Hart Engineering Corporation

SUBMITTAL:
11315-03

PROJECT: 9950. - Veolia/Taunton WWTP Improvements Phase 2 **DATE: 05/30/2023**

SUBMITTAL: 11315-03 - Submersible Propeller Pumps - O&M Manual
REVISION: 0
STATUS: Eng
SPEC #: 11315-03

TO:
Enea Mushi
Veolia North America
125 S. 84th Street, Suite 175
Milwaukee, WI 53214
enea.mushi@veolia.com

FROM:
Nick George
Hart Engineering Corporation
800 Scenic View Drive
Cumberland, RI 02864
NGeorge@hartcompanies.com

Item	Revision	Description	Status	Date Sent	Date Returned
11315-03	0	Submersible Propeller Pumps - 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 PROPELLER PUMPS
SECTION 11315

SULZER/ABS MODEL RCP 5033 A120/12

TABLE OF CONTENTS

SECTION 1

GENERAL INFORMATION

SULZER/ABS WET PIT SUBMERSIBLE PUMPS

Pump Nameplate Data
Manufacturer: Sulzer/ABS
Model: RCP 5033 A120/12
Serial No.: 300849846; 300849847; 300849848; 300849849
Impeller Trim: 492 mm (#5033)
HP: 16.1
RPM: 580
Voltage: 460
Phase: 3
Hz: 60
FLA: 31.4

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
info@carlsensystems.com
(203) 663-1314

SECTION 2

SCOPE OF SUPPLY

SCOPE OF SUPPLY

1. Four (4) Sulzer/ABS Model RCP 5033 A120/12 submersible propeller pumps as follows:
    - 16.1 HP, 580 RPM motor
        - 460/3/60
        - Cast iron motor housing
    - 316 SS propeller
    - 316 SS coupling system, shroud, and frame
    - 316 SS upper and lower guide rail brackets
    - Motor overtemp and seal fail detection
    - 32 FT power/control cable
    - Certified factory test performance test
        - HI Grade 2B
        - Works Certificate

2. Accessories:
   Four (4) guide rail systems including 316 SS upper and lower guide rail brackets and 316 SS 2" Sch. 40 guide rails

   Four (4) CA462 combination relays for motor overtemp and seal failure
   120 VAC

3. Spare Parts:
    - Four (4) Repair Kits

SECTION 3

FACTORY TEST DATA

QD426 21-01-2013

SULZER Test Certificate 60HZ

RCP5033 **A120/12D** **Sr No. 300849846**

Shop Order no.: 3490521
Impeller: 492 mm
Test Line: 600
Meas. Voltage: 458.1 V
Customer Order No.: 843891/10

Rated Voltage: 460 V
Rated input (P_1): 15.3 kW
Rated power (P_2): 16.1 HP
Rated Current (I): 31.40 A
Rated Speed (n): 569 rpm

