

Lipulift-C

**Grease separator with integrated sampling and pumping station,
for below ground installation**




For safe and proper use, read carefully through the instructions for use and all other documents enclosed with the product, pass them on to the end user and keep them until the end of the product's life.

The German version of the instructions for use is definitive.

Introduction

ACO Tiefbau Vertrieb GmbH (hereinafter referred to as ACO) thanks you for your trust and hands over to you a product (hereinafter referred to as the plant) which is state-of-the-art and has been tested for proper condition as part of quality controls which were executed before delivery.

 Figures in these instructions are provided for basic understanding and may differ, depending on the product version and the installation situation.

ACO Service


Accessories, refer to "Product Catalogue":  <http://katalog.aco-tiefbau.de>

ACO Service is available for further information regarding the plant, ordering spare parts and services, e.g. expert training, maintenance contracts, general inspections.


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Target group

The target group for these operating instructions is technically trained skilled personnel.

The personnel must have the appropriate qualifications,  Chap. 1.4 "Personnel qualifications". Areas of responsibility, competence and monitoring of the personnel must be closely regulated by the operator. Any lack of knowledge in the personnel must be rectified through training and instruction by adequately trained skilled personnel. Training on the system shall be carried out only under the supervision of technical skilled personnel.

Guarantee

For information regarding the guarantee, please refer to General Terms and Conditions of Business ("Allgemeine Geschäftsbedingungen"),  <http://www.aco-tiefbau.de/agb>

Symbols used

Certain information in these instructions for use is marked as follows:



-  Tips and additional information, which make the work easier
- Bullet points
- Actions to be carried out in the specified order
-  References to other information in these instructions for use and other documents

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1 For your safety



Always read the safety instructions before installing and commissioning the plant in order to prevent personal injuries and damage to property.

1.1 Intended use

Very greasy wastewater is a risk to pipelines and sanitary drainage objects. Greases and oils deposit on the walls of the pipes together with other wastewater constituents and cause corrosion, blockages and odour nuisance. Therefore, grease separators are mandatory in the industrial and commercial sectors.

This includes:


- Hotels, restaurants, refectories and canteens, soup kitchens
- Butchers' shops, slaughterhouses, meat and processed meat factories
- Canneries, ready meals producers, chip and crisp production

The integrated pump station with combined sampling option serves to collect and automatically lift wastewater above the backflow level. The wastewater is drained into the drainage sewer safely for people and without damaging structures.

Harmful substances must not be discharged into the grease separator chamber e.g.:

- Faecal wastewater
- Rain water
- Wastewater containing mineral oils and greases
- Wastewater from wet waste/shredder units
- Wastewater from slaughterhouses
- Solidifying greases in concentrated form (e.g. deep-frying fat)

The use of biologically active agents e.g. products containing enzymes for converting the greasy substances and/or for so-called self-cleaning, is not permitted in the grease separator and the inlet pipes.

Detergents, washing-up liquids, cleaning products, disinfectants and other cleaning agents, which can get into the wastewater must not form stable emulsions or contain or release chlorine. For additional information regarding suitable rinsing agents, refer to the technical information sheets (German/English) issued by the German Commercial Dishwasher Association ("Arbeitsgemeinschaft Geschirrspülen, Hagen"):  www.vgg-online.de.

IMPORTANT

- The maximum wastewater temperature must not exceed 40 °C.
- The installation fittings and components (e.g. inlet immersion pipe, pressure pipe parts) are designed for operation as a grease separator and/or pump station. They are not designed to be a step or foot board for people and storage e.g. heavy cleaning devices. The load capacity is not designed for such purposes.

Other possible uses and changes are not allowed. Installation of unapproved parts impairs safety and excludes any guarantee from ACO. In the event of replacement, only use original ACO parts or spare parts approved by ACO.

1.2 Planning drainage systems

Wastewater, in which a significant proportion of the grease exists in a non-separable (emulsified) form, cannot be treated effectively in grease separators which operate using the gravity principle.

For instance, wastewater from the following application fields:

- Dairies, cheese dairies, slaughterhouses, fish and meat processing companies
- Catering service companies e.g. catering establishments in which pure rinsing or flushing operation exists
- Waste treatment plants

The design must provide for separation of the wastewater substreams, by type, quantity and state of the wastewater contents. In this way the wastewater substreams can be treated optimally and the retained substances disposed of properly. If the formation of stable emulsions in the wastewater cannot be prevented, then special wastewater treatment plants are required (e.g. ACO wastewater treatment plants on request).


1.3 Operational regulations

Installation and operation of grease separators and pump stations are subjected to municipal statutes. For more information, please contact the responsible authorities. The following standards are listed for orientation purposes and must be supplemented and checked to ensure that they are up-to-date (Only applies for Germany. Provisions in other countries can vary).

Grease separator

- DIN 4040-100: Grease separators – Part 100: Requirements for the utilisation of separator systems according to DIN EN 1825-1 and DIN EN 1825-2
- DIN EN 1825-1: Grease separators – Part 1: Principles for design, function and testing, identification marking and quality controlling and monitoring
- DIN EN 1825-2: Grease separators – Part 2: Selecting the nominal size, operation and maintenance
- DIN 1986-100: Drainage systems for buildings and property – Part 100: Provisions in connection with DIN EN 752 and DIN EN 12056
- DIN EN 752: Drainage systems outside buildings
- DIN EN 12056 (Standards Series): Gravity drainage systems inside buildings

Examples from the listed standards:

- Sampling: When installing the grease separator, a device for sampling and inspection must be provided directly at the outlet of the grease separator and before mixing with other wastewater. The sampling is integrated in this plant. Samples must be taken from the flowing discharge water of the grease separator by qualified persons.
- Disposal: The grease separator must be drained and cleaned at least once a month. Subsequent refilling must be carried out with water (e.g. drinking water, process water, treated wastewater from the plant) which conforms to the local discharge provisions.
- General inspection: Before commissioning and every 5 years thereafter at the latest, the grease separator must be completely drained and cleaned and subsequently inspected by a properly qualified technician to ensure that it is in proper working order and operates properly.
- Operating log: The operator must maintain and keep an operating log for every grease separator and submit it to the local competent inspecting authority on request. Operating logs can be purchased from ACO Service,  Introduction Chapter “ACO Service”.

Pump station (lifting plant)

- EN 12050-2 “Wastewater lifting plants for for land and site drainage
– Part 2: Lifting plants for faecal-free wastewater”
- EN 12050-4 “Wastewater lifting plants for land and site drainage
– Part 4: Non-return valves for faecal-free wastewater and wastewater containing faecal matter”
- EN 12056-1 “Gravity drainage systems inside buildings
– Part 1: General and performance requirements”
- EN 12056-4 “Gravity drainage systems inside buildings
– Part 4: Wastewater lifting plants, layout and calculation”
- EN 12056-5 “Gravity drainage systems inside buildings
– Part 5: Wastewater lifting plant; Installation and testing, instructions for operation, maintenance and use”
- EN 752 “Drain and sewer systems outside buildings”
- DIN 1986-100 “Drainage systems for buildings and property
– Part 100: Provisions in connection with EN 752 and EN 12056”

Examples from the listed standards:

- Backflow protection: Wastewater which is produced below the backflow level must be routed into the drainage system via an automatic wastewater lifting plant.
- Sampling: Execute at least 2 samplings every month
- Maintenance: Wastewater lifting plants must be operated and maintained according to EN 12056-4 in such a way as to ensure proper functioning and operating safety. Prescribed maintenance intervals for the wastewater lifting plant according to DIN EN 12056-4: Operation in commercial enterprises = every 3 months






1.4 Personnel qualifications

Activities	Person	Knowledge
Layout, operational changes	Planners	Knowledge of building systems and services and applicable standards and directives Evaluation of wastewater technology application cases Proper layout of drainage systems
Below ground installation	Skilled people	Specific knowledge of carrying out civil engineering works
Installation, commissioning, troubleshooting	Skilled people	Sanitary and electrical installation
Operation monitoring	Owner, operating company	No specific requirements

Activities	Person	Knowledge
Monthly check	Properly qualified, competent person	Approved disposal contractor
Maintenance	Expert and/or competent people	“Properly qualified technicians” according to DIN 4040-100* and/or “competent personnel” according to DIN 4040-100**
General inspection before commissioning and every 5 years	Qualified people	“Competent personnel” according to DIN 4040-100**
Disposal	Skilled people	Appropriate and environmentally friendly disposal of materials and substances, knowledge of recycling
<p>* Definition of “properly qualified personnel” in accordance with DIN 4040-100: Properly qualified personnel are personnel of the operator or designated third parties, who by virtue of their training, knowledge and practical experience can always ensure that they execute assessments or tests and inspections in the respective field properly.</p> <p>** Definition “competent personnel” according to DIN 4040-100 and/or DIN 1986-100: Properly qualified technicians are employees of companies independent of the operator company/owner, experts or other institutions, that can demonstrate that they have the required technical knowledge to operate, maintain and check separators to the scope named here and have the equipment required to test separators. In individual cases, these inspections of larger operating units may also be carried out by internal personnel of the operator who are properly qualified technicians, independent with regard to their area of responsibility and who are not bound by instructions, and who have the same qualification and technical equipment.</p>		




1.5 Personal protection equipment

Personal protective equipment must be made available to the personnel and supervisors must check that it is used or worn.

Mandatory sign	Meaning
	Safety footwear provides good slip resistance, especially in wet conditions, as well as a high degree of penetration resistance (e.g. in case of nails) and protects the feet from falling objects (e.g. during transport).
	Protective gloves protect hands from infections (moisture-tight protective gloves) and minor bruises and cuts, especially during transport, installation, maintenance and dismantling.
	Protective clothing protect the skin from infection and from minor bruising and cut injuries.
	A safety helmet protects against head injuries, e.g. in case of falling objects or knocks in the event of low room heights.
	Safety glasses and goggles protect eyes from infections, especially during launch, maintenance and repair.

1.6 Warnings

In the instructions for use, warnings are identified by the following warning symbols and signal words.

Warning symbols and signal words		Meaning	
	DANGER	Personal injuries	Hazard with a high degree of risk which, if not prevented, results in death or severe injuries.
	WARNING		Hazard with a moderate degree of risk which, if not prevented, can result in death or severe injuries.
	CAUTION		Hazard with a low degree of risk which, if not prevented, can result in minor or moderate injuries.
	IMPORTANT	Damage to property	Hazard which, if not prevented, can result in the damage of products and their functions or an item/property in the surrounding area.

1.7 Storage and Transport

IMPORTANT Note during storage and transport:

- Store the plant parts in frost-protected premises.
- If intermediate storage is required, then the tank must be protected from water ingress.
- Never drive the forks of a fork-lift truck or lift truck directly under the plant parts.
- Where possible, do not remove the packaging and transport restraints until the components are at their installation site.
- If transporting the unit parts using a crane or crane hook:
 - Comply with the accident prevention regulations
 - Check the working load limit of the crane and the slings
 - Never stand under the suspended load
 - Prevent other persons from entering the entire danger zone
 - Avoid oscillating motion (swinging) during transport

1.8 Decommissioning and disposal

IMPORTANT Improper disposal is a hazard for the environment. Comply with the regional disposal regulations.

- Completely drain and clean the plant when decommissioning.
- Separate the unit parts according to their material and hand them over for recovery or recycling.
- Electrical equipment must never be disposed of in household waste.

2 Product Description

3 functions in one product:

ACO Lipulift-C = Grease separator plus sampling possibility plus pump station in one tank

2.1 Product features

2.1.1 Plant

- Comprising: Tank, cover plate with manhole covers and accessories
- National technical approval Z-54.1-538 issued by the DIBt Berlin
- Maximum installation depth, Class D 400/SLW 60: 7.0 m
- Easy accessibility for maintenance work
- Selected material combinations for longer service life

2.1.2 Tank

Basin

- Monolithic (one-piece) basin made from high-quality, quality-monitored reinforced concrete
- Solid partition wall made of concrete divides the basin into a grease separator chamber and a pump station chamber
- Basin with rebate formation in accordance with DIN 4034 Part 1 and assembled mechanical seal
- Socket with socket seal (connection on-site to inlet pipe)
- Compression fitting and/or flange connection (connection on-site to pressure pipe)
- Socket pipe with socket seal (connection on-site to ventilation pipe)
- Socket pipe with socket seal (connection on-site to reserve cable conduit) and cable gland (sealing insert)
- Direct suction (version right or left) with compression fitting (optional, connection on-site to disposal pipe)

Grease separator chamber

- Internal cladding made from polyethylene (PE-HD) ensures additional, permanent resistance and therefore for permanent structural protection *
- Inlet submersible pipe made of polyethylene (PE-HD)
- Outlet submersible pipe made of polyethylene (PE-HD)
- Submersible pipe for direct suction (optional)

Pump station chamber

- Internal cladding made from polyethylene (PE-HD) to prevent hydrogen sulphide corrosion *
- Inlet pipe (overflow pipe from grease separator chamber) made from polyethylene (PE-HD)
- Pressure pipe unit:
 - Piping made from PVC-U up to approx. 30 – 40 cm outside the pump station chamber
 - Underwater coupling system with short guide pipe (slider pipe) made from plastic
 - Ball-type non-return valve made of cast iron EN-GJL
 - Ball valve made of PVC-U and/or gate valve made from cast iron
 - Flushing pipe connection option
 - Universal special bracket made from stainless steel
- Connection socket DN/OD 110 with socket seal (connection on-site to reserve cable conduit and/or ventilation pipe)

Integrated sampling

- Integrated in the pump station chamber (arranged via the collection area and/or pump area)
- Sampling in accordance with 4040-100:
 - Overflow pipe extends approx. 30 mm freely into the pump station chamber
 - Gradient of at least 160 mm
 - Utilising a wide-neck bottle for sampling

* The grease separator chamber and the pump station chamber can be optionally equipped with a standardised internal coating instead of the PE-HD inliner.

2.1.3 Cover plate, complete

- Cover plate made from concrete with maintenance opening:
 - 2x clear opening width Ø 600 mm (NS 2/200 – 10/1000)
 - 2x clear opening width Ø 800 mm (NS 10-20/4000)
- Manhole covers Class D 400 made from cast iron:
 - 2x clear opening width Ø 600 mm (NS 2/200 – 10/1000)
 - 2x clear opening width Ø 800 mm (NS 10-20/4000)

2.1.4 Accessories

Submersible pumps

- Submersible pumps (10 m connection cable) with assembled coupling piece:
 - Delivery head from 2 to 19 m
 - Pump output from 4 to 85 m³/h
- Submersible pumps are designed to match the nominal size of the grease separator and are optimally suited for this purpose

MultiControl Duo control

- For regulating the level for liquid statuses. The filling level can be optionally determined via pneumatic pressure (with/without air bubble injection) or an external sensor (4 – 20 mA)
- Direct control via motor contactor for two submersible pumps with performance up to a maximum of 5.5 kW
- 5 relay contacts for issuing fault signal
- LCD plain text display
- Hand – 0 – Auto functions
- Acknowledge button
- Forced switching for the pumps (24 hours)
- Internal acoustic alarm
- High water level alarm, isolated
- Operating hours counter
- High reliability
- Level registered by an internal pressure transducer
- All settings and fault messages are retained after a power failure
- Rotating field and phase failure control
- The pumps switch off automatically after 2 minutes runtime in manual operation
- Switching off of pump via switch-off point and stop delay period
- Electronic monitoring of the motor current
- Group alarm isolated and non-isolated
- “Number of pump cycles” memory
- Ampere meter
- Automatic pump changeover
- Easy operation
- Service mode
- Mains-independent alarm with battery back-up (approx. 7 h) through integrated 9 V rechargeable battery, horn volume maximum. approx. 85 dB (optional)

Level sensor

- Open pressure bell
 - Measuring principle: pneumatic filling level recording. When the liquid reaches the bottom of the pressure bell, the air within the bell is compressed. A rising liquid level activates the control. After pumping out it must be ensured that the pressure bell is ventilated (not the version with air bubble injection).
 - Utilisation: in highly contaminated, polluted and viscous medium as well as Zone 1 + 2 potentially explosive atmospheres
 - Restriction: not suitable for aggressive media and temperatures higher than 40 °C
 - Housing: grey cast iron GG
 - 20 m pneumatic control pipe

- Closed pressure bell with 40 m pneumatic control pipe

- Level sensor:
 - 4 - 20 mA output signal for hydrostatic filling level measurement in water and wastewater
 - Very easy to clean and is ideally suited for wastewater with the front flush-installed membrane (ATEX II 2 G EEx ia IIC T6: XA131P/00/a3)
 - Degree of protection IP68
 - Utilisation for ambient temperature: -10 °C to +70 °C
 - Measuring range: 0.1 – 0.4 bar
 - 20, 50 and/or 80 m connecting cable (bending radius maximum 120 mm)

Air bubble injection

- Air bubble injection (in combination with open back pressure bell): A compressor is integrated as a bypass into the hose pipe of the open pressure bell via a T-piece. The compressor permanently blows in air via the hose pipe. This prevents the open pressure bell from becoming clogged by substances that form a floating layer (e.g. fat).

Ex-safety-barrier

- Ex-safety-barrier (in combination with level sensor):
 - For separating potentially explosive and safe area. The ex-safety-barrier is an additional piece of equipment whose purpose is to achieve safe isolation of intrinsically safe electric circuits from non-intrinsically safe electric circuits. It contains limiting devices with voltage limitation for two circuits.
 - Maximum permissible ambient temperature: -20 °C to +50 °C

Protective pipe

- Protective pipe for level sensor (total length 1,700 mm)

Manhole rings

- Manhole rings made from concrete according to/similar to DIN 4034-1:
 - Characteristic size 1,500 with construction heights from 265 to 2,515 mm for NS 2/200 – 5.5/1100
 - Characteristic size 1,750 with construction heights from 265 to 2,515 mm for NS 7/700 – 10/1000
 - Characteristic size 2,100 with construction heights from 265 to 2,515 mm for NS 10 - 20/4000
- Assembled mechanical seal

Supporting rings

Manhole rings made from concrete according to/similar to DIN 4034-2:

- Characteristic size 600 with construction heights from 70 to 110 mm for NS 2/200 – 10/1000
- Characteristic size 800 with construction heights from 70 to 110 mm for NS 10 - 20/4000

Pump pull chain

Stainless steel with a pull force of 500 kg (metre goods)

Shackle

Shackle for fastening the pump pull chain on the pump handle

Rechargeable battery

12 V/1.2 aH, for retaining the alarm signal in case of power failure

Pressure pipe adapter

Pressure pipe adapter from DN/OD 50 to DN/OD 80 for NS 2/200 – 10/1000

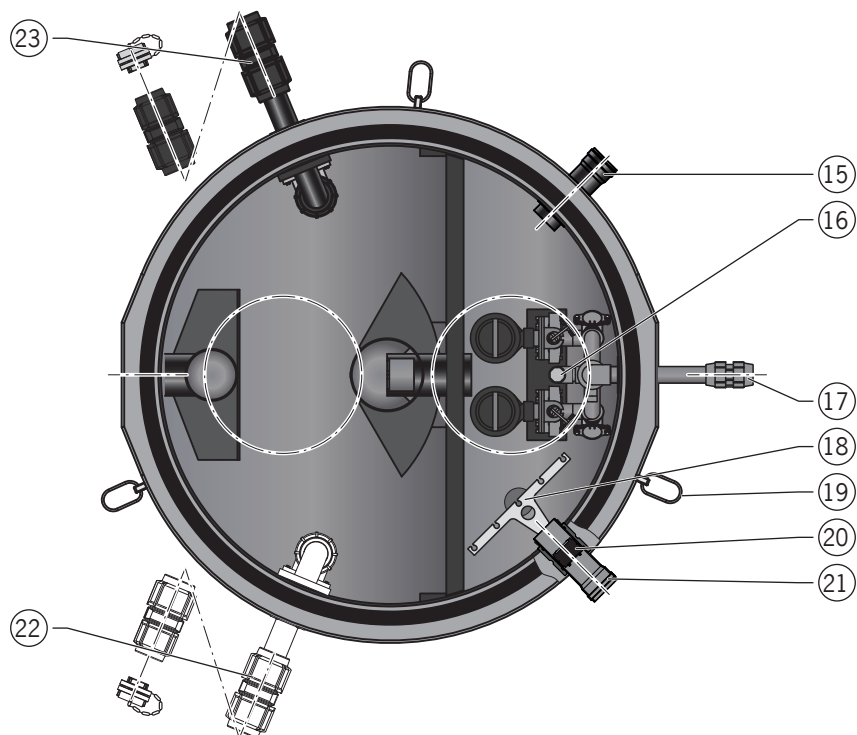
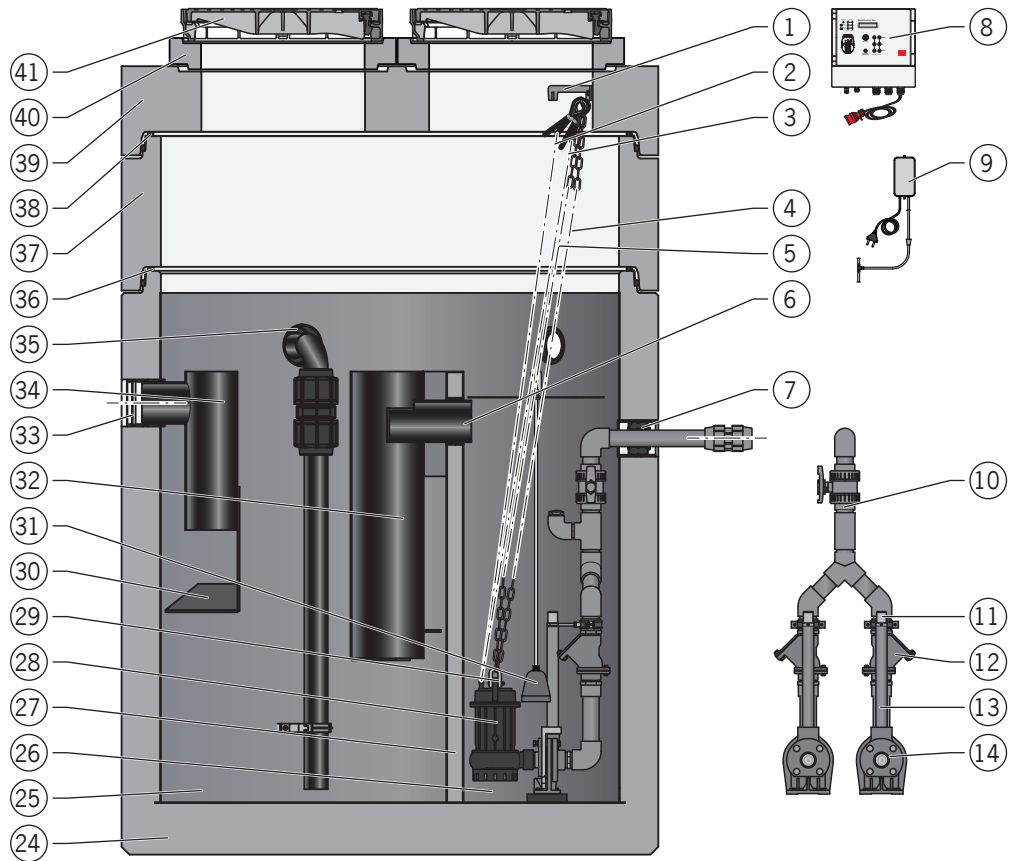
Direct extraction

