Galletti
AIR CONDITIONING

GB

TECHNICAL MANUAL FOR CHILLERS AND HEAT PUMPS

MPI DC

08 kW - 29 kW

CHILLERS AND HEAT PUMPS DC-INVERTER

CE

eco R410A

EUROVENT CERTIFIED PERFORMANCE
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DECLARATION OF CONFORMITY

Galletti S.p.A., whose head office is located at 12/a Via Romagnoli 12/a Bentivoglio (Bologna) - Italy, hereby declares, under its own responsibility, that the water chillers and heat pumps belonging to the series: (see table below) units intended for applications in civil air conditioning systems, comply with the requirements of Directives: **2006/42/CE, 2004/108/CE, 2006/95/CE, 97/23/CE (PED)**.

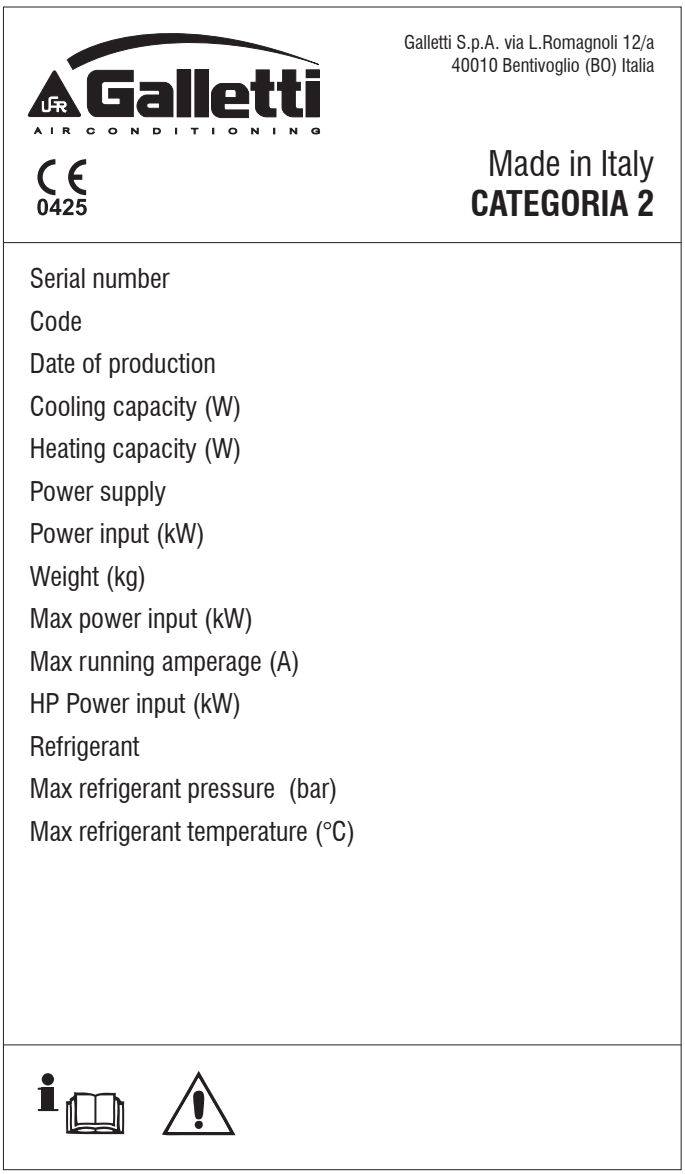
These units , working with fluids belonging to group 2, according to Directive **97/23/CE**, are the result of an assembly of components [compressors, brazed plate heat exchangers, liquid receivers, pipes, control and safety valves] which are individually provided, where required, with certification in accordance with current directives: the category to which the machines belong is determined on the basis of an analysis of the components subject to the **PED** and corresponds to the highest category among the components used.

For each series of machines, the conformity of the assembly has been assessed by notified bodies, applying the assessment procedures (forms) pursuant to annex II of the **PED - Directive 97/23/CE**, as shown in the following table:

Bentivoglio, 20/06/2013
Galletti S.p.A.
Luca Galletti

CE

Range	Size	Notified body	certificate	Conformity Compliance Module	PED category	Marking
MCC - MCC H	6 - 7 - 9 - 12 - 15	0425	2422/0	Modulo D1	I	CE
MCC - MCC H	18 - 22 - 25 - 33 - 37	0425		Modulo D1	II	CE + PED
MCW - MCW / H	5 - 7 - 10 - 12 - 15	0425		Modulo D1	I	CE
MCW - MCW / H	18 - 20 - 22 - 27 - 31 - 39	0425		Modulo D1	II	CE + PED
MPE - MPEH MCE - MCEH	4 - 5 - 7 - 8	0425		Modulo D1	I	CE
MPE - MPEH MCE - MCEH	9 - 10 - 11 - 13 - 15 - 18	0425		Modulo D1	I	CE
MPE - MPEH MCE - MCEH	19-20-21-23-24-26-27-28-31-32-34-35-39-40	0425		Modulo D1	II	CE + PED
MPE - MPEH MCE - MCEH	T30 - T34 - T40 - T45	0425		Modulo D1	II	CE + PED
MPE - MPEH	54 - 66	0425		Modulo D1	II	CE + PED
MPI	15	0425		Modulo D1	I	CE
MPI	27	0425		Modulo D1	II	CE + PED
MPI DC	8 - 10 - 14 - 15 - 18	0425		Modulo D1	I	CE
MPI DC	23 - 27 - 29	0425		Modulo D1	II	CE + PED
MFE	5 - 6 - 8 - 12 -13 - 16 - 17 - 20 - 23	0425		Modulo D1	I	CE
MXE - MXE E	9 - 11 - 14 - 16	0425		Modulo D1	I	CE
MXE - MXE E	19 - 21	0425		Modulo D1	II	CE + PED
MCP	7 - 9	0425		Modulo D1	I	CE
MCP	10-13-15-18-27-32-40-T18-T22-T24-T30	0425		Modulo D1	II	CE + PED
LCE - LCE H	42 - 52 - 62 - 72 - 82 91/2/4 - 101/2/4 - 121/2/4 141/2/4 - 161/2/4 - 174 - 194 - 214	0425		Modulo D1	II	CE + PED
LEW	41-42-51-52-61-62-71-72-81-82-91-92-111-112-131-132-141-142-144-161-162-164-181-182	0425		Modulo D1	II	CE + PED



UNIT IDENTIFICATION

The unit data are reported on the rating label in this page.

THE LABEL SHOWS THE FOLLOWING DATA:

- Series and size of the unit
- Date of manufacture
- Main technical data
- Manufacturer
- The label is applied on the unit, usually on the enclosing panels beside the condenser coil.

IMPORTANT: NEVER REMOVE THE LABEL

- Serial number of the unit
- The serial number permits to identify the technical characteristics and the components installed.
- Without this datum it will be impossible to identify the unit correctly.

TRANSLATION OF ORIGINAL INSTRUCTIONS

WATER CHILLERS AND HEAT PUMPS ARE IN ACORDARCE WITH THE LAW 97/23/CE (PED) FILLING IN D1 FORM, APPROVED BY THE THIRD NOTIFIED BODY ICIM N°0425.

The technical and dimensional data provided herein may undergo changes in connection with product improvements.

- For any further information, contact the manufacturer: info@galletti.it
- To get the weight of the unit, refer to the User Manual, Rated technical data table.

1 THE SERIES

The actual thermal load of an air conditioning system is less than 60% of the rated load capacity 90% of the time.
In case of low power installations with a low number of indoor units and low water content, operation under part load conditions is especially critical.
In order to ensure that the unit functions correctly the variation of the power delivered by the unit is necessary.
The inverter controller controls the compressor rpm through the modulation of the refrigerant rate, the cooling capacity and the electrical input.
The operating logic of MPI DC units allows an accurate adjustment of the outlet water temperature according to the thermal load conditions:
The PID control algorithm allows to adjust the water temperature within +/- 15%.
The inverter controller allows to adjust the capacity and the input of the compressor to the actual thermal load and makes it possible to considerably reduce electrical intakes at the compressor start-up (reduction of starting currents) and during the operation under partial loads.
The spinning airtight scroll compressors (for models from MPI014 DC to MPI029 DC) or Twin Rotary compressors (for models from MPI08 DC to MPI010 DC) are equipped with motor protection against overheating and overcurrents.
Mounted on anti-vibration supports, complete with oil charge, they are enclosed in a soundproofed compartment and equipped with an automatically controlled oil heating system to avoid oil dilution by the refrigerant when the compressor is stopped.
The compressor motor is a permanent magnets, brushless, alternating current motor controlled by a trapezoidal wave driver operating in the frequency field ranging from 30 to 110 Hz (BLDC “Brushless Direct Current” Technology)
The electronic control system allows the setpoint to be adjusted automatically according to the outdoor temperature in order to reduce consumption and broaden the working temperature range.
The condensation control adapts the fan rpm to the actual working conditions
This results in better working conditions, reduction of sound levels under partial load conditions and possibility of operating in cooling mode beyond conventional working limits (up to an outdoor air temperature of -10°C).
In heat pump operation the exclusive defrost system can correctly identify an impairment of performance in the outdoor exchanger due to the formation of ice and minimise the process time in relation to normal operation of the unit.

- **> PERMANENT MAGNETS ELECTRIC SYNCHRONOUS MOTOR**
- **> LOWER MOTOR INERTIA EFFECT**
- **> COMPACT DIMENSIONS**
- **> LOWER NOISE EMISSIONS**
- **> NO ROTOR LOSSES DUE TO CURRENTS AND INDUCTION -> HIGHER EFFICIENCY AT PART LOAD**
- **> HIGHER COMPRESSOR ISENTROPIC EFFICIENCY**

The MPI DC series heat pump units can be also used in applications to produce domestic hot water, 365 days/year, when connected to "MYCHILLER DHW" (remote control/management panel).
For general hydraulic schemes, see the control panel manual.

REMARK: this applications are not compatible with the option: water buffer tank (on board)

2 CONSTRUCTIVE FEATURES

STRUCTURE
Painted galvanised sheet steel structure (RAL9002) for an attractive look and effective resistance to corrosive agents.
Fastening devices are made of non-oxidizable materials, or carbon steel that has undergone surface-passivating treatments.
The compressor compartment is completely sealed and may be accessed on 3 sides thanks to easy-to-remove panels that greatly simplify maintenance and/or inspection.
Sound insulation, available on request, can further reduce the noise emissions of the unit.

CUSTOMISED HYDRAULIC KIT
- High head pump made entirely of stainless steel, already configured for use with mixtures of water and ethylene glycol up to 35% and provided with internal thermal protection. It is housed in the compressor compartment and is easy to reach thanks to the removable perimeter panels.
- Expansion tank
- Safety valve.
- Filling cock (included).
- Automatic vent valve.
- Water differential pressure switch and outlet water temperature probe with anti-freeze thermostat function.
- Mechanical Y filter supplied as a standard feature on all models to protect the evaporator (included).

COOLING CIRCUIT
- BLDC-type compressor housed in a compartment that can be sound insulated.
- Brazed plate heat exchangers made of STAINLESS steel and optimised for use with R410A.
- Finned block condenser with 8 mm copper piping and aluminium fins, characterised by ample heat exchange surfaces.
- Dehydrating filter.
- Flow indicator with humidity indicator.
- Thermostatic valve with external equalization and integrated MOP function.
- Cycle-reversing valve (MPI DC H).
- Single-acting valves (MPI DC H).
- Liquid receiver (MPI DC H).
- High and low pressure switches.
- Safety valve.
- Schrader valves for checks and/or maintenance.
- Refrigerant pressure gauges (optional).

FAN DRIVE ASSEMBLY
Electric fan with 6-pole external rotor motor directly keyed to the axial fan, with internal thermal protection on the windings, complete with safety grille and dedicated supporting structure.
The fan is housed in a special compartment having a profile designed to optimise ventilation.
The use of finned block heat exchangers with 8mm diameter pipes reduces pressure drops on the air side, thus significantly improving the noise levels of the units.
The condensation control system continuously and automatically regulates the fan speed, further limiting the noise emissions of the unit during nighttime operation and under partial load conditions.

FINNED BLOCK HEAT EXCHANGER
Made of 8mm diameter copper pipes and aluminium fins, generously sized.
The special engineering of the heat exchangers allows defrost cycles to be carried out at maximum speed in the models with heat pump operation, which brings clear benefits in terms of the integrated efficiency of the whole cycle.

ELECTRONIC MICROPROCESSOR CONTROL
The electronic control enables the complete control of the MPI DC unit. It can be easily accessed through a polycarbonate flap with IP65 protection rating.

The modulation of capacity enables the unit to operate even in systems where the water content is low, without the use of an inertial water buffer tank. By reading the outdoor air temperature, it can automatically change the setpoint to adapt it to the outdoor load conditions or keep the unit running even in the harshest winter conditions.
The basic controller comes complete with the MODBUS protocol and enables an immediate connection to ERGO networks.

Main functions:
- Continuous modulation of compressor capacity.
- Control of outlet temperature
- Control over the temperature of water entering the evaporator.
- Defrosting management (MPI DC-H)
- Control of fan speed (optional)
- Complete alarm management.
- Dynamic control of the setpoint according to the outdoor air temperature.
- Can be connected to an RS485 serial line for supervisory / teleassistance operation
- Option of connecting a remote terminal that duplicates the control functions

Devices controlled:
- Compressor
- Fans
- Cycle-reversing valve (MPI DC-H).
- Water circulation pump
- Antifreeze heating elements (optional)
- Alarm signalling relay

On request, it is possible to install the advanced controller whose functions extend to:
- LAN networks
- Smart Defrost System

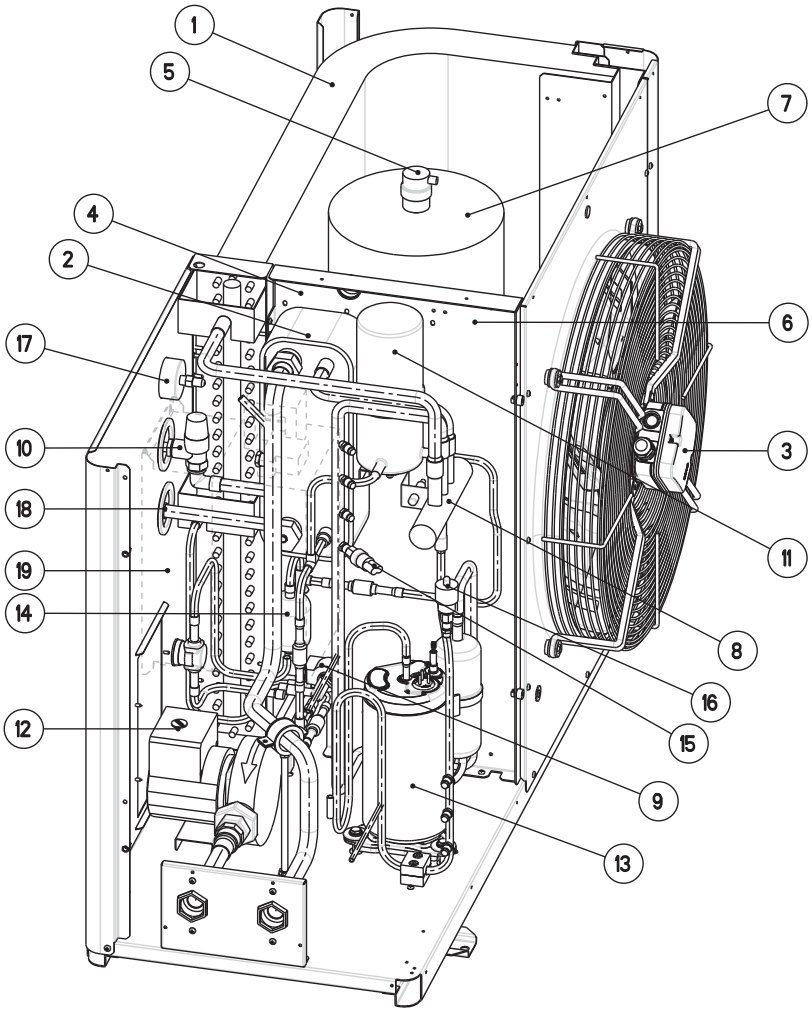
ELECTRIC CONTROL BOARD
Electric control board constructed and wired in accordance with the Directive on electromagnetic compatibility and related standards. Made of steel sheet, it is also protected by the enclosing panels of the unit.

OPTIONS
Incorporable hydronic kits
Condensation control
Low noise execution
Refrigerant pressure gauges
Antifreeze heating elements on the water circuit
Electronic thermostatic valve
Heat recovery 25% (chiller)
Special exchangers (hydrophilic treatment, copper-copper, cataphoresis, anti-corrosion)

ACCESSORIES AVAILABLE
Remote control boards
Base vibration dampers
Metal grilles to protect exchangers
MYCHILLER DHW

3 LAYOUT OF COMPONENTS

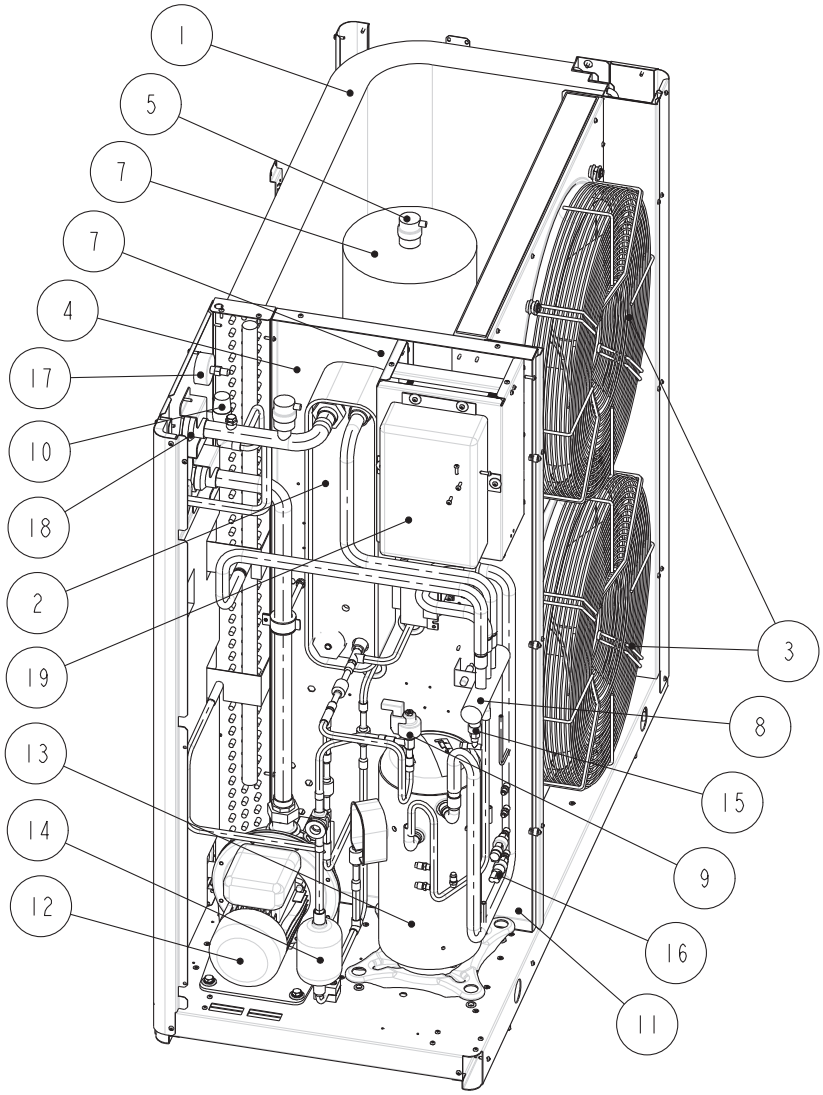
MPI DC 08



	Description
1	R410A - air exchanger
2	R410A - water exchanger
3	Fans
4	Water differential pressure switch (fan compartment)
5	Automatic air vent valve
6	Expansion tank (fan compartment)
7	Buffer tank (accessory)
8	4-way valve (MPI DC H)
9	Electronic expansion valves
10	Water safety valve
11	Liquid receiver
12	Circulation pump
13	Compressor
14	Refrigerant filter
15	Low pressure switch and charge inlet
16	High pressure switch and charge inlet
17	Water pressure gauge
18	Water filling point
19	Inverter