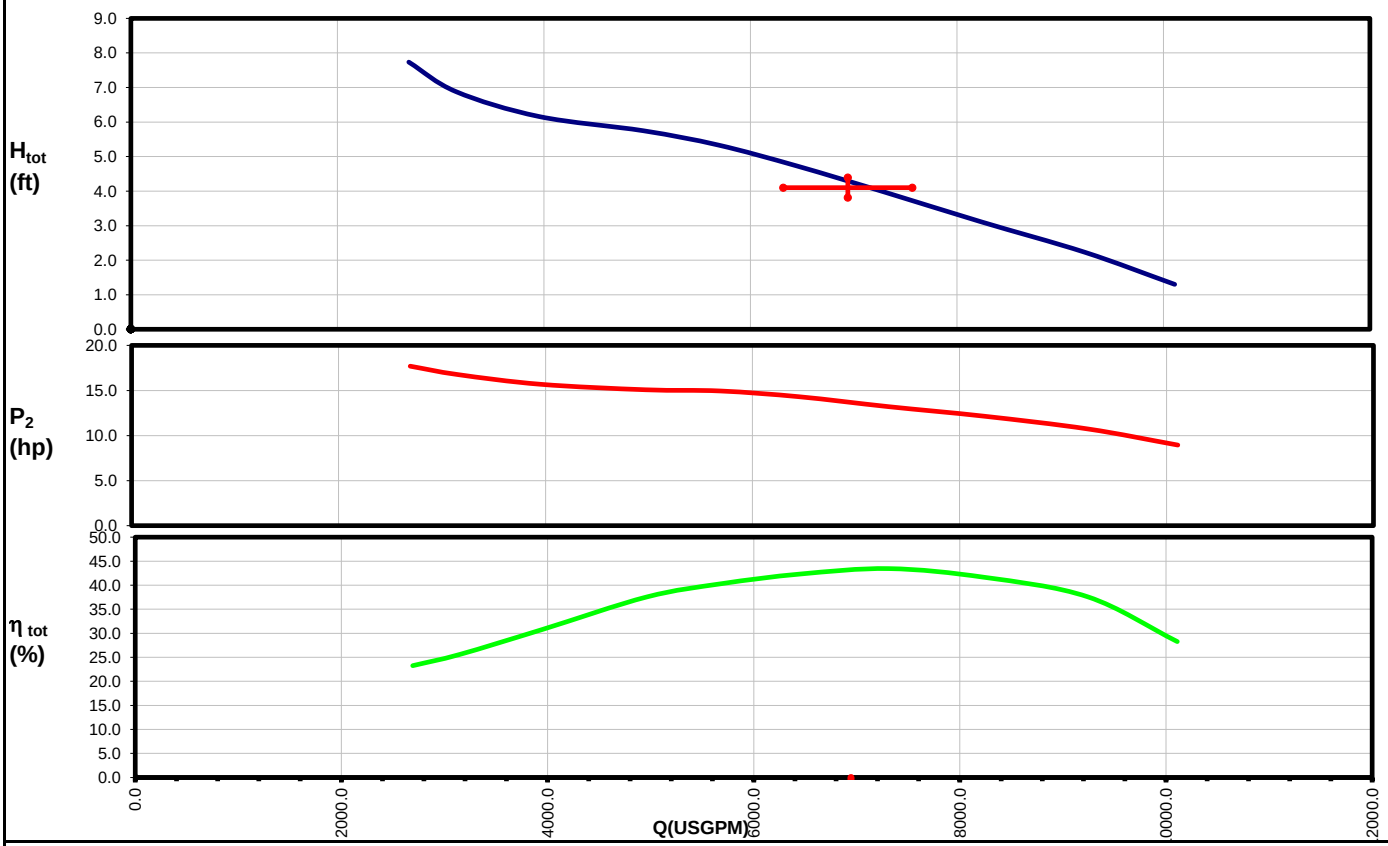
Absel points

	H[ft]	Q[USGPM]	η Tοτ
Customer Duty	4.10	6944.00	

FI - DN 600
PI - DN 600

Acceptance Test A/C to ISO 9906 HI Level 3B

H_{tot} (ft)	H_{dyn} (m)	Q (USGPM)	H_{st} (m)	Q (m^3/h)	P_1 (kW)	I (A)	p.f	η_{tot} (%)	η_{motor} (%)	η_{hyd} (%)		P_2 (hp)
1.30	0.26	10109.58	0.14	2295.91	8.77	27.18	0.41	28.28	76.05	37.18		8.94
2.23	0.22	9241.81	0.46	2098.84	10.33	28.33	0.46	37.58	77.45	48.53		10.73
3.11	0.17	8235.48	0.78	1870.30	11.60	29.29	0.50	41.65	78.08	53.35		12.15
3.96	0.14	7313.29	1.07	1660.87	12.57	30.05	0.53	43.46	78.35	55.46		13.20
4.73	0.11	6452.14	1.34	1465.30	13.59	30.92	0.55	42.33	78.49	53.93		14.30
5.33	0.08	5691.45	1.54	1292.54	14.19	31.52	0.57	40.33	78.50	51.38		14.94
5.75	0.06	4965.34	1.69	1127.64	14.32	31.65	0.57	37.58	78.50	47.86		15.08
6.16	0.04	3952.64	1.84	897.65	14.90	32.21	0.58	30.81	78.48	39.27		15.68
6.88	0.03	3151.17	2.07	715.64	15.95	33.33	0.60	25.62	78.36	32.70		16.76
7.73	0.02	2692.09	2.34	611.38	16.88	34.39	0.62	23.27	78.18	29.76		17.69



Tested By:- Test Line Plant 1 **Issue Date:-** 01-Mar-23 **Test Date:-** 01-Mar-23

Approved By:- Technical **Test Line:-** 9 **Place of Test:-** Sulzer Pump Solutions Ireland Ltd

WORKS TEST CERTIFICATE

SULZER

DIN 55350-18-4.2.2

Description	RCP5033-A120/12STD-460_480/60		
Item Number	KRBP342236TA111		
Serial Number	300849846		
Order Number	843891	**Customer Reference:**	PO: 2107-2517-3
Shop Order	3490521		
Test Date	01/03/2023		

MOTOR RATINGS:			**PUMP RATINGS**		
Voltage:	460	V	**Head**	7.2	ft
Phase	3		**Flow**	9422	GPM
Frequency	60	Hz	**Impeller Diameter**	19.4	inches
Power P1	15.3	kW	**Discharge DN**	500	
Power P2	16.1	HP			
Current (FL)	31.4	A			
Nominal Speed	569	RPM			
Cable Length	10	m			

TEST RESULTS		Test Point 5	Test Point 6	Test Point 7
Head (static) (ft)		1.34	1.54	1.69
Flow (GPM)		6,452.1	5,691.4	4,965.3
Current (A)	**Phase1 (U)**	30.89	31.54	31.66
	Phase2 (V)	30.98	31.57	31.68
	Phase3 (W)	30.89	31.47	31.60
Voltage	**Phase1 (U)**	458	458	458
	Phase2 (V)	458	457	458
	Phase3 (W)	458	457	457

High Voltage Test	Pass
Leakage Test	Pass
Earth Test	Pass

Issued by:

Quality Assurance Department

03 March 2023

Sulzer Pump Solutions Ireland Ltd.
Clonard Road,
Wexford,
Ireland. www.sulzer.com

QD426 21-01-2013

SULZER Test Certificate 60HZ

RCP5033 A120/12D Sr No. 300849847

Shop Order no.: 3490521
Impeller: 492 mm
Test Line: 600
Meas. Voltage: 457.6 V
Customer Order No.: 843891/10

Rated Voltage: 460 V
Rated input (P_1): 15.3 kW
Rated power (P_2): 16.1 HP
Rated Current (I): 31.40 A
Rated Speed (n): 569 rpm

