Instructions for Use

Issued: 2019-06-03

Wastewater lifting plant Muli Pro

For faecal wastewater, for free-standing installation in frost-protected premises

Model PE K duo

PE Material PE-HD / K Pumps with channel impeller / duo Plant with 2 pumps

Model PE V duo

PE Material PE-HD / K Pumps with free flow impeller / duo Plant with 2 pumps

Model PE K parallel

PE Material PE-HD / K Pumps with channel impeller / parallel 2 tanks (connected)

Model PE V parallel

PE Material PE-HD / K Pumps with free flow impeller / parallel 2 tanks (connected)

Model 1.x VA duo

1.x Tank dimension 1. Pump dimension / VA Material 1.4571 / duo Plant with 2 pumps

Model 2.x VA duo

2.x Tank dimension 2. Pump dimension / VA Material 1.4571 / duo Plant with 2 pumps

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

Introduction

ACO Passavant GmbH (referred to as ACO in the following) thanks you for your trust and hands over to you a product which is state-of-the-art and has been tested for proper condition as part of quality controls carried out before delivery.

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

ACO Service

For additional information regarding wastewater lifting plants, ordering spare parts and after-sales services e.g. maintenance contracts, ACO Service will be pleased to be of assistance.

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Guarantee

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

Declaration of Performance (DoP)

"Declaration of Performance" (DoP) for the wastewater lifting plant
http://www.aco-haustechnik.de/DoP

Symbols used

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

Tips and additional information, which make the work easier

- Bullet points

➔ Actions to be carried out in the specified order

References to other information in these instructions for use and other documents

Table of Contents

1 For your safety

Read the safety instructions before installing and commissioning of the wastewater lifting plant, in order to prevent personal injuries and damage to property.

1.1 Intended use

The wastewater lifting plant is used for collecting and automatic lifting of wastewater above the backflow level. The wastewater is then drained into the drainage sewer safely for people and without damaging structures.

The following wastewater may be discharged:

- Waste water free of faeces
- Faecal wastewater
- Wastewater from grease separators
- Wastewater with long-fibrous content, next page “Application range for various models”

Harmful substances must not be discharged:

- Heavy metals, e.g. zinc, lead, cadmium, nickel, chromium
- Aggressive substances, e.g. acids (pipe cleaning agent with pH value below 4)
- Alkaline solutions, salts and condensates
- Cleaning products and disinfectants, washing-up agents and detergents in excessive quantities or quantities that result in disproportionate foaming
- Flammable or explosive substances, e.g. petrol, benzene, oil, phenols, solvent-based paints, white spirits
- Solids, e.g. kitchen waste, glass, sand, ashes, fibrous material, synthetic resins, tar, cardboard, textiles, greases (oils), leftover paint
- Liquid substances, which can harden, e.g. gypsum, cement, lime
- Ecocides, e.g. plant treatment and pest control products
- Wastewater from manure pits and keeping of livestock, e.g. liquid manure, slurry, dung

Application ranges for various models

Model	Field of application
PE K duo	■ Multiple dwelling units ■ Smaller commercial properties with large quantities of wastewater ■ Downstream of grease separators up to NS 20 ■ For long pressure pipework sections with larger height differences
PE V duo	■ Multiple dwelling units ■ Smaller commercial properties with large quantities of wastewater ■ For wastewater with long-fibre solids ■ Downstream of grease separators up to NS 15
PE K parallel	■ Commercial or industrial properties with heavy wastewater cases ■ For long pressure pipework sections with larger height differences
PE V parallel	■ Commercial or industrial properties with heavy wastewater cases ■ Multiple dwelling units ■ Downstream of grease separators up to NS 20 ■ For wastewater with long-fibre solids
1.x VA duo	■ Multiple dwelling units ■ Smaller commercial properties with large quantities of wastewater ■ Wastewater with long-fibre solids ■ Downstream of grease separators up to NS 10
2.x VA duo	■ Multiple dwelling units ■ Downstream of grease separators up to NS 20 ■ For municipal and industrial wastewater

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

1.2 Normative specifications

The listed standards must be supplemented and checked for currency.

- DIN EN 12050-1 “Wastewater lifting plants for building drainage and property drainage – Part 1: Wastewater lifting plants for faecal-containing wastewater”
- DIN EN 12050-2 “Wastewater lifting plants for building and land drainage – Part 2: Wastewater lifting plants for faecal-free wastewater”
- DIN EN 12050-4 “Wastewater lifting plants for building and land drainage – Part 4: Back flow preventer for faecal-free and faecal-containing wastewater”
- DIN EN 12056-1 “Gravity drainage systems inside buildings – Part 1: General points and design requirements”
- DIN EN 12056-4 “Gravity drainage systems inside buildings – Part 4: General points and design requirements”
- DIN 1986-100: Drainage systems for buildings and property – Part 100: Provisions in connection with DIN EN 752 and DIN EN 12056“

1.3 Personnel qualifications

Activities	Person	Knowledge
Layout, operational changes	Planners	Knowledge of building systems and services and applicable standards and directives Evaluation of wastewater technology application cases Proper layout of drainage systems
Sanitary installation	Skilled people	Installation, fixing and connection of pipes
Electrical installation	Electrician	Work on electrical connections to power supply must be carried out by qualified electricians only
Operation monitoring	Owner, user	No specific requirements
Launch, maintenance	Qualified people	“Qualified people” in according to DIN 1986-100*
Disposal	Skilled people	Appropriate and environmentally friendly disposal of materials and substances, knowledge of recycling

*Definition of “competent people” in accordance with DIN 1986-100:

“Competent people are employees of companies independent of the operating company/owner, experts or other institutions, who verifiably have the required technical knowledge to operate, maintain and check wastewater lifting plants to the scope named here and have the equipment required to test wastewater lifting plants. In individual cases, in larger operational units, these tests and inspections can also be carried out by internal personnel of the operating company who are qualified people, independent with regard to their area of responsibility and who are not bound by instructions, and who have the same qualification and technical equipment.”

1.4 Personal protective equipment

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

Manda-tory sign	Meaning
	Safety footwear provides good slip resistance, especially in wet conditions, as well as a high degree of penetration resistance (e.g. in case of nails) and protects the feet from falling objects (e.g. during transport).
	Protective gloves protect the hands from infection (moisture proof protective gloves) and from minor bruising and cut injuries.
	Protective clothing protects the skin from minor mechanical effects and infections.
	A protective helmet protects the head in case of low ceilings and from falling objects (e.g. during transport).
	Safety glasses and goggles protect eyes from infections, especially during commissioning, maintenance and repair.

1.5 Warnings

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

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

1.6 Responsibility of the Owner

Due diligence in the owner's, or the operator's, area of responsibility:

ACO recommends that an operating log be kept and that inspections, servicing, maintenance work, repairs, etc. be documented, so that proof exists in case of an insurance claim:

Planning and installation

Specifications in accordance with DIN EN 12056-4 as well as regional provisions and directives must be complied with, these include, among other things:

- Layout and dimensioning
- Protection against backflow
- Installation of pipes

Operation monitoring

- Monitoring normal operation, Chapter 1.1 "Intended use".
- Monthly performance of at least 2 trial runs.
- Controlling of the wastewater lifting plant, e.g. for leakages, unusual operating noises.
- Controlling the operational readiness of the wastewater lifting plant on the duo pump control system.

Maintenance

Wastewater lifting plants must be operated and maintained in according to EN 12056-4 to ensure proper functioning and operating safety. We recommend that plant owners/ operating companies conclude a maintenance contract for the regular servicing and maintenance work to be undertaken.

ACO Service would be pleased to undertake the servicing and maintenance work professionally. Maintenance contract request service@aco.com.

Stipulated servicing intervals for the wastewater lifting plant in according to EN 12056-4:

- Commercial operation = every 3 months
- Operation in multi-dwelling buildings = every 6 months

Additional (extraordinary) maintenance of the wastewater lifting plant:

- After flooding the wastewater lifting plant
- Before restarting the wastewater lifting plant

1.7 Storage and Transport

On delivery, the wastewater lifting plant is fixed onto a wooden pallet and are protected from moisture and dirt by plastic film.

IMPORTANT Note during storage and transport:

- Store the wastewater lifting plant in frost proof premises.
- Never drive the forks a fork-lift truck or lift truck directly under the wastewater lifting plant.
- Where possible, transport the wastewater lifting plant on its base frame or the wooden pallet.
- Where possible, do not remove the packaging and transport restraints until the separator is in its place of installation.
- Use additional transport straps.
- When transporting the wastewater lifting plant with a crane and/or crane hook: Attach lashing straps on the wooden pallet or on the transport lifting eyelets.

1.8 Decommissioning and disposal

IMPORTANT Improper disposal is a hazard for the environment. Comply with the regional disposal regulations and recover or recycle the components.

- Completely drain and clean the wastewater lifting plant on decommissioning.
- Separate plastic parts (e.g. seals) and metal parts. Recover metal scrap.
- Electrical equipment must never be disposed of in household waste. Comply with the regional disposal regulations for the protection of the environment.

2 Product Description

2.1 Type plate

The type plate is attached to the tank.

- Product type designation
- DoP-Code
- Year of construction
- Article number
- Manufacturer's address
- Serial number

2.2 Technical terms utilised

- Centrifugal pump with channel impeller:
  Flow machinery; The centrifugal force is utilised for conveying the liquids by means of a rotating channel impeller. The channel impeller is suitable for pumping faecal wastewater, and for pumping wastewater with solid and short-fibre solids and thick matter (pulp), sludge and organic materials.

- Centrifugal pump with free flow impeller:
  Flow machinery; The centrifugal force is utilised for conveying the liquids by means of a rotating impeller. The large clear space in the volute casing (free ball passage) enables the liquid to easily flow via the suction port into the pump chamber and solid and long-fibre thick matter, such as long sanitary towels, textiles etc. can pass through the pump housing without blocking the volute casing.
  Additional advantage: As there is no throttle gap present between the impeller and volute casing, this type of structure provides increased operating safety in application areas with very large downtimes. Rusting up of the impeller and therefore resulting blockaging of the pump are excluded here.

2.3 Product features

Tank

- Material:
  - Polyethylene – PE (all models except VA duo)
  - Stainless steel (Models -VA duo)
- Inspection opening:
  - Clear opening width Ø 250 mm (all models except VA duo)
  - Clear opening width Ø 285 mm (all VA duo models)
- Fixing set for buoyancy-proof anchorage
- Connection sockets for on-site inlet pipe:
  - 2x horizontal OD 160 mm _ Arrangement laterally on right/left (all models except VA duo)
  - 2x horizontal OD 160 mm _ Arrangement on front side (all models except VA duo)
  - 2x horizontal OD 110 mm _ Arrangement on the top (all models except VA duo)
  - 1x horizontal OD 160 mm _ Arrangement on the top (all models except VA duo)
  - 1x horizontal OD 200 mm _ Arrangement on the top (all models except VA duo)
  - 2x vertical connection flange for OD 110 mm or 160 mm connection sockets_ Arrangement on the top (all VA duo models)
  - 1x vertical clamp flange for OD 110 mm or 160 mm pipe _ Arrangement on the top (all VA duo models)
  - 2x vertical clamp flange for OD 160 mm pipe _ Arrangement on the top (Model 2 x VA duo)
- Connection sockets for on-site overflow connection:
  - 2x horizontal OD 160 mm _ Arrangement on the top (all parallel models)
- Connection sockets for on-site ventilation pipe:
  - 1x horizontal OD 110 mm _ Arrangement on the top (all models)
- Connection for on-site emptying pipe (manual diaphragm pump):
  - 1x horizontal connection collar Rp 1½“ (closed)_ Arrangement on front side (all models except VA duo)
- Connection for on-site manual diaphragm pump:
  - 2x vertical connection collar Rp 1½“ _Arrangement on the top (all models except VA duo)
- Bottom outlet R 2“ with cap and/or plug closed_Arrangement on front side (all models)

- Pressure pipe:
  - Pipework DN 80 with 2x backflow preventer with aspiration device and drain tap (all models except K-75)
  - Pipework DN 100 with 2x backflow preventer with aspiration device and drain tap (K-75 Models)
  - 2x DN 80 shut-off valve _ optional (all models)
  - 2x DN 100 shut-off valve _ optional (K-75 Models)
  - DN 80/80/80 y-branch pipe (all models except K)
  - DN 80/80/100 y-branch pipe (all K Models)
  - DN 100/100/100 y-branch pipe (K-75 Models)
  - DN 80/100 special mounting adapter for elastic connection for OD 108 – 114 mm pressure pipe (all models except K)
  - DN 100 special mounting adapter for elastic connection for OD 108 – 114 mm pressure pipe (all K Models)
- Pneumatic pipe (measuring pipe) with connection flange for pneumatic control line and air bubble injection
- Flood proof according to IP 68: Flooding height (from set-up flange) maximum 2 m, flooding time maximum 7 days

Level switching

- Pneumatic pipe (measuring pipe in collection tank) with connection flange for pneumatic control line and air bubble injection
- Pneumatic control line (hose)
- Pressure sensor (in control system)

Mini compressor

Mini compressor for air bubble injection for protection against floating media layer build up on the opening of the pneumatic pipe

Pumps:

- 2x centrifugal pump with channel impeller (all K Models):
  - Channel impeller for granulation size 70 mm
  - Channel impeller for granulation size 100 mm (all K-75 Models)
- 2x centrifugal pump with free flow impeller (all models except K):
  - Free flow impeller for granulation size 80 mm
- S3 intermittent operation
- Permissible conveying media temperature up to 40 °C (short term up to 60 °C)
- 400 V/50 Hz three-phase motor with 7 m connecting cable, degree of protection IP 68
- Shaft seal: motor-sided Simmerring, carbon graphite ceramic on medium side, mechanical seal

Pump control duo

- Ready to plug in with 1.5 m cable and
  - 16 A CEE plug-in connector with integrated phase inverter (Models: up to K-22, V-22, 1.2 + 2.2 VA)
  - 32 A CEE plug-in connector with integrated phase inverter (Models: up to K-30, V-30, 1.3 + 2.3 VA)
- Pneumatic level switching with pneumatic pipe and pneumatic control line
- Isolated group alarm and operating signal
- Mains-independent alarm (85 dBA) in accumulator mode for 5 to 6 hours
- Numeric display with state display and digital potentiometer for setting:
  - Pump 1 and 2 ON and OFF
  - High Water
  - Motor current limitation
- Rotary field control
- H-0-A button
- Display service intervals
- Operating hours counting device and display of the activation impulses
- Ampere meter
- Error memory (last defect)
- Automatic pump change
- Control pre-set and multilingual
- 230 V connection for the mini compressor
- With soft start up (Models K-55 to 75)

Accessories:

For example inlet shut-off valve for inlet pipe, 🕮 “Product Catalogue”: 🕮 http://katalog.aco-haustechnik.de

2.4 Operating signals

- Pneumatic level switching
- Reliable level control by utilising an air bubble injection
- Automatic control for the pump procedures
- Workplace-related emission value ≤ 70 dB (A). The drive unit and the pipework are not hereby included.

