HYDRO-OPT[®] S

OPERATING AND ASSEMBLY INSTRUCTIONS

CENTRAL VENTILATION AND AIR HANDLING UNITS









Legal

AL-KO THERM GMBH Hauptstraße 248 - 250 D-89343 Jettingen-Scheppach Germany Phone: +49 8225 39 - 0 Fax: +49 8225 39 - 2113 E-mail: klima.technik@alko-air.com

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1 About this manual

- The German version is the original operating instructions. All further language versions are translations of the original operating instructions.
- Read these operating and assembly instructions carefully before assembly, commissioning and maintenance. This is the prerequisite for safe work and trouble-free handling.
- Observe the safety instructions and warnings in this documentation and on the product.
- This documentation is a permanent part of the described product, and must be handed over to the buyer if the product is sold.

1.1 Explanation of symbols

1.1.1 Safety instructions

🛕 DANGER



This signal word is used to indicate an imminently dangerous situation which, if not avoided, will result in death or severe injury.

MARNING

This signal word is used to indicate a potentially dangerous situation which, if not avoided, could result in death or severe injury.



A CAUTION

This signal word is used to indicate a potentially dangerous situation which, if not avoided, could result in minor injury.



ATTENTION

This signal word is used to indicate a potential risk of property damage.

NOTE

Special instructions for ease of understanding and handling.

1.2 Safety signs

Meaning	Sign
GENERAL DANGER SIGN Failure to observe the required safety instructions may result in death, severe injury or serious damage to property.	
IMPORTANT NOTICE If this notice is not observed, problems can arise with the unit.	
OBSERVE THE OPERATING AND ASSEMBLY INSTRUCTIONS If you do not observe the notices in the operating and assembly instructions, this can lead to problems with the unit.	Carlos Carlos
INFORMATION Observing this information will make working with the machine easier.	1

Warning sign

The warning signs used in these operating and assembly instructions draw attention to specific hazards.

Meaning	Warning sign
Warning of risk of falling If the required safety instructions are not observed, this can lead to death or severe injuries due to falling.	
Warning of risk of slipping If the required safety instructions are not observed, this can lead to death or severe injuries due to slipping.	
Warning of electrical voltage If the required safety instructions are not observed, this can lead to death or severe injuries due to dangerous electrical voltage.	4
Warning of suspended loads If the required safety instructions are not observed, this can lead to death or severe injuries due to a suspended load.	
Warning of falling objects If the required safety instructions are not observed, this can lead to death or severe injuries due to falling objects.	
Warning of hot surface If the required safety instructions are not observed, this can lead to death or severe injuries due to a hot surface.	<u>SSSS</u>
Warning of crushing If the required safety instructions are not observed, this can lead to death or severe injuries due to crushing.	



Meaning	Warning sign
Warning of pointed object If the required safety instructions are not observed, this can lead to death or severe injuries due to pointed objects.	
Warning of hand injuries If the required safety instructions are not observed, this can lead to death or severe injuries.	
Warning of poisonous substances If the required safety instructions are not observed, this can lead to death or severe injuries due to a poisonous substances.	
Warning of explosive substances If the required safety instructions are not observed, this can lead to death or severe injuries due to explosions.	

Mandatory signs

The mandatory signs in these operating and assembly instructions draw attention to instructions to be observed.

Meaning	Mandatory signs
Use eye protection If you do not wear eye protection, there is a risk of eye injuries.	
Use foot protection If you do not wear foot protection, there is a risk of foot injuries.	
Use hand protection If you do not wear hand protection, there is a risk of hand injuries.	Man and a start of the start of
Use head protection If you do not wear head protection, there is a risk of head injuries.	
Use mask If you do not wear respiratory protection, this can lead to poisoning and chemical burns to the lungs.	
Isolate before maintenance or repair Failure to disconnect the unit from all energy sources before starting maintenance or repair work can result in serious injuries.	

1.2.1 Abbreviations

Abbreviation	Meaning
PPE	Personal protective equipment, such as cut-proof gloves, safety goggles, work gloves, ear protection, safety helmet, breathing mask
CCS	Circulating coil system
PWW	Pump warm water heater

1.3 Legal notices

All specified data serve solely to describe the product. No statement on a specific characteristic or suitability for a specific purpose can be derived from these data. The data do not exempt the user from his own judgement and checks.



2 Safety instructions

2.1 Intended use

The range of application for HYDRO-OPT[®] S is exclusively the recovery of energy between **an** exhaust air device and **a** supply air handling unit. Permissible pressure range between 2.0 and 5.5 bar (g).

2.2 Foreseeable misuse

HYDRO-OPT[®] S may only be operated within the scope of the technical data specified by AL-KO THERM. Any use other or more extensive than that described in the section "2.1 Intended use" on page 9 is regarded as not in accordance with the intended use. The manufacturer cannot be held liable for damage resulting from this.

2.3 General safety instructions

A WARNING

Risk of serious injury or death due to working without personal protective equipment can result in serious injury or death.
 Working on HYDRO-OPT® S without personal protective equipment can result in serious injury or death.
 Observe the safety instructions in this operating and assembly instructions.
 Use the personal protective equipment when working on the installation.
 Use other protective equipment according to the work carried out.

WARNING

Risk of serious injuries or death! Working on HYDRO-OPT[®] S can result in serious injury or death.

- Only allow assembly, installation, commissioning, repair, maintenance and servicing work to be carried out by qualified staff.
- Before repair and maintenance work, disconnect the HYDRO-OPT[®] S from the mains on all poles and lock it out.
- Integrate weatherproof units into the lightning protection concept when installed outdoors.
- Avoid sparks and flying sparks in the intake area of the installation.
- Observe the working instructions and these operating and assembly instructions.
- Work with care.

- Use the personal protective equipment when working on the installation.
 - Use other protective equipment according to the work carried out.

WARNING



Risk of injury due to falling, and falling modules.

When installing the modules or installing them on platforms or on the roof, persons may fall off and/or modules may fall down.

- Only allow assembly, installation, commissioning, repair, maintenance and servicing work to be carried out by qualified staff.
- Observe the assembly instructions in these operating and assembly instructions.
- Use only tested ladders, scaffolding or suitable platforms.
- Only use suitable lifting equipment.
- Only use approved fasteners when installing the HYDRO-OPT[®] S.
- Use the personal protective equipment when working on the installation.

🛕 WARNING



- Risk of injury due to unauthorised opening.
- Keep the inspection doors/inspection covers closed during operation.
- Never open the unit during operation.
- Open the inspection doors/inspection covers using the relevant tool if necessary.
- Observe the hazard warnings on the inspection doors/inspection covers.

WARNING



- Work with care.
- Do not swallow the sealant, adhesive or pre-treatment agent.

Do not touch the sealant, adhesive or pre-treatment agent.

- Ensure that there is adequate ventilation at the workplace.
- Observe the safety data sheets and operating procedures in accordance with the Ordinance on Hazardous Substances.
- Use personal protective equipment during all work on the installation.

WARNING



Risk of injury from falling from ladders, scaffolding or work platforms.

- Only use suitable and tested ladders, steps, scaffolding and work platforms.
- Work with care.

Observe the safety instructions in these operating and assembly instructions to avoid injuries, fires and other hazards due to improper use and improper operation of the unit:

- If installation is performed contrary to our regulations, and the defect/damage which has occurred is attributable to improperly modification, processing or any other treatment, all damage compensation or warranty claims are ruled out. The orderer must prove that improper installation did not cause the defect which has occurred.
- Safety and monitoring equipment must not be removed, bridged or disabled in any other way.
- All authorised persons must have read and understood the operating and assembly instructions in full before starting work on the unit and must observe them at all times.
- To avoid dangers during operation, all of the user's plant, operating and working instructions apply in addition to these operating and assembly instructions.



2.3.1 Safety instructions for operation

- The HYDRO-OPT[®] S may only be operated with completely closed inspection doors/inspection covers.
- No unauthorised persons are permitted to have access to the HYDRO-OPT® S during operation.
- The HYDRO-OPT[®] S may only be operated in the performance range specified in the technical documents from AL-KO THERM.
- The HYDRO-OPT[®] S must be installed properly and used subject to precise observation of our operating and assembly instructions.
- The HYDRO-OPT[®] S may only be operated in technically flawless condition. Malfunctions and damage that can affect safety must be rectified immediately and professionally.
- Avoid sparking in the vicinity of the HYDRO-OPT[®] S
- Wear personal protective equipment (e.g. hearing protection) during operation of the HYDRO-OPT[®] S.

