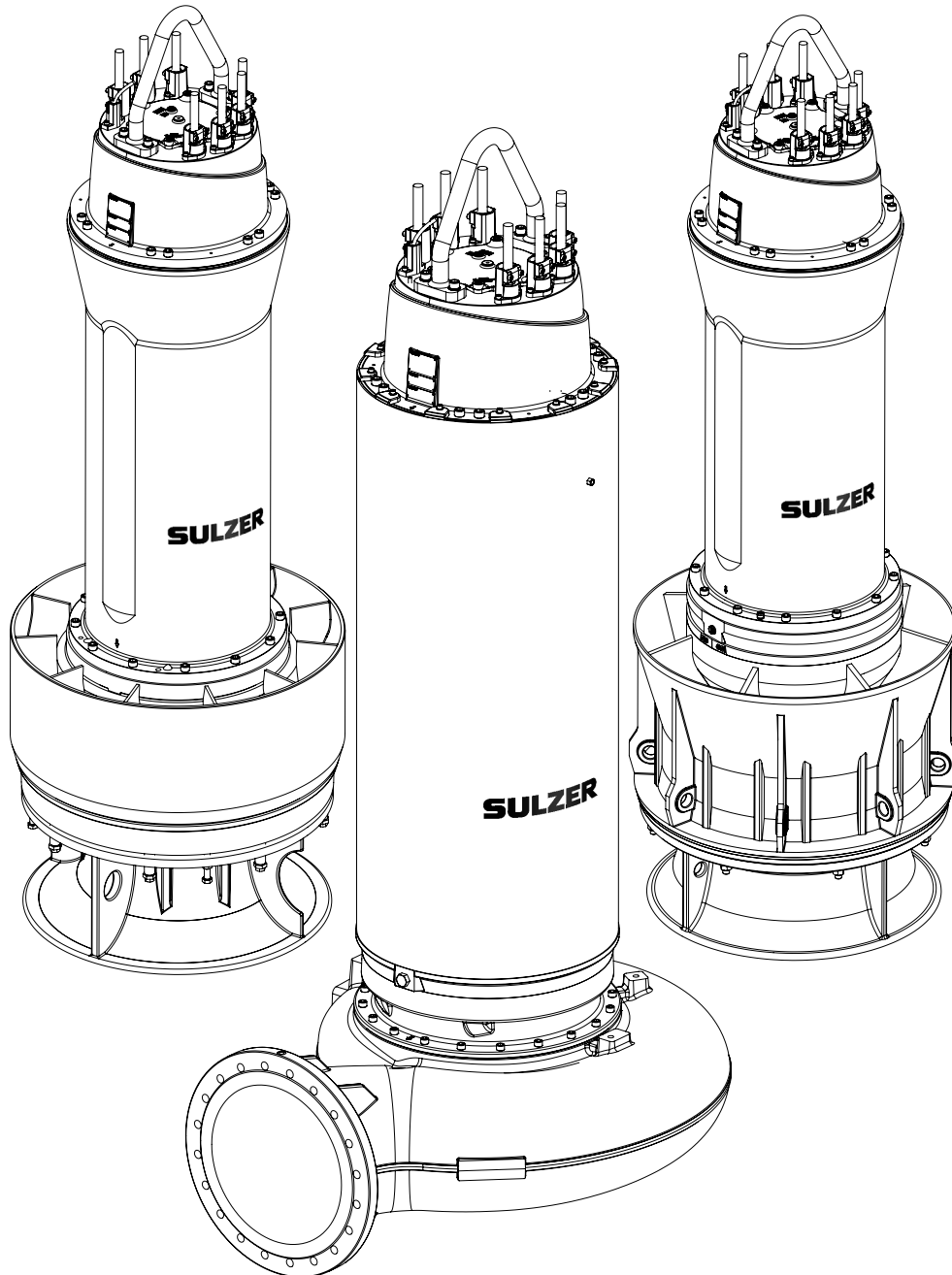

Submersible Sewage Pump Type ABS XFP-PE7
Submersible Mixed Flow Column Pump Type ABS AFLX-PE7
Submersible Propeller Pump Type ABS VUPX-PE7



2500-0001

15972520-01 (04.2023)

en

Installation and Operating Instructions

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1 General

These **Installation and Operating Instructions** and the separate booklet **Safety Instructions for Sulzer Products Type ABS** contain basic instructions and safety hints which must be observed during transport, installation and commissioning. For this reason it is essential that they are read by the installing technician as well as by relevant skilled operators or users. They should also be always available where the unit is installed.



Safety Instructions which might cause danger to life in case of non-observance have been specifically highlighted with the general danger symbol.

The presence of a dangerous voltage is identified with this safety symbol.



This symbol indicates the danger of an explosion occurring.



ATTENTION *Appears at safety hints, the non-observance of which could damage the unit or affect its functioning.*

NOTE *Used for important pieces of information.*

1.1 Correct usage of the products

In the case of any faults arising, the Sulzer units should immediately be taken out of use and secured. The fault should be immediately rectified or, if necessary, contact your **Sulzer Pump Sweden AB Vadstena factory** (in the following called Sulzer) Service Centre.

The submersible pumps with PE motor can be supplied both as standard versions and in explosion-proof execution with Ex II 2G Ex h db IIB T4 Gb for 50 Hz according to the standards EN ISO 12100:2010, EN 809:1998 + A1:2009 + AC:2010, EN 60079-0:2012+A11:2018, EN 60079-1:2014, EN 60034-1:2010, EN ISO 80079-36, EN ISO 80079-37, or FM execution (NEC 500, Class I, Division 1, Group C&D, T3C) for 60 Hz in isolation class H (140).

Temperature limiter in the winding = 140 °C / 284 °F (bimetallic or thermistor [PTC] as an option).

Special version Class H

A special version with temperature limiter in the winding = 160 °C / 320 °F (bimetallic, temperature sensor [PTC] as an option or PT100) is also available. This version is only available without explosion-proof or NEC 500 approval with isolation class H (160) components.

For both versions an EMV-execution is available as an option.

ATTENTION *Repair work on explosion-proof motors may only be carried out in authorized workshops by qualified personnel using original parts supplied by the manufacturer. Otherwise the Ex-approvals are no longer valid. All Ex-relevant components and dimensions can be found in the modular workshop manual and the spare parts list.*

ATTENTION *After repair work in unauthorized workshops by unqualified personnel the Ex-approvals are no longer valid. After such repair the unit must not be operated in hazardous areas. The Ex-nameplate (see figure 2, 3) has to be removed.*

NOTE *All regulations and guidelines, which may vary from country to country, must be followed without exception.*

Limitations: The ambient temperature range is 0 °C to + 40 °C (32 °F to 104 °F)
Immersion depth maximum 20 m (65 ft)

NOTE *Leakage of lubricants could result in pollution of the medium being pumped*

For the operation of units as explosion-proof execution the following applies:

In hazardous areas care must be taken that during switching on and operation of the pumps the pump section is filled with water (dry installation) or alternatively is submerged or under water (wet installation with cooling jacket). Other types of operation e.g. snore operation or dry running are not allowed!

The temperature monitoring of the explosion-proof submersible pumps has to be carried out by **bimetallic temperature limiters** or thermistors according to DIN 44 082 connected to a suitable release device which is certified in accordance with EC directive 2014/34/EU.

NOTE *Ex protection method type “c” (Constructional Safety) and “k” (Liquid immersion) in accordance with EN 80 079 – 37 are used.*

For the operation of explosion-proof submersible pumps in wet well installation without cooling jacket:

It must be ensured that the motor of the Ex submersible pump is always fully submerged during start-up and operation!

For the operation of explosion-proof submersible pumps with frequency inverter in hazardous areas (ATEX Zone 1 and 2):

Motors must have direct thermal protection devices fitted. These consist of temperature sensors (PTC DIN 44082) embedded in the windings. These must be connected to a suitable release device which is certified in accordance with EC directive 2014/34/EU.

Machines designated as Ex machines may never, without exception, be operated using a mains frequency that is greater than the maximum of 50 or 60 Hz as indicated on the nameplate.

Operation with frequency inverters

See chapter 4.6

1.2 Application areas for the series XFP

The submersible sewage pumps type ABS **XFP series** have been designed for the economical and reliable pumping of commercial, industrial and municipal sewage and can be installed dry or wet.

They are suitable for pumping of the following liquids:

- Clear and wastewater, for sewage containing solids and fibrous material
- Faecal matter
- Sludge
- Fresh and process water pumping
- Raw water for drinking water supply
- Surface and rain water
- Sewage

1.3 Application areas for the series AFLX

The mixed flow column pump type ABS **AFLX series** have been developed for environmental protection, water supply, municipal sewage treatment and dewatering of polders.

They are suitable for the following liquids:

- Storm water protection, irrigation and aquaculture.
- Industrial raw water and process water.
- Combined sewage and surface water.
- Recirculation sludge or return activated sludge (RAS).
- Hazardous locations. Certification for ATEX (Ex II 2G Ex h db IIB T4 Gb), FM and CSA available as an option.

The AFLX pumps are installed in a **concrete sump** or in a **steel pressure pipe** using a suitable coupling ring. A screen must be attached to the inlet (see section 5.2).

1.4 Application areas for the series VUPX

The submersible propeller pumps type ABS **VUPX series** are designed for those applications where large water volumes must be pumped at low heads (up to 10 m / 33 ft).

They are suitable for the following liquids

- Storm water protection, irrigation and aquaculture.
- Industrial raw water and process water.
- Combined sewage and surface water.
- Recirculation sludge or return activated sludge (RAS).
- Hazardous locations. Certification for ATEX (Ex II 2G Ex h db IIB T4 Gb), FM and CSA available as an option.

