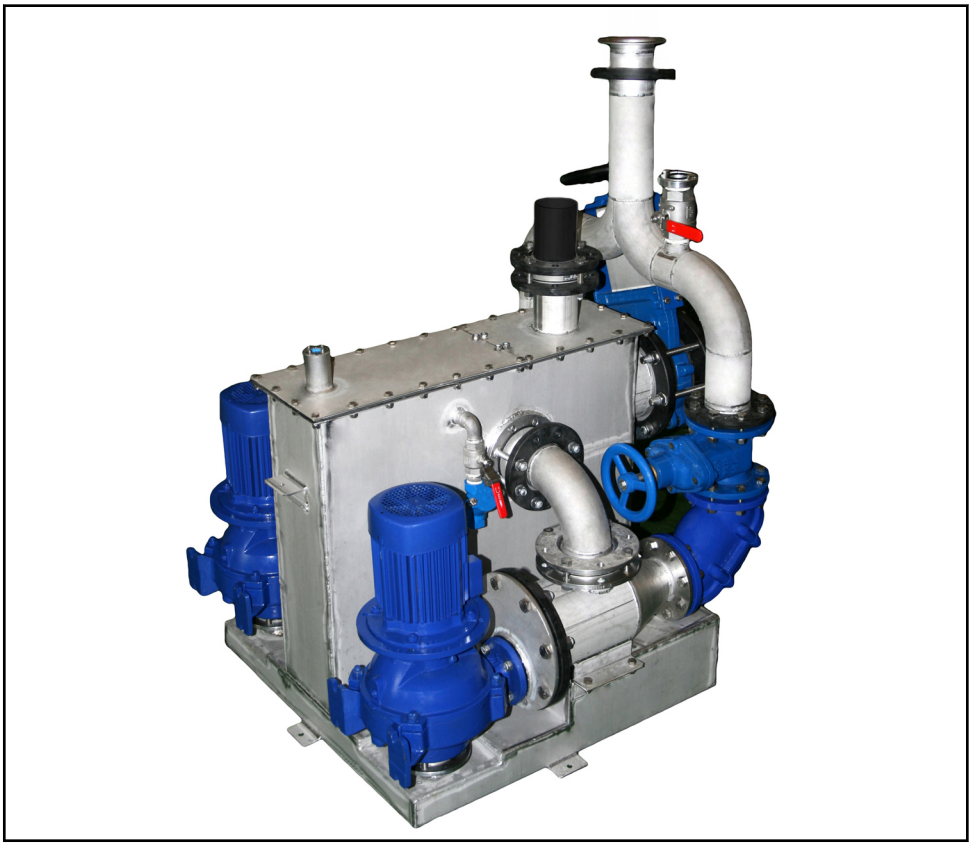
Pump Station

AmaDS³

Solids Separation System

Installation/Operating Manual



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Installation/Operating Manual AmaDS³
Original operating manual

KSB Aktiengesellschaft Halle

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Contents

Glossary 5

1 General 6

1.1 Principles 6

1.2 Target group 6

1.3 Other applicable documents 6

1.4 Symbols 6

2 Safety 8

2.1 Key to safety symbols/markings 8

2.2 General 8

2.3 Intended use 8

2.4 Personnel qualification and training 9

2.5 Consequences and risks caused by non-compliance with these operating instructions 9

2.6 Safety awareness 9

2.7 Safety information for the operator/user 10

2.8 Safety information for maintenance, inspection and installation work 10

2.9 Unauthorised modes of operation 10

3 Transport/Temporary Storage/Disposal 11

3.1 Checking the condition upon delivery 11

3.2 Transport 11

3.3 Storage/preservation 12

3.4 Return to supplier 13

3.5 Disposal 13

4 Description 14

4.1 General description 14

4.2 Designation 14

4.3 Name plate 14

4.4 Design details 14

4.5 Configuration and function 15

4.6 Noise characteristics 16

4.7 Collecting tank 16

5 Installation at Site 17

5.1 Safety regulations 17

5.2 Checks to be carried out prior to installation 17

5.3 Installing the system 17

5.4 Connecting the piping 21

5.5 Electrical connection 22

5.6 Fitting the level sensor 22

6	**Commissioning/Start-up/Shutdown**	**23**
6.1	Prerequisites for commissioning/start-up	23
6.2	Commissioning/start-up	24
6.3	Operating limits	25
6.4	Shutdown	26
6.5	Returning to service	27
7	**Servicing/Maintenance**	**29**
7.1	Safety regulations	29
7.2	Maintenance/Inspection	30
8	**Trouble-shooting**	**40**
9	**Related Documents**	**41**
9.1	Configuration of solids separation system	41
9.2	Requirements to be met by other manufacturers' control systems	43
10	**EC Declaration of Conformity**	**45**
11	**Certificate of Decontamination**	**46**
	Index	**47**

Glossary

Backflow

Waste water flowing back from the sewer into the connected drainage piping

Backflow loop

The section of the discharge pipe of a waste water lifting unit that is located above the flood level

Certificate of decontamination

A certificate of decontamination certifies that the unit has been properly cleaned and decontaminated to eliminate any environmental and health hazards arising from components in contact with the fluid handled.

Collecting tank

Unpressurised component of a sewage lifting unit in which the incoming waste water is stored prior to automatic lifting.

DIN 1986-3 and -30

German standard which stipulates technical rules for the operation, maintenance and servicing of drainage systems in buildings and on premises.

Domestic waste water

Faeces-free waste water from washbasins, showers, washing machines, etc.

Flood level

Maximum backflow level of waste water in a drainage system

Separator

Device which uses gravity to prevent any ingress of harmful substances into the drainage system by separating these substances from the waste water, e.g. grease separator.

Stormwater

Water from natural precipitation which has not been contaminated by any form of use.

Waste water

Water changed by use, e.g. domestic waste water

1 General

1.1 Principles

This operating manual is supplied as an integral part of the type series and variants indicated on the front cover. The manual describes the proper and safe use of this equipment in all phases of operation.

Table 1: Variants covered by this manual

System sizes
AmaDS³ 01 / 2 / 01
AmaDS³ 02 / 2 / 02
AmaDS³ 03 / 2 / 03.0
AmaDS³ 03 / 2 / 03
AmaDS³ 03 / 2 / 04.0
AmaDS³ 04.0 / 2 / 04.1

The name plate indicates the type series and size, the main operating data, the order number and the order item number. The order number and order item number uniquely identify the pump (set) and serve as identification for all further business processes.

In the event of damage, contact your nearest KSB service centre immediately to maintain the right to claim under warranty.

Noise characteristics (⇨ Section 4.6 Page 16)

1.2 Target group

This manual is aimed at the target group of trained and qualified specialist technical personnel. (⇨ Section 2.4 Page 9)

1.3 Other applicable documents

Table 2: Overview of other applicable documents

Document	Contents
Data sheet	Description of the system's technical data
General arrangement drawing/ outline drawing	Description of mating and installation dimensions for the system, weights
Pump operating manual	Proper and safe use of the pump in all phases of operation
Motor operating manual	Proper and safe use of the motor in all phases of operation
Operating manual of the control cabinet incl. control system	Proper and safe use of the control system in all phases of operation
Operating manuals of the individual valves	Proper and safe use of the valves in all phases of operation
Technical literature on various accessories	Proper and safe use of the accessories in all phases of operation

For accessories and/or integrated machinery components observe the relevant manufacturer's product literature.

1.4 Symbols

Table 3: Symbols used in this manual

Symbol	Description
✓	Conditions which need to be fulfilled before proceeding with the step-by-step instructions
▷	Safety instructions
⇨	Result of an action

Symbol	Description
⇨	Cross-references
1. 2.	Step-by-step instructions
	Note Recommendations and important information on how to handle the product

2 Safety

DANGER

All the information contained in this section refers to hazardous situations.

2.1 Key to safety symbols/markings

Table 4: Definition of safety symbols/markings

Symbol	Description
DANGER	**DANGER** This signal word indicates a high-risk hazard which, if not avoided, will result in death or serious injury.
WARNING	**WARNING** This signal word indicates a medium-risk hazard which, if not avoided, could result in death or serious injury.
CAUTION	**CAUTION** This signal word indicates a hazard which, if not avoided, could result in damage to the machine and its functions.
	**Explosion protection** This symbol identifies information about avoiding explosions in potentially explosive atmospheres in accordance with EC Directive 94/9/EC (ATEX).
	**General hazard** In conjunction with one of the signal words this symbol indicates a hazard which will or could result in death or serious injury.
	**Electrical hazard** In conjunction with one of the signal words this symbol indicates a hazard involving electrical voltage and identifies information about protection against electrical voltage.
	**Machine damage** In conjunction with the signal word CAUTION this symbol indicates a hazard for the machine and its functions.

2.2 General

This manual contains general installation, operating and maintenance instructions that must be observed to ensure safe pump operation and prevent personal injury and damage to property.

The safety information in all sections of this manual must be complied with.

This manual must be read and completely understood by the specialist personnel/ operators responsible prior to installation and commissioning.

The contents of this manual must be available to the specialist personnel at the site at all times.

Information attached directly to the pump must always be complied with and be kept in a perfectly legible condition at all times. This applies to, for example:

- Arrow indicating the direction of rotation
- Markings for connections
- Name plate

The operator is responsible for ensuring compliance with all local regulations not taken into account in this manual.

2.3 Intended use

The system must only be operated within the operating limits described in the other applicable documents.

- Only operate systems which are in perfect technical condition.
- Do not operate partially assembled systems.

- The system may only handle the fluids described in the product literature of the relevant design variant.
- Never operate the system without the fluid to be handled.
- Observe the information on minimum flow rates specified in the product literature (to prevent overheating, bearing damage, etc.).
- Observe the information on maximum flow rates specified in the product literature (to prevent overheating, mechanical seal damage, cavitation damage, bearing damage, etc.).
- Do not throttle the flow rate on the suction side of the system (to prevent cavitation damage).
- Consult the manufacturer about any other modes of operation not described in the product literature.

Prevention of foreseeable misuse

- Observe the minimum flow velocities required to fully open the swing check valves to prevent the reduction of pressure and risk of clogging. (Contact the manufacturer for the required minimum flow velocities/loss coefficients.)
- Never exceed the permissible operating limits (pressure, temperature, etc.) specified in the product literature.
- Observe all safety information and instructions in this manual.

2.4 Personnel qualification and training

All personnel involved must be fully qualified to install, operate, maintain and inspect the machinery this manual refers to.

The responsibilities, competence and supervision of all personnel involved in installation, operation, maintenance and inspection must be clearly defined by the operator.

Deficits in knowledge must be rectified by means of training and instruction provided by sufficiently trained specialist personnel. If required, the operator can commission the manufacturer/supplier to train the personnel.

Training on the pump (set) must always be supervised by technical specialist personnel.

