

AL-KO

QUALITY FOR LIFE



CENTRAL VENTILATION AND AIR CONDITIONING UNITS

TRANSLATION OF THE ORIGINAL INSTALLATION AND OPERATING INSTRUCTIONS

HYDROOPT M ®

Legal

AL-KO THERM GmbH
Hauptstraße 248 - 250
89343 Jettingen-Scheppach
Germany
Telephone: +49 8225 39 - 0
Fax: +49 8225 39 - 2113
E-mail: klima.technik@al-ko.de

Revision history

Version	Description	Date
1.0	Initial release	27/04/2020

Table of contents

1	Product description	4
1.1	Intended use.....	5
1.2	Possible misuse	5
1.3	Residual dangers.....	5
1.4	Explanation of symbols	5
1.5	Description of various application areas and versions.....	6
1.5.1	Station structure (example).....	6
1.5.2	Technical data.....	6
1.5.3	Schematic with one exhaust air device (example).....	8
1.5.4	Schematic with one exhaust air device and feed option (example).....	9
1.6	Delivery	10
1.7	Transport and storage	10
1.8	Owner's obligations.....	10
1.9	Disposal of the packaging.....	10
2	Installation	11
2.1	General information.....	11
2.2	Setup.....	11
2.3	Filling and venting	12
2.4	Electrical connection.....	12
2.4.1	Cabling to the customer's control technology	12
2.4.2	Bus model assembly (option).....	13
3	Commissioning	14
3.1	General information.....	14
3.2	Requirements	14
3.3	Procedure for commissioning	14
3.4	Control-oriented integration of the HYDROOPT M® in the customer's instrument and control facilities ..	15
4	Operation	16
4.1	Operating unit.....	16
4.2	Alarm message/Warning message	16
4.3	Display menu.....	17
4.4	Main menu (Info key)	19
4.4.1	Password menu.....	19
4.4.2	Settings	20
4.4.3	Commissioning menu.....	20
4.4.4	System information	21
4.4.5	System integrator	21
4.5	Further operating options	26
4.5.1	HMI Web	26
4.5.2	System graphic (optional)	28
5	Warnings, faults and emergencies	29
6	Maintenance	30
6.1	Maintenance schedule	31
7	Shut-down	33
7.1	Decommissioning.....	33
7.2	Dismantling	33
7.3	Disposal.....	33
8	Appendix.....	34
8.1	Commissioning list.....	34

1 Product description

The hydraulic station is used for highly efficient heat and cold recovery in closed-cycle systems.

In winter, heat is extracted from the exhaust air flow from an exhaust air unit and transferred to a heat exchanger in the central supply air unit.

The integrated controller monitors the operating conditions and regulates the optimum brine circulation amount. Frost on the exhaust air heat exchanger and freezing of an optional heat feed are prevented by the control system.

Power control is achieved by a frequency-controlled pump and a power regulating valve.

The brine circulation amount is continuously recorded and can be used together with the temperature measurement for heat quantity metering.

The decision whether heat recovery is possible and how much heat should be recovered must be made by a higher-level building control technology.

Together with the building control technology, the station thus makes a significant contribution to saving energy and reducing operating costs.

Optional components for extended use are:

- Plate heat exchanger for heat feed
- Plate heat exchanger for cold feed
- Redundancy pump for increased operational safety

Warnings and faults are displayed and forwarded via potential-free contacts.

The control system can be easily integrated into higher-level systems via permanently configured bus systems: Modbus, Bacnet/TCP-IP are available.



Our products are subject to continuous quality control, and comply with the applicable regulations.

1.1 Intended use

These devices are used exclusively for heat recovery from the exhaust air flow of a central ventilation unit. It may only be operated within a pressure range of 4–6 bar. Deviating operating areas must be agreed with the manufacturer.

1.2 Possible misuse

HYDROOPT M® may only be operated within the scope of the technical data specified by AL-KO. Any other use or use beyond that described in the "intended use" point is regarded as not in accordance with the designated use. The manufacturer cannot be held liable for damage resulting from this.

1.3 Residual dangers

The system may present a danger if it is not operated by trained personnel and/or is not used according to its designated use.

Residual dangers are potential dangers that are not obviously apparent, such as:

- Injury caused by non-observance of the safety instructions
- Injury caused by uncoordinated work
- Danger caused by working on the electrical system, cables and connections

Please use suitable personal protective equipment such as gloves and safety shoes when working on the device.

1.4 Explanation of symbols



Warning!

This symbol indicates safety measures that must be complied with in order to avoid injury to personnel.



Important!

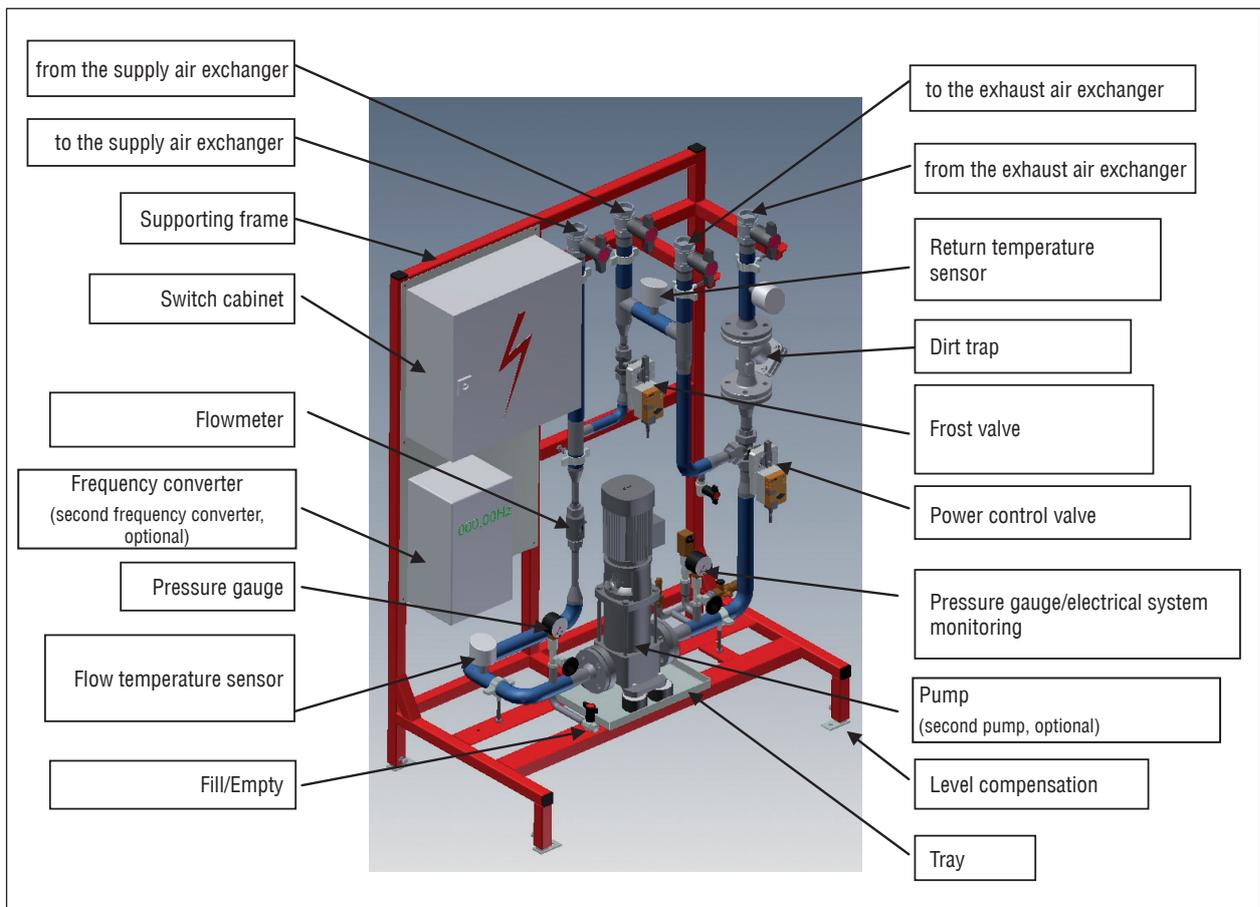
This symbol indicates safety measures that must be observed under all circumstances to avoid damage to property.



Special instructions for ease of understanding and handling.

