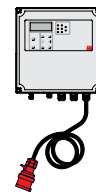


Muli-Mini

Wastewater lifting plant

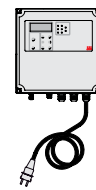
DDP Type

Dual pump 3-phase pneumatic



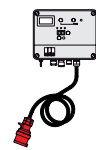
DWP Type

Dual pump AC pneumatic



MDP Type

Single pump 3-phase pneumatic



To ensure safe and proper use read the operating instructions and other documents supplied with the product carefully, provide these to end users, and keep them safely until the product is disposed of.

Welcome

ACO Passavant GmbH (hereafter referred to as ACO) would like to thank you for your confidence, and has delivered you a wastewater lifting plant (hereafter referred to as a lifting plant), which is state of the art and whose proper condition has been checked prior to delivery as part of a quality control process.



The following hints will help you to work with this operating manual.

- A list of tables and illustrations can be found as an annex.
- The following specific abbreviations are used in this manual:
 - Illus. = Illustration
 - Chap. = Chapter
 - max. = Maximum
 - min. = Minimum
 - mins = Minutes
 - secs = Seconds
 - hrs = Hours
 - Tab. = Table
 - e.g. = for
 - example
- The following specific abbreviations are used in this manual:
 - BL = Base load ON/Switch on point for the first pump
 - BL OFF = Base load OFF/Switch on for after-running time for the pump
 - PL = Peak load ON/Switch on point for the second pump
 - PL OFF = Peak load OFF/Switch off point for the second pump
 - ART OFF = After-running time OFF/Switch off point for the pump
 - AL = High water level alarm

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Inhaltsverzeichnis

1	Introduction	6
1.1	ACO Service	6
1.2	Product Identification.....	6
1.3	Guarantee	7
1.4	Owners, Users.....	7
1.5	Symbols used in the operating instructions	7
2	For your Safety	8
2.1	Appropriate Usage	8
2.1.1	Scope of Usage.....	8
2.1.2	Improper Applications.....	8
2.2	Qualification of Personnel	10
2.3	Personal Protective Equipment	10
2.4	Images of Warning Signs	11
2.5	Non-approved Parts.....	12
2.6	Basic Risks Electrical Current.....	12
2.6.1	Thermal Risks.....	12
2.6.2	Risks Relating to Materials/Substances	12
2.7	Owner's Responsibility.....	13
3	Transport and Storage.....	14
3.1	Safety during Transport and Storage.....	14
3.2	Transport.....	15
3.3	Storage	16
4	Product Description.....	17
4.1	Included in product.....	17
4.2	Product features	18
4.3	Components	22
4.4	Functional Principle	23
4.5	Recommendations for Installation	25
4.6	Type Plates	26
4.7	Accessories	26
4.8	DDP and DWP Controls	27
4.8.1	Overview of Operational and Display Elements.....	27
4.8.2	Operational Elements	28
4.8.3	Display Elements	29
4.8.4	Messages in the Display Field.....	30
4.8.5	Control Settings.....	30

4.8.6	Default Settings on Delivery	31
4.8.7	Setting Options.....	32
4.9	MDP Controls	35
4.9.1	Overview of Operational and Display Elements.....	35
4.9.2	Operational Elements	36
4.9.3	Display Elements	37
4.9.4	Default Settings on Delivery	38
4.10	Functional principles for Level Regulation.....	39
4.10.1	Version without Air Bubble Injection (standard).....	39
4.10.2	Version with Air Bubble Injection (option).....	40
5	Technical Data.....	41
5.1	Technical Data for the Lifting Plant.....	41
5.2	Technical Data for DDP and DWP Controls.....	44
5.2.1	Characteristic Data and Dimensions	44
5.2.2	Circuit Diagram for Controls.....	45
5.3	Technical Data for MDP Controls.....	46
5.3.1	Characteristic Data and Dimensions	46
5.3.2	Circuit Diagram for Controls.....	47
6	Installation.....	48
6.1	Safety during Installation.....	48
6.2	Sanitary Installation.....	49
6.2.1	Positioning the Tank	50
6.2.2	Preparing Connection for Drain Plug (option)	50
6.2.3	Connecting side Inlet Line	51
6.2.4	Connecting Inlet Line from above	52
6.2.5	Fitting Inlet Socket	53
6.2.6	Installing Stop Valve	54
6.2.7	Preparing Connection for Drain Line (option)	54
6.2.8	Connecting Air Line.....	55
6.2.9	Creating Backflow Loop.....	56
6.2.10	Connecting Pressure Line	57
6.2.11	Preparing Connection for Drain Tap (option)	58
6.2.12	Recommendations for Pipe Systems	58
6.2.13	Fitting Mounting Set	59
6.3	Electrical Installation	60
6.3.1	Attaching Controls	62
6.3.2	Group Alarm Relay (option).....	62
6.3.3	Attaching EEC or Earthed Plug	63
6.3.4	Adjusting Length of Electrical Cable for Pump(s).....	63
6.3.5	Attaching Mini Compressor (option).....	64
6.3.6	Connecting Pipes for Air Bubble Injection (option)	65

6.3.7	Connecting Electrical Lines for Mini Compressor	66
6.3.8	Connecting Line for Level Controls.....	67
7	Commissioning and Operation.....	68
7.1	Safety during Commissioning and Operation	68
7.2	Commissioning	68
7.3	Setting Ventilation Screw	69
7.4	Test Run for DDP or DWP Type	70
7.4.1	Test Run for Version without Air Bubble Injection.....	70
7.4.2	Test Run for Version with Air Bubble Injection	74
7.5	Test Run for MDP Type	77
7.5.1	Test Run for Version without Air Bubble Injection.....	77
7.5.2	Test Run for Version with Air Bubble Injection	81
7.6	Control Checks.....	84
7.7	Adjusting Air Bubble Injection	84
7.8	Adjusting Battery (for DDP and DWP types)	84
7.9	Setting Automatic Operation.....	85
7.10	Automatic Ventilation of the Volute	85
7.11	Hand Over Lifting Plant to Users	85
7.12	ACO Maintenance Contract.....	86
7.13	Operation.....	86
8	Maintenance	87
8.1	Safety during Installation.....	87
8.2	Lifting Plant Logbook.....	88
8.3	Maintenance Tasks for Users.....	88
8.3.1	Daily Checks	88
8.3.2	Maintenance Tasks as Needed.....	88
8.3.3	Annual Maintenance Work	89
8.4	Maintenance Plan for Qualified Personnel.....	89
9	Correcting Faults and Repairs	91
9.1	Safety during Repairs and Fault Correction	91
9.2	Tracking down Faults.....	93
9.3	Repairs and Replacement Parts	94
10	Decommissioning and Disposal	95
10.1	Safety during Decommissioning and Disposal.....	95
10.2	Decommissioning.....	96
10.3	De-activation	96
10.4	Disposal	97
	Index of Tables and Illustrations	98
	Declaration of Conformity	99

1 Introduction

The greatest care was taken when preparing these operating instructions for the Multi-Mini DDP, DWP and MDP lifting plants, and they contain information which ensures safe operation over a long working life.


If errors have nevertheless occurred, or if information has been omitted, please do let us know.

1.1 ACO Service

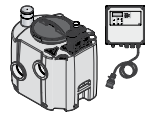
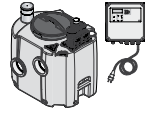
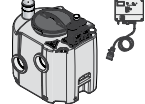
For any questions about the lifting plant, the operating instructions and for other information, our ACO Service team looks forward to hearing from you.

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1.2 Product Identification

Lifting plants on site can be identified from their type plate,  note down in Chap. 4.6 and the tables that follow.

Tab. 1: Key data for product identification

	Item number	Type	Motor power P2 [kW]	Illus.	Year of construction	Serial No.
○	1206.00.01	DDP 1.1	0.75		_____	_____
○	1206.00.02	DDP 1.2	1.2		_____	_____
○	1206.00.03	DWP 1.1	0.75		_____	_____
○	1206.00.04	DWP 1.2	1.2		_____	_____
○	1206.00.05	MDP 1.1	0.75		_____	_____
○	1206.00.06	MDP 1.2	1.2		_____	_____

1.3 Guarantee

Information about guarantees can be found in our "General Terms and Conditions of Sale"

at www.aco-haustechnik.de/agb.html.

1.4 Owners, Users

If the lifting plant is not operated by the owner, the following points must be agreed with the user:

- Who is responsible for day-to-day operations?
- Who is responsible for initiating maintenance or repairs for the lifting plant?
- Who will react when there is a malfunction?
- ...

1.5 Symbols used in the operating instructions

To better understand the information, it has been classified using the following symbols in this operating manual:



Useful tips and other information to make working with it easier



Steps to be carried out in the prescribed sequence



References to additional information in these operating instructions or in other documents



Warnings,  Chap. 2.4

2 For your Safety



In order to avoid injury to people or damage to property, read the safety instructions before installation or use of the lifting plant.

2.1 Appropriate Usage

2.1.1 Scope of Usage

This lifting plant can be used to collect and automatically lift wastewater above the backflow level. The wastewater is then fed into the sewage system without any danger to humans or any damage to buildings.

It can accept the following kinds of wastewater:


- Wastewater which is free from faeces from laundries, shower-rooms and cellars
- Wastewater from grease separators

Other possible uses and applications, and modifications are not permitted.

The owner is responsible for the layout (design and dimensions) of the lifting plant.

2.1.2 Improper Applications

Some examples of incorrect applications are e.g.:

- Using the lifting plant outside the scope of its application ,  Chap. 5.
- Letting the lifting plant or the pumps run dry.
- Using worn components (neglecting maintenance).
- Ignoring these operating instructions and other documentation supplied with the product.
- Using in areas where there is a risk of explosion.

Never put dangerous substances into the lifting plant which could injure people, pollute the water or affect the proper functioning of the lifting plant.

This includes in particular:

- Heavy metals, e.g. zinc, lead, cadmium, nickel, chrome
- Corrosive substances, e.g. acids (pipe cleaning products with a pH-value below 4), alkalines and lyes
- Cleaning and disinfecting, laundry and dish-washing products in large quantities or any which generate excessive quantities of foam
- Inflammable or explosive substances e.g. petrol, benzene, oil, phenols, paints which include solvents, white spirit
- Solids, e.g. kitchen scraps, glass, sand, ashes, fibres, synthetic resins, tar, cardboard, textiles, fats (oils), paint
- Fluids which can set into solids, e.g. plaster of paris, cement, lime
- Biocides, e.g. plant protection products and pest control products
- Wastewater from manure pits and animal husbandry, e.g. swill, slurry, manure

2.2 Qualification of Personnel

Any activities which affect the lifting plant must be carried out by qualified personnel, unless they are explicitly designated as suitable for other people (owners, users). The supplier of the lifting plant is responsible for making these people available.

Qualified personnel must be able to provide proof of several years of professional experience and specific knowledge of the following:

Tab. 2: Personnel qualifications






Activities	Person	Knowledge
Design Functional changes New type of use	Designer	<ul style="list-style-type: none"> ■ Knowledge of buildings, sanitary and building services ■ Assessment of applications for wastewater technology and correct planning of wastewater lifting systems
Transport/Storage	Dispatchers, handlers	<ul style="list-style-type: none"> ■ Proof of training in safety for loading ■ Safe handling of lifting and fixing accessories
Installation of sanitary goods/electrical Commissioning, maintenance, repair, decommissioning, dismantling	Qualified personnel	<ul style="list-style-type: none"> ■ Working safely with tools ■ Laying and connecting pipes and connectors ■ Laying electrical wiring ■ Fitting distributors, earth circuit breakers, other circuit breakers, electrical machinery, switches, buttons, sockets etc. ■ Measuring effectiveness of electrical protective measures ■ Product-specific knowledge
Use, operation Monitoring operations Simple maintenance and fault correction	Owners, users	<ul style="list-style-type: none"> ■ No specific requirements
Disposal	Qualified personnel	<ul style="list-style-type: none"> ■ Correct and environmentally-friendly disposal of materials and substances ■ Decontamination of dangerous substances ■ Knowledge of recycling

2.3 Personal Protective Equipment

Personal protective equipment is needed for various activities relating to the lifting plant.

Protective equipment from expert suppliers must be provided to your staff in sufficient quantities, and its use must be enforced by supervisors.




Tab. 3: Personal Protective Equipment

Mandatory signs	Meaning	Explanation
	Wear safety shoes	Safety shoes offer good non-slip protection, especially in wet areas, and resistance to piercing, e.g. by nails, and also protect the feet from falling objects, e.g. when moving items
	Wear a safety helmet	Safety helmets protect from head injuries e.g. from falling objects or blows, particularly where there are low ceilings and equipment is mounted above head height
	Wear protective gloves	Protective gloves protect the hands from minor bruises, cuts, infections and hot surfaces, particularly during transport, commissioning, maintenance, repairs and dismantling
	Wear protective clothing	Protective clothing protects the skin from minor mechanical damage and from infections due to exposure to wastewater
	Wear protective goggles or glasses	Protective eye-gear will protect the eyes against exposure to wastewater, especially during commissioning, maintenance, repairs and decommissioning

2.4 Images of Warning Signs

To assist you, risks and dangers are indicated using the following warning symbols and words in these operating instructions:

Tab. 4: Levels of Risks

Warning symbols and words		Meaning	
	DANGER	Injuries	Indicates a dangerous situation which, if not prevented, will lead to death or serious injuries.
	WARNING		Indicates a dangerous situation which, if not prevented, can sometimes lead to death or serious injuries.
	BEWARE		Indicates a dangerous situation which, if not prevented, can sometimes lead to medium or light injuries.
	CAUTION	Damage to property	Indicates a situation which, if not prevented, can sometimes lead to damage to components, the lifting plant and/or its functioning, or to an item close by.



Examples of warning messages:

KEY WORD

Cause of risk

Impact of risk

Description/list of protective measure(s)

2.5 Non-approved Parts

The lifting plant had to complete a large number of quality control steps before it was launched, and all components were tested at maximum load.


If you build in unapproved parts this can threaten safety and it voids any guarantee from ACO.

Only original parts from ACO, or ACO approved replacement parts, may be used when replacing components.

2.6 Basic Risks Electrical Current

This Chapter shows the basic risks relating to the lifting plant.

2.6.1 Thermal Risks

The electric motor of the submersible pump(s) works intermittently. Thermal risks do not exist in relation to the lifting plant when it is operating normally. In the event of a fault, the motor can heat up to a maximum of 110 °C and cause burns, so protective equipment should be worn  Tab. 3.





2.6.2 Risks Relating to Materials/Substances

On contact with greasy water or contaminated pump parts, e.g. when removing blockages, there is a risk of infections, protective equipment should be worn,

 Tab. 3.

2.7 Owner's Responsibility

It is the responsibility of the owner to ensure the following points are respected:

- The lifting plant must only be used as intended and in a good operating condition,  Chap. 2.1.
- There must be no impediment to the good functioning of the safety devices.
- Maintenance timetables must be respected and faults dealt with swiftly. The owner should only tackle faults themselves when these measures are described in this operating manual. ACO Service is responsible for all other tasks.
- Check the type plates on the lifting plant for completeness and legibility,  Chap. 4.7.
- A sufficient quantity of personal protective equipment must be provided and must also be worn,  Chap. 2.3.
- Make the operating instructions available in a legible and complete version at the place of use and train people in its contents.
- Only use qualified and authorised staff,  Chap. 2.2.
- Do not allow humidity in the installation room of the lifting plant to exceed 80%.

3 Transport and Storage

This Chapter provides information on the correct way to transport and store the lifting plant.



the lifting plant and spare parts (packed in a box) are attached to a pallet for delivery. The whole unit is protected by a plastic sheet, Chap. 4.1.

3.1 Safety during Transport and Storage

The following risks can occur during transport and storage:



WARNING

Read safety instructions carefully before transport or storage. If carried out incorrectly severe injuries may occur.

Ensure the staff carrying out the transport and storage have the necessary qualifications, Chap. 2.2.

The lifting plant must always be moved by two people, Chap. 3.2

Physical injury may result from a single person trying to move too heavy a weight

Transport using a forklift truck or lorry

Severe bruising or blows can result from incorrect transport

- Personal protective equipment must be worn, Chap. 2.3.
- Move the lifting plant while in its delivery packaging (fixed to a pallet).
- Fasten the load securely.
- Check the fastening materials for suitability and freedom from damage.



WARNING

Transport by crane

Severe bruising and blows from falling heavy items

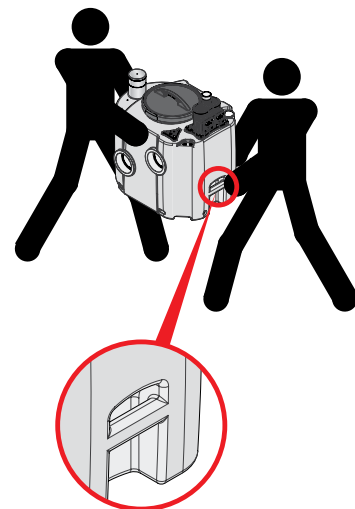
- Personal protective equipment must be worn 📖 Chap. 2.3.
- Move the lifting plant only while in its delivery packaging (fixed to a pallet).
- Check the max. permitted load for the crane and the fastening materials.
- Never stand below a hoisted heavy item.
- Make sure that no other people can access any of the danger area.
- Avoid swinging movements while moving.

3.2 Transport

The correct procedure for transport using 2 people or a crane is described below.

By 2 people:

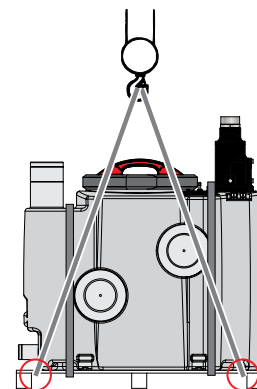
The lifting plant (max. 75 kg) can be lifted by 2 people using the carrying handles/grips, 📖 Illus. on right.



By crane:

The hoisting slings or ropes must be attached to the connecting points

○ provided, 📖 Illus. on right.



3.3 Storage

CAUTION Incorrect storage or storage conditions can cause damage to the lifting plant. The following steps must be taken:

For short-term storage (less than 3 months):

- Store the lifting plant in an enclosed, dry, dust-free and frost-free room.
- Avoid temperatures outside the range -20 °C to +60 °C.

For long-term storage (more than 3 months):

- Store the lifting plant in an enclosed, dry, dust-free and frost-free room.
- Store the lifting plant at temperatures between -20 °C and +60 °C.
- For materials which are not rustproof: Apply a coating of preservative to all internal and external metallic parts.
- Check preservative after 6 months and repeat if necessary.

4 Product Description

This Chapter provides you with information about what the product includes, features and an overview of components.

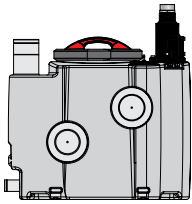


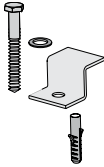
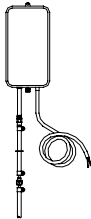
4.1 Included in product

Check that the supplied product is undamaged and complete using Tab. 5 below.

CAUTION Never install a damaged lifting plant.

Report any damage to the lifting plant to the supplier, so that any claims can be processed rapidly.

Tab. 5: Items delivered and spare parts for lifting plant

Unit	Component	Illus.	Packaging
Container	<ul style="list-style-type: none"> ■ 1 x tank ■ 1 x control cable, length 10 m ■ 1x (MDP) or 2x (DDP and DWP) connector cables, length 10 m (attached to terminal boxes in the motor and the control unit) 		Wooden pallet
Fitting accessories	<ul style="list-style-type: none"> ■ 1 x DN 100 seal 		Cardboard box
	<ul style="list-style-type: none"> ■ 1 x hose connector DN 70 with 2 clamps ■ 1 x hose connector DN 100 with 2 clamps 		
	<ul style="list-style-type: none"> ■ 4 x brackets ■ 4 x wood screws ■ 4 x washers ■ 4 x rawlplugs 		
Accessories (optional) e.g. mini-compressor 0154.81.27	<ul style="list-style-type: none"> ■ 1 x mini-compressor ■ 1 x hose 6 x 4 length 100 mm ■ 1 x hose 6 x 3 length 500 mm ■ 1 x hose 6 x 3 length 9500 mm ■ 1 x screw-on connector ■ 1 x retaining valve ■ 1 x hose nozzle with USIT ring ■ 4 x hose clamps 		Cardboard box

Tab. 5: Items delivered and spare parts for lifting plant

Unit	Component	Illus.	Packaging
Controls	<ul style="list-style-type: none"> 1 x plug-in controls (MDP, DDP or DWP) 		Cardboard box
Documentation	<ul style="list-style-type: none"> Operating instructions Delivery documents 	-	PVC bag



Further accessories, such as inlet valve stop valve, signal system etc.,
 Product catalogue, www.aco-haustechnik.de.

4.2 Product features

Technical Terms Used

- **Backflow level:** The highest point in an installation which the polluted water can reach. The backflow level is found in the area with the greatest diameter and should be installed such that the water runs back into the sewers and not into the lifting plant.
- **Free flow centrifugal pump:** Flow machine; centrifugal force is used via a rotating impeller to keep the liquids moving.
- **Free flow impeller:** A large margin of free space in the volute (free ball passage) allows an uninterrupted flow of both liquids and solids up to a diameter of 50 mm max. A further advantage is that there is no throttle gap between the impeller and the volute which can threaten the safety of operations in areas where there are long periods of inaction.

Short Description of the Lifting Plant

The lifting plant is intended for free-standing installation in a frost-free, enclosed space below the backflow level.

The casing is made from high-quality plastic (PE-HD). The lifting plant has a single (MDP) or dual (DDP or DWP) pump(s) for wastewater without faecal matter, and also has level regulation.

The submerged pumps (free flow centrifugal pumps) are fitted with robust 3-phase or alternating current motors. The pump flange is sealed from the the motor with two circular rotating mechanical seals with an oil chamber between them.

The volute and the impeller are both made out of Technopolymer. All other pump elements are made from stainless steel.

The connecting lines for the pumps and the control lines for level regulation are each 10 m in length.