2.3.2 Safety instructions for maintenance

- Damaged parts are only permitted to be replaced with original spare parts.
- During repair and maintenance work, the HYDRO-OPT[®] S must be disconnected from the mains on all poles and locked out.
- General maintenance instructions in the operating and assembly instructions from AL-KO THERM must be observed under all circumstances.

2.3.3 Personal safety instructions

- The HYDRO-OPT [®] S may only be operated by persons who are trained in operating it and expressly authorised to use it.
- Personal protective equipment must be used when working on the HYDRO-OPT[®] S.
- To avoid dangers during operation, all of the operator's plant, operating and working instructions apply in addition to these operating and assembly instructions.
- The operating and assembly instructions must be kept at a suitable, known place in the workplace.
- The operator of the HYDRO-OPT[®] S must draw up operating procedures in an understandable form and in the language of the employees, taking the operating and assembly instructions and the operating conditions into consideration.

2.4 Residual dangers

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

Residual hazards are potential dangers that are not immediately obvious, e.g.:

- Injuries due to failure to observe the safety instructions, standards, directives or regulations.
- Injuries caused by uncoordinated work.
- Danger caused by working on the electrical installation, cables and connections.
- Transporting, unpacking and setting up the unit; these may result in crushing, cutting, puncture or impact injuries.
- Tipping of the unit; uneven and loose surfaces promote unit tipping.
- There is a risk of stumbling, slipping, falling and falling down when setting up the unit and the accessory parts.
- There is a danger of electric shock due to damaged and defective electrical components.
- Electrical connection cable: Danger due to stumbling, falling and slipping.
- Noise (hearing damage).
- Human misconduct: Non-observance of safety instructions, standards and regulations.
- Operation or transport without suitable safety measures.

2.5 Training

The owner/operator of the HYDRO-OPT[®] S must regularly train their personnel in the following subjects:

- Observance of the operating and assembly instructions as well as the legal regulations.
- Intended operation of the HYDRO-OPT[®] S.
- Observance of all company, operating and working instructions at the owner's/operator's installation site.
- What to do in an emergency.



3 Product description

The HYDRO-OPT[®] S hydraulic station is used for high-efficiency heat and cold recovery in circulating coil systems (CCS) and is prepared for connection on both the electrical and hydraulic sides.

The ready integrated HYDRO-OPT[®] S transfers energy between **an** exhaust air device and **a** supply air handling unit.

The integrated control unit monitors the operating conditions and regulates the brine circulation amount. If there is a danger of frost on the exhaust air heat exchanger, a control-specific frost protection function is activated.

The power control is realised through a combination of a frequency-controlled pump with a power regulating valve.

A higher-level control unit decides whether energy recovery is possible and determines the amount of energy.

Therefore, the HYDRO-OPT[®] S works together with the control unit in a crucial relationship to save energy and reduce operating costs.

Malfunctions are displayed and forwarded via potential-free contacts.

Optionally, the HYDRO-OPT[®] S can be easily integrated in higher-level systems via permanently configured bus systems; Modbus and BAC-net MSTP are available.

NOTE



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

3.1 Functional description

The HYDRO-OPT[®] S comprises the following functional components:

- Programmable frequency converter with main switch, I/O interfaces and display
- Temperature sensors in immersion sleeves for pre flow and return flow temperature
- Pressure switch for monitoring the system pressure
- 3-way control ball valve, drive voltage 24 V, control voltage 0-10 V
- Electrical safety devices

3.1.1 Power control

The capacity of the energy recovery system is controlled from the higher-level control unit via an enable and an external setpoint (0-10 V). 10 V means full speed of the circulating pump (e.g. 55 Hz maximum value – adjustable on the FC).

As the control diminishes, the pump speed is first reduced to a minimum pump speed. When the control (energy recovery capacity request) is reduced further, the control ball valve then opens steadily in sequence. The energy recovery capacity constantly decreases until energy can no longer be transferred.

With a setpoint setting of 0 V, the HYDRO-OPT[®] S must obtain the enable from the higher-level control unit.

3.1.2 Function monitoring

The higher-level control unit is controlled by an enable signal (potential-free) as well as by the 0-10 V setpoint. A collective fault is fed back potential-free to the higher-level control unit. With 0 V drive of the hydraulic unit, the enable must be rescinded so that the pump is switched off.

The fault messages can appear:

- FC defective installation is switched off
- Pump fault installation is switched off
- System pressure monitor triggered system pressure too low installation is switched off

The pre flow and return flow temperatures of the water/glycol circuit as well as the value of the external control are permanently shown on the display of the frequency converter.

3.2 Frost protection control

The integrated frost protection control is intended to prevent any frosting of the exhaust air heat exchanger and associated air volume reduction and extreme power reduction of heat recovery in the exhaust air. It is very important to prevent any potential frosting and associated power reduction. This is achieved by increasing the circulation amount of the water/ glycol mixture up to a specified limit.

The power reduction of the heat recovery is affected only very slightly. If this measure does not suffice to prevent frost formation on the exhaust air heat exchanger, the transfer capacity is steadily reduced via a downstream capacity control valve until the possibility of frost is ruled out. The temperature conditions for this can be adjusted in the control unit of the hydraulic station.

The following conditions are necessary for engaging frost protection control:

Activate frost protection control in the FC (frost protection control is deactivated at the factory). To activate frost protection control, corresponding parameters of the factory setting must be adjusted from -8 °C to -2 °C.

3.3 Handling variable air volumes

If the air handling unit is operated with variable air volume flows, the circulating water/glycol amount must be adapted accordingly. To adjust the media circulation amount, the maximum external control of HYDRO-OPT[®] S is adjusted according to the air volume flow ratio. (e.g. max. drive of 5 V at 50% air volume flow)

The adaptation to limit the max. external setpoint (0-10 V) must be achieved using a high-level control.

An adequate adjustment of the heat recovery to variable air volume flows can be mapped using this mathematical dependency.



3.4 HYDRO-OPT® S set-up



Fig. 1 HYDRO-OPT® S set-up

1	Carrier frame	9	Drip pan
2	Frequency converter/display/control unit/main switch	10	Pre flow temperature sensor, exhaust air heat exchanger
3	Pre-flow, supply air heat exchanger	11	Pre-flow, exhaust air heat exchanger
4	Return flow supply air heat exchanger	12	Return flow exhaust air heat exchanger
5	Level compensation foot	13	Safety valve/pressure gauge/system pressure monitor
6	Power control ball valve	14	Pre flow temperature sensor, supply air heat exchanger
7	Volume flow rate indicator	15	Pressure expansion vessel with cap valve
8	Circulating pump		

3.4.1 HYDRO-OPT[®] S schematic with supply air/exhaust air device



anger

1	Exhaust air heat exchanger	9	Pre flow temperature sensor, exhaust air heat exchanger
2	Supply air heat exchanger	10	Expansion vessel
3	Shut-off ball valve	11	Cap valve
4	Pre flow temperature sensor, supply air heat exchanger	12	Drain and fill valve
5	Circulating pump	13	Safety valve
6	Drain screw on circulating pump	14	pressure gauge
7	Control ball valve with drive	15	Pressure gauge valve
8	Volume flow rate indicator	16	System pressure monitor



3.5 Technical data



Read the documentation supplied with the unit. Information on the technical and electrical data can be found there.

The HYDRO-OPT[®] S is available in 5 sizes depending on the required quantity of brine being circulated: (see type overview)

ATTENTION

Operating pressure: 2.0 to 5.5 bar (g) Supply voltage: 400 V/50 Hz (3 phases) Max. pre-fusing: 10 A slow

The maximum on-site pre-fusing is oriented on the output of the frequency converter used as well as the length and cross-section of the supply line. (For details, see our information in the switching documentation)





Fig. 3 Dimensions HYDRO-OPT[®] S type overview:

Туре	IG connections	Flow rate	L	W	Н	Weight
		m3/h	mm	mm	mm	kg
S0.5	DN 20	0.35 - 0.55	1178	489	971	105
S1.5	DN 25	0.56 - 1.50	1178	489	971	110
S3.5	DN 32	1.51 - 3.50	1178	489	971	119
S6.5	DN 40	3.51 - 6.50	1178	489	971	133
S11	DN 50	6.51 - 11.0	1178	489	971	153

Maximum electrical connected load (depending on the pump output; see also switching document):

Туре	Flow rate m3/h	Max. connected load V / kW / A
S0.5	0.35 - 0.55	3-400/0.37/1.0
S1.5	0.56 - 1.50	3-400/0.37/1.0
S3.5	1.51 - 3.50	3-400/1.1/2.5
S6.5	3.51 - 6.50	3-400/1.5/3.2
S11	6.51 - 11.0	3-400/2.2/4.5

3.6 Type plate

Each HYDRO-OPT[®] S has a type plate. The type plates contain the order number, position details, year of manufacture, manufacturer's data as well as the design data. The type plate is attached to the outside of the unit.



