QVANTUM

Qvantum LB4

Air-to-water heat pump

Installation and user handbook

QCH EN 2526-A

1011661

CONTENTS

1 IMPORTANT INFORMATION

General

WARNING

Read this manual before starting the unit for the first time.

The installer is responsible for the installation and commissioning of the heat pump system. If you suspect the product is defective, contact your dealer.

Safety

This appliance can be used by children from 8 years and above and people with reduced physical, sensory or mental capabilities or lack of experience and knowledge if they have been given supervision or instruction concerning the use of the appliance in a safe way and understand the hazards involved. Children must not play with the appliance. Cleaning and maintenance must not be performed by children unless they are older than 8 and supervised.

The manual must be available for people who install, support or use the product.

Work must follow the instructions described in this manual. Companies and persons installing and maintaining the product must have the required certificates, licenses and qualifications.

The work must comply with current regulations and practices and be carried out professionally.

When powering up the product, there must be no frozen water in the system.

Wiring and electrical installation must be performed in compliance with national regulations.

It must be possible to safely disconnect the electrical power supply to the unit. Install the power supply with an isolator switch and size the cable area based on the fuse rating that is being used.

Symbols

The manual contains the following symbols

WARNING

This symbol describes information that is of great danger to people or equipment.

CAUTION

This symbol describes information that could cause danger to people or equipment.

NOTE

This symbol describes information that is crucial when installing or servicing the heat pump.

TIP

This symbol describes information that can be helpful when installing or servicing the heat pump.

Product labels

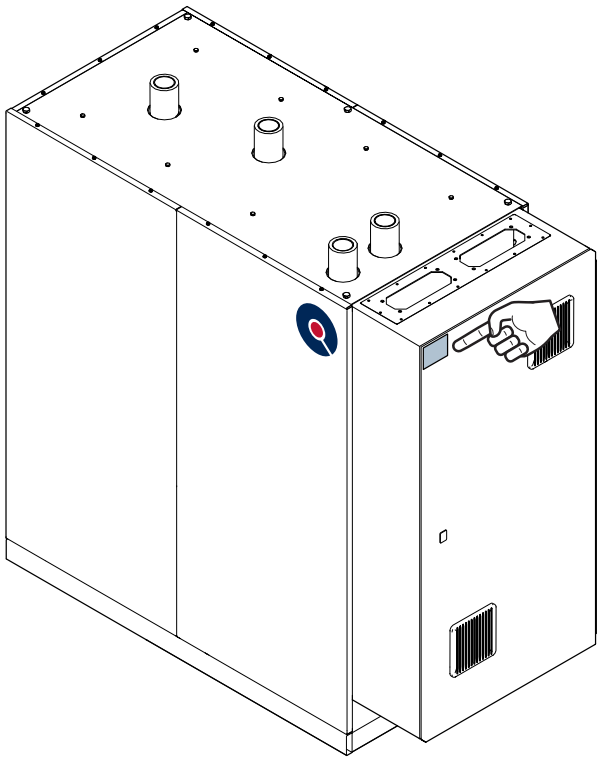
These labels are found on the product.

CE marking indicates that a product has been assessed by the manufacturer and deemed to meet EU safety, health and environmental protection requirements.

Serial number

The serial number for the LB4 is visible at the following locations:

- Electrical cabinet cover.
- On the chassis, inside the product.



Warranty terms

The warranty terms apply between Qvantum and its distributors/installers. These in turn determine the warranty conditions to be applied to their end customers. Only the distributor/installer is entitled to invoke the warranty against Qvantum.

The warranty applies to defects in design, materials or manufacturing. The warranty only applies to heat pump and any accessories supplied by Qvantum. The warranty does not applies to installation materials such as pipes, electrical installations or other external components.

NOTE

In order for the warranty to be effective, the installer must complete the commissioning protocol for the installation and send to Qvantum, no later than one month after the commissioning date.

NOTE

See separate document for warranty instructions.

Environmental Information

F-gas regulation (EU) No. 2024/573

This product contains a fluorinated greenhouse gas that is covered by the Kyoto protocol.

The equipment contains R407C, a fluorinated greenhouse gas with a global warming potential (GWP) of 1774. Do not release R407C into the atmosphere.

Recycling

At the end of the electrical products useful life, is must not be disposed of with household waste.

Recycle at waste facility. Check with your local authority or retailer for local recycling regulations.

2 SYSTEM DESCRIPTION

General

Qvantum LB4 is designed to be installed in systems where the brine consists of a mixture of water and antifreeze.

Enhanced Vapor Injection (EVI)

Qvantum LB4 heat pumps equipped with an EVI two-stage compressor that splits the compression phase into two parts.

In the first step, refrigerant gas from the evaporator enters the compressor in the same way as in a conventional compressor. In the second step, compressed gas is supplemented by new cold gas from the economizer (sub cooler). This increases the heat output as well as the Coefficient of Performance (COP). The gas temperature during the compression process is reduced which results in a higher flow temperature being achieved.

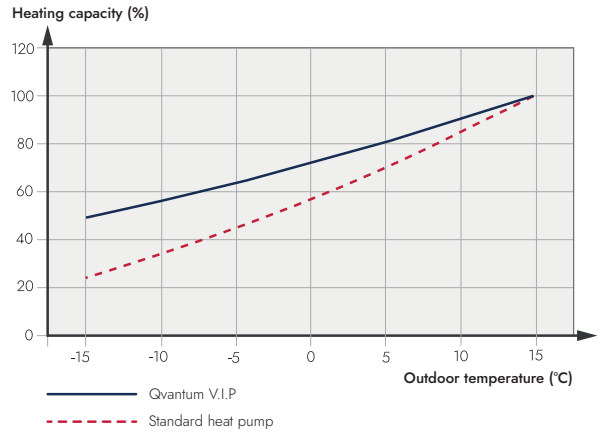
The heat pump delivers up to 65 °C supply temperature even at very low temperatures on the evaporator side.

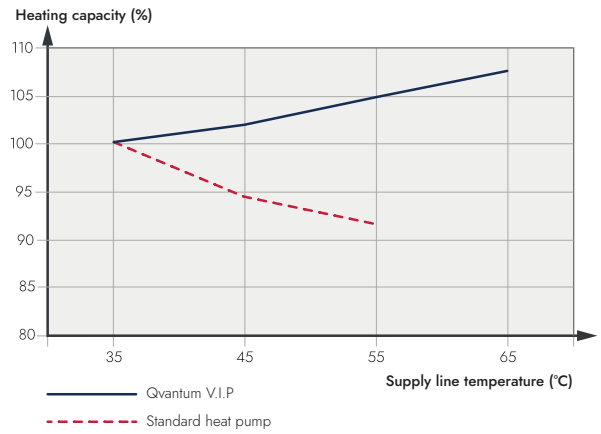
The heat pump transitions to liquid injection at extremely low outdoor temperatures to ensure safe operation of the compressors.

Benefits of EVI heat pumps:

- Higher heating capacity with increased supply temperature.
- Increased efficiency and COP, even at low temperatures.

Below is the difference in heating capacity between a standard heat pump and EVI heat pump:





Electronic expansion valve

Qvantum LB4 is equipped with the electronic expansion valves both for the main refrigerant circuit and the economizer circuit.

Product description

QvantumLB4 is built on a frame of galvanized square tubes with a sound-absorbing enclosure, consisting of powder coated steel panels with sound absorbing material inside.

The upper side is made out of textured aluminum. The top and bottom are also covered with sound absorbing material.

The Zinc-plated frame stands on four, five or eight adjustable feet, depending on the size of the product.

NOTE

See technical data for the product specifications.

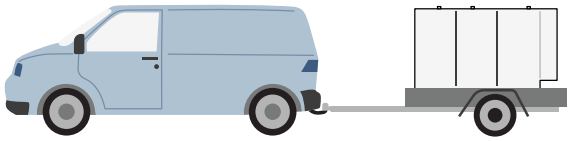
3 BEFORE INSTALLING

Delivery and handling

The product is factory tested and ready for installation upon delivery.

- The adjustable feet are delivered separately; they are temporarily attached to the top of the product or inside the product.
- The product is delivered on pallet with plastic protection.

Transport the product in an upright position. Ensure that the product is adequately secured so it does not fall down during transit.

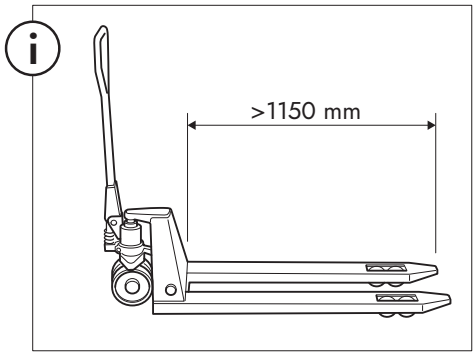


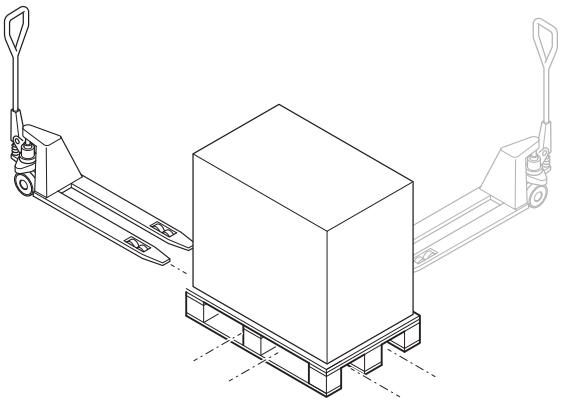
If the product must be tilted after arrival, always tilt it backwards.

CAUTION

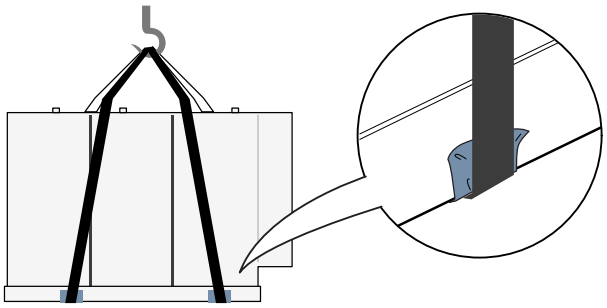
If the product has been tilted forward, a minimum waiting period of 24 hours must be observed before starting the compressors.

If using a trolley or hand truck when moving the product, always have the product standing on the pallet.





The product can be lifted if needed. Put soft material between the lifting strap and the product to prevent damage to the product cabinet.



CAUTION

Do not use the pipes on the product for lifting, as this may risk damaging internal components if the pipes become bent or burdened.

Installation area

Ensure that the following requirements are met before installation.

- Make sure the product stands on a stable and flat foundation.

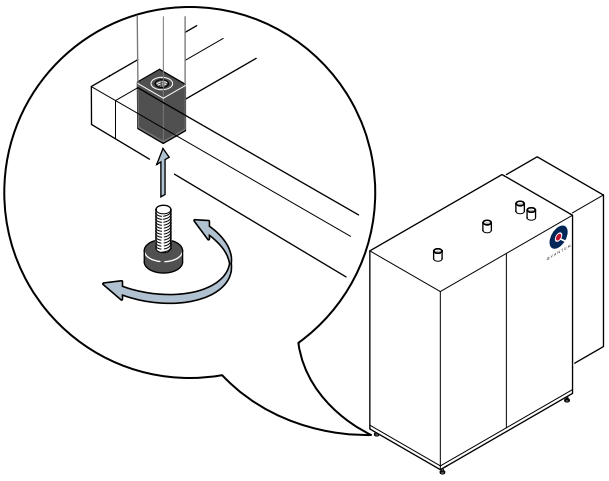
CAUTION

The product must not vibrate when it operates, as vibration leads to deformation due to the weight of the product.

- A separate foundation is not necessary for the installation.
- The product must be placed horizontally with the front side easily accessible, as the front cover needs to be removed for standard inspection and services.
- The adjustable rubber feet must be mounted on the bottom frame of the product before installation.

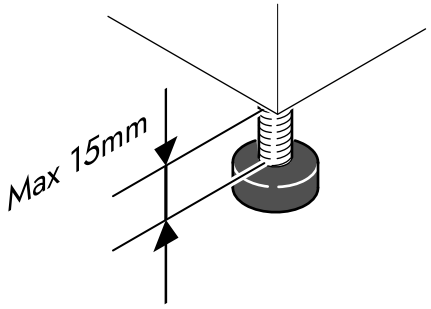
TIP

Rubber mats can be placed under the feet to prevent ground vibrations in sound-sensitive environments.



NOTE

Make sure the feet are not too long. The maximum allowed distance between the frame and the feet head is 15 mm.



Setup dimensions

WARNING

The safety distance for electrical cabinets must be maintained in accordance with the regulations in your country.

