

MCC

Water chillers and heat pumps TECHNICAL MANUAL

GB



CE

COMPANY
WITH QUALITY SYSTEM
CERTIFIED BY DNV
=ISO 9001/2000=

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DECLARATION OF CONFORMITY

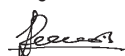
Galletti S.p.A. hereby declares, under its sole responsibility, that the water chillers and heat pumps belonging to the MCC series have been designed, built and tested in conformity with the specifications of European Directives:

- 98/37/CE (Machinery Directive)
- 73/23/CEE (Low Voltage Directive)
- 89/336/CEE (Directive on Electromagnetic Compatibility)
- 97/23 CE (PED)

Bentivoglio, 04/07/2006

Galletti S.p.A.

Luigi Galletti



1 THE RANGE

The series MCC of the air cooled water chillers and heating pumps has been designed for indoor installation, for residential and commercial applications, when duct connection is required.

The series MCC has been designed and developed with the 410 A refrigerant, in fact the unit reaches excellent level of energetic efficiency thanks to the optimization of the heat exchangers in the type of plates and the distribution of the refrigerant.

The logic of the Plug&Play on the hydraulic side- already present (DNA) in all our water chillers models - here is going alongside with the Plug&Play on the fans group : Auto - adaptive control of the air flow and the constant fan speed modulations (condensation control on pressure basis) reduces the installation costs and timing.

> PLUG&PLAY ON AIR SIDE:

Autoadaptive air flow depending on:

- pressure drop on air side
- inlet air temperature

All units comes with modulating continuous fan speed control that adjust the rpm of the motor depending on the air temperature and air pressure drop, using a cutting-phase device.

Air outlet can be vertical or horizontal (optional).

> HYDRAULIC PLUG&PLAY

3 different hydraulic kits are available to enable an easy installation of MCC units in the cooling and heating system:

- B version: standard unit with evaporator
- P version: unit with evaporator, pump and expansion vessel
- S version: unit with evaporator, pump, expansion vessel and watertank

> SIMPLIFIED MAINTENANCE

Centrifugal fans are directly coupled to the electric motor without using pulley and belt system.

The compressor and technical compartment is completely separated from the fan compartment in order to perform check operation while the unit is operating .

Easily accessible electronic microprocessor control.

> ELECTRONIC MICROPROCESSOR CONTROL PANEL

Brand new technology, it allows the connection with ERGO 

Adjustable set-point thanks to an outdoor temperature probe (optional).

2 CONSTRUCTIVE FEATURES

REFRIGERANT GAS: R410A

STRUCTURE

Galvanised sheet steel supporting base and enclosing panels made of Peraluman to ensure effective protection against corrosive agents.

All bolts and screws and fastening devices are made of non-oxidisable materials, or carbon steel that has undergone surface-passivating treatments. The compressor compartment is completely sealed, acoustically isolated and may be accessed on 2 sides (electric board side and plumbing connection side) thanks to easy-to-remove panels that greatly simplify maintenance and inspection.

The ventilation compartment is separated from the compressor compartment of the unit, for inspection purposes when the unit is working.

For lifting the unit, ø 40-mm holes are provided in the base, through which lifting pipes can be inserted and the vibration-damping feet can be accessed for fastening.



MICROPROCESSOR CONTROL

The control panel enables the complete control of the MCC unit. It can be easily accessed through a polycarbonate flap with IP65 protection rating.

Main functions

- Control over the temperature of water entering the evaporator
- Defrosting management (heat pumps) via pressure control
- Control of fan speed via pressure probe
- Complete alarm management
- Can be connected to an RS485 serial line (optional) for supervisory / teleassistance operation
- Integrated MODBUS protocol
- Can be connected to ERGO networks (via RS485 optional)
- A remote terminal that reproduces the control functions is available as optional (not compatible with ERGO)
- A configuration with external air probe that assures dynamic variation of unit set point is available (optional).

Controlled devices:

- compressors
- fans
- cycle reversing valve (only for heating pump MCA-H)
- circulating pump
- antifreeze resistance (optional)
- alarm relay

The end user can change the parameter settings shown in the table within the limits indicated.

Parameter	min	standard	max
Cooling setpoint (°C)	8	11,5	20
Heating setpoint (°C)	15	40	45
Cooling hysteresis (°C)	0,3	2	5
Heating hysteresis (°C)	0,3	3	5
Antifreeze set point (°C)	-40	3	5

All other parameters may be adjusted by an AUTHORISED SERVICE CENTRE by means of a programming access key, except for the machine configuration, which may be modified exclusively by GALLETTI S.p.A.

REFRIGERANT CIRCUIT

- scroll compressor fitted in a sound proofed compartment
- heat exchanger with stainless steel braze-welded plates optimised for type of plate and distribution for R410A.
- finned block condenser coil with copper pipping and aluminium fins.
- dehydration filter.
- refrigerant sight glass with humidity indicator.
- thermostatic valve with external equalization and integrated MOP function.
- cycle - reversing valve (heat pump models only).
- check valves (heat pump only).
- liquid receiver (heat pump only).
- high and low pressure switches.
- safety valve.
- Schrader valves for checks and/or maintenance.
- refrigerant manometers (options).

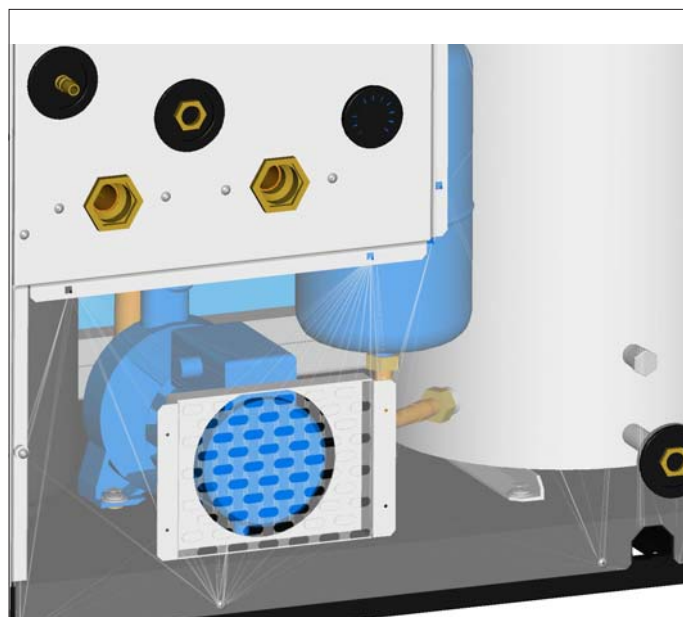
TAYLORED HYDRONIC KIT

To simplify the connection of the MCC unit to user plant, 3 different hydraulic kit are available.:

- base unit (MCC..B)
- kit including water pump and expansion vessel (MCC..P)
- kit including water pump and expansion vessel and buffer tank (MCC..S)

The main features are:

- High performance pump with extended working range: suitable to operate with glycol mix up to 30%.The pump is fitted in the compressors vane, acoustically insulated and of easy access thanks to the openable panels.The pump is provided with internal thermal protection.
- The water pump is cooled by the external air through a suitable grille.



- expansion vessel
- water safety valve
- automatic filling system
- automatic vent valve
- differential pressure switch and antifreeze thermostat with probe on leaving water side.
- buffer tank downstream to the evaporator, best solution to reduce the chilled water variation due to the compressor ON/OFF operation.

2 CONSTRUCTIVE FEATURES

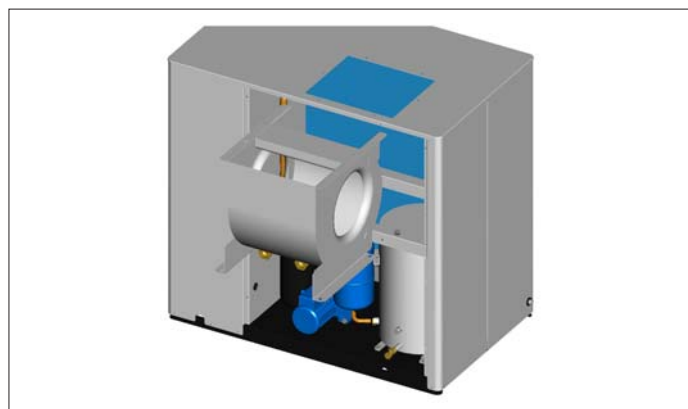
VENTILATION SECTION

Statically and dynamically balanced centrifugal fans with forward-curved blades, directly mounted on the electric motor. All electric fans are mounted on an appropriate structure with interposed vibration dampers to reduce the propagation of vibrations.

All units are equipped with phase-cut speed regulator controlled by the pressure probe.

The ventilation compartment is completely insulated with anti-condensation material and separated from the compressor/electrical system compartment for inspection purposes when the unit is working (without interfering with the finned block exchanger).

The absence of belt drive and the frontally removable fan considerably reduce maintenance work.



FINNED BLOCK HEAT EXCHANGER

Built with 3/8" copper piping and aluminium fins.

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. The condenser coil can be fitted with a metal filter that is easily removed from the machine side panels in case of ducted air intake.

With heat pumps, an aluminium condensate drip pan is mounted that can be ducted. To prevent ice from forming, a heating cable is installed in the heat exchanger base.

ELECTRIC PANEL

The electric panel is built and wired according to the CEE 73/23 directive, to the 89/336 directive for the electromagnetic compatibility and related standards. Built with steel panels sheet, completely closed and protected by the enclosing panels of the unit.

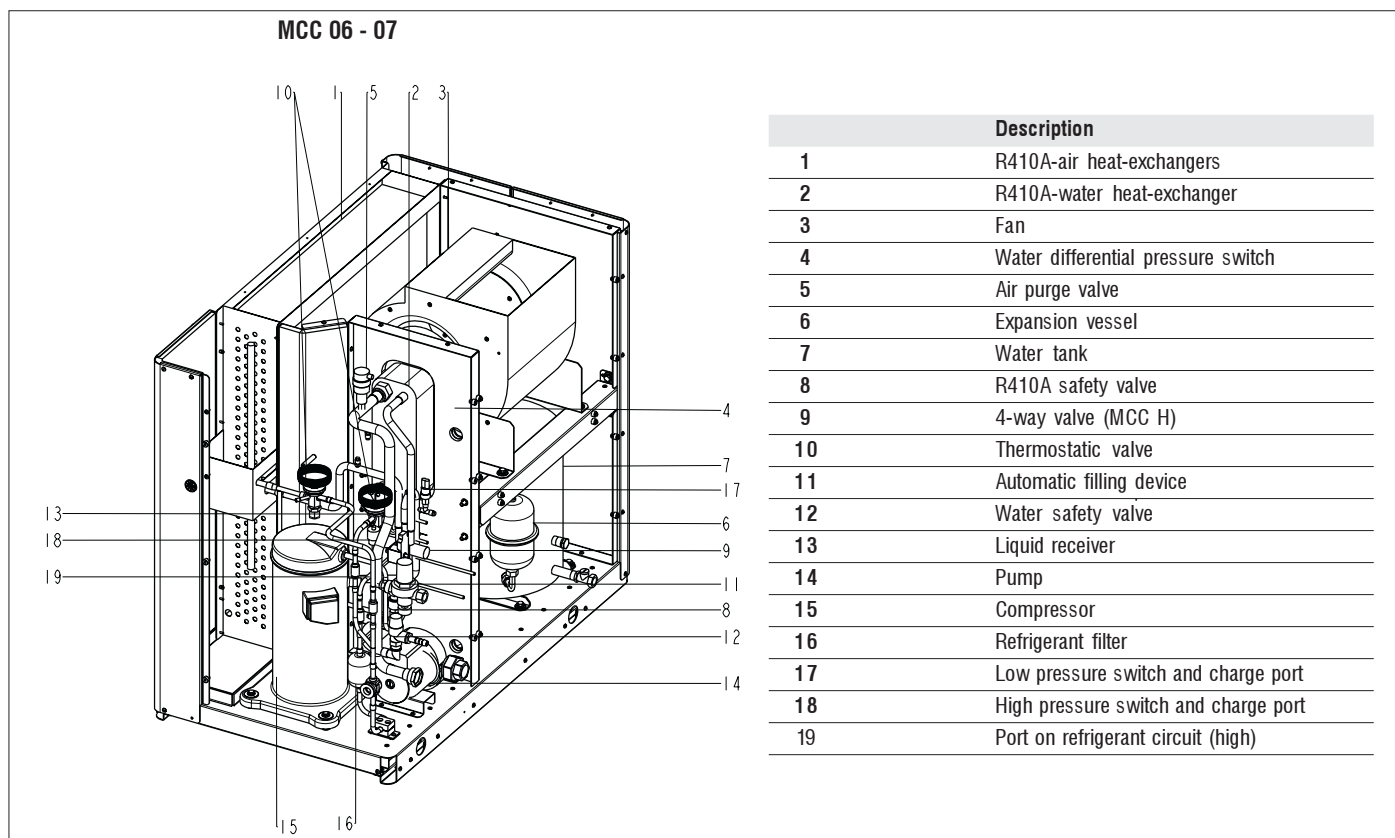
It is composed by:

- compressors contactors
- pump relay
- pump, fans, transformer and main control box protection fuses
- 230V/24V transformer
- terminal box