Fig. 4 Example of a type plate

3.6.1 HYDRO-OPT[®] S components

3.6.1.1 Pressure expansion vessel

Setting the upstream pressure



ATTENTION

Never exceed the permissible operating pressure (type plate). The vessel can burst.

If the upstream pressure and system fill pressure are not set correctly, the "reflex" function is not (or not sufficiently) guaranteed.

- If necessary, readjust the factory set upstream pressure p₀ to the required value (minimum operating pressure of the installation). If the pressure on the gas valve is too high, release gas. If the pressure is too low, replenish using a nitrogen bottle, for example.
- Enter the newly set upstream pressure p₀ on the type plate.



$$\mathbf{p}_{0}$$
 [bar] = $\frac{H[m]}{10}$ + 0,2 bar¹ + p Δ^{2} + Δp_{p}^{3}

¹⁾ Recommendation

²⁾ Evaporation pressure for hot water systems > 100 °C

³⁾ Differential pressure of the circulating pump; only take into account when installing the "reflex" on the pressure side of the circulating pump



Fig. 5 Upstream pressure setting on the gas valve

1	Valve cap		Gas valve
Step	step Action		
1	Loosen the valve cap (1) and remove it.		
2	Set the upstream pressure p_0 on the gas valve (2) to the minimum operating pressure of the installation.		
3	Enter the newly set upstream pressure p_0 on the type plate.		
4	Mount the valve cap (1) and tighten it.		

Applying the fill pressure

ATTENTION



When filling from drinking water mains, it is essential to comply with the national regulations, e.g. in Germany, the safety instructions of DIN 1988 T4 for protecting the drinking water.

$p_F[bar] \ge p_0 + 0,3 bar$

Fill pressure p_{F} in vented state.



Fig. 6 Setting the fill pressure

1	1 Lock		Water connection
Step	Action		
1	Open the shut-off (1) carefully.		
2	Carefully vent the expansion line and close the shut-off (1).		
3	Raise the fill pressure p_F by filling on the water side (2)		

End pressure

- Run the installation until it reaches the max. pre flow temperature (thermal degassing)
- Switch off the circulation pumps. Post-vent the installation
- Replenish water to end pressure p_e

$p_e \text{ [bar]} \le p_{sv} - 0,5 \text{ bar}$



Fig. 7 Setting the end pressure (example of a heating system)

1	1 Water connection		
Step	Action		
1	End pressure p_{e} , refill on the water side via the water co	onnecti	on (2)

The "reflex" is now ready for operation.

3.6.1.2 Flowmeter



Index marker is the bottom edge of the baffle float. The factory settings must not be changed.

ATTENTION



Fig. 8 HYDRO-OPT[®] S flowmeter **General**

Operating temperature TB max: 100 °C Operating pressure PB max: 10 bar Measurement accuracy: Measurement range 20 - 80% \pm 5% of the displayed value Measurement range < 20% / > 80% = \pm 10% of the displayed value

Material

Housing: Brass Inner parts: Rust-free steel, brass and plastic Inspection glass: Heat-resistant, impact-proof plastic Seals: EPDM

Flow media

Water mixture with commonly used corrosion and antifreeze additives (see document "Glycol correction curves"). For flowmeters up to DN20 (HYDRO-OPT[®] S Station Type 0.5 and 1.5) and their flow ranges, there is a chart with correction curves for using anti-corrosion and antifreeze agents. For larger dimensions, corrections are not necessary as the variance lies within the measurement tolerance.

AL-KO



Fig. 9 Flowmeter diagram

3.6.1.3 Control ball valve with continuous actuator

The control ball valve is adjusted by a rotary drive. The rotary drive is constantly controlled by the HYDRO-OPT[®] S control system and brings the ball of the ball valve (which acts as a throttle) to the position specified by the control signal. The ball valve is opened anti-clockwise and closed clockwise.

Equal percentage flow control is ensured by the integrated control orifice.



Fig. 10 HYDRO-OPT® S 3-way ball valve with continuous actuator





Fig. 11 HYDRO-OPT® S 3-way ball valve (ball position)



Fig. 12 0.5 - 1.5 wiring diagram



Fig. 13 3.5 / 6.5 / 11 wiring diagram

3.6.1.4 HYDRO-OPT® S temperature sensors

Temperature sensors of type Ni1000 are always installed in the HYDRO-OPT[®] S.



Fig. 14 Resistance values of the temperature sensors



4 Delivery, transport, storage

4.1 Delivery

■ The HYDRO-OPT[®] S is delivered on a euro pallet.

4.2 Transport

WARNING



Risk of injury due to impacts, cutting or piercing during loading, unloading and transport of the modules.

- Observe the working instructions and these operating and assembly instructions.
- Work with care.
- Use the personal protective equipment when working on the installation.
- Use other protective equipment according to the work carried out (cut-proof gloves).

MARNING



Danger of death - Suspended loads.

For crane transport, all valid safety conditions according to DGUV regulation 52 Cranes and DGUV Control unit 100-500 chapter 2.8 must be observed.

- Do not walk under suspended loads.
- Use the specified attachment and mounting points.

Risk of injury due to the module tilting or tipping over.

- Observe the weight specifications.
- Only use suitable lifting equipment.

A CAUTION



Failure to observe the safety instructions, standards, directives and regulations leads to a risk of injury due to the unit tipping over.

- Observe the relevant standards, directives and regulations.
- Observe the instructions in these operating and assembly instructions.
- Use the specified attachment and mounting points.
- Observe the weight specifications.
- Only work on on-site surfaces that are suitable for installation preparations and lifting.

ATTENTION

- Uniform lifting of the unit components must be ensured.
- Transport is only permitted using the attachment points given below.
- Only approved lifting equipment with a sufficient load capacity may be used.
- The lifting equipment must be in perfect condition.
- The lifting gear must be checked for load-bearing capacity and damage before use.
- Secure the load during transport.
- Use only suitable transport locks.
- If the maximum weights to be lifted are exceeded (per person), plan for a second person to help.
- The individual components of the installation may only be moved with the transport equipment provided for this purpose.
- Use only suitable transport devices and suitable industrial trucks.
- Maintenance doors must be kept closed at all times during transport.
- Ensure sufficient visibility during transport (accompanying persons, if necessary).
- No persons must be allowed to remain in the transport area.
- The unit must only be transported by trained and qualified personnel and in observance of the safety aspects.
- If transport devices are used that require a driving licence, the personnel operating these devices must have a valid driving licence for this.
- During transport, observe the instructions in these operating and assembly instructions and the relevant regulations on occupational safety and environmental protection.
- Only transport the unit upright and secure the unit against tipping and slipping.
- Avoid distorting the housing or other damage.
- Damage that results from improper packaging and transport are at the expense of the initiator.
- As described in chapter "4.2.2 Fork-lift truck/pallet truck" on page 26, the unit can be transported using a forklift or a crane.
- HYDRO-OPT[®] S is only permitted to be transported, lifted and set up within the temperature limits for use (-20 °C to +40 °C).

4.2.1 Transport under aggravated conditions

When transporting under aggravated conditions (e.g. on open vehicles, under unusual vibration stresses, transport by sea or in subtropical countries), additional packaging must be used that will protect the unit from these particular influences.

4.2.2 Fork-lift truck/pallet truck

- 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.
- Suitable fork lengths must be used to prevent damage to the unit.



4.2.3 Crane transport

All	HYDR0-0PT®	S	units	have	а	crane	transport	option.	
				🛕 WARNIN	G				
	🔥 Dan	ger of dea	th - Suspend	ed loads and	crane tra	ansport!			
	Obs	Observe the local and legal regulations and the rules of the professional associations.							
		Do not wa	lk under susp	pended loads.					
-		Do not wo	ork under sus	pended loads					
 Use the specified attachment and mounting points. 									
Observe the weight specifications.									
		Use suitat	ole lifting equ	ipment.					
		Only use s	uitable indus	trial trucks ar	nd lifting e	equipment (cra	ne).		
		Only use s	uitable positi	ioning tools.					
		Attach sui	table load see	curing equipm	nent befor	re lifting the loa	ıd.		
		Wear pers	onal protecti	ve equipment					
Stora	age prior to assemb	bly							

Store the individual functional parts in a dry and weatherproof location in their original packaging.