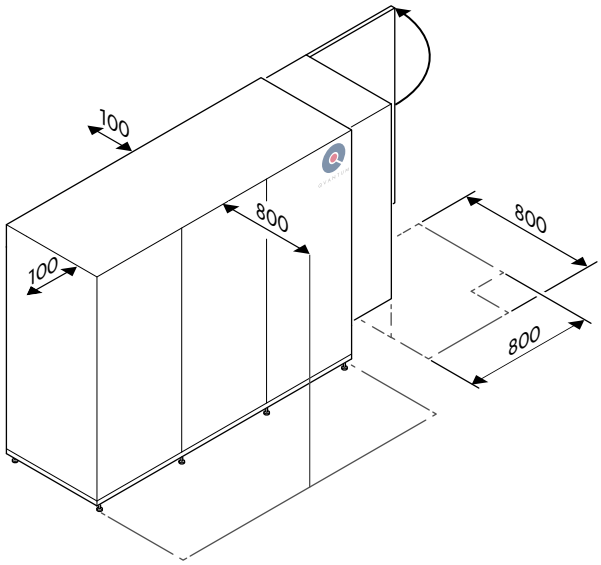
CAUTION

Maintain a minimum of 100 mm of free space between the product and surrounding walls in all directions.

It is recommended to have a minimum of 800 mm service distance available in front of the product.

NOTE

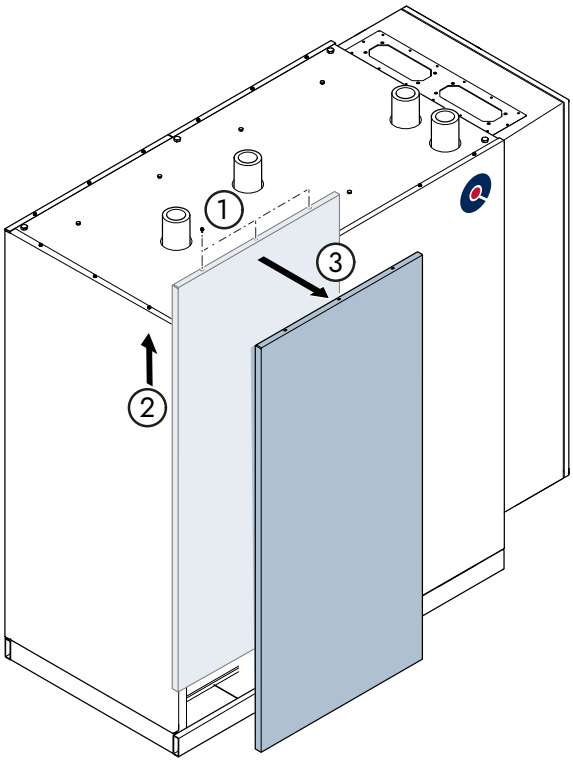
Maintain a minimum of 800 mm backing distance available in front of the electrical cabinet and its door.



Cover removal

All components inside the heat pump are easily accessible by removing the cover plates.

1. Remove the screws from the cover.
2. Lift the cover upwards.
3. Remove the cover from the product.

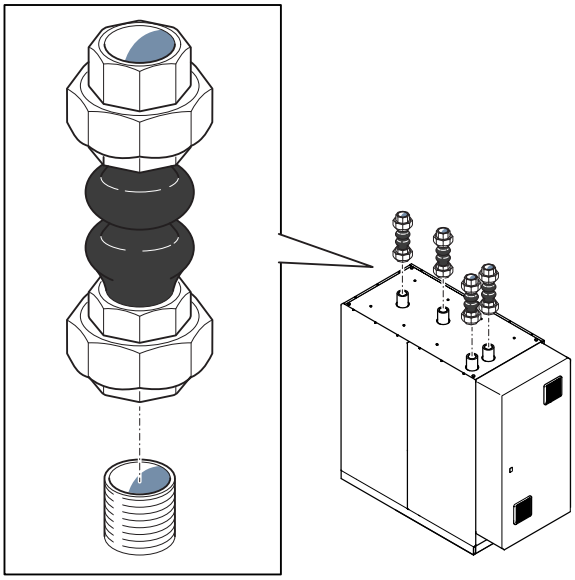


4 PIPE INSTALLATION

General

- Supply and return connections must be properly connected to their corresponding external systems. Follow the labels on the pipe connections.
- The pipes must be well-supported to ensure the safety of the heat pump connections.
- The product must not carry the loads from connecting pipes.

> *TIP*
>
> Install rubber compensators between the product and the external pipe connections. This will prevent vibrations from transferring into the pipe system. The rubber compensators are included in the accessory pack.

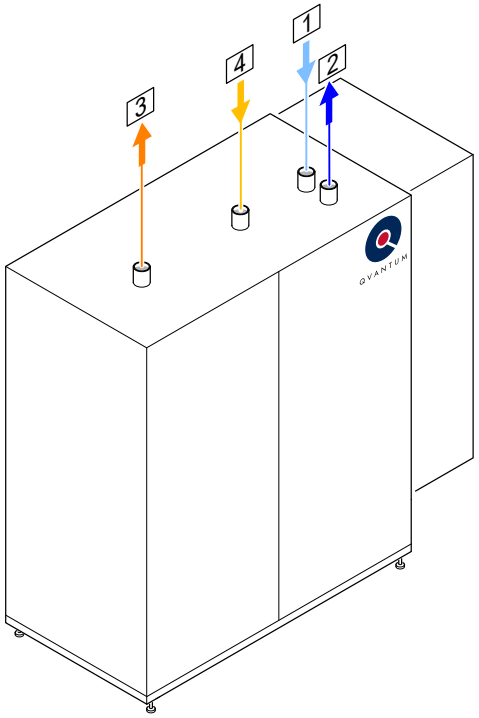


- All connecting pipes must be fully insulated up to the product´s frame.
- It is mandatory to install a strainer on both the source and sink sides. The strainer is included in the accessory pack.

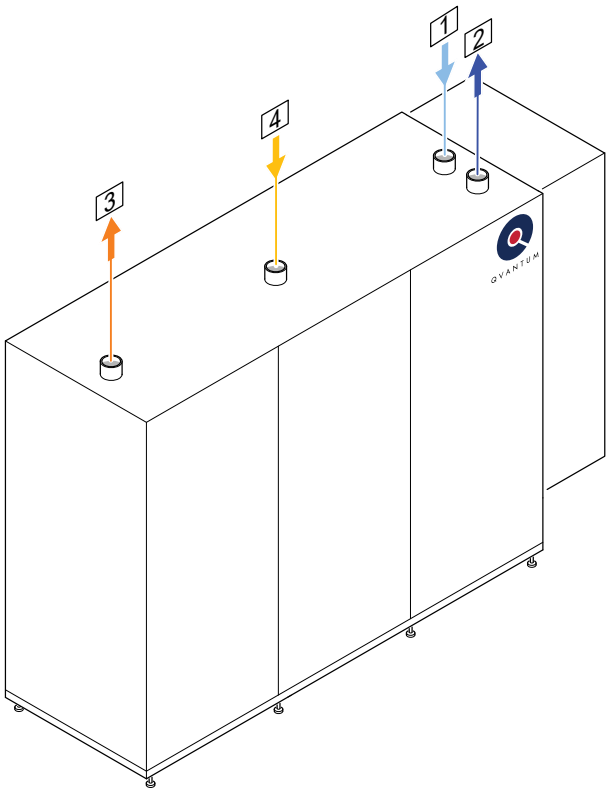
> *NOTE*
>
> The strainer installed on the sink side should have a maximum mesh size of 0.5 - 0.7 mm.

Pipe connections

The pipe connections on the LB4 are at the top.



PRODUCT	ITEM	CONNECTION	DIMENSION
Q65-Q96	1	Evaporator Inlet	DN50
	2	Evaporator Outlet	DN50
	3	Condenser Outlet	DN50
	4	Condenser Inlet	DN50
Q123-Q144	1	Evaporator Inlet	DN65
	2	Evaporator Outlet	DN65
	3	Condenser Outlet	DN50
	4	Condenser Inlet	DN50



PRODUCT	ITEM	CONNECTION	DIMENSION
Q162-Q192	1	Evaporator Inlet	DN65
	2	Evaporator Outlet	DN65
	3	Condenser Outlet	DN65
	4	Condenser Inlet	DN65

Brine system

- The standard design of the brine system is dimensioned for a total length of 2 x 25 meters between the indoor heat pump unit and the outdoor air coil. If longer distances are desired, the capacity of the brine pump can be increased.
- It is recommended to use 45% of ethylene glycol in the brine circuit to handle the low temperatures.
- Insulate the brine circuit with condensation insulation.

Expansion vessel

The brine circuit must be fitted with a pressure expansion vessel.

CAUTION

The pre-filled air pressure in the expansion vessel must be lower than the brine system's operating pressure. This ensures the expansion vessel functions correctly and absorbs pressure changes effectively.

5 ELECTRICAL INSTALLATION

General

WARNING

All electrical connections in the power supply system, both inside the heat pump and in external components, must be tightened after transportation and again after a few months of operation.

CAUTION

A unit operated with an incorrect voltage or excessive phase imbalance will invalidate the product warranty. The unit should not be switched on until corrective measures are taken if a phase imbalance exceeds 2% for voltage, or 10% for current.

The unit contains a complete electrical system with power distribution, controls, and alarm functions.

NOTE

The main switch should be installed on the incoming line.

NOTE

See wiring diagram for electrical installation.

Electrical connections

Circulation pumps

The circulation pumps (heat carrier and brine pumps) must be connected to the electrical system according to the wiring diagram.

External inputs

It is possible to connect wiring for auxiliary heat control using either a digital ON/OFF signal or an analogue 0-10V (DC) signal for capacity regulation.

The electrical system has the capability for connection to an external control system, external ON/OFF, export of alarm signals, running indication, and Modbus communication.

Temperature sensors

Temperature sensors (ST1, ST2, ST3, and ST4) are mounted on the heating system's supply and return pipes.

If there is a hot water boiler or an accumulator tank, temperature sensors (ST51) must be fitted in it. If mixing valves (CV31) are used, these must be connected to the control system.

An outdoor temperature sensor can be connected to the unit to utilize the heat pump's heating curve, compensating for the operating temperature based on the outside temperature.

The outdoor temperature sensor must be mounted on the north-facing wall.

If mixing valves are used in the heating system, the outdoor temperature sensor will also monitor the mixing valves.

The outdoor temperature sensor must be connected directly to the electrical system in accordance with the wiring diagrams.

ID	DESCRIPTION
ST1	Temperature sensor, brine inlet
ST2	Temperature sensor, brine outlet
ST3	Temperature sensor, condenser inlet
ST4	Temperature sensor, condenser outlet
CV31	Mixing valve, secondary side

Outdoor fan unit

- The electrical wiring to the outdoor unit is connected to the fan safety switch.
- The power supply could be 1~230V or 3~400V, depending on the model.
- The unit requires a 0-10V DC signal from the compressor unit. For this connection, a terminal box is installed on the fan unit.

6 COMMISSIONING

Commissioning, general

NOTE

Personnel authorized by Qvantum must be present during the start-up procedure. A correct start-up procedure reduces the risk of comfort disturbances.

Make sure to perform a thorough inspection and check the below points before starting the unit.

- Ensure that all the pipe and electrical connections are correct. See installation instructions.
- Cable ladders are not allowed to be placed between ceiling/walls and the unit.
- Make sure that the motor protection for the compressor is set according to the wiring diagram.
- If frost protection is used, ensure it is properly mixed in the correct proportion before commissioning.

CAUTION

Scroll compressors must be checked to ensure that they are moving in the right direction. This type of compressor must have the correct phase sequence. When the compressor moves in the wrong direction, it causes noise as the compressor fails to supply a reasonable working pressure at the same time as the suction pressure drops.

Preparations

1. Turn on the main switch for the electrical system. Check all fuses and that the motor protection switches are turned on.
2. Make sure that the compressor crankcase heater is activated.

   When the compressor starts, the crankcase heater automatically deactivates.
3. Ensure that the brine system is fully purged and that the pressure within the system is accurate.
4. Test the circulation pump (P2) in the brine system.
5. Press the **Manual on** button in the controller **Manual operation** setting to start the circulation pump manually.
6. Press the **Manual off** button in the controller **Manual operation** setting to stop the circulation pump manually.
7. Start and stop the circulation pump repeatedly to ensure that the brine system is fully purged.
8. Test the circulation pump (P1) in the heat carrier system.
9. Ensure that the heat carrier system is fully purged and that the pressure within the system is accurate.
10. The heat carrier pump can be operated either in parallel with the compressor or in continuous operation, depending on the system's configuration in the controller.

CAUTION

Make sure that all systems are completely secure. Check inside the heat pump to make sure that no damages or leaks have occurred.

First start-up

CAUTION

When powering up the product, there must be no frozen water in the system.

CAUTION

Make sure that the distribution system is fully purged and that there is no air in the system.

If Qvantum's control system is used, the circulation pumps start before the compressor starts.

NOTE

If the units are controlled externally, make sure that the circulation pumps are operating before starting the compressors.

1. Turn on the heat pump.

   Press the **On/Off** button on the controller's **Manual operation** setting to start the heat pump.

   NOTE

   Make sure that the heat pump is set to **Auto** mode.
2. The crankcase heater starts automatically when the power supply is on. The compressor is ready for start-up when it is heated to approximately 30-40 °C.

   TIP

   Touch the bottom of the compressor with your hand and feel the temperature.

   WARNING

   Do not touch the top of the compressor as it reaches very high operating temperatures.
3. Verify that no alarms are active and confirm there is a demand for the compressor to start.

   NOTE

   If alarms are indicated, alarms must be reset.

