Operating manual

2011-08-18 Edition

Upstream tank plant

Wastewater lifting plant

Type -duo

For a safe and proper use, read operating manual and further product-related documents thoroughly.
Hand on to end user and keep up to product disposal.

0150.36.89_V1.1_EN_Translation of the original German operating manual.

Welcome

The ACO Passavant GmbH (hereinafter called ACO) appreciates your confidence and supplies you with an upstream tank plant (hereinafter called plant) which is state-of-the-art technology and which was checked for its proper condition in line with our quality controls prior to its delivery.

The following guidelines facilitate handling with this operating manual.

- A table and illustration directory is contained in attachmnent 1
- The following general abbreviations are used in the text:
  - e. g. = for example
  - min. = minimum, minutes
  - max. = maximum
  - fig. = figure
  - h = hours
  - sec. = seconds
- The following specific abbreviations are used in the text:
  - ART OFF = After-run time OFF/release operating point of first pump
  - BL OFF = Base load OFF/after-run time of first pump starts
  - BL = Base load ON/switching point of first pump
  - PL OFF = Peak load OFF/release operating of second pump
  - PL = Peak load ON/switching point of second pump
  - AL = Flood alarm

ACO Passavant GmbH
Ulsterstrasse 3
D-36269 Philippsthal

Tel.: + 49 (0) 3 69 65 / 81 9 -0
Fax: + 49 (0) 3 69 65 / 81 9 -3 61

www.aco.com

Contents

Welcome **2**

1 Introduction **6**
1.1 ACO service 6
1.2 Product identification 6
1.3 Warranty 7
1.4 Owner, user 7
1.5 Symbols used in the operating manual 7

2 For your safety **8**
2.1 Proper use 8
2.1.1 Field of application 8
2.1.2 Foreseeable misuse 9
2.2 Required staff qualifications 10
2.3 Personal protective equipment 10
2.4 Depiction of warning notices 11
2.5 Non-approved parts 12
2.6 Basic risk potential 12
2.6.1 Thermal hazards 12
2.6.2 Material/substance hazards 12
2.6.3 Pressure-induced hazards 12
2.7 Responsibility of owner 13

3 Transport and storage **14**
3.1 Safety during transport and storage 14
3.2 Transport 15
3.3 Storage 15

4 Product description **16**
4.1 Scope of supply 16
4.2 Product features 17
4.3 Components 20
4.4 Functional principle 21
4.5 Recommendations for installation 23
4.6 Type plates 24
4.7 Accessories 24

4.8 Control 25
4.8.1 Survey on control elements and display elements 25
4.8.2 Operating elements 26
4.8.3 Display elements 27
4.8.4 Signals in the display 28
4.8.5 Control settings 28
4.8.6 Setting values when supplied 29
4.8.7 Setting options 30
4.9 Switchgear 33
4.9.1 Survey of operating and display elements 33
4.9.2 Operating elements 33
4.9.3 Display elements 34
4.10 Switching points of level control 35

5 Technical data 36
5.1 Technical plant data 36
5.2 Technical data of control 38
5.2.1 Specifications and dimensions 38
5.2.2 Wiring diagram of control and switchgear 39

6 Installation 40
6.1 Safety during installation 40
6.2 Sanitary installation 41
6.2.1 Align collecting container 42
6.2.2 Install inlet slide 42
6.2.3 Connect inlet line 43
6.2.4 Mount connecting socket 44
6.2.5 Connect ventilation line 45
6.2.6 Carry out pressure line 45
6.2.7 Mount special fastening element 46
6.2.8 Recommendations for pipeline systems 46
6.2.9 Connect pressure line 47
6.2.10 Mount fixation kit 48
6.3 Electric installation 49
6.3.1 Fix control 50
6.3.2 Fix CEE power socket 50
6.3.3 Adjust length of electric line of pumps 51
6.3.4 Fix switchgear 51
6.3.5 Adjust length of the electric connecting lines between control and switchgear 52
6.3.6 Adjust length of the electric lines for thermal and electric monitoring of pumps 53

6.3.7 Adjust length of electric lines for flow monitoring of pumps 54
6.3.8 Fix mini compressor 54
6.3.9 Connect line for air bubble injection 55
6.3.10 Connect electric line of mini compressor 56
6.3.11 Connect control line for level control 57
6.3.12 Transmit collective fault signal (optional) 58

7 Initial commissioning, operation 59
7.1 Safety with initial commissioning and operation 59
7.2 Initial commissioning 60
7.2.1 Prerequisites, presence and performance 60
7.2.2 Check sense of rotation 60
7.2.3 Test run 61
7.2.4 Control works 65
7.2.5 Set air bubble injection 66
7.2.6 Insert battery 66
7.2.7 Set automatic operation 67
7.2.8 Hand over plant to user 67
7.2.9 ACO maintenance contract 67
7.3 Operation 68

8 Maintenance 69
8.1 Safety during maintenance works 69
8.2 Plant manual 70
8.3 Maintenance works for the user 70
8.3.1 Daily checks 70
8.3.2 Maintenance works as needed 70
8.3.3 Annual maintenance works 71
8.4 Maintenance plan for specialist 71

9 Fault clearance and repair 73
9.1 Safety during fault clearance and repair works 73
9.2 Fault finding 75
9.3 Repair and spare parts 78

10 Decommissioning and disposal 79
10.1 Safety during decommissioning and disposal 79
10.2 Decommissioning 80
10.3 Stopping 80
10.4 Disposal 81
Attachment 1: Table and illustration directory 82
Conformity declaration 83

1 Introduction

This operating manual for the -duo plant was issued with high diligence and contains information which guarantees safe and long-lasting operation.
If, however, some mistakes should have slipped in or if some information is missing, please advise us accordingly.

1.1 ACO service

In the case of questions on the plant and this operating manual, please contact our ACO Service.

ACO Service
Im Gewerbepark 11c
36457 Stadtlengsfeld

Tel.: + 49 (0) 3 69 65 / 81 9 -4 44
Fax: + 49 (0) 3 69 65 / 81 9 -3 67

service@aco-online.de

1.2 Product identification

Plant supplied is identified by means of the characteristics of the type plate,
chapter 4.6. Take over data in below table.

Table 1: Characteristics for product identification

	Art. no.	Type	Motor output per pump [kW]	Illustration	Year built	Serial no.
◯	0175.30.25	2	1.5		_____	_____
◯	0175.27.84	4	1.5		_____	_____
◯	0175.30.26	7	4.0		_____	_____
◯	0175.30.32	10	4.0		_____	_____

1.3 Warranty

For full particulars on warranty refer to the "General Terms and Conditions" under www.aco-haustechnik.de/agb.html.

1.4 Owner, user

The owner is responsible for the design (planning and dimensioning) of plant,

If owner does not operate the plant, the following must be agreed upon with the user:

- Who is responsible for current operation?
- Who initiates maintenance or repair works at plant?
- Who reacts in the case of malfunction?
- ...

1.5 Symbols used in the operating manual

For better differentiation of information, the following symbols are used in the operating manual:

Useful hints and additional information facilitating work

Steps to be carried out

References to further information in this operating manual or to other documents

Depiction of warning notices, chapter 2.4.

2 For your safety

Please read the safety notes in this chapter prior to using the plant. Severe injuries may occur in the case of misuse.

2.1 Proper use

2.1.1 Field of application

This plant collects and automatically lifts wastewater upstream grease separator plants.
The greasy wastewater must be led into the separator with free gradient of at least 1:50. If this is not possible, the wastewater must be lifted to a higher level.
The disadvantage of lifting by means of centrifugal pumps is that grease and wastewater are intensely mixed. Separation is thus hindered and exceedance of limit values is pre-programmed.
By using this plant with low-turbulence displacement pumps (eccentric spiral pumps), these disadvantages are nearly eliminated.
If a larger distance must be bridged between wastewater point of origin and grease separator plant, this plant must also be used.

The following wastewater may be fed:

- Greasy wastewater

Different application and use options as well as amendments are prohibited.

The owner is responsible for the design (planning and dimensioning) of the plant.

2.1.2 Foreseeable misuse

Improper use is, e. g.:

- Operating the plant outside the limitations of use, 📖 chapter 5
- Operating the plant or the pumps in dry operation
- Using worn components (omitted servicing works)
- Disregarding this operating manual and product-related documents
- Using the plant in explosive areas

Never discharge any harmful substances into the plant which could or affect functional capability of the grease separator plant.

This includes particularly:

- Wastewater containing faeces
- Rain water
- Wastewater containing mineral oils and fats
- Wastewater from wet refuse disposal installations/cutting plants
- Wastewater from slaughterhouses
- Solidifying fats in concentrated form (e. g. chip fat)
- Drain water containing a noteworthy part of fats in non-separable, e. g. in emulsified or dissolved form.

2.2 Required staff qualifications

All works at plant must be carried out by specialists, if not expressly mentioned that different persons (owner, user) are allowed to do so.

Besides a perennial work experience, specialists must have proof of the following knowledge:

Table 2: Required staff qualifications

Activities	Person	Knowledge
Design Operational alterations New context of use	Planner	■ Knowledge of building, sanitary and house technique ■ Evaluation of applications of wastewater technology and proper design of wastewater lifting systems
Transport/storage	Forwarders, dealers	■ Proof of load securing education ■ Safe handling of lifting accesories
Installation sanitary/ electrical works initial commissioning, maintenance, repair works, decommissioning, dismantling	Specialists	■ Safe handling of tools ■ Laying and connection of pipelines and joints ■ Laying of electric lines ■ Assembly of distribution boards, ground fault circuit interrupters, line safety switches, electrical machines, switches, push-buttons, power sockets etc. ■ Measuring effectiveness of electrical protective measures ■ Product-specific knowledge
Operation, operation monitoring, easy maintenance and fault clearance	Owner, user	■ No specific prerequisites
Disposal	Specialists	■ Proper and environmentally friendly disposal of materials and substances ■ Decontamination of harmful substances ■ Knowledge about recycling

2.3 Personal protective equipment

For different works at the plant, personal protective equipment is required.
The specialist company must put a sufficient number of protective equipment at the disposal of their employees. Supervisors must make sure that the equipment is worn.

Table 3: Personal protective equipment

Sign giving orders	Meaning	Explanation
	Wear safety shoes	Safety shoes offer good anti-slip property, particularly under wet conditions, as well as high puncture resistance, e. g. with nails, and they safeguard the feet against objects falling down, e. g. during transport
	Wear safety helmet	Safety helmets safeguard against head injuries, e. g. in the case of objects falling down or impacts, particularly with low ceiling heights and above-head assembly
	Wear safety gloves	Safety gloves safeguard the hands against light crushes, cutting damages, infections and hot surfaces, particularly during transport, commissioning, maintenance, repair and dismantling
	Use protective clothing	Protective clothing safeguards the skin against light mechanic effects and infections in the case of wastewater escaping
	Wear protective glasses	Protective glasses safeguard the eyes against the escape of wastewater, particularly during commissioning, maintenance, repair, decommissioning

2.4 Depiction of warning notices

For better differentiation, risks and hazards are marked in the operating manual by following warning signs and signal words:

Table 4: Risk levels

Warning signs and signal words		Meaning	
	**DANGER**	Injuries to persons	Refers to a dangerous situation leading to death or severe injuries if it is not avoided.
	**WARNING**		Refers to a dangerous situation possibly leading to death or severe injuries if it is not avoided.
	**BEWARE**		Refers to a dangerous situation possibly leading to medium or light injuries if it is not avoided.
	CAUTION	Property damage	Refers to a situation possibly leading to damages of components, of plant and/or its functions or of an object in its work environment, if it is not avoided

Exemplary warning notice:

SIGNAL WORD

Cause of danger

Consequences of danger

Description/listing of protective measure(s)

2.5 Non-approved parts

Prior to its market introduction, the plant had to pass all product tests and all components were checked under high load.

Copies of high-quality spare parts are increasingly available. Installing non-approved parts affects safety and rules out warranty by ACO.

In the case of an exchange, exclusively use original ACO parts or spare parts released by ACO.

2.6 Basic risk potential

This chapter holds information on basic risks for plant.

2.6.1 Thermal hazards

The electric motor works in interval operation. During proper operation, no thermal hazards are to be expected from the plant. In the case of malfunction, however, the temperature of the motor may reach 110°C and affect burnings, wear protective clothing, 📖 table 3.

2.6.2 Material/substance hazards

Contact with wastewater containing faeces or contaminated pump parts, e. g. when clearing blockages, may lead to infections, wear protective clothing, 📖 table 3.

2.6.3 Pressure-induced hazards

Eccentric spiral pumps are displacement pumps and can (e. g. by blockage of pressure line) generate a multiple of the max. permissible plant pressure, which may lead to bursting of lines, wear protective clothing, 📖 table 3.

2.7 Responsibility of owner

It is in the owner's responsibility that the following points are observed:

- The plant must be operated in accordance with its intended use and in proper condition, chapter 2.1.
- Function of protective equipment must not be affected.
- Service intervals must be kept and faults must be remedied promptly. Remedy faults oneself only if relevant measures are described in this operating manual. For all other measures, the ACO Service is in charge.
- Check the type plate at plant for completeness and legibility, chapter 4.7.
- Sufficient number of required personal protective equipment must be available and must be worn, chapter 2.3.
- This operating manual must be available at place of installation legibly and completely and staff members must be trained with this manual.
- Only qualified and authorised staff members may be used, chapter 2.2.

3 Transport and storage

This chapter contains information on proper transport and storage of plant.

Packing

The plant and the loosely supplied components (packed in a carton) are delivered fixed to a pallet. The entire unit is protected by a foil, chapter 4.1.

3.1 Safety during transport and storage

During transport and storage, the following risks may occur:

WARNING

Read the following safety notes thoroughly prior to transport or storage. In the case of misuse, severe injuries may occur.

Make sure that transport and storage personnel have required qualification, chapter 2.2.

Transport with forklift or truck

Severe crushes, impacts and momentous accidents in the case of improper transport!

- Wear personal protective equipment, chapter 2.3.
- Transport plant in delivery status (fixed on pallet).
- Secure cargo sufficiently.
- Check suitability and intactness of lifting accessories.

Transport with crane

Severe crushes and impacts in the case of objects falling down!

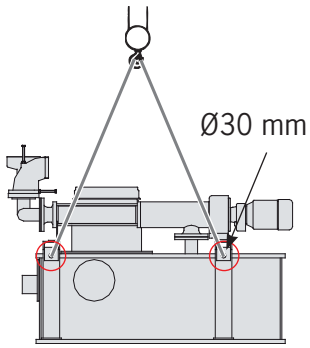
- Wear personal protective equipment, chapter 2.3.
- Check max. permissible bearing load of crane equipment and lifting accessories.
- Never stand beneath pending loads.
- Make sure that no foreign persons are able to enter the hazardous area.
- Avoid reciprocating movements during transport.

3.2 Transport

Proper transport with crane or lifting gear is described in the following:

With crane or lifting gear:

→ Apply lifting straps or ropes to the intended rope stops ◯, 🕮 see fig.



3.3 Storage

CAUTION An improper storage or missing conservation may lead to damage of plant. The following measures have to be taken:

In the case of short-time storage (up to 3 months):

- Store plant in a closed, cool, dry, moderately ventilated, dust-free and frost-free room (relative humidity below 65 %).
- Avoid temperatures outside the range of -10°C to +15°C.

In the case of long-time storage (more than 3 months):

- Store plant in a closed, cool, dry, moderately ventilated, dust-free and frost-free room (relative humidity below 65 %).
- Avoid temperatures outside the range of -10°C to +15°C.
- Storage rooms may not contain appliances generating ozone (e. g. electric motors).
- Solvents, motor fuels, lubricants and chemicals may not be kept in the storage room.
- Stator of pump: in the case of extended stoppage, the rotor can deform the stator at the contact surfaces constantly (constant deformation under pressure). This requires an increased starting torque during restart. Therefore, demount stator and store separately, specialist 🕮 chapter 2.2.
- Pump-shaft seal: remove gland packing, specialist, 🕮 chapter 2.2.
- In the case of non rust-proof material: use preservative agent.
- Check conservation after 6 months and renew, if required.

4 Product description

This chapter contains information on design and performance of plant.

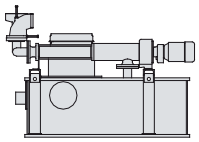
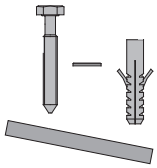
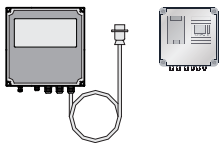
4.1 Scope of supply

Check delivery for intactness and, by means of the following table, for completeness.

CAUTION Do not install damaged parts.

Inform supplier of possible damagings to plant to make sure that complaints can be processed without delay.

Table 5: Supply units and plant components

Unit	Single component	Illustration	Packing
Container	■ 1x collecting container ■ 1x control line 10 m long ■ 2x connection line 10 m long, connected to terminal box of motor and in control		Wooden pallet
Fixation kit	■ 4x plate ■ 4x wooden screw ■ 4x disc ■ 4x dowel		PVC bag
Special fastening element	■ 1x special fastening element complete		Carton
Control	■ 1x control ready to plug in (battery enclosed) ■ 1x switchgear		Carton
Mini compressor	■ 1x mini compressor complete with accessories		Carton
Documentation	■ Operating manual ■ Supply documents	–	PVC bag

For further accessories, as inlet slide, signalling plant etc., product catalogue, www.aco-haustechnik.de.