- Store the functional parts in the temperature range of -20 °C to +40 °C.
- Cover open pallets with tarpaulins, and protect the functional parts from dirt (e.g. chips, stones, wire, etc.). The HY-DRO-OPT[®] S is delivered unfilled and thus frost-proof.
- Frequent and, above all, abrupt temperature changes must be avoided during storage. This is especially harmful if moisture is able to form condensation.
- Avoid distorting the housing and other damage during storage.
- Damage resulting from improper packaging and storage are at the expense of the initiator.

4.4 Disposal of packaging



4.3

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.

5 Assembly

5.1 Safety instructions for assembly

WARNING

Risk of injury from falling from ladders, scaffolding or work platforms.

- Only use suitable and tested ladders, steps, scaffolding and work platforms.
- Work with care.

MARNING



Risk of slipping! Leaked medium/condensate

Immediately take up the spill quantity and dispose of it properly.

🛕 WARNING



Risk of explosion of hydraulic station. The hydraulic station is not protected against explosions; if it is operated in potentially explosive atmospheres, there is a risk of explosion.

Never set up the HYDRO-OPT[®] S in potentially explosive atmospheres.

WARNING



Risk of injury due to impact, cutting or stabbing during assembly/installation of the modules.

- Have installation, commissioning, servicing and maintenance work carried out only by qualified staff.
- Electrical connections must only be undertaken by a certified electrician under consideration of the valid DIN and VDE regulations as well as the directives of the local energy supply company.
- Observe the working instructions and these operating and assembly instructions.
- Work with care.
- Use the personal protective equipment when working on the installation.
- Use other protective equipment according to the work carried out (cut-proof gloves).

WARNING



Risk of injury when installing the unit modules on platforms or on the roof.

When assembling the unit modules, the tool/housing material can fall off in the event of careless operation.

Due to the working height, there is a risk of falling.



- Use only suitable industrial trucks and lifting equipment (crane) and suitable positioning aids.
- Only use suitable and tested ladders, steps, scaffolding and work platforms.
- Work with care.
- Wear personal protective equipment.



A CAUTION



Risk of crushing the limbs and cutting injuries on sharp edges during assembly/installation of the modules.

- Have installation, commissioning, servicing and maintenance work carried out only by qualified staff.
- Use assembly aids when installing the modules and components.
- Work with care.
 - Wear personal protective equipment (cut-proof gloves).

ATTENTION



Before installation and commissioning, it is essential to read and observe the operating and assembly instructions.

■ The HYDRO-OPT[®] S is delivered pre-assembled with its components.

5.2 General information

All hydraulic components are pre-mounted and piped on the supporting frame. All pipe sections and fittings at risk from condensation must be insulated on site when insulating the pipeline, provided that it is not already delivered insulated.

5.3 Setup

- Check the HYDRO-OPT[®] S for transport damage.
- Secure any loosened assemblies.
- Observe the condition of the substrate at the installation site.
- Level compensation must be carried out via the height-adjustable feet.
- Install the piping to the heat exchangers. Ensure that the material selected is appropriate for the intended heat exchanger medium (glycol).
- Check the venting possibility of the heat exchangers and establish if necessary.
- Make sure that no impurities get into the system.
- Take into account the counterflow principle; see "Fig. 15 Counterflow principle in CCS installations" on page 30.
- After the piping has been installed, the installation must be rinsed and checked for leaks.
- Media-carrying parts of the HYDRO-OPT[®] S must be insulated on site together with the external pipelines, provided this has not been done yet.

ATTENTION

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



Fig. 15 Counterflow principle in CCS installations

1	Air inlet	3	Brine inlet
2	Air outlet	4	Brine outlet

5.4 Filling and venting

WARNING



Risk of poisoning when filling the installation.

The unit may contain media that are hazardous to health, such as coolants.

- The media may only be filled and stored in approved containers.
- Work with care.
- Avoid skin and eye contact with the media, do not swallow media and observe the safety data sheets.
- Wear personal protective equipment.
- Absorb spills immediately.
- Fill and venting must be performed by qualified staff. Air inclusions can lead to lower performance, malfunctions of the installation or damage to the pump.
- The glycol-water mixture (brine) must be produced in accordance with the design data.
- Create the brine mixture before filling. Mixing is not guaranteed to happen inside the installation and can lead to a malfunction due to the formation of foam.
- Note: Brine must be renewed after a specific operating time in accordance with the manufacturer's data.

ATTENTION



The heat exchangers must be vented using venting valves or screws installed for this purpose, each water circuit separately if necessary. If applicable, the heat exchangers must be filled using an existing drain/fill connection. Air inclusions lead to lower performance.

The pump must be vented using a provided venting screw. Air inclusions lead to wear and premature pump failure. The pump is best vented after the installation is entirely vented. Otherwise, air from the installation could collect in the pump head again.



5.5 Electrical connection



A DANGER

Hazard due to electric current.

Incorrect connection to the energy supply or incorrect installation of electrical components can result in electric shock.

- Only have the electrical connection carried out by an approved electrician.
- Perform the connection exactly according to the circuit diagram and the assignment plan.
- Observe the valid DIN and VDE regulations.
- Observe the directives of the local energy supply company.
- Use the personal protective equipment when working on the installation.
- Use other protective equipment according to the work carried out.
- Do not operate the unit with defective or damaged cables or plugs.
- Regularly check the connection cables for damaged areas.
- Use only the permissible tool.
- Shut off the energy supply for maintenance work and secure it to prevent restart.
- Observe the electrical safety regulations.

WARNING

Risk of injuries due to incorrect or faulty connection.



- Electrical connections must only be undertaken by a certified electrician under consideration of the valid DIN and VDE regulations as well as the directives of the local energy supply company.
- Only have assembly, servicing and maintenance carried out by qualified staff.
- Wear personal protective equipment.

ATTENTION



It must be possible to shut down the supply line on all poles via a main switch and/or a repair switch.

The operating and assembly instructions for the individual field devices must be observed.

- Perform the connection exactly according to the wiring diagram and assignment plan.
- Check that the data on the type plate matches the connection data.

Main switch or repair switch

- After completion of the electrical connection work, a safety inspection of the installation must be carried out in accordance with VDE 0701 Part 1 and VDE 0702.
- 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.
- Make the electrical connection in accordance with the HYDRO-OPT[®] S circuit diagram supplied.
- The supply line must be fuse-protected on site.

5.6 Cabling to the on-site air handling control unit

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

Coming from the higher-level control unit:

Release signal potential-free contact

External setpoint 0-10 V analogue signal

Going to the higher-level control unit:

Malfunction message energy recovery potential-free contact

Connections:

- Select the cross-sections of the cables by means of the input current of the frequency converter (see circuit diagram).
- Follow the local and national regulations in regard to cable cross-sections.



Fig. 16 Control cables must be connected to the control cable terminals in accordance with the circuit diagram.



5.7 Bus coupling

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

As standard, the integrated control unit contains a Modbus interface.

A BAC-net MSTP interface can be provided via an additional board (option)

The adjacent data points can be called up via the optional BAC-net board:

Data type	Instance	Designation	Unit	Comment
AO	0	Write	%	Release
AI	4	Return flow temperature	°C	From supply air WC (terminal X42/1)
AI	5	Pre flow temperature	°C	To supply air WC (terminal X42/3)
AV	1	Actual frequency	%	Act. speed Value
AV	5	Operating voltage	V	
AV	6	Power consumption	A	
AV	15	Power consumption	kW	
BI	1	Frost protection active		Digital input 32
BI	4	System pressure monitoring active		Digital input 19
BV	1	Release		Release
BV	14	Collective fault message		Alarm
BV	16	Operational feedback message		Engine turning



Fig. 17 Standard (without BAC-net)

5.8



Fig. 18 Optional with BAC-net-MCA 109



6 Commissioning



Commissioning protocol

During commissioning, all functions are checked, logged and signed by the operator. Transfer of the operating and assembly instructions is also confirmed on signing. These documents must be attached to the unit documentation.

6.1 Principles



WARNING

ATTENTION

Risk of slipping! Leaked medium/condensate

Immediately take up the spill quantity and dispose of it properly.

WARNING



Accident and injury risk due to human misconduct Failure to observe the safety instructions, standards, directives and regulations leads to a risk of injury.

- Before any repair and maintenance work is performed, disconnect the HYDRO-OPT[®] S from the mains on all poles and lock it out.
- Wear personal protective equipment.
- The maintenance instructions in the operating and assembly instructions for central air handling units of the HYDRO-OPT[®] S series of the AL-KO THERM company must be observed under all circumstances.
- Have installation, commissioning, servicing and maintenance work carried out only by qualified staff.
- Observe standards and directives.