4. Make sure that the fans in the outdoor air unit start when the brine pump (P2) starts.
   The fans automatically turn off during the defrosting mode; this is an automated function preset from the factory.
5. The Qvantum control system starts the compressor after a preset delay of maximum five minutes.
6. Make sure that the temperature of outgoing water heating increases after the compressor starts.

   When the heat pump starts, it bubbles strongly in the sight glass for a short period of time. The bubbles eventually subside and should disappear in about two to three minutes.

   > *NOTE*
   >
   > The product use the refrigerant R407C, which may cause some bubbles during regular operation.

7. Listen carefully for noise in the system.
8. Check the temperature difference (ΔT) between the condenser outlet (ST4) and inlet (ST3) in the heat pump flow diagram on the controller interface.
9. Check the temperature difference (ΔT) between the evaporator inlet (ST1) and outlet (ST2) in the heat pump flow diagram on the controller interface.

Fill in the protocol. For recommended values, see Technical Data.

Protocol

When the unit is in operation and all adjustments are done, temperatures can be measured to complete the start-up protocol.

All remarks noted during the start-up must be cleared before the protocol is completed.

> *NOTE*
>
> The start-up protocol must be completed by a technician and submitted to the authorized dealer.

7 USER INTERFACE

General

Qvantum LB4 is equipped with the X-pro controller, which can further communicate with a BMS (Building Management System) with full read and write access.

Communication

The X-pro has a built-in network connection for LAN/WAN. You can also use the X-pro with a 4G router.

Alarms can be sent and acknowledged via email and SMS.

Modbus server TCP

Connect the Modbus server TCP to the RJ45 port on each heat pump.

DEFAULT NETWORK SETTINGS	
Net mask	255.255.255.0
Gateway	192.168.73.1
TCP port	502
Master heat pump HP01 - IP address	192.168.73.101
Slave unit HP0(x)	192.168.73.10(x)
Industrial PC	192.168.73.100

Connections

The user can connect to the X-pro user interface by using the IP addresses in the default network settings table.

To connect, make sure that your client device is in the same network as the X-pro.

Log in

When you log into the X-pro user interface, the system prompts you to enter a password.

Auto login is available for each facility, and the data is specific to each user profile.

The user password is preset from the factory. The user can change the password using the X-pro operator program.

NOTE

Contact Qvantum support to get user credentials.

Role-based access control

X-pro gives different user access levels to operate and set up the heat pump system.

USER LEVEL	DESCRIPTION
End user	End users can adjust the domestic hot water (DHW) and low-temperature hot water (LTHW) settings. End users car see the current operating status in the system overview and the heat pump flow diagram. They can read logs, see active alarms, and acknowledge specific alarms.
Service	Service users can use the **Service settings** for maintenance, diagnostics, and service-level adjustments.
Install	Install users can use the **Manual operation**, **Install settings** and **Service settings** needed during installation.

System status

Status and value indications on the display

STATUS	DESCRIPTION
< 45,0 °C	A grey button with yellow text shows a warning threshold.
20,0 °C	A grey button with blue text shows a set point.
0,0 °C	A grey button with red text shows an alarm threshold. If the values go above or below the thresholds, the system will trigger an alarm.
Off	A red button or filed shows an active alarm.
Blk Off	A yellow button shows that the output is forced or blocked and does not operate in automatic mode. • **Man Off**: It shows that the user has set the system to manual off mode. • **Man On**: It shows that the user has set the system to manual on mode.
~~Off~~	A strike-through value shows a hardware or network problem.

Log view

Press the log view  button to see the log details for the settings associated with the log.

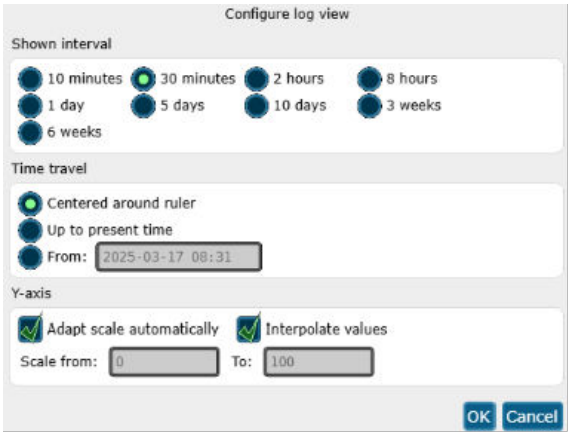
The system displays the logs in a chart. The logging chart includes a ruler.

The user can move the ruler to read exact values for each log.

Move the ruler by clicking and dragging it in the diagram.

- Click the back button to move the diagram backward in time.
- Click the forward button to move the diagram forward in time.

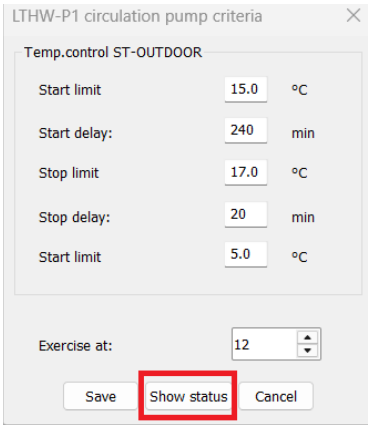
Select the **Settings** button in the log view to configure the log view.



- To change the displayed interval, select the **From** button in the time travel dialog box.
- In the interval dialog box, choose the interval duration.
- The specified interval is shown around the time indicated by the ruler position.

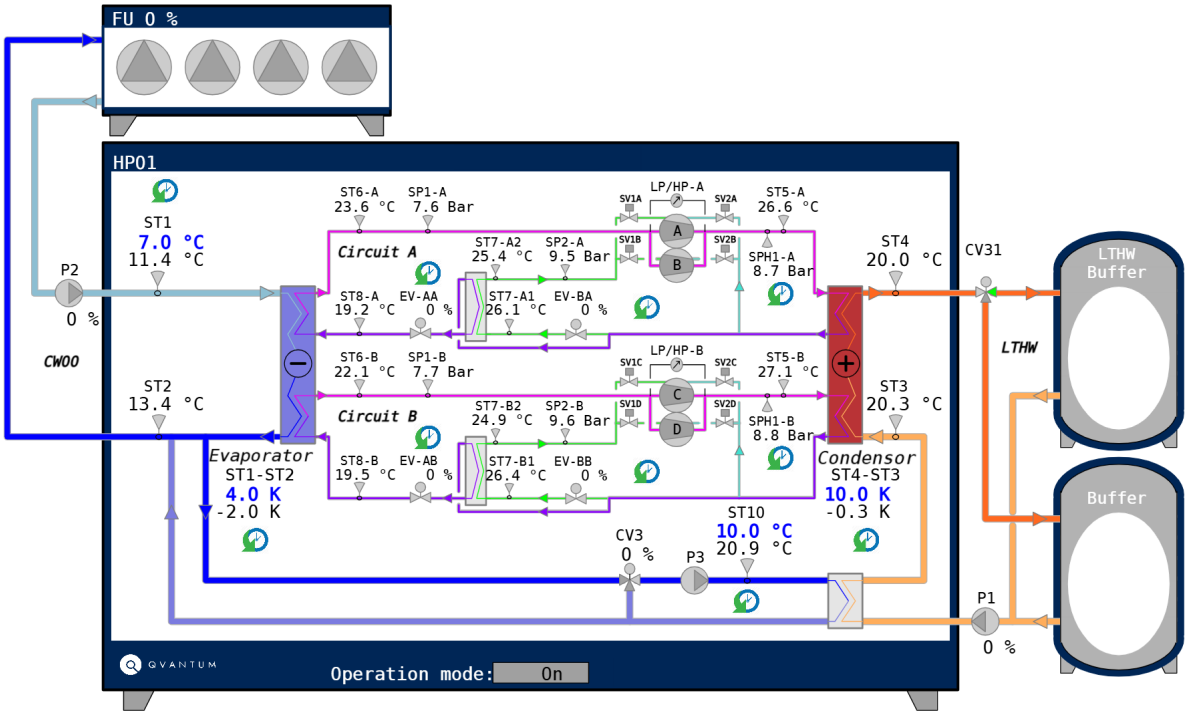
Show status

Select **Status** in the settings dialog box to view a dynamic summary of the parameters currently processed by the controller. This includes input and output signals as well as certain internal states.



This dialog is useful for commissioning and troubleshooting . It requires a good understanding of control settings and the controller software.

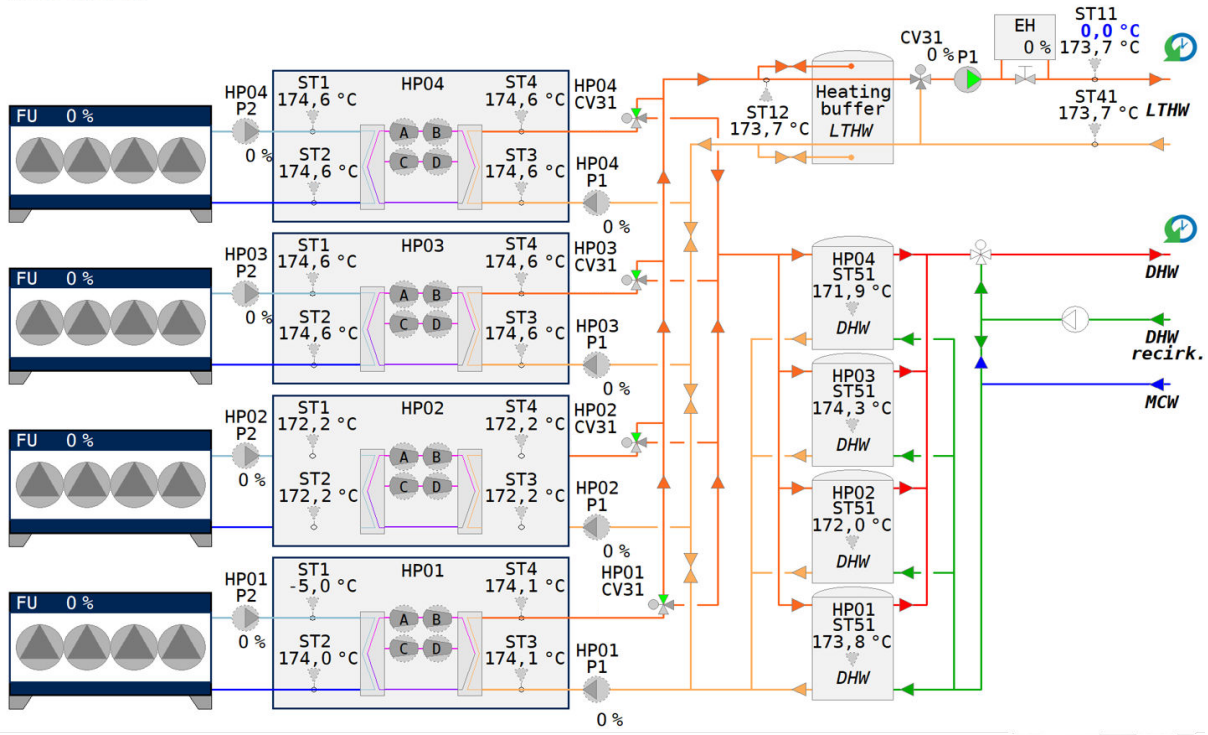
Flow diagram



The heat pump flow diagram shows the following details:

- Current heat pump operating mode.
- Controller output demand for the fan unit, the valves, and the circulation pumps.
- The actual, set point and differential values for the temperature sensors.
- The actual values for the pressure sensors.
- Calculated evaporating temperatures (ST8-A, ST8-B, ST7-A1, ST7-B1).

System overview



The system overview shows the following details:

- Controller output demand for the fan unit, the valves, the circulation pumps, and the external heater.
- Current values of the temperature sensors.

Component symbols

	Circulation pump
	Compressor
	Heat exchanger
	Expansion valve
	Manual valve
	High/Low pressure switch
	Three-way valve
	Temperature sensor
	Solenoid valve

Component list

The X-pro uses a prefix to identify external components.