3 LAYOUT OF COMPONENTS

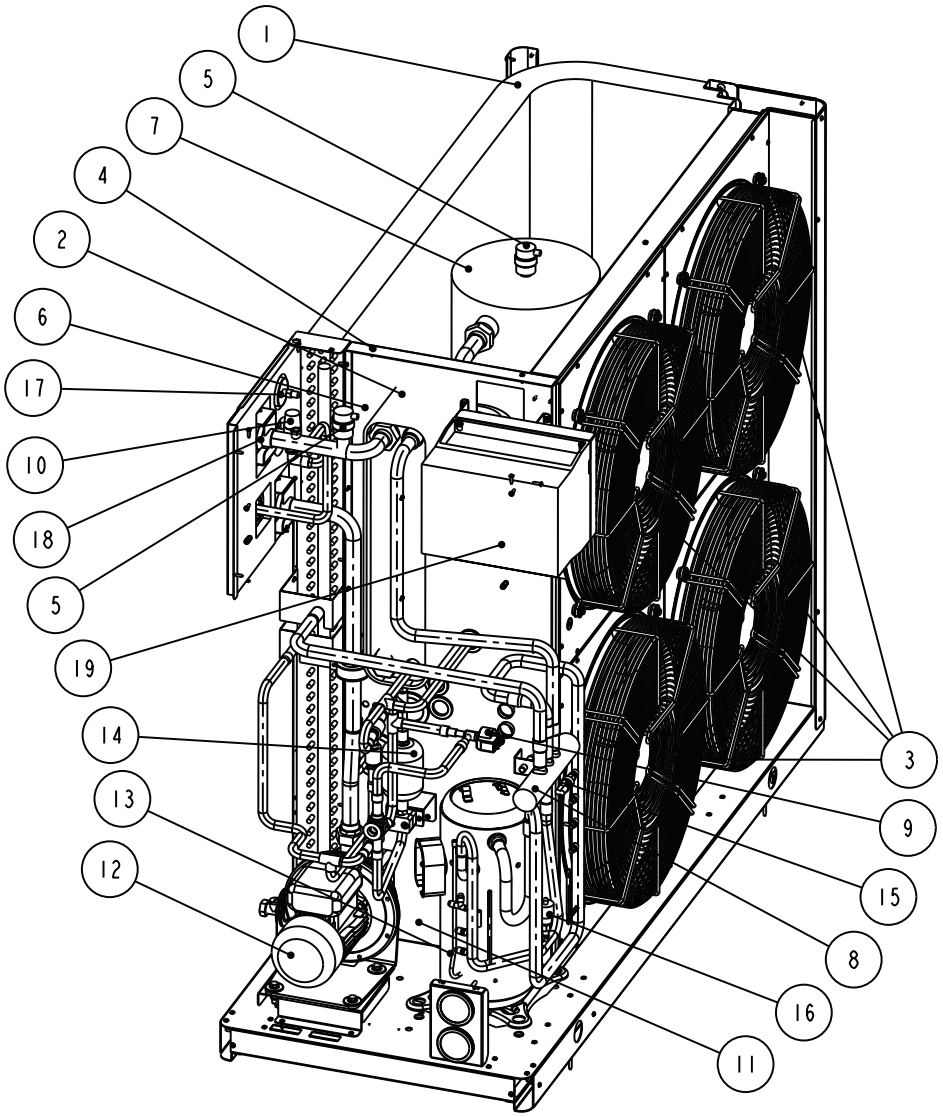
MPI DC 10 ÷ 18



	DESCRIPTION		
1	R410A - air exchanger	**10**	Water safety valve
2	R410A - water exchanger	**11**	Liquid receiver (fan compartment)
3	Fans	**12**	Circulation pump
4	Water differential pressure switch (fan compartment)	**13**	Compressor
5	Automatic air vent valve	**14**	Refrigerant filter
6	Expansion tank (fan compartment)	**15**	Low pressure switch and charge inlet
7	Buffer tank (accessory)	**16**	High pressure switch and charge inlet
8	4-way valve (MPI DC H)	**17**	Water pressure gauge
9	Electronic expansion valves	**18**	Water filling point
		19	Inverter

3 LAYOUT OF COMPONENTS

MPI DC 23 - 29



	DESCRIPTION
1	R410A - air exchanger
2	R410A - water exchanger
3	Fans
4	Water differential pressure switch (fan compartment)
5	Automatic air vent valve
6	Expansion tank (fan compartment)
7	Buffer tank (accessory)
8	4-way valve (MPI DC H)
9	Electronic expansion valves
10	Water safety valve
11	Liquid receiver (fan compartment)
12	Circulation pump
13	Compressor
14	Refrigerant filter
15	Low pressure switch and charge inlet
16	High pressure switch and charge inlet
17	Water pressure gauge
18	Water filling point
19	Inverter

4 MODELS AND CONFIGURATIONS

FIELD OF APPLICATION

MPI DC air-condensed water chillers and heat pumps have been designed to cool and heat water for air conditioning and heating systems in residential or commercial buildings.

The MPI DC units are designed for outdoor installation (protection rating IP24), in a position not accessible to the public.

If protection grilles (accessory) are not provided or if the unit can be reached by unauthorized persons, special protection barriers should be provided in order to prevent access to the finned coil

Do not install the unit in places where inflammable gases or powders are present.

MODELS AND VERSIONS

All models are charged with R410A refrigerant.

N.B. The choice of some options may preclude the choice of others or make some other fields become mandatory. Contact Galletti S.p.A. for verification

Complete unit code	M	P	I	D	C	0	1	4	H	0	A	A	A	1	0	0	C	0	0	0	0	0	0	0	2

Version 0
Single compressor **0**

Model (size) 1 4

Operation H
Water chiller **C**
Heat pump **H**

Supply voltage 0
Standard 400 - 3N - 50 **0**
Single-phase **M**

Refrigerant A
R410A high efficiency **A**

Revision A
Initial **A**

Expansion valve A
Electronic valve **A**

Pump and accessories 1
Modulating pump – expansion tank – filling tap **1**
BLDC pump – expansion tank – filling tap **2**

Inertial buffer tank 0
Absent **0**
Present + expansion tank **S**

Heat recovery 0
Absent **0**

Condensation control C
With adjustment of air flow rate **C**
BLDC fans **E**

Antifreeze kit 0
Absent **0**
For units with evaporator only **E**
For units with evaporator, pump and expansion tank **P**
For units with evaporator, pump, expansion tank and tank **S**

Sound insulation 0
Absent **0**
Compressor compartment soundproofing **1**
Compressor hoods **2**
Option 1 + option 2 **3**

Cooling accessories 0
None **0**
Refrigerant pressure gauges **M**

Remote control / Communication 0
Absent **0**
Output RS485 (Modbus or Carel protocol) **2**
Simplified remote control (PCDS) **S**
PCOXS microprocessor remote control **X**
Clock board **C**

Special coils 0
Standard **0**
Copper - copper **R**
Cataphoresis **C**
Corrosion-proof **B**
Hydrophilic **I**

Condenser protection grille 0
Absent **0**
Present **G**

Additional options 0
Absent **0**
Heating cable for heat exchanger (heat pump version only) **4**

Control 2
pCOXS **2**

5 TECHNICAL FEATURES

5.1 RATED TECHNICAL DATA OF WATER CHILLERS

MPI DC - C		010 M	014	018	023	029
Power supply	V - ph - Hz	230-1-50	400-3N-50	400-3N-50	400-3N-50	400-3N-50
Rated cooling capacity	kW	10,6	14,3	18,2	22,9	29,1
Total power input	kW	3,35	4,78	7,63	7,77	12,3
EER (rated capacity)		3,16	2,99	2,39	2,95	2,37
Total power input with pump	kW	3,6	5,3	8,2	8,3	12,9
Maximum power input	kW	5,6	7,1	10,7	10,8	21,9
Maximum electrical input	A	26,6	20,0	22,0	28,5	43,0
Starting current	A	10	10	10	10	10
No. of compressors / circuits		1 / 1	1 / 1	1 / 1	1 / 1	1 / 1
Refrigerant charge	kg	3,5	4,1	4,1	5,7	5,7
Low / high pressure switch	bar	42 / 2	42 / 2	42 / 2	42 / 2	42 / 2
No. of axial fans		2	2	2	4	4
Air flow rate	m^3/h	6.939	6.939	6.939	11.438	11.438
Water flow	l/s	1826	2454	3132	3935	4992
Diameter of water connections	"	1 1/4	1 1/4	1 1/4	1 1/4	1 1/4
Pressure drop, water side	kPa	23	35	35	36	36
Available head	kPa	130	120	120	98	98
Water content, excluding optionals	dm^3	3,0	3,0	3,0	5,0	5,0
Expansion tank	dm^3	5	5	5	5	5
Buffer tank	dm^3	30	30	30	50	50
Height	mm	1250	1250	1250	1300	1300
Length	mm	1220	1220	1220	1565	1565
Depth	mm	560	560	560	600	600
Sound power level	dB(A)	70	71	71	74	74
Sound pressure level	dB(A)	42	43	43	46	46
Transport weight *	kg	210	210	210	285	285
Operating weight *	kg	235	235	235	335	335

* Weights refer to model with pump and buffer tank
- Cooling capacity: outdoor air temperature 35°C, water temperature 12°C -7°C
- Sound power measured according to standards ISO 3741 - ISO 3744 and EN 29614-1
- Sound pressure measured at a distance of 10 m and a height of 1.5 m above the ground in an open field (fan side).
- The maximum electrical input is the mains electricity that must be available in order for the unit to work.
- The maximum current absorption refers to the current that will trigger the internal safety devices of the unit. It is the maximum current allowed in the unit. This value may never be exceeded; it must be used as a reference for determining the size of the power supply line and the related safety devices (refer to the wiring diagram supplied with the units).

5 TECHNICAL FEATURES

5.2 RATED TECHNICAL DATA - HEAT PUMP

MPI DC - H		008 M	010 M	014	018	023	029
Power supply	V-ph-Hz	230-1-50	230-1-50	400-3N-50	400-3N-50	400-3N-50	400-3N-50
Rated cooling capacity	kW	7,96	10,4	14,0	17,9	22,5	28,5
Total power input	kW	2,62	3,35	4,78	7,63	7,77	12,3
EER (rated capacity)		3,04	3,10	2,93	2,35	2,90	2,32
Total power input with pump	kW	2,8	3,6	5,3	8,2	8,3	12,9
Rated heating capacity	kW	8,89	11,5	15,7	21,6	24,6	33,7
Total power input in heating mode	kW	2,81	3,56	4,96	7,48	7,86	11,7
COP (rated power)		3,16	3,23	3,17	2,89	3,13	2,88
Total power input with pump in heating mode	kW	3,0	4,1	5,5	8,0	8,4	12,3
Maximum power input	kW	4,1	5,6	7,1	10,7	10,8	21,9
Maximum electrical input	A	16	26,6	20,0	22,0	28,5	43,0
Starting current	A	10	10	10	10	10	10
No. of compressors / circuits		1 / 1	1 / 1	1 / 1	1 / 1	1 / 1	1 / 1
Refrigerant charge	kg	2,1	4,1	4,4	4,4	6,0	6,0
Low / high pressure switch	bar	42 / 2	42 / 2	42 / 2	42 / 2	42 / 2	42 / 2
No. of axial fans		1	2	2	2	4	4
Air flow rate	m^3/h	4680	6939	6.939	6.939	11.438	11.438
Water flow rate in cooling mode	l/s	1367	1.789	2.407	3.072	3.861	4.898
Water flow rate in heating mode	l/s	1545	1.974	2.727	3.752	4.273	5.853
Diameter of water connections	"	1 1/4	1 1/4	1 1/4	1 1/4	1 1/4	1 1/4
Water pressure drop (cooling)	kPa	6	22	33	33	34	34
Water pressure drop (heating)	kPa	7	23	36	36	40	40
Available head (cooling)	kPa	93	130	120	120	98	98
Available head (heating)	kPa	95	120	110	110	80	80
Water content, excluding optionals	dm^3	2	3	3	3	5	5
Expansion tank	dm^3	1	5	5	5	5	5
Buffer tank	dm^3	19,5	30	30	30	50	50
Height	mm	758	1250	1250	1250	1300	1300
Length	mm	1241	1220	1220	1220	1565	1565
Depth	mm	582	560	560	560	600	600
Sound power level	dB(A)	68	70	71	71	74	74
Sound pressure level	dB(A)	40	42	43	43	46	46
Transport weight *	kg	144	220	220	220	300	300
Operating weight *	kg	153	240	240	240	347	347

* Weights refer to model with pump and buffer tank
- Cooling capacity: outdoor air temperature 35°C, water temperature 12°C -7°C
- Heating capacity: outdoor air temperature 7°C dry bulb and 6.2°C wet bulb, water temperature 40°C - 45°C
- Sound power measured according to standards ISO 3741 - ISO 3744 and EN 29614-1
- Sound pressure measured at a distance of 10 m and a height of 1.5 m above the ground in an open field (fan side).
- The maximum electrical input is the mains electricity that must be available in order for the unit to work.
- The maximum current absorption refers to the current that will trigger the internal safety devices of the unit. It is the maximum current allowed in the unit. This value may never be exceeded; it must be used as a reference for determining the size of the power supply line and the related safety devices (refer to the wiring diagram supplied with the units).

6 PERFORMANCES

6.1 COOLING CAPACITIES MPI DC-C

Tbs_1 Air inlet temperature (dry bulb)
Tw in/out Water inlet/outlet temperature

PF Cooling capacity
PA Total power input including pump

	Tbs_1		20		25		30		35		40		45	
	Tw in	Tw out	PF	PA	PF	PA	PF	PA	PF	PA	PF	PA	PF	PA
	[°C]	[°C]	kW	kW	kW	kW	kW	kW	kW	kW	kW	kW	kW	kW
MPI DC 08 C	Rated data at maximum frequency													
	10	5	9,01	2,19	8,52	2,39	8,07	2,60	7,58	2,83	7,09	3,08	6,62	3,35
	11	6	9,31	2,19	8,82	2,40	8,33	2,61	7,84	2,85	7,34	3,11	6,84	3,39
	12	7	9,62	2,19	9,12	2,40	8,61	2,63	8,12	2,87	7,61	3,13	7,09	3,41
	13	8	9,92	2,19	9,44	2,41	8,91	2,64	8,39	2,89	7,86	3,16	7,34	3,44
	14	9	10,30	2,20	9,73	2,42	9,21	2,66	8,68	2,91	8,13	3,18	7,59	3,47
	15	10	10,61	2,19	10,06	2,42	9,52	2,67	8,96	2,93	8,42	3,20	7,86	3,49
	16	11	10,91	2,20	10,40	2,43	9,82	2,68	9,26	2,95	8,69	3,22	8,12	3,52
	17	12	11,22	2,19	10,71	2,43	10,14	2,69	9,57	2,96	8,98	3,25	8,38	3,54
MPI DC 08 C	Rated data at minimum frequency													
	10	5	5,93	1,43	5,61	1,55	5,30	1,68	4,99	1,81	4,68	1,96	4,38	2,11
	11	6	6,12	1,43	5,81	1,55	5,50	1,68	5,17	1,82	4,86	1,97	4,54	2,13
	12	7	6,32	1,42	6,01	1,55	5,68	1,68	5,36	1,82	5,03	1,98	4,70	2,14
	13	8	6,54	1,42	6,21	1,55	5,88	1,68	5,54	1,83	5,21	1,99	4,87	2,15
	14	9	6,75	1,41	6,42	1,55	6,08	1,69	5,73	1,84	5,39	2,00	5,04	2,16
	15	10	6,98	1,41	6,63	1,54	6,28	1,69	5,94	1,84	5,58	2,01	5,22	2,18
	16	11	7,20	1,40	6,84	1,54	6,49	1,69	6,13	1,85	5,76	2,01	5,41	2,18
	17	12	7,43	1,39	7,06	1,54	6,70	1,69	6,34	1,85	5,97	2,02	5,59	2,19
MPI DC 08 C	Rated data at intermediate frequency													
	10	5	2,87	0,89	2,71	0,95	2,57	1,01	2,43	1,07	2,27	1,14	2,12	1,21
	11	6	2,96	0,89	2,82	0,95	2,66	1,01	2,51	1,07	2,36	1,14	2,20	1,22
	12	7	3,06	0,88	2,91	0,94	2,75	1,00	2,60	1,07	2,45	1,14	2,28	1,22
	13	8	3,16	0,88	3,01	0,94	2,86	1,00	2,69	1,07	2,53	1,14	2,37	1,22
	14	9	3,27	0,87	3,11	0,94	2,95	1,00	2,78	1,07	2,62	1,15	2,46	1,23
	15	10	3,38	0,87	3,21	0,93	3,05	1,00	2,89	1,07	2,71	1,15	2,55	1,23
	16	11	3,49	0,86	3,32	0,93	3,15	1,00	2,98	1,07	2,81	1,15	2,63	1,23
	17	12	3,60	0,85	3,43	0,92	3,25	0,99	3,08	1,07	2,91	1,15	2,72	1,23
MPI DC 010 C	Rated data at maximum frequency													
	10	5	11,7	2,92	11,1	3,18	10,50	3,47	9,91	3,79	9,29	4,13	8,68	4,49
	11	6	12,1	2,91	11,5	3,18	10,90	3,48	10,30	3,80	9,61	4,15	8,99	4,52
	12	7	12,5	2,90	11,8	3,19	11,2	3,49	10,60	3,82	9,93	4,17	9,29	4,55
	13	8	12,8	2,90	12,2	3,18	11,6	3,50	10,90	3,83	10,30	4,19	9,61	4,57
	14	9	13,2	2,89	12,6	3,21	11,9	3,50	11,3	3,85	10,60	4,21	9,92	4,59
	15	10	13,6	2,87	13,0	3,18	12,3	3,50	11,6	3,86	10,90	4,23	10,30	4,61
	16	11	14,0	2,86	13,4	3,18	12,7	3,51	12,0	3,87	11,30	4,24	10,60	4,64
	17	12	14,5	2,85	13,8	3,17	13,1	3,52	12,4	3,88	11,60	4,26	10,90	4,66
MPI DC 010 C	Rated data at intermediate frequency													
	10	5	7,37	1,82	6,99	1,97	6,62	2,13	6,52	2,30	5,87	2,48	5,49	2,68
	11	6	7,62	1,81	7,23	1,97	6,84	2,13	6,46	2,30	6,08	2,49	5,69	2,69
	12	7	7,84	1,80	7,46	1,96	7,07	2,13	6,69	2,30	6,29	2,49	5,90	2,69
	13	8	8,10	1,79	7,70	1,96	7,32	2,12	6,91	2,31	6,51	2,50	6,09	2,70
	14	9	8,35	1,78	7,96	1,95	7,56	2,12	7,14	2,31	6,72	2,50	6,30	2,71
	15	10	8,61	1,77	8,21	1,94	7,80	2,12	7,37	2,31	6,94	2,51	6,52	2,72
	16	11	8,88	1,75	8,47	1,93	8,04	2,11	7,61	2,31	7,18	2,51	6,74	2,72
	17	12	9,15	1,74	8,73	1,92	8,29	2,11	7,85	2,31	7,41	2,52	6,96	2,73
MPI DC 010 C	Rated data at minimum frequency													
	10	5	3,19	1,15	3,03	1,22	2,87	1,28	2,70	1,35	2,54	1,43	2,37	1,51
	11	6	3,30	1,14	3,13	1,21	2,97	1,28	2,80	1,35	2,63	1,43	2,46	1,51
	12	7	3,41	1,13	3,24	1,21	3,07	1,28	2,90	1,35	2,73	1,43	2,55	1,51
	13	8	3,52	1,13	3,35	1,20	3,18	1,27	3,00	1,35	2,82	1,43	2,65	1,52
	14	9	3,64	1,12	3,46	1,19	3,28	1,27	3,10	1,35	2,92	1,43	2,74	1,52
	15	10	3,76	1,11	3,57	1,19	3,39	1,26	3,21	1,34	3,03	1,43	2,84	1,52
	16	11	3,87	1,10	3,69	1,18	3,50	1,26	3,32	1,34	3,13	1,43	2,94	1,52
	17	12	3,99	1,09	3,81	1,17	3,62	1,25	3,43	1,34	3,23	1,43	3,04	1,52