AVAILABLE OPTIONS

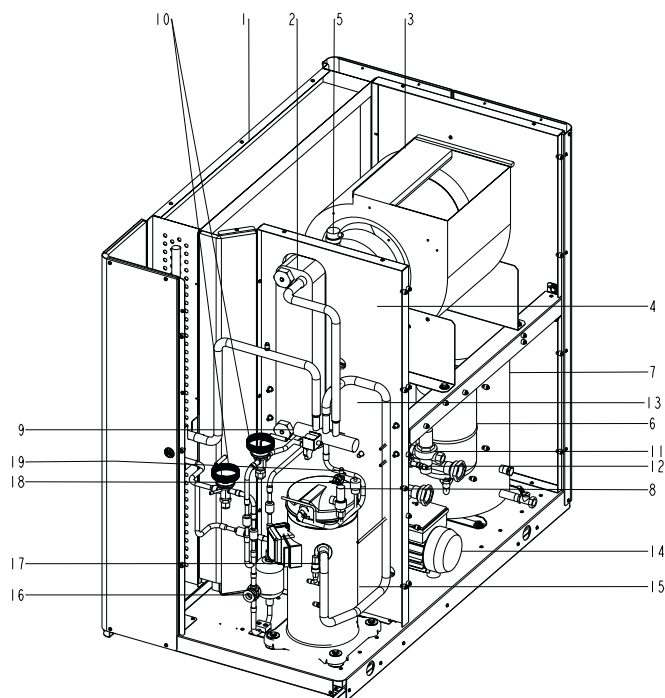
- refrigerant gauges
- antifreeze kit
- electronic expansion valve
- partial heat recovery system 20% (cooling only model)
- special treatment on coils (copper/copper, cataphoresis, Blygold)
- remote control board (PCD)
- simplified remote board (PDCS)
- antivibration mounting.
- protecting grid for condensing coils.
- air delivery connectors

3 COMPONENTS LAY-OUT

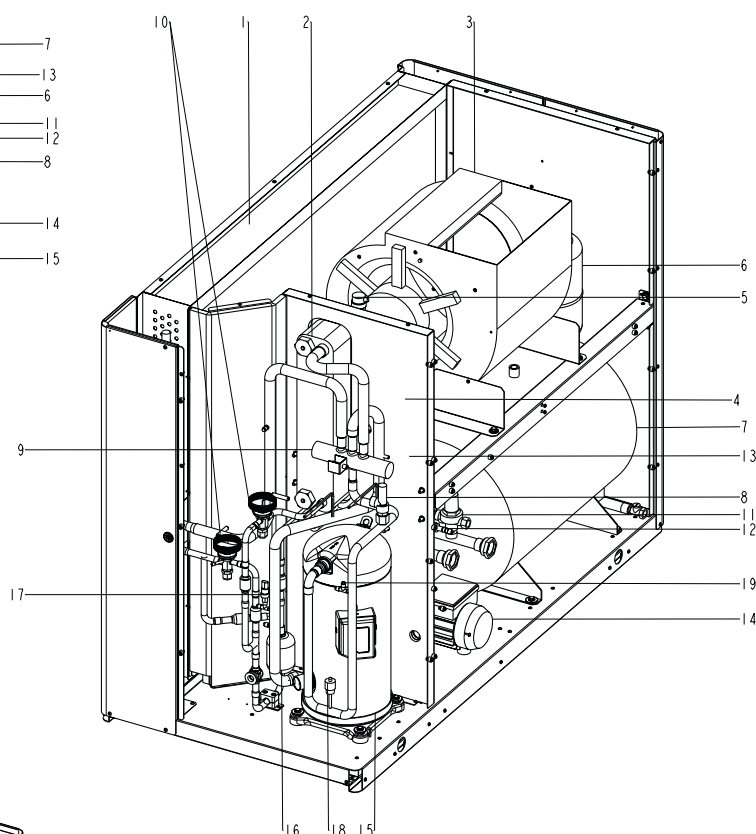


3 COMPONENTS LAY-OUT

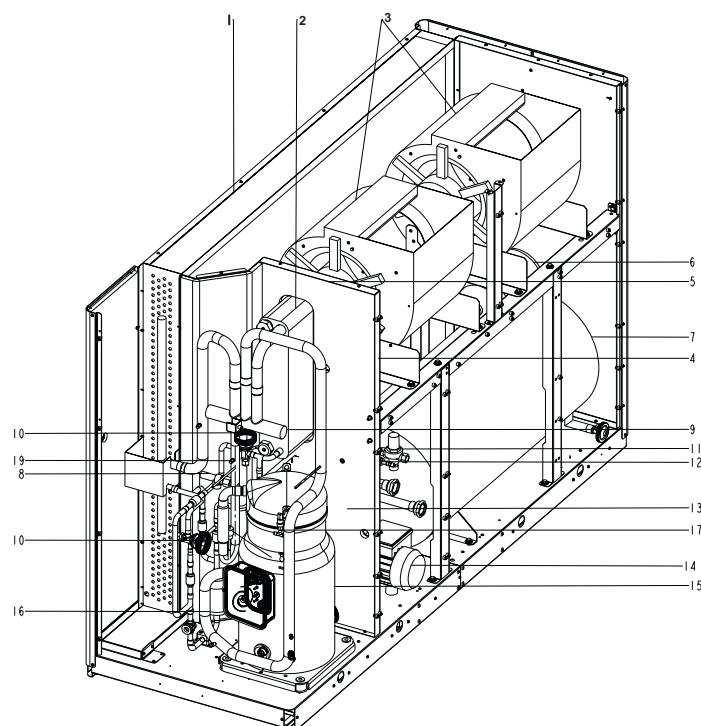
MCC 09 - 15



MCC 18 - 22



MCC 25- 37



Description

1	R410A-air heat-exchangers
2	R410A-water heat-exchanger
3	Fan
4	Water differential pressure switch
5	Air purge valve
6	Expansion vessel
7	Water tank
8	R410A safety valve
9	4-way valve (MCC H)
10	Thermostatic valve
11	Automatic filling device
12	Water safety valve
13	Liquid receiver
14	Pump
15	Compressor
16	Refrigerant filter
17	Low pressure switch and charge port
18	High pressure switch and charge port
19	Port on refrigerant circuit (high)

4 MODELS AND CONFIGURATIONS

The range is made of 10 models cooling only, with cooling capacities from 6 to 37 kW and 10 models heat pump operation with heating capacity from 6 to 41 kW.

To simplify the way of making the order, Galletti offers 3 different solutions of hydraulic kit built in the unit, for only cooling only and heating pumps units.

WATER CHILLER

MCC..CB	basic unit (only evaporator)
MCC..CP	unit with pump and expansion vessel
MCC..CS	unit with buffer tank ,pump and expansion vessel

HEAT PUMP

MCC..HB	basic unit (only evaporator)
MCC..HP	unit with pump and expansion vessel
MCC..HS	unit with buffer tank ,pump and expansion vessel

The choice of some options can prevent the choice of some options or oblige the selection of other fields. To contact the Galletti for verification

Name	M	C	C	0	1	2	C	0	A	A	A	1	S	0	C	S	0	M	0	0	0	0	0
Gives information on the cooling capacity of the standard model							0	1	2														
Typology		C																					
Water chiller		C																					
Heat pump		H																					
Power supply			0																				
400V - 3 - 50 Hz				0																			
400V - 3 - 50 Hz + with thermal-magnetic					2																		
230V - 1 - 50 Hz						M																	
Expansion valve			A																				
Thermostatic				0																			
Electronic				A																			
Water pump					1																		
Not present					0																		
Pump and epansion vessel						1																	
Water storage tank							S																
Not present							0																
Present								S															
Heat recover								0															
Not present									0														
Partial (desuperheater) 20%										D													
Condensing control											C												
Modulating air flow with fan speed control												C											
Antifreeze kit													S										
Not present														0									
Present, standard unit																				E			
Present, unit with pump and tank																					P		
Present, unit with pump, tank and vessel																						S	
Remote control board																						0	
Not present																							0
Simplified																							S
With microprocessor *																							M
Refrigerant circuit options																							M
Not present																							0
Gauges																							M
Remote control																							0
Not present																							0
RS 485 x ERGO (modbus built in)																							2
Special heat exchanger features																							0
Standard																							0
Copper / copper heat exchanger																							R
Cataphoresis																							C
Blygold																							B
Coil special execution																							0
Not present																							0
Protection grille																							R
Metallic filter																							F
Compressor options																							0
Not present																							0
Power factor correction capacitors																							1
Soft starter																							2
Power factor correction capacitors + Soft starter																							3

*To be requested at the moment of the order

Power factor correction capacitors + Soft starter

*To be requested at the moment of the order

5 RATED TECHNICAL DATA

5.1 COOLING ONLY UNITS RATED TECHNICAL DATA

MCC-C		06M	07 M	09 M	6	7	9	12	15	18	22	25	33	37
Power supply	V - ph - Hz	230-1-50			400-3-50									
Cooling capacity	kW	5,70	6,90	9,20	5,70	6,95	9,25	12,00	14,60	18,00	22,30	25,50	33,10	36,70
MCC CB Total power input	kW	2,61	3,18	4,83	2,58	3,04	4,63	5,73	6,43	7,53	8,93	12,05	14,85	16,25
MCC CP CS Total power input	kW	2,75	3,32	5,20	2,72	3,18	5,00	6,10	6,80	7,90	9,30	12,60	15,40	16,80
Maximum power input	kW	4,00	5,00	7,00	4,00	5,00	7,00	9,00	9,00	11,00	13,00	17,00	19,00	21,00
Maximum current absorption	A	17,1	19,1	33,6	7,5	9,5	17,4	19,4	20,4	23,2	25,2	28,4	34,6	38,2
Starting absorbed current	A	61,6	82,6	100,2	32,6	35,6	51,2	67,2	77,2	104,2	114,2	134,6	162,6	199,6
n° of scroll compressors / circuits		1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
Refrigerant charge	kg	2,80	2,90	3,70	2,80	2,90	3,70	3,80	4,80	5,90	7,50	9,70	10,00	11,30
Low/high pressure switch	bar	2 / 42	2 / 42	2 / 42	2 / 42	2 / 42	2 / 42	2 / 42	2 / 42	2 / 42	2 / 42	2 / 42	2 / 42	2 / 42
n° of axial fan		1	1	1	1	1	1	1	1	1	1	2	2	2
Air flow	m³/h	2500	2500	5500	2500	2500	5500	5500	5500	6500	6500	11000	13000	13000
ASEP		91	85	140	91	85	135	130	120	120	110	125	95	90
Water flow	l/s	0,273	0,329	0,439	0,272	0,331	0,442	0,573	0,698	0,860	1,065	1,218	1,582	1,753
Water side pressure drop	"	4,1	4,4	36,0	4,1	4,5	36,4	38,8	56,4	38,3	45,4	47,8	40,9	38,4
Available pressure head	kPa	57,0	55,1	155,1	57,1	55,0	154,6	147,7	125,2	136,0	117,5	123,1	122,7	121,0
Diameter of hydraulic connections	kPa	1	1	1 1/4	1	1	1 1/4	1 1/4	1 1/4	1 1/4	1 1/4	1 1/4	1 1/4	1 1/4
Water content excluding optionals	dm³	2,50	2,80	3,30	2,50	2,80	3,30	3,50	4,10	4,40	5,00	6,10	7,30	7,80
Expansion tank	dm³	1	1	5	1	1	5	5	5	5	5	8	8	8
Buffer tank	dm³	20	20	36	20	20	36	36	36	96	96	155	155	155
Height	mm	1000	1000	1160	1000	1000	1160	1160	1160	1210	1210	1400	1400	1400
Length	mm	1050	1050	1250	1050	1050	1250	1250	1250	1650	1650	2250	2250	2250
Depth	mm	600	600	730	600	600	730	730	730	800	800	800	800	800
Sound power level	dB(A)	70	70	78	70	70	78	78	78	79	79	80	82	82
Sound pressure level	dB(A)	42	42	50	42	42	50	50	50	51	51	52	54	54
Transport weight *	kg	160	165	220	160	165	220	228	240	295	301	405	430	440
Operating weight *	kg	168	178	239	168	178	239	248	260	375	381	546	572	583

5.2 HEAT PUMP UNITS RATED TECHNICAL DATA

MCC-H		06M	07 M	09 M	6	7	9	12	15	18	22	25	33	37
Power supply	V - ph - Hz	230-1-50			400-3-50									
Cooling capacity	kW	5,60	6,75	9,00	5,60	6,80	9,10	11,70	14,30	17,60	21,80	25,00	32,40	35,90
MCC HB Cooling power input	kW	2,61	3,18	4,83	2,58	3,04	4,63	5,73	6,43	7,53	8,93	12,05	14,85	16,25
MCC HP - HS Cooling power input	kW	2,75	3,32	5,20	2,72	3,18	5,00	6,10	6,80	7,90	9,30	12,60	15,40	16,80
Heating capacity	kW	6,40	7,75	10,20	6,40	7,65	9,95	13,10	15,50	19,20	23,80	28,20	36,36	40,56
MCC HB Heating power input	kW	2,86	3,38	5,20	2,94	3,23	4,90	6,10	6,72	7,73	9,23	12,35	15,25	16,75
MCC HP - HS Heating power input	kW	3,00	3,52	5,57	3,08	3,37	5,27	6,47	7,09	8,12	9,57	12,85	15,75	17,25
Maximum power input	kW	4,00	5,00	7,00	4,00	5,00	7,00	9,00	9,00	11,00	13,00	17,00	19,00	21,00
Maximum current absorption	A	17,1	19,1	33,6	7,5	9,5	17,4	19,4	20,4	23,2	25,2	28,4	34,6	38,2
Starting absorbed current	A	61,6	82,6	100,2	32,6	35,6	51,2	67,2	77,2	104,2	114,2	134,6	162,6	199,6
n° of scroll compressor / circuits		1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1
Refrigerant charge	kg	2,7	2,8	3,5	2,7	2,8	3,5	3,6	4,2	5,6	7,3	9,2	10,0	10,7
Low/high pressure switch	bar	2 / 42	2 / 42	2 / 42	2 / 42	2 / 42	2 / 42	2 / 42	2 / 42	2 / 42	2 / 42	2 / 42	2 / 42	2 / 42
n° of axial fan		1	1	1	1	1	1	1	1	1	1	2	2	2
Air flow	m³/h	2500	2500	5500	2500	2500	5500	5500	5500	6500	6500	11000	13000	13000
AESP	Pa	91	85	140	91	85	135	130	120	120	110	125	95	90
Water flow in cooling mode	l/s	0,267	0,323	0,431	0,267	0,325	0,433	0,561	0,684	0,843	1,043	1,194	1,550	1,715
Water flow in heat pump	l/s	0,306	0,369	0,488	0,308	0,365	0,477	0,626	0,743	0,920	1,138	1,349	1,729	1,930
Water pressure drop (cooling)	"	4,0	4,3	34,6	4,0	4,3	34,9	37,2	54,2	36,9	43,7	46,0	39,4	36,8
Water pressure drop (heating)	kPa	5,1	5,4	42,0	5,1	5,4	42,0	46,0	63,0	44,0	51,0	58,0	48,0	46,0
Available pressure head (cooling)	kPa	57,4	55,5	156,7	57,4	55,4	156,4	149,8	128,0	138,2	120,5	125,3	124,9	123,6
Available pressure head (heating)	kPa	55,2	52,9	145,4	55,0	53,2	147,7	138,7	116,2	127,7	106,7	110,6	111,7	108,5
Diameter of hydraulic connections	kPa	1	1	1 1/4	1	1	1 1/4	1 1/4	1 1/4	1 1/4	1 1/4	1 1/4	1 1/4	1 1/4
Water content excluding optionals	dm³	2,50	2,80	3,30	2,50	2,80	3,30	3,50	4,10	4,40	5,00	6,10	7,30	7,80
Expansion tank	dm³	1	1	5	1	1	5	5	5	5	5	8	8	8
Buffer tank	dm³	20	20	36	20	20	36	36	36	96	96	155	155	155
Height	mm	1000	1000	1160	1000	1000	1160	1160	1160	1210	1210	1400	1400	1400
Length	mm	1050	1050	1250	1050	1050	1250	1250	1250	1650	1650	2250	2250	2250
Depth	mm	600	600	730	600	600	730	730	730	800	800	800	800	800
Sound power level	dB(A)	70	70	78	70	70	78	78	78	79	79	80	82	82
Sound pressure level	dB(A)	42	42	50	42	42	50	50	50	51	51	52	54	54
Transport weight *	kg	170	180	240	170	180	240	245	250	310	342	450	475	485
Operating weight *	kg	173	183	260	173	183	260	265	270	388	436	601	627	638

