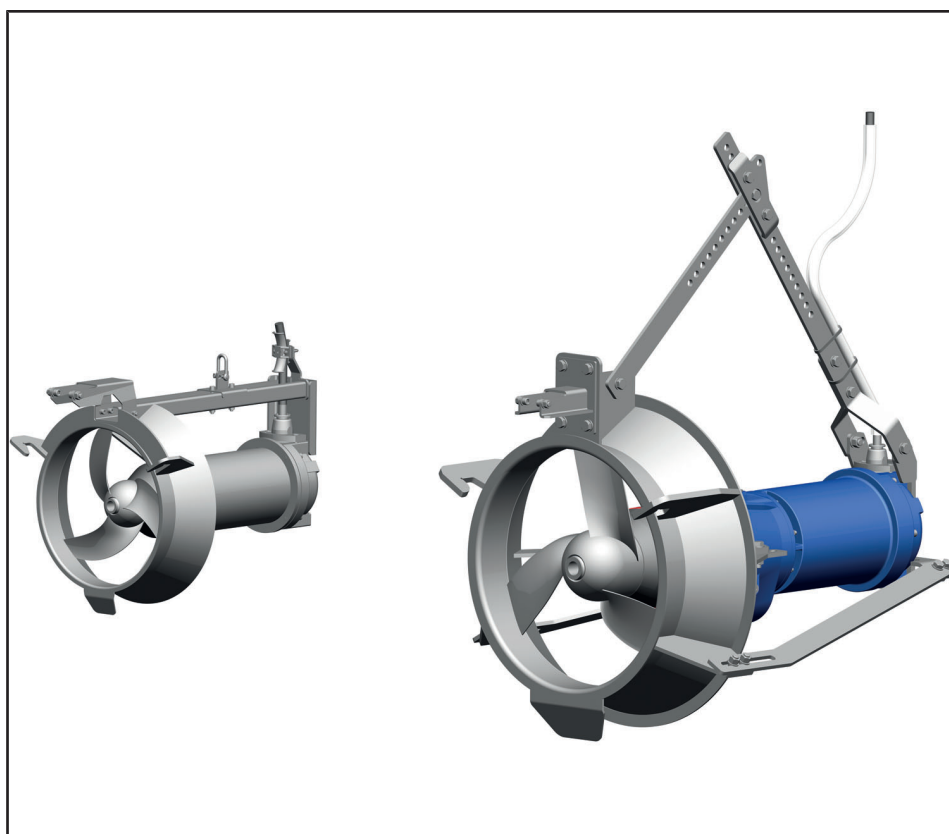


Submersible Motor Pump

Amaline

60 Hz

Installation/Operating Manual



Mat. No.: 01564607

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Installation/Operating Manual Amaline

Original operating manual

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Contents

	Glossary	6
1	General.....	7
1.1	Principles	7
1.2	Installation of partly completed machinery.....	7
1.3	Target group.....	7
1.4	Other applicable documents.....	7
1.5	Symbols	7
2	Safety	9
2.1	Key to safety symbols/markings.....	9
2.2	General.....	9
2.3	Intended use	9
2.4	Personnel qualification and personnel training.....	10
2.5	Consequences and risks caused by non-compliance with these operating instructions.....	10
2.6	Safety awareness	10
2.7	Safety information for the operator/user	10
2.8	Safety information for maintenance, inspection and installation	11
2.9	Unauthorized modes of operation.....	11
2.10	Explosion protection	11
3	Transport/Temporary Storage/Disposal.....	12
3.1	Checking the condition upon delivery	12
3.2	Fitting the bail or shackle	12
3.3	Lifting rope	13
3.4	Webbing sling.....	14
3.5	Transport.....	14
3.6	Storage/preservation	15
3.7	Return to supplier.....	16
3.8	Disposal	16
4	Description.....	17
4.1	General description	17
4.2	Product information.....	17
4.2.1	Product information as per Regulation No 1907/2006 (REACH)	17
4.3	Designation.....	17
4.4	Name plate.....	18
4.5	Design details.....	18
4.6	Configuration and function.....	19
4.7	Scope of supply.....	20
4.8	Dimensions and weights	20
5	Installation at Site	21
5.1	Safety regulations.....	21
5.2	Checks to be carried out prior to installation.....	21
5.2.1	Checking the operating data	21
5.2.2	Preparing the place of installation	22
5.2.3	Checking the lubricant level.....	22
5.3	Installing the pump set	24
5.3.1	Fitting the protective cable sheath at the submersible motor pump.....	24
5.3.2	Fitting the installation parts.....	24
5.3.3	Lifting hook.....	25
5.3.4	Checking and adjusting the attachment point	26
5.3.5	Positioning of crane and crane hook.....	29
5.3.6	Checking attachment dimension	30
5.3.7	Installing the pump set.....	30
5.3.8	Fastening and tensioning the power cable.....	31

5.3.9	Fastening the lifting rope.....	31
5.3.10	Fitting the rope winder/bollard	32
5.4	Electrical system.....	32
5.4.1	Information for planning the control system	32
5.4.2	Connection to power supply	36
5.5	Checking the direction of rotation.....	38
6	Commissioning/Start-up/Shutdown.....	40
6.1	Commissioning/start-up	40
6.1.1	Prerequisites for commissioning/start-up	40
6.1.2	Start-up.....	40
6.2	Operating limits.....	40
6.2.1	Frequency of starts.....	41
6.2.2	Operation on the power supply mains.....	41
6.2.3	Frequency inverter operation	41
6.2.4	Fluid handled	41
6.3	Shutdown/storage/preservation	42
6.3.1	Shutdown	42
6.3.2	Measures to be taken for shutdown	43
6.4	Returning to service	44
7	Servicing/Maintenance.....	45
7.1	Safety regulations.....	45
7.2	Maintenance/inspection.....	46
7.2.1	Inspection work.....	47
7.3	Drainage/cleaning	53
7.4	Dismantling the pump set.....	53
7.4.1	General information/Safety regulations.....	53
7.4.2	Preparing the pump set.....	54
7.4.3	Removing the axial propeller	54
7.4.4	Removing the mechanical seals	56
7.4.5	Dismantling the motor section	58
7.5	Reassembling the pump set.....	58
7.5.1	General information/Safety regulations.....	58
7.5.2	Reassembling the motor section.....	59
7.5.3	Installing the mechanical seals.....	59
7.5.4	Leak testing	60
7.5.5	Mounting the axial propeller	62
7.6	Tightening torques.....	63
7.7	Spare parts stock.....	63
7.7.1	Recommended spare parts stock for 2 years' operation to DIN 24296	63
7.7.2	Ordering spare parts.....	64
8	Trouble-shooting.....	65
9	Related Documents	66
9.1	General assembly drawings with list of components.....	66
9.1.1	Amaline 200 (motors: 1 4, 2 4; motor housing made of gray cast iron).....	66
9.1.2	Amaline 200 (motors: 1 4, 2 4; motor housing made of stainless steel).....	68
9.1.3	Amaline 300 (motors: 0 6, 2 6; motor housing made of gray cast iron).....	69
9.1.4	Amaline 300 (motors: 0 6, 2 6; motor housing made of stainless steel).....	71
9.1.5	Amaline 300 (motors: 8 6; motor housing made of gray cast iron).....	72
9.1.6	Amaline 400 (motors: 3 8, 4 8; motor housing made of gray cast iron).....	74
9.1.7	Amaline 400 (motors: 3 8, 4 8; motor housing made of stainless steel).....	75
9.1.8	Amaline 500/600/800 (motors: 17 2, 25 2, 4 4, 6 4, 11 4, 16 4, 23 4, 30 4; motor housing made of gray cast iron).....	77
9.2	Flamepaths on explosion-proof motors.....	79
9.2.1	Amaline 200, 300, 400 (motor housing made of stainless steel).....	79
9.2.2	Amaline 200, 300, 400 (motor housing made of gray cast iron).....	80
9.2.3	Amaline 300 with motor 8 6 (motor housing made of gray cast iron).....	80
9.2.4	Amaline 500, 600, 800 (motor housing made of gray cast iron).....	81

9.2.5	Amaline 500, 600, 800 (motor housing made of gray cast iron).....	81
9.3	Wiring diagrams	82
9.3.1	Amaline 200, Amaline 300 with motor 0 6 or 2 6.....	82
9.3.2	Amaline 300 with motor 8 6, Amaline 400	83
9.3.3	Amaline 500, 600, 800	85
9.4	Forcing screws.....	87
9.5	Dimensions.....	88
9.5.1	Amaline 200, 300, 400; motor housing made of gray cast iron	88
9.5.2	Amaline 200, 300, 400; motor housing made of stainless steel	90
9.5.3	Amaline 500, 600, 800; motor housing made of gray cast iron	92
9.5.4	Connection pipe.....	94
10	Certificate of Decontamination.....	96
	Index	97

Glossary

Certificate of decontamination

If a product is to be returned to the manufacturer, the customer declares in a certificate of decontamination that the product has been properly drained to eliminate any environmental and health hazards arising from components in contact with the fluid handled.

Pump

Machine without drive, additional components or accessories

Pump set

Complete pump set consisting of pump, drive, additional components and accessories

Submersible motor pump

Submersible motor pumps are floodable, close-coupled units which are not self-priming. Submersible motor pumps are operated completely submerged.

1 General

1.1 Principles

This operating manual is valid for 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.

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 clearly identify the pump set and serve as identification for all further business processes.

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

1.2 Installation of partly completed machinery

To install partly completed machinery supplied by KSB refer to the sub-sections under Servicing/Maintenance.

1.3 Target group

This operating manual is aimed at the target group of trained and qualified specialist technical personnel. (⇒ Section 2.4, Page 10)

1.4 Other applicable documents

Table 1: Overview of other applicable documents

Document	Contents
Data sheet	Description of the technical data of the pump (set)
General arrangement drawing/ outline drawing	Description of mating and installation dimensions for the pump (set), weights
Hydraulic characteristic curve	Characteristic curves showing head, flow rate, efficiency and power input
General assembly drawing ¹⁾	Sectional drawing of the pump (set)
Sub-supplier product literature ¹⁾	Operating manuals and other product literature of accessories and integrated machinery components
Spare parts lists ¹⁾	Description of spare parts


For accessories and/or integrated machinery components observe the product literature of the corresponding manufacturer.

1.5 Symbols

Table 2: 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
⇒	Cross-references

1) If agreed to be included in the scope of supply

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









2 Safety

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

In addition to the present general safety information the action-related safety information given in the other sections must be observed.

2.1 Key to safety symbols/markings

Table 3: 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.
	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 operating manual contains general installation, operating and maintenance instructions that must be observed to ensure safe operation of the system and prevent personal injury and damage to property.
- Comply with all the safety instructions given in the individual sections of this operating manual.
- The operating manual must be read and understood by the responsible specialist personnel/operators prior to installation and commissioning.
- The contents of this operating manual must be available to the specialist personnel at the site at all times.
- Information and markings attached directly to the product must always be complied with and 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 which are not taken into account.

2.3 Intended use

- The pump (set) must only be operated in the fields of application and within the use limits which are described in the other applicable documents.
- Only operate pumps/pump sets which are in perfect technical condition.
- Do not operate the pump (set) in partially assembled condition.

- Only use the pump (set) to handle the fluids described in the data sheet or product literature of the pump variant.
- Never operate the pump (set) without the fluid to be handled.
- Observe the minimum flow rates and maximum flow rates indicated in the data sheet or product literature (to prevent overheating, mechanical seal damage, cavitation damage, bearing damage, etc).
- Always operate the pump (set) in the direction of rotation it is intended for.
- Do not throttle the flow rate on the suction side of the pump (to prevent cavitation damage).
- Consult the manufacturer about any use or mode of operation not described in the data sheet or product literature.

2.4 Personnel qualification and personnel training

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

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

Deficits in knowledge must be rectified by sufficiently trained specialist personnel training and instructing the personnel who will carry out the respective tasks. 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 operating manual and the intended use, the following safety regulations shall be complied with:

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

2.7 Safety information for the operator/user

- Fit protective equipment (e.g. contact guards) supplied by the operator for hot, cold or moving parts, and check that the equipment functions properly.
- Do not remove any protective equipment (e.g. 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

- Modifications or alterations of the pump (set) are only permitted with the manufacturer's prior consent.
- Use only original spare parts or parts/components authorized by the manufacturer. The use of other parts/components can invalidate any liability of the manufacturer for resulting damage.
- The operator ensures that maintenance, inspection and installation is performed by authorized, qualified specialist personnel who are thoroughly familiar with the manual.
- Only carry out work on the pump (set) during standstill of the pump.
- Only perform work on the pump set when it has been disconnected from the power supply (de-energized).
- The pump (set) must have cooled down to ambient temperature.
- Pump pressure must have been released and the pump must have been drained.
- When taking the pump set out of service always adhere to the procedure described in the manual. (⇒ Section 6.3, Page 42)
- Decontaminate pumps which handle fluids posing a health hazard.
- As soon as the work has been completed, re-install and re-activate any safety-relevant devices and protective devices. Before returning the product to service, observe all instructions on commissioning. (⇒ Section 6.1, Page 40)

2.9 Unauthorized 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 pump (set) supplied is only valid if the equipment is used in accordance with its intended use. (⇒ Section 2.3, Page 9)

2.10 Explosion protection

Special conditions apply to the operation of explosion-proof pumps.

- The explosion-proof status of the pump set is only assured if the pump set is used in accordance with its intended use.
- The limits stated in the data sheet and on the name plate must not be exceeded under any circumstances.
- Correct monitoring of the motor temperature is imperative to ensure explosion protection.
- Observe the wiring diagrams.
- Never operate an explosion-proof pump set without temperature monitoring.
- Modifications or alteration of the pump set could affect explosion protection and are only permitted after consultation with the manufacturer.
- Only original spare parts and accessories authorized by the manufacturer must be used for explosion-proof pumps.

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 distributor and the insurance company about the damage in writing immediately.

3.2 Fitting the bail or shackle

Amaline 200, 300, 400 As standard, shackle 59-17 is fitted to the pump set in the center-of-gravity position. Bail 571 can be fitted instead, as an option.

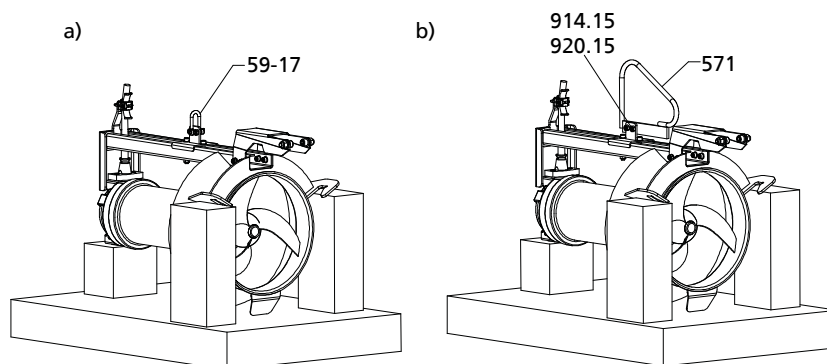


Fig. 1: Amaline with: a) shackle 59-17 b) bail 571

✓ The pump set has been positioned as illustrated.

1. Attach shackle 59-17 to the attachment lug at the pump casing, or fasten bail 571 to the attachment lug at the pump casing with screws 914.15 and nuts 920.15.

Amaline 500, 600, 800 As standard, bail 571 is fitted to the pump set in the center-of-gravity position.

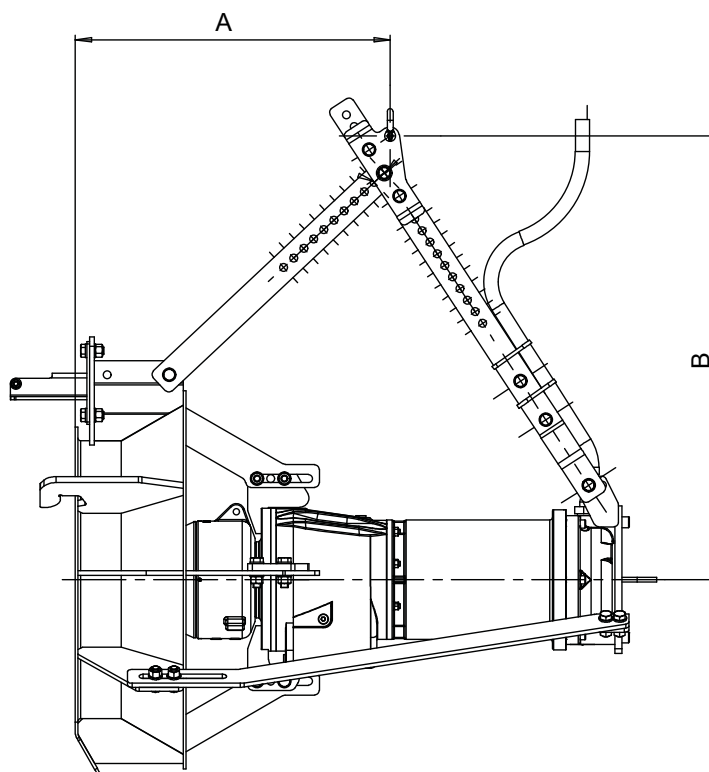


Fig. 2: Amaline with bail 571

Table 4: Fitting bail 571

Size	Axial propeller	Gear unit	Motor	A	B
				[mm]	[mm]
500	5033	SP189	4 4	510	930
500	5033	SP189	6 4	550	900
500	5033	SP189	11 4	640	800
500	5035	SP189	4 4	510	910
500	5035	SP189	6 4	570	920
500	5035	SP189	11 4	580	920
500	5035	SP190	17 2	640	1000
600	6032 / 6033	SP189	4 4	460	650
600	6032 / 6033	SP189	6 4	610	820
600	6032 / 6033	SP189	11 4	720	1000
600	6035	SP190	16 4	560	780
600	6035	SP190	17 2	580	960
600	6035	SP190	25 2	610	1000
800	8032	SP189	4 4	430	960
800	8032	SP189	6 4	530	850
800	8032	SP189	11 4	530	850
800	8032	SP190	16 4	510	950
800	8032	SP190	23 4	530	900
800	8032	SP190	30 4	600	800

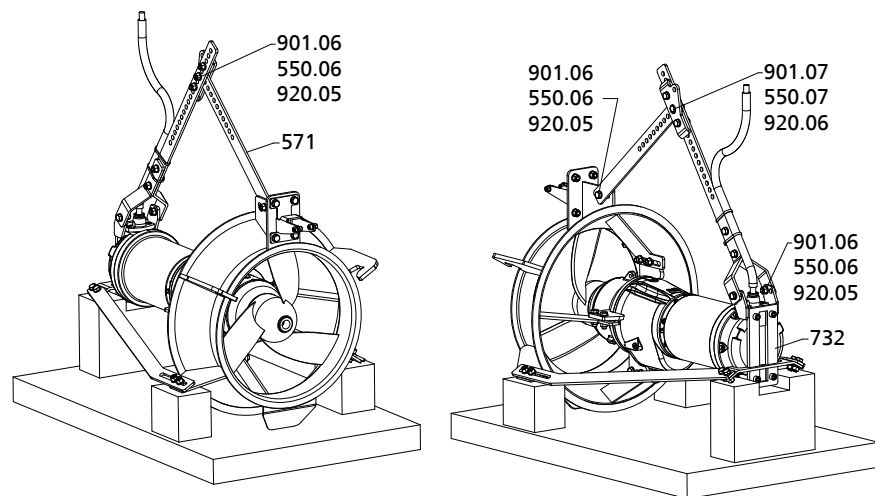


Fig. 3: Fitting bail 571

✓ The pump set has been positioned as illustrated.

1. Fasten the short leg of bail 571 to the pump casing with bolt 901.06, disc 550.06 and nut 920.05.
2. Fasten the long leg of bail 571 to bracket 732 with bolts 901.06, discs 550.06 and nuts 920.05.
3. Connect the two parts with bolt 901.06, disc 550.06 and nut 920.05.
4. Fit the reinforcement plate and fasten it with bolts 901.07, discs 550.07 and nuts 920.06.









3.3 Lifting rope

For lifting/lowering with lifting equipment, the lifting rope can also be attached directly at the attachment point. It can remain attached during operation.

3.4 Webbing sling

For lifting/lowering with lifting equipment, the webbing sling can also be attached directly at the attachment point.

3.5 Transport

	<div data-bbox="507 376 683 421">  DANGER </div> <div data-bbox="494 443 718 470"> Improper transport </div> <div data-bbox="494 479 868 506"> Danger to life from falling parts! </div> <div data-bbox="494 515 788 542"> Damage to the pump set! </div> <div data-bbox="518 555 1388 810"> <ul style="list-style-type: none"> ▷ Use tested, marked and approved lifting accessories only. ▷ The load-carrying capacity of the lifting accessory must be greater than the weight indicated on the name plate of the product to be lifted. ▷ Use the attachment point provided for attaching the lifting accessory. ▷ Never suspend the pump set by its power cable. ▷ Never enter the area underneath suspended load. ▷ Observe the regional transport regulations. </div>
	<div data-bbox="507 851 702 896">  WARNING </div> <div data-bbox="494 918 1185 945"> Improper lifting/moving of heavy assemblies or components </div> <div data-bbox="494 954 956 981"> Personal injury and damage to property! </div> <div data-bbox="518 994 1388 1048"> <ul style="list-style-type: none"> ▷ Use suitable transport devices, lifting equipment and lifting tackle to move heavy assemblies or components. </div>
	<div data-bbox="507 1086 702 1131">  WARNING </div> <div data-bbox="494 1153 1114 1180"> Temporary storage on unsecured and uneven surfaces </div> <div data-bbox="494 1189 956 1216"> Personal injury and damage to property! </div> <div data-bbox="518 1229 1260 1283"> <ul style="list-style-type: none"> ▷ Always place the pump (set) on a secured and level surface. ▷ Refer to the weights given in the data sheet/on the name plate. </div>
	<div data-bbox="507 1332 702 1377">  WARNING </div> <div data-bbox="494 1400 1144 1426"> Pump set and transport holder tipping over or rolling off </div> <div data-bbox="494 1435 652 1462"> Risk of injury! </div> <div data-bbox="518 1476 1406 1503"> <ul style="list-style-type: none"> ▷ Secure the pump set and transport holder against tipping over or rolling off. </div>

To transport the pump/pump set suspend it as illustrated.

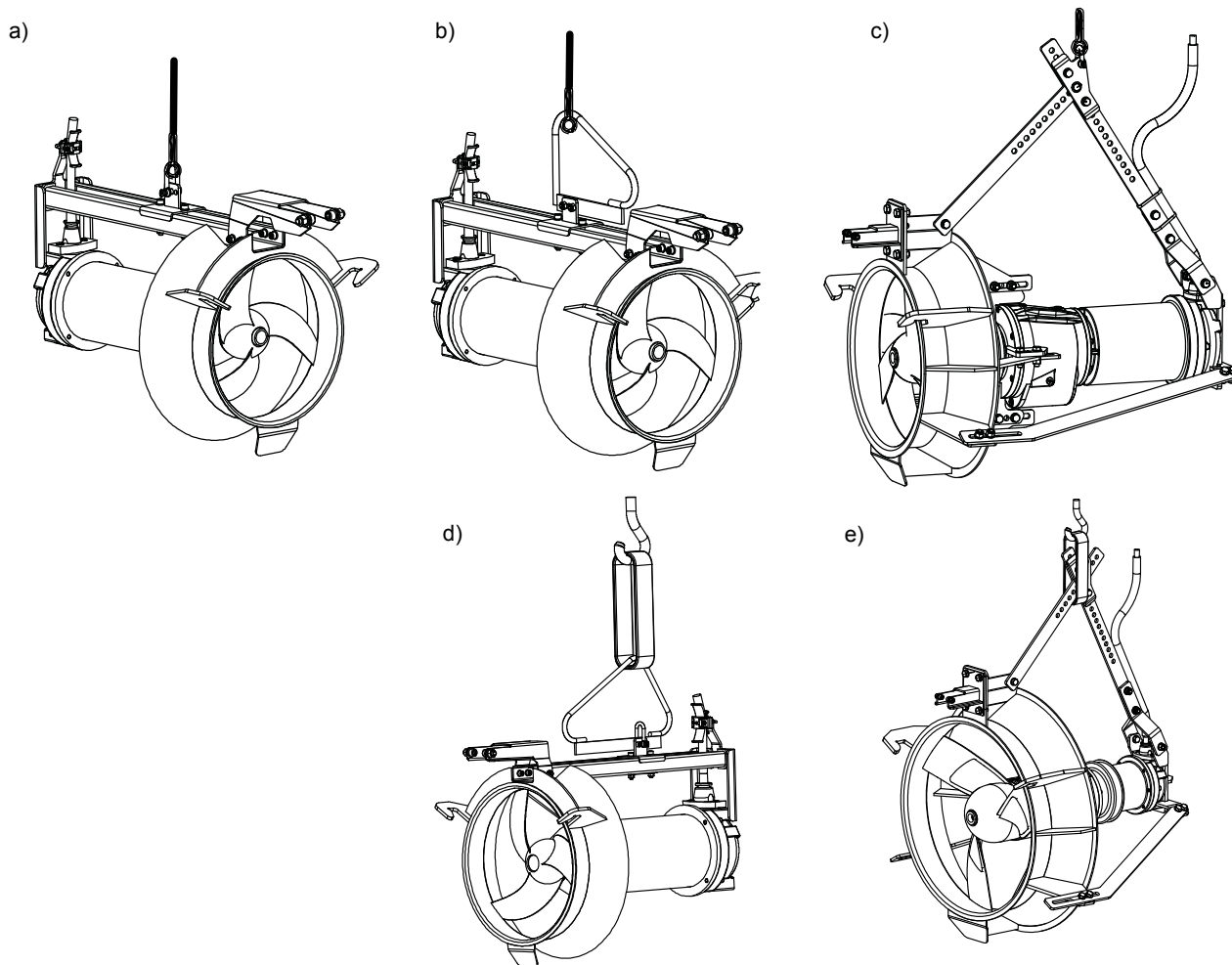


Fig. 4: Transporting the pump set a) Amaline 200, 300, 400 with lifting rope at shackle b) Amaline 200, 300, 400 with lifting rope at bail c) Amaline 500, 600, 800 with lifting rope at bail d) Amaline 200, 300, 400 with webbing sling at bail e) Amaline 500, 600, 800 with webbing sling at bail

3.6 Storage/preservation

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



	<p>CAUTION</p> <p>Improper storage Damage to the power cable!</p> <ul style="list-style-type: none"> ▷ Support the power cable at the cable entry to prevent permanent deformation. ▷ Only remove the protective cap from the power cable at the time of installation.
	<p>CAUTION</p> <p>Damage during storage due to humidity, dirt or vermin Corrosion/contamination of the pump (set)!</p> <ul style="list-style-type: none"> ▷ For outdoor storage cover the pump (set) or the packaged pump (set) and accessories with waterproof material.

Table 5: Ambient conditions for storage

Ambient condition	Value
Relative humidity	5 % to 85 % (non-condensing)
Ambient temperature	-4 °F to 158 °F [-20 °C to +70 °C]

- Store the pump set under dry and vibration-free conditions, if possible in its original packaging.

3.7 Return to supplier

- Drain the pump as per operating instructions. (⇒ Section 7.3, Page 53)
- Flush and clean the pump, particularly if it has been used for handling noxious, explosive, hot or other hazardous fluids.
- If the pump has handled fluids whose residues could lead to corrosion damage in the presence of atmospheric humidity or could ignite upon contact with oxygen, the pump must also be neutralized, and anhydrous inert gas must be blown through the pump to ensure drying.
- Always complete and enclose a certificate of decontamination when returning the pump.
Always indicate any safety measures and decontamination measures taken.
(⇒ Section 10, Page 96)



NOTE

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

3.8 Disposal



WARNING

Fluids handled, consumables and operating supplies which are hot or pose a health hazard

Hazard to persons and the environment!

- Collect and properly dispose of the flushing fluid and of 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.

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

4 Description

4.1 General description

- Submersible motor pump

Wet-installed horizontal propeller pump with submersible motor, equipped with direct drive or spur gear, ECB propeller with rigid, fiber-repellent blades, bolt-free connection to the discharge pipe. Explosion-proof version available.

4.2 Product information

4.2.1 Product information as per Regulation No 1907/2006 (REACH)

For information as per chemicals Regulation (EC) No 1907/2006 (REACH), see <http://www.ksb.com/reach>.

4.3 Designation

Example: Amaline C 2035 - 1750 / 24 UDG

Table 6: Designation key

Code	Description
Amaline	Type series
C	Pump casing material
C	Stainless steel
S	Galvanized steel
20	Size, nominal diameter (DN)
20	200
30	300
40	400
50	500
60	600
80	800
3	Number of blades
2, 3	
5	Code of blade incidence angle
1, 2, 3, 4, 5, 6	
1750	Nominal speed of axial propeller [rpm]
2	Motor size
0, 1, 2, 3, 4, 6, 8, 11, 16, 17, 23, 25, 30	
4	Number of motor poles
2, 4, 6, 8	
UD	Motor version
UD	Standard version without gear unit
UR	Standard version with gear unit
XD	Explosion-proof, T3, without gear unit
XR	Explosion-proof, T3, with gear unit
G	Motor housing material
G	Gray cast iron
C	Stainless steel

4.4 Name plate

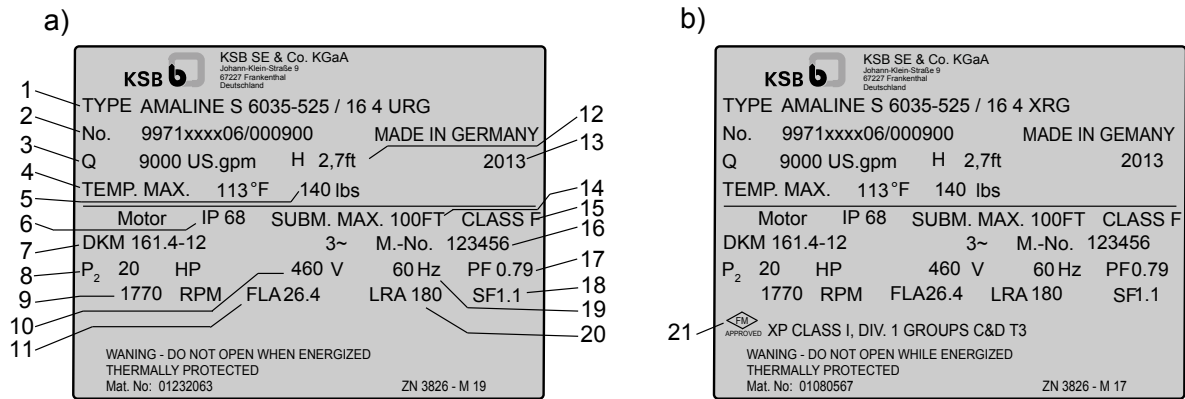


Fig. 5: Name plate (example) a) Standard pump set b) Explosion-proof pump set

1	Designation	2	KSB order number and order item number
3	Flow rate	4	Maximum fluid temperature and ambient temperature
5	Total weight	6	Enclosure
7	Motor type	8	Rated power
9	Rated speed	10	Rated voltage
11	Rated current	12	Head
13	Year of construction	14	Maximum submergence
15	Thermal class of winding insulation	16	Motor number
17	Power factor at design point	18	Mode of operation
19	Rated frequency	20	Starting current
21	Explosion protection marking		

4.5 Design details

Design

- Fully floodable submersible motor pump
- Horizontal installation
- Wet installation

Axial propeller

- Self-cleaning (ECB) propeller

Shaft seal

- Two bi-directional mechanical seals in tandem arrangement, with liquid reservoir
- Amaline 500, 600, 800:
- Additional leakage chamber between the mating ring carrier and the gear unit

Bearings

Amaline 200, 300, 400:

- Grease-packed rolling element bearings sealed for life

Amaline 500, 600, 800:

- Grease-packed rolling elements bearings (sealed for life) in the motor
- Oil-lubricated rolling element bearings in the gear unit

Drive

- Three-phase asynchronous squirrel-cage motor
- Motors integrated in explosion-proof pump sets are supplied in Explosionproof Class I Division 1, Groups C&D, T3.