2.5 Structure of the wastewater lifting plant

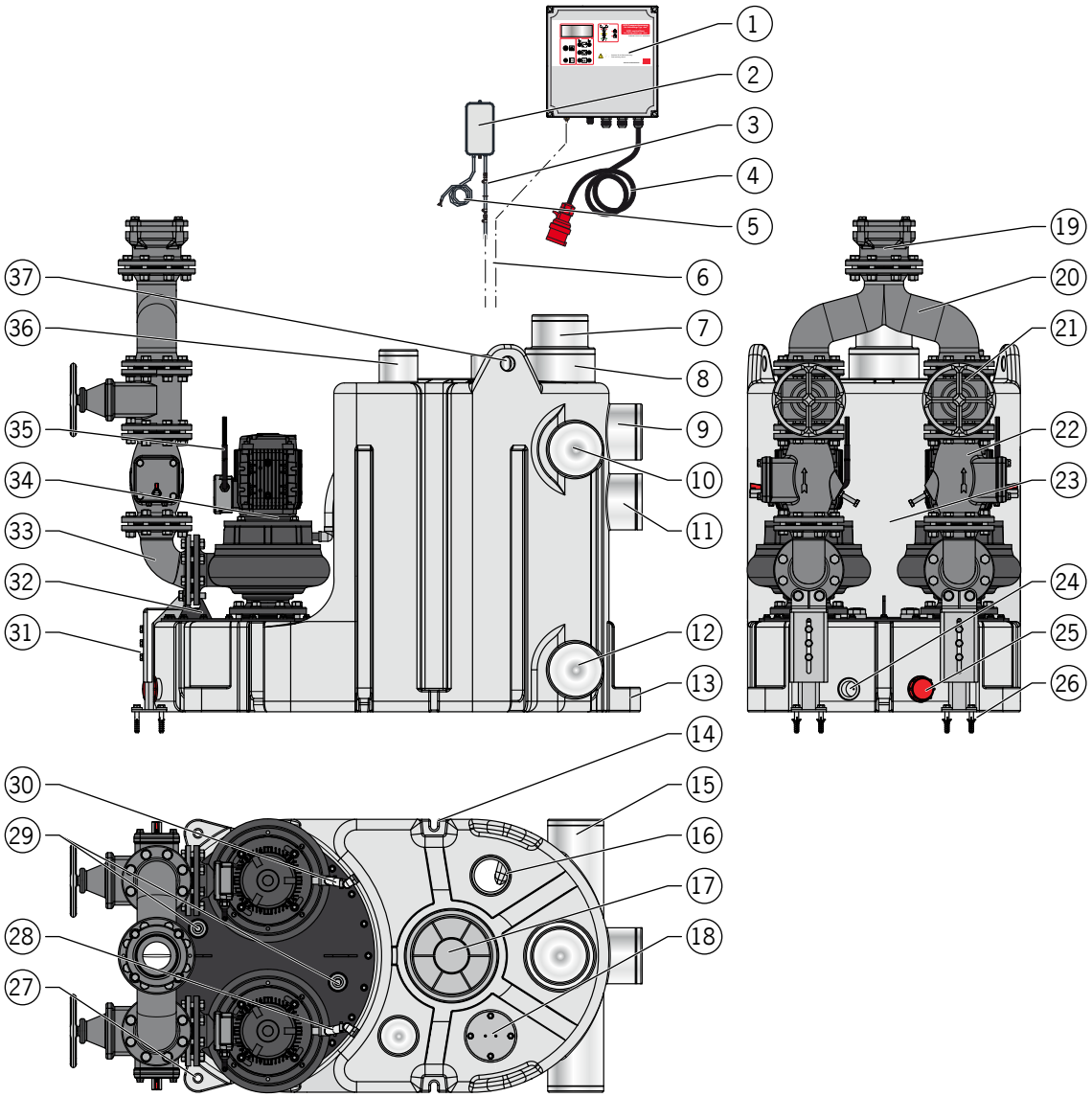


Figure: Model PE K duo

1 = Pump control-duo
2 = Mini compressor
3 = Hose pipe
4 = Connection cable with CEE plug-in connector
5 = Connection cable for mini compressor
6 = Pneumatic control line
7 = OD 160 connection sockets for connecting an on-site inlet pipe
8 = OD 200 connection sockets for connecting an on-site inlet pipe
9 = OD 160 connection sockets for connecting an on-site inlet pipe
10 = OD 160 mm connection sockets for connecting an on-site inlet pipe and/or a connection pipe with parallel models
11 = OD 160 connection sockets for connecting an on-site inlet pipe
12 = OD 160 mm connection sockets for connecting an on-site inlet pipe and/or a connection pipe for parallel models
13 = Fixing strap
14 = Fixing strap
15 = OD 160 mm connection sockets for connecting an on-site inlet pipe and/or a connection pipe with PE K parallel model
16 = OD 110 connection sockets for connecting an on-site vent stack
17 = Inspection cover, screwed on
18 = Connection flange (for pneumatic control line and air bubble injection)
19 = Special mounting adapter for connecting the on-site pressure pipe
20 = Y-branch pipe
21 = Shut-off valve (optional)
22 = Backflow preventer with aspiration device and drain tap
23 = Collection tank
24 = Connection collar for connecting an on-site emptying pipe
25 = DN 50 bottom outlet with cap, closed
26 = Fixing kit
27 = Fixing strap
28 = Ventilation pipe, volute casing
29 = Rp 1½“ connection collar for connecting an on-site manual diaphragm pump
30 = Ventilation pipe, volute casing
31 = Support feet for pumps
32 = Attaching eye
33 = Flange bend
34 = Centrifugal pump
35 = Connection cable for centrifugal pump
36 = OD 110 connection sockets for connecting an on-site inlet pipe
37 = Attaching eye

2.6 Operating principle

Wastewater resulting from the connected sanitary and drainage appliances flows via the inlet pipe(s) into the collection tank.

A pneumatic pipe installed in the collection tank is connected to the pressure sensor located in the pump control duo by means of a control line. If the water rises, then the air in the pneumatic pipe is compressed. At a defined pressure, the pumps are switched on and off and/or a High Water is triggered.

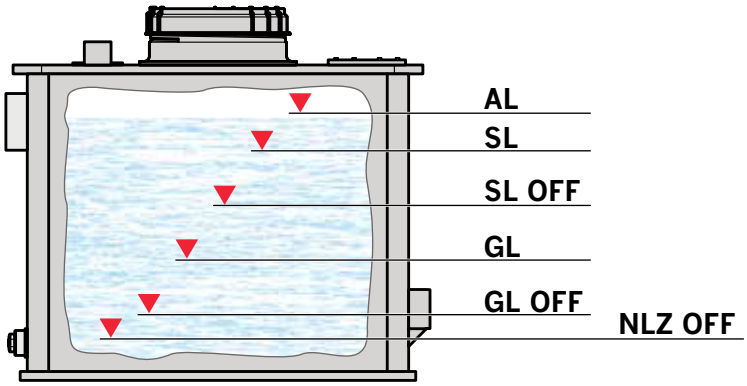


Figure: Water status level

AL	=	High Water	GL	=	Base load
SL	=	Peak load	GL OFF	=	Base load OFF
SL OFF	=	Peak load OFF	NLZ OFF	=	Stop delay OFF

If the water level reaches the base load level (GL), then a pump switches on and pumps the wastewater through the pressure pipe to above the backflow level.

Two backflow preventers prevent backflow from the pressure pipe and into the collection tank.

If the water level drops to the base load OFF level (GL OFF), the pre-set Stop delay (NLZ) of the pump is activated and the water level continues to drop to the 'NLZ OFF' level.

The wastewater lifting plant is equipped with two pumps:

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

3 Installation

The specifications of EN 12056-4 and the regional directives must be complied with for the installation. Following installation, the commissioning must be carried out by a qualified person, according to the requirements in these instructions for use, Chapter 4 “Commissioning”.

3.1 Installation example (schematic diagram)

The example represents the installation of a wastewater lifting plant in combination with a grease separator and can differ from the respective installation situation and the components utilised.

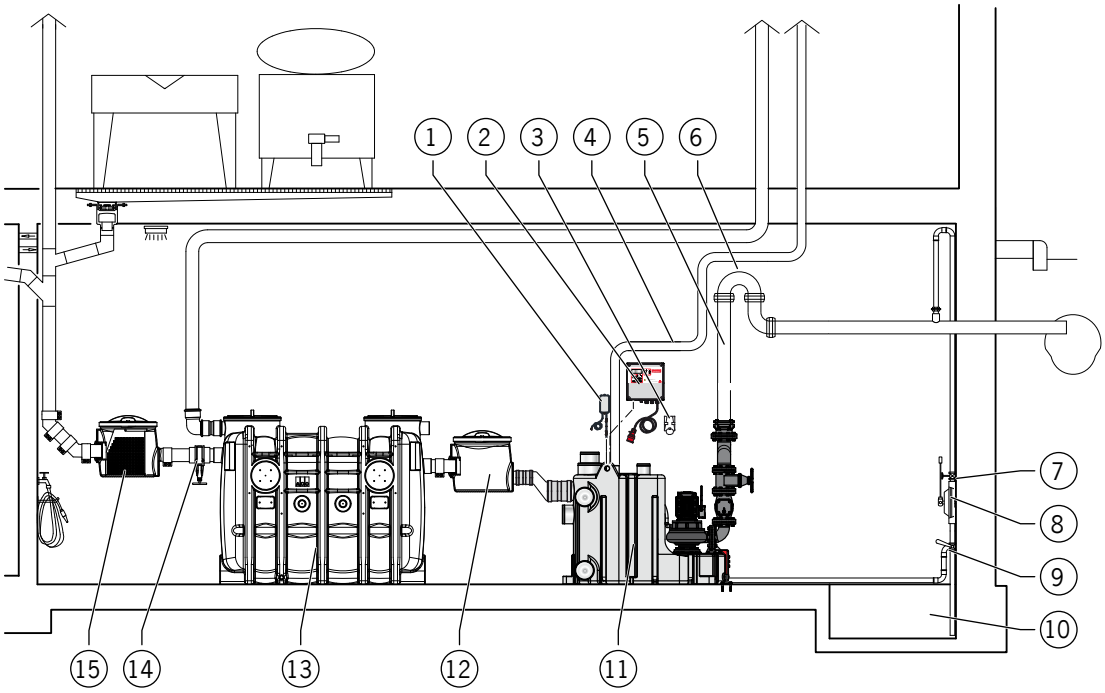


Figure: Wastewater lifting plant downstream of grease separator

1 = Air bubble injection/mini compressor
2 = Pump control-duo
3 = CEE plug (on-site)
4 = Ventilation pipe (on-site)
5 = Pressure pipe (on-site)
6 = Backflow loop (on-site)
7 = Shut-off valve (optional)
8 = Manual diaphragm pump (optional)
9 = Three-way valve (optional)
10 = Pump sump (on-site)
11 = Collection tank
12 = Sampling pot (optional)
13 = Grease separator (optional)
14 = Inlet valve (optional)
15 = Coarse trap (optional)

3.2 Sanitary installation

CAUTION

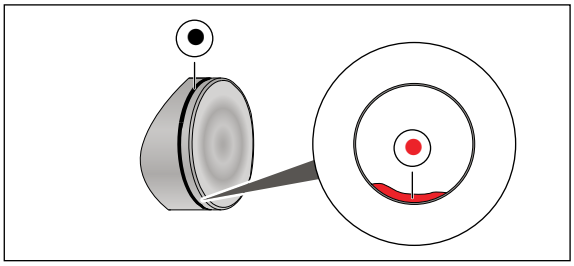
Flooding and risk of infection in case of improper sanitary installation

- Work on the sanitary equipment must only be executed by qualified personnel, Chapter 1.3 "Personnel qualifications".
- All pipes must be installed so that they can drain automatically.
- Conduits may not be constricted in the flow direction.

There are numerous connections on the collection tank for connecting the inlet pipe(s) and connection pipe(s), Chapter 2.5 “Structure of the wastewater lifting plant”. They are all closed and must be opened for possible connection.

Cut open a closed connection socket (●) along the notch provided and deburr the cut edge.

Remove possible material deposits (●) in base area of the sockets.



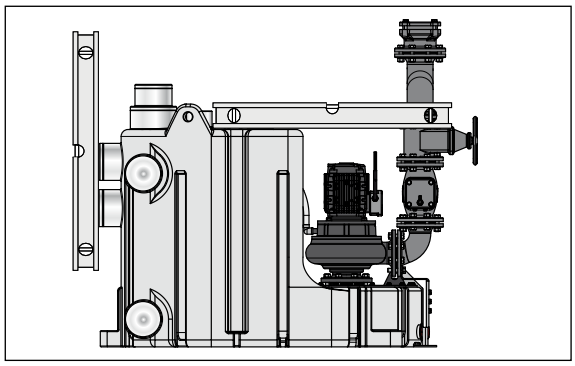
3.2.1 Setting up the wastewater lifting plant

All models

Specifications:

- Frost-protected installation room, sufficient illumination and well ventilated and vented
- Level installation surface with corresponding bearing load. It is not permitted to install the wastewater lifting plant in a lower position.
- Easily accessible for operation, cleaning and maintenance. Surrounding working environment of at least 600 mm.

➔ Align the wastewater lifting plant at the installation site using a spirit level.

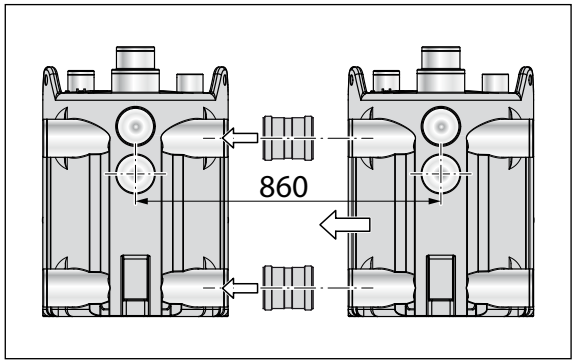


PE K parallel and PE V parallel Models

Two DN 150 double shut-off valve collars are supplied as loose parts in the asdelivered condition.

2 connections are respectively located on the right and left sides of the collection tank for connecting the connection pipes, Chapter 2.5 “Structure of the wastewater lifting plant”.

➔ Grease the spigot ends of the connection pipes and collar seals of the double shut-off valve collars with acid-free lubricant.
➔ Slide the double shut-off valve collars onto the connection sockets of one collecting tank.
➔ Guide the connection sockets of the second collecting tank into the shut-off valve collars and push the two collecting tanks together to a distance of approx. 860 mm.



3.2.2 Installing the shut-off valve in the pressure pipe

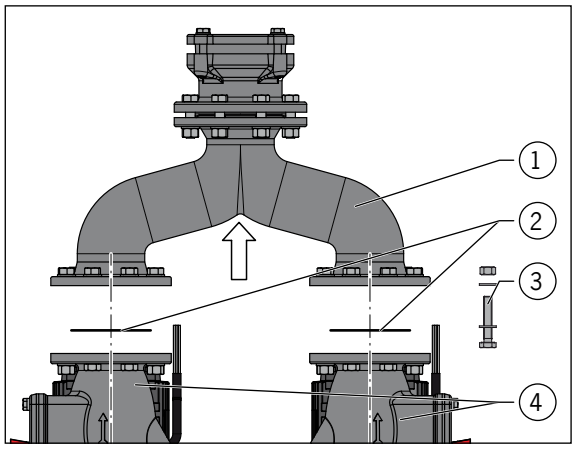
IMPORTANT A DN 80 (DN 100 with Model K-75) shut-off valve must be installed downstream of both backflow preventers in the pressure pipe respectively.

The shut-off valve can be purchased from ACO optionally. A flat seal and a fixing kit, comprising bolts, washers and nuts is included in the shut-off valve scope of delivery.

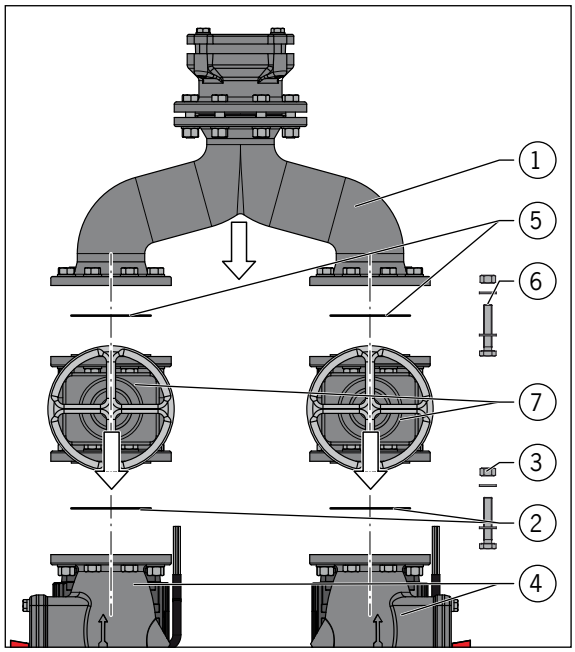
All models except parallel

The “y-branch pipe with special mounting adapter” is assembled on both backflow preventers in the as delivered condition, Chapter 2.5 “Structure of the wastewater lifting plant”.

- Loosen the fixing kits (3) on the connection flanges of the y-branch pipes (1) and the backflow preventers (4).
- Remove the “y-branch pipe with special mounting adapter” unit and store it to one side.
- Leave and/or position the flat seals (2) on the connection flanges of the backflow preventer (4).



- Position the shut-off valve (7) on the connection flanges of the backflow preventer (4) and arrange the drill holes congruently.
- Create the screwed connections with the fixing kit (2), comprising bolts, washers and nuts.
- Position the flat seals (5) on the connection flanges of the backflow preventer (7) and arrange the holes/drill holes congruently.
- Position the “y-branch pipe with special mounting adapter” (1) on the connection flanges of the backflow preventer (7) and arrange the drill holes congruently.
- Create the screwed connections with the fixing kit (6), comprising bolts, washers and nuts.
- Tighten the screwed connections (3 + 6) equally crosswise (maximum 12 N·m).