4.2 Product features

This chapter holds information on essential plant features

Technical terms used

- Stator: A stator is a fixed, immobile part of a machine (eccentric spiral pump). The stator consists of a flexible material, e. g. elastomer.
- Rotor: A rotor is the rotating part of a machine or an aggregate (eccentric spiral pump). In particular, a rotor is talked of when also a stator is available. Normally, the rotor consists of a highly abrasion-proof material, e. g. stainless steel.
- Eccentric spiral pump: With an eccentric spiral pump, the driven, coiled motor rolls off on the inner surface of the housing which is also spirally coiled, the stator, and rotates with its axis eccentrically round the stator axis. Thanks to the special design of rotor and stator, sealed hollow spaces are generated between rotor and stator, which move axially when the rotor rotates and deliver the medium.

Short description of plant

The plant is desigend for free-standing installation in frostproof rooms upstream a grease separator plant.

The collecting container consists of high-quality plastic (PE-HD). The plant is equipped with two eccentric spiral pumps for greasy wastewater and a level control.

The eccentric spiral pumps are equipped with robust three-phase motors and are mounted on the collecting container.

The rotor is made of stainless steel and the stator of an elastomer.

The connecting lines of the eccentric spiral pumps and the control lines of the level control are each 10 m long.

Short description of control

The pump control guarantees an automatic level control of liquid levels. The filling level is determined by means of the liquid's back pressure.

For activation of the two pumps, separate switches with overload protection are available and 4 relay contacts signal malfunctions.

All settings or values of control can be inquired from the display panel and can be changed.

Table 6: Plant features

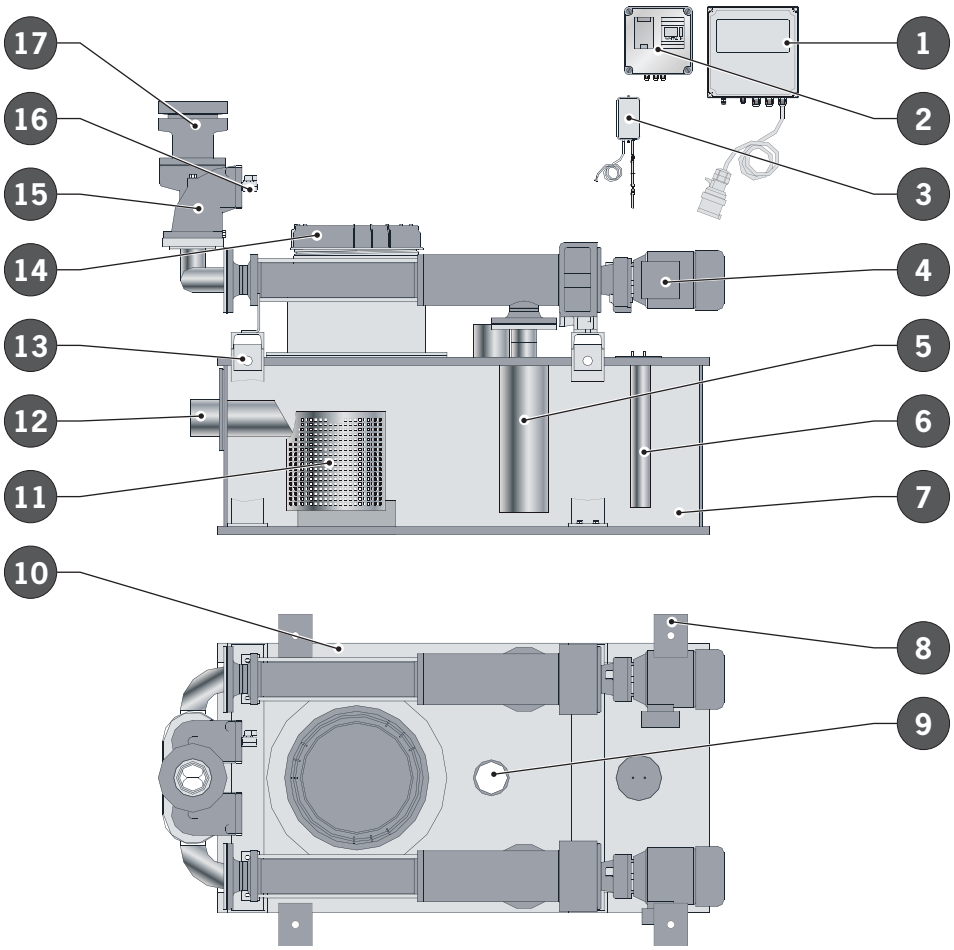
General
■ Low-turbulence wastewater feed to grease separator plant thanks to displacement pumps
■ Compact shape
■ Low energy consumption
■ Safe level control thanks to application of an air bubble injection
■ Suitable for greasy wastewater
■ Types as per inlet performance: 2 l/s, 4 l/s, 7 l/s and 10 l/s
■ Useable volume up to 250 l (type 2 – 7), up to 350 l (type 10)
■ Inlet heights 350 mm (type 2 + 4), 375 mm (type 7), 450 mm (type 10)
■ The emission value at respective workplace is ≤ 70 dB (A). Here, the drive and the pipeline are not included
Polyethlene collecting container
■ 1x revision opening for easy maintenance (350 mm clear width) with odourproof screw cap
■ Fixation kit for buoyancy-safe anchoring
■ Sieve insert downstream inlet
■ 1x horizontal inlet socket DN 100, Ø110 mm (type 2 + 4), DN 150, Ø160 mm (type 7 + 10)
■ 2x horizontal dummy flange DN 100 (type 2 + 4), DN 150 (type 7 + 10), useable as optional inlets
■ 1x vertical socket DN 100 (ventilation)
2x eccentric spiral pump
■ Gear motor 400 V, 50 Hz, protection type IP 55
■ Integrated thermal monitoring
■ Integrated volume flow monitoring
■ 10 m connecting cable
Design of pressure line
■ Special backflow preventer with ball in housing, designed as Y-pipe
■ Special fastening element for flexible connection of pressure line DN 100 (pipe external dia. Ø108 – 114.3 mm), optional DN 80 (pipe external dia. Ø88 – 90 mm)
Level control
■ Pneumatic level switch with 10 m control line
■ Air bubble injection by means of mini compressor
Control
■ Protection type IP 54
■ 1.5 m cable and CEE plug (32 A)
■ Potential-free collective fault and operating signal
■ Soft start with type 10

Table 7: Control features

Characteristics
■ LCD clear text display
■ Manual – 0 – Auto functions
■ Acknowledgement buttons
■ Compulsive switch-on of pumps (24 h)
■ Internal audible alarm
■ Flood alarm potential-free
■ Operating hours counter
■ High immunity
■ Level determination by internal pressure transformer
■ Connection to control systems via digital and analog inputs and outputs
■ All settings and fault signals persist even after mains failure
■ Control of rotating field failure and phases failure
■ When operated manually, the pumps switch off after 2 min. run time automatically
■ Thermal and electric monitoring of pumps
■ Pump switch-off via stop point and after-run time
■ Electronic monitoring of motor current
■ Collective fault signal potential-free and potentially bound
■ Storage „number of pump starts"
■ Integrated amperemeter
■ Automatic pump change
■ Easy operation
■ Service mode
■ Battery-buffered, mains-independent alarm (app. 7 h) by integrated 9 V battery, sound volume of hooter max. app. 85 dB

4.3 Components

The following illustration shows design and position of single plant components. Descriptions of the following chapters can be easily assigned.

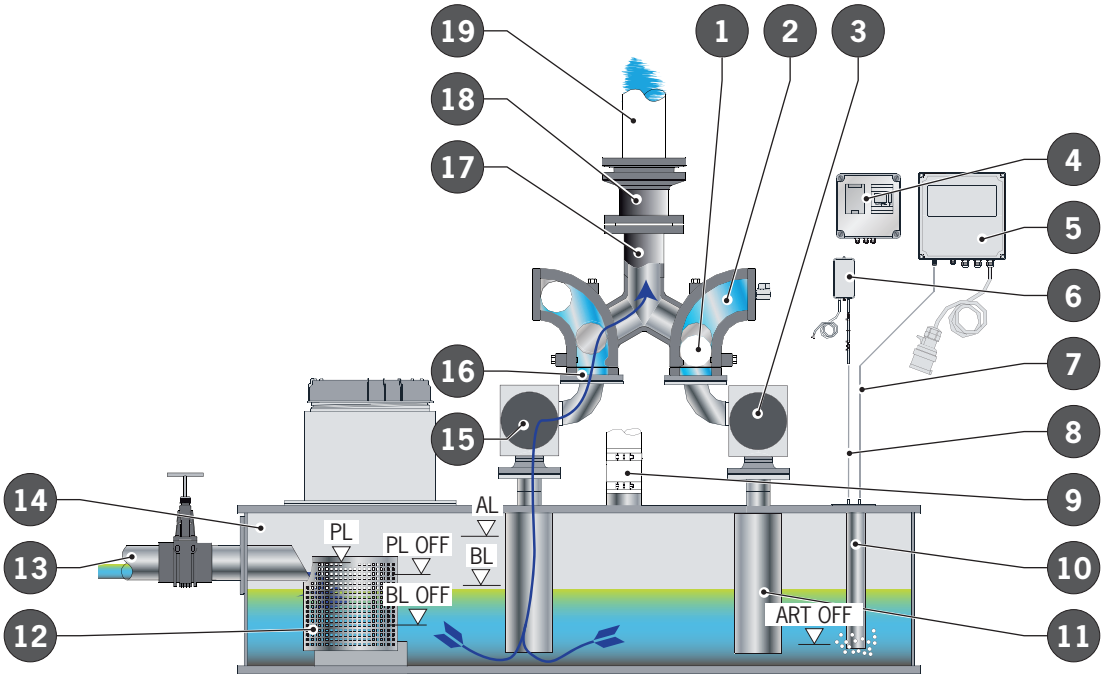


1 = Control ready to plug in with CEE plug 32 A and 1.5 m line	8 = Fixation kit for buoyancy safeguard	14 = Revision opening with odourproof screw cap
2 = Switchgear	9 = Socket DN 100/ ventilation	15 = Y-pipe with integrated twin backflow preventer
3 = Air bubble injection (mini compressor)	10 = Dummy flange (both sides), inlet socket (optional)	16 = Drain valve
4 = Eccentric spiral pump	11 = Sieve insert (coarse trap)	17 = Special fastening element for flexible connection of pressure line DN 100 (optionally DN 80)
5 = Suction immersion pipe	12 = Inlet socket DN 100 or 150	
6 = Pitot tube	13 = Suspensions	
7 = Collecting container		

Fig. 1: Illustration of components

4.4 Functional principle

This chapter holds information on the function of the plant.



1 = Backflow ball	9 = Container ventilation	18 = Special fastening element
2 = Head space Y-pipe	10 = Pitot tube	19 = Pressure line
3 = Eccentric spiral pump 1	11 = Suction immersion pipe	
4 = Switchgear	12 = Sieve insert (coarse trap)	
5 = Control	13 = Inlet	
6 = Mini compressor	14 = Collecting container	
7 = Control line for level measuring	15 = Eccentric spiral pump 2	
8 = Line for mini compressor	16 = Valve seat	
	17 = Y-pipe	

Fig. 2: Schematic illustration of functional principle

Mode of operation:

Via one (or several) inlets (13), the wastewater flows into the collecting container (14). A sieve insert (12), arranged directly downstream the inlet, retains accumulating coarse media, before the wastewater is distributed in the collecting container (14). The wastewater level in the collecting container (14) is displayed at the control (5). If the wastewater reaches a given level, the eccentric spiral pumps (3, 15) switch on automatically or the "flood alarm" is triggered off.

The level control works as follows:
Via a control line (7), a pitot tube (10) mounted in the collecting container (14) is connected to the control (5). If the wastewater rises, the air in the pitot tube (10) is compressed. At a predefined pressure, the eccentric spiral pumps (3, 15) are switched on and off.

The container ventilation (9) and the permanent rise of the control line (7) are of utmost importance for the proper function of the automatic level control.

If wastewater reaches the "BL level", the pump (3) or (15) switches on and the wastewater is pumped into the grease separator via the pressure line (19) and the inlet line of the grease separator plant. The wastewater flows through relevant part of the Y-pipe (17), displaces the backflow ball (1) in the head space (2) and flows into the pressure line (19) through the released valve seat (16) and the special fastening element (18). If the eccentric spiral pumps do not operate, the balls (1) seat in the valve seats (16) and close the passageway into the pressure line (19) in the Y-pipe (17). Contents of pressure line (19) cannot flow back or empty into the collecting container (14).

If wastewater continues sinking to the "BL OFF" level, the preset after-run time of eccentric spiral pump is activated and the eccentric spiral pump is switched off at "ART OFF" level. Both eccentric spiral pumps (3) and (15) work alternately, i. e. after each restart, an automatic change of start-up sequence of eccentric spiral pump (3) and (15) is carried out.

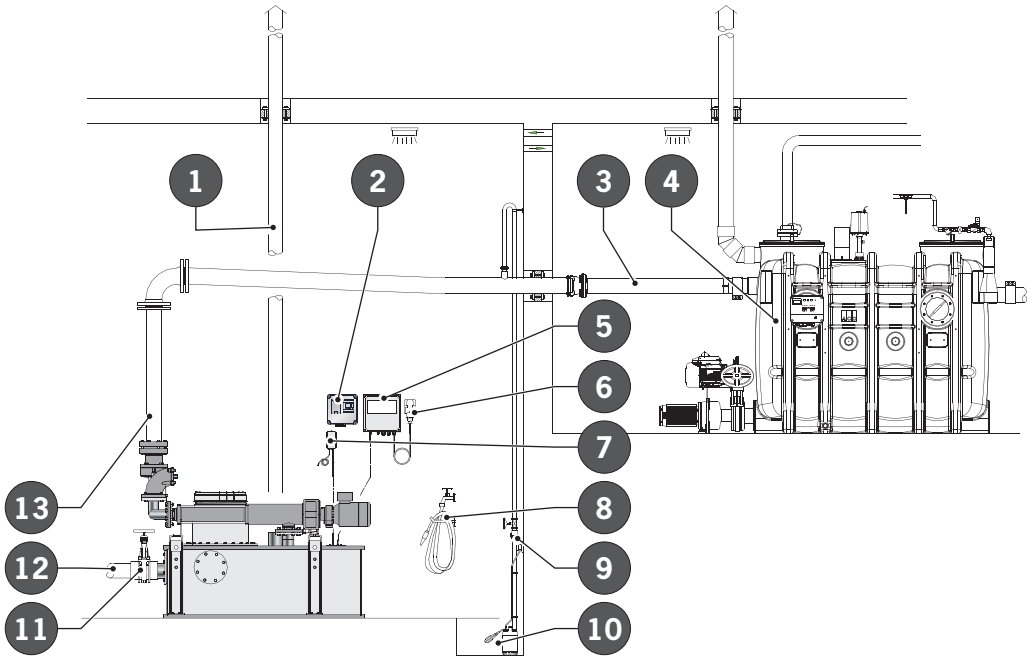
In the case of failure of first eccentric spiral pump (3 or 15), heavier wastewater incidence or reaching the "PL" level, the second eccentric spiral pump (15 or 3) switches on additionally and switches off automatically with "PL OFF" level. When reaching the "AL" level, the "flood alarm" is triggered off.

The useable volume of the collecting container (14) is made up of the contents between both switching points "ART OFF and PL". The automatic level control is preset to the relevant switching points by the manufacturer, however, for an ideal operation it should be adapted to the individual operating conditions, 📖 chapter 7.2.3.

Operation of mini compressor:
A mini compressor (6) generates compressed air continuously and releases same in the pitot tube (10) via a line (8). When leaving the pitot tube (10), the compressed air "bubbles" freely in the wastewater of the collecting container (14), thus reducing blockage of pitot tube (10) and rendering the level control even safer. Thanks to this process, the measured value fluctuations are kept very low.

4.5 Recommendations for installation

The following illustration depicts a possible installation situation of the plant.



1 = Ventilation line*	6 = CEE power socket*	11 = Inlet slide (optional)*
2 = Switchgear	7 = Air bubble injection	12 = Inlet line*
3 = Inlet line of grease separator*	8 = Fresh water connection*	13 = Pressure line*
4 = Grease separator*	9 = Gate valve (optional)*	* Local prerequisites
5 = Control	10 = Pump sump/immersion pump*	

Fig. 3: Suggested installation

4.6 Type plates

A type plate is fixed to the collecting container of the plant and to the electric motor of the eccentric spiral pumps. The following data can be taken from the plate to have them ready for information and enquiries of any kind.

- Design type
- Motor type
- Year of construction
- Article no.
- Serial no.