Amaline 200, 300, 400:

- Direct drive

Amaline 500, 600, 800:

- Spur gear drive

4.6 Configuration and function

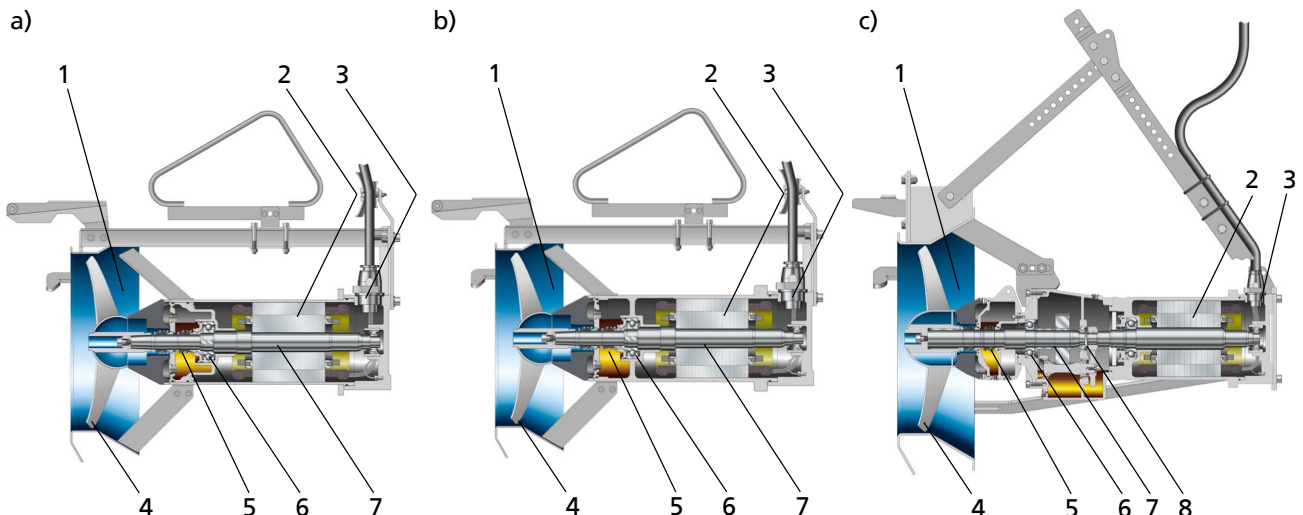


Fig. 6: Sectional drawings a) Amaline 400 (motor housing made of stainless steel) b) Amaline 400 (motor housing made of gray cast iron) c) Amaline 600 (motor housing made of gray cast iron)

1	Pump casing	2	Motor
3	Cable gland	4	Axial propeller
5	Mechanical seal	6	Rolling element bearing
7	Shaft	8	Gear unit

Design The pump casing (1) is fitted with a self-cleaning axial propeller (4) for recirculating activated sludge from the nitrification to the denitrification stage of activated sludge tanks, for handling stormwater, river water, surface water and polder water at low heads, as well as for generating flow in water bodies.

The pump set is designed for continuously submerged operation. The motor (2) is cooled by the fluid handled on the motor surface.

The shaft (7) runs in rolling element bearings (6) located in the motor (2) or gear unit (8).

Function The motor (2) converts electrical to mechanical energy, thus causing the shaft (7) to rotate.

On the Amaline 500, 600 and 800 models, the axial propeller (4) is connected to the shaft (7) via a gear unit (8), whereas the axial propeller (4) of the Amaline 200, 300 and 400 models is directly connected to the shaft (7).

The shaft drives the axial propeller (4), which generates thrust. This thrust induces the required flow.

Sealing The pump shaft (7) is equipped with two bi-directional mechanical seals (5) in tandem arrangement. A lubricant reservoir between the mechanical seals (5) ensures cooling and lubrication.

The cable gland (3) for the power cable is absolutely watertight.

4.7 Scope of supply

Depending on the model, the following items are included in the scope of supply:

- Pump set complete with power cable
- Shackle
- Bail

Using a bail is recommended when the lifting rope of the crane will not remain attached to the attachment point of the pump set during operation; instead, the pump set will be pulled up or lowered by means of a hook.²⁾



NOTE

A separate name plate is included in KSB's scope of supply. Attach this name plate in a clearly visible position outside the place of installation, e.g. at the control panel, pipeline or mounting bracket.

Accessories

- Depending on the model, the installation parts comprise:
 - Guide rail
 - Mounting brackets
 - Middle support
- Connection pipe
- Cable support for properly routing the power cable
- Other accessories on request











4.8 Dimensions and weights

For dimensions and weights refer to the general arrangement drawing/outline drawing or data sheet of the pump set.

2) For Amaline 200, 300, 400 only

5 Installation at Site

5.1 Safety regulations

	<div data-bbox="507 315 683 360"> DANGER</div> <p>Improper installation in potentially explosive atmospheres Damage to the pump set!</p> <ul style="list-style-type: none"> ▸ Comply with the applicable local explosion protection regulations. ▸ Observe the information given in the data sheet and on the pump/motor name plates.
	<div data-bbox="507 593 683 638"> DANGER</div> <p>Risk of falling when working at great heights Danger to life by falling from great heights!</p> <ul style="list-style-type: none"> ▸ Do not step onto the pump (set) during installation work or dismantling work. ▸ Pay attention to safety equipment, such as railings, covers, barriers, etc. ▸ Observe the applicable local occupational safety regulations and accident prevention regulations.
	<div data-bbox="507 911 683 956"> DANGER</div> <p>Persons in the tank during pump operation Electric shock! Risk of personal injury! Danger of death from drowning!</p> <ul style="list-style-type: none"> ▸ Never start up the pump set when there are persons in the tank.
	<div data-bbox="507 1191 703 1236"> WARNING</div> <p>Hands, other body parts and/or foreign objects in the axial propeller and/or intake area Risk of injury! Damage to the submersible motor pump!</p> <ul style="list-style-type: none"> ▸ Never insert your hands, other body parts or foreign objects into the axial propeller and/or intake area. ▸ Check that the axial propeller can rotate freely.
	<div data-bbox="507 1500 703 1545"> WARNING</div> <p>Impermissible solid objects (tools, screws/bolts or similar) in the pump sump/inlet tank during pump start-up Personal injury and damage to property!</p> <ul style="list-style-type: none"> ▸ Check the pump sump/inlet tank for impermissible solid objects before flooding, and remove, if necessary.

5.2 Checks to be carried out prior to installation

5.2.1 Checking the operating data

Before installing the pump set, verify that the name plate data matches the data given in the purchase order and the system data.

5.2.2 Preparing the place of installation

1. Check the structural requirements.
All structural work required must have been prepared in accordance with the dimensions stated in the outline drawing/general arrangement drawing. (⇒ Section 9.5, Page 88)
2. Check the lifting equipment.
The lifting equipment must be of sufficient load-carrying capacity. The weight of the pump set is indicated on the name plate. (⇒ Section 4.4, Page 18)

5.2.3 Checking the lubricant level

The lubricant reservoirs have been filled with an environmentally-friendly, non-toxic lubricant at the factory.

Amaline 200, 300 with motor 0 6 or 2 6, 400

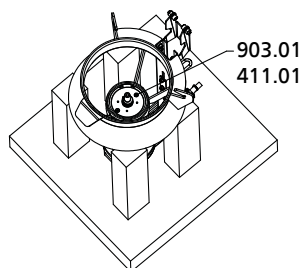


Fig. 7: Checking the lubricant level of an Amaline 200, 300 with motor 0 6 or 2 6, 400

- ✓ The pump set has been set down as illustrated.
- ✓ The axial propeller and adapter have been removed. (⇒ Section 7.4.3, Page 54)
- 1. Unscrew screw plug 903.01 with joint ring 411.01.
- 2. Measure the lubricant level.
 - ⇒ The lubricant level must not be any lower than $\frac{3}{8}$ " [10 mm] below the value "A" indicated in the following table.

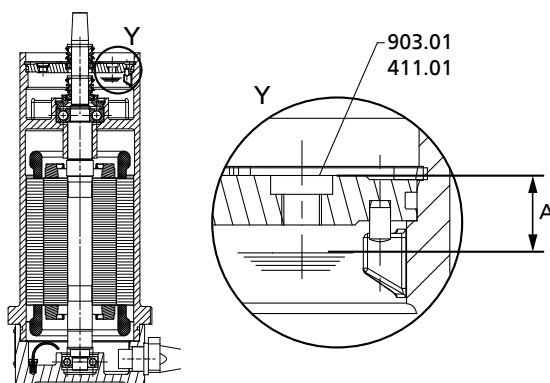


Fig. 8: Lubricant level Amaline 200, 300 with motor 0 6 or 2 6, 400

3. If the lubricant level is lower, top up the lubricant in the lubricant reservoir through the filler opening. (⇒ Section 7.2.1.5.4, Page 51)
4. Screw in screw plug 903.01 with joint ring 411.01.
5. Mount the adapter and axial propeller. (⇒ Section 7.5.5, Page 62)

Table 7: Distance "A" from the casing edge to the lubricant level

Size	A	
	[inch]	[mm]
200	1	25
300	1½	38
400	1¾	35

Amaline 300 with motor 8 6

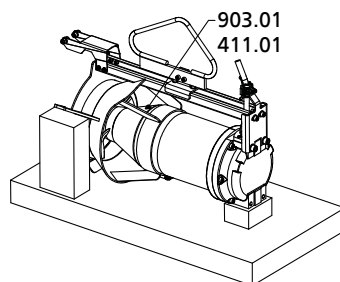


Fig. 9: Checking the lubricant level of an Amaline 300 with motor 8 6

✓ The pump set has been set down as illustrated.

1. Unscrew and remove screw plug 903.01 with joint ring 411.01.
⇒ The lubricant level must be approximately 2" [50 mm] below the filler opening.
2. If the lubricant level is lower, top up lubricant through the filler opening until the lubricant level is approximately 2" [50 mm] below the filler opening.
(⇒ Section 7.2.1.5.1, Page 48)
3. Screw in screw plug 903.01 with joint ring 411.01.

Amaline 500, 600, 800

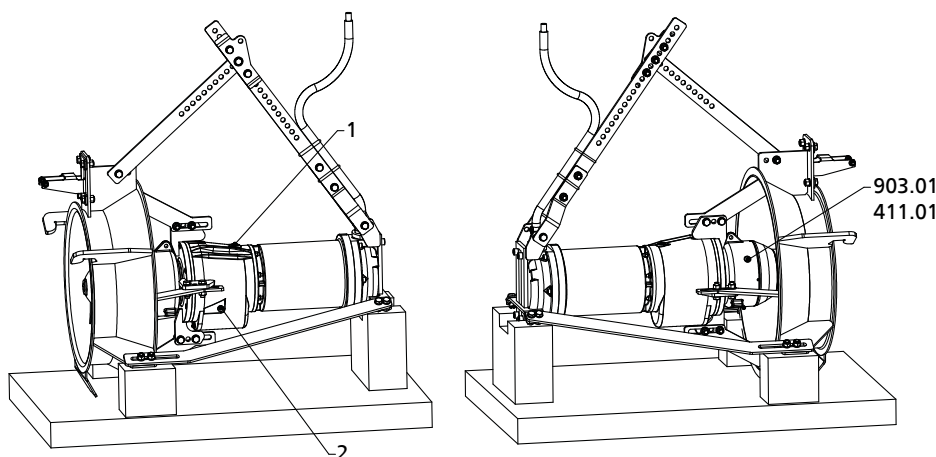


Fig. 10: Lubricant level of an Amaline 500, 600, 800

1	Lubricant filler plug of the gear unit
2	Lubricant check plug of the gear unit

Lubricant level of mechanical seal

✓ The pump set has been set down as illustrated.

1. Unscrew and remove screw plug 903.01 with joint ring 411.01.
⇒ The lubricant level must reach the lubricant check opening.
2. If the lubricant level is lower, top up lubricant through the filler opening until the lubricant reservoir overflows. (⇒ Section 7.2.1.5.1, Page 48)
3. Screw in screw plug 903.01 with joint ring 411.01.

Lubricant level of gear unit

1. Unscrew the lubricant check plug on the gear unit.
⇒ The lubricant level must reach the lubricant check opening.
2. If the lubricant level is lower, unscrew the lubricant filler plug on the gear unit and top up lubricant through the filler opening until the lubricant reservoir overflows at the lubricant check opening. (⇒ Section 7.2.1.5.1, Page 48)
3. Screw in the lubricant check plug of the gear unit and, if applicable, the lubricant filler plug.

5.3 Installing the pump set

Always refer to and comply with the general arrangement drawing/outline drawing when installing the pump set.

5.3.1 Fitting the protective cable sheath at the submersible motor pump

1. To protect the power cable, slip protective cable sheath 719 over the cable end, and slide it all the way up against the bushing.
2. Fasten the protective cable sheath to bail 571 with cable ties 81-7.

5.3.2 Fitting the installation parts

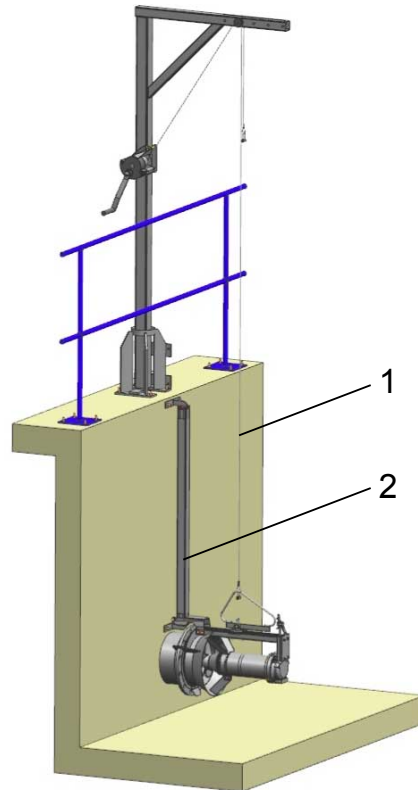


Fig. 11: Installation in the tank

1	Plumb-vertical	2	Vertical
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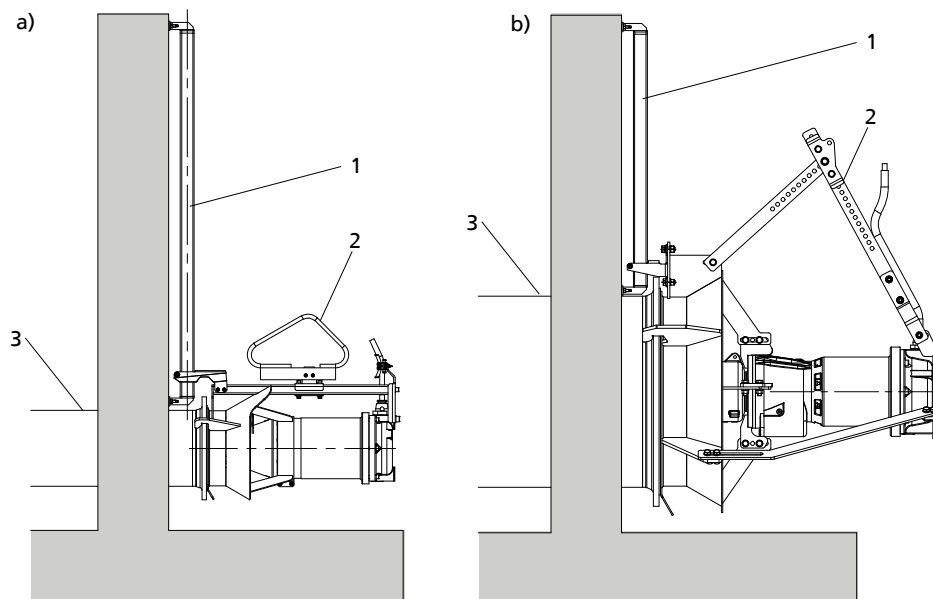


Fig. 12: Installation a) Amaline 200, 300, 400 b) Amaline 500, 600, 800

1	Guide rail	2	Bail
3	Connection pipe		


The connection pipe has been installed parallel to the floor and perpendicular to the wall.

The guide rail has been installed in a vertical position parallel to the wall.

Ensure that the guide rail is correctly positioned in compliance with the specified dimensions and tolerances and that it is fitted with chemical anchors.

(⇒ Section 9.5, Page 88)

5.3.3 Lifting hook

	NOTE
	Lifting hooks can only be used in low-viscosity substrates.

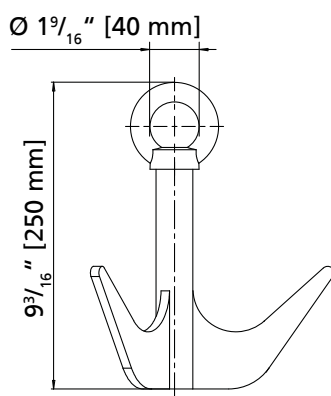






Fig. 13: Lifting hook

The lifting hook has a maximum load-carrying capacity of 1100 lbs [500 kg].

For lifting/lowering with a lifting hook, the lifting hook is attached to the lifting rope of the lifting equipment (crane) with a shackle.

5.3.4 Checking and adjusting the attachment point

	<div data-bbox="504 230 683 280">  DANGER </div> <p>Improper transport Danger to life from falling parts! Damage to the pump set!</p> <ul style="list-style-type: none"> ▷ Use tested, marked and approved lifting accessories only. ▷ The load-carrying capacity of the lifting accessory must be greater than the weight indicated on the name plate of the product to be lifted. ▷ Use the attachment point provided for attaching the lifting accessory. ▷ Never suspend the pump set by its power cable. ▷ Never enter the area underneath suspended load. ▷ Observe the regional transport regulations.
	<div data-bbox="504 694 703 743">  WARNING </div> <p>Improper lifting/moving of heavy assemblies or components Personal injury and damage to property!</p> <ul style="list-style-type: none"> ▷ Use suitable transport devices, lifting equipment and lifting tackle to move heavy assemblies or components.

To smoothly pull out / lower the pump set along the guide rail the pump set must be suspended from the attachment point in a perfectly horizontal position.

Checking the attachment point

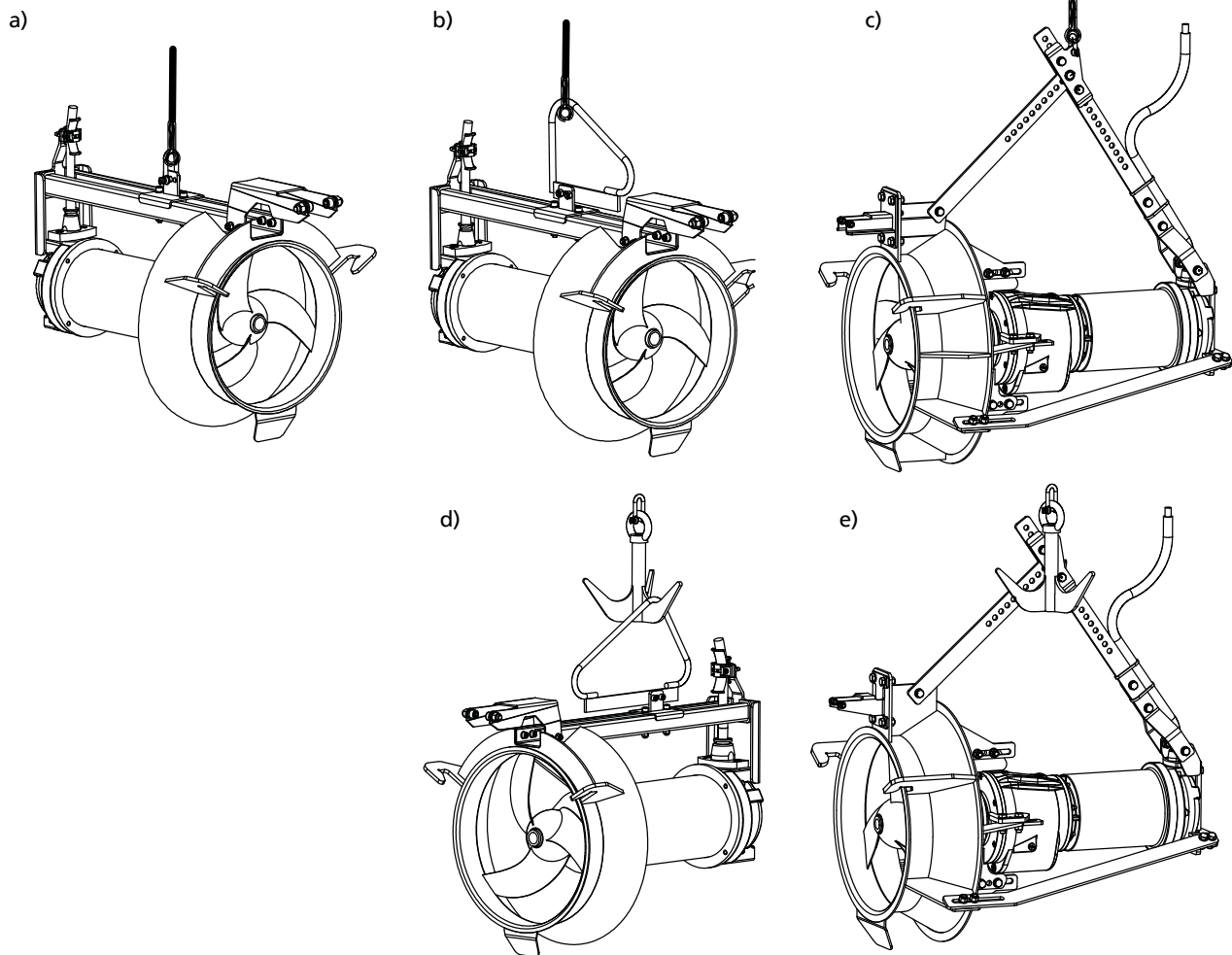


Fig. 14: Checking the attachment point a) Amaline 200, 300, 400 with lifting rope at shackle b) Amaline 200, 300, 400 with lifting rope at bail c) Amaline 500, 600, 800 with lifting rope at bail d) Amaline 200, 300, 400 with lifting hook at bail e) Amaline 500, 600, 800 with lifting hook at bail

1. Suspend the pump set as illustrated.


2. Lift the pump set.

3. Use a spirit level and measure the angular position.

⇒ The pump set is suspended in a perfectly horizontal position.

⇒ If the angle deviates from the requirements, the attachment point must be adjusted.

Adjusting the attachment point

	<p>! WARNING</p>
	<p>Temporary storage on unsecured and uneven surfaces Personal injury and damage to property!</p> <ul style="list-style-type: none"> ▷ Always place the pump (set) on a secured and level surface. ▷ Refer to the weights given in the data sheet/on the name plate.



WARNING

Pump set and transport holder tipping over or rolling off

Risk of injury!

- ▷ Secure the pump set and transport holder against tipping over or rolling off.

Amaline 200, 300, 400

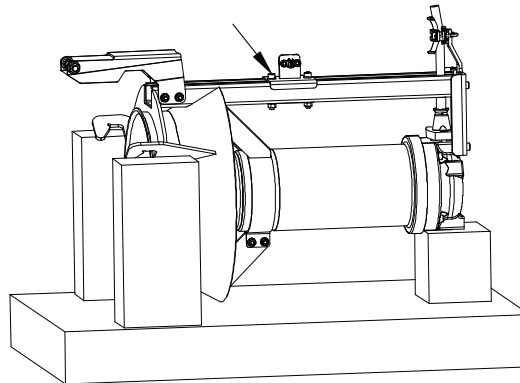


Fig. 15: Adjusting the attachment point

- ✓ The angular position has been found to deviate from the requirements.
- ✓ The pump set has been set down as illustrated.
- 1. Undo the bolts, discs and nuts at the attachment lug as illustrated.
- 2. Shift the attachment lug along the guide structure.



CAUTION

Loose or insufficiently tightened screwed connections

Damage to the installation parts during operation

- ▷ Observe the tightening torques.

3. Re-tighten all bolts.

4. Double-check the attachment point using a spirit level.

⇒ For the correct center-of-gravity position the inclination angle must be close to 0°.

Amaline 500, 600, 800 Table 8: Attachment point, hole combination

Size	Axial propeller	Gear unit	Motor	Hole combination ³⁾	
				Hole (long leg)	Hole (short leg)
500	5033	SP189	4 4	5	5
500	5033	SP189	6 4	5	1
500	5033	SP189	11 4	9	5
500	5035	SP189	4 4	5	5
500	5035	SP189	6 4	6	3
500	5035	SP189	11 4	7	4
500	5035	SP190	17 2	4	1
600	6032 / 6033	SP189	4 4	9	11
600	6032 / 6033	SP189	6 4	9	6
600	6032 / 6033	SP189	11 4	4	3
600	6035	SP190	16 4	10	8
600	6035	SP190	17 2	4	3
600	6035	SP190	25 2	4	2
800	8032	SP189	4 4	5	11

Size	Axial propeller	Gear unit	Motor	Hole combination ³⁾	
				Hole (long leg)	Hole (short leg)
800	8032	SP189	6 4	4	7
800	8032	SP189	11 4	4	7
800	8032	SP190	16 4	5	8
800	8032	SP190	23 4	7	9
800	8032	SP190	30 4	12	9

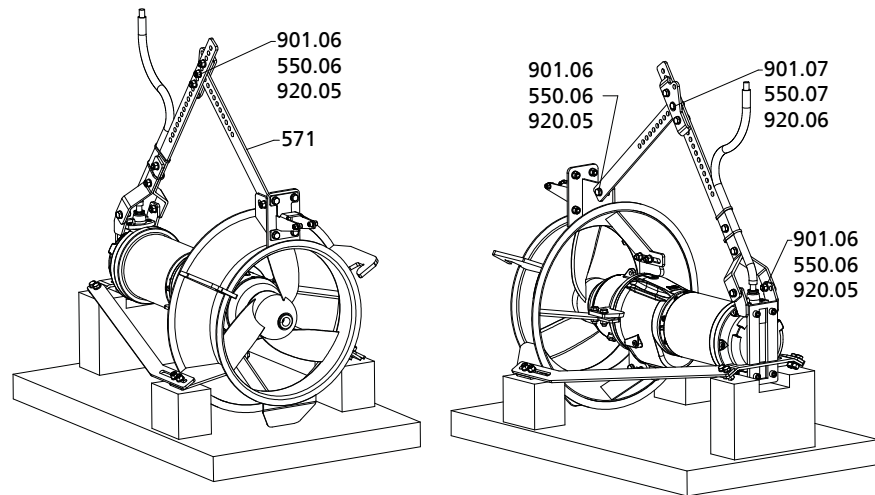



Fig. 16: Adjusting the attachment point

- ✓ The angular position has been found to deviate from the requirements.
 - ✓ The pump set has been set down as illustrated.
1. Remove the reinforcement plate with bolts 901.07, discs 550.07 and nuts 920.06.
 2. Loosen bolts 901.06, discs 550.06 and nuts 920.05.
 3. At the connection between the long leg and the short leg of bail 571 remove bolt 901.06 with disc 550.06 and nut 920.05.
 4. Select the correct hole combination of bail 571.

	CAUTION
	Loose or insufficiently tightened screwed connections Damage to the installation parts during operation ▷ Observe the tightening torques.


5. Re-tighten all bolts.
 6. Double-check the attachment point using a spirit level.
- ⇒ The pump set is suspended in a perfectly horizontal position to ensure smooth installation and removal.

5.3.5 Positioning of crane and crane hook

Choose the crane's height and position to ensure that the lifting rope between the crane and the pump set's attachment point is plumb-vertical.
 (⇒ Section 9.5, Page 88)

3) The hole combination is composed of the hole used in the long leg and the hole used in the short leg (both of them counted starting from the top).

5.3.6 Checking attachment dimension

	<div style="background-color: #FFD700; padding: 5px;">CAUTION</div> <p>Incorrect attachment dimension</p> <p>Damage to the pump set when falling down or as a result of jamming!</p> <p>▷ Observe attachment dimension (E). (⇒ Section 9.5, Page 88)</p>
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When mounting a new pump set to an existing guide rail and connection pipe, attachment dimension (E) at the claws (1) of the new pump set must match that of the previous pump set. Non-compliance could lead to the pump set becoming jammed at the connection pipe so that it can no longer be pulled out of the tank. For the pump set to be pulled out smoothly, the attachment dimension (E) must equal the flange thickness + 3 mm as a minimum.

When replacing an existing pump set, attachment dimension (E) at the claws of the new pump set must be reworked to match that of the previous pump set.

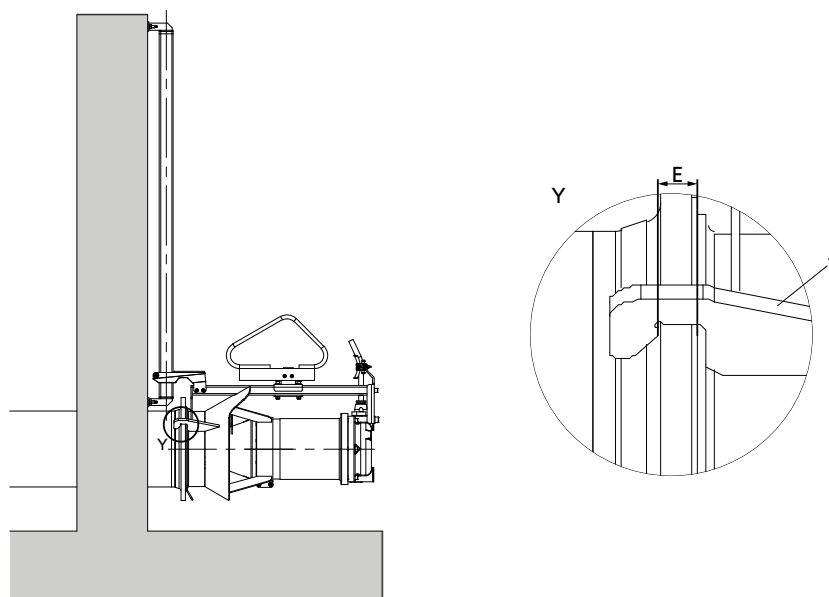


Fig. 17: Mounting a new pump set to an existing guide rail and connection pipe

1	Claws	E	Attachment dimension
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5.3.7 Installing the pump set

- ✓ The bail or shackle has been fitted at the pump set. (⇒ Section 3.2, Page 12)
 - ✓ The attachment point has been adjusted correctly. (⇒ Section 5.3.4, Page 26)
 - ✓ The dimensions of guide piece 897 match the guide rail.
 - ✓ The dimensions of the flange to be connected with claws have been verified.
 - ✓ If applicable, the access opening dimensions have been verified.
 - ✓ The load-carrying capacity of the crane has been verified.
1. Suspend the pump set from the lifting gear and position it above the guide rail.
 2. Lower the pump set onto the guide rail.
 3. Lower the pump set down into the tank along the guide rail until it engages with the connection pipe. Avoid an inclined lifting rope angle.
 - ⇒ The rope slackens.
 4. Check rope tension and confirm that the pump set can be pulled out by tightening the rope using the original crane.



NOTE

To facilitate finding this position of the pump (set) again, mark the rope accordingly.

5.3.8 Fastening and tensioning the power cable



DANGER

Power cable not properly routed

Risk of personal injury! Risk of falling!

- ▷ Route the power cable in such a way that it cannot pull down any persons if the pump set falls down or is lowered down.



CAUTION

Power cable routed with too much slack

Damage to power cable by axial propeller!

- ▷ Pull the power cable taut before fastening it at the tank edge.

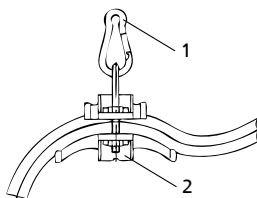


Fig. 18: Fastening and tensioning the power cable

1	Carabine hook	2	Cable support
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If possible, the power cable should be fastened to the tank edge at a distance of approx. 31 1/2" [0.8 m] from the side of the guide rail to prevent chafing on the guide rail, which would damage the power cable.

1. Fit the cable support to the power cable at the tank edge and use a carabine hook to attach it to an appropriate point (e.g. railing or eyebolt).
2. Pull the power cable taut up to the tank edge before tightening the cable support bolts.
Prevent chafing of the power cable (use appropriate pads at the tank edge, if necessary).

5.3.9 Fastening the lifting rope



CAUTION

Loose or slack lifting rope

Damage to the lifting rope!

- ▷ With the system in its normal operating position, the lifting rope must be unstressed yet without excessive slack.
- ▷ Securely fasten the lifting rope. Use a rope winder/bollard or other rope fastening equipment if necessary.

