

RackChiller CDU800 Coolant Distribution Unit

Operation and Instruction Manual

89217391



Produced by

nVent
2100 Hoffman Way
Anoka
MN 55303, USA

The details in this manual have been carefully compiled and checked - supported by certified Quality Management System. The company cannot accept any liability for errors or misprints. The company reserves the right to amendments of technical specifications due to further development and improvement of products.

Copyright © 2018

All rights and technical modifications reserved

1	Contact Addresses	6
1.1	Manufacturer's address	6
1.2	Service addresses	6
1.3	Making contact.....	6
2	About this manual	7
2.1	Use and storage	7
2.2	Target audience	8
2.3	Explanation of the various notes	9
2.4	Seal of quality	10
2.5	Further applicable documents	10
3	Terms of warranty	11
4	Safety	13
4.1	General information	13
4.2	Intended use	14
4.3	Safety of personnel.....	14
4.4	Transport and installation/start-up	16
4.5	Operation	17
4.6	Maintenance	17
4.7	Operating faults	17
4.8	Use of cleaning agents	18
4.9	Use of chemicals	19
4.10	Residual risks	19
4.11	Safety labels	20
5	Description / Overview	21
5.1	General information	21
5.2	Safety devices	21
5.3	Factory protective measures	21
5.4	Foreseeable misuse	22
6	System Layout	23
6.1	Overview	23
6.1.1	Primary circuit	24
6.1.2	Secondary circuit	25
6.2	Unit connections and electrical components	27
7	Receiving the CDU	28
8	Handling the CDU	29
8.1	Installation site selection.....	29
8.2	Transport to the installation location.....	29
9	Setting Up	31
9.1	Notes.....	31
9.2	Overview.....	32
9.3	Installation guidelines	34
9.4	Connections.....	36
9.4.1	Primary circuit	36
9.4.2	Secondary circuit	40
9.5	Electrical connection.....	41

9.5.1	Residual-current-operated circuit-breaker	41
9.5.2	General information	41
9.6	Filling.....	46
9.6.1	Antifreeze and anticorrosion agents	47
9.6.2	Primary circuit	48
9.6.3	Secondary circuit	49
9.6.3.1	Using internal fill pump	49
9.6.3.2	Using alternative filling procedure.....	51
9.6.3.3	Using external fill kit.....	54
9.7	Venting of closed circuits	59
9.8	Final steps after start-up	59
10	Operation.....	60
10.1	Notes.....	60
10.2	Adjustments	61
10.2.1	Low water level	61
10.3	Control unit.....	62
10.3.1	Selection and adjustment of values	62
10.4	Password protection	64
10.5	Program overview.....	65
10.6	Screen contents and descriptions	68
10.6.1	Direct selection	68
10.6.2	General functions/symbols	69
10.6.3	Page 1300, Settings	70
10.6.4	Page 1310 "Languages"	73
10.6.5	Page 1402 "Communication parameters"	74
10.6.6	Page 1500, Information	76
10.6.7	Page 2200 "Overview"	77
10.6.8	Page 2300, schematic system diagram.....	78
10.6.9	Page 4200, screen cleaning	80
10.6.10	Page 7492, sensor adjustment.....	81
10.6.11	Page 7581, general settings.....	82
10.6.12	Page 7582, Einstellungen Data log settings.....	83
10.6.13	Page 7583, control settings	84
10.6.14	Page 7681, temperature PID settings	85
10.6.15	Page 7682, pump speed PID settings	86
10.6.16	Page 7683, environment/primary circuit settings.....	87
10.6.17	Page 7684, low water/secondary circuit settings.....	88
10.6.18	Page 9999, Alarm	90
10.6.19	Page 9998 "Message history".....	91
11	Maintenance.....	93
11.1	Notes.....	93
11.2	Overview.....	95
11.3	Maintenance plan	97
11.4	Maintenance jobs.....	99
11.4.1	Primary circuit	100
11.4.2	Secondary circuit	102
11.4.3	Checking of the expansion vessel	104

11.4.4	Check of the circuit breaker	105
11.4.5	Antifreeze agent.....	106
11.5	Restart	106
12	Troubleshooting	107
12.1	Notes.....	107
12.2	General malfunctions.....	108
12.3	Electrical connection.....	109
12.4	Unit-specific	110
12.5	Control valve	111
12.5.1	Replacement.....	112
12.6	User interface	116
12.7	Control unit.....	117
12.8	Restart	118
13	Disconnecting the device	119
13.1	Notes.....	119
13.2	Transport and storage	120
13.3	Dismantling	121
13.4	Recycling	121
14	Technical Data	122
14.1	Dimensions, connections.....	122
14.2	General data	123
14.3	Weights	123
14.4	Primary circuit	124
14.5	Secondary circuit	125
14.6	Electrical connection.....	126
14.6.1	Supply	126
14.6.2	Interfaces	126
14.7	Performance curves.....	127
14.8	Schematic flow chart.....	129
15	Spare Parts.....	130
15.1	Part type.....	130
15.2	Mechanical parts.....	130
15.3	Electrical parts as indicated on the circuit diagram (equipment designations).....	131
15.4	Electrical cabinet.....	132
16	Index	133

1 Contact Addresses

1.1 Manufacturer's address

nVent Hoffman
 2100 Hoffman Way
 Anoka
 MN 55303,
USA

1.2 Service addresses

AFTERMARKET SUPPORT - REGIONAL LOCATIONS

NORTH AMERICA
 2100 Hoffman Way
 Minneapolis, Minnesota 55303-1745 USA

EUROPE
 Langenalber Straße 96-100
 75334 Staubenhardt, Germany
 Tel: +49 (0) 7082 794-0

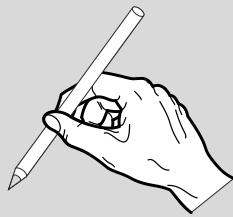
1.3 Making contact

Please keep the following details ready (see the type plate of the unit) when contacting us (e.g. for spare part orders, warranty claims, etc.):

- Product name
- Serial no.

NOTE

If necessary, enter the information, which is stated on the type plate of the unit, into the table.

	Name of the unit: (Product Name)
	Serial number: (Serial No.)
	Part number: (Part No.)
	Year of manufacture: (Year of Manufacture)

2 About this manual

2.1 Use and storage

NOTE

Prior to performing any work on the unit/system, read the instruction manual.

The following points must be noted:

- The instruction manual is an integral part of the unit/system and must be available to the operating personnel at the unit/system at all times.
- The instruction manual is indispensable for the safe start-up, operation and maintenance of the unit/system in line with its intended purpose.
- The instruction manual applies solely to the product that is stated on the cover sheet.
- We reserve the right to change the instruction manual due to further technical developments.
- This instruction manual is part of the scope of supply.
- The instruction manual shall apply from the transport phase up to the final disposal and must be absolutely observed.
- Keep the instruction manual in a place where it is readily accessible at all times. It must be complete, remain with the machine and must be available to all authorised persons.
- Maintain the instruction manual in a clearly legible state at all times.
- Hand over the instruction manual along with the device if it is resold.
- The unit/system may present unavoidable residual risks to persons and property. This is why the instruction manual must be read, understood and strictly complied with for all types of tasks by the personnel prior to commencing any work. In addition, any person who works on or with the unit/system in any way must be instructed and familiar with the potential hazards.
- This instruction manual is solely intended for trained and authorised personnel.
- It is the operator's responsibility to ensure that the manual is read and understood by all operating personnel before starting work.
- The illustrations in this manual are for providing a basic understanding and may differ from the actual unit/system.

2.2 Target audience

When working with the unit/system, the various tasks must be assigned to specific groups of persons.

Depending on the location of use, the necessary qualification of the personnel may be subject to varying statutory provisions. The operator must ensure compliance with the relevant laws. Unless regulated by law, the following list is used to define the permissible personnel and their minimum qualification.

The following points must be noted:

- Any work on the unit/system must be performed by qualified and instructed personnel.
- The personnel must have knowledge of the relevant standards, provisions, accident prevention regulations and operating conditions.
- The personnel must be instructed and trained for the tasks that need to be performed.
- The personnel must be able to identify and avoid any potential hazards.

Person	Task	Qualification	Lifecycle phase
Qualified personnel for transporting loads	Lifting/lowering and transport of the system	Proven experience in the handling of suspended loads and in the securing of loads	Transport, installation, disassembly and removal
Qualified personnel (mechanics)	Mechanical work during: start-up, elimination of faults and malfunctions, maintenance and shut-down	Training as an industrial mechanic or an equivalent professional qualification	Start-up, maintenance, elimination of faults and malfunctions, shut-down, disassembly and removal
Qualified personnel (trained electricians)	Electrical work	Specialised electrical training or an equivalent professional qualification	
Qualified personnel (refrigeration specialists)	Work on the refrigeration unit	Training as a refrigeration specialist or an equivalent professional qualification	
Qualified personnel (machine operators and fitters)	Operation and set-up of the system	Person who has been trained and instructed by the operator based on the instructions for use	Start-up, operation, maintenance, elimination of faults and malfunctions
Qualified personnel (disposal specialists)	Proper disposal of the system	Knowledge about the disposal regulations applicable on site	Shut-down, disassembly and removal, disposal
Qualified personnel (safety specialists)	Implementation of the applicable safety regulations	Knowledge about the safety regulations applicable on site	All phases
Others (e.g. visitors)	Site inspection	Person under the supervision of a safety specialist	-

2.3 Explanation of the various notes

The warning notes are preceded by signal words indicating the severity of the hazard.

Compliance with the warning notes is imperative in order to avoid accidents, injuries and damage to property.

Explanation of warning notices used in this manual:

DANGER

Short description of danger

The signal word **DANGER** identifies an immediately threatening danger.

Any non-adherence will result in severe injuries or death.

WARNING

Short description of danger

The signal word **WARNING** identifies a potential danger.

Any non-adherence may result in severe injuries or death.

CAUTION

Short description of danger

The signal word **CAUTION** identifies a potential danger.

Non-compliance may result in minor to medium injuries.

NOTICE

Short description

The signal word **NOTICE** identifies a potential risk of damage to property.

Non-compliance may cause damage to the unit or system.

NOTE

The signal word **NOTE** identifies further information on the unit or about its use.

Note concerning the protection of the environment

The keyword **Note concerning the protection of the environment** indicates information concerning the protection of the environment.

2.4 Seal of quality



The seal of quality "gdsCert" of gds GmbH (service provider for technical documentation) is a proof of quality for technical documentation.

With the "gdsCert" seal of quality, the manufacturer provides proof of the high standard of the technical documentation and of the compliance with the relevant standards and guidelines.



The seal of quality "ecoDoc" is used for the certification of instruction manuals under ecological points of view. It is listed under the "green safety instruction".

With the "ecoDoc" seal of quality, the manufacturer indicates that the product documentation includes notes concerning the potential ecological hazards resulting from operating errors or other tasks that are performed with or on the product. Companies thereby make a contribution to the protection of the environment.

The seal of quality "ecoDoc" provides a proof of compliance with the relevant standards and guidelines and/or of the ecological approach concerning the contents of the documents.

2.5 Further applicable documents

In addition to this instruction manual, there are further applicable documents that also need to be taken into consideration. These are usually the following documents:

- spare parts catalogues/lists
- electrical documentation
- safety data sheets
- project drawings
- documentation of third-party manufacturers

NOTE

Information concerning the actual documents that are part of the product-accompanying documents can be found in the specifications of the order confirmation.

3 Terms of warranty

Damage or Loss in Transit - Delivery of goods to a carrier at Seller's plant or other shipping point shall constitute delivery. Regardless of freight payment, all risk of loss or damage in transit shall pass to Buyer at that time. Buyer shall make claims for loss or damage to goods while in transit against the carrier. Seller will assist Buyer in securing satisfactory adjustment of such claims if notified within 15 days of receipt. Terms are F.O.B. point of origin.

Warranties - For all products listed herein, Seller warrants goods manufactured by it to be free from defects in materials and workmanship for a period of (1) year from date of shipment from its plant. If within such period any such goods shall be proven to Seller's satisfaction to be defective, then and in that event such goods shall be repaired or replaced at Seller's option. Such corrections or replacement of defective goods shall constitute a fulfillment of all liabilities in respect to such goods. Under no circumstances will credit be allowed for unauthorized rework on any materials. Connectors, hoses and barb fittings cannot be removed for any reason, if removed warranty is null and void. **THE FOREGOING WARRANTIES ARE EXCLUSIVE AND IN LIEU OF ALL OTHER EXPRESS AND IMPLIED WARRANTIES WHATSOEVER, INCLUDING BUT NOT LIMITED TO IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE.**

EXCLUSIONS: Seller's obligations do not cover defects or losses caused by normal wear and tear or deterioration, defects in or damage to any goods resulting from improper installation, accident, shipping or any utilization, maintenance, repair or modification of the goods that is not consistent with Seller's instructions or the designed capabilities of the goods, the removal or re-installation of the goods, or related non-Seller supplied products for repair or replacement unless such installation is required by Seller's design or included on original invoice from Seller, or that, in Seller's sole judgment, the performance or reliability thereof is adversely affected thereby, or which is subjected to abuse, mishandling, misuse or neglect or any damage caused by connections, interfacing or use in unforeseen, unintended or detrimental environments, nor shall Seller be liable for any damages or loss, including bodily injury or death, as a result of the aforementioned causes of loss and/or defects. Seller does not warrant that the operation of the goods will be uninterrupted or error-free products. Seller assumes no liability for non-Seller supplied products or services furnished by Buyer to its customer nor does this warranty cover any copy of or update to any user manual for the goods. Buyer is fully and solely responsible for its selection of the goods purchased hereunder, and Seller shall not be liable for Buyer's failure to select goods that ultimately do not meet Buyer's application needs, or any damages resulting therefrom. Furthermore, Buyer is solely and fully responsible for selecting goods that meet all applicable legal and regulatory requirements and/or required classifications for its desired use and application, and Seller shall not be responsible for any loss or damage, monetary or otherwise, if the goods purchased by Buyer hereunder ultimately do not meet such requirements and/or classifications.

Limitation of Liability - Seller's total liability shall not exceed the price paid by Buyer under the Agreement for the goods giving rise to the claim. Under no circumstances shall Seller be liable for special, incidental, indirect, delay or liquidated, punitive or consequential damages for any reason. Seller assumes no obligation or liability for technical advice given or not given, or results obtained.

Buyer Warranty Responsibilities - Buyer must adhere to all requirements in the Water Quality Statement guidelines provided by the Seller. Seller's Warranty is conditional upon Buyer adhering to such requirements.

Limited Cross Vendor Compatibility - Buyer shall ensure that only Products of Seller, including Coolant Distribution Units, Rack Manifolds, Rack Manifold Hoses, Reservoir Pump Units (RPU's), Liquid Cooling Coils and Heat Rejection Coils are operating together on the Secondary Side (Server Side) of the liquid loop. If Buyer shall fail to do so, the period of Seller's Warranty shall be reduced to 30 days from the date of invoice.

Buyer Inspection and Use - Seller is expected to examine, inspect and follow RackChiller CDU800 User Manual for all processes involving the CDU. Failure to follow the RackChiller CDU800 User Manual will render the warranty null and void.

Maintenance - Non-compliance with the maintenance intervals may lead to damage to the unit or system, and to the partial or complete loss of warranty.

- Only use genuine spare parts by nVent.
- Only use media that have been approved by nVent and the machine manufacturer.
- Comply with the specified maintenance intervals.

Terms of Sale can be found at <http://nVent.com/hoffman/terms-of-sale>

Warranty can be found at <http://hoffman.nVent.com/warranty-information>

4 Safety

4.1 General information

NOTE

Every person who is ordered to work on the unit/system must have read and understood these instructions and, in particular, the "Safety" chapter.

If necessary, in-house instruction should be provided, taking into account the technical qualifications of the personnel concerned.

The "Safety" chapter provides an overview of all of the important safety aspects for the optimum protection of the personnel and for the safe and trouble-free use of the unit/system from the transport up to the operation and disposal.

The unit/system has been designed and manufactured in line with the current state of the art and is in compliance with the recognised safety regulations and standards.

The unit/system is safe to operate.

Non-compliance with the instructions and safety notes in this instruction manual may lead to substantial hazards to persons and damage to the unit/system.

Only use specialised personnel who are familiar with the fundamental health and safety rules and regulations and who have been briefed about the handling of the unit/system.

Certain components have additional warning plates or labels to ensure safe operation. Plates or labels must not be covered or removed.

Compliance with the safety instructions is mandatory. The observation of these instructions is essential for ensuring safety.

The relevant accident prevention regulations as well as other generally recognised regulations concerning workplace health and safety must be observed.

4.2 Intended use

The unit or the system is intended solely for the application outlined in the “Description/Overview” section and only with the components supplied and approved.

Using the unit for purposes other than those mentioned above is considered contrary to the intended use. The manufacturer cannot be held liable for any damage resulting from such use. The risk of such misuse lies entirely with the user.

The product-specific documentation can only refer to the intended use of the unit/system on which the order is based.

The instructions cannot cover any specific situations arising from special local conditions or special applications that the manufacturer was not aware of. In this case, the operator must ensure the safe operation of the unit/system or shut the unit/system down until appropriate measures for the safe operation have been coordinated or implemented in consultation with the manufacturer or other competent authorities.

4.3 Safety of personnel

Knowledge of, and compliance with, the present content is a prerequisite for the protection of persons against danger and for the avoidance of errors and mistakes.

Tasks (e.g. maintenance and service tasks) should be performed only by suitably qualified persons who are familiar with these tasks and who have been informed concerning the potential danger.

Avoid any working practice that:

- puts the health and safety of the user or third parties at risk,
- is detrimental to the unit or system or other material assets,
- impairs the safety or functionality of the unit or system,
- does not comply with the safety instructions.

In addition:

- Always wear personal protective equipment when working on the unit/system.
- Comply with the relevant accident prevention regulations.
- Comply with the occupational health regulations.
- Comply with the generally recognised safety rules.

There is an increased risk of injury if the safety devices and guards are disabled. Never dismantle or disable any safety devices or guards.

- Check the safety devices and guards daily for correct operation.
- Report any faults and defects concerning the safety devices and guards to the customer service without delay.
- Keep covers (e.g. panels, shields, housings) closed during operation.
- Perform repairs of the pipe systems and tanks only when the system is depressurised.
- Observe the respective supplier's safety data sheets and disposal instructions as well as all of the local safety regulations when using chemicals.
- When handling process fluids (e.g. oils, greases and other chemical substances), comply with the supplier's specifications and safety information for the respective product.
- Wear personal protective equipment.

Failure to wear personal protective equipment may cause serious injuries or death.

- Wear the prescribed personal protective equipment, e.g. hearing protection, eye protection, safety shoes, helmet, protective clothing, safety gloves, and respiratory protective equipment.
- Long hair must be tied back. Do not wear any jewellery or loose-fitting clothes. There is a risk of injury if these items get caught in or are pulled into any moving parts of the machinery.
- Ensure that there are no unauthorised persons in the danger zone.

Any safety devices that have been removed for set-up, maintenance, or repair purposes must be reinstalled and checked for correct operation immediately upon the completion of the maintenance and repair work.

In the above case, particular attention must be paid to the general accident prevention and safety regulations.

There is a risk of damage to property if the unit/system is operated improperly.

- Comply with the description of any add-on parts or ancillary equipment (if included).
- See also the supplier documentation or the separate documentation provided by the third-party suppliers.

4.4 Transport and installation/start-up

There is an increased risk of injury for persons who perform tasks for which they are neither qualified nor trained.

Only persons who are familiar with the tasks, who have been informed about the associated hazards have the necessary qualifications are authorised to transport the unit.

- Never work or stand under suspended loads. There is a risk of fatal injuries from falling loads.
- Transport tasks may only be performed by qualified and authorised persons and in compliance with the safety instructions!
- The shipping company and the manufacturer must be informed immediately in writing about any damage that is noticed after the delivery. The start-up of the unit/system must be suspended, if necessary.
- Use only suitable lifting devices, transport equipment, load handling attachments and lifting accessories and ensure that they are in a perfect technical state and have a sufficient load-bearing capacity.
- Take the attachment points and centre of gravity of the load into consideration.
- Do not add any additional attachment points to the units/systems by welding, flame cutting or drilling. There is a risk of cracking due to the notch effect of the weld seam or flame-cutting spot or bore.
- When transporting the unit, observe the instruction labels on the unit (if provided).
- Transport the unit only when it is empty.
- If the unit/system needs to be replaced, fasten and secure it thoroughly on the lifting devices.
- The banksman must be within the range of vision of the operator or have voice contact with the operator.
- Block and mark the transport routes so that unauthorised persons cannot reach the hazard area!
- Always secure the transport route with the aid of a third person!

NOTE

Comply with the general accident prevention and safety regulations.

4.5 Operation

- Operation is permissible only if all of the components are in a perfect technical state and proper operational condition and if they are used in line with the intended purpose.
- Avoid any operation that compromises the safety of the unit/system.
- The operator must ensure that unauthorised persons cannot work on the machine.
- Prior to switching the unit/system on, the operator must ensure that no persons are put at risk by starting the machine.
- During operation, the entire hazard area must be observed or closed off so that no one can enter this area without being noticed.
- Do not leave the unit/system unattended during operation.
- Use the unit/system only if all of the guards and safety devices are present and fully functional.
- The operator must ensure a clean and clearly arranged workplace at and around the unit/system by issuing corresponding instructions and performing checks.
- Observe the controls and indicators during operation.

4.6 Maintenance

The operator must ensure that the unit/system and its safety devices and guards are kept in a functional state. The control devices as well as the safety devices and guards must be checked in terms of their effectiveness.

Only specialised and trained personnel are authorised to perform maintenance, repairs and overhauls.

If safety devices or guards need to be removed for maintenance, overhauls and repairs, they must be reinstalled and checked for correct operation immediately after the completion of the tasks.

4.7 Operating faults

Malfunctions of the unit/system may be caused by a fault that can be localised and eliminated with the aid of the "Troubleshooting" section.

- Assign the associated tasks to the corresponding specialised personnel.
- If the fault cannot be eliminated, contact the service of the manufacturer.

NOTE

See the "Contacts" section.

4.8 Use of cleaning agents

No material, i.e. neither metals nor plastics, can be certified to be completely chemically resistant.

Due to the large number of available additives and cleaning agents, the recipes of which are subject to change, the manufacturer cannot assume any liability for damage attributable to the influence of such substances.

Damages through cleaning agents!

Cleaning agents can have an effect on devices and measuring equipment and can destroy materials and harm the environment.

Please observe the following points:

- Cleaning agents must not enter system circuits.
- Use cleaning agents economically and for specific objectives.
- Keep the application duration to a minimum, especially for plastic parts and seals.
- Excess cleaning agent has to be removed and parts have to be wiped dry or, if possible, rinsed with clear water.
- Do not use any flammable cleaning agents (unless explicitly specified by the manufacturer).
- Do not use any cleaning agents containing silicone or chlorine (unless explicitly specified by the manufacturer).

In case of doubt, the user should perform a test to see whether the detergents / chemicals are compatible with the materials used.

The materials used for this product have been selected on the basis of several years of field experience of these products worldwide. If the product is used as intended and if the information provided in the "Safety" chapter is observed, this product offers very good performance and a long service life.



Note concerning the protection of the environment

The excessive use of cleaning agents has a negative impact on the environment.

- Use environmentally friendly cleaning agents.
- Use cleaning agents economically and for specific objectives only.
- Do not spill any cleaning agents.
- Keep the containers tightly sealed. Empty containers or containers that are in use must also be sealed upon the completion of the task.
- Used cleaning agents and the associated containers, tanks, etc. must be disposed of in an environmentally sound manner and in compliance with the local and national rules and regulations.

4.9 Use of chemicals

Health hazard!

The use of chemicals can present a health hazard.

- When handling chemicals, always wear protective gloves, eyewear, and clothing.
- Observe the safety data sheets.

Damage due to aggressive chemicals!

Aggressive chemicals can damage the components.

- Do not use any chemicals (e.g. for cleaning) that are aggressive to the components.
- Observe the relevant material safety data sheets of the suppliers.



Note concerning the protection of the environment

The improper disposal of chemicals (e.g. additives) has a negative impact on the environment.

- Chemicals must not be disposed of as household waste and it must be ensured that they are not released into the sewage system or soil.
- Wear suitable protective equipment (gloves, eye protection) when performing disposal tasks.
- Chemicals must be disposed of separately (e.g. as special waste if applicable) and supplied separately to the recycling centres.
- Comply with the safety data sheets and also with the applicable national and local rules and regulations.

4.10 Residual risks

Any unavoidable, design-based residual risks (if present) are mentioned and described in this instruction manual in the corresponding sections.

4.11 Safety labels

Notes and symbols on the equipment/system, e.g. safety labels and plates, must be absolutely complied with. Do not remove them and ensure that they are fully legible.

NOTE

Destroyed or illegible marks/symbols must be replaced immediately.



Warning – Electrical hazard.

Only specialised personnel is authorised to perform work on the electrical system.

Negligence can lead to electric shock.

- Comply with the information in the "Safety" section.
- Wear protective clothing.

5 Description / Overview

5.1 General information

The cooling unit (CDU800) is designed for efficient and safe supply of IT equipment. The entire system is focused on providing the highest reliability, availability, and serviceability for supporting direct-to-chip liquid cooling. The CDU800 is fed from a primary facility water system (FWS), where the integrated pumps drive the secondary technology cooling system (TCS) cooling loop flow. The heat exchanger transfers the excess heat from the secondary or TCS coolant to the primary or FWS coolant.

There are three options for the control of the unit:

- based on the pressure difference,
- based on the volume flow or
- based on the temperature.

NOTE

In the event of a malfunction of the unit (e.g. due to a defective pressure sensor if the unit is controlled based on the pressure difference), the unit will switch to the volume flow or temperature difference based control.

The unit consists of the following main functional assemblies:

- Primary circuit
- Secondary circuit
- Plate heat exchanger
- Control unit

NOTE

The unit has been designed for indoor use in industrial buildings.

5.2 Safety devices

- The unit can be disconnected from the power supply via the maintenance switch.

5.3 Factory protective measures

- Outer painting/coating/anodisation against corrosion.
- Protective earthing / potential equalization for static discharge.
- Warning labels (in accordance with the German regulation BGV A8) e.g. "Warning – hot surface" and "Warning – dangerous voltage".

5.4 Foreseeable misuse

The following points describe a foreseeable misuse of the unit/system:

- Operation in the event of non-compliance with the permissible technical data. See the "Technical data" section.
- Set-up in unsuitable locations
- Set-up on unsuitable surfaces.
- Use of the unit/system as a storage area.
- Use of the unit/system as a work platform.
- Outdoor use.
- Operation with an incorrect phase sequence.
- Operation with missing or damaged sub-assemblies intended to protect the safety of persons and the device/system.
- Operation of the unit without unit cladding.

6 System Layout

6.1 Overview

NOTE

The representations in this chapter are examples. The final unit design can vary, depending on unit and equipment variations.

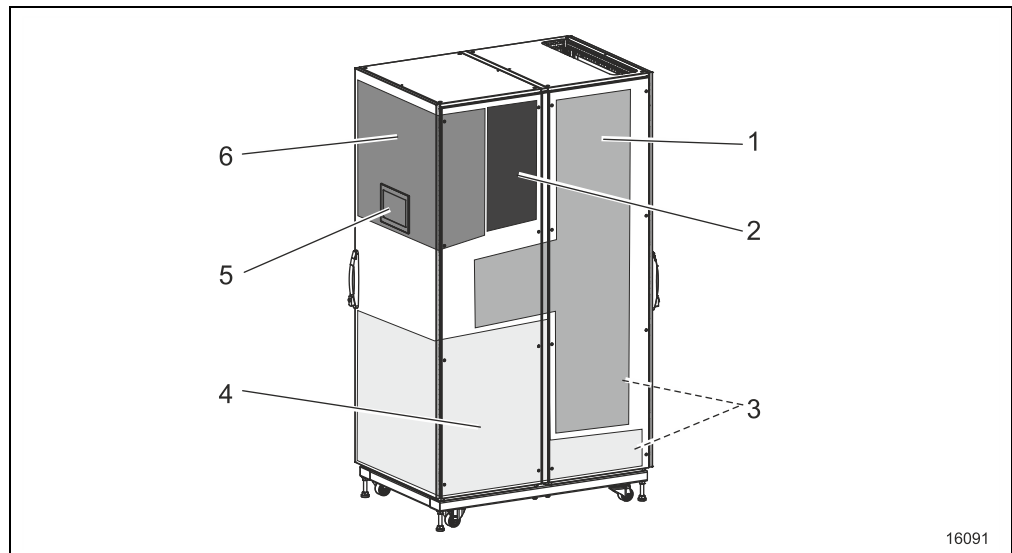


Fig. 1: CDU 800

- 1 Secondary circuit
- 2 Frequency converter
- 3 Connection points
- 4 Primary circuit
- 5 Control unit
- 6 Control cabinet

NOTE

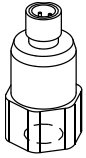
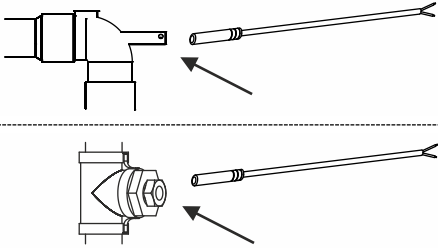
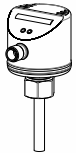
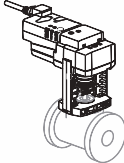
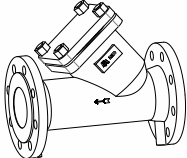
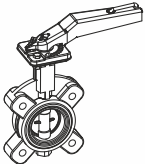
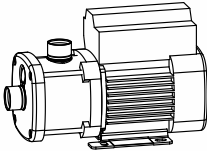
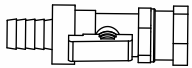
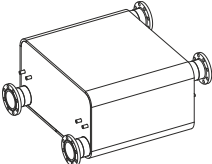
Electrical components are marked with reference designators. See also the circuit diagram.

NOTE

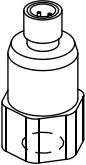
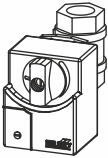
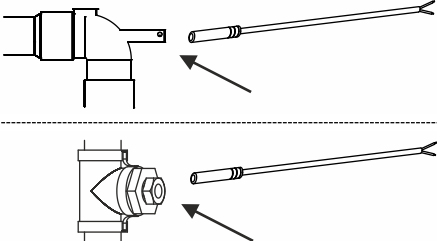
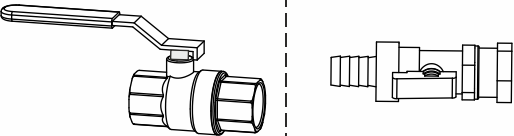
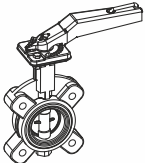
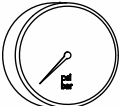
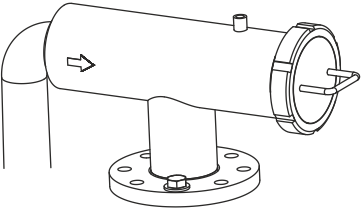
Installed pressure sensors can be replaced without stopping the device. First remove the electrical connector. Then remove the pressure sensor from the device.