PREFIX	DESCRIPTION
HP0x[1]	Heat pump
DHW	Domestic hot water
LTHW	Low temperature hot water (heating system primary and secondary side)

1 "x" shows the heat pump ID

Internal components

ID	DESCRIPTION
Temperature sensors	
ST1	Temperature sensor, brine inlet
ST2	Temperature sensor, brine outlet
ST3	Temperature sensor, condenser inlet
ST4	Temperature sensor, condenser outlet
ST5-A	Temperature sensor, desuperheater, circuit A
ST5-B	Temperature sensor , desuperheater, circuit B
ST6-A	Temperature sensor, suctions gas, circuit A
ST6-B	Temperature sensor, suctions gas, circuit B
ST7-A2	Injection temperature, circuit A
ST7-B2	Injection temperature, circuit B
ST10	Temperature sensor, defrosting
Pressure transmitters and pressure switches	
SP1-A	Pressure transmitter, low pressure, circuit A
SP1-B	Pressure transmitter, low pressure, circuit B
SP2-A	Pressure transmitter, economizer, circuit A
SP2-B	Pressure transmitter, economizer, circuit B
SPH1-A	Pressure transmitter, high pressure, circuit A
SPH1-B	Pressure transmitter, high pressure, circuit B
LP/HP-A	High/Low pressure switch, circuit A
LP/HP-B	High/Low pressure switch, circuit B
Control valves	
EV-AA	Expansion valve A, circuit A
EV-AB	Expansion valve A, circuit B
EV-BA	Expansion valve B, circuit A
EV-BB	Expansion valve B, circuit B
SV1A	Solenoid valve VIP, compressor A
SV1B	Solenoid valve VIP, compressor B
SV1C	Solenoid valve VIP, compressor C
SV1D	Solenoid valve VIP, compressor D

ID	DESCRIPTION
SV2A	Solenoid valve LIP, compressor A
SV2B	Solenoid valve LIP, compressor B
SV2C	Solenoid valve LIP, compressor C
SV2D	Solenoid valve LIP, compressor D
CV3	Mixing control valve, defrosting
Circulation pumps	
HP0x-P3	Circulation pump, defrosting

External components

ID	DESCRIPTION
FU	Fan unit
EH	External heater
Temperature sensors	
ST-OUTSIDE	Temperature sensor, outdoor
LTHW-ST11	Temperature sensor, secondary side, supply
LTHW-ST12	Temperature sensor, primary side, supply
LTHW-ST41	Temperature sensor, secondary side, return
ST51	Temperature sensor, DHW tank
Circulation pumps	
HP0x-P1	Circulation pump, heat carrier
HP0x-P2	Circulation pump, brine
LTHW-P1	Circulation pump, heating system
Control valves	
HP0x-CV31	Diverting control valve
LTHW-CV31	Mixing control valve, secondary side

Set point types

The controller uses the following set point types.

External set point

The controller uses an external set point when it gets the set point from an external source or calculation.

> *NOTE*
>
> External set points cannot be changed in the controller settings.

Manual set point

The controller uses a manual set point when its does not depend on external factors.

> *NOTE*
>
> You lock the set point to the value you enter in the set point settings. However, internal or external adjustments can change the set point.

Curve set point

Curve set point means the set point changes based on another signal, usually the outside temperature.

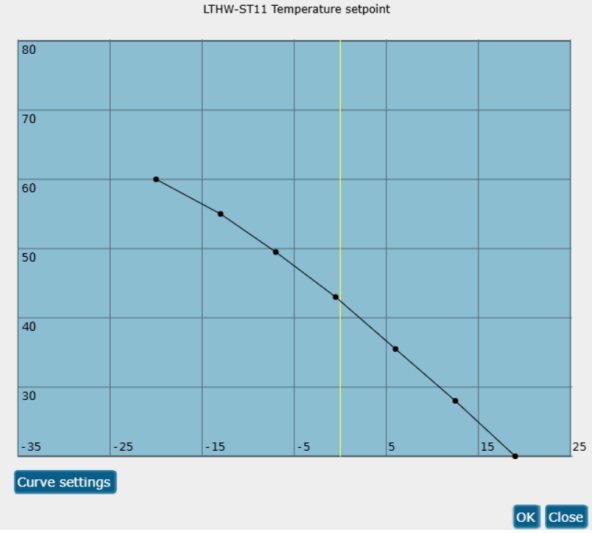
Curve set point adjustment

Adjust the curve set point by selecting the specific curve settings.

> *TIP*
>
> Ensure the curve is smooth and logical. Avoid sudden changes that can cause operational problems.

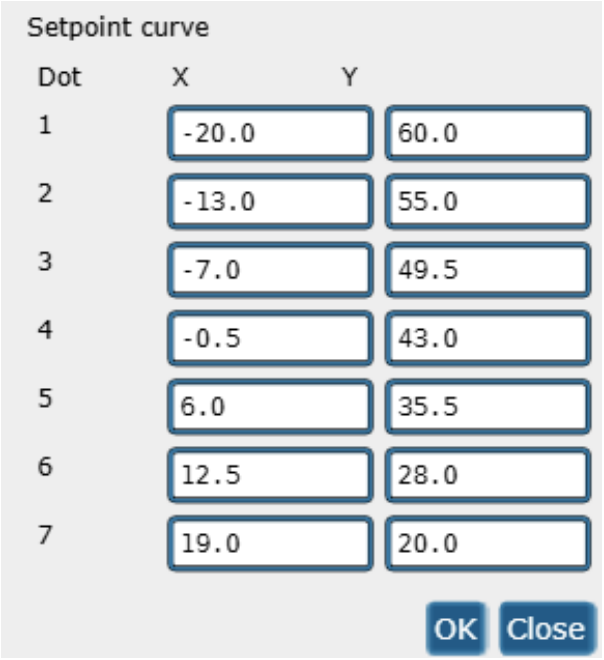
1. In the dialog box that appears, the current set point curve is displayed.

   The set point curve consists of seven breakpoints.



2. Click and hold the curve point that you wish to adjust.
3. Drag the point up or down to adjust the curve.
4. Select the **Curve settings** to enter the set point values manually.

   Enter the set point values for the X and Y axes of the curve.



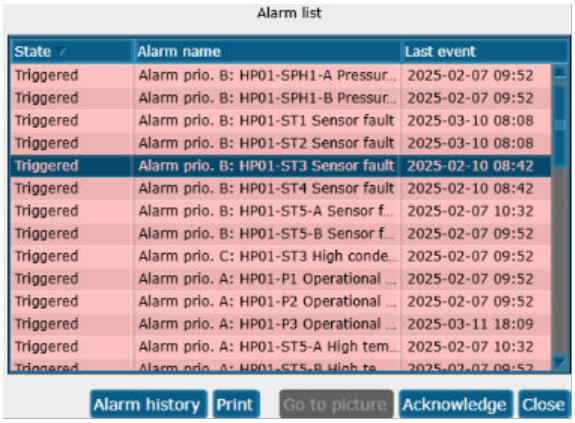
5. Press the **OK** button to update the curve settings.

Alarm handling

An alarm is triggered if an event in the heat pump system requires special attention.

The alarm line at the bottom of the display shows the most recent alarm with the highest priority.

To open the **Alarm list**, press the red indicator on the alarm line.



An alarm can have four states. Each state shows a different background color.

ALARM STATUS	COLOR	DESCRIPTION
Triggered- not acknowledged	Red	The alarm is active and not acknowledged.
Triggered-acknowledged	Yellow	The cause of the alarm remains, but the alarm is acknowledged.
Returned- not acknowledged	Green	The cause of the alarm is gone, but the alarm is not acknowledged.
Blocked	Blue	The alarm is blocked. This is used during maintenance.

The alarm list shows more information about the alarms.

Alarm history: Check the alarm history.

Print: Print the active alarm list.

Acknowledge alarm

To acknowledge an alarm, select the alarm in the alarm list and press **Acknowledge**.

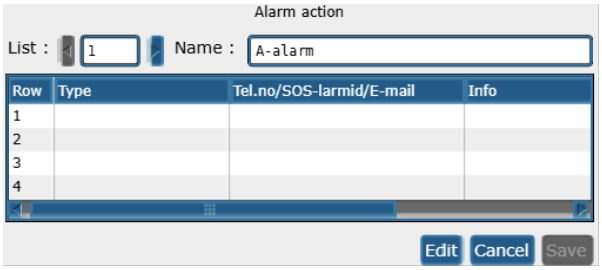
- When an alarm triggered, it automatically changes to the triggered-not acknowledged state.
- If the cause of the alarm disappears before you acknowledge it, the alarm changes to returned-not acknowledged state.
- When you acknowledge the alarm, it disappears if the cause of the alarm is corrected.
- If the cause of the alarm is not corrected, the alarm changes to the triggered-acknowledged state.

Alarm action list

When an alarm triggered, the system automatically sends the alarms to the receivers in the alarm action list.

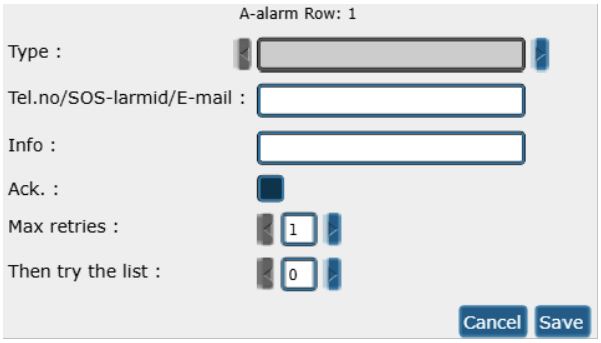
To set up the alarm action list, select the settings icon in the top-right corner of the interface.

1. Press the **Alarm action** button to display the list.



> *TIP*
>
> The user can set four receivers for each alarm group.

2. Double-click the row to edit the alarm action list.
3. Enter the receiver's email address and information.



4. Set the maximum number of retries if the system fails to send the alarms to the receiver on the first attempt.
5. Select the list number to choose a different receiver if the first receiver does not respond or is not available.
6. **Save** the changes after you enter the details.

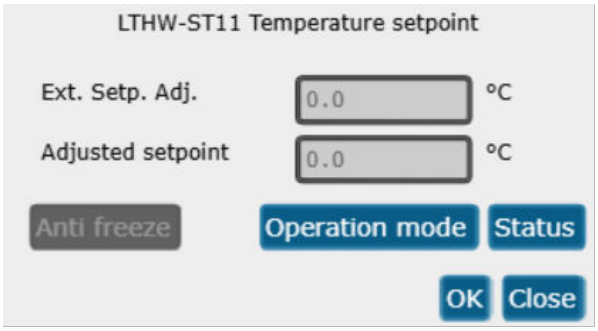
> *NOTE*
>
> If the alarm is active but not acknowledged, the system does not send the alarm again.

Operation mode

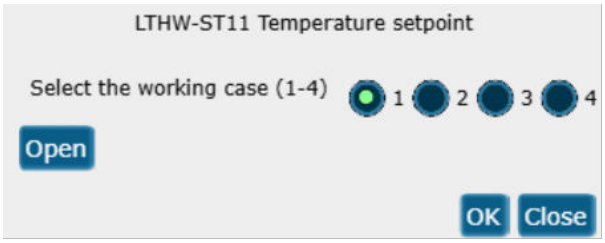
The following settings include the **Operation mode** settings for the temperature set points.

- **LTHW-ST11 set point during defrost** > **Set point**
- **LTHW-ST11 supply temperature** > **Set point**
- **Delta temp. ST1-ST2** > **Set point**
- **Source temp. ST1** > **Set point**
- **Delta temp. ST4-ST3** > **Set point**
- **Defrost temp. ST10** > **Set point**
- **Defrost temp. ST2** > **Set point**

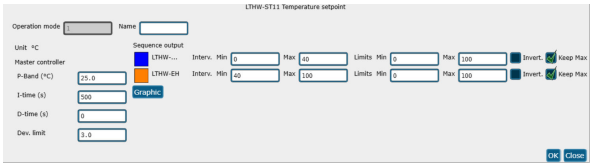
Press the **Set point** button to access the operation mode setting.



Operation mode shows different working cases.



Select **Open** to configure the working case.



Dev. limit	Set the deviation alarm limit for the controller. This setting defines the acceptable range of deviation between the actual temperature and the set point. If the deviation exceeds this limit, an alarm is triggered.
Interv. Min/Max	Set the step within the controller's output signal range. Normally, set these to 0% and 100% if there is only one sequence.
Limits Min/Max	The minimum and maximum output level for the components. Normally, set these to 0% and 100% if you do not want to limit the output signal from this step.
Invert.	Type inverted. This is a factory setting and must not be changed.
Keep Max	This shows if the step should keep the maximum output signal after the controller's output signal crosses the step's interval limit.
P-band	The P-band shows the error in °C that provides full gearing. A small P-band gives fast regulation, but a very small P-band causes unstable regulation.
I-time	The time required to reach full gear when the error is constant and equal to the P-band. The I-time removes residual errors. A small I-time removes residual errors quickly but can cause instability.
D-time	The D-time helps to make sluggish systems faster. If D-time is used, it is usually set between 1/4 to 1/10 of the I-time. To achieve good regulation in building automation, D-time is normally not needed and is set to 0.

CAUTION

For certain signal types, some of the above parameters are not applicable and must not be set.

Settings

This page allows the user to control and monitor the settings for domestic hot water (DHW) and low-temperature hot water (LTHW).

Settings	Heating system LTHW[1]	
	Hot water DHW[1]	
	Pool heating PS01[21]	
	PS01 install settings[2]	
	DHW install settings	DHW heat pump demand
		Hot water DHW
		DHW electric heaters[2]
	LTHW install settings	Heating system LTHW
		LTHW heat pump demand
		LTHW external heat demand

1 Settings that the end-user can access.
2 An accessory is required.

Settings, general

The X-pro controller menu shows different setting types.

- Set point : These are the user-defined parameters or target values (indicated in blue text)
- Factory settings: These are the default settings provided by the manufacturer.
- Dynamic values: These are the real-time data and diagnostics about the system performance.
- Maneuver modes: This lets user switch between different operating modes.

NOTE

The minimum and maximum ranges appear at the top of the dialog box when you select a setting value.

Expansion module

The Qvantum expansion module includes accessory settings for pool heating, the immersion heater, and DHW recirculation.

NOTE

The settings are available only if the required accessories are installed in the system.

Heating system LTHW

Heating operating criteria

This setting allows the user to adjust the operating criteria for the heating system circulation pump (LTHW-P1).

