SYSHP MINI 07-16

Mini Heat Pump Monobloc Series

Engineering Data Manual

6,3 to 13,8 kW

6,7 to16,2 kW

R32

systemair

CONTENTS

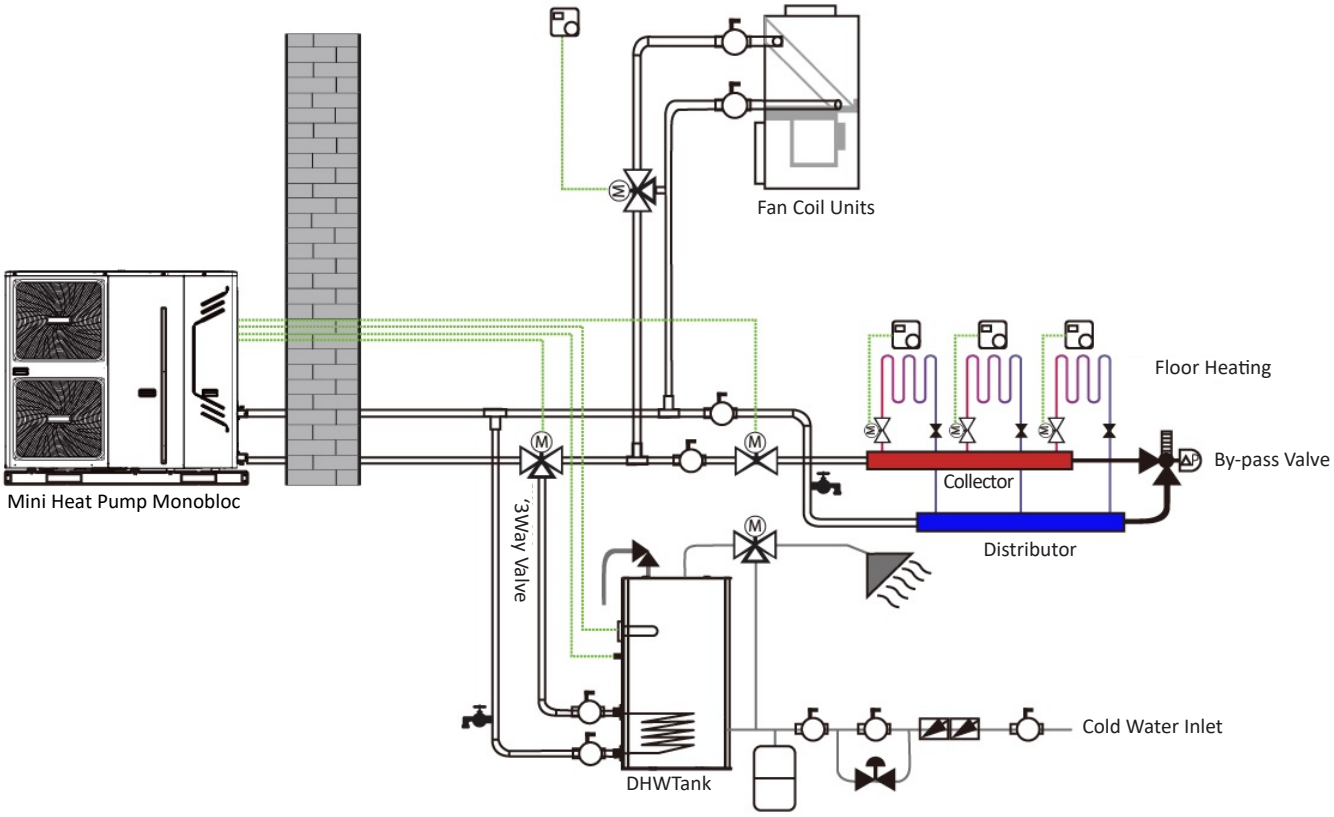
Part 1

General Information

1 Mini Heat Pump Monobloc System

1.1 System Schematic

Figure 1-1.1: System schematic



Mini Heat Pump Monobloc is an integrated air-to-water space heating, space cooling and domestic hot water heat pump system. The outdoor heat pump system extracts heat from the outdoor air and transfers this heat through refrigerant piping to the plate heat exchanger in the hydronic system. The heated water in the hydronic system circulates to low temperature heat emitters (floor heating loops or low temperature radiators) to provide space heating, and to the domestic hot water tank to provide domestic hot water. The 4-way valve in the outdoor unit can reverse the refrigerant cycle so that the hydronic system can provide chilled water for cooling using fan coil units.

The heating capacity of heat pumps decreases with ambient temperature. Mini Heat Pump Monobloc can be equipped with a backup electric heater to provide additional heating capacity for use during extremely cold weather when the heat pump capacity is insufficient. The backup electric heater also serves as a backup in case of heat pump malfunction and for anti-freeze protection of the outside water piping in winter.

1.2 System Configurations

Mini Heat Pump Monobloc can be configured to run with the electric heater either enabled or disabled and can also be used in conjunction with an auxiliary heat source such as a boiler.

The chosen configuration affects the size of heat pump that is required. Three typical configurations are described below. Refer to Figure 1-1.2.

Configuration 1: Heat pump only

- The heat pump covers the required capacity and no extra heating capacity is necessary.
- Requires selection of larger capacity heat pump and implies higher initial investment.
- Ideal for new construction in projects where energy efficiency is paramount.

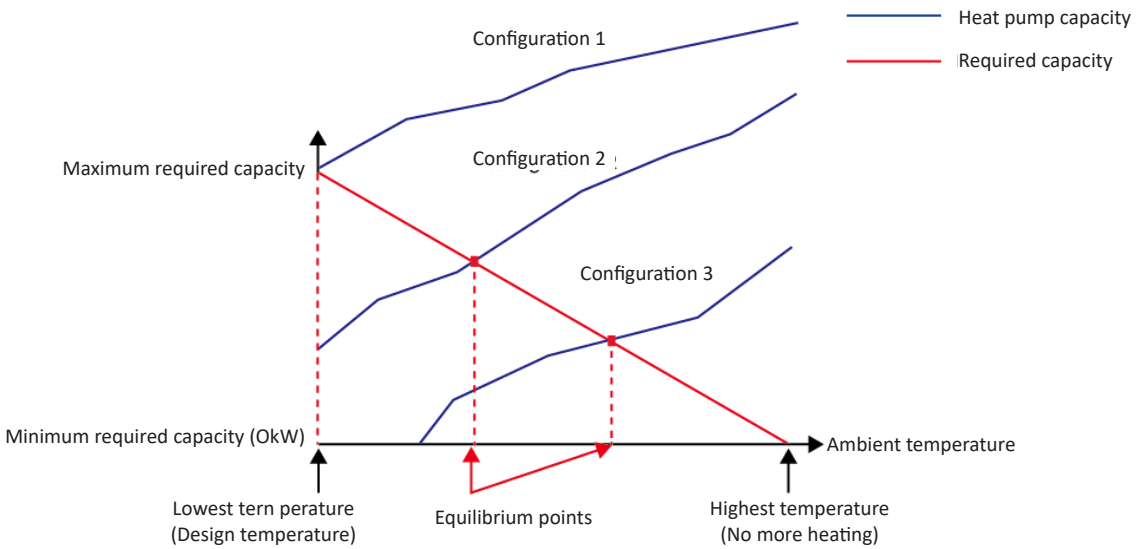
Configuration 2: Heat pump and backup electric heater

- Heat pump covers the required capacity until the ambient temperature drops below the point at which the heat pump is able to provide sufficient capacity. When the ambient temperature is below this equilibrium point (as shown in Figure 1-1.2), the backup electric heater supplies the required additional heating capacity.
- Best balance between initial investment and running costs, results in lowest lifecycle cost.
- Ideal for new construction.

Configuration 3: Heat pump with auxiliary heat source

- Heat pump covers the required capacity until the ambient temperature drops below the point at which the heat pump is able to provide sufficient capacity. When the ambient temperature is below this equilibrium point (as shown in Figure 1-1.2), depending on the system settings, either the auxiliary heat source supplies the required additional heating capacity or the heat pump does not run and the auxiliary heat source covers the required capacity.
- Enables selection of lower capacity heat pump.
- Ideal for refurbishments and upgrades.

Figure 1-1.2: System configurations



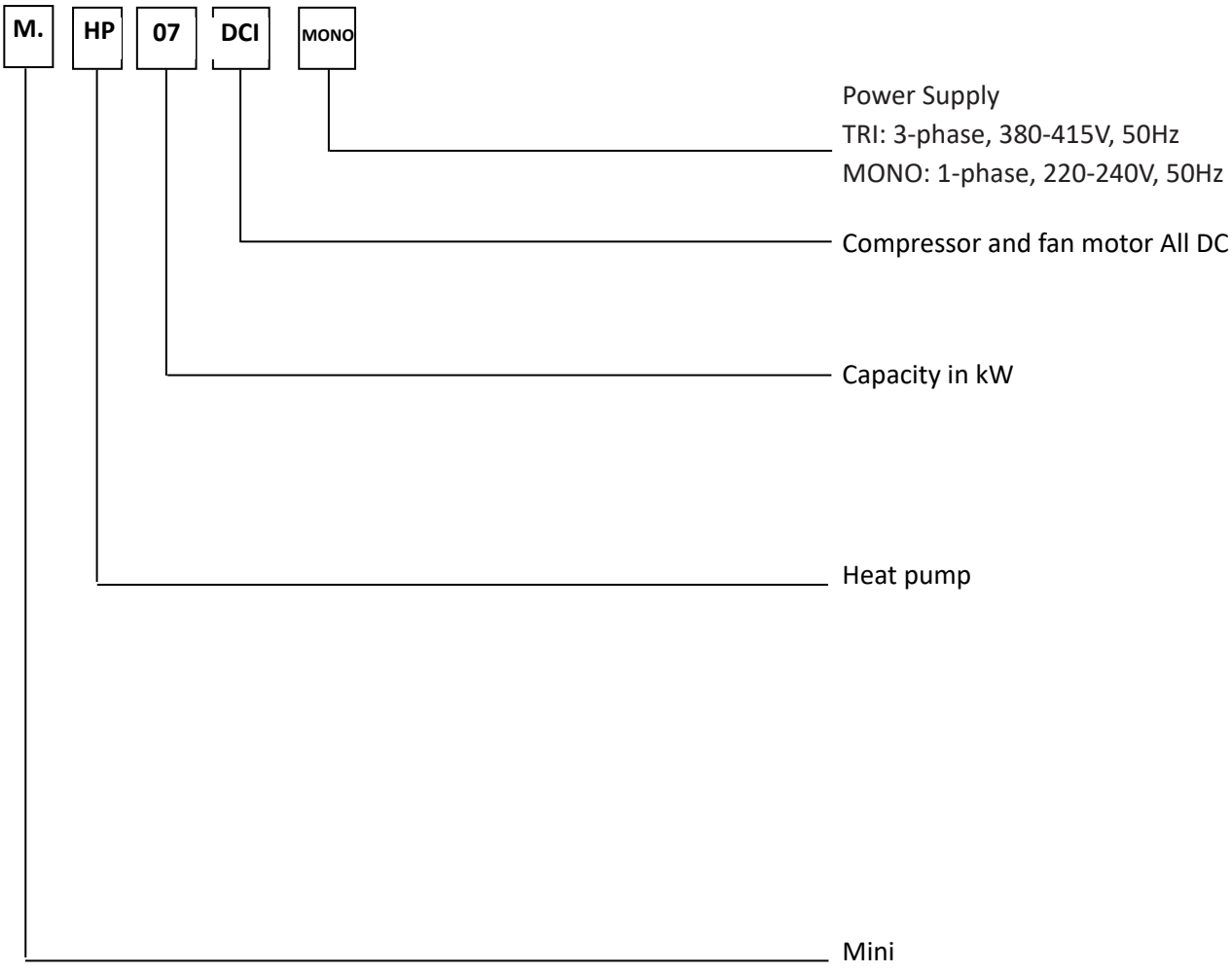
Mini Heat Pump Monobloc

2 Unit Capacities

Table 1-2.1: Mini Heat Pump Monobloc uni t capacity range and unit appearances

Capacity	5kW	7kW	9kW	12kW	14kW	16kW
Model	M.HP05 DCI MONO	M.HP07 DCI MONO	M.HP09 DCI MONO	M.HP12 DCI MONO M.HP12 DCI TRI	M.HP14 DCI MONO M.HP14 DCI TRI	M.HP16 DCI MONO M.HP16 DCI TRI
Appearance						

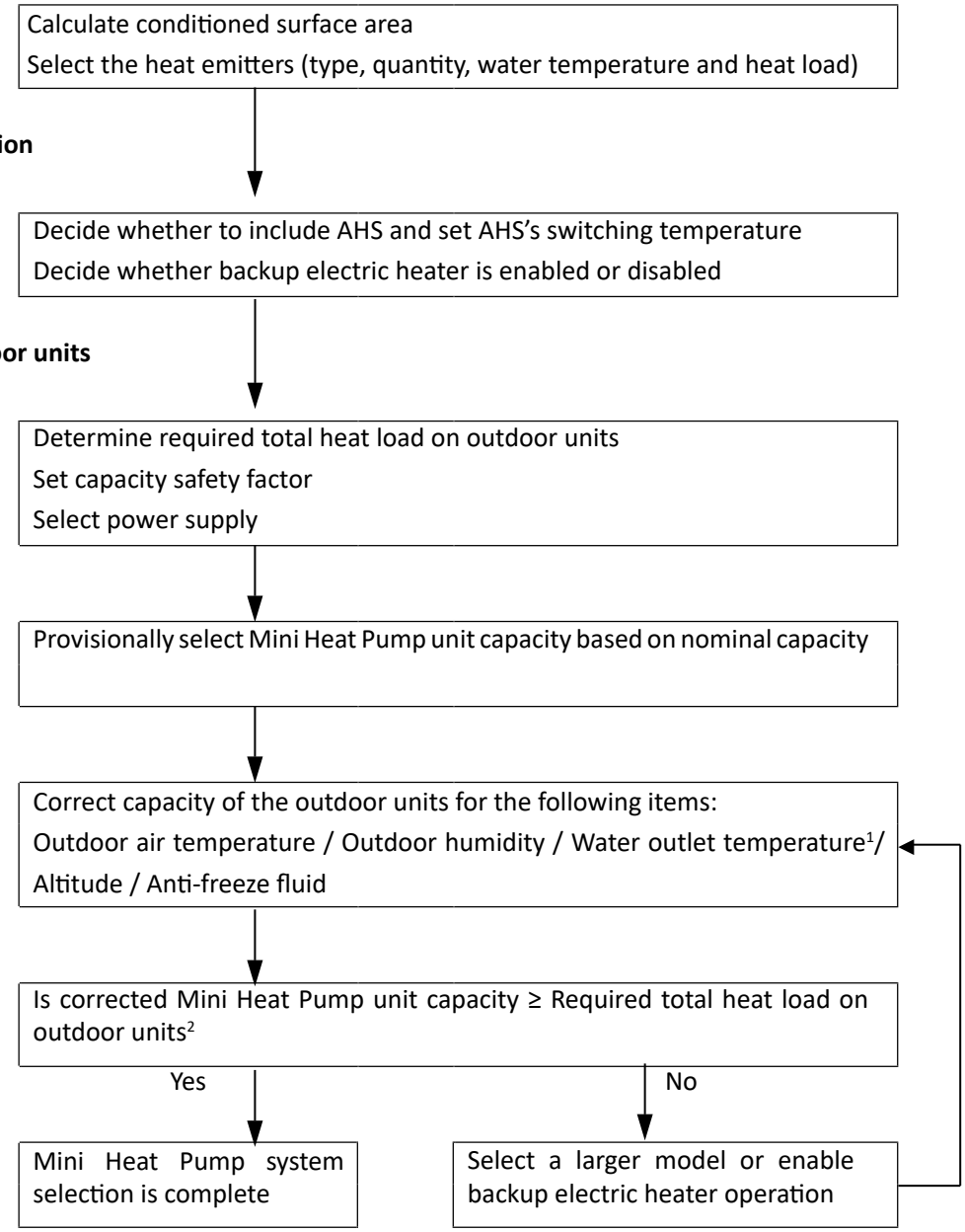
3 Nomenclature



4 System and Design Unit Selection

4.1 Selection Procedure

Step 1: Total heat load calculation



Notes:

1. If the required water temperatures of the heat emitters are not all the same, the Mini Heat Pump's outlet water temperature setting should be set at the highest of the heat emitter required water temperatures. If the water outlet design temperature falls between two temperatures listed in the outdoor unit's capacity table, calculate the corrected capacity by interpolation.
2. If the outdoor unit selection is to be based on total heating load and total cooling load, select Mono units which satisfy not only the total heating load requirements but also the total cooling load requirements.

4.2 Mini Heat Pump Leaving Water Temperature (LWT) Selection

The recommended design LTW ranges for different types of heat emitter are:

- For floor heating: 30 to 35°C
- For fan coil units: 30 to 45°C
- For low temperature radiators: 40 to 50°C

4.3 Optimizing System Design

To get the most comfort with the lowest energy consumption with Mini Heat Pump, it is important to take account of the following considerations:

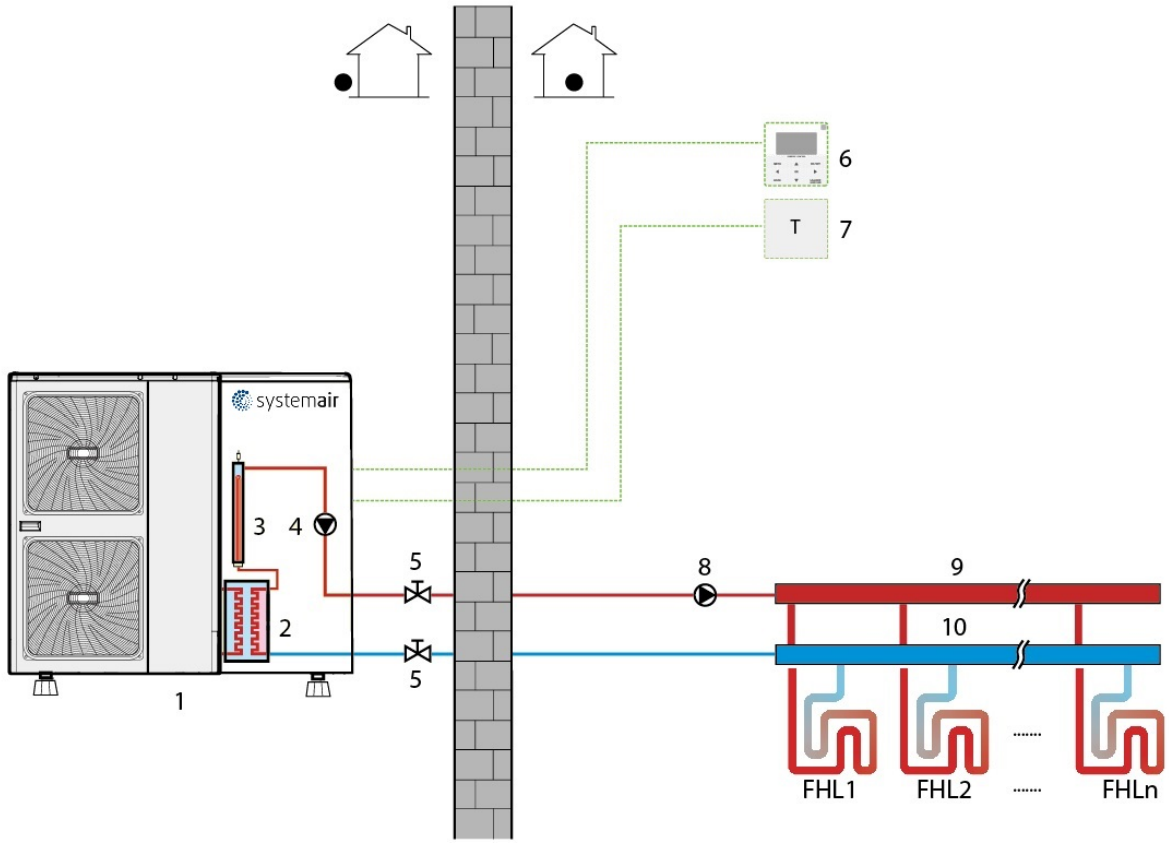
- Choose heat emitters that allow the heat pump system to operate at as low a hot water temperature as possible whilst still providing sufficient heating.
- Make sure the correct weather dependency curve is selected to match the installation environment (building structure, climate) as well as ender user's demands.
- Connecting room thermostats (field supplied) to the hydronic system helps prevent excessive space heating by stopping the outdoor unit and circulator pump when the room temperature is above the thermostat set point.

5 Typical Applications

5.1 Space Heating Only

The room thermostat is used as a switch. When there is a heating request from the room thermostat, the Mini HP unit operates to achieve the target water temperature set on the user interface. When the room temperature reaches the thermostat's set temperature, the unit stops.

Figure 1-5.1: Space heating



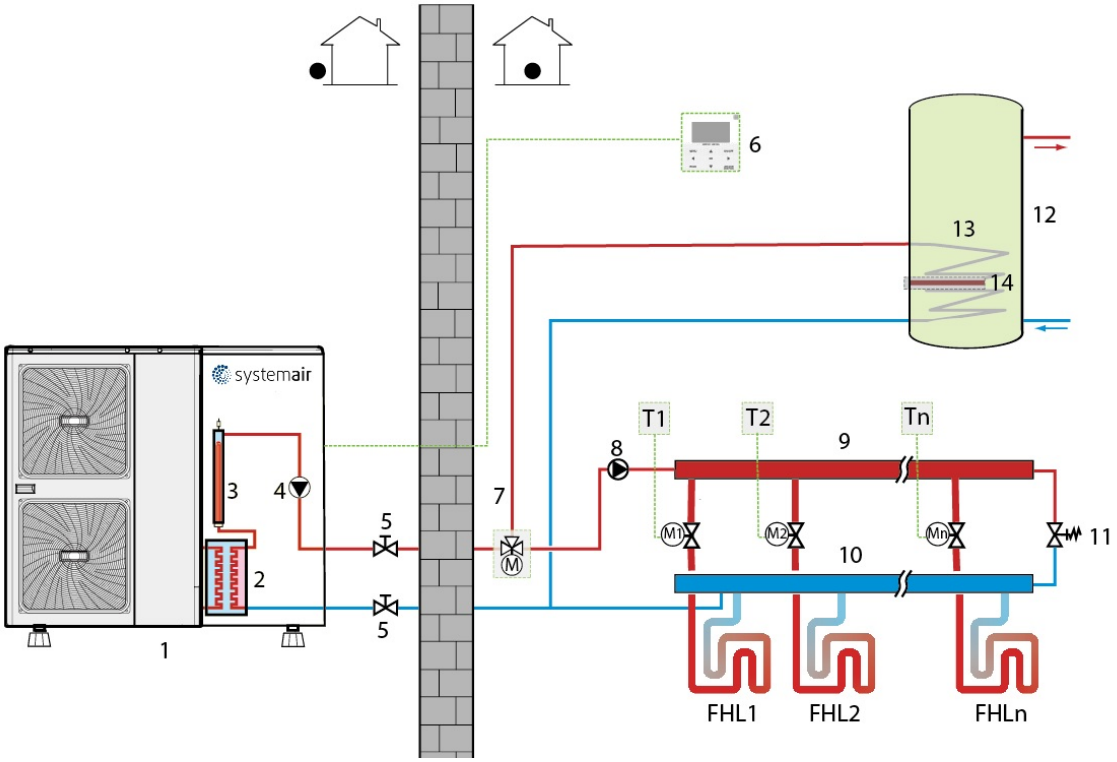
Legend			
1	Outdoor unit	7	Room thermostat (field supplied)
2	Plate heat exchanger	8	External circulator pump (field supplied)
3	Backup electric heater (customized)	9	Distributor (field supplied)
4	Internal circulator pump	10	Collector (field supplied)
5	Stop valve (field supplied)	FHL 1...n	Floor heating loops (field supplied)
6	User interface		

Notes:
1. The example is just for application illustration; please confirm the exact installation method according to the installation manual.

5.2 Space Heating and Domestic Hot Water

The room thermostats are not connected to the Mini HP unit but to a motorized valve. Each room's temperature is regulated by the motorized valve on its water circuit. Domestic hot water is supplied from the domestic hot water tank connected to the Mini HP unit. A bypass valve is required.

Figure 1-5.2: Space heating and domestic hot water



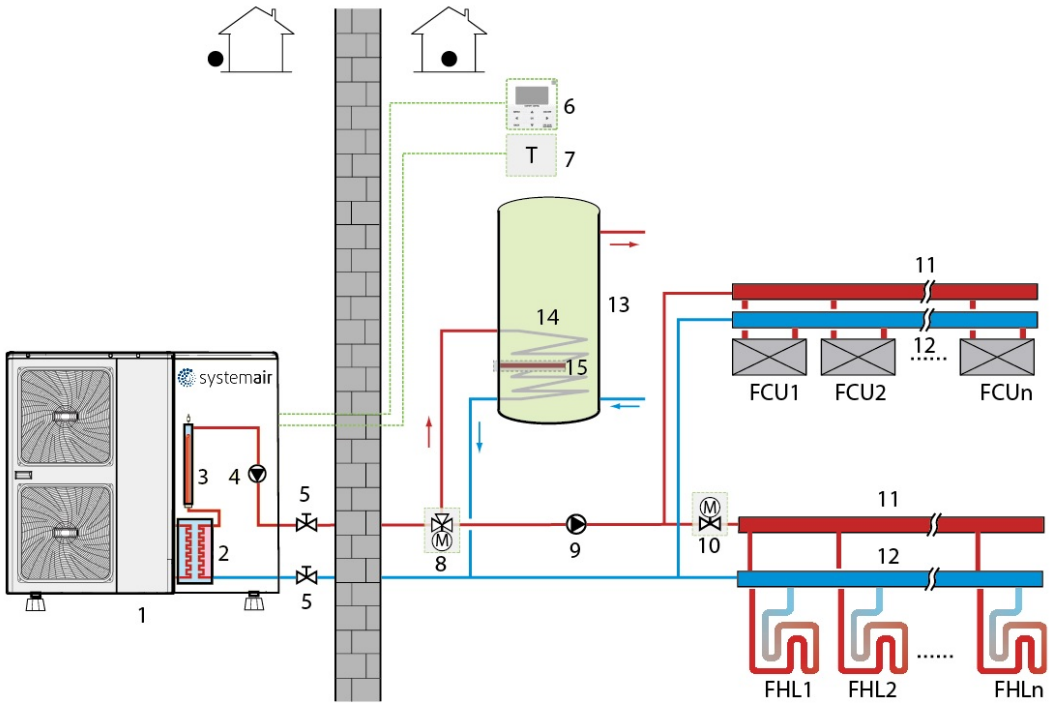
Legend			
1	Outdoor unit	10	Collector (field supplied)
2	Plate heat exchanger	11	Bypass valve (field supplied)
3	Backup electric heater (customized)	12	Domestic water tank (field supplied)
4	Internal circulator pump	13	Heat exchanger coil
5	Stop valve (field supplied)	14	Immersion heater
6	User interface	FHL 1...n	Floor heating loops (field supplied)
7	Motorized 3-way valve (field supplied)	M1...n	Motorized valves (field supplied)
8	External circulator pump (field supplied)	T1...n	Room thermostats (field supplied)
9	Distributor (field supplied)		

Notes:
1. The example is just for application illustration; please confirm the exact installation method according to the installation manual.

5.3 Space Heating, Space Cooling and Domestic Hot Water

Floor heating loops and fan coil units are used for space heating and fan coil units are used for space cooling. Domestic hot water is supplied from the domestic hot water tank connected to the Mini HP unit. The unit switches to heating or cooling mode according to the temperature detected by the room thermostat. In space cooling mode, the 2-way valve is closed to prevent cold water entering the floor heating loops.

Figure 1-5.3: Space heating, space cooling and domestic hot water



Legend			
1	Outdoor unit	10	Two-way valve (field supplied)
2	Plate heat exchanger	11	Distributor (field supplied)
3	Backup electric heater (customized)	12	Collector (field supplied)
4	Internal circulator pump	13	Domestic water tank (field supplied)
5	Stop valve (field supplied)	14	Heat exchanger coil
6	User interface	15	Immersion heater
7	Room thermostat (field supplied)	FHL 1...n	Floor heating loops (field supplied)
8	Motorized 3-way valve (field supplied)	FCU 1...n	Fan coil units (field supplied)
9	External circulator pump (field supplied)		

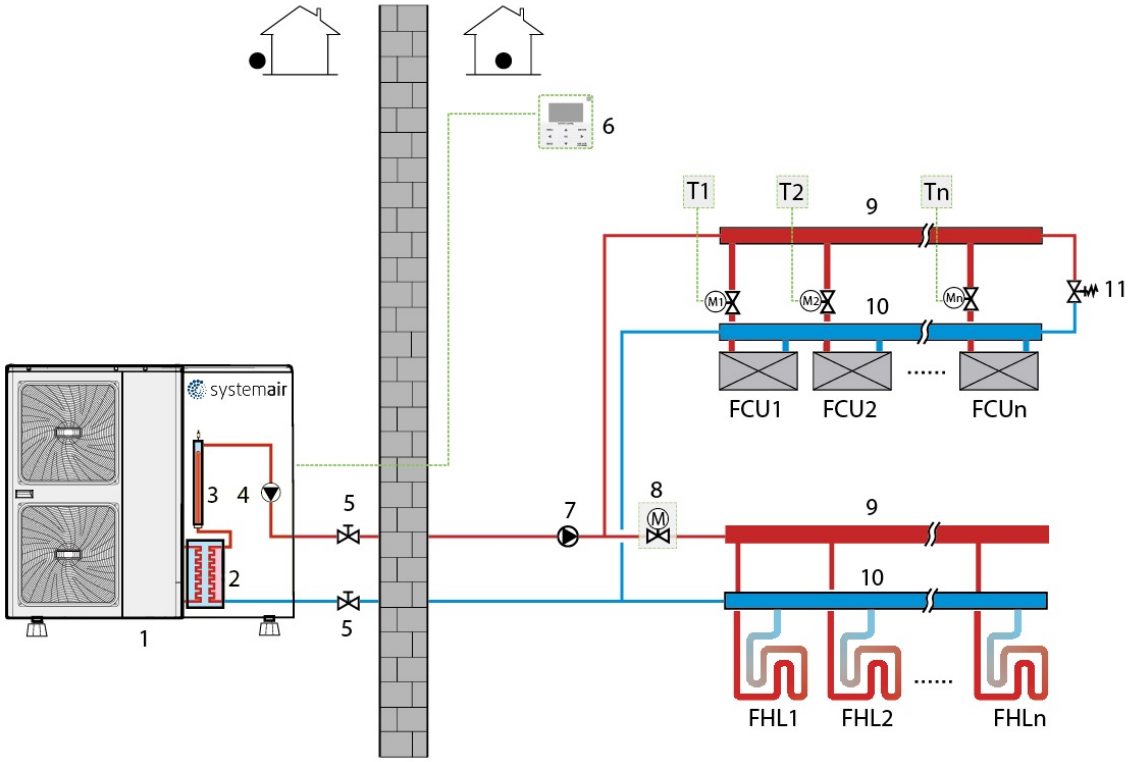
Notes:

1. The example is just for application illustration; please confirm the exact installation method according to the installation manual.

5.4 Space Heating and Space Cooling

Floor heating loops and fan coil units are used for space heating and fan coil units are used for space cooling. The room thermostats are not connected to the Mini HP unit but are connected to the fan coil units.

Figure 1-5.4: Space heating and space cooling



Legend			
1	Outdoor unit	9	Distributor (field supplied)
2	Plate heat exchanger	10	Collector (field supplied)
3	Backup electric heater (customized)	11	Bypass valve (field supplied)
4	Internal circulator pump	FHL 1...n	Floor heating loops (field supplied)
5	Stop valve (field supplied)	FCU 1...n	Fan coil units (field supplied)
6	User interface	M1...n	Motorized valves (field supplied)
7	External circulator pump (field supplied)	T1...n	Room thermostats (field supplied)
8	Motorized 2-way valve (field supplied)		

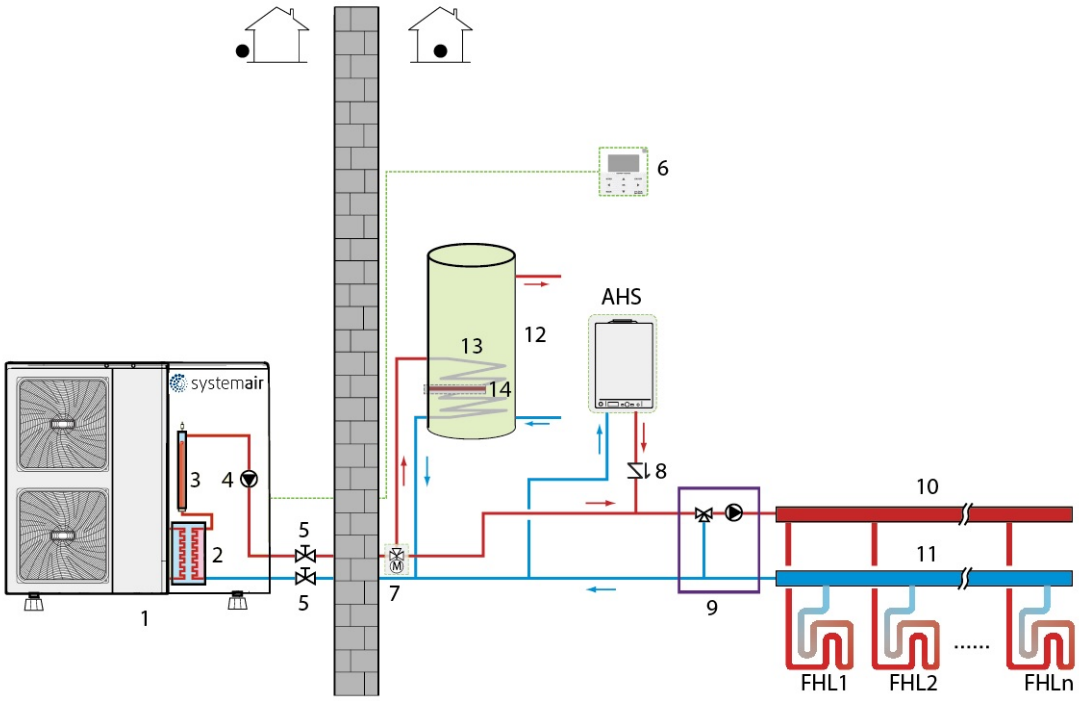
Notes:

1. The example is just for application illustration; please confirm the exact installation method according to the installation manual.

5.5 Space Heating and Domestic Hot Water (Bivalent)

5.5.1 Auxiliary heat source provides space heating only

Figure 1-5.5: Space heating and domestic hot water with auxiliary heat source providing space heating only

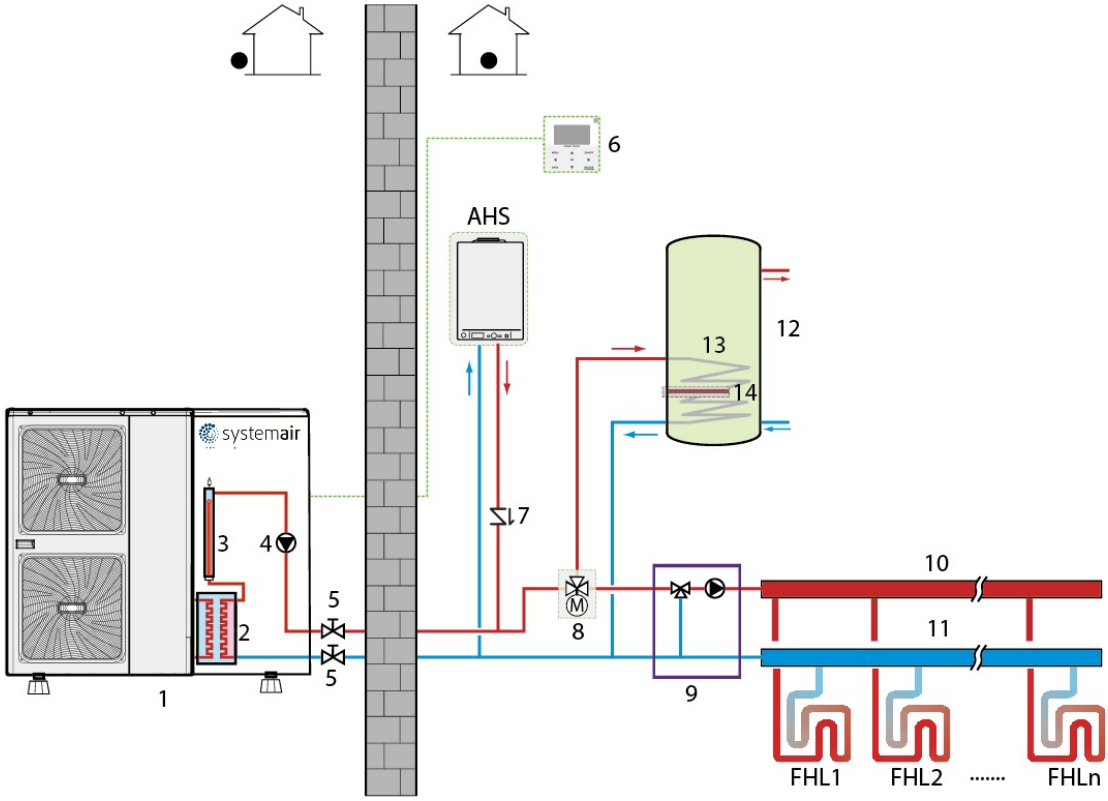


Legend			
1	Outdoor unit	9	Mixing station (field supplied)
2	Plate heat exchanger	10	Distributor (field supplied)
3	Backup electric heater (customized)	11	Collector (field supplied)
4	Internal circulator pump	12	Domestic water tank (field supplied)
5	Stop valve (field supplied)	13	Heat exchanger coil
6	User interface	14	Immersion heater
7	Motorized 3-way valve (field supplied)	FHL 1...n	Floor heating loops (field supplied)
8	Non-return valve (field supplied)	AHS	Auxiliary heating source (field supplied)

Notes:
1. The example is just for application illustration; please confirm the exact installation method according to the installation manual.

5.5.2 Auxiliary heat source provides space heating and domestic hot water

Figure 1-5.6: Space heating and domestic hot water with auxiliary heat source providing space heating and domestic hot water



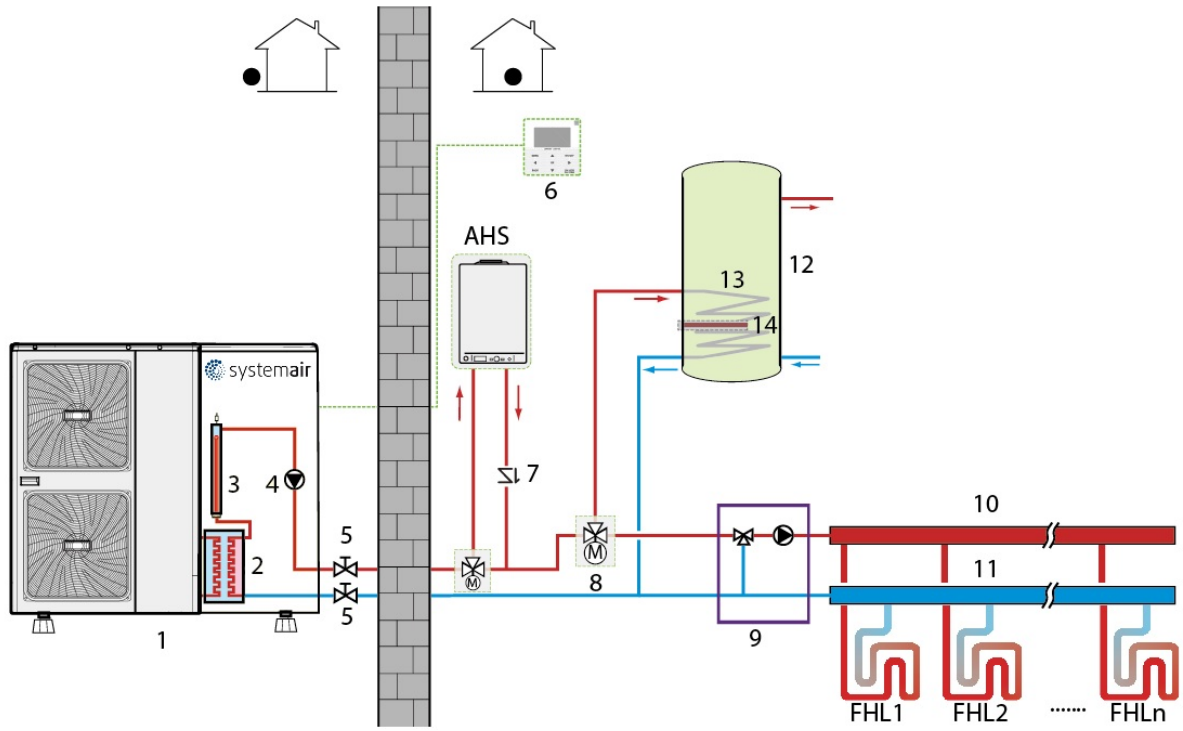
Legend			
1	Outdoor unit	9	Mixing station (field supplied)
2	Plate heat exchanger	10	Distributor (field supplied)
3	Backup electric heater (customized)	11	Collector (field supplied)
4	Internal circulator pump	12	Domestic water tank (field supplied)
5	Stop valve (field supplied)	13	Heat exchanger coil
6	User interface	14	Immersion heater
7	Non-return valve (field supplied)	FHL 1...n	Floor heating loops (field supplied)
8	Motorized 3-way valve (field supplied)	AHS	Auxiliary heating source (field supplied)

Notes:
1. The example is just for application illustration; please confirm the exact installation method according to the installation manual.

5.5.3 Auxiliary heat source provides additional heating

If the Mini HP unit's outlet temperature is too low, the auxiliary heat source provides additional heating to raise the water temperature to the set temperature. An additional 3-way valve is required. When the Mini HP unit's outlet temperature is too low, the 3-way valve is open and the water flows through the auxiliary heat source. When the Mini HP unit's outlet temperature is high enough, the 3-way valve is closed.

Figure 1-5.7: Space heating and domestic hot water with auxiliary heat source providing additional heating



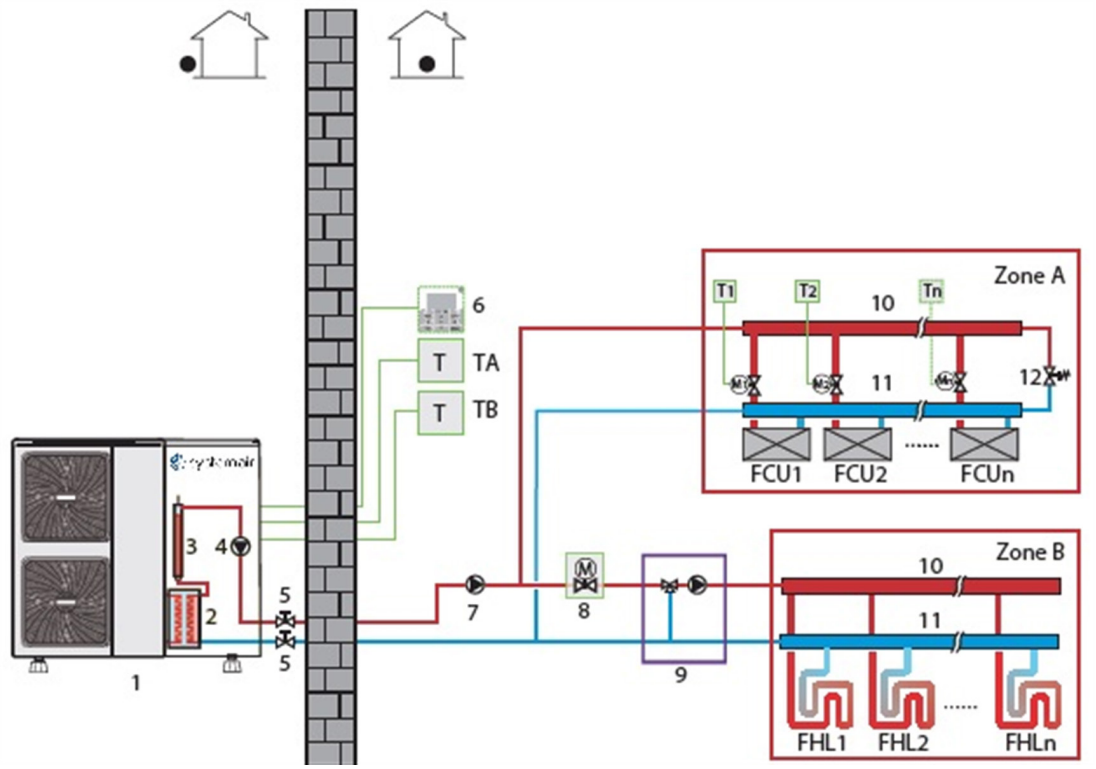
Legend			
1	Outdoor unit	9	Mixing station (field supplied)
2	Plate heat exchanger	10	Distributor (field supplied)
3	Backup electric heater (customized)	11	Collector (field supplied)
4	Internal circulator pump	12	Domestic water tank (field supplied)
5	Stop valve (field supplied)	13	Heat exchanger coil
6	User interface	14	Immersion heater
7	Non-return valve (field supplied)	FHL 1...n	Floor heating loops (field supplied)
8	Motorized 3-way valve (field supplied)	AHS	Auxiliary heating source (field supplied)

Notes:
1. The example is just for application illustration; please confirm the exact installation method according to the installation manual.