NOTE

Observe the operating and assembly instructions for the individual field devices/components.



Before commissioning, always ensure the following:

- that the unit has been installed as described in these operating and assembly instructions (see chapter "5 Assembly" on page 28).
- that the duct system and the water and drain pipe are properly connected to the unit.
- that the electrical installations have been implemented completely and professionally.
- that all media connections have been professionally connected and are leak-tight.
- After extended standstill times, check the venting state again before commissioning, especially of the pump.

6.2 Requirements

ATTENTION



Venting the rotary pump

It is essential that the rotary pump has been vented according to the manufacturer's information. To do so, the venting screw on the pump must remain open until brine comes out free of bubbles.

The lack of (or improper) venting leads to damage to the pump and to system malfunctions.

The following actions must have been completed already on-site before the commissioning of the HYDRO-OPT® S:

- The supply and exhaust air system must be operational.
- The air quantities must have already been measured.
- The system brine content must have already been determined.

For frost protection if the installation is outdoors, the brine must be designed for the lowest installation site temperature

(e.g. For an outside temperature of -12 °C, at least 25% of glycol is required. For an outside temperature down to -20 °C, 34% of glycol is required. An unnecessarily high amount of glycol reduces the performance capability of the heat recovery system).

- The system pressure must be at least 2 bar.
- All isolation devices on the HYDRO-OPT[®] S and any on the heat exchangers must be open.
- The HYDRO-OPT[®] S electrical supply must have been checked. The protective earth conductor and neutral conductor must be in place.
- The installation, including the pump and heat exchanger, is fully vented.

6.3 Commissioning procedure (see also chapter "6.5.4 Settings for commissioning" on page 42)

- Check or set the system pressure on the expansion vessel according to the manufacturer's manual (see chapter "3.6.1.1 Pressure expansion vessel" on page 18). At delivery, the system pressure is 1.5 bar (g).
- 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.
- Finally, reset the frequency converter to AUTOmatic operation.
- Grant the release signal with higher-level control unit and bring the control signal to 10 V.
- When the control signal is set below 90% (9 V) by the higher-level control unit, this initially reduces the pump speed. When this reaches a lower limit of 13 Hz, then the control ball valve diverts the brine past the supply air heat exchanger (bypass operation).

6.4 Control-oriented integration of the HYDRO-OPT[®] S in the higher-level control unit

The circulating coil system (CCS) covers most of the energy requirement during ongoing operation via energy recovery from the exhaust air flow.

The decision whether or not to use energy recovery must be made by the higher-level control unit by means of an air temperature comparison. For energy recovery, the temperature difference between the exhaust air and outdoor air flow should be at least 2 Kelvin.

After the enable contact, the analogue request signal (0 - 10 V) for operating the HYDRO-OPT[®] S is required by the higher-level control unit. The energy recovery output (heating or cooling) can be controlled proportionally via the signal from 0 - 100%.

Thus the complete HYDRO-OPT[®] S acts like a heating valve (also when inert) with constant valve actuation and can be easily integrated in the strategy of the higher-level control unit.

The system pressure monitor attached upstream from the pump protects the pump from running dry through lost brine. The switching threshold is fixed in the factory at approx. 1.0 bar (g).

ATTENTION



Components containing water in the air handling unit (heater, cooler, humidifier, etc.) can freeze at below-freezing temperatures.

A sufficiently high temperature must be ensured.

Especially when starting up the installation, the heat supply of the heater must be available immediately (by means of a pre-flow time).

A heat recovery such as the circulating coil system (CCS) cannot make heating power available immediately because of its slowness (mass, exhaust temperature).



Fig. 19 Control strategy for controlling the HYDRO-OPT® S CCS system



6.5 HYDRO-OPT® S operation

6.5.1 Operating unit of the control system



Fig. 20 Operating unit with display

1	Plain text display	6	Access to parameter main menu (all parameters)
2	Menu selection	7	Error buffer and alarm diagnostics
3	Status LEDs	8	Online help (for each parameter, menu item and alarm)
4	operating mode	9	Acknowledging an alarm
5	Access to commissioning menus		

6.5.2 Functions of the control system

Commissioning menu – Quick menu

This menu provides quick access to parameters for programming the initial commissioning and to a lot of detailed application information.

Press the button to access the Q2 commissioning menu;

This menu contains all of the parameters and instructions necessary for basic programming of the frequency converter.

Go through the parameters in the displayed sequence in order to set up the most important functions (the engine performance data is preset at the factory).

The commissioning menu includes a selection of 14 parameters that are needed during a typical commissioning procedure. The parameters are logically structured and not arranged according to number. Important: Enter them in the specified order. The commissioning menu is accessed via the (Quick menu) button. Select "Q2 Inbetriebnahmemenü" (Q2 commissioning menu) and confirm with (OK). Press the (Status) button to return to the normal view.

Item	Description	Setting
0-01	Language	German (1)
1-20	Engine rating (kW)	Data in accordance with motor type plate
1-22	Engine voltage (V)	Data in accordance with motor rating plate
1-23	Engine frequency (Hz)	Data in accordance with motor rating plate
1-24	Motor current (A)	Data in accordance with motor type plate
1-25	Rated engine speed (rpm)	Data in accordance with motor type plate
1-28	Engine rotation direction check	Off (0)
3-41	Ramp number up 1	Sets the ramp number up (start-up time until rated engine speed)
3-42	Ramp number down 1	Sets the ramp number down (delay time from rated speed to 0 RPM)
4-12	Min. frequency (Hz)	Sets the required minimum speed
4-14	Max. frequency (Hz)	Sets the required maximum frequency
3-11	Fixed speed jog (Hz)	Sets the required fixed speed/jog frequency
5-12	Terminal 27 function	For the "Engine coasting (inv.)" factory setting, a cable bridge must be provid- ed between terminals 12 and 27. If terminal 27 is not required: Select "No function"
5-40	Relay function 0,1	Alarm (9), engine turns (5)

Buttons for local operation and for selecting the operating mode are located at the bottom of the operating unit.



Fig. 21 Operating buttons at the bottom of the operating unit

Button	Function	
Hand on	Press this button to start the frequency converter in manual mode (On control system).	
	The speed of the frequency converter can be controlled with the navigation buttons	
	An external stop signal via control signals or serial communication cancels the manual mode.	
Off	Stops the connected engine, but does not switch off the power supply to the frequency converter.	
Auto on	This button sets the system in remote mode (automatic mode).	
	It reacts to an external start command via control terminals or serial communication.	
	The speed setpoint originates from an external source.	
Reset	Used to manually reset the frequency converter after clearing an error.	

NOTE

NOTE

Hand on, only use for briefly checking the direction of pump rotation or for bleeding the hydraulic system. Ensure that the system is filled and the pump is vented.Auto on, sets the installation in controlled operation

Further details are given in the Danfoss manual supplied.



All engine data of the circulating pump are parametrised in the control system by AL-KO THERM at the factory.



6.5.3 Energy recovery display menu



Fig. 22 Basic menu display view

TVL	Media temperature to supply air heat exchanger	Freq	Controls energy recovery in %
TRL	Media temperature from supply air heat exchanger		



Fig. 23 Display view in the event of a malfunction

A fault message is generated by malfunctions on the circulating pump or in the frequency converter or by triggering the system pressure monitoring system:

"Alarm" and "Ext. interlocks [A60]" are shown on the display.

Triggering of the system pressure monitoring system: If the brine pressure is below the minimum system pressure (< 1 bar), the energy recovery system is switched off to protect the circulating pump and the displayed alarm message generated.

Action for unlocking: 1. Increase the system pressure by replenishing brine to above the minimum operating pressure (> 1 bar). 2. Enable the installation with the - **Reset** - button on the operating unit of the control system.

6.5.4 Settings for commissioning

The settings of the rated engine data and the maximum speed of the circulating pump are carried out by AL-KO THERM prior to delivery. The configured engine parameters can be seen in the **"Quick menu"** and can be compared with the type plate data of the pump.

All of the following parameters can be accessed using the "Quick menu" function and selecting the "User menu".



Fig. 24 Example display for parameter 13-12 [4]: Maximum pump speed 2850 rpm (preset at the factory)





Fig. 25 Example display for parameter 13-12 [2]: Activation of frost protection (-8 °C preset at the factory)



Factory setting -000008.000 means frost protection **deactivated**. Setting -000002.000 means frost protection **activated**

To activate the frost protection function, parameter 13-12 must be changed from factory setting - 8.0000 to - 2.0000 in the Quick menu/User menu.