4.7 Accessories

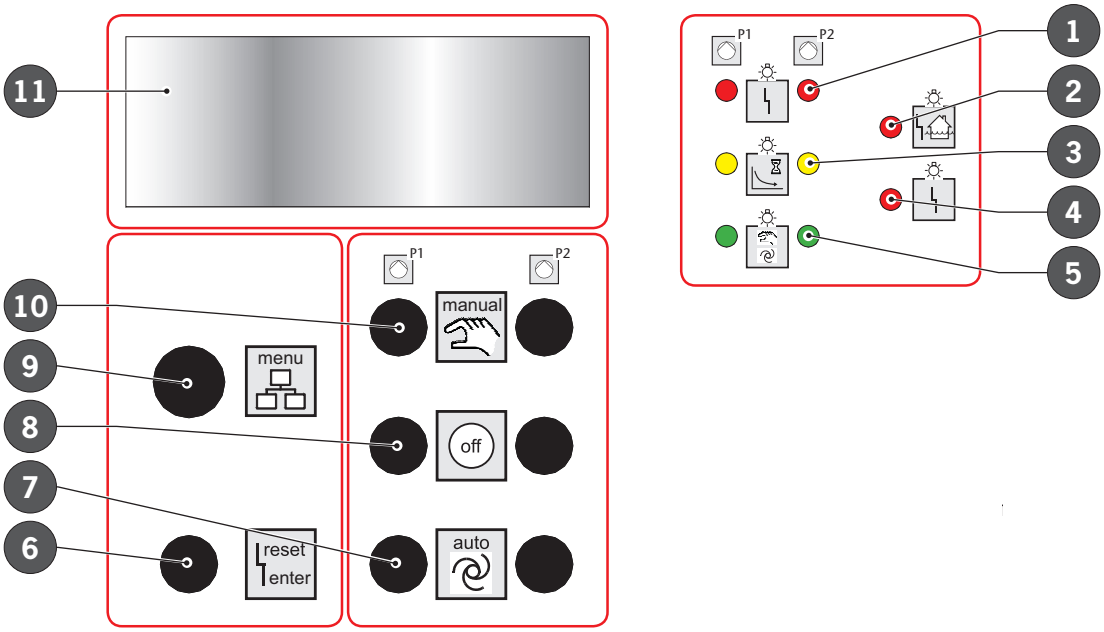
Information on suitable accessories, product catalogue 🕮 www.aco-haustechnik.de.

4.8 Control

In this chapter, the control is explained.

4.8.1 Survey on control elements and display elements

The following illustration shows control design and position of single control and display elements. Descriptions of the following chapters can be easily assigned.



1 = LED: Fault pump 1 or 2	6 = Push button: Acknowledgement of fault and setting of values	9 = Control knob: Display/ menu selection
2 = LED: Flood alarm	7 = Push button: Automatic operation P1 or P2	10 = Push button: Manual operation P1 or P2
3 = LED: Operation pump 1 or 2	8 = Push button: Off P1 or P2	11 = Display panel
4 = LED: General fault		
5 = LED: Operating mode P1 or P2		

Fig. 4: Operation of control

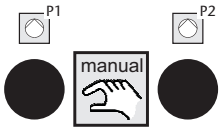
4.8.2 Operating elements

Operating elements and their meaning:

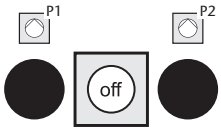
- Querying menu settings
  By means of the control knob, all parameters (fault signals, operating hours, number of pump starts and motor current) can be queried and all settings can be carried out. Display automatically returns to basic position after 20 sec.

- Acknowledging faults (acknowledge and set back fault signals) and changing settings
  By means of this push button, all faults (overcurrent, P1 or P2 without load and thermal fault 2) are acknowledged after clearance and all settings are changed. If a fault furthermore persists, only the collective fault indicator relay and the alarm sound are switched off. This also applies to the thermal fault 1 and the "flood alarm".

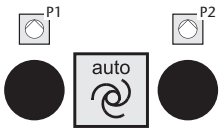
- Switching on manual operation
  By means of these buttons, the pump P1 or P2 are operated manually. Here, an automatic switching-off is carried out after 2 min.



- Switching off pumps
  By means of these buttons, the pump P1 or P2 are switched off.



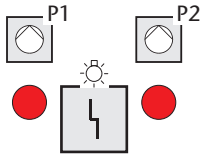
- Switching on automatic operation
  By means of these buttons, the automatic operation of pump P1 or P2 is switched on. The pump is switched automatically via the "level control".



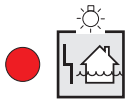
4.8.3 Display elements

Display elements and their meaning:

- Fault pump P1 or P2
  In the case of fault of pump P1 or P2: LED lights up.

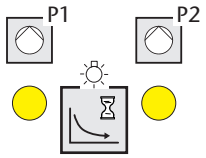


- Collecting container is full
  If the collecting container is full = "flood alarm": LED lights up.

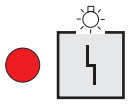


- Readiness for operation
  If the pump P1 or P2 is in operation: LED lights permanently.

  If the pump P1 or P2 is operated via the after-run function: LED flashes.



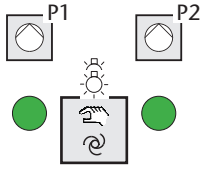
- Collective fault
  If a collective fault signal persists (e. g. incorrect rotating field): LED lights up.



- Operating mode of pumps
  If the pump P1 or P2 is switched automatically via the "level control" in automatic operation: LED lights permanently.

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

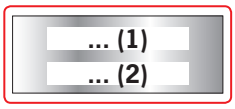
  If plants switches off automatically after 2 min. in manual operation: LED flashes irregularly.



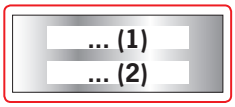
4.8.4 Signals in the display

Meanings of signals in the display panel:

- Signals in the top line (1)
  - Water level in the collecting container (if no pump is in operation)
  - Motor current (if pump is in operation or changing value display if both pumps operate)
  - Setting option (in the setting mode)



- Displays in the bottom line (2)
  - Operating hours of pumps (if the pumps are not requested)
  - Faults occurred (alternating)
  - Modifiable value (in the setting mode)



4.8.5 Control settings

The settings at the display panel can only be changed in the service mode. If the service mode is not activated, the settings are displayed, however they are not saved.

- After 20 seconds, display changes automatically to base position again.
- Operating hours and pump starts can be queried, but not changed

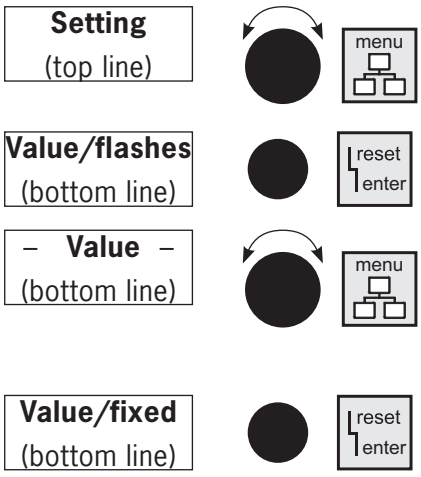
Changing the setting:

→ Turn control knob "menu" (right/left), until required parameter is displayed, 📖 chapter 4.8.7.

→ Press push button "reset/enter" (the last stored value starts flashing).

→ Turn control dial "menu" until setting value is reached (quick turning causes a bigger value change, slow turning allows for a fine tuning).

→ Press push button "reset/enter" (value stops flashing and is stored).



4.8.6 Setting values when supplied

Prior to delivery, the plant is checked and a test run carried out. The setting values are adjusted or set to the **types**.

CAUTION

- The menu points ▭ may only be altered when agreed upon with ACO Service
- The values for the ▭ menu points must be checked and adjusted, if required, during the test run, chapter 7.2.3

Table 8: Setting values

	Setting values					
Setting menu	Value				Unit	Value, chapter...
Type	2	4	7	10		
Base load ON (BL)	22	22	21	30	cm	4.8.7
Base load OFF (OFF)	5	5	5	5	cm	4.8.7
Peak load ON (PL)	27	27	29	38	cm	4.8.7
Peak load OFF (OFF)	24	24	23	32	cm	4.8.7
Flood alarm (AL)	32	32	37	45	cm	4.8.7
Run time, max.	0	0	0	0	min.	4.8.5
Run time change	2	2	2	2	min.	4.8.5
After-run time	9	5	3	3	Sek.	7.2.3
Current, max. P1 + P2	3.64	3.64	8.30	8.30	A	5.1
Thermal monitoring	is activated				-	4.8.5
24 h switching-on	is activated				-	4.8.5
Audible alarm	is activated				-	4.8.5
Interval alarm	is switched off				-	4.8.5
Pump change	is activated				-	4.8.5
Sense of rotation fault	is activated				-	4.8.5
Service mode	is switched off				-	4.8.5
Language	German				-	4.8.5
Switching points	Proper values				-	4.8.7
Next maintenance	Predefined 90 days				-	8.3

4.8.7 Setting options

The following table shows various settings in the setting menu.

Table 9: Setting menu

Top line	Bottom line	Explanation
Setting	Setting range	Top and bottom line
Base load ON	0 – 200 (500) cm	Switching point of first pump.
Base load OFF	0 – 200 (500) cm	Release operating point of first pump.
Peak load ON	0 – 200 (500) cm	Switching point of second pump.
Peak load OFF	0 – 200 (500) cm	Release operating point of second pump.
Flood	0 – 200 (500) cm	When exceeding the set value, the "collective fault" relay and the "flood relay" switch.
Max. running time	0 – 60 min.	The zero value deactivates this function. If a value of 1 – 60 min. is set, switching off is carried out if pump operates longer than value set. The pump restarts only after fault was acknowledged.
Running time -change	Is switched off 1 – 60 min	When exceeding the set time in base operation, a pump change takes place. After a triple change without interruption, the "flood alarm" is triggered off additionally and the signal "run time alarm" is displayed.
After-run	0 – 180 sec.	After under-running the release operating point, the base load pump continues to run until set time has expired.
Thermal monitoring	Is switched off, is activated	Is activated = in case of a fault, the internal warning sounds.
Max. current – 1 Max. current – 2	0.3 – 12.0 A	If pump 1 or 2 exceed the preset current consumption for a certain time, it is switched off. Message P1 or P2: overcurrent is displayed. Only after operating the push button (7), the pump is cleared.
24 h switching-on	Is switched off, is activated	Is activated = If the pumps are not requested for 24 hours, they operate automatically for 5 sec.
Audible alarm	Is switched off, is activated	Is activated = In case of a fault, the internal warning tone sounds.
Interval alarm	Is switched off, is activated	Is activated = The collective fault relay switches on.
Pump change	Is switched off, is activated	Is activated = After every operation of base load pump, a change to the other pump takes place.
Rotating field fault	Is switched off, is activated	Is activated = In the case of incorrect phase sequence or missing of L2 or L3, the "flood alarm" is triggered off and the pumps cannot be operated.
Service mode	Is switched off, is activated	Is activated = All settings can be altered. Is switched off = settings are displayed, however cannot be altered.
Language	German – English – French – ...	The national language in the display panel is selectable.
Switching points	Proper values	The switching points refer to the types 2, 4, 7 and 10 or to adjusted settings.
Next maintenance	Is now due Due since Still days	Maintenance is due.

Survey of the setting menus:

- Block peak load operation
  In order to use the pumps in alternating operation only, the switching point for the peak load operation must be set to zero. The message "Peak load On is switched off" is displayed.

- Setting of min. level settings
  - If a value below 5 cm is chosen as switching point, 5 cm are saved automatically.
  - If a value below 3 cm is chosen as release operating point, 3 cm are saved automatically.

- Setting of max. run time
  A max. run time can be set for the base load pump. After time has elapsed, a pump change takes place, on the proviso that both pumps are in automatic operation. After triple change without interruption, an alarm is triggered off additionally and the message "run time alarm" is displayed.

- Setting of run time monitoring
  The run time monitoring applies to automatic and manual operation. The menu point "max. run time" can be called up. When supplied, value is set to zero, i. e. function is switched off. If a value of 1 – 60 minutes is set, pump is switched off if pump operates longer than set value without interruption. Furthermore, an alarm is triggered off and a fault signal is displayed. The pump only operates again if fault was acknowledged.

- Setting of run time change and run time monitoring
  It is sensible to activate one of both functions only. If a time is set with both functions, only the function with the lower time setting is carried out.

- Setting of after-run time
  The after-run allows for pumping down below the pitot tube.

- Reading of error memory
  Even in case of a mains failure, the last fault occurred remains stored and can be called up in the menu under "last fault". The fault signal can be erased from the memory by means of the push button "reset/enter".

- Setting the current limiting
  - Pump 1 (P1): max. current – 1
  - Pump 2 (P2): max. current – 2

These settings consider an increased starting current.

- Setting of thermal fault
  - Pump 1 (P1): Thermal fault – 1
  - Pump 2 (P2): Thermal fault – 2

Temperature monitoring via bimetal contact per pump.

- Signal of rotating field fault
  The rotating field monitoring monitors the phase sequence and also signals the lack of a phase. In case of a phase error, the pumps do not switch on, an alarm is triggered off and the message "rotating field error" is displayed. The rotating field monitoring can be activated and switched off via the menu. When operating 1 ~ motors, the rotating field monitoring must be switched off.

- Service mode
  When supplied, the service mode is switched on (activated), i. e. all settings can be changed. If the service mode is switched off (deactivated) in the menu, the settings can only be queried with the with the control knob, but not changed. This does not apply to the national language settings.

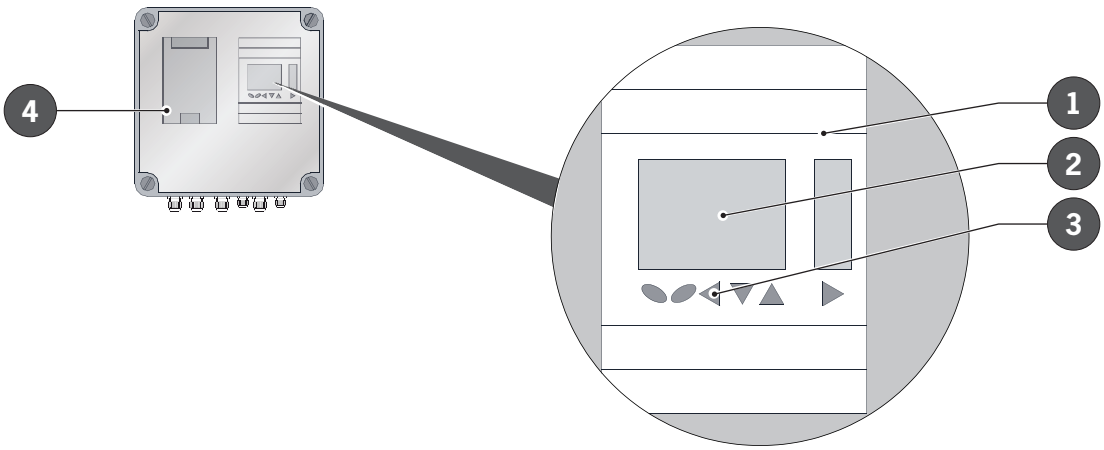
- Setting the national language
  The following languages can be chosen: German / English / French / Italian / Spanish / Dutch / Polish / Czech / Portuguese.

4.9 Switchgear

In this chapter, the switchgear is explained. The switchgear processes faults at the pumps (current or thermal fault signal) and transfers them to the control for additional display.

4.9.1 Survey of operating and display elements

The following illustration depicts the switchgear design and the position of the individual operating and display elements, thus enabling a clear assignment of descriptions in the following chapters.



1 = PLC (programmable logic control)	3 = Push button: ESC (Escape)	4 = Switchgear
2 = Display panel		

Fig. 5: Operation of switchgear

4.9.2 Operating elements

Operating elements and their meaning:

The user must operate only the operating elements described in the following:

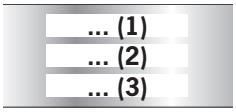
- Acknowledge faults (acknowledge and set back fault signals)
  By means of this button (3),the fault signals of the flow detector are acknowledged after having remedied the cause.

4.9.3 Display elements

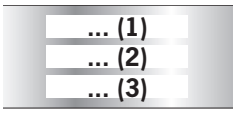
Meanings of signals in the display field:

The user must only process the signals described in the following.

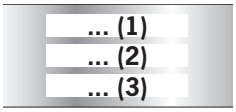
- Signals in the top line (1)
  - Fault pump 1 or 2



- Signals in the centre line (2)
  - Cause: Flow detector pump 1 or 2
  - Cause: Thermal monitoring pump 1 or 2



- Signals in the bottom line (3)
  - Acknowledgement: Fault of flow detector pump 1 or 2, „Reset via ESC"



4.10 Switching points of level control

The following illustration shows the switching points of variants (type 2 + 4, 7 and 10) and relevant values are shown in table.