2.5 Consequences and risks caused by non-compliance with these operating instructions

- Non-compliance with these operating instructions will lead to forfeiture of warranty cover and of any and all rights to claims for damages.
- Non-compliance can, for example, have the following consequences:
  - Hazards to persons due to electrical, thermal, mechanical and chemical effects and explosions
  - Failure of important product functions
  - Failure of prescribed maintenance and servicing practices
  - Hazard to the environment due to leakage of hazardous substances

2.6 Safety awareness

In addition to the safety information contained in this manual and the intended use, the following safety regulations shall be complied with:

- Accident prevention, health and safety regulations
- Explosion protection regulations
- Safety regulations for handling hazardous substances
- Applicable standards and laws

2.7 Safety information for the operator/user

- The operator shall fit contact guards for hot, cold and moving parts and check that the guards function properly.
- Do not remove any contact guards during operation.
- Provide the personnel with protective equipment and make sure it is used.
- Contain leakages (e.g. at the shaft seal) of hazardous fluids handled (e.g. explosive, toxic, hot) so as to avoid any danger to persons and the environment. Adhere to all relevant laws.
- Eliminate all electrical hazards. (In this respect refer to the applicable national safety regulations and/or regulations issued by the local energy supply companies.)
- If shutting down the pump does not increase potential risk, fit an emergency-stop control device in the immediate vicinity of the pump (set) during pump set installation.

2.8 Safety information for maintenance, inspection and installation work

- Modifications or alterations of the system require the manufacturer's prior consent.
- Use only original spare parts or parts authorised by the manufacturer. The use of other parts can invalidate any liability of the manufacturer for resulting damage.
- The operator ensures that all maintenance, inspection and installation work is performed by authorised, qualified specialist personnel who are thoroughly familiar with the manual.
- Carry out work on the system during standstill only.
- The pump casing must have cooled down to ambient temperature.
- The system (collecting tank, discharge line, solids separators, pump casings) must have been drained and depressurised.
- When taking the system out of service always adhere to the procedure described in the manual.
- Decontaminate systems which handle fluids posing a health hazard.
- As soon as the work is complete, re-install and/or re-activate any safety-relevant and protective devices. Before returning the equipment to service, observe all instructions on commissioning/start-up.
- Make sure the system cannot be accessed by unauthorised persons (e.g. children).

2.9 Unauthorised modes of operation

Never operate the pump (set) outside the limits stated in the data sheet and in this manual.

The warranty relating to the operating reliability and safety of the supplied pump (set) is only valid if the equipment is used in accordance with its intended use.

3 Transport/Temporary Storage/Disposal

3.1 Checking the condition upon delivery

1. On transfer of goods, check each packaging unit for damage.
2. In the event of in-transit damage, assess the exact damage, document it and notify KSB or the supplying dealer (as applicable) and the insurer about the damage in writing immediately.

3.2 Transport



⚠ DANGER

System falling off the pallet
Risk of injury from falling system!

- ▹ Always transport the system in horizontal position.
- ▹ Observe the weight and centre of gravity limits specified.
- ▹ Never suspend the pump by its power cable.
- ▹ Prevent the system from being knocked or dropped.



⚠ WARNING

Improper transport
Risk of injury from falling system!
The load could slip!

- ▹ Select lifting accessories which are suitable for the system weight.
- ▹ Attach lifting accessories only to the transport lugs provided.
- ▹ Secure the load appropriately.
- ▹ Comply with the applicable health and safety regulations.



⚠ WARNING

Installation on mounting surface which is unsecured and cannot support the load
Personal injury and damage to property!

- ▹ Use a concrete of compressive strength class C12/15 which meets the requirements of exposure class XC1 to EN 206-1.
- ▹ The mounting surface must have set and must be completely horizontal and even.
- ▹ Observe the weights indicated.

✓ Suitable hoisting tackle and lifting accessories which are suitable for the system weight are available.[1)]

✓ The system's transport lugs show no signs of damage.

1. Attach the lifting accessories to the transport lugs provided.
2. Lift the system and transport it. Maintain adequate safety distance during lifting operations (load may swing when being lifted).

1) See name plate of the system.

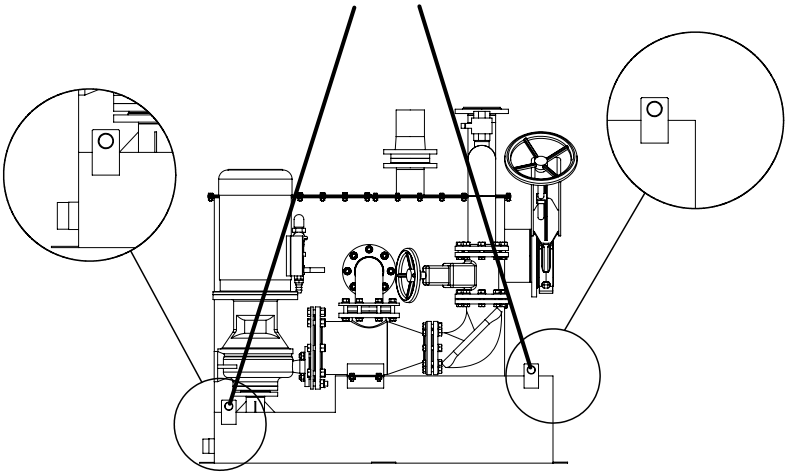


Fig. 1: Transport example for AmaDS³ 01 and AmaDS³ 02

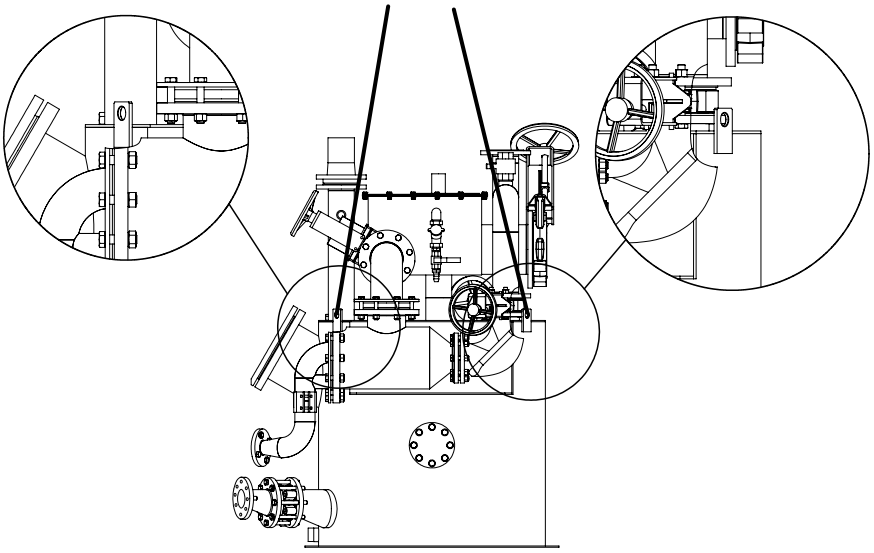


Fig. 2: Transport example for AmaDS³ 03 and AmaDS³ 04.0

3.3 Storage/preservation

If commissioning is to take place some time after delivery, we recommend that the following measures be taken for system storage:

	**CAUTION** **Wet, contaminated or damaged openings and connections** Leakage or damage to the system! ▷ Only open the openings of the system at the time of installation.

	**CAUTION** **Improper storage** Damage to the power cables! ▷ Support the power cables at the cable entry to prevent permanent deformation. ▷ Only remove the protective caps from the power cables at the time of installation.

Store the system in a dry, protected room where the atmospheric humidity is as constant as possible.

Table 5: Ambient conditions for storage

Ambient conditions	Value
Relative humidity	5 % to 85 % (non-condensing)
Ambient temperature	- 20 °C to + 70°C

3.4 Return to supplier

1. Drain the system as per operating instructions.
2. Always flush and clean the system, particularly if it has been used for handling noxious, explosive, hot or other hazardous fluids.
3. If the fluids handled by the system leave residues which might lead to corrosion when coming into contact with atmospheric humidity, or which might ignite when coming into contact with oxygen, the system must also be neutralised and blown through with anhydrous gas for drying purposes.
4. Always complete and enclose a certificate of decontamination when returning the system.
   It is imperative to indicate any safety and decontamination measures taken.



NOTE

If required, a blank certificate of decontamination can be downloaded from the KSB web site at: www.ksb.com/certificate_of_decontamination

3.5 Disposal



⚠ WARNING

Fluids posing a health hazard and/or hot fluids
Hazard to persons and the environment!

- ▹ Collect and properly dispose of flushing liquid and any residues of the fluid handled.
- ▹ Wear safety clothing and a protective mask, if required.
- ▹ Observe all legal regulations on the disposal of fluids posing a health hazard.

1. Dismantle the system.
   Collect greases and lubricants during dismantling.
2. Separate and sort the pump materials, e.g. by:
   - Metals
   - Plastics
   - Electronic waste
   - Greases and lubricants
3. Dispose of materials in accordance with local regulations or in another controlled manner.

4 Description

4.1 General description

Waste water pump station for the collection and automatic lifting of unpressurised waste water with or without faeces to a level above the flood level.

The system consists of one gas- and watertight stainless steel tank (collecting tank), two solids separators, two pump sets and the control system.

4.2 Designation

Example:
AmaDS³ 03 / 2 / 03.0 F 50 - 251

Table 6: Key to the designation

Code	Description
AmaDS³	Type series
03	Size of solids separator
2	Number of pump sets
03.0	Size of collecting tank
F	Impeller type
50	Nominal discharge nozzle diameter [mm]
251	Nominal impeller diameter [mm]

4.3 Name plate



Fig. 3: Example: AmaDS³ name plate

1	System size (⇨ Section 4.2 Page 14)	2	Type of system
3	Order number and order item number	4	Pump set flow rate
5	Collecting tank volume	6	Total system weight
7	Year of construction	8	Inflow rate

4.4 Design details

4.4.1 System

- Ready-to-connect system
- One gas- and watertight stainless steel tank (collecting tank)
- Two solids separators
- Two pump sets

4.5 Configuration and function

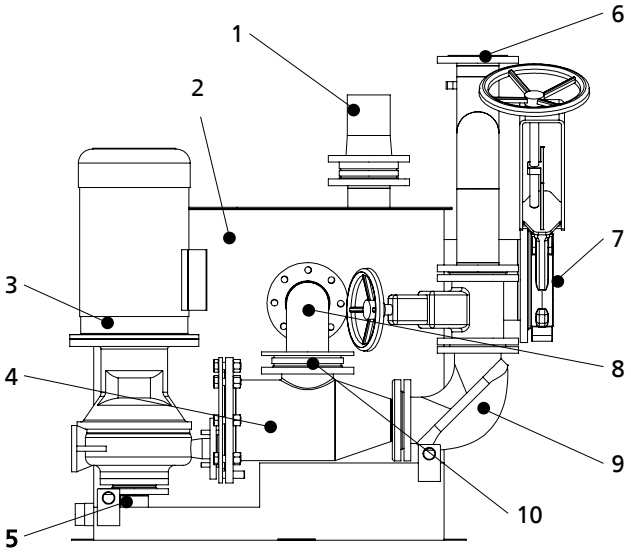
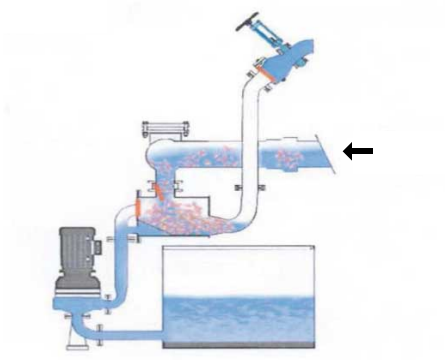