6 PERFORMANCES

6.1 COOLING CAPACITIES MPI DC-C

Tbs_1 Air inlet temperature (dry bulb)
Tw in/out Water inlet/outlet temperature

PF Cooling capacity
PA Total power input including pump

	Tbs_1		20		25		30		35		40		45	
	Tw in	Tw out	PF	PA	PF	PA	PF	PA	PF	PA	PF	PA	PF	PA
	[°C]	[°C]	kW	kW	kW	kW	kW	kW	kW	kW	kW	kW	kW	kW
MPI DC 014 C	Rated data at maximum frequency													
	10	5	15,7	4,10	15,0	4,44	14,30	4,83	13,40	5,26	12,50	5,75	11,50	6,26
	11	6	16,2	4,11	15,5	4,46	14,70	4,85	13,90	5,29	12,90	5,77	11,90	6,30
	12	7	16,7	4,11	16,0	4,48	15,2	4,87	14,30	5,31	13,30	5,81	12,30	6,33
	13	8	17,3	4,12	16,5	4,48	15,7	4,90	14,70	5,34	13,80	5,84	12,70	6,36
	14	9	17,8	4,12	17,0	4,50	16,1	4,92	15,2	5,36	14,20	5,86	13,10	6,41
	15	10	18,4	4,13	17,6	4,52	16,6	4,93	15,6	5,39	14,60	5,90	13,50	6,43
	16	11	19,0	4,14	18,1	4,53	17,1	4,95	16,1	5,42	15,10	5,93	13,90	6,47
	17	12	19,5	4,14	18,6	4,54	17,6	4,97	16,6	5,45	15,50	5,95	14,40	6,51
MPI DC 014 C	Rated data at intermediate frequency													
	10	5	10,60	2,59	10,10	2,80	9,60	3,01	9,09	3,26	8,50	3,53	7,89	3,82
	11	6	10,90	2,59	10,40	2,80	9,91	3,02	9,39	3,27	8,80	3,53	8,16	3,83
	12	7	11,30	2,59	10,80	2,80	10,20	3,02	9,68	3,27	9,09	3,55	8,43	3,84
	13	8	11,60	2,59	11,10	2,80	10,60	3,03	10,00	3,28	9,38	3,56	8,71	3,86
	14	9	12,00	2,58	11,50	2,80	10,90	3,03	10,30	3,29	9,70	3,57	9,00	3,87
	15	10	12,40	2,58	11,80	2,80	11,30	3,03	10,70	3,29	10,00	3,58	9,30	3,88
	16	11	12,80	2,58	12,20	2,80	11,60	3,04	11,00	3,30	10,30	3,59	9,60	3,90
	17	12	13,20	2,58	12,60	2,80	12,00	3,04	11,30	3,31	10,60	3,60	9,90	3,92
MPI DC 014 C	Rated data at minimum frequency													
	10	5	4,02	1,45	3,84	1,54	3,66	1,63	3,47	1,72	3,26	1,83	3,03	1,94
	11	6	4,16	1,45	3,97	1,54	3,79	1,63	3,59	1,72	3,38	1,83	3,14	1,94
	12	7	4,31	1,44	4,11	1,53	3,92	1,62	3,72	1,72	3,50	1,83	3,26	1,95
	13	8	4,47	1,44	4,26	1,53	4,06	1,62	3,85	1,72	3,62	1,83	3,37	1,95
	14	9	4,62	1,43	4,41	1,53	4,20	1,62	3,98	1,72	3,75	1,83	3,49	1,95
	15	10	4,79	1,43	4,56	1,52	4,35	1,62	4,12	1,72	3,88	1,83	3,61	1,95
	16	11	4,95	1,42	4,72	1,52	4,50	1,61	4,26	1,71	4,01	1,83	3,74	1,95
	17	12	5,12	1,42	4,88	1,52	4,65	1,61	4,41	1,71	4,14	1,83	3,86	1,95
MPI DC 018 C	Rated data at maximum frequency													
	10	5	20,40	6,19	19,40	6,74	18,40	7,36	17,20	8,05	15,90	8,82	14,50	9,64
	11	6	21,00	6,21	20,00	6,77	18,90	7,40	17,70	8,10	16,40	8,87	15,00	9,72
	12	7	21,60	6,24	20,70	6,81	19,50	7,44	18,20	8,16	16,90	8,93	15,40	9,76
	13	8	22,30	6,26	21,30	6,84	20,10	7,49	18,80	8,21	17,40	8,99	15,90	9,83
	14	9	23,00	6,28	21,90	6,88	20,70	7,54	19,30	8,27	17,90	9,05	16,40	9,91
	15	10	23,70	6,31	22,50	6,91	21,30	7,58	19,90	8,32	18,50	9,12	16,90	9,98
	16	11	24,30	6,33	23,20	6,94	21,90	7,62	20,50	8,38	19,00	9,18	17,40	10,04
	17	12	25,10	6,35	23,90	6,97	22,40	7,68	21,00	8,44	19,60	9,24	19,70	10,10
MPI DC 018 C	Rated data at intermediate frequency													
	10	5	13,30	3,36	12,70	3,61	12,10	3,91	11,40	4,24	10,70	4,61	9,88	5,01
	11	6	13,70	3,36	13,10	3,62	12,50	3,92	11,80	4,26	11,00	4,63	10,20	5,03
	12	7	14,20	3,35	13,60	3,62	12,90	3,93	12,20	4,27	11,40	4,65	10,50	5,06
	13	8	14,60	3,35	14,00	3,62	13,30	3,94	12,60	4,28	11,80	4,67	10,90	5,08
	14	9	15,10	3,34	14,50	3,63	13,70	3,94	13,00	4,30	12,10	4,69	11,20	5,10
	15	10	15,60	3,33	14,90	3,63	14,10	3,96	13,40	4,32	12,50	4,70	11,60	5,13
	16	11	16,10	3,32	15,40	3,63	14,60	3,96	13,,8	4,33	12,90	4,72	11,90	5,15
	17	12	16,60	3,31	15,80	3,62	15,00	3,97	14,20	4,34	13,20	4,74	12,30	5,18
MPI DC 018 C	Rated data at minimum frequency													
	10	5	3,98	1,45	3,80	1,53	3,63	1,62	3,44	1,72	3,24	1,82	3,01	1,93
	11	6	4,13	1,44	3,94	1,53	3,76	1,62	3,56	1,71	3,35	1,82	3,12	1,93
	12	7	4,28	1,43	4,09	1,53	3,88	1,62	3,69	1,71	3,47	1,82	3,23	1,94
	13	8	4,45	1,42	4,24	1,52	4,03	1,61	3,82	1,71	3,59	1,82	3,34	1,94
	14	9	4,61	1,41	4,39	1,51	4,17	1,61	3,95	1,71	3,71	1,82	3,46	1,94
	15	10	4,79	1,40	4,55	1,50	4,32	1,60	4,08	1,70	3,83	1,82	3,57	1,94
	16	11	4,96	1,39	4,72	1,49	4,48	1,59	4,22	1,70	3,96	1,82	3,69	1,94
	17	12	5,16	1,37	4,89	1,48	4,63	1,59	4,36	1,70	4,09	1,82	3,81	1,94

6 PERFORMANCES

6.1 COOLING CAPACITIES MPI DC-C

Tbs_1 Air inlet temperature (dry bulb)
Tw in/out Water inlet/outlet temperature

PF Cooling capacity
PA Total power input including pump

	Tbs_1		20		25		30		35		40		45	
	Tw in	Tw out	PF	PA	PF	PA	PF	PA	PF	PA	PF	PA	PF	PA
	[°C]	[°C]	kW	kW	kW	kW	kW	kW	kW	kW	kW	kW	kW	kW
MPI DC 023 C	Rated data at maximum frequency													
	10	5	24,80	6,47	23,80	7,00	22,70	7,59	21,50	8,26	20,30	9,01	19,00	9,84
	11	6	25,60	6,49	24,50	7,01	23,40	7,62	22,20	8,30	21,00	9,07	19,60	9,89
	12	7	26,30	6,49	25,30	7,04	24,10	7,65	22,90	8,34	21,60	9,11	20,30	9,93
	13	8	27,10	6,50	26,00	7,06	24,90	7,69	23,60	8,37	22,30	9,16	20,90	10,00
	14	9	28,00	6,52	26,90	7,08	25,60	7,72	24,40	8,41	23,00	9,20	21,60	10,03
	15	10	28,80	6,54	27,70	7,10	26,40	7,75	25,10	8,47	23,80	9,24	22,20	10,10
	16	11	29,70	6,54	28,50	7,13	27,20	7,77	25,80	8,50	24,50	9,29	23,00	10,13
	17	12	30,60	6,57	29,40	7,14	28,00	7,80	26,60	8,54	25,20	9,35	23,60	10,20
MPI DC 023 C	Rated data at intermediate frequency													
	10	5	16,70	4,09	16,00	4,39	15,30	4,73	14,60	5,10	13,80	5,53	13,00	5,99
	11	6	17,30	4,09	16,50	4,40	15,80	4,73	15,10	5,12	14,30	5,54	13,40	6,01
	12	7	17,80	4,09	17,10	4,40	16,40	4,74	15,60	5,13	14,70	5,56	13,90	6,03
	13	8	18,40	4,09	17,60	4,40	16,90	4,75	16,10	5,14	15,20	5,57	14,30	6,05
	14	9	19,00	4,09	18,20	4,41	17,40	4,76	16,60	5,16	15,70	5,59	14,80	6,07
	15	10	19,50	4,09	18,80	4,41	18,00	4,76	17,10	5,16	16,20	5,61	15,30	6,09
	16	11	20,10	4,09	19,40	4,41	18,50	4,78	17,70	5,18	16,80	5,63	15,80	6,12
	17	12	20,70	4,10	20,00	4,42	19,10	4,78	18,20	5,19	17,30	5,65	16,30	6,13
MPI DC 023 C	Rated data at minimum frequency													
	10	5	6,24	2,17	5,98	2,31	5,73	2,43	5,46	2,57	5,18	2,73	4,88	2,90
	11	6	6,46	2,17	6,19	2,30	5,93	2,43	5,65	2,57	5,36	2,73	5,05	2,91
	12	7	6,68	2,16	6,40	2,30	6,13	2,43	5,85	2,57	5,55	2,73	5,23	2,91
	13	8	6,91	2,16	6,62	2,30	6,34	2,43	6,05	2,57	5,74	2,73	5,42	2,91
	14	9	7,13	2,16	6,84	2,30	6,56	2,43	6,26	2,57	5,94	2,74	5,61	2,92
	15	10	7,37	2,15	7,07	2,29	6,78	2,42	6,47	2,57	6,15	2,74	5,81	2,92
	16	11	7,62	2,15	7,31	2,29	7,01	2,42	6,69	2,57	6,36	2,74	6,01	2,92
	17	12	7,86	2,15	7,55	2,29	7,24	2,42	6,91	2,57	6,57	2,74	6,22	2,92
MPI DC 029 C	Rated data at maximum frequency													
	10	5	31,90	9,71	30,40	10,57	29,00	11,57	27,30	12,67	25,70	13,87	23,90	15,27
	11	6	32,80	9,75	31,50	10,67	29,80	11,67	28,20	12,77	26,40	13,97	24,60	15,37
	12	7	33,90	9,79	32,40	10,67	30,70	11,67	29,10	12,87	27,20	14,07	25,40	15,47
	13	8	34,90	9,80	33,30	10,77	31,70	11,77	30,00	12,97	28,10	14,17	26,20	15,57
	14	9	35,90	9,85	34,20	10,77	32,60	11,87	30,90	12,97	28,90	14,27	27,00	15,67
	15	10	36,90	9,89	35,30	10,87	33,60	11,97	31,70	13,07	29,80	14,37	27,70	15,77
	16	11	38,00	9,94	36,40	10,87	34,60	11,97	32,60	13,17	30,70	14,47	28,60	15,87
	17	12	39,10	9,99	37,40	10,97	35,50	12,07	33,70	13,27	31,60	14,57	29,50	15,87
MPI DC 029 C	Rated data at intermediate frequency													
	10	5	21,3	5,27	20,4	5,67	19,50	6,14	18,50	6,68	17,40	7,28	16,30	7,94
	11	6	21,9	5,27	21,0	5,68	20,10	6,17	19,10	6,70	18,00	7,31	16,90	7,97
	12	7	22,7	5,26	21,7	5,70	20,7	6,18	19,70	6,73	18,60	7,34	17,40	8,01
	13	8	23,3	5,26	22,4	5,70	21,4	6,20	20,30	6,76	19,20	7,37	18,00	8,03
	14	9	24,0	5,26	23,1	5,72	22,0	6,22	21,0	6,77	19,80	7,40	18,60	8,07
	15	10	24,8	5,26	23,8	5,72	22,7	6,23	21,6	6,80	20,40	7,42	19,20	8,10
	16	11	25,5	5,26	24,5	5,73	23,4	6,26	22,3	6,82	21,10	7,45	19,80	8,13
	17	12	26,2	5,27	25,2	5,74	24,1	6,28	22,9	6,85	21,70	7,49	20,40	8,17
MPI DC 029 C	Rated data at minimum frequency													
	10	5	6,26	2,15	6,00	2,28	5,74	2,41	5,46	2,55	5,17	2,71	4,87	2,89
	11	6	6,48	2,14	6,20	2,28	5,93	2,41	5,65	2,55	5,36	2,71	5,04	2,89
	12	7	6,69	2,13	6,41	2,27	6,13	2,40	5,84	2,55	5,54	2,71	5,22	2,89
	13	8	6,91	2,13	6,62	2,27	6,34	2,40	6,04	2,55	5,73	2,71	5,41	2,89
	14	9	7,13	2,12	6,84	2,26	6,55	2,40	6,25	2,55	5,93	2,71	5,60	2,89
	15	10	7,36	2,11	7,06	2,26	6,77	2,39	6,46	2,54	6,13	2,71	5,78	2,90
	16	11	7,60	2,10	7,29	2,25	6,99	2,39	6,67	2,55	6,34	2,71	5,98	2,90
	17	12	7,84	2,10	7,53	2,25	7,22	2,39	6,89	2,54	6,54	2,72	6,18	2,90

6 PERFORMANCES

6.1 COOLING CAPACITIES MPI DC-H

Tbs_1 Air inlet temperature (dry bulb)
Tw in/out Water inlet/outlet temperature

PF Cooling capacity
PA Total power input including pump

	Tbs_1		20		25		30		35		40		45	
	Tw in	Tw out	PF	PA	PF	PA	PF	PA	PF	PA	PF	PA	PF	PA
	[°C]	[°C]	kW	kW	kW	kW	kW	kW	kW	kW	kW	kW	kW	kW
MPI DC 08 H	Rated data at maximum frequency													
	10	5	8,83	2,19	8,35	2,39	7,91	2,60	7,43	2,83	6,95	3,08	6,49	3,35
	11	6	9,13	2,19	8,65	2,40	8,17	2,61	7,69	2,85	7,20	3,11	6,71	3,39
	12	7	9,43	2,19	8,94	2,40	8,44	2,63	7,96	2,87	7,46	3,13	6,95	3,41
	13	8	9,73	2,19	9,25	2,41	8,74	2,64	8,23	2,89	7,71	3,16	7,20	3,44
	14	9	10,10	2,20	9,54	2,42	9,03	2,66	8,51	2,91	7,97	3,18	7,44	3,47
	15	10	10,40	2,19	9,86	2,42	9,33	2,67	8,78	2,93	8,25	3,20	7,71	3,49
	16	11	10,70	2,20	10,20	2,43	9,63	2,68	9,08	2,95	8,52	3,22	7,96	3,52
	17	12	11,00	2,19	10,50	2,43	9,94	2,69	9,38	2,96	8,80	3,25	8,22	3,54
MPI DC 08 H	Rated data at intermediate frequency													
	10	5	5,81	1,43	5,50	1,55	5,20	1,68	4,89	1,81	4,59	1,96	4,29	2,11
	11	6	6,00	1,43	5,70	1,55	5,39	1,68	5,07	1,82	4,76	1,97	4,45	2,13
	12	7	6,20	1,42	5,89	1,55	5,57	1,68	5,25	1,82	4,93	1,98	4,61	2,14
	13	8	6,41	1,42	6,09	1,55	5,76	1,68	5,43	1,83	5,11	1,99	4,77	2,15
	14	9	6,62	1,41	6,29	1,55	5,96	1,69	5,62	1,84	5,28	2,00	4,94	2,16
	15	10	6,84	1,41	6,50	1,54	6,16	1,69	5,82	1,84	5,47	2,01	5,12	2,18
	16	11	7,06	1,40	6,71	1,54	6,36	1,69	6,01	1,85	5,65	2,01	5,30	2,18
	17	12	7,28	1,39	6,92	1,54	6,57	1,69	6,22	1,85	5,85	2,02	5,48	2,19
MPI DC 08 H	Rated data at minimum frequency													
	10	5	2,81	0,89	2,66	0,95	2,52	1,01	2,38	1,07	2,23	1,14	2,08	1,21
	11	6	2,90	0,89	2,76	0,95	2,61	1,01	2,46	1,07	2,31	1,14	2,16	1,22
	12	7	3,00	0,88	2,85	0,94	2,70	1,00	2,55	1,07	2,40	1,14	2,24	1,22
	13	8	3,10	0,88	2,95	0,94	2,80	1,00	2,64	1,07	2,48	1,14	2,32	1,22
	14	9	3,21	0,87	3,05	0,94	2,89	1,00	2,73	1,07	2,57	1,15	2,41	1,23
	15	10	3,31	0,87	3,15	0,93	2,99	1,00	2,83	1,07	2,66	1,15	2,50	1,23
	16	11	3,42	0,86	3,25	0,93	3,09	1,00	2,92	1,07	2,75	1,15	2,58	1,23
	17	12	3,53	0,85	3,36	0,92	3,19	0,99	3,02	1,07	2,85	1,15	2,67	1,23
MPI DC 010 H	Rated data at maximum frequency													
	10	5	11,50	2,92	10,90	3,18	10,30	3,47	9,72	3,79	9,12	4,13	8,52	4,49
	11	6	11,80	2,91	11,20	3,18	10,60	3,48	10,10	3,80	9,43	4,15	8,82	4,52
	12	7	12,20	2,90	11,60	3,19	11,00	3,49	10,40	3,82	9,74	4,17	9,11	4,55
	13	8	12,60	2,90	12,00	3,18	11,30	3,50	10,70	3,83	10,10	4,19	9,43	4,57
	14	9	13,00	2,89	12,40	3,21	11,70	3,50	11,10	3,85	10,40	4,21	9,74	4,59
	15	10	13,40	2,87	12,70	3,18	12,10	3,50	11,40	3,86	10,70	4,23	10,10	4,61
	16	11	13,80	2,86	13,10	3,18	12,40	3,51	11,80	3,87	11,10	4,24	10,40	4,64
	17	12	14,20	2,85	13,50	3,17	12,80	3,52	12,10	3,88	11,40	4,26	10,70	4,66
MPI DC 010 H	Rated data at intermediate frequency													
	10	5	7,23	1,82	6,86	1,97	6,49	2,13	6,13	2,30	5,76	2,48	5,39	2,68
	11	6	7,47	1,81	7,09	1,97	6,72	2,13	6,34	2,30	5,96	2,49	5,58	2,69
	12	7	7,69	1,80	7,32	1,96	6,94	2,13	6,56	2,30	6,17	2,49	5,78	2,69
	13	8	7,94	1,79	7,56	1,96	7,18	2,12	6,78	2,31	6,39	2,50	5,98	2,70
	14	9	8,19	1,78	7,81	1,95	7,41	2,12	7,01	2,31	6,60	2,50	6,18	2,71
	15	10	8,45	1,77	8,05	1,94	7,65	2,12	7,23	2,31	6,81	2,51	6,39	2,72
	16	11	8,71	1,75	8,31	1,93	7,89	2,11	7,46	2,31	7,04	2,51	6,61	2,72
	17	12	8,98	1,74	8,56	1,92	8,13	2,11	7,71	2,31	7,27	2,52	6,83	2,73
MPI DC 010 H	Rated data at minimum frequency													
	10	5	3,13	1,15	2,97	1,22	2,81	1,28	2,65	1,35	2,49	1,43	2,33	1,51
	11	6	3,24	1,14	3,07	1,21	2,91	1,28	2,75	1,35	2,58	1,43	2,42	1,51
	12	7	3,35	1,13	3,18	1,21	3,01	1,28	2,84	1,35	2,68	1,43	2,50	1,51
	13	8	3,46	1,13	3,29	1,20	3,12	1,27	2,95	1,35	2,77	1,43	2,60	1,52
	14	9	3,57	1,12	3,39	1,19	3,22	1,27	3,05	1,35	2,87	1,43	2,69	1,52
	15	10	3,68	1,11	3,50	1,19	3,33	1,26	3,15	1,34	2,97	1,43	2,78	1,52
	16	11	3,80	1,10	3,62	1,18	3,44	1,26	3,26	1,34	3,07	1,43	2,88	1,52
	17	12	3,92	1,09	3,74	1,17	3,55	1,25	3,36	1,34	3,17	1,43	2,98	1,52