To avoid damage to the lifting rope during operation, the lifting rope must always be lightly tensioned.

5.3.10 Fitting the rope winder/bollard

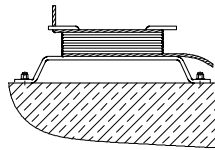



Fig. 19: Rope winder/bollard (RB)

When using transportable cranes, the lifting rope is removed from the winch of the lifting equipment after the submersible motor pump has been lowered into the tank. The lifting rope is then securely tied around the rope winder/bollard.

	CAUTION
	<p>Loose or slack lifting rope Damage to the lifting rope!</p> <ul style="list-style-type: none"> ▷ With the system in its normal operating position, the lifting rope must be unstressed yet without excessive slack. ▷ Securely fasten the lifting rope. Use a rope winder/bollard or other rope fastening equipment if necessary.

1. Position the rope winder/bollard at the edge of the tank, e.g. beneath the railing, and fasten it with M10 x 130 chemical anchors or M10 bolts.
2. Run the end of the lifting rope through a stirrup bolt on the rope winder and pull it through completely.
3. Secure the lifting rope with the M5 stirrup bolt.
Observe the tightening torques.
4. Wind the rope around the two sheet metal brackets.
5. Secure the lifting rope against unintentional unwinding with the second M5 stirrup bolt.
Observe the tightening torques.

Alternatively, the rope winder/bollard can also be fastened to the railing.


5.4 Electrical system

5.4.1 Information for planning the control system

For the electrical connection of the pump set observe the wiring diagrams.

(⇒ Section 9.3, Page 82)

The pump set is supplied with a power cable and is designed for DOL starting. Star-delta starting is an option for motor ratings exceeding 4 kW.


	NOTE
	<p>When laying a cable between the control system and the pump set's connection point, make sure to have a sufficient number of cores for the sensors. A minimum cross-section of AWG 15 [1.5 mm²] is required.</p>

The motors can be connected to electrical low-voltage grids with rated voltages and voltage tolerances to IEC 60038. The permissible tolerances must be observed.

5.4.1.1 Overload protection

1. Protect the pump set against overloading by a thermal time-lag overload protection device in accordance with IEC 947 and local regulations.
2. Set the overload protection device to the rated current specified on the name plate.




5.4.1.2 Level control

	CAUTION
	<p>Fluid level below the specified minimum</p> <p>Damage to the pump set by cavitation!</p> <p>▷ Never allow the fluid level to drop below the specified minimum.</p>

Automatic pump set operation in a tank requires the use of level control equipment. Observe the specified minimum fluid level. (⇒ Section 6.2.4.1, Page 41)

5.4.1.3 Operation on a frequency inverter

The pump set is driven by an induction machine to IEC 60034-12 designed for fixed speed operation. In accordance with IEC 60034-25, Section 18, the pump set is suitable for operation on a frequency inverter.

	NOTE
	<p>⚠ DANGER</p> <p>Operation outside the permitted frequency range</p> <p>Explosion hazard!</p> <p>▷ Never operate an explosion-proof pump set outside the specified range.</p>
	<p>⚠ DANGER</p> <p>Incorrect selection and setting of the frequency inverter</p> <p>Explosion hazard!</p> <p>▷ Observe the following information on selecting and setting a frequency inverter.</p>

Selection When selecting a frequency inverter, check the following details:

- Data provided by the manufacturer
- Electrical data of the pump set, particularly the rated current
- Only voltage intermediate-circuit inverters (VSI) with pulse width modulation (PWM) and carrier frequencies between 1 and 16 kHz are suitable.

Setting Observe the following instructions for setting a frequency inverter:

- Set the current limit to max. 1.2 times the rated current. The rated current is indicated on the name plate.

Start-up Observe the following instructions for starting up a frequency inverter:

- Ensure short start ramps (maximum 5 seconds).
- Only start speed-controlled operation after 2 minutes at the earliest. Pump start-up with long start ramps and low frequency may cause clogging.


Operation Observe the following limits when operating the pump set on a frequency inverter:

- Only utilize up to 95 % of the rated power P_2 indicated on the name plate.
- Frequency range 30 to 60 Hz


Electromagnetic compatibility Operation on a frequency inverter produces interference emissions whose level varies depending on the inverter used (type, interference suppression, make). To prevent the drive system, consisting of a submersible motor and a frequency inverter, from exceeding any given limits always observe the EMC information provided by the inverter manufacturer. If the inverter manufacturer recommends a shielded power cable, make sure to use a submersible motor pump with shielded power cables.

Interference immunity The submersible motor pump generally meets interference immunity requirements. For monitoring the sensors installed the operator must ensure sufficient interference immunity by appropriately selecting and laying the power cables in the plant. No modifications are required on the power/control cable of the submersible motor pump. Suitable analyzing devices must be selected. This applies in particular to the leakage sensor inside the motor.

5.4.1.4 Sensors


	<p style="background-color: #FFD700; margin: 0;">CAUTION</p> <p>Incorrect connection Damage to the sensors!</p> <ul style="list-style-type: none"> ▷ Observe the limits stated in the following sections of this manual when connecting the sensors.
---	---


The pump set features sensors that avoid hazards and damage to the pump set.

	<p style="background-color: #0056B3; color: white; margin: 0;">NOTE</p> <p>Reliable and safe operation of the pump within the scope of our warranty is only possible if the sensor signals are properly analyzed as stipulated in this manual.</p>
---	---

All sensors are located inside the pump set and are connected to the power cable. For information on wiring and core identification please refer to the wiring diagrams. The individual sensors and the limit values to be set are described in the following sections.



5.4.1.4.1 Motor temperature

	<p style="background-color: #D95319; color: white; margin: 0;">! DANGER</p> <p>Insufficient cooling Explosion hazard! Winding damage!</p> <ul style="list-style-type: none"> ▷ Never operate a pump set without operational temperature monitoring. ▷ For explosion-proof pump sets use a thermistor tripping unit with manual reset.
---	---

	<p style="background-color: #FFD700; margin: 0;">CAUTION</p> <p>Insufficient cooling Damage to the pump (set)!</p> <ul style="list-style-type: none"> ▷ Never operate a pump (set) without operational temperature monitoring equipment.
---	---

The motor is monitored by three series-connected PTC thermistors with terminals 10 and 11. They must be connected to a thermistor tripping unit with manual reset. Tripping must result in the pump set cutting out.

5.4.1.4.2 Leakage inside the motor

	 DANGER
	<p>Incorrect monitoring of leakage electrode</p> <p>Explosion hazard! Danger of death from electric shock!</p> <p>▸ Voltages must be < 30 V AC and tripping currents < 0.5 mA.</p>

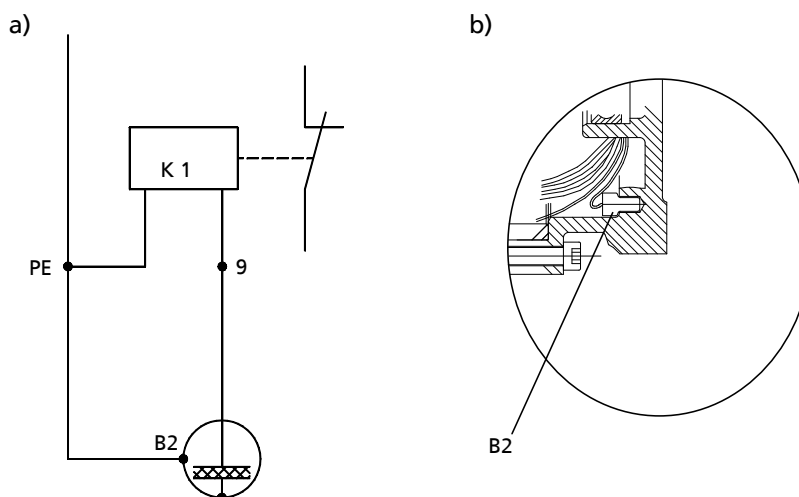


Fig. 20: a) Wiring of the electrode relay and b) Position of the electrode in the motor housing

An electrode fitted inside the motor monitors the winding space (B2) for leakage. This electrode must be connected to an electrode relay (core marked 9). Tripping of the electrode relay must result in the pump set cutting out.

The electrode relay (K1) must meet the following requirements:

- Sensor circuit 10 to 30 V AC
- Tripping current ≤ 0.5 mA

5.4.1.4.3 Leakage at the mechanical seal (optional)

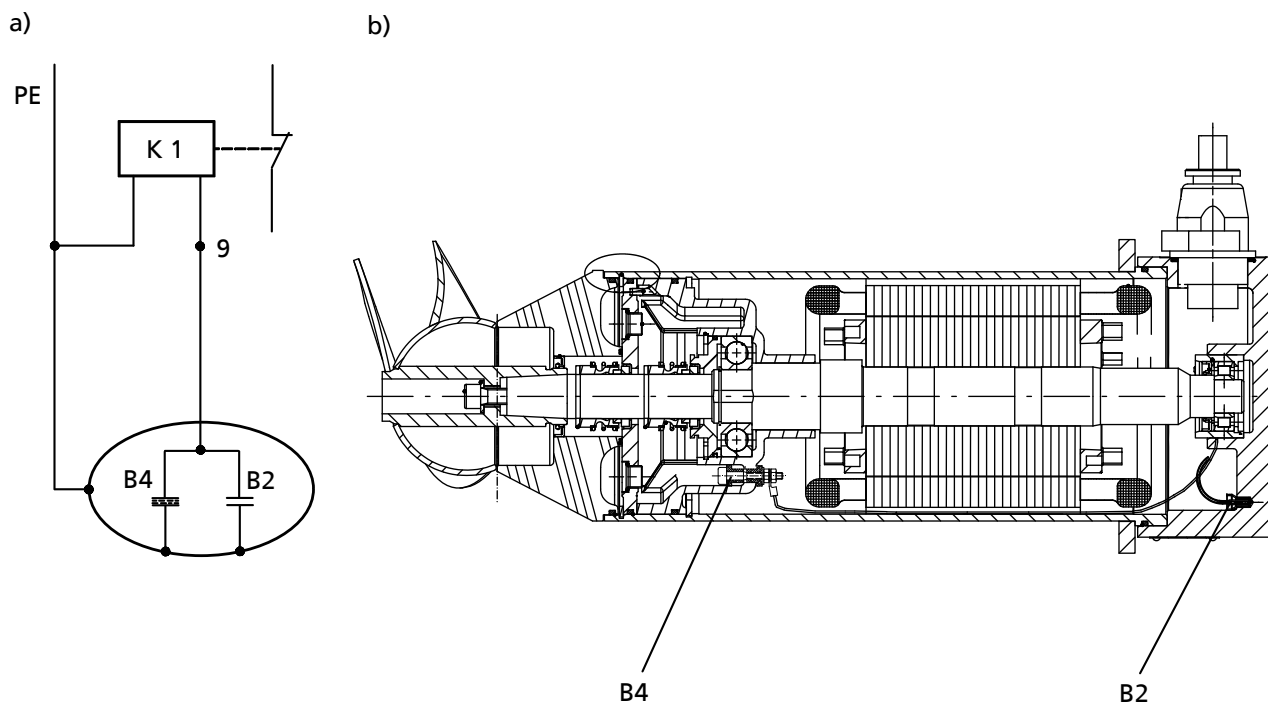




Fig. 21: a) Wiring of the electrode relay and b) Position of the leakage sensor





Versions with (optional) monitoring of mechanical seal leakage are fitted with an electrode in the oil chamber (B4) in addition to the electrode (B2) monitoring the winding space inside the motor for leakage. Both electrodes are connected in parallel and must be monitored by a single electrode relay.

The electrode relay (K1) must meet the following requirements:

- Sensor circuit 10 to 30 V AC
- Tripping current 0.5 to 3 mA
(equivalent to a tripping resistance of 3 to 60 kΩ)




5.4.2 Connection to power supply

	<p>⚠ DANGER</p> <p>Electrical connection work by unqualified personnel Danger of death from electric shock!</p> <ul style="list-style-type: none"> ▷ Always have the electrical connections installed by a trained electrician. ▷ Observe regulations IEC 60364 and, for explosion-proof models, .
	<p>⚠ DANGER</p> <p>Connection of damaged power cables Danger of death from electric shock!</p> <ul style="list-style-type: none"> ▷ Check the power cables for damage before connecting them. ▷ Never connect damaged power cables. ▷ Replace damaged power cables.

	<p>⚠ WARNING</p> <p>Faulty insulation Danger of death from electric shock!</p> <ul style="list-style-type: none"> ▷ Never connect to the power supply a pump set with faulty insulation.
	<p>⚠ WARNING</p> <p>Incorrect connection to the mains Damage to the mains network, short circuit!</p> <ul style="list-style-type: none"> ▷ Observe the technical specifications of the local energy supply companies.
	<p>CAUTION</p> <p>Improper routing of power cables Damage to the power cable!</p> <ul style="list-style-type: none"> ▷ Never move the power cable at temperatures below -25 °C. ▷ Never kink or crush the power cable.
	<p>CAUTION</p> <p>Motor overload Damage to the motor!</p> <ul style="list-style-type: none"> ▷ Protect the motor by a thermal time-lag overload protection device in accordance with IEC 60947 and local regulations.





For electrical connection observe the wiring diagrams and the information on planning the control system. (⇒ Section 9.3, Page 82)

The pump set is supplied with a power cable. Always connect all marked cores.








	<p>⚠ DANGER</p> <p>Incorrect connection Explosion hazard!</p> <ul style="list-style-type: none"> ▷ The connection point of the cable ends must be located outside hazardous areas or in an area approved for electrical equipment.
	<p>CAUTION</p> <p>Flow-induced motion Damage to the power cable!</p> <ul style="list-style-type: none"> ▷ Run the power cable upwards without slack.
	<p>NOTE</p> <p>We recommend using cable supports available as accessories for properly fastening the power cable at the tank edge.</p>

1. Run the power cable directly upwards without slack, and fasten it.
2. Remove the protective caps from the power cable immediately before connection.
3. If necessary, adjust the length of the power cable to the site requirements.
4. After shortening the cable, correctly re-affix the markings on the individual cores at the cable end.

Potential equalization The pump set does not have an external PE connection (risk of corrosion).

	<div data-bbox="507 190 683 235"> DANGER</div> <p>Incorrect connection Explosion hazard!</p> <ul style="list-style-type: none"> ▸ Explosion-proof pump sets installed in a tank must never be retrofitted with an external potential equalization connection!
	<div data-bbox="507 425 683 470"> DANGER</div> <p>Touching the pump set during operation Electric shock!</p> <ul style="list-style-type: none"> ▸ Make sure that the pump set cannot be touched during operation.

5.5 Checking the direction of rotation

	<div data-bbox="507 710 683 754"> DANGER</div> <p>Pump set running dry Explosion hazard!</p> <ul style="list-style-type: none"> ▸ Check the direction or rotation of explosion-proof pump sets outside potentially explosive atmospheres.
	<div data-bbox="507 943 702 987"> WARNING</div> <p>Hands inside the pump casing Risk of injuries, damage to the pump!</p> <ul style="list-style-type: none"> ▸ Never insert your hands or any other objects into the pump if the pump has not been de-energized and secured against unintentional start-up.
	<div data-bbox="507 1176 638 1220">CAUTION</div> <p>Wrong direction of rotation Damage to the pump!</p> <ul style="list-style-type: none"> ▸ Check the direction of rotation as indicated.
	<div data-bbox="507 1386 638 1431">CAUTION</div> <p>Pump set running dry Increased vibrations! Damage to mechanical seals and bearings!</p> <ul style="list-style-type: none"> ▸ Never operate the pump set for more than 60 seconds outside the fluid to be handled.
	<div data-bbox="507 1655 638 1700">CAUTION</div> <p>Axial propeller not fully submerged Damage to the pump set!</p> <ul style="list-style-type: none"> ▸ Never lower the pump set into the fluid while checking the direction of rotation.

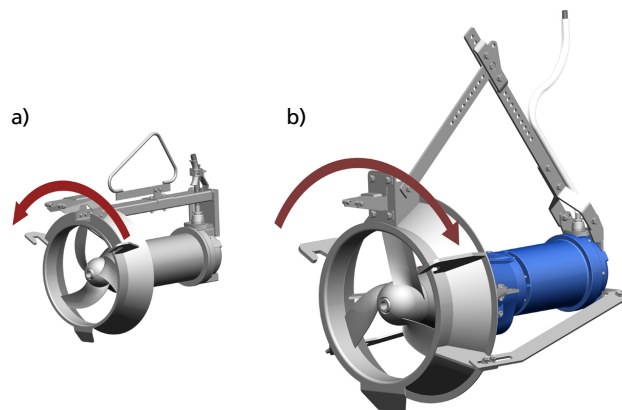


Fig. 22: Direction of rotation a) Amaline 200, 300, 400 b) Amaline 500, 600, 800

- ✓ The pump (set) is mounted on the guide rail and positioned entirely outside the fluid to be handled.
For filled tanks: mounted on the guide rail and suspended from the lifting equipment above the fluid handled, or placed down in a vertical position outside of the tank and protected against falling over or rolling off.
For empty tanks: mounted on the guide rail, attached to the connecting pipe, and in working position.
- ✓ The pump set is connected to the power supply.
 1. Start the pump set and stop it again immediately to determine the axial propeller's direction of rotation.
 2. Check the direction of rotation.
Seen from the pump mouth, axial propeller rotation must match the arrow indicating the direction of rotation on the pump set.
 3. If the impeller is running in the wrong direction of rotation, check the electrical connection of the pump and the control system, if applicable.

6 Commissioning/Start-up/Shutdown




6.1 Commissioning/start-up

6.1.1 Prerequisites for commissioning/start-up

Before commissioning/starting up the pump set, make sure that the following conditions are met:


- The pump set has been properly connected to the power supply and is equipped with all protection devices. (⇒ Section 5.4.2, Page 36)
- The direction of rotation has been checked. (⇒ Section 5.5, Page 38)
(⇒ Section 5.5, Page 38)
- The lubricant has been checked. (⇒ Section 5.2.3, Page 22)
- After prolonged shutdown of the pump (set), the activities required for returning the pump (set) to service have been carried out. (⇒ Section 6.4, Page 44)

6.1.2 Start-up


	<div style="background-color: #e67e22; color: white; padding: 5px;">⚠ DANGER</div> <p>Pump set running dry Explosion hazard!</p> <p>▷ Never allow an explosion-proof pump set to run dry.</p>
	<div style="background-color: #e67e22; color: white; padding: 5px;">⚠ DANGER</div> <p>Operating an incompletely connected pump set Explosion hazard! Damage to the pump set!</p> <p>▷ Never start up a pump set with an incompletely connected power cable or non-operational monitoring devices.</p>
	<div style="background-color: #f1c40f; color: black; padding: 5px;">CAUTION</div> <p>Re-starting while motor is still running down Damage to the pump set!</p> <p>▷ Do not re-start the pump set before it has come to a standstill. ▷ Never start the pump set while the pump is running in reverse.</p>

Start up the pump (set).

6.2 Operating limits

	<div style="background-color: #e67e22; color: white; padding: 5px;">⚠ DANGER</div> <p>Non-compliance with operating limits Damage to the pump set!</p> <p>▷ Comply with the operating data indicated in the data sheet. ▷ Never operate the pump set at ambient or fluid temperatures exceeding those specified in the data sheet or on the name plate. ▷ Never operate the pump set outside the limits specified below.</p>
---	--

6.2.1 Frequency of starts

	CAUTION
	Excessive frequency of starts Damage to the motor! ▷ Never exceed the specified frequency of starts.


To prevent high temperature increases in the motor and excessive loads on the motor, sealing elements and bearings, the switching frequency shall not exceed the following number of starts per hour.

Table 9: Frequency of starts

Interval	Maximum frequency of starts
	[Start-ups]
Per hour	15


These values apply to mains start-up (DOL or with star-delta contactor, autotransformer, soft starter). These limits do not apply to frequency inverter operation.

6.2.2 Operation on the power supply mains

	! DANGER
	Non-compliance with permissible supply voltage tolerances Explosion hazard! ▷ Never operate an explosion-proof pump (set) outside the specified range.

The maximum permissible deviation in supply voltage is $\pm 10\%$ of the rated voltage. The voltage difference between the individual phases must not exceed 1 %.

6.2.3 Frequency inverter operation



	! DANGER
	Operation outside the permitted frequency range Explosion hazard! ▷ Never operate an explosion-proof pump set outside the specified range.

Frequency inverter operation of the pump set is permitted in the frequency range from 25 to 60 Hz.

6.2.4 Fluid handled

6.2.4.1 Minimum level of fluid handled


	! DANGER
	Pump set running dry Explosion hazard! ▷ Never allow an explosion-proof pump set to run dry.

	<p>WARNING</p> <p>Fluid spurting out Health hazard by fluid spurting out!</p> <ul style="list-style-type: none"> ▸ The fluid level must never drop below the minimum submergence H_{0min} of the pump set. (⇒ Section 9.5, Page 88)
	<p>CAUTION</p> <p>Fluid level below the specified minimum Damage to the pump set by cavitation!</p> <ul style="list-style-type: none"> ▸ Never allow the fluid level to drop below the specified minimum.

The pump set is operational when the minimum fluid level is not lower than dimension W_T . (⇒ Section 9.5, Page 88) This minimum fluid level must also be ensured during automatic operation.

6.2.4.2 Fluid temperature


The pump set is designed for transporting liquids. The pump set is not operational under freezing conditions.

	<p>CAUTION</p> <p>Danger of freezing! Damage to the pump set!</p> <ul style="list-style-type: none"> ▸ Drain the pump set or protect it against freezing.
---	--

Refer to the maximum permissible fluid temperature and ambient temperature indicated on the name plate and/or in the data sheet.

6.2.4.3 Density of the fluid handled

The power input of the pump changes in proportion to the density of the fluid handled.

	<p>CAUTION</p> <p>Impermissibly high density of fluid handled Motor overload!</p> <ul style="list-style-type: none"> ▸ Observe the information on fluid density in the data sheet. ▸ Make sure the motor has sufficient power reserves.
---	---

6.2.4.4 Abrasive fluids



Do not exceed the maximum permissible solids content specified in the data sheet. When the pump handles fluids containing abrasive substances, increased wear of the hydraulic system and the shaft seal is to be expected. In this case, halve the intervals commonly recommended for servicing and maintenance.

6.3 Shutdown/storage/preservation


6.3.1 Shutdown

Switch off the pump (set).

6.3.2 Measures to be taken for shutdown

	<div style="background-color: #f4a460; padding: 5px;">⚠ WARNING</div> <p>Unintentional starting of pump set Risk of injury by moving components and shock currents!</p> <ul style="list-style-type: none"> ▷ 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.
	<div style="background-color: #f4a460; padding: 5px;">⚠ WARNING</div> <p>Fluids handled, consumables and operating supplies which are hot or pose a health hazard Risk of personal injury!</p> <ul style="list-style-type: none"> ▷ Observe all relevant laws. ▷ When draining the fluid take appropriate measures to protect persons and the environment. ▷ Decontaminate pumps which handle fluids posing a health hazard.

The pump set remains installed

	<div style="background-color: #f4d03f; padding: 5px;">CAUTION</div> <p>Danger of frost/freezing Damage to the pump set!</p> <ul style="list-style-type: none"> ▷ If there is any danger of frost/freezing, remove the pump set from the fluid handled and clean, preserve and store it.
--	--

- ✓ Sufficient fluid is available for the operation check run of the pump.
- 1. For prolonged shutdown periods, start up the pump set regularly between once a month and once every three months for approximately one minute.
This will prevent the formation of deposits within the pump and the pump intake area.

The pump (set) is removed from the piping and stored




- ✓ All safety regulations are observed.
- 1. Clean the pump set.
- 2. Preserve the pump set.

6.4 Returning to service

For returning the pump set to service, observe the items on commissioning/start-up.
(⇒ Section 6.1, Page 40)

Refer to and comply with the operating limits. (⇒ Section 6.2, Page 40)











For returning the pump set to service after storage also follow the instructions for maintenance/inspection. (⇒ Section 7.2, Page 46)






	<div data-bbox="507 414 703 459"> WARNING</div> <div data-bbox="496 479 1366 613">Failure to re-install or re-activate protective equipment/devices Risk of personal injury from moving parts or escaping fluid! ▷ As soon as the work is completed, re-install and/or re-activate any safety-relevant devices and protective devices.</div>
	<div data-bbox="507 649 587 689">NOTE</div> <div data-bbox="496 712 1388 770">On pumps/pump sets older than 5 years we recommend replacing all elastomer seals.</div>

7 Servicing/Maintenance

7.1 Safety regulations

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

	<div data-bbox="507 421 683 465">  DANGER </div> <p>Sparks produced during maintenance work Explosion hazard!</p> <ul style="list-style-type: none"> ▷ Observe the safety regulations in force at the place of installation. ▷ Never open a pump set that is connected to the power supply. ▷ Always perform maintenance work on pump sets outside potentially explosive atmospheres.
	<div data-bbox="507 736 683 781">  DANGER </div> <p>Risk of falling when working at great heights Danger to life by falling from great heights!</p> <ul style="list-style-type: none"> ▷ Do not step onto the pump (set) during installation work or dismantling work. ▷ Pay attention to safety equipment, such as railings, covers, barriers, etc. ▷ Observe the applicable local occupational safety regulations and accident prevention regulations.
	<div data-bbox="507 1052 703 1097">  WARNING </div> <p>Unintentional starting of pump set Risk of injury by moving components and shock currents!</p> <ul style="list-style-type: none"> ▷ 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.
	<div data-bbox="507 1332 703 1377">  WARNING </div> <p>Hands, other body parts and/or foreign objects in the axial propeller and/or intake area Risk of injury! Damage to the submersible motor pump!</p> <ul style="list-style-type: none"> ▷ Never insert your hands, other body parts or foreign objects into the axial propeller and/or intake area. ▷ Check that the axial propeller can rotate freely.
	<div data-bbox="507 1648 703 1693">  WARNING </div> <p>Fluids handled, consumables and operating supplies which are hot or pose a health hazard Risk of personal injury!</p> <ul style="list-style-type: none"> ▷ Observe all relevant laws. ▷ When draining the fluid take appropriate measures to protect persons and the environment. ▷ Decontaminate pumps which handle fluids posing a health hazard.

	<p>! WARNING</p> <p>Hot surface Risk of personal injury!</p> <ul style="list-style-type: none"> ▷ Allow the pump set to cool down to ambient temperature.
	<p>! WARNING</p> <p>Improper lifting/moving of heavy assemblies or components Personal injury and damage to property!</p> <ul style="list-style-type: none"> ▷ Use suitable transport devices, lifting equipment and lifting tackle to move heavy assemblies or components.
	<p>! WARNING</p> <p>Insufficient stability Risk of crushing hands and feet!</p> <ul style="list-style-type: none"> ▷ During assembly/dismantling, secure the pump (set)/pump parts against tilting or tipping over.
	<p>NOTE</p> <p>Special regulations apply to repair work on explosion-proof pump sets. Modifications or alteration of the pump sets can affect explosion protection and are only permitted after consultation with the manufacturer.</p>
	<p>NOTE</p> <p>All maintenance work, service work and installation work can be carried out by KSB Service or authorized workshops. Find your contact in the attached "Addresses" booklet or on the Internet at "www.ksb.com/contact".</p>

A regular maintenance schedule will help avoid expensive repairs and contribute to trouble-free, reliable operation of the pump (set) with a minimum of maintenance expenditure and work.

Never use force when dismantling and reassembling the pump set.

7.2 Maintenance/inspection

KSB recommends the following regular maintenance schedule:

Table 10: Overview of maintenance work

Maintenance interval	Maintenance work
Every 8,000 operating hours ⁴⁾	Insulation resistance measurement (⇒ Section 7.2.1.1, Page 47)
	Checking the power cable (⇒ Section 7.2.1.2, Page 47)
	Visual inspection of shackle/lifting rope (⇒ Section 7.2.1.3, Page 47)
Every 16000 operating hours ⁵⁾	Checking the sensors (⇒ Section 7.2.1.4, Page 48)
	Lubricant change (⇒ Section 7.2.1.5, Page 48)
	Bearing lubricant change (⇒ Section 7.2.1.5, Page 48)
Every five years	General overhaul

4) At least once a year


5) At least every three years


7.2.1 Inspection work

7.2.1.1 Measuring the insulation resistance

Measure the insulation resistance of the motor winding during annual maintenance work.

- ✓ The pump set has been disconnected in the control cabinet.
- ✓ Use an insulation resistance measuring device.
- ✓ The maximum measuring voltage is 500 V (maximum permissible voltage 1000 V).
 1. Measure the winding to chassis ground.
To do so, connect all winding ends together.
 2. Measure the winding temperature sensor to chassis ground.
To do so, connect all core ends of the winding temperature sensors together and connect all winding ends to chassis ground.
- ⇒ The insulation resistance of the core ends to chassis ground must not be lower than 1 MΩ.
If the resistance measured is lower, power cable and motor resistance must be measured separately. Disconnect the power cable from the motor for this purpose.

	NOTE If the insulation resistance of the power cable is lower than 1 MΩ, the power cable is defective and must be replaced.
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	NOTE If the insulation resistances measured on the motor are too low, the winding insulation is defective. The pump set must not be returned to service in this case.
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7.2.1.2 Checking the power cable

Visual inspection

- ✓ The pump set has been cleaned.
 1. Inspect the power cable for visible damage.
 2. Replace any damaged components by original spare parts.

Checking the ground conductor

- ✓ The pump set has been cleaned.
 1. Measure the resistance between ground conductor and ground.
The resistance must be lower than 1 Ω.
 2. Replace any damaged components by original spare parts.
(⇒ Section 7.7.2, Page 64)

	⚠ DANGER Defective ground conductor Electric shock! ▷ Never switch on a pump set with a defective ground conductor.
---	--

7.2.1.3 Inspecting the lifting rope and shackle or bail

Visual inspection

- ✓ The pump set has been lifted out of the fluid handled and cleaned.
 1. Inspect the lifting rope and shackle or bail and all fastening elements for visual damage.
 2. Replace any damaged components by original spare parts.
(⇒ Section 7.7.2, Page 64)

7.2.1.4 Checking the sensors

	<div style="background-color: #FFD700; padding: 5px;">CAUTION</div> <p>Excessive test voltage Damage to the sensors!</p> <p>► Use a commercially available ohmmeter to measure the resistance.</p>
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The tests described below measure the resistance at the core ends of the control cable. The actual sensor function is not tested.

Temperature sensors in the motor winding

Table 11: Resistance measurement

Measurement between terminals ...	Resistance
10 and 11	100 Ω - 1000 Ω

If the specified tolerances are exceeded, disconnect the connection cable at the pump set and repeat the check inside the motor.

If the tolerances are exceeded here, too, the motor part must be opened and overhauled. The temperature sensors are fitted in the stator winding and cannot be replaced.

Leakage sensor in the motor

Table 12: Resistance measurement of the leakage sensor in the motor

Measurement between terminals ...	Resistance
	[kΩ]
9 and ground conductor (PE)	> 60

Lower resistance values would suggest water ingress into the motor. In this case the motor section must be opened and serviced.