1.5 Description of various application areas and versions

1.5.1 Station structure (example)



1.5.2 Technical data

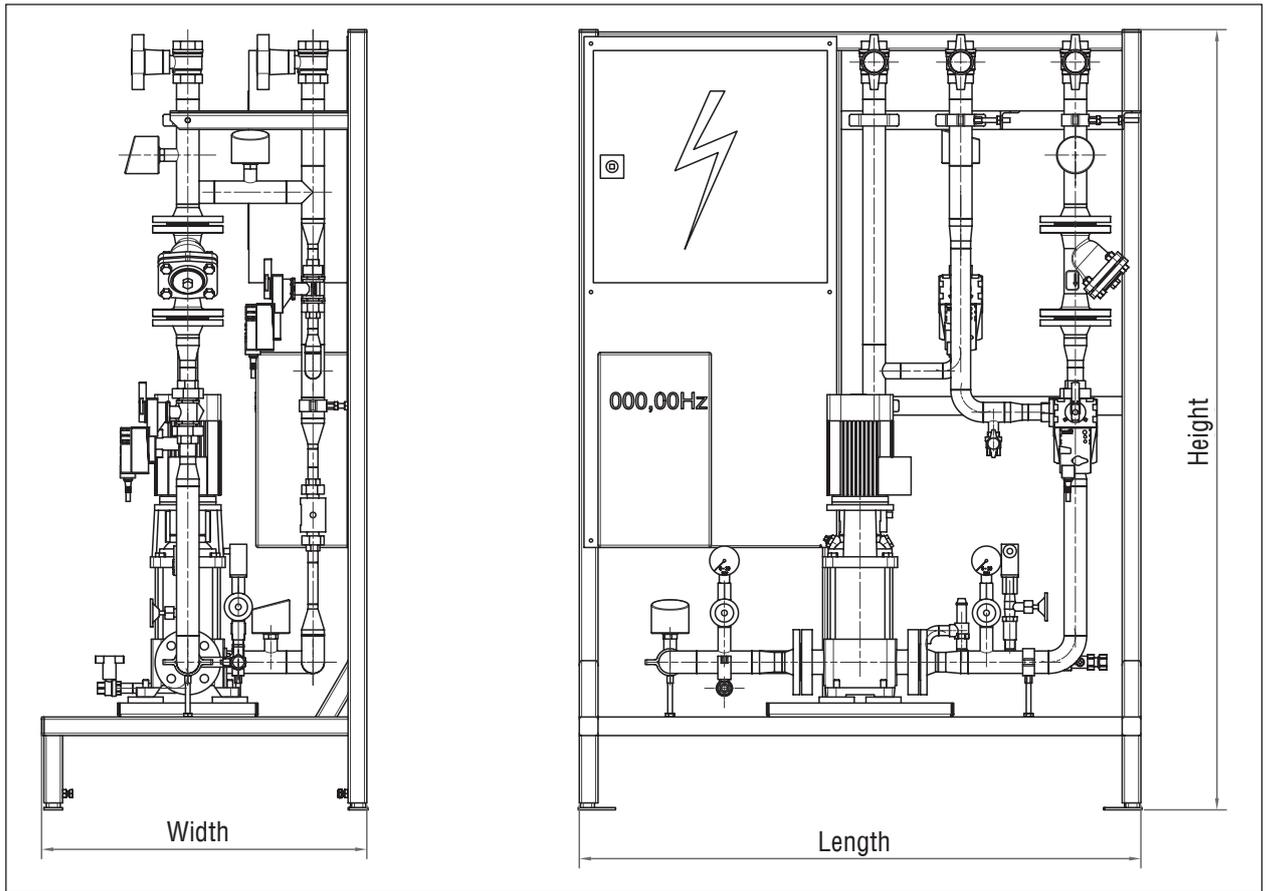
The station is available in 5 sizes depending on the required quantity of brine being circulated:
(see drawing)

System pressure: 4 to 6 bar
 Supply voltage: 3 Ph/400 V/50 Hz
 Fuse, max.: 20 A slow blow

The maximum customer-side back-up fuse is specified on the enclosed circuit diagram.

The exact dimensioning of the pump and the calculation of the necessary system pressure is carried out by AL-KO THERM after the order is placed.

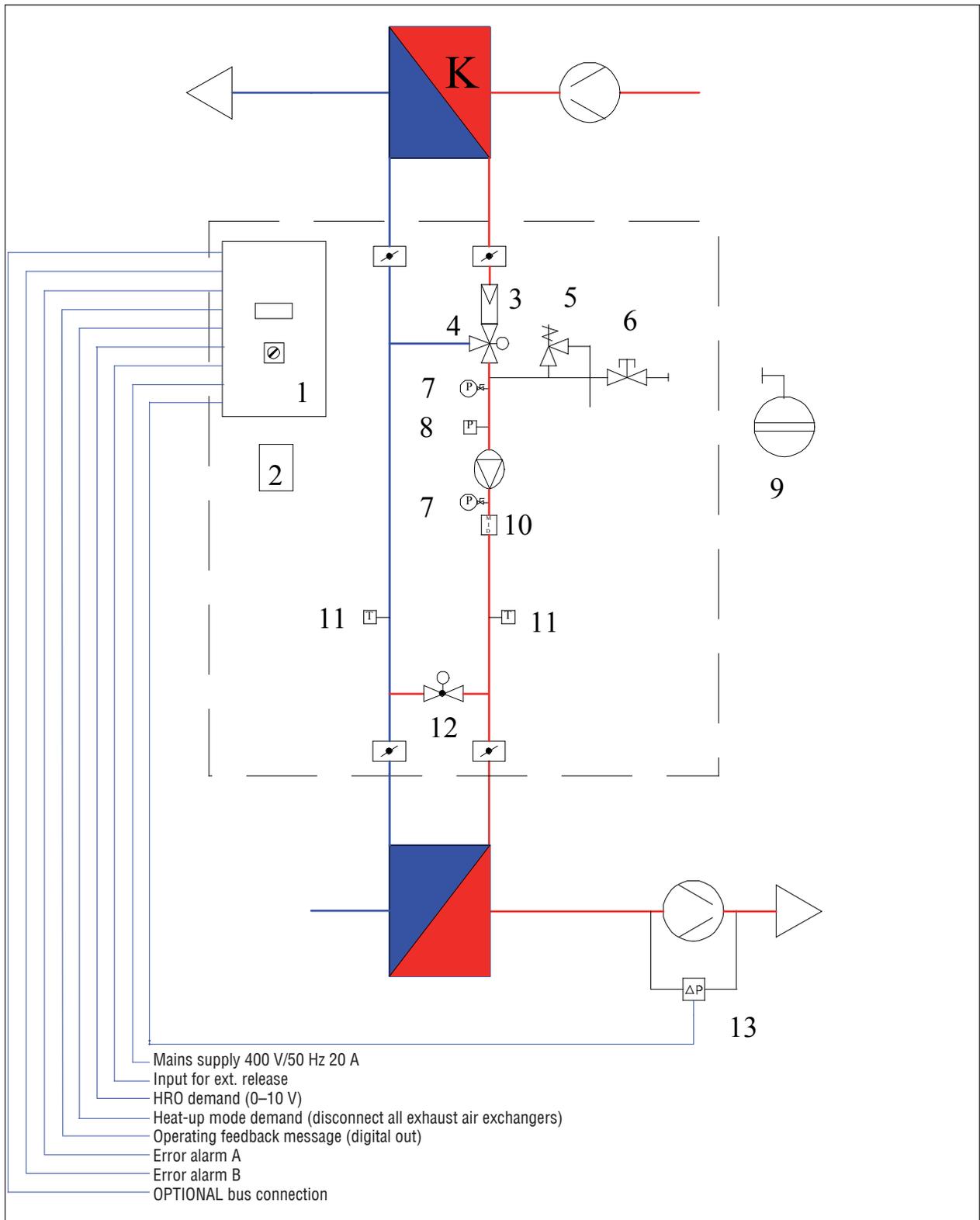
Dimensions:



Compact control units						
Type	Dimension	Flow rate m ³ /h	Length mm	Width mm	Height mm	Weight kg
2	DN 32	0.5–1.9	1330	695	1680	170
5	DN 40	2.0–4.9	1330	695	1680	178
10	DN 50	5.0–9.9	1330	695	1680	205
15	DN 65	10.0–14.9	1630	895	1880	307
25	DN 80	15.0–25.0	1630	895	1880	380

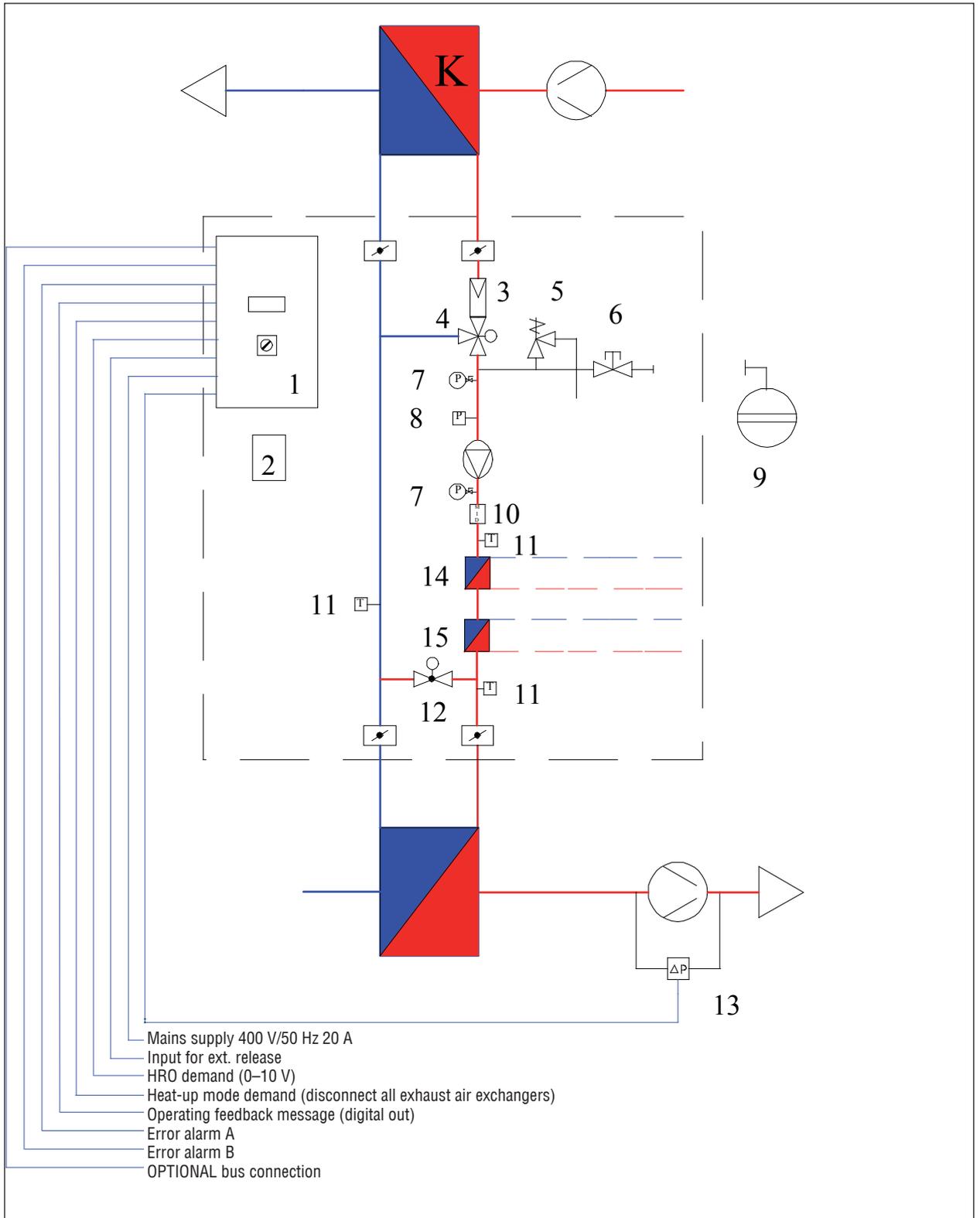
Weight varies depending on equipment and pump size.