6 PERFORMANCES

6.1 COOLING CAPACITIES MPI DC-H

Tbs_1 Air inlet temperature (dry bulb)
Tw in/out Water inlet/outlet temperature

PF Cooling capacity
PA Total power input including pump

	Tbs_1		20		25		30		35		40		45	
	Tw in	Tw out	PF	PA	PF	PA	PF	PA	PF	PA	PF	PA	PF	PA
	[°C]	[°C]	kW	kW	kW	kW	kW	kW	kW	kW	kW	kW	kW	kW
MPI DC 014 H	Rated data at maximum frequency													
	10	5	15,40	4,10	14,70	4,44	14,00	4,83	13,20	5,26	12,30	5,75	11,30	6,26
	11	6	15,90	4,11	15,20	4,46	14,40	4,85	13,60	5,29	12,70	5,77	11,70	6,30
	12	7	16,40	4,11	15,70	4,48	14,90	4,87	14,00	5,31	13,10	5,81	12,00	6,33
	13	8	16,90	4,12	16,20	4,48	15,40	4,90	14,40	5,34	13,50	5,84	12,50	6,36
	14	9	17,50	4,12	16,70	4,50	15,80	4,92	14,90	5,36	13,90	5,86	12,80	6,41
	15	10	18,00	4,13	17,20	4,52	16,30	4,93	15,30	5,39	14,30	5,90	13,20	6,43
	16	11	18,60	4,14	17,70	4,53	16,80	4,95	15,80	5,42	14,80	5,93	13,70	6,47
	17	12	19,20	4,14	18,30	4,54	17,30	4,97	16,30	5,45	15,20	5,95	14,10	6,51
MPI DC 014 H	Rated data at intermediate frequency													
	10	5	10,40	2,59	9,88	2,80	9,41	3,01	8,91	3,26	8,34	3,53	7,74	3,82
	11	6	10,70	2,59	10,20	2,80	9,72	3,02	9,21	3,27	8,63	3,53	8,00	3,83
	12	7	11,00	2,59	10,50	2,80	10,00	3,02	9,50	3,27	8,91	3,55	8,27	3,84
	13	8	11,40	2,59	10,90	2,80	10,40	3,03	9,81	3,28	9,20	3,56	8,54	3,86
	14	9	11,80	2,58	11,20	2,80	10,70	3,03	10,10	3,29	9,51	3,57	8,83	3,87
	15	10	12,10	2,58	11,60	2,80	11,10	3,03	10,40	3,29	9,80	3,58	9,12	3,88
	16	11	12,50	2,58	12,00	2,80	11,40	3,04	10,80	3,30	10,10	3,59	9,42	3,90
	17	12	12,90	2,58	12,40	2,80	11,80	3,04	11,10	3,31	10,40	3,60	9,71	3,92
MPI DC 014 H	Rated data at minimum frequency													
	10	5	3,94	1,45	3,76	1,54	3,59	1,63	3,40	1,72	3,20	1,83	2,98	1,94
	11	6	4,08	1,45	3,90	1,54	3,72	1,63	3,52	1,72	3,31	1,83	3,08	1,94
	12	7	4,23	1,44	4,03	1,53	3,85	1,62	3,65	1,72	3,43	1,83	3,20	1,95
	13	8	4,38	1,44	4,18	1,53	3,98	1,62	3,78	1,72	3,55	1,83	3,31	1,95
	14	9	4,53	1,43	4,33	1,53	4,12	1,62	3,91	1,72	3,67	1,83	3,42	1,95
	15	10	4,69	1,43	4,47	1,52	4,27	1,62	4,04	1,72	3,80	1,83	3,54	1,95
	16	11	4,85	1,42	4,63	1,52	4,41	1,61	4,18	1,71	3,93	1,83	3,67	1,95
	17	12	5,03	1,42	4,79	1,52	4,56	1,61	4,32	1,71	4,06	1,83	3,79	1,95
MPI DC 018 H	Rated data at maximum frequency													
	10	5	20,00	6,19	19,10	6,74	18,00	7,36	16,80	8,05	15,60	8,82	14,20	9,64
	11	6	20,60	6,21	19,60	6,77	18,60	7,40	17,40	8,10	16,10	8,87	14,70	9,72
	12	7	21,20	6,24	20,30	6,81	19,10	7,44	17,90	8,16	16,60	8,93	15,20	9,76
	13	8	21,90	6,26	20,90	6,84	19,70	7,49	18,40	8,21	17,10	8,99	15,60	9,83
	14	9	22,60	6,28	21,40	6,88	20,30	7,54	19,00	8,27	17,50	9,05	16,10	9,91
	15	10	23,20	6,31	22,00	6,91	20,90	7,58	19,50	8,32	18,10	9,12	16,60	9,98
	16	11	23,90	6,33	22,80	6,94	21,40	7,62	20,10	8,38	18,60	9,18	17,10	10,04
	17	12	24,60	6,35	23,40	6,97	22,00	7,68	20,60	8,44	19,20	9,24	17,60	10,10
MPI DC 018 H	Rated data at intermediate frequency													
	10	5	13,00	3,36	12,50	3,61	11,90	3,91	11,20	4,24	10,50	4,61	9,69	5,01
	11	6	13,40	3,36	12,90	3,62	12,30	3,92	11,60	4,26	10,80	4,63	10,00	5,03
	12	7	13,90	3,35	13,30	3,62	12,70	3,93	11,90	4,27	11,20	4,65	10,30	5,06
	13	8	14,30	3,35	13,70	3,62	13,10	3,94	12,30	4,28	11,50	4,67	10,70	5,08
	14	9	14,80	3,34	14,20	3,63	13,50	3,94	12,70	4,30	11,90	4,69	11,00	5,10
	15	10	15,30	3,33	14,60	3,63	13,90	3,96	13,10	4,32	12,20	4,70	11,30	5,13
	16	11	15,80	3,32	15,10	3,63	14,30	3,96	13,50	4,33	12,60	4,72	11,70	5,15
	17	12	16,30	3,31	15,50	3,62	14,70	3,97	13,90	4,34	13,00	4,74	12,10	5,18
MPI DC 018 H	Rated data at minimum frequency													
	10	5	3,91	1,45	3,73	1,53	3,56	1,62	3,37	1,72	3,18	1,82	2,96	1,93
	11	6	4,05	1,44	3,87	1,53	3,69	1,62	3,49	1,71	3,29	1,82	3,06	1,93
	12	7	4,20	1,43	4,01	1,53	3,80	1,62	3,62	1,71	3,40	1,82	3,17	1,94
	13	8	4,36	1,42	4,15	1,52	3,96	1,61	3,74	1,71	3,52	1,82	3,28	1,94
	14	9	4,52	1,41	4,31	1,51	4,09	1,61	3,87	1,71	3,64	1,82	3,39	1,94
	15	10	4,69	1,40	4,46	1,50	4,24	1,60	4,01	1,70	3,76	1,82	3,50	1,94
	16	11	4,87	1,39	4,63	1,49	4,39	1,59	4,14	1,70	3,88	1,82	3,62	1,94
	17	12	5,06	1,37	4,80	1,48	4,54	1,59	4,28	1,70	4,01	1,82	3,74	1,94

6 PERFORMANCES

6.1 COOLING CAPACITIES MPI DC-H

Tbs_1 Air inlet temperature (dry bulb)
Tw in/out Water inlet/outlet temperature

PF Cooling capacity
PA Total power input including pump

	Tbs_1		20		25		30		35		40		45	
	Tw in	Tw out	PF	PA	PF	PA	PF	PA	PF	PA	PF	PA	PF	PA
	[°C]	[°C]	kW	kW	kW	kW	kW	kW	kW	kW	kW	kW	kW	kW
MPI DC 023 H	Rated data at maximum frequency													
	10	5	24,40	6,47	23,30	7,00	22,20	7,59	21,10	8,26	19,90	9,01	18,60	9,84
	11	6	25,10	6,49	24,10	7,01	22,90	7,62	21,80	8,30	20,60	9,07	19,20	9,89
	12	7	25,90	6,49	24,80	7,04	23,60	7,65	22,50	8,34	21,20	9,11	19,90	9,93
	13	8	26,60	6,50	25,50	7,06	24,40	7,69	23,20	8,37	21,90	9,16	20,50	10,00
	14	9	27,40	6,52	26,30	7,08	25,52	7,72	23,90	8,41	22,60	9,20	21,20	10,03
	15	10	28,30	6,54	27,20	7,10	25,90	7,75	24,60	8,47	23,30	9,24	21,80	10,10
	16	11	29,20	6,54	28,00	7,13	26,70	7,77	25,40	8,50	24,00	9,29	22,50	10,13
	17	12	30,00	6,57	28,80	7,14	27,50	7,80	26,10	8,54	24,70	9,35	23,20	10,20
MPI DC 023 H	Rated data at intermediate frequency													
	10	5	16,40	4,09	15,70	4,39	15,10	4,73	14,30	5,10	13,50	5,53	12,70	5,99
	11	6	16,90	4,09	16,20	4,40	15,60	4,73	14,80	5,12	14,00	5,54	13,20	6,01
	12	7	17,50	4,09	16,80	4,40	16,10	4,74	15,30	5,13	14,40	5,56	13,60	6,03
	13	8	18,00	4,09	17,30	4,40	16,60	4,75	15,80	5,14	14,90	5,57	14,10	6,05
	14	9	18,60	4,09	17,80	4,41	17,10	4,76	16,30	5,16	15,40	5,59	14,50	6,07
	15	10	19,10	4,09	18,40	4,41	17,70	4,76	16,80	5,16	15,90	5,61	15,00	6,09
	16	11	19,70	4,09	19,00	4,41	18,20	4,78	17,30	5,18	16,40	5,63	15,50	6,12
	17	12	20,40	4,10	19,60	4,42	18,70	4,78	17,90	5,19	17,00	5,65	16,00	6,13
MPI DC 023 H	Rated data at minimum frequency													
	10	5	6,13	2,17	5,87	2,31	5,62	2,43	5,35	2,57	5,08	2,73	4,78	2,90
	11	6	6,34	2,17	6,07	2,30	5,82	2,43	5,54	2,57	5,26	2,73	4,96	2,91
	12	7	6,55	2,16	6,28	2,30	6,02	2,43	5,74	2,57	5,45	2,73	5,13	2,91
	13	8	6,78	2,16	6,49	2,30	6,22	2,43	5,94	2,57	5,64	2,73	5,32	2,91
	14	9	7,00	2,16	6,72	2,30	6,44	2,43	6,14	2,57	5,83	2,74	5,51	2,92
	15	10	7,23	2,15	6,94	2,29	6,65	2,42	6,35	2,57	6,03	2,74	5,70	2,92
	16	11	7,48	2,15	7,17	2,29	6,87	2,42	6,56	2,57	6,24	2,74	5,90	2,92
	17	12	7,72	2,15	7,41	2,29	7,11	2,42	6,78	2,57	6,45	2,74	6,10	2,92
MPI DC 029 H	Rated data at maximum frequency													
	10	5	31,30	9,71	29,90	10,57	28,40	11,57	26,80	12,67	25,20	13,87	23,40	15,27
	11	6	32,20	9,75	30,90	10,67	29,30	11,67	27,70	12,77	25,90	13,97	24,10	15,37
	12	7	33,30	9,79	31,80	10,67	30,10	11,67	28,50	12,87	26,70	14,07	24,90	15,47
	13	8	34,30	9,80	32,70	10,77	31,10	11,77	29,40	12,97	27,60	14,17	25,70	15,57
	14	9	35,20	9,85	33,60	10,77	32,00	11,87	30,30	12,97	28,40	14,27	26,40	15,67
	15	10	36,20	9,89	34,60	10,87	33,00	11,97	31,10	13,07	29,20	14,37	27,20	15,77
	16	11	37,30	9,94	35,70	10,87	33,90	11,97	32,00	13,17	30,20	14,47	28,10	15,87
	17	12	38,40	9,99	36,70	10,97	34,80	12,07	33,00	13,27	31,00	14,57	29,00	15,87
MPI DC 029 H	Rated data at intermediate frequency													
	10	5	20,90	5,27	20,00	5,67	19,10	6,14	18,10	6,68	17,10	7,28	16,00	7,94
	11	6	21,50	5,27	20,60	5,68	19,70	6,17	18,70	6,70	17,70	7,31	16,60	7,97
	12	7	22,20	5,26	21,30	5,70	20,30	6,18	19,30	6,73	18,20	7,34	17,10	8,01
	13	8	22,90	5,26	22,00	5,70	21,00	6,20	19,90	6,76	18,80	7,37	17,70	8,03
	14	9	23,60	5,26	22,60	5,72	21,60	6,22	20,60	6,77	19,40	7,40	18,20	8,07
	15	10	24,30	5,26	23,30	5,72	22,30	6,23	21,20	6,80	20,00	7,42	18,80	8,10
	16	11	25,00	5,26	24,00	5,73	23,00	6,26	21,80	6,82	20,70	7,45	19,40	8,13
	17	12	25,70	5,27	24,70	5,74	23,60	6,28	22,50	6,85	21,30	7,49	20,00	8,17
MPI DC 029 H	Rated data at minimum frequency													
	10	5	6,15	2,15	5,89	2,28	5,63	2,41	5,36	2,55	5,08	2,71	4,78	2,89
	11	6	6,35	2,14	6,08	2,28	5,82	2,41	5,55	2,55	5,25	2,71	4,95	2,89
	12	7	6,56	2,13	6,29	2,27	6,02	2,40	5,73	2,55	5,44	2,71	5,12	2,89
	13	8	6,78	2,13	6,50	2,27	6,22	2,40	5,93	2,55	5,63	2,71	5,31	2,89
	14	9	7,00	2,12	6,71	2,26	6,43	2,40	6,13	2,55	5,82	2,71	5,49	2,89
	15	10	7,22	2,11	6,93	2,26	6,64	2,39	6,34	2,54	6,01	2,71	5,68	2,90
	16	11	7,46	2,10	7,15	2,25	6,86	2,39	6,54	2,55	6,22	2,71	5,87	2,90
	17	12	7,69	2,10	7,38	2,25	7,08	2,39	6,76	2,54	6,42	2,72	6,06	2,90