Fig. 4: Configuration of solids separation system

1	Vent	6	Discharge line
2	Collecting tank	7	Inflow line (optional inflow gate valve)
3	Pump set	8	Inflow line to solids separator
4	Solids separator	9	Non-return valve
5	Suction line	10	Inflow check valve

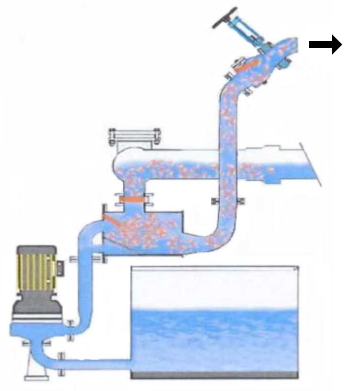
Function

The raw waste water flows through the inflow lines (7 and 8) into the solids separator (4) where the solids are separated from the liquid. The solids-free waste water flows through the pump set (3) into the collecting tank (2) where it is collected until a pre-set level is reached. The pump set (3) is started up via a control system and pumps the solids-free waste water from the collecting tank (2) to the discharge line (6). Due to the pressure increase in the solids separator (4), the inflow check valve (10) closes automatically. By pumping the waste water through the solids separator (4) the solids are carried away again with the waste water and pumped into the discharge line (6) while the solids separator (4) is flushed. As soon as a minimum level is reached in the collecting tank (2), the pump set (3) is stopped. The inflow check valve (10) opens automatically and the inflow phase starts again.

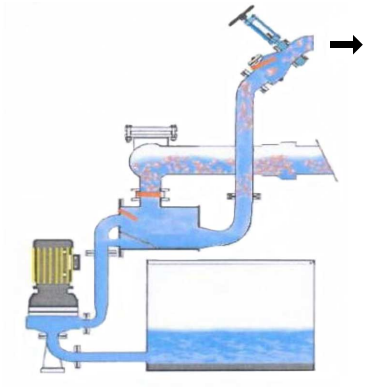


Inflow phase

Upstream of the pumps, the solids are separated from the waste water and temporarily stored in the solids separators. Only pre-treated waste water flows through the pumps.



Inflow of fluid handled



End of pumping process

Pumping process

In this phase the pre-treated waste water is pumped through the solids separators in the opposite direction and carries the solids out of the separators and into the discharge line. Through this process the solids separators and pumps are cleaned and ready for the next inflow phase.

4.6 Noise characteristics

Table 7: Surface sound pressure level L_{pA} [2)]

Rated power input P_N [kW]	Pump set		
	2900 rpm [dB]	1450 rpm [dB]	960/760 rpm [dB]
1.5	62.5	56.5	55.0
2.2	65.0	58.5	57.5
3.0	67.0	60.5	59.0
4.0	68.5	62.0	60.5
5.5	70.0	63.5	63.0
7.5	71.0	65.0	63.5
11.0	72.5	67.0	65.5
15.0	73.5	68.0	66.5
18.5	74.0	68.5	67.5
22.0	74.5	69.0	68.0
30.0	75.0	70.5	69.0
37.0	76.0	71.0	69.5

4.7 Collecting tank

The collecting tank is designed for unpressurised operation; this means the pre-cleaned waste water is stored in the tank in an unpressurised condition and is then pumped into the discharge line.

2) Measured at a distance of 1 m from the pump outline (as per DIN 45635 Part 1 and 24)

5 Installation at Site

5.1 Safety regulations



⚠ DANGER

Improper installation in potentially explosive atmospheres
Explosion hazard!
Damage to the system!

- ▹ Comply with the applicable local explosion protection regulations.
- ▹ Observe the information in the technical product literature and on the name plates of system and motor.

5.2 Checks to be carried out prior to installation

Place of installation



⚠ DANGER

The system is incorrectly mounted on the foundation or the foundation is inadequate.
Tipping over of system and/or system components!
Personal injury and damage to property!

- ▹ Make sure the foundation concrete is of sufficient strength (to EN 206-1).



⚠ WARNING

Installation on mounting surfaces which are unsecured and cannot support the load
Personal injury and damage to property!

- ▹ Use a concrete of compressive strength class C12/15 which meets the requirements of exposure class X0 to EN 206-1.
- ▹ The mounting surface must have set and must be completely horizontal and even.
- ▹ Observe the weights indicated.

Check structural requirements.
All structural features such as the sump size and the positioning of the inflow and discharge piping must have been prepared in accordance with the dimensions specified at the planning stage.



NOTE

When installing the system in its assembled state, it is necessary to remove the sump cover. Provide a sufficient amount of space.

5.3 Installing the system



⚠ DANGER

Persons in the pump sump during operation/touching live components
Danger of death from electric shock!

- ▹ Never turn on the electric power supply when there are persons in the pump sump.



CAUTION

Insufficient ventilation
Damage to the electric control unit!

- ▹ Provide proper aeration and ventilation.
- ▹ For drainage of rooms, a pump sump must be provided.

5.3.1 Installing AmaDS³ 01 or AmaDS³ 02

The AmaDS³ 01 and AmaDS³ 02 systems are supplied completely pre-assembled. The system is installed in its assembled state.



⚠ WARNING

Improper transport
Risk of injury from falling system!
The load could slip!

- ▹ Select lifting accessories which are suitable for the system weight.
- ▹ Attach lifting accessories only to the transport lugs provided.
- ▹ Secure the load appropriately.
- ▹ Comply with the applicable health and safety regulations.

✓ The name plate data has been compared against the purchase order and the site data (e.g. supply voltage, frequency, pump operating data, etc.).

✓ The fluid to be handled is an approved fluid.

✓ The installation room is frost-proof.

✓ The installation room is adequately ventilated.

✓ All structural work required has been prepared in accordance with the dimensions stated in the connection example and in EN 12 056.

✓ The foundation has the required strength and characteristics.

✓ Suitably dimensioned hoisting equipment incl. lifting tackle is available.

1. Attach the system to the transport lugs provided and lift it up.
2. Secure the assembled pump sets appropriately to avoid loads on the piping system.
3. Lower the system into the prepared sump and place it on the foundation.
4. Align the system with the help of a spirit level.



NOTE

Use the prepared inflow line (inflow pipe) as a reference point for the alignment.

5. The system is mounted on the foundation using the lugs welded to the tank and the fasteners which are supplied along with the system.
6. Drill the holes as specified in the table "Chemical anchor bolt dimensions". Then clean the holes.



⚠ WARNING

Improper handling of mortar cartridges
Skin sensitisation or irritation!

- ▹ Wear suitable protective clothing.

7. Insert the mortar cartridges into the drilled holes.
   Observe the curing times of the mortar cartridges!
8. Insert threaded rods into the corresponding drilled holes with an electric tool (e.g. impact drill, hammer drill).

9. After the curing time (see table), tighten the chemical anchors (4) evenly and tightly.

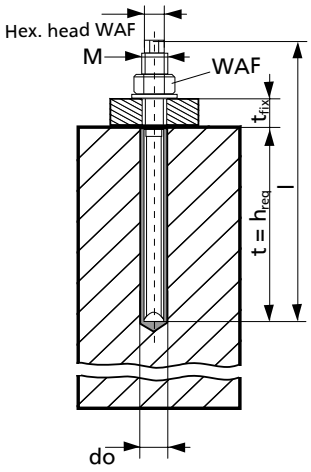


Fig. 5: Dimensions

Table 8: Chemical anchor bolt dimensions

Bolt size	d_o [mm]	$t=h_{req}$ [mm]	t_{fix} [mm]	WAF [mm]	M [mm]	Hex. head WAF [mm]	Torque [Nm]
M 10x130	12	90	20	17	10	7	20
M 12x160	14	110	25	19	12	8	40
M 16x190	18	125	35	24	16	12	60
M 20x260	25	170	65	30	20	12	120
M 24x300[3)]	28	210	65	36	24	-	150
M 30x380[3) 4)]	35	280	65	46	30	-	300

Table 9: Curing times of mortar cartridge

Floor temperature	Curing time [min]
-5 °C to 0 °C	240
0 °C to +10 °C	45
+10 °C to +20 °C	20
> +20 °C	10

5.3.2 Installing AmaDS³ 03 or AmaDS³ 04.0

The AmaDS³ 03 and AmaDS³ 04.0 systems are supplied partially assembled. The pump sets are supplied unfitted as separate items. Complete system assembly is performed during installation on site.



⚠ WARNING

Improper transport
Risk of injury from falling system!
The load could slip!

- ▹ Select lifting accessories which are suitable for the system weight.
- ▹ Attach lifting accessories only to the transport lugs provided.
- ▹ Secure the load appropriately.
- ▹ Comply with the applicable health and safety regulations.

✓ The name plate data has been compared against the purchase order and the site data (e.g. supply voltage, frequency, pump operating data, etc.).

✓ The fluid to be handled is an approved fluid.

✓ The installation room is frost-proof.

✓ All structural work required has been prepared in accordance with the dimensions stated in the connection example and in EN 12 056.

✓ The installation room is adequately ventilated.

✓ Suitably dimensioned hoisting equipment incl. lifting tackle is available.

✓ **The pump sets have been supplied unfitted as separate items.**

✓ The operating manual of the pump sets is available.

1. Attach the system to the transport lugs provided and lift it up.
2. Lower the system into the prepared sump and set it down.

3) Mounting accessories of respective manufacturer required.

NOTE

It is advisable to move the module as close as possible to the sump wall or the inflow pipe.

3. Place the system on a level floor and align it with the help of a spirit level.

NOTE

Use the prepared inflow line (inflow pipe) as a reference point for the alignment.

4. Once the system is positioned in its correct place of installation, the pump sets are fitted, aligned and connected to the appropriate flanges in accordance with the manufacturer's operating manual. Observe the permissible flange loads and bolt tightening torques (refer to the operating manual of the pump set).
5. The system is mounted on the foundation using the lugs welded to the tank and the fasteners which are supplied along with the system.
6. Drill the holes as specified in the table "Chemical anchor bolt dimensions". Then clean the holes.

⚠ WARNING

Improper handling of mortar cartridges
Skin sensitisation or irritation!

▷ Wear suitable protective clothing.