7.2.1.5 Lubrication and lubricant change

7.2.1.5.1 Lubricant quality

The lubricant chamber is filled at the factory with an environmentally friendly, non-toxic lubricant of medical quality (unless otherwise specified by the customer). The following lubricants can be used to lubricate the mechanical seals:

Table 13: Oil quality


Description	Properties	
Paraffin oil or white oil Alternative: motor oils of classes SAE 10W to SAE 20W	Kinematic viscosity at 104 °F [40 °C]	<20 mm ² /s
	Flash point (to Cleveland)	320 °F [160 °C]
	Solidification point (pour point)	2 °F [-15 °C]

Recommended oil quality:

- Merkur WOP 40 PB, made by SASOL
- Merkur white oil Pharma 40, made by DEA
- Thin-bodied paraffin oil No. 7174, made by Merck
- Equivalent brands of medical quality, non-toxic
- Water-glycol mixture

Recommended oil types for gear units:

- Lubricant to ISO VG 320 (viscosity 320)

	<div style="background-color: #FFA500; padding: 5px;">! WARNING</div> <p>Contamination of fluid handled by lubricant Hazard to persons and the environment!</p> <p>► Using machine oil is only permitted if the oil is disposed of properly.</p>
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7.2.1.5.2 Lubricant quantity


Mechanical seal Table 14: Quantity of mechanical seal lubricant

Size	Lubricant quantity	
	[oz]	[l]
200 (motor housing made of gray cast iron)	10.0	0,3
200 (motor housing made of stainless steel)	13.5	0,4
300 (motor 0 6, 2 6)	13.5	0,4
300 (motor 8 6)	47.0	1,4
400	27.0	0,8
500, 600, 800	64.0	1,9

Gear unit Table 15: Quantity of gear unit lubricant

Motor	Gear unit model	Lubricant quantity	
		[oz]	[l]
4 4, 6 4, 11 4	SP 189	68.0	2,0
17 2, 25 2, 16 4, 23 4, 30 4	SP 190	88.0	2,6

7.2.1.5.3 Draining the lubricant

	<p>⚠ WARNING</p> <p>Lubricants posing a health hazard and/or hot lubricants</p> <p>Hazard to persons and the environment!</p> <ul style="list-style-type: none"> ▷ When draining the lubricant take appropriate measures to protect persons and the environment. ▷ Wear safety clothing and a protective mask if required. ▷ Collect and dispose of any lubricants. ▷ Observe all legal regulations on the disposal of fluids posing a health hazard.
	<p>⚠ WARNING</p> <p>Excess pressure in the lubricant chamber</p> <p>Liquid spurting out when the lubricant chamber is opened at operating temperature!</p> <ul style="list-style-type: none"> ▷ Open the screw plug of the lubricant chamber very carefully.

Amaline 200, 300 with motor 0 6 or 2 6, 400

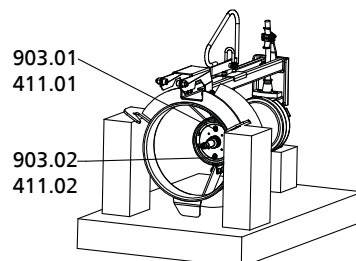


Fig. 23: Draining the lubricant of an Amaline 200, 300 with motor 0 6 or 2 6, 400

1. Position the pump set as shown.
2. Remove the axial propeller and adapter. (⇒ Section 7.4.3, Page 54)
3. Place a suitable container under the screw plugs.
4. Remove screw plugs 903.01 and 903.02 with joint rings 411.01 and 411.02. Drain off the lubricant.

5. Insert and tighten screw plugs 903.01 and 903.02 with new joint rings 411.01 and 411.02.
6. Mount the adapter and axial propeller. (⇒ Section 7.5.5, Page 62)

Amaline 300 with motor 8 6

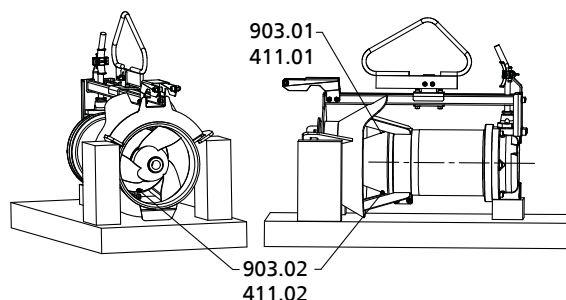


Fig. 24: Draining the lubricant of an Amaline 300 with motor 8 6

1. Position the pump set as shown.
2. Place a suitable container under the screw plugs.
3. Remove screw plugs 903.01 and 903.02 with joint rings 411.01 and 411.02. Drain off the lubricant.
4. Insert and tighten screw plugs 903.01 and 903.02 with new joint rings 411.01 and 411.02.

Amaline 500, 600, 800

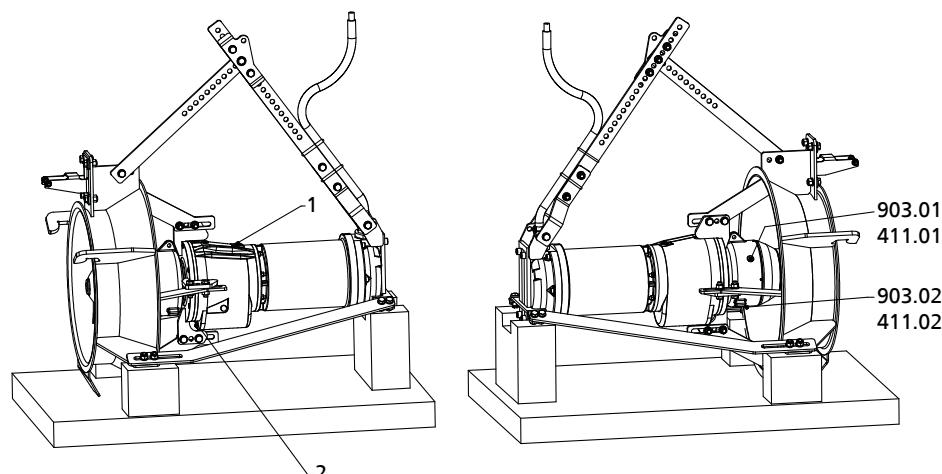




Fig. 25: Draining the lubricant of an Amaline 500, 600, 800

1	Lubricant filler plug of the gear unit
2	Lubricant drain plug of the gear unit

1. Position the pump set as shown.
2. Place a suitable container under the screw plugs.
3. Unscrew the lubricant filler plug of the gear unit and the lubricant drain plug of the gear unit. Drain off the lubricant.
4. Insert and tighten the lubricant filler plug of the gear unit and the lubricant drain plug of the gear unit.
5. Remove screw plugs 903.01 and 903.02 with joint rings 411.01 and 411.02. Drain off the lubricant.
6. Insert and tighten screw plugs 903.01 and 903.02 with new joint rings 411.01 and 411.02.

7.2.1.5.4 Topping up the lubricant

	<p>WARNING</p> <p>Lubricants posing a health hazard Hazard to persons and the environment!</p> <ul style="list-style-type: none"> ▷ When refilling the lubricant take appropriate measures to protect persons and the environment.
	<p>CAUTION</p> <p>Lubricant level too high Mechanical seal operation is impaired!</p> <ul style="list-style-type: none"> ▷ Always place the pump (set) in horizontal position (as shown) for topping up the lubricant.

The lubricant reservoirs have been filled with an environmentally-friendly, non-toxic lubricant at the factory.

Amaline 200, 300 with motor 0 6 or 2 6, 400

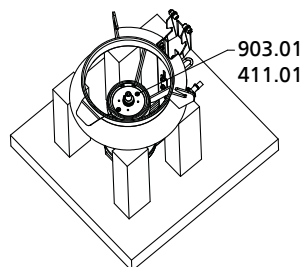


Fig. 26: Topping up the lubricant of an Amaline 200, 300 with motor 0 6 or 2 6, 400

- ✓ The pump set has been set down as illustrated.
 - ✓ The axial propeller and adapter have been removed. (⇒ Section 7.4.3, Page 54)
1. Unscrew and remove screw plug 903.01 with joint ring 411.01.
 2. Measure the lubricant level.
 - ⇒ The lubricant level must not be any lower than 10 mm below the value "A" indicated in the following table.

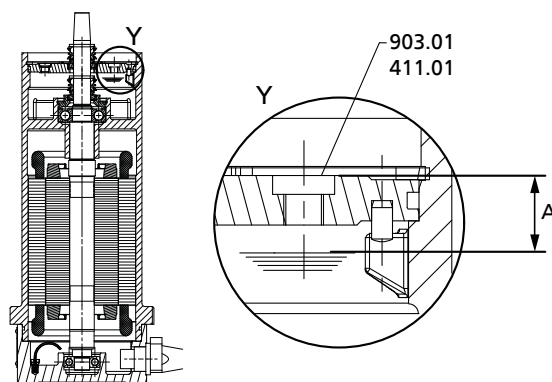
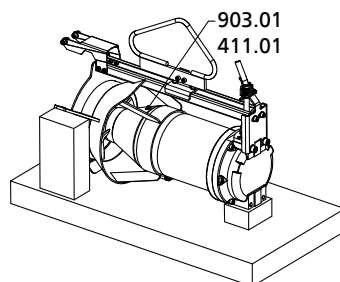


Fig. 27: Lubricant level Amaline 200, 300 with motor 0 6 or 2 6, 400

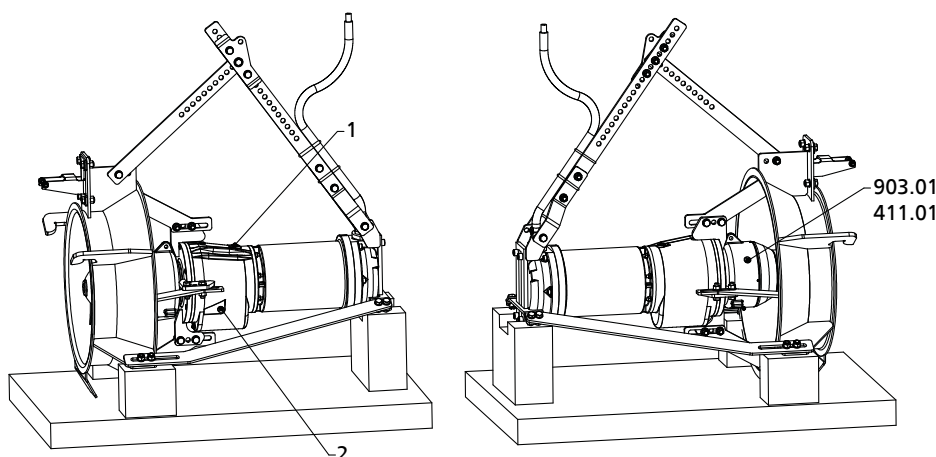
3. If the lubricant level is lower, top up the lubricant in the lubricant reservoir through the filler opening.
4. Screw in screw plug 903.01 with joint ring 411.01.
5. Mount the adapter and axial propeller. (⇒ Section 7.5.5, Page 62)

Table 16: Distance "A" from the casing edge to the lubricant level

Size	A
	[mm]
200	25
300	38
400	35

Amaline 300 with motor 8 6

Fig. 28: Topping up the lubricant of an Amaline 300 with motor 8 6

1. Place the pump set down as illustrated.
2. Unscrew and remove screw plug 903.01 with joint ring 411.01.
⇒ The lubricant level must be approximately 2" [50 mm] below the filler opening.
3. If the lubricant level is lower, top up lubricant through the filler opening until the lubricant level is approximately 2" [50 mm] below the filler opening.
(⇒ Section 7.2.1.5.1, Page 48)
4. Screw in screw plug 903.01 with joint ring 411.01.

Amaline 500, 600, 800

Fig. 29: Topping up the lubricant of an Amaline 500, 600, 800

1	Lubricant filler plug of the gear unit
2	Lubricant check plug of the gear unit

Lubricant level of mechanical seal


1. Place the pump set down as illustrated.
2. Unscrew and remove screw plug 903.01 with joint ring 411.01.
⇒ The lubricant level must reach the lubricant check opening.
3. Fill the lubricant through the filler opening until the lubricant reservoir overflows.
4. Screw in screw plug 903.01 with joint ring 411.01.

Lubricant level of gear unit

1. Unscrew the lubricant check plug at the gear unit.

- ⇒ The lubricant level must reach the filler opening.
- Unscrew the lubricant filler plug on the gear unit and top up lubricant through the filler opening until the lubricant reservoir overflows at the lubricant check opening.
 - Screw in the lubricant check plug of the gear unit and the lubricant filler plug.




7.3 Drainage/cleaning

	<div style="background-color: #f4a460; padding: 5px;">! WARNING</div> <p>Fluids handled, consumables and operating supplies which are hot or pose a health hazard</p> <p>Hazard to persons and the environment!</p> <ul style="list-style-type: none"> ▷ Collect and properly dispose of the flushing fluid and of 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.
---	--

- Always flush the pump if it has been used for handling noxious, explosive, hot or other hazardous fluids.
- Always flush and clean the pump before transporting it to the workshop. Always complete and enclose a certificate of decontamination when returning the pump set. (⇒ Section 10, Page 96)

7.4 Dismantling the pump set



7.4.1 General information/Safety regulations

	<div style="background-color: #f4a460; padding: 5px;">! WARNING</div> <p>Unqualified personnel performing work on the pump (set)</p> <p>Risk of personal injury!</p> <ul style="list-style-type: none"> ▷ Always have repair work and maintenance work performed by specially trained, qualified personnel.
	<div style="background-color: #f4a460; padding: 5px;">! WARNING</div> <p>Hot surface</p> <p>Risk of personal injury!</p> <ul style="list-style-type: none"> ▷ Allow the pump set to cool down to ambient temperature.
	<div style="background-color: #f4a460; padding: 5px;">! WARNING</div> <p>Improper lifting/moving of heavy assemblies or components</p> <p>Personal injury and damage to property!</p> <ul style="list-style-type: none"> ▷ Use suitable transport devices, lifting equipment and lifting tackle to move heavy assemblies or components.

Observe the safety instructions and information.

For dismantling and reassembly observe the general assembly drawing.

In the event of damage you can always contact KSB Service.

	<p>⚠ DANGER</p> <p>Insufficient preparation of work on the pump (set) Risk of injury!</p> <ul style="list-style-type: none"> ▷ Properly shut down the pump set. ▷ Drain the pump. (⇒ Section 7.3, Page 53) ▷ Shut off any auxiliary feed lines. ▷ Allow the pump set to cool down to ambient temperature.
	<p>⚠ WARNING</p> <p>Components with sharp edges Risk of cutting or shearing injuries!</p> <ul style="list-style-type: none"> ▷ Always use appropriate caution for installation and dismantling work. ▷ Wear work gloves.

7.4.2 Preparing the pump set

1. De-energize the pump set and secure it against unintentional start-up.
2. Drain the lubricant. (⇒ Section 7.2.1.5.3, Page 49)

7.4.3 Removing the axial propeller

Amaline 200, 300 with motor 0 6 or 2 6, 400

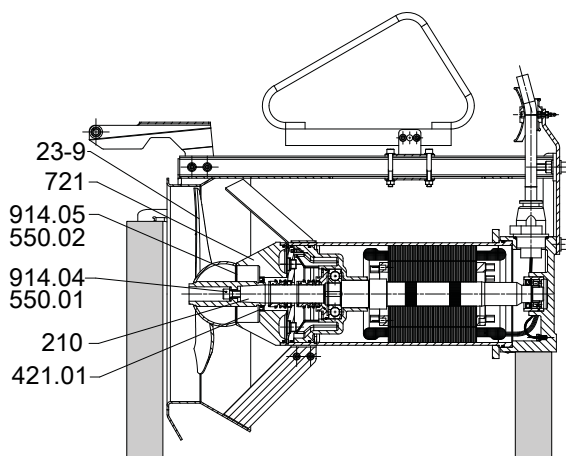


Fig. 30: Removing the axial propeller of an Amaline 200, 300 with motor 0 6 or 2 6, 400

- ✓ The pump set has been properly removed from the system, cleaned and set down as illustrated.
1. Undo and remove hexagon socket head cap screw 914.04 with disc 550.01.
 2. Screw a forcing screw into axial propeller 23-9 and pull the axial propeller off shaft 210.
 3. Undo and remove hexagon socket head cap screws 914.05 with discs 550.02.
 4. Remove adapter 721.
 5. Remove lip seal 421.01.

Amaline 300 with motor 8 6

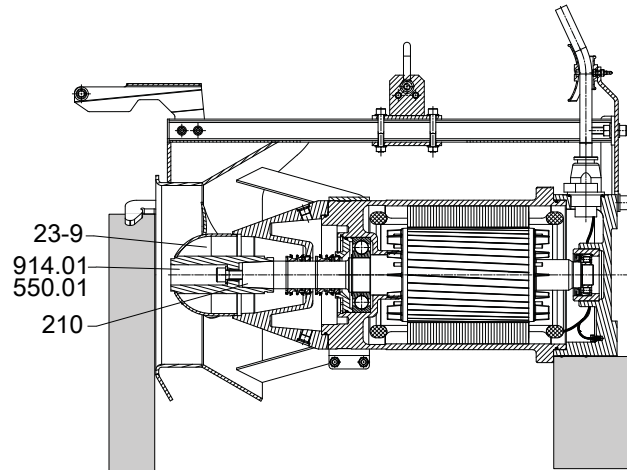


Fig. 31: Removing the axial propeller of an Amaline 300 with motor 8 6

✓ The pump set has been properly removed from the system, cleaned and set down as illustrated.

1. Undo and remove hexagon socket head cap screw 914.01 with disc 550.01.
2. Screw a forcing screw into axial propeller 23-9 and pull the axial propeller off shaft 210.

Amaline 500, 600

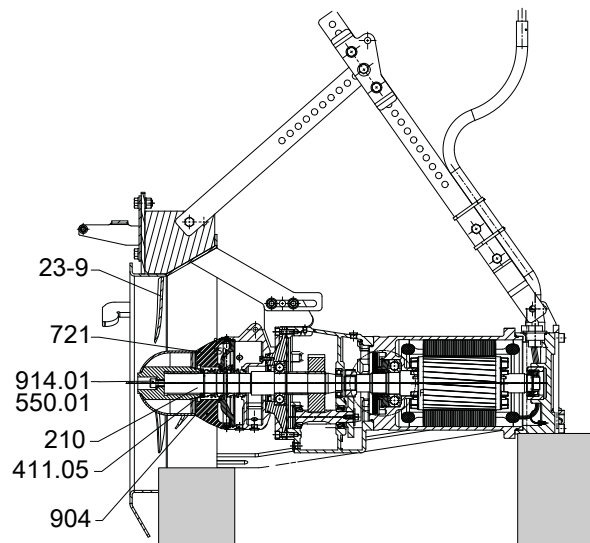


Fig. 32: Removing the axial propeller of an Amaline 500, 600


✓ The pump set has been properly removed from the system, cleaned and set down as illustrated.

1. Undo and remove hexagon socket head cap screw 914.04 with disc 550.01.
2. Screw a forcing screw into axial propeller 23-9 and pull the axial propeller off shaft 210.
3. Remove joint ring 411.05.
4. Undo and remove grub screws 904.
5. Remove adapter 721.

Amaline 800

- ✓ The pump set has been properly removed from the system, cleaned and set down.
- 1. Undo and remove hexagon socket head cap screw 914.01 with disc 550.01.
- 2. Screw a forcing screw into axial propeller 23-9 and pull the axial propeller off shaft 210.

7.4.4 Removing the mechanical seals

	<div style="background-color: #FFD700; padding: 5px;">CAUTION</div> <p>Improper removal of mechanical seal Damage to the shaft!</p> <p>▷ Carefully remove and dismantle the mechanical seal.</p>
---	--

Amaline 200, 300 with motor 0 6 or 2 6, 400

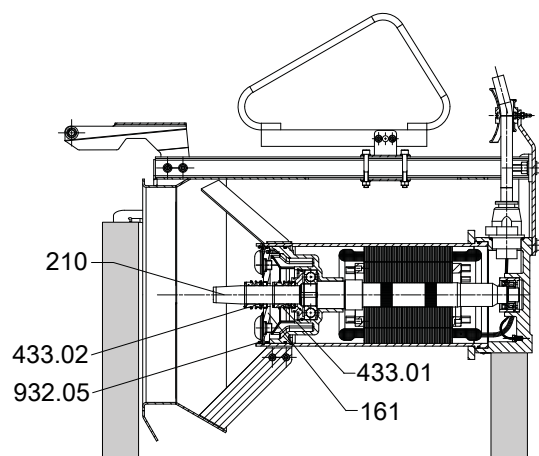


Fig. 33: Removing the mechanical seal of an Amaline 200, 300 with motor 0 6 or 2 6, 400

- ✓ The axial propeller and adapter have been removed. (⇒ Section 7.4.3, Page 54)
- 1. Gently pull mechanical seal 433.02 off shaft 210.
- 2. Remove circlip 932.05.
- 3. Take off cover 161.
- 4. Gently pull mechanical seal 433.01 off shaft 210.

Amaline 300 with motor 8 6

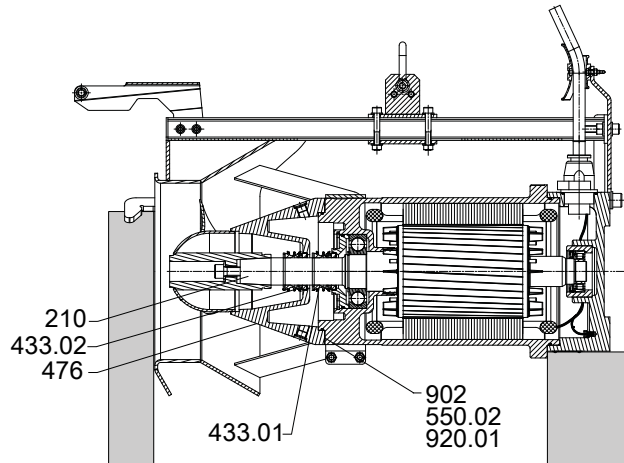


Fig. 34: Removing the mechanical seal of an Amaline 300 with motor 8 6

- ✓ The axial propeller has been removed. (⇒ Section 7.4.3, Page 54)
- 1. Gently pull mechanical seal 433.02 off shaft 210.
- 2. Undo and remove nuts 920.01 with discs 550.02 from studs 902.01.
- 3. Remove mating ring carrier 476.
- 4. Gently pull mechanical seal 433.01 off shaft 210.

Amaline 500, 600

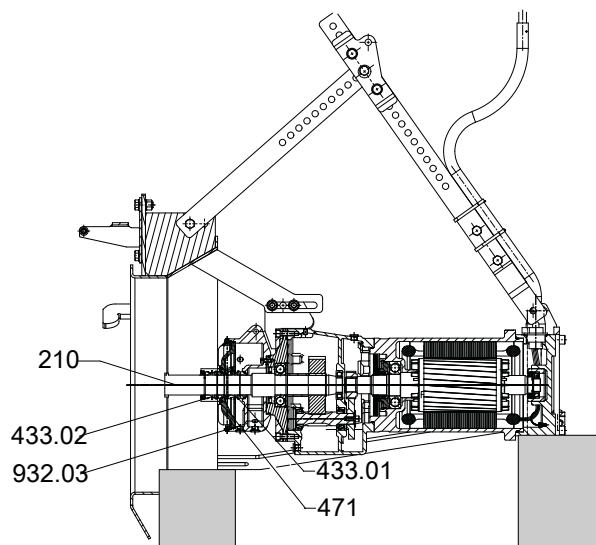




Fig. 35: Removing the mechanical seal of an Amaline 500, 600

- ✓ The axial propeller and adapter have been removed. (⇒ Section 7.4.3, Page 54)
- 1. Gently pull mechanical seal 433.02 off shaft 210.
- 2. Remove circlip 932.02.
- 3. Remove seal cover 471.
- 4. Gently pull mechanical seal 433.01 off shaft 210.

Amaline 800

- ✓ The axial propeller has been removed. (⇒ Section 7.4.3, Page 54)
- 1. Gently pull mechanical seal 433.02 off shaft 210.
- 2. Remove circlip 932.02.
- 3. Remove seal cover 471.
- 4. Gently pull mechanical seal 433.01 off shaft 210.




7.4.5 Dismantling the motor section

	<p>NOTE</p> <p>Special regulations apply to repair work on explosion-proof pump sets. Modifications or alteration of the pump sets can affect explosion protection and are only permitted after consultation with the manufacturer.</p>
	<p>NOTE</p> <p>The motors of explosion-proof pump sets are supplied in "flameproof enclosure" type of protection. Any work on the motor section which could affect explosion protection, such as re-winding and repair work involving machining, must be inspected by an approved expert or performed by the motor manufacturer. No modifications must be made to the internal configuration of the motor space. Repair work at the flameproof joints must only be performed in accordance with the manufacturer's instructions.</p>

When dismantling the motor section and the connection cable make sure that the cores/terminals are clearly marked for future reassembly.

7.5 Reassembling the pump set

7.5.1 General information/Safety regulations



	<p>! WARNING</p> <p>Improper lifting/moving of heavy assemblies or components Personal injury and damage to property!</p> <ul style="list-style-type: none"> ▸ Use suitable transport devices, lifting equipment and lifting tackle to move heavy assemblies or components.
	<p>! WARNING</p> <p>Components with sharp edges Risk of cutting or shearing injuries!</p> <ul style="list-style-type: none"> ▸ Always use appropriate caution for installation and dismantling work. ▸ Wear work gloves.
	<p>CAUTION</p> <p>Improper reassembly Damage to the pump!</p> <ul style="list-style-type: none"> ▸ Reassemble the pump (set) in accordance with the general rules of sound engineering practice. ▸ Use original spare parts only.

Sequence Always reassemble the pump set in accordance with the corresponding general assembly drawing.

- Sealing elements**
- O-rings
 - Check O-rings for any damage and replace by new O-rings if required.
 - Never use O-rings that have been made by cutting an O-ring cord to size and gluing the ends together.
 - Assembly adhesives
 - Avoid the use of assembly adhesives if possible.

Tightening torques For reassembly, tighten all screws and bolts as indicated.

7.5.2 Reassembling the motor section

	<p>NOTE</p> <p>Before reassembling the motor section, check that all joints relevant to explosion protection (flamepaths) are undamaged. Any components with damaged flamepaths must be replaced. Only use original spare parts made by KSB for explosion-proof pump sets. Observe the flamepath positions specified in the Annex (Flamepaths on explosion-proof motors). (⇒ Section 9.2, Page 79) (⇒ Section 9.2, Page 79) Secure all screwed/bolted connections closing off the flameproof enclosure with a thread-locking agent (Loctite Type 243).</p>
	<p>⚠ DANGER</p> <p>Wrong screws/bolts Explosion hazard!</p> <ul style="list-style-type: none"> ▷ Always use the original screws/bolts for assembling an explosion-proof pump set. ▷ Never use screws/bolts of different dimensions or of a lower property class.

7.5.3 Installing the mechanical seals

The following rules must be observed when installing the mechanical seal:

- Work cleanly and accurately.
- Only remove the protective wrapping of the contact faces immediately before installation takes place.
- Prevent any damage to the sealing surfaces or O-rings.

Amaline 200, 300 with motor 0 6 or 2 6, 400

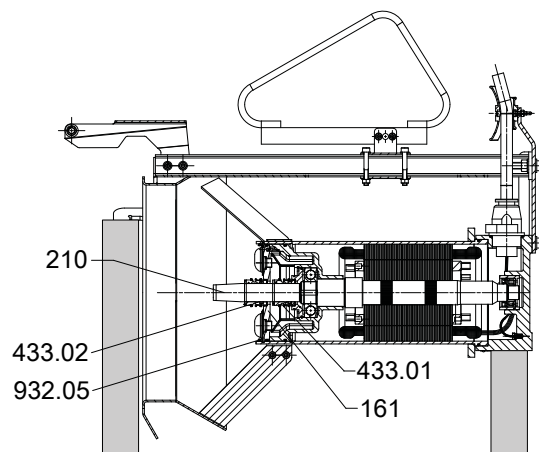


Fig. 36: Installing the mechanical seal of an Amaline 200, 300 with motor 0 6 or 2 6, 400

1. Gently slide mechanical seal 433.01 onto shaft 210.
2. Fit cover 161.
3. Insert circlip 932.05.
4. Gently slide mechanical seal 433.02 onto shaft 210.

Amaline 300 with motor 8 6

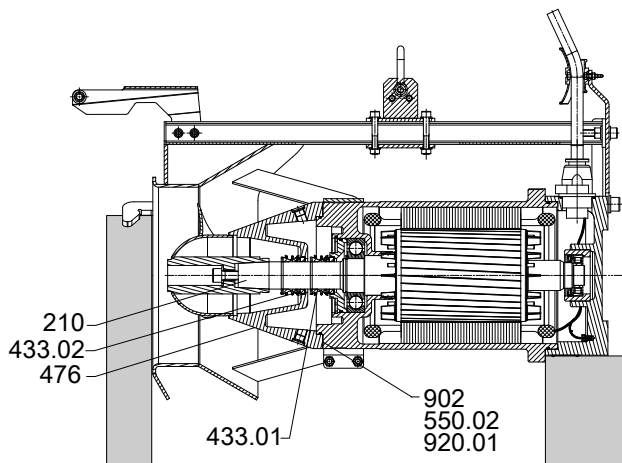


Fig. 37: Installing the mechanical seal of an Amaline 300 with motor 8 6

1. Gently slide mechanical seal 433.01 onto shaft 210.
2. Fit mating ring carrier 476.
3. Fasten nuts 920.01 with discs 550.02 on studs 902.01.
4. Gently slide mechanical seal 433.02 onto shaft 210.

Amaline 500, 600

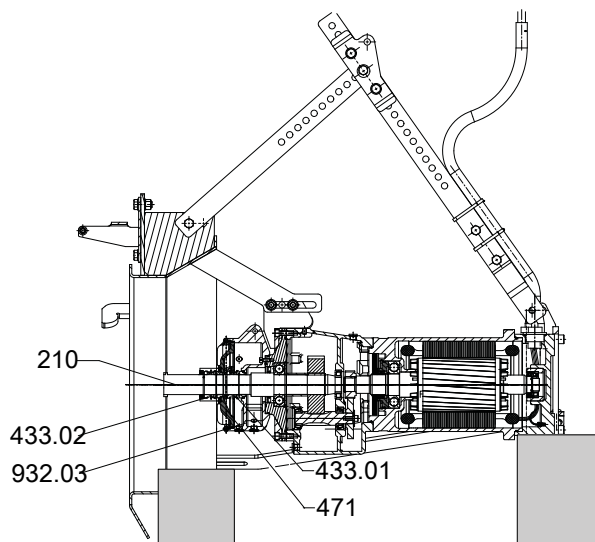


Fig. 38: Installing the mechanical seal of an Amaline 500, 600

1. Gently slide mechanical seal 433.01 onto shaft 210.
2. Fit seal cover 471.
3. Insert circlip 932.02.
4. Gently slide mechanical seal 433.02 onto shaft 210.

Amaline 800

1. Gently slide mechanical seal 433.01 onto shaft 210.
2. Fit seal cover 471.
3. Insert circlip 932.02.
4. Gently slide mechanical seal 433.02 onto shaft 210.

7.5.4 Leak testing

After reassembly, the mechanical seal area/lubricant chamber must be checked for leakage. The leak test is performed at the lubricant filler opening.

Observe the following values for leak testing:

Table 17: Leak test values

Size	Test medium	Test pressure		Test period
		[psi]	[bar]	[min]
200, 300, 400	Compressed air	11.6	0,8	2
500, 600, 800	Compressed air	7.25	0,5	2

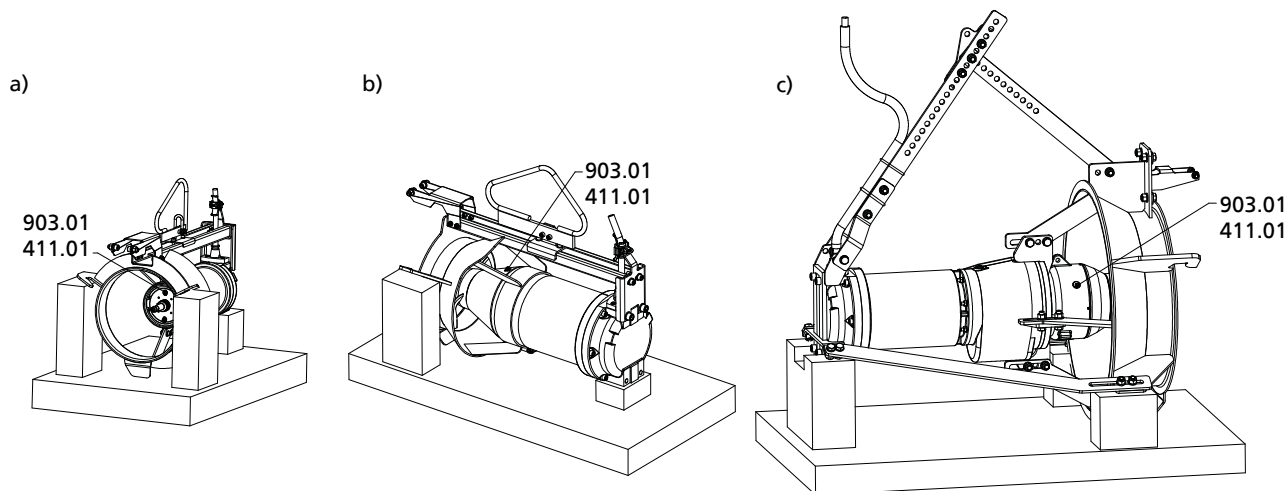


Fig. 39: Leak test a) Amaline 200, 300 with motor 0 6 or 2 6, 400 b) Amaline 300 with motor 8 6 c) Amaline 500, 600, 800

1. Undo and remove screw plug 903.01 with joint ring 411.01.
2. Screw the testing device tightly into the lubricant filler opening.
3. Carry out the leak test with the values specified above.