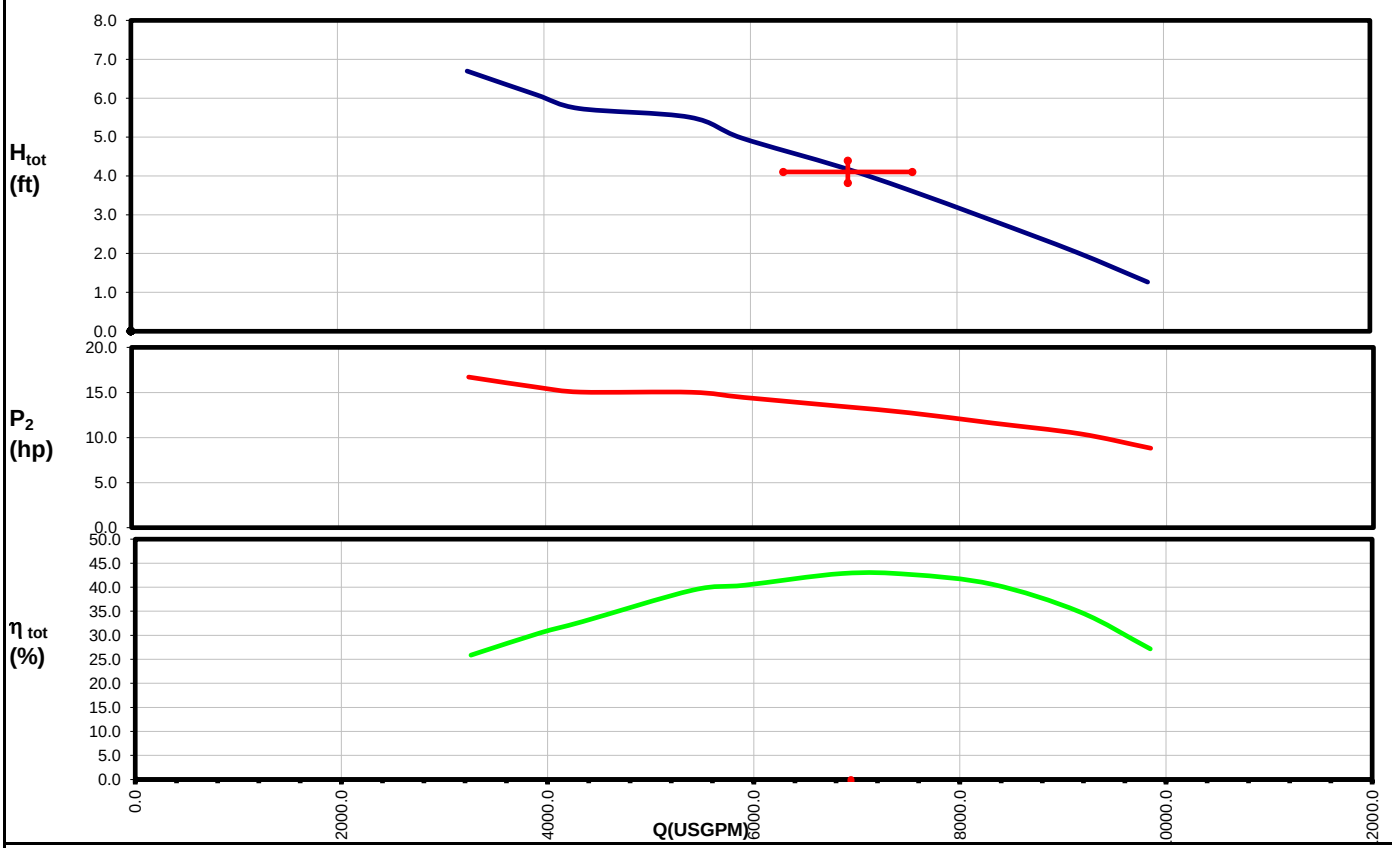
Absel points

	H[ft]	Q[USGPM]	η Tοτ
Customer Duty	4.10	6944.00	

Fl - DN 600
Pl - DN 600

Acceptance Test A/C to ISO 9906 HI Level 3B

H_{tot} (ft)	H_{dyn} (m)	Q (USGPM)	H_{st} (m)	Q (m^3/h)	P_1 (kW)	I (A)	p.f	η_{tot} (%)	η_{motor} (%)	η_{hyd} (%)		P_2 (hp)
1.27	0.25	9847.48	0.14	2236.39	8.66	27.42	0.40	27.17	75.91	35.80		8.81
2.03	0.21	9161.34	0.41	2080.56	10.06	28.32	0.45	34.89	77.26	45.16		10.42
2.88	0.18	8317.50	0.70	1888.92	11.11	29.17	0.48	40.59	77.88	52.12		11.61
3.65	0.14	7517.08	0.97	1707.15	12.14	30.04	0.51	42.65	78.25	54.50		12.74
4.24	0.12	6858.98	1.17	1557.69	12.80	30.64	0.53	42.85	78.40	54.66		13.46
4.97	0.09	5915.78	1.43	1343.49	13.73	31.49	0.55	40.43	78.49	51.51		14.45
5.51	0.07	5410.08	1.61	1228.64	14.27	32.03	0.56	39.40	78.50	50.19		15.02
5.73	0.05	4338.22	1.70	985.22	14.29	31.94	0.56	32.84	78.50	41.83		15.04
6.09	0.04	3926.97	1.82	891.83	14.79	32.46	0.57	30.49	78.48	38.85		15.56
6.70	0.03	3256.98	2.01	739.67	15.90	33.66	0.60	25.87	78.36	33.02		16.71



Tested By:- Test Line Plant 1 **Issue Date:-** 01-Mar-23 **Test Date:-** 27-Feb-23

Approved By:- Technical **Test Line:-** 9 **Place of Test:-** Sulzer Pump Solutions Ireland Ltd

WORKS TEST CERTIFICATE

SULZER

DIN 55350-18-4.2.2

Description	RCP5033-A120/12STD-460_480/60		
Item Number	KRBP342236TA111		
Serial Number	300849847		
Order Number	843891	**Customer Reference:**	PO: 2107-2517-3
Shop Order	3490521		
Test Date	27/02/2023		

MOTOR RATINGS:			**PUMP RATINGS**		
Voltage:	460	V	**Head**	7.2	ft
Phase	3		**Flow**	9422	GPM
Frequency	60	Hz	**Impeller Diameter**	19.4	inches
Power P1	15.3	kW	**Discharge DN**	500	
Power P2	16.1	HP			
Current (FL)	31.4	A			
Nominal Speed	569	RPM			
Cable Length	10	m			

TEST RESULTS		Test Point 5	Test Point 6	Test Point 7
Head (static) (ft)		1.17	1.43	1.61
Flow (GPM)		6,859.0	5,915.8	5,410.1
Current (A)	**Phase1 (U)**	30.62	31.48	32.01
	Phase2 (V)	30.77	31.61	32.15
	Phase3 (W)	30.53	31.38	31.91
Voltage	**Phase1 (U)**	457	457	457
	Phase2 (V)	457	457	457
	Phase3 (W)	457	457	457

High Voltage Test	Pass
Leakage Test	Pass
Earth Test	Pass

Issued by:

Quality Assurance Department

03 March 2023

Sulzer Pump Solutions Ireland Ltd.
Clonard Road,
Wexford,
Ireland. www.sulzer.com

QD426 21-01-2013

SULZER Test Certificate 60HZ

RCP5033 A120/12D Sr No. 300849848

Shop Order no.: 3490521
Impeller: 492 mm
Test Line: 600
Meas. Voltage: 457.9 V
Customer Order No.: 843891/10

Rated Voltage: 460 V
Rated input (P_1): 15.3 kW
Rated power (P_2): 16.1 HP
Rated Current (I): 31.40 A
Rated Speed (n): 569 rpm