- Submersible suction pipe
 - Submersible pipe
 - Submersible bend with connecting pipe
 - Compression fitting
 - Pipe clamp
- Compression fitting OD 90/OD 90
- Compression fitting OD 90/OD 75
- Disposal connection DN 65 with blank cover

Outdoor cabinet

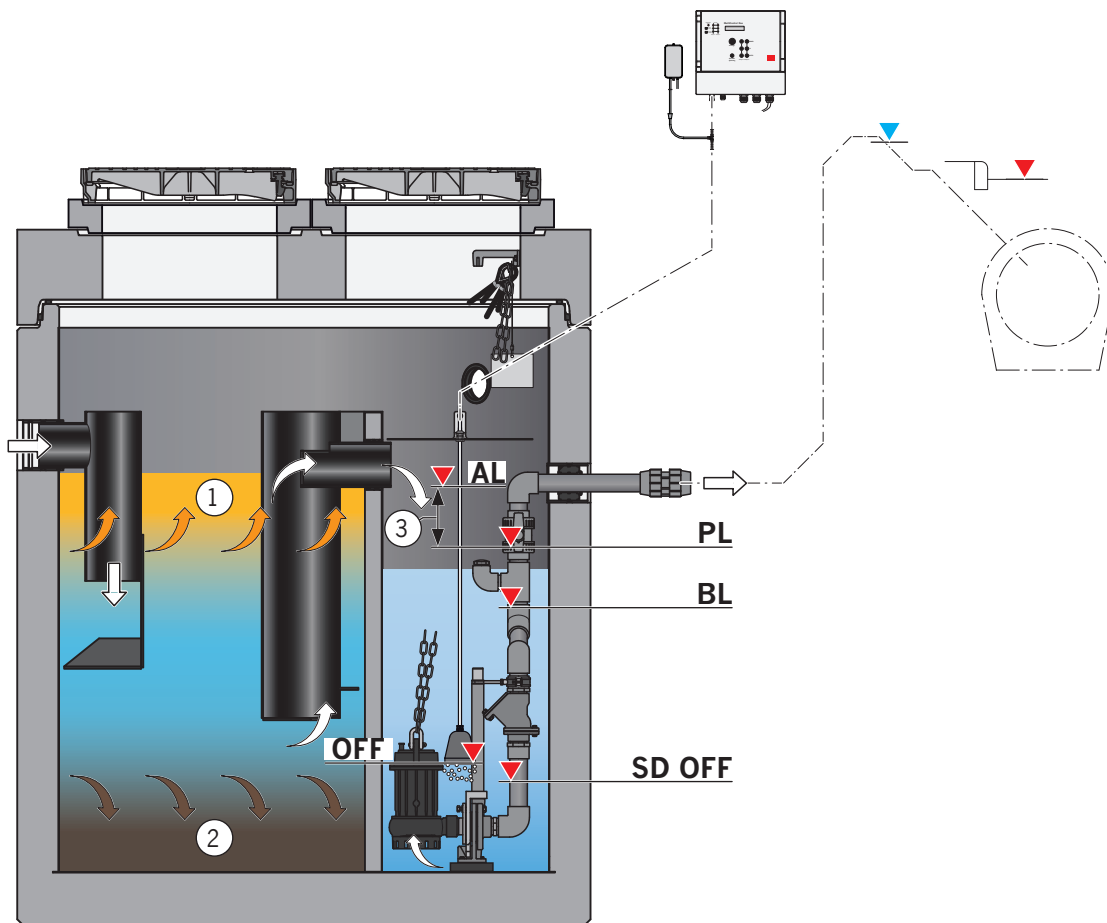
- As empty housing
- Dimension: 806 x 2,000 x 338 mm
(W x H x D)
- with horizontal partition
- Area above the partition wall: Spare space for a control unit
- With 230 V and 400 V plug socket
- Area below the partition wall: Spare space for an on-site DN 50 - 200 backflow loop,
- with 100 W heating with thermostat

2.2 Components



- | | |
|---|--|
| 1 = Chain holder | 23 = Direct suction, complete (optional), version left |
| 2 = Connecting cable Pump 1 | 24 = Basin (tank) |
| 3 = Connecting cable Pump 2 | 25 = Grease separator chamber (with Inliner) |
| 4 = Pump pull chain (optional) for Pump 2 | 26 = Pump station chamber (with Inliner) |
| 5 = Pump pull chain (optional) for Pump 1 | 27 = Partition wall |
| 6 = Inlet pipe (pump station) | 28 = Submersible pump (optional) |
| 7 = Pipe feed-through | 29 = Shackle (optional) |
| 8 = Control (optional) | 30 = Baffle plate |
| 9 = Air bubble injection (optional) | 31 = Level probe (optional) e.g. open pressure bell |
| 10 = Ball valve and/or gate valve | 32 = Submersible outlet pipe |
| 11 = Clip on nipple | 33 = Socket with socket seal (connection on-site to inlet pipe) |
| 12 = Ball retaining valve | 34 = Submersible inlet pipe |
| 13 = Slide pipe | 35 = Sealing plug |
| 14 = Underwater coupling system-automatic | 36 = Mechanical seal according to DIN 4034 |
| 15 = Socket with socket seal (connection on-site to ventilation pipe) | 37 = Manhole ring (optional) for adapting the 38 |
| 16 = Flushing connection (optional) | 38 = Mechanical seal (optional) according to DIN 4034 |
| 17 = Compression fitting and/or flange connection (connection on-site to pressure pipe) | 39 = Cover plate |
| 18 = Probe holder | 40 = Support ring (optional) for adapting the installation depth |
| 19 = Lifting lug | 41 = Cover (maintenance opening and/or inspection opening) |
| 20 = Cable feed-through (sealing insert) | |
| 21 = Socket pipe with socket seal (connection on-site to reserve cable conduit) | |
| 22 = Direct suction, complete (optional), version right | |

2.3 Operating principle



Grease separator Pump station

- 1 = Grease collection area
- 2 = Sludge collection area
- 3 = Sampling position (available height approx. 160 mm)
- ▼ = Pipe base, backflow loop
- ▼ = Backflow level

Water levels in pump station:

- AL = High water level alarm
- PL = Peak load
- BL = Base load
- OFF = Pump OFF
- SDP OFF = Stop delay period OFF

Grease separator

Before commissioning, the grease separator must be filled with water until it overflows into the pump station. The grease separator operates physically according to the gravity principle. The different densities are used to separate grease/oil from wastewater. Animal and vegetable greases/oils have a lower specific density than water and therefore rise to the surface (grease collection area). Wastewater constituents with a higher density than water e.g. sludge, sink to the bottom in the sludge collection area. Utilising the submersible pipes at the inlet and outlet and the partition wall enables the freely separable and settle capable substances to remain in the grease separator. The contents must be completely disposed when the maximum storage capacity of sludge and grease has been reached or once a month at the latest.

Sampling

The wastewater from the grease separator flows into the pumping station with a free gradient via the inlet pipe projecting over the partition wall. There is sufficient space between the pipe bottom of the inlet pipe and the water level PL (peak load) to take a sample from the draining water of the grease separator (e.g. with a 1 litre wide-neck bottle).

Pump station

The resulting wastewater from the grease separator flows into the pumping station with a free gradient via the submersible outlet pipe (grease separator) and inlet pipe. The assembled level sensor (sensors) for level switching are connected to the control. If necessary, the submersible pumps can be switched on and off or the high water level alarm can be triggered. An optional air bubble injection for the open pressure bell prevents the hardening of a floating layer in the pressure bell which leads to clogging.

The water level in the pump station is shown in the display panel of the control.

If the water level reaches the base load (BL), then a submersible pump switches on and pumps the wastewater through the pressure pipe above the ▼ “Pipe base, backflow loop” level. From there the wastewater flows by gravity to the drainage sewer.

Two ball retaining valves prevent a backflow from the pressure pipe and into pump station.

If the water level falls to the pump OFF (OFF) level, then the submersible pump switches off.


With a set stop delay period (SDP), the submersible pump remains activated and the water level continues to be lowered to the stop delay period OFF (SDP OFF) level.

The pump station is equipped with two submersible pumps:

- With each new start, alternating operation is executed.
- If one submersible pump fails, then the second submersible pump switches on.
- If the wastewater inflow is higher than the delivery performance of one submersible pump and the water level rises to the peak load (PL) level, then the second submersible pump also switches on.

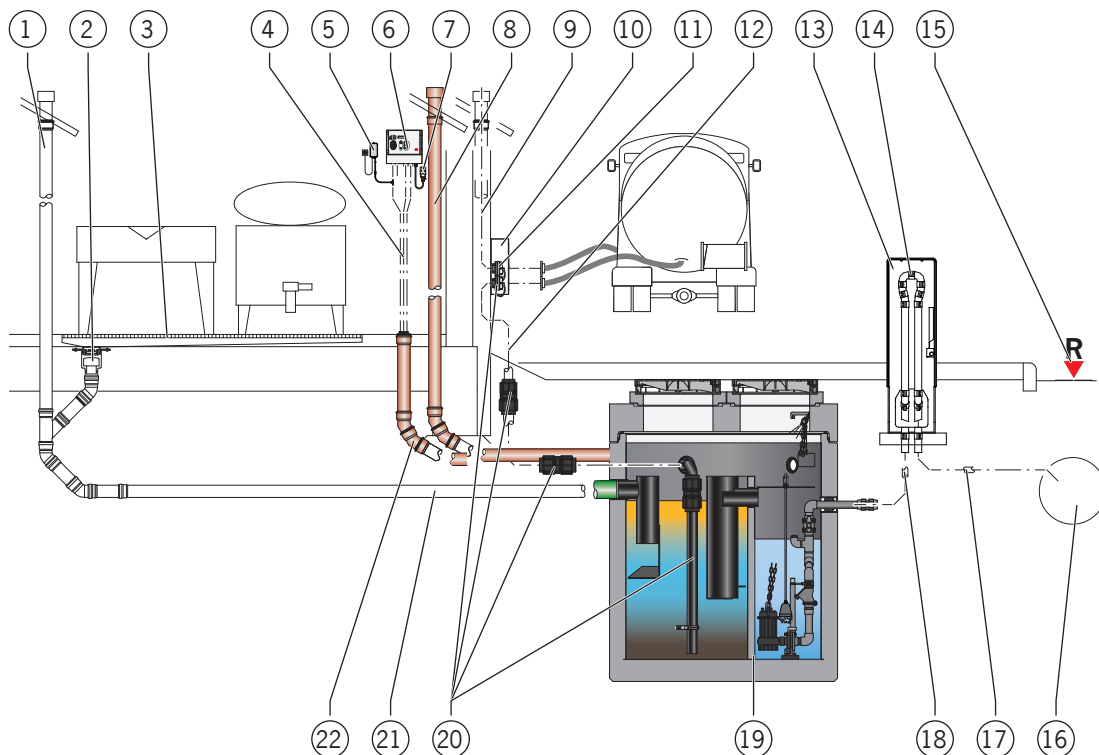
3 Installation

The specifications of EN 1825 -2 12056-5 as well as the regional provisions, directives and regulations must be complied with for the installation.

IMPORTANT Always ensure the required qualifications of personnel,  Chapter 1.4 "Personnel qualifications".

3.1 Installation example

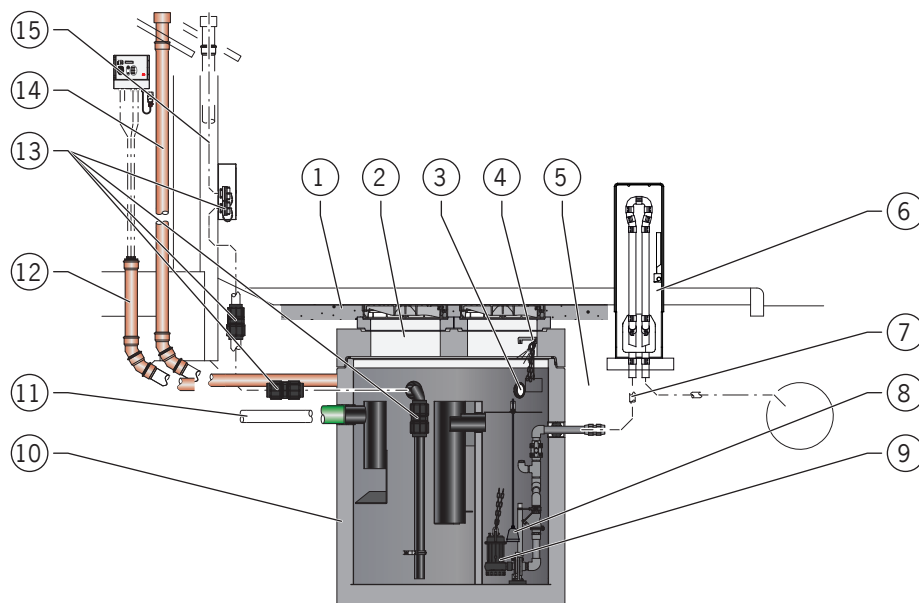
The example shows the installation of a plant for draining a kitchen. The components used can differ, depending on the installation situation.




- | | |
|--|--|
| 1 = On-site ventilation pipe (inlet pipe grease separator) | 8 = On-site ventilation pipe Lipulift-C |
| 2 = Floor gully (optional) | 9 = On-site pendulum gas pipe |
| 3 = Channel (optional) | 10 = Connection box (optional) |
| 4 = Connecting cable and control cable | 11 = Connecting coupling with blank cover (optional) |
| 5 = Air bubble injection (optional) | 12 = On-site "direct suction" pipe (optional) |
| 6 = Control for MultiControl Duo | 13 = Outdoor cabinet (optional) |
| 7 = On-site CEE power socket | 14 = On-site backflow loop |
| | 15 = Backflow level |

- 16 = Sewage channel
 17 = On-site connecting pipe to sewer
 18 = On-site pressure pipe
 19 = Lipulift-C
 20 = Direct suction (optional)
 21 = On-site inlet pipe
 22 = On-site cable duct

3.2 Overview of earthwork and installation works




Item	Work	Description  Chapter
1	Backfilling the excavation	3.3.13
2	Installation of shaft components	3.3.4
3	Assembling cable gland	3.4.4
4	Assembling the chain holder	3.4.1
5	Digging the excavation	3.3.2
6	Installation in the outdoor cabinet (optional)	3.3.11
7	Laying and connecting the on-site pressure pipe	3.3.8
8	Assembling the level sensor (optional)	3.4.3
9	Installing the submersible pumps	3.4.2
10	Installing the tank	3.3.3
11	Laying and connecting the on-site inlet pipe	3.3.5
12	Laying and connecting the on-site blank cable pipe	3.3.7
13	Installing on-site direct suction (optional)	3.3.9
14	Laying and connecting the on-site ventilation pipe	3.3.6
15	Installing on-site pendulum gas pipe (optional)	3.3.10
-	Execute leak test	3.3.12

3.3 Earthworks

3.3.1 Specifications

Installation point

- The plant should be installed close to the source of the wastewater although preferably not in traffic or storage surface areas.
- In order to avoid unpleasant odours, it should not be placed near occupied rooms and in particular windows or ventilation openings
- Installation points in courtyards are critical with regard to odour nuisance during operation and disposal. Assistance: Always equip plants with direct suction (optional),  Chapter 3.3.9 “Installation of on-site direct suction”.
- The plant must be easily accessible for cleaning vehicles.
- The parking space for waste disposal vehicles should be paved.

Installation depth

In Germany, the minimum depth for frost-free earthworks is regulated in DIN 1054. In this standard, the depth is cited as min. 80 cm, but can be stipulated even higher due to supplementary regional ordinances or empirical meteorological values.

Installation in groundwater

When the structural prerequisites make a buoyancy safeguard necessary, then the following proposal for buoyancy safeguard applies:

The tank will have drill holes drilled in the factory, including delivery of short structural steel pieces for connection to the on-site concrete structure to be erected by the customer. Please note that we do not provide a reinforcement plan and that the calculation as well as an associated reinforcement plan must be inspected and approved by a structural engineer (client's obligation). We are happy to do this for you for a fee.

Excavated pit

- Excavation and back-filling per DIN 18300
- Embankment / work space / shoring per DIN 4124
- Under normal soil conditions, a compacted sand or gravel bed with levelling accuracy suitable for the profile is sufficient.
- Maximum ground pressure is 15.5 N/cm²
- Work must be carried out in such a way that no damage is caused to the system and the lines and that they remain in position. The subsequent subsidence of system components must be prevented by appropriate measures.
- If the levelling is made of concrete, a 5 cm thick layer of sand must be applied to it to ensure an even load distribution and to be able to compensate for any manufacturing tolerances.

- A foundation earthing electrode or earthing strip shall be provided for potential compensation during the construction phase.
- Always secure the excavation pit during the construction stage.

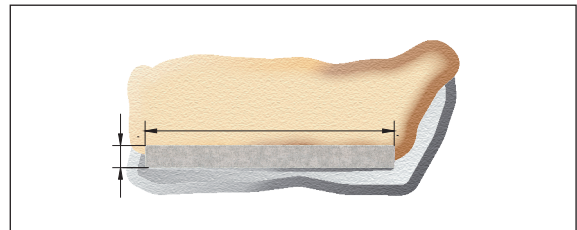
Slings for transport using lifting gear

- Tank and cover plate: Use 3-part harness with at least 5 m long strands made from chain or cables with load hooks and NG 5 shackles according to DIN 82101
- Cover and shaft components: Use 3-type part harness with at least 5 m long strands made from chain or cables with shaft jaws

3.3.2 Digging the excavation

Requirement: Excavation pits should have a diameter at least 1,500 mm larger than the external diameter of the tank.

- Excavate the pit and secure.
- Make underfill/bedding.

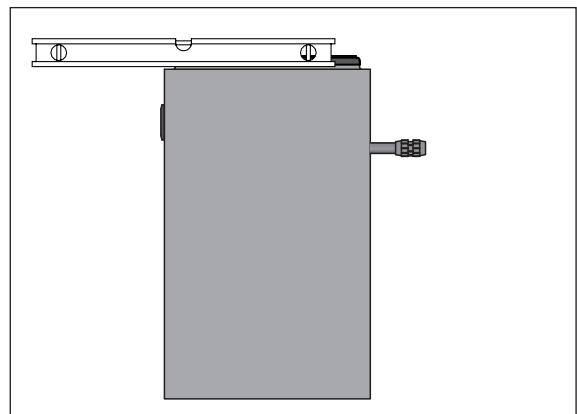


3.3.3 Installing the tank

IMPORTANT Transport lugs are designed for the load of the tank. Do not transport with shaft components placed on top.

- Bring in the tank and align horizontally.

Complete weight,
📖 Chapter 7.1.2 “Characteristic Data”



3.3.4 Installation of shaft components

Shaft rings (optional), cover plate, support rings (optional) and covers will be delivered loosely.



- Shaft components delivered by ACO in accordance with/similar to DIN 4034-1 have an ACO mechanical seal for joint sealing. The mechanical seal is a compression mechanical seal with a wedge-shaped cross section and a factory-made, closed, pre-lubricated slide sleeve. A load-distributing tube filled with fine quartz sand is permanently attached to the sealing ring.
- The mechanical seal is pre-fitted at the factory to the spigot end of the shaft component and/or the tank.