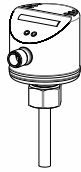
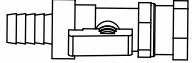
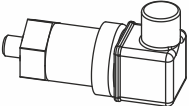
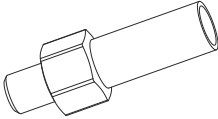
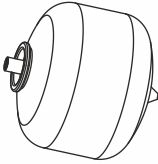
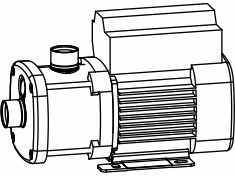
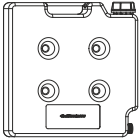
If you first remove the pressure sensor, the device will stop.

6.1.1 Primary circuit

Component	Description
	Pressure sensor
	The temperature sensor is located in the pipe fitting (see the arrow).
	Flow sensor
	Control valve with actuator
	Filter housing with filter
	Butterfly valve
	Pump
	Fill and drain valve
	Heat exchanger

6.1.2 Secondary circuit

Component	Description
	<p>Pressure sensor</p>
	<p>Control valve with actuator</p>
	<p>The temperature sensor is located in the pipe fitting (see the arrow).</p>
	<p>Shut-off/drain valve</p>
	<p>Butterfly valve</p>
	<p>Pressure gauge</p>
	<p>Filter housing with filter</p>

Component	Description
	Flow sensor
	Fill and drain valve
	Low-water level switch
	Safety valve
	Expansion vessel
	Pump
	Refill tank

6.2 Unit connections and electrical components

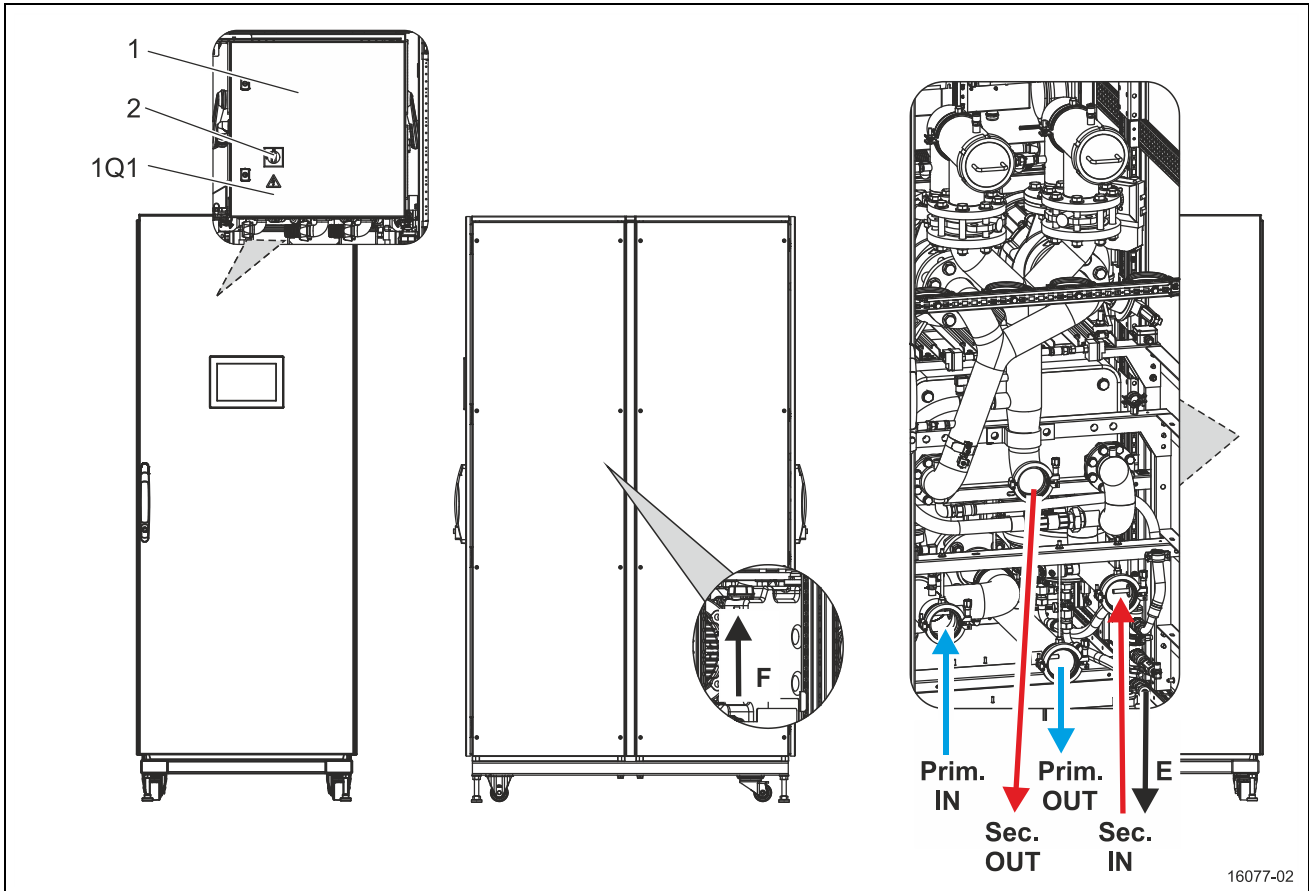


Fig. 2: Electrical components/connections

1	Control cabinet	Prim. IN	Primary circuit inlet
2	Maintenance switch	Prim. OUT	Primary circuit outlet
1Q1	Power supply connection point	Sec. IN	Secondary circuit inlet
F	Secondary circuit filling point	Sec. OUT	Secondary circuit outlet
E	Drainage point		

7 Receiving the CDU

NOTE

See also separate document "Unloading Large Enclosures with a Ramp" (90001347552).

Unpack the CDU as defined by nVent unpacking documentation. Physical copies were provided with the unit and electronic copies can be found on the CDU800 product web page.

Inspect the packaging and the CDU. Check for concealed damage that may have occurred during shipment. Look for dents, scratches, loose assemblies, etc. Refer to warranty terms for how to address any damage evident upon receipt.

8 Handling the CDU

8.1 Installation site selection

When selecting an installation site, observe the following instructions:

- Keep the specified escape routes clear.
- Ensure firm support and a horizontal position of the unit.
- Comply with the data stated in the “Technical Data” section concerning the ambient temperature for operation, transport and storage when the unit is completely empty.
- Ensure sufficient space for operating, maintaining and cleaning.
- If provided, keep the vents for incoming and outgoing air clear

Observe relevant technical and building regulations.

Hoses and electrical cables must be laid such that there is no danger of tripping and that they are protected from damage.

When selecting an installation site, the applicable safety regulations and manufacturer’s instructions concerning substances used for or located near the machine must be observed.

When installing the units near traffic routes, separate the units from the traffic routes by suitable structures.

8.2 Transport to the installation location

⚠ WARNING

Danger for persons!

Increased risk of injuries through improper transport.

The transport of the unit should be carried out only by suitably qualified persons who are familiar with the unit and who have been informed as to potential hazards.

Risk of crushing between components during transport!

During the transport of components, limbs may be crushed. Serious injuries may result.

- Only use suitable means of transport.
- Secure the loads adequately.
- Wear personal protective equipment.

NOTICE

Damaging of unit!

Damage due to improper transport.

- Make sure to follow signs (if attached) at unit when transporting unit.
- Transport units with suitable lifting gear only.
- Transport the unit only when it is empty.
- Transport on suitable and secured transporting pallet.

NOTE

The castors are not suitable for transporting the unit. They are solely intended for moving the unit in the area of the installation location.

NOTE

The equipment cannot be moved by crane.

- When moving the unit, the respective transport vehicle (e.g., forklift, pallet truck) must be operated compliant with the local rules and regulations and according to relevant industrial accident prevention regulations.
- Compliance with the maximum lifting capacity of the transport equipment is mandatory. The weight of the unit is stated in the "Technical Data" section.
- Push the forks of the forklift/pallet truck horizontally into the transport pockets of the unit.
- Ensure that the load is evenly distributed when using a forklift/pallet truck.
- Use a low lifting speed.

9 Setting Up

9.1 Notes

The following must be observed in order to avoid injuries and damage to property:

- Only qualified personnel are authorised to perform these tasks.
- Comply with the information given in the "Safety" section.

⚠ WARNING

Risk due to incorrect installation/start-up!

There is an increased risk of injury for persons who perform tasks for which they are neither qualified nor trained.

- Only persons who are familiar with the tasks, who have been informed about the associated hazards and who have the necessary qualifications are authorised to install/start the unit.
- All technical safety conditions must be fulfilled prior to the installation/start-up.
- The location of the unit or system must comply with the specifications that are stated in the chapter "Transport/Location selection".

NOTE

- Observe national and local regulations regarding liquids that are hazardous to water (e.g. German Federal Water Act (WHG)).
- The owner is responsible for ensuring that the system meets the requirements for quality and operation.

NOTE

Use the unit only if the housing panels are installed.














For further information regarding connections, versions, pressure specifications, settings etc. please refer to the following chapters:

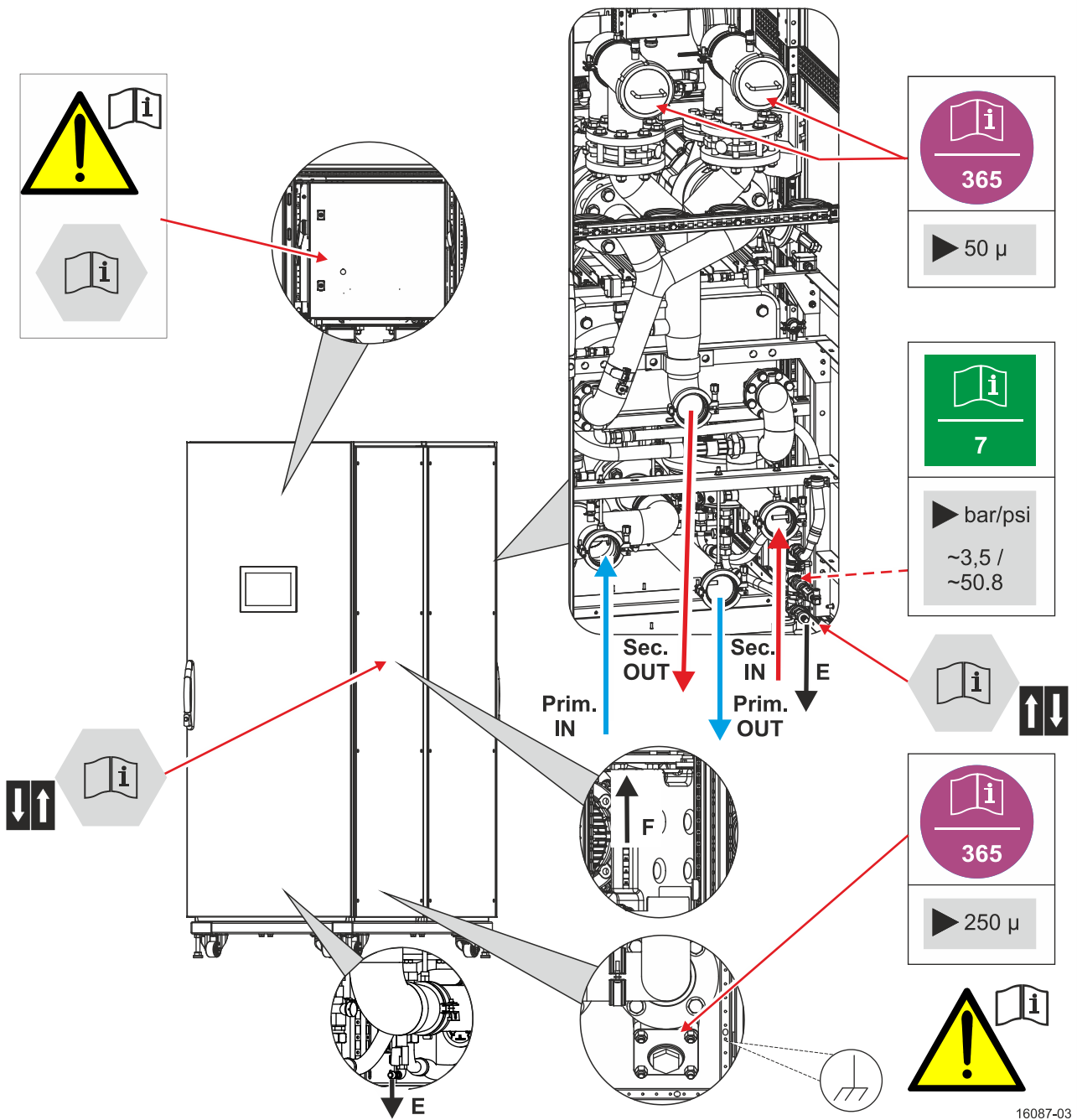
- Layout / System layout
- Maintenance
- Technical Data

as well as the instruction labels on the unit (if provided).

9.2 Overview

Legend:

	Danger
	Please refer to the instruction manual!
	Maintenance point
	Adjustment, check
	Operating point, connection point
	Inlet/outlet
	Note
	Every day
	Weekly
	Monthly
	Every six months
	Annually
	Use original replacement parts and filters only –otherwise the warranty will be invalidated.



16087-03

9.3 Installation guidelines

⚠ WARNING**Danger to persons due to heavy objects!**

When installing or removing components of the system (e.g., pumps, compressors, heat exchangers, ...), their entire weight must be taken into consideration.

- Perform the installation and removal with several persons or use suitable lifting devices.
 - Install/remove the components individually one by one.
 - Use personal protective equipment.
-

NOTE

The load-bearing capacity of the set-up surface must be sufficient for the total weight of the unit/machine. The set-up surface must be vibration-free and sufficiently firm. The set-up surface must not transfer any vibrations.

1. Take the following measures prior to the set-up:
 - Prepare the set-up location (level ground with a sufficient load-bearing capacity).
 - Perform the set-up in accordance with the specifications in the project drawings (e.g. floor plan, foundation plan) (if provided).
2. Comply with the maximum lengths (hoses, pipes, cables etc.) and pressure and temperature values as stated in the "Technical Data" section.

The connections to the unit must be flexible and sufficiently pressure- and temperature-proof.

NOTE

-
- Installation on different levels is permissible only after consultation with nVent.
 - Do not exceed the maximum lengths without prior consultation with nVent.
 - Leave space around the unit for access during operation, maintenance, fault removal and cleaning.
 - Check the pipe and hose connections. Retighten them if necessary.
-

Unit with casters

NOTE

The casters are not suitable for transporting the unit. They are solely intended for moving the unit in the area of the installation location.

3. At the installation location, adjust the height of the unit by way of its feet (1) and secure it by way of the lock nut (2).

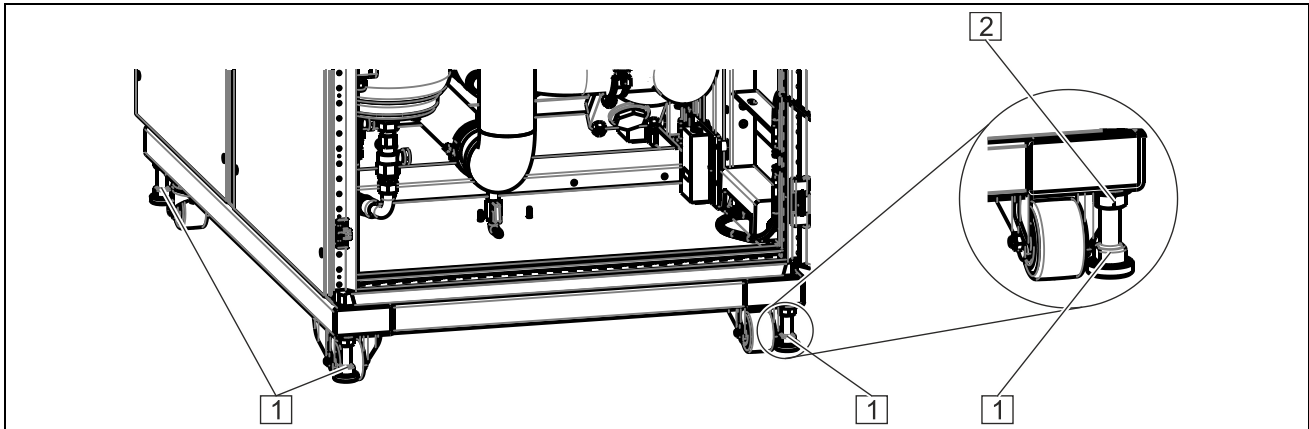


Fig. 3: Adjustable feet

NOTICE

Damage to the unit!

Damage due to improper transport.

Do not transport the unit on a pallet with its feet extended.

9.4 Connections

9.4.1 Primary circuit

1. Release nitrogen at drainage points (1).

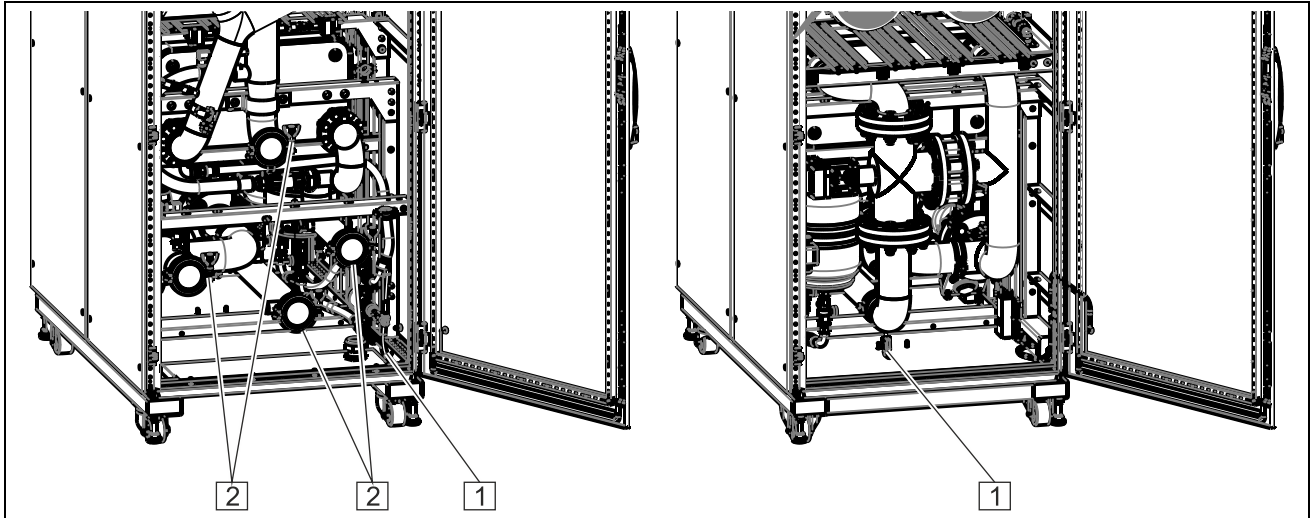


Fig. 4: Drainings and tri-clamps

2. Loosen/open tri-clamps (2).
3. Remove and store the lids (6).

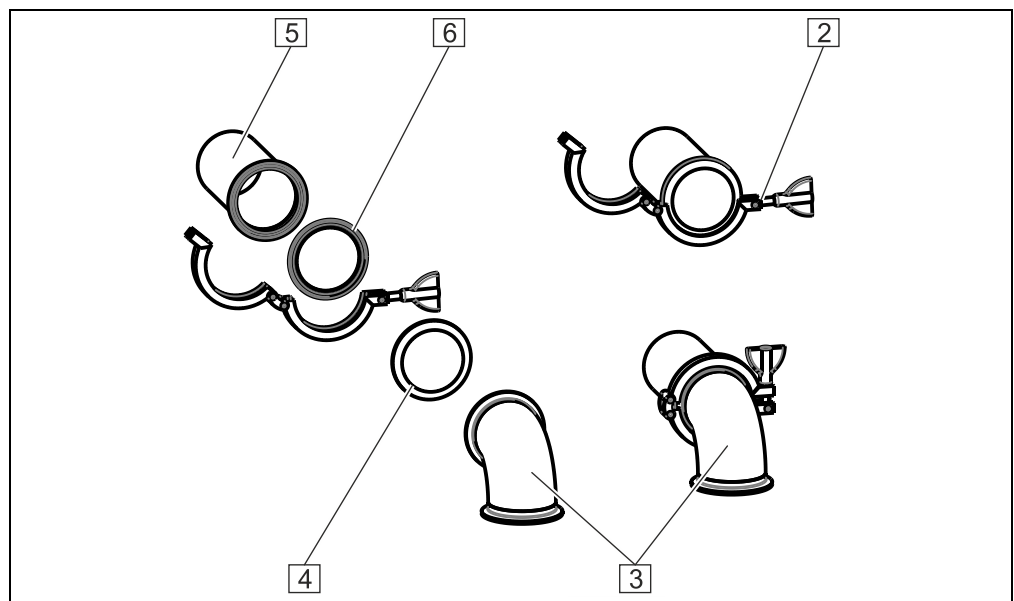


Fig. 5: Tri-clamp with pipe bend

4. Install pipe bend (3) with seal (4) to the pipe (5).
5. For connections from above rotate pipe bends (3) with opening to the top. (see also Figure Connection possibilities)
6. For connections from below rotate pipe bends (3) with opening to the bottom and remove cover in bottom of the housing. (see also Figure Connection possibilities)
7. Install tri-clamp (2) and fasten/close it.

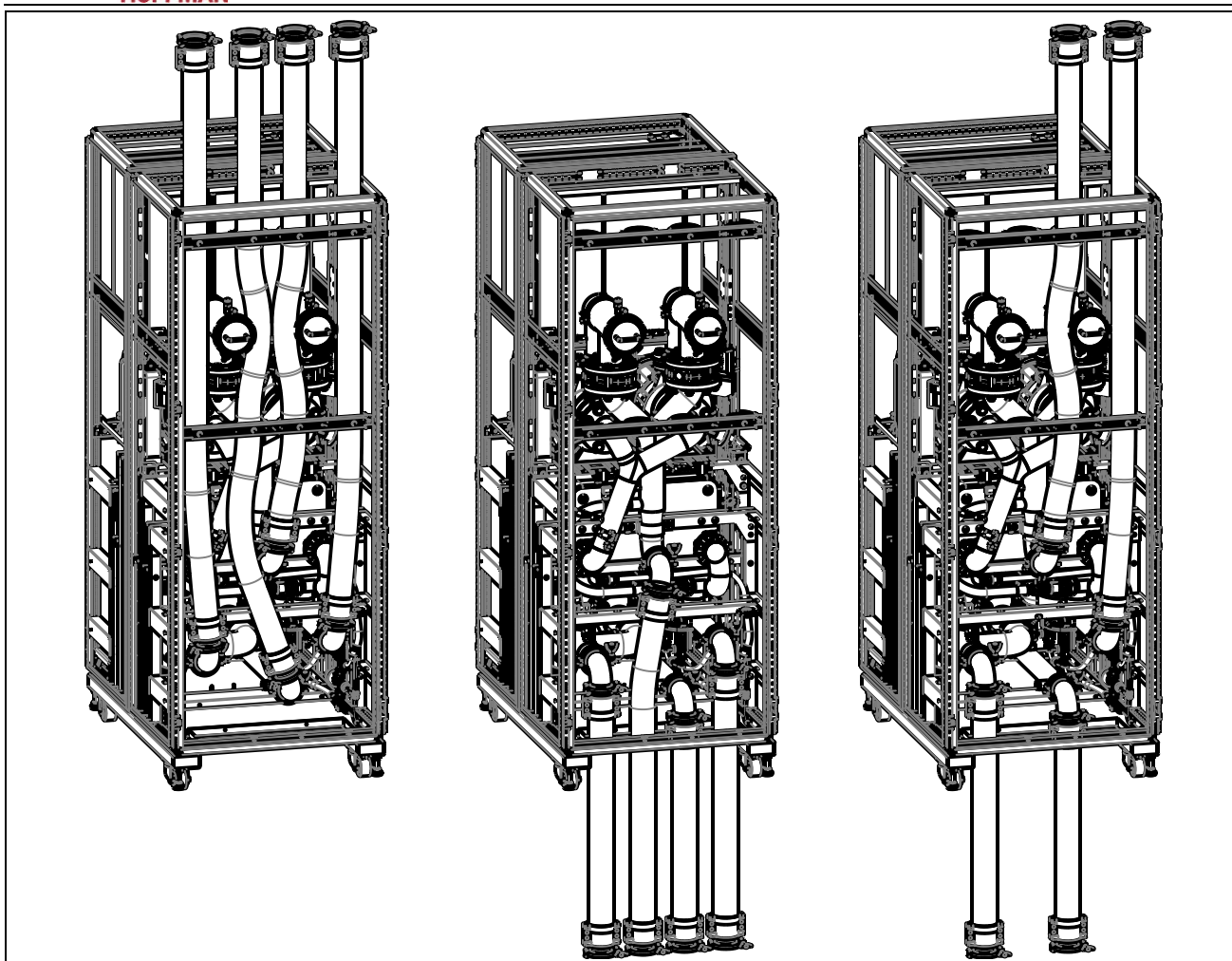


Fig. 6: Connection possibilities

NOTE

Hose set with flexible hoses and tri-clamps can be ordered separately.

8. Connect hose set also with tri-clamps and seals.

9. Open shut-off valves (6).
10. Close shut-off valve (7) for the filter bypass.

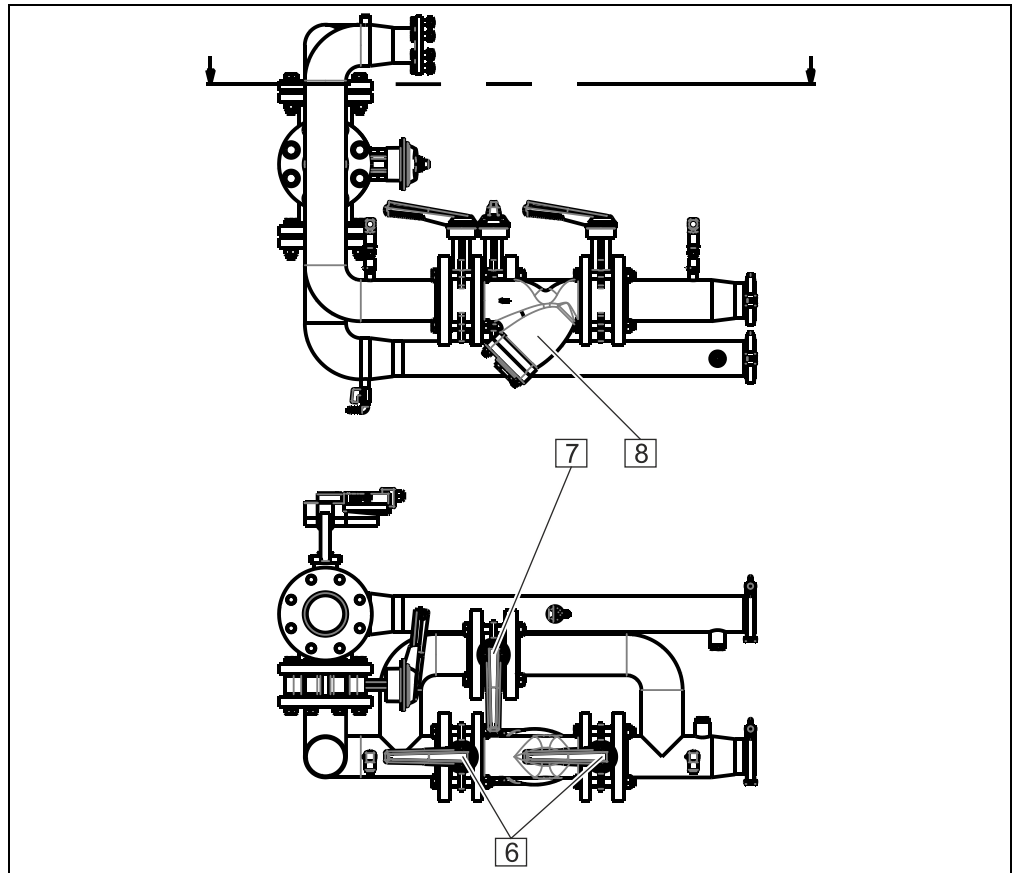


Fig. 7: Shut-off valves

11. If the cooling water regulator is used as a three-way valve, bring shut-off valve (9) in position as shown in the figure below.
12. If the cooling water regulator is used as a two-way valve, close shut-off valve (9) (rotate 90°).

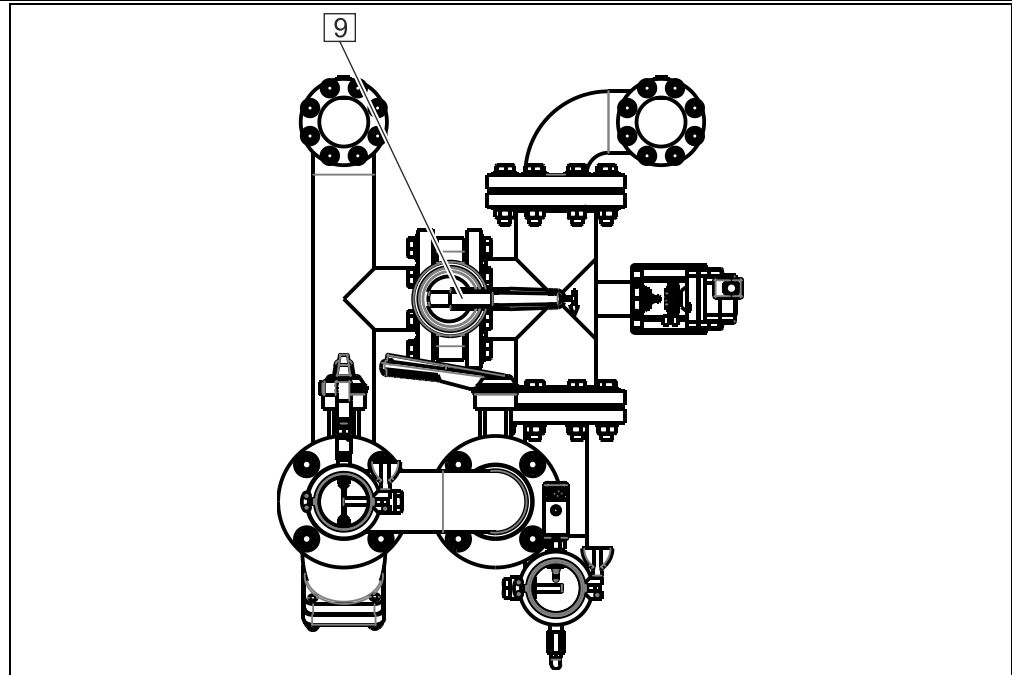


Fig. 8: Shut-off valve cooling water regulator

NOTE

Provide vents at the highest points in the pipework.

NOTE

Provide customer-side shut-off options for piping

13. Fill medium in customer-side circuit according to Technical Data.
14. Vent circuit at highest position.
15. Clean filters. (see also chapter Maintenance)

9.4.2 Secondary circuit

Carry out connection to unit via flexible, pressure-resistant hoses.