The VUPX pumps are installed in a **concrete sump** or in a **steel pressure pipe** using a suitable coupling ring. A screen must be attached to the inlet (see section 5.2).

1.5 Technical data

Please take the technical data and the weight from the nameplate. Please take the dimensions of the units from the respective dimension drawing.

The maximum noise level of the units of this series is ≤ 70 dB(A). In some types of installations it is possible that during pump operation the noise level of 70 dB(A) or the measured noise level may be exceeded.

HINT *The respective dimension drawings can be found in downloads “dimension drawing” at the following link: www.sulzer.com.*

The weights in the dimension sheets refer to a cable length of 10 m. In the case of cable lengths exceeding 10 m, the additional weight must be determined using the following table and added.

	Cable type	Weight kg/m		Cable type	Weight kg/m		Cable type	Weight kg/m	Weight lb/1000ft
EMC-FC S1BC4N8-F	3x16/16KON	1.0	S1BN8-F / H07RN8-F	4 G 16	1.3	G-GC	AWG 4-3	1.6	1070
				4 G 25	1.8		AWG 2-3	2.3	1533
	3x6/6KON +3x1,5ST	0,6		4 G 35	2.3		AWG 1-3	2.8	1865
				4 G 50	3.0		AWG 1/0-3	3.5	2315
	3x25 +3G16/3	1,5		4 G 70	4.2		AWG 2/0-3	4.1	2750
	3x35 +3G16/3	1,9		4 G 95	5.5		AWG 3/0-3	5.0	3330
	3x50 +3G25/3	2,6		4 G 120	6.7		AWG 4/0-3	6.1	4095
	3x70 +3G35/3	3,6							
	3x95 +3G50/3	4,7		10 G 1,5	0.5	DLO	AWG 3/0	1.1	742
	3x120 + 3G70/3	6.0		12 G 1,5	0.5		AWG 4/0	1.3	872
							262 MCM	1.6	1068
	1x185	2,2		1x150	1.8		313 MCM	1.9	1258
	1x240	2,7		1x185	2.2		373 MCM	2.2	1462
	1x300	3,4		1x300	3.4		444 MCM	2.6	1726
				1x400	4.1		535 MCM	3.1	2047
							646 MCM	3.6	2416
				SOOW	AWG 16/4	0.3	144		
					AWG 16/8	0.4	222		
					AWG 16/10	0.5	278		
					AWG 16/12	0.5	305		

1.6 Nameplate

We recommend that you record the data from the original nameplate *Figure 1* so that you can refer to the data at any time.



									
Type ②					⑤				
PN ③			SN ④		⑥				
U _N ⑦ V		3~ ②⑦		max. ▽ ⑧		I _N ⑨ A		⑩ Hz	
P _{1N} ⑪		P _{2N} ⑫		n ⑬		∅ ⑭			
T _A max. ⑮ °C			Nema Code ⑯			Hmin. ⑰			
DN ⑱		Q ⑲		H ⑳		Hmax. ㉑			
⑳		Weight ㉒		IP68 ㉓		㉔			
Motor Eff. Cl ㉖			 ← ㉗		㉘				
Sulzer Pump Sweden AB Vadstena factory Box 170 SE-592 24 Vadstena Sweden									

Figure 1: Nameplate standard

Legend

- | | |
|---|--|
| 1 Address | 15 Max. ambient temperature [flexible unit] |
| 2 Type designation | 16 Nema code letter (only at 60 Hz, e.g., H) |
| 3 Art. no. | 17 Min. pumping height [flexible unit] |
| 4 Serial number | 18 Nominal width [flexible unit] |
| 5 Order number | 19 Pumping quantity [flexible unit] |
| 6 Year of manufacture [month/year] | 20 Pumping height [flexible unit] |
| 7 Nominal voltage | 21 Max. pumping height [flexible height] |
| 8 Max. immersion depth [flexible unit] | 22 Weight (without attached parts) [flexible unit] |
| 9 Nominal current | 23 Motor efficiency class |
| 10 Frequency | 24 Motor shaft direction of rotation |
| 11 Power (consumption) [flexible unit] | 25 Continuous operating mode |
| 12 Power (output) [flexible unit] | 26 Sound level |
| 13 Rotation speed [flexible unit] | 27 Phase Connection |
| 14 Impeller/propeller ∅ [flexible unit] | 28 Protection method |



Figure 2: Nameplate ATEX

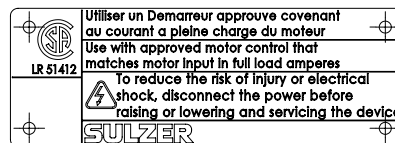
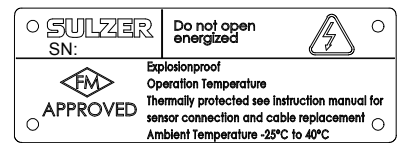


Figure 3: Nameplate CSA / FM



2 Safety

The general and specific health and safety hints are described in detail in the separate booklet **Safety Instructions for Sulzer Products Type ABS**. If anything is not clear or you have any questions as to safety make certain to contact the manufacturer Sulzer.

3 Lifting, transport and storage

3.1 Lifting

NOTE *Observe the total weight of the Sulzer units and their attached components! (see nameplate for weight of base unit).*

The duplicate nameplate provided must always be located and visible close to where the pump is installed (e.g. at the terminal boxes / control panel where the pump cables are connected).

NOTE *Lifting equipment must be used if the total unit weight and attached accessories exceeds local manual lifting safety regulations.*

The total weight of the unit and accessories must be observed when specifying the safe working load of any lifting equipment! The lifting equipment, e.g. crane and chains, must have adequate lifting capacity. The hoist must be adequately dimensioned for the total weight of the Sulzer units (including lifting chains or steel ropes, and all accessories which may be attached). The end user assumes sole responsibility that lifting equipment is certified, in good condition, and inspected regularly by a competent person at intervals in accordance with local regulations. Worn or damaged lifting equipment must not be used and must be properly disposed of. Lifting equipment must also comply with the local safety rules and regulations.

NOTE *The guidelines for the safe use of chains, ropes and shackles supplied by Sulzer are outlined in the Lifting Equipment manual provided with the items and must be fully adhered to.*



The unit must never be raised by the power cable.

Depending on model and mode of installation, the units are prepared at the factory for vertical or horizontal transportation.

The units are equipped with a safety shackle (series for vertical setup) or swivel ring bolt (horizontal setup), which allow fixing chains for transporting or for installing or removing. We recommend using chains from the Sulzer list of accessories.



Take note of the entire weight of the unit (see nameplate Figure 1) The hoist and chain must be adequately dimensioned for the weight of the unit and must comply with the current valid safety regulations.

ATTENTION *In the case of pumps set up vertically, sealing plugs are mounted for protecting the thread holes instead of swivel ring bolts. These seals may only be replaced by a swivel ring bolt for maintenance work but must be screwed on again before startup!*

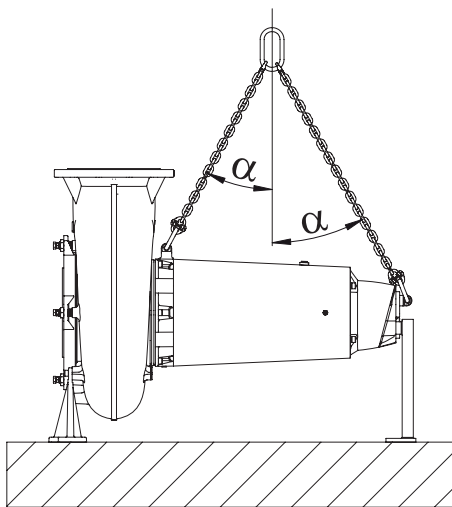


Figure 4: Transport in a horizontal manner XFP

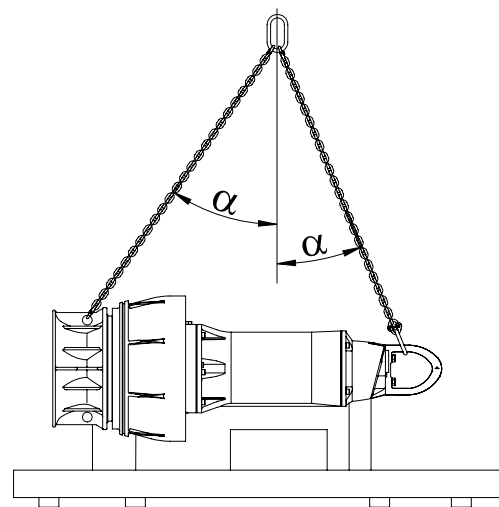


Figure 5: Transport in a horizontal manner AFLX/VUPX

ATTENTION *α max. $\leq 45^\circ$. The angle α between the centre line of the unit and the lifting tools should not exceed 45° .*

3.2 Transport securing devices

The motor connection cables are protected against the ingress of moisture along the cable by having the ends sealed at the factory with protective covers.

These protective covers should only be removed immediately prior to connecting the pumps electrically.

ATTENTION *These protective covers only provide protection against water spray or similar and are not a water tight seal. The ends of the cables should not be immersed in water, otherwise moisture could enter the connection chamber of the motor.*

ATTENTION *If there is a possibility of water ingress then the cables should be secured so that the ends are above the maximum possible flood level. Take care not to damage the cable or its insulation when doing this!*

In order to avoid damage to the pump shaft or the bearings during horizontal transport the shaft is clamped in an axial direction when leaving the factory.

