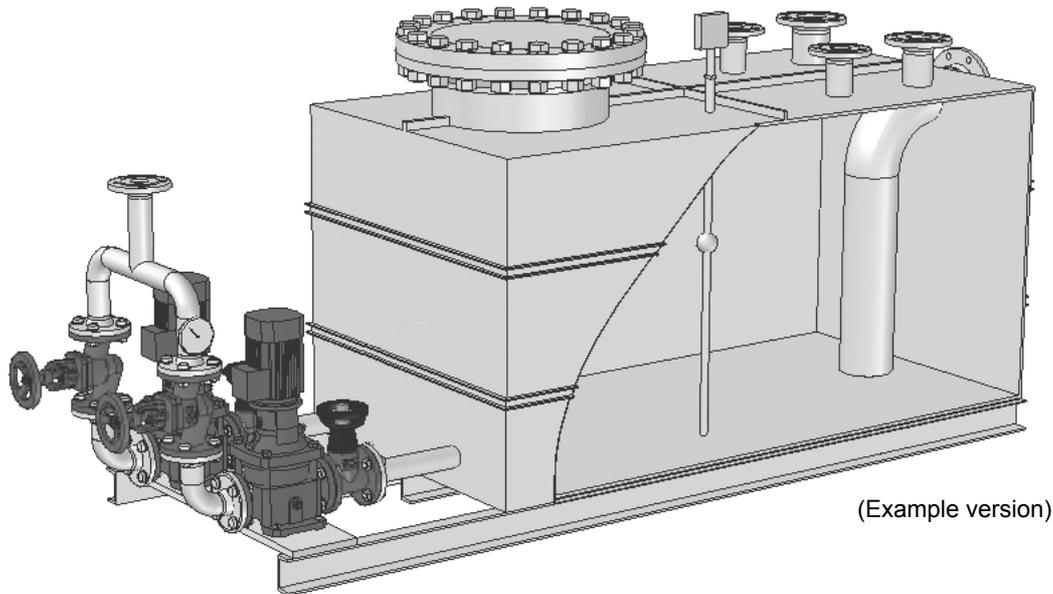


Operating and installation instructions

Condensate recovery and return station

ARI-CORsys[®] (Type CRS)



(Example version)

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1.0 General information on operating instructions

These operating instructions provide information on mounting and maintaining the condensate recovery and return station. Please contact the supplier or the manufacturer in case of problems that cannot be solved by reference to the operating instructions.

The instructions are binding for transport, storage, installation, start-up, operation, maintenance and repair.

The notes and warnings must be observed and adhered to.

- Handling and all other work must be carried out by expert personnel or all activities must be supervised and checked.

It is the owner's responsibility to define areas of responsibility and competence and to monitor the personnel.

- In addition, current regional safety requirements must be applied and observed when taking the fittings out of service as well as when maintaining and repairing them.

The manufacturer reserves the right to make technical modifications at any time.

These operating instructions comply with the requirements of EU Directives. The operating and installation instructions of all components must be observed.

Installation and operation must be in accordance with the local regulations and accepted codes of good practice.

2.0 Notes on possible dangers

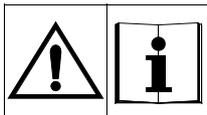
2.1 Meaning of symbols



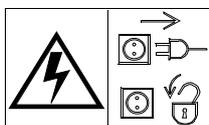
Warning of general danger.



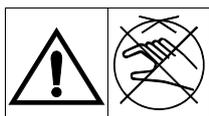
Warning of dangerous voltage.



Non-compliance with operating instructions is dangerous!
Read the operating instructions before installation, operation, maintenance or disassembly and adhere to them strictly.



Danger though voltage!
Before dismantling the hood, disconnect from the mains and secure against accidental switching on.



Danger of injury!
If the station is in operation, do not remove the barriers for moving parts.

2.2 Explanatory notes on safety information

In these operating and installation instructions dangers, risks and items of safety information are highlighted to attract special attention.

Information marked with the above symbol and “**ATTENTION!**” describes practices that can result in serious injury or danger of death for users or third parties or in material damage to the system or the environment if they are not complied with. It is vital to comply with these practices and to monitor compliance.

All other information that is not specifically emphasized, such as transport, installation, operating and maintenance instructions, as well as technical data (in the operating instructions, product documentation and on the device itself), must also be complied with to the fullest extent in order to avoid faults that in turn can cause serious injury to persons or damage to property.

3.0 Storage and transport



ATTENTION!

- *Attachments of valves and pumps, such as actuators, handwheels, hoods, motor lifting lugs, must not be used to take external forces, e.g. they are not designed for use as climbing aids, or as connecting points for lifting gear. Non-compliance may lead to death, injury or damage to property due to falling or to parts being dropped.*
- *Suitable handling and lifting equipment should be used. The lifting equipment must be connected to the existing lugs.*
See data sheet or name plate for weights.

