



# Hart Engineering Corporation

**SUBMITTAL:**  
11301-03

**PROJECT:** 9950. - Veolia/Taunton WWTP Improvements Phase 2

**DATE:** 05/30/2023

**SUBMITTAL:** 11301-03 - Submersible Mixer - O&M Manual

**REVISION:** 0

**STATUS:** Eng

**SPEC #:** 11301

**TO:**  
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Item	Revision	Description	Status	Date Sent	Date Returned
11301-03	0	Submersible Mixers - O&M Manual	Eng	05/30/2023	
Notes:					

Additional Notes:

**Status Codes**

- 1-APP – No Exceptions Taken
- 2-ANR – Make Corrections Noted
- 3-R&R – Revise and Resubmit
- 4-REJ – Rejected
- 5-IPO – For Information Purposes Only
- 6-NRR – Not Required for Review
- ENG – Submitted to Engineer

Sincerely,  
Hart Engineering Corporation

DATE: \_\_\_\_\_ 05/30/2023 \_\_\_\_\_

**CITY OF TAUNTON**

**WWTF PHASE 2 IMPROVEMENTS**

**OPERATION AND MAINTENANCE MANUAL  
SUBMERSIBLE MIXERS  
SECTION 11301**

**SULZER/ABS MODEL RW 4024 A46/8 EC  
SULZER/ABS MODEL RW 6522 A60/12 EC  
SULZER/ABS MODEL XRW 3031 PA35/6 EC**

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**SECTION 1**

**GENERAL INFORMATION**

## **SULZER/ABS SUBMERSIBLE MIXERS**

### Mixer Nameplate Data – Swing Zone 1

Manufacturer: Sulzer/ABS

Model: RW 4024 A46/8

Serial No.: 300849854; 300849855; 300849856; 300849857; 300849858; 300849859

HP: 6.2

RPM: 841

Voltage: 480

Phase: 3

Hz: 60

FLA: 10.3

### Mixer Nameplate Data – Swing Zone 2

Manufacturer: Sulzer/ABS

Model: RW 6522 A60/12

Serial No.: 300849860; 300849861

HP: 8.0

RPM: 571

Voltage: 480

Phase: 3

Hz: 60

FLA: 17.5

### Mixer Nameplate Data – Anoxic Zones 1&2

Manufacturer: Sulzer/ABS

Model: XRW 3031 PA35/6

Serial No.: 300849860; 300849861

HP: 4.7

RPM: 1169

Voltage: 480

Phase: 3

Hz: 60

FLA: 6.9

### Manufacturer Contact Information

Sulzer/ABS

108 Leigus Road, Suite 1180

Wallingford, CT 06492 USA

(203) 238-2700 (T)

(203) 238-0738 (F)

**FOR PARTS AND SERVICE CONTACT THE LOCAL SULZER/ABS SALES REPRESENTATIVE:**

Carlsen Systems, LLC  
41 Crossroads Plaza  
West Hartford, CT 06117  
[www.carlsensystems.com](http://www.carlsensystems.com)  
[info@carlsensystems.com](mailto:info@carlsensystems.com)  
(203) 663-1314

**SECTION 2**  
**SCOPE OF SUPPLY**

## SCOPE OF SUPPLY

### 1. Anoxic Mixer Zones 1&2

Four (4) ABS Model XRW 3031 PA35/6 submersible mixers as follows:

- 4.7 HP, 1169 RPM
- 460/3/60, Class H Insulation
- Cast iron motor housing
- 329 SS propeller
- 32 FT power/control cable
- Factory Performance Testing
  - ISO 21630 Thrust Test
  - Works Certificate

Accessories:

- Four (4) 316 SS guide rail assemblies (floor mount bracket, upper bracket, two custom intermediate brackets)
- Four (4) 316 SS 2"x2" square guide masts, 20 FT
- Four (4) power cable support kits
- Four (4) CA462 Relays for moisture and overtemp

Spare Parts:

- Four (4) Repair Kits

### 2. Swing Zone 1 Mixers

Two (2) ABS Model RW 4024 A46/8 submersible mixers as follows:

- 6.2 HP, 841 RPM
- 460/3/60, Class H Insulation
- Cast iron motor housing
- 316 SS propeller
- 32 FT power/control cable
- Factory Performance Testing
  - ISO 21630 Thrust Test
  - Works Certificate

Accessories:

- Two (2) 316 SS guide rail assemblies (floor mount bracket, upper bracket, custom intermediate bracket)
- Two (2) 316 SS 4"x4" square guide masts, 20 FT
- Two (2) power cable support kits
- Two (2) CA462 Relays for moisture and overtemp



Spare Parts:

- Two (2) Repair Kits

### **3. Swing Zone 2 Mixers**

Two (2) ABS Model RW 6522 A60/12 submersible mixers as follows:

- 8 HP, 571 RPM
- 460/3/60, Class H insulation
- Cast iron motor housing
- 316 SS propeller
- 32 FT power/control cable
- Factory Performance Testing
  - ISO 21630 Thrust Test
  - Works Certificate

Accessories:

- Two (2) 316 SS guide rail assemblies (floor mount bracket, custom upper bracket, custom intermediate bracket)
- Two (2) 316 SS 4"x4" square guide masts, 20 FT
- Two (2) power cable support kits
- Two (2) CA462 Relays for moisture and overtemp

Spare Parts:

- Two (2) Repair Kits

### **4. Secondary Anoxic Zones 1 and 2 Mixers**

Four (4) ABS Model RW 4024 A46/8 submersible mixers as follows:

- 6.2 HP, 841 RPM
- 460/3/60, Class H insulation
- Cast iron motor housing
- 316 SS propeller
- 32 FT power/control cable
- Factory Performance Testing
  - ISO 21630 Thrust Test
  - Works Certificate

Accessories:

- Four (4) 316 SS guide rail assemblies (floor mount bracket, upper bracket, intermediate bracket)
- Four (4) 316 SS 4"x4" square guide masts, 20 FT
- Four (4) power cable support kits

- Four (4) CA462 Relays for moisture and overtemp

Spare Parts:

- Four (4) Repair Kits

**SECTION 3**

**FACTORY TEST DATA**

**SULZER/ABS MODEL XRW 3031 PA35/6 EC**

**SN 300849850**

**SN 300849851**

**SN 300849852**

**SN 300849853**



# WORKS TEST CERTIFICATE



DIN 55350-18-4.2.2

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**Description** XRW3031-PA35/6STD-480/60  
**Item Number:** MX34818D1211A31  
**Serial Number** 300849850  
**Order Number IEM:** 843901      **Customer Reference:** 2107-2517-2  
**Shop Order** 3477800  
**Test Date** 09/11/2022

**MOTOR**

<b>Voltage</b>	480	V
<b>Phase</b>	3	
<b>Frequency</b>	60	Hz
<b>Power P1 (Rated)</b>	4.1	kW
<b>Power P2 (Rated)</b>	4.7	HP
<b>Current (Rated)</b>	6.9	A
<b>Current - Dry Run (Tested) U</b>	3.29	A
<b>Current - Dry Run (Tested) V</b>	3.36	A
<b>Current - Dry Run (Tested) W</b>	3.33	A
<b>Nominal Speed (Rated)</b>	1169	RPM
<b>Cable Length</b>	10	m
<b>High Voltage Test</b>	Pass	
<b>Leakage Test</b>	Pass	
<b><u>MIXER</u></b>		
<b>Propeller Diameter</b>	300	mm

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**Issued by:** Gary Nolan      Sulzer Pump Solutions Ireland Ltd.  
Quality Assurance Department      Clonard Road,  
17 November 2022      Wexford,  
Ireland. [www.sulzer.com](http://www.sulzer.com)



# WORKS TEST CERTIFICATE



DIN 55350-18-4.2.2

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**Description** XRW3031-PA35/6STD-480/60  
**Item Number:** MX34818D1211A31  
**Serial Number** 300849851  
**Order Number IEM:** 843901      **Customer Reference:** 2107-2517-2  
**Shop Order** 3477800  
**Test Date** 09/11/2022

**MOTOR**

<b>Voltage</b>	480	V
<b>Phase</b>	3	
<b>Frequency</b>	60	Hz
<b>Power P1 (Rated)</b>	4.1	kW
<b>Power P2 (Rated)</b>	4.7	HP
<b>Current (Rated)</b>	6.9	A
<b>Current - Dry Run (Tested) U</b>	3.30	A
<b>Current - Dry Run (Tested) V</b>	3.35	A
<b>Current - Dry Run (Tested) W</b>	3.33	A
<b>Nominal Speed (Rated)</b>	1169	RPM
<b>Cable Length</b>	10	m
<b>High Voltage Test</b>	Pass	
<b>Leakage Test</b>	Pass	
<b><u>MIXER</u></b>		
<b>Propeller Diameter</b>	300	mm

---

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# WORKS TEST CERTIFICATE



DIN 55350-18-4.2.2

---

**Description** XRW3031-PA35/6STD-480/60  
**Item Number:** MX34818D1211A31  
**Serial Number** 300849852  
**Order Number IEM:** 843901      **Customer Reference:** 2107-2517-2  
**Shop Order** 3477800  
**Test Date** 09/11/2022

**MOTOR**

<b>Voltage</b>	480	V
<b>Phase</b>	3	
<b>Frequency</b>	60	Hz
<b>Power P1 (Rated)</b>	4.1	kW
<b>Power P2 (Rated)</b>	4.7	HP
<b>Current (Rated)</b>	6.9	A
<b>Current - Dry Run (Tested) U</b>	3.29	A
<b>Current - Dry Run (Tested) V</b>	3.35	A
<b>Current - Dry Run (Tested) W</b>	3.32	A
<b>Nominal Speed (Rated)</b>	1169	RPM
<b>Cable Length</b>	10	m
<b>High Voltage Test</b>	Pass	
<b>Leakage Test</b>	Pass	
<b><u>MIXER</u></b>		
<b>Propeller Diameter</b>	300	mm

---

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# WORKS TEST CERTIFICATE



DIN 55350-18-4.2.2

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**Description** XRW3031-PA35/6STD-480/60  
**Item Number:** MX34818D1211A31  
**Serial Number** 300849853  
**Order Number IEM:** 843901      **Customer Reference:** 2107-2517-2  
**Shop Order** 3477800  
**Test Date** 09/11/2022

**MOTOR**

<b>Voltage</b>	480	V
<b>Phase</b>	3	
<b>Frequency</b>	60	Hz
<b>Power P1 (Rated)</b>	4.1	kW
<b>Power P2 (Rated)</b>	4.7	HP
<b>Current (Rated)</b>	6.9	A
<b>Current - Dry Run (Tested) U</b>	3.30	A
<b>Current - Dry Run (Tested) V</b>	3.35	A
<b>Current - Dry Run (Tested) W</b>	3.35	A
<b>Nominal Speed (Rated)</b>	1169	RPM
<b>Cable Length</b>	10	m
<b>High Voltage Test</b>	Pass	
<b>Leakage Test</b>	Pass	
<b><u>MIXER</u></b>		
<b>Propeller Diameter</b>	300	mm

---

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**SULZER/ABS MODEL RW 4024 A46/8 EC**

**SN 300849854**

**SN 300849855**

**SN 300849856**

**SN 300849857**

**SN 300849858**

**SN 300849859**



# WORKS TEST CERTIFICATE



DIN 55350-18-4.2.2

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**Description** RW4024-A46/8STD-460\_480/60  
**Item Number:** M4B4312N2F1TA13  
**Serial Number** 300849854  
**Order Number IEM:** 843901      **Customer Reference:** PO: 2107-2517-2  
**Shop Order** 3476749  
**Test Date** 29/03/2023

**MOTOR**

**Voltage** 460 V  
**Phase** 3  
**Frequency** 60 Hz  
**Power P1 (Rated)** 6 kW  
**Power P2 (Rated)** 4.6 kW  
**Current (Rated)** 10.3 A  
**Current - Dry Run (Tested) U** 6.17 A  
**Current - Dry Run (Tested) V** 6.14 A  
**Current - Dry Run (Tested) W** 6.11 A

**Nominal Speed (Rated)** 841 RPM  
**Cable Length** 10 m  
**High Voltage Test** Pass  
**Leakage Test** Pass

**MIXER**

**Propeller Diameter** 400 mm

---

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# WORKS TEST CERTIFICATE



DIN 55350-18-4.2.2

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**Description** RW4024-A46/8STD-460\_480/60  
**Item Number:** M4B4312N2F1TA13  
**Serial Number** 300849855  
**Order Number IEM:** 843901      **Customer Reference:** PO: 2107-2517-2  
**Shop Order** 3476749  
**Test Date** 29/03/2023

## MOTOR

**Voltage** 460 V  
**Phase** 3  
**Frequency** 60 Hz  
**Power P1 (Rated)** 6 kW  
**Power P2 (Rated)** 4.6 kW  
**Current (Rated)** 10.3 A  
**Current - Dry Run (Tested) U** 6.10 A  
**Current - Dry Run (Tested) V** 6.16 A  
**Current - Dry Run (Tested) W** 6.13 A

**Nominal Speed (Rated)** 841 RPM  
**Cable Length** 10 m  
**High Voltage Test** Pass  
**Leakage Test** Pass

## MIXER

**Propeller Diameter** 400 mm

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# WORKS TEST CERTIFICATE



DIN 55350-18-4.2.2

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**Description** RW4024-A46/8STD-460\_480/60  
**Item Number:** M4B4312N2F1TA13  
**Serial Number** 300849856  
**Order Number IEM:** 843901      **Customer Reference:** PO: 2107-2517-2  
**Shop Order** 3476749  
**Test Date** 31/03/2023

**MOTOR**

**Voltage** 460 V  
**Phase** 3  
**Frequency** 60 Hz  
**Power P1 (Rated)** 6 kW  
**Power P2 (Rated)** 6.17 HP  
**Current (Rated)** 10.3 A  
**Current - Dry Run (Tested) U** 6.23 A  
**Current - Dry Run (Tested) V** 6.20 A  
**Current - Dry Run (Tested) W** 6.17 A

**Nominal Speed (Rated)** 841 RPM  
**Cable Length** 10 m  
**High Voltage Test** Pass  
**Leakage Test** Pass

**MIXER**

**Propeller Diameter** 400 mm

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# WORKS TEST CERTIFICATE



DIN 55350-18-4.2.2

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**Description** RW4024-A46/8STD-460\_480/60  
**Item Number:** M4B4312N2F1TA13  
**Serial Number** 300849857  
**Order Number IEM:** 843901      **Customer Reference:** PO: 2107-2517-2  
**Shop Order** 3476749  
**Test Date** 31/03/2023

**MOTOR**

<b>Voltage</b>	460	V
<b>Phase</b>	3	
<b>Frequency</b>	60	Hz
<b>Power P1 (Rated)</b>	6	kW
<b>Power P2 (Rated)</b>	6.17	HP
<b>Current (Rated)</b>	10.3	A
<b>Current - Dry Run (Tested) U</b>	6.29	A
<b>Current - Dry Run (Tested) V</b>	6.29	A
<b>Current - Dry Run (Tested) W</b>	6.27	A
<b>Nominal Speed (Rated)</b>	841	RPM
<b>Cable Length</b>	10	m
<b>High Voltage Test</b>	Pass	
<b>Leakage Test</b>	Pass	
<b><u>MIXER</u></b>		
<b>Propeller Diameter</b>	400	mm

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# WORKS TEST CERTIFICATE



DIN 55350-18-4.2.2

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**Description** RW4024-A46/8STD-460\_480/60  
**Item Number:** M4B4312N2F1TA13  
**Serial Number** 300849858  
**Order Number IEM:** 843901      **Customer Reference:** PO: 2107-2517-2  
**Shop Order** 3476749  
**Test Date** 29/03/2023

**MOTOR**

**Voltage** 460 V  
**Phase** 3  
**Frequency** 60 Hz  
**Power P1 (Rated)** 6 kW  
**Power P2 (Rated)** 4.6 kW  
**Current (Rated)** 10.3 A  
**Current - Dry Run (Tested) U** 6.57 A  
**Current - Dry Run (Tested) V** 6.55 A  
**Current - Dry Run (Tested) W** 6.55 A

**Nominal Speed (Rated)** 841 RPM  
**Cable Length** 10 m  
**High Voltage Test** Pass  
**Leakage Test** Pass

**MIXER**

**Propeller Diameter** 400 mm

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# WORKS TEST CERTIFICATE



DIN 55350-18-4.2.2

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**Description** RW4024-A46/8STD-460\_480/60  
**Item Number:** M4B4312N2F1TA13  
**Serial Number** 300849859  
**Order Number IEM:** 843901      **Customer Reference:** PO: 2107-2517-2  
**Shop Order** 3476749  
**Test Date** 28/03/2023

**MOTOR**

**Voltage** 460 V  
**Phase** 3  
**Frequency** 60 Hz  
**Power P1 (Rated)** 6 kW  
**Power P2 (Rated)** 4.6 kW  
**Current (Rated)** 10.3 A  
**Current - Dry Run (Tested) U** 6.46 A  
**Current - Dry Run (Tested) V** 6.51 A  
**Current - Dry Run (Tested) W** 6.48 A

**Nominal Speed (Rated)** 841 RPM  
**Cable Length** 10 m  
**High Voltage Test** Pass  
**Leakage Test** Pass

**MIXER**

**Propeller Diameter** 400 mm

---

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**SULZER/ABS MODEL RW 6522 A60/12 EC**

**SN 300849860**

**SN 300849861**



# WORKS TEST CERTIFICATE



DIN 55350-18-4.2.2

---

**Description** RW6522-A60/12STD-460\_480/60  
**Item Number:** M6B2312N1L1TA13  
**Serial Number** 300849860  
**Order Number IEM:** 843901      **Customer Reference:** PO:2107-2517-2  
**Shop Order** 3477247  
**Test Date** 28/03/2023

**MOTOR**

**Voltage** 460 V  
**Phase** 3  
**Frequency** 60 Hz  
**Power P1 (Rated)** 8 kW  
**Power P2 (Rated)** 8.00 HP  
**Current (Rated)** 17.5 A  
**Current - Dry Run (Tested) U** 13.83 A  
**Current - Dry Run (Tested) V** 13.95 A  
**Current - Dry Run (Tested) W** 13.93 A

**Nominal Speed (Rated)** 571 RPM  
**Cable Length** 10 m  
**High Voltage Test** Pass  
**Leakage Test** Pass

**MIXER**

**Propeller Diameter** 580 mm

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# WORKS TEST CERTIFICATE



DIN 55350-18-4.2.2

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**Description** RW6522-A60/12STD-460\_480/60  
**Item Number:** M6B2312N1L1TA13  
**Serial Number** 300849861  
**Order Number IEM:** 843901      **Customer Reference:** PO:2107-2517-2  
**Shop Order** 3477247  
**Test Date** 28/03/2023

**MOTOR**

**Voltage** 460 V  
**Phase** 3  
**Frequency** 60 Hz  
**Power P1 (Rated)** 8 kW  
**Power P2 (Rated)** 8.00 HP  
**Current (Rated)** 17.5 A  
**Current - Dry Run (Tested) U** 13.82 A  
**Current - Dry Run (Tested) V** 13.81 A  
**Current - Dry Run (Tested) W** 13.87 A

**Nominal Speed (Rated)** 571 RPM  
**Cable Length** 10 m  
**High Voltage Test** Pass  
**Leakage Test** Pass

**MIXER**

**Propeller Diameter** 580 mm

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## **SECTION 4**

# **RECOMMENDED MAINTENANCE AND TROUBLE SHOOT GUIDE**

**RECOMMENDED MAINTENANCE SCHEDULE  
SULZER/ABS SUBMERSIBLE MIXER**

Maintenance Operation	Frequency	Description
Perform general inspection	Every 6 months	Inspect power and control cable for damage. Inspect lifting devices. Remove mixer from tank and perform visual inspection. Remove any fibrous material.
Jog any idle unit	Every month	Any mixer that does not operate regularly should be operated in manual mode.
Check current draw	Every 6 months	Record current draw. Record incoming phase-to-phase voltage.
Check moisture detection probe	Every 6 months	Use megohmmeter at 250 volt scale or 500 volt scale to check resistance between moisture detection probe lead and mixer ground lead. Moisture detection relay energizes at 0.1 megohms. If measured resistance is less than 1.0 megohm, schedule unit to be removed from service for repair. If measured resistance is between 1.0 megohm and 10 megohms, continue to monitor on a regular basis.*  If the moisture detection relay is energized but the measured resistance is greater than 0.1 megohms, then replace the relay.

**IMPORTANT SAFETY NOTES**

- 1) The procedures above should only be performed by qualified and properly trained personnel. Proper safety measures must be taken and proper personal protective equipment must be utilized. If qualified personnel are not available, contact your local authorized Sulzer/ABS distributor.
- 2) Always follow lockout/tagout procedures

\* To obtain accurate data, this test must be performed with a megohmmeter. A megohmmeter should only be used by qualified and properly trained personnel.



**TROUBLESHOOTING GUIDE**  
**SULZER/ABS SUBMERSIBLE MIXERS**

<b>Fault</b>	<b>Cause</b>	<b>Troubleshooting Steps</b>
Excessive noise or vibration	Fibrous material around propeller or caught between propeller and coupling ring  Bearing failure  Inadequate submergence	Remove material.  Remove mixer and rebuild with new bearings and mechanical seals.  A vortex can form if adequate submergence is not maintained. If a surface vortex is observed, raise the tank fluid level and contact the local Sulzer distributor for additional guidance.
Moisture alarm	Water in seal chamber  Damaged cable  Moisture in junction box	Use megohmmeter at 250 volt scale to check resistance between seal fail probe lead and mixer ground lead. Seal fail relay energizes at 0.1 megohms. If measured resistance is between 1 megohm and 10 megohms, continue to monitor seal probe lead resistance on a regular basis.  Check cable for damage and possible moisture ingress.  If moisture probe leads are connected in a junction box, check junction box for moisture.
Motor overtemperature alarm	Temperature switch in stator is open	Use multimeter to check motor overtemperature leads for continuity.
Mixer does not run	Moisture alarm shutdown  Motor overtemperature alarm shutdown  Stator failure  Bearing failure	If moisture alarm is active and it is tied into the mixer run circuit, see "moisture alarm" troubleshooting steps above.  If motor overtemperature alarm is active and it is tied into the mixer run circuit, see "motor overtemperature alarm" troubleshooting steps above.  If stator failure is suspected, contact local Sulzer/ABS distributor. Evaluation of stator requires proper test equipment and must be performed by qualified personnel.  Check if propeller can spin freely. If not, mixer should be scheduled for service.
High current draw	Fibrous material around propeller or caught between impeller and coupling ring  Low or unbalanced voltage	Remove material.  Check incoming power.

**IMPORTANT SAFETY NOTES**

- 1) The procedures above should only be performed by qualified and properly trained personnel. Proper safety measures must be taken and proper personal protective
- 2) Always follow lockout/tagout procedures

\* This test must be performed with a megohmmeter to obtain accurate data. A megohmmeter should only be used by qualified and properly trained personnel.

**SECTION 5**

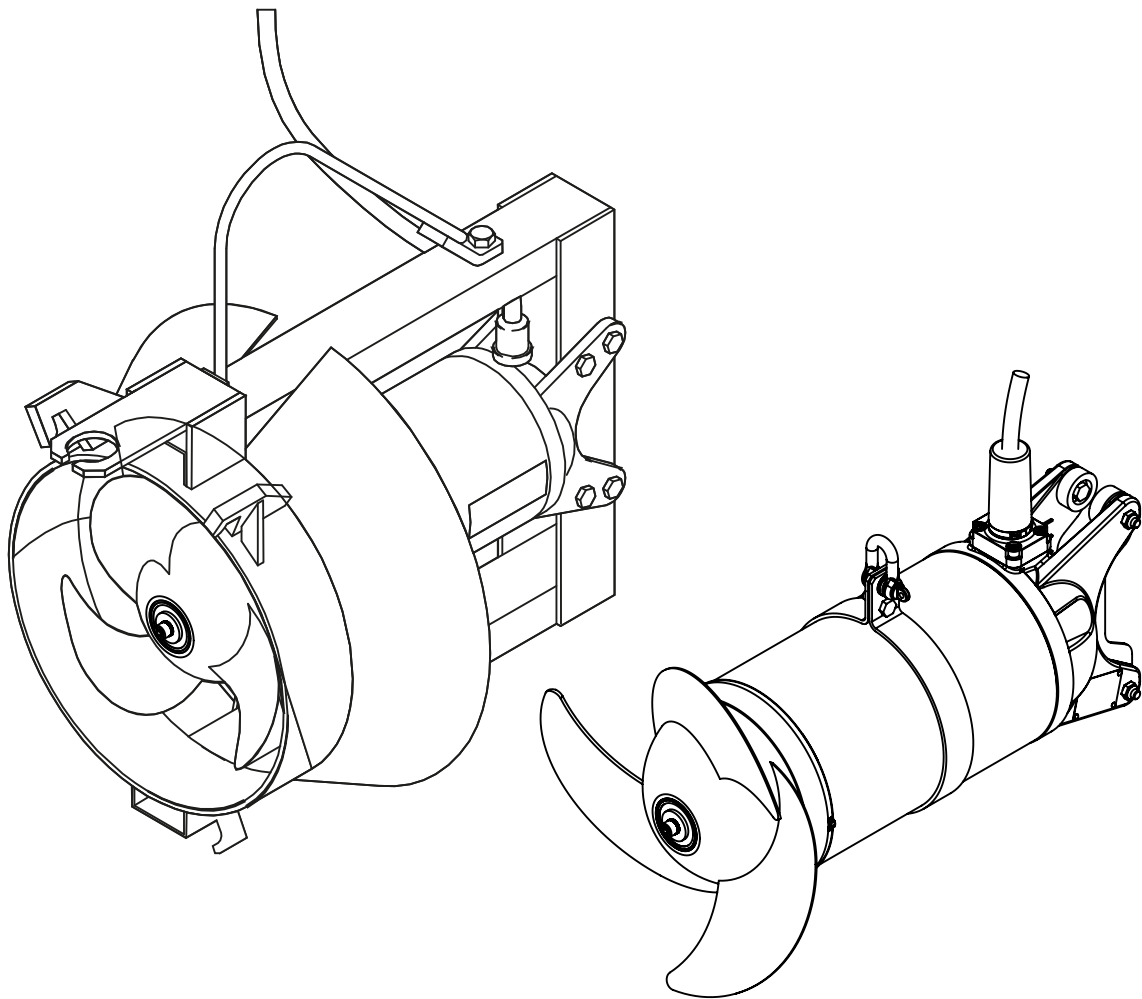
**OPERATION & MAINTENANCE INSTRUCTIONS**

**RW**

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**Submersible Mixer Type ABS RW 400 and 650 [NG]**  
~~**Submersible Recirculation Pump Type ABS RCP 400 and 500 [NG]**~~

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1549-01

## Installation and Operating Instructions (Original Instructions)

Submersible mixer RW [NG] and submersible recirculation pump RCP [NG]

RW 400	RW 650
RCP 400	RCP 500

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# 1 General

## 1.1 Introduction

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 instructions, the non-observance of which could damage the unit or affect its functioning.*

**NOTE**              *Used for important pieces of information.*

## 1.2 Correct usage of the products

Sulzer products have been designed and built in accordance with the latest technology and taking into account the relevant safety regulations. However, improper usage could cause a danger to life or limb of the user or a third party, or cause damage or function impairment to the unit itself and other items of value.

Sulzer units should only be used if they are in perfect technical condition, taking into account all safety requirements and conscious of the need to avoid potential dangers. The contents of the **Installation and Operating Instructions** and the **Safety Instructions for Sulzer Products Type ABS** must be applied! Any other usage (abnormal usage) or usage beyond that specified will be considered as non-compliance. The manufacturer/supplier will not accept any responsibility for damage due to this. The risk is borne by the user. In case of doubt the entire scope of the planned application must be approved by **Sulzer Pump Solutions Ireland Ltd.** (in the following called Sulzer).

In the case of any faults arising, Sulzer units should immediately be taken out of use and secured. The fault should be immediately rectified, or if necessary, contact your Sulzer Service Centre.

## 1.3 Application restrictions of RW / RCP

The RW / RCP can be supplied both in standard versions and in explosion-proof execution (ATEX II 2G Ex 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 80038-36:2016, or FM approval for 60 Hz (NEC 500. Class I, Division 1. Group C&D. T3C).

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

**ATTENTION**      *If cable length is less than 20 m / 65 ft, the max. immersion depth reduces accordingly. In special cases an immersion depth greater than 20 m / 65 ft is possible. However, the maximum number of starts according to the motor datasheet may not be exceeded. In order to do this you need written approval from the manufacturer Sulzer.*



Pumping of flammable or explosive liquids with these pumps is not allowed!



Only explosion-proof executions may be used in hazardous areas!

### **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 unit it is submerged or under water. Other types of operation e.g. snore operation or dry running are not allowed!

**ATTENTION** *RW / RCP mixers with Ex d IIB T4 approval are not equipped with a DI in the oil chamber.*

**ATTENTION** *RW 400 / 650 and RCP 400/500 with FM approval (NEC 500) are equipped with a DI in the oil chamber.*

### **For the operation of RW / RCP Ex the following applies:**

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

The temperature monitoring of the RW / RCP Ex 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 and FM 3650.

### **For the operation of RW / RCP Ex with frequency inverter the following applies:**

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 and FM 3650.

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

In the event that the pump is to be operated in explosive atmospheres using a variable speed drive, please contact your local Sulzer representative for technical advice regarding the various approvals and standards concerning thermal overload protection.

**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** *If repair work is carried out in an unauthorized workshop and 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 figures 7 and 8) has to be removed.*

## **1.4 Application areas**

### **1.4.1 Application areas RW**

The ABS submersible mixers RW 400 and 650, with a water pressure-tight encapsulated submersible motor, are high class quality products with the following range of applications in municipal treatment plants, in industry and in agriculture:

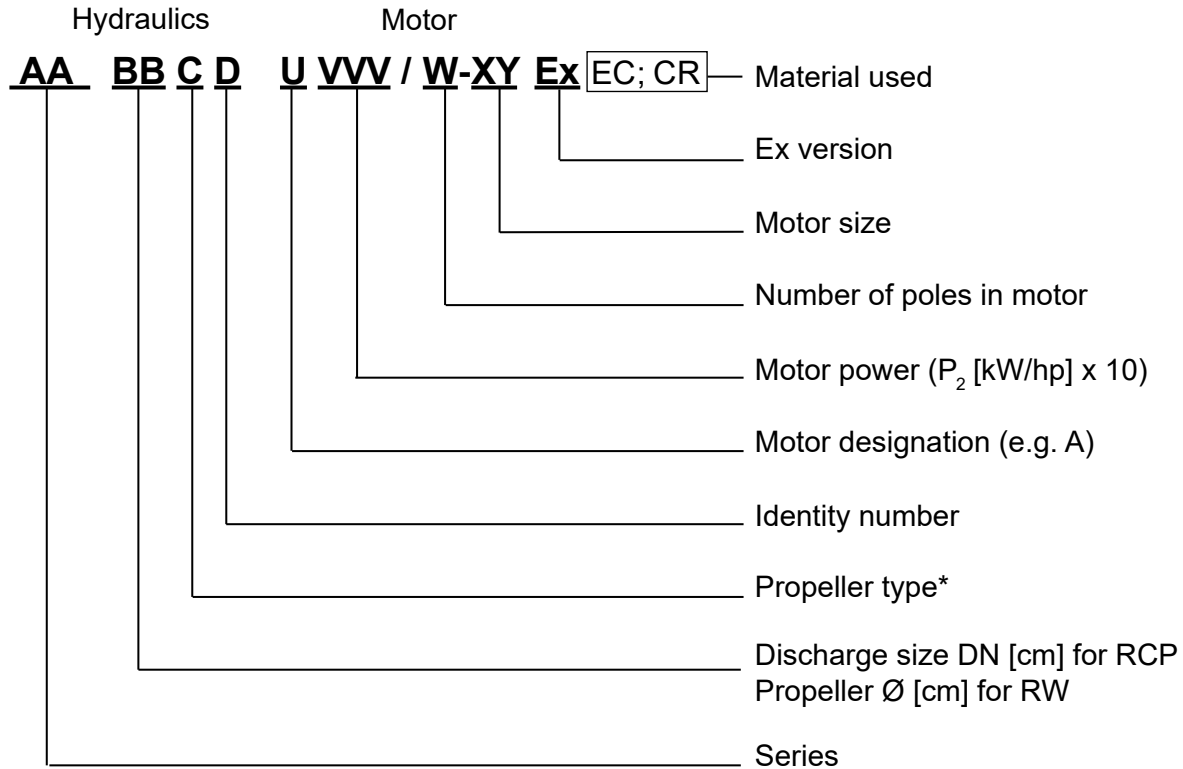
- Mixing
- Stirring
- Agitation

## 1.4.2 Application areas RCP

The ABS submersible recirculation pumps RCP 400 and 500 are fitted with water-pressure-tight encapsulated motors and are quality products suitable for use in the following areas:

- Pumping and recirculation of active sludge in treatment plants with nitrogen removal (nitrification/denitrification).
- Pumping of rain and surface water.

## 1.5 Identification code



0551-0003

\*Propeller type: 1 = Mixing propeller (only without flow ring); 2 = 2-blade thrust propeller; 3 = 3-blade thrust propeller;  
4 = 2-blade thrust propeller with flow ring; 5 = 3-blade thrust propeller with flow ring;  
7 = 3-blade special propeller for biofilm carrier process

## 1.6 Technical data

The maximum noise level of the units of this series is  $\leq 70$  dB(A). In some types of installation it is possible that the noise level of 70 dB(A) or the measured noise level will be exceeded.

**ATTENTION**      ***The maximum fluid temperature for continuous operation is 40 °C / 104 °F for a submerged unit.***



### 1.6.1 Technical data RW 50 Hz

Mixer type	Propeller			Version with flow ring	Motor type	Motor (50 Hz/400 V)						Cable type** (Ex and standard)	Temperature monitoring	Seal monitoring	Ex d IIB T4	Installation		Total weight (without flow ring)	Total weight (with flow ring)
	Propeller diameter	Speed				Rated power input P <sub>1</sub>	Rated power output P <sub>2</sub>	Starting: Direct (D.O.L)	Starting: Star/Delta	Rated current at 400 V	Starting current at 400 V					Guide tube □ 60	Guide tube □ 100		
	[mm]	[1/min]			[kW]	[kW]			[A]	[A]							[kg]	[kg]	
RW 4021	400	702	○	A 30/8	4.2	3.0	●		9.3	40	1	●	●		●	○	96	107	
RW 4022	400	702	○	A 30/8	4.2	3.0	●		9.3	40	1	●	●		●	○	96	107	
RW 4023	400	702	○	A 30/8	4.2	3.0	●		9.3	40	1	●	●		●	○	96	107	
RW 4024	400	702	○	A 30/8	4.2	3.0	●		9.3	40	1	●	●		●	○	96	107	
RW 4031	400	680	○	A 40/8	5.6	4.0		●	10.9	40	2	●	●		●	○	96	107	
RW 4032	400	680	○	A 40/8	5.6	4.0		●	10.9	40	2	●	●		●	○	96	107	
RW 4033	400	680	○	A 40/8	5.6	4.0		●	10.9	40	2	●	●		●	○	96	107	
RW 6521	580	470	○	A 50/12	7.1	5.0		●	18.2	52	2	●	●			●	155	173	
RW 6522	580	470	○	A 50/12	7.1	5.0		●	18.2	52	2	●	●			●	155	173	
RW 6523	650	470	○	A 50/12	7.1	5.0		●	18.2	52	2	●	●			●	155	173	
RW 6524	650	470	○	A 50/12	7.1	5.0		●	18.2	52	2	●	●			●	155	173	
RW 6525	650	470	○	A 50/12	7.1	5.0		●	18.2	52	2	●	●			●	155	173	
RW 6531	650	462	○	A 75/12	10.3	7.5		●	24.5	54	3	●	●			●	182	200	
RW 6532	650	462	○	A 75/12	10.3	7.5		●	24.5	54	3	●	●			●	182	200	
RW 6533	650	470	○	A 100/12	13.3	10.0		●	31.9	91	4	●	●			●	214	232	

P<sub>1</sub> = Power input ; P<sub>2</sub> = Power output

● = Standard ; ○ = Option.

\*\*Cable type: 10 m cable with free cable ends as standard: 1 = 1 x 7G 1.5, 2 = 1 x 10G 1.5, 3 = 1 x 10 G 2.5, 4 = 2 x 4G 4 + 2 x 0.75

**NOTE** *Data applies also for versions with flow ring (see section 1.5 Identification code). Other voltages available on request.*

1.6.2 Technical data RW 60 Hz

Mixer type	Propeller			Version with flow ring	Motor type	Motor (60 Hz/460 V)						Installation						
	Propeller diameter	Speed				Rated power input P <sub>1</sub>	Rated power output P <sub>2</sub>	Starting: Direct (D.O.L)	Starting: Star/Delta	Rated current at 460 V	Starting current at 460 V	Cable type** (Ex and standard)	Temperature monitoring	Seal monitoring	FM (NEC 500)	Guide tube □ 60	Guide tube □ 100	Total weight (without flow ring)
	[mm]	[1/min]			[kW]	[kW]			[A]	[A]							[kg]	[kg]
RW 4021	400	858	○	A 35/8	4.6	3.5	●		8.7	38	1	●	●	○	●	○	96	107
RW 4022	400	858	○	A 35/8	4.6	3.5	●		8.7	38	1	●	●	○	●	○	96	107
RW 4023	400	858	○	A 35/8	4.6	3.5	●		8.7	38	1	●	●	○	●	○	96	107
RW 4024	400	841	○	A 46/8	6.0	4.6		●	10.3	38	2	●	●	○	●	○	96	107
RW 4031	400	841	○	A 46/8	6.0	4.6		●	10.3	38	2	●	●	○	●	○	96	107
RW 6521	580	571	○	A 60/12	8.0	6.0		●	17.5	50	2	●	●	○		●	155	173
RW 6522	580	571	○	A 60/12	8.0	6.0		●	17.5	50	2	●	●	○		●	155	173
RW 6531	650	567	○	A 90/12	11.5	9.0		●	23.9	52	2	●	●	○		●	182	200
RW 6532	650	567	○	A 90/12	11.5	9.0		●	23.9	52	2	●	●	○		●	182	200
RW 6533	650	567	○	A 90/12	11.5	9.0		●	23.9	52	2	●	●	○		●	182	200
RW 6534	650	569	○	A 120/12	15.3	12.0		●	31.4	88	3	●	●	○		●	214	232
RW 6535	650	569	○	A 120/12	15.3	12.0		●	31.4	88	3	●	●	○		●	214	232

P<sub>1</sub> = Power input ; P<sub>2</sub> = Power output

● = Standard ; ○ = Option.

\*\*Cable type: 10 m cable with free cable ends as standard: 1 = 1 x 7G 1.5, 2 = 1 x 10G 1.5, 3 = 1 x 10 G 2.5, 4 = 2 x 4G 4 + 2 x 0.75

**NOTE** *Data applies also for versions with flow ring (see section 1.5 Identification code). Other voltages available on request.*

### 1.6.3 Technical data RCP 50 Hz

RCP hydraulics type	Propeller				Motor (50 Hz/400 V)											
	Propeller diameter	Propeller speed	H <sub>max</sub>	Q <sub>max</sub>	Motor type	Rated input power P <sub>1</sub>	Rated motor power P <sub>2</sub>	Starting: Direct (D.O.L)	Starting: Star/Delta	Rated current at 400 V	Starting current at 400 V	Cable type** (Ex- and standard)	Temperature monitoring	Seal monitoring	Ex d IIB T4	Total weight (Complete unit)
	[mm]	[1/min]	[m]	[l/s]		[kW]	[kW]			[A]	[A]					[kg]
RCP 4022	394	730	1.13	165	A 40/8	5.6	4.0		•	10.9	40	1	•	•	•	118
RCP 4023	394	730	1.35	195	A 40/8	5.6	4.0		•	10.9	40	1	•	•	•	118
RCP 4024	394	730	1.49	215	A 40/8	5.6	4.0		•	10.9	40	1	•	•	•	118
RCP 4031	394	730	1.67	225	A 40/8	5.6	4.0		•	10.9	40	1	•	•	•	118
RCP 4032	394	730	1.40	245	A 40/8	5.6	4.0		•	10.9	40	1	•	•	•	118
RCP 4033	394	730	1.21	280	A 40/8	5.6	4.0		•	10.9	40	1	•	•	•	118
RCP 5031	492	470	1.08	390	A 50/12	7.1	5.0		•	18.2	52	1	•	•	•	215
RCP 5032	492	470	1.30	440	A 75/12	10.3	7.5		•	24.5	54	2	•	•	•	250
RCP 5033	492	470	1.38	500	A 75/12	10.3	7.5		•	24.5	54	2	•	•	•	250
RCP 5034	492	470	1.40	550	A 75/12	10.3	7.5		•	24.5	54	2	•	•	•	250
RCP 5035	492	470	1.45	585	A 100/12	13.3	10.0		•	31.9	91	3	•	•	•	255
RCP 5036	492	470	1.27	655	A 100/12	13.3	10.0		•	31.9	91	3	•	•	•	255

P<sub>1</sub> = Power input ; P<sub>2</sub> = Power output.

• = Standard ; ○ = Option.

\*\*Cable type: 10 m cable with free cable ends as standard: 1 = 1 x 10G 1.5, 2 = 1 x 10G 2.5, 3 = 2 x 4G 4 + 2 x 0.75

### 1.6.4 Technical data RCP 60 Hz

RCP hydraulics type	Propeller				Motor (60 Hz/460 V)											
	Propeller diameter	Propeller speed	H <sub>max</sub>	Q <sub>max</sub>	Motor type	Rated input power P <sub>1</sub>	Rated motor power P <sub>2</sub>	Starting: Direct (D.O.L)	Starting: Star/Delta	Rated current at 460 V	Starting current at 460 V	Cable type** (Ex- and standard)	Temperature monitoring	Seal monitoring	FM (NEC 500)	Total weight (Complete unit)
	[mm]	[1/min]	[m]	[l/s]		[kW]	[kW]			[A]	[A]					[kg]
RCP 4022	394	841	1.70	200	A 46/8	6.0	4.6		•	10.3	38	1	•	•	•	118
RCP 4023	394	841	1.85	245	A 46/8	6.0	4.6		•	10.3	38	1	•	•	•	118
RCP 4024	394	841	1.62	265	A 46/8	6.0	4.6		•	10.3	38	1	•	•	•	118
RCP 4031	394	841	1.36	275	A 46/8	6.0	4.6		•	10.3	38	1	•	•	•	118
RCP 5031	492	570	1.62	460	A 90/12	11.5	9.0		•	23.9	52	1	•	•	•	250
RCP 5032	492	570	1.52	515	A 120/12	15.3	12.0		•	31.4	88	2	•	•	•	255
RCP 5033	492	570	1.20	590	A 120/12	15.3	12.0		•	31.4	88	2	•	•	•	255
RCP 5034	492	570	1.14	640	A 120/12	15.3	12.0		•	31.4	88	2	•	•	•	255

P<sub>1</sub> = Power input ; P<sub>2</sub> = Power output.

• = Standard ; ○ = Option.

\*\*Cable type: 10 m cable with free cable ends as standard: 1 = 1 x 10G 1.5, 2 = 1 x 10G 2.5

## 1.7 Dimensions and weights

**NOTE** The weights of the units can be obtained from the nameplate of the unit or from the table in section 1.6 Technical data.

### 1.7.1 Dimensions RW

Dimension	RW 400 A30/40 (50 Hz) A35/46 (60 Hz)	RW 650 A50 (50 Hz) A60 (60 Hz)	RW 650 A75 (50 Hz) A90 (60 Hz)	RW 650 A100 (50 Hz) A120 (60 Hz)
$D_1$	ø 400	ø 650	ø 650	ø 650
$D_2$	ø 560	ø 810	ø 810	ø 810
$d_1$	ø 222.5	ø 262.5	ø 262.5	ø 262.5
H □ 60	262	-	-	-
H □ 100	306	306	306	306
$h_1$	700	1100	1100	1100
$L_1$ □ 60	665	-	-	-
$L_1$ □ 100	700	830	970	970
$L_2$ □ 60	685	-	-	-
$L_2$ □ 100	720	850	990	990
$l_1$	795	925	1065	1065
$l_2$ □ 60	300	-	-	-
$l_2$ □ 100	300	400	630	530
$X_1$ □ 60	360	-	-	-
$X_1$ □ 100	280	320	420	400
$X_2$ □ 60	300	-	-	-
$X_2$ □ 100	310	330	430	410

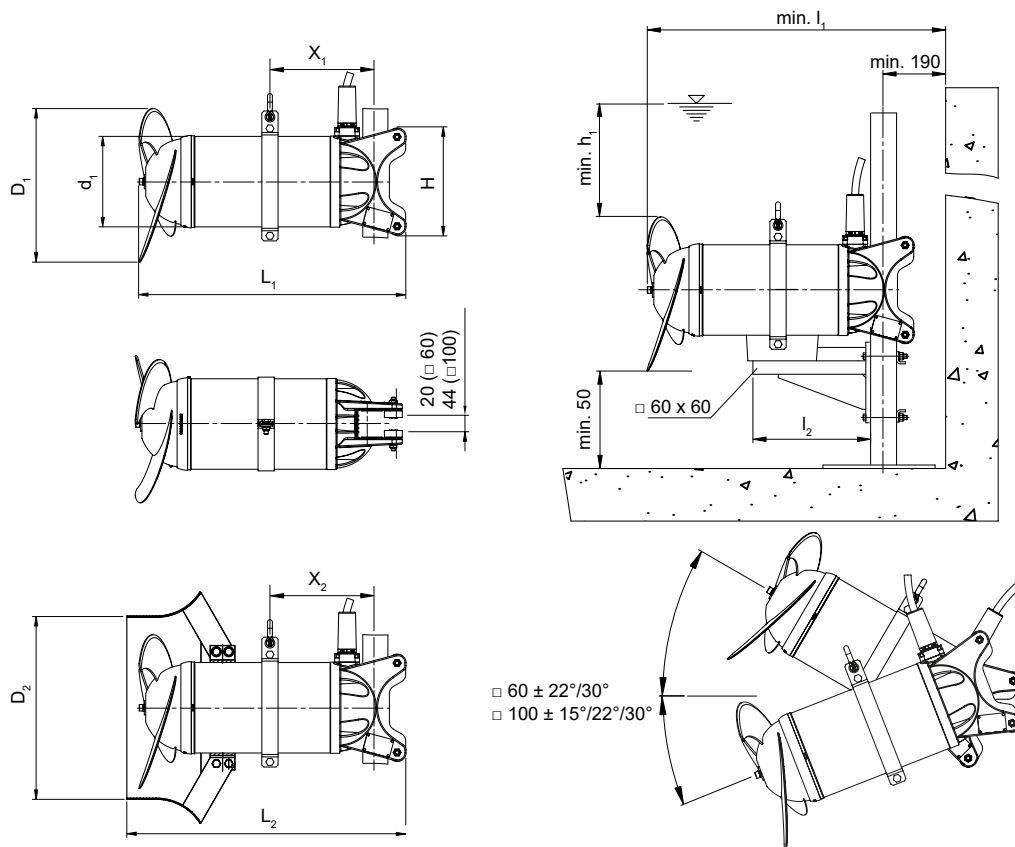


Figure 1. Dimensions RW

0552-0001



1.7.3 Flange dimension check

0655-0001

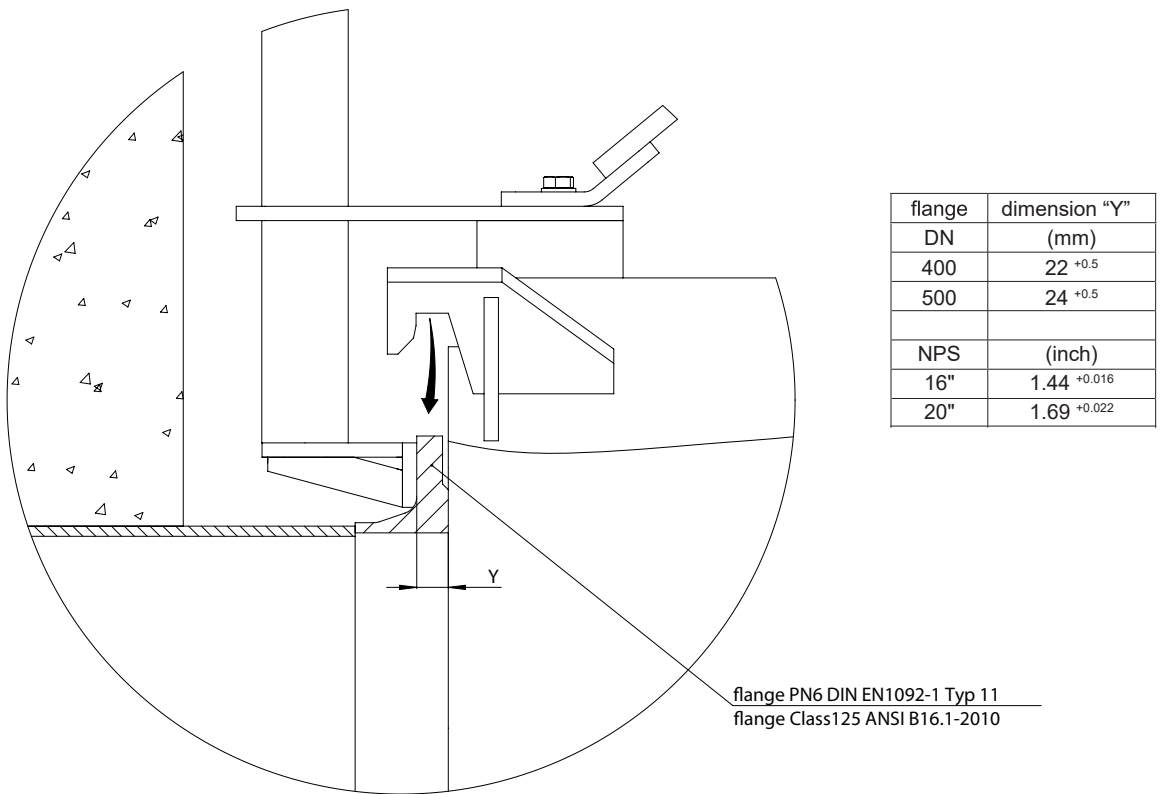


Figure 4. Flange dimensions

**ATTENTION** Before installing the recirculation pump, check the "Y" dimension of the flange. Make sure that the dimensions specified in the table are adhered to, otherwise the flange will need to be reworked.

## 1.8 Nameplate

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

**NOTE** In all communication please state type of the unit, item and serial number.

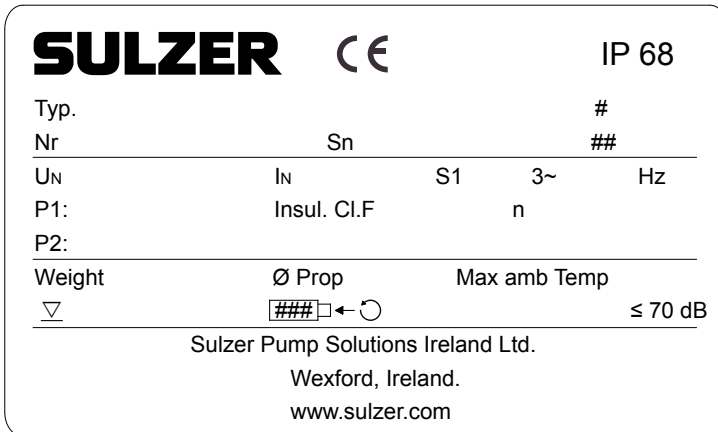


Figure 5. Nameplate 50 Hz

1555-00

Legend	
IP68	Protection type
Typ.	Type designation
#	Production date (Week/Year)
Nr	Item number
Sn	Serial number
##	Order number
UN	Nominal voltage V
IN	Nominal current A
S1	Continuous operating mode
3~	Number of phases
Hz	Frequency Hz
P1	Power (consumption) kW
Insul. Cl.H	Insulation class
n	Rotation speed rpm
P2	Power (output) kW
Weight	kg
Ø Prop.	Propeller diameter mm
Max amb Temp	Maximum ambient temperature 40 °C
∇	Maximum immersion depth m
###	Motor shaft direction of rotation
≤ 70 dB	Maximum noise level



#####: RW 400/RCP400 = 1034,  
RW 650/RCP500 = 1035

Figure 6. Nameplate ATEX

## 2 Safety

The general and specific health and safety instructions 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 Transport and storage

### 3.1 Transport



The unit must never be raised by the power cable.