NOTE

This frost protection function is only required for installations where there is <u>a permanently high humidity load</u> in the exhaust air.



Fig. 26 Example for parameter 4-14: Setting of the required flow rate (data in Hz)

The operating flow rate for the HYDRO-OPT[®] S must be set via parameter 4-14 (maximum setpoint) in the "Quick menu/ User menu". The water/glycol volume flow for the circulating coil system stated in the equipment data sheet must be read on the flowmeter. The flow rate can be adjusted by changing the pump speed by adjusting parameter 4-14. The factory setting is 50 Hz and must be adjusted during commissioning.

Process for setting the maximum operating circulation amount:

Setting to manual mode (Hand on) or to automatic mode if it is certain that there is an external request with 10 V.

Quick menu User menu Select parameter 4-14 (maximum setpoint)

Factory setting 50 Hz [50] is displayed

Change the pump speed with to set the correct circulation amount (can be read on the flowmeter)



ATTENTION

The flowmeter indicates the flow rate in I/min. The resulting frequency for the pump speed usually lies between 30 and 50 Hz.

After setting the operating circulation amount, go back to the basic menu display view using the **"Back"** button and set the installation into automatic mode with **"Auto on"**.



6.5.5 Handling variable air volume flows

If the air handling unit is operated with variable air volume flows, the circulating water/glycol amount must be adapted accordingly. This adjustment to limit the max. external setpoint (0-10 V) must be made with the higher-level control unit.

Example:

100% air volume flow max. control of the energy recovery system with 10 V

50% air volume flow max. control of the energy recovery system analogue with 5 V

An adequate adjustment of energy recovery to variable air volume flows can be realised using this mathematical dependency.

6.5.6 Restoring the factory setting

If "malfunctions" occur in the HYDRO-OPT[®] S due to incorrect parametrisation, it is possible to restore the factory settings and then parametrise the operating circulation amount again.

Procedure:

Set the installation to **"OFF"**. Call up parameter 14-2 using the **"Main menu"** button and select the "Operating mode" in parameter 14--22. Use selection 2 to go to the "Initialisation" menu item. Use the **"Back"** button to exit the menu, then switch off the main switch. After switching back on, the "Sprache" (Language) menu item appears on the display. After selecting the required language using **"OK"**, go to the main menu

Select menu item 0-5x

Select the "Laden vom LCD - Alle" (Load from LCD - all) selection parameter

0K

Factory settings are read.

After completing the software update, turn the main switch off and back on again – then the operating parameters in chapter "6.5.4 Settings for commissioning" on page 42 can be re-parametrised.

6.5.7 Frequency converter parameter settings for Modbus communication

The following parameters apply to the RS-485 interface (FC interface).

Parameter	Function
8-30 Protocol	This parameter defines the transmission protocol for the RS-485 interface.
8-31 Address	This parameter defines the address of the frequency converter on the interface. Note: The address range depends on the protocol selection in 8-30 Protocol.
8-12 Baud Rate	This parameter defines the baud rate of the frequency converter on the interface. Note: The standard baud rate depends on the protocol selection in 8-30 Protocol.
8-33 Parity/Stop Bits	This parameter defines the parity of the interface and the number of stop bits. Note: The standard selection depends on the protocol selection in 8-30 Protocol.
8-35 Minimum Response Delay	Defines the minimum time that the frequency converter waits after receiving an FC telegram before its answer telegram is sent. Modem reversal times can be bypassed in this way.
8-36 Maximum Response Delay	Defines a maximum time after which the frequency converter expects the answer telegram after sending an FC telegram.
8-37 Maximum Inter-Char Delay	Defines a maximum time that the frequency converter waits between two bytes when receiving an FC telegram to ensure that the timeout transmission is interrupted.

7 Servicing and maintenance

7.1 Safety instructions for servicing and maintenance

M WARNING



Risk of injuries.

- Before any repair and maintenance work is performed, disconnect the HYDRO-OPT[®] S from the mains on all poles and lock it out.
- Close the media supply (water, gas, etc.) before all repair and maintenance work.
- Follow the applicable safety rules.
- Have installation, commissioning, servicing and maintenance work carried out only by qualified staff.

To be carried out by the person responsible:

- After carrying out the work, ensure that there are no longer any persons in the installation.
- Before restarting the installation, ensure that all factory-installed protective measures are functioning correctly.

🛕 WARNING



Risk of cuts

During maintenance and cleaning of the HYDRO-OPT [®] S, there is a risk of being cut.

Wear personal protective equipment (cut-proof gloves).

WARNING



Risk of slipping! Leaked medium/condensate

Immediately take up the spill quantity and dispose of it properly.

WARNING



- Only use suitable and tested ladders, steps, scaffolding and work platforms.
- Work with care.

WARNING



Risk of injuries due to fan delay

- Only open the inspection doors only when the fans are switched off and stationary.
- Observe the delay time of the fans. Observe a waiting time of at least 3 minutes, until the fan impellers are stationary, before opening the inspection doors.
- Never brake the impellers of the fans by hand or using an object.

A CAUTION



- Risk of burns due to contact with hot surfaces and media
 - Wait until the hot surfaces have cooled down.
- Wear personal protective equipment.



NOTE



The owner/operator of an RLT installation is obliged to have the system maintained regularly by trained qualified staff.

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

Upon conclusion of a maintenance contract, AL-KO THERM undertakes these tasks.

Customer Service

Phone: +49 8225 39 - 2574

E-mail: service.center@alko-air.com

Web: www.alko-airtech.com

ATTENTION

Only use original consumables and spare parts. This is the only way to ensure safe operation. Otherwise the warranty will be voided. A spare parts list can be found as part of the unit documentation.

After Sales

Phone: +49 8225 39 - 2600

E-mail: airtech.after-sales@alko-air.com

Web: www.alko-airtech.com

7.1.1 Qualifications of personnel

Assembly, commissioning, operation, maintenance, decommissioning and disposal may only be performed by qualified staff.

7.2 Maintenance instructions as per VDMA 24186

- The owner/operator is obliged to have the installation maintained regularly by qualified staff.
- The operating and assembly instructions for the installed parts must be observed under all circumstances (request them if necessary).

7.2.1 Maintenance schedule

Maintenance, service of air handling units as per VDMA 24186

ltem		implementation	
Assembly/ Component/ Activity	Activity	Periodically every	As required
1	Pipe network (VDMA 24186-1)		
1.1	Pumps		
1.1.1	Check exterior for dirt, damage, corrosion and a secure fit	3 mon	
1.1.2	Function-preserving cleaning (exterior)		X
1.1.3	Check functionality	6 mon	
1.1.4	Check leak-tightness (visual check)	3 mon	
1.1.5	Drive elements	VDMA 24186-4	
1.1.6	DDC technology	VDMA 24186-4	
1.2	Shut-off, adjustment, and control fittings		
1.2.1	Check exterior for damage and corrosion (visual check)	3 mon	
1.2.2	Check functionality	6 mon	
1.2.3	Check leak-tightness (visual check)	3 mon	
1.2.4	Actuators	VDMA 24186-4	
1.3	Pipelines and expansion tanks		
1.3.1	Check the exterior of accessible pipelines for damage, leak-tightness and secure fitting	3 mon	