1. Secondary circuit inlet (Sec. IN).
2. Secondary circuit outlet (Sec. OUT).

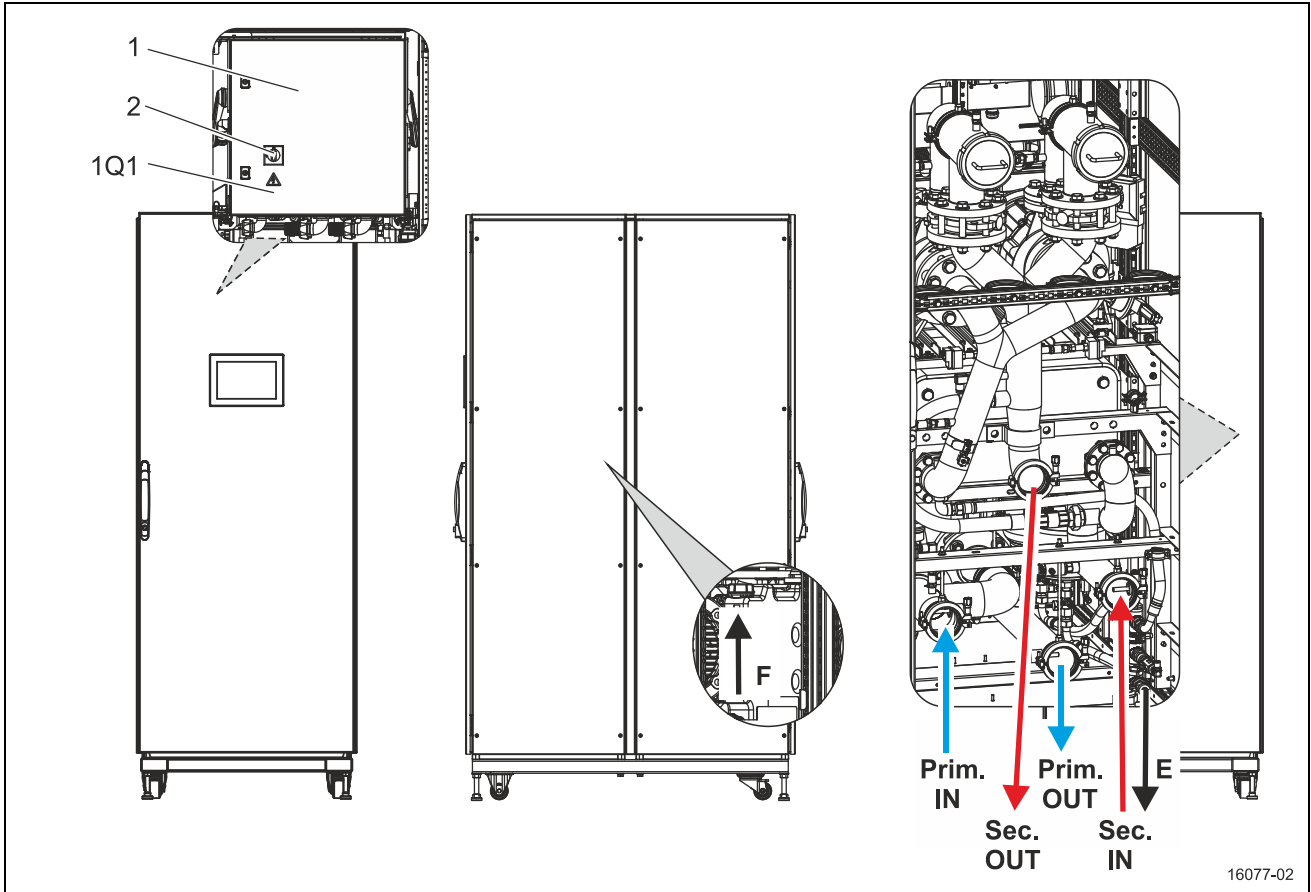


Fig. 9: Electrical components/connections

1	Control cabinet	Prim. IN	Primary circuit inlet
2	Maintenance switch	Prim. OUT	Primary circuit outlet
1Q1	Power supply connection point	Sec. IN	Secondary circuit inlet
F	Secondary circuit filling point	Sec. OUT	Secondary circuit outlet
E	Drainage point		

NOTE

The system diagram is enclosed in the appendix.

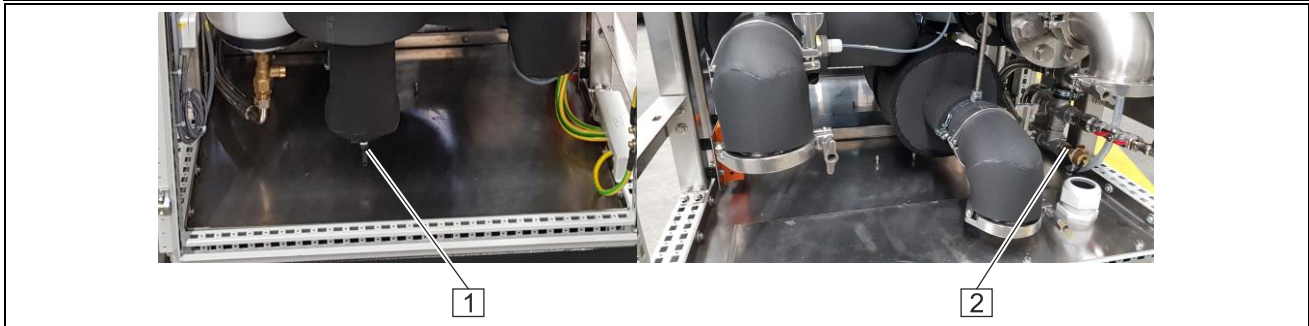


Abb. 10: Drainage points

1 Drainage point primary circuit

2 Drainage point secondary circuit

9.5 Electrical connection

9.5.1 Residual-current-operated circuit-breaker

The manufacturer recommends using residual current devices (RCDs), if the chiller (CDU) is to be powered via the customer's network (in-house network). Other devices (consumers, power sockets, ...) may not be set up behind the residual current device.

If the chiller (CDU) is to be supplied with electricity from the consumer, the respective manufacturers' specifications must be observed.

Fuse protection to be provided by the customer	Residual-current-operated circuit breaker Nominal current (In)
10 / 16 / 20 / 25	25
35	40
50 / 63	63
80	80
100 / 125	125
150	150

9.5.2 General information

⚠ DANGER

Danger to life due to electrical hazard!

There is a risk of death by electric shock if the connected voltages are not correct.

- Only qualified and specialised personnel is authorised to perform the connection.
- Compare the connection voltage to the voltage that is stated on the type plate.
- Comply with the specifications of the circuit diagram.

NOTICE

Wrong connected voltage!

Incorrect supply voltages can lead to component damage.

Compare the supply voltage value with the voltage specification stated on the nameplate at the device. Set up the necessary fuse protection in accordance with the “Technical Data” section or the circuit diagram.

Loose bolts and terminal clamping points!

During transport and installation, screws and terminal clamping points might get loose.

Check all screws and terminal clamping points in the control cabinet for secure fitting prior to setting up the unit.

Danger of damage to unit components due to incorrect rotating field!

Even short-term operation of the unit with an incorrect rotating field can lead to considerable damage to the unit components, especially to the Scroll compressors (if installed).

Check the electrical rotating field of the power supply connection for correctness prior to setting up the unit.

There is no warranty for damages caused by operating the unit with an incorrect rotating field.

NOTICE

Impairment of the unit operation!

EMC disturbance may affect the unit function negatively and/or damage components in case of insufficient equipotential bonding.

- If devices/machines are electrically coupled, additional local equipotential bonding must be provided between the devices/machines.
 - Connect a suitable equipotential bonding cable to the marked location in the unit.
 - Connect any conductive pipes to the equipotential bonding system.
-

NOTE

Ensure clockwise phase rotation.

NOTE

Observe local rules and regulations

1. Insert customer wire (1) from below through the cable gland (2) at the back of the.
2. Carefully guide the customer wire (1) through the chiller (as shown in the figure below).
3. Fasten customer wire (1) to the clamps (3).

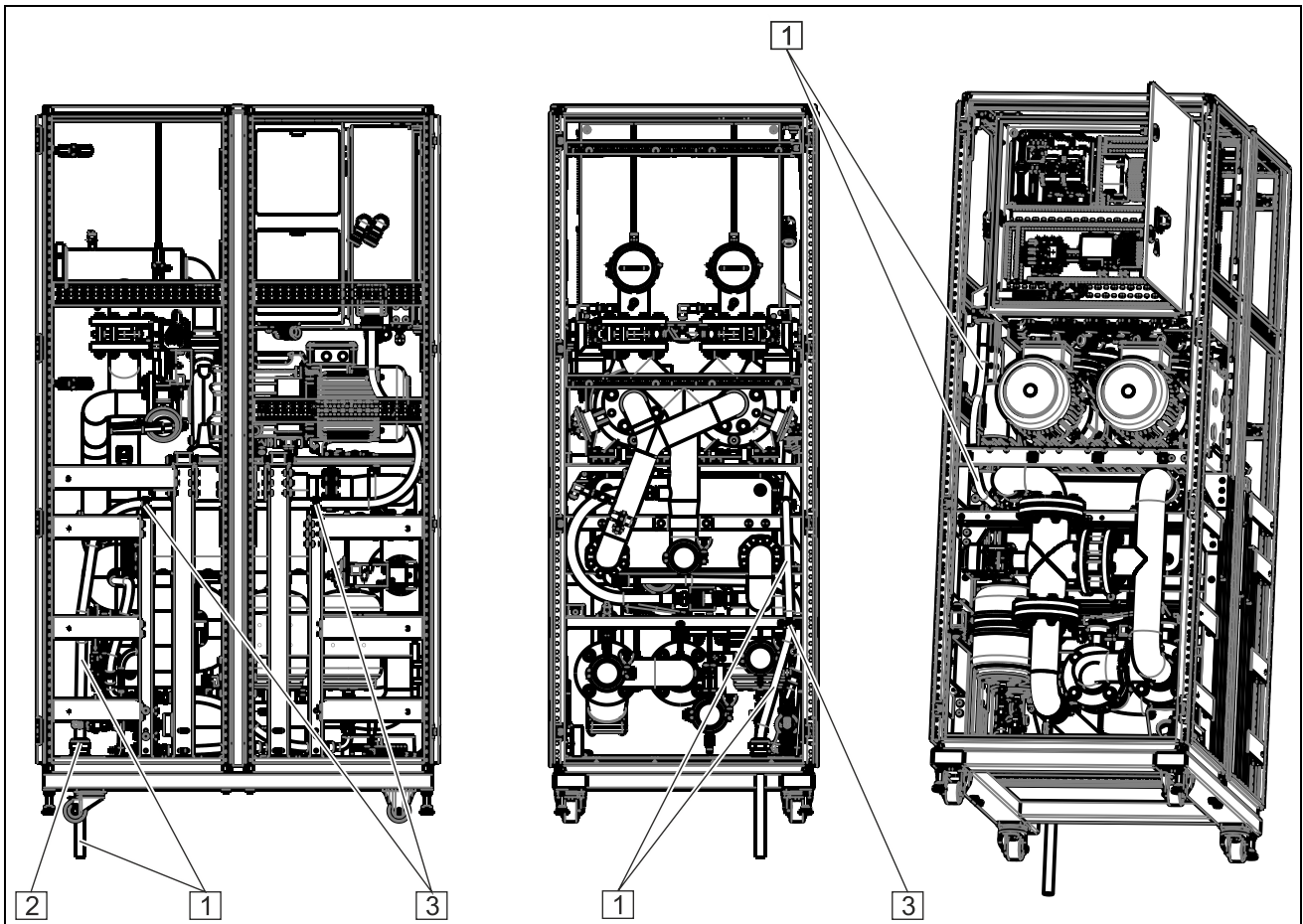


Fig. 11: Positioning of the wire

4. Lay the cable (1) in such a way (see figure below) that the cable (1) will not be damaged if the control cabinet (4) is pivoted.

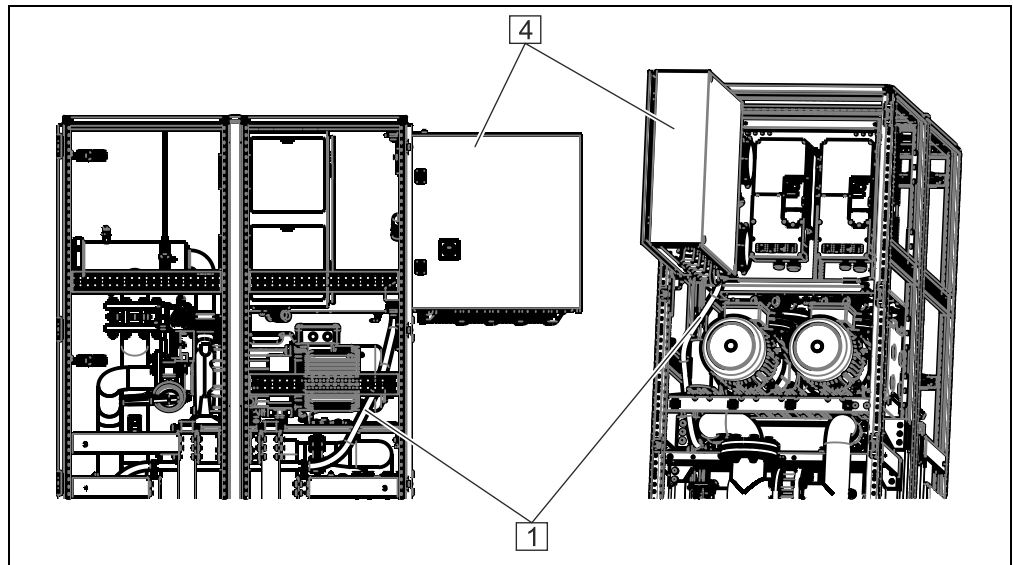


Fig. 12: Positioning of the wire for pivoted control cabinet

5. Open control cabinet (4).
6. Insert customer wire (1) from below through the cable gland (5) at the control cabinet (4).
7. Carefully guide the customer wire (1) through the control cabinet (4) and prepare it for connecting.

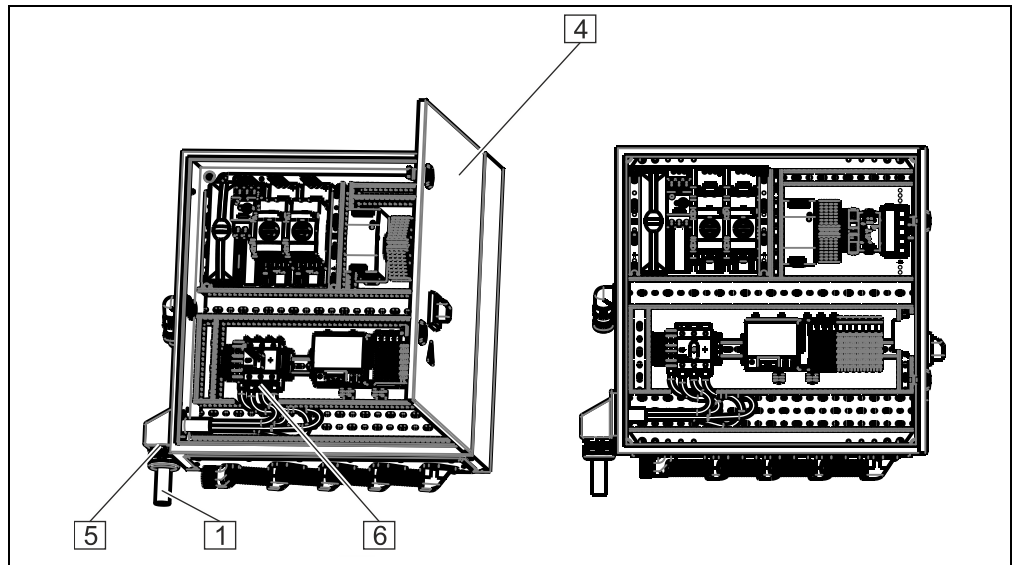


Fig. 13: Connecting the main switch

NOTICE

Danger of damage to unit components due to incorrect rotating field!

Even short-term operation of the unit with an incorrect rotating field can lead to considerable damage to the unit components.

Check the electrical rotating field of the power supply connection for correctness prior to setting up the unit.

There is no warranty for damages caused by operating the unit with an incorrect rotating field.

8. Connect customer wire (1) to the main switch (6) (1Q1) according to wiring diagram.
9. Connect protective conductor (7) (X1:PE) according to wiring diagram.

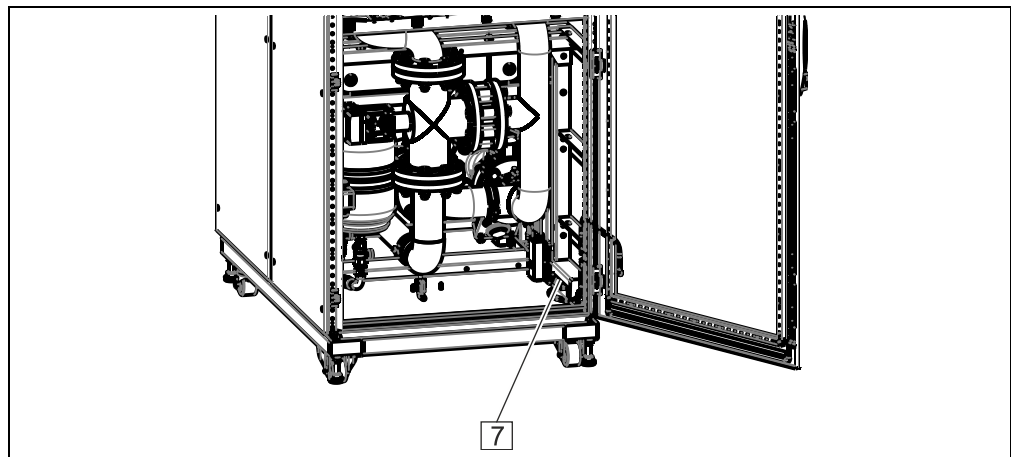


Fig. 14: Connecting protective conductor

9.6 Filling

⚠ WARNING

Health hazard!

The use of chemicals can present a health hazard.

- When handling chemicals, always wear protective gloves, eyewear, and clothing.
 - Observe the safety data sheets.
-

NOTICE

Damage through dirt particles!

Dirt particles in customer-provided installations (e.g. pipes, hoses, ...) may lead to malfunctions or damage to the components or unit/system.

- Ensure that the customer-provided installations (e.g. pipes, hoses, ...) are free from dirt particles.
- If necessary, clean, rinse, or flush the customer-provided installations.

Damage to components!

Damage to the pump due to dry operation. Never start the unit when it is not, or only insufficiently, filled.

NOTE

Optimum water quality for filling: information can be found in the “Technical Data” section.

9.6.1 Antifreeze and anticorrosion agents

In order to protect the components against corrosion and frost damage, the system circuit must be filled with an anti-corrosion and anti-freezing agent.

NOTE

Frost damage can be caused by the following factors:

- contaminants in the circuits
 - pump fault
 - air in the system (this applies only to units with a closed circuit)
-

NOTICE

Risk of damage to components!

If the concentration of the anti-corrosion or anti-freeze agents in the system circuit is too high or too low, components may be damaged (e.g. the seals). If the concentration is too low, corrosion may be stimulated.

When using anti-corrosion or antifreeze agents, please comply with the information provided by the manufacturers concerning the area of application, compatibility with other materials, and minimum/maximum mixing ratios, etc.

When using monoethylene glycol as the anti-corrosion and antifreeze agent, please observe the following points:

- Do not mix anti-corrosion and antifreeze agents of different manufacturers. Document the name and type of the anti-corrosion and antifreeze agent that is used.
- For filling the system circuit with anti-corrosion and antifreeze agents, we recommend mixing the liquids in advance in a separate tank (please refer to the "Technical data" section for information concerning the quantities).
- Comply with the concentration that is specified in the information provided by the manufacturer (e.g. in the technical data sheet).
- Comply with the information given on the manufacturer's material safety data sheet.

NOTE

- Refer to the specification of the manufacturer!
 - See the "Technical data" section.
 - The anti-freezing agent concentration must be adapted to the conditions on site (climate zone, ambient temperature).
-



Note concerning the protection of the environment

The excessive use of antifreeze and corrosion inhibitors places a burden on the environment.

- Use environmentally friendly anti-freeze and corrosion inhibitors.
- Do not spill anti-freeze and corrosion inhibitors into the soil.
- Keep containers tightly closed. Ensure to close empty containers and those that are currently being used after the work is finished.
- Used antifreeze and corrosion inhibitors must be disposed of in an environmentally responsible way and compliant with local and national regulations.

9.6.2 Primary circuit

Fill the primary circuit with the medium as per the "Technical data" section via the "Prim. IN/OUT" connectors and the customer-provided medium supply system.

Vent the system thoroughly during the filling process. To do this, open all shut-off valves or butterfly valves.

NOTE

Filling pressure and cooling medium temperature (see the "Technical data" section).

9.6.3 Secondary circuit

9.6.3.1 Using internal fill pump

When starting the unit for the first time, fill the secondary circuit with fluid as per the "Technical data" section.

NOTE

Ensure that the following conditions are met during the filling process:

- Use clean tools and personal protective clothing.
- Use clean auxiliary devices (e.g. pail, container).

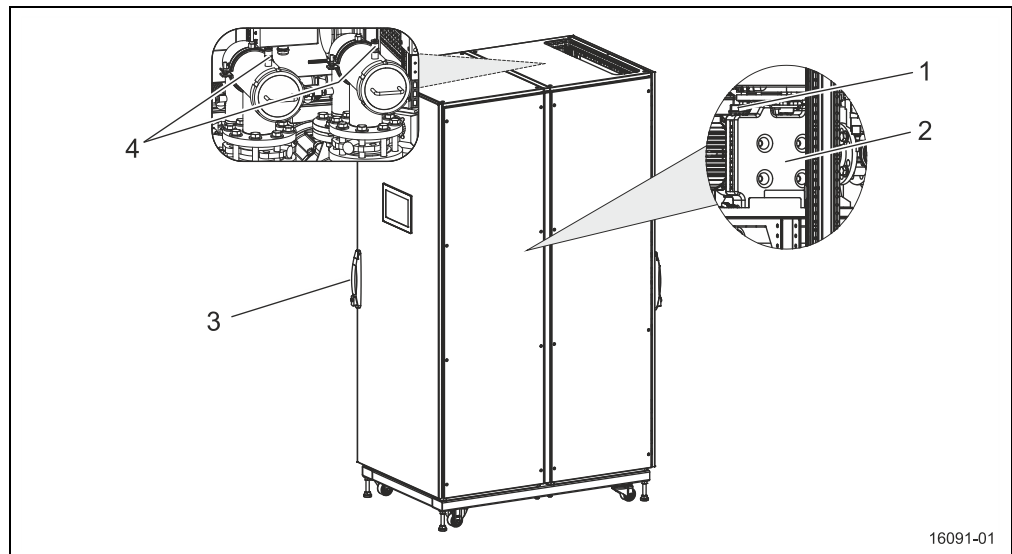


Fig. 15: Filling the secondary circuit

Perform the filling process as follows:

1. Open the lock (3) of the control cabinet.
2. Open all shut-off valves or butterfly valves.

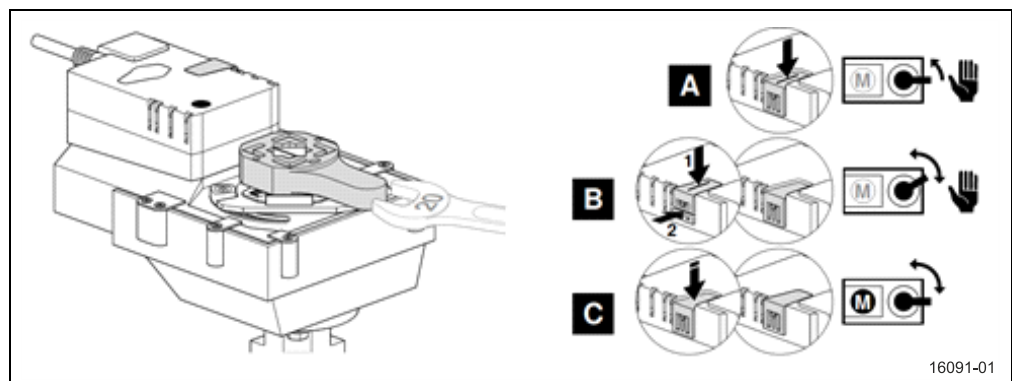


Fig. 16: Manual opening of the control valve

3. Open the electrical control valve manually to ensure proper venting of the system (see the illustration).

4. Remove the caps from the vent valve (4) and connect a venting hose with a threaded fitting.

NOTE

Collect any escaping cooling medium in a suitable container.

5. After filling, disconnect the venting hose and refit the caps to the vent valve (4).
6. Unscrew the cover (1) of the tank (2) and fill the tank up to the "Max." mark.

NOTE

When starting or filling the unit for the first time, proceed as follows:

- Remove the tank from the device. To do this, disconnect the quick coupling and the connector from the float switch.
 - Fill the tank up to the "Max." mark and reconnect.
 - Do not install the quick coupling.
 - Remove the hose from the quick coupling and insert it into a customer-provided container with a premixed water/glycol or water/anti-corrosion agent mixture.
 - Switch the unit on and activate the automatic filling function via the control unit. The filling pump withdraws the mixture from the container.
 - After 60 seconds, the pump will stop automatically. Acknowledge the fault via the control unit. Then, the pump will restart.
 - If the pump does not draw in any liquid when it is initially activated, prefill the hose.
 - Fill the secondary circuit until the necessary filling pressure is reached.
 - Push the hose back into the quick coupling.
-

7. Switch the pumps on (secondary circuit) via the control unit. Let them run for approximately one minute. Then, switch them off.
8. **Open and then close all possible venting points of the system. After approximately ten minutes, open and close all possible venting points again. Then, switch the pump on, let it run for one minute and then switch it off. Repeat these venting steps several times.**

NOTE

If the secondary circuit has been filled via the drain connection, the filling pump will not aspirate.

In this case, remove the pressure hose of the filling pump and insert it into a container with a premixed water/glycol or water/anti-corrosion agent mixture.

Switch the filling pump on briefly and then off again. Then, reinstall the pressure hose of the filling pump.

9.6.3.2 Using alternative filling procedure

1. Fill reservoir (1) with coolant. (ref. image below)

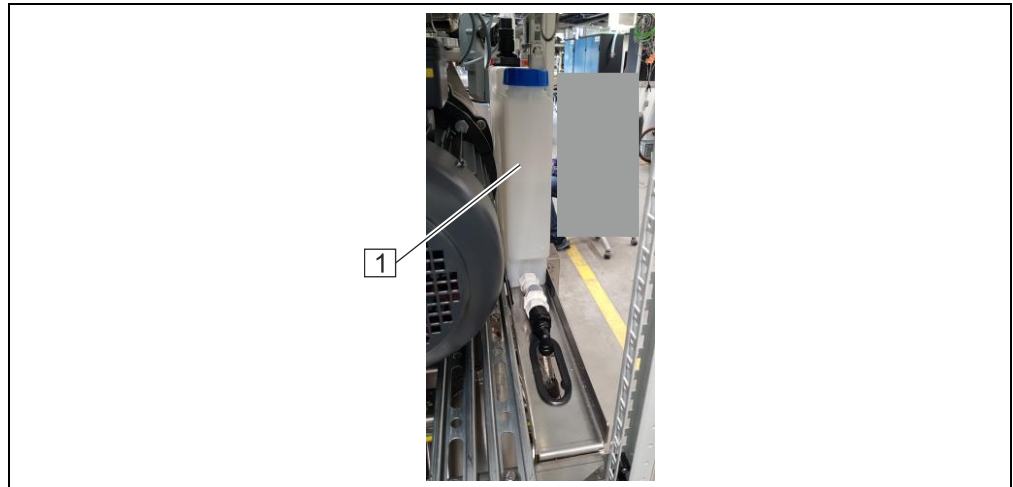


Abb. 17: Reservoir

2. Disconnect coupling (2) from reservoir (1). (ref. image below)

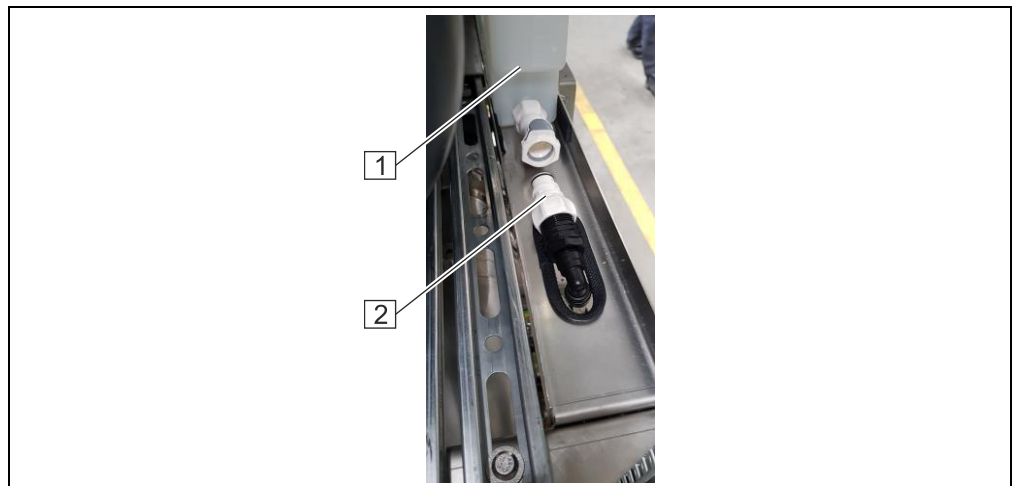


Abb. 18: Reservoir with coupling

3. Remove coupling (2) from the hose (3). (ref. image below)

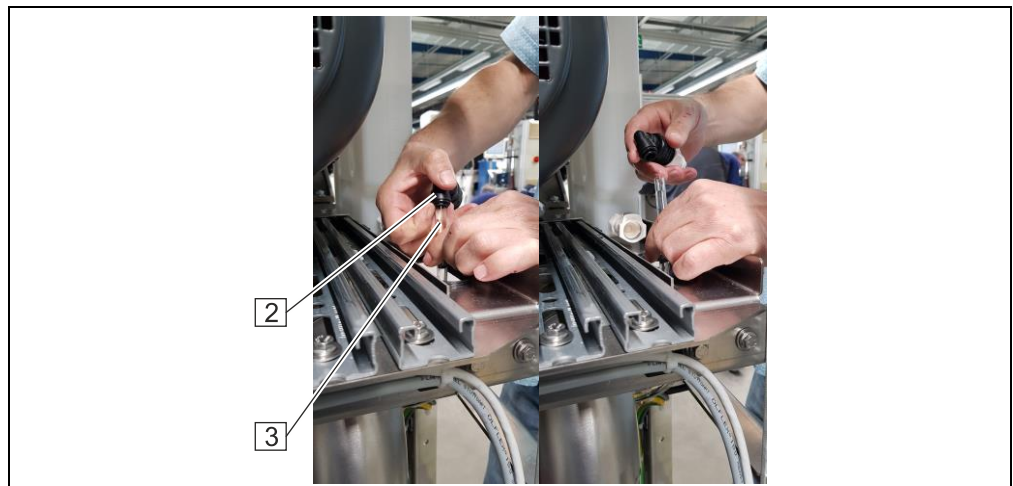


Abb. 19: Coupling and hose

- Put hose (3) into the tank (4) with coolant. (ref. image below)