3.2.3 Assembling the shut-off valve and y-branch pipe (parallel models)

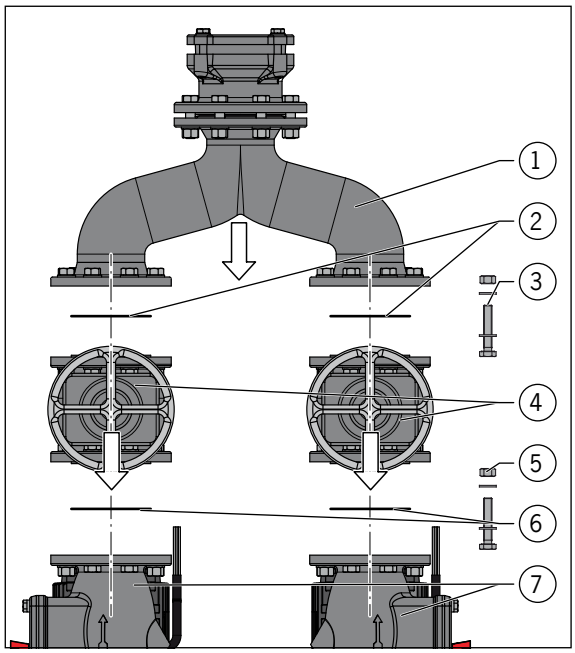
IMPORTANT

- A DN 80 (DIN 100 with K-75 Model) shut-off valve must be installed downstream of both backflow preventers in the pressure pipe respectively.

  The shut-off valve can be purchased from ACO optionally. A flat seal and a fixing kit, comprising bolts, washers and nuts is included in the shut-off valve scope of delivery.

- Implement the assembly of the “y-branch pipe with special mounting adapter” unit after connecting both collection tanks, Chapter 3.2.1 “Setting up the wastewater lifting plant”.

The “y-branch pipe with special mounting adapter” unit, 2x flat seal and 2x fixing kit (bolts, washers and nuts) is supplied loose in the as delivered condition.



- Position the flat seals (6) on the connection flanges of the backflow preventer (7).
- Position the shut-off valve (4) on the connection flanges of the backflow preventer (7) and arrange the drill holes congruently.
- Create the screwed connections with the fixing kit (5), comprising bolts, washers and nuts.
- Position the flat seals (2) on the connection flanges of the backflow preventer (4) and arrange the holes/drill holes congruently.
- Position the “y-branch pipe with special mounting adapter” (1) on the connection flanges of the backflow preventer (4) and arrange the drill holes congruently.
- Create the screwed connections with the fixing kit (3), comprising bolts, washers and nuts.
- Tighten the screwed connections (3 + 5) equally crosswise (maximum 12 N·m).

3.2.4 Connect the inlet line

Specifications:

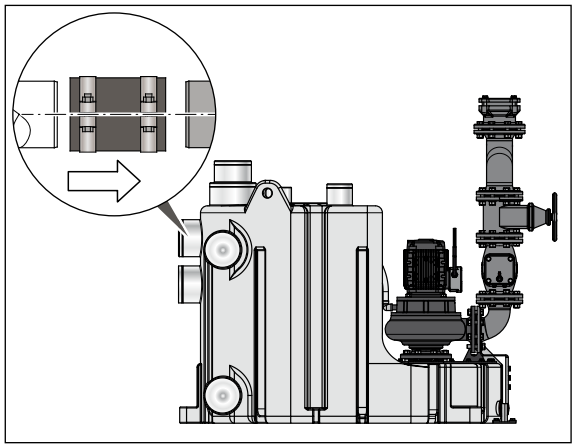
- The pipe cross-section must not reduce in the direction of flow.
- Make flexible pipe joints.
- Install up to the tank with a free gradient of at least 1.5 – 2 %.
- When utilising a hose connector, the inlet pipe and the connection socket in the hose connector must have a distance of at least 10 mm.
- Implement the inlet pipe by utilising resistant material.

All models except VA

There are several connections for the inlet pipe(s) located on the collection tank, Chapter 2.5 “Structure of the wastewater lifting plant”.

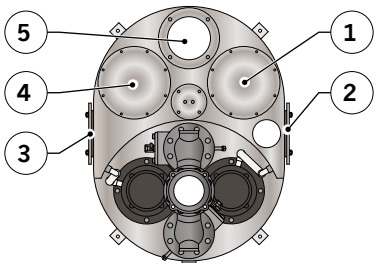
Example with hose connector:

➔ Fix the inlet pipe e.g. with a hose connector on the connection on the collection tank.



Model VA

The following connections are present on the collection tank for connecting the inlet pipe(s):

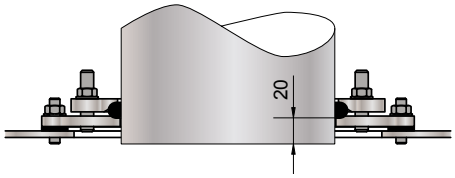


1 = Inlet from above as exchange for inspection cover
2 = Inlet from the side as exchange for blank flange
3 = Inlet from the side as exchange for blank flange
4 = Inlet from above as exchange for inspection cover
5 = Inlet from above with clamp flange

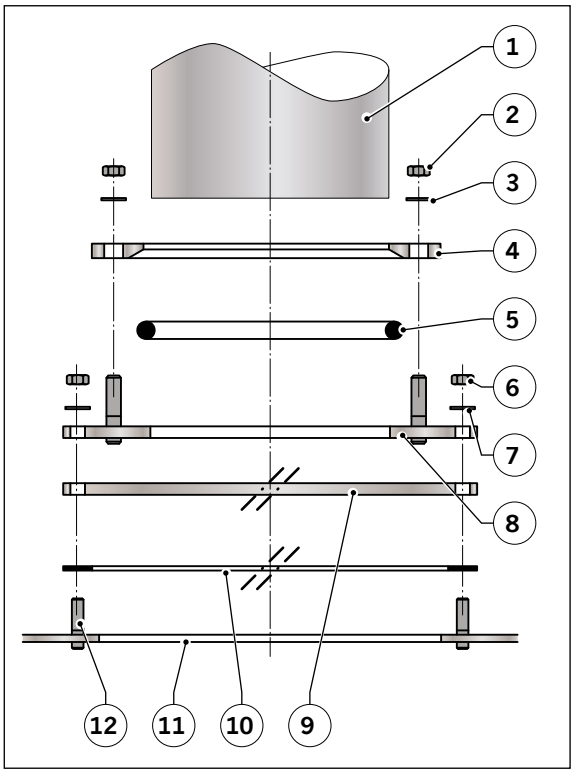
Inlet from above as exchange for inspection cover

A DN 100 and/or 150 accessory kit (transition flange, clamp flange, round section seal, washers and nuts) can be purchased from ACO as an option.

IMPORTANT Spigot ends of the connection pipe (OD 110 mm and/or 160 mm) should protrude by at least 20 mm over the round section seal after connection work.



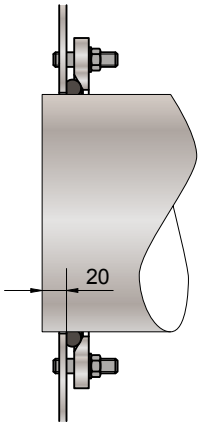
- Loosen the nuts (6) from the stud bolts (12) on the collection tank cover and store to one side.
- Loosen the washers (7) from the stud bolts (12) and store to one side.
- Remove the blank flange (9) store it or dispose of as environmentally friendly.
- Slide the transition flange (8) with hole pattern over the stud bolts (12) and position on the flat seal (10) and/or cover of the collection tank.
- Create screwed connections with the washers (7) and nuts (6) which were stored to one side and tighten equally crosswise (maximum 12 N·m).
- Push the clamp flange (4) over the spigot end of the connection pipe (1).
- Pull the round section seal (5) over the spigot end of the connection pipe (1).
- Push the “connection pipe (1) with clamp flange (4) and round section seal (5)” unit into the opening (11), push the hole pattern of the clamp flange (4) over the stud bolts of the transition flange.
- Create screwed connections with the washers (3) and nuts (2) and tighten equally crosswise (maximum 12 N·m).



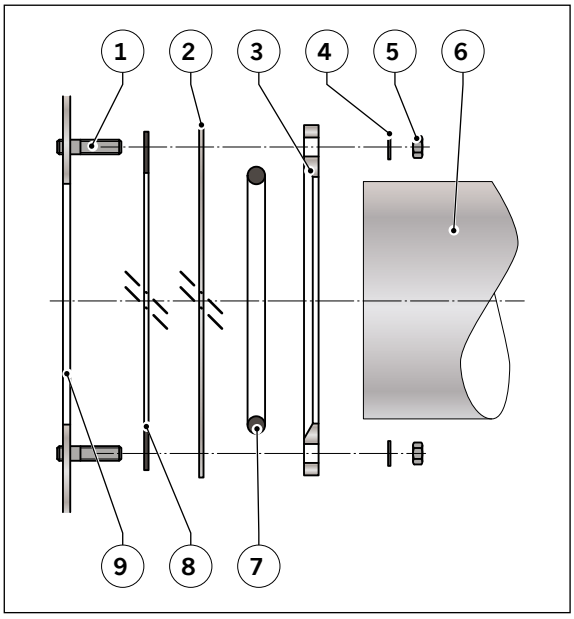
Inlet from the side as exchange for blank flange

Two DN 150 clamp flanges and two round section seals are supplied as loose parts in the as delivered condition.

IMPORTANT Spigot ends of the connection pipe (OD 160 mm) should protrude by at least 20 mm over the round section seal after connection work.



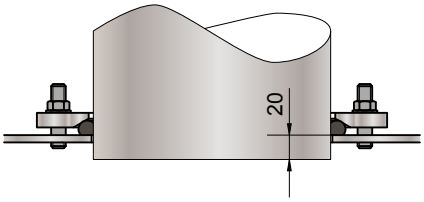
- Loosen the nuts (5) from the stud bolts (1) on the side wall of the collection tank cover and store to one side.
- Loosen the washers (4) from the stud bolts (1) and store to one side.
- Remove the blank flange (2) store it or dispose of as environmentally friendly.
- Remove the flat seal (8) store it or dispose of as environmentally friendly.
- Push the clamp flange (3) over the spigot end of the connection pipe (6).
- Pull the round section seal (7) over the spigot end of the connection pipe (6).
- Push the “connection pipe (6) with clamp flange (3) and round section seal (7)” unit into the opening (9), push the hole pattern over the stud bolts (1).
- Create screwed connections with the washers (4) and nuts (5) and tighten equally crosswise (maximum 12 N·m).



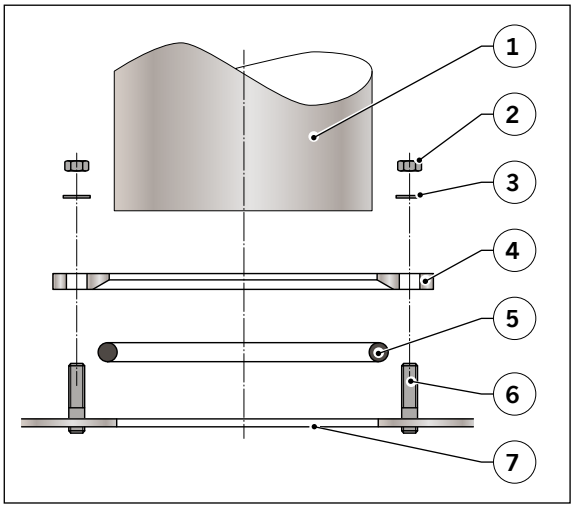
Inlet from above with clamp flange

A DN 100 and/or DN 150 clamp flange and round section seal are assembled on the connection opening on the collection tank in the as delivered condition.

IMPORTANT Spigot ends of the connection pipe (OD 110 mm and/or 160 mm) should protrude by at least 20 mm over the round section seal after connection work.



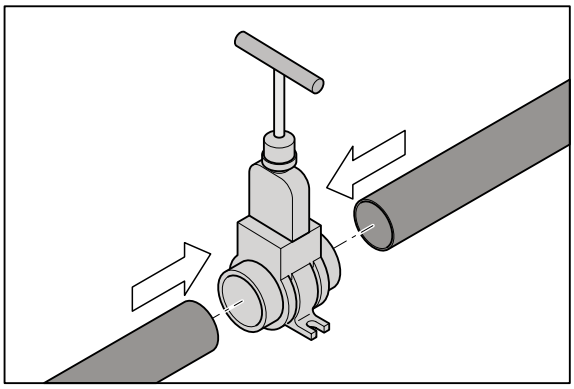
- Loosen, screw out the nuts (2) from the stud bolts (6) on the cover of the collection tank cover and store to one side.
- Loosen the washers (3) from the stud bolts (6) and store to one side.
- Push the clamp flange (4) over the spigot end of the connection pipe (1).
- Pull the round section seal (5) over the spigot end of the connection pipe (1).
- Push the “connection pipe (1) with clamp flange (4) and round section seal (5)” unit into the opening (7), push the hole pattern over the stud bolts (6).
- Create screwed connections with the washers (3) and nuts (2) and tighten equally crosswise (maximum 12 N·m).



3.2.5 Installing the inlet shut-off valve (optional)

The inlet valve can be purchased from ACO optionally.

- Grease the spigots of the inlet pipe with an acid-free lubricant.
- Push the insert socket of the inlet valve onto the inlet line.
- Push the other end of the inlet pipe into the inlet socket of the inlet shut-off valve.



3.2.6 Connecting the ventilation pipe

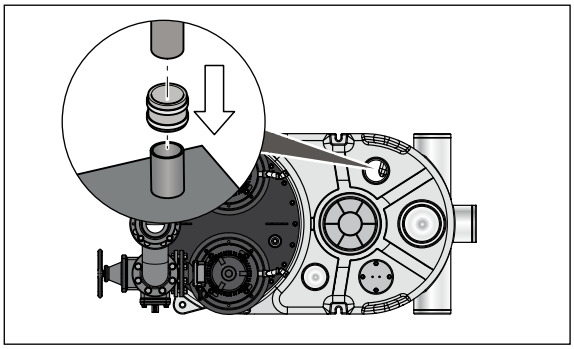
Specifications:

- Ventilation pipes for both collection tanks can be implemented in one pipe (parallel plants)
- Route the ventilation pipe with a constant cross-section as continuously upwards to above the roof. The ventilation pipe may be fed into both the main vent stack and in the secondary vent stack.
- The ventilation pipe must not be connected to the vent stack on the inlet side of a grease separator.
- When utilising a hose connector, the inlet pipe and the connection socket in the hose connector must have a distance of at least 10 mm.

There is a connection for the inlet pipe located on the collection tank, Chapter 2.5 “Structure of the wastewater lifting plant”.

Example with hose connector:

➔ Secure the ventilation pipe e.g. with a hose connector on the connection on the collection tank.



3.2.7 Connecting the pressure line

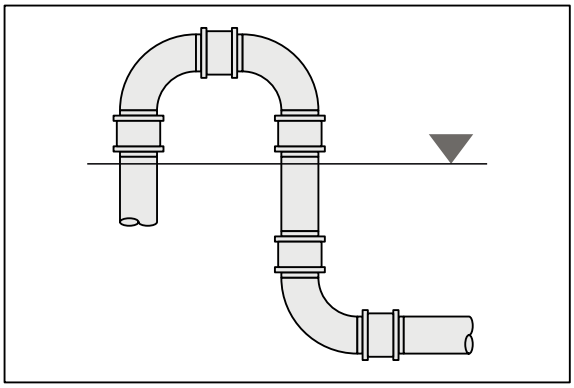
Creating the backflow loop in the pressure pipe

The wastewater lifting plant must have a backflow drain. The backflow loop must be established above the backflow level.

Definition of terms:

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

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



Connecting the pressure line

The special mounting adapter enables the elastic connection for OD 108 – 114 mm on site pressure pipes.

Utilising another sealing ring enables the connection of an OD 88 – 90 mm pressure pipe. A sealing ring can be purchased from ACO as an option.

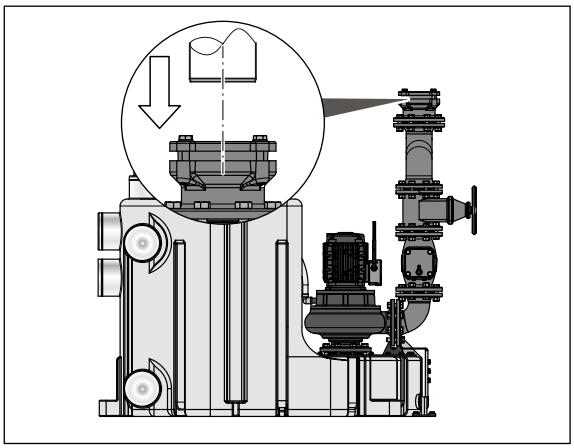
Specifications:

- The pressure pipe must be designed for at least 1.5 times the pump pressure.
- Lay the pressure pipe so that it rises continuously and is frost-resistant.
- The flow velocity in the pressure pipe must not fall below 0.7 m/s and must not exceed 2.3 m/s.
- Never connect other pipes to the pressure pipe.
- Air admittance valves are not allowed in the pressure pipe.
- The pressure line may not stand up in the special mounting adapter.

There is a connection for the pressure pipe located on the collection tank, 📖 Chapter 2.5 “Structure of the wastewater lifting plant”.