5.6 Space Heating Through Floor Heating Loops and Fan Coil Units

Dual setpoint function application with or without two thermostat connect to the outdoor unit. The floor heating loops and fan coil units require different operating water temperatures. To achieve these two set points, a mixing station is required. Room thermostats for each zone are optional.

Figure 1-5.8: Space heating through floor heating loops and fan coil units



Legend			
1	Outdoor unit	10	Distributor (field supplied)
2	Plate heat exchanger	11	Collector (field supplied)
3	Backup electric heater (customized)	12	Bypass valve (field supplied)
4	Internal circulator pump	FHL 1...n	Floor heating loops (field supplied)
5	Stop valve (field supplied)	FCU 1...n	Fan coil units (field supplied)
6	User interface	M1...n	Motorized valves (field supplied)
7	External circulator pump (field supplied)	T1...n	Room thermostats (field supplied)
8	Motorized 2-way valve (field supplied)	TA	Zone A thermostat (field supplied)
9	Mixing station (field supplied)	TB	Zone B thermostat (field supplied)

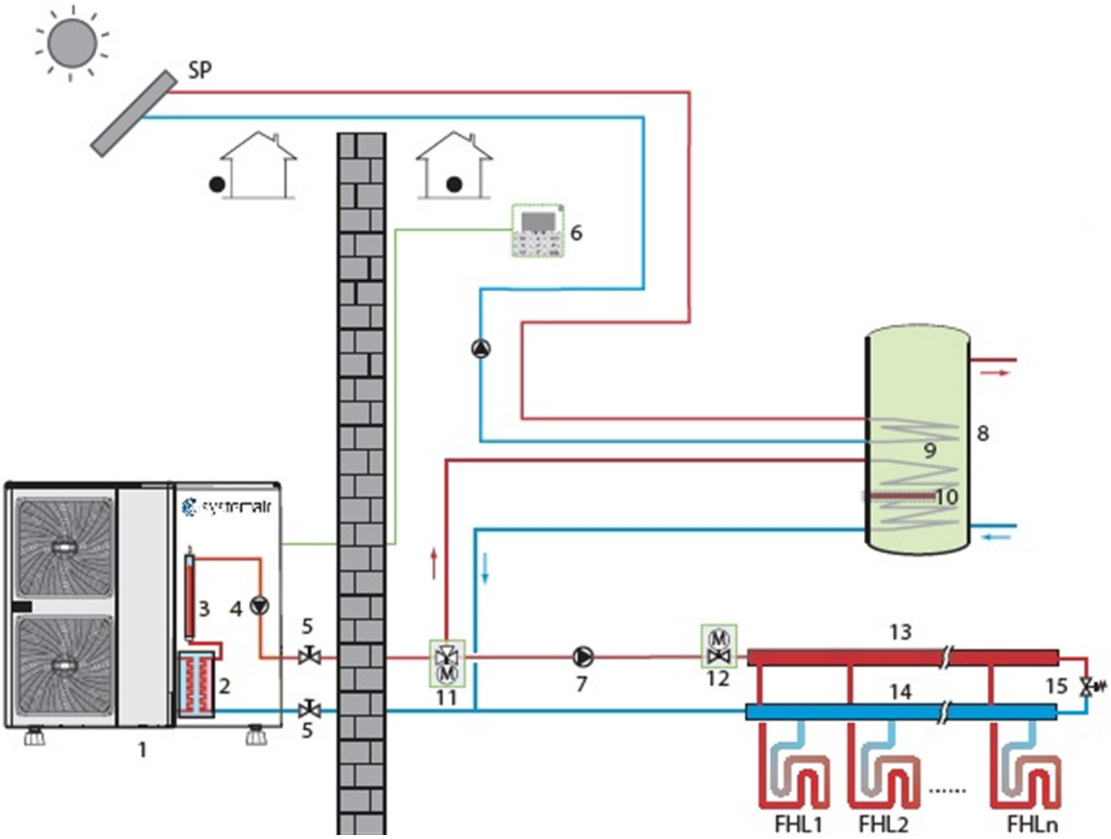
Notes:

1. The example is just for application illustration; please confirm the exact installation method according to the installation manual.

5.7 Space Heating and Domestic Hot Water Heating with a solar energy kit

Space heating application and domestic hot water heating with a solar energy kit connected to the system; space heating provided by heat pump, domestic hot water heating is provided by heat pump and solar energy kit.

Figure 1-5.9: Space Heating and Domestic Hot Water Heating with a solar energy kit



Legend			
1	Outdoor unit	10	Immersion heater
2	Plate heat exchanger	11	Motorized 3-way valve (field)
3	Backup electric heater (customized)	12	Two-way valve (field supplied)
4	Internal circulator pump	13	Distributor (field supplied)
5	Stop valve (field supplied)	14	Collector (field supplied)
6	User interface	15	Bypass valve (field supplied)
7	External circulator pump (field supplied)	FHL 1...n	Floor heating loops (field supplied)
8	Domestic hot water tank (field supplied)		
9	Heat exchanger coil		

Notes:

2. The example is just for application illustration; please confirm the exact installation method according to the installation manual.

Part 2

Engineering Data

1 Specifications

M.HP05 DCI MONO / M.HP07 DCI MONO / M.HP09 DCI MONO

Table 2-1.1: M.HP05/07/09 DCI MONO specifications[1]

kW			5	7	9
Model name			M.HP05 DCI MONO	M.HP07 DCI MONO	M.HP09 DCI MONO
Power supply		V/Ph/Hz	220-240/1/50		
Heating[2]	Capacity	kW	4.65	6.65	8.60
	Rated input	kW	0.93	1.35	1.87
	COP		5.00	4.94	4.60
Heating[3]	Capacity	kW	4.80	6.70	8.60
	Rated input	kW	1.33	1.88	2.50
	COP		3.60	3.57	3.44
Heating[4]	Capacity	kW	4.65	6.80	8.60
	Rated input	kW	1.77	2.42	3.13
	COP		2.63	2.81	2.75
Cooling[5]	Capacity	kW	4.60	6.45	8.00
	Rated input	kW	0.95	1.39	1.92
	EER		4.82	4.65	4.16
Cooling[6]	Capacity	kW	4.85	6.30	7.95
	Rated input	kW	1.63	2.27	3.15
	EER		2.98	2.77	2.53
Seasonal space heating energy efficiency class[7]	LWT at 35°C		A+++		
	LWT at 55°C		A++		
SCOP [7]	LWT at 35°C		4.47	4.47	4.51
	LWT at 55°C		3.24	3.24	3.22
SEER [7]	LWT at 7°C		4.71	4.99	4.92
	LWT at 18°C		7.61	8.58	7.88
Compressor	Type		Twin rotary DC inverter		
	Poles		6		
	Speed range	rps	10-120		
	Capacity at 60rps	kW	7.10		
	Input at 60rps	kW	2.23		
	Max. heating	Hz	96		
	Max. cooling	Hz	88		
Outdoor fan	Motor type		Brushless DC motor		
	Number of fans		1		
	Air flow	m^3/h	3050		
Air side heat exchanger	Type		Finned tube		
	Number of rows		2		
	Number of circuits		8		

Abbreviations:
MOP: Maximum overcurrent protection
MCA: Minimum circuit amps
DHW: Domestic hot water
EWT: Entering water temperature
LWT: Leaving water temperature

Notes:
1. Relevant EU standards and legislation: EN14511:2013; EN14825:2013; EN50564:2011; EN12102:2011; (EU) No 811/2013; (EU) No 813/2013; OJ 2014/C 207/02.
2. Outdoor air temperature 7°C DB, 85% R.H.; EWT 30°C, LWT 35°C.
3. Outdoor air temperature 7°C DB, 85% R.H.; EWT 40°C, LWT 45°C.
4. Outdoor air temperature 7°C DB, 85% R.H.; EWT 47°C, LWT 55°C.
5. Outdoor air temperature 35°C DB; EWT 23°C, LWT 18°C.
6. Outdoor air temperature 35°C DB; EWT 12°C, LWT 7°C.
7. Seasonal space heating energy efficiency class tests in average climate conditions.
8. Sound power level is the maximum value tested under the three conditions of Notes1, Notes3 and Note5.

Table continued on next page …

Table 2-1.1: M.HP05/07/09 DCI MONO specifications[1](continued)

kW			**5**	**7**	**9**
Model name			M.HP05 DCI MONO	M.HP07 DCI MONO	M.HP09 DCI MONO
MOP		A	20.0	20.0	20.0
MCA		A	14.1	14.1	14.1
Water side heat exchanger			Plate type		
Water pump	Pump head	m	6.0		
Expansion tank	Volume	L	6.0 2.0		
Refrigerant	Type		R32 6.0		
	kWCharge	kg	2.0		
Throttle type			Electronic expansion valve		
Backup electric heater	Standard internal	kW	-	-	-
	Optional	kW	3	3	3
	Output steps		1	1	1
	Power supply	V/Ph/Hz	220-240/1/50		
Sound power level[8]		dB(A)	61	64	67
Net dimensions (W×H×D)		mm	1210×945×402		
Packed dimensions (W×H×D)		mm	1500×1140×450		
Net/Gross weight		kg	92/111		
Water piping connections		mm	1'' Male BSP		
Safety valve set pressure		MPa	0.3	0.3	0.3
Total water volume		L	2	2	5.5
Operating temperature range	Cooling	°C	-5 to 43		
	Heating	°C	-25 to 35		
	DHW	°C	-25 to 43		
LWT range	Cooling	°C	5 to 25		
	Heating	°C	25 to 60		
	DHW	°C	40 to 60		

Abbreviations:
MOP: Maximum overcurrent protection
MCA: Minimum circuit amps
DHW: Domestic hot water
EWT: Entering water temperature
LWT: Leaving water temperature

Notes:
1. Relevant EU standards and legislation: EN14511:2013; EN14825:2013; EN50564:2011; EN12102:2011; (EU) No 811/2013; (EU) No 813/2013; OJ 2014/C 207/02
2. Outdoor air temperature 7°C DB, 85% R.H.; EWT 30°C, LWT 35°C.
3. Outdoor air temperature 7°C DB, 85% R.H.; EWT 40°C, LWT 45°C.
4. Outdoor air temperature 7°C DB, 85% R.H.; EWT 47°C, LWT 55°C.
5. Outdoor air temperature 35°C DB; EWT 23°C, LWT 18°C.
6. Outdoor air temperature 35°C DB; EWT 12°C, LWT 7°C.
7. Seasonal space heating energy efficiency class tests in average climate conditions.
8. Sound power level is the maximum value tested under the three conditions of Notes1, Notes3 and Note5..

M.HP12 DCI MONO / M.HP14 DCI MONO / M.HP16 DCI MONO

Table 2-1.2: M.HP12/14/16 DCI MONO specifications[1]

kW			**12**	**14**	**16**
Model name			M.HP12 DCI MONO	M.HP14 DCI MONO	M.HP16 DCI MONO
Power supply		V/Ph/Hz	220-240/1/50		
Heating[2]	Capacity	kW	12.30	14.10	16.30
	Rated input	kW	2.56	3.07	3.66
	COP		4.81	4.60	4.45
Heating[3]	Capacity	kW	12.40	14.10	16.20
	Rated input	kW	3.52	4.06	4.72
	COP		3.53	3.47	3.43
Heating[4]	Capacity	kW	11.90	14.20	16.10
	Rated input	kW	4.28	5.17	5.91
	COP		2.78	2.75	2.73
Cooling[5]	Capacity	kW	12.20	14.00	15.50
	Rated input	kW	2.55	3.10	3.64
	EER		4.78	4.52	4.26
Cooling[6]	Capacity	kW	10.90	12.90	13.80
	Rated input	kW	3.74	4.64	5.21
	EER		2.92	2.78	2.65
Seasonal space heating energy[7]	LWT at 35°C		A++		
	LWT at 55°C		A++		
SCOP[7]	LWT at 35°C		4.29	4.27	4.30
	LWT at 55°C		3.23	3.26	3.27
SEER[7]	LWT at 7°C		4.85	4.73	4.54
	LWT at 18°C		7.50	7.16	6.78
Compressor	Type		Twin rotary DC inverter		
	Poles		6		
	Speed range	rps	612-102		
	Capacity at 60rps	kW	13.38		
	Input at 60rps	kW	4.40		
	Max. heating	Hz	92		
	Max. cooling	Hz	78		
Outdoor fan	Motor type		Brushless DC motor		
	Number of fans		2		
	Air flow	m^3/h	6150		
Air side heat exchanger	Type		Finned tube		
	Number of rows		2		
	Number of circuits		9		

Abbreviations:
MOP: Maximum overcurrent protection
MCA: Minimum circuit amps
DHW: Domestic hot water
EWT: Entering water temperature
LWT: Leaving water temperature

Notes:
1. Relevant EU standards and legislation: EN14511:2013; EN14825:2013; EN50564:2011; EN12102:2011; (EU) No 811/2013; (EU) No 813/2013; OJ 2014/C 207/02.
2. Outdoor air temperature 7°C DB, 85% R.H.; EWT 30°C, LWT 35°C.
3. Outdoor air temperature 7°C DB, 85% R.H.; EWT 40°C, LWT 45°C.
4. Outdoor air temperature 7°C DB, 85% R.H.; EWT 47°C, LWT 55°C.
5. Outdoor air temperature 35°C DB; EWT 23°C, LWT 18°C.
6. Outdoor air temperature 35°C DB; EWT 12°C, LWT 7°C.
7. Seasonal space heating energy efficiency class tests in average climate conditions.
8. Sound power level is the maximum value tested under the three conditions of Notes1, Notes3 and Note5.

Table continued on next page …

Table 2-1.2: M.HP12/14/16 DCI MONO specifications1(continued)

kW			**12**	**14**	**16**
Model name			M.HP12 DCI MONO	M.HP14 DCI MONO	M.HP16 DCI MONO
MOP		A	30.0	30.0	30.0
MCA		A	26.8	26.8	26.8
Water side heat exchanger			Plate type		
Water pump	Pump head	m	7.5	7.5	7.5
Expansion tank	Volume	L	5	5	5
Refrigerant	Type		R32		
	Charge	kg	2.8		
Throttle type			Electronic expansion valve		
Backup electric heater	Standard internal	kW	3	3	3
	Optional	kW	-	-	-
	Output steps		1	1	1
	Power supply	V/Ph/Hz	220-240/1/50		
Sound power level[8]		dB(A)	68	71	71
Net dimensions (W×H×D)		mm	1404×1414×405		
Packed dimensions (W×H×D)		mm	1475×1580×440		
Net/Gross weight		kg	158/178		
Water piping connections		mm	1-1/4“ Male BSP		
Safety valve set pressure		MPa	0.3		
Total water volume		L	3.2		
Operating temperature range	Cooling	℃	-5 to 46		
	Heating	℃	-25 to 35		
	DHW	℃	-25 to 43		
LWT range	Cooling	℃	5 to 25		
	Heating	℃	25 to 60		
	DHW	℃	40 to 60		

M.HP12 DCI TRI / M.HP14 DCI TRI / M.HP16 DCI TRI

Abbreviations:
MOP: Maximum overcurrent protection
MCA: Minimum circuit amps
DHW: Domestic hot water
EWT: Entering water temperature
LWT: Leaving water temperature

Notes:
1. Relevant EU standards and legislation: EN14511:2013; EN14825:2013; EN50564:2011; EN12102:2011; (EU) No 811/2013; (EU) No 813/2013; OJ 2014/C 207/02.
2. Outdoor air temperature 7°C DB, 85% R.H.; EWT 30°C, LWT 35°C.
3. Outdoor air temperature 7°C DB, 85% R.H.; EWT 40°C, LWT 45°C.
4. Outdoor air temperature 7°C DB, 85% R.H.; EWT 47°C, LWT 55°C.
5. Outdoor air temperature 35°C DB; EWT 23°C, LWT 18°C.
6. Outdoor air temperature 35°C DB; EWT 12°C, LWT 7°C.
7. Seasonal space heating energy efficiency class tests in average climate conditions.
8. Sound power level is the maximum value tested under the three conditions of Notes1, Notes3 and Note5.

Table 2-1.3: M.HP12/14/16 DCI TRI specifications kW

Model name Power supply

kW			12	14	16
Model name			M.HP12 DCI TRI	M.HP14 DCI TRI	M.HP16 DCI TRI
Power supply		V/Ph/Hz	380-415/3/50		
Heating[2]	Capacity	kW	12.30	14.10	16.30
	Rated input	kW	2.54	3.05	3.63
	COP		4.84	4.63	4.49
Heating[3]	Capacity	kW	12.40	14.10	16.20
	Rated input	kW	3.45	3.99	4.70
	COP		3.59	3.54	3.45
Heating[4]	Capacity	kW	11.90	14.20	16.10
	Rated input	kW	4.24	5.10	5.83
	COP		2.81	2.79	2.76
Cooling[5]	Capacity	kW	12.20	14.00	15.50
	Rated input	kW	2.53	3.11	3.63
	EER		4.83	4.50	4.27
Cooling[6]	Capacity	kW	10.90	12.90	13.80
	Rated input	kW	3.72	4.62	5.19
	EER		2.93	2.80	2.66
Seasonal space heating energy efficiency class[7]	LWT at 35°C		A++		
	LWT at 55°C		A++		
SCOP[7]	LWT at 35°C		4.29	4.27	4.30
	LWT at 55°C		3.23	3.26	3.27
SEER	LWT at 7°C		4.85	4.73	4.54
	LWT at 18°C		7.50	7.16	6.78
Compressor	Type		Twin rotary DC inverter		
	Poles		6		
	Speed range	rps	10-102		
	Capacity at 60rps	kW	13.38		
	Input at 60rps	kW	4.40		
	Max. heating	Hz	92		
	Max. cooling	Hz	78		
Outdoor fan	Motor type		Brushless DC motor		
	Number of fans		2		
	Air flow	m^3/h	6150		
Air side heat exchanger	Type		Finned tube		
	Number of rows		2		
	Number of circuits		9		

Abbreviations:
MOP: Maximum overcurrent protection
MCA: Minimum circuit amps
DHW: Domestic hot water
EWT: Entering water temperature
LWT: Leaving water temperature

Notes:
1. Relevant EU standards and legislation: EN14511:2013; EN14825:2013; EN50564:2011; EN12102:2011; (EU) No 811/2013; (EU) No 813/2013; OJ 2014/C 207/02.
2. Outdoor air temperature 7°C DB, 85% R.H.; EWT 30°C, LWT 35°C.
3. Outdoor air temperature 7°C DB, 85% R.H.; EWT 40°C, LWT 45°C.
4. Outdoor air temperature 7°C DB, 85% R.H.; EWT 47°C, LWT 55°C.
5. Outdoor air temperature 35°C DB; EWT 23°C, LWT 18°C.
6. Outdoor air temperature 35°C DB; EWT 12°C, LWT 7°C.
7. Seasonal space heating energy efficiency class tests in average climate conditions.
8. Sound power level is the maximum value tested under the three conditions of Notes1, Notes3 and Note5.

Table continued on next page …

Table 2-1.3: M.HP12/14/16 DCI TRI specifications

kW			**12**	**14**	**16**
Model name			M.HP12 DCI TRI	M.HP14 DCI TRI	M.HP16 DCI TRI
MOP		A	15.0	15.0	15.0
MCA		A	11.0	11.0	11.0
Water side heat exchanger			Plate type		
Water pump	Pump head	m	7.5	7.5	7.5
Expansion tank	Volume	L	5	5	5
Refrigerant	Type		R32		
	kWCharge	kg	2.8		
Throttle type			Electronic expansion valve		
Backup electric heater	Standard internal	kW	4.5	4.5	4.5
	Optional	kW	-	-	-
	Output steps		1	1	1
	Power supply	V/Ph/Hz	380-415/3/50		
Sound power level[8]		dB(A)	68	71	71
Net dimensions (W×H×D)		mm	1404×1414×405		
Packed dimensions (W×H×D)		mm	1475×1580×440		
Net/Gross weight		kg	172/193		
Water piping connections		mm	1-1/4“ Male BSP		
Safety valve set pressure		MPa	0.3		
Total water volume		L	3.2		
Operating temperature range	Cooling	°C	-5 to 46		
	Heating	°C	-25 to 35		
	DHW	°C	-25 to 43		
LWT range	Cooling	°C	5 to 25		
	Heating	°C	25 to 60		
	DHW	°C	40 to 60		

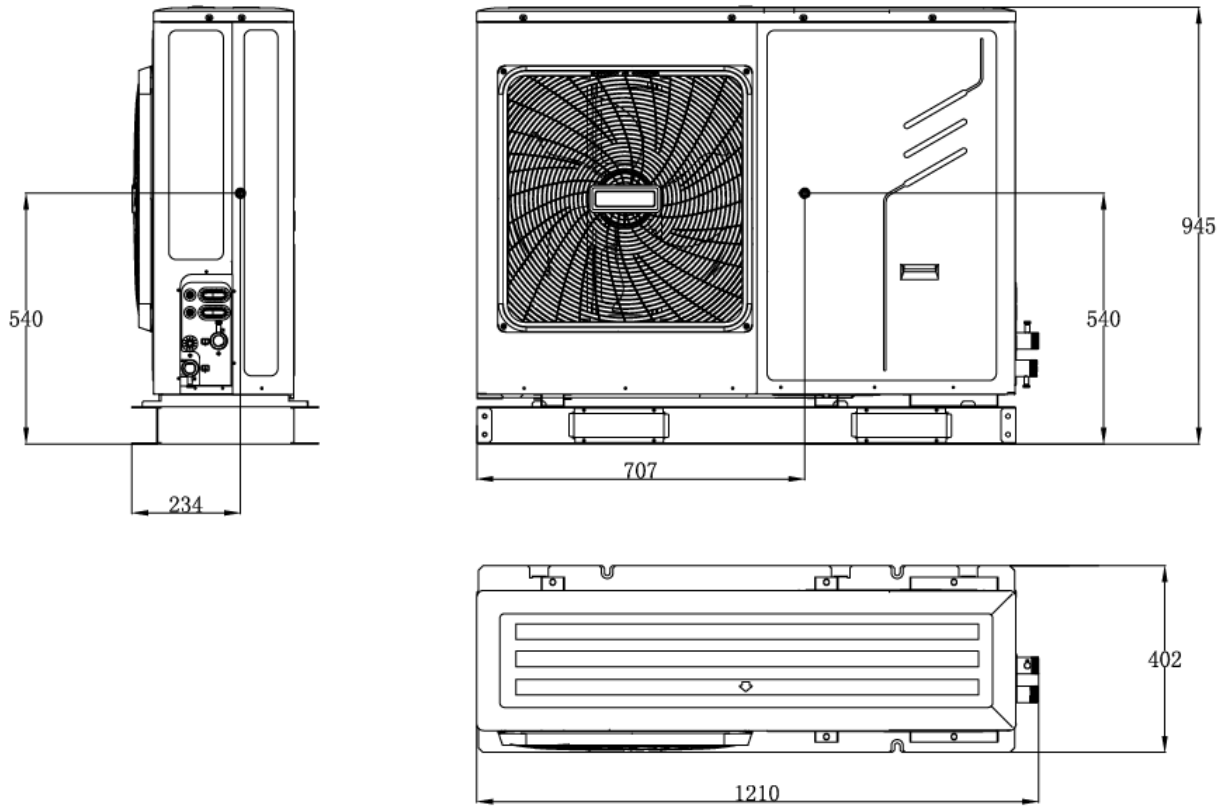
Abbreviations:
MOP: Maximum overcurrent protection
MCA: Minimum circuit amps
DHW: Domestic hot water
EWT: Entering water temperature
LWT: Leaving water temperature

Notes:
1. Relevant EU standards and legislation: EN14511:2013; EN14825:2013; EN50564:2011; EN12102:2011; (EU) No 811/2013; (EU) No 813/2013; OJ 2014/C 207/02.
2. Outdoor air temperature 7°C DB, 85% R.H.; EWT 30°C, LWT 35°C.
3. Outdoor air temperature 7°C DB, 85% R.H.; EWT 40°C, LWT 45°C.
4. Outdoor air temperature 7°C DB, 85% R.H.; EWT 47°C, LWT 55°C.
5. Outdoor air temperature 35°C DB; EWT 23°C, LWT 18°C.
6. Outdoor air temperature 35°C DB; EWT 12°C, LWT 7°C.
7. Seasonal space heating energy efficiency class tests in average climate conditions.
8. Sound power level is the maximum value tested under the three conditions of Notes1, Notes3 and Note5..

2 Dimensions and Center of Gravity

M.HP05 DCI MONO / M.HP07 DCI MONO / M.HP09 DCI MONO

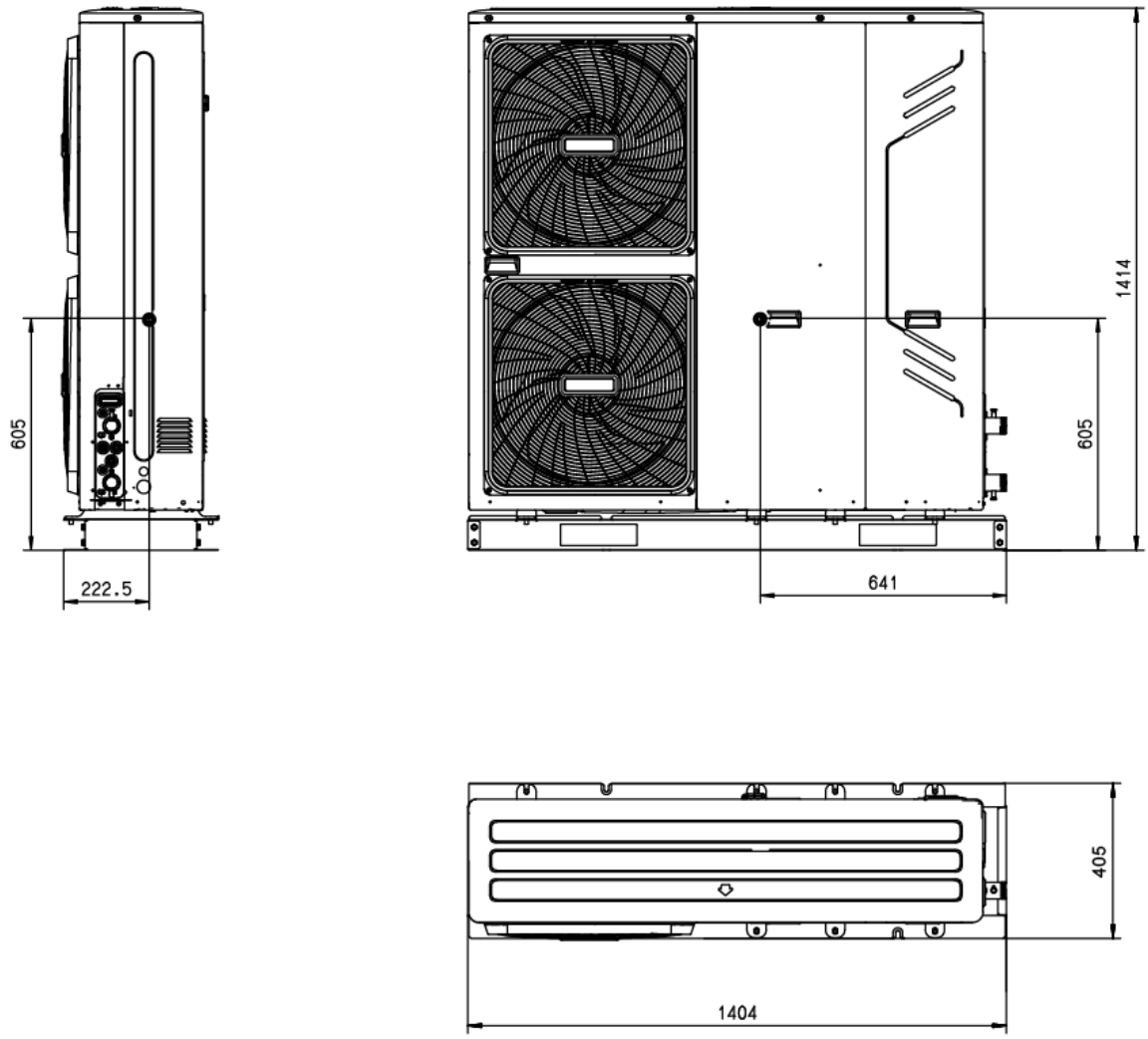
Figure 2-2.1: M.HP05/07/09 DCI MONO dimensions and center of gravity (unit: mm)



M.HP12 DCI MONO / M.HP14 DCI MONO /M.HP16 DCI MONO

M.HP12 DCI TRI / M.HP14 DCI TRI / M.HP16 DCI TRI

Figure 2-2.2: M.HP12/14/16 DCI MONO /TRI dimensions and center of gravity (unit: mm)

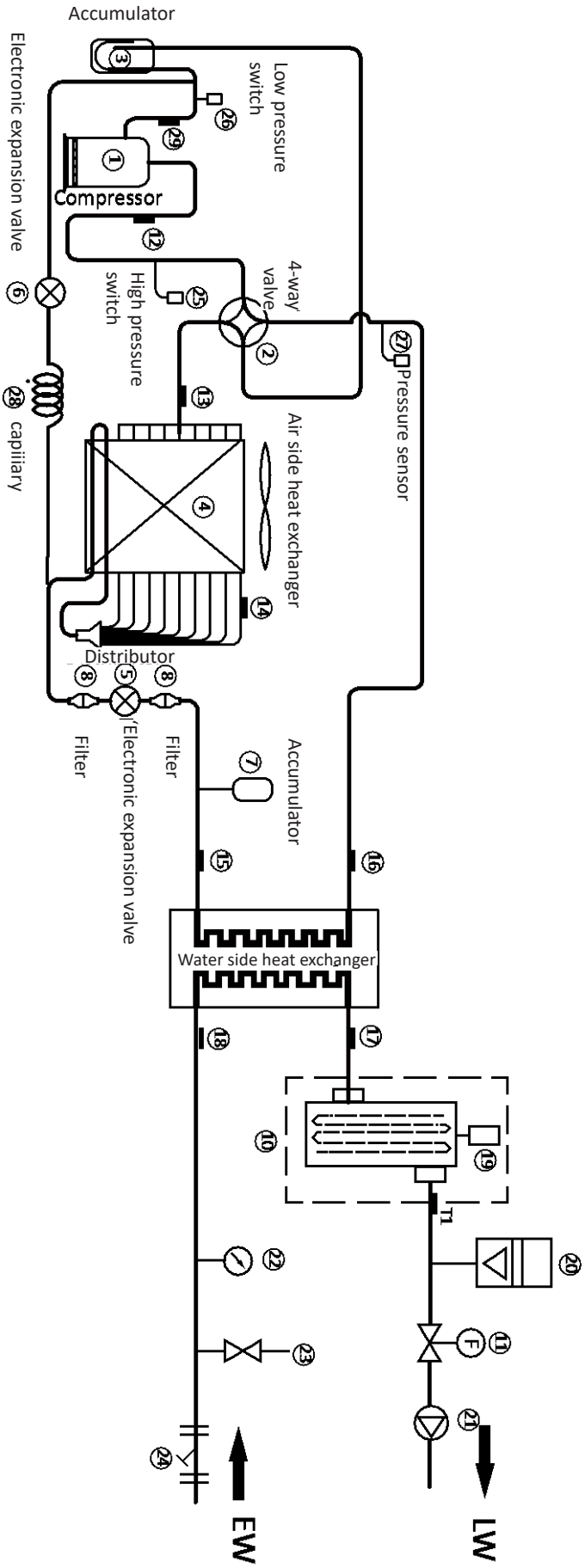


3 Piping Diagrams

M.HP05 DCI MONO / M.HP07 DCI MONO / M.HP09 DCI MONO

Figure 2-3.1: M.HP05/07/09 DCI MONO piping diagram

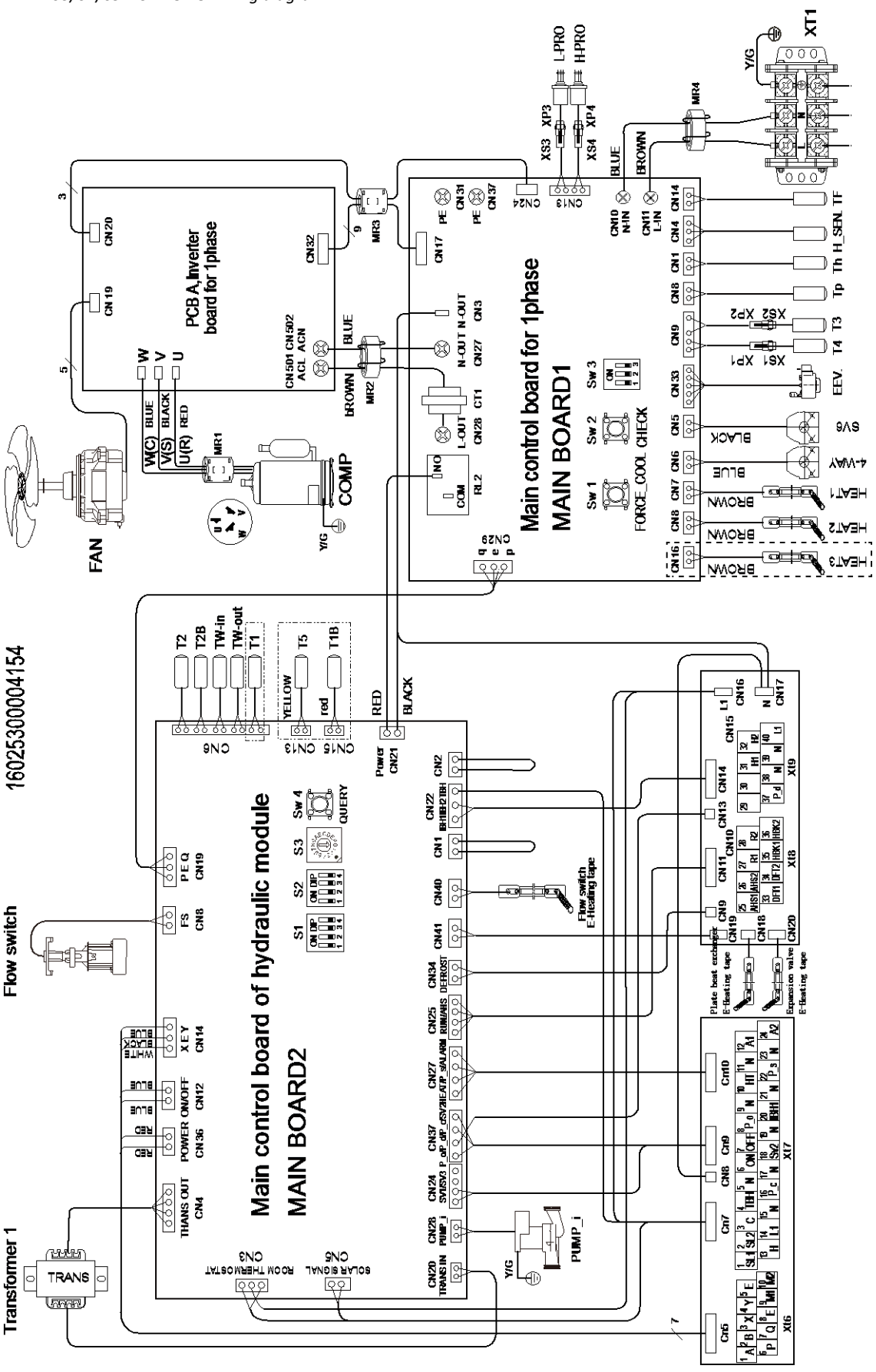
Legend	
1	Compressor
2	4-Way Valve
3	Gas-liquid separator
4	Air side heat exchanger
5	Electronic expansion Valve
6	Single-way electromagnetic valve
7	Liquid Tank
8	Strainer
9	Water Side Heat Exchanger (Plate Heat Exchange)
10	Backup heater (optional)
11	Flow switch
12	Discharge gas sensor
13	Outdoor temperature sensor
14	Evaporation sensor in heating (Condenser sensor in cooling)
15	Refrigerant inlet (liquid pipe) temp. sensor
16	Refrigerant outlet (gas pipe) temp. sensor
17	Water outlet temp. sensor
18	Water Inlet temp. sensor
19	Air purge valve
20	Expansion vessel
21	Circulating pump
22	Manometer
23	Safety valve
24	Y-shape filter
25	High Pressure Switch
26	Low Pressure Switch
27	Pressure valve
28	Capillary
29	Suction gas sensor



4 Wiring Diagrams

M.HP05 DCI MONO / M.HP07 DCI MONO / M.HP09 DCI MONO

Figure 2-4.1: M.HP05/07/09 DCI MONO wiring diagram



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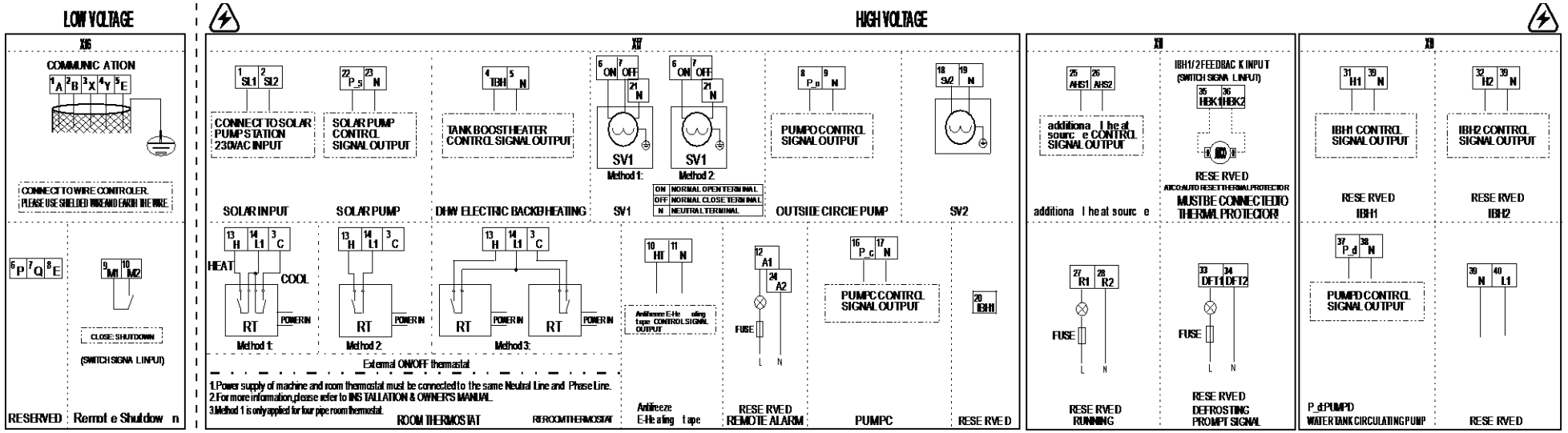

Figure 2-4.1: M.HP05/07/09 DCI MONO wiring diagram (continued)

MAIN BOARD 2	
Sequence	Content
0	Normal display :OFF:0;ON:T1 (Show TW_out When T1 invalid and including T1 is not set or T1 fault)
1	Mode (0/Off,2/Cool,3/Heat, 5/Heat water)
2	Capacity requirements
3	Capacity requirements (Correct)
4	T1
5	T1B
6	T1S
7	Ta
8	T5
9	T2
10	T2B
11	Tw_out
12	Tw_in
13	T4
14	Current IBH2
15	Current IBH1
16	Last fault
17	Last second failure
18	Last third failure
19	Software version
20	——

MAIN BOARD 2

	S1	ON	OFF
PIPE	DIP 1 2 3 4	50m	5m
T1	DIP 1 2 3 4	YES	NON
IBH1	DIP 1 2 3 4	YES	NON
IBH2	DIP 1 2 3 4	YES	NON

	S2	ON	OFF
T1B	DIP 1 2 3 4	YES	NON

FACTORY SETTING S1 S2

Set S3 to 0 S3

MAIN BOARD 1 FACTORY SETTING SW3

MAIN BOARD1	
Sequence	Content
0	Normal display: OFF:0; ON:frequency
1	Mode: 0:Off, 2:Cool 3:Heat,4:Force Cool
2	Fan speed
3	Capacity requirements
4	Capacity requirements (Correct)
5	T3
6	T4
7	Tp
8	Th
9	TF
10	Electric expansive valve
11	Input current
12	Compressor current
13	Input voltage
14	DC bus voltage
15	Pressure value
16	Software version
17	Last fault
18	——

Temp. Sensor code	Property values
T2/T2B	$B_{25/50}$=4100K, $R_{25℃}$=10kΩ
T1/T1B/T5/TW_out/TW_in	$B_{0/100}$=3970K, $R_{50℃}$=17.6kΩ
T3/T4/T5/T6	$B_{25/50}$=4100K, $R_{90℃}$=10kΩ
Tp	$B_{25/50}$=3950K, $R_{90℃}$=5kΩ

CODE	PART NAME
COMP.	Compressor
CT1	AC current detector
EEV.	Electric expansive valve
FAN	Outdoor fan motor
HEAT1/HEAT2	Compressor electric heating zone
H-PRO	High pressure switch
H-SEN	Pressure sensor
L-PRO	Low pressure switch
MR1-MR4	Magnetic ring
T3	Condenser temp. sensor
T4	Outdoor ambient temp. sensor
Tp	Comp. discharge temp. sensor
Th	Suction temp. sensor
XT1 XT6~XT9	Terminal blocks
4-WAY	4-Way valve