Tab. 6: Lifting plant features

General
<ul style="list-style-type: none"> ■ Low weight (50 – 75 kg) ■ Ready to connect, rapid to install ■ Low cost of maintenance ■ No tools required to dismantle pumps ■ All components have high chemical stability ■ High useful volume (up to 140 l) adjustable by varying the inlet heights ■ Suitable for wastewater that contains grease, grease separator up to NS 4 ■ Guaranteed against overflow as per IP 68: Flooding height (from base support surface) max. 2 m. Flood period max. 7 days
Polyethylene container
<ul style="list-style-type: none"> ■ Scour outlet R 1 ■ Maintenance hatch for simple maintenance (clear width diameter 350 mm) ■ Fixing kit to secure against floating ■ DN 50 connector for hand diaphragm pump ■ 4x horizontal intake sockets DN 100 ■ 1x vertical intake sockets DN 100 for inlet or ventilation ■ 1x vertical nozzle DN 70 for ventilation line ■ 1x vertical socket DN 50 (optional)
Submersible pump
<ul style="list-style-type: none"> ■ Casing and impeller made from Technopolymer, other parts from stainless steel ■ 3-phase motor 400 V, 50 Hz (for DDP and MDP types); protection level IP 68 ■ 3-phase motor 230 V, 50 Hz (for DWP type); protection level IP 68 ■ Blockage resistant free flow impeller ■ Two circular rotating mechanical seals with an oil chamber between them (motor side: carbon/ceramic, pump side: carborundum/carborundum) ■ 10 m mains cable
Extension pressure line
<ul style="list-style-type: none"> ■ Flexible hoses with quick-lock connectors in the tank ■ Y-branch pipe with built-in double backflow stop (ball with venting option) ■ DN 50 mounting adapter with Rp 2 connector
Level regulation
<ul style="list-style-type: none"> ■ Level regulation with 10 m control cable ■ Optionally includes air bubble injection
Controls
<ul style="list-style-type: none"> ■ IP 54 protection ■ 1.5 m cable and EEC-plug (for DDP and MDP types) or earthed plug (for DWP type) ■ Mains-free group fault and operational messages

Short Description of Controls

The pump controls are used to automatically regulate the level of the liquids. The level is measured via the back pressure of the liquid.

Separate switches with overload protection are fitted for controlling the pumps and there are relay contacts to transmit warning messages.

All settings and values can be queried and changed using the display field.

Tab. 7: Features of DDP or DWP controls

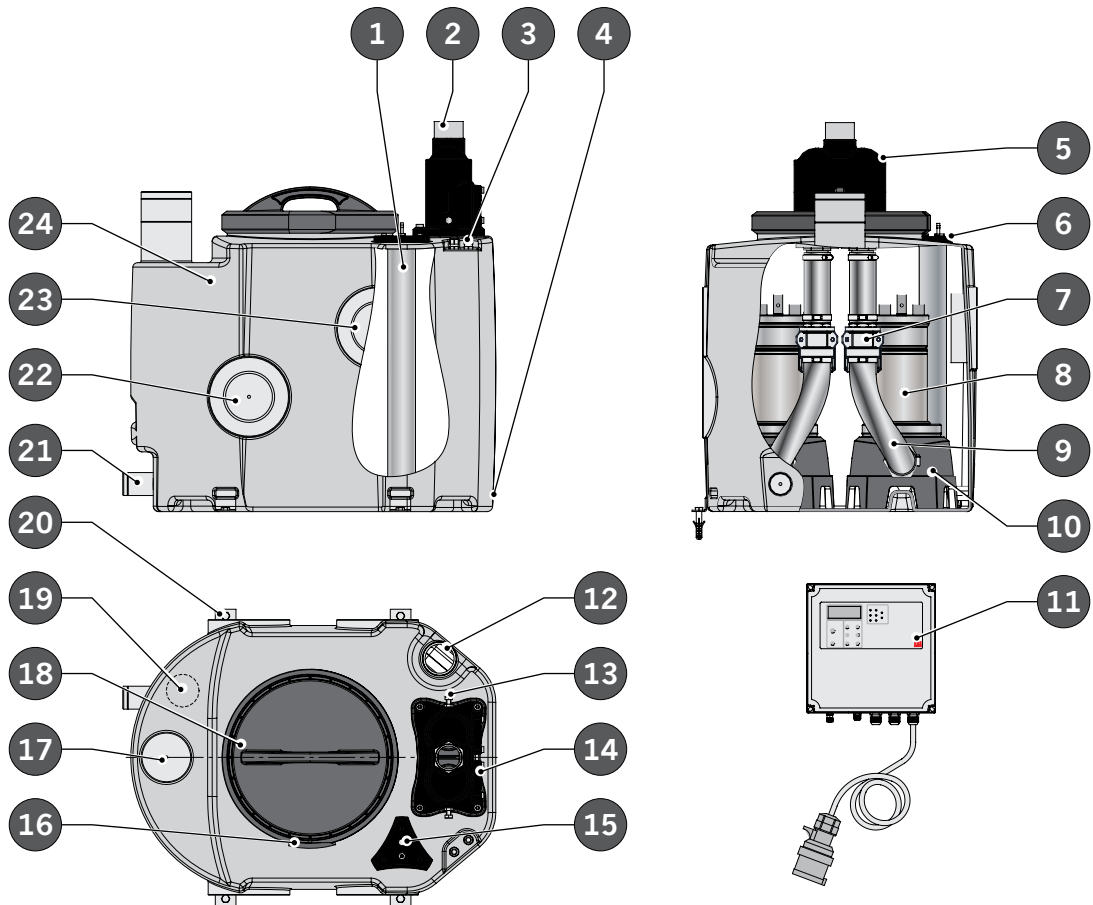
Features
■ LCD text display
■ Manual – 0 – Auto functions
■ Confirm button
■ Positive switching on of pumps (24 hrs)
■ Internal acoustic alarm
■ Mains-free high water level alarm
■ Operating hours counter
■ High level of resistance to faults
■ Level reading using internal pressure transducers
■ All settings and error messages are preserved in event of a power failure
■ Rotating field and loss of phase control
■ When operating manually the pump automatically switches off after running for 2 minutes
■ Pump is switched off via switch-off point and after-running time
■ Electronic monitoring of power to motor
■ Group alarm works with or without mains power
■ Store "Number of times pump started"
■ Ammeter
■ Automatic pump change-over
■ Simple to use
■ Service mode
■ Battery backup, mains independent alarm (approx. 7 hours) using built-in 9 V battery, alarm horn: sound level max. approx, 85 dB

Tab. 8: Features of MDP controls

Features
Displays:
■ 1x digital display of level
■ 1x rotating field control/red
■ 1x pump operation/green
■ 1x fault/red
Controls:
■ 1x control knob BL level/pump
■ 1x control knob AL level
■ 1x control knob after-running time
■ 1x control knob current cut-out
■ 1x rocker switch Off/Auto/Manual
■ 1x reset key
Signals:
■ 1x main free group signal
■ 1x mains free operational signal for pump

4.3 Components

The following diagram shows the structure or position of the individual lifting plant components and is used for unambiguous reference in the following chapters.



1 = Pilot tube
2 = Pressure pipes connector Rp 2
3 = Cable glands
4 = Scour outlet R 1
5 = Y-branch pipe with built-in double backflow stop
6 = Pipe nozzle for pneumatic level measurement
7 = Hose connection
8 = Motor for submersible pump

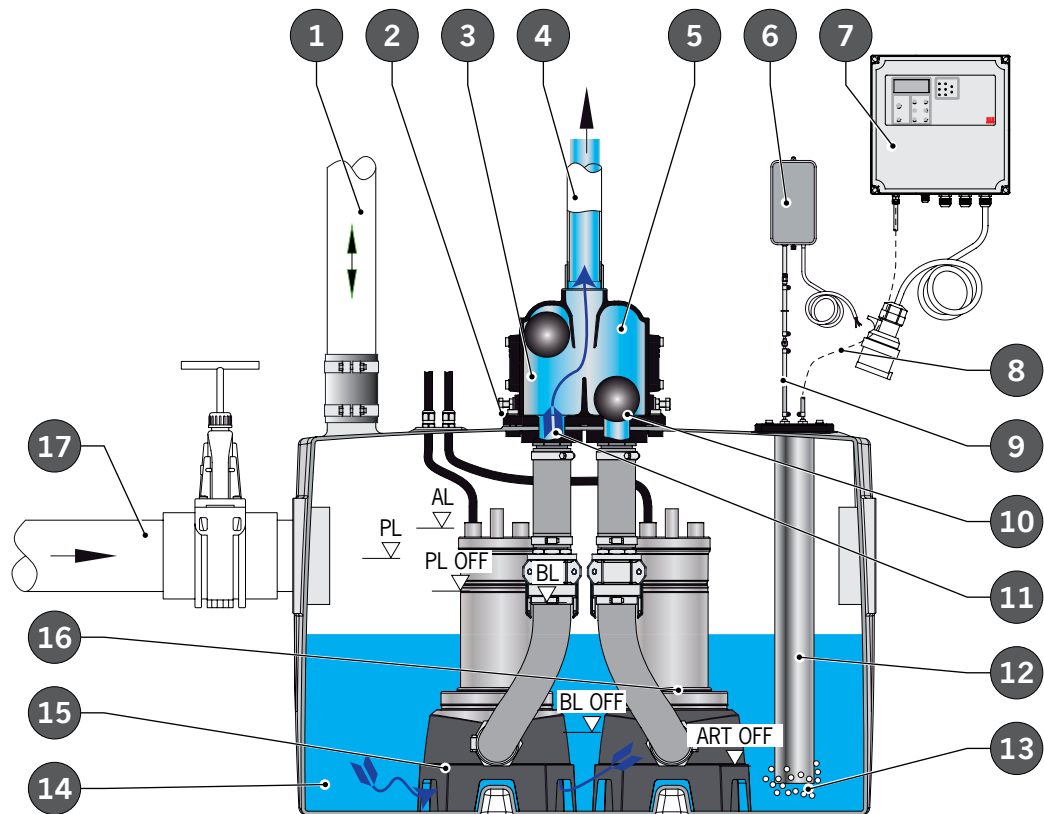
9 = Pressure hose
10 = Volute
11 = Controls
12 = Ventilation DN 70
13 = Lifting screw
14 = Maintenance cover backflow stop
15 = Connector for air bubble injection (optional)
16 = Tension ring for maintenance cover
17 = DN 100 sockets

18 = Maintenance cover
19 = DN 50 connection (optional)
20 = Fixing bracket with screws and rawplugs to secure against buoyancy
21 = DN 50 connector for hand diaphragm pump
22 = Socket DN 100
23 = Socket DN 100
24 = Tank

Illus. 1: Diagram of components

4.4 Functional Principle

This chapter describes the functions of the lifting plant.



1 = Tank ventilation
2 = Screw (for venting the pressure line)
3 = Y-branch pipe
4 = Pressure line
5 = Clear space Y-branch pipe

6 = Mini-compressor (optional)
7 = Controls
8 = Control lines for pneumatic level measurement
9 = Lines for air bubble injection

10 = Backflow ball
11 = Valve seat
12 = Pilot tube
13 = Air bubble injection (optional)
14 = Tank
15 = Pump 1
16 = Pump 2
17 = Inlet

Illus. 2: Schematic representation of functional principle

How it works:

The wastewater flows into the tank (14) through one (or more) inlets (17). The water level in the tank (14) is displayed in the display field of the controls (7). Once the water reaches a pre-defined level, the pumps (15, 16) automatically start running and the 'high level' alarm is triggered.

The level control functions as follows (using type DDP or DWP as example):


A pilot tube (12) mounted in the tank (14) is connected via a control line (8) to a diaphragm pressure switch in the controls (7). If the wastewater level rises, then the air in the pilot tube (12) is compressed. At a given pressure the diaphragm pressure switch in the controls switches the pumps (15, 16) on or off.

In order for the automatic level control to work correctly, the tank ventilation (1) and the steady incline of the control line (8) are critical.

If the wastewater reaches the "BL" level, then pump (15) or pump (16) will switch on and the wastewater is pumped through the pressure line (4) and the backflow loop into the sewer. The wastewater flows through the relevant part of the Y-branch pipe (3), pushes back the backflow ball (10) into the space (5) and flows through the released valve seat (11) into the pressure line. When the pump is not running, the ball sits in the valve seat and closes the pressure line in the Y-branch pipe. This means that the contents of the pressure line cannot flow backwards and cannot empty into the tank. The backflow ball (10) can be raised using the screws (2) (the pipeline is vented).

If the wastewater level falls to the level "BL OFF" then the predefined after-run time (ART) for the pump is activated and the pump is switched off at "ART OFF". Both pumps (15) and (16) work alternately, i.e. the sequence of switching on pumps (15) and (16) is automatically reversed each time they are restarted.

The second pump (16) also switches on if the first pump fails, if there is a larger amount of wastewater or when the "PL" water level is reached and switches off automatically when the "PL OFF" level is reached. If the wastewater level reaches "AL" the "high water alarm" is triggered.

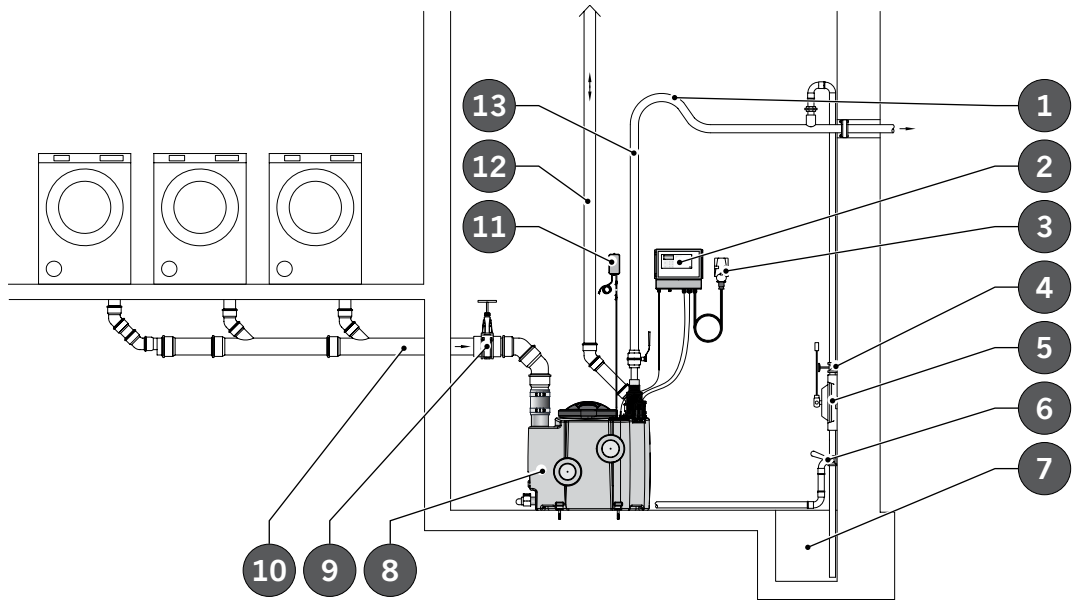
The content between the two switch points "ART OFF + BL" represents the useful volume of the tank. The automatic level regulation is preset by the manufacturer for the relevant switch points, but for optimum functioning it should be adjusted to suit the individual operating conditions,  Chap. 7.4 and 7.5.

Running with a mini-compressor (optional):

A mini-compressor (6) generates continuous air pressure and passes this through a line (9) into the pilot tube (12). The compressed air (13) leaves the pilot tube and mixes freely in the wastewater in the tank (14). This helps to prevent any blockages in the pilot tube which helps to make the level regulation more reliable. Thanks to this procedure, fluctuations in readings can be kept to a minimum.

4.5 Recommendations for Installation

In the diagram below two possible ways of installing the lifting plant are show.



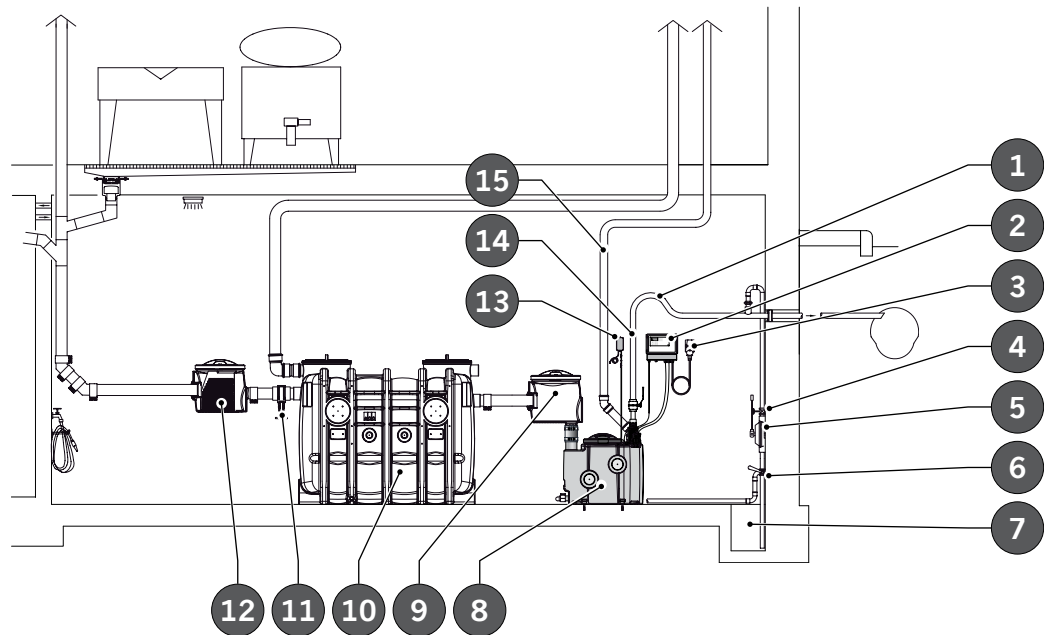
1 = Backflow loop*
2 = Controls
3 = EEC plug or earthed plug*
4 = Stop valve (optional)

5 = Manual diaphragm pump (optional)
6 = Three-way valve (optional)
7 = Pump sump*
8 = Tank
9 = Stop valve

10 = Inlet line*
11 = Air bubble injection (optional)
12 = Ventilation line*
13 = Pressure line*

*Need to be installed on site

Illus. 3: Suggested installation behind laundry rooms



1 = Backflow loop*
2 = Controls
3 = EEC plug or earthed plug*
4 = Stop valve (optional)
5 = Manual diaphragm pump (optional)

6 = Three-way valve (optional)
7 = Pump sump*
8 = Tank
9 = Sampling pot (optional)
10 = Grease separator (optional)

11 = Stop valve (optional)
12 = Coarse trap
13 = Air bubble injection (optional)
14 = Pressure line*
15 = Ventilation line*

*Need to be installed on site


Illus. 4: Suggested installation behind grease separator

4.6 Type Plates

There is a type plate attached to the tank and the electric motor for the pump(s). The following data need to be copied from there and kept easily available for information and queries of all types.

- Model type
- Motor type
- Year of construction
- Item number
- Serial No.

4.7 Accessories

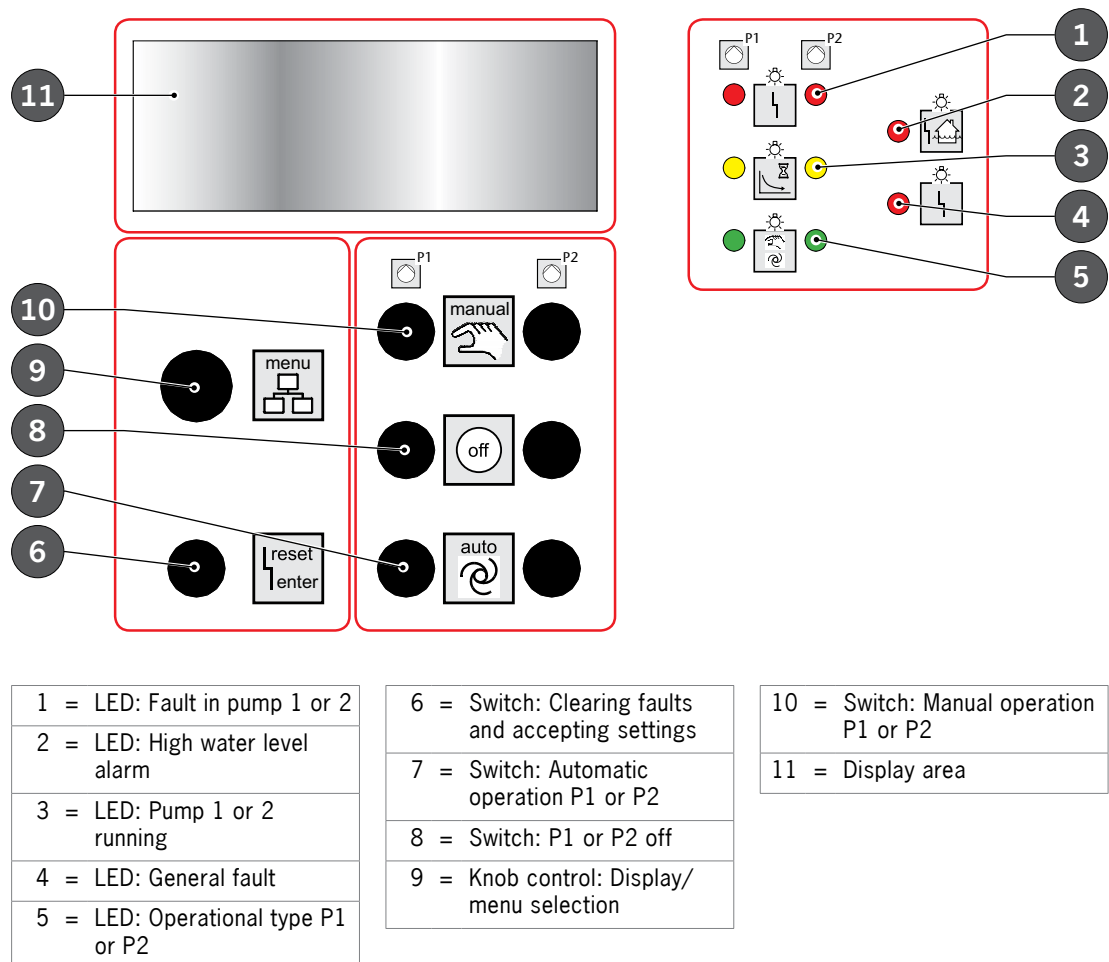
Information on suitable accessories, Product catalogue  www.aco-haustechnik.de.

4.8 DDP and DWP Controls

This chapter explains the DDP and DWP controls.

4.8.1 Overview of Operational and Display Elements

The following diagram shows the controls or position of the individual operating and display components and is used for unambiguous reference in the following chapters.

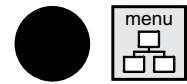


Illus. 5: Using DDP or DWP controls

4.8.2 Operational Elements

Control elements and what they mean:

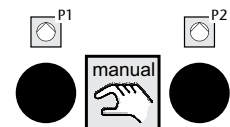
- Query menu settings
Using the control knob all information can be queried, (error messages, hours of operation, number of pump starts and motor power), and all settings adjusted. After 20 secs, the display automatically reverts to the default setting.