NOTE

The pressure must not drop during the test period.

4. Unscrew and remove the testing device.
5. Fit screw plug 903.01 and joint ring 411.01 again.

7.5.5 Mounting the axial propeller

Amaline 200, 300 with motor 0 6 or 2 6, 400

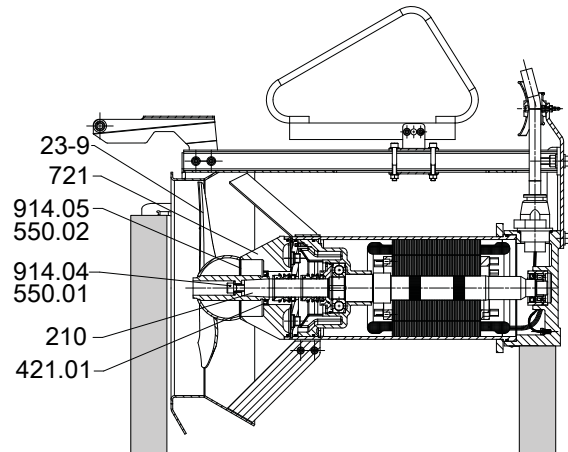


Fig. 40: Mounting the axial propeller of an Amaline 200, 300 with motor 0 6 or 2 6, 400

1. Fit lip seal 421.01.
2. Fit adapter 721.
3. Insert and tighten hexagon socket head cap screws 914.05 with discs 550.02.
4. Place axial propeller 23-9 onto shaft 210.
5. Insert and tighten hexagon socket head cap screw 914.04 with disc 550.01.

Amaline 300 with motor 8 6

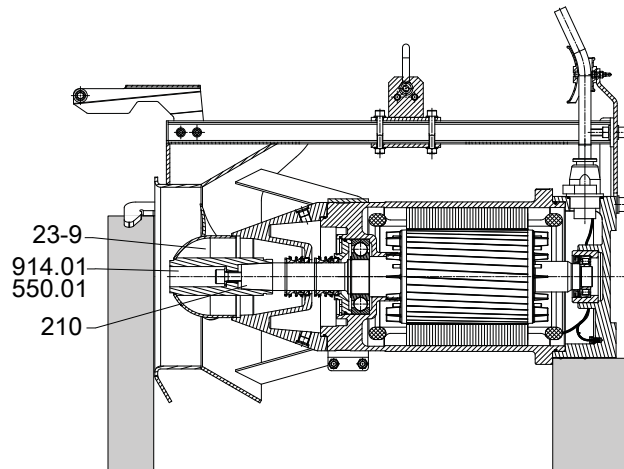


Fig. 41: Mounting the axial propeller of an Amaline 300 with motor 8 6

1. Place axial propeller 23-9 onto shaft 210.
2. Insert and tighten hexagon socket head cap screw 914.01 with disc 550.01.

Amaline 500, 600

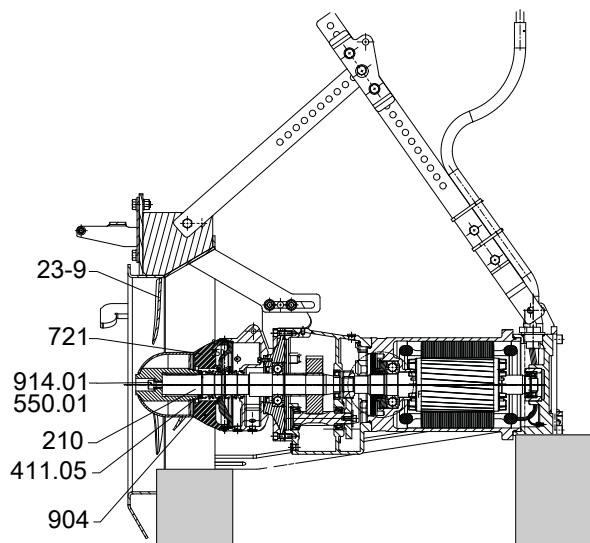


Fig. 42: Mounting the axial propeller of an Amaline 500, 600

1. Fit adapter 721.
2. Insert and tighten grub screws 904.
3. Fit joint ring 411.05.
4. Place axial propeller 23-9 onto shaft 210.
5. Insert and tighten hexagon socket head cap screw 914.04 with disc 550.01.

Amaline 800

1. Place axial propeller 23-9 onto shaft 210.
2. Insert and tighten hexagon socket head cap screw 914.01 with disc 550.01.

7.6 Tightening torques

Table 18: Tightening torques [Nm] depending on thread, material and property class

Thread	Material									
	A4-50		A4-70				1.4462		8.8	
	Property class Rp 0.2 ^N / _{mm²}									
	210		250		450		450		640	
	[ft lbs]	[Nm]	[ft lbs]	[Nm]	[ft lbs]	[Nm]	[ft lbs]	[Nm]	[ft lbs]	[Nm]
M5	-	-	-	-	4	4	4	4	4.5	6
M6	-	-	-	-	5	7	5	7	7.5	10
M8	-	-	-	-	12	17	12	17	19	25
M10	-	-	-	-	25	35	25	35	37	50
M12	-	-	-	-	45	60	45	60	64	85
M16	-	-	-	-	112	150	112	150	157	210

7.7 Spare parts stock

7.7.1 Recommended spare parts stock for 2 years' operation to DIN 24296

Table 19: Quantity of spare parts for recommended spare parts stock

Part No.	Description	Number of pump sets (including stand-by pumps)						
		2	3	4	5	6	8	10 and more
23-9	Axial propeller	1	1	1	2	2	3	30%
321.01	Rolling element bearing, propeller end	1	1	2	2	3	4	50%

Part No.	Description	Number of pump sets (including stand-by pumps)						
		2	3	4	5	6	8	10 and more
321.02 / 322	Rolling element bearing, drive end	1	1	2	2	3	4	50%
433.01	Mechanical seal, drive end	2	3	4	5	6	7	90%
433.02	Mechanical seal, propeller end	2	3	4	5	6	7	90%
818	Rotor	-	-	-	1	1	2	3
834	Cable gland	1	1	2	2	2	3	40%
	Set of sealing elements	4	6	8	8	9	10	100%

7.7.2 Ordering spare parts

Always quote the following data when ordering replacement parts or spare parts:



- Order number
- Order item number
- Type series
- Size
- Year of construction
- Motor number

Refer to the name plate for all data.

Also supply the following data:

- Part No. and description (⇒ Section 9.1, Page 66)
- Quantity of spare parts
- Shipping address
- Mode of dispatch (freight, mail, express freight, air freight)

8 Trouble-shooting

	<div style="background-color: #f4a460; padding: 5px; border: 1px solid black; margin-bottom: 5px;">  WARNING </div> <p>Improper remedial work Risk of personal injury!</p> <p>► For any work performed in order to remedy faults observe the relevant information given in this operating manual and/or the product literature provided by the accessories manufacturers.</p>
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If problems occur that are not described in the following table, consultation with KSB Service is required.

- A** Pump is running but does not deliver
- B** Pump delivers insufficient flow rate
- C** Excessive current/power input
- D** Vibrations and noise during pump operation

Table 20: Trouble-shooting

A	B	C	D	Possible cause	Remedy ⁶⁾
-	X	-	-	Unfavorable installation of pump	Check installation and, if necessary, remove obstacles from flow area.
-	-	X	X	Axial propeller covered in solids; density of fluid handled too high	Clean the axial propeller, check power data.
-	X	-	X	Axial propeller damaged	Replace the axial propeller.
-	X	X	X	Wear of internal components	Replace worn parts by new ones.
-	X	X	X	Wrong direction of rotation	If the direction of rotation is incorrect, check the electrical connection of the pump set and the control system if necessary.
-	-	X	-	Wrong supply voltage	Check mains voltage. Check power cable connections.
X	-	-	-	No voltage	Check electrical installation. Contact energy supplier.
X	-	-	-	Motor winding or power cable defective	Replace with original KSB parts or contact KSB.
-	-	X	X	Defective rolling element bearing	Contact KSB.
-	X	X	-	For star-delta starting: motor runs in star configuration only	Check star-delta contactor.
-	X	-	-	Water level lowered too much during operation	Check level control equipment.
X	-	-	-	Temperature control device monitoring the winding has tripped the pump as a result of excessive winding temperatures.	Have cause determined and eliminated by qualified and trained personnel.
X	-	-	-	Motor has been tripped by leakage monitor.	Have cause determined and eliminated by qualified and trained personnel.
X	-	-	-	Mechanical seal monitor has tripped.	Have cause determined and eliminated by qualified and trained personnel.

⁶⁾ Disconnect the pump (set) from the power supply.

9 Related Documents

9.1 General assembly drawings with list of components

9.1.1 Amaline 200 (motors: 1 4, 2 4; motor housing made of gray cast iron)

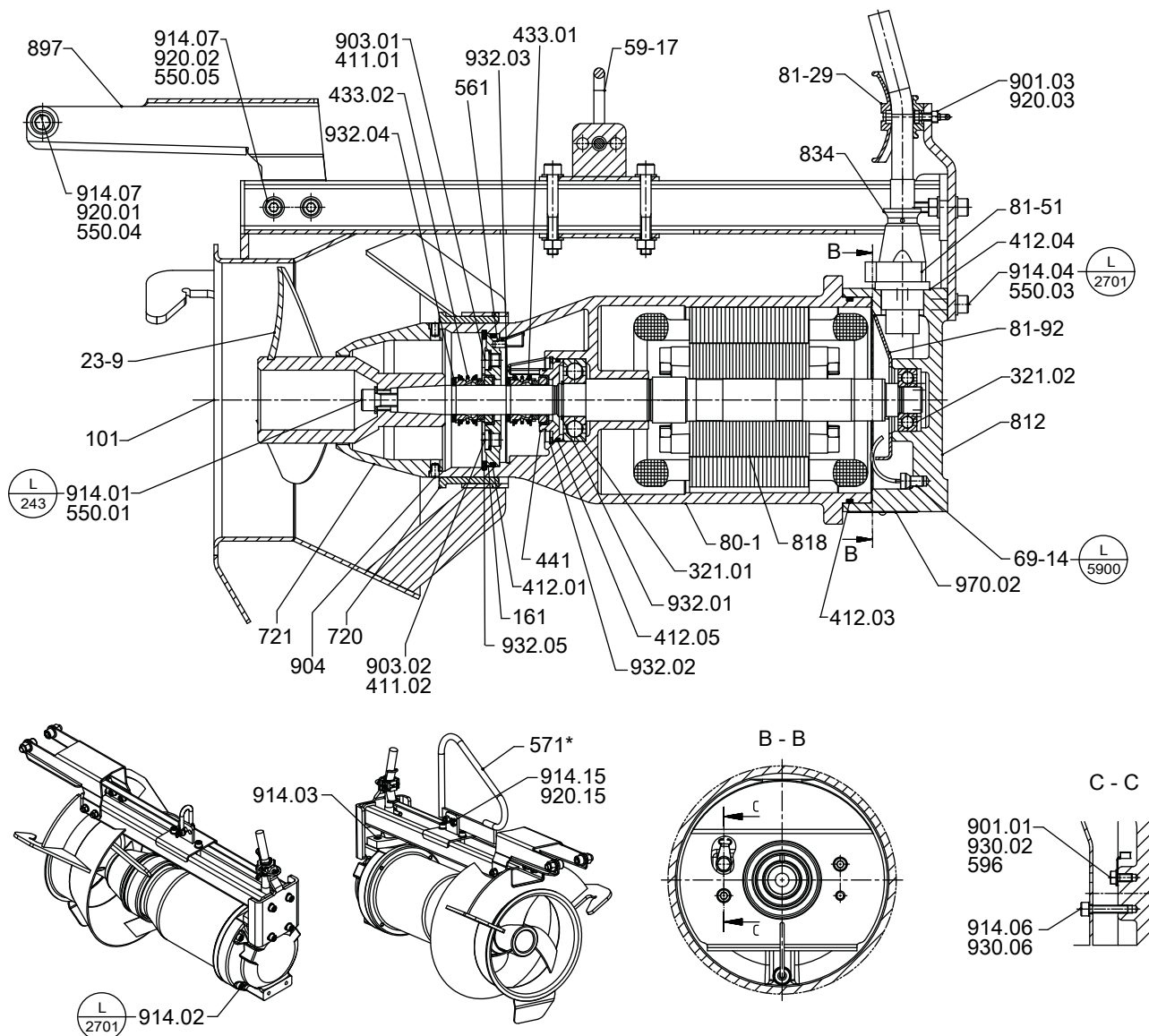


Fig. 43: General assembly drawing

*: On specific designs only

Table 21: Key to the symbols

Symbol	Key
	Always secure screwed connections marked with this symbol with Loctite 243 .
	Always secure screwed connections marked with this symbol with Loctite 2701 .
	Always secure screwed connections marked with this symbol with Loctite 5900 .

Table 22: List of components

Part No.	Description	Part No.	Description
23-9	Axial propeller	571	Bail (optional)
59-17	Shackle	596	Wire
69-14	Leakage sensor	720	Spacer
80-1	Motor unit	721	Adapter
81-29	Terminal	812	Motor housing cover
81-51	Clamping element	818	Rotor
81-92	Cover plate	834	Cable gland
101	Pump casing	897	Guide piece
161	Casing cover	901.01/.03	Hexagon head bolt
321.01/.02	Radial ball bearing	903.01/.02	Screw plug
411.01/.02	Joint ring	904	Grub screw
412.01/.03/.04/.05	O-ring	914.01/.02/.03/.04/.06/.07/.15	Hexagon socket head cap screw
433.01/.02	Mechanical seal	920.01/.02/.03/.15	Nut
441	Shaft seal housing	930.02/.06	Safety device
550.01/.03/.04/.05	Disc	932.01/.02/.03/.04/.05	Circlip
561	Grooved pin	970.02	Label/plate

9.1.2 Amaline 200 (motors: 1 4, 2 4; motor housing made of stainless steel)

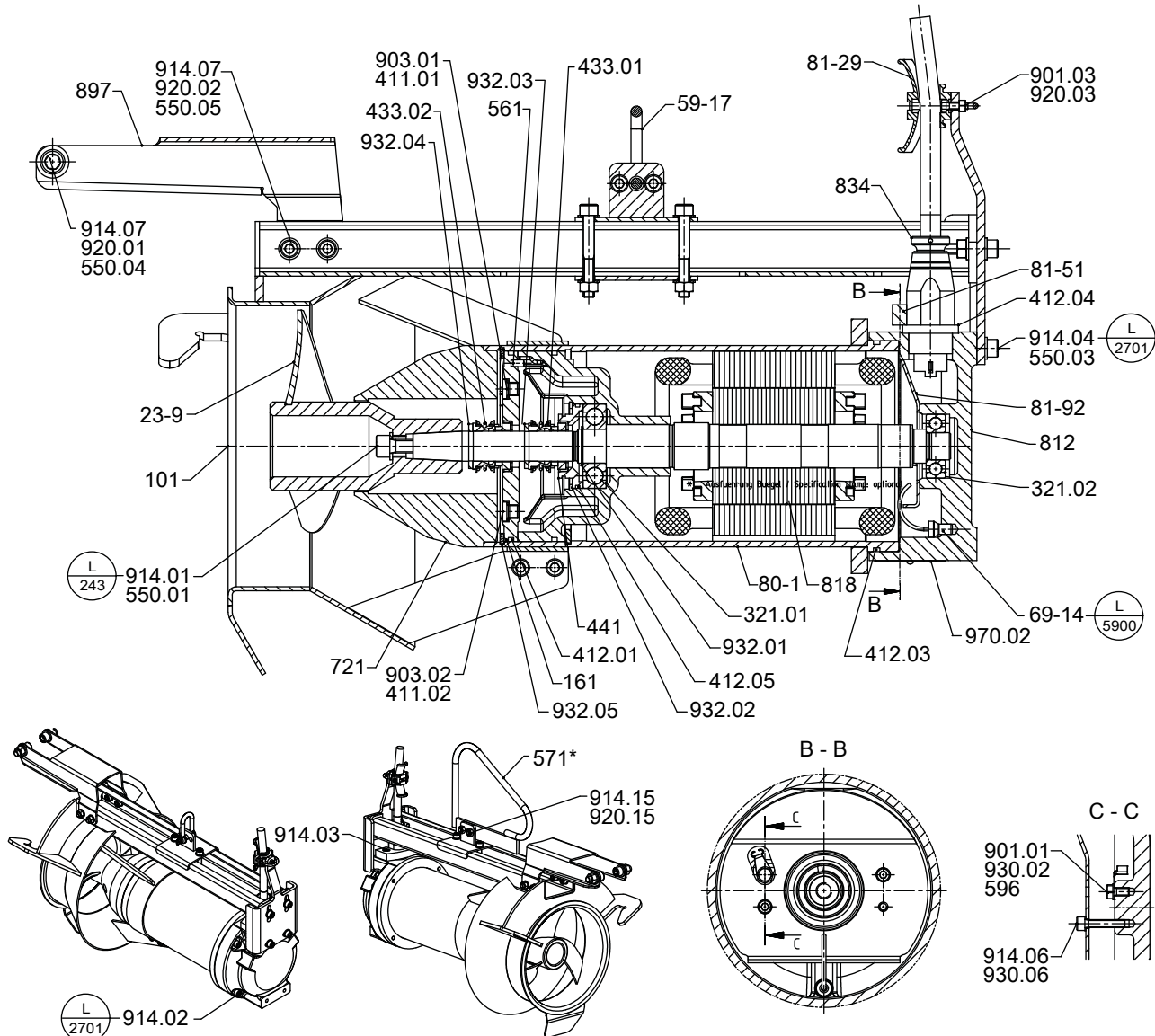


Fig. 44: General assembly drawing

*: On specific designs only

Table 23: Key to the symbols

Symbol	Key
	Always secure screwed connections marked with this symbol with Loctite 243 .
	Always secure screwed connections marked with this symbol with Loctite 2701 .
	Always secure screwed connections marked with this symbol with Loctite 5900 .

Table 24: List of components

Part No.	Description	Part No.	Description
23-9	Axial propeller	561	Grooved pin
59-17	Shackle	571	Bail (optional)
69-14	Leakage sensor	596	Wire
80-1	Motor unit	721	Adapter
81-29	Terminal	812	Motor housing cover

Part No.	Description	Part No.	Description
81-51	Clamping element	818	Rotor
81-92	Cover plate	834	Cable gland
101	Pump casing	897	Guide piece
161	Casing cover	901.01/03	Hexagon head bolt
321.01/02	Radial ball bearing	903.01/02	Screw plug
411.01/02	Joint ring	914.01/02/03/04/05/ .06/07/15	Hexagon socket head cap screw
412.01/02/03/04/05	Shaft seal ring	920.01/02/03/15	Nut
433.01/02	Mechanical seal	930.02/06	Safety device
441	Shaft seal housing	932.01/02/03/04/05	Circlip
550.01/03/04/05	Disc	970.02	Label/plate

9.1.3 Amaline 300 (motors: 0 6, 2 6; motor housing made of gray cast iron)

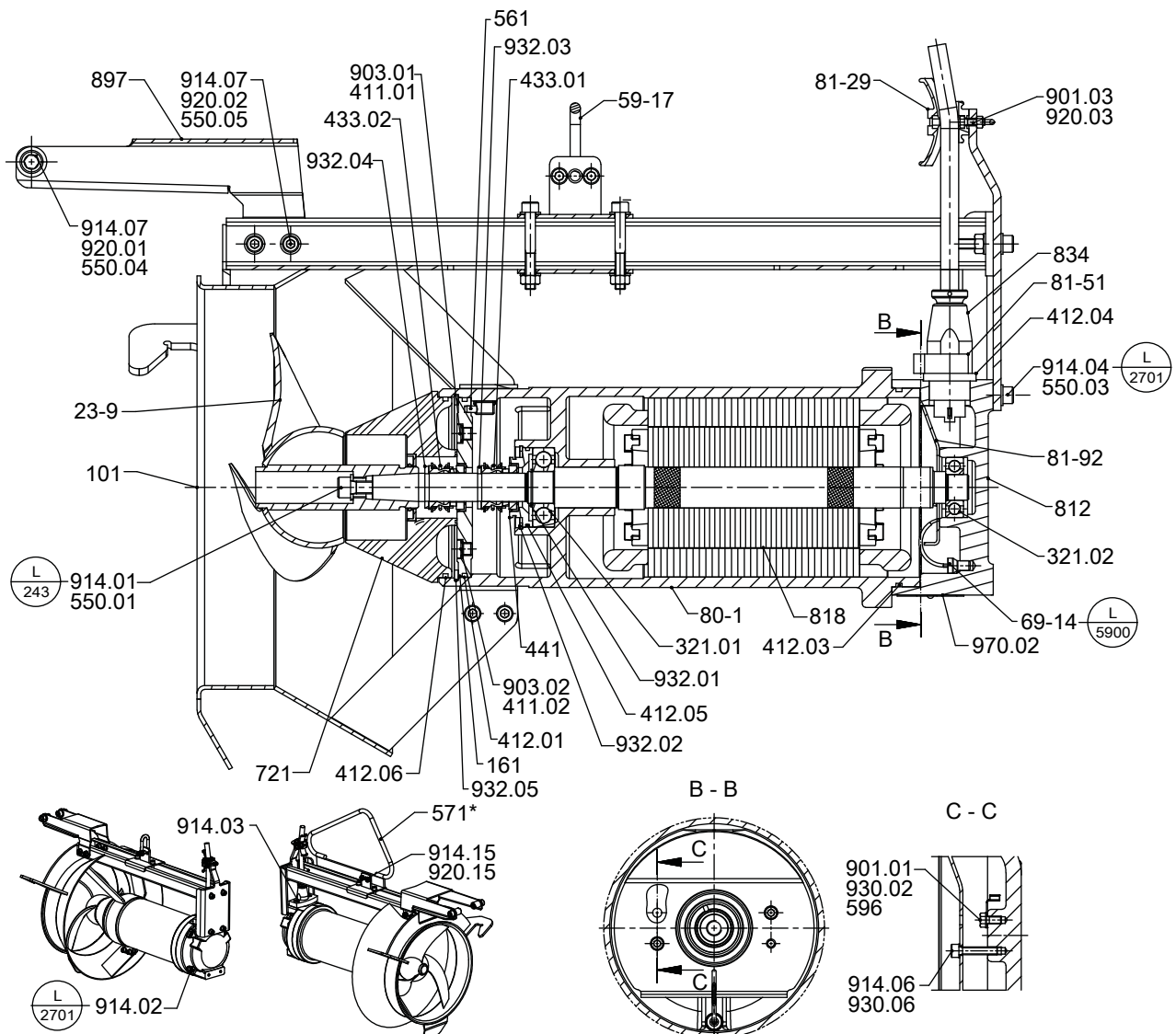


Fig. 45: General assembly drawing: a) with shackle b) with bail (optional)

*: On specific designs only

Table 25: Key to the symbols




Symbol	Key
	Always secure screwed connections marked with this symbol with Loctite 243 .
	Always secure screwed connections marked with this symbol with Loctite 2701 .
	Always secure screwed connections marked with this symbol with Loctite 5900 .

Table 26: List of components

Part No.	Description	Part No.	Description
23-9	Axial propeller	561	Grooved pin
59-17	Shackle	571	Bail (optional)
69-14	Leakage sensor	596	Wire
80-1	Motor unit	721	Adapter
81-29	Terminal	812	Motor housing cover
81-51	Clamping element	818	Rotor
81-92	Cover plate	834	Cable gland
101	Pump casing	897	Guide piece
161	Casing cover	901.01/.03	Hexagon head bolt
321.01/.02	Radial ball bearing	903.02	Screw plug
411.01/.02	Joint ring	914.01/.02/.03/.04/.05/.06/.07/.15	Hexagon socket head cap screw
412.01/.03/.04/.05/.06/.07	O-ring	920.01/.02/.03/.15	Nut
433.01/.02	Mechanical seal	930.02/.06	Safety device
441	Shaft seal housing	932.01/.02/.03/.04/.05	Circlip
550.01/.03/.04/.05	Disc	970.02	Label/plate

9.1.4 Amaline 300 (motors: 0 6, 2 6; motor housing made of stainless steel)

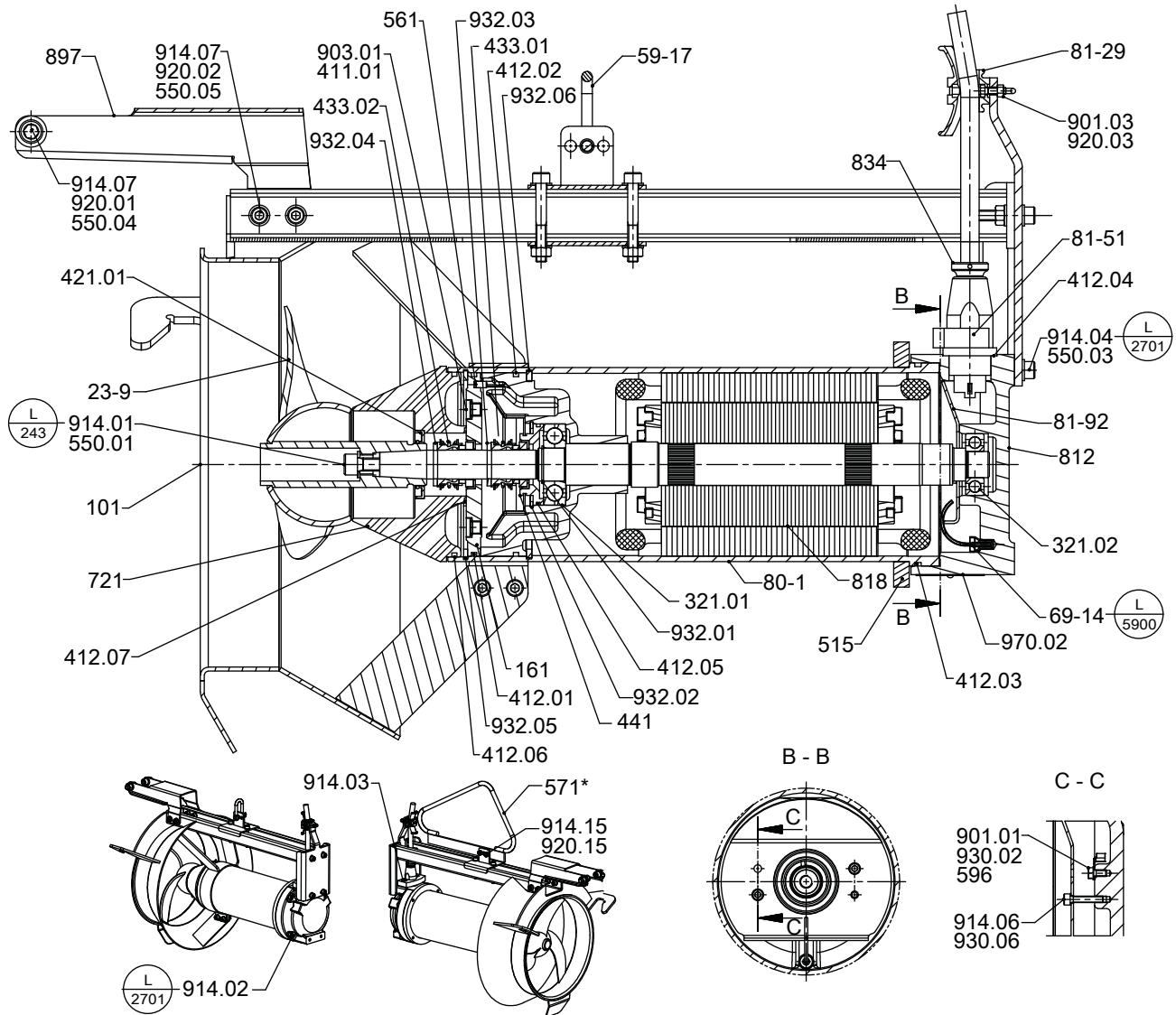


Fig. 46: General assembly drawing: a) with shackle b) with bail (optional)

*: On specific designs only

Table 27: Key to the symbols

Symbol	Key
	Always secure screwed connections marked with this symbol with Loctite 243 .
	Always secure screwed connections marked with this symbol with Loctite 2701 .
	Always secure screwed connections marked with this symbol with Loctite 5900 .

Table 28: List of components

Part No.	Description	Part No.	Description
23-9	Axial propeller	550.01/.03/.04/.05	Disc
59-17	Shackle	561	Grooved pin
69-14	Leakage sensor	571	Bail (optional)
80-1	Motor unit	596	Wire
81-29	Terminal	721	Adapter
81-51	Stator	812	Motor housing cover

Part No.	Description	Part No.	Description
81-92	Cover plate	818	Rotor
101	Pump casing	834	Cable gland
161	Casing cover	897	Guide piece
321.01/.02	Radial ball bearing	901.01/.03	Hexagon head bolt
411.01	Joint ring	903.01	Screw plug
412.01/.02/.03/.04/.05/.06 /.07	O-ring	914.01/.02/.03/.04/ .06/.07/.15	Hexagon socket head cap screw
421.01	Lip seal	920.01/.02/.03/.15	Nut
433.01/.02	Mechanical seal	930.02/.06	Safety device
441	Shaft seal housing	932.01/.02/.03/.04/.05/.06	Circlip
515	Locking ring	970.02	Label/plate

9.1.5 Amaline 300 (motors: 8 6; motor housing made of gray cast iron)

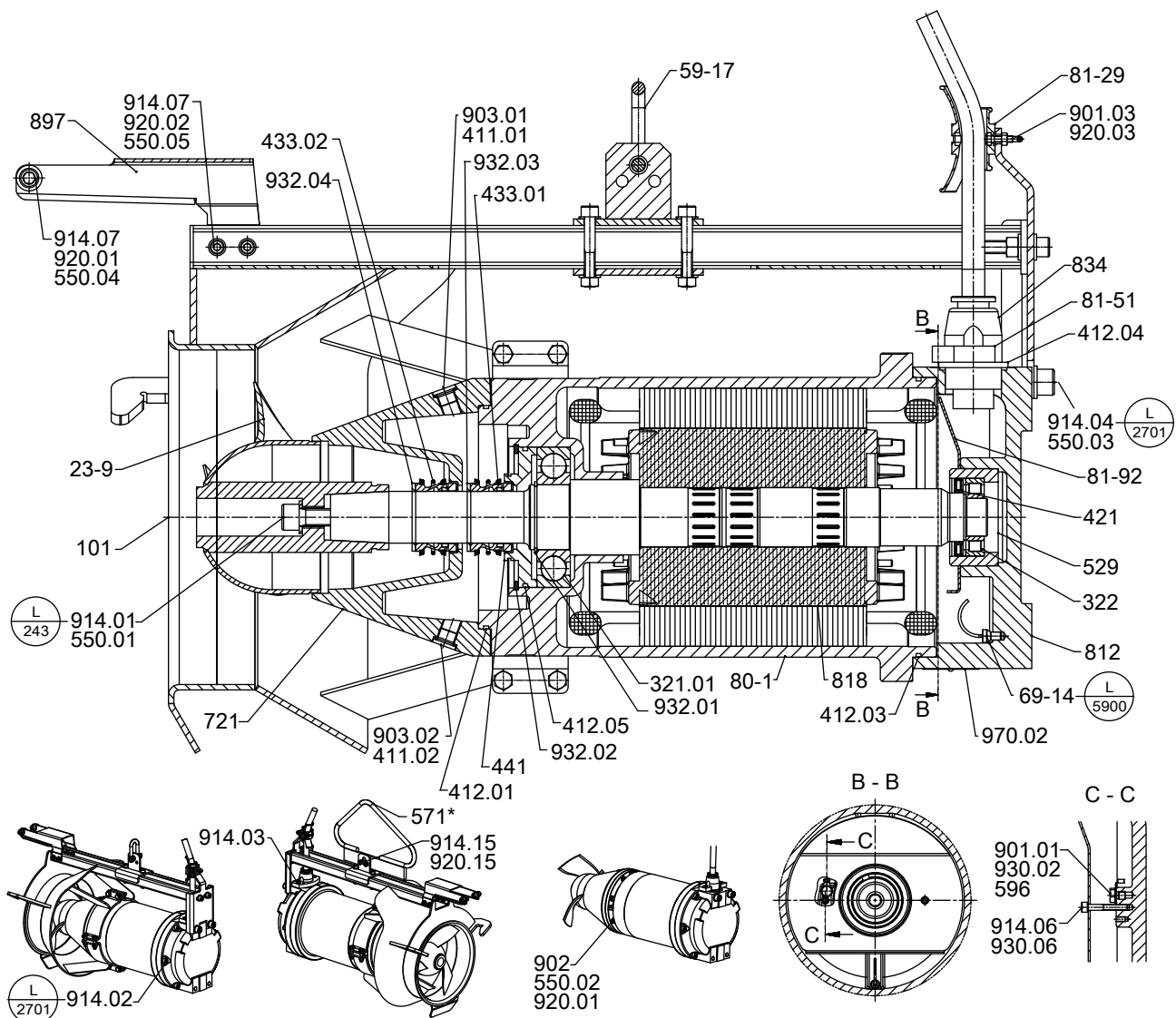


Fig. 47: General assembly drawing: a) with shackle b) with bail (optional)

*: On specific designs only

Table 29: Key to the symbols




Symbol	Key
	Always secure screwed connections marked with this symbol with Loctite 243 .
	Always secure screwed connections marked with this symbol with Loctite 2701 .
	Always secure screwed connections marked with this symbol with Loctite 5900 .