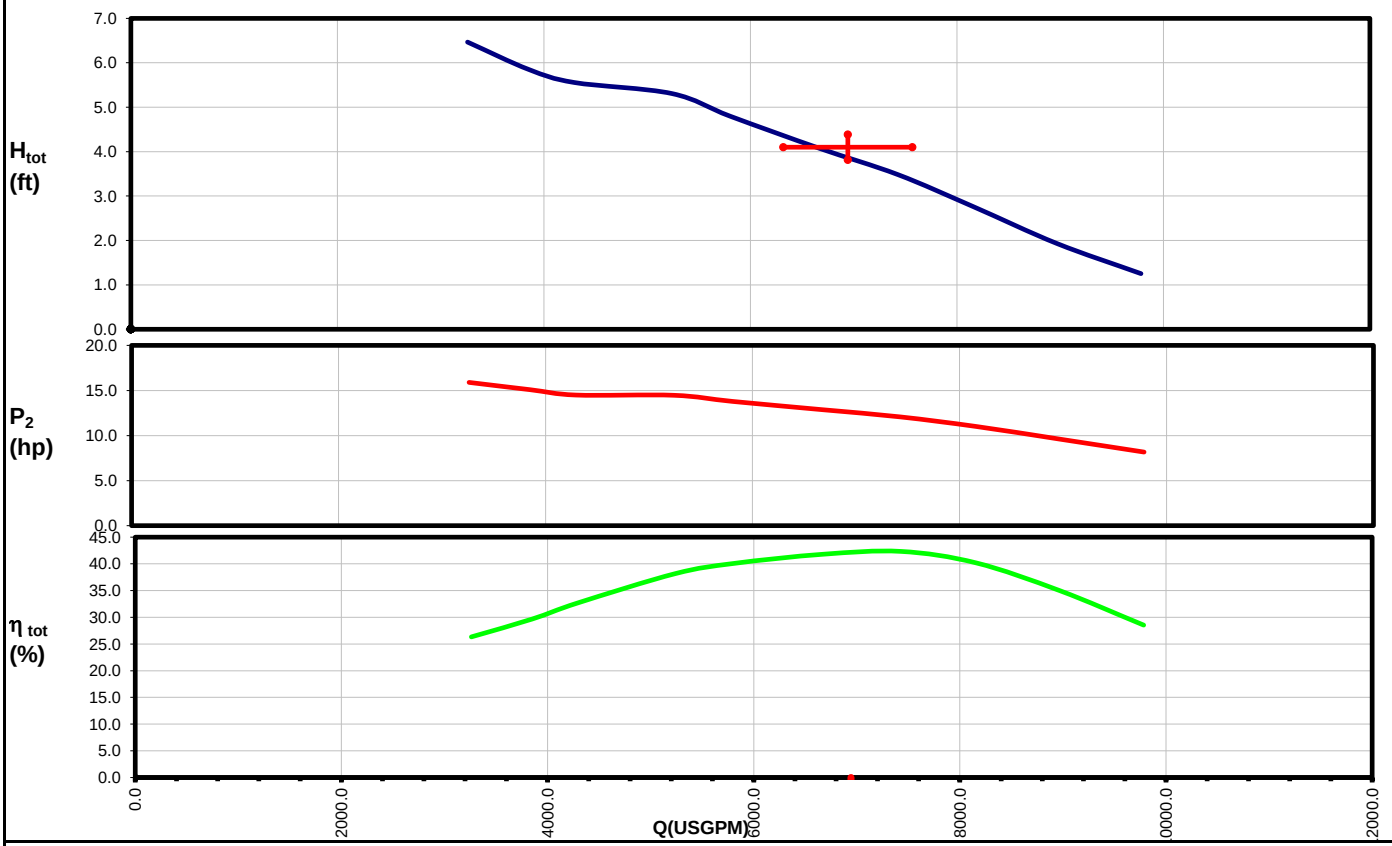
Absel points

	H[ft]	Q[USGPM]	η Tοτ
Customer Duty	4.10	6944.00	

Fl - DN 600
Pl - DN 600

Acceptance Test A/C to ISO 9906 HI Level 3B

H_{tot} (ft)	H_{dyn} (m)	Q (USGPM)	H_{st} (m)	Q (m^3/h)	P_1 (kW)	I (A)	p.f	η_{tot} (%)	η_{motor} (%)	η_{hyd} (%)		P_2 (hp)
1.25	0.24	9783.26	0.14	2221.80	8.10	26.95	0.38	28.54	75.14	37.98		8.16
1.93	0.20	8970.65	0.38	2037.26	9.34	27.73	0.42	34.98	76.65	45.63		9.60
2.76	0.17	8158.30	0.67	1852.77	10.58	28.63	0.47	40.18	77.60	51.78		11.01
3.48	0.14	7427.03	0.92	1686.70	11.53	29.44	0.49	42.33	78.06	54.23		12.07
4.07	0.11	6668.73	1.13	1514.49	12.26	30.08	0.51	41.79	78.28	53.39		12.87
4.80	0.09	5807.15	1.38	1318.82	13.10	30.88	0.53	40.08	78.44	51.10		13.78
5.31	0.07	5240.57	1.55	1190.15	13.74	31.29	0.55	38.18	78.49	48.64		14.46
5.56	0.05	4293.94	1.65	975.17	13.77	31.27	0.55	32.69	78.50	41.65		14.49
5.85	0.04	3851.83	1.75	874.76	14.33	31.85	0.57	29.67	78.50	37.80		15.08
6.47	0.03	3260.96	1.94	740.57	15.11	32.72	0.58	26.33	78.46	33.56		15.89



Tested By:- Test Line Plant 1 Issue Date:- 01-Mar-23 Test Date:- 27-Feb-23

Approved By:- Technical Test Line:- 9 Place of Test:- Sulzer Pump Solutions Ireland Ltd

WORKS TEST CERTIFICATE

SULZER

DIN 55350-18-4.2.2

Description	RCP5033-A120/12STD-460_480/60
Item Number	KRBP342236TA111
Serial Number	300849848
Order Number	843891
Customer Reference:	PO: 2107-2517-3
Shop Order	3490521
Test Date	27/02/2023

MOTOR RATINGS:			**PUMP RATINGS**		
Voltage:	460	V	**Head**	7.2	ft
Phase	3		**Flow**	9422	GPM
Frequency	60	Hz	**Impeller Diameter**	19.4	inches
Power P1	15.3	kW	**Discharge DN**	500	
Power P2	16.1	HP			
Current (FL)	31.4	A			
Nominal Speed	569	RPM			
Cable Length	10	m			

TEST RESULTS		Test Point 5	Test Point 6	Test Point 7
Head (static) (ft)		1.13	1.38	1.55
Flow (GPM)		6,668.7	5,807.1	5,240.6
Current (A)	**Phase1 (U)**	30.03	30.86	31.28
	Phase2 (V)	30.19	30.98	31.39
	Phase3 (W)	30.02	30.79	31.21
Voltage	**Phase1 (U)**	457	457	458
	Phase2 (V)	458	457	458
	Phase3 (W)	457	457	457

High Voltage Test	Pass
Leakage Test	Pass
Earth Test	Pass

Issued by:

Quality Assurance Department

03 March 2023

Sulzer Pump Solutions Ireland Ltd.
Clonard Road,
Wexford,
Ireland. www.sulzer.com

QD426 21-01-2013

SULZER Test Certificate 60HZ

RCP5033 A120/12D Sr No. 300849849

Shop Order no.: 3490521
Impeller: 492 mm
Test Line: 600
Meas. Voltage: 458.0 V
Customer Order No.: 843891/10

Rated Voltage: 460 V
Rated input (P_1): 15.3 kW
Rated power (P_2): 16.1 HP
Rated Current (I): 31.40 A
Rated Speed (n): 569 rpm

