exchanger, air vents, flow switch, water filter, safety valve, EC water pumps, expansion tank) which optimizes installation space, time, and costs.

EXTREME COMPACTNESS

The precise design and the meticulous attention to the details of each single component make this range the best-in-class solution in terms of footprint per kW.

HIGH EFFICIENCY AT PARTIAL LOAD

Top-level partial load efficiency thanks to proprietary technological solutions at the forefront: VSD scroll compressors, EC fans as standard and advanced control algorithms.

MECH-iB-G07 40Y

Size

First two digits
Capacity [kW]
Last digit
Power Supply:
Y = 400V/3Ph+N/50Hz

Product**MECH-iB-G07**

Chiller, air source for outdoor
installation
Refrigerant gas R32

5.1 Standard unit composition

AIR SOURCE CHILLER FOR OUTDOOR INSTALLATION

Unit for the production of chilled water with variable speed (Inverter Driven) Scroll compressors, optimized for R32 refrigerant in a single-circuit configuration, source side heat exchanger with copper tubes and aluminum fins, plate heat exchanger on user side, electronic expansion valve as standard and axial-flow variable speed fans with EC motor. Integrated hydronic module including variable flow pump with EC motor. Flexible and reliable unit; it easily adapts different thermal load conditions thanks to the precise temperature control together with the use of inverter technology. The unit is designed according to a holistic approach that makes all components perfectly integrated and in synergy with each other following a proprietary logic that maximizes the efficiency of the unit.

The unit is supplied fully refrigerant charged and factory tested. On site installation only requires power and hydraulic connection.

STRUCTURE

Structure and paneling in hot-galvanised sheet steel of suitable thickness. All parts polyester-powder painted to assure total weather resistance. Panels painted in white RAL 7035. The self-supporting frame is built to guarantee maximum accessibility for servicing and maintenance operations, thanks also to easily removable panels.

REFRIGERANT CIRCUIT

Main components of the refrigerant circuit:

- R32 refrigerant
- plate heat exchanger
- Electronic expansion valves
- Filter Drier
- High pressure switches
- Liquid separators
- high and low pressure transducers

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R32 REFRIGERANT

The refrigerant used in these units is R32, a pure refrigerant, highly efficient and characterized by an ODP (Ozone Depletion Potential) index of 0 (zero) and a GWP (Global Warming Potential) value of 675.

Refrigerant gases are classified according to their degree of toxicity and flammability (ISO 817-2014).

The R32 is classified as A2L: the first digit defines toxicity (A: NON-TOXIC), while the last digits define the flammability level (2L: MILDLY FLAMMABLE - low burning velocity). It is classified by PED Directive into Group 1.

With regard to flammability, it is important to underline that the R32 is flammable only in high concentrations.

The triggering occurs only in the presence of a very high energy source, such as a flame with a minimum temperature of 648°C.

Moreover the flame propagation speed is very low, equal to 0.10 m/s.

It should be noted that if the power source is turned off, the flame is extinguished.

The Lower Flammability Limit (LFL Index) is 0.307 kg / m3.

ADVANTAGES OF THE R32

Comparing the characteristics of the R32 refrigerant with the R410A we obtain a series of advantages such as:

- It is more efficient
 - At the same cooling capacity, the amount of refrigerant charge is reduced
 - Reduces the electrical consumption of the machine
 - As pure gas it is easy to load and recover
 - Has a significantly reduced environmental impact
-
- All operations on the unit must be performed by trained and qualified personnel on flammable refrigerants handling, in accordance with the relevant local standards and codes of practice.
 - The refrigerant is heavier than air and can stagnate, reaching a dangerous concentration. To avoid risks, maintain a safe environment by ensuring adequate ventilation.
 - The units must be installed in such a way as to prevent any refrigerant leaks from flowing into the buildings or any place where it could cause damage to people, animals or properties. Pay particular attention to the presence and disposition of any external air intakes, doors, shutters, etc.
 - Do not braze pipes and components containing refrigerant.
 - Do not use flames to cut / open pipes.
 - The hydraulic circuit must be designed in such a way as to prevent the release of refrigerant gas inside the buildings or in any case in places where it can cause damage to people, animals or properties.

COMPRESSORS

Mitsubishi Electric hermetic variable speed scroll compressors, designed to ensure high performance in any load condition and optimized for R32 refrigerant. The units have single inverter driven scroll compressor. The inverter scroll compressor uses a brushless Interior Permanent Magnet (IPM) design to provide higher efficiency across a wider range of applications and with an oil sump heater. Inverter logic ensures a soft start that reduces inrush current. The frequency converter is designed in compliance with the limits set by the norms about the harmonic current emission. Compressors are installed on rubber anti-vibration mounts and soundproofed by dedicated sound-absorbing covering.

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PLANT SIDE HEAT EXCHANGER

Braze welded AISI 316 steel plate heat exchanger. The heat exchanger is lined on the outside with closed-cell neoprene lagging to prevent condensation. When the unit is operating, the heat exchangers are protected against no flow conditions by a flow switch. The unit is also ready to operate using non-freezing fluid mixes, down to heat exchanger outlet temperatures of -12° and with a frost protection heater on the heat exchanger.

SOURCE SIDE HEAT EXCHANGER

Finned coil exchanger made by copper tubes and aluminium fins. The exchanger grants excellent heat conduction: copper pipes are brazed to the coil headers and joined, by mechanical expansion, to correctly spaced aluminum fins. Coil protection grids are included on all sizes as a standard.

FAN SECTION SOURCE SIDE

Axial EC fans with embedded VSD, IP 54 protection rate, with external rotor and profiled metal sheet blades, housed in aerodynamic hoods and complete with safety grid. EC motor includes built-in thermal protection and allows the continuous fan speed regulation through a pressure switch.

ELECTRICAL AND CONTROL PANEL

Electrical and control panel complete with:

- Electronic control W3000+
- numbered cables
- terminal board with push-in terminals
- control circuit transformer
- Outdoor air temperature probe
- input for ON/OFF contact
- configurable input
- fuse for compressor driver protection
- fuse for exchanger electrical heater protection
- fuse for primary circuit pump protection
- fuse for fans protection
- fuse for auxiliaries protection
- relay for exchanger electrical heater

CERTIFICATION AND APPLICABLE DIRECTIVES

The unit complies with the following directives and relative amendments:

- CE - Declaration of conformity certificate for the European Union
- 2014/30/EC EMC Directive
- ErP Directive 2009/125/EC
- Machinery Directive 2006/42/EC
- PED Directive 2014/68/EC
- WEEE (Waste Electrical and Electronic Equipment) Directive

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- ISO 14001 - Company Environmental Management System certification
- ISO 9001 - Company Quality Management System certification

TESTS

Tests performed throughout the production process, as indicated in ISO9001.

Performance or noise tests can be performed by highly qualified staff in the presence of customers.

Performance tests comprise the measurement of:

- electrical data
 - water flow rates
 - working temperatures
 - power input
 - power output
 - pressure drops on the water-side exchanger both at full load (at the conditions of selection and at the most critical conditions for the condenser) and at part load conditions.
- During performance testing it is also possible to simulate the main alarm states.
- Noise tests are performed to check noise emissions according to ISO9614.

5.2 Versions**- Basic version**

Standard unit

5.3 Configurations**- , standard unit**

Standard unit for production of chilled water

5.4 Electronic controller

Electronic control W3000+

W3000+ features an easy-to-use interface and a complete LCD display that allows one to consult and intervene by means of a multi-language menu (19 languages are available). The diagnostics includes a complete alarm management, with the “black-box” and the alarm history display for enhanced analysis of the unit operation. The programmable timer manages a weekly schedule organized into time bands to optimize unit performance by minimizing power consumption during periods of inactivity. Up to 10 daily time bands can be associated with different operating set points. As option, KIPLink is available - Keyboard In Your Pocket. KIPLink is the innovative user interface based on WiFi technology that allows one to operate on the unit directly from the smartphone or tablet.

The regulation is based on the patented “Quickmind” water temperature regulation logic uses self-adapting control to maintain flow temperatures and optimize performance even in low water content scenarios. As an alternative, the proportional or proportional-integral regulations are also available.

Optional proprietary devices can perform the adjustment of resources in systems made of several units. Consumption metering and performance measurement are possible as well. The variable primary flow control is always available as per standard (VPF.E function).

Supervision can be easily developed via proprietary devices or the integration in third party systems by means of the most common protocols as ModBus, Bacnet-over-IP, Bacnet MS/TP RS485, Konnex, ModBus TCP/IP, SNMP. Compatibility with the remote keyboard (up to 8 units).



MAIN FUNCTIONS

- Operating parameters with dedicated user and installer menus to configure the type of system
- Outside air temperature probe to control the system water temperature set point based on compensation curves. Fixed point operation also available.
- Frost protection management based on outside air temperature or water temperature, to protect the system pipes and heat exchangers inside the unit.

1681 - Master/Client

Master/Client is a function that allows the control of a group of up to 4 hydronic units without additional hardware. It will only require a temperature probe present in the price list as accessory.

The Master/Client calculates the demand by means of a proportional controller on the storage probe of the plant. Depending on the plant demand, the Master unit decides how many units should be switched on or off.

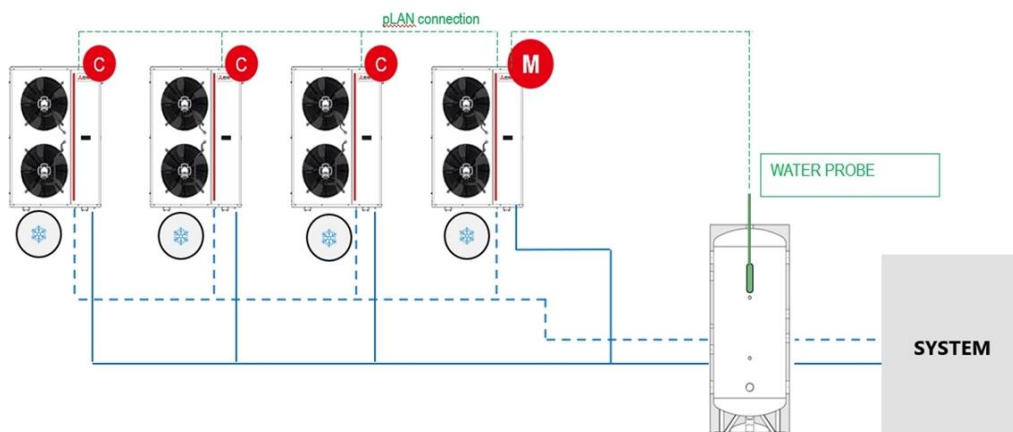
The operating logic of Master/Client function can be summarized as follows:

- Master unit sends water set-point to all Client units
- The % request is calculated according to the difference between system set-point and the buffer tank temperature, the higher the percentage, the greater the number of units required to work.

