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LÄMPÖÄSSÄ

RE 28–48, RE 56–96

Installation and operation manual

M8009 2231EN
3 August 2022

Contents

7 Technical data

1 Introduction

1.1 Heat pumps covered in the manual

Model	Item code	Refrigerant
RE 28 05	RE2805	R-410A
RE 33 05	RE3305	R-410A
RE 38 05	RE3805	R-410A
RE 42 05	RE4205	R-410A
RE 48 05	RE4805	R-410A
RE 56 05	RE5605	R-410A
RE 66 05	RE6605	R-410A
RE 76 05	RE7605	R-410A
RE 84 05	RE8405	R-410A
RE 96 05	RE9605	R-410A

1.2 Product description

RE 05 heat pumps

RE 05 heat pumps come in two configurations: **RE 28–48** heat pumps have a single compressor unit, while **RE 56–96** heat pumps have two compressor units. All RE heat pumps include a control cabinet. The standard position of the control cabinet is on the unit's left side, but it can be moved to the right side if needed.

RE 28–48 models

By default, the unit’s automation system has been configured for one domestic hot water tank, one buffer tank for a heating circuit, and one heating circuit controlled by a three-way valve. The automation system supports numerous other connections, systems and accessories. Alternative system configurations are presented in separate technical manuals for the automation system.

RE 56–96 models

The heat pump includes two compressor units, which can be used independently or they can be joined together. The automation system has a separate controller and separate electrical connections for each unit. If the units are used separately, they operate independently of each other.

In standard two-unit deliveries, the units’ automation systems have been connected for joint use (in a cascade configuration). In cascade systems, one of the heat pump controllers operates as the master and controls the entire system, while the other, the slave controller, operates under the master controller. The upper unit is the master unit and the lower unit the slave unit.

1.3 Instructions and diagrams

Document	Designation
Installation and operation manual	M8009 (34793586)
RE 05 28–33 Electric diagram	110415
RE 05 38–48 Electric diagram	110414
RE 05 56–66 Electric diagram	110412
RE 05 76–96 Electric diagram	110413
Quick guide	34793587

1.4 Safety notice and warnings

Read these instructions carefully before installation, commissioning, operation, or maintenance of the device. The given instructions must be followed. Throughout this manual, the following symbols are used to point out very important information:

Use special caution. The DANGER symbol indicates an immediate hazard that will result in serious injury or death.

Use special caution. The WARNING symbol indicates a hazard that may result in serious injury or death.

Use caution. The CAUTION symbol indicates a hazard that may result in an injury.

Pay attention. The NOTICE symbol indicates a risk of damage to the equipment, components, or surroundings.

The ‘i’ (info) symbol indicates important information as well as useful tips and hints.

Keep these instructions as well as the electrical diagrams available near the device.

Installation, commissioning, or service of the appliance is to be carried out by authorized and trained personnel only, adhering to all local regulations and requirements.

Wear proper personal protective equipment, such as protective footwear, gloves, and safety goggles when necessary.

Electrical safety

Once powered on, some of the unit's components carry a hazardous voltage. Always pay attention to electrical safety when working with or near electrical components.

Before any maintenance or servicing, switch off electricity using the main switch and ensure that there is no voltage present in the unit's components.

Refrigerant

Refrigerant leaking from an open or broken circuit may cause asphyxiation, severe frost damage, arrhythmia, or neurological symptoms. If you suspect a refrigerant leak, leave the area immediately, and seek fresh air. Help and warn others.

Safety devices

Do not bypass, disable, or damage any of the unit's pressure switches or other safeguards with tools, by accessing the system's software, or by any other means.

Bypassing the unit's safeguards may lead to equipment failure, damage to property or injury to people.

Lifting and handling

The weight of the unit presents a crush hazard. Use safe work methods when lifting and handling the unit.

During lifting, do not walk or work under the heat pump or any other suspended load.

Other considerations

To avoid slipping, keep floor surfaces dry, and seal off or report any leaks that you detect.

1.5 Transportation and storage

Storage

Store the unit upright in a warm, dry place. Protect the device against water and dust. Do not stack goods on the unit.

Transportation

Transport the unit upright and protected against water and dust. Do not stack goods on the unit. Use only safe lifting and handling methods when moving or lifting the unit. After lifting, lower the unit carefully down onto the floor. Hard impacts can cause equipment damage.

Do not tilt the unit.

If the unit is tilted beyond 45 degrees, the compressor may not receive proper lubrication at startup. As a result, the compressor may become damaged.

- If the unit has been accidentally tilted beyond 45 degrees, leave the unit in vertical position for at least three hours before starting the compressor.

Lifting

Do not use the user interfaces as support points when lifting the unit.

Do not lift the unit from under the control cabinet.

Lift and move the unit with a hand pallet truck or forklift.

- Lift and move the unit only so that both forks of the lifting device extend under the whole unit.
- Keep the exterior panels of the compressor unit closed when lifting and moving the heat pump.
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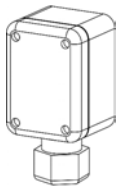
Two-unit heat pumps:

Lift the tower consisting of two units only from below the lower unit.

1.6 Scope of delivery

Equipment and components

Item	PCS	Designation	
Outdoor temperature sensor	1	36217226	 Outdoor temperature sensor ver. 1 Delivered with a solar screen panel. NTC 1 k.
Condenser pump, RE 05 28–48	1	34023075	Wilo-Stratos PARA 25/1-12 T16 180 mm 6h
Condenser pumps, RE 05 56–96	2	34023075	Wilo-Stratos PARA 25/1-12 T16 180 mm 6h
Buffer tank temperature	1		Connected to the heat pump's control cabinet, cable length approximately 4 m.
DHW storage tank temperature	1		
Heating circuit 1 flow temperature	1		

Sensors and actuators

Controller	Piping diagram pos.		
BRINE CIRCUIT			
B91	TE101	Brine circuit in (evaporator in)	S
B92	TE102	Brine circuit out (evaporator out)	S
Q8	P101	Brine pump (evaporator circuit pump)	O
HEATING			
B71	TE201	Heating water return (condenser in)	S
B21	TE202	Heating water flow (condenser out)	S
Q9	P201	Heating pump (condenser circuit pump)	S
K25/K26	EB203	In-line heater, condenser circuit	-
B4	TE255	Buffer tank temperature (tank upper section)*	S
B41	TE256	Buffer tank temperature (tank upper lower section)	O
B3	TE265	DHW storage tank temperature (tank upper section)*	S
B31 (B3)	TE266	DHW storage tank temperature (tank lower section)	O
Q8	FV202	Change-over valve	O
B9	TE0	Outdoor temperature	S
HEATING CIRCUIT 1			
B1	TE212	Heating circuit 1 flow temperature*	S
Q2	P221	Heating circuit 1 pump	O
Y1/Y2	FV222	Heating circuit 1 control valve	O
B5/HMI1	TE213	Room temperature 1	O
HEATING CIRCUIT 2			
B12	TE222	Heating circuit 2 flow temperature	OA
Q6	P221	Heating circuit 2 pump	OA
Y5/Y6	FV222	Heating circuit 2 control valve	OA

Controller	Piping diagram pos.		
B52/HMI2	TE223	Room temperature 2	O
HEATING CIRCUIT 3			
B14	TE232	Heating circuit 3 flow temperature	OA
Q20	P231	Heating circuit 3 pump	OA
Y11/Y12	FV232	Heating circuit 3 control valve	OA
B53/HMI3	TE233	Room temperature 3	O
REFRIGERANT CIRCUIT			
K1	COMP1	Compressor	S
B81	TE2	Hot gas temperature	S
E9	PS1	Low pressure switch	S
E10	PS2	High pressure switch	S
CONNECTION DEVICE			
OZW/ OCI672			O

S: Standard equipment
O: Optional accessory, can be connected to the heat pump's automation system and enabled without additional equipment.
OA: Optional equipment that requires an auxiliary controller kit (controller + enclosure) for installation.

1.7 Accessories

For a full list of available accessories, please refer to brochures and price lists. Storage tanks are presented in a separate storage tank brochure.

Accessories

Accessory	Temperature sensor NTC10k 5 m
Designation	36217266
Description	Sensor with flexible cable (length: 5 m), metallic probe (diameter: 6 mm, length: 50 mm), 1xNTC 10 kOhm, 2 wires, B(25/85)=3976, $t_{0.9}$7 s
Intended use	Buffer tank temperature TE255 Heating circuit flow temperature TE212, TE222, TE232

Accessory	Sensor pocket 6x200 G1/2
Designation	34021268
Description	For 6 mm sensor probes, with cable gland, depth: 200 mm, G1/2" outer thread, brass
Intended use	Sensor pocket for buffer tanks and heating circuits
Compatible equipment	36217266

Accessory	Remote connection device OCI670/109
Designation	36108276
Description	Siemens OCI670/109. For remote connection through the Climatix IC cloud service. Local connection through a USB cable. Connects to the heat pump controller through an LPB bus (DB+/MB–) and to the internet through a network cable. You can establish the connection with an internet browser, the Siemens ACS790 computer program or the Siemens Climatix IC mobile app.

Accessory	Remote connection device OZW672.01 OZW672.04 OZW672.16
Designation	36108094 36108107 36108268
Description	Siemens OZW672. Remote connection for one, four, or 16 controllers. For remote connection through the Climatix IC cloud service or a direct IP connection. Local connection with a network cable or a USB cable. Connects to the heat pump controller through an LPB bus (DB+/MB–) and to a LAN or the internet through a network cable. You can establish the connection with an internet browser, the Siemens ACS790 computer program or the Siemens Climatix IC mobile app.

Accessory	Modbus module OCI351.01/109
Designation	36108283
Description	Siemens OCI351.01/109. Modbus RTU RS485.

2 Installation

2.1 Installation site

Site planning and selection

- Install the unit and the associated equipment in a warm, dry place.
- The installation site's ambient temperature must be within +5...+40 °C (non-condensing).
- No condensate should accumulate onto the unit's components from ambient air (non-condensing atmosphere).
- The air at the installation site should be free of harmful quantities of dust or other substances that may influence the heat pump's performance, durability, or safety.

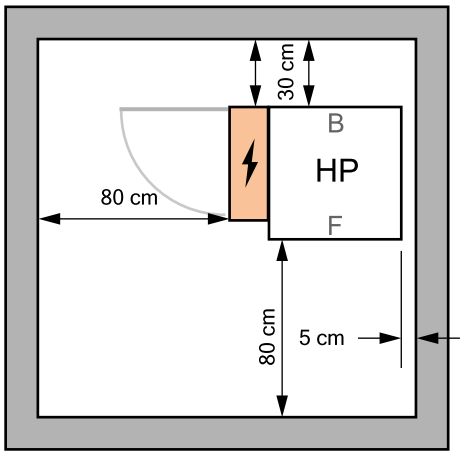
Unit base and leveling feet

Place the unit on a stable, steady base that can carry its entire weight. Mount the unit securely in a vertical position onto its own leveling feet. Level the machine using the machine's leveling feet. The device must be adjusted horizontally using the leveling feet of the device.

Maintenance and access clearance

Install shut-off valves that allow the unit's evaporator and condenser to be isolated from the rest of the system.

- Leave at least 30 cm of clearance behind the unit (on the evaporator and condenser side).
- Leave at least 80 cm of clearance in front of the unit (on the user interface side).
- Leave at least 80 cm of clearance in front of the unit's control cabinet door.
- There must be enough space for servicing at least in front of the unit.



Access clearance (RE) ver. 1

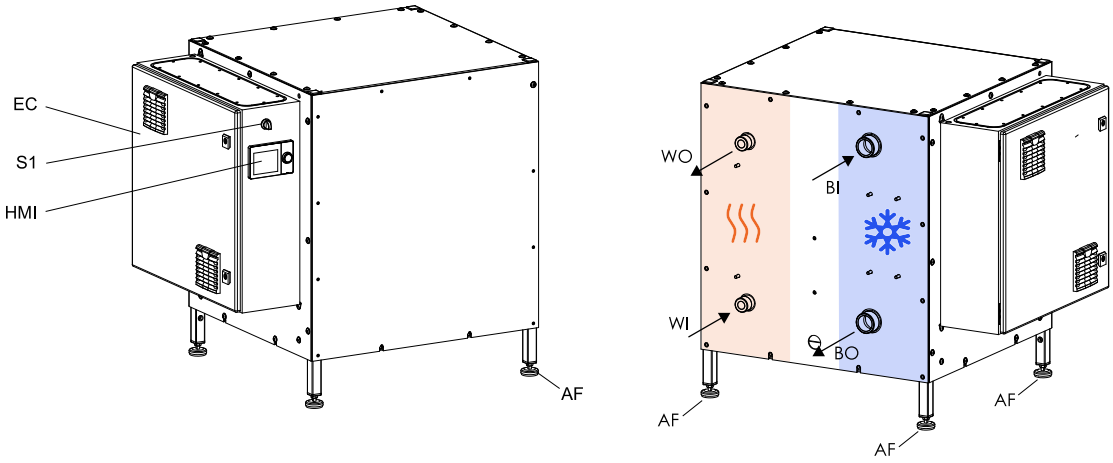
Pos.	Item
HP	Heat pump
F	Front
B	Back
⚡	Control cabinet

Floor drain

The unit's installation site must have a floor drain. The site's floor should be inclined so that any runoff from the unit leads towards the drain.

2.2 Dimensions, connections, and components

Components, RE 28–48



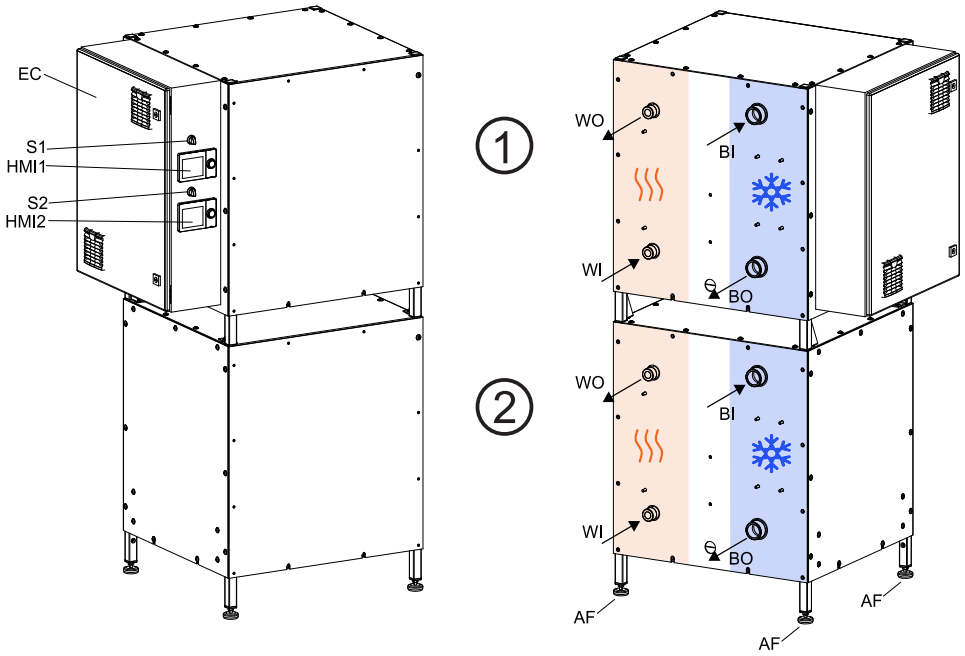
RE, single compressor unit ver. 5

RE 05 28–48, single-unit configuration.

measurements in the image are in millimeters

Pos.	Item
EC	Switchboard
HMI	User interface
S1	Operating switch, ON/OFF
AF	Adjustable feet (M10, DIN/ISO 17/16 mm)
BI	Brine circuit in (evaporator circuit in) ISO 228 G 2 (normal 2" outer thread)
BO	Brine circuit out (evaporator circuit out) ISO 228 G 2 (normal 2" outer thread)
WO	Condenser circuit out, heating water flow ISO 228 G 1 1/4 (normal 1 1/4" outer thread)
WI	Condenser circuit in, heating water return ISO 228 G 1 1/4 (normal 1 1/4" outer thread)

Components, RE 56–96



RE, two compressor units ver. 3

RE 05 56–96, two-unit configuration. 1: master unit, 2: slave unit.

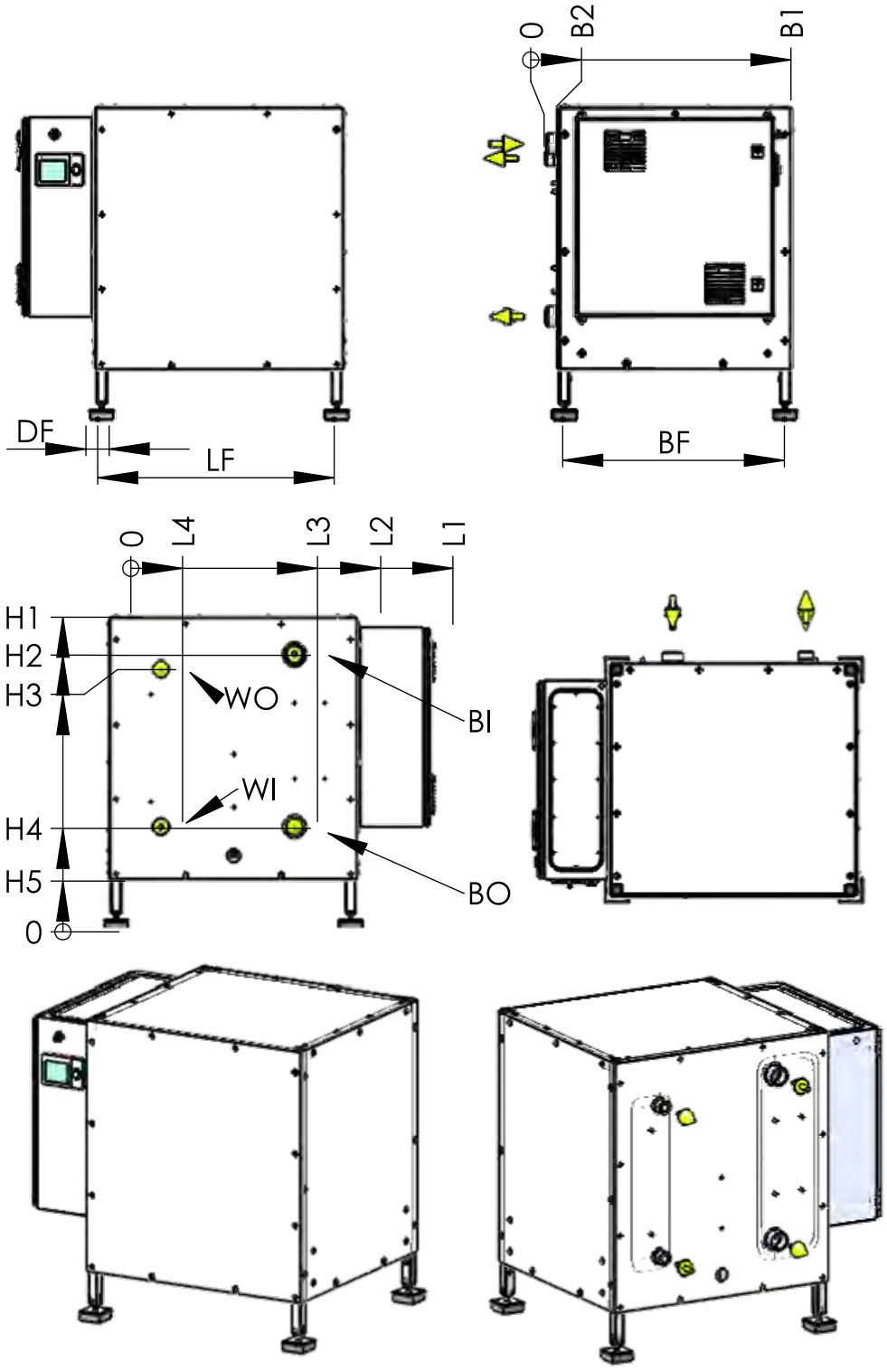
Pos.	Item
EC	Control cabinet
HMI1	User interface Upper unit (master)
HMI2	User interface Lower unit (slave)
S1	Operating switch (ON/OFF) Upper unit (master)
S2	Operating switch (ON/OFF) Lower unit (slave)
AF	Adjustable feet M10, DIN/ISO 17/16 mm
BI	Brine circuit in (evaporator circuit in) ISO 228 G 2 (normal 2" outer thread)
BO	Brine circuit out (evaporator circuit out) ISO 228 G 2 (normal 2" outer thread)
WO	Condenser circuit out, heating water flow ISO 228 G 1 1/4 (normal 1 1/4" outer thread)
WI	Condenser circuit in, heating water return ISO 228 G 1 1/4 (normal 1 1/4" outer thread)

Transit bolts in compressor unit bottom plates

Each compressor plate has a transit bolt (screw) that supports the compressor during transit. The screw goes through the compressor unit's bottom plate, securing the compressor's base to the bottom plate. The transit bolt must be removed before starting the unit.

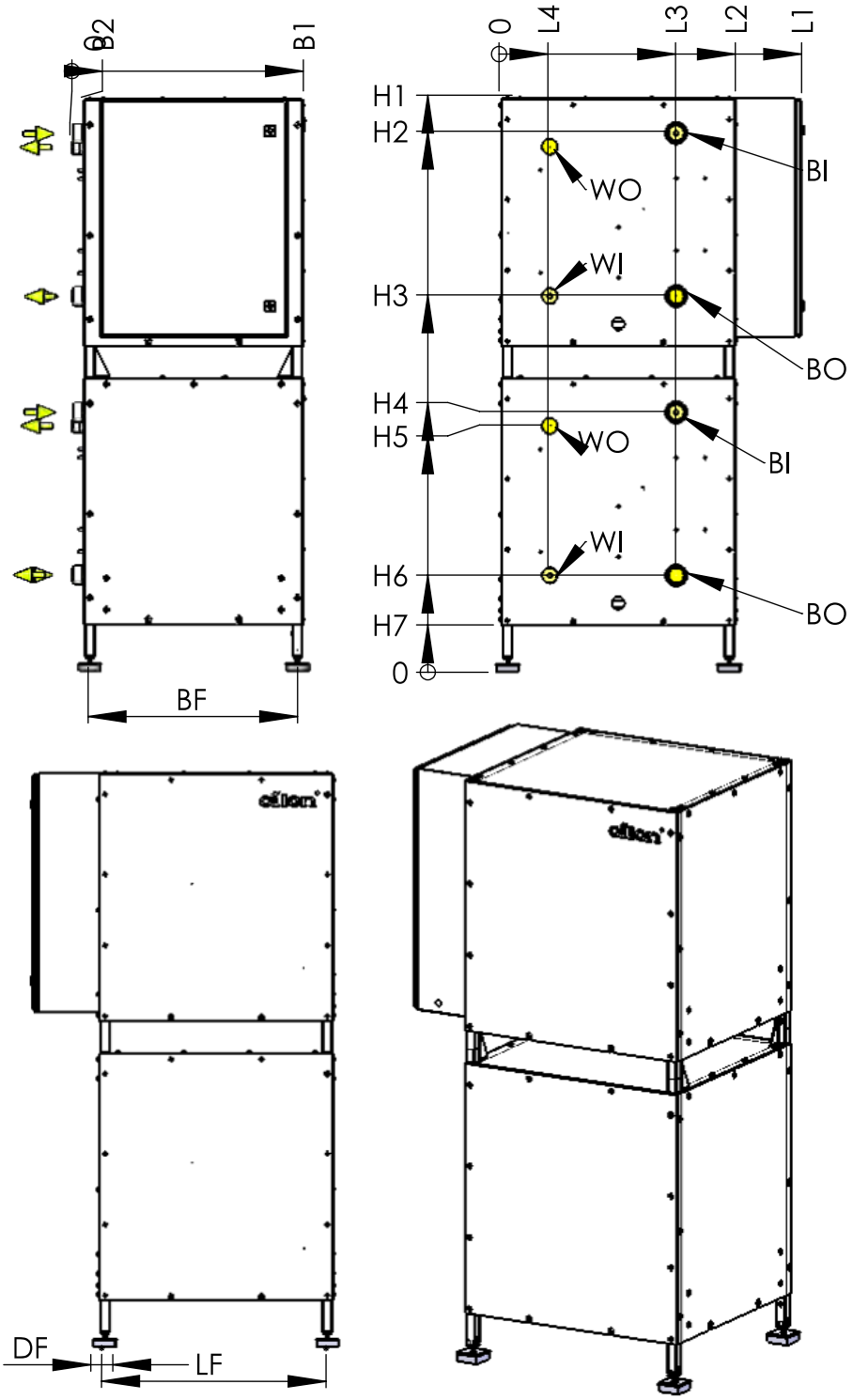
- Remove the transit bolt by unscrewing the screw from the bottom of the unit's plate.
- The transit bolt has an M8 thread and a 13 mm hexagonal head.