Depending on the version, the units are fitted with a lifting hoop/eyelet, to which a chain can be fastened by means of shackles for transportation, installation or removal.



Take note of the entire weight of the unit (see nameplate Figure 2). The hoist and chain must be adequately dimensioned for the weight of the unit and must comply with the current valid safety regulations. Good technical practice must be observed.



The unit should be protected from rolling over!



The unit is prepared for transportation by placing it on an adequately strong, completely horizontal surface, taking care that it cannot topple over.



Do not stay or work in the swivel area of a suspended load!



The lifting hook height must take into consideration the entire height of the unit as well as the length of the lifting chain.

### 3.2 Transport securing devices

#### 3.2.1 Motor connection cable moisture protection

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

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

Particular attention is necessary during storage or installation of units in locations, which could fill with water prior to laying and connection of the power cable of the motor. Please note that the cable ends, even where fitted with protective sleeves, must not be immersed in water.

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

**NOTE** *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!*



### 3.3 Storage of the units

**ATTENTION** *Sulzer products must be protected from weather influences such as UV from direct sunlight, high humidity, aggressive dust emissions, mechanical damage, frost etc. 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.*

**NOTE** *Sulzer units do not generally require any particular maintenance during storage. After long storage periods (after approx. one year), the transportation locking device on the motor shaft (not with all versions) should be disassembled. By rotating the shaft several times by hand, new lubricating oil, or depending on the version, a small amount of coolant (which also serves to cool or lubricate the mechanical seals) is applied to the sealing surfaces, thus ensuring perfect operation of the mechanical seals. The bearings supporting the motor shaft are maintenance-free.*

## 4 Product description

### 4.1 General description

- Hydraulically optimized propeller with high wear resistance.
- The motor shaft is supported in lubricated-for-life, maintenance-free ball bearings.
- The shaft is sealed on the medium side by means of a high quality mechanical seal, which is independent of direction of rotation.
- The oil chamber is filled with lubricating oil (oil change is not necessary).

#### Motor

- Three phase squirrel cage motor.
- Rated voltage: 400 V 3~ 50 Hz / 460 V 3~ 60 Hz.
- Other voltages available on request.
- Insulation class F = 155 °C / 311 °F, Protection type IP68.
- Temperature of the medium for continuous operation: + 40 °C / 104 °F.

#### Motor monitoring

- All motors are fitted with temperature monitors that switch off the motor in the case of excessive temperatures. The sensors must be correctly wired into the control panel.

#### Seal monitoring

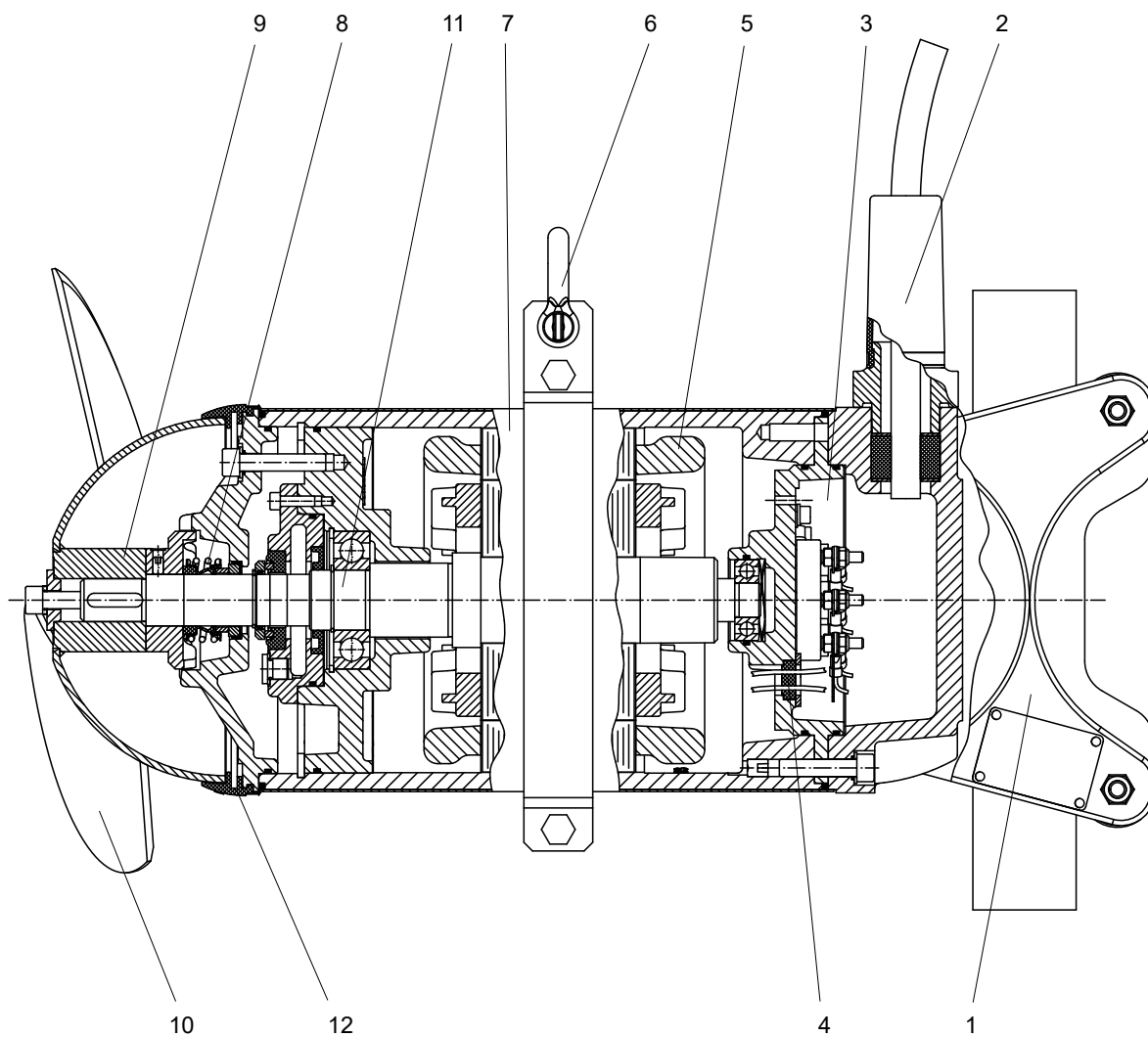
- The DI electrode carries out the seal monitoring function and signals the ingress of moisture by means of a special electronic device.

#### Operation with frequency inverters

- All RW / RCP, when **suitably selected**, can be used with frequency inverters. **Observe the EMC Directive and the installation and operating instructions of the inverter manufacturer!**

## 4.2 Structural design

### 4.2.1 RW 400 and 650



0556-0001

Figure 7. RW 400/650

#### Legend

- |   |                                   |    |                                    |
|---|-----------------------------------|----|------------------------------------|
| 1 | Bracket                           | 8  | Mechanical seal                    |
| 2 | Cable inlet                       | 9  | Propeller boss                     |
| 3 | Connection chamber                | 10 | Propeller                          |
| 4 | Sealing of the motor chamber      | 11 | Shaft unit with rotor and bearings |
| 5 | Stator                            | 12 | SD ring                            |
| 6 | Bracket with shackle              |    |                                    |
| 7 | Stainless steel covering (option) |    |                                    |

#### 4.2.2 RCP 400 and 500

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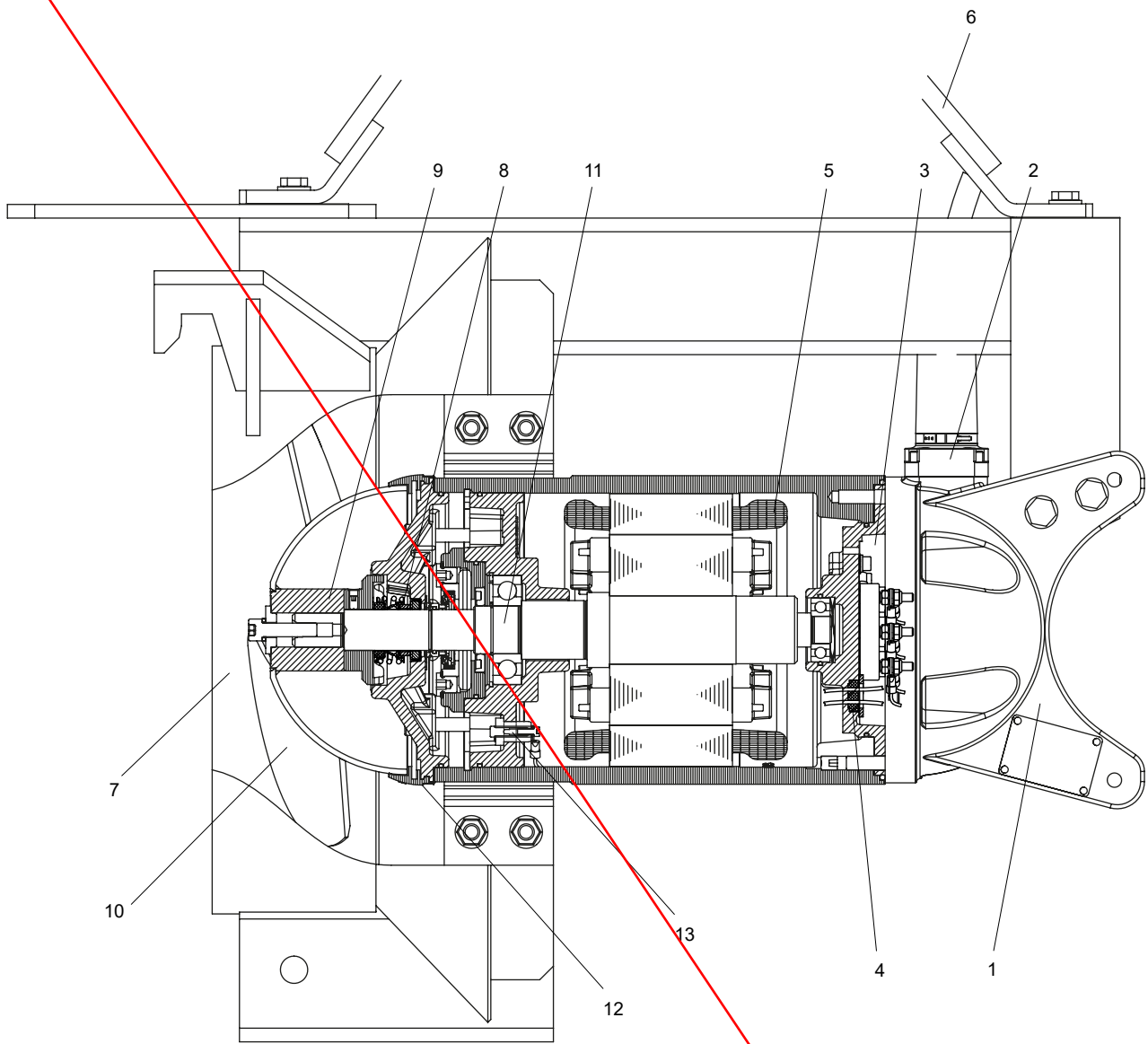


Figure 8. RCP 400/500

#### Legend

- |   |                              |    |                                    |
|---|------------------------------|----|------------------------------------|
| 1 | Bracket                      | 8  | Mechanical seal                    |
| 2 | Cable inlet                  | 9  | Propeller boss                     |
| 3 | Connection chamber           | 10 | Propeller                          |
| 4 | Sealing of the motor chamber | 11 | Shaft unit with rotor and bearings |
| 5 | Stator                       | 12 | SD ring                            |
| 6 | Lifting hook                 | 13 | DI-electrode (seal monitor)        |
| 7 | Inlet cone                   |    |                                    |

### 4.3 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).
- Machines designated as Ex machines may never, without exception, be operated using a mains frequency that is greater than the maximum of 50 Hz or 60 Hz as indicated on the nameplate. Make sure that the rated current specified on the nameplate is not exceeded after starting the motor. 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 nameplate. 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 it is not falling below 25 Hz.
- 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 flanks of the voltage wave. This means that motor loss and motor noise is 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 Figure 9). 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.

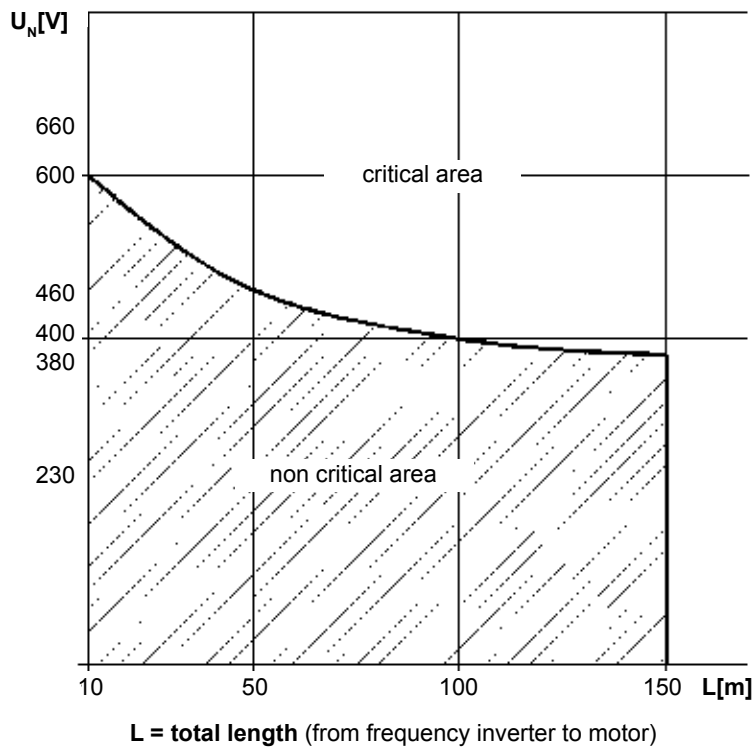


Figure 9. Critical/non critical area

1186-00

## 5 Installation



The safety instructions in the previous sections must be observed!

### 5.1 Installation RW / RCP



Care must be taken that the connection cables are positioned that they cannot get caught up in the propeller blades and that they are not subjected to tension.



The electrical connection is carried out in accordance with section 5.7 Electrical connection.

#### NOTE

*We recommend that Sulzer installation accessories be used for the installation of the RW / RCP.*

### 5.2 Tightening torque

Tightening torque for Sulzer stainless steel screws A4-70:							
Thread	M6	M8	M10	M12	M16	M20	M24
Tightening torque	6.9 Nm	17 Nm	33 Nm	56 Nm	136 Nm	267 Nm	460 Nm

#### 5.2.1 Nord-Lock® washer

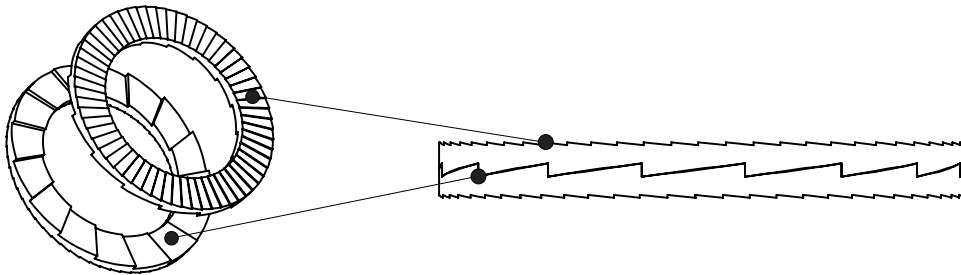


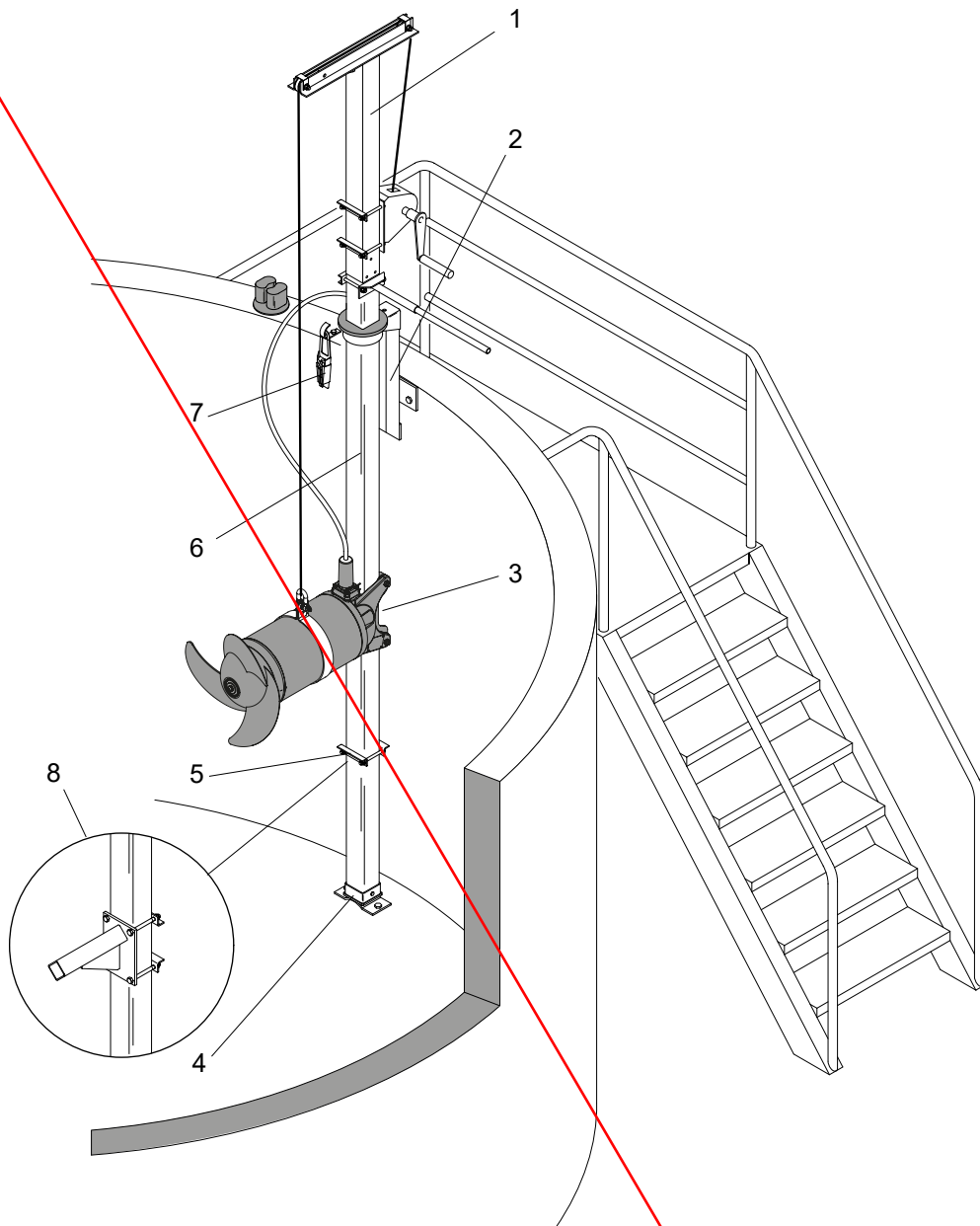
Figure 10. Correct fitting position of the Nord-Lock® securing washers

1176-00

### 5.3 Installation examples RW

#### 5.3.1 Installation example with existing accessories

We recommend that the closed bracket be used for this type of installation (See Figure 17).



0556-0001

Figure 11. Installation example with existing accessories

#### Legend

- |   |                                  |   |                                    |
|---|----------------------------------|---|------------------------------------|
| 1 | Hoist with winch and rope        | 5 | Safety stop clamp                  |
| 2 | Upper bracket with locking plate | 6 | Swivelling square guide tube       |
| 3 | Closed bracket                   | 7 | Cable clamp with cable hook        |
| 4 | Bottom plate                     | 8 | Stop for vibration damper (option) |

### 5.3.2 Installation example with alternative fixing possibilities

We recommend that the open bracket be used for this type of installation (See Figure 17).

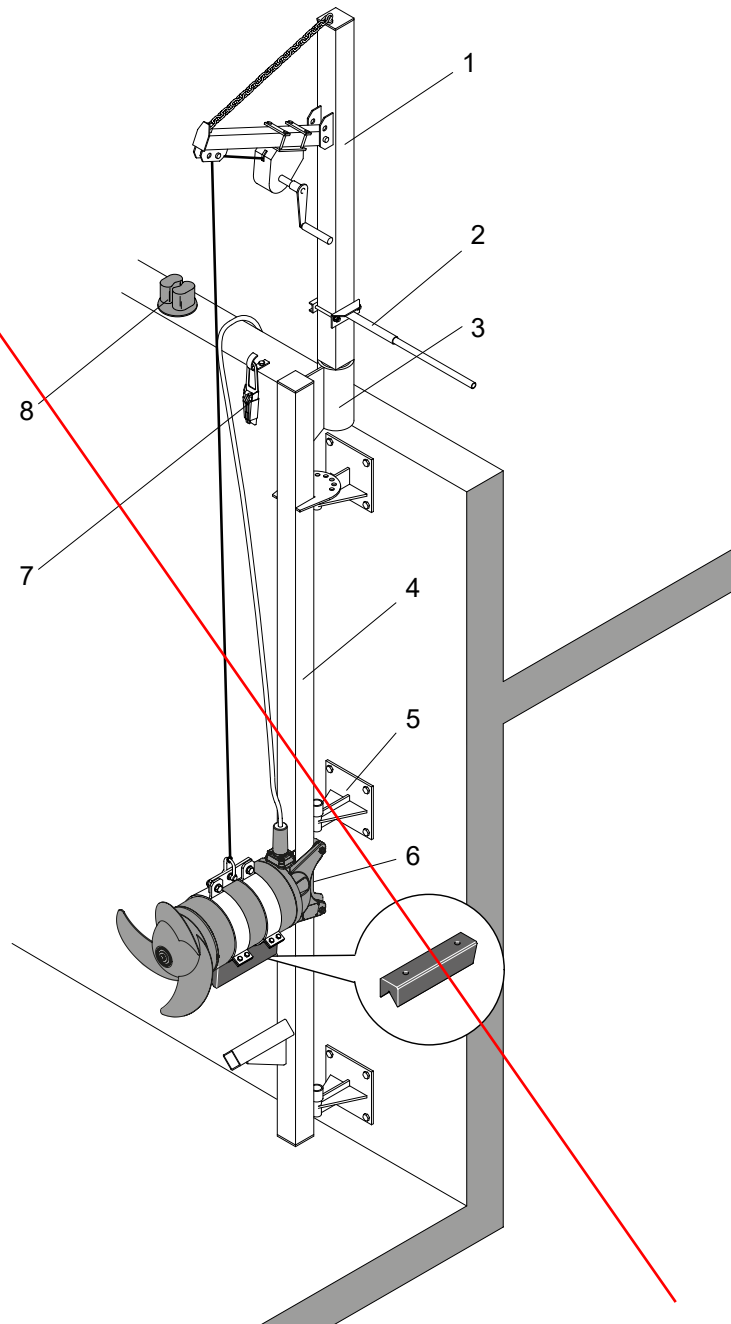


Figure 12. Installation example with alternative fixing possibilities

#### Legend

- |   |                              |   |                                 |
|---|------------------------------|---|---------------------------------|
| 1 | Transportable lifting unit   | 5 | Swivelling wall mounted bracket |
| 2 | Swivel handle                | 6 | Open bracket                    |
| 3 | Socket (fixed installed)     | 7 | Cable clamp with cable hook     |
| 4 | Swivelling square guide tube | 8 | Rope block                      |

### 5.3.3 Installation example with fixed installation as flow booster

We recommend that the open bracket be used for this type of installation (See Figure 17).

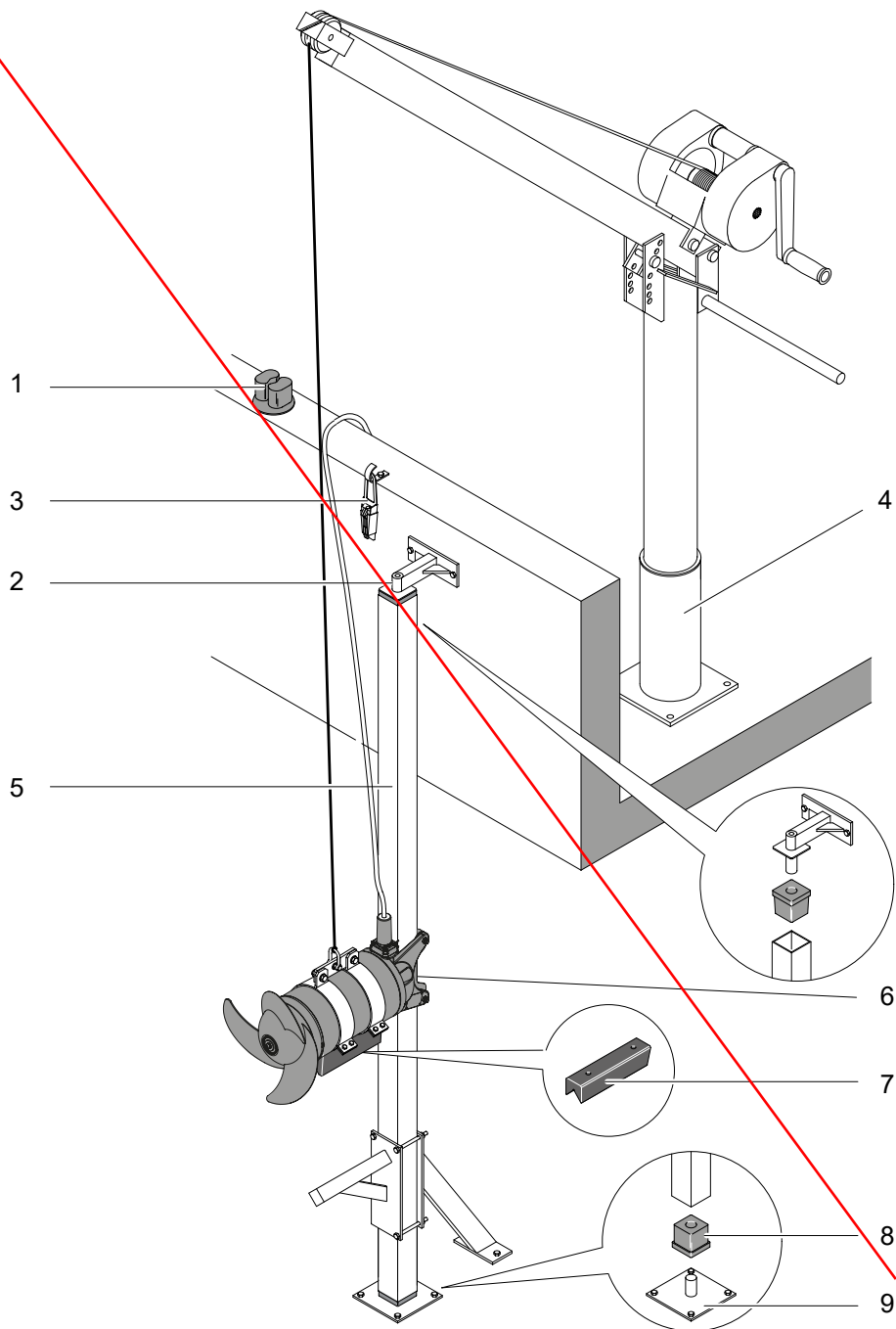


Figure 13. Installation example with fixed installation as flow booster

#### Legend

- 1 Rope block
- 2 Tube retainer
- 3 Cable clamp with cable hook
- 4 Sulzer lifting unit 5 kN
- 5 Square guide tube
- 6 Open bracket
- 7 Vibration damper
- 8 Tube connector
- 9 Bottom plate

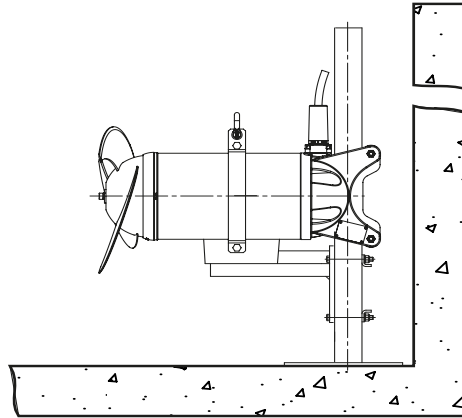


### 5.3.4 Fixed installation with vibration damper

If the mixer is to be installed at a fixed point in the tank, then we recommend that the console with the vibration damper be used. In this case a further square tube must be used as a console at the guide tube. The vibration damper for the relevant mixer can be ordered (see table below).

#### Vibration damper listing

Mixer	Part no.
RW 400	6 162 0019
RW 650	6 162 0020 (A50/12, A 60/12). 6 162 0027 (A75/12, A 90/12, A100/12, A 120/12)

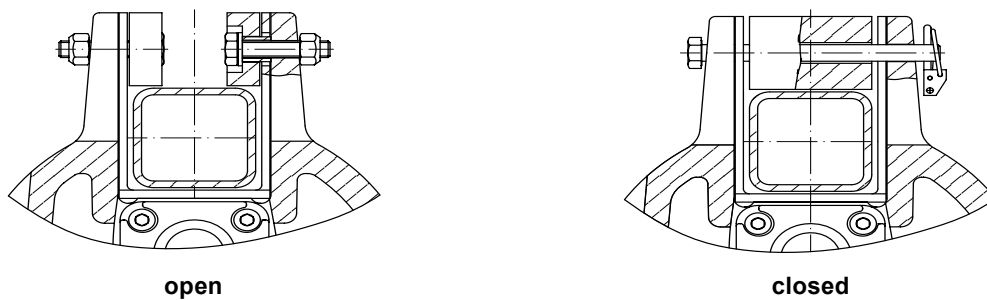


10001-0001

Figure 14. Fixed installation with vibration damper

### 5.4 Brackets RW

Brackets which can be swivelled vertically (only optional) are available for both open and closed models of the brackets for all mixers of the series.



0563-0001

Figure 15. Open bracket / closed bracket

5.4.1 Fitting of the open bracket with vertical swivelling (option)

0564-0001

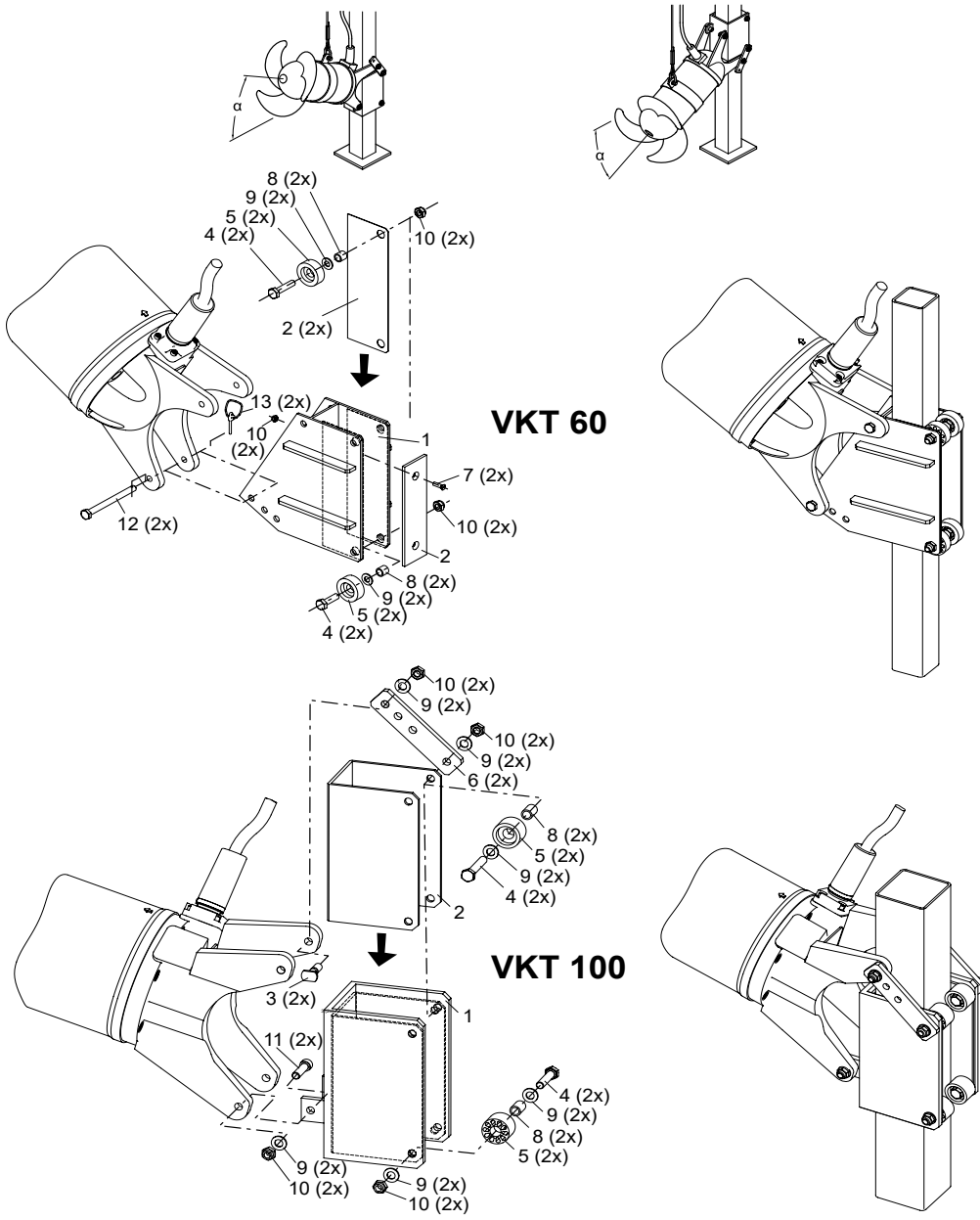
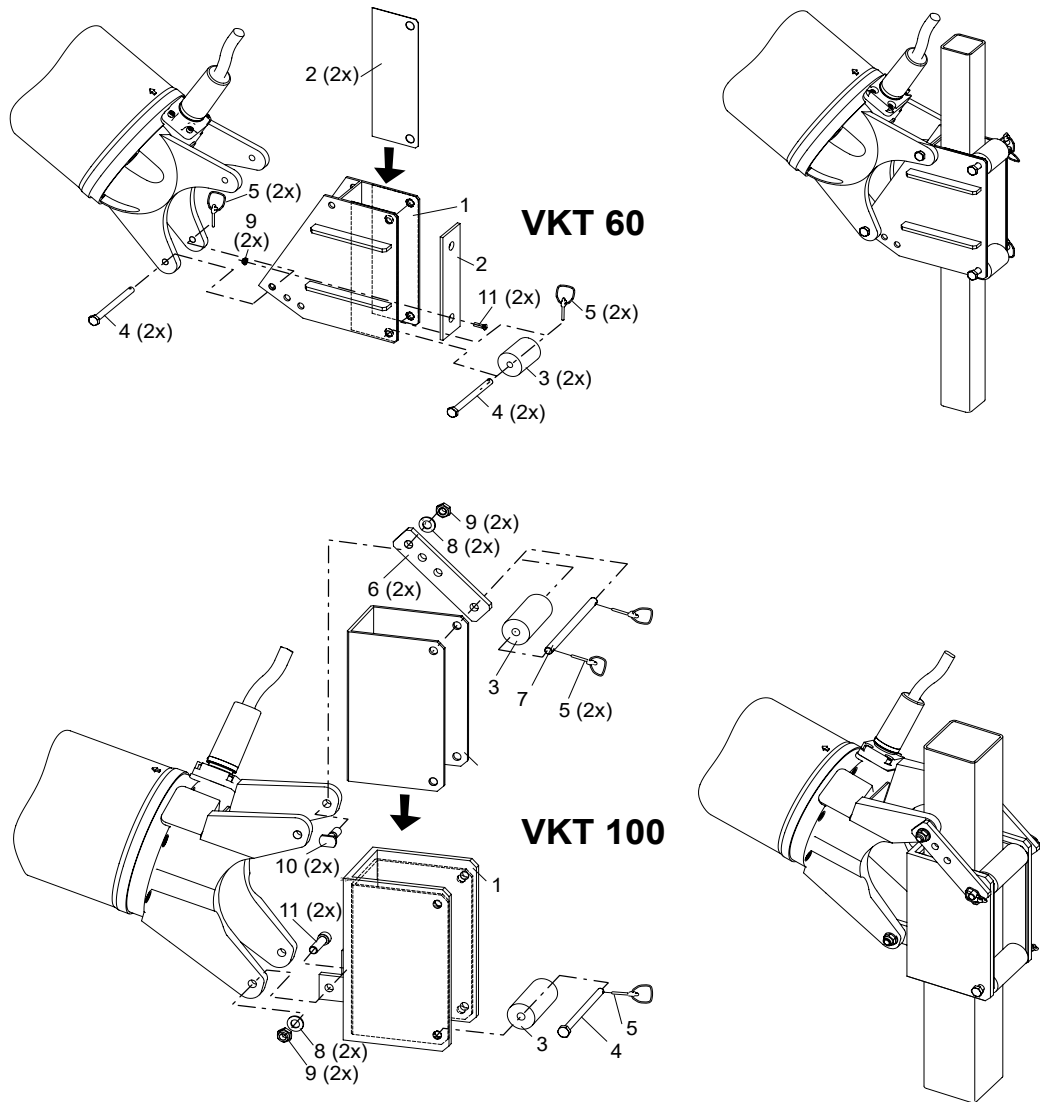


Figure 16. Open bracket with vertical swivelling

Legend

- |                    |                   |                      |
|--------------------|-------------------|----------------------|
| 1 Bracket          | 6 Strap           | 10 Hex nut           |
| 2 Cladding         | 7 Flat head screw | 11 Socket head screw |
| 3 Threaded inserts | 8 Tube            | 12 Hinge bolt        |
| 4 Hex bolts        | 9 Washer          | 13 Linchpin          |
| 5 Roller           |                   |                      |

### 5.4.2 Fitting of the closed bracket with vertical swivelling (option)



0565-0001

Figure 17. Closed bracket with vertical swivelling

#### Legend

- |              |                      |
|--------------|----------------------|
| 1 Bracket    | 7 Bolt long          |
| 2 Cladding   | 8 Washer             |
| 3 Roller     | 9 Hex nut            |
| 4 Bolt short | 10 Threaded insert   |
| 5 Linchpin   | 11 Socket head screw |
| 6 Strap      |                      |

### 5.4.3 Bracket alignment on guide rail

The mixer must be set up freely suspended with bracket fully mounted so that the bracket points vertically towards the ground. When doing this the clamp of the mixer should be moved until the desired slope of the mixer is achieved. This ensures that the mixer can slide up and down easily on the guide tube after it is fitted.

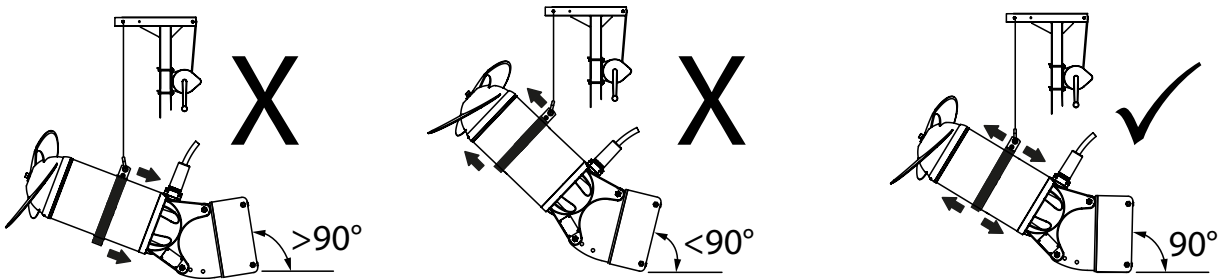


Figure 18. Setting up with fully mounted bracket

**ATTENTION** *Damage to bracket liner due to incorrect alignment setup will not be covered under warranty.*

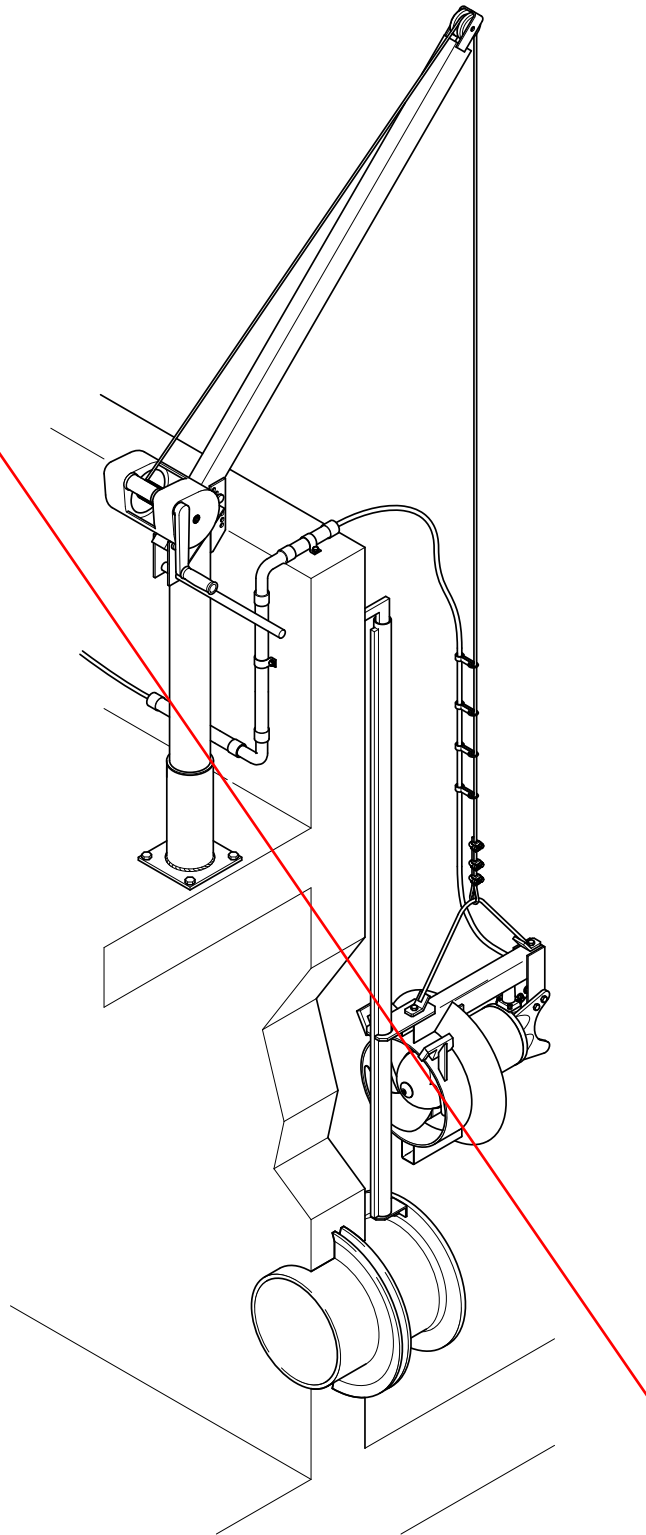
### 5.5 Guide tube lengths RW (square tube)

The table below shows the maximum lengths of the guide tubes, based on the maximum allowable bending  $1/300$  th. of the length. These values have been determined in clean water of density  $1000 \text{ kg/m}^3$  for the maximum thrust of the most powerful mixer.

Mixer	Maximum guide tube length (L) for an installation with square guide tube		
	with push-in type lifting unit	with separate lifting unit	guide tube with additional wall fixing
RW 400	□ 2" x 3/16". L ≤ 5 m	□ 2" x 3/16". L ≤ 5 m	□ 2" x 3/16". L ≤ 5 m
	□ 60 x 60 x 4. L ≤ 4 m	□ 60 x 60 x 4. L ≤ 5 m	□ 60 x 60 x 4. L ≤ 5 m
	□ 100 x 100 x 4. L ≤ 9 m	□ 100 x 100 x 4. L ≤ 10 m	□ 100 x 100 x 4. L ≤ 10 m
RW 650	□ 100 x 100 x 4. L ≤ 5 m	□ 100 x 100 x 4. L ≤ 6 m	□ 100 x 100 x 4. L ≤ 6 m
	□ 100 x 100 x 6. L ≤ 6 m	□ 100 x 100 x 4. L ≤ 7 m	□ 100 x 100 x 4. L ≤ 6 m
	□ 100 x 100 x 8. L ≤ 7 m	□ 100 x 100 x 4. L ≤ 8 m	□ 100 x 100 x 4. L ≤ 6 m

## 5.6 Installation RCP

### 5.6.1 Installation example with Sulzer lifting unit



0570-0001

Figure 19. Installation example with Sulzer lifting unit 5 kN

## 5.6.2 Guide tube installation



The safety hints in the previous sections must be observed!

### ATTENTION

*The discharge line and the required flange DIN EN 1092-1 PN6 should be installed on site before starting the installation of the guide tube. The DIN flange should be installed so that none of the holes in the flange are on the axis line but are symmetrically on either side of it. Ensure that the DIN flange is securely fixed in the concrete.*

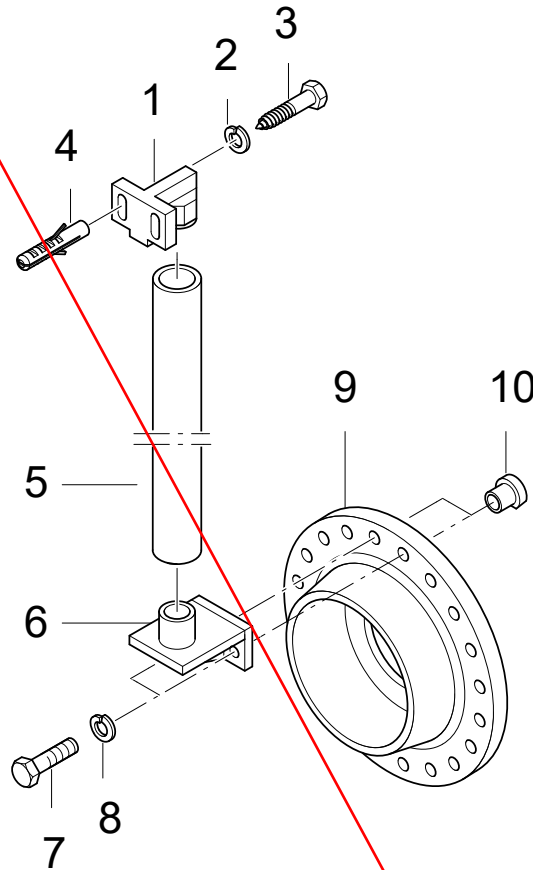


Figure 20. Guide tube installation

- Place bracket (20/6) on the DIN-flange (20/9) and fasten using hex nuts (20/7) together with spring washers (20/8) and the special nuts (20/10).

### ATTENTION

*The flattened edge of the special nuts (20/10) must point towards the flange centre.*

- Position the tube retainer (20/1) vertically over the bracket (20/6). Mount with the aid of the wall plugs (20/4) but do not tighten yet!
- Place the guide tube (20/5) alongside the conical section of the bracket (20/6) and determine the required length. To do this measure the upper edge of the tube retainer (20/1).
- Cut the guide tube (20/5) to the required length and place it on the conical portion of the bracket (20/6).
- Press the tube retainer (20/1) into the guide tube (20/5), so that no vertical play remains. Now tighten the hex screws (20/3) using the spring washers.

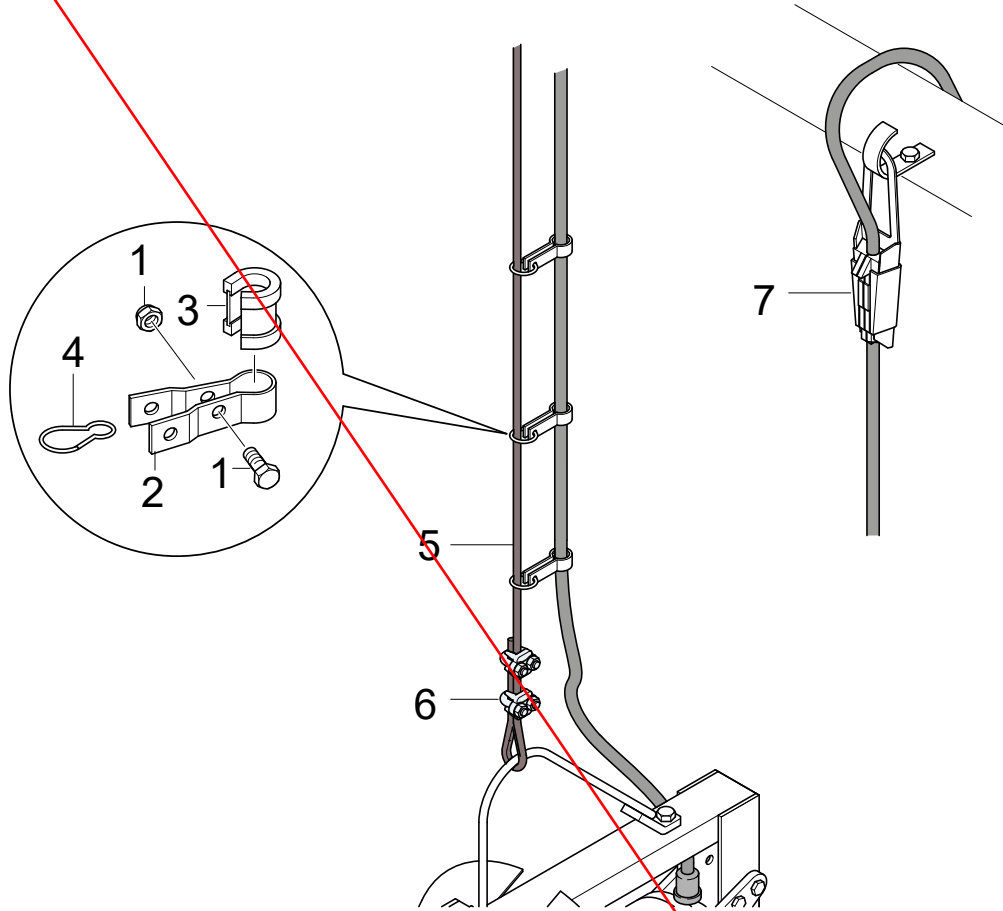
### 5.6.3 Securing and positioning of the motor connection cables of the RCP



The safety hints in the previous sections must be observed!

#### NOTE

*The cable holders described here are not supplied as part of the standard execution of the RCP.*



0572-0001

Figure 21. Securing and positioning of the motor connection cables of the RCP

- Place the cable holder (21/2) with rubber sleeve (21/3) on the connection cable close to the RCP itself and tighten using hex screw (21/1).
- Connect the snap hook (21/4) to the cable holder (21/2) and attach to the wire rope or chain.