ATTENTION *The motor shaft transport lock must be removed before startup!*

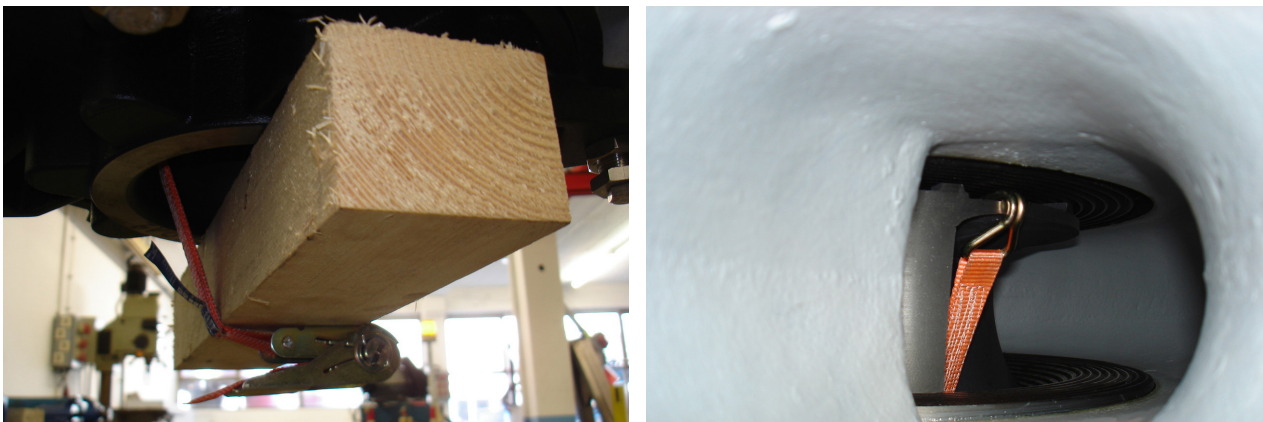


Figure 6: Removal of the transport securing devices

3.3 Storage of the units

ATTENTION *The Sulzer products must be protected from weather influences such as UV from direct sunlight, high humidity, aggressive dust emissions, mechanical damage, frost etc. The Sulzer original packaging with the relevant transport securing devices (where used) ensures optimum protection of the unit. If the units are exposed to temperatures under 0 °C / 32 °F check that there is no water in the hydraulics, cooling system, or other spaces. In the case of heavy frosts, the units and cable should not be moved if possible. When storing under extreme conditions, e.g. in tropical or desert conditions suitable additional protective steps should be taken. We would be glad to advise you further*

ATTENTION *The Sulzer units normally require no maintenance during storage. During longer storage times, (after approx. one year) the transport locks on the motor shaft (not all versions) must be dismantled. Coolant is applied to the sealing surfaces by manually turning the shaft several times (also for the purpose of cooling or lubricating so that trouble-free function of the sliding ring seal is ensured). No maintenance is required when storing the motor shaft.*

4 Monitoring system

4.1 Motor monitoring system

Motor equipment:

Monitoring		non Ex/ FM	Ex / FM
Leakage sensor	Inspection chamber	●	●
	Motor chamber	●	●
	Connection chamber	●	●
Stator temperature	Bimetallic	●	●*
	Thermistors (PTC)	○	○*
	PT 100	○	○
Bearing temperature Upper/lower	Bimetallic	●	●
	Thermistors (PTC)	○	○
	PT 100	○	○

● = Standard ○ = Option * Ex with VFD, monitoring via PTC

4.2 Leakage sensor (DI)

The leakage sensors carry out the seal monitoring function and signal the ingress of moisture into the motor by means of a special electronic device; see also section 6.3.

4.3 Temperature monitoring of the stator

Thermal limiters protect the stator from overheating in the case of asymmetric phase loading or voltage, continuous dry running, or excessive temperatures in the medium itself. The stator is equipped with three bimetallic thermal limiters (optional PTC, PT100) which are connected in series.

4.4 Temperature monitoring of the bearings (option)

In the case of existing bearing monitoring, a bimetal temperature limiter is built into the bearing flanges of the standard version. This enables premature switching off of the submersible motor (e.g., due to wear-related increase in bearing temperature).

Switching temperature: Upper bearing = 140 °C / 284 °F

Lower bearing = 150 °C / 302 °F

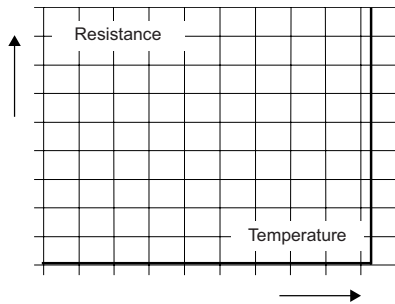
4.5 Temperature sensor indication

A continuous indication of the temperature in the stator and the bearings is not possible using bimetallic thermal limiters or thermistors. For this application it is necessary to fit thermal sensors of the type PT 100 with linear characteristics into the stator and bearing blocks. This type of resistor has a linear characteristic, i.e. the resistance rise is proportional to the temperature rise; see also section 6.3.

ATTENTION *If the leakage sensor (DI) is activated the unit must be immediately taken out of service. Please contact your Sulzer Service Centre.*

NOTE *Running the pump with the thermal and/or leakage sensors disconnected will invalidate related warranty claims.*

4.5.1 Temperature sensor bimetal



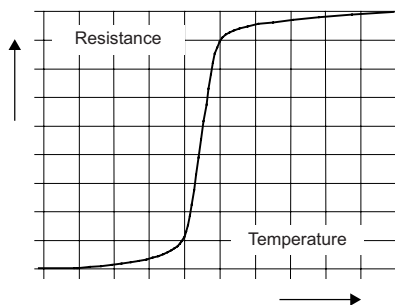
0562-0017	Application	Option
	Function	Temperature switch using the bimetallic principle, which opens at a rated temperature
	Switching	Taking care not to exceed the allowable switching current, these can be fitted directly into the control circuit

Figure 7: Curve showing principle of operation of bimetallic temperature limiter

Operating voltage ...AC	100 V to 500 V ~
Rated voltage AC	250 V
Rated current AC $\cos \varphi = 1,0$	2.5 A
Rated current AC $\cos \varphi = 0,6$	1.6 A
max. switching current at I_N	5.0 A

ATTENTION The maximum switching ability of the thermal sensors is 5 A, the rated voltage 250 V. Explosion-proof motors which are connected to static frequency inverters must be fitted with thermistors. Activation must be by means of a thermistor protective relay device with PTB-Approval number.

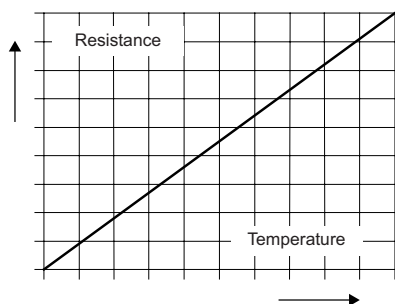
4.5.2 Temperature sensor PTC



0562-0018	Application	Option
	Function	Temperature dependent resistance (no switch) curve with stepwise behaviour
	Switching	Cannot be installed direct into the control circuit. Evaluation of the signal must be carried out by suitable electronic equipment

Figure 8: Curve showing principle of operation of thermistor

4.5.3 Temperature sensor PT 100



0562-0019	Application	Option (not for Ex)
	Function	Function temperature dependent resistance (no switch). The linear curve allows continuous measurement and indication of the temperature
	Switching	Cannot be installed direct into the control circuit. Evaluation of the signal must be carried out by suitable electronic equipment

Figure 9: Curve showing principle of operation of PT 100

ATTENTION Thermistors or PT 100 devices must never be directly connected into the control or power system. They must always be connected to a suitable evaluation device.

The thermal monitoring circuit must be wired into the motor contactors in such a manner that a manual reset is required.

4.6 Operation with frequency inverters

The stator design and the insulation grade of the motors from Sulzer means that they are suitable for usage with frequency inverters. It is however essential that the following conditions are met:

- The guidelines for EMC (electromagnetic compatibility) are complied with.
- Speed/torque curves for motors driven by frequency inverters can be found in our product selection range.
- Explosion-proof motors must be equipped with thermistors (PTC temperature sensors) if operated in hazardous areas (ATEX Zone 1 and 2).
- Machines designated as Ex machines may never, without exception, be operated using a mains frequency that is greater than the maximum of 50 or 60 Hz as indicated on the type plate. Make sure that the rated current specified on the type plate is not exceeded after starting the motors. The maximum number of starts according to the motor datasheet may not be exceeded.
- Machines that are not designated as Ex machines may only be operated using the mains frequency indicated on the type plate. Greater frequencies can be used but only after consulting with and receiving permission from the Sulzer manufacturing plant.
- For operation of Ex motors on frequency inverters special requirements in relation to the tripping times of the thermo control elements, must be observed.
- The lowest frequency must be set so that the minimum fluid velocity of 1 m/s is present in the volute.
- The maximum frequency must be set so the rated power of the motor is not exceeded.

Modern frequency inverters use higher wave frequencies and a steeper rise on the edge of the voltage wave. This means that motor losses and motor noise are reduced. Unfortunately these inverter output signals cause higher voltage spikes in the stator. Experience has shown, that depending on rated voltage and the length of the cable between the inverter and the motor, these voltage spikes can adversely affect the life of the motor. In order to avoid this, inverters of this type must be equipped with sinus filters when used in the critical zone (see fig 10). The sinus filter chosen must be suitable for the inverter with regard to rated voltage, inverter wave frequency, rated current of the inverter and maximum inverter output frequency. Make sure that the rated voltage is supplied to the terminal board of the motor.