Dimensions, RE, single-unit configuration



d063311revc RE 28-48 ver. 1

Dimensions, RE, two-unit configuration



d081566revb RE 56-96 ver. 1

Heat pump	L1	L2	L3	L4	H1	H2	H3	H4	H5	H6	H7
RE 28–48	967	750	560	155	945	830	786	310	152	–	–
RE 56–96	967	750	560	155	1835	1716	1198	830	786	310	150

Heat pump	B1	B2	BI/BO	ØWI/WO	LF	BF	DF
RE 28–48	750	37	ISO228/1-G2 B	ISO228/1-G1 1/4 B	710	665	70X70
RE 56–96	750	37	ISO228/1-G2 B	ISO228/1-G1 1/4 B	710	665	70x70

Switches and fuses

RE 28–48

Marking	Function	Default position
1S1	Operating switch ON/OFF	ON
1FI	Compressor motor protection	ON
F3	Control fuse (automation system's fuse)	ON
1F4	Condenser circuit pump Q9's fuse	ON
1F5	Evaporator circuit pump Q8's fuse	ON
F6	Heating circuit 1 pump Q2's fuse	ON
F7 (Optional)	Heating circuit 2 pump Q6's fuse	ON

RE 56–96

Marking	Function	Default position
F3	Control fuse (automation system fuse)	ON
S1	Operating switch ON/OFF Upper unit (master)	ON
S2	Operating switch ON/OFF Lower unit (slave)	ON
1F1	Compressor motor protection Upper unit (master)	ON
2F1	Compressor motor protection, Lower unit (slave)	ON
1F4	Condenser circuit pump Q9's fuse Upper unit (master)	ON
1F5	Evaporator circuit pump Q8's fuse Upper unit (master)	ON
2F4	Condenser circuit pump Q9's fuse Lower unit (slave)	ON
2F5	Evaporator circuit pump Q8's fuse Lower unit (slave)	ON
F6	Heating circuit 1 pump Q2's fuse	ON
F7 (optional)	Heating circuit 2 pump Q6's fuse	ON

Operating switches

RE 26–48: operating switch S1; RE 56–96: operating switch S1 and S2

When the switch is in position 1/ON, the unit is in normal operating mode. When the switch is in position 0/OFF, the compressor is prevented from starting, while the heat pump's automation system stays operational. The frost protection function is an exception to this: it starts the in-line heater and the compressor's condenser circuit when the temperature falls below 5 °C, even if the switch is set to 0/OFF.

If the condenser circuit's temperature is below 5 °C and you do not want the compressor to start, set the compressor motor protection circuit breakers to the OFF position.

- RE 26–48: circuit breaker 1F1
- RE 56–96: circuit breakers 1F1 and 2F1

In RE 56–96 models, operating switch S1 halts the upper compressor unit (master), and operating switch S2 halts the lower compressor unit (slave).

2.3 Modbus connection

Accessory	Modbus module OCI351.01/109
Designation	36108283
Description	Siemens OCI351.01/109. Modbus RTU RS485.

The structure and operation of the previous version of the product (OCI350.01/101; 36108133) is nearly identical.

Connect the RVS61.843 module to the controller's connector X60. Use two-sided tape to attach the module on top of the controller.

If the system includes several heat pumps, equip each controller with the Modbus module. Activate the terminating resistor in the last module in the chain by setting each of the module's DIP switches to the top position.

- The terminating resistor is disabled, when both of the DIP switches are in the lower position.

You can check that the controller has identified the module using the ACS program. In the configuration menu, the line **Modbus interface available** will show **yes**, and the **Modbus** menu will appear.

Modbus parameters

Configure the Modbus connection parameters presented below either using the user interface or the ACS program.

Menu	Line	Setting
Modbus	6641	Modbus slave address
Modbus	6652	Baud rate
Modbus	6653	Parity
Modbus	6654	Stop bit

The Modbus registers are available from our website and our customer services.

3 Installing temperature sensors

3.1 Outdoor temperature sensor

The heat pump's outdoor temperature sensor (B9) is delivered with the heat pump. See the necessary sensor connections in the unit's electric diagram.

- In two-unit RE models, connect the sensor to controller A1.0 (master controller, in the upper unit). If the system includes several heat pumps, connect the sensor to the whole system's master controller.

Connecting the sensor

Connect the sensor in terminal K in the heat pump's Siemens RVS61.843 controller.

- Use a regular insulated copper twin cable for connecting the cable and extending the cable.
- Select the cross-sectional area of the wires by consulting the table below.
- Join or splice the cable ends in a way that causes no additional electrical resistance in the wires. Protect the joint against moisture and oxidation.

Cable length (m)	40	60	80	120
Wire cross-sectional area (mm^2)	0.50	0.75	1.0	1.5

Outdoor installation

Install the sensor outside the building with the sensor cable gland pointing downwards.

- Place the sensor in a position where the prevailing outdoor temperature can be measured as accurately as possible.
- Make sure that the sensor is not exposed to solar radiation or heat from the building.

Even though the sensor housing is protected against dust and water spray (IP65, provided that the cable gland is pointed downwards), it is advisable to install the unit in a location that is covered from rain. A good place for the sensor would be, for example, under the eaves in a shady spot on the north wall of the building.

3.2 DHW tank sensor

The heat pump comes with the DHW storage tank temperature sensor (B3) already connected. The sensor cable is approximately 4.5 m long. The sensor probe's diameter is 6 mm and length 50 mm.

Install the sensor in the domestic hot water tank's sensor pocket as specified in the piping diagram.

- If a dedicated tank is used, install the sensor in the lower section of the tank.
- If a combined storage tank is used, install the sensor in the upper section of the tank.
- Install the sensor probe (supplied with the unit) into a sensor pocket designed for 6 mm probes. The sensor pocket needs to extend into the interior of the tank by at least 150 mm.

Install the sensor in a way that allows it to measure the temperature of the fluid in the storage tank as accurately as possible. The sensor pocket needs to extend far enough into the interior of the tank, and the sensor pocket's internal diameter must be suitable for the sensor probe's diameter.

- Use only metallic sensor pockets that won't corrode to any significant degree (from the outside or the inside) over time.
- The air gap between the probe and the pocket wall should be as small as possible. If necessary, use thermal paste between the sensor probe and the pocket walls.
- To ensure that the sensor probe remains firmly seated at the bottom of the sensor pocket, secure the sensor cable with a cable gland.

The cable can be extended if required. Use a regular insulated copper twin cable for connecting the cable and extending the cable (0.5 mm^2, length < 40 m).

- Join or splice the cable ends in a way that causes no additional electrical resistance in the wires.
- Protect the joint against moisture and oxidation.

If the heat pump will not be used for heating domestic hot water (and the sensor will not be installed), disconnect the sensor's wires from the heat pump's control cabinet and protect the bare wire ends. You can otherwise leave the sensor in place.

3.3 Buffer tank sensor

Installation

The heat pump comes with the buffer tank temperature sensor (B4) already connected.

Install the sensor in the buffer tank as specified in the piping diagram.

- If a dedicated tank is used, install the sensor in the upper section of the tank, below the heating circuit outlets.
- If using a combined storage tank with separate sections for DHW heating and space heating, install the sensor in the lower section of the tank.
- Install the sensor probe into a sensor pocket designed for 6-mm probes. The sensor pocket needs to extend into the interior of the tank by at least 150 mm. The sensor pocket is available as an accessory, see section *Accessories.*

Install the sensor in a way that allows it to measure the temperature of the fluid in the storage tank as accurately as possible. The sensor pocket needs to extend far enough into the interior of the tank, and the sensor pocket's internal diameter must be suitable for the sensor probe's diameter.

- Use only metallic sensor pockets that won't corrode to any significant degree (from the outside or the inside) over time.
- The air gap between the probe and the pocket wall should be as small as possible. If necessary, use thermal paste between the sensor probe and the pocket walls.
- To ensure that the sensor probe remains firmly seated at the bottom of the sensor pocket, secure the sensor cable with a cable gland.

The sensor cable is approximately 4.5 m long. The sensor probe's diameter is 6 mm and length 50 mm.

The cable can be extended if required. Use a regular insulated copper twin cable for connecting the cable (0.5 mm^2, length < 40 m).

- Join or splice the cable ends in a way that causes no additional electrical resistance in the wires.
- Protect the joint against moisture and oxidation.

If the heat pump will not be used for heating a buffer tank (and the sensor will not be installed), disconnect the sensor's wires from the heat pump's control cabinet and protect the bare wire ends. You can otherwise leave the sensor in place.

3.4 Flow temperature sensor for heating circuit 1

Installation

In single-unit RE heat pumps, the heating circuit 1 flow sensor (B1) is used to control the circuit's control valve (Y1/Y2). In two-unit configurations, the sensor is installed in a the cascade's shared flow line (sensor marking: B10; see the details at the end of this section).

The sensor can be installed in the heating circuit's flow line, even if there is no valve to be controlled by the heat pump; this will allow the sensor's reading to be viewed through the automation system.

- If you do not install the sensor in the flow line, disconnect the sensor's wires from the heat pump's switchboard and protect the bare wire ends.
- You can otherwise leave the sensor in place.

Install the sensor in the heating circuit flow line as indicated in the piping diagram. Place the sensor in a way that allows it to measure the temperature in the flow line as accurately as possible.

Install the sensor 0.5–2.0 m downstream from the control valve. Install the sensor preferably downstream from the circulation pump. If the sensor is too close to the valve, its readings will be inaccurate, and placing the sensor too far downstream will cause harmful control delay.

Attach the sensor to a metallic pipe surface or in a metallic sensor pocket in the pipe.

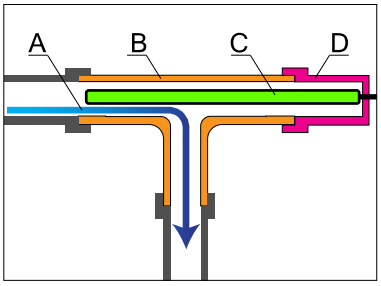
<u>Surface installation</u>

- Attach the sensor firmly and securely against the pipe surface along the entire length of the metal sleeve covering the sensor probe.
- Finish by adding thermal insulation to insulate the sensor from ambient air temperature.
- If necessary, use thermal paste between the sensor probe and the pipe surface.
- It is advisable to attach the sensor along the pipe surface at the 3 o'clock or 9 o'clock position.

<u>Installation in a sensor pocket</u>

Iinstall the sensor in a pocket intended for 6 mm probes.

If the pipe has a small diameter, create a 90 degree turn in the line flow direction with a tee fitting. Place the sensor pocket in the outlet that is parallel to the original line. The probe itself should extend upstream from the turn. This will allow you to install even a long sensor pocket (150–200 mm) along the line. The sensor pocket is available as an accessory, see section *Accessories.*



Tee fitting with sensor pocket ver. 1

Pos.	Item
A	Flow direction
B	Tee fitting
C	Sensor probe in pocket
D	Sensor pocket connection

Using a tee connector to install a sensor pocket in a small-diameter pipe.

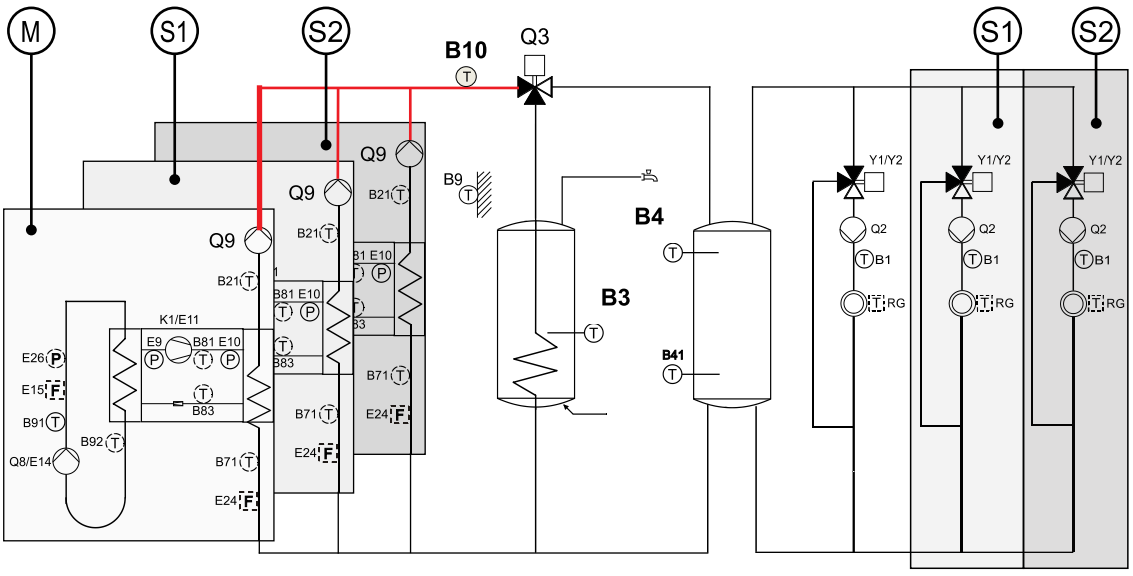
Sensor cable

The cable can be extended if required. Use a regular insulated copper twin cable for connecting the cable and extending the cable (0.5 mm^2, length < 40 m).

- Join or splice the cable ends in a way that causes no additional electrical resistance in the wires.
- Protect the joint against moisture and oxidation.

Shared cascade flow sensor

By default, in two-unit RE models (and in multi-unit heat pump configurations), a single shared flow temperature sensor (B10) is used to control the entire cascade. The heat pump comes with the sensor already connected. Install the sensor to the condenser's flow line downstream from the last heat pump in the cascade. See the instructions above.



An example of shared cascade flow sensor installation. M: Master, S1: Slave 1, S2: Slave 2 (Slave 2 not present in standard two-unit RE configurations).
The shared cascade flow line and the heat pumps' individual flow lines are shown in red.

4 Commissioning

4.1 Configuring automation settings

1. Keep the operating switches in the OFF position.
   - **In RE 28–48 models**, the operating switch is S1.
   - **In RE 56–96 models**, the operating switches are S1 and S2
2. Keep the compressor motor protection circuit breaker (breakers) in the OFF position.
   - In **RE 28–48 models**, the MPCB is 1F1.
   - In **RE 56–96 models**, the MPCBs are 1F1 and 2F2.
3. Turn the control fuse (F3) to the ON position.
4. Wait for the user interface to update the data from the controller.
   a. If necessary, go through the commissioning menus. The commissioning menu settings are preset at the factory.
5. Adjust the heating circuit's basic settings to fit the heating system. The most common settings are listed in the table below.
6. If necessary, change the settings based on the piping diagram.
7. If you have installed external actuators (such as a heating circuit control valve), test the actuators' operation and connections with a relay test.

If necessary, activate the outdoor temperature simulation function from the **Diagnostics** menu. This will allow you to bypass the outdoor temperature sensor and set the outdoor temperature value manually.

Basic settings

Menu	Line	Setting
Heating circuit 1	720	Heating curve slope
Heating circuit 1	721	Heating curve displacement (parallel displacement)
Heating circuit 1	730	Summer/winter heating limit
Heating circuit 1	740	Flow temp. setpoint min. (lower limit)
Heating circuit 1	741	Flow temp. setpoint max. (upper limit)

4.2 Starting the heat pump

1. Turn all motor protection circuit breakers and fuses to the ON position. Keep any operating switches in the OFF position.
   - **In RE 28–48 models**, the operating switch is S1.
   - **In RE 56–96 models**, the operating switches are S1 and S2
2. If necessary, reset the heat pump from settings.
3. Turn the compressor unit's operating switch (S1) the ON position.
   - **In RE 56–96 models, use only the upper unit's operating switch (S1)**
4. Wait for the compressor to start.
   - The brine circuit's and the condenser circuit's pump will start approximately 10–20 seconds before the compressor starts.
5. If you have to restart the compressor, wait at least 5 minutes after the last start.

- Starting up too frequently may cause damage to the soft starter.

6. Make sure that the compressor rotates in the right direction, **see the table below.**
   - If the compressor rotates in the wrong direction, stop the compressor immediately by moving its motor protection circuit breaker (RE 28–48: F1; RE 56–96: 1F1) to the OFF position or by turning its operating switch to the OFF position.
   - If the compressor rotates in the wrong direction, make sure that the power supply is de-energized and reverse the order of two phases in the heat pump's supply cable. After this, restart the process from the first step in this section.
   - The unit is equipped with an internal phase guard. This device will stop the compressor within 10 seconds of start-up, if the compressor rotates in the wrong direction due to an incorrect phase order.
7. Check the temperature indicators to ensure that the condenser circuit starts to warm up and the evaporator circuit to cool down.

Additional steps for RE 56–96:

1. Next, turn the lower unit's operating switch S2 in the ON position.
2. Wait for the lower compressor to start.
3. The compressor will start with a delay depending on the system's demand for heating.
   - If necessary, speed up the compressor's start-up by using the outdoor temperature simulation function and decreasing the cascade's delay time and degree minutes. Restore the settings after commissioning.
4. Make sure that the compressor rotates in the right direction.
   - If the compressor rotates in the wrong direction, stop the compressor with operating switch S2 or motor protection circuit breaker 2F1.

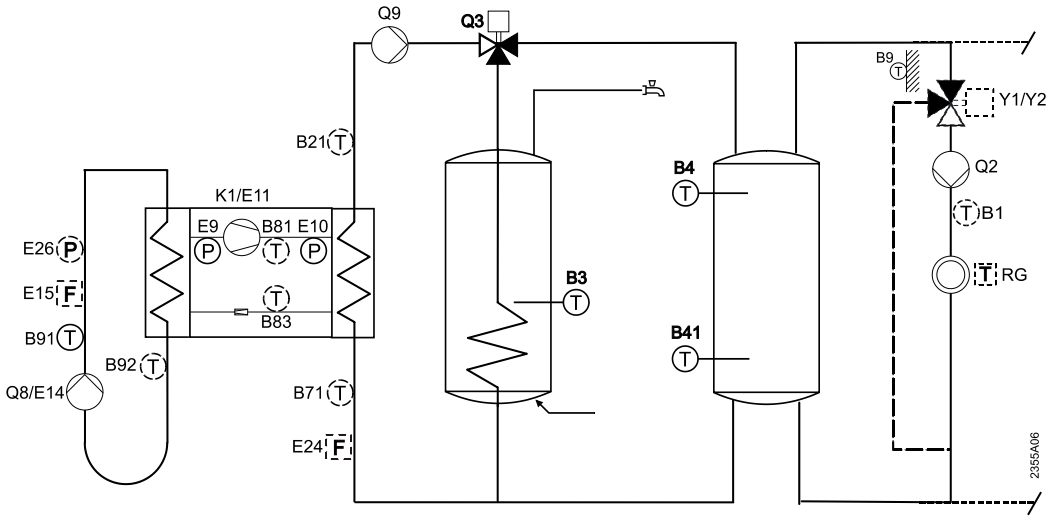
Identifying compressor rotation direction

Indication	Correct rotation direction	Incorrect rotation direction	Notes
Operating sound	Normal	**Unusual**	
Hot gas pipe temperature (line 8415)	Increases	**Does not increase**	Line 8415
Pressure on the high pressure side	Increases	**Does not increase**	Refrigerant gauge
pressure on the low pressure (suction) side	Decreases	**Does not decrease**	Refrigerant gauge

4.3 Automation factory settings

RE 28–48

By default, the unit's automation system has been configured for one domestic hot water tank, one buffer tank for a heating circuit, and one heating circuit controlled by a three-way valve. The automation system supports numerous other connections, systems and accessories. Alternative system configurations are presented in separate technical manuals for the automation system.



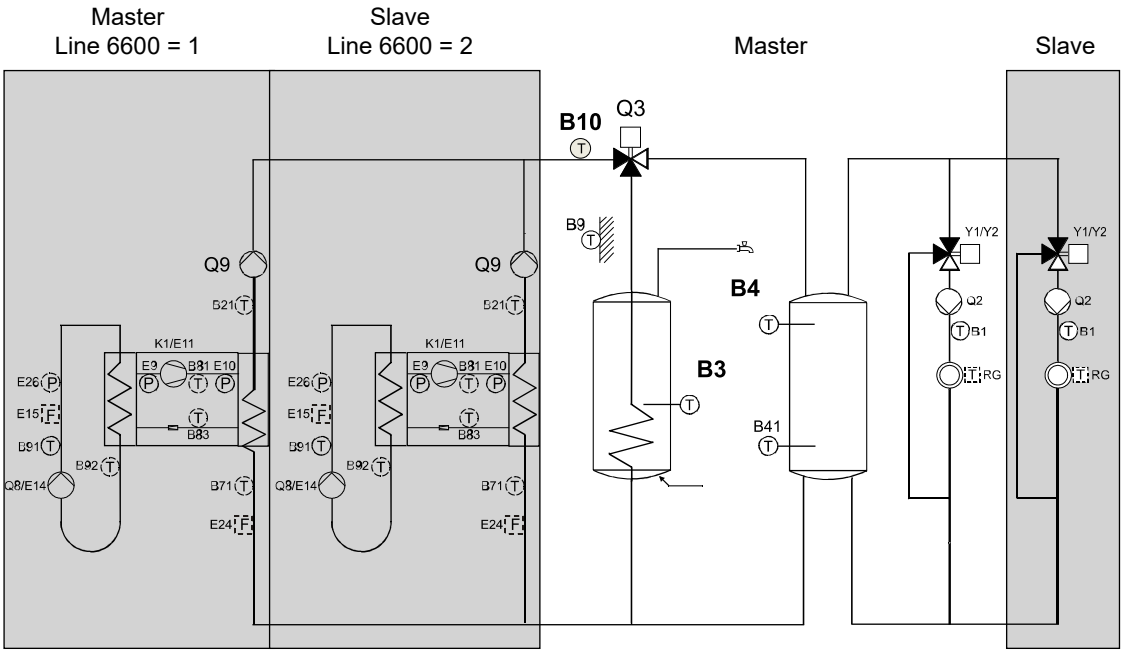
2355A06 ver. 1

RE 56–96

In standard two-unit RE heat pump deliveries, the units' automation systems have been connected for joint use in a cascade. The cascade is controlled with a sensor (B10) installed in the cascade's shared flow line. By default, the cascade system includes one shared brine pump and two condenser circuit pumps. If necessary, the system can be configured to include two separate brine circuit pumps.