ltem			implementation	
Assembly/ Component/ Activity	Activity	Periodically every	As required	
1.3.2	Check heat insulation for damage and completeness	3 mon		
1.3.3	Check temperature and pressure measurement devices for damage and display accuracy (plausibility check)	3 mon		
1.3.4	Check functionality of safety installation	6 mon		
1.3.5	Check compensators for damage and secure fitting (visual check)	3 mon		
1.3.6	Check fluid level	3 mon		
1.3.7	Top off fluid		Х	
1.3.8	Check the heat carrier of circulating coil systems for frost resistance	12 mon		
1.3.9	Check functionality of piping trace heating	6 mon		
01/03/2010	Check functionality of venting valves	6 mon		
01/03/2011	Venting		X	
2	Drive elements (according to VDMA 24186-1)			
2.1	Electric motors			
2.1.1	Check the exterior for dirt, secure fitting, damage, and corrosion	3 mon		
2.1.2	Function-preserving cleaning (exterior)		X	
2.1.3	Check direction of rotation		X	
2.1.4	Re-tighten connection terminals		X	
2.1.5	Measure tension	12 mon		
2.1.6	Check connection terminals to ensure they are seated firmly	12 mon		
2.1.7	Measure power consumption	12 mon		
2.1.8	Measure phase symmetry	12 mon		
2.1.9	Check for smooth running and temperature increase	12 mon		
02/01/2010	Check bearings for noise	3 mon		
3.1	Maintenance-relevant documents			
3.1.1	Overview sheet available in HVE	3 mon		
3.1.2	Inventory documents folder available	3 mon		
4	Switch cabinets (according to VDMA 24186-4)			
4.1	Control part			
4.1.1	Check for proper and functional installation and check ambient conditions	12 mon		
4.1.2	Check for dirt, damage, corrosion, and a secure fit	12 mon		
4.1.3	Check protective covers	12 mon		
4.1.4	Function-preserving cleaning		Х	
4.1.5	Check connections	12 mon		
4.1.6	Check functional elements (e.g. operating and display equipment)	12 mon		
4.1.7	Check switching and control processes		X	
5	Field devices (according to VDMA 24186-4)			
5.1	Sensors (brine temperature sensor, pressure switch)			
5.1.1	Check for proper and functional installation and check ambient conditions	12 mon		
5.1.2	Check for dirt, damage, corrosion, and a secure fit	12 mon		
5.1.3	Function-preserving cleaning		X	
5.1.4	Check measurement signals	12 mon		
6	Controller (according to VDMA 24186-4)			
6.1	Controller (frequency converter)			
6.1.1	Check integral power supply (e.g. buffer battery)	12 mon		
6.1.2	Check functional elements (e.g. operating and display equipment)	12 mon		
6.1.3	Check input signals (e.g. sensors, remote dial, reference variable)	12 mon		
6.1.4	Check control loop and control signal	12 mon		



ltem		implementation	
Assembly/ Component/ Activity	Activity	Periodically every	As required
7	Sub-stations (according to VDMA 24186-4)		
7.1	Sub-station		
7.1.1	Check power failure and power recovery behaviour	12 mon	
8	Documentation (according to VDMA 24186-4)		
8.1	Maintenance-relevant documents		
8.1.1	Check for presence (circuit diagram, CHC operating instructions)	12 mon	
8.2	Existing system markings (signage)		
8.2.1	Check for availability	12 mon	

7.3 Maintaining and cleaning components

All installed components are either freely accessible for cleaning or can be pulled out of the unit or removed after opening the inspection doors/removing the inspection cover.

- Coarse dirt in the housing can be removed using an industrial vacuum cleaner.
- Remove other dirt with a damp cloth.

Cleaning

- Only lukewarm water, possibly with a mild detergent without perfume, should be used for cleaning. Do not use mechanical aids, e.g. sharp tools, grinding stones, wire brushes, files, steel wool made of unalloyed or low-alloy carbon steel, etc.
- Do not use a high-pressure cleaner for cleaning.
- Detergents must not penetrate into electrical or mechanical installation parts.
- If necessary, completely reinstall the protective and safety installations or coverings removed for cleaning and check their functionality. (Subsequent) damage resulting from a nonetheless carried out or incorrect application of corresponding disinfection or cleaning are at the expense of the initiator.

8 Emergencies and malfunctions

8.1 Emergency



ATTENTION In case of fire, used building materials can develop toxicologically hazardous substances. To protect against any released pollutants, rooms must only be entered with breathing masks. Safety of persons has priority over safety of property.

8.2 Help in the event of malfunctions



Risk of injury due to incorrectly implemented measures.

WARNING

Incorrect or incorrectly executed measures can put the installation in a potentially dangerous state. There is then a risk of injuries and even electric shock.

- Only allow work on electrical equipment inside the switch cabinet (e.g. test work, replacement of fuses) to be carried out by qualified staff.
- Only allow diagnosis, troubleshooting and recommissioning to be carried out by authorised persons.
- Use the personal protective equipment when working on the installation.
- Use other protective equipment according to the work carried out.
- A malfunction message is notified via a potential-free contact and, alternatively, via bus.
- A malfunction message must be acknowledged on-site after the error is corrected.

8.3 Contact for malfunctions

For all questions that you have in connection with our products, please contact the manufacturer of your ventilation installation, one of our branches or directly to:

AL-KO THERM GmbH	Phone:	(+49) 82 25 / 39 - 0	
Hauptstraße 248-250	Fax:	(+49) 82 25 / 39 - 2113	
D-89343 Jettingen-Scheppach	E-mail:	klima.technik@alko-air.com	
Germany	Web:	www.alko-airtech.com	
Customer Service	Phone:	(+49) 82 25 / 39 - 2574	
	E-mail:	service.center@alko-air.com	



9 Shutting down the unit

9.1 Decommissioning

The installation can continue to remain filled with brine.

WARNING

Risk of injury due to pressurised parts.

- When decommissioning, note that certain installation parts are pressurised.
- Comply with the safety rules!

ATTENTION

In winter, there is a general freezing hazard for all components. If necessary, take suitable measures such as fully draining the liquid media. At temperatures below freezing point, the installation must be either drained and blown out with compressed air, or filled with a commercially available antifreeze with corrosion inhibiting additive due to the risk of freezing and corrosion.

- If the installation 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).
- Before recommissioning, observe chapters "6 Commissioning" on page 36 and "7 Servicing and maintenance" on page 46.

9.2 Dismantling

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

🛕 WARNING



- Only use suitable and tested ladders, steps, scaffolding and work platforms.
- Work with care.

WARNING



Risk of poisoning when draining the media.

The unit may contain media that are hazardous to health, such as coolants.

- The drained media may only be filled and stored in approved containers.
- Work with care.
- Avoid skin and eye contact with the media, do not swallow media and observe the safety data sheets.
- Wear personal protective equipment.
- Absorb spills immediately.

	A WARNING
Δ	Risk of injury when dismantling electrical and thermal components.
	Only have disassembly work carried out by trained qualified staff.
	Before starting work, disconnect the installation from the central supply line at all poles
	When dismantling, note that certain parts of the installation are pressurised.
	Fix the impellers of the fans.
	Work with care.
	Use only suitable means of transport when transporting installation parts.
	Use the personal protective equipment when working on the installation.
	Absorb spills immediately.

9.3 Disposal

WARNING



Risk of poisoning when disposing of the media.

The unit may contain media that are hazardous to health, such as coolants.

- Work with care.
- Avoid skin and eye contact with the media, do not swallow media and observe the safety data sheets.
- Wear personal protective equipment.
- When disposing of the media, 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.
- The drained media may only be filled and stored in approved containers.



Do not dispose of worn-out units, spent batteries or rechargeable batteries in domestic waste. When disposing of the HYDRO-OPT® S, operating materials and accessories, proceed according to the relevant local environmental and recycling regulations in your country and community that are applicable at the time when the activity is undertaken.



10 Spare parts



ATTENTION Only use original consumables and spare parts. This is the only way to ensure safe operation. Otherwise the warranty will be voided.

A spare parts list can be found as part of the unit documentation.

ATTENTION



The warranty may also be invalidated.

NOTE



The valid spare parts list can be found as part of the unit documentation created on the basis of the order.

AL-KO THERM GmbH	Phone:	(+49) 82 25 / 39 - 0
Hauptstraße 248-250	Fax:	(+49) 82 25 / 39 - 2113
D-89343 Jettingen-Scheppach	E-mail:	klima.technik@alko-air.com
Germany	Web:	www.alko-airtech.com
After Sales	Phone:	(+49) 82 25 / 39 - 2600
	E-mail:	airtech.after-sales@alko-air.com

11 Appendix

11.1 HYDRO-OPT® S commissioning protocol

Project designation:			
Order number:	Item:		
1. HYDRO-OPT® S system data			
Nominal brine quantity	m³/h	I/min	
Antifreeze (glycol)			
Glycol content (brine)	%		
Fill pressure	bar (g)		
Pre-pressure of expansion vessel	bar		
Pump output	kW		
2. HYDRO-OPT® S visual inspection			
Wiring performed according to DIN VD	E 0100/0113		
Earthing OK and complete			
Operating material and line marking Ok	K and complete		
All of the insulation present on the pipe	elines and the HYDRO-OPT® S		
3. HYDRO-OPT® S function test			
Function and direction of rotation of pu	Imp tested (only start dry for max. 5 seconds!	!!)	
Function and direction of rotation of co	Function and direction of rotation of control ball valve and drive tested		
Function of both temperature sensors tested			
Function of system pressure monitorin	g tested (activation pressure 1 bar (g))		
Flow rate set			
Set value: I/mi	in At FC frequency:	_ Hz	
4. HYDRO-OPT® S documentation			
2x switching documents system	Operating manual	Parameter list for FC control	
□		□	
5. Comments			
Date	Location	Signature	



12 Certifications

The following EC Declaration of Incorporation and EC Declaration of Conformity will be issued per order, according to their validity.