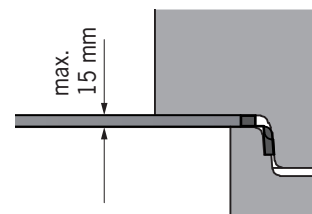


Should the mechanical seal slip out of place e.g. during transportation or on-site, then this should be tightened again as follows:

- On cold days, pre-heat the sealing, e.g. construction tank.
- Clean the spigot.
- Fit the circular rotating mechanical seal to the spigot such that the slide sleeve of the circular rotating mechanical seal faces outwards and the load-distributing tube lies centrally on the spigot.
- Position the circular rotating mechanical seal on the shoulder and spread the pre-tensioning evenly.


IMPORTANT

- Transport eyes on the shaft components are designed for their own weight load. Do not transport with other shaft components placed on top.
- After placement, there must be a maximum gap of 15 mm present in the interior.

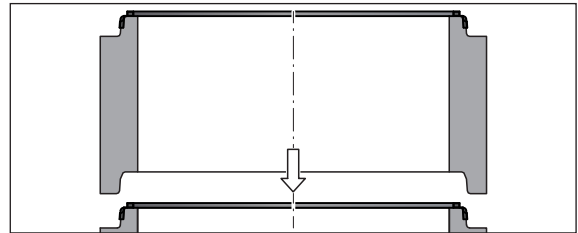


- Always observe the maximum installation depth of the tank, Chapter 7.1.1 “Dimensions”.

Manhole rings

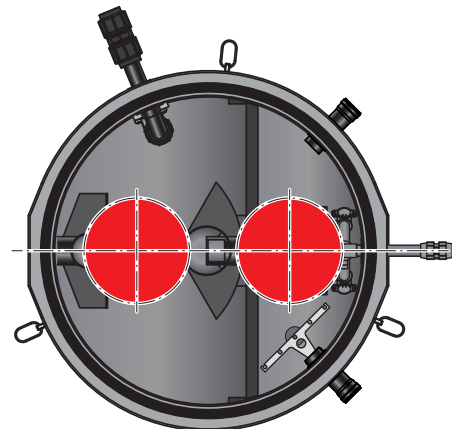
-  Manhole rings of characteristic size 1,500, 1,750 and/or 2,100 according to DIN 4034-1 can be installed between the tank and cover plate to adapt the installation depth. Shaft rings with construction heights from 265 to 2,515 mm can be optionally purchased from ACO.

- Position the shaft ring centrally above the tank, fit plumb and allow to slide on. Press carefully if there is any canting.

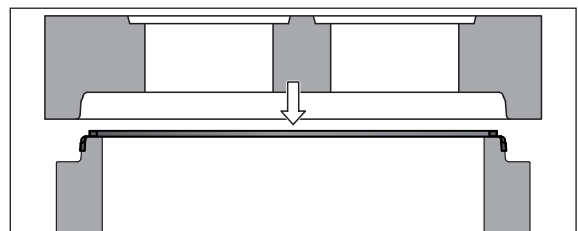



Cover plate similar to 4034-1

IMPORTANT Position the cover plate as illustrated next to this:




- Position the cover plate centrally over the shaft ring and/or the tank, fit plumb and allow to slide on. Press carefully when tilted.



Complete weight,
 Chapter 7.1.2 “Characteristic Data”.

Supporting rings

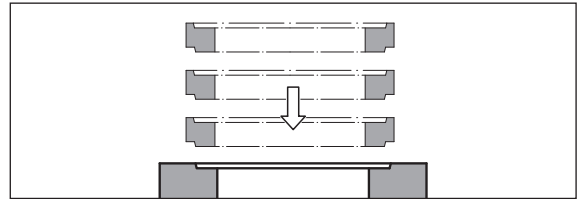
-  Standard supporting rings can be installed between the cover and the cover plate to adjust to the upper level of the terrain on site. Support rings with construction heights from 70, 90 to 110 mm are available from ACO as optional extras.

IMPORTANT Produce a maximum size of 600 mm with a clear diameter of 625 mm.

Specifications:


- The mortar joint shall not be less than 1 cm or more than 3 cm.
- Use MG III mortar per DIN 1053. Alternatively, use non-shrinking shaft-grouting mortar, e.g. Ebralit or equivalent. In doing so, the manufacturer's processing instructions must be complied with.
- Establishing a permanently watertight connection.

- Clean and moisten the sliding rebate and the underside of the supporting ring.
- Apply mortar bed on the surface of the rebate.
- Insert the supporting ring into the "retainer".




Cover

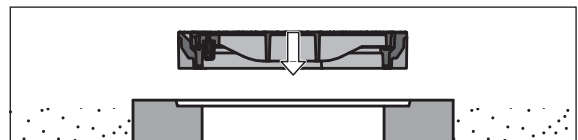
IMPORTANT

- Before the cover is installed, the excavations must be backfilled up to this level,  Chap. 3.3.13 "Backfill pit".
- Release for traffic is only permitted after an adequate bonding time has passed, once the mortar has reached a compressive strength of at least 10 N/mm².
- When installing in asphalt surfaces, it is not permitted to tar over the cover.


Specifications:

- The mortar joint shall not be less than 1 cm or more than 3 cm.
- Use MG III mortar per DIN 1053. Alternatively, use non-shrinking shaft-grouting mortar, e.g. Ebralit or equivalent. In doing so, the manufacturer's processing instructions must be complied with.
- Establishing a permanently watertight connection.
- Installation,  product-accompanying documentation: Instruction "Multitop manhole cover".


- Clean and moisten the sliding rebate of the cover plate and/or the supporting ring and the underside of the cover.
- Apply mortar bed on the surface of the rebate.
- Insert the cover in the "retainer" and align.



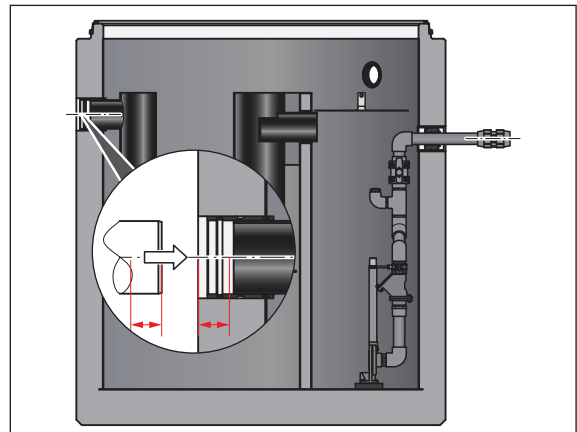
3.3.5 Laying and connecting the on-site inlet pipe

IMPORTANT Before the inlet pipe is connected, the excavations must be filled up to this level,  Chap. 3.3.13 “Backfill excavations”.


Specifications:

- Pipe nominal width,  Chapter 7.1.1 “Dimensions”.
- Lay pipes to be frost resistant.
- The pipe cross-section must not reduce in the direction of flow.
- Make flexible pipe joints.
- Lay up to the tank with a gradient of at least 1.5 – 2 %.
- Reverse gradients, and the formation of siphons or pockets are not allowed.
- Select material that is resistant to the wastewater (e.g. KML, PP, PE, PVC).

- **IMPORTANT** Mark the insertion depth on the spigot of the inlet pipe (if the spigot end of the pipe is inserted too deeply, then the installation parts will be damaged).
- Use acid-free lubricant to grease the spigot of the inlet pipe and the sealing lips of the socket seal.
- Slide the spigot into the socket seal up to the marked insertion depth.



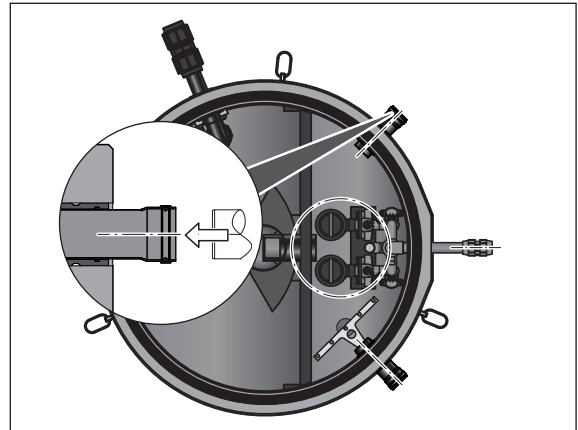
3.3.6 Laying and connecting the on-site ventilation pipe

IMPORTANT Before the on-site ventilation pipe is connected, the excavations must be backfilled up to this level,  Chap. 3.3.13 “Backfill excavations”.


Specifications:

- Pipe nominal size DN 100, OD = 110 mm
- Lay the vent stack so that it rises continuously. Do not reduce the stack cross-section.
- The end of the vent stack must be routed to above the roof or, for example, in the ground, where it does not cause any odour nuisance.
- Choose resistant material (e.g. KML, PP, PE, PVC).

- Use acid-free lubricant to grease the spigot end of the ventilation pipe and the sealing lips of the socket seal for the socket pipe.
- Push the spigot end into the socket pipe.

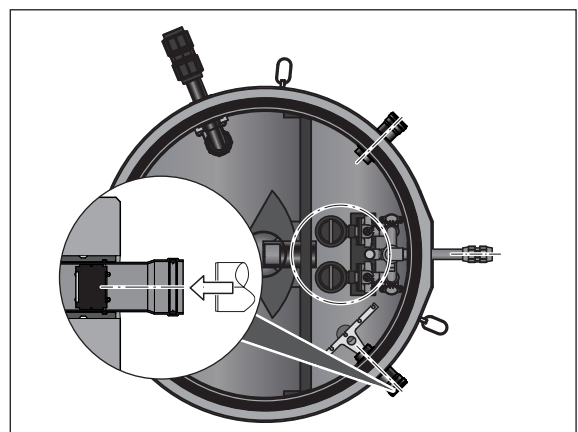


3.3.7 Laying and connecting the on-site blank cable pipe


IMPORTANT Before the on-site blank cable pipe is connected, the excavations must be backfilled up to this level,  Chap. 3.3.13 “Backfill excavations”.

Specifications:

- Pipe nominal size DN 100, OD = 110 mm
 - The blank cable pipe must be laid as always rising from the tank to the assembly location of the control unit (technology room and/or outside cabinet). Do not reduce the stack cross-section.
 - Do not use pipe bends with angles larger than 30°.
 - Lay a high-quality pull wire in the reserve conduit directly at the same time.
 - Choose resistant material (e.g. KML, PP, PE, PVC).
-
- Use acid-free lubricant to grease the spigot end of the blank cable conduit and the sealing lips of the sleeve gasket for the socket pipe.
 - Push the spigot end into the socket pipe.




3.3.8 Laying and connecting the on-site pressure pipe


IMPORTANT Before the on-site pressure pipe is connected, the excavations must be backfilled up to this level,  Chap. 3.3.13 “Backfill excavations”.

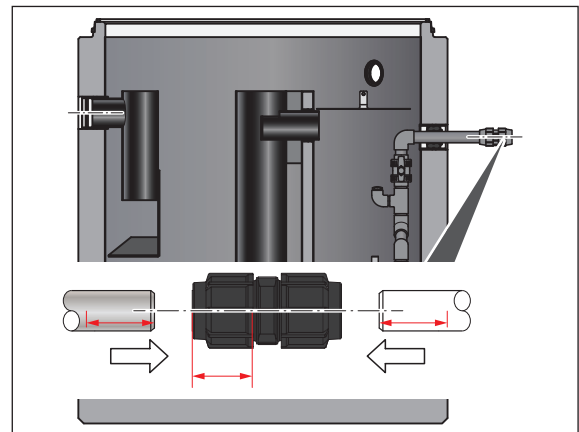
Based on normative requirements:

- The pressure pipe must be designed for at least 1.5 times the pump pressure.
- Lay the pressure pipe so that it rises continuously and is frost-resistant.
- The flow velocity in the pressure pipe must not fall below 0.7 m/s and must not exceed 2.3 m/s.
- Never connect other pipes to the pressure pipe.
- Air admittance valves are not allowed in the pressure pipe.
- Connect the pressure pipe without any tension.


Pressure pipe DN 50, DN 70 and/or DN 80 (NS 2/200 – 10/1000)

 Compression fitting ID 63 mm to ID 75 and 90 can be purchased from ACO as an optional item.

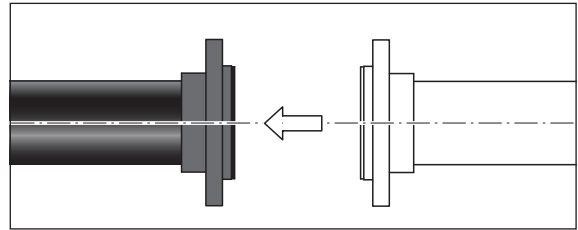
- Cut the on-site pressure pipe at right-angles and grind the spigot end.
- Use acid-free lubricant to grease the spigot end of the on-site pressure pipe and the connection pipe to the pump station.
- Determine the insertion depth  and mark it on the pipe.
- Loosen the conical nuts on the compression fitting by a 3 – 4 turn (do not loosen off completely).
- Insert the pipe to the end stop and/or marking in the compression fitting.
- Hand tighten the conical nuts.
- Tighten for an optimal strength with tools suitable for plastic compression fittings.




Pressure pipe DN 100 (NS 10-20/4000)

 Flange connection dimension according to DIN 2501/PN 16.

→ Connect the on-site pressure pipe with the on-site seal and on-site fastening material on the flange.



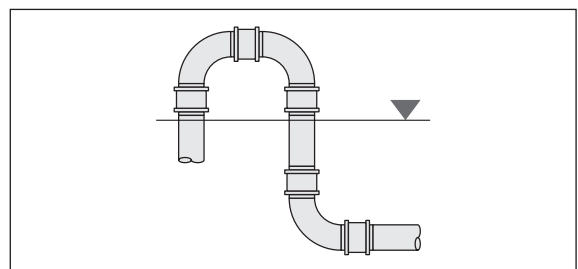
Creating the backflow loop in the pressure pipe

Based on the normative requirements, the unit should drain via a backflow loop. The backflow loop must be established above the backflow level. The installation example shows the basic layout,  Chapter 3.1 “Installation example”.


Definition of terms in accordance with EN 12056-4:

- “Back flow”: Wastewater return pressure from the sewer into the connected pipes.
- “Back flow level”: The highest level to which water can rise within a drainage system.
- “Back flow loop”: Part of the pressure pipe of a wastewater lifting plant above backflow level.

→ Lay the backflow loop above the “backflow level” ▼.



3.3.9 Installing on-site direct suction (optional)

IMPORTANT Before the on-site direct suction pipe (version as right or left) is installed, the excavation pit must be backfilled up to this height,  Chapter 3.3.13 “Backfill excavation pits”.

Specifications:

- Direct suction, pressure pipes and/or suction pipes must be designed and implemented with at least pressure rating PN 6. Utilise tension-resistant connections (maximum strength 1.5 times the pump pressure of the suction carriage) for individual pipes and fittings.
- Install direct suction made of corrosion-resistant materials (e.g. plastic pipes made of PE, PP).

- Install direct suction from the grease separator up to the transfer point (disposal vehicle) with a continuously rising gradient, implement alterations in direction in the pipe with 90° elbow bends with the largest possible radius. If the horizontal pipes are particularly long, then it may make sense to install the pipe on-site on a gradient towards the disposal point (to prevent the wastewater flowing back into the grease separator after disposal).
- Limit the maximum length to the performance of the suction vehicle pump.

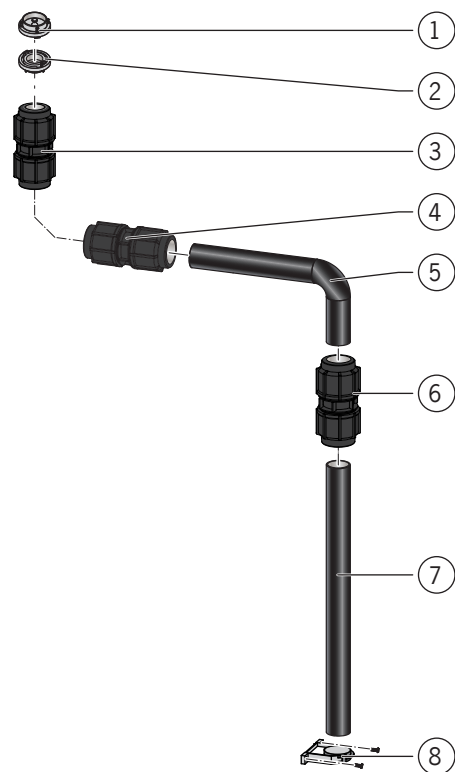


The following products for creating direct suction can be purchased from ACO as optional components:

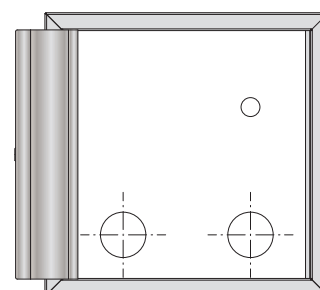
- Direct extraction

Scope of supply:

- 1 = Blank cover
- 2 = Disposal connection DN 65
- 3 = Compression fitting OD 90/OD 75
- 4 = Compression fitting OD 90/OD 90
- 5 = Submersible bend with connecting pipe
- 6 = Compression fitting OD 90/OD 90
- 7 = Submersible pipe
- 8 = Pipe clamp



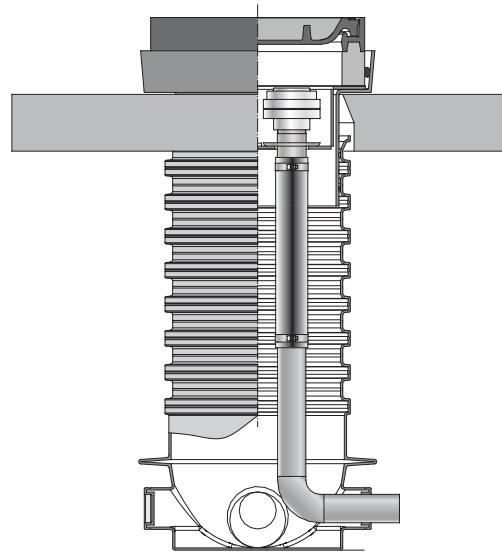
- A connection box with space for 2 connecting couplings (for direct suction pipe and pendulum gas pipe and one water connection)



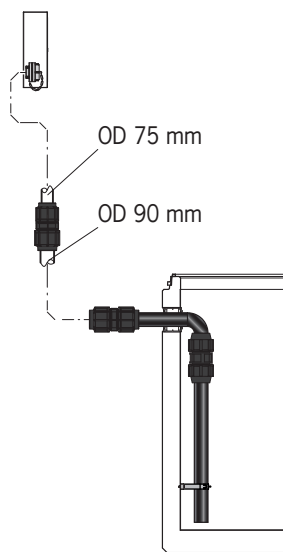
- Street installation cap



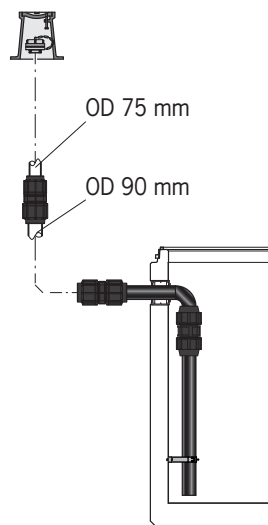
- Disposal shaft



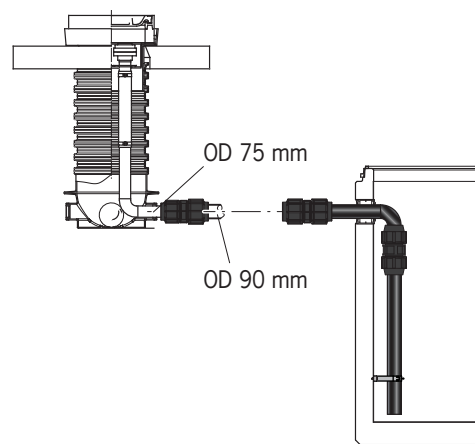
The following possibilities can be implemented for direct suction:



Variant with connection box



Variant with street installation cap



Variant with disposal shaft

- Assemble the part for direct suction according to separate, product accompanied instructions for use.

3.3.10 Installing on-site pendulum gas pipe (optional)


By using a ventilation connection, odour nuisance during the disposal process (displaced air from the suction vehicle is discharged into the ambient air) can be prevented. The pendulum gas pipe can be connected to the ventilation pipe of the grease separator and laid up to the connection location of the suction vehicle.

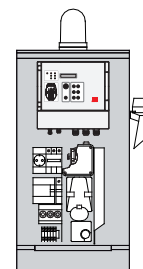
3.3.11 Installation in the outdoor cabinet (optional)

Outdoor cabinet for accommodation of accessories

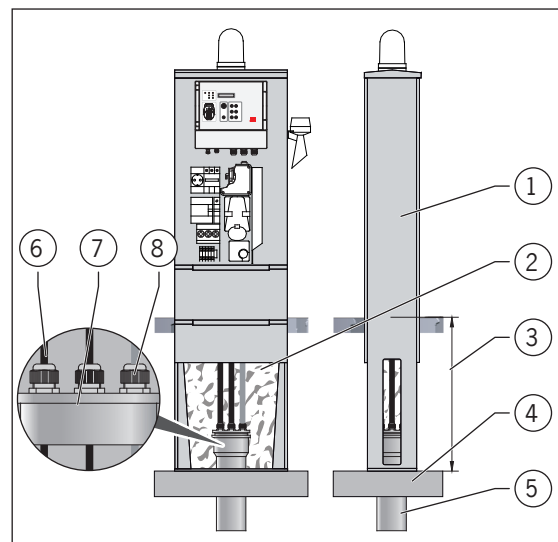
Specifications:

- The construction materials used and installation method must not cause any harmful deformations, damage or unfavourable load cases for the outdoor cabinet.
- Use base filler (fill material for reducing the formation of condensation).