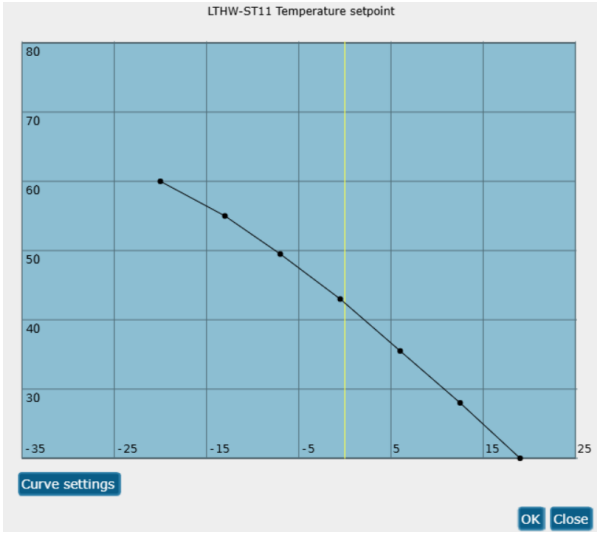
Start limit (delayed)	The circulation pump starts at this outside air temperature. The circulation pump starts when the outside air temperature is below the specified limit for the time set by the **Start delay**.
Start delay	The delay time before the pump starts after the start temperature is reached.
Stop limit (delayed)	The circulation pump stops at this outside air temperature. The circulation pump stops when the outside air temperature is above the specified limit for the time set by the **Stop delay**.
Stop delay	The delay time before the pump stops after the stop temperature is reached.
Start limit (instant)	Outside air temperature start limit: instantaneous.
Exercise at	Exercise time shows the time of day to exercise the pumps.
Status	Shows the current status of the circulation pump.

Save the changes after you enter the values.

LTHW-ST11 set point type

The setting shows the selected set point type.

LTHW-ST11 set points



Curve set point	Set the curve set point for the supply temperature on the secondary side of the heating system based on the outside temperature. *TIP* Only applicable when the **LTHW-ST11 set point type** is set to **Curve**.
Curve settings	Manually enter the set point values. • Set the values for the outside temperature on the X-axis of the curve. • Set the values for the supply temperature on the Y-axis of the curve.
Fixed set point	This setting keeps a constant supply temperature on the secondary side of the heating system, regardless of the outdoor conditions. *TIP* Only applicable when the **LTHW-ST11 set point type** is set to **Fixed**.

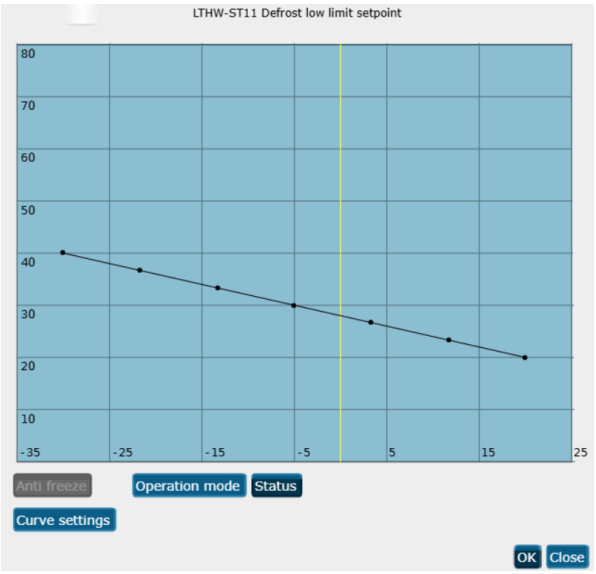
LTHW-ST11 set point offset

This setting allows the user to set the offset temperature for the supply temperature on the secondary side of the heating system. This applies to a **Fixed** or a **Curve set point**.

NOTE

A **Fixed set point** is often used when a SCADA system writes the value. An offset can also adjust the set point from a SCADA system.

LTHW-ST11 set point during defrost



Curve set point	Set the curve set point to keep a minimum supply temperature on the secondary side of the heating system during defrost cycles based on the outside temperature.
Curve settings	Manually enter the set point values. • Set the values for the outside temperature on the X-axis of the curve. • Set the values for the minimum supply temperature limit during defrost on the Y-axis of the curve. The external heater produces heat up to this limit.
Operation mode	Use this setting to control the external heater (EH) sequence output.

LTHW-ST11 supply temperature

This allows the user to monitor the current set point and actual supply temperature on the secondary side of the heating system.

Hot water DHW

HP0x-ST51 DHW production limits

These settings allows the user to set the start and stop limits for domestic hot water production.

> **NOTE**
>
> If the system has more than one domestic hot water tank, the temperature value is an average.

Start	Set the start temperature limit for the domestic hot water production. The hot water production starts when the tank temperature goes below this limit.
Stop	Set the stop temperature limit for the domestic hot water production. The hot water production stops when the tank temperature reaches this limit.
Actual	This is the current water temperature in the domestic hot water tank.
Alarm	This is the alarm set point. It triggers an alarm if the water temperature goes below this limit.

DHW install settings

This page shows the domestic hot water settings for installers.

DHW heat pump demand

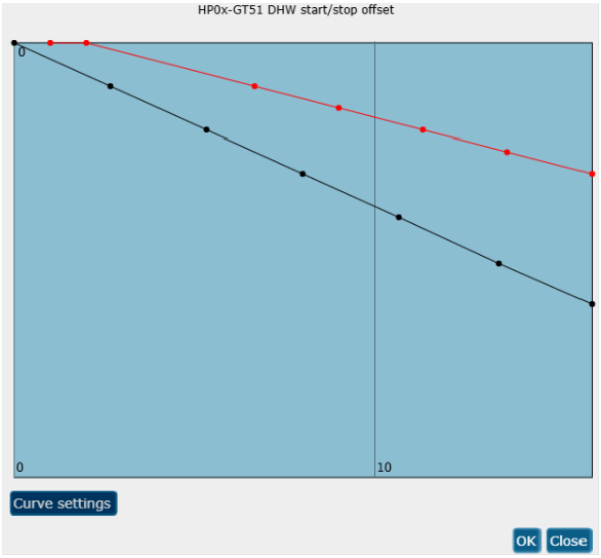
These settings controls the compressor demand for the domestic hot water production. The system responds to demand changes to keep a steady supply of hot water.

ST51 DHW tank average temp.

This setting allows the user to monitor the domestic hot water tank average temperature.

Start compressor	The start compressor value is the temperature at which the next compressor activates based on demand. This usually happens when the tank temperature goes below the **Start compressor** set point.
Actual	This is the current water temperature in the domestic hot water tank.
Stop compressor	The stop compressor value is the temperature at which a compressor is deactivated when there is no demand. This usually happens when the tank temperature reaches the **Stop compressor** set point.
Demand	This shows the number of compressors in demand.

Start/stop next compressor



> **NOTE**
>
> The offset curve to reduce compressors based on hot water demand can only be configured through the X-pro user interface and cannot be adjusted or controlled from a SCADA system.

Settings	Set the curve to decide when to start and stop the next compressor based on the water temperature in the domestic hot water tank.
Curve settings	Manually enter the start/stop offset values.
Start offset	This offset curve allows the user to add additional compressors to the hot water demand. • Set the compressor demand values for domestic hot water on the X-axis of the curve. • Set the values for the temperature difference from the **HP0x-ST51 DHW production limits** > **Start** set point on the Y-axis of the curve.
Stop offset	This is the temperature difference below the **Stop** limit that determines when the compressor is deactivated.

- If the **Start compressor** set point is 50°C and the start offset is 5°C, the compressor will start when the tank temperature drops to 45°C.
- If the **Stop compressor** set point is 50°C and the stop offset is 3°C, the compressor will stop when the tank temperature reaches 47°C.

LTHW install settings

This page shows the low-temperature hot water settings for installers.

Heating system LTHW

Heating operating criteria

This setting allows the user to adjust the operating mode and criteria for the heating system circulation pump (LTHW-P1). For operational criteria of the circulation pump, see the settings page.

Auto	The pump operates automatically based on system settings and external inputs. This is the default mode. It ensures the pump runs only when needed.
Manual On	The pump operates continuously, ignoring system demand and external conditions.
Manual Off	The pump is turned off, ignoring system demand and external conditions.

Supply temp. set point type

This setting enables the user to select between **Curve** and **Fixed** set point types.

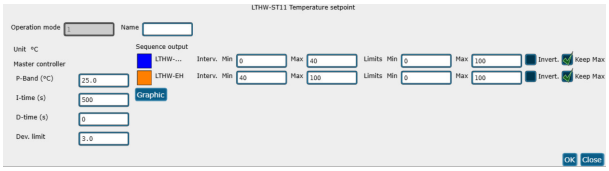
LTHW-ST11 supply temperature

This setting lets the user control the supply temperature set point on the secondary side of the heating system (LTHW-ST11).

Set point	This shows the supply temperature set point on the secondary side.
Actual	This shows the current supply temperature on the secondary side.

Operation mode

Press the **Set point** button to access the settings for the **Operation mode**.



Interv. Min/Max	Set the controller demand to operate the external heater (LTHW-EH) and mixing control valve (LTHW-CV31) in sequence to reach the required output.
Limits Min/Max	Set the minimum and maximum operating range for the mixing control valve and external heater.

LTHW-CV31 mixing valve

This setting allows the user to control the supply temperature on the secondary side by using the mixing valve in both **Auto** and **Manual** modes.

Auto	The system automatically adjusts the mixing valve based on the **LTHW-ST11 supply temperature** set point.
Manual	Manually set the output signal value for the controller demand. *TIP* During the defrost cycle, the mixing valve value is yellow and shows **BLK0%**. This indicates that the valve is blocked, and the manual value is not used.

LTHW-ST11 set point during defrost

This setting allows the user to control the supply temperature **Set point** on the secondary side of the heating system (LTHW-ST11) during defrost with an external heat source (LTHW-EH).

TIP

See the front page of the settings for detailed information.

LTHW-EH external heater

This setting allows the user to set the external heater to **Auto** or **Manual** mode.

NOTE

Make sure that the external heater is activated and adjusted when the outside temperature gets close to the defrost low limit set point.

Auto	The system automatically activates the external heater based on the defrost low limit **Set point**.
Manual	Manually set the output signal value for the controller demand.
Runtime	This indicates the runtime hours for the external heater.

LTHW-CV31 exercise time

Off delay: Set the time delay for the mixing valve to fully open after the heating system circulation pump (LTHW-P1) is exercised.

LTHW-CV31 release valve

The mixing valve (LTHW-CV31) is blocked during the defrost cycle. The valve is released when the supply temperature on the primary side (ST12) exceeds the supply temperature on the secondary side (ST11).

Diff.	Set the required supply temperature difference between the primary side and the secondary side.
ST11	Current supply temperature on the secondary side.
ST12	Current supply temperature on the primary side.
Blocking status	The current status of the mixing valve during the defrost cycle.

LTHW heat pump demand

LTHW-ST12 set point offset

This setting makes sure that the system responds to heating demands without large temperature changes or delays.

Diff.	Set the required supply temperature difference between the primary side and the secondary side.

LTHW-ST12 supply temperature

This allows the user to monitor the settings for the supply temperature on the primary side of the heating system (ST12).

Set point	This indicates the set point for supply temperature offset for the primary side.
Actual	Current supply temperature on the primary side.

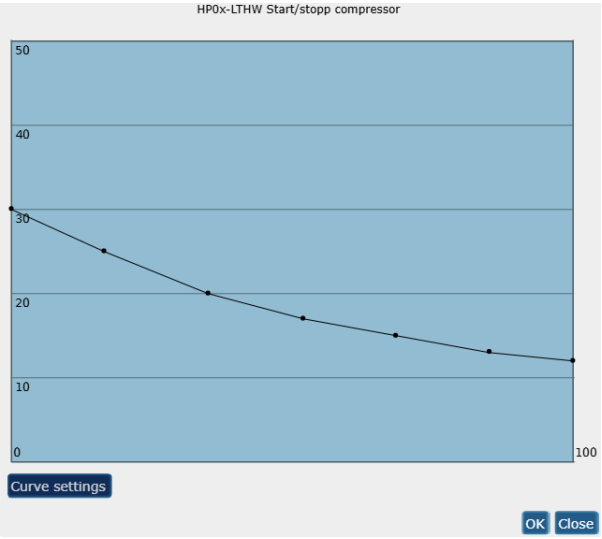
LTHW-ST12 degree minutes

The setting shows the degree minutes calculation for the supply temperature on the primary side of the heating system (ST12).

The system calculates the degree-minutes over time based on the difference between the supply temperature and the set point.

Start compr.	This indicates the set point for the start compressor degree-minutes. The controller starts the next compressor to give additional capacity when the actual degree-minutes are less than the **Start compressor** degree-minutes.
Stop compr.	Set point for the stop compressor degree-minutes. The controller stops one compressor when the actual degree-minutes are higher than the **Stop compressor** degree-minutes.
Actual	This indicates the current degree-minutes for the primary side supply temperature. The install users can adjust the actual degree-minute value for the compressors to increase or decrease demand immediately.
Demand	This indicates the number of compressors in demand. The install users can adjust the compressor demand by selecting the **Demand** button.