6 PERFORMANCES

6.3 HEATING CAPACITIES MPI DC-H

Tbs_1 Air inlet temperature (dry bulb)
Tw in/out Water inlet/outlet temperature

PT Heating capacity
PA Total power input including pump
RH Relative humidity

	Tbs_1 / RH		-5 °C / 90 %		0 °C / 90 %		7 °C / 88 %		15 °C / 80 %		20°C / 70 %	
	Tw in	Tw out	PT	PA	PT	PA	PT	PA	PT	PA	PT	PA
	[°C]	[°C]	kW	kW	kW	kW	kW	kW	kW	kW	kW	kW
MPI DC 08 H	Rated data at maximum frequency											
	25	30	6,73	2,31	7,78	2,36	9,22	2,40	11,50	2,46	12,70	2,46
	30	35	6,63	2,46	7,60	2,52	8,99	2,60	11,20	2,69	12,40	2,71
	35	40	6,46	2,62	7,45	2,71	9,07	2,84	11,00	2,95	12,10	2,98
	40	45	6,32	2,80	7,29	2,91	10,80	3,21	11,80	3,27	11,80	3,27
	45	50	6,26	3,03	7,20	3,16	8,71	3,35	10,50	3,50	11,50	3,57
MPI DC 08 H	Rated data at intermediate frequency											
	25	30	4,41	1,55	5,07	1,57	6,14	1,59	7,57	1,59	8,30	1,58
	30	35	4,29	1,64	4,94	1,67	5,99	1,71	7,37	1,73	8,10	1,73
	35	40	4,17	1,74	4,81	1,78	5,86	1,84	7,17	1,89	7,91	1,90
	40	45	4,06	1,85	4,69	1,91	5,69	1,98	7,01	2,06	7,69	2,07
	45	50	3,98	1,97	4,62	2,05	5,57	2,14	6,81	2,23	7,52	2,25
MPI DC 08 H	Rated data at minimum frequency											
	25	30	2,10	0,97	2,46	0,97	3,01	0,97	3,69	0,96	4,22	0,93
	30	35	2,04	1,01	2,39	1,02	2,92	1,03	3,58	1,03	4,12	1,01
	35	40	1,98	1,06	2,32	1,08	2,84	1,09	3,48	1,10	4,02	1,10
	40	45	1,93	1,11	2,25	1,13	2,76	1,16	3,39	1,18	3,93	1,18
	45	50	1,89	1,17	2,19	1,20	2,68	1,23	3,29	1,26	3,82	1,27
MPI DC 010 H	Rated data at maximum frequency											
	25	30	8,66	3,05	10,00	3,12	12,30	3,14	15,00	3,09	16,40	3,03
	30	35	8,47	3,29	9,80	3,36	11,90	3,41	14,60	3,40	16,10	3,38
	35	40	8,28	3,53	9,58	3,62	11,70	3,71	14,20	3,75	15,70	3,74
	40	45	8,11	3,78	9,37	3,90	11,40	4,03	13,80	4,11	15,30	4,12
	45	50	7,94	4,03	9,19	4,19	11,20	4,37	13,50	4,48	14,90	4,51
MPI DC 010 H	Rated data at intermediate frequency											
	25	30	5,17	1,98	6,01	2,01	7,39	2,01	9,02	1,96	10,00	1,92
	30	35	5,03	2,11	5,84	2,14	7,16	2,16	8,78	2,14	9,74	2,11
	35	40	4,90	2,24	5,73	2,29	6,95	2,32	8,57	2,32	9,46	2,32
	40	45	4,77	2,38	5,57	2,44	6,75	2,50	8,30	2,53	9,20	2,53
	45	50	4,66	2,53	5,42	2,60	6,64	2,69	8,06	2,73	8,91	2,75
MPI DC 010 H	Rated data at minimum frequency											
	25	30	2,16	1,25	2,53	1,26	3,11	1,26	3,82	1,22	4,05	1,48
	30	35	2,10	1,31	2,46	1,32	3,02	1,32	3,71	1,30	3,98	1,53
	35	40	2,04	1,36	2,39	1,38	2,93	1,39	3,39	1,58	3,91	1,58
	40	45	1,99	1,42	2,32	1,45	2,85	1,46	3,33	1,63	3,84	1,63
	45	50	1,94	1,48	2,26	1,51	2,77	1,54	2,77	1,67	3,77	1,68
MPI DC 014 H	Rated data at maximum frequency											
	25	30	12,40	4,15	14,20	4,24	16,6	4,29	20,5	4,28	22,7	4,25
	30	35	12,10	4,49	13,80	4,57	16,4	4,64	20,2	4,66	22,2	4,65
	35	40	11,80	4,87	13,50	4,96	16,2	5,04	19,6	5,10	21,6	5,10
	40	45	11,50	5,30	13,30	5,39	15,8	5,49	19,1	5,58	21,3	5,60
	45	50	11,40	5,80	13,00	5,89	15,4	6,00	18,5	6,10	20,5	6,15
MPI DC 014 H	Rated data at intermediate frequency											
	25	30	7,91	2,75	9,02	2,80	10,90	2,81	13,30	2,78	14,80	2,76
	30	35	7,68	2,95	8,81	2,99	10,60	3,02	13,00	3,02	14,40	3,00
	35	40	7,48	3,17	8,57	3,21	10,40	3,25	12,70	3,28	14,00	3,27
	40	45	7,30	3,42	8,39	3,47	10,10	3,52	12,30	3,55	13,60	3,57
	45	50	7,15	3,71	8,16	3,75	9,82	3,81	12,00	3,86	13,10	3,88
MPI DC 014 H	Rated data at minimum frequency											
	25	30	2,97	1,59	3,40	1,60	4,11	1,59	5,06	1,57	5,35	1,93
	30	35	2,89	1,66	3,32	1,68	4,03	1,68	4,94	1,66	5,25	2,00
	35	40	2,82	1,75	3,24	1,77	3,93	1,77	4,81	1,77	5,15	2,07
	40	45	2,76	1,85	3,17	1,87	3,83	1,88	4,66	1,89	5,05	2,15
	45	50	2,71	1,97	3,09	1,99	3,72	2,00	4,52	2,02	4,96	2,23

6 PERFORMANCES

6.3 HEATING CAPACITIES MPI DC-H

Tbs_1 Air inlet temperature (dry bulb)
Tw in/out Water inlet/outlet temperature

PT Heating capacity
PA Total power input including pump
RH Relative humidity

	Tbs_1 / RH		-5 °C / 90 %		0 °C / 90 %		7 °C / 88 %		15 °C / 80 %		20°C / 70 %	
	Tw in	Tw out	PT	PA	PT	PA	PT	PA	PT	PA	PT	PA
	[°C]	[°C]	kW	kW	kW	kW	kW	kW	kW	kW	kW	kW
MPI DC 018 H	Rated data at maximum frequency											
	25	30	17,00	5,90	18,80	6,05	22,6	6,21	27,4	6,22	30,4	6,15
	30	35	16,60	6,43	18,50	6,56	22,3	6,71	25,9	8,35	29,7	6,77
	35	40	16,40	7,04	18,30	7,15	21,9	7,30	26,5	7,42	29,0	7,44
	40	45	16,10	7,71	18,00	7,83	21,4	7,98	25,9	8,35	28,3	8,19
	45	50	16,00	8,46	17,70	8,57	21,1	8,76	25,3	8,94	27,6	9,01
MPI DC 018 H	Rated data at intermediate frequency											
	25	30	10,20	3,44	11,70	3,53	14,00	3,57	17,10	3,53	19,10	3,46
	30	35	9,93	3,71	11,40	3,78	13,70	3,84	16,70	3,84	18,60	3,80
	35	40	9,67	4,01	11,20	4,08	13,40	4,15	16,40	4,18	18,00	4,18
	40	45	9,54	4,36	11,00	4,43	13,20	4,50	16,00	4,56	17,50	4,57
	45	50	9,36	4,76	10,70	4,82	12,80	4,91	15,40	4,98	16,90	5,01
MPI DC 018 H	Rated data at minimum frequency											
	25	30	2,95	1,58	3,37	1,60	4,07	1,60	5,03	1,55	5,26	1,92
	30	35	2,87	1,66	3,30	1,67	4,00	1,68	4,90	1,65	5,16	1,99
	35	40	2,80	1,75	3,22	1,76	3,91	1,77	4,76	1,76	5,07	2,06
	40	45	2,74	1,85	3,15	1,86	3,80	1,88	4,61	1,88	4,98	2,14
	45	50	2,69	1,96	3,08	1,98	3,70	1,99	4,47	2,01	4,89	2,22
MPI DC 023 H	Rated data at maximum frequency											
	25	30	20,00	6,84	22,30	6,74	25,80	6,69	31,50	6,63	34,80	6,60
	30	35	19,40	7,11	21,90	7,15	25,40	7,18	31,10	7,18	34,30	7,18
	35	40	19,00	7,58	21,50	7,68	25,00	7,68	30,60	7,77	34,00	7,84
	40	45	18,60	8,17	21,10	8,31	25,10	8,44	30,20	8,55	33,20	8,58
	45	50	18,40	8,91	20,80	9,05	24,70	9,21	29,70	9,33	32,60	9,39
MPI DC 023 H	Rated data at intermediate frequency											
	25	30	12,80	4,47	14,50	4,42	17,20	4,37	21,00	4,32	23,00	4,30
	30	35	12,50	4,66	14,10	4,66	16,70	4,66	20,50	4,66	22,50	4,64
	35	40	12,20	4,94	13,90	4,98	16,40	5,02	20,10	5,04	23,00	5,04
	40	45	12,00	5,29	13,50	5,35	16,20	5,41	19,60	5,47	21,70	5,48
	45	50	11,80	5,72	13,30	5,79	15,80	5,88	19,30	5,94	21,20	5,96
MPI DC 023 H	Rated data at minimum frequency											
	25	30	4,74	2,43	5,34	2,40	6,38	2,37	7,78	2,34	9,11	2,32
	30	35	4,62	2,51	5,23	2,50	6,26	2,49	7,63	2,47	8,39	2,96
	35	40	4,51	2,61	5,12	2,62	6,13	2,63	7,49	2,62	8,27	3,07
	40	45	4,42	2,75	5,03	2,77	6,02	2,79	7,32	2,79	8,15	3,18
	45	50	4,35	2,92	4,95	2,95	5,91	2,97	7,16	2,98	8,02	3,29
MPI DC 029 H	Rated data at maximum frequency											
	25	30	27,20	9,73	29,60	9,67	34,90	9,62	36,90	9,60	46,50	9,51
	30	35	26,40	10,22	29,80	10,32	34,40	10,36	40,70	12,87	45,90	10,43
	35	40	26,00	10,97	29,40	11,07	33,90	11,27	41,70	11,37	45,30	11,47
	40	45	25,60	11,87	29,00	12,07	33,40	12,27	40,70	12,87	44,40	12,57
	45	50	25,60	13,07	28,80	13,27	33,00	13,47	40,20	13,67	43,80	13,77
MPI DC 029 H	Rated data at intermediate frequency											
	25	30	16,80	5,62	18,70	5,58	22,20	5,52	26,90	5,45	29,70	5,41
	30	35	16,30	5,89	18,30	5,92	21,80	5,93	26,50	5,91	29,10	5,90
	35	40	15,90	6,28	17,90	6,35	21,40	6,42	25,90	6,45	28,50	6,45
	40	45	15,50	6,77	17,60	6,86	21,00	6,96	25,30	7,03	27,80	7,05
	45	50	15,30	7,37	17,30	7,47	20,60	7,59	24,80	7,68	27,30	7,72
MPI DC 029 H	Rated data at minimum frequency											
	25	30	4,72	2,40	5,33	2,38	6,39	2,34	7,75	2,30	9,02	2,27
	30	35	4,60	2,48	5,21	2,48	6,25	2,47	7,60	2,44	8,32	2,94
	35	40	4,49	2,59	5,11	2,60	6,12	2,61	7,46	2,60	8,19	3,04
	40	45	4,40	2,74	5,01	2,75	6,00	2,77	7,29	2,77	8,06	3,15
	45	50	4,33	2,91	4,93	2,93	5,89	2,95	7,12	2,96	7,93	3,26

6 PERFORMANCES

6.4 INTEGRATED CAPACITIES

In the heat pump operation (heating mode), the actual heating capacities of units may be lower than the values shown in the table, due to defrosting cycles. To obtain the actual heating capacity, multiply the capacity values by the corrective coefficients given below.

Control	Air temperature dry bulb (°C)			
	-5	0	5	>5
µchiller2	0,89	0,88	0,94	1
PCO XS	0,91	0,9	0,94	1

7 SOUND LEVELS

LEGEND

Lp_A Total sound pressure level, weighted A, measured at a distance of 10 m, with a directivity factor of 2.
Lw Sound power level by octave band, not weighted
Lw_A Total sound power level, weighted A

Modell	Lw							Lw_A		Lp_A	
	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	8000 Hz	Total	Low-noise version	Total	Low-noise version
	dB	dB	dB	dB	dB	dB	dB	dB (A)	dB (A)	dB (A)	dB (A)
MPI DC 08	74,1	67,8	67,2	63,1	55,9	50,9	47,1	68,0	66,0	40,0	38,0
MPI DC 010	79,1	71,2	66,1	61,2	58,9	58,4	57,0	70,0	68,0	42,0	40,0
MPI DC 014	76,6	70,2	69,6	65,6	58,3	53,3	49,6	71,0	69,0	43,0	41,0
MPI DC 018	76,6	70,2	69,6	65,6	58,3	53,3	49,6	71,0	69,0	43,0	41,0
MPI DC 023	77,9	72,0	70,3	67,7	67,8	59,7	58,3	74,0	72,0	46,0	44,0
MPI DC 029	77,9	72,0	70,3	67,7	67,8	59,7	58,3	74,0	72,0	46,0	44,0

8 OPERATING LIMITS

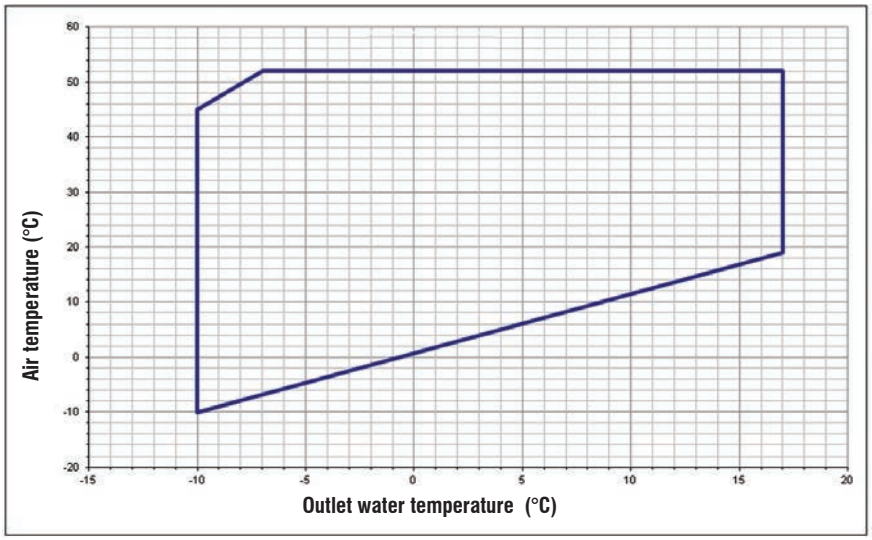
The graphs below illustrate the operating limits of **MPI DC** units (in the case of continuous operation) in relation to the outlet water temperature and outdoor air temperature.

Operating limits	Chiller		Heat pump	
	min	max	min	max
Inlet water temperature (°C)	8	20 [1]	25	42
Outlet water temperature (°C)	5	15	28	58 [2]
Water temperature differential (°C)	3	8	3	8
Outdoor air temperature (°C)	-10 [3]	48	-10	35

1 For transitory periods (e.g. equipment start up) values up to 25 °C are allowed
2 Value that may be reached only for outdoor air temperatures exceeding 0°C.
3 With condensation control: outdoor air T min -15 °C

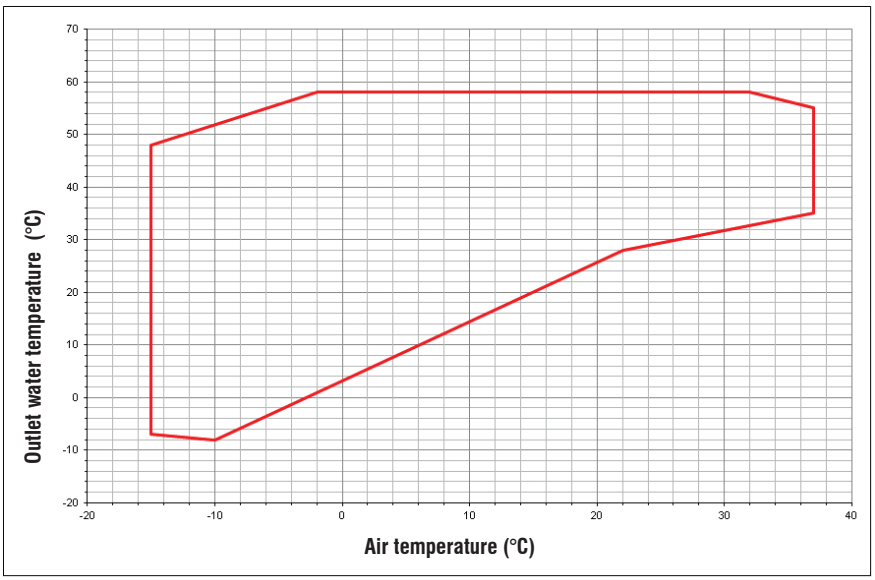
Warning!: ⚠ The units are designed to work with water and air temperatures falling within the range defined by the operating limits. Attempting to operate the units beyond these limits could cause irreparable damage to the units themselves.

8.1 OPERATING LIMITS IN CHILLER MODE



8 OPERATING LIMITS

8.2 OPERATING LIMITS IN HEATING MODE



8.3 THERMAL CARRIER FLUID

The units belonging to the **MPI DC** series can work with mixtures of water and up to 30% ethylene glycol.

9 CALCULATION FACTORS

9.1 CHANGE IN OPERATING PARAMETERS WITH ΔT OTHER THAN 5°C

After identifying the unit's performance in the terms of the desired outlet water temperature, correct the value by multiplying it by the following corrective coefficients.

ΔT_W	$C_{PF/PT}$	C_{PA}	C_{Qw}	$C_{\Delta pw1}$
3	0,975	1	1,63	2,64
4	0,99	1	1,24	1,53
5	1	1	1	1
6	1,015	1	0,85	0,72
7	1,03	1	0,74	0,54
8	1,04	1	0,65	0,42

ΔT_W Difference between water inlet temperature and water outlet temperature
$C_{PF/PT}$ Corrective coefficient of cooling/heating capacity
C_{PA} Correction coefficient of electrical input
C_{Qw} Correction coefficient of water flow rate
$C_{\Delta pw1}$ Correction coefficient of pressure drop

9.2 WATER AND GLYCOL MIXTURE

Based on the minimum outlet water temperature, you can derive the percentage of ethylene glycol and the corrective coefficient using the table below.