Table 30: List of components

Part No.	Description	Part No.	Description
23-9	Axial propeller	550.01/.02/.03/.04/.05	Disc
59-17	Shackle	571	Bail (optional)
69-14	Leakage sensor	596	Wire
80-1	Motor unit	721	Adapter
81-29	Terminal	812	Motor housing cover
81-51	Clamping element	818	Rotor
81-92	Cover plate	834	Cable gland
101	Pump casing	897	Guide piece
321.01	Radial ball bearing	901.01/.03	Hexagon head bolt
322	Radial roller bearing	902	Stud
411.01/.02	Joint ring	903.01/.02	Screw plug
412.01/.03/.04/.05	O-ring	914.01/.02/.03/.04/.06/.07/.15	Hexagon socket head cap screw
421	Lip seal	920.01/.02/.03/.15	Nut
433.01/.02	Mechanical seal	930.02/.06	Safety device
441	Shaft seal housing	932.01/.02/.03/.04	Circlip
529	Bearing sleeve	970.02	Label/plate

9.1.6 Amaline 400 (motors: 3 8, 4 8; motor housing made of gray cast iron)

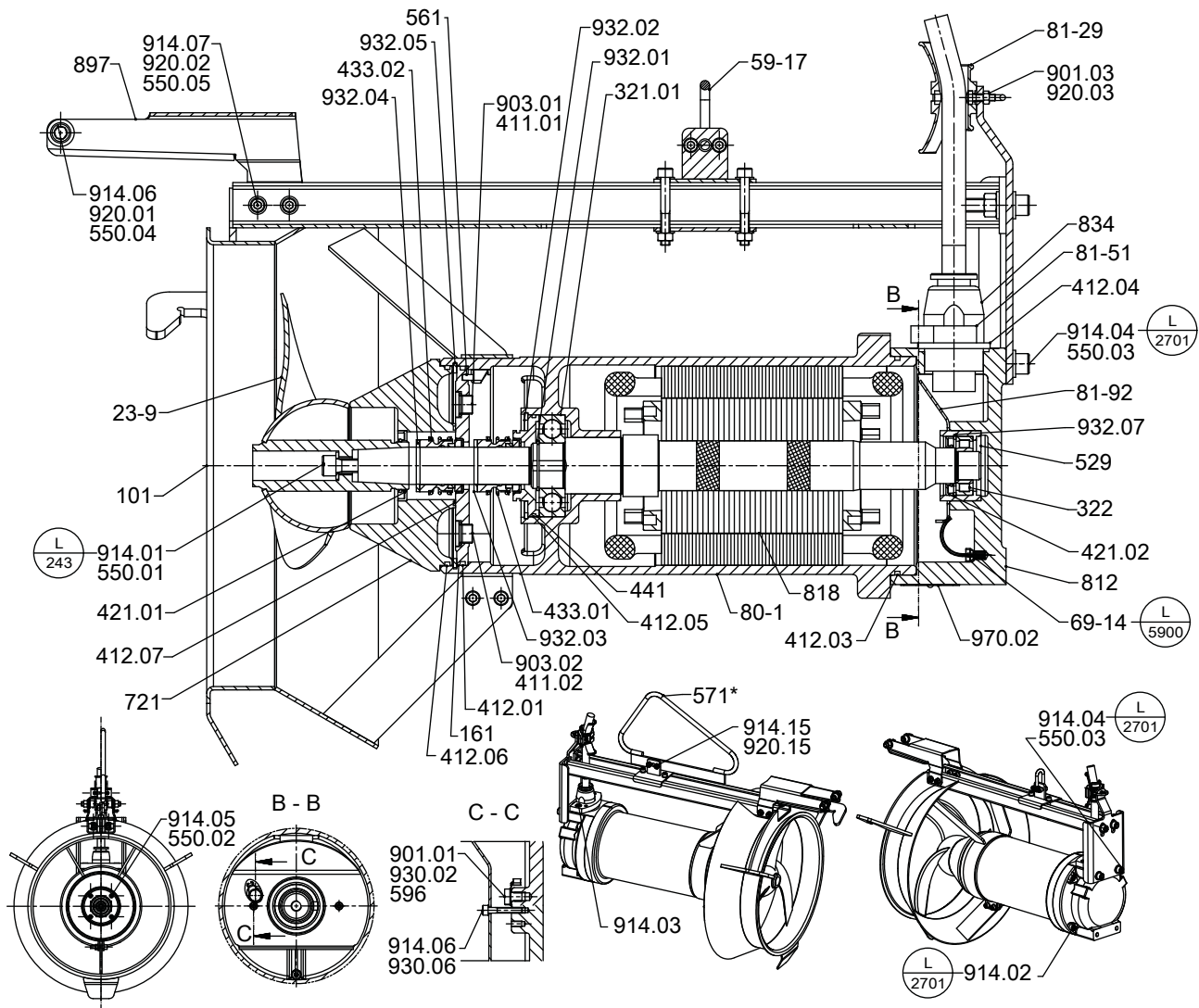


Fig. 48: General assembly drawing: a) with shackle b) with bail (optional)

*: On specific designs only

Table 31: Key to the symbols

Symbol	Key
	Always secure screwed connections marked with this symbol with Loctite 243 .
	Always secure screwed connections marked with this symbol with Loctite 2701 .
	Always secure screwed connections marked with this symbol with Loctite 5900 .

Table 32: List of components

Part No.	Description	Part No.	Description
23-9	Axial propeller	550.01/.02/.03/.04/.05	Disc
59-17	Shackle	561	Grooved pin
69-14	Leakage sensor	571	Bail (optional)
80-1	Motor unit	596	Wire
81-29	Terminal	721	Adapter
81-51	Clamping element	812	Motor housing cover

Part No.	Description	Part No.	Description
81-92	Cover plate	818	Rotor
101	Pump casing	834	Cable gland
161	Casing cover	897	Guide piece
321.01	Radial ball bearing	901.01/03	Hexagon head bolt
322	Radial roller bearing	903.01/02	Screw plug
411.01	Joint ring	914.01/02/03/04/05/06/07/15	Hexagon socket head cap screw
412.01/03/04/05/06/07	O-ring	920.01/02/03/15	Nut
421.01/02	Lip seal	930.02/06	Safety device
433.01/02	Mechanical seal	932.01/02/03/04/05/07	Circlip
441	Shaft seal housing	970.02	Label/plate
529	Bearing sleeve		

9.1.7 Amaline 400 (motors: 3 8, 4 8; motor housing made of stainless steel)

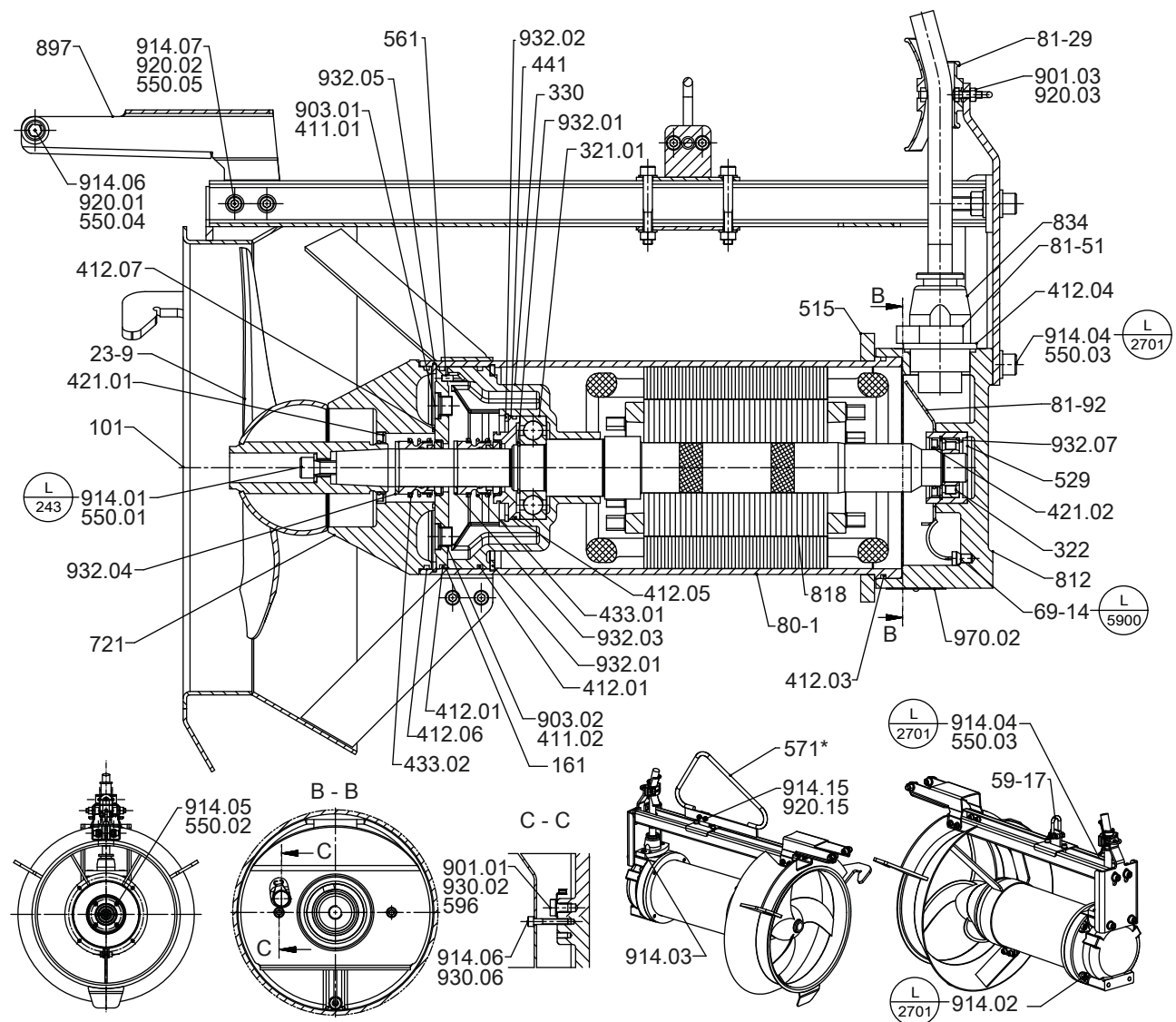


Fig. 49: General assembly drawing: a) with shackle b) with bail (optional)

*: On specific designs only

Table 33: Key to the symbols




Symbol	Key
	Always secure screwed connections marked with this symbol with Loctite 243 .
	Always secure screwed connections marked with this symbol with Loctite 2701 .
	Always secure screwed connections marked with this symbol with Loctite 5900 .

Table 34: List of components

Part No.	Description	Part No.	Description
23-9	Axial propeller	529	Bearing sleeve
59-17	Shackle	550.01/.02/.03/.04/.05	Disc
69-14	Leakage sensor	561	Grooved pin
80-1	Motor unit	571	Bail (optional)
81-29	Terminal	596	Wire
81-51	Clamping element	721	Adapter
81-92	Cover plate	812	Motor housing cover
101	Pump casing	818	Rotor
161	Casing cover	834	Cable gland
321.01	Radial ball bearing	897	Guide piece
322	Radial roller bearing	901.01/.03	Hexagon head bolt
330	Bearing bracket	903.01	Screw plug
411.01/.02	Joint ring	914.01/.02/.03/.04/.05/.06/.07/.15	Hexagon socket head cap screw
412.01/.03/.04/.05/.06/.07	O-ring	920.01/.02/.03/.15	Nut
421.01/.02	Lip seal	930.02	Safety device
433.01/.02	Mechanical seal	932.01/.02/.03/.04/.05/.06/.07	Circlip
441	Shaft seal housing	970.02	Label/plate
515	Locking ring		

9.1.8 Amaline 500/600/800 (motors: 17 2, 25 2, 4 4, 6 4, 11 4, 16 4, 23 4, 30 4; motor housing made of gray cast iron)

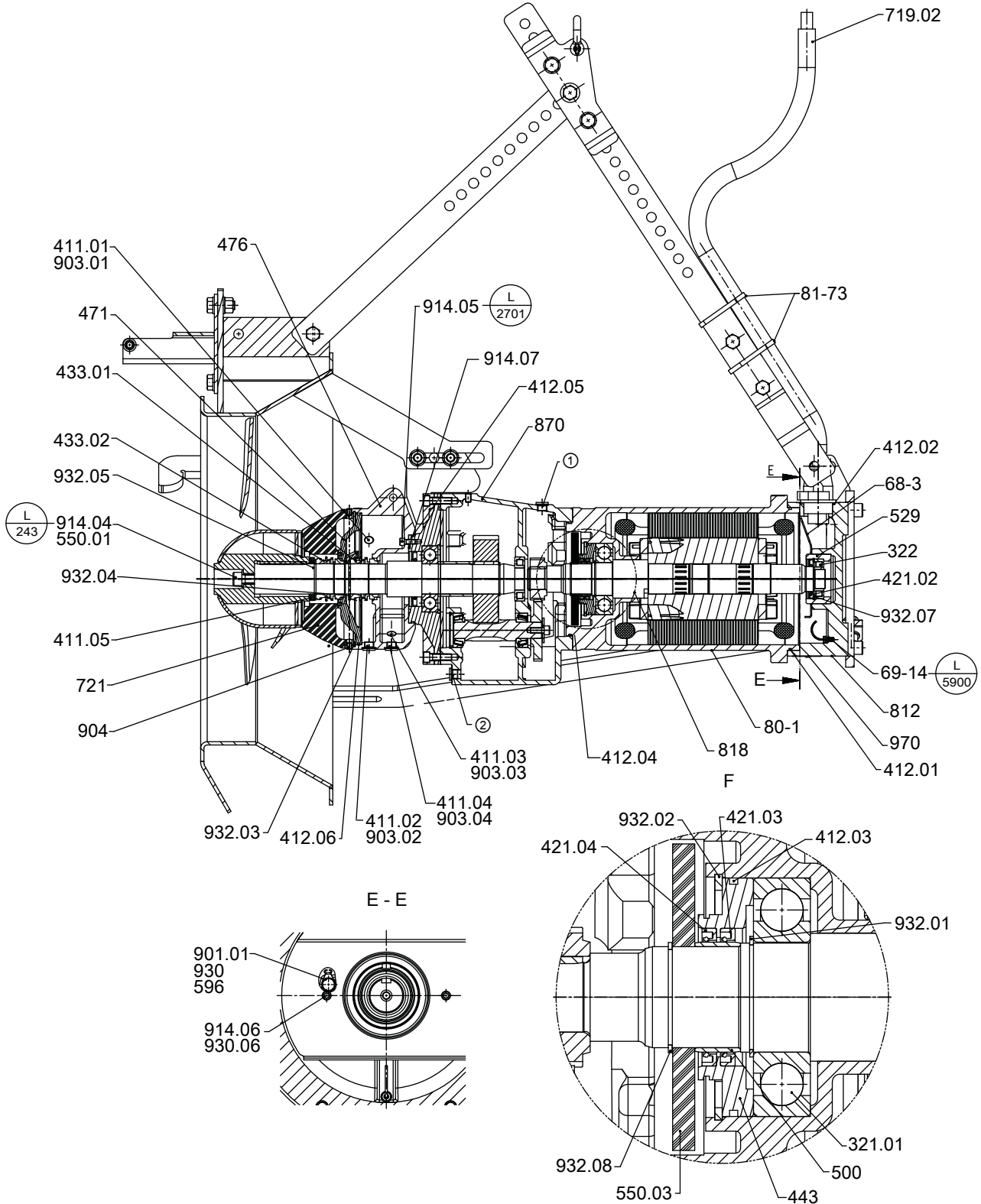


Fig. 50: General assembly drawing

①	Oil filler plug
②	Oil drain plug

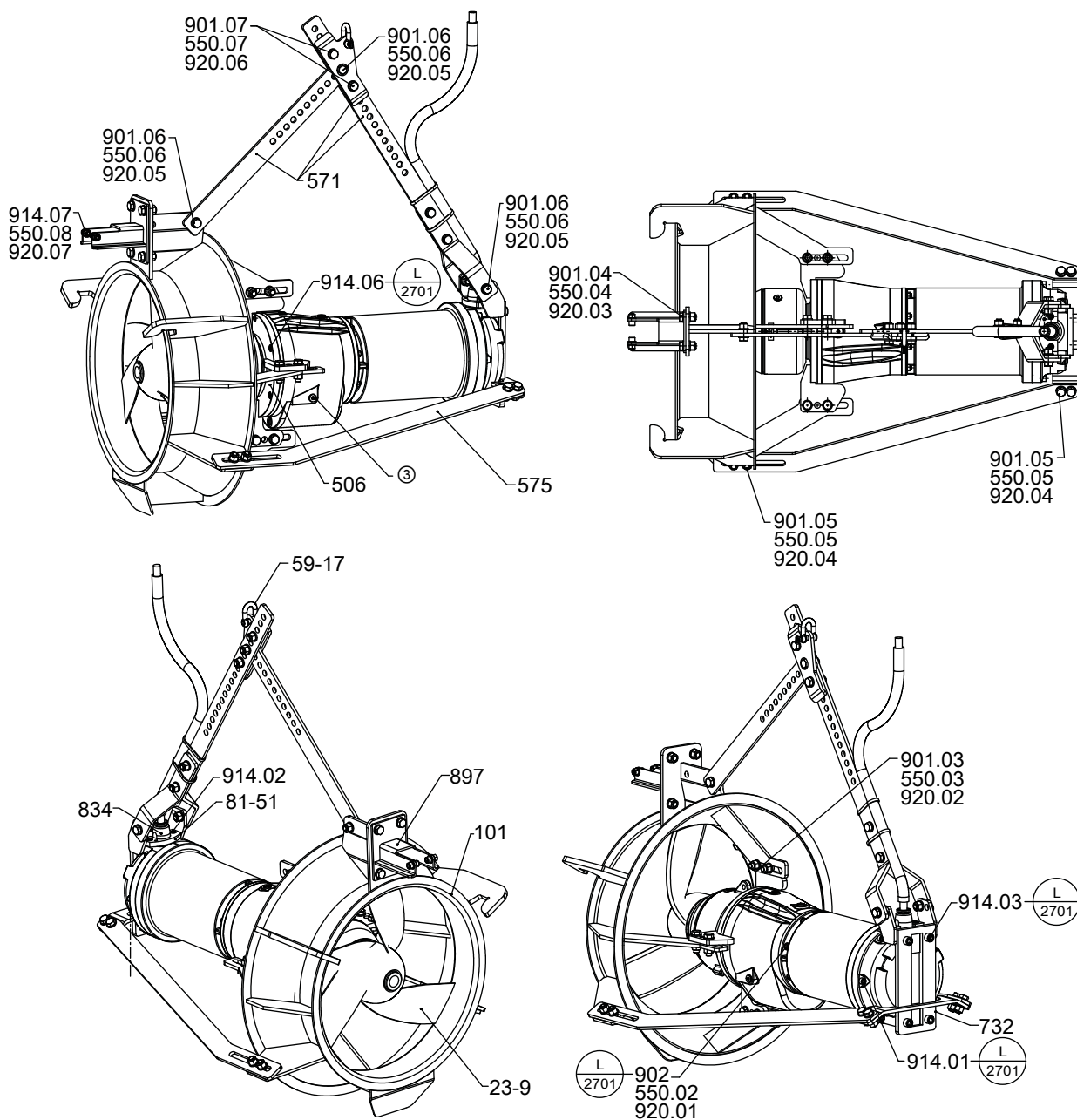


Fig. 51: Views

③	Oil check plug
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Table 35: Key to the symbols

Symbol	Key
	Always secure screwed connections marked with this symbol with Loctite 243 .
	Always secure screwed connections marked with this symbol with Loctite 2701 .
	Always secure screwed connections marked with this symbol with Loctite 5900 .

Table 36: List of components

Part No.	Description	Part No.	Description
23-9	Axial propeller	571	Bail
59-17	Shackle	575	Strip

Part No.	Description	Part No.	Description
68-3	Cover plate	596	Wire
69-14	Leakage sensor	719.02	Flexible tube
80-1	Motor unit	721 ⁷⁾	Adapter
81-51	Clamping element	732	Holder
81-73	Cable support	812	Motor housing cover
101	Pump casing	818	Rotor
321.01	Radial ball bearing	834	Cable gland
322	Radial roller bearing	870	Gear unit
411.01/.02/.03/.04/.05	Joint ring	897	Guide piece
412.01/.02/.03/.04/.05/.06	O-ring	901.01/.03/.04/.05/.06/.07	Hexagon head bolt
421.02/.03/.04	Lip seal	902	Stud
433.01/.02	Mechanical seal	903.01/.02/.03/.04	Screw plug
443	Seal insert	904	Grub screw
471	Seal cover	914.01/.02/.03/.04/.05/.06/.07	Hexagon socket head cap screw
476	Mating ring carrier	920.01/.02/.03/.04/.05/.06/.07	Nut
500	Ring	930/.06	Safety device
506	Retaining ring	932.01/.02/.03/.04/.05/.07/.08	Circlip
529	Bearing sleeve	970/970.02	Label/plate
550.01/.02/.03/.04/.05/.06/.07/.08	Disc		