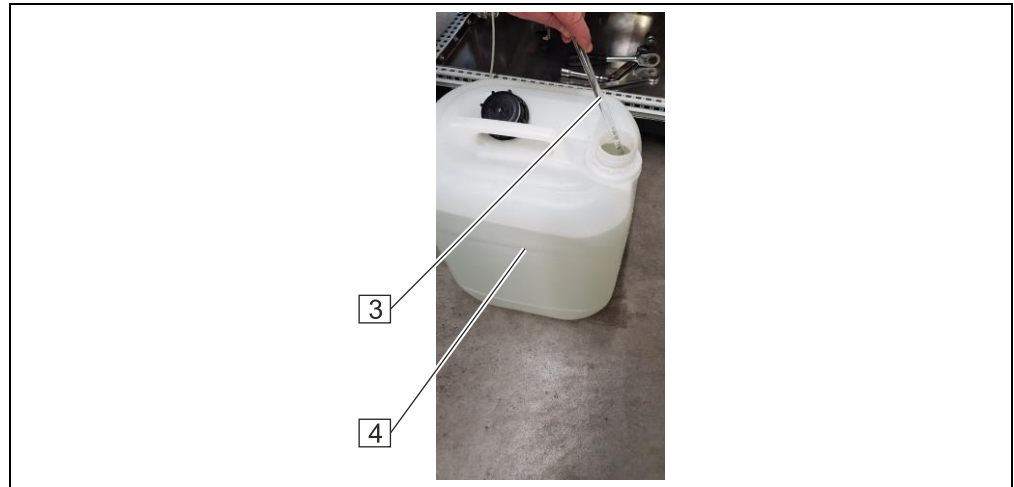


Abb. 20: Tank with coolant

- Start pump.
- Run pump until the the tank (4) is empty.
- Stop pump.
- Continue with another tank (4), if necessary.
- Remove hose (3) from the tank (4).
- Connect coupling (2) to the hose (3). (ref. image below)

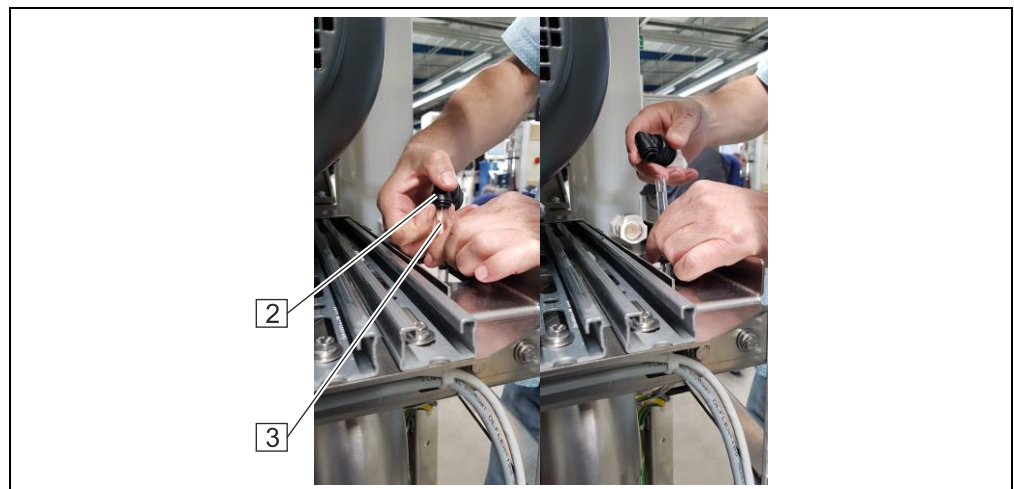


Abb. 21: Coupling and hose

11. Connect coupling (2) to reservoir (1). (ref. image below)

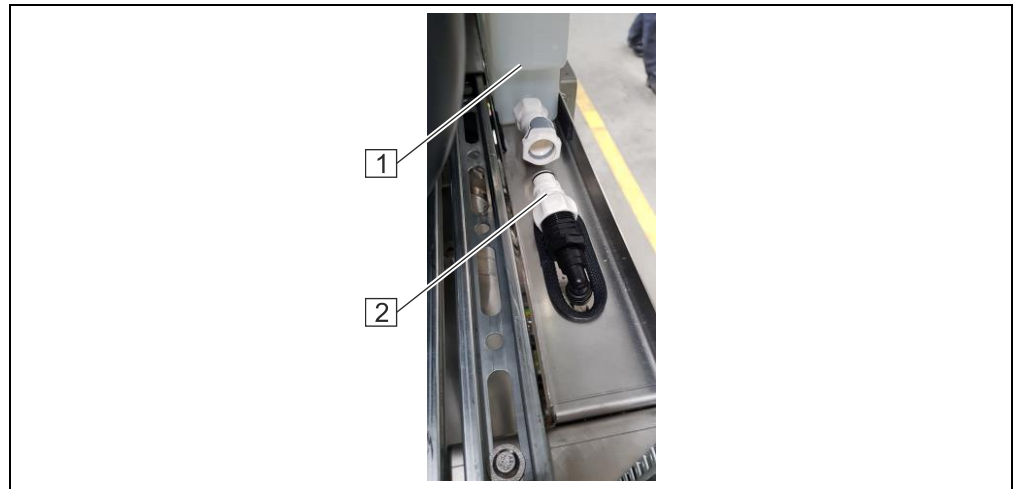


Abb. 22: Reservoir with coupling

9.6.3.3 Using external fill kit

Pre-fill requirements

1. Determine total system volume to be filled accounting for the CDU as well as the customer supplied items (hoses, piping, manifolds, etc...)

NOTE

Estimated system volume of the secondary loop on the CDU800 is 100 l (26.4 Gal)

2. Prepare fill kit or external filling device with enough coolant to meet the requirement identified in the previous step
3. Confirm system has been fully installed (i.e. all plumbing has been attached, electrical connections have been completed, etc.)

Critical component identification

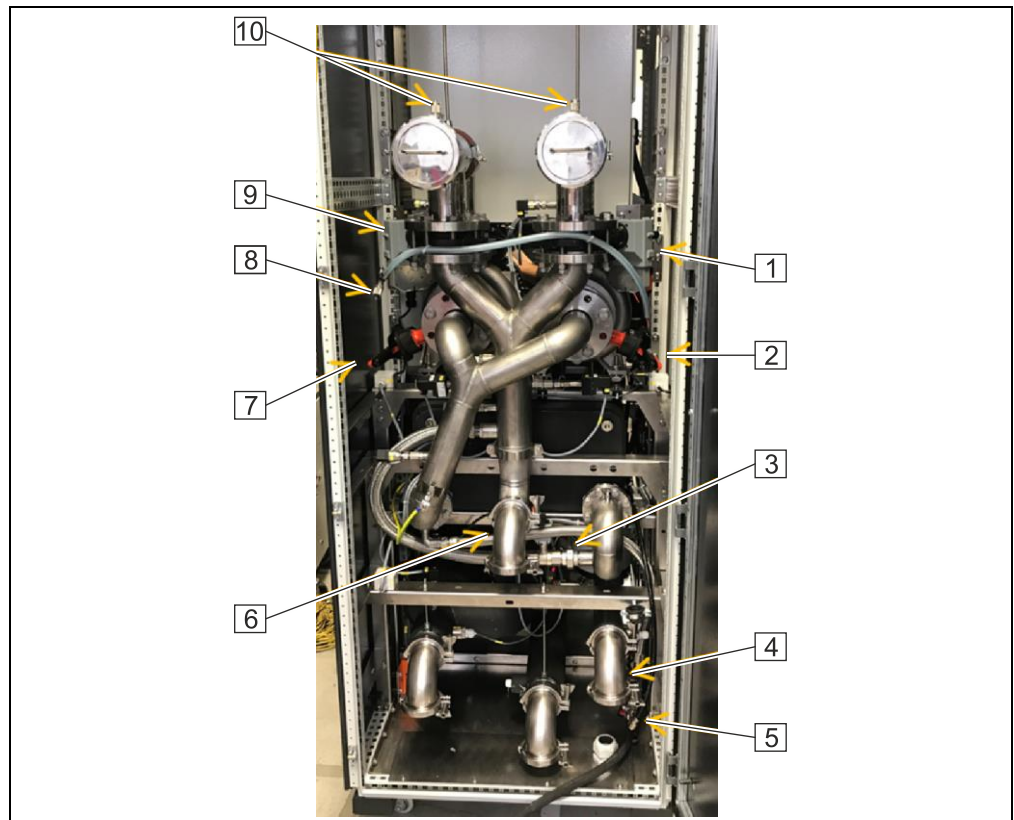


Abb. 23: RackChiller CDU800 critical components

- | | | | |
|---|------------------------|----|-------------------|
| 1 | Pump outlet valve | 6 | Secondary supply |
| 2 | Pump inlet valve | 7 | Pump inlet valve |
| 3 | Secondary bypass valve | 8 | Purge hose |
| 4 | Secondary return | 9 | Pump outlet valve |
| 5 | Drain/fill port | 10 | Air purge port |

Fill and purge procedure

1. Connect supply hose (1) from filling system to the drain/fill port (2) of the CDU and open the ball valve.

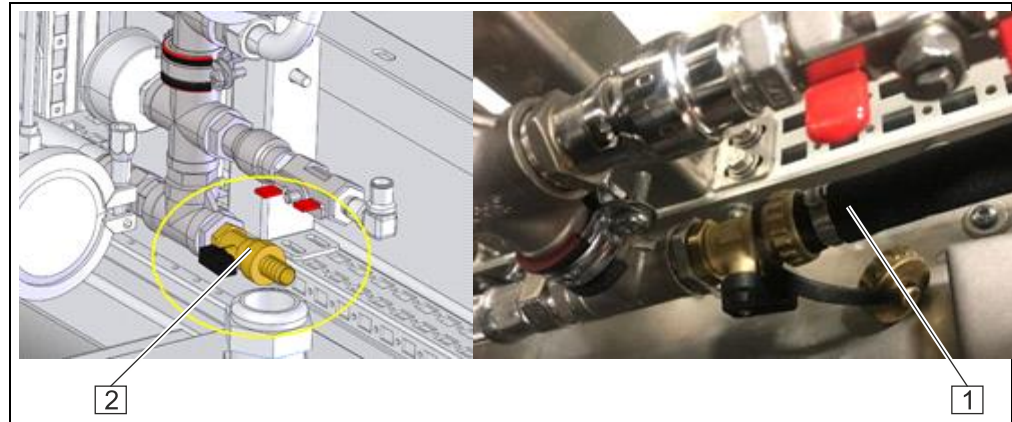


Abb. 24: Supply hose and drain/fill port

2. Manually open the pump outlet valves by depressing the manual override button (3) and rotating the valve handle (4). (ref. image below)

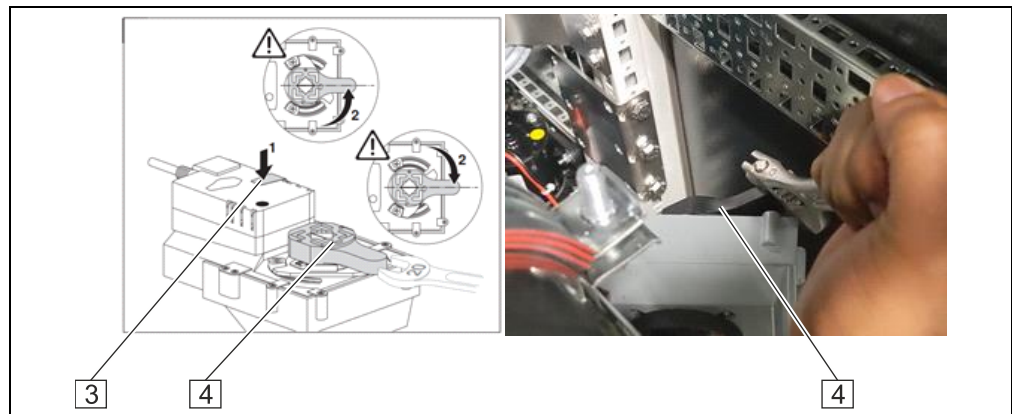


Abb. 25: Manual override button and valve handle pump outlet valves

3. Manually open the secondary bypass valve by depressing the manual override button (5) and rotating the valve handle (6). (ref. image below)

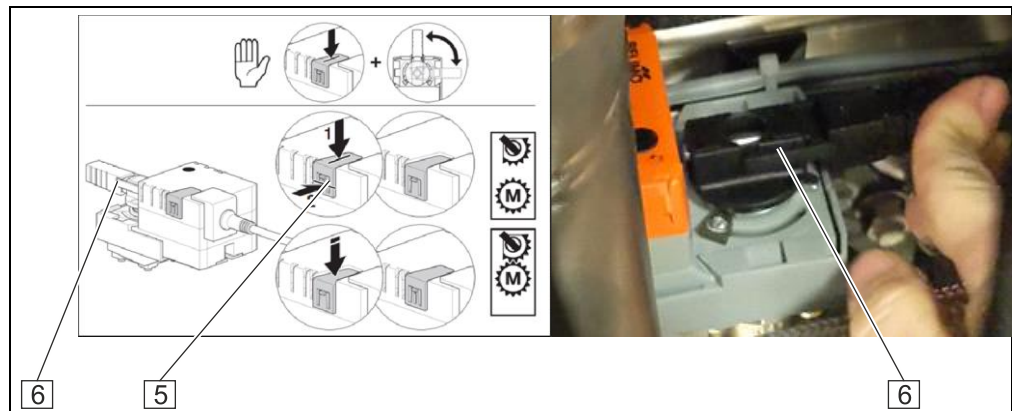


Abb. 26: Manual override button and valve handle secondary bypass valve

4. Verify pump inlet valves (7) are open. (ref. image below)

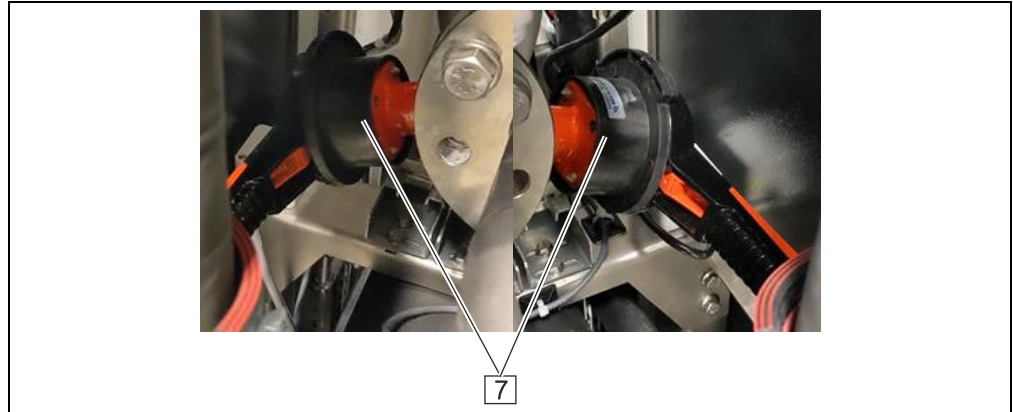


Abb. 27: Pump inlet valves

5. Disconnect sensor cable (10) and QD (9) from reservoir (8), then remove reservoir (8) from unit. (ref. image below)

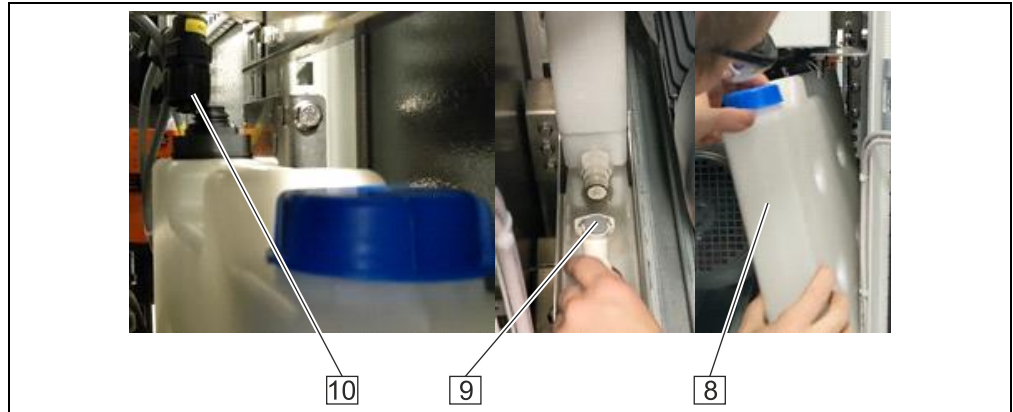


Abb. 28: Reservoir

6. Fill reservoir (8) with coolant then re-install in the unit.
7. Attach purge lines (12) to both purge ports (11). (ref. image below)

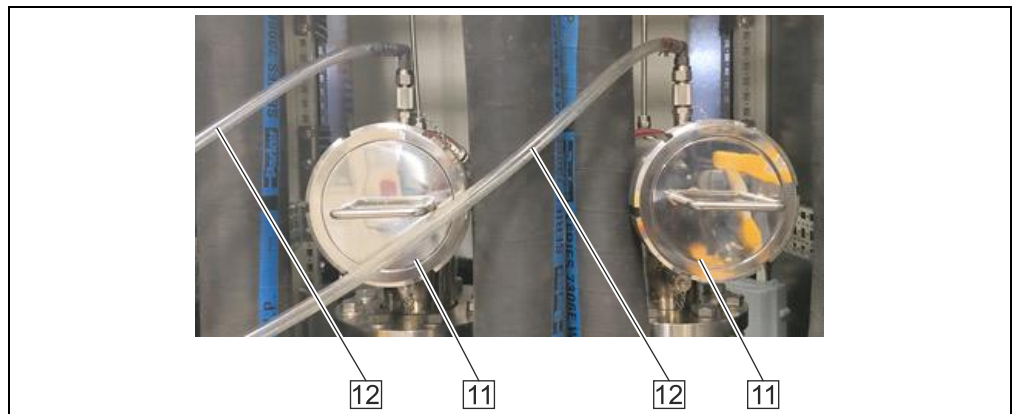


Abb. 29: Purge lines/ports

8. Verify fill hose is connected to the fill/drain valve and that the valve is open.
9. Route the purge lines back to the tank, drain, etc.
10. Start the pump on the fill kit and wait for both purge lines to fill with a solid stream of coolant and become clear of air bubbles. (ref. image below)

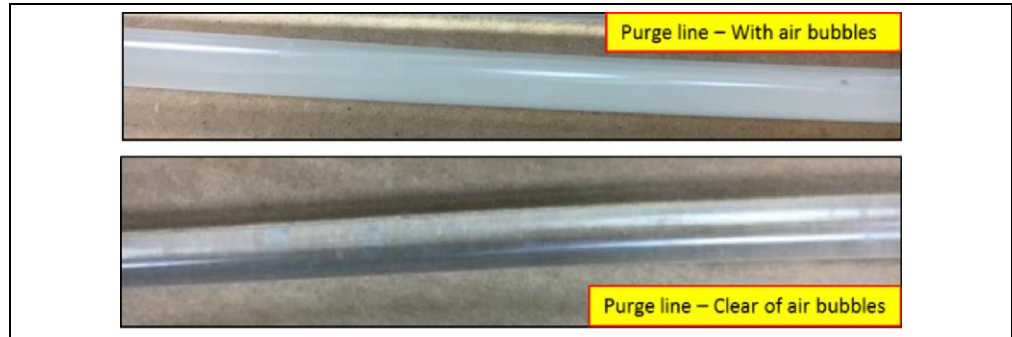


Abb. 30: Purge lines

11. Once purge lines are clear, turn on the unit's main power switch and set the unit to dual pump mode.
12. Set unit to flow control mode and set flow target to minimal value (i.e. 200LPM). (ref. image below)

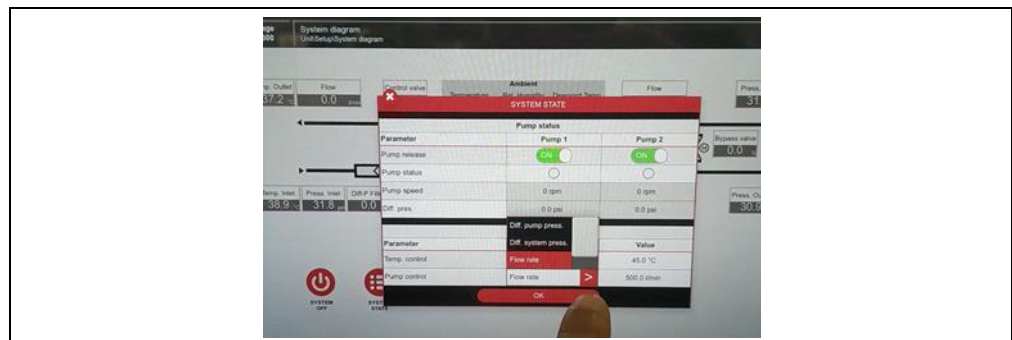


Abb. 31: Control panel

13. Turn on the system and wait for all the air to be driven out and the purge lines to clear.

NOTE

Fill tool pump and CDU800 pumps should all be running.

14. Prime the CDU800 internal fill pump as follows:
 - Disconnect plastic fill line from the QD elbow and insert into tank/container of coolant.
 - Briefly turn the fill pump on and then off again.
 - Reconnect the plastic fill line to the QD elbow (ref. image below)

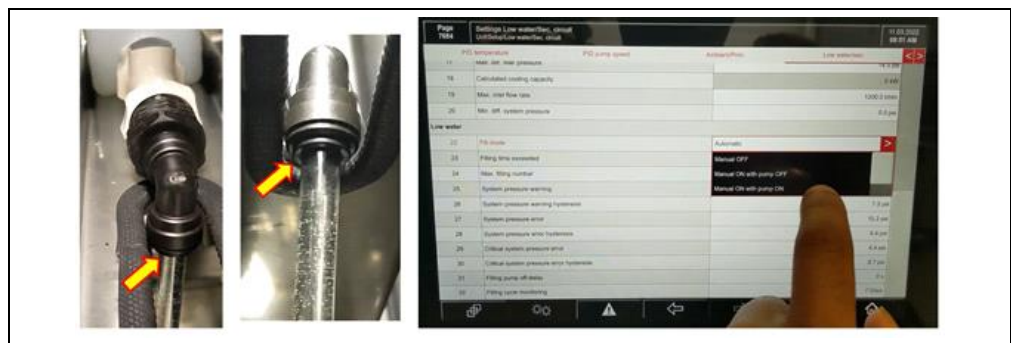


Abb. 32: Fill line

15. Once purge lines are clear, turn off the system and remove the purge lines and store in unit.
16. Adjust system static pressure to desired value.
17. Close the fill/drain valve.
18. Stop the fill kit pump.
19. Release manual override button (13) on the pump outlet valves and the secondary bypass valve. (ref. image below)

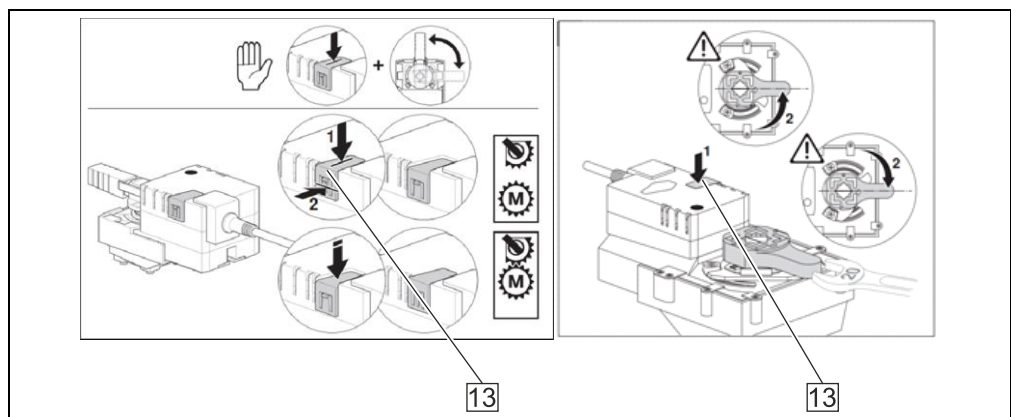


Abb. 33: Bypass valves

20. Disconnect fill hose

9.7 Venting of closed circuits

In order to ensure the correct operation and operational reliability of the closed circuits, vent the entire system thoroughly during the start-up phase.

NOTICE

Risk of damage to the components!

Insufficient venting may damage the unit.

If venting at the highest point is not possible, there is a risk that air remains entrapped in the system.

As a result, the pumps may run dry.

We recommend installing a venting device (vent valve) at the highest point of the system.

NOTE

Foam may form inside the system during start-up. This is due to the additives (glycol, anti-corrosion agents, etc.). This foam has a tendency to entrap air bubbles in the circuit, which subsequently cannot escape.

This is why venting must be repeated for a certain period of time (if necessary for several days) depending on the specific situation on site. See also the "Filling process/Secondary circuit" chapter.

9.8 Final steps after start-up

Prior to using the unit/system, it must be absolutely ensured that there are no safety-critical defects or malfunctions. After the completion of the tasks and prior to switching the unit/system on, comply with the following (if applicable):

- Ensure that any safety devices, guards and covers which were removed prior to commencing the tasks have been properly reinstalled.
- Ensure that the area around the unit/system is free from tools, materials or other pieces of equipment that had to be used.
- Clean the workspace and remove any liquid spills or similar substances.
- Check whether the safety devices and guards of the unit/system operate correctly.

10 Operation

10.1 Notes

The following must be observed in order to avoid injuries and damage to property:

- Only qualified personnel are authorised to perform these tasks.
- Comply with the information given in the "Safety" section.

⚠ WARNING

Working on the unit/with the system may be hazardous to your health!

Failure to wear personal protective equipment while working on the unit/with the system may cause serious injuries or death.

Wearing personal protective equipment as specified by the company, e.g., hearing protection, eye protection, safety shoes, helmet, protective clothing, safety gloves, and respiratory protective equipment, is mandatory.

NOTE

Check proper condition of unit before switching it on. Please comply with the instructions given in the "Maintenance" section.

NOTE

Use the unit only if the housing panels are installed.

Fault messages are displayed on the control unit.

10.2 Adjustments

Unit

- Check the shut-off valves and open them, if necessary.

Switching the unit on:



1. Use the maintenance switch to turn on the device.

NOTE

Check the direction of rotation of the pump(s) only during the initial commissioning of the system.

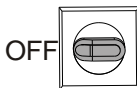
NOTE

There is a white mark on the impeller of the pump(s). It indicates the direction of rotation. The pump must turn clockwise.

The unit now operates completely automatically and supplies the peripheral units with chilling medium.

Fault messages are displayed on the control unit.

Switching the unit off:



1. Switch the unit off via the maintenance switch.

10.2.1 Low water level

If the water level is too low, the control unit will display a fault message. The low water level can be remedied by adding water to the tank without having to stop the system. After the elimination of the low water level fault, the fault message is cleared from the control unit.

NOTE

If the low water level problem is not eliminated within a preset warning period, the fault message must be acknowledged via the control unit following the elimination of the problem.

10.3 Control unit

10.3.1 Selection and adjustment of values

This manual includes information for the instructed operating personnel about the software that is used.

NOTICE

Damage to the unit!

The unit function cannot be ensured if the system configuration is tampered with. The values set at delivery are basic settings and may only be changed after consultation with the customer service.

Hard or pointed objects will damage the screen surface!

The screen cannot be used properly if it is scratched.

- Do not use any hard or pointed objects on the screen.
- If necessary, clean the screen using a damp cloth. Do not use any aggressive chemicals.

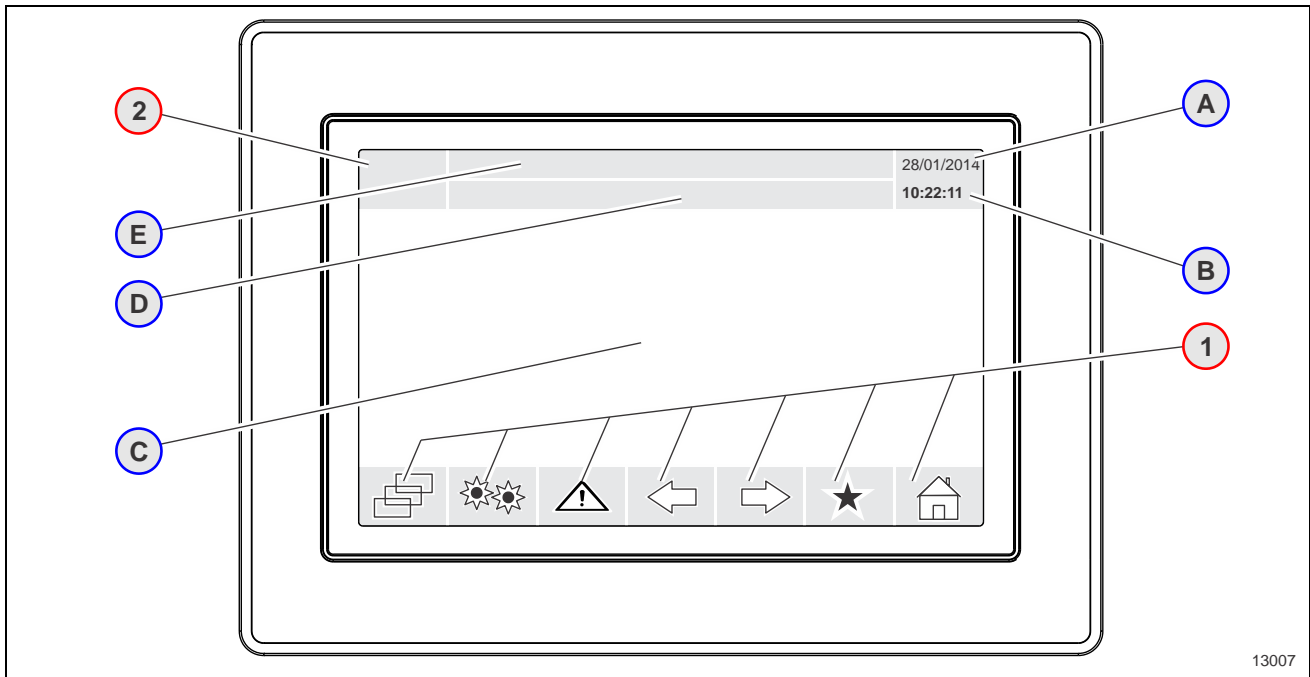
Parameters, setpoints and limits as well as unit-specific data can be selected and adjusted by touching the associated fields.

1

Numbered fields with a red frame indicate that the operator needs to execute a function.

A

Fields with letters and a blue frame are used to explain the screen elements.



13007

Fig. 34: Touchscreen

- 1 Menu bar
- 2 Button for the selection and viewing of the page number

- A Indication of the date
- B Indication of the time
- C Touchscreen
- D Indication of the screen path
- E Status line and indication of the current screen name

10.4 Password protection


When unit-specific data are changed, the user is prompted to enter a password.