Every unit is managed to balance the number of compressors' operating hours.

Plant storage probe is mandatory and must be connected only to the Master unit.

The following picture shows a typical system working with Master/Client function:



KIPlink - KEYBOARD IN YOUR POCKET (OPTIONAL)

KIPlink - Keyboard In Your Pocket - is the innovative user interface based on WiFi technology that allows one to operate on the unit directly from the smartphone or tablet. Using KIPlink, it is possible to turn the unit on and off, adjust the set-point, plot the main operating variables, monitor in detail the status of the refrigerant circuits, the compressors, the fans (if present) and the pumps (if present) and display and reset the possible alarms.



OPTIONS	DESCRIPTIONS	BENEFITS	AVAILABLE FOR MODELS
A990 WATER PUMP			
A991 WITHOUT PUMP	Unit without pump mounted on board. Unit terminal board include terminals for controlling the pump. Pump power supply to be provided at field.	Flexibility on plant design: possibility to choose the most suitable pump based on plant needs. Useful for renovations where a pump for primary circuit is already available.	ALL
A994 WITH INVERTER PUMP H.P.	The unit is provided with a variable flow pump, high head, installed on board. Based on the size, the units can be provided with a single H.H. pump or with two pumps in series.	This option allow to combine the felxibility of a plug&play unit (monobloc, with pump on board) with a high level of residual head. It is useful for process installtion or in case it is requiried a residual head higher than the level of pressure of the standard pump.	ALL
2430 PIPING ANTIFREEZE HEATER OPTIONS			
2432 ANTIFREEZE PIPING, PUMPS	Electrical heaters on pipes and other hydraulic unit's components. This option is mandatory if the unit is supposed to work with outdoor temperature below 0°C. Only for units provided with on-board pumps.	It protects the unit against ice formation on its hydraulic components.	ALL
B180 EXTERNAL FREE COOLER MANAGEMENT			
B181 WITH EXTERNAL FREE COOLER MANAGEMENT	The unit can be equipped with this function which allows you to exploit the Free-cooling mode using an external dry-cooler (MEDR-TF). Recommended for IT Cooling and Process applications. The external temperature measured by the probe installed on the chiller detects a temperature that is too high to allow Free-cooling operation. The chiller will manage the heat load through mechanical operation (active compressor).		ALL
1440 USER INTERFACE			
1441 KIPLink + COMPACT KEYBOARD	In addition to KIPLink, the innovative user interface based on WiFi technology, the unit is equipped with the Compact keyboard with LCD display and buttons.		ALL
9970 PACKING			
9973 WOODEN CAGE PACKING	Unit provided with wooden cage		ALL

6.2 Options - Additional information

EXTERNAL FREE-COOLER MANAGEMENT

The unit can be equipped with this function which allows you to exploit the Free-cooling mode using an external dry-cooler (MEDR-TF). Recommended for IT Cooling and Process applications.

The option includes the presence in the electrical panel of:

- 0-10V signal for dry-cooler regulation
- 0-10V signal for regulating the 3-way valve

MECHANICAL OPERATION

The external temperature measured by the probe installed on the chiller detects a temperature that is too high to allow Free-cooling operation.

The chiller will manage the heat load through mechanical operation (active compressor).

PARTIAL FREE-COOLING OPERATION

The external temperature measured by the probe installed on the chiller detects an adequate temperature to operate in partial free-cooling.

The logic will start to open the 3 way modulating valve and increase the speed of the dry-cooler fans.

The water crossing the dry-cooler will pre cool down, reducing the thermal load in charge of the chiller (compressor partialized), introducing energy savings in the entire cooling system.

TOTAL FREE-COOLING OPERATION

The external temperature measured by the probe installed on the chiller detects an adequate temperature to operate in total free-cooling.

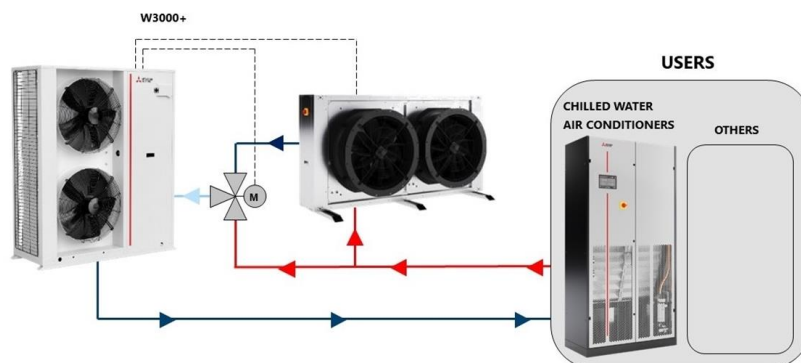
The total opening of the 3-way valve and the heat rejects by the dry-cooler allow to entirely pre-cooled the water.

The chiller will turn off, leaving the thermal load to be rejects entirely by the dry-cooler.

For correct operation of the system, the total pressure losses (chiller, dry-cooler, air conditioner, 3-way valve, piping, etc.) must be taken into account by verifying that the on-board pump or high head pump option is sufficient to meet the demand.

The use of 3-way valves and external auxiliary pumps is allowed as long as the supply is managed separately in the field.

Control of the external components (valve and pumps) is provided by the chiller via two 0-10V signals.



HPC

HPC is an advanced and fully integrated control function designed by MEHITS for the optimisation of hydronic systems. It connects MEHITS chillers and indoor CRAH units without the need for any external devices.

INFRASTRUCTURE

The HPC function is based on LAN units.

- Each indoor and outdoor unit must be equipped with KIPLink.
 - HPC supports up to 20 LAN groups of indoor air conditioners (maximum 15 units per group)
 - HPC requires a KIPLAN (KIPLink network) consisting of one unit per LAN group.
 - The KIPLAN network enables HPC-related data communication between the different LAN groups.
- KIPLink allows direct access to all HPC variables and parameters with dedicated menus and pages. The most important parameters are also available on the compact/large keyboard.

WORKING LOGICS

HPC control logics improve system efficiency by exploiting partial loads, redundant units and favourable environmental conditions.

HPC acts in time intervals. The time interval between each HPC intervention can be set from 1 up to 500 minutes. The time until the next HPC intervention is visible in the group interface section of the KIPLink. Based on the instantaneous operating conditions detected in the chilled water system, HPC adjusts: the set-point of the chiller, the speed of the pumps and, the valves and fans of the indoor air conditioners.

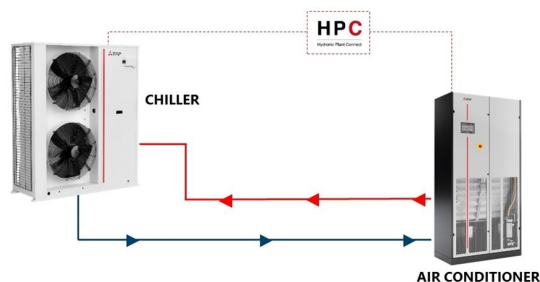
The main variables taken into account are:

- Cooling demand of each group of indoor units (room temperature, fan speed, valve opening),
- Chilled water temperature,
- Pump speed,
- Chiller operating status (outdoor air temperature, FC availability).

The highest benefits are achieved in systems with VSD pumps and free-cooling chillers or with external dry-coolers. Meeting the required IT heat load is crucial. HPC always prioritises room cooling to ensure maximum reliability. Therefore, actions are taken based on the status of the indoor units.

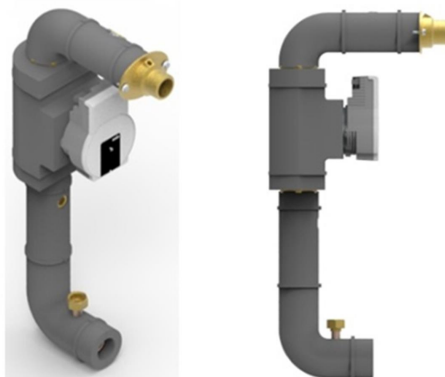
There are four operating modes, in order of priority:

1. Reset : Occurs when the cooling demand of at least one group of indoor units increases suddenly. The contribution made by HPC is reset and suspended until the Reset message is active. The system immediately increases cooling capacity.
2. Reduce : Occurs when the cooling demand of at least one group of indoor units increases slightly. The contribution made by HPC is reduced. The system increases the cooling capacity.
3. Optimise On : Occurs when the cooling demand of all groups of indoor units remains stable or decreases. HPC optimises the system by increasing its contribution.
4. No Action : Happens when the cooling demand of all groups of indoor units remains stable or decreases, but HPC has already brought the system to the best performance achievable under current conditions. No further action is taken.



ANTIFREEZE PIPING AND PUMPS

Thanks to the application of special insulation on the piping and the presence of a dedicated electrical heater, it is possible to prevent the system from freezing during downtime, even in conditions of low outside air temperatures

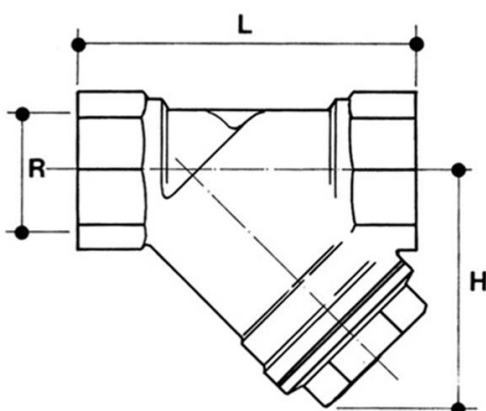


METAL MESH WATER FILTER

Accessory included (std.) with the unit for installation in field. This filter **MUST** be installed on the return pipe to trap any impurities in the water circuit that may damage the unit's heat exchanger.