9.2 Flamepaths on explosion-proof motors

9.2.1 Amaline 200, 300, 400 (motor housing made of stainless steel)

Motors: 1 4, 2 4, 0 6, 2 6, 3 8, 4 8

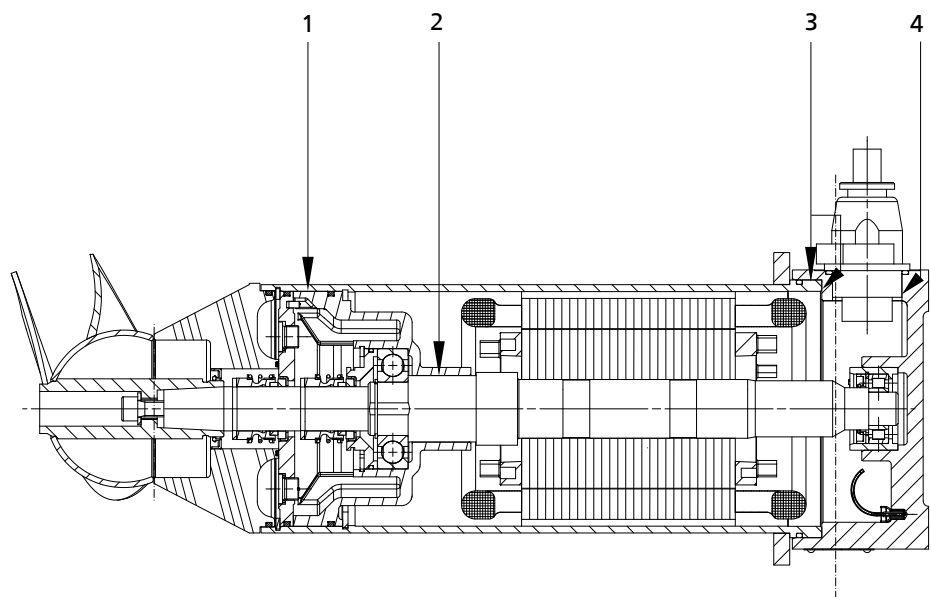


Fig. 52: Flamepaths

7) For Amaline 500/600 only

9.2.2 Amaline 200, 300, 400 (motor housing made of gray cast iron)

Motors: 1 4, 2 4, 0 6, 2 6, 3 8, 4 8

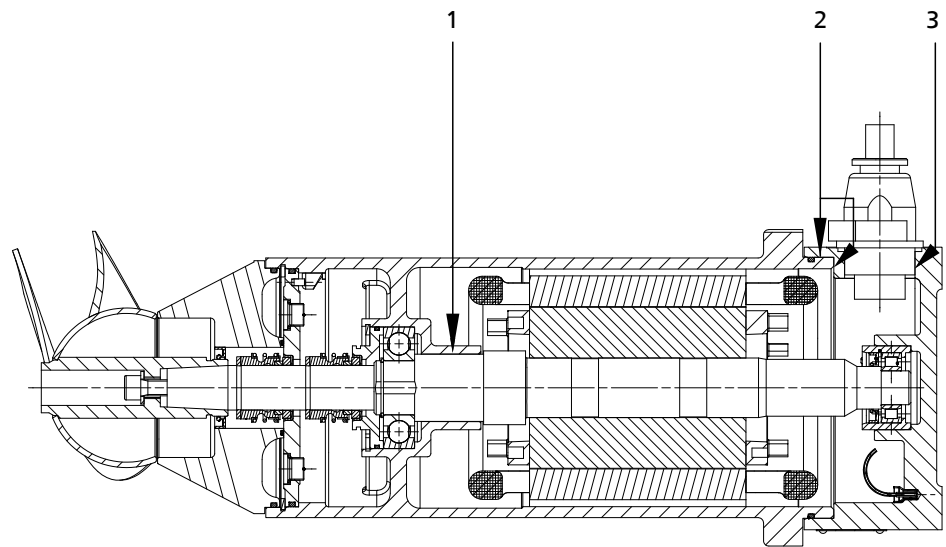


Fig. 53: Flamepaths

9.2.3 Amaline 300 with motor 8 6 (motor housing made of gray cast iron)

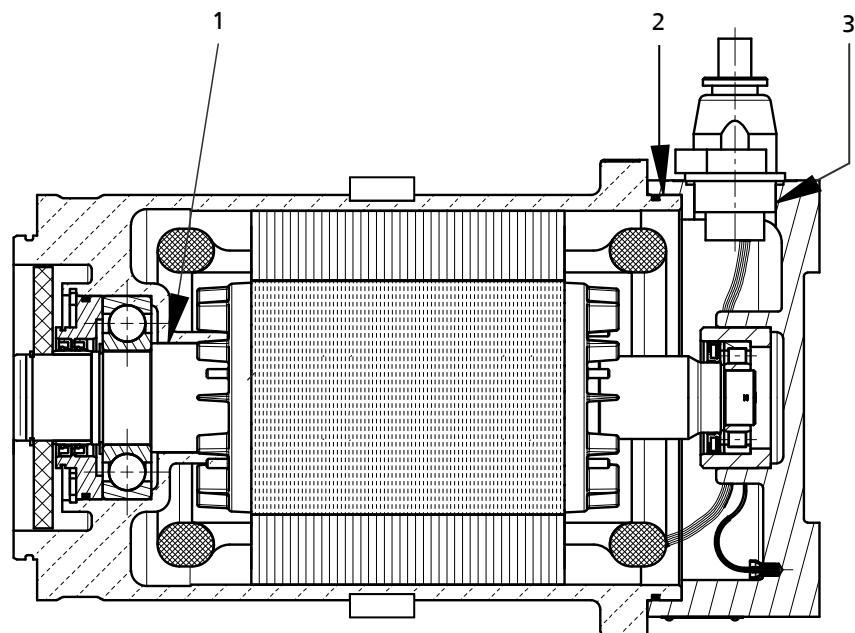


Fig. 54: Flamepaths

9.2.4 Amaline 500, 600, 800 (motor housing made of gray cast iron)

Motors: 17 2, 25 2, 6 4, 11 4, 16 4, 23 4, 30 4

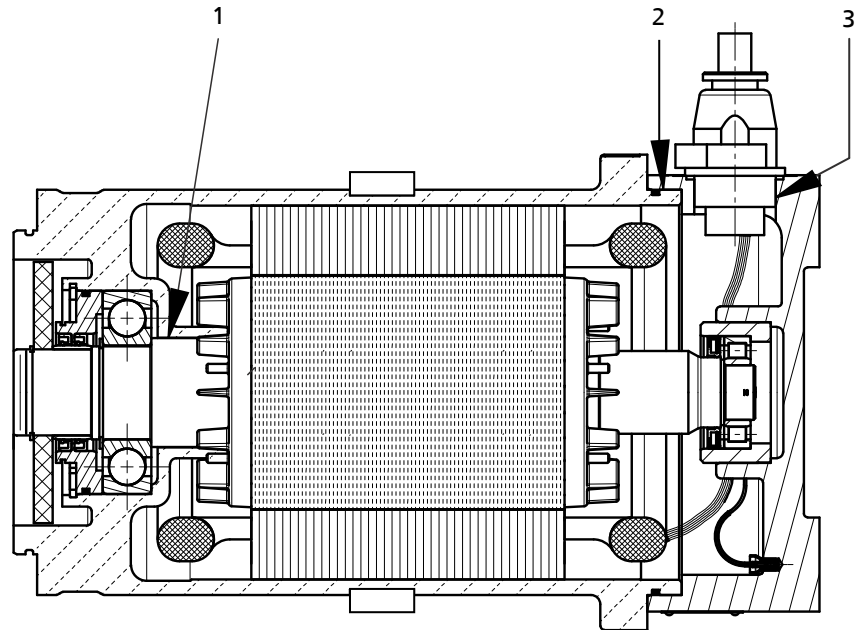


Fig. 55: Flamepaths

9.2.5 Amaline 500, 600, 800 (motor housing made of gray cast iron)

Motor: 4 4

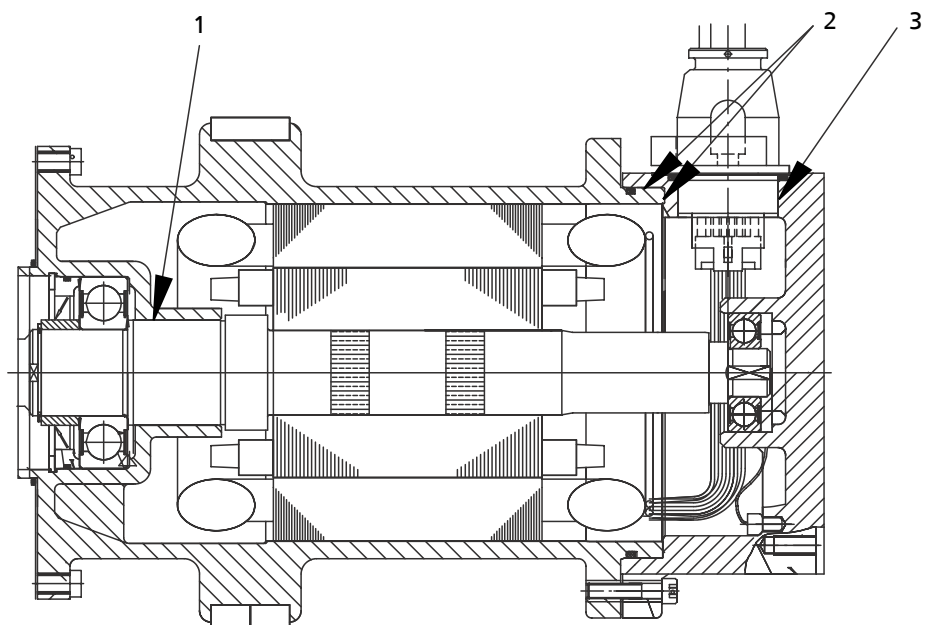


Fig. 56: Flamepaths

9.3 Wiring diagrams

9.3.1 Amaline 200, Amaline 300 with motor 0 6 or 2 6

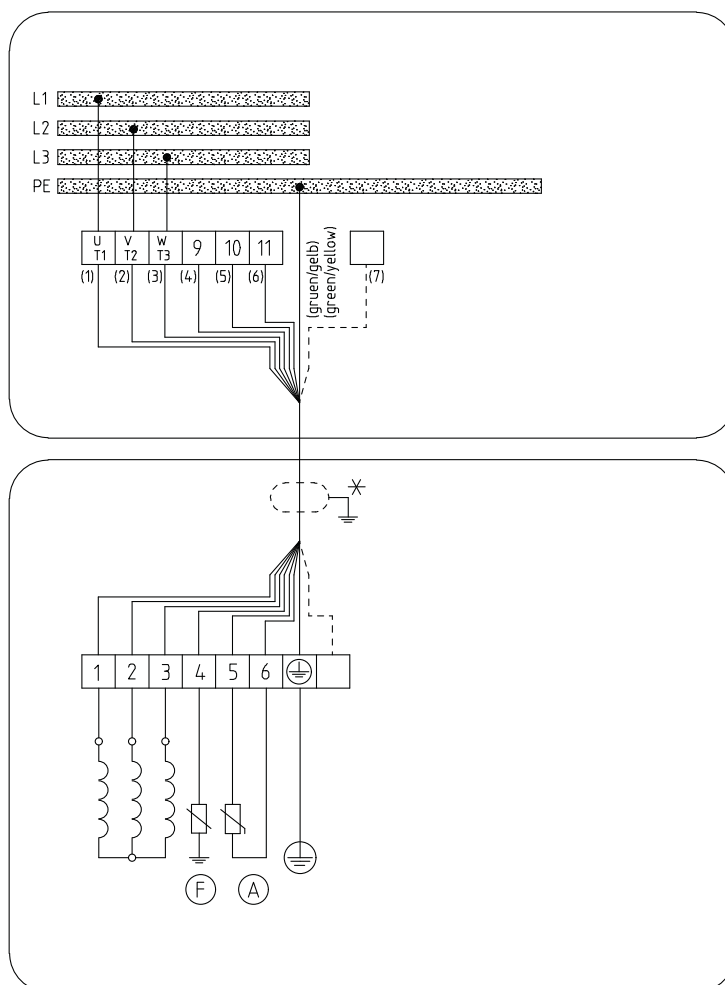


Fig. 57: Wiring diagram for Amaline 200, Amaline 300 with motor 0 6 or 2 6

*	Shielded cable, optional
Ⓐ	Motor temperature (PTC)
Ⓕ	Leakage inside the motor

9.3.2 Amaline 300 with motor 8 6, Amaline 400

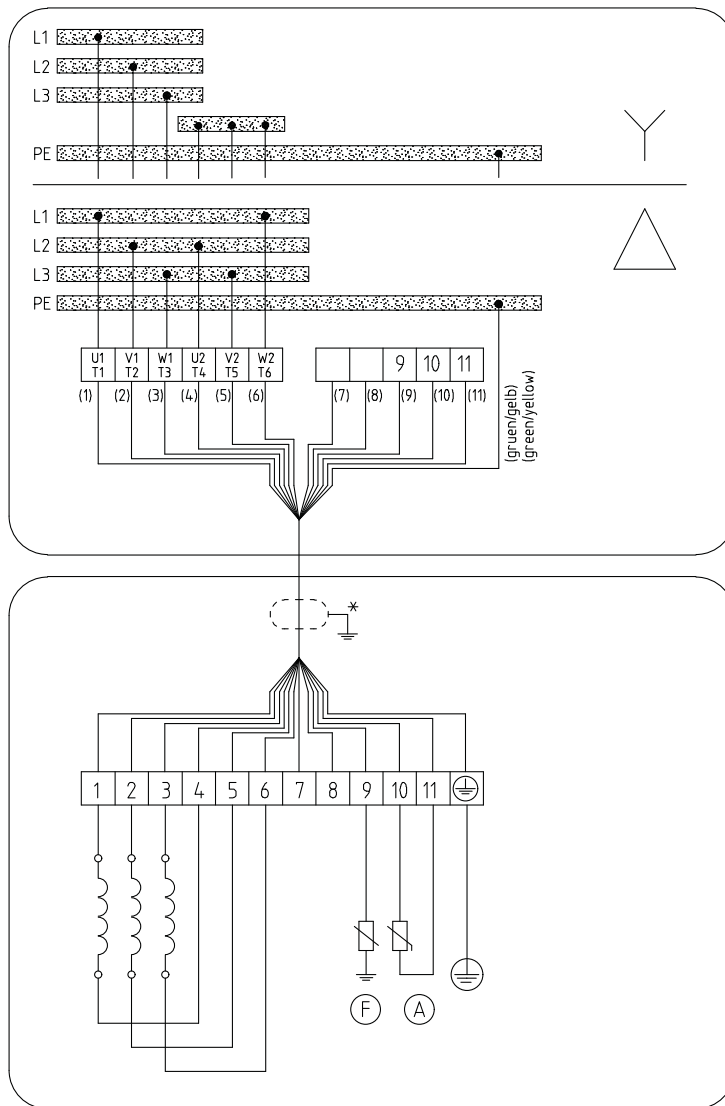


Fig. 58: Wiring diagram for power cables 12G 1.5 and 12G 2.5

*	Shielded cable, optional
Ⓐ	Motor temperature (PTC)
Ⓕ	Leakage inside the motor

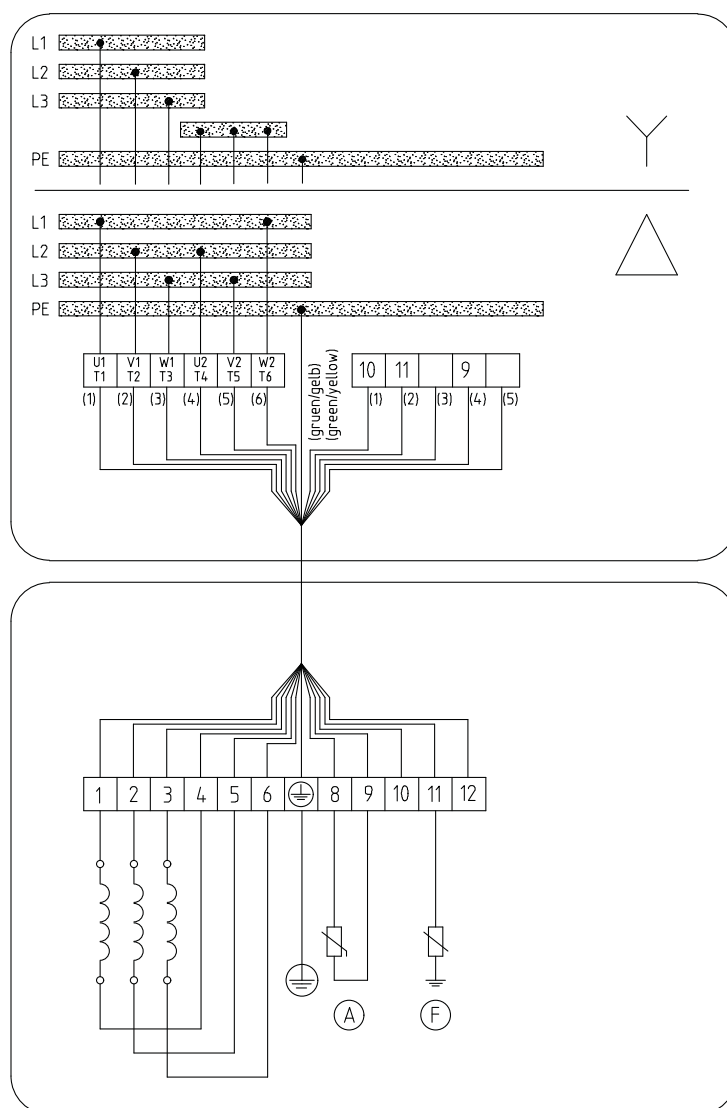


Fig. 59: Wiring diagram for power cables 7G4 + 5x1.5, 7G6 5 x 1.5 and 7G10 5 x 1.5

Ⓐ	Motor temperature (PTC)
Ⓔ	Leakage inside the motor

9.3.3 Amaline 500, 600, 800

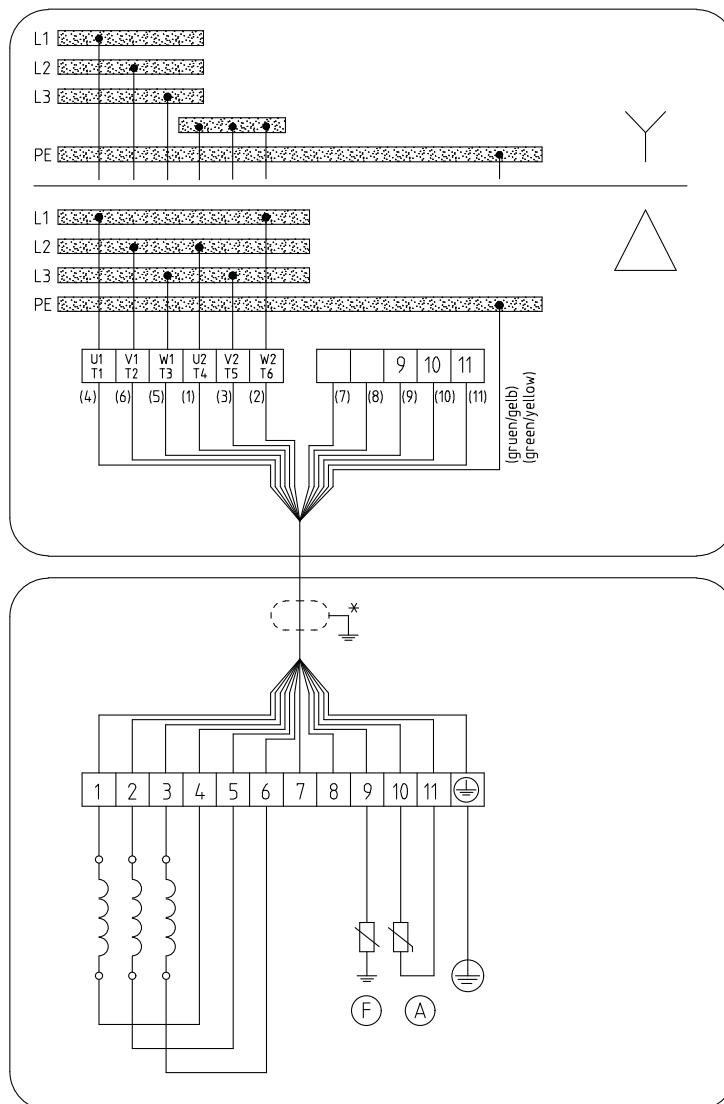


Fig. 60: Wiring diagram for Amaline 500, 600, 800 with electric cables 12G 1.5 and 12G 2.5

*	Shielded cable, optional
(A)	Motor temperature (PTC)
(F)	Leakage inside the motor

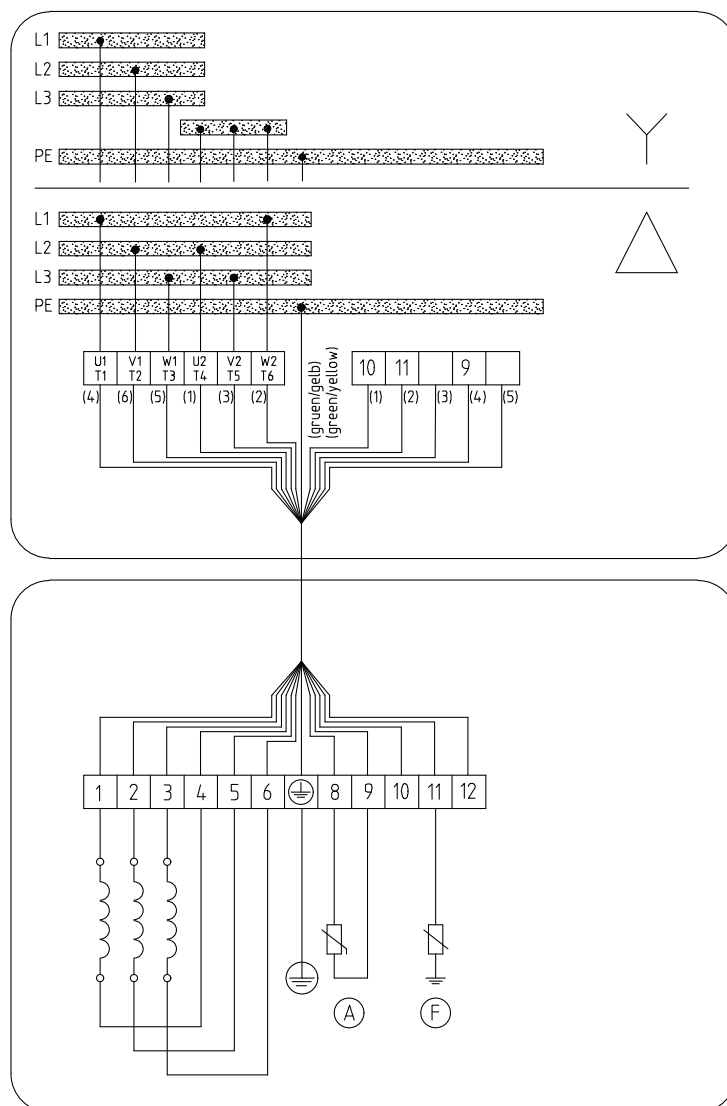


Fig. 61: Wiring diagram for Amaline 500, 600, 800 with electric cables 7G4 + 5x1.5, 7G6 5x1.5 and 7G10 5x1.5

Ⓐ	Motor temperature (PTC)
Ⓔ	Leakage inside the motor

9.4 Forcing screws

Table 37: Forcing screws

Amaline	Forcing screw	
200	$\frac{5}{8} \times 2 \frac{3}{8}$ [M16 x 60]	
300, motors: 0 6, 2 6		
400		
300, motor: 8 6	$\frac{13}{16} \times 3 \frac{3}{4}$ [M20 x 95]	
600		
800		

9.5 Dimensions

9.5.1 Amaline 200, 300, 400; motor housing made of gray cast iron

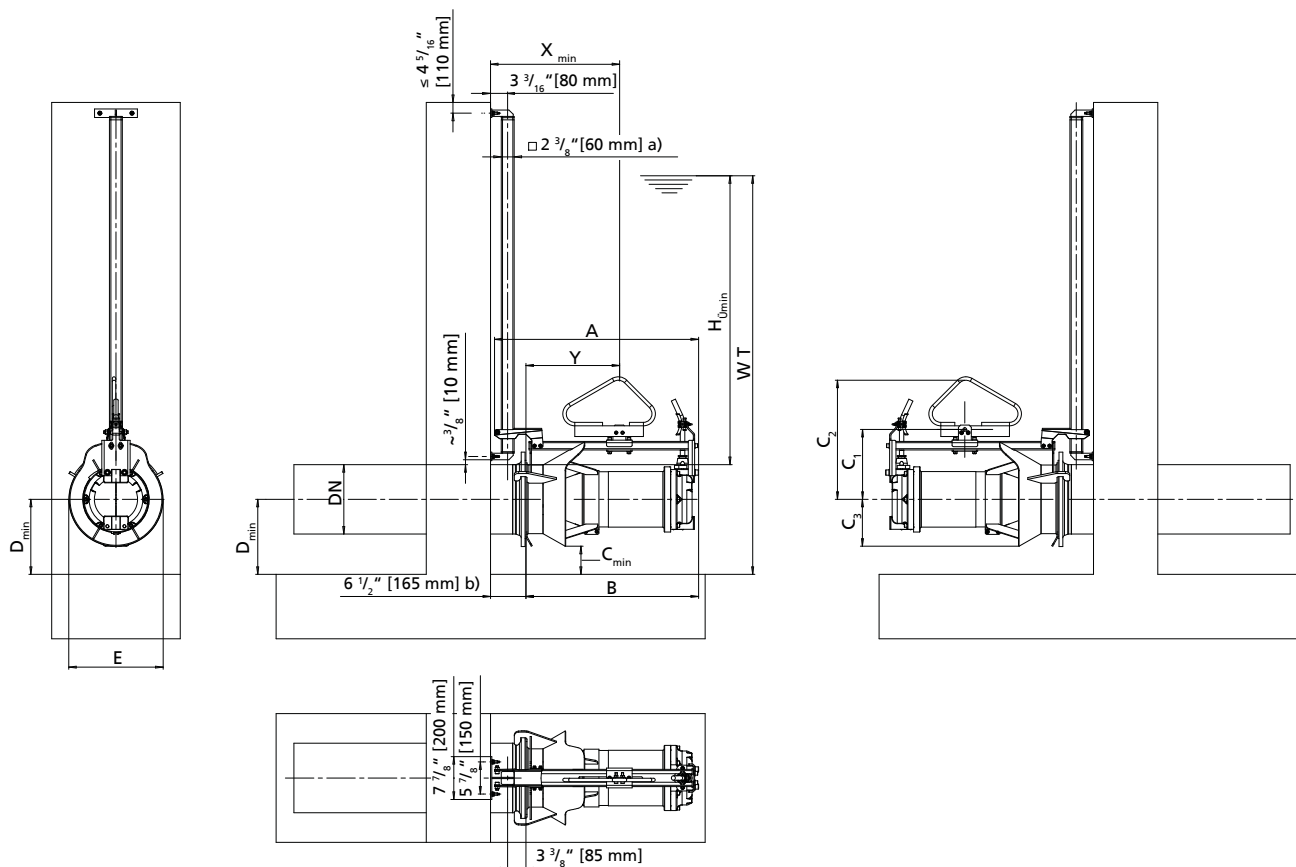


Fig. 62: Dimensions of an Amaline 200, 300, 400; motor housing made of gray cast iron

a)	For the US market: $\square 2''$ [50 mm]
b)	Minimum

The tolerances of the connection pipe (flange diameter and flange thickness) must be observed to ensure smooth functioning. If required, the flanges must be reworked prior to installation.

Table 38: Dimensions ["]

Size	DN	A	B	C_{min}	C_1	C_2	C_3	D_{min}	E	H_{min}	W_T	X_{min}	Y	[lbs]
Amaline 200														
2021-1750/14	8	$27 \frac{15}{16}$	$23 \frac{3}{8}$	$4 \frac{7}{16}$	$7 \frac{5}{8}$	$14 \frac{5}{16}$	$6 \frac{5}{8}$	11	$13 \frac{1}{16}$	$15 \frac{3}{4}$	$30 \frac{11}{16}$	$18 \frac{5}{16}$	$11 \frac{13}{16}$	100
2021-1750/24	8	$27 \frac{15}{16}$	$23 \frac{3}{8}$	$4 \frac{7}{16}$	$7 \frac{5}{8}$	$14 \frac{5}{16}$	$6 \frac{5}{8}$	11	$13 \frac{1}{16}$	$15 \frac{3}{4}$	$30 \frac{11}{16}$	$18 \frac{1}{2}$	12	103
2022-1750/24	8	$27 \frac{15}{16}$	$23 \frac{3}{8}$	$4 \frac{7}{16}$	$7 \frac{5}{8}$	$14 \frac{5}{16}$	$6 \frac{5}{8}$	11	$13 \frac{1}{16}$	$15 \frac{3}{4}$	$30 \frac{11}{16}$	$18 \frac{1}{2}$	12	103
2034-1750/24	8	$27 \frac{15}{16}$	$23 \frac{3}{8}$	$4 \frac{7}{16}$	$7 \frac{5}{8}$	$14 \frac{5}{16}$	$6 \frac{5}{8}$	11	$13 \frac{1}{16}$	$15 \frac{3}{4}$	$30 \frac{11}{16}$	$18 \frac{1}{2}$	12	103
2035-1750/24	8	$27 \frac{15}{16}$	$23 \frac{3}{8}$	$4 \frac{7}{16}$	$7 \frac{5}{8}$	$14 \frac{5}{16}$	$6 \frac{5}{8}$	11	$13 \frac{1}{16}$	$15 \frac{3}{4}$	$30 \frac{11}{16}$	$18 \frac{1}{2}$	12	103
Amaline 300														
3021-1160/06	12	$30 \frac{5}{8}$	$25 \frac{1}{16}$	$5 \frac{1}{8}$	$9 \frac{9}{16}$	$16 \frac{1}{4}$	$8 \frac{11}{16}$	$13 \frac{3}{4}$	$17 \frac{3}{16}$	$19 \frac{11}{16}$	$39 \frac{3}{8}$	$21 \frac{7}{16}$	$14 \frac{15}{16}$	129
3021-1160/26	12	$30 \frac{5}{8}$	$25 \frac{1}{16}$	$5 \frac{1}{8}$	$9 \frac{9}{16}$	$16 \frac{1}{4}$	$8 \frac{11}{16}$	$13 \frac{3}{4}$	$17 \frac{3}{16}$	$19 \frac{11}{16}$	$39 \frac{3}{8}$	$21 \frac{7}{16}$	$14 \frac{15}{16}$	129
3022-1160/06	12	$30 \frac{5}{8}$	$25 \frac{1}{16}$	$5 \frac{1}{8}$	$9 \frac{9}{16}$	$16 \frac{1}{4}$	$8 \frac{11}{16}$	$13 \frac{3}{4}$	$17 \frac{3}{16}$	$19 \frac{11}{16}$	$39 \frac{3}{8}$	$21 \frac{7}{16}$	$14 \frac{15}{16}$	129
3022-1160/26	12	$30 \frac{5}{8}$	$25 \frac{1}{16}$	$5 \frac{1}{8}$	$9 \frac{9}{16}$	$16 \frac{1}{4}$	$8 \frac{11}{16}$	$13 \frac{3}{4}$	$17 \frac{3}{16}$	$19 \frac{11}{16}$	$39 \frac{3}{8}$	$21 \frac{7}{16}$	$14 \frac{15}{16}$	129
3031-1160/06	12	$30 \frac{5}{8}$	$25 \frac{1}{16}$	$5 \frac{1}{8}$	$9 \frac{9}{16}$	$16 \frac{1}{4}$	$8 \frac{11}{16}$	$13 \frac{3}{4}$	$17 \frac{3}{16}$	$19 \frac{11}{16}$	$39 \frac{3}{8}$	$21 \frac{7}{16}$	$14 \frac{15}{16}$	129
3031-1160/26	12	$30 \frac{5}{8}$	$25 \frac{1}{16}$	$5 \frac{1}{8}$	$9 \frac{9}{16}$	$16 \frac{1}{4}$	$8 \frac{11}{16}$	$13 \frac{3}{4}$	$17 \frac{3}{16}$	$19 \frac{11}{16}$	$39 \frac{3}{8}$	$21 \frac{7}{16}$	$14 \frac{15}{16}$	129
3032-1160/26	12	$30 \frac{5}{8}$	$25 \frac{1}{16}$	$5 \frac{1}{8}$	$9 \frac{9}{16}$	$16 \frac{1}{4}$	$8 \frac{11}{16}$	$13 \frac{3}{4}$	$17 \frac{3}{16}$	$19 \frac{11}{16}$	$39 \frac{3}{8}$	$21 \frac{7}{16}$	$14 \frac{15}{16}$	129
3033-1160/26	12	$30 \frac{5}{8}$	$25 \frac{1}{16}$	$5 \frac{1}{8}$	$9 \frac{9}{16}$	$16 \frac{1}{4}$	$8 \frac{11}{16}$	$13 \frac{3}{4}$	$17 \frac{3}{16}$	$19 \frac{11}{16}$	$39 \frac{3}{8}$	$21 \frac{7}{16}$	$14 \frac{15}{16}$	129
3034-1160/86	12	$37 \frac{3}{8}$	$31 \frac{5}{8}$	$5 \frac{1}{8}$	$12 \frac{13}{16}$	$21 \frac{7}{8}$	$8 \frac{11}{16}$	$13 \frac{3}{4}$	$17 \frac{1}{4}$	$19 \frac{11}{16}$	$39 \frac{3}{8}$	$21 \frac{7}{16}$	$14 \frac{15}{16}$	373
3035-1160/86	12	$37 \frac{3}{8}$	$31 \frac{5}{8}$	$5 \frac{1}{8}$	$12 \frac{13}{16}$	$21 \frac{7}{8}$	$8 \frac{11}{16}$	$13 \frac{3}{4}$	$17 \frac{1}{4}$	$19 \frac{11}{16}$	$39 \frac{3}{8}$	$21 \frac{7}{16}$	$14 \frac{15}{16}$	373
3035-1160/126	12	$37 \frac{3}{8}$	$31 \frac{5}{8}$	$5 \frac{1}{8}$	$12 \frac{13}{16}$	$21 \frac{7}{8}$	$8 \frac{11}{16}$	$13 \frac{3}{4}$	$17 \frac{1}{4}$	$19 \frac{11}{16}$	$39 \frac{3}{8}$	$21 \frac{7}{8}$	$15 \frac{3}{8}$	386

Size	DN	A	B	C _{min}	C ₁	C ₂	C ₃	D _{min}	E	Hs _{min}	W _T	X _{min}	Y	[lbs]
3036-1160/86	12	37 ³ / ₈	31 ⁵ / ₈	5 ¹ / ₈	12 ¹³ / ₁₆	21 ⁷ / ₈	8 ¹¹ / ₁₆	13 ³ / ₄	17 ¹ / ₄	19 ¹¹ / ₁₆	39 ³ / ₈	21 ⁷ / ₁₆	14 ¹⁵ / ₁₆	373
3036-1160/126	12	37 ³ / ₈	31 ⁵ / ₈	5 ¹ / ₈	12 ¹³ / ₁₆	21 ⁷ / ₈	8 ¹¹ / ₁₆	13 ³ / ₄	17 ¹ / ₄	19 ¹¹ / ₁₆	39 ³ / ₈	21 ⁷ / ₁₆	15 ³ / ₈	386
Amaline 400														
4021-875/38	16	34 ¹ / ₈	28 ⁹ / ₁₆	5 ⁵ / ₁₆	11 ¹ / ₈	19 ⁵ / ₈	10 ⁷ / ₁₆	15 ³ / ₄	20 ⁵ / ₈	23 ⁵ / ₈	47 ¹ / ₄	23 ¹³ / ₁₆	17 ⁵ / ₁₆	204
4021-875/48	16	34 ¹ / ₈	28 ⁹ / ₁₆	5 ⁵ / ₁₆	11 ¹ / ₈	19 ⁵ / ₈	10 ⁷ / ₁₆	15 ³ / ₄	20 ⁵ / ₈	23 ⁵ / ₈	47 ¹ / ₄	23 ¹³ / ₁₆	17 ⁵ / ₁₆	204
4022-875/38	16	34 ¹ / ₈	28 ⁹ / ₁₆	5 ⁵ / ₁₆	11 ¹ / ₈	19 ⁵ / ₈	10 ⁷ / ₁₆	15 ³ / ₄	20 ⁵ / ₈	23 ⁵ / ₈	47 ¹ / ₄	23 ¹³ / ₁₆	17 ⁵ / ₁₆	204
4022-875/48	16	34 ¹ / ₈	28 ⁹ / ₁₆	5 ⁵ / ₁₆	11 ¹ / ₈	19 ⁵ / ₈	10 ⁷ / ₁₆	15 ³ / ₄	20 ⁵ / ₈	23 ⁵ / ₈	47 ¹ / ₄	23 ¹³ / ₁₆	17 ⁵ / ₁₆	204
4031-875/38	16	34 ¹ / ₈	28 ⁹ / ₁₆	5 ⁵ / ₁₆	11 ¹ / ₈	19 ⁵ / ₈	10 ⁷ / ₁₆	15 ³ / ₄	20 ⁵ / ₈	23 ⁵ / ₈	47 ¹ / ₄	23 ¹³ / ₁₆	17 ⁵ / ₁₆	204
4031-875/48	16	34 ¹ / ₈	28 ⁹ / ₁₆	5 ⁵ / ₁₆	11 ¹ / ₈	19 ⁵ / ₈	10 ⁷ / ₁₆	15 ³ / ₄	20 ⁵ / ₈	23 ⁵ / ₈	47 ¹ / ₄	23 ¹³ / ₁₆	17 ⁵ / ₁₆	204
4032-875/48	16	34 ¹ / ₈	28 ⁹ / ₁₆	5 ⁵ / ₁₆	11 ¹ / ₈	19 ⁵ / ₈	10 ⁷ / ₁₆	15 ³ / ₄	20 ⁵ / ₈	23 ⁵ / ₈	47 ¹ / ₄	23 ¹³ / ₁₆	17 ⁵ / ₁₆	204
4033-875/48	16	34 ¹ / ₈	28 ⁹ / ₁₆	5 ⁵ / ₁₆	11 ¹ / ₈	19 ⁵ / ₈	10 ⁷ / ₁₆	15 ³ / ₄	20 ⁵ / ₈	23 ⁵ / ₈	47 ¹ / ₄	23 ¹³ / ₁₆	17 ⁵ / ₁₆	204

Table 39: Dimensions [mm]

Size	DN	A	B	C _{min}	C ₁	C ₂	C ₃	D _{min}	E	Hs _{min}	W _T	X _{min}	Y	[kg]
Amaline 200														
2021-1750/14	200	709	568	112	193	363	168	280	331	400	780	300	465	45,4
2021-1750/24	200	709	568	112	193	363	168	280	331	400	780	305	470	47
2022-1750/24	200	709	568	112	193	363	168	280	331	400	780	305	470	47
2034-1750/24	200	709	568	112	193	363	168	280	331	400	780	305	470	47
2035-1750/24	200	709	568	112	193	363	168	280	331	400	780	305	470	47
Amaline 300														
3021-1160/06	300	778	637	130	243	413	220	350	436	500	1000	545	380	58,5
3021-1160/26	300	778	637	130	243	413	220	350	436	500	1000	545	380	58,5
3022-1160/06	300	778	637	130	243	413	220	350	436	500	1000	545	380	58,5
3022-1160/26	300	778	637	130	243	413	220	350	436	500	1000	545	380	58,5
3031-1160/06	300	778	637	130	243	413	220	350	436	500	1000	545	380	58,5
3031-1160/26	300	778	637	130	243	413	220	350	436	500	1000	545	380	58,5
3032-1160/26	300	778	637	130	243	413	220	350	436	500	1000	545	380	58,5
3033-1160/26	300	778	637	130	243	413	220	350	436	500	1000	545	380	58,5
3034-1160/86	300	950	804	131	326	556	219	350	438	500	1000	545	380	169,5
3035-1160/86	300	950	804	131	326	556	219	350	438	500	1000	545	380	169,5
3035-1160/126	300	950	804	131	326	556	219	350	438	500	1000	555	390	175,5
3036-1160/86	300	950	804	131	326	556	219	350	438	500	1000	545	380	169,5
3036-1160/126	300	950	804	131	326	556	219	350	438	500	1000	555	390	175,5
Amaline 400														
4021-875/38	400	867	726	135	283	498	265	400	524	600	1200	605	440	92,5
4021-875/48	400	867	726	135	283	498	265	400	524	600	1200	605	440	92,5
4022-875/38	400	867	726	135	283	498	265	400	524	600	1200	605	440	92,5
4022-875/48	400	867	726	135	283	498	265	400	524	600	1200	605	440	92,5
4031-875/38	400	867	726	135	283	498	265	400	524	600	1200	605	440	92,5
4031-875/48	400	867	726	135	283	498	265	400	524	600	1200	605	440	92,5
4032-875/48	400	867	726	135	283	498	265	400	524	600	1200	605	440	92,5
4033-875/48	400	867	726	135	283	498	265	400	524	600	1200	605	440	92,5

9.5.2 Amaline 200, 300, 400; motor housing made of stainless steel

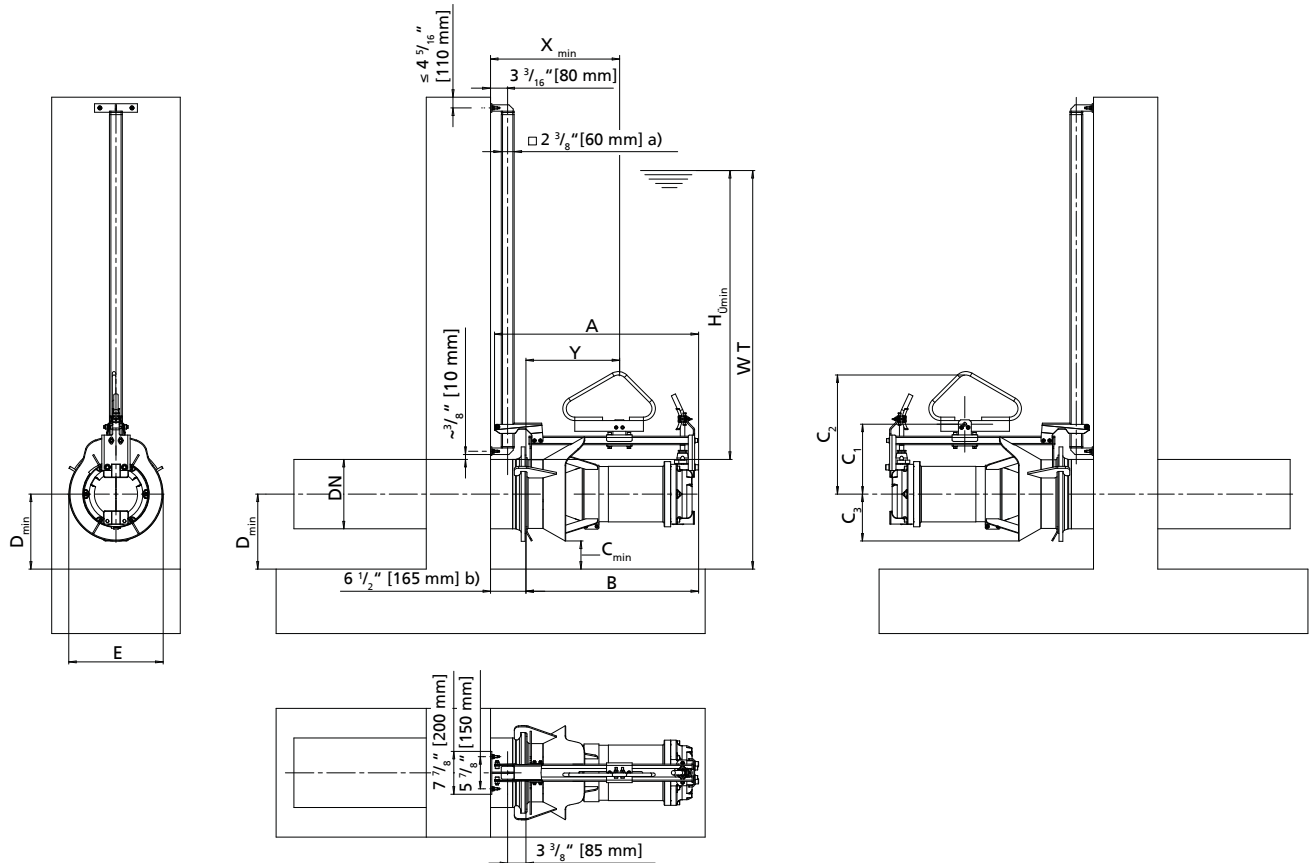


Fig. 63: Dimensions of an Amaline 200, 300, 400; motor housing made of stainless steel

a)	For the US market: □ 2" [50 mm]
b)	Minimum

The tolerances of the connection pipe (flange diameter and flange thickness) must be observed to ensure smooth functioning. If required, the flanges must be reworked prior to installation.