1.5.3 Schematic with one exhaust air device (example)



1	Switch cabinet	9	Expansion tank installation on the intake side
2	Frequency converter	10	Flowmeter
3	Dirt trap	11	Temperature sensor
4	Power control valve	12	Frost valve
5	Safety valve 6 bar	13	Eff. pressure fan differential pressure sensor
6	Filling connection		
7	Pressure gauge		
8	Pressure monitor		

1.5.4 Schematic with one exhaust air device and feed option (example)



1	Switch cabinet	9	Expansion tank installation on the intake side
2	Frequency converter	10	Flowmeter
3	Dirt trap	11	Temperature sensor
4	Power control valve	12	Frost valve
5	Safety valve 6 bar	13	Eff. pressure fan differential pressure sensor
6	Filling connection	14	Plate heat exchanger, heat feed
7	Pressure gauge	15	Plate heat exchanger, cold feed
8	Pressure monitor		

1.6 Delivery

- The station is delivered on a one-way pallet.

1.7 Transport and storage

- Transport within the building can be performed by a lift truck or a forklift. The forks can be inserted under the cross profiles of the supporting frame.
- Note that the position of the centre of gravity is not exactly central.
- The HYDROOPT M® station must be transported upright and secured against tipping over.
- Suitable fork lengths must be used to prevent damaging the device.
- Use suitable intermediate layer pads to avoid damage to the paint.
- The station must be stored in a dry location, protected against the weather. The functional units must be protected against debris (e.g swarf, stones, wires, etc.) and strong UV exposure. The HYDROOPT M® station is delivered unfilled and thus frost-proof.
- When transporting under difficult conditions (e.g. on open vehicles, under unusual vibrational stresses, transport by sea or in tropical/subtropical countries), additional packaging must be used that will protect against these particular influences.
- Constant and, above all, abrupt temperature changes must be prevented during storage. This is especially harmful if moisture is able to form condensation.
- Damage that results from improper packaging, storage, and transport are at the expense of the person responsible.
- No personnel may be in the transport area.
- All relevant provisions related to occupational safety and environmental protection must be followed during transport.
- Sufficient visibility must be maintained during transport.
- When using transport devices requiring a driving licence, ensure that the personnel has a valid driving licence.
- The HYDROOPT M® station may only be transported by properly trained and qualified personnel who are also familiar with the information in the "Safety" section.

1.8 Owner's obligations

The owner of AL-KO THERM products must regularly train its personnel in the following subjects:

- Compliance with and use of the installation and operating instructions as well as statutory regulations.
- Intended use of the HYDROOPT M®
- If necessary, comply with the instructions for plant protection and the owner's company instructions.
- What to do in an emergency.

1.9 Disposal of the packaging

When disposing of the packaging, comply with the relevant local environmental and recycling regulations in your country and community that are applicable at the time when the activity is undertaken.

2 Installation

2.1 General information

All hydraulic components are pre-mounted and piped on the supporting frame. All pipe parts and fittings at risk from condensation are insulated against cold and steam.



Warning!

Assembly, electrical connection, supply connection, maintenance, commissioning and repair, etc. must only be carried out by trained and authorised specialists.

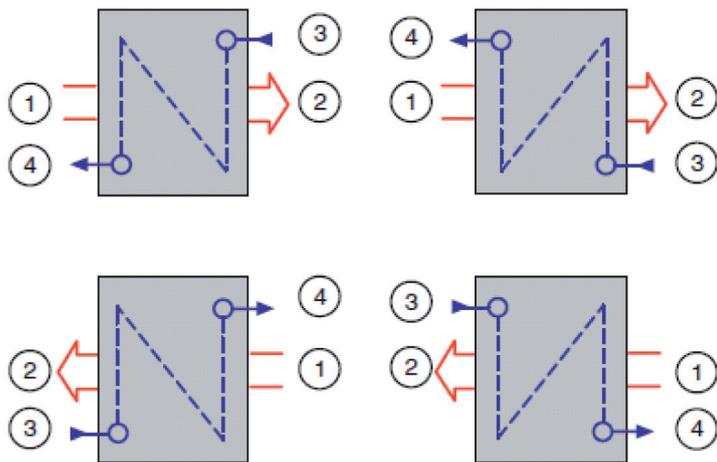
2.2 Setup



Important!

Components that come loose during transport can lead to faults or damage.

- The station must be checked for transport damage upon delivery.
- The condition of the ground must be taken into account.
- The station should be vertical, the level can be adjusted by the height-adjustable feet.
- The station must be bolted to the floor at the feet in a vibration-decoupled manner.
- Connect piping to the heat exchangers.
- Make sure that no impurities get into the system.
- Take into account the reverse flow principle.
- Once the piping is complete, the system must be flushed out.



1	Air inlet
2	Air outlet
3	Media inlet
4	Media outlet

Fig.: Reverse flow principle

2.3 Filling and venting

- The filling and venting equipment for the heat exchanger must be set up on-site.
- The pipe system must be resistant to ethylene glycol (N).
- The glycol content must be prepared according to the manufacturer's instructions.
- Note: The glycol mixture must be renewed after a certain elapsed time according to the manufacturer's instructions.
- The glycol/water mixture must already be mixed before filling. Otherwise, subsequent mixing is not guaranteed.
- Feed and return flow lines must be connected according to professional standards and properly insulated.
- The complete piping system must be checked for leak-tightness.
- When setting up the heat recovery system, the manufacturer's information regarding the heat carrier used (brine) must be taken into account.
- To protect drinking water, avoid the discharge of heat transfer fluid into watercourses. Discharge into wastewater must be coordinated with the regional disposal company.

2.4 Electrical connection

- Make sure that the components and the connection cable at the setup location cannot be either damaged or contaminated by oil or other materials.
- Check fuses, clamping connections, contactors, and circuit boards to ensure that they are seated firmly.
- Re-secure any loose components.
- Protect the pump motor against overload.
- The electrical connection must be made according to the circuit diagram provided.



Warning!

The electrical connection may only be performed by a certified electrician according to statutory regulations as well as the guidelines of the local utility company. Perform the connection according to the wiring diagram and according to the assignment plan.

2.4.1 Cabling to the customer's control technology

The following cabling is required along with the 3-phase supply:

Coming from the customer's building control technology:

Enable signal	potential-free contact
Power control signal	0–10 Volt analogue signal
Air volume-proportional signal	4–20 mA analogue signal usually from the supply pressure transmitter**
Demand for heating operation *	potential-free contact

Outgoing to the customer's building control technology:

Heat recovery operating message	potential-free contact
Heat recovery warning message	potential-free contact
Heat recovery fault message	potential-free contact

* only optional for systems with heat input via plate heat exchanger

** mounted on the ventilation device or enclosed loose

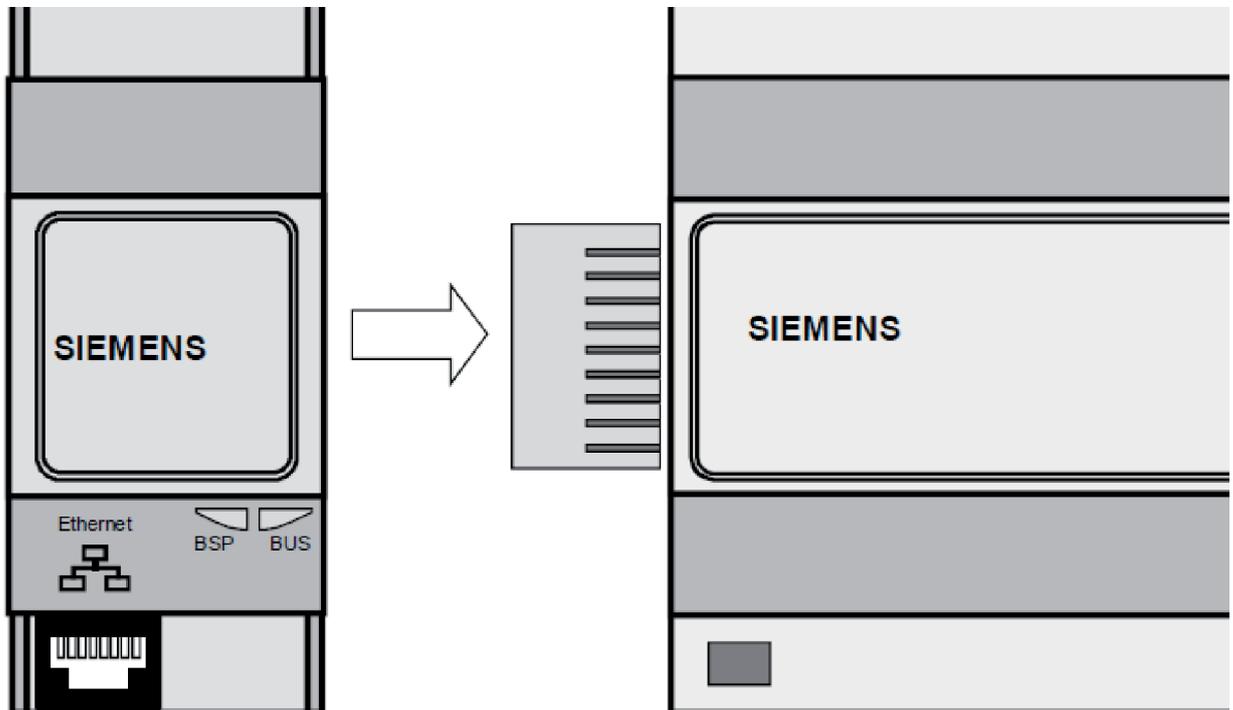
The cabling of the control lines is connected to the terminal rows in the station switch cabinet.