Care must be taken that the connection cables are positioned that they cannot be caught up in the propeller blades and that they are not subjected to tension.

- Assemble all other cable holders in a similar manner. The spacing can be increased as the distance from the RCP increases.
- Hang the connection cable into the cable hook using the strain relief (21/7).



The electrical connection is carried out in accordance with section 5.7 Electrical connection.

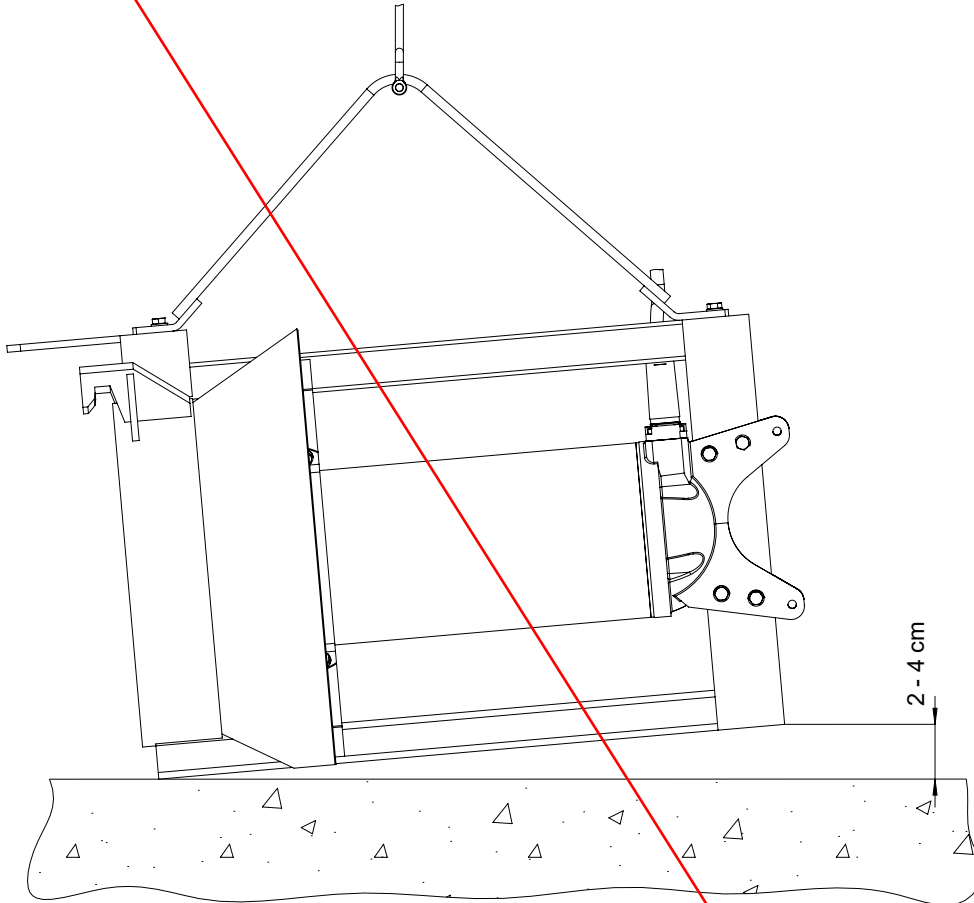
#### 5.6.4 Lowering of the RCP along the guide tube



The safety hints in the previous sections must be observed!

The RCP together with the guide piece is connected onto the guide tube and lowered along it until it automatically sits in its final position (see Figure 23). When doing this, carefully feed the power cable downwards at the same time.

To ensure the RCP will tilt enough to lower correctly on the guide tube, the angle of the pump created by the lifting hook when suspended by the hoist has to be checked prior to lowering. For this purpose, begin lifting the pump from a horizontal surface and check that the rear end of the fixing support rises 2- to 4- cm from the floor before the front end begins to lift clear (see Figure 22).



0573-0001

Figure 22. checking installation angle of pump

**ATTENTION** *The power cable should be connected to the wire rope or chain in such a manner that it cannot become entangled in the propeller and that it is not subjected to any tension.*

After lowering of the RCP the tension of the wire rope or the chain should be released.



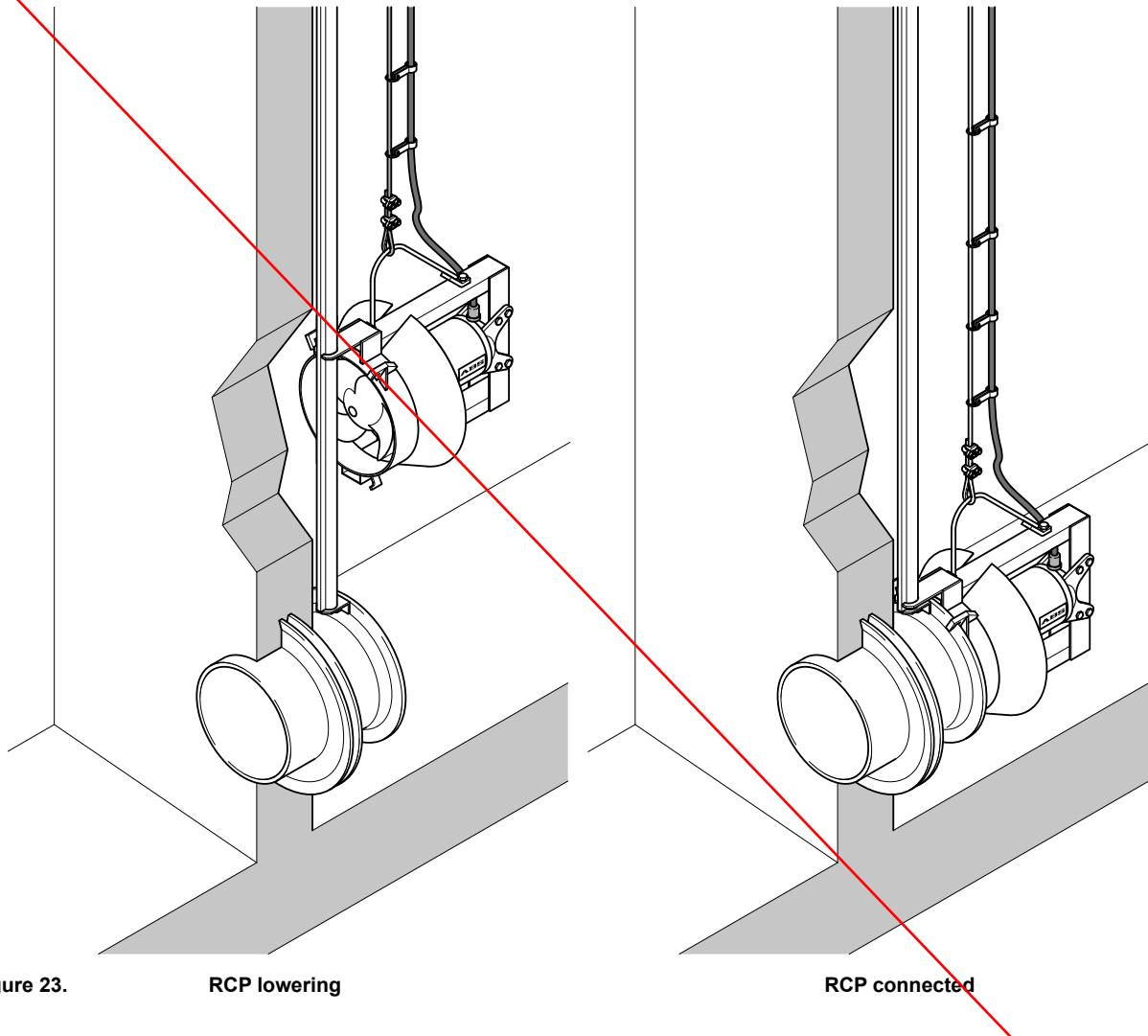


Figure 23.

RCP lowering

RCP connected

## 5.7 Electrical connection



The safety instructions in the previous sections must be observed!

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 VDE or other local regulations with regard to cross-sectional area and maximum voltage drop. The voltage stated on the nameplate of the pump must correspond to that of the mains.*



The incoming power supply as well as the connection of the unit 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.

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

In pump stations/tanks potential bonding must be carried out in accordance with EN 60079-14:2014 [Ex] or IEC 60364-5-54 [non-Ex] (Regulations for the installation of pipe lines, protective measures in power plants).

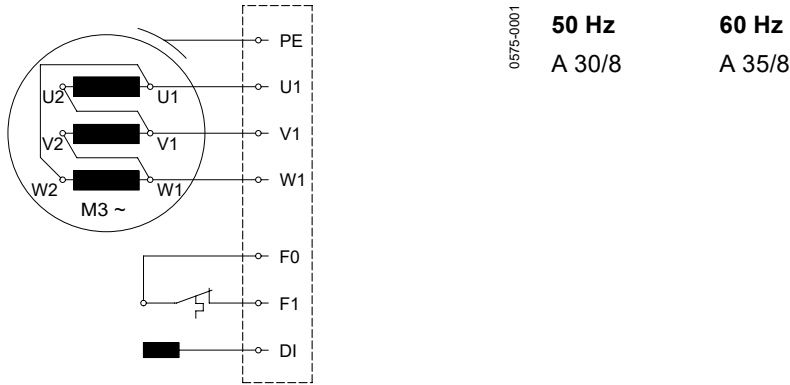
In the case of units supplied with a standard control panel this must be protected from dampness and installed above flood level by means of a correctly fitted CEE earthed socket.

**ATTENTION**

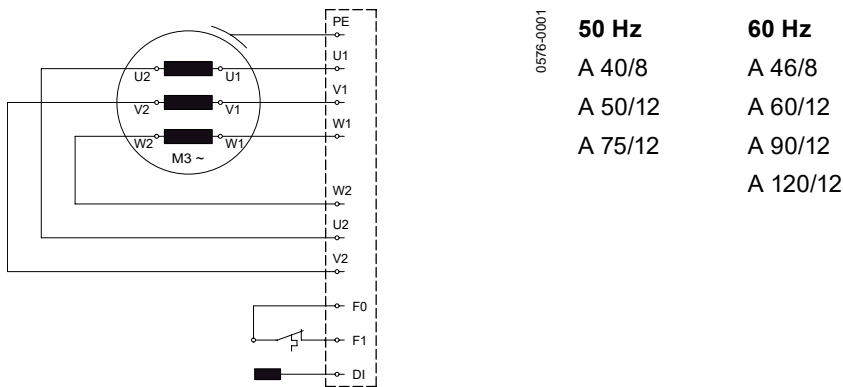
*The only method of starting allowed is that specified in chapter 1.6 Technical data or on the nameplate. If you want to use other starting methods please consult the manufacturer.*

*In the case where a control panel is not supplied as standard the unit must only be operated with a motor protection switch with overload relay and thermal sensors connected.*

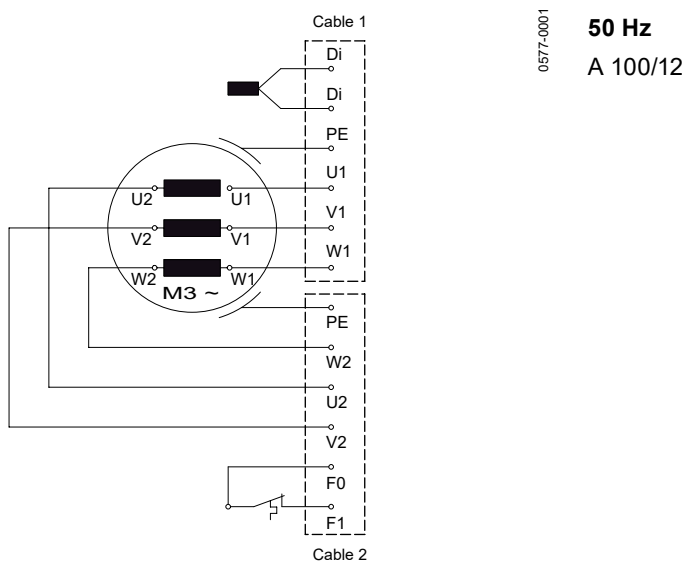
**5.7.1 Standard connection diagrams. mains voltage 380 - 420 V at 50 Hz / 460 V at 60 Hz**



**Figure 24. One power cable with integrated control leads (internal connection in the motor only for motor < 3 kW)**



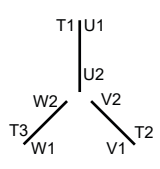
**Figure 25. One power cable with integrated control leads**



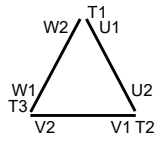
**Figure 26. Two power cables with integrated control leads**

### 5.7.2 Lead designations

Direct starting in star				
	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				
	L1	L2	L3	
North America	T1 (U1)*	T2 (V1)*	T3 (W1)*	-
Sulzer factory standard	U1; W2	V1; U2	W1; V2	-



\* Alternative lead designations



The thermal monitoring circuit (F1) must be wired into the motor contactors in such a manner that a manual reset is required.

**ATTENTION** The temperature limiting switches may only be operated as specified by the manufacturer (see following table).

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

### 5.7.3 Soft starter (option)

For units > 15 kW we recommend the use of a soft starter.

**ATTENTION** The units must be connected DOL when used with soft starters.

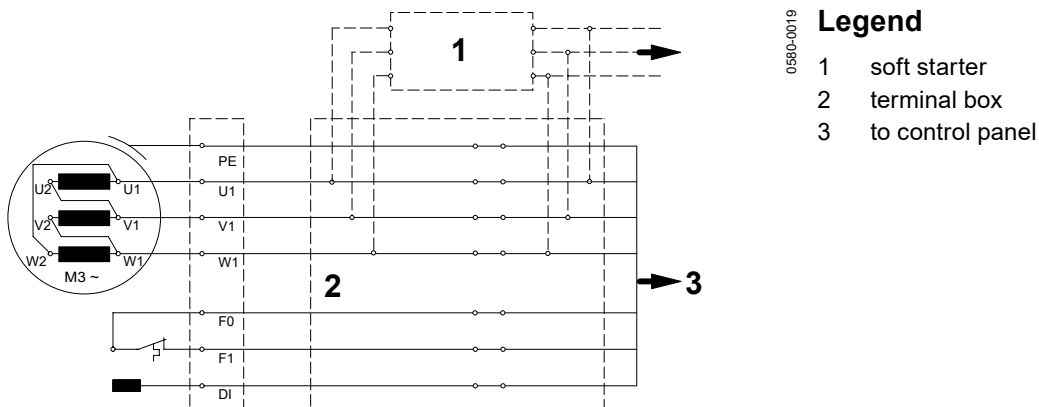


Figure 27. Wiring diagram with soft starter (option)

### Testing and adjustment of soft starter:

**ATTENTION** For the first test adjust the potentiometer in position C.

For further information consult the installation and operating instructions of the soft start manufacturer. These are supplied with the unit.

#### Test:

- First test with potentiometer setting “C”.

#### Setting:

- Set to the **lowest possible starting torque** (within the adjustment range possible).
- Set to the **longest possible starting time** (within the adjustment range possible).

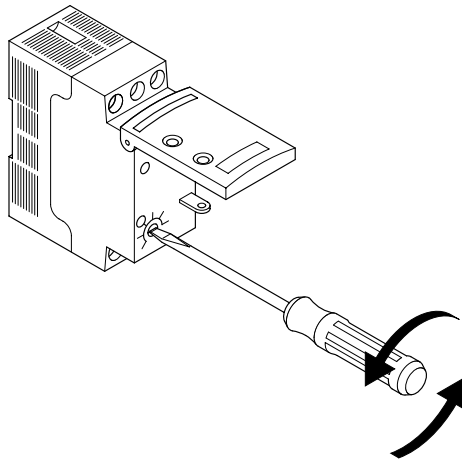


Figure 28. Testing and adjustment of soft starter

0581-0001

### 5.7.4 Checking direction of rotation

When the 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.

The direction of rotation (propeller rotation) is correct if the propeller when viewed from the rear over the motor housing rotates in a clockwise manner (see *arrow*). This applies to all versions of the RW / RCP!

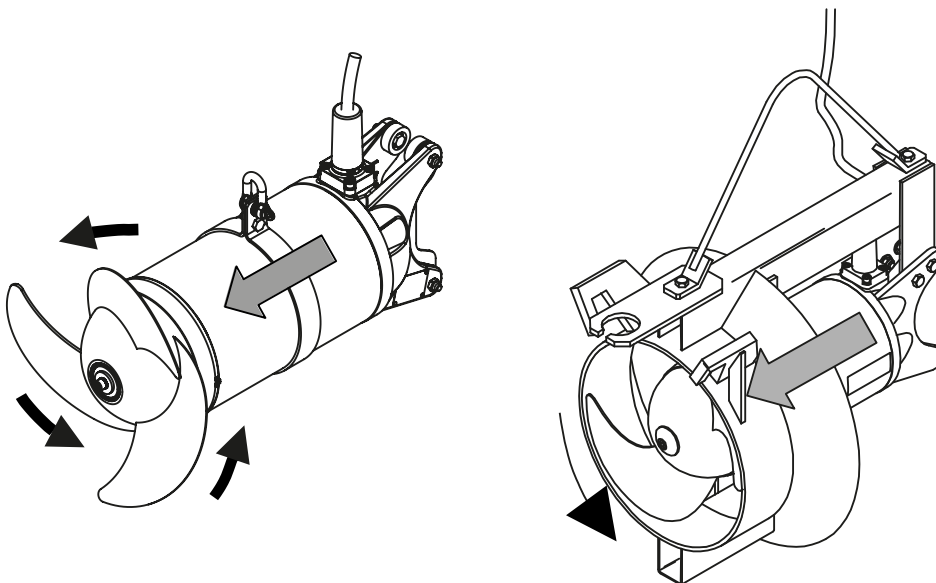


Figure 29. Checking direction of rotation

0582-0001



When checking the direction of rotation take care that no injury can be caused by the rotation of the propeller or the resulting airflow. Do not place a hand or other part of the body near the propeller or the hydraulics!



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.

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

**ATTENTION** *The mains supply in the control panel must have a clockwise sense of rotation. If the units are connected in accordance with the wiring diagram and the lead designations the direction of rotation will be correct.*

#### 5.7.5 Changing direction of rotation



The safety instructions in the previous sections must be observed!



Changing direction of rotation must only be carried out by a qualified person.

If the direction of rotation is incorrect then this is altered by changing over two phases of the power supply cable in the control panel. The direction of rotation should then be rechecked.

**NOTE** *The direction of rotation measuring device monitors the direction of rotation of the mains supply or that of an emergency generator.*

#### 5.7.6 Connection of the seal monitoring unit to the control panel

The standard versions of the units are fitted as standard with DI seal monitors which monitor the state of the sealing. In order to integrate the DI electrode into the control panel it is necessary to fit a Sulzer DI module and connect it in accordance with the wiring diagram (Fig. 23).

**ATTENTION** *The DI seal monitoring probe in the oil chamber (60 Hz, Hazardous Location, North America only) must be connected to an intrinsically safe electrical circuit in accordance with FM (Factory Mutual) 3650.*

**ATTENTION** *The Sulzer DI module must be located outside of the hazardous location.*

**ATTENTION** *If the DI seal monitor 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 moisture sensors disconnected will invalidate any related warranty claims.*

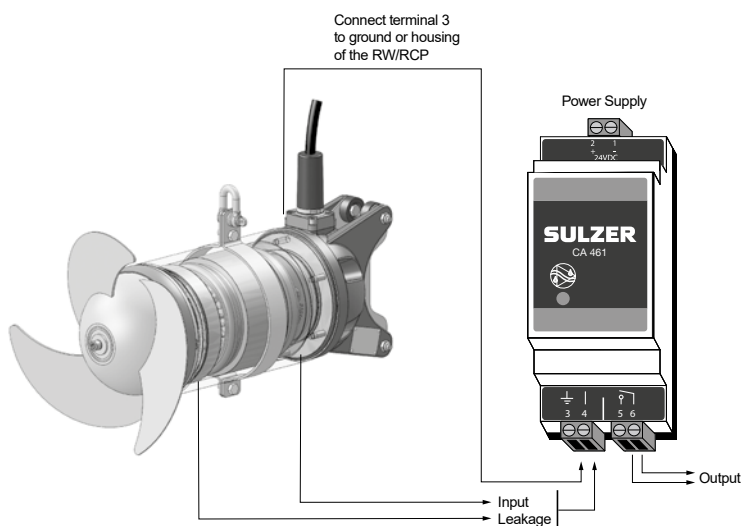


Figure 30. Electronic amplifier with collective signalling

### Electronic amplifier for 50/60 Hz

110 - 230 V AC (CSA) (Part No.: 1 690 7010)

18 - 36 V DC (CSA) (Part No.: 1 690 7011)

**ATTENTION** Maximum relay contact loading: 2 Ampere

## 6 Commissioning

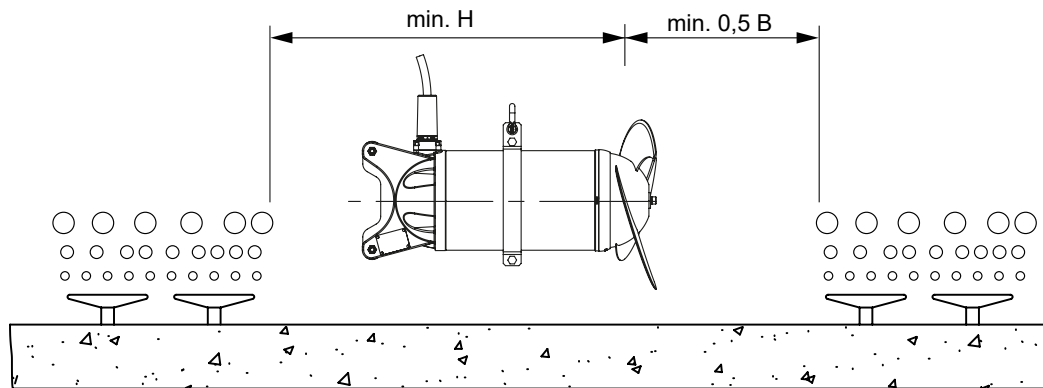


The safety instructions in the previous sections must be observed!

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

- Have the electrical connections been carried out in accordance with regulations?
- Have the thermal sensors/limiters been connected?
- Is the seal monitoring device (where fitted) correctly installed?
- Is the motor overload switch correctly set?
- Have the power and control circuit cables been correctly fitted?
- Has the motor connection cable been laid in such a manner that it cannot be caught up by the rotating body?
- Has the minimum submergence level been observed? (See Section 1.7 Dimensions and weights).

## 6.1 Types of operation



B = Tank width; H = Water depth

Figure 31. Installation example with aeration

**ATTENTION** *The illustration is only an example. For the correct installation please contact Sulzer.*

**ATTENTION** *Operation within the directly aerated area is not allowed!*

**ATTENTION** *The units must work fully submerged in the fluid. During operation no air should be drawn in by the propeller. Ensure that there is a smooth medium flow. The unit should not vibrate heavily when in operation.*

**Uneven flow formation and vibrations can occur if:**

- Over-active mixing in small tanks (only for RW).
- Prevention of free inflow or outflow in the area of the flow ring if fitted (only for RW). Changing the position or direction of the mixer may assist.
- Prevention of free inflow or outflow in the area of the guide cone (only for RCP).

## 7 Maintenance



The safety instructions in the previous sections must be observed!

In particular, the advice regarding maintenance in *paragraph 3.2* of the separate booklet Safety Instructions for Sulzer Products Type ABS are to be observed.

### 7.1 General maintenance hints



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



Servicing must only be carried out by qualified personnel.

**NOTE** *The maintenance instructions 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 approved workshops by approved personnel using original parts supplied by the manufacturer. Otherwise the Ex approvals no longer apply.

Sulzer units are reliable quality products, each being subjected to careful final inspection. Lubricated-for-life ball bearings, together with monitoring devices, ensure optimum reliability provided that the unit 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 unit 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).

**ATTENTION**      ***The lifting tools such as chains and shackles should be visually checked at regular intervals (approx. every 3 months) for wear and corrosion. These parts should be replaced if required!***

The Sulzer Service Organisation would be pleased to advise you on any applications you may have and to assist you in solving your aerating 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.***

**ATTENTION**      ***Regular checks are highly recommended and other checks are prescribed regulations after specific intervals. This ensures a long lifetime and trouble-free operation of the units (see section 7.2 Maintenance).***

**NOTE**              ***In the case of repair work, "Table 1" from IEC60079-1 and FM 3615 may not be applied. In this case please contact Sulzer After-Sales Service!***

## **7.2 Maintenance RW/RCP**



The safety instructions in the previous sections must be observed!

Inspections carried through at regular intervals and preventive maintenance guarantee trouble-free operation. For this reason the complete unit should be cleaned thoroughly on a regular basis, maintained and inspected. For this purpose special care must be taken that all parts of the unit are in a good condition and that operational security is guaranteed. The inspection period is determined by the type of usage of the units, but should however not exceed one year.

The maintenance and inspection work must be carried through corresponding to the subsequent inspection plan. The executed work must be documented in the attached inspection list. In case of non-observance the manufacturer's warranty does not apply!

### **7.2.1 Faults**

In addition to the maintenance and inspection tasks described in section 7.3 *Inspection and maintenance intervals* an urgent check of the unit and installation should be carried out if heavy vibrations develop or uneven flow patterns occur.

#### **Possible causes:**

- Minimum liquid coverage of the RW propeller is not present.
- Aeration in the RW propeller area.
- Wrong direction of rotation of the propeller.
- Propeller is damaged.
- Restriction to the free inflow or outflow in the area of the RW flow ring.
- Restriction to the free inflow or outflow in the area of the RCP inflow cone.
- Parts of the installation, such as bracket or coupling parts, have become defective or loose.

In these cases the unit should be immediately switched off and inspected. If no fault can be found, or the fault remains after it has apparently been corrected, the unit should be left switched off. The same applies also where the current overload in the control panel regularly trips, where the DI seal monitor or the temperature sensors in the stator are activated. We recommend that in such cases you contact the local Sulzer Service Centre.



### 7.3 Inspection and maintenance intervals



The safety instructions in the previous sections must be observed!

<b>PERIOD OF TIME:</b>	<b>Regulation: once a month</b>
ACTIVITY:	Cleaning and inspection of the power and control circuit cables.
DESCRIPTION:	Once a month (more frequently - for example - in difficult application cases where the medium is heavily polluted with fibrous matter) the power and control circuit cables should be cleaned. In particular, fibrous materials must be removed. Part of the regular maintenance is also the inspection of the motor cables. These must be checked for scratches, fissures, bubbles or crushing.
MEASURE:	Damaged power and control circuit cables must be replaced in all cases. Please contact your local Sulzer Service Centre.

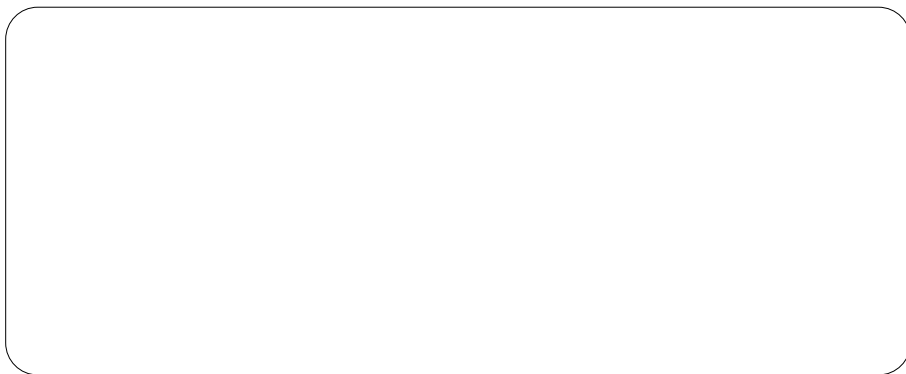
<b>PERIOD OF TIME:</b>	<b>Recommendation: once a month</b>
ACTIVITY:	Check the current consumption at the amp meter.
DESCRIPTION:	With normal operation the current consumption is constant; occasional current fluctuations result from the constitution of the material being mixed.
MEASURE:	If the current consumption is too high for a longer period during normal operation please contact your local Sulzer Service Centre.

<b>PERIOD OF TIME:</b>	<b>Regulation: every 3 months</b>
ACTIVITY:	Cleaning and inspection of the shackles and the lifting equipment.
DESCRIPTION:	Lift the unit out of the tank and clean it. Lifting equipment like hoists, shackles, wire ropes and wire clamps etc. must undergo a visual examination at regular intervals for wear and corrosion.
MEASURE:	Worn or damaged parts should be replaced. Please contact your local Sulzer Service Centre.
ACTIVITY:	Inspection of the propeller and the SD ring (Solids-Deflection-Ring).
DESCRIPTION:	The propeller should be inspected carefully. The propeller might show spots of rupture and wear due to strongly abrasive or aggressive mixing material. In both cases the flow formation is reduced considerably and the propeller must be replaced. The solids deflection ring must also be checked. If wear or scoring is visible on the propeller boss these parts must be replaced as well.
MEASURE:	If you find out any cases of the damage described above please contact your local Sulzer Service Centre.

<b>PERIOD OF TIME:</b>	<b>Recommendation: every 6 months</b>
ACTIVITY:	Insulation resistance check.
DESCRIPTION:	Within the scope of the maintenance work the insulation resistance of the motor winding should be measured every 4,000 hours, and/or at least once a year. If the proper insulation resistance level is not reached, moisture might have got into the motor.
MEASURE:	The unit must be taken out of operation and may not be started again. Please contact your local Sulzer Service Centre.
ACTIVITY:	Functional testing of the monitoring devices.
DESCRIPTION:	In the scope of the maintenance measures functional testing of all monitoring devices must be carried through every 4,000 hours and/or at least once a year. For these functional tests the unit must have cooled down to the ambient temperature. The electrical connecting line of the monitoring device must be disconnected at the control box. These measurements must be carried through by means of an ohmmeter at the respective cable ends.
MEASURE:	In any case of any functional problems on the monitoring devices please contact your local Sulzer Service Centre.







**SECTION 6**

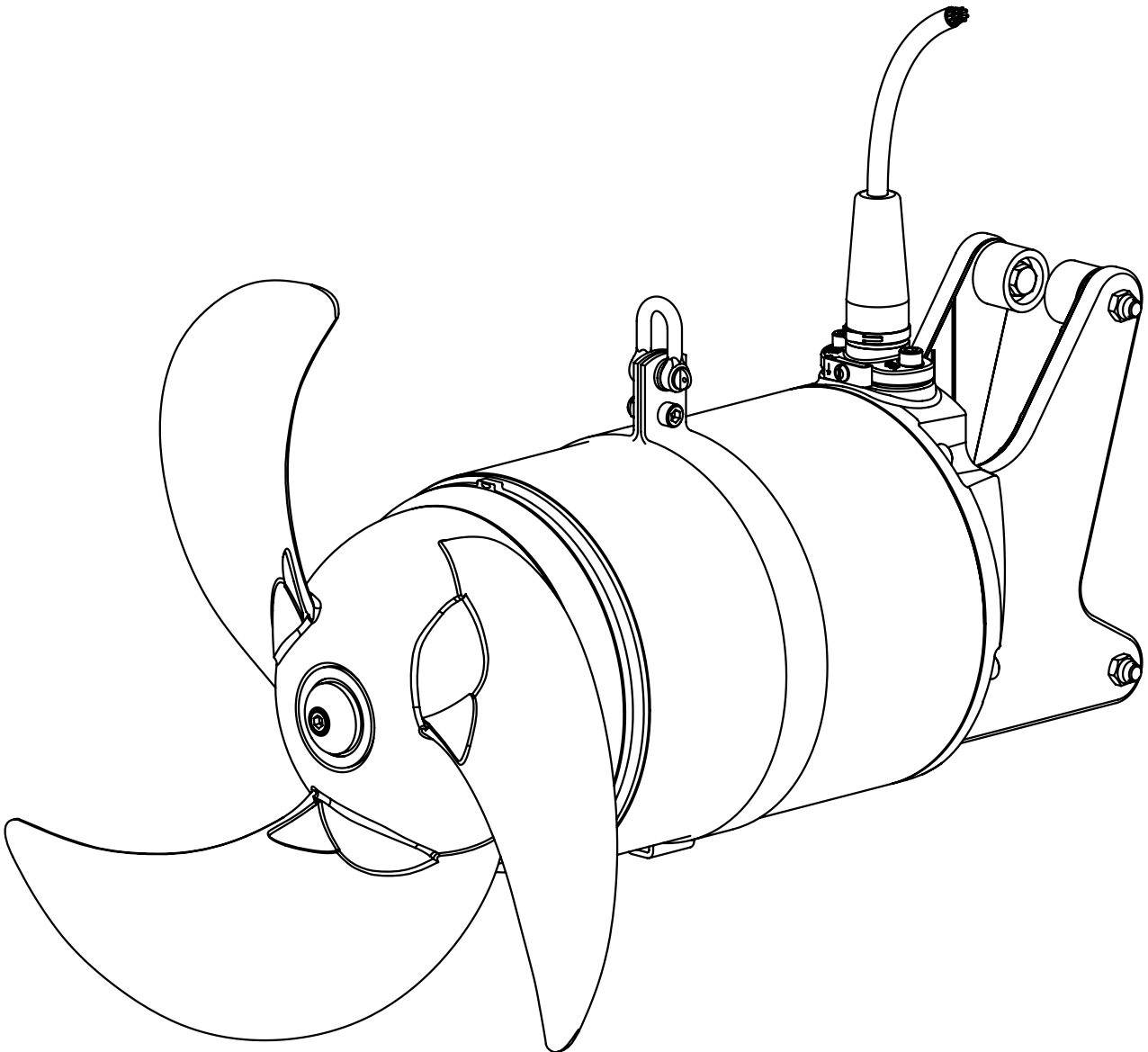
**OPERATION & MAINTENANCE INSTRUCTIONS  
XRW**

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**Submersible Mixer Type ABS XRW 210 - 900**

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1169-00



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**Installation and Operating Instructions**

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# 1 General

## 1.1 Introduction

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 when not observed have been specifically highlighted with this 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.*

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

Illustrations code; e.g. (3/2). The first digit refers to the figure no. and the second digit to the position in that figure.

## 1.2 Correct usage of the products

Sulzer products have been designed and built in accordance with the latest technology, taking into account the relevant safety regulations. However, improper usage could cause a danger to the user or a third party and cause damage or impair functionality of the unit itself or other items of value.

Sulzer units should only be used if they are in perfect technical condition, taking into account all safety requirements and being conscious of the need to avoid potential dangers. The contents of the **Installation and Operating Instructions** and the “**Safety Instructions for Sulzer Products Type ABS**” manuals must be applied! Any abnormal usage, or usage beyond that specified, will be considered as non-compliance. The manufacturer/supplier will not accept any responsibility for damage as a result of such usage and the risk will be borne by the user. In case of doubt the entire scope of the planned application must be approved by Sulzer.

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 Service Centre.

## 1.3 Application restrictions of XRW

The XRW can be supplied in standard version and in explosion-proof execution (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 61000-6-1:2019, EN 61000-6-2:2005-01, EN 61000-6-3:2007, EN 61000-6-4:2007) or FM execution (NEC 500, Class I, Division 1, Group C&D, T3C) for 60 Hz in isolation class H (140).

**Limitations:**            The ambient temperature range is 0 °C to + 40 °C (32 °F to 104 °F)  
Immersion depth maximum 20 m (66 ft)

**ATTENTION**      *If cable length is less than 20 m, the maximum immersion depth reduces accordingly. In special cases an immersion depth greater than 20 m is possible. However, the maximum number of starts according to the motor datasheet may not be exceeded. In order to do this you need the written approval from the manufacturer Sulzer.*



Pumping of flammable or explosive liquids with these pumps is not allowed!



Only explosion-proof executions may be used in hazardous areas!

**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 unit it is submerged or under water. Other types of operation e.g. snore operation or dry running are not allowed!

**ATTENTION** *XRW with Ex approval is equipped with a DI in the oil chamber in the 60 Hz (FM) version only and not in 50 Hz (ATEX).*

**NOTE!** *Ex protection method type c “Constructional Safety” and k “Liquid immersion” in accordance with EN ISO 80079-36, EN ISO 80079-37 are used.*

**Operation of Ex-XRW**

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

The temperature monitoring of the Ex-XRW has to be carried out by bi-metallic 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.

**Operation of Ex-XRW with variable frequency drive (VFD) 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 Ex must never, without exception, be operated using a mains frequency that is greater than the maximum 50 Hz or 60 Hz as indicated on the nameplate.

**Operation with frequency inverters**

See section 10.1

**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 4, 5) has to be removed.*

**1.4 Application areas**

Sulzer submersible mixers, with a water-pressure-tight encapsulated submersible motor, are a high-class quality product for mixing, stirring, and agitation applications in municipal treatment plants, in industry and in agriculture:

**1.5 Identification code:**

e.g. XRW 6531C-PM100/24Ex-CR

**Hydraulics:**

- XRW**.....Mixer series
- 65** ..... Propeller diameter (cm)
- 3** ..... Propeller type\*
- 1** ..... Propeller identification code
- C**..... VFD size (XRW 400 and XRW 650 only)

**Motor:**

- PM** ..... Motor type. PM = Permanent Magnet; PA = Premium efficiency Asynchronous
- 100** ..... Motor power (P<sub>2</sub> [kW] x 10)
- 24** ..... Number of poles
- Ex** ..... Motor designation. Ex = explosion proof; without code = standard motor

**Material:**

- CR** ..... Material. CR = stainless steel; EC = cast iron

\* 1 = mixed flow propeller (without flow ring); 2 = two-blade thrust propeller; 3 = three-blade thrust propeller; 4 = two-blade thrust propeller with flow ring; 5 = three-blade thrust propeller with flow ring.

## 2 Technical data

The maximum noise level of the units of this series is  $\leq 70$  dB(A). In some types of installation it is possible that the noise level of 70 dB(A) or the measured noise level will be exceeded.

Additional technical information is available in the XRW technical data sheets which can be downloaded from [www.sulzer.com](http://www.sulzer.com) > Products > Submersible Mixers.

### 2.1 Technical data XRW 210 and 300

Hydraulics no	Propeller diameter	Speed	Motor type	Rated input power $P_1$	Rated output power $P_2$	Rated current*	Thrust ISO 21630	Mixing power $P_p$	Power consumption $P_1$	Weight
<b>50 Hz</b>	[mm]	[1/min]		[kW]	[kW]	[A]	[N]	[kW]	[kW]	[kg]
2121	210	1424	PA 08/4	0.9	0.8	1.8	156	0.7	0.8	33
2131	210	1437	PA 15/4	1.8	1.5	3.7	207	1.0	1.2	41
2132	210	1437	PA 15/4	1.8	1.5	3.7	285	1.2	1.4	41
2133	210	1437	PA 15/4	1.8	1.5	3.7	304	1.5	1.7	41
2141	210	1424	PA 08/4	0.9	0.8	1.8	-	-	-	39
2151	210	1437	PA 15/4	1.8	1.5	3.7	-	-	-	47
2152	210	1437	PA 15/4	1.8	1.5	3.7	-	-	-	47
2153	210	1437	PA 15/4	1.8	1.5	3.7	-	-	-	47
3021	300	958	PA 15/6	1.8	1.5	3.5	289	0.9	1.1	62
3022	300	958	PA 15/6	1.8	1.5	3.5	350	1.2	1.4	62
3023	300	958	PA 15/6	1.8	1.5	3.5	409	1.3	1.6	62
3031	300	971	PA 29/6	3.5	2.9	7.3	456	1.6	2.1	82
3032	300	971	PA 29/6	3.5	2.9	7.3	564	2.2	2.6	82
3033	300	971	PA 29/6	3.5	2.9	7.3	695	2.7	3.2	82
3041	300	958	PA 15/6	1.8	1.5	3.5	-	-	-	73
3042	300	958	PA 15/6	1.8	1.5	3.5	-	-	-	73
3043	300	958	PA 15/6	1.8	1.5	3.5	-	-	-	73
3051	300	971	PA 29/6	3.5	2.9	7.3	-	-	-	93
3052	300	971	PA 29/6	3.5	2.9	7.3	-	-	-	93
3053	300	971	PA 29/6	3.5	2.9	7.3	-	-	-	93
<b>60 Hz</b>	[mm]	[1/min]		[kW]	[kW/hp]	[A]	[N]	[kW/hp]	[kW/hp]	[kg/lbs]
2121	210	1735	PA 18/4	2.1	1.8 / 2.4	3.5	255	1.1 / 1.5	1.3 / 1.6	41 / 90
2131	210	1735	PA 18/4	2.1	1.8 / 2.4	3.5	310	1.7 / 2.3	2.0 / 2.7	41 / 90
2141	210	1735	PA 18/4	2.1	1.8 / 2.4	3.5	-	-	-	47 / 102
2151	210	1735	PA 18/4	2.1	1.8 / 2.4	3.5	-	-	-	47 / 102
3021	300	1153	PA 18/6	2.2	1.8 / 2.4	3.4	484	1.7 / 2.3	2.1 / 2.8	62 / 131
3022	300	1169	PA 35/6	4.1	3.5 / 4.7	6.9	565	2.1 / 2.8	2.6 / 3.4	82 / 181
3023	300	1169	PA 35/6	4.1	3.5 / 4.7	6.9	660	2.3 / 3.1	2.8 / 3.8	82 / 181
3031	300	1169	PA 35/6	4.1	3.5 / 4.7	6.9	717	3.1 / 4.1	3.6 / 4.9	82 / 181
3041	300	1153	PA 18/6	2.2	1.8 / 2.4	3.4	-	-	-	73 / 162
3042	300	1169	PA 35/6	4.1	3.5 / 4.7	6.9	-	-	-	93 / 206
3043	300	1169	PA 35/6	4.1	3.5 / 4.7	6.9	-	-	-	93 / 206
3051	300	1169	PA 35/6	4.1	3.5 / 4.7	6.9	-	-	-	93 / 206

\*50 Hz at 400 V; 60 Hz at 480 V.

Starting: Direct On Line (D.O.L)

## 2.2 Technical data XRW 400, 650 and 900, 50 Hz

Hydraulics no.	Propeller diameter	Speed	Motor type	Rated input power P <sub>1</sub>	Rated output power P <sub>2</sub>	Rated current at 400 V	Thrust ISO 21630	Mixing power P <sub>p</sub>	Power consumption P <sub>1</sub>	Weight
	[mm]	[1/min]		[kW]	[kW]	[A]	[N]	[kW]	[kW]	[kg]
4031A	400	470	PM 30/10	3.4	3.0	9.9	415	1.2	1.4	80
4032A	400	509	PM 30/10	3.4	3.0	9.9	473	1.5	1.7	80
4033A	400	542	PM 30/10	3.4	3.0	9.9	547	1.8	2.1	80
4034A	400	577	PM 30/10	3.4	3.0	9.9	637	2.2	2.5	80
4035A	400	608	PM 30/10	3.4	3.0	9.9	690	2.6	2.9	80
4031B	400	628	PM 50/10	5.8	5.0	12.9	805	3.0	3.4	80
4032B	400	662	PM 50/10	5.8	5.0	12.9	908	3.5	3.9	80
4033B	400	691	PM 50/10	5.8	5.0	12.9	979	4.0	4.5	80
4034B	400	705	PM 50/10	5.8	5.0	12.9	1028	4.4	5.0	80
4051A	400	470	PM 30/10	3.4	3.0	9.9	378	1.2	1.0	90
4052A	400	509	PM 30/10	3.4	3.0	9.9	449	1.5	1.3	90
4053A	400	542	PM 30/10	3.4	3.0	9.9	507	1.8	1.6	90
4054A	400	577	PM 30/10	3.4	3.0	9.9	562	2.2	1.9	90
4055A	400	608	PM 30/10	3.4	3.0	9.9	643	2.6	2.2	90
4051B	400	628	PM 50/10	5.8	5.0	12.9	670	3.0	2.4	90
4052B	400	662	PM 50/10	5.8	5.0	12.9	750	3.5	2.9	90
4053B	400	691	PM 50/10	5.8	5.0	12.9	823	4.0	3.3	90
4054B	400	705	PM 50/10	5.8	5.0	12.9	838	4.4	3.5	90
6531A	650	314	PM 55/24	6.1	5.5	12.9	952	2.0	2.2	150
6532A	650	338	PM 55/24	6.1	5.5	12.9	1025	2.5	2.8	150
6533A	650	360	PM 55/24	6.1	5.5	12.9	1258	3.0	3.3	150
6534A	650	378	PM 55/24	6.1	5.5	12.9	1384	3.5	3.8	150
6535A	650	396	PM 55/24	6.1	5.5	12.9	1521	4.0	4.4	150
6536A	650	413	PM 55/24	6.1	5.5	12.9	1651	4.5	5.0	150
6530B	650	429	PM 75/24	8.3	7.5	15.8	1761	5.0	5.5	150
6531B	650	442	PM 75/24	8.3	7.5	15.8	1875	5.5	6.1	150
6532B	650	456	PM 75/24	8.3	7.5	15.8	1972	6.0	6.7	150
6533B	650	468	PM 75/24	8.3	7.5	15.8	2077	6.5	7.2	150
6530C	650	480	PM 100/24	11.0	10.0	24.2	2196	7.0	7.8	150
6531C	650	490	PM 100/24	11.0	10.0	24.2	2323	7.5	8.2	150
6532C	650	502	PM 100/24	11.0	10.0	24.2	2421	8.0	8.8	150
6551A	650	314	PM 55/24	6.1	5.5	12.9	647	2.0	1.6	165
6552A	650	338	PM 55/24	6.1	5.5	12.9	742	2.5	2.0	165
6553A	650	360	PM 55/24	6.1	5.5	12.9	845	3.0	2.4	165
6554A	650	378	PM 55/24	6.1	5.5	12.9	939	3.5	2.8	165
6555A	650	396	PM 55/24	6.1	5.5	12.9	1018	4.0	3.2	165
6556A	650	413	PM 55/24	6.1	5.5	12.9	1140	4.5	3.6	165
6550B	650	429	PM 75/24	8.3	7.5	15.8	1221	5.0	3.9	165
6551B	650	442	PM 75/24	8.3	7.5	15.8	1304	5.5	4.3	165
6552B	650	456	PM 75/24	8.3	7.5	15.8	1398	6.0	4.7	165
6553B	650	468	PM 75/24	8.3	7.5	15.8	1467	6.5	5.1	165
6550C	650	480	PM 100/24	11.0	10.0	24.2	1523	7.0	5.5	165
6551C	650	490	PM 100/24	11.0	10.0	24.2	1599	7.5	5.9	165
6552C	650	502	PM 100/24	11.0	10.0	24.2	1679	8.0	6.3	165
9032	900	246 <sup>1</sup>	PA 110/4	12.0	11.0	21.7	3109	7.2	8.0	260
9033	900	246 <sup>1</sup>	PA 110/4	12.0	11.0	21.7	3328	8.1	9.1	260
9034	900	245 <sup>1</sup>	PA 110/4	12.0	11.0	21.7	3449	8.9	9.9	260
9035	900	246 <sup>1</sup>	PA 150/4	16,3	15.0	30.0	3882	10.6	11.9	295
9033	900	294 <sup>2</sup>	PA 150/4	16,3	15.0	30.0	5105	13.1	14.6	295
9035	900	295 <sup>2</sup>	PA 220/4	23,9	22.0	44.8	5223	14.6	16.4	320
9035	900	293 <sup>2</sup>	PA 220/4	23,9	22.0	44.8	6039	18.3	20.4	320

Starting: XRW 400 and 650 = Variable Frequency Drive (VFD), XRW 900 = Star / Delta <sup>1</sup> Gear ratio i = 6, <sup>2</sup> Gear ratio i = 5

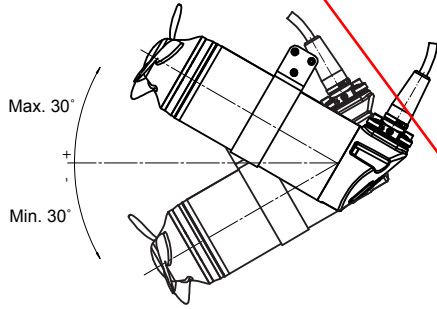
## 2.3 Technical data XRW 400, 650 and 900, 60 Hz