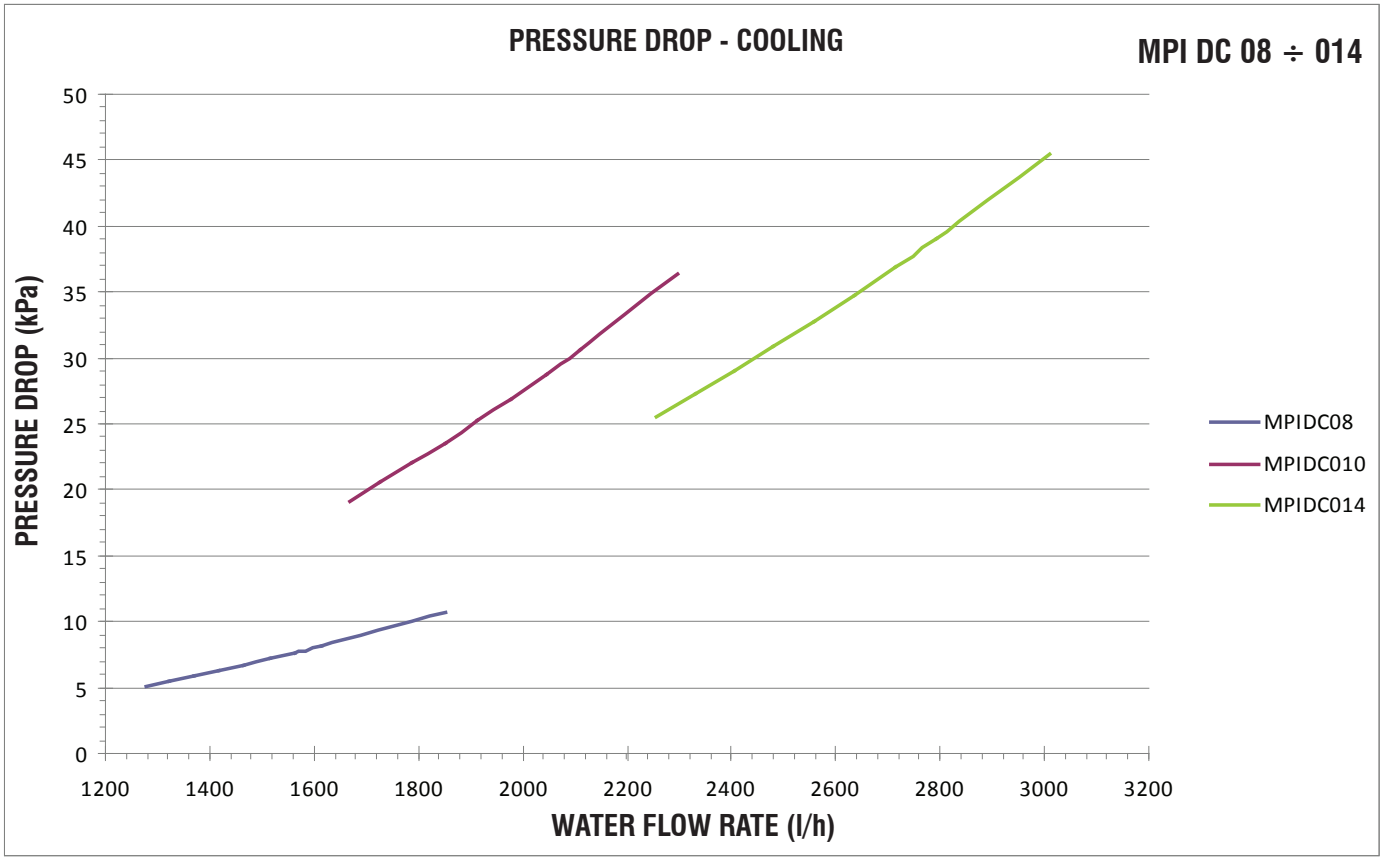
PERCENTAGE OF ETHYLENE GLYCOL	0%	10%	20%	30%	40%
Minimum temp. of water produced	5°C	2°C	-5°C	-10°C	-15°C
Mixture freezing temp. (°C)	0°C	-4°C	-14°C	-18°C	-24°C
Capacity correction factor	1,000	0,998	0,994	0,989	0,983
Water flow rate correction factor	1,000	1,047	1,094	1,140	1,199
Pressure drop correction factor	1,000	1,157	1,352	1,585	1,860

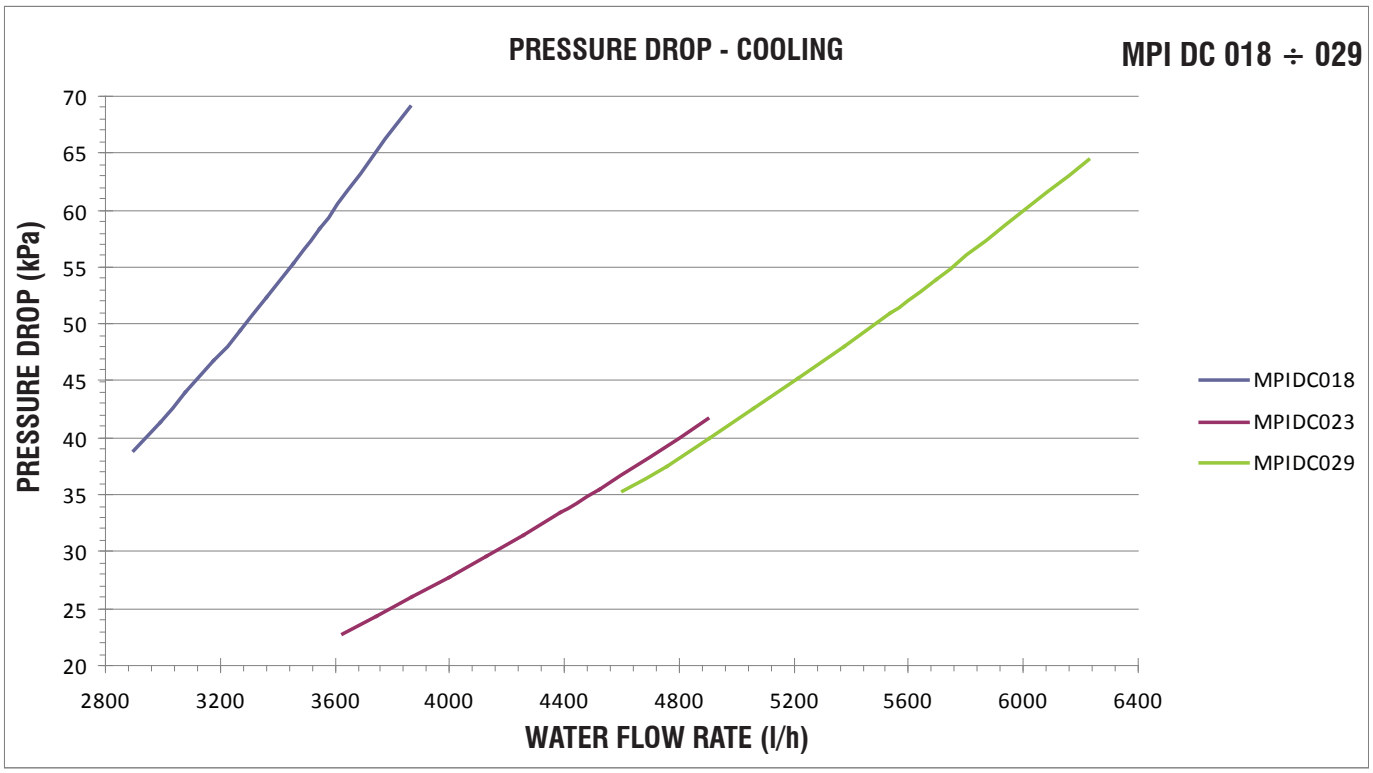
Warning ⚠ The use of propylene glycol is not admitted with standard pumps. For further information, contact the manufacturer.

10 PRESSURE DROPS

10.1 PRESSURE DROPS, WATER SIDE

The diagram shows the evaporator pressure drops (**Δp**) as a function of the water flow rate (**Qw**), assuming an average water temperature of 10°C.

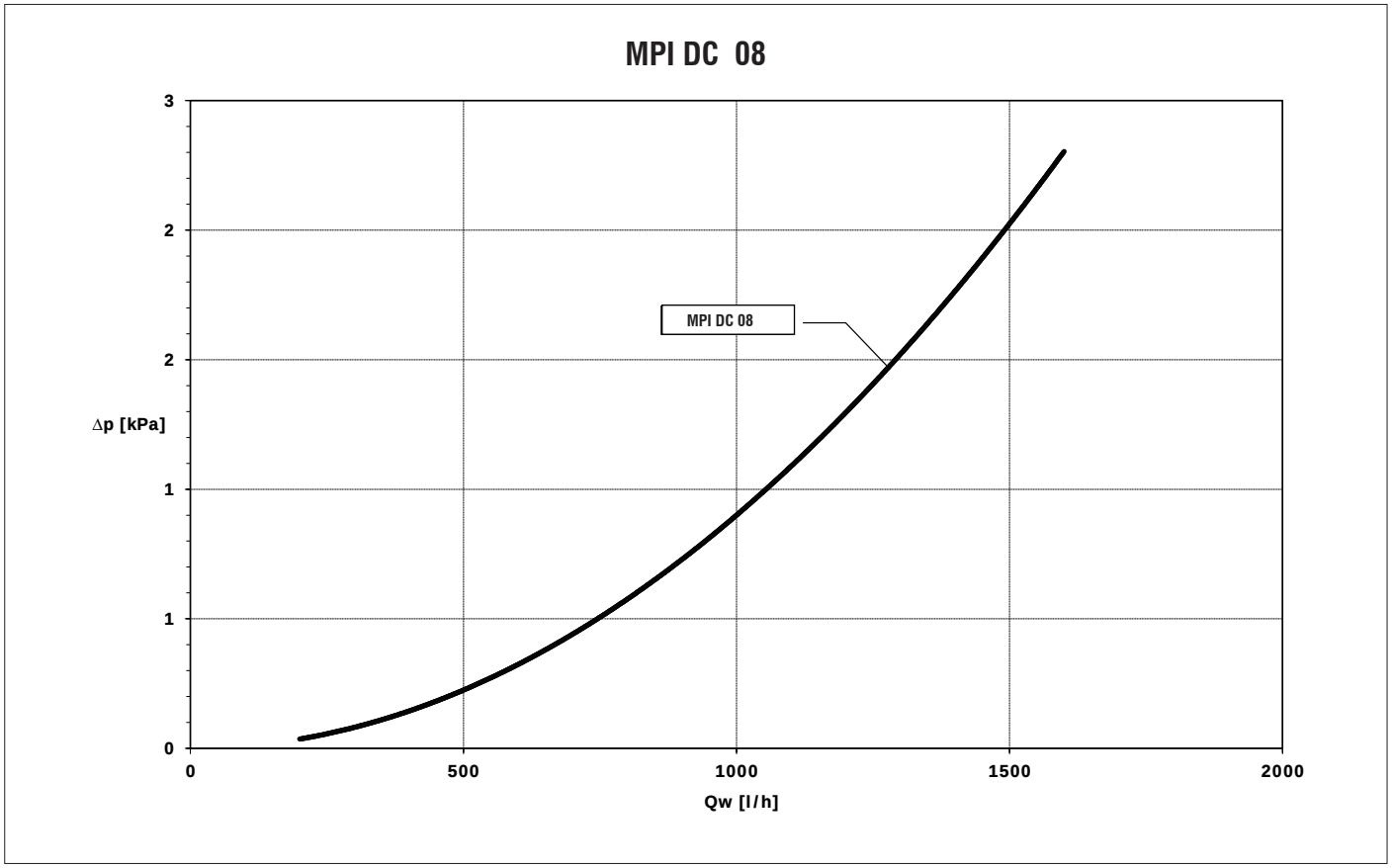


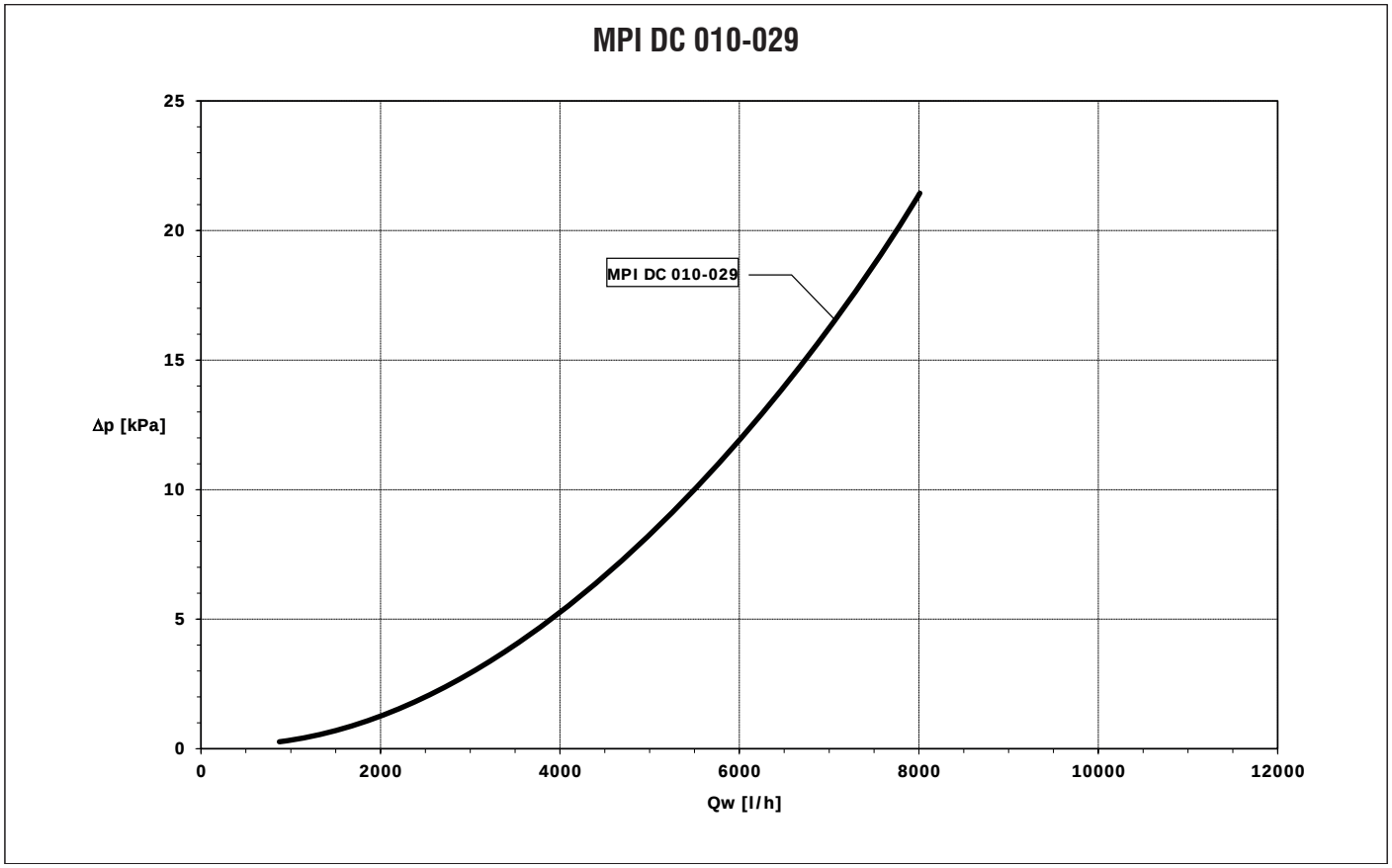


10 PRESSURE DROPS

10.2 PRESSURE DROPS OF Y FILTER

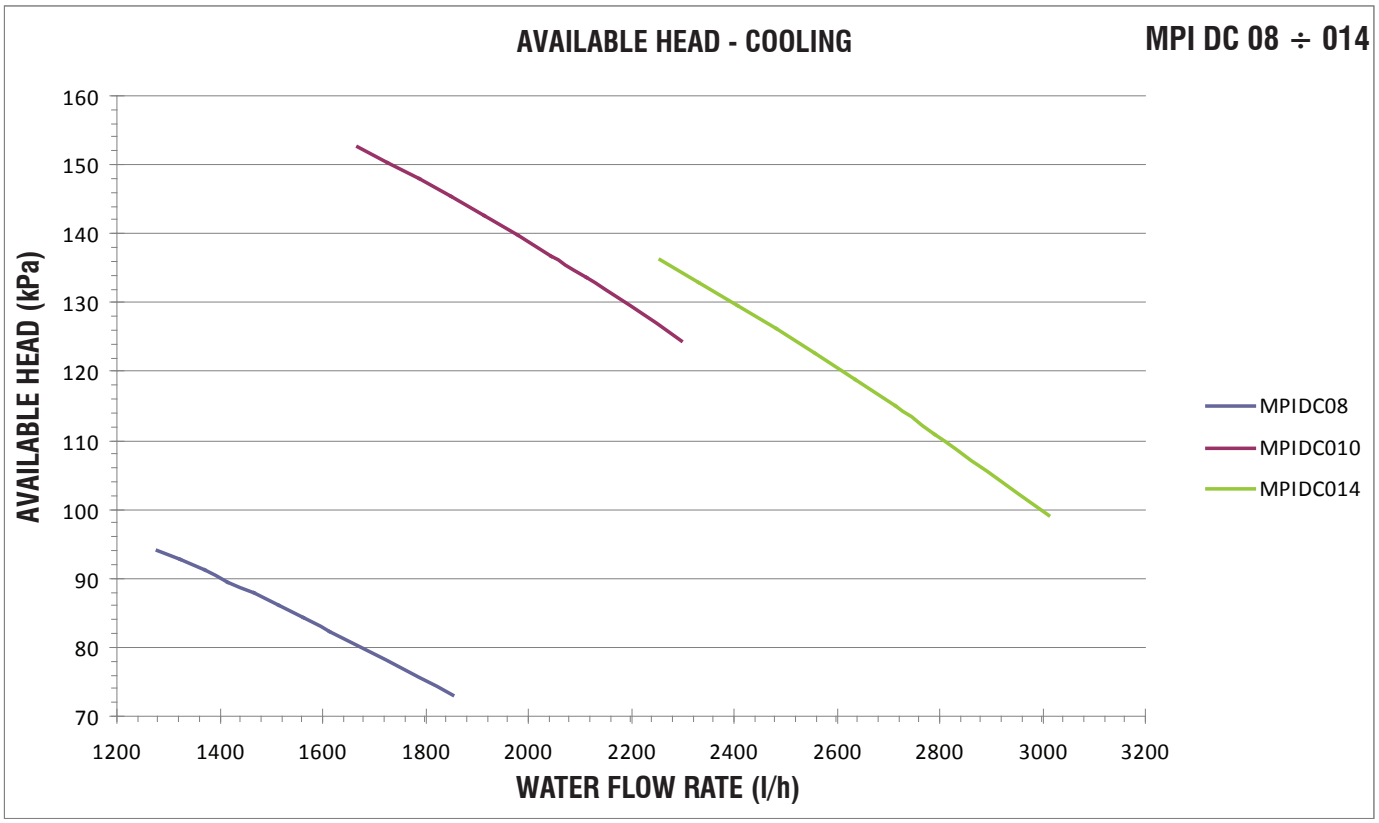
The diagram shows the evaporator pressure drops (**Δp**) as a function of the water flow rate (**Qw**), assuming an average water temperature of 10°C.

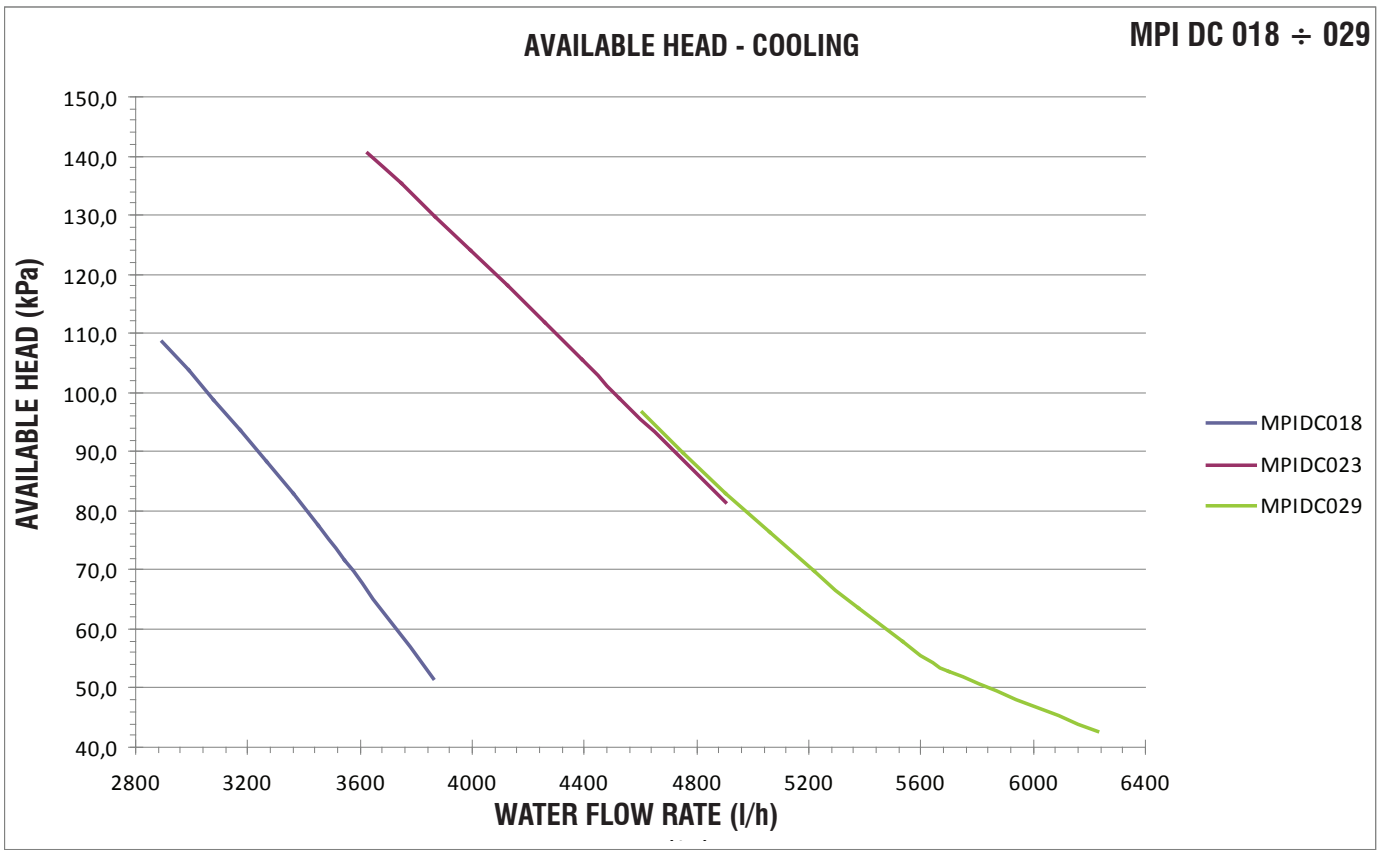




11 AVAILABLE HEAD OF THE UNIT

The diagram below shows the available head (**Pu**) of the unit as a function of the water flow rate (**Qw**), assuming an average water temperature of 10°C, net of pressure drops. Pressure drops of the Y filter are not counted.