➔ Insert the pipe (OD 108 – 114 mm) through the flange ring and the sealing ring and push it approx. 50 mm into the special mounting adapter.

➔ Tighten the M 12 bolts equally crosswise (maximum 15 N·m).



3.2.8 Connecting the emptying pipe (optional)

All models except VA

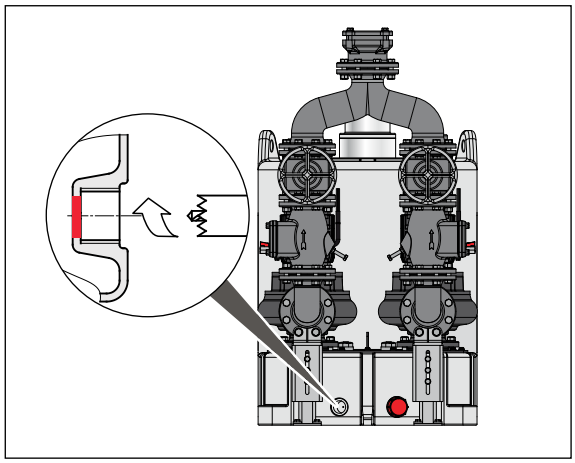
A possibility for connecting an emptying pipe is provided on the collection tank, Chapter 2.5 “Structure of the wastewater lifting plant”.

- Rp 1½“ connection collar

The connection collar is closed and must be opened for possible connection.

➔ Drill open the closed collar base using a lock saw (maximum Ø 36 mm).

➔ Insert the on-site emptying pipe into the threaded collar and seal it.



3.2.9 Connecting the manual diaphragm pump (optional)

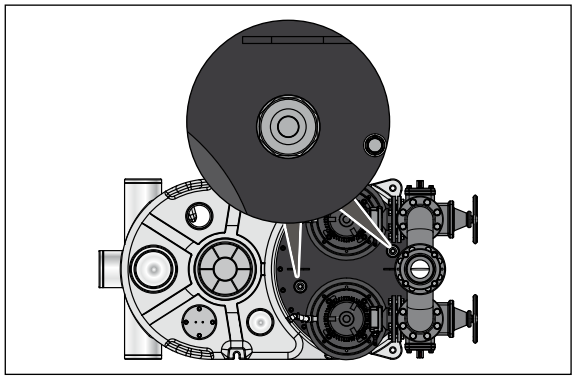
All models except VA

Two possibilities for connecting a manual diaphragm pump are provided on the collection tank, Chapter 2.5 “Structure of the wastewater lifting plant”.

Both Rp 1½“ connection collars are closed with plugs and must be opened for possible connection.

A manual diaphragm pump can be purchased from ACO as an option.

➔ Remove the plugs (store to one side) and seal the suction pipe of the manual diaphragm pump into the threaded collar.



3.2.10 Securing the wastewater lifting plant

All models

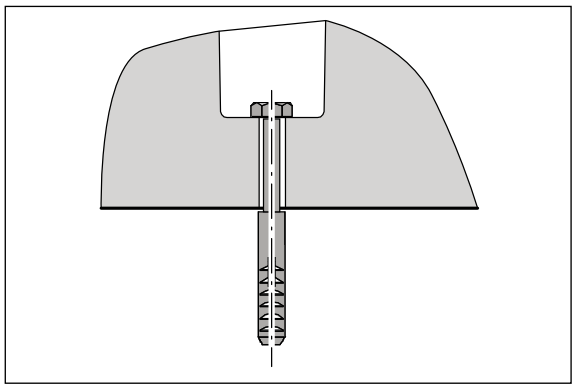
Shaped and/or welded on fixing straps are located on the collection tank, Chapter 2.5 “Structure of the wastewater lifting plant”.

A fixing kit is supplied as loose in the as delivered condition.

Specifications:

- Wastewater lifting plants must be installed in a way that ensures no twisting or tension.
- Wastewater lifting plants must be attached to prevent buoyancy.

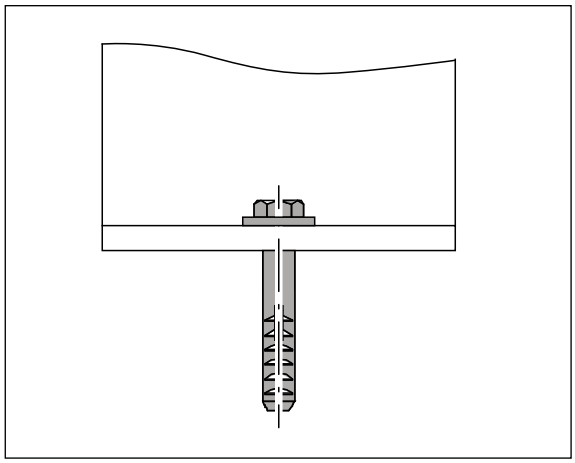
→ Mark the drill holes.
→ Execute the drill holes (Ø 12 mm, depth: 60 mm) on the marked positions.
→ Suck out the drill holes and insert dowel anchors.
→ Insert wood screws with plain washers in the fixing straps and/or drill holes and tighten them as hand tight.



Model K

IMPORTANT In addition to the fixing straps, the support feet of this pump model must also be fixed on the ground to provide load compensation. A fixing kit is supplied as loose in the as delivered condition.

→ Mark the drill holes.
→ Execute the drill holes (Ø 12 mm, depth: 60 mm) on the marked positions.
→ Suck out the drill holes and insert dowel anchors.
→ Insert wood screws with plain washers in the support feet and/or drill holes and tighten them as hand tight.



3.3 Electrical installation

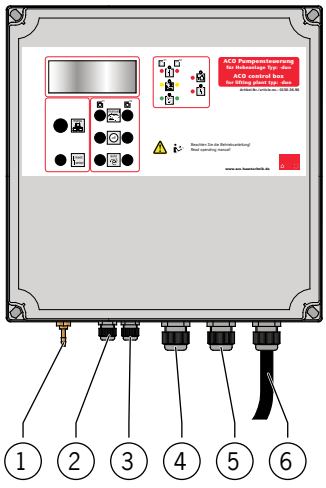
WARNING

Electric shock risk in case of improper electrical installation

- The pump control duo must not be connected to the power supply until after the sanitary installation, electrical installation and power supply have been completed.
- Electrical connections may only be executed by qualified electricians.
- The power supply must comply with the directives of the local power supplier. In particular, attention should be paid to the specific protection measures and the cable cross-sections and potential compensation.
- Electrical connections must be executed in accordance with the circuit diagram, Chapter 6.4.3 “Circuit diagram”.

3.3.1 Connections of the pump control duo

The electrical cables are already connected to the connection terminals of the pumps and the pump control duo in the as delivered condition.



1 = Connection control line level switching
2 = Connection power supply mini compressor
3 = Fault signal device connection (optional)
4 = Pump 1 power supply connection
5 = Pump 2 power supply connection
6 = Connection for power supply to pump control duo

3.3.2 Installing the pump control duo

Specifications:

- Flood-proof assembly location
- Space requirement: Minimum = 400 x 500 mm (W x H)
- Distance to collection tank less than 7 m (connecting cable of the pumps, respectively 7 m long, control unit cable 7 m long)

➔ Install the pump control duo using on-site fixing material.

3.3.3 Installing the on-site power sockets and connecting to the power supply

IMPORTANT Malfunction when utilising unsuitable CEE plug socket

Specifications:

- Flood-proof assembly location close to pump control duo (connecting cable of the pump control duo is 1.5 m long)
- Space requirement for CEE plug socket according to manufacturer´s instructions
- 16 A CEE plug socket (Models: up to K-22, V-22, 1.2 + 2.2 VA)
  - Connecting value of 400 V/50 Hz
  - Right rotating field
  - Network-side fuse maximum 3 x 16 A time lag
- 32 A CEE plug socket (Models: up to K-30, V-30, 1.3 + 2.3 VA)
  - Connecting value of 400 V/50 Hz
  - Right rotating field
  - Network-side fuse maximum 3 x 25 A time lag
  - Network-side fuse maximum 3 x 32 A time lag (Models K-55 and K-75)

➔ Install the CEE plug socket in accordance with the manufacturer's instructions.

3.3.4 Laying the pump connection cable and clamping it

Connection cable for pumps in as delivered condition:

- Respectively 7 m long
- Clamped on terminals in connection space in the pumps
- Clamped on terminals in connection space in the pump control duo.
- Layed in loops on the collection tank and are secured with cable ties.

IMPORTANT

- The ends of the wire are labelled. There is a risk of short circuits if the wires are confused.
- If the connecting cable has to be shortened, then transfer the identification of the wires.
- Check that the pump motor turns in the right direction.

➔ Adjust the length of the connecting cable or hang in loops and attach.

➔ Inspect the rotational direction of the pumps:

- ☐ Switch on pump and switch off again immediately.
- ☐ The rotational direction is only correct when the shaft (as viewed from outside) rotates in the specified direction (rotation arrow).

3.3.5 Connect fault message device (optional)

A cable (2-wire/0.75 mm²) must be connected in the pump control duo in order to forward the potential-free contact as a group malfunction alarm. A cost-effective continuous light can be used instead of a flashing light.

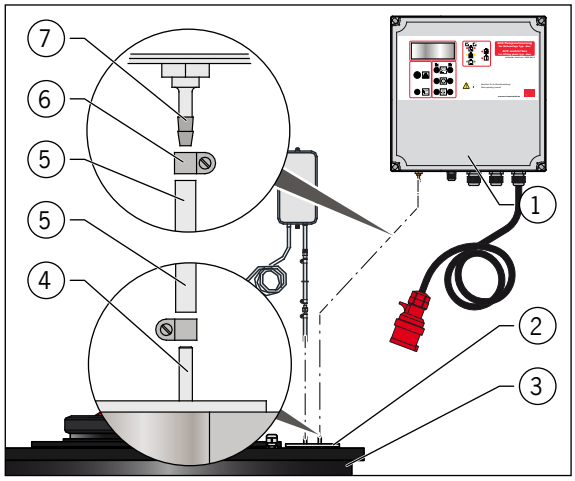
3.3.6 Connecting the control line to the level switching

IMPORTANT To prevent malfunctions: Always lay the control cable to the pump control duo as rising upwards and frost-resistant.

The control cable (5, 7 m long) for the level switching is already connected to the connection nipple (4) of the connecting flange (2) on the collection tank (3) in the as delivered condition.

➔ Push the hose clamp (6) over the end of the hose (5) of the control cable.

➔ Push the hose end (5) onto the hose bush (7) of the pump control duo (1) and fix it by utilising a hose clamp (6).



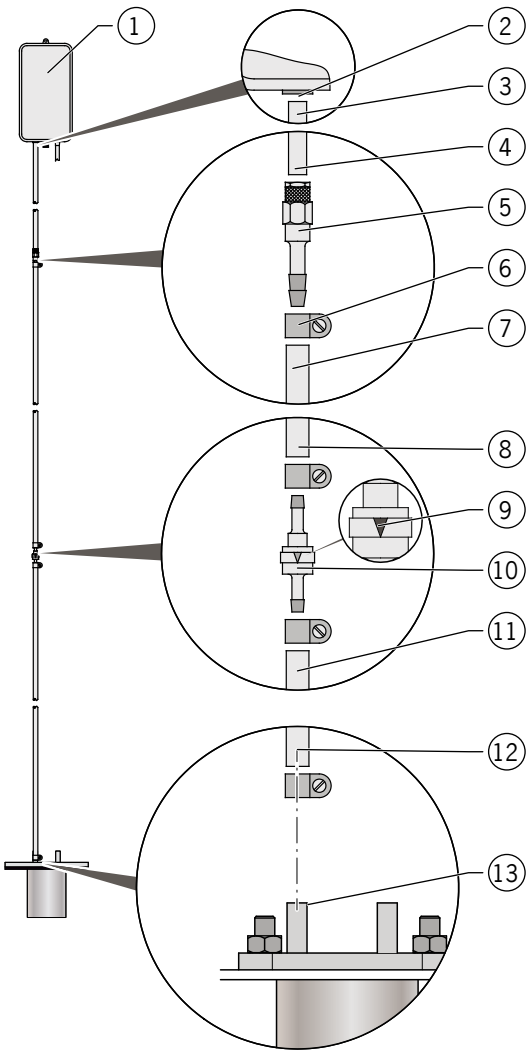
3.3.7 Installing the mini compressor

Install the mini compressor, lay and connect the hose cable

In normal cases, the hose cable for the air bubble injection is already connected to the connecting flange of the pneumatic pipe and the mini compressor in the as delivered condition.

Specifications

- The assembly location of the mini compressor must be easily accessible for the operator
- Space requirement: Minimum = 200 x 200 mm (W x H)
- Distance to collection tank less than 10 m
- Distance to pump control duo less than 5 m



➔ Assemble the mini compressor (1) on a wall close to the pump control duo in a flood-proof manner.

➔ Push hose clamp (6) over the end (12) of the 9.5 m long hose.

➔ Push the hose end (12) onto the connection nipple (13) and fix it by utilising a hose clamp (6).

➔ Push the hose clamp (6) over the other end of the hose (11).

➔ Push the hose end (11) onto the hose bush of the spring check valve (10), in the installation direction (9), and fix using a hose clamp (6).

➔ Push hose clamp (6) over the end (8) of the 500 mm long hose.

➔ Push the hose end (8) onto the hose bush of the spring check valve (10) and fix using a hose clamp (6).

➔ Push the hose clamp (6) over the other end of the hose (7).

➔ Push the hose end (7) onto the hose bush (5) and fix using a hose clamp (6).

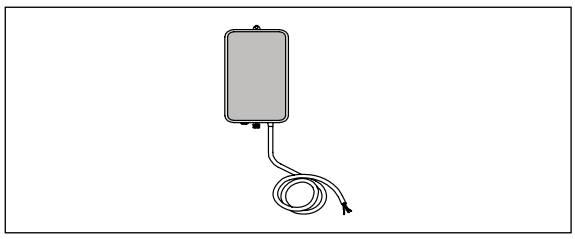
➔ Insert the hose end (4, 100 mm long) into the retainer of the screw connection (5) and clamp.

➔ Push the end of the hose (3) over the retainer (2) of the mini compressor (1).

3.3.8 Connecting the mini compressor on the pump control duo

The connecting cable is 5 m long and is already connected to the mini compressor on delivery.

- ➔ Strip the ends of the cables and fit on wire-end ferrules.
- ➔ Unscrew the cover of the pump control duo.
- ➔ Clamp the cable ends.

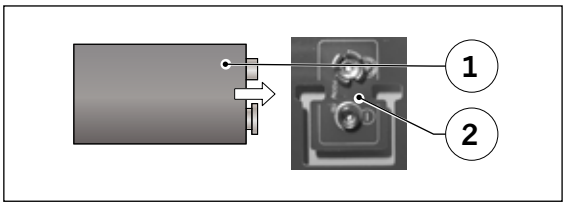


3.3.9 Inserting the accumulator into the pump control duo

If the power supply is interrupted, the accumulator guarantees a mains-independent alarm. Once the accumulator is inserted, the alarm is automatically activated.

IMPORTANT
Damage to the pump control duo: Only utilise an original accumulator from ACO,
📖 Chapter 6.3 “Pump control duo”.

- ➔ Unscrew the cover of the pump control duo.
- ➔ Insert the accumulator (1) at point (2) on the circuit board.

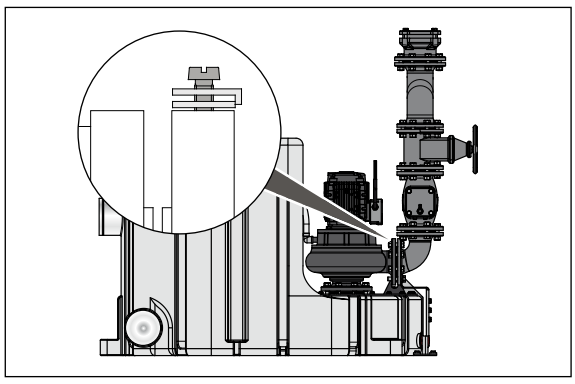


3.3.10 Connecting the equipotential bonding

IMPORTANT A one-wire cable can be utilised as equipotential bonding, when this is permitted in EX-Areas. The cross section must be selected according to locally applicable provisions from the EVU and/or the operator.

Terminal screws are provided on the pressure sided connection flange of every centrifugal pump for connecting the equipotential bonding.

- ➔ Connect the on-site equipotential bonding.