NOTE

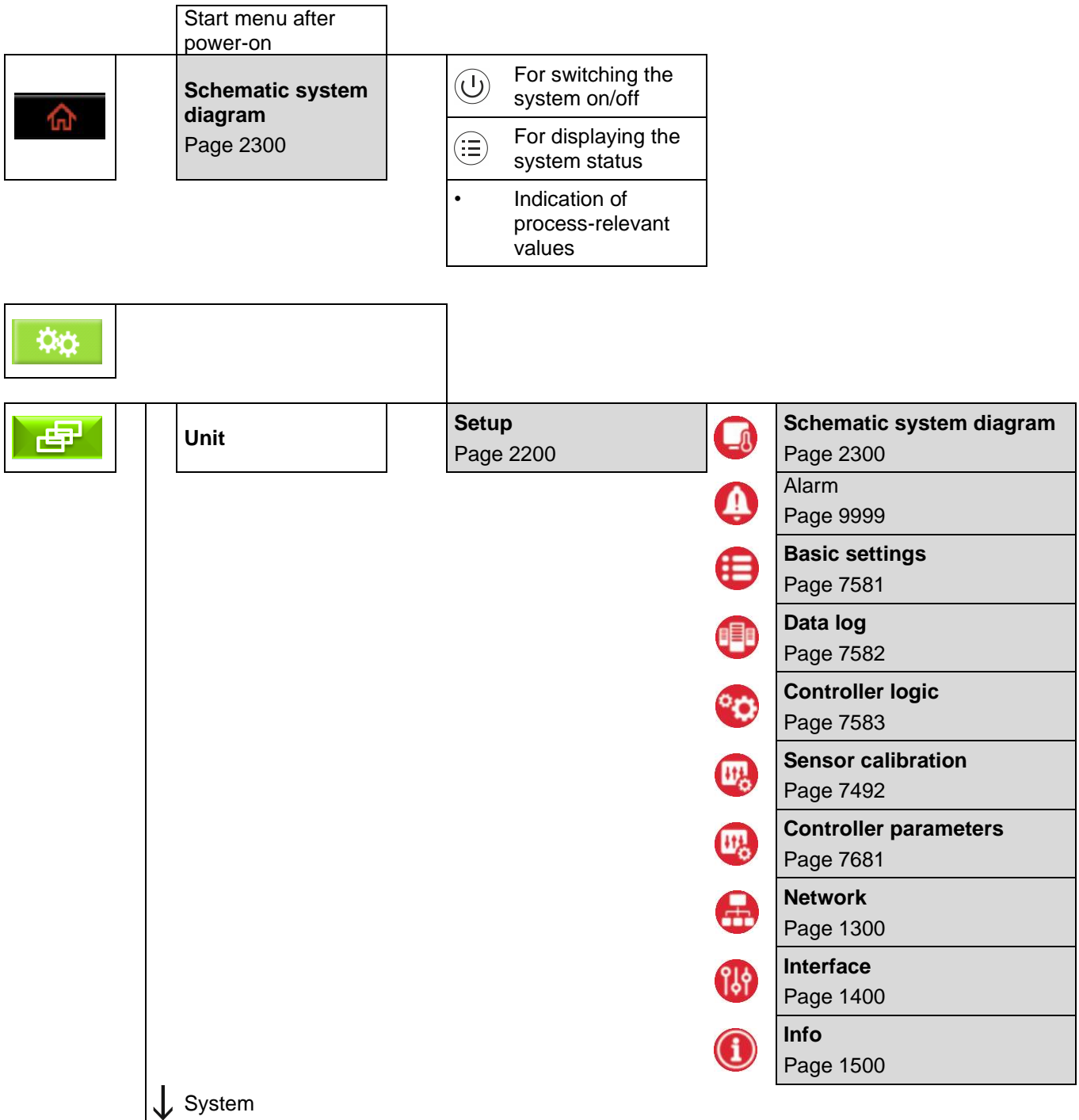
- The password levels 1 and 2 are preset and can be changed, if necessary.
 - Password for password level 1 = 3 1
Password level 1 is intended for users with extended access rights.
 - Password for password level 2 = 4 3 2 1
Password level 2 is intended for set-up and service personnel.

Password level 3 is exclusively reserved for nVent service technicians.

- The required level will be displayed during the password enquiry. When a higher level is entered, the lower levels will also be enabled automatically.
- If no changes are made within a preset period of time, the password must be entered again.

	<p>Password protection active. Password-protected fields cannot be edited.</p> <ul style="list-style-type: none">• Tap the button to open a window for entering the password.• Press the Enter key to confirm (the password) or the ESC key to cancel the action.• The required password level is shown inside the padlock.
------------------------------------------------------------------------------------	-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------

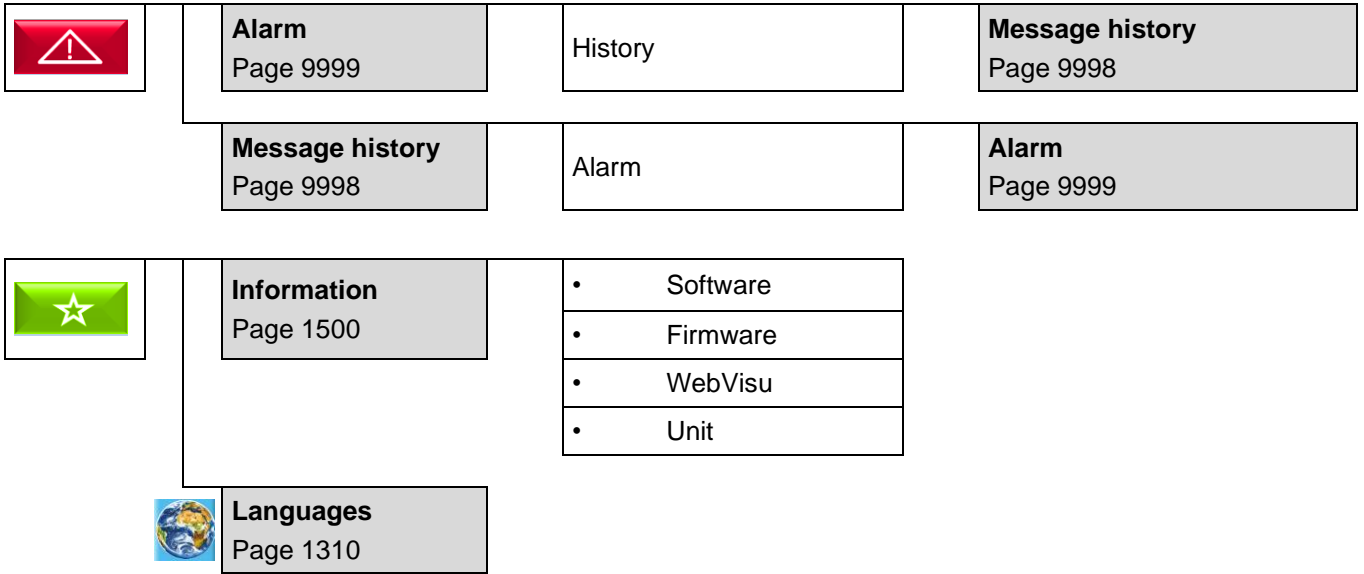
10.5 Program overview



... continued



System	Screen cleaning Page 4200
Interfaces	Customer Page 1400
	TTSIM Page 3100
	IPv6 Page 3200
	FU 1 Page 3300
	SNMPv3 Page 3400
Settings Page 1300	<ul style="list-style-type: none"> • IP address • Language • Save • Time • Password • Unit
Information Page 1500	<ul style="list-style-type: none"> • Software • Firmware • WebVisu • Unit
Diagnosis	Hardware Page 1540
	SDM Page 1110



10.6 Screen contents and descriptions

10.6.1 Direct selection

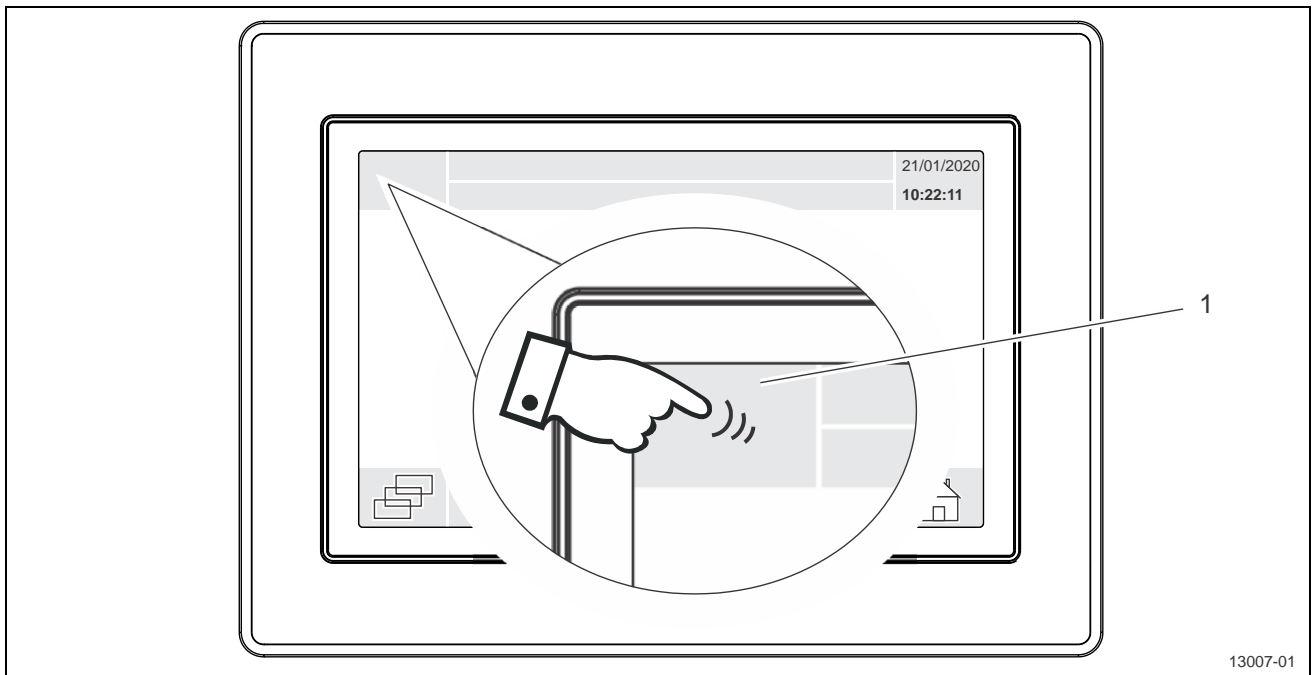


Fig. 35: Touchscreen

Open the desired page as follows:

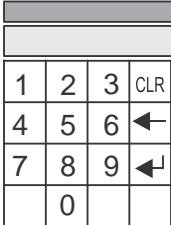
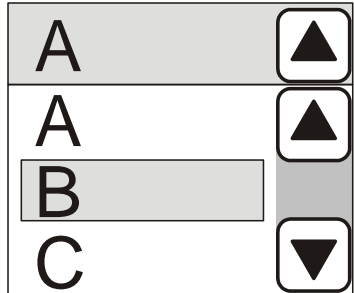
1. Tap the button (1).

NOTE

A window for entering the page number opens.

2. Enter the page number.
3. Press the Enter key to confirm the entry or press the ESC key to cancel the action.

10.6.2 General functions/symbols

Screen contents:	Description
	<p>Values can be changed as follows:</p> <ol style="list-style-type: none"> 1. After a value has been selected, a window for entering data opens. 2. Enter the new value. 3. Press Enter to confirm. The process can be aborted by clicking outside of the window.
	<p>To change the settings on the list, proceed as follows:</p> <ol style="list-style-type: none"> 1. Select a parameter from the list. Tapping the parameter will open a window for the selection. 2. If necessary, expand the selection window by way of the down key. 3. Select the parameter. Following the selection of the parameter, the window will be closed and the parameter will be included in the list.

10.6.3 Page 1300, Settings




/ Unit / Setup /






Network

- Network settings (IP address)
- Selection of the desired language
- Saving/loading of settings
- Setting of date and time
- Indication and changing of password levels
- Indication and adjustment of physical units

Screen contents:	Description
IP address	
DHCP active <input checked="" type="checkbox"/>	DHCP enabled
(Dynamic Host Configuration Protocol) <input type="checkbox"/>	DHCP not enabled
IP address	Setting of the IP address
Subnet mask	Setting of the subnet mask
Gateway address	Setting of the gateway address
Save	Button for saving the settings.
Device node number: Node number	<p>Indication of the node number of the unit</p> <p>Damage to the unit! If the system configuration is changed without authorisation, the correct operation of the unit can no longer be guaranteed. The factory settings concerning the system configuration are default settings and must not be changed unless approved by the customer service department.</p> <p>Note Settings only become effective after a restart.</p>
Language	
Example: German English	<p>Selection of the desired language from the list of available languages (e.g. English).</p> <p>Note The desired language can be selected by tapping the button. All the other pages will then also be displayed with the selected language.</p>

Screen contents:	Description
Save	
	<p>USB flash drive icon.</p> <p>In the event of a fault (e.g. no USB flash drive available), a corresponding message will be displayed (e.g. "Not available").</p>
Device settings	Device settings are saved or loaded to/from the CPU (processor).
Device settings to/from USB	Device settings are saved or loaded to/from the USB drive.
Default settings	Used to load default settings. Any customised settings will be lost.
Save	Button for saving the settings (e.g. device settings).
Load	Button for loading the setting (e.g. default settings).
Time	
<p>Time and date</p> <p>HH:MM:SS</p>	<p>Adjustment/setting of the time</p> <ul style="list-style-type: none"> • HH = hour • MM = minute • SS = second
YYYY/MM/DD	<p>Adjustment/setting of the date</p> <ul style="list-style-type: none"> • YYYY = year • MM = month • DD = day
SNTP synchronisation protocol	Activation/configuration of the SNTP synchronisation protocol (Simple Network Time Protocol) by qualified personnel (e.g. service technician/setup personnel).

Screen contents:	Description
Password	
Password level x	Password protection for password level x is not activated.
Password level x 	Password protection for password level x is activated. Tapping the field opens a window for entering the required password level. Enter the password level and tap Enter to confirm. The password protection will be disabled after a correct entry.
***	Button for changing the existing password level. Prerequisites: The password level is not activated. Tapping the field opens a window for entering the new password level. Enter the new password level and tap Enter to confirm.
	All password levels are activated.
	Button for the simultaneous activation of the password protection for all of the password levels.
	Further information can be found in the "Password protection" chapter.
Units	
	Setting of units (metric/Anglo-American).
Temperature [°C / °F]	Tapping the fields under "Indication of units" opens a window for selecting the unit. Select the desired unit. The process can be aborted by clicking outside of the window.
Pressure [bar / psi]	
Weight [kg / lb]	
Volume [l / gal]	
Length [m / inch]	
Volumetric flow rate [l/min / gal/min]	
Speed [km/h / mile/h]	

10.6.4 Page 1310 "Languages"



- Selection of the desired language

Screen contents:	Description
German English ...	Selection of the desired language from the list of available languages (e.g. English). Note The desired language can be selected by tapping the button. All the other pages will then also be displayed with the selected language.

10.6.5 Page 1402 "Communication parameters"



/ Unit / System / Interfaces / SNMPv3 /

Page	SNMPv3	22.10.2021
1402	System/Interfaces/SNMPv3	11:45 AM
Index	Parameter	Value
SNMP General		
2	MD5 Authentication	<input checked="" type="checkbox"/>
3	DES Encryption	<input type="checkbox"/>
4	Context Name	
SNMP Read Only Access		
6	SNMP User	admin12345
7	SNMP Authority	admin12345
8	SNMP Privacy	AdminPassw0rd
SNMP Read Write Access		
10	SNMP User	admin12345
11	SNMP Authority	admin12345
12	SNMP Privacy	AdminPassw0rd
13	IF2 SNMP Receive	8
14	IF2 SNMP Send	8
3 SNMP Counter		
16	IF3 SNMP Receive	12

Fig. 36: Page 1402 "Communication parameters" (example)

Screen contents:	Description
SNMP General	
MD5 Authentication	Activates MD5 authentication in SNMPv3-protocol. Default: 1
DES Encryption	Activates DES- Encryption in SNMPv3-protocol. If DES is activated, MD5 must be also activated. Default: 1
Context name	Enter "Context names" for SNMPv3-parameters for transmission.
SNMP Read Only Access	
SNMP User	Enter user name for SNMPv3-user with read only access (at least 10 characters, maximum 25 characters). Default: admin12345
SNMP Authority	Enter password for SNMPv3-user with read only access for MD5 Authentication (at least 10 characters, maximum 25 characters). Default: admin12345
SNMP Privacy	Enter password for SNMPv3-user with read only access for DES Encryption (at least 10 characters, maximum 25 characters). Default: AdminPassw0rd
SNMP Read Write Access	
SNMP User	Enter user name for SNMPv3-user with write access (at least 10 characters, maximum 25 characters). Default: admin12345
SNMP Authority	Enter password for SNMPv3-user with write access for MD5 Authentication (at least 10 characters, maximum 25 characters). Default: admin12345
SNMP Privacy	Enter password for SNMPv3-user with write access for DES Encryption (at least 10 characters, maximum 25 characters). Default: AdminPassw0rd
IF3 SNMP Counter	
IF2 Receive Counter	Counter for received items via IF2 interface (maximum 65535).
IF2 Send Counter	Counter for sent items via IF2 interface (maximum 65535).

10.6.6 Page 1500, Information



/ Unit / Setup /  Information



/ System / Information



/ Information

- Display of general information (e.g. software, firmware, WebVisu, unit)
- Indication of the manufacturer address

Screen contents:	Description
Software	Information about the software. For example: <ul style="list-style-type: none"> • Part number, version, date, name
Firmware	Information about the firmware. For example: <ul style="list-style-type: none"> • Part number, version, date, name
WebVisu	Information about WebVisu. For example: <ul style="list-style-type: none"> • Core, version, date, name
Unit	Information about the unit. For example: <ul style="list-style-type: none"> • Serial number
	Information about the manufacturer: <ul style="list-style-type: none"> • Address, telephone number











10.6.7 Page 2200 "Overview"



/ Setup



/ Unit / Setup

Screen contents:		Description
		When selected, the following pages will open:
SCHEMATIC SYSTEM DIAGRAM		Page 2300 Schematic system diagram
ALARM		Page 9999 Alarm
BASIC SETTINGS		Page 7581 General settings
DATA LOG		Page 7582 Data log settings
CONTROLLER LOGIC		Page 7583 Control settings
SENSOR CALIBRATION		Page 7492 Sensor adjustment
CONTROLLER PARAMETERS		Page 7681 Temperature PID settings
NETWORK		Page 1300 Network settings
INTERFACE		Page 1400 Customer interface
INFO		Page 1500 Information

10.6.8 Page 2300, schematic system diagram



- Start menu after power-on.

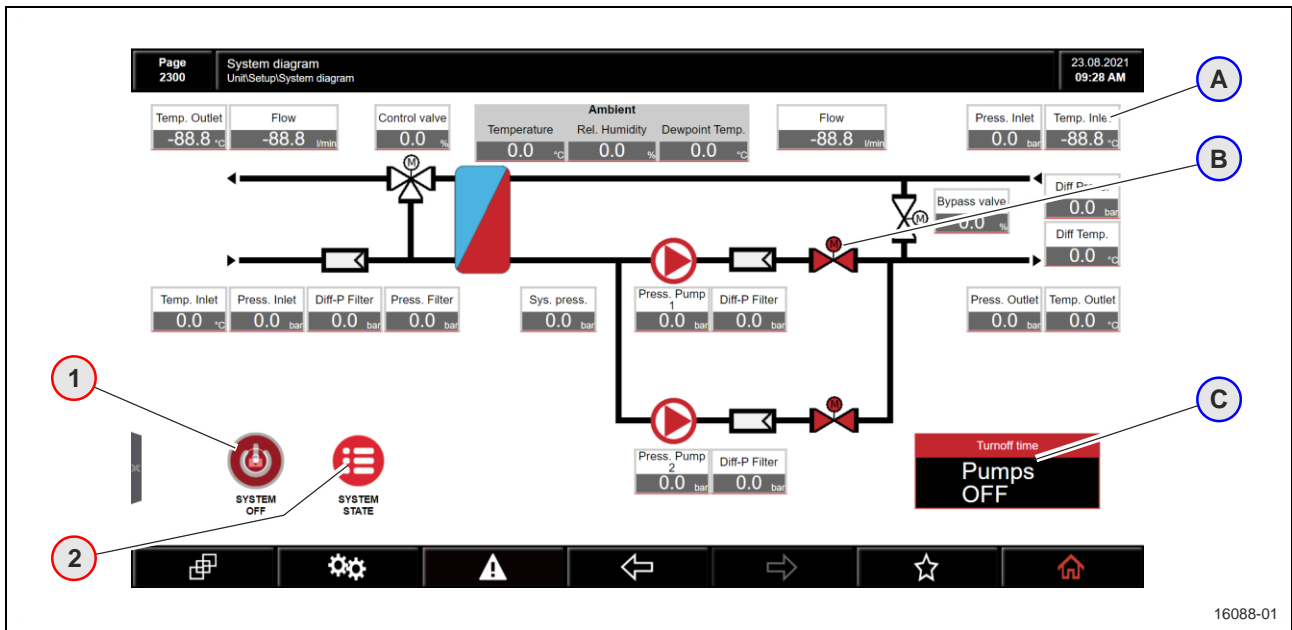


Fig. 37: Page 2300 "Schematic system diagram" (example)

- 1 Button for switching the system ON/OFF.
- Green: The system is on.
- Red: The system is off.

NOTE

When pressed, a window opens with a query whether the system should be switched on/off.

- 2 Button for displaying the system status (pump status, control system status. Refer to the following information.)

- A Display of process-relevant values (e.g. temperature, flow rate, ambient conditions, pressure, valve opening degree)
- B Status of process-relevant components
 - Red: Fault
 - Yellow: Warning
 - Green: Component active
 - White: Component inactive
- C Display of the pump turn-off time, status of the pumps

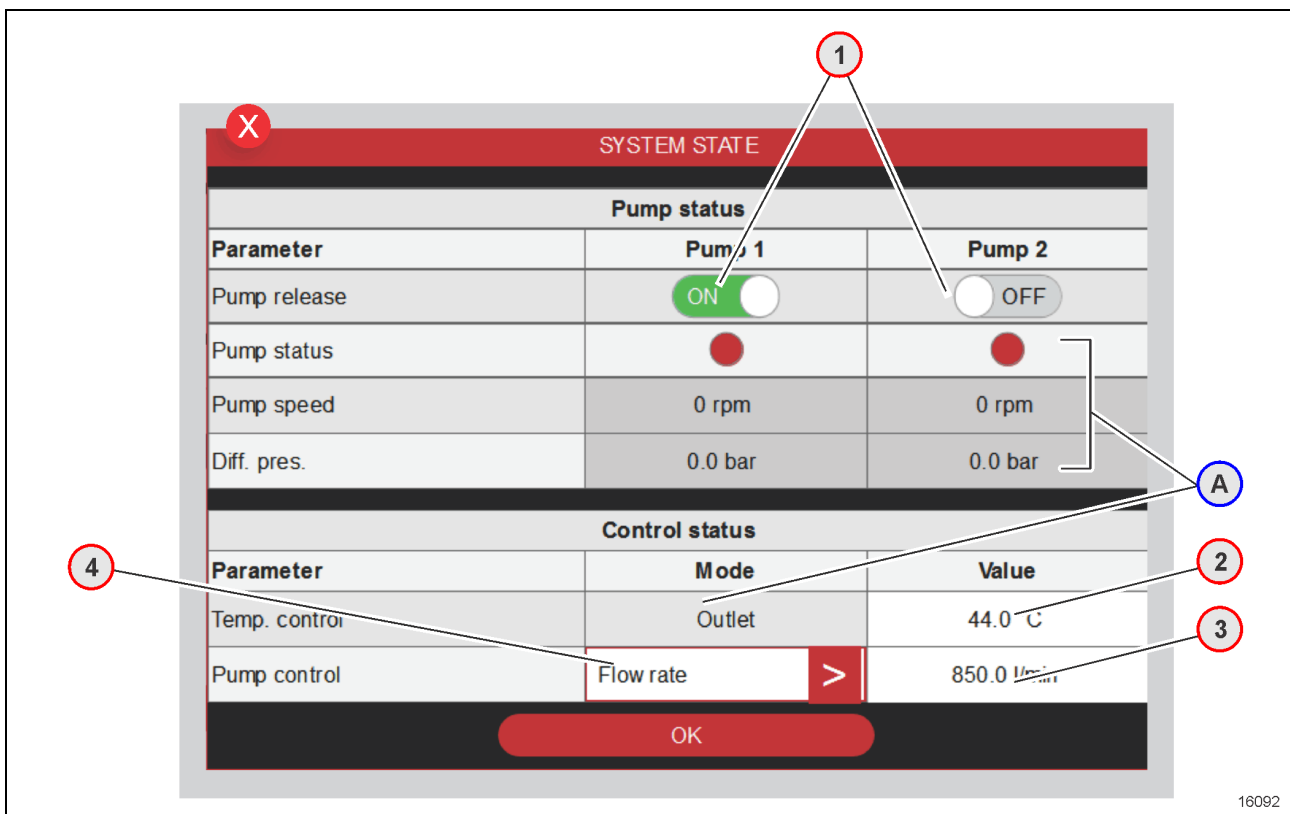


Fig. 38: Page 2300 "Schematic system diagram/System status" (example)

- | | |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p>1 Button for configuring the pump release.</p> <ul style="list-style-type: none"> • ON: Enabled. The pump will start if all the process-relevant conditions are fulfilled. • OFF: Disabled (e.g. to deactivate the pump for a filter change). <p>2 Configuration of the temperature setpoint *) **)</p> <p>3 Field for adjusting the pressure/flow rate. The display depends on the pump control type.</p> <p>4 Button for selecting the pump control type *) ***)</p> <ul style="list-style-type: none"> • based on the differential pressure of the pump (differential pump pressure), • based on the differential pressure of the system (differential system pressure), • based on the temperature difference (temperature difference), • based on the flow rate. | <p>A Status indicators of the pumps:</p> <ul style="list-style-type: none"> • Red: Component error • Green: Component active • Grey: Component OFF • Indication of process-relevant values (e.g. pump speed, differential pressure) • Temperature control *) <ul style="list-style-type: none"> - Temperature control mode: e.g. via the medium outlet, medium inlet |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

NOTE

*) See also **page 7583** for information about the setting procedure.


***) Tapping the button will open a window for performing the settings. Tap Enter to confirm or ESC to cancel the action.

***) Tapping the button will open a window for performing the settings. Select the parameter. Then, the window closes.

10.6.9 Page 4200, screen cleaning



/ System / Screen cleaning

Screen contents:	Description
	<p>Use this button to activate the screen cleaning function. The remaining cleaning time is indicated by a progress bar.</p> <p>Note Tapping the button will disable all of the function for preset time.</p>

10.6.10 Page 7492, sensor adjustment



/ Unit / Setup /



Sensor calibration

- Indication of actual values.
- Adjustment and setting of the gain and offset values (calibration) of the sensors.

Screen contents:	Description
	Actual value display:
Primary inlet temperature [°C]	Temperature sensor (medium inlet in the primary circuit)
Secondary outlet temperature [°C]	Temperature sensor (medium outlet in the secondary circuit)
Primary inlet pressure [bar]	Pressure sensor (medium inlet in the primary circuit)
Primary filter pressure [bar]	Pressure sensor (filter in the primary circuit)
System pressure [bar]	Pressure sensor (system)
Secondary inlet pressure [bar]	Pressure sensor (medium inlet in the secondary circuit)
Secondary outlet pressure [bar]	Pressure sensor (medium outlet in the secondary circuit)
Filter 1 pressure [bar]	Pressure sensor (filter 1)
Filter 2 pressure [bar]	Pressure sensor (filter 2)
Ambient temperature [°C]	Temperature sensor (outside temperature)
Ambient relative humidity [%]	Humidity sensor
Primary outlet flow [l/min]	Flow sensor (medium outlet in the primary circuit)
Reference minimum flow rate *) [l/min]	Reference minimum flow rate
Reference maximum flow rate *) [l/min]	Reference maximum flow rate
Primary outlet temperature [°C]	Temperature sensor (medium outlet in the primary circuit)
Secondary inlet flow [l/min]	Flow sensor (medium inlet in the secondary circuit)
Reference minimum flow rate *) [l/min]	Reference minimum flow rate
Reference maximum flow rate *) [l/min]	Reference maximum flow rate
Secondary inlet temperature [°C]	Temperature sensor (medium inlet in the secondary circuit)

Offset	Adjustment and setting of gain and offset values. (for specialist personnel only)
Gain	

*) = option

NOTICE

Damage to the unit!

If the offset and gain values are changed without authorisation, the correct operation of the unit can no longer be guaranteed.

The values that are set at the time of delivery are default settings and they must not be changed without prior consent from the customer service department.

10.6.11 Page 7581, general settings



/ Unit / Setup /



Basic settings

- Adjustment of process-relevant parameters

Screen contents:		Description
Delay after start	[s]	Setting of the delay time of the pumps after a start.
Supply voltage		Setting of the supply voltage: <ul style="list-style-type: none"> • 208 V/60 Hz • 400 V/50 Hz • 460 V/60 Hz
Parallel operation no. of slaves	[0-10]	0 = no parallel operation with secondary CDUs >0 = number of connected secondary CDUs
Parallel operation secondary CDU - address	[0-255]	Setting of the secondary CDU address for parallel operation.
IP protocol	[1-2]	Setting of the IP protocol 1 = IPv4 connection 2 = IPv6 connection
Pump operation mode		Setting of the pump mode: <ul style="list-style-type: none"> • Dual mode • Single mode with switching • Single mode without switching
Time switch	[h] [min]	Setting of the time at which the system switches from one pump to the other in mode 1 (single pump operation with switching).
Switching interval	[days]	Setting of the time interval in days to specify the time at which switching is to be performed.
Error shutdown time window	[min]	Setting of the shutdown time of the pumps in the event of an error.
Max. operating temperature	[°C]	Setting of the maximum operating temperature. If the temperature exceeds the set temperature value, the unit will be switched off.
Unit type	[1-3]	Setting the device type: <ul style="list-style-type: none"> 1 = Device with bypass sensor and flow sensor. 2 = Device without bypass sensor and with flow sensor, type "A". 3 = Device without bypass sensor and with flow sensor, type "B".

10.6.12 Page 7582, Einstellungen Data log settings



/ Unit / Setup /



Data log

- Settings for the collection of process-relevant data.

Screen contents:		Description
Log operating data		No = No data will be stored. Yes = Data will be stored.
Storage location	FLASH	The data will be stored by way of a flash memory and can be accessed via a network connection. To access the data via a network connection, follow these steps: 1. Start the FTP client. 2. Enter the address (see also page 1300, IP address) 3. Log in. <ul style="list-style-type: none"> • User name: loguser • Password: loguser <p>After a successful login, the saved files will be displayed. The data is available for further processing/storage.</p>
	USB	The data will be stored on a USB drive.
	FTP + USB	The data will be stored on a USB drive and by way of a flash memory and can be accessed via a network connection (see "FLASH" for a description of the network connection).
Interval	[s]	Time interval in seconds to specify the time at which the operating data will be saved to the selected storage location.
Log file format		Format of the stored operating data. Default format (recommended by nVent): The data will be saved as a csv file. multicom format: The data will be saved in a special format. Order format: The data will be saved in a special order format.
Max. number of log files		Maximum number of log files

10.6.13 Page 7583, control settings



/ Unit / Setup /



Controller logic

- Adjustment of process-relevant parameters.