If both the order number and the position of the unit are specified, the issued document must be assigned to the respective unit.

12.1 EC Declaration of Incorporation conforming to 2006/42/EC

EG-EINBAUERKLÄRUNG

EC DECLARATION OF INCORPORATION DÉCLARATION DE MONTAGE CE

Hersteller / Manufacturer / Fabricant: AL-KO THERM GMBH | Hauptstraße 248-250 | 89343 Jettingen-Scheppach | Germany Im Sinne der EG-Maschinenrichtlinie 2006/42/EG, Anhang II, Teil 1, Abschnitt B As defined in EC Machinery Directive 2006/42/EC, Annex II, Part 1, Section B

Au sens de la directive Machines CE 2006/42/CE, annexe II, partie 1, section B

Maschine / Machine / Machine : Kreislaufverbundsystem (KVS) Dual-circuit system (DCS) Système relié par circuit à fluide caloporteur (SRC) Typ: 2 : 5 ; 10 ; 15 ; 25 Typ: 2 : 5 ; 10 ; 15 ; 25 Typ: 2 : 5 ; 10 ; 15 ; 25 Typ: 2 : 5 ; 10 ; 15 ; 25 Serie / Series / Série : HydroOpt M Intelligent HydroOpt M Intelligent HydroOpt M Intelligent HydroOpt S Typ : S0,5 ; S1,5 ; S3,5 ; S6,5 ; S11 HydroOpt S HydroOpt S Typ : S0,5 ; S1,5 ; S3,5 ; S6,5 ; S11 Typ : S0,5 ; S1,5 ; S3,5 ; S6,5 ; S11

Hiermit erklären wir, dass die oben genannte unvollständige Maschine den folgenden EG/EU- Richtlinien entspricht: We hereby declare that the above-mentioned partly completed machinery conforms to all relevant provisions of the following EC/EU directives: Nous déclarons par la présente que le Machine incomplète susnommé répond à toutes les dispositions pertinentes de la directive CE/UE suivante:

Maschinenrichtlinie 2006/42/EG / Machinery Directive 2006/42/EC / Directive Machines CE 2006/42/CE Elektromagnetische Verträglichkeit 2014/30/EU / Electromagnetic Compatibility 2014/30/EU / Compatibilité électromagnétique 2014/30/UE Druckgeräterichtlinie 2014/68/EU / Pressure Equipment Directive 2014/68/EU / Directive sur les appareils sous pression 2014/68/UE Ökodesign-Richtlinie 2009/125/EG / Ecodesign Directive 2009/125/EC / Directive d'écoconception 2009/125/CE RoHS-Richtlinie 2011/65/EU / RoHS Directive 2011/65/EU / Directive RoHS 2011/65/UE

ndte harmonisierte Normen / Applied harmonized standards / Normes harn nicóno n

Angewandte narmonisie	rte Normen / Applied narmonized standards / Normes narmonisees appliquees:
- DIN EN ISO 12100,	Sicherheit von Maschinen – Allgemeine Gestaltungsleitsätze – Risikobeurteilung und Risikominderung
2011-03	Safety of machinery – General principles for design – Risk assessment and risk reduction
	Sécurité des machines – Principes généraux de conception – Appréciation et réduction du risque
- DIN EN 60204-1,	Sicherheit von Maschinen – Elektrische Ausrüstung von Maschinen – Teil 1: Allgemeine Anforderungen
2019-06	Safety of machinery - Electrical equipment of machines - Part 1: General requirements
	Sécurité des machines – Equipement électrique des machines – Partie 1 : exigences générales
- DIN EN ISO 13854,	Sicherheit von Maschinen - Mindestabstände zur Vermeidung des Quetschens von Körperteilen
2020-01	Sarety or machinery - Minimum gaps to avoid crushing or parts or the numan body
DIN EN 100 40057	Securite des machines – Distances minimales de prévention des contusions de parties du corps humain Site de la contraction
- DIN EN ISU 13857,	Sicherneit von Maschinen – Sicherneitsabstande gegen das Erreichen von Gerandungsbereichen mit den oberen und unteren Gliedmaisen
2020-04	Salety of machinely - Salety distances to prevent mazard zones being reached by upper and lower minus Salety of machinely - Salety distances to prevent mazard zones being reached by upper and lower minus
DIN EN 61000 6 1	Securite des indulinies — Distances de securite emperaint reminee dans les zones dans les dans es dues internores superieurs et interneurs
2010 11	Storiesugnet für Wolfingen und Storiesung and licht industrial environmente
2019-11	miniunity statutar un testuenia, commencia and ingineritudustra environmento. Bénérosa eu testuenza, eu testuenza eu ingineritudustra environmento.
- DIN EN 61000-6-2	Resistance au arouniage pour le comaine o naoranne considerato conimerciaux et professionnels ansi que les petites exploitations Stärfactivati fil politistrativa
2019-11	Unorealized and indexendence of the international and the internationand and the international and the interna
2010 11	Résistance au brouillane nour les zones industrielles
- DIN EN 61000-6-3	Störaussendium für Wohnbereich. Geschäfts, und Gewerhehereiche sowie Kleinhetriehe
2011-09	Contractional grant with the contraction of contractic contraction of the contractic contraction of the contractic contra
2011 00	Émission au brouillage nou le domaine d'habitation. les locaux commerciaux et professionnels ainsi que les netites exploitations
- DIN EN 61000-6-4.	Störaussendung für Industriebereiche
2020-09	Emission standard for industrial environments
	Émission d'interférences pour les zones industrielles
- DIN EN 13831,	Ausdehnungsgefäße mit eingebauter Membrane für den Einbau in Wassersystemen
2007-12	Closed expansion vessels with built in diaphragm for installation in water
	Vases d'expansion avec membrane intégrée destinés à l'installation dans des systèmes hydrauliques
-DIN EN 12828,	Heizungsanlagen in Gebäuden – Planung von Warmwasser- Heizungsanlagen
2017-07	Heating systems in buildings - Design for water-based heating systems
	Installations de chauffage dans les bâtiments - Planification d'installations de chauffage par eau chaude
-DIN EN 806-4	Technische Regeln für Trinkwasser-Installationen
2010-06	Specifications for installations inside buildings conveying water for human consumption
	Règles techniques relatives aux installations d'eau potable
-DIN EN ISO 4126-1	Sicherheitseinrichtungen gegen unzulässigen Überdruck
2016-12	Safety devices for protection against excessive pressure
	Dispositifs de sécurité contre les surpressions non autorisées
Zusätzlich angewendete	nationale Normen und techn. Spezifikationen / Additional applied national standards and technical specifications / Les normes nationales et spécifications techniques, utilisées supplémentaires
-VDI 6022 Blatt1	Raumlufttechnik, Raumluftgualität - Hygieneanforderungen an raumlufttechnische Anlagen und Geräte
2018-01	Ventilation and indoor-air quality - Hygiene requirements for ventilation and air-conditioning systems and units
	Technique de ventilation des locaux, qualité de l'air ambiant - Exigences en matière d'hygiène pour les installations et appareils techniques de ventilation des locaux
-DIN 2403	Kennzeichnung von Rohrleitungen nach dem Durchflussstoff
2018-10	Identification of pipelines according to the fluid conveyed

Marquage des canalisations selon la substance en circulation

Die Inbetriebnahme unseres Produktes bleibt so lange untersagt, bis festgestellt wurde, dass die Ausführung der Anlage/ Maschine, in welcher der Einbau erfolgen soll oder von dem es ein Teil sein wird, mit den entsprechenden Rechtsvorschriften übereinstimmt. Our product is not cleared for commissioning and use until it has been determined that the product is going to be integrated into a facility/machine and/or is used as part of an assembly, which agree with all applicable laws and regulations.

La mise en service de ce produit est interdite tant qu'il n'a pas été constaté, que le modèle de l'installation/ la machine, dans lequel il doit être incorporé, ou dont il deviendra une partie, est conforme aux dispositions légales correspondantes

Bevollmächtigter für die Zusammenstellung der technischen Unterlagen:

Authorized representative in charge of the technical document compilation:

Personne autorisée à constituer le dossier technique

Anschrift siehe Hersteller / see manufacturer's address above / Adresse, voir fabricant

Jettingen-Scheppach, 02.12.2024

Head of Development Department Chef du département de développemen

> 49 no

Leiter der Abteilung Entwicklung

Stephan Hafner Geschäftsführer/Managing Director/Directeur génér

Pohou

Translation of original operating instructions



Notes



Notes



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