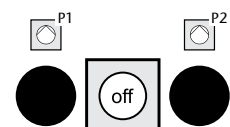
- Clearing faults (confirming and resetting fault warnings) and adjusting settings
Using this key all faults (over-power, P1 or P2 no load and thermal fault 2) are cleared once the cause has been corrected, and all settings are adjusted. If a fault continues to be present, then the group fault message relay and the sound alarm are switched off. This also applies for thermal error 1 and the "high water level alarm".



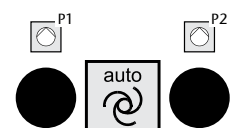
- Switch on manual operation
Using the switches, pumps P1 and P2 can be switched to manual operation. They then switch off automatically after 2 mins.



- Switch off pumps
Using these switches pumps P1 and P2 can be switched off.



- Switch on automatic operation
Using these switches pumps P1 and P2 can be switched over to automatic operation. The pump is switched automatically by the "water level switch points"



4.8.3 Display Elements

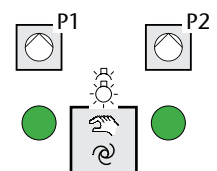
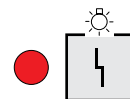
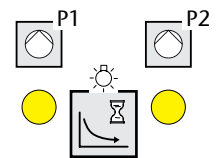
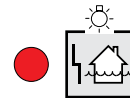
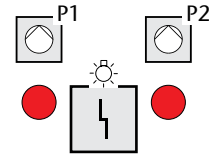
Display elements and what they mean:

- Fault in pump P1 or P2
If there is a fault in pump P1 or P2: LED lights up.
- Tank full
If the tank is full = "high water level alarm" LED lights up.
- Operating status
If pump P1 or P2 is in operation: LED lights up and stays lit.

If pump P1 or P2 is in operation in after-running mode: LED flashes.
- Group fault
If there is a group fault message (e.g. incorrect rotating field): LED lights up.
- Type of pump operation
If pump P1 or P2 is switched on automatically because of reaching a "water level switch point": LED lights up and stays lit.

If pump P1 or P2 is operating manually: LED flashes regularly.

If the plant switches off automatically after 2 minutes manual operation: LED flashes irregularly.

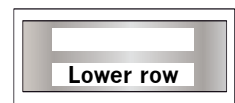
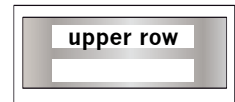


4.8.4 Messages in the Display Field

Meaning of messages in display area (1):

- Messages in top row
 - Water level in tank (when no pump is running)
 - Motor power (if pump is running, or when both pumps are running, then alternating display)
 - Setting option (in adjustment mode)

- Messages in lower row
 - Operational hours of the pump (if pumps are not running)
 - Current errors (alternating)
 - Adjustable values (in adjustment mode)




4.8.5 Control Settings

The settings in the display field can only be changed in service mode. If service mode has not been activated, then the settings are displayed but not stored.

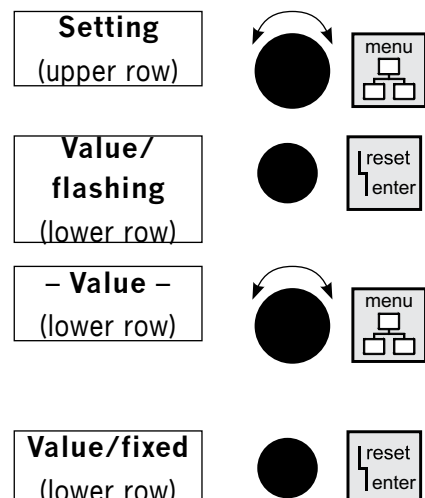


- After 20 secs, the display automatically reverts to the default setting.
- Hours of operation and number of pump starts can be queried, but not adjusted.

Changes to settings:

- Turn the "menu" control knob (to right or left), until the value of the setting you are looking for appears,  Chap. 4.8.7.
- Press the "reset/enter" button (the last value stored starts to flash).



- Turn the "menu" button until the value you want is reached (turning quickly will step changes more quickly, turn it slowly to fine tune).
- Press the "reset/enter" switch (value stops flashing and is saved).




4.8.6 Default Settings on Delivery

Prior to delivery the lifting plant is checked and a test run is carried out. The menu settings are tuned and adjusted to suit a **250 mm inlet**.

CAUTION

- If a different inlet is connected (**400 mm inlet or from above**), then the values for the menu items need to be adjusted,  Chap. 4.10.
- Menu items may not be changed.
- Values for and menu items must be checked during the test run,  Chap. 7.4 and 7.5.

Tab. 9: Settings

		Settings		
Settings menu		Value	Unit	Value,  Chap. ...
Base load ON (BL)		10	cm	04.10
Base load OFF (OFF)		3	cm	04.10
Peak load ON (PL)		14 (0 for DWP1.2)	cm	04.10
Peak load OFF (OFF)		12 (0 for DWP1.2)	cm	04.10
High water level alarm (AL)		18	cm	04.10
Running time, max.		0	Min.	4.8.7
Running time change-over		2	Min.	4.8.7
After-running	1.1	10	secs	7.4 or 7.5
	1.2	5	secs	7.4 or 7.5
Power, max. P1 + P2	DDP1.1	2	A	5.1
	DDP1.2	4	A	5.1
	DWP1.1	6	A	5.1
	DWP1.2	9	A	5.1
24 hr operation		is activated	-	4.8.7
Acoustic signal*		is activated	-	4.8.7
Intermittent alarm		is switched off	-	4.8.7
pump change-over		is activated	-	4.8.7
Rotating field fault		is activated	-	4.8.7
Service mode		is switched off	-	4.8.7
Language		German	-	4.8.7
Next maintenance		preset 90 days	-	8.4
*High water level alarm				

4.8.7 Setting Options

In the table below there is an overview of the different settings in the Settings Menu.

Tab. 10: Settings menu

Upper row	Lower row	Explanation
Setting	Setting range	Upper and lower row
Basic load ON	0 – 200 (500) cm	Switch on point for first pump
Basic load OFF	0 – 200 (500) cm	Switch off point for first pump
Peak load ON	0 – 200 (500) cm	Switch on point for second pump
Peak load OFF	0 – 200 (500) cm	Switch off point for second pump
High water level	0 – 200 (500) cm	If the preset value is exceeded then the "group fault" relay and the "high water level alarm" relay are activated .
Maximum running time	0 – 60 Min.	Setting the value to zero de-activates this function. If a value between 1– 60 mins is set, then the pump is switched off if it runs uninterrupted for longer than the value which has been set. The pump only works again after the error is cleared.
Running time changeover	is switched off 1 – 60 mins	If the time which is set is exceeded running in base load mode, then a pump changeover is carried out. After three changeovers without a break the "high water level alarm" is triggered in addition, and the message is displayed "runtime changeover".
After-running	0 – 180 secs	The pump continues to run after the switch-off point is reached until the time set here expires.
max. current – 1 max. current – 2	0.3 – 12.0 A	If pump 1 or 2 exceeds the power consumption for a given length of time, it is switched off. Message P1 or P2 appears: Excess current. The pump is only unlocked after the switch (7) has been used to clear it.
24 hr operation	Is switched off, is activated	Is activated = if the pumps are not started for a period of 24 hours, then they automatically run for a period of 5 secs.
acoustic signal	Is switched off, is activated	Is activated = a warning horn is sounded if there is a fault.
Intermittent alarm	Is switched off, is activated	Is activated = the group warning relay switches on.
Pump change-over	Is switched off, is activated	Is activated = each time a new session is started after working at base load, the other pump is used.
Rotating field fault	Is switched off, is activated	Is activated = if the phase sequence is incorrect or if L2 or L3 is missing, then the "high water level alarm" is activated and the pumps cannot be operated..
Service mode	Is switched off, is activated	Is activated = all settings can be changed. Is switched off = settings are displayed but cannot be changed.
Language	German – English – French – ...	The local language can be selected for the display fields.
Next maintenance	Now due Was due on In days	Maintenance is due.

Overview of setting menus:

- Block peak load operation
To always use the pumps in alternating mode, the switch-on point for peak load operation must be set to zero. A message appears in the display field "Peak Load On has been switched off".
- Setting the minimum water level settings
 - If value lower than 5 cm is selected for the switch-on point, then 5 cm is automatically stored.
 - If a value lower than 3 cm is selected for the switch-off point, then 3 cm is automatically stored.
- Setting the maximum running time
The maximum running time for the base load pump can be set. At the end of this time period a pump change-over occurs. The pre-requisite is that both pumps are set to automatic operation. After three changeovers without a break, an alarm is also triggered and the message "Running time alarm" is displayed.
- Setting running time monitoring
Running time monitoring applies to both automatic and manual operation. In the menu, bring up the item Maximum Running Time. The factory setting for this value is set to zero, i.e. this function is switched off. If you set a value between 1 and 60 mins, then the pump is switched off whenever the pump runs without interruption for longer than the defined value. And in addition a warning signal sounds and a fault message is displayed in the display field. The pump only works again after the error is cleared.
- Setting running time change-over and running time monitoring
It is sensible to switch on just one of these two functions. If both functions are activated at the same time, only the function with the shorter time setting will be applied.
- Setting after-running time
After-running allows pumping out liquid below the pilot tube.
- Clear the error memory
The previous error is stored, even if there is a power failure and is shown in the menu under the item "Last Fault". This error message can be deleted from the error memory using the "reset/enter" key.

- Setting current limiter
 - Pump 1 (P1): max. current – 1
 - Pump 2 (P1): max. current – 2

These settings manage a higher incoming current.

- Warning for rotating field errors

The monitoring of rotating fields allows the phase sequence to be monitored and also signals if a phase is missing. If there is a phase-related error, then the pump will not switch itself on. An alarm is sounded and the message "Rotating field error" appears in the display field. Rotating field monitoring can be switched on and off via the menu. If using 1 ~ motors then rotating field monitoring must be switched off.

- Service mode

When supplied, service mode is switched on (activated), i.e. all settings can be changed. Once service mode is switched off (deactivated) using the menu, settings other than local language can only be queried using the control knob, and not changed any longer.

- Setting local language

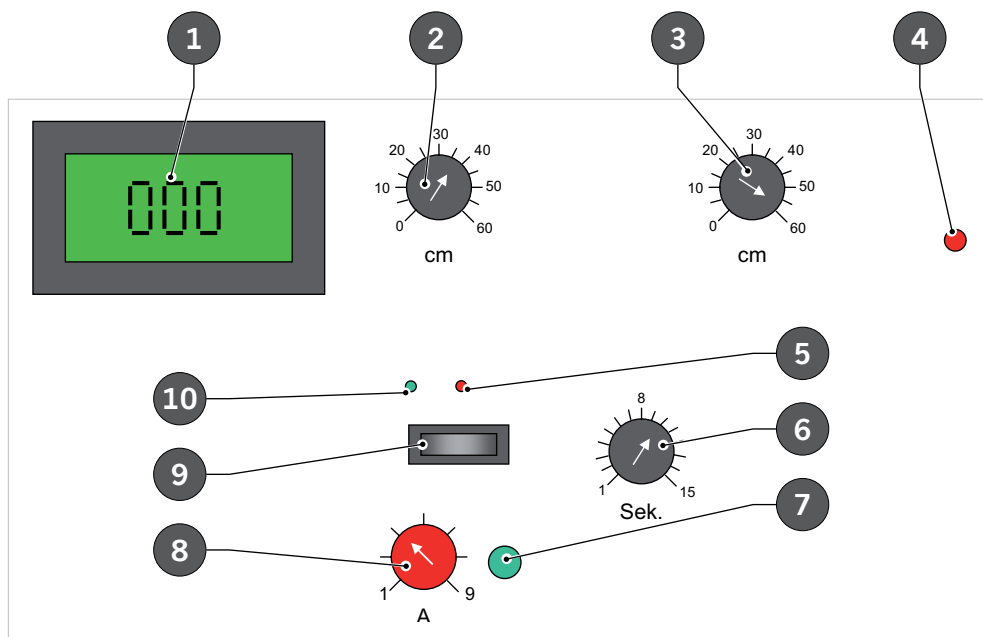
The following languages can be selected: German / English / French / Italian / Spanish / Dutch / Polish / Czech / Portuguese.

4.9 MDP Controls

This chapter explains the MDP controls.

4.9.1 Overview of Operational and Display Elements

The following diagram shows the controls or position of the individual operating and display components and is used for unambiguous reference in the following chapters.



1 = Display area: Level
2 = Control knob: Set the switch-on point for the pump
3 = Control knob: Set the high water level alarm
4 = LED: Incorrect rotating field

5 = LED: Pump fault
6 = Control knob: After-running time for pump
7 = Switch: Clearing the fault
8 = Control knob: Set the switch-off current for the pump

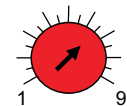
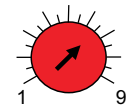
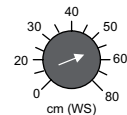
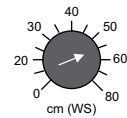
9 = Rocker switch: Select operating mode
10 = LED: Operational display

Illus. 6: Using MDP controls

4.9.2 Operational Elements





Control elements and what they mean:

- Set the pump switch-on point (2)
The control knob is used to set the pump switch-on point.
- Set the high water level alarm (3)
The control knob is used to set the high water level switch point.
- Set the after-running time (6)
The control knob is used to set the pump's after-running time.
- Set the switch-off current (8)
The control knob is used to set the cut-out current level to protect the pump.
- Switch over to manual operation (9)
Putting the rocker switch into this position moves the pump into manual operation. The rocker switch does not stay in this position, it needs to be held there.
- Switch off pump (9)
Putting the rocker switch into this position switches the pump off. The rocker switch stays at rest in this position.
- Switch over to automatic operation (9)
Putting the rocker switch into this position switches the pump over to automatic operation. The rocker switch stays at rest in this position. The pump is automatically switched off using "level regulation".
- Clear errors (7)
By pressing once, the alarm for the fault can be silenced. After the cause of the fault has been corrected the display can be cleared by pressing twice.



4.9.3 Display Elements



Display elements and what they mean:

- Incorrect rotating field (4)
If there is an incorrect rotating field in the connecting cable or if a phase is missing: LED lights up. 
- Group fault (5)
If there is group fault (e.g. pump overloaded, tank full): LED lights up. 
- Operating status (10)
If the pump is running: LED lights up and stays lit. 
- Level display (1)
Shows the current level of water in the tank. This is in relation to the end of the pilot tube. 


4.9.4 Default Settings on Delivery

Prior to delivery the lifting plant is checked and a test run is carried out. The default values are calibrated and set for a **250 mm inlet**.

CAUTION

- If another inlet is connected (**400 mm inlet** or **inlet from above**), then the values for these settings must be changed,  Chap. 4.10.
- The value for the after-running time must be checked or calculated and adjusted as part of the test run,  Chap. 7.4 or 7.5.

Tab. 11: Settings

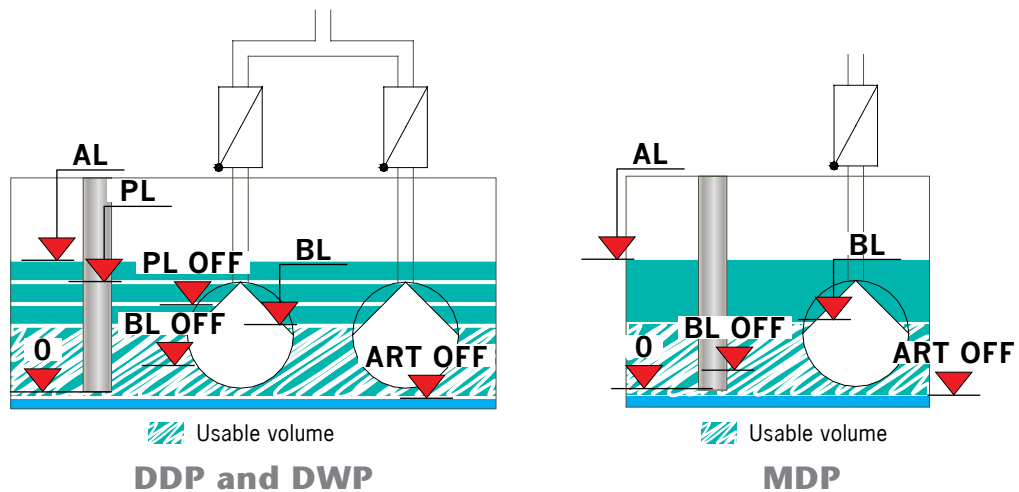
Setting		Settings		
		Value	Unit	Value,  Chap. ...
Base load ON (BL)		10	cm	04.10
High water level alarm (AL)		18	cm	04.10
After-running	1.1	10	secs	7.4 or 7.5
	1.2	5	secs	7.4 or 7.5
power, max. P	MDP1.1	3	A	5.1
	MDP1.2	5	A	5.1

4.10 Functional principles for Level Regulation

This chapter describes the level regulation for the lifting plant.

4.10.1 Version without Air Bubble Injection (standard)

In the diagrams below the switch points for DDP and DWP and MDP types are shown, and the relevant values are given for all types.



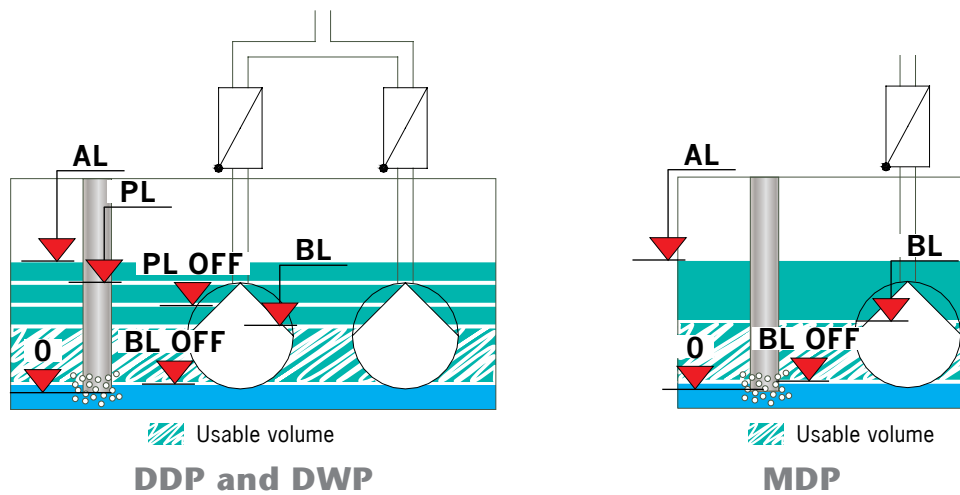
Illus. 7: Schematic representation of level regulation

Tab. 12: Switch points

Type	Switch points with reference to level "0" (lower side of pilot tube)					Usable volume [l]
	BL OFF [cm]	BL [cm]	PL OFF [cm]	PL [cm]	AL [cm]	
250 Inlet – DDP and DWP	3	10	12	14	18	55
400 Inlet – DDP and DWP	3	22	24	26	30	100
Inlet from above – DDP and DWP	3	28	30	32	36	130
250 Inlet – MDP	3	10	-	-	18	60
400 Inlet – MDP	3	22	-	-	30	108
Inlet from above – MDP	3	28	-	-	36	140

4.10.2 Version with Air Bubble Injection (option)

In the diagrams below the switch points for DDP and DWP and MDP types are shown, and the relevant values are given for all types.



Illus. 8: Schematic representation of level regulation

Tab. 13: Switch points

Type	Switch points with reference to level "0" (lower side of pilot tube)					Usable volume [l]
	BL OFF [cm]	BL [cm]	PL OFF [cm]	PL [cm]	AL [cm]	
250 Inlet – DDP and DWP	3	10	12	14	18	45
400 Inlet – DDP and DWP	3	22	24	26	30	90
Inlet from above – DDP and DWP	3	28	30	32	36	120
250 Inlet – MDP	3	10	-	-	18	50
400 Inlet – MDP	3	22	-	-	30	98
Inlet from above – MDP	3	28	-	-	36	130

5 Technical Data

This chapter provides information about the technical data for the lifting plant and the controls.

5.1 Technical Data for the Lifting Plant

The following table shows the technical data for the lifting plant.