 An outdoor cabinet for accommodating the control, flashing light, horn, etc. can be purchased from ACO as an optional product. In general, components such as the control are already pre-installed in the outdoor cabinet.



- Make a hole in the ground for the outdoor cabinet (1), note the buried depth (3).
- Build the foundation (4) for the outdoor cabinet (1) and at the same time position the cable duct above the foundation.
- Install and fix the outdoor cabinet (1) onto a foundation (4).
- Use, for example, cable glands (8) and end covers (7) to pass through the cables and control line (6).
- Fill the void (2) with base filler.
- Backfill the excavated hole.



Outdoor cabinet for accommodation of a backflow loop

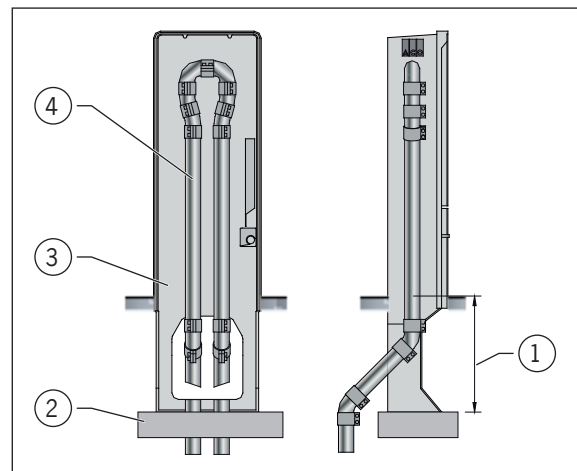
Specifications:

- The construction materials used and installation method must not cause any harmful deformations, damage or unfavourable load cases for the outdoor cabinet.
- Install the backflow loop not necessarily “filling the cabinet”. It is sufficient if the pipe bottom of the backflow loop is located above the backflow level on site.
- The backflow loop must be protected on site against the effects of frost e.g. by utilising trace heating tape.



- An outdoor cabinet for accommodating the backflow loop can be purchased from ACO as an optional product.
- ACO recommends that the backflow loop is created in PE-HD using mirror-image welding with short-legged bends or in PVC-U in an adhesive process on site.

- Make a hole in the ground for the outdoor cabinet (3), note the buried depth (1) (see outdoor cabinet data sheet).
- Make the foundation (2) for the outdoor cabinet (3).
- Install and fix the outdoor cabinet (3) onto a foundation (2).
- Install the on-site pressure pipe in the outdoor cabinet as a backflow loop (4).
- Backfill the excavated hole.



3.3.12 Leak test



WARNING

Danger of injury caused by incorrect execution

- Any resulting buoyancy forces acting on the cover plate due to the water filling must be compensated for by applying an additional load to the shaft structure.

All drainage systems on private ground must be leaktight (only applies to Germany. Provisions in other countries can vary).

The requirements and provisions for the leak test sequence must be enquired about for each individual country.

IMPORTANT

- Leak tests must be executed on the whole plant by a specialist company before backfilling the excavation pit.
- Additional weights must be evenly positioned directly on the cover plate.

Additional weights

Additional weights with installation depth T (upper edge of tank to upper edge of terrain) with the respective characteristic size (NS) for the plant:

T [m]	Additional weight [kg] with plant/NS								
	2/200	2-4/400	4/800	5.5/550	5.5/1100	7/700	7/1400	10/1000	10-20/4000
0.5	-	-	-	-	-	-	-	-	-
1.0	-	-	-	-	-	-	-	-	290
1.5	-	-	-	-	-	-	-	-	1,140
2.0	-	-	-	-	-	120	120	120	2,000
2.5	-	-	-	-	-	450	450	450	2,850
3.0	-	-	-	-	-	770	770	770	3,700
3.5	-	-	-	-	-	1,090	1,090	1,090	4,550
4.0	-	-	-	-	-	1,420	1,420	1,420	5,400
4.5	-	-	-	-	-	1,740	1,740	1,740	6,260
5.0	-	-	-	-	-	2,060	2,060	2,060	7,110

3.3.13 Backfilling the excavation

Specifications:

- The construction materials utilised and installation method must not cause any harmful deformations, damage or unfavourable load cases for the tank and shaft components.
- The tank must be embedded all around (≥ 0.50 m) with a low-fine grain sand-gravel or sand-gravel mixture of the soil groups GW or GI according to DIN 18196.
- The backfill material must be placed in layers (≤ 30 cm high) and compacted with lightweight compacting equipment to a Proctor density of $D_{pr} \geq 97\%$.
- The frame of the cover should never be higher than the surfacing, rather the surfacing should be slightly higher and drawn up at the edge of the frame.
- When laying the surfacing (e.g. asphalt surface), the cover must not be moved.
- The shaft structure may not be loaded until the excavated pit has been completely backfilled and the materials used have cured sufficiently.

→ Backfill the excavation pit.

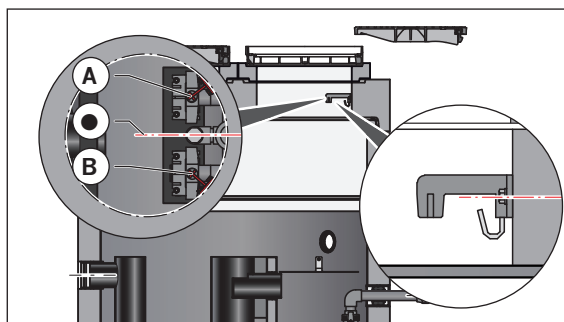
3.4 Installation work

3.4.1 Assembling the chain holder

In the as-delivered condition, a chain holder with fixing material is enclosed as a loose part.


Requirement: The chain holder should be assembled centrally in the cover plate according to the height.

- Transfer and mark the middle axis (●) between both sliding pipes (A + B) vertically in the opening of the cover plate.
- Fasten the chain holder on the marked position.



3.4.2 Installing the submersible pumps

Submersible pumps with assembled coupling pieces, cable lugs, pump pull chains (by the metre) and shackles can be purchased from ACO as an option.

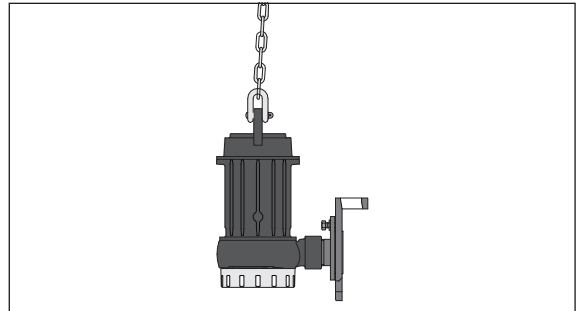
The connection cable (10 m long) is already connected in the terminal box of the pump in the ready to deliver status, cable type  Chapter 7.2 “Submersible pumps”.

The following table shows the arrangement of the optimised and/or provided submersible pumps to the respective characteristic sizes (NS) of the plant:

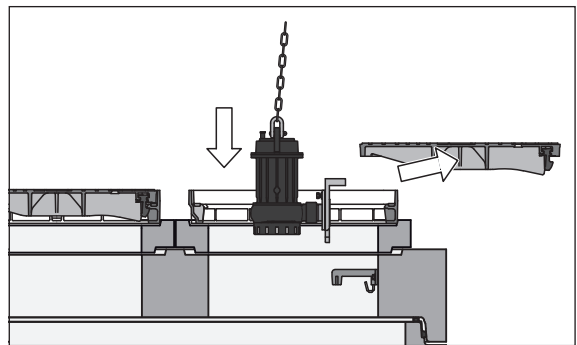
Plant/NS	Type of submersible pumps
2/200	SAT 100/D
2-4/400	SAT 100/D
4/800	SAT 100/D
5.5/550	SAT-150/D
5.5/1100	SAT-150/D
7/700	SAT-150/D
7/1400	SAT-150/D
10/1000	SAT-200/D
10-20/4000	SAT-Q 300/65/D

The description applies to both submersible pumps:

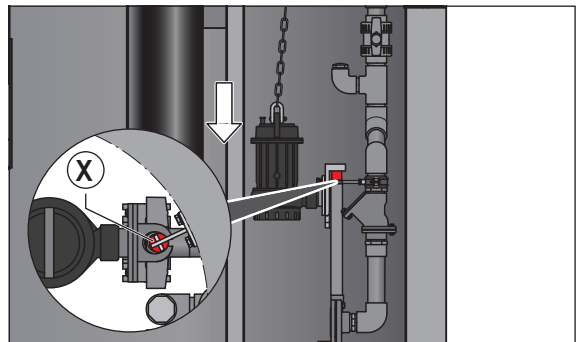
- Assemble the shackle on the handle of the submersible pump and/or lay the chain around the submersible pump handle and connect two chain links with the shackle.



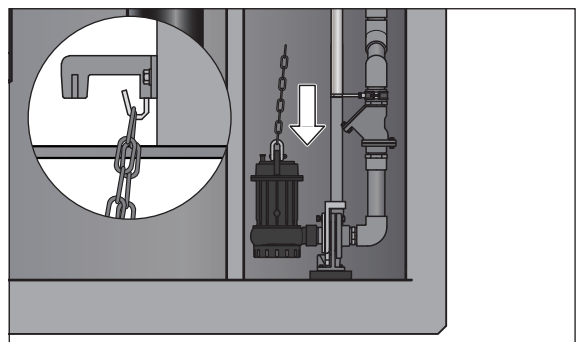
- Lift the cover out of the cover frame above the pump station chamber and store to the side.
- Lower the submersible pump on the chain into the tank.



- Thread the coupling piece for the submersible pump onto the sliding pipe: Position **X**.

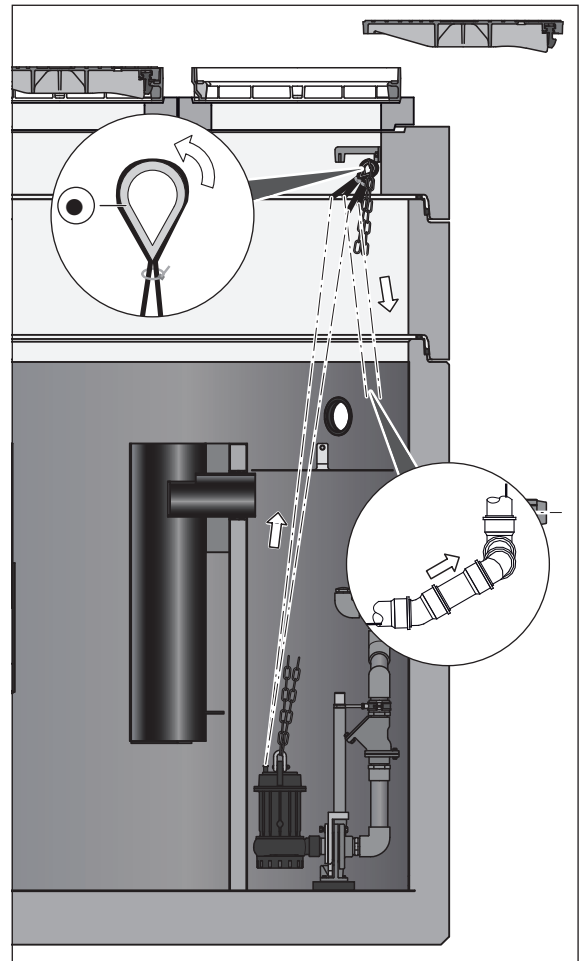


- Lower the submerged pump further until the coupling piece sits in the underwater automatic coupling.
- Hook the chain onto the chain holder.




- Protect the end of the submersible pump connecting cable against penetrating moisture.
- Pull the connecting cable upwards (not while energised) until it reaches the chain holder.
- Place the loop around the cable lug (●) and fasten with cable tie.
- Hang the cable lug on the chain holder.
- Use the pull wire to pull the connecting cable together with connecting cable and/or the control cable for the level sensor (optional) through the blank cable pipe up to the assembly location of the control.
- Keep sufficient excess cable length (approx. 1 m), to enable the wiring in the terminal compartment of the control.
- Replace the cover.

This is the only way that enables the submersible pumps to be removed and put down to the side next to the inspection opening.



3.4.3 Assembling the level sensor (optional)

-  ■ Level sensors (open or closed pressure bell or level probe) can be purchased from ACO as optional components.
 - The probe bracket is already assembled in the tank in the as-delivered condition.
 - Cable glands are supplied loose upon delivery.

IMPORTANT

- Protect the ends of the connecting cable or control cable against penetrating moisture.
- Never crimp or bend the control cable
- Ensure free movability of the level sensor after installation.

Open pressure bell

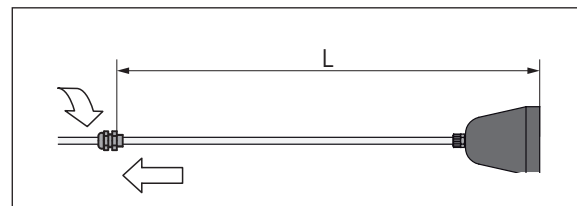
The open pressure bell has a 20 m long pneumatic control line (hose fixed onto the bell) and is hung on the probe holder.

The pressure bell must be set to the **length measurement L** according to the following table.

Longitudinal measurement L:

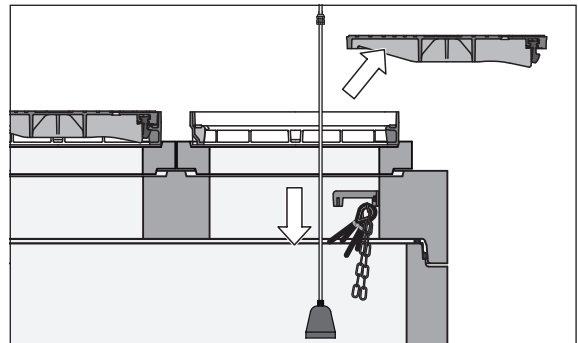
Plant/NS	Longitudinal measurement L [cm]
2/200	62
2-4/400	82
4/800	122
5.5/550	96
5.5/1100	150
7/700	110
7/1400	154
10/1000	151
10-20/4000	131

- Push the control cable through the cable gland, set it to the **longitudinal measurement L** and tighten the union nut of the cable gland as hand-tight.

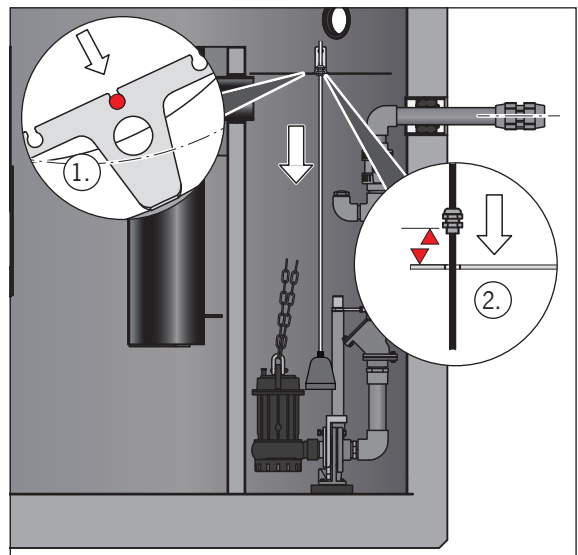


Lipulift-C Installation

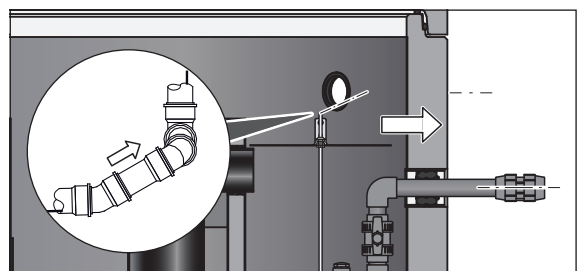
- Lift the cover out of the cover frame and store to the side.
- Lower the open pressure bell on the control cable into the pump station chamber.



- Guide the control cable length below the cable gland into the recess (●) of the probe holder (1).
- Lower the pressure bell until the cable gland sits on the probe bracket (2).



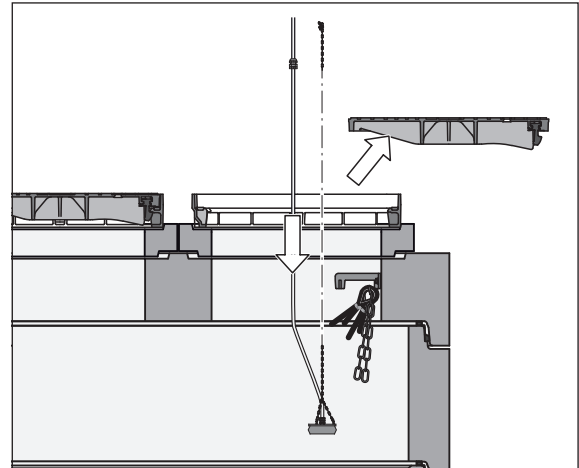
- Use the pull wire to pull the connection cable together with the pump connecting cable through the cable duct up to the mounting location of the control.
- Keep sufficient excess control cable (approx. 0.5 m), to enable the connection to the control.
- **IMPORTANT** Pull the control line back out of the blank pipe by a small amount and arrange it so that it again so that it is kink-free and rising. This is the only way that the back pressure bell can be removed (e.g. for cleaning purposes).
- Replace the cover.



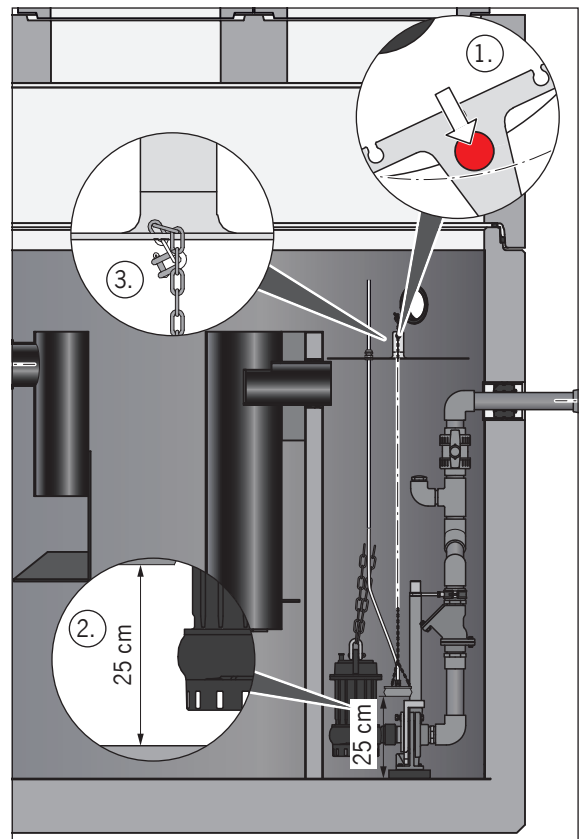
Closed pressure bell

The closed pressure bell with 40 m control cable is assembled on the probe holder.

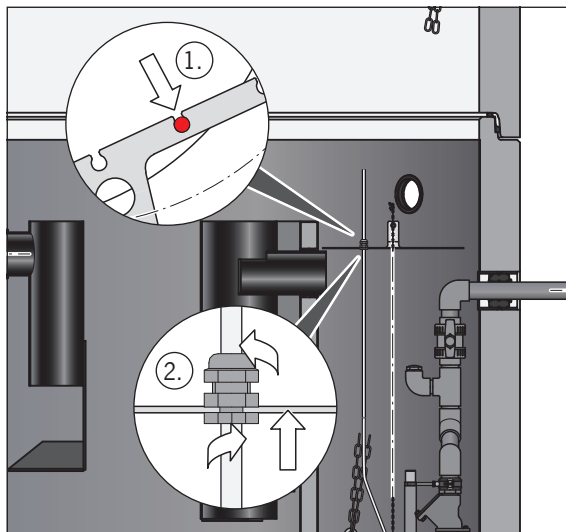
- Lift the cover out of the cover frame and store to the side.
- Lower the closed pressure bell into the pump station chamber.



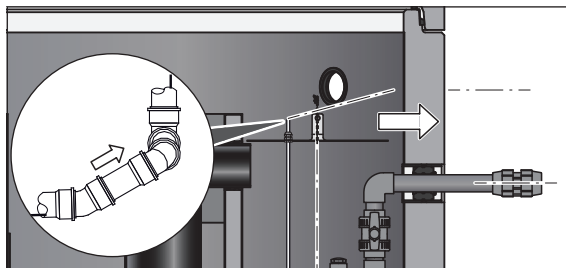
- Insert the chain through the drill hole (●) of the probe bracket (1).
- Adjust the pressure bell to a **distance of 25 cm** to the tank base (2).
- Fix the chain with the shackle on the probe holder (3).



- Guide the control cable into the recess (●) of the probe holder (1).
- Pull the control cable through by means of a PG screw and fix it with a PG screw on the probe bracket (2).



- Use the pull wire to pull the connection cable together with the pump connecting cable through the cable duct up to the mounting location of the control.
- Keep sufficient excess control cable (approx. 0.5 m), to enable the connection to the control.
- Replace the cover.