7. Insert the mortar cartridges into the drilled holes.
   Observe the curing times of the mortar cartridges!
8. Insert threaded rods into the corresponding drilled holes with an electric tool (e.g. impact drill, hammer drill).
9. After the curing time (see table), tighten the chemical anchors (4) evenly and tightly.

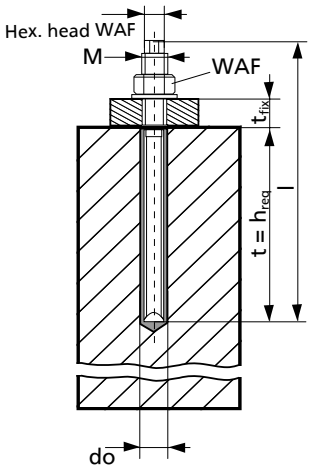


Fig. 6: Dimensions

Table 10: Chemical anchor bolt dimensions

Bolt size	d_o [mm]	$t=h_{req}$ [mm]	t_{fix} [mm]	WAF [mm]	M [mm]	Hex. head WAF [mm]	Torque [Nm]
M 10x130	12	90	20	17	10	7	20
M 12x160	14	110	25	19	12	8	40
M 16x190	18	125	35	24	16	12	60
M 20x260	25	170	65	30	20	12	120
M 24x300[4)]	28	210	65	36	24	-	150
M 30x380[3) 4)]	35	280	65	46	30	-	300

Table 11: Curing times of mortar cartridge

Floor temperature	Curing time [min]
-5 °C to 0 °C	240
0 °C to +10 °C	45
+10 °C to +20 °C	20
> +20 °C	10

4) Mounting accessories of respective manufacturer required.

5.4 Connecting the piping



⚠ DANGER

Impermissible loads acting on the system nozzles
Danger to life from leakage of hot, toxic, corrosive or flammable fluids!

- ▷ Do not use the system as an anchorage point for the piping.
- ▷ Anchor the pipes immediately up- and downstream of the system and connect them without transmitting any stresses or strains.
- ▷ Observe the permissible forces and moments in the system.
- ▷ Take appropriate measures to compensate thermal expansion of the piping.



NOTE

It is advisable to move the system as close as possible to the sump wall or the inflow pipe.



NOTE

Observe DIN EN 13480 when laying the piping.

✓ All bolted connections, couplings and pipe connections have been checked and tightened where required.

✓ The inflow and discharge piping is located at the heights specified at the planning stage.

✓ Make sure the inflow pipe is laid straight, without invert level offsets.

✓ The system is in the prepared place of installation.

1. Connect the system to the customer-provided inflow pipe using appropriate means.
2. Check the connection for leakage.
3. Align the collecting tank using a spirit level.
4. Fasten the system to the concrete floor using the tank wall's angle brackets.
5. Fasten the supplied installation kits of the pump sets to the concrete floor. (Refer to the pump set's operating manual, section "Installing the pump set".)
6. Check the specified piping heights.
7. Connect the discharge line. Ensure that the discharge line's weight is supported and appropriate anchorage points are provided. (Precautionary measures against surge pressures)

Connecting the collecting tank venting equipment

✓ The system has been properly installed.

✓ The piping has been connected.

1. Remove the blind flange.
2. Route the vent line to the outside (outside of the building structure), e.g. using a PE-HD discharge line with arc-welded socket weld end. An extension pipe is not included in the scope of supply.
3. Equip the vent line with a protective cover.



NOTE

The protective cover prevents foreign particles from entering the collecting tank.

5.5 Electrical connection



⚠ DANGER

Work on the system by unqualified personnel
Danger of death from electric shock!

- Always have the electrical connections installed by a trained electrician.
- Observe regulations IEC 30364 (DIN VDE 0100) and, for explosion-proof systems, IEC 60079 (DIN VDE 0165).



⚠ DANGER

Operating a pump set that has not been fully connected
Explosion hazard!
Damage to the pump set!

- Never start up a pump set with power cables that have not been fully connected or non-operational monitoring devices.



⚠ DANGER

Live parts due to a damaged power supply cable
Danger of death from electric shock!
Damage to the mains network, short circuit!

- Check the power cables for damage before connecting them to the power supply.
- Never connect a damaged power cable.
- Always have the electrical connections installed by a trained and qualified electrician.



⚠ WARNING

Incorrect connection to the mains
Damage to the mains network, short circuit!

- Observe the technical specifications of the local energy supply companies.

Electrical connections must be performed in accordance with the operating manual supplied and the wiring diagrams of the pump set.

5.6 Fitting the level sensor

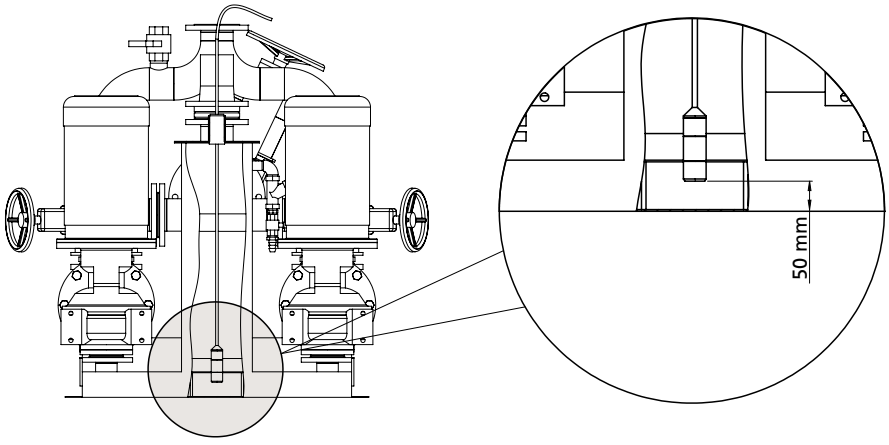


Fig. 7: Fitting the level sensor

6 Commissioning/Start-up/Shutdown

6.1 Prerequisites for commissioning/start-up

6.1.1 Priming and venting the system

✓ All inflow and discharge lines have been properly connected.

✓ All valves of the system (except for the inflow gate valve) are open.

1. Open the inflow gate valve, if any.
2. The system is filled with the fluid to be handled.
3. Check all parts and connections for leakage during filling.
   ⇨ If necessary, stop filling procedure and eliminate leakage. Then re-fill and vent the system.

6.1.2 Checklist for action to be taken

Table 12: Checklist for commissioning/start-up, inspection, servicing and maintenance

Action [5]	More information	Required during		
		Commissioning/start-up	Inspection	Servicing/maintenance
Advise and/or train operating staff.		✓	✓	✓
Read the operating manuals and store securely for later reference.		✓	✓	✓
Check the power supply.	Check against the data on the motor name plate.	✓	✓	✓
Check the switching mechanism.		✓	✓	✓
Check automatic switching functionality: Manual-0-automatic selector switch Pump changeover after each start/stop cycle Check pump changeover after max. running time Start-up of idle pump should duty pump fail Set selector switch back to automatic mode		✓	✓	✓
Check switchover time from star to delta.	Required: 3 seconds	✓	✓	✓
Check fuses.	Size, characteristics, three-pole/interlocked	✓	✓	✓
Check the alarm device to ensure that it functions properly.		✓	✓	✓
Check the collecting tank. Clean collecting tank from deposits, if any. In case of major grease deposits in the tank as a result of greasy waste water from industrial businesses, inform the customer that according to DIN 1986-100 a grease separator must be installed (upstream of the system).		✓	✓	✓
Fit level sensor; check settings.	(⇨ Section 5.6 Page 22)	✓		
Remove level sensor; check for jamming/ incrustations; clean, if necessary.			✓	✓

[5] Action to be taken depends on the control system used.

Action [5]	More information	Required during		
		Commissioning/start-up	Inspection	Servicing/maintenance
Check inspection hole covers on solids separator and collecting tank for leakage.		✓	✓	✓
Check winding resistances.	As described in the motor operating manual. Check the current limits set on the motor protection switches. Refer to the motor rating plate for the motor current.	✓	✓	✓
Re-tighten the terminals (motor, control system, level transmitter).		✓	✓	✓
Check motor power consumption.	Check data displayed at the control system against the data on the motor rating plate.	✓	✓	✓
Test-run for several start/stop cycles.		✓	✓	✓
Check the pump set for smooth running.		✓	✓	✓
Check bearings and replace, if required.	As described in the pump operating manual.		✓	✓
Check shaft seal and replace, if required.	As described in the pump operating manual.		✓	✓
Check lubricant and replace, if required.	As described in the pump operating manual.	✓	✓	✓
Check the shut-off, drain/vent and check valves for proper functioning and tightness.		✓	✓	✓

6.2 Commissioning/start-up

CAUTION

Incorrect commissioning/start-up
Damage to property!

- ▹ Ensure that all local applicable regulations and directives – particularly the machinery and low-voltage directives – are fulfilled.
- ▹ Install a line protection device in the supply cable. For the line protection required please refer to the attached logic diagram.
- ▹ Before commissioning, check all connected cables against the wiring diagram.

NOTE

Commissioning is performed by KSB as standard.

NOTE

Commission/start up the pump sets in compliance with the accompanying pump operating manual. Observe the safety information in this operating manual. Carry out all steps required for the commissioning/start-up of the pump sets.

✓ The system has been properly connected to the electric power supply and is equipped with all protection devices.

5) Action to be taken depends on the control system used.

✓ All relevant VDE standards and/or regulations applicable in the country of use are complied with.

✓ The control system used is in compliance with KSB's specifications. (⇨ Section 9.2 Page 43)

✓ The control system used has been properly connected and is ready for operation.

1. Set the manual-0-automatic selector switches for both pumps to "0".
2. Switch on the power supply.
3. Check the parameters to ensure they are compatible with the required application and functionality. Adjust if necessary.
4. Set the manual-0-automatic selector switches for both pumps to "Automatic".

⇨ Both pumps can now be started/stopped by the control unit as required.

6.3 Operating limits



⚠ DANGER

Non-compliance with pressure and temperature limits
Hot or toxic fluid may escape!
Explosion hazard!

- ▹ Comply with the operating data indicated in the technical product literature.
- ▹ Avoid prolonged operation against a closed shut-off element.
- ▹ Never operate the system at temperatures exceeding those specified in the technical product literature or on the name plate.
- ▹ The system must never be allowed to run dry.

Observe the following parameters and values during operation:

Parameter	Value
Max. permissible fluid temperature	40 °C up to 65 °C for 5 minutes max.
Max. ambient temperature (air)	40 °C

6.3.1 Fluids handled



⚠ WARNING

Pumping of impermissible fluids
Hazardous to persons and the environment!

- ▹ Only discharge permissible fluids into the public sewer system.
- ▹ Check the suitability of pump/system materials.