Tab. 14: Technical Data for the Lifting Plant

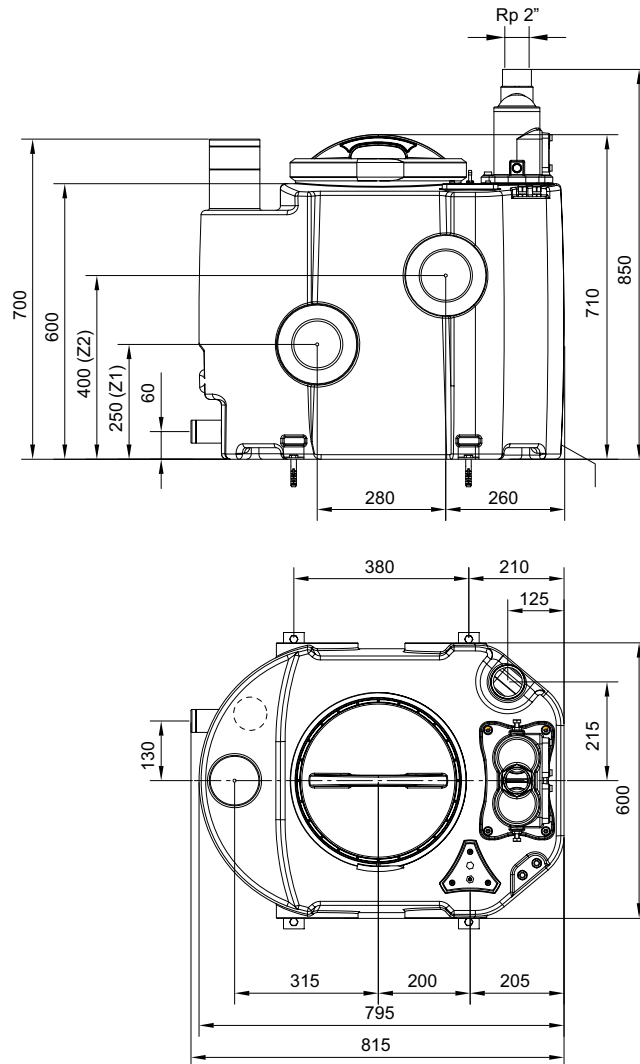
Type	Motor performance		Key data				Granulation	Temperature Limits	
	P1	P2	Power consumption	Voltage	Frequency	Rev count		Delivery medium	Ambient temp.
	[kW]	[kW]	[A]	[V]	[Hz]	[rpm]	[mm]	[°C]	[°C]
Muli-Mini DDP1.1	1.04	0.75	2	400	50	2,900	38	40 (65 for max. 5 mins)	40 (air)
Muli-Mini DDP1.2	1.86	1.2	4	400					
Muli-Mini DWP1.1	1.11	0.75	6	230					
Muli-Mini DWP1.2	1.93	1.2	9	230					
Muli-Mini MDP1.1	1.04	0.75	2	400					
Muli-Mini MDP1.2	1.86	1.2	4	400					

Type	Inlet 250 mm		Inlet 400 mm		Top inlet		Weight unladen
	Usable volume	Total volume	Usable volume	Total volume	Usable volume	Total volume	
	[l]	[l]	[l]	[l]	[l]	[l]	[kg]
Muli-Mini DDP1.1	55*	195	100*	195	130*	195	66
Muli-Mini DDP1.2							74
Muli-Mini DWP1.1	35**		80**		110**		66
Muli-Mini DWP1.2							74
Muli-Mini MDP1.1	60*	205	108*	205	140*	205	50
Muli-Mini MDP1.2							40**

*Without air bubble injection

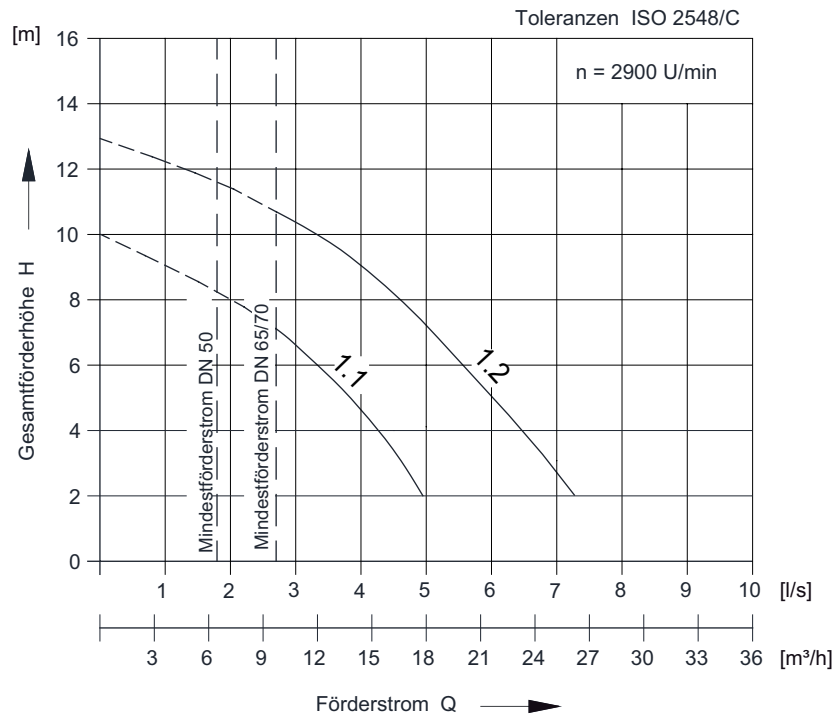
**With air bubble injection

In the following diagrams the dimensions and connector sizes are shown for the lifting plant.



Illus. 9: Lifting plant dimensions

The following illustrations and tables show the performance data for the lifting plant,



Illus. 10: Characteristic lines

Tab. 15: Performance data

Type	Deliv- ery head Range [m]	Overall delivery head					
		2 m [l/s]	4 m [l/s]	6 m [l/s]	8 m [l/s]	10 m [l/s]	12 m [l/s]
Muli-Mini DDP1.1	2 – 8,2	4.9	4.3	3.2	2.0		
Muli-Mini DDP1.2	2 – 11,6	7.2	6.4	5.6	4.6	3.4	1.5
Muli-Mini DWP1.1	2 – 8,2	4.9	4.3	3.2	2.0		
Muli-Mini DWP1.2	2 – 11,6	7.2	6.4	5.6	4.6	3.4	1.5
Muli-Mini MDP1.1	2 – 8,2	4.9	4.3	3.2	2.0		
Muli-Mini MDP1.2	2 – 11,6	7.2	6.4	5.6	4.6	3.4	1.5

5.2 Technical Data for DDP and DWP Controls

This chapter provides information about the characteristic data and dimensions of the controls.

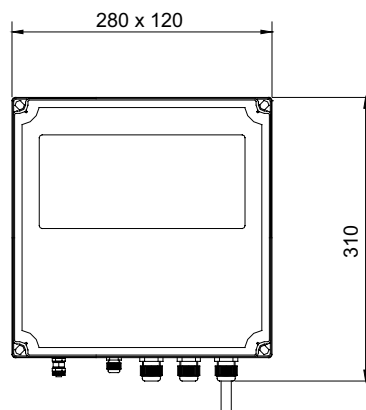
5.2.1 Characteristic Data and Dimensions

The following table shows the technical data for the controls.

Tab. 16: Technical Data for Controls


Key data	Values
Operating voltage	DDP: 3 ~ 400 V (L1, L2, L3, N, PE)
	DWP: 230 V
Frequency	50/60 Hz
Control voltage	230 V/AC/ 50 Hz
Current consumption (contactor activated)	< 20 VA
Connected load, max.	P2 < 5.5 kW
Range of electrical motor current limiter	0.3 to 12 A
Mains free alarm contact	3 A
Casing	polycarbonate
Protection level	IP 54
Temperature range	-20 to +60 °C
Fuse	5 x 20 1AT (Alarm output)
Mains free alarm	9 V/200 mAh battery, approx. 7 hrs, volume 85 dB

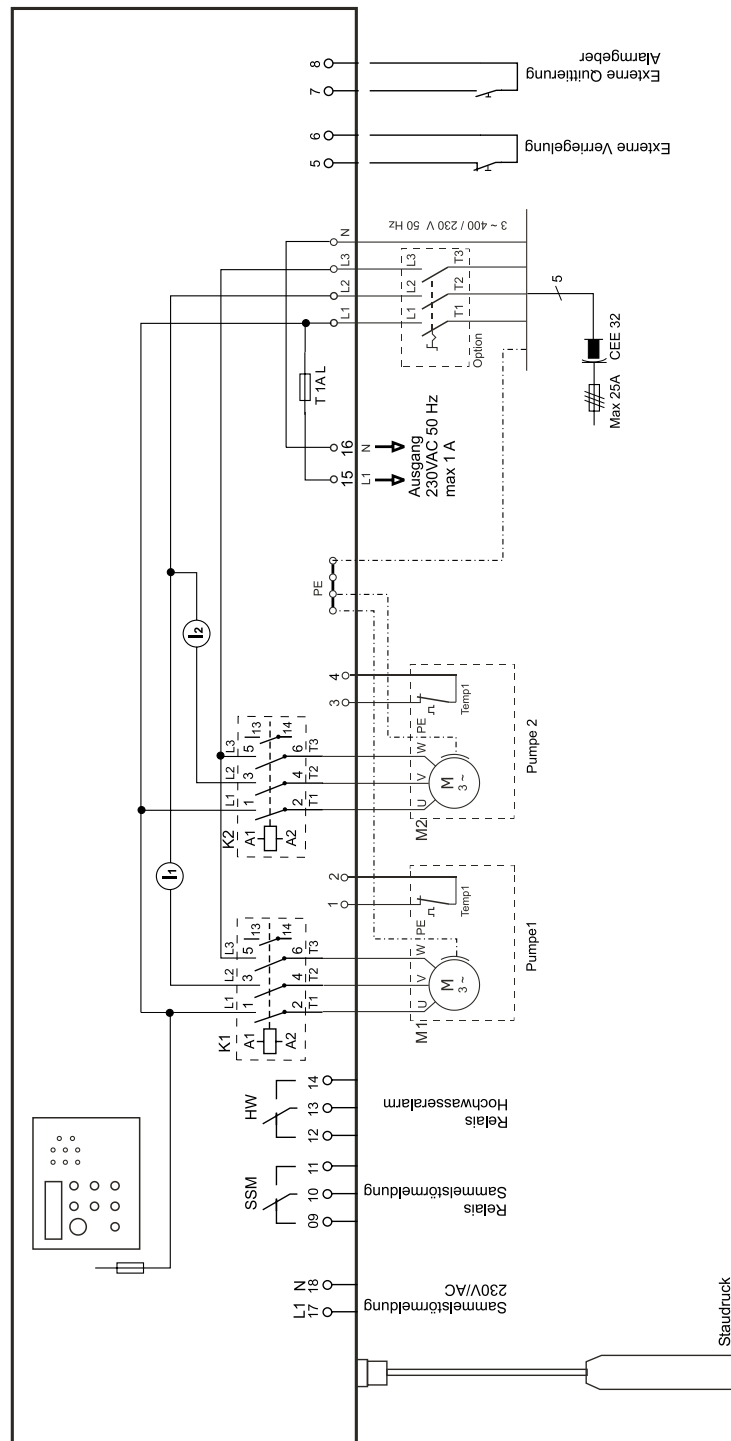
The dimensions of the controls can be seen from the following illustrations.



Illus. 11: Controls Dimensions

5.2.2 Circuit Diagram for Controls

The following illustration shows a reduced scale circuit diagram for the controls. The circuit diagram in its original scale is attached to the operating instructions and copies can be obtained from ACO-Service if required,  Chap. 1.1.



Illus. 12: Circuit diagram

5.3 Technical Data for MDP Controls

This chapter provides information about the technical data for the controls.

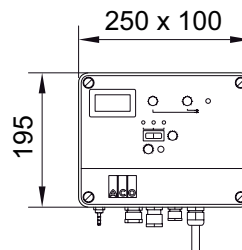
5.3.1 Characteristic Data and Dimensions

The following table shows the technical data for the controls.

Tab. 17: Technical Data for Controls


Key data	Values
Operating voltage	400 V, 3/N/PE
Frequency	50/60 Hz
Control voltage	24 V
Current consumption (contactor activated)	9 W
Connected load, max.	3 kW
Range of electrical motor current limiter	1 – 9 A
Mains free alarm contact	1x group fault, 1x operational message
Casing	polycarbonate
Protection level	IP 54
Temperature range	- 5 °C to + 40 °C
Fuse	1x 1 A T (controls)/1x 3.15 A T (compressor)
Mains free alarm	optional

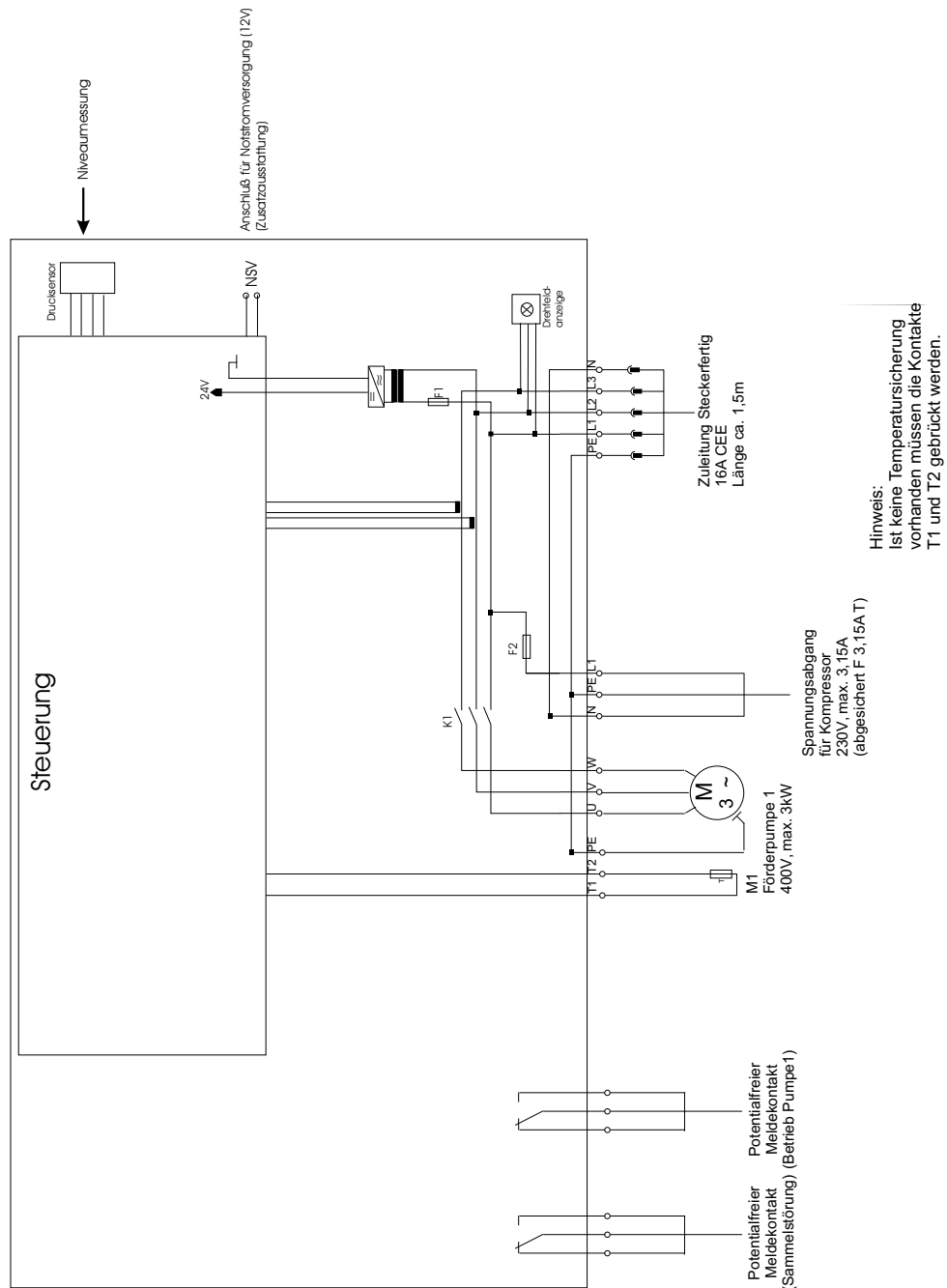
The dimensions of the controls can be seen from the following illustrations.



Illus. 13: Dimensions of MDP controls

5.3.2 Circuit Diagram for Controls

The following illustration shows a reduced scale circuit diagram for the controls. The circuit diagram in its original scale is attached to the operating instructions and copies can be obtained from ACO-Service if required,  Chap. 1.1.



Illus. 14: Circuit diagram

6 Installation

This Chapter basically provides information on how to install the lifting plant. The following table provides an overview of the prerequisites (tools, parts, installation materials) needed to complete installation.

Tab. 18: Prerequisites for installation

Tools, parts, installation materials		
<ul style="list-style-type: none"> ■ Pencil ■ 32 A EEC plug ■ Stanley knife ■ Pressure line DN 50 ■ File ■ Hammer ■ Cable cutter ■ Power cable: 2-core/0.75 mm² ■ Open-ended spanner SW 14,16 	<ul style="list-style-type: none"> ■ Measuring tape ■ Spirit level ■ Pipe clamps ■ Pipe sections DN 70 100 ■ Saw ■ Hammer drill with <ul style="list-style-type: none"> □ 12 mm masonry bit □ keyhole saws diameters 16, 29 and 100 mm 	<ul style="list-style-type: none"> ■ Screws and rawlplugs ■ Screwdrivers (straight and Philips) ■ Earthed socket ■ Side-cutter ■ Vacuum cleaner ■ Acid-free grease ■ Delay action fuses 16, 25 A

The layout of the pipework system is the responsibility of the designer.


6.1 Safety during Installation

During installation work the following risks must be assumed:




WARNING

The following safety instructions must be read carefully before starting installation. If ignored severe injuries may occur.

Ensure the personnel have the necessary qualifications,  Chap. 2.2.

Mechanical risks

Severe bruising from falling parts (e.g. stop valves, pipe sections) - particularly when mounting them overhead.

- Personal protective equipment must be worn,  Chap. 2.3.
- At least 2 people for overhead fittings

Electrical risks

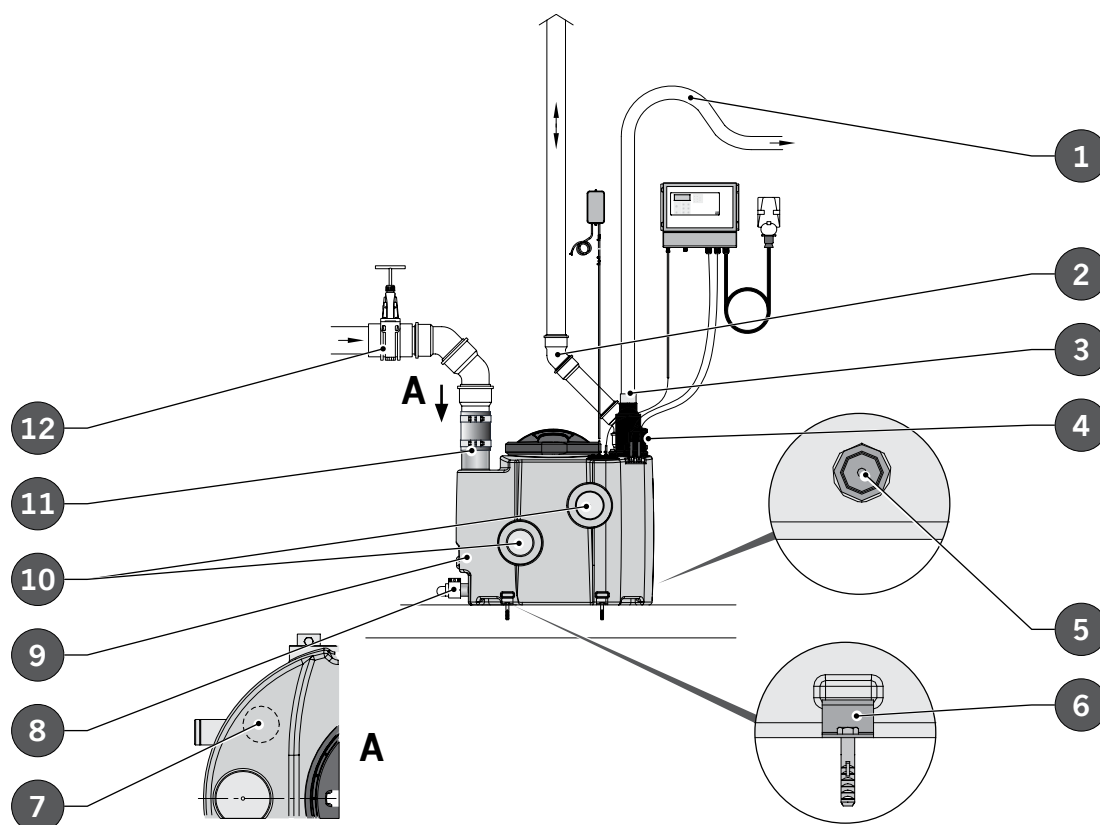
Severe injuries or death are possible from contact with parts which are connected to mains






- Pumps, compressors and controls must be connected by qualified electricians.
- Never carry out modifications.






6.2 Sanitary Installation




The following illustration provides an overview of the installation tasks and the pre-requisites for the on-site installation, and the following chapters describe these in more detail.

Adhere to the recommended pipework systems,  Chap. 6.2.12.



1 = Creating backflow loop*,  Chap. 6.2.9
2 = Connecting air line*,  Chap. 6.2.8
3 = Connecting pressure line*,  Chap. 6.2.10
4 = Preparing connection for drain tap (optional),  Chap. 6.2.11
5 = Preparing connection for drain plug (option),  Chap. 6.2.2

6 = Fitting mounting set,  Chap. 6.2.13
7 = Fitting (optional) inlet socket*,  Chap. 6.2.5
8 = Preparing connection for drain line (optional)*,  Chap. 6.2.7
9 = Setting up the tank,  Chap. 6.2.1
10 = Connecting inlet line (socket)*,  Chap. 6.2.3

11 = Connecting inlet line (spigot)*,  Chap. 6.2.4
12 = Installing stop valve*,  Chap. 6.2.6
13 = Laying pipes (generally)  Chap. 6.2.12

*Need to be installed on site

Illus. 15: Installation work

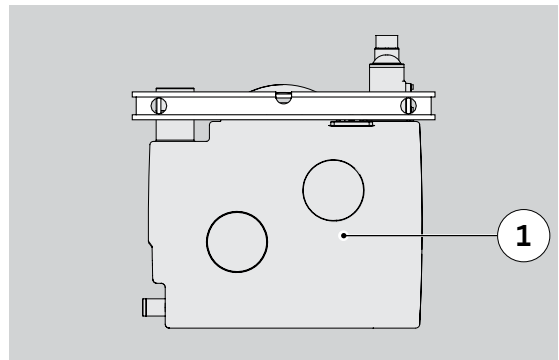
6.2.1 Positioning the Tank

The space where the lifting plant is to operate must be large enough to allow a free working space of at least 600 mm beside and above all parts which require access during operation or service. The installation base must be level.


Pre-requisite:

- Spirit level
- Measuring tape

→ Set up the tank (1) horizontally in the correct position.



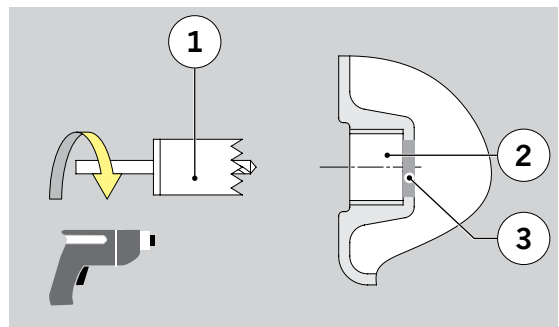
6.2.2 Preparing Connection for Drain Plug (option)

A threaded socket Rp 1 (2) on the tank,  Chap. 4.3/ Component No. 4, can be used to attach a draining hose. The base of the socket is closed and needs to be opened up.


Pre-requisite:

- Drill with a 29 mm diameter key-hole saw attachment

→ Drill out closed socket base (3) with keyhole saw (1, max 29 mm diameter).




6.2.3 Connecting side Inlet Line

4 DN 100 sockets (2 each on the right and the left-hand side) are moulded onto the tank at 2 different heights,  Chap. 4.3/Component No. 22 and 23. The base of each socket is closed. One or several sockets can be used to connect one or more inlet hoses. A DN 100 socket seal for pipes with an external diameter of 110 mm is supplied as a loose part with the product. More can be ordered from ACO if needed.