Level sensor

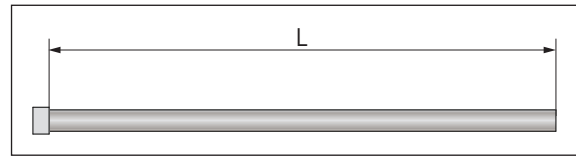
The level sensor has a 20 m, 50 m and/or 80 m long connecting cable (connected and sealed on the level sensor). A protective pipe (total length 1,700 mm), a tensioning clamp and a cable lug are supplied loose upon delivery.

The protective pipe must be adjusted to the **length measurement L** according to the following table.

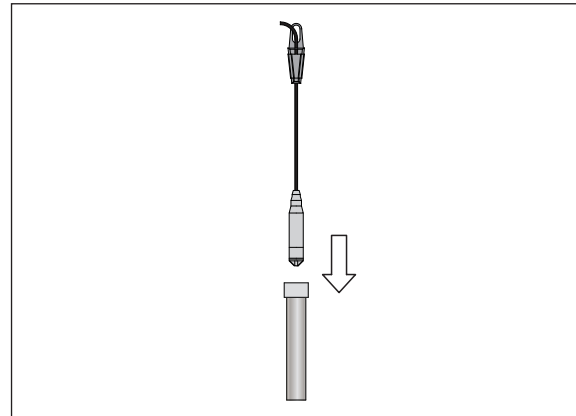
Longitudinal measurement L:

Plant/NS	Longitudinal measurement L [cm]
2/200	60
2-4/400	80
4/800	120
5.5/550	94
5.5/1100	148
7/700	108
7/1400	152
10/1000	149
10-20/4000	129

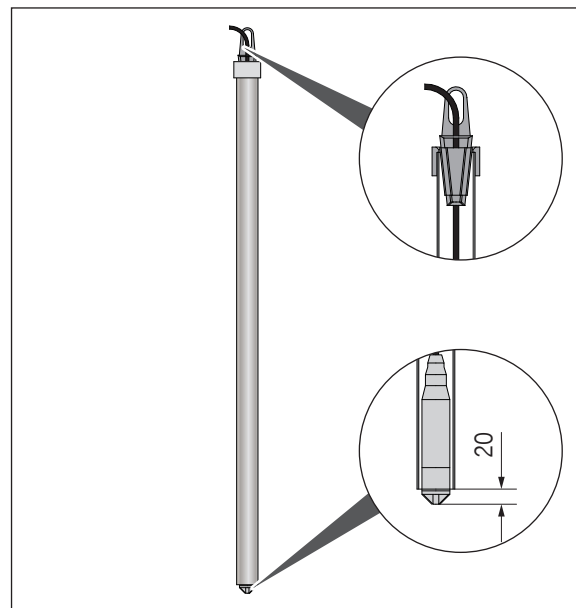
- Cut the protective pipe to **longitudinal measurement L** length.



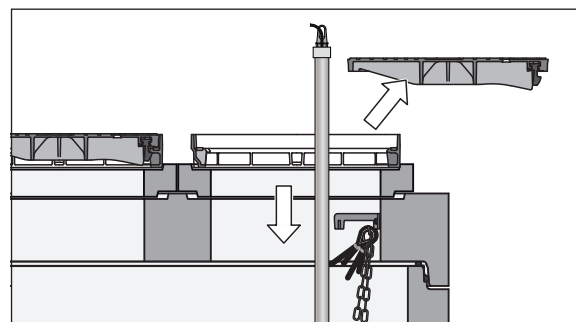
- Insert the level sensor in the protective pipe.



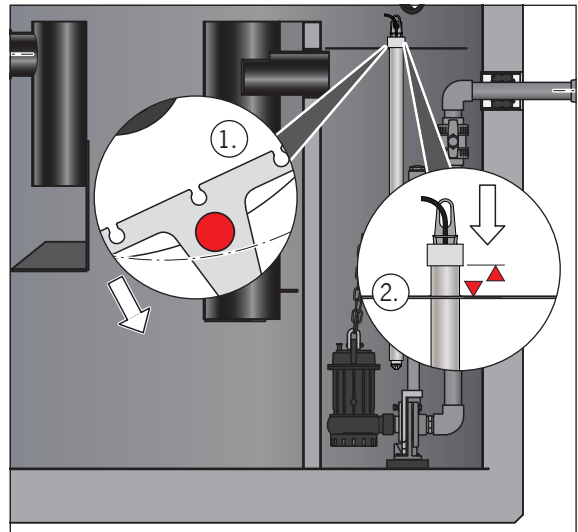
- Fix the length (projection of 20 mm) with the tensioning clamp and centre it in the protective pipe.



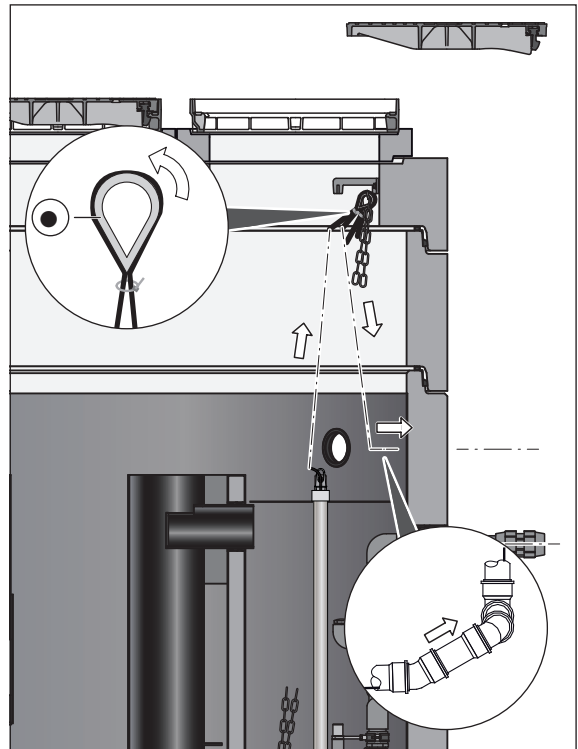
- Lift the cover out of the cover frame and store to the side.
- Lower the “protective pipe with level sensor” unit on the protective pipe into the tank.



- Guide the protective pipe into the drill bore hole (●) of the probe bracket (1).
- Lower the protective pipe with level sensor until the protective pipe sits on the probe bracket (2).



- Pull the connecting cable for the level sensor upwards (not while energised) until it reaches the chain holder.
- Place the loop around the cable lug (●) and fasten with cable tie.
- Hang the cable lug on the chain holder.
- Utilise the pull wire to pull the connecting cable together with the pump connecting cable through the cable duct up to the assembly location of the control.
- Keep sufficient excess cable length (approx. 1 m), to enable the wiring in the terminal compartment of the control.
- Replace the cover.



This is the only way that the level sensor can be removed from the tank.

3.4.4 Assembling cable gland

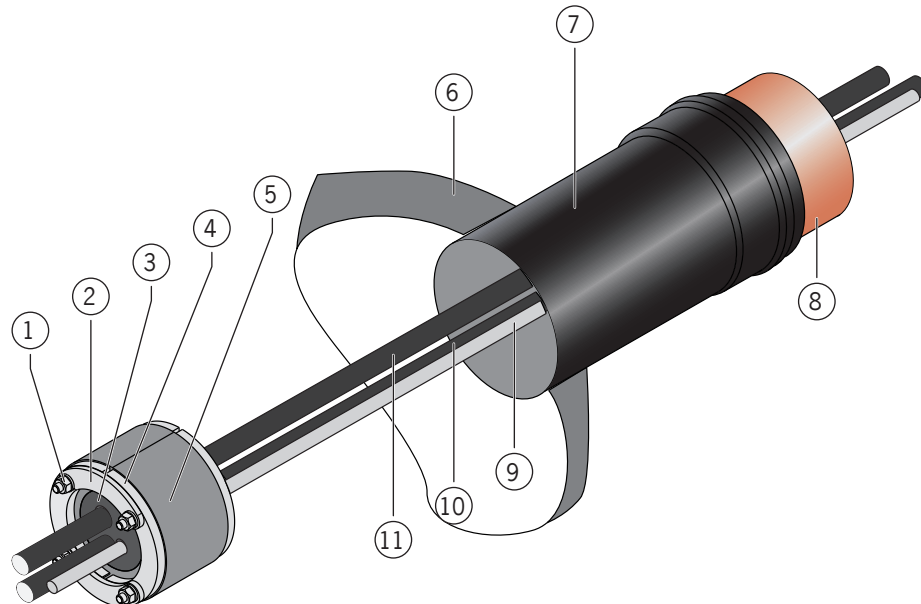
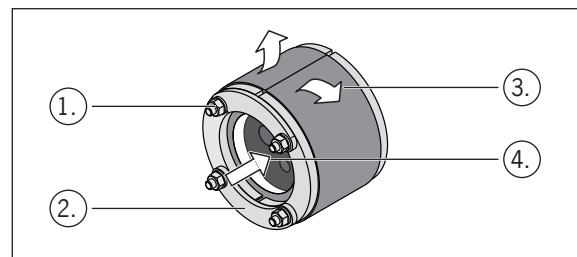


Figure: Components for cable gland

- | | |
|------------------------|--|
| 1 = Threaded connector | 7 = Socket pipe |
| 2 = Clamp | 8 = On-site blank cable pipe |
| 3 = Sealing insert | 9 = Control cable and/or connection cable for level sensor |
| 4 = Flange | 10 = Connecting cable Pump 1 |
| 5 = Split sleeve | 11 = Connecting cable Pump 2 |
| 6 = Tank wall | |

The cable gland is loose when delivered.

- Undo the threaded connector (1).
- Open the clamp (2).
- Split open the sleeve (3).
- Remove the sealing insert (4).

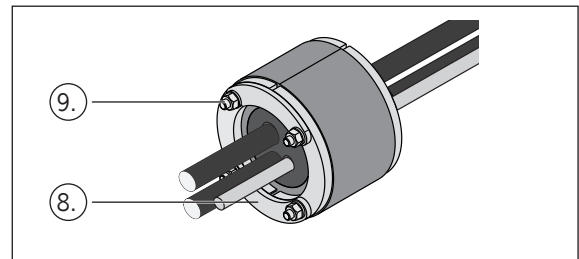
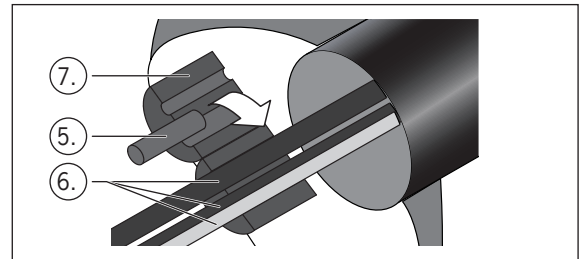


IMPORTANT The sealing insert must be positioned tightly on the socket pipe.

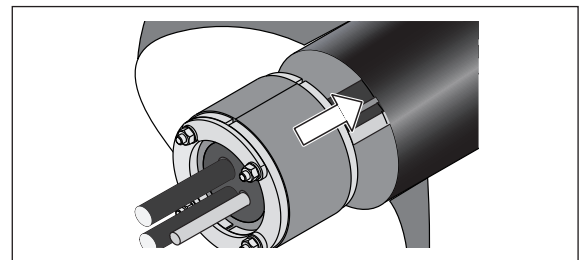


The sealing insert has 3 drill holes with “placeholders”.

- Fold open the sealing insert and remove “placeholder” (5).
- Place the connecting cable and control cable in the recesses of the sealing insert half (6).
- Fold the upper half of the sealing insert onto the lower half (7).
- Place the split sleeve around the insert.
- Re-fit the clamp (8).
- Screw on the threaded connector (9) slightly.



- Push the cable feed-through into the socket tube.
- Tighten the threaded connector uniformly cross-wise until it is hand-tight.




3.5 Electrical installation




WARNING

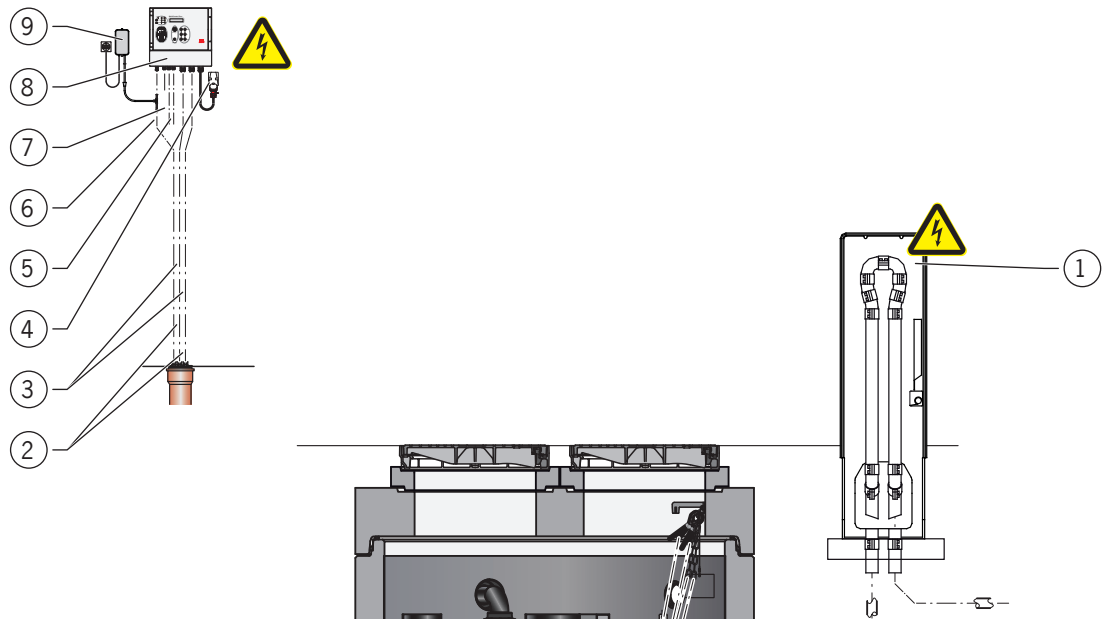
Electric shock risk in case of improper electrical installation


- The control must not be connected to the power supply until after all installation work has been completed.
- The voltage supply must be implemented in compliance with the directives of the local power supplier.
- According to EN 12056, electrical connections may only be carried out by qualified electricians.
- Electrical connections must be executed in accordance with the circuit diagram,  Chapter 7.3.2 “Circuit diagram”.

IMPORTANT Voltage failures caused by longer cable routes must be considered on site.

 The MultiControl Duo control, air bubble injection, outside cabinet and ex-safety-barrier can be purchased from ACO as optional components.

3.5.1 Overview of the electrical installation work

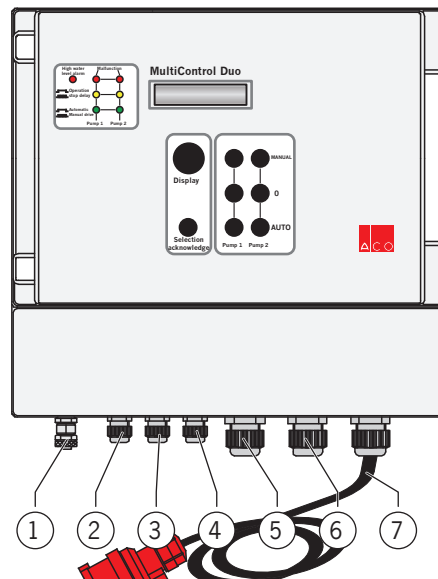


Item	Work	Description Chapter 
1	Supplying heating (optional) and work plug socket (optional) with current	3.5.2
2	Clamping the connection cable for the pumps (optional)	3.5.6
3	Check the rotational direction of the pumps	3.5.7
4	Connecting the MultiControl Duo (optional) to the power supply	3.5.5
5	Connect fault message device (optional)	3.5.11
6	Connecting the control cable (optional)	3.5.9
7	Clamping the connection cable for the level sensor (optional)	3.5.8
8	Installing the MultiControl Duo control	3.5.4
9	Connecting the air bubble injection (optional)	3.5.10
-	Installing ex-safety-barrier (optional)	3.5.12

3.5.2 Supplying heating (optional) and work plug socket (optional) with current

→ Observe the connection values with electrical installations: 400 V, 50 HZ, fuse 25 A

3.5.3 Connections of the MultiControl Duo control



- | | |
|---|---|
| 1 = Connection, pneumatic level switching control cable and/or pressure bell) | 5 = Pump 1 power supply connection |
| 2 = Connection, mini compressor power supply (optional) | 6 = Pump 2 power supply connection |
| 3 = Connection, level sensor connecting cable (optional) | 7 = 1.5 m connecting cable with CEE plug 32 A |
| 4 = Fault signal connection (optional) | |

3.5.4 Installing the MultiControl Duo control (optional)

Mounting on a wall

Specifications:

- Flood-proof and clear wall surface of at least 400 mm x 400 mm (width x height)
- Select the maximum spacing according to the lengths of the connection cables of the pumps and level sensor and/or control cable for level sensor. If necessary, versions with longer connection cables or control cable can be purchased from ACO as optional components.

Installation in the outdoor cabinet

📖 Chapter 3.3.11 “Outdoor cabinet installation (optional)”

3.5.5 Connecting the MultiControl Duo (optional) to the power supply

With the electrical installation:

- Note the connection values, 📖 Chapter 7.3 “MultiControl Duo control”.
- Install the 32 A CEE plug socket in accordance with the manufacturer's instructions.

3.5.6 Clamping the connection cable for the pumps (optional)

The pump connecting cables are 10 m long and are connected in the terminal room of the pump in the as-delivered condition. Type of cable, 📖 Chapter 7.2 “Submersible pumps”.

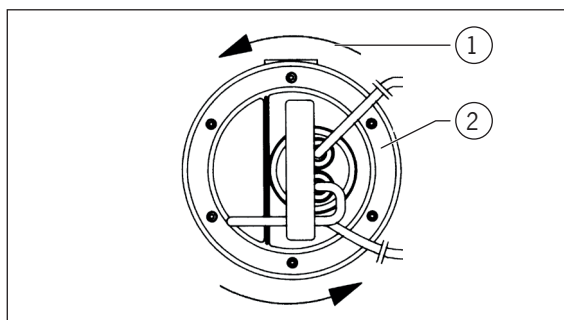
IMPORTANT

- The ends of the wire are labelled. There is a risk of short circuits if the wires are confused.
 - If the connecting cable is shortened, transfer the identification of the wires.
- Adjust the length of the connecting cable or hang in sufficiently large loops and attach.
 - Insert the connection cable into the terminal compartment of the control and connect to the electrical system.

3.5.7 Check the rotational direction of the pumps

IMPORTANT The rotational direction is correct, i.e. clockwise, if the protective cover (2) moves as shown (1).

- Control the rotational direction: Switch on pump and switch off again immediately. Observe the starting recoil carefully from the motor side.



3.5.8 Clamping the connection cable for the level sensor (optional)

The level sensor connecting cables are 20, 50 and/or 80 m long and are connected in the terminal compartment of the level probe upon delivery.

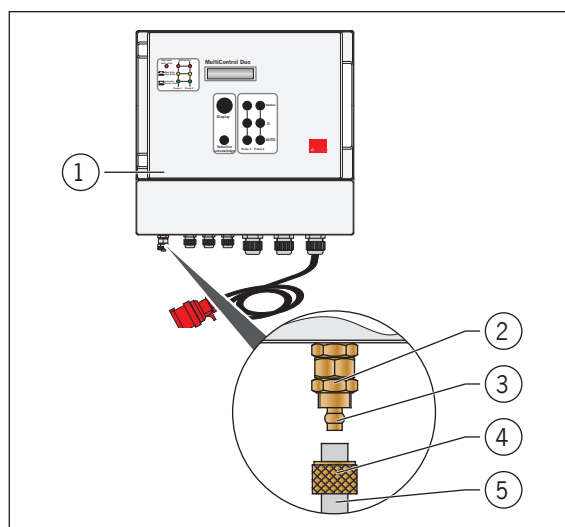
- Insert the connection cable into the terminal compartment of the control and connect to the electrical system.

3.5.9 Connecting the control cable (optional)

IMPORTANT To prevent errors:

- Lay the control cable to the MultiControl Duo control along a rising, kink-free and frost-resistant route (lay, e.g. in a reserve conduit of at least DN 50).
- Use a cutter to adjust the control cable length at right angles.
- Only connect the control cable to the MultiControl Duo control if the open pressure bell is not hanging in the water.

- At the control (1), unscrew the union nut (4) from the compression fitting (2) and push over the control cable (5).
- Push the control line (5) onto the bush (3).
- Twist the union nut (4) onto the compression fitting (2) and tighten hand-tight.



3.5.10 Installing the air bubble injection (optional)

Air bubble injection can be purchased from ACO as an optional component.

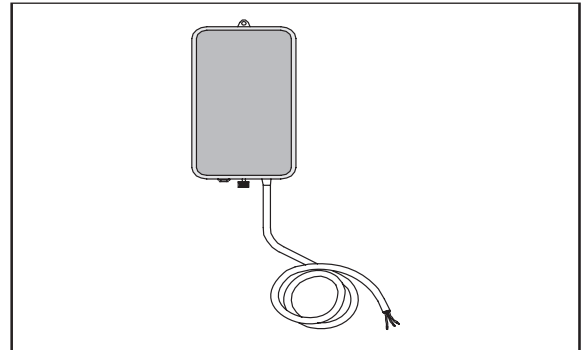
Mounting the mini compressor onto a wall

The mini compressor has a 1.5 m long connection cable with Schuko earthed safety plug.