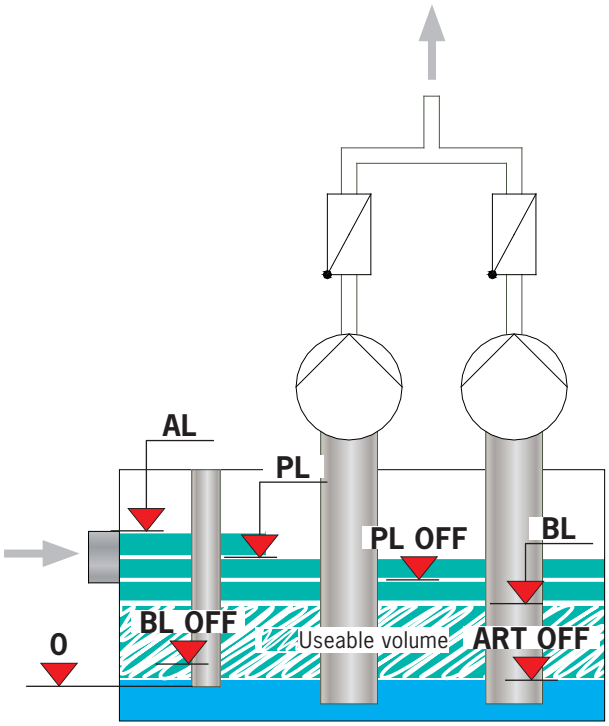


Fig. 6: Schematic illustration of level control

Table 10:Switching points

	Switching points related to „0" level (lower edge of pitot tube)						Useable volume
Type	ART OFF [cm]	BL OFF [cm]	BL [cm]	PL OFF [cm]	PL [cm]	AL [cm]	[l]
2 + 4	app. 3	5	21	24	27	32	170
7	app. 3	5	21	23	29	37	200
10	app. 3	5	30	32	38	45	340

5 Technical data

This chapter holds information on technical data of plant and control.

5.1 Technical plant data

The following tables comprise technical plant data.

Table 11:Technical plant data

	Max. delivery perform.	Motor output per pump	Current consump-tion	Useable volume	Total volume	Weight	
Type						Empty	Filled
	[l/s]	[kW]	[A]	[l]	[l]	[kg]	[kg]
2	2	1.5	3.64	225	475	410	870
4	4	1.5	3.64	225	475	410	870
7	7	4.0	8.30	270	575	480	1020
10	10	4.0	8.30	420	695	680	1400

The following table and illustration depicts dimensions and connecting values of plant

Table 12:Plant dimensions

	DN	Dimensions											
Type		A	B	C	D	E	F	G	H	I	J	K	L
		[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]
2	100	535	635	930	820	45	1500	1720	1310	350	110	375	1580
4	100	535	635	930	820	45	1500	1720	1310	350	110	375	1580
7	150	535	635	930	820	0	1800	1990	1320	375	160	375	1880
10	150	610	710	1010	940	240	1800	2250	1450	450	160	450	1880

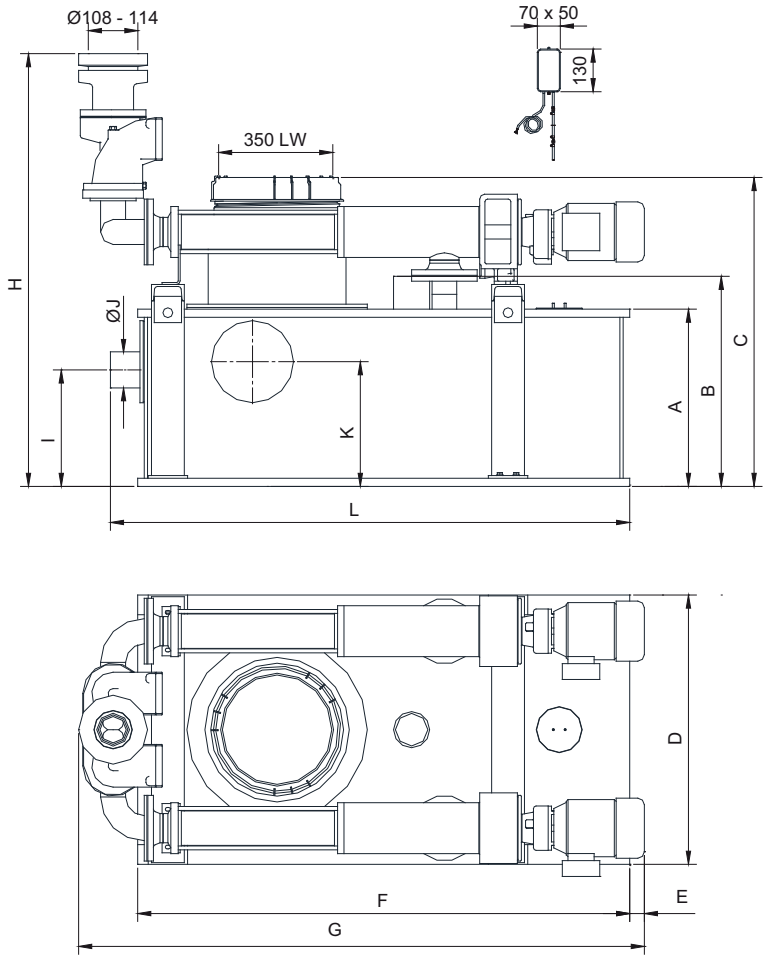


Fig. 7: Plant dimensions

5.2 Technical data of control

This chapter holds information on technical data of control

5.2.1 Specifications and dimensions

The following table contains technical data of control

Table 13:Technical data of control

Specifications	Values
Operating voltage	3 ~ 400 V (L1, L2, L3, N, PE)
Frequency	50/60 Hz
Control voltage	230 V/AC/50 Hz
Current consumption (contactors activated)	< 20 VA
Max. connecting performance	P2 < 5.5 kW
Range of electrical motor current limitation	0,3 – 12 A
Alarm contact potential-free	3 A
Housing	Polycarbonate
Protection type	IP 54
Temperature range	- 20 °C to + 60 °C
Fuse	5 x 20 1AT (alarm output)
Mains-independent alarm	Battery 9 V/200 mAh, app. 7 h, loudness 85 dB

The following illustration depicts dimensions of control and switchgear.

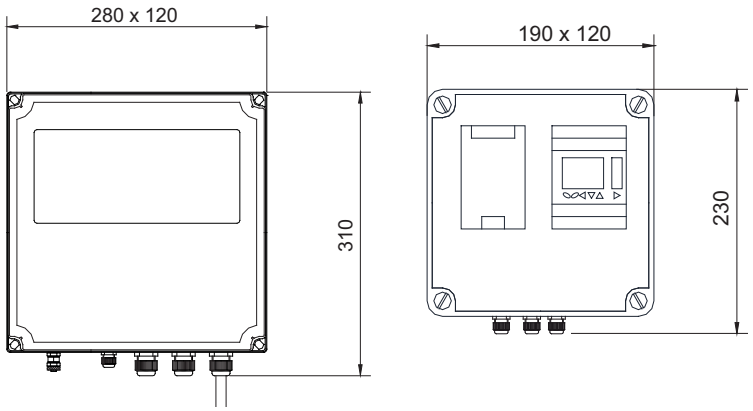


Fig. 8: Dimensions of control and switchgear

5.2.2 Wiring diagram of control and switchgear

The following illustration depicts the reduced wiring diagram of the control. The original size wiring diagrams are attached to the operating manual and can be requested from ACO service in case of loss, chapter 1.1.

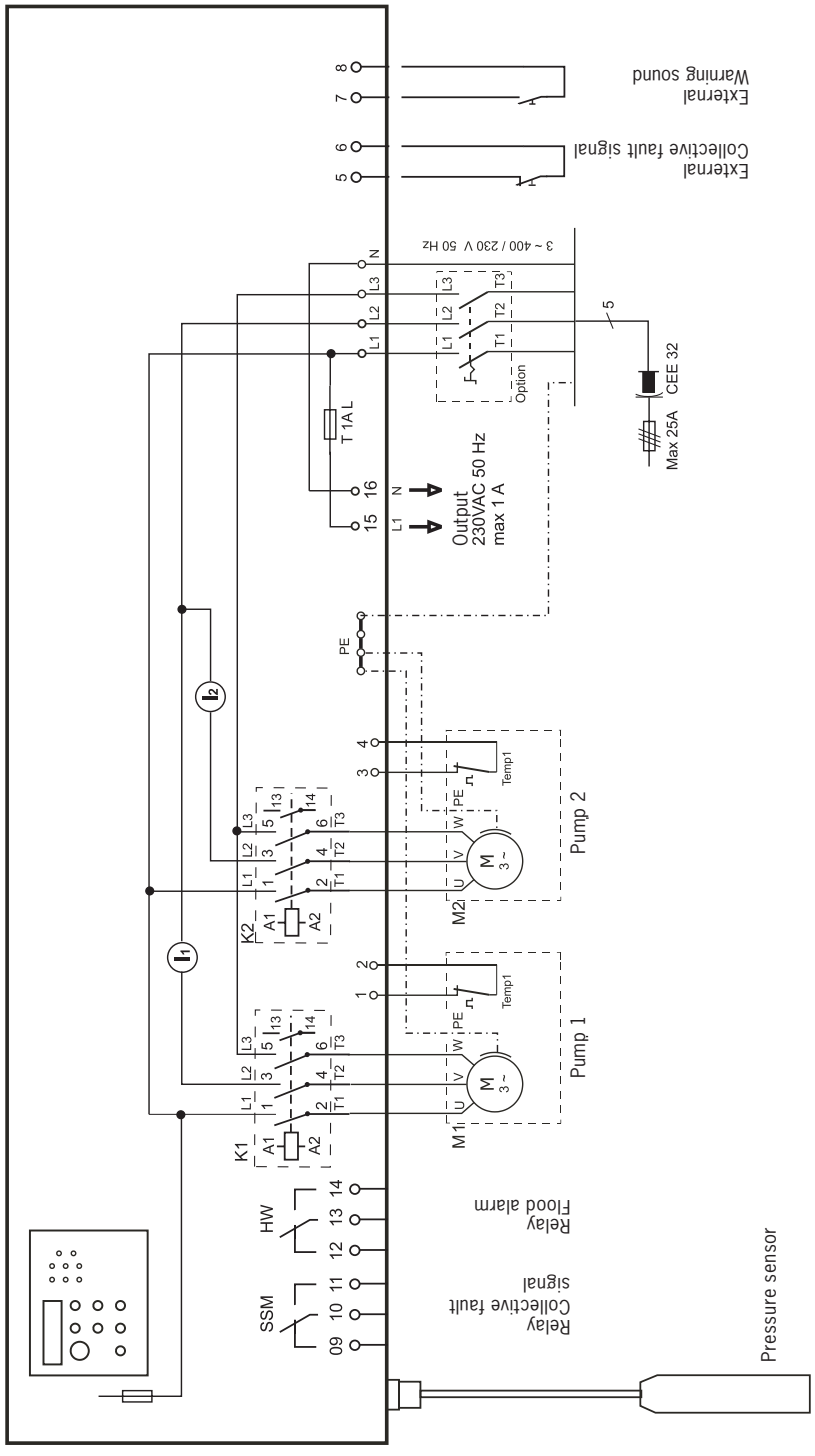


Fig. 9: Wiring diagram of control

6 Installation

This chapter holds information on plant installation.
The following table surveys the prerequisites (tools, parts, installation material) for the installation:

Table 14:Prerequisites for the installation

Tools, parts, installation material		
■ Pencil ■ CEE power socket 32 A ■ Cutter ■ Torque key SW 19, 24 ■ Insertion chuck ■ File ■ Hammer ■ Cable stripping knife	■ Line: 2-wire/0.75 mm² ■ Wrench SW 14, 19, 24 ■ Delay fuses 25 A ■ Pipe wrench ■ Pipe clamps ■ Saw ■ Impact drilling machine with rock drill Ø12 mm ■ Lubricating grease	■ Bolts and dowels ■ Screwdriver (flat-headed and crosstip) ■ Side cutter ■ Vacuum cleaner ■ Drift recorder (water level) ■ Measuring tape

The planner is responsible for the pipeline system design.

6.1 Safety during installation

During installation works, the following hazards may occur:

WARNING

Please read the following safety indications thoroughly prior to installation. In the case of non-observance, severe injuries may occur.
Make sure the staff members have required qualification, chapter 2.2..

Mechanical hazards

Severe crushes if assembly groups (e. g. special fastening element, pipe elements) fall down - especially in the case of overhead assembly!

- Wear personal protective equipment, chapter 2.3.
- In case of overhead assembly, works should be carried out by at least 2 persons.

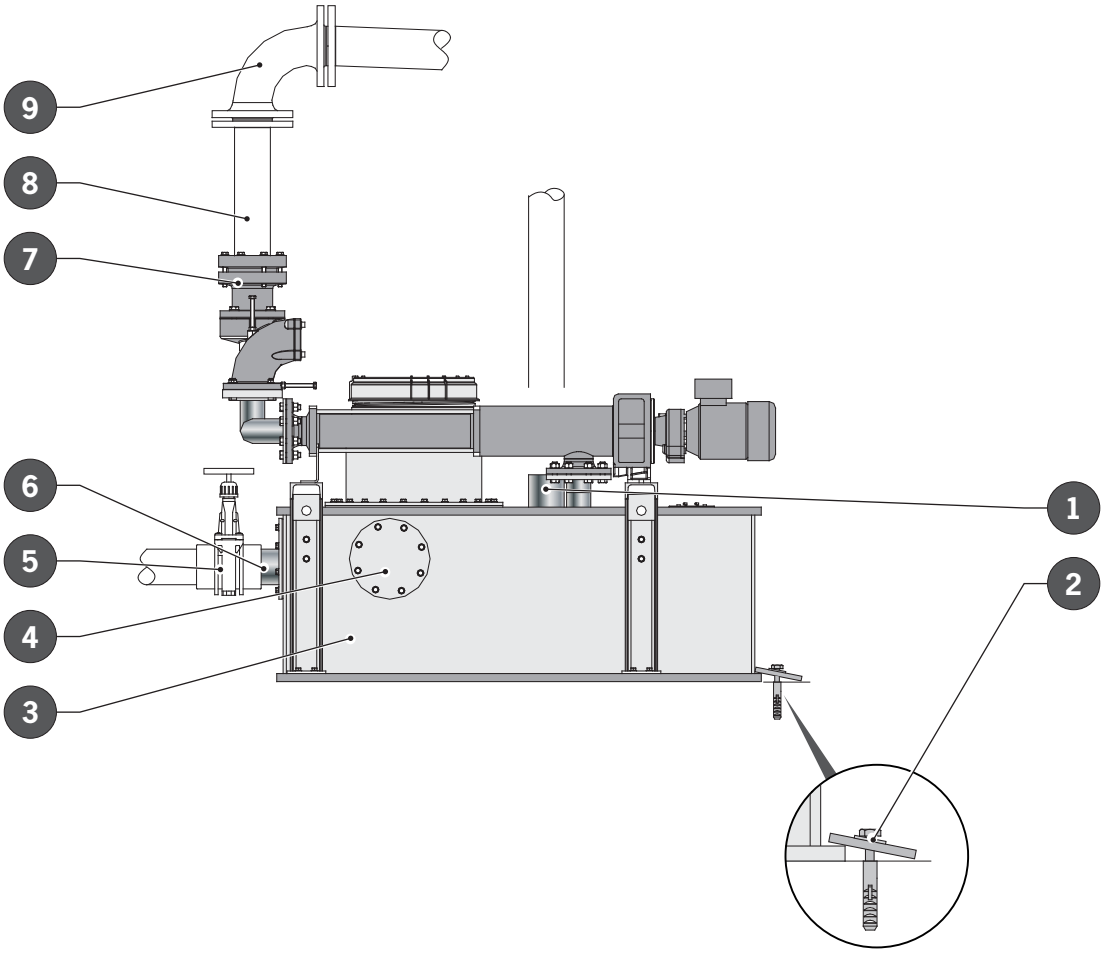
Electrical hazards

Severe injuries or death possible in case of contact with energised components

- Have pumps, mini compressor and control connected by an electrician
- Never carry out alterations

6.2 Sanitary installation

The following illustration surveys the installation works and the local prerequisites which are described in more detail in the following chapter. Observe recommendations for pipeline systems, chapter 6.2.11.



1 = Connect ventilation line*, chapter 6.2.5	5 = Install inlet slide*, chapter 6.2.2	10 = Laying of pipelines (general), chapter 6.2.8
2 = Mount fixation kit (buoyancy safeguard), chapter 6.2.10	6 = Connect inlet line*, chapter 6.2.3	* Local prerequisites
3 = Align collecting container, chapter 6.2.1	7 = Mount special fastening element, chapter 6.2.7	
4 = Mount connecting socket (optional)*, chapter 6.2.4	8 = Connect pressure line*, chapter 6.2.9	
	9 = Carry out pressure line*, chapter 6.2.6	

Fig. 10: Installation works

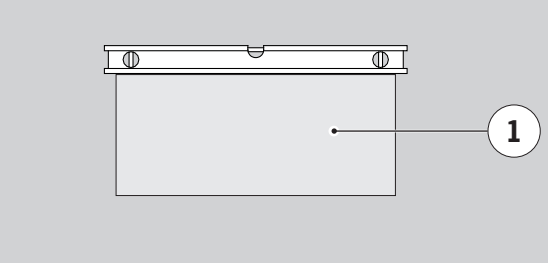
6.2.1 Align collecting container

The room sizes for the plant must be such that besides and above all components to be operated and maintained a free working space of at least 600 mm is available.