M.HP12 DCI MONO / M.HP14 DCI MONO / M.HP16 DCI MONO

Figure 2-4.2: M.HP12/14/16 DCI MONO wiring diagram

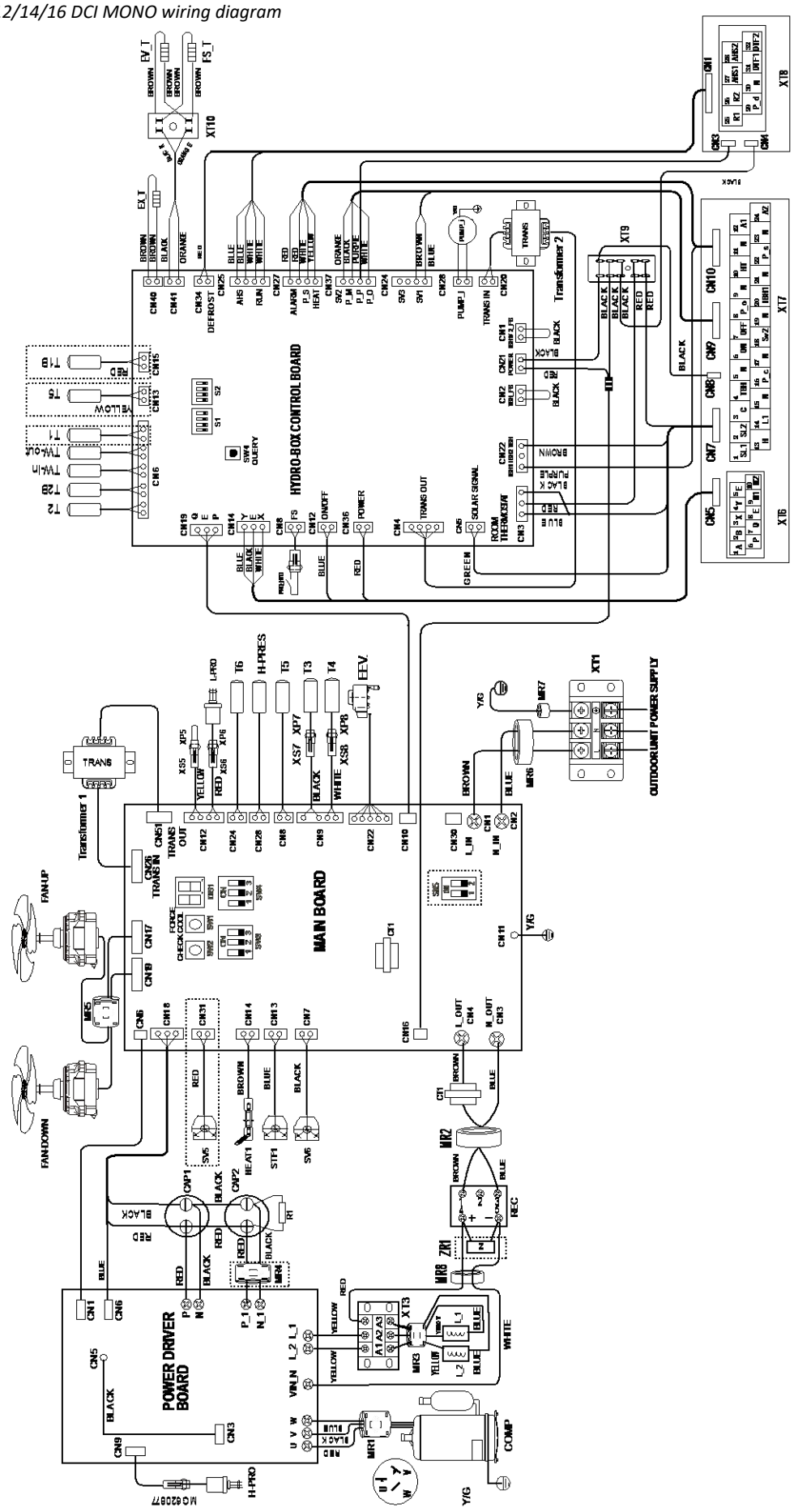

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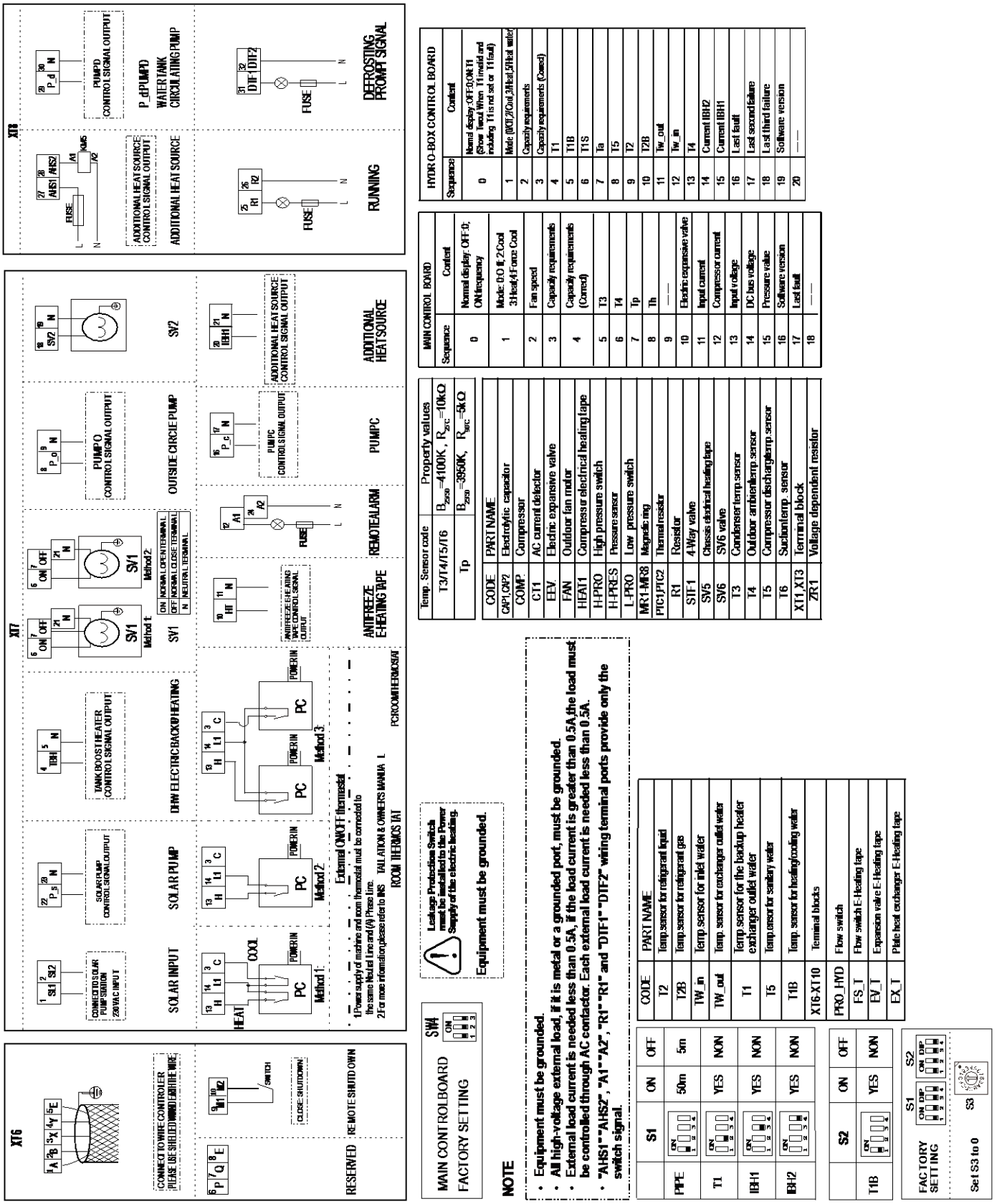
Figure 2-4.2: M.HP12/14/16 DCI MONO wiring diagram (continued)



Temp. Sensor code	Property values
T3/T4/T5/T6	$B_{25/50}$=4100K, $R_{25°C}$=10kΩ
Tp	$B_{25/50}$=3950K, $R_{25°C}$=5kΩ

CODE	PART NAME
CAP1,CAP2	Electrolytic capacitor
COMP	Compressor
CT1	AC current detector
EEV	Electric expansive valve
FAN	Outdoor fan motor
HEAT1	Compressor electrical heating tape
H-PRO	High pressure switch
H-PRES	Pressure sensor
L-PRO	Low pressure switch
MR1-MR8	Magnetic ring
PTC1,PTC2	Thermal resistor
R1	Resistor
STF1	4-Way valve
SV5	Chassis electrical heating tape
SV6	SV6 valve
T3	Condenser temp.sensor
T4	Outdoor ambient temp.sensor
T5	Compressor discharge temp.sensor
T6	Suction temp. sensor
XT1,XT3	Terminal block
ZR1	Voltage dependent resistor

MAIN CONTROL BOARD	
Sequence	Content
0	Normal display: OFF:0; ON:frequency
1	Mode: 0:O ff; 2:Cool 3:Heat;4:Force Cool
2	Fan speed
3	Capacity requirements
4	Capacity requirements (Correct)
5	T3
6	T4
7	Tp
8	Th
9	——
10	Electric expansive valve
11	Input current
12	Compressor current
13	Input voltage
14	DC bus voltage
15	Pressure value
16	Software version
17	Last fault
18	——

HYDR O-BOX CONTROL BOARD	
Sequence	Content
0	Normal display: OFF:0; ON:T11 (Show Nixout When T11invalid and including T11is nd set or T11fault)
1	Mode: (0:OT,2:Cool,3:Heat,5:Heat water
2	Capacity requirements
3	Capacity requirements (Corrected)
4	T1
5	T1B
6	T1S
7	Ta
8	T5
9	T2
10	T2B
11	Tw_out
12	Tw_in
13	T4
14	Current IBH2
15	Current IBH1
16	Last fault
17	Last second failure
18	Last third failure
19	Software version
20	——

NOTE

- **Equipment must be grounded.**
- **All high-voltage external load, if it is metal or a grounded port, must be grounded.**
- **External load current is needed less than 0.5A, if the load current is greater than 0.5A,the load must be controlled through AC contactor. Each external load current is needed less than 0.5A.**
- **"AHS1" "AHS2", "A1" "A2", "R1" "R1" and "DTF1" "DTF2" wiring terminal ports provide only the switch signal.**

	S1	ON	OFF
PIPE		50m	5m
T1		YES	NON
IBH1		YES	NON
IBH2		YES	NON

	S2	ON	OFF
T1B		YES	NON

CODE	PART NAME
T2	Temp.sensor for refrigerant liquid
T2B	Temp.sensor for refrigerant gas
TW_in	Temp.sensor for inlet water
TW_out	Temp. sensor for exchanger outlet water
T1	Temp.sensor for the backup heater exchanger outlet water
T5	Temp.sensor for sanitary water
T1B	Temp. sensor for heating/cooling water
X16-XT10	Terminal blocks
PRO_HYD	Flow switch
FS_T	Flow switch E-Heating tape
EV_T	Expansion valve E-Heating tape
EX_T	Plate heat exchanger E-Heating tape

FACTORY SETTING

S1

S2

S3

Set S3 to 0

M.HP12 DCI TRI / M.HP14 DCI TRI / M.HP16 DCI TRI

Figure 2-5.3 M.HP12/14/16 DCI TRI wiring diagram

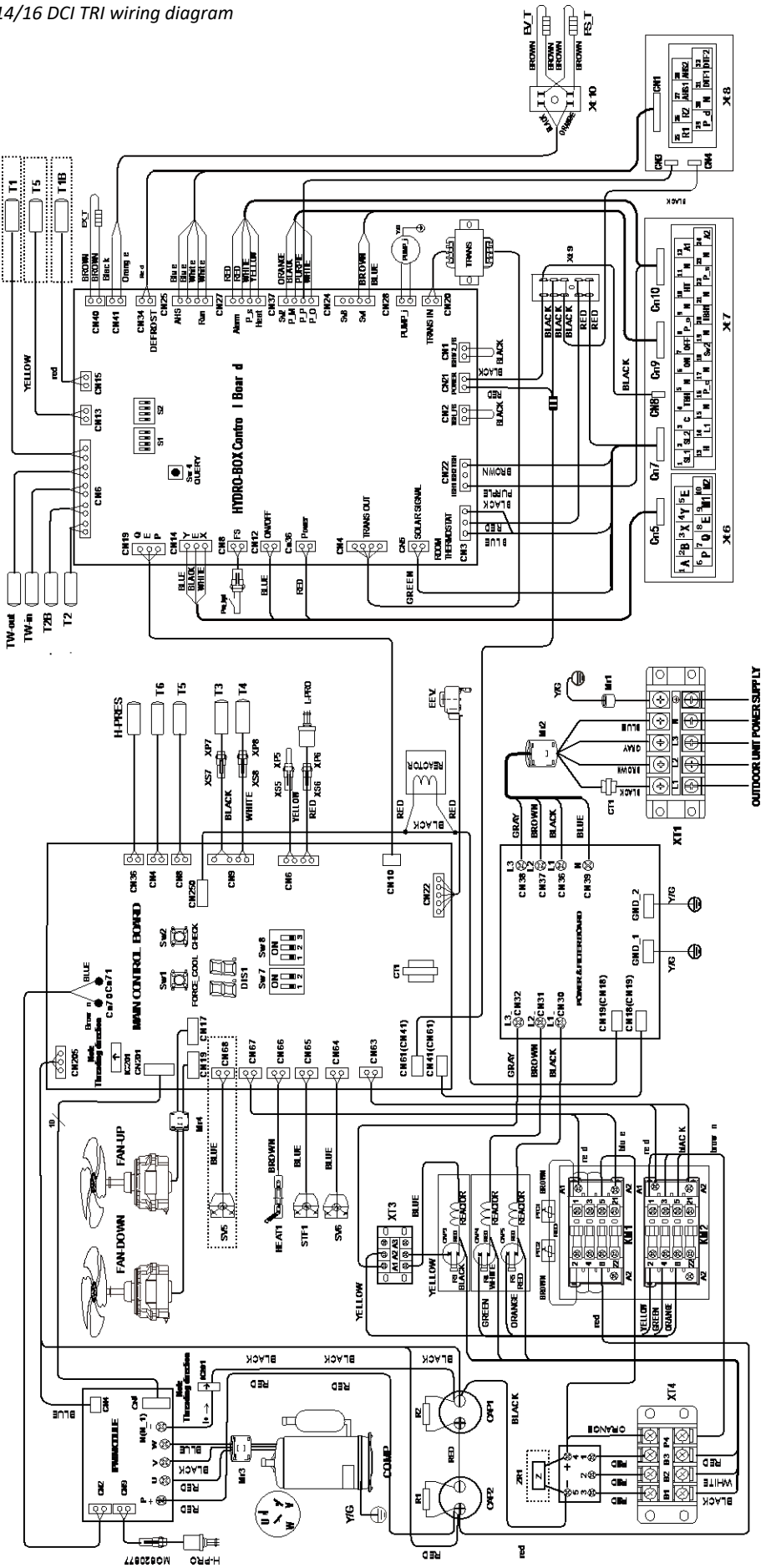


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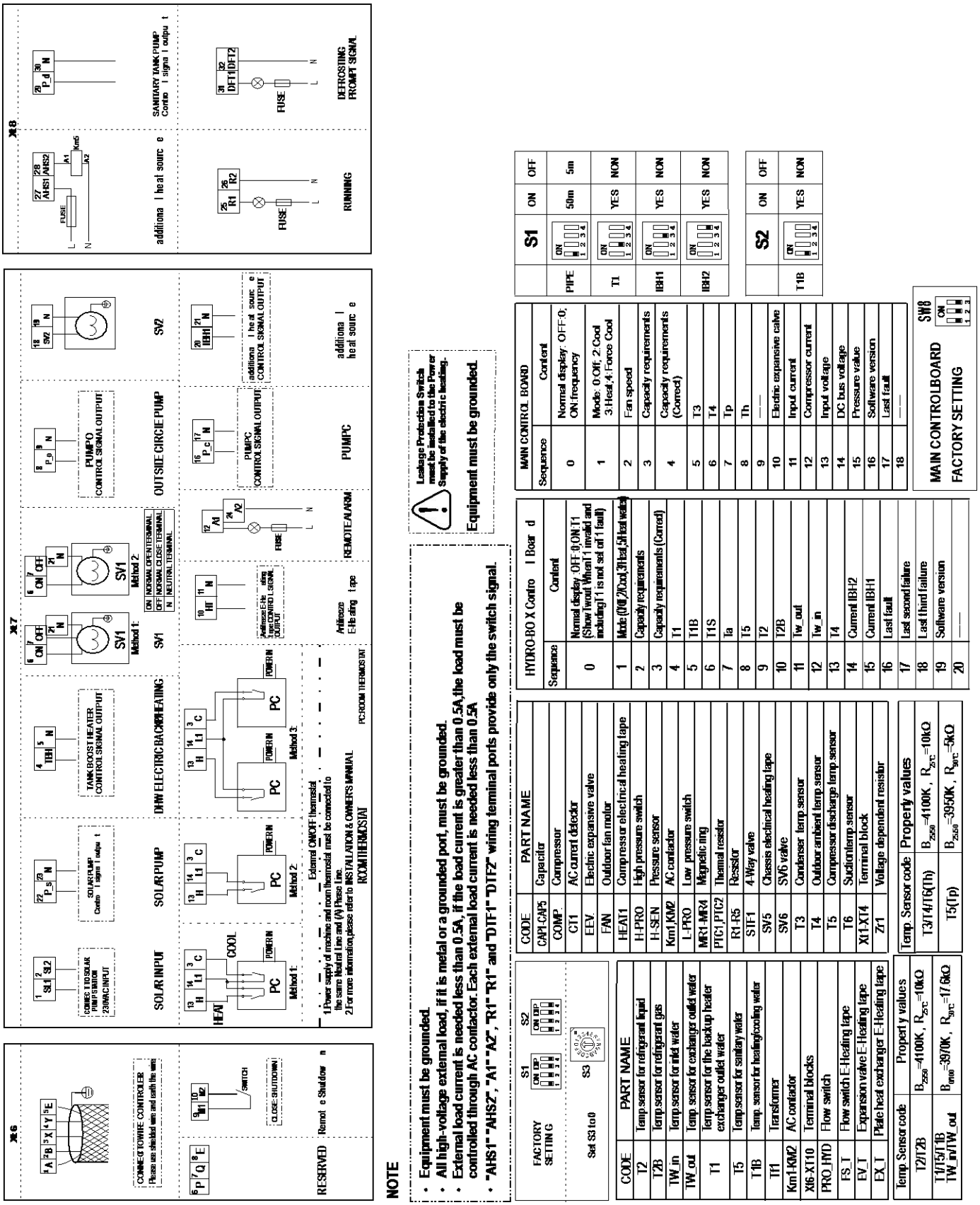
Figure 2-4.3 M.HP12/14/16 DCI TRI wiring diagram (continued)



CODE	PART NAME
T2	Temp.sensor for refrigerant liquid
T2B	Temp.sensor for refrigerant gas
TW_in	Temp.sensor for inlet water
TW_out	Temp.sensor for exchanger outlet water
T1	Temp.sensor for the backup heater exchanger outlet water
T5	Temp.sensor for sanitary water
T1B	Temp. sensor for heating/cooling water
Tf1	Transformer
Km1-KM2	AC contactor
X6-XT10	Terminal blocks
PRO_HYD	Flow switch
FS_T	Flow switch E-Heating tape
EV_T	Expansion valve E-Heating tape
EX_T	Plate heat exchanger E-Heating tape

Temp. Sensor code	Property values
T2/T2B	$B_{25/50}$=4100K, $R_{25℃}$=10kΩ
T1/T5/T1B TW_in/TW_out	$B_{0/100}$=3970K, $R_{30℃}$=17.6kΩ

Temp. Sensor code	Property values
T3/T4/T6(Th)	$B_{25/50}$=4100K, $R_{25℃}$=10kΩ
T5(Tp)	$B_{25/50}$=3950K, $R_{30℃}$=9kΩ

CODE	PART NAME
CAPI-CAPS	Capacitor
COMP.	Compressor
CT1	AC current detector
EEV	Electric expansive valve
FAN	Outdoor fan motor
HEAT1	Compressor electrical heating tape
H-PRO	High pressure switch
H-SEN	Pressure sensor
Km1,KM2	AC contactor
L-PRO	Low pressure switch
MR1-MR4	Magnetic ring
PTC1,PTC2	Thermal resistor
R1-R5	Resistor
STF1	4-Way valve
SV5	Chassis electrical heating tape
SV6	SV6 valve
T3	Condenser temp.sensor
T4	Outdoor ambient temp.sensor
T5	Compressor discharge temp.sensor
T6	Suction temp.sensor
X11-XT4	Terminal block
Zr1	Voltage dependent resistor

HYDRO-BOX Contro l Boar d		
Sequence	Content	
0	Normal display: OFF:0; ON:1	
	(Show 1 wout When T1 invalid and including T1 is not set on T1 fault)	
1	Mode: (0:Off, 2:Cool,3:Heat,5:Heat water)	
2	Capacity requirements	
3	Capacity requirements (Corrected)	
4	T1	
5	T1B	
6	T1S	
7	Ta	
8	T5	
9	T2	
10	T2B	
11	Tw_out	
12	Tw_in	
13	T4	
14	Current IBH2	
15	Current IBH1	
16	Last fault	
17	Last second failure	
18	Last third failure	
19	Software version	
20	——	

MAIN CONTROL BOARD	
Sequence	Content
0	Normal display: OFF:0; ON:frequency
1	Mode: 0:Off; 2:Cool 3:Heat;4:Force Cool
2	Fan speed
3	Capacity requirements
4	Capacity requirements (Corrected)
5	T3
6	T4
7	Tp
8	Th
9	——
10	Electric expansive valve
11	Input current
12	Compressor current
13	Input voltage
14	DC bus voltage
15	Pressure value
16	Software version
17	Last fault
18	——

5 Capacity Tables

5.1 Heating Capacity Tables

Table 2-5.1: M.HP05 DCI MONO heating capacity - peak values[1]

Outdoor air temp.		LWT (°C)																				
		30			35			40			45			50			55			60		
°C DB	°C WB	HC	PI	COP	HC	PI	COP	HC	PI	COP	HC	PI	COP	HC	PI	COP	HC	PI	COP	HC	PI	COP
-25.0	-	2.62	1.46	1.81	2.56	1.60	1.60															
-20.0	-	3.45	1.48	2.34	3.49	1.66	2.10	3.48	1.86	1.88												
-15.0	-	4.61	1.64	2.81	4.23	1.68	2.52	4.03	1.89	2.13	4.10	2.10	1.95	3.76	2.24	1.68						
-10	-11	5.52	1.61	3.43	5.14	1.73	2.97	4.66	1.90	2.45	4.55	2.04	2.23	4.14	2.18	1.90	3.25	2.25	1.47	1.93	1.65	1.21
-7.0	-8.0	5.83	1.60	3.64	5.42	1.74	3.12	4.85	1.89	2.57	4.73	1.98	2.38	4.23	2.13	1.98	3.83	2.27	1.69	2.32	1.66	1.39
-2.0	-3.0	5.42	1.29	4.22	5.31	1.47	3.61	5.15	1.66	3.10	4.63	1.73	2.68	4.51	1.91	2.36	4.27	2.05	2.08	2.50	1.49	1.69
0	-1	5.95	1.21	4.93	5.58	1.38	4.03	5.21	1.56	3.34	5.08	1.69	3.00	5.05	1.88	2.68	5.10	2.06	2.48	3.08	1.49	2.07
2.0	1.0	6.57	1.06	6.21	5.98	1.28	4.68	5.39	1.48	3.64	5.48	1.71	3.21	5.58	1.93	2.89	5.68	2.15	2.64	3.47	1.55	2.24
7.0	6.0	4.65	0.72	6.45	4.65	0.93	5.00	4.65	1.14	4.08	4.65	1.35	3.45	4.65	1.56	2.98	4.65	1.77	2.63	2.79	1.29	2.16
15.0	12.0	5.15	0.72	7.20	5.18	0.94	5.54	5.20	1.16	4.50	5.23	1.38	3.80	5.25	1.60	3.29	5.28	1.82	2.91	3.17	1.33	2.39
20.0	15.0	5.21	0.68	7.66	5.24	0.89	5.89	5.27	1.10	4.79	5.29	1.31	4.04	5.32	1.52	3.50	5.35	1.73	3.09	3.21	1.26	2.54
25.0	18.0	5.08	0.62	8.22	5.10	0.81	6.32	5.13	1.00	5.14	5.15	1.19	4.34	5.18	1.38	3.76	5.20	1.57	3.32	3.12	1.14	2.73
30.0	22.0	4.73	0.53	8.99	4.76	0.69	6.91	4.78	0.85	5.62	4.80	1.01	4.75	4.83	1.17	4.11	4.85	1.34	3.63	2.91	0.98	2.98
35.0	24.0	4.19	0.41	10.30	4.21	0.53	7.91	4.23	0.66	6.44	4.25	0.78	5.44	4.27	0.91	4.71	4.29	1.03	4.16			

Abbreviations:
LWT: Leaving water temperature (°C)
HC: Total heating capacity (kW)
PI: Power input (kW)

Notes:
1. Peak heating capacity values do not take account of capacity drops caused by frost accumulation and during defrosting.

Table 2-5.2: M.HP05 DCI MONO heating capacity - integrated values[1]

Outdoor air temp.		LWT (°C)																				
		30			35			40			45			50			55			60		
°C DB	°C WB	HC	PI	COP	HC	PI	COP	HC	PI	COP	HC	PI	COP	HC	PI	COP	HC	PI	COP	HC	PI	COP
-25.0	-	2.62	1.44	1.81	2.43	1.56	1.56															
-20.0	-	3.36	1.47	2.29	3.11	1.58	1.97	2.87	1.69	1.70												
-15.0	-	4.10	1.49	2.76	3.80	1.60	2.37	3.50	1.72	2.04	3.20	1.83	1.75	2.91	1.95	1.49						
-10	-11	4.84	1.51	3.21	4.49	1.63	2.76	4.14	1.74	2.37	3.78	1.86	2.03	3.43	1.98	1.74	3.08	2.09	1.47	1.85	1.53	1.21
-7.0	-8.0	5.29	1.52	3.47	4.90	1.64	2.99	4.52	1.76	2.57	4.13	1.87	2.20	3.75	1.99	1.88	3.36	2.11	1.59	2.02	1.54	1.31
-2.0	-3.0	4.80	1.21	3.96	4.67	1.38	3.39	4.54	1.54	2.95	4.42	1.71	2.59	4.29	1.87	2.29	4.16	2.04	2.04	2.50	1.49	1.68
0	-1	4.69	1.10	4.28	4.62	1.28	3.62	4.56	1.46	3.13	4.50	1.64	2.75	4.44	1.82	2.44	4.38	2.00	2.19	2.63	1.46	1.80
2.0	1.0	4.62	0.93	4.97	4.60	1.16	3.98	4.58	1.38	3.31	4.57	1.61	2.83	4.55	1.84	2.47	4.53	2.07	2.19	2.72	1.51	1.80
7.0	6.0	4.65	0.72	6.45	4.65	0.93	5.00	4.65	1.14	4.08	4.65	1.35	3.45	4.65	1.56	2.98	4.65	1.77	2.63	2.79	1.29	2.16
15.0	12.0	5.15	0.72	7.20	5.18	0.94	5.54	5.20	1.16	4.50	5.23	1.38	3.80	5.25	1.60	3.29	5.28	1.82	2.91	3.17	1.33	2.39
20.0	15.0	5.21	0.68	7.66	5.24	0.89	5.89	5.27	1.10	4.79	5.29	1.31	4.04	5.32	1.52	3.50	5.35	1.73	3.09	3.21	1.26	2.54
25.0	18.0	5.08	0.62	8.22	5.10	0.81	6.32	5.13	1.00	5.14	5.15	1.19	4.34	5.18	1.38	3.76	5.20	1.57	3.32	3.12	1.14	2.73
30.0	22.0	4.73	0.53	8.99	4.76	0.69	6.91	4.78	0.85	5.62	4.80	1.01	4.75	4.83	1.17	4.11	4.85	1.34	3.63	2.91	0.98	2.98
35.0	24.0	4.19	0.41	10.30	4.21	0.53	7.91	4.23	0.66	6.44	4.25	0.78	5.44	4.27	0.91	4.71	4.29	1.03	4.16			

Abbreviations:
LWT: Leaving water temperature (°C)
HC: Total heating capacity (kW)
PI: Power input (kW)

Notes:
1. Integrated heating capacity values take account of capacity drops caused by frost accumulation and during defrosting.

Table 2-5.3: M.HP07DCI MONO heating capacity - peak values[1]

Outdoor air temp.		LWT (°C)																				
		30			35			40			45			50			55			60		
°C DB	°C WB	HC	PI	COP	HC	PI	COP	HC	PI	COP	HC	PI	COP	HC	PI	COP	HC	PI	COP	HC	PI	COP
-25.0	-	3.49	1.99	1.78	3.37	2.11	1.60															
-20.0	-	4.59	2.01	2.29	4.59	2.19	2.10	4.52	2.38	1.91												
-15.0	-	6.14	2.23	2.76	5.57	2.21	2.52	5.23	2.42	2.16	5.24	2.63	2.00	4.70	2.73	1.72						
-10	-11	7.35	2.19	3.36	6.77	2.28	2.97	6.05	2.43	2.49	5.81	2.55	2.28	5.18	2.66	1.95	3.96	2.68	1.50	2.36	1.97	1.24
-7.0	-8.0	7.76	2.18	3.56	7.13	2.29	3.11	6.30	2.43	2.60	6.04	2.48	2.43	5.30	2.61	2.03	4.67	2.71	1.72	2.82	1.99	1.42
-2.0	-3.0	7.23	1.79	4.03	6.99	1.99	3.52	6.66	2.18	3.06	5.89	2.22	2.65	5.62	2.41	2.34	5.22	2.54	2.05	3.06	1.84	1.67
0	-1	8.00	1.70	4.69	7.40	1.89	3.92	6.82	2.07	3.29	6.55	2.20	2.97	6.42	2.40	2.67	6.38	2.59	2.46	3.85	1.87	2.06
2.0	1.0	8.94	1.53	5.85	8.05	1.76	4.59	7.19	1.97	3.66	7.25	2.21	3.28	7.30	2.45	2.97	7.34	2.69	2.73	4.50	1.95	2.31
7.0	6.0	6.61	1.08	6.13	6.65	1.35	4.94	6.69	1.62	4.14	6.73	1.89	3.57	6.76	2.16	3.14	6.80	2.42	2.81	4.08	1.77	2.31
15.0	12.0	7.32	1.08	6.81	7.40	1.36	5.45	7.48	1.64	4.57	7.56	1.92	3.94	7.64	2.20	3.47	7.72	2.48	3.11	4.63	1.81	2.56
20.0	15.0	7.41	1.02	7.24	7.50	1.29	5.80	7.58	1.56	4.86	7.66	1.83	4.19	7.74	2.09	3.69	7.82	2.36	3.31	4.69	1.72	2.72
25.0	18.0	7.22	0.93	7.76	7.29	1.17	6.22	7.37	1.42	5.21	7.45	1.66	4.49	7.53	1.90	3.96	7.61	2.14	3.55	4.56	1.56	2.92
30.0	22.0	6.73	0.79	8.50	6.80	1.00	6.81	6.87	1.21	5.70	6.95	1.41	4.92	7.02	1.62	4.33	7.09	1.83	3.88	4.26	1.33	3.19
35.0	24.0	5.95	0.61	9.73	6.02	0.77	7.80	6.08	0.93	6.53	6.15	1.09	5.63	6.21	1.25	4.96	6.28	1.41	4.45			

Abbreviations:
LWT: Leaving water temperature (°C)
HC: Total heating capacity (kW)
PI: Power input (kW)

Notes:
1. Peak heating capacity values do not take account of capacity drops caused by frost accumulation and during defrosting.

Table 2-5.4: M.HP07DCI MONO heating capacity - integrated values[1]

Outdoor air temp.		LWT (°C)																				
		30			35			40			45			50			55			60		
°C DB	°C WB	HC	PI	COP	HC	PI	COP	HC	PI	COP	HC	PI	COP	HC	PI	COP	HC	PI	COP	HC	PI	COP
-25.0	-	3.49	1.96	1.78	3.20	2.05	1.56															
-20.0	-	4.47	1.99	2.24	4.10	2.08	1.97	3.73	2.17	1.72												
-15.0	-	5.46	2.02	2.70	5.00	2.11	2.37	4.55	2.20	2.07	4.09	2.29	1.79	3.64	2.37	1.53						
-10	-11	6.45	2.05	3.14	5.91	2.14	2.76	5.37	2.23	2.41	4.83	2.32	2.08	4.29	2.41	1.78	3.76	2.50	1.50	2.25	1.82	1.24
-7.0	-8.0	7.04	2.08	3.39	6.45	2.16	2.98	5.86	2.25	2.60	5.27	2.34	2.25	4.68	2.43	1.93	4.10	2.52	1.63	2.46	1.84	1.34
-2.0	-3.0	6.41	1.69	3.79	6.14	1.86	3.31	5.88	2.02	2.90	5.62	2.19	2.56	5.35	2.36	2.27	5.09	2.52	2.02	3.05	1.84	1.66
0	-1	6.30	1.55	4.08	6.14	1.74	3.53	5.97	1.93	3.09	5.81	2.13	2.73	5.64	2.32	2.43	5.48	2.51	2.18	3.29	1.83	1.79
2.0	1.0	6.28	1.34	4.69	6.20	1.59	3.90	6.12	1.84	3.33	6.03	2.09	2.89	5.95	2.34	2.55	5.86	2.59	2.27	3.52	1.89	1.86
7.0	6.0	6.61	1.08	6.13	6.65	1.35	4.94	6.69	1.62	4.14	6.73	1.89	3.57	6.76	2.16	3.14	6.80	2.42	2.81	4.08	1.77	2.31
15.0	12.0	7.32	1.08	6.81	7.40	1.36	5.45	7.48	1.64	4.57	7.56	1.92	3.94	7.64	2.20	3.47	7.72	2.48	3.11	4.63	1.81	2.56
20.0	15.0	7.41	1.02	7.24	7.50	1.29	5.80	7.58	1.56	4.86	7.66	1.83	4.19	7.74	2.09	3.69	7.82	2.36	3.31	4.69	1.72	2.72
25.0	18.0	7.22	0.93	7.76	7.29	1.17	6.22	7.37	1.42	5.21	7.45	1.66	4.49	7.53	1.90	3.96	7.61	2.14	3.55	4.56	1.56	2.92
30.0	22.0	6.73	0.79	8.50	6.80	1.00	6.81	6.87	1.21	5.70	6.95	1.41	4.92	7.02	1.62	4.33	7.09	1.83	3.88	4.26	1.33	3.19
35.0	24.0	5.95	0.61	9.73	6.02	0.77	7.80	6.08	0.93	6.53	6.15	1.09	5.63	6.21	1.25	4.96	6.28	1.41	4.45			

Abbreviations:
LWT: Leaving water temperature (°C)
HC: Total heating capacity (kW)
PI: Power input (kW)

Notes:
1. Integrated heating capacity values take account of capacity drops caused by frost accumulation and during defrosting.

Table 2-5.5: M.HP09 DCI MONO heating capacity - peak values[1]

Outdoor air temp.		LWT (°C)																				
		30			35			40			45			50			55			60		
°C DB	°C WB	HC	PI	COP	HC	PI	COP	HC	PI	COP	HC	PI	COP	HC	PI	COP	HC	PI	COP	HC	PI	COP
-25.0	-	4.01	2.20	1.85	3.91	2.47	1.58															
-20.0	-	5.28	2.22	2.38	5.34	2.56	2.08	5.32	2.93	1.83												
-15.0	-	7.06	2.46	2.87	6.47	2.58	2.50	6.16	2.98	2.07	6.27	3.38	1.86	5.74	3.65	1.57						
-10	-11	8.46	2.42	3.49	7.87	2.67	2.95	7.13	2.99	2.38	6.96	3.28	2.12	6.32	3.55	1.78	4.96	3.72	1.36	2.95	2.73	1.12
-7.0	-8.0	8.93	2.41	3.70	8.29	2.68	3.09	7.42	2.99	2.49	7.23	3.19	2.27	6.47	3.48	1.86	5.85	3.75	1.56	3.54	2.75	1.29
-2.0	-3.0	7.66	2.10	3.65	7.72	2.43	3.17	7.68	2.77	2.78	7.11	2.91	2.45	7.12	3.23	2.21	6.95	3.48	2.00	4.07	2.53	1.62
0	-1	8.54	2.06	4.15	8.26	2.36	3.50	7.95	2.66	2.98	7.98	2.90	2.75	8.18	3.22	2.54	8.52	3.52	2.42	5.14	2.55	2.02
2.0	1.0	9.86	1.87	5.26	9.22	2.25	4.11	8.54	2.59	3.30	8.93	2.98	2.99	9.33	3.37	2.77	9.73	3.74	2.60	5.96	2.71	2.20
7.0	6.0	8.60	1.56	5.53	8.60	1.87	4.60	8.60	2.18	3.94	8.60	2.50	3.44	8.60	2.81	3.06	8.60	3.13	2.75	5.16	2.28	2.26
15.0	12.0	9.53	1.55	6.16	9.57	1.88	5.09	9.62	2.21	4.35	9.67	2.55	3.80	9.72	2.88	3.38	9.77	3.21	3.04	5.86	2.34	2.50
20.0	15.0	9.64	1.47	6.55	9.69	1.79	5.42	9.74	2.11	4.63	9.79	2.42	4.04	9.84	2.74	3.59	9.89	3.05	3.24	5.93	2.23	2.66
25.0	18.0	9.39	1.34	7.02	9.43	1.62	5.81	9.48	1.91	4.96	9.53	2.20	4.33	9.57	2.49	3.85	9.62	2.77	3.47	5.77	2.02	2.85
30.0	22.0	8.75	1.14	7.68	8.80	1.38	6.36	8.84	1.63	5.43	8.88	1.87	4.74	8.93	2.12	4.22	8.97	2.36	3.80	5.38	1.72	3.12
35.0	24.0	7.74	0.88	8.80	7.78	1.07	7.28	7.82	1.26	6.22	7.86	1.45	5.43	7.90	1.64	4.83	7.94	1.82	4.35			

Abbreviations:
LWT: Leaving water temperature (°C)
HC: Total heating capacity (kW)
PI: Power input (kW)

Notes:
1. Peak heating capacity values do not take account of capacity drops caused by frost accumulation and during defrosting.

Table 2-5.6: M.HP09 DCI MONO heating capacity - integrated values[1]

Outdoor air temp.		LWT (°C)																				
		30			35			40			45			50			55			60		
°C DB	°C WB	HC	PI	COP	HC	PI	COP	HC	PI	COP	HC	PI	COP	HC	PI	COP	HC	PI	COP	HC	PI	COP
-25.0	-	4.01	2.17	1.85	3.72	2.40	1.55															
-20.0	-	5.14	2.20	2.33	4.77	2.44	1.96	4.39	2.67	1.65												
-15.0	-	6.28	2.24	2.81	5.82	2.47	2.35	5.36	2.71	1.98	4.90	2.94	1.67	4.44	3.18	1.40						
-10	-11	7.41	2.27	3.26	6.87	2.51	2.74	6.33	2.75	2.30	5.78	2.98	1.94	5.24	3.22	1.63	4.70	3.46	1.36	2.82	2.53	1.12
-7.0	-8.0	8.09	2.30	3.52	7.50	2.53	2.96	6.91	2.77	2.49	6.31	3.01	2.10	5.72	3.25	1.76	5.13	3.49	1.47	3.08	2.54	1.21
-2.0	-3.0	6.79	1.98	3.43	6.79	2.28	2.98	6.78	2.57	2.64	6.78	2.87	2.36	6.78	3.16	2.14	6.78	3.46	1.96	4.07	2.53	1.61
0	-1	6.73	1.87	3.60	6.84	2.18	3.14	6.96	2.49	2.80	7.08	2.80	2.53	7.19	3.11	2.31	7.31	3.42	2.14	4.39	2.49	1.76
2.0	1.0	6.93	1.64	4.22	7.10	2.03	3.49	7.27	2.43	3.00	7.43	2.82	2.64	7.60	3.21	2.37	7.77	3.60	2.16	4.66	2.63	1.77
7.0	6.0	8.60	1.56	5.53	8.60	1.87	4.60	8.60	2.18	3.94	8.60	2.50	3.44	8.60	2.81	3.06	8.60	3.13	2.75	5.16	2.28	2.26
15.0	12.0	9.53	1.55	6.16	9.57	1.88	5.09	9.62	2.21	4.35	9.67	2.55	3.80	9.72	2.88	3.38	9.77	3.21	3.04	5.86	2.34	2.50
20.0	15.0	9.64	1.47	6.55	9.69	1.79	5.42	9.74	2.11	4.63	9.79	2.42	4.04	9.84	2.74	3.59	9.89	3.05	3.24	5.93	2.23	2.66
25.0	18.0	9.39	1.34	7.02	9.43	1.62	5.81	9.48	1.91	4.96	9.53	2.20	4.33	9.57	2.49	3.85	9.62	2.77	3.47	5.77	2.02	2.85
30.0	22.0	8.75	1.14	7.68	8.80	1.38	6.36	8.84	1.63	5.43	8.88	1.87	4.74	8.93	2.12	4.22	8.97	2.36	3.80	5.38	1.72	3.12
35.0	24.0	7.74	0.88	8.80	7.78	1.07	7.28	7.82	1.26	6.22	7.86	1.45	5.43	7.90	1.64	4.83	7.94	1.82	4.35			

Abbreviations:
LWT: Leaving water temperature (°C)
HC: Total heating capacity (kW)
PI: Power input (kW)

Notes:
1. Integrated heating capacity values take account of capacity drops caused by frost accumulation and during defrosting.

Table 2-5.7: M.HP12 DCI MONO heating capacity - peak values[1]

Outdoor air temp.		LWT (°C)																				
		30			35			40			45			50			55			60		
°C DB	°C WB	HC	PI	COP	HC	PI	COP	HC	PI	COP	HC	PI	COP	HC	PI	COP	HC	PI	COP	HC	PI	COP
-25.0	-	6.40	4.01	1.62	6.26	4.19	1.49															
-20.0	-	8.43	4.05	2.08	8.54	4.35	1.97	8.55	4.66	1.84												
-15.0	-	11.26	4.49	2.51	10.35	4.38	2.36	9.89	4.75	2.08	10.11	5.08	1.99	9.30	5.21	1.79						
-10	-11	13.49	4.41	3.06	12.59	4.52	2.78	11.44	4.76	2.40	11.21	4.93	2.28	10.24	5.08	2.02	8.08	5.07	1.62	4.81	3.72	1.33
-7.0	-8.0	14.24	4.39	3.24	13.27	4.54	2.92	11.92	4.75	2.52	11.66	4.79	2.43	10.48	4.97	2.11	9.53	5.12	1.86	5.77	3.75	1.54
-2.0	-3.0	14.02	3.70	3.79	13.78	4.00	3.45	13.38	4.29	3.12	12.07	4.30	2.81	11.77	4.59	2.56	11.18	4.79	2.34	6.55	3.47	1.90
0	-1	15.63	3.52	4.44	14.66	3.79	3.87	13.70	4.07	3.37	13.35	4.24	3.15	13.28	4.56	2.92	13.42	4.84	2.77	8.10	3.50	2.31
2.0	1.0	17.46	3.43	5.09	15.85	3.76	4.21	14.26	4.07	3.51	14.48	4.45	3.25	14.70	4.83	3.04	14.92	5.20	2.87	9.13	3.76	2.43
7.0	6.0	12.40	2.13	5.83	12.30	2.56	4.81	12.20	2.99	4.08	12.10	3.42	3.54	12.00	3.85	3.12	11.90	4.28	2.78	7.14	3.12	2.28
15.0	12.0	13.74	2.12	6.48	13.69	2.57	5.32	13.65	3.03	4.51	13.60	3.48	3.91	13.56	3.94	3.45	13.51	4.39	3.08	8.11	3.20	2.53
20.0	15.0	13.91	2.02	6.89	13.86	2.45	5.66	13.82	2.88	4.80	13.77	3.31	4.16	13.73	3.75	3.66	13.68	4.18	3.27	8.21	3.05	2.69
25.0	18.0	13.54	1.83	7.39	13.49	2.22	6.07	13.45	2.62	5.14	13.40	3.01	4.46	13.36	3.40	3.93	13.31	3.79	3.51	7.99	2.77	2.89
30.0	22.0	12.62	1.56	8.09	12.58	1.89	6.64	12.54	2.23	5.63	12.50	2.56	4.88	12.46	2.90	4.30	12.42	3.23	3.84	7.45	2.36	3.16
35.0	24.0	11.17	1.21	9.26	11.13	1.46	7.61	11.09	1.72	6.44	11.06	1.98	5.59	11.02	2.24	4.93	10.98	2.50	4.40			

Abbreviations:
LWT: Leaving water temperature (°C)
HC: Total heating capacity (kW)
PI: Power input (kW)

Notes:
1. Peak heating capacity values do not take account of capacity drops caused by frost accumulation and during defrosting.

Table 2-5.8: M.HP12 DCI MONO heating capacity - integrated values[1]

Outdoor air temp.		LWT (°C)																				
		30			35			40			45			50			55			60		
°C DB	°C WB	HC	PI	COP	HC	PI	COP	HC	PI	COP	HC	PI	COP	HC	PI	COP	HC	PI	COP	HC	PI	COP
-25.0	-	6.40	3.96	1.62	5.95	4.07	1.46															
-20.0	-	8.21	4.02	2.04	7.63	4.13	1.85	7.05	4.24	1.66												
-15.0	-	10.02	4.08	2.46	9.31	4.19	2.22	8.60	4.31	2.00	7.90	4.42	1.79	7.19	4.54	1.59						
-10	-11	11.83	4.14	2.86	10.99	4.25	2.58	10.16	4.37	2.32	9.33	4.49	2.08	8.49	4.60	1.84	7.66	4.72	1.62	4.59	3.45	1.33
-7.0	-8.0	12.91	4.17	3.09	12.00	4.29	2.80	11.09	4.41	2.52	10.18	4.52	2.25	9.27	4.64	2.00	8.36	4.76	1.76	5.02	3.47	1.44
-2.0	-3.0	12.42	3.49	3.56	12.11	3.74	3.24	11.81	3.99	2.96	11.50	4.24	2.71	11.20	4.50	2.49	10.89	4.75	2.29	6.54	3.47	1.89
0	-1	12.32	3.20	3.85	12.16	3.50	3.48	12.00	3.80	3.16	11.84	4.10	2.89	11.67	4.40	2.66	11.51	4.70	2.45	6.91	3.43	2.02
2.0	1.0	12.28	3.01	4.08	12.20	3.41	3.58	12.13	3.80	3.19	12.05	4.20	2.87	11.98	4.60	2.60	11.90	5.00	2.38	7.14	3.65	1.96
7.0	6.0	12.40	2.13	5.83	12.30	2.56	4.81	12.20	2.99	4.08	12.10	3.42	3.54	12.00	3.85	3.12	11.90	4.28	2.78	7.14	3.12	2.28
15.0	12.0	13.74	2.12	6.48	13.69	2.57	5.32	13.65	3.03	4.51	13.60	3.48	3.91	13.56	3.94	3.45	13.51	4.39	3.08	8.11	3.20	2.53
20.0	15.0	13.91	2.02	6.89	13.86	2.45	5.66	13.82	2.88	4.80	13.77	3.31	4.16	13.73	3.75	3.66	13.68	4.18	3.27	8.21	3.05	2.69
25.0	18.0	13.54	1.83	7.39	13.49	2.22	6.07	13.45	2.62	5.14	13.40	3.01	4.46	13.36	3.40	3.93	13.31	3.79	3.51	7.99	2.77	2.89
30.0	22.0	12.62	1.56	8.09	12.58	1.89	6.64	12.54	2.23	5.63	12.50	2.56	4.88	12.46	2.90	4.30	12.42	3.23	3.84	7.45	2.36	3.16
35.0	24.0	11.17	1.21	9.26	11.13	1.46	7.61	11.09	1.72	6.44	11.06	1.98	5.59	11.02	2.24	4.93	10.98	2.50	4.40			

Abbreviations:
LWT: Leaving water temperature (°C)
HC: Total heating capacity (kW)
PI: Power input (kW)

Notes:
1. Integrated heating capacity values take account of capacity drops caused by frost accumulation and during defrosting.