Hydraulics no.	Propeller diameter	Speed	Motor type	Rated input power P <sub>1</sub>	Rated output power P <sub>2</sub>	Rated current at 480 V	Thrust ISO 21630	Mixing power P <sub>P</sub>	Power consumption P <sub>1</sub>	Weight
	[mm]	[1/min]		[kW]	[kW/hp]	[A]	[N]	[kW/hp]	[kW/hp]	[kg/lbs]
4031A	400	470	PM 30/10	3.4	3.0 / 4.0	8.1	415	1.2 / 1.6	1.4 / 1.9	80 / 176
4032A	400	509	PM 30/10	3.4	3.0 / 4.0	8.1	473	1.5 / 2.0	1.7 / 2.3	80 / 176
4033A	400	542	PM 30/10	3.4	3.0 / 4.0	8.1	547	1.8 / 2.4	2.1 / 2.8	80 / 176
4034A	400	577	PM 30/10	3.4	3.0 / 4.0	8.1	637	2.2 / 3.1	2.5 / 3.3	80 / 176
4035A	400	608	PM 30/10	3.4	3.0 / 4.0	8.1	690	2.6 / 3.5	2.9 / 3.9	80 / 176
4031B	400	628	PM 50/10	5.8	5.0 / 6.7	10.9	805	3.0 / 4.0	3.4 / 4.5	80 / 176
4032B	400	662	PM 50/10	5.8	5.0 / 6.7	10.9	908	3.5 / 4.7	3.9 / 5.3	80 / 176
4033B	400	691	PM 50/10	5.8	5.0 / 6.7	10.9	979	4.0 / 5.4	4.5 / 6.1	80 / 176
4034B	400	705	PM 50/10	5.8	5.0 / 6.7	7.9	1028	4.4 / 5.9	5.0 / 6.7	80 / 176
4051A	400	470	PM 30/10	3.4	3.0 / 4.0	9.9	378	1.2 / 1.6	1.4 / 1.9	90 / 198
4052A	400	509	PM 30/10	3.4	3.0 / 4.0	9.9	449	1.5 / 2.0	1.7 / 2.3	90 / 198
4053A	400	542	PM 30/10	3.4	3.0 / 4.0	9.9	507	1.8 / 2.4	2.0 / 2.7	90 / 198
4054A	400	577	PM 30/10	3.4	3.0 / 4.0	9.9	562	2.2 / 3.0	2.5 / 3.3	90 / 198
4055A	400	608	PM 30/10	3.4	3.0 / 4.0	9.9	643	2.6 / 3.5	2.9 / 3.9	90 / 198
4051B	400	628	PM 50/10	5.8	5.0 / 6.7	12.9	670	3.0 / 4.0	3.4 / 4.5	90 / 198
4052B	400	662	PM 50/10	5.8	5.0 / 6.7	12.9	750	3.5 / 4.7	3.9 / 5.3	90 / 198
4053B	400	691	PM 50/10	5.8	5.0 / 6.7	12.9	823	4.0 / 5.4	4.5 / 6.1	90 / 198
4054B	400	705	PM 50/10	5.8	5.0 / 6.7	12.9	838	4.5 / 6.0	5.1 / 6.9	90 / 198
6531A	650	314	PM 55/24	6.1	5.5 / 7.4	10.9	952	2.0 / 2.7	2.2 / 3.0	150 / 331
6532A	650	338	PM 55/24	6.1	5.5 / 7.4	10.9	1025	2.5 / 3.4	2.8 / 3.7	150 / 331
6533A	650	360	PM 55/24	6.1	5.5 / 7.4	10.9	1258	3.0 / 4.0	3.3 / 4.4	150 / 331
6534A	650	378	PM 55/24	6.1	5.5 / 7.4	10.9	1384	3.5 / 4.7	3.8 / 5.1	150 / 331
6535A	650	396	PM 55/24	6.1	5.5 / 7.4	10.9	1521	4.0 / 5.4	4.4 / 5.9	150 / 331
6536A	650	413	PM 55/24	6.1	5.5 / 7.4	10.9	1651	4.5 / 6.0	5.0 / 6.7	150 / 331
6530B	650	429	PM 75/24	8.3	7.5 / 10.1	14.3	1761	5.0 / 6.7	5.5 / 7.4	150 / 331
6531B	650	442	PM 75/24	8.3	7.5 / 10.1	14.3	1875	5.5 / 7.4	6.1 / 8.2	150 / 331
6532B	650	456	PM 75/24	8.3	7.5 / 10.1	14.3	1972	6.0 / 8.1	6.7 / 8.9	150 / 331
6533B	650	468	PM 75/24	8.3	7.5 / 10.1	14.3	2077	6.5 / 8.7	7.2 / 9.7	150 / 331
6530C	650	480	PM 100/24	11.0	10.0 / 13.4	20.9	2196	7.0 / 9.4	7.8 / 10.4	150 / 331
6531C	650	490	PM 100/24	11.0	10.0 / 13.4	20.9	2323	7.5 / 10.1	8.2 / 11.0	150 / 331
6532C	650	502	PM 100/24	11.0	10.0 / 13.4	20.9	2421	8.0 / 10.7	8.8 / 11.8	150 / 331
6551A	650	314	PM 55/24	6.1	5.5 / 7.4	12.9	647	2.0 / 2.7	2.2 / 3.0	165 / 364
6552A	650	338	PM 55/24	6.1	5.5 / 7.4	12.9	742	2.5 / 3.4	2.8 / 3.7	165 / 364
6553A	650	360	PM 55/24	6.1	5.5 / 7.4	12.9	845	3.0 / 4.0	3.3 / 4.4	165 / 364
6554A	650	378	PM 55/24	6.1	5.5 / 7.4	12.9	939	3.5 / 4.7	3.8 / 5.1	165 / 364
6555A	650	396	PM 55/24	6.1	5.5 / 7.4	12.9	1018	4.0 / 5.4	4.4 / 5.9	165 / 364
6556A	650	413	PM 55/24	6.1	5.5 / 7.4	12.9	1140	4.5 / 6.0	5.0 / 6.7	165 / 364
6550B	650	429	PM 75/24	8.3	7.5 / 10.1	15.8	1221	5.0 / 6.7	5.5 / 7.0	150 / 331
6551B	650	442	PM 75/24	8.3	7.5 / 10.1	15.8	1304	5.5 / 7.4	6.1 / 8.2	165 / 364
6552B	650	456	PM 75/24	8.3	7.5 / 10.1	15.8	1398	6.0 / 8.1	6.7 / 8.9	165 / 364
6553B	650	468	PM 75/24	8.3	7.5 / 10.1	15.8	1467	6.5 / 8.7	7.2 / 9.7	165 / 364
6550C	650	480	PM 100/24	11.0	10.0 / 13.4	26.4	1523	7.0 / 9.4	7.8 / 10.4	150 / 331
6551C	650	490	PM 100/24	11.0	10.0 / 13.4	26.4	1599	7.5 / 10.1	8.3 / 11.1	165 / 364
6552C	650	502	PM 100/24	11.0	10.0 / 13.4	26.4	1679	8.0 / 10.7	8.8 / 11.8	165 / 364
9032	900	254 <sup>1</sup>	PA 130/4	14.0	13.0 / 17.4	21.8	3353	8.1 / 10.7	9.0 / 12.1	260 / 573
9033	900	254 <sup>1</sup>	PA 130/4	14.0	13.0 / 17.4	21.8	3641	9.2 / 12.3	10.1 / 13.5	260 / 573
9034	900	254 <sup>1</sup>	PA 130/4	14.0	13.0 / 17.4	21.8	3675	9.8 / 13.1	10.8 / 14.5	260 / 573
9035	900	253 <sup>1</sup>	PA 170/4	18.3	17.0 / 22.8	28.8	4160	11.8 / 15.8	13.0 / 17.4	295 / 650
9033	900	295 <sup>2</sup>	PA 170/4	18.3	17.0 / 22.8	28.8	5131	13.2 / 17.7	14.5 / 19.4	295 / 650
9034	900	296 <sup>2</sup>	PA 250/4	27.0	25.0 / 33.5	43.2	5238	14.6 / 19.6	16.5 / 21.1	320 / 706
9035	900	294 <sup>2</sup>	PA 250/4	27.0	25.0 / 33.5	43.2	6060	18.4 / 24.7	20.5 / 27.5	320 / 706

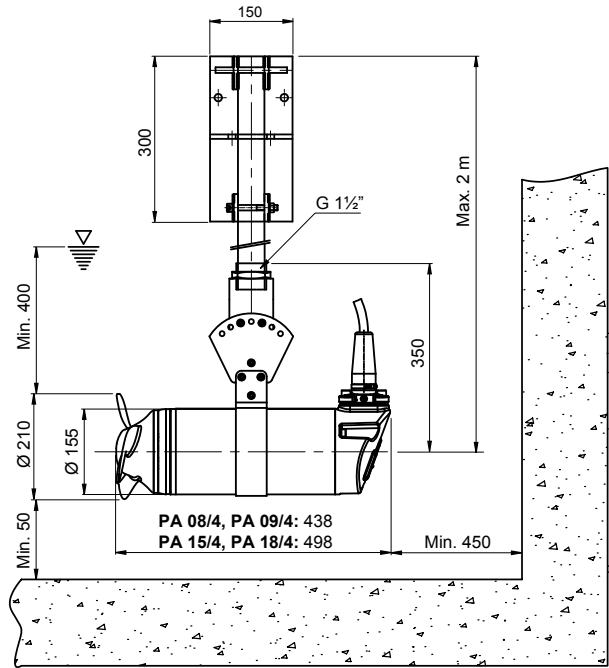
Starting: XRW 400 and 650 = Variable Frequency Drive (VFD), XRW 900 = Star / Delta, <sup>1</sup> Gear ratio i = 7, <sup>2</sup> Gear ratio i = 6

**2.4 Dimensions (mm)**

**2.4.1 XRW 210**

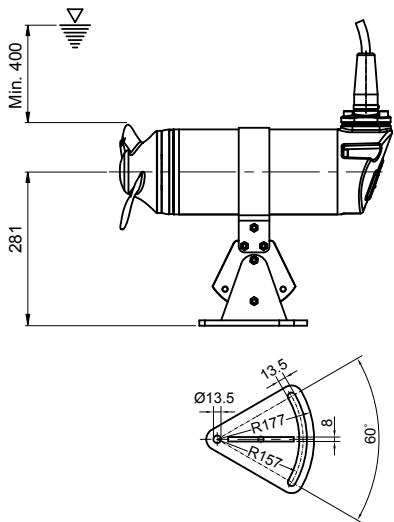


Vertical adjustment limits



Wall mounted on adjustable bracket

Floor mounted on adjustable bracket



Floor mounted on concrete base

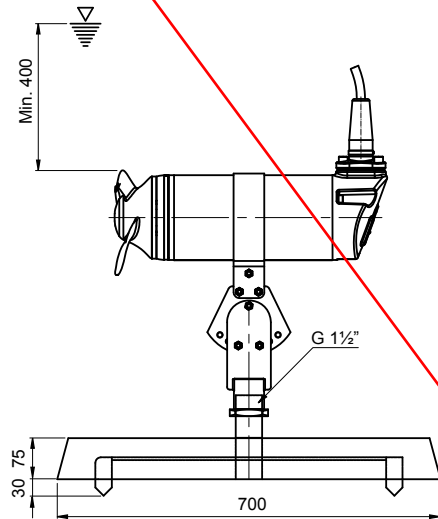


Figure 1: Dimensions XRW 210

## 2.4.2 XRW 210 (with rail mounting bracket), XRW 300, XRW 400, XRW 650, XRW 900

Dimension	XRW 210 PA 08 (50 Hz) PA 09 (60 Hz)	XRW 210 PA 15 (50 Hz) PA 18 (60 Hz)	XRW 300 PA 15 (50 Hz) PA 18 (60 Hz)	XRW 300 PA 29 (50 Hz) PA 35 (60 Hz)	XRW 400 PM 30, PM 50 (VFD)	XRW 650 PM 55, PM 75, PM 100 (VFD)	XRW 900 PA 110, PA 150, PA 220 (50 Hz) PA 130, PA 170, PA 250 (60 Hz)
$D_1$	ø 210	ø 210	ø 300	ø 300	ø 400	ø 650	ø 900
$D_2$	ø 370	ø 370	ø 461	ø 461	ø 560	ø 811	ø 1150
$d_1$	ø 155	ø 155	ø 196	ø 196	ø 207	ø 279	ø 282
H □ 60	268	268	274.4	274.4	270	-	-
H □ 100	-	-	-	-	310	310	310
$h_1$	400	400	500	500	700	1100	1500
I □ 60	260	260	350	350	350	-	-
I □ 100	-	-	-	-	300	400	-
$L_1$ □ 60	524	584	698.7	798.7	629.6	-	-
$L_1$ □ 100	-	-	-	-	670.6	736	1258
$L_2$ □ 60	534	594	618	718	632.4	-	-
$L_2$ □ 100	-	-	-	-	673	787	1281
$X_1$ □ 60	235	235	278.5	278.5	274	-	-
$X_1$ □ 100	-	-	-	-	293.5	301	570
$X_2$ □ 60	235	235	278.5	278.5	254	-	-
$X_2$ □ 100	-	-	-	-	273.5	289	505

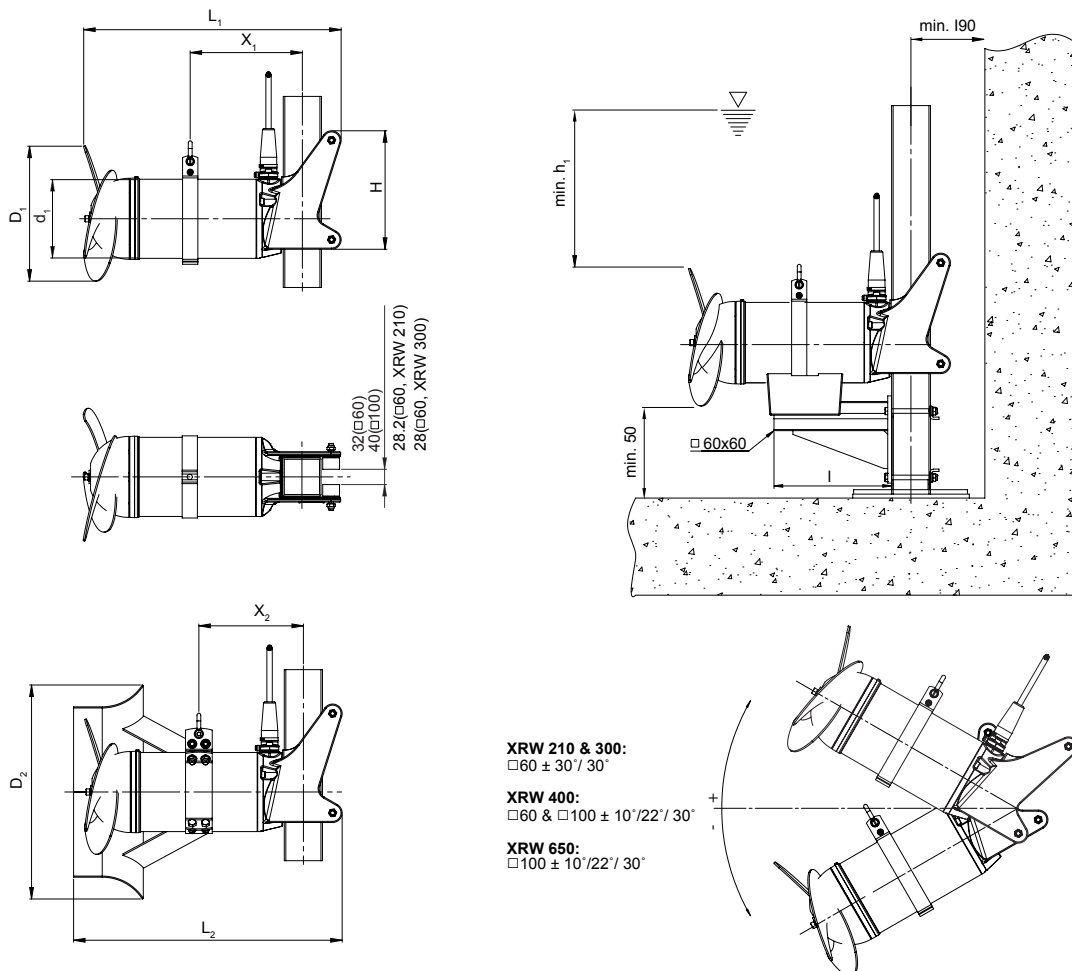


Figure 2: Dimensions XRW 210 - 900 rail mounted

## 2.5 Nameplates

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

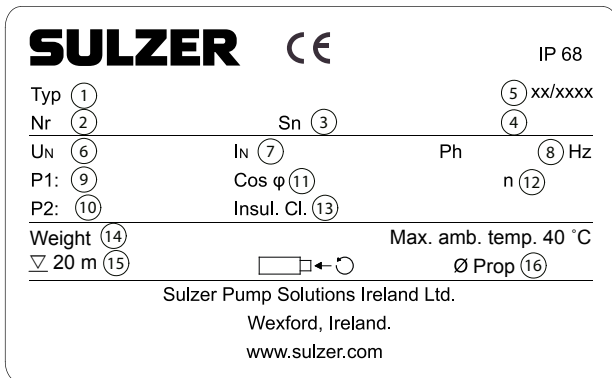


Figure 3: Nameplate XRW

1198-02

### Legend

1	Typ	Mixer type	
2	Nr	Item number	
3	Sn	Serial number	
4		Order number	
5	xx/xxxx	Production date (Week/Year)	
6	UN	Rated voltage	V
7	IN	Rated current	A
8	Hz	Frequency	Hz
9	P1	Rated input power	kW
10	P2	Rated output power	kW
11	Cos φ	Power factor	pf
12	n	Speed	r/min
13	Insul. Cl.	Insulation class	
14	Weight		kg
15	∇	Maximum immersion depth	m
16	Ø Prop	Propeller diameter	mm



Figure 4: Nameplate ATEX

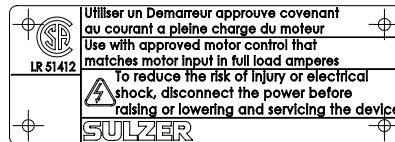


Figure 5: Nameplate CSA / FM

## 3 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.



The safety instructions for the variable frequency drive (VFD) have to be observed during installation or maintenance. The complete motor starter has to be disconnected from the incoming power supply all-pole. The specified waiting time until total discharge of the intermediate circuit must be observed. The function “safety stop” is not activated.



The cable-cross section of the PE cable, connected at terminal 95 (VFD), has to be minimum 10 mm<sup>2</sup>, otherwise two separated earth wires have to be used.



### Residual current protection device (RCD):

Leakage current of the VFD is > 3,5 mA. At power side you have to use RCD's type “B” (universal-current-sensitive).

### Short circuit protection:

From power side the VFD has to be protected against short circuit to avoid danger of electric risk and fire. The VFD output is completely short-circuit-proved.



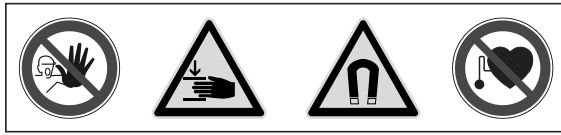
To comply with the EMC directives the use of shielded motor cables (up to 50 m cable category C1 according EN 61800-3) is highly recommended. Avoid pigtails. The connection of the shield should have the maximum contact area. Disconnections must be continued with the lowest possible HF impedance.



Prior to maintenance of the VFD, the mixer must be lifted out of the medium. This prevents generation of voltages by rotating propeller caused by moving medium.











### 3.1 Safety information for permanent-magnet motors



1227-00

**ATTENTION!**

**High magnetic forces! Do not open the motor.**

-  Users of heart pacemakers should avoid being near magnets. If a neodymium magnet is placed within 30 mm of a heart pacemaker it will stop working!
-  Do not use magnets in explosive atmospheres.
-  Do not use magnets if you are pregnant!
-  Do not use magnets if you wear an insulin pump.
-  Modern permanent magnets can attract steel objects or other magnets from large distances and cause trapping injuries. Place non-ferrous (wood / polystyrene / plastic / aluminium) parts between magnets and any steel or other magnet to prevent this hazard.
-  Many magnets are brittle and may shatter if they are allowed to 'jump' together or onto a steel surface. Always wear eye protection if this is likely to happen.
-  Strong magnets may affect or interfere with sensitive electronic instruments and can destroy information stored on magnetic media such as credit cards, floppy discs and computer hard drives. Always keep magnets at least 1 m from such devices.
-  Analogue watches and computer monitors, can be permanently damaged by placing magnets near them.

## 4 Lifting, transport and storage

### 4.1 Lifting

**ATTENTION!** *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.*

## 4.2 Transport



The unit must never be raised by the power cable.

Depending on the version, the units are fitted with a lifting hoop/eyelet, to which a steel rope can be fastened by means of shackles, for transportation, installation or removal.



Take note of the entire weight of the unit (see nameplate: section 2.5). The hoist and steel rope must be adequately dimensioned for the weight of the unit and must comply with the current valid safety regulations. Good technical practice must be observed.



The unit should be protected from rolling over!



The unit is prepared for transportation by placing it on an adequately strong, completely horizontal surface taking care that it cannot topple over.



Do not stay or work in the swivel area of a suspended load!



The lifting hook height must take into consideration the entire height of the unit as well as the length of the steel rope.

## 4.3 Motor connection cable moisture protection

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

**ATTENTION!** *The ends of the cables should never be immersed in water as the protective covers only provide protection against water spray or similar (IP44) and are not a water tight seal. The covers should only be removed immediately prior to connecting the pumps electrically.*

During storage or installation, prior to the laying and connection of the power cable, particular attention should be given to the prevention of water damage in locations which could flood.

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

## 4.4 Storage of the units

**ATTENTION** *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.*

**NOTE** *Sulzer units do not generally require any particular maintenance during storage. After long storage periods (approx. one year), the transportation locking device on the motor shaft (not with all versions) should be disassembled. By rotating the shaft several times by hand, new lubricating oil, or depending on the version, a small amount of coolant (which also serves to cool or lubricate the mechanical seals) is applied to the sealing surfaces, thus ensuring perfect operation of the mechanical seals. The bearings supporting the motor shaft are maintenance-free.*

## 5 Product description

The XRW mixer is designed as a compact, water-pressure-tight unit, with axially operating propeller.

- Hydraulically optimized propeller with high wear-resistance.
- The motor shaft is supported in lubricated-for-life, maintenance-free, ball bearings.
- The shaft is sealed on the medium side by means of a high quality mechanical seal, which is independent of direction of rotation.
- The oil chamber is filled with lubricating oil.

### Motor

- XRW 210, XRW 300, XRW 900: Premium Efficiency asynchronous.  
XRW 400 and XRW 650: permanent-magnet.
- Rated voltage: 400 V, 3~ ,50 Hz / 480 V, 3~ , 60 Hz (other voltages available on request).
- Starting: XRW 210 and XRW 300: direct on line (D.O.L).  
XRW 900: star delta (SD)  
XRW 400 and XRW 650: variable frequency drive (VFD)
- Protection type IP68.

## 6 Structural design

### Legend

1	Guide rail bracket	5	Stator	9	Propeller
2	Cable inlet	6	Lifting band	10	Shaft end with key
3	Connection chamber	7	Motor housing	11	Solids deflection (SD) ring
4	Motor chamber seal	8	Mechanical seal	12	Shaft with rotor and bearings
				13	Planetary gearbox

### 6.1 XRW 210

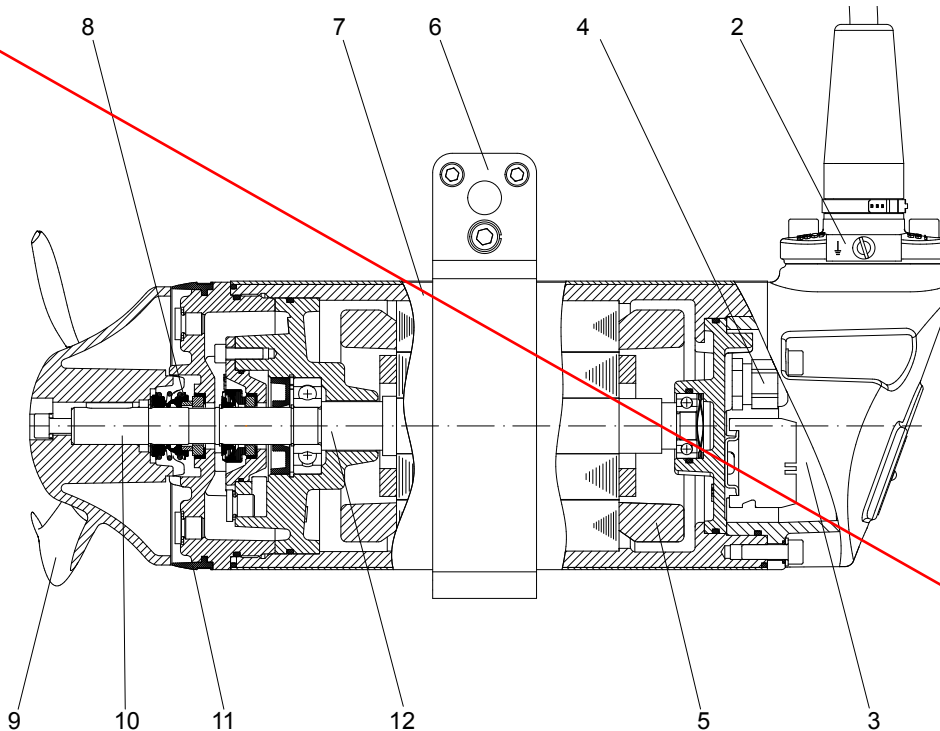
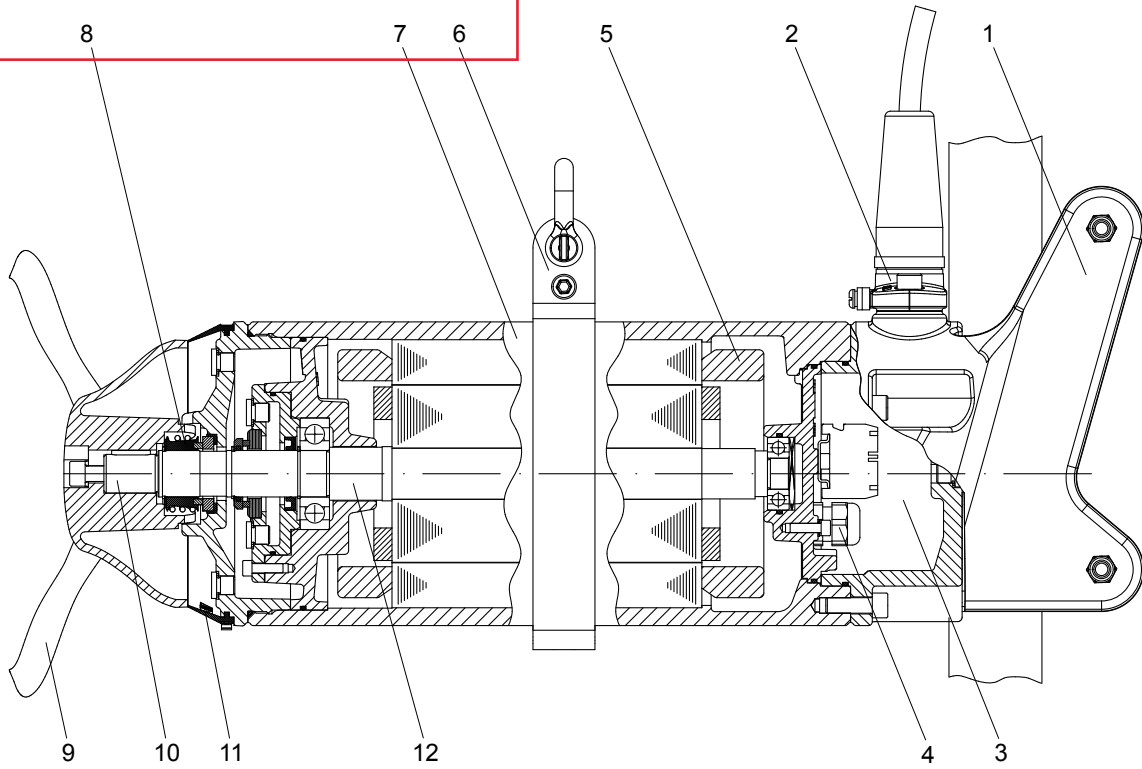


Figure 6: XRW 210

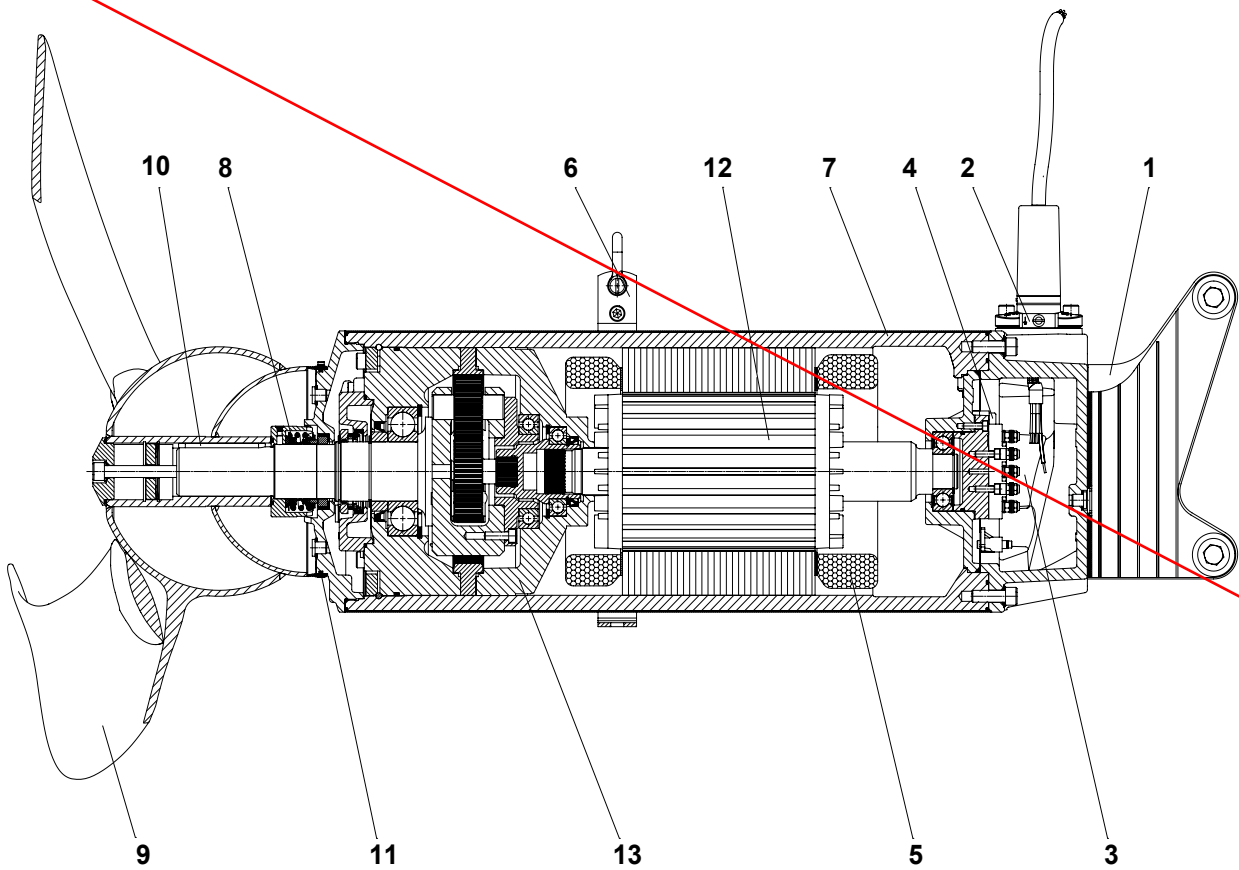
**6.2 XRW 300/400/650**



1171-00

Figure 7: XRW 300/400/650

**6.3 XRW 900**



1228-00

Figure 8: XRW 900

## 7 Propeller assembly XRW

### Legend

1	Socket head screw	4	Propeller washer	7	Shaft key
2	Securing washer	5	O-ring		
3	O-ring	6	O-ring		

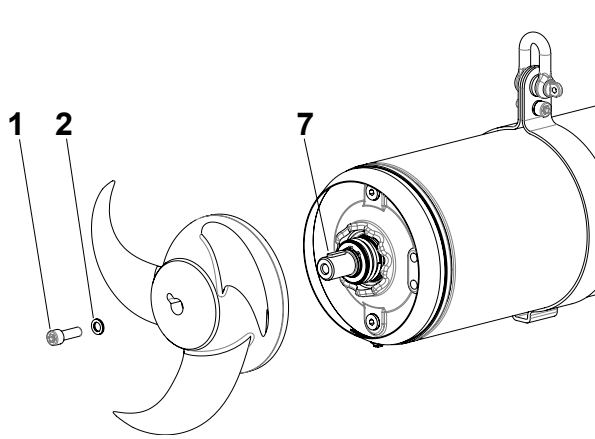


Figure 9: XRW 210 & 300



Figure 10: XRW 400 & 650

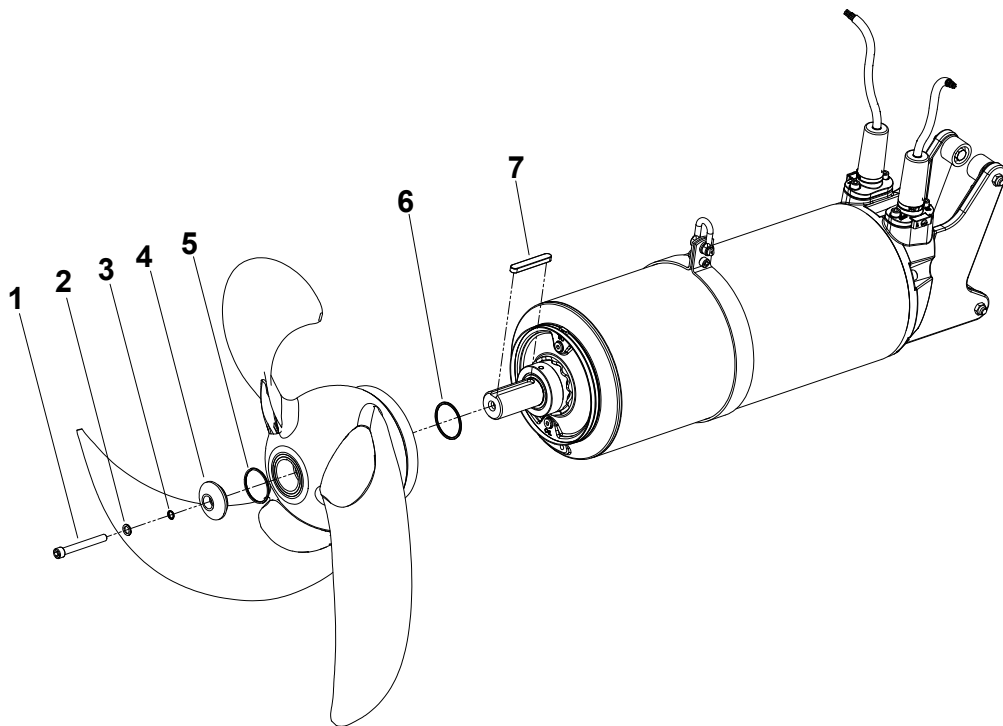


Figure 11: XRW 900

### Dismantling

- Loosen and remove socket head screw (1), security washer (2), o-ring (3 & 5) [XRW 900] and propeller washer (4) [XRW 400, 650 & 900].
- Withdraw the propeller from the propeller shaft.

**XRW 210, 300 and 900:** Use 10 mm (min. length 75 mm), 12 mm (min. length 75 mm) and 16 mm (min. length 80 mm) jacking bolts respectively. Pull impeller from shaft by tightening jacking bolt against the shaft through the threaded bore of the propeller hub.

Note: To protect the shaft bore threads from damage by the jacking bolt, place an adequately sized metal blank or washer at the opening of the shaft bore, against which the jacking bolt can be tightened. Otherwise the shaft bore may need to be re-tapped before the socket head screw can be re-fitted.

**XRW 400 and 650:** Carefully prise the propeller hub from the motor housing using two screwdrivers at opposite sides.

- Remove key (7) from the end of the shaft.

### Assembly

- Clean carefully shaft and boss. Lightly oil shaft and boss.
- Fit the key to the shaft end.
- Bring the groove of the propeller hub into line with the shaft key and push the propeller carefully to a stop.
- Fit the securing washer and the propeller washer (where applicable) to the socket head screw. Ensure the correct fitting position of the securing washers (see Section 8.3).
- Screw in the socket head screw and tighten it to the specified tightening torque (see Section 8.2).

**ATTENTION** Do not use any products containing molybdenum disulphide!

## 8 Installation



The safety hints in the previous sections must be observed!

### 8.1 Installation XRW



Care must be taken that the connection cables are positioned that they cannot get caught up in the propeller blades and that they are not subjected to tension.



The electrical connection is carried out in accordance with Section 10: "Electrical connection".

**NOTE** We recommend that Sulzer installation accessories are used for the installation of the XRW mixer.

### 8.2 Tightening torques

Tightening torque for stainless steel screws A4-70:

Thread	M6	M8	M10	M12	M16	M20	M24
Tightening torque	6.9 Nm	17 Nm	33 Nm	56 Nm	136 Nm	267 Nm	460 Nm

### 8.3 Correct fitting position of the Nord-Lock® washer

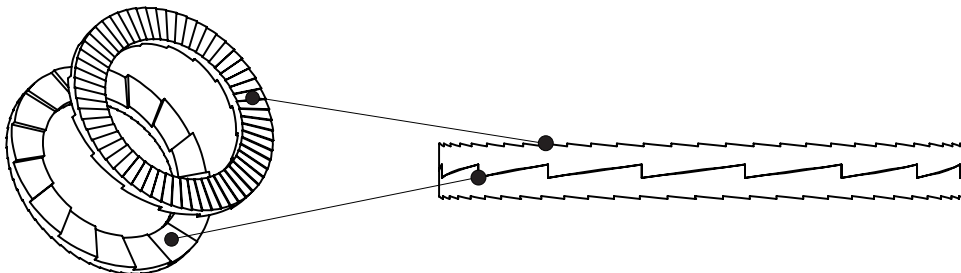
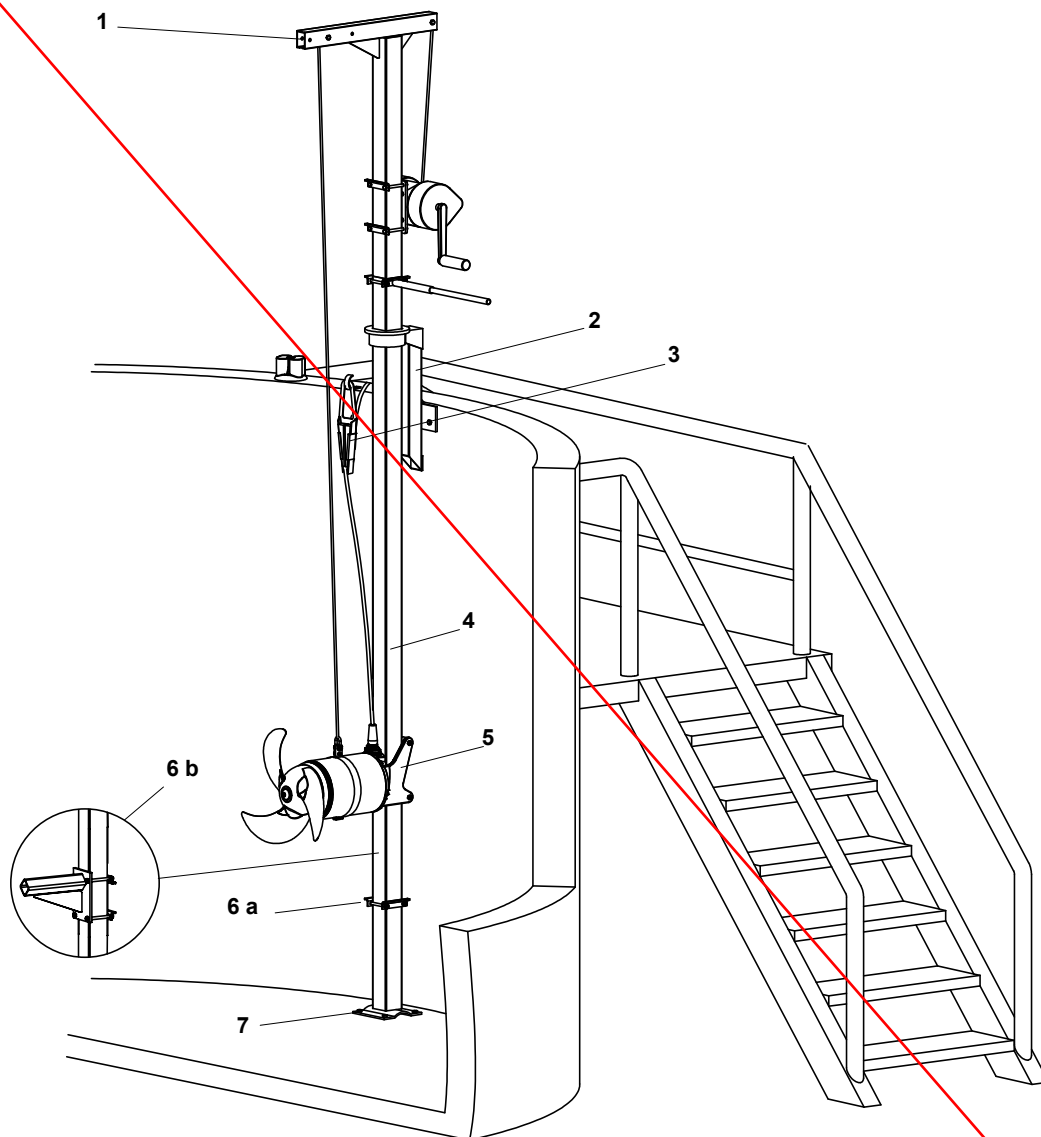


Figure 12: Correct fitting position of the Nord-Lock® securing washers

## 8.4 Installation examples XRW

### 8.4.1 Installation example with existing accessories

We recommend that the closed bracket be used for this type of installation (see Figure 16: closed bracket).



1183-00

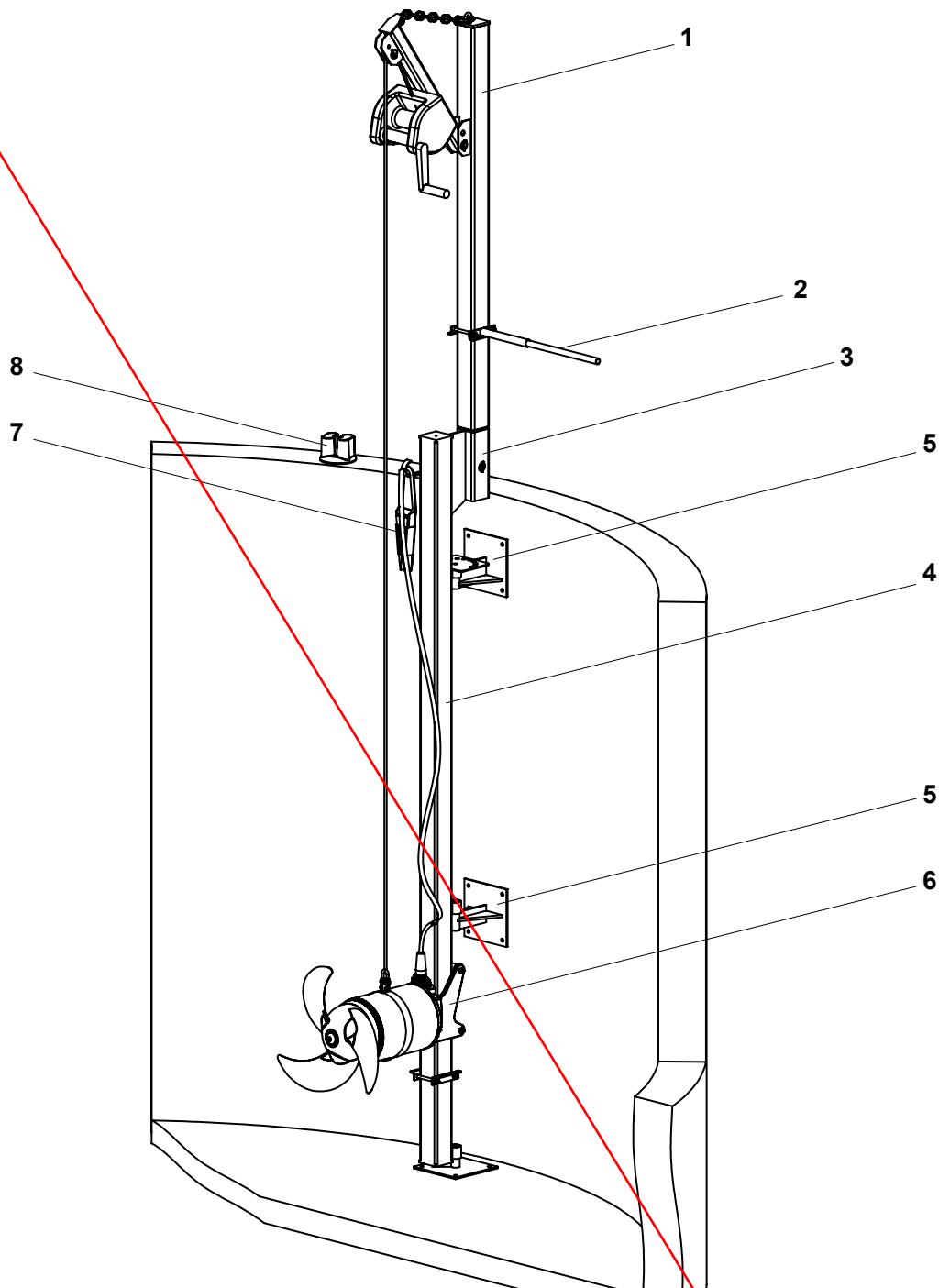
Figure 13: Installation example with existing accessories

### Legend

- 1 Hoist with winch and rope
- 2 Upper bracket with locking plate
- 3 Cable clamp with cable hook
- 4 Swivelling square guide tube
- 5 Closed bracket
- 6 a Safety stop clamp
- 6 b Safety stop for use when mixer is fitted with optional vibration damper
- 7 Bottom plate

### 8.4.2 Installation example with alternative fixing possibilities

We recommend that the open bracket be used for this type of installation (see *Figure 16: open bracket*).



1188-00

Figure 14: Installation example with alternative fixing possibilities

#### Legend

- 1 Transportable lifting unit
- 2 Swivel handle
- 3 Socket (fixed installed)
- 4 Swivelling square guide tube
- 5 Swivelling wall mounted bracket
- 6 Open bracket
- 7 Cable clamp with cable hook
- 8 Rope block



### 8.4.3 Fixed installation with vibration damper

If the mixer is to be installed at a fixed point in the tank, then we recommend that the console with the vibration damper is used. In this case a further square tube must be used as a console on the guide tube.

The vibration damper kit is supplied as an accessory with XRW 210 - 650 and as standard with XRW 900.

Vibration damper listing

Mixer	XRW 210	XRW 300	XRW 400	XRW 650
Part no.:	61625000	61625001	61625001	61625003

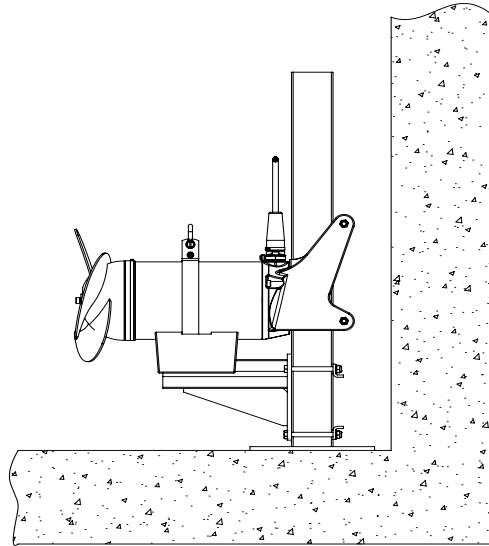
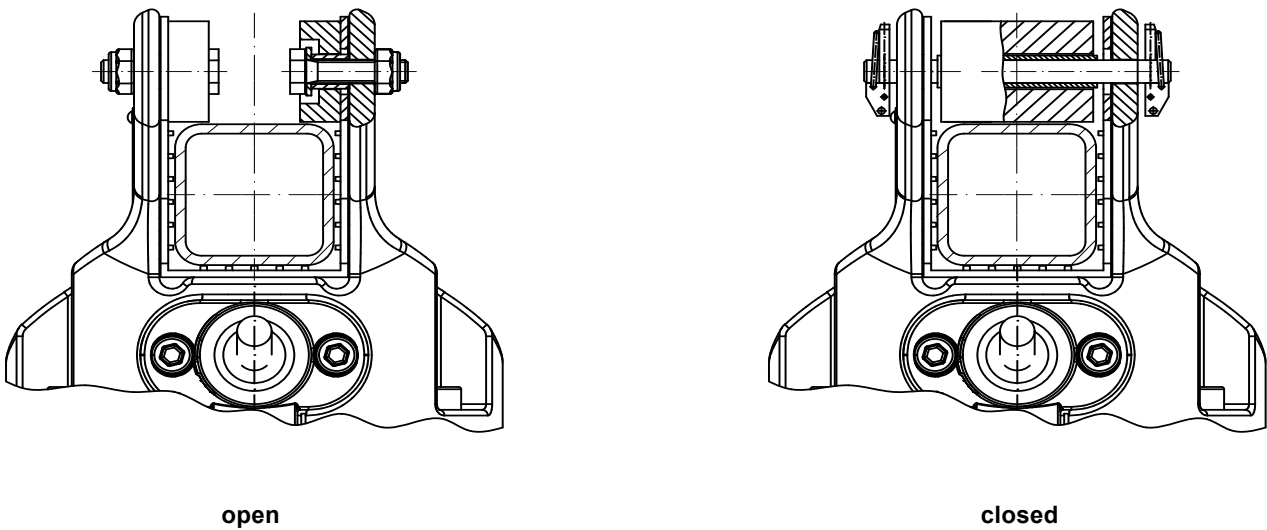


Figure 15: Fixed installation with vibration damper

### 8.5 Brackets XRW

Brackets which can be swivelled vertically (optional) are available for both open and closed models of the brackets for all mixers of the series XRW.

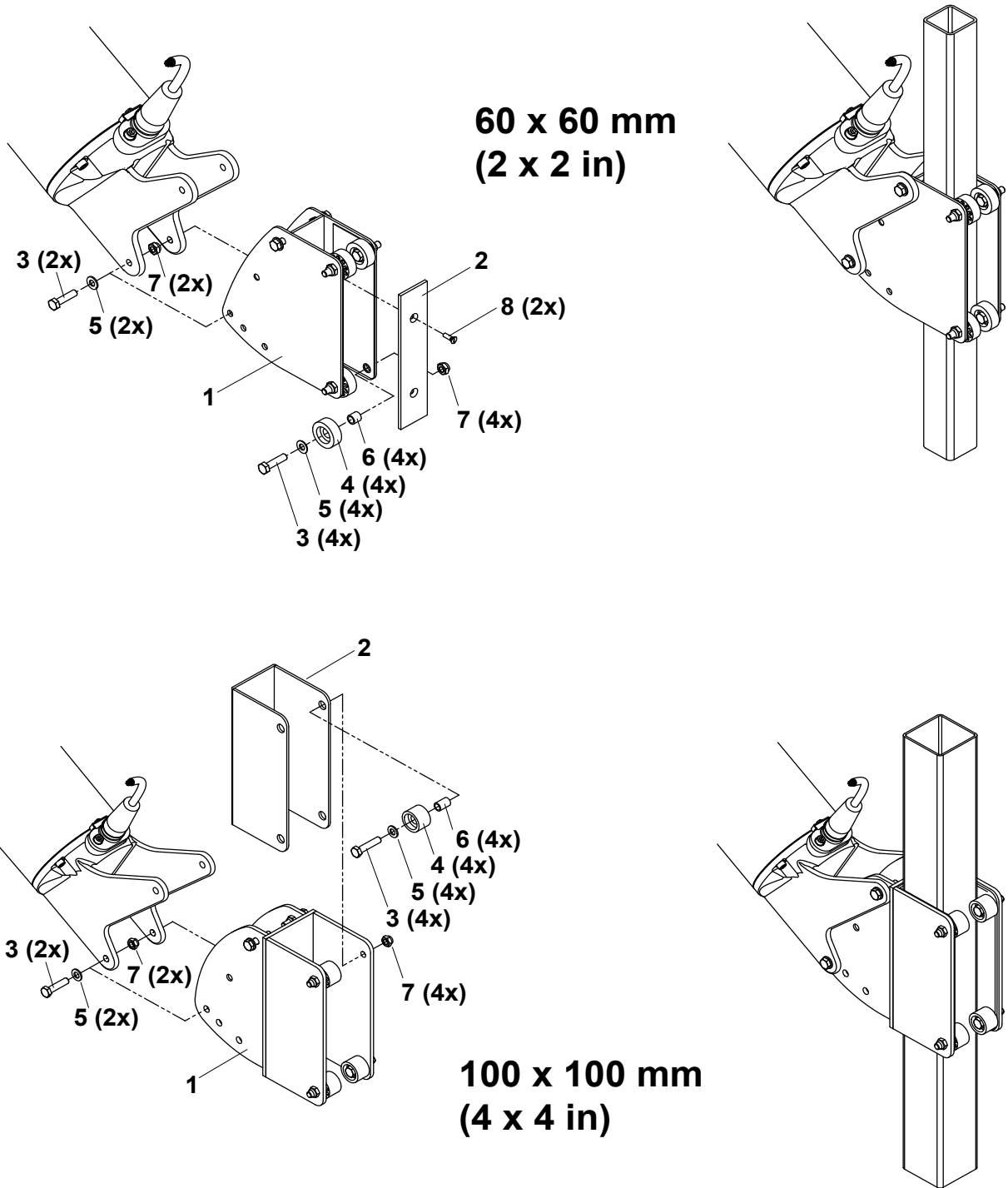


open

closed

Figure 16: Open bracket / closed bracket

8.5.1 Fitting of the open bracket with vertical swivelling (option)



1189-00

Figure 17: Open bracket with vertical swivelling

**Legend**

- |             |                     |
|-------------|---------------------|
| 1 Bracket   | 5 Washer            |
| 2 Cladding  | 6 Tube              |
| 3 Hex bolts | 7 Hex nut           |
| 4 Roller    | 8 Socket head screw |

**NOTE** See section 8.5.3.

8.5.2

Fitting of the closed bracket with vertical swivelling (option)

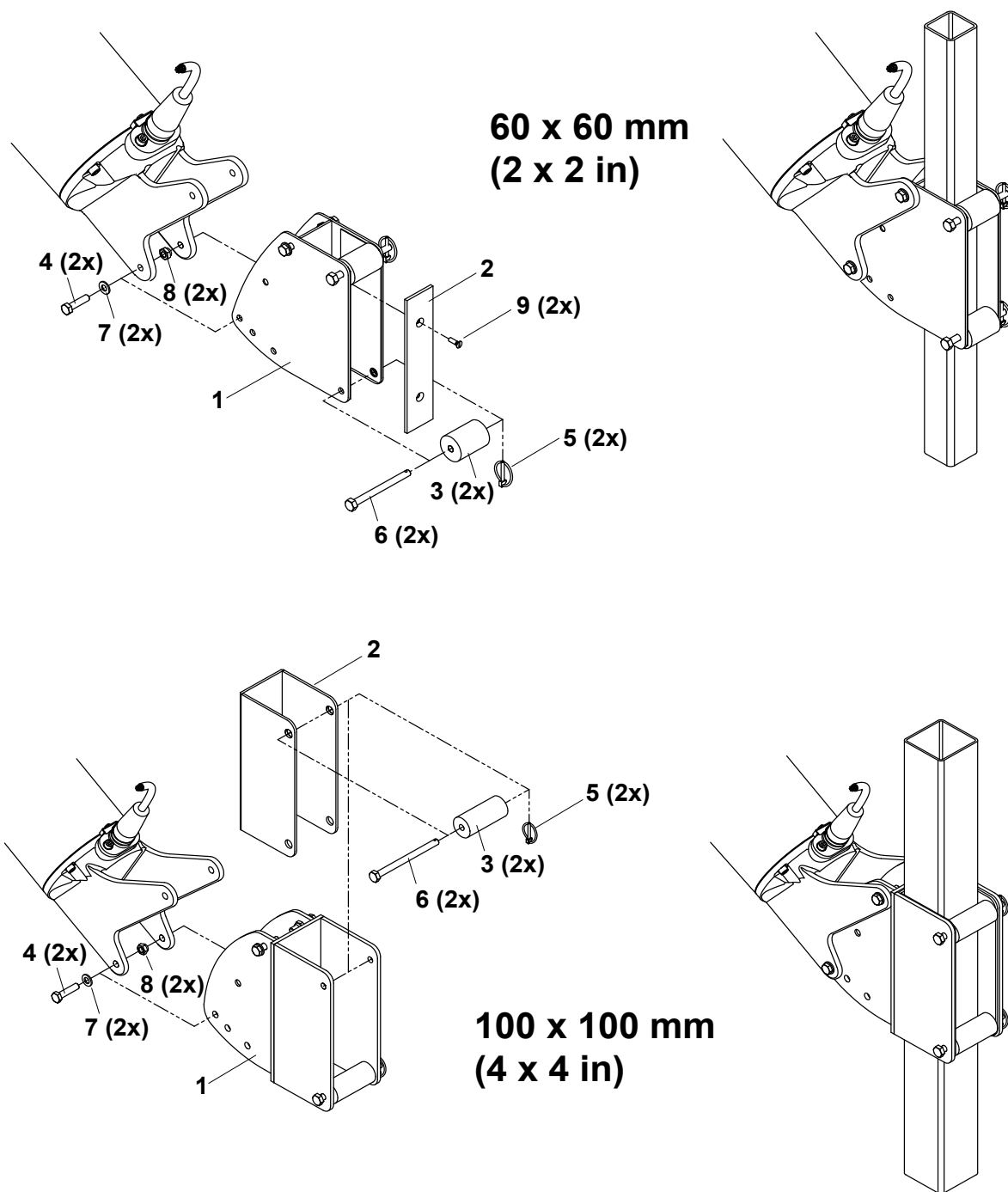


Figure 18: Closed bracket with vertical swivelling

**Legend**

- |              |                     |
|--------------|---------------------|
| 1 Bracket    | 6 Long bolt         |
| 2 Cladding   | 7 Washer            |
| 3 Roller     | 8 Hex nut           |
| 4 Short bolt | 9 Socket head screw |
| 5 Linch pin  |                     |

**NOTE** See section 8.5.3.

### 8.5.3 Bracket alignment on guide rail

The mixer must be set up freely suspended with bracket fully mounted so that the bracket points vertically towards the ground. When doing this the clamp of the mixer should be moved until the desired slope of the mixer is achieved. This ensures that the mixer can slide up and down easily on the guide tube after it is fitted.