Prerequisite:

- Water level
- Measuring tape

→ Align collecting container (1) horizontally at installation location.



6.2.2 Install inlet slide

Ideally, a gate valve should be installed in the inlet line (inflow side of plant). Such valve in nominal widths DN 100 or 150 can be purchased from ACO, chapter 4.7.

Prerequisites:

- Lubricating grease
- Gate valve

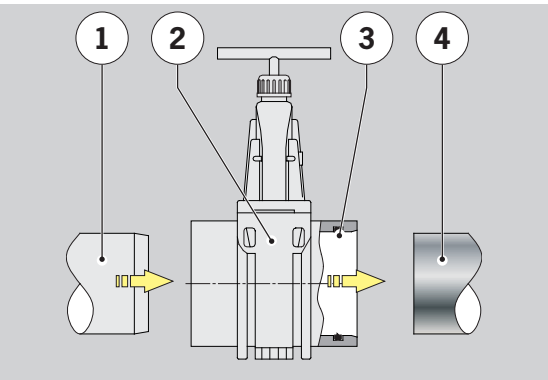
→ Grease spigot end (4) of inlet socket of plant.

→ Grease lip seals (3) of gate valve (2).

→ Grease spigot end (1) of inlet line.

→ Slide gate valve (2) onto spigot end (4) of inlet socket of plant.

→ Slide spigot end (1) of inlet line in gate valve (2).

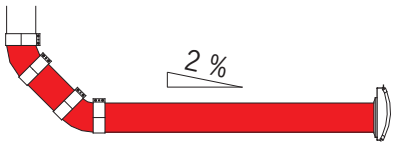


6.2.3 Connect inlet line

A pipe socket marked „Inlet" (2) DN 100 or 150, 🕮 chapter 4.3/component no. 12, is available at the face side of the collecting container (3). The external diameters are: 110 mm or 160 mm.

CAUTION

- Cable cross-section may not be reduced in flow direction
- In order to avoid grease deposits, inlet lines of grease separator plants must have an incline of at least 2 % (1 : 50). If this is not possible for structural and operational reasons, measures must be taken to avoid such grease deposits.
- The transition from downpipes to horizontal lines must be carried out by means of two 45° pipe bends and a min. 250 mm long intermediate section or by an equal pipe bend with big radius

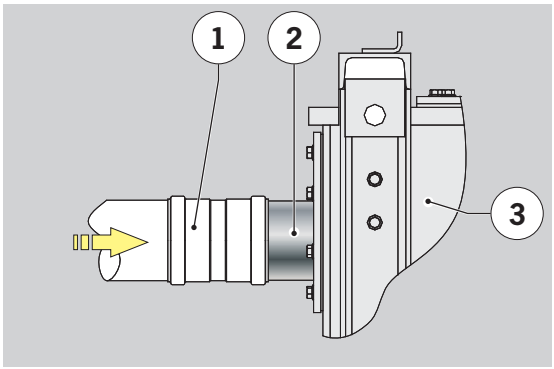


- Then, a stabilising path must be allowed for in flow direction, the length of which must correspond to at least 10 x DN of the separator inlet (example: DN 100 = 1 m, DN 150 = 1.50 m)

Prerequisite:

- Pipeline DN 100 or 150

→ Connect inlet line (1) to pipe socket (2) (pipe connector, sliding sleeve etc.).



6.2.4 Mount connecting socket

Max. 2 further inlet lines can be connected to the plant. To do so, the lateral dummy flanges, chapter 4.3/component no. 10, must be disassembled and the connecting sockets to be fitted. Connecting sockets are available from ACO, chapter 4.7.

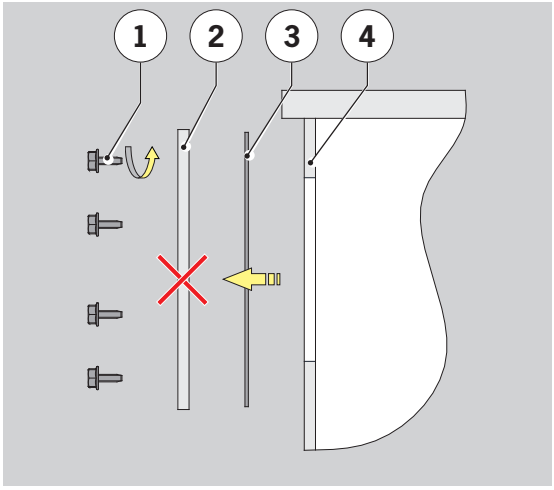
Prerequisites:

- Wrench SW 14
- Connecting socket

→ Remove ejot bolts (1).

→ Take off dummy flange (2), dispose of or keep for re-use.

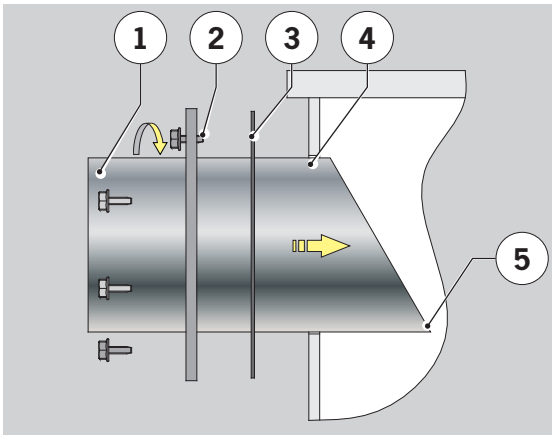
→ Leave flat sealing (3), if it is still attached to the housing.



→ Slide flat sealing (3) over the inclined spigot end of the connecting socket (1), if it is no longer attached to the housing.

→ Slide connecting socket (1) with the sealing (3) through the hole (4) in the lateral wall of the collecting container. Summit (5) must be at lowest place.

→ Fix connecting socket (1) to the housing wall of the collecting container by means of the ejot bolts (2).



6.2.5 Connect ventilation line

A socket with nominal width DN 100, 🕮 chapter 4.3/component no. 8, is available at top of collecting container for connection of ventilation line.
The external diameter is 110 mm.

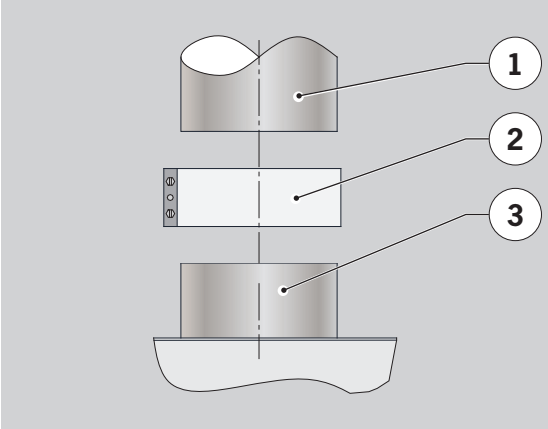
Prerequisite:

- Pipeline components

CAUTION

- Ventilation lines have to be taken above the roof top with equal section and permanently rising. The line may be taken to the main ventilation as well as to the secondary ventilation.

→ Connect ventilation line (1) to socket (3) by means of pipe connector (2) or sliding sleeve.



6.2.6 Carry out pressure line

In the following illustration, the pressure line (1) is illustrated schematically. The following listing holds information on the expert design.

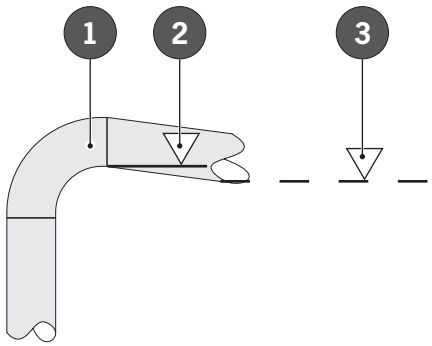


Fig. 11: Pressure line

CAUTION In order to guarantee the function of the plant, the invert (2) of the pressure line (1) must be taken over the "invert inlet grease separator" (3).

6.2.7 Mount special fastening element

Prerequisites:

- Wrench SW 19 and 24
- Torque key SW 19 and 24
- Insertion chuck
- Pipe wrench

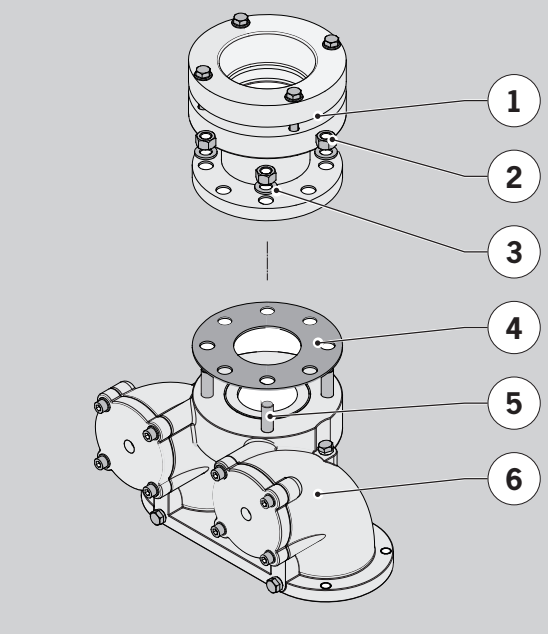
→ Screw in stud bolts M16 (5) with insertion chuck in the threaded holes of the connecting flange/double backflow preventer (6) (max. 10 N m).

→ Apply flat sealing (4) to the connecting flange of the double backflow preventer (6).

→ Lead special fastening element (1) with the flange bores over the stud bolts (5).

→ Lead discs (3) over the stud bolts.

→ Screw nuts M16 (2) on the stud bolts and tighten evenly across (max. 10 N m).



6.2.8 Recommendations for pipeline systems

This chapter contains recommendations for the expert laying of pipelines.

CAUTION In order to avoid damages and functional deficiency, the following information must be observed without fail:

- Lay pipelines with gradient (except for the pressure line).
- Drainage lines have to be connected to the plant without strain. No pipe forces and moments may act upon the plant. Expansions of pipes, caused by temperature, must be compensated for. Pipeline compensators between pump and pipelines are beneficial in this case.
- Absorb weight of lines (e. g. with pipe supports)
- In the case of longitudinal force-locked flexible connections, safeguard the line against loosening (e. g. pipe supports).
- Carry out lines in a frostproof manner

6.2.9 Connect pressure line

The special fastening element, 🕮 chapter 4.3/component no. 2; assembly 🕮 chapter 6.2.7, makes the flexible connection of the local pressure line DN 100 possible (pipe spigot end Ø108 – 114 mm).
When supplied, the sealing ring (4) plus flange ring (3) is applied to the special fastening element (5) and the bolts (1) are partly screwed in the threaded hole of the flange ring (3).

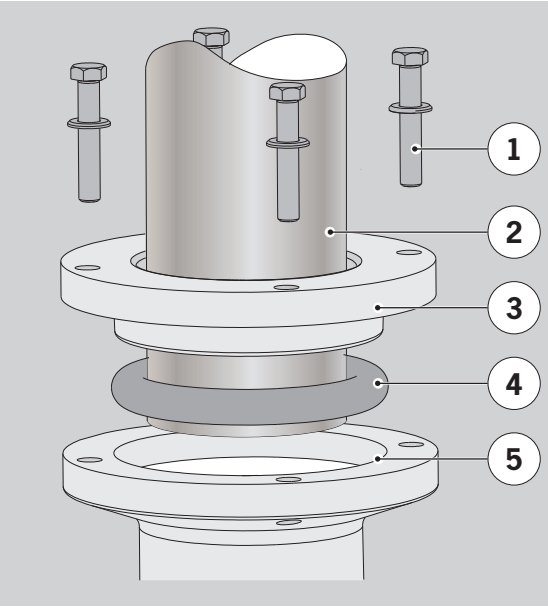
Prerequisites:

- Wrench SW 19
- Torque key SW 19

CAUTION In order to avoid damages and functional deficiency, the following information must be observed without fail:

- The pressure line must withstand at least 1.5x the respective pump pressure
- The pressure line must be laid permanently rising
- Never connect different lines to the pressure line
- Never connect plant pressure lines to wastewater downpipes
- Never connect vent valves in the pressure line

→ Push pipe (2) through the flange ring (3) and the sealing ring (4) and slide into the special fastening element (5) for app. 50 mm.
→ Tighten bolts M12 (1) evenly across (max. 15 N m).



Using a different sealing ring (4), 🕮 chapter 4.7, makes the connection of a pressure line DN 80 (pipe spigot end Ø88 – 90 mm) possible.

6.2.10 Mount fixation kit

Anchor aligned collecting container, chapter 6.2.1, to 4 spots in the floor by means of the supplied fixation kit.

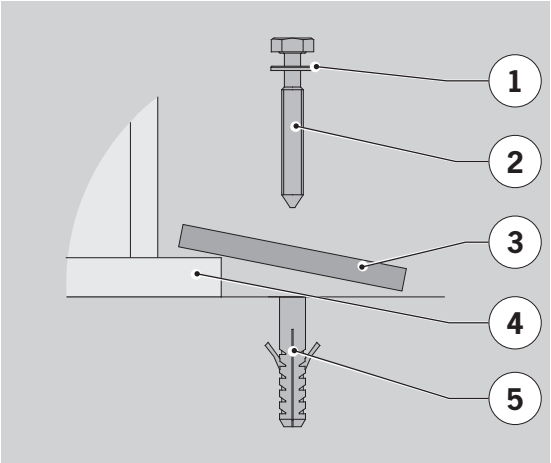
CAUTION In order to avoid damages and functional deficiency, the following information must be observed without fail:

- Wastewater plants must be installed protected against distortion
- Plants must be safeguarded against buoyancy

Prerequisites:

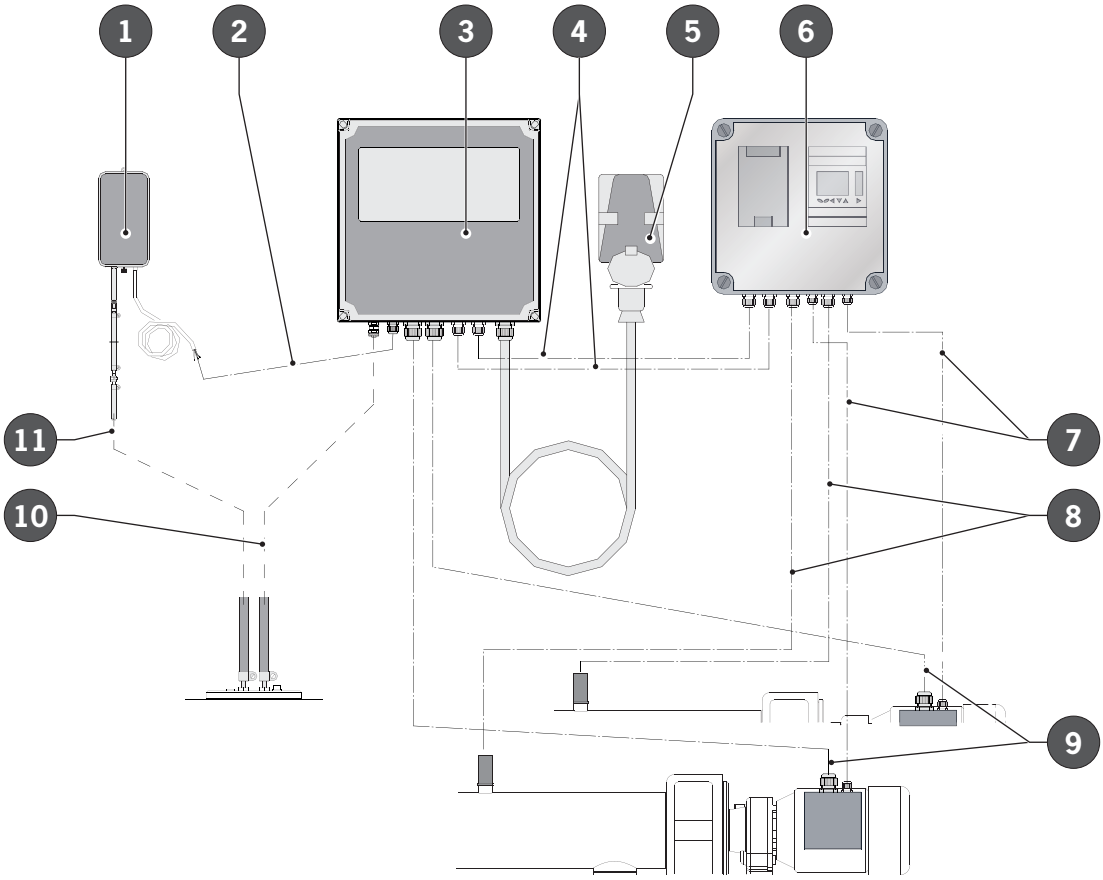
- Marking aids (e. g. pencil)
- Impact drilling machine and rock drill Ø12 mm
- Hammer
- Vacuum cleaner

→ Put fixation plate (3) to supermatant bottom (4) ot the collecting container and mark borehole.
→ Drill a hole Ø12 mm, 60 mm deep.
→ Exhaust borehole.
→ Insert dowel 12 W (8) in borehole.
→ Apply fixation plate (3).
→ Slide disks (1) over wooden screws 10 x 60 (2) , put through the hole in the fixation plate and screw in the dowel (5).
→ Tighten bolts 10 x 60 (2) (10 N m).