- At -20° to +70°C dry, free from dirt.
- Protect against external force (impact, vibration, etc.).
- Do not soil or damage type identification plate and wiring diagram.

4.0 Description

4.1 Scope of applications

The condensate recovery and return station is used in steam systems and serves to return the accruing condensate for reuse.

The ARI condensate station is a compact installation premounted on a base frame and consists of high-quality individual components. The individual components of the centrifugal pump (shaft, impellers, distributors) are made of high-quality CrNi steel. Recirculation protection is ensured through the installation of non-return valves. Maintenance in the operating status is enabled by stop valves installed upstream and downstream from the pumps.

Venting the receiver to the atmosphere ensures that the condensate feed is not hindered by back-pressure in the collecting tank. The temperature display is attached directly to the receiver (max. system temperature 95°C). The pumps are fitted on the pressure side with a control pressure gauge.



ATTENTION !

- *See the individual operating instructions for applications, limits on use and possible areas of use.
If media other than condensate from water vapour are transported, specific media require special materials or exclude their use.*
- *To achieve a particularly long useful life we recommend surface coating or a stainless steel model.*
- *The system is designed for standard operating conditions. If conditions exceed these requirements, e.g. aggressive or abrasive media, the system operator should state the more stringent requirements when ordering.*

The information conforms with the relevant directives.

It is the responsibility of the system operator to ensure compliance.

The special markings on the condensate recovery and return station must be taken into account.

See the parts lists for the materials.

Please contact the supplier or the manufacturer if you have any questions.

Degree of protection IP54 in accordance with EN60529 is standard but more stringent requirements are available on request (for converting, please consult the manufacturer).

4.2 Operating principles

As it accrues the condensate is collected in the receiver of the condensate recovery and return station until a preset maximum level in the receiver is reached. If the preset maximum level is exceeded one of the installed recirculating pumps comes into operation. The condensate is pumped off until the minimum level required by the system is reached.

Pump controller (optional)

The pump controller works discontinuously. This minimizes operating hours and energy consumption.

The switching instants (pump(s) on / pump(s) off / low water and high water alarm) are preset.

The following signals and switches are integrated in the controller:

- Pump On / Off
- High water alarm (overflow)
- Low water alarm (water shortage)

The controller contains:

- Optical operating and fault displays for the pump(s)
- Operating device for manual / off / automatic mode on the control cabinet
- Regular, automatic lead pump changeover (if 2 pumps are used)

See the annex for the pump controller's technical data "wiring diagram"

Level measuring as well (optional)

The level in the receiver is visualised by means of a sensor in the display.

Safety devices

The condensate station is designed for use with atmospheric pressure.

A vent to the atmosphere protects against operations with non-permissible pressure (vapour pipe).



ATTENTION !