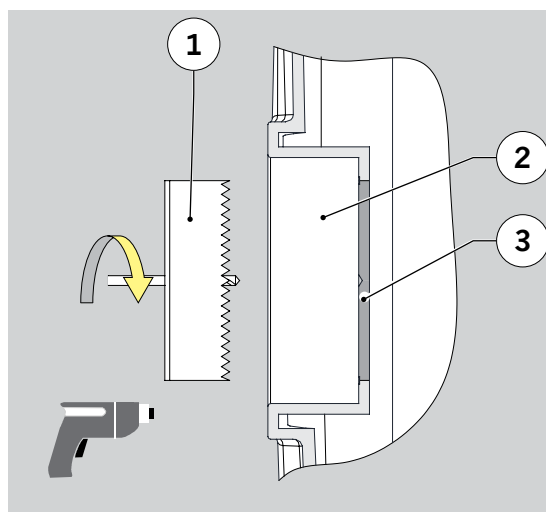
Pre-requisites:

- Drill with a 100 mm diameter key-hole saw attachment
- Pipe sections DN 100
- File
- Acid-free grease

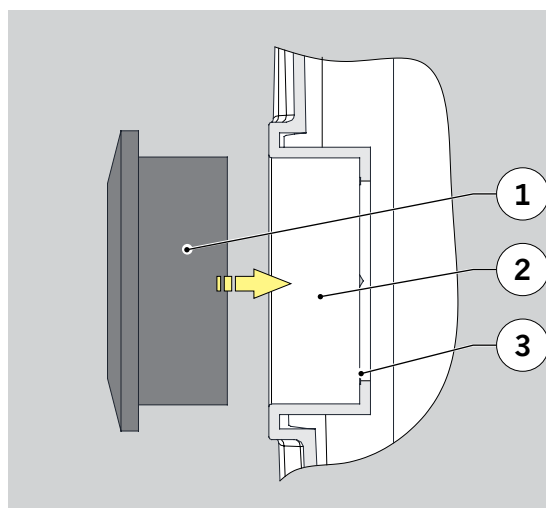
CAUTION

- The hose must not become narrower downstream.
- A stop valve must be fitted on the inlet side,  Chap. 6.2.6.


→ Drill out the socket base (3) of the DN 100 socket (2) using the keyhole saw (1 x max 110 mm diameter) and deburr the drill hole.



- Push the socket seal (1) into the socket until it sits on the base (3).
- Grease the lips of the socket seal (1) and the inlet hose spigot.
- Push the inlet hose into the socket seal (1).



6.2.4 Connecting Inlet Line from above


A socket with nominal diameter DN 100 is moulded on the top of the tank,  Chap. 4.3/Component No. 17,, The socket is closed and needs to be opened up. Its external diameter is 110mm.

A DN 100 hose connector (4) for flexible connection of the inlet hose is supplied as a loose part (it can e.g. be replaced by a double socket).

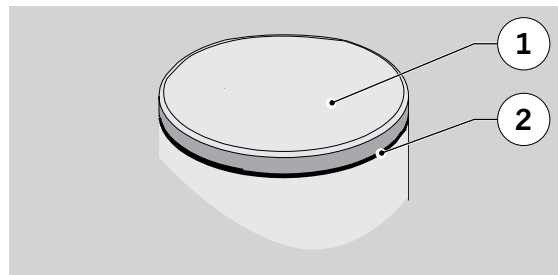
Pre-requisites:

- Saw
- File
- Pipe sections DN 100

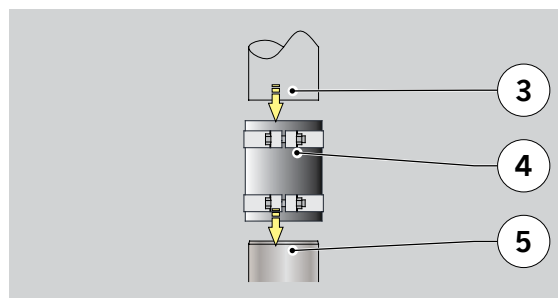
CAUTION

- Both pipes (3 + 5) must have at least 10 mm inserted into the hose connector (4).
- The hose must not become narrower downstream.
- A stop valve must be fitted on the inlet side,  Chap. 6.2.6.

→ Cut open closed sockets (1) along the groove and deburr the cut edge.



→ Connect the inlet pipe (3) using the hose connector (4) to the socket (5) of the lifting plant.



6.2.5 Fitting Inlet Socket

A DN 50 inlet pipe can be connected to the tank from above. The inlet socket, consisting of the socket itself (5), flat seal (6) and threaded section (8) for connecting pipes with external diameter 58 mm, can be purchased from ACO as an optional extra.

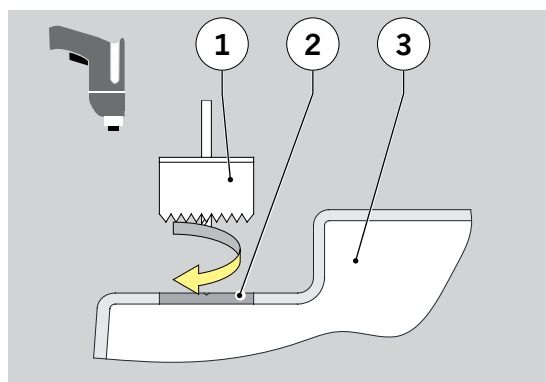
Pre-requisites:

- Drill with a 42 mm diameter key-hole saw attachment
- Acid-free grease

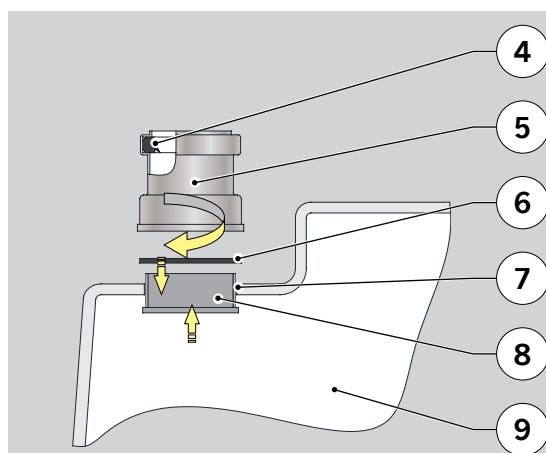
CAUTION Risk of blockage

- The hose must not become narrower downstream.


→ Drill out the tank (3) at the indicated place (2) using the keyhole saw (1 x max 42 mm diameter).



- Push the threaded section (8) from inside to outside through the hole (7) in the tank (9).
- Push the flat seal (6) over the start of the thread on the threaded section (8).
- Twist the socket (5) onto the thread of the threaded section (8) and tighten against the seal.
- Grease the lip seal (4) of the socket (5) and connect the inlet pipe.



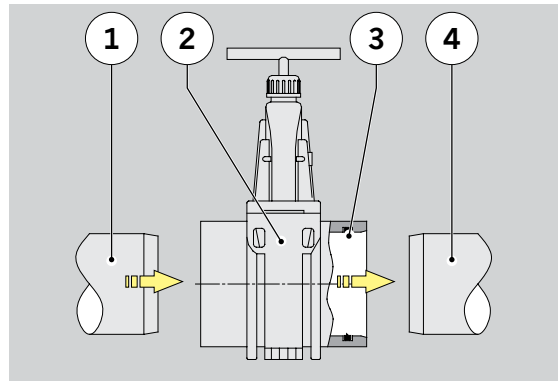
6.2.6 Installing Stop Valve

A stop valve must be fitted in the inlet pipe (inlet side of the lifting plant). A suitable valve with a nominal diameter of DN 100 can be purchased from ACO as an option,  Chap. 4.7.


Pre-requisite:

- Acid-free grease

- Grease the spigot (4) of the lifting plant inlet socket.
- Grease the lip seals (3) of the stop valve (2).
- Grease the spigot (1) of the inlet pipe.
- Push the stop valve (2) onto the end of the spigot (4) of the lifting plant inlet socket.
- Push the spigot (1) of the inlet pipe into the stop valve (2).



6.2.7 Preparing Connection for Drain Line (option)

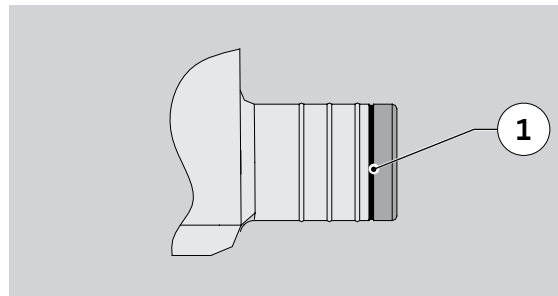
A socket to connect a hose with nominal diameter DN 50 is moulded on the side of the tank,  Chap. 4.3/ComponentNo. 21 , The socket is supplied closed and needs to be opened up for fitting to the outlet pipe.

Its external diameter is 50 mm.


Pre-requisite:

- Saw
- File

- Cut open closed sockets along the groove (1) and deburr the cut edge.
- Attach outlet line (hose, hose clamps etc.).



6.2.8 Connecting Air Line

A socket with nominal diameter DN 70 is moulded on the top of the tank,  Chap. 4.3/ Component No. 12,, Its external diameter is 75 mm.

A DN 70 hose connector (2) for flexible connection of the ventilation pipe is supplied as a loose part (it can e.g. be replaced by a double socket).

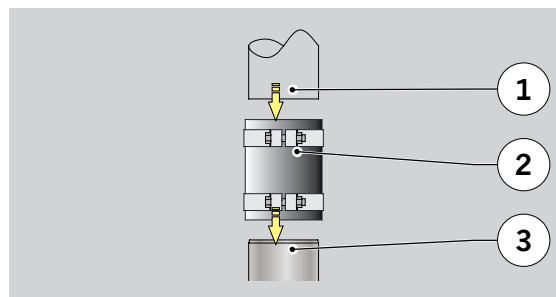
Pre-requisite:

- File
- Pipe sections DN 70

CAUTION

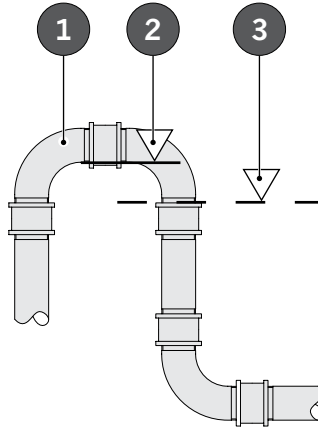
- Both pipes (1 + 3) must have at least 10 mm inserted into the hose connector (2).
- Ventilation lines must have a constant diameter and must be laid continuously rising up to the roof of the building. The pipe can be inserted into the main and the secondary ventilation.
- To avoid odours, the ventilation of the lifting plant must never be connected to the input side ventilation line of a grease separator.

→ Connect the ventilation line (1) using the hose connector (2) to the socket (3) of the lifting plant.



6.2.9 Creating Backflow Loop

The following diagram is a schematic representation of a backflow loop (1). The list which follows instructs you how to install it correctly.



Illus. 11: Backflow loop

CAUTION To ensure the lifting plant functions correctly, the backflow loop must finish with the bottom of its pipe (2) above the height of the "backflow level" (3).



- **Pump delivery quantity in l/s**

The volume of the flow which the lifting plant pumps over the total delivery head at the operational site.


- **Delivery head in m**

Head of pressure which the lifting plant reaches at the site of operation. This overcomes the static height difference plus the total head loss in the pressure pipe.

- **Overall delivery head in m**

The overall delivery head is the total of all static delivery heads and the pressure head losses in valves and fittings and pipe friction losses.

6.2.10 Connecting Pressure Line

The mounting adapter,  Chap. 4.3/Component No. 2, allows connection of the DN 50 pressure pipe on-site. The connection socket is size Rp 2.

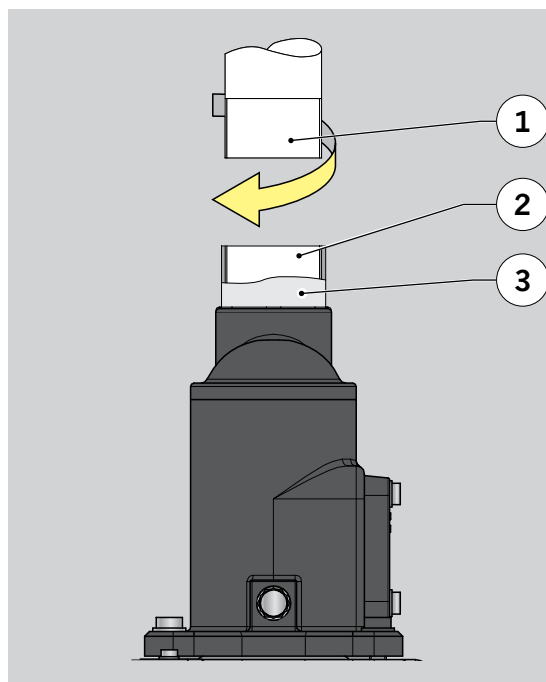
Pre-requisites:

- Pressure line DN 50


CAUTION To avoid damage to property and interruptions to operations the following requirements must be met:

- Pressure lines must always be connected to either ventilated pipe systems or collecting lines. The connections must be installed in the same way as for non-pressurised lines.
- The pressure line must be able to resist 2.5 bar.
- The pressure line must be installed continuously rising.
- The flow speed in the pressure line must not be less than 0.7 m/s or more than 2.3 m/s.
- Never connect other pipes to the pressure line.
- Never connect pressure lines for a lifting plant to wastewater downpipes.
- Never connect ventilation valves to the pressure line.

→ Seal the 50 DN pressure pipe with R 2 thread (1) onto the threaded socket (2) of the connector (3).



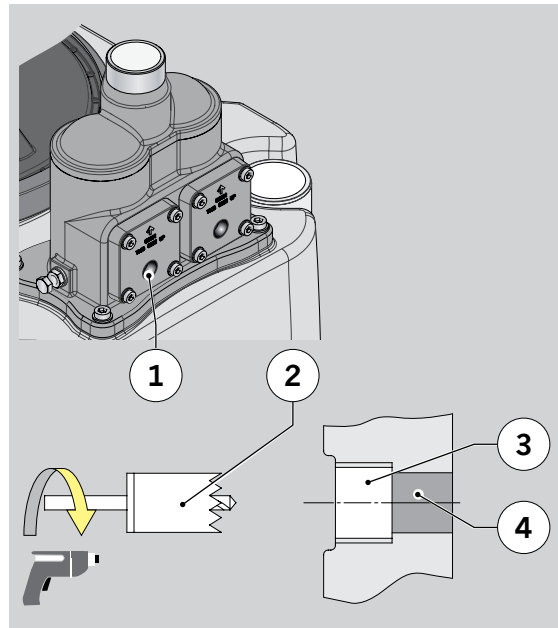
6.2.11 Preparing Connection for Drain Tap (option)

On each of the maintenance covers (1) of the double backflow stops, position  Kap. 4.3/Component No. 5, there is a moulded Rp 1/2 (3) threaded socket (3). During installation a drain tap can be attached to allow partial draining of the pressure pipe.

Pre-requisite:

- Drill with a 16 mm diameter key-hole saw attachment

→ Drill out the closed socket base (4) using the keyhole saw (2 x max 16 mm diameter).




6.2.12 Recommendations for Pipe Systems

This section includes recommendations for professional pipe laying.

CAUTION To avoid damage to property and interruptions to operations the following requirements must be met:

- Lay pipes with a downwards incline (except for pressure pipes).
- Drainage pipes must be connected free from tension to the lifting plant. No pipework strains or momentum must be transferred to the lifting plant. Stretching of pipework due to temperature must be compensated for.
- Support the weight of the pipes (e.g. using pipe mountings).
- For elastic connections which are not fixed longitudinally, secure the pipes against coming apart (e.g. pipe mountings).
- Ensure pipework is not subjected to frosts.

6.2.13 Fitting Mounting Set



Fix the tank,  Chap. 6.2.1 to the ground at four points, using the supplied fixing set .

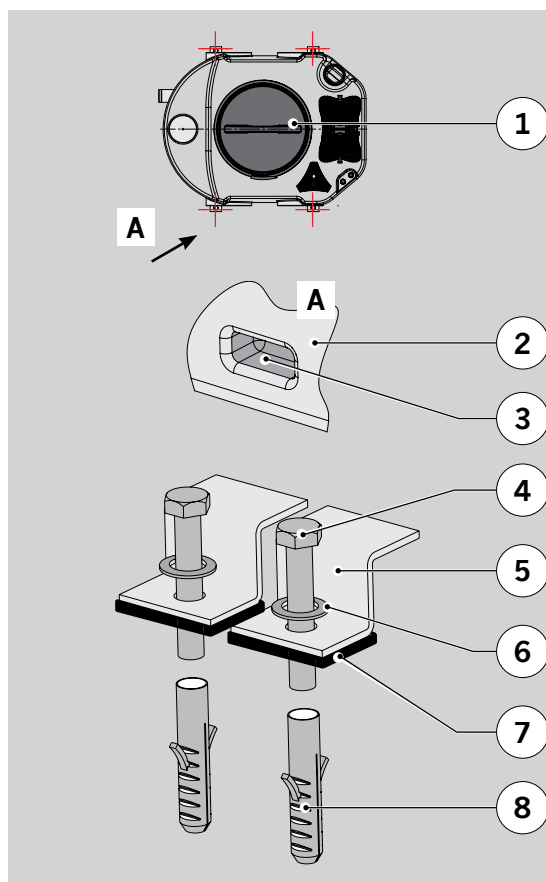
CAUTION To avoid damage to property and interruptions to operations the following must be done:

- Lifting plants must be installed and fixed so they cannot swivel.
- Lifting plants at risk of floating must be fixed securely so they cannot float.

Pre-requisites:

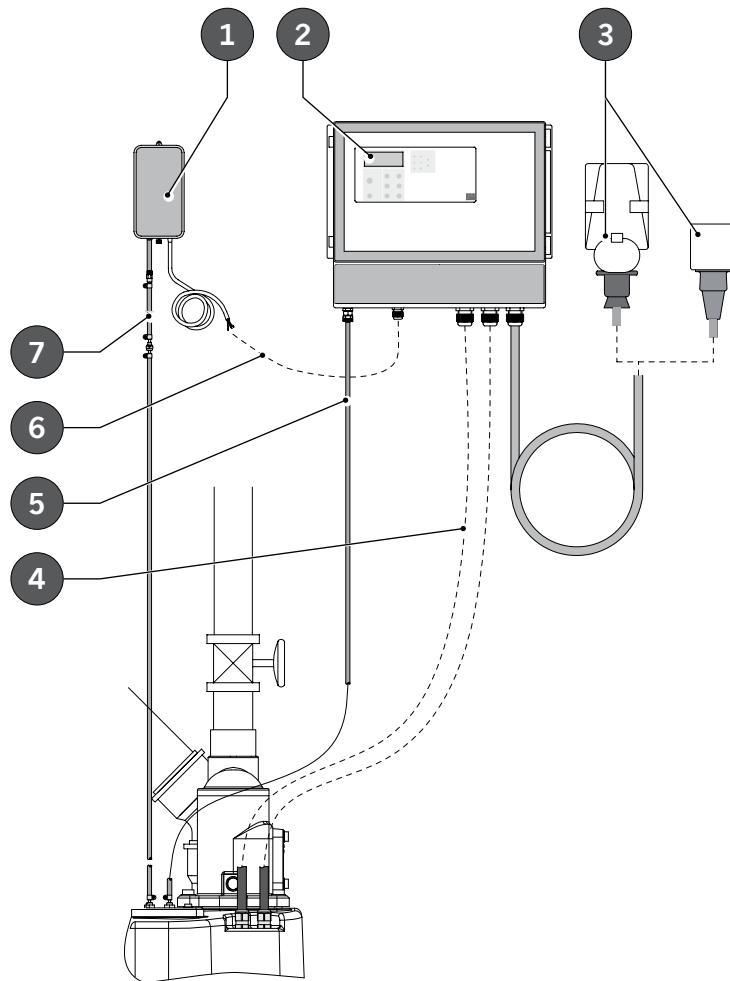
- Marker (e.g. pencil)
- Drill with a 12 mm diameter masonry bit
- Hammer
- Vacuum cleaner

- Line up 4 fixing points + (squared up),  1 = lifting plant viewed from above.
- Place the brackets (5) in the moulded trough (3) on the tank,  View A = 2, and mark floor for drilling.
- Remove bracket (5) from trough (3).
- Drill 12 mm diameter hole 60 mm deep.
- Vacuum drilled hole clean.
- Insert a 12 W rawplug (8) into the drilled hole.
- For noise insulation insert rubber supports (7) between the brackets (5) and the base.
- Place bracket (5) in the trough (3).
- Push washers (6) over the 10 x 60 wood-screws (4), push through the holes in the bracket and screw into the rawplugs (8).
- Tighten 10 x 60 screws (4) (10 Nm).



6.3 Electrical Installation

The following illustration provides an overview of the installation pre-requisites and the electrical work to be carried out and the following chapters describe these in more detail.



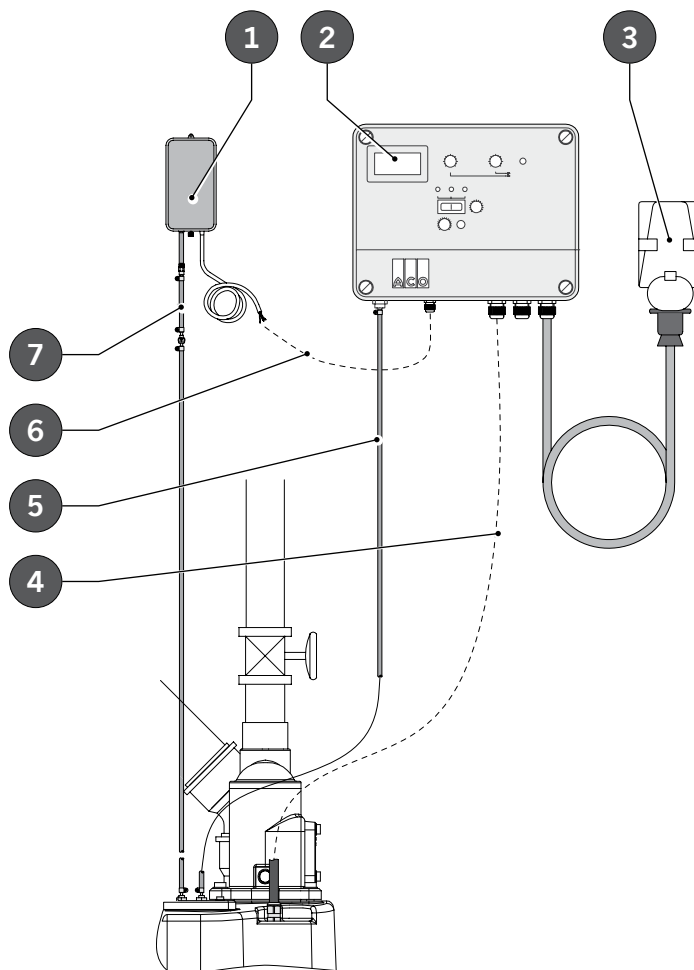
1 = Attaching mini-compressor (optional) 📖 Chap. 6.3.5
2 = Attaching controls, 📖 Chap. 6.3.1
3 = Attaching EEC socket or earthed socket*, 📖 Chap. 6.3.3

4 = Adjusting length of pumps' electrical cables, 📖 Chap. 6.3.4
5 = Connecting control line for level controls, 📖 Chap. 6.3.8
6 = Connecting electrical cables for the (optional) mini-compressor, 📖 Chap. 6.3.7

7 = Connecting pipe for air bubble injection, (optional), 📖 Chap. 6.3.6
8 = Relaying group fault message (optional), 📖 Chap. 6.3.2

*Installation site requirements

Illus. 16: Electrical work for DDP and DWP types



<p>1 = Attaching mini-compressor (optional) Chap. 6.3.5</p>
<p>2 = Attaching controls, Chap. 6.3.1</p>
<p>3 = Attaching EEC socket*, Chap. 6.3.3</p>

<p>4 = Adjusting length of pump's electrical cable, Chap. 6.3.4</p>
<p>5 = Connecting control line for level controls, Chap. 6.3.8</p>
<p>6 = Connecting electrical cables for the (optional) mini-compressor, Chap. 6.3.7</p>

<p>7 = Connecting pipe for air bubble injection, (optional), Chap. 6.3.6</p>
<p>8 = Relaying group fault message (optional), Chap. 6.3.2</p>

*Installation site requirements

Illus. 17: Electrical work MDP type

6.3.1 Attaching Controls

A free wall surface which is safe from flooding measuring approx.
W x H = 400 x 400 mm is required to install the controls.