6.3 Electric installation

The following illustration depicts required local prerequisites and the electrical works which are described in more detail in the following chapters.



1 = Fix mini compressor, chapter 6.3.8	6 = Fix switchgear, chapter 6.3.4	10 = Connect control line to level control, chapter 6.3.11
2 = Connect electrical line of mini compressor, chapter 6.3.10	7 = Adjust length of electrical lines for thermal and electrical monitoring of pumps, chapter 6.3.6	11 = Connect line for air bubble injection, chapter 6.3.9
3 = Fix control, chapter 6.3.1	8 = Adjust length of electrical lines for flow monitoring of pumps, chapter 6.3.7	12 = Transmit collective fault signal (optional), chapter 6.3.12
4 = Adjust length of electric connecting lines for control/switchgear, chapter 6.3.5	9 = Adjust length of electrical lines of pumps, chapter 6.3.3	
5 = Fix CEE power socket*, chapter 6.3.2		

* Local prerequisite

Fig. 12: Electric works

6.3.1 Fix control

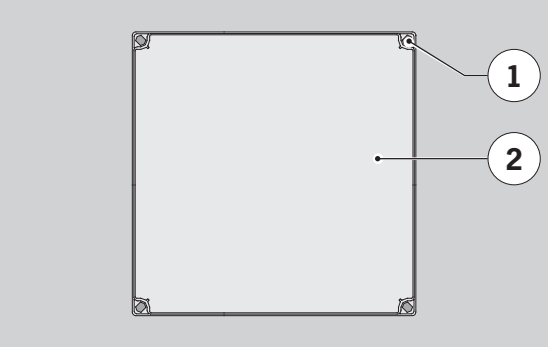
A floodproof and free wall surface of approx. W x H = 400 x 500 mm for fixation of control is required.

The control line for level control and the electric line of pumps are each 10 m long and already connected to control.

Prerequisites:

- Impact drilling machine and rock drill
- Hammer
- Vacuum cleaner
- Screwdriver (flat-headed and crosstip)
- Screws and dowels

→ Transpose the hole pattern (1) from all corners of the rear panel of the original control (2) to the wall.
→ Drill holes.
→ Suck dry boreholes.
→ Batter in dowels.
→ Hold control (2) to the wall and fix with screws.



6.3.2 Fix CEE power socket

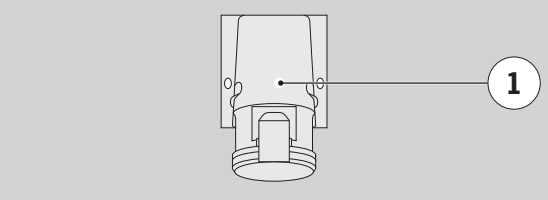
The control has a 1.5 m long connecting cable with CEE plug 32 A.

CAUTION Functional disorder with improper power socket.

A local CEE power socket 32 A with following data must be installed:

- Connecting value of 400 V/50 Hz
- Right rotating field
- Mains fuse protection max. 3 x 25 A delay fuse

→ Mount CEE power socket (1) to the wall as per the manufacturer's instructions.



6.3.3 Adjust length of electric line of pumps

The electric lines are each 10 m long and already connected to the connecting terminals in the connecting box of the pump and the control when supplied.

CAUTION The ends of the skinners are marked. If skinners are mixed up, a short-circuit hazard persists.
If the cable is shortened, transpose the marking of the skinners.

Following assembling aids are required:

- Screwdriver
- Side cutter
- Cable stripping knife

→ Retighten connecting terminals.

If the cable length is not shortened, the part not required should be fixed in loose, medium-sized loops.

6.3.4 Fix switchgear

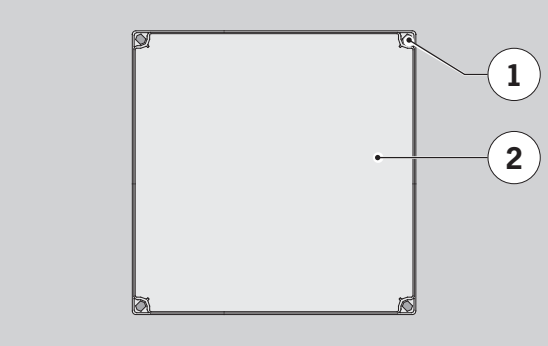
A floodproof and free wall surface of approx. W x H = 300 x 300 mm is required for fixing the control.

The connecting lines to the control are each 2 m long and are already connected to the control.

Prerequisites:

- Impact drilling machine and rock drill
- Hammer
- Vacuum cleaner
- Screwdriver (flat-headed and crosstip)
- Screws and dowels

- → Transpose the hole pattern (1) from all corners of the rear panel of the original switchgear (2) to the wall.
- → Drill holes.
- → Suck dry boreholes.
- → Batter in dowels.
- → Hold switchgear (2) to the wall and fix with screws



6.3.5 Adjust length of the electric connecting lines between control and switchgear

The electric connecting lines between control and switchgear are each 2 m long and already connected to the connecting terminals in the connecting box of the control and the switchgear when supplied.

CAUTION The ends of the skinners are marked. If skinners are mixed up, a short-circuit hazard persists.
If the cable is shortened, transpose the marking of the skinners.

Prerequisites:

- Screwdriver
- Side cutter
- Cable stripping knife

- → Retighten connecting terminals.

If the cable length is not shortened, the part not required should be fixed in loose, medium-sized loops.

6.3.6 Adjust length of the electric lines for thermal and electric monitoring of pumps

The electric connecting lines between pumps and switchgear are each 10 m long and already connected to the connecting terminals in the connecting box of the control and the pumps when supplied.

CAUTION The ends of the skinners are marked. If skinners are mixed up, a short-circuit hazard persists.
If the cable is shortened, transpose the marking of the skinners.

Prerequisites:

- Screwdriver
- Side cutter
- Cable stripping knife

→ Retighten connecting terminals.

If the cable length is not shortened, the part not required should be fixed in loose, medium-sized loops.

6.3.7 Adjust length of electric lines for flow monitoring of pumps

The electric connecting lines between pumps and switchgear are each 10 m long and already connected to the connecting terminals in the connecting box of the control and the flow detector when supplied.

CAUTION The ends of the skinners are marked. If skinners are mixed up, a short-circuit hazard persists.
If the cable is shortened, transpose the marking of the skinners.

Prerequisites:

- Screwdriver
- Side cutter
- Cable stripping knife

→ Retighten connecting terminals.

If the cable length is not shortened, the part not required should be fixed in loose, medium-sized loops.

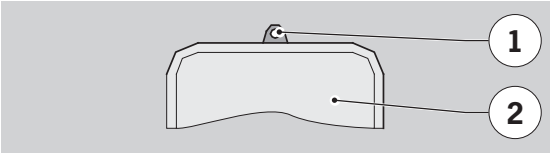
6.3.8 Fix mini compressor

A mini compressor for permanent air bubble injection reduces the risk of a pitot tube blockage and renders the level control even safer. A floodproof and free wall surface of approx. W x H = 200 x 100 mm is required

Prerequisites:

- Impact drilling machine and rock drill
- Hammer and vacuum cleaner
- Screwdriver (flat-headed and crosstip)
- Bolts and dowels

→ Drill hole for lug (1) at intended assembly location.
→ Suck dry borehole.
→ Batter in dowel.
→ Hold mini compressor (2) to the wall and fix by means of bolt.



6.3.9 Connect line for air bubble injection

The lines and connecting elements are included in scope of supply. All parts which are not mounted when supplied have to be connected as follows.

CAUTION The line must be laid permanently rising and frostproof.

Prerequisites:

- Wrench SW 14
- Screwdriver (flat-headed and crosstip)
- Cutter knife
- Pipe clamps

→ Slide hose clamp (5) over hose end (9) of the 9.5 m long hose.

→ Place hose end (9) on hose nozzle (10) and fix by means of hose clamp (5).

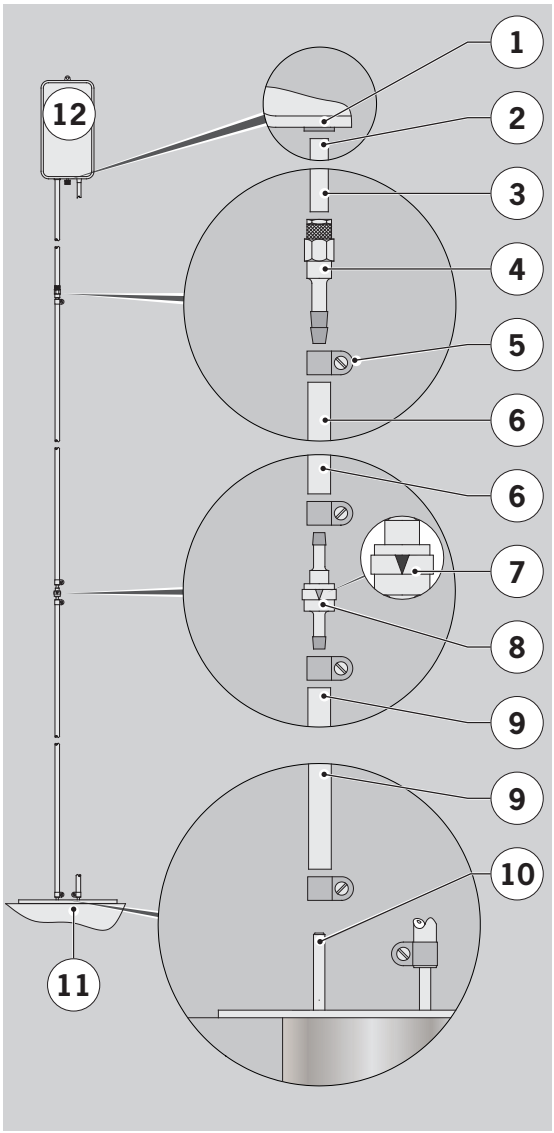
→ Slide hose clamp (5) over other hose end (9).

→ Put hose end (9) onto hose nozzle of the spring check valve (8), installation direction 📖 (7), and fix by means of hose clamp (5).

→ Slide hose clamp (5) over hose end (6) of the 500 mm long hose.

→ Put hose end (6) on hose nozzle of spring check valve (8) and fix by means of hose clamp (5).

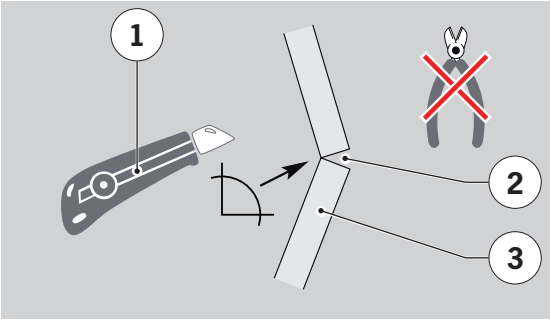
→ Slide hose clamp (5) over other hose end (6).



- → Put hose end (6) on hose nozzle of screw connection (4) and fix by means of hose clamp.
- → Put hose end (2, 100 mm long) in screw connection support and connect.
- → Put other hose end (2, 100 mm long) over support (1) of the mini compressor (12).

CAUTION Functional disorder possible if length adjustment of line was not carried out expertly.

- → Cut off line (3) with a cutter (1) perpendicularly (2).



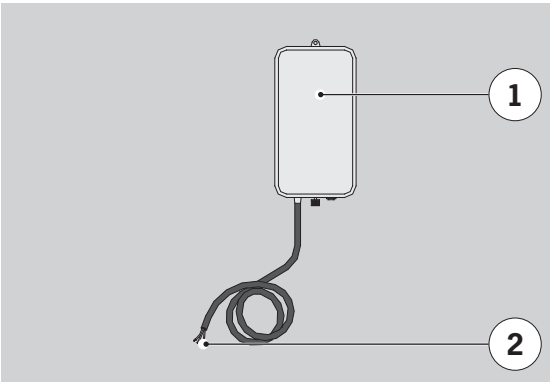
6.3.10 Connect electric line of mini compressor

When supplied, the electric line to mini compressor (1) is already connected. The electric line must still be connected to the control.

Prerequisites:

- Screwdriver (crosstip or flat-headed)
- Side cutter
- Cable stripping knife

- → Dismantle line ends (2) and provide with a cable end sleeve.
- → Connect in connecting box of control, wiring diagram chapter 5.2.2.



6.3.11 Connect control line for level control

When supplied, the control line (3) is already connected to the hose nozzle (4) of the connecting flange (5) of the level control. It lies on top of plant in loops and is fixed by means of cable clips.

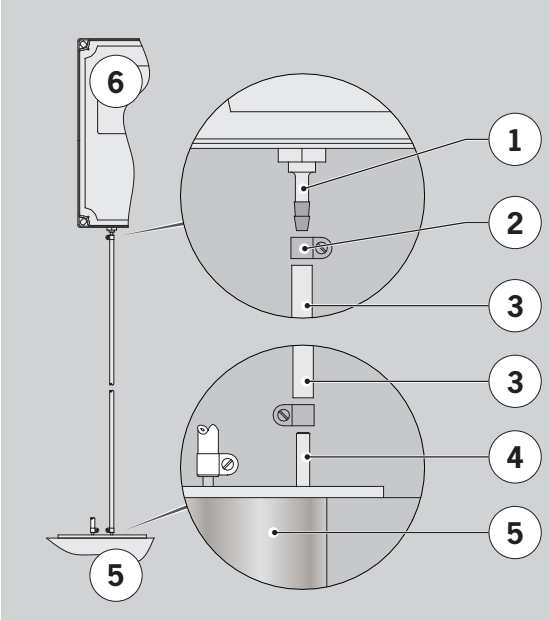
CAUTION The line must be laid permanently rising and frostproof.

Prerequisites:

- Screwdriver (crosstip or flat-headed)
- Cutter
- Pipe clamps

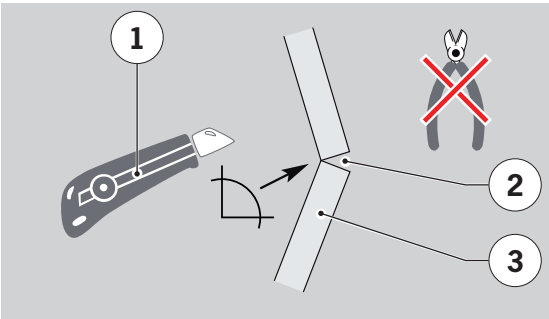
→ Slide hose clamp (2) over hose end (3) of the 10 m long control line.

→ Put hose end (3) over hose nozzle (1) of the control (6) and clamp by means of hose clamp (2).



CAUTION Functional disorder possible if length adjustment of control line was not carried out expertly.

→ Cut off control line (3) with a cutter (1) perpendicularly (2).



6.3.12 Transmit collective fault signal (optional)

For transmittance of the potential-free contact as collective fault signal, a line must be laid.

Prerequisites:

- Line: 2-wire/0.75 mm^2
- Screwdriver (crosstip or flat-headed)
- Cutter
- Pipe clamps

→ Connect line in the control in accordance with the wiring diagram, chapter 5.2.2.

7 Initial commissioning, operation

This chapter contains information on correct initial commissioning and current operation of plant.

7.1 Safety with initial commissioning and operation

During initial commissioning and during operation, the followings hazards may occur:

WARNING

The following safety indications must be read thoroughly prior to initial commissioning and operation. In the case of non-observance, severe injuries may occur.

Make sure the personnel is sufficiently qualified, chapter 2.2.

Pressure-induced hazards

Eccentric spiral pumps are displacement pumps and can (e. g. by blockage of pressure line) generate a multiple of the max. permissible pressure of the plant, which may lead to the lines bursting.

- In the case of pressure-induced hazards, have works carried out by an expert.

BEWARE

Leakages at the plant during initial commissioning and operation.

Injuries/burnings of eyes and skin!

- Wear personal protective equipment, chapter 2.3
- Stop plant immediately and leave hazard area until pressure drops

Contact with greasy wastewater.

Injury of skin and eyes, danger of infection!

- Wear personal protective equipment, chapter 2.3.
- In the case of skin contact: immediately wash affected skin areas thoroughly with soap and disinfect.
- In the case of eye contact: rinse eyes. If eyes continue watering, consult a doctor.

7.2 Initial commissioning

This chapter holds information on the prerequisites for the initial commissioning of the plant and the hand-over to the user.