Requirement: Flood-proof and free wall surface 100 mm x 200 mm (width x height) near the control unit

Connecting the mini compressor to the power supply

- Note the connection value 230 V/50 Hz.
- Install the Schuko earthed safety socket or connect to the control:
 - Strip the ends of the cables and fit on wire-end ferrules.
 - Unscrew the cover of the control and connect the cable ends.



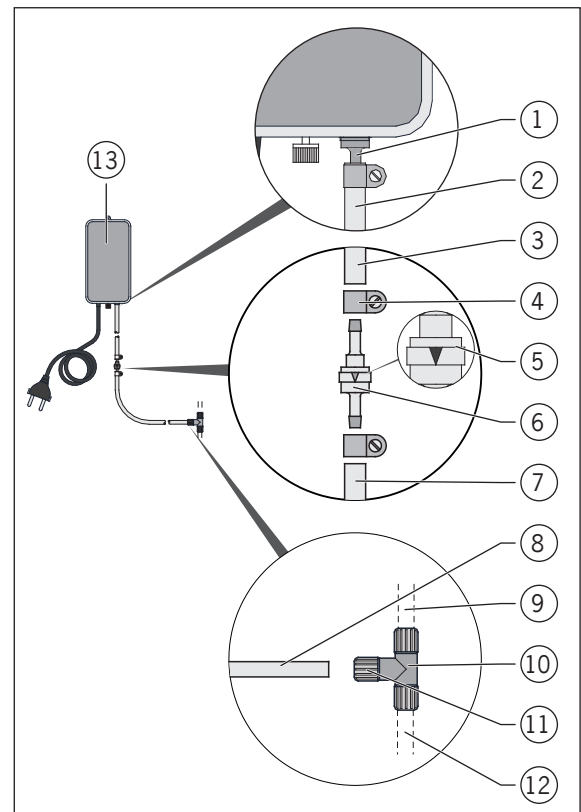
Connecting the hose pipe

Upon delivery, the connection parts are enclosed with the mini compressor as loose items.

IMPORTANT In order to prevent malfunctions:

Utilise a cutting knife to adjust the hose pipe and control cable length at right angles.

- Cut the control line (12).
- Push the hose ends (8, 9 + 12) into the retainers of the screw-in T-fitting (10) and clamp (tighten hand-tight) using the respective union nuts (11).
- Push hose clamp (4) over the end (7) of the 0.5 m long hose.
- Push the hose end (7) onto the hose bush of the spring check valve (6), in accordance with the installation direction (5), and fix using a hose clamp (4).
- Push hose clamp (4) over the end (3) of the 0.5 m long hose.
- Push the hose end (3) onto the other hose bush of the spring check valve (6) and fix using a hose clamp (4).
- Put the other hose end (2) on the hose nozzle (1) of the mini compressor (13) and fix it with hose clamp (4).



3.5.11 Connect fault message device (optional)

If a fault signalling device is specified, this should be installed so that a system malfunction is signalled to each connected unit.

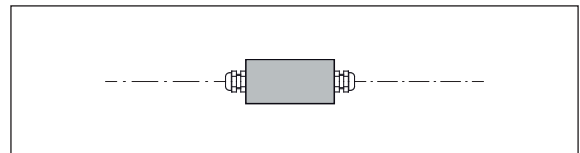
To forward the potential-free contact as a group alarm, a cable (2-wire/0.75 mm²) must be connected in the control unit, see Chapter 7.3 "MultiControl Duo control".

3.5.12 Installing ex-safety-barrier (optional)



IMPORTANT If the level sensor is to be utilised in an explosion protected area, then an ex-safety-barrier must be installed.


Ex-safety-barrier can be purchased from ACO as an optional component.

- Ex-safety-barrier must be installed and/or connected in the connection cable for the level sensor.





4 Operation

A general inspection by a properly qualified technician is mandatory before the commissioning,  Chapter 1.4 “Personnel qualifications”. Scope of the general inspection,  Chapter 5.5 “5 year general inspection”.

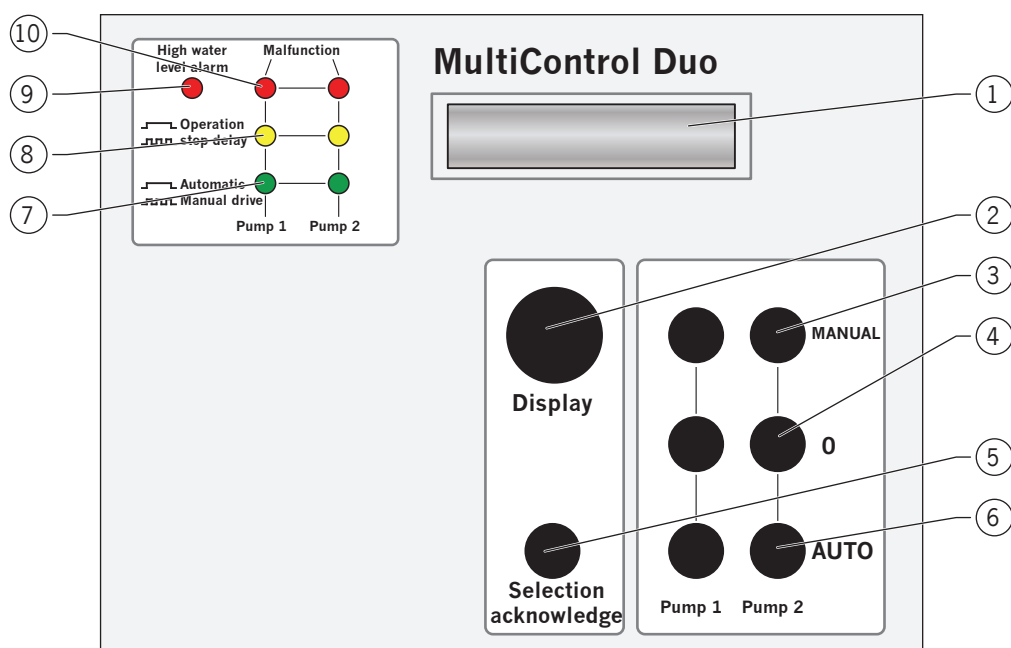
The commissioning must be documented,  Appendix: “Commissioning record”.

4.1 Commissioning

- Clean the plant.
 - Check the setting values in the menu points for the control systems,  Chapter 4.2. “Control for MultiControl Duo” and/or 4.3 “Setting values for commissioning”.
- IMPORTANT** There must not be any water in the pump station chamber during the setting operation.
- Fill the grease separator with freshwater up to the static water level (pipe bottom, inlet pipe pump station).
 - Close maintenance openings.
 - Open the penstock in the inlet pipe and pressure pipe (is present).
 - Execute a test run for the pump station,  Chapter 4.5 “Execute test run for pump station”.

4.2 MultiControl Duo control

4.2.1 Controls and display elements







- 1 = Display panel
- 2 = Rotary knob: Select menu items
- 3 = Button: Manual mode AN P1 and/or P2
- 4 = Button: Operation OFF P1 and/or P2
- 5 = Button: Acknowledgement of the malfunction/
value settings
- 6 = Button: Automatic mode AN P1 and/or P2
- 7 = LED illuminates: Automatic malfunction P1 and/or P2
LED flashes: Manual operation P1 or P2
LED flashes irregularly: Manual operation was
automatically terminated after approx. 2 minutes
- 8 = LED illuminates: Automatic operation P1 and/or P2
LED flashes: Overrun P1 or P2
- 9 = LED illuminates: Malfunction high water level alarm
- 10 = LED illuminates: Automatic malfunction P1 and/or P2

Function of the controls

Description	Function	Explanation
Display	Selection of the menu items	The rotary knob can be used to select the menu items in the display panel. The display automatically changes back to the basic setting after 20 seconds.
Selection acknowledge	Acknowledge malfunction	The button is used to acknowledge malfunction signals and messages after removing the cause of the fault. If the malfunction is not corrected, only the group fault alarm relay and the alarm sound signal (e.g. High water level alarm) are switched off.
	Confirm setting	The button is used to save the settings made in the menu items.
MANUAL	Switch on manual operation	The buttons for Pump P1 and P2 are used to switch on the pumps independently of the "level switching". Manual operation is switched off automatically after 2 minutes.
0	Switch off operation	The buttons for Pump P1 and P2 are used to switch off automatic mode or manual operation of the pumps.
AUTO	Switch on automatic mode	The buttons for Pump P1 and P2 are used to switch on automatic operation of the pumps and to control them automatically via the "level switching".

Explanation of the display elements

Description	Meaning	Explanation
High water level	 High water level alarm group fault	Fault signal: The water level in the tank has reached the "High water level alarm" level
Malfunction	 Pump P1 or P2 malfunction	Malfunction Pump(s) not in operation
Operation Stop delay	 Operating display for Pump P1 or P2	LED illuminates: Pump(s) in operation LED flashes: Pump(s) in operation via the stop delay function
Automatic	 Pump P1 or P2 operation mode	LED illuminates: Automatic mode LED flashes irregularly: Manual mode LED flashes irregularly: Manual operation was switched off automatically after approx. 2 minutes

4.2.2 Menu items and settings

Display panel

Messages in the display panel:

- Top line:
 - The water level in the tank (if no pump is in operation)
 - Setting option
- Bottom line:
 - Operating hours of the pumps (if pumps are not in operation)
 - Malfunctions that have occurred
 - Changeable settings (in service mode)
 - Motor current (if pump is in operation or changing display if both pumps are in operation)

Overview of the menu items and settings

Top line (menu item)	Bottom line (settings)	Explanation
Base load ON	0 – 200 (1,000) cm	The value determines the activation point of the first pump.
Base load OFF	0 – 200 (1,000) cm	The value determines the switch-off point of the first pump.
Peak load ON	0 – 200 (1,000) cm	The value determines the activation point of the second pump.
Peak load OFF	0 – 200 (1,000) cm	The value determines the switch-off point of the second pump.
High water level	0 – 200 (1,000) cm	If the set value is exceeded, the group alarm relay and the high water level relay switch
Run. Time max	0 – 60 minutes	The value zero deactivates this function. If a value of 1 – 60 min. is set, the pump is switched off if it runs for longer than the set value without interruption. The pump does not start up again until the defect has been acknowledged.
Run time altern.	Is switched off 1 – 60 minutes	If the set time is exceeded in base load operation a pump changeover takes place. After three changes without interruption the alarm is also triggered and the "Runtime alarm" message appears in the display.
Delay	0 – 900 s	After a mains failure (staggered start) the pumps do not start until the set time has expired. The remaining time is shown in the display.
Stop delay	0 – 180 s	After falling below the switching off point, the base load pump carries on running until the set time has expired.
Maximum current – 1	0.3 – 14.0 A	If Pump 1 exceeds the set current consumption for a certain time it is switched off. Message P1 appears: overcurrent. The pump is not re-released until the Acknowledge button is pressed.
Maximum current – 2	0.3 – 14.0 A	If Pump 2 exceeds the set current consumption for a certain time it is switched off. Message P2 appears: overcurrent. The pump is not re-released until the Acknowledge button is pressed.

Top line (menu item)	Bottom line (settings)	Explanation
Test Pump run 24h	Is switched off 1 – 10 s	Is activated = If the pumps are not requested for a duration of 24 hours, they run automatically for the duration of the set time.
Acoustic alarm	Is switched off Is activated	Is activated = In the event of a fault the internal Piezo buzzer sounds.
Interm. alarm	Is switched off Is activated	Is activated = The alarm relay is clocked. A more cost-effective continuous light can be used instead of a flashing light.
Pump changeover	Is switched off Is activated	Is activated = After each operation of the base load pump the system switches to the other pump.
Thermal overload P1 malfunction 1	Is switched off, is activated	Is switched off = no bimetal contact (alarm contact) is connected to terminal 31,32 (Pump 1).
Thermal overload P2 malfunction 1	Is switched off, is activated	Is switched off = no bimetal contact (alarm contact) is connected to terminal 38,39 (pump 2).
Rotating field malfunction	Is switched off Is activated	Is activated = In the event of incorrect phase sequence or the lack of L2 or L3, an alarm is triggered and the pumps cannot be started up.
ATEX mode	Is switched off Is activated	Is activated = If the level sensing does not determine any liquid, the pumps cannot be started. This applies to the manual function, and to the Test Pump run 24h and the telecontrol systems.
Service mode	Is activated Is switched off	Is activated = All settings can be changed Is switched off = Settings are displayed but cannot be changed.
Level control	Internal converter Float switch 4 – 20 mA interface	Level sensing via pneumatic pressure or air bubble injection Level sensing – recording via float switch Level sensing via external sensor (4 – 20 mA)
20mA => level	0 – 1,000 cm	The measurement range of the external level probe can be set.
Language	German – English – French – Italian – Spanish – Dutch – Polish – Czech	The national language in the display can be changed.

4.2.3 Changing the settings

Notes:

- Settings can only be changed in service mode. If Service mode is not activated the settings are displayed, but cannot be changed or saved.
- If no entry is made within 20 seconds the display automatically switches back to the basic setting.
- Operating hours and pump cycles can be displayed but not changed.

Procedure:

- Turn the “Display” rotary knob until the required menu item is displayed.
- Press the “Acknowledge selection” button. The most recently saved setting begins to flash.
- Turn the rotary “Display” knob to change the setting (fast turning for a rough setting, slow turning for a fine setting).
- Press the “Acknowledge selection” button to save the setting.

4.3 Commissioning settings



If no settings have been made in the factory (default) for the entered menu items, then the recommended settings given in the table are to be utilised. Menu items not listed are already preset in the as-delivered condition and do not need to be changed.

The various level sensors are abbreviated and/or represented in the tables as follows:

- Open pressure bell without air bubble injection = (A)
- Open pressure bell with air bubble injection = (B)
- Closed pressure bell = (C)
- Level sensor = (D)

Menu item	Unit	Plant/NS	Settings with level sensor:											
			A + B				C				D			
			AL	PL	BL	OFF	AL	PL	BL	OFF	AL*	PL*	BL*	OFF*
High water level AL = AL Peak load ON = PL Base load ON = BL Base load OFF = OFF	cm	2/200	46	30	20	11	65	49	39	19	46	30	20	11
		2-4/400	66	50	40	11	85	69	59	19	66	50	40	11
		4/800	106	90	80	11	125	109	99	19	106	90	80	11
		5.5/550	80	64	54	11	99	83	73	19	80	q64	54	11
		5.5/1100	134	118	108	11	153	137	127	19	134	118	108	11
		7/700	94	78	68	11	113	97	87	19	94	78	68	11
		7/1400	138	122	112	11	157	141	131	19	138	122	112	11
		10/1000	135	119	109	11	154	138	128	19	135	119	109	11
		10-20/4000	111	95	85	11	148	132	122	37	111	95	85	11
Stop delay	s		0**				0				0			
Maximum current – 1 Maximum current – 2	A	2/200	2.3											
		2-4/400												
		4/800												
		5.5/550	2.7											
		5.5/1100												
		7/700												
		7/1400	3.6											
		10/1000												
		10-20/4000	5.1											
Level control	-	Internal converter								4-20mA Interface				
20 mA => level	cm	-				-				400				
Language	-	German												
<p>* Previously under "level control" menu item = Set 4-20mA Interface and under "20 mA => Level" = 400.</p> <p>** Value = 0 with version with air bubble injection. With version without air bubble injection, value assessment during trial run: Water level must remain approx. 5 cm under lower edge of back pressure hole.</p>														

Settings for installed plant

The settings made during the commissioning must be entered in the following table by hand.

Menu item	Unit	Plant/NS	Settings with level sensor:			
			A	B	C	D
Base load ON	cm					
Base load OFF	cm					
Peak load ON	cm					
High water level AL	cm					
Stop delay	s			0	0	0
Maximum current – 1 Maximum current – 2	A					
Level control	–		Internal converter			4-20mA Interface
20 mA => level	cm		–	–	–	400
Language	–		German			

4.4 Starting up the submersible pumps

IMPORTANT To ensure dry-running protection, the pump chamber must be vented during the initial startup.

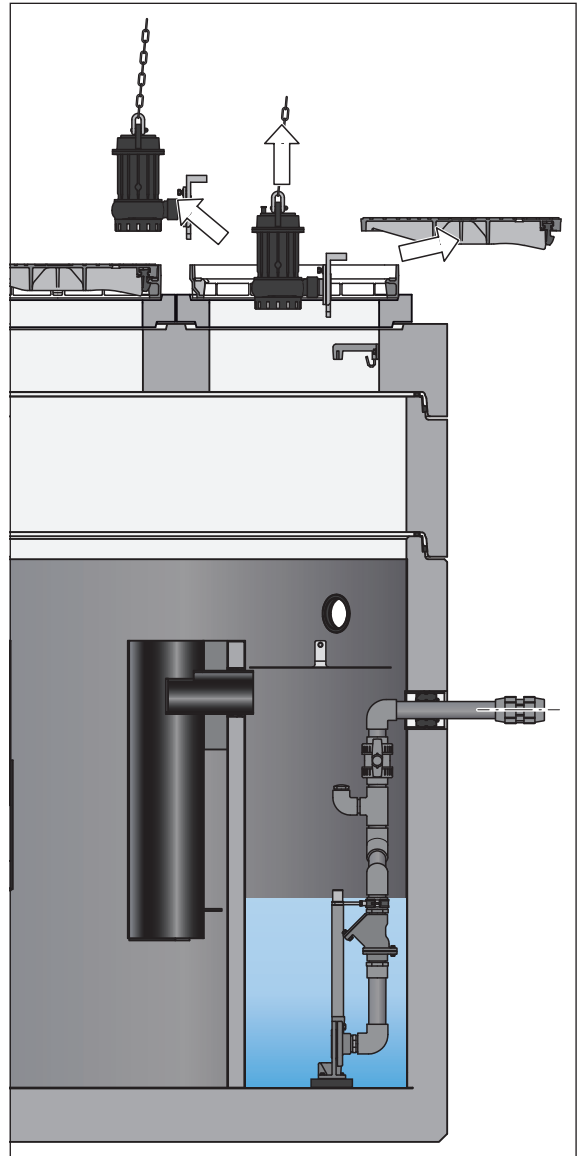


It can be filled with drinking water, rainwater or process water (if it meets the local discharge conditions for effluent).

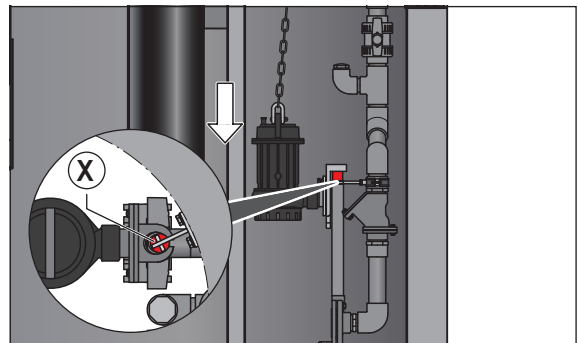
The pump station chamber can be filled via the inlet pipe of the plant or via the inspection opening.

The description applies to both submersible pumps:

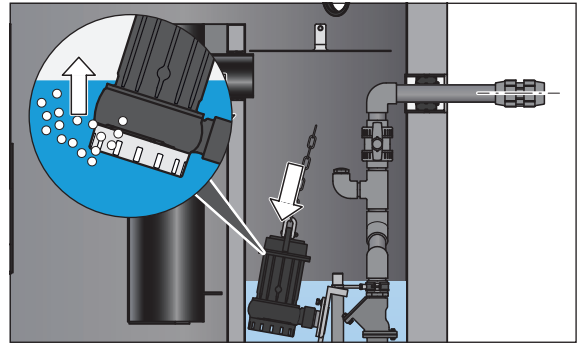
- Lift the cover out of the cover frame above the pump station chamber and store to the side.
- Remove the pumps from the pump station chamber and store to the side.
- Fill the pump station chamber up to approx. half-full (relative to the inlet level).



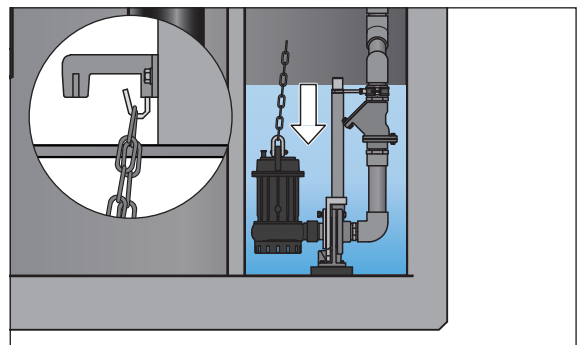
- Thread the coupling piece for the pump onto the sliding pipe: Position X.



- Pull the pump as inclined and lower it further into the filled water.
Air escapes from the pump chamber.



- Lower the pump further vertically until the coupling piece sits in the underwater automatic coupling.
- Hook the chain onto the chain holder.



4.5 Executing test run for pump station

Requirements:

- The ball valve and/or gate valve is opened in the pressure pipe.
- The control is connected to the power supply.

During the trial run, pay attention to the following:

- Perform the trial run at least twice during commissioning.
- Perform the trial run with drinking water, rainwater or process water (if it meets the local discharge conditions for effluent).
- Avoid dry running during the trial run.
- Observe the signals/messages in the display panel of the control.