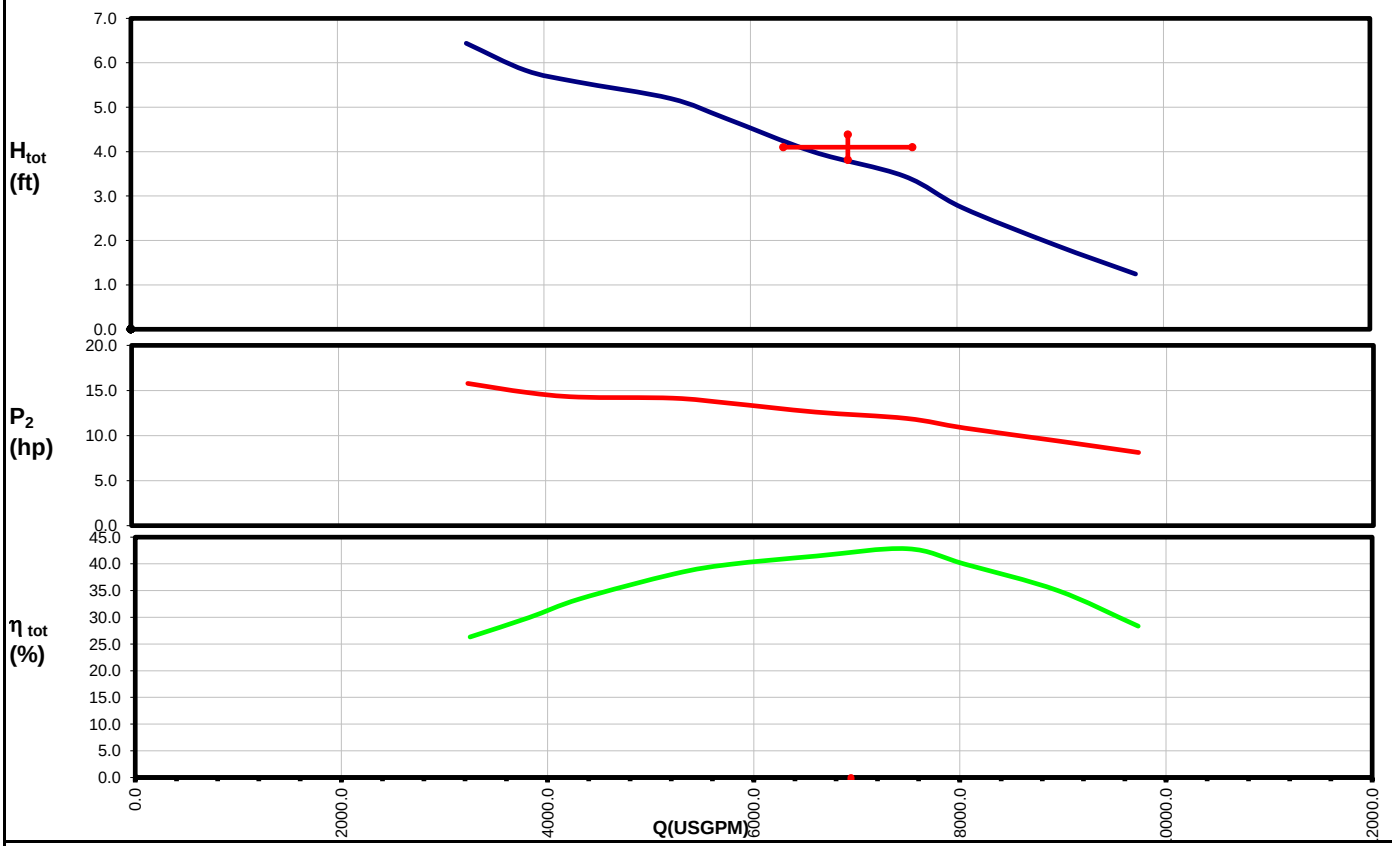
Absel points

	H[ft]	Q[USGPM]	η Tοτ
Customer Duty	4.10	6944.00	

Fl - DN 600
Pl - DN 600

Acceptance Test A/C to ISO 9906 HI Level 3B

H_{tot} (ft)	H_{dyn} (m)	Q (USGPM)	H_{st} (m)	Q (m^3/h)	P_1 (kW)	I (A)	p.f	η_{tot} (%)	η_{motor} (%)	η_{hyd} (%)		P_2 (hp)
1.24	0.24	9730.38	0.14	2209.79	8.06	26.27	0.39	28.34	75.08	37.75		8.11
1.90	0.20	8949.70	0.38	2032.50	9.17	26.96	0.43	35.00	76.48	45.77		9.40
2.74	0.16	8049.74	0.67	1828.12	10.42	27.91	0.47	39.94	77.51	51.53		10.83
3.45	0.14	7488.37	0.91	1700.63	11.37	28.69	0.50	42.84	78.00	54.92		11.90
4.00	0.11	6610.74	1.11	1501.32	12.01	29.25	0.52	41.47	78.22	53.02		12.60
4.74	0.08	5768.78	1.36	1310.10	12.93	30.12	0.54	39.90	78.42	50.89		13.60
5.19	0.07	5229.72	1.51	1187.68	13.44	30.57	0.55	38.12	78.47	48.58		14.14
5.57	0.05	4317.51	1.65	980.52	13.56	30.62	0.56	33.47	78.48	42.65		14.27
5.83	0.04	3818.70	1.74	867.24	14.04	31.12	0.57	29.93	78.50	38.13		14.78
6.44	0.03	3248.49	1.94	737.74	14.99	32.18	0.59	26.31	78.47	33.53		15.78



Tested By:- Test Line Plant 1 **Issue Date:-** 01-Mar-23 **Test Date:-** 27-Feb-23

Approved By:- Technical **Test Line:-** 9 **Place of Test:-** Sulzer Pump Solutions Ireland Ltd

WORKS TEST CERTIFICATE

SULZER

DIN 55350-18-4.2.2

Description	RCP5033-A120/12STD-460_480/60		
Item Number	KRBP342236TA111		
Serial Number	300849849		
Order Number	843891	**Customer Reference:**	PO: 2107-2517-3
Shop Order	3490521		
Test Date	27/02/2023		

MOTOR RATINGS:			**PUMP RATINGS**		
Voltage:	460	V	**Head**	7.2	ft
Phase	3		**Flow**	9422	GPM
Frequency	60	Hz	**Impeller Diameter**	19.4	inches
Power P1	15.3	kW	**Discharge DN**	500	
Power P2	16.1	HP			
Current (FL)	31.4	A			
Nominal Speed	569	RPM			
Cable Length	10	m			