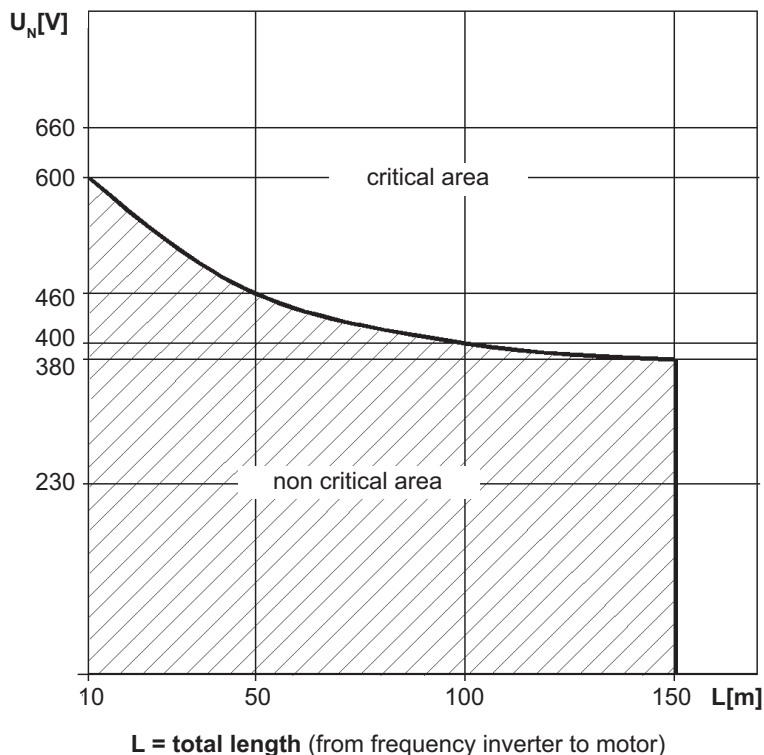


Figure 10: Critical / non critical area

0562-0012

5 Installation

The wires (motor cable) are designed according to EN 50525-1; the operating conditions are based on table 14 for special rubber cables. The load capacity of the wires is adapted to an ambient temperature of 40 °C according to table 15 (column 4 for multicore cables and column 5 for single-core cables), and calculated with a factor for clustering and installation type.

A minimum gap of 1 x outer diameter of the cable used applies when installing.

ATTENTION *Twisting must not occur. The cables must not touch anything, not grabbed or bundled. When extending, recalculate the wire cross-section according to EN 50525-1, irrespective of the cable and installation type, cluster etc.!*

In pump stations/tanks, equipotential bonding must be carried out according to EN 60079-14:2014 [Ex] or IEC 60364-5-54 [non-Ex] (Regulations for the installation of pipelines, protective measures in high-voltage systems).

5.1 Installation of the XFP submersible sewage pumps

5.1.1 Installation options for the XFP submersible sewage pumps

There are three main installation options for the submersible pumps.

1. Wet installation vertical with Sulzer automatic coupling system
2. Dry installation with ground support ring (with closed cooling system)
3. Dry installation horizontal (with closed cooling system)

Wet installation:

NOTE *The dimensional sheets and foundation plans for each type of installation are supplied either with the planning documents or your order confirmation.*

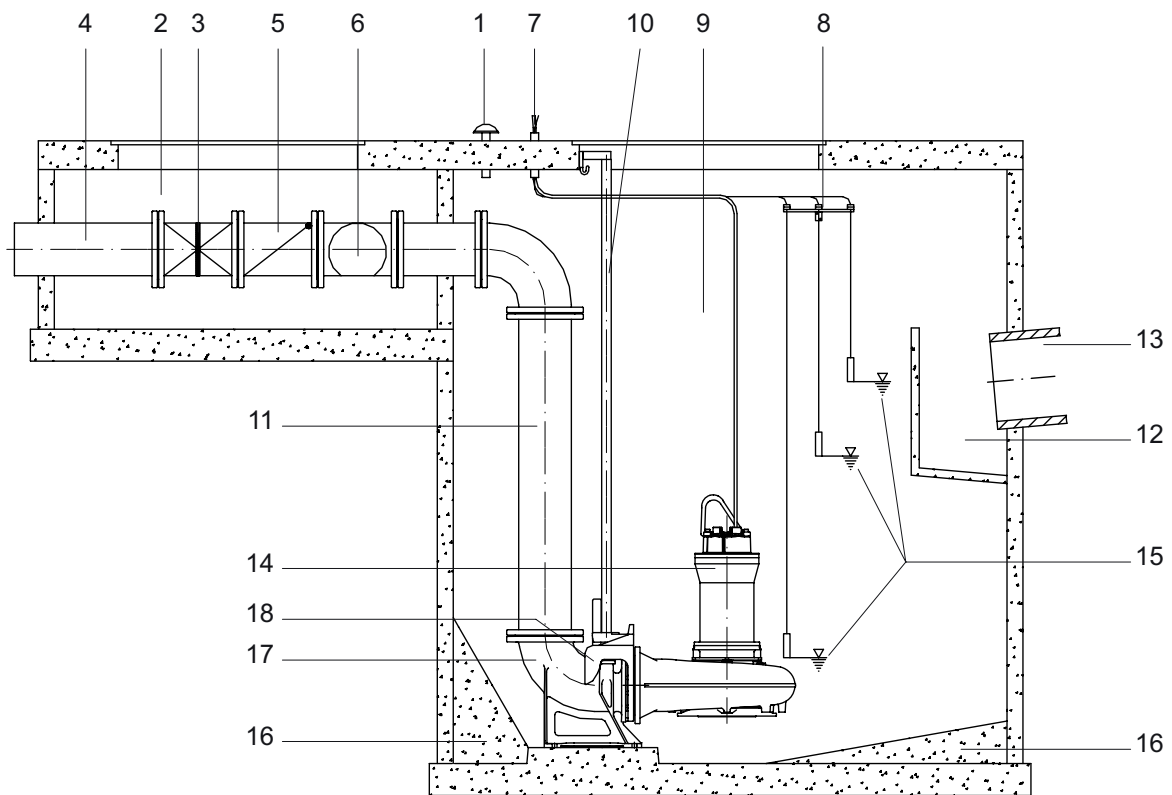


Figure 11: Wet installation vertical with Sulzer automatic coupling system

Legend (Figure 11)

1	Venting	10	Guide tube
2	Valve chamber	11	Discharge line
3	Shut-off valve	12	Inflow chamber with impact wall
4	Outflow line	13	Inflow line
5	Non-return valve	14	Sulzer submersible sewage pump
6	Fitting for valve removal	15	Automatic level control
7	Cable duct	16	Concrete benching
8	Bracket for float switches	17	Pedestal
9	Collection sump	18	Bracket

ATTENTION *The power cables should be handled carefully during installation and removal of the pumps in order to avoid damage to the insulation. When raising the submersible pump out of the concrete sump or the steel discharge pipe with the hoist ensure that the connection cables are lifted out simultaneously as the pump itself is being raised.*

ATTENTION *Submersible sewage pumps should be installed in accordance with Figure 12.*

- Fit a hoist to the submersible sewage pump.
- The Sulzer submersible sewage pump is suspended on the guide tube by means of the pedestal bracket on the pressure connection and carefully lowered vertically, or at a slight inclination (max. 3°). It couples automatically at the pedestal and seals the pressure connection at the pedestal leak-tight by means of its own weight and a seal.

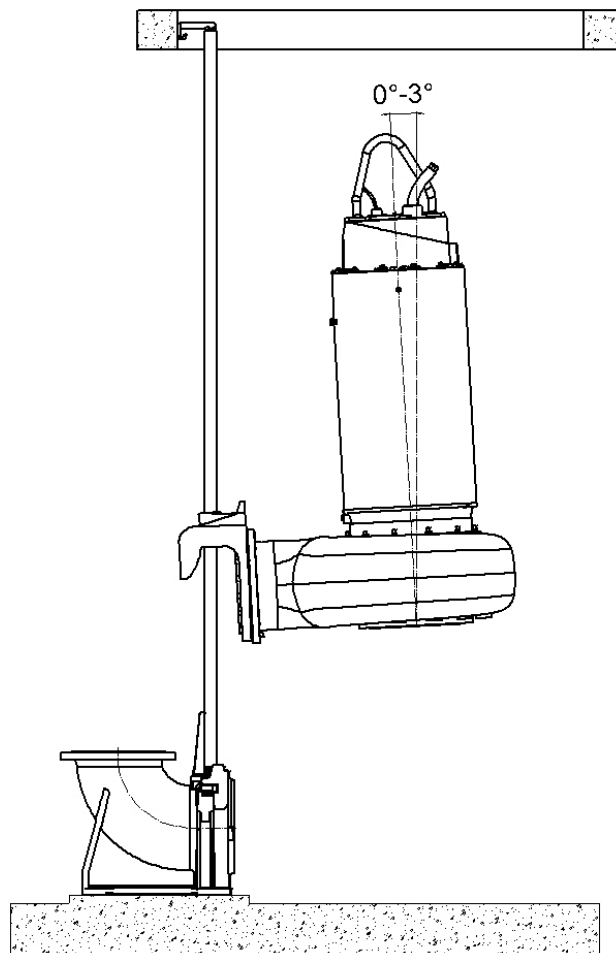


Figure 12: Lowering the submersible pump

0562-0028

Dry sump installation:

- Fit a hoist to the submersible pump.
- With the aid of the hoist place the submersible pump carefully into the prepared mounting frame and fasten.
- Mount suction and pressure nozzles on the pump housing.
- If required, fit the vent line to the volute.
- Open the gate valves on the suction and discharge side.