*** Weights referred to version including 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 level measured according to standards ISO 3741 - ISO 3744 and EN 29614-1
- Sound pressure level measured at a distance of 10 m and a height of 1.5 m above the ground in a free 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 MCC-C COOLING OPERATION

T_{bs1}	Inlet air dry bulbe temperature
$T_{w\ in/out}$	Inlet/outlet air temperature
PF	Cooling capacity
PA	Total electric absorbed power models with hydraulic kit (MCC CP / MCC CS)

	T_{bs1}		25		30		35		40		45	
	$T_{w\ in}$	$T_{w\ out}$	PF	PA	PF	PA	PF	PA	PF	PA	PF	PA
	[°C]	[°C]	kW	kW	kW	kW	kW	kW	kW	kW	kW	kW
MCC 06 MC	10	5	6,08	2,31	5,72	2,51	5,34	2,74	4,94	3,01	4,52	3,31
	11	6	6,29	2,31	5,92	2,52	5,52	2,75	5,11	3,02	4,67	3,31
	12	7	6,50	2,32	6,12	2,52	5,71	2,76	5,28	3,02	4,83	3,32
	13	8	6,72	2,32	6,32	2,53	5,90	2,76	5,46	3,03	4,99	3,33
	14	9	6,94	2,33	6,53	2,53	6,09	2,77	5,63	3,04	5,15	3,34
	15	10	7,16	2,34	6,74	2,54	6,29	2,78	5,81	3,04	5,32	3,34
	16	11	7,39	2,34	6,95	2,55	6,49	2,78	6,00	3,05	5,48	3,35
MCC 06 C	10	5	6,08	2,26	5,72	2,47	5,34	2,71	4,94	3,00	4,53	3,32
	11	6	6,29	2,26	5,91	2,47	5,52	2,72	5,11	3,00	4,68	3,32
	12	7	6,50	2,26	6,11	2,47	5,70	2,72	5,28	3,00	4,85	3,32
	13	8	6,72	2,27	6,31	2,48	5,89	2,72	5,46	3,01	5,01	3,32
	14	9	6,94	2,27	6,52	2,48	6,08	2,73	5,64	3,01	5,17	3,33
	15	10	7,16	2,27	6,73	2,49	6,28	2,73	5,82	3,02	5,34	3,33
	16	11	7,39	2,28	6,94	2,49	6,48	2,74	6,00	3,02	5,51	3,34
MCC 07 MC	10	5	7,44	2,70	6,96	2,98	6,46	3,30	5,95	3,66	5,41	4,07
	11	6	7,68	2,71	7,19	2,99	6,68	3,31	6,14	3,67	5,59	4,08
	12	7	7,93	2,72	7,42	3,00	6,89	3,32	6,34	3,69	5,77	4,10
	13	8	8,19	2,73	7,66	3,01	7,12	3,33	6,55	3,70	5,96	4,11
	14	9	8,45	2,74	7,91	3,02	7,34	3,35	6,75	3,71	6,14	4,13
	15	10	8,71	2,75	8,15	3,04	7,57	3,36	6,96	3,73	6,33	4,14
	16	11	8,98	2,77	8,40	3,05	7,80	3,38	7,18	3,75	6,53	4,16
MCC 07 C	10	5	7,76	2,61	7,17	2,86	6,56	3,16	5,90	3,51	5,22	3,89
	11	6	7,98	2,62	7,38	2,87	6,75	3,17	6,08	3,51	5,39	3,90
	12	7	8,19	2,62	7,58	2,88	6,94	3,18	6,26	3,52	5,56	3,91
	13	8	8,40	2,63	7,78	2,89	7,13	3,19	6,44	3,53	5,72	3,92
	14	9	8,61	2,64	7,97	2,90	7,31	3,20	6,61	3,55	5,88	3,93
	15	10	8,81	2,65	8,17	2,92	7,49	3,22	6,78	3,56	6,04	3,94
	16	11	9,01	2,67	8,35	2,93	7,66	3,23	6,94	3,57	6,19	3,95
MCC 09 MC	10	5	9,21	2,68	8,54	2,95	7,84	3,25	7,10	3,59	6,34	3,97
	11	6	9,8	4,5	9,2	4,8	8,6	5,1	8,0	5,5	7,3	5,97
	12	7	10,16	4,55	9,55	4,83	8,90	5,16	8,23	5,55	7,52	5,99
	13	8	10,5	4,56	9,9	4,84	9,2	5,18	8,50	5,57	7,77	6,01
	14	9	10,8	4,57	10,2	4,86	9,5	5,19	8,78	5,59	8,02	6,03
	15	10	11,2	4,58	10,5	4,87	9,8	5,21	9,06	5,61	8,28	6,06
	16	11	11,6	4,60	10,9	4,88	10,1	5,23	9,35	5,63	8,54	6,08
MCC 09 C	10	5	11,9	4,61	11,2	4,90	10,4	5,24	9,64	5,65	8,81	6,10
	11	6	12,3	4,62	11,5	4,91	10,8	5,26	9,94	5,67	9,08	6,13
	12	7	9,9	4,36	9,3	4,64	8,7	4,95	7,99	5,31	7,30	5,71
	13	8	10,3	4,37	9,6	4,65	9,0	4,97	8,26	5,33	7,55	5,73
	14	9	10,6	4,38	9,9	4,66	9,3	4,98	8,54	5,34	7,80	5,74
	15	10	10,9	4,39	10,3	4,68	9,6	5,00	8,82	5,36	8,06	5,77
	16	11	11,3	4,41	10,6	4,69	9,9	5,02	9,11	5,38	8,33	5,79
MCC 12 C	10	5	11,7	4,42	10,9	4,71	10,2	5,03	9,40	5,40	8,59	5,81
	11	6	12,0	4,43	11,3	4,72	10,5	5,05	9,69	5,42	8,87	5,83
	12	7	12,4	4,45	11,6	4,74	10,8	5,07	9,99	5,44	9,14	5,85
	13	8	12,9	5,14	12,1	5,54	11,3	6,02	10,4	6,58	9,41	7,21
	14	9	13,3	5,16	12,5	5,56	11,6	6,05	10,7	6,60	9,72	7,23
	15	10	13,7	5,18	12,9	5,59	12,0	6,07	11,0	6,63	10,03	7,26
	16	11	14,1	5,20	13,3	5,62	12,4	6,10	11,4	6,66	10,3	7,28
	17	12	14,5	5,23	13,7	5,65	12,7	6,13	11,7	6,69	10,7	7,31
	18	13	15,0	5,26	14,1	5,68	13,1	6,17	12,1	6,72	11,0	7,34
	19	14	15,4	5,29	14,4	5,71	13,5	6,20	12,4	6,75	11,3	7,37
	20	15	15,8	5,32	14,9	5,75	13,8	6,24	12,8	6,79	11,7	7,40

6 PERFORMANCES

6.1 MCC-C COOLING OPERATION

Tbs₁	Inlet air dry bulbe temperature
Tw in/out	Inlet/outlet air temperature
PF	Cooling capacity
PA	Total electric absorbed power models with hydraulic kit (MCC CP / MCC CS)

	Tbs ₁		25		30		35		40		45	
	Tw in	Tw out	PF	PA	PF	PA	PF	PA	PF	PA	PF	PA
	[°C]	[°C]	kW	kW	kW	kW	kW	kW	kW	kW	kW	kW
MCC 15 C	10	5	15,7	5,78	14,7	6,21	13,7	6,70	12,6	7,25	11,4	7,85
	11	6	16,2	5,81	15,2	6,25	14,2	6,74	13,0	7,29	11,8	7,89
	12	7	16,7	5,84	15,7	6,28	14,6	6,77	13,5	7,33	12,2	7,94
	13	8	17,2	5,88	16,2	6,32	15,1	6,81	13,9	7,37	12,6	7,98
	14	9	17,8	5,91	16,7	6,35	15,5	6,85	14,3	7,41	13,0	8,03
	15	10	18,3	5,94	17,2	6,39	16,0	6,89	14,7	7,45	13,4	8,07
	16	11	18,8	5,98	17,7	6,43	16,5	6,93	15,2	7,50	13,8	8,12
MCC 18 C	10	5	19,3	6,62	18,1	7,15	16,9	7,76	15,6	8,46	14,2	9,23
	11	6	19,9	6,66	18,7	7,20	17,4	7,81	16,1	8,51	14,7	9,29
	12	7	20,5	6,71	19,3	7,25	18,0	7,87	16,6	8,57	15,2	9,35
	13	8	21,2	6,76	19,9	7,30	18,6	7,92	17,2	8,63	15,7	9,41
	14	9	21,8	6,81	20,5	7,35	19,1	7,98	17,7	8,69	16,2	9,47
	15	10	22,5	6,86	21,2	7,41	19,7	8,04	18,2	8,75	16,7	9,54
	16	11	23,2	6,91	21,8	7,46	20,3	8,10	18,8	8,81	17,2	9,61
MCC 22 C	10	5	24,0	7,78	22,6	8,43	21,0	9,20	19,3	10,06	17,5	11,0
	11	6	24,8	7,83	23,3	8,49	21,6	9,26	19,9	10,13	18,1	11,1
	12	7	25,6	7,89	24,0	8,55	22,3	9,32	20,5	10,19	18,7	11,2
	13	8	26,3	7,95	24,7	8,62	23,0	9,39	21,2	10,3	19,3	11,2
	14	9	27,1	8,01	25,4	8,68	23,6	9,46	21,8	10,3	19,9	11,3
	15	10	27,9	8,08	26,1	8,76	24,3	9,54	22,4	10,4	20,5	11,4
	16	11	28,7	8,15	26,9	8,83	25,0	9,62	23,1	10,5	21,1	11,5
MCC 25 C	10	5	27,4	10,92	25,8	11,6	24,0	12,5	22,0	13,4	19,9	14,5
	11	6	28,3	10,98	26,6	11,7	24,7	12,6	22,7	13,5	20,5	14,6
	12	7	29,2	11,04	27,4	11,8	25,5	12,6	23,4	13,6	21,1	14,6
	13	8	30,1	11,11	28,3	11,9	26,3	12,7	24,1	13,7	21,8	14,7
	14	9	31,1	11,17	29,2	11,9	27,1	12,8	24,8	13,7	22,4	14,8
	15	10	32,0	11,24	30,1	12,0	27,9	12,9	25,6	13,8	23,0	14,9
	16	11	33,0	11,32	31,0	12,1	28,7	12,9	26,3	13,9	23,7	15,0
MCC 33 C	10	5	35,6	13,2	33,4	14,1	31,1	15,2	28,6	16,5	25,8	17,8
	11	6	36,8	13,3	34,5	14,2	32,1	15,3	29,5	16,6	26,6	17,9
	12	7	37,9	13,3	35,6	14,3	33,1	15,4	30,4	16,7	27,4	18,0
	13	8	39,1	13,4	36,7	14,4	34,1	15,5	31,3	16,8	28,2	18,2
	14	9	40,4	13,5	37,9	14,5	35,2	15,6	32,2	16,9	29,1	18,3
	15	10	41,6	13,6	39,0	14,6	36,2	15,8	33,2	17,0	29,9	18,4
	16	11	42,9	13,7	40,2	14,7	37,3	15,9	34,1	17,1	30,7	18,5
MCC 37 C	10	5	44,1	13,8	41,4	14,8	38,3	16,0	35,1	17,2	31,6	18,6
	11	6	45,0	14,6	42,1	15,7	39,0	17,0	35,7	18,5	32,3	20,1
	12	7	42,3	14,5	39,6	15,6	36,7	16,8	33,6	18,3	30,4	19,8
	13	8	43,6	14,5	40,8	15,7	37,9	16,9	34,7	18,4	31,3	19,9
	14	9	44,1	14,8	41,4	15,9	38,3	17,2	35,1	18,8	31,6	20,4
	15	10	46,4	14,7	43,4	15,8	40,2	17,1	36,8	18,6	33,2	20,2
	16	11	47,8	14,8	44,7	15,9	41,4	17,2	37,9	18,7	34,2	20,3