By default, the unit's automation system has been configured for one domestic hot water tank, one buffer tank for a heating circuit, and one heating circuit controlled by a three-way valve. The automation system supports numerous other connections, systems and accessories. Alternative system configurations are presented in separate technical manuals for the automation system.

By default, both compressor units are connected to the building's system through the same change-over valve (Q3). As a result, both units are used to heat either domestic hot water or a storage tank used in space heating (buffer tank). This connection type works almost exactly as a single-unit heat pump system; the only difference is that there are two compressor units to take care of heating. However, the system can be laid out and programmed so that one of the heat pumps is used for heating either domestic hot water or the buffer tank, and the other is used only for heating up the buffer tank, see chapter *Cascade*.



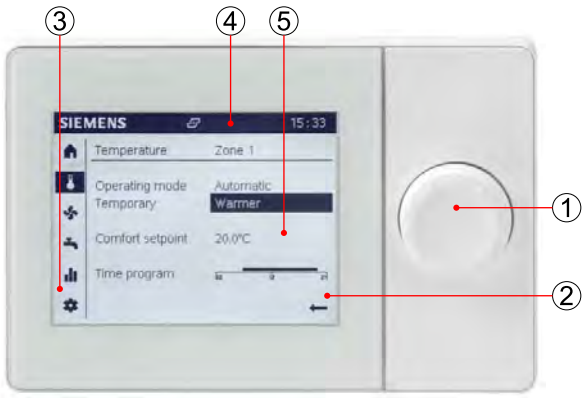
4.4 Bleeding the system of air

You can use the **relay test** function (see section *Relay test*) to make it easier to bleed the system of air.

- Use the relay test to run the pump for a while, then stop, then run the pump again.
- Bleed and fill (pressurize) the circuits during each break.
- Repeat until bleeding is complete.
- If necessary, switch the positions of the change-over and control valves during bleeding.

5 Operation

5.1 Heat pump user interface



Navigate the menus and settings by turning the control knob.

Select a menu or setting by pushing in the control knob.

Move to the previous menu by using the arrow or text field at the bottom of the screen.

1) Control knob
2) Display
3) Navigation bar
4) Status bar
5) Work area

Status bar symbols

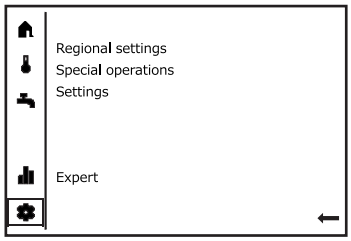
	Active alarm
	Special operations are active (e.g., outdoor temperature simulation or emergency operation), or the maximum number of error notifications permitted by the settings has been reached.
	The heating circuit operating mode has been changed and, as a result, scheduled automatic operation is disabled. This icon is shown if the operating mode is changed from Automatic to another mode, such as Comfort.
	User level No symbol: end-user (no password) 1: commissioning (no password) 2: expert (password: 00017) 3: OEM operation (password 24358)
	The heat pump's compressor is on.
	Event message

Navigation bar

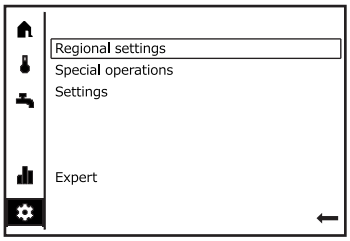
	Start page • key temperature values • switching heating circuits **ON** (to automatic mode) or **OFF** (to frost protection mode)
	Heating circuits • operating mode • room temperature setpoint for **Comfort** mode • time programs
	Domestic hot water • switching domestic hot water heating on and off • recharging DHW to its setpoint (before the switching limit is reached) • Domestic hot water time programs
	Status information • temperatures • operating modes • fault information and resetting the heat pump under fault conditions

	Settings • time and language • changing the user level • resetting the heat pump • emergency operation mode • basic settings for the heating circuit assigned to the current user interface
	Diagnostics menu • testing inputs and outputs • bus settings • outdoor temperature simulation • heat pump status • consumer-side heating details • error notification history
	Service menu • parameter list • commissioning menu (incl. assigning heating circuits to the user interface) • updating the user interface's operating views (visible if the interface needs to be updated)

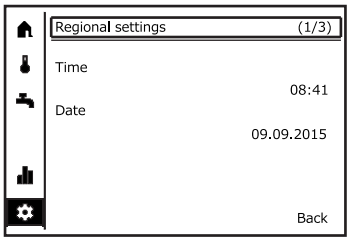
Using menus



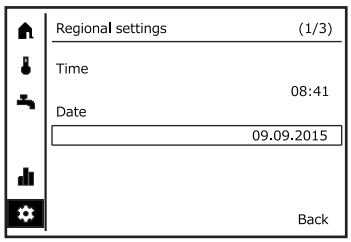
Move the cursor on the left-hand side of the screen to the desired menu icon. Select the menu by pushing in the control knob.



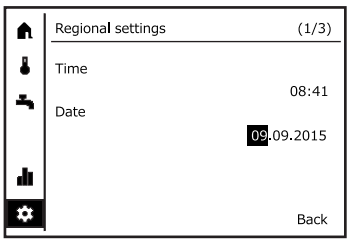
Move to the desired function by turning the control knob. Select the function by pushing in the control knob.



If the menu consists of several pages, the cursor is initially in the status bar.

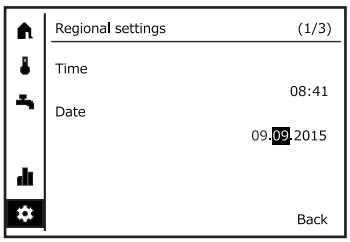


Move to one of the setpoints from the status bar by turning the control knob.



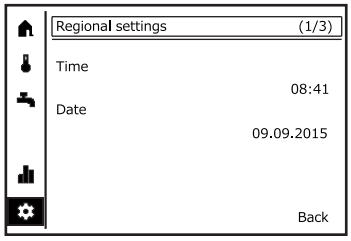
Select the setpoint to be changed by pushing in the knob.

- The setpoint can be changed, when its background turns dark.
- Adjust the setpoint by turning the control knob.

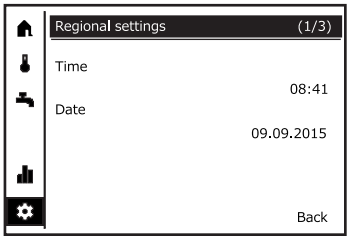


Move to the next number field by pushing in the control knob.

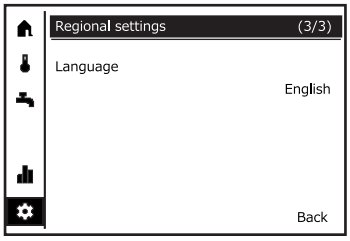
- Proceed like this until you have gone through all the fields.



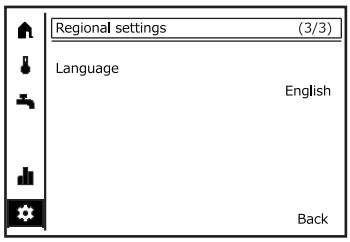
To move from one page to another, move to cursor the status bar



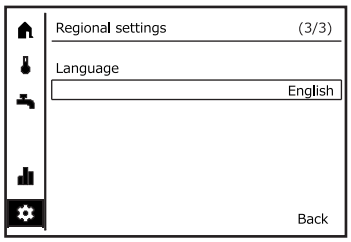
To scroll between the pages, push in the control knob.



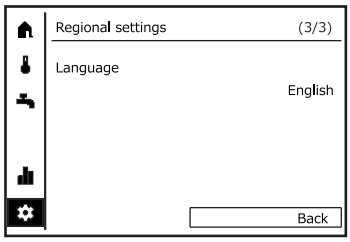
Move from one page to another by turning the knob.

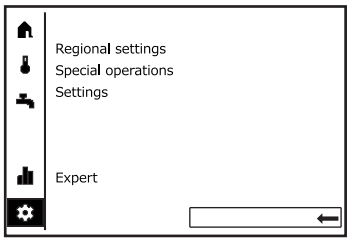


Once you are on the correct page, push in the control knob again.



Move from the status bar to one of the setpoints by turning the control knob.





Go back by moving the cursor to the lower right-hand corner and pushing in the control knob.

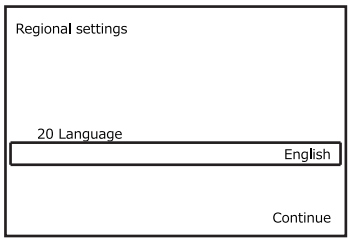
5.2 Commissioning menus

Language and time settings

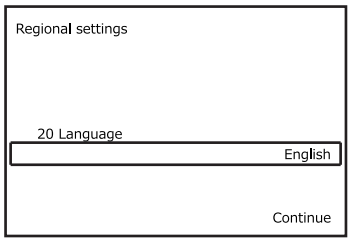
The menu settings are preset at the factory. However, if the commissioning menu appears, go through the settings as indicated below.

To bypass the settings pages in the commissioning menu, select **Skip** in the lower left-hand corner of the screen. If you select **Continue** by accident, select **Skip** in the following screens until the commissioning wizard menus have been bypassed.

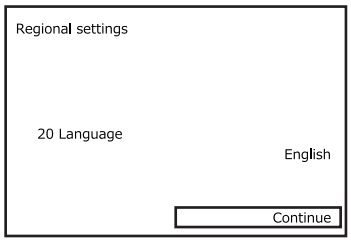
Commissioning menus can be accessed later from the service menu. Usually, it is advisable to change the settings later through the parameter menu.



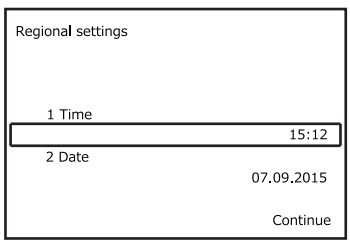
Initially, the display's language is English.

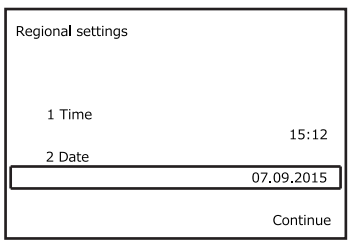


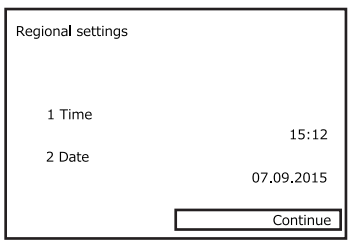
1. The interface language can be changed in the first screen.



2. Move to the next page by pressing the button in the lower right-hand corner.



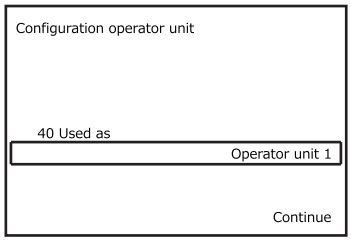




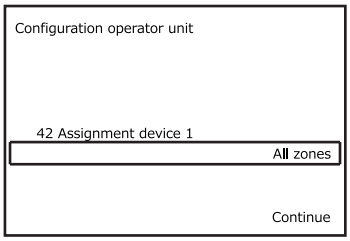
3. Set the time.

4. Set the date.

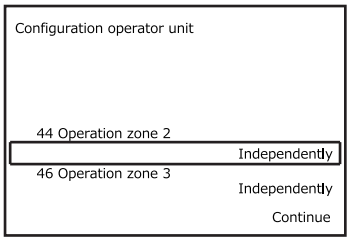
5. Continue to the next page.



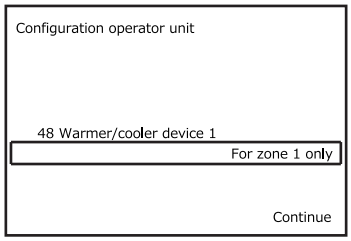
6. Select **Operator unit 1**.



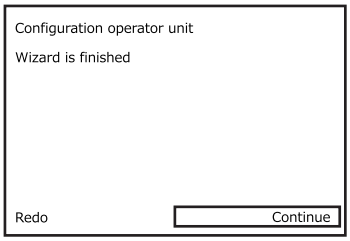
7. Select **All zones**.



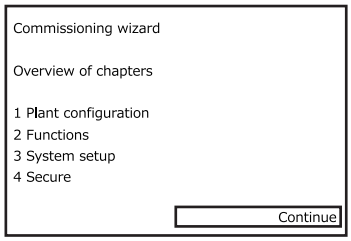
8. Select **Autonomously** for both.



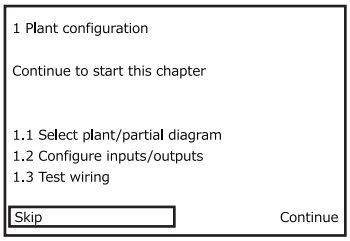
9. Select **For zone 1** only.



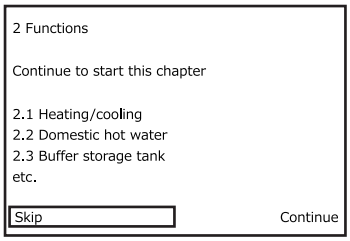
10. Exit the commissioning menus from the lower right-hand corner of the screen. Select **Continue**. Wait for the controller to load the data. This will take a few minutes.



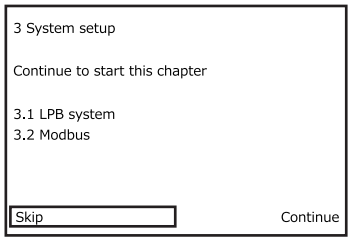
11. Continue to the next page.



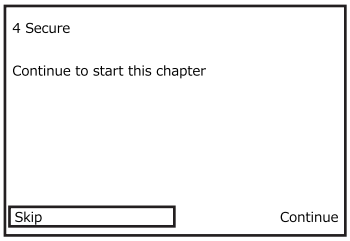
12. Select **Skip**.



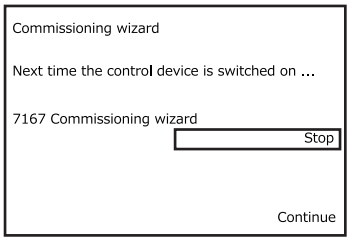
13. Select **Skip**.



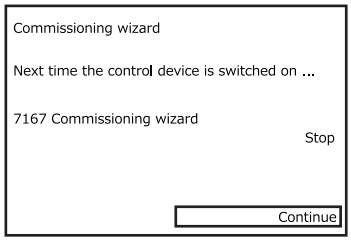
14. Select **Skip**.



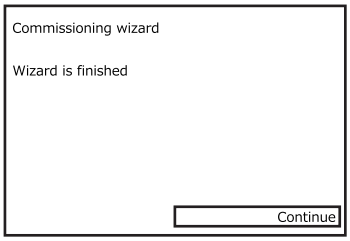
15. Select **Skip**.



16. Select **Stop**.



17. Select **Continue**.

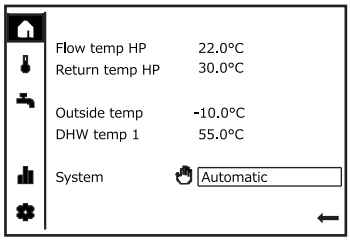


18. Select **Continue**.

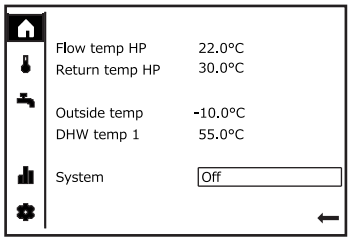
5.3 Start page

From the start page, you can switch all heating circuits assigned to the relevant user interface **ON** or **OFF** in one go. When switched ON, all heating circuits will operate in automatic mode. When switched OFF, all heating circuits will operate in frost protection mode. The start page shows the condenser's flow temperature (sensor B21), the condenser's return temperature (sensor B71), domestic hot water temperature (sensor B3), and the outdoor temperature (sensor B9).

An individual heating circuit's operating mode can be changed separately from the circuit's own settings.



Heating circuits switched **ON** (in automatic mode or in an operating mode selected separately from the settings afterwards).



Heating circuits in frost protection mode.

5.4 Heating circuit menu

Three different room temperature setpoints can be assigned to the heating circuits. These setpoints are **Comfort**, **Reduced**, and **Frost protection**. The **Comfort** setpoint can be altered directly from the heating circuit's main menu. The other setpoints can be changed in each heating circuit's advanced settings (through the parameter list).

If the heating circuit is controlled based on a heating curve, changing the room temperature setpoint will correspond to moving the heating curve sideways (parallel displacement). If the heating circuit is controlled based on room temperature measurement instead, changing the room temperature setpoint will directly change the target room temperature value.

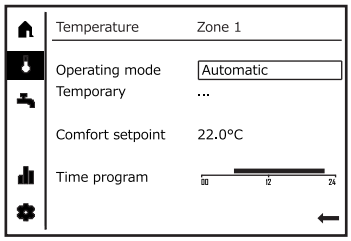
Heating circuits should be kept in **Automatic** mode, as this will allow them to be automatically disabled when the heating period ends (summer/winter heating limit). Additionally, time programs are enabled only when the heating circuit is in **Automatic** operating mode.

Time programs

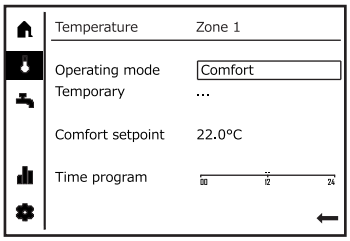
A time program toggles the heating circuit's operating mode automatically between **Comfort** mode and **Reduced** mode. **Comfort** mode is used during the period specified in the time program. At other times, **Reduced** mode is used. Time programs can be set up for each day of the week separately.

When using factory settings, the heating circuits have **Automatic** mode enabled, and the time program keeps **Comfort** mode on permanently. If a time program is used to switch from **Comfort** mode to **Reduced** mode, **Comfort** mode can be temporarily restored by selecting a temporary operating mode for the heater (from the **Temporary** setting). The heating circuit's operating mode will return to normal the next time the time program changes the mode or the user some other operating mode than **Automatic**.

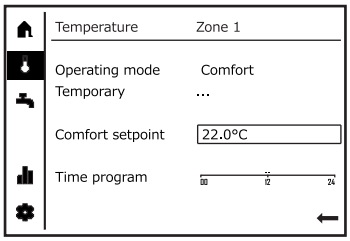
Settings



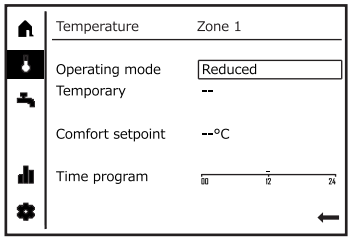
Automatic mode. Heating circuits should be kept in **Automatic** mode.



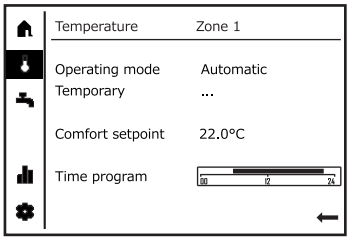
Comfort setpoint for room temperature always on.



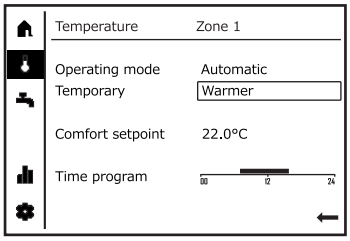
When the operating mode is set to **Comfort**, the setpoint for the room temperature in **Comfort** mode can be changed.



The **Reduced** setpoint for room temperature.



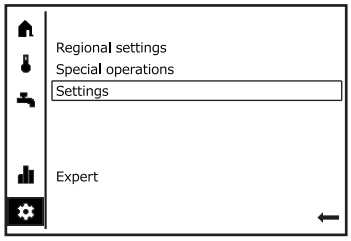
Time programs are enabled in **Automatic** mode only.



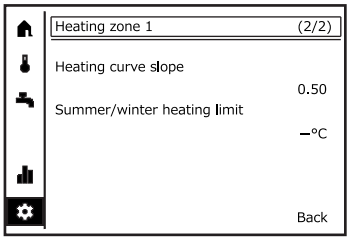
Temporary comfort mode selected for the heating circuit.

5.5 Heating curve

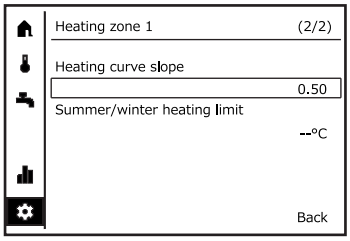
You can adjust the slope of the heating curve in the settings menu. The change applies only to the heating circuit assigned to the relevant user interface. Use the parameter list to change other settings for the particular heating circuit (and the settings of other heating circuits connected to the system).



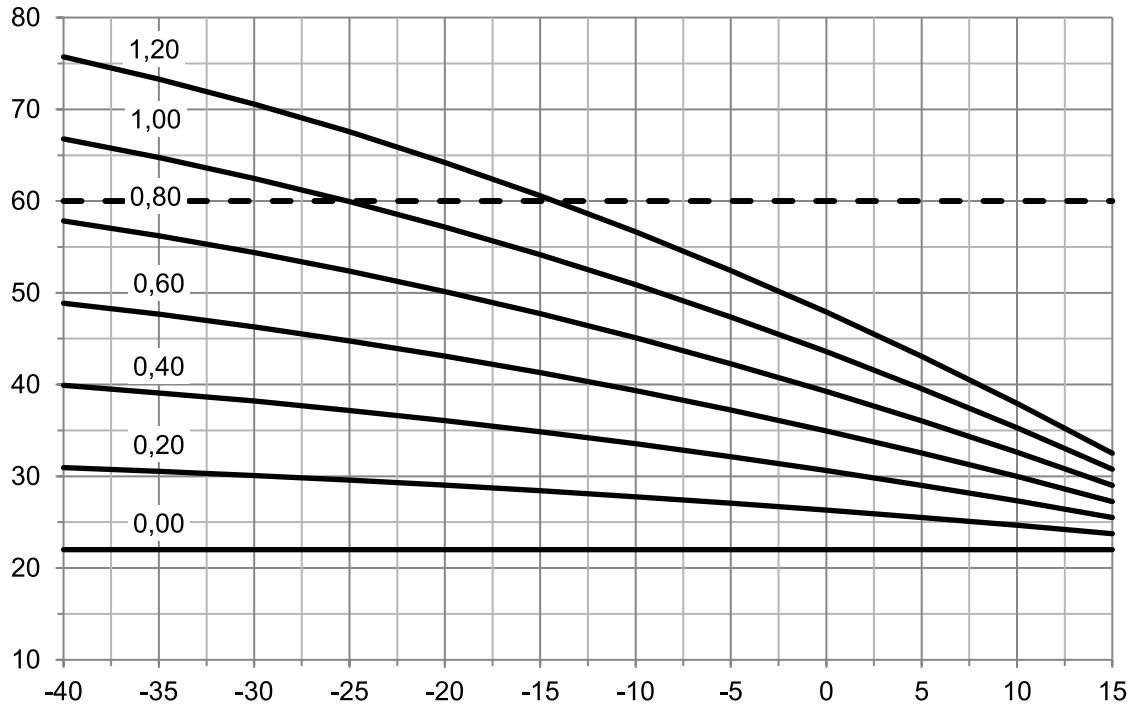
1. Select **Settings**.