2.4.2 Bus model assembly (option)

As an option, the control system can be integrated in a superordinate network.

The following bus modules are optionally available for this:

Modbus
BACnet, TCP/IP



- The figure shows the Climatix BACnet/POL908.00 IP module/STD. It is connected to the Climatix control system via the internal communication expansion bus. This takes place via a plug connection on the left side of the control system.
- For data point lists, see "Data point lists appendix".
- Please also refer to the introductory manuals of Climatix™.

3 Commissioning

3.1 General information



Warning!

Installation, commissioning, maintenance, and repair work may only be performed by trained and qualified specialist personnel.

3.2 Requirements

For commissioning the HYDROOPT M® station, the following actions must already have been completed on site:

- The supply and exhaust air system must be operational.
- The air quantities must have already been measured.
- The glycol content of the system must already have been determined.
- The system pressure must correspond to the specified idle pressure.
- All isolation devices on the station and any on the heat exchangers must be open.
- The electrical supply of the station must have been checked.. The protective earth conductor and neutral conductor in particular must be in place.



Important!

The rotary pump must have been vented according to the manufacturer's instructions. For this purpose, the corresponding plugs must be opened until brine flows out free of bubbles. Please have a suitable collection container available for this procedure. Improper venting can cause damage to the rotary pump.

3.3 Procedure for commissioning

- After turning on the main switch, the pump can be manually operated on the frequency converter for a brief time. The direction of rotation must be checked. The corresponding directional arrow is marked on the pump.
- The analogue pressure monitor attached upstream of the pump protects the pump from running dry due to lost brine. The switching threshold was set in the factory to approx. 1.5 bar (warning) and to 0.5 bar media overpressure (fault).
- Finally, reset the frequency converter to AUTOMATIC operation.
- The pressure transmitter attached to the supply air device must be connected to the inlet nozzle and the device ring line on the intake side. The pressure transmitter must be set to 4–20 mA.
- The measuring range (factory setting 2500 Pa) may have to be adapted.
- The pressure transmitter measures the differential pressure at the inlet nozzle and outputs this pressure linearly (not square root).
- The measuring range end value of the flowmeter is set to approx. 1.4x the nominal fluid volume at the factory, as the fluid volume is raised above the nominal fluid volume even for a short time if there is a risk of frost.
- Give the customer's enable signal and bring the customer's power control signal to 10 volts.
- From 95 %, the controller display will show the request "Optimizing active"  unless other operating states (e.g. defrost) are active. The fluid volume is then optimised on the basis of the supply air quantity.
- 1 m³/h brine corresponds to about 3300 m³/h air.
- This optimisation process can take several minutes.
- If the power control signal is set to below 90 % (9 volts), this initially reduces the pump speed. If this reaches a lower limit of 12 Hz, the brine is also directed past the exhaust air heat exchanger via the power control valve (bypass operation).

3.4 Control-oriented integration of the HYDROOPT M® in the customer's instrument and control facilities

The closed-cycle system covers the majority of the heat output during operation by recovering heat from the exhaust air flow.

Due to the inertia of the system, any existing pump hot water heater (PWW) must be rinsed before starting the central ventilation system.

After a rinsing period to warm up the on-site pipeline system, the air shut-off dampers must be opened.

Only then may the fans be put into operation and the enable given for the closed-cycle system.

After the enable contact, an analogue request signal (0–10 Volt) is required by the customer for operation of the closed-cycle system. The heat recovery output can be controlled proportionally from 0–100 % via the signal.

Thus the complete station behaves like a (albeit sluggish) heating valve with a continuous valve drive and can be easily integrated in the customer's control strategy.

The decision whether the heat recovery can take place must be made by the customer's control system by comparing the air temperature.

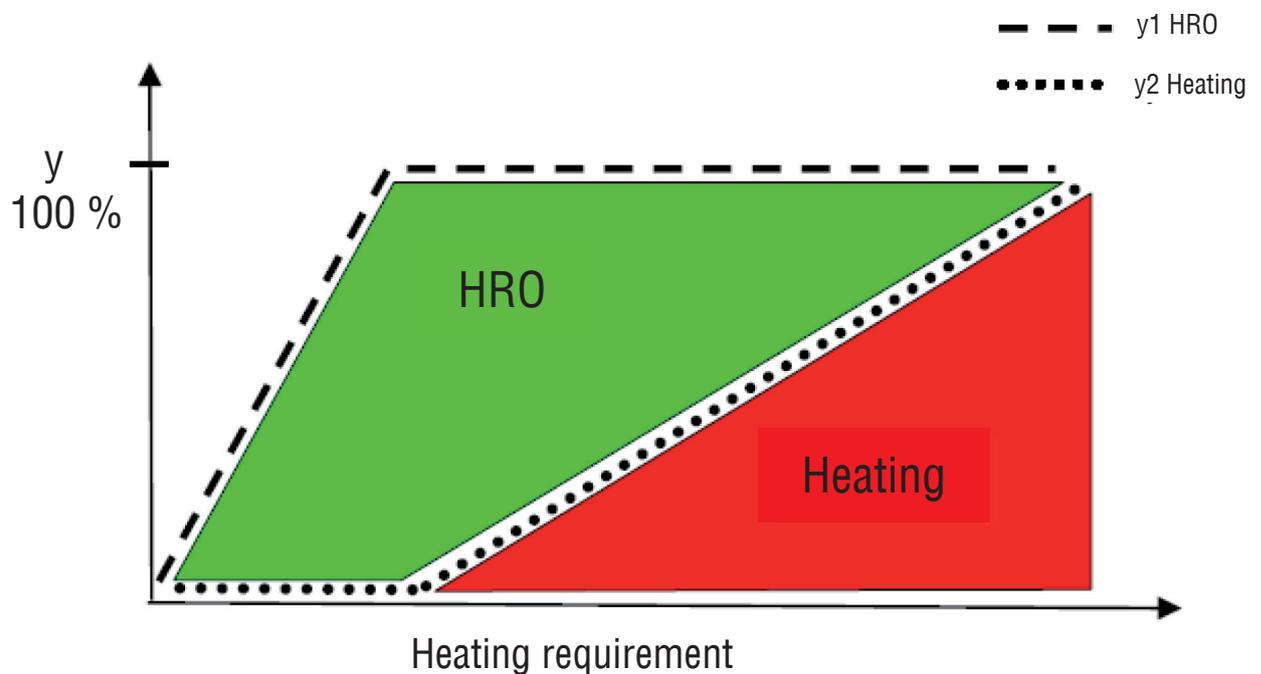
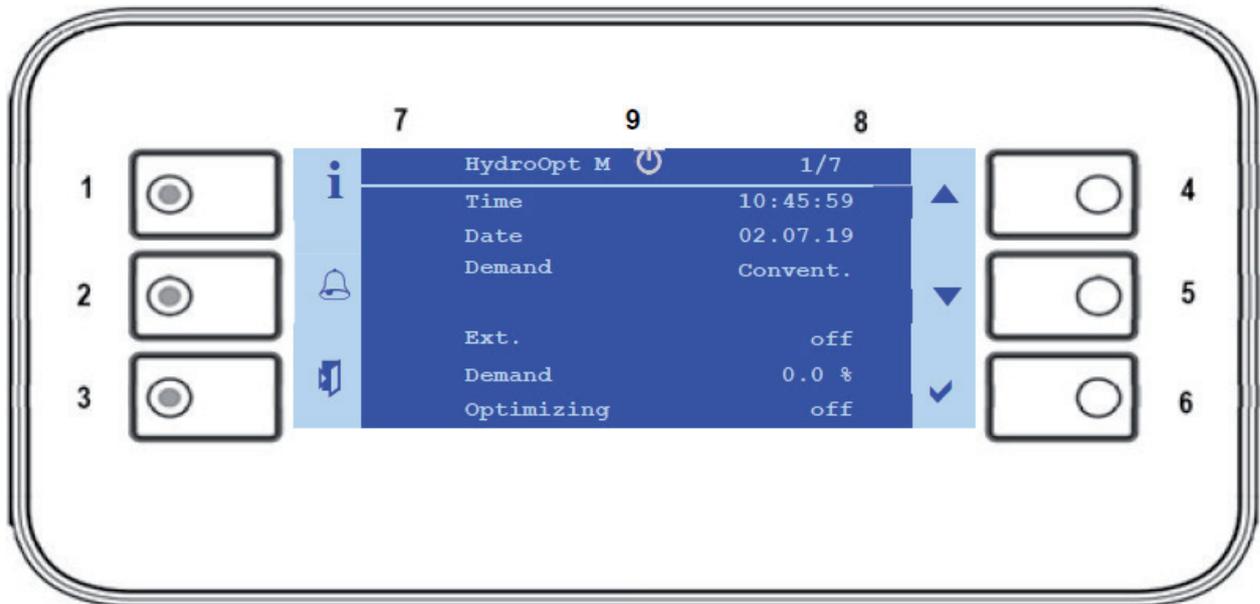


Fig. Control strategy for controlling the HYDROOPT M® closed-cycle system

4 Operation

4.1 Operating unit



The operation is menu-driven and is carried out via the keys on the control unit or an optional remote control panel.