Characteristics:

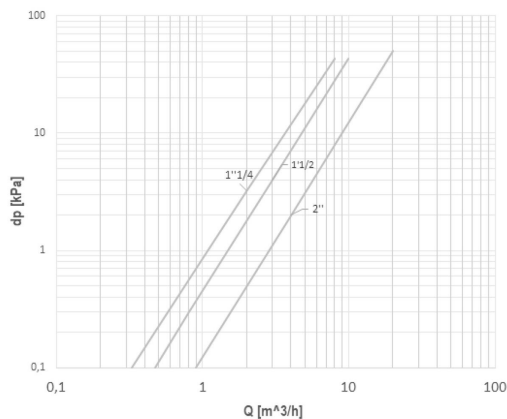
- Body: Brass
- Finish: Sanded
- Body gasket: Betaflex 71
- Thread: ISO 228/1
- Filter: AISI 304 stainless steel micro-perforated sheet metal



Dimensions				
DN		32	40	50
R	inch	1"1/4	1"1/2	2"
L	mm	96	106	126
H	mm	68	75	90

Pressure drop				
R	inch	1"1/4	1"1/2	2"
Kv	m ³ /h	13	15	28

Flow rate VS pressure drop chart for Y-filter



Residual head for each unit with filter installed.

	DN	Φ	Kv	Cooling Cap. (12/7°C-35°C)	Water flow	Residual Head	Filter press. drops	Residual Head with filter
	[inch]	[mm]	[m³/h]	[kW]	[m³/h]	[kPa]	[kPa]	[kPa]
MECH-IB-G07 15Y	1 1/4	32	13	15,00	2,57	56,1	3,42	52,68
MECH-IB-G07 18Y	1 1/4	32	13	17,90	3,06	72,5	4,72	67,78
MECH-IB-G07 23Y	1 1/2	40	15	21,10	3,63	73,5	3,53	69,97
MECH-IB-G07 27Y	1 1/2	40	15	27,80	4,77	57,0	5,88	51,12
MECH-IB-G07 35Y	2	50	28	32,70	5,60	72,2	5,97	66,23
MECH-IB-G07 40Y	2	50	28	38,40	6,58	63,3	8,04	55,26

DUAL POWER SUPPLY KIT (ATS)

This KIT gives redundancy to the system by increasing the degree of reliability and ensuring service continuity.

It provides for the installation of an automatic transfer switch inside a dedicated electrical box:

- 40A size ATS, type OTM40F4C20D400C (ABB: 1SCA151252R1001)
- IP40 electric box, dimensions 300x450x150mm

The device automatically switches the electrical load from a main energy source (e.g. mains) to an alternative one (e.g. auxiliary generator). The ATS automatically detects the presence of voltage in the two supply lines and, in the event of a power failure in the main line, switches to the secondary line, only to switch back to the main line as soon as it is available again.

It is possible to set the priority of the supply lines and the frequency of the voltage return check.



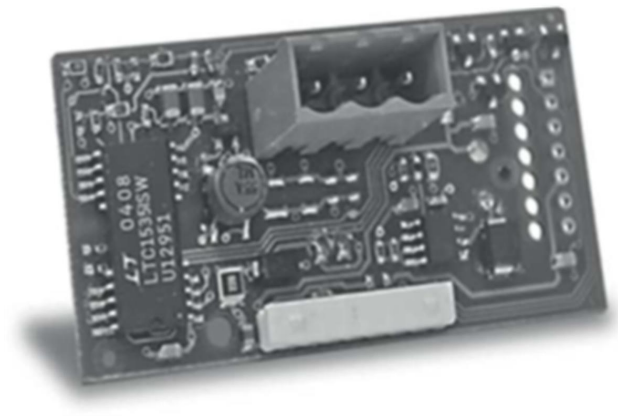
SERIAL INTERFACING CARDS KIT

The unit is equipped with the W3000+ control SW that allows the use of different serial cards for interfacing the unit with BMS systems based on many communication protocols. The cards are supplied as a separate kit for easy installation (electrical and mechanical) directly in the field.

Refer to the dedicated documentation and the interfacing manuals of the unit for connection with the BMS system.

The communication cards available are as follows:

- Serial interfacing card MODBUS
- Serial interfacing card BACNETMS/TP RS485
- Serial interfacing card for KONNEX
- Serial interfacing card for BACNET OVER IP or MODBUS TCP or IP-SNMP.



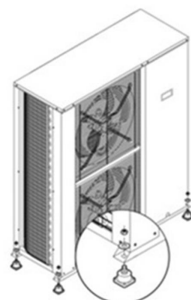
BTB STORAGE TANKS KIT

Buffer tanks to be used in cooling systems, to ensure minimum operating time in all operating conditions and avoid too many starts and stops of the unit. To be installed under the unit on the return pipe. In this case, make sure the available pressure head of the pump on the unit is sufficient to guarantee correct system operation. The connection pipes for connecting BTB to the unit are an additional kit, base on the unit size (refer to pricelist).



ANTIVIBRATION MOUNTING KIT

Used between the unit and the support surface. Vibration dampers made from rubber, elastomer and aluminium alloy casing for fastening to the floor.

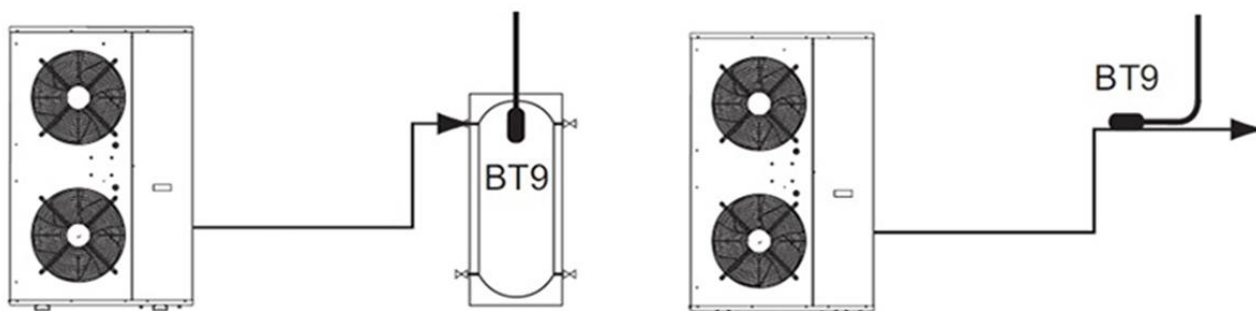


Size	15Y	18Y	23Y	27Y	35Y	40Y
No.4 AA-50/N	✓	✓	×	×	×	×
No.4 AA-100/N	×	×	✓	✓	✓	✓

PROBES KIT

The unit can be equipped with following temperature probe useful in master client management:

- Buffer tank water temperature probe(BT9): measurement of water temperature inside the buffer tank or in the supply side piping.



BT STORAGE TANKS KIT

Storage tanks to be used in cooling systems, to ensure minimum chiller operating time in all operating conditions and avoid excessive starts and stops.

It can also be used to isolate the water circuit from the chiller and to partially meet energy demand during periods in which the unit is shutdown due to the electricity rate.

For indoor installation.

7 GENERAL TECHNICAL DATA

Data Book

DB_ME_MECH-iB-G07 15Y - 40Y_062024_EN R32

[SI System]

MECH-IB-G07		15Y	18Y	23Y	27Y	35Y	40Y	
Power supply		V/ph/Hz 400/3+N/50 400/3+N/50 400/3+N/50 400/3+N/50 400/3+N/50 400/3+N/50						
PERFORMANCE								
COOLING ONLY (GROSS VALUE)								
Cooling capacity	(1)	kW	14,93	17,79	21,03	27,73	32,51	38,19
Total power input	(1)	kW	4,825	5,232	6,504	8,415	9,902	11,88
EER	(1)	kW/kW	3,085	3,403	3,231	3,290	3,283	3,210
COOLING ONLY (EN14511 VALUE)								
Cooling capacity	(1)(4)	kW	15,00	17,90	21,10	27,80	32,70	38,40
EER	(1)(4)	kW/kW	3,100	3,400	3,250	3,310	3,300	3,230
EXCHANGERS								
HEAT EXCHANGER USER SIDE IN COOLING								
Water flow	(1)	l/s	0,714	0,851	1,005	1,326	1,554	1,827
Pressure drop at the heat exchanger	(1)(4)	kPa	15,2	21,6	15,1	20,5	25,1	23,8
PERFORMANCE								
COOLING ONLY (GROSS VALUE)								
16°C/10°C								
Cooling capacity	(2)	kW	16,28	19,36	22,90	30,30	35,50	41,58
Total power input	(2)	kW	4,894	5,319	6,612	8,526	10,05	12,12
EER	(2)	kW/kW	3,333	3,647	3,464	3,552	3,515	3,438
23°C/15°C								
Cooling capacity	(3)	kW	18,54	21,97	26,02	34,60	40,49	47,21
Total power input	(3)	kW	4,962	5,414	6,736	8,640	10,22	12,42
EER	(3)	kW/kW	3,730	4,067	3,858	4,005	3,971	3,806
EXCHANGERS								
16°C/10°C								
Water flow	(2)	l/s	0,649	0,772	0,913	1,209	1,416	1,658
Pressure drop at the heat exchanger	(2)	kPa	12,6	17,8	12,4	17,0	20,8	19,6
23°C/15°C								
Water flow	(3)	l/s	0,555	0,658	0,780	1,037	1,213	1,414
Pressure drop at the heat exchanger	(3)	kPa	9,19	12,9	9,06	12,5	15,3	14,3
REFRIGERANT CIRCUIT								
Compressors nr.		N°	1	1	1	1	1	1
Number of capacity steps		N°	0	0	0	0	0	0
No. Circuits		N°	1	1	1	1	1	1
Regulation			STEPLESS	STEPLESS	STEPLESS	STEPLESS	STEPLESS	STEPLESS
Min. capacity step		%	32	34	29	30	26	26
Refrigerant			R32	R32	R32	R32	R32	R32
Theoretical refrigerant charge		kg	2,10	2,83	3,60	4,74	5,67	6,00
Oil charge		kg	1,00	1,00	1,00	2,30	2,30	2,30
Rc (ASHRAE)	(5)	kg/kW	0,14	0,16	0,17	0,17	0,18	0,16
FANS								
Quantity		N°	2	2	1	2	2	2
Air flow		m³/s	1,84	1,95	2,34	4,52	4,35	4,75
Total fans power input		kW	0,22	0,22	0,39	0,78	0,78	0,78
NOISE LEVEL								
Total sound Pressure	(6)	dB(A)	39	40	45	46	47	48
Total sound power level in cooling	(7)(8)	dB(A)	70	71	76	78	79	80
SIZE AND WEIGHT								
A	(9)	mm	900	900	1450	1450	1450	1700
B	(9)	mm	420	420	550	550	550	650
H	(9)	mm	1390	1390	1200	1700	1700	1700
Operating weight	(9)	kg	144	155	207	256	272	306

Notes:

- 1 Plant (side) cooling exchanger water (in/out) 12,00°C/7,00°C; Source (side) heat exchanger air (in) 35,0°C.
 2 Plant (side) cooling exchanger water (in/out) 16,00°C/10,00°C; Source (side) heat exchanger air (in) 35,0°C.
 3 Plant (side) cooling exchanger water (in/out) 23,00°C/15,00°C; Source (side) heat exchanger air (in) 35,0°C.
 4 Values in compliance with EN14511

5 Rated in accordance with AHRI Standard 550/590

6 Average sound pressure level at 10m distance, unit in a free field on a reflective surface; non-binding value calculated from the sound power level.