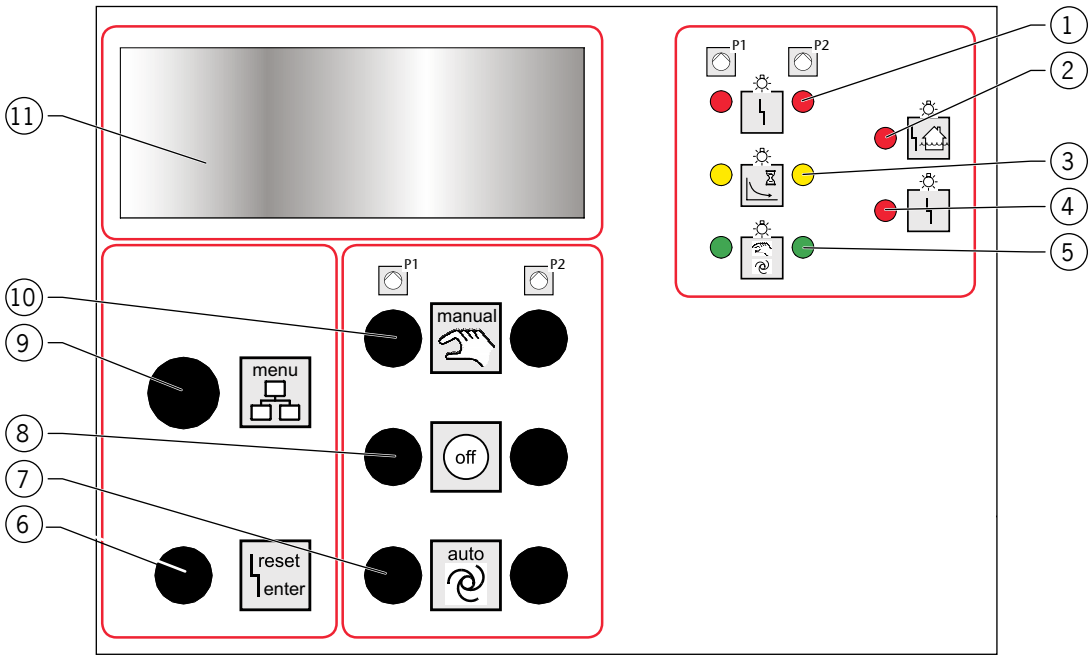
4 Commissioning

A qualified person must execute the commissioning according to DIN EN 12056-4.
The commissioning must be documented, 🕮 Appendix: “Commissioning record”.

4.1 Pump control duo

Pump control duo is utilised for all models except K-15 to K-75.

4.1.1 Controls and display elements

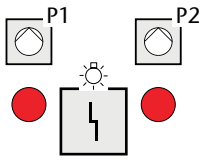
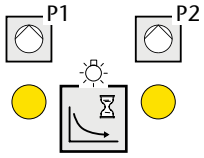
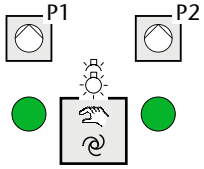
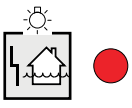
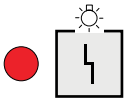


1 = LED illuminates: Automatic malfunction P1 and/or P2
2 = LED illuminates: High Water (collection tank full)
3 = LED illuminates: Mode P1 and/or P2
LED flashes: After run P1 and/or P2
4 = LED illuminates: Group alarm/malfunction, e.g. incorrect rotating field
5 = LED illuminates: Automatic mode P1 and/or P2
LED flashes: Manual mode P1 and/or P2
LED flashes irregularly: Manual mode will be terminated automatically after approx. 2 minutes.
6 = Button: Acknowledgement of the malfunction/ value settings
7 = Button: Automatic mode AN P1 and/or P2
8 = utton: Operation OFF P1 and/or P2
9 = Rotary knob: Select menu items
10 = Button: Manual mode AN P1 and/or P2
11 = Display panel

Function of the controls

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

Explanation of the display elements

LED display	Meaning	Explanation
	Pump P1 or P2 malfunction	Malfunction Pump(s) not in operation
	Operating display for Pump P1 or P2	LED illuminates: Pump(s) in operation LED flashes: Pump(s) in operation via the after-running function
	Pump P1 or P2 operation mode	LED illuminates: Automatic mode LED flashes irregularly: Manual mode LED flashes irregularly: Manual operation was switched off automatically after approx. 2 minutes
	High Water	The water level in the tank has reached the “High Water” level
	Group alarm	Error messages, e.g. in case of excessive power consumption, wrong rotating field

4.1.2 Menu items and settings

Display panel

Messages in the display panel:

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

Overview of the menu items and settings

Top row (menu item)	Bottom row (settings)	Explanation
Last Fault	Delete value	Fault signal remains saved ‘zero voltage-proof’.
Next inspection	90 days 180 days 360 days	Specification of the maintenance intervals
Base load ON	0 – 100 cm	Activation point for first Pump 1
Base load OFF	0 – 100 cm	Switch-off point for first Pump 1
Peak load ON	0 – 100 cm	Activation point for additional pump
Peak load OFF	0 – 100 cm	Deactivation point for additional pump
High Water	Do not observe 0 – 100 cm	High Water is deactivated High Water for overstepping
Run. Time max.	0 – 60 min.	Value ‘0’ deactivates the function. if the pump is operated without interruption, it is automatically shut down after the set Run Time Max. The pump does not start up again until the defect has been acknowledged.
Run. Time altern.	Is switched off 1 – 60 min.	After the set time in base load operation a pump change takes place. After three changes without interruption the “High Water” is also triggered and the “Run. Time altern.” message appears in the display.
Stop delay	0 – 180 sec.	Stop delay of the pump after the switch-off point has been reached.
Max. current-1	0.3 – 12.0 A	Pump P1 is shut down automatically when the power consumption is exceeded. The message ‘overcurrent’ appears in the display field.
Max. current-2	0.3 – 12.0 A	Pump P2 is shut down automatically when the power consumption is exceeded. The message ‘overcurrent’ appears in the display field.

Top row (menu item)	Bottom row (settings)	Explanation
Force activation	Is switched off 1 – 10 sec.	Duration of the automatic activation of the pumps, if the pumps have not been operated for longer than 24 hours.
Accoustic alarm	Is switched off Is activated	Activated: An alarm sounds in the event of a malfunction.
Intermitt. Alarm	Is switched off Is activated	Activated: Malfunction message relay will be cycled.
Pump alternation	Is switched off Is activated	Activated: Pump alternation with every restart.
Rot.field fault	Is switched off Is activated	If the phase sequence is incorrect, or there is no L2 and/ or L3, the group alarm is triggered.
Service mode	Is switched off Is activated	Switched off: Settings are shown, but cannot be amended. Activated: Settings can be amended.
Language	German English ...	Selection of the language for the menu.

4.1.3 Changing the settings

Notes:

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

Procedure:

➔ Turn rotary knob 

until the required menu item is displayed.

➔ Press 

button. The most recently saved setting begins to flash.

➔ Turn rotary knob 

, to change the setting (fast turning for a rough setting, slow turning for a fine setting).

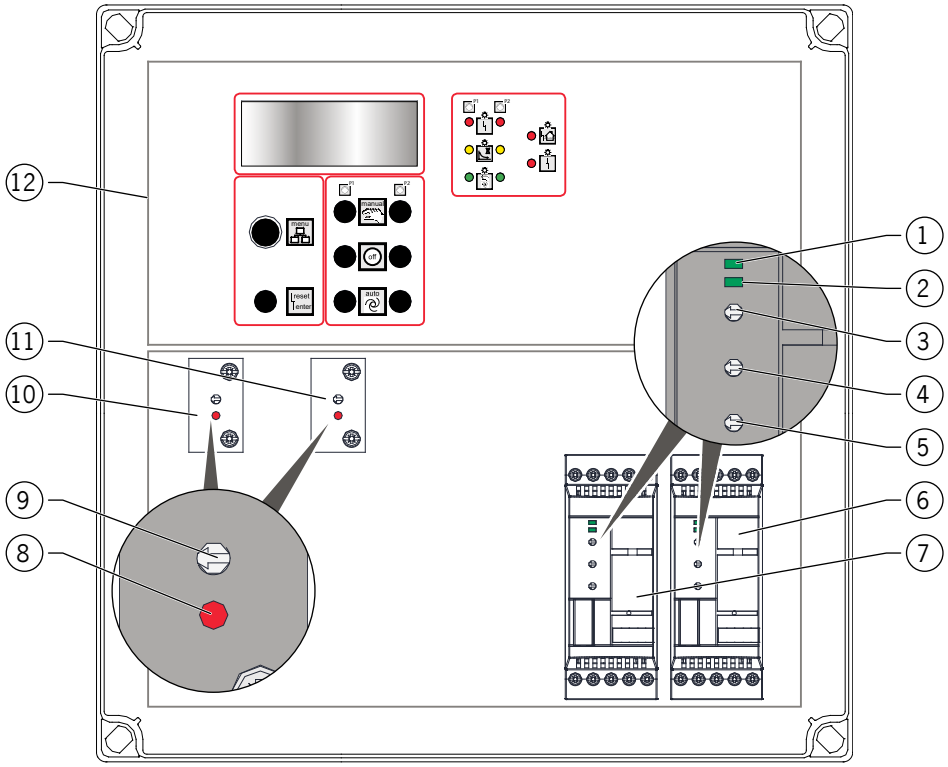
➔ Press 

button to save the setting.

4.2 Pump control duo with soft start up

Pump control duo is utilised with soft start up for all K-15 to K-75 models.

Controls and display elements



1 = LED: ON/Ready *
2 = LED: RUN/TOR *
3 = Rotation regulator: Start time *
4 = Rotation regulator: Stop time *
5 = Rotation regulator: Start voltage (UINI) *
6 = SAA relay: Pump 2 *
7 = SAA relay: Pump 1 *
8 = LED: Operation *
9 = Rotation regulator: Runtime *
10 = Stop relay: Pump 1 *
11 = Stop relay: Pump 2 *
12 = Operating and display elements, Chapter 4.1 “Pump control duo”.

* Arranged below the front plate

4.3 Commissioning settings

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

4.3.1 Pump control duo with and without soft start up

Menu point	Setting values	Settings with delivery Model					Settings/adjustment with commissioning
		-VA duo		-PE K and V Inlet			
		1.x	2.x	Z1	Z2	Z3 and from above	
Next inspection	90 days 180 days 360 days	90					
Base load ON	0 – 100 cm	31	61	37	52	57	
Base load OFF	0 – 100 cm	8	8	8	8	8	
Peak load ON	0 – 100 cm	36	66	42	57	62	
Peak load OFF	0 – 100 cm	34	64	39	54	59	
High Water	Do not observe 0 – 100 cm	41	71	47	62	67	
Run. Time max.	0 – 60 minutes	0					
Run. Time altern.	1 – 60 minutes	2					
Stop delay	0 – 180 sec.	15					
Max. current-1	0.3 – 12.0 A	Nominal current, 🕮 Chapter 6.1.1 “Characteristic Data”.					
Max. current-2	0.3 – 12.0 A						
Language	German English ...	German					

4.3.2 Soft start up

	Runtime Stop relay Pump		Start time SAA relay Pump		Stop time SAA relay Pump		UINI SAA relay Pump	
	P1 [Sec.]	P2 [Sec.]	P1 [Sec.]	P2 [Sec.]	P1 [Sec.]	P2 [Sec.]	P1 [%]	P2 [%]
Settings with delivery	8	8	6	6	6	6	50	50
Settings/adjustment with commissioning								

4.4 Execute test run

Requirements:

- Installation is completely concluded.
- Shut-off valve in inlet and pressure pipes is opened.
- The pump control duo is connected to the power supply.

During the trial run, pay attention to the following:

- Perform the trial run at least twice during commissioning.
- Carry out a test run with drinking water.
- Prevent dry running of the centrifugal pumps.
- Observe the messages in the display panel.

- Control the soft start up for the centrifugal pumps on the display elements of the pump control duo with soft start up (for models K-15 to K-75):

Water level and/or start-up stage	Pump mode	Displays for control				Displays for stop relay		Displays for SAA relay			
		P1 *		P2 *		P1 *	P2 *	P1 *		P2 *	
		LED ●	LED ●	LED ●	LED ●	LED ●	LED ●	ON/Ready ▮	Run/TOR ▮	ON/Ready ▮	Run/TOR ▮
< GL	OFF	⊗	○	⊗	○	○	○	□	▭	□	▭
GL	Soft start up	⊗	⊗	⊗	○	⊗	○	⊠	□	□	▭
GL – GL OFF	Full load	⊗	⊗	⊗	○	⊗	○	⊠	⊠	□	▭
GL OFF – NLZ OFF/ Stop delay	Full load	⊗	◐	⊗	○	⊗	○	⊠	⊠	□	▭
GL OFF – NLZ OFF/ Expiry time	Soft start expiry	⊗	⊗	⊗	○	⊗	○	⊠	□	□	▭
NLZ OFF	End	⊗	○	⊗	○	○	○	□	▭	□	▭

○ and/or ▭ = LED OFF
⊗ and/or ⊠ = LED illuminates permanently
◐ and/or □ = LED flashes

* Interchanging mode for Pump P1 and P2 (display then reversed from P1 to P2)

IMPORTANT

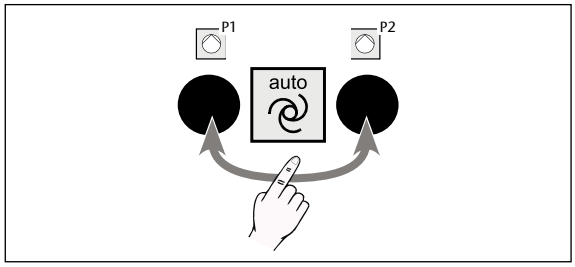
- If knocking noises/vibrations occur in the pressure pipe when the pump is switched off, then the “Stop delay” must be increased.
- If loud operating noises of the pumps and/or knocking noises in the pressure pipe occur during the test run, then the factory settings for the soft start up can be adjusted in consultation with ACO Service (for models K-15 to K-75).
- Water level at “Stop Delay OFF” (control via inspection opening):

  The lower edge of the pneumatic pipe is 30 mm below the waterline.

The **collection tank** can be filled via the inlet pipe or via the inspection opening.

Starting automatic mode:

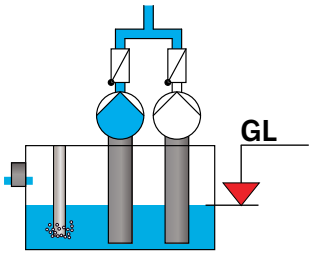
➔ Press both buttons to start automatic operation of Pump 1 and 2.



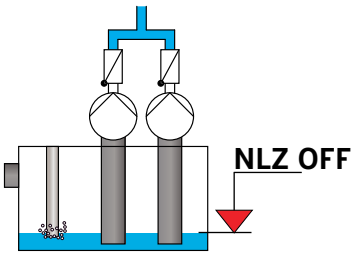
➔ Fill the collection tank.

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

➔ Interrupt the inlet.



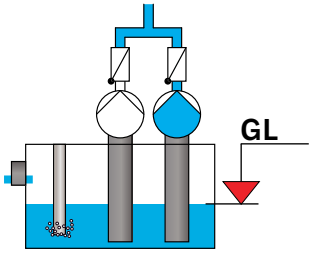
When the water reaches the “Base load OFF” level, the water level is reduced by the after-running period to the level “Stop delay OFF” (NLZ OFF) pump. Then the Pump 1 switches off.



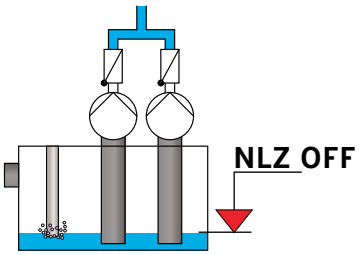
➔ Fill the collection tank.

When the water level reaches the “Base load” (GL) level, Pump 2 switches on.

➔ Interrupt the inlet.



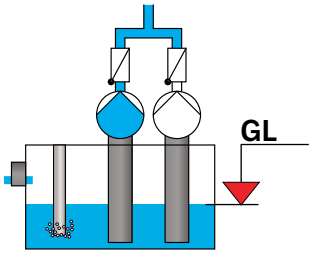
When the water reaches the “Base load OFF” level, the water level is reduced by the after-running period to the level “Stop delay OFF” (NLZ OFF) pump. Then Pump 2 switches off.



➔ Fill the collection tank.

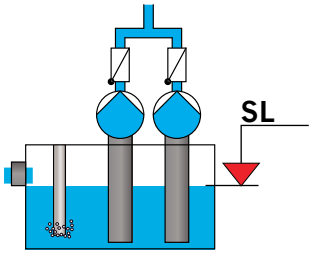
When the water level reaches the “Base load” (GL) level, Pump 1 switches on.

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

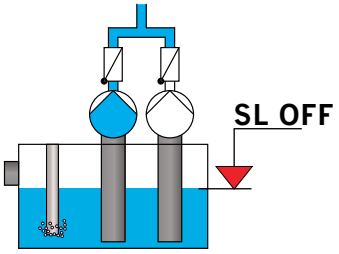


When the water level reaches the “Peak load” (SL) level, Pump 2 also switches on.