No.	Designation	General function
1	INFO button with integrated LED	This button can be used to navigate from any menu item to the main menu.
2	ALARM button with integrated LED	This button can be used to navigate from any menu item to the alarms. The integrated LED also indicates the alarm and acknowledgement status (see chapter “5 Warnings, faults and emergencies” on page 29).
3	ESC button	This button can be used to exit the currently displayed menu item.
4	UP button	This button can be used to scroll up in the current menu or to increase the setting value.
5	DOWN button	This button can be used to scroll down in the current menu or to reduce the setting value.
6	ENTER button	This button can be used to confirm a new setting and activate the new setting value.
7	Line	The number of the line that is currently marked is shown here. The number after the slash indicates the total number of lines on this page.
8	Page	The name of the page on which you are located is shown here.

4.2 Alarm message/Warning message

The actions and status displays for the arrival, acknowledgement and resetting of an alarm are listed below:

- Each alarm is indicated by the alarm LED flashing red.
- By pressing the Alarm key, the alarm is displayed in plain text including alarm class, date and time.
- Each new alarm generates a line in the alarm list as well as in the alarm history. The alarm history is displayed by pressing the Alarm key several times.



An acknowledged but still active alarm is present when the alarm LED on the control panel on the switch cabinet lights up constantly.

- Reset alarms:
 - Alarm list: The line is deleted.
 - Alarm history: Display as an "outgoing" alarm

Alarm types:

The following table describes all of the alarms that can be displayed. Class B does not lead to a shut-down, but merely serves as a warning.

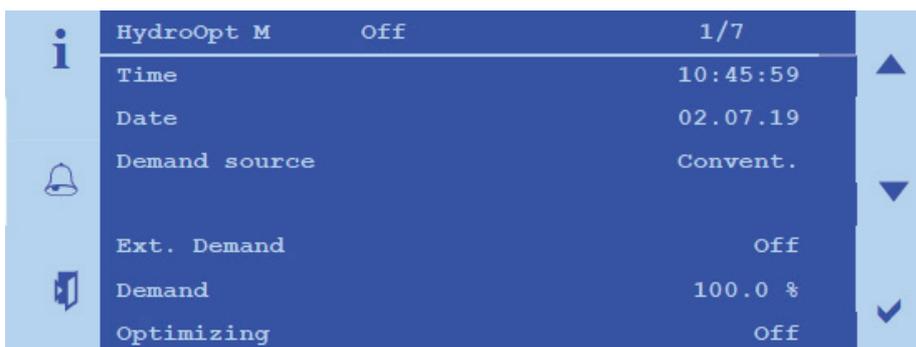
Alarm text	Class	Description/Remedy
Feed temp.	A	Sensor defective or cable break -> Sensor check required
Return temp.	A	Sensor defective or cable break -> Sensor check required
Feed temp. after feed-in	A	Sensor defective or cable break -> Sensor check required
Eff. pressure 1	A	Sensor defective or cable break -> Sensor check required
Eff. pressure 2	A	Sensor defective or cable break -> Sensor check required
Fluid volume	B	Fluid volume implausible The brine circulation is checked within a defined period of time. If the fluid volume is implausible, the system is switched off with an A alarm
Pump 1	B	Pump frequency converter has triggered -> System check required
Pump 2	B	Pump frequency converter has triggered -> System check required
Pump 1 and pump 2	A	If both pumps have a fault, the system switches off → Pump frequency converter is faulty -> System check required
Sole pressure warning	B	Pressure sensor reports lack of system pressure -> System check required
Sole pressure fault	A	Pressure sensor reports lack of system pressure -> System check required

Class A alarms lead to system shut-down.

4.3 Display menu

The screens that are not described must be skipped with the Enter key when they appear.

The **Start menu** visualises the current status with symbols in the top line. The digital enable is shown in "Ext. Demand" and the analogue request signal in "Demand". The Optimizing display indicates whether or not the optimisation is active.



If the higher-level controller does not enable it, "Off" appears in the main menu.

i	HydroOpt M	Off	1/7	
	Time		10:45:59	▲
	Date		02.07.19	
🔔	Demand source		Convent.	▼
	Ext. Demand		On	
🔑	Demand		100.0 %	✓
	Optimizing		On	

In the main menu, the access level can be logged in, settings adjusted and system information retrieved.

The displayed language can be changed with the service password in the main menu.

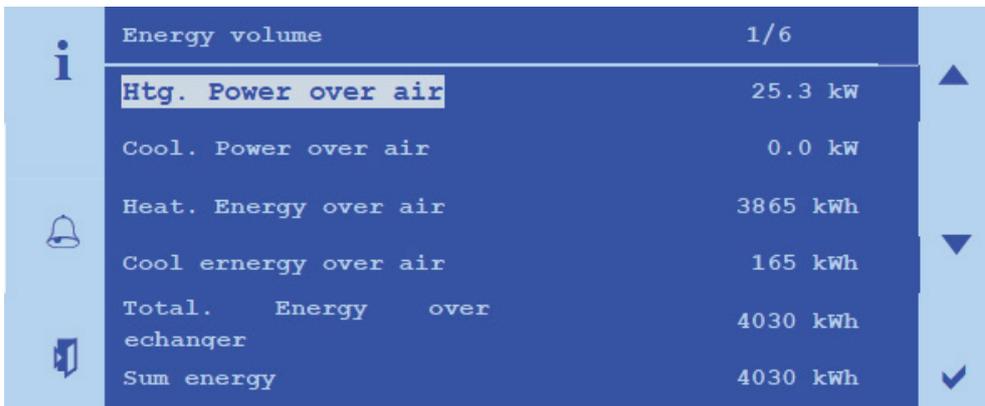
i	Main menu	1/4	
	Enter password		▲
	Information		
🔔	Settings		▼
	Versions		
🔑			✓

System information, e.g. temperatures and brine/air volumes, can be viewed in the main menu under Information. These can vary depending on the expansion stage.

i	Information	3/30	
	Ext. demand		▲
	BMS demand		0.0%
🔔	Demand source		Convent.
	Energy volume		▼
	Feed temp.		24.3°C
🔑	Return temp.		16.1°C
	Power ctr. valve		100.%
			✓

Information about energy volumes can be found under the "Energy volume" menu item.

i	Information	3/30	
	Ext. demand		▲
	BMS demand		0.0%
🔔	Demand source		Konventio
	Energy volume		▼
	Feed temp.		24.3°C
🔑	Return temp.		16.1°C
	Power ctr. valve		100.%
			✓



4.4 Main menu (Info key)

The selection of menu items changes depending on the access level:

- Password input
- Information
- Settings
- Versions

The display of the screens depends on the system configuration. Only the screens required for the system configuration are displayed.

4.4.1 Password menu

Access rights are delivered from the factory as follows:

Level	Default password	Description
User	1000	Level for the operator to select the setpoint source and alarm acknowledgement
Service	****	Level for service technicians with many parameter settings
Factory	****	Manufacturer level for fixed parameters that are set in the factory

The password can be changed in the corresponding access level.

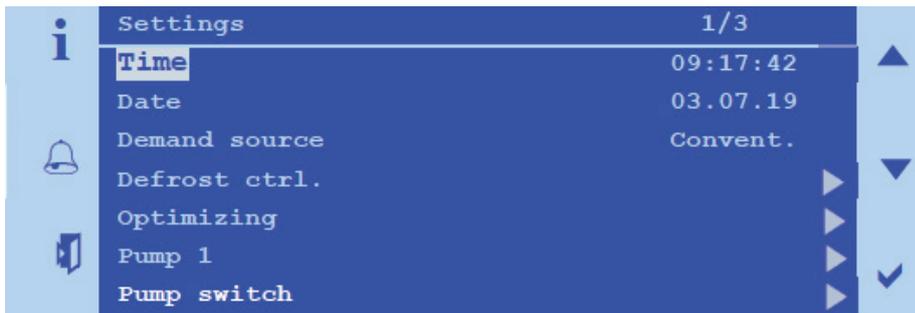
Example:

If the factory user password is entered in password input, a key symbol appears at the top right of the control unit as an indicator of the "User" access level. Two keys are displayed when the service password is entered.



4.4.2 Settings

The setting options vary depending on the expansion stage. The date and time can be changed with the user password. All other settings fall under service applications.



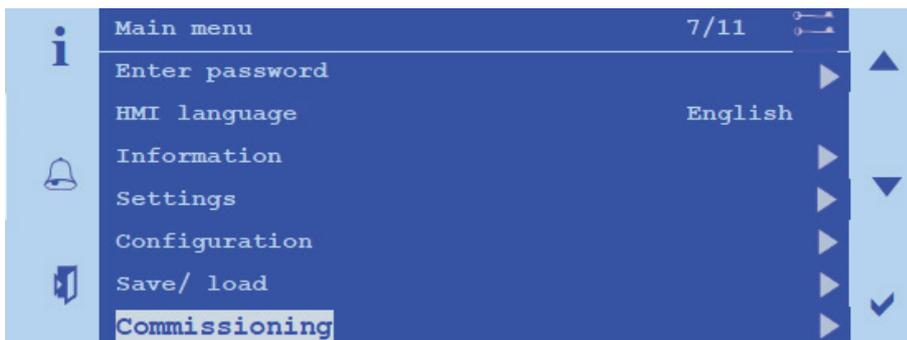
Under Settings, the service technician can adjust the system parameters in the service level.

i Always set a valid date or the correct time in order to obtain all functions.