Permissible fluids

According to DIN 1986-3 the following fluids can be discharged into sewer systems: Water contaminated by domestic use, human and – as far as required and permitted – animal faeces together with the necessary flushing water as well as stormwater in case no other way of disposal is possible. [6)]

Impermissible fluids

Substances / water which must **not** be discharged into the sewer system are, amongst others:

Solid matter, fibres, tar, sand, cement, ash, coarse paper, paper towels, cardboard, debris, garbage, offal, grease, oil.

Waste water from installations situated above the flood level (EN 12 056-1).

Waste water containing hazardous substances (DIN 1986-100), e.g. greasy waste water from large-scale catering kitchens.
For drainage of greasy water a grease separator to DIN 4040-1 must be fitted.

6) Other types of waste water, e.g. industrial waste water, must not be discharged into the local sewer system without prior treatment.

6.3.2 Frequency of starts

To prevent high temperature increases in the motor and excessive loads on the pump, motor, seals and bearings, the frequency of starts shall not exceed the following number of start-ups per hour.

Table 13: Frequency of starts

Motor rating [kW]	Maximum number of start-ups [start-ups/hour]
≤ 11	25
≤ 37	20

6.3.3 Start and stop points

Liquid levels must not exceed or fall below the following start and stop levels:

Table 14: Start and stop levels

Size	Start level [mm]	Stop level [mm]
AmaDS³ 01 / 2 / 01	550	220
AmaDS³ 02 / 2 / 02	700	250
AmaDS³ 03 / 2 / 03.0	950	300
AmaDS³ 03 / 2 / 03	950	300
AmaDS³ 03 / 2 / 04.0	950	300
AmaDS³ 04.0 / 2 / 04.1	1300	350

6.3.4 Supply voltage



CAUTION

Wrong supply voltage
Damage to the system!

- ▹ The maximum permissible deviation in supply voltage is 10 % of the rated voltage indicated on the name plate.

6.4 Shutdown



⚠ DANGER

An incorrect sequence of the steps to be taken and malfunctioning of non-return valves may lead to overpressure in the collecting tank.
Bursting of the collecting tank!
Uncontrolled fluid leakage from the vent lines!

- ▹ Step 1: Always close the discharge line first to prevent unchecked fluid backflow.
- ▹ Step 2: Then close the inflow line.



⚠ DANGER

Failure to interrupt power supply
Danger to life!

- ▹ Disconnect all electrical connections from the power supply and secure against accidental start-up.

Short-term shutdown

1. Set the manual-0-automatic switches for both pumps to "0".
   - ⇨ Both pumps are switched off.
   - ⇨ The control unit remains operational.
2. **Check that the non-return valve functions properly.**



NOTE

The non-return valve's function can be checked as follows:
1) Listen for whether fluid is flowing!
2) Check the liquid level indication at the control system!

3. Shut off the discharge line using the appropriate valves.
4. Shut off the inflow line using the appropriate valve.

Short-term shutdown for work on a pump/solids separator

1. Set the manual-0-automatic switch of the pump on which work is to be done to "0".
   ⇨ One pump is switched off.
   ⇨ The control unit remains operational.
2. **Check that the non-return valve functions properly.**



NOTE

The non-return valve's function can be checked as follows:
1) Listen for whether fluid is flowing!
2) Check the liquid level indication at the control system!

3. Open the control unit.
4. For 400 V variants:
   Deactivate the motor protection switch on the pump on which work is to be done and secure against unintentional activation.
5. Close the control unit again.
6. Close the shut-off valves provided in the discharge and suction line and upstream of the solids separator of the relevant pump.
7. The system's main inflow line remains open as the other pump is operating.

Long-term shutdown

1. Set the manual-0-automatic switches for both pumps to "0".
2. Switch off the power supply.
   ⇨ This disables all control and signalling functions.
3. **Check that the non-return valve functions properly.**



NOTE

The non-return valve's function can be checked as follows:
1) Listen for whether fluid is flowing!
2) Check the liquid level indication at the control system!

4. Shut off the discharge line using the appropriate valves.
5. Shut off the inflow line using the appropriate valve.
6. Drain the collecting tank (e.g. using a hand diaphragm pump).
7. After long idle periods:
   Clean the tank and the solids separators.
   Clean and preserve the pump sets (refer to the operating manual of the pump set).
   Clean and preserve the valves (refer to the operating manuals of the valves).

6.5 Returning to service



⚠ WARNING

Failure to re-install or re-activate protective devices
Risk of personal injury from moving parts or escaping fluid!

▷ As soon as the work is complete, re-install and/or re-activate any safety-relevant and protective devices.



NOTE

If the pump has been out of service for more than one year, replace all elastomer seals.

Before returning the system to service:

1. Check all bolted connections of the system. (⇨ Section 7.2.3 Page 38)
2. Check all seal elements. If the system has been out of service for more than one year, replace all elastomer seals.
3. Check all piping connections. (⇨ Section 5.4 Page 21)
4. Observe and take all measures required to return the pump sets to service (refer to the operating manual of the pump set).
5. Observe and take all measures required to return the control system to service (refer to the operating manual of the control system).
6. Observe the sections on commissioning/start-up (⇨ Section 6.1 Page 23) (⇨ Section 6.2 Page 24) and the operating limits (⇨ Section 6.3 Page 25) to return the system to service.

7 Servicing/Maintenance

7.1 Safety regulations

The operator ensures that all maintenance, inspection and installation work is performed by authorised, qualified specialist personnel who are thoroughly familiar with the manual.



⚠ DANGER

Insufficient preparation of work on the system
Risk of personal injury!

- Properly shut down the system and secure against unintentional start-up.
- Close the shut-off elements in suction and discharge line.
- Drain the system.
- Close auxiliary connections, if any.
- Allow the system to cool down to ambient temperature.



⚠ DANGER

Work on the system by unqualified personnel
Danger of death from electric shock!

- Have system components modified and dismantled by authorised personnel only.



⚠ WARNING

Pumped fluids which are injurious to health
Hazardous to persons and the environment!

- Systems handling liquids posing health hazards must be decontaminated. Wear safety clothing and a protective mask, if required.
- Observe all legal regulations on the disposal of harmful fluids.



⚠ WARNING

Unintentional starting of pump set
Risk of injury by moving parts!

- Make sure that the pump set cannot be started up unintentionally.
- Always make sure the electrical connections are disconnected before carrying out work on the pump set.



⚠ WARNING

Hot surface
Risk of injury!

- Allow the pump set to cool down to ambient temperature.



⚠ WARNING

Pump set with high noise levels
Damage to hearing!

- Persons must only enter the vicinity of the running pump set if they are wearing protective equipment / ear protection.
- See noise characteristics.



⚠ WARNING

Insufficient stability
Risk of crushing hands and feet!

- ▷ During assembly/dismantling, secure the pump (set)/pump parts to prevent tipping or falling over.

A regular servicing/maintenance schedule will help avoid expensive repairs and contribute to trouble-free, reliable operation of the system with a minimum of maintenance expenditure and work.



NOTE

All maintenance, service and installation work can be carried out by KSB Service or authorised workshops. Find your contact in the attached "Addresses" booklet or on the internet at "www.ksb.com/contact".

Never use force when dismantling and reassembling the pump set.

Also see
- Noise characteristics [⇨ 16]

7.2 Maintenance/Inspection

7.2.1 Supervision of operation



⚠ DANGER

Formation of an explosive atmosphere inside the pump
Explosion hazard!

- ▷ The pump internals in contact with the fluid to be handled, including the seal chamber and auxiliary systems must be filled with the fluid to be handled at all times.
- ▷ Provide sufficient inlet pressure.
- ▷ Provide an appropriate monitoring system.



CAUTION

Increased wear due to dry running
Damage to the pump set!

- ▷ Never operate the pump set without liquid fill.
- ▷ Never close the shut-off element in the suction line and/or supply line during pump operation.



CAUTION

Impermissibly high temperature of fluid handled
Damage to the pump!

- ▷ Prolonged operation against a closed shut-off element is not permitted (heating of the fluid).
- ▷ Observe the temperature limits in the data sheet and in the section on operating limits (refer to the operating manual of the pump set).

While the pump is in operation, observe and check the following:
- The pump must run quietly and free from vibrations at all times.
- Monitor the correct functioning of any auxiliary connections.

7.2.2 Servicing/maintenance/inspection

This supervision plan contains the minimum scope of work recommended by KSB. Do not exceed the time intervals indicated; shorter intervals serve to improve the operating reliability.

Table 15: Servicing/maintenance intervals

Subassembly	Interval	Action
Pump set	Refer to the operating manual of the pump set.	
Collecting tank	Every year	▪ Check for solids. ▪ Clean as required.
Solids separator	Every year	▪ Check for solids. ▪ Clean as required.
Flow splitter	Every 6 months	▪ Check for solids. ▪ Clean as required.
Gate valve	Monthly	▪ Functional test ▪ Lubrication
Non-return valve	Monthly	▪ Functional test
	Every 6 months	▪ Clean as required.

7.2.2.1 Cleaning the solids separator

7.2.2.1.1 AmaDS³ 01 and AmaDS³ 02



⚠ DANGER

An incorrect sequence of the steps to be taken and malfunctioning of non-return valves may lead to overpressure in the collecting tank.
Bursting of the collecting tank!
Uncontrolled fluid leakage from the vent lines!

- ▷ Step 1: Always close the discharge line first to prevent unchecked fluid backflow.
- ▷ Step 2: Then close the inflow line.



⚠ WARNING

Fluids posing a health hazard
Hazard to persons and the environment!

- ▷ Collect and properly dispose of flushing liquid and any residues of the fluid handled.
- ▷ Wear safety clothing and a protective mask, if required.
- ▷ Observe all legal regulations on the disposal of substances posing a health hazard.

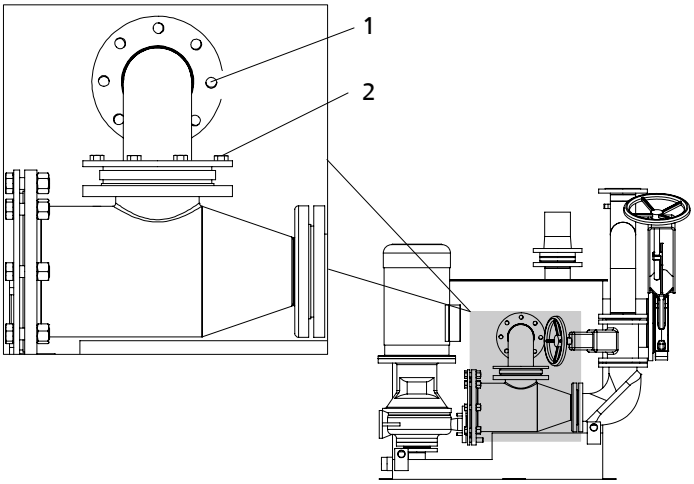


Fig. 8: Dismantling/reassembly of solids separator

1	Hex. head bolts M16 x 70
2	Hex. head bolts on solids separator M16 x 80

✓ The equipment has been properly shut down. (⇨ Section 6.4 Page 26)

✓ The discharge line is closed with a wedge gate valve[7)] .