6 PERFORMANCES

6.2 MCC-H COOLING OPERATION

T_{bs1}	Inlet air dry bulbe temperature
$T_{w \text{ in/out}}$	Inlet/outlet air temperature
PF	Cooling capacity
PA	Total electric absorbed power models with hydraulic kit (MCC HP / MCC HS)

	T_{bs1}		25		30		35		40		45	
	$T_{w \text{ in}}$	$T_{w \text{ out}}$	PF	PA	PF	PA	PF	PA	PF	PA	PF	PA
	[°C]	[°C]	kW	kW	kW	kW	kW	kW	kW	kW	kW	kW
MCC 06 MH	10	5	5,64	2,49	5,61	2,51	5,24	2,74	4,84	3,01	4,43	3,31
	11	6	5,85	2,49	5,80	2,52	5,41	2,75	5,01	3,02	4,58	3,31
	12	7	6,07	2,48	5,99	2,52	5,60	2,76	5,18	3,02	4,73	3,32
	13	8	6,30	2,47	6,19	2,53	5,78	2,76	5,35	3,03	4,89	3,33
	14	9	6,53	2,46	6,40	2,53	5,97	2,77	5,52	3,04	5,05	3,34
	15	10	6,77	2,46	6,60	2,54	6,16	2,78	5,70	3,04	5,21	3,34
	16	11	7,01	2,45	6,81	2,55	6,36	2,78	5,88	3,05	5,37	3,35
MCC 06 H	17	12	7,27	2,44	7,03	2,56	6,56	2,79	6,06	3,06	5,54	3,36
	10	5	5,64	2,45	5,61	2,47	5,24	2,71	4,85	3,00	4,44	3,32
	11	6	5,85	2,44	5,80	2,47	5,41	2,72	5,01	3,00	4,60	3,32
	12	7	6,07	2,43	6,00	2,47	5,60	2,72	5,18	3,00	4,75	3,32
	13	8	6,30	2,42	6,19	2,48	5,78	2,72	5,35	3,01	4,91	3,32
	14	9	6,53	2,41	6,40	2,48	5,97	2,73	5,53	3,01	5,08	3,33
	15	10	6,77	2,40	6,60	2,49	6,16	2,74	5,71	3,02	5,24	3,33
MCC 07 MH	16	11	7,02	2,39	6,81	2,49	6,36	2,74	5,89	3,02	5,41	3,34
	17	12	7,27	2,38	7,03	2,50	6,56	2,75	6,08	3,03	5,58	3,34
	10	5	7,04	2,85	6,82	2,98	6,33	3,30	5,83	3,66	5,31	4,07
	11	6	7,30	2,84	7,05	2,99	6,54	3,31	6,02	3,67	5,48	4,08
	12	7	7,58	2,83	7,28	3,00	6,76	3,32	6,22	3,69	5,66	4,10
	13	8	7,86	2,82	7,51	3,01	6,97	3,33	6,42	3,70	5,84	4,11
	14	9	8,15	2,81	7,75	3,02	7,19	3,35	6,62	3,71	6,02	4,13
MCC 07 H	15	10	8,45	2,80	7,99	3,04	7,42	3,36	6,82	3,73	6,21	4,14
	16	11	8,75	2,79	8,24	3,05	7,65	3,38	7,03	3,75	6,40	4,16
	17	12	9,07	2,78	8,49	3,07	7,88	3,39	7,25	3,77	6,59	4,18
	10	5	7,30	2,74	7,03	2,86	6,42	3,16	5,78	3,51	5,11	3,89
	11	6	7,54	2,73	7,23	2,87	6,61	3,17	5,96	3,51	5,28	3,90
	12	7	7,79	2,72	7,43	2,88	6,80	3,18	6,14	3,52	5,44	3,91
	13	8	8,04	2,71	7,62	2,89	6,98	3,19	6,31	3,53	5,61	3,92
MCC 09 MH	14	9	8,29	2,70	7,82	2,90	7,16	3,20	6,48	3,55	5,77	3,93
	15	10	8,53	2,70	8,00	2,92	7,34	3,22	6,64	3,56	5,92	3,94
	16	11	8,78	2,69	8,19	2,93	7,51	3,23	6,81	3,57	6,07	3,95
	17	12	9,02	2,68	8,37	2,95	7,68	3,25	6,96	3,59	6,21	3,97
	10	5	9,10	4,79	9,05	4,82	8,44	5,15	7,80	5,53	7,13	5,97
	11	6	9,44	4,79	9,36	4,83	8,72	5,16	8,06	5,55	7,37	5,99
	12	7	9,80	4,78	9,67	4,84	9,01	5,18	8,33	5,57	7,61	6,01
MCC 09 H	13	8	10,16	4,78	9,99	4,86	9,31	5,19	8,60	5,59	7,86	6,03
	14	9	10,5	4,77	10,3	4,87	9,61	5,21	8,88	5,61	8,12	6,06
	15	10	10,9	4,76	10,6	4,88	9,91	5,23	9,16	5,63	8,37	6,08
	16	11	11,3	4,76	11,0	4,90	10,23	5,24	9,45	5,65	8,63	6,10
	17	12	11,7	4,75	11,3	4,91	10,5	5,26	9,74	5,67	8,90	6,13
	10	5	9,2	4,61	9,2	4,64	8,52	4,95	7,86	5,31	7,18	5,71
	11	6	9,6	4,61	9,5	4,65	8,81	4,97	8,13	5,33	7,42	5,73
MCC 12 H	12	7	9,9	4,60	9,8	4,66	9,10	4,98	8,40	5,34	7,67	5,75
	13	8	10,3	4,60	10,1	4,68	9,40	5,00	8,67	5,36	7,93	5,77
	14	9	10,7	4,59	10,4	4,69	9,70	5,02	8,96	5,38	8,19	5,79
	15	10	11,0	4,59	10,7	4,71	10,01	5,03	9,24	5,40	8,45	5,81
	16	11	11,4	4,58	11,1	4,72	10,32	5,05	9,53	5,42	8,72	5,83
	17	12	11,8	4,58	11,4	4,74	10,6	5,07	9,83	5,44	8,99	5,85
	10	5	11,6	4,70	11,6	4,70	10,9	5,13	10,0	5,69	9,07	6,34
MCC 12 H	11	6	12,0	4,69	12,1	4,66	11,3	5,11	10,4	5,68	9,36	6,36
	12	7	12,4	4,69	12,5	4,65	11,9	5,10	10,8	5,70	9,66	6,39
	13	8	12,8	4,68	12,9	4,68	12,0	5,17	11,1	5,73	9,97	6,41
	14	9	13,3	4,68	13,2	4,74	12,3	5,24	11,3	5,81	10,3	6,44
	15	10	13,6	4,71	13,4	4,81	12,5	5,31	11,5	5,88	10,5	6,52
	16	11	14,1	4,70	13,8	4,85	12,8	5,35	11,8	5,92	10,8	6,55
	17	12	14,5	4,70	14,2	4,89	13,2	5,39	12,2	5,96	11,1	6,59

6 PERFORMANCES

6.2 MCC-H COOLING OPERATION

Tbs ₁	Inlet air dry bulbe temperature
Tw in/out	Inlet/outlet air temperature
PF	Cooling capacity
PA	Total electric absorbed power models with hydraulic kit (MCC HP / MCC HS)

	Tbs ₁		25		30		35		40		45	
	Tw in	Tw out	PF	PA	PF	PA	PF	PA	PF	PA	PF	PA
	[°C]	[°C]	kW	kW	kW	kW	kW	kW	kW	kW	kW	kW
MCC 15 H	10	5	14,5	5,12	14,1	5,32	13,1	5,82	12,1	6,38	10,9	6,99
	11	6	15,0	5,12	14,7	5,32	13,7	5,81	12,6	6,37	11,3	7,04
	12	7	15,6	5,12	15,2	5,35	14,3	5,80	13,0	6,41	11,7	7,08
	13	8	16,1	5,12	15,6	5,39	14,5	5,89	13,4	6,45	12,1	7,12
	14	9	16,7	5,12	15,9	5,46	14,8	5,97	13,7	6,54	12,4	7,17
	15	10	17,1	5,16	16,2	5,54	15,1	6,06	13,9	6,64	12,7	7,28
	16	11	17,7	5,16	16,7	5,58	15,6	6,10	14,4	6,68	13,1	7,32
MCC 18 H	17	12	18,3	5,16	17,2	5,62	16,0	6,15	14,8	6,73	13,5	7,37
	10	5	17,8	6,63	17,3	6,89	16,1	7,52	14,9	8,23	13,6	9,02
	11	6	18,5	6,64	18,1	6,89	16,8	7,52	15,5	8,22	14,1	9,08
	12	7	19,2	6,65	18,6	6,94	17,6	7,51	16,0	8,28	14,5	9,14
	13	8	19,9	6,66	19,2	6,99	17,9	7,62	16,6	8,34	15,0	9,20
	14	9	20,6	6,67	19,6	7,10	18,3	7,74	16,9	8,46	15,4	9,27
	15	10	21,1	6,73	20,0	7,20	18,7	7,85	17,3	8,59	15,8	9,41
MCC 22 H	16	11	21,8	6,74	20,6	7,26	19,2	7,92	17,8	8,65	16,2	9,47
	17	12	22,6	6,75	21,3	7,32	19,8	7,98	18,3	8,72	16,7	9,55
	10	5	22,6	7,72	21,6	8,23	20,0	9,01	18,4	9,90	16,7	10,9
	11	6	23,4	7,72	22,4	8,23	20,9	9,00	19,2	9,89	17,3	11,0
	12	7	24,3	7,73	23,1	8,29	21,8	9,00	19,8	9,95	17,9	11,0
	13	8	25,1	7,74	23,8	8,35	22,2	9,14	20,4	10,0	18,4	11,1
	14	9	25,9	7,79	24,3	8,49	22,6	9,28	20,8	10,2	19,0	11,2
MCC 25 H	15	10	26,4	7,92	24,7	8,63	23,0	9,43	21,2	10,3	19,4	11,4
	16	11	27,1	7,99	25,4	8,71	23,6	9,52	21,8	10,4	19,9	11,4
	17	12	27,9	8,07	26,1	8,79	24,3	9,61	22,4	10,5	20,5	11,5
	10	5	25,5	9,62	24,6	10,0	22,9	10,9	21,0	11,9	19,0	12,9
	11	6	26,5	9,63	25,7	10,0	23,9	10,9	21,9	11,8	19,6	13,0
	12	7	27,4	9,64	26,5	10,1	25,0	10,9	22,6	11,9	20,2	13,1
	13	8	28,4	9,65	27,3	10,2	25,4	11,0	23,3	12,0	20,8	13,2
MCC 33 H	14	9	29,5	9,66	27,9	10,3	25,9	11,2	23,7	12,2	21,4	13,3
	15	10	30,2	9,74	28,4	10,5	26,4	11,4	24,2	12,4	21,8	13,5
	16	11	31,2	9,78	29,3	10,6	27,2	11,4	24,9	12,5	22,4	13,6
	17	12	32,1	9,85	30,1	10,6	27,9	11,5	25,6	12,5	23,0	13,7
	10	5	33,1	13,2	32,0	13,8	29,7	14,9	27,3	16,2	24,7	17,5
	11	6	34,3	13,2	33,3	13,8	31,0	14,9	28,4	16,1	25,4	17,6
	12	7	35,6	13,3	34,4	13,9	32,4	14,9	29,3	16,2	26,2	17,8
MCC 37 H	13	8	36,9	13,3	35,5	14,0	32,9	15,1	30,2	16,4	27,0	17,9
	14	9	38,2	13,3	36,2	14,2	33,6	15,3	30,8	16,6	27,8	18,0
	15	10	39,2	13,4	36,9	14,4	34,2	15,5	31,4	16,8	28,3	18,2
	16	11	40,5	13,4	38,0	14,5	35,2	15,7	32,3	17,0	29,1	18,4
	17	12	41,7	13,5	39,1	14,6	36,3	15,8	33,2	17,1	29,8	18,5
	10	5	36,8	14,4	35,5	15,1	32,9	16,4	30,2	17,8	27,3	19,4
	11	6	38,2	14,4	37,0	15,0	34,3	16,3	31,5	17,7	28,2	19,5
MCC 37 H	12	7	39,6	14,4	38,2	15,1	36,0	16,3	32,5	17,8	29,0	19,6
	13	8	41,1	14,4	39,4	15,2	36,5	16,5	33,5	17,9	29,9	19,7
	14	9	42,6	14,4	40,3	15,4	37,3	16,7	34,2	18,2	30,8	19,8
	15	10	43,7	14,5	41,1	15,6	38,0	17,0	34,8	18,5	31,4	20,1
	16	11	45,2	14,5	42,3	15,7	39,2	17,1	35,8	18,6	32,3	20,2
	17	12	46,6	14,6	43,6	15,8	40,3	17,2	36,9	18,7	33,2	20,4

6 PERFORMANCES

6.3 MCC H HEATING OPERATION

Tbs₁	Inlet air dry bulbe temperature
Tw in/out	Inlet/outlet air temperature
PT	Heating capacity
PA	Total electric absorbed power models with hydraulic kit (MCC HP / MCC HS)
RH	Relative umidity

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.