7 Sound power on the basis of measurements taken in compliance with ISO 9614.

8 Sound power level in cooling, outdoors.

9 Unit in standard configuration, without optional accessories.

- Not available

Data certified in EUROVENT

8 TECHNICAL DATA SEASONAL EFFICIENCY IN COOLING (EN14825 VALUE)

Data Book

DB_ME_MECH-iB-G07 15Y - 40Y_062024_EN R32

[SI System]

ENERGY EFFICIENCY

SEASONAL EFFICIENCY IN COOLING (Reg. EU 2016/2281)

Ambient refrigeration

MECH-iB-G07			15Y	18Y	23Y	27Y	35Y	40Y				
Prated,c	(1)	kW	15,0	17,9	21,1	27,8	32,7	38,4				
SEER	(1) (2)	-	5,23	5,40	5,66	5,39	5,46	5,24				
Performance η_s	(1) (3)	%	206,0	213,0	223,0	212,0	215,0	207,0				

Notes:

(1) Parameter calculated according to [REGULATION (EU) N. 2016/2281]

(2) Seasonal energy efficiency ratio

(3) Seasonal space cooling energy efficiency

The units highlighted in this publication contain R32 [GWP₁₀₀ 677] fluorinated greenhouse gases.

Data certified in EUROVENT

ENERGY EFFICIENCY

SEASONAL EFFICIENCY IN COOLING (Reg. EU 2016/2281)

High temperature process cooling

MECH-iB-G07			15Y	18Y	23Y	27Y	35Y	40Y				
Prated,c	(1)	kW	15,00	17,89	21,10	27,80	32,67	38,36				
SEPR HT	(1) (3)	-	7,52	7,91	7,85	7,34	7,72	6,84				

SEASONAL EFFICIENCY IN COOLING (Reg. EU 2015/1095)

Process refrigeration at medium temperature

MECH-iB-G07			15Y	18Y	23Y	27Y	35Y	40Y				
Prated,c	(2)	kW	8,02	9,66	11,30	14,69	17,27	20,70				
SEPR MT	(2) (3)	-	4,06	4,34	4,30	3,83	4,10	4,22				

Notes:

(1) Seasonal energy efficiency of high temperature process cooling [REGULATION (EU) N. 2016/2281]

(2) Seasonal Energy Efficiency of Process Cooling at Medium Temperature [REGULATION (EU) N. 2015/1095]

(3) Seasonal energy efficiency ratio

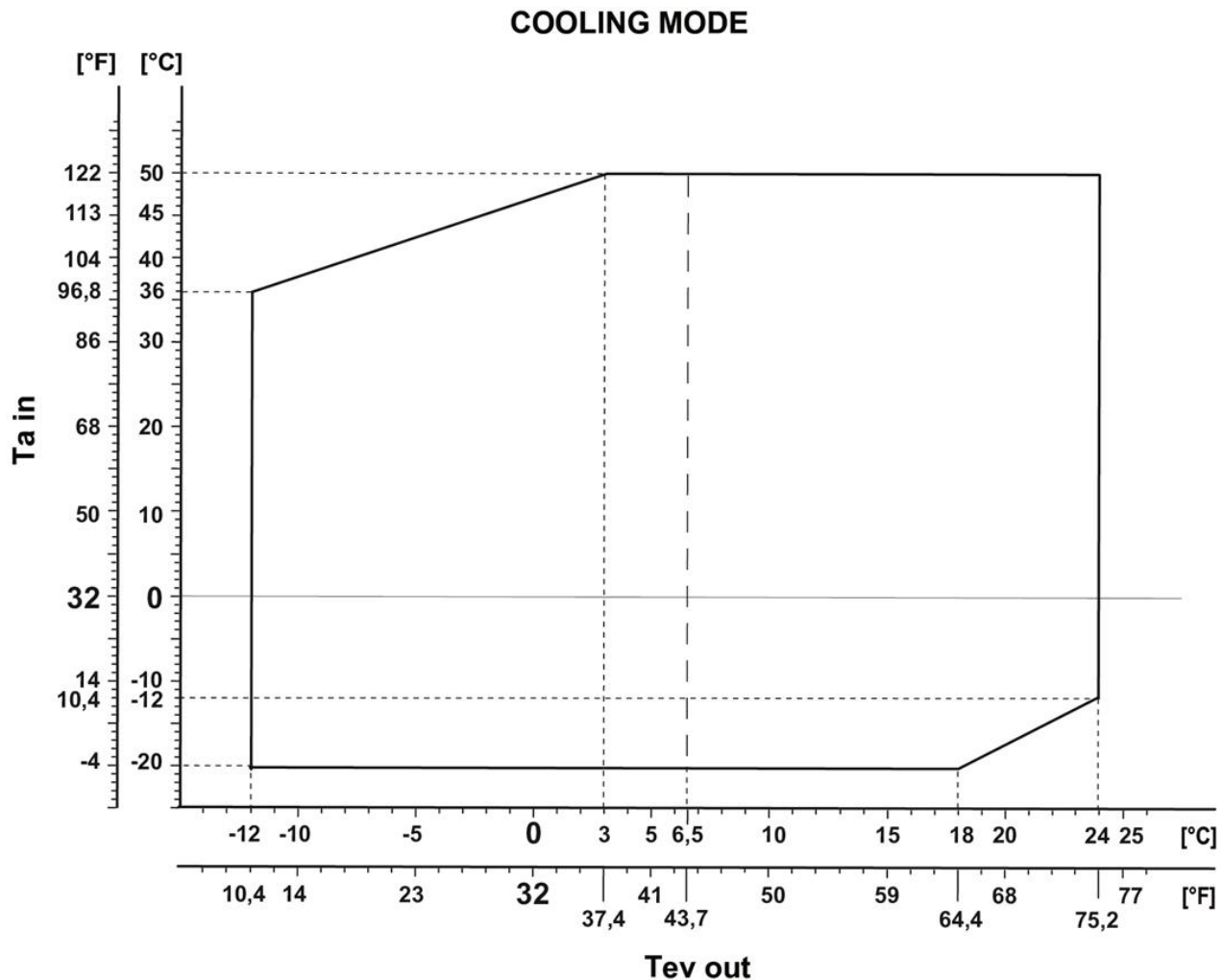
The units highlighted in this publication contain R32 [GWP₁₀₀ 677] fluorinated greenhouse gases.

9 OPERATING LIMITS

Data Book

DB_ME_MECH-iB-G07 15Y - 40Y_062024_EN R32

9.1 Operating limits - Graphs



Ta in Outdoor air temperature

Tev out Evaporator leaving water temperature

Required: Glycol for fluid temperatures below 6.5°C/43.7°F

In particular operating conditions the unit can work with forced ventilation, at partial loads or with derating compressors. For any specific information please refer to the software selection.

For the specific temperature limits of each model please refer to the selection software.

9 OPERATING LIMITS

Data Book

DB_ME_MECH-iB-G07 15Y - 40Y_062024_EN R32

9.2 ETHYLENE GLYCOL MIXTURE

Ethylene glycol and water mixture, used as a heat-conveying fluid, cause a variation in unit performance. For correct data, use the factors indicated in the following tabel.

	Freezing point (°C)							
	0	-5	-10	-15	-20	-25	-30	-35
	Ethylene glycol percentage by weight							
	0%	12%	20%	30%	35%	40%	45%	50%
cPf	1	0,985	0,98	0,974	0,97	0,965	0,964	0,96
cQ	1	1,02	1,04	1,075	1,11	1,14	1,17	1,2
cdp	1	1,07	1,11	1,18	1,22	1,24	1,27	1,3

cPf: cooling power correction factor

cQ: flow correction factor

cdp: pressure drop correction factor

For data concerning other kind of anti-freeze solutions (e.g, propylene glycol) please contact our Sale Department.

9.3 FOULING FACTORS

Performances are based on clean condition of tubes (fouling factor = 1). For different fouling values, performance should be adjusted using the correction factors shown in the following table.