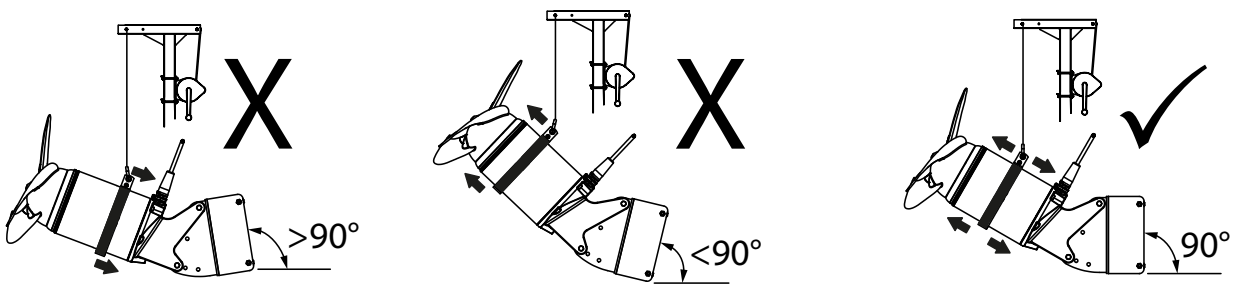


Figure 19: Setting up with fully mounted bracket

**ATTENTION** Damage to bracket liner due to incorrect alignment setup will not be covered under warranty.

### 8.6 Guide tube lengths (square tube)

The table below shows the maximum lengths of the guide tubes - based on the maximum allowable bending  $1/300$  th. of the length of the guide tubes. These values have been determined in clean water of density  $1000 \text{ kg/m}^3$  for the maximum thrust of the most powerful mixer.

Mixer	Maximum guide tube length (L) for an installation with square guide tube		
	with push in type lifting unit	with separate lifting unit	guide tube with additional wall fixing
XRW 300	□ 2" x 3/16". L ≤ 5 m	□ 2" x 3/16". L ≤ 5 m	□ 2" x 3/16". L ≤ 5 m
	□ 60 x 60 x 4. L ≤ 5 m	□ 60 x 60 x 4. L ≤ 5 m	□ 60 x 60 x 4. L ≤ 5 m
XRW 400	□ 2" x 3/16". L ≤ 5 m	□ 2" x 3/16". L ≤ 5 m	□ 2" x 3/16". L ≤ 5 m
	□ 60 x 60 x 4. L ≤ 4 m	□ 60 x 60 x 4. L ≤ 5 m	□ 60 x 60 x 4. L ≤ 5 m
	□ 100 x 100 x 4. L ≤ 9 m	□ 100 x 100 x 4. L ≤ 10 m	□ 100 x 100 x 4. L ≤ 10 m
XRW 650	□ 100 x 100 x 4. L ≤ 5 m	□ 100 x 100 x 4. L ≤ 6 m	□ 100 x 100 x 4. L ≤ 6 m
	□ 100 x 100 x 6. L ≤ 6 m	□ 100 x 100 x 6. L ≤ 7 m	□ 100 x 100 x 4. L ≤ 6 m
	□ 100 x 100 x 8. L ≤ 7 m	□ 100 x 100 x 8. L ≤ 8 m	□ 100 x 100 x 4. L ≤ 6 m
XRW 900 ≤ 15 kW	□ 100 x 100 x 6. L ≤ 5 m	□ 100 x 100 x 6. L ≤ 6 m	□ 100 x 100 x 6. L ≤ 6 m
	□ 100 x 100 x 10. L ≤ 7 m	□ 100 x 100 x 10. L ≤ 7 m	□ 100 x 100 x 6. L ≤ 6 m
XRW 900 > 15 kW only with special installation!			

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1193-00

## 9 Electrical connection



The safety hints in the previous sections must be observed!

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 nameplate of the pump must correspond to that of the mains.*

**ATTENTION** *Before start up of the XRW 400 and XRW 650 the date and time must be set on the VFD via the Quick Menu display. For details please refer to the Danfoss FC 202 Operating Instructions. These clock settings must be made after every power failure, switch-off of the power supply, or before reinstallation.*



The incoming power supply as well as the connection of the unit 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.

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

In pump stations/tanks potential bonding must be carried out in accordance with EN 60079-14:2014 [Ex] or IEC 60364-5-54 [non-Ex] (Regulations for the installation of pipe lines, protective measures in power plants).

In the case of units supplied with a standard control panel this must be protected from dampness and installed above flood level by means of a correctly fitted CEE earthed socket.

**ATTENTION** *The only method of starting allowed is that specified in Section 5 “Product description” or on the nameplate. If you want to use other starting methods please consult the manufacturer.*

*In the case where a control panel is not supplied as standard, the unit must only be operated with a motor protection switch with overload relay and thermal sensors connected.*

## 10 Operation by variable frequency drive (VFD)

VFD control is optional with XRWs 210, 300, 900, and supplied as standard with XRWs 400 and 650.

**ATTENTION** *Before installing the VFD; for important instructions concerning the mounting and cooling of the unit it is necessary to refer to the installation section of the unit’s operating instructions.*

**ATTENTION** *When operating at altitudes above 1000 m the VFD should be derated in accordance with the guidelines of the VFD supplier’s Design Guide manual, which can be downloaded at the supplier homepage.*

Observe the EMC-Directive and the installation and operating instructions of the VFD manufacturer!

## 10.1 Operation of XRW 210, 300 and 900 by variable frequency drive (VFD)

In the case of XRW 210, 300, 900 motors (PA range) it is 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 PTC temperature sensors.
- 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. 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 nameplate. Greater frequencies can be used but only after consulting with, and receiving permission from, the manufacturer Sulzer.
- For operation of Ex-motors by VFD, special requirements in relation to the tripping times of the thermo-control elements, must be observed.
- The lowest frequency must be set so that it is not falling below 25 Hz.
- The maximum frequency must be set so that the rated power of the motor is not exceeded.

Modern VFDs use higher wave frequencies and a steeper rise on the flanks of the voltage wave. This means that motor losses and motor noise is 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 VFD and the motor, these voltage spikes can adversely affect the life of the motor. In order to avoid this, VFDs of this type must be equipped with sinus filters when used in the critical zone (see *Figure 20*). The sinus filter chosen must be suitable for the VFD with regard to rated voltage, VFD wave frequency, rated current of the VFD, and maximum VFD output frequency. Make sure that the rated voltage is supplied to the terminal board of the motor.

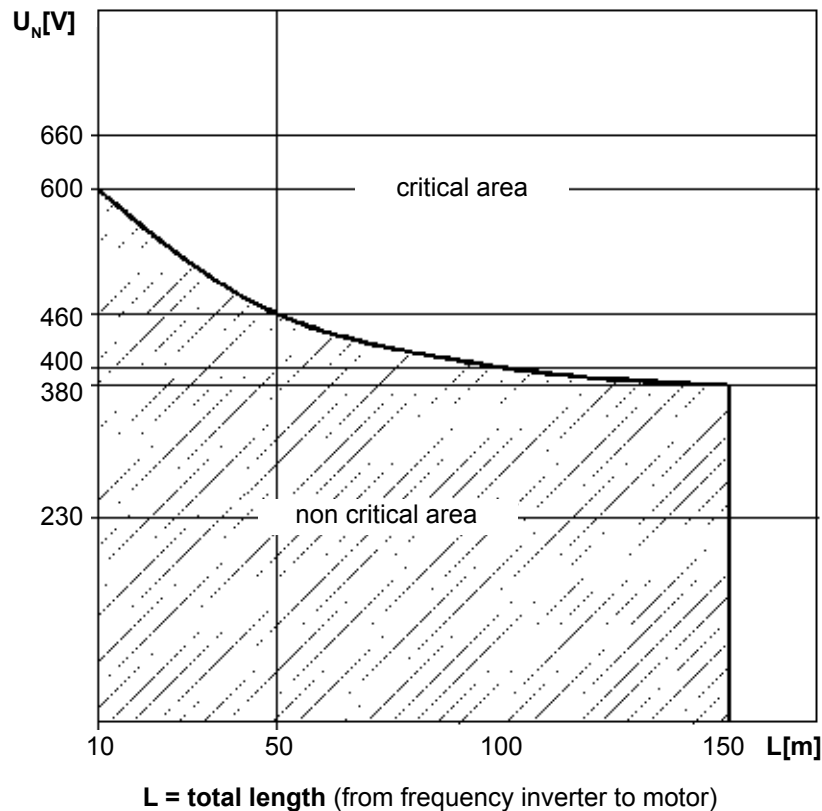
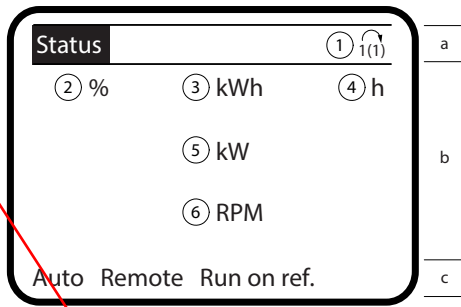


Figure 20: Critical / non-critical area

### 10.2 VFD display panel (XRW 400 / XRW 650)

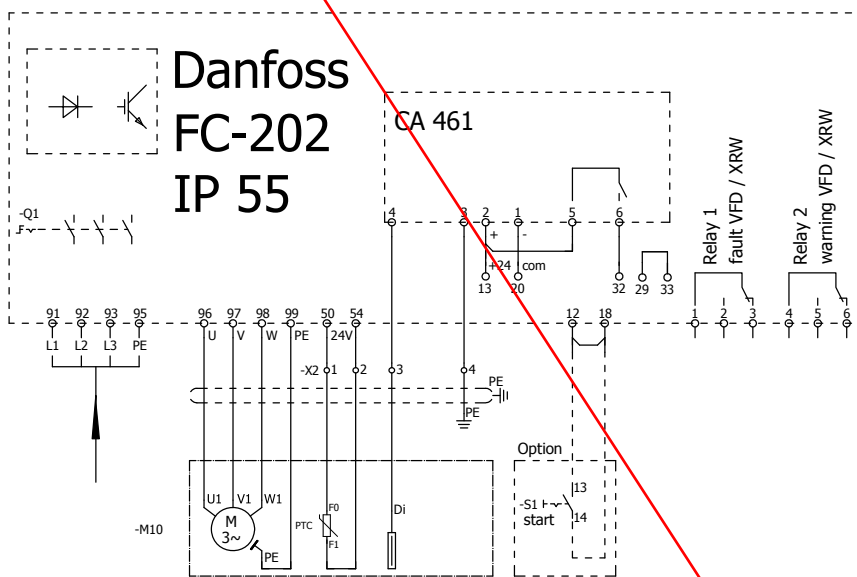
For monitoring of the mixer performance the main operating variables are pre-programmed to display on the VFD control panel.



- a. Status line 1.
  - b. Data field.
  - c. Status line 2.
1. Parameter setting
  2. Motor efficiency
  3. Energy consumption.
  4. Run time.
  5. Motor power.
  6. Speed.

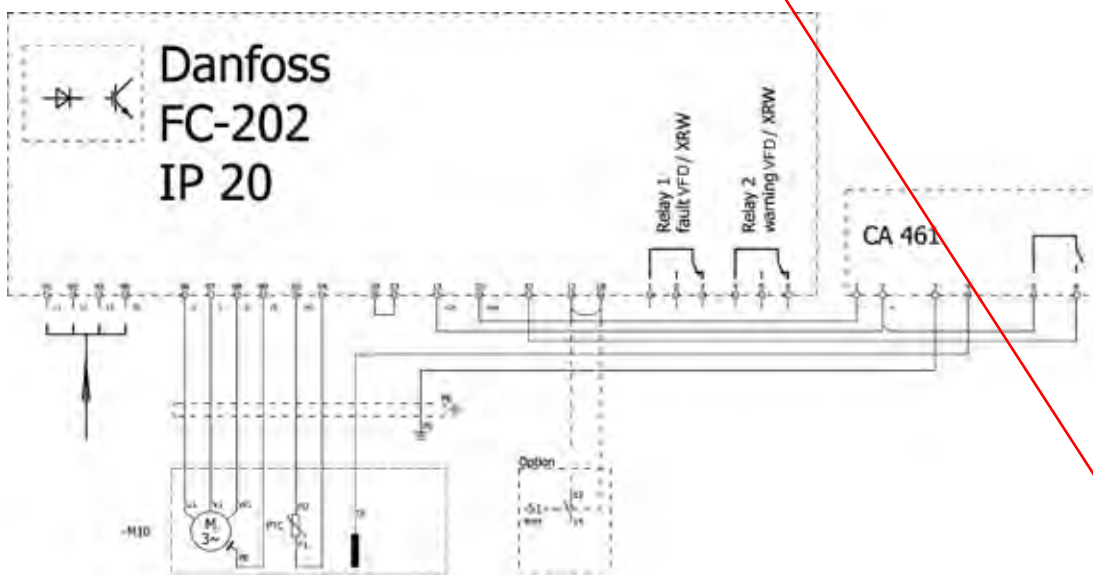
Figure 21: mixer operating variables displayed on VFD

### 10.3 Connection diagram VFD XRW 400 / 650



- 1179-00 Supply line  
L1 / L2 / L3 / PE
- Motor cable (7 x 1.5 mm<sup>2</sup>)  
U1 / V1 / W1 / PE /  
Shielding  
F0 / F1  
DI

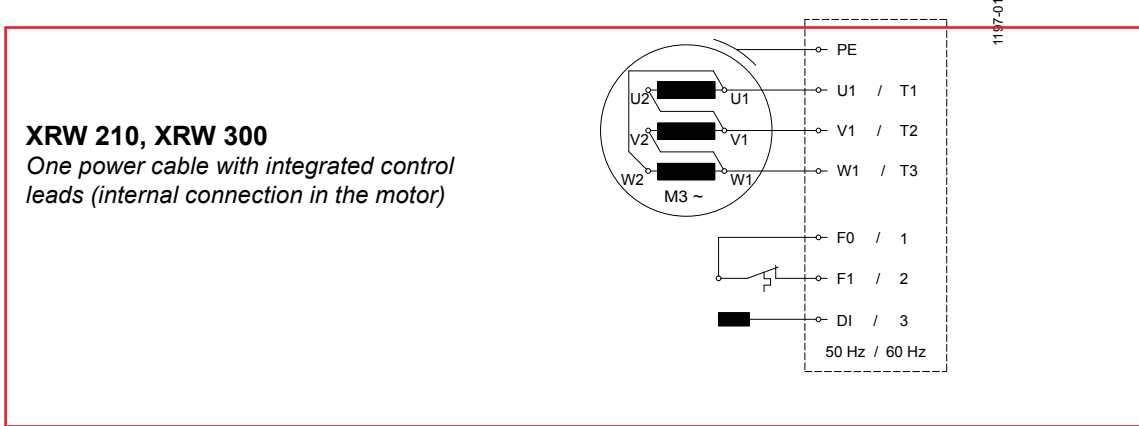
Figure 22: Connection diagram VFD IP 55



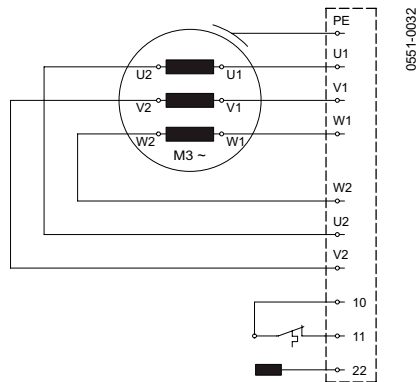
Supply line L1 / L2 / L3 / PE; Motor cable (7 x 1,5 mm<sup>2</sup>) U1 / V1 / W1 / PE; Shielding F0 / F1 DI

Figure 23 Connection diagram VFD IP 20

## 10.4 Standard connection diagrams XRW 210, 300 and 900



**XRW 900**  
*One power cable with integrated control leads*



**XRW 900**  
*Two power cables with integrated control leads*

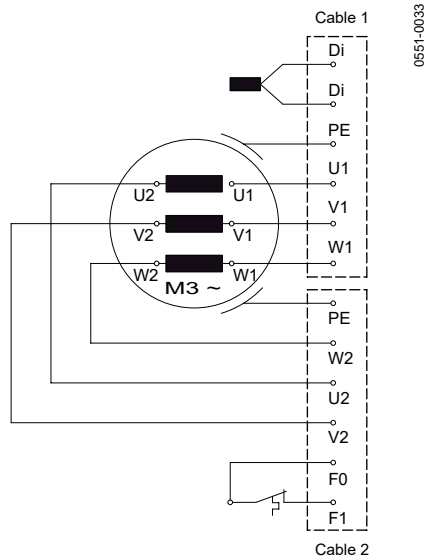


Figure 24: Connection diagrams

PE = Earth

U1, V1, W1, / T1, T2, T3 = Live

F0, F1 / 1, 2 = Thermal sensor

DI / 3 = Seal monitor



## 10.5 Motor monitoring

All motors are fitted with temperature monitors which switch off the motor in the case of excessive temperatures. The sensors must be correctly wired into the control panel.

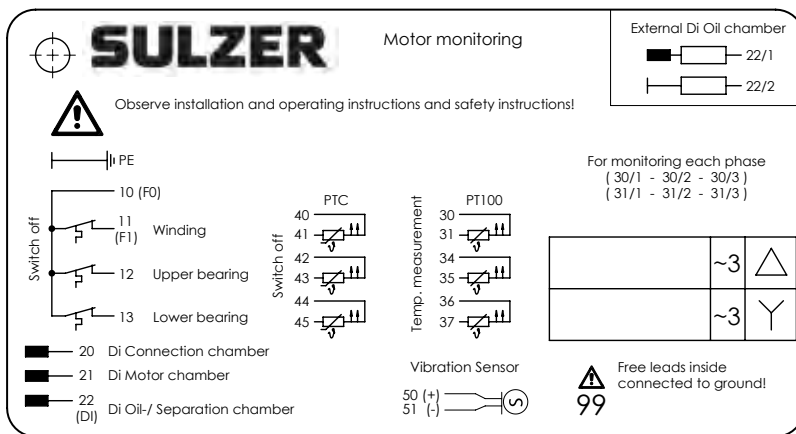


The thermal monitoring circuit (F1) must be wired into the motor contactors in such a manner that a manual reset is required.

**ATTENTION** *The temperature limiting switches may only be operated as specified by the manufacturer (see following table).*

Operating voltage... <b>AC</b>	<b>100V to 500 V ~</b>
Rated voltage <b>AC</b>	<b>250 V</b>
Rated current <b>AC cos φ = 1.0</b>	<b>2.5 A</b>
Rated current <b>AC cos φ = 0.6</b>	<b>1.6 A</b>
Max. switching current at $I_N$	<b>5.0 A</b>

## 10.6 Connection of the control circuit leads



2590-0004

### Control circuit leads for submersible mixers

- 10 = Common lead
- 11 = Stator upper
- 12 = Bearing upper
- 13 = Bearing lower
- 20 = DI-connection chamber
- 21 = DI-Motor chamber
- 22 = DI-Oil chamber

= PE (green/yellow)

Figure 25 Designation of control circuit leads

## 10.7 Connection of the seal monitoring unit to XRW 210, 300 and 900 control panel

XRW 210, 300 and 900 are fitted as standard with DI seal monitors in the oil, motor and connection chambers (only in motor and connection chambers in Ex 50 Hz version). The DI-electrode carries out the seal monitoring function and signals the ingress of moisture by means of a special electronic device. In order to integrate the DI electrode into the control panel it is necessary to fit an Sulzer DI module and connect it in accordance with the wiring diagrams (see fig.26).

**ATTENTION** *If the DI seal monitor 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 moisture sensors disconnected will invalidate related warranty claims.*

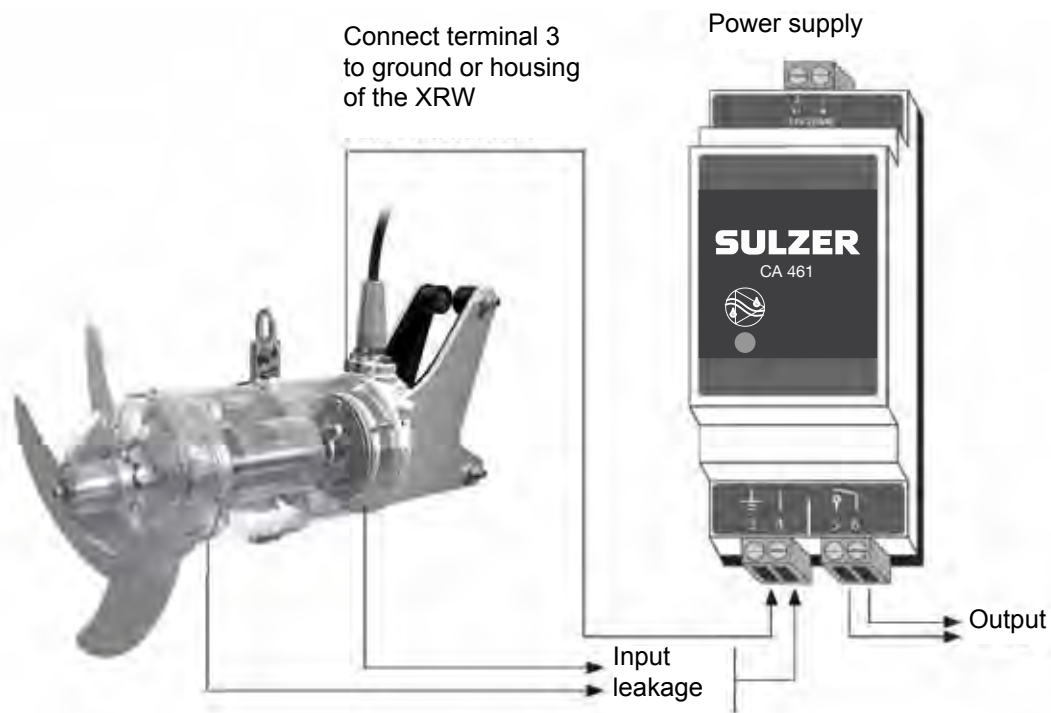


Figure 26: Electronic amplifier with collective signalling

### Electronic amplifier for 50/60 Hz

110 - 230 V AC (CSA) (Part No.: 1 690 7010)

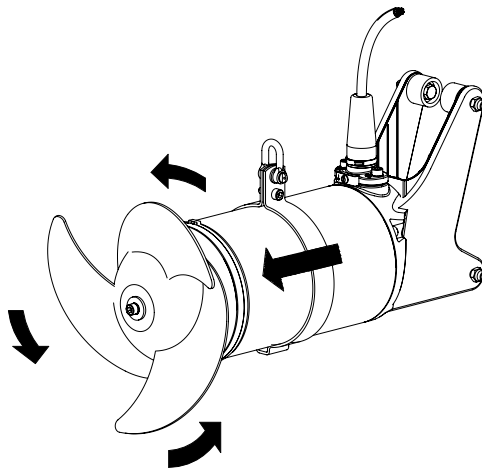
18 - 36 V DC (CSA) (Part No.: 1 690 7011)

**ATTENTION** *Maximum relay contact loading: 2 Ampere*

## 11 Checking direction of rotation




When the 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.

The direction of rotation (propeller rotation) is correct if the propeller rotates in a clockwise manner when viewed from the rear over the motor housing (see arrow).



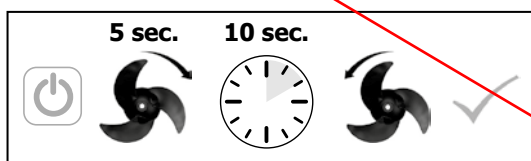
1187-00

Figure 27: Checking direction of rotation

-  When checking the direction of rotation take care that no injury can be caused by the rotation of the propeller or the resulting airflow. Do not place a hand or other part of the body near the propeller or the hydraulics!
-  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.

### 11.1 Pre-start (XRW 400 and XRW 650)

During pre-start, a de-ragging function is automatically employed to free the propeller from any items that may have become entangled on it. To begin, the propeller rotates in reverse rotation for five seconds. It then stops for ten seconds before re-starting fully in the correct rotation. The process repeats automatically every 6 hrs.



Be aware that the propeller will stop for only 10 seconds and then re-start. Do not handle the mixer or place a hand in the contact area of the propeller during de-rag stoppage!

Figure 28: De-ragging

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

**ATTENTION** The mains supply in the control panel must have a clockwise sense of rotation. If the units are connected in accordance with the wiring diagram and the lead designations the direction of rotation will be correct.

## 11.2 Changing direction of rotation



The safety hints in the previous sections must be observed!



Changing direction of rotation must only be carried out by a qualified person.

If the direction of rotation is incorrect then this is altered by changing over two phases of the power supply cable in the control panel. The direction of rotation should then be rechecked.

**NOTE** *The direction of rotation measuring device monitors the direction of rotation of the mains supply or that of an emergency generator.*

## 12 Commissioning

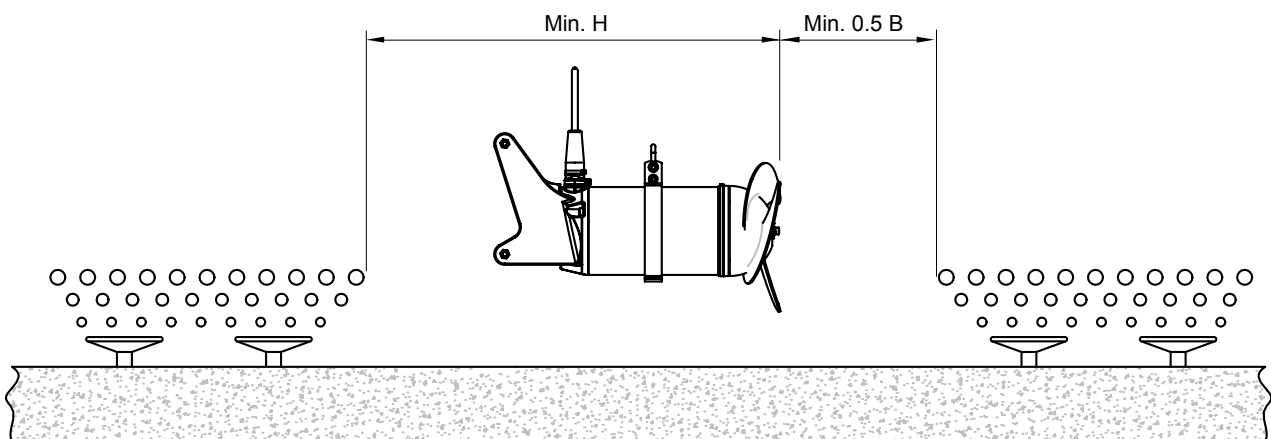


The safety hints in the previous sections must be observed!

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

- Have the electrical connections been carried out in accordance with regulations?
- Have the thermal sensors/limiters been connected?
- Is the seal monitoring device correctly installed?
- Is the motor overload switch correctly set?
- Have the power and control circuit cables been correctly fitted?
- Has the motor connection cable been laid in such a manner that it cannot be caught up by the rotating body?
- Has the minimum submergence level been observed? (see section 2.4 Dimensions).

### 12.1 Types of operation



1178-00

B = Tank width; H = Water depth

Figure 29: Installation example with aeration

**ATTENTION** *The illustration is only an example. For the correct installation please contact Sulzer.*

**ATTENTION** *Operation within the directly aerated area is not allowed!*

**ATTENTION** *The units must work fully submerged in the fluid. During operation no air should be drawn in by the propeller. Ensure that there is a smooth medium flow. The unit should not vibrate heavily when in operation.*

### Uneven flow formation and vibrations can occur if:

- Overactive mixing in small tanks.
- Prevention of free inflow or outflow in the area of the flow ring where fitted. Changing the position or direction of the mixer may assist.

## 13 Maintenance and service



The safety hints in the previous sections must be observed!

In particular, the advice regarding maintenance in paragraph 3.2 of the separate booklet “Safety Instructions for Sulzer Products Type ABS” is to be observed.

### 13.1 General maintenance hints



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



Servicing must only be carried out by qualified personnel.

#### 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 approved workshops by approved personnel using original parts supplied by the manufacturer. Otherwise, the Ex-approvals no longer apply.

Sulzer units 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 unit 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 unit 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 DI seal monitoring system.

#### ATTENTION

***Steel ropes and shackles should be visually checked at regular intervals (approx. every 3 months) for wear and corrosion. These parts should be replaced if required!***

The Sulzer Service Organisation would be pleased to advise you on any applications you may have and to assist you in solving your aerating 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.***

#### ATTENTION

***Regular checks, and other prescribed regulatory checks after specific intervals, are highly recommended. This ensures a long lifetime and trouble-free operation of the units.***

#### NOTE

***In the case of repair work, „Table 1“ from IEC 60079-1 may not be applied. In this case please contact Sulzer after sales service!***

## 13.2 Maintenance XRW



The safety hints in the previous sections must be observed!

Inspections carried through at regular intervals, and preventive maintenance, guarantee trouble-free operation. For this reason the complete unit should be cleaned thoroughly, maintained and inspected, on a regular basis. For this purpose special care must be taken that all parts of the unit are in a good condition and that the operational security of the unit is guaranteed. The inspection period is determined by the type of usage of the unit, but should however not exceed one year.

The maintenance and inspection work must be carried through corresponding to the subsequent inspection plan (see section 13.3). The executed work must be documented in the inspection list (page 32). In case of non-observance the manufacturer's warranty does not apply!

### 13.2.1 Faults

In addition to the maintenance and inspection tasks described in Section 13.3 "Inspection and maintenance intervals for XRW", an urgent check of the unit and installation should be carried out if heavy vibrations develop or uneven flow patterns occur.

#### Possible causes:

- Minimum liquid coverage of the propeller is not present.
- Aeration in the propeller area.
- Wrong direction of rotation of the propeller.
- Propeller is damaged.
- Restriction to the free inflow or outflow in the area of the XRW flow ring.
- Parts of the installation, such as bracket or coupling parts have become defective or become loose.

In these cases the unit should be immediately switched off and inspected. If no fault can be found, or the fault remains after it has apparently been corrected, the unit should be left switched off. The same applies also if the current overload in the control panel regularly trips where the DI seal monitor or the temperature sensors in the stator are activated. We recommend that in such cases you contact the local Sulzer Service Centre.

### 13.3 Inspection and maintenance intervals for XRW



The safety hints in the previous sections must be observed!

<b>PERIOD OF TIME:</b>	<b>Regulation: once a month</b>
ACTIVITY:	Cleaning and inspection of the power and control circuit cables.
DESCRIPTION:	Once a month (more frequently - for example - in difficult application cases where the medium is heavily polluted with fibrous matter) the power and control circuit cables should be cleaned. In particular, fibrous materials must be removed. Part of the regular maintenance is also the inspection of the motor cables. These must be checked for scratches, fissures, bubbles or crushing.
MEASURE:	Damaged power and control circuit cables must be replaced in all cases. Please contact your local Sulzer Service Centre.

<b>PERIOD OF TIME:</b>	<b>Recommendation: once a month</b>
ACTIVITY:	Check the current consumption at the ampere meter.
DESCRIPTION:	With normal operation the current consumption is constant. Occasional current fluctuations result from the constitution of the material being mixed.
MEASURE:	If the current consumption is too high for a longer period during normal operation please contact your local Sulzer Service Centre.

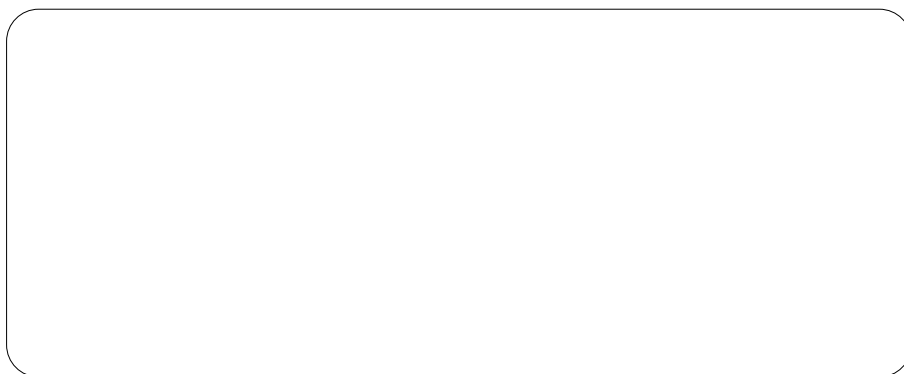
<b>PERIOD OF TIME:</b>	<b>Regulation: every 3 months</b>
ACTIVITY:	Cleaning and inspection of the shackles and the lifting equipment.
DESCRIPTION:	Lift the unit out of the tank and clean it. Lifting hoists, shackles, wire ropes and wire clamps etc. must undergo a visual examination at regular intervals for wear and corrosion.
MEASURE:	Worn or damaged parts should be replaced. Please contact your local Sulzer Service Centre.
ACTIVITY:	Inspection of the propeller and the SD ring (Solids-Deflection-Ring).
DESCRIPTION:	The propeller should be inspected carefully. The propeller might show spots of rupture and wear due to strongly abrasive or aggressive mixing material. In both cases the flow formation is reduced considerably and the propeller must be replaced. The SD ring must also be checked. If wear or scoring is visible on the propeller boss these parts must be replaced also.
MEASURE:	If you find out any cases of the damage described above please contact your local Sulzer Service Centre.

<b>PERIOD OF TIME:</b>	<b>Recommendation: every 6 months</b>
ACTIVITY:	Insulation resistance check.
DESCRIPTION:	Within the scope of the maintenance work the insulation resistance of the motor winding should be measured every 4,000 hours, and/or at least once a year. If the proper insulation resistance level is not reached, moisture might have got into the motor.
MEASURE:	The unit must be taken out of operation and may not be started again. Please contact your local Sulzer Service Centre.
ACTIVITY:	Functional testing of the monitoring devices.
DESCRIPTION:	In the scope of the maintenance measures functional testing of all monitoring devices must be carried through every 4,000 hours and/or at least once a year. For these functional tests the unit must have cooled down to the ambient temperature. The electrical connecting line of the monitoring device must be disconnected at the control box. These measurements must be carried through by means of an ohm meter at the respective cable ends.
MEASURE:	In any case of any functional problems on the monitoring devices please contact your local Sulzer Service Centre.

<b>PERIOD OF TIME:</b>	<b>Recommendation: once a year</b>
ACTIVITY:	Checking of the tightening torques of the screws and nuts.
DESCRIPTION:	For safety reasons we recommend that all screws are checked for their perfect positioning once a year.
MEASURE:	Tighten screws with correct tightening torques (see 9.2).







**SECTION 7**

**SAFETY INSTRUCTIONS**

## 1 Safety

### 1.1 General safety instructions

This document, “**Safety Instructions for Sulzer Products Type ABS**”, as well as the respective associated product-related “**Installation and Operating Instructions**” contain fundamental instructions that are to be complied with during transportation, installation, assembly, commissioning, operation, maintenance and repair. This also applies for additional product documentation such as, maintenance instructions, workshop manuals or nameplate.

Therefore the technician and the responsible specialist/operator must read this manual “**Safety Instructions for Sulzer Products Type ABS**” as well as the respective associated product-related “**Installation and Operating Instructions**” prior to transportation, installation, assembly, commissioning, operation, maintenance and repair, and these documents must be available at the site where the unit/system is operated.

#### 1.1.1 Identification of safety instructions



Safety instructions that may cause hazards to persons if they are not complied with are identified with a general hazard symbol.



A warning related to electrical voltage is identified by 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.*

Symbols attached directly on the unit itself, i.e.

- direction of rotation arrow
- nameplate

must be carefully followed and must be maintained in a legible condition.

#### 1.1.2 Qualifications of personnel and their training

The personnel for operation, maintenance, inspection and assembly must possess the required qualifications for the work. The area of responsibility, duties and supervision of personnel must be carefully checked by the user. If the personnel involved do not have the required knowledge, they must be trained or instructed. If necessary, this can be carried out on behalf of the operator of the unit by the manufacturer/supplier. The operator must furthermore ensure that the personnel fully understand the contents of the “**Safety Instructions for Sulzer Products Type ABS**” as well as the product-related “**Installation and Operating Instructions**”.

#### 1.1.3 Dangers due to non-observance of the Safety Instructions

The non-observance of the Safety Instructions can lead both to danger to personnel and also possible damage to the environment or the unit itself. Non-observance of the Safety Instructions can lead to the loss of any right to compensation.

In particular, non-observance can result in the following dangers:

- Failure of important functions of the unit/installation
- Danger to personnel by electrical, mechanical, thermal or chemical influences.
- Danger to the environment by leakage of dangerous substances.

#### 1.1.4 Carrying out work in a safety conscious manner

The safety instructions quoted in this manual “**Safety Instructions for Sulzer Products Type ABS**” as well as the product-related “**Installation and Operating Instructions**”, the existent national regulations for prevention of accidents, as well as any operator's internal working, operation and safety instructions, are to be complied with.

#### 1.1.5 Safety regulations for the owner/operator

- Devices provided as protection against accidental contact with moving parts (e.g. couplings) should not be removed while the unit is in operation.
- All dangers due to electrical energy must be avoided. For details consult the IEC/CENELEC Regulations or the regulations of your local Electricity Supply Company.

#### 1.1.6 Safety regulations for maintenance, inspection and installation work

The operator must ensure that all maintenance, inspection and assembly work is performed by authorised and qualified specialists. The operator must also carefully study the “**Safety Instructions for Sulzer Products Type ABS**” as well as the product-related “**Installation and Operating Instructions**” manuals.

As a rule, work on the unit or system is only to be carried out when shut down. The procedures for shutting down the units or systems as described in the “**Safety Instructions for Sulzer Products Type ABS**” and in the product-related “**Installation and Operating Instructions**” must be complied with.

Units that are operated in media hazardous to health have to be decontaminated.



Care must be taken when unblocking a pump because the medium in the pump volute may have heated up to a level that could cause a serious burn injury, on contact or if expelled under pressure as liquid or steam.

All safety and protection equipment must be refitted and placed in operation immediately after completion of the work.

The points listed in the commissioning section of the product-related **“Installation and Operating Instructions”** are to be complied with prior to return to service.

### 1.1.7 Modifications and manufacture of spare parts without approval of the manufacturer

Modifications or changes to the unit may only be carried out after consultation with the manufacturer. Original spare parts and accessories authorised by the manufacturer are essential for compliance with safety regulations. The use of other parts can annul any responsibility for the consequences resulting from that action

### 1.1.8 Inadmissible modes of operation

The operating safety of the delivered unit or system is only guaranteed for normal use as advised in the booklet **“Safety Instructions for Sulzer Products Type ABS”** (paragraph 2), proper use, and the corresponding sections of the product-related **“Installation and Operating Instructions”**. The specified limits are not to be exceeded or not reached under any circumstances.

**General regulations and standards not mentioned here are not overruled by these “Safety Instructions for Sulzer Products Type ABS”.**

## 2 Proper use and limitations of use

Sulzer units and systems are constructed in accordance with the current state of technology and recognised technical safety regulations. Nonetheless, hazards to life and limb as well as other material assets may occur in the case of improper use.

Sulzer units and systems may only be operated when they are in a technically perfect condition and in accordance with normal operation in awareness of safety and hazards in compliance with the **“Installation and Operating Instructions”!**

Any other (foreign) or additional use to that described is considered not to be normal use. The manufacturer/supplier is not liable for any damage that results from this. The user alone bears the risk. In cases of doubt Sulzer must give approval for the planned operating method prior to use.

Sulzer units and systems are to be shut down immediately and secured in the event of malfunctions. The malfunction is to be cleared immediately. The Sulzer customer services department is to be informed if required.

Maximum noise level ≤ 70 dB. This may be exceeded in certain circumstances.

### The rules for prevention of accidents and the general rules of good technical practice must be observed!



Sulzer units must not be installed in combustible or explosive media!



Only an explosion-protected version (Ex) of Sulzer units/products may be used in areas considered to have an explosion hazard! The electric control systems of Sulzer units must not be installed in areas considered to have an explosion hazard. Systems provided for this purpose require authorised certification.



In areas considered to have an explosion hazard it must be ensured that the pump section is filled with water (dry installation) or is flooded or submersed (wet installation) when the Ex pumps are switched on or operated in any other way. Ex mixers must be fully flooding accordingly. Other operating methods such as snore operation or dry running are not permitted.

### For operation in the open air the below points apply according to IEC/CENELEC:



For application in the open air Sulzer units must be provided with a fixed supply cable of at least 10 m in length. Regulations may vary by country.



Sulzer units for installation in swimming pools, garden ponds or similar must be executed in protection class III (protective low voltage 24 V) according to European Standard 60335 part 2 - 48 where people can come in contact with the pumped media. In cases of doubt the planned operating mode must be authorised by Sulzer prior to use.



When using the Sulzer units in process or raw water non-toxic (physiologically safe) oil, lubricants or coolant should be used. In such cases please consult Sulzer. The corresponding regulations of the application countries must be observed!

## 3 Transportation and installation

The regulations of DIN 1986 as well as local regulations should be observed when installing the pumps.



Sulzer units may never be lifted by the motor connection cable. During transport the submersible pump should not be dropped or thrown.

The motor connection cables are protected against the ingress of moisture along the cable by having the ends sealed at manufacture with protective covers. These protective covers should only be removed immediately prior to connecting the pumps electrically. These protective covers only provide protection against water spray or similar (IP44) 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. If there is a possibility of water ingress then the cable should be secured so that the end is above the maximum possible flood level. Take care not to damage the cable or its insulation when doing this!



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



The Sulzer units are prepared for transportation by placing them on an adequately strong horizontal surface. Care should be taken that they cannot fall over.



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) and must comply with local valid safety regulations.



Transport safety securing devices (if present) are to be removed prior to installation or commissioning as advised in the product-related “**Installation and Operating Instructions**”.



Do not stay or work in the swivel area of a suspended load!



The lifting hook height must take into consideration the entire height of the Sulzer units as well as the length of the lifting chain!

**3.1 Electrical connection and commissioning**



Prior to starting the unit a qualified person must ensure that one of the required electrical protective measures has been provided. Grounding, neutral line, \*Earth-leakage circuit breaker etc. (\*not recommended for HST™ Turbocompressor), must comply with the regulations of the local Power Supply Authority and must be checked by a qualified person to ensure that they are functioning correctly. The power supply systems (network configurations) of the power supply companies must be taken into consideration.



The system is to be protected by a suitable pre-fuse (appropriate to the rated current of the motor or turbocompressor as advised).



In pump stations/tanks potential bonding must be carried out in accordance with IEC 60364-4-41 (Regulations for installation of pipe lines, protective measures in power plants).



In all installations, the power supply to the pump must be via a residual current device (e.g. RCD, ELCB, RCBO etc.) with a rated residual operating current not exceeding 30 mA. For installations not having a fixed residual current device the pump must be plugged into the power supply through a portable version of the device.

Cable ducting to the control panel should be sealed off in a gas-tight manner by the use

of a foaming material after the cable and control circuits have been pulled through. In particular the safety regulations covering work in enclosed areas in sewage plants should be observed, together with general good technical practice.



When checking the direction of rotation, the Sulzer units should be secured in such a manner that no danger to personnel is caused by the rotating impeller, by the resulting air flow, or parts that are ejected. **Do not put your hand into the hydraulic system.**



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



Observe the start reaction when switching on Sulzer units and when checking the direction of rotation. The **START REACTION** can take place with a considerable force! If a number of pumps are connected to a single control panel then each unit must be individually checked.



The current-carrying systems on site must comply with local regulations with regard to cross-sectional area and maximum voltage drop. The voltage stated on the rating plate must correspond to the existing mains voltage.



Electrical connection of Sulzer units and connection of the power supply line as well as the motor connection cable to the terminals on the control system is to be performed by a qualified electrician in accordance with the circuit diagram of the control system as well as the motor connection diagrams.

**ATTENTION: Only operate Sulzer units/products with thermal motor protection and connected temperature limiters.**



The regulations contained in the specific installation and operating instructions for installation and operation of explosion-protected (Ex) versions of Sulzer units must be observed.



The electrical control devices (control panel, junction boxes etc.) should be protected against dampness and be mounted in a flood-proof area.



In the case of the usage of uninterruptible power systems or reactive-power compensation equipment, ensure that the batteries or capacitors are sufficiently discharged before start-up or maintenance work. **Danger due to electrical shock!**



Do not operate the HST™ Turbocompressor before the inlet and outlet air connections are complete.



The HST™ Turbocompressor and it's piping must be shielded to prevent contact with hot surfaces. Contact with hot surfaces may cause injury.



Internal components of the HST™ Turbocompressor can contain high voltages when connected to line voltage. Contact with this voltage may cause serious bodily injury or death.



HST™ Turbocompressor motor connection terminals U, V, W, DC voltage terminals and brake resistor terminals are under high voltage even when the turbocompressor is not running.

### 3.1.1 Special conditions for safe use of S-type, explosion-proof motors



The integral supply cable shall be suitably protected from mechanical damage and terminated within an appropriate termination facility.



Pump motors rated for use with 50/60 Hz sinusoidal supplies shall have the thermal protection devices connected in such a way that the machine is isolated from the supply in the event of the stator reaching 130 °C.



Pump motors rated for use with variable frequency or non-sinusoidal supplies shall have the thermal protection devices connected in such a way that the machine is isolated from the supply in the event of the stator reaching 100 °C for T4 classified machines, or 160 °C for T3 classified machines.



These motor units are not intended for user service or repair. Any operation that may affect the explosion protection characteristics should be referred to the manufacturer. The maximum permitted flamepath gaps are tighter than those specified in EN 50018.

### 3.2 Maintenance



Prior to starting with any maintenance work the Sulzer units should be completely disconnected from the mains by a qualified person and protected from being inadvertently switched back on.



Depending on the version of the switching station, the auxiliary equipment could be energised, even when the main switch is switched off.



After isolation of the HST™ Turbocompressor wait at least five minutes. The frequency converter contains high voltage in the capacitors.



Prior to maintenance, any units, which have been used in contaminated media, e.g. wastewater containing faeces, must always be cleaned and, if necessary, be thoroughly decontaminated. The specific regulations for hygiene of the respective application countries must be observed.



When carrying out any repair or maintenance work, the safety regulations covering the working in enclosed areas of sewage installations, as well as “good technical practice“ must be observed!



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!



**WARNING: Dangerous gases. Observe all accident prevention measures and regulations!** Please use a safety belt and a lifeline when getting into the sump and work together with supervisory staff. **Ensure adequate venting!**



Repair on explosion-proof motors may only be carried out by workshops or by authorised personnel. During repair work only original parts supplied by the manufacturer must be used!



Separate lifting accessories such as chains, shackles, steel cables and cable grips etc. must be subjected to a visual examination for wear, corrosion, chafing etc. at regular intervals (approximately every 3 months unless stipulated differently elsewhere in, for instance, a product-related maintenance instruction) and replaced as required! Installation accessories (especially for submersible motor agitators and submersible aerators) must be subjected to a visual examination for wear, corrosion, chafing etc. at regular intervals and replaced as required!



Changing the direction of rotation at control panels without changeover switch should only be carried out by a qualified person and for this reason this procedure is not allowed for cleaning hydraulics or propellers



The oil in the oil chambers/coolant chambers and gearboxes (if present) of the Sulzer units may be under pressure. Before opening the coolant or oil drain plug, always place a cloth over the plug, slacken it a little, then tighten in again!



Comply with the regulations for handling coolants, oils and lubricants. These materials are to be disposed of in accordance with regulations!