5.1.2 Pedestal fitting of o-ring and guide piece

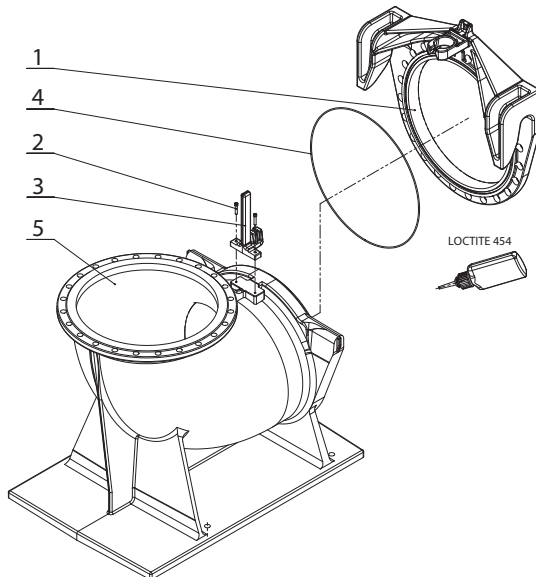


Ensure that adhesive does not come into contact with skin or eyes! Wear safety glasses and gloves!

The o-ring and groove of the bracket must be clean and free of grease. The instant adhesive LOCTITE type 454 (supplied with the unit) is spread evenly on the base of the groove in the bracket (13/1) and the o-ring inserted immediately.

NOTE *The hardening time of the adhesive is only about 10 seconds!*

The guide piece (13/3) must be screwed on as shown in the drawing! Fasten the guide piece (13/3) with the two M12 screws (13/2). Tighten the screws with a torque of 56 Nm.



Legend

- 1 Bracket (is fitted to the pump)
- 2 Screws (2 off)
- 3 Guide piece
- 4 O-ring
- 5 Pedestal

05662-0027

Figure 13: HD-Pedestal DN 100 - 800

5.1.3 Tightening torque

Tightening torque for Sulzer stainless steel screws A4-70:								
Thread	M8	M10	M12	M16	M20	M24	M27	M30
Tightening torque	17 Nm	33 Nm	56 Nm	136 Nm	267 Nm	460 Nm	500 Nm	600 Nm

5.1.4 Fitting position of the Nord-Lock® securing washers

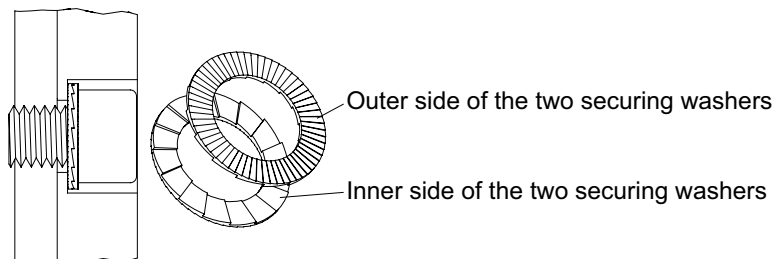


Figure 14: Correct fitting position of the Nord-Lock® securing washers

05662-0009

5.2 Installation of the AFLX and VUPX submersible pumps

A screen must be attached to the inlet of the AFLX submersible mixed flow column pump. The maximum bar spacing depends on the type of hydraulics fitted to the pump and can be obtained from the table below.

Type of hydraulics	Clean water	Runoff water, river water, used water, rain water, pre-screened liquid, recirculation
	Bar spacing in mm	Bar spacing in mm
AFLX 1200	≤ 100	≤ 50
If larger bar spacings are required, please contact Sulzer		

A screen must be attached to the inlet of the VUPX submersible propeller pump. The maximum bar spacing depends on the type of hydraulics fitted to the pump and can be obtained from the table below.

Type of hydraulics	Clean water	Runoff water, river water, used water, rain water	pre-screened liquid, recirculation
	Bar spacing in mm	Bar spacing in mm	Bar spacing in mm
VUPX 0800	≤ 60	≤ 25	≤ 6
VUPX 1000	≤ 80		
VUPX 1200	≤ 80		
If larger bar spacings are required, please contact Sulzer			

ATTENTION When setting the switching off level the minimum cover as given in the installation documents must be adhered to.

5.2.1 Installation examples with AFLX and VUPX submersible pumps

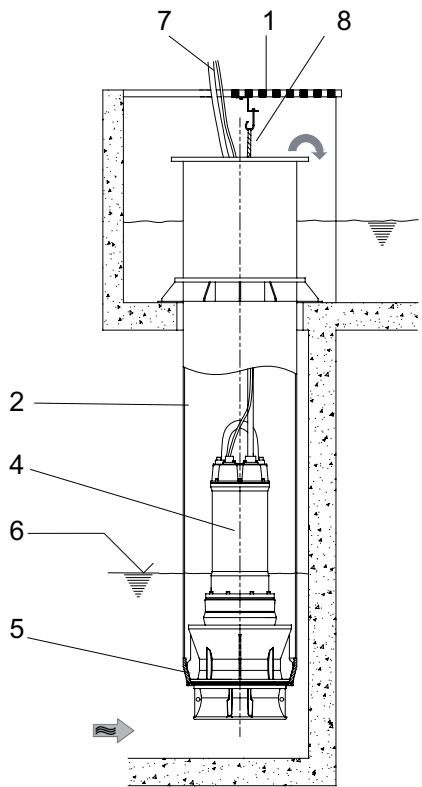


Figure 15a: AFLX/VUPX in a steel discharge pipe

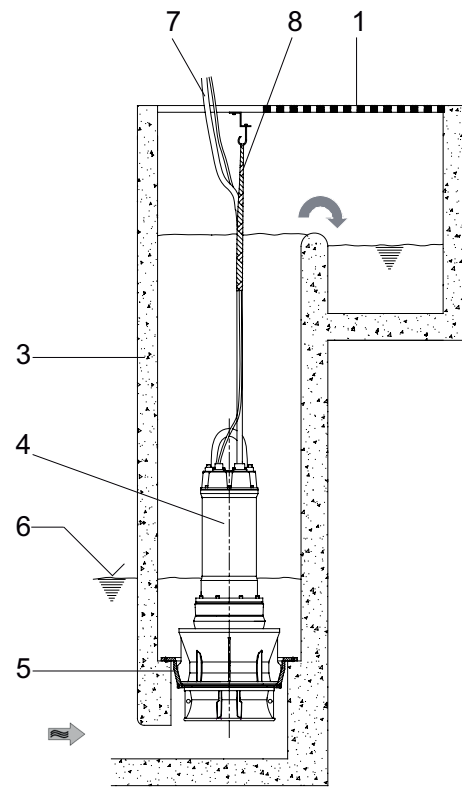


Figure 15b: AFLX/VUPX in a concrete sump

Legend

- | | |
|-------------------------------|---|
| 1 Tank cover | 5 Coupling ring |
| 2 Discharge pipe (riser pipe) | 6 Minimum water level (see installation drawings) |
| 3 Concrete sump | 7 Connection cable |
| 4 AFLX/VUPX submersible pump | 8 Cable support (for fixing the power cable) |

ATTENTION *The power cables should be handled carefully during installation and removal of the pumps in order to avoid damage to the insulation.*

- Fit a hoist to the submersible pump.

The coupling ring required for installation of the AFLX/VUPX submersible pump must already be installed as shown in *Figure 15a and 15b*. Before installation of the pump a suitable support (hook) for the chain, as well as an opening and suspension (cable sock) for the cable must be provided in the sump or riser pipe.

Before or during the installation the motor connection cables should be fitted on site with suitable strain relief (e.g. cable socks). Particular care should be taken that the cable insulation is not crushed or damaged by the weight of the hanging cable especially in the area of the cable inlet.

ATTENTION *When raising the submersible pump out of the concrete sump or the steel discharge pipe with the hoist ensure that the connection cables are lifted out simultaneously as the pump itself is being raised.*

5.2.2 Lowering of the AFLX and VUPX submersible pump into the coupling ring

ATTENTION *Before lowering the pump a direction of rotation check should be carried out.*

- Draw the cable hose over the end of the connection cable.

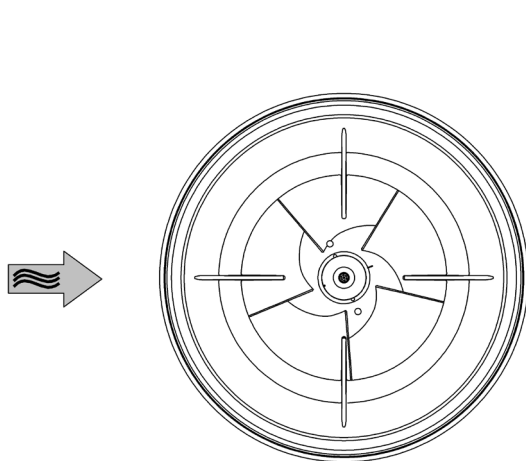


Figure 16: adjustment Bellmouth AFLX

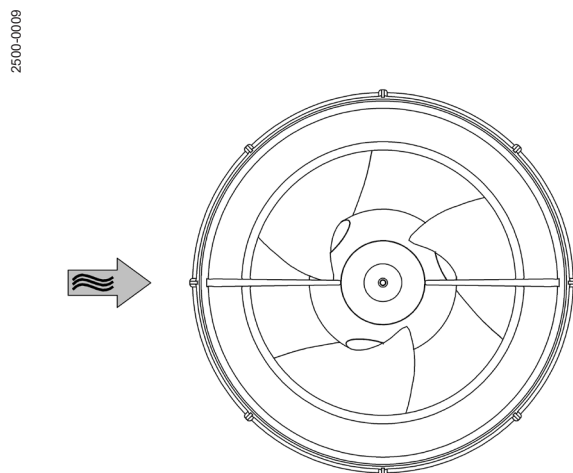


Figure 17: adjustment Bellmouth VUPX

ATTENTION *The steel riser pipe, or concrete sump must be cleaned thoroughly (builder's rubble etc.). To optimise the inflow and to reduce the noise level it is important that one pair of fins of the suction pipe are in line with the main flow direction of the inflow chamber. This must be observed when fitting the pump into a sump or into a steel discharge pipe.*

- Use lifting equipment to slowly lower the submersible mixed flow column/propeller pump into the shaft up to the coupling ring; feed in the motor connecting cable at the same time. The submersible mixed flow column/propeller pump centres itself automatically and leakage-free in the coupling ring.
- Attach the lifting chain to the hook provided so that it cannot strike either the pump cable or the sump wall.
- Tension the pump cable and fasten to the hook provided with the aid of the cable sock. Where a steel pressure pipe is used the connection cable should be brought through the connection cable inlet and sealed off in a watertight manner.