SERIES	FOULING FACTORS	EVAPORATOR			CONDENSER/RECOVERY			DESUPERHEATER
	ff (m ² °CW)	F1	FK1	KE [°C]	F2	FK2	KC [°C]	R3
VARIOUS	0	1,000	1,000	0,0	1,000	1,000	0,0	1,000
VARIOUS	1,80 x 10 ⁻⁵	1,000	1,000	0,0	1,000	1,000	0,0	1,000
VARIOUS	4,40 x 10 ⁻⁵	1,000	1,000	0,0	0,990	1,030	1,0	0,990
VARIOUS	8,80 x 10 ⁻⁵	0,960	0,990	0,7	0,980	1,040	1,5	0,980
VARIOUS	13,20 x 10 ⁻⁵	0,944	0,985	1,0	0,964	1,050	2,3	0,964
VARIOUS	17,20 x 10 ⁻⁵	0,930	0,980	1,5	0,950	1,060	3,0	0,950

ff: fouling factors

F1 - F2: potential correction factors

FK1 - FK2: compressor power input correction factors

R3: capacity correction factors

KE: minimum evaporator outlet temperature increase

KC: maximum condenser outlet temperature decrease

[SI System]

Water flow and pressure drop

Water flow in the plant (side) exchanger is given by:

$$Q = P / (4,186 \times \Delta t)$$

Q: water flow (l/s)

 Δt : difference between inlet and outlet water temp. (°C)

P: heat exchanger capacity (kW)

Pressure drop is given by:

$$\Delta p = K \times (3,6 \times Q)^2 / 1000$$

Q: water flow (l/s)

 Δp : pressure drop (kPa)

K: unit size ratio

SIZE	Power supply V/ph/Hz	HEAT EXCHANGER USER SIDE				
		K	Q min l/s	Q max l/s	C.A.S. l	C.a. min l
MECH-iB-G07 15Y	400/3+N/50	2300	0,389	1,000	1,34	75,0
MECH-iB-G07 18Y	400/3+N/50	2300	0,464	1,181	1,34	90,0
MECH-iB-G07 23Y	400/3+N/50	1150	0,581	1,431	1,78	115
MECH-iB-G07 27Y	400/3+N/50	900	0,728	1,806	1,97	140
MECH-iB-G07 35Y	400/3+N/50	800	0,856	2,106	2,40	165
MECH-iB-G07 40Y	400/3+N/50	550	0,986	2,472	2,83	193

Q min: minimum water flow admitted to the heat exchanger

Q max: maximum water flow admitted to the heat exchanger

C.a. min: minimum water content admitted in the plant

C.A.S.: Exchanger water content

11 ELECTRICAL DATA

Data Book

DB_ME_MECH-iB-G07 15Y - 40Y_062024_EN R32

11.1 ELECTRIC DATA

[SI System]

MECH-iB-G07

SIZE	Power supply V/ph/Hz	Maximum values								
		Compressor				Fans (1)		Total (1)(2)		
		n	F.L.I. [kW]	F.L.A. [A]	L.R.A. [A]	F.L.I. [kW]	F.L.A. [A]	F.L.I. [kW]	F.L.A. [A]	S.A. [A]
15Y	400/3+N/50	1	1x5.6	1x8.9	-	2x0.11	2x0.9	6,130	11	-
18Y	400/3+N/50	1	1x6.3	1x10.1	-	2x0.11	2x0.9	7,020	12	-
23Y	400/3+N/50	1	1x7.5	1x12	-	1x0.39	1x1.7	8,590	15	-
27Y	400/3+N/50	1	1x10.6	1x16.9	-	2x0.39	2x1.7	12,03	20	-
35Y	400/3+N/50	1	1x12.5	1x20	-	2x0.39	2x1.7	14,26	24	-
40Y	400/3+N/50	1	1x15.2	1x24.3	-	2x0.39	2x1.7	16,95	28	-

F.L.I.: Full load power

F.L.A.: Full load current

L.R.A.: Locked rotor amperes for single compressor

S.A.: Inrush current

(1) Values calculated referring to the version with the maximum number of fans working at the max absorbed current

(1)(2) Safety values to be considered when cabling the unit for power supply and line-protections

Data valid for standard units without any additional option.

Voltage tolerance: 10%

Maximum voltage unbalance: 2%

Give the typical operating conditions of units designed for outdoor installation, which can be associated (according to reference document IEC 60721) to the following classes:

- climatic conditions class 4K4H: air temperature range from -20 up to 55°C (*), relative humidity range from 4 up to 100%, with possible precipitations, at air pressure from 70 and 106 kPa and a maximum solar radiation of 1120 W/m²

- special climatic conditions negligible

- biological conditions class 4B1 and 4C2: locations in a generic urban area

- mechanically active substances class 4S2: locations in areas with sand or dust representative of urban areas

- mechanical conditions class 4M1: locations protected from significant vibrations or shocks

The required protection level for safe operation, according to reference document IEC 60529, is IP43XW (protection against access, to the most critical unit's parts, of external devices with diameter larger than 1 mm and rain).

The unit can be considered IP44XW protected, i.e. protected against access of external devices (with diameter larger than 1 mm) and water in general.

(*) for the unit's operating limits, see "selection limits" section

11.2 Dimensions of the electrical connections to the main switch

Power supply connections

Maximum cross-section area of power supply conductors that can be connected to R,S,T,N e PE terminals (for three-phase units) is shown in the table here below:

Model	Size	Flexible conductor cross-section area [mm ²]	Flexible conductor with crimping lugs and collar cross-section area [mm ²]
MECH-iB-G07	15Y	10	6
MECH-iB-G07	18Y	10	6
MECH-iB-G07	23Y	10	6
MECH-iB-G07	27Y	10	6
MECH-iB-G07	35Y	10	6
MECH-iB-G07	40Y	10	6

Controller connections

Controller connections data:

- Flexible conductor cross section area 0,14 mm² ... 1,5 mm²
- Flexible conductor cross section area [AWG] 26 ... 14 (converted according to IEC)
- Flexible conductor cross section area (crimping lug without insulation collar) 0,14 mm² ... 1,5 mm²
- Flexible conductor cross section area (crimping lug and plastic collar) 0,14 mm² ... 1 mm²

12 FULL LOAD SOUND LEVEL**Data Book****DB_ME_MECH-iB-G07 15Y - 40Y_062024_EN R32****MECH-iB-G07**

SOUND POWER LEVEL IN COOLING									
SIZE	Octave band [Hz]								Total sound level dB(A)
	63	125	250	500	1000	2000	4000	8000	
	Sound power level dB								
15Y	69	69	71	68	64	62	57	49	70
18Y	74	74	72	66	66	63	55	49	71
23Y	77	78	78	74	69	67	60	50	76
27Y	82	84	79	76	71	69	65	62	78
35Y	83	85	80	77	72	70	66	63	79
40Y	87	89	80	78	73	70	64	57	80

Working conditions

Plant (side) cooling exchanger water (in/out) 12,00°C/7,00°C; Source (side) heat exchanger air (in) 35,0°C.

Sound power on the basis of measurements taken in compliance with ISO 9614.

Such certification refers specifically to the sound Power Level in dB(A). This is therefore the only acoustic data to be considered as binding.

Sound power level in cooling, outdoors.

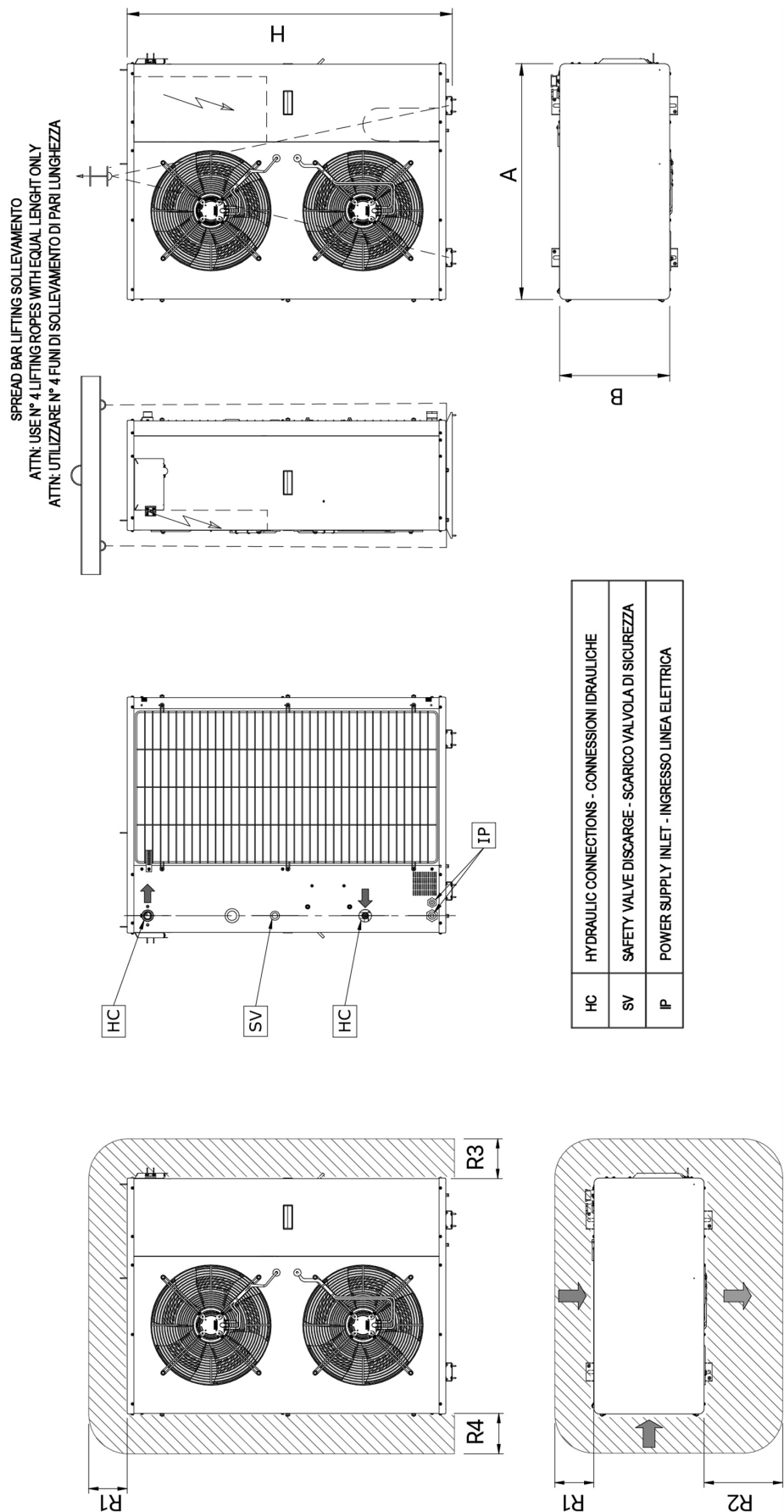
MECH-iB-G07

SOUND PRESSURE LEVEL									
SIZE	Octave band [Hz]								Total sound level dB(A)
	63	125	250	500	1000	2000	4000	8000	
	Sound pressure level dB								
15Y	38	38	40	37	33	31	26	18	39
18Y	43	43	41	35	35	32	24	18	40
23Y	46	47	47	43	38	36	29	19	45
27Y	50	52	47	44	39	37	33	30	46
35Y	51	53	48	45	40	38	34	31	47
40Y	55	57	48	46	41	38	32	25	48

Working conditions

Plant (side) cooling exchanger water (in/out) 12,00°C/7,00°C; Source (side) heat exchanger air (in) 35,0°C.