**SECTION 8**

**WORKSHOP MANUAL  
RW**

A

**RW**

**400 / 650 / 900**

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## **Workshop Manual**

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We reserve the right to make modifications in the furtherance of technical development !

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### 1. General

Illustrations, e.g. (3/2) indicates the fig. number using the first digit and the second digit indicates the position on that illustration.

#### 1.1 Safety

When carrying out repairs the safety hints in the Appendix "Safety for pumps and mixers" as well as in the "Installation and Operating Instructions" must be observed.

**NOTE** *The Installation and Operating Instructions are appended to the Workshop Handbook.*

#### 1.2 General maintenance hints

- Before assembly all parts should be carefully cleaned.
- Parts being reused must be in perfect condition and should be carefully cleaned before fitting.

**ATTENTION** *Mechanical seals, shaft seals, O-rings and other seals should **always** be replaced. Only in an emergency and after careful checking may these parts be used again!*

- Only oil approved by the manufacturer should be used.



Waste oil should be disposed of in a proper manner !

**ATTENTION** *The pressure testing carried out in the individual sections must be carefully and properly carried out!*

#### 1.3 Description of mixer

The description of the mixer is given in the Installation and Operating Instructions (appended to this Workshop Handbook).

#### 1.4 Design of mixer

The design of the mixer is described in detail in the Installation and Operating Instructions.

#### 1.5 Technical data

Please obtain the technical data from the Installation and Operating Instructions.

### 2. Installation

The mixer should be installed as described in the Installation and Operating Instructions.

### 3. Maintenance

**ATTENTION** *Before commencing any maintenance work **Section 7. to 7.3** of the Installation and Operating Instructions should be carefully read.*



If the mixer has been used in contaminated liquids, i.e. in sewage containing faecal matter, then the unit itself and all accessories should be carefully cleaned and decontaminated before carrying out any maintenance work. The relevant hygiene instructions in each country must be observed.



When carrying out any maintenance or repair work the safety regulations covering work in the enclosed areas of sewage treatment facilities, as well as the general recognized rules of good technical practice should be observed.



Before commencing any repair work the mixer must be totally disconnected from the mains and steps taken

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to ensure that it cannot be inadvertently switched back on.

**ATTENTION** Repair work on explosion-proof motors may only be carried out in approved workshops by qualified personnel. When carrying out such repair work only original spare parts supplied by the manufacturer may be used.

**NOTE** The ABS guarantee only applies if repairs have been carried out by an authorized ABS workshop and where original ABS spare parts have been used.

### 3.1 Oil fill and oil change

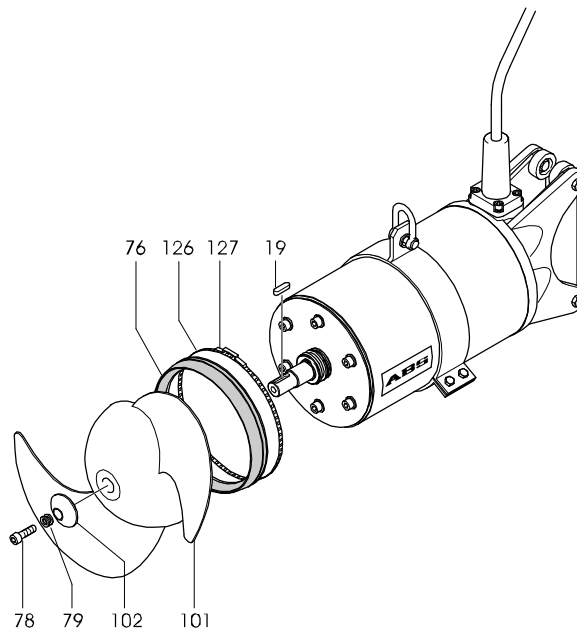


Waste oil should be disposed of in a proper manner !

#### 3.1.1 Filling oil into oil chamber

The mixer oil chamber has been filled at the works with lubricating oil. **A regular oil change is not necessary.**

When carrying out repair work it is normally necessary to release the lubricating oil before continuing with the dismantling work. However, release of the lubricating oil can only take place after the propeller has been dismantled.



**Fig. 01** Dismantling the propeller

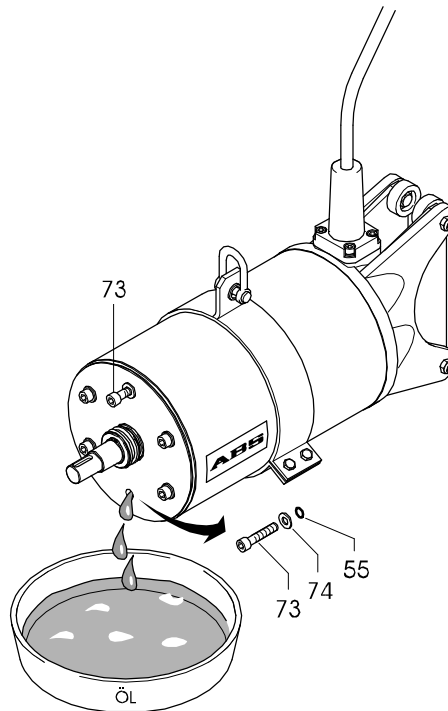
#### Propeller dismantling/Oil release :

**NOTE** The dismantling of the propeller is described in detail in **Section 7.4** of the *Installation and Operating Instructions*.



As there may be a slight pressure build-up in the oil chamber of the mixer care should be taken when removing the plug screw (02/73) and this should be covered as a precaution with a cloth until the pressure has been released.

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**Fig. 02** Releasing the oil

- Carefully open the upper socket head screw (02/73) and release the oil pressure.
- Remove the lower socket head screw (02/73) together with washer (02/74) and sealing washer (02/55) and allow the oil to flow out fully into a suitable adequately dimensioned container.



Waste oil should be disposed of in a proper manner !

### Filling in the oil :

**NOTE** *If it has been necessary to release the lubricating oil when changing the mechanical seal or carrying out repair work then this should be replaced with new lubricating oil.*

**ATTENTION** *After fitting of the mechanical seal - **and before filling in the new lubricating oil** - a leak test should always be carried out. The leak tests are described in detail in **Section 5** of this Workshop Handbook.*



Before filling in new lubricating oil and after fitting of the mechanical seal the mixer is placed vertically on its bracket with the shaft end facing upwards, taking care that it cannot topple over.

- Filling takes place in a similar manner to the oil removal by filling in the oil through the plug holes of the mechanical seal cover (05/53 or 06/71).

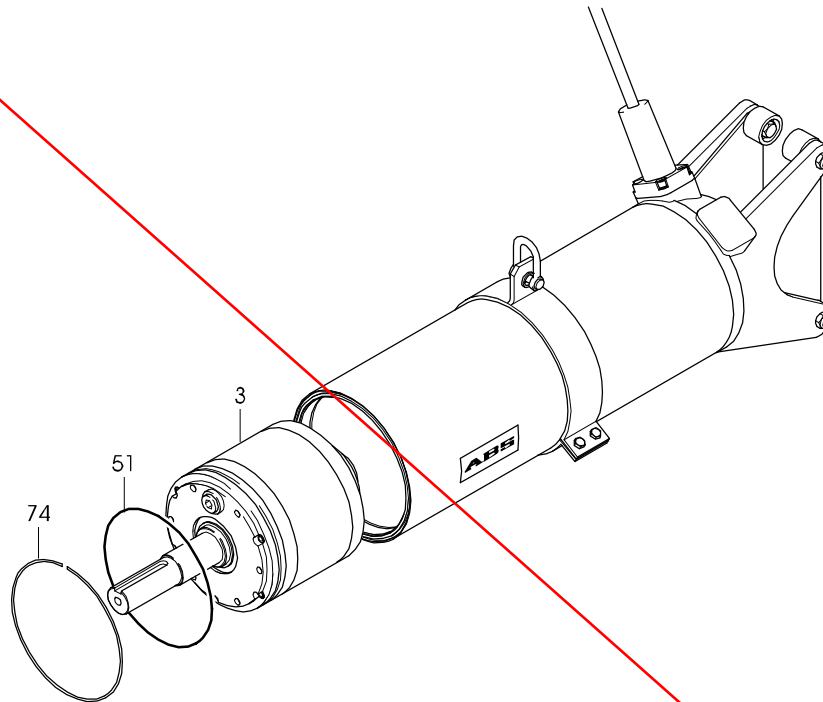
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**ATTENTION** The oil quantities given in the Table below should be carefully adhered to. The maximum allowable deviation from the values given is **max. + 10%**.

Table of Lubricating Oil quantities in litres:	RW 300	RW 400	RW 650	RW 900
	0,31	0,35	0,60	0,50
List of the oils approved by the manufacturer which correspond to the oil type fitted at the factory:	1. Castrol Deusol CRI SAE 10 2. BP Vanellus T Öl SAE 10 3. Esso Essolub HDX SAE 10 4. TEXACO / DEA WETEX W46 5. Mobil Deval 1210 6. Shell Voltol-Lubricant Oil-46			

### 3.1.2 Oil fill gearbox (only for RW 900)

**NOTE** The gearbox unit (03/3) has been filled at the Works with high grade synthetic oil. **It is not necessary to change the gearbox oil!**



**Fig. 03** Gearbox unit removed

**NOTE** In the case of damage to the gearbox an exchange gearbox complete with oil fill is supplied. The removal of the gear unit is described in detail in **Section 4.3.2**.

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### 4. Repair

#### 4.1 Dismantling and fitting of flow ring (Option)

##### Dismantling:

- Remove the mixer in accordance with the Installation and Operating Instructions and place it on a clean level surface.



In order to avoid the danger of the mixer toppling over or slipping it should remain attached to the hoist during dismantling. In addition, care should be taken that the mixer cannot roll over.

- Dismantle propeller (04/4) and SD-Ring (04/12) in accordance with the Installation and Operating Instructions.
- Dismantle hex screws (04/6) together with hex nuts and washers.
- Withdraw flow ring (04/5).

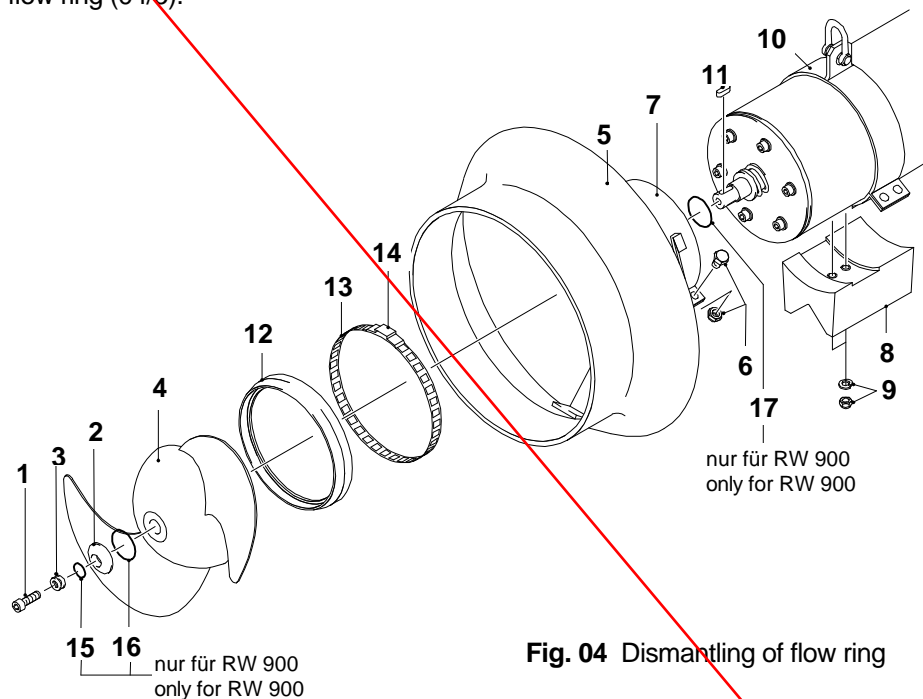


Fig. 04 Dismantling of flow ring

##### Installation:

- Reassembly takes place in the reverse order

**ATTENTION** When reassembling the flow ring it should be positioned in such a manner that the cylindrical portion fully overlaps the propeller blade ends. This can be checked out by rotating the unit manually. The propeller should not rub on the flow ring.

- If necessary reopen the fixing screws, straighten up the flow ring in an axial direction and retighten.

**ATTENTION** Tightening torques for stainless steel screws (see Table S.7)!

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### 4.2 Mechanical seal and oil chamber - removal and fitting

#### Dismantling mechanical seal :

- Remove the propeller. (The dismantling of propeller is described in detail in **Section 7.4** of the Installation and Operating Instructions).

**ATTENTION** After dismantling the mechanical seal this should be carefully checked for damage before attempting to reuse it. When checking particular attention should be paid to grooves or scratches. Only in the case of a perfect surface finish (smooth, polished surface) and rubber parts in perfect condition may the mechanical seal be reused. A dynamic leakage test (see **Section 5**) should always be carried out after assembly!

**ATTENTION** If grooves are visible or can be felt on the sealing surfaces, or the rubber parts are brittle or torn, then it is essential that the mechanical seal is replaced. The same applies if water (milky emulsion) has entered into the oil chamber. In such cases the most common cause is a defective mechanical seal.



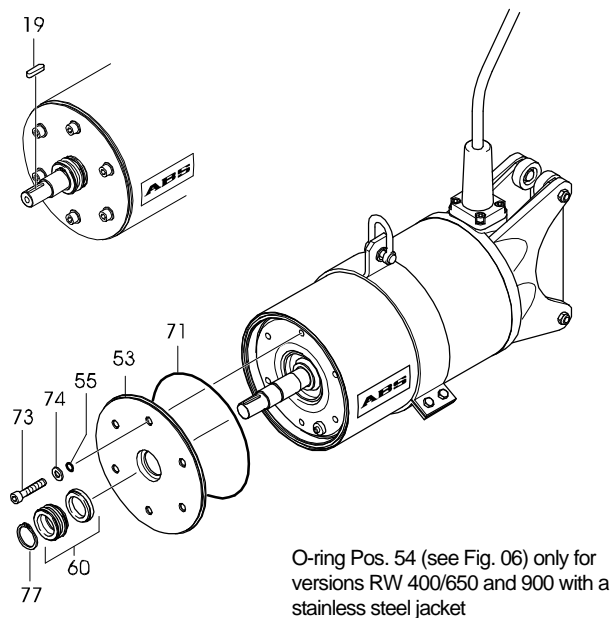
Before removal of the mechanical seal the lubricating oil should be fully released

- A hoist is attached to the shackle on the mixer and the mixer is placed on a work bench in such a manner that the socket head screws (05 or 06/73) are accessible.

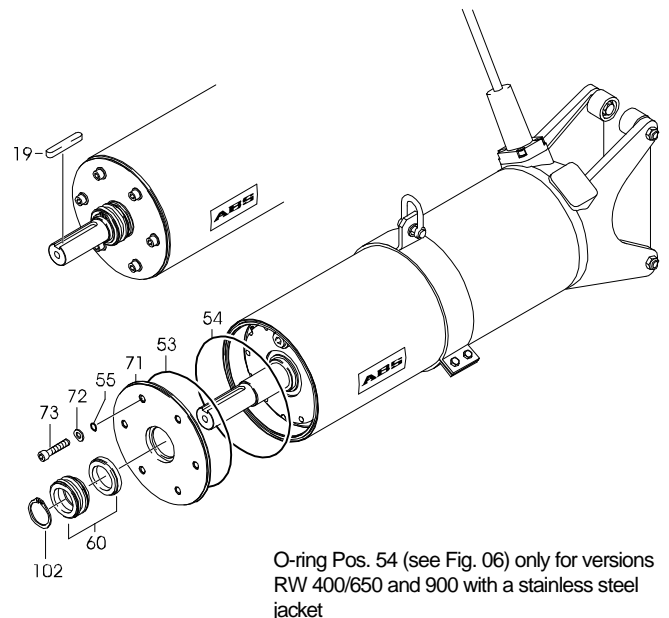


In order to avoid the danger of the mixer falling over or slipping during repair then it should remain attached to the hoist. Care should also be taken that the mixer cannot roll over.

- Remove key (05 or 06/19).
- Remove circlip (05 or 06/77).

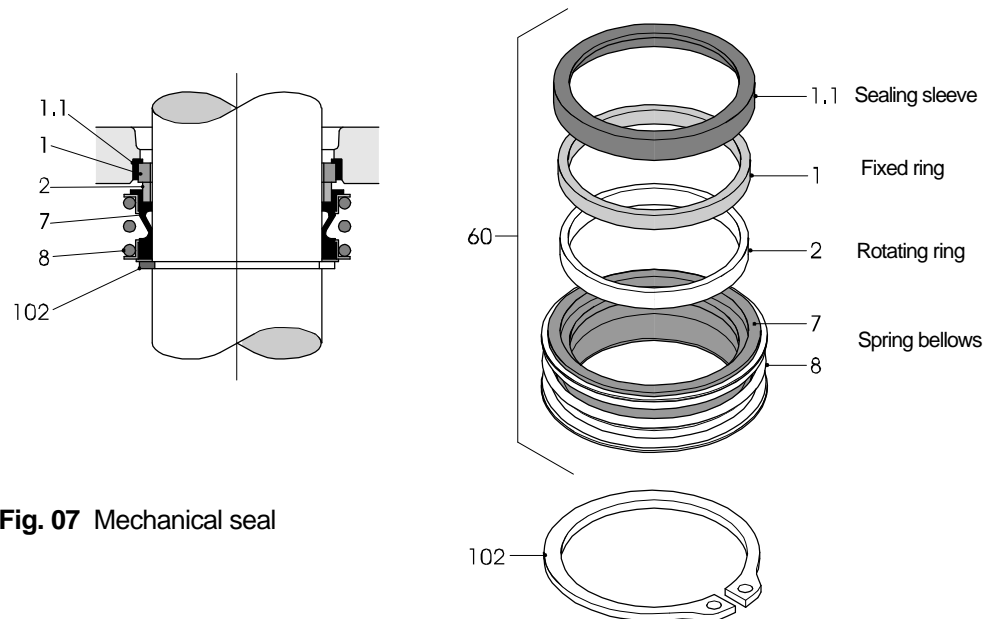


**Fig. 05** Dismantling of mechanical seal RW 400/650



**Fig. 06** Dismantling of mechanical seal RW 900

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**Fig. 07** Mechanical seal

- Remove the rotating section of the mechanical seal (07/2,7,8) carefully from the shaft in a rotating movement (see also **Figs. 05 or 06**)

**NOTE** If the mechanical seal itself is only being replaced then the fixed ring can be carefully pressed out of the seating of the oil chamber cover (05/53 or 06/71). In this case it is not necessary to fully dismantle the oil chamber cover.

- Unscrew socket head screws (05/73 or 06/73) together with washers and seals.
- Withdraw the oil chamber cover (05/53 or 06/71) together with the fixed ring carefully and without tilting it over the motor housing or in the case of RW 900 the gearbox shaft.
- Carefully press out the fixed ring together with sealing sleeve out of its seating in the oil chamber lid.

**NOTE** The versions using stainless steel jacket have two O-rings as shown in **Fig. 06/54** and deviate from the illustration in **Fig. 05**.

### Fitting of the mechanical seal unit and oil chamber cover:

**ATTENTION** When fitting the oil chamber lid always use new O-rings (05/71) or 06/53 and 54). The sealing washers (05/74 or 06/72) should be checked before fitting and replaced if necessary !

- Insert new O-ring (05/71 or 06/53).
- Slide oil chamber cover (05/53 or 06/71) carefully over the shaft into the central location in the motorhousing.
- The socket head screws (05/73 and 06/73) should be tightened by **firstly tightening in a gradual manner** in a crosswise arrangement and then finally **tightened a number of times** in a **circular pattern using a torque of 33 - 36 Nm** until the O-rings are pressed into place!

<b>Tightening torques for ABS-stainless steel screws:</b>	<i>M6 = 7 Nm</i>	<i>M8 = 18 Nm</i>	<i>M10 = 33 Nm</i>	<i>M12 = 57 Nm</i>
<i>In the case of screwed connections, using Nord-Lock-Washers (propeller fixing screw) the torque figures given above should be <b>increased by 10%</b> !</i>				

**ATTENTION** When fitting the mechanical seal absolute cleanliness and great care should be observed. The sealing surfaces of the mechanical seals must be clean and free from grease. For this reason avoid touching the surfaces !



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- The fixed ring (07/1) of the mechanical seal together with the sealing sleeve (7/1.1) is lightly smeared with clean lubricating oil and pressed into the seating of the fitted oil chamber cover using a mounting sleeve (special tool).
- The sliding surfaces as well as the insides of the rubber bellows (07/2,7,8) of the rotating ring should be lightly smeared with clean lubricating oil.

**ATTENTION** *In order to avoid damage to the rubber parts (rubber bellows 07/7,8) check carefully that the transition location on the shaft end, as well as the groove for the circlip (07/102) have not got burrs. Any burrs present should be removed before fitting the seal !*

- Carefully fit the rubber bellows and mechanical seal over the end of the motor or gearbox shaft and press fully home against the fixed ring using a rotational movement.
- The rubber bellows and seal are carefully pressed against the fixed ring until it passes beyond the groove of the circlip and is pressed into its end position using the mounting sleeve.
- Fit circlip (05/77 or 06/102).
- The mechanical seal will seat itself correctly if the shaft is rotated manually a number of times

**ATTENTION** *After fitting the mechanical seal a leak test should be carried out under all circumstances.  
(See Section 5).*

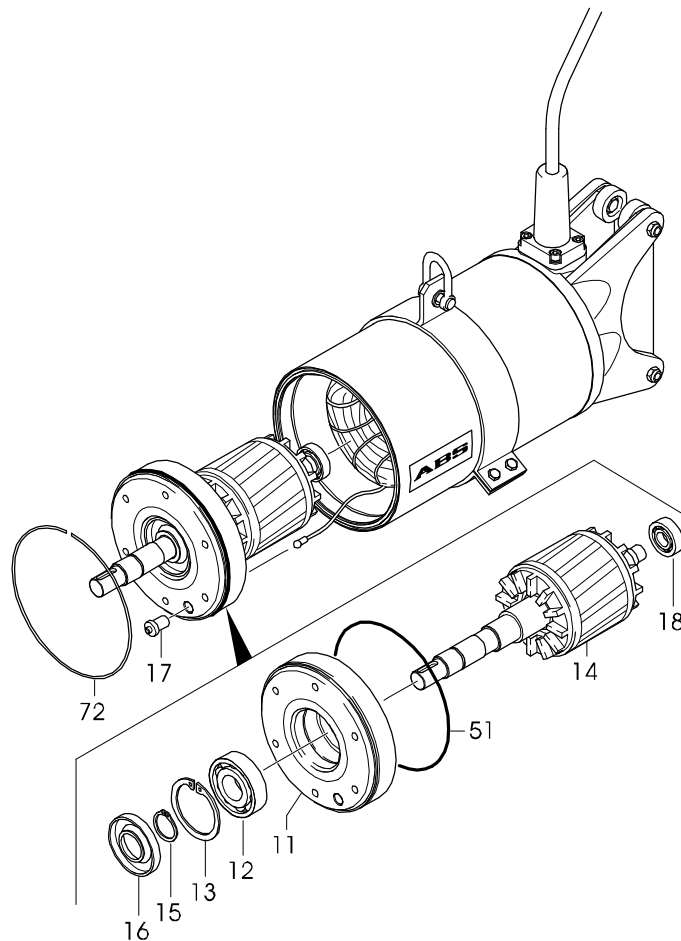
## Workshopmanual RW 400 / 650 / 900

### 4.3 Motor shaft/fixed bearing unit on RW 400 and 650 - removal and refitting

#### Dismantling of motor shaft/fixed bearing unit on RW 400 and 650

- Dismantle mechanical seal in accordance with **Section 4.2**

**NOTE** *If it is only intended to exchange the lipseal (08/16) of the fixed bearing unit on the RW 400 and 650, then it is not necessary to withdraw the shaft unit. The lipseal can be pressed out of its seating using screwdrivers. The sealed bearings (sealed on both sides) (08/12 and 18) of the RW 400 and 650 should always be filled with a life-time grease fill.*



**Fig. 08** Dismantling the motor shaft/fixed bearing unit (RW 400/650)

- Carefully tap on the bearing lid (08/11) with a plastic hammer so that the fixed bearing unit can move backwards and take the pressure off the clamping ring.
- Press clamping ring (08/72) out of its groove using a screwdriver.
- Carefully withdraw the motor shaft together with the fixed bearing unit sufficiently far so that the plug connector between the DI-Electrode (08/17) and the connecting lead is accessible.

**NOTE** *If it is not possible to withdraw the shaft/fixed bearing unit manually, then the oil chamber cover (05/53 or 06/71) can be used as a withdrawal tool.*

- Place two pieces of timber between the oil chamber cover and the motorhousing. The through holes of the oil chamber lid must line up with the threaded holes. Screw in three suitable studs into the threaded holes (offset

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## Workshopmanual RW 400 / 650 / 900

120°) in the bearing lid (08/11) and attach nuts and washers. The shaft may now be drawn out of the fixed bearing unit by tightening the nuts in a crosswise direction.

- Release the DI-connection lead (plug type connection) on the DI (08/17) and fully withdraw shaft/fixed bearing unit.
- Press the lip seal (08/16) out of its seating and remove the circlip (08/15) from the groove on the shaft (on the inner bearing ring).
- Withdraw the bearing lid (08/11) complete with fixed bearing (08/12) and circlip (08/13) over the shaft
- Remove circlip (08/13) out of the bearing seating of the bearing lid
- Press the bearings (08/12) out of the bearing seat using a suitable sleeve.
- Press the bearings (08/18) from the shaft.

**NOTE** *Check the shaft for wear grooves, especially in the area of the sealing lips of the lip seal. If this is the case it is possible to fit a spacer (approx. 1 mm thick washer) into the seating of the lip seal. This moves the lips of the lip seal approximately 1 mm in an axial direction.*

### Fitting the shaft / fixed bearing unit on RW 400 and 650 :

- Fitting of the fixed bearing unit or its preassembly takes place in the reverse sequence.



When fitting the preassembled shaft/fixed bearing unit the motorhousing should be placed in a vertical manner and care should be taken that it cannot tip over.

**ATTENTION** *Before fitting the shaft/fixed bearing unit a suitable **insulating sleeve** should be placed over the DI-lead. This avoids the danger of damage to the insulation of the DI-lead during assembly !*

- Screw in a suitable eyebolt into the end of the shaft and lower the shaft/fixed bearing unit over the motorhousing with the aid of a suitable hoist in such a manner that the DI-connection lead (with insulating sleeve!) can be placed on to the DI-Electrode (08/17).

**ATTENTION** *Pay particular attention to correct positioning of the bearing lid with reference to the motorhousing. **The bearing lid has a mark in the form of an arrow** which must point upwards in the installation position of the mixer. This ensures that the position of the DI-Electrode is correct.*

- The preassembled shaft/fixed bearing unit is (with a newly greased O-ring 08/51) lowered carefully into the motorhousing with the aid of a suitable hoist so that the bearing lid (08/11) slides as far as the O-ring in its seating.

**ATTENTION** *During assembly of the shaft/fixed bearing unit of the RW 400/650 care should be taken that in the case of the stainless steel versions the motorhousing jacket in stainless steel is not damaged !*

- Tap the bearing lid with a plastic hammer in order to overcome the resistance of the O-ring and allow the shaft/fixed bearing unit to seat itself fully home in the motorhousing or in the groove of the circlip (08/72).
- Place the circlip into the groove.

**ATTENTION** *Renew the O-ring on the bearing lid (08/51) !*

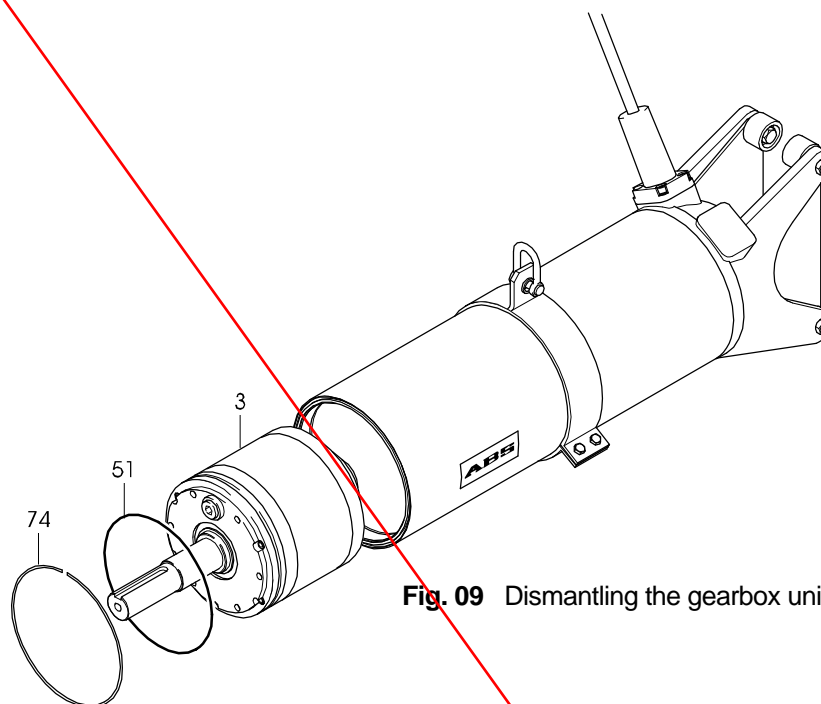
## Workshopmanual RW 400 / 650 / 900

### 4.4 Gearbox unit of RW 900 - removal and fitting

#### Dismantling of the gearbox unit in the case of RW 900 :

**NOTE** *It is not necessary to remove the connection chamber in order to dismantle the gearbox*

**NOTE** *In the case of the RW 900 the lower bearing unit is integral with the gearbox. The gearbox may only be exchanged as a complete unit. An exchange of the bearing unit and the internal shaft sealing is not required in the case of the RW 900 as these are parts of the gearbox unit. The RW 900 has no DI in the oil chamber.*




**Fig. 09** Dismantling the gearbox unit (RW 900)

- Dismantle mechanical seal unit as described in **Section 4.2**.
- Tap lightly against the gearbox housing with a plastic hammer so that the gearbox unit can be displaced backwards and take the pressure off the circlip.
- Press out the circlip (09/74) out of its groove with the aid of a screwdriver.
- Withdraw gearbox unit (09/03).

**NOTE** *If it is not possible to withdraw the gearbox unit manually then it is possible to screw a threaded bar into the threaded bore of the drive shaft. With the aid of a standard withdrawal device (e.g. three suitable square timber blocks as spacers) it is possible to withdraw the gearbox unit with the aid of the oil chamber cover, a washer and nut.*

#### Refitting the gearbox unit of RW 900 :

 In order to assemble the gearbox unit it is necessary to place the motorhousing in a vertical manner and take care that it cannot topple over.

- Screw a suitable eyebolt into the shaft end and position the gearbox unit carefully over the motorhousing with the aid of a suitable hoist.
- Fully lower the gearbox unit carefully into the motorhousing with the aid of a suitable hoist.

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## Workshopmanual RW 400 / 650 / 900

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**ATTENTION** *When assembling RW 900 units with stainless steel jacket care should be taken that the stainless steel jacket is not damaged when the gearbox unit is being assembled !*

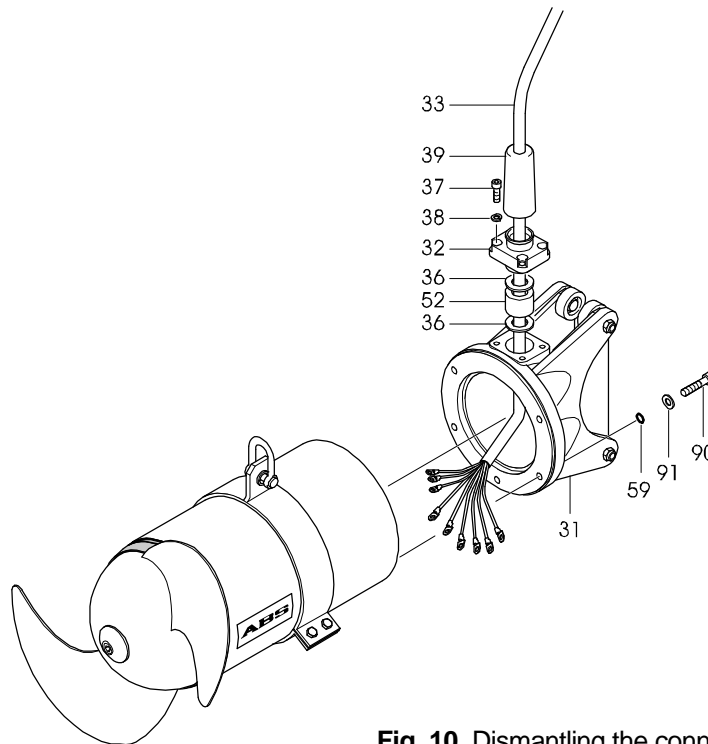
- Tap carefully against the gearbox cover with the aid of a plastic hammer so that the groove of the circlip (09/74) is free.
- Press the circlip into the groove.

**NOTE** *Before fitting the oil chamber cover a new O-ring **must** be used every time !*

- The fitting of the oil chamber cover is carried out as described in **Section 4.2.**

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### 4.5 Connection chamber - removal and fitting



**Fig. 10** Dismantling the connection chamber

#### Dismantling the connection chamber :

**NOTE** Because of the design of the gearbox version fitting and removal of the motor shaft of the RW 900 is only possible if the connection chamber is dismantled beforehand.

**NOTE** If only the motor shaft/bearing lid unit is to be dismantled then it is not necessary to remove the gearbox unit.

- Remove socket head screws (10/90) together with washers (10/91) and seals (10/59).
- Carefully lift off the connection chamber (10/31).

**ATTENTION** The connection chamber cover should be carefully removed as otherwise the terminal board or connection leads may be damaged !

- Release the cable eyelets from the terminal board. To do this remove nuts (11/86) and washers (11/87) beforehand.

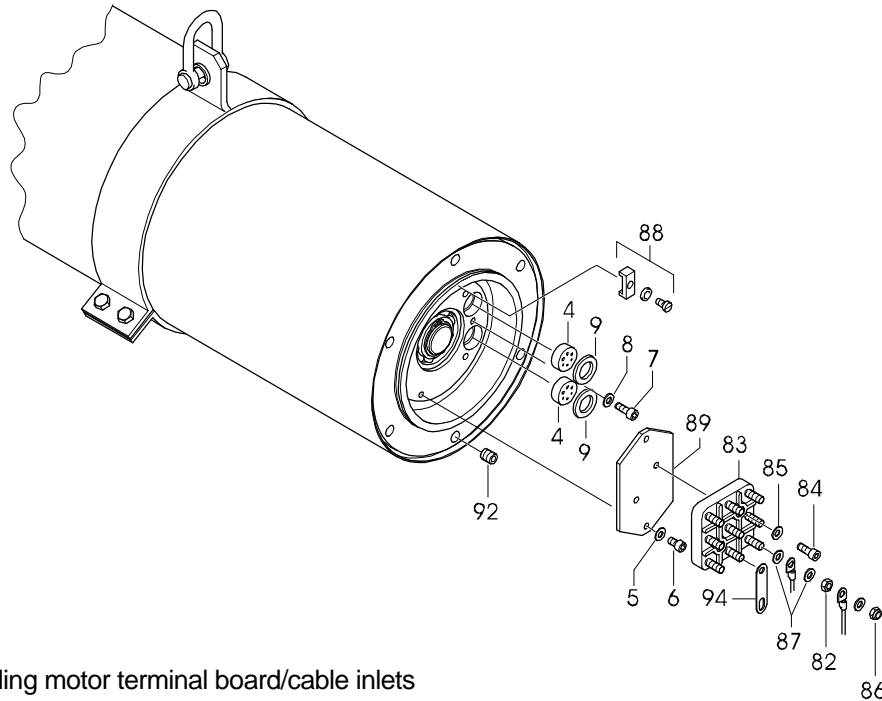
#### Refitting of the connection chamber:

- The connection chamber is refitted in the reverse sequence.

**ATTENTION** When fitting the connection chamber pay particular attention that it is correctly positioned with reference to the motorhousing. The pressure test hole (the only through hole in the motorhousing) must point downwards in the installation position of the mixer (lowest point).

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**4.6 Motor terminal board and cable inlets - removal and fitting**



**Fig. 11** Dismantling motor terminal board/cable inlets

- Disconnect the cable eyelets on the stator side and identify them.

**ATTENTION** Each lead should be identified immediately it is disconnected from its cable eyelet !

- Dismantle terminal board (10/83) and mounting plate (11/89). This is done by opening the socket head screws (11/84) and removing the washers (11/85).
- Remove the cable inlets (11/4). To do this open socket head screws (11/7) and washers (11/8).
- Remove the compression washers (11/9).
- Press the cable inlets (11/4) out of the bore and slide them over the stator leads.

<b>Lead designation of stator :</b>					
<b>Stator lead with control circuit</b>			<b>Stator lead without control circuit</b>		
<b>U1</b>	<b>V1</b>	<b>W1</b>	<b>U2</b>	<b>V2</b>	<b>W2</b>
long length of insulation removed	short length of insulation removed	do not remove insulation	long length of insulation removed	short length of insulation removed	do not remove insulation
<b>Control circuit leads:</b> DI / F0 / F1 should be suitably identified.					
<b>DI</b>	<b>F0</b>	<b>F2</b>			
long length of insulation removed	short length of insulation removed	do not remove insulation			

**NOTE** The fitting of the connection chamber is described in **Section 4.5**, the fitting of the connection cable is described in **Section 4.8**.

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### 4.7 Motor shaft/fixed bearing unit of RW 900 - removal and fitting

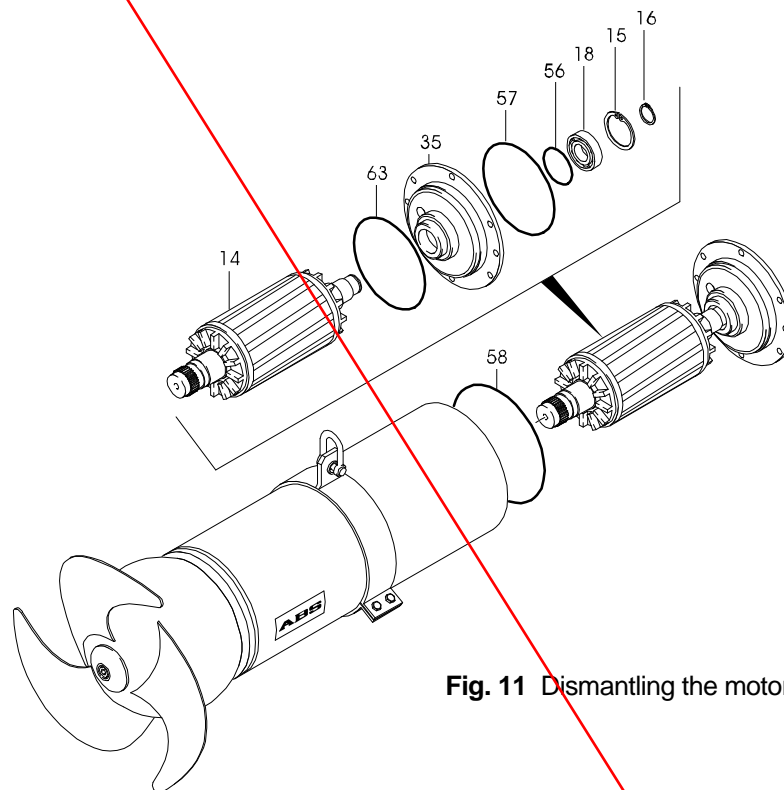
#### Dismantling the motor shaft/fixed bearing unit in the case of RW 900 :

- Dismantle terminal board and cable inlets as described in **Section 4.6**.
- Screw an eyebolt into the threaded hole on the motor shaft.



When dismantling the shaft/fixed bearing unit of the RW 900 the motorhousing should be placed in a vertical manner and care should be taken that it cannot topple over.

- It is now possible to withdraw the shaft/fixed bearing unit consisting of motor shaft (11/14) and bearing lid (11/35) using a suitable hoist.
- Remove circlip (11/16) and press the motor shaft (11/14) out of the bearing lid (11/35).
- Remove circlip (11/15) and press the bearing out of the bearing lid.
- Remove the O-ring (11/56) out of the bearing seating, check and replace if necessary.
- O-ring (11/63 or 11/57) should be renewed.



**Fig. 11** Dismantling the motor shaft of the RW 900

#### Refitting the motor shaft/fixed bearing unit of the RW 900 :

- The fitting of the motor shaft or bearing unit takes place in the reverse sequence

**ATTENTION** We recommend that all O-rings (11/63, 57 and 56) be renewed before carrying out any further assembly !

*(The old O-rings should only be reused in an emergency and after careful checking).*



When fitting the shaft/fixed bearing unit place the motorhousing in a vertical manner and take care that it cannot topple over.



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- Screw a suitable eyebolt into the shaft end and position the shaft/fixing bearing unit carefully over the motorhousing with the aid of a suitable hoist, so that the marking (cast rib) points upwards and that the holes in the motorhousing line up with those in the bearing lid.
- The preassembled shaft/fixing bearing unit is carefully lowered into the motorhousing (using a newly greased O-ring !) until the bearing lid (011/35) slides in its seating as far as the O-ring.

**ATTENTION** When assembling the shaft/fixing bearing unit of the RW 900 care should be taken that in the case of motorhousing versions in stainless steel the stainless steel jacket is not damaged !

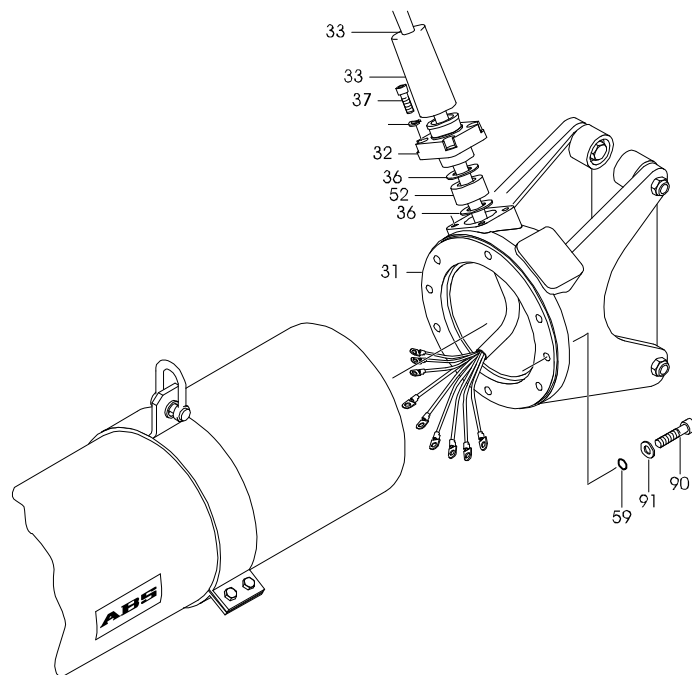
- With the aid of a plastic hammer tap the bearing lid so that the resistance of the O-ring is overcome and the shaft/fixing bearing unit slides fully home in the motorhousing.

**NOTE** Before connecting the connection chamber a screw (09/90) should be screwed in in order to test that the through holes of the bearing lid and the threaded holes of the motorhousing line up.

### 4.8 Connection cable - removal and fitting

#### Dismantling :

- Dismantle the connection chamber as described in **Section 4.5**.



**Fig. 12** Connection cable dismantling

- Pull the antikink sleeve (12/33) over the thickened section of the cable cap (12/32).
- Unscrew socket head screws (12/37) together with spring washers (12/38).
- Withdraw the connection cable together with cable cap (12/32), seal (12/52), and washers (12/36) out of the connection chamber (12/31).

#### Assembly :

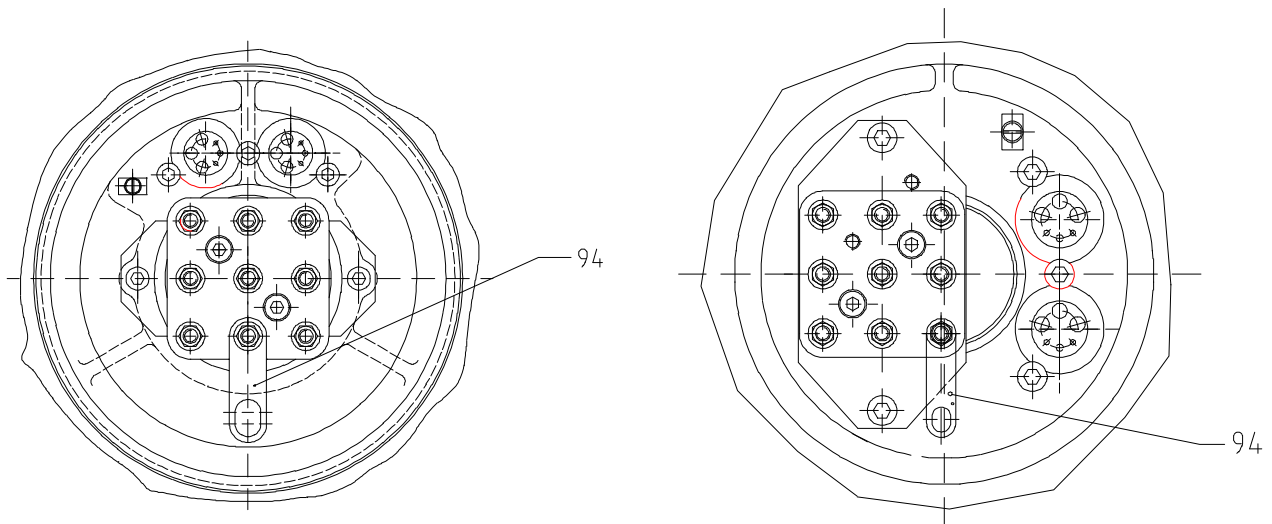
- Before fitting the new connection cable the cable cover, or where relevant, the individual leads themselves should have the insulation removed as required and these should be identified. The old cable can be used as a reference.

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**NOTE** When making up the cable the jacket of the cable should have its insulation removed approx. 150 mm - 200 mm - and the insulation of the individual leads (for crimped connection of the cable eyelets) should be removed approximately 5 mm.

- Press the antikink sleeve (12/33) cable cap (12/32) and seal with washers (12/52 or 12/36) on to the prepared cable.
- Fit the cable eyelets (crimped connectors), if this has not already been done.
- Attach the earth clamp (10/88) to the earth lead of the connection cable.
- Mount the cable eyelets of the individual leads to the terminal board in accordance with the lead identifications.
- Insert seal (12/52) together with washers (12/36).

**ATTENTION** Before tightening the screws and washers (12/37 or 38) of the cable cap (12/32) it is necessary to check that the jacket of the connection cable projects approx. 10 - 20 mm out of the seal in order to ensure correct sealing between the cable and the seal.



**Fig. 13** RW 400 and 900 bearing lid with terminal board    **Fig. 14** RW 650 bearing lid with terminal board

**ATTENTION** Pay particular attention to the lead identification of the stator (Table on Page 11) and the positioning of the DI-bracket (13 or 14/94) - **lowest point in the installed position!**

**NOTE** If the old connection cable is to be reused then it should be shortened in such a manner that the sealing area is not located at the old seal location, as this may have suffered permanent distortion due to compression. Pay attention to the markings on the cable leads!  
In all cases the seal (12/52) should be renewed!

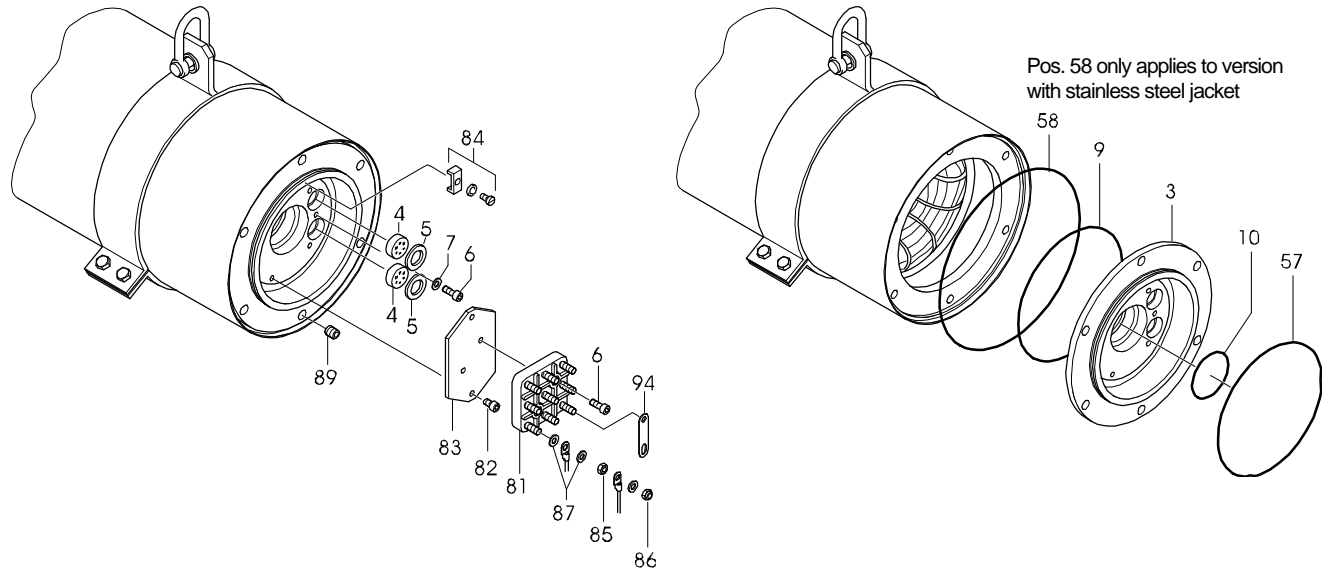
- Mount the DI-bracket (13 or 14/94) to the terminal board (10/83) and screw on the control lead **DI**.
- Fit the control circuit leads of the thermal sensors **FO** and **F1** to the terminal board.

**NOTE** In some versions of the RW 650 and 900 series there are two cable inlets at the connection chamber. This version is not shown on the illustration.