- *The vent must never be shut off*

4.3 System arrangement - Condensate recovery and return station

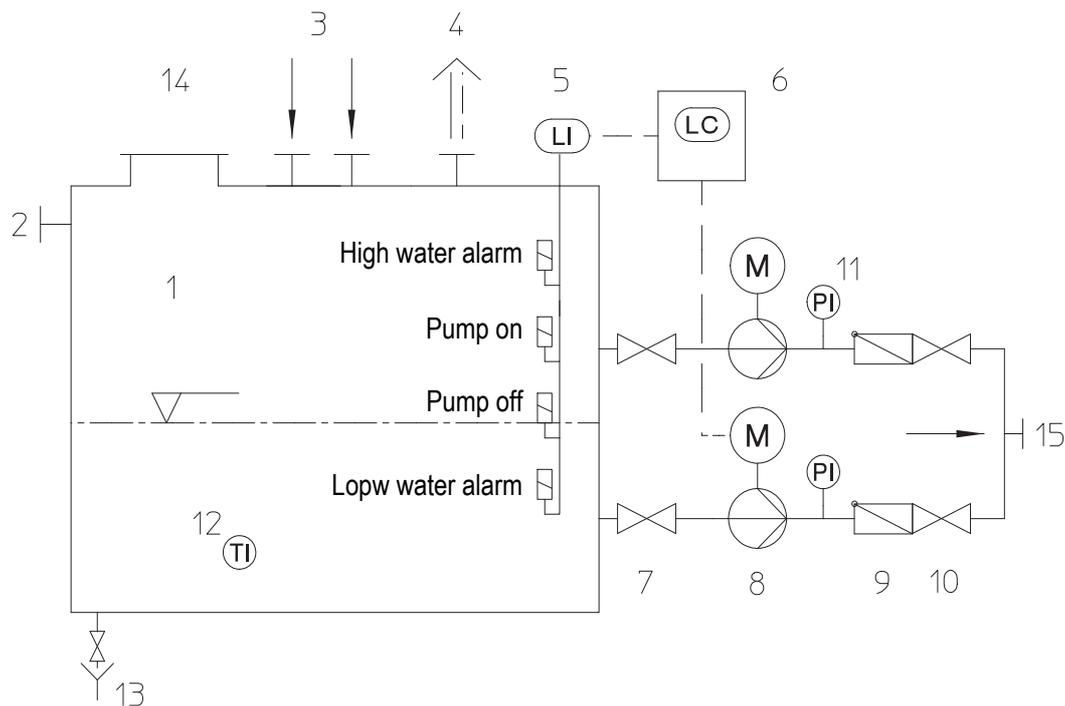


Fig. 1

4.3.1 Parts

Pos.	Designation
1	Receiver
2	Overflow (to the outside) with flash barrier (inlet under condensate level)
3	Condensate feed (the number of receiver connections varies in accordance with the size of the receiver)
4	Vapour pipe connection (vent to the outside)
5	Level measuring
6	Liquid level controller (optional)
7	Stop valve, suction side
8	Low NPSH pump
9 / 10	Stop valve, pressure side
11	Pressure gauge, complete (optional)
12	Thermometer (optional)
13	Drain to the outside
14	Inspection opening
15	Outlet

Material, dimensions, size (nominal diameter, etc.) see name plate / manufacturing drawing.

4.4 Technical data - comments

for

- Selected designs/size,
- Material, delivery head, weights, etc.

can be seen in the name plate.

4.5 Marking

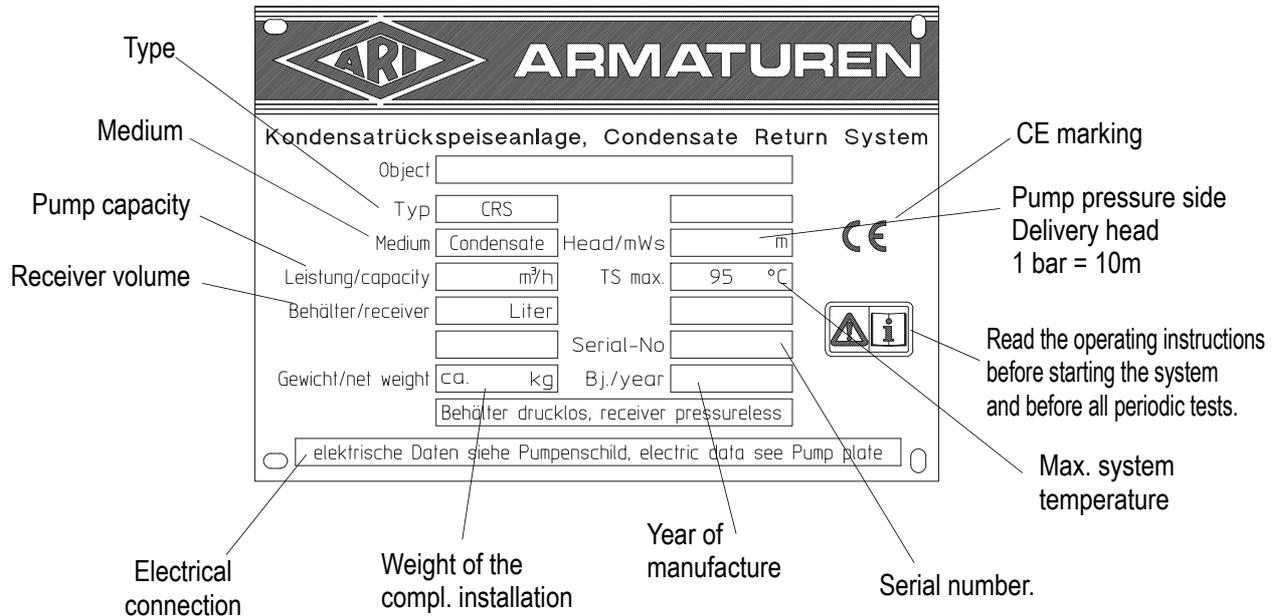


Fig. 2: Marking

Address of manufacturer: see section 12.0 Warranty / Guarantee

PED 2014/68/EU, MD 98/37/EC, EMC 89/336/EEC, LVD 73/23/EEC

Evaluation in accordance with PED 2014/68/EU (Fluid Group 2)

The evaluation of an installation (assembly of pressure vessels) is aligned to the correspondingly highest category of an installation component Art. 10 Paragraph 2.

If all the individual components of a subassembly fall under Art. 4.3 (sound engineering practice), the installation may not display a CE mark in accordance with PED.

If the subassembly falls at the outside under Category I and under Article 1, Paragraph 3.6, the subassembly does not fall under the Pressure Equipment Directive.

5.0 Installation

5.1 General notes on installation

The following points should be taken into account in addition to the general principles governing installation work:



ATTENTION !