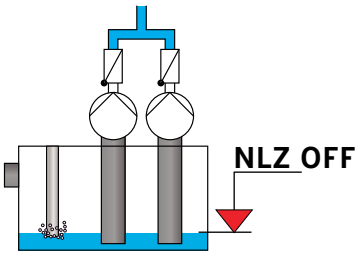
➔ Interrupt the inlet.



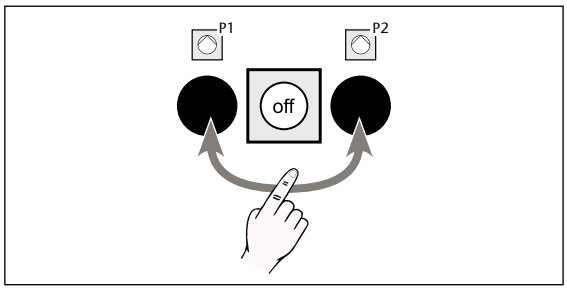
When the water level reaches the “Peak load OFF” (SL OFF) level, Pump 2 switches off.



When the water reaches the “Base load OFF” level, the water level is reduced by the after-running period to the level “Stop delay OFF” (NLZ OFF) pump. Then the Pump 1 switches off.

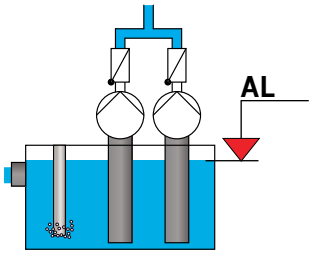


Terminating automatic mode:
Press both buttons in order to end automatic mode of Pump 1 and 2.



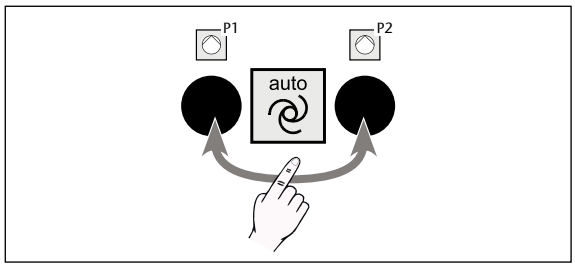
➔ Fill the collection tank.

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

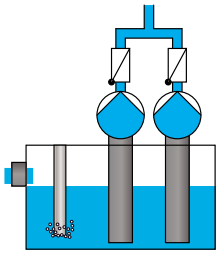


➔ Interrupt the inlet.

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



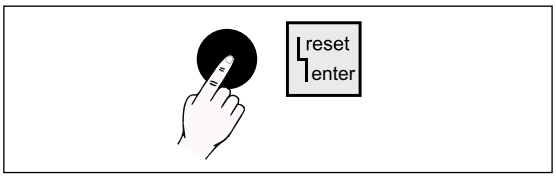
Both pumps switch on. Water drops to below water level “AL”.



Acknowledging a malfunction:

➔ Press the button to acknowledge the malfunction.

A malfunction signal is no longer displayed and the LED for the “High Water” goes out:



The trial run is finished

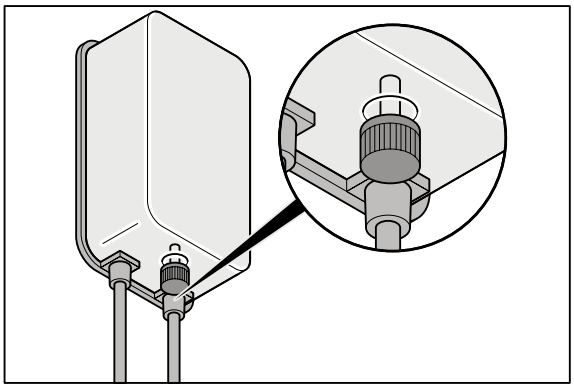
Final work:

- Set the air bubble injection 🕮 Chapter 4.5 “Setting air bubble injection”
- Document the settings, 🕮 Chapter 4.3 “Commissioning settings”
- Document the commissioning, 🕮 Appendix: “Commissioning report”

4.5 Setting the air bubble injection

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

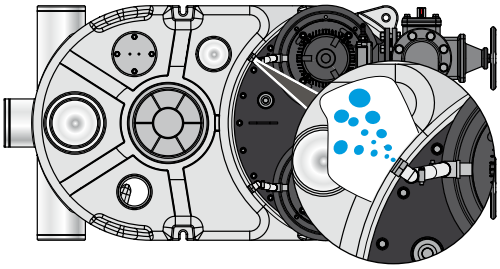
➔ Use the screw on the mini compressor to set the air bubble injection so that only a few air bubbles escape at the end of the pneumatic pipe (check via inspection opening).



4.6 Automatic venting of the volute casing

The volute casing vents independently during operation and protects the centrifugal pumps against damage.

The water-air mixture sprays out of the ventilation pipe into the collection tank.



5 Troubleshooting

WARNING

Electric shock

- Work on electrical connections must only be executed by qualified electricians.
- Disconnect the pump control duo from the power supply before troubleshooting.

CAUTION

Flooding and risk of infection in case of improper sanitary installation

- Work on the sanitary equipment must be carried out by qualified personnel only, Chap. 1.3 "Personnel qualifications".
- Only use original spare parts.
- Have wastewater lifting plant repairs carried out by ACO or an ACO Service partner, page 3 “ACO Service”.
- Avoid contact with wastewater and wear protective equipment, Chap. 1.4 "Personal protective equipment".
- Do not carry out work on the connections and pipes unless they are depressurised.

Burns due to hot surfaces

- Allow the pump motors to cool.

IMPORTANT

Acoustic alarm with power failure and High Water

- Always interrupt the wastewater feed and remedy the causes.

Malfunctions on the wastewater lifting plant

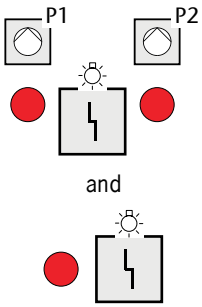
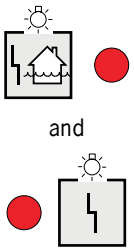
No claim is made that the list is complete.

Malfunction	Cause(s)	Actions
Pump does not deliver or pumps too little or the tank is full	Shut-off valve in the pressure pipe is not fully open and/or is closed	Fully open the shut-off valve or stop valve in the pressure pipe
	Pressure pipe obstructed	Clean the pressure pipe
	Impeller (pump) obstructed	Pump maintenance required (ACO Service)
	Pump parts are worn	Pump repair required (ACO Service)

Malfunction	Cause(s)	Actions
Pump does not operate	Pump motor is defective	Pump replacement required (ACO Service)
	Pump blocked by foreign bodies	Pump maintenance required (ACO Service)
	Power supply interrupted	Control the electrical connections to power supply Reinstate the power supply
	Automatic mode is switched off	Switch on automatic mode
	Pump overload protection has tripped. Malfunction cannot be acknowledged	Pump maintenance or repair required (ACO Service)
Pump only runs in manual operation	Control pipe of the level switching is leaking, incorrectly laid, kinked or obstructed	Check the control pipe
	Pneumatic pipe obstructed	Clean the pneumatic pipe
Knocking noises/vibrations in the pressure pipe on switching off the pump(s)	Stop delay of the pump(s) is too low	Increase the after-running period of the pump(s)
Loud operating noises in the pump and/or impacting noises/vibrations in the pressure pipe	Settings for soft start up not correct	Adjust the settings for soft start up in consultation with ACO Service

Malfunctions on the pump control duo

No claim is made that the list is complete.

Display panel	LED display(s)	Cause(s)	Actions
Maximum current		Exceeding of the maximum current consumption Pump possibly blocked by foreign bodies	Pump maintenance required (ACO Service)
		Pump overload protection has tripped. Malfunction cannot be acknowledged	Pump maintenance or repair required (ACO Service)
High Water		Shut-off valve in the pressure pipe is not fully open and/or is closed	Fully open the shut-off valve or stop valve in the pressure pipe
		Automatic mode is switched off	Switch on automatic mode
		Pump motor is defective	Pump replacement required (ACO Service)
		Impeller (pump) obstructed	Pump maintenance required (ACO Service)
		Pressure pipe obstructed	Clean the pressure pipe
		Pump parts are worn	Pump repair required (ACO Service)

6 Technical Data

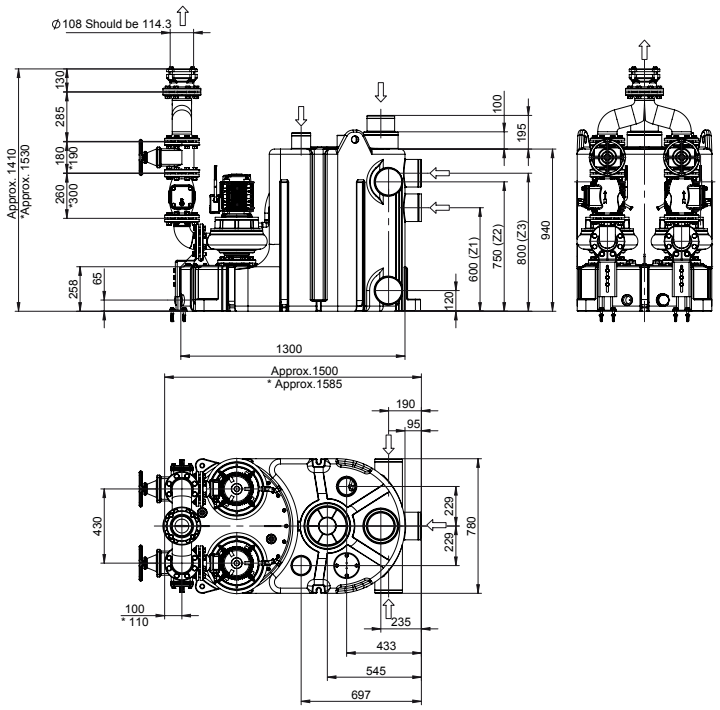
6.1 Wastewater lifting plant Muli Pro

6.1.1 Key data

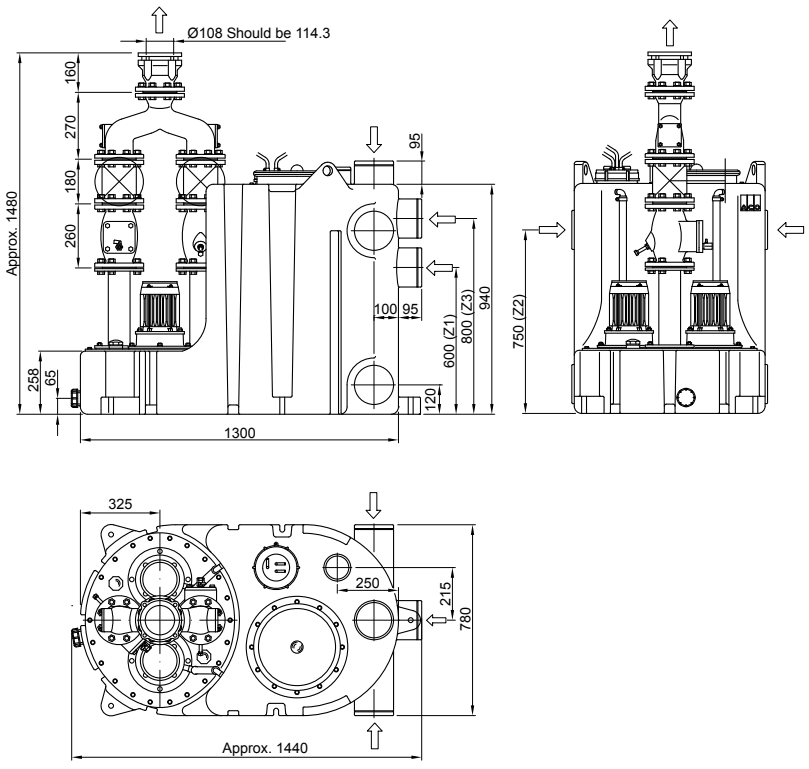
Model	Motor output [kW]		Nominal current [A]	Voltage [V]	Frequency [Hz]	rpm [U/min.]	Granulation size [mm]	Total volumes [l]	Usable volumes [l] Collection tank inlet				Weight [kg]
	P1	P2	I						Z1	Z2	Z3	From above	cpl.
PE K-15 duo	2.01	1.5	3.6	400	50	1,450	70	520	240	305	330	330	295
PE K-22 duo	2.94	2.2	5.2	400	50	1,450	70	520	240	305	330	330	310
PE K-30 duo	3.87	3.0	6.6	400	50	1,450	70	520	240	305	330	330	350
PE K-55 duo	6.71	5.5	11.6	400	50	1,450	70	520	240	305	330	330	425
PE K-75 duo	8.97	7.5	15.5	400	50	1,450	100	520	240	305	330	330	495
PE V-15 duo	2.01	1.5	4.1	400	50	1,450	80	520	240	305	330	330	210
PE V-22 duo	2.94	2.2	5.2	400	50	3,000	80	520	240	305	330	330	215
PE V-30 duo	3.87	3.0	7.2	400	50	3,000	80	520	240	305	330	330	225
PE V-40 duo	5.1	4.0	10.3	400	50	3,000	80	520	240	305	330	330	230
PE K-15 parallel	2.01	1.5	3.6	400	50	1,450	70	1,040	480	610	660	660	360
PE K-22 parallel	2.94	2.2	5.2	400	50	1,450	70	1,040	480	610	660	660	375
PE K-30 parallel	3.87	3.0	6.6	400	50	1,450	70	1,040	480	610	660	660	415
PE K-55 parallel	6.71	5.5	11.6	400	50	1,450	70	1,040	480	610	660	660	490
PE K-75 parallel	8.97	7.5	15.5	400	50	1,450	70	1,040	480	610	660	660	560
PE V-15 parallel	2.01	1.5	4.1	400	50	1,450	80	1,040	480	610	660	660	275
PE V-22 parallel	2.94	2.2	5.2	400	50	3,000	80	1,040	480	610	660	660	280
PE V-30 parallel	3.87	3.0	7.2	400	50	3,000	80	1,040	480	610	660	660	290
PE V-40 parallel	5.1	4.0	10.3	400	50	3,000	80	1,040	480	610	660	660	295
1.1 VA duo	2.01	1.5	4.1	400	50	1,450	80	270	–	–	–	155	210
1.2 VA duo	2.94	2.2	5.2	400	50	3,000	80	270	–	–	–	155	215
1.3 VA duo	3.87	3.0	7.2	400	50	3,000	80	270	–	–	–	155	225
1.4 VA duo	5.1	4.0	10.3	400	50	3,000	80	270	–	–	–	155	230
2.1 VA duo	2.01	1.5	4.1	400	50	1,450	80	365	185	–	–	245	290
2.2 VA duo	2.94	2.2	5.2	400	50	3,000	80	365	185	–	–	245	295
2.3 VA duo	3.87	3.0	7.2	400	50	3,000	80	365	185	–	–	245	305
2.4 VA duo	5.1	4.0	10.3	400	50	3,000	80	365	185	–	–	245	310