2. Move to the correct menu page.



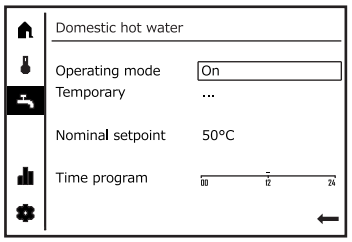
3. Enter the desired heating curve slope.



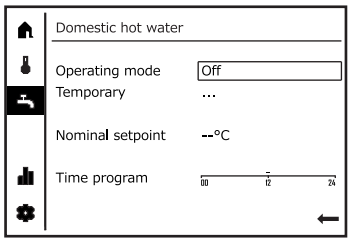
X-axis: outdoor temperature, °C. Y-axis: heating water temperature, °C.
Heating curves when the room temperature setpoint is 22 °C, the heating curve displacement is 0 °C, and the upper and lower limits do not restrict the heating water temperature.

5.6 Domestic hot water menu

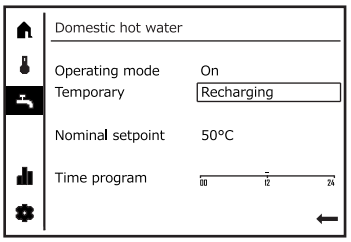
Key domestic hot water settings can be changed in the **Domestic hot water menu**. Other DHW settings can be changed in the domestic hot water and DHW storage tank settings in the parameter list.



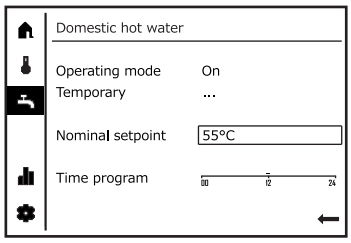
Domestic hot water heating on.



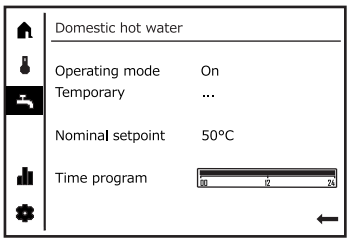
Domestic hot water heating off.



DHW is being heated to its setpoint before the temperature has fallen to the switch-on threshold. The function returns to normal mode once DHW temperature has reached its setpoint.



Changing the DHW temperature setpoint.



DHW time program (time program 4). Activate the time program from line 1620.

5.7 Changing the user level

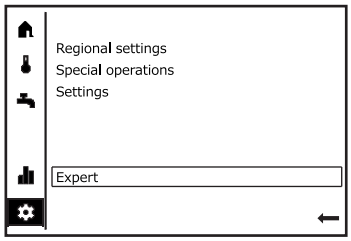
The heat pump automation has four distinct user levels. The user level influences the menu structure and the setpoints displayed in the menus. The user levels are **end user**, **commissioning**, **engineer**, and **OEM**.

The end user view is the default interface view. The **end user** and **commissioning** levels are sufficient for performing most actions.

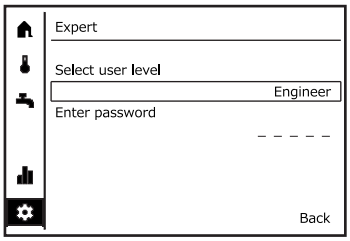
Change the user level from the settings menu (gear icon).

The **commissioning** level does not require a password, but the **engineer** and **OEM** levels are password-protected. The current user level is indicated by a number in the status bar.

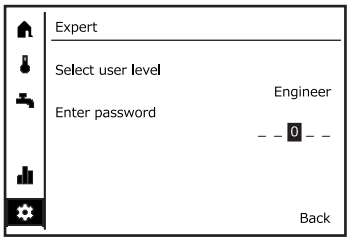
- No number: end user (no password)
- 1: commissioning (no password)
- 2: expert (password 00017)
- 3: OEM level (password 24358)



1. Enter the settings menu (gear symbol), and select **Expert**.

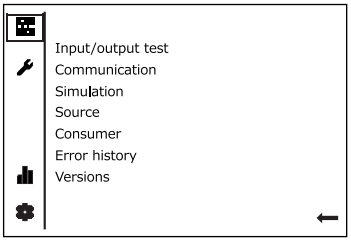


2. Select the user level.

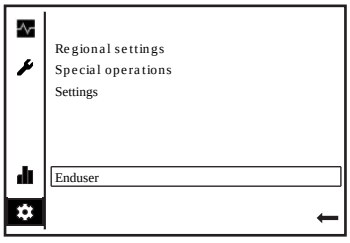


3. Enter the password (if necessary).

4. The interface will inform you that you have logged in.



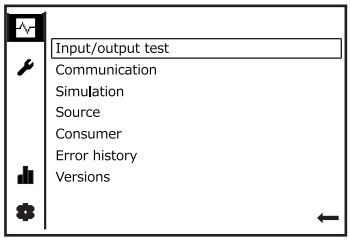
5. The menus applicable to the selected user level are now shown.



Returning to end-user level.

5.8 Diagnostics menu

The diagnostics menu can be accessed only at the commissioning user level or above. The sub-menus displayed depend on the user level.



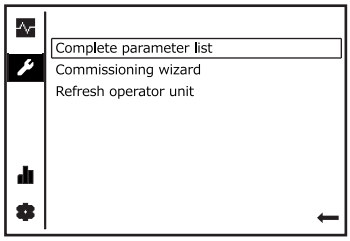
Diagnostics menu.

5.9 Service menu

The service menu can be accessed only at the **commissioning** user level or above. The service menu provides access to the **parameter list**. The parameter list allows for a much more in-depth configuration of the automation settings than the basic views.

In addition, the commissioning wizard can be launched again, and the user interface can be updated via the service menu. It is advisable to update the user interface after any changes in connections, such as after adding heating circuits.

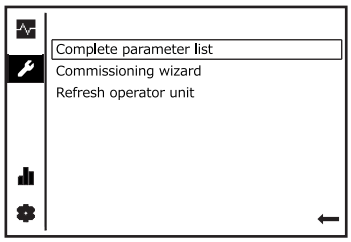
- If there is no need to update the user interface, the service menu does not include an option to start an update.



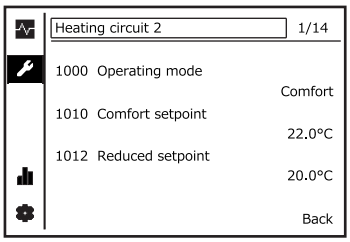
Service menu.

5.10 Parameter list

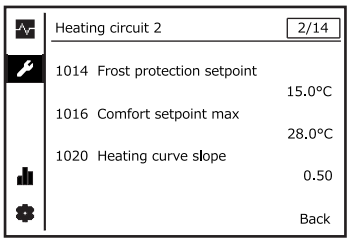
The parameter list can be accessed from the **service** menu. The parameter list can be accessed only at the **commissioning** user level or above. The lines displayed in the parameter list depend on the user level. During first start-up and after changing the user level, it will take some time for the user interface to load the parameter list.



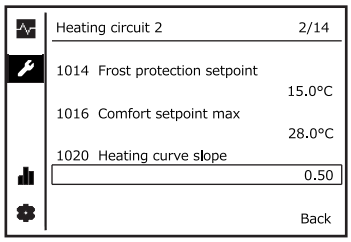
1. Open the parameter list.



2. Select the desired menu from the status bar.

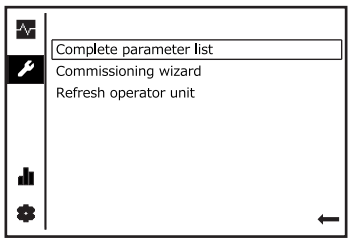


3. Scroll through the pages in the menu and select the relevant one.

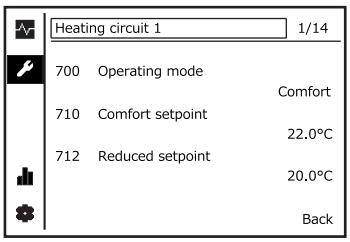


4. Move the cursor to the desired setpoint and edit it.

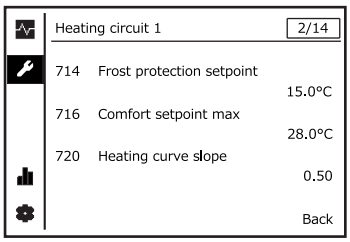
Advanced settings for heating circuits



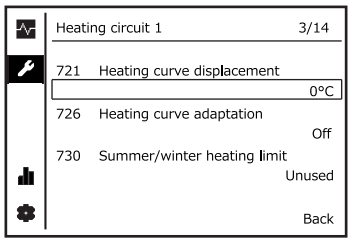
1. Open the parameter list.



2. Select the desired menu from the status bar.



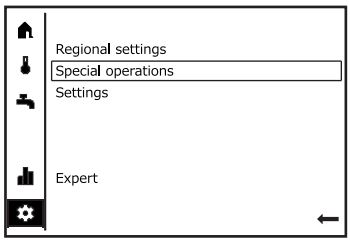
3. Scroll through the pages in the menu and select the relevant one.



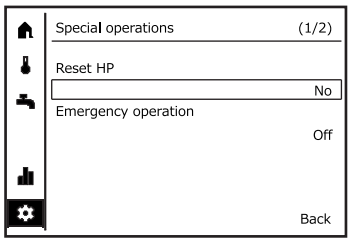
4. Move the cursor to the desired setpoint and edit it.

5.11 Resetting the heat pump

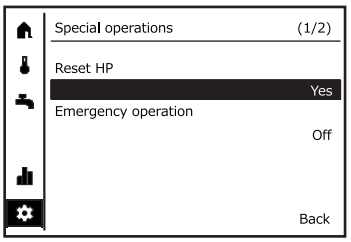
The heat pump can be reset (recovered) from a fault condition from the settings menu. Before the reset, you should investigate the causes of the fault and address the issue.



1. From the settings menu, select **Special operations**.

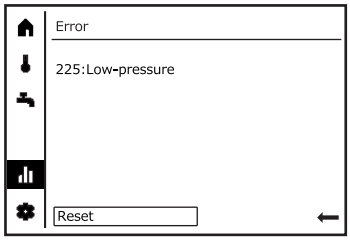


2. Select **Reset HP**.



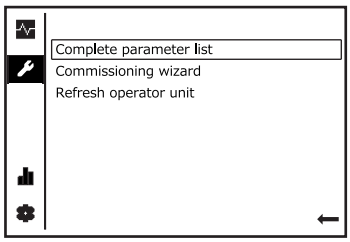
3. Change the setting to **Yes**.

In case of a fault

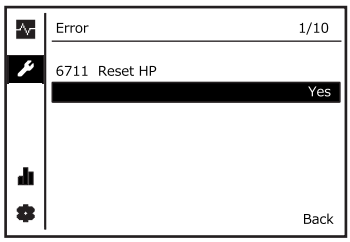


In the diagnostics menu, select **Reset.** Select **Confirm**.

Through the parameter list



Open the parameter list.



Enter the fault menu and select **Reset HP** on line 6711. Switch the line value to **Yes**.

5.12 Relay test

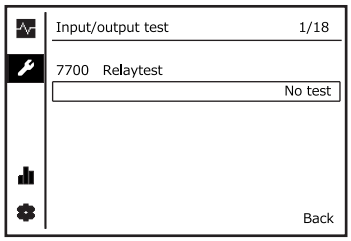
Use the relay test to test the operation of actuators.

1. Perform the relay test by selecting the desired QX output (and, if required, the UX signal output) and observing the operation of the actuator.
2. Finish the test by changing the relay test function setting (line 7700) to **no test**.
3. After the relay test, reset the heat pump (line 6711).

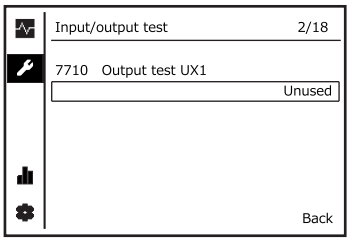
Connector	Output	Function	Marking	Additional information
R	QX8	Change-over valve Q3	Q3	Before the relay test, the change-over valve is in position B (B for building, heating circuit). ● Switching the power on turns the valve to position A (A for aqua, DHW tank). ● When you switch the relay test off, the valve returns to position B.
S	QX9	Heating circuit 1 pump Q2	Q2	When the test is activated, the pump should start to run. ● For speed controlled pumps, see further instructions in the following chapter.
T	QX10	Heating circuit 1 valve open Y1	Y1	The branch leading from the storage tank to the heating circuit opens (the circuit starts to take heat from the storage tank). ● After the test, the valve remains in the position it was in at the end of the test.
T	QX11	Heating circuit 1 valve closed Y2	Y2	The branch leading from the storage tank to the heating circuit closes (heating circuit's internal circulation). ● After the test, the valve remains in the position it was in at the end of the test.
U	QX12	Brine circuit (evaporator circuit) pump Q8	Q8	When the test is activated, the pump should start to run. ● See further instructions for speed controlled pumps at the end of this section.
V	QX13	Condenser circuit pump Q9	Q9	When the test is activated, the pump should start to run. ● See further instructions for speed controlled pumps at the end of this section.

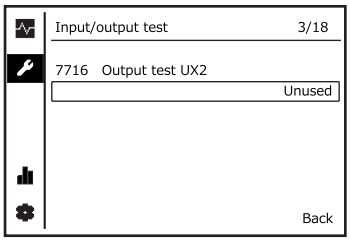
Relay test for speed controlled pumps

Perform the test for speed controlled pumps by activating the pump's QX output and signal output test. Finish the test by changing the relay test function setting (line 7700) to **no test** and setting the test value for UX output to **---**.



Select the QX output that is connected to the pump.





Activate an UX output test for the pump. Select the UX output that is connected to the pump (see section *Automation factory settings* and electrical diagrams). Select a test value, for example 100, 50, and 0 per cent.

Relay test for a speed controlled condenser circuit pump

Line	Connector	Output	Function	Marking	Additional information
7700	V	QX13	Condenser circuit pump Q9	Q9	When the test is switched on and the desired speed is selected on line 7710, the pump should start to run. ● Check that speed control works correctly by repeating the test with different speed settings on line 7710 (for example, to 100%, 50%, and 0%).
7710	y	UX1	Output test UX1	UX1	

Relay test for a speed controlled brine circuit pump

Line	Connector	Output	Function	Marking	Additional information
7700	U	QX12	Brine circuit pump Q8	Q8	When the test is switched on and the desired speed is selected on line 7716, the pump should start to run. ● Check that speed control works correctly by repeating the test with different speed settings on line 7716 (for example, to 100%, 50%, and 0%).
7716	y	UX2	Output test UX2	UX2	

6 Cascade connection

6.1 Cascade connection

In a cascade connection, two or more heat pumps are connected to a system that is controlled by a single heat pump controller. One of the RVS61 heat pump controllers connected to the system operates as the master controller (which controls the entire system), and the other RVS61 controllers operate as slaves (which are controlled by the master controller). Heat pump controllers are connected to each other through an LBP bus. The system may contain up to 16 controllers (heat pumps).

In RE models consisting of two compressor units (RE 56–96), the upper unit's controller (A1.0) is the master controller and the lower unit's controller (A2.0) is the slave controller. The controllers are identical, but the slave controller's address has been changed to a slave address (value on line 6600 set to 2).

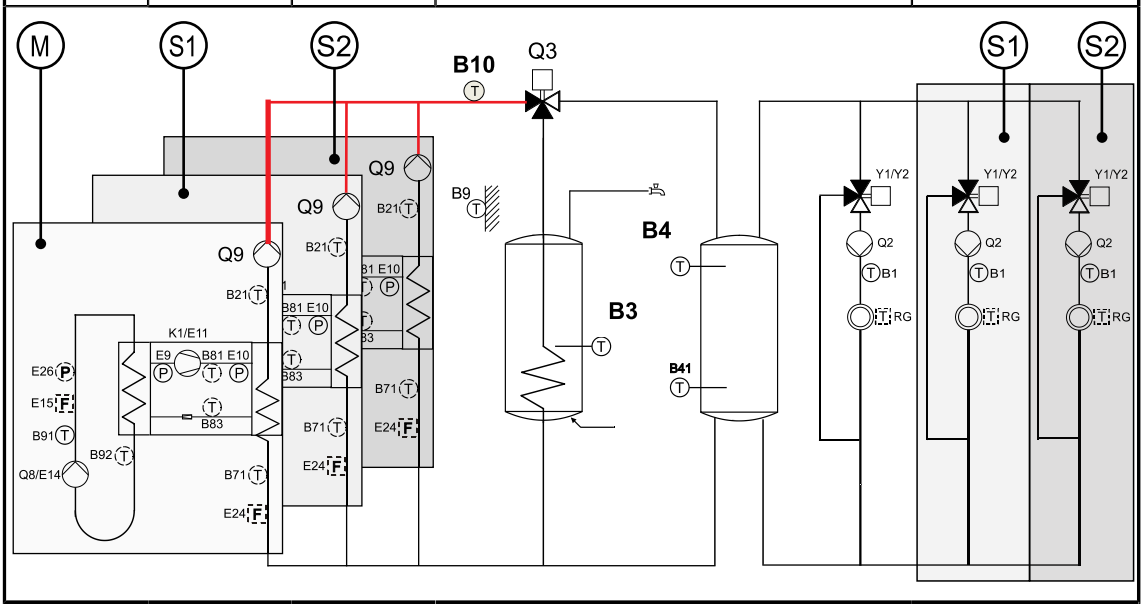
The controllers are connected via an LPB bus (DB+/MB–). The heat pump comes with the storage tank sensors (B3 and B4) and the shared flow sensor (B10) already connected to the master controller.

- Connect the outdoor temperature sensor (B9) also to the master controller.

If the system includes several heat pumps (several A1.0 controllers), connect sensors B3, B4, B10 and B9 to the A1.0 controller that controls the entire system, and disconnect the sensors from the other A1.0 controllers.

- Disconnect the sensors by disconnecting the sensor's connector from the relevant controller.
- If necessary, the disconnected sensors can be used for other functions.

Heat pumps in the cascade				
M	**S1**	**S2**		
Master S0/G1 Line 6600 = 1	**Slave** S0/G2 Line 6600 = 2	**Slave** S0/G3 Line 6600 = 3	Master controller's sensors, actuators, and functions	S1 = Slave S0/G2 S2 = Slave S0/G3

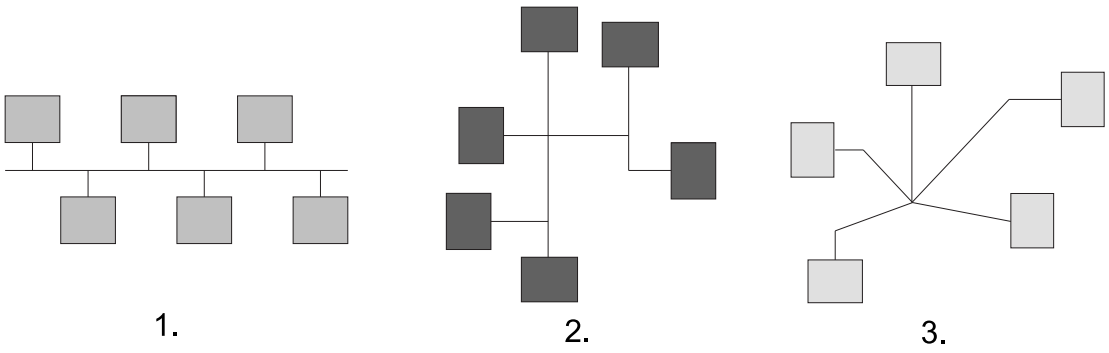


6.2 LPB bus configuration

The system's controllers are connected to an LPB bus (DB+/MB–). Any remote access devices will also be connected to the same bus.

- Use twisted pair cables with a minimum wire cross-sectional area of 0.75 mm^2. Over long distances, use 1.5 mm^2 wires.
- Do not arrange the bus as a closed loop.

The permitted topologies are presented below.



Cascade bus topology ver. 1

The minimum voltage between the bus's DB+ and MB– connectors is 9.5 V DC.

- If the voltage is smaller, the electrical resistance in the bus cables is too great.

- Check the cables and if necessary, use cables with a greater wire cross-sectional area.
- If there is no voltage present, the bus has short-circuited.
- If the voltage is negative, the polarity is incorrect.

Bus addresses

Each device in the bus has its own address. Set the device address from the user interface itself (line 6600).

- The device address of the master controller is always 1.
- Slave controllers can have any free address between 2 and 16.
- Do not use addresses 8 and 5, since these are reserved for the OCI700 connection cable and a remote connection device.

Enable the cascade by using the user interface to change each slave controller's device address to any free address (such as 3) and connecting the slave controller to the bus. Once the slave addresses have been changed and the bus cable connected, the cascade function will be enabled, and the cascade menu will be displayed in the master controller.

After the cascade has been enabled, make the necessary changes in the master and slave controllers' settings. The settings are presented in the table below. An example of a cascade consisting of four RE96 heat pumps is presented in the figure at the end of this section.

Menu	Line	Line name	Master (S0/G1)	Slave 1 (S0/G2)	Slave 2 (S0/G2)
LPB	6600	Device address (G)	1	2	3
LPB	6601	Segment address (S)	0	0	0
LPB	6640	Clock use	Master	Slave with remote setting	Slave with remote setting
Configuration	5710	Heating circuit 1	On	Off	Off
Configuration	5800	Heat source	Brine	Externally brine (If a common brine circuit pump is in use)	Externally brine (If a common brine circuit pump is in use)

Slave controllers' unused BX inputs and outputs can be disabled, but this is not necessary.

If there is a remote access device in the bus, it should be set as the master for clock use, and the master controller's line 6640 setting should be set to **Slave with remote setting**. This way, the entire system's time will be automatically kept up to date through the remote access device and, if necessary, the time can be changed from any controller.

Bus segments

If necessary, the bus can be divided into several segments. The device addresses within these segments are independent from the rest of the system.

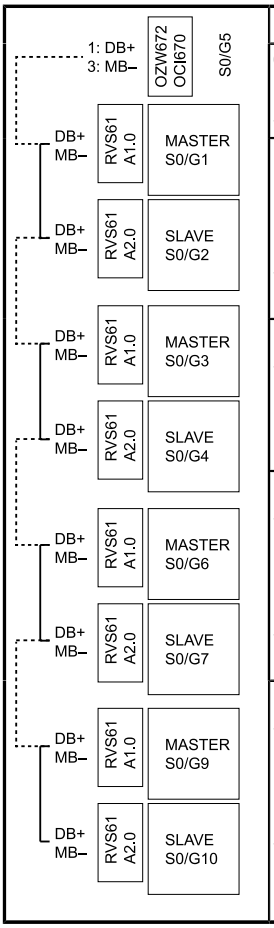
Select the segment ID from line 6601.

- The address for the segment's master is always 1.
- The address for the remote access device's segment is always 0.

The segment ID and the device address constitute the controller's entire address. The address can be, for example, S0/G1 or S0/G2, which means segment 0's (S0) master (G1) and its first slave (G2).

The ACS program can only be connected to device address 1 (the master controller). Any slave controllers connected to the bus will be displayed in the program through the master controller. As usual, the program can be used to copy the settings across all controllers connected to the bus through the master controller.

If you want to specifically connect to a slave controller using the ACS program, the controller needs to be disconnected from the bus and its device address changed to "1" via the controller's user interface. If the value on line 5800 is set to **externally brine**, the slave controller's PI diagram will show any and all components that can be present in the refrigerant circuit. Otherwise, the diagram will correspond to the actual controller settings. If you want to check the slave controller's wiring diagram for the refrigerant circuit, temporarily set the value on line 5800 to **Brine circuit**.