Start/stop next compressor



Settings	The curve settings set the thresholds for when the next compressor starts or stops, based on the combined heat demand and degree-minutes.
Curve settings	Manually enter the values. • Set the values for the heat demand on the X-axis of the curve. • Set the values for the LTHW-ST12 degree-minutes on the Y-axis of the curve to increase or decrease the demand for one compressor.

LTHW external heat demand

This setting lets users control the degree-minutes calculation to start and stop the external heat source.

EH limit for °min LTHW-ST11

The external heater (EH) uses its own degree-minutes calculation.

Diff.	Set the difference between the secondary side supply temperature (LTHW-ST11) set point and the actual temperature.
Actual	The current supply temperature on the secondary side.
Set point	Temperature threshold for the degree-minutes calculation.

Control logic

Start condition (EH): If the sum of **Diff.** and the actual value is less than the **Set point**.

Reset condition (EH): If the sum of **Diff.** and the actual value is greater than or equal to the **Set point**.

> *NOTE*
>
> The system does not calculate degree-minutes until the sum of **Diff.** and the actual value becomes less than the **Set point** again.

Start external heat source

The external heater starts when the actual degree-minutes are less than the **Start EH** degree-minutes.

Start EH	Set point for the start EH degree minutes. When the external heater starts, the degree-minutes are reset to 0.
Actual	This shows the current value of the calculated degree-minutes. The install users can adjust the actual degree-minute value for the external heater to increase or decrease demand immediately.
Status	This shows the operating status of the external heater.

Stop external heat source

Set the **Off delay** time for the external heater to turn off when there is no demand.

> *NOTE*
>
> During defrost, the external heater is always on when the heating system circulation pump (LTHW-P1) is running.

Heat pump

This page shows the heat pump flow diagram and settings for installers and service users.

Heat pump[1]	Manual operation
	Install settings
	Service settings

1 The available settings depend on the number of heat pumps in the system.

Install settings

Install settings	Pump settings
	Valve settings
	Compressor settings
	Fan unit settings
	Freeze protection
	Overheat protection

Pump settings

This setting allows the users to check pump statuses, set operating criteria, and manually control the pump when needed.

Press the **On/Off** button to open the settings for the demand-driven circulation pump.

Criteria pump P1	This shows the current operating status of the heat carrier pump.
Criteria pump P2	This shows the current operating status of the brine pump.
Criteria pump P3	This shows the current operating status of the defrosting pump.
Stop delay	Set the delay time for the circulation pump to stop after a demand condition (after the last compressor or defrost cycle stops) is no longer met.
Exercise at	Exercise time shows the time of day to exercise the pumps.

Pump operating mode

This setting allows the user to select different operating modes for the circulation pumps.

Auto	The pump operates automatically based on system settings and external inputs. This is the default mode. It ensures the pump runs only when needed.
Manual On	The pump operates continuously, ignoring system demand and external conditions.
Manual Off	The pump is turned off, ignoring system demand and external conditions.

Valve settings

This setting allows the user to set the exercise **Off delay** time for the defrosting mixing valve (CV3) and the diverting valve (CV31).

Exercise time CV3

Off delay	Set the time delay for the defrosting mixing control valve (CV3) to fully open after the defrosting circulation pump (P3) stops.

CV31 exercise time

Off delay	Set the time delay for the diverting control valve (CV31) to fully open after the heat carrier pump (P1) is exercised.

Compressor settings

Compressor demand	This shows the number of compressors in demand.
Start delay compr.	Set the start delay time for the first compressor to start after heat carrier pump (HP0x-P1) and brine pump (HP0x-P2) starts, and the heat pump (HP0x) is not in defrost mode.
Start delay next	Set the start delay time for the next compressor to start after the last compressor starts. When the first compressor starts, the system waits for the set delay time before the next compressor starts.
Restart delay CmprA[1]	Set the restart delay time for compressor A. This setting prevents the compressors from restarting too soon. The timer on the right side shows the time remaining before the compressor can start.
Compressor CmprA[1]	Set the operating mode for the compressors.
Runtime	This shows the current run time hours for the compressors. **NOTE** Set the **Runtime** hours to 0 when you install a new compressor.
Compressor start counter	The start counter shows the number of compressor starts since it was installed. The start counter is set during installation and is updated when the compressor is replaced. • Select the button next to the **Runtime** setting to see the start history for the compressor. • Press the **Calibrate** button to set the start counter.

1 This setting depends on how many compressors are in the heat pump.

Fan unit settings

Stop delay fan unit	Set the delay time for the fan unit to stop after the last compressor stops.

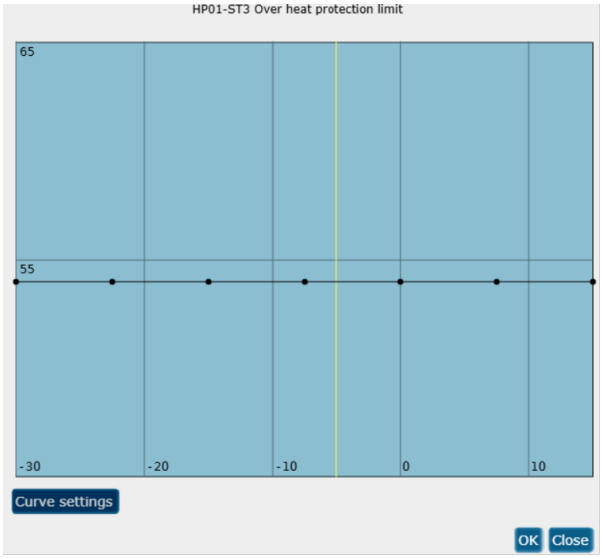
Freeze protection

ST2 Alarm limit	This setting shows the freeze protection alarm limit. The heat pump is blocked when the brine outlet temperature (ST2) falls below this limit.
ST2 limit to 1 compr.[1]	The heat pump runs with a maximum of one compressor when the brine outlet temperature goes below this limit.
Release time	Set the **Off delay** time. Its the time at which the next compressor is allowed to start. The next compressor starts when the brine outlet temperature (ST2) is higher than the ST2 limit for the compressor.
Time left	The timer shows how much time is left before the next compressor starts.
Status	The On/Off status shows the reduction of compressors in operation. If it is On, the heat pump operates in reduced mode.

1 This setting depends on how many compressors are in the heat pump.

Overheat protection

This setting allows the user to set the temperature limit curve for the condenser inlet (ST3).



The heat pump stops when the condenser inlet temperature goes above the overheat protection limit.

ST3 limit to 0 compr.	Set the curve to adjust the overheat protection limit based on the operating conditions of the heat pump. This is the maximum allowable temperature at the condenser inlet before the overheat protection mechanism is triggered.
Curve settings	Manually enter the set point values. • Set the values for the brine inlet temperature (ST1) on the X-axis of the curve. • Set the values for the condenser inlet temperature (ST3) overheat protection limit on the Y-axis of the curve.
Actual	This is the current temperature at the condenser inlet side.
Release diff.	Set the temperature differential to release the compressor overheat protection. The compressors remains off until the condenser inlet temperature decreases by the release differential margin.

Service settings

Service settings	Operation
	Evaporator
	Condenser
	Defrost start criteria
	Defrost stop criteria
	Defrost settings

Operation HP0x

This setting lets the user set the minimum outside temperature limit for heat pump operation.

The heat pumps in the system stop when the outside air temperature goes below the temperature stop limit.

Operation limit HP0x	This shows the outside temperature stop limit for the heat pump.
ST-OUTSIDE	This shows the current outside temperature.
Start delay	Set the delay time for the heat pump to restart.

Status	This shows the current operating status of the heat pump.

Operation

These settings allow the user to control heat pump and monitor the status of the diverting valve. The diverting valve switches between LTHW and DHW based on system demand.

Operation On/Off	The **On/Off** button allows the user to start or stop the heat pump manually.
Diverting valve CV31	This indicates the current status of the diverting valve.

Evaporator

Delta temp. ST1-ST2

Set point	Set the set point for the temperature difference (ΔT) between brine inlet (ST1) and outlet (ST2).
Actual	This shows the current ΔT between the brine inlet and outlet.
P2 defrost	Set a fixed speed for the brine pump during defrost.
Circulation pump P2	This shows the current operating mode and the output signal value of the brine pump.

Source temp. ST1

Set point	Set the set point for the brine inlet temperature (ST1).
Actual	This shows the current brine inlet temperature.
Fan unit FU	This shows the current operating mode and the output signal value of the fan unit.

Condenser

Delta temp. ST4-ST3	Set the **Set point** for the temperature difference (ΔT) between condenser outlet (ST4) and inlet (ST3).
Actual	This shows the current ΔT between the condenser inlet and outlet temperatures.
P1 defrost	Set a fixed speed for the heat carrier pump during defrost.
Circulation pump P1	This shows the current operating mode and the output signal value of the heat carrier pump.

Defrost start criteria

The defrosting starts when the following conditions are met:

1. The outside temperature (ST-OUTSIDE) and the brine inlet temperature (ST1) are lower than the **Set point** limit for more than the specified **Cycle time**.
2. The time since the last defrosting **Time counter** is greater than the **Cycle time**.

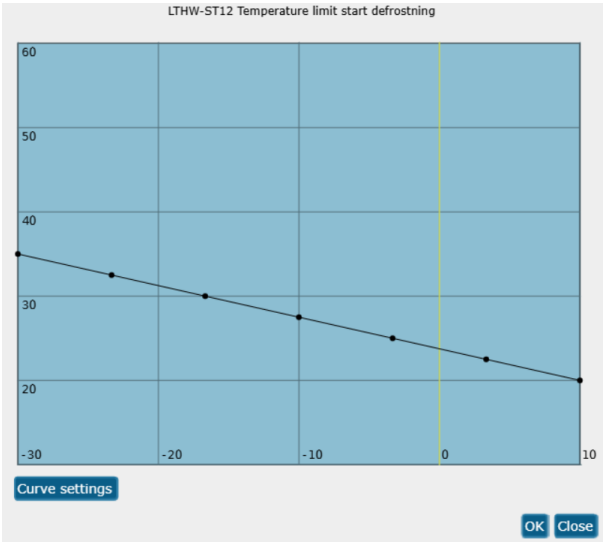
Temp. ST -OUTSIDE

Limit	Set the outside temperature limit at which defrosting starts.
Actual	This shows the current outside temperature.
Defrost queue	This shows the status of the defrost queue. When one heat pump is in defrost mode, the system puts other heat pumps that need defrosting into a queue.

Source temp. ST1

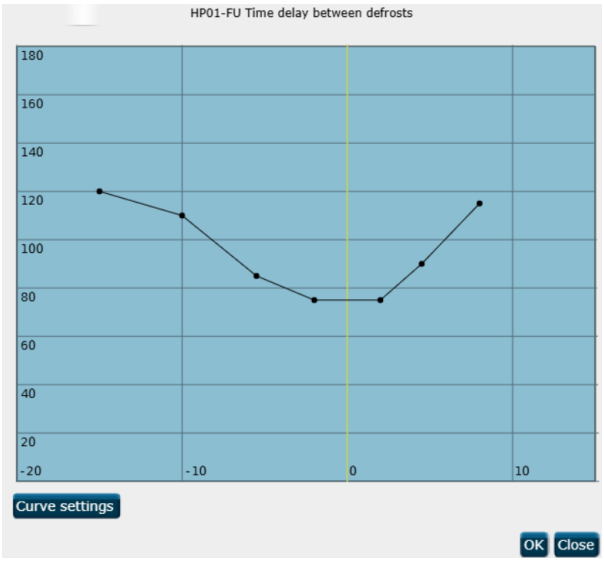
Limit	Set the brine inlet temperature at which defrosting starts.
Actual	This shows the current brine inlet temperature.
Defrost status	This shows the current defrost status.

Ack. temp. LTHW-ST12



Limit	Set the curve limit for the primary side supply temperature at which defrosting starts.
Curve settings	Manually enter the set point values. • Set the values for the outside temperature on the X-axis of the curve. • Set the values for the primary side supply temperature limit on the Y-axis of the curve.
Actual	This shows the current supply temperature on the primary side.
Defrost counter	The defrost counter shows the number of defrost cycles for the fan unit since installation.

Start timer defrost



Cycle time	Set the curve for the fan unit time delay between defrost cycles.
Curve settings	Manually enter the set point values. • Set the values for the outside temperature on the X-axis of the curve. • Set the time between defrost cycles on the Y-axis of the curve.
Time counter	This shows the time since the last defrost cycle. The defrosting **Time counter** stops when the outside temperature goes above the set limit.
Time counter factor	The defrost time counter factor for the fan unit changes the timer speed based on the number of compressors in operation.
Manual start trigger	This setting allows the user to start defrosting manually.

Defrost stop criteria

Source temp. ST1	Set the brine inlet temperature at which defrosting stops. Defrosting stops when the brine inlet temperature (ST1) is higher than the set limit.
Max defrost time	Set the maximum defrosting time for the fan unit. Defrosting stops after the set time, even if the brine inlet temperature does not reach the set limit.
Manual stop trigger	This setting allows the user to stop defrosting manually.

Defrost settings

Defrost temp. ST10

Set point	Set the defrosting temperature set point.
Actual	This shows the current defrosting temperature (ST10).
Freeze protection	Set the defrosting temperature alarm limit for the frost protection. If the defrost temperature goes below the set alarm limit, the system triggers the freeze protection alarm.
Mixing valve CV3	This shows the current operating mode and the output signal value of the defrosting mixing valve (CV3).