TEST RESULTS		Test Point 5	Test Point 6	Test Point 7
Head (static) (ft)		1.11	1.36	1.51
Flow (GPM)		6,610.7	5,768.8	5,229.7
Current (A)	**Phase1 (U)**	29.21	30.08	30.58
	Phase2 (V)	29.39	30.21	30.59
	Phase3 (W)	29.16	30.07	30.53
Voltage	**Phase1 (U)**	457	457	457
	Phase2 (V)	457	456	457
	Phase3 (W)	456	456	456

High Voltage Test	Pass
Leakage Test	Pass
Earth Test	Pass

Issued by:

Quality Assurance Department

03 March 2023

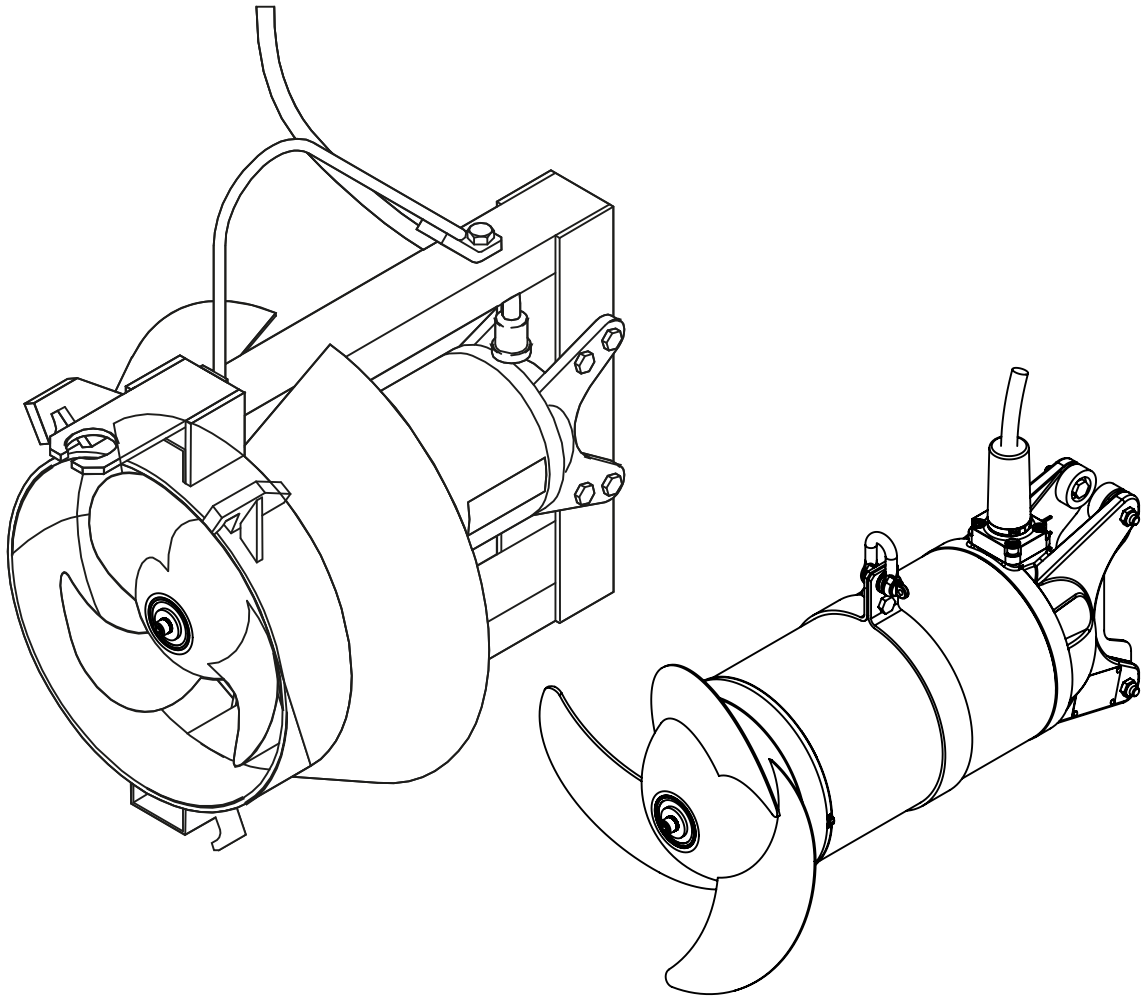
Sulzer Pump Solutions Ireland Ltd.
Clonard Road,
Wexford,
Ireland. www.sulzer.com

SECTION 4

OPERATION AND MAINTENACE INSTRUCTIONS

SULZER

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



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Installation and Operating Instructions

www.sulzer.com

Installation and Operating Instructions (Original Instructions)

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

RW 400	RW 650
RCP 400	RCP 500

Table of contents

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:

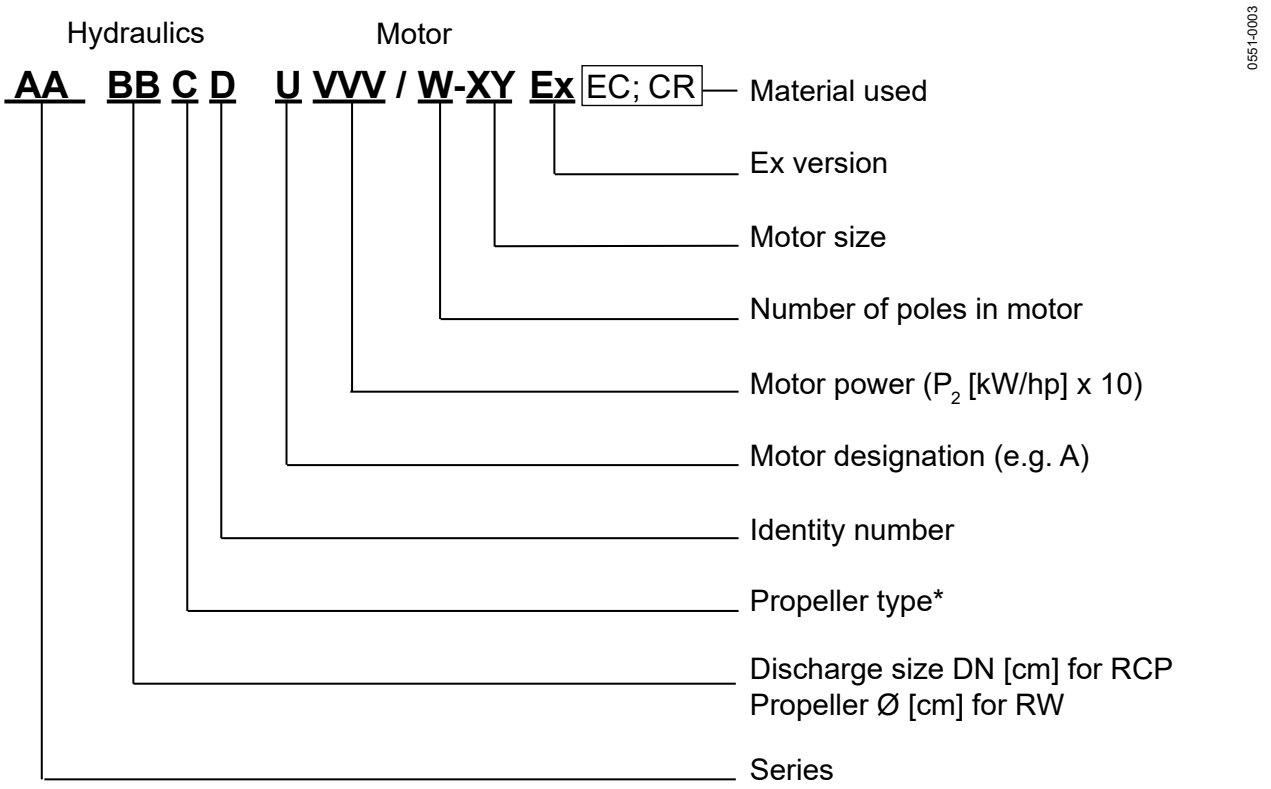
- Mixing
- Stirring
- Agitation

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



*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 ≤ 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

Propeller				Motor (50 Hz/400 V)												Installation			
Mixer type	**Propeller diameter**	**Speed**	**Version with flow ring**	**Motor type**	**Rated power input P_1**	**Rated power output P_2**	**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**	**Guide tube □ 60**	**Guide tube □ 100**	**Total weight** (without flow ring)	**Total weight** (with flow ring)
	[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_1 = Power input ; P_2 = 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 16 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

Propeller				Motor (60 Hz/460 V)												Installation			
Mixer type	Propeller diameter	Speed	Version with flow ring	Motor type	Rated power input P_1	Rated power output P_2	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)	Total weight (with 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_1 = Power input ; P_2 = 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_{max}	Q_{max}	Motor type	Rated input power P_1	Rated motor power P_2	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_1 = Power input ; P_2 = 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_{max}	Q_{max}	Motor type	Rated input power P_1	Rated motor power P_2	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_1 = Power input ; P_2 = 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

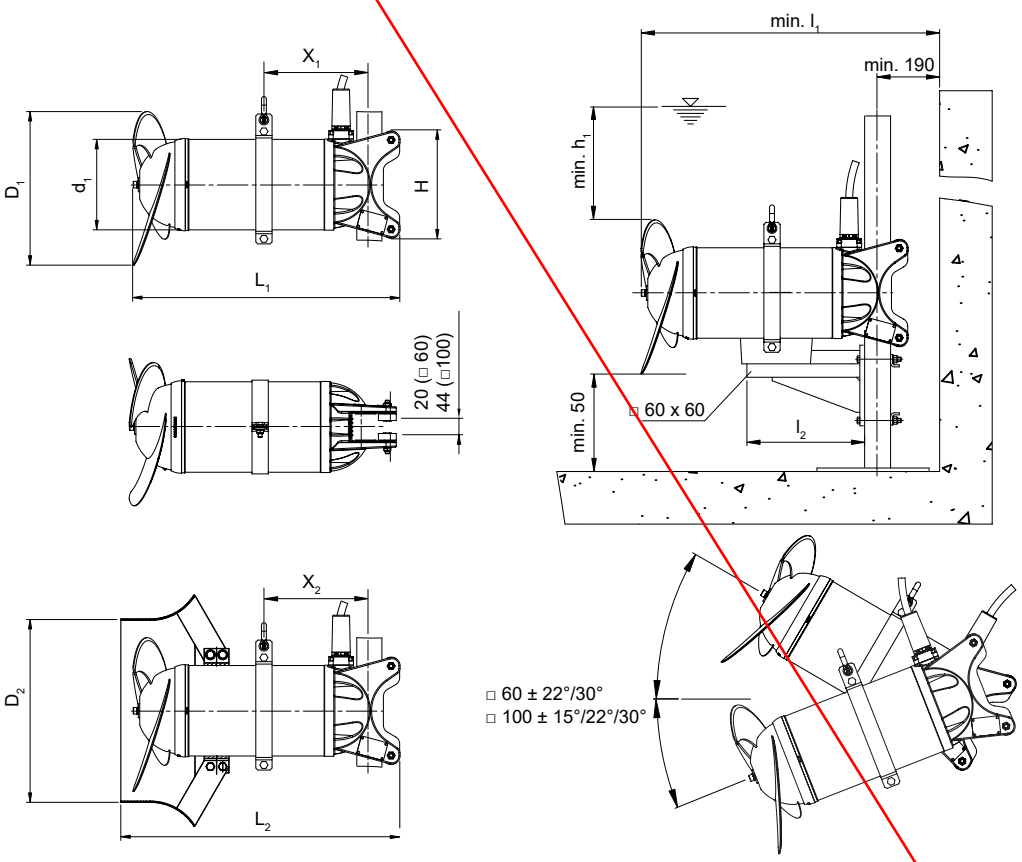
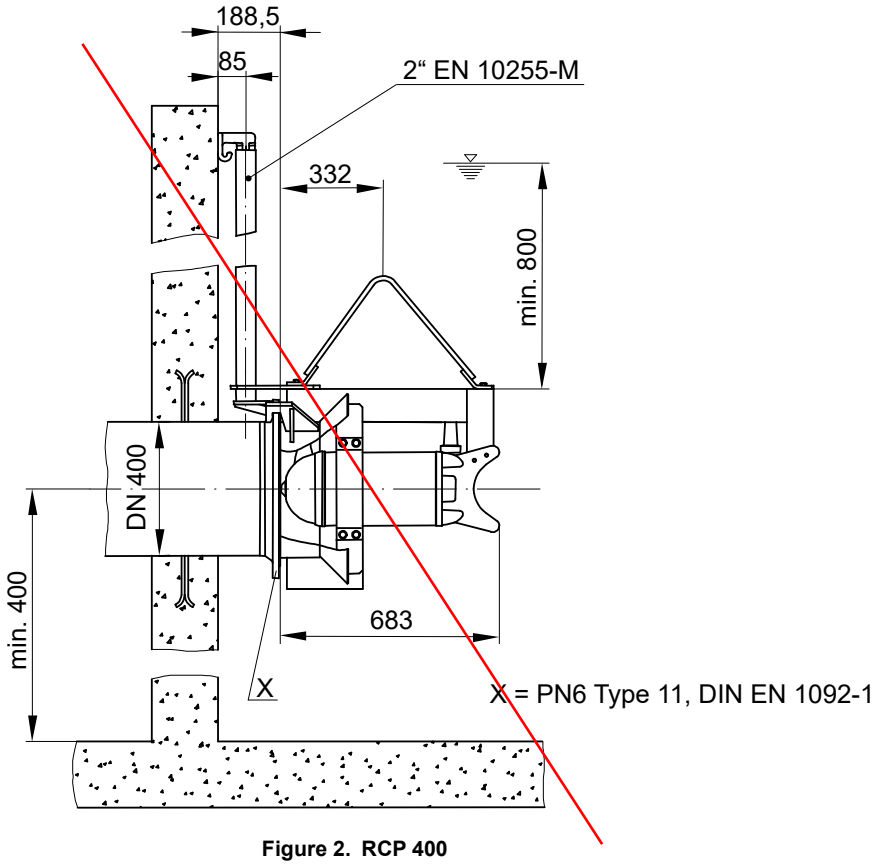