	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
MCC 06 HM	25	30	4,29	2,36	5,43	2,33	6,92	2,31	8,05	2,30	8,31	2,30
	30	35	4,24	2,57	5,33	2,54	6,74	2,51	7,80	2,50	8,05	2,50
	35	40	4,21	2,82	5,24	2,77	6,57	2,74	7,56	2,73	7,80	2,73
	40	45	4,19	3,09	5,16	3,04	6,40	3,01	7,32	2,99	7,54	2,99
	45	50	4,18	3,39	5,10	3,35	6,23	3,30	7,09	3,29	7,29	3,28
MCC 06 H	25	30	4,31	2,42	5,41	2,35	6,87	2,31	7,97	2,30	8,23	2,29
	30	35	4,31	2,67	5,34	2,58	6,70	2,53	7,74	2,51	7,98	2,51
	35	40	4,33	2,96	5,28	2,86	6,54	2,79	7,52	2,76	7,74	2,76
	40	45	4,36	3,29	5,23	3,17	6,40	3,08	7,31	3,05	7,52	3,04
	45	50	4,41	3,65	5,20	3,52	6,28	3,42	7,12	3,37	7,32	3,37
MCC 07 HM	25	30	5,15	2,67	6,57	2,64	8,38	2,62	9,74	2,61	10,06	2,61
	30	35	5,11	2,95	6,45	2,91	8,15	2,87	9,44	2,86	9,74	2,86
	35	40	5,08	3,26	6,35	3,22	7,94	3,18	9,15	3,16	9,43	3,16
	40	45	5,07	3,61	6,27	3,57	7,75	3,53	8,87	3,51	9,13	3,51
	45	50	5,09	4,00	6,21	3,96	7,58	3,92	8,61	3,90	8,85	3,90
MCC 07 H	25	30	5,11	2,60	6,81	2,56	8,72	2,52	9,96	2,51	10,2	2,51
	30	35	4,91	2,85	6,54	2,80	8,36	2,76	9,54	2,75	9,80	2,75
	35	40	4,71	3,14	6,26	3,09	8,00	3,04	9,13	3,03	9,37	3,02
	40	45	4,49	3,47	5,98	3,43	7,65	3,37	8,72	3,35	8,95	3,34
	45	50	4,27	3,84	5,71	3,81	7,29	3,74	8,30	3,71	8,52	3,70
MCC 09 HM	25	30	6,72	4,54	8,98	4,56	11,2	4,58	12,6	4,58	13,6	4,59
	30	35	6,60	4,82	8,76	4,84	10,8	4,85	12,1	4,87	13,1	4,87
	35	40	6,48	5,13	8,55	5,16	10,5	5,19	11,7	5,20	12,6	5,21
	40	45	6,37	5,47	8,36	5,53	10,2	5,57	11,3	5,60	12,2	5,61
	45	50	6,26	5,83	8,18	5,95	9,91	6,02	11,0	6,04	11,7	6,06
MCC 09 H	25	30	6,66	4,30	8,93	4,33	11,1	4,34	12,5	4,35	13,5	4,36
	30	35	6,49	4,56	8,66	4,59	10,7	4,61	12,0	4,62	13,0	4,64
	35	40	6,36	4,85	8,40	4,89	10,4	4,92	11,6	4,94	12,5	4,95
	40	45	6,26	5,17	8,16	5,23	10,00	5,27	11,2	5,30	12,0	5,31
	45	50	6,19	5,53	7,94	5,61	9,65	5,66	10,7	5,69	11,5	5,71
MCC 12 H	25	30	8,82	5,03	11,6	5,04	14,3	5,07	16,0	5,09	17,2	5,12
	30	35	8,69	5,44	11,4	5,44	13,9	5,46	15,5	5,48	16,6	5,51
	35	40	8,60	5,92	11,1	5,92	13,5	5,93	15,0	5,95	16,1	5,98
	40	45	8,53	6,47	10,9	6,47	13,1	6,47	14,5	6,49	15,5	6,51
	45	50	8,50	7,10	10,6	7,11	12,7	7,10	14,0	7,11	14,9	7,12

6 PERFORMANCES

6.3 MCC H HEATING OPERATION

Tbs₁	Inlet air dry bulbe temperature
Tw in/out	Inlet/outlet air temperature
PT	Heating capacity
PA	Total electric absorbed power models with hydraulic kit (MCC HP / MCC HS)
RH	Relativeumidity

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.

	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
MCC 15 H	25	30	10,35	5,49	13,9	5,59	17,2	5,67	19,4	5,73	20,9	5,78
	30	35	10,03	5,89	13,4	5,99	16,7	6,09	18,7	6,15	20,1	6,20
	35	40	9,69	6,33	13,0	6,45	16,1	6,56	18,0	6,63	19,4	6,68
	40	45	9,33	6,81	12,5	6,97	15,5	7,09	17,3	7,17	18,6	7,22
	45	50	8,95	7,33	12,0	7,54	14,9	7,68	16,6	7,76	17,8	7,82
MCC 18 H	25	30	12,7	6,11	17,1	6,25	21,2	6,38	23,8	6,47	25,7	6,54
	30	35	12,4	6,61	16,6	6,75	20,5	6,88	23,1	6,97	24,9	7,04
	35	40	12,1	7,17	16,1	7,32	19,9	7,46	22,3	7,55	24,0	7,62
	40	45	11,8	7,79	15,6	7,97	19,2	8,12	21,5	8,22	23,1	8,29
	45	50	11,6	8,46	15,2	8,69	18,6	8,86	20,7	8,96	22,2	9,03
MCC 22 H	25	30	15,7	7,27	21,1	7,34	26,3	7,44	29,5	7,53	31,8	7,61
	30	35	15,2	7,89	20,5	7,95	25,5	8,04	28,5	8,13	30,7	8,21
	35	40	14,8	8,61	19,9	8,67	24,7	8,75	27,5	8,84	29,6	8,92
	40	45	14,3	9,43	19,3	9,50	23,8	9,57	26,6	9,65	28,5	9,72
	45	50	13,7	10,34	18,6	10,4	23,0	10,5	25,6	10,6	27,4	10,6
MCC 25 H	25	30	18,7	10,12	25,0	10,33	31,2	10,51	35,1	10,64	37,9	10,73
	30	35	18,3	10,80	24,4	11,00	30,3	11,19	34,0	11,31	36,6	11,40
	35	40	17,9	11,55	23,7	11,8	29,3	12,0	32,7	12,1	35,2	12,2
	40	45	17,6	12,4	23,0	12,6	28,2	12,9	31,5	13,0	33,8	13,1
	45	50	17,3	13,3	22,3	13,6	27,1	13,8	30,1	14,0	32,2	14,1
MCC 33 H	25	30	24,0	12,1	32,2	12,4	40,1	12,7	45,2	12,8	48,8	12,9
	30	35	23,5	13,0	31,3	13,3	39,0	13,6	43,7	13,7	47,2	13,8
	35	40	23,1	14,0	30,5	14,3	37,7	14,6	42,2	14,8	45,4	14,9
	40	45	22,7	15,1	29,7	15,5	36,4	15,7	40,6	15,9	43,6	16,1
	45	50	22,4	16,3	28,8	16,7	35,0	17,0	38,8	17,2	41,6	17,4
MCC 37 H	25	30	27,4	13,6	36,3	13,6	45,1	13,8	50,7	13,8	54,8	13,9
	30	35	26,6	14,7	35,2	14,7	43,6	14,8	49,0	14,9	52,8	14,9
	35	40	26,0	15,9	34,1	15,8	42,1	15,9	47,1	16,0	50,8	16,1
	40	45	25,6	17,2	33,1	17,1	40,6	17,3	45,3	17,4	48,7	17,5
	45	50	25,3	18,6	32,2	18,6	39,0	18,7	43,3	18,8	46,5	18,9

7 OPERATING LIMITS

Supply voltage: $\pm 10\%$ of rated voltage.

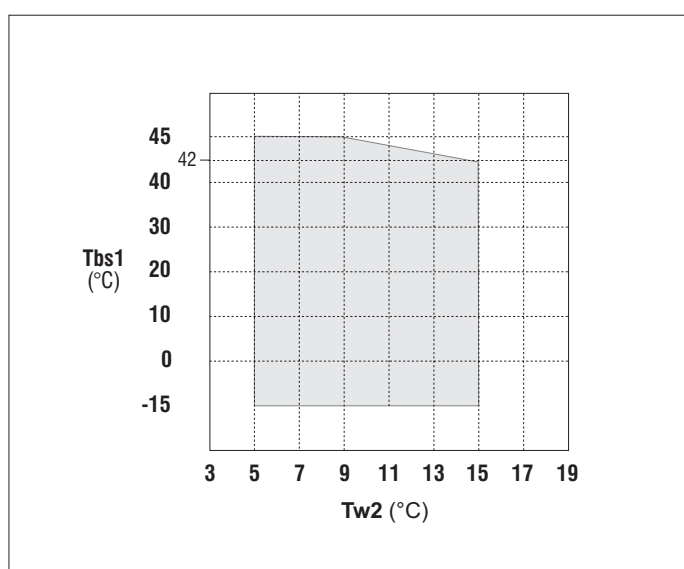
The operating limits shown in the diagrams are valid for thermal differentials of water between 3 and 8°C

Legend:

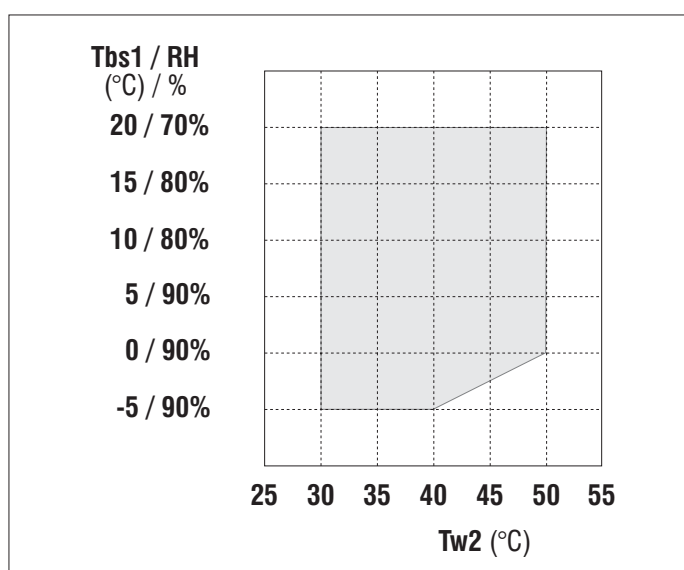
RH Relative humidity of outdoor air
Tbs₁ Outdoor temperature (dry bulb)
Tw₂ Outlet water temperature

7.1 COOLING MODE

In order to work with outdoor temperatures below 20 °C it is essential to install a condensation control device. The control works by modulating the fan speed with a potentiometer and allows the unit to operated in the cooling mode with outdoor temperatures (Tbs1) as low as -15 °C

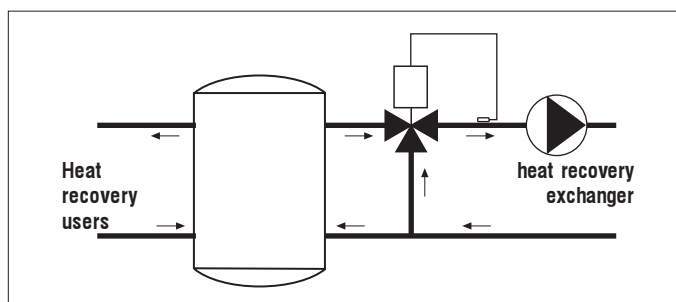


7.2 HEATING MODE



8 HEAT RECOVERY OPTIONS

In air-conditioning applications it is useful and often indispensable to have heat available for heating sanitary water or controlling post-heating in air-handling units where independent temperature and humidity control is required. All the units belonging to the MCC-C series can be equipped (on request) with a desuperheater for recovering heating power corresponding to 20% of the available heating capacity. To prevent unbalances from occurring in the cooling circuit in the event of start-ups with very low water temperatures at the recuperator inlet, the recovery system water circuit should be configured as shown in the figure.



A low recuperator inlet water temperature would cause low condensation temperatures and thus an insufficient pressure differential on the expansion valve with the consequent risk of tripping the safety devices.

The sensor of the 3-way mixing valve should be situated at the recuperator inlet and mixing the hot water produced with colder water from the inertial storage reservoir makes it possible to bring the system to optimal operating conditions in a few instants. Given that the demand for heat and the availability of heat do not coincide, since the latter is dependent on the compressors running, it is essential to install an inertial storage reservoir between the unit and the user.

9 CALCULATION FACTORS

9.1 WATER TEMPERATURE DROP/RISE DIFFERENT THAN 5°C

Find the performances of the unit as a function of the water outlet temperature and multiply them with the factor reported in the table below.