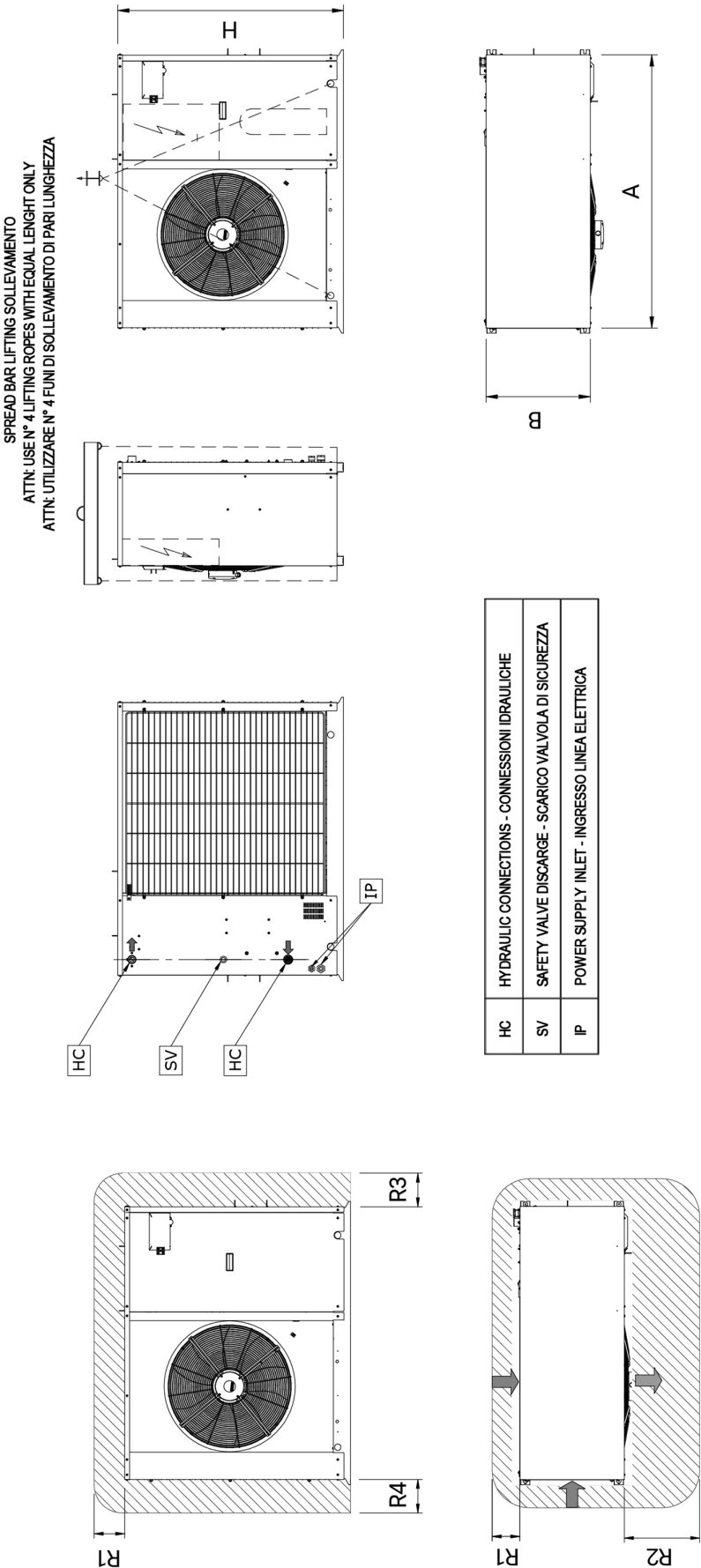
Average sound pressure level at 10m distance, unit in a free field on a reflective surface; non-binding value calculated from the sound power level.



REMARKS: For installation purposes, please refer to the documentation sent after the purchase contract. This technical data should be considered as indicative. Mitsubishi Electric Hydraulics & IT Cooling Systems S.p.A. may modify them at any moment. Data valid for standard units without any additional option.

[SI System]

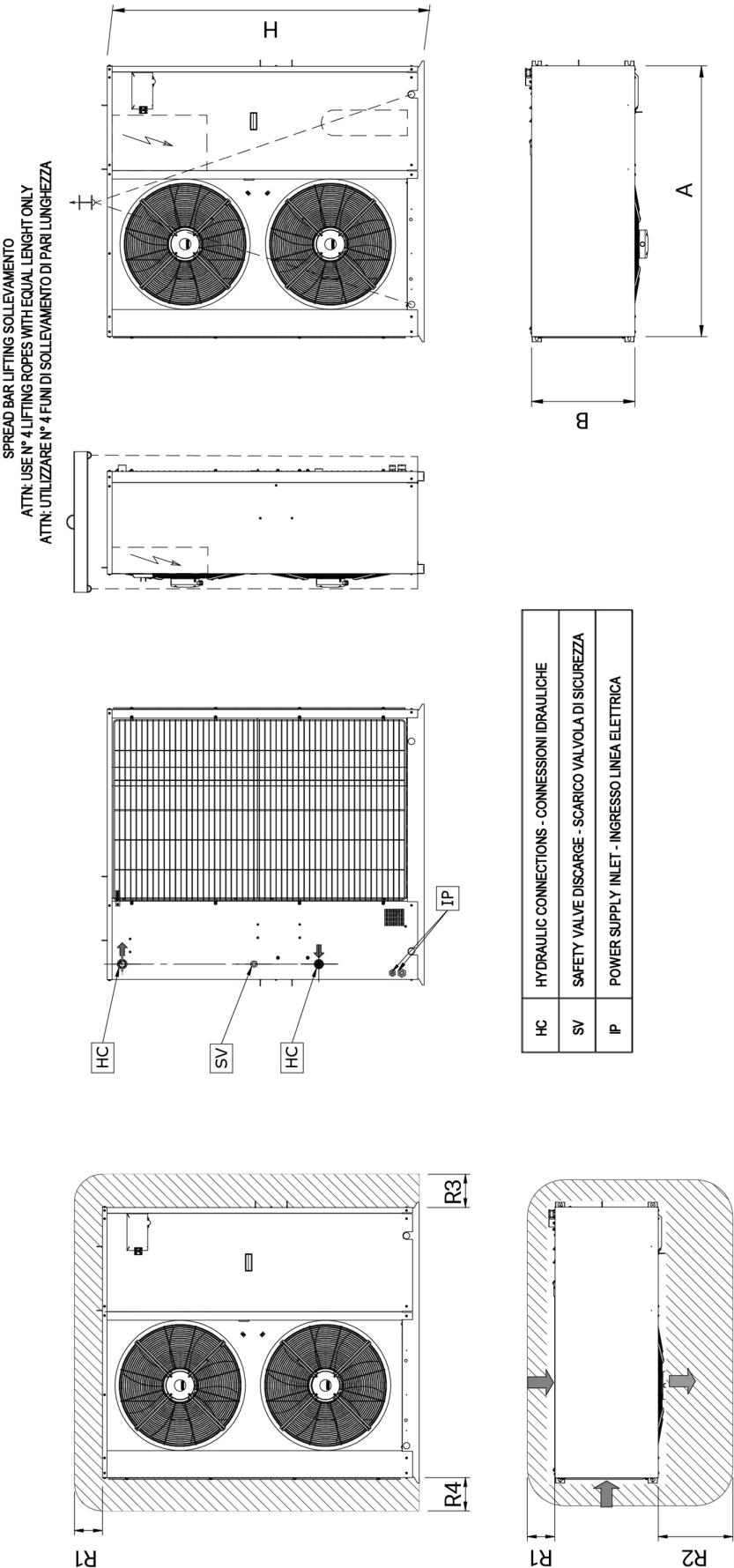
SIZE	DIMENSIONS AND WEIGHTS				CLEARANCE				HEAT EXCHANGER USER SIDE	
	A	B	H	WEIGHT	R1	R2	R3	R4	IN/OUT	
	[mm]	[mm]	[mm]	[kg]	[mm]	[mm]	[mm]	[mm]	TYPE	Ø
MECH-iB-G07 15Y	900	420	1390	144	400	900	400	400	B2	1"1/4
MECH-iB-G07 18Y	900	420	1390	155	400	900	400	400	B2	1"1/4



REMARKS: For installation purposes, please refer to the documentation sent after the purchase contract. This technical data should be considered as indicative. Mitsubishi Electric Hydraulics & IT Cooling Systems S.p.A. may modify them at any moment. Data valid for standard units without any additional option.

[SI System]

SIZE	DIMENSIONS AND WEIGHTS				CLEARANCE				HEAT EXCHANGER USER SIDE	
	A	B	H	WEIGHT	R1	R2	R3	R4	IN/OUT	
	[mm]	[mm]	[mm]	[kg]	[mm]	[mm]	[mm]	[mm]	TYPE	Ø
MECH-iB-G07 23Y	1450	550	1200	207	400	900	400	400	B2	1"1/4



REMARKS: For installation purposes, please refer to the documentation sent after the purchase contract. This technical data should be considered as indicative. Mitsubishi Electric Hydraulics & IT Cooling Systems S.p.A. may modify them at any moment. Data valid for standard units without any additional option.

[SI System]

SIZE	DIMENSIONS AND WEIGHTS				CLEARANCE				HEAT EXCHANGER USER SIDE	
	A	B	H	WEIGHT	R1	R2	R3	R4	IN/OUT	
	[mm]	[mm]	[mm]	[kg]	[mm]	[mm]	[mm]	[mm]	TYPE	Ø
MECH-iB-G07 27Y	1450	550	1700	256	400	900	400	400	B2	1"1/4
MECH-iB-G07 35Y	1450	550	1700	272	400	900	400	400	B2	1"1/2
MECH-iB-G07 40Y	1700	650	1700	306	400	900	400	400	B2	1"1/2

14.1 Hydronic groups

HYDRONIC GROUP

Hydronic module provided on board of the unit as a standard, allowing easy installation of the unit (Plug&Play solution).