✓ The inflow gate valve [7)] is closed. If no inflow gate valve is fitted, waste water inflow has been prevented by other appropriate measures.

✓ An appropriate container for solids to be disposed of is available.

1. Drain the collecting tank by opening the tank's inspection hole and lowering an appropriate submersible pump with hose system.
2. Dismantle all bolted connections at the inflow line (elbow) to the solids separator; remove and put the inflow elbow in a safe place.
3. Remove the inflow check valve and put in a safe place.
4. Remove the seal elements.
5. Check and clean the solids separator. Remove any solids.
6. Check and clean the suction lines.
7. Re-mount the inflow line to the solids separator; fit new seals.
8. Fit inflow check valve and align correctly. Observe the marking on the valve!
9. Tighten all bolted connections on the inflow line to the solids separator applying the specified tightening torque. (⇨ Section 7.2.3 Page 38)
10. Perform commissioning of the solids separation system including the pump sets.

7.2.2.1.2 AmaDS³ 03 and AmaDS³ 04.0



⚠ DANGER

An incorrect sequence of the steps to be taken and malfunctioning of non-return valves may lead to overpressure in the collecting tank.
Bursting of the collecting tank!
Uncontrolled fluid leakage from the vent lines!

- ▹ Step 1: Always close the discharge line first to prevent unchecked fluid backflow.
- ▹ Step 2: Then close the inflow line.

7) Optional

	**⚠ WARNING** **Fluids posing a health hazard** Hazard to persons and the environment! ▷ Collect and properly dispose of flushing liquid and any residues of the fluid handled. ▷ Wear safety clothing and a protective mask, if required. ▷ Observe all legal regulations on the disposal of substances posing a health hazard.

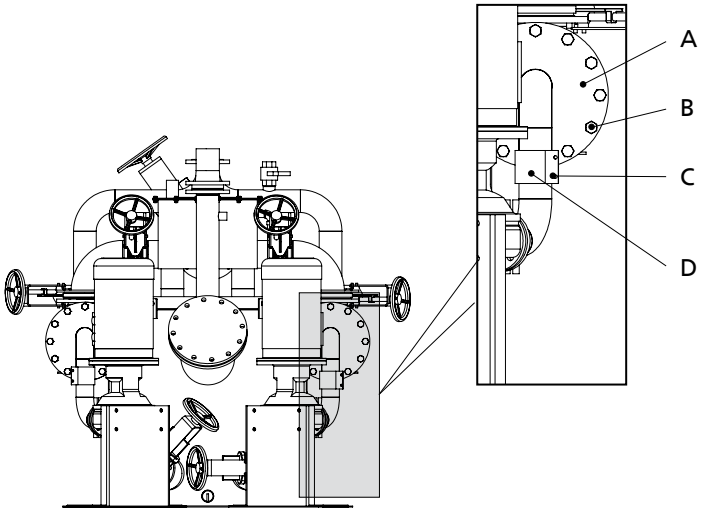


Fig. 9: Dismantling and reassembly of solids separator

A	Separator flange plate
B	Hex. head bolts M20 x 70
C	Socket head cap screws M10 x 90
D	Coupling

Cleaning during system standstill

✓ The equipment has been properly shut down. (⇨ Section 6.4 Page 26)

✓ The non-return valve is closed and has been checked for proper functioning. (⇨ Section 6.4 Page 26)

✓ The discharge line is closed with a knife gate valve.

✓ The inflow gate valve [8] is closed. If no inflow gate valve is fitted, waste water inflow has been prevented by other appropriate measures.

✓ An appropriate container for solids to be disposed of is available.

1. Drain the collecting tank by opening the tank's inspection hole and lowering an appropriate submersible pump with hose system.
2. Undo bolts (C) of coupling (D).
3. Undo bolts (B) of separator flange plate (A). Remove separator flange plate (A) and put in a safe place.
4. Carry out a visual inspection of the inflow check valve while the solids separator is open.
5. Check and clean the solids separator. Remove any solids.
6. Re-mount separator flange plate (A) including bolts (B); fit new seal elements.
7. Fit coupling (D) using bolts (C).
8. Tighten all bolted connections applying the specified tightening torques. (⇨ Section 7.2.3 Page 38)

8) Optional

Cleaning while the parallel pump is operating

✓ The equipment has been properly shut down. (⇨ Section 6.4 Page 26)

✓ The non-return valve is closed and has been checked for proper functioning. (⇨ Section 6.4 Page 26)

✓ The discharge line is closed with a knife gate valve .

✓ An appropriate container for solids to be disposed of is available.

1. Close the shut-off valves provided in the discharge and suction line and upstream of the solids separator of the relevant pump.
2. Undo bolts (C) of coupling (D).
3. Undo bolts (B) of separator flange plate (A). Remove separator flange plate (A) and put in a safe place.
4. Carry out a visual inspection of the inflow check valve while the solids separator is open.
5. Check and clean the solids separator. Remove any solids.
6. Re-mount separator flange plate (A) including bolts (B); fit new seal elements.
7. Fit coupling (D) using bolts (C).
8. Tighten all bolted connections applying the specified tightening torques. (⇨ Section 7.2.3 Page 38)
9. Re-open the appropriate valves (gate valves).
10. Return the pump which has been shut down to service.

7.2.2.2 Cleaning the collecting tank

7.2.2.2.1 AmaDS³ 01 and AmaDS³ 02



⚠ DANGER

An incorrect sequence of the steps to be taken and malfunctioning of non-return valves may lead to overpressure in the collecting tank.
Bursting of the collecting tank!
Uncontrolled fluid leakage from the vent lines!

- ▹ Step 1: Always close the discharge line first to prevent unchecked fluid backflow.
- ▹ Step 2: Then close the inflow line.



⚠ WARNING

Fluids posing a health hazard
Hazard to persons and the environment!

- ▹ Collect and properly dispose of flushing liquid and any residues of the fluid handled.
- ▹ Wear safety clothing and a protective mask, if required.
- ▹ Observe all legal regulations on the disposal of substances posing a health hazard.

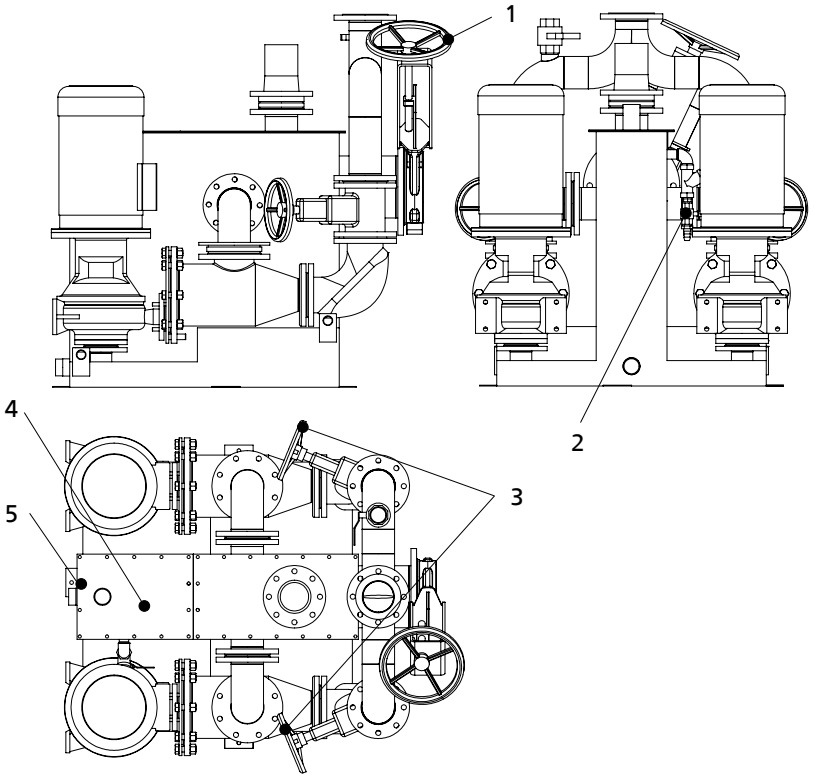


Fig. 10: Opening the collecting tank

1	Inflow gate valve	2	Connection for residual drainage pump
3	Wedge gate valve in discharge line	4	Collecting tank cover
5	Hex. head bolts M10 x 25		

✓ The equipment has been properly shut down. (⇨ Section 6.4 Page 26)

✓ The non-return valve is closed and has been checked for proper functioning. (⇨ Section 6.4 Page 26)

✓ The discharge line is closed by means of the two wedge gate valves.

✓ The inflow gate valve[9)] is closed. If no inflow gate valve is fitted, waste water inflow has been prevented by other appropriate measures.

✓ An appropriate container for solids to be disposed of is available.

1. Drain the system (collecting tank) by opening the tank's inspection hole and lowering an appropriate submersible pump with hose system.
2. Undo bolts (5) of collecting tank cover (4), remove cover and put in a safe place.
3. Clean the collecting tank.
4. Re-mount the collecting tank cover (4) and fit bolts (5) again. Fit new seal element.
5. Tighten all bolted connections applying the specified tightening torques. (⇨ Section 7.2.3 Page 38)
6. Return the system to service. (⇨ Section 6.5 Page 27)

9) Optional

7.2.2.2.2 AmaDS³ 03 and AmaDS³ 04.0

⚠ DANGER

An incorrect sequence of the steps to be taken and malfunctioning of non-return valves may lead to overpressure in the collecting tank.
Bursting of the collecting tank!
Uncontrolled fluid leakage from the vent lines!

- Step 1: Always close the discharge line first to prevent unchecked fluid backflow.
- Step 2: Then close the inflow line.

⚠ WARNING

Fluids posing a health hazard
Hazard to persons and the environment!

- Collect and properly dispose of flushing liquid and any residues of the fluid handled.
- Wear safety clothing and a protective mask, if required.
- Observe all legal regulations on the disposal of substances posing a health hazard.