The connection cable should only be tightened sufficiently so that no tension acts at the cable inlet in the head of the pump. The connection cable should not strike the chain or the sump wall.

- If necessary, the steel riser pipe is sealed off in a watertight manner.

6 Electrical connection

Before commissioning, an expert should check that one of the necessary electrical protective devices is available. Earthing, neutral, earth leakage circuit breakers, etc. must comply with the regulations of the local electricity supply authority and a qualified person should check that these are in perfect order.

ATTENTION *The power supply system on site must comply with local regulations with regard to cross-sectional area and maximum voltage drop. The voltage stated on the name-plate of the pump must correspond to that of the mains.*

Suitably rated means of disconnection shall be incorporated in the fixed wiring by the installer for all pumps in accordance with applicable local National codes.



The incoming power supply as well as the connection of the pump itself to the terminals on the control panel must comply with the circuit diagram of the control panel as well as the motor connection diagrams and must be carried out by a qualified person.

Note *Please consult your electrician*

The power supply cable must be protected by an adequately dimensioned slow-blow fuse corresponding to the rated power of the pump.

ATTENTION *The unit should only be operated with the overload relay and thermal sensors/limiters connected.*

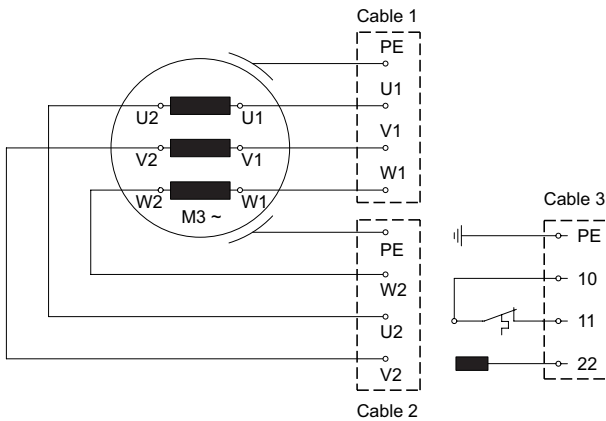


Figure 18: Two power cables and one control cable

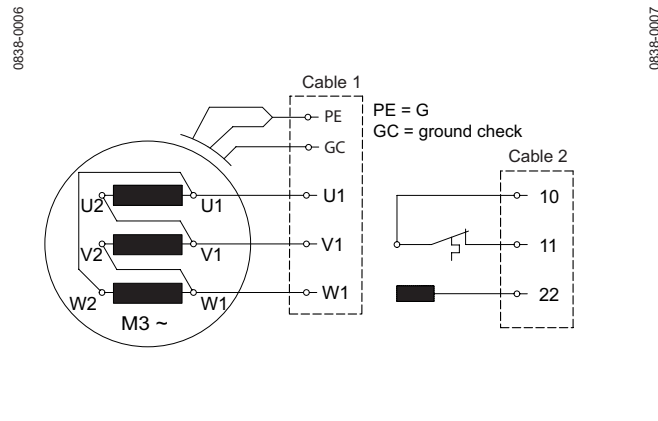


Figure 19: 60 Hz version: One power cable and one control cable

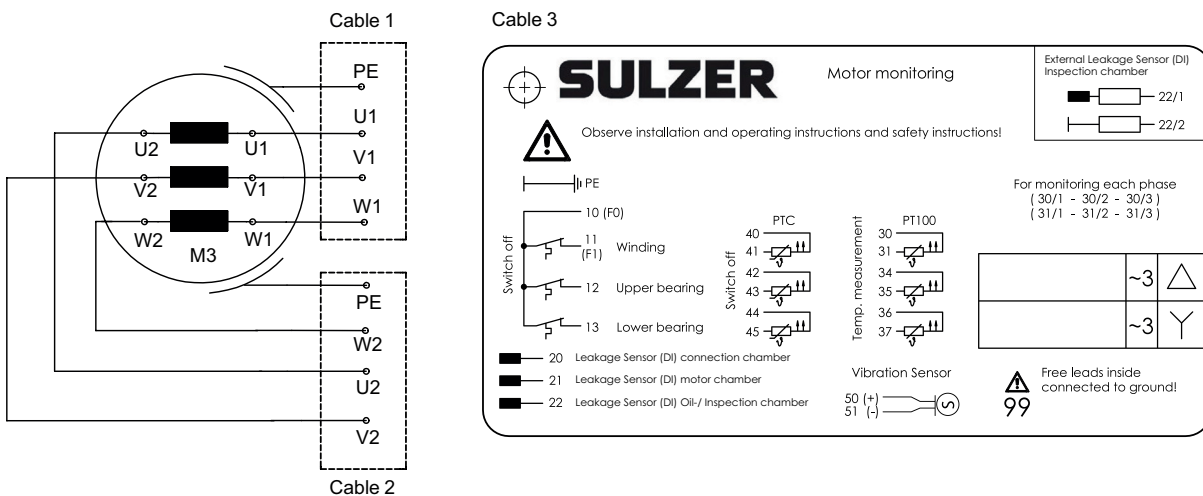


Figure 20: Special versions: two power cables and one control cable - for optional motor monitoring features

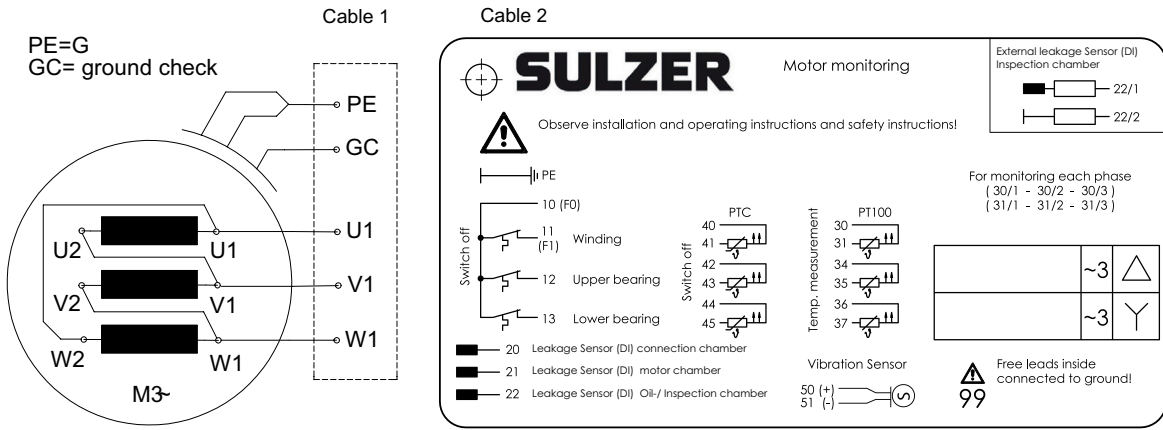


Figure 21: 60 Hz version: one power cable and one control cable - for optional motor monitoring features

ATTENTION The cable leads are routed out of the motor. No switching takes place in the motor! (Exception US-version). Any switching requiring (use of bridges) must be carried out in the control panel.

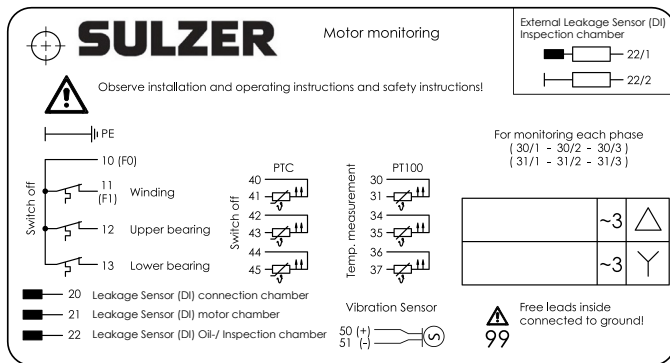
NOTE Information on the type of starting can be obtained from the nameplate of the pump.

6.1 Lead designations

Direct starting in star					<p>0562-0033</p>
	L1	L2	L3	Join	
North America	T1 (U1)*	T2 (V1)*	T3 (W1)*		
Sulzer/Factory Standard	U1	V1	W1	U2 & V2 & W2	
Direct starting in delta					<p>0562-0034</p>
	L1	L2	L3	-	
North America	T1 (U1)*	T2 (V1)*	T3 (W1)*	-	
Sulzer/Factory Standard	U1; W2	V1; U2	W1; V2	-	

*Optional labeling possible.

6.2 Connection of the control circuit leads



2500-0003

Control circuit leads for submersible pumps

- 10 = Common lead
- 11 = Stator upper
- 12 = Bearing upper
- 13 = Bearing lower
- 20 = Leakage sensor (DI) - Connection chamber
- 21 = Leakage sensor (DI) - Motor chamber
- 22 = Leakage sensor (DI) - Inspection chamber

= PE (green/yellow)

Figure 22: Designation of control circuit leads

6.3 Connection of the seal monitoring unit to the control panel

The submersible pumps, depending on execution, are supplied as standard with one or more leakage sensors (DI) for seal monitoring. In order to integrate this seal monitoring function into the control panel of the pump it is necessary to fit a Sulzer DI module and connect this in accordance with the circuit diagrams below.