Table 2-5.9: M.HP14 DCI MONO heating capacity - peak values[1]

Outdoor air temp.		LWT (°C)																				
		30			35			40			45			50			55			60		
°C DB	°C WB	HC	PI	COP	HC	PI	COP	HC	PI	COP	HC	PI	COP	HC	PI	COP	HC	PI	COP	HC	PI	COP
-25.0	-	6.72	4.25	1.60	6.68	4.49	1.49															
-20.0	-	8.85	4.29	2.06	9.11	4.66	1.96	9.28	5.04	1.85												
-15.0	-	11.83	4.76	2.48	11.04	4.70	2.35	10.74	5.14	2.09	11.21	5.55	2.02	10.56	5.74	1.84						
-10	-11	14.17	4.68	3.03	13.43	4.85	2.77	12.43	5.16	2.41	12.43	5.38	2.31	11.63	5.60	2.08	9.44	5.63	1.71	5.62	4.14	1.40
-7.0	-8.0	14.95	4.66	3.21	14.15	4.87	2.90	12.94	5.14	2.52	12.92	5.24	2.47	11.90	5.49	2.17	11.14	5.69	1.96	6.74	4.17	1.62
-2.0	-3.0	14.47	3.97	3.64	14.37	4.35	3.30	14.09	4.72	2.99	12.85	4.77	2.70	12.68	5.13	2.47	12.19	5.38	2.26	7.14	3.90	1.84
0	-1	16.25	3.83	4.24	15.39	4.17	3.69	14.51	4.52	3.21	14.28	4.76	3.00	14.35	5.14	2.79	14.64	5.50	2.66	8.83	3.98	2.22
2.0	1.0	18.44	3.63	5.07	16.89	4.04	4.18	15.33	4.41	3.48	15.71	4.87	3.23	16.09	5.32	3.03	16.47	5.76	2.86	10.08	4.16	2.42
7.0	6.0	14.08	2.54	5.55	14.10	3.07	4.60	14.13	3.59	3.93	14.15	4.12	3.44	14.18	4.65	3.05	14.20	5.17	2.75	8.52	3.78	2.26
15.0	12.0	15.59	2.53	6.16	15.70	3.09	5.09	15.80	3.64	4.34	15.91	4.19	3.79	16.02	4.75	3.37	16.13	5.30	3.04	9.68	3.87	2.50
20.0	15.0	15.78	2.41	6.55	15.89	2.94	5.41	16.00	3.46	4.62	16.11	3.99	4.04	16.22	4.52	3.59	16.32	5.05	3.24	9.79	3.68	2.66
25.0	18.0	15.36	2.19	7.02	15.47	2.67	5.80	15.57	3.14	4.95	15.68	3.62	4.33	15.78	4.10	3.85	15.89	4.58	3.47	9.53	3.34	2.85
30.0	22.0	14.32	1.86	7.68	14.42	2.27	6.35	14.52	2.68	5.42	14.62	3.09	4.74	14.72	3.49	4.21	14.81	3.90	3.80	8.89	2.85	3.12
35.0	24.0	12.67	1.44	8.80	12.76	1.75	7.27	12.84	2.07	6.21	12.93	2.38	5.42	13.02	2.70	4.82	13.11	3.01	4.35			

Abbreviations:
LWT: Leaving water temperature (°C)
HC: Total heating capacity (kW)
PI: Power input (kW)

Notes:
1. Peak heating capacity values do not take account of capacity drops caused by frost accumulation and during defrosting.

Table 2-5.10: M.HP14 DCI MONO heating capacity - integrated values[1]

Outdoor air temp.		LWT (°C)																				
		30			35			40			45			50			55			60		
°C DB	°C WB	HC	PI	COP	HC	PI	COP	HC	PI	COP	HC	PI	COP	HC	PI	COP	HC	PI	COP	HC	PI	COP
-25.0	-	6.72	4.20	1.60	6.34	4.36	1.45															
-20.0	-	8.62	4.26	2.02	8.14	4.43	1.84	7.66	4.60	1.67												
-15.0	-	10.52	4.33	2.43	9.93	4.50	2.21	9.34	4.66	2.00	8.76	4.83	1.81	8.17	5.00	1.63						
-10	-11	12.42	4.39	2.83	11.73	4.56	2.57	11.03	4.73	2.33	10.34	4.90	2.11	9.64	5.07	1.90	8.95	5.25	1.71	5.37	3.83	1.40
-7.0	-8.0	13.56	4.43	3.06	12.80	4.60	2.78	12.04	4.77	2.52	11.29	4.95	2.28	10.53	5.12	2.06	9.77	5.29	1.85	5.86	3.86	1.52
-2.0	-3.0	12.82	3.75	3.42	12.63	4.07	3.11	12.44	4.39	2.84	12.25	4.71	2.60	12.07	5.02	2.40	11.88	5.34	2.22	7.13	3.90	1.83
0	-1	12.81	3.48	3.69	12.76	3.85	3.32	12.71	4.22	3.01	12.66	4.59	2.76	12.61	4.96	2.54	12.56	5.34	2.35	7.53	3.89	1.93
2.0	1.0	12.96	3.19	4.07	13.00	3.66	3.56	13.04	4.13	3.16	13.07	4.59	2.85	13.11	5.06	2.59	13.14	5.53	2.38	7.89	4.04	1.95
7.0	6.0	14.08	2.54	5.55	14.10	3.07	4.60	14.13	3.59	3.93	14.15	4.12	3.44	14.18	4.65	3.05	14.20	5.17	2.75	8.52	3.78	2.26
15.0	12.0	15.59	2.53	6.16	15.70	3.09	5.09	15.80	3.64	4.34	15.91	4.19	3.79	16.02	4.75	3.37	16.13	5.30	3.04	9.68	3.87	2.50
20.0	15.0	15.78	2.41	6.55	15.89	2.94	5.41	16.00	3.46	4.62	16.11	3.99	4.04	16.22	4.52	3.59	16.32	5.05	3.24	9.79	3.68	2.66
25.0	18.0	15.36	2.19	7.02	15.47	2.67	5.80	15.57	3.14	4.95	15.68	3.62	4.33	15.78	4.10	3.85	15.89	4.58	3.47	9.53	3.34	2.85
30.0	22.0	14.32	1.86	7.68	14.42	2.27	6.35	14.52	2.68	5.42	14.62	3.09	4.74	14.72	3.49	4.21	14.81	3.90	3.80	8.89	2.85	3.12
35.0	24.0	12.67	1.44	8.80	12.76	1.75	7.27	12.84	2.07	6.21	12.93	2.38	5.42	13.02	2.70	4.82	13.11	3.01	4.35			

Abbreviations:
LWT: Leaving water temperature (°C)
HC: Total heating capacity (kW)
PI: Power input (kW)

Notes:
1. Integrated heating capacity values take account of capacity drops caused by frost accumulation and during defrosting.

Table 2-5.11: M.HP16 DCI MONO heating capacity - peak values[1]

Outdoor air temp.		LWT (°C)																				
		30			35			40			45			50			55			60		
°C DB	°C WB	HC	PI	COP	HC	PI	COP	HC	PI	COP	HC	PI	COP	HC	PI	COP	HC	PI	COP	HC	PI	COP
-25.0	-	7.07	4.50	1.59	7.05	4.80	1.47															
-20.0	-	9.31	4.54	2.05	9.61	4.97	1.93	9.82	5.42	1.82												
-15.0	-	12.44	5.04	2.47	11.65	5.02	2.32	11.36	5.53	2.06	11.90	6.01	1.98	11.25	6.26	1.80						
-10	-11	14.90	4.96	3.01	14.16	5.17	2.74	13.14	5.54	2.37	13.19	5.83	2.26	12.39	6.10	2.03	10.10	6.18	1.66	6.01	4.53	1.37
-7.0	-8.0	15.73	4.93	3.19	14.93	5.20	2.87	13.69	5.53	2.48	13.71	5.67	2.42	12.68	5.98	2.12	11.92	6.24	1.91	7.21	4.57	1.58
-2.0	-3.0	16.61	4.50	3.69	16.15	4.90	3.30	15.50	5.29	2.93	13.81	5.32	2.60	13.30	5.70	2.33	12.46	5.97	2.09	7.30	4.32	1.70
0	-1	19.02	4.44	4.28	17.58	4.78	3.67	16.17	5.13	3.15	15.51	5.36	2.89	15.17	5.76	2.63	15.06	6.13	2.46	9.09	4.43	2.05
2.0	1.0	21.78	4.65	4.69	19.49	4.96	3.93	17.27	5.24	3.29	17.28	5.64	3.06	17.26	6.02	2.87	17.23	6.40	2.69	10.55	4.63	2.28
7.0	6.0	16.35	3.10	5.27	16.30	3.66	4.45	16.25	4.22	3.85	16.20	4.79	3.39	16.15	5.35	3.02	16.10	5.91	2.73	9.66	4.31	2.24
15.0	12.0	18.11	3.08	5.87	18.15	3.68	4.93	18.18	4.28	4.25	18.22	4.87	3.74	18.25	5.47	3.34	18.28	6.06	3.02	10.97	4.42	2.48
20.0	15.0	18.34	2.94	6.25	18.37	3.50	5.25	18.41	4.07	4.52	18.44	4.64	3.98	18.47	5.20	3.55	18.51	5.77	3.21	11.11	4.21	2.64
25.0	18.0	17.85	2.66	6.70	17.88	3.18	5.63	17.91	3.69	4.85	17.95	4.21	4.27	17.98	4.72	3.81	18.01	5.23	3.44	10.81	3.82	2.83
30.0	22.0	16.64	2.27	7.33	16.67	2.71	6.16	16.70	3.15	5.31	16.73	3.58	4.67	16.77	4.02	4.17	16.80	4.46	3.77	10.08	3.26	3.09
35.0	24.0	14.72	1.75	8.39	14.75	2.09	7.05	14.78	2.43	6.08	14.80	2.77	5.35	14.83	3.11	4.77	14.86	3.45	4.31			

Abbreviations:
LWT: Leaving water temperature (°C)
HC: Total heating capacity (kW)
PI: Power input (kW)

Notes:
1. Peak heating capacity values do not take account of capacity drops caused by frost accumulation and during defrosting.

Table 2-5.12:M.HP16 DCI MONO heating capacity - integrated values[1]

Outdoor air temp.		LWT (°C)																				
		30			35			40			45			50			55			60		
°C DB	°C WB	HC	PI	COP	HC	PI	COP	HC	PI	COP	HC	PI	COP	HC	PI	COP	HC	PI	COP	HC	PI	COP
-25.0	-	7.07	4.45	1.59	6.69	4.66	1.44															
-20.0	-	9.07	4.51	2.01	8.58	4.73	1.82	8.10	4.94	1.64												
-15.0	-	11.07	4.58	2.42	10.47	4.80	2.18	9.88	5.02	1.97	9.29	5.23	1.78	8.70	5.45	1.60						
-10	-11	13.07	4.65	2.81	12.37	4.87	2.54	11.67	5.09	2.29	10.97	5.31	2.07	10.27	5.53	1.86	9.57	5.75	1.66	5.74	4.20	1.37
-7.0	-8.0	14.26	4.69	3.04	13.50	4.91	2.75	12.74	5.13	2.48	11.98	5.36	2.24	11.21	5.58	2.01	10.45	5.80	1.80	6.27	4.23	1.48
-2.0	-3.0	14.71	4.24	3.47	14.20	4.58	3.10	13.69	4.92	2.78	13.17	5.25	2.51	12.66	5.59	2.27	12.14	5.92	2.05	7.29	4.32	1.69
0	-1	14.99	4.03	3.72	14.57	4.41	3.30	14.16	4.80	2.95	13.75	5.18	2.65	13.33	5.56	2.40	12.92	5.95	2.17	7.75	4.34	1.79
2.0	1.0	15.31	4.08	3.76	15.00	4.49	3.34	14.69	4.91	2.99	14.38	5.32	2.70	14.07	5.74	2.45	13.76	6.15	2.24	8.25	4.49	1.84
7.0	6.0	16.35	3.10	5.27	16.30	3.66	4.45	16.25	4.22	3.85	16.20	4.79	3.39	16.15	5.35	3.02	16.10	5.91	2.73	9.66	4.31	2.24
15.0	12.0	18.11	3.08	5.87	18.15	3.68	4.93	18.18	4.28	4.25	18.22	4.87	3.74	18.25	5.47	3.34	18.28	6.06	3.02	10.97	4.42	2.48
20.0	15.0	18.34	2.94	6.25	18.37	3.50	5.25	18.41	4.07	4.52	18.44	4.64	3.98	18.47	5.20	3.55	18.51	5.77	3.21	11.11	4.21	2.64
25.0	18.0	17.85	2.66	6.70	17.88	3.18	5.63	17.91	3.69	4.85	17.95	4.21	4.27	17.98	4.72	3.81	18.01	5.23	3.44	10.81	3.82	2.83
30.0	22.0	16.64	2.27	7.33	16.67	2.71	6.16	16.70	3.15	5.31	16.73	3.58	4.67	16.77	4.02	4.17	16.80	4.46	3.77	10.08	3.26	3.09
35.0	24.0	14.72	1.75	8.39	14.75	2.09	7.05	14.78	2.43	6.08	14.80	2.77	5.35	14.83	3.11	4.77	14.86	3.45	4.31	8.92	2.52	3.54

Abbreviations:
LWT: Leaving water temperature (°C)
HC: Total heating capacity (kW)
PI: Power input (kW)

Notes:
1. Integrated heating capacity values take account of capacity drops caused by frost accumulation and during defrosting.

Table 2-5.13: M.HP12 DCI TRI heating capacity - peak values[1]

Outdoor air temp.		LWT (°C)																				
		30			35			40			45			50			55			60		
°C DB	°C WB	HC	PI	COP	HC	PI	COP	HC	PI	COP	HC	PI	COP	HC	PI	COP	HC	PI	COP	HC	PI	COP
-25.0	-	6.40	3.93	1.65	6.26	4.12	1.52															
-20.0	-	8.43	3.96	2.13	8.54	4.27	2.00	8.55	4.60	1.86												
-15.0	-	11.26	4.39	2.56	10.35	4.31	2.40	9.89	4.69	2.11	10.11	5.04	2.01	9.30	5.19	1.79						
-10	-11	13.49	4.32	3.12	12.59	4.45	2.83	11.44	4.70	2.43	11.21	4.89	2.29	10.24	5.06	2.03	8.08	5.07	1.62	4.81	3.72	1.33
-7.0	-8.0	14.24	4.30	3.31	13.27	4.47	2.97	11.92	4.69	2.55	11.66	4.75	2.45	10.48	4.96	2.12	9.53	5.12	1.86	5.77	3.75	1.54
-2.0	-3.0	14.02	3.63	3.87	13.78	3.94	3.50	13.38	4.25	3.15	12.07	4.27	2.83	11.77	4.57	2.57	11.18	4.78	2.34	6.55	3.46	1.90
0	-1	15.63	3.46	4.52	14.66	3.74	3.92	13.70	4.02	3.40	13.35	4.21	3.17	13.28	4.53	2.93	13.42	4.83	2.78	8.10	3.49	2.32
2.0	1.0	17.46	3.35	5.21	15.85	3.70	4.28	14.26	4.02	3.55	14.48	4.42	3.28	14.70	4.81	3.05	14.92	5.20	2.87	9.13	3.76	2.43
7.0	6.0	12.40	2.12	5.85	12.30	2.54	4.84	12.20	2.96	4.12	12.10	3.39	3.57	12.00	3.81	3.15	11.90	4.23	2.81	7.14	3.09	2.31
15.0	12.0	13.74	2.11	6.52	13.69	2.55	5.36	13.65	3.00	4.55	13.60	3.45	3.95	13.56	3.89	3.48	13.51	4.34	3.12	8.11	3.17	2.56
20.0	15.0	13.91	2.01	6.93	13.86	2.43	5.70	13.82	2.86	4.84	13.77	3.28	4.20	13.73	3.70	3.71	13.68	4.13	3.31	8.21	3.01	2.72
25.0	18.0	13.54	1.82	7.44	13.49	2.21	6.12	13.45	2.59	5.19	13.40	2.98	4.50	13.36	3.36	3.97	13.31	3.75	3.55	7.99	2.74	2.92
30.0	22.0	12.62	1.55	8.14	12.58	1.88	6.69	12.54	2.21	5.68	12.50	2.54	4.93	12.46	2.86	4.35	12.42	3.19	3.89	7.45	2.33	3.20
35.0	24.0	11.17	1.20	9.32	11.13	1.45	7.67	11.09	1.71	6.50	11.06	1.96	5.64	11.02	2.21	4.98	10.98	2.47	4.45			

Abbreviations:
LWT: Leaving water temperature (°C)
HC: Total heating capacity (kW)
PI: Power input (kW)

Notes:
1. Peak heating capacity values do not take account of capacity drops caused by frost accumulation and during defrosting.

Table 2-5.14: M.HP12 DCI TRI heating capacity - integrated values[1]

Outdoor air temp.		LWT (°C)																				
		30			35			40			45			50			55			60		
°C DB	°C WB	HC	PI	COP	HC	PI	COP	HC	PI	COP	HC	PI	COP	HC	PI	COP	HC	PI	COP	HC	PI	COP
-25.0	-	6.40	3.87	1.65	5.95	4.00	1.49															
-20.0	-	8.21	3.93	2.09	7.63	4.06	1.88	7.05	4.19	1.68												
-15.0	-	10.02	3.99	2.51	9.31	4.12	2.26	8.60	4.26	2.02	7.90	4.39	1.80	7.19	4.52	1.59						
-10	-11	11.83	4.05	2.92	10.99	4.18	2.63	10.16	4.32	2.35	9.33	4.45	2.09	8.49	4.59	1.85	7.66	4.72	1.62	4.59	3.45	1.33
-7.0	-8.0	12.91	4.09	3.16	12.00	4.22	2.84	11.09	4.35	2.55	10.18	4.49	2.27	9.27	4.62	2.01	8.36	4.76	1.76	5.02	3.47	1.44
-2.0	-3.0	12.42	3.42	3.63	12.11	3.68	3.29	11.81	3.95	2.99	11.50	4.21	2.73	11.20	4.48	2.50	10.89	4.74	2.30	6.54	3.46	1.89
0	-1	12.32	3.14	3.92	12.16	3.45	3.52	12.00	3.76	3.19	11.84	4.07	2.91	11.67	4.37	2.67	11.51	4.68	2.46	6.91	3.42	2.02
2.0	1.0	12.28	2.94	4.18	12.20	3.35	3.64	12.13	3.76	3.22	12.05	4.17	2.89	11.98	4.58	2.61	11.90	5.00	2.38	7.14	3.65	1.96
7.0	6.0	12.40	2.12	5.85	12.30	2.54	4.84	12.20	2.96	4.12	12.10	3.39	3.57	12.00	3.81	3.15	11.90	4.23	2.81	7.14	3.09	2.31
15.0	12.0	13.74	2.11	6.52	13.69	2.55	5.36	13.65	3.00	4.55	13.60	3.45	3.95	13.56	3.89	3.48	13.51	4.34	3.12	8.11	3.17	2.56
20.0	15.0	13.91	2.01	6.93	13.86	2.43	5.70	13.82	2.86	4.84	13.77	3.28	4.20	13.73	3.70	3.71	13.68	4.13	3.31	8.21	3.01	2.72
25.0	18.0	13.54	1.82	7.44	13.49	2.21	6.12	13.45	2.59	5.19	13.40	2.98	4.50	13.36	3.36	3.97	13.31	3.75	3.55	7.99	2.74	2.92
30.0	22.0	12.62	1.55	8.14	12.58	1.88	6.69	12.54	2.21	5.68	12.50	2.54	4.93	12.46	2.86	4.35	12.42	3.19	3.89	7.45	2.33	3.20
35.0	24.0	11.17	1.20	9.32	11.13	1.45	7.67	11.09	1.71	6.50	11.06	1.96	5.64	11.02	2.21	4.98	10.98	2.47	4.45			

Abbreviations:
LWT: Leaving water temperature (°C)
HC: Total heating capacity (kW)
PI: Power input (kW)

Notes:
1. Integrated heating capacity values take account of capacity drops caused by frost accumulation and during defrosting.

Table 2-5.15: M.HP14 DCI TRI heating capacity - peak values[1]

Outdoor air temp.		LWT (°C)																				
		30			35			40			45			50			55			60		
°C DB	°C WB	HC	PI	COP	HC	PI	COP	HC	PI	COP	HC	PI	COP	HC	PI	COP	HC	PI	COP	HC	PI	COP
-25.0	-	6.72	4.19	1.62	6.68	4.45	1.50															
-20.0	-	8.85	4.23	2.09	9.11	4.61	1.98	9.28	5.00	1.86												
-15.0	-	11.83	4.70	2.52	11.04	4.65	2.38	10.74	5.10	2.11	11.21	5.52	2.03	10.56	5.73	1.84						
-10	-11	14.17	4.62	3.07	13.43	4.79	2.80	12.43	5.11	2.43	12.43	5.36	2.32	11.63	5.58	2.08	9.44	5.63	1.71	5.62	4.14	1.40
-7.0	-8.0	14.95	4.59	3.26	14.15	4.82	2.94	12.94	5.10	2.54	12.92	5.21	2.48	11.90	5.47	2.17	11.14	5.69	1.96	6.74	4.17	1.62
-2.0	-3.0	14.47	3.92	3.69	14.37	4.30	3.34	14.09	4.68	3.01	12.85	4.74	2.71	12.68	5.11	2.48	12.19	5.37	2.27	7.14	3.89	1.85
0	-1	16.25	3.78	4.29	15.39	4.13	3.72	14.51	4.48	3.24	14.28	4.73	3.02	14.35	5.12	2.80	14.64	5.48	2.67	8.83	3.96	2.23
2.0	1.0	18.44	3.59	5.13	16.89	4.01	4.22	15.33	4.39	3.50	15.71	4.85	3.24	16.09	5.31	3.03	16.47	5.76	2.86	10.08	4.16	2.42
7.0	6.0	14.08	2.53	5.56	14.10	3.05	4.63	14.13	3.56	3.97	14.15	4.07	3.47	14.18	4.59	3.09	14.20	5.10	2.79	8.52	3.72	2.29
15.0	12.0	15.59	2.53	6.17	15.70	3.07	5.12	15.80	3.61	4.38	15.91	4.15	3.84	16.02	4.69	3.42	16.13	5.23	3.08	9.68	3.82	2.53
20.0	15.0	15.78	2.40	6.57	15.89	2.92	5.45	16.00	3.43	4.66	16.11	3.95	4.08	16.22	4.46	3.63	16.32	4.98	3.28	9.79	3.63	2.70
25.0	18.0	15.36	2.18	7.04	15.47	2.65	5.84	15.57	3.12	5.00	15.68	3.58	4.38	15.78	4.05	3.90	15.89	4.52	3.52	9.53	3.30	2.89
30.0	22.0	14.32	1.86	7.71	14.42	2.26	6.39	14.52	2.66	5.47	14.62	3.05	4.79	14.72	3.45	4.26	14.81	3.85	3.85	8.89	2.81	3.16
35.0	24.0	12.67	1.44	8.82	12.76	1.74	7.32	12.84	2.05	6.26	12.93	2.36	5.48	13.02	2.67	4.88	13.11	2.97	4.41			

Abbreviations:
LWT: Leaving water temperature (°C)
HC: Total heating capacity (kW)
PI: Power input (kW)

Notes:
1. Peak heating capacity values do not take account of capacity drops caused by frost accumulation and during defrosting.

Table 2-5.16: M.HP14 DCI TRI heating capacity - integrated values[1]

Outdoor air temp.		LWT (°C)																				
		30			35			40			45			50			55			60		
°C DB	°C WB	HC	PI	COP	HC	PI	COP	HC	PI	COP	HC	PI	COP	HC	PI	COP	HC	PI	COP	HC	PI	COP
-25.0	-	6.72	4.14	1.62	6.34	4.32	1.47															
-20.0	-	8.62	4.20	2.05	8.14	4.38	1.86	7.66	4.56	1.68												
-15.0	-	10.52	4.27	2.47	9.93	4.45	2.23	9.34	4.63	2.02	8.76	4.81	1.82	8.17	4.99	1.64						
-10	-11	12.42	4.33	2.87	11.73	4.51	2.60	11.03	4.69	2.35	10.34	4.88	2.12	9.64	5.06	1.91	8.95	5.25	1.71	5.37	3.83	1.40
-7.0	-8.0	13.56	4.36	3.11	12.80	4.55	2.81	12.04	4.73	2.54	11.29	4.92	2.29	10.53	5.11	2.06	9.77	5.29	1.85	5.86	3.86	1.52
-2.0	-3.0	12.82	3.70	3.47	12.63	4.02	3.14	12.44	4.35	2.86	12.25	4.68	2.62	12.07	5.01	2.41	11.88	5.33	2.23	7.13	3.89	1.83
0	-1	12.81	3.44	3.73	12.76	3.81	3.35	12.71	4.19	3.04	12.66	4.56	2.77	12.61	4.94	2.55	12.56	5.31	2.36	7.53	3.88	1.94
2.0	1.0	12.96	3.15	4.11	13.00	3.63	3.58	13.04	4.10	3.18	13.07	4.58	2.85	13.11	5.06	2.59	13.14	5.53	2.38	7.89	4.04	1.95
7.0	6.0	14.08	2.53	5.56	14.10	3.05	4.63	14.13	3.56	3.97	14.15	4.07	3.47	14.18	4.59	3.09	14.20	5.10	2.79	8.52	3.72	2.29
15.0	12.0	15.59	2.53	6.17	15.70	3.07	5.12	15.80	3.61	4.38	15.91	4.15	3.84	16.02	4.69	3.42	16.13	5.23	3.08	9.68	3.82	2.53
20.0	15.0	15.78	2.40	6.57	15.89	2.92	5.45	16.00	3.43	4.66	16.11	3.95	4.08	16.22	4.46	3.63	16.32	4.98	3.28	9.79	3.63	2.70
25.0	18.0	15.36	2.18	7.04	15.47	2.65	5.84	15.57	3.12	5.00	15.68	3.58	4.38	15.78	4.05	3.90	15.89	4.52	3.52	9.53	3.30	2.89
30.0	22.0	14.32	1.86	7.71	14.42	2.26	6.39	14.52	2.66	5.47	14.62	3.05	4.79	14.72	3.45	4.26	14.81	3.85	3.85	8.89	2.81	3.16
35.0	24.0	12.67	1.44	8.82	12.76	1.74	7.32	12.84	2.05	6.26	12.93	2.36	5.48	13.02	2.67	4.88	13.11	2.97	4.41			

Abbreviations:
LWT: Leaving water temperature (°C)
HC: Total heating capacity (kW)
PI: Power input (kW)

Notes:
1. Integrated heating capacity values take account of capacity drops caused by frost accumulation and during defrosting.

Table 2-5.15: M.HP16 DCI TRI heating capacity - peak values[1]

Outdoor air temp.		LWT (°C)																				
		30			35			40			45			50			55			60		
°C DB	°C WB	HC	PI	COP	HC	PI	COP	HC	PI	COP	HC	PI	COP	HC	PI	COP	HC	PI	COP	HC	PI	COP
-25.0	-	7.07	4.43	1.62	7.05	4.74	1.49															
-20.0	-	9.31	4.47	2.08	9.61	4.91	1.96	9.82	5.37	1.83												
-15.0	-	12.44	4.96	2.51	11.65	4.95	2.35	11.36	5.48	2.07	11.90	5.97	1.99	11.25	6.24	1.80						
-10	-11	14.90	4.88	3.06	14.16	5.11	2.77	13.14	5.50	2.39	13.19	5.80	2.28	12.39	6.08	2.04	10.10	6.18	1.66	6.01	4.53	1.37
-7.0	-8.0	15.73	4.84	3.25	14.93	5.13	2.91	13.69	5.48	2.51	13.71	5.64	2.43	12.68	5.96	2.13	11.92	6.24	1.91	7.21	4.57	1.58
-2.0	-3.0	16.61	4.43	3.75	16.15	4.84	3.34	15.50	5.24	2.96	13.81	5.29	2.61	13.30	5.68	2.34	12.46	5.95	2.09	7.30	4.31	1.70
0	-1	19.02	4.38	4.34	17.58	4.73	3.72	16.17	5.09	3.18	15.51	5.33	2.91	15.17	5.73	2.65	15.06	6.11	2.47	9.09	4.42	2.06
2.0	1.0	21.78	4.59	4.75	19.49	4.91	3.97	17.27	5.21	3.32	17.28	5.61	3.08	17.26	6.01	2.87	17.23	6.40	2.69	10.55	4.63	2.28
7.0	6.0	16.35	3.08	5.30	16.30	3.63	4.49	16.25	4.18	3.88	16.20	4.73	3.42	16.15	5.28	3.06	16.10	5.83	2.76	9.66	4.26	2.27
15.0	12.0	18.11	3.07	5.91	18.15	3.65	4.97	18.18	4.23	4.30	18.22	4.81	3.78	18.25	5.40	3.38	18.28	5.98	3.06	10.97	4.36	2.51
20.0	15.0	18.34	2.92	6.28	18.37	3.47	5.29	18.41	4.03	4.57	18.44	4.58	4.02	18.47	5.14	3.60	18.51	5.69	3.25	11.11	4.15	2.67
25.0	18.0	17.85	2.65	6.74	17.88	3.15	5.67	17.91	3.66	4.90	17.95	4.16	4.32	17.98	4.66	3.86	18.01	5.16	3.49	10.81	3.77	2.87
30.0	22.0	16.64	2.26	7.37	16.67	2.69	6.21	16.70	3.11	5.36	16.73	3.54	4.72	16.77	3.97	4.22	16.80	4.40	3.82	10.08	3.21	3.14
35.0	24.0	14.72	1.74	8.44	14.75	2.07	7.11	14.78	2.41	6.14	14.80	2.74	5.41	14.83	3.07	4.83	14.86	3.40	4.37			

Abbreviations:
LWT: Leaving water temperature (°C)
HC: Total heating capacity (kW)
PI: Power input (kW)

Notes:
1. Peak heating capacity values do not take account of capacity drops caused by frost accumulation and during defrosting.

Table 2-5.16: M.HP16 DCI TRI heating capacity - integrated values[1]

Outdoor air temp.		LWT (°C)																				
		30			35			40			45			50			55			60		
°C DB	°C WB	HC	PI	COP	HC	PI	COP	HC	PI	COP	HC	PI	COP	HC	PI	COP	HC	PI	COP	HC	PI	COP
-25.0	-	7.07	4.37	1.62	6.69	4.60	1.45															
-20.0	-	9.07	4.44	2.04	8.58	4.67	1.84	8.10	4.90	1.65												
-15.0	-	11.07	4.51	2.46	10.47	4.74	2.21	9.88	4.97	1.99	9.29	5.20	1.79	8.70	5.44	1.60						
-10	-11	13.07	4.57	2.86	12.37	4.81	2.57	11.67	5.04	2.31	10.97	5.28	2.08	10.27	5.52	1.86	9.57	5.75	1.66	5.74	4.20	1.37
-7.0	-8.0	14.26	4.61	3.10	13.50	4.85	2.79	12.74	5.08	2.51	11.98	5.32	2.25	11.21	5.56	2.02	10.45	5.80	1.80	6.27	4.23	1.48
-2.0	-3.0	14.71	4.18	3.52	14.20	4.53	3.14	13.69	4.87	2.81	13.17	5.22	2.52	12.66	5.56	2.27	12.14	5.91	2.05	7.29	4.31	1.69
0	-1	14.99	3.97	3.77	14.57	4.36	3.34	14.16	4.75	2.98	13.75	5.14	2.67	13.33	5.53	2.41	12.92	5.92	2.18	7.75	4.32	1.79
2.0	1.0	15.31	4.02	3.81	15.00	4.45	3.37	14.69	4.87	3.01	14.38	5.30	2.71	14.07	5.72	2.46	13.76	6.15	2.24	8.25	4.49	1.84
7.0	6.0	16.35	3.08	5.30	16.30	3.63	4.49	16.25	4.18	3.88	16.20	4.73	3.42	16.15	5.28	3.06	16.10	5.83	2.76	9.66	4.26	2.27
15.0	12.0	18.11	3.07	5.91	18.15	3.65	4.97	18.18	4.23	4.30	18.22	4.81	3.78	18.25	5.40	3.38	18.28	5.98	3.06	10.97	4.36	2.51
20.0	15.0	18.34	2.92	6.28	18.37	3.47	5.29	18.41	4.03	4.57	18.44	4.58	4.02	18.47	5.14	3.60	18.51	5.69	3.25	11.11	4.15	2.67
25.0	18.0	17.85	2.65	6.74	17.88	3.15	5.67	17.91	3.66	4.90	17.95	4.16	4.32	17.98	4.66	3.86	18.01	5.16	3.49	10.81	3.77	2.87
30.0	22.0	16.64	2.26	7.37	16.67	2.69	6.21	16.70	3.11	5.36	16.73	3.54	4.72	16.77	3.97	4.22	16.80	4.40	3.82	10.08	3.21	3.14
35.0	24.0	14.72	1.74	8.44	14.75	2.07	7.11	14.78	2.41	6.14	14.80	2.74	5.41	14.83	3.07	4.83	14.86	3.40	4.37			

Abbreviations:
LWT: Leaving water temperature (°C)
HC: Total heating capacity (kW)
PI: Power input (kW)

Notes:
1. Integrated heating capacity values take account of capacity drops caused by frost accumulation and during defrosting.

5.2 Cooling Capacity Tables

Table 2-5.21: M.HP05 DCI MONO cooling capacity

Outdoor air temp.	LWT (°C)																							
	25			22			18			15			13			10			7			5		
°C DB	CC	PI	EER	CC	PI	EER	CC	PI	EER	CC	PI	EER	CC	PI	EER	CC	PI	EER	CC	PI	EER	CC	PI	EER
45	3.7	0.8	4.59	3.6	1.0	3.70	3.6	1.2	2.92	3.5	1.4	2.52	3.5	1.5	2.30	3.5	1.7	2.03	3.4	1.9	1.81	3.4	2.0	1.68
40	4.7	0.8	6.27	4.6	0.9	5.06	4.6	1.1	4.00	4.5	1.3	3.44	4.5	1.4	3.14	4.4	1.6	2.77	4.3	1.8	2.47	4.3	1.9	2.30
35	5.3	0.7	7.57	5.2	0.9	6.10	5.1	1.1	4.82	5.0	1.2	4.15	5.0	1.3	3.79	4.9	1.5	3.34	4.9	1.6	2.98	4.8	1.7	2.78
30	5.4	0.6	8.51	5.4	0.8	6.86	5.3	1.0	5.42	5.2	1.1	4.67	5.2	1.2	4.26	5.1	1.4	3.76	5.0	1.5	3.35	5.0	1.6	3.12
25	5.4	0.6	9.16	5.3	0.7	7.39	5.2	0.9	5.84	5.1	1.0	5.02	5.1	1.1	4.58	5.0	1.2	4.04	4.9	1.4	3.61	4.9	1.5	3.36
20	5.1	0.5	9.59	5.0	0.6	7.74	4.9	0.8	6.11	4.9	0.9	5.26	4.8	1.0	4.80	4.8	1.1	4.23	4.7	1.2	3.78	4.6	1.3	3.52
15	4.7	0.5	9.92	4.6	0.6	8.00	4.6	0.7	6.32	4.5	0.8	5.44	4.5	0.9	4.96	4.4	1.0	4.38	4.3	1.1	3.91	4.3	1.2	3.64
10	4.3	0.4	10.31	4.3	0.5	8.32	4.2	0.6	6.57	4.1	0.7	5.65	4.1	0.8	5.16	4.0	0.9	4.55						
5	4.0	0.4	11.05	4.0	0.4	8.91	3.9	0.6	7.04	3.9	0.6	6.06	3.8	0.7	5.53	3.8	0.8	4.88						
0	3.9	0.3	12.60	3.8	0.4	10.17	3.8	0.5	8.03	3.7	0.5	6.91	3.7	0.6	6.31	3.6	0.7	5.57						
-5	4.0	0.3	11.86	4.0	0.4	11.05	3.9	0.4	10.11	3.9	0.4	8.70	3.8	0.5	7.94	3.8	0.5	7.00						

Abbreviations:
LWT: Leaving water temperature (°C)
CC: Total cooling capacity (kW)
PI: Power input (kW)

Table 2-5.22: M.HP07 DCI MONO cooling capacity

Outdoor air temp.	LWT (°C)																							
	25			22			18			15			13			10			7			5		
°C DB	CC	PI	EER	CC	PI	EER	CC	PI	EER	CC	PI	EER	CC	PI	EER	CC	PI	EER	CC	PI	EER	CC	PI	EER
45	4.6	1.0	4.83	4.6	1.2	3.71	4.5	1.6	2.82	4.5	1.9	2.39	4.5	2.1	2.16	4.5	2.4	1.89	4.4	2.6	1.68	4.4	2.8	1.56
40	5.9	0.9	6.60	5.8	1.1	5.07	5.8	1.5	3.86	5.7	1.8	3.26	5.7	1.9	2.96	5.7	2.2	2.59	5.6	2.5	2.30	5.6	2.6	2.14
35	6.5	0.8	7.96	6.5	1.1	6.11	6.5	1.4	4.65	6.4	1.6	3.94	6.4	1.8	3.57	6.3	2.0	3.12	6.3	2.3	2.77	6.3	2.4	2.58
30	6.8	0.8	8.95	6.7	1.0	6.87	6.7	1.3	5.23	6.6	1.5	4.43	6.6	1.6	4.01	6.6	1.9	3.51	6.5	2.1	3.12	6.5	2.2	2.90
25	6.7	0.7	9.64	6.6	0.9	7.40	6.6	1.2	5.63	6.5	1.4	4.76	6.5	1.5	4.32	6.5	1.7	3.78	6.4	1.9	3.35	6.4	2.0	3.12
20	6.3	0.6	10.09	6.3	0.8	7.75	6.2	1.1	5.90	6.2	1.2	4.99	6.2	1.4	4.52	6.1	1.5	3.96	6.1	1.7	3.51	6.1	1.9	3.27
15	5.9	0.6	10.43	5.8	0.7	8.01	5.8	0.9	6.10	5.7	1.1	5.16	5.7	1.2	4.67	5.7	1.4	4.09	5.6	1.6	3.63	5.6	1.7	3.38
10	5.4	0.5	10.85	5.3	0.6	8.33	5.3	0.8	6.34	5.3	1.0	5.36	5.2	1.1	4.86	5.2	1.2	4.25						
5	5.0	0.4	11.62	5.0	0.6	8.93	4.9	0.7	6.79	4.9	0.9	5.75	4.9	0.9	5.21	4.9	1.1	4.56						
0	4.9	0.5	10.44	4.8	0.5	9.10	4.8	0.6	7.75	4.8	0.7	6.56	4.7	0.8	5.94	4.7	0.9	5.20						
-5	5.0	0.5	10.91	5.0	0.5	10.39	4.9	0.5	9.75	4.9	0.6	8.25	4.9	0.7	7.48	4.9	0.7	6.54						

Abbreviations:
LWT: Leaving water temperature (°C)
CC: Total cooling capacity (kW)
PI: Power input (kW)

Table 2-5.23: M.HP09 DCI MONO cooling capacity

Outdoor air temp.	LWT (°C)																							
	25			22			18			15			13			10			7			5		
°C DB	CC	PI	EER	CC	PI	EER	CC	PI	EER	CC	PI	EER	CC	PI	EER	CC	PI	EER	CC	PI	EER	CC	PI	EER
45	5.8	1.4	4.05	5.7	1.8	3.23	5.6	2.2	2.52	5.5	2.6	2.16	5.5	2.8	1.96	5.4	3.1	1.73	5.3	3.5	1.53	5.3	3.7	1.43
40	7.4	1.3	5.54	7.3	1.7	4.41	7.2	2.1	3.45	7.1	2.4	2.95	7.0	2.6	2.68	6.9	2.9	2.36	6.8	3.2	2.10	6.7	3.5	1.95
35	8.3	1.2	6.68	8.1	1.5	5.33	8.0	1.9	4.16	7.9	2.2	3.56	7.8	2.4	3.24	7.7	2.7	2.85	7.6	3.0	2.53	7.5	3.2	2.35
30	8.5	1.1	7.52	8.4	1.4	5.99	8.3	1.8	4.68	8.2	2.0	4.00	8.1	2.2	3.64	8.0	2.5	3.20	7.9	2.8	2.85	7.8	2.9	2.65
25	8.4	1.0	8.09	8.3	1.3	6.45	8.1	1.6	5.04	8.0	1.9	4.31	8.0	2.0	3.92	7.9	2.3	3.45	7.7	2.5	3.06	7.7	2.7	2.85
20	8.0	0.9	8.47	7.9	1.2	6.75	7.7	1.5	5.27	7.6	1.7	4.51	7.6	1.8	4.11	7.4	2.1	3.61	7.3	2.3	3.21	7.3	2.4	2.98
15	7.4	0.8	8.76	7.3	1.0	6.98	7.2	1.3	5.45	7.1	1.5	4.66	7.0	1.6	4.25	6.9	1.8	3.73	6.8	2.1	3.32	6.7	2.2	3.08
10	6.8	0.7	9.11	6.7	0.9	7.26	6.6	1.2	5.67	6.5	1.3	4.85	6.4	1.5	4.41	6.3	1.6	3.88						
5	6.3	0.6	9.76	6.2	0.8	7.78	6.1	1.0	6.08	6.0	1.2	5.20	6.0	1.3	4.73	5.9	1.4	4.16						
0	6.1	0.5	11.14	6.0	0.7	8.87	5.9	0.9	6.93	5.8	1.0	5.93	5.8	1.1	5.40	5.7	1.2	4.74						
-5	6.3	0.6	11.00	6.2	0.6	9.91	6.1	0.7	8.73	6.0	0.8	7.46	6.0	0.9	6.79	5.9	1.0	5.97						

Abbreviations:
LWT: Leaving water temperature (°C)
CC: Total cooling capacity (kW)
PI: Power input (kW)

Table 2-5.24: M.HP12 DCI MONO cooling capacity

Outdoor air temp.	LWT (°C)																							
	25			22			18			15			13			10			7			5		
°C DB	CC	PI	EER	CC	PI	EER	CC	PI	EER	CC	PI	EER	CC	PI	EER	CC	PI	EER	CC	PI	EER	CC	PI	EER
45	9.2	2.1	4.40	8.9	2.5	3.63	8.6	3.0	2.90	8.3	3.3	2.50	8.2	3.6	2.28	7.9	4.0	2.00	7.7	4.3	1.77	7.5	4.6	1.64
40	11.7	1.9	6.01	11.3	2.3	4.96	10.9	2.8	3.96	10.6	3.1	3.42	10.4	3.3	3.11	10.1	3.7	2.73	9.8	4.0	2.42	9.5	4.3	2.24
35	13.0	1.8	7.25	12.7	2.1	5.98	12.2	2.6	4.78	11.8	2.9	4.12	11.6	3.1	3.76	11.3	3.4	3.30	10.9	3.7	2.92	10.7	4.0	2.70
30	13.5	1.7	8.16	13.1	2.0	6.72	12.6	2.3	5.38	12.3	2.6	4.63	12.0	2.8	4.22	11.7	3.1	3.71	11.3	3.4	3.28	11.0	3.6	3.03
25	13.3	1.5	8.78	12.9	1.8	7.24	12.4	2.1	5.79	12.1	2.4	4.99	11.8	2.6	4.55	11.5	2.9	3.99	11.1	3.1	3.53	10.9	3.3	3.26
20	12.6	1.4	9.19	12.2	1.6	7.58	11.8	1.9	6.06	11.4	2.2	5.22	11.2	2.4	4.76	10.9	2.6	4.18	10.5	2.8	3.70	10.3	3.0	3.42
15	11.7	1.2	9.51	11.3	1.4	7.84	10.9	1.7	6.27	10.6	2.0	5.40	10.4	2.1	4.92	10.1	2.3	4.32	9.8	2.6	3.82	9.5	2.7	3.53
10	10.7	1.1	9.88	10.4	1.3	8.15	10.0	1.5	6.52	9.7	1.7	5.61	9.5	1.9	5.12	9.3	2.1	4.49						
5	10.0	0.9	10.59	9.7	1.1	8.73	9.3	1.3	6.98	9.1	1.5	6.02	8.9	1.6	5.48	8.6	1.8	4.81						
0	9.7	0.8	12.08	9.4	0.9	9.96	9.0	1.1	7.97	8.8	1.3	6.86	8.6	1.4	6.26	8.3	1.5	5.49						
-5	10.0	0.9	11.64	9.7	0.9	10.91	9.4	0.9	10.03	9.1	1.1	8.64	8.9	1.1	7.88	8.6	1.2	6.91						