Devices in the cascade
OZW672 or OCI670 REMOTE CONNECTION DEVICE S0/G5
RE 96 MASTER S0/G1 Line 6600: 1, Line 6601: 0 B10, B4, B3, B9 SLAVE S0/G2 Line 6600: 2, Line 6601: 0
RE 96 SLAVE S0/G3 Line 6600: 3, Line 6601: 0 ● Disconnect sensors B10, B4, and B3 from the controller.
RE 96 SLAVE S0/G6 Line 6600: 6, Line 6601: 0 ● Disconnect sensors B10, B4, and B3 from the controller. SLAVE S0/G7 Line 6600: 7, Line 6601: 0
RE 96 SLAVE S0/G9 Line 6600: 9, Line 6601: 0 ● Disconnect sensors B10, B4, and B3 from the controller. SLAVE S0/G10 Line 6600: 10, Line 6601: 0

6.3 Shared brine circuit pump

A shared brine circuit pump can be defined for the cascade. The shared pump will always start when the first compressor in the running order starts, even if it is not in the compressor circuit that is controlled by the particular controller. By default, the cascade's shared brine circuit pump is connected to the master controller in accordance with the electrical drawings, and the slave controllers will request the master controller to activate the output via the bus.

Connect the pump using the regular brine pump output (Q8) in any of the controllers connected to the cascade.

- Select the controller to which the shared pump is connected on line 5803.
- By default, the setting for the line is **1**, which is the master controller's device address.

Enable the shared brine circuit pump by setting the option on line 5800 to **externally brine**.

- Enable this option in all controllers that use the shared brine circuit pump, except for the controller to which the shared pump is connected.
- As a rule, set the value on line 5800 to **externally brine** in all slave controllers, and leave the value unchanged in the master controller.

The controllers that use the shared pump may also have the their own brine circuit pump output Q8 configured. As usual, the output is activated when the compressor circuit controlled by the relevant controller starts, even if the controller sends out a request for the shared brine circuit pump to turn on via the bus. This means that if required, the shared brine circuit pump can be used as an additional pump alongside the compressor circuit's own brine circuit pump.

6.4 Separate heat pump for DHW heating

The cascade can be laid out and programmed so that one compressor unit (one condenser) is reserved for heating domestic hot water. In this configuration, the selected heat pump's automation system controls the change-over valve for the heat pump's flow, switching between domestic hot water heating and space heating as necessary.

1. To activate this function, open the configuration menu in the selected heat pump's settings.
2. On line 5736, activate the option **DHW dedicated**.
3. Install sensor B10 to the flow line branch that leads to space heating.

In space heating, the selected heat pump will operate just like the other heat pumps in the system (controlled by sensor B10).

Using all heat pumps for domestic hot water heating

If you wish to use all heat pumps for heating up domestic hot water, connect the change-over valve to the master controller, and position all of the heat pumps (condensers) upstream from the valve. This way, the system functions like an ordinary single-pump system.

7 Technical data

7.1 Heat pump technical data

The performance between different units may vary. This variation is due to a wide number of factors, such as the properties of the fluids used in the circuits, fouling of the heat transfer surfaces in the condenser and evaporator circuit, flow rates, individual differences between compressors (standard EN 12900) as well as refrigerant circuit charge and adjustments made to the refrigerant circuit during installation.

NOTICE Check the fuse ratings from wiring diagrams. If necessary, take additional equipment (such as heating circuit pumps) into consideration.

RE 28–48, dimensions and weight

MODEL/RATED CAPACITY (kW) 3~, 400 V, 50 Hz, PE	28	33	38	42	48
Total width, mm	970	970	970	970	970
Width without control cabinet, mm	750	750	750	750	750
Depth (incl. heat exchanger connections), mm	750	750	750	750	750
Height, mm	930	930	930	930	930
Weight, kg	303	303	303	303	303

RE 56–96, dimensions and weight

MODEL/RATED CAPACITY (kW) 3~, 400 V, 50 Hz, PE	56	66	76	84	96
Total width, mm	970	970	970	970	970
Width without control cabinet, mm	750	750	750	750	750
Depth (incl. heat exchanger connections), mm	750	750	750	750	750
Height, mm	1830	1830	1830	1830	1830
Weight, kg	572	572	572	572	572

RE 28–48, water and brine connections

MODEL/RATED CAPACITY (kW) 3~, 400 V, 50 Hz, PE	28	33	38	42	48
Condenser connections ISO 228 outer thread (G)	G 1 1/4	G 1 1/4	G 1 1/4	G 1 1/4	G 1 1/4
Evaporator connections ISO 228 outer thread (G)	G 2	G 2	G 2	G 2	G 2
Maximum permissible operating pressure, bar	10	10	10	10	10

RE 56–96, water and brine connections

MODEL/RATED CAPACITY (kW) 3~, 400 V, 50 Hz, PE	56	66	78	84	96
Condenser connections ISO 228 outer thread (G)	G 1 1/4	G 1 1/4	G 1 1/4	G 1 1/4	G 1 1/4
Evaporator connections ISO 228 outer thread (G)	G 2	G 2	G 2	G 2	G 2
Maximum permissible operating pressure, bar	10	10	10	10	10

RE 28–48, fuse

MODEL/RATED CAPACITY (kW) 3~, 400 V, 50 Hz, PE	28	33	38	42	48
Fuse, 3x	25 A	32 A	40 A	40 A	40 A

RE 56–96, fuse

MODEL/RATED CAPACITY (kW) 3~, 400 V, 50 Hz, PE	56	66	76	84	96
Fuse, 3x	50A	63A	80 A	80 A	80 A

RE 28–48, noise level, B0/-3, W30/35

MODEL/RATED CAPACITY (kW) 3~, 400 V, 50 Hz, PE	28	33	38	42	48
Sound pressure level @ 1 m dB(A)	40.8	40.5	41.2	40.9	41.5
Sound power level EN12102 dB(A)	55.6	55.3	56	55.7	56.3

RE 28–48, noise level, B0/-3, W47/55

MODEL/RATED CAPACITY (kW) 3~, 400 V, 50 Hz, PE	28	33	38	42	48
Sound pressure level @ 1 m dB(A)	43.6	43.3	44.1	43.7	44.5
Sound power level EN12102 dB(A)	58.4	58.1	58.9	58.5	59.3

RE 56–96, noise level, B0/-3, W30/35

MODEL/RATED CAPACITY (kW) 3~, 400 V, 50 Hz, PE	56	66	76	84	96
Sound pressure level @ 1 m dB(A)	43.5	43.2	43.9	43.6	44.1
Sound power level EN12102 dB(A)	58.3	58	58.7	58.4	58.9

RE 56–96, noise level, B0/-3, W47/55

MODEL/RATED CAPACITY (kW) 3~, 400 V, 50 Hz, PE	56	66	76	84	96
Sound pressure level @ 1 m dB(A)	46.5	46.2	47.1	46.7	47.5
Sound power level EN12102 dB(A)	61.3	61	61.9	61.5	62.2

7.2 Compressor units

RE

MODEL / RATED CAPACITY (kW) 3~ 400 V, 50 Hz, PE	28	33	38	42	48	56	66	76	84	96
Number of compressors	1	1	1	1	1	2	2	2	2	2
Compressor type	28	33	38	42	48	28+28	33+33	38+38	42+42	48+48
Number of compressors	1	1	1	1	1	2	2	2	2	2
Number of evaporators	1	1	1	1	1	2	2	2	2	2
Number of condensers	1	1	1	1	1	2	2	2	2	2

MODEL / RATED CAPACITY (kW) 3~ 400 V, 50 Hz, PE	28	33	38	42	48
Heat pump version	05	05	05	05	05
Refrigerant	R-410A	R-410A	R-410A	R-410A	R-410A
Number of refrigerant circuits	1	1	1	1	1
Number of compressors	1	1	1	1	1
Number of evaporators	1	1	1	1	1
Number of condensers	1	1	1	1	1
Refrigerant circuit (EU517/2014)					
Contains fluoridized greenhouse gases	yes	yes	yes	yes	yes
Hermetically sealed device	yes	yes	yes	yes	yes
Refrigerant	R-410A	R-410A	R-410A	R-410A	R-410A
Refrigerant's GWP value (global warming potential)	2,088	2,088	2,088	2,088	2,088
Refrigerant charge, g*	5,250	5,200	5,300	5,100	5,100
Refrigerant charge, kg*	5.25	5.2	5.3	5.1	5.1
Refrigerant charge, CO_2-eq kg*	10,962	10,858	11,066	10,649	10,649
Refrigerant charge, CO_2-eq t*	10.962	10.858	11.066	10.649	10.649
Low pressure switch					
Cut-off pressure, low, bar (g)	3.4 ± 0.5	3.4 ± 0.5	3.4 ± 0.5	3.4 ± 0.5	3.4 ± 0.5
Recovery pressure, bar (g)	5.9 ± 0.5	5.9 ± 0.5	5.9 ± 0.5	5.9 ± 0.5	5.9 ± 0.5
High pressure switch					
Cut-off pressure, high, bar (g)	45 ± 1.2	45 ± 1.2	45 ± 1.2	45 ± 1.2	45 ± 1.2
Recovery pressure, bar (g)	35 ± 2.0	35 ± 2.0	35 ± 2.0	35 ± 2.0	35 ± 2.0
Compressor					
Compressor type	scroll	scroll	scroll	scroll	scroll

*Always check the refrigerant charge from the name plate primarily. Pay attention to any changes made to the refrigerant charge after installation.

7.3 Performance data

To view performance data in other conditions, please use the Oilon Selection Tool (www.oilon.com).

Capacity and coefficient of performance B0/–3 (brine in: 0, brine out: –3)

Heating capacity, kW	Water in, °C	Water out, °C	28	33	38	42	48	56	66	76	84	96
B0/−3, W30/35	30	35	27.4	32.0	36.1	41.1	47.2	54.7	63.9	72.2	82.2	94.5
B0/−3, W40/45	40	45	27.4	32.6	36.7	41.2	47.8	54.9	65.3	73.5	82.5	95.6
B0/−3, W47/55	47	55	27.6	33.2	37.3	41.7	48.3	55.2	66.4	74.6	83.3	96.6
B0/−3, W55/65	55	65	28.1	33.9	38.2	42.6	48.9	56.2	67.9	76.4	85.1	97.8

Coefficient of performance (COP), -	Water in, °C	Water out, °C	28	33	38	42	48	56	66	76	84	96
B0/−3, W30/35	30	35	4.9	4.9	4.7	4.8	4.8	4.9	4.9	4.7	4.8	4.8
B0/−3, W40/45	40	45	3.9	3.9	3.8	3.9	3.9	3.9	3.9	3.8	3.9	3.9
B0/−3, W47/55	47	55	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.1
B0/−3, W55/65	55	65	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5

Cooling capacity, kW	Water in, °C	Water out, °C	28	33	38	42	48	56	66	76	84	96
B0/−3, W30/35	30	35	22.1	25.7	28.8	33.0	37.8	44.2	51.4	57.6	65.9	75.6
B0/−3, W40/45	40	45	20.7	24.6	27.6	31.2	36.0	41.5	49.2	55.1	62.3	72.1
B0/−3, W47/55	47	55	19.1	23.0	25.8	29.1	33.7	38.3	46.0	51.7	58.1	67.5
B0/−3, W55/65	55	65	17.2	20.9	23.6	26.6	30.7	34.4	41.8	47.1	53.1	61.3

Electrical power, kW	Water in, °C	Water out, °C	28	33	38	42	48	56	66	76	84	96
B0/−3, W30/35	30	35	5.5	6.6	7.7	8.6	9.9	11.1	13.2	15.3	17.1	19.8
B0/−3, W40/45	40	45	7.0	8.5	9.6	10.6	12.4	14.1	16.9	19.3	21.3	24.8
B0/−3, W47/55	47	55	8.9	10.8	12.1	13.3	15.3	17.8	21.5	24.2	26.5	30.7
B0/−3, W55/65	55	65	11.5	13.7	15.4	16.9	19.2	22.9	27.5	30.9	33.7	38.4

Electrical current, A	Water in, °C	Water out, °C	28	33	38	42	48	56	66	76	84	96
B0/−3, W30/35	30	35	12.0	14.7	20.8	21.3	22.9	23.9	29.3	41.7	42.7	45.8
B0/−3, W40/45	40	45	13.7	16.9	22.4	23.2	25.8	27.4	33.7	44.8	46.5	51.6
B0/−3, W47/55	47	55	16.0	19.6	24.5	25.8	29.3	32.1	39.2	49.0	51.5	58.6
B0/−3, W55/65	55	65	19.4	23.4	28.5	30.2	34.1	38.7	46.8	56.9	60.4	68.2

Flow rates, B0/–3 (brine in: 0, brine out: –3)

Condenser flow rate, m^3/h	Water in/ out, °C	28	33	38	42	48	56	66	76	84	96	c_p, kJ/ (kg K)	ρ, kg/ m^3
B0/−3, W30/35	30/35	4.74	5.54	6.25	7.12	8.18	9.48	11.07	12.49	14.24	16.36	4.18	994.9
B0/−3, W40/45	40/45	4.77	5.67	6.38	7.17	8.31	9.54	11.34	12.76	14.34	16.62	4.18	991.3
B0/−3, W47/55	47/55	3.01	3.62	4.07	4.54	5.27	6.02	7.24	8.13	9.08	10.53	4.18	987.6
B0/−3, W55/65	55/65	2.46	2.97	3.34	3.72	4.28	4.91	5.94	6.69	7.45	8.56	4.18	983.2

Evaporator flow rate, m^3/h	Water in/ out, °C	28	33	38	42	48	56	66	76	84	96	c_p, kJ/ (kg K)	ρ, kg/ m^3
B0/−3, W30/35	30/35	6.51	7.57	8.48	9.71	11.13	13.01	15.14	16.95	19.41	22.27	4.21	968.1
B0/−3, W40/45	40/45	6.11	7.24	8.12	9.17	10.61	12.22	14.48	16.23	18.34	21.23	4.21	968.1
B0/−3, W47/55	47/55	5.63	6.77	7.61	8.56	9.94	11.27	13.55	15.22	17.11	19.87	4.21	968.1
B0/−3, W55/65	55/65	5.06	6.15	6.93	7.82	9.03	10.12	12.30	13.87	15.64	18.05	4.21	968.1

Condenser circuit liquid: water
Evaporator circuit fluid: mixture of water and ethanol, 28 mass-% ethanol (34 volume-%)

Capacity and coefficient of performance B0/–4 (brine in: 0, brine out: –4)

Heating capacity, kW	Water in, °C	Water out, °C	28	33	38	42	48	56	66	76	84	96
B0/−4, W30/35	30	35	26.7	31.2	35.2	40.1	46.1	53.4	62.4	70.4	80.1	92.2
B0/−4, W40/45	40	45	26.8	31.9	35.8	40.2	46.7	53.5	63.7	71.7	80.5	93.5
B0/−4, W47/55	47	55	27.0	32.5	36.5	40.7	47.3	53.9	65.0	72.9	81.3	94.5
B0/−4, W55/65	55	65	27.5	33.2	37.4	41.6	47.9	55.0	66.4	74.8	83.3	95.8

Coefficient of performance (COP), -	Water in, °C	Water out, °C	28	33	38	42	48	56	66	76	84	96
B0/−4, W30/35	30	35	4.8	4.7	4.6	4.7	4.6	4.8	4.7	4.6	4.7	4.6
B0/−4, W40/45	40	45	3.8	3.8	3.7	3.8	3.8	3.8	3.8	3.7	3.8	3.8
B0/−4, W47/55	47	55	3.0	3.0	3.0	3.1	3.1	3.0	3.0	3.0	3.1	3.1
B0/−4, W55/65	55	65	2.4	2.4	2.4	2.5	2.5	2.4	2.4	2.4	2.5	2.5

Cooling capacity, kW	Water in, °C	Water out, °C	28	33	38	42	48	56	66	76	84	96
B0/−4, W30/35	30	35	21.4	24.9	27.9	31.9	36.7	42.8	49.8	55.8	63.8	73.4
B0/−4, W40/45	40	45	20.1	23.8	26.7	30.1	35.0	40.1	47.6	53.4	60.3	69.9
B0/−4, W47/55	47	55	18.5	22.3	25.0	28.1	32.7	37.0	44.5	50.0	56.2	65.4
B0/−4, W55/65	55	65	16.6	20.2	22.8	25.6	29.7	33.2	40.3	45.5	51.2	59.3

Electrical power, kW	Water in, °C	Water out, °C	28	33	38	42	48	56	66	76	84	96
B0/−4, W30/35	30	35	5.6	6.6	7.7	8.6	9.9	11.1	13.2	15.4	17.1	19.8
B0/−4, W40/45	40	45	7.1	8.5	9.6	10.6	12.4	14.1	17.0	19.3	21.2	24.8
B0/−4, W47/55	47	55	8.9	10.8	12.1	13.2	15.3	17.8	21.5	24.1	26.5	30.7
B0/−4, W55/65	55	65	11.5	13.7	15.4	16.9	19.2	22.9	27.4	30.8	33.7	38.4

Electrical current, A	Water in, °C	Water out, °C	28	33	38	42	48	56	66	76	84	96
B0/−4, W30/35	30	35	12.0	14.7	20.9	21.3	22.9	24.0	29.4	41.7	42.7	45.9
B0/−4, W40/45	40	45	13.7	16.9	22.4	23.2	25.8	27.4	33.8	44.8	46.5	51.6
B0/−4, W47/55	47	55	16.1	19.6	24.5	25.7	29.3	32.1	39.2	49.0	51.5	58.6
B0/−4, W55/65	55	65	19.4	23.4	28.4	30.2	34.1	38.7	46.7	56.8	60.4	68.2

Flow rates, B0/–4 (brine in: 0, brine out: –4)

Condenser flow rate, m^3/h	Water in/ out, °C	28	33	38	42	48	56	66	76	84	96	c_p, kJ/ (kg K)	ρ, kg/ m^3
B0/−4, W30/35	30/35	4.62	5.40	6.09	6.94	7.98	9.24	10.80	12.19	13.88	15.96	4.18	994.9
B0/−4, W40/45	40/45	4.65	5.54	6.23	6.99	8.12	9.31	11.08	12.46	13.98	16.24	4.18	991.3
B0/−4, W47/55	47/55	2.94	3.54	3.97	4.43	5.15	5.88	7.08	7.95	8.86	10.30	4.18	987.6
B0/−4, W55/65	55/65	2.40	2.90	3.27	3.64	4.19	4.81	5.81	6.54	7.28	8.38	4.18	983.2

Evaporator flow rate, m^3/h	Water in/ out, °C	28	33	38	42	48	56	66	76	84	96	c_p, kJ/ (kg K)	ρ, kg/ m^3
B0/−4, W30/35	30/35	4.72	5.50	6.16	7.05	8.10	9.45	11.0	12.32	14.10	16.20	4.21	968.3
B0/−4, W40/45	40/45	4.43	5.26	5.89	6.65	7.72	8.86	10.51	11.79	13.31	15.44	4.21	968.3
B0/−4, W47/55	47/55	4.08	4.91	5.52	6.20	7.22	8.16	9.83	11.04	12.40	14.44	4.21	968.3
B0/−4, W55/65	55/65	3.66	4.45	5.02	5.66	6.55	7.32	8.90	10.05	11.31	13.10	4.21	968.3

Condenser circuit liquid: water
Evaporator circuit fluid: mixture of water and ethanol, 28 mass-% ethanol (34 volume-%)

Capacity and coefficient of performance B5/2 (brine in: +5, brine out: +2)

Heating capacity, kW	Water in, °C	Water out, °C	28	33	38	42	48	56	66	76	84	96
B5/2, W30/35	30	35	30.9	36.1	40.7	46.6	53.3	61.8	72.2	81.4	93.3	106.5
B5/2, W40/45	40	45	30.9	36.6	41.3	46.6	53.5	61.9	73.3	82.7	93.2	107.1
B5/2, W47/55	47	55	31.0	37.1	41.8	46.8	53.8	61.9	74.2	83.6	93.7	107.6
B5/2, W55/65	55	65	31.2	37.7	42.5	47.5	54.2	62.5	75.4	85.0	95.1	108.3

Coefficient of performance (COP), -	Water in, °C	Water out, °C	28	33	38	42	48	56	66	76	84	96
B5/2, W30/35	30	35	5.7	5.6	5.4	5.4	5.4	5.7	5.6	5.4	5.4	5.4
B5/2, W40/45	40	45	4.4	4.4	4.3	4.4	4.3	4.4	4.4	4.3	4.4	4.3
B5/2, W47/55	47	55	3.5	3.5	3.4	3.5	3.5	3.5	3.5	3.4	3.5	3.5
B5/2, W55/65	55	65	2.7	2.7	2.7	2.8	2.8	2.7	2.7	2.7	2.8	2.8

Cooling capacity, kW	Water in, °C	Water out, °C	28	33	38	42	48	56	66	76	84	96
B5/2, W30/35	30	35	25.8	30.0	33.5	38.4	43.8	51.5	59.9	67.0	76.9	87.7
B5/2, W40/45	40	45	24.3	28.7	32.1	36.5	41.8	48.6	57.4	64.3	73.0	83.6
B5/2, W47/55	47	55	22.5	27.0	30.2	34.2	39.2	45.1	53.9	60.5	68.4	78.4
B5/2, W55/65	55	65	20.4	24.6	27.7	31.5	35.9	40.8	49.2	55.4	62.9	71.8

Electrical power, kW	Water in, °C	Water out, °C	28	33	38	42	48	56	66	76	84	96
B5/2, W30/35	30	35	5.4	6.5	7.6	8.6	9.9	10.9	13.0	15.2	17.2	19.8
B5/2, W40/45	40	45	7.0	8.4	9.7	10.7	12.4	14.0	16.7	19.4	21.3	24.8
B5/2, W47/55	47	55	8.9	10.7	12.2	13.3	15.3	17.8	21.4	24.4	26.6	30.7
B5/2, W55/65	55	65	11.4	13.8	15.6	16.9	19.3	22.8	27.5	31.2	33.8	38.5

Electrical current, A	Water in, °C	Water out, °C	28	33	38	42	48	56	66	76	84	96
B5/2, W30/35	30	35	11.8	14.5	20.7	21.3	22.7	23.7	29.0	41.4	42.6	45.4
B5/2, W40/45	40	45	13.6	16.7	22.4	23.3	25.7	27.2	33.4	44.9	46.6	51.5
B5/2, W47/55	47	55	16.0	19.6	24.6	25.8	29.3	31.9	39.1	49.3	51.6	58.6
B5/2, W55/65	55	65	19.3	23.5	28.6	30.2	34.2	38.6	46.9	57.3	60.4	68.4

Flow rates, B5/2 (brine in: +5, brine out: +2)

Condenser flow rate, m^3/h	Water in/ out, °C	28	33	38	42	48	56	66	76	84	96	c_p, kJ/ (kg K)	ρ, kg/ m^3
B5/2, W30/35	30/35	5.35	6.26	7.05	8.07	9.22	10.71	12.51	14.10	16.15	18.44	4.18	994.9
B5/2, W40/45	40/45	5.38	6.37	7.18	8.10	9.30	10.75	12.73	14.36	16.20	18.61	4.18	991.3
B5/2, W47/55	47/55	3.37	4.04	4.56	5.10	5.86	6.75	8.09	9.11	10.21	11.72	4.18	987.6
B5/2, W55/65	55/65	2.73	3.30	3.72	4.16	4.74	5.47	6.60	7.44	8.32	9.48	4.18	983.2