ΔT_w	$C_{PF/PT}$	C_{PA}	C_{Qw}	$C_{\Delta p w1}$
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

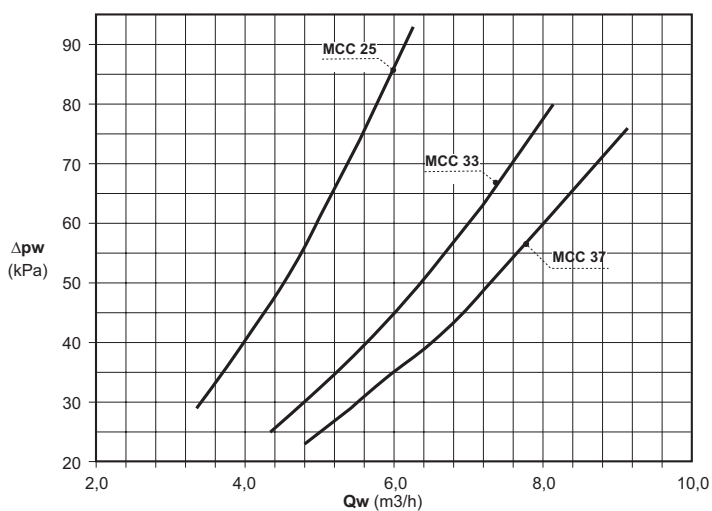
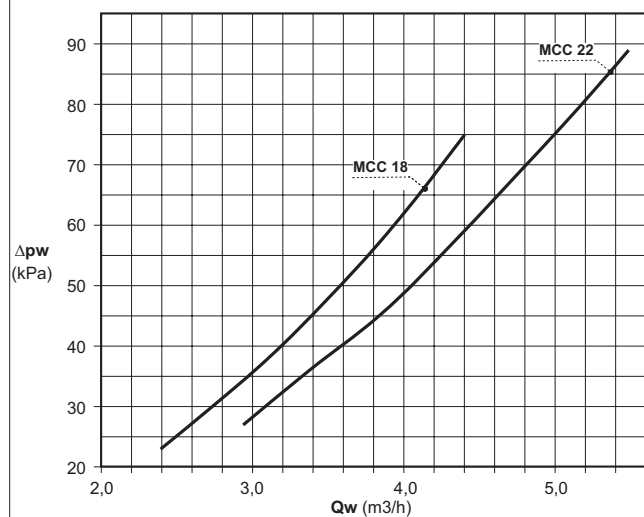
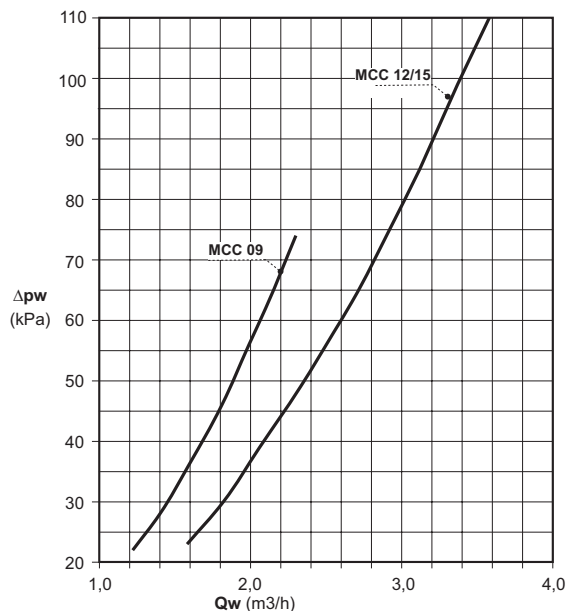
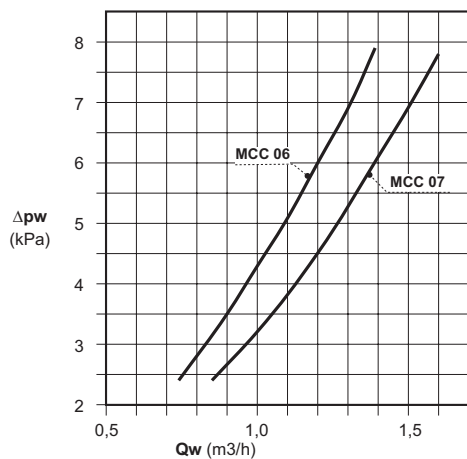
9.2 GLYCOLAND WATER SOLUTION

With the minimum water outlet temperature find the glycol percentage and the calculation factors using the table below..

Percentage of glycol	0%	10%	20%	30%	40%
Minimum water outlet temperature	5°C	2°C	-5°C	-10°C	-15°C
Mixture freezing temperature	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 correction factor	1,000	1,047	1,094	1,140	1,199
Water pressure drop correction factor	1,000	1,157	1,352	1,585	1,860

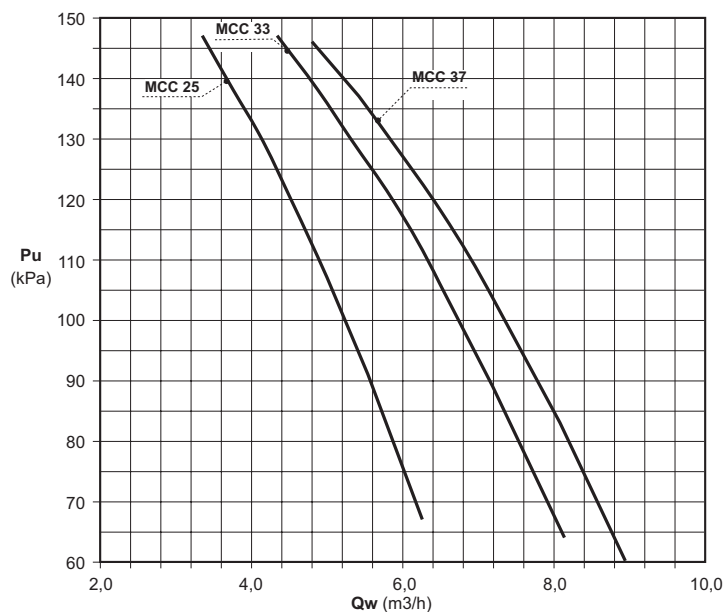
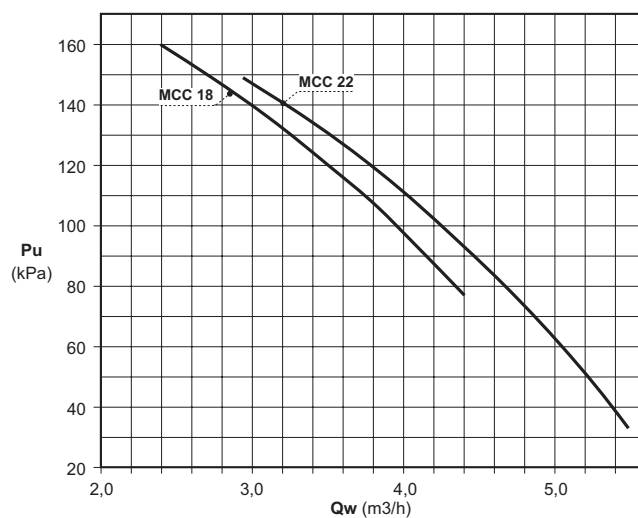
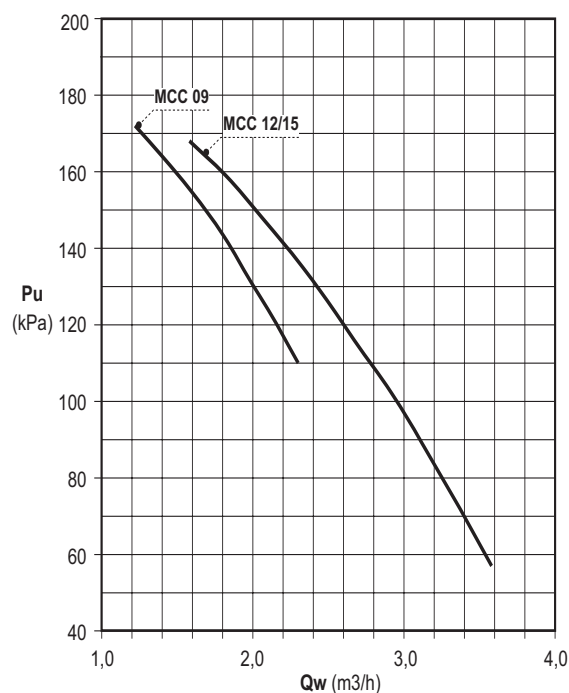
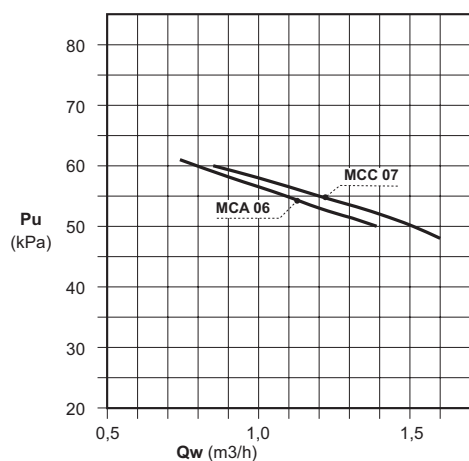
10 PRESSURE DROP ON WATER SIDE

The following diagrams show evaporator pressure drops (Δp_w) according to water flow rate (Q_w) with average water temperature of 10°C.



11 UNIT AVAILABLE PRESSURE HEAD

The following diagrams show available unit pressure head (P_u) according to water flow rate (Q_w) with average water temperature of 10°C.



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 (incoming pipes), with a mesh not to exceed 1 mm, 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 inertial storage reservoir: this operation may only be carried out when the unit is disconnected from the power supply).

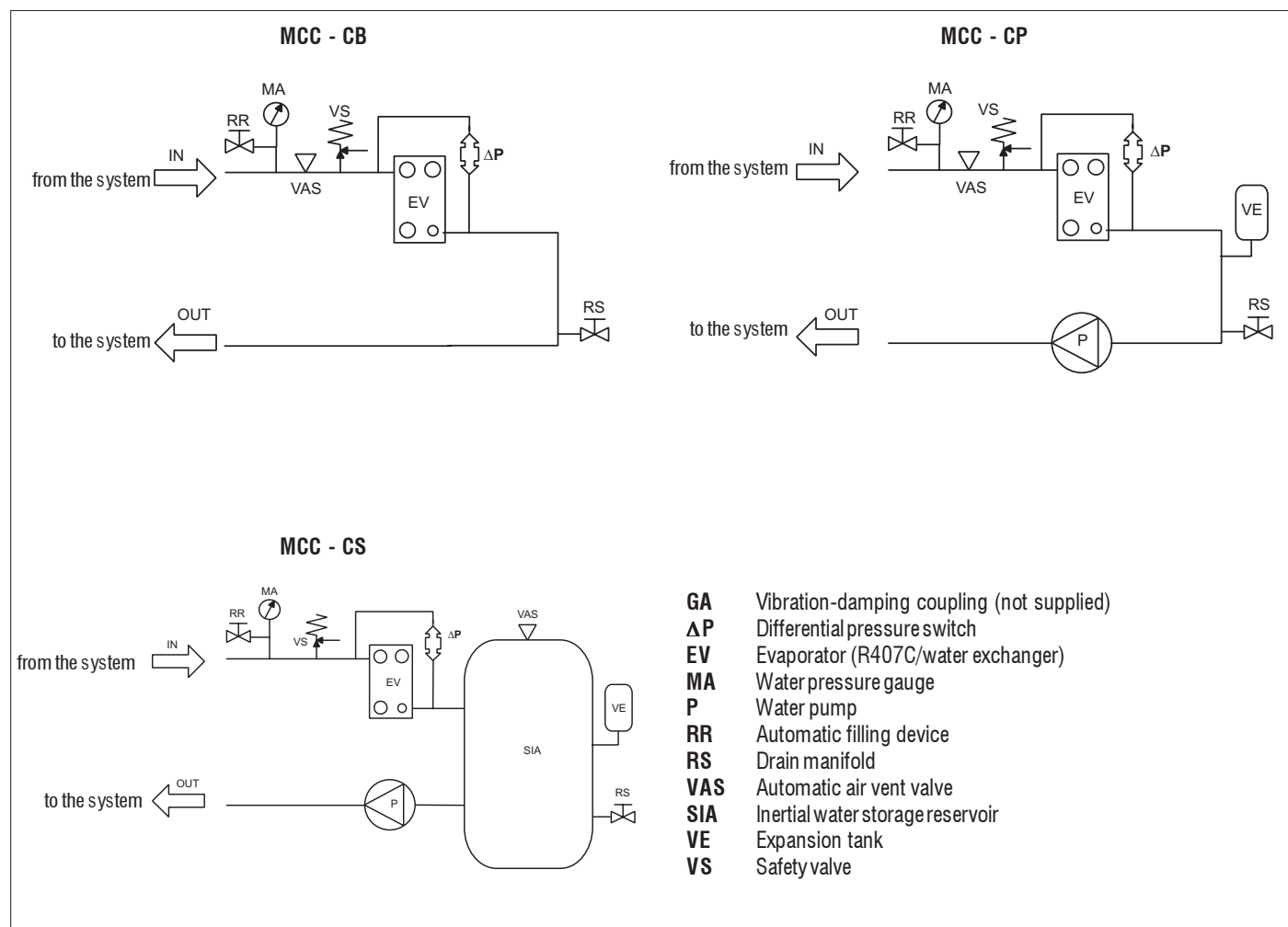
It is of fundamental importance that the incoming water supply is hooked up to the connection marked "Water Inlet"

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 back 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 MCC 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.