4.4.3 Commissioning menu

Warning! The safety functions of the software can be deactivated if incorrect settings are made.

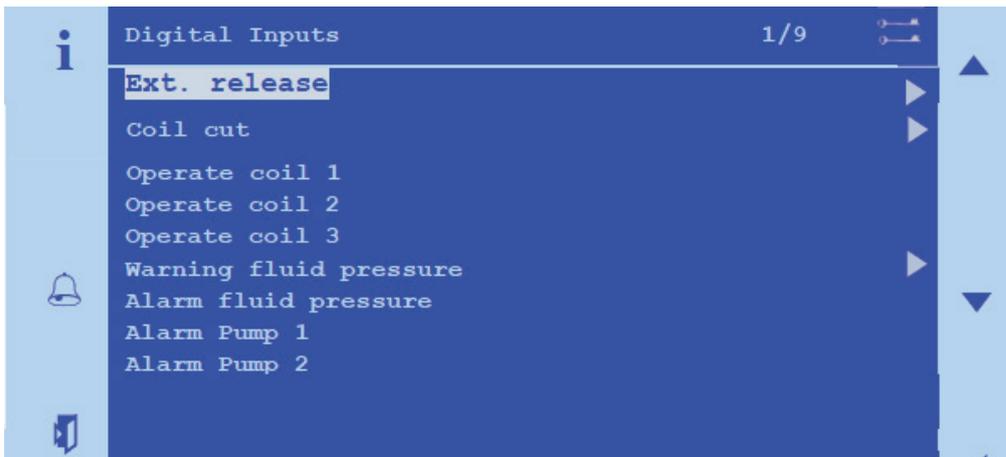
Commissioning can only be achieved by entering the service password.



During commissioning, measurement and control signals can be checked for plausibility with the service password.



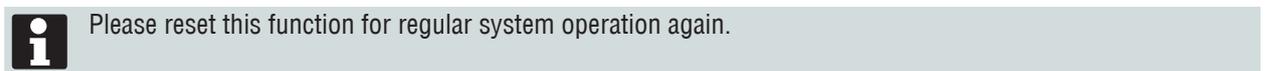
Example of a manual value specification.



Decommissioning must be set to active. The actual value can then be entered manually.



The presence of a manual value entry can be indicated by orange/red flashing of the Info LED.



4.4.4 System information

The version number can be found in the main menu. The currently installed software versions are documented in versions.

4.4.5 System integrator

Modbus (optional)

The HYDROOPT M controller can be connected to a higher-level controller via a communication interface. The service password is required for this. The Modbus variant is explained below.

To set the interface, navigate to the following menu item:

Main menu (press the INFO key) > System integrator > Modbus

Name	Range	Explanation
MB type	None Slave	No connection via Modbus HYDROOPT M controller as slave for a higher-level controller
Address	0...247	Address of the HYDROOPT M controller
MB ComType	RTU Int TCP/IP	Modbus RTU (via serial RS485 interface) Modbus TCP/IP (via the IP network)
Baud rate	2400 4800 9600 19200 38400	Baud rate for communication in the Modbus system (Modbus RTU only)
Parity		Parity for communication in the Modbus system (Modbus RTU only)
Stop bits		Number of stop bits for communication in the Modbus system (Modbus RTU only)
Termination	Passive Active	Terminal resistance at the serial interface in the controller deactivated Terminal resistance at the serial interface activated in the controller
Restart required!	Execute	After changes have been made to the parameters, the controller must be restarted with Execute to accept the data.

If the Modbus connection is used via the IP network, network settings can be found under the following menu item:

Main menu (press the INFO key) > System integrator > IP Config

Name	Range	Explanation
DHCP	Active Passive	Setting the type of address reference: Obtain the address from the DHCP server. Permanently set IP address.
Current IP		Display of the controller IP address
Curr. mask		Display of the subnet mask
Curr. gateway		Display of the gateway address
Set IP	XXX.XXX.XXX.XXX	Entry of the controller IP address if DHCP is set to passive
Set mask	XXX.XXX.XXX.XXX	Entry of the subnet mask
Set gateway	XXX.XXX.XXX.XXX	Entry of the gateway address
Primary DNS	XXX.XXX.XXX.XXX	Entry of the primary DNS server
Secondary DNS	XXX.XXX.XXX.XXX	Entry of the secondary DNS server
Name		Display of the controller name
MAC		Display of the controller MAC address.
Link	Active Passive	No connection to Ethernet. Connection to Ethernet.
100 Mbit	Active Passive	Switching the transmission speed: 10 Mbit 100 Mbit
Advanced		Change the access data (user names, passwords)
After changing values		
Restart required!	Execute	After changes have been made to the parameters, the controller must be restarted with Execute to accept the data.

Access		Address	Description ENG	Data Type	Unit Value
Input Status	Read-Only for BMS	1x0001	ext. demand	Bit	0 = Off 1 = On
Input Status	Read-Only for BMS	1x0002	Operating mode	Bit	0 = Off 1 = On
Input Status	Read-Only for BMS	1x0003	Pump 1	Bit	0 = Off 1 = On

Access		Address	Description ENG	Data Type	Unit Value
Input Status	Read-Only for BMS	1x0004	Pump 2	Bit	0 = Off 1 = On
Input Status	Read-Only for BMS	1x0005	Optimizing	Bit	0 = Off 1 = On
Input Status	Read-Only for BMS	1x0006	Coil 1	Bit	0 = Off 1 = On
Input Status	Read-Only for BMS	1x0007	Coil 2	Bit	0 = Off 1 = On
Input Status	Read-Only for BMS	1x0008	Coil 3	Bit	0 = Off 1 = On
Input Status	Read-Only for BMS	1x0009	Warning	Bit	0 = Ok 1 = Alarm
Input Status	Read-Only for BMS	1x0010	Central alarm	Bit	0 = Ok 1 = Alarm
Input Status	Read-Only for BMS	1x0011	Coil cut	Bit	0 = Off 1 = On
Input Status	Read-Only for BMS	1x0012	Operate coil 1	Bit	0 = Off 1 = On
Input Status	Read-Only for BMS	1x0013	Operate coil 2	Bit	0 = Off 1 = On
Input Status	Read-Only for BMS	1x0014	Operate coil 3	Bit	0 = Off 1 = On
Input Status	Read-Only for BMS	1x0015	Alarm pump 1	Bit	0 = Off 1 = On
Input Status	Read-Only for BMS	1x0016	Alarm pump 2	Bit	0 = Off 1 = On
Input Status	Read-Only for BMS	1x0017	Demand	Bit	0 = Off 1 = On
Input Status	Read-Only for BMS	1x0018	Feed cooling	Bit	0 = Off 1 = On
Coil Status	Read-Write for BMS	0x0001	BMS release	Bit	0 = Off 1 = On
Coil Status	Read-Write for BMS	0x0002	Al. acknowledge	Bit	0 = Off 1 = Execu
Input Register	Read-Only for BMS	3x0001	Feed temp.	Signed Word	0,1 °C
Input Register	Read-Only for BMS	3x0002	Return temp.	Signed Word	0,1 °C
Input Register	Read-Only for BMS	3x0003	Feed temp. after feed	Signed Word	0,1 °C
Input Register	Read-Only for BMS	3x0004	Sum. air volume	Signed Word	0,1 m³/h
Input Register	Read-Only for BMS	3x0005	Fluid volume	Signed Word	0,1 m³/h
Input Register	Read-Only for BMS	3x0006	Eff. pressure 1	Signed Word	1Pa
Input Register	Read-Only for BMS	3x0007	Eff. pressure 2	Signed Word	1Pa
Input Register	Read-Only for BMS	3x0008	Demand	Unsigned Word	0,1%
Input Register	Read-Only for BMS	3x0009	Power ctr. valve	Unsigned Word	0,1%
Input Register	Read-Only for BMS	3x0010	Pump 1 signal	Unsigned Word	0,1%
Input Register	Read-Only for BMS	3x0011	Pump 1 signal	Unsigned Word	0,1%
Input Register	Read-Only for BMS	3x0012	Sum. energy	Signed Word	1Pa
Input Register	Read-Only for BMS	3x0013	Demand source	Signed Word	1Pa
Input Register	Read-Only for BMS	3x0014	Air volume P1	Signed Word	0,1 m³/h
Input Register	Read-Only for BMS	3x0015	Air volume P2	Signed Word	0,1 m³/h
Input Register	Read-Only for BMS	3x0016	Defrost valve	Unsigned Word	0,1%

Access		Address	Description ENG	Data Type	Unit Value
Input Register	Read-Only for BMS	3x0017	Demand	Unsigned Word	0,1%
Input Register	Read-Only for BMS	3x0018	State 0=Off; 1=On; 2=Optimizing; 3=Defrost; 4=Alarm;	Unsigned Word	
Holding Register	Read-Write for BMS	4x0001	BMS demand	Unsigned Word	0,1%

BACnet/IP (optional)

System-specific Bacnet data points are stored in the controller. Please observe the integration instructions which you receive when purchasing the selected communication module.