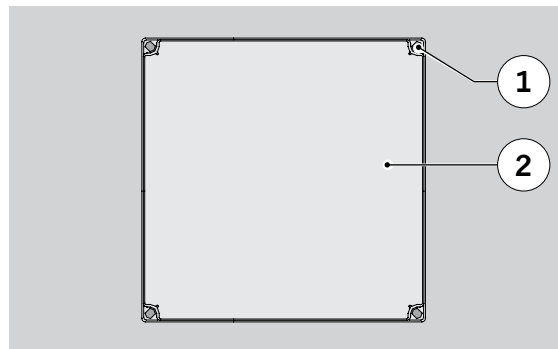


The control line for level regulation and the electrical lines to the pumps are all 10 m long and already connected to the control panel.

Pre-requisites:

- Hammer drill with a masonry bit
- Hammer
- Vacuum cleaner
- Screwdrivers (straight and Philips)
- Screws and rawlplugs


- Place the holes template (1) for all corners in the back panel of the original controls (2) against the wall and mark them.
- Drill the holes.
- Vacuum drilled holes clean.
- Knock in rawlplugs.
- Hold control panel (2) against the wall and fix with the screws.



6.3.2 Group Alarm Relay (option)

In order to forward the mains free contact as a group fault warning a cable needs to be laid.

Pre-requisites:

- Power cable: 2-core/0.75 mm²
 - Screwdrivers (straight or Philips)
 - Stanley knife
 - Cable clamps
- Connect cable terminals in the control panel as shown in the circuit diagram,
 Chap. 5.2.2 or 5.3.2.

6.3.3 Attaching EEC or Earthed Plug

The controls have a 1.5 m long power cable with an EEC plug or earthed plug.

CAUTION There will be problems in functioning if an unsuitable socket is used.

DDP and MDP types

Install an EEC socket on-site with the following specification:

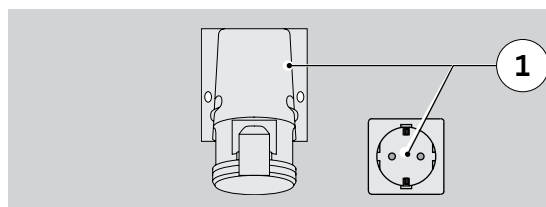
- 400 V/50 Hz connection
- Right-hand rotating field
- Mains fuse max. 3 x 16 A delayed action

DWP Type

Install an earthed socket on-site with the following specification:

- 230 V/50 Hz connection
- Mains fuse max. 16 A delayed action

→ Install an EEC socket or earthed socket (1) to the wall in accordance with the manufacturer's instructions.



6.3.4 Adjusting Length of Electrical Cable for Pump(s)

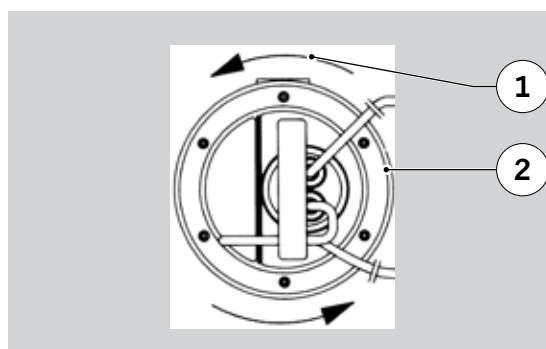
The electric cables are each 10 m long and are supplied attached to the terminals in the connection box for the pump and to the controls, and transit via leak proof cable glands through the walls of the tank.

CAUTION The ends of the individual wires are marked. If wires are connected incorrectly there is a risk of a short-circuit.

If the cables are shortened, transfer the markings on each wire.

In case of uncertainty, check the direction the pump is rotating as described below.

- Switch on pump and immediately switch off again.
- Carefully observe the starting kickback on the motor.
- The rotation direction is correct, that is clockwise, if the protective cover (2) moves as indicated (1).



Pre-requisites:


- Screwdriver
- Side-cutter
- Cable cutter

→ Pull through connector clips.



If the cables are not shortened, coil excess length loosely in large loops and suspend these.

6.3.5 Attaching Mini Compressor (option)

A mini-compressor for continuous air bubble injection can be purchased from ACO as an option,  Chap. 4.7. The continuous air bubble injection reduces the risk of the pilot tube becoming blocked and makes the level regulation more reliable. A free wall surface which is safe from flooding measuring approx. W x H = 200 x 100 mm is required.

Pre-requisites:

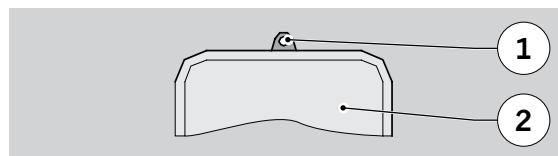
- Hammer drill with a masonry bit
- Hammer and vacuum cleaner
- Screwdrivers (straight and Philips)
- Screws and rawlplugs

→ Drill hole for tag (1) at the requisite place.

→ Vacuum drilled hole clean.

→ Insert rawlplug.

→ Hold mini-compressor (2) against the wall and fix with the screws.




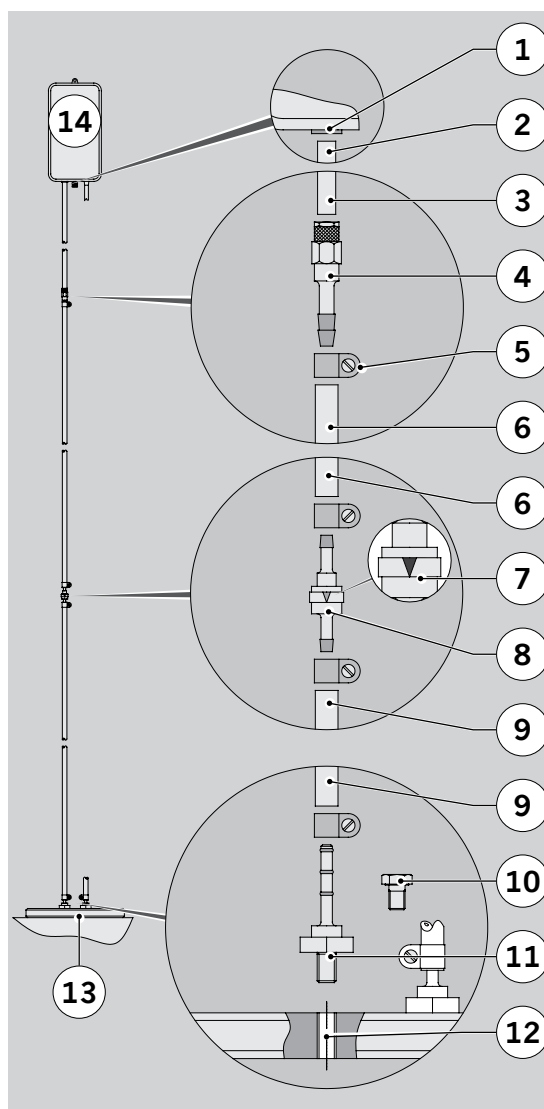
6.3.6 Connecting Pipes for Air Bubble Injection (option)

The cables and connectors are included with the mini-compressor.

CAUTION The line must be installed continuously rising and protected from frost.

The following items are required:

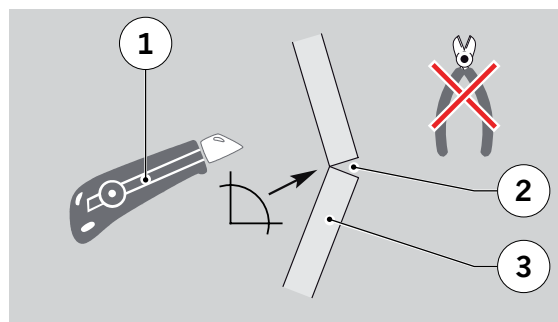
- Open-ended spanner SW 13, 14
 - Screwdrivers (straight or Philips)
 - Stanley knife
 - Pipe clamps
-
- Remove and dispose of the M8 screw (10) with a USIT ring from the threaded hole (12) of the connector flange (13).
 - Screw the hose nozzle (11) with a USIT ring into the threaded hole (12).
 - Push a hose clamp (5) over one end (9) of the 9.5 m long hose.
 - Push the hose end (9) onto the hose nozzle (11) and fix with the hose clamp (5).
 - Push a hose clamp (5) over the other end (9) of the hose.
 - Push the hose end (9) onto the hose nozzle of the sprung retaining valve (8), in direction  (7), and fix with the hose clamp (5).
 - Push a hose clamp (5) over one end (6) of the 500 mm long hose.
 - Push the hose end (6) onto the hose nozzle of the sprung retaining valve (8) and fix with the hose clamp (5).
 - Push a hose clamp (5) over the other end (6) of the hose.



- Push the hose end (6) onto the hose nozzle of the screw-on connector (4) and fix with the hose clamp.
- Insert the end of the hose (3, 100 mm long) into the screw-on connector and crimp.
- Insert the end of the hose (2, 100 mm long) into the intake (1) of the mini-compressor.

CAUTION Functional faults are possible if the length of the line is not adjusted correctly.


- Cut the line (3) at right angles (2) with a Stanley knife (1).

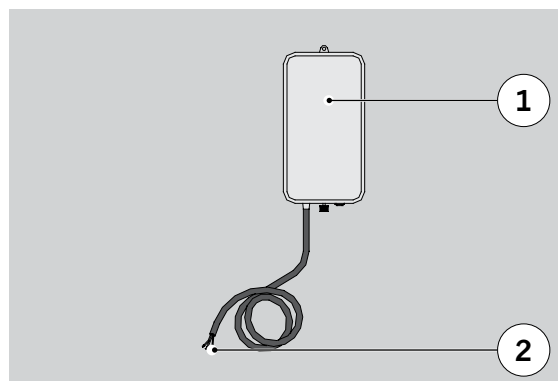


6.3.7 Connecting Electrical Lines for Mini Compressor (option)

The electrical cable is already connected to the mini-compressor (1) prior to delivery. The electrical cable still needs to be connected to the controls.

Pre-requisites:

- Screwdrivers (straight or Philips)
 - Side-cutter
 - Cable cutter
- Strip insulation from cable ends (2) and attach cable end ferrules.
 - Connect in the control panel connection box, circuit diagram  Chap. 5.2.2 or 5.3.2.



6.3.8 Connecting Line for Level Controls

The control pipe (3) is attached to the hose nozzle (4) of the connecting flange (5) for level regulation prior to delivery, lies in loops inside the lifting plant and is attached by cable ties.

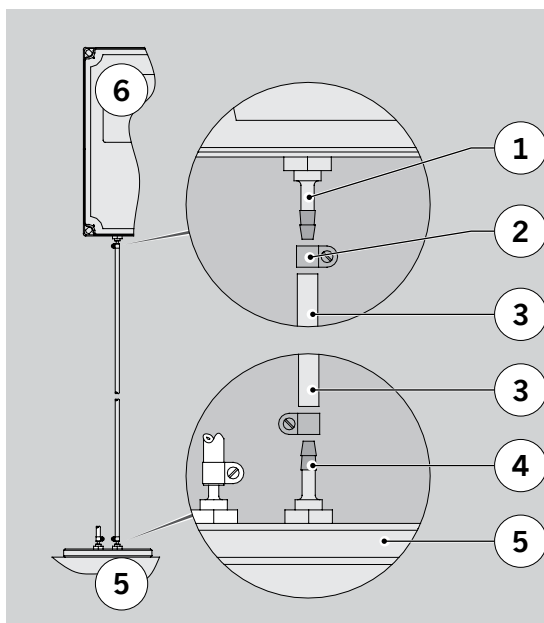
CAUTION The line must be installed continuously rising and protected from frost.

Pre-requisites:

- Screwdrivers (straight or Philips)
- Stanley knife
- Pipe clamps

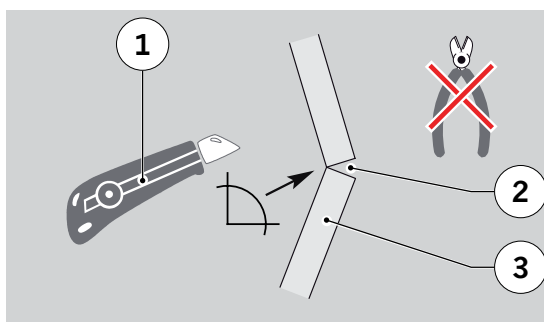
→ Push a hose clamp (2) over one end (3) of the 10 m long hose.

→ Push the hose end (3) onto the hose nozzle of the control (6) and fix with the hose clamp (2).



CAUTION Functional faults are possible if the length of the control hose is not adjusted correctly.

→ Cut the line (3) at right angles (2) with a Stanley knife (1).



7 Commissioning and Operation

This Chapter provides you with information about the correct way to commission and operate the lifting plant.


7.1 Safety during Commissioning and Operation

During commissioning work and operation the following risks must be assumed:




BEWARE

The following safety instructions must be read carefully before starting commissioning and operation. If ignored, injuries may occur.

Ensure the personnel have the necessary qualifications,  Chap. 2.2.


Leaks in the lifting plant during commissioning and operation

Injuries/burns to eyes and skin

- Personal protective equipment must be worn,  Chap. 2.3.
- Immediately de-activate the lifting plant and leave the danger area until the pressure subsides.

Contact with greasy water

Skin and eye infections


- Personal protective equipment must be worn,  Chap. 2.3.
- On contact with skin: relevant skin areas must be washed thoroughly with soap and disinfected.
- If in contact with eyes: Rinse eyes. If eyes continue to water, consult a doctor.


7.2 Commissioning

This chapter describes the requirements for commissioning, the process of commissioning the lifting plant and handover to the user.

Prerequisites, attendance and execution

Prerequisites for commissioning:








- All sanitary and electrical installations must have been completed,  Chap. 6.
- The tank must have been cleaned (any rubble removed) and drained.

CAUTION If another inlet is connected than a "250 mm inlet", then the preset values for the controls must be changed,  Chap. 4.10.

People required for commissioning:

- Installer
- Professional electrician
- Owner or users

CAUTION To ensure safe operation of the lifting plant, the following sequence must be followed for commissioning:

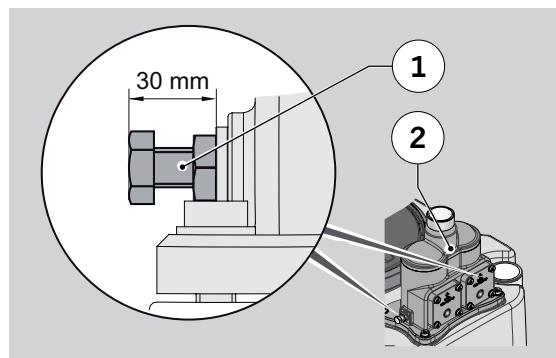
1. Check the setting on the lifting screws.
2. Test run for version **without** air bubble injection,  Chap. 7.4, or for version **with** air bubble injection,  Chap. 7.5, to be completed at least 2ce
3. Carry out checks,  Chap. 7.6
4. Set up for air bubble injection,  Chap. 7.7
5. Set up battery,  Chap. 7.8
6. Switch on automatic operation,  Chap. 7.9
7. Hand over lifting plant to owner or user,  Chap. 7.11

7.3 Setting Ventilation Screw

The setting of the lifting screws must be checked before commissioning.

Pre-requisites:

- Open-ended spanner SW 16
- Adjust the lifting screws (1) on both sides of the backflow stop (2) to 30 mm.



7.4 Test Run for DDP or DWP Type

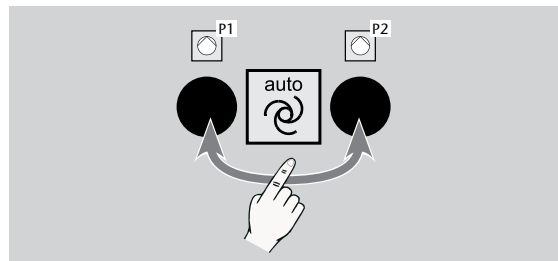
This chapter describes the test run for types DDP and DWP.

7.4.1 Test Run for Version without Air Bubble Injection

This is followed by a description of the how the lifting plant operates and its controls.

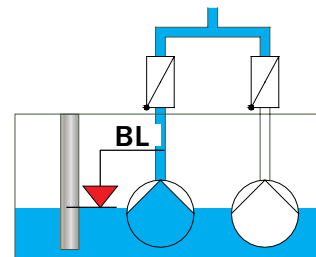
Carrying out a test run:

- Open valves in the inlet pipes and the pressure pipe (if present).
- Plug EEC or earthed plug into the socket.
- Put fuses in place.
- Check operational messages being received by controls.
- Press switch to "auto" (P1 and P2) for automatic operation of pumps 1 and 2.



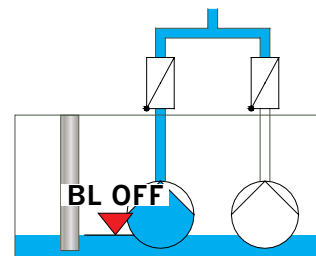
- Allow water to flow through the inlet pipes into the lifting plant.

When the water level reaches "BL" (base load) pump 1 switches on and pumps the wastewater from the tank above the backflow level.

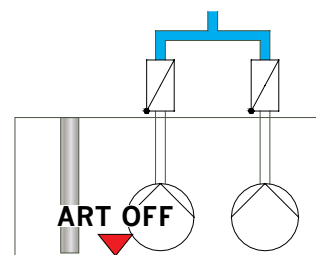


- Stop inflow of water.



When the water level reaches "BL OFF" the after-running time for the pump is activated.



When the water level reaches "ART OFF" the pump switches off.

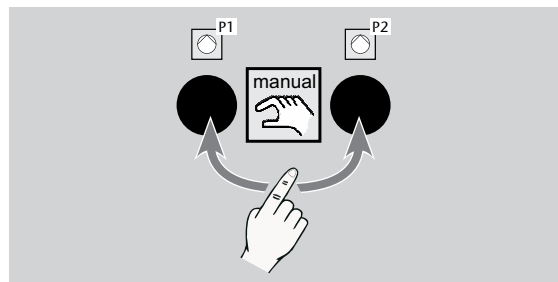


- Check the water level through the open maintenance cover.

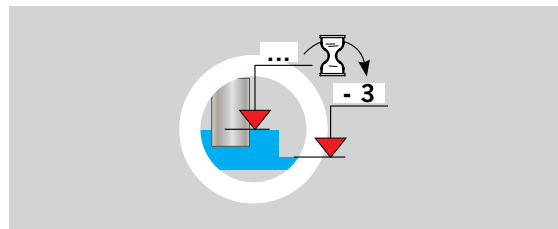
CAUTION If the water level is not below the lower edge of the pilot tube then continue with  Section A. If the water level is 2 – 3 cm below the bottom edge of the pilot tube, then the preset after-running period is adequate and you can continue with  Section B.

Section A

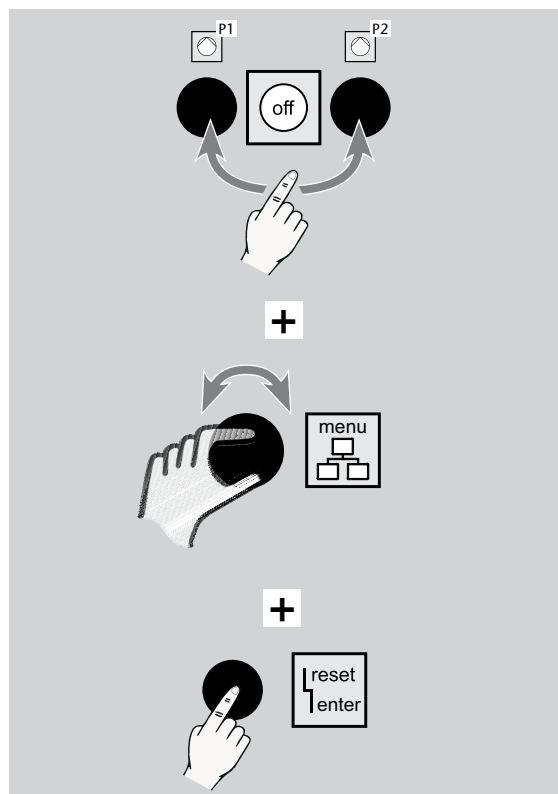
- Press switch to "manual" (P1 and P2) for manual operation of pumps 1 and 2.



- Time how long it takes until the surface water level is about 2-3 cm below the bottom edge of the pilot tube (visual check through the open maintenance cover).

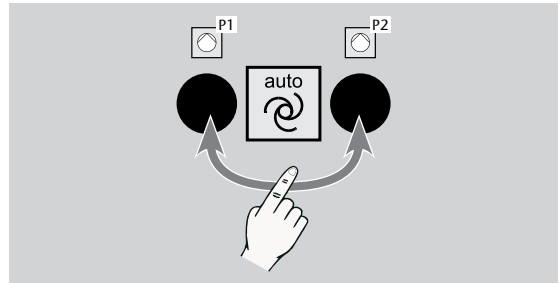


- Set switch to "off" for the pumps which were running and switch them off.
- Add the time just measured to the factory preset after-running time (2 secs).
- Set the total time as the new after-running time using the control knob menu.
- Save the value using the "reset/enter" key.



This is the way to make sure that the pilot tube is aerated each time the pumps are "OFF".