Temp. increase ST2

This setting allows the user to set the maximum brine outlet temperature (ST2) increase per minute during defrosting.

This limits the operation of the defrosting mixing valve (CV3).

Defrost temp. ST2

Calculated set point	This shows the calculated set point for the brine outlet temperature (ST2) increase limit.
Actual	This shows the current defrosting temperature (ST10).
Circulation pump P3	This shows the current operating status of the defrosting pump (P3).

Manual operation

This setting allows the user to control the heat pump system manually.

HP01 operation setting

Users can override these settings through Modbus.

On/Off	The On/Off button allows the user to start and stop the heat pump.
Auto/ Manual	This allows the user to switch the heat pump operating mode between **Auto** and **Manual**.
DHW/ LTHW	When the heat pump is in **Manual** mode, the user can control the position of the diverting valve (CV31) to switch between DHW and LTHW.

HP01 manual operation load

This setting allows the user to select the number of compressors to operate when the heat pump is in manual mode.

> **NOTE**
>
> Refer to the **Install settings** for the start delay and restart delay of the compressors.

Circuit A SV1/2x and Circuit B SV1/2x

This setting allows the user to manually control the solenoid valves (SV) for the circuit A and circuit B to switch between vapor Injection (V.I.P) and Liquid Injection (L.I.P).

Auto: This is the default setting. When the compressor starts, the system opens either the V.I.P valve or the L.I.P valve, depending on the requirement.

Manual On: This setting causes the L.I.P valve to open when the compressor starts.

> **CAUTION**
>
> This setting can cause damage to the compressor.

Manual Off: This setting causes the V.I.P valve to open when the compressor starts.

> **CAUTION**
>
> This setting can cause higher temperatures in the cooling circuit. Higher temperatures can block the cooling circuit.

Diverting valve CV31

This setting allows the user to manually control the diverting valve.

Auto	The system adjusts the valve position automatically based on the demand.
Manual	Manually set the output signal value for the controller demand.

Mixing valve CV3

This setting allows the user to manually control the mixing valve.

Auto	The system adjusts the valve position automatically based on the demand.
Manual	Manually set the output signal value for the controller demand.

Circulation pump

These settings allow the user to manually control the operations of circulation pumps.

The settings for the heat carrier, and brine pump includes the option to manually set the output value for the controller demand.

Auto	The pump operates automatically based on system settings and external inputs. This is the default mode. It ensures the pump runs only when needed.
Manual On	The pump operates continuously, ignoring system demand and external conditions.
Manual Off	The pump is turned off, ignoring system demand and external conditions.

Fan unit

Fan unit FU: This setting allows the user to manually set the output value for the controller demand of the fan unit.

Defrosting FU: This allows the user to manually **Start** and **Stop** the defrost for the fan unit.

8 SERVICE AND MAINTENANCE

Maintenance, general

The following schedule is a template for supervision that can be followed to obtain the best energy exchange and avoid unnecessary and unplanned downtime.

> **NOTE**
>
> Refrigerant work must be documented and reported in accordance with the national regulations of your country.

- Check the electrical cables. It is necessary to re-tighten all electrical cables immediately after installation also after a few months of operation.
- Keep the installation area neat and tidy. This allows for easier maintenance, supervision, and leak detection.

Maintenance

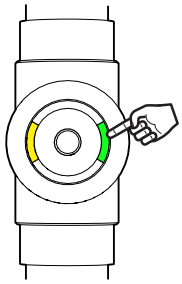
> **CAUTION**
>
> Maintenance and servicing must be performed by persons with sufficient knowledge about the task.

Regular checks

- Check for any alarms present on the controller. In case of alarms, see Troubleshooting instructions.
- Check that the temperatures on the brine and heat carrier sides are reasonable.

Quarterly checks

- Check the moisture sight glass. Check the color (green) indicator in the sight glass for moisture levels.



There should be no or only few bubbles visible in the sight glass. The bubbles should disappear after about two to three minutes of run-time.

> **NOTE**
>
> An excess of bubbles could indicate a shortage of refrigerant.

- Clean the strainer on a timely schedule.
- Check the pressure in the brine and heat carrier systems.
- Check for leaks on all systems, especially pumps and valves.
- Check the heat pump for abnormal sounds and vibrations.
- Read values from the run-time counter.
- Check the outdoor unit to ensure the clear way for air flow.

  To ensure optimal efficiency, the fins in the outdoor air unit must be clean. Check the unit at least once a year and clean it with water or compressed air if necessary. Ensure there is space for air to pass under and through the unit, and remove any debris.

> **CAUTION**
>
> Do not use cleaning detergents that are aggressive to copper or aluminum.

9 TROUBLESHOOTING

Troubleshooting, general

The following instructions are a guide for locating faults in the heat pump. In the event of an alarm, it is indicated by the display of the heat pump controller.

The alarm line at the bottom of the display shows the most recent alarm with the highest priority.

High pressure pressostat

The pressure in the refrigerant circuit is higher than the maximum set point limit. If the alarm is triggered, the heat pump will stop.

Insufficient flow

- Ensure that there is no air in the system's circuit.
- Verify that the heat carrier pump is operating properly.
- Make sure that the strainer is clean.
- Make sure that the valves are in the correct position.
- Acknowledge the alarm in the controller.

The temperature settings in the controller may be set too high

- Check the temperature settings in the controller.
- If the temperature is too high, set the temperature to a lower value. The default temperature is approximately +65 °C
- Acknowledge the alarm in the controller.

Low pressure pressostat

The compressor, the fan, and the brine pump stop operating.

Too low temperature or insufficient flow in the brine circuit.

- Ensure that there is no air in the system's circuit.
- Verify that the brine pump is operating properly.
- Make sure that the strainer is clean.
- Make sure that the valves are in the correct position.
- Acknowledge the alarm in the controller.

Insufficient refrigerant in the circuit.

- Check the sight glass for deviations such as bubbles which could indicate a shortage of refrigerant.
- Acknowledge the alarm in the controller.

Operational fault compressor

The compressor stop operating.

Tripped motor circuit breaker or overcurrent relay

- Q123 and Q144 LB4 require manual resetting of the motor protection switch in the electrical equipment (black button pressed).
- Electrical fault.
- Check that no phase is missing.
- Check for loose or burnt contacts.
- In the event of further stops, contact a service technician to check the electric motor, cables and electrical components.
- Acknowledge the alarm in the controller.

High pressure pressostat

Low pressure pressostat

Tripped fuse

- Inspect the fuse.
- Replace it with a new fuse of the correct rating.
- Acknowledge the alarm in the controller.

Freeze protection

The compressors and the brine pump stop operating. The current incoming (ST1) and outgoing (ST2) brine temperatures can be read in the controller's **System overview**.

Low flow on the brine pump or outgoing temperature on the brine has been too low.

- The units lowest acceptable brine temperature (ST2) is set in the X-pro controller. This function prevents the unit from running the brine temperature too low.

> *NOTE*
>
> The set point depends on the source, see the **ST2 alarm limit** in the controller's **Install settings**.

- Check the function of the brine pump.
- Check the strainer and clean or replace it, if necessary.
- Acknowledge the alarm in the controller.

High condenser inlet temperature

The compressors stop operating.

The condenser inlet temperature (ST3) is above the set limit.

- The maximum allowable temperature at the condenser inlet side is set in the controller. This function prevent the compressors from running with a very high temperature on the condenser inlet side.

> *NOTE*
>
> See the **Over heat protection** limit in the controller's **Install settings**.

- Check the function of the heat carrier pump.
- Check the strainer and clean or replace it, if necessary.
- When the condenser inlet temperature (ST3) is within the over heat protection limit, the system automatically acknowledges the alarm and starts the compressors.

High temperature circuit

The temperature in the system's circuit is too high. The circuit is blocked, and the compressors stop.

The desuperheater temperature from the compressor has been too high.

- Contact Qvantum support for troubleshooting.

Sensor fault

When the sensor fault alarm triggers, the controller interface shows the temperature value on a red background.

Sensor failure.

Loose connections in cables.

- Check the sensors and cable connections.
  Sensors in this system are depend on the settings:

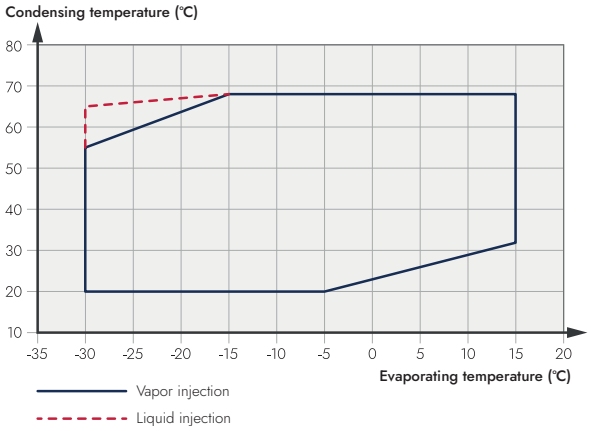
Internal temperature sensors:		External temperature sensors (optional)	
ST1	Brine inlet	ST-OUTSIDE	Outdoor sensor
ST2	Brine outlet	LTHW-ST11	Supply, secondary side
ST3	Condenser inlet	LTHW-ST12	Supply, primary side
ST4	Condenser outlet	LTHW-ST41	Return, secondary side
ST5	Desuperheater compressor	ST51	Accumulator tank/ system tank

  The suction gas sensor is connected to the EVD.