6.1.2 Dimensional drawings

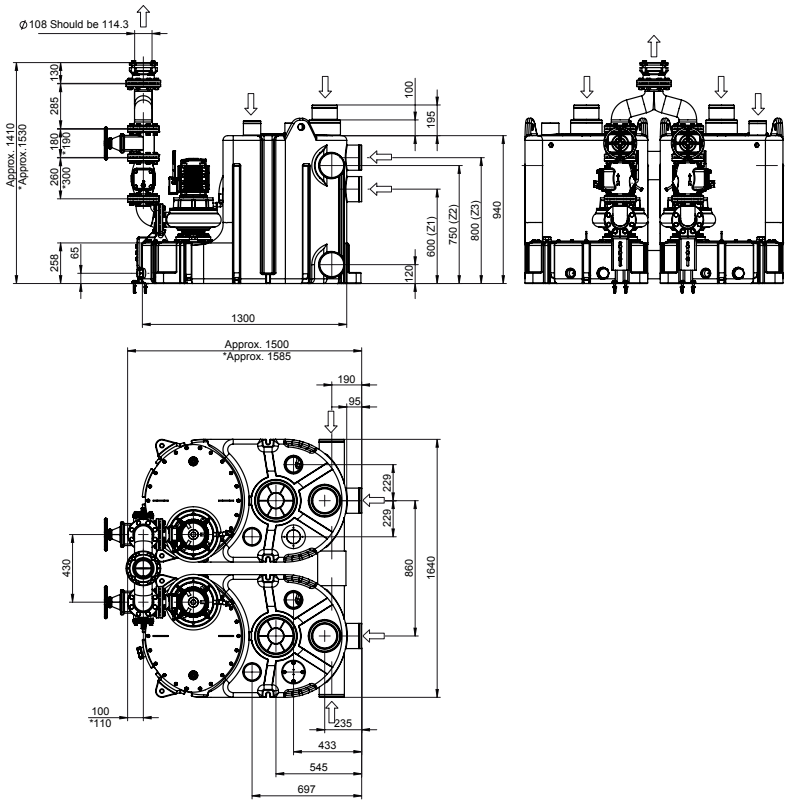
Model PE K duo



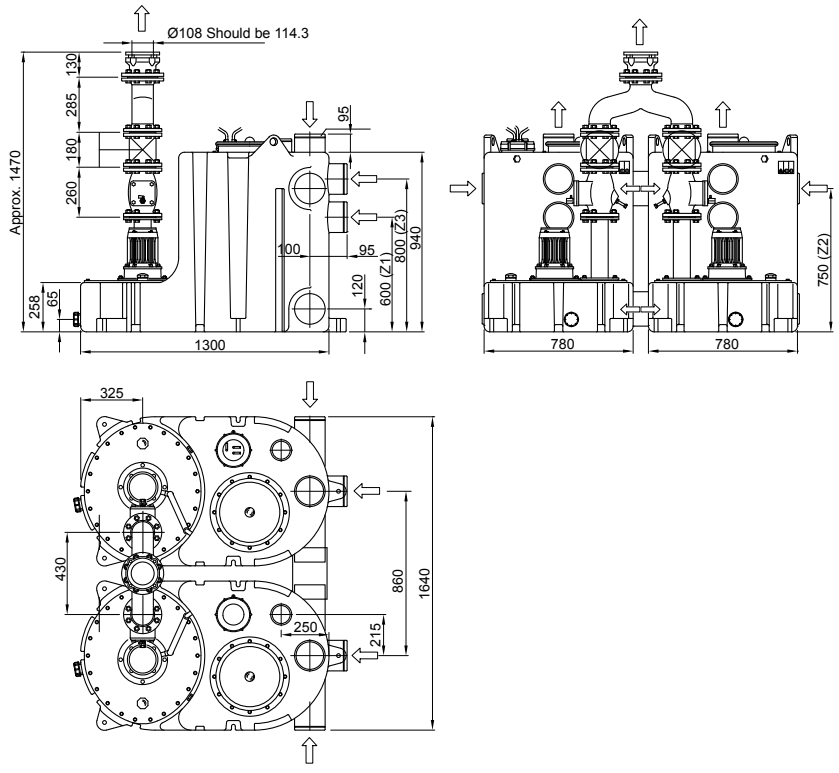
Model PE V duo



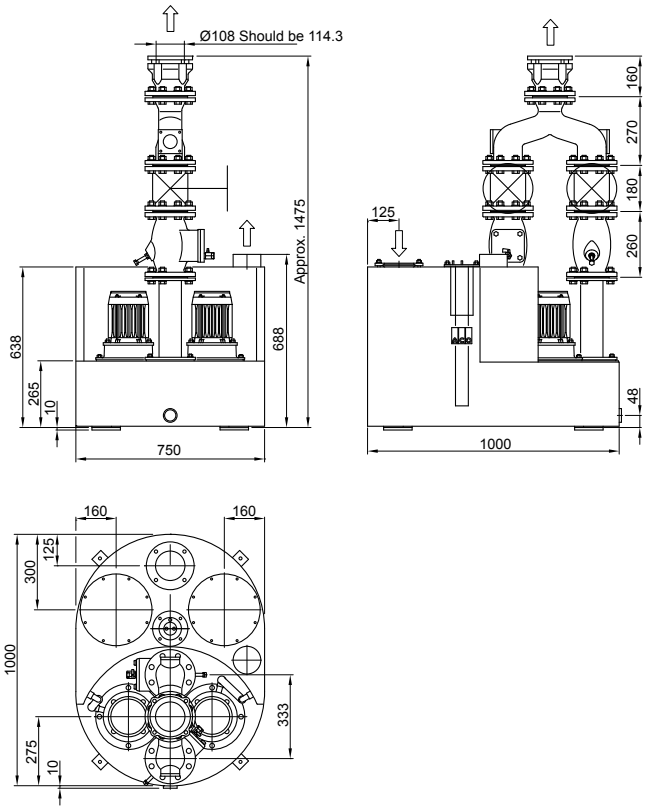
Model PE K parallel



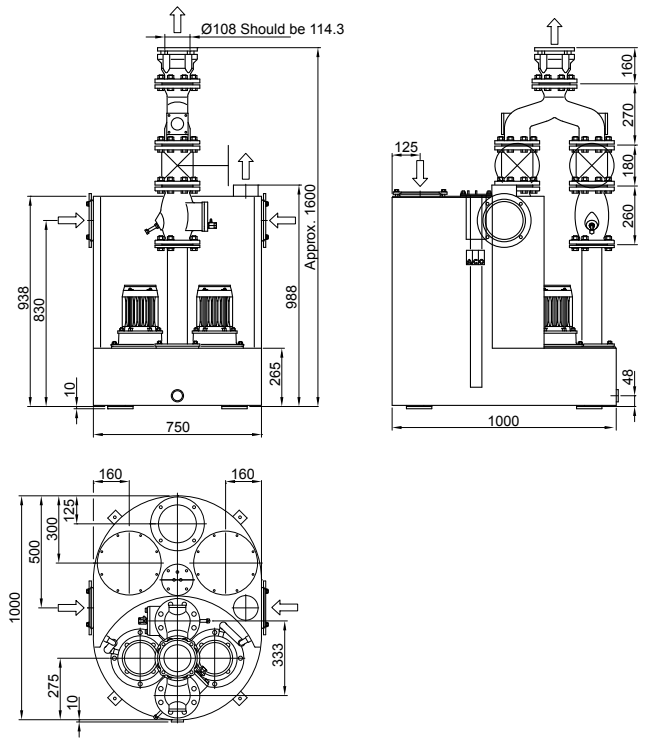
Model PE V parallel



Model 1.x VA duo



Model 2.x VA duo



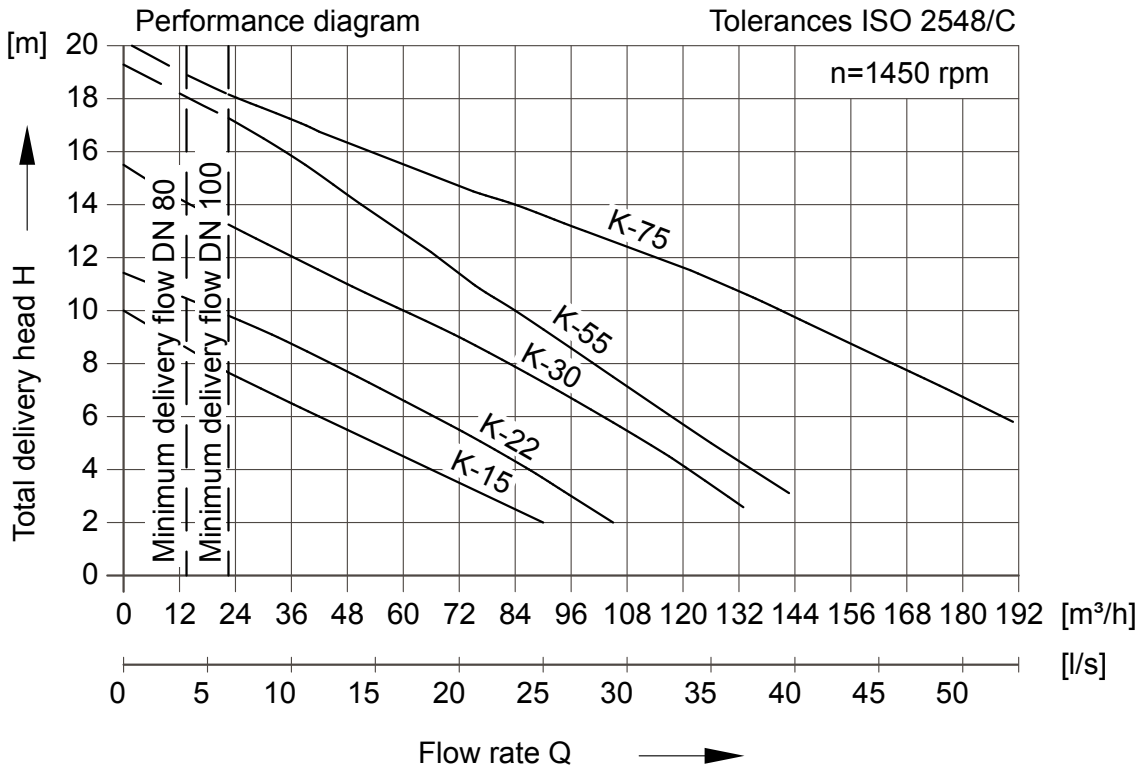
6.2 Performance data for the plants

6.2.1 Model PE K dou + parallel

Characteristic data and use limits

Model	Delivery head Area [m]	Delivery flow Q [l/s] With total delivery head [m] 4	6	8	10	12	14	16	18	Delivery media temperature Normal [° C]	Maximum [° C]
PE K-15 duo	3 – 8	18.3	11.7	5.8	–	–	–	–	–	40	60
PE K-22 duo	3 – 10	24.2	18.5	12.5	5.3	–	–	–	–	40	60
PE K-30 duo	4 – 14	33.5	28.4	23.1	16.8	10.3	4.2	–	–	40	60
PE K-55 duo	4 – 17	37.3	32.7	28.1	23.1	18.8	14.1	9.4	–	40	60
PE K-75 duo	6 – 18	–	51.8	46.2	39.2	31.7	23.2	14.2	6.8	40	60

Performance diagram

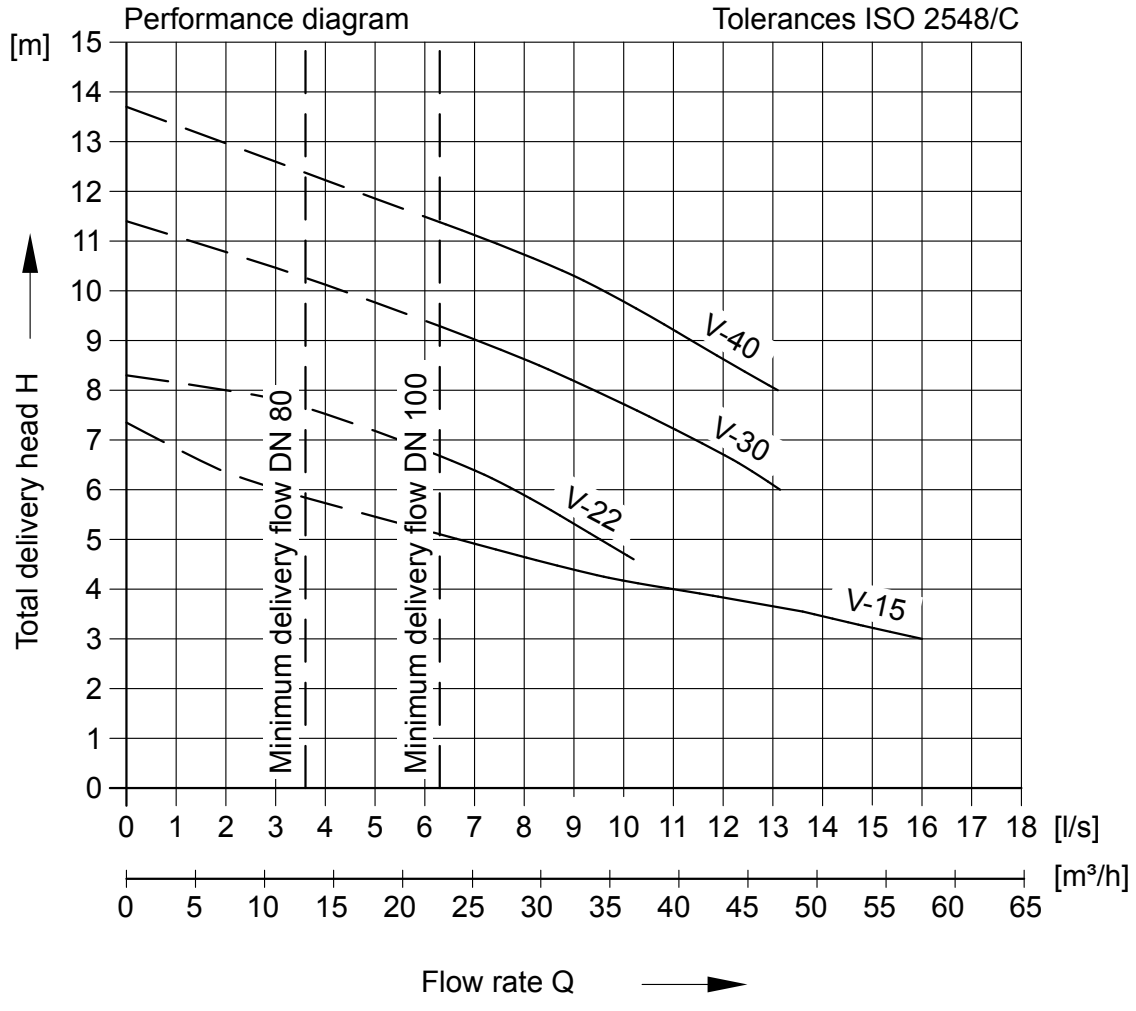


6.2.2 Model PE V dou + parallel

Characteristic data and use limits

Model	Delivery head Area [m]	Delivery flow Q [l/s] With total delivery head [m] 4	6	8	10	12	Delivery media temperature Normal [° C]	Maximum [° C]
PE V-15 duo	3 – 6	11.0	3.1	–	–	–	40	60
PE V-22 duo	5 – 7	–	7.8	–	–	–	40	60
PE V-30 duo	6 – 10	–	13.15	9.4	4.35	–	40	60
PE V-40 duo	8 – 12	–	–	13.1	9.6	4.7	40	60

Performance diagram

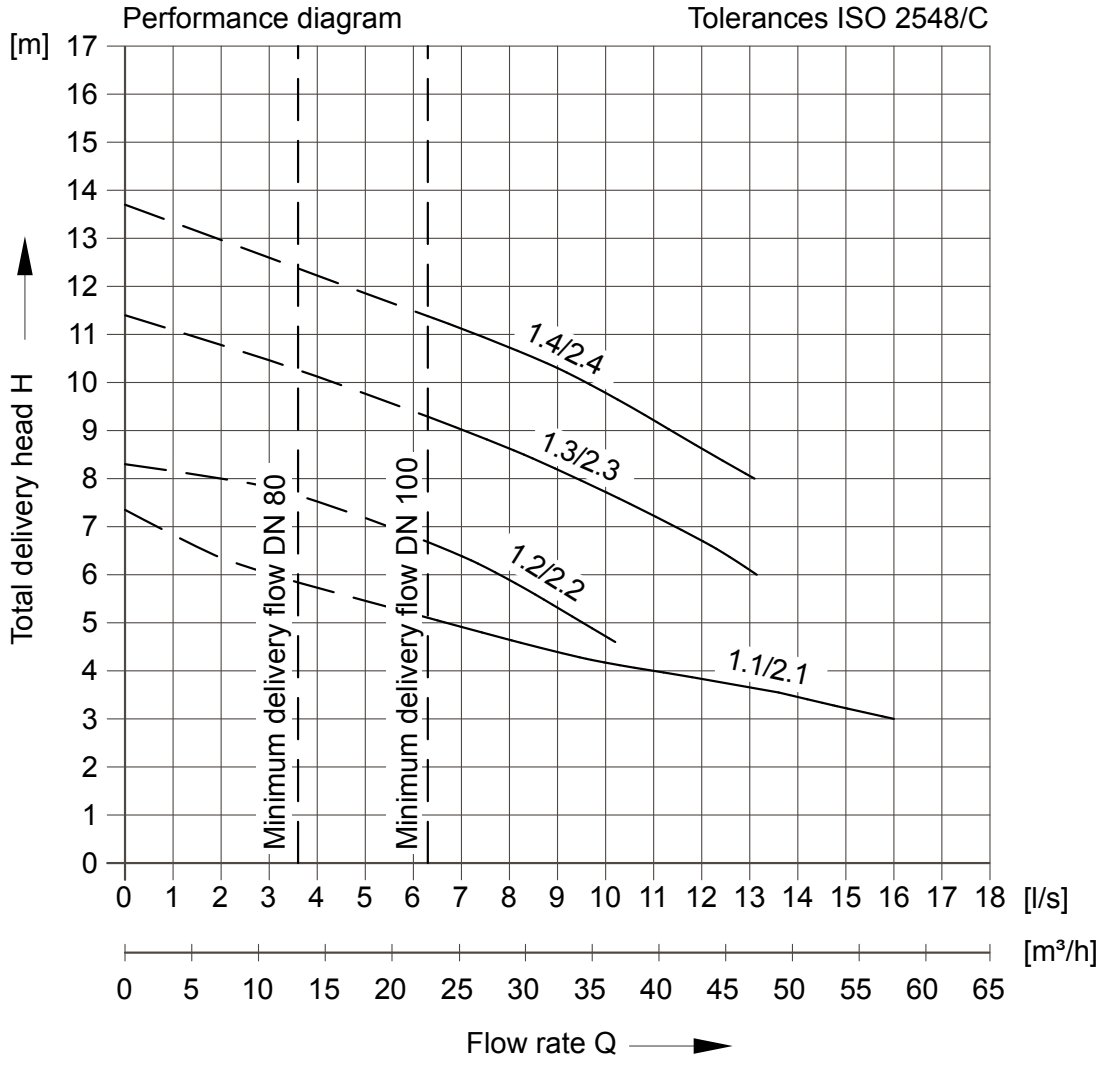


6.2.3 Model 1.x + 2.x VA duo

Characteristic data and use limits

Model	Delivery head Area [m]	Delivery flow Q [l/s] With total delivery head [m] 4	6	8	10	12	Delivery media temperature Normal [° C]	Maximum [° C]
1.1 + 2.1 VA duo	3 – 6	11.0	3.1	–	–	–	40	60
1.2 + 2.2 VA duo	5 – 7	–	7.8	–	–	–	40	60
1.3 + 2.3 VA duo	6 – 10	–	13.15	9.4	4.35	–	40	60
1.4 + 2.4 VA duo	8 – 12	–	–	13.1	9.6	4.7	40	60