- Remove flange covers if present.
- The interior of the condensate recovery and return station must be free from foreign particles.
- When replacing single components, e.g. pumps note the installation position with reference to flow, see mark on the pump / valve.
- Lay pipes in such a way that air cannot build up in the area of the pump.
- The condensate level must not fall below a minimum level.
(refer to wiring diagram)
- Install the condensate recovery and return station so, in such a way that damaging transverse, bending and torsional forces are avoided.
- Protect the condensate recovery and return station from dirt during construction work.
- Connection flanges must match exactly.
- Connecting bolts for pipe flanges should be mounted preferably from the counter flange side (hexagon nuts from the valve side).
At DN15-32: If valves should be mounted directly to valves, the upper flange connecting bolts should be preferably executed with studs and hexagon nuts on both sides.
- Attachments of valves and pumps such as actuators, handwheels, hoods, motor lifting lugs must not be used to take external forces, e.g. they are not designed for use as climbing aids, or as connecting points for lifting gear.
- Suitable materials handling and lifting equipment should be used. The lifting gear may only be attached to the existing lifting lugs.
See specification sheet for weights.
- The vapour pipe (vent) and overflow pipe must be connected for safe discharge. Danger of scalding !
- The vapour pipe must be dimensioned so that the receiver is always depressurized.
- The pump may not be insulated because an adequate supply of air to cool the motor must be guaranteed.
- Lay the vent pipe so that it is favourable for the flow and has a steady gradient to the inlet or discharge. Liquids must be prevented from collecting or freezing in the pipe because this is dangerous.
- Lay all pipes so that danger to persons through escaping hot water or steam is avoided.

- Planners / construction companies or operators are responsible for positioning and installing the condensate recovery and return station.
- The stations are designed for application, not influenced from weather.
- For application outside or in adverse environments like corrosion-promoting conditions (sea water, chemical vapours, etc.), special constructions or protective measures are recommended.

- Before installing the condensate recovery and return station rinse and clean the total system to remove impurities that can damage the seat / disc of the valves and block the inspection hole.
- Centre the packings between the flanges.
- To reduce any structure-born noises we recommend fitting the connection with compensators and installing the condensate recovery and return station on a level horizontal area with an oscillation-reducing base.
- Install the station so that maintenance and operating is guaranteed from all sides.

- There is a risk of a siphon effect in stations in which the pressure lines run downwards from the pump. Install a vent valve at the pump (See Fig. 3 for the layout).

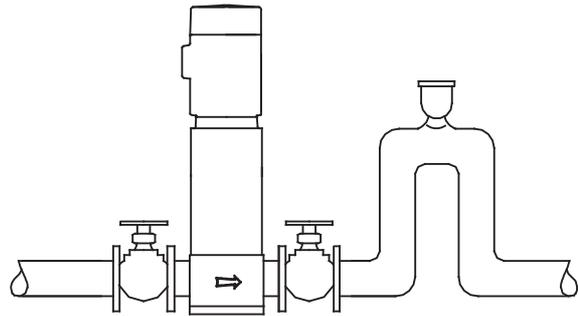


Fig. 3

5.2 Electrical connection







ATTENTION !

- *Work on electrical systems or equipment must only be carried out by qualified electricians or by trained individuals under the guidance and supervision of a qualified electrician in compliance with regional electrical requirement and regulations.*
- *When connecting the condensate recovery and return station the supply line must be disconnected from the mains (not live) during connection work. It must be impossible to switch the power on unintentionally while the mains are disconnected in this way.*

Failure to comply may result in death, serious injury or substantial damage to property.

- All electrical components require verification of the relevant EU Directive, e.g. EMC or Low-Voltage Directive.
- If only one controller assembly kit is enclosed or only premounted at the customer's request, comply with the relevant connection instructions in the operating instructions for the individual components.
- The electrical connection should be carried out by an authorized electrician in accordance with local regulations.







ATTENTION !

- *The system earthing/grounding must exist!*
- *Make sure that the electricity supply has been switched off before removing the terminal box cover and before removing/dismantling the pump.*
- *The pump must be connected to an external mains switch. All-pole disconnection is required!*
- *Danger from electricity must be excluded.*

(For details, see, e.g., the VDE/EVU regulations.)

- Connection is by means of the optional switchgear cabinet. In the delivery condition the station conforms to the IP54 requirements in accordance with EN 60529. Requirements in

excess of this must be indicated when ordering. Any conversion must be agreed with the manufacturer.