ATTENTION *If the leakage sensor (DI) is activated the unit must be immediately taken out of service. Please contact your Sulzer service centre.*

6.3.1 Internal leakage sensor (DI)

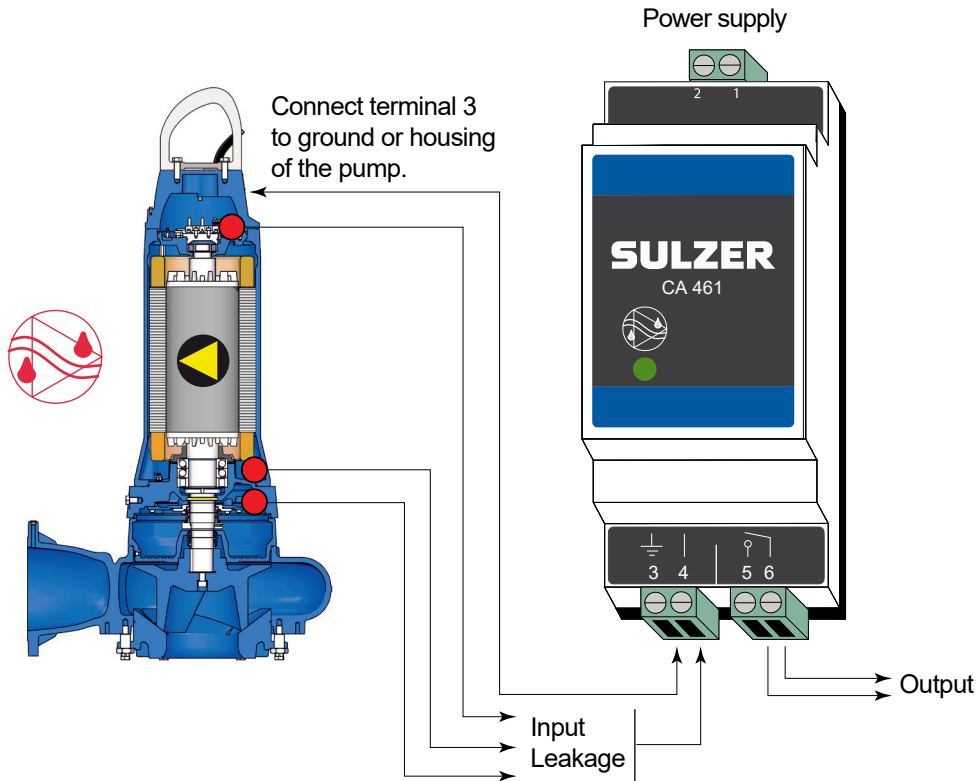


Figure 23: Sulzer leakage control type CA 461

Electronic amplifier for 50/60 Hz

110 -230 V AC (CSA). Part No.: 16907010.

18 - 36 V DC (CSA). Part No.: 16907011.

ATTENTION *Maximum relay contact loading: 2 Ampere*

ATTENTION *It is very important to note that with the connection example above it is not possible to identify which sensor/alarm is being activated. As an alternative Sulzer highly recommends to use a separate CA 461 module for each sensor/input, to allow not only identification but also to prompt to the appropriate response to the alarm category/severity.*

Multiple-input leakage control modules are also available. Please consult with your local Sulzer representative.

6.4 Connecting the EMC cable in the control cabinet



Figure 24: EMC cable in delivery condition.
Cable is stripped!



Figure 25: Strip 30 mm from the EMC cable before connecting to the cable terminal board. Dimension "t" corresponds to the approximate gap from the fastening clip to the cable terminal

NOTICE

Strip approx. 30 mm insulation in the area of the cable terminal before connecting the EMC cable.

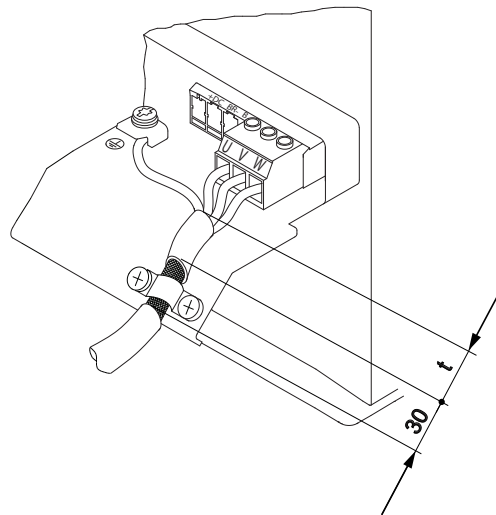


Figure 26: Connecting the EMC cable in the control cabinet

7 Commissioning

Before commissioning, the pump/pump station should be checked and a functional test carried out. Particular attention should be paid to the following:



In explosive zones care must be taken that during switching on and operation of the pumps, the pump section is filled with water (dry running) or alternatively is submerged or under water (wet installation). Ensure in this case that the minimum submergence given in the data sheet is observed, Other types of operation e.g. snore operation or dry running are not allowed.

- Have the electrical connections been carried out in accordance with regulations?
- Have the thermal sensors been connected?
- Is the leakage sensor (where fitted) correctly installed?
- Is the motor overload switch correctly set?
- Have the power and control circuit cables been correctly fitted?
- Was the sump cleaned out?
- Have the inflow and outflows of the pump station been cleaned and checked?
- Is the direction of rotation of the pump correct - even if run via an emergency generator?
- Are the level controls functioning correctly?
- Are the required gate valves (where fitted) open?

XFP

- Do the non-return valves (where fitted) function easily?
- Have the hydraulics been vented in the case of dry-installed pumps?

AFLX/VUPX

- Has the steel riser pipe, or concrete sump be cleaned thoroughly (builder's rubble, etc.)?
- Are any paint remnants removed from the conical surfaces on the pumps or on the coupling ring? Are these conical surfaces to be greased?

7.1 Checking direction of rotation

When three phase units are being commissioned for the first time and also when used on a new site, the direction of rotation must be carefully checked by a qualified person.



When checking the direction of rotation, the submersible pump should be secured in such a manner that no danger to personnel is caused by the rotating impeller, or by the resulting air flow. Do not place your hand into the hydraulic system!



The direction of rotation should only be altered by a qualified person.



When carrying out the direction of rotation check as well as when starting the unit pay attention to the **START REACTION**. This can be very powerful.

ATTENTION

The **direction of rotation** is correct if the impeller/propeller rotates in a **clockwise** manner when viewing down from the top of the placed unit

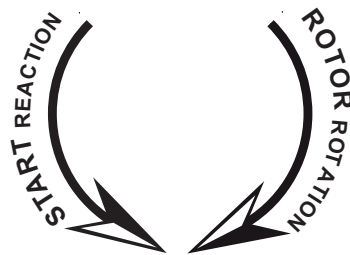


Figure 27: Rotor rotation

ATTENTION

The **start reaction** is **anti clockwise**

NOTE

If a number of pumps are connected to a single control panel then each unit must be individually checked.

ATTENTION

The mains supply to the control panel should have a clockwise rotation. If the leads are connected in accordance with the circuit diagram and lead designations, the direction of rotation will be correct.

8 Maintenance



Before commencing any maintenance work the pump should be completely disconnected from the mains by a qualified person and care should be taken that it cannot be inadvertently switched back on.

General maintenance hints

NOTE

The maintenance hints given here are not designed for “do-it-yourself” repairs as special technical knowledge is required.



Repair work on explosion-proof motors may only be carried out in authorized workshops by qualified personnel using original parts supplied by the manufacturer. Otherwise the Ex-approvals are no longer valid.

Sulzer submersible pumps are reliable quality products each being subjected to careful final inspection. Lubricated-for-life ball bearings, together with monitoring devices, ensure optimum pump reliability provided that the pump has been connected and operated in accordance with the operating instructions.

Should, nevertheless, a malfunction occur, do not improvise but ask your Sulzer customer service department for assistance.

This applies particularly if the pump is continually switched off by the current overload in the control panel, by the thermal sensors/limiters of the thermo-control system, or by the seal monitoring system (DI).

The Sulzer service organisation would be pleased to advise you on any applications you may have and to assist you in solving your pumping problems.

NOTE

The Sulzer warranty conditions are only valid provided that any repair work has been carried out in Sulzer approved workshops and where original Sulzer spare parts have been used.

NOTE

In the case of repair work, “Table 1” from IEC60079-1 may not be applied. In this case please contact Sulzer after sales service!

Maintenance hints if the submersible pump is out of use for a considerable period

NOTE

If the pumps have remained idle for more than twelve months then we recommend that you ask Sulzer or an approved distributor for advice.

Before installation:

The covers giving moisture protection to the cables should only be removed immediately before actual installation of the pump. After the removal of the transport securing devices and before connecting up the pump electrically the motor shaft should be rotated a number of times by turning the impeller or propeller by hand.

After installation:

If, after installation of the submersible pump it remains out of use for prolonged periods (for example in storm water holding tanks), then we recommend that the pump is run for a maximum of 1 minute every 3 months in order to check both its functioning and availability.

Inspection chamber

The oil in the inspection chamber should be checked every 12 months. Change the oil immediately if it is contaminated by water, or if the seal failure monitoring indicates an alarm. If it happens again shortly after the oil has been changed please contact your local Sulzer Service Representative.

Motor chamber

The motor chamber should be inspected every 12 months to ensure it is free from moisture.

8.1 Oil filling

ATTENTION Only use products that are approved by the manufacturer!

8.1.1 Oil filling inspection chamber XFP / AFLX / VUPX.

Motor size	Filling volumes*	
	Vertical installation	Horizontal installation
XFP / A-C	12	9.8
AFLX, VUPX / A-C	7	-
XFP, AFLX, VUPX / D-F	7	7.5
XFP 800X-MX, XFP 801X-CH	2	6.2

* Filling volumes in litres.