Screen contents:	Description
Temp. control	Outlet = control of the temperature via the medium outlet. Inlet = control of the temperature via the medium inlet.
Set temperature [°C]	Setting of the temperature setpoint
Pump control	Pump control type: <ul style="list-style-type: none"> • Diff. pump press. (differential pump pressure) • Diff. system press. (differential system pressure) • Diff. temp. (differential temperature) • Flow rate
Speed control call interval [s]	Time interval of the speed control.
Set diff. pump pressure [bar]	Setting of the differential pump pressure setpoint.
Set diff. system pressure [bar]	Setting of the differential system pressure setpoint.
Set flow rate [l/min]	Setting of the flow rate setpoint.
Set diff. temperature [°C]	Setting of the differential temperature setpoint.
Manual pump switching	Switch = Forces switching from one pump to another in single pump mode.
Pressure fault message delay [s]	Setting of the time during which a fault message (pressure) is suppressed.
Start delay [s]	Setting of the time during which a fault message is suppressed after power-on.
Fault message delay after pump start [s]	Setting of the time during which a fault message is suppressed after a pump start.
Bypass control	
Note The following parameters apply to all pump speed control modes.	
Bypass control call interval [s]	Time interval of the bypass control.
Offset [%]	Adjustment and setting of gain and offset values. (for specialist personnel only)
Gain [%]	
Min. valve opening [%]	Control valve opening degree in per cent (minimum)
Max. valve opening [%]	Control valve opening degree in per cent (maximum)

10.6.14 Page 7681, temperature PID settings



/ Unit / Setup /



Controller parameters / Temperature PID

- Adjustment of process-relevant parameters.

Screen contents:	Description
------------------	-------------

PID temp.

Setpoint		
Temperature	[°C]	Setting of the temperature control setpoint
Temp. controller		
Contr. Kp	-	Contr. gain
Contr. Ti	[s]	Integral action time of the controller
Contr. Td	[s]	Derivative action time of the controller
D-factor mean value	[s]	Time range over which the mean value of the D-part of the controller is calculated
Blocked cool.	[K]	Value below the setpoint at which the valve will be closed.
Max. cool.	[K]	Value above the setpoint at which the valve will be fully opened.
Dewpoint offset	[K]	Offset from the calculated dew point to limit the temperature setpoint.
Min. valve opening	[%]	Minimum valve opening.

10.6.15 Page 7682, pump speed PID settings



/ Unit / Setup /



Controller parameters / Pump speed PID

- Adjustment of process-relevant parameters.

Screen contents:	Description
PID pump speed	
Setpoint	
Diff. pump press. [bar]	Setpoint setting in the "differential pump pressure" mode
Set diff. sys. pr. [bar]	Setpoint setting in "differential system pressure" mode
Flow rate [l/min]	Setpoint setting in the "flow rate" mode
Temperature [°C]	Setpoint setting in the "temperature" mode
Pr. contr.	
Flow controller	
Temp. controller	
Contr. Kp -	Contr. gain
Contr. Ti [s]	Integral action time of the controller
Contr. Td [s]	Derivative action time of the controller
D-factor mean value [s]	Time range over which the mean value of the D-part of the controller is calculated
Contr. min. speed [%]	Min. speed of the pumps in the selected mode.
Contr. max. speed [%]	Max. speed of the pumps in the selected mode.

10.6.16 Page 7683, environment/primary circuit settings



/ Unit / Setup /



Controller parameters / Environment / Primary circuit

- Adjustment of process-relevant parameters.

Screen contents:		Description
Environment / Primary circuit		
Environment		
Min. outside temp.	[°C]	Minimum outside temperature
Max. outside temp.	[°C]	Maximum outside temperature
Min. relative humidity	[%]	Minimum relative humidity
Max. relative humidity	[%]	Maximum relative humidity
Primary circuit		
Min. outlet flow rate	[l/min]	Minimum flow rate (outlet)
Min. inlet temp.	[°C]	Minimum temperature (inlet)
Max. inlet temp.	[°C]	Maximum temperature (inlet)
Max. outlet temp.	[°C]	Maximum temperature (outlet)
Min. inlet pr.	[bar]	Minimum pressure (inlet)
Max. outlet pr.	[bar]	Maximum pressure (outlet)
Max. diff. pr.	[bar]	Maximum differential pressure
Pressure fault message delay	[s]	Setting of the time during which a fault message is suppressed after a pressure fault.
Cp	[kJ(kgxK)]	Specific heat capacity of the medium
Density	[g/ccm]	Density of the medium
Calc. cooling capacity	[kW]	Indication of the calculated cooling capacity

10.6.17 Page 7684, low water/secondary circuit settings



/ Unit / Setup /



Controller parameters / Low water / Secondary circuit

- Adjustment of process-relevant parameters.

Screen contents:	Description
------------------	-------------

Low water / Secondary circuit









Secondary circuit		
Min. outlet pr.	[bar]	Minimum pressure (outlet)
Max. outlet pr.	[bar]	Maximum pressure (outlet)
Min. outlet temp.	[°C]	Minimum temperature (outlet)
Max. outlet temp.	[°C]	Maximum temperature (outlet)
Min. outlet flow rate	[l/min]	Minimum flow rate (outlet)
Max. diff. system pr.	[bar]	Maximum differential pressure (system)
Max. diff. pump pr.	[bar]	Maximum differential pressure (pump)
Min. inlet pr.	[bar]	Minimum pressure (inlet)
Max. inlet pr.	[bar]	Maximum pressure (inlet)
Min. inlet temp.	[°C]	Minimum temperature (inlet)
Max. inlet temp.	[°C]	Maximum temperature (inlet)
Cp	[kJ(kgxK)]	Specific heat capacity of the medium
Density	[g/ccm]	Density of the medium
Error delay	[s]	Setting of the time during which a fault message will be suppressed after a fault.
Max. system pr.	[bar]	Maximum pressure (system)
Max. diff. filter pr.	[bar]	Maximum differential pressure (filter)
Calc. cooling capacity	[kW]	Indication of the calculated cooling capacity
Max. inlet flow rate	[l/min]	Maximum flow rate (inlet)
Min. diff. system pr.	[bar]	Minimum differential pressure (system)

Screen contents:		Description
Low water		
Fill mode		0 = manual OFF 1 = manual ON with pump OFF 2 = manual ON with pump ON 3 = automatic mode
Fill timeout	[s]	Maximum duration of the filling process until an error occurs.
Max. overfilling number	-	Maximum number of refilling processes in the specified time interval.
System pr. warning	[bar]	Pressure warning, automatic refill starts
System pr. warning hysteresis	[bar]	Hysteresis for the warning limit up to which the system will be filled and the warning message will be cleared
System pr. error	[bar]	Pressure error, pumps continue to run
System pr. error hysteresis	[bar]	Hysteresis value (system pressure error)
Critical system pr. error	[bar]	Critical system pressure. When this value is reached, the pumps will be switched off.
Critical system pr. error hysteresis	[bar]	Hysteresis value (critical system pressure error)
Filling pump off-delay	[s]	Off-delay of the filling pump, i.e. the time during which the pump continues to run after the hysteresis value has been exceeded.
Filling cycle monitoring	[days]	Time window in which the maximum number of automatic refills will be monitored.

10.6.18 Page 9999, Alarm



- Indication of fault messages and warnings, including the date, time, fault number and fault message text.
- Display of help texts.
- Fault acknowledgement.






Screen contents:	Description										
Representation in yellow	There is a pending warning.										
Representation in red	There is a pending fault.										
	Button for scrolling down on a page-by-page basis.										
	Scrolling stepwise downwards with the display indicator.										
	Button for scrolling up on a page-by-page basis.										
	Scrolling stepwise upwards with the display indicator.										
	<p>Filter selection. After pressing the button, a filter can be set. For the filter selection, a window with the following options opens:</p> <ul style="list-style-type: none"> • No filter • Alarms from (time) *) • Alarms to (time) *) • Error no. only • Status/messages • Status/warnings • Status/errors 										
<table border="1"> <tr> <td>dd</td> <td>mm</td> <td>yyyy</td> <td>hh</td> <td>mm</td> </tr> <tr> <td>31</td> <td>12</td> <td>2014</td> <td>23</td> <td>59</td> </tr> </table>	dd	mm	yyyy	hh	mm	31	12	2014	23	59	*) Following the selection, a window for entering the time will open.
dd	mm	yyyy	hh	mm							
31	12	2014	23	59							
	<p>Show/hide help text. Following the selection, a window with help texts and unit-specific information will be displayed.</p>										
	Button for acknowledging a pending fault.										
	<p>9999</p> <p>Note Tapping the "History" button will open the screen "Message history", page 9998.</p>										




10.6.19 Page 9998 "Message history"



/ History

Indication of all of the warnings and faults that have occurred and that have been eliminated.

Screen contents:	Description
Representation in white	The fault has been eliminated and is no longer pending.
Representation in yellow	Formerly pending warning.
Representation in red	Formerly pending fault.
	<p>9999 Note Tapping the "History" button will open the screen "Message history", page 9998.</p>
	Button for scrolling down on a page-by-page basis.
	Scrolling stepwise downwards with the display indicator.
	Button for scrolling up on a page-by-page basis.
	Scrolling stepwise upwards with the display indicator.

Screen contents:	Description					
	<p>Filter selection. After pressing the button, a filter can be set. For the filter selection, a window with the following options opens:</p> <ul style="list-style-type: none"> • No filter • Alarms from (time) *) • Alarms to (time) *) • Error no. only • Status/messages • Status/warnings • Status/errors 					
<p>dd mm yyyy hh mm</p> <table border="1" data-bbox="172 741 491 786"> <tr> <td>31</td> <td>12</td> <td>2014</td> <td>23</td> <td>59</td> </tr> </table>	31	12	2014	23	59	<p>*) Following the selection, a window for entering the time will open.</p>
31	12	2014	23	59		
	<p>Show/hide help text. Following the selection, a window with help texts and unit-specific information will be displayed.</p>					
 <p style="text-align: right;">9998</p>	<p>Note Tapping the "Alarm" button will open the screen "Alarm", page 9999.</p>					

11 Maintenance

11.1 Notes

The following must be observed in order to avoid injuries and damage to property:

- Only qualified personnel are authorised to perform these tasks.
- Comply with the information given in the "Safety" section.

⚠ DANGER

Electrical hazard!

Disconnect the unit from the power supply prior to performing any work on the unit.

Check whether the unit is properly disconnected from power and absolutely voltage-free. Secure it so that it cannot be reconnected.

Only skilled and certified electricians are authorised to perform any work on the system.

⚠ DANGER

Risk of injury caused by electric current!

The unit remains live even in the maintenance switch is switched off.

If the unit is open, contact with parts can result in an electric shock.

The following points must be observed when performing work on the open unit:

- Comply with the information that is given in the "Safety" chapter.
- Only suitably qualified persons are authorised to perform these tasks.
- Remove the electrical connecting cable.

⚠ WARNING

Perform only those tasks that you have been instructed to perform!

There is an increased risk of injury for persons who perform tasks for which they are neither qualified nor trained.

- Only persons familiar with the tasks who have been instructed regarding the associated hazards and who possess the necessary qualifications are authorised to perform work on the unit/system.
- Perform repairs of the pipe systems and tanks only when the system is depressurised.

Risk of injuries for persons due to heavy objects!

The components mentioned above are very heavy and bulky.

Always have several persons carry out the installation or dismantling or use appropriate lifting devices!

⚠ CAUTION**Risk of injury - the expansion vessel is under pressure!**

The expansion vessel in the unit is under pressure when the unit is switched off and depressurised.

When working on the expansion vessel, exercise extreme caution.

NOTICE**Risk of damage to the electronic components!**

Take suitable measures (ESD protection measures) to prevent the electronic components from being damaged due to electrostatic discharge.

**Note concerning the protection of the environment**

The improper disposal of the media/liquids that are used has a negative impact on the environment.

- Ensure that the media/liquids are not released into the sewage system or soil.
- The media/liquids must be disposed of separately and supplied separately to the recycling centres.
- Comply with material safety data sheets.
- Comply with the applicable national and local rules and regulations.

NOTE

Prior to performing any maintenance tasks or repairs, switch the unit off via the maintenance switch!

NOTE

Do not use any detergents containing solvents.

Keep the entire system clean.

NOTE

If you want to order spare parts, please refer to spare parts catalogue included in the scope of supply.

NOTE














Installed pressure sensors can be replaced without stopping the device.

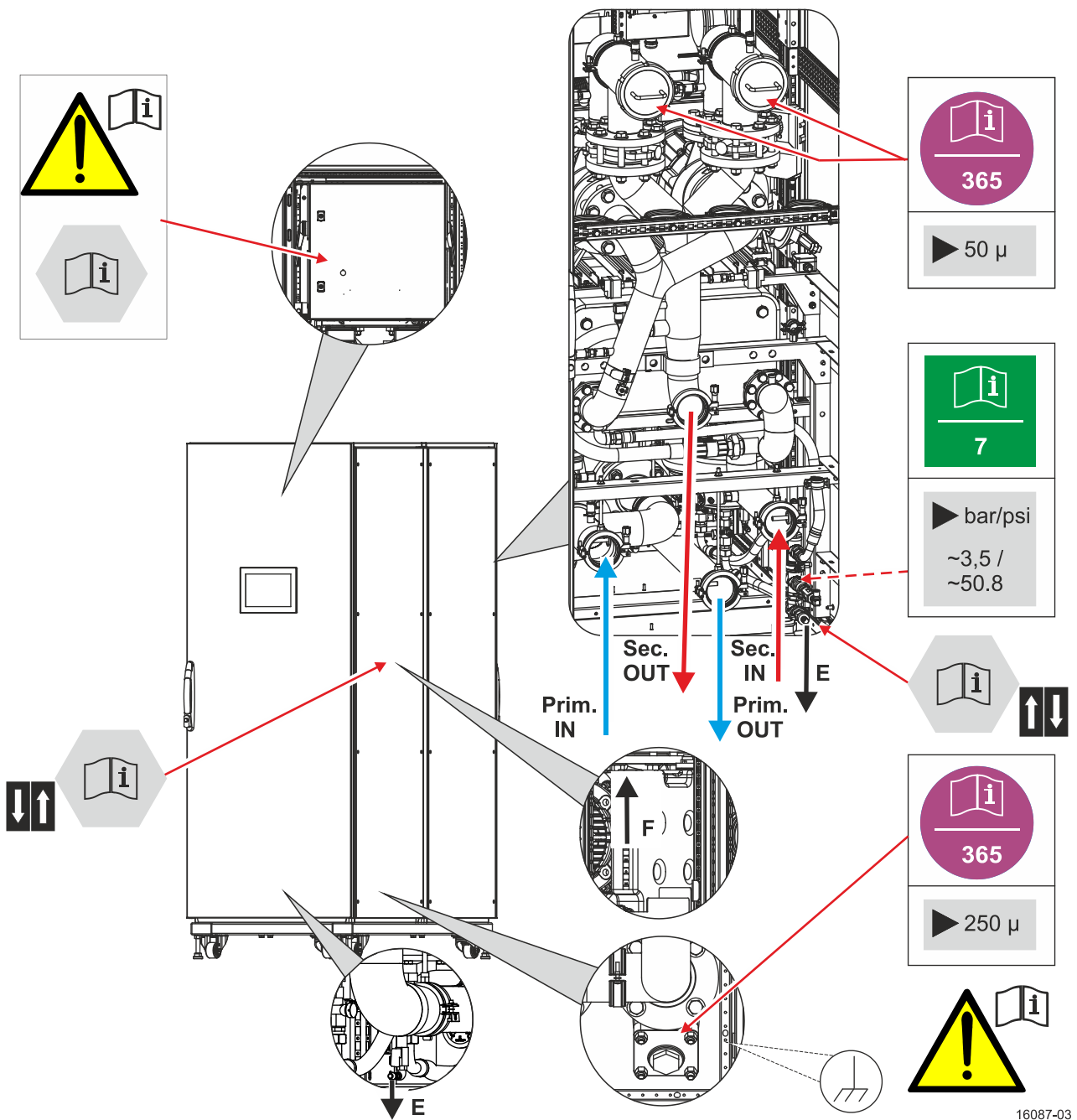
First remove the electrical connector. Then remove the pressure sensor from the device.

If you first remove the pressure sensor, the device will stop.

11.2 Overview

Legend:

	Danger
	Please refer to the instruction manual!
	Maintenance point
	Adjustment, check
	Operating point, connection point
	Inlet/outlet
	Note
	Every day
	Weekly
	Monthly
	Every six months
	Annually
	Use original replacement parts and filters only –otherwise the warranty will be invalidated.



16087-03

11.3 Maintenance plan

Carry out the described maintenance tasks at the intervals specified in the maintenance schedule.

No.	Component	Maintenance job	Maintenance interval	
1	Pipe fittings	Check the pipe fittings and hose connections for leaks. Tighten the pipe fittings, if necessary.	Weekly	
		Check for soiling and clean, if necessary.		
2	Primary circuit	Check for leaks.	Weekly	
		Check the system pressure when the unit is switched on. Fill the unit, if necessary. Monitor the permissible system pressure according to the "Technical data" section.		
		Check the supply pressure and differential pressure of the filter.		
		If necessary, vent the customer-provided cooling medium supply and top up. Vent the system (always after a filter change). Comply with the information given in the chapter "Start-up/Venting of closed circuits".		
		Check the glycol and contaminant content in the cooling medium. See the "Maintenance/Antifreeze agent" chapter.	Annually	
		Replace the filter. See the "Maintenance/Filter change" section.		
3	Secondary circuit	Check for leaks.	Weekly	
		Check the medium tank. Top up, if necessary.		
		Check the system pressure when the unit is switched on. Fill the unit, if necessary. Monitor the permissible system pressure according to the "Technical data" section.		
		Check the differential pressure. Check the volume flow and temperature difference. Adjust them, if necessary.		
		Vent the system (always after a filter change). Comply with the information given in the chapter "Start-up/Venting of closed circuits".		
			Check the glycol and contaminant content in the cooling medium. See the "Maintenance/Antifreeze agent" chapter.	Annually
			Replace the filter. See the "Maintenance/Filter change" section.	
		Check the pressure at the expansion vessel. Observe the section "Checking the expansion vessel".		

No.	Component	Maintenance job	Maintenance interval
4	Plates/labels	Check that the labels and symbols on the unit are complete and legible. Missing or illegible labels/symbols must be replaced.	Annually
5	Unit	Check the connecting lines inside the unit for signs of damage. Replace them, if necessary.	
6	Pump	Check whether the pump exhibits any unusual noise. Check the system parameters. Follow the instructions that are given in the "Troubleshooting" section.	Annually
		Check the circuit breakers. See the "Maintenance/Circuit breakers" chapter.	
7	Control valve	Check for correct operation.	Annually
8	Shut-off valves/butterfly valves	Functional test. Check whether the positions are correct and in line with the schematic system diagram (shut-off valves = SOV; butterfly valves = BV).	
		9	
10	Sensors (temperature sensors and pressure sensors etc.)	Visual inspection. Check the cables for signs of damage. Clean if necessary.	

11.4 Maintenance jobs

WARNING

Health hazard!

The use of chemicals can present a health hazard.

- When handling chemicals, always wear protective gloves, eyewear, and clothing.
- Observe the safety data sheets.



Note concerning the protection of the environment

The improper disposal of consumables (e.g. filters, filter mats) has a negative impact on the environment.

- Consumables must not be disposed of as household waste.
- The materials must be disposed of separately and supplied separately to the recycling centres.
- Depending on the contaminants that are filtered out, it may be necessary to dispose of the used filter materials as special waste.
- Comply with the applicable national and local rules and regulations.

11.4.1 Primary circuit

Replace the filters in the primary circuit in accordance with the maintenance plan.

NOTE

We recommend practising the filter change procedure several times while the servers are not in operation.

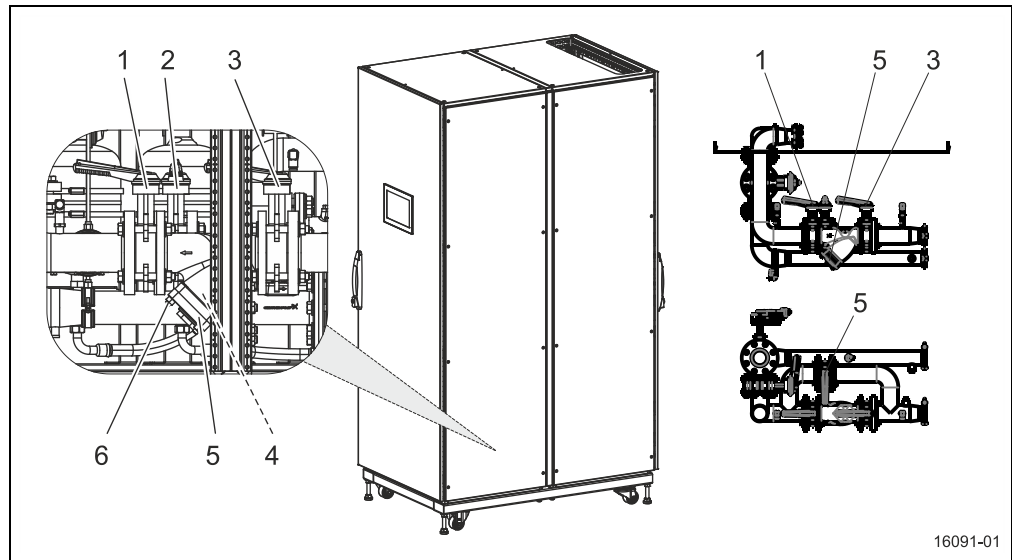


Fig. 39: Filter change (primary circuit)

Perform the filter change as follows:

1. Open the front door of the cabinet.
2. Close the butterfly valves (1 and 3) and open the bypass valve (2).
3. Push the supplied drip tray under the filter first.

NOTE

The pipe is under pressure.

4. Loosen the nuts (6) of the cover (5) and remove the cover. Collect any escaping liquid.
5. Remove the filter (5) and clean or replace it.
6. Reinstall the filter (5).

NOTICE

Damage to the unit!

If the filter is not installed correctly, it may be deformed.

When installing the filter, take extra care and ensure the correct installation position based on the threaded hole of the drain plug.

7. Reinstall the cover (6) by way of the nuts (6).

NOTE

If necessary, use a new cover seal. Fasten the cover seal in place on the sealing surface with sealing paste (e.g. Fermit).

8. Check the system pressure and, if necessary, top the system up again via the customer-provided cooling medium supply.

NOTE

Before opening the butterfly valves (1 and 3), ensure that the on-site cooling medium supply can compensate for a cooling medium loss of approximately two litres. Otherwise, there is a risk of a malfunction or system downtime.

9. Slowly open the butterfly valves (1 and 3) and close the bypass valve (2).
10. Check the filter (primary circuit) for leaks.
11. Close the front door of the cabinet.

NOTE

If you want to order spare parts, please refer to spare parts catalogue included in the scope of supply.

11.4.2 Secondary circuit

Replace the filter in the secondary circuit in accordance with the maintenance plan.

NOTE

- The secondary circuit consists of two circuits. During maintenance, one circuit can be maintained during operation (e.g. filter change).
- The circuit that is to be maintained must first be deselected via the control unit.
- In the "Automatic switching" mode, ensure that the system does not switch during a running maintenance task. Otherwise, there is a risk of a malfunction or system downtime.
- We recommend practising the filter change procedure several times while the servers are not in operation.

1. Check the display of the control unit to identify the filter for which maintenance is due (i.e. the filter with the highest differential pressure).
2. At the control unit, switch the unit to single-pump operation without switching.
3. Deactivate the corresponding pump (1 or 2) via the display and ensure that the other pump is active.

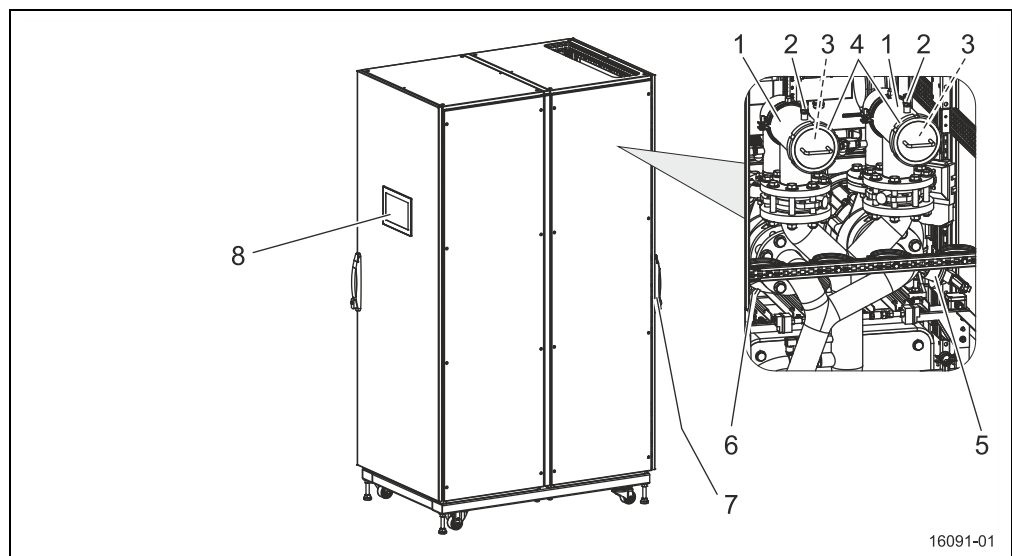


Fig. 40: Filter change (secondary circuit)

Perform the filter change as follows:

4. Open the back door (7) of the cabinet.
5. Close the butterfly valve (5 or 6).

NOTE

The pipes are under pressure.

6. Prior to changing the filter, connect the supplied drain hose to the manual drain valve (2) to depressurise the filter housing (1).
7. Loosen the union nut (4) with a hook wrench. Collect the escaping fluid (approximately 4 litres). Remove the union nut (4) and open the filter housing.
8. Pull the filter insert (3) with the filter out forwards by the handle. Clean the filter and replace it, if necessary.
9. Install the filter insert (3) with the new/cleaned filter in the filter housing (1).
10. Refit the union nut (4) and tighten it with a hook wrench.
11. Disconnect the drain hose and close the manual vent valve (2).
12. At the control unit (8), select the automatic filling function. If the filling time has been exceeded, acknowledge this fact via the control unit. Then, the pump will restart.
13. Slowly reopen the shut-off valve (5 or 6) in front of the corresponding pump (suction side).

NOTICE

Damage to the unit!

There is an increased risk of malfunctions or system downtimes if the tank in the secondary circuit is not completely filled.

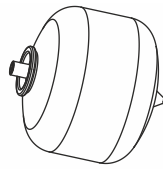
- Slowly open the butterfly valve. If the refill pump does not start, close the butterfly valve again.
- The pump can be switched off if the butterfly valve is opened too quickly.

14. Connect the supplied drain hose to the manual vent valve (2) and vent the system. When the medium is clear, close the manual vent valve (2). Disconnect the drain hose.
15. Check the threaded fittings upstream of the filters for leaks after the unit has been switched on.
16. Close the back door of the cabinet.
17. At the control unit, select the operating mode "Automatic switching" for the pumps.

NOTE

If you want to order spare parts, please refer to spare parts catalogue included in the scope of supply.

11.4.3 Checking of the expansion vessel



Expansion vessel

(Example)

Perform pressure and leak testing in accordance with the maintenance plan.

For **leak testing** of the expansion vessel proceed as follows.

1. Take off the cap of the expansion vessel gas valve.
2. Briefly open the gas valve. If liquid escapes, the diaphragm of the expansion vessel is defective.
3. Replace the expansion vessel, if necessary contact the unit manufacturer.

For **pressure testing** of the expansion vessel proceed as follows.

1. Close the shut-off valve upstream of the expansion vessel.
2. Have a vessel ready to collect the liquid that flows out.
3. Open the drain at the expansion vessel and allow the medium to flow into the collecting vessel.
4. Take off the cap of the expansion vessel gas valve.
5. Connect the adapter with the pressure gauge and measure the gas pressure.
Monitor the system pressure according to the "Technical data" section.
6. If necessary allow gas to escape or top up with gas.

⚠ CAUTION

Risk of injury - the expansion vessel is under pressure!

The expansion vessel in the unit is under pressure when the unit is switched off and depressurised.

When working on the expansion vessel, exercise extreme caution.

NOTE

After maintenance, ensure that the drain valve of the expansion tank is closed and the shut-off valve in the system is open.

This ensures the correct operation of the expansion tank.

Otherwise, the pressure in the system increases, the safety valve opens and the cooling medium escapes.

11.4.4 Check of the circuit breaker

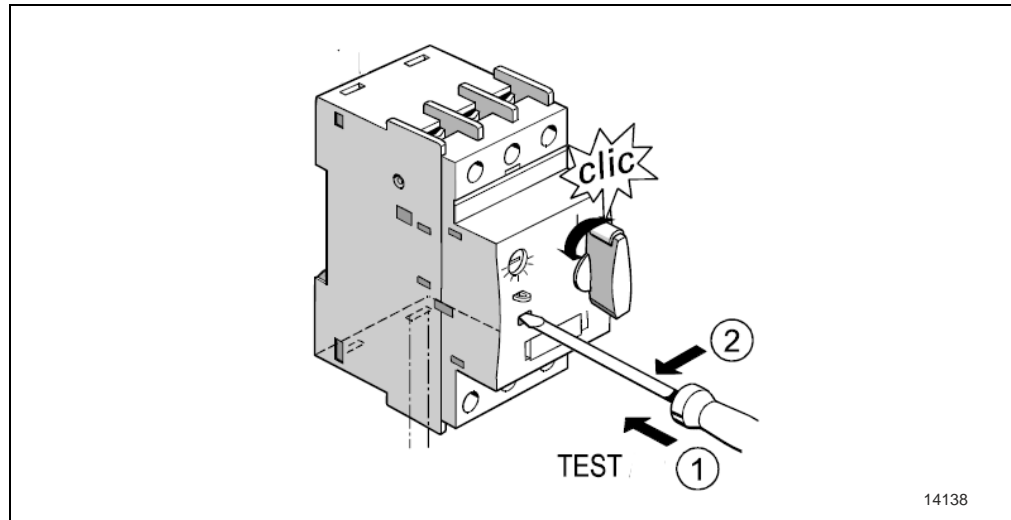


Fig. 41: Circuit breaker (example)

The circuit breaker is mounted on a DIN rail (top hat type) in the electrical box. Check the circuit breaker as follows:

1. Push a pointed object (e.g. a screwdriver) into the opening 'TEST' (1) and push to the left (2).
The circuit breaker trips. If it operates correctly, it must stop between I and O.
2. Set the circuit breaker back to position I.

If the circuit breaker does not trip as described, it must be replaced. See the chapter "Troubleshooting/Circuit breaker replacement".

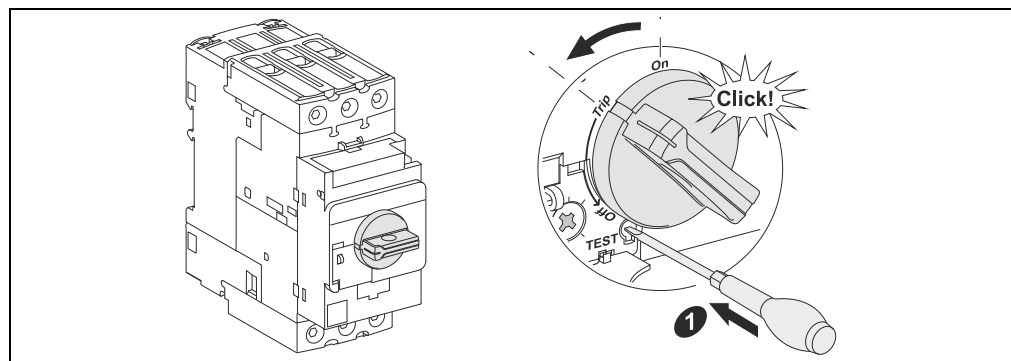


Fig. 42: Circuit breaker (example)

The circuit breaker is mounted on a DIN rail (top hat type) in the electrical box. Check the circuit breaker as follows:

1. Push a pointed object (e.g. a screwdriver) to the 'TEST' button and push (1).
The circuit breaker trips. If it operates correctly, it must stop between On and Off.
2. Set the circuit breaker back to position On.