Evaporator flow rate, m^3/h	Water in/ out, °C	28	33	38	42	48	56	66	76	84	96	c_p, kJ/ (kg K)	ρ, kg/ m^3
B5/2, W30/35	30/35	7.58	8.81	9.85	11.31	12.90	15.16	17.63	19.71	22.63	25.79	4.22	966.4
B5/2, W40/45	40/45	7.15	8.45	9.46	10.73	12.30	14.30	16.89	18.91	21.47	24.59	4.22	966.4
B5/2, W47/55	47/55	6.63	7.93	8.90	10.07	11.54	13.26	15.86	17.79	20.13	23.08	4.22	966.4
B5/2, W55/65	55/65	6.00	7.25	8.15	9.26	10.56	12.00	14.49	16.30	18.52	21.11	4.22	966.4

Condenser circuit liquid: water
Evaporator circuit fluid: mixture of water and ethanol, 28 mass-% ethanol (34 volume-%)

Capacity and coefficient of performance B12/7 (brine in: +12, brine out: +7)

Heating capacity, kW	Water in, °C	Water out, °C	28	33	38	42	48	56	66	76	84	96
B12/7, W30/35	30	35	33.9	39.8	44.7	51.4	58.5	67.9	79.5	89.4	102.8	116.9
B12/7, W40/45	40	45	33.9	40.1	45.3	51.3	58.5	67.8	80.2	90.5	102.5	116.9
B12/7, W47/55	47	55	33.8	40.4	45.6	51.3	58.5	67.7	80.8	91.3	102.6	116.9
B12/7, W55/65	55	65	34.0	40.9	46.2	51.8	58.6	67.9	81.7	92.4	103.6	117.2

Coefficient of performance (COP), -	Water in, °C	Water out, °C	28	33	38	42	48	56	66	76	84	96
B12/7, W30/35	30	35	6.4	6.2	6.0	5.9	5.9	6.4	6.2	6.0	5.9	5.9
B12/7, W40/45	40	45	4.9	4.9	4.7	4.8	4.7	4.9	4.9	4.7	4.8	4.7
B12/7, W47/55	47	55	3.8	3.8	3.7	3.8	3.8	3.8	3.8	3.7	3.8	3.8
B12/7, W55/65	55	65	3.0	3.0	2.9	3.1	3.0	3.0	3.0	2.9	3.1	3.0

Cooling capacity, kW	Water in, °C	Water out, °C	28	33	38	42	48	56	66	76	84	96
B12/7, W30/35	30	35	28.9	33.6	37.5	43.2	49.0	57.8	67.3	75.1	86.4	98.1
B12/7, W40/45	40	45	27.4	32.3	36.1	41.1	46.7	54.7	64.5	72.1	82.2	93.5
B12/7, W47/55	47	55	25.5	30.3	34.0	38.6	43.9	50.9	60.7	68.0	77.3	87.8
B12/7, W55/65	55	65	23.2	27.8	31.2	35.7	40.3	46.3	55.7	62.4	71.4	80.7

Electrical power, kW	Water in, °C	Water out, °C	28	33	38	42	48	56	66	76	84	96
B12/7, W30/35	30	35	5.3	6.4	7.5	8.6	9.9	10.6	12.9	15.0	17.3	19.9
B12/7, W40/45	40	45	6.9	8.3	9.7	10.7	12.4	13.8	16.5	19.4	21.4	24.7
B12/7, W47/55	47	55	8.8	10.6	12.3	13.3	15.3	17.6	21.2	24.5	26.7	30.6
B12/7, W55/65	55	65	11.4	13.7	15.7	16.9	19.3	22.7	27.4	31.5	33.9	38.5

Electrical current, A	Water in, °C	Water out, °C	28	33	38	42	48	56	66	76	84	96
B12/7, W30/35	30	35	11.7	14.4	20.6	21.2	22.6	23.4	28.8	41.1	42.4	45.1
B12/7, W40/45	40	45	13.4	16.6	22.4	23.3	25.7	26.9	33.2	44.9	46.6	51.3
B12/7, W47/55	47	55	15.8	19.5	24.7	25.9	29.3	31.7	38.9	49.4	51.8	58.6
B12/7, W55/65	55	65	19.2	23.4	28.8	30.2	34.2	38.4	46.8	57.6	60.5	68.4

Flow rates, B12/7 (brine in: +12, brine out: +7)

Condenser flow rate, m^3/h	Water in/ out, °C	28	33	38	42	48	56	66	76	84	96	c_p, kJ/ (kg K)	ρ, kg/ m^3
B12/7, W30/35	30/35	5.88	6.88	7.74	8.90	10.12	11.75	13.77	15.47	17.81	20.25	4.18	994.9
B12/7, W40/45	40/45	5.89	6.97	7.86	8.91	10.16	11.78	13.94	15.73	17.81	20.32	4.18	991.3
B12/7, W47/55	47/55	3.69	4.40	4.97	5.59	6.37	7.37	8.81	9.95	11.18	12.74	4.18	987.6
B12/7, W55/65	55/65	2.97	3.57	4.04	4.53	5.13	5.94	7.15	8.08	9.06	10.26	4.18	983.2

Evaporator flow rate, m^3/h	Water in/ out, °C	28	33	38	42	48	56	66	76	84	96	c_p, kJ/ (kg K)	ρ, kg/ m^3
B12/7, W30/35	30/35	5.11	5.94	6.64	7.64	8.67	10.22	11.89	13.27	15.27	17.34	4.23	963.0
B12/7, W40/45	40/45	4.83	5.70	6.37	7.26	8.26	9.67	11.40	12.75	14.52	16.52	4.23	963.0
B12/7, W47/55	47/55	4.50	5.36	6.01	6.83	7.76	9.00	10.73	12.01	13.66	15.53	4.23	963.0
B12/7, W55/65	55/65	4.09	4.92	5.52	6.31	7.13	8.18	9.84	11.04	12.62	14.26	4.23	963.0

Condenser circuit liquid: water
Evaporator circuit fluid: mixture of water and ethanol, 28 mass-% ethanol (34 volume-%)

Seasonal coefficient of performance (SCOP) and seasonal performance factor (SPF)

RE 05 28

Climate		Average (A)	Warm (W)	Cold (C)	References
City		Strasbourg, France	Athens, Greece	Helsinki, Finland	
Seasonal coefficient of performance (SCOP), space heating, EN 14825:2018	SCOP				3
Low temperature application, max. flow water temperature: 35 °C		5.6	5.6	5.7	
Medium-temperature application, max. flow water temperature: 55 °C		4.2	4.3	4.3	
Heat pump seasonal performance factor (SPF), space heating	SPF_{spaces}				3, 4
Floor heating, max. flow temperature 35 °C		5.6	5.6	5.7	
Radiator heating, max. flow temperature 55 °C		4.2	4.3	4.3	
Heat pump seasonal performance factor (SPF), domestic hot water heating	SPF_{DHW}				1, 2, 4
Domestic hot water heating		2.8	2.8	2.8	
Seasonal space heating energy efficiency	η_s				1, 2, 3
Low temperature application, max. flow water temperature: 35 °C	%	215	217	220	
Medium-temperature application, max. flow water temperature: 55 °C	%	160	162	165	
Seasonal space heating energy efficiency class					2
Low temperature application, max. flow water temperature: 35 °C		A+++	A+++	A+++	
Medium-temperature application, max. flow water temperature: 55 °C		A+++	A+++	A+++	
Seasonal DHW heating energy efficiency	η_s				1, 2
Load profile XL	%	112	112	112	
Energy efficiency class in DHW heating	η_s				2
Load profile XL		A	A	A	

1) Ecodesign regulation (EU) No 813/2013
2) Energy labelling regulation (EU) No 811/2013
3) Standard EN 14825:2018
4) National Building Code of Finland

RE 05 33

Climate		Average (A)	Warm (W)	Cold (C)	References
City		Strasbourg, France	Athens, Greece	Helsinki, Finland	
Seasonal coefficient of performance (SCOP), space heating, EN 14825:2018	SCOP				3
Low temperature application, max. flow water temperature: 35 °C		5.4	5.5	5.5	
Medium-temperature application, max. flow water temperature: 55 °C		4.2	4.2	4.3	
Heat pump seasonal performance factor (SPF), space heating	SPF_{spaces}				3, 4
Floor heating, max. flow temperature 35 °C		5.4	5.5	5.5	
Radiator heating, max. flow temperature 55 °C		4.2	4.2	4.3	
Heat pump seasonal performance factor (SPF), domestic hot water heating	SPF_{DHW}				1, 2, 4
Domestic hot water heating		2.8	2.8	2.8	
Seasonal space heating energy efficiency	η_s				1, 2, 3
Low temperature application, max. flow water temperature: 35 °C	%	209	211	214	
Medium-temperature application, max. flow water temperature: 55 °C	%	159	160	163	
Seasonal space heating energy efficiency class					2
Low temperature application, max. flow water temperature: 35 °C		A+++	A+++	A+++	
Medium-temperature application, max. flow water temperature: 55 °C		A+++	A+++	A+++	
Seasonal DHW heating energy efficiency	η_s				1, 2
Load profile XL	%	112	112	112	
Energy efficiency class in DHW heating	η_s				2
Load profile XL		A	A	A	

1) Ecodesign regulation (EU) No 813/2013
2) Energy labelling regulation (EU) No 811/2013
3) Standard EN 14825:2018
4) National Building Code of Finland

RE 05 38

Climate		Average (A)	Warm (W)	Cold (C)	References
City		Strasbourg, France	Athens, Greece	Helsinki, Finland	
Seasonal coefficient of performance (SCOP), space heating, EN 14825:2018	SCOP				3
Low temperature application, max. flow water temperature: 35 °C		5.2	5.3	5.3	
Medium-temperature application, max. flow water temperature: 55 °C		4.1	4.1	4.2	
Heat pump seasonal performance factor (SPF), space heating	SPF_{spaces}				3, 4
Floor heating, max. flow temperature 35 °C		5.2	5.3	5.3	
Radiator heating, max. flow temperature 55 °C		4.1	4.1	4.2	
Heat pump seasonal performance factor (SPF), domestic hot water heating	SPF_{DHW}				1, 2, 4
Domestic hot water heating		2.8	2.8	2.8	
Seasonal space heating energy efficiency	η_s				1, 2, 3
Low temperature application, max. flow water temperature: 35 °C	%	201	203	205	
Medium-temperature application, max. flow water temperature: 55 °C	%	155	157	160	
Seasonal space heating energy efficiency class					2
Low temperature application, max. flow water temperature: 35 °C		A+++	A+++	A+++	
Medium-temperature application, max. flow water temperature: 55 °C		A+++	A+++	A+++	
Seasonal DHW heating energy efficiency	η_s				1, 2
Load profile XL	%	112	112	112	
Energy efficiency class in DHW heating	η_s				2
Load profile XL		A	A	A	

1) Ecodesign regulation (EU) No 813/2013
2) Energy labelling regulation (EU) No 811/2013
3) Standard EN 14825:2018
4) National Building Code of Finland

RE 05 42

Climate		Average (A)	Warm (W)	Cold (C)	References
City		Strasbourg, France	Athens, Greece	Helsinki, Finland	
Seasonal coefficient of performance (SCOP), space heating, EN 14825:2018	SCOP				3
Low temperature application, max. flow water temperature: 35 °C		5.3	5.4	5.4	
Medium-temperature application, max. flow water temperature: 55 °C		4.2	4.2	4.3	
Heat pump seasonal performance factor (SPF), space heating	SPF_{spaces}				3, 4
Floor heating, max. flow temperature 35 °C		5.3	5.4	5.4	
Radiator heating, max. flow temperature 55 °C		4.2	4.2	4.3	
Heat pump seasonal performance factor (SPF), domestic hot water heating	SPF_{DHW}				1, 2, 4
Domestic hot water heating		2.8	2.8	2.8	
Seasonal space heating energy efficiency	η_s				1, 2, 3
Low temperature application, max. flow water temperature: 35 °C	%	204	206	208	
Medium-temperature application, max. flow water temperature: 55 °C	%	158	160	163	
Seasonal space heating energy efficiency class					2
Low temperature application, max. flow water temperature: 35 °C		A+++	A+++	A+++	
Medium-temperature application, max. flow water temperature: 55 °C		A+++	A+++	A+++	
Seasonal DHW heating energy efficiency	η_s				1, 2
Load profile XL	%	112	112	112	
Energy efficiency class in DHW heating	η_s				2
Load profile XL		A	A	A	

1) Ecodesign regulation (EU) No 813/2013
2) Energy labelling regulation (EU) No 811/2013
3) Standard EN 14825:2018
4) National Building Code of Finland

RE 05 48

Climate		Average (A)	Warm (W)	Cold (C)	References
City		Strasbourg, France	Athens, Greece	Helsinki, Finland	
Seasonal coefficient of performance (SCOP), space heating, EN 14825:2018	SCOP				3
Low temperature application, max. flow water temperature: 35 °C		5.3	5.4	5.4	
Medium-temperature application, max. flow water temperature: 55 °C		4.1	4.2	4.2	
Heat pump seasonal performance factor (SPF), space heating	SPF_{spaces}				3, 4
Floor heating, max. flow temperature 35 °C		5.3	5.4	5.4	
Radiator heating, max. flow temperature 55 °C		4.1	4.2	4.2	
Heat pump seasonal performance factor (SPF), domestic hot water heating	SPF_{DHW}				1, 2, 4
Domestic hot water heating		2.8	2.8	2.8	
Seasonal space heating energy efficiency	η_s				1, 2, 3
Low temperature application, max. flow water temperature: 35 °C	%	204	207	209	
Medium-temperature application, max. flow water temperature: 55 °C	%	157	159	162	
Seasonal space heating energy efficiency class					2
Low temperature application, max. flow water temperature: 35 °C		A+++	A+++	A+++	
Medium-temperature application, max. flow water temperature: 55 °C		A+++	A+++	A+++	
Seasonal DHW heating energy efficiency	η_s				1, 2
Load profile XL	%	112	112	112	
Energy efficiency class in DHW heating	η_s				2
Load profile XL		A	A	A	

1) Ecodesign regulation (EU) No 813/2013
2) Energy labelling regulation (EU) No 811/2013
3) Standard EN 14825:2018
4) National Building Code of Finland

7.4 EN 14825 Technical data sheets

RE 28

Technical data sheet	EN 14825:2018				
Model (indoor + outdoor)	RE 05 28				
Air-to-water heat pump	N				
Water-to-water heat pump	Y				
Brine-to-water heat pump	Y				
Low-temperature heat pump	N				
Equipped with supplementary heater	N				
Heat pump combination heater	N				
Parameters shall be declared for medium-temperature application, except for low-temperature heat pumps. For low temperature heat pumps, parameters shall be declared for low-temperature heat pumps					
Parameters shall be declared for average climate conditions and for warmer and/or colder climate conditions, where applicable					
Rated heat output*	Prated			27,6	kW
Seasonal space heating energy efficiency	η_s			160	%
Declared capacity for heating at indoor conditions 20°C and outdoor temperature Tj	climate (average, warmer or colder)	Tj = −7°C		27,5	kW
		Tj = 2°C		27,4	kW
		Tj = 7°C		27,4	kW
		Tj = 12°C		27,3	kW
		Tj = bivalent temperature		27,6	kW
		Tj = operation limit	Pdh	-	kW
		Tj = −15°C (if TOL < −20°C) (for air to water heat pumps)	Pdh	-	kW
Bivalent temperature		T_{biv}		-10	°C
Degradation coefficient**		Cdh		0,998	-
Declared coefficient of performance for heating at indoor conditions 20°C and outdoor temperature Tj	Tj = −7°C	COPd		3,32	-
	Tj = 2°C	COPd		4,18	-
	Tj = 7°C	COPd		4,82	-
	Tj = 12°C	COPd		5,55	-
	Tj = bivalent temperature	COPd		3,10	-
	Tj = operation limit	COPd		-	-
	Tj = −15°C (if TOL < −20°C) (for Air to water heat pumps)	COPd		-	-
Operation limit temperature	TOL			-	°C
Heating water operation limit temperature	WTOL			68	°C
Power consumption in modes other than active mode	Off mode	P_{OFF}		2	W
	Thermostat-off mode	P_{TO}		20	W
	Standby mode	P_{SB}		2	W
	Crankcase heater mode	P_{CK}		0	W
Supplementary heater	Rated heat output*	P_{sup}		6,0	kW
	Type of energy input			-	
Other items	Capacity control			Fixed	
	Annual energy consumption	Q_{HE}		13540	kWh
For water/brine-to-water heat pumps	Rated brine or water flow rate, outdoor heat exchanger			5,63	m^3/h
For air-to-water heat pumps	Rated air flow rate, outdoors			-	m^3/h
Contact details	**Suomen Lämpöpumpputekniikka O, Unikontie 2, 62100 Lapua, Finland**				
*** For heat pumps space heaters and heat pump combination heaters, the rated heat output Prated is equal to the design load for heating Pdesignh, and the rated heat output of a supplementary heater Psup is equal to the supplementary capacity for heating sup(Tj)**					
**** If Cdh is not determined by measurement then the default degradation coefficient is Cdh = 0,9**					

RE 28 Technical data sheet ver. 1

RE 33

Technical data sheet	EN 14825:2018				
Model (indoor + outdoor)	RE 05 33				
Air-to-water heat pump	N				
Water-to-water heat pump	Y				
Brine-to-water heat pump	Y				
Low-temperature heat pump	N				
Equipped with supplementary heater	N				
Heat pump combination heater	N				
Parameters shall be declared for medium-temperature application, except for low-temperature heat pumps. For low temperature heat pumps, parameters shall be declared for low-temperature heat pumps					
Parameters shall be declared for average climate conditions and for warmer and/or colder climate conditions, where applicable					
Rated heat output*	Prated			33,2	kW
Seasonal space heating energy efficiency	η_s			159	%
Declared capacity for heating at indoor conditions 20°C and outdoor temperature Tj	climate (average, warmer or colder)	Tj = −7°C		33,0	kW
		Tj = 2°C		32,4	kW
		Tj = 7°C		32,0	kW
		Tj = 12°C		31,6	kW
		Tj = bivalent temperature		33,2	kW
		Tj = operation limit	Pdh	-	kW
		Tj = −15°C (if TOL < −20°C) (for air to water heat pumps)	Pdh	-	kW
Bivalent temperature		T_{biv}		-10	°C
Degradation coefficient**		Cdh		0,998	-
Declared coefficient of performance for heating at indoor conditions 20°C and outdoor temperature Tj	Tj = −7°C	COPd		3,30	-
	Tj = 2°C	COPd		4,14	-
	Tj = 7°C	COPd		4,75	-
	Tj = 12°C	COPd		5,42	-
	Tj = bivalent temperature	COPd		3,09	-
	Tj = operation limit	COPd		-	-
	Tj = −15°C (if TOL < −20°C) (for Air to water heat pumps)	COPd		-	-
Operation limit temperature	TOL			-	°C
Heating water operation limit temperature	WTOL			68	°C
Power consumption in modes other than active mode	Off mode	P_{OFF}		2	W
	Thermostat-off mode	P_{TO}		20	W
	Standby mode	P_{SB}		2	W
	Crankcase heater mode	P_{CK}		0	W
Supplementary heater	Rated heat output*	P_{sup}		6,0	kW
	Type of energy input			-	
Other items	Capacity control			Fixed	
	Annual energy consumption	Q_{HE}		16475	kWh
For water/brine-to-water heat pumps	Rated brine or water flow rate, outdoor heat exchanger			6,77	m^3/h
For air-to-water heat pumps	Rated air flow rate, outdoors			-	m^3/h
Contact details	**Suomen Lämpöpumpputekniikka O, Unikontie 2, 62100 Lapua, Finland**				

*** For heat pumps space heaters and heat pump combination heaters, the rated heat output Prated is equal to the design load for heating Pdesignh, and the rated heat output of a supplementary heater Psup is equal to the supplementary capacity for heating sup(Tj)**

RE 33 Technical data sheet ver. 1

RE 38

Technical data sheet	EN 14825:2018				
Model (indoor + outdoor)	RE 05 38				
Air-to-water heat pump	N				
Water-to-water heat pump	Y				
Brine-to-water heat pump	Y				
Low-temperature heat pump	N				
Equipped with supplementary heater	N				
Heat pump combination heater	N				
Parameters shall be declared for medium-temperature application, except for low-temperature heat pumps. For low temperature heat pumps, parameters shall be declared for low-temperature heat pumps					
Parameters shall be declared for average climate conditions and for warmer and/or colder climate conditions, where applicable					
Rated heat output*	Prated			37,3	kW
Seasonal space heating energy efficiency	η_s			155	%
Declared capacity for heating at indoor conditions 20°C and outdoor temperature Tj	climate (average, warmer or colder)	Tj = −7°C		37,1	kW
		Tj = 2°C		36,5	kW
		Tj = 7°C		36,2	kW
		Tj = 12°C		35,6	kW
		Tj = bivalent temperature		37,3	kW
		Tj = operation limit	Pdh	-	kW
		Tj = −15°C (if TOL < −20°C) (for air to water heat pumps)	Pdh	-	kW
Bivalent temperature		T_{biv}		-10	°C
Degradation coefficient**		Cdh		0,998	-
Declared coefficient of performance for heating at indoor conditions 20°C and outdoor temperature Tj	Tj = −7°C	COPd		3,29	-
	Tj = 2°C	COPd		4,06	-
	Tj = 7°C	COPd		4,60	-
	Tj = 12°C	COPd		5,21	-
	Tj = bivalent temperature	COPd		3,09	-
	Tj = operation limit	COPd		-	-
	Tj = −15°C (if TOL < −20°C) (for Air to water heat pumps)	COPd		-	-
Operation limit temperature	TOL			-	°C
Heating water operation limit temperature	WTOL			68	°C
Power consumption in modes other than active mode	Off mode	P_{OFF}		2	W
	Thermostat-off mode	P_{TO}		20	W
	Standby mode	P_{SB}		2	W
	Crankcase heater mode	P_{CK}		0	W
Supplementary heater	Rated heat output*	P_{sup}		6,0	kW
	Type of energy input			-	
Other items	Capacity control			Fixed	
	Annual energy consumption	Q_{HE}		18892	kWh
For water/brine-to-water heat pumps	Rated brine or water flow rate, outdoor heat exchanger			7,61	m^3/h
For air-to-water heat pumps	Rated air flow rate, outdoors			-	m^3/h
Contact details	**Suomen Lämpöpumpputekniikka O, Unikontie 2, 62100 Lapua, Finland**				
*** For heat pumps space heaters and heat pump combination heaters, the rated heat output Prated is equal to the design load for heating Pdesignh, and the rated heat output of a supplementary heater Psup is equal to the supplementary capacity for heating sup(Tj)**					
**** If Cdh is not determined by measurement then the default degradation coefficient is Cdh = 0,9**					