object-name	object-type	object-instance	description ENG
POL908_FF9FAF	8	4169647	DeviceTemplate
BACnetClientConfig	10	1	
BACnetCovConfig	10	2	
ErrorLog	10	3	
HistryLog	10	4	
BACnetEventEnrollmentConfig	10	5	
EDE-File	10	6	
EDE-File_StateText	10	7	
BACnetNotificationClassConfig	10	8	
BACnetDynamicTrendlogConfig	10	9	
TrendObj1	20	1	
TrendObj2	20	2	
TrendObj3	20	3	
TrendObj4	20	4	
TrendObj5	20	5	
TrendObj6	20	6	
TrendObj7	20	7	
TrendObj8	20	8	
TrendObj9	20	9	
TrendObj10	20	10	
TrendObj11	20	11	
TrendObj12	20	12	
TrendObj13	20	13	
TrendObj14	20	14	
TrendObj15	20	15	
TrendObj16	20	16	
TrendObj17	20	17	
TrendObj18	20	18	
TrendObj19	20	19	
TrendObj20	20	20	
TrendObj21	20	21	
TrendObj22	20	22	
TrendObj23	20	23	
TrendObj24	20	24	

object-name	object-type	object-instance	description ENG
TrendObj25	20	25	
TrendObj26	20	26	
TrendObj27	20	27	
TrendObj28	20	28	
TrendObj29	20	29	
TrendObj30	20	30	
BMSAlmAck	3	30029	BMS Alm ack
Inlettemperature	0	36600	Feed temp.
Returntemperature	0	26206	Return temp.
Soleflowvolumelpm	0	11049	Fluid volume
pressure1	0	28519	Eff. pressure 1
pressure2	0	24324	Eff. pressure 2
Inlettemperatureafterinfeed	0	54992	Temp. After feed
extract exchanger 1	3	63397	Operate coil 1
extract exchanger 2	3	44789	Operate coil 2
extract exchanger 3	3	39365	Operate coil 3
Solelowpressurewarning	3	62468	Warning fluid pressure
SolelowpressureAlarm	3	34533	Alarm fluid pressure
Nosoleflow	3	37994	Fluid flow
Pump1alarm	3	37430	Alarm pump 1
Pump2alarm	3	2538	Alarm pump 2
Soleflowvolumeqpm	2	12675	Fluid volume
frostcontroler	2	22201	Frost valve
Frostvalve	1	500	defrost valve
Operatingmode	19	39944	Operating mode
Airvolume1	2	24709	Air volume P1
Airvolume2	2	20710	Air volume P2
Summaryairvolume	2	26578	Sum. air volume
actualsignaloptimazing	2	1087	Opt_Ctrl.PrVal
CmdPump1	4	4295	Pump 1
Pump1	1	35056	Demand pump 1
CmdPump2	4	51269	Pump 2
Pump2	1	26146	Demand pump 2
Powervalve	1	25280	Power ctr. valve
Cmdsource	19	45287	Demand source
DemandBMS	19	39795	BMS release
Externaldemand	19	54661	Ext. demand
DemandDisplay	2	11145	Demand
Optimazing	19	35330	Optimizing
leadingPumpsignal	2	21693	Signal pump
Aktivpump	19	27914	Number of pumps
Globalalarm	4	41370	Central alarm
Warning	4	50808	Warning
State	4	9161	Operating mode
Htgrecovery	2	33917	Htg. power over air
Clg	2	32980	Cool. power over air
Recovery	2	23344	Sum energy

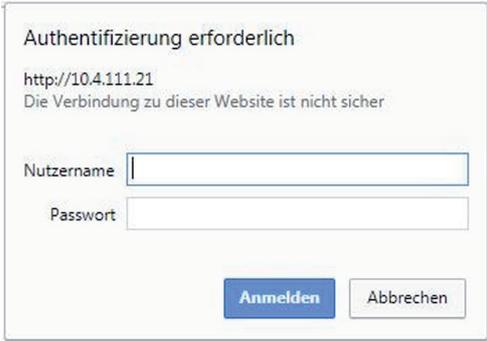
4.5 Further operating options

4.5.1 HMI Web

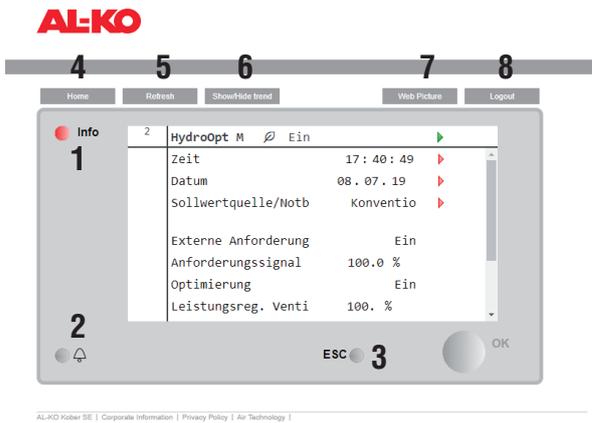
With the HMI Web, the entire system can be fully configured and put into operation according to the logged-in password level. HMI Web is part of the standard controller equipment.

It can be accessed via the network connection of the controller via a terminal device provided by the customer (PC, notebook, tablet) with a web browser. Menu structure and password levels are identical to HMI Basic.

This access is also possible wirelessly by using a commercially available WLAN router.

Step	Description
1	<p>Make sure that the controller and the on-site terminal device (PC, notebook, tablet) with which you want to access the Web interface are in the same network.</p> <p> Settings such as DHCP may be necessary. If you have connection problems, contact the responsible network administrator.</p>
2	<p>Open an HTML5-enabled web browser on the terminal device. The following browsers are tested and supported: Google Chrome, Mozilla Firefox, Microsoft Edge.</p>
3	<p>Enter the IP address of the controller in the address bar of the web browser. The IP address of the controller can be read from the local control unit.</p> 
4	<p>Enter username and password. Default username: WEB default password: SBTAdmin! Username and password can be changed. The Web interface appears.</p> 
5	<p>For the extended activation of the system graphic (Web Picture): Enter the username: ADMIN and the order-specific password.</p>

Visually, the display of the HMI Web in the web browser is based on the HMI Facility. The keys described below can be pressed with the mouse button (PC, notebook) or by touch (tablet), depending on the terminal device used. Menu items or detail pages can be selected directly. Use the mouse wheel (PC, notebook) or gestures (tablet) in the menu to scroll up and down.

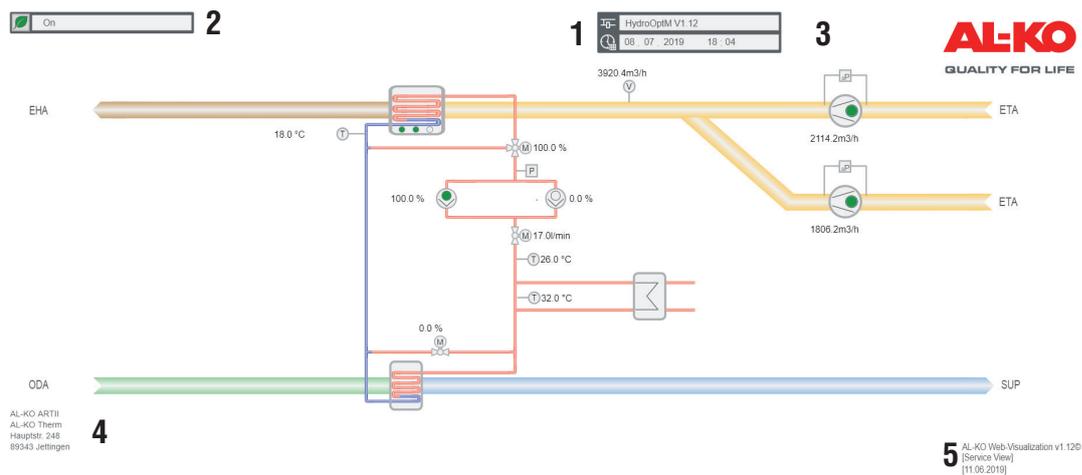


AL-KO Kober SE | Corporate Information | Privacy Policy | Air Technology |

No.	Designation	General function
1	INFO button with integrated LED	Press this button to return to the home page. The integrated LED indicates the system status.
2	ALARM button with integrated LED	Press this button to access the alarm pages. The integrated alarm LED indicates the alarm and acknowledgement status.
3	ESC button	Press this button to return to the previous page.
4	Home	Press this button to return to the home page.
5	Refresh	Updates the browser window.
6	Show/Hide Trend	Shows or hides the online trend window below the user interface. To record a value (e.g. supply air temperature), press a value directly. When the trend window is displayed, it is immediately displayed in the window. Up to five values can be simultaneously recorded online. The online trend function is used for commissioning and diagnostics. The data will not be saved.
7	System graphic (Web Picture)	The system display is visualised graphically.
8	Login	Press this button to enter the password.

4.5.2 System graphic (optional)

Once this option has been enabled, the system can be visualised on the PC using a system graphic via a LAN connection.



No.	Symbol	Description
1		Display of the name and version of the controller software
		Display of the system time of the controller (date)
		Display of the system time of the controller (time)
2		Display of the current operating mode: Off On Defrost protection Optimizing
3		Group A (danger/urgent)
		Group B (low)
		Group C (warning)
4		Location description of the system (change in the controller possible)
5		Version number of the visualisation system

5 Warnings, faults and emergencies

**Warning!**

Diagnostics, fault elimination and recommissioning must only be performed by authorised persons. This is especially true when working on electrical equipment inside the switch cabinet (e.g. testing, replacement, etc.).

A distinction is made between warning messages (heat recovery operation is maintained) and fault messages. Both are communicated to the BCS via potential-free contact and via bus.

A malfunction message must be acknowledged on-site after the error is corrected.

Error messages are shown on the controller in plain text.

In case of emergency and in case of questions, please contact the manufacturer of your Air Technology system, one of our branch offices or us directly:

AL-KO THERM GMBH
Hauptstraße 248-250
89343 Jettingen-Scheppach

Telephone: (+49) 8225/ 39-0
Telefax: (+49) 8225/ 39-2113
E-mail: service.center@al-ko.de
Web: www.al-ko.com

6 Maintenance

The owner of an air conditioning system is obliged to have the system maintained regularly by trained specialist personnel.