12 WATER CIRCUIT

When setting up the water circuit of the unit, it is advisable to follow the directions below and in any case comply with local or national regulations.
Connect the pipes to the chiller using flexible couplings to prevent the transmission of vibrations and to compensate thermal expansions.

It is recommended to install the following components on the pipes:
- temperature and pressure indicators for routine maintenance and monitoring of the unit. Checking the pressure on the water side will enable you to verify whether the expansion tank is working efficiently and to promptly detect any water leaks within the equipment.
- Traps on incoming and outgoing pipes for temperature measurements, which can provide a direct reading of the operating temperatures.
- Regulating valves (gate valves) for isolating the unit from the water circuit.
- **Metal mesh filter (supplied), with a mesh size no greater than 1 mm, to be fitted on the inlet pipe to protect the exchanger from scale or impurities present in the pipes.**
- Air vent valves, to be placed at the highest points of the water circuit for the purpose of bleeding air. The internal pipes of the unit are fitted with small air vent valves for bleeding the unit itself. This operation may only be carried out when the unit is disconnected from the power supply.
- Drainage valve and, where necessary, a drainage tank for emptying out the equipment for maintenance purposes or when the unit is taken out of service at the end of the season. A 1" drainage valve is provided on the optional water buffer tank: this operation may only be carried out when the unit is disconnected from the power supply.

It is of fundamental importance that the incoming water supply is hooked up to the connection marked "Water Inlet".
Otherwise the evaporator would be exposed to the risk of freezing since the antifreeze thermostat would not be able to perform its function; moreover the reverse cycle would not be respected in the cooling mode, resulting in additional risks of malfunctioning.

The dimensions and position of plumbing connections are shown in the dimension tables at the end of the manual.

The water circuit must be set up in such a way as to guarantee that the nominal flow rate of the water supplied to the evaporator remains constant (+/- 15%) in all operating conditions.
A standard feature of MPI DC units is a device for controlling the flow rate (flow switch or differential pressure switch) in the water circuit in the immediate vicinity of the evaporator.

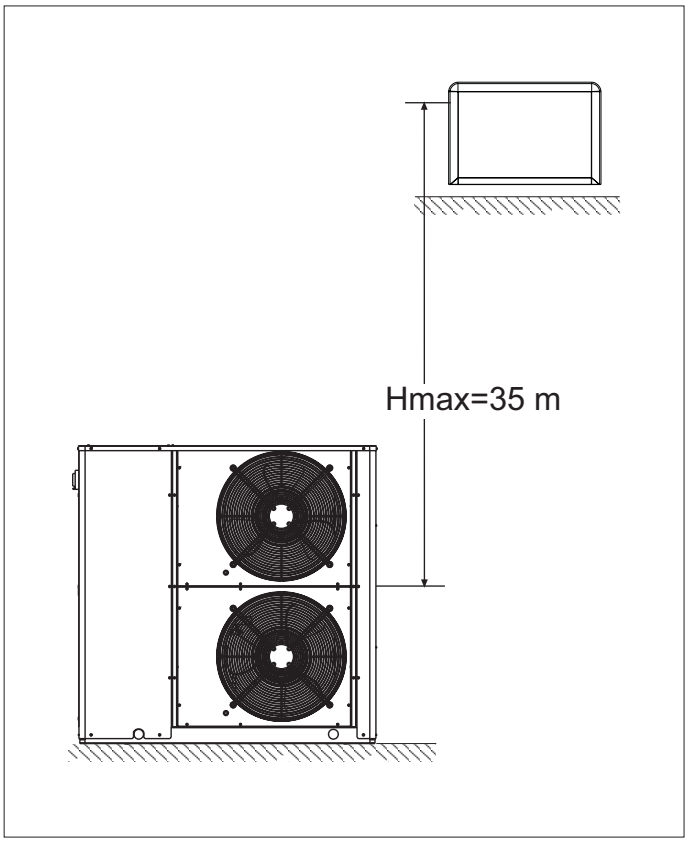
12.1 WATER CONTENT WITHIN THE SYSTEM AND CHARGING OF EXPANSION TANK

In models without buffer tank it is necessary to assure that the content of water within the system does not fall below 4.5 litres/kW in the case of heat pump models. This level is necessary to prevent the water temperature from falling below the indoor unit enabling threshold during defrost cycles.

N.B. kW in reference to rated capacity
The expansion tank is pre-charged to a pressure of 1.5 bars, sufficient for systems with a maximum height difference (H in the figure at the side) of 13 metres. For greater height differences, refer to the table below in order to adjust the charging pressure of the expansion tank accordingly.
In no case should you exceed the maximum height difference Hmax = 35 m.

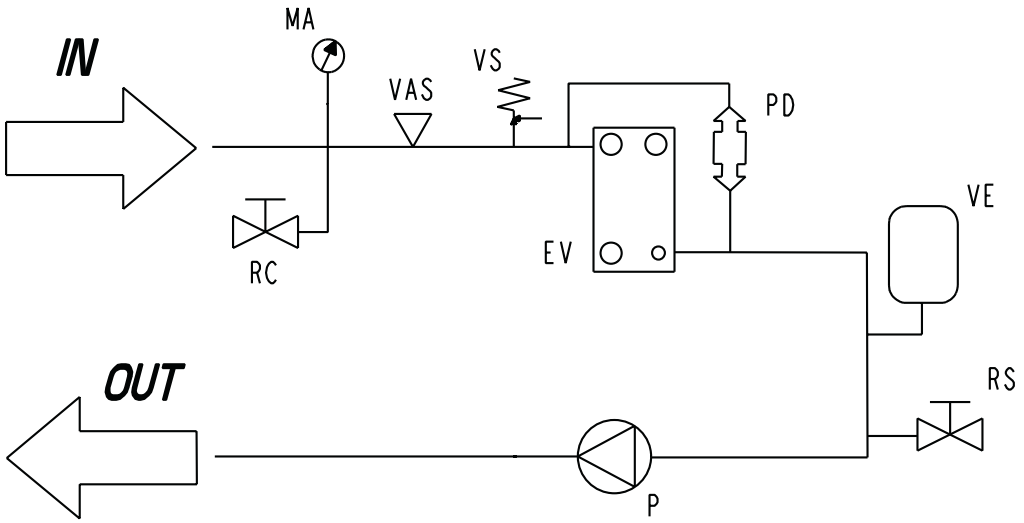
Models	H (m)	p_i (bar)	C_{max} (l)
MPI DC 08-029	<13	1,5	145
	15	1,7	133
	20	2,2	105
	25	2,7	77
	30	3,1	49

	LEGEND
H	Height difference of system
p_i	Charging pressure of expansion tank
C_{max}	Maximum system water content

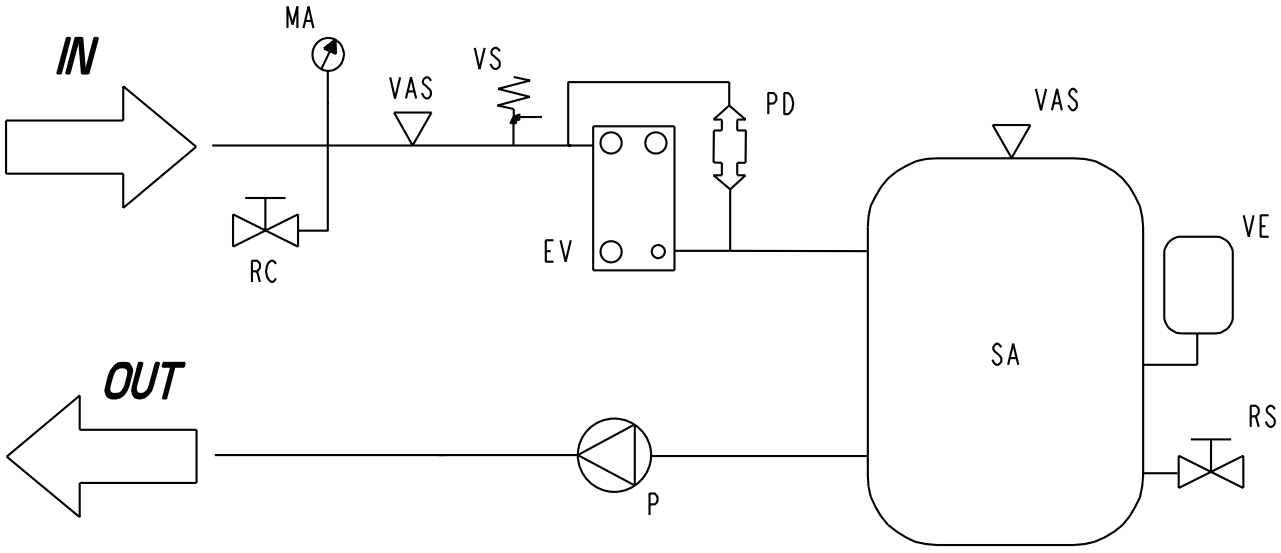


12 WATER CIRCUIT PLUMBING DIAGRAMS)

MPI DC (EVAPORATOR AND PUMP)



MPI DC (EVAPORATOR, PUMP AND TANK)



LEGEND			
VS	Safety valve	**VE**	Expansion tank
EV	Evaporator	**P**	Pump
PD	Differential pressure switch	**RS**	Drainage valve
MA	Water pressure gauge	**RC**	Water filling cock
VAS	Air vent valve	**VU**	Check valve
		SA	Buffer tank

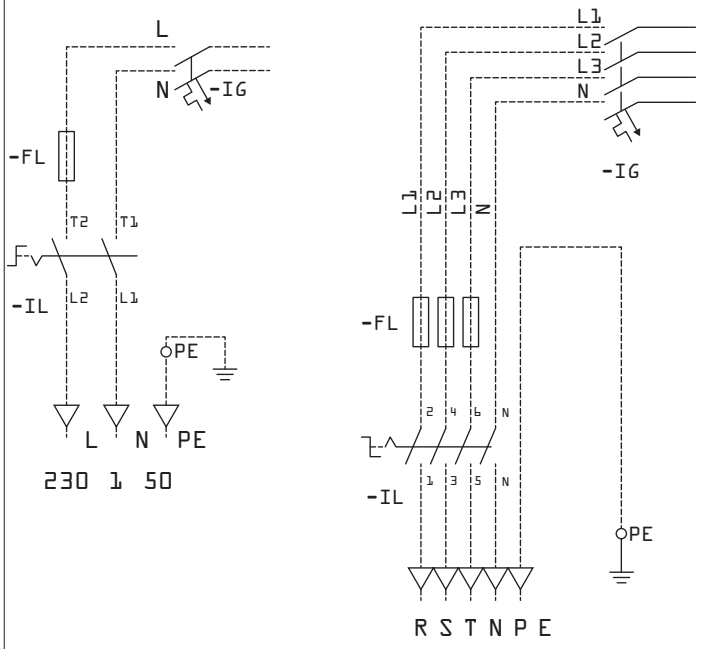
13 ELECTRICAL DATA AND CONNECTIONS

MPI DC		08 M	010 M	014	018	023	029
Maximum power input	kW	4,1	5,6	7,1	10,7	10,8	21,9
Maximum current absorption	A	16	26,6	20	22	28,5	43
Starting absorbed current	A	10	10	10	10	10	10
Fan motor rated power	kW	0,24	0,14	0,14	0,14	0,14	0,14
Fan motor rated current	A	1,03	0,64	0,64	0,64	0,64	0,64
Pump motor rated power	kW	0,14	0,48	0,65	0,65	0,65	0,65
Pump motor rated current	A	0,58	2,7	3	3	3	3
Power supply	V/f/Hz	230/1/50		400/3N/50			
Auxiliary power supply	V/f/Hz	230/1/50					
Power cables	mm^2	4	4	6	6	10	10
PCD connecting cables	mm^2	AWG22	AWG22	AWG22	AWG22	AWG22	AWG22
PCDS connecting cables	mm^2	1	1	1	1	1	1
Safety fuse F	A	20	20	25	25	32	32
Circuit breaker IL	A	20	20	25	25	40	40

- The maximum electrical input is the mains electricity that must be available in order for the unit to work.
- The maximum current absorption refers to the current that will trigger the internal safety devices of the unit.
  It is the maximum current allowed in the unit. This value may never be exceeded; it must be used as a reference for determining the size of the power supply line and the related safety devices (refer to the wiring diagram supplied with the units).

13 ELECTRICAL DATA AND CONNECTIONS

MAIN ELECTRIC CONNECTION OF SINGLE-PHASE AND THREE-PHASE UNITS



MPI DC WIRING DIAGRAM WITH MYCHILLER REMOTE CONTROL

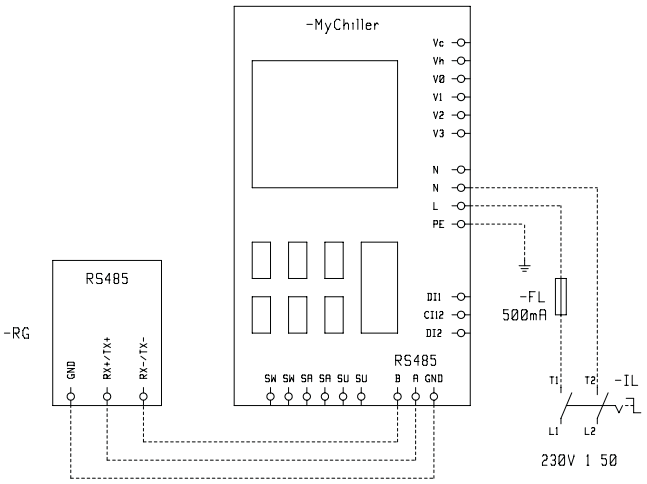
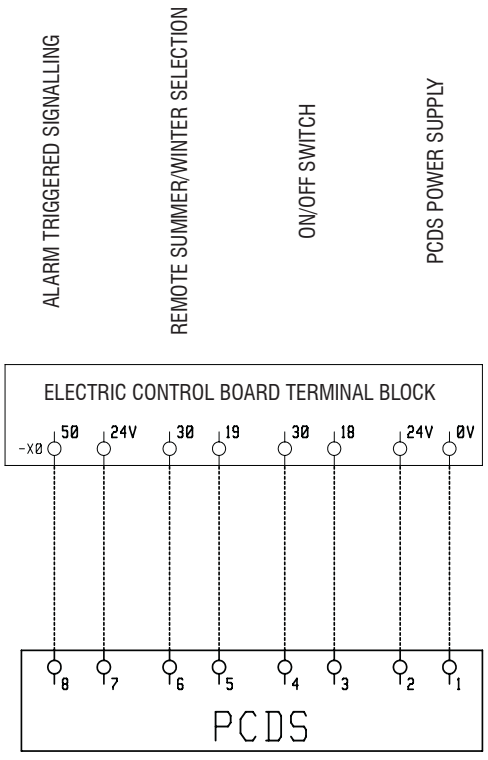


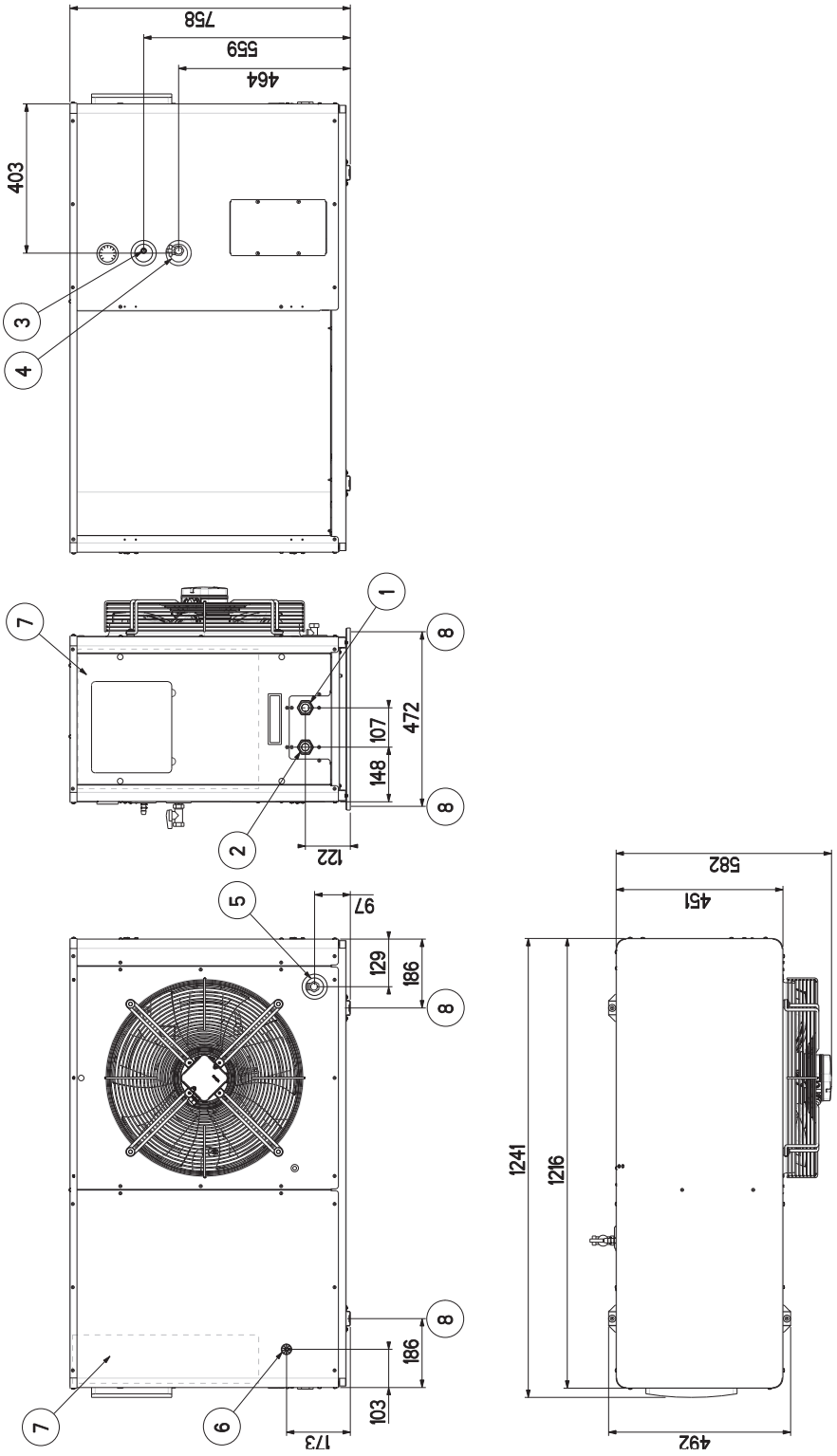
DIAGRAM SHOWING ELECTRICAL CONNECTIONS BETWEEN MPI DC AND PCDS REMOTE CONTROL PANEL



Note: Should the unit go into an alarm status, a voltage of 24V will be present on the terminals of the electric control panel; where an interface with a voltage-free contact is desired, a relay must be fitted by the installer.