- The cable leads must at least conform to the requirements of degree of protection IP54 in accordance with EN 60529.
- The single-phase motors have an integrated thermostatic switch and do not require any additional motor protection.
The three-phase a.c. motors must be connected to a motor protective switch.
- The switching frequency (pumping out cycles) of the pump should not exceed 2 to 4 times per hour.
- See the name plate on the pump motor for the electrical data as well.
- Make sure that the electrical data on the name plate conforms to the existing power supply.
- The pumps, the toggle switches and the pump controller are fitted with heavy-gauge screwed glands for round cables.
- If the pump controller is contained in a separate package, the controller with heavy-gauge screwed glands showing downwards to a wall protected from the weather and sunshine.
The ambient temperature must not exceed the operational limits of -30°C to $+50^{\circ}\text{C}$.

5.3 Frequency converter operation

- All the pump three-phase a.c. motors for the condensate recovery and return station can be connected to a frequency converter.



ATTENTION !

- *Depending on the frequency converter type, this may cause increased noise from the motor. In addition, it may cause the motor to be exposed to detrimental voltage peaks.*
- *Grundfos motors type MG 71 and MG 80 as well as MG 90 (1.5 kW, 2-pole), all for supply voltages up to and including 440 V (see motor name plate), must be protected against voltage peaks in excess of 650 V (peak value) between the supply terminals.*
- *It is recommended that all other motors are protected against voltage peaks in excess of 850 V.*

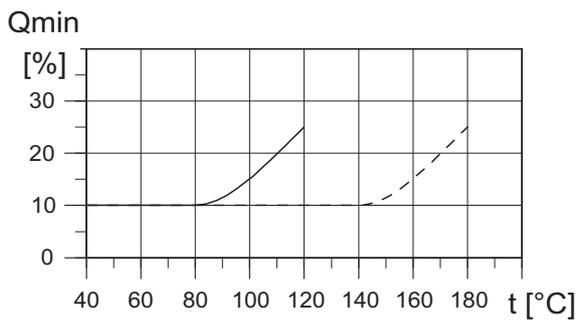
- The above disturbances, i.e. both increased noise and detrimental voltage peaks, can be eliminated by fitting an LC filter between the frequency converter and the motor.
For further information, please contact the suppliers of the frequency converter and the motor.



ATTENTION !

- *Motors other than those supplied by Grundfos:
Please contact Grundfos or the motor manufacturer.*

5.4 Min. flow rate for continuously operating pumps



Because of the risk of overheating, the pump should not be used at flows below the minimum flow rate.

The curve shows the minimum flow rate as a percentage of the nominal flow rate in relation to the medium temperature.

Fig. 4

- If the pumps are to work continuously, a minimum delivery of 15-20% (see Fig. 4) must be guaranteed, e.g. through an overflow valve.



ATTENTION !

- *The pump must never operate against a closed stop valve.*

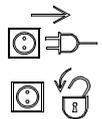
- The pressure-side stop valve must be opened at least far enough for the required delivery flow in Fig. 4 to be maintained.

6.0 Putting into operation / operation



ATTENTION !

Before putting a new station into operation or restarting a station after repairs or modification, always make sure that:



- *All work has been completed!*
- *Regional safety instructions must be observed as a matter of principle.*
- *The covers of the switchgear cabinet and the pump must be fitted.*
- *Do not start the pump until it has been filled with liquid and vented. If the pump runs dry, the pump bearings and the shaft seal may be damaged.*
- *Pay attention to the direction of the vent hole and take care to ensure that the escaping water does not cause injury to persons or damage to the motor or other components.*



- *In hot-water installations, special attention should be paid to the risk of injury caused by scalding hot water.*

6.1 Procedure



ATTENTION !

- *Make sure that the discharging medium does not cause injury to persons or damage to the motor or other components.*
- *In case of stations with hot media the danger of scalding must be avoided in particular.*

The initial start-up and all additional starts must be carried out in the following sequence.

1. Put the liquid level measuring device into operation
 - Close the discharge valve for the liquid level measuring device, open the shut-off devices
2. Put the condensate receiver into operation
 - Close the discharge stop-cock for the condensate receiver

Note: the upper and lower toggle switches must be located so that they can be overrun or underun by the floaters.

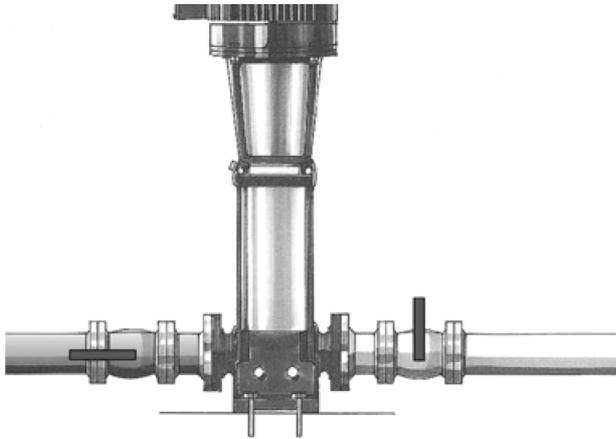
3. Switch the pump controller on
 - Control direction of pump (see point 6.2).
 - Without media pump off, plus water storage signal.
 - If the filling level (switch point) water shortage is exceeded, signal water shortage off.
 - Switch point, pump on/off checked when filling with media.
 - Check switch point, over flow (high water level) through tuning on the system control, when over filling with neutral media.