Abbreviations:
LWT: Leaving water temperature (°C)
CC: Total cooling capacity (kW)
PI: Power input (kW)

Table 2-5.25: M.HP14 DCI MONO cooling

Outdoor air temp.	LWT (°C)																							
	25			22			18			15			13			10			7			5		
°C DB	CC	PI	EER	CC	PI	EER	CC	PI	EER	CC	PI	EER	CC	PI	EER	CC	PI	EER	CC	PI	EER	CC	PI	EER
45	10.3	2.5	4.17	10.1	3.0	3.42	9.8	3.6	2.73	9.6	4.1	2.36	9.5	4.4	2.15	9.3	4.9	1.90	9.1	5.4	1.69	8.9	5.7	1.57
40	13.2	2.3	5.70	12.9	2.8	4.67	12.5	3.4	3.73	12.3	3.8	3.22	12.1	4.1	2.94	11.8	4.6	2.59	11.5	5.0	2.31	11.4	5.3	2.14
35	14.7	2.1	6.88	14.4	2.6	5.64	14.0	3.1	4.50	13.7	3.5	3.88	13.5	3.8	3.55	13.2	4.2	3.13	12.9	4.6	2.78	12.7	4.9	2.58
30	15.2	2.0	7.74	14.9	2.4	6.34	14.5	2.9	5.06	14.2	3.2	4.37	14.0	3.5	3.99	13.7	3.9	3.52	13.4	4.3	3.13	13.2	4.5	2.91
25	15.0	1.8	8.33	14.7	2.1	6.82	14.3	2.6	5.45	14.0	3.0	4.70	13.8	3.2	4.29	13.4	3.6	3.78	13.1	3.9	3.37	12.9	4.1	3.13
20	14.2	1.6	8.72	13.9	1.9	7.15	13.5	2.4	5.71	13.2	2.7	4.92	13.0	2.9	4.50	12.8	3.2	3.96	12.5	3.5	3.52	12.3	3.7	3.27
15	13.2	1.5	9.01	12.9	1.7	7.39	12.5	2.1	5.90	12.3	2.4	5.09	12.1	2.6	4.65	11.8	2.9	4.10	11.5	3.2	3.64	11.4	3.4	3.39
10	12.1	1.3	9.37	11.8	1.5	7.68	11.5	1.9	6.13	11.3	2.1	5.29	11.1	2.3	4.83	10.9	2.5	4.26						
5	11.3	1.1	10.04	11.0	1.3	8.23	10.7	1.6	6.57	10.5	1.8	5.67	10.3	2.0	5.18	10.1	2.2	4.57						
0	10.9	1.0	11.46	10.7	1.1	9.39	10.4	1.4	7.50	10.2	1.6	6.47	10.0	1.7	5.91	9.8	1.9	5.21						
-5	11.3	1.1	10.51	11.0	1.1	10.03	10.7	1.1	9.44	10.5	1.3	8.14	10.3	1.4	7.44	10.1	1.5	6.56						

Abbreviations:
LWT: Leaving water temperature (°C)
CC: Total cooling capacity (kW)
PI: Power input (kW)

Table 2-5.26: M.HP16 DCI MONO cooling

Outdoor air temp.	LWT (°C)																							
	25			22			18			15			13			10			7			5		
°C DB	CC	PI	EER	CC	PI	EER	CC	PI	EER	CC	PI	EER	CC	PI	EER	CC	PI	EER	CC	PI	EER	CC	PI	EER
45	11.7	3.1	3.80	11.3	3.6	3.18	10.9	4.2	2.58	10.6	4.7	2.24	10.3	5.0	2.05	10.0	5.5	1.81	9.7	6.0	1.61	9.5	6.4	1.49
40	14.8	2.9	5.19	14.4	3.3	4.35	13.9	3.9	3.53	13.5	4.4	3.06	13.2	4.7	2.80	12.8	5.2	2.47	12.3	5.6	2.20	12.1	5.9	2.04
35	16.6	2.6	6.27	16.1	3.1	5.24	15.5	3.6	4.26	15.0	4.1	3.70	14.7	4.4	3.38	14.3	4.8	2.98	13.8	5.2	2.65	13.5	5.5	2.46
30	17.2	2.4	7.05	16.7	2.8	5.90	16.1	3.4	4.79	15.6	3.7	4.16	15.3	4.0	3.81	14.8	4.4	3.36	14.3	4.8	2.98	14.0	5.1	2.76
25	16.9	2.2	7.58	16.4	2.6	6.35	15.8	3.1	5.15	15.3	3.4	4.47	15.0	3.7	4.10	14.5	4.0	3.61	14.1	4.4	3.21	13.7	4.6	2.97
20	16.0	2.0	7.94	15.6	2.3	6.65	15.0	2.8	5.39	14.5	3.1	4.68	14.2	3.3	4.29	13.8	3.6	3.78	13.3	4.0	3.36	13.0	4.2	3.11
15	14.8	1.8	8.21	14.4	2.1	6.87	13.9	2.5	5.58	13.5	2.8	4.84	13.2	3.0	4.43	12.8	3.3	3.91	12.4	3.6	3.47	12.1	3.7	3.22
10	13.6	1.6	8.54	13.3	1.9	7.15	12.7	2.2	5.80	12.4	2.5	5.04	12.1	2.6	4.61	11.7	2.9	4.07						
5	12.7	1.4	9.15	12.3	1.6	7.66	11.9	1.9	6.21	11.5	2.1	5.40	11.3	2.3	4.94	10.9	2.5	4.36						
0	12.3	1.2	10.44	11.9	1.4	8.74	11.5	1.6	7.09	11.1	1.8	6.16	10.9	1.9	5.64	10.6	2.1	4.97						
-5	12.7	1.3	9.96	12.4	1.3	9.50	11.9	1.3	8.92	11.5	1.5	7.75	11.3	1.6	7.09	10.9	1.7	6.26						

Abbreviations:
LWT: Leaving water temperature (°C)
CC: Total cooling capacity (kW)
PI: Power input (kW)

Table 2-5.27: M.HP12 DCI TRI cooling capacity

Outdoor air temp.	LWT (°C)																							
	25			22			18			15			13			10			7			5		
°C DB	CC	PI	EER	CC	PI	EER	CC	PI	EER	CC	PI	EER	CC	PI	EER	CC	PI	EER	CC	PI	EER	CC	PI	EER
45	9.2	2.1	4.40	8.9	2.5	3.63	8.6	3.0	2.90	8.3	3.3	2.50	8.2	3.6	2.28	7.9	4.0	2.00	7.7	4.3	1.77	7.5	4.6	1.64
40	11.7	1.9	6.01	11.3	2.3	4.96	10.9	2.8	3.96	10.6	3.1	3.42	10.4	3.3	3.11	10.1	3.7	2.73	9.8	4.0	2.42	9.5	4.3	2.24
35	13.0	1.8	7.25	12.7	2.1	5.98	12.2	2.6	4.78	11.8	2.9	4.12	11.6	3.1	3.76	11.3	3.4	3.30	10.9	3.7	2.92	10.7	4.0	2.70
30	13.5	1.7	8.16	13.1	2.0	6.72	12.6	2.3	5.38	12.3	2.6	4.63	12.0	2.8	4.22	11.7	3.1	3.71	11.3	3.4	3.28	11.0	3.6	3.03
25	13.3	1.5	8.78	12.9	1.8	7.24	12.4	2.1	5.79	12.1	2.4	4.99	11.8	2.6	4.55	11.5	2.9	3.99	11.1	3.1	3.53	10.9	3.3	3.26
20	12.6	1.4	9.19	12.2	1.6	7.58	11.8	1.9	6.06	11.4	2.2	5.22	11.2	2.4	4.76	10.9	2.6	4.18	10.5	2.8	3.70	10.3	3.0	3.42
15	11.7	1.2	9.51	11.3	1.4	7.84	10.9	1.7	6.27	10.6	2.0	5.40	10.4	2.1	4.92	10.1	2.3	4.32	9.8	2.6	3.82	9.5	2.7	3.53
10	10.7	1.1	9.88	10.4	1.3	8.15	10.0	1.5	6.52	9.7	1.7	5.61	9.5	1.9	5.12	9.3	2.1	4.49						
5	10.0	0.9	10.59	9.7	1.1	8.73	9.3	1.3	6.98	9.1	1.5	6.02	8.9	1.6	5.48	8.6	1.8	4.81						
0	9.7	0.8	12.08	9.4	0.9	9.96	9.0	1.1	7.97	8.8	1.3	6.86	8.6	1.4	6.26	8.3	1.5	5.49						
-5	10.0	0.9	11.64	9.7	0.9	10.91	9.4	0.9	10.03	9.1	1.1	8.64	8.9	1.1	7.88	8.6	1.2	6.91						

Abbreviations:
T_{amb}: Outdoor air temperature (°C)
LWT: Leaving water temperature (°C)
CC: Total cooling capacity (kW)
PI: Power input (kW)

Table 2-5.28: M.HP14 DCI TRI cooling capacity

Outdoor air temp.	LWT (°C)																							
	25			22			18			15			13			10			7			5		
°C DB	CC	PI	EER	CC	PI	EER	CC	PI	EER	CC	PI	EER	CC	PI	EER	CC	PI	EER	CC	PI	EER	CC	PI	EER
45	10.3	2.5	4.17	10.1	3.0	3.42	9.8	3.6	2.73	9.6	4.1	2.36	9.5	4.4	2.15	9.3	4.9	1.90	9.1	5.4	1.69	8.9	5.7	1.57
40	13.2	2.3	5.70	12.9	2.8	4.67	12.5	3.4	3.73	12.3	3.8	3.22	12.1	4.1	2.94	11.8	4.6	2.59	11.5	5.0	2.31	11.4	5.3	2.14
35	14.7	2.1	6.88	14.4	2.6	5.64	14.0	3.1	4.50	13.7	3.5	3.88	13.5	3.8	3.55	13.2	4.2	3.13	12.9	4.6	2.78	12.7	4.9	2.58
30	15.2	2.0	7.74	14.9	2.4	6.34	14.5	2.9	5.06	14.2	3.2	4.37	14.0	3.5	3.99	13.7	3.9	3.52	13.4	4.3	3.13	13.2	4.5	2.91
25	15.0	1.8	8.33	14.7	2.1	6.82	14.3	2.6	5.45	14.0	3.0	4.70	13.8	3.2	4.29	13.4	3.6	3.78	13.1	3.9	3.37	12.9	4.1	3.13
20	14.2	1.6	8.72	13.9	1.9	7.15	13.5	2.4	5.71	13.2	2.7	4.92	13.0	2.9	4.50	12.8	3.2	3.96	12.5	3.5	3.52	12.3	3.7	3.27
15	13.2	1.5	9.01	12.9	1.7	7.39	12.5	2.1	5.90	12.3	2.4	5.09	12.1	2.6	4.65	11.8	2.9	4.10	11.5	3.2	3.64	11.4	3.4	3.39
10	12.1	1.3	9.37	11.8	1.5	7.68	11.5	1.9	6.13	11.3	2.1	5.29	11.1	2.3	4.83	10.9	2.5	4.26						
5	11.3	1.1	10.04	11.0	1.3	8.23	10.7	1.6	6.57	10.5	1.8	5.67	10.3	2.0	5.18	10.1	2.2	4.57						
0	10.9	1.0	11.46	10.7	1.1	9.39	10.4	1.4	7.50	10.2	1.6	6.47	10.0	1.7	5.91	9.8	1.9	5.21						
-5	11.3	1.1	10.51	11.0	1.1	10.03	10.7	1.1	9.44	10.5	1.3	8.14	10.3	1.4	7.44	10.1	1.5	6.56						

Abbreviations:
LWT: Leaving water temperature (°C)
CC: Total cooling capacity (kW)
PI: Power input (kW)

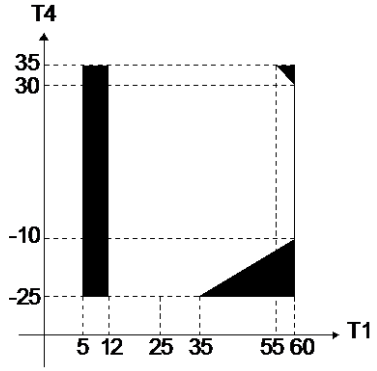
Table 2-5.29: M.HP16 DCI TRI cool

Outdoor air temp.	LWT (°C)																							
	25			22			18			15			13			10			7			5		
°C DB	CC	PI	EER	CC	PI	EER	CC	PI	EER	CC	PI	EER	CC	PI	EER	CC	PI	EER	CC	PI	EER	CC	PI	EER
45	11.7	3.1	3.80	11.3	3.6	3.18	10.9	4.2	2.58	10.6	4.7	2.24	10.3	5.0	2.05	10.0	5.5	1.81	9.7	6.0	1.61	9.5	6.4	1.49
40	14.8	2.9	5.19	14.4	3.3	4.35	13.9	3.9	3.53	13.5	4.4	3.06	13.2	4.7	2.80	12.8	5.2	2.47	12.3	5.6	2.20	12.1	5.9	2.04
35	16.6	2.6	6.27	16.1	3.1	5.24	15.5	3.6	4.26	15.0	4.1	3.70	14.7	4.4	3.38	14.3	4.8	2.98	13.8	5.2	2.65	13.5	5.5	2.46
30	17.2	2.4	7.05	16.7	2.8	5.90	16.1	3.4	4.79	15.6	3.7	4.16	15.3	4.0	3.81	14.8	4.4	3.36	14.3	4.8	2.98	14.0	5.1	2.76
25	16.9	2.2	7.58	16.4	2.6	6.35	15.8	3.1	5.15	15.3	3.4	4.47	15.0	3.7	4.10	14.5	4.0	3.61	14.1	4.4	3.21	13.7	4.6	2.97
20	16.0	2.0	7.94	15.6	2.3	6.65	15.0	2.8	5.39	14.5	3.1	4.68	14.2	3.3	4.29	13.8	3.6	3.78	13.3	4.0	3.36	13.0	4.2	3.11
15	14.8	1.8	8.21	14.4	2.1	6.87	13.9	2.5	5.58	13.5	2.8	4.84	13.2	3.0	4.43	12.8	3.3	3.91	12.4	3.6	3.47	12.1	3.7	3.22
10	13.6	1.6	8.54	13.3	1.9	7.15	12.7	2.2	5.80	12.4	2.5	5.04	12.1	2.6	4.61	11.7	2.9	4.07						
5	12.7	1.4	9.15	12.3	1.6	7.66	11.9	1.9	6.21	11.5	2.1	5.40	11.3	2.3	4.94	10.9	2.5	4.36						
0	12.3	1.2	10.44	11.9	1.4	8.74	11.5	1.6	7.09	11.1	1.8	6.16	10.9	1.9	5.64	10.6	2.1	4.97						
-5	12.7	1.3	9.96	12.4	1.3	9.50	11.9	1.3	8.92	11.5	1.5	7.75	11.3	1.6	7.09	10.9	1.7	6.26						

Abbreviations:
LWT: Leaving water temperature (°C)
CC: Total cooling capacity (kW)
PI: Power input (kW)

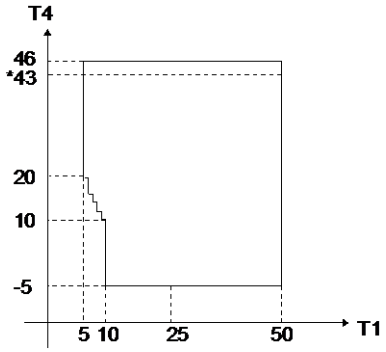
6 Operating Limits

Figure 2-6.1: Heating operating limits[1]



Abbreviations:
T4: Outdoor temperature (°C)
T1: Leaving water temperature (°C)
Notes:
1. Shaded areas indicate no heat pump operation (backup electric heater or auxiliary heat source only)

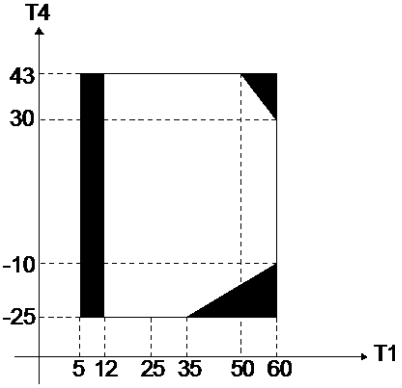
Figure 2-6.2: Cooling operating limits



Abbreviations:
T4: Outdoor temperature(°C)
T1: Leaving water temperature (°C)

Notes:
1. The maximum operating temperature of the 5/7/9kW model is 43°C.

Figure 2-6.3: Domestic hot water operating limits[1]

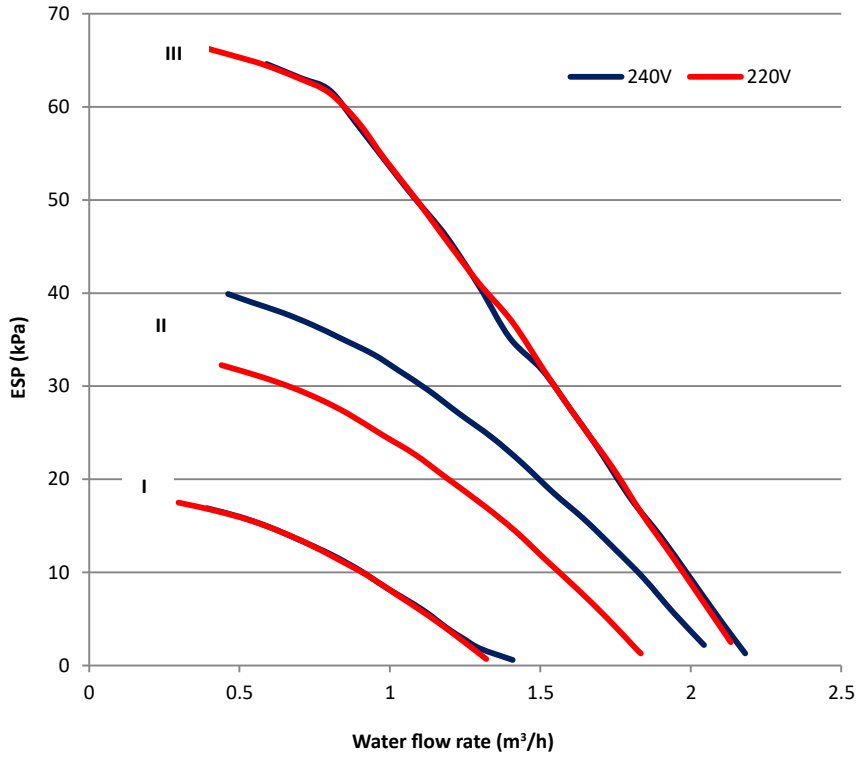


Abbreviations:
T4: Outdoor temperature(°C)
T1: Leaving water temperature (°C)
Notes:
1. Shaded areas indicate no heat pump operation (backup electric heater or auxiliary heat source only)

7 Hydronic Performance

M.HP05 DCI MONO / M.HP07 DCI MONO / M.HP09 DCI MONO

Figure 2-7.1: M.HP05/07/09 DCI MONO hydronic performance[1]

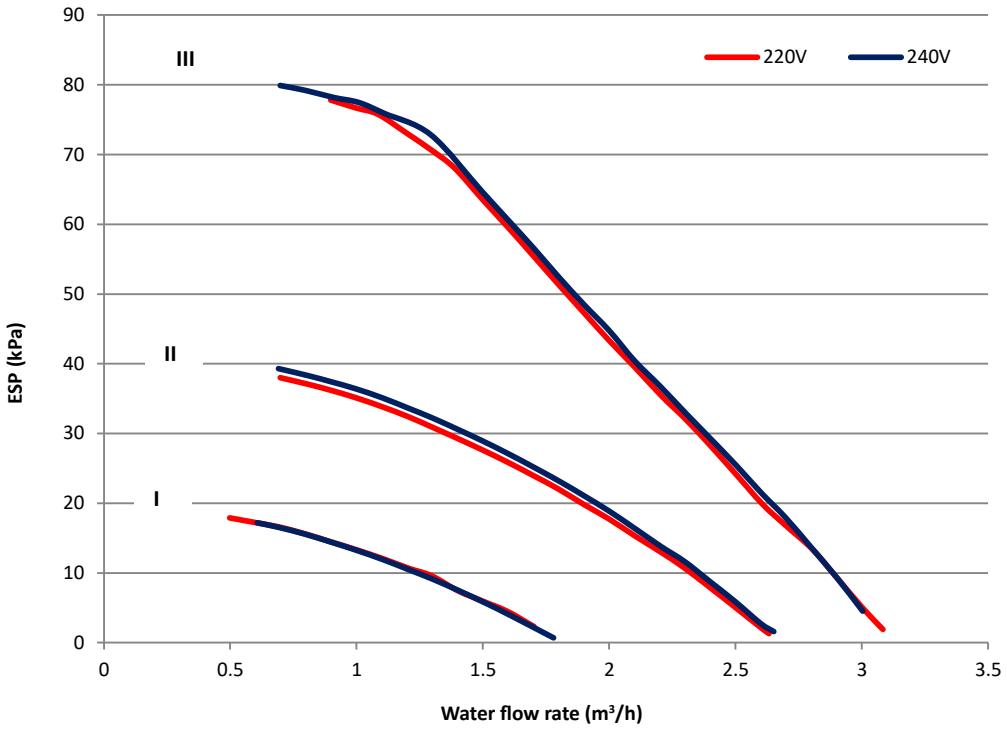


Abbreviations:
ESP: External static pressure
Notes:
1. I, II and III indicate water pump speed:
   - I: Low; II: Medium; III: High.

M.HP12 DCI MONO / M.HP14 DCI MONO / M.HP16 DCI MONO

M.HP12 DCI TRI / M.HP14 DCI TRI / M.HP16 DCI TRI

Figure 2-7.2: M.HP12/14/16 DCI MONO/TRI hydronic performance[1]



Abbreviations:
ESP: External static pressure

Notes:
1. I, II and III indicate water pump speed:
   - I: Low; II: Medium; III: High.

8 Sound Levels

8.1 Overall

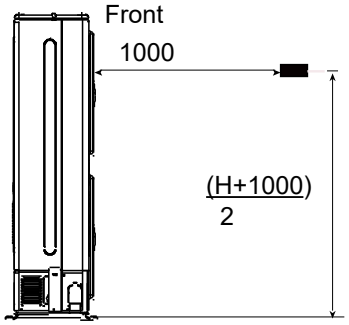
Table 2-8.1: Sound pressure levels[1]

Model name	dB(A)[2]
M.HP05 DCI MONO	48.8
M. HP07 DCI MONO	52.3
M.HP09 DCI MONO	54.5
M.HP12 DCI MONO	57.6
M.HP14 DCI MONO	58.0
M.HP16 DCI MONO	58.1
M.HP12 DCI TRI	57.2
M.HP14 DCI TRI	58.1
M.HP16 DCI TRI	59.0

Notes:

1. Sound pressure level is measured at a position 1m in front of the unit and (1+H)/2m (where H is the height of the unit) above the floor in a semi-anechoic chamber. During in-situ operation, sound pressure levels may be higher as a result of ambient noise.

Figure 2-8.1: Sound pressure level measurement (unit: mm)



2. dB(A) is the maximum value tested under the conditions below:
   Outdoor air temperature 7°C DB, 85% R.H.; EWT 30°C, LWT 35°C. Free compressor frequency.
   Outdoor air temperature 7°C DB, 85% R.H.; EWT 40°C, LWT 45°C. .Free compressor frequency.
   Outdoor air temperature 7°C DB, 85% R.H.; EWT 47°C, LWT 55°C. Free compressor frequency.
   Outdoor air temperature 35°C DB; EWT 23°C, LWT 18°C. Free compressor frequency.
   Outdoor air temperature 35°C DB; EWT 12°C, LWT 7°C. Free compressor frequency.