10 TECHNICAL SPECIFICATIONS

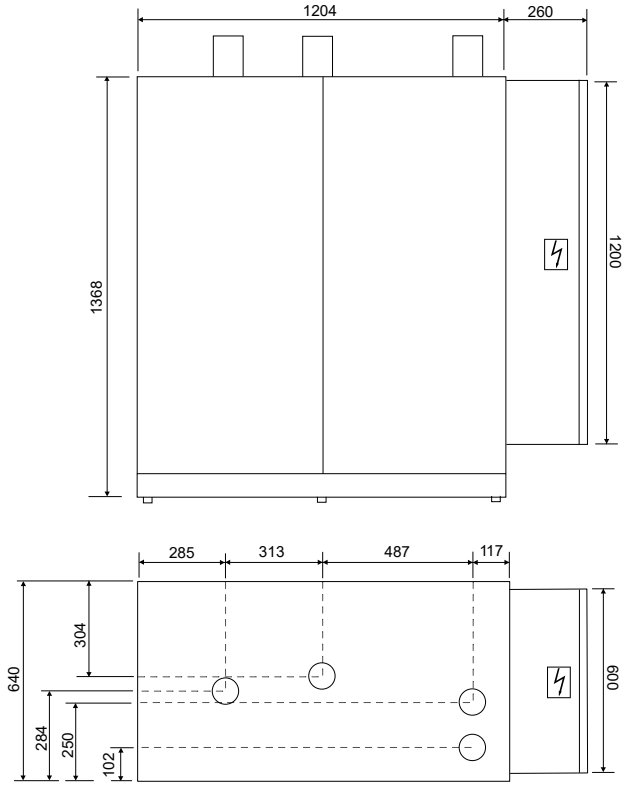
Operational data

Compressor envelope

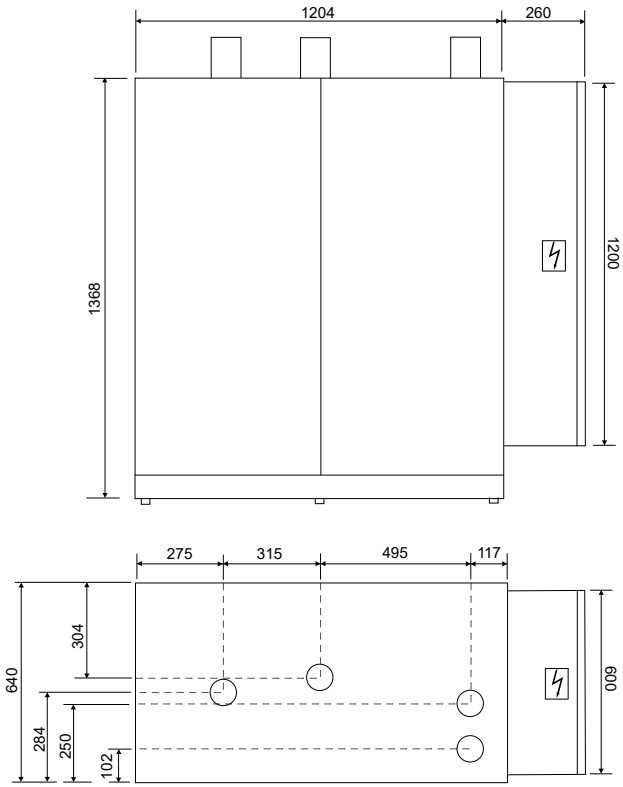


Dimensions

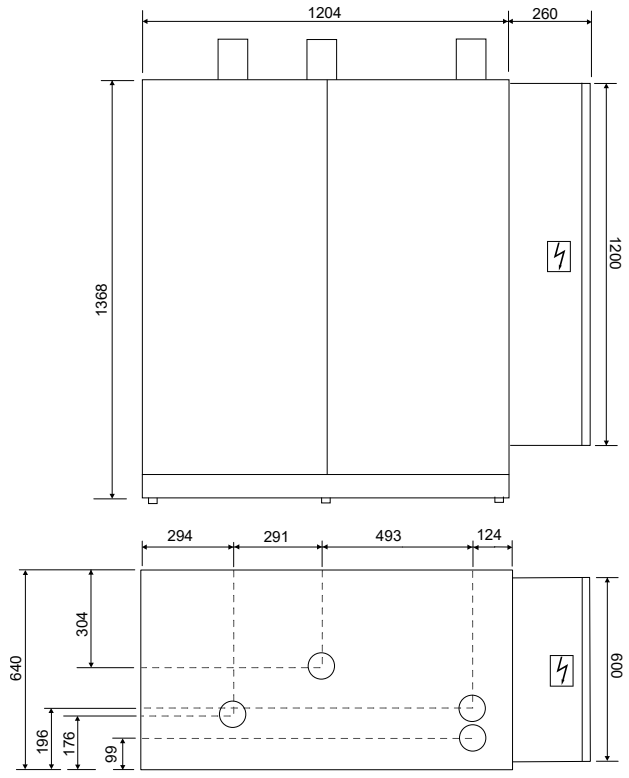
Q65 - Q81



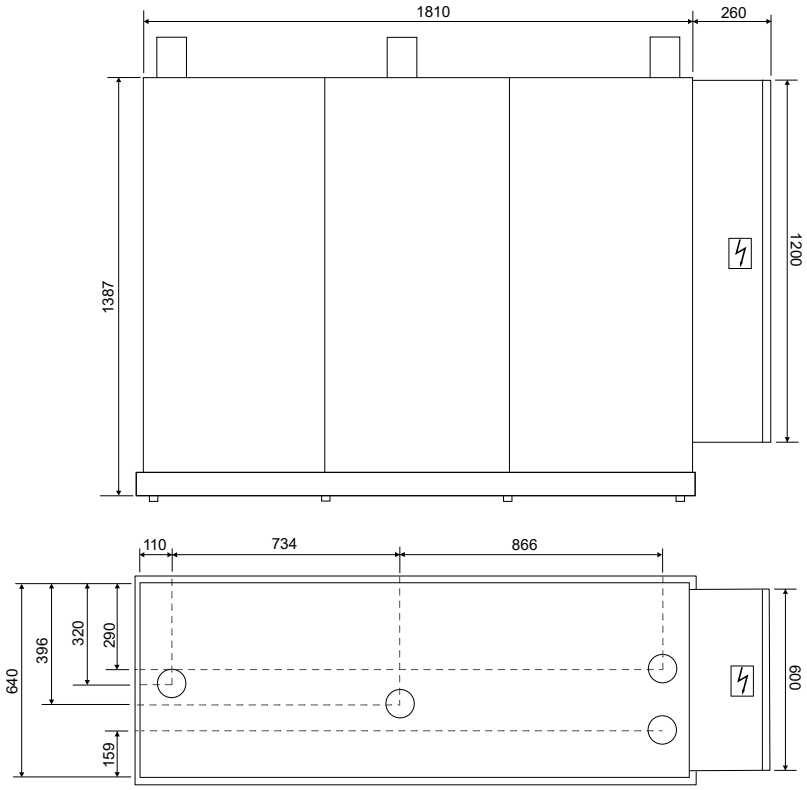
Q96



Q123 - Q144



Q162 - Q192



Technical data

Q65 – Q96LB4

SPECIFICATION		Q65	Q81	Q96
Heating capacity according to EN14511				
Heating capacity A7/W35	kW	57.6	66.8	80.0
Heating capacity A7/W45	kW	57.2	67.6	81.0
Heating capacity A2/W45	kW	50.4	59.4	71.2
Heating capacity A-5/W65	kW	46.6	55.2	66.2
Heating capacity A-7/W35	kW	41.3	48.4	58.0
COP A7/W35		4.6	4.5	4.4
COP A7/W45		3.9	3.9	3.8
SCOP according to EN14825				
SCOP average climate, 35°C/55°C		5.19/4.29	5.08/4.22	-
SCOP colder climate, 35°C/55°C		4.69/3.96	4.63/3.92	-
Energy efficiency class				
Energy efficiency class, space heating, 35°C/55°C		A+++/A+++	A+++/A+++	-
Condenser				
Condenser flow rate (ΔT=7K at A7/W45)	l/s	1.96	2.32	2.78
Pressure drop condenser including defrosting plate heat exchanger	kPa	52.0	54.0	53.0
Max operating pressure		PN10	PN10	PN10
Max operating temperature	°C	65.0	65.0	65.0
Min outdoor temperature at +65 °C flow temperature	°C	-20	-20	-20
Connection size condenser	mm	DN50	DN50	DN50
Evaporator				
Evaporator flow rate (ΔT=4K at A7/W45)	l/s	3.13	3.70	4.40
Pressure drop evaporator	kPa	30.0	30.0	32.0
Max operating pressure		PN10	PN10	PN10
Connection size evaporator	mm	DN50	DN50	DN50
Product dimensions				
Weight	kg	396	396	423
Length	mm	1464	1464	1464
Width	mm	640	640	640
Height[1]	mm	1368	1368	1368
Fan unit dimensions				
Weight	kg	419	419	545
Length (±15 mm)	mm	4105	4105	5954
Width (±15 mm)	mm	1541	1541	1541
Height (±15 mm)	mm	1342	1342	1342
Recommended pipe size between IDU & ODU	mm	DN65	DN80	DN80
Connections fan unit	mm	Threaded connection, Cu54.0	Threaded connection, Cu54.0	Threaded connection, Cu54.0
Compressor	Fully hermetic scroll			
No. compressors / No. refrigerant circuits	pcs/pcs	2/1	2/1	2/1
Refrigerant (GWP)	R407C (1774)			
Amount of refrigerant / CO_2(e)	kg/tons	8.9/14.45	9.5/15.43	9.9/16.08
Fan unit				
No. fans	pcs	2	2	3
Air volume	m^3/s	6.89	6.89	9.9
Fan unit brine volume	liters	66.9	66.9	74.0
Pressure drop fan unit	kPa	42.0	41.0	42.0
Sound levels compressor unit				
Sound pressure level, measured at 1 m distance	dB(A)	50	50	50
Sound levels fan unit				
Sound pressure level 10 m EN13487	dB(A)	35	35	36
Power supply				
Nominal voltage	V-ph-Hz	400-3-50	400-3-50	400-3-50
Nominal voltage fans	V-ph-Hz	230-1-50	230-1-50	230-1-50
Electric consumption (including fan unit)				
Maximum electric consumption	A	41.5	50.5	59.9
Maximum starting current (compressors only)	A	68.6	83.0	99.4
Recommended fuse	A	50	63	80

1 Height without pipe connections and feet.

Q123 – Q192LB4

SPECIFICATION		Q123	Q144	Q162	Q192
Heating capacity according to EN14511					
Heating capacity A7/W35	kW	100.2	120.0	133.6	160.0
Heating capacity A7/W45	kW	101.4	121.5	135.2	162.0
Heating capacity A2/W45	kW	89.1	106.8	118.8	142.4
Heating capacity A-5/W65	kW	82.8	99.3	110.4	132.4
Heating capacity A-7/W35	kW	72.6	87.0	96.8	116.0
COP A7/W35		4.5	4.4	4.5	4.4
COP A7/W45		3.9	3.8	3.9	3.8
SCOP according to EN14825					
SCOP average climate, 35°C/55°C		-	-	-	-
SCOP colder climate, 35°C/55°C		-	-	-	-
Energy efficiency class					
Energy efficiency class, space heating, 35°C/55°C		-	-	-	-
Condenser					
Condenser flow rate (ΔT=7K at A7/W45)	l/s	3.48	4.16	4.63	5.55
Pressure drop condenser including defrosting plate heat exchanger	kPa	50.0	50.0	53.0	58.0
Max operating pressure		PN10	PN10	PN10	PN10
Max operating temperature	°C	65.0	65.0	65.0	65.0
Min outdoor temperature at +65 °C flow temperature	°C	-20	-20	-20	-20
Connection size condenser	mm	DN50	DN50	DN65	DN65
Evaporator					
Evaporator flow rate (ΔT=4K at A7/W45)	l/s	5.56	6.60	7.41	8.80
Pressure drop evaporator	kPa	30.0	32.0	42.0	54.0
Max operating pressure		PN10	PN10	PN10	PN10
Connection size evaporator	mm	DN65	DN65	DN65	DN65
Product dimensions					
Weight	kg	522	522	775	775
Length	mm	1464	1464	2070	2070
Width	mm	640	640	640	640
Height[1]	mm	1368	1368	1387	1387
Fan unit dimensions					
Weight	kg	667	730	995	1098
Length (±15 mm)	mm	4133	4749	5982	5982
Width (±15 mm)	mm	2343	2343	2343	2343
Height (±15 mm)	mm	1534	1534	1534	1534
Recommended pipe size between IDU & ODU	mm	DN100	DN100	DN100	DN100
Connections fan unit	mm	Flanged connection, DN65	Flanged connection, DN65	Flanged connection, DN65	Flanged connection, DN65
Compressor	Fully hermetic scroll				
No. compressors / No. refrigerant circuits	pcs/pcs	3/1	3/1	4/2	4/2
Refrigerant (GWP)	R407C (1774)				
Amount of refrigerant / CO_2(e)	kg/tons	12.2/21.64	13.0/23.06	2x7.9/28.03	2x8.3/29.45
Fan unit					
No. fans	pcs	4	4	6	6
Air volume	m^3/s	13.18	13.42	18.8	18.45
Fan unit brine volume	liters	184.7	210.9	193.0	227.5
Pressure drop fan unit	kPa	40.0	43.0	47.0	55.0
Sound levels compressor unit					
Sound pressure level, measured at 1 m distance	dB(A)	51	51	53	53
Sound levels fan unit					
Sound pressure level 10 m EN13487	dB(A)	37	37	37	37
Power supply					
Nominal voltage	V-ph-Hz	400-3-50	400-3-50	400-3-50	400-3-50
Nominal voltage fans	V-ph-Hz	230-1-50	230-1-50	230-1-50	230-1-50
Electric consumption (including fan unit)					
Maximum electric consumption	A	76.5	90.6	100.9	119.7
Maximum starting current (compressors only)	A	106.7	127.8	130.4	156.2
Recommended fuse	A	125	125	125	2x80

1 Height without pipe connections and feet.

Index

QVANTUM	EC DECLARATION OF CONFORMITY	Date: 2025 -03-04

Manufacturer

Qvantum Energi AB
Ringugnsgatan 12
216 16 Limhamn, Sweden

Mail:
support@qvantum.com
Tel: +46 40 15 10 44

Heat pump / Chiller: Qvantum LB4 - Series
Type: Q65LB4, Q81LB4, Q96LB4, Q123LB4, Q144LB4, Q162LB4, Q192LB4

The manufacturer declares that the product conforms according to the following EC directives:

- Machinery Directive (MD) 2006/42/EG
- Low Voltage Directive (LVD) 2014/35/EU
- Electromagnetic Compatibility Directive (EMC) 2014/30/EU
- Restriction of the use of Hazardous Substances RoHS III 2015/863/EU
- Eco design directive 2009/125/EC
- Eco design regulations 813/2013/EU
- Energy labelling regulations 811/2013/EU
- Electrical components recycling directive 2012/19/EU, WEEE
- Pressure Equipment Directive (PED) 2014/68/EU § 3.3, implemented in Sweden through AFS 2016:1 Pressure Equipment §8

The conformity was checked in accordance with the following standards:

EN 378 -2:2016	Refrigeration systems and Heat pumps
EN 60 335 -1:2012	Specific additional requirements
EN 60 335 -2-40:2003	Electrical safety
EN 61 000 -6-1:2019	EMC -immunity, Flicker
EN 61 000 -6-3:2021	Emission standard for residential, commercial and light industrial environments
EN 14825:2018	Air conditioners, liquid chilling packages and heat pumps, with electrically driven compressors, for space heating and cooling - Testing and rating at part load conditions and calculation of seasonal performance
SS -EN ISO 13585:2012	Competence qualification of brazing

The product is manufactured under a production control system, which guarantees conformity between the manufactured product and technical data.
The product has to be installed and connected in accordance with the product's instructions and design.
Maintenance and usage of the product also must follow instructions in the manufacturer's technical documentation.
It is not allowed to let the product come into operation until the heat equipment of which the product is to be part of has been confirmed to be in accordance with the statutory regulations.
The whole heat equipment including the product must be in accordance with these regulations.

The product is CE marked.

Limhamn 2025 -03-04
Qvantum Energi AB

Nihad Sinanovic

QCH EN 2526-A
1011661

HEAT PUMPS FOR SUSTAINABLE CITIES

WE CHANGE THE WAY THE CITIES OF EUROPE ARE HEATED

Qvantum, founded in Sweden in 1993, develops high-quality heat pumps for individual buildings and innovative heat pump-based solutions for densely populated areas to enable everybody to benefit from emission free heating and cooling. The company has deep knowledge in both heat pump technology and energy systems engineering and works in close collaboration with engineering consultants, installers, project developers and utilities.

Qvantum Energi AB
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