7.2.1 Prerequisites, presence and performance

Prerequisites for the initial commissioning:

- All sanitary and electric works were finished, chapter 6
- Collecting container was thoroughly cleaned (from possible construction waste) and emptied

Persons required during initial commissioning:

- Plumber
- Electrician
- Owner or user

CAUTION For a safe operation of plant, the following sequence has to be observed during initial commissioning:

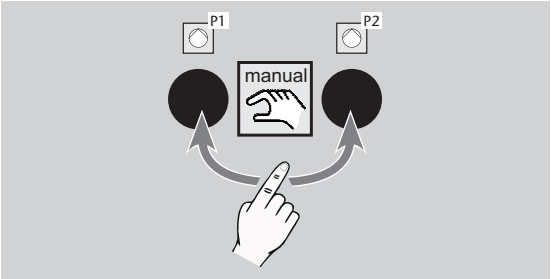
1. Check sense of rotation of pump, chapter 7.2.2
2. Carry out test run, chapter 7.2.3, at least twice
3. Carry out control works, chapter 7.2.4
4. Set air bubble injection, chapter 7.2.5
5. Insert battery, chapter 7.2.6
6. Set automatic operation, chapter 7.2.7
7. Hand over plant to owner or user, chapter 7.2.8

7.2.2 Check sense of rotation

CAUTION Prior to initial commissioning, the sense of rotation of the eccentric spiral pumps must be checked. The correct sense of rotation is depicted on the type plate. Switch on pumps for a very short while only, dry run hazard!

→ Press push button „manual“ P1 or P2 for manual operation of pump 1 and 2 one after the other, very shortly.

→ Check sense of rotation and, if required, have corrected by electrician.



7.2.3 Test run

In the following, works at the plant and the control are described:

Carry out test run:

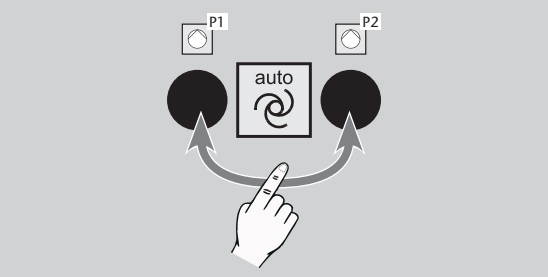
→ Open slide in inlet line (if any).

→ Insert CEE plug in CEE power socket.

→ Insert fuses.

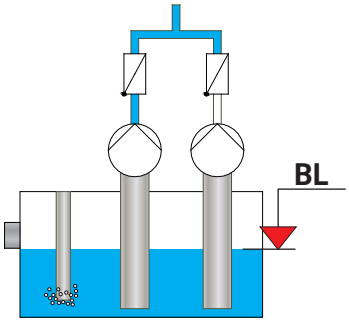
→ Check operating displays at the control.

→ Press push button „auto“ (P1 and P2) for automatic operation of pump 1 and 2.



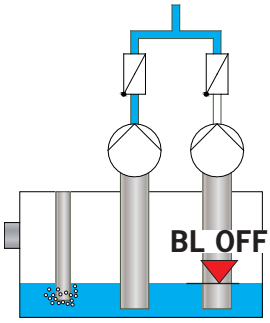
→ Allow for water to flow in the plant via the inlet line.

Water level reaches „BL (base load)“, pump 1 switches on and pumps the waste-water from the collecting container into the grease separator via the pressure line.

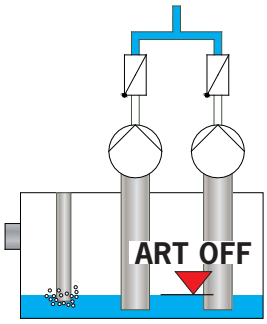


→ Interrupt water inflow.

Water level reaches „BL OFF“, after-run time of pump is activated.



Water level reaches „ART OFF“, after-run pump switches off.



→ Check water level via opened revision cover.

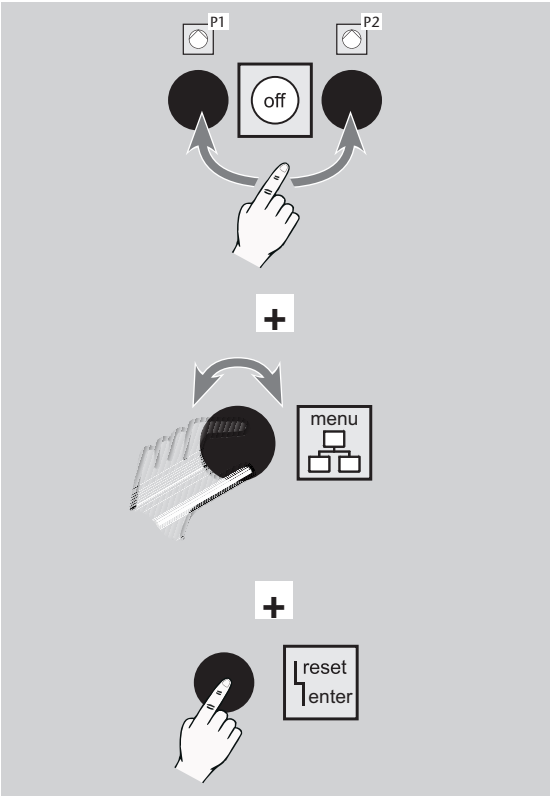
CAUTION If water level is 2 – 3 cm above the lower edge of the pitot tube, the preset after-run time is sufficient.
If water level has not reached this level, the after-run time must be changed or adjusted.

→ Press push button „off“ of the switched on pump.

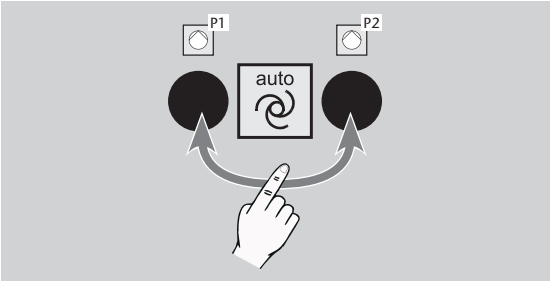
Pump switches off.

→ Set new after-run time by means of the control knob „menu“.

→ Save value with button „reset/enter“.

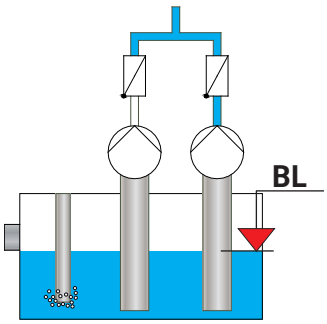


→ Press button „auto“ (P1 and P2) for automatic operation of pump 1 and 2.



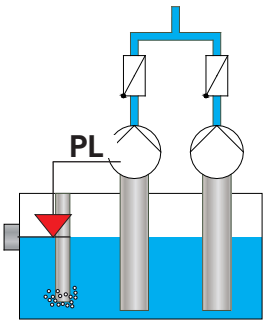
→ Allow water to flow in again.

Water level reaches „BL (base load)“, pump 2 switches on and pumps the wastewater into the grease separator via the pressure line.



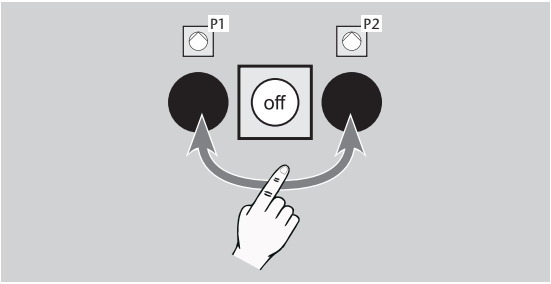
→ Increase water inflow.

Water level reaches „PL (peak load)“, pump 1 switches on additionally and both pumps pump the wastewater from the collecting container into the grease separator via the pressure line.

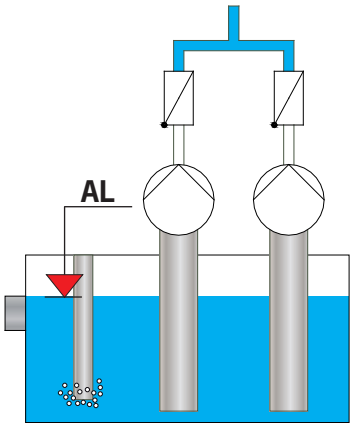


→ Press button „off“ (P1 and P2) of pump 1 and 2.

Pumps switch off.



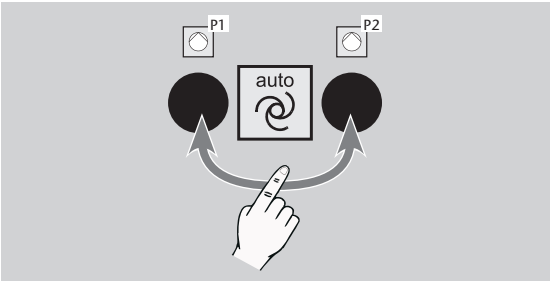
Water level reaches „AL“ = flood alarm.



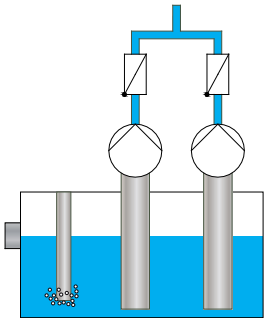
Red LED lights up and the audible alarm sounds.

→ Interrupt water inflow.

→ Press button „auto“ (P1 and P2) for automatic operation of pump 1 and 2.

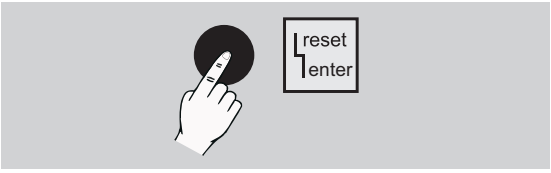


Both pumps switch on and pump the wastewater from the collecting container into the grease separator via the pressure line.



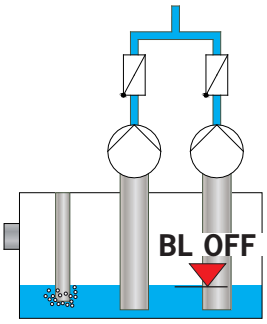
Water level „AL“ is gone below.

→ Press button „reset/enter“.

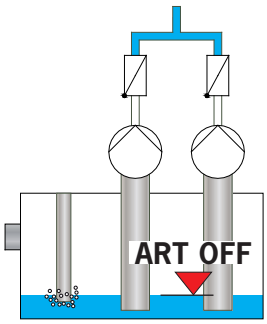


Red LED goes out as does the audible alarm.

Water level reaches „BL OFF“, after-run time is activated.



Water level reaches „ART OFF“, pumps switch off.



The test run is finished.

→ Carry out test run for a second time.

→ Close revision opening again.

7.2.4 Control works

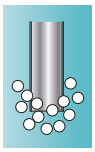
Prior to, during or after the test run, the following must be checked:

- Tightness of plant, fittings and lines
- Function of the gate valves
- Setting of the air bubble injection, chapterp. 7.2.5

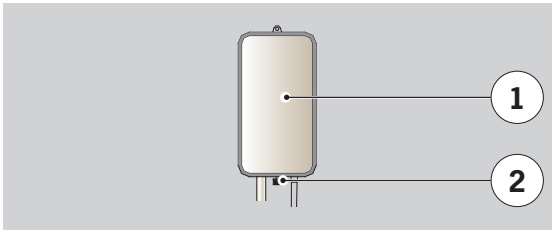
7.2.5 Set air bubble injection

To reduce the sound level of the mini compressor, the air flow must be reduced.

CAUTION Reduce air flow to such an extent only that air bubbles still escape from the pitot tube end and rise to the top in the wastewater (it still bubbles, inspect via revision cover).



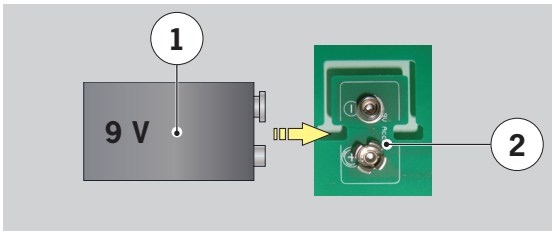
→ Reduce air flow at control knob (2) of the mini compressor (1).



7.2.6 Insert battery

The battery supplied (2) for the mains-independent alarm must be inserted in the control.

→ Have battery (2) inserted at intended place (1) on the circuit board by an electrician.

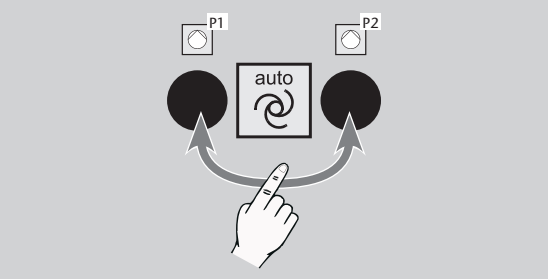


After inserting the battery, the mains-independent alarm is automatically activated.

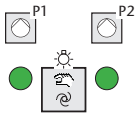
7.2.7 Set automatic operation

Carry out the following setting at the control:

→ Press button „auto“ (P1 and P2) for automatic operation of pump 1 and 2.



Green LED lights permanently, the pump P1 or P2 is in automatic operation and is switched automatically via the level control.



Plant is ready for operation.

7.2.8 Hand over plant to user

During hand-over to the user:

1. Explain operating mode of plant
2. Hand over the plant fully functioning
3. Hand out handover protocol with essential commissioning data (e. g. supplements or alterations of works settings)
4. Hand out operating manual

7.2.9 ACO maintenance contract

In order to maintain the value and performance of the plant as well as the guarantee conditions, we recommend to have works carried out by the manufacturer, ACO, directly.

This secures a permanent operability and you also profit from revisions and alterations which are carried out in the course of our product development.

In order to enquire for a **maintenance contract,** fill in the following form and fax it to:

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

In the case of queries, our ACO service is at your disposal under, 📖 chapter 1.1.

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

Please send me a non-binding quotation for regular maintenance of the plant.

Sender

Type:

Installed on:

Application:

☐ Industrial plant

☐ ...

Post code Town

7.3 Operation

CAUTION The plant may only be operated in accordance with its intended use, chapter 2.1.

The plant works automatically. During operation, works required are limited to:

- Monthly inspections of at least 2 switching cycles or test runs, chapter 7.2.3.

Further inspections at the plant are limited to maintenance works, chapter 8.3 and 8.4.

8 Maintenance

For a long-time safe and trouble-free operation, regular maintenance works are indispensable.
The required maintenance works are described in this chapter.

8.1 Safety during maintenance works

During maintenance works at plant, the following hazards may occur:

WARNING
The following safety indications must be read thoroughly prior to maintenance works. In the case of non-observance, severe injuries may occur.
Make sure the maintenance staff is sufficiently qualified, chapter 2.2.

The user may only carry out such works which are described in this operating manual.

All further works require comprehensive expert knowledge as well as long experience in the handling of plants. Here, the ACO Service is responsible.

Electricity hazard!

- Have works at the electrical equipment of the plant carried out by an electrician.

BEWARE
Leakages at the plant during maintenance works.
Injuries/combustions of eyes and skin!

- Wear personal protective equipment, chapter 2.3
- Stop plant immediately and leave hazardous area (approx. 30 min.) until pressure drops

Contact with greasy wastewater.
Injury of skin and eyes

- Wear personal protective equipment, chapter 2.3.
- In the case of skin contact: immediately wash affected skin areas thoroughly with soap and disinfect.
- In the case of eye contact: rinse eyes. If eyes continue watering, consult a doctor.

BEWARE

Sharp edges due to material chippings

Injuries by worn parts!

- Be particularly cautious and thoughtful.
- Wear personal protective equipment, chapter 2.3

8.2 Plant manual

ACO recommend the issue of a plant manual in which the following data and information are entered:

- Data of regular inspection and maintenance works
- Faults occurred, causes, measures taken
- Data of repair and servicing works carried out
- Data of tests carried out

Keeping such a manual offers a lot of advantages, e. g. traceability of measures and a well-directed fault finding.

8.3 Maintenance works for the user

This chapter contains information on works which can be carried out by the user.

8.3.1 Daily checks

Carry out the following checks every 1 - 2 days:

- Check plant and its components for leakages.
- Check operational availability of plant at control.
- Watch out for abnormalities (e. g. nontypical operating noise of pumps), react and take necessary actions.

8.3.2 Maintenance works as needed

The following works must be carried out by the user as needed:

- Cleaning works at plant and control

CAUTION In order to avoid damages to property, only use commercial, non-aggressive cleaning agents.

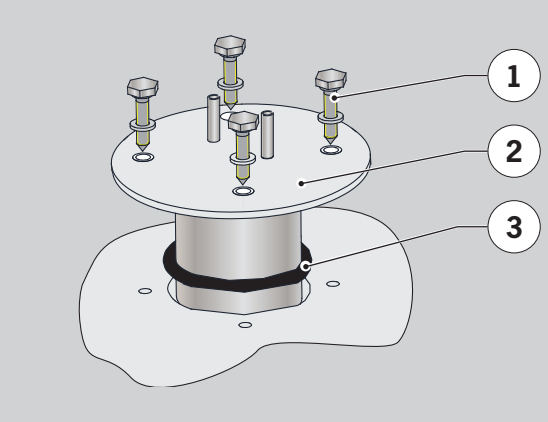
- Following flooding of the plant and before a re-commissioning, have maintenance works carried out, chapter 8.4.