IMPORTANT If knocking noises/vibrations occur in the pressure pipe when the pump is switched off, then set a stop delay period and/or increase the set stop delay period.

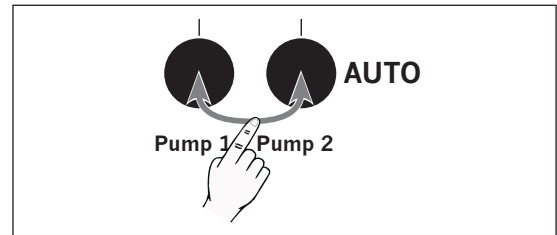
Requirement for design with open pressure bell without air bubble injection:

The water level at the “stop delay OFF” is located at approx. 50 mm below the lower edge of the pressure bell.

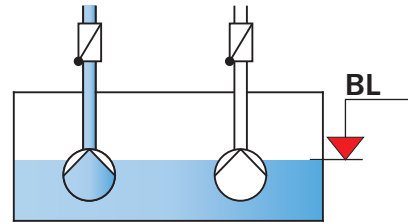
The pump station chamber can be filled via the inlet pipe or via the inspection opening (cover above the pump station chamber).

Starting automatic mode:

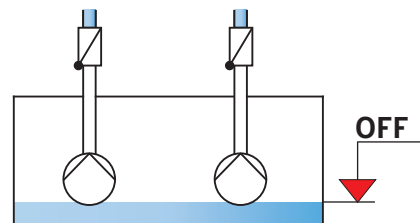
- Press both buttons to start automatic operation of pump 1 and 2.



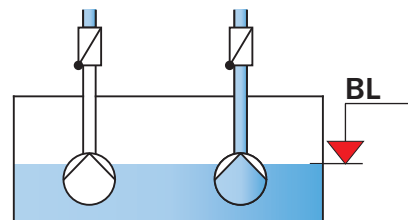
- Fill pump station chamber.
- When the water level reaches the “Base load” (BL) level, pump 1 switches on.
- Interrupt the inlet.



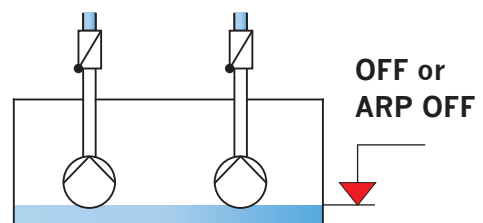
- When the water reaches the “OFF” level, Pump 1 switches off.
- IMPORTANT** With a combination of open pressure bell without air bubble injection: Switch on Pump 1 manually, measure the time until the water level is approx. 50 mm below the open pressure bell and set this time in the control as the stop delay period for both pumps.



- Fill pump station chamber.
- When the water level reaches the “Base load” (BL) level, pump 2 switches on.
- Interrupt the inlet.



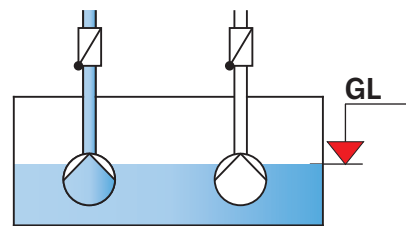
- When the water reaches the “OFF” level, Pump 2 switches off.
- IMPORTANT** With a combination of open pressure bell without air bubble injection: The water level will be lowered by the stop delay to the “stop delay period OFF” (SDP OFF) level. Then pump 2 switches off.



→ Fill pump station chamber.

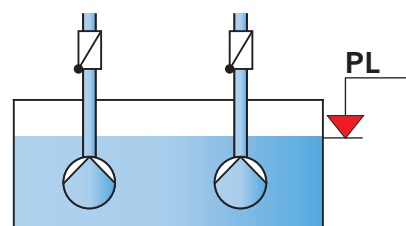
When the water level reaches the “Base load” (BL) level, pump 1 switches on.

→ Increase the inlet flow so that the water level continues to rise.



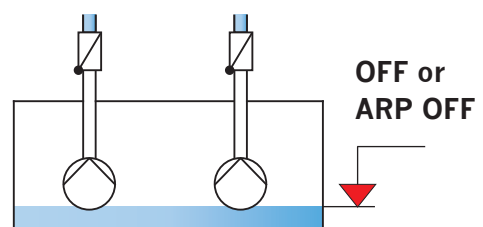
When the water reaches the “Peak load” (PL) level, Pump 2 also switches on.

→ Interrupt the inlet.

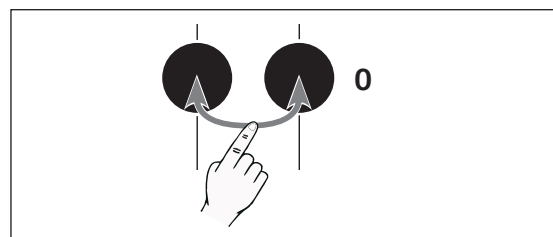


When the water level reaches the “OFF” level, the pumps switch off.

IMPORTANT With a combination of open pressure without air bubble injection: The water level will be lowered by the stop delay to the “stop delay period OFF” (SDP OFF) level. Then the pumps switch off.



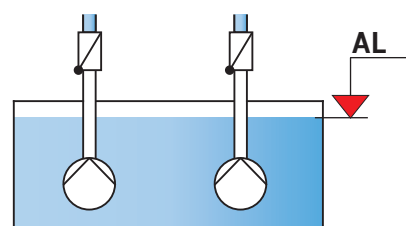
Terminating automatic mode: Press both buttons in order to end the automatic mode of Pump 1 and 2.



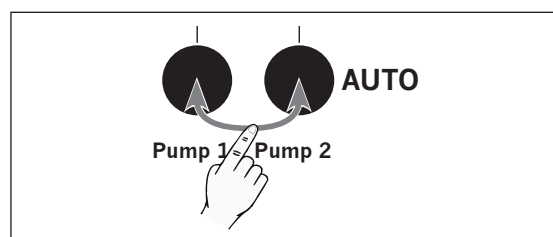
→ Fill pump station chamber.

If the water reaches the “High water level alarm” (AL) level, an alarm sounds, a fault message appears in the display panel and the LED for “High water level alarm” ● lights up:

→ Interrupt the inlet.



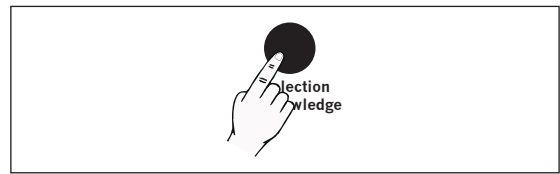
Starting automatic mode: Press both buttons in order to start the automatic mode of Pump 1 and 2.



Acknowledging a malfunction:

→ Press the button to acknowledge the malfunction.

A fault message is no longer displayed and the LED for the “High water level alarm” ● goes out.



The trial run is finished.

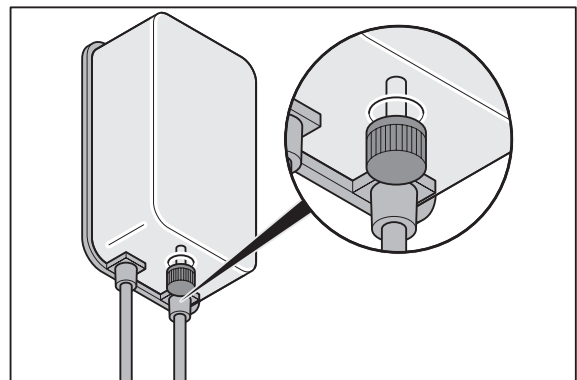
Final work:

- Position the cover again
- For version with air bubble injection (optional): Set air bubble injection on the mini compressor, Chapter 4.6 “Setting air bubble injection (optional)”
- Document the settings, Chapter 4.3 “Commissioning settings”
- Document the commissioning, Appendix “Commissioning report”

4.6 Setting the air bubble injection (optional)

The air outlet of the mini compressor must be adjusted to reduce the volume and power consumption.

→ Use the screw on the mini compressor to set the air bubble injection so that only a few air bubbles escape at the end of the pressure bell (check via inspection opening).



4.7 Draining and cleaning grease separators

Grease separators must be emptied and cleaned at least once a month by properly qualified personnel, Chapter 1.4 “Personnel qualifications”. More frequently depending on the wastewater composition.



Enter the date and address of the disposal contractor in the operating log.

Characters in brackets “()”, refer to representation for the plant, Chapter 2.2. “Components”.

4.7.1 Checks

- Define additional disposal intervals. The storage capacity of the sludge trap (half sludge trap volume) and the grease separator (volume of the grease collection chamber) must not be exceeded.
- Check maintenance opening(s), especially the condition and the leak-proof capability of the seal(s).
- Clean the sampling equipment (in pump station).


4.7.2 Lipulift-C without optional connection to direct suction


- Interrupt the wastewater inlet (33) or set catering establishment.
- Open maintenance opening (41) and insert the suction hose (suction vehicle) in the grease separator chamber (25).
- Switch on the suction pump for so long until the chamber content has dropped by approx. 1/4.
- Break down and remove any possibly hardened grease layer.
- Switch on suction pump (suction vehicle) and pump out chamber content.
- Clean the grease separator chamber.
- Switch on suction pump (suction vehicle) and pump out polluted cleaning water.
- Switch off suction pump (suction vehicle) and remove the suction hose from the inspection opening (41).
- Fill at least 2/3 of the grease separator chamber (25) with fresh water.
- Close the maintenance opening (41) and connect the wastewater supply (33) and/or acquire catering establishment.

4.7.3 Lipulift-C with optional connection to direct suction

- Interrupt the wastewater inlet (33) or set catering establishment.
- Connect the suction hose (suction vehicle) onto the direct suction (22 and/or 23).
- Switch on the suction pump and suck out the content from the grease separator chamber.
- Open maintenance opening (41).
- Break down and remove any possibly hardened grease layer.
- Clean the grease separator chamber.
- Switch on suction pump (suction vehicle) and pump out polluted cleaning water.
- Switch off suction pump (suction vehicle) and separate the suction hose from the direct suction (22 and/or 23).
- Fill at least 2/3 of the grease separator chamber with fresh water.
- Close the maintenance opening (41) and connect the wastewater supply (33) and/or acquire catering establishment.

5 Regular testing, inspection and maintenance

ACO recommends that you take out a maintenance contract. This therefore guarantees professional and on-schedule completion of the maintenance work by ACO product specialists,  Chapter Introduction “ACO Service”.

Required qualifications for testing, inspection and maintenance,  Chapter 1.4 “Personnel qualifications”.

Enter the tests, inspections, maintenance work and test results in the operating log:

- Inspections by the operator company
- Sampling
- Measuring: Water consumption, sludge layer and grease layer thickness, pH value, temperature
- Maintenance and general inspections
- Disposal (draining and cleaning)

IMPORTANT If defects are determined during inspection and tests, then the plant may only be initially put back into service when these defects have been remedied.

5.1 Weekly Inspections

Inspections by the operator company:

- Inspect the system, connections, mechanical and electrical components for external damage.
- Testing of the sludge volume in the integrated sludge trap and the grease layer thickness in the grease collection area of the grease separator.
- Remove the coarse floating matter on the surface of the water in the grease separator.

5.2 Quarterly maintenance of the pump station

Tests and/or inspections (following prior draining and cleaning) by a competent person (if operated in private areas = every 6 months):

- Test that ball valve and/or gate valve moves smoothly and does not leak, if necessary reset and grease.
- Test the function of the ball valve backflow preventer: open and clean, control the seating of the ball and seal.

- Execute internal cleaning for the pump station chamber
- Test the function of the pumps.
- Inspect the wear of the pump parts.
- Inspect the control cable for the level sensor and hose pipe for air bubble injection for ease of flow-through and, if necessary, blow through.
- Inspect the level sensor, in particular the opening width of the pressure bell, for contamination and narrowing of the cross-section and, if necessary, clean
- Inspect the function of the mini compressor: if the air bubble injection is impaired, then malfunctions can occur on the pumps.
- Inspect the function of the level switch: Switching points are factory-set and can be adjusted.

5.3 Annual maintenance of the grease separator

Tests & inspections (after prior draining and cleaning) by a properly qualified person:

- Inspect the internal wall surfaces and components of the grease separator.
- Inspect maintenance openings especially the condition and the leak-proof capability of the seals.

5.4 5-year general inspection of the grease separator

Tests and/or inspections (following prior draining and cleaning) by a properly qualified, competent person before commissioning and then every 5 years at the latest:

- Inspect the dimensioning of the grease separator.
- Inspect the structural condition and leak tightness of the grease separator according to DIN 4040-100.
- Inspect the internal wall surfaces and components.
- Inspect for proper execution of the vent stack of the grease separator as a vent stack above the roof according to EN 1825-2.
- Inspect the completeness and plausibility of the entries in the operating log e.g. verifications of proper disposal, substances removed, sampling.
- Inspect the completeness of all the required permits and documents e.g. approvals, drainage plans, instructions for operation and maintenance.

6 Troubleshooting



WARNING

Electric shock

- According to EN 12056, work on electrical connections to the power supply may only be carried out by qualified electricians.
- Disconnect the control from the power supply before troubleshooting.

CAUTION

Flooding and risk of infection in case of improper sanitary installation

- Work on the sanitary equipment must only be executed by qualified personnel, Chapter 1.4 “Personnel qualifications”.
- Only use original spare parts.
- Only have prefabricated pumping station repairs executed by ACO or an ACO Service partner, Chapter Introduction, “ACO Service”.
- Avoid contact with wastewater and wear protective equipment, Chap. 1.5 “Personal protective equipment”.
- Never execute work on the connections and pipes unless they are depressurised.

Burns due to hot surfaces

- Allow the pump motors to cool.

Malfunctions on the pump station

Malfunction	Cause(s)	Actions
Pump without function	Power consumption too high (automatic shut-off)	Acknowledge malfunction If the malfunction remains: Contact ACO Service
	Control without power supply	Restore power supply (electrician)
	Automatic mode not switched on	Switch on automatic mode
	Pump motor is defective	Pump replacement required (ACO Service)
	Pump blocked by foreign bodies	Pump maintenance required (ACO Service)
Pump does not pump or pumps too little or the tank is full	Ball valve and/or gate valve in the pressure pipe is not fully open or is closed	Fully open the ball valve or stop valve in the pressure pipe
	Pressure pipe obstructed	Clean the pressure pipe
	Impeller (pump) obstructed	Pump maintenance required (ACO Service)
	Pump parts are worn	Pump repair required (ACO Service)

Malfunction	Cause(s)	Actions
Pump only runs in manual operation	Control line of the level switching is leaking, incorrectly laid, kinked or obstructed	Check the control line
	Pressure bell blocked	Pressure bell
	Closed pressure bell defective	Replace the closed pressure bell
	Level sensor is defective	Exchange the level sensor
	Float switch is defective	Exchange the float switch(es)
Knocking noises/vibrations in the pressure pipe on switching off the pump(s)	Stop delay period for the pumps is too short	Increase pump stop delay period

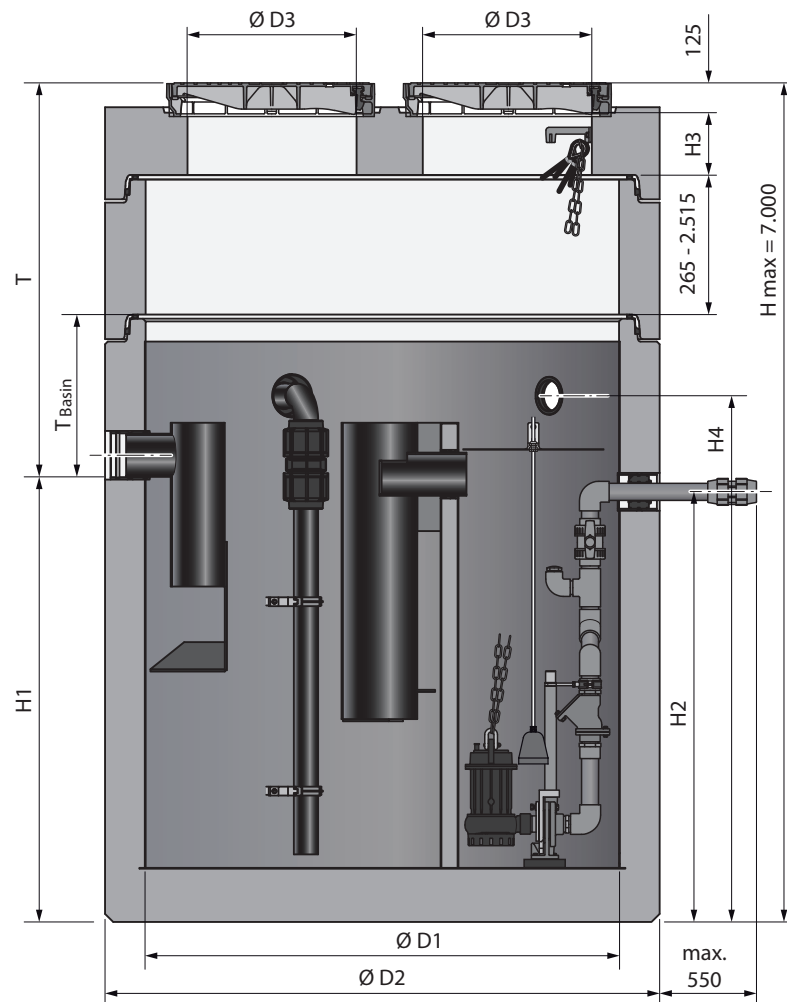
Fault messages at the control

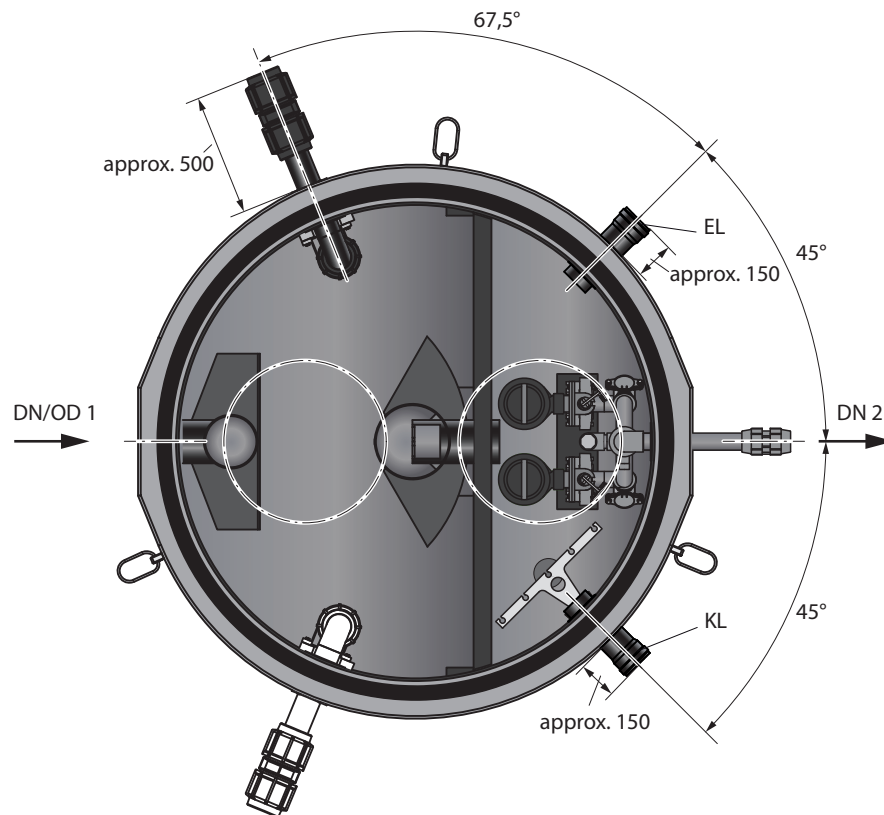
Display panel	LED display(s)	Cause(s)	Actions
Maximum current	●	Power consumption too high (automatic shut-off)	Acknowledge malfunction If the malfunction remains: Contact ACO Service
High water level alarm	●	Ball valve and/or gate valve in the pressure pipe is not fully open and/or is closed	Fully open the ball valve or stop valve in the pressure pipe
		Automatic mode is switched off	Switch on automatic mode
		Pump motor is defective	Pump replacement required (ACO Service)
		Impeller (pump) obstructed	Pump maintenance required (ACO Service)
		Pressure pipe obstructed	Clean the pressure pipe
		Pump parts are worn	Pump repair required (ACO Service)

7 Technical Data

7.1 Lipulift-C

7.1.1 Dimensions





NS	Dimensions [mm]										
	D1	D2	D3	H1	H2	H3	H4	T _{basin}	T	OD1	DN2
2/200	1,500	1,740	600	1,120	1,040	190	1,265	445	760	160	50 ¹⁾
2-4/400	1,500	1,740	600	1,320	1,150	190	1,540	520	835	160	50 ¹⁾
4/800	1,500	1,740	600	1,720	1,540	190	1,785	365	680	160	50 ¹⁾
5.5/550	1,500	1,740	600	1,460	1,430	190	1,540	380	695	160	50 ¹⁾
5.5/1100	1,500	1,740	600	2,000	1,540	190	2,085	385	700	160	50 ¹⁾
7/700	1,750	2,050	600	1,650	1,590	240	1,940	595	960	160	50 ¹⁾
7/1400	1,750	2,050	600	2,090	1,590	240	2,150	355	720	160	50 ¹⁾
10/1000	1,750	2,050	600	2,060	1,590	240	2,150	385	750	160	50 ¹⁾
10-20/4000	2,100	3,000	800	2,000	1,805	240	2,420	960	1,325	200	100 ²⁾