If the circuit breaker does not trip as described, it must be replaced. See the chapter "Troubleshooting/Circuit breaker replacement".

11.4.5 Antifreeze agent

To ensure sufficient concentration of the anti-freeze agent, check the concentration according to the maintenance schedule.

This test is carried out using a conventional density measuring system or a refractometer. See the manufacturer's product information.

Check/top up the anti-freeze agent as follows:

1. Take a sample from the system circuit (e.g. via the fill and drain valve). Withdraw at least 0.5 l (0.1 gal) of the medium to ensure a conclusive measuring result.
2. Measure the concentration with a suitable measuring instrument.
3. If the concentration is outside of the specified range, top up the anti-freeze agent.

NOTE

- Ensure a homogeneous mixture of the medium and anti-freeze agent (by refilling the system circuit or by slowly adding the anti-freeze agent while the pumps are running).
- The use of a suitable filling pump is recommended for topping up.

11.5 Restart

Prior to using the unit/system, it must be absolutely ensured that there are no safety-critical defects or malfunctions. After the completion of the tasks and prior to switching the unit/system on, comply with the following (if applicable):

- Ensure that any safety devices, guards and covers which were removed prior to commencing the tasks have been properly reinstalled.
- Ensure that the area around the unit/system is free from tools, materials or other pieces of equipment that had to be used.
- Clean the workspace and remove any liquid spills or similar substances.
- Check whether the safety devices and guards of the unit/system operate correctly.

12 Troubleshooting

12.1 Notes

The following must be observed in order to avoid injuries and damage to property:

- Only qualified personnel are authorised to perform these tasks.
- Comply with the information given in the "Safety" section.

⚠ DANGER

Risk of injury caused by electric current!

When the device is open, parts of the device may be energised and cause an electric shock when they are touched.

The following points must be observed when performing work on the open unit:

- Comply with the information that is given in the "Safety" chapter.
 - Only suitably qualified persons are authorised to perform these tasks.
1. Disconnect the unit from the power supply in order to deenergise it.
 2. Secure the unit so that it cannot be switched on again accidentally.
 3. Check whether the unit is properly disconnected from power and absolutely voltage-free.
 4. Earth and short-circuit the unit.
 5. Cover any adjacent live parts and secure the danger area.

⚠ WARNING

Carry out instructed work only!

There is an increased risk of injury to persons who perform tasks for which they are not suitably qualified or trained.

Troubleshooting shall only be carried out by qualified personnel. Contact the after-sales service particularly in the event of malfunctions in the electrical system or the refrigeration unit (if provided).

⚠ WARNING

Risk of injuries for persons due to heavy objects!

The components mentioned above are very heavy and bulky.

Always have several persons carry out the installation or dismantling or use appropriate lifting devices!

⚠ CAUTION

Risk of injury - the expansion vessel is under pressure!

The expansion vessel in the unit is under pressure when the unit is switched off and depressurised.

When working on the expansion vessel, exercise extreme caution.

NOTE

Before contacting the manufacturer, read the chapter "General malfunctions", check the unit for faults and, if necessary, repair the malfunction.

12.2 General malfunctions

Fault	Cause	Note
No flow / Insufficient flow detected	The flow meter is defective.	Check the the flow meter and replace it, if necessary.
	The shut-off valves are closed.	Check and open.
	The parameter settings of the control unit are not correct.	Check the parameter settings at the control unit and correct them, if necessary.
	The filter is fouled.	Check, clean, and replace it, if necessary.
Medium too warm/too cold.	Temperature sensor removed from sensor sheath.	Check. Insert temperature sensor back into sensor sheath.

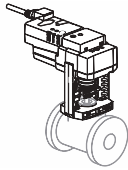
12.3 Electrical connection

Fault	Cause	Note
Unit won't start.	No power supply.	Switch the power supply system on.
		Check the external fuses.
		Check the power supply cable for signs of damage and ensure that it is properly connected.
		Check the electrical circuit.
		Check the fuses.
		Contact the nVent service department.
	The circuit breaker has tripped.	Check the motor and motor connecting cable. Replace them if necessary.
		Check the setting of the circuit breaker and adjust it in accordance with the circuit diagram, if necessary.
		Reset the circuit breaker.
		Contact the nVent service department if necessary.
	The external activation system is switched off or not connected.	Switch it on or connect it. Refer to the circuit diagram.
The rotating field of the motor is incorrect.	Motor not properly connected.	Check the rotating field. Check the connection. If necessary, change the phases. Refer to the circuit diagram.

12.4 Unit-specific

Fault	Cause	Note
No flow in secondary circuit.	The pump in the secondary circuit is not running.	Reset the circuit breaker.
		Check whether the pump runs smoothly.
		Check the pump motor and replace the pump, if necessary.
	The shut-off valves/butterfly valves are closed.	Open them.
	Low water level.	Top up with water.
		Acknowledge the fault message via the control unit.
	The filter is fouled.	Clean it.
The direction of rotation of the pump(s) is incorrect.	Check and reconnect (reverse the connection), if necessary.	
Temperature at secondary circuit outlet is too low.	Temperature setpoint too low.	Adjust the setpoint value.
	Poor contact of the temperature sensor.	Check.
Temperature at secondary circuit outlet is too high.	Temperature setpoint too high.	Adjust the setpoint value.
	Poor contact of the temperature sensor.	Check.
Frequent loss of medium in the secondary circuit.	Pipe system leaking.	Check the system for leaks and seal the system, if necessary.
		Check the safety valve for leaks.
		Check the expansion tank for leaks.
		Top the system up.
		Acknowledge the fault message via the control unit.
Temperature at primary circuit inlet is too high.	Check the on-site cooling medium supply.	Eliminate any faults.
	Poor contact of the temperature sensor.	Check.

12.5 Control valve



Control valve with actuator

Control valve for the continuous control of cooling media in primary circuit.
The actuator is activated by a control signal and moves to the position (0 ... 100%) that is specified by the control signal.

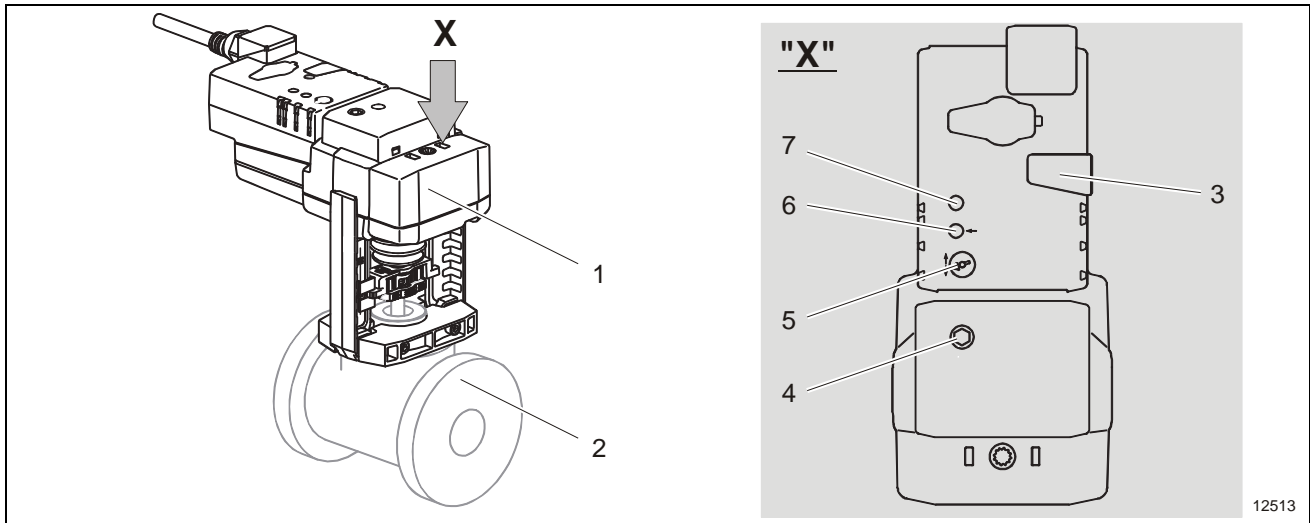


Fig. 43: Actuator, control valve (example)

- | | |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p>1 Actuator</p> <p>2 Control valve</p> <p>3 Button for locking and unlocking the transmission</p> <ul style="list-style-type: none"> • Button pressed: <ul style="list-style-type: none"> - The transmission unlocks - The motor stops - Manual adjustment possible • Button released: <ul style="list-style-type: none"> - The transmission locks - Normal operation <p>4 Adjusting screw (hexagon) of the actuator</p> <p>5 Stroke switch for changing the stroke direction (to be used only by authorised and specialised personnel)</p> | <p>6 Pushbutton, indicator LED (green)</p> <ul style="list-style-type: none"> • LED off: <ul style="list-style-type: none"> - No power supply - Fault • LED on: Operation • When the button is pressed, the stroke adaptation is initiated. <p>7 Indicator LED (yellow)</p> <ul style="list-style-type: none"> • Off: Normal operation • Illuminated: Adaptation process active |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

NOTE

When the system is used for the first time or when it is switched on, the actuator performs a stroke adaptation. When the process is complete, the actuator moves to the position that is specified by the control signal.

12.5.1 Replacement

If a malfunction occurs and the actuator needs to be replaced, comply with the following instructions:

NOTE

Ensure that the actuator is disconnected from the power supply and completely voltage-free prior to installing or removing it.

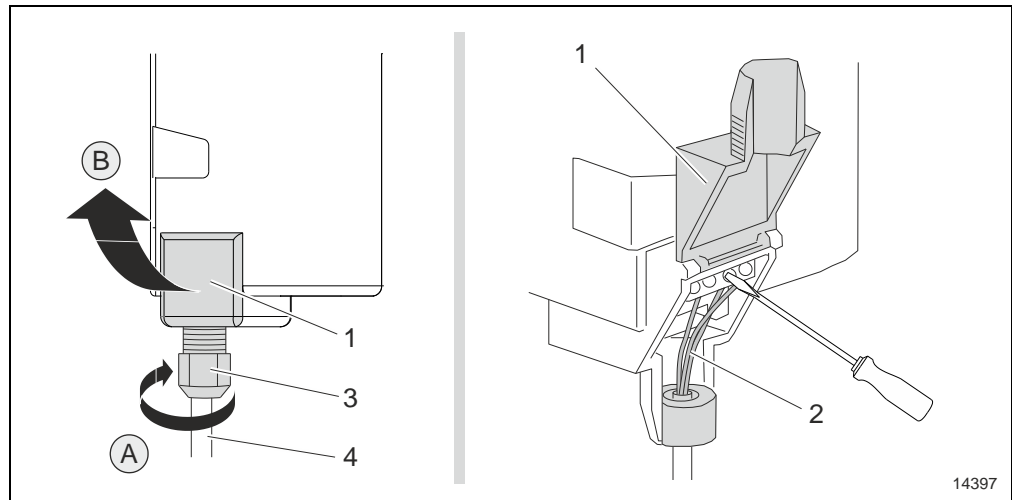


Fig. 44: Disconnection of the electrical connector

1. Ensure that the unit is switched off in accordance with the safety instructions.
2. Loosen the union nut (3) by turning it anti-clockwise (see arrow "A") and push it back.
3. Open the cover cap (1) (see arrow "B").
4. Disconnect the wires (2) of the connecting cable (4).

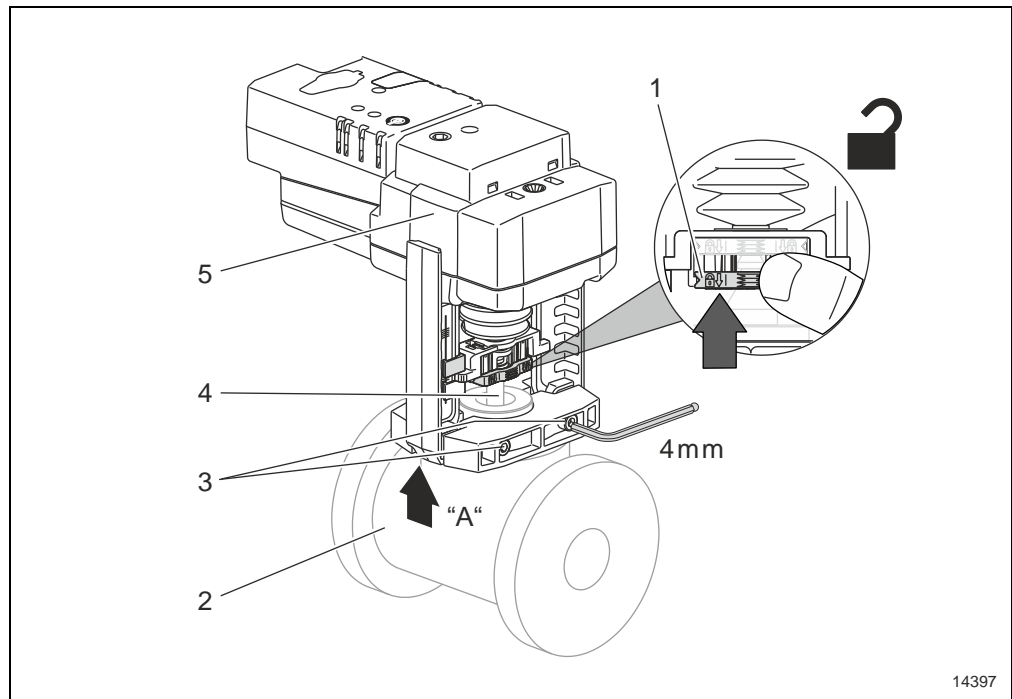


Fig. 45: Removal/installation of the actuator

Removal of the actuator

5. When the locking mechanism (1) is pushed upwards, the connection between the tappet (4) of the control valve (2) and the actuator (5) is opened (unlocking of the lock).
6. Loosen the screws (3) by turning them anti-clockwise with an Allen key.
7. Take the actuator (5) off the control valve (2).

Installation of the actuator

8. Attach the actuator (5) to the control valve (2) and align it with the "A" arrow.
9. Tighten the screws (3) by turning them clockwise with an Allen key (4 Nm).

NOTE

Comply with the specified tightening torque.

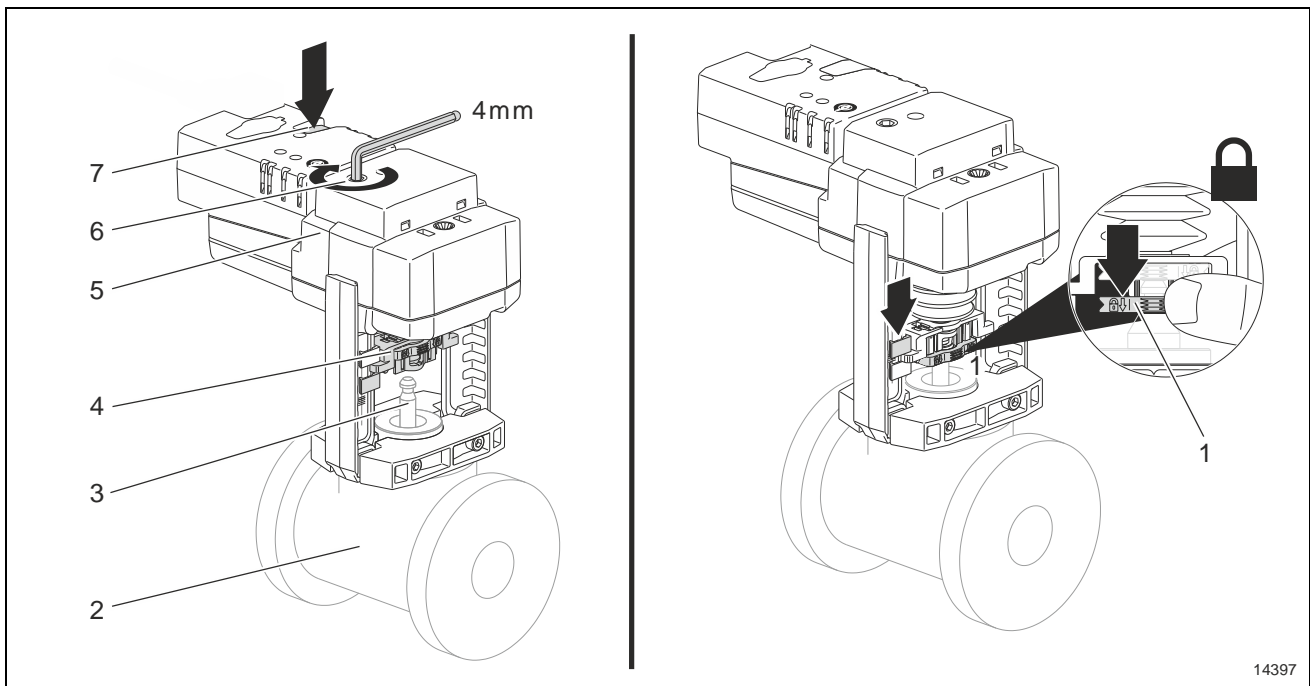


Fig. 46: Locking the actuator

Locking the actuator

10. Press the button (7) for locking/unlocking the actuator.
11. Lower the holding fixture (4) of the actuator (5) by turning the adjusting screw (6) clockwise with an Allen key.

NOTE

Lower the holding fixture (4) down onto the tappet (3).

12. When the locking mechanism (1) is pushed downwards, the connection between the tappet (4) of the control valve (2) and the actuator (5) is closed (locking of the lock).

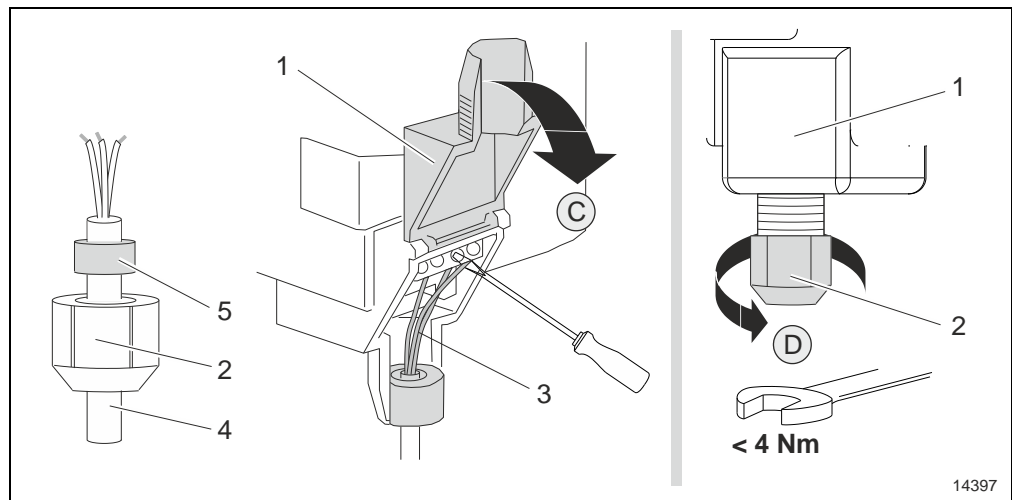


Fig. 47: Setting up the electrical connection

Set up the electrical connection in accordance with the circuit diagram:

13. Lead the connecting cable (4) through the union nut (2). Push a grommet (5) over the connecting cable (4).
14. Connect the wires (3) of the connecting cable (4). Insert the connecting cable with the grommet into the cable leadthrough.
15. Close the cover cap (1) (see arrow "C").
16. Tighten the union nut (2) by turning it clockwise (see arrow "D").

NOTE

- Keep the cover cap (1) pressed down when tightening the union nut (2).
- Comply with the specified tightening torque.

NOTE

After the unit has been switched on, press the pushbutton of the indicator LED (green). The actuator perform a stroke adaption. When the process is complete, the actuator moves to the position that is specified by the control signal.

12.6 User interface



Bring up page 9999 (Alarm) on the user interface of the control unit for viewing the messages.

Further information can be found in chapter “**Operation/ Screen contents and descriptions / page 9999, Alarm**”.



- Indication of fault messages and warnings, including the date, time, fault number and fault message text.
- Display of help texts.
- Fault acknowledgement.

The following buttons are available for editing error messages:

Symbol	Description
	Info screen/help text This button activates the online help for the selected fault message. Select a fault message.
	Accepting (acknowledging) a fault message This button is used to accept (acknowledge) the selected fault message.

NOTE

Information on how to eliminate the operating faults is given in the help texts.

12.7 Control unit

NOTE

Follow the instructions given in the circuit diagram.

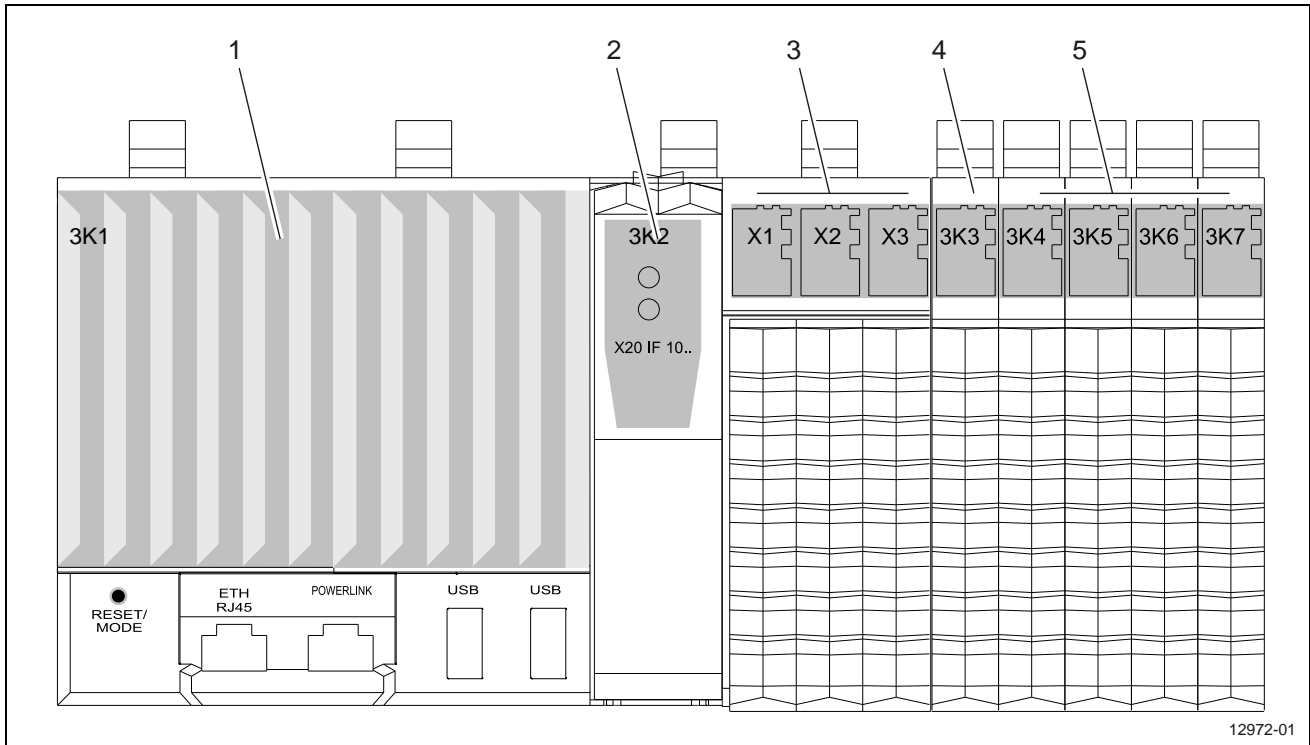


Fig. 48: Control unit (example)

- | | |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------|
| <p>1 Computer electronics, CPU incl.</p> <ul style="list-style-type: none"> - Address switch - 2 USB ports - Network connection point (RJ45) for connecting a control unit | <p>3 Input/output modules</p> |
| <p>2 Interface module (e.g.)</p> <ul style="list-style-type: none"> - Profibus - Ethercat - Profinet | <p>4 Interface module RS485 (internal communication)</p> <p>5 Optional input/output modules</p> |

NOTE

The address switches have been set customer-specifically.
For setting and checking the address switches, comply with the electric circuit diagram.

NOTE

The number of types of modules is dependent on the device specifications.

12.8 Restart

Prior to using the unit/system, it must be absolutely ensured that there are no safety-critical defects or malfunctions. After the completion of the tasks and prior to switching the unit/system on, comply with the following (if applicable):

- Ensure that any safety devices, guards and covers which were removed prior to commencing the tasks have been properly reinstalled.
- Ensure that the area around the unit/system is free from tools, materials or other pieces of equipment that had to be used.
- Clean the workspace and remove any liquid spills or similar substances.
- Check whether the safety devices and guards of the unit/system operate correctly.

13 Disconnecting the device

13.1 Notes

The following must be observed in order to avoid injuries and damage to property:

- Only qualified personnel are authorised to perform these tasks.
- Comply with the information given in the "Safety" section.

DANGER

Warning – Danger to life due to electrical current!

Negligence can lead to electric shock. Observe the following points when working on the electrical system:

- Comply with the information that is given in the "Safety" chapter.
 - Only suitably qualified persons are authorised to perform these tasks.
1. Disconnect the unit from the power supply in order to deenergise it.
 2. Secure the unit so that it cannot be switched on again accidentally.
 3. Check whether the unit is properly disconnected from the power supply and absolutely voltage-free.
 4. Earth and short-circuit the unit.
 5. Cover any adjacent live parts and secure the danger area.

WARNING

Danger of injury due to improper work practices!

Pressurised systems can be extremely dangerous.

- Wear suitable protective clothing.
- Depressurise all of the circuits prior to dismantling the system or device.

13.2 Transport and storage

NOTE

See also separate document "Unloading Large Enclosures with a Ramp" (90001347552).

NOTICE

Freezing hazard

The unit may be damaged if the medium freezes inside the unit.
Drain the unit completely prior to transporting it.

NOTE

Transport the unit carefully and in a shock-free and vibration-free manner.
Comply with the information given in the "Transport" section.

Please note the following:

- The unit must be completely drained before transport.
- The unit must be completely drained before storage.
- Ensure that the ambient conditions are in line with the "Technical data".
- Use suitable packaging material (e.g., shock-absorbing and vibration-absorbing material; preferably, use the original packaging material).
- Ensure that the packaging will protect the unit against dust and dirt.
- Pack the unit so that it is protected against shocks and falling down.
- Ship the unit on a pallet only with belts wrapped around.
- If the unit is shipped separately, use the original padding blocks and mark as follows:
 - "Protect against moisture"
 - "Transport and store in upright position"
 - "Fragile"

13.3 Dismantling

WARNING

Improper shutdown!

Pressurised systems present increased dangers.

Depressurise all of the circuits prior to dismantling the system or device.

The following steps must be performed:

1. Disconnect all of the electrical connections leading to the system or unit.
2. Disconnect the medium connections.
3. Remove all of the hose connections leading to the system or unit.
4. Depressurise the circuit. If necessary, tilt the unit in order to empty it completely.

13.4 Recycling

Note concerning the protection of the environment

The improper disposal of reusable materials (e.g. plastics, steel and aluminium parts, electronic modules) has a negative impact on the environment.

- Ensure that reusable materials are recovered for reuse. Recycling is an important contribution to the protection of the environment.
- Ensure that reusable materials are recycled.

The improper disposal of chemicals (e.g. additives) has a negative impact on the environment.

- Chemicals must not be disposed of as household waste and it must be ensured that they are not released into the sewage system or soil.
- Wear suitable protective equipment (gloves, eye protection) when performing disposal tasks.
- Chemicals must be disposed of separately (e.g. as special waste if applicable) and supplied separately to the recycling centres.
- Comply with the safety data sheets and also with the applicable national and local rules and regulations.

The components of the system or unit are mainly made of the following materials:

- plastic
- non-ferrous metals
- stainless steel
- steel and aluminium components
- electronic modules

14 Technical Data

NOTE

The values that are stated are standard values. Depending on the specific variant, deviations are possible; unit-specific information concerning the electrical system can be found in the circuit diagram.

14.1 Dimensions, connections

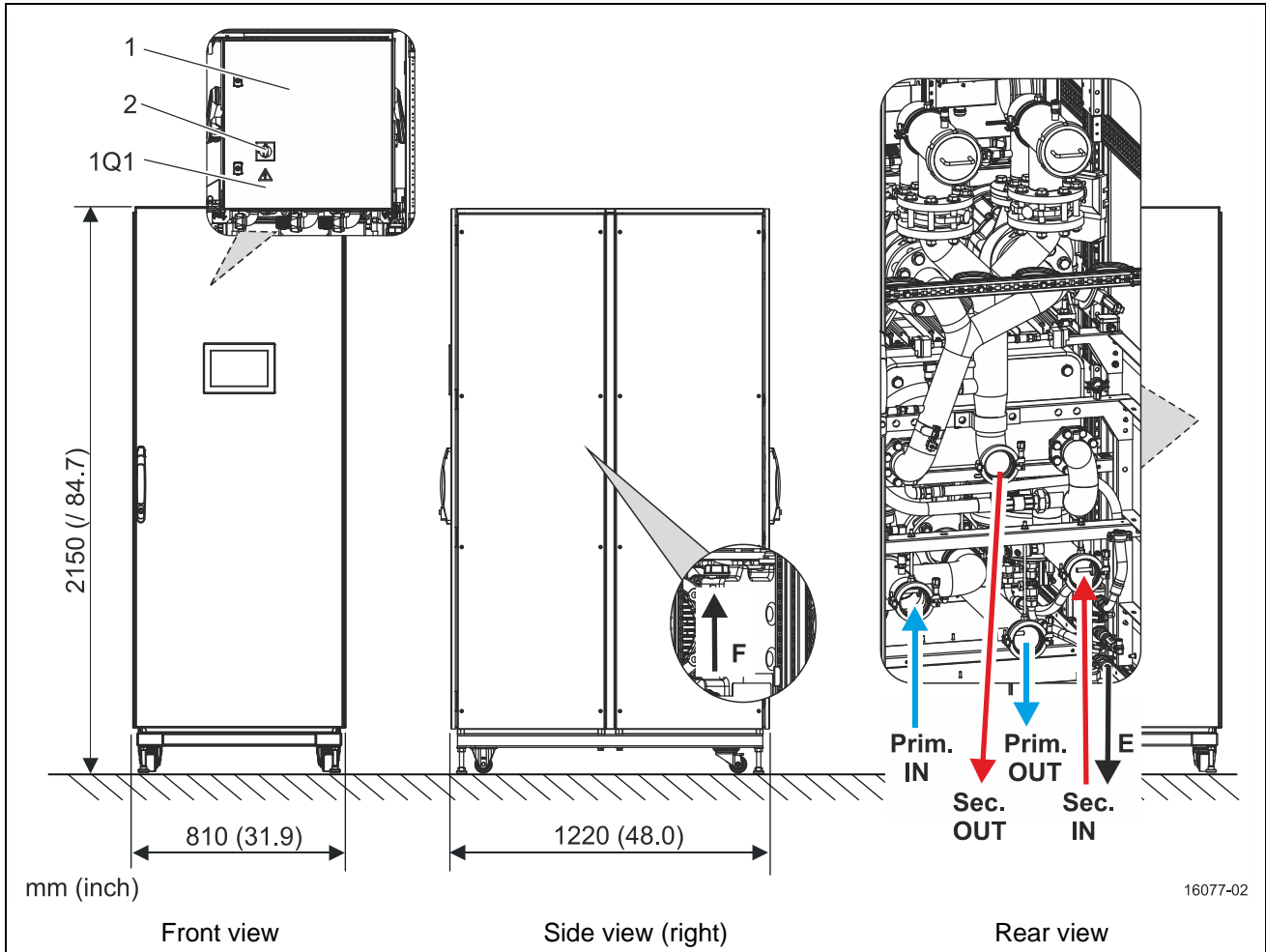


Fig. 49: CDU 800

1	Control cabinet	Prim. IN	Primary circuit inlet
2	Maintenance switch	Prim. OUT	Primary circuit outlet
1Q1	Power supply connection point	Sec. IN	Secondary circuit inlet
F	Secondary circuit filling point	Sec. OUT	Secondary circuit outlet
E	Drainage point		

14.2 General data

Ambient conditions			
- Temperature for transport and storage when completely drained	°C	-25 ... 85	
	°F	-13 ... 185	
- Temperature during operation	°C	5 ... 45	
	°F	41 ... 113	
- Liquid temperature range	°C	20 ... 70	
	°F	68 ... 158	
Filling process			
- Addition of antifreeze and anti-corrosion agents:			Antifrogen N BP C2230
- Alternative corrosion inhibitors and biocides			
Fresh water supply			
Noise emission	dB (A)	≤65	

Tolerance:		
Volume flow (based on DIN EN ISO 9906):	%	±9
Delivery head (based on DIN EN ISO 9906):	%	±7

14.3 Weights

Net weight	kg	≈1135
	lb	≈2502
Operating weight	kg	≈1285
	lb	≈2831

14.4 Primary circuit

NOTE

Fill the circuit with an antifreeze and anti-corrosion agent (monoethylene glycol, e.g. Antifrogen N). Alternatively, fill it with water and an anti-corrosion agent.