**ATTENTION** Before assembling any further use a continuity tester to ensure that the leads are correctly connected!

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### 4.9 Bearing lid of RW 400 and 650 - removal and fitting



**Fig. 15** Fitting and removal of the bearing lid

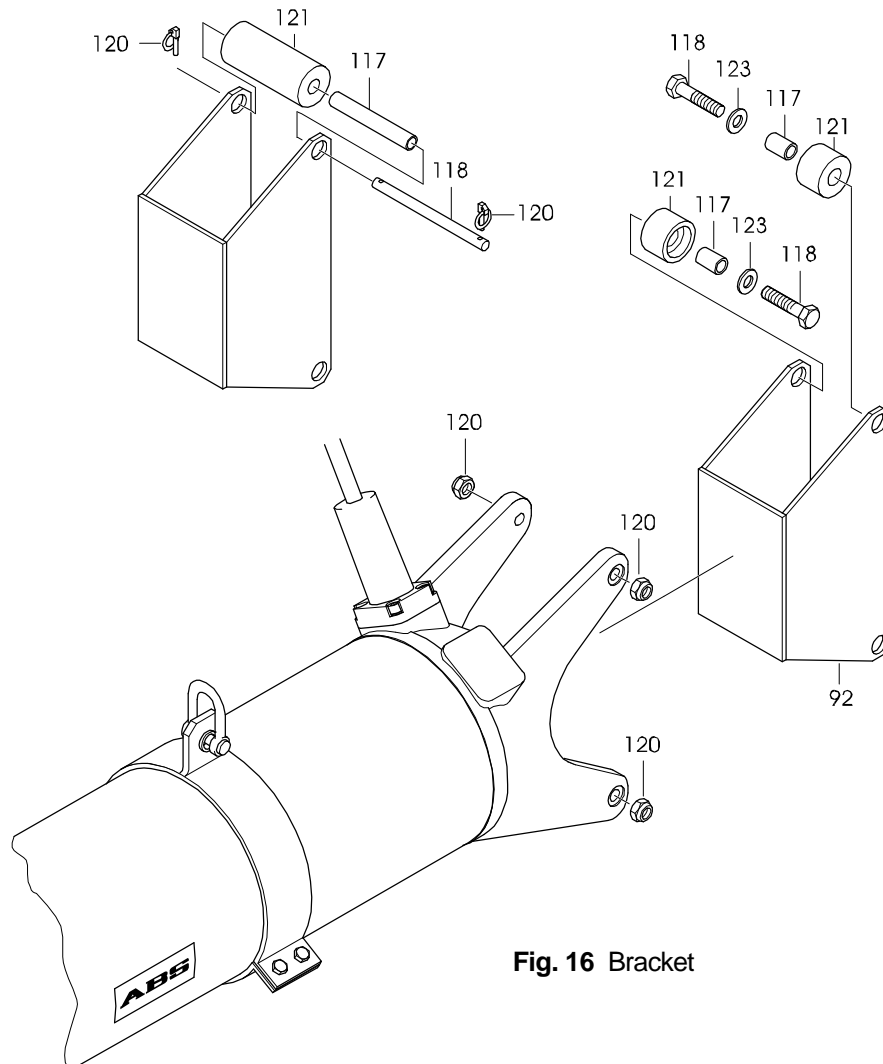
- Remove connection chamber as described in **Section 4.5**.
- Dismantle mounting plate (15/83) and terminal board (15/81).
- Disconnect stator leads directly at the crimped connectors of the cable eyelets.
- Remove socket head screws (15/6) together with washers (15/7).
- Press out the lead inlets (15/4) and withdraw over the stator and control circuit leads
- It is now possible to withdraw the bearing lid (15/3).
- Reassembly takes place in the reverse order.

**ATTENTION** When fitting the bearing lid and the terminal board care should be taken that the position of the lead openings with reference to the pressure test hole (through hole in motorhousing) is correct. The DI-bracket (13 or 14/94) must be at the lowest position when the mixer is installed.

**NOTE** During assembly all hints and assembly steps such as described in **Section 4.8** must be observed.

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### 4.10 Bracket - removal and fitting



**Fig. 16** Bracket

#### Open bracket :

- Open the self-locking nuts (16/120) and screws (16/118) together with washers (16/123), sleeve (16/117) and rollers (12/121).
- If necessary, exchange roller (16/121), sleeve (16/117) and sliding bracket (16/92).
- Reassembly takes place in the reverse order.

**ATTENTION** For safety reasons we recommend that new self-locking nuts be used when assembling the open bracket.

#### Closed bracket :

- Remove spring clips (12/120) and drive out (12/120).
- If necessary, replace roller (12/121), sleeve (12/117) and sliding bracket (12/92).
- Reassembly takes place in the reverse sequence.

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#### 4.11 Stator - removal and fitting

Stators of the RW 400-900 series are pressed into the motorhousing. Motor housings can be purchased as a complete unit. However, they can be dismantled with the aid of special devices and tools and reused. The required fixtures and special tools can be supplied on request.

##### Dismantling :

- In order to be able to remove the stator from the mixer it is necessary to totally dismantle the mixer right down to the motorhousing.
- Place the motorhousing on its propeller side on a level fixed base (the table of a press or similar) and centre the pressing out tool (special tool) in the stator bore.



Ensure that the motorhousing cannot fall over!

- With the aid of a hydraulic press the stator is pressed out of the motorhousing

**ATTENTION** *It is not possible to press out the stator without damaging it. The stator core can, however, after careful checking, be rewound.*

**ATTENTION** *In the case of versions fitted with a stainless steel jacket care should be taken that this is not damaged. If necessary support the motorhousing in such a manner, (e.g. using a suitable frame) so that the stator can be pressed out fully where the press table has not got a suitable device, or where the press has not got sufficient stroke.*

##### Fitting :

- The motorhousing is placed on the bracket side using distance pieces on a level fixed base (press table or similar) taking care that it cannot fall over.

**ATTENTION** *In the case of versions fitted with stainless steel jackets this projects only a few millimeters over the casting on the bracket side. In order to ensure a solid base **and in order to avoid damage to the stainless steel jacket it is necessary to support the cast piece with suitable spacers or a spacer ring.** (The stainless steel jacket no longer lies directly on the press table and the force of the press is taken up by the cast piece!)*

- Bundle the leads into the stator bore in such a manner that they are not damaged when this is being pressed in.
- Place the stator carefully over the stator seated bore of the motorhousing and centre it.

**NOTE** *It is possible to clamp heavy stators in the stator bore with the aid of a special device (special tool) and handle these using a suitably dimensioned hoist.*

**ATTENTION** *The stator bore and the stator core must be absolutely clean. No swarf or burrs should be present !*

- Carefully locate the pressing cylinder (special tool) over the head of the stator. Care should be taken that the stator wires (insulation) are not damaged.
- Carefully lower the press towards the pressing cylinder and then fully press home the stator.

**NOTE** *In the case of some mixer types a suitable extension (special tool) is required in addition to the pressing-on cylinder in order to bring the stator to its final location.*

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#### 5. Tests

In order to ensure proper functioning and with particular reference to the sealing units the following tests should be carefully carried out.

**ATTENTION** *The motor can only be pressure tested or connected with the bracket fully fitted !*

**ATTENTION** *The pressure test should be carried out before the lubricating oil is filled into the oil chamber !*

##### 5.1 Static pressure test

**ATTENTION** *One-sided pressure testing is only possible on the oil chamber !*

- Remove a socket head screw (02/73), washer (02/74) and sealing ring (02/55).
- The compressed air nozzle for the oil chamber is fed in through the hole in the oil chamber and screwed into the threaded hole in the bearing lid, so that the seal on the pressure testing device is compressed.
- Remove the lower socket head screw (12/90), which lines up with the grub screw (10/92) in the motorhousing together with washer (12/91) and sealing ring (12/59).
- Unscrew the grub screw (10/92).

**NOTE** Two different compressed air nozzles for M10 threaded holes are available as special tools

- Apply a **max. 0,5 bar** compressed air **simultaneously** to both compressed air connections (on the oil chamber or bracket).

**ATTENTION** *During the pressure test care should be taken that pressure equalization takes place. Otherwise there is a danger that if pressure is applied to one side only the lip seal may be pressed out of its seating.*

- Lower the motor into a suitable test tank and submerge for a few seconds with the compressed air nozzles connected (at max. 0,5 bar).
- After the pressure test the threaded holes must be carefully closed off. The grub screw (10/92) should be screwed back in with the application of **LOCTITE TYPE 242 !**

**ATTENTION** *In order to ensure the correct functioning of the mechanical seal where possible a dynamic pressure test should be carried out.*

##### 5.2 Dynamic pressure test

In the case of a dynamic pressure test the procedure is exactly the same as for the static pressure test of the motor. An additional step is that the motor is connected to the mains and allowed to run (without propeller or key in the key-way on the shaft) in the test tank. This allows the correct functioning of the mechanical seal to be checked.



Mains connection may only be carried out by a qualified person and all safety regulations must be observed!

##### 5.3 Measurement of stator resistances

By measuring the stator resistances and comparing with the values in the Table below it is possible to check the stator.

**ATTENTION** *The stator resistance should be checked at the stator leads on the motor while this is cold.*

**NOTE** *The values in the Table apply only to the stator without the resistance of the connection cable.*

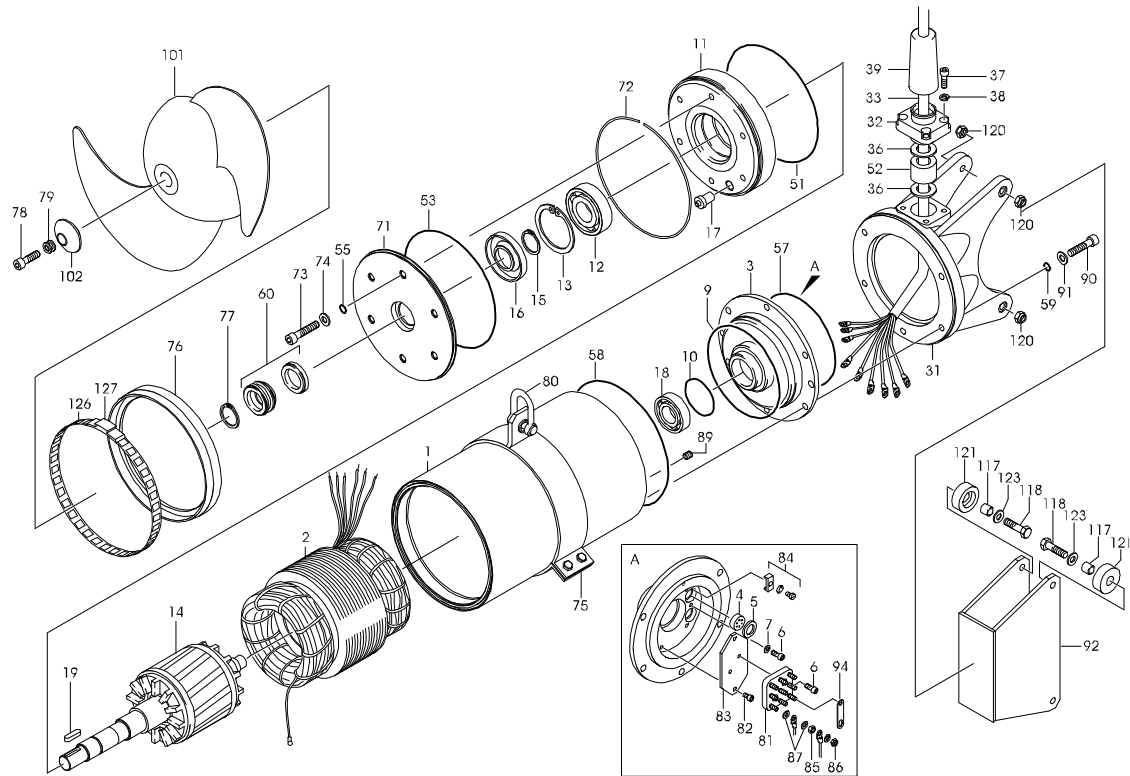
## Workshopmanual RW 400 / 650 / 900

Table stator resitances :			(Tolerance +/- 10%)
RW-Range	Motor	Rated voltage [V]	Stator resitance [W]
RW 400	40/8	400 V	5,90
		230 / 400 V	1,80
RW 650	50/12	400 V	3,40
	75/12	400 V	2,10
	100/12	400 V	1,50
RW 900	110/4	400 V	1,40
	150/4	400 V	0,95
	220/4	400 V	0,55

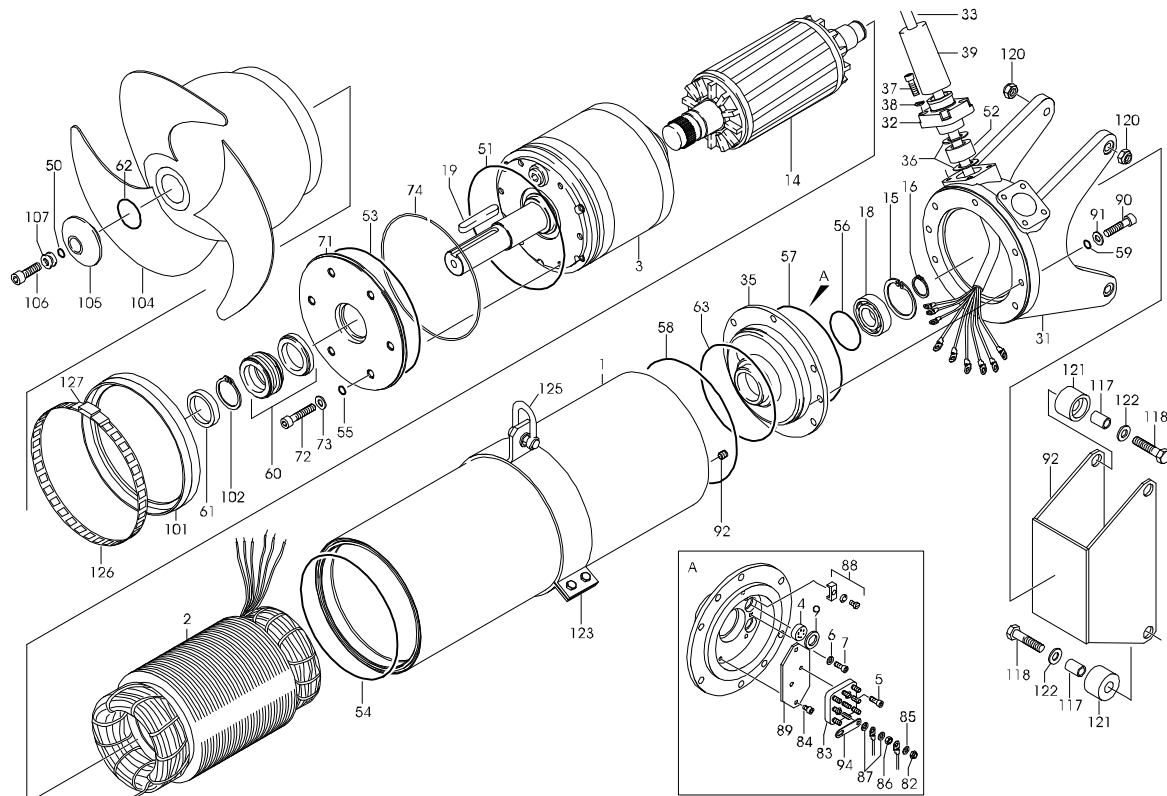
Table special tools :	
Tool / fixture	Part-No.
Assembly tool for mechanical seal 30	
Assembly tool for mechanical seal 40	
Assembly tool for mechanical seal 45	
Air nozzle for oil chamber M10	
Air nozzle for connection chamber M10	

Notes :

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**Bild 17** Complete explosive drawing RW 400 / 600



**Bild 18** Complete explosive drawing RW 900



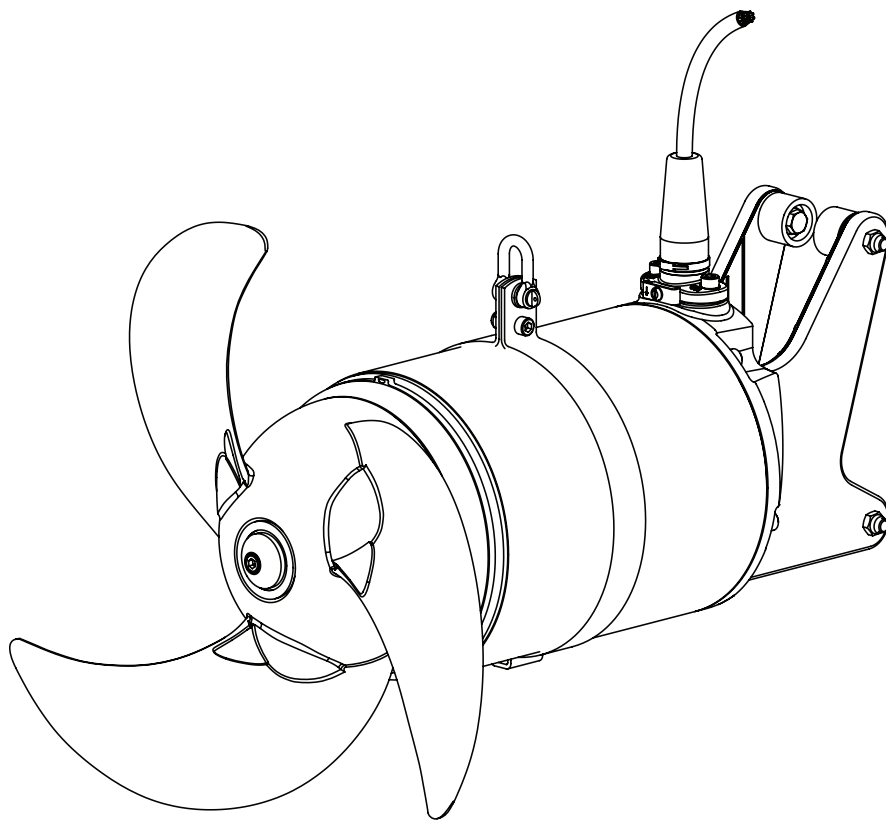
**SECTION 9**

**WORKSHOP MANUAL  
XRW**

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**ABS submersible mixer XRW 210, 300, 400 and 650**

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**ABS submersible mixer XRW**

210 - 50 Hz	210 - 60 Hz	300 - 50 Hz	300 - 60 Hz	400 - VFD	400 - VFD	650 - VFD	650 - VFD
2121-PA 08/4	2121-PA 18/4	3021-PA 15/6	3021-PA 18/6	4031A-PM 30/10	4031B-PM 50/10	6531A-PM 55/24	6532B-PM 75/24
2141-PA 08/4	2141-PA 18/4	3022-PA 15/6	3022-PA 35/6	4032A-PM 30/10	4032B-PM 50/10	6532A-PM 55/24	6533B-PM 75/24
2131-PA 15/4	2131-PA 18/4	3023-PA 15/6	3023-PA 35/6	4033A-PM 30/10	4033B-PM 50/10	6533A-PM 55/24	6534B-PM 75/24
2132-PA 15/4	2151-PA 18/4	3041-PA 15/6	3041-PA 18/6	4034A-PM 30/10	4034B-PM 50/10	6534A-PM 55/24	6550B-PM 75/24
2133-PA 15/4		3042-PA 15/6	3042-PA 35/6	4035A-PM 30/10	4051B-PM 50/10	6535A-PM 55/24	6551B-PM 75/24
2151-PA 15/4		3043-PA 15/6	3043-PA 35/6	4051A-PM 30/10	4052B-PM 50/10	6536A-PM 55/24	6552B-PM 75/24
2152-PA 15/4		3031-PA 29/6	3031-PA 35/6	4052A-PM 30/10	4053B-PM 50/10	6551A-PM 55/24	6553B-PM 75/24
2153-PA 15/4		3032-PA 29/6	3051-PA 35/6	4053A-PM 30/10	4054B-PM 50/10	6552A-PM 55/24	6554B-PM 75/24
		3033-PA 29/6		4054A-PM 30/10		6553A-PM 55/24	6530C-PM 100/24
		3051-PA 29/6		4055A-PM 30/10		6554A-PM 55/24	6531C-PM 100/24
		3052-PA 29/6				6555A-PM 55/24	6532C-PM 100/24
		3053-PA 29/6				6556A-PM 55/24	6550C-PM 100/24
						6530B-PM 75/24	6551C-PM 100/24
						6531B-PM 75/24	6552C-PM 100/24

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# 1 Health and safety instructions

When carrying out any repair work the instructions in the "Safety Instructions for ABS Products" brochure and "Installation and Operating Instructions" must be observed.

Prior to starting with any maintenance work the ABS units must be completely disconnected from the mains by a qualified person and protected from being inadvertently switched back on.



Prior to maintenance, any units that have been used in contaminated media, e.g wastewater containing faeces, must always be cleaned, and if necessary, thoroughly decontaminated. The specific hygiene regulations of the respective application countries must be observed.

When carrying out any repair or maintenance work, the safety regulations covering working in enclosed areas of sewage installations, as well as "good technical practice", must be observed!



**WARNING: DANGEROUS GASES**

Before removal of units in hazardous areas, the sump and surrounding area must be adequately vented to avoid the danger of an explosion caused by a spark.

Observe all accident prevention measures and regulations!

Please use a safety belt and a life line when getting into the sump and work together with supervisory staff.



Ensure adequate venting

## ATTENTION

***Repair on explosion-proof and permanent-magnet motors may only be carried out by authorised workshops or persons. During repair work only original parts supplied by the manufacturer must be used. Lifting equipment such as hoists, shackles, wire ropes and wire clamps etc. must undergo a visual examination at regular intervals (approx. every 3 months) for wear and corrosion and if necessary must be replaced. Installation accessories (in particular for mixers and aerators) must undergo a visual examination at regular intervals for wear and corrosion etc. and if necessary must be replaced.***



Changing the direction of rotation at control panels without a changeover switch should only be carried out by a qualified person and for this reason this procedure is not allowed for cleaning hydraulics or propellers.

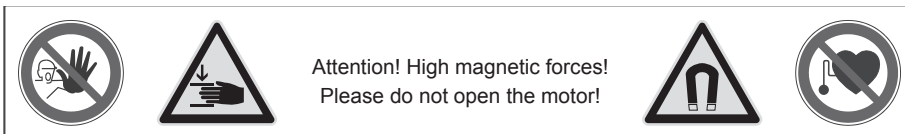


The oil in the chambers of XRW mixers may be under pressure. Before opening the oil drain plug, please always put a cloth over the oil filler screw, loosen it to release any pressure and screw it down again! The regulations covering oil and grease or cooling liquids must be observed. Any waste oil, grease or cooling liquid should be correctly disposed of.



To avoid the possibility of injury from expelled objects when using an hydraulic press to assemble components that require compression fit, ensure that the placed components are squarely aligned beneath the hydraulic ram and are behind a protective screen.

## 1.1 Safety information for permanent-magnet motors



Attention! High magnetic forces!  
Please do not open the motor!



Users of heart pacemakers should avoid being near magnets. If a neodymium magnet is placed within 30 mm of a heart pacemaker it will stop working!



Do not use magnets in explosive atmospheres.



Do not work with permanent- magnet motors if you are pregnant!



Do not work with permanent- magnet motors if you wear an insulin pump.



Modern permanent magnets can attract steel objects or other magnets from large distances and cause trapping injuries. Place non-ferrous (wood / polystyrene / plastic / aluminium) parts between magnets and any steel or other magnet to prevent this hazard.



Many magnets are brittle and may shatter if they are allowed to 'jump' together or onto a steel surface. So it is always necessary to wear eye protection when working with permanent- magnet motors.



Strong magnets may affect or interfere with sensitive electronic instruments and can destroy information stored on magnetic media such as credit cards, floppy discs and computer hard drives. Always keep magnets at least 1 m from such devices.

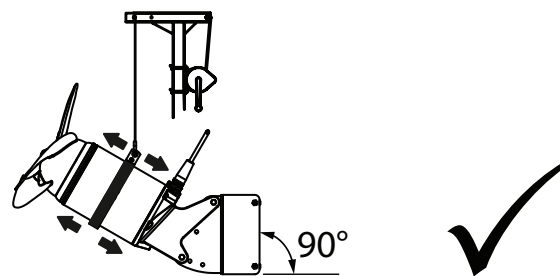
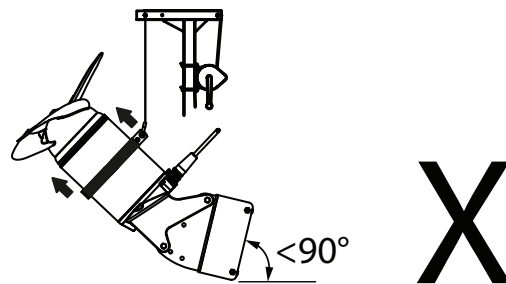
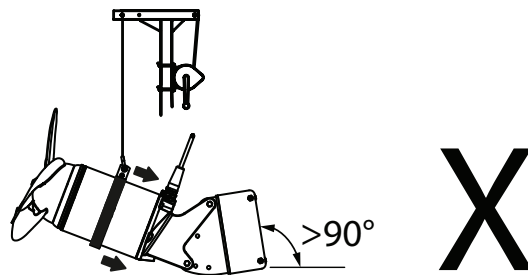


Analogue watches and computer monitors, can be permanently damaged by placing magnets near them.

**2 General**

**2.1 Lifting band position**

**ATTENTION** *If during any repair or service procedure the lifting band is removed from the motor housing it **MUST** be refitted in such a position that when the mixer is suspended by it then the guide rail bracket will assume a precise vertical alignment of 90° from horizontal. Otherwise the guide rail bracket will lock on the guide rail when the mixer is being installed and damage the bracket liner.*



## 2.2 Dimensions and weights

**ATTENTION** *Note the entire weight (see nameplate) of the ABS unit. The dimensions of the unit can be found on the relevant dimensional sheet on the Downloads page of the Sulzer website or EPM (Electronic Product Manual). The technical data and weight of the unit can be found on the nameplate.*

The ABS units are prepared for transportation by placing them on an adequately strong horizontal surface. Care should be taken that they cannot fall over. The hoist must be adequately dimensioned for the total weight of the ABS units, the lifting chain and shackle, and all accessories which may be fitted, and must comply with the local valid safety regulations. Do not stay or work in the swivel area of a suspended load. The lifting hook height must take into consideration the height of the ABS units as well as the length of the lifting chain.

## 2.3 Tightening torques

Stainless steel screws:

M6	7 Nm
M8	17 Nm
M10	33 Nm
M12	56 Nm

In the case of screwed connections using “Nord-Lock” securing washers (e.g impeller fixing screw) the torque figures given above should be increased by 10%.

## 2.4 Equipment and tools

The procedures outlined in this manual require the use of specified equipment and tools. Before proceeding with maintenance or repair work please ensure that your workshop is equipped with the following:

### Equipment:

- Hydraulic press
- Hoist
- High voltage tester
- Pressure tester (compressed air)
- Hydraulic hand pump (for connection to stator extraction tool)

### Tools:

- Mechanical seal hand press tools.
- Mechanical seal compression tool.
- Lip seal tools.
- Shaft sleeve tools - to aid fitting of mechanical seal on shaft.
- Bearing pullers.
- Front cover tools.
- Bearing press tools.
- Bearing support tools.
- Bearing lid tools
- Stator pullers - fits to extraction tool.
- Stator press tools.
- Pressure test tools.
- Box spanner.
- Banding tool.

Apart from bearing pullers, banding tool and a box spanner, the above tools are specific to ABS mixer maintenance and repair. Tools are not supplied by Sulzer and so must be manufactured locally. Dimension drawings for that purpose can be found at the end of this booklet.

**3 Structural design (double mechanical seal version)**

**3.1 XRW 210**

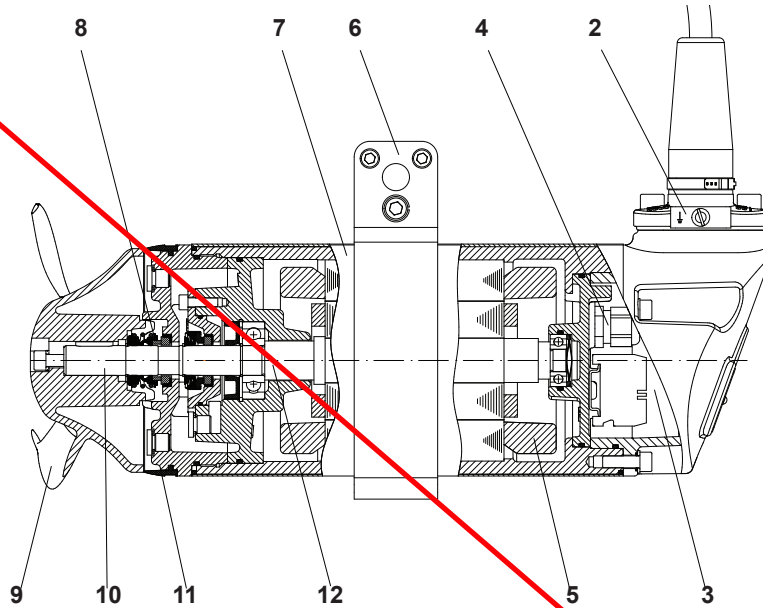


Figure 5: XRW 210

**3.2 XRW 300, 400 and 650**

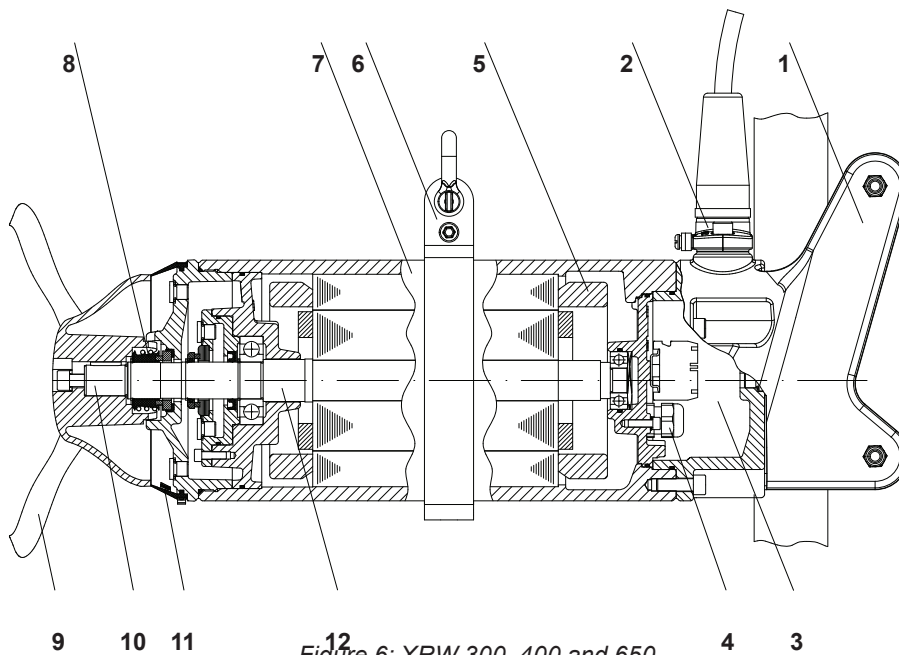


Figure 6: XRW 300, 400 and 650

**Legend**

- |                      |                   |                                  |
|----------------------|-------------------|----------------------------------|
| 1 Guide rail bracket | 5 Stator          | 9 Propeller                      |
| 2 Cable inlet        | 6 Lifting band    | 10 Shaft end with key            |
| 3 Connection chamber | 7 Motor housing   | 11 Solids deflection (SD) ring   |
| 4 Motor chamber seal | 8 Mechanical seal | 12 Shaft with rotor and bearings |



## 4 Explosion approved motor



***Explosion approved motors may only be repaired or maintained by authorized ABS personnel or personnel authorized by ABS. The personnel and /or your workshop may also require authorisation by your local government.***

***IEC 60079-19 and EU Directive 94/9/EC are valid for all maintenance and repair work carried out on products used in hazardous locations.***

***To ensure that the motor complies with the regulations and approval of the authorities, use only genuine ABS spare parts when carrying out repair work.***

***Always check the dimensions of vital parts before assembly (Sec 4.6).***

***The assembled pump shall always be insulation tested and test run before delivery.***

### 4.1 General

In an explosion approved motor (Ex), the gaps between different parts, for example between the motor housing and the connection chamber, shall prevent any sparks from the interior of the motor from escaping and igniting surrounding gases.

All flame path lengths and gaps shall be measured with accurate and calibrated instruments. All gap surfaces shall be inspected. No scratches, tool marks etc are permissible.

Failure to meet the above requirements may render the explosion approval invalid. Note that the work requires experienced and specially trained personnel.

### 4.2 Workshop repair

The parts for which dimensions must be checked are given in the part list. It is important to ensure that the gap surfaces for these parts are not damaged during dismantling.

The product must be thoroughly examined and a report must be prepared on all findings. Any measurements, dimensional checks, test readings; and details of materials, parts or windings which are found to require attention should be carefully noted. It is required to affix a repair nameplate on the product after repair.

If the products have been modified and do not comply with original approval, the owner must be informed and further information on the application must be requested.

If there are any doubts during the repair as to the results of measurements, tests, the continued integrity of parts, or the possible reclamation of damaged parts, reference must be made to your local Ex co-ordinator.

### 4.3 Guidelines for repair

Care must be taken when dismantling Ex approved products, as damage to flame-proof faces can easily occur. For instance, if difficulties are found in separating spigot gaps, draw studs should be used wherever possible rather than trying to wedge the components apart, as not only will damage occur at the point of wedging, but the wedges are liable to be driven through and damage the flame path surface of the spigot.

Similarly, care should be exercised when removing the main bearing assembly and bearing housing to ensure that damage does not occur on the part of the shaft that constitutes the flame path.

Once the motor has been completely dismantled, detailed examination of all parts should be made and a concise record kept of all findings.

When assembling an Ex approved product, measure the gaps and the flame path length. Inspect the flame path surfaces and smear them with grease to prevent corrosion.

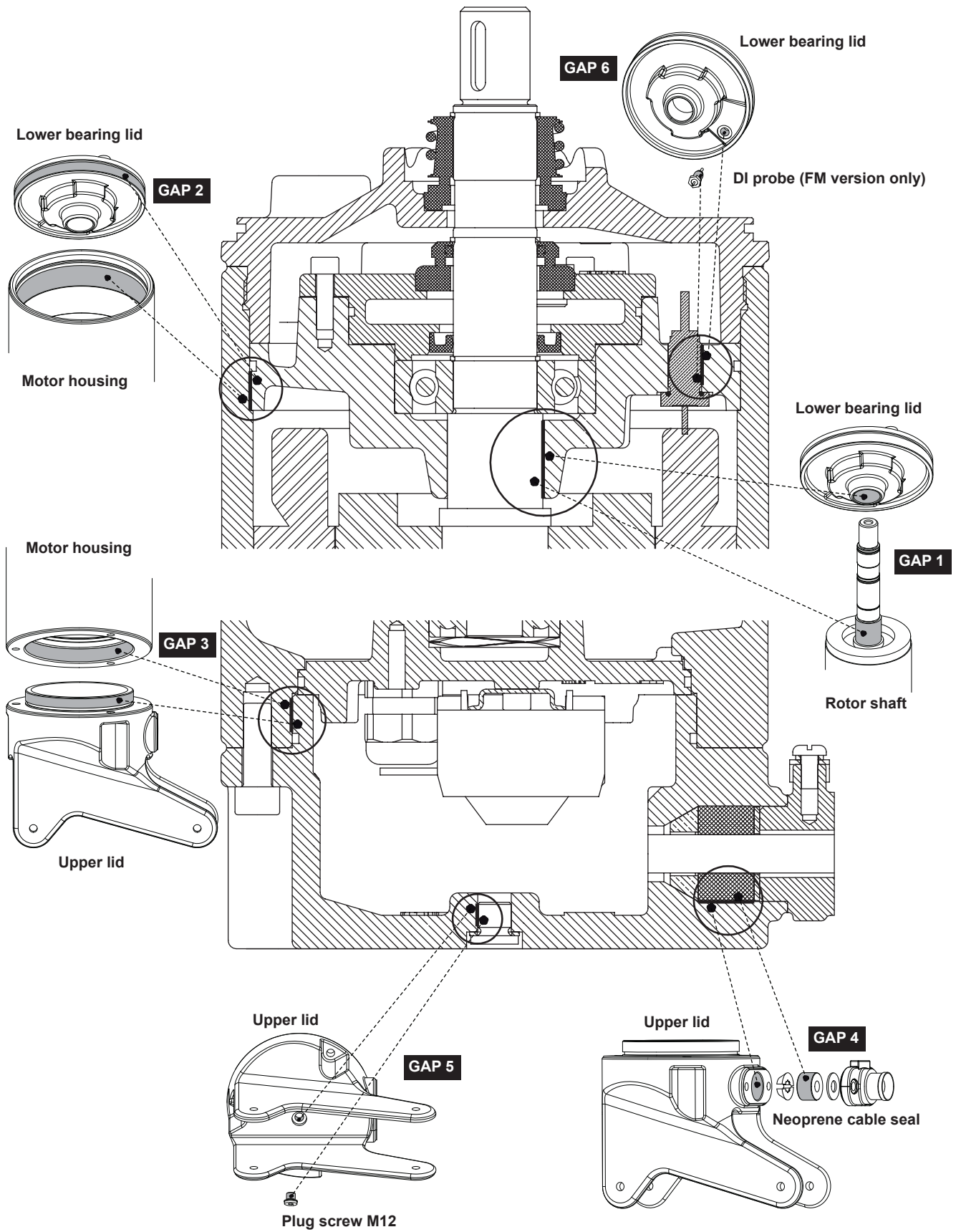
If a part does not meet the requirements on dimensional accuracy or surface finish, it must be discarded and a new specially approved part ordered. The new part must also be inspected. Observe caution during assembly to prevent damage to the flame path surfaces.

### 4.4 Flame paths

The flame paths should be examined for any corrosive pitting or damage which may have occurred.

All castings should be examined for blow holes or hairline cracks. If there is evidence that there has been an internal explosion of gases, this may be confirmed by the user and will probably be evident by smoke and debris tracking across the flame paths.

**4.5 Flamepath drawing for explosion approved motors XRW 210 - 650**

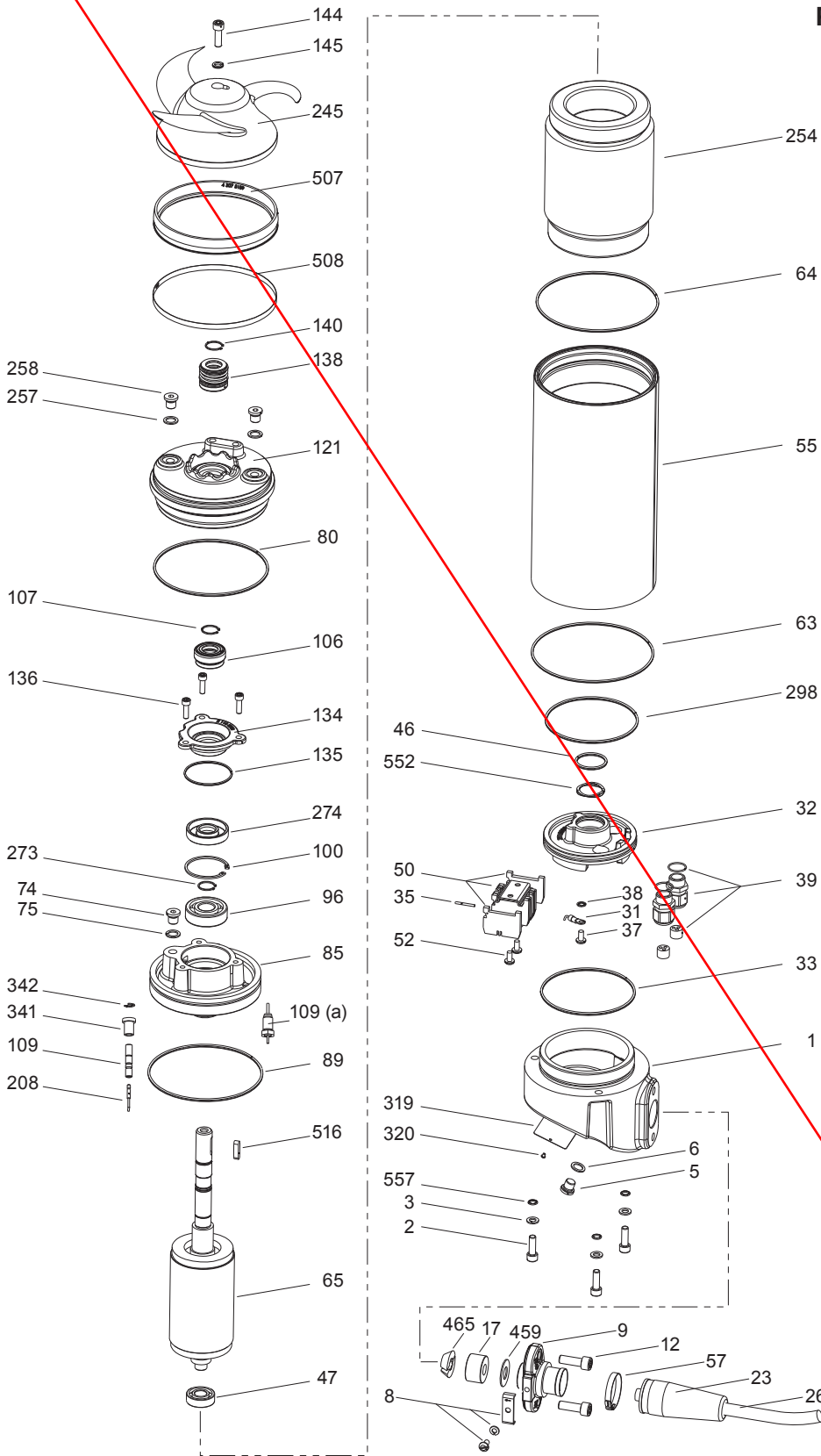


**4.6 Dimensional checks for explosion- approved motors XRW 210 - 650**

	XRW	GAP 1	GAP 2	GAP 3	GAP 4	GAP 5	GAP 6
Flame Path Length (mm)	210	> 25	> 12.5	> 12.5	> 12.5	thread > 9	thread > 14
	300						
	400						
	650						
Diameter (mm)	210	Ø26.4 <sup>+0.050</sup> / <sub>-0.000</sub>	Ø138.0 <sup>+0.040</sup> / <sub>-0.000</sub>	Ø118.0 <sup>+0.100</sup> / <sub>+0.050</sub>	Ø34.2 <sup>+0.100</sup> / <sub>+0.050</sub>	M12	M12
		Ø26.2 <sup>-0.025</sup> / <sub>-0.050</sub>	Ø138.0 <sup>-0.100</sup> / <sub>-0.160</sub>	Ø118.0 <sup>-0.050</sup> / <sub>-0.100</sub>	Ø34.0 ----		
	300	Ø34.4 <sup>+0.050</sup> / <sub>-0.000</sub>	Ø176.0 <sup>+0.040</sup> / <sub>-0.000</sub>	Ø145.0 <sup>+0.100</sup> / <sub>+0.050</sub>	Ø34.2 <sup>+0.100</sup> / <sub>+0.050</sub>		
		Ø34.2 <sup>-0.025</sup> / <sub>-0.050</sub>	Ø176.0 <sup>-0.100</sup> / <sub>-0.160</sub>	Ø145.0 <sup>-0.050</sup> / <sub>-0.100</sub>	Ø34.0 ----		
	400	Ø50.3 <sup>-0.030</sup> / <sub>-0.060</sub>	Ø185.0 <sup>+0.040</sup> / <sub>-0.000</sub>	Ø158.0 <sup>+0.040</sup> / <sub>-0.000</sub>	Ø34.2 <sup>+0.150</sup> / <sub>-0.000</sub>		
		Ø50.0 <sup>-0.000</sup> / <sub>-0.030</sub>	Ø185.0 <sup>-0.020</sup> / <sub>-0.060</sub>	Ø158.0 <sup>-0.020</sup> / <sub>-0.090</sub>	Ø34.0 ----		
	650	Ø68.3 <sup>-0.032</sup> / <sub>-0.062</sub>	Ø257.0 <sup>+0.040</sup> / <sub>-0.000</sub>	Ø228.0 <sup>+0.046</sup> / <sub>-0.000</sub>	Ø34.2 <sup>+0.150</sup> / <sub>-0.000</sub>		
		Ø68.0 <sup>-0.000</sup> / <sub>-0.019</sub>	Ø257.0 <sup>-0.020</sup> / <sub>-0.060</sub>	Ø228.0 <sup>-0.020</sup> / <sub>-0.090</sub>	Ø34.0 ----		

	XRW	Lower bearing lid	Motor housing	Rotor shaft	Upper lid
Surface finish (Ra)	210	3.2	3.2	3.2	6.3
	300	3.2	3.2	3.2	6.3
	400	6.3	6.3	6.3	6.3
	650	6.3	6.3	6.3	6.3

**5 Mixer unit XRW 210**



**Position Description**

- 144 Screw cyl. M8 x 25
- 145 Lock washer M8
- 245 Propeller
- 507 Solids deflection ring
- 508 Clamp band
- 140 Circlip 20 x 1.2
- 138 Mechanical seal 20 mm
- 258 Screw plug M12
- 257 Seal ring C12 x 18 x 1.5
- 121 Front cover
- 80 O-ring 132 x 3
- 107 Circlip 20 x 1.2 \*
- 106 Mechanical seal \*
- 136 Screw cyl. M6 x 20 \*
- 134 Seal holding plate \*
- 135 O-ring 55 x 2 \*
- 274 Lip seal 20 x 52 x 10
- 100 Circlip 52 x 2
- 273 Circlip 20 x 1.2
- 96 Bearing
- 74 Screw plug M12
- 75 Seal ring C12 x 18 x 1.5
- 85 Lower bearing lid
- 89 O-ring 132 x 3
- 342 Circlip 7 x 0.9 \*\*
- 341 DI probe seal \*\*
- 109 DI probe \*\*
- 109 (a) DI probe - FM version
- 208 DI plug (Std. and FM only)
- 516 Propeller key 6 x 6 x 25
- 65 Rotor shaft
- 47 Bearing
- 254 Stator
- 64 O-ring 140 x 3 \*\*\*
- 55 Motor housing
- 63 O-ring 140 x 3 \*\*\*
- 298 O-ring 108 x 3
- 46 O-ring 35 x 3
- 552 Wavy washer 34.7 x 28.5
- 32 Upper bearing lid
- 39 Cable gland assembly.
- 38 Toothed washer A6.4
- 31 Cable eyelet 1.0 - 2.5 M6
- 37 Screw slot M6 x 12
- 50 Terminal block + clamps
- 52 Screw slot M6 x 12
- 35 DI (connection chamber)
- 33 O-ring 108 x 3
- 1 Upper lid
- 319 Nameplate
- 320 Rivet dia. 3 x 4 mm
- 6 Seal ring C12 x 18 x 1.5
- 5 Screw plug M12
- 2 Screw cyl. M8 x 25
- 3 O-ring 8 x 2 \*\*\*
- 557 Washer \*\*\*
- 465 Strain relief
- 17 Seal cable dia. 34 mm
- 459 Washer
- 9 Cable gland
- 8 Clamp strap Earth
- 12 Screw cyl. M10 x 30
- 57 Clamp band
- 23 Cable protector
- 26 Cable

\* Optional second mechanical seal.  
 \*\* Standard (non-Ex) version only.  
 \*\*\* CR version only.

## 8 Removal and fitting of propeller and oil change

### Position Description

144	Cylinder screw*
145	Lock washer*
143	Collar washer (XRW 400 and 650 only)
245	Propeller
516	Propeller key
258	Plug screw M12
257	Seal washer

\* XRW 210 = M8, XRW 300, 400 & 650 = M10



**XRW 400 & 650: permanent-magnet motor.**  
**Danger from magnetized parts! See section 1.1.**

### Removing propeller.

XRW 210 and 300:

- Remove screw (144)
- Remove washer (145)
- Pull off propeller (245) using a jacking bolt \*\* of minimum length 75 mm. Pull from shaft by tightening jacking bolt against the shaft through the threaded bore of the propeller hub.

**Note:** To protect the shaft bore threads from damage by the jacking bolt, place an adequately sized metal blank or washer at the opening of the shaft bore, against which the jacking bolt can be tightened. Otherwise the shaft bore may need to be re-tapped before the screw can be re-fitted.

\*\* XRW 210 = M10, XRW 300 = M12.

XRW 400 and 650:

- Remove screw (144)
- Remove washer (145)
- Remove collar washer (143)
- Carefully prise the propeller hub from the motor housing using two large screwdrivers at opposite sides. If necessary use 3- or 4-leg bearing pullers.

### Oil draining

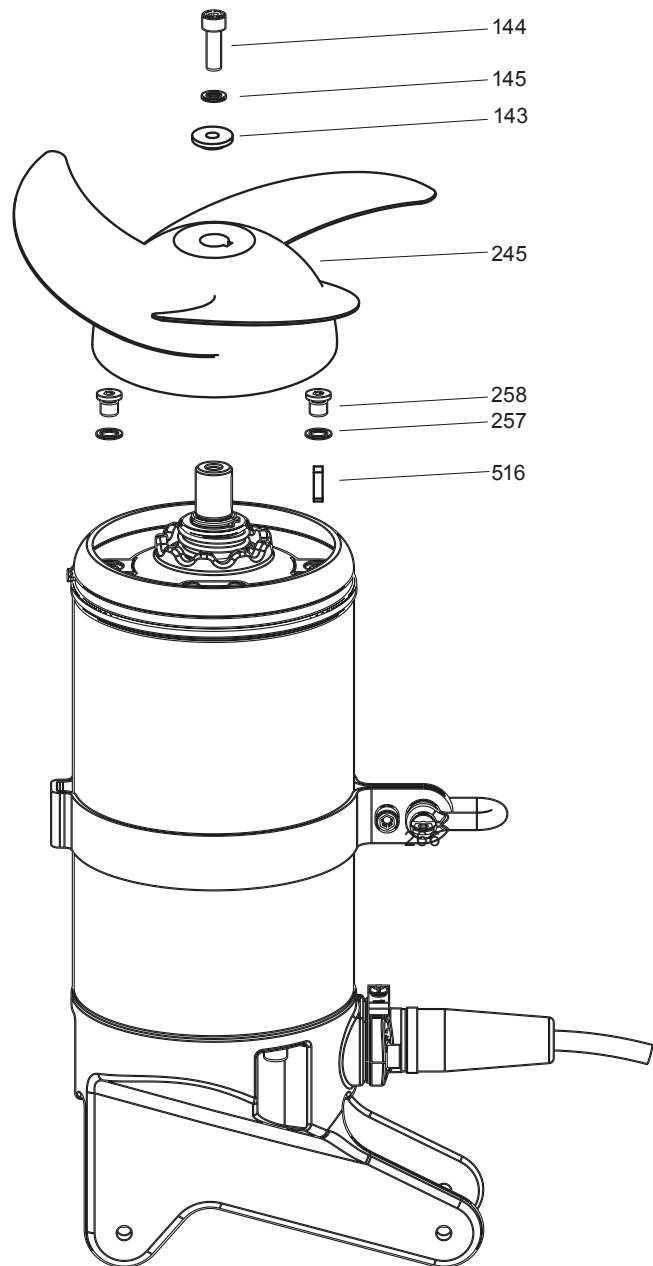
- Remove plug screws (258) and seal washers (257) from vent and drain holes.
- Allow the oil to flow out into a suitable container.

### Oil filling

- Stand the mixer vertically with the shaft end facing upwards, taking care that it cannot topple over.
- Fill oil in through same hole as oil removal (for quantities see page 22).
- Replace seal washers (257) and plug screws (258).

### Refitting propeller.

- Remove propeller key (516) from shaft. Clean and refit.
- Lightly grease propeller hub and shaft end.
- Fit propeller (245) to shaft.
- Fit washer (145).
- Fit screw (144).