Performance diagram



6.3 Pump control duo and mini compressor

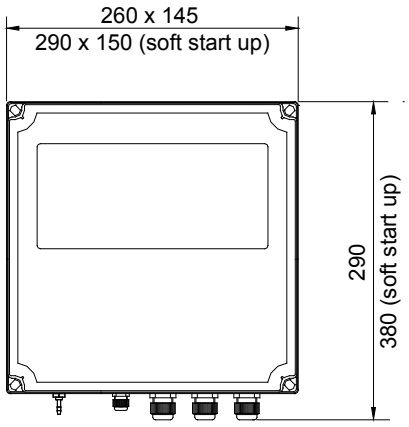
6.3.1 Pump control duo

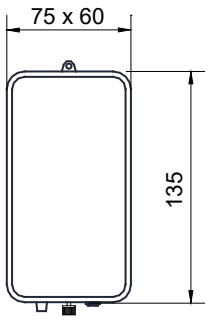
Key data	Values
Operating voltage:	~ 400 V (L1, L2, L3, N, PE), 50 Hz
Control voltage:	230 VAC, 50 Hz
Motor current limitation	0.3 A to 12 A (with duo: adjustable for each pump)
Power intake (contactors operated):	< 20 VA
Connected load, maximum:	P2 < 5.5 kW
Protection type, controller:	IP 54
Isolated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

6.3.2 Mini compressor

Key data	Values
Operating voltage:	~ 230 V (L, N, PE), 50 Hz
Maximum pressure:	300 mbar
Volume flow:	250 l/h
Power consumption:	5 W
Connection on pressure side:	4/6 mm
Protection type:	IP 54
Alarm volume:	< 38 dB

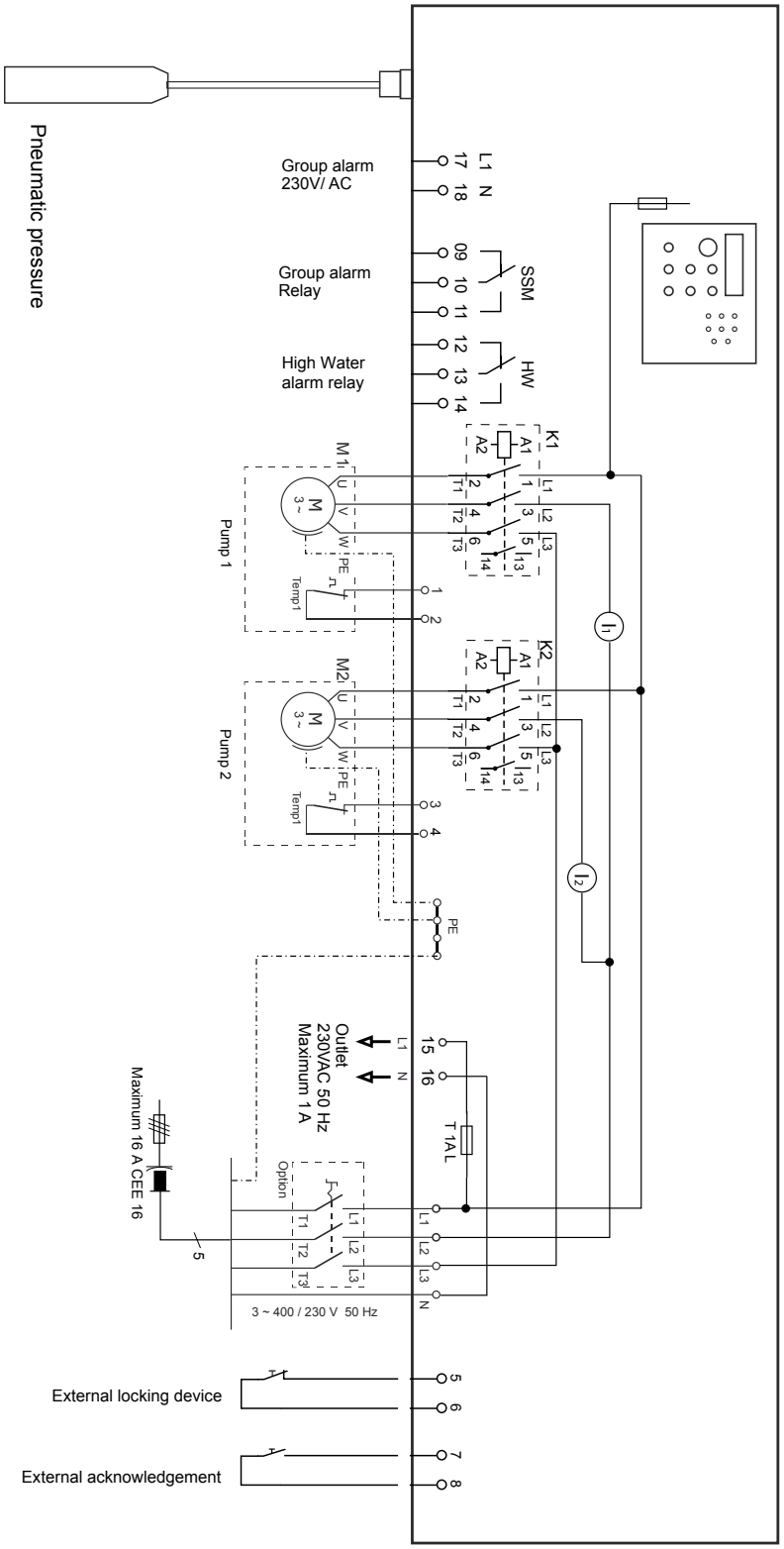
6.3.3 Dimensional drawings



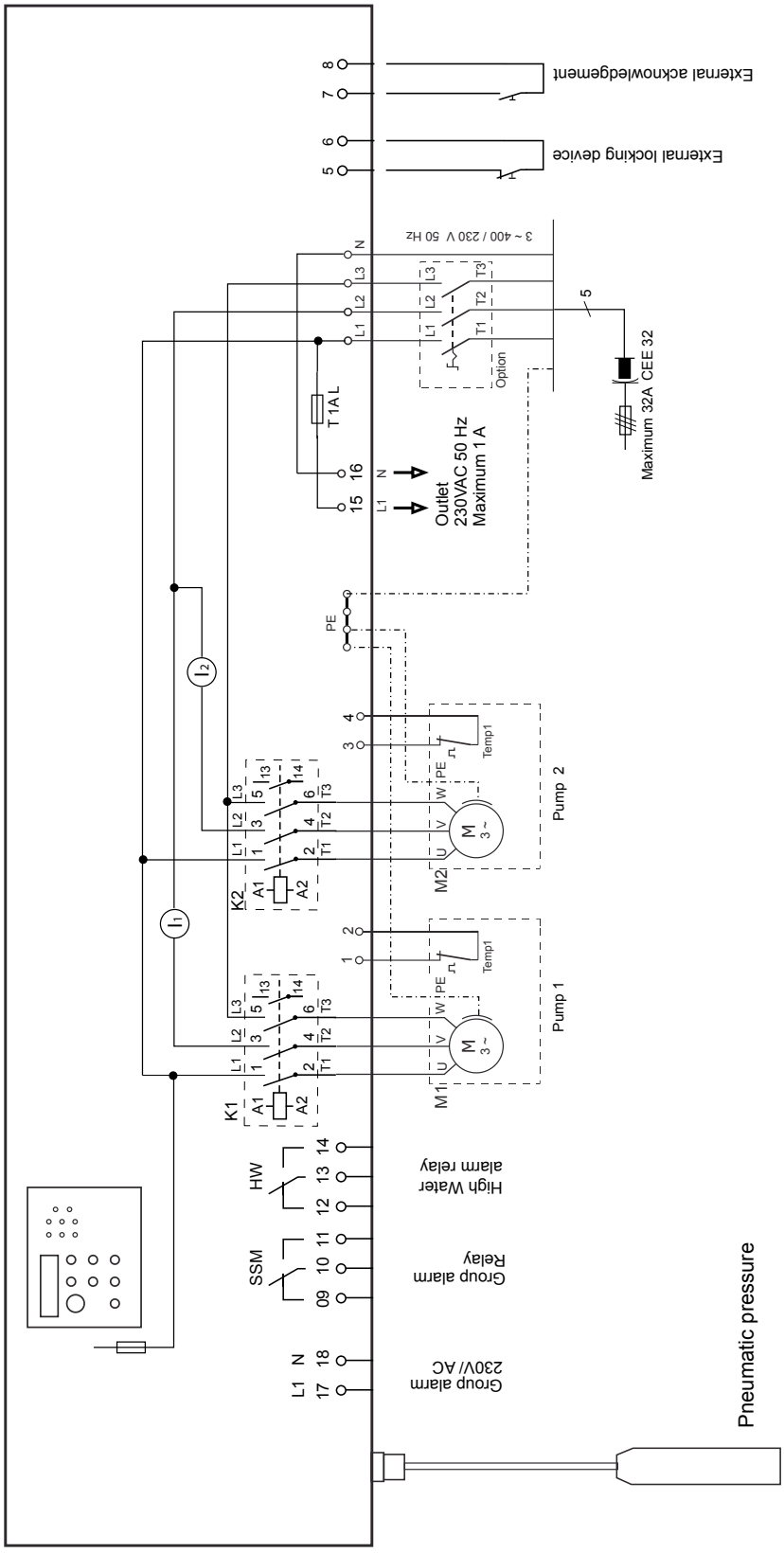


6.3.4 Circuit diagrams

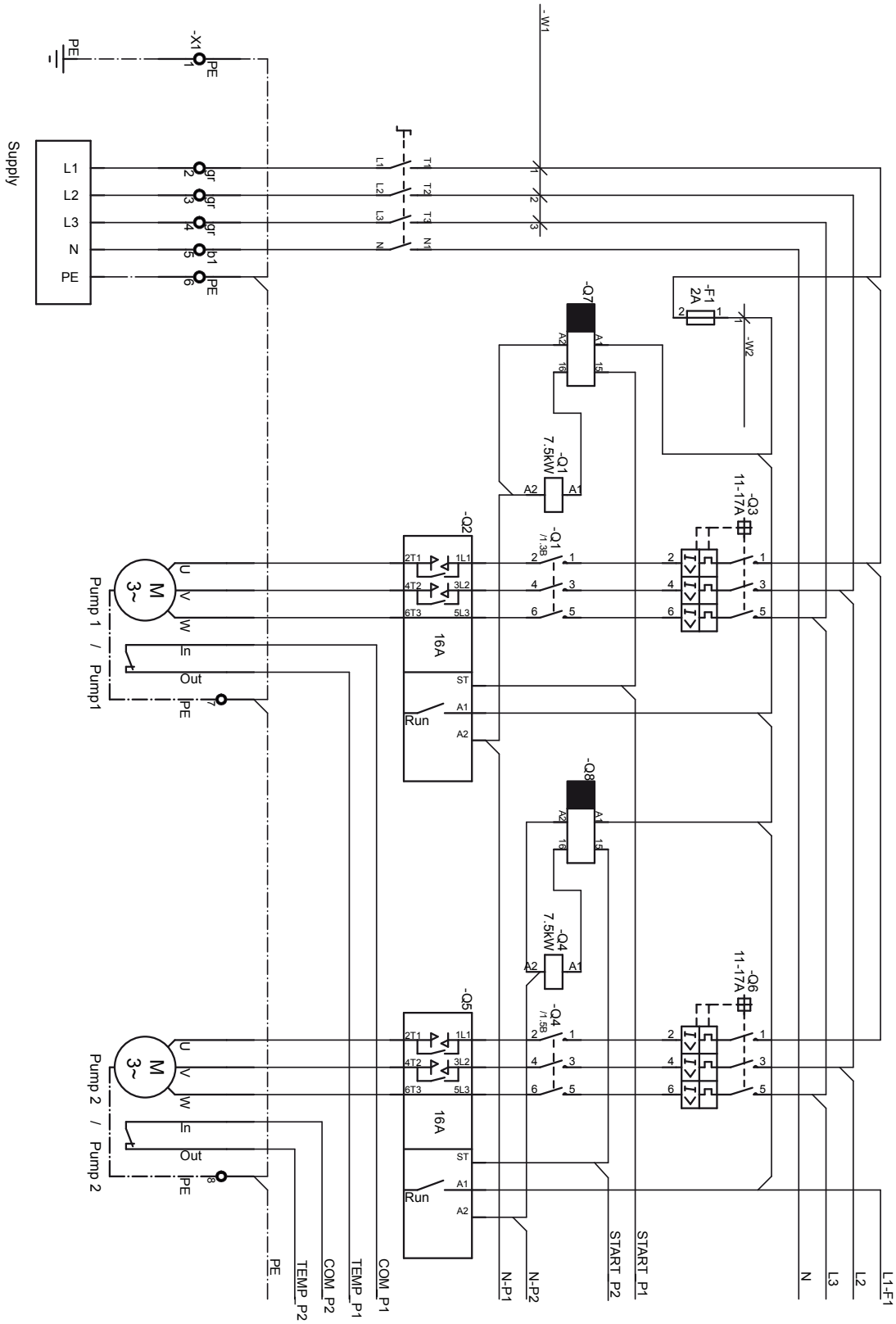
Pump control duo_three-phase current CEE 16 A



Pump control duo_three-phase current CEE 32 A



Pump control duo_three-phase current CEE 16 A with soft start up



Appendix: Commissioning report

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

Commissioning date: _____

Handover date: _____

Wastewater lifting plant

Product	Model	DoP-Code	Year of construction	Article No.	Serial No.
Wastewater lifting plant -duo					

Use location

Building/room: _____

Use: Multi-dwelling building ○ Commercial operation ○

Street: _____

Town/city: _____

Responsible persons

	Qualified person	Authorised acceptance representative	Plant operating company
Name:			
Phone No.:			
Fax No.:			
Email:			
Address:			

Check list for commissioning (Qualified person)

Two trial runs are required before, during and after start up, 📖 Chapter 4.4 “Performing a trial run”.

Tests & Inspections (no claim is made that the list is complete)	**OK**	**Not OK**
Electrical fusing of the wastewater lifting plant in accordance with the IEC directives or national and local regulations	○	○
Rotational direction of pump motors	○	○
Operating voltage and frequency	○	○
Motor protection switch: Test by briefly unscrewing individual fuses (two-phase run)	○	○
Inlet valve in the inlet pipe: Functioning test, actuation, open position, leak tightness	○	○
Shut-off valve and/or gate valve in the pressure pipe: functioning test, actuation, open position, leak tightness	○	○
Attachment of the inlet and pressure line	○	○
Switching and setting of the switching on levels in the pump control-duo menu	○	○
Setting the soft start up for the pumps on the pump control duo	○	○
Leak tightness: Wastewater lifting plant, fittings, pipework, connections	○	○
Malfunction and fault signalling equipment: Fault and malfunction messages in the display panel, malfunction displays, acoustic alarm, remote and telecommunication equipment (group malfunction)	○	○
Functional inspection of the backflow preventer	○	○

Instruction (by installer company)

Instruction	**Remarks**	**Yes**	**No**
Instruction:	Functions, pump control duo, operating information, troubleshooting, maintenance obligations	○	○
Handover:	Instructions for Use	○	○

Remarks:

Signature of Qualified person: _____

Signature of authorised acceptance inspection representative: _____

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