Temperature set point range at inlet with glycol (min./max.)	°C	2 ... 39	
	°F	35.6 ... 102.2	
Temperature set point range at inlet with water (min./max.)	°C	2 ... 41	
	°F	35.6 ... 105.8	
External cooling requirement	kW	810	
	BTU/h	2763720	
Required flow rate to achieve 800 kW cooling capacity at 4 Kelvin (water)	l/min	1135	
	US gal/min	300	
Maximum system pressure	bar	10.3	
	psi	150.0	
Max. inlet pressure (or differential pressure) when using a 3-way valve	bar	4.0	
	psi	58.0	
Max. inlet pressure (or differential pressure) when using a 2-way valve	bar	1.6	
	psi	23.2	
Pressure drop at 850 LPM (water)	bar	1.3	
	psi	18.5	
System volume	l	50	
	gal	13.2	
Filter in the primary circuit (mesh size)	µm	250	
Water quality	pH value	pH	7.0 ... 9.0
If there is a risk of frost, use glycol with an anti-corrosion agent. *)		%	50 max.
NOTE			
• Comply with the minimum concentration specified by the manufacturer, e.g. 25 %.			
• Glycol reduces the heating output by up to 15 % depending on the concentration.			
*) = Alternatively, use an anti-corrosion agent and biocides.	Sulphides	ppm	<10
	Sulphates	ppm	<100
	Chloride	ppm	<50
	Colonies	CFU/ml	<1000
	Total hardness CA CO3	ppm	<200
	Residues after evaporation	ppm	<500
	Turbidity	NTU	<20
Primary circuit inlet (Tri-clamp BPE-ASME)	Prim. IN	inch	3
Primary circuit outlet (Tri-clamp BPE-ASME)	Prim. OUT	inch	3

NOTE

If a "Tri-Clamp BPE-ASME" connection fitting is used, observe the dimension drawing in the appendix.

14.5 Secondary circuit

NOTE

Fill the circuit with water and an anti-corrosion agent. Alternatively, fill it with an antifreeze and anti-corrosion agent (monoethylene glycol, e.g. Antifrogen N).

Temperature set point range at inlet with glycol or water (min./max.)	°C	20 ... 45	
	°F	68 ... 113	
Required flow rate to achieve 800 kW cooling capacity at 4 Kelvin (water)	l/min	850	
	US gal/min	225	
Maximum system pressure	bar	8.6	
	psi	125.0	
Maximum external differential pressure at 850 LPM (single pump mode)	bar	3.4	
	psi	49.0	
Max allowable static pressure	bar	3.5	
	psi	50.8	
Gas pressure at expansion tank	bar	1.0	
	psi	14.5	
Pressure relief valve setpoint	bar	9.0	
	psi	130.5	
System volume	l	100	
	gal	26.4	
Filter in the secondary circuit (mesh size)	µm	50	
Water quality	pH value	pH	8.0 ... 9.5
If there is a risk of frost, use an anti-corrosion agent and biocides.			
Alternatively, use glycol with an anti-corrosion agent *).			
NOTE			
<ul style="list-style-type: none"> Comply with the minimum concentration specified by the manufacturer, e.g. 25 %. Glycol reduces the heating output by up to 15 % depending on the concentration. 			
	Sulphides	ppm	<1
	Sulphates	ppm	<10
	Chloride	ppm	<5
	Colonies	CFU/ml	<100
	Total hardness CA CO3	ppm	0
	Conductivity	µS/cm	0.2 ... 20
	Residues after evaporation	ppm	<50
	Turbidity	NTU	<20
Secondary circuit inlet (Tri-clamp BPE-ASME)	Sec. IN	inch	3
Secondary circuit outlet (Tri-clamp BPE-ASME)	Sec. OUT	inch	3

NOTE

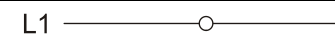
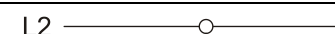
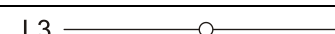
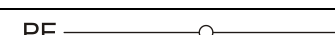
If a "Tri-Clamp BPE-ASME" connection fitting is used, observe the dimension drawing in the appendix.

14.6 Electrical connection

Supply voltage	- depending on device variant	V, Ph / Hz	380 ... 480+10/-5 % AC 3~ / 50/60
	- depending on device variant		200 ... 240+10/-15 % AC 3~ / 50/60
Input power (max.)		kW	22.2
			22.2 *)
Current consumption (rated current)		A	47.5
			93.5 *)
Current consumption (max.)		A	75
			123.3 *)
Fuse protection provided by the customer		A	100
			150 *)
Frequency tolerance	continuous	%	±1.0
	temporary	%	±2.0
Control voltage		V	24 DC±10 %

*) = referred to supply voltage 200 ... 240 V

14.6.1 Supply

Name	Circuit diagram	BMK
3 phases, PE	L1 	1 Q1: 2
	L2 	1 Q1: 4
	L3 	1 Q1: 6
	PE 	X 1 PE

14.6.2 Interfaces

Name		BMK
Data interface RS485	Modbus RTU slave	3K4: 11/21/13
		3K5: 11/21/13
Data interface RS232		3K1 X1: 26/27/28
Data interface IPV4		3K1 IF2: RJ45
Data interface IPV6		12K1 X9: RJ45

14.7 Performance curves

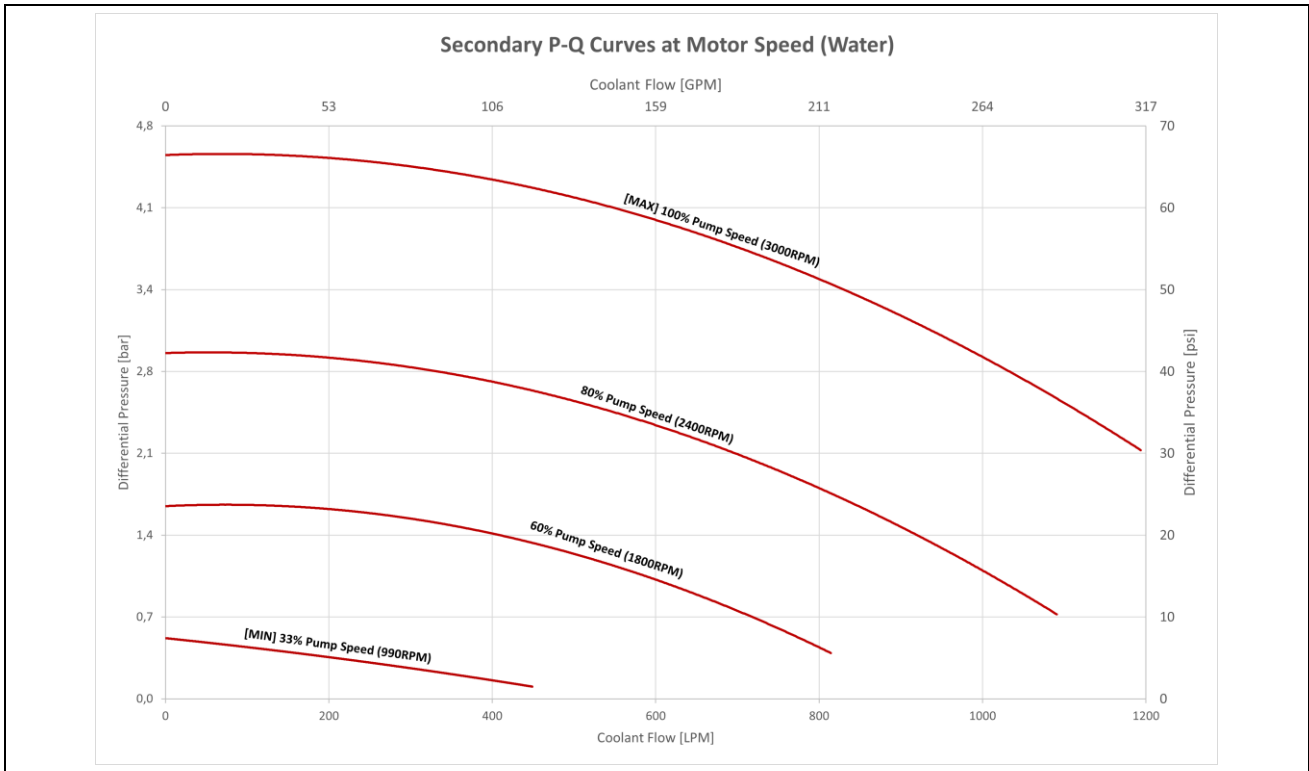


Fig. 50: Performance curve - secondary circuit (differential pressure/cooling medium flow rate)

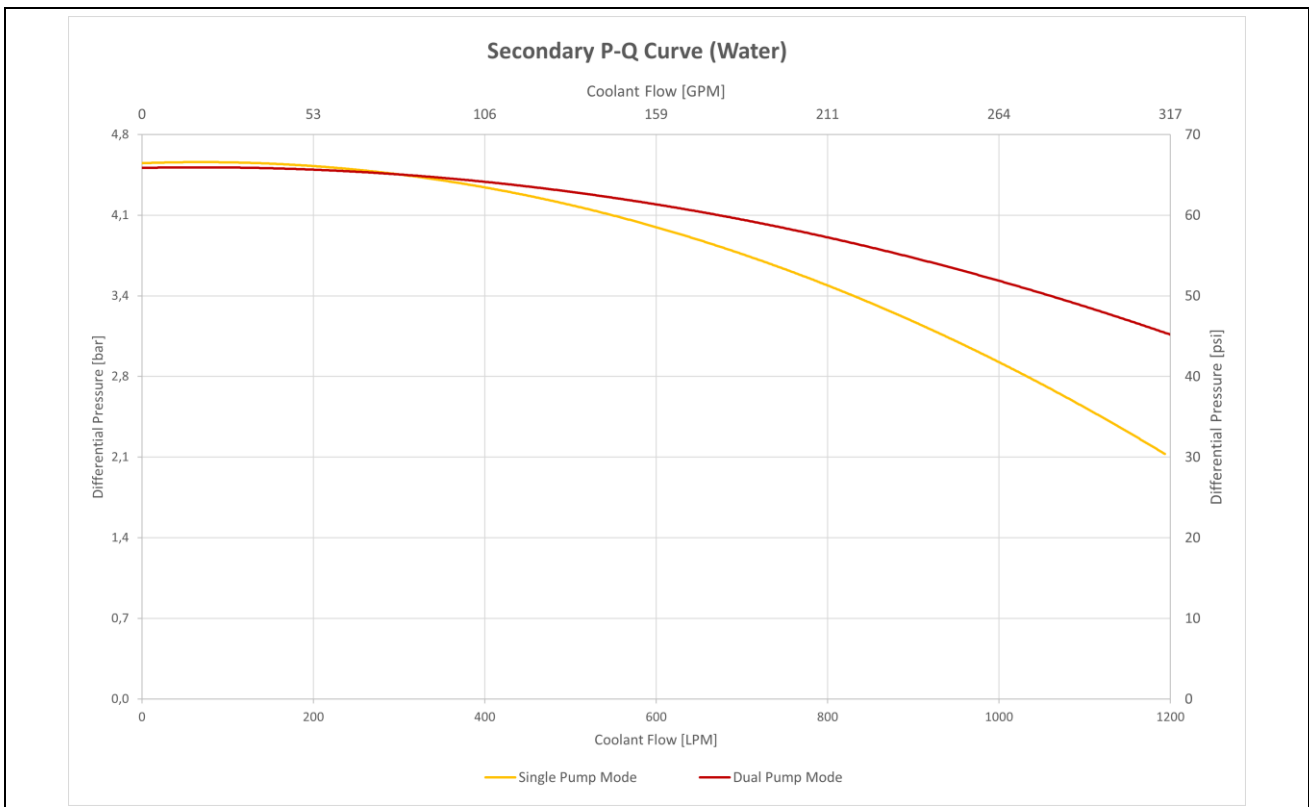


Fig. 51: Performance curve - secondary circuit (differential pressure/cooling medium flow rate)

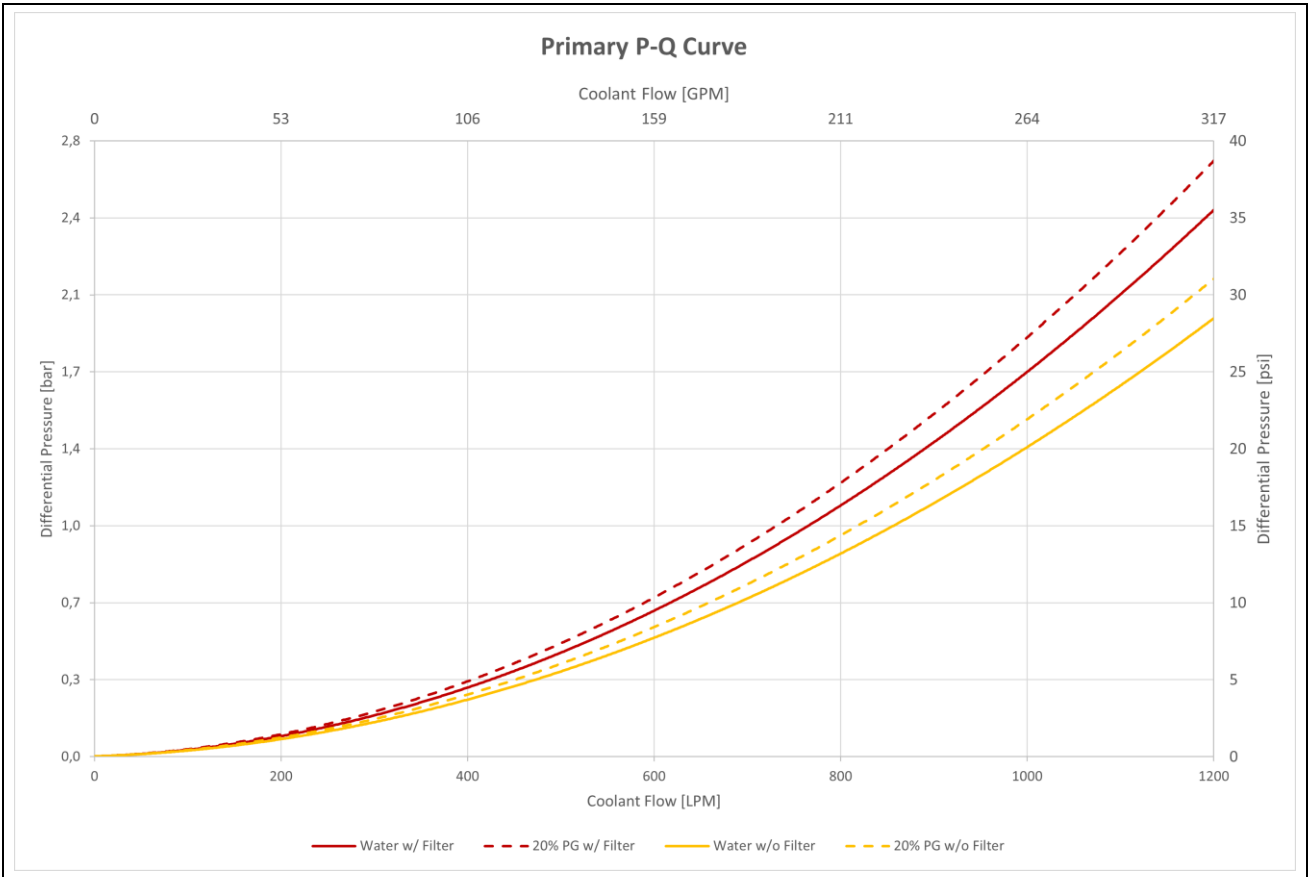


Fig. 52: Performance curve - primary circuit pressure loss

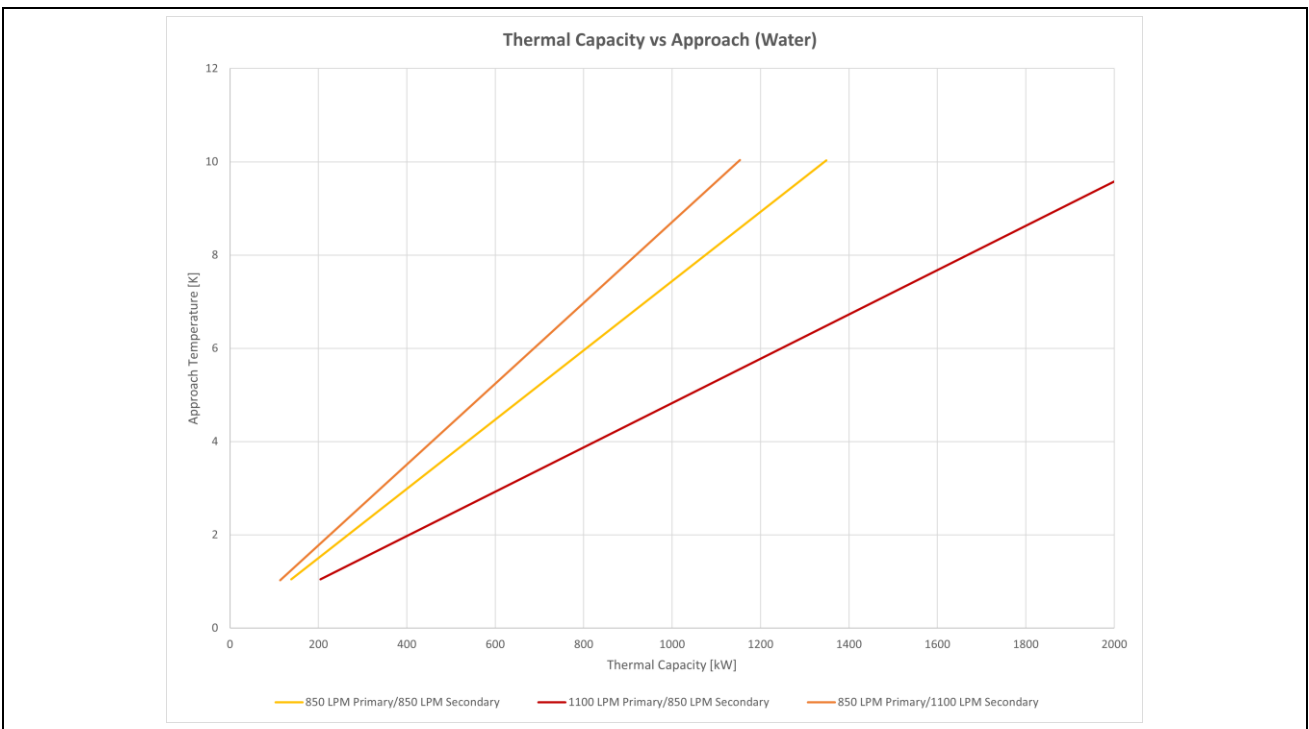


Fig. 53: Performance curve - heat capacity

14.8 Schematic flow chart

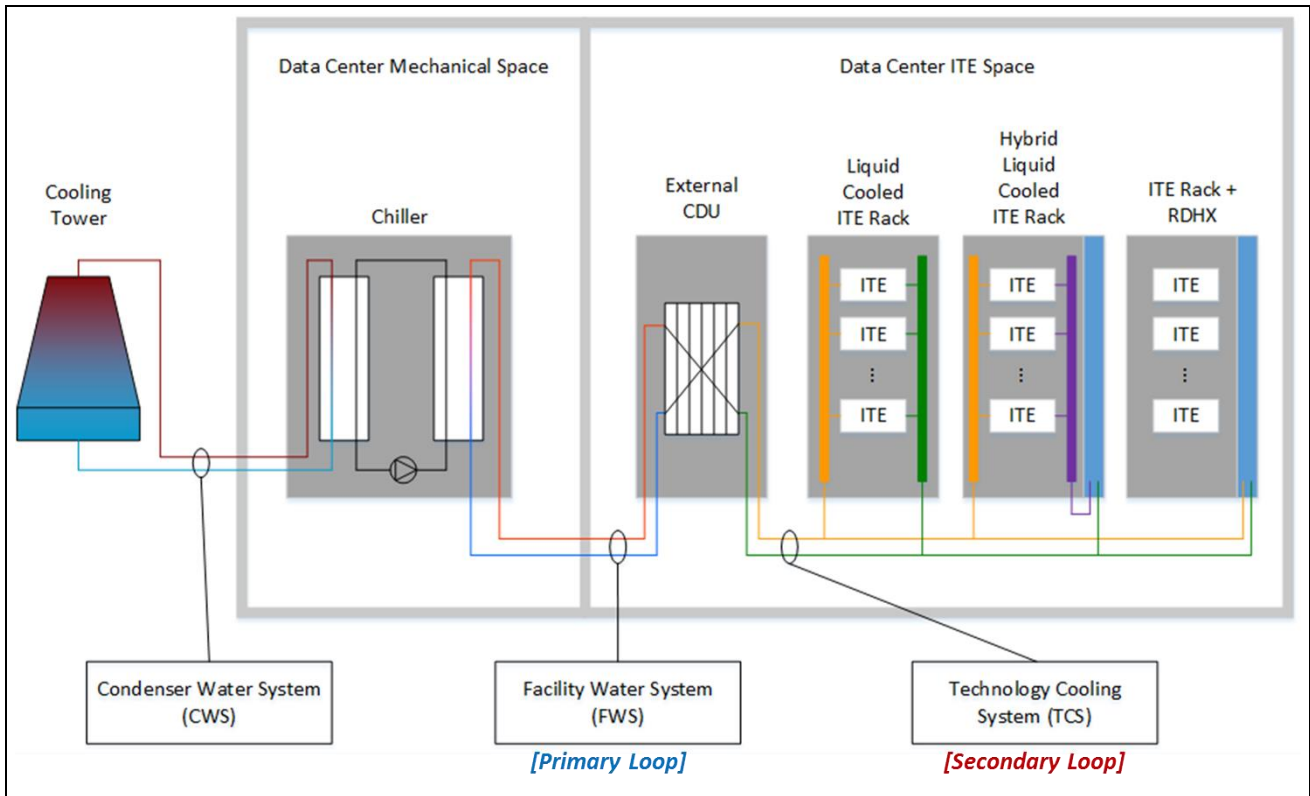


Fig. 54: Flow chart

15 Spare Parts

NOTE

Only use genuine spare parts and filters, otherwise loss of warranty.

See the "Contacts" section.

15.1 Part type

Status	Description
1	Field replaceable unit (FRU)
2	Customer replaceable unit (CRU)

15.2 Mechanical parts

	Part. - No.	Description	Type	Status
1.	10144570	Secondary pump shut valve	DN 65	1
2.	10144604	Filter shut valve (electric)	DN 80	1
3.	10144529	Filter shut valve (manual)	DN 80	1
4.	10144178	Expansion vessel	8 l	1
5.	10147541	Tank 5L compl. incl. float switch		1
6.	10145742	Pressure relief valve	1/4"	1
7.	10168179	Filter strainer compl.		1
8.	10031030	Cap valve	3/4"	1
9.	058405012	Ball valve	IG 1/2" VA	1
10.	058424012	Ball valve	1/2"	1
11.	058401007	Ball valve	1/4"	1
12.	10148312	Ball valve compl.		1
13.	10147567	Coupling	3/4"	1
14.	10147548	Coupler connector	3/4"	1
15.	10036447	Pressure gauge	0-10,0 bar	1
16.	058450126	Check valve	1/2" VA	1
17.	10036597	Primary control valve	DN 80	1
18.	10157307	Primary filter screen		2
19.	10157308	Primary filter gasket		2
20.	10163701	Secondary filter screen		2
21.	10168155	Secondary filter O-ring		2
22.	10188924	Secondary filter lid gasket		2
23.	10145537	Tri-clamp gasket		2

	Part. - No.	Description	Type	Status
24.	10145522	Clamp for tri-clamp		2
25.	10069533	Pump flange gasket		1
26.	10057998	Primary control valve gasket		1
27.	058800210	Drain tube for secondary filter	2 m	2
28.	10160027	Venting tube for secondary circuit		2
29.	10188927	Primary hose kit up		2
30.	10188950	Primary hose kit down		2
31.	10188929	Secondary hose kit up		2
32.	10188951	Secondary hose kit down		2

15.3 Electrical parts as indicated on the circuit diagram (equipment designations)

	Part no.	Equipment designator	Description	Type	Status
1.	10147012	1M3	Fill pump	24 V	1
2.	10144049	2M1, 2M2	Secondary pump		1
3.	10070492	5M1	Primary control valve motor		1
4.	10145387	5M2	Bypass valve motor	2-Way	1
5.	10145536	5M3, 5M4	Secondary outlet valve motor		1
6.	10146006	6B3, 6B4	Water leak detector		1
7.	10145426	7B1-7B5, 8B1, 8B2	Pressure sensor	0-10,0 bar	2
8.	065066360	8B5	Temperature/humidity sensor		1
9.	10145750	9B1, 9B2	Pressure switch		2
10.	10175083	11B2, 11B3	Flow sensor		1

NOTE

Installed pressure sensors can be replaced without stopping the device.

First remove the electrical connector. Then remove the pressure sensor from the device.

If you first remove the pressure sensor, the device will stop.

15.4 Electrical cabinet

	Part no.	Equipment designator	Description	Type	Status
1.	10067345	1B1, 1B2	Temperature controller		1
2.	10043789	1F1	Circuit breaker control voltage	1,4 - 2,0 A	1
3.	10008377	1F2	Automatic circuit breaker	3,0 A / 1 pole	1
4.	10145491	1M1, 1M2	Switchgear cabinet fan	24 VDC	1
5.	10045055	1Q1	Maintenance switch		1
6.	10049287	1T1	Power supply	24 VDC	1
7.	10145751	1T1	Fuse		2
8.	10086480	2F1, 2F2	Auxiliary contact		1
9.	10086465	2F1, 2F2	Circuit breaker pump 1, pump 2	30,0 - 40,0 A	1
10.	10143885	2Q1, 2Q2	Pump variable speed drive		1
11.	10148415	3K1, 3K3	Processor with Software		1
12.	10041202	3K4, 3K5	Interface assembly		1
13.	10085030	4K1	Input module temperature and humidity sensor condensate tray		1
14.	10144177	4K2	Input module pressure sensor filter 1 and filter 2		1
15.	10071839	4K3	Analog outputmodul		1
16.	10059258	4K4	Temperature input module		1
17.	10107152	4P1	Touch panel		1
18.	10145692	6B1, 6B2	Temperature sensor		1
19.	10145849	6K1	Interface	Sensor	1
20.	065500570	10K1	Relay coupler	1 pole / 24 VDC UL	1
21.	10144044	12K1	Interface adapter		1
22.	10058057	12X1	Ethernet switch	5 Port	1
23.	061031000	W-ETH01; W-ETH02	Interface cable	0,5 m	1
24.	061031005	W-ETH03	Interface cable	5 m	1

16 Index

A

About this manual7
 Alternative filling procedure51
 Anticorrosion agent.....47
 Antifreeze agent.....47, 106

C

Check of the circuit breaker105
 Checking of the expansion vessel104
 Chemicals19
 Cleaning.....17
 Connections.....27, 36, 122
 Contact Addresses6
 Control unit62, 117
 Control valve.....111

D

Description/Overview21
 Detergents18
 Dimensions122
 Direct selection68
 Disconnecting the device.....119
 Dismantling121

E

Electrical cabinet.....132
 Electrical components.....27
 Electrical connection.....41, 109, 126
 Electrical parts as indicated on the circuit diagram
 (equipment designations)131
 Expansion vessel.....104
 Explanation of the various notes9
 External fill kit.....54

F

Factory protective measures21
 Filling.....46
 Final steps after start-up59
 Foreseeable misuse22
 Further applicable documents10

G

General functions/symbols69
 General malfunctions.....108

H

Handling the CDU29

I

Installation 16
 Installation guidelines..... 34
 Installation site selection 29
 Intended use 14
 Internal fill pump..... 49
 IP address 70

L

Language 70
 Low water level 61

M

Maintenance 17, 93
 Maintenance jobs..... 99
 Maintenance plan..... 97
 Maintenance schedule 97
 Maintenance, repair and overhaul 17
 Making contact..... 6
 Manufacturer's address 6
 Mechanical parts 130

N

Notes..... 31, 60, 93, 107, 119

O

Operating faults..... 17, 107
 Operating personnel 14
 Operation 17, 60
 Overview 23, 32, 95

P

Page 1300, Settings..... 70
 Page 1310..... 73
 Page 1402..... 74
 Page 1500, Information..... 76
 Page 2200 "Overview" 77
 Page 2300, schematic system diagram..... 78
 Page 7492, sensor adjustment 81
 Page 7581, general settings 82
 Page 7582, Data log settings..... 83
 Page 7583, control settings 84
 Page 7681, temperature PID settings..... 85
 Page 7682, pump speed PID settings 86
 Page 7683, environment/primary circuit settings87
 Page 7684, low water/secondary circuit settings88
 Page 9998 "Message history" 91

Page 9999, Alarm	90	Setting Up	31
Part type	130	Skilled and certified electricians.....	93
Password	72	Spare Parts	130
Password protection	64	Start-up	16
Primary circuit	24, 36, 48, 100	Storage	120
Program overview	65	Switching the unit off.....	61
R		Switching the unit on.....	61
Receiving the CDU	28	System Layout	23
Recycling	121	T	
Replacement.....	112	Target audience	8
Residual risks	19	Technical Data	122
Residual-current-operated circuit-breaker	41	Terms of warranty	11
Restart	106, 118	Time	71
S		Transport.....	16, 120
Safety	13	Transport to the installation location	29
Safety devices	21	U	
Safety labels	20	Units	72
Save.....	71	Unit-specific	110
Screen cleaning	80	Use and storage.....	7
Screen contents	68	User interface.....	116
Seal of quality	10	V	
Seal of quality " ecoDoc"	10	Venting of closed circuits	59
Seal of quality " gdsCert"	10	W	
Secondary circuit	25, 40, 49, 102, 125	Weights	123
Service addresses	6		