HYDRAULIKÖL VG 32 HLP-D (part.nr.: 11030021)

8.1.2 Oil filling XFP

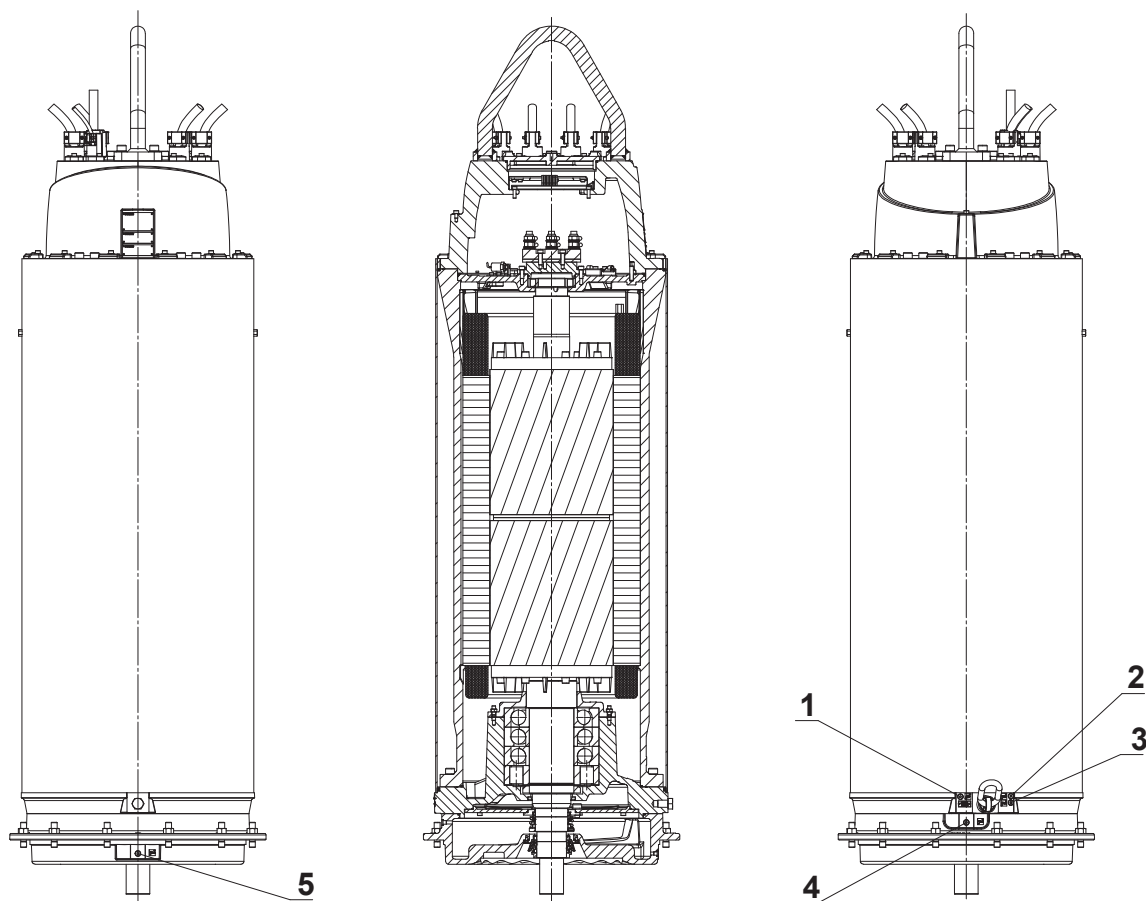


Figure 28: Oil filling and emptying XFP

Legend

- 1 Inspection hole motor chamber
- 2 Oil emptying inspection chamber.
- 3 Oil filling inspection chamber, pump should be in horizontal position! (quantities see 8.1.1)
- 4 Oil filling seal chamber, pump should be in horizontal position! (quantities see 8.1.3)
- 5 Oil emptying seal chamber.

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8.1.3 Lubricant filling quantity seal chamber XFP

Hydraulic	Filling volumes*	
	Vertical Installation	Horizontal Installation
XFP 400T-CH	29	24.7
XFP 500U-CH	42.5	31.6
XFP 600V-CH	36	30.5
XFP 600X-SK	42	35
XFP 800X-MX	28.8	24.3
XFP 801X-CH	28.8	24.3

* Filling volumes in litres.

HYDRAULIKÖL VG 32 HLP-D (part.nr.: 11030021)

8.1.4 Oil filling VUPX / AFLX

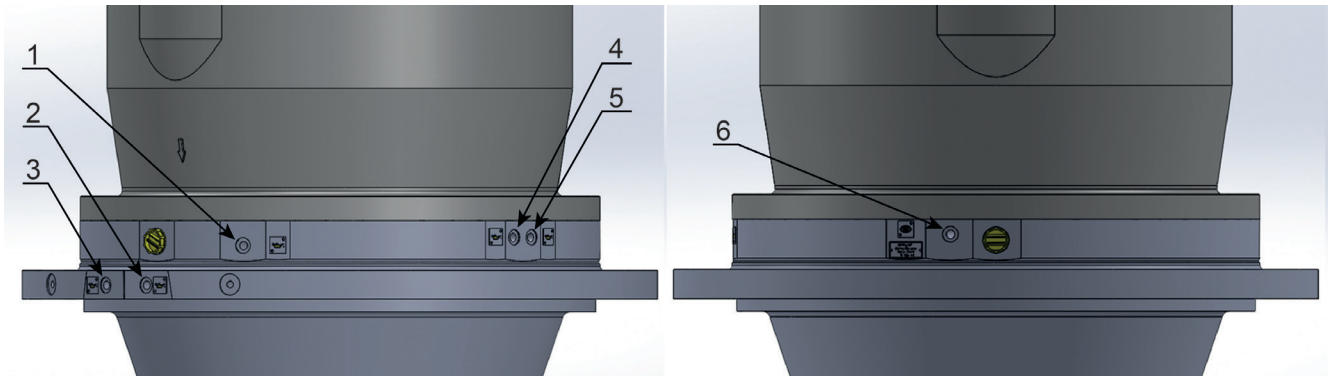


Figure 29: Oil filling and emptying VUPX / AFLX

Legend

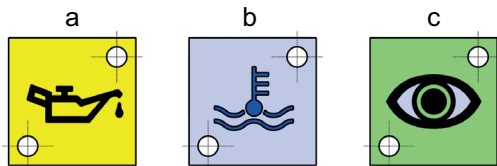
- 1 Levels inspection port inspection chamber.
- 2 Levels inspection port and venting for seal chamber.
- 3 Oil emptying / filling seal chamber.
Emptying: Pump should be in a horizontal position, or vertical using a small pump and hose.
Filling: Pump should be in a vertical position (quantities see 8.1.5).
- 4 Inspection port and venting for inspection chamber.
- 5 Inspection port and venting for inspection chamber.
- 6 Inspection port for motor housing.

8.1.5 Lubricant filling quantity seal chamber VUPX / AFLX

Axial hydraulics	
Hydraulics	
VUPX 0800	10.5
VUPX 1000/1200	25
AFLX 0800/1200	25
Filling volumes in litres VG 32 (11030021)	

Axial hydraulics with gear unit		
Hydraulic	Filling quantity	Gear unit filling quantity
VUPX1000G	5.3	52*
VUPX1200G		
AFLX1200G		
Filling volumes in litres VG 32 (11030021); * Filling volumes in litres, Rivolta S.G.L 220 part. nr.:11030094		

8.1.6 Symbols



Legend

- a Fill with or drain oil.
- b Fill with or drain coolant.
- c Visual inspection

Figure 30: Symbols

8.2 Starting frequency of the motors

The allowable starting frequency per hour can be read from the table below (where not otherwise specified from the factory). However, the maximum number of starts according to the motor datasheet may not be exceeded.

maximum starts per hour	at interval in minutes
15	4

ATTENTION The allowable starting frequency for any starting devices should be obtained from the manufacturer of these devices.

8.3 Removal of the submersible sewage pump



The safety hints in the previous sections must be observed!

8.3.1 Removal of the XFP submersible sewage pump from a wet sump



Before removal of the unit the motor connection cables at the control panel should be completely disconnected from the mains by a qualified person and care should be taken that it cannot be inadvertently switched back on.



Before removal of units in hazardous areas the sump and surrounding area must be adequately vented to avoid the danger of a spark causing an explosion!

- Fit a hoist to the pump.
- Raise the submersible pump out of the sump with the hoist. While doing this the connection cables should be simultaneously drawn out of the sump as the pump itself is being raised.
- Place the submersible sewage pump vertically onto a firm surface and secure against tipping.

8.3.2 Removal of the XFP submersible sewage pump when dry-installed

- Close off the gate valves on the inlet and discharge sides.
- Empty the volute and, if necessary, the discharge line.
- If fitted, dismantle the venting line above the discharge.
- Install lifting gear on the submersible pump.
- Disconnect the suction inlet by opening the bolts on the bottom plate of the hydraulics (or at the pump housing).
- Dismantle the pressure hose by loosening the screws on the pressure flange of the pump housing.
- If necessary, remove the fastening bolts at the ground support ring and carefully lift off the pump with the hoist.
- Place the pump on an even, firm, flat surface.

8.3.3 Removal of the AFLX and VUPX submersible pump

- If present, the discharge pipe cover should be removed and the water-pressure-tight cable inlet opened.
- Raise the submersible pump out of the concrete sump or the steel discharge pipe with the hoist. While doing this the connection cables should be drawn out as the pump itself is being raised.
- Place the submersible pump with propeller housing vertically on a solid surface, taking care that it cannot tip over.