RE 38 Technical data sheet ver. 1

RE 42

Technical data sheet	EN 14825:2018				
Model (indoor + outdoor)	RE 05 42				
Air-to-water heat pump	N				
Water-to-water heat pump	Y				
Brine-to-water heat pump	Y				
Low-temperature heat pump	N				
Equipped with supplementary heater	N				
Heat pump combination heater	N				
Parameters shall be declared for medium-temperature application, except for low-temperature heat pumps. For low temperature heat pumps, parameters shall be declared for low-temperature heat pumps					
Parameters shall be declared for average climate conditions and for warmer and/or colder climate conditions, where applicable					
Rated heat output*	Prated			41,7	kW
Seasonal space heating energy efficiency	η_s			158	%
Declared capacity for heating at indoor conditions 20°C and outdoor temperature Tj	climate (average, warmer or colder)	Tj = −7°C		41,5	kW
		Tj = 2°C		41,2	kW
		Tj = 7°C		41,1	kW
		Tj = 12°C		41,1	kW
		Tj = bivalent temperature		41,7	kW
		Tj = operation limit	Pdh	-	kW
		Tj = −15°C (if TOL < −20°C) (for air to water heat pumps)	Pdh	-	kW
Bivalent temperature		T_{biv}		-10	°C
Degradation coefficient**		Cdh		0,998	-
Declared coefficient of performance for heating at indoor conditions 20°C and outdoor temperature Tj	Tj = −7°C	COPd		3,35	-
	Tj = 2°C	COPd		4,14	-
	Tj = 7°C	COPd		4,70	-
	Tj = 12°C	COPd		5,30	-
	Tj = bivalent temperature	COPd		3,14	-
	Tj = operation limit	COPd		-	-
	Tj = −15°C (if TOL < −20°C) (for Air to water heat pumps)	COPd		-	-
Operation limit temperature	TOL			-	°C
Heating water operation limit temperature	WTOL			68	°C
Power consumption in modes other than active mode	Off mode	P_{OFF}		2	W
	Thermostat-off mode	P_{TO}		20	W
	Standby mode	P_{SB}		2	W
	Crankcase heater mode	P_{CK}		0	W
Supplementary heater	Rated heat output*	P_{sup}		6,0	kW
	Type of energy input			-	
Other items	Capacity control			Fixed	
	Annual energy consumption	Q_{HE}		20696	kWh
For water/brine-to-water heat pumps	Rated brine or water flow rate, outdoor heat exchanger			8,56	m^3/h
For air-to-water heat pumps	Rated air flow rate, outdoors			-	m^3/h
Contact details	**Suomen Lämpöpumpputekniikka O, Unikontie 2, 62100 Lapua, Finland**				
*** For heat pumps space heaters and heat pump combination heaters, the rated heat output Prated is equal to the design load for heating Pdesignh, and the rated heat output of a supplementary heater Psup is equal to the supplementary capacity for heating sup(Tj)**					
**** If Cdh is not determined by measurement then the default degradation coefficient is Cdh = 0,9**					

RE 42 Technical data sheet ver. 1

RE 48

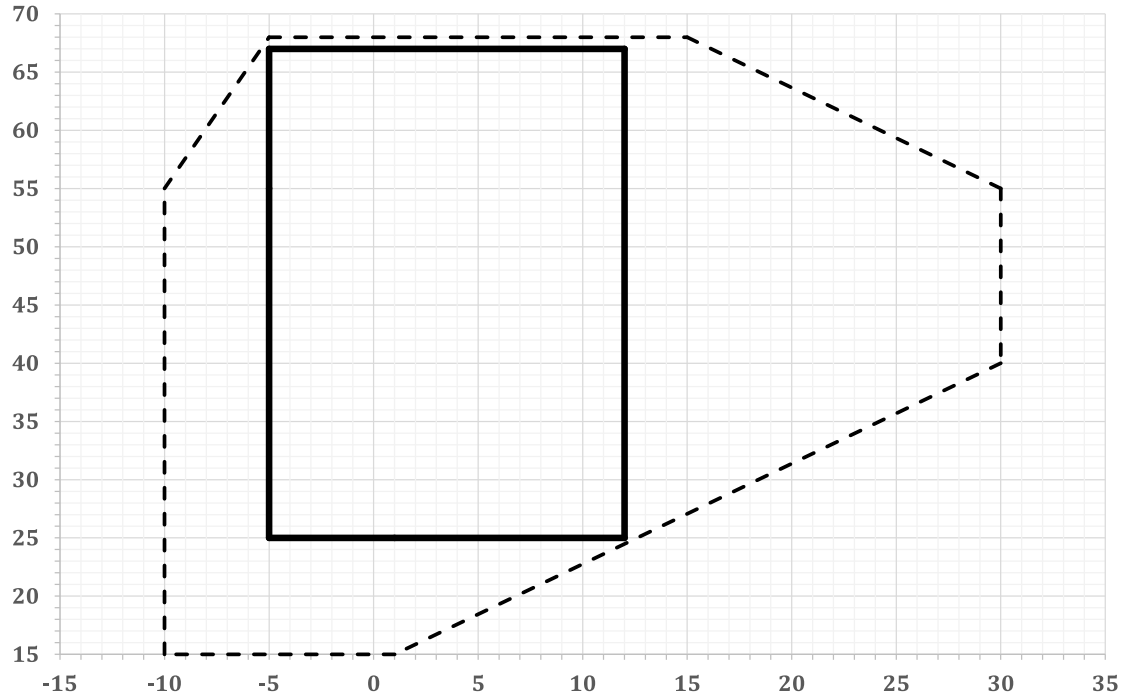
Technical data sheet	EN 14825:2018				
Model (indoor + outdoor)	RE 05 48				
Air-to-water heat pump	N				
Water-to-water heat pump	Y				
Brine-to-water heat pump	Y				
Low-temperature heat pump	N				
Equipped with supplementary heater	N				
Heat pump combination heater	N				
Parameters shall be declared for medium-temperature application, except for low-temperature heat pumps. For low temperature heat pumps, parameters shall be declared for low-temperature heat pumps					
Parameters shall be declared for average climate conditions and for warmer and/or colder climate conditions, where applicable					
Rated heat output*	Prated			48,3	kW
Seasonal space heating energy efficiency	η_s			157	%
Declared capacity for heating at indoor conditions 20°C and outdoor temperature Tj	climate (average, warmer or colder)	Tj = −7°C		48,2	kW
		Tj = 2°C		47,7	kW
		Tj = 7°C		47,3	kW
		Tj = 12°C		46,9	kW
		Tj = bivalent temperature		48,3	kW
		Tj = operation limit	Pdh	-	kW
		Tj = −15°C (if TOL < −20°C) (for air to water heat pumps)	Pdh	-	kW
Bivalent temperature		T_{biv}		-10	°C
Degradation coefficient**		Cdh		0,998	-
Declared coefficient of performance for heating at indoor conditions 20°C and outdoor temperature Tj	Tj = −7°C	COPd		3,35	-
	Tj = 2°C	COPd		4,11	-
	Tj = 7°C	COPd		4,66	-
	Tj = 12°C	COPd		5,30	-
	Tj = bivalent temperature	COPd		3,15	-
	Tj = operation limit	COPd		-	-
	Tj = −15°C (if TOL < −20°C) (for Air to water heat pumps)	COPd		-	-
Operation limit temperature	TOL			-	°C
Heating water operation limit temperature	WTOL			68	°C
Power consumption in modes other than active mode	Off mode	P_{OFF}		2	W
	Thermostat-off mode	P_{TO}		20	W
	Standby mode	P_{SB}		2	W
	Crankcase heater mode	P_{CK}		0	W
Supplementary heater	Rated heat output*	P_{sup}		6,0	kW
	Type of energy input			-	
Other items	Capacity control			Fixed	
	Annual energy consumption	Q_{HE}		24130	kWh
For water/brine-to-water heat pumps	Rated brine or water flow rate, outdoor heat exchanger			9,94	m^3/h
For air-to-water heat pumps	Rated air flow rate, outdoors			-	m^3/h
Contact details	**Suomen Lämpöpumpputekniikka O, Unikontie 2, 62100 Lapua, Finland**				
*** For heat pumps space heaters and heat pump combination heaters, the rated heat output Prated is equal to the design load for heating Pdesignh, and the rated heat output of a supplementary heater Psup is equal to the supplementary capacity for heating sup(Tj)**					
**** If Cdh is not determined by measurement then the default degradation coefficient is Cdh = 0,9**					

RE 48 Technical data sheet ver. 1

7.5 Operating conditions

The unit's operating condition range is provided in the diagram and table below. In the diagram, the bold continuous line indicates the unit's recommended operating envelope. The dashed line indicates the operating range where the unit can operate for a short period – during start-up, for example.

The unit's performance cannot be guaranteed outside the recommended values.



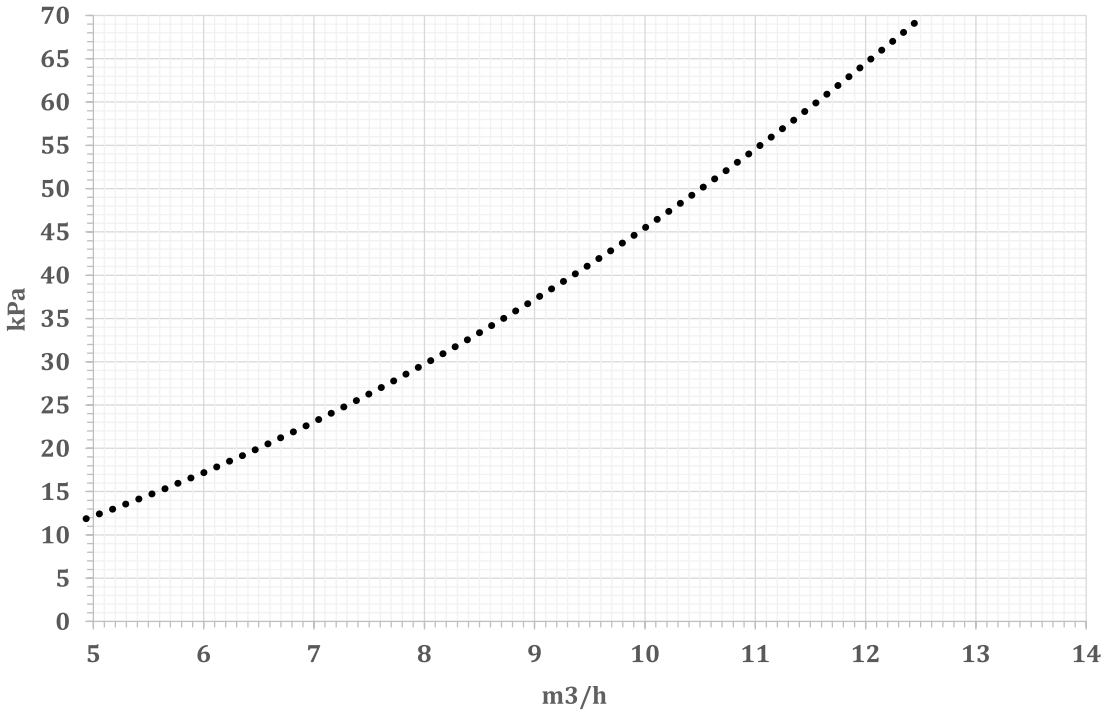
Operating range RE 28-96 ver. 1

X-axis: brine to evaporator (°C), Y-axis: water from condenser (°C). The bold continuous line indicates the unit's recommended operating envelope.

TEMPERATURE		Minimum value		Maximum value	
		Absolute	Recom.	Recom.	Absolute
Brine into the evaporator	°C	–10	–5	12	30
Condenser circuit temperature difference, brine to condenser < 5 °C	°C	1	3	4	5
Temperature difference across the evaporator circuit	°C	2	3	5	6
Brine out of the evaporator	°C	–15	-8	10	25
Water into the condenser	°C	12	20	60	63
Temperature difference across the condenser circuit	°C	3	5	15	20
Water from the condenser	°C	15	25	67	68

7.6 Condenser and evaporator pressure loss

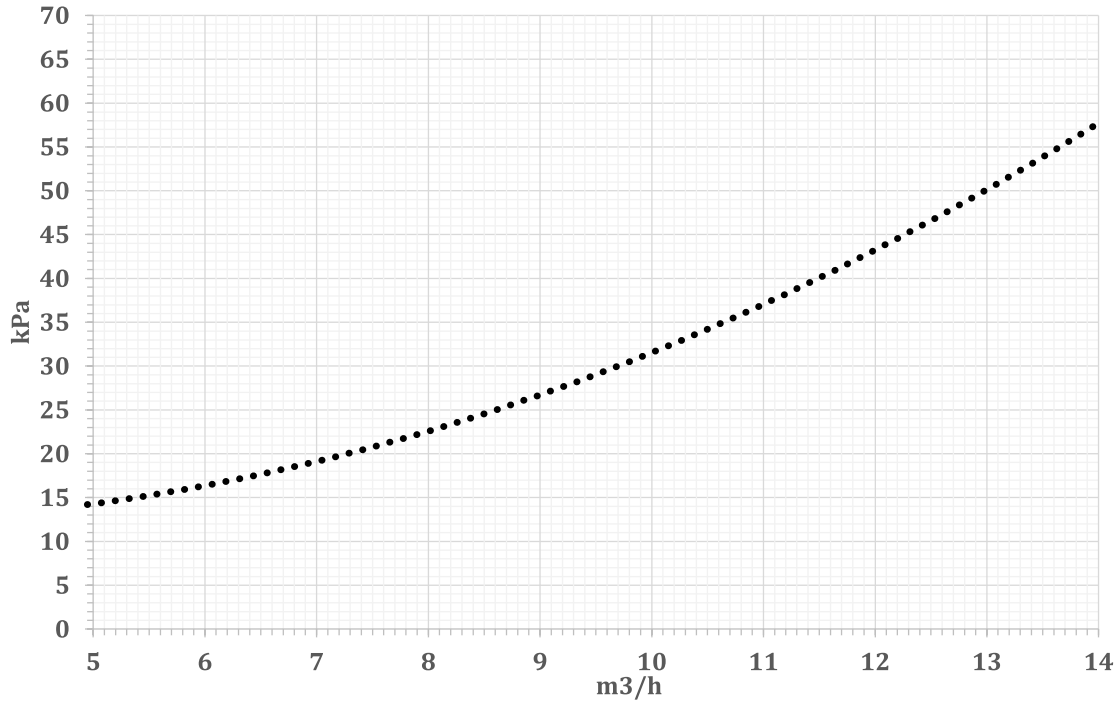
Condenser pressure loss



Condenser pressure loss, RE ver. 1

Y-axis: pressure loss, kPa, X-axis: flow rate, m^3/h.
Water: 30/35 °C.

Evaporator pressure loss



Evaporator pressure loss (RE) ver. 1

Y-axis: pressure loss, kPa, X-axis: flow rate, m^3/h.
Water and ethanol solution, 30 mass-% @ 0/−3 °C

7.7 Pumps

Condenser pumps

Condenser pumps are included in the heat pump delivery.

Designation	Pump	Description
34023075	Wilo-Stratos PARA 25/1-12 T16 180 mm 6h	1–phase, wet-motor, G 1 1/2 outer thread, installation dimension 180 mm, manual control and 0–10 V, 16–310 W (0.16–1.37 A), motor protection 1.6–2.5

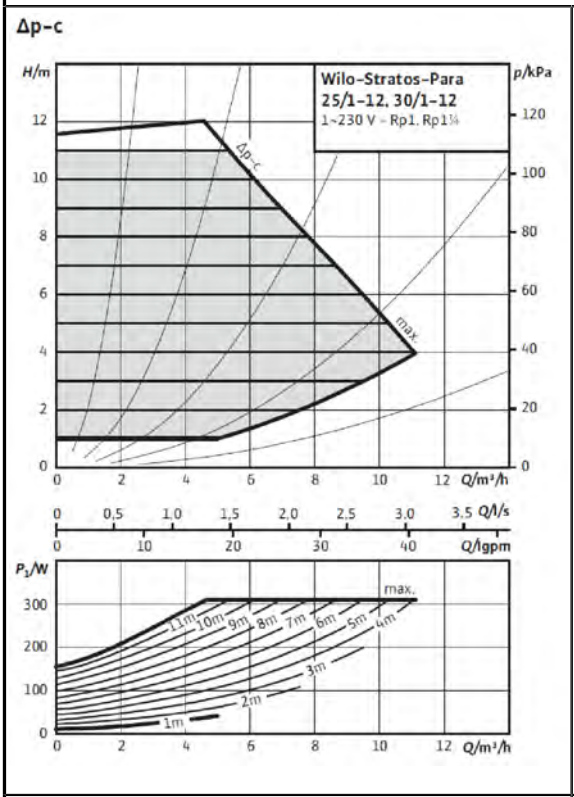
Evaporator pumps

The evaporator pump is not included in the heat pump delivery. The required evaporator pump capacity must be determined on a case-by-case basis and added to the order separately. See the whole range of available pumps in our price list.

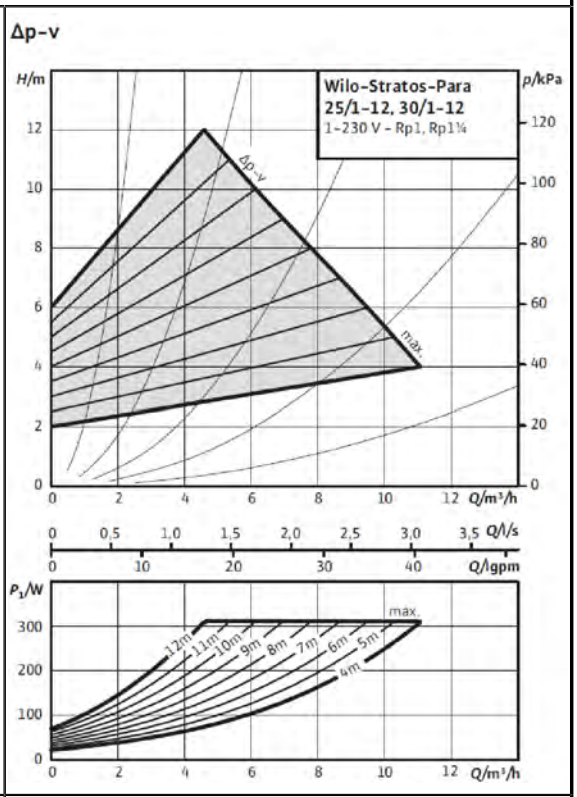
Designation	Pump	Description
34023075	Wilo-Stratos PARA 25/1-12 T16 180 mm 6h	1-phase, wet motor, G 1 1/2 outer thread, installation dimension 180 mm, manual control and 0–10 V, 16–310 W (0.16–1.37 A), motor protection 1.6–2.5
34023081	Wilo-Yonos MAXO 40/0.5-12	1-phase, wet motor, DN 40 flange, distance between flanges 250 mm, manual control, 15–550 W (0.17–2.4 A), motor protection 1.6-2.5
34023070	Wilo-Stratos 40/1-12	1-phase, wet motor, DN 40 flange, distance between flanges 250 mm, manual control, with accessory card: 0–10 V, bus control, etc.; 25–550 W (0.20–2.40 A), motor protection 1.6–2.5
34023082	Wilo-Yonos MAXO 40/0.5-16	1-phase, wet motor, DN 40 flange, distance between flanges 250 mm, manual control, 30–800 W (0.27–3.5 A), motor protection 2.5–4
34023083	Wilo-Yonos MAXO 50/0.5-16	1-phase, wet motor, DN 50 flange, distance between flanges 340 mm, manual control, 40–1250 W (0.3–5.5 A), motor protection 4–6.3
34023066	Wilo-VeroLine-IPL 40/115-0.55/2	3-phase, dry motor, DN 40 flange, distance between flanges 250 mm, 1-speed, 1.34 A, motor protection 1.6–2.5
34023067	Wilo-VeroLine-IPL 50/105-0.75/2	3-phase, dry motor, DN 50 flange, distance between flanges 280 mm, 1-speed, 1.7 A, motor protection 1.6-2.5
34023068	Wilo-VeroLine-IPL 50/120-1.5/2	3-phase, dry motor, DN 50 flange, distance between flanges 340 mm, 1-speed, 3.2 A, motor protection 2.5–4
34023063	Wilo-VeroLine-IPL 50/130-2.2/2	3-phase, dry motor, DN 50 flange, distance between flanges 340 mm, 1-speed, 4.5 A, motor protection 4–6.3

Pump graphs

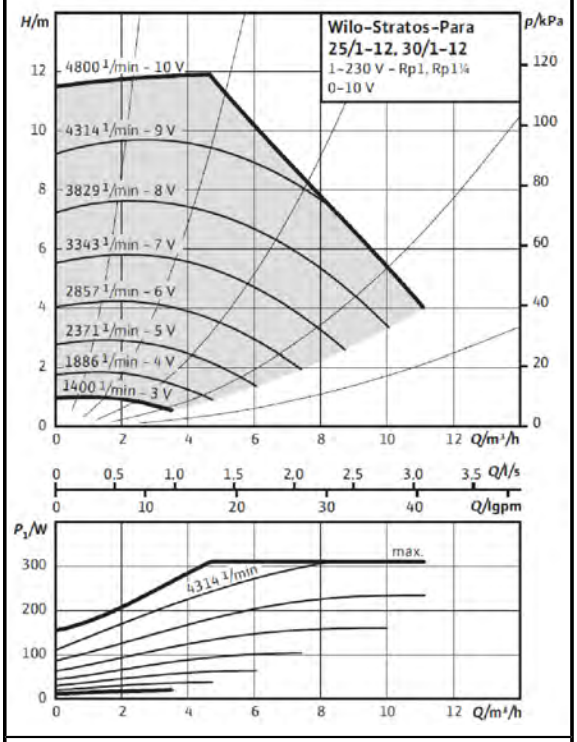
Wilo-Stratos PARA 1-12 T16



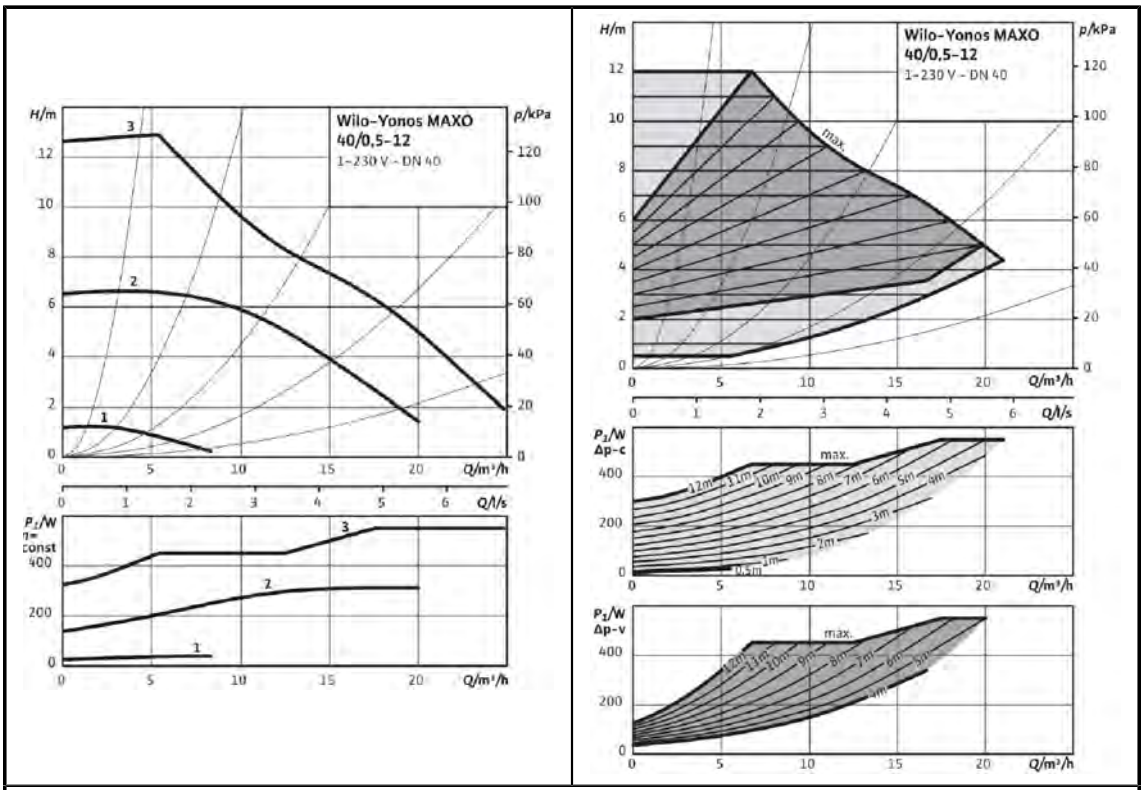
WILO-STRATOS PARA 1-12, ΔP-C (CONSTANT)