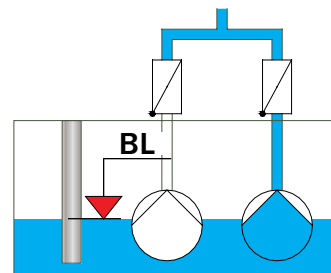
- Press switch to "auto" (P1 and P2) for automatic operation of pumps 1 and 2.



Section B

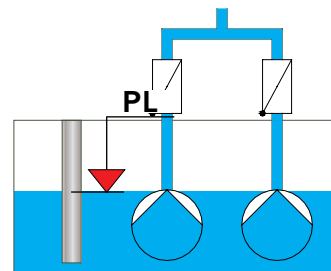
- Switch the inlet water on again.

When the water level reaches "BL" (base load) pump 2 switches on and pumps the wastewater from the tank above the backflow level.

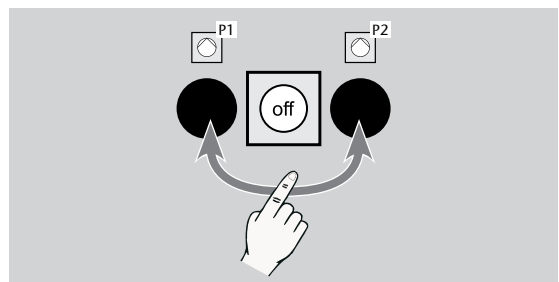


- Increase inflow of water.

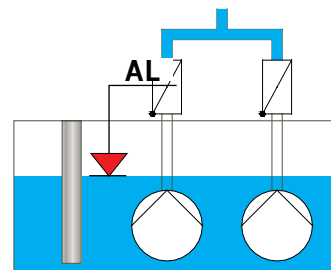
When the water level reaches "PL" (peak load) pump 1 also switches on and both pumps pump the wastewater from the tank above the backflow level.



- Press switch to "off" (P1 and P2) and switch off pumps 1 and 2.



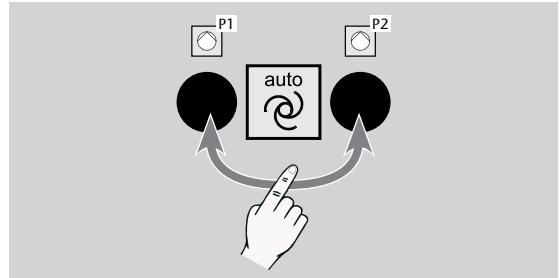
Water level reaches "AL" = High water alarm level.



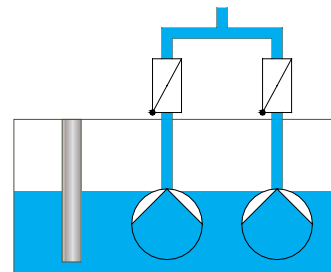
Red LED is lit and the acoustic alarm sounds.



- Stop inflow of water.
- Press switch to "auto" (P1 and P2) for automatic operation of pumps 1 and 2.

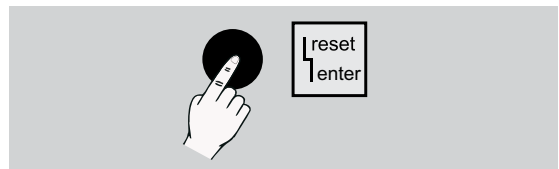


Both pumps switch on and pump the wastewater from the tank above the backflow level.



The water level is below "AL".

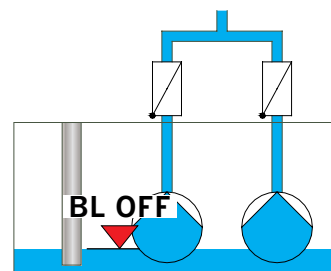
- Press the "reset/enter" key.



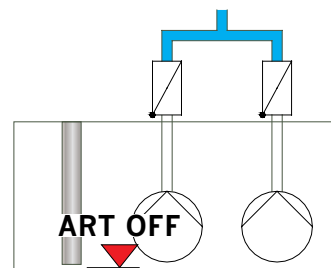
Red LED goes out and the acoustic alarm switches off.



When the water level reaches "BL OFF" the after-running time for the pump is activated.



When the water level reaches "ART OFF" the pumps switch off.
The test run for the version without air bubble Injection is now complete.



- Repeat the test run for a second time.

7.4.2 Test Run for Version with Air Bubble Injection

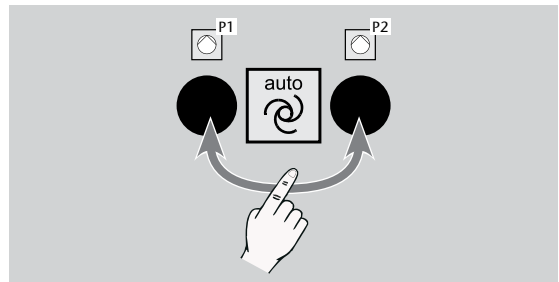
A description follows of how the lifting plant operates and its controls.

Carry out test run:

- Open valves in the inlet pipes and the pressure pipe (if present).
- Plug EEC or earthed plug into the socket.
- Put fuses in place.

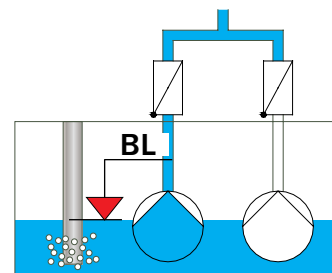
CAUTION

- Set after-running time to "0".
- Check operational messages being received by controls.
- Press switch to "auto" (P1 and P2) for automatic operation of pumps 1 and 2.



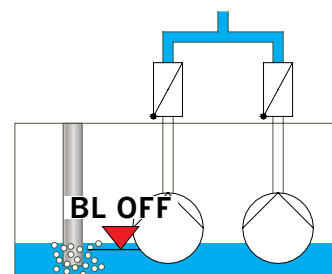
- Allow water to flow through the inlet pipes into the lifting plant.

When the water level reaches "BL" (base load) pump 1 switches on and pumps the wastewater from the tank above the backflow level.



- Stop inflow of water.

When the water level reaches "BL OFF" the pump switches off.

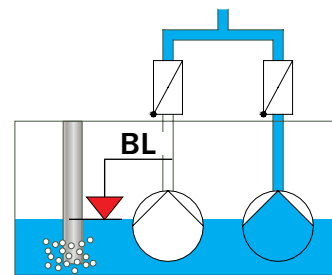


- Check the water level through the open maintenance cover.

CAUTION If the water level is 2 – 3 cm above the lower edge of the pilot tube then the factory setting is correct, otherwise correct the after-running time using the switch point "BL OFF".

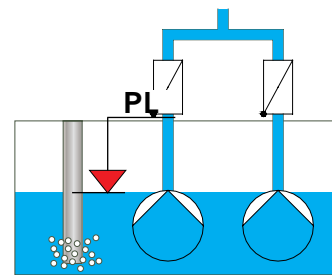
- Switch the inlet water on again.

When the water level reaches "BL" (base load) pump 2 switches on and pumps the wastewater from the tank above the backflow level.

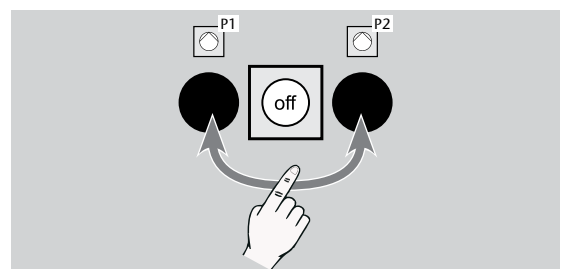


- Increase inflow of water.

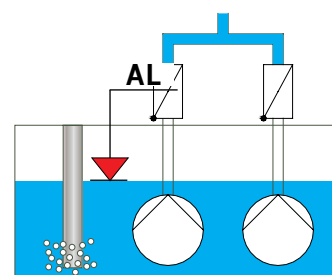
When the water level reaches "PL" (peak load) pump 1 also switches on and both pumps pump the wastewater from the tank above the backflow level.



- Press switch to "off" (P1 and P2) and switch off pumps 1 and 2.



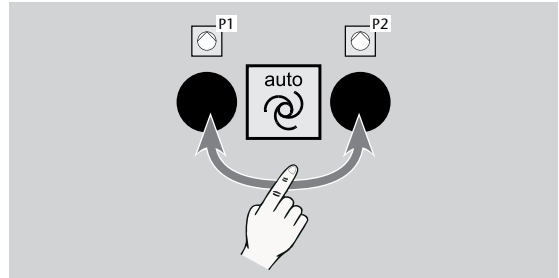
Water level reaches "AL" = High water alarm level.



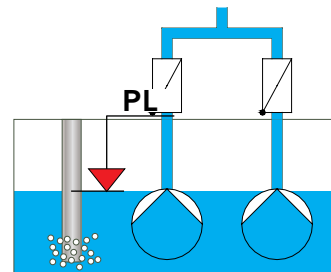
Red LED is lit and the acoustic alarm sounds.



- Stop inflow of water.
- Press switch to "auto" (P1 and P2) for automatic operation of pumps 1 and 2.

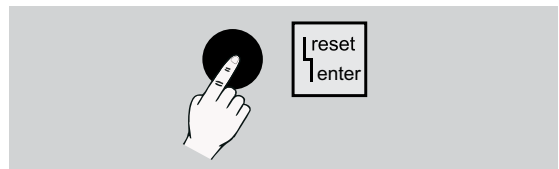


Both pumps switch on and pump the wastewater from the tank above the backflow level.



The water level is below "AL".

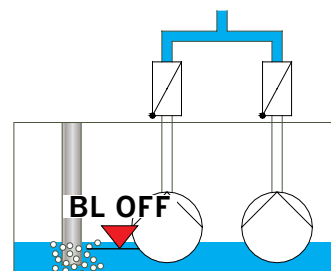
- Press the "reset/enter" key.



Red LED goes out and the acoustic alarm switches off.



When the water level reaches "BL OFF" the pumps switch off.



The test run for the version with air bubble Injection is now complete.

- Repeat the test run for a second time.

7.5 Test Run for MDP Type

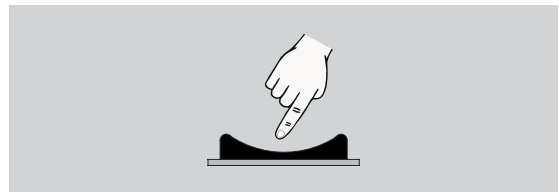
This chapter describes the test run for MDP type.

7.5.1 Test Run for Version without Air Bubble Injection

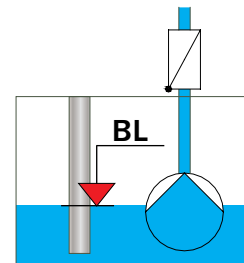
A description follows of how the lifting plant operates and its controls.

Carry out test run:

- Open valves in the inlet pipes and the pressure pipe (if present).
- Plug EEC plug into the socket.
- Put fuses in place.
- Check operational messages being received by controls.
- Put the rocker switch "Select mode of operation" for the pump into the position for "automatic operation".
- Allow water to flow through the inlet pipes into the lifting plant.

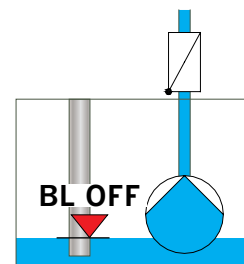


When the water level reaches "BL" (base level) the pump switches on and pumps the wastewater from the tank above the backflow level.

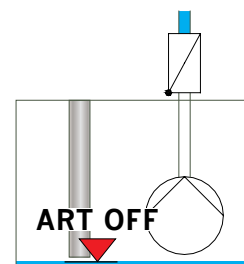


- Stop inflow of water.



When the water level reaches "BL OFF" the after-running time for the pump is activated.



When the water level reaches "ART OFF" the pump switches off.

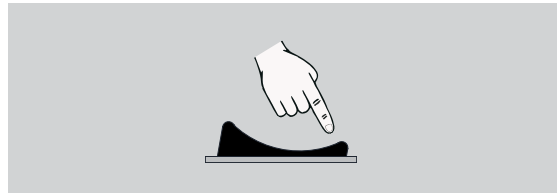


- Check the water level through the open maintenance cover.

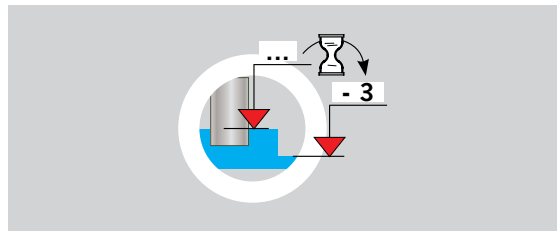
CAUTION If the water level is 2 – 3 cm below the bottom edge of the pilot tube, then the preset after-running period is sufficient, continue with  Section B. If the water level is not below the bottom edge of the pilot tube, continue with  Section A.

Section A

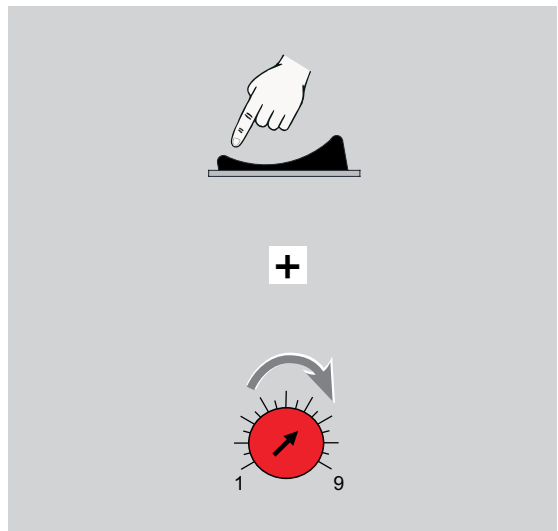
- Put the rocker switch "Select mode of operation" for the pump into the position for "manual operation".



- Time how long it takes until the surface water level is about 2-3 cm below the bottom edge of the pilot tube (visual check through the open maintenance cover).

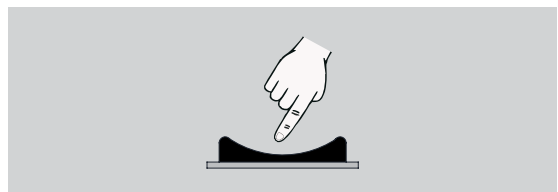


- Release the rocker switch "Select mode of operation" for the pump from the position for "manual operation" and press into the position for "pump off".
- Add the time just measured to the factory preset after-running time.
- Set the total time as the new after-running time using the control knob for "After-running Time".



This is the way to make sure that the pilot tube is aerated each time the pumps are "OFF".

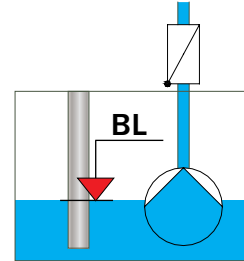
- Put the rocker switch "Select mode of operation" for the pump into the position for "automatic operation".



Section B

→ Switch the inlet water on again.

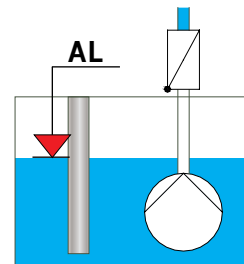
When the water level reaches "BL" (base level) the pump switches on and pumps the wastewater from the tank above the backflow level.



→ Put the rocker switch "Select mode of operation" for the pump into the position for "Pump off".



Water level reaches "AL" = High water alarm level.

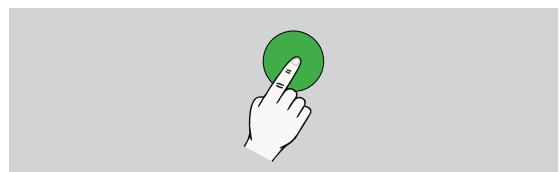


Red LED is lit and the acoustic alarm sounds.



→ Stop inflow of water.

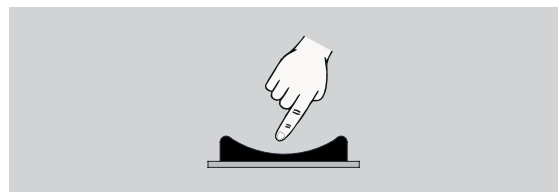
→ Press the "reset/enter" key 1x.



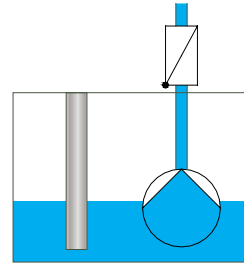
The acoustic alarm switches off.



→ Put the rocker switch "Select mode of operation" for the pump into the position for "automatic operation".

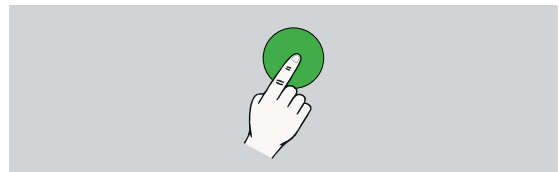


Pump switches on and pumps the wastewater from the tank above the backflow level.



The water level is below "AL".

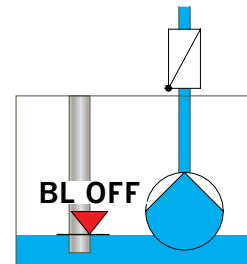
→ Press the "Clear" key 2x.



Red LED goes out.



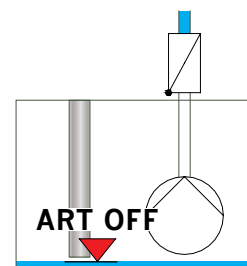
When the water level reaches "BL OFF" the after-running time for the pump is activated.



When the water level reaches "ART OFF" the pump switches off.

The test run for the version without air bubble Injection is now complete.

→ Repeat the test run for a second time.



7.5.2 Test Run for Version with Air Bubble Injection

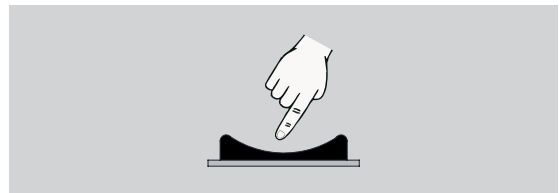
A description follows of how the lifting plant operates and its controls.

Carry out test run:

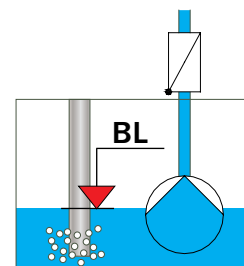
- Open valves in the inlet pipes and the pressure pipe (if present).
- Plug EEC plug into the socket.
- Put fuses in place.

CAUTION

- Set after-running time to "0".
- Check operational messages being received by controls.
- Put the rocker switch "Select mode of operation" for the pump into the position for "automatic operation".
- Allow water to flow through the inlet pipes into the lifting plant.

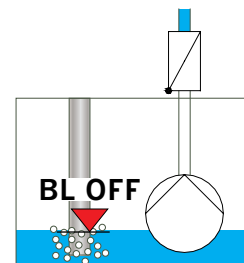


When the water level reaches "BL" (base level) the pump switches on and pumps the wastewater from the tank above the backflow level.



- Stop inflow of water.

When the water level reaches "BL OFF" the pump switches off.

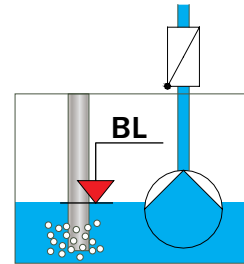


- Check the water level through the open maintenance cover.

CAUTION If the water level is 2 – 3 cm above the lower edge of the pilot tube then the factory setting is correct, otherwise correct the after-running time using the switch point "BL OFF".

- Switch the inlet water on again.

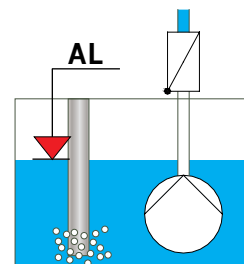
When the water level reaches "BL" (base level) the pump switches on and pumps the wastewater from the tank above the backflow level.



- Put the rocker switch "Select mode of operation" for the pump into the position for "Pump off".



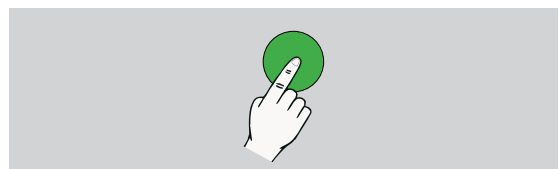
Water level reaches "AL" = High water alarm level.



Red LED is lit and the acoustic alarm sounds.



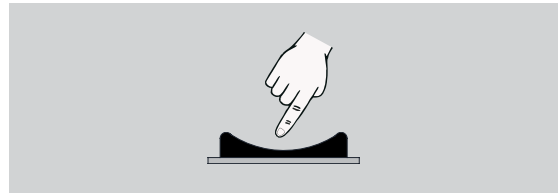
- Stop inflow of water.
- Press the "reset/enter" key 1x.



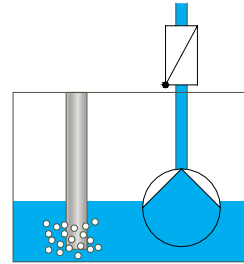
The acoustic alarm switches off.



- Put the rocker switch "Select mode of operation" for the pump into the position for "automatic operation".

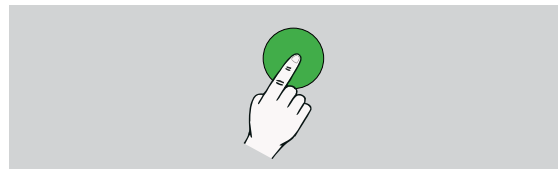


Pump switches on and pumps the wastewater from the tank above the backflow level.



The water level is below "AL".

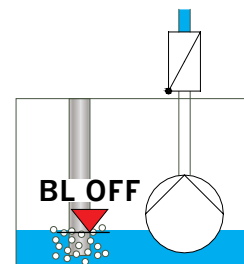
- Press the "Clear" key 2x.



Red LED goes out.



When the water level reaches "BL OFF" the pump switches off.




The test run for the version with air bubble injection is now complete.

- Repeat the test run for a second time.

7.6 Control Checks

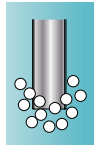
Checks before, during and after the test run:

- No leaks from the lifting plant, fittings and pipes
- The shut-off devices work correctly
- Good functioning of any hand diaphragm pipe which is installed
- Settings for air bubble injection,  Chap. 7.7

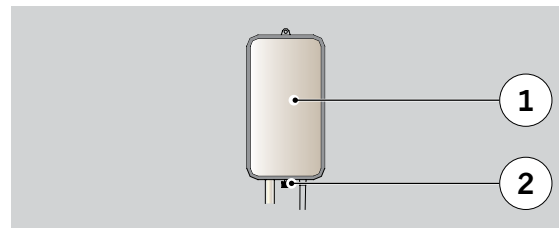
7.7 Adjusting Air Bubble Injection

The airflow can be reduced in order to reduce the noise level of the mini-compressor.