- Clean pitot tube

Prerequisites:

- ☐ Wrench SW 13

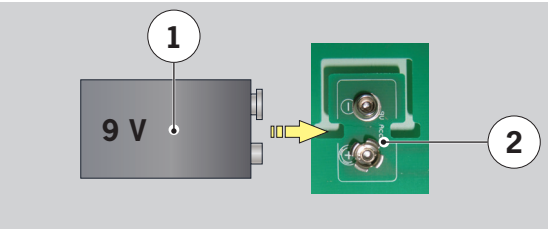
→ Undo 4 ejot screws (1) and turn off.
→ Take out pitot tube (2) of collecting container.
→ Clean pitot tube (2) and sealing (3).
→ Reinsert pitot tube (2).
→ Retighten bolts (1) evenly across (fastening torque 8 N m)



8.3.3 Annual maintenance works

The following works have to be carried out once a year:

→ Have battery (2) inserted in the control at intended place (1) on circuit board by an electrician.



8.4 Maintenance plan for specialist

The following table surveys maintenance works which must be carried out by a specialist, 🕮 chapter 2.2.

CAUTION The maintenance works, 🕮 table 17, must be carried out in the following intervals:
Operation of plant in **commercial establishments = every 3 (max. 6) months.**

Table 15:Maintenance plan of specialist

Lifting plant	Work	Setting values	
Component	Description	carry out/carried out	
Control	Check condition and function of signal lamps	☒	☐
	Check condition and function of operating elements	☒	☐
	Check condition and function of display panel	☒	☐
	Check function and menu settings	☒	☐
	Carry out test run	☒	☐
	Check function of remote signalling	☒	☐
	Check tight fit of fuses	☒	☐
	Retighten terminal connections	☒	☐
Level control	Clean pitot tube	☒	☐
	Check control line	☒	☐
	Check connection of control line	☒	☐
Mini compressor	Check condition	☒	☐
	Check function	☒	☐
	Check air setting	☒	☐
Collecting container	Check condition	☒	☐
	Clean container inside and outside	☒	☐
	Check buoyancy-safety	☒	☐
Pumps	Check condition and function of motor	☒	☐
	Check operating noise	☒	☐
	Check rotor condition and clean	☒	☐
	Check stator condition and clean	☒	☐
	Check gland packing	☒	☐
	Clean motors outside	☒	☐
Y-pipe with double backflow preventer	Check condition and function	☒	☐
	Check condition of balls	☒	☐
Special fastening element	Check condition	☒	☐
Inlet slide	Check condition and function	☒	☐
	Grease adjusting spindle	☒	☐
Inlet line	Check condition of pipeline	☒	☐
	Check connecting points	☒	☐
	Check fixations	☒	☐
Vent line	Check condition of pipeline	☒	☐
	Check connecting points	☒	☐
	Check fixations	☒	☐
Pressure line	Check condition of pipeline	☒	☐
Accessories	Check condition	☒	☐
	Clean outside	☒	☐
Lifting plant cpl.	Check flange connections and connections	☒	☐
	Clean outside	☒	☐
	Carry out test run	☒	☐
	Clean surroundings	☒	☐
☐ = Space to tick off works carried out ☑			

9 Fault clearance and repair

This chapter contains information on fault clearance and repair works at plant.

9.1 Safety during fault clearance and repair works

During fault clearance and repair works at plant, the following hazards may occur:

WARNING

The following safety indications must be read thoroughly prior to fault clearance and repair works. In the case of non-observance, severe injuries may occur.

Make sure the personnel is sufficiently qualified, chapter 2.2.

The user may only carry out such works as described in this manual.

All further works require comprehensive expert knowledge as well as long experience in the handling of plants. Here, the ACO Service is responsible.

Electricity hazard!

- Have works at the electrical equipment of the plant carried out by an electrician

Pressure-induced hazards

Eccentric spiral pumps are displacement pumps and can (e. g. by blockage of pressure line) generate a multiple of the max. permissible pressure of plant, which may lead to bursting of pipes.

- In case of pressure-induced hazards, have works carried out by a specialist.

BEWARE

Contact with greasy wastewater.

Injury of skin and eyes

- Wear personal protective equipment, 🕮 chapter 2.3.
- In the case of skin contact: immediately wash affected skin areas thoroughly with soap and disinfect.
- In the case of eye contact: rinse eyes. If eyes continue watering, consult a doctor.

Sharp edges due to material chippings

Injuries by worn parts!

- Be particularly cautious and thoughtful

In case of a malfunction, the pump motor may heat up to 110°.

Injuries by combustion hazards!

- Wear personal protective equipment, 🕮 chapter 2.3
- Allow motor to cool down for at least 30 min.
- Be particularly cautious and thoughtful

9.2 Fault finding

The following table helps detecting fault causes and taking the required measures.

Table 16:Fault finding part 1

Fault	Cause(s)	Measure(s)	Expert required	
Faults at plant and at connections				
Pump does not operate or does not initiate or Collective container full	Motor is defective	Exchange motor	x	9.3
	Static friction too big	Fill pump and turn manually by means of suitable auxiliary media; apply glycerin in stator as lubricant, in case of need	x	9.3
	Foreign body is in pump	Remove foreign body and clear possible damages	x	9.3
	Temperature of delivery liquid too high, stator expands too intensely	If temperature of delivery liquid cannot be reduced, use undersize rotor	x	9.3
	Delivery liquid sediments or hardens while standing	Flush pump following finished delivery and clean	x	9.3
	Electrical data of drive do not conform to mains	Check electric installation (possibly 2-phase operation) and correct	x	9.3
	Electric connection is interrupted	Check connection and restore, if required	x	9.3
	Automatic operation is switched off	Switch on automatic operation	-	
	Overload protection of pump has triggered off, cannot be acknowledged	Dismantle pump and clean	x	9.3
Pump does not suck (anymore)	Suction line leaks	Check sealings, retighten pipe connections	x	9.3
	Shaft seal leaks	Renew bearing rings or sealings, remove blockages	x	9.3
	In the case of undersize rotors: operating temperature not yet reached	Firstly, warm up pump (stator) to operating temperature only	x	9.3
	Stator is worn	Fit new stator	x	9.3
	Stator material is embrittled	Fit new stator	x	9.3
	Rotor is used up	Exchange rotor	x	9.3

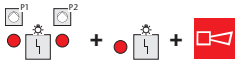
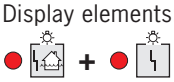
Table 16: Fault finding part 2

Fault	Cause(s)	Measure(s)	Expert required	
Faults at plant and at connections				
Delivery quantity is too low	Electrical data of drive do not conform to mains	Check electric instal-lation (possibly 2-phase operation) and correct	x	9.3
	Pressure head is too big	Reinforce drive	x	9.3
	Air escapes into the suction line	Avoid air pockets	x	9.3
		Check sealings, retighten pipe connections	x	9.3
	Shaft seal leaks	Rotating mechanical seal: renew bearing rings or sealings, remove blockages	x	9.3
	In the case of undersize rotors: operating tempe-rature is not yet reached	Firstly, warm up pump (stator) to operating temperature	x	9.3
	Pump runs dry	Commission pump following test run	x	9.3
	Stator is worn	Fit new stator	x	9.3
	Stator material is embrittled	Fit new stator	x	9.3
	Rotor is used up	Exchange rotor	x	9.3
Pressure head is too low	Electrical data of drive do not conform to mains	Check electric instal-lation (possibly 2-phase operation) and correct	x	9.3
	Air escapes into the suction line	Avoid air pockets	x	9.3
	Suction line leaks	Check sealings, retighten pipe connections	x	9.3
	Shaft seal leaks	Rotating mechanical seal: renew bearing rings or sealings, remove blockages	x	9.3
	In the case of undersize rotors: operating tempe-rature is not yet reached	Firstly, warm up pump (stator) to operating temperature	x	9.3
	Pump runs dry	Commission pump following test run	x	9.3
	Stator is worn	Fit new stator	x	9.3
	Stator material is embrittled	Fit new stator	x	9.3
	Rotor is used up	Exchange rotor	x	9.3
Delivery quantity fluctuates	Air escapes into the suction line	Avoid air pockets	x	9.3
		Check sealings, retighten pipe connections	x	9.3

Table 16: Fault finding part 3

Fault	Cause(s)	Measure(s)	Expert required	
Faults at plant and at connections				
Pump operates loudly	Pump runs dry	Commission pump after test run	x	9.3
	Stator is worn	Fit new stator	x	9.3
	Stator material is embrittled	Fit new stator	x	9.3
	Rotor is used up	Exchange rotor	x	9.3
	Hinges are worn out	Replace respective hinges, again tighten properly and grease	x	9.3
	Wrong pump axis to drive	Align aggregate anew	x	9.3
	Flexible intermediate element of coupling is worn	Use new intermediate element and align pump anew	x	9.3
	Ball bearings are destroyed	Replace ball bearing	x	9.3
	Pressure line or vent line blocked	Clear line	x	9.3
	Vent line not laid at all or improperly laid	Lay line properly	x	6.2.5
	Wrong dimensioning of pressure line, losses too high	Reduce losses by choosing a bigger nominal width	x	6.2.7
	Double backflow preventer defective	Open backflow preventer; clean and possibly exchange seating of ball and ball itself	x	9.3
Pump is stuck	Foreign body is in pump	Remove foreign body and clear possible damages	x	9.3
	Temperature of delivery liquid too high, stator expands too intensely	If temperature of delivery liquid cannot be reduced, use undersize rotor	x	9.3
	Delivery liquid sediments or hardens while standing	Flush pump following finished delivery and clean	x	9.3
	Pump runs dry	Commission pump after test run	x	9.3
Shaft seal leaks	Delivery liquid sediments or hardens while standing	Flush pump following finished delivery and clean	x	9.3
	Ball bearings are destroyed	Replace ball bearings, grease and reseal	x	9.3
	Rotating mechanical seal: wrong sense of direction	Change electric connection	x	9.3
	Rotating mechanical seal: bearing ring and counter-ring are run in	Relap respective rings or replace by new ones	x	9.3
	Rotating mechanical seal: sealings damaged, swollen or brittle	Replace sealings	x	9.3
	Gland tightened improperly	Maintain gland	x	9.3

Table 16:Fault finding part 4

Fault	Cause(s)	Measure(s)	Expert required	🕮
Faults at plant and at connections				
Drive is overloaded	In the case of new pump or new stator: static friction too high	Fill pump and turn manually by means of suitable auxiliary media; apply glycerin in stator as lubricant, in case of need	x	9.3
	Electrical data of drive do not conform to mains	Check electric instal-lation (possibly 2-phase operation) and correct	x	9.3
	Pressure head too big	Reinforce drive	x	9.3
	Foreign body is in pump	Remove foreign body and clear possible damages	x	9.3
	Temperature of delivery liquid too high, stator expands too intensely	If temperature of delivery liquid cannot be reduced, use undersize rotor	x	9.3
	Delivery liquid sediments or hardens while standing	Flush pump after finished delivery and clean	x	9.3
	Pump runs dry	Commission pump after test run	x	9.3
Pump runs in manual operation only	Control line of level control leaks, is improperly laid, bent or blocked	Check control line and arrange for proper condition		6.3.7
	Pitot tube blocked	Clean pitot tube		8.3.2
	Pressure switch in control defective	Replace control	x	9.3
Display panel: □ max. voltage □ Thermal monitoring □ Flow detector Display elements: 	Pump blocked by foreign body and current limiting triggered off fault	Dismantle pump and clean	x	9.3
	Thermal overload protection of pump has triggered off and cannot be acknowledged	Dismantle pump and clean	x	9.3
	Flow detector of pump has triggered off and cannot be acknowledged	Dismantle pump and clean	x	9.3
Display panel: Flood alarm Display elements: 	Automatic operation not switched on	Switch on automatic operation		7.2.7
	Pump motor defective	Check manual operation, exchange motor, if needed	x	9.3
	Pump blocked	Dismantle pump and clean	x	9.3
	Pressure line blocked	Clean pressure line	x	9.3
	Pump parts worn	Replace worn pump parts	x	9.3

9.3 Repair and spare parts

For repair works and spare parts ordering, please contact the ACO Service by mentioning original type plate data, 🕮 chapter 1.1.

10 Decommissioning and disposal

This chapter contains information on correct decommissioning and disposal of plant contents.

10.1 Safety during decommissioning and disposal

During decommissioning and disposal of plant, the following hazards may occur:

WARNING

The following safety indications must be read thoroughly prior to decommissioning and disposal. In the case of non-observance, severe injuries may occur.

Make sure the personnel is sufficiently qualified. chapter 2.2.

In addition, observe safety indications for „Transport and Storage“, chapter 3.1.

Electrical hazards

Severe injuries or death possible when coming in contact with energised parts

- Have works at the electrical equipment of the plant carried out by an electrician
- Have decommissioning of electric equipment carried out by an electrician

BEWARE

Contact with greasy wastewater.

Injury of skin and eyes

- Wear personal protective equipment, chapter 2.3.
- In the case of skin contact: immediately wash affected skin areas thoroughly with soap and disinfect.
- In the case of eye contact: rinse eyes. If eyes continue watering, consult a doctor.

BEWARE

Sharp edges due to material chippings

Injuries by worn parts!

- Be particularly cautious and thoughtful

Injuries by pipe components falling down!

- Wear personal protective equipment, 🕮 chapter 2.3
- Be particularly cautious and thoughtful

Injuries by combustion hazard!

- Wear personal protective equipment, 🕮 chapter 2.3
- Allow motor to cool down
- Be particularly cautious and thoughtful

10.2 Decommissioning

Sequence of decommissioning:

1. Draw CEE plug of control out of CEE power socket.
2. Empty collecting container and all pipes.
3. Cover up control and protect against humidity.
4. Cover up collecting container/plant and protect against humidity.
5. Preserve plant if decommissioning lasts more than 1 month, 🕮 chapter 3.2

10.3 Stopping

Sequence of stopping:

1. Draw CEE plug of control out of CEE power socket.
2. Disconnect pump connecting cable in the control.
3. Disconnect mini compressor in the control.
4. Dismantle control lines at the control.
5. Empty collecting container and all connected lines.
6. Dismantle connecting lines.
7. Dismantle collecting container/plant components.

10.4 Disposal

The plant consists of recyclable materials.

CAUTION Improper disposal endangers the environment. Regional disposal regulations have to be observed.

- Separate all steel or cast iron components and recycle
- Separate all rubber components (NBR) and recycle
- Separate all plastic components (PE-HD or PUR) and recycle
- Separate control from mini compressor and recycle as electronic scrap

Attachment 1: Table and illustration directory

Table directory

Table 1: Specifications for product identification 6
Table 2: Required staff qualification 10
Table 3: Personal protective equipment 11
Table 4: Risk levels 11
Table 5: Supply units and plant components 16
Table 6: Plant characteristics 18
Table 7: Characteristics of control 19
Table 8: Setting values 29
Table 9: Setting menu 30
Table 10: Switching points 35
Table 11: Technical data of plant 36
Table 12: Plant dimensions 36
Table 13: Technical data of control 38
Table 14: Prerequisites for the installation 40
Table 15: Maintenance plan for specialist 72
Table 16: Fault finding 75

Illustration directory

Fig. 1: Illustration of components 20
Fig. 2: Schematic illustration of functional principle 21
Fig. 3: Suggested installation 23
Fig. 4: Operation of control 25
Fig. 5: Operation of switchgear 33
Fig. 6: Schematic illustration of level switch 35
Fig. 7: Plant dimensions 37
Fig. 8: Dimensions of control and switchgear 38
Fig. 9: Wiring diagram 39
Fig. 10: Installation works 41
Fig. 11: Pressure line 45
Fig. 12: Electric works 49

Conformity declaration

Upstream tank plant-duo
Wastewater lifting plant for greasy wastewater / free-standing installation

The manufacturer:	
■	ACO Passavant GmbH Ulsterstrasse 3 36269 Philippsthal

herewith declares that the plant:	
■	Upstream tank plant -duo

conform to regulations:		
■	EG-RL 2006/42/EG	Machine directive

Machine parts of the plant are in conformity with further Directives:		
■	EG-RL 2006/95/EG	Low Voltage Directive
■	98/336/EWG	EMC Directive
■	92/31/EWG	EMC Directive

The following harmonised standards were applied:		
■	DIN EN 12050-1	2001-05 edition
■	EN ISO 12100-1	2009-10 edition
■	EN ISO 12100-2	2009-10 edition
■	DIN EN 60335	2008-01 edition

The following authorities were employed:		
■	-	-

Addition:
■ -

Remark:
■ The wastewater lifting plant collects and lifts automatic, low-turbulence wastewater upstream grease separators

Competent documentary agent:		
■	Mr Marco Eulenstein	ACO Passavant GmbH Im Gewerbepark 11c 36457 Stadtlengsfeld

Philippsthal, 20.06.2011			
■	Mr Ralf Sand		General Management ACO Passavant GmbH

ACO Passavant GmbH

Im Gewerbepark 11c
D-36457 Stadtlengsfeld
Tel.: + 49 (0) 3 69 65/81 9 -0
Fax: + 49 (0) 3 69 65/81 9 -3 61

www.aco.com

The ACO Group. A strong family you can build on.

LTC 920A/08/2011 ● Subject no. 0150.36.89_V1.1
Origin: German manual ● Subject to technical alterations!