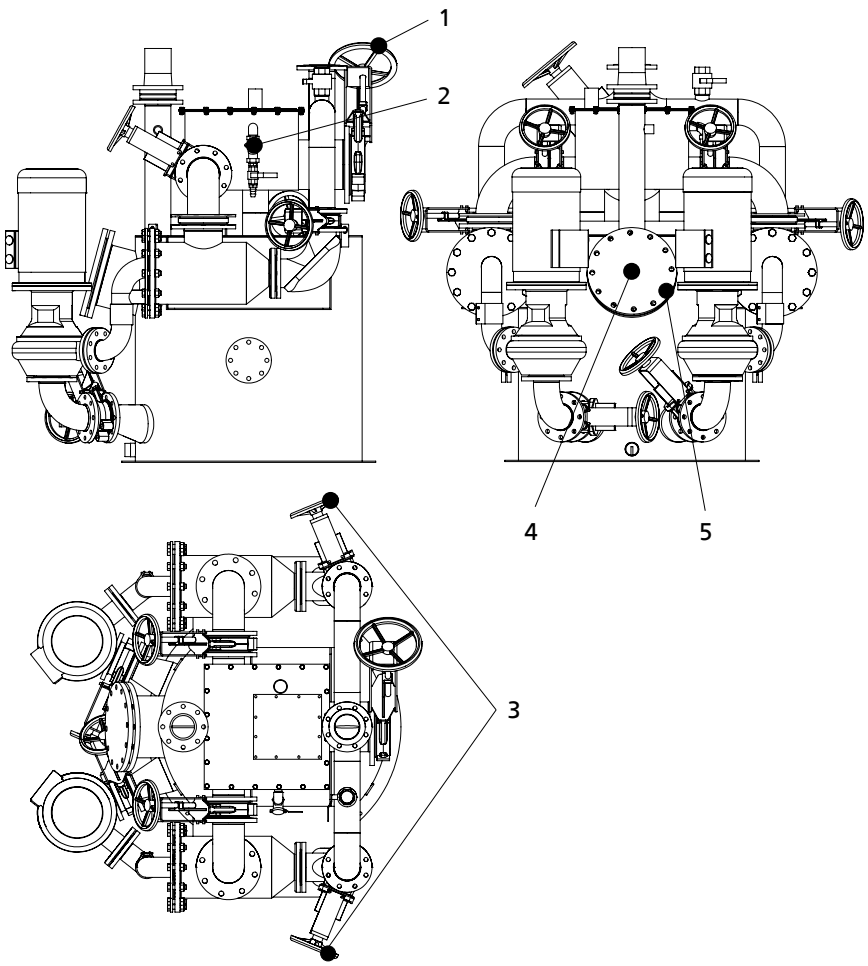


Fig. 11: Cleaning the collecting tank

1	Inflow gate valve	2	Connection for residual drainage pump
3	Knife gate valve in the discharge line	4	Collecting tank cover
5	Hex. head bolts M20 x 90		

✓ The equipment has been properly shut down. (⇨ Section 6.4 Page 26)

✓ The non-return valve is closed and has been checked for proper functioning. (⇨ Section 6.4 Page 26)

✓ The discharge line is closed with a knife gate valve.

✓ The inflow gate valve [10] is closed. If no inflow gate valve is fitted, waste water inflow has been prevented by other appropriate measures.

✓ An appropriate container for solids to be disposed of is available.

1. Drain the system (collecting tank) by opening the tank's inspection hole and lowering an appropriate submersible pump with hose system.
2. Clean the collecting tank.
3. Re-mount the collecting tank cover (4) and fit bolts (5) again. Fit new seal element.
4. Tighten all bolted connections applying the specified tightening torques. (⇨ Section 7.2.3 Page 38)
5. Return the system to service. (⇨ Section 6.5 Page 27)

7.2.2.3 Cleaning the ball non-return valve



⚠ DANGER

An incorrect sequence of the steps to be taken and malfunctioning of non-return valves may lead to overpressure in the collecting tank.
Bursting of the collecting tank!
Uncontrolled fluid leakage from the vent lines!

- ▹ Step 1: Always close the discharge line first to prevent unchecked fluid backflow.
- ▹ Step 2: Then close the inflow line.



⚠ WARNING

Fluids posing a health hazard
Hazard to persons and the environment!

- ▹ Collect and properly dispose of flushing liquid and any residues of the fluid handled.
- ▹ Wear safety clothing and a protective mask, if required.
- ▹ Observe all legal regulations on the disposal of substances posing a health hazard.

10) Optional

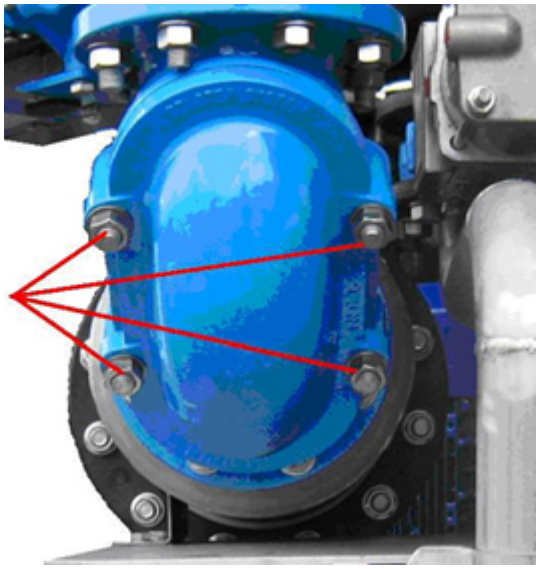


Fig. 12: Opening the ball non-return valve

✓ The equipment has been properly shut down. (⇨ Section 6.4 Page 26)

✓ The non-return valve is closed and has been checked for proper functioning. (⇨ Section 6.4 Page 26)

✓ The discharge line has been closed with a wedge gate valve (AmaDS³ 01/2/01 and 02/2/02) or with a knife gate valve (AmaDS³ 03/2/03.0, 03/2/03, 03/2/04.0 and 04.0/2/04.1).

✓ The inflow gate valve [11] is closed. If no inflow gate valve is fitted, waste water inflow has been prevented by other appropriate measures.

✓ An appropriate container for solids to be disposed of is available.

1. Undo the cover bolts.
2. Remove cover and ball.
3. Check ball for wear and clean the inside of the valve.
4. Re-mount cover and tighten the bolts. Fit new seal elements.
5. Tighten all bolted connections applying the specified tightening torques. (⇨ Section 7.2.3 Page 38)
6. Re-open the appropriate valves (gate valves).
7. Return the pump which has been shut down to service.

	NOTE
	Depending on the system variant, cleaning of the ball non-return valve can be carried out during parallel operation. **Not possible for:** AmaDS³ 01 and AmaDS³ 02 in standard design. **Possible for:** AmaDS³ 03 and AmaDS³ 04 in standard design and for AmaDS³ 02 in special design.

7.2.3 Tightening torques

Observe the bolt tightening torques (depending on the size and material).

11) Optional

Table 16: Tightening torques

Thread	Torque [Nm] A4-70/1.4462
M4	2
M5	4
M 6	7
M 8	17
M 10	35
M 12	60
M 16	150
M 20	290
M 24	278 / 500
M 27	409 / 736
M 30	554 / 1000

8 Trouble-shooting



NOTE

All maintenance, service and installation work can be carried out by KSB Service. Find your contact in the attached "Addresses" booklet or on the Internet at www.ksb.com/contact".

The operator ensures that all maintenance, inspection and installation work is performed by authorised, qualified specialist personnel who are thoroughly familiar with the manual.

Fault	Cause	Remedy
Lowering of the liquid level in the collecting tank does not take place.	Solids separation system clogged	✓ The operating manual of the pump set is on hand. ✓ The operating manual of the control system is on hand. 1. Shut down the pump set in compliance with the operating manual and secure it against unintentional start-up. 2. Close the gate valve in the discharge line first, then close the gate valve in the inflow line. 3. Check and, if necessary, clean the respective non-return valves. 4. Check and, if necessary, clean the respective solids separator. 5. Check and, if necessary, clean the collecting tank including sensor zones. 6. Check and, if necessary, clean the respective suction line. 7. Check and, if necessary, clean the respective pump in compliance with the operating manual of the pump set. 8. Check the inflow and flow splitter system.
	Defective pump set	✓ The operating manual of the pump set is on hand. ✓ The operating manual of the control system is on hand. 1. Shut down the system. 2. Service the pump set in compliance with the operating manual of the pump set.
	Control system displays error message.	✓ The operating manual of the control system is on hand. 1. Deal with the error messages in compliance with the operating manual of the control system.
	Discharge line clogged	1. Request sewer cleaning vehicle. 2. Close wedge or knife gate valve (depending on the variant). 3. Flush discharge line. **Caution:** Do not exceed the discharge line's max. pressure class. Observe sewer cleaning company's specifications.
	Inflow rate too high	1. Find the cause of the additional inflow of water and take remedial action.
	The collecting tank's venting equipment does not function properly.	1. Find the cause and take remedial action; check for proper functioning.

9 Related Documents

9.1 Configuration of solids separation system

9.1.1 Example – AmaDS³ 01 and AmaDS³ 02

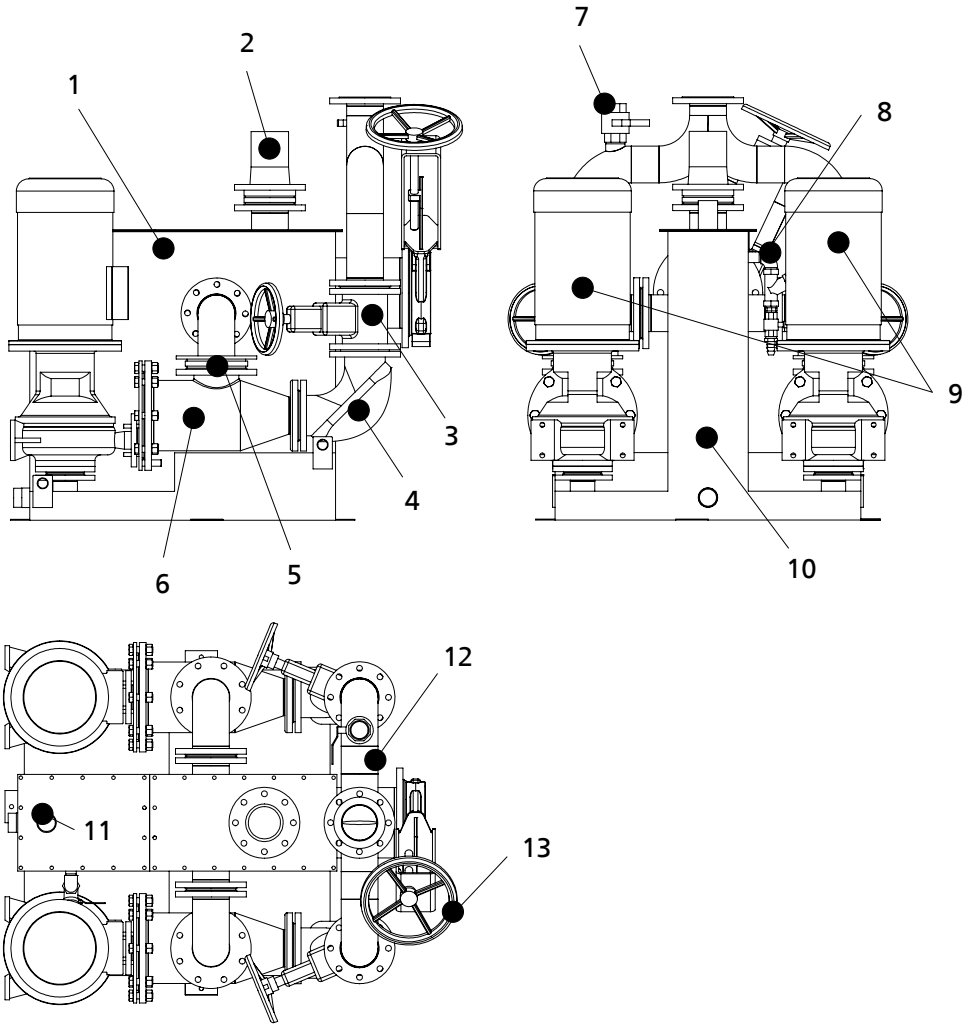


Fig. 13: Example – AmaDS³ 01 and/or AmaDS³ 02

Table 17: Selection table

Item	Description	Quantity
1	Integrated flow splitter system	1
2	Collecting tank venting equipment	1
3	Wedge gate valve	2
4	Ball non-return valve	2
5	Inflow check valve	2
6	Solids separator	2
7	Connection for flushing and cleaning	1
8	Connection for residual drainage pump	1
9	Pump set	2
10	Stainless steel tank (collecting tank)	1
11	Collecting tank cover/ Inspection hole with level sensor connection (seal element)	1
12	Discharge line	1
13	Inflow gate valve (optional)	1