Table 40: Dimensions ["]

Size	DN	A	B	C _{min}	C ₁	C ₂	C ₃	D _{min}	E	H _{s min}	W _T	X _{min}	Y	[lbs]
Amaline 200														
2021-1750/14	8	27 15/16	23 3/8	4 7/16	7 5/8	14 5/16	6 5/8	11	13 1/16	15 3/4	30 11/16	18 5/16	11 13/16	99
2021-1750/24	8	27 15/16	23 3/8	4 7/16	7 5/8	14 5/16	6 5/8	11	13 1/16	15 3/4	30 11/16	18 1/2	12	105
2022-1750/24	8	27 15/16	23 3/8	4 7/16	7 5/8	14 5/16	6 5/8	11	13 1/16	15 3/4	30 11/16	18 1/2	12	105
2034-1750/24	8	27 15/16	23 3/8	4 7/16	7 5/8	14 5/16	6 5/8	11	13 1/16	15 3/4	30 11/16	18 1/2	12	105
2035-1750/24	8	27 15/16	23 3/8	4 7/16	7 5/8	14 5/16	6 5/8	11	13 1/16	15 3/4	30 11/16	18 1/2	12	105
Amaline 300														
3021-1160/06	12	30 5/8	25 1/16	5 1/8	9 9/16	16 1/4	8 11/16	13 3/4	17 3/16	19 11/16	39 3/8	21 7/16	14 15/16	127
3021-1160/26	12	30 5/8	25 1/16	5 1/8	9 9/16	16 1/4	8 11/16	13 3/4	17 3/16	19 11/16	39 3/8	21 7/16	14 15/16	127
3022-1160/06	12	30 5/8	25 1/16	5 1/8	9 9/16	16 1/4	8 11/16	13 3/4	17 3/16	19 11/16	39 3/8	21 7/16	14 15/16	127
3022-1160/26	12	30 5/8	25 1/16	5 1/8	9 9/16	16 1/4	8 11/16	13 3/4	17 3/16	19 11/16	39 3/8	21 7/16	14 15/16	127
3031-1160/06	12	30 5/8	25 1/16	5 1/8	9 9/16	16 1/4	8 11/16	13 3/4	17 3/16	19 11/16	39 3/8	21 7/16	14 15/16	127
3031-1160/26	12	30 5/8	25 1/16	5 1/8	9 9/16	16 1/4	8 11/16	13 3/4	17 3/16	19 11/16	39 3/8	21 7/16	14 15/16	127
3032-1160/26	12	30 5/8	25 1/16	5 1/8	9 9/16	16 1/4	8 11/16	13 3/4	17 3/16	19 11/16	39 3/8	21 7/16	14 15/16	127
3033-1160/26	12	30 5/8	25 1/16	5 1/8	9 9/16	16 1/4	8 11/16	13 3/4	17 3/16	19 11/16	39 3/8	21 7/16	14 15/16	127
Amaline 400														
4021-875/38	16	34 1/8	28 9/16	5 5/16	11 1/8	19 5/8	10 7/16	15 3/4	20 5/8	23 5/8	47 1/4	23 13/16	17 5/16	199
4021-875/48	16	34 1/8	28 9/16	5 5/16	11 1/8	19 5/8	10 7/16	15 3/4	20 5/8	23 5/8	47 1/4	23 13/16	17 5/16	199
4022-875/38	16	34 1/8	28 9/16	5 5/16	11 1/8	19 5/8	10 7/16	15 3/4	20 5/8	23 5/8	47 1/4	23 13/16	17 5/16	199
4022-875/48	16	34 1/8	28 9/16	5 5/16	11 1/8	19 5/8	10 7/16	15 3/4	20 5/8	23 5/8	47 1/4	23 13/16	17 5/16	199

Size	DN	A	B	C _{min}	C ₁	C ₂	C ₃	D _{min}	E	Hs _{min}	W _T	X _{min}	Y	[lbs]
4031-875/38	16	34 ¹ / ₈	28 ⁹ / ₁₆	5 ⁵ / ₁₆	11 ¹ / ₈	19 ⁵ / ₈	10 ⁷ / ₁₆	15 ³ / ₄	20 ⁵ / ₈	23 ⁵ / ₈	47 ¹ / ₄	23 ¹³ / ₁₆	17 ⁵ / ₁₆	199
4031-875/48	16	34 ¹ / ₈	28 ⁹ / ₁₆	5 ⁵ / ₁₆	11 ¹ / ₈	19 ⁵ / ₈	10 ⁷ / ₁₆	15 ³ / ₄	20 ⁵ / ₈	23 ⁵ / ₈	47 ¹ / ₄	23 ¹³ / ₁₆	17 ⁵ / ₁₆	199
4032-875/48	16	34 ¹ / ₈	28 ⁹ / ₁₆	5 ⁵ / ₁₆	11 ¹ / ₈	19 ⁵ / ₈	10 ⁷ / ₁₆	15 ³ / ₄	20 ⁵ / ₈	23 ⁵ / ₈	47 ¹ / ₄	23 ¹³ / ₁₆	17 ⁵ / ₁₆	199
4033-875/48	16	34 ¹ / ₈	28 ⁹ / ₁₆	5 ⁵ / ₁₆	11 ¹ / ₈	19 ⁵ / ₈	10 ⁷ / ₁₆	15 ³ / ₄	20 ⁵ / ₈	23 ⁵ / ₈	47 ¹ / ₄	23 ¹³ / ₁₆	17 ⁵ / ₁₆	199

Table 41: Dimensions [mm]

Size	DN	A	B	C _{min}	C ₁	C ₂	C ₃	D _{min}	E	Hs _{min}	W _T	X _{min}	Y	[kg]
Amaline 200														
2021-1750/14	200	707	566	112	193	363	168	280	332	400	780	465	300	45,2
2021-1750/24	200	707	566	112	193	363	168	280	332	400	780	470	305	47,5
2022-1750/24	200	707	566	112	193	363	168	280	332	400	780	470	305	47,5
2034-1750/24	200	707	566	112	193	363	168	280	332	400	780	470	305	47,5
2035-1750/24	200	707	566	112	193	363	168	280	332	400	780	470	305	47,5
Amaline 300														
3021-1160/06	300	778	637	130	243	413	220	350	436	500	1000	545	380	57,7
3021-1160/26	300	778	637	130	243	413	220	350	436	500	1000	545	380	57,7
3022-1160/06	300	778	637	130	243	413	220	350	436	500	1000	545	380	57,7
3022-1160/26	300	778	637	130	243	413	220	350	436	500	1000	545	380	57,7
3031-1160/06	300	778	637	130	243	413	220	350	436	500	1000	545	380	57,7
3031-1160/26	300	778	637	130	243	413	220	350	436	500	1000	545	380	57,7
3032-1160/26	300	778	637	130	243	413	220	350	436	500	1000	545	380	57,7
3033-1160/26	300	778	637	130	243	413	220	350	436	500	1000	545	380	57,7
Amaline 400														
4021-875/38	400	867	726	135	283	498	265	400	524	600	1200	605	440	90,6
4021-875/48	400	867	726	135	283	498	265	400	524	600	1200	605	440	90,6
4022-875/38	400	867	726	135	283	498	265	400	524	600	1200	605	440	90,6
4022-875/48	400	867	726	135	283	498	265	400	524	600	1200	605	440	90,6
4031-875/38	400	867	726	135	283	498	265	400	524	600	1200	605	440	90,6
4031-875/48	400	867	726	135	283	498	265	400	524	600	1200	605	440	90,6
4032-875/48	400	867	726	135	283	498	265	400	524	600	1200	605	440	90,6
4033-875/48	400	867	726	135	283	498	265	400	524	600	1200	605	440	90,6

9.5.3 Amaline 500, 600, 800; motor housing made of gray cast iron

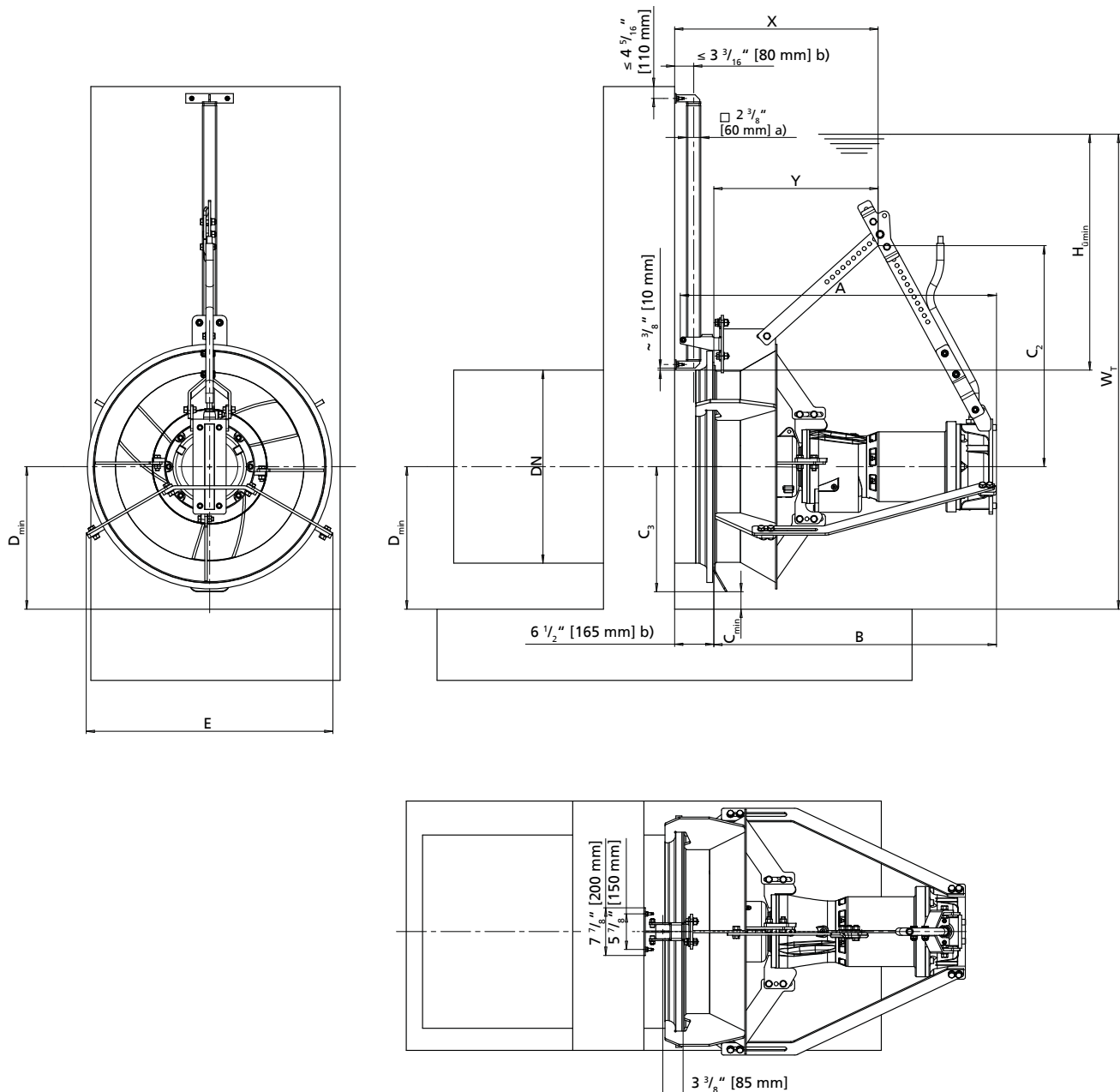


Fig. 64: Dimensions of an Amaline 500, 600, 800; motor housing made of gray cast iron

a)	For the US market: $\square 2''$ [50 mm]
b)	Minimum

The tolerances of the connection pipe (flange diameter and flange thickness) must be observed to ensure smooth functioning. If required, the flanges must be reworked prior to installation.

Table 42: Dimensions ["]

Size	DN	A	B	C _{min}	C ₂	C ₃	D _{min}	E	H _{s min}	W _T	X _{min}	Y	[lbs]
Amaline 500													
5033-.../44	20	50 ⁵ / ₈	45 ¹ / ₁₆	2 ³ / ₄	37 ³ / ₁₆	14 ¹⁵ / ₁₆	17 ¹¹ / ₁₆	30 ¹ / ₄	27 ⁹ / ₁₆	55 ¹ / ₈	32 ¹ / ₁₆	25 ⁹ / ₁₆	529
5033-.../64	20	54 ³ / ₁₆	48 ⁵ / ₈	2 ³ / ₄	35 ¹³ / ₁₆	14 ¹⁵ / ₁₆	17 ¹¹ / ₁₆	30 ¹ / ₄	27 ⁹ / ₁₆	55 ¹ / ₈	33 ¹¹ / ₁₆	27 ³ / ₁₆	607
5033-.../114	20	54 ³ / ₁₆	48 ⁵ / ₈	2 ³ / ₄	35 ¹³ / ₁₆	14 ¹⁵ / ₁₆	17 ¹¹ / ₁₆	30 ¹ / ₄	27 ⁹ / ₁₆	55 ¹ / ₈	33 ¹¹ / ₁₆	27 ³ / ₁₆	607
5035-.../172	20	52 ¹⁵ / ₁₆	47 ³ / ₈	2 ³ / ₄	35 ⁵ / ₈	14 ¹⁵ / ₁₆	17 ¹¹ / ₁₆	30 ¹ / ₄	27 ⁹ / ₁₆	55 ¹ / ₈	33 ¹ / ₁₆	27 ⁹ / ₁₆	673
5035-.../64	20	52 ¹⁵ / ₁₆	47 ³ / ₈	2 ³ / ₄	35 ⁵ / ₈	14 ¹⁵ / ₁₆	17 ¹¹ / ₁₆	30 ¹ / ₄	27 ⁹ / ₁₆	55 ¹ / ₈	33 ¹ / ₁₆	27 ⁹ / ₁₆	604
5035-.../114	20	52 ¹⁵ / ₁₆	47 ³ / ₈	2 ³ / ₄	35 ⁵ / ₈	14 ¹⁵ / ₁₆	17 ¹¹ / ₁₆	30 ¹ / ₄	27 ⁹ / ₁₆	55 ¹ / ₈	33 ¹ / ₁₆	27 ⁹ / ₁₆	604
Amaline 600													

Size	DN	A	B	C _{min}	C ₂	C ₃	D _{min}	E	Hs _{min}	W _T	X _{min}	Y	[lbs]
6032-.../44	24	50 ⁵ / ₈	45 ¹ / ₁₆	2 ¹⁵ / ₁₆	38 ⁹ / ₁₆	16 ³ / ₄	19 ¹¹ / ₁₆	33	35 ⁷ / ₁₆	65 ¹⁵ / ₁₆	32 ⁷ / ₈	26 ³ / ₈	547
6032-.../64	24	54 ³ / ₁₆	48 ⁵ / ₈	2 ¹⁵ / ₁₆	37 ³ / ₈	16 ³ / ₄	19 ¹¹ / ₁₆	33	35 ⁷ / ₁₆	65 ¹⁵ / ₁₆	33 ⁷ / ₈	27 ³ / ₈	625
6032-.../114	24	54 ³ / ₁₆	48 ⁵ / ₈	2 ¹⁵ / ₁₆	37 ³ / ₈	16 ³ / ₄	19 ¹¹ / ₁₆	33	35 ⁷ / ₁₆	65 ¹⁵ / ₁₆	33 ⁷ / ₈	27 ³ / ₈	625
6033-.../44	24	50 ⁵ / ₈	45 ¹ / ₁₆	2 ¹⁵ / ₁₆	38 ⁹ / ₁₆	16 ³ / ₄	19 ¹¹ / ₁₆	33	35 ⁷ / ₁₆	65 ¹⁵ / ₁₆	32 ⁷ / ₈	26 ³ / ₈	547
6033-.../64	24	54 ³ / ₁₆	48 ⁵ / ₈	2 ¹⁵ / ₁₆	37 ³ / ₈	16 ³ / ₄	19 ¹¹ / ₁₆	33	35 ⁷ / ₁₆	65 ¹⁵ / ₁₆	33 ⁷ / ₈	27 ³ / ₈	625
6033-.../114	24	54 ³ / ₁₆	48 ⁵ / ₈	2 ¹⁵ / ₁₆	37 ³ / ₈	16 ³ / ₄	19 ¹¹ / ₁₆	33	35 ⁷ / ₁₆	65 ¹⁵ / ₁₆	33 ⁷ / ₈	27 ³ / ₈	625
6035-.../172	24	52 ³ / ₄	47 ³ / ₁₆	2 ¹⁵ / ₁₆	37 ³ / ₁₆	16 ³ / ₄	19 ¹¹ / ₁₆	33	35 ⁷ / ₁₆	65 ¹⁵ / ₁₆	32 ¹ / ₁₆	25 ⁹ / ₁₆	693
6035-.../252	24	52 ³ / ₄	47 ³ / ₁₆	2 ¹⁵ / ₁₆	37 ³ / ₁₆	16 ³ / ₄	19 ¹¹ / ₁₆	33	35 ⁷ / ₁₆	65 ¹⁵ / ₁₆	32 ¹ / ₁₆	25 ⁹ / ₁₆	730
6035-.../114	24	51 ¹ / ₂	46	2 ¹⁵ / ₁₆	38 ⁹ / ₁₆	16 ³ / ₄	19 ¹¹ / ₁₆	33	35 ⁷ / ₁₆	65 ¹⁵ / ₁₆	32 ¹ / ₂	26	694
6035-.../164	24	52 ³ / ₄	47 ³ / ₁₆	2 ¹⁵ / ₁₆	37 ³ / ₁₆	16 ³ / ₄	19 ¹¹ / ₁₆	33	35 ⁷ / ₁₆	65 ¹⁵ / ₁₆	32 ¹ / ₁₆	25 ⁹ / ₁₆	694
Amaline 800													
8033-.../44	32	46 ⁷ / ₁₆	40 ⁷ / ₈	2 ⁷ / ₈	39 ³ / ₈	20 ³ / ₄	23 ⁵ / ₈	40 ¹³ / ₁₆	43 ⁵ / ₁₆	82 ¹¹ / ₁₆	31 ⁵ / ₁₆	24 ¹³ / ₁₆	594
8033-.../64	32	50 ¹ / ₁₆	44 ¹ / ₂	2 ⁷ / ₈	39 ³ / ₈	20 ³ / ₄	23 ⁵ / ₈	40 ¹³ / ₁₆	43 ⁵ / ₁₆	82 ¹¹ / ₁₆	36 ¹³ / ₁₆	30 ⁵ / ₁₆	672
8033-.../114	32	50 ¹ / ₁₆	44 ¹ / ₂	2 ⁷ / ₈	39 ³ / ₈	20 ³ / ₄	23 ⁵ / ₈	40 ¹³ / ₁₆	43 ⁵ / ₁₆	82 ¹¹ / ₁₆	36 ¹³ / ₁₆	30 ⁵ / ₁₆	672
8033-.../164	32	51 ⁹ / ₁₆	46	2 ⁷ / ₈	39	20 ³ / ₄	23 ⁵ / ₈	40 ¹³ / ₁₆	43 ⁵ / ₁₆	82 ¹¹ / ₁₆	37 ³ / ₁₆	30 ¹¹ / ₁₆	742
8033-.../234	32	51 ⁹ / ₁₆	46	2 ⁷ / ₈	39	20 ³ / ₄	23 ⁵ / ₈	40 ¹³ / ₁₆	43 ⁵ / ₁₆	82 ¹¹ / ₁₆	37 ³ / ₁₆	30 ¹¹ / ₁₆	769
8033-.../304	32	52 ³ / ₈	46 ⁷ / ₈	2 ⁷ / ₈	41 ³ / ₄	20 ³ / ₄	23 ⁵ / ₈	40 ¹³ / ₁₆	43 ⁵ / ₁₆	82 ¹¹ / ₁₆	34 ¹³ / ₁₆	28 ³ / ₈	873

Table 43: Dimensions [mm]

Size	DN	A	B	C _{min}	C ₂	C ₃	D _{min}	E	Hs _{min}	W _T	X _{min}	Y	[kg]
Amaline 500													
5033-.../44	500	1286	1145	70	945	380	450	768	700	1400	815	650	240,5
5033-.../64	500	1376	1235	70	910	380	450	768	700	1400	855	690	276
5033-.../114	500	1376	1235	70	910	380	450	768	700	1400	855	690	276
5035-.../172	500	1344	1203	70	905	380	450	768	700	1400	865	700	306,5
5035-.../64	500	1344	1203	70	905	380	450	768	700	1400	865	700	274,5
5035-.../114	500	1344	1203	70	905	380	450	768	700	1400	865	700	274,5
Amaline 600													
6032-.../44	600	1285	1145	75	980	425	500	838	900	1700	835	670	248,5
6032-.../64	600	1376	1235	75	950	425	500	838	900	1700	860	695	284
6032-.../114	600	1376	1235	75	950	425	500	838	900	1700	860	695	284
6033-.../44	600	1285	1145	75	980	425	500	838	900	1700	835	670	248,5
6033-.../64	600	1376	1235	75	950	425	500	838	900	1700	860	695	284
6033-.../114	600	1376	1235	75	950	425	500	838	900	1700	860	695	284
6035-.../172	600	1340	1199	75	945	425	500	838	900	1700	815	650	315
6035-.../252	600	1340	1199	75	945	425	500	838	900	1700	815	650	332
6035-.../114	600	1308	1168	75	980	425	500	838	900	1700	825	660	284
6035-.../164	600	1340	1199	75	945	425	500	838	900	1700	815	650	315,6
Amaline 800													
8033-.../44	800	1179	1038	73	1000	527	600	1037	1100	2100	795	630	270
8033-.../64	800	1271	1130	73	1000	527	600	1037	1100	2100	935	770	305,5
8033-.../114	800	1271	1130	73	1000	527	600	1037	1100	2100	935	770	305,5
8033-.../164	800	1309	1168	73	990	527	600	1037	1100	2100	945	780	337,5
8033-.../234	800	1309	1168	73	990	527	600	1037	1100	2100	945	780	349,5
8033-.../304	800	1331	1190	73	1060	527	600	1037	1100	2100	885	720	397

9.5.4 Connection pipe

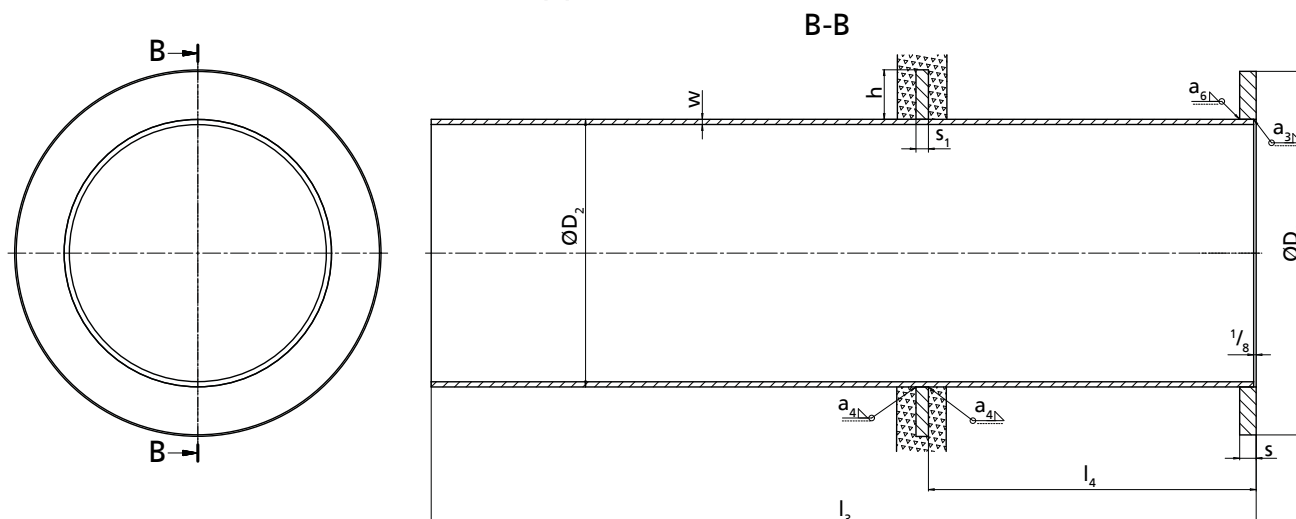


Fig. 65: Dimensions of the connection pipe (l_3 , l_4 = order specifications provided to the manufacturer by the customer)

Prior to installation all dimensions including the indicated tolerances (especially the flange diameter and thickness) must be verified and, if required, adjusted by reworking.

Table 44: Dimensions of the connection pipe

DN	Ø D ₁		Ø D ₂		s _{-0.5}		w ⁺¹		s ₁		h	
	["]	[mm]	["]	[mm]	["]	[mm]	["]	[mm]	["]	[mm]	["]	[mm]
200	12 5/8	320	8 5/8	219	13/16	20	1/4	6	3/8	10	2	50
300	17 5/16	440	12 3/4	324	7/8	22	1/4	6	9/16	15	2 3/8	60
400	21 1/4	540	16	406	7/8	22	1/4	6	9/16	15	2 3/16	65
500	25 3/8	645	20	508	15/16	24	1/4	6	9/16	15	2 3/8	70
600	29 3/4	755	24	610	1 3/16	30	1/4	6	9/16	15	2 15/16	75
800	38 3/8	975	32	813	1 3/16	30	1/4	6	9/16	15	3 1/8	80

Table 45: Material variants of the connection pipe

	Description	DN	Material		[lbs]	[kg]
			ASTM	EN		
	Connection pipe with flange to DIN EN 1092-1 / PN 6, length $l_3 = \sim 40''$ [1 m]	200	Galvanized steel		100,1	45,5
		200	A 276 Type 316 Ti	1.4571	100,1	45,5
		300	Galvanized steel		166,1	75,5
		300	A 276 Type 316 Ti	1.4571	166,1	75,5
		400	Galvanized steel		210,1	95,5
		400	A 276 Type 316 Ti	1.4571	210,1	95,5
		500	Galvanized steel		269,5	122,5
		500	A 276 Type 316 Ti	1.4571	269,5	122,5
		600	Galvanized steel		341,0	155,0
		600	A 276 Type 316 Ti	1.4571	341,0	155,0
		800	Galvanized steel		478,5	217,5
		800	A 276 Type 316 Ti	1.4571	478,5	217,5

Table 46: Connection pipe extension per meter

DN	Material variant		[lbs]	[kg]
	Galvanized steel	A 276 Type 316 Ti/1.4571		
200	X	X	74.4	33,8
300	X	X	112	50,8
400	X	X	142	64,5

DN	Material variant		[lbs]	[kg]
	Galvanized steel	A 276 Type 316 Ti/1.4571		
500	X	X	173	78,5
600	X	X	208	94,5
800	X	X	284	129

10 Certificate of Decontamination

Type:
 Order number/
 Order item number⁸⁾:
 Delivery date:
 Field of application:
 Fluid handled⁸⁾:

Please check where applicable⁸⁾:



Corrosive



Oxidizing



Flammable



Explosive



Hazardous to health



Seriously hazardous to health



Toxic



Radioactive



Hazardous to the environment



Safe

Reason for return⁸⁾:
 Comments:

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

We herewith declare that this product is free from any hazardous chemicals as well as from biological and radioactive substances.

For mag-drive pumps, the inner rotor unit (impeller, casing cover, bearing ring carrier, plain bearing, inner rotor) has been removed from the pump and cleaned. In cases of leakage at the stator can, the stator space has been examined for fluid leakage; if fluid handled has penetrated the stator space, it has been removed.

For canned motor pumps, the rotor and plain bearing have been removed from the pump for cleaning. In cases of leakage at the stator can, the stator space has been examined for fluid leakage; if fluid handled has penetrated the stator space, it has been removed.

- ☐ 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

8) Required fields

Index

A

Axial propeller 18

B

Bearings 18

C

Certificate of decontamination 96

Commissioning/start-up 40

D

Design 18

Designation 17

Direction of rotation 39

Dismantling 53

Disposal 16

Drive 19

E

Electromagnetic compatibility 34

Event of damage 7

Ordering spare parts 64

Explosion protection 33, 34, 37, 38, 40, 41, 45, 46, 58, 59

F

Faults

Causes and remedies 65

Flamepaths 79, 80, 81

Fluid handled

Density 42

Frequency inverter operation 41

Frequency of starts 41

I

Intended use 9

Interference immunity 34

K

Key to safety symbols/markings 9

L

Leakage monitoring 35

Level control 33

Lubricant

Quality 48

O

Oil lubrication

Oil quality 48

Operating limits 9

Operation on a frequency inverter 34

Order number 7

Other applicable documents 7

Overload protection 33

P

Partly completed machinery 7

Preservation 15

Product description 17

R

Reassembly 53

Return to supplier 16

Returning to service 44

S

Safety 9

Safety awareness 10

Scope of supply 20

Sensors 34

Shaft seal 18

Shutdown 43

Spare part

Ordering spare parts 64

Spare parts stock 63

Storage 15, 43

Supply voltage 41

T

Tightening torques 63

Transport 14

W

Warnings 9

Warranty claims 7



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