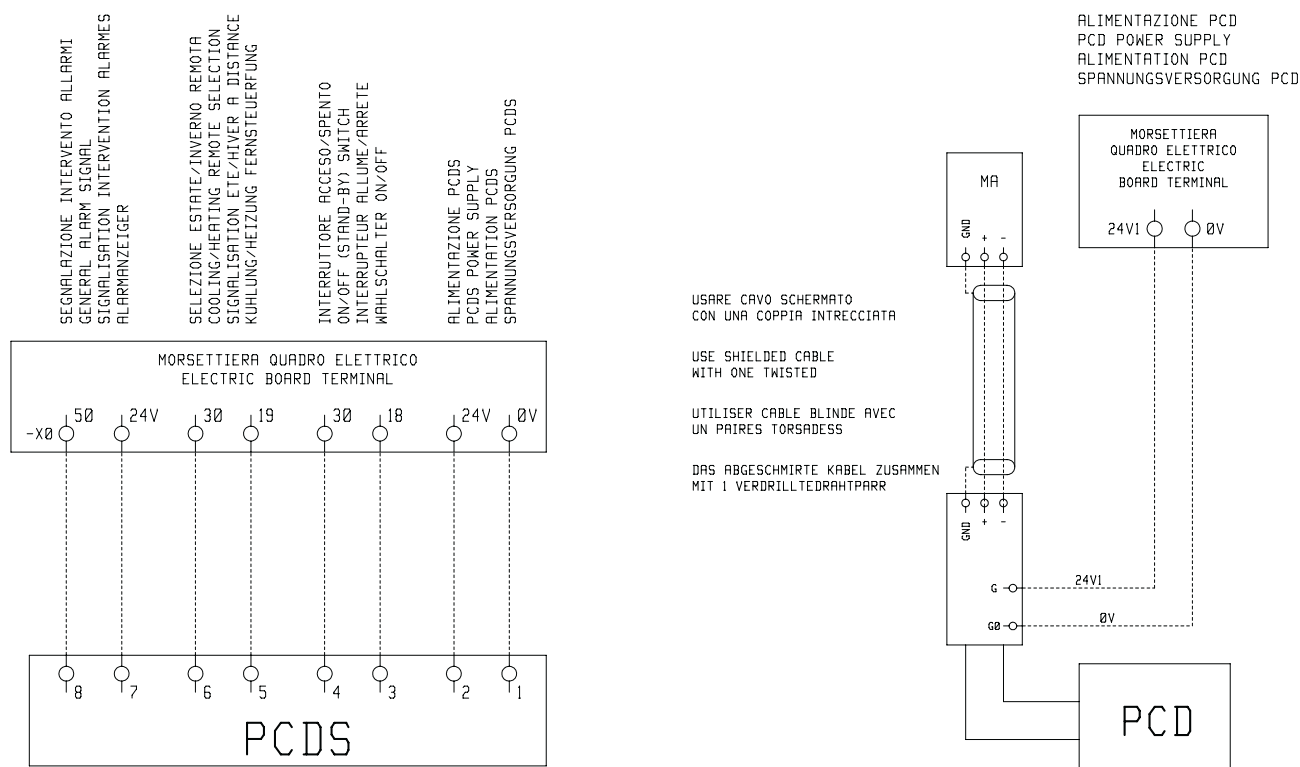


13 ELECTRICAL DATA

MCC		6 M	7 M	9 M	6	7	9	12	15	18	22	25	33	37
Unit power supply	V/f/Hz	230 / 1 / 50			400 / 3 / 50									
Max power input	kW	4,0	5,0	7,0	4,0	5,0	7,0	9,0	9,0	11,0	13,0	17,0	19,0	21,0
Max current absorbed	A	17,1	19,1	33,6	7,5	9,5	17,4	19,4	20,4	23,2	25,2	28,4	34,6	38,2
Starting ampere	A													
Fan motor lpower supply		230 / 1 / 50												
Number of fans	n	1	1	1	1	1	1	1	1	1	1	2	2	2
Fan motor power input (each)	kW	0,73	0,73	1,90	0,73	0,73	0,73	1,90	1,90	2,00	2,00	1,90	2,00	2,00
Fan motor current (each)	A	3,0	3,0	9,0	3,0	3,0	9,0	9,0	9,0	9,5	9,5	9,0	9,5	9,5
Pump power supply		230 / 1 / 50												
Pump rated power input	kW	0,1	0,1	0,4	0,1	0,1	0,4	0,4	0,4	0,4	0,4	0,6	0,6	0,6
Pump rated current absorbtion	A	0,6	0,58	3,2	0,6	0,6	3,2	3,2	3,2	3,2	3,2	4,6	4,6	4,6
Auxiliary power supply	V/f/Hz	24 / 50												
Sezione cavi alimentazione	mm ²	6,0	2,5	6,0	4,0	10,0	6,0	6,0	6,0	6,0	6,0	10,0	10,0	16,0
PCD connection cable	mm ²	2 poles with braiding												
PCDS connection cable	mm ²	1,5	1,5	1,5	1,5	1,5	1,5	1,5	1,5	1,5	1,5	1,5	1,5	1,5
F protection fuse	A	20	10	25	16	40	20	25	25	32	32	40	50	50
IL mains switch	A	20	10	25	16	40	20	25	25	32	32	40	50	63

- The maximum input power is the mains power 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).

DIAGRAM SHOWING ELECTRICAL CONNECTIONS BETWEEN MCA AND PCDS / PCD REMOTE CONTROL PANEL

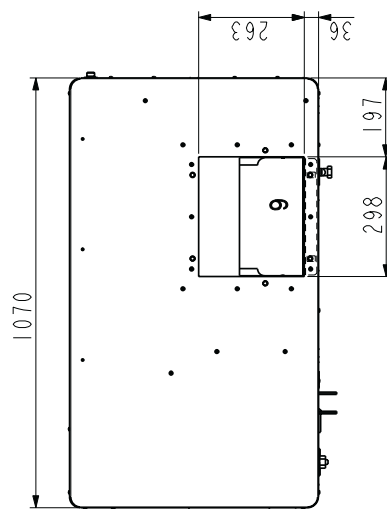
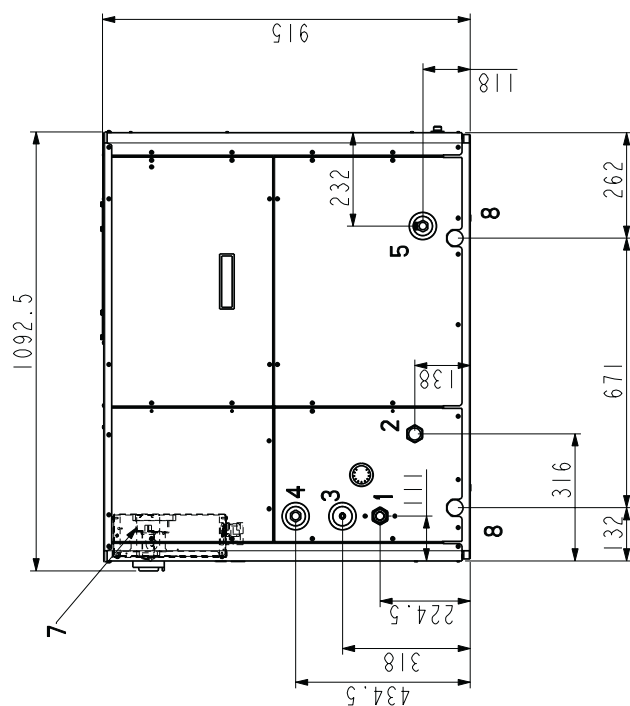
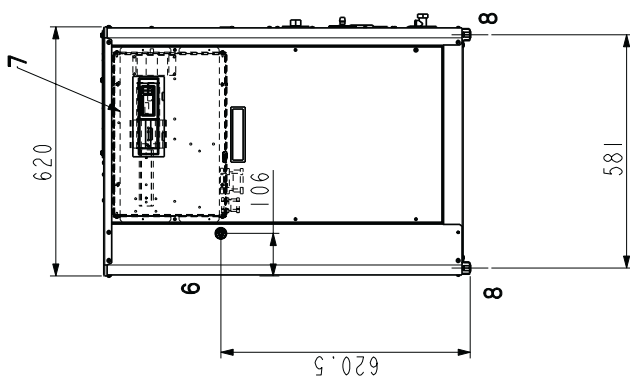
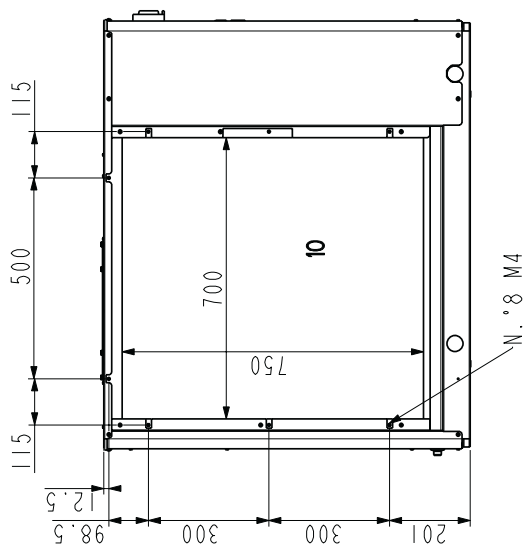


14 OVERALL DIMENSIONS MCC 06 - 07

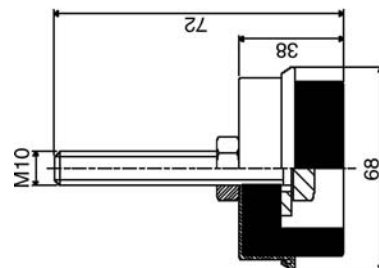
- 1 1" female water inlet
- 2 1" female water outlet
- 3 1/2" safety valve discharge
- 4 1/2" female water supply
- 5 1/2" drain manifold

- 6 Power supply Φ 28 mm
- 7 Electrical box
- 8 Dampers fastening points
- 9 Air discharge
- 10 Air suction

Dimensions in mm

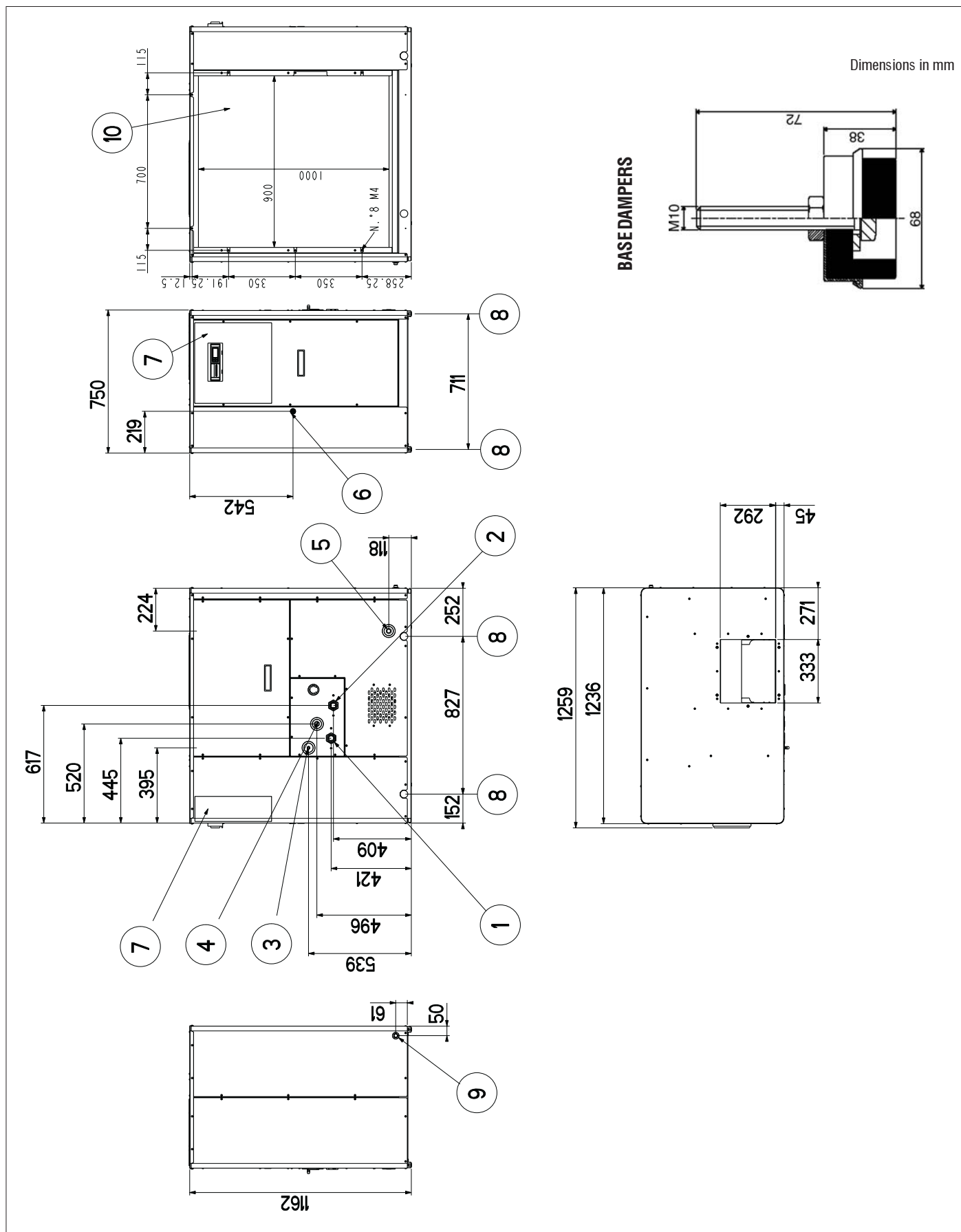


BASE DAMPERS



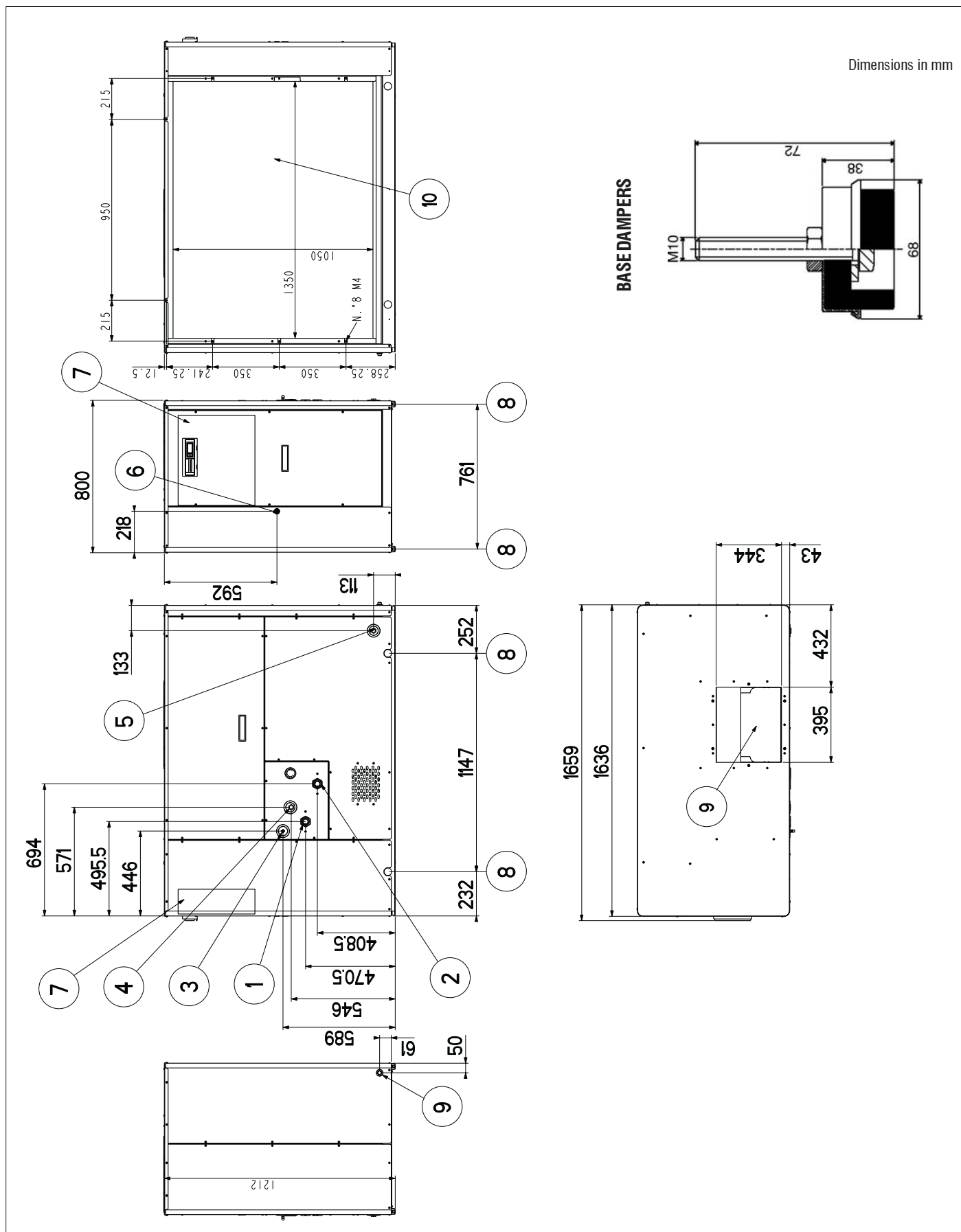
14 OVERALL DIMENSIONS MCC 09 - 15

- | | | | |
|---|-----------------------------|----|---------------------------|
| 1 | 1 1/4" female water inlet | 6 | Power supply Φ 28 mm |
| 2 | 1 1/4" female water outlet | 7 | Electrical box |
| 3 | 1/2" safety valve discharge | 8 | Dampers fastening points |
| 4 | 1/2" female water supply | 9 | Air discharge |
| 5 | 1/2" drain manifold | 10 | Air suction |