The pumps only work optimally in the design point. In operations with very low back-pressure the throughput volume can increase above the permissible max. volume and the pumps can cavitate as a result of the excessive suction resistances.

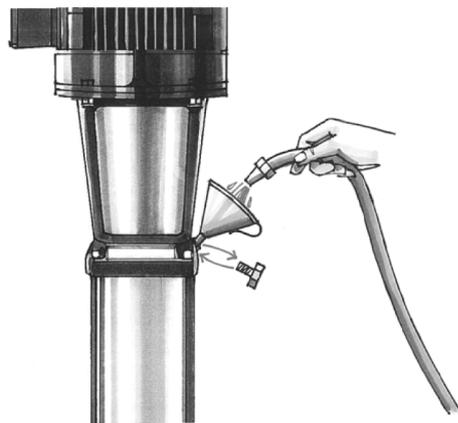
The pumps' delivery volume is reduced if the back-pressure is too high. In the worst case, the condensate volume is not recirculated completely.

6.2 Start-up

- Fill the receiver with feed-water. The first level must be over switch point pump "on".
(Level: pump's function switching starts to work.)



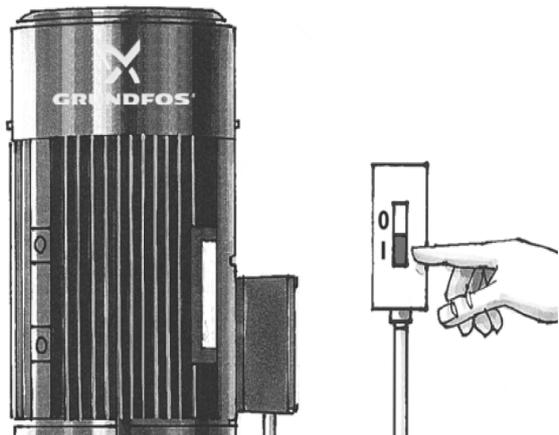
1. Close the isolating valve on the pressure side of the pump and open the isolating valve on the suction side.



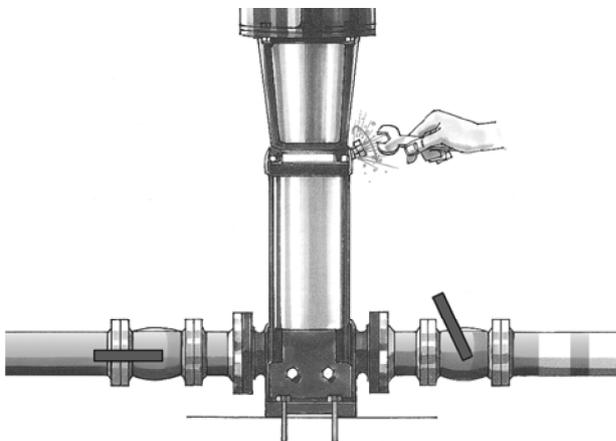
2. Remove the priming plug from the pump head. Pump is vented through filling out of the receiver. If necessary slowly fill the pump with liquid. Replace the priming plug and tighten securely.



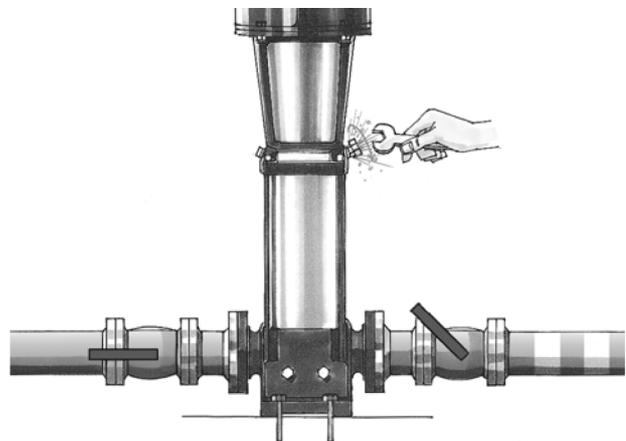
3. See the correct direction of rotation of the pump on the motor fan cover.



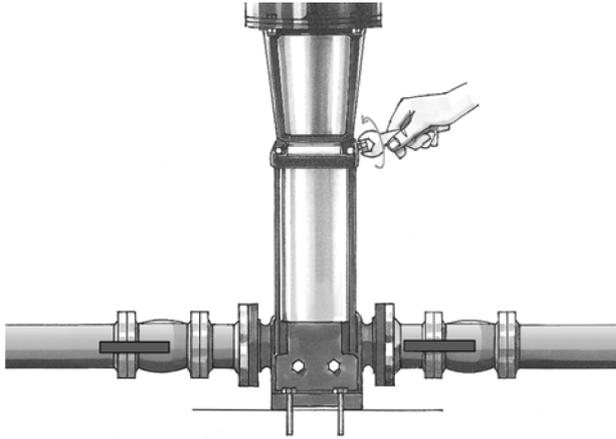
4. Start the pump and check the direction of rotation.