8.2 Octave Band Levels

Figure 2-8.2: M.HP05 DCI MONO octave band levels

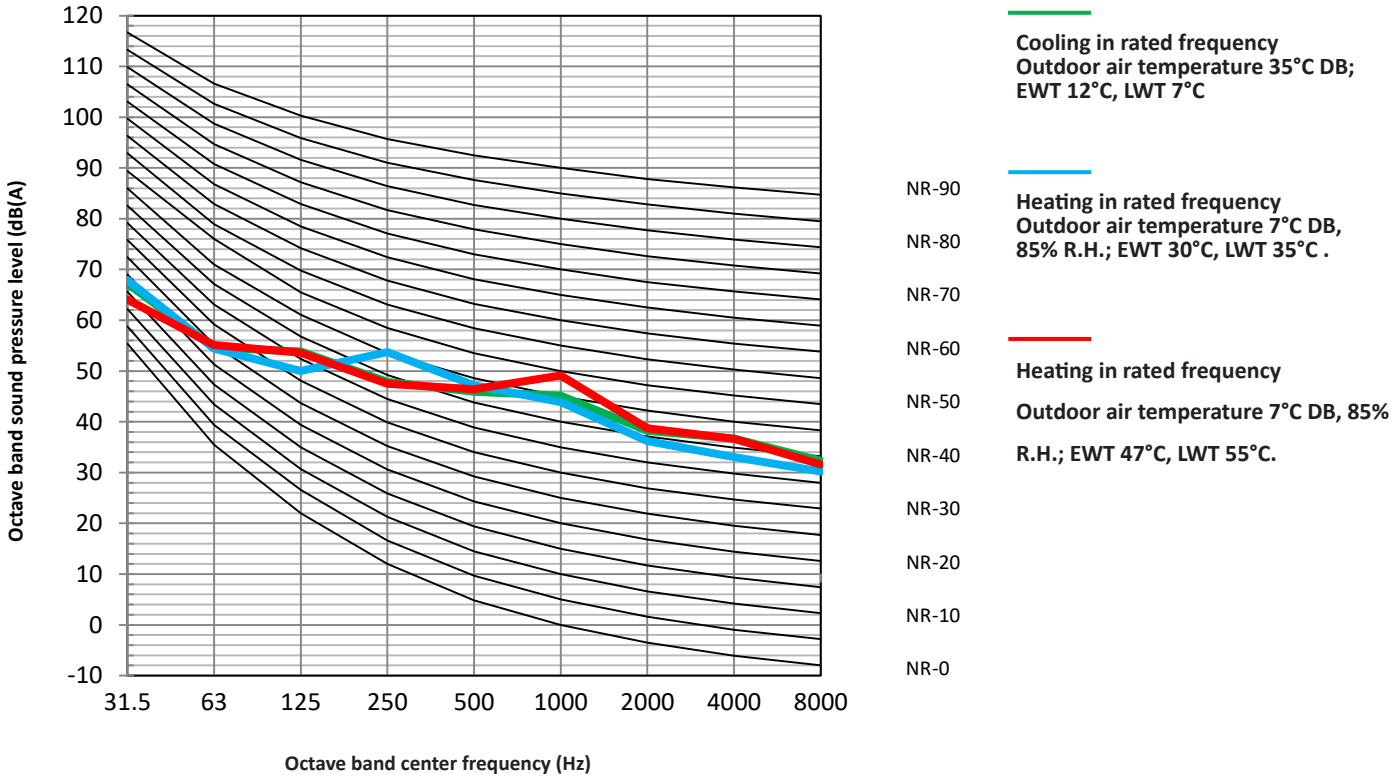


Figure 2-8.3: M.HP07 DCI MONO octave band levels

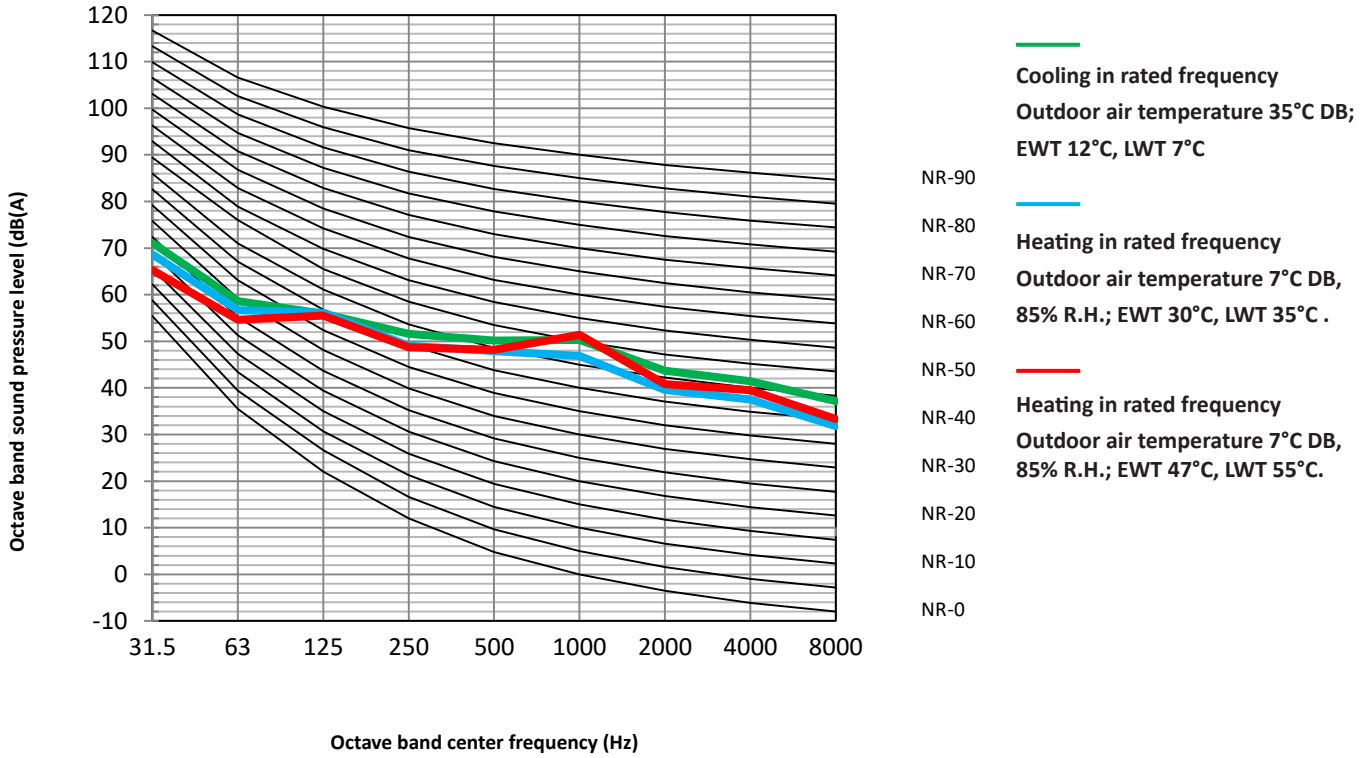


Figure 2-8.4: M.HP09 DCI MONO octave band levels

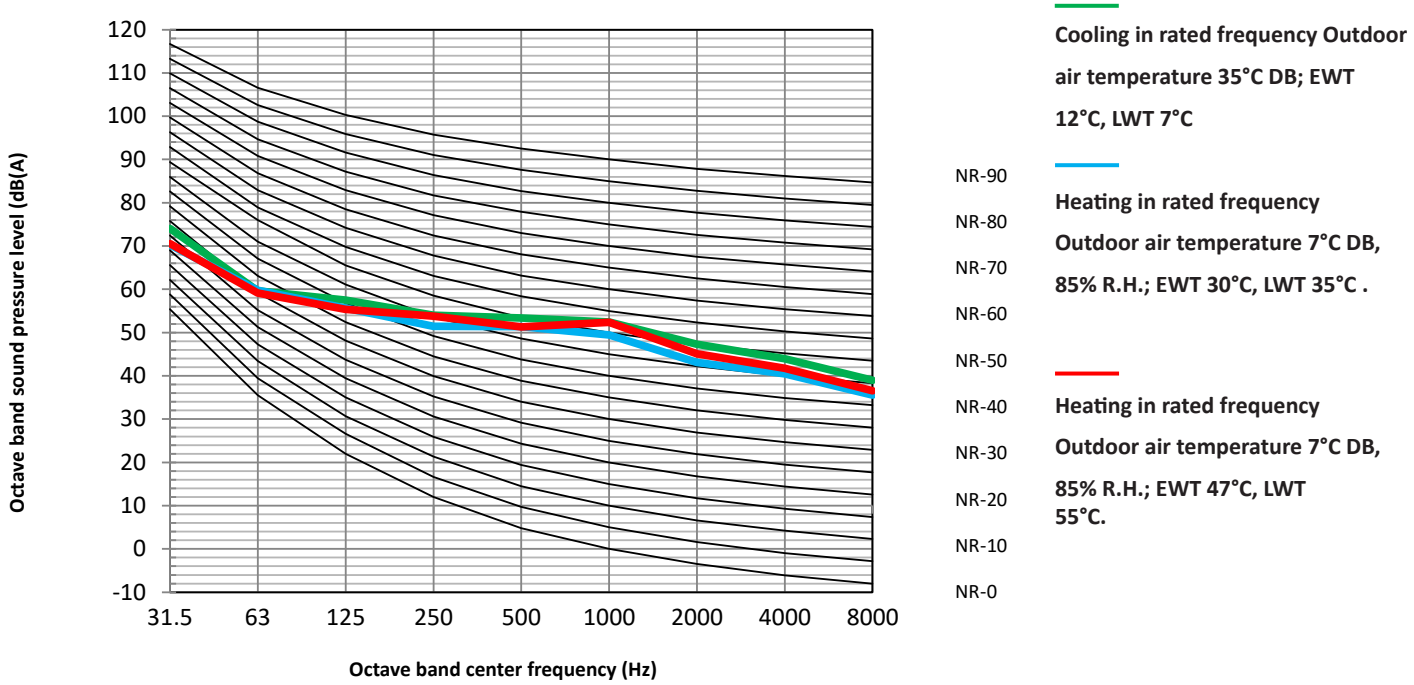


Figure 2-8.5: M.HP12 DCI MONO octave band levels

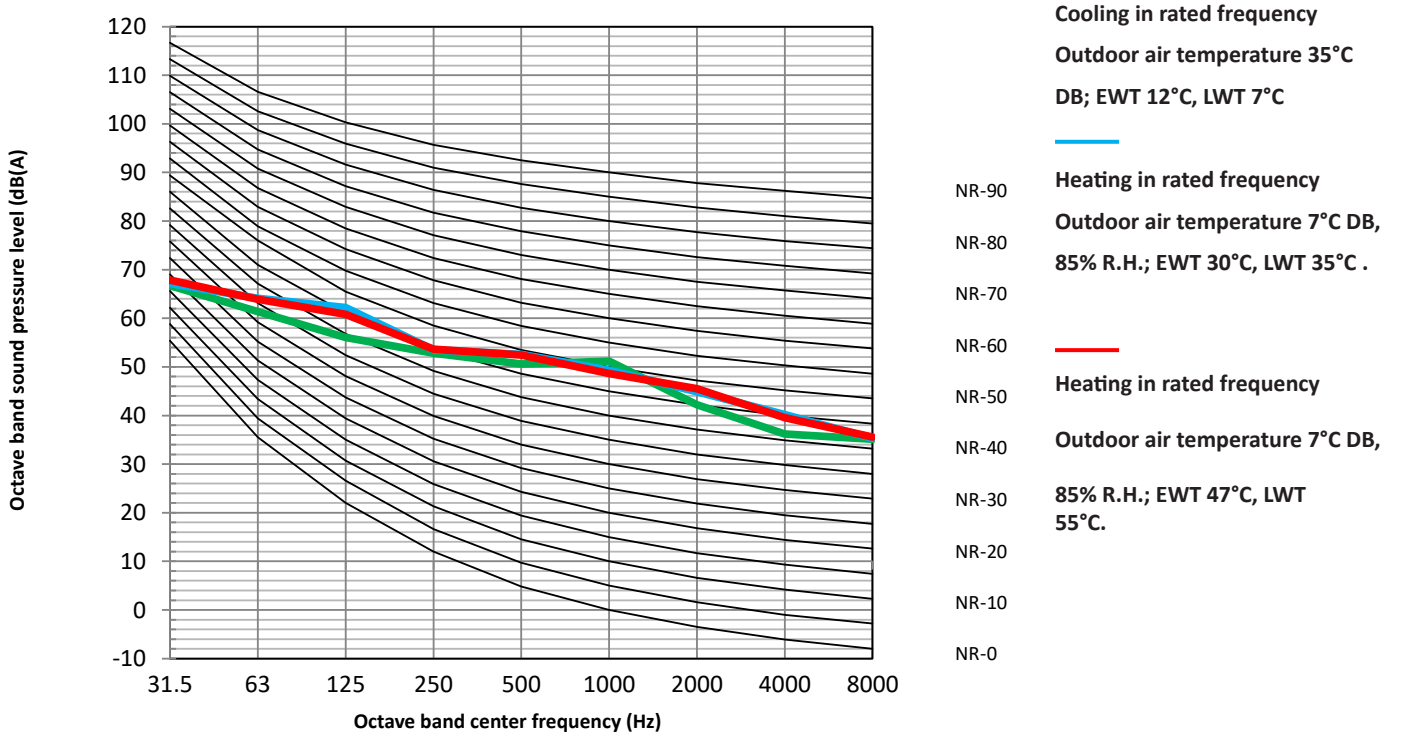


Figure 2-8.6: M.HP14 DCI MONO octave band levels

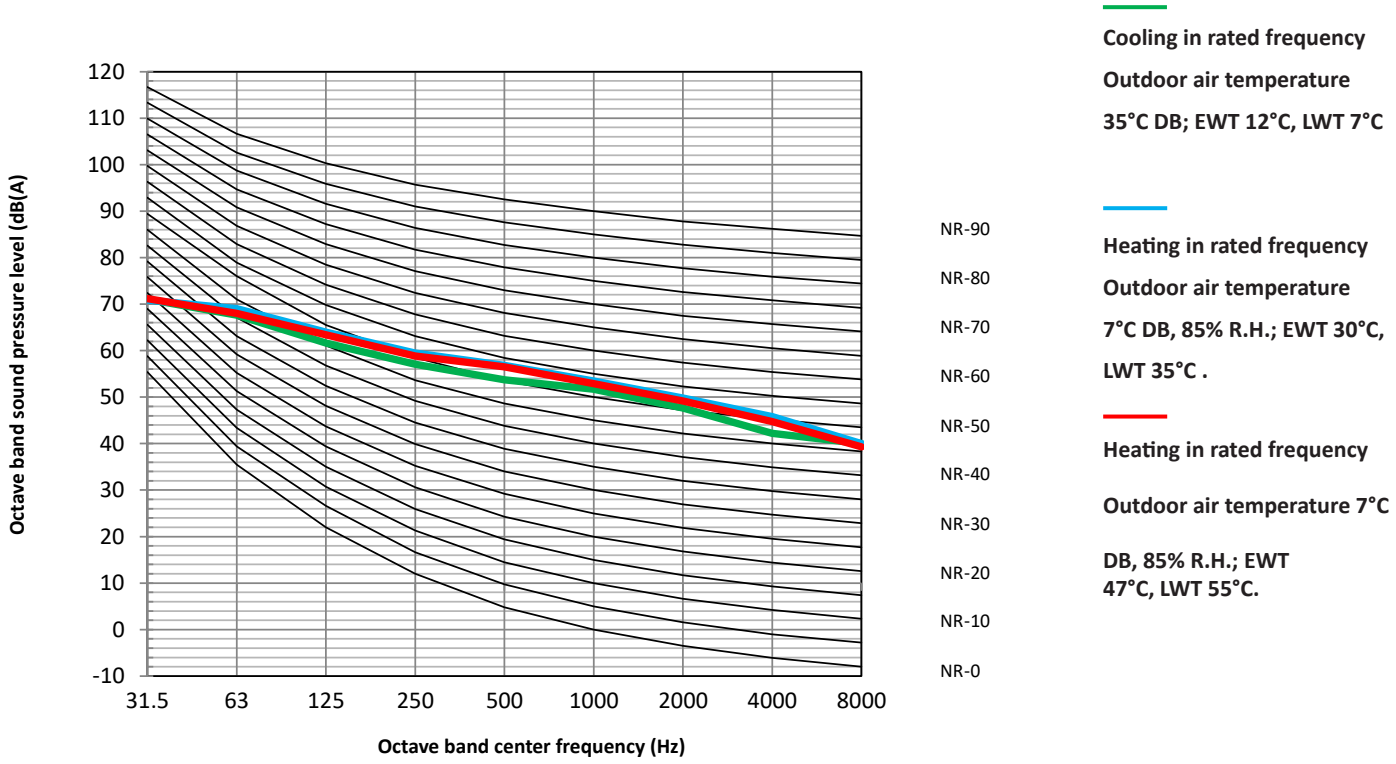


Figure 2-8.7: M.HP16 DCI MONO octave band levels

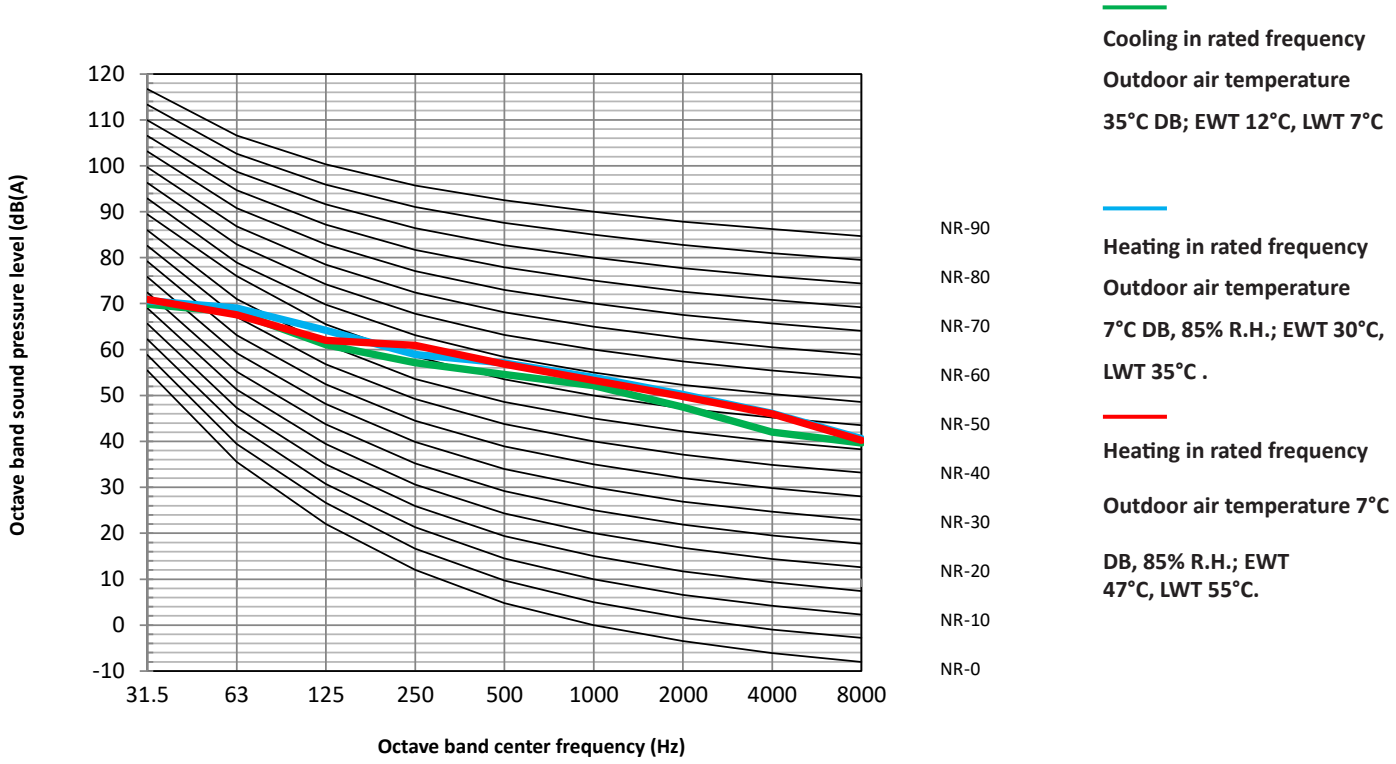


Figure 2-8.8: M.HP12 DCI TRI octave band levels

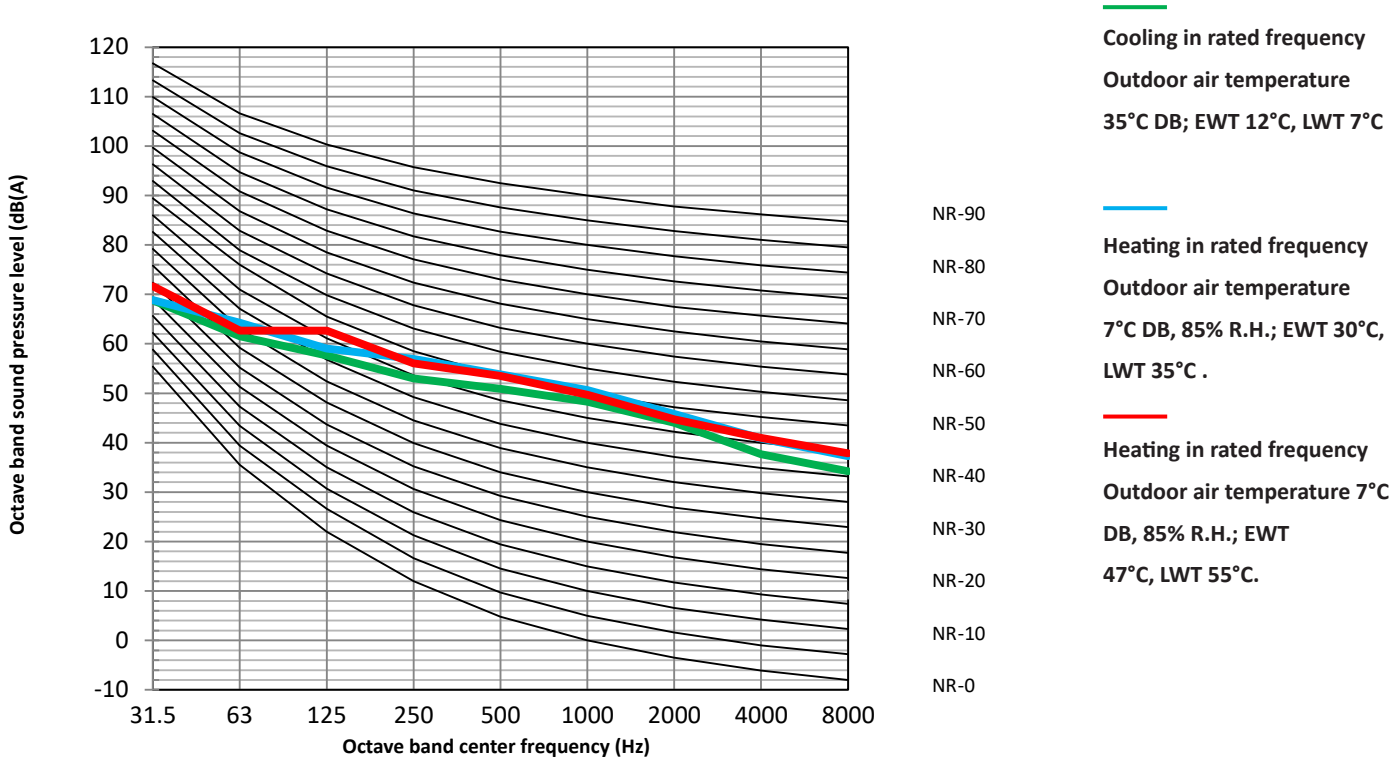


Figure 2-8.9: M.HP14 DCI TRI octave band levels

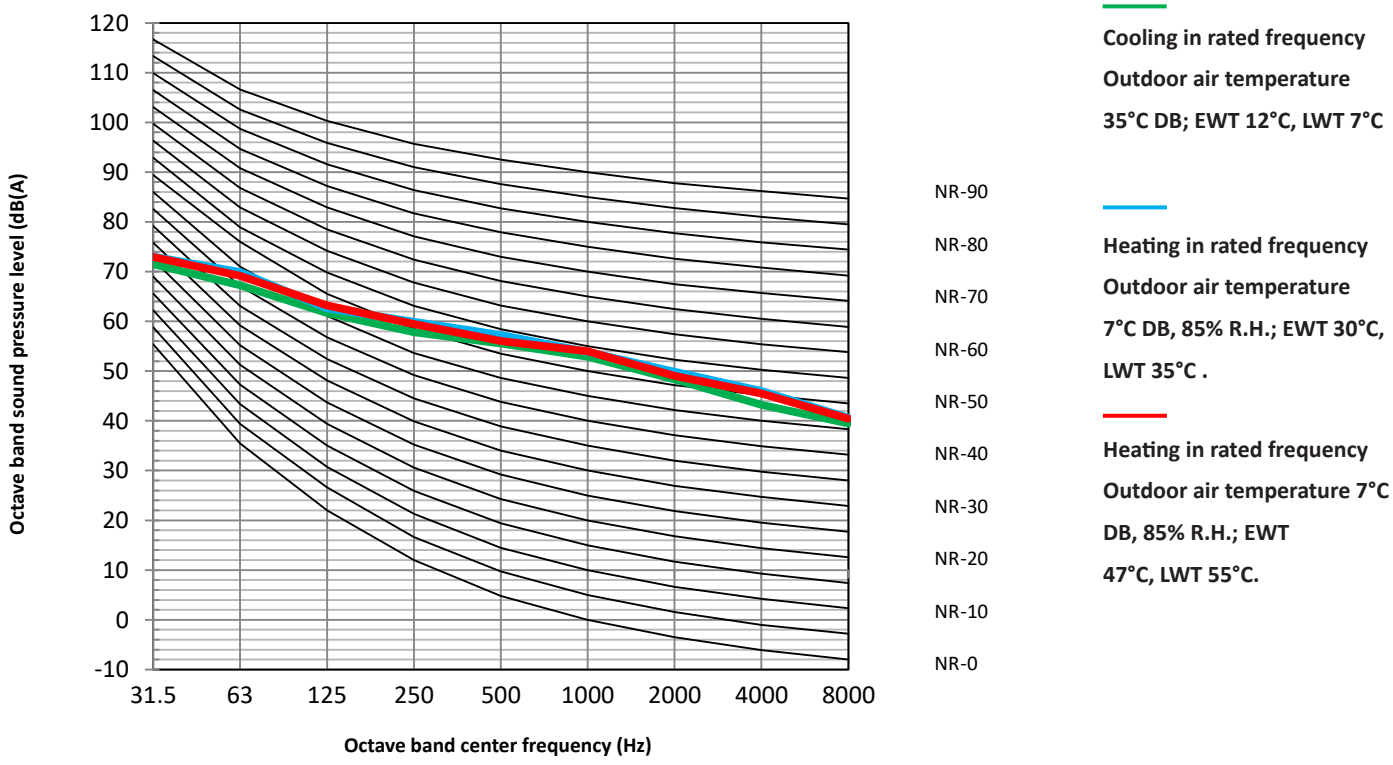
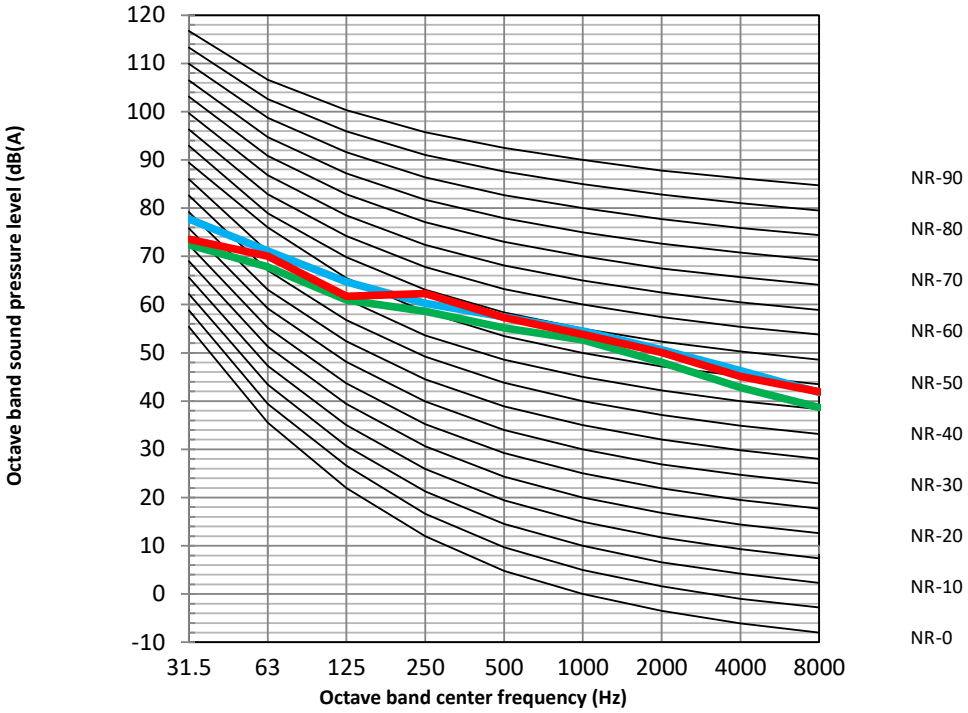


Figure 2-8.10: M.HP16 DCI TRI octave band levels



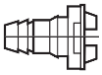
Cooling in rated frequency Outdoor air temperature 35°C DB; EWT 12°C, LWT 7°C

Heating in rated frequency Outdoor air temperature 7°C DB, 85% R.H.; EWT 30°C, LWT 35°C .

Heating in rated frequency Outdoor air temperature 7°C DB, 85% R.H.; EWT 47°C, LWT 55°C.

9 Accessories

9.1 Standard accessories *Table 2-9.1: Standard accessories*

Name	Shape	Quantity	
		M.HP05 DCI MONO M.HP07 DCI MONO M.HP09 DCI MONO	M.HP12 DCI MONO M.HP14 DCI MONO M.HP16 DCI MONO M.HP12 DCI TRI M.HP14 DCI TRI M.HP16 DCI TRI
Outdoor unit installation and owner's manual		1	1
User interface owner's manual		1	1
Technical data manual		1	1
Y-shaped filter		1	1
Water outlet connection pipe assembly		2	1
Wired controller		1	1
Tighten belt for customer wiring use		0	2
		3	3
Thermistor for domestic hot water tank or additional heating source		1	1
Extension wire for T5		1	0

9.2 Optional Accessories

Table 2-9.2: Optional accessories

Optional accessories	Model	Dimensions (mm)	Packed dimensions (mm)	Net/gross weight (kg)	Function
Backup electric heater	M.HP07-09 E-heater	780×220×280	890×325×385	18.5/24	3kW capacity backup electric heater for 5/7/9kW models

Part 3

Installation and Field Settings

1 Preface to Part 3

1.1 Notes for Installers Boxes

The information contained in this Engineering Data Book may primarily be of use during the system design stage of a Mini Heat Pump Monobloc project. Additional important information which may primarily be of use during field installation has been placed in boxes, such as the example below, titled “Notes for installers”.

Notes for installers

- Notes for installers boxes contain important information which may primarily be of use during field installation, rather than during desk-based system design.

1.2 Definitions

In this Engineering Data Book, the term “applicable legislation” refers to all national, local and other laws, standards, codes, rules, regulations and other legislation that apply in a given situation.

1.3 Precautions

All system installation including installation of water piping and electrical works must only be carried out by competent and suitably qualified, certified and accredited professionals and in accordance with all applicable legislation.

2 Installation

2.1 Acceptance and Unpacking

Notes for installers

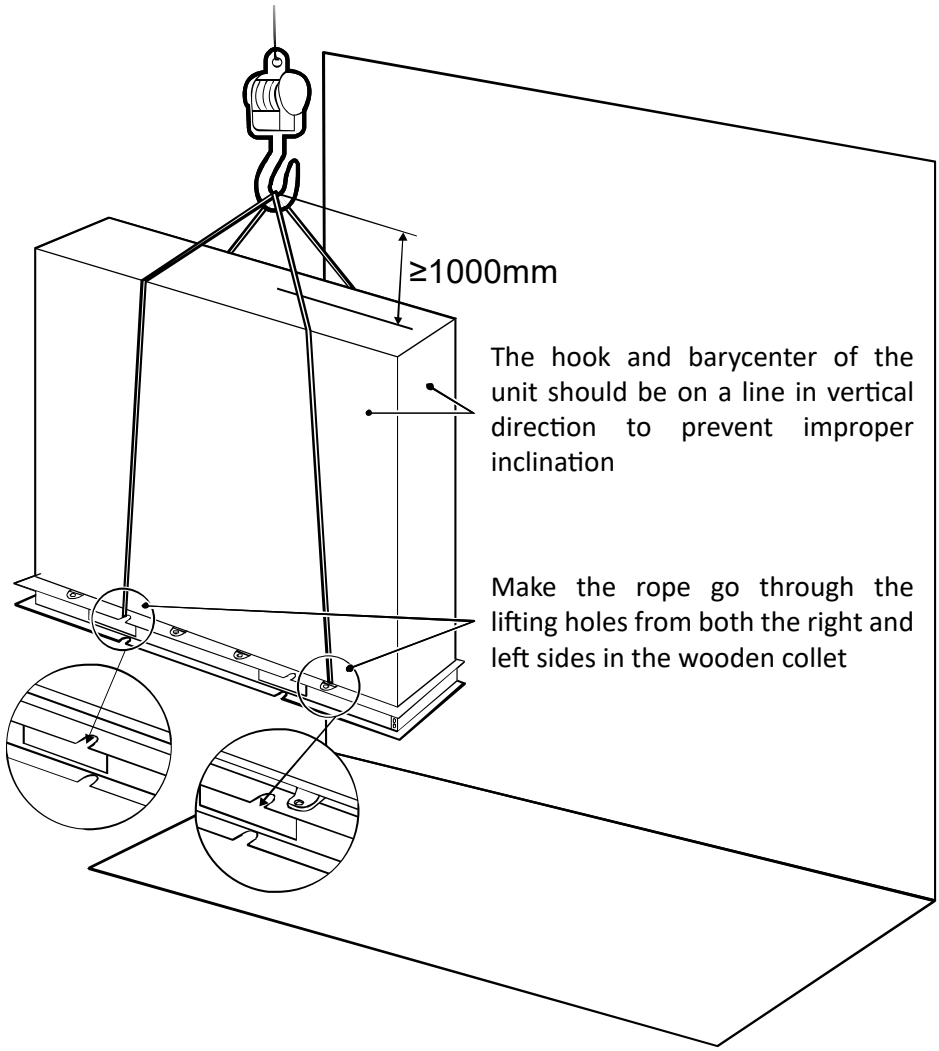
- When units are delivered check whether any damage occurred during shipment. If there is damage to the surface or outside of a unit, submit a written report to the shipping company.
- Check that the model, specifications and quantity of the units delivered are as ordered.
- Check that all accessories ordered have been included. Retain the Owner's Manual for future reference.

2.2 Hoisting

Notes for installers

- Do not remove any packaging before hoisting. If units are not packaged or if the packaging is damaged, use suitable boards or packing material to protect the units.
- Hoist one unit at a time, using two ropes to ensure stability.
- Keep units upright during hoisting, ensuring that the angle to the vertical does not exceed 30°.

Figure 3-2.1: Hosting the unit



2.3 Placement Considerations

Placement of the outdoor unit should take account of the following considerations:

- Outdoor units should not be exposed to direct radiation from a high-temperature heat source.
- Outdoor units should not be installed in positions where dust or dirt may affect heat exchangers.
- Outdoor units should not be installed in locations where exposure to oil or to corrosive or harmful gases, such as acidic or alkaline gases, may occur.
- Outdoor units should not be installed in locations where exposure to salinity may occur.
- Outdoor units should be installed in well-drained, well-ventilated positions.
- Outdoor units should be installed in positions that are as close as possible to the heat emitters.
- Outdoor units should be installed in positions that are sufficiently close to the desired position of the wired controller that the controller's wiring length limitation will not be exceeded.
- In systems that are configured to heat domestic hot water and/or include an external backup electric heater, outdoor units should be installed in positions that are sufficiently close to the domestic hot water tank and/or backup electric heater that the temperature sensor wiring length limitations will not be exceeded.
- Outdoor units should be installed in locations where the noise from the unit will not disturb neighbors.

2.4 Strong Wind Installation

Wind of 5m/s or more blowing against an outdoor unit's air outlet blocks the flow of air through the unit, leading to deterioration in unit capacity, accelerated frost accumulation when in heating mode or domestic hot water mode, and potential disruption to operation due to increased pressure in the refrigerant circuit. Exposure to very strong wind can also cause the fan to rotate excessively fast, potentially leading to damage to the fan. In locations where exposure to high winds may occur should take account of the following considerations:

- For installation of the outdoor unit in a place where the wind direction can be foreseen. Set the outlet side at a right angle to the direction of the wind, refer to Figure 3-2.2.
- If turn the air outlet side toward the building's wall, fence or screen. Make sure there is enough room to do the installation

Figure 3-2.2: Strong wind installation direction

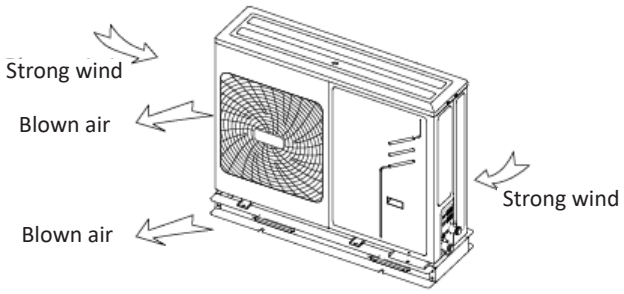


Figure 3-2.3: Installation room illustration

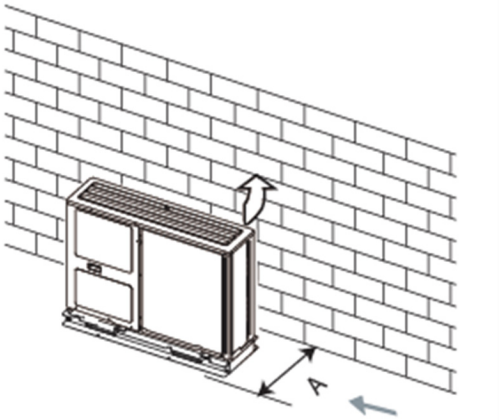


Table 3-2.1: Installation room requirement(Unit: mm)

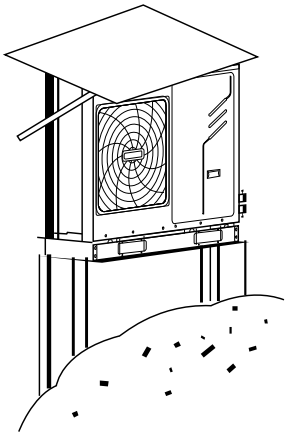
Model	A
M.HP05 DCI MONO M.HP07 DCI MONO M.HP09 DCI MONO	1000
M.HP12 DCI MONO M.HP14 DCI MONO M.HP16 DCI MONO M.HP12 DCI TRI M.HP14 DCI TRI M.HP16 DCI TRI	1500

2.5 Cold Climate Installation

In cold climate locations installation should take account of the following considerations:

- Never install the unit at a site where the suction side may be exposed directly to wind.
- To prevent exposure to wind, install a baffle plate on the air discharge side of the unit.
- To prevent exposure to wind, install the unit with its suction side facing the wall. In areas of heavy snowfall, a canopy should be installed to prevent snow entering the unit. Additionally, the height of the base structure should be increased so as to raise the unit further off the ground. Refer to Figure 3-2.4.

Figure 3-2.4: Snow shielding



2.6 Hot Climate Installation

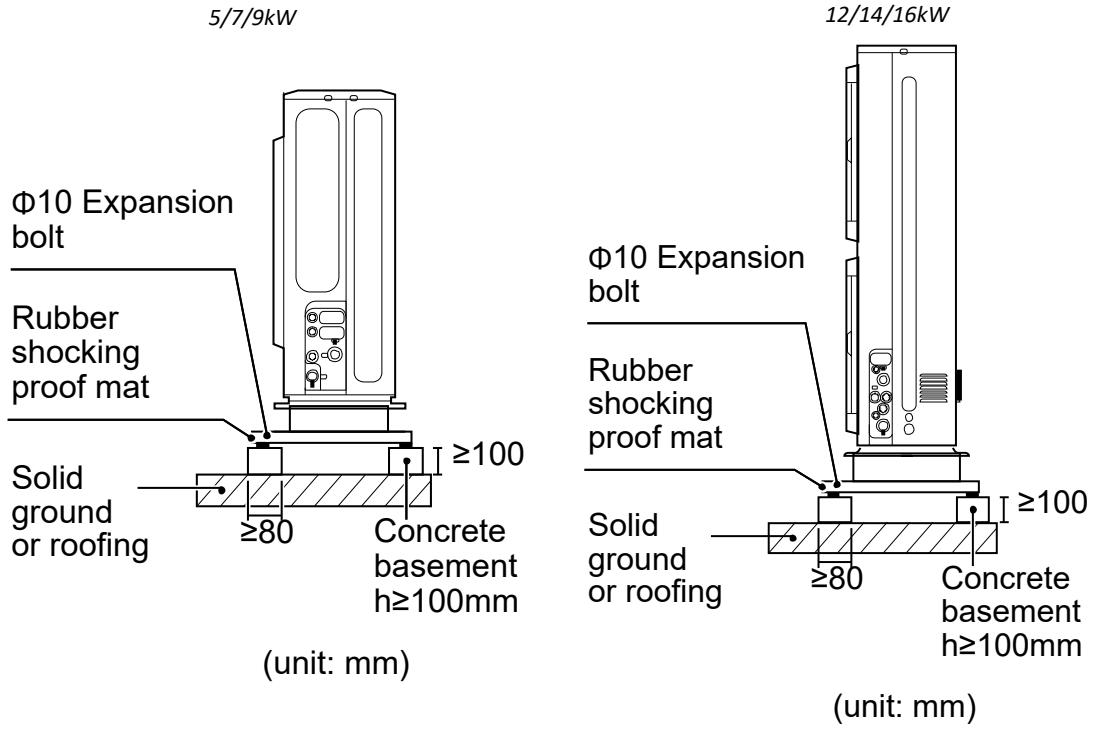
As the outdoor temperature is measured via the outdoor ambient temperature sensor, make sure to install the outdoor unit in the shade, or a canopy should be constructed to avoid direct sunlight. So that it is not influenced by the sun's heat, otherwise system protection may occur.

2.7 Base Structure

Outdoor unit base structure design should take account of the following considerations:

- A solid base prevents excess vibration and noise. Outdoor unit bases should be constructed on solid ground or on structures of sufficient strength to support the unit's weight.
- Bases should be at least 100mm high to provide sufficient drainage and to prevent water ingress into the base of the unit.
- Either steel or concrete bases may be suitable.
- Outdoor units should not be installed on supporting structures that could be damaged by water build-in in the event of a blocked drain.
- Fix the unit securely to foundation by means of the Φ10 expansion bolt. It is best to screw in the foundation bolts until their length is 20 mm from the foundation surface.

Figure 3-2.5: Outdoor unit typical concrete base structure design (unit: mm)



2.8 Drainage

Drainage ditch should be provided to allow drainage of condensate that may form on the air side heat exchanger when the unit is running in heating mode or domestic hot water mode. The drainage should ensure that condensate is directed away from roadways and footpaths, especially in locations where the climate is such that condensate may freeze.

Figure 3-2.6: 5/7/9kW models drainage hole

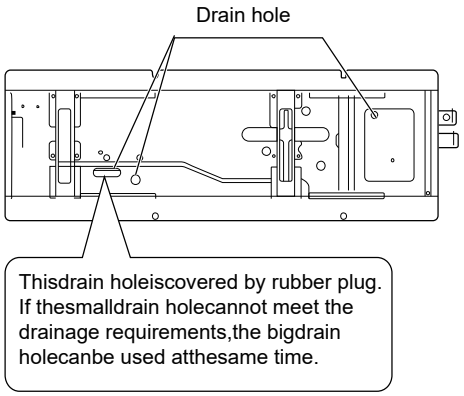
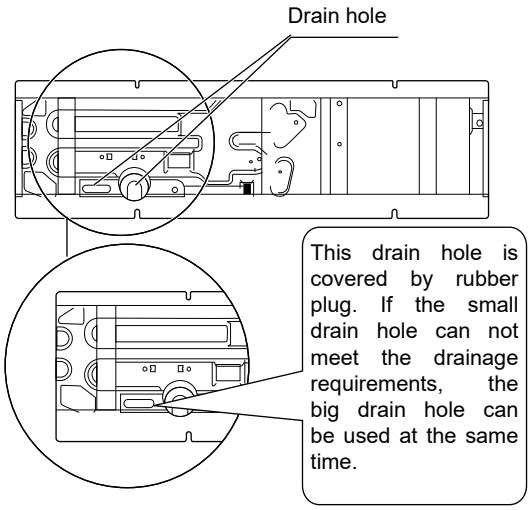


Figure 3-2.7: 12/14/16kW models drainage hole



2.9 Spacing

2.9.1 STACKED INSTALLATION

Outdoor units must be spaced such that sufficient air may flow through each unit. Sufficient airflow across heat exchangers is essential for outdoor units to function properly. Figures 3-1.8 and 3-1.9 show the minimum spaces that must be allowed between units and the minimum distances from obstacles in front of and behind units.

Figure 3-2.8: Installation with obstacles in front of the unit

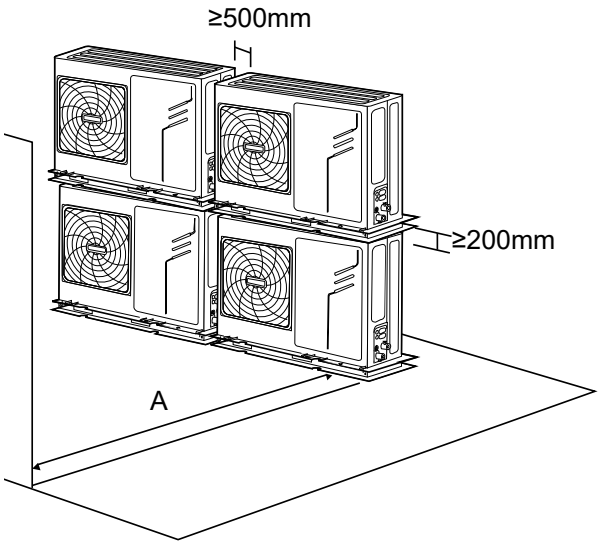
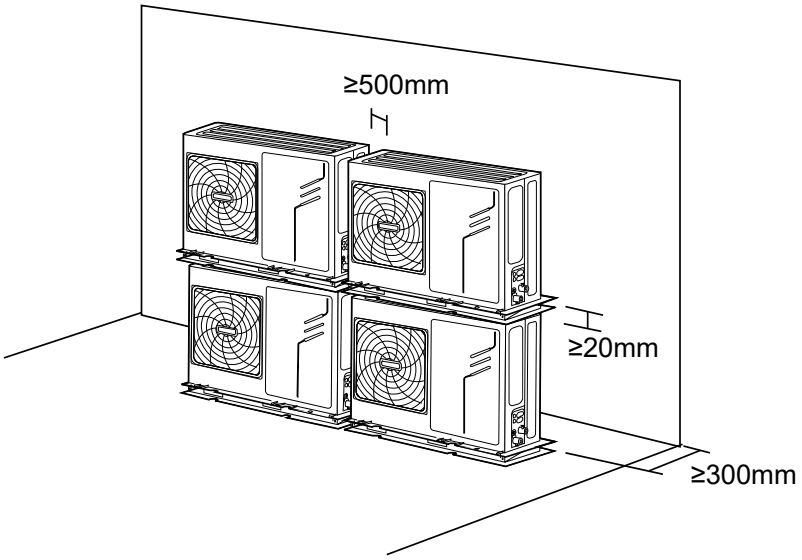


Table 3-2.2: Minimum spacing from obstacles in front of the unit

Model name	A (mm)
M.HP05 DCI MONO M.HP07 DCI MONO M.HP09 DCI MONO	≥1000
M.HP12 DCI MONO M.HP14 DCI MONO M.HP16 DCI MONO M.HP12 DCI TRI M. HP14 DCI TRI M.HP16 DCI TRI	≥1500

Figure 3-2.9: Installation with obstacles behind the unit



2.9.2 Installation in rows

Figure 3-2.10: Single row installation

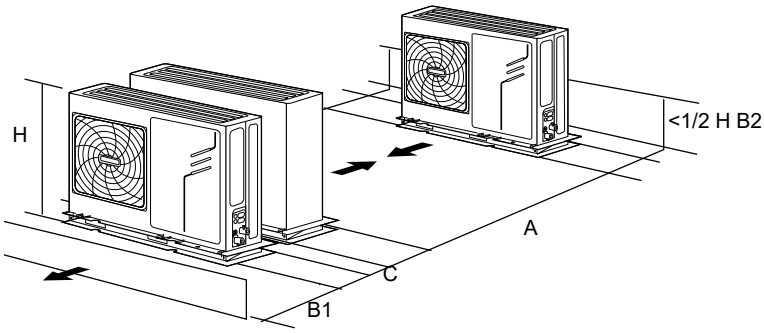


Table 3-2.3: Single row installation spacing requirements

Model name	A (mm)	B1 (mm)	B2 (mm)	C (mm)
M.HP05 DCI MONO M.HP07 DCI MONO M.HP09 DCI MONO	≥1500	≥500	≥150	≥300
M.HP12 DCI MONO M.HP14 DCI MONO M.HP16 DCI MONO M.HP12 DCI TRI M. HP14 DCI TRI M.HP16 DCI TRI	≥2000	≥1000	≥150	≥300

Figure 3-2.11: Multi-row installation

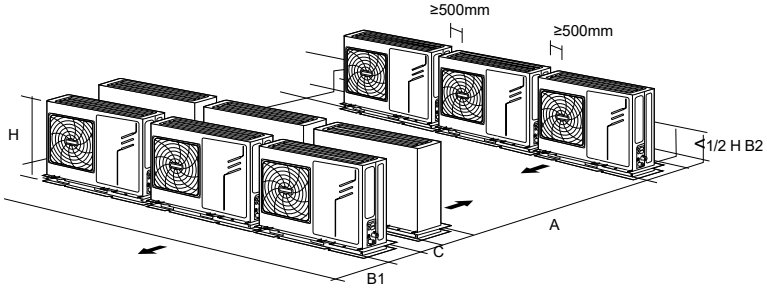


Table 3-2.4: Multiple row installation spacing requirements

Model name	A (mm)	B1 (mm)	B2 (mm)	C (mm)
M.HP05 DCI MONO M.HP07 DCI MONO M.HP09 DCI MONO	≥2500	≥1000	≥300	≥600
M.HP12 DCI MONO M.HP14 DCI MONO M.HP16 DCI MONO M. HP12 DCI TRI M. HP14 DCI TRI M.HP16 DCI TRI	≥3000	≥1500	≥300	≥600

3 Water Pipework

3.1 Water Circuit Checks

Mini Heat Pump Monobloc units are equipped with a water inl et and outlet for connection to a water circuit. Mini Heat Pump Monobloc units should only be connected to closed water circuits. Connection to an open water circuit would lead to excessive corrosion of the water piping. Only materials complying with all applicable legislation should be used. Before continuing installation of the unit, check the following:

- The maximum water pressure ≤ 3 bar.
- The maximum water temperature ≤ 70°C according to safety device setting.
- Always use materials that are compatible with the water used in the system and with the materials used in the unit.
- Ensure that components installed in the field piping can withstand the water pressure and temperature.
- Drain taps must be provided at all low points of the system to permit complete drainage of the circuit during maintenance.
- Air vents must be provided at all high points of the system. The vents should be located at points that are easily accessible for service. An automatic air purge is provided inside the unit. Check that this air purge valve is not tightened so that automatic release of air in the water circuit is possible.

3.2 Water Volume and Expansion Vessel Pre-pressure Checks

Outdoor units are equipped with an expansion vessel (5/7/9kW models: 2L; 12/14/16kW models: 5L) that has a default pre-pressure of 1.5 bar. To assure proper operation of the unit, the pre-pressure of the expansion vessel might need to be adjusted. Refer to Table 3-3.1. The total volume of water in the system must be at least 25L(for 5/7/9kW unit, the minimum volume is 15L) and should not exceed the limits specified in Figure 3-3.1.

Table 3-3.1: Expansion vessel pre-pressure adjustment

Installation height difference[1]	**Water volume ≤ X L**[2]	**Water volume > X L**[2]
≤ 12 m	No pre-pressure adjustment required	Actions required: •Pre-pressure must be decreased, calculate according to “Calculating the pre-pressure of theexpansion vessel”[3] •Check if the water volume is lower than maximumallowed water volume (refer to Figure 3-3.1)
> 12 m	Actions required: •Pre-pressure must be increased, calculate according to “Calculating the pre-pressure of theexpansion vessel”[2]•Check if the water volume is lower than maximumallowed water volume (refer to Figure 3-3.1)	Expansion vessel in the outdoorunit too small for the system. An external expansion vessel (field suppied) is required.

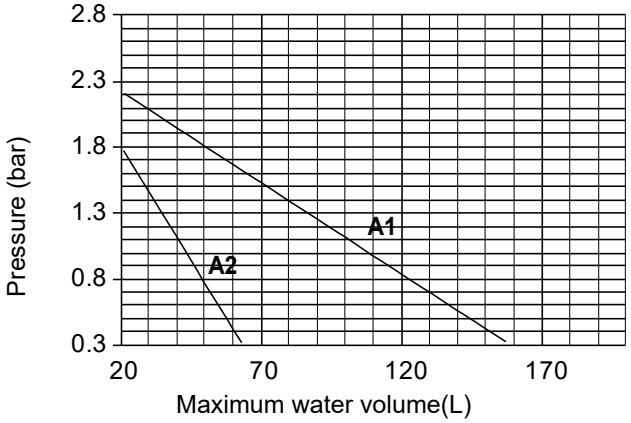
Notes:

1. Height difference is between the highest point of the water circuit and the outdoor unit’s expansion tank. Unless the unit is located at the highest point of the system, in which case the installation height difference is considered to be zero.
2. For 1-phase 12~16kW and 3-phase 12~16kW units, this value is 72L, for 5~9kW units, this value is 30 L.
3. Calculating the pre-pressure of the expansion vessel:
   The pre-pressure (Pg) to be set depends on the maximum installation height difference (H) and is calculated as Pg(bar)=(H(m)/10+0.3) bar

To determine the maximum allowed water volume in the entire circuit, proceed as follows:

- Determine the calculated pre-pressure (Pg) for the corresponding maximum water volume using the Figure 3-3.1.

Figure 3-3.1: Maximum water volume



A1: System without glycol for 1-phase 12~16kW and 3-phase 12~16kW unit
A2: System without glycol for the 5/7/9kW unit

- Check that the total water volume in the entire water circuit is lower than this value. If this is not the case, the expansion vessel inside the unit is too small for the installation.

Example

The unit(16kW) is installed at the highest point in the water circuit. The total water volume in the water circuit is 150L.

Since 150L is more than 72L, the pre-pressure must be decreased, refer to Table 3-3:1.

- The required pre-pressure is: Pg(bar) = (H(m)/10+0.3) bar = (0/10+0.3) bar = 0.3 bar
- The corresponding maximum water volume can be read from the Figure 3-1.7 is approximately 160L
- Since the total water volume (150L) is below the maximum water volume (160L), the expansion vessel suffices for the installation.

When it is required to change the default pre-pressure of the expansion vessel (1.5 bars), following guidelines:

- Use only dry nitrogen to set the expansion vessel pre-pressure.
- Inappropriate setting of the expansion vessel pre-pressure will lead to malfunctioning of the system. Pre-pressure should only be adjusted by a licensed installer.

If the expansion vessel of unit is too small for the installation, an additional expansion vessel is needed.

- Calculate the pre-pressure of the expansion vessel: Pg(bar) = (H(m)/10+0.3) bar = (0/10+0.3) bar The expansion vessel equipped in the unit should adjust the pre-pressure also.
- Calculate the volume needed of the additional expansion vessel: V1=0.0693*Vwater/(2.5-Pg)-V0 Vwater: the volume of water in the system
- V0: the volume of expansion vessel which the unit is equipped (For 5~9kW, V0=2L; For 10~16kW, V0=5L)

3.3 Water Circuit Connection

Water connections must be made correctly in accordance with the labels on the outdoor unit, with respect to the water inlet and water outlet. If air, moisture or dust gets in the water circuit, problems may occur. Therefore, always take into account the following when connecting the water circuit:

- Use clean pipes only.
- Hold the pipe end downwards when removing burrs
- Cover the pipe end when inserting it through a wall to prevent dust and dirt entering.
- Use a good thread sealant for sealing the connections. The sealing must be able to withstand the pressures and temperatures of the system.

- When using non-copper metallic piping, be sure to insulate the two kind of materials from each other to prevent galvanic corrosion.
- For copper is a soft material, use appropriate tools for connecting the water circuit. Inappropriate tools will cause damage to the pipes

3.4 Water Circuit Anti-freeze Protection

Ice formation can cause damage to the hydronic system. As the outdoor unit may be exposed to sub-zero temperatures, care must be taken to prevent freezing of the system. All internal hydronic parts are insulated to reduce heat loss. Insulation must also be added to the field piping.

- The software contains special functions using the heat pump to protect the entire system against freezing.
- When the temperature of the water flow in the system drops to a certain value, the unit will heat the water, either using the heat pump, the electric heating tap, or the backup heater. The freeze protection function will turn off only when the temperature increases to a certain value.
- In event of a power failure, the above features would not protect the unit from freezing.
- Since a power failure could happen when the unit is unattended, the supplier recommends use anti-freeze fluid to the water system.
- Depending on the expected lowest outdoor temperature, make sure the water system is filled with a concentration of glycol as mentioned in the table below. When glycol is added to the system, the performance of the unit will be affected. The correction factor of the unit capacity, flow rate and pressure drop of the system is listed in the table 3-3.2 and 3-3.3.

Table 3-3.2: Ethylene Glycol

Concentration of ethylene glycol (%)	Modification coefficient				Freezing point (°C)
	Cooling capacity	Power input	Water resistance	Water flow	
0	1.000	1.000	1.000	1.000	0
10	0.984	0.998	1.118	1.019	-4
20	0.973	0.995	1.268	1.051	-9
30	0.965	0.992	1.482	1.092	-16
40	0.960	0.989	1.791	1.145	-23
50	0.950	0.983	2.100	1.200	-37

Table 3-3.3: Propylene Glycol

Concentration of propylene glycol (%)	Modification coefficient				Freezing point (°C)
	Cooling capacity	Power input	Water resistance	Water flow	
0	1.000	1.000	1.000	1.000	0
10	0.976	0.996	1.071	1.000	-3
20	0.961	0.992	1.189	1.016	-7
30	0.948	0.988	1.380	1.034	-13
40	0.938	0.984	1.728	1.078	-22
50	0.925	0.975	2.150	1.125	-35

Uninhibited glycol will turn acidic under the influence of oxygen. This process is accelerated by presence of copper and at higher temperatures. The acidic uninhibited glycol attacks metal surfaces and forms galvanic corrosion cells that cause severe damage to the system. It is of extreme importance:

- That the water treatment is correctly executed by a qualified water specialist.
- That a glycol with corrosion inhibitors is selected to counteract acids formed by the oxidation of glycols.

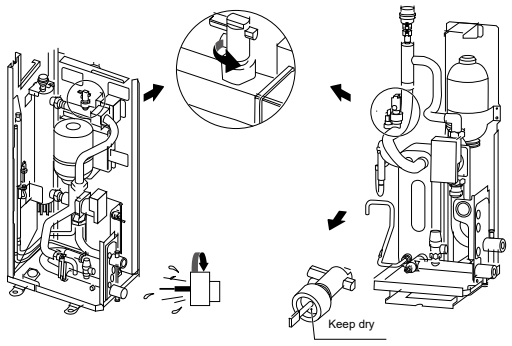
- That in case of an installation with a domestic hot water tank, only the use of propylene glycol is allowed. In other installations the use of ethylene glycol is fine.
- That no automotive glycol is used because their corrosion inhibitors have a limited lifetime and contain silicates that can foul or plug the system;
- That galvanized piping is not used in glycol systems since it may lead to the precipitation of certain elements in the glycol's corrosion inhibitor;
- To ensure that the glycol is compatible with the materials used in the system.

3.5 Water Flow Switch

Water may enter into the flow switch and cannot be drained out and may freeze when the temperature is low enough. The flow switch should be removed and dried, then can be reinstalled in the unit.

- Counterclockwise rotation, remove the water flow switch.
- Drying the water flow switch completely.

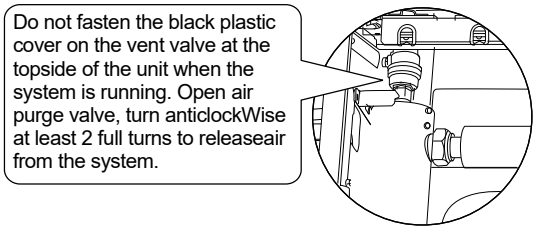
Figure 3-3.2: Water flow switch



3.6 Adding Water

- Connect the water supply to the fill valve and open the valve.
- Make sure the automatic air purge valve is open (at least 2 turns). Refer to Figure 3-3.3.
- Fill with water until the manometer indicates a pressure of approximately 2.0 bars. Remove air in the circuit as much as possible using the air purge valve. Air in the water circuit could lead to malfunction of the backup electric heater.

Figure 3-3.3: Air purge valve



3.7 Water Piping Insulation

The complete water circuit including all piping, water piping must be insulated to prevent condensation during cooling operation and reduction of the heating and cooling capacity as well as prevention of freezing of the outside water piping during winter. The insulation material should at least of B1 fire resistance rating and complies with all applicable legislation. The thickness of the sealing materials must be at least 13mm with thermal conductivity 0.039W/mK in order to prevent freezing on the outside water piping. If the outdoor ambient temperature is higher than 30°C and the humidity is higher than RH 80%, the thickness of the sealing materials should be at least 20mm in order to avoid condensation on the surface of the seal.

4 Electrical Wiring

4.1 General

Notes for installers

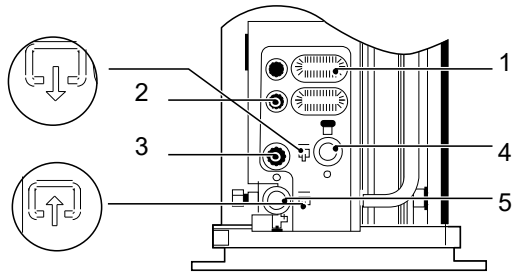
Caution

- All installation and wiring must be carried out by competent and suitably qualified, certified and accredited professionals and in accordance with all applicable legislation.
- Electrical systems should be grounded in accordance with all applicable legislation.
- Overcurrent circuit breakers and residual-current circuit breakers (ground fault circuit interrupters) should be used in accordance with all applicable legislation.
- Wiring patterns shown in this data book are general connection guides only and are not intended for, or to include all details for, any specific installation.
- The water piping, power wiring and communication wiring are typically run in parallel. However the communication wiring should not be bound together with power wiring. To prevent signal interference, the power wiring and communication wiring should not be run in the same conduit. If the power supply is less than 10A, a separation of at least 300mm between power wiring and communication wiring conduits should be maintained; if the power supply is in the range 10A to 50A then a separation of at least 500mm should be maintained.

4.2 Precautions

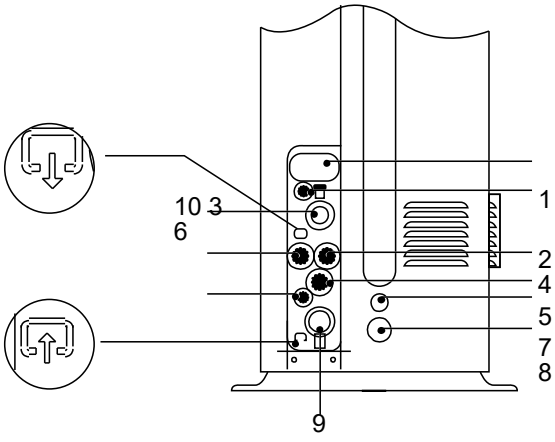
- Fix cables so that cables do not make contact with the pipes (especially on the high pressure side).
- Secure the electrical wiring with cable ties as shown in Figure 3-1.14 and Figure 3-1.15. So that it does not come in contact with the piping, particularly on the high-pressure side.

Figure 3-4.1: Wiring hole for 5/7/9kW models



Legend	
1	High voltage wire hole
2	Low voltage wire hole
3	Drainage pipe hole
4	Water outlet
5	Water inlet

Figure 3-4.2: Wiring hole for 12~16kW models



Legend	
1	High voltage wire hole
2	Low voltage wire hole
3	High voltage wire hole
4	Compressor connection port W
5	Drainage pipe hole
6	Low voltage wire hole
7	Low voltage wire hole (backup)
8	Low voltage wire hole (backup)
9	Water outlet
10	Water inlet

- Make sure no external pressure is applied to the terminal connectors.
- When installing the ground fault circuit interrupter make sure that it is compatible with the inverter (resistant to high
- frequency electrical noise) to avoid unnecessary opening of the ground fault circuit interrupter
- This unit is equipped with an inverter. Installing a phase advancing capacitor not only reduce the power factor improvement effect, but also may cause abnormal heating of the capacitor due to high frequency waves. Never install a phase advancing capacitor as it could lead to an accident.