AL-KO THERM recommends that maintenance of the overall AC system is carried out in accordance with German VDMA 24186 and VDI 6022.

Upon conclusion of a maintenance contract, AL-KO THERM GMBH takes over these tasks.

**Warning!**

Installation, commissioning, maintenance, and repair work may only be performed by trained and qualified specialist personnel.

**Warning!**

When working on the HYDROOPT M®, the device must normally be disconnected from the power supply beforehand, the main switch and/or repair switch turned off (all poles switched off), and secured against unauthorised reactivation.

Once work is complete on the device, the responsible party must make sure that no personnel are in the vicinity of the system as well as that all factory installed protection measures are functional before putting the device back into operation.

Only use original consumable materials and spare parts. This is the only way to ensure safe operation. The warranty may also be invalidated.

6.1 Maintenance schedule

Excerpt from VDMA 24186-1 and -4

Item Assembly/ Component/ Activity	Activity	Implementation	
		Periodically every	As required
8	Pipe network (VDMA 24186-1)		
8.1	Pumps		
8.1.1	Check exterior for dirt, damage, corrosion and a secure fit	3 mon	
8.1.2	Function-maintaining cleaning (exterior)		X
8.1.3	Check functionality	6 mon	
8.1.4	Check leak-tightness (visual check)	3 mon	
8.1.5	Drive elements	VDMA 24186-4	
8.1.6	DDC technology	VDMA 24186-4	
8.2	Shut-off, adjustment, and control fittings		
8.2.1	Check exterior for damage and corrosion (visual check)	3 mon	
8.2.2	Check functionality	6 mon	
8.2.3	Check leak-tightness (visual check)	3 mon	
8.2.6	Actuators	VDMA 24186-4	
8.3	Dirt trap		
8.3.1	Check for soiling		X
8.3.2	Clean the sieve		X
8.3.3	Check the sieve for damage		X
8.4	Piping and expansion tanks		
8.4.1	Check the exterior of accessible piping for damage, leak-tightness and secure fitting	3 mon	
8.4.2	Check heat insulation for damage and completeness	3 mon	
8.4.3	Check temperature and pressure measurement devices for damage and display accuracy (plausibility check)	3 mon	
8.4.4	Check functionality of safety equipment	6 mon	
8.4.5	Check compensators for damage and secure fitting (visual check)	3 mon	
8.4.6	Check fluid level	3 mon	
8.4.7	Top off fluid		X
8.4.8	Check the heat carrier of circulation-linked systems for frost resistance ⁽¹⁾	12 mon	
8.4.9	Check functionality of piping trace heating	6 mon	
8.4.10	Check functionality of venting valves	6 mon	
8.4.11	Venting		X
	⁽¹⁾ See overview sheet on HVE for specifications		
10	Drive elements (according to VDMA 24186-1)		
10.1	Electric motors		
10.1.1	Check the exterior for dirt, secure fitting, damage, and corrosion	3 mon	
10.1.2	Function-maintaining cleaning (exterior)		X
10.1.3	Check direction of rotation		X
10.1.4	Re-tighten connection terminals		X
10.1.5	Measure tension	12 mon	
10.1.6	Check connection terminals to ensure they are seated firmly	12 mon	
10.1.7	Measure power consumption	12 mon	
10.1.8	Measure phase symmetry	12 mon	
10.1.9	Check for smooth running and temperature increase	12 mon	
10.1.10	Check bearings for noise	3 mon	
10.1.11	Grease bearings using a regreasing unit		X

Item	Activity	Implementation	
		Periodically every	As required
10.1.12	Check the function of the protection device	6 mon	
11	Documentation and marking (according to VDMA 24186-1)		
11.1	Maintenance-relevant documents		
11.1.1	Overview sheet available in HVE	3 mon	
	Inventory documents folder available	3 mon	
2	Switch cabinets (according to VDMA 24186-4)		
2.1	Control part		
2.1.1	Check for proper and functional installation and check ambient conditions	12 mon	
2.1.2	Check for dirt, damage, corrosion, and a secure fit	12 mon	
2.1.3	Check protective covers	12 mon	
2.1.7	Function-maintaining cleaning		X
2.1.8	Check connections	12 mon	
2.1.9	Check functional elements (e.g. operating and display equipment)	12 mon	
2.1.11	Check switching and control processes		X
3	Field equipment (according to VDMA 24186-4)		
3.1	Sensors (brine temperature sensor, magnetic ind. flow rate transmitter)		
3.1.1	Check for proper and functional installation and check ambient conditions	12 mon	
3.1.2	Check for dirt, damage, corrosion, and a secure fit	12 mon	
3.1.3	Function-maintaining cleaning		X
3.1.6	Check measurement signals	12 mon	
4	Controller (according to VDMA 24186-4)		
4.1	Controller (CPU HEHR Connector)		
4.1.4	Check integral power supply (e.g. buffer battery)	12 mon	
4.1.6	Check functional elements (e.g. operating and display equipment)	12 mon	
4.1.8	Check input signals (e.g. sensors, remote dial, reference variable)	12 mon	
4.1.9	Check control loop and control signal	12 mon	
5	Sub-stations (according to VDMA 24186-4)		
5.1	Sub-station		
5.1.15	Check power failure and power recovery behaviour	12 mon	
10	Documentation (according to VDMA 24186-4)		
10.1	Maintenance-relevant documents		
10.1.1	Check for presence (circuit diagram, CHC operating instructions)	12 mon	
10.2	Existing system markings (signage)		
10.2.1	Check for availability	12 mon	

7 Shut-down

7.1 Decommissioning

The system can remain permanently filled with the glycol/water mixture.

Disconnect the system from the power supply before beginning work (shut down all poles) and secure it to prevent unauthorised reactivation.

**Important!**

Certain system parts are under pressure. Therefore, drain off the glycol/water mixture before starting the dismantling.

If the system is decommissioned for a long period of time, the instructions for the individual components must be observed.

The information from the component manufacturers must also be followed (request this information if necessary).

**Important!**

In winter, there is a risk of freezing due to residual water in individual components.

If necessary, take suitable measures such as adding frost protection/taking frost protection measures.

Before recommissioning, follow the points in the commissioning and maintenance chapters.

7.2 Dismantling

Disconnect the system from the power supply before beginning work (shut down all poles) and secure it to prevent unauthorised reactivation.

**Important!**

Certain system parts are under pressure.

Disassembly may only be performed by trained technical personnel.

Dismantling must be carried out according to the currently valid and applicable occupational safety and accident prevention regulations.

7.3 Disposal



Do not dispose of worn-out equipment, spent batteries or rechargeable batteries in domestic waste.

When disposing of the HYDROOPT M®, operating material or accessories, comply with the relevant local environmental and recycling regulations in your country and community that are applicable at the time when the activity is undertaken.

8 Appendix

8.1 Commissioning list

Attention of:

Company:

In order to ensure a smooth commissioning process, the following work is necessary in advance:

Central ventilation unit:

	Yes	No
Central ventilation unit ready for operation	<input type="checkbox"/>	<input type="checkbox"/>
Connection on air side available	<input type="checkbox"/>	<input type="checkbox"/>
Air volume measurements carried out	<input type="checkbox"/>	<input type="checkbox"/>

Hydraulic station:

	Yes	No
Hydraulic station installed and piped	<input type="checkbox"/>	<input type="checkbox"/>
All heat exchangers connected in counterflow	<input type="checkbox"/>	<input type="checkbox"/>
Expansion vessel with safety valve installed	<input type="checkbox"/>	<input type="checkbox"/>
System filled with glycol/water mixture	<input type="checkbox"/>	<input type="checkbox"/>
Glycol content measured	_____ %	
Read system fill pressure in idle state	_____ bar	
Pump vented	<input type="checkbox"/>	<input type="checkbox"/>
Electrical mains supply: Voltage measurement performed	<input type="checkbox"/>	<input type="checkbox"/>
Exhaust air shut-off valves connected (only for systems with several exhaust air exchangers)	<input type="checkbox"/>	<input type="checkbox"/>
Enable and demand from GLT connected	<input type="checkbox"/>	<input type="checkbox"/>
Enable and demand checked		

Optional functions:

	Yes	No
Supply air measurement of pressure transmitter 4-20 mA set; and in operation?	<input type="checkbox"/>	<input type="checkbox"/>
Signal of all heat exchangers disconnected tested	<input type="checkbox"/>	<input type="checkbox"/>
Signals of exhaust air exchanger 1, 2, 3 in operation and their shut-off valves 1, 2, 3	<input type="checkbox"/>	<input type="checkbox"/>

Functional test:

Optimisation function checked (set demand to 100% and test brine optimisation with variable air volume 1 m ³ /h brine should correspond to approx. 3300 m ³ /air)	<input type="checkbox"/>	<input type="checkbox"/>
---	--------------------------	--------------------------

Evidence of heat recovery

Supply air volume _____ m³/h
Exhaust air volume _____ m³/h
Outdoor air temperature _____ °C
Temperature according to HRO SUPP _____ °C
Exhaust air temperature _____ °C
Temperature according to HRO EXH _____ °C
BCS power requirement in _____ %
Outdoor air amount: _____ %
Pump frequency _____ Hz
Displayed HRO power in _____ kW

Place, date

Name of commissioning person

© Copyright 2020

AL-KO THERM GMBH | Jettingen-Scheppach | Germany

All rights reserved for AL-KO THERM GMBH, as well as in the event of applications for industrial property rights. This documentation or excerpts thereof may not be copied or forwarded to third parties without the express consent of AL-KO THERM GMBH. We reserve the right to make technical changes that do not impair the function.

3061955 /Apr2020