The unit in standard configuration includes the hydronic module with the following components:

- variable flow EC water pump
- expansion tank
- safety valve
- air vent
- anti-freeze electrical heater
- flow switch
- water filter

It is available as an option the configuration with high prevalence pump with the following components:

- variable flow EC and high prevalence water pump
- expansion tank
- safety valve
- air vent
- anti-freeze electrical heater
- flow switch
- water filter

and as an option the configuration without pump and without expansion tank with the following components:

- safety valve
- air vent
- anti-freeze electrical heater
- flow switch
- water filter.

Expansion tank volume

Grandezza	15Y	18Y	23Y	27Y	35Y	40Y
MECH-iB-G07	2	5	5	5	5	5

Possible configurations

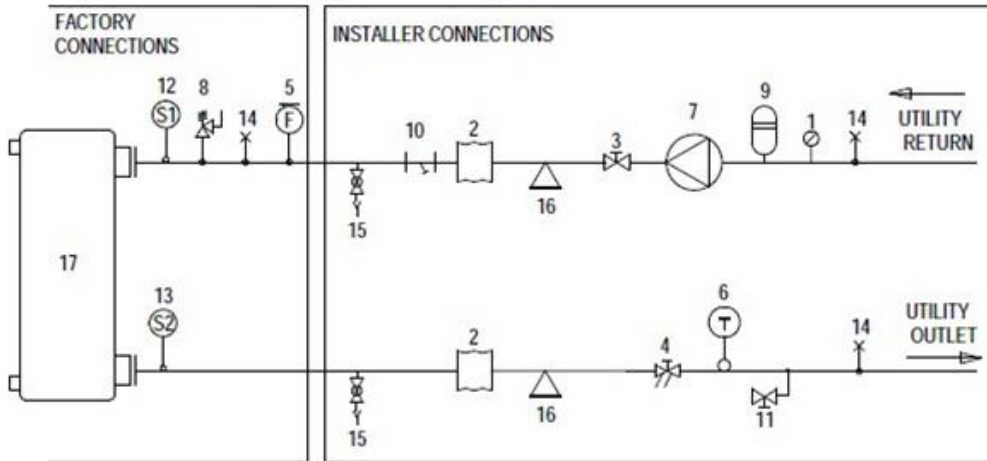
PUMP GROUP	Versions
WITH INVERTER WATER PUMP(A993)	X
WITH HIGH HEAD INVERTER WATER PUMP(A994)	X

HYDRONIC GROUP

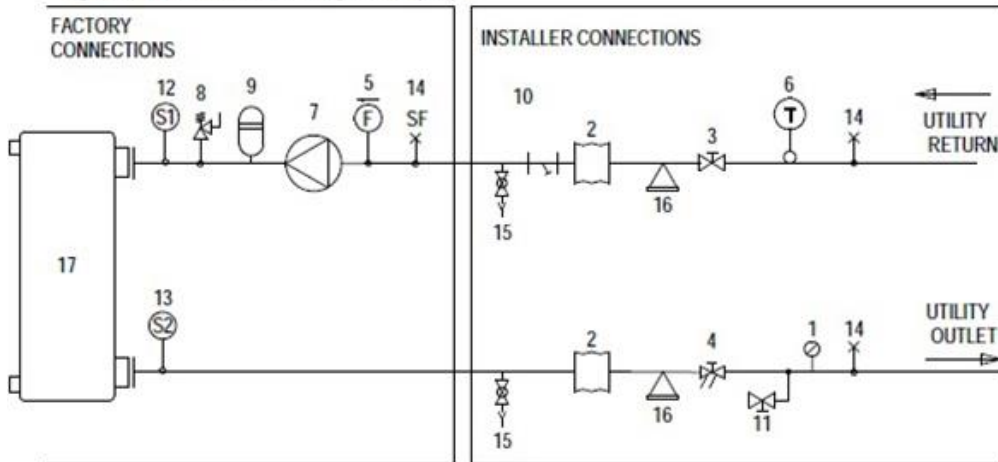
Data Book

DB_ME_MECH-iB-G07 15Y - 40Y_062024_EN R32

System water circuit connection diagram, version without pump



System water circuit connection diagram, with pump



POS	DESCRIPTION
1	PRESSURE GAUGE
2	VIBRATION DAMPER JOINT
3	SHUT-OFF VALVE
4	CALIBRATING VALVE
5	FLOW SWITCH
6	THERMOMETER
7	CIRCULATING PUMP
8	SAFETY VALVE
9	EXPANSION VESSEL
10	WIRE MESH FILTER
11	FILL - REFILL
12	INLET TEMPERATURE SENSOR
13	OUTLET TEMPERATURE SENSOR
14	SYSTEM VENT
15	DRAIN / CHEMICAL WASHING VALVE
16	FIXING POINT
17	PLATE HEAT EXCHANGER

Hydronic kit positioning

	Version	WITH INVERTER WATER PUMP (A993)				WITH HIGH HEAD INVERTER WATER PUMP (A994)											
		extra L [mm]	extra W [mm]	extra H [mm]	extra WGT [kg]	extra L [mm]	extra W [mm]	extra H [mm]	extra WGT [kg]	extra L [mm]	extra W [mm]	extra H [mm]	extra WGT [kg]	extra L [mm]	extra W [mm]	extra H [mm]	extra WGT [kg]
15Y	-	/	/	/	3	/	/	/	6								
18Y	-	/	/	/	4	/	/	/	6								
23Y	-	/	/	/	4	/	/	/	8								
27Y	-	/	/	/	4	/	/	/	8								
35Y	-	/	/	/	6	/	/	/	12								
40Y	-	/	/	/	6	/	/	/	12								

- extra L

extra W

extra H

extra WGT

WITH INVERTER WATER PUMP

WITH HIGH HEAD INVERTER WATER PUMP

-
- Unit's extra length

Unit's extra operating width (NOT to be considered for transport)

Unit's extra height

Unit's extra weight (pumps and piping)

WITH INVERTER WATER PUMP

WITH HIGH HEAD INVERTER WATER PUMP

Not available

HYDRONIC GROUP**Data Book**

DB_ME_MECH-iB-G07 15Y - 40Y_062024_EN R32

HEAT EXCHANGER USER SIDE - WITH HIGH HEAD INVERTER WATER PUMP (A994)

SIZE	Version	CH		PUMP					CH
		Pfgross	Qfgross	Curve	Model	N.	F.L.A.	F.L.I.	HU
		[kW] (1)	[l/s] (1)			Pole	[A]	[kW]	[kPa]
15Y	-	14,93	0,714	A1	STRATOS PARA 25/180-12	0	1	0,305	99,9
18Y	-	17,79	0,851	A2					94,8
23Y	-	21,03	1,005	B1	2 x PARA MAXO-G 25-180-10-F02	0	3	0,400	144
27Y	-	27,73	1,326	B2					119
35Y	-	32,51	1,554	C1	2 x STRATOS PARA 25/180-12	0	3	0,610	150
40Y	-	38,19	1,827	C2					133

(1) Values refer to nominal conditions

CH Cooling mode

Pf Cooling capacity unit (Cooling mode)

Pt Heating capacity unit (Heating mode)

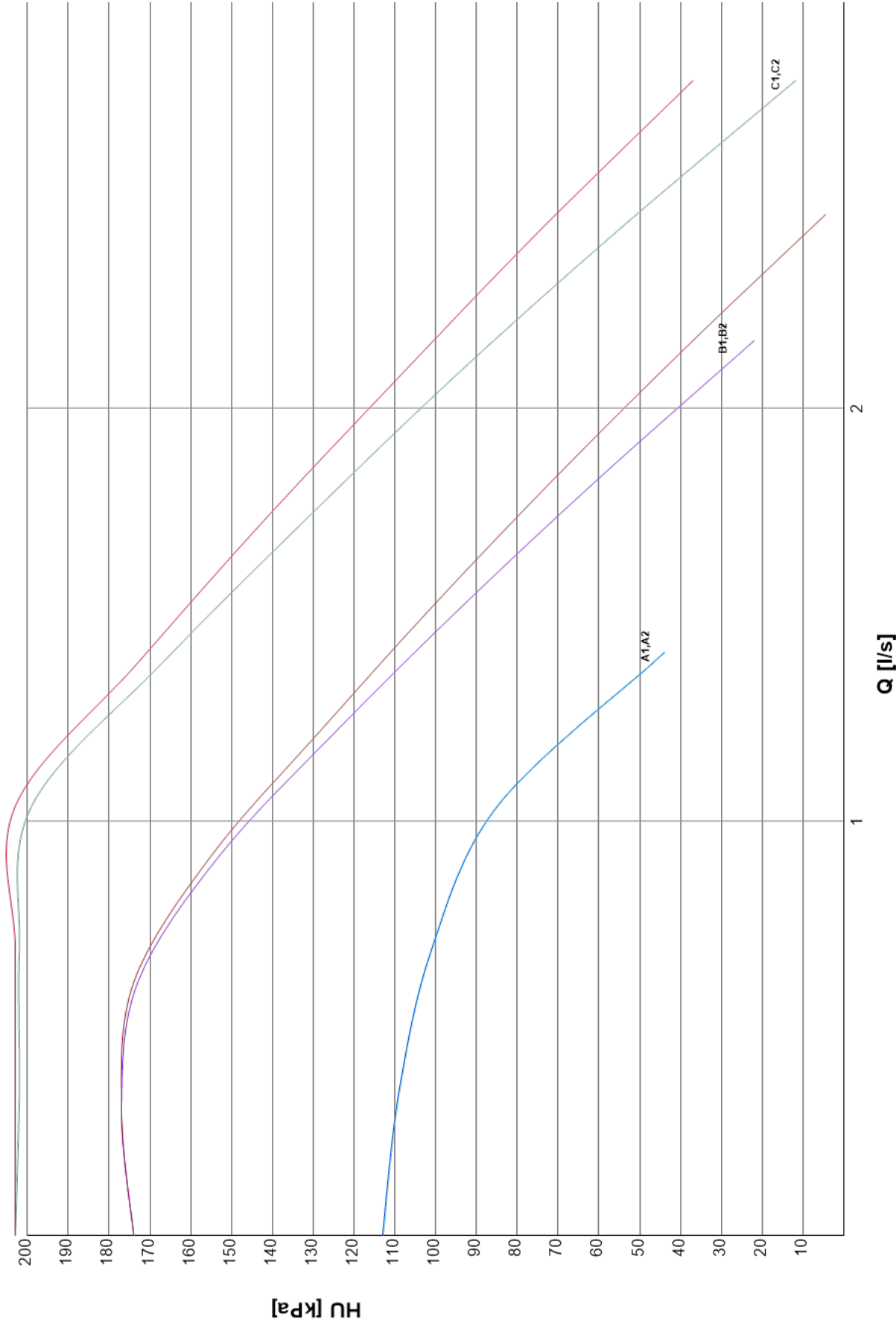
Q Plant (side) exchanger water flow

F.L.I. Pump power input

F.L.A. Pump running current

HU Pump residual pressure head (Units with hydronic group without mains filter)