CAUTION Only reduce the flow of air to the point where air bubbles still appear from the end of pilot tube and rise up through the wastewater (still bubbling, check through maintenance cover).



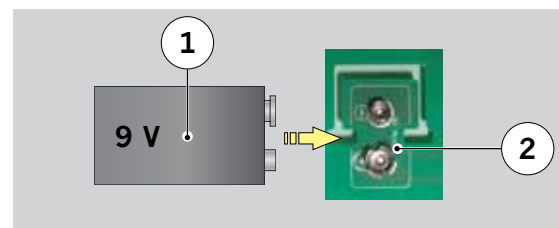
- Reduce the airflow using the control knob (2) on the mini-compressor (1).



7.8 Adjusting Battery (for DDP and DWP types)

The battery guarantees the mains-free alarm will function if the power is interrupted.

- The battery (2) should be inserted in its position (1) on the circuit board by a professional electrician.



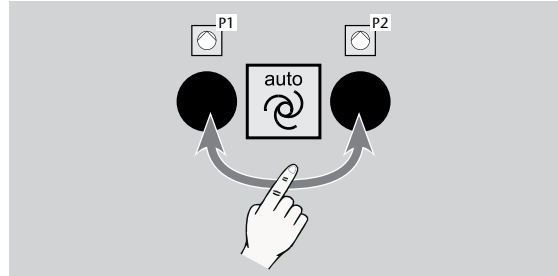
Once the battery is inserted the alarm is automatically activated.

7.9 Setting Automatic Operation

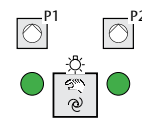
Set the following in the controls:

DDP and DWP Types

→ Press switch to "auto" (P1 and P2) for automatic operation of pumps 1 and 2.

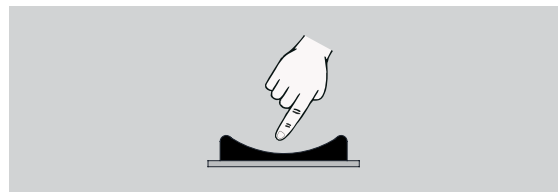


Green LED lights up steadily, pump P1 or P2 is in automatic mode and is switched automatically using level regulation.



MDP Type

→ Put the rocker switch "Select mode of operation" for the pump into the position for "automatic operation".



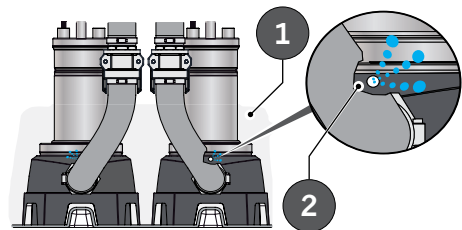
Lifting plant is ready to run

7.10 Automatic Ventilation of the Volute



During operation the volute ventilates independently and protects the pumps from damage.

Water sprays into the tank (1) through drilled holes (2) in the pressure connector to the pumps.



7.11 Hand Over Lifting Plant to Users

On handover to the user:

1. Explain how the lifting plant works.
2. Hand over the lifting plant in good working order.
3. Also provide a handover report with the important data about commissioning (e.g. additions or changes to the factory settings).
4. Hand over the operating instructions.


7.12 ACO Maintenance Contract

To safeguard the value and ensure that proper operation of the lifting plant is maintained, and also as a condition of the manufacturer's guarantee, we recommend that work should be carried out directly by the manufacturer, ACO.

This ensures long-term operational safety, and you will also benefit from adjustments and updates which result from our ongoing product development programme.

To request a quotation for a **Maintenance Contract** please photocopy the next section, complete all details, and fax it to:

Fax + 49 (0) 3 69 65 / 81 9 -3 67.

ACO Service department will be happy to answer any questions you may have,  Chap. 1.1.

Request: **Quotation for a maintenance contract for the lifting plant**

Please send me a quotation for regular maintenance. I am aware this is not binding.

Sender

Type:

Installed on:



Postcode

Town/city


 _____  _____

Usage:

Commercial usage



Domestic usage

7.13 Operation

CAUTION The lifting plant may only be used for the purpose for which it is designed,  Chap. 2.1.



The lifting plant runs automatically. The only work or inspections during operations are:

- Monthly inspections which check all switches and carry out test runs at least twice,  Chap. 7.4 or 7.5.
- Other inspections of the lifting plant relate only to maintenance work,  Chap. 8.3 + 8.4.

8 Maintenance

Regular maintenance is necessary in order to ensure long-term, safe and interruption-free operation.

The necessary maintenance activities are described in this chapter.


8.1 Safety during Installation

During maintenance work on the lifting plant, the following risks must be assumed:



WARNING

The following safety instructions must be read carefully before starting maintenance work. If used incorrectly severe injuries may occur.

Ensure the maintenance staff have the necessary qualifications,  Chap. 2.2.

The user should only carry out tasks which are described in this operating manual. All other work requires adequate professional training and sufficient experience in dealing with lifting plants. ACO Service is responsible for this.

Electrical risks


- All work on the electrical equipment in the lifting plant must be carried out by a qualified electrician.



BEWARE


Leaks in the lifting plant during commissioning and operation

Injuries/burns to eyes and skin

- Personal protective equipment must be worn,  Chap. 2.3.
- Immediately de-activate the lifting plant and leave the danger area until the pressure subsides (about 30 minutes).

Contact with greasy water

Skin and eye infections


- Personal protective equipment must be worn,  Chap. 2.3.
- On contact with skin: relevant skin areas must be washed thoroughly with soap and disinfected.
- If in contact with eyes: Rinse eyes. If eyes continue to water, consult a doctor.



BEWARE

Sharp edges due to damaged materials

Cuts from worn parts

- Be especially careful and vigilant.
- Personal protective equipment must be worn,  Chap. 2.3.

8.2 Lifting Plant Logbook

Keeping a Logbook has many benefits, e.g. traceability of measures and targeted error analysis.

ACO recommends creating a lifting plant logbook where the following data and information can be recorded:

- Dates of Regular Inspections and Maintenance Work
- Problems, Causes of Problems, Steps Taken
- Dates of Repair Work Carried out
- Dates of Tests

8.3 Maintenance Tasks for Users

This chapter describes the work which can be carried out by a user.

8.3.1 Daily Checks

The following checks need to be carried out every 1 – 2 days.


- Check lifting plant for leaks.
- Check that the lifting plant is operational by checking the controls.
- Take notice of anything unusual (e.g. different noises when the pump is running), react and take the necessary measures.

8.3.2 Maintenance Tasks as Needed

The following work can be carried out by the user if necessary:

- cleaning the lifting plant and controls

CAUTION To avoid damage to property only use normally available and non-corrosive cleaning materials.

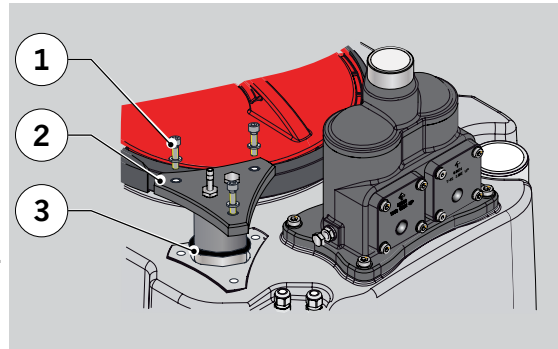
- If the lifting plant has been flooded, carry out a full maintenance check before recommissioning,  Chap. 8.4.

- Clean the pilot tube

Pre-requisites:

- Size 6 Allen key

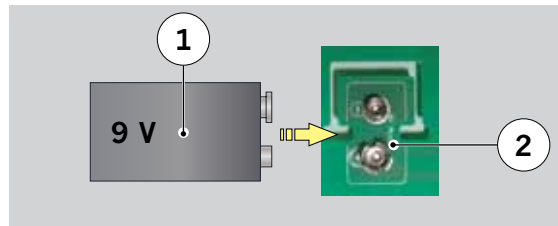
- Loosen and remove 3x M6 Allen screws (1)
- Remove pilot tube (2) from the tank.
- Clean pilot tube (2) and seal (3).
- Re-insert pilot tube (2).
- Tighten screws (1) evenly (torque 8 Nm).



8.3.3 Annual Maintenance Work

For DDP and DWP types have an electrician replace the battery each year.

- Insert battery (2) in the controls in its position (1) on the circuit board.



8.4 Maintenance Plan for Qualified Personnel

Table 19 below provides an overview of the maintenance work which needs to be carried out by a skilled professional, 📖 Chap. 2.2.


CAUTION Maintenance work, 📖 in Tab. 19, must be carried out at the following frequencies:

Lifting plants operating in **commercial premises** = every 3* months

Lifting plants operating in **domestic premises** = every 6* months

* Only applies in Germany Requirements in other countries may vary.

Tab. 19: Maintenance plan qualified personnel

Lifting plant	Activity	Settings	
Component	Description	to be done/completed	
Controls	Check condition/functioning of warning lights	<input checked="" type="checkbox"/>	<input type="checkbox"/>
	Check condition/functioning of controls	<input checked="" type="checkbox"/>	<input type="checkbox"/>
	Check condition/functioning of display fields	<input checked="" type="checkbox"/>	<input type="checkbox"/>
	Check functions and menu settings	<input checked="" type="checkbox"/>	<input type="checkbox"/>
	Carry out test run	<input checked="" type="checkbox"/>	<input type="checkbox"/>
	Check functioning of remote warnings	<input checked="" type="checkbox"/>	<input type="checkbox"/>
	Check fuses are in place	<input checked="" type="checkbox"/>	<input type="checkbox"/>
	Tighten up crimped connections	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Level regulation	Clean the pilot tube	<input checked="" type="checkbox"/>	<input type="checkbox"/>
	Check the control pipe	<input checked="" type="checkbox"/>	<input type="checkbox"/>
	Check the control pipe connection	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Mini compressor	Check condition	<input checked="" type="checkbox"/>	<input type="checkbox"/>
	Check functions	<input checked="" type="checkbox"/>	<input type="checkbox"/>
	Check air setting	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Tank	Check condition	<input checked="" type="checkbox"/>	<input type="checkbox"/>
	Clean tank inside and out	<input checked="" type="checkbox"/>	<input type="checkbox"/>
	Check buoyancy anchors	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Pumps	Check condition/functioning of the motor	<input checked="" type="checkbox"/>	<input type="checkbox"/>
	Check noise when running	<input checked="" type="checkbox"/>	<input type="checkbox"/>
	Check condition of impeller and clean	<input checked="" type="checkbox"/>	<input type="checkbox"/>
	Check condition of volute and clean	<input checked="" type="checkbox"/>	<input type="checkbox"/>
	Clean outside of motor	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Y-branch pipe with built-in double backflow stop	Check condition and functioning	<input checked="" type="checkbox"/>	<input type="checkbox"/>
	Check condition of balls	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Connector	Check condition	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Inlet valve	Check condition and functioning	<input checked="" type="checkbox"/>	<input type="checkbox"/>
	Lubricate adjustment spindle	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Pressure line stop valve	Check condition and functioning	<input checked="" type="checkbox"/>	<input type="checkbox"/>
	Lubricate adjustment spindle	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Inlet line	Check condition of pipes	<input checked="" type="checkbox"/>	<input type="checkbox"/>
	Check connection points	<input checked="" type="checkbox"/>	<input type="checkbox"/>
	Check attachments	<input checked="" type="checkbox"/>	<input type="checkbox"/> 
Ventilation pipes	Check condition of pipes	<input checked="" type="checkbox"/>	<input type="checkbox"/>
	Check connection points	<input checked="" type="checkbox"/>	<input type="checkbox"/>
	Check attachments	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Pressure line	Check condition of pipes	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Accessories	Check condition	<input checked="" type="checkbox"/>	<input type="checkbox"/>
	Clean externally	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Complete lifting plant	Check flange connections and connectors	<input checked="" type="checkbox"/>	<input type="checkbox"/>
	Clean externally	<input checked="" type="checkbox"/>	<input type="checkbox"/>
	Carry out test run	<input checked="" type="checkbox"/>	<input type="checkbox"/>
	Clean surrounding area	<input checked="" type="checkbox"/>	<input type="checkbox"/>

= Can use to check off completed tasks

9 Correcting Faults and Repairs

This Chapter basically provides information on how to troubleshoot and repair the lifting plant.


9.1 Safety during Repairs and Fault Correction

During troubleshooting and repair work on the lifting plant, the following risks must be assumed:



WARNING

The following safety instructions must be read carefully before starting troubleshooting and repair. If ignored severe injuries may occur.

Ensure the personnel have the necessary qualifications,  Chap. 2.2.

The user should only carry out tasks which are described in this operating manual.

All other work requires adequate professional training and sufficient experience in dealing with lifting plants. ACO Service is responsible for this.

Electrical risks


- All work on the electrical equipment in the lifting plant must be carried out by a qualified electrician.



BEWARE

Contact with greasy water

Skin and eye infections

- Personal protective equipment must be worn,  Chap. 2.3.
- On contact with skin: relevant skin areas must be washed thoroughly with soap and disinfected.
- If in contact with eyes: Rinse eyes. If eyes continue to water, consult a doctor.


Sharp edges due to damaged materials

Cuts from worn parts

- Be especially careful and vigilant.

In the event of a fault, the motor can heat up to a maximum of 110 °C

Burn injuries

- Personal protective equipment must be worn,  Chap. 2.3.
- Let the motor cool for at least 30 mins.













9.2 Tracking down Faults

The following table can be used to help identify the cause of problems and take the necessary measures.


Tab. 20: Tracking down Faults

Fault	Cause(s)	Remedy/ies	Type of expert required	
Faults in the lifting plant and connections				
Pump transports nothing or too little	Shut-off device in pressure line is neither open nor shut completely	Fully open shut-off device		7.4 7.5
or	Air pipe blocked	Clean air pipe	x	9.3
Tank full	Impeller blocked	Dismantle pump and clean impeller	x	9.3
	Venting of volute blocked	Dismantle pump and clean ventilation hole in the volute casing	x	7.10
	Worn pump parts	Replace worn pump parts	x	9.3
Pump not running	Defective motor	Replace motor	x	9.3
	Pump blocked by foreign body	Dismantle pump and clean impeller and volute	x	9.3
	Electrical contact broken	Check connection and repair as needed	x	6.3
	Automatic operation switched off	Switch on automatic operation		7.9
	Pump overload protection has been triggered and cannot be cleared	Dismantle pump and clean impeller and volute	x	9.3
Pump only runs in manual mode	Control pipe for level regulation is leaking, laid wrongly, kinked or blocked	Check control pipe and correct problem		6.3.8
	Pilot tube blocked	Clean the pilot tube		8.3.3
	Switch in controls not working	Change controls	x	9.3
Pump is running noisily and for too long or does not switch off	Power line or ventilation line is blocked	Clean line	x	9.3
	Ventilation line is not laid at all or incorrectly	Lay ventilation line properly	x	6.2.8
	Pressure line wrong size, losses too great	Reduce losses by selecting a larger nominal diameter	x	6.3.10
	Double backflow stop is defective	Open backflow stop; clean chamber, ball seat and ball and replace if necessary	x	9.3
Thumping noises/vibrations in the pressure line when the pump(s) is/are switched off	Pressure or water hammer in the pressure system	Increase the pump's after-running time		7.4 7.5

Tab. 20: Tracking down Faults

Fault	Cause(s)	Remedy/ies	Type of expert required	
Fault reporting on Controls				
Display area: max. current	Pump is blocked by foreign body and current limiter has generated a fault	Dismantle pump and clean impeller and volute	x	9.3
Display element   +  +  + 	Pump overload protection has been triggered and cannot be cleared	Dismantle pump and clean impeller and volute	x	9.3
Display area: High water level alarm	Shut-off device in pressure line is neither open nor shut completely	Fully open shut-off device		7.4 7.5
Display element  +  +  + 	Automatic operation not switched on	Switch on automatic operation		7.9
or  + 	Defective pump motor	Check manual operation, if necessary replace motor	x	9.3
	Impeller blocked	Dismantle pump and clean impeller	x	9.3
	Venting of volute blocked	Dismantle pump and clean ventilation hole in the volute casing	x	9.3
	Air pipe blocked	Clean air pipe	x	9.3
	Worn pump parts	Replace worn pump parts	x	9.3

9.3 Repairs and Replacement Parts

For repair work and replacement parts please contact ACO Service, quoting the details shown on the type plate,  Chap. 1.1.

10 Decommissioning and Disposal

This Chapter provides you with information about the correct way to decommission and dispose of the lifting plant.


10.1 Safety during Decommissioning and Disposal


During decommissioning and disposal work on the lifting plant, the following risks must be assumed:



WARNING

The following safety instructions must be read carefully before starting decommissioning and disposal. If ignored severe injuries may occur.

Ensure the personnel have the necessary qualifications,  Chap. 2.2.

Follow additional safety instructions for "Transport and Storage",  Chap. 3.1.

Electrical risks

Severe injuries or death are possible from contact with parts which are connected to mains


- All work on the electrical equipment in the lifting plant must be carried out by a qualified electrician.
- All work on decommissioning the electrical equipment in the lifting plant must be carried out by a qualified electrician.



BEWARE

Contact with greasy water

Skin and eye infections

- Personal protective equipment must be worn,  Chap. 2.3.
- On contact with skin: relevant skin areas must be washed thoroughly with soap and disinfected.
- If in contact with eyes: Rinse eyes. If eyes continue to water, consult a doctor.




BEWARE

Sharp edges due to damaged materials


Cuts from worn parts

- Be especially careful and vigilant.

Injuries from pipe sections falling.


- Personal protective equipment must be worn,  Chap. 2.3.
- Be especially careful and vigilant.

Burn injuries

- Personal protective equipment must be worn,  Chap. 2.3.
- Let the motor cool.
- Be especially careful and vigilant.

10.2 Decommissioning

Sequence for de-activating:

1. Unplug EEC or earthed plug from the socket.
2. Remove battery from the controls.
3. Empty tank and all pipes.
4. Cover controls and protect from damp.
5. Cover tank/lifting plant and protect from damp.
6. If not in use for more than one month, shut down the lifting plant,  Chap. 3.2.

10.3 De-activation

Sequence for de-activation:

1. Unplug EEC or earthed plug from the socket.
2. Detach pump cable connections in the controls.
3. Detach mini-compressor cable from controls, if present.
4. Dismantle control lines from controls.
5. Empty tank and all connected pipes.
6. Dismantle connections.
7. Dismantle tank/lifting plant parts.

10.4 Disposal

The lifting plant is made from materials which can be recycled.

CAUTION Incorrect recycling damages the environment unnecessarily. Regional disposal regulations must be respected.

- All steel or cast iron components should be separated out and taken for recycling.
- All rubber (NBR) components should be separated out and taken for recycling.
- All plastic (PE-HD or PUR) components should be separated out and taken for recycling.
- Separate out the controls and mini-compressor (if present) and recycle as electrical waste.

Index of Tables and Illustrations




List of Tables

Tab. 1:	Key data for product identification.....	6
Tab. 2:	Personnel qualifications	10
Tab. 3:	Personal protective equipment.....	11
Tab. 4:	Risk levels.....	11
Tab. 5:	Items delivered and spare parts for lifting plant	17
Tab. 6:	Lifting plant features.....	19
Tab. 7:	Features of DDP or DWP controls.....	20
Tab. 8:	Features of MDP controls	21
Tab. 9:	Settings for DDP or DWP controls	31
Tab. 10:	Settings menu	32
Tab. 11:	Settings for MDP controls	38
Tab. 12:	Switch point without air bubble injection.....	39
Tab. 13:	Switch point with air bubble injection	40
Tab. 14:	Technical data for the lifting plant.....	41
Tab. 15:	Performance data	43
Tab. 16:	Technical data for DDP or DWP controls.....	44
Tab. 17:	Technical data for MDP controls.....	46
Tab. 18:	Prerequisites for installation	48
Tab. 19:	Maintenance plan qualified personnel.....	90
Tab. 20:	Tracking down faults.....	93

List of illustrations

Illus. 1:	Diagram of components.....	22
Illus. 2:	Schematic representation of functional principle	23
Illus. 3:	Suggested installation behind laundry rooms	25
Illus. 4:	Suggested installation behind grease separator	26
Illus. 5:	Using DDP or DWP controls	27
Illus. 6:	Using MDP controls	35
Illus. 7:	Schematic of level controls (without air bubble injection).....	39
Illus. 8:	Schematic of level controls (with air bubble injection)	40
Illus. 9:	Lifting plant dimensions	42
Illus. 10:	Characteristic lines.....	43
Illus. 11:	Dimensions of DDP and DWP controls.....	44
Illus. 12:	Circuit diagram for DDP and DWP controls	45
Illus. 13:	Dimensions of MDP controls	46
Illus. 14:	Circuit diagram for MDP controls	47
Illus. 15:	Installation work.....	49
Illus. 16:	Electrical work DDP and DWP types	60
Illus. 17:	Electrical work MDP type	61

Declaration of Conformity

ACO Haustechnik	
	
Declaration of Conformity	
according to Machinery Directive 2006/42/EC, Annex II, Part 1, Section A	
Manufacturer:	ACO Passavant GmbH, Ulsterstraße 3, 36269 Philippsthal, Germany
Responsible for documentation:	Katrin Kropp ACO Passavant GmbH, Im Gewerbepark 11c, 36457 Stadtlengsfeld, Germany
Machine designation:	Wastewater lifting plant „Multi-Mini“
Typ:	DDP, DWP, MDP
Year of construction:	2012
<p>In terms of design and type and in the version supplied by us, the designated machine is in conformity with the provisions of the Machinery Directive 2006/42/EC and of the following directives:</p>	
2006/95/EC	Low Voltage Directive
89/106/EEC	Construction Products Directive
2004/108/EC	Electromagnetic Compatibility Directive
<p>The following harmonised norms are used in the version in force on the date of issue:</p>	
EN 12050-2	Wastewater lifting plants for buildings and sites. Principles of construction and testing – Part 2: Lifting plants for faecal-free wastewater
EN 12050-4	Wastewater lifting plants for building and sites. Principles of construction and testing – Part 4: Non-return valves for faecal-free wastewater and wastewater containing faecal matter
EN ISO 12100	Safety of machinery – General principles for design – Risk assessment and risk reduction
EN 60335-1	Household and similar electrical appliances – Safety – Part 1: General requirements
<p>If the machine is modified in a manner which has not been agreed, this declaration shall cease to be valid.</p>	
Stadtlengsfeld, 2012-06-18	 <hr/> Ralf Sand (Managing Director)
DC_V1.0_GB Translation of the original document	

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ACO. The future of drainage.