9.1.2 Example – AmaDS³ 03 and AmaDS³ 04.0

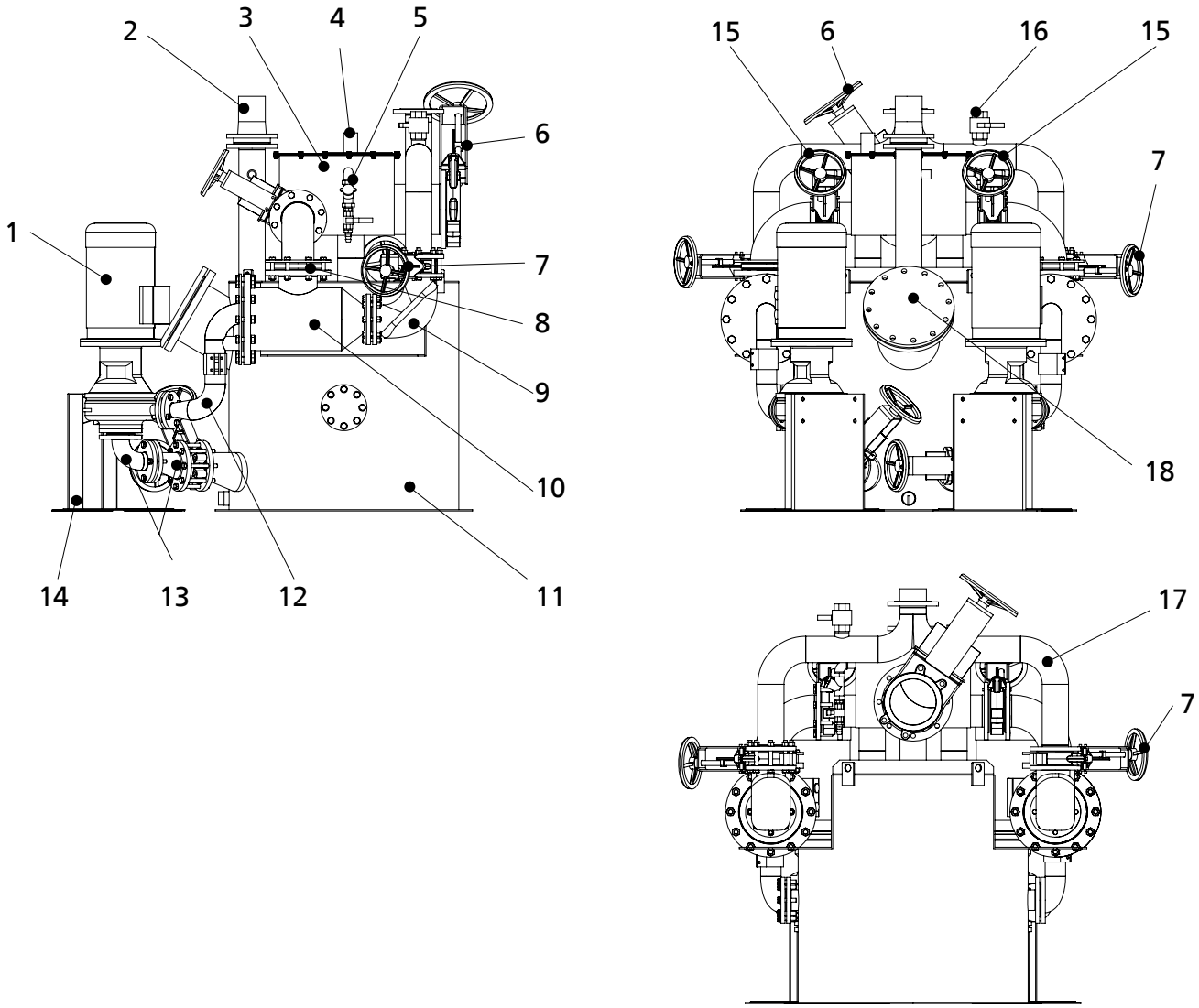


Fig. 14: Example – AmaDS³ 03 and AmaDS³ 04.0

Table 18: Selection table

Item	Description	Quantity
1	Pump set	2
2	Collecting tank venting equipment	1
3	Flow splitter system	1
4	Level sensor connection (seal element)	1
5	Connection for residual drainage pump	1
6	Inflow gate valve (optional)	1
7	Knife gate valve (discharge line)	2
8	Inflow check valve	2
9	Ball non-return valve	2
10	Solids separator	2
11	Stainless steel tank (collecting tank)	1
11a	Collecting tank inspection hole	1
12	Discharge line (pump set)	2
13	Suction line (pump set)	2
14	Installation accessories (pump set)	2
15	Knife gate valve (solids separator inflow)	2
16	Flushing/cleaning inspection hole	1

Item	Description	Quantity
17	Discharge line	
18	Collecting tank inspection hole	1

9.2 Requirements to be met by other manufacturers' control systems

Requirements to be met by other manufacturers' control systems suitable for use with the AmaDS³ solids separation system:

Functions:

- Tank drainage
- Automatic pump changeover at every start and in the case of a pump fault
- ATEX mode (with integrated dry running protection)
- Inflow-dependent starting
- Runtime limitation with forced changeover
- Adjustable cut-in delay
- Adjustable stop delay
- Liquid level-dependent stopping
- Connection for optional redundant emergency level control system
- Flushing cycle (functional check)
- Remote acknowledgement, external faults

Monitoring:

- Integrated alarm buzzer, 85 dB(A)
- Mains-independent rechargeable battery with charging unit for powering the electronics and the level control system (optional)
- High water alert
- Motor protection: Overcurrent and short-circuit protection
- General fault message: Volt-free changeover contact
- Phase failure monitoring
- Monitoring of rotary field (power supply)
- Voltage monitoring
- Sensor fault/Broken wire detection
- External alarm input
- Service interval monitoring (optional)

Information displayed:

- Tank water level indication
- "Traffic light" LEDs signalling operational availability, warning and alert (green/yellow/red)
- Process symbol with LEDs for pump operation/fault and high water
- Operation and status information per pump
- Operating hours per pump
- Indication of mains voltage
- Rotary field recognition of mains power supply
- Pump starts per pump, manual-0-automatic switch per pump
- Operating panel
- Service interface Mini-USB (RS 232)

Design:

- Control of two pumps
- Signalling module for transmitting alerts (optional)
- Signalling module for transmitting the fill level (analog) 4…20 mA (optional)

- Connection for level sensor 4-20 mA, analog
- Connection/supply to level sensor in potentially explosive atmospheres via intrinsic safety barrier (optional)
- Connection for redundant digital emergency level control system (optional)
- Motor protection via bimetal switch (1 x)/PTC relay (1 x)
- Master switch
- Sheet steel housing

Inputs and outputs:

Digital inputs:

- 12..25.2 V DC or 230 V AC
- Motor protection via bimetal switch, 24 V DC
- Motor protection via PTC relay
- 1 x external alarm input, 24 V DC
- 1 x remote acknowledgement, 24 V DC

Digital outputs:

- 1 x volt-free signalling output, changeover contact, max. 230 V DC / 1 A
- 1 x signalling output, 12 V DC, max. 200 mA

Analog inputs:

- 4…20 mA (two-wire and three-wire) input resistor <= 300 Ohm

Operating data:

Table 19: Operating data

	Values to be observed:
Rated voltage:	3 x 400 V (L1-L2-L3-N-PE)
Mains frequency:	50 / 60 Hz
Rated insulation voltage:	500 V AC
Starting method:	DOL/Star-delta
Transmitter supply:	24 V +/- 10 %, max. impedance 200 mA DC
Temperature range:	
▪ Operation	-10 to + 50 °C
▪ Storage	0 to + 70 °C
Enclosure	IP 54

10 EC Declaration of Conformity

Manufacturer: **KSB Aktiengesellschaft**
Johann-Klein-Straße 9
67227 Frankenthal (Germany)

The manufacturer herewith declares that **the product**:

AmaDS³

KSB order number: .....

- is in conformity with the provisions of the following Directives as amended from time to time:
  - System: EC Machinery Directive 2006/42/EC
- Applied harmonised standards
  - ISO 12100

Person authorised to compile the technical file:
Thomas Pensler
Head of Product Development
Waste Water Pumps
KSB Aktiengesellschaft
Turmstraße 92
06110 Halle (Germany)

The EC Declaration of Conformity was issued in/on:

Frankenthal, 1 March 2011

Head of Product Development
Submersible Pumps
KSB Aktiengesellschaft
Johann-Klein-Straße 9
67227 Frankenthal (Germany)

11 Certificate of Decontamination

Type .....
Order number/ Certificate of decontamination
Order item number[12)] .....

Delivery date .....

Field of application: .....

Fluid handled[12)] : .....

Please tick where applicable[12)] :


☐ radioactive


☐ explosive


☐ corrosive


☐ toxic


☐ harmful


☐ bio-hazardous


☐ highly flammable



☐ safe

Reason for return[12)] : .....

Comments: .....

.....

The lifting unit/accessories have been carefully drained, cleaned and decontaminated inside and outside prior to dispatch/ placing at your disposal.

☐ No special safety precautions are required for further handling.
☐ The following safety precautions are required for flushing fluids, fluid residues and disposal:

.....

.....

We confirm that the above data and information are correct and complete and that dispatch is effected in accordance with the relevant legal provisions.

.....	.....	.....
Place, date and signature	Address	Company stamp

12) Required fields

Index

C

Certificate of decontamination 46
Commissioning/start-up 24

D

Designation 14
Disposal 13

E

Explosion protection 17, 22, 30

F

Fluids handled 25

I

Installation
    Installation on a foundation 18
Intended use 8

O

Operating limits 8
Order number 6
Other applicable documents 6

R

Return to supplier 13

S

Safety 8
Safety awareness 9
Servicing/maintenance 30
Shutdown 26

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