14 OVERALL DIMENSIONS

MPI DC 08

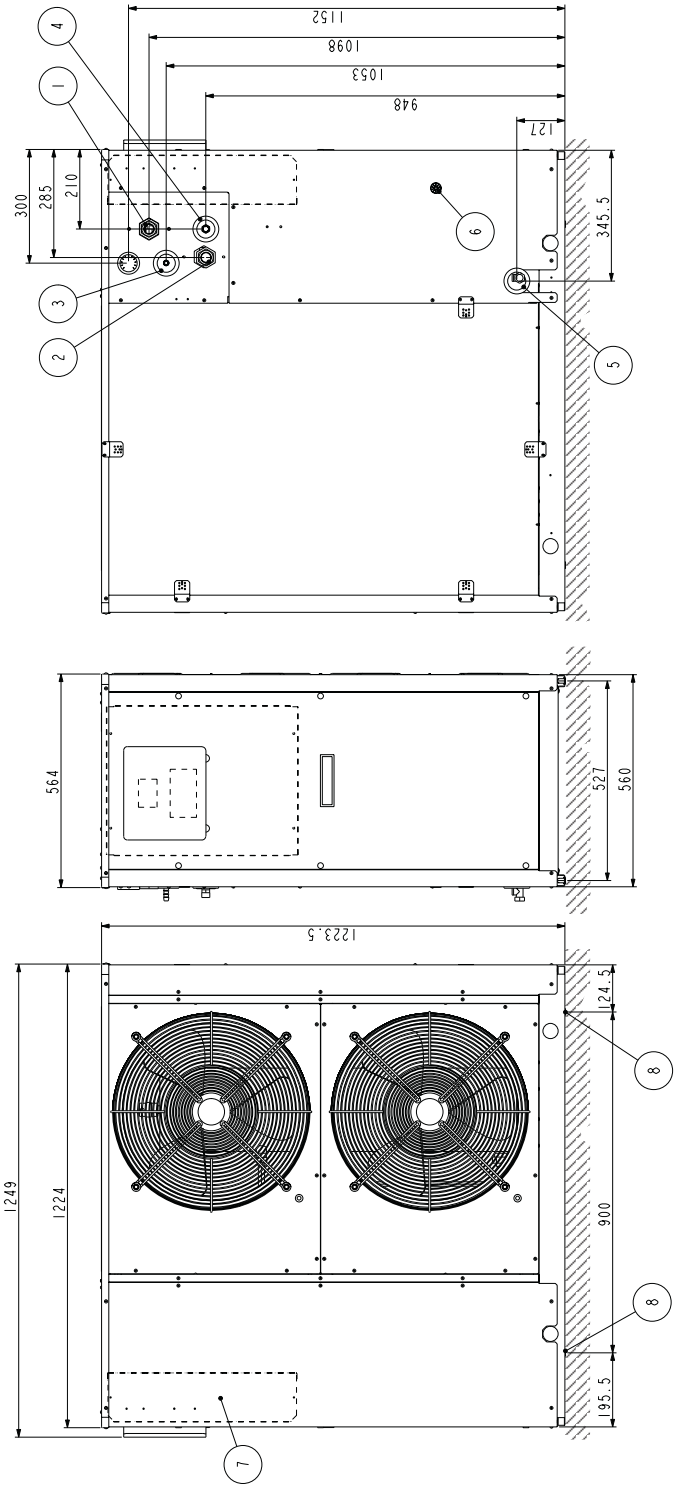


Legend:

1 Water inlet 1" female
2 Water outlet 1" female
3 Safety valve discharge outlet provided with rubber ring holder
4 Water supply ½" male (optional tap)
5 Water drainage ½" female
6 Power supply Ø 28 mm
7 Electric control board
8 Fastening points for vibration dampers (accessory)

14 OVERALL DIMENSIONS

MPI DC 10 - 18

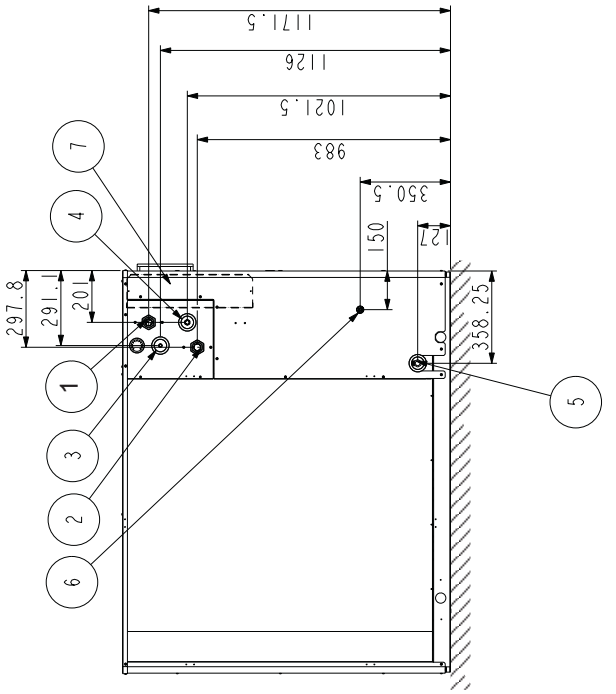


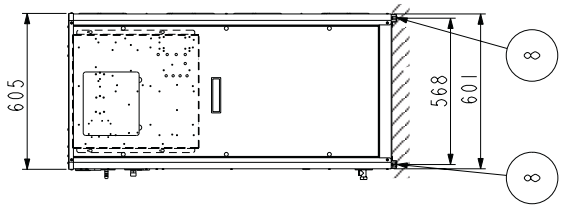
Legend:

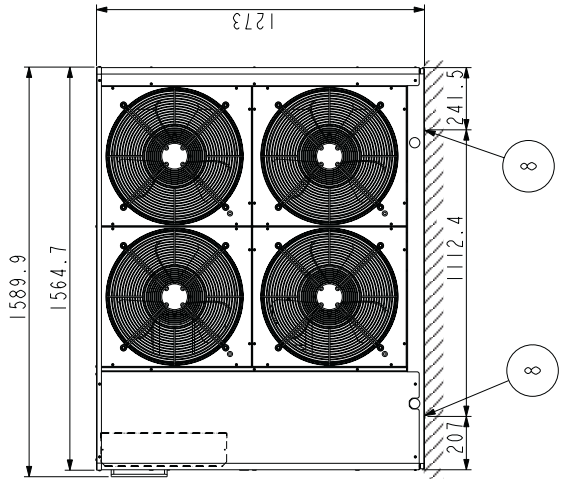
1 Water inlet 1" ¼ female
2 Water outlet 1" ¼ female
3 Safety valve discharge outlet provided with rubber ring holder
4 Water supply ½" male (optional tap)
5 Water drainage ½" female
6 Power supply Ø 28 mm
7 Electric control board
8 Fastening points for vibration dampers (accessory)

14 OVERALL DIMENSIONS

MPI DC 23 - 29







Legend:

1 Water inlet 1" ¼ female
2 Water outlet 1" ¼ female
3 Safety valve discharge outlet provided with rubber ring holder
4 Water supply ½" male (optional tap)
5 Water drainage ½" female
6 Power supply Ø 28 mm
7 Electric control board
8 Fastening points for vibration dampers (accessory)

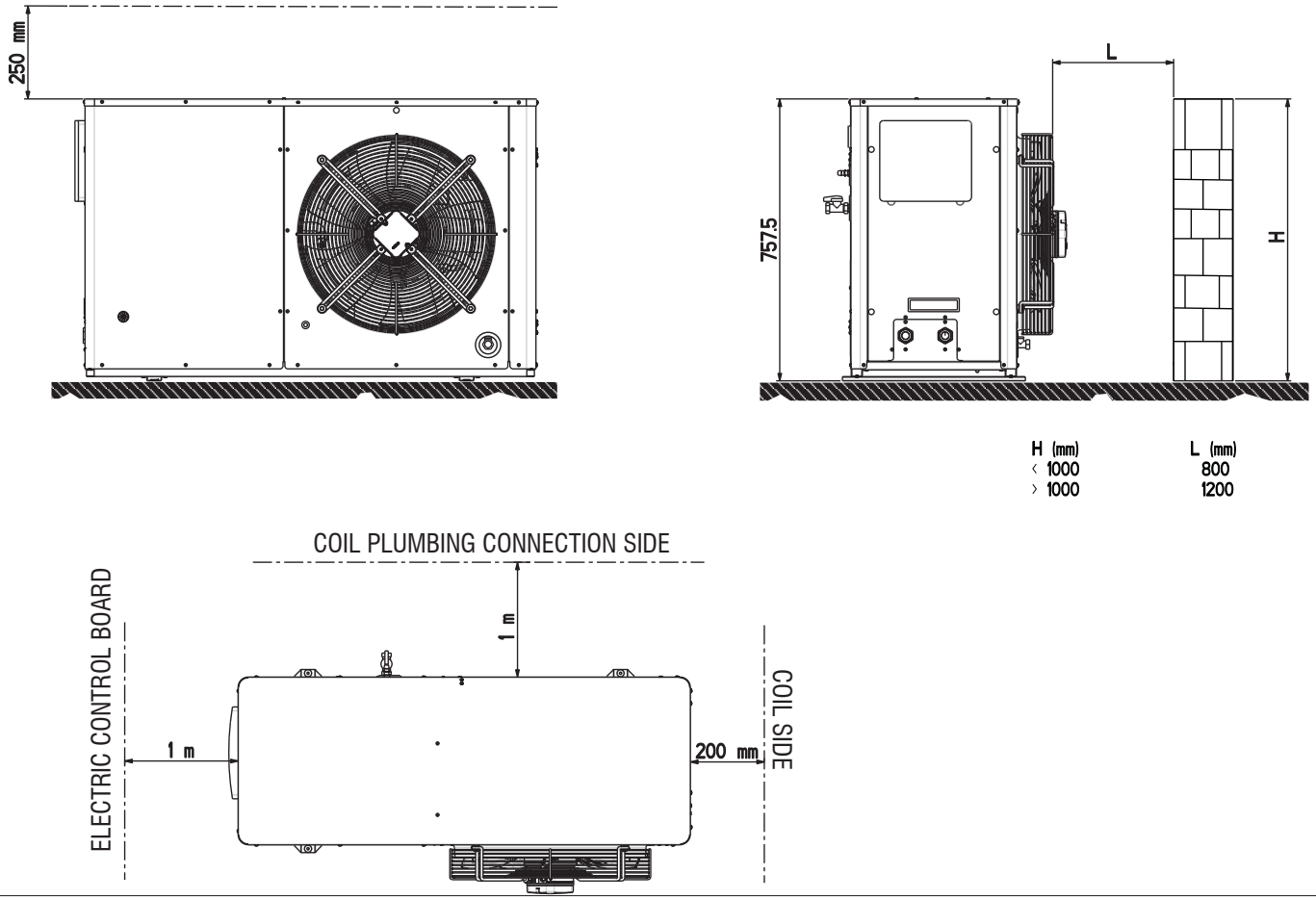
15 INSTALLATION CLEARANCE REQUIREMENTS

To guarantee the proper functioning of the unit and access for maintenance purposes, it is necessary to comply with the minimum installation clearance requirements shown in figures 1 and 2.
There must be no obstacles blocking the path of the air flow from the fans.
Avoid any and all situations of backflow of hot air between air outlet and inlet of the unit.
If even only one of the above conditions is not fulfilled, please contact the manufacturer to check for feasibility.

In the design of the MPI DC series, special care has been taken to minimise noise and vibrations transmitted to the ground.
Even greater insulation may be obtained, however, by using vibration damping base supports (available as optional accessories).
If vibration damping base supports are adopted, it is strongly recommended also to use vibration damping couplings on the water pipes.
Whenever the unit is to be sited on unstable ground (various types of soil, gardens, etc.) it is a good idea to provide a supporting base of adequate dimensions.

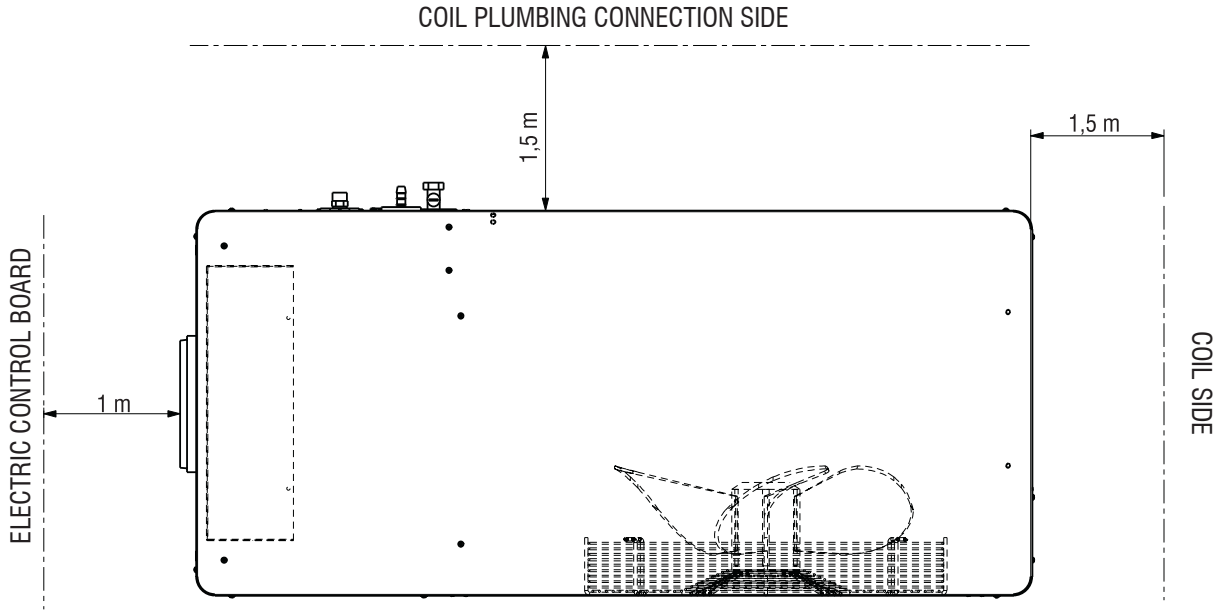
Warning ⚠ heat pump units produce condensation while operating in the heating mode.

MPI DC 08

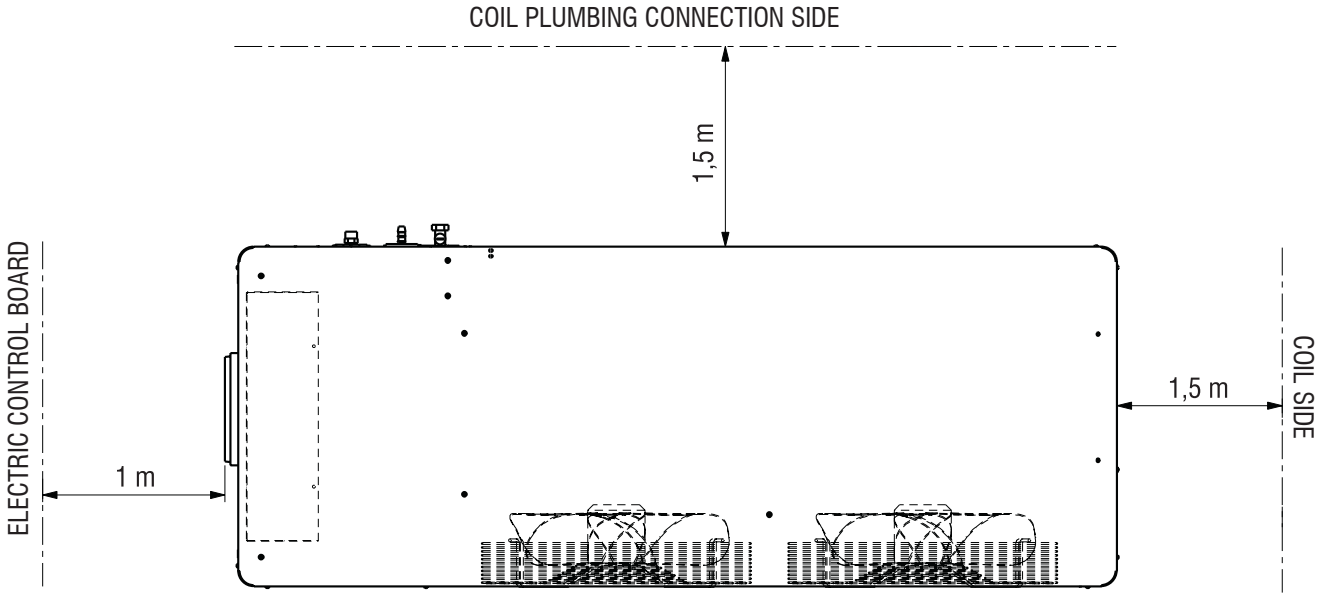


15 INSTALLATION CLEARANCE REQUIREMENTS

MPI DC 10 - 18



MPI DC 23 - 29

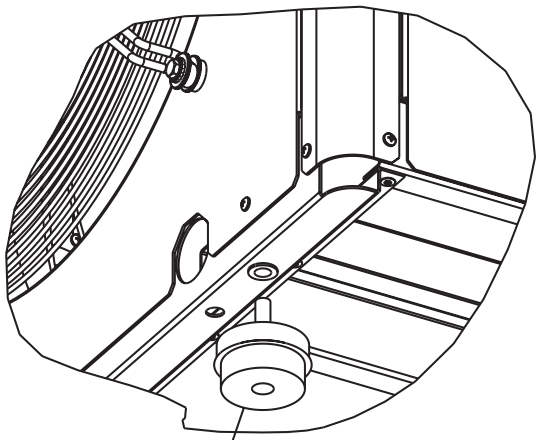


16 SITING

It is important to bear in mind the following aspects when choosing the best site for installing the unit:
- Size and origin of water pipes;
- Location of the power supply;
- Solidity of the supporting surface;
- Avoid obstacles to the outflow of air from the fan which could cause back suction (see section on “installation clearance requirements”);
- Direction of prevalent winds: (position the unit so that prevalent winds do not alter the fan air flow).
  A prevalent wind blowing from a direction opposite to the fan air flow will reduce the maximum air temperature to a lower value than specified in the operating limits,
  A wind blowing in the same direction as the fan air flow will increase the minimum air temperature to a higher value than specified in the operating limits. Also in the heat pump mode, wind may have the effect of reducing the unit's operating range.
- Avoid the possible reverberation of sound waves; do not install the unit in narrow or cramped spaces;
- Ensure adequate accessibility for maintenance or repairs (see section on “installation clearance requirements”).

This device is not intended to be used by children or by people with physical, sensory or mental impairments, except under supervision. Make sure that children do not have access to the device.

16.1 POSITIONING OF VIBRATION DAMPERS (ACCESSORY)



MPI DC	NO. OF VIBRATION DAMPERS
08 - 29	4

NOTES

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AIR CONDITIONING

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