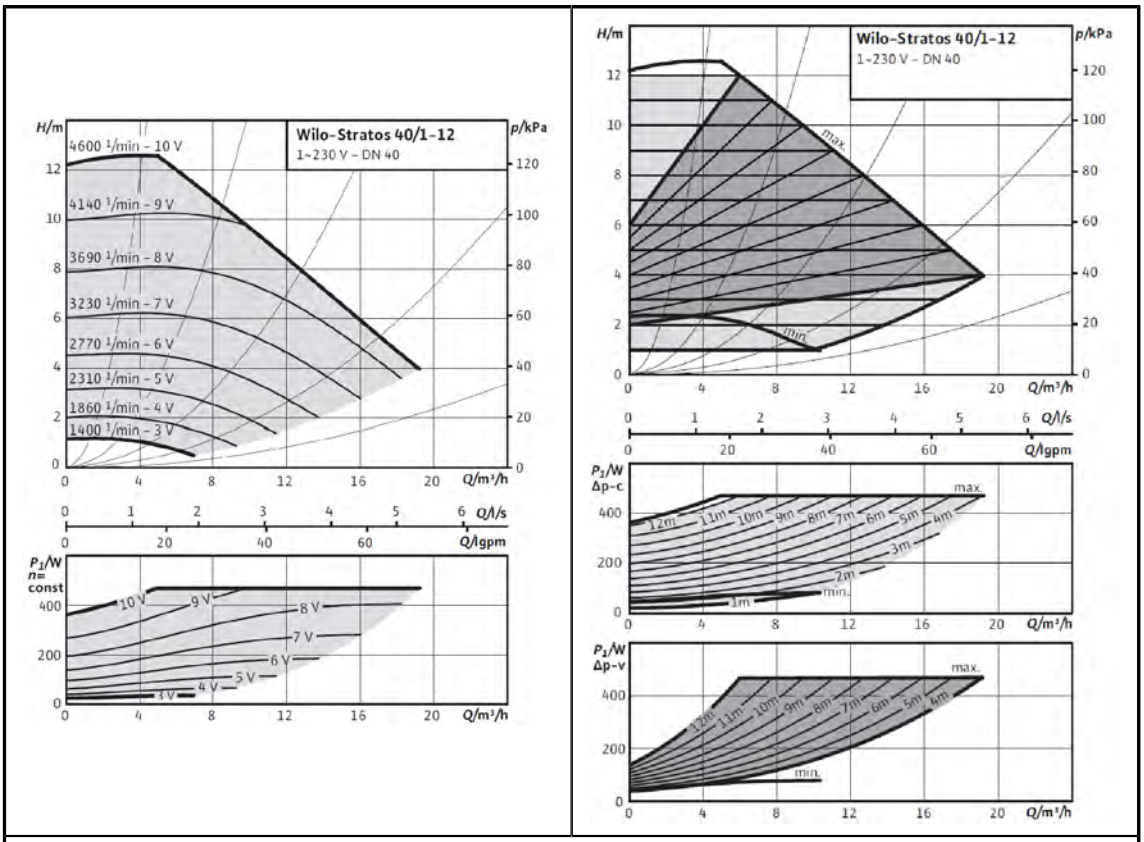
WILO-STRATOS PARA 1-12, ΔP-V (VARIABLE)



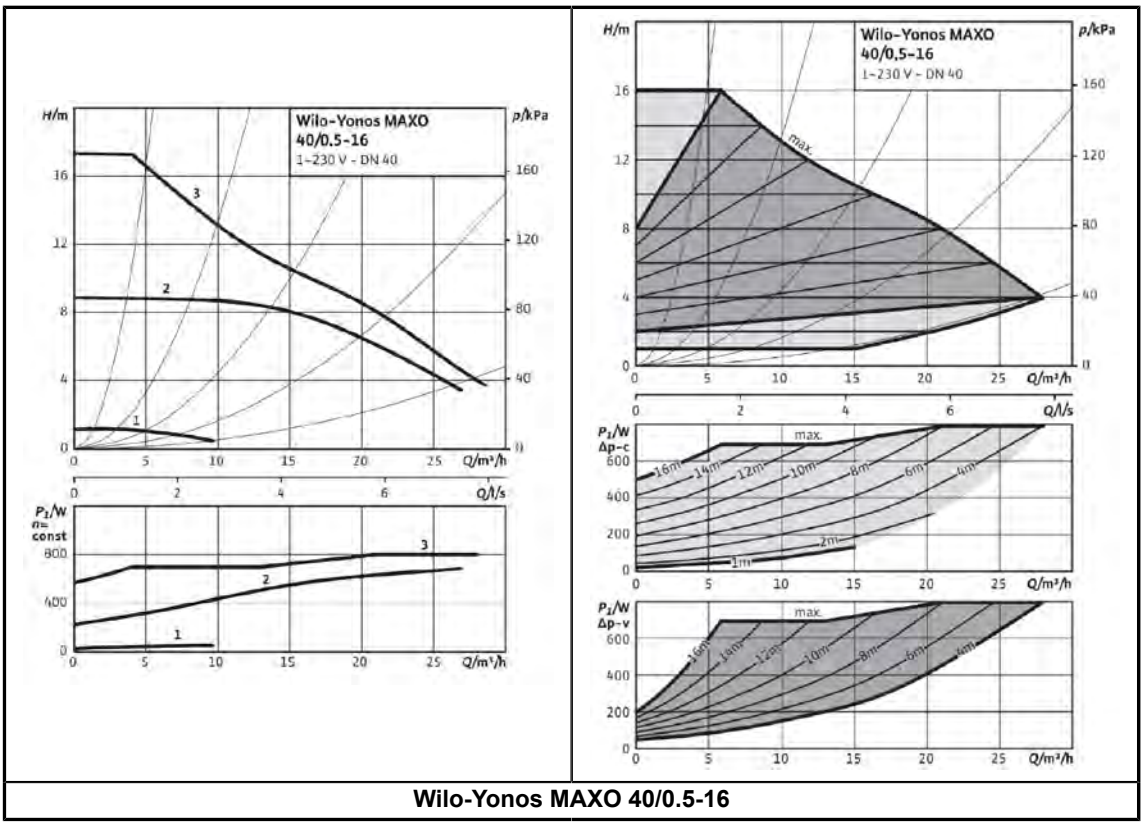
Wilo-Stratos Para 1–12, external control mode via analog input (0–10 V)



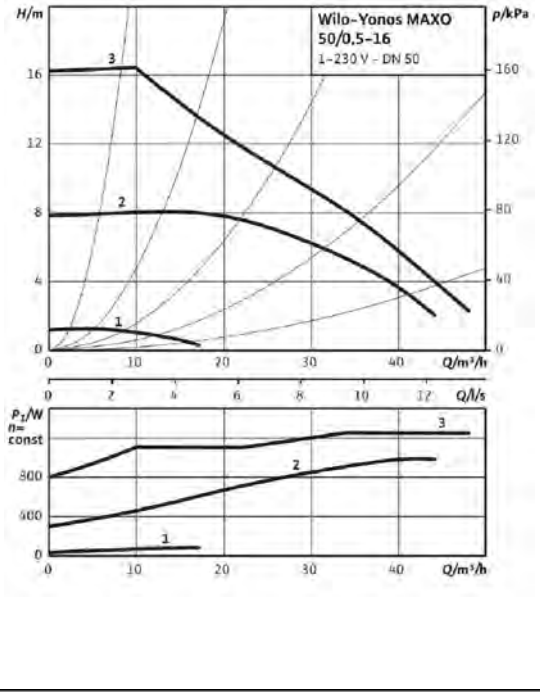
Wilo-Yonos MAXO 40/0.5-12

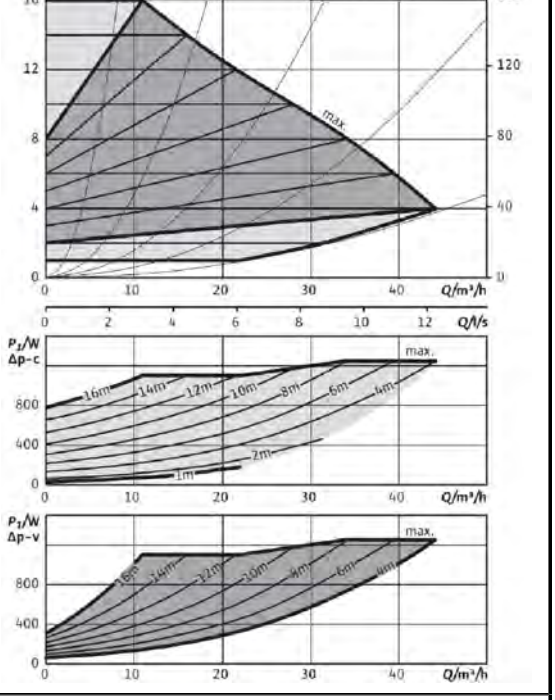


Wilo-Stratos 40/1-12

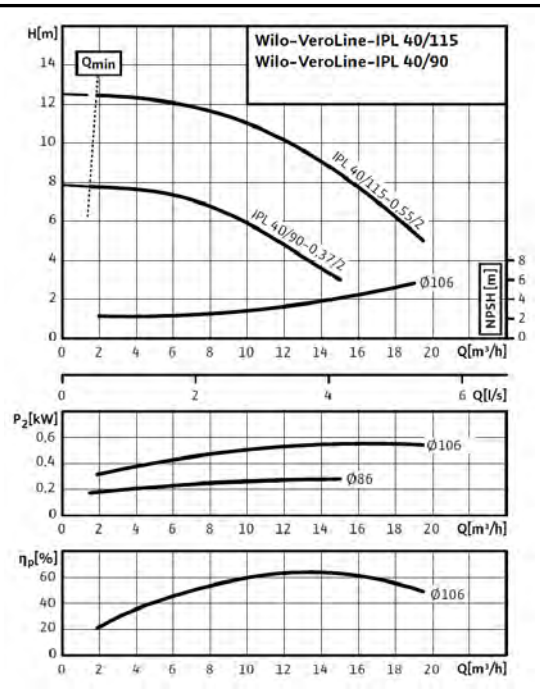


Wilo-Yonos MAXO 40/0.5-16

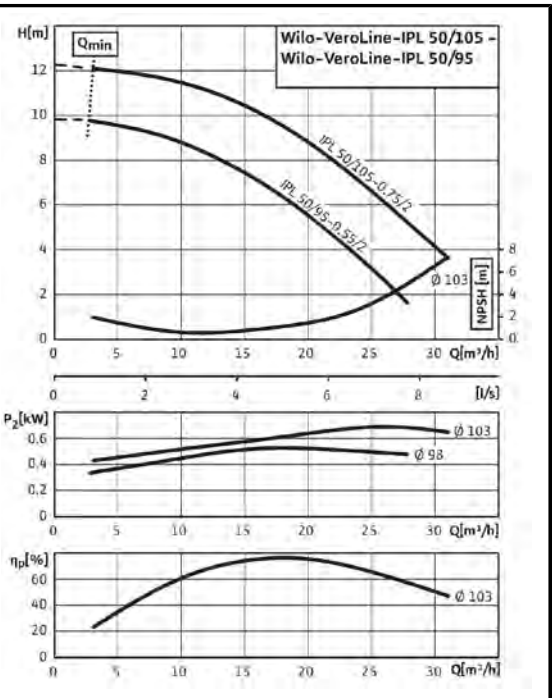




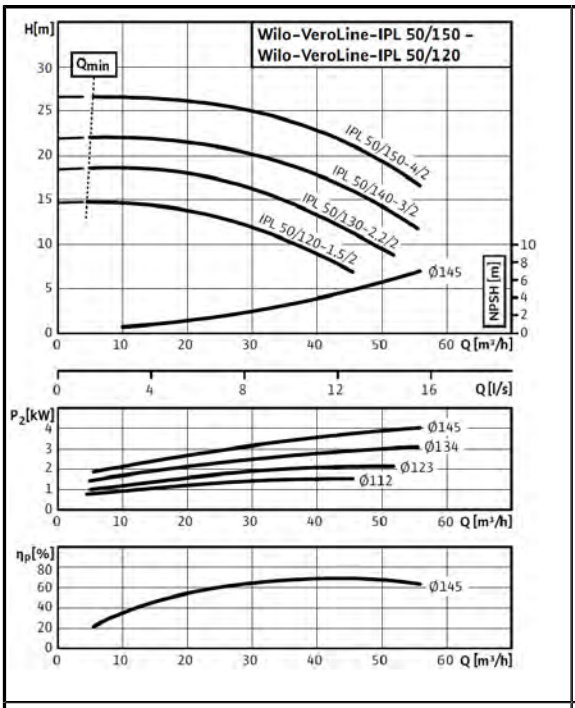
Wilo-Yonos MAXO 50/0.5-16



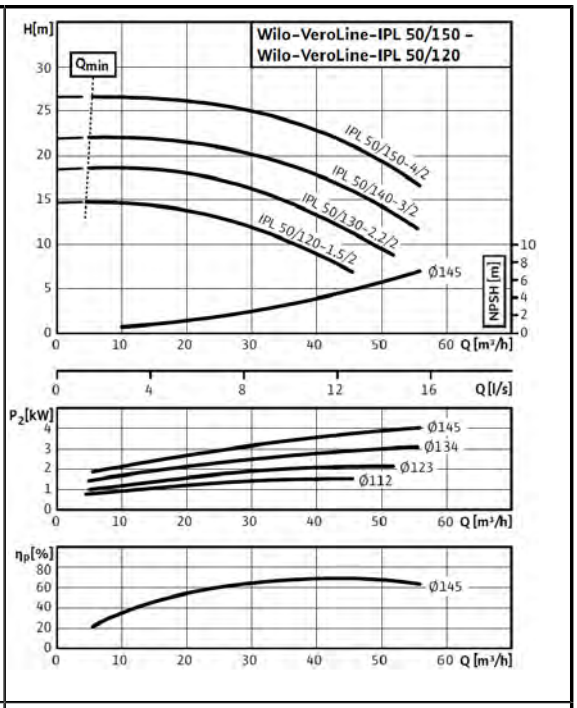
Wilo-VeroLine-IPL 40/115-0.55/2



Wilo-VeroLine-IPL 50/105-0.75/2



Wilo-VeroLine-IPL 50/120-1.5/2



Wilo-VeroLine-IPL 50/130-2.2/2

7.8 Temperature sensors

Sensor	Sensor type	value	Tolerance:
Outdoor temperature B9	NTC 1 kOhm	3464 K (25 °C / 50 °C)	+/–100 K
Other sensors (B3, B4, B21, B71, B91, B92 etc.)	NTC 10 kOhm	3978 K (25 °C / 85 °C)	B85: +/–10 K Other sensors: +/–100 K

7.9 EU product data

Product fiche, space heaters

COMMISSION DELEGATED REGULATION

(EU) No 811/2013 ANNEX IV

				RE 28	RE 33	RE 38	RE 42	RE 48
a	supplier's name or trademark			Oilon	Oilon	Oilon	Oilon	Oilon
b	supplier's model identifier			RE 05 28	RE 05 33	RE 05 38	RE 05 42	RE 05 48
	STANDARD RATING CONDITIONS (BRINE 0/−3 °C, WATER 47/55 °C), AVERAGE CLIMATE CONDITIONS							
c	seasonal space heating energy efficiency class, water 47/55 °C			A+++	A+++	A+++	A+++	A+++
d	total rated heat output of heat pump and supplementary heater	P_{rated} + P_{sup}	kW	28 + 0	33 + 0	37 + 0	42 + 0	48 + 0

				RE 28	RE 33	RE 38	RE 42	RE 48
e	seasonal space heating energy efficiency	η_s	%	160	159	155	158	157
f	annual electricity consumption to space heating	Q_{HE}	kWh	13540	16475	18892	20696	24130
g	sound power level	L_{WA}	dB(A)	RE 28: 58.4 RE 56: 61.3	RE 33: 58.1 RE 66: 61.0	RE 38: 58.9 RE 74: 61.9	RE 42: 58.5 RE 84: 61.5	RE 48: 59.3 RE 96: 62.2
h	specific precautions that shall be taken when the space heater is assembled, installed or maintained			1)	1)	1)	1)	1)
	STANDARD RATING CONDITIONS (BRINE 0/−3 °C, WATER 47/55 °C), COLDER AND WARMER CLIMATE CONDITIONS							
j	total rated heat output of heat pump and supplementary heater under colder climate conditions	P_{rated} + P_{sup}	kW	28 + 0	33 + 0	37 + 0	42 + 0	48 + 0
j	total rated heat output of heat pump and supplementary heater under warmer climate conditions	P_{rated} + P_{sup}	kW	28 + 0	33 + 0	37 + 0	42 + 0	48 + 0
k	seasonal energy efficiency under colder climate conditions, space heating	η_s	%	165	163	160	163	162
k	seasonal energy efficiency under warmer climate conditions, space heating	η_s	%	162	160	157	160	159
l	annual space heating energy consumption under colder climate conditions	Q_{HE}	kWh	15692	19112	21970	24069	28066
l	annual electricity consumption under warmer climate conditions, space heating	Q_{HE}	kWh	8671	10552	12110	13267	15456

Information requirements for heat pump space heaters and heat pump combination heaters

COMMISSION REGULATION

(EU) No 813/2013 ANNEX II TABLE 2

				RE 28	RE 33	RE 38	RE 42	RE 48
	supplier’s name or trademark			Oilon	Oilon	Oilon	Oilon	Oilon
	supplier’s model identifier			RE 05 28	RE 05 33	RE 05 38	RE 05 42	RE 05 48
	air-to-water heat pump			-	-	-	-	-
	water-to-water heat pump			#	#	#	#	#
	brine-to-water heat pump			#	#	#	#	#
	equipped with a supplementary heater			-	-	-	-	-
	heat pump combination heater			-	-	-	-	-
	MEDIUM-TEMPERATURE APPLICATION (BRINE 0/−3 °C, WATER 47/55 °C), AVERAGE CLIMATE CONDITIONS							
	rated heating capacity	P_{rated}	kW	28	33	37	42	48

				RE 28	RE 33	RE 38	RE 42	RE 48
	seasonal space heating energy efficiency	η_s	%	160	159	160	158	157
	bivalent temperature	T_{biv}	°C	-	-	-	-	-
	cycling interval capacity for heating	P_{cych}	kW	-	-	-	-	-
	degradation coefficient	Cdh	–	0.9	0.9	0.9	0.9	0.9
	DECLARED HEATING CAPACITY AND COEFFICIENT OF PERFORMANCE FOR PARTIAL LOAD AT AN INDOOR TEMPERATURE OF 20 °C AND THE OUTDOOR TEMPERATURES AND FLOW TEMPERATURES GIVEN BELOW (BRINE 0/–3 °C)							
	−7 °C	Pdh	kW	27.5	33.0	37.1	41.5	48.2
	+2 °C	Pdh	kW	27.4	32.4	36.5	41.2	47.7
	+7 °C	Pdh	kW	27.4	32.0	36.2	41.1	47.3
	+12 °C	Pdh	kW	27.3	31.6	35.6	41.1	46.9
	−7 °C	Pdh	kW	27.6	33.2	37.3	41.7	48.3
	bivalent temperature	T_{biv}	°C	–10	–10	–10	–10	–10
	operating limit temperature (outdoor temperature)	TOL	°C	-	-	-	-	-
	DECLARED COEFFICIENT OF PERFORMANCE FOR PARTIAL LOAD AT AN INDOOR TEMPERATURE OF 20 °C AND THE OUTDOOR TEMPERATURES AND FLOW TEMPERATURES GIVEN BELOW (BRINE 0/–3 °C)							
	−7 °C	COPd	-	3.32	3.30	3.29	3.35	3.35
	+2 °C	COPd	-	4.18	4.14	4.06	4.14	4.11
	+7 °C	COPd	-	4.82	4.75	4.60	4.70	4.66
	+12 °C	COPd	-	5.55	5.42	5.21	5.30	5.30
	−7 °C	COPd	-	3.10	3.09	3.09	3.14	3.15
	bivalent temperature	T_{biv}	°C	–10	–10	–10	–10	–10
	operating limit temperature (outdoor temperature)	TOL	°C	-	-	-	-	-
	POWER CONSUMPTION							
	when the unit is in OFF mode	P_{OFF}	kW	0.0020	0.0020	0.0020	0.0020	0.0020
	when the thermostat is not requesting heat	P_{TO}	kW	0.0200	0.0200	0.0200	0.0200	0.0200
	on standby	P_{SB}	kW	0.0020	0.0020	0.0020	0.0020	0.0020
	in crankcase heating mode	P_{CK}	kW	0.0000	0.0000	0.0000	0.0000	0.0000
	SUPPLEMENTARY HEATER							
	rated heating capacity		kW	-	-	-	-	-
	type of energy input		-	-	-	-	-	-
	OTHER ITEMS							
	variable capacity control		-	-	-	-	-	-
	sound power level	L_{WA}	dB(A)	55–60	55–60	55–60	55–60	55–60
	brine volume flow rate (brine 0/−3 °C, brine solution: water–ethanol 30 m-%, water +47/+55 °C)		m3/h	5.63	6.77	7.61	8.56	9.94
	WATER HEATER							
	declared load profile		-	-	-	-	-	-

				RE 28	RE 33	RE 38	RE 42	RE 48
	daily electricity consumption	Q_{elec}	kWh/d	-	-	-	-	-
	Energy efficiency, DHW heating	η_{wh}	-	-	-	-	-	-
	NAME AND ADDRESS OF THE MANUFACTURER							
	Suomen Lämpöpumpputekniikka O, Unikontie 2, 62100 Lapua, Finland							

1) Specific precautions that shall be taken when the space heater is assembled, installed, or maintained: Pay attention to safety when tilting, lifting, carrying, or moving the unit. Always pay attention to electrical safety when working with or near electrical components. Always switch off electricity using the main switch and ensure that there is no voltage present before doing any electrical work. Pay attention to safety when handling refrigerant and compressor oil. Exposure to the high voltage, refrigerant or refrigeration oil in the unit can cause a serious injury. The weight of the unit presents a crushing hazard.

Disassembly, recycling and/or disposal at end-of-life: Recover the refrigerant and the compressor oil, transfer for recycling or disposal as required by applicable laws, rules, and regulations. The other components should also be recycled and disposed of in compliance with applicable laws, rules, and regulations.

The values presented in this document are rounded to the nearest integer in accordance with the regulation.

The values presented are based on the conditions and calculation rules presented in the regulation. The performance in a real system may differ from the values presented.

The values in the table apply only when calculation rules and assumptions specified in the ecodesign and energy labelling regulation are applied. The values for the actual building may differ considerably from those presented here.

Contact information of Oilon dealer:

Date of installation:

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