4.3 Guideless

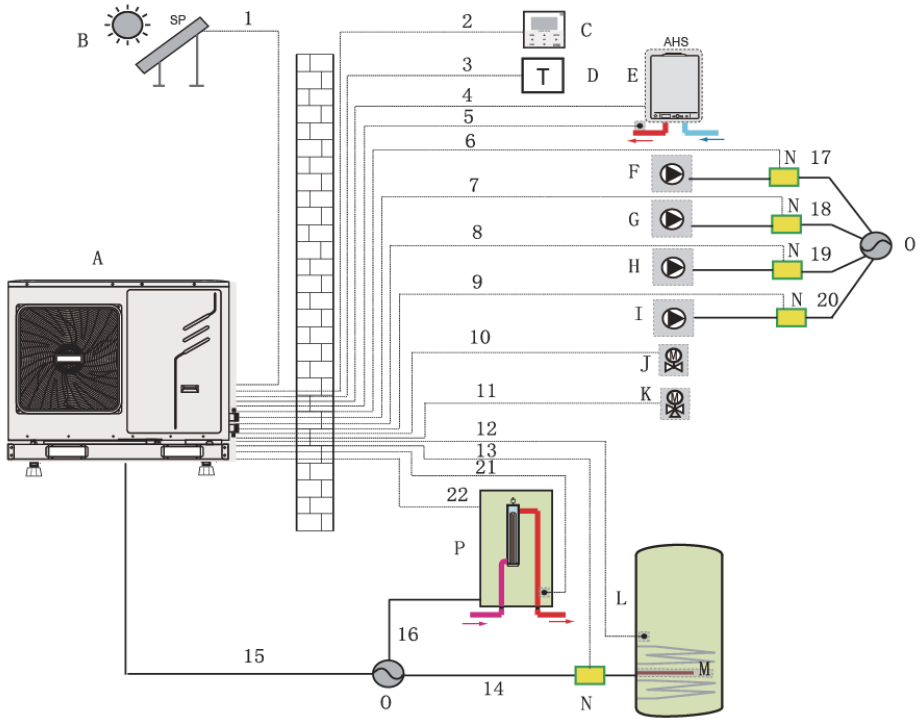
- Most field wiring on the unit is to be made on the terminal block inside the switch box. To gain access to the terminal block, remove the switch box service panel.
- Fix all cables using cable ties.
- A dedicated power circuit is required for the backup electric heater.
- Installation equipped with a domestic hot water tank (field supplied) requires a dedicated power circuit for the immersion heater.

Secure the wiring in the order shown below:

- Lay out the electrical wiring so that the front cover does not rise up when doing wiring work and attach the front cover securely.
- Follow the electric wiring diagrams for electrical wiring works. Refer to Figure 2-4.1, Figure 2-4.2 and Figure 2-4.3 in part 2, 4 “Wiring Diagram”.
- Install the wires and fix the cover firmly so that the cover may be fit in properly.

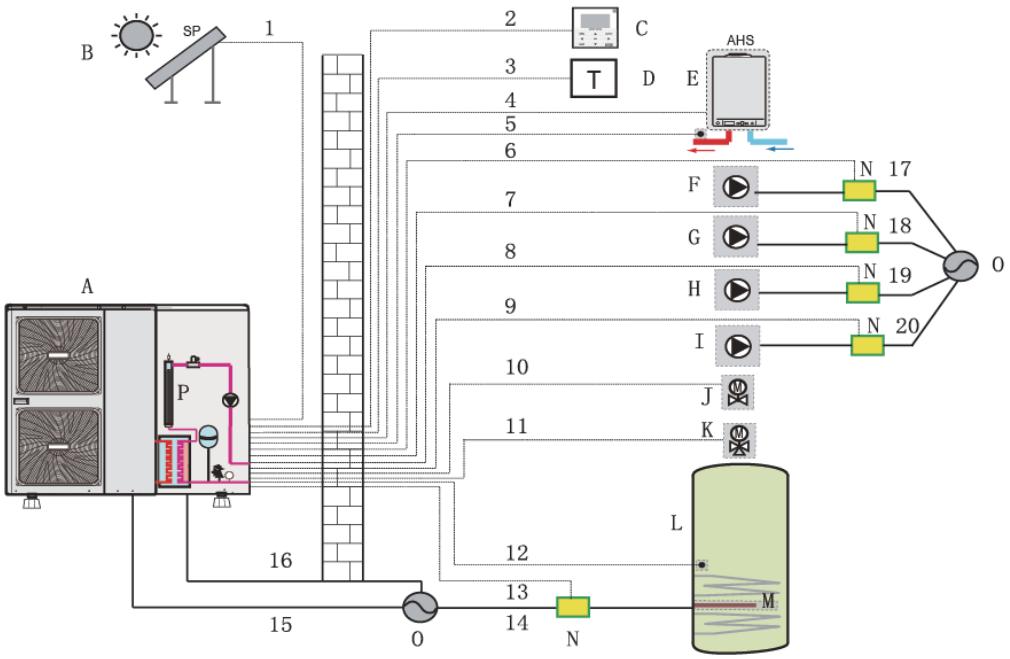
4.4 Wiring Overview

Figure 3-4.3: Wiring overview for 5/7/9kW models



Legend			
A	Outdoor unit	I	P_d: DHW pump (field supplied)
B	Solar energy kit (field supplied)	J	SV2: Motorized 2-way valve (field supplied)
C	User interface	K	SV1: Motorized 3-way valve (field supplied)
D	Room thermostat (field supplied)	L	Domestic water tank (field supplied)
E	Auxiliary heating source (field supplied)	M	Immersion heater (field supplied)
F	P_s: Solar pump (field supplied)	N	Contactor (field supplied)
G	P_c: Mixing pump (field supplied)	O	Power supply
H	P_o: External circulator pump (field supplied)	P	Backup electric heater (customized)

Figure 3-4.4: Wiring overview for 12/14/16kW models



Legend			
A	Outdoor unit	I	P_d: DHW pump (field supplied)
B	Solar energy kit (field supplied)	J	SV2: Motorized 2-way valve (field supplied)
C	User interface	K	SV1: Motorized 3-way valve (field supplied)
D	Room thermostat (field supplied)	L	Domestic water tank (field supplied)
E	Auxiliary heating source (field supplied)	M	Immersion heater (field supplied)
F	P_s: Solar pump (field supplied)	N	Contactor (field supplied)
G	P_c: Mixing pump (field supplied)	O	Power supply
H	P_o: External circulator pump (field supplied)	P	Backup electric heater (customized)

Table 3-4.1: Wiring requirements

Item	Description	Current	Required number of conductors	Maximum running current	Minimum wiring size
1	Solar energy kit signal wire	AC	2	200mA	0.75mm^2
2	User interface wire[1]	AC	5	200mA	0.75-1.25mm^2
3	Room thermostat wire	AC	2 or 3	200mA	0.75mm^2
4	Auxiliary heating source control wire	-	2	200mA	0.75mm^2
5	Temperature sensor wire[2]	DC	2		
9	DHW pump control wire	AC	2	200mA	0.75mm^2
10	Motorized 2-way valve control wire	AC	2	200mA	0.75mm^2
11	Motorized 3-way valve control wire	AC	2 or 3	200mA	0.75mm^2
12	Temperature sensor wire[2]	DC	2		
13	Immersion heater control wire	AC	2	200mA	0.75mm^2
14	Power supply wire for immersion heater	AC	2+GND(1 Ph) 3+GND(3Ph)		Dedicated power supply
15	Power supply wire for outdoor unit	AC	2+GND(1Ph,5/7/9kW) 2+GND(1Ph,12/14/16kW) 3+GND(3Ph,12/14/16kW)	31A(1Ph,5/7/9kW) 31A(1Ph,12/14/16kW) 15A(3Ph,12/14/16kW)	4mm^2(1Ph,5/7/9kW) 6mm^2(1Ph,12/14/16kW) 4mm^2(3Ph,12/14/16kW)
16	Power supply wire for backup electric heater	AC	2+GND(1Ph) 3+GND(3Ph)	14A(1Ph,5/7/9kW) 14A(1Ph,12/14/16kW) 6A(3Ph,12/14/16kW)	
17	Power supply wire for solar pump[3]	AC	2	related to the pump power	related to the pump power
18	Power supply wire for mixing pump[3]	AC	2	related to the pump power	related to the pump power
19	Power supply wire for outside circulator pump[3]	AC	2	related to the pump power	related to the pump power
20	Power supply wire for DHW pump[3]	AC	2	related to the pump power	related to the pump power
21	Temperature sensor wire[2]	DC	2		

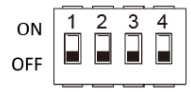
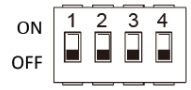
Notes:

1. 5-core shielded wire is required; the standard maximum wire length is 50m.
2. The temperature sensors are included in the unit.
3. If the Maximum running current is higher than 200mA, dedicated power supply is needed.

5 DIP Switch Settings

DIP switches S1 and S2 on the hydronic system main PCB should be used to specify refrigerant piping length and to specify whether certain components have or have not been installed. Refer to Table 3-5.1 and to the Mini Heat Pump Monobloc units Service Manual, Part 4, 2.2 “Main PCB for Hydronic System”.

Table 3-5.1: DIP switch settings

Switch		Description	ON	OFF	Default factory setting
S1 	1	Selection of refrigerant pipe length	/	5m	OFF
	2	Backup electric heater outlet temperature sensor	Installed	Not installed	OFF
	3	The first backup electric heater element	Not installed	Not Installed	OFF
	4	The second backup electric heater element	Not installed	Not Installed	ON
S2 	1	Additional heating source outlet temperature sensor	Installed	Not installed	OFF
	2	Reserved			
	3				
	4				

6 Internal Circulator Pump Speed Settings

The internal circulator pump speed can be selected by adjusting the red knob on the pump. The default factory setting is the highest speed (III). If the system water flow is too high, the pump speed can be set to medium (II) or low (I). The relationship between external static pressure and water flow rate is described in Part 2, 11 “Hydronic Performance”.

Figure 3-6.1: Internal circulator pump

The pump has an LED operating status display. This makes it easy for the technical engineer to search for the cause of a fault in the system.

- If the LED display lights up continuously green, it means the pump is running normally.
- If the LED display is flashing green, it means the pump is running the venting function. The pump runs during the 10 minute venting function. After its cycle, the installer needs to adjust the targeted performance.
- If the LED is flashing green/red, it means that the pump has stopped operating due to an external reason. The pump will restart by itself after the abnormal situation disappears. One of the reason is pump undervoltage or overvoltage (V<160V or V>280V), please check the power supply and solve the problem. The other reason is module overheating, and you should check the water and ambient temperatures.
- If the LED is flashing red, it means the pump has stopped operating, and a serious fault has happened (e.g. pump blocked). The pump cannot restart itself due to a permanent failure and the pump should be changed.
- If the LED does not light up, it means no power supply to the pump, possibly the pump is not connected to power supply. Check the cable connection. If the pump runs but LED not light up, it means the LED is damaged. Or the electronics are damaged and the pump should be changed.

7 User Interface Field Settings

7.1 Introduction

During installation, the Mini Heat Pump Monobloc units' settings and parameters should be configured by the installer to suit the installation configuration, climate conditions and end-user preferences. The relevant settings are accessible and programmable through the FOR SERVICEMAN menu on the Mini Heat Pump Monobloc units' user interface. The user interface menus and settings can be navigated using the user interface's touch-sensitive keys, as detailed in Table 3-7.1.

Figure 3-7.1: User interface

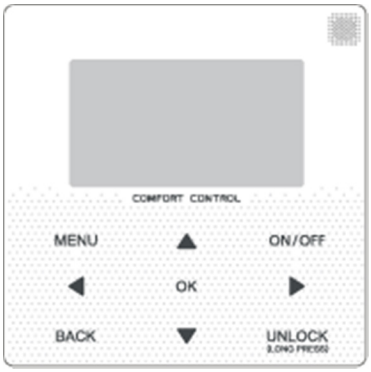
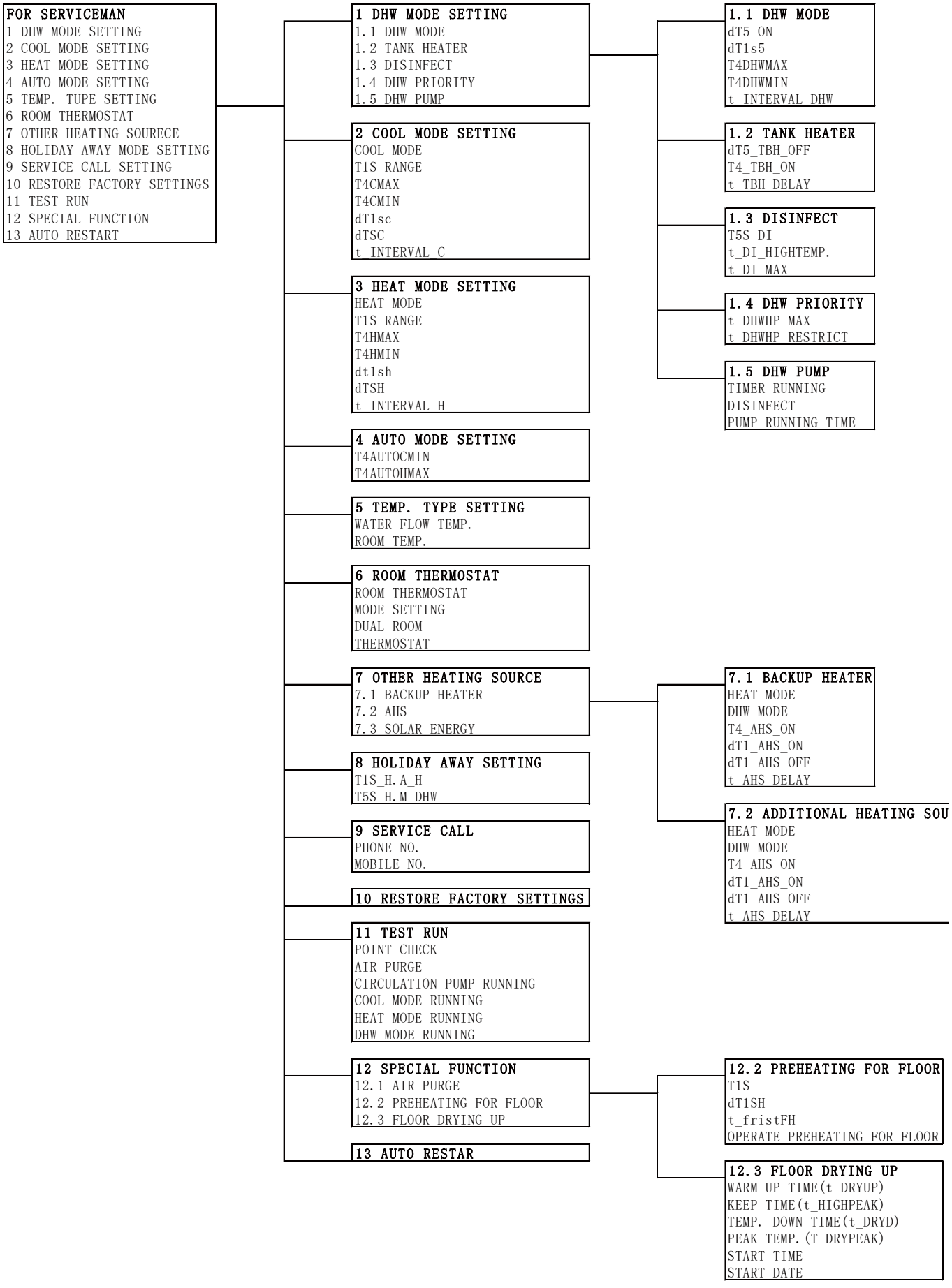


Table 3-7.1: User interface keys

Keys	Function
MENU	▪ Go to the menu structure(on the home page)
◄► ▼ ▲	▪ Navigate the cursor on the display ▪ Navigate in the menu structure ▪ Adjust settings
ON/OFF	▪ Turn on/off the space heating/cooling operation or DHW mode ▪ Turn on/or off functions in the menu structure
BACK	▪ Come back to the up level
UNLOCK	▪ Long press for unlock/ lock the controller ▪ Unlock/ Lock some functions such as "DHW temperature adjusting"
OK	▪ Go to the next step when programming a schedule in the menu structure; and confirm a selection to enter in the submenu of the menu structure.

7.2 Menu Structure



7.3 FOR SERVICEMAN Menu

FOR SERVICEMAN allows installers to input the system configuration and set the system parameters. To enter FOR SERVICEMAN, go to MENU > FOR SERVICEMAN.

Enter the password, using ◄ ► to navigate between digits and using ▼ ▲ to adjust the numerical values, and then press OK. The password is 234. Refer to Figure 3-7.2.

Figure 3-7.2: FOR SERVICEMAN password screen

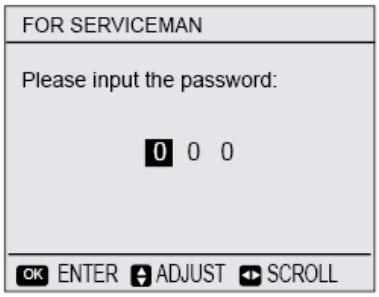
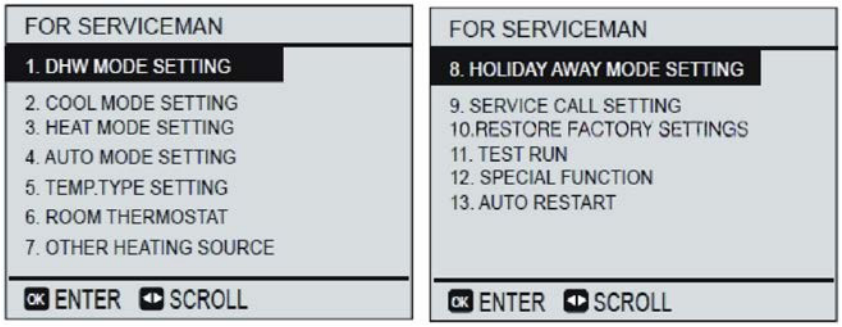


Figure 3-7.2: FOR SERVICEMAN password screen



7.4 DHW MODE SETTING Menu

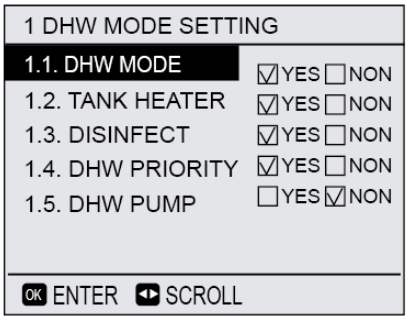
7.4.1 DHW MODE SETTING menu overview

MENU > FOR SERVICEMAN > DHW MODE SETTING

In DHW MODE SETTING the following parameters should be set.

DHW MODE enables or disables DHW mode. For installations with DHW tanks, select **YES** to enable DHW mode. For installations without DHW tanks, select **NON** to disable DHW mode. **TANK HEATER** sets whether or not the domestic hot water tank has an immersion heater and, if it does, whether or not it is to be controlled by the Mini Heat Pump Monobloc unit. If the DHW tank does not have an immersion heater, select NON. If the tank has a heater and it is to be controlled by the Mini Heat Pump Monobloc unit, select YES. If the tank has a heater but it is not to be controlled by the Mini Heat Pump Monobloc unit, select NON.

Figure 3-7.4: DHW MODE SETTING menu[1]



Notes:

1. When **NON** is chosen for **1.1 DHW MODE**, only menu item **1.1 DHW MODE** is displayed and menu items 1.2 to 1.5 are hidden.

Note: If **YES** is selected, the Mini Heat Pump Monobloc unit's backup electric heater (if installed) is not used in DHW mode.

DISINFECT sets whether or not the disinfection operation is performed.

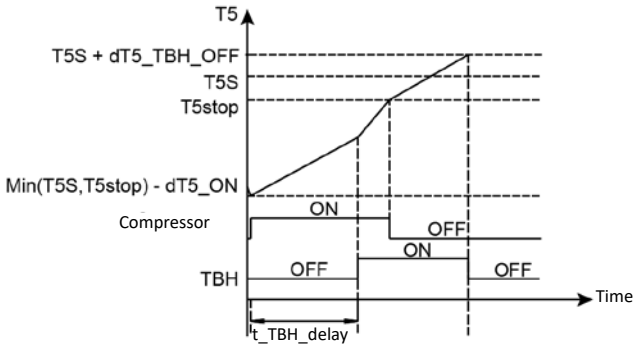
DHW PRIORITY sets whether domestic hot water heating or space heating takes priority. If **NON** is selected in the **DHW PRIORITY** mode, when it is available and the space heating/cooling is OFF, the heat pump will heat the water as required.

If space heating/cooling is **ON**, the water will be heated as required only when the immersion heater is available.

DHW PUMP sets whether or not the DHW pump is controlled by the Mini Heat Pump Monobloc unit. If the DHW pump is to be controlled by the Mini Heat Pump Monobloc unit, select **YES**. If the DHW pump is not to be controlled by the Mini Heat Pump Monobloc unit, select **NON**.

Figure 3-7.5 illustrates the operation of the heat pump and immersion heater in DHW mode. If the DHW tank water temperature (T5) is less than the minimum of the DHW set temperature (T5S) and the heat pump leaving water temperature operating limit (T5stop) (refer to Figure 2-6.3 in Part 2, 6 “Operating Limits”) less **dT5_ON** (refer to Part 3, 7.4.2 “DHW MODE Menu”), the heat pump starts providing heated water to the DHW tank. After **t_TBH_delay** (refer to Part 3, 7.4.3 “TANK HEATER Menu”) minutes have elapsed, the immersion heater is turned on. If T5 reaches T5stop, the heat pump stops but the immersion heater continues running until T5 has reached T5S + **dT5_TBH_OFF** (refer to Part 3, 7.4.3 “TANK HEATER Menu”).

Figure 3-7.5: DHW mode operation



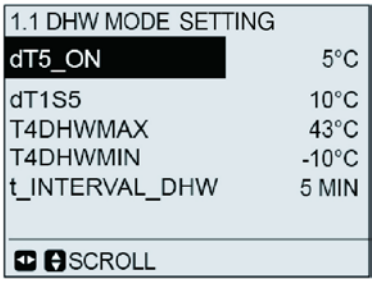
Abbreviations:
T5: DHW tank water temperature
T5S: DHW set temperature
T5stop: DHW mode leaving water temperature operating limit
TBH: Immersion heater in DHW tank

7.4.2 DHW MODE MENU

MENU > FOR SERVICEMAN > DHW MODE SETTING > DHW MODE

Figure 3-7.6: DHW MODE menu

To enter the **DHM MODE** menu, navigate to the **DHW MODE SETTING** menu, scroll to **YES** on the **DHW MODE** line and press **OK**.

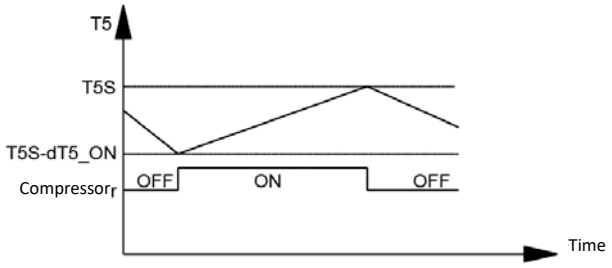


dT5_ON sets the temperature difference between the DHW set temperature (T5S) and the DHW tank water temperature (T5) above which the heat pump providing heated water to the DHW tank. When T5S - T5 ≥ dT5_ON the heat pump providing heated water to the DHW tank.

If **NON** is selected for **TANK HEATER** on the DHW MODE SETTING menu, **dT5_ON** cannot be adjusted and is fixed at 4°C.

Note: When the heat pump’s leaving water temperature is above the DHW mode leaving water temperature operating limit (T5stop), the heat pump does not provide heated water to the DHW tank. The DHW mode leaving water temperature operating limit is related to ambient temperature as shown in Figure 2-6.3 in Part 2, 6 “Operating Limits”.

Figure 3-7.7: dT5_ON



Abbreviations:
T5: DHW tank water temperature
T5S: DHW set temperature
T5stop: DHW mode leaving water temperature operating limit

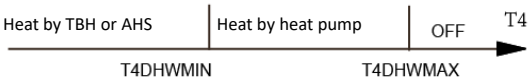
dT1S5 sets the heat pump’s leaving water set temperature (T1S) relative to DHW tank water temperature (T5). For DHW mode, the user sets the DHW set temperature (T5S) on the main screen and cannot manually set T1S. T1S is set as T1S = T5 + dT1S5.

T4DHWMAX sets the ambient temperature above which the heat pump will not operate in DHW mode. The highest value that **T4DHWMAX** can take is 43°C, which is the DHW mode upper ambient temperature operating limit of the heat pump.

T4DHWMIN sets the ambient temperature below which the heat pump will not operate in DHW mode. The lowest value that **T4DHWMIN** can take is -25°C, which is the DHW mode lower ambient temperature operating limit of the heat pump.

t_INTERVAL_DHW sets the DHW mode compressor re-start delay. When the compressor stops running, it will not re-start until at least **t_INTERVAL_DHW** minutes have elapsed.

Figure 3-7.8: T4DHWMAX and T4DHWMIN



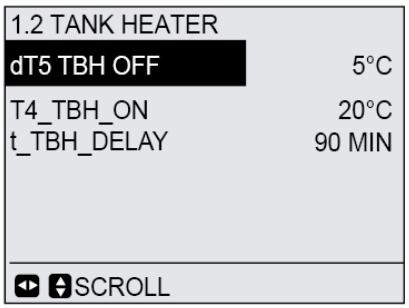
Abreviations:
HP: Heat pump
TBH: DWH tank immersion heater
AHS: Additional heating source

7.4.3 TANK HEATER MENU

MENU > FOR SERVICEMAN > DHW MODE SETTING > TANK HEATER

To enter the **TANK HEATER** menu, navigate to the **DHW MODE SETTING** menu, scroll to **YES** on the TANK HEATER line and press **OK**.

Figure 3-7.9: TANK HEATER menu



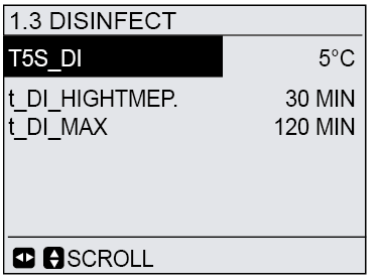
dT5_TBH_OFF sets the temperature difference between the DHW set temperature (T5S) and the DHW tank water temperature (T5) below which the immersion is not used. When T5≥Min(T5S+dT5_TBH_OFF, 65) immersion heater is off.

T4_TBH_ON sets the ambient temperature above which the immersion heater will not be used.

t_TBH_DELAY sets the delay between the compressor starting and the immersion heater being turned on.

7.4.4 DISINFECT MENU

Figure 3-7.10: DISINFECT menu



MENU > FOR SERVICEMAN > DHW MODE SETTING > DISINFECT

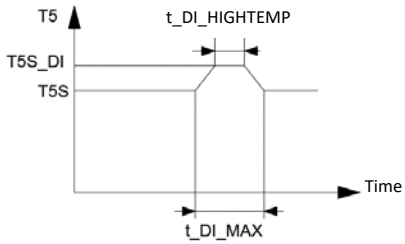
To enter the **DISINFECT** menu, navigate to the **DHW MODE SETTING** menu, scroll to **YES** on the **TANK HEATER** line and press **OK**.

T5S_DI sets the DHW tank disinfection operation target temperature. Caution: during the disinfection operation (duration: **t_DI_MAX**) the domestic hot water temperature at the hot water taps will at times be equal to the value set for **T5S_DI**.

t_DI_HIGHTEMP sets that length of time that the DHW tank disinfection operation target temperature is maintained.

t_DI_MAX sets the total duration of the DHW tank disinfect operation.

Figure 3-7.11: DHW tank disinfection



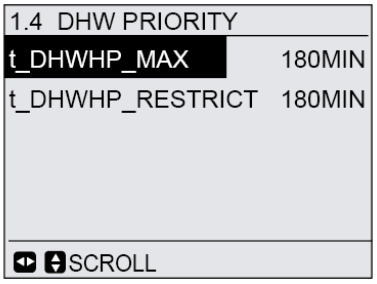
Abbreviations:
T5: DHW tank water temperature
T5S: DHW set temperature

7.4.5 DHW PRIORITY MENU

MENU > FOR SERVICEMAN > DHW MODE SETTING > DHW PRIORITY

To enter the **DHW PRIORITY** menu, navigate to the **DHW MODE SETTING** menu, scroll to **YES** on the **DHW PRIORITY** line and press OK.

Figure 3-7.12: DHW PRIORITY menu

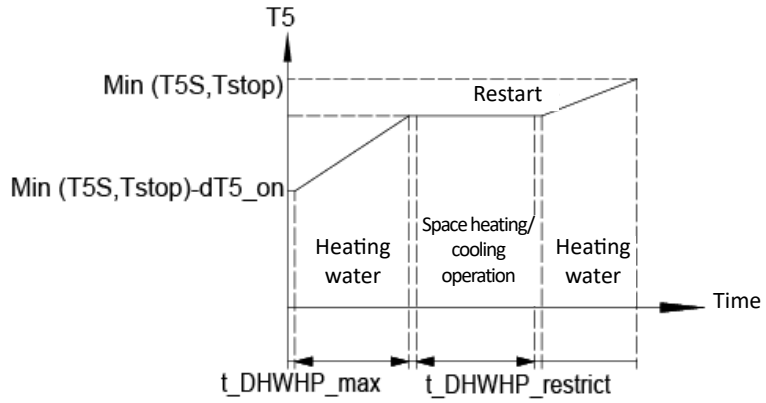


t_DHWHP_MAX sets the maximum length of time that the heat pump will run in DWH mode before switching to space heating mode or space cooling mode if a requirement for space heating/cooling modes exists. When running in DHW mode, the heat pump becomes available for space heating/cooling either as soon as the DHW tank water temperature (T5) reaches the DHW set temperature (T5S) or after **t_DHWHP_MAX** minutes have elapsed.

t_DHWHP_RESTRICT sets the maximum length of time that the heat pump will run in space heating or space cooling modes before switching to DHW mode, if a requirement for DHW mode exists. When running in space heating mode or space cooling mode, the heat pump becomes available for DHW mode either as soon as the space heating/cooling set temperatures have been reached (refer to Part 3, 7.5 “COOL MODE SETTING Menu” and Part 3, 7.6 “HEAT MODE SETTING Menu”) or after t_**DHWHP_MAX** minutes have elapsed.

Figure 3-7.13 illustrates the effects of **t_DHWHP_MAX** and **t_DHWHP_RESTRICT** when DHW PRIORITY is enabled. The heat pump initially runs in DWH mode. After **t_DHWHP_MAX** minutes, T5 has not reached the minimum of T5S and Tstop and the heat pump run in space heating or space cooling modes. After **t_DHWHP_restrict** minutes have elapsed, the heat pump switch to DHW mode.

Figure 3-7.13: Operation in DHW PRIORITY

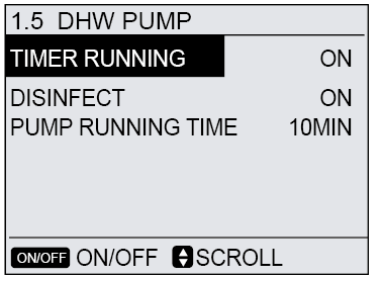


Abbreviations:
T5: DHW tank water temperature
T5S: DHW set temperature
T5stop: DHW mode leaving water temperature operating limit

7.4.6 DHW PUMP MENU

MENU > FOR SERVICEMAN > DHW MODE SETTING > DHW PUMP

Figure 3-7.14: DHW PUMP *menu*



To enter the **DHW PUMP** menu, navigate to the **DHW MODE SETTING** menu, scroll to **YES** on the **DHW PUMP** line and press OK.

A DHW pump can be used to circulate the water in the DHW piping system.

TIMER RUNNING sets whether or not the user is able to set pump start times on the **DHW PUMP** tab of the **DOMESTIC HOT WATER (DHW)** menu. For installations with a DHW pump, select **ON** so that the user is able to set pump start times. For installations without a **DHW pump**, select **OFF** to hide the start time options on the **DHW PUMP** tab of the **DOMESTIC HOT WATER (DHW)** menu.

DISINFECT sets whether or not the DHW pump operates during the DHW tank disinfection operation.

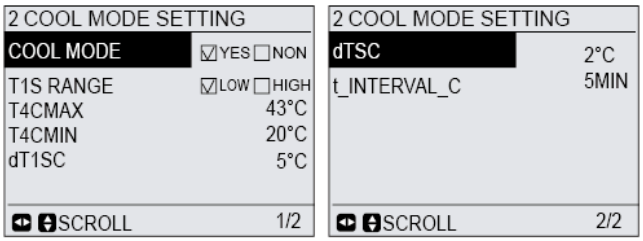
PUMP RUNNING TIME sets the length of time the pump runs for at each of the user-specified start times on the **DHW PUMP** tab on the **DOMESTIC HOT WATER (DHW)** menu, if **TIMER RUNNING** is enabled.

7.5 COOL MODE SETTING Menu

MENU > FOR SERVICEMAN > COOL MODE SETTING

In **COOL MODE SETTING** the following parameters should be set.

Figure 3-7.15: COOL MODE SETTING menu

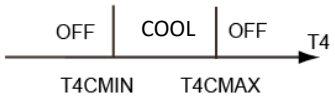


COOL MODE enables or disables cooling mode. For installations with space cooling terminals, select **YES** to enable cooling mode. For installations without space cooling terminals, select **NON** to disable cooling mode.

T1S RANGE selects the heat pump leaving water set temperature range that is available to the user for cooling mode on the user interface main screen. **LOW** or **HIGH** should be selected to suit the type of space cooling terminals installed. When **LOW** is selected, the minimum set temperature is 5°C. If the climate-related curve function is selected, the curve selected is the low temperature curve. When **HIGH** is selected, the minimum set temperature is 18°C. If the climate-related curve function is selected, the curve selected is the high temperature curve. Climate-related curves refer to Mini Heat Pump Monobloc Series Engineering Data Book, Part 3, 8.1 “Environment Temperature Curves”.

T4CMAX sets the ambient temperature above which the heat pump will not operate in cooling mode. For M.HP05/07/09 DCI MONO, the highest value that **T4CMAX** can take is 43°C. For M.HP12/14/16 DCI MONO, the highest value that **T4CMAX** can take is 46°C. **T4CMAX** is the cooling mode upper ambient temperature operating limit of the heat pump. Refer to Figure 3-7.16.

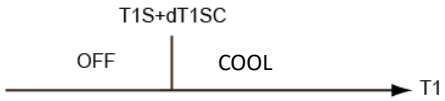
Figure 3-7.16: T4CMAX, T4CMIN



Abreviations:
T4: Outdoor ambient temperature

T4CMIN sets the ambient temperature below which the heat pump will not operate in cooling mode. The lowest value that **T4CMIN** can take is -5°C, which is the cooling mode lower ambient temperature operating limit of the heat pump. Refer to Figure 3-7.16.

Figure 3-7.17: dT1SC

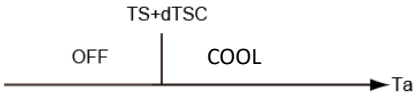


dT1SC sets the minimum temperature difference between the heat pump leaving water temperature (T1) and the heat pump leaving water set temperature (T1S) at which the heat pump provides chilled water to the space cooling terminals. When T1 – T1S ≥ dT1SC the heat pump provides chilled water to the space cooling terminals and when T1 ≤ T1S the heat pump does not pro water to the space cooling terminals.

Abreviations:
T1: Heat pump leaving water temperature
T1S: Heat pump leaving water set temperature

dTSC sets the temperature difference between the actual room temperature (Ta) and set room temperature (TS) above which the heat pump provides chilled water to the space cooling terminals. When Ta – TS ≥ dTSC the heat pump provides chilled water to the space cooling terminals and when Ta ≤ TS the heat pump does not provide chilled water to the space cooling terminals. Refer to Figure 3-7.18. dTSC is only applicable if **YES** is selected for **ROOM TEMP** in the **TEMP. TYPE SETTING** menu. Refer to Part 3, 7.8 “TEMP. TYPE SETTING Menu”.

Figure 3-7.18: dTSC



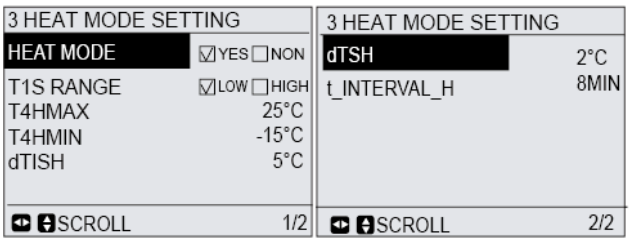
t_INTERVAL_C sets the cooling mode compressor re-start delay. When the compressor stops running, it will not re-start until at least **t_INTERVAL_C** minutes have elapsed.

7.6 HEAT MODE SETTING Menu

MENU > FOR SERVICEMAN > HEAT MODE SETTING

In **HEAT MODE SETTING** the following parameters should be set.

Figure 3-7.19: HEAT MODE SETTING menu



HEAT MODE enables or disables heating mode.

T1S RANGE selects the heat pump leaving water set temperature range that is available to the user for heating mode on the user interface main screen. **LOW** or **HIGH** should be selected to suit the type of space heating terminals installed. When **LOW** is selected, the maximum set temperature is 55°C. If the climate-related curve function is selected, the curve selected is the low temperature curve. When **HIGH** is selected, the maximum set temperature is 60°C. If the climate-related curve function is selected, the curve selected is the high temperature curve. Climate-related curves refer to Part 3, 8.1 “Environment Temperature Curves”.

T4HMAX sets the ambient temperature above which the heat pump will not operate in heating mode. The highest value that **T4HMAX** can take is 35°C, which is the heating mode upper ambient temperature operating limit of the heat pump. Refer to Figure 3-7.20.

Figure 3-7.20: T4HMAX, T4HMIN

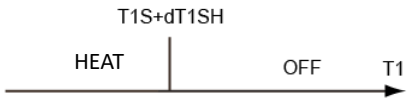
Abreviations:
T4: Outdoor ambient temperature

T4HMIN sets the ambient temperature below which the heat pump will not operate in heating mode. The lowest value that **T4CMIN** can take is -25°C, which is the heating mode lower ambient temperature operating limit of the heat pump. Refer to Figure 3-7.20.

dT1SH:

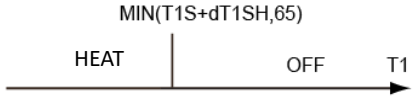
- When T1S < 47°C, **dT1SH** sets the temperature difference between the heat pump leaving water temperature (T1) and the heat pump leaving water set temperature (T1S) above which the heat pump provides heated water to the space heating terminals. When T1S – T1 ≥ dT1SH the heat pump provides heated water to the space heating terminals and when T1 ≥ T1S the heat pump does not provide heated water to the space heating terminals. Refer to Figures 3-7.21.
- When T1S ≥ 47°C, **dT1SH** sets the temperature difference between the heat pump leaving water temperature (T1) and the heat pump leaving water set temperature (T1S) above which the heat pump provides heated water to the space heating terminals, unless T1S + dT1SH > 65°C. When either T1S – T1 ≥ dT1SH or T1 < 65°C the heat pump provides heated water to the space heating terminals and when T1 ≥ T1S the h does not provide heated water to the space heating terminals. Refer to Figures 3-7.22.

Figure3-7.21: dT1SH when T1S < 47°C



Abreviations:
T1: Heat pump leaving water temperature
T1S: Heat pump leaving water set temperature

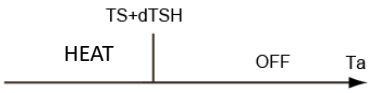
Figure 3-7.22: dT1SH when T1S ≥ 47°C



Abreviations:
T1: Heat pump leaving water temperature
T1S: Heat pump leaving water set temperature

dTSH sets the temperature difference between the actual room temperature (Ta) and set room temperature (TS) above which the heat pump provides heated water to the space heating terminals. When TS – Ta ≥ dTSH the heat pump provides heated water to the space heating terminals and when Ta ≥ TS the heat pump does not provide heated water to the space heating terminals. Refer to Figure 3-7.23. **dTSH** is only relevant if **YES** is selected for **ROOM TEMP** in the **TEMP. TYPE SETTING** menu. Refer to Part 3, 7.8 "TEMP. TYPE SETTING Menu".

Figure 3-7.23: dTSH



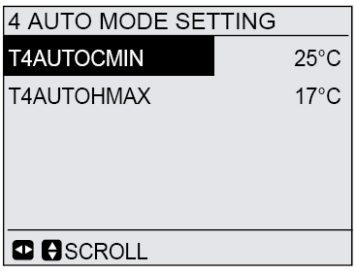
Note:
Only when ROOM TEMP is enabled will this function be available

t_INTERVAL_H sets the heating mode compressor re-start delay. When the compressor stops running, it will not re-start until at least **t_INTERVAL_H** minutes have elapsed.

7.7 AUTO MODE SETTING Menu

MENU > FOR SERVICEMAN > AUTO MODE SETTING

Figure 3-7.24: AUTO MODE SETTING menu

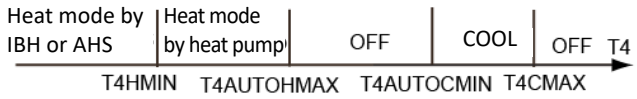


In **AUTO MODE SETTING** the following parameters should be set.

T4AUTOCMIN sets the ambient temperature below which the heat pump will not provide chilled water for space cooling in auto mode. Refer to Figure 3-7.25.

T4AUTOHMAX sets the ambient temperature above which the heat pump will not provide heated water for space heating in auto mode. Refer to Figure 3-7.25.

Figure 3-7.25: T4AUTOCMAX, T4AUTOCMIN

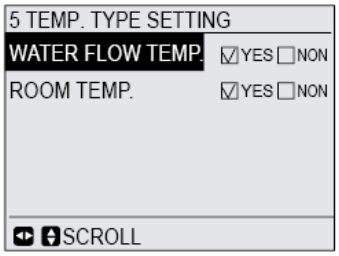


Abreviations:
HP: Heat pump
AHS: Additional heating source
IBH: Backup electric heater
T4CMAX: The ambient temperature above which the heat pump will not operate in cooling mode.
T4HMIN: The ambient temperature below which the heat pump will not operate in heating mode.

7.8 TEMP. TYPE SETTING Menu

MENU > FOR SERVICEMAN > TEMP. TYPE SETTING

Figure 3-7.26: TEMP. TYPE SETTING menu



For installations without room thermostats, space heating and cooling modes can be controlled in one of three different ways:

- according to the Mini Heat Pump Monobloc's leaving water temperature
- alone; according to the room temperature detected by the Mini Heat Pump Monobloc user interface's built-in temperature sensor alone; or
- according to either the Mini Heat Pump Monobloc's leaving water temperature or the room temperature detected by the Mini Heat Pump Monobloc user interface's built-in temperature sensor.

WATER FLOW TEMP. sets whether space heating/cooling modes are controlled according to the Mini Heat Pump Monobloc's leaving water temperature. If **YES** is selected, the user is able to set the Mini Heat Pump Monobloc unit's leaving water temperature set temperature on the user interface's main screen.

ROOM TEMP. sets whether space heating/cooling modes are controlled according to the room temperature detected by the temperature sensor in the Mini Heat Pump Monobloc user interface. If **YES** is selected, the user is able to set the room temperature set temperature on the user interface's main screen.

If **YES** is selected for both **WATER FLOW TEMP.** and **ROOM TEMP.**, the user is able to set both the Mini Heat Pump Monobloc unit's leaving water temperature set temperature and the room temperature set temperature on the user interface's main screen. (In this situation, on the main screen ► can be used to move to the room temperature setting).

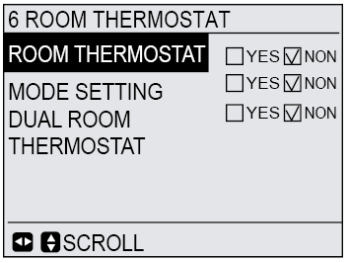
If **YES** is selected and space heating/cooling modes are controlled according to both the Mini Heat Pump Monobloc unit's leaving water and the room temperature setting, the Mini Heat Pump Monobloc provides space heating/ cooling until both the leaving water temperature and room temperature conditions are met. Refer to Part 3, 7.5 "COOL MODE SETTING Menu" and Part 3, 7.6 "HEAT MODE SETTING Menu".

7.9 ROOM THERMOSTAT Menu

MENU > FOR SERVICEMAN > ROOM THERMOSTAT

As an alternative to controlling space heating/cooling modes according the Mini Heat Pump Monobloc unit's leaving water temperature and/or the room temperature detected by the temperature sensor in the Mini Heat Pump Monobloc user interface, separate room thermostat can be installed and used to control space heating/cooling modes.

Figure 3-7.27: ROOM THERMOSTAT menu



In **ROOM THERMOSTAT** the following parameters should be set.

ROOM THERMOSTAT sets whether or not room thermostats are installed. For installations with room thermostats, select **YES**. For installations without room thermostats, select **NON**.