**ENSURE WORK AREA AND TOOLS ARE CLEAN**

## 9 Removal and fitting of primary mechanical seal (hydraulic side)

Position	Description
140	Circlip (XRW 210 & 300 only)
139	Mech. seal cover (XRW 400 & 650 only)
137	Grub screw & cap (XRW 400 & 650 only)
138	Mechanical seal
. a	Mech. seal - stationary part
. b	Mech. seal - rotating part
516	Propeller key



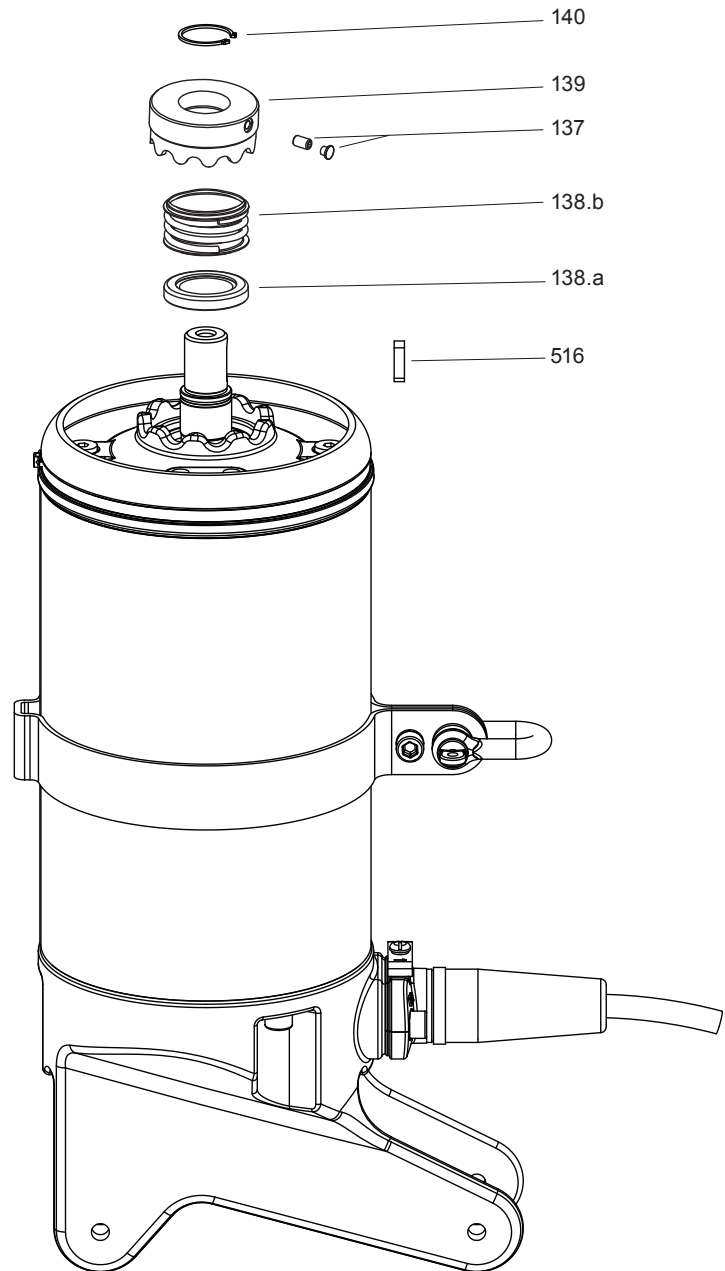
**XRW 400 & 650: permanent-magnet motor. Danger from magnetized parts!**  
See section 1.1.

### Dismantling

- Remove propeller (Sec. 8).
  - Remove propeller key (516).
  - XRW 210 and 300: remove circlip (140).
  - XRW 400 and 650: remove grub screw cap and loosen grub screw (137) until mechanical seal cover releases and can be removed from shaft.
  - Using two screw drivers as levers, slide seal (138) from shaft.
- Attention:** take care not to damage surface of rotor shaft as scratches etc. can result in leakage and render shaft unusable.

### Fitting

- Clean shaft and lubricate the rubber boot on the stationary part of the mechanical seal (138a) with P-80\* rubber lubricant.
- Attention:** clean seal face with paper towel and brush with oil.
- With rubber side facing down, slide stationary part of seal over shaft and push by hand into position using seal press tool.
  - Lightly tap tool with mallet to locate seal into final position.
- Attention:** ensure that working edge of insertion tool is clean so as not to contaminate or damage seal surface.
- Fit shaft sleeve tool over shaft.
  - Lubricate shaft and inside rubber bellow of rotating part of seal with P-80.
  - Place rotating part of seal (138b) over shaft, ensuring polished seal surface is facing inwards (to meet with same on stationary part).
  - Slide seal over shaft sleeve tool and using seal press tool push by hand into final position on shaft.
- Attention:** clean seal face with paper towel and brush with oil before fitting.
- XRW 210 and 300: slide circlip (140) onto shaft and press into position by hand using the seal press tool.
  - XRW 400 and 650: fit mechanical seal cover over shaft ensuring that the grub screw is in line with the keyway in the rotor shaft.
  - Fit mechanical seal compression tool over shaft and tighten fully using bolt threaded into end of rotor shaft (M10 x 35 where XRW 400, M10 x 40 where XRW 650).
  - Remove and clean grub screw. Apply Loctite and refit, tightening fully. Fit grub screw cap.
  - Remove compression tool.
  - Refit propeller (Sec. 8).



\*P-80 is a temporary lubricant that dries and returns the lubricated parts to their original condition. It is designed only to aid assembly of rubber parts.

DO NOT use any other synthetic lubricant or oil where P-80 is specified that would leave a residue and prevent the correct functioning of the parts to which it is applied.

**Tip:** if not available, a soapy water solution can be used as a substitute.



**ENSURE WORK AREA AND TOOLS ARE CLEAN**

## 10 Removal and fitting of secondary mechanical seal (motor side)

Position	Description
121	Front cover
80	O-ring (XRW 210 - 650)
553	O-ring (XRW 300 CR only)
64	O-ring (XRW 210 CR only)
107	Circlip
106	Mechanical Seal
.a	Mech. Seal - stationary part
.b	Mech. Seal - rotating part
74	Plug screw
75	Seal ring
134	Seal holding plate
136	Cylinder screw
135	O-ring



**XRW 400 & 650: permanent-magnet motor. Danger from magnetized parts! See section 1.1.**

### Dismantling

- Remove propeller and drain oil (Sec. 8).
- Remove primary mechanical seal (Sec. 9).
- Unscrew front cover anticlockwise (121) using front cover tool and remove from motor housing (55).
- Remove circlip (107).
- Remove plug screw (74) and seal washer (75) and drain oil from lip seal chamber.

- Note:** XRW 210 has plug screw x 1 in bearing lid, XRW 300, 400 & 650 has plug screws x 2 in seal holding plate. For later reassembly of XRW 300, 400 & 650 take note of which of the two plug holes are aligned with the arrow on the lower bearing lid.
- Remove cylinder screws (136) and carefully remove seal holding plate (134) and seal from shaft.

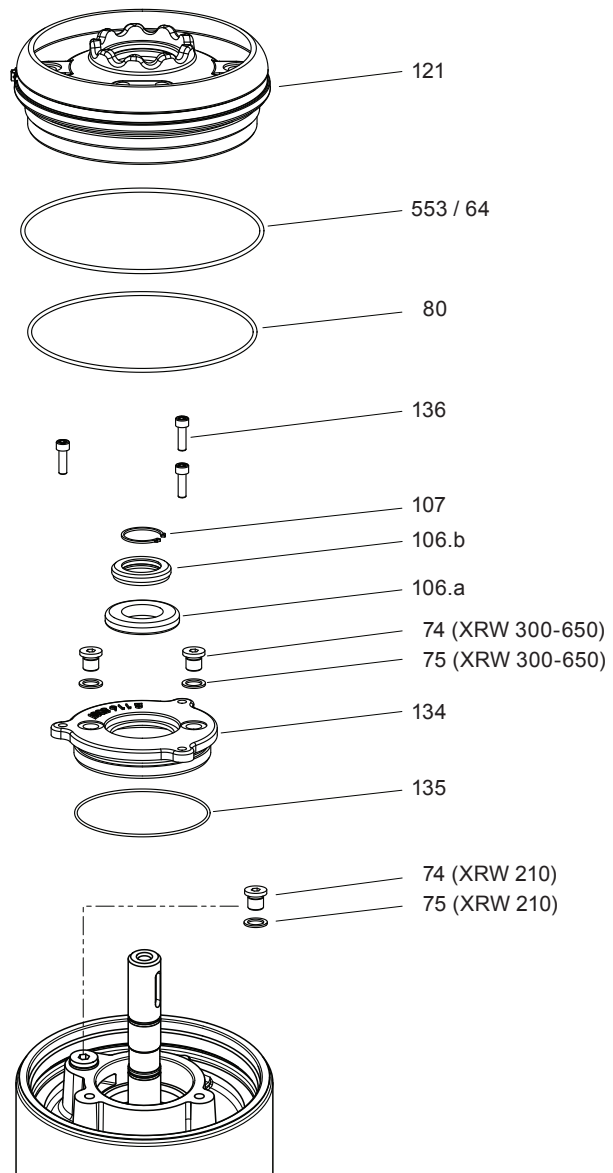
- Attention:** take care not to damage surface of rotor shaft as scratches etc. can result in leakage and render shaft unusable.
- Remove stationary part of mechanical seal from seal holding plate.

### Fitting

- Inspect O-ring (135) for damage and if necessary replace.
- Lubricate O-ring with oil and fit onto seal holding plate.
- Spray P-80\* lubricant into seal holding plate bore.
- Lower seal holding plate over shaft and fit to lower bearing lid.
- Apply Loctite to screws (136) and refit to secure seal holding plate.

- Attention:** Where XRW 210, ensure that the cutaway on the outer rim of the seal holding plate is aligned with the oil fill hole in the lower bearing lid. Where XRW 300, 400 & 650 ensure that the threaded plug hole noted earlier is aligned with the arrow on the lower bearing lid.
- Fit stationary part of mechanical seal into seal holding plate bore with polished seal surface facing outwards.
  - Clean seal surface with paper towel and brush with oil.
  - Use seal press tool to press into position.

- Note:** ensure that working edge of seal press tool is clean so as not to contaminate or damage seal surface.
- Fit shaft sleeve tool over shaft.



- Note:** shaft sleeve tool is necessary to prevent damage to seal from circlip grooves on shaft.
- Lubricate shaft and inside rubber bellow of rotating part of seal with P-80.
  - Place rotating part of seal over shaft, ensuring polished seal surface is facing inwards (to meet with same on stationary part).
  - Using seal press tool push seal over assembly sleeve tool and press into final position on shaft.
  - Refit circlip (107) and use seal press tool to press into position.
  - Refill lip seal chamber with oil and refit plug screws and seals. For oil quantities see page 22.
  - Inspect O-ring 80, and 64 or 553 where applicable, for damage and if necessary replace.
  - Lubricate O-ring(s) with oil and fit onto front cover (121) and where applicable onto motor housing (64 or 553).
  - Fit front cover over shaft and screw clockwise into motor housing by hand. Tighten fully using front cover tool.
  - Refit primary mechanical seal (Sec. 9).
  - Refill seal chamber with oil and refit propeller (Sec. 8).

\* see note page 15.



**ENSURE WORK AREA AND TOOLS ARE CLEAN**

## 11 Removal and fitting of lip seal

Position	Description
274	Lip seal
134	Seal holding plate
135	O-ring



**XRW 400 & 650: permanent-magnet motor.**  
**Danger from magnetized parts!**  
 See section 1.1.

### Dismantling

XRW 210 - 650:

- Remove propeller and drain oil (Sec. 8).
- Remove primary mechanical seal (Sec. 9).
- Where fitted, remove secondary mechanical seal (Sec. 10).

XRW 210, XRW 400 & 650 (single mech. seal version):

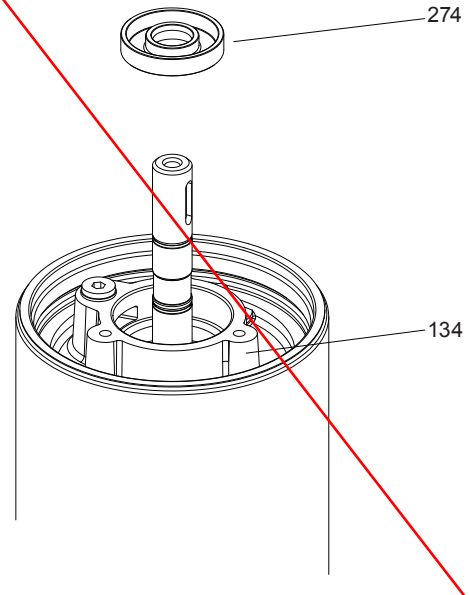
- Using two screwdrivers prise lipseal (274) from bearing lid and remove from shaft.

**Attention:** take care not to damage surface of rotor shaft as scratches etc. can result in leakage and render shaft unusable.

XRW 300, XRW 400 & 650 (double mech. seal version):

- Using two screwdrivers prise lipseal (274) from underside of seal holding plate (134).

**XRW 210 - double and single mechanical seal version mixers**  
**XRW 400 & 650 - single mechanical seal version**



### Fitting

XRW 210, XRW 400 & 650 (single mech. seal version):

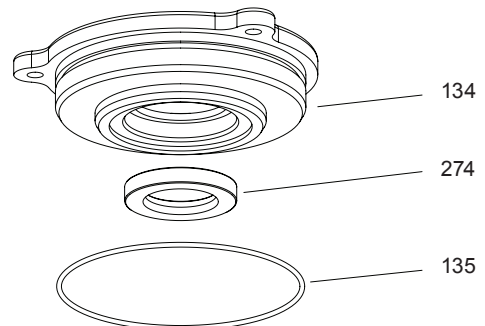
- Apply P80 lubricant to lipseal and fit on shaft.
- Note:** ensure lip side of seal is facing out from bearing lid.
- Press into bearing lid using lip seal press tool.
- If necessary use mallet to press fully home.

XRW 300, XRW 400 & 650 (double mech. seal version):

- Apply P80 lubricant to lipseal seat in seal holding plate.
- Fit seal onto lip seal tool and press into underside of seal holding plate.
- If necessary use mallet to press fully home.
- Note:** ensure lip side of seal is facing in to seal holding plate.

- Where applicable, refit secondary mechanical seal (Sec.10).
- Refit primary mechanical seal (Sec.9).
- Refill seal chamber with oil and refit propeller (Sec. 8).

**XRW 300 - double and single mechanical seal version mixers**  
**XRW 400 & 650 - double mechanical seal version**



**ENSURE WORK AREA AND TOOLS ARE CLEAN**



## 12 Bearings - removal and fitting

Position	Description
100	Circlip (XRW 210, XRW 400 & 650 single mech. seal version only)
273	Circlip
96	Lower bearing
85	Lower bearing lid
89	O-ring
65	Rotor shaft
47	Upper bearing
208	DI plug connector



**XRW 400 & 650: permanent-magnet motor.**  
**Danger from magnetized parts! See section 1.1.**

### Removal

#### Bearing assembly:

- Remove propeller, drain oil, and remove seals (see pages 14, 15, 16 and 17).
- Pull rotor shaft (65) to release bearing lid (85) from motor housing, enough to access and disconnect DI cable (208) from the underside of the bearing lid (standard and FM versions only).  
**Note:** where XRW 210 and 300 standard version, cable is connected by bullet connector that fits directly into the DI. Where XRW 400 and 650 standard version, cable is connected by eyelet screwed onto DI.  
 Cable is connected by male to female bullet connectors on all FM versions.
- Remove bearing housing assembly and shaft from motor housing, taking care not to damage stator windings as rotor shaft is withdrawn.
- Remove circlip (273), and circlip (100) where applicable.
- Remove bearing lid from shaft using bearing pullers, or if necessary hydraulic press
- Remove O-ring (89) from bearing lid and inspect for damage.

#### Bottom bearing:

- Tap bearing from lid using bearing press tool. If external wall of bearing remains in lid remove by prising free with two screwdrivers.

#### Upper bearing:

- Secure rotor shaft in workbench vice.
- Remove bearing using bearing pullers.

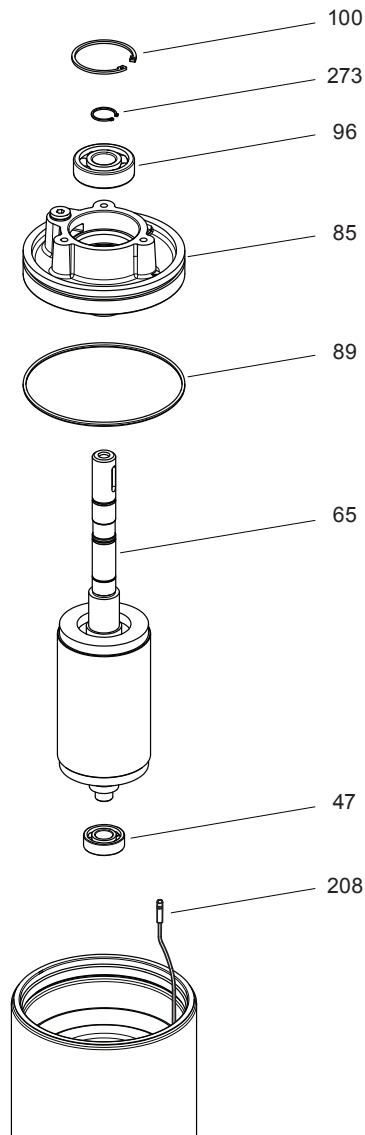
### Fitting

#### Bottom bearing to bearing lid

- After inspection for damage, clean and lubricate the bearing location area in the bearing lid.
- Sit bearing loosely in bearing lid ensuring that it is kept level.
- Sit bearing press tool on bearing.
- Carefully position assembly directly under hydraulic press ram.
- Press bearing into bearing housing.

#### Upper bearing and shaft to bearing lid

- Sit bearing lid over bearing support fixture and position under hydraulic ram.  
**Note:** base of hydraulic press on which the support fixture and bearing lid rest must be able to accommodate the rotor shaft protruding through.
- Apply oil to rotor shaft bearing diameter.
- Insert shaft into bearing lid.
- Fit upper bearing on shaft ensuring that it is kept level.
- Ensure that assembly is directly and squarely positioned under hydraulic press ram.
- Initially, to help align assembly, press slightly until contact and release.



- Press again until shaft is fully home.
- Lift assembly from press and lay on bench.
- Refit circlip (273), and circlip (100) where applicable.
- Check O-ring (89) for damage and replace if necessary.
- Lubricate and refit O-ring to bearing lid.

#### Bearing assembly to motor housing

- Apply P80 lubricant to outer diameter of upper bearing and to the internal diameter of motor housing where it will come into contact with the bearing lid O-ring.
- Align arrow on bearing lid with cable entry in motor housing and partially slide in shaft to allow reconnection of DI plug/cable.
- Carefully tuck DI cable between stator coils and inner wall of motor housing as lid and rotor assembly is lowered into position.
- Fit the lower bearing lid tool and, using minimum force necessary, with a mallet tap the bearing lid fully into position.
- Refit seals, refill with oil, and refit propeller (see pages 14, 15, 16 and 17).



**ENSURE WORK AREA AND TOOLS ARE CLEAN**

### 13 Upper lid and cable - Removal and Fitting

**Position Description**

50	Terminal block
63	O-ring (XRW 210 CR only)
554	O-ring (XRW 300 CR, 400 & 650 only)
33	O-ring
397	Screw cyl.
396	Cable clamp
31	Earth cable eyelet (XRW 210)
38	Toothed washer (XRW 210)
37	Slot screw (XRW 210).
1	Upper lid
3	Washer (CR versions only)
557	O-ring (CR versions only)
2	Screw cyl.
465	Strain relief
17	Cable seal
459	Washer
8	Clamp strap (earth)
9	Cable cap
12	Screw cyl.
57	Clamp band
23	Cable protector
26	Cable



**XRW 400 & 650: permanent-magnet motor. Danger from magnetized parts! See section 1.1.**



**XRW 400 & 650: there is a danger of electric shock, even when disconnected from power source, from voltage generated by manual rotation of the rotor.**

**Removal**

**Upper lid**

- Remove screws (2), and where CR version, washers (3) and O-rings (557).
- Pull upper lid (1) from motor housing.
- Take note of connections and disconnect power leads from terminal block (50).

**Note:** XRW 210 earth lead is connected directly to upper bearing lid. To disconnect, remove screw (37) and toothed washer (38). XRW 300, 400 and 650 earth lead connects directly into terminal block.

**Cable**

**Note:** before removal take note of required length and position of cable inside upper lid.

- Remove screws (12).
- Where XRW 400 & 650 remove screws (397) and cable clamp (396).
- Pull cable assembly from upper lid.
- If changing cable, slide strain relief (465), cable seal (17), washer (459), and cable gland (9) with cover (23) from cable and fit to replacement cable in reverse order.

**Fitting**

**Cable**

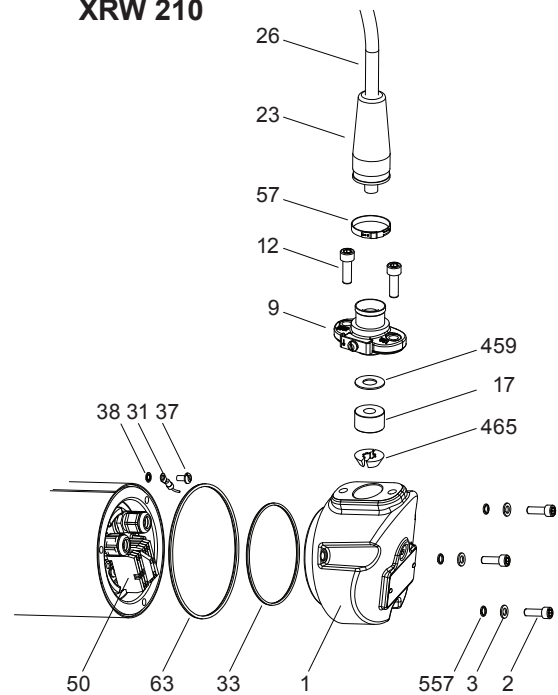
- Push cable into upper lid and position as noted prior to removal.
- Where XRW 400 & 650 refit cable clamp and screws.
- While keeping the cable in position, slide the strain relief, seal, washer and cable gland along the cable into the cable bore in the upper lid.
- Fit screws and tighten to secure cable assembly.

**Note:** for CR version apply grease to screws.

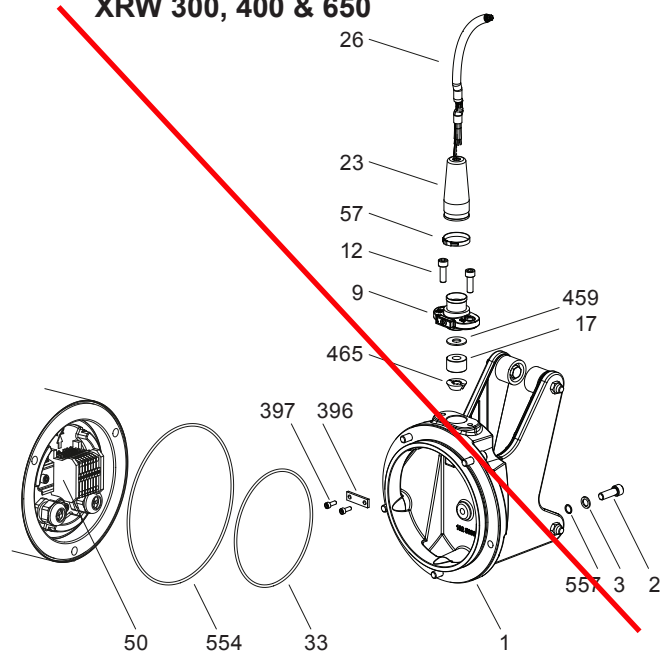
**Upper lid**

- Check O-rings (33), and where CR version (63 or 554), for

**XRW 210**



**XRW 300, 400 & 650**



- damage and replace if necessary.
  - Lubricate O-rings with oil and refit.
  - Connect power leads to terminal block as noted (or refer to wiring diagrams pages 20 & 21). Where XRW 210, connect earth lead to lid with screw and toothed washer.
  - Tidy leads with ty-rap.
  - Fit lid to motor housing taking care that power leads are neatly tucked into lid to avoid being trapped or damaged.
- Tip:** to aid alignment before fitting lid, fit suitable pin in one of the motor housing screw holes. Otherwise, because of tight fit, if incorrectly aligned, adjusting after fitting would be difficult.
- Remove alignment pin and secure lid with screws, and where CR version, washers and O-rings.



**ENSURE WORK AREA AND TOOLS ARE CLEAN**

## 14 Upper bearing lid and stator - removal and fitting

Position	Description
55	Motor housing
298	O-ring
46	O-ring
50	Terminal block
552	Wavy washer
32	Upper bearing lid
39 a	Cable gland cover
39 b	Rubber grommet seal
39 c	Cable gland



**XRW 400 & 650: permanent-magnet motor.**  
**Danger from magnetized parts! See section 1.1.**

### Removal

**Note:** the stator is held in by a compression fit only, so therefore it can only be removed by pulling it out by force.

- Remove propeller, drain oil, and remove seals (see pages 14, 15, 16 and 17).
- Remove bearings and shaft assembly (see page 18).
- Remove upper lid (see page 19).
- Take note of connections and disconnect stator leads from terminal block (50).
- Unscrew cable gland covers (39 a) using box spanner.
- Prise rubber grommets (39 c) from cable glands (39 c) and slide from stator leads.
- To ensure correct alignment when refitting, mark the motor housing beside the embossed arrow on the bearing lid.
- Remove bearing lid from motor housing by tapping out from underside.

**Attention:** before removal of stator, mark position of stator leads on motor housing to ensure correct alignment of replacement stator.

- Pull stator from motor housing using extraction tool.

### Fitting

**Note:** refitting of stator can only be done by means of a heavy press and insertion tool.

- Stand motor housing with front cover opening facing upwards.
- Apply lubricant to upper rim of stator bore in motor housing.
- Lower the stator into the motor housing, leads end first, taking care not to damage the stator windings against the motor housing wall.

**Attention:** ensure stator leads are in line with mark on motor housing applied earlier.

- Place stator press tool over stator, taking care not to damage stator windings.

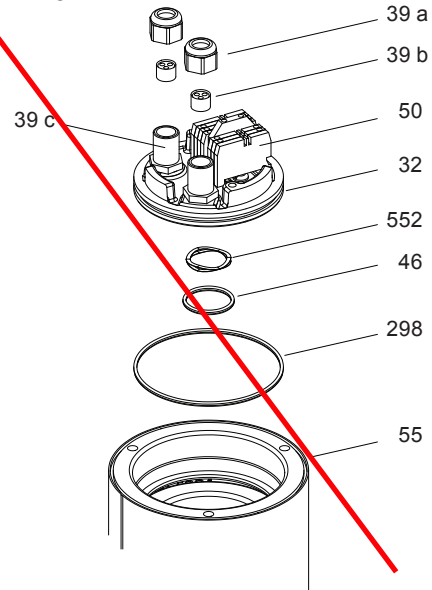
**Attention:** where XRW 210, 300 & 650 ensure slot in side wall of tool is in line with DI lead.

- Place assembly squarely into position beneath hydraulic ram and press inserting tool until fully home.
- Remove inserting tool.
- Check bearing lid O-rings (46 and 298) and wave washer (552) for damage and replace if necessary.
- Lubricate O-rings with oil and refit O-rings and wavy washer.
- Fit DI lead to stator as noted earlier and feed stator leads out through cable entry bores, power leads through one and control leads through the other.
- With minimum force necessary use nylon mallet and upper bearing lid tool to fit bearing lid to motor housing.

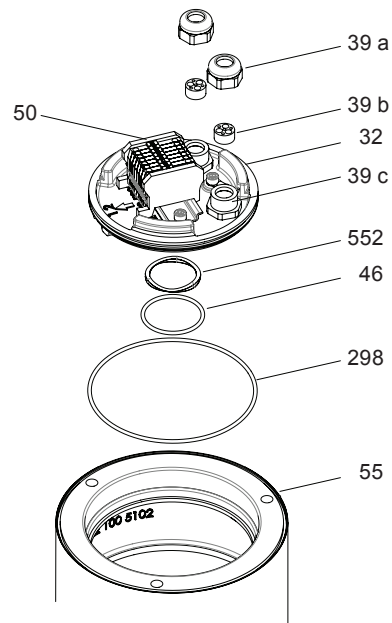
**Attention:** ensure arrow on bearing lid is in line with mark on motor housing applied earlier.

- Slide rubber grommets over stator leads into position in cable glands making sure the lip side of grommets face upwards.

**XRW 210**



**XRW 300, 400 & 650**



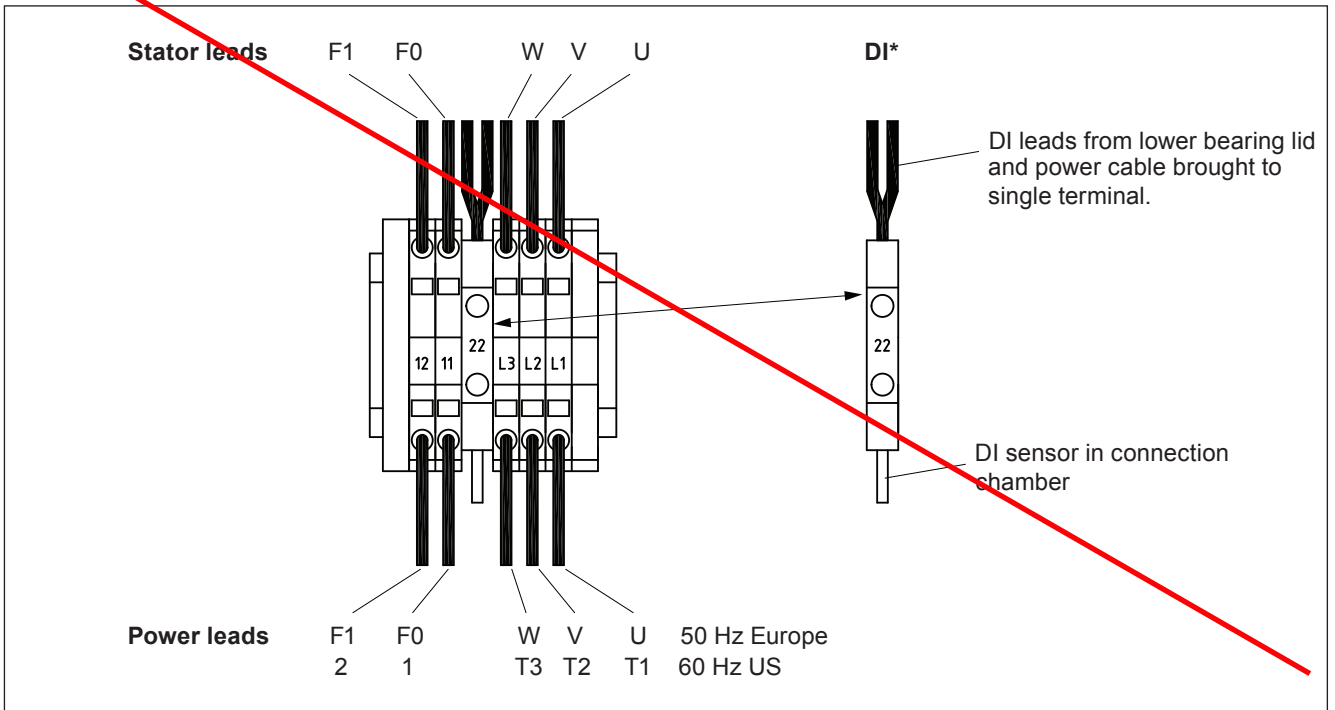
- Gently pull stator leads to take up slack from stator.
- Fit cable gland covers and tighten fully using box spanner.
- Reconnect stator leads to terminal block as noted (or refer to wiring diagrams pages 21 & 22).
- Refit upper lid (see page 19).
- Refit bearings and shaft assembly (see page 18).
- Refit seals, refill with oil, and refit propeller (see pages 14, 15, 16 and 17).



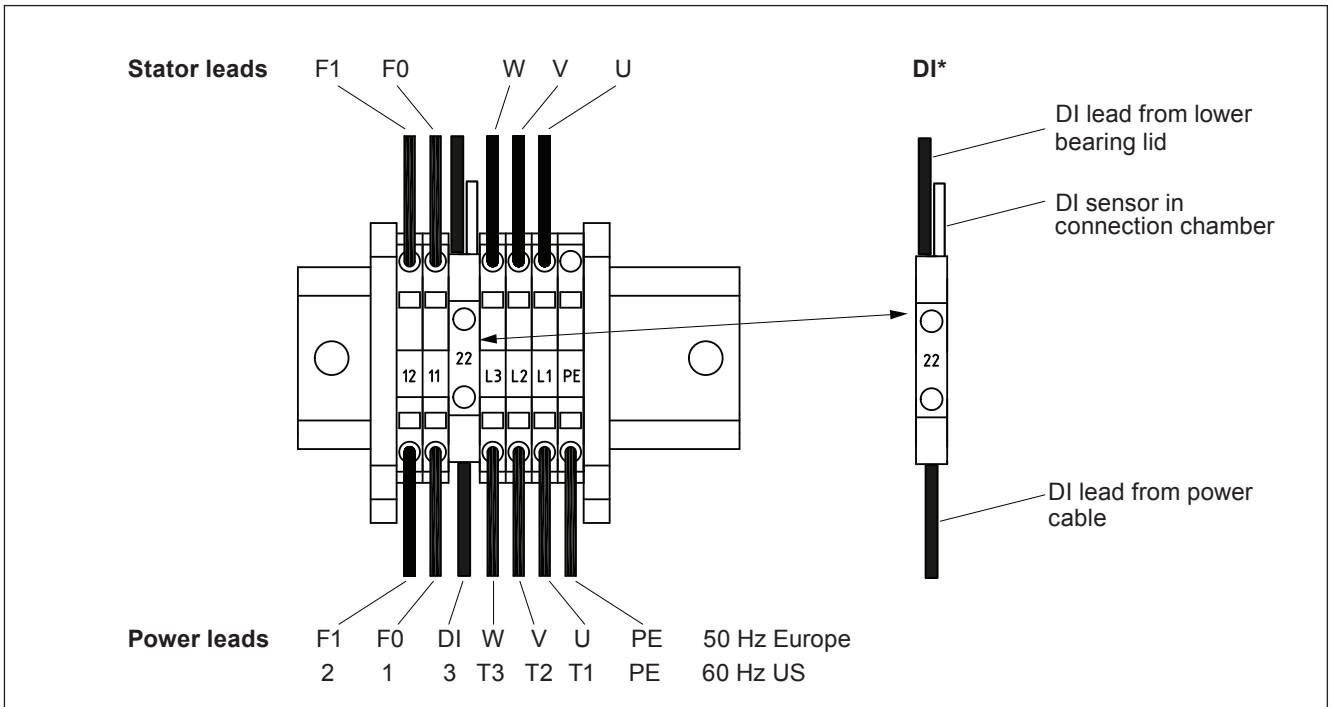
**ENSURE WORK AREA AND TOOLS ARE CLEAN**

**15 Wiring**

**15.1 XRW 210**



**15.2 XRW 300**

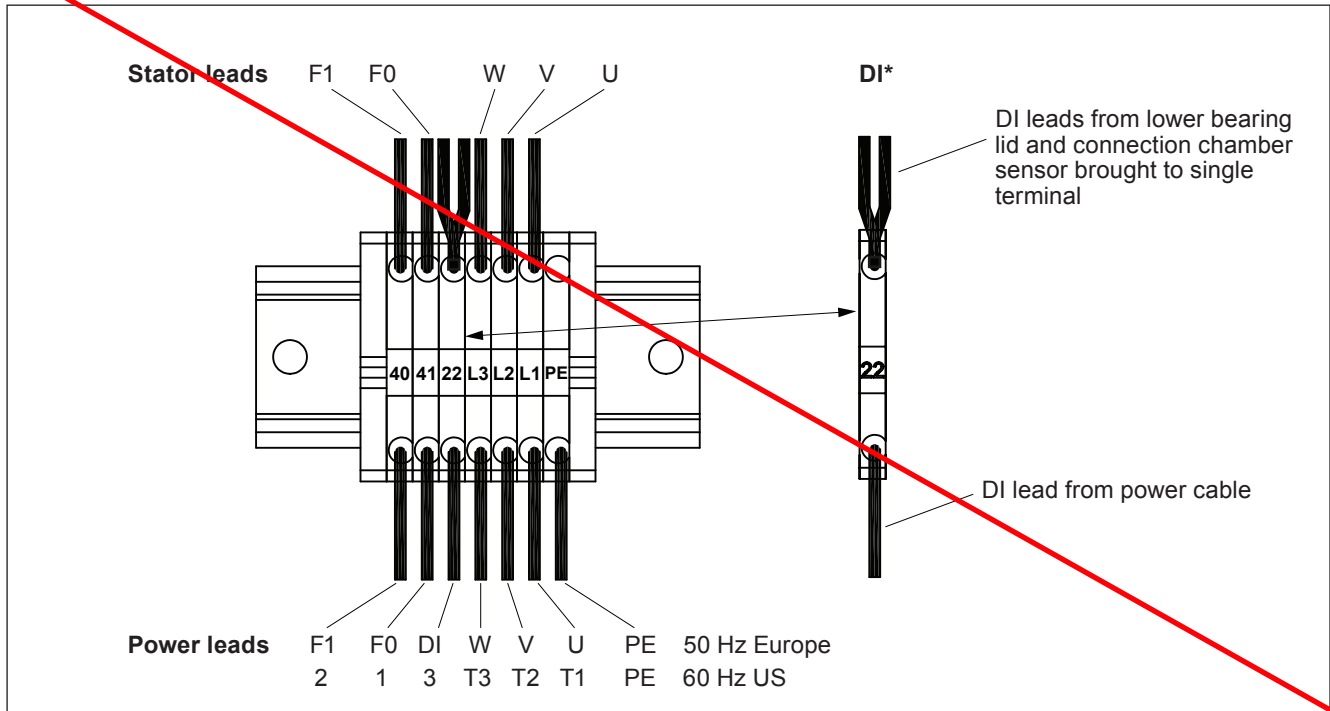


\* Non-Ex and FM versions only.



**Explosion-proof pumps may only be used in explosive zones with the thermal sensors connected (leads FO & F1).**

**15.3 XRW 400 and 650**



\* Non-Ex and FM versions only.  
 FI/F0: PTC as standard.



**Explosion-proof pumps may only be used in explosive zones with the thermal sensors connected (leads F0 & F1).**

**16 Oil fill quantities (litres)**

XRW	Single mechanical seal		Double mechanical seal	
	Lip seal chamber	Oil chamber	Lip seal chamber	Oil chamber
210	-	0.27	0.01	0.25
300	-	0.48	0.038	0.40
400	-	0.80	0.08	0.70
650	-	1.50	0.11	1.30

**Specification:** Hydraulic Rando HDZ 46

## 17 Test procedures

### High voltage test

A high voltage test is recommended, if the mixer has been repaired or reassembled, to detect any breakdown of insulation.

Link all power leads together, and with a trip level of 40 mA apply 1500 V for one second between the earth and power leads.

### Earth check

An earth check is recommended if the mixer has been repaired or reassembled. This involves checking the continuity between earth lead and the motorhousing (where earth lead is connected). This can be done with a resistance meter.

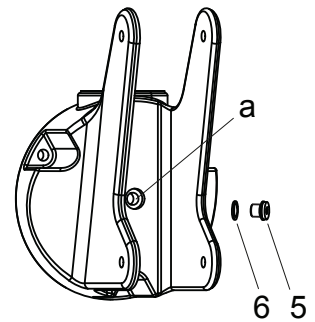
### Leak test

This is performed to check sealing of the unit and is recommended if the mixer has been repaired, and before reassembly of hydraulic parts . All pressure testing must be carried out without oil in the mixer. Firstly drain the oil.

**NOTE:** *In order to prevent dislodging of the seals it is absolutely essential that the stated testing pressure limits are not exceeded.*

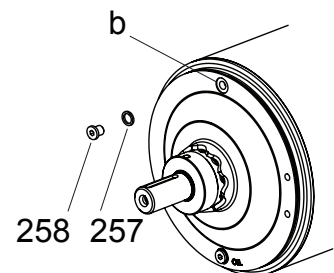
Test 1:

- Remove pressure test screw (5) and seal ring (6) from upper lid and screw upper lid pressure test tool into test hole (a).
- Connect U-tube containing small quantity of water to test tool.
- Remove plug screw (258) and seal ring (257) from front cover/seal chamber and screw front cover pressure test tool into test hole (b).
- Apply pressure of ½ bar (7 psi) to front cover pressure test tool.
- If water displaces from U-tube then there is a leak from the oil chamber.



Test 2:

- Remove pressure test screw (5) and seal ring (6) from upper lid and screw upper lid pressure test tool into test hole (a).
- Remove plug screw (258) and seal ring (257) from front cover/seal chamber and screw front cover pressure test tool into test hole (b).
- Apply pressure of ½ bar (7 psi) to both tools.
- Lower mixer into water.
- Leave motor submerged for a few minutes to allow trapped air to escape and then observe for leaks which are indicated by a flow of bubbles.



### Run test

A dry run test should be run to check the amps, voltage, and power drawn against rated data (see ABSEL or Technical Data Sheet for rated data).

**SECTION 10**

**RECOMMENDED SPARE PARTS**

## RECOMMENDED SPARE PARTS

We recommend that the Owner keep one (1) repair kit in stock for each mixer type. The repair kit includes bearings, and seals (medium and static) and cable seals (RW 4024 and 6522 only).

The following lists the part number and price as of May 2023:

<b>Mixer Model</b>	<b>Part Number</b>	<b>Price May 2023</b>
XRW 3031 PA35/6 EC	61705412	\$1,287.80
RW 4024 A46/8 EC	61702075-NG	\$1,479.71
RW 6522 A60/12 EC	61702076-NG	\$1,721.65



## **SECTION 11**

### **MOISTURE & OVERTEMP RELAYS**

# ABS temperature and leakage relay CA 462

CA 462 is designed to spy and detect leakage and temperature in pumps and mixers.

The amplifier is housed in a norm enclosure fitted for DIN-rail mounting.

The unit is available in two executions, 24 VDC or **110-230 VAC** supply.

To minimize the risk of false alarms the leakage failure has to be detected for time duration of approximately 10 seconds.

To simplify the mounting the unit is fitted with plug-in type of connectors.

The unit has separate alarm outputs for temperature and leakage. CA 462 also has main contactor relay output energized depending on alarm/s with manual reset option.

Included in the kit is also a Xylem MiniCas adaptor.

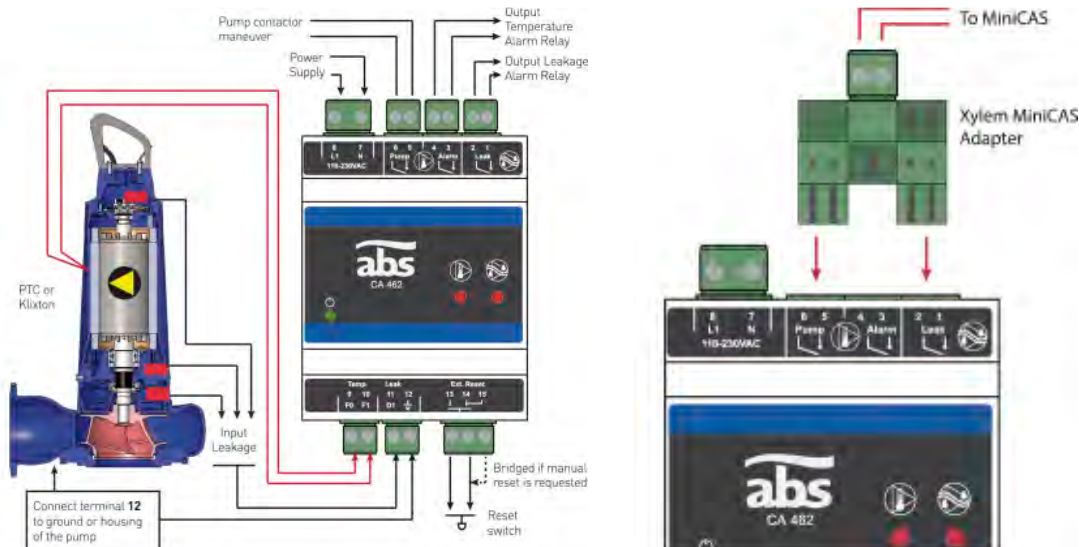


## Features

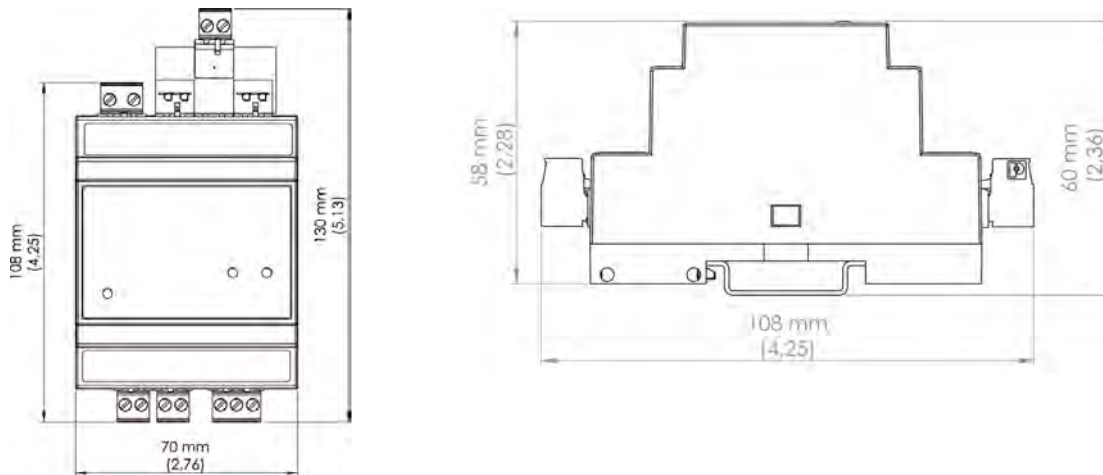
- Leakage monitoring with 10 sec alarm delay
- Temperature monitoring
- Relay output 250 VAC 3 Ampere
- Connection via plug in connectors
- DIN-rail mounted

## Technical specifications

Leakage detection threshold (+/-10%)	< 100 kohm
Temp. input threshold (+/-10%)	> 3.3 kohm (PTC / Klixon)
Leakage alarm delay	10 seconds
Ambient operating temperature	-20 to +70 °C [-4 to +158 °F]
Ambient storage temperature	-30 to +80 °C [-22 to +176 °F]
Degree of protection	IP 20, NEMA: Type 1
Housing material	PPO and PC
Mounting	DIN Rail 35 mm
Installation category	CAT II
Pollution degree	2
Flame rate	V0 (E45329)
Humidity	0-95% RH non-condensing
Dimensions	H x W x D: 108 x 70 x 58 mm (4.25 x 2.76 x 2.28 in.)
Power supply	<b>16907006:</b> 110-230 VAC / <b>16907007:</b> 18-36 VDC SELV or Class 2
Fuse	Max 10 A
Terminal wire size	Use copper (Cu) wire only. 0.2 - 2.5 mm <sup>2</sup> flexible core, stripped length 8 mm.
Terminal tightening torque	0.56 - 0.79 Nm (5-7 lbs-in)
Power consumption	< 5 W
Max load alarm relays	250 VAC 3 Ampere resistive load
Altitude	Max 2000 MASL or 6562 ft. AMSL
Max load output Pump blocking relay	250 VAC 6 Ampere resistive load



## Dimensions



## Alarm and relay function table:

Leakage Led	Temp. Led	Pump Relay	Temp. Relay	Leakage Relay
Alarm		Closed	Open	Closed
Alarm	Alarm	Open	Closed	Closed
		Closed	Open	Open
	Alarm	Open	Closed	Open

**Contacts 5 & 6 (motor overtemp): contacts are closed in a non-alarm state**  
**Contacts 3 & 4 (motor overtemp): contacts are open in a non-alarm state**  
**Contacts 1 & 2 (leakage): contacts are open in a non-alarm state**

**SECTION 12**

**WARRANTY**

# Warranty

## ONE YEAR PRODUCT WARRANTY

### XFP, AFP, AFL, VUP, Piranha, AS, Scavenger, RCP, & Robusta Series Pumps; Mixers, Aerators, Control Panels, Installation Accessories\*

Manufacturer warrants the above referenced ABS brand equipment ("Products") to be free from defects in workmanship and materials as follows:

The warranty period shall expire on the earliest of the below dates:

- i) one (1) year from date of installation of the Products; or
- ii) eighteen (18) months from date of shipment of the Products from Manufacturer.

Products or parts thereof that are replaced or repaired under warranty during the original warranty period, shall be covered under this warranty until the expiration of the original warranty period or ninety (90) days from the date of such replacement or repair, whichever is later. In any event, such extended warranty period shall not exceed ninety (90) days after the expiration of the original warranty period.

The warranties stated above are contingent upon start-up of the equipment on site by an authorized Manufacturer's representative, as verified by receipt of start-up reports completed and signed by an authorized Manufacturer's representative. Robusta Series pumps and Piranha 09 Series pumps are exempt from this requirement, though any supporting documentation is requested for all warranty claims.

If during the warranty period, any Products fail to meet the requirements set out in this warranty, the purchaser or end user shall give written notification to Manufacturer stating the reasons therefor. Upon receipt of prior written authorization from Manufacturer, Products shall be transported to Manufacturer's authorized service center, prepaid, at purchaser or end-user's cost. Manufacturer's sole obligation shall be to repair, modify or replace Products or parts thereof, at Manufacturer's sole option. Products repaired under this warranty will be returned with freight prepaid. Products must be repaired by an authorized Manufacturer repair center for warranty coverage to be considered. Explosion Proof or other Agency Approved pumps must be repaired at a Manufacturer's authorized service center in order to retain the agency's approval rating.

All protection features (such as moisture sensors, bearing monitors, and thermal overloads) incorporated in the Products must be connected and operable for warranty coverage. This warranty is valid only if Manufacturer supplied or authorized alarm monitoring components, cables and control components/panels are used.

This warranty shall not apply to any Products or parts thereof which have been (i) subjected to misuse, misapplication, accident, alteration, neglect, failure to act in a timely manner to address alarms/warnings, or physical damage; (ii) installed, operated, and/or maintained in a manner which is contrary to Manufacturer's written instructions as it pertains to installation, operation and maintenance of the Products, including but without limitation to being operated without being connected to monitoring devices supplied with specific products for protection; (iii) used in an application or for pumping liquids other than the use for which it is intended as specified in Manufacturer's product literature; (iv) damaged due to a defective power supply, improper electrical protection, faulty repair, ordinary wear and tear, corrosion, erosion or chemical attack, an act of God, an act of war or by an act of terrorism; (v) damaged resulting from the use of accessory equipment not sold by Manufacturer or not approved by Manufacturer for use in connection with Manufacturer's products; or (vi) repaired or altered without Manufacturer's written consent.

This warranty does not cover costs for standard and/or scheduled maintenance that is performed, nor does it cover Manufacturer's parts that, by virtue of their operation, require replacement through normal wear (aka: Wear Parts), unless a defect in material or workmanship is determined by Manufacturer. Wear Parts are defined as cutters, cutting plates, seals, bearings, impellers/propellers, diffusers, wear rings (stationary or rotating), volutes (when used in an abrasive environment), oil, grease, cooling fluids and/or any items deemed necessary to perform and meet the requirements of normal maintenance on all Manufacturer's equipment.

Manufacturer shall not be liable for any special, indirect, consequential, or punitive damages, or profit loss of any kind. Major components not manufactured by the Manufacturer are covered by the original manufacturer's warranty in lieu of this warranty. In addition to any other special, indirect or consequential damages referenced above, Manufacturer shall not be responsible for travel expenses, rented (replacement) equipment, pump removal fees, installation fees, outside contractors fees, or unauthorized repair shop expenses.

This warranty shall extend only to the initial end user.

**ALL OTHER WARRANTIES, CONDITIONS AND REPRESENTATIONS, EXPRESSED OR IMPLIED BY STATUTE, COMMON LAW OR OTHERWISE, IN RELATION TO THE SUPPLY OF THE PRODUCTS INCLUDING BUT NOT LIMITED TO THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE ARE EXCLUDED TO THE EXTENT PERMITTED BY LAW.**

\*This warranty is applicable to Products supplied by Sulzer Pump Solutions (US) Inc. or Sulzer Pumps Wastewater Canada, Inc. for installation in the U.S.A. or Canada, unless specifically indicated otherwise in writing by Manufacturer.