H3, T_{Basin} and T = Construction height with joints for circular rotating mechanical seal (15 mm) or mortar (10 mm)

H maximum = Maximum installation depth of the tank relative to the tank base

EL = Ventilation pipe connection DN 100/OD = 110 mm: details for pipe bottom on request

KL = Blank cable pipe connection DN 100/OD = 110 mm: details for pipe bottom on request

¹⁾ For connecting pipe OD 63 mm

²⁾ Flange connection with flange connection dimension according to DIN 2501- PN 16

7.1.2 Key data

The various level sensors are abbreviated and/or represented in the tables as follows:

- Open pressure bell without air bubble injection = (A)
- Open pressure bell with air bubble injection = (B)
- Closed pressure bell = (C)
- Level sensor = (D)

NS	Grease separator Contents [l]			Pumping station Utilisation content [l]				Weights [kg]	
	Sludge trap	Grease store	Total	(A)	(B)	(C)	(D)	Tank Complete*	Cover plate Complete
2/200	200	255	1,715	55	160	125	55	3,340	1,230
2-4/400	400	255	1,940	185	290	255	185	3,820	1,230
4/800	800	255	2,650	445	550	515	445	4,300	1,230
5.5/550	550	255	2,190	275	380	345	275	3,850	1,230
5.5/1100	1,100	255	3,140	630	730	700	630	4,830	1,230
7/700	700	505	3,320	405	520	485	405	6,630	1,970
7/1400	1,400	505	4,375	720	830	800	720	7,200	1,970
10/1000	1,000	700	4,300	700	810	780	700	7,190	1,970
10-20/4000	4,000	1,350	9,790	525	640	600	525	15,920	2,640

*without submersible pumps

7.2 Submersible pumps

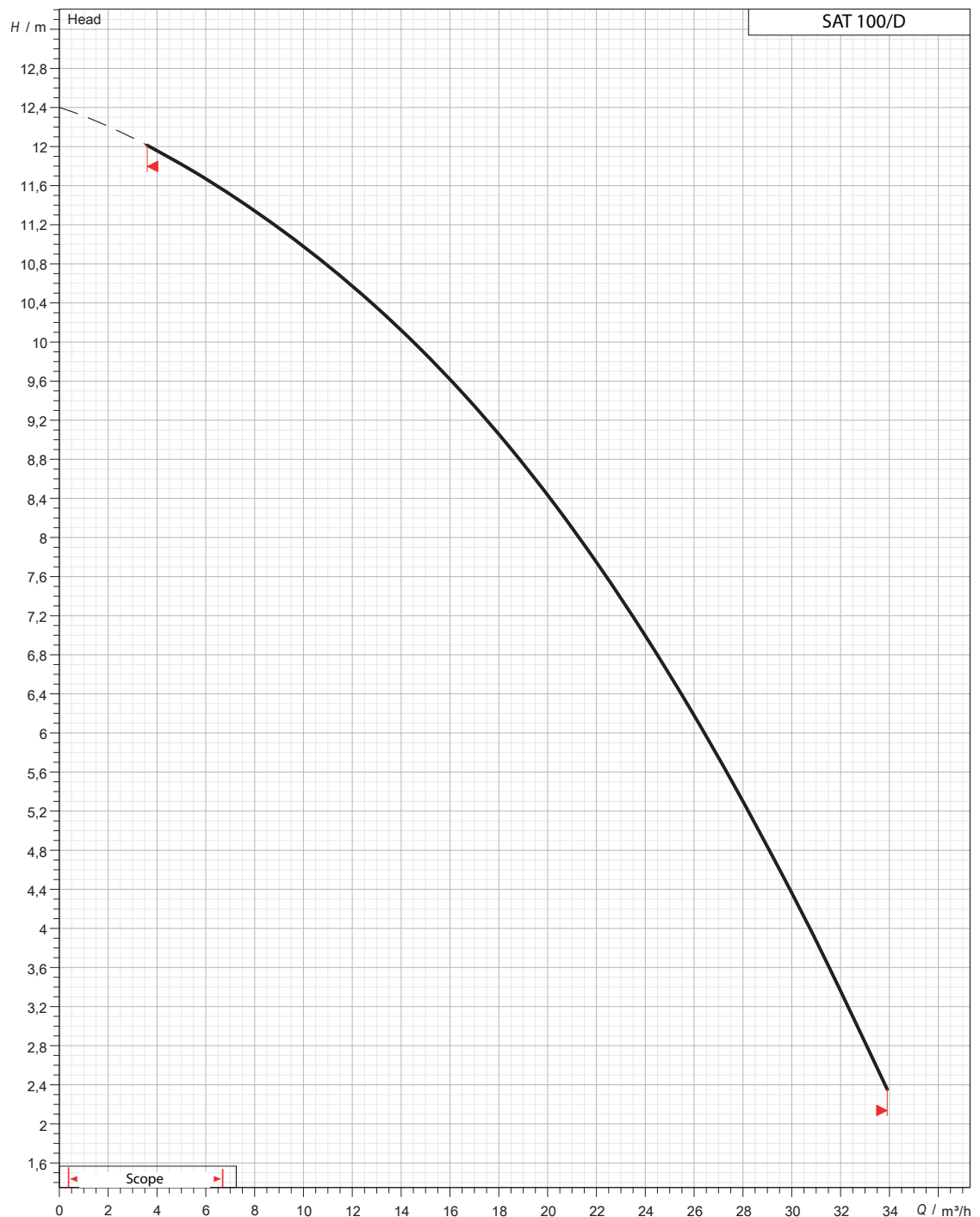
7.2.1 SAT-100/D, SAT-150/D and SAT-200/D

Characteristic data and use limits

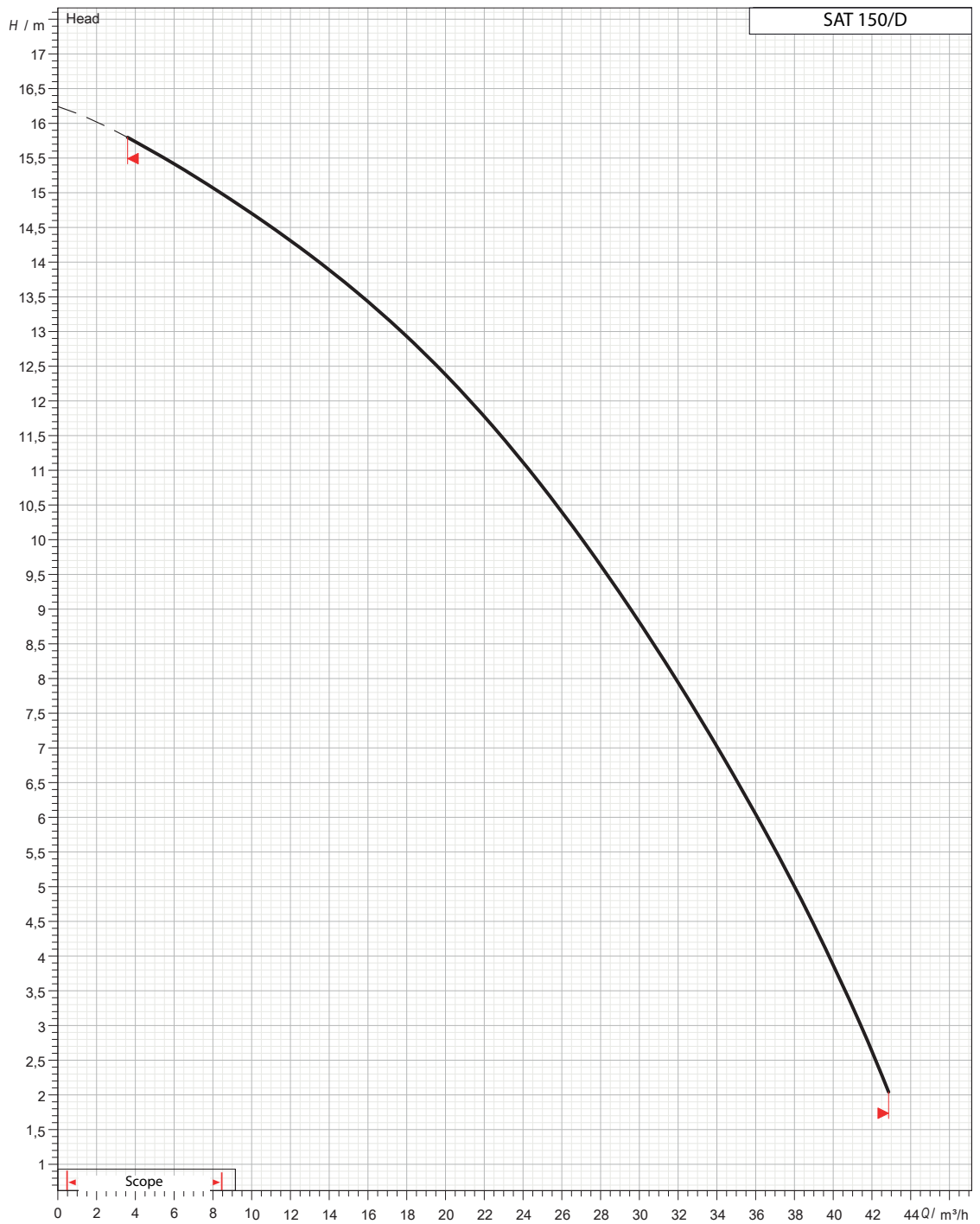
Key data	SAT 100/D	SAT 150/D	SAT 200/D
Type of cable for connection cable:	4G1	4G1	4G1
Pump motor operating voltage [V]:	400	400	400
Frequency [Hz]:	50	50	50
Pump motor speed [1/min.]:	2,700	2,665	2,740
Pump motor power input P1 [kW]:	1.3	1.6	2.0
Pump motor output P2 [kW]:	0.9	1.1	1.5
Pump motor nominal current [A]:	2.3	2.7	3.6
Maximum starts per hour:	30	30	30
Maximum ball through-flow [mm]:	15	15	15
Medium temperature range [°C]:	40	40	40

Key data	SAT 100/D	SAT 150/D	SAT 200/D
Fluid pH-value:	6 – 14	6 – 14	6 – 14
Fluid viscosity [mm ² /s]:	1.005	1.005	1.005
Medium density [kg/m ³]:	1,100	1,100	1,100
Weight [kg]:	19.5	20.5	21.5

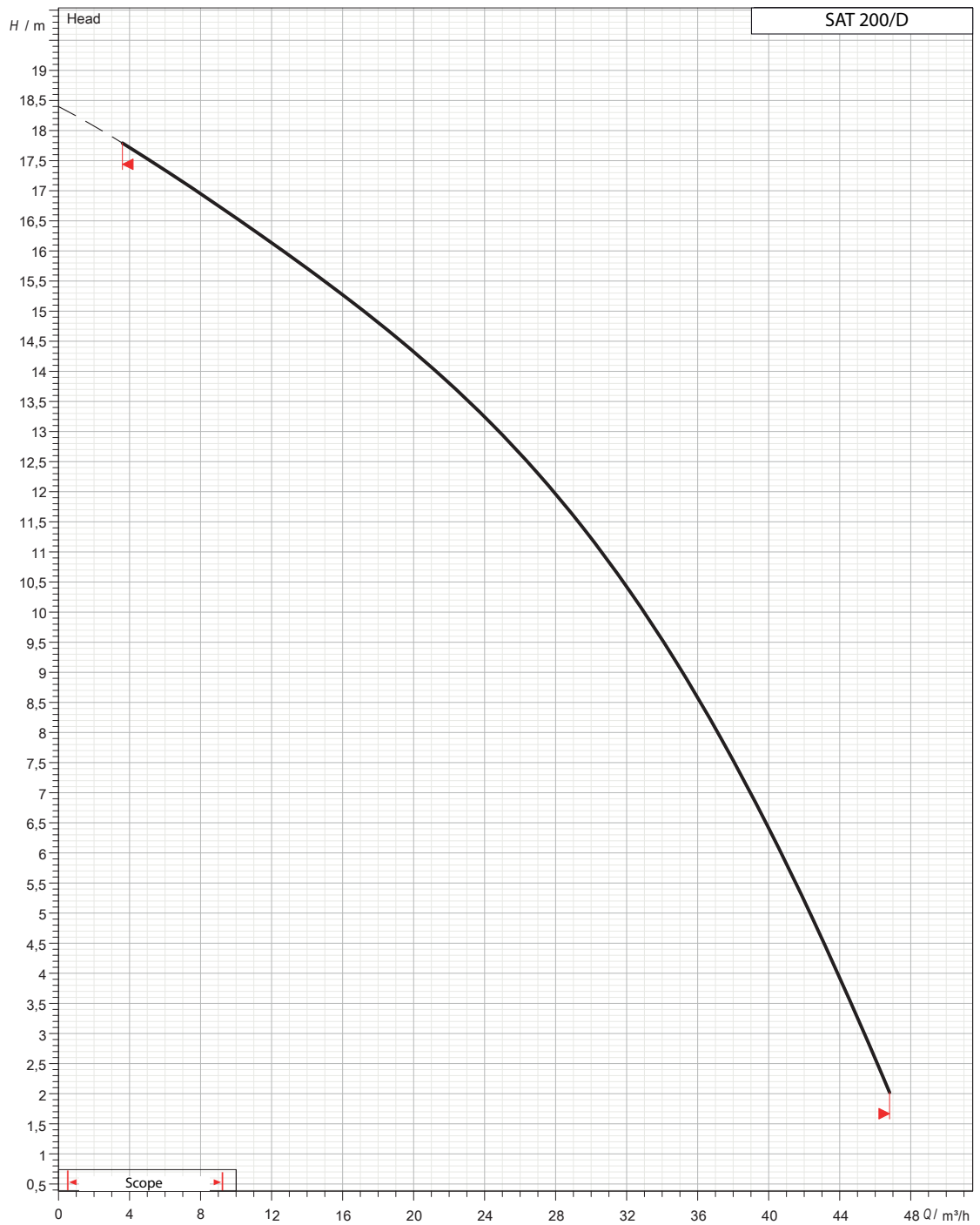
Performance diagram SAT-100/D



Performance diagram SAT-150/D



Performance diagram SAT-200/D



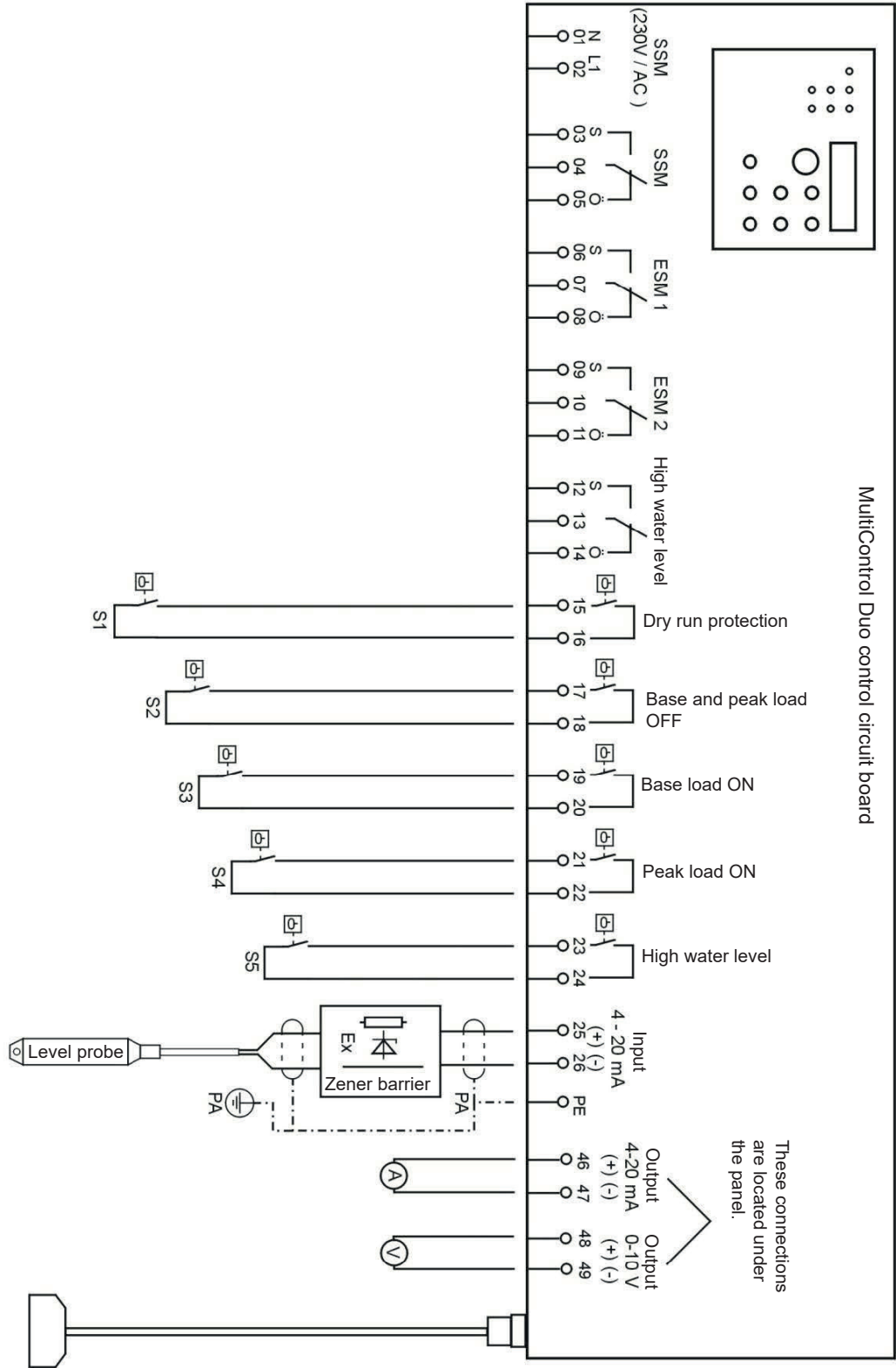
7.2.2

7.3 MultiControl Duo control

7.3.1 Key data

Key data	Values
Operating voltage:	~ 400 V (L1, L2, L3, N, PE), 50 Hz
Control voltage:	230 VAC, 50 Hz
Motor current limitation	0.3 A to 12 A (with duo: adjustable for each pump)
Power intake (contactors operated):	< 20 VA
Connected load, maximum:	P2 < 5.5 kW
Protection type, controller:	IP 54
Isolated alarm contact:	3 A
Fuse (alarm output):	5 x 20 AT
Rechargeable accumulator (mains-independent alarm):	9 V, 200 mAh (approx. 5 to 6 h)
Alarm volume:	85 dB
MultiControl Duo dimensions:	320 mm x 300* mm x 120 mm (W x H x D)
* incl. cable glands	

7.3.2 Circuit diagram



Appendix: Commissioning report

Commissioning and instruction of a qualified person takes place in the presence of the authorised acceptance inspection representative and the plant operating company.

Commissioning date: _____

Handover date: _____

Lipulift-C

Lipulift-C_NS									Accessories						
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
2/200	2-4/400	4/800	5.5/550	5.5/1100	7/700	7/1400	10/1000	10-20/4000	SAT ...	SAT-Q ...	MultiControl Duo control	Open pressure bell	Air bubble injection	Closed pressure bell	Level sensor

Use location

Building/room: _____

Use: Commercial company

Street: _____

Town/city: _____

Responsible persons

	Competent person	Authorised inspector	System operator
Name:			
Phone no.:			
Fax no.:			
Email:			
Address:			

Check list for commissioning (Qualified person)

Two trial runs are required before, during and/or after the commissioning,
 📖 Chapter 4.5 “Performing a trial run for pump station”.

Checks	OK	Not OK
Water storage basin in grease separator chamber	<input type="radio"/>	<input type="radio"/>
Electrical fusing of the plant in accordance with the IEC regulations or national and local regulations	<input type="radio"/>	<input type="radio"/>
Rotational direction of pump motors	<input type="radio"/>	<input type="radio"/>
Operating voltage and frequency	<input type="radio"/>	<input type="radio"/>
Motor protection switch: Test by briefly unscrewing individual fuses (two-phase run)	<input type="radio"/>	<input type="radio"/>
Ball check valve in the pressure pipe: Function testing, actuation, leak tightness	<input type="radio"/>	<input type="radio"/>
Ball valve and/or gate valve in the pressure pipe: function test, actuation, open position, leak tightness	<input type="radio"/>	<input type="radio"/>
Fixing of the pressure pipe	<input type="radio"/>	<input type="radio"/>
Switching and setting of the switching on levels in the control menu	<input type="radio"/>	<input type="radio"/>
Leak tightness: Fittings, connections, leak tightness inspection for plant	<input type="radio"/>	<input type="radio"/>
Fault and malfunction signalling equipment: Fault messages in the display panel, LED fault displays, acoustic alarm, telecommunication equipment (group fault)	<input type="radio"/>	<input type="radio"/>

Instruction (by installer company)

Instruction	Remarks	Yes	No
Instruction:	Functions, control, operating information, troubleshooting, maintenance obligations	<input type="radio"/>	<input type="radio"/>
Handover:	Instructions for Use	<input type="radio"/>	<input type="radio"/>

Remarks:

Signature of qualified person: _____

Signature of authorised acceptance inspection representative: _____

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