MODE SETTING sets whether the room thermostat is to be able to control the heat pump's mode (space heating or space cooling). Select **YES** for installations with room thermostats that have mode-control capability. Select **NON** for installations with room thermostats that do not have mode-control capability. When **YES** is selected, the heat pump's operating mode is controlled by the room thermostat and not by the Mini Heat Pump Monobloc user interface.

DUAL ROOM THERMOSTAT sets whether the dual room thermostat is available. In **DUAL ROOM**, if **YES** is selected, the **ROOM THERMOSTAT**, **MODE SETTING** will turn to **NON** automatically, and the **WATER FLOW TEMP.** and **ROOM TEMP**. is forcibly set to **YES**. The timer function in the user interface is unavailable. The setting of operation mode and target temperature can be done on the user interface.

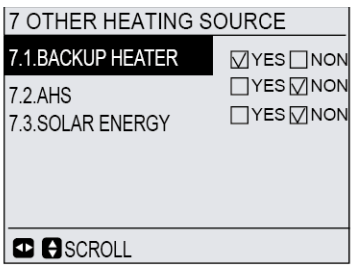
7.10 OTHER HEATING SOURCE Menu

7.10.1 OTHER HEATING SOURCE MENU OVERVIEW

MENU > FOR SERVICEMAN > OTHER HEATING SOURCE

In **OTHER HEATING SOURCE** the following parameters should be set.

Figure 3-7.28: OTHER HEATING SOURCE menu



BACKUP HEATER sets whether or not the system has a backup electric heater and, if it does, whether or not it should be used. If the system does not have a backup electric heater, select **NON**. If the system has a backup electric heater and the Mini Heat Pump Monobloc unit should be able to use it, select **YES**. If the system has a backup electric heater but the Mini Heat Pump Monobloc unit should not be able to use it, select **NON**.

AHS sets whether or not the system has an additional heating source and, if it does, whether or not it should be used. If the system does not have an additional heating source, select **NON**. If the system has an additional heating source and the Mini Heat Pump Monobloc unit should be able to control it, select **YES**. If the system has an additional heating source but the Mini Heat Pump Monobloc unit should not be able to control it, select **NON**.

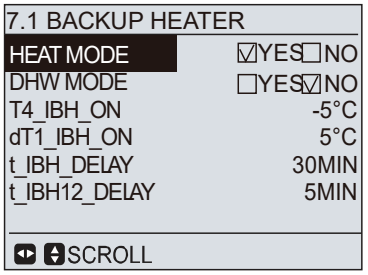
SOLAR ENERGY sets whether or not a solar energy kit is installed. If a solar energy kit is installed select **YES** and the heat pump will not provide heated water to the DHW tank when the solar energy kit is running.

7.10.2 BACKUP HEATER MENU

MENU > FOR SERVICEMAN > OTHER HEATING SOURCE > BACKUP HEATER

Figure 3-7.29: BACKUP HEATER menu

To enter the **BACKUP HEATER** menu, navigate to the **OTHER HEATING SOURCE** menu, scroll to **YES** on the **BACKUP HEATER** line and press **OK**.

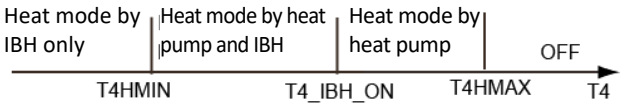


HEAT MODE sets whether or not the backup electric heater is used in space heating mode.

DHW MODE sets whether or not the backup electric heater is used in DHW mode. Note: If **YES** is selected for **TANK HEATER** in **MENU > FOR SERVICEMAN > DHW MODE SETTING**, the backup electric heater is not used in DHW mode.

T4_IBH_ON sets the ambient temperature below which the backup electric heater is used. If the ambient temperature is above **T4_IBH_ON**, the backup electric heater is not used. The relationship between operation of the backup heater and the ambient is shown in Figure 3-7.30.

Figure 3-7.30: T4_IBH_ON



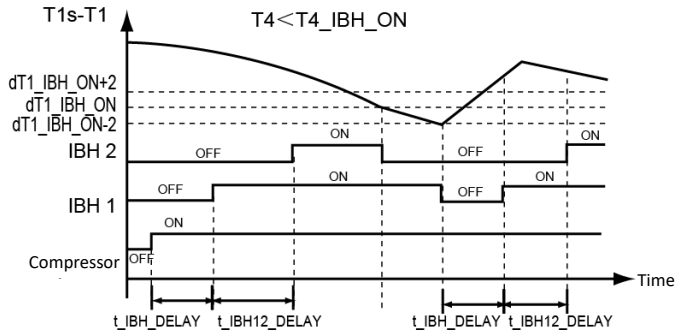
Abreviations:
T4: Outdoor ambient temperature
IBH: Backup electric heater

dT1_IBH_ON sets the temperature difference between the heat pump's leaving water set temperature (T1S) and the heat pump's leaving water temperature (T1) above which the backup electric heater heating element(s) are on. When T1S - T1 ≥ dT1_IBH_ON the backup electric heater is on (on models where the backup electric heater has a simple on/off control function) or the backup electric heater's first element is on (on models where the backup electric heater has a two-step control function). On models where the backup electric heater has a two-step control function, when T1S - T1 ≥ dT1_IBH_ON + 2°C, the backup heater's second element is on.

t_IBH_DELAY sets the delay between the compressor starting and the backup electric heater's first element being turned on.

t_IBH12_DELAY sets the delay between the backup electric heater's first element being turned on and the backup electric heater's second element being turned on.

Figure 3-7.31: t_IBH_DELAY, t_IBH12_DELAY

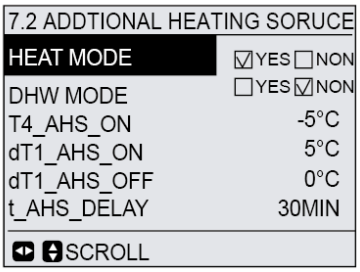


Abreviations:
IBH 1: Backup electric heater's first heating element
IBH 2: Backup electric heater's second heating element
T1: Heat pump leaving water temperature
T1S: Heat pump leaving water set temperature
T4: Outdoor ambient temperature

7.10.3 ADDITIONAL HEATING SOURCE MENU

MENU > FOR SERVICEMAN > OTHER HEATING SOURCE > ADDITIONAL HEATING SOURCE

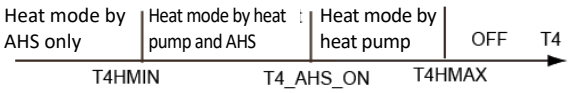
Figure 3-7.32: ADDITIONAL HEATING SORUCE menu



To enter the **ADDITIONAL HEATING SOURCE** menu, navigate to the **OTHER HEATING SOURCE** menu, scroll to YES on the **ADDITIONAL HEATING SOURCE** line and press **OK**.

T4_AHS_ON sets the ambient temperature below which the additional heating source is used. If the ambient temperature is above **T4_ASH_ON**, the additional heating source is not used. The relationship between operation of the additional heating source and the ambient is shown in the picture below.

Figure 3-7.33: T4_AHS_ON



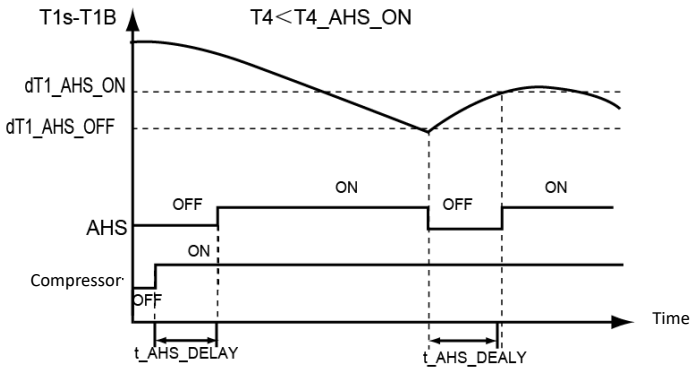
Abreviations:
AHS: Additional heating source
T4: Outdoor ambient temperature

dT1_ASH_ON sets the temperature difference between the heat pump's leaving water set temperature (T1S) and the heat pump's leaving water temperature (T1) above which the additional heating source is on. When T1S - T1 ≥ dT1_AHS_ON the additional heating source is on.

dT1_ASH_OFF sets the temperature difference between the heat pump's leaving water set temperature (T1S) and the heat pump's leaving water temperature (T1) below which the additional heating source is off. When T1 - T1S ≥ dT1_AHS_OFF the additional heating source is off. Note: **dT1_ASH_OFF** can take values in the range -5°C to 0°C.

t_ASH_DELAY sets the delay between the compressor starting and the additional heating source being turned on.

Figure 3-7.34: Additional heating source delay



Abreviations:
AHS: Additional heating source
T1: Heat pump leaving water temperature
T1S: Heat pump leaving water set temperature
T4: Outdoor ambient temperature

7.11 HOLIDAY AWAY SETTING Menu

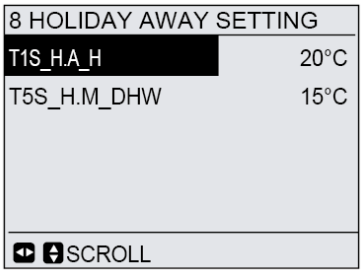
MENU > FOR SERVICEMAN > HOLIDAY AWAY SETTING

The **HOLIDAY AWAY SETTING** menu settings are used to set the outlet water temperature to prevent water pipes freezing when away from home in cold weather seasons. In **HOLIDAY AWAY SETTING** the following parameters should be set.

T1S_H.A._H sets the heat pump's leaving water set temperature for space heating mode when in holiday away mode.

T5S_H.M_DHW sets the heat pump's leaving water set temperature for DHW mode when in holiday away mode.

Figure 3-7.35: HOLIDAY AWAY SETTING menu

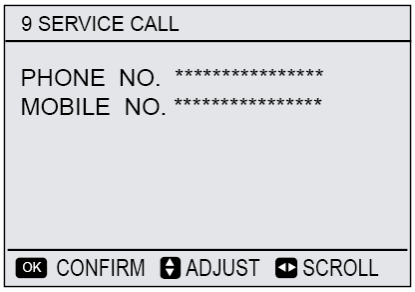


7.12 SERVICE CALL Menu

MENU > FOR SERVICEMAN > SERVICE CALL

In **SERVICE CALL** the following parameters can be set.

Figure 3-7.36: SERVICE CALL menu



PHONE NO. and **MOBILE NO.** can be used to set after-sales service contact numbers. If set, these numbers are displayed to users in **MENU > SERVICE INFORMATION**.

Use ▼ ▲ to adjust the numerical values. The maximum length of the phone numbers is 13 digits.

The black rectangle found between 0 and 9 when scrolling up and down using ▼ ▲ is converted to a blank space when the phone numbers are displayed to users in **MENU > SERVICE INFORMATION** and can be used for phone numbers less than 13 digits in length.

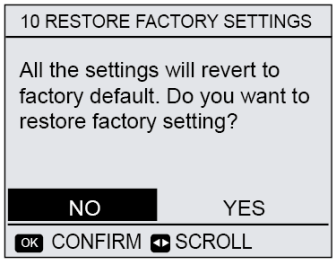
7.13 RESTORE FACTORY SETTINGS

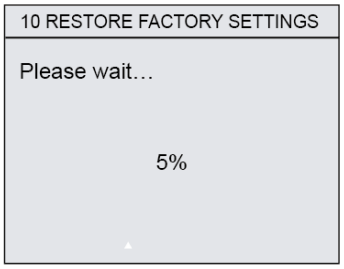
MENU > FOR SERVICEMAN > RESTORE FACTORY SETTINGS

RESTORE FACTORY SETTINGS is used to restore all the parameters set in the user interface to their factory defaults.

On selecting **YES**, the process of restoring all settings to their factory defaults begins and progress is displayed as a percentage.

Figure 3-7.37: RESTORE FACTORY SETTINGS screens





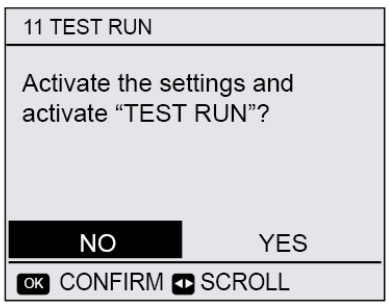
7.14 TEST RUN

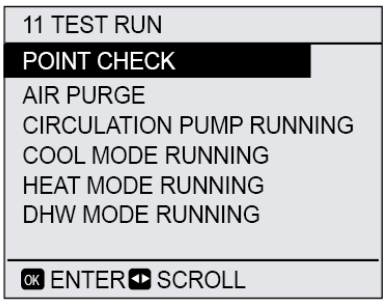
7.14.1 TEST RUN MENU OVERVIEW

MENU > FOR SERVICEMAN > TEST RUN

TEST RUN is used to check that the valves, air purge function, circulation pump, space cooling mode, space heating mode and DHW mode are all operating correctly.

Figure 3-7.38: TEST RUN start screen and TEST RUN menu



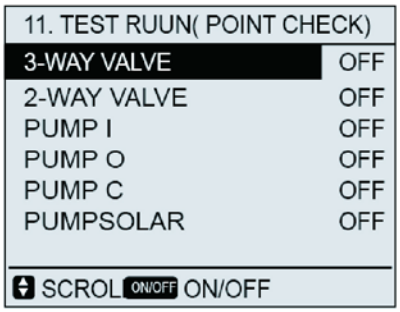


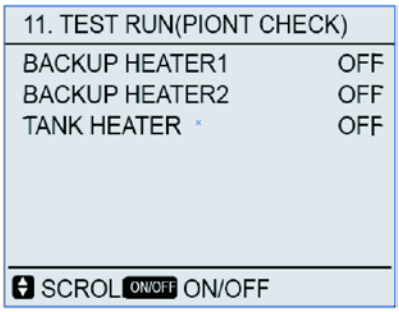
7.14.2 POINT CHECK MENU

MENU > FOR SERVICEMAN > TEST RUN > POINT CHECK

The POINT CHECK menu is used to check the operation of individual components. Use ▼▲ to scroll to the components you want to check and press ON/OFF to toggle the on/off state of the component. If a valve does not turn on/off when its on/off state is toggled or if a pump/heater does not operate when turned on, check the component’s connection to the hydronic system main PCB.

Figure 3-7.39: POINT CHECK menu





7.14.3 AIR PURGE OPERATION

MENU > FOR SERVICEMAN > TEST RUN > AIR PURGE

Figure 3-7.40: AIR PURGE display

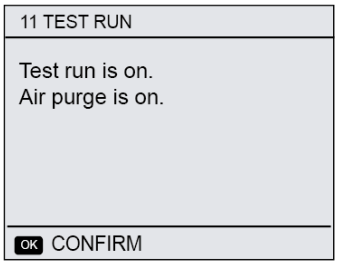
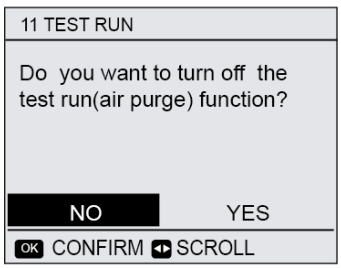


Figure 3-7.41: Test run turn off display

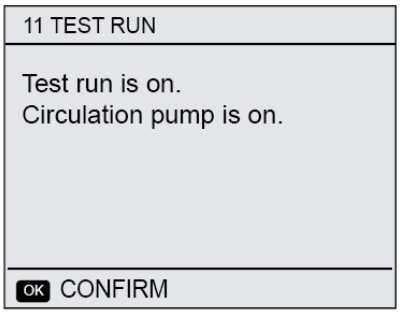


The **AIR PURGE** operation is used to remove air from the water piping. When the air purge operation starts, the 3-way valve opens and the 2-way valve closes. 60 secs later the pump in the unit (PUMPI) operates for 10min during which the flow switch does not work. After the pump stops, the 3-way valve closes and the 2-way valve opens. 60 secs later both PUMPI and PUMPO operate until the air purge operation is exited

by pressing **OK**. If any error code is displayed during the air purge operation, the cause should be investigated. Refer to Part 3, 9 “Error Code table”.

7.14.4 CIRCULATION PUMP RUNNING OPERATION

Figure 3-7.42: CIRCULATION PUMP RUNNING display

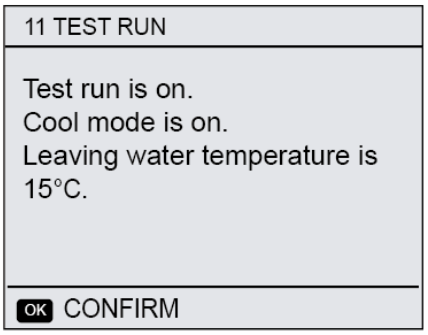


MENU > FOR SERVICEMAN > TEST RUN > CIRCULATION PUMP RUNNING

The **CIRCULATION PUMP RUNNING** operation is used to check the operation of the circulation pump. When the circulation pump running operation starts, all running components stop. 60 secs later, the 3-way valve opens and the 2-way valve closes. After a further 60 secs PUMPI starts. 30 secs later, if the flow switch detects that the water flow is normal, PUMPI operates for 3 mins after which the 3-way valve closes and the 2-way valve opens. 60s later the both PUMPI and PUMPO starts. After a further 2 mins the flow switch start to check the water flow. If the water flow rate is sufficient, both PUMPI and PUMPO operate until the **CIRCULATION PUMP RUNNING** operation is exited by pressing **OK**. If the water flow rate is insufficient over any 15-second period, PUMPI and PUMPO stop and error code E8 is displayed. Refer to Part 3, 9 “Error Code table”.

7.14.5 COOL MODE RUNNING operation

Figure 3-7.43: COOL MODE RUNNING display



MENU > FOR SERVICEMAN > TEST RUN > COOL MODE RUNNING

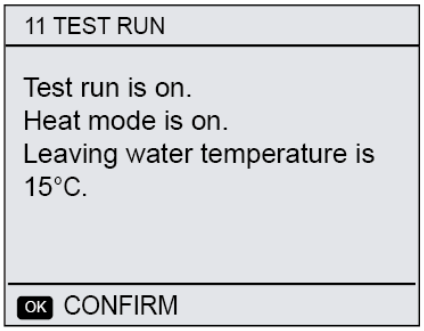
The **COOL MODE RUNNING** operation is used to check the operation of the system in space cooling mode.

During the **COOL MODE RUNNING** operation, the Mini Heat Pump Monobloc unit leaving water set temperature is 7°C. The current actual leaving water temperature is displayed on the user interface. The unit operates until the leaving water temperature drops to the set temperature or the **COOL MODE RUNNING** operation is exited by pressing OK.

If any error code is displayed during the cool mode running operation, the cause should be investigated. Refer to Part 3, 9 “Error Code table”.

7.14.6 HEAT MODE RUNNING operation

Figure 3-7.44: HEAT MODE RUNNING display



The **HEAT MODE RUNNING** operation is used to check the operation of the system in space heating mode.

During the HEAT MODE RUNNING operation the Mini Heat Pump Monobloc unit leaving water set temperature is 35°C. The current actual leaving water temperature is displayed on the user interface. When the **HEAT MODE RUNNING** operation starts, the heat pump first runs for 10 mins.

After 10 mins:

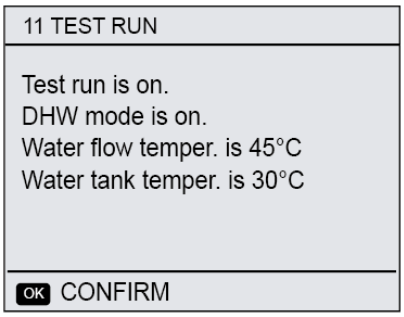
- On systems where an auxiliary heat source (AHS) is installed, the AHS starts and runs for 10 mins (whilst the heat pump continues running), after which the AHS stops and the heat pump continues to operate until the water temperature rises to the set temperature or the heat mode running operation is exited by pressing OK.
- On systems where a backup electric heater is being used, the backup heater turn on (on models where the backup heater has a simple on/off control function) or the backup heater’s first element will turn on (on models where the backup heater has a two-step control function). On models where the backup heater has a two-step control function, after a further 60 secs, the backup heater’s second element will turn on. 3 mins later the backup electric heater will turn off. The heat pump will then operate until the water temperature rises to the set temperature or the heat mode running operation is exited by pressing **OK**.

- On systems with no auxiliary heat source and no backup electric heater, the heat pump will then operate until the water temperature rises to the set temperature or the heat mode running operation is exited by pressing **OK**.

If any error code is displayed during the cool mode running operation, the cause should be investigated. Refer to Part 3, 9 “Error Code table”.

7.14.7 DHW MODE RUNNING operation

Figure 3-7.45: DHW MODE RUNNING display



The **DHW MODE RUNNING** operation is used to check the operation of the system in DHW mode.

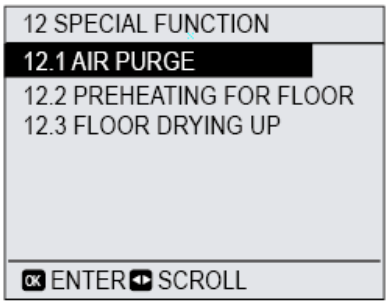
During the **DHW MODE RUNNING** operation, the DHW set temperature is 55°C. On systems where an immersion heater is installed, the immersion heater will turn on once the heat pump has run for 10 mins. The immersion heater will turn off 3 mins later and the heat pump will operate until the water temperature rises to the set temperature or the DHW mode running operation is exited by pressing **OK**.

7.15 SPECIAL FUNCTION

7.15.1 SPECIAL FUNCTION MENU OVERVIEW

MENU > FOR SERVICEMAN > SPECIAL FUNCTION

Figure 3-7.46: Special functions menu



SPECIAL FUNCTION is used to purge air, pre-heating floor and drying up floor once installation is complete or the first time start up the unit or restart the unit after a long time stop.

7.15.2 AIR PURGE

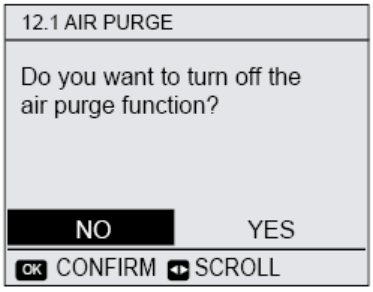
MENU > FOR SERVICEMAN > SPECIAL FUNCTION > AIR PURGE

Once installation is complete it is important to run the air purge function to remove any air which may be present in the water piping and which could cause malfunctions during operation.

Make sure that the air purge valve is open then select **13.1 AIR PURGE** on the **SPECIAL FUNCTION** menu.

At the start of air purge operation, the 3-way valve opens, and the 2-way valve closes. After 60 seconds, the circulator pump in the unit starts and operates for 10 minutes, during which the water flow switch is disabled. Once the pump stops, the 3-way valve closes and the 2-way valve opens. 60 seconds later both the circulator pump in the unit (PUMPI) and the external circulator pump (PUMPO) start and operate until the air purge operation is exited on the user interface.

Figure 3-7.47: Exit air purge screen

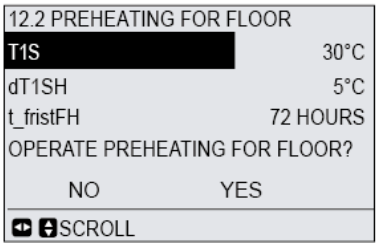


Whilst the air purge operation is running, the number of minutes that it has been running for is displayed on the user interface. During the air purge operation, all buttons except **OK** are inactivated. To exit the air purge operation, press **OK** and then select **YES** when prompted. Refer to Figure 3-7.47.

7.15.3 PREHEATING FOR FLOOR

MENU > FOR SERVICEMAN > SPECIAL FUNCTION > PREHEATING FOR FLOOR

Figure 3-7.48: Preheating for floor menu



During initial start-up and when water temperature is low, it is important that the water is heated gradually. Or it may result in concrete floors cracking due to rapid temperature change.

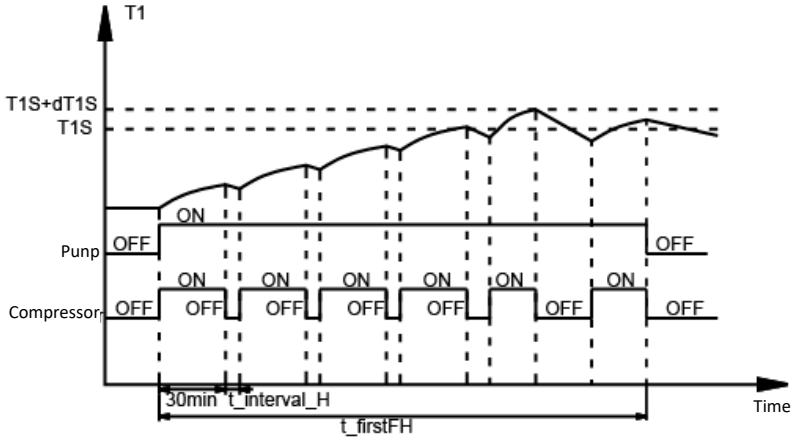
T1S sets the heat pump's leaving water set temperature in preheating for floor mode.

dT1SH sets the temperature difference between the heat pump's leaving water set temperature (T1S) and the heat pump's leaving water temperature (T1) above which the heat pump provides heated water to the floor heating loops. When T1S – T1 ≥ dT1SH the heat pump provides heated water to the floor heating loops.

t_fristFH sets the duration of preheating for floor mode.

The operation of the unit during preheating for floor mode is illustrated in Figure 3-7.49.

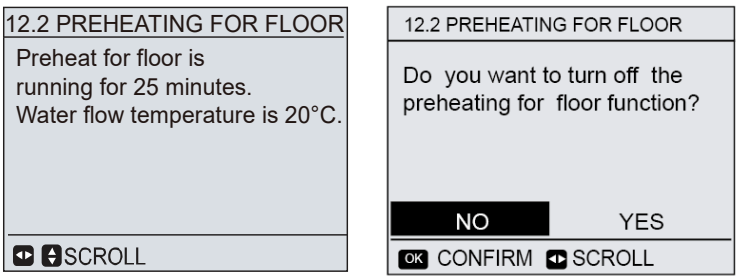
Figure 3-7.49: Preheating for floor



Abreviations:
t_interval_H: Compressor re-start delay in space heating mode. (Refer to Part 3, 7.6 "HEAT MODE SETTING Menu").

Whilst the preheating for floor operation is running, the number of minutes that it has been running for and the heat pump's leaving water temperature are displayed on the user interface. During the preheating for floor operation all buttons except OK are inactivated. To exit the preheating for floor operation, press OK and then select YES when prompted. Refer to Figure 3-7.50.

Figure 3-7.50: Preheating for floor screens



Before floor heating, if large a amount of water remains on the floor, the floor may be warped or even rupture during floor heating operation, in order to protect the floor, floor drying is necessary, during which the temperature of the floor should be increased gradually.

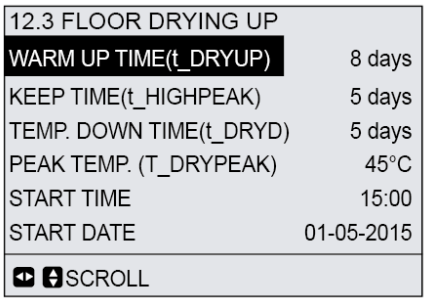
7.15.4 FLOOR DRYING UP

MENU > FOR SERVICEMAN > SPECIAL FUNCTION > FLOOR DRYING UP

For newly-installed under-floor heating systems, floor drying up mode can be used to remove moisture from the floor slab and subfloor to prevent warping or rupture of the floor during floor heating operation. There are three phases to the floor drying up operation:

- Phase 1: gradual temperature increase from a starting point of 25°C to the peak temperature. After running a unit of time(t_dryup/9), the set temperature of a unit of time rises 3°C until the peak temperature.
- Phase 2: maintain peak temperature 45°C
- Phase 3: gradual temperature decrease from the peak temperature to 30°C. After running a unit of time(t_drydown/7), the set temperature of a unit of time declines 3°C until 30°C.

Figure 3-7.51: FLOOR DRYING UP menu



t_DRYUP sets the duration of Phase 1.

t_HIGHPEAK sets the duration of Phase 2.

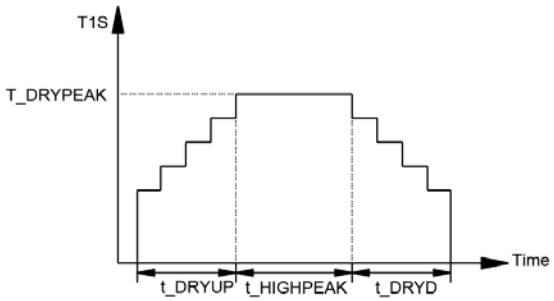
t_DRYD is the duration of Phase 3.

T_DRYPEAK sets the heat pump's leaving water set temperature for Phase 2.

START TIME sets the floor drying up operation start time.

START DATE sets the floor drying up operation start date.

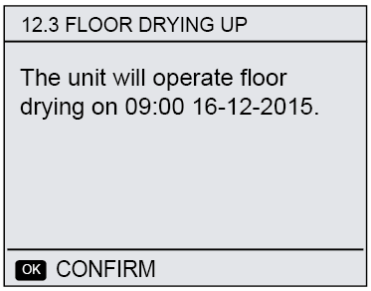
Figure 3-7.52: FLOOR DRYING UP settings



The heat pump's leaving water set temperature during the floor drying up operation is illustrated in Figure 3-7.52.

During the floor drying up operation all buttons except OK are inactivated. To exit the floor drying up operation, press OK and then select YES when prompted.

Figure 3-7.53: FLOOR DRYING UP screen



Note: In the event of a heat pump malfunction, floor drying up mode will continue if a backup electric heater and/or additional heating source is available and configured to support space heating mode.

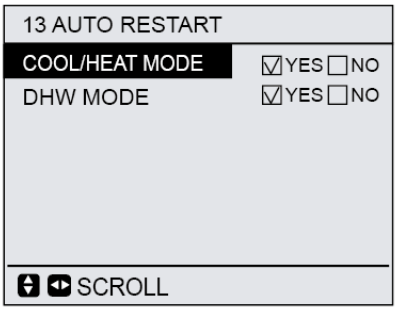
7.16 AUTO RESTART

MENU > FOR SERVICEMAN > AUTO RESTART

AUTO RESTART sets whether or not the unit re-applies the user interface settings when the power returns following a power failure. Select **YES** to enable auto restart or NON to disable auto restart.

If the auto restart function is enabled, when the power returns following a power failure, the unit re-applies the user interface settings from before the power failure. If the auto restart function is disabled, when the power returns after a power failure, the unit won't auto restart.

Figure 3-7.54: AUTO RESTART menu



8 Climate Related Curves

The climate related curves can be selected in the user interface, **MENU > PRESET TEMPERATURE > WEATHER TEMP. SET**.

The curves for heating mode and ECO heating mode are the same but the default curve is curve 4 in heating mode, while in ECO mode, the default curve is curve 6. The curves for cooling mode and ECO cooling mode are the same but the default curve is curve 4 in cooling mode, while in ECO mode, the default curve is curve 6. Once the curve is selected, the leaving water set temperature (T1s) is determined by the outdoor temperature. In each mode, each curve from the eight curves in the user interface can be selected. The relationship between outdoor ambient temperature (T4) and leaving water set temperature (T1s) is described as in Figure 3-8.2, Figure 3-8.3, Figure 3-8.4 and Figure 3-8.5.

Figure 3-8.1: WEATHER TEMP. SET menu

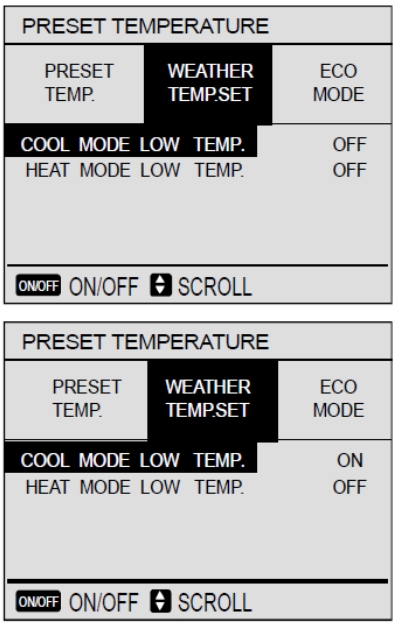
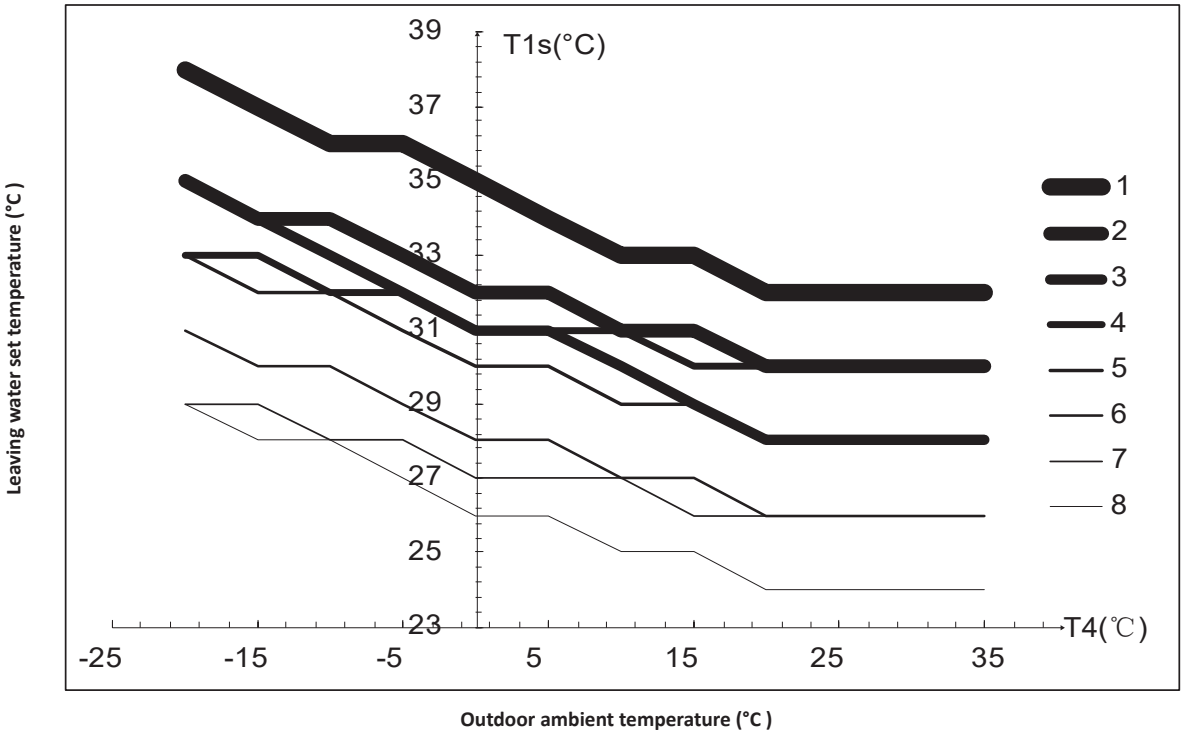
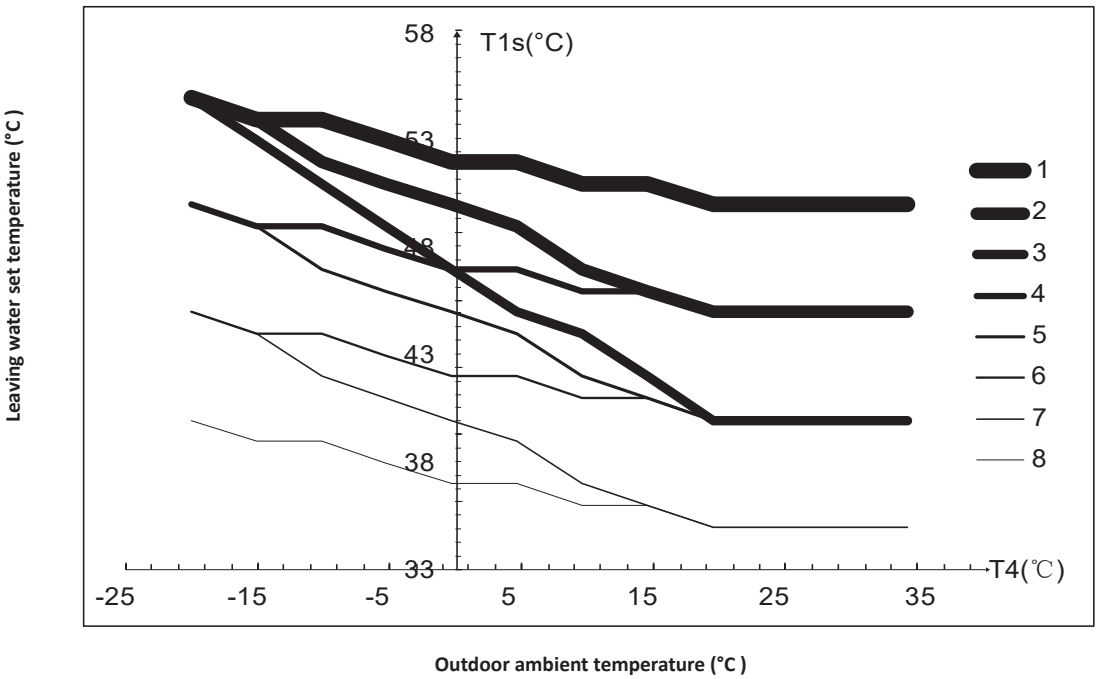


Figure 3-8.2: Low temperature curves for heating mode[1]



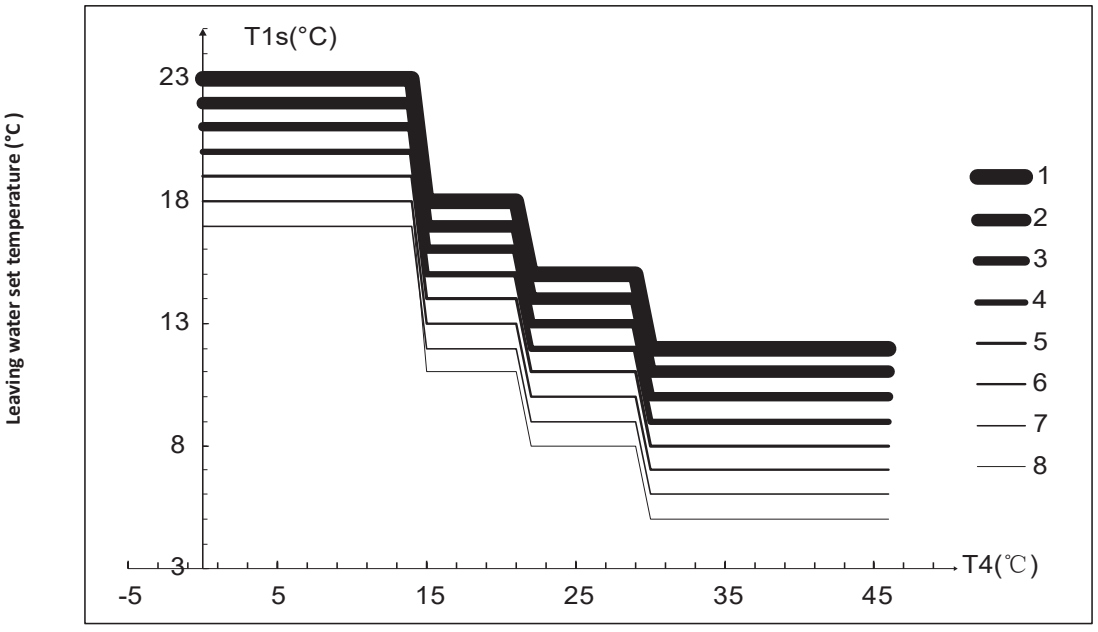
Notes:
1. It only has the curves of the high temperature setting for heating, if the low temperature is set for heating.
2. Curve 4 is default in low temperature heating mode and curve 6 is default in ECO mode.

Figure 3-8.3: High temperature curves for heating mode[1]



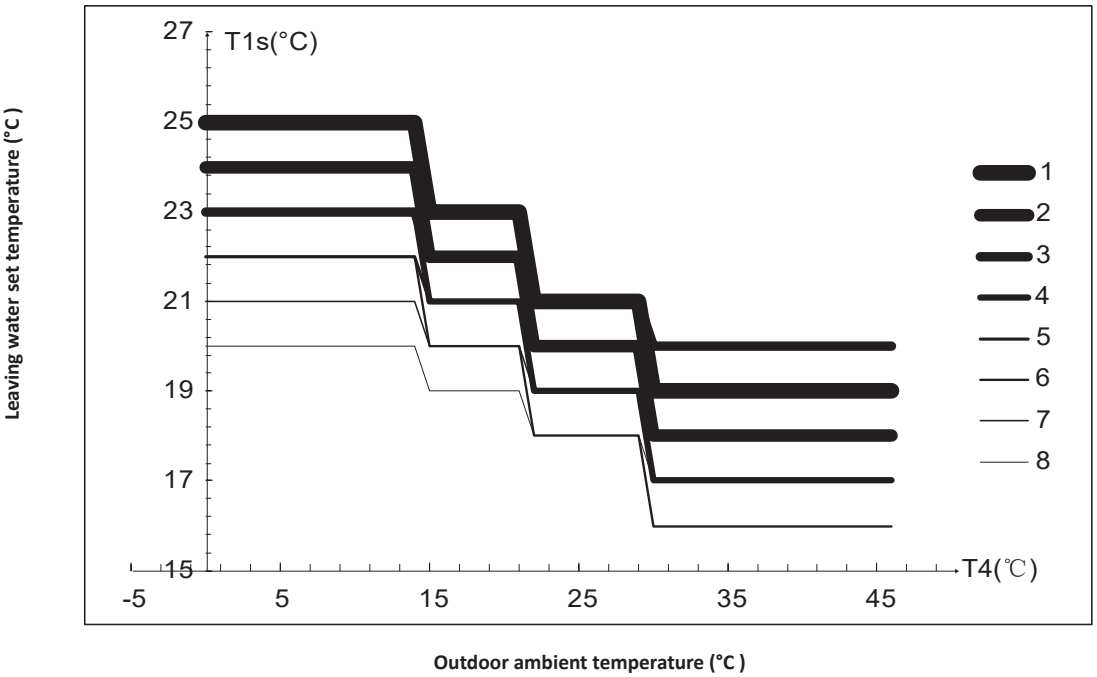
Notes:
1. It only has the curves of the low temperature setting for heating, if the high temperature is set for heating.
2. Curve 4 is default in high temperature heating mode and curve 6 is default in ECO mode.

Figure 3-8.4: Low temperature curves for cooling mode[1]



Notes:
1. It only has the curves of the high temperature setting for cooling, if the low temperature is set for cooling.
2. Curve 4 is default in low temperature cooling mode and curve 6 is default in ECO mode.

Figure 3-8.5: High temperature curves for cooling mode[1]



Notes:

1. It only has the curves of the low temperature setting for cooling, if the high temperature is set for cooling.
2. Curve 4 is default in high temperature cooling mode and curve 6 is default in ECO mode.

9 Error Code Table

Table 3-9.1: Error code table

Error code	Content
C7	Transducer module temperature too high protect
E0 E8	Water flow failure
E1	Phase sequence error
E2	Communication error between outdoor unit and user interface
E3	Backup electric heater exchanger water outlet temperature sensor error
E4	Domestic hot water tank temperature sensor error
E5	Air side heat exchanger refrigerant outlet temperature sensor error
E6	Outdoor ambient temperature sensor error
E9	Suction pipe temperature sensor error
EA	Discharge pipe temperature sensor error
Ed	Water side heat exchanger water inlet temperature sensor error
EE	Hydronic system EEPROM error
F1	DC generatrix voltage is too low
H0	Communication error between refrigerant system main control chip and hydronic system main control chip
H1	Communication error between refrigerant system main control chip and inverter driver chip
H2	Water side heat exchanger refrigerant inlet (liquid pipe) temperature sensor error
H3	Water side heat exchanger refrigerant outlet (gas pipe) temperature sensor error
H5	Room temperature sensor error
H6 HH	DC fan error
H7	Abnormal main circuit voltage
H8	Pressure sensor error
H9	Auxiliary heat source water outlet temperature sensor error
HA	Water side heat exchanger water outlet temperature sensor error
HF	Refrigerant system EEPROM error
P0 HP	Low pressure protection
P1	High pressure protection
P3	Compressor current protection
P4	Discharge temperature protection
P5	High temperature difference between water side heat exchanger water inlet and water outlet temperatures protection
P6 H4	Inverter module protection
L0	Inverter module protection
L1	DC bus low voltage protection
L2	DC bus high voltage protection
L4	MCE error
L5	Zero speed protection
L7	Phase sequence error

Table continued on next page …

Table 3-9.1: Error code table (continued)

L8	Compressor frequency variation greater than 15Hz within one second protection
L9	Actual compressor frequency differs from target frequency by more than 15Hz protection
Pb	Water side heat exchanger anti-freeze protection
Pd	High temperature protection of refrigerant outlet temperature of condenser in cooling mode
PP	Water side heat exchanger inlet temperature is higher than outlet temperature in heating mode

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