1 1 1/4" female water inlet
2 1 1/4" female water outlet
3 1/2" safety valve discharge
4 1/2" female water supply
5 1/2" drain manifold

- | | |
|----|---------------------------|
| 6 | Power supply Φ 28 mm |
| 7 | Electrical box |
| 8 | Dampers fastening points |
| 9 | Air discharge |
| 10 | Air suction |



14 OVERALL DIMENSIONS MCC 25 - 37

- 1

1 1/4" female water inlet
- 2

1 1/4" female water outlet
- 3

1/2" safety valve discharge
- 4

1/2" female water supply
- 5

1/2" drain manifold
- 6

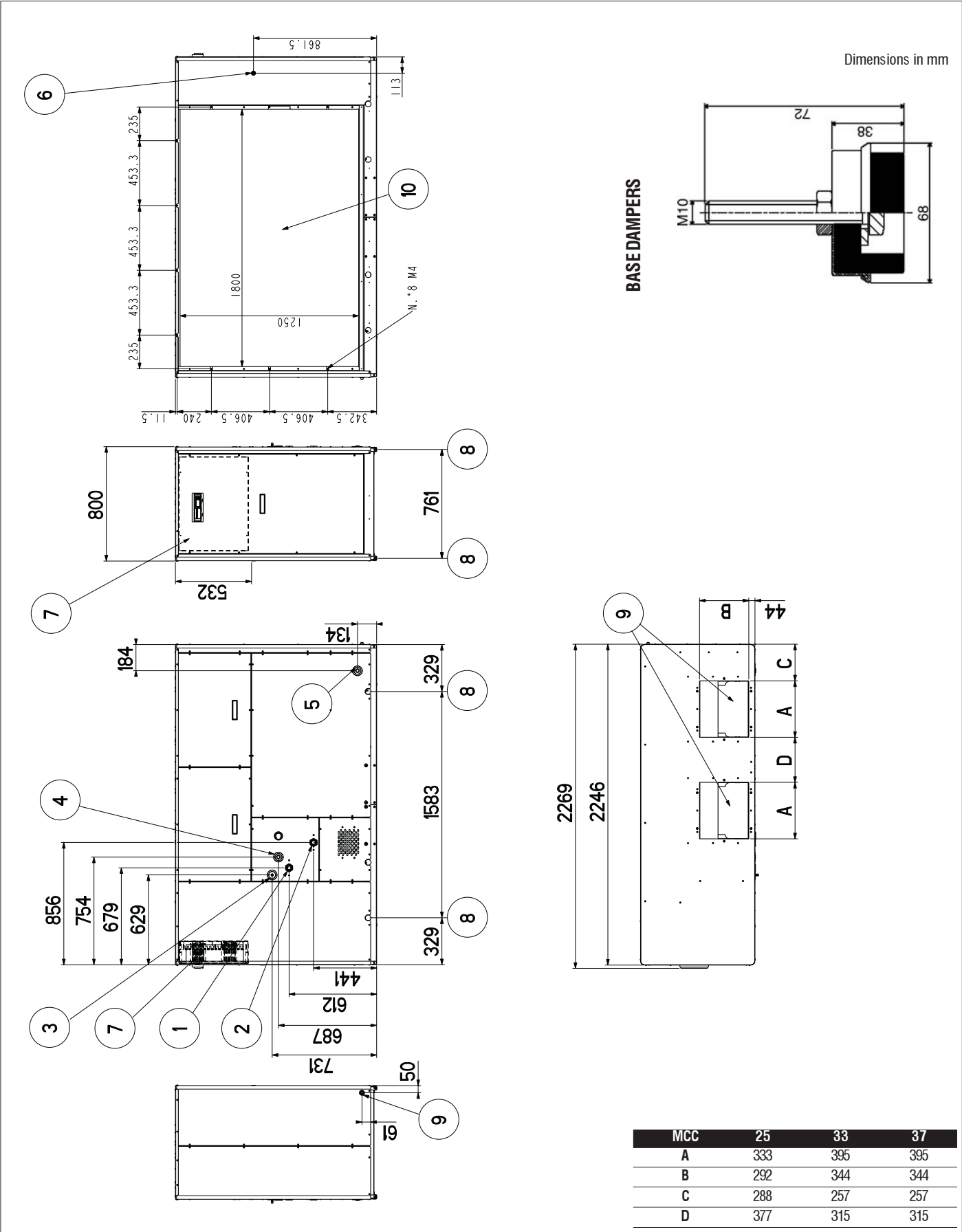
Power supply Φ 28 mm
- 7

Electrical box
- 8

Dampers fastening points
- 9

Air discharge
- 10

Air suction

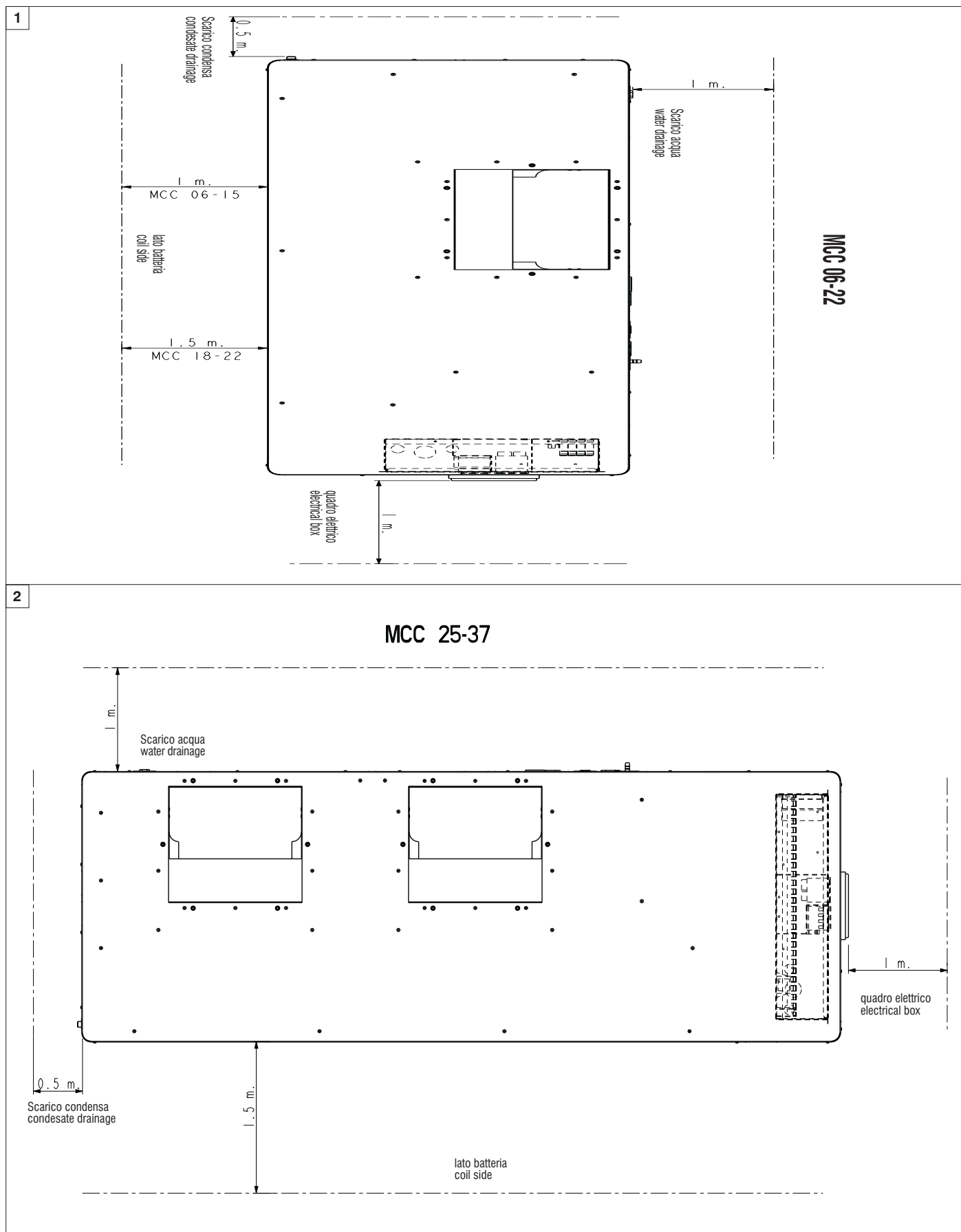


15 INSTALLATION CLEARANCE REQUIREMENTS

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.

Verify that there are no obstacles in front of the fans air outlet.

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.



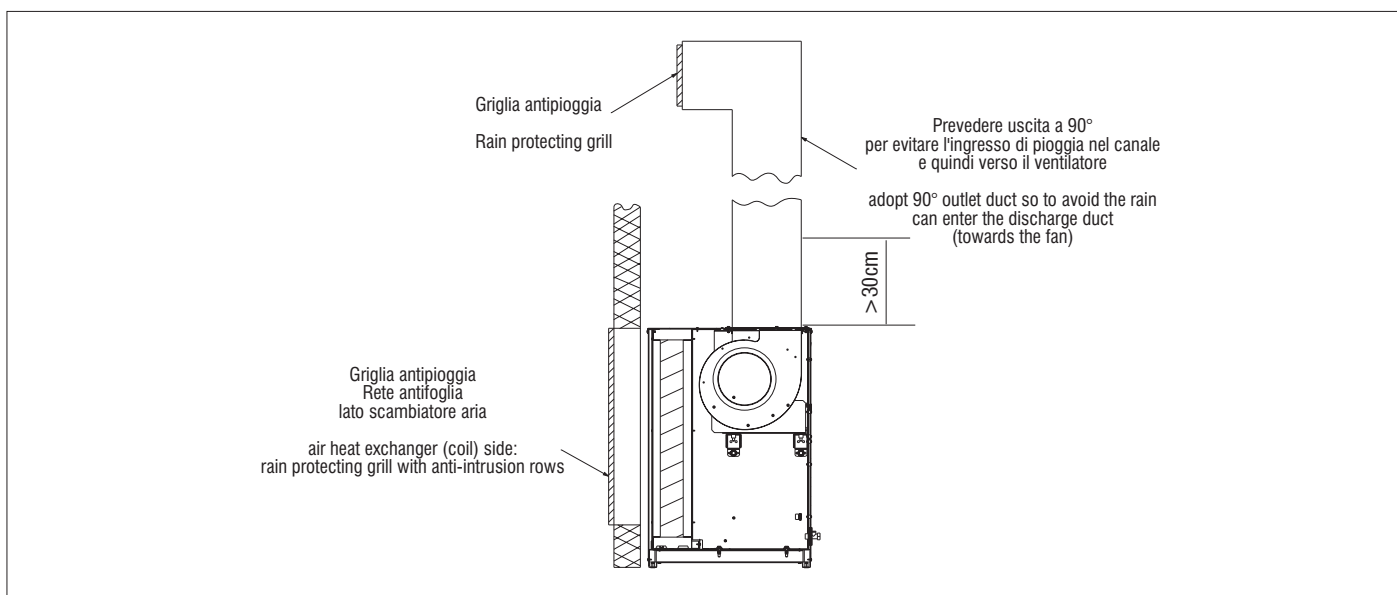
16 SITING

Water chillers and Heat pumps, MCC series, are air condensed units, designed for installation inside technical rooms. Discharge and/or intake ducts has to be made and designed for the rated air flow and available static pressure, for each model. At same time any possible air bypass (between intake and discharge) due to wrong installation layout must be avoided. A typical installation with upper discharge is shown in picture 1.

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;
- site the unit so to avoid dominant winds can influence the air flow of the unit (ex. cold winds on the condensing coil, during winter in cooling mode, could alter the correct working of the condensing control);
- Avoid installations that could create noise or vibration transmission along ducts or through the technical room structure. For this reason the adoption of vibration insulation on the air discharge (options) and also vibration dampers (option) are recommended. When vibration dampers on the unit basement are installed, vibration insulators on the hydraulic connections are also strongly recommended.
- ensure adequate accessibility for maintenance or repairs (see section on "installation clearance requirements").

Note:  heat pump units produce condensation while operating in the heating mode.



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