5. Vent the pump by means of the vent valve in the pump head. At the same time, open the discharge isolating valve a little.



6. Continue to vent the pump. At the same time, open the discharge isolating valve a little more.



7. Close the vent valve when a steady stream of liquid runs out of it. Open the discharge isolating valve fully.



ATTENTION !

- The stop valve on the pressure side and suction side must be complete open.

7.0 Care, maintenance and taking out of operation

Check the system regularly for perfect function and for any leaks. Observe the appropriate instructions for the maintenance of the equipment.

Do not clean the condensate recovery and return station with high-pressure appliances or with solvents or cleaning agents that are aggressive, detrimental to health or easily flammable.

Check the sealing points of the switchgear cabinet and the pump covers (terminal) during or after cleaning.

If leaks are detected at the switchgear cabinet-pump connection (electrical connection), remove the seal and replace with a new one.

	ATTENTION!
	- Before starting work on the pump, make sure that all power supplies to the pump have been switched off and that they cannot be accidentally switched on. This must be done by qualified personnel only!
	- If the station is in operation, do not remove the barriers for moving parts.
	- Danger from electricity must be excluded (for details of this see, e.g., the VDE regulations and those issued by local utilities).
	- The system operator must ensure that all maintenance, inspection and assembly work is carried out by authorized and qualified skilled personnel that has acquired their information through a detailed study of the assembly and operating instructions.
	- Work on the station may only be carried out when it is at a standstill. The procedure for bringing the station to a standstill described in the assembly and operating instructions must be complied with.
	- All the safety and protective devices must be put back in place or in function immediately after this work is completed.
	- Read section "6.0 Putting into operation / operation" before restarting the plant.

The pump bearings and shaft seal are maintenance-free.

Motors that are not fitted with grease nipples are maintenance-free.

Motors fitted with grease nipples should be lubricated with a high temperature lithium-based grease; see the instructions on the fan cover.

- The current regional safety requirements must be consulted in addition when shutting the station down, or carrying out maintenance or repair work.

7.1 Unauthorized conversion and spare parts

Conversions or changes to the station are only permitted after consulting the manufacturer. Original spare parts and accessories authorized by the manufacturer serve safety. Using other parts can cancel the liability for the resulting consequences.

7.2 Taking out of operation / Frost protection

In the case of seasonal operation (motor is idle for more than 6 months of the year), we recommend greasing the motor bearing when the pump is taken out of operation.



ATTENTION !

- Before taking out of operation observe section 10.0!

Taking out of operation in reverse order, see section "6.0 Putting into operation / operation".

Procedure

- Switch the condensate pumps off.
- Close the shut-off devices for the pump discharge.
- Switch the pump controller off.
- Pumps that are not being used during periods of frost should be drained to avoid damage.
- Drain the pump by loosening the vent screw in the pump head and removing the drain plug from the base.



ATTENTION !

- Make sure that the discharging medium does not cause injury to persons or damage to the motor or other components.

- In case of stations with hot media the danger of scalding must be avoided in particular.

- Tighten the vent screw and fit the drain plug before the pump is put back into operation (see section „6.0 Putting into operation / operation“).
 - Then screw the drain plug in and tighten the large sleeve nut. Tighten the circulation valve.
- If the pumps are drained for longer standstill periods, spray a few drops of silicon oil onto the shaft between the head and the coupling. This stops the sealing surfaces from sticking together. Remove the coupling protection to do this.

7.3 Lifting the pump



ATTENTION !

*- The motors for pumps CR, CRI, CRN are supplied with lifting lugs.
These lugs must not be used to lift the complete station.*

When lifting the whole pump, note the following:

- The pumps CR, CRI, CRN with Grundfos MG motors must be lifted with the help of straps or similar devices.
If there are lifting lugs on the head or the motor flange the lifting gear must be attached here only.
- With other makes of motor we recommend lifting the motors at the head with the help of straps.
- Technical data, weights, spare parts, etc. for the pumps: see www.grundfos.com.

8.0 Troubleshooting

In the event of malfunction or faulty operating performance check that the installation and adjustment work has been carried out and completed in accordance with these Operating Instructions.



ATTENTION !
It is essential that the safety regulations are observed when identifying faults.

If malfunctions cannot be eliminated with the help of the following table "9.0 Troubleshooting table", the supplier or manufacturer should be consulted.