HEAT EXCHANGER USER SIDE - WITH HIGH HEAD INVERTER WATER PUMP (A994)



HEAT EXCHANGER USER SIDE - WITH INVERTER WATER PUMP (A993)

SIZE	Version	CH		Curve	PUMP				CH
		Pfgross	Qfgross		Model	N.	F.L.A.	F.L.I.	HU
		[kW] (1)	[l/s] (1)			Pole	[A]	[kW]	[kPa]
15Y	-	14,93	0,714	A1	PARA MAXO-G 25-180-08-F02	0	1	0,130	56,1
18Y	-	17,79	0,851	B1	PARA MAXO-G 25-180-10-F02	0	2	0,200	72,5
23Y	-	21,03	1,005	B2					73,5
27Y	-	27,73	1,326	B3					57,0
35Y	-	32,51	1,554	C1	STRATOS PARA 25/180-12	0	1	0,305	72,2
40Y	-	38,19	1,827	C2					63,3

(1) Values refer to nominal conditions

CH Cooling mode

Pf Cooling capacity unit (Cooling mode)

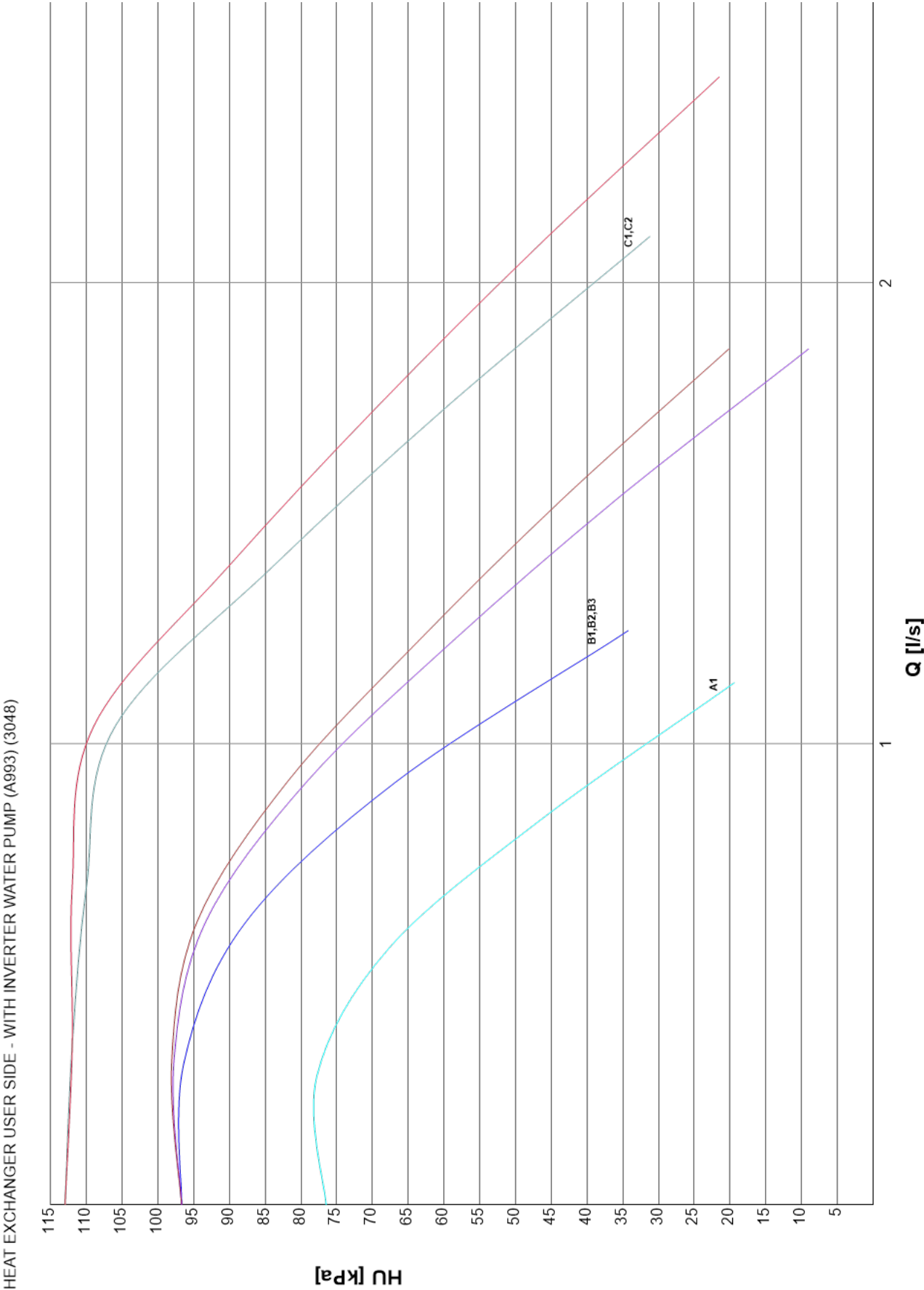
Pt Heating capacity unit (Heating mode)

Q Plant (side) exchanger water flow

F.L.I. Pump power input

F.L.A. Pump running current

HU Pump residual pressure head (Units with hydronic group without mains filter)



15.1 Variable flow control

Pump energy consumption significantly impacts plant running costs, but it can be considerably reduced thanks to the use of variable speed pumps (inverter driven pumps), capable of adjusting the water flow rate according to the actual plant thermal load.

Mitsubishi Electric Hydronics & Cooling Systems has developed the VPF control series (Variable Primary Flow), that provides different water flow regulation logics specifically devoted to various hydraulic plant solutions: only a primary circuit, primary and secondary circuits, single unit or multi-unit systems controlled with external controller (Manager 3000+, KlimaPRO+) or with 1541, 1542 Multi Manager options.

The VPF systems adjust the pump speeds on the basis of the plant's thermal load and optimize the unit's thermoregulation algorithm for variable flow operation, in a dynamic and simultaneous way. This ensures the highest energy savings, stable operation, and complete reliability.

VPF.E SYSTEM (delta T control) For plants with primary circuit.

VPF.E - Plant and unit requirements

The VPF.E system monitors the temperature difference of the primary circuit (ΔT) and adjusts the primary circuit's pump speed in order to keep it within a defined range (ΔT_{min} ΔT_{max}).

- If $\Delta T_{min} \leq \Delta T \leq \Delta T_{max}$

The plant water flow is appropriate to the thermal load, the pump speed is kept constant.

- If $\Delta T < \Delta T_{min}$

The plant water flow exceeds what is necessary to properly cover the thermal load, the pump speed is reduced to save pump energy.

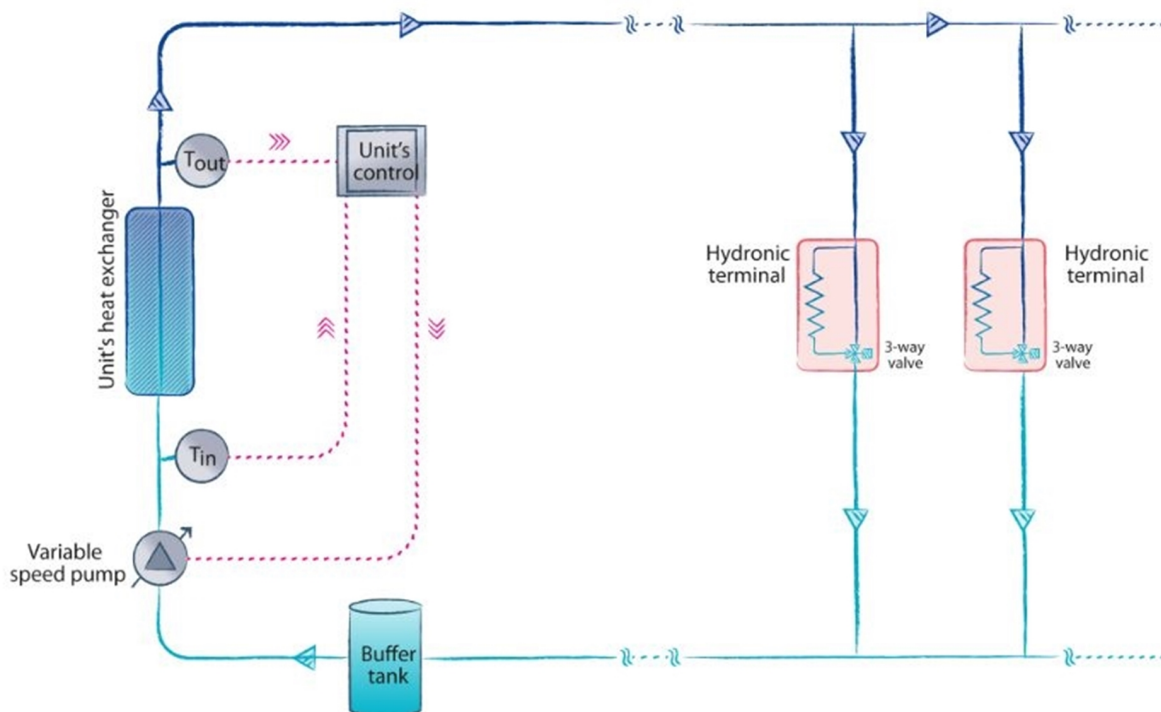
- If $\Delta T > \Delta T_{min}$

The plant water flow is too low to ensure the proper feed to the users, the pump speed is increased.

With the VPF.E system, the water flow can be reduced to 50% of the unit nominal water flow, with regards to the selection conditions, provided that the minimum water flow required by the unit's heat exchanger is respected (the control of the heat exchanger's minimum water flow is described below).

The pump speed regulation is performed with little progressive adjustments while continuously monitoring the value of the temperature difference on the primary circuit.

The absence of abrupt water flow changes prevents fluctuation due to possible conflicts with the unit's thermoregulation function (compressor regulation).



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