9.0 Troubleshooting table









ATTENTION !
- Read sections 10.0 and 12.0 prior to dismantling and repair work !
- Read sections 5.0 and 6.0 before restarting the station!
The supply voltage must be switched off at all poles before the terminal box cover is removed and before the pump is dismantled.
- It must not be possible to switch the power on unintentionally while the mains are disconnected in this way. Failure to comply may result in death, serious injury or substantial damage to property.

Fault	Possible causes	Remedy
Motor does not run when started.	Supply failure.	Connect the electricity supply.
	Fuses are blown.	Replace fuses.
	Motor starter overload has tripped.	Reactivate the motor protection.
	Thermal protection has tripped.	Reactivate the thermal protection.
	Main contacts in motor starter are not making contact or the coil is faulty.	Replace contacts or magnetic coil.
	Control circuit is defective.	Repair the control circuit.
Motor starter overload trips immediately when supply is switched on.	Motor is defective.	Replace the motor.
	One fuse/automatic circuit breaker is blown.	Cut in the fuse.
	Contacts in motor starter overload are faulty.	Replace motor starter contacts.
	Cable connection is loose or faulty.	Fasten or replace the cable connection.
	Motor winding is defective.	Replace the motor.
	Pump mechanically blocked.	Remove the mechanical blocking of the pump.
Motor starter overload trips occasionally.	Overload setting is too low.	Set the motor starter correctly.
	Low voltage at peak times.	Check the electricity supply.

Motor does not run when started.	Supply failure.	Connect the electricity supply.
	Fuses are blown.	Replace fuses.
	Thermal protection has tripped.	Reactivate the thermal protection.
	Main contacts in motor starter are not making contact or the coil is faulty.	Replace contacts or magnetic coil.
	Control circuit is defective.	Repair the control circuit.
Pump capacity not constant.	Pump inlet pressure is too low (cavitation).	Fit new pump. Use a low NPSH pump
	Suction pipe/pump partly blocked by impurities.	Clean the pump or suction pipe.
	Pump draws in air.	Check the suction conditions. Check the system control, see point 6.1.
Pump runs but does not provide water.	Suction pipe/pump blocked by impurities.	Clean the pump or suction pipe.
	Non-return valve blocked in closed position.	Repair the non-return valve.
	Leakage in suction pipe.	Repair the suction pipe.
	Air in suction pipe or pump.	Check the suction conditions. Check the system control, see point 6.1.
	Motor rotates in the wrong direction.	Fit a ventilation valve with falling pipes (see section 5.0, Fig. 3).
	The stop valves (suction an pressure side) are closed.	Open the stop valves completely.
Pump runs but does not provide water.	Suction pipe/pump blocked by impurities.	Change the direction of rotation of the motor.
Pump runs backwards when switched off.	Leakage in suction pipe.	Repair the suction pipe.
	Non-return valve is defective.	Repair the non-return valve, if necessary exchange.
Leakage in shaft seal.	Shaft seal is defective.	Replace the shaft seal.
Noise.	Cavitation occurs in the pump.	Use a low NPSH pump.
	Frequency converter operation.	See point 5.3.
High water alarm (overflow)	Level in receiver too high	Check the controller (6.1 and refer to wiring diagram)

10.0 Dismantling

	ATTENTION !
	- The supply line for connecting the condensate recovery and return station must be in the dead state i.e. disconnected while dismantling is being carried out. After being disconnected, the mains power must be prevented from being switched back on again accidentally.
	The following points must be observed:
	- Pressureless pipe system.
	- Medium must be cool.
	- Plant must be drained.
	- Purge piping systems in case of caustic, inflammable, aggressive or toxic media.
	- The operating an installation instructions of all components must be observed.

11.0 Disposal

This product or parts of it must be disposed of in accordance with the following guidelines:
Use the local public or private waste collection service.

12.0 Warranty / Guarantee

The extent and period of warranty cover are specified in the "Standard Terms and Conditions of Albert Richter GmbH & Co. KG" valid at the time of delivery or, by way of departure, in the contract of sale itself.

We guarantee freedom of faults in compliance with state-of-the-art technology and the confirmed application.

No warranty claims can be made for any damage caused as the result of incorrect handling or disregard of operating and installation instructions, datasheets and relevant regulations.

This warranty also does not cover any damage which occurs during operation under conditions deviating from those laid down by specifications or other agreements.

Justified complaints will be eliminated by repair carried out by us or by a specialist appointed by us.

No claims will be accepted beyond the scope of this warranty. The right to replacement delivery is excluded.

The warranty shall not cover maintenance work, installation of external parts, design modifications or natural wear.

Any damage incurred during transport should not be reported to us but *rather* to the competent cargo-handling depot, the railway company or carrier company immediately or else claims for replacements from these companies will be invalidated.



Technology for the Future.
GERMAN QUALITY VALVES

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