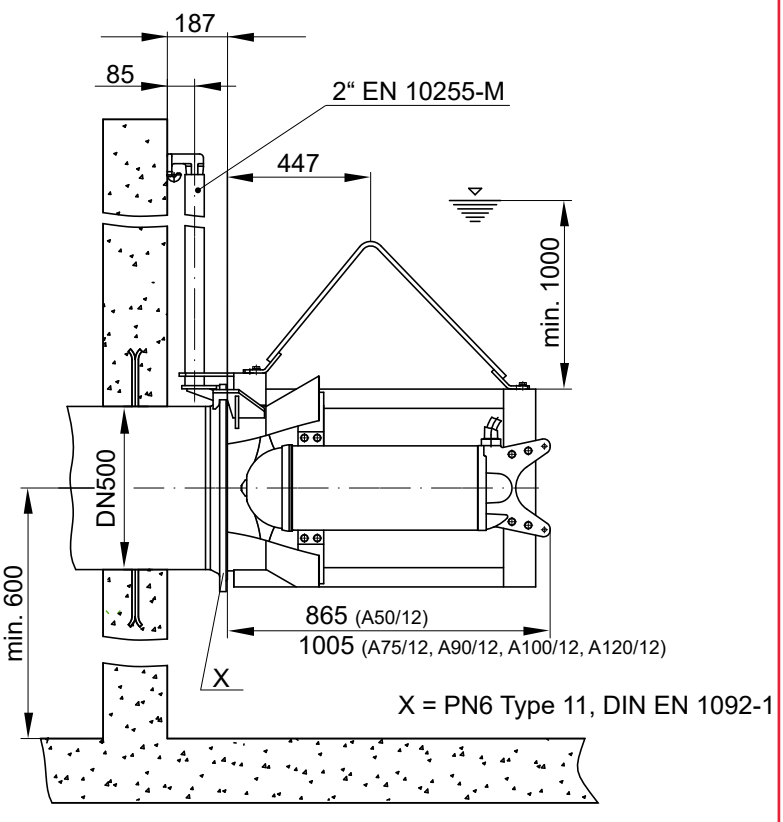
Figure 1. Dimensions RW

1.7.2 Dimensions RCP



0553-0001

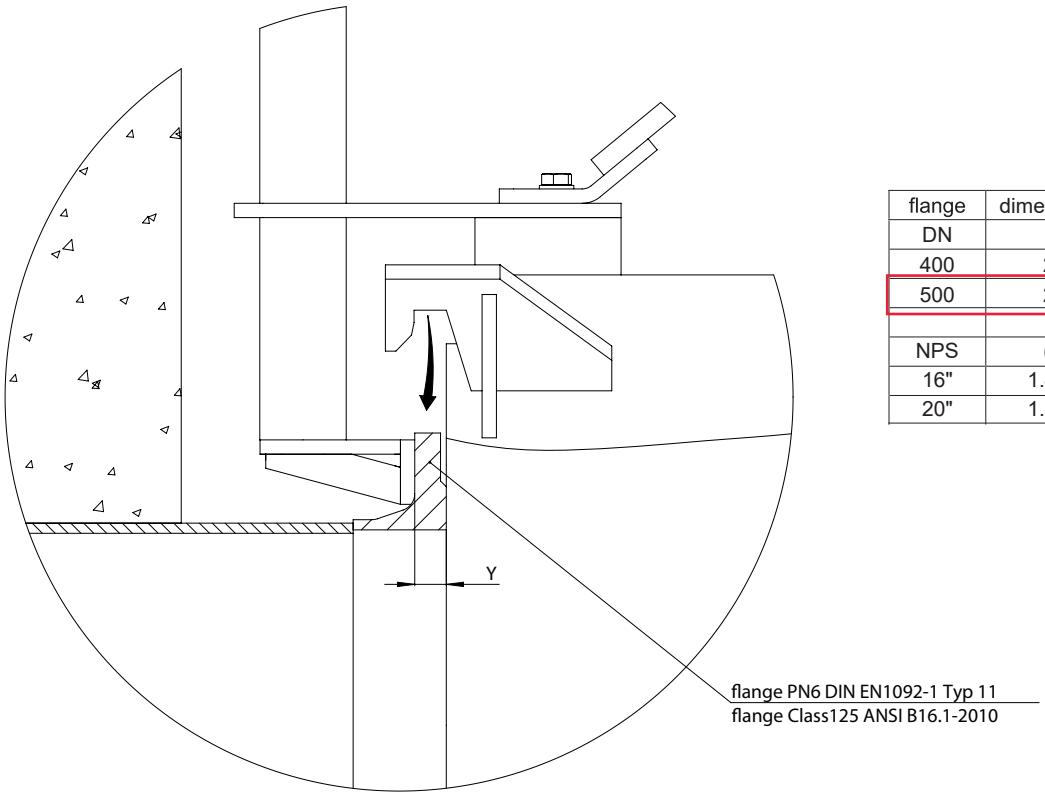
Figure 2. RCP 400



0554-0001

Figure 3. RCP 500

1.7.3 Flange dimension check



flange	dimension “Y”
DN	(mm)
400	22 $^{+0.5}$
500	24 $^{+0.5}$
NPS	(inch)
16"	1.44 $^{+0.016}$
20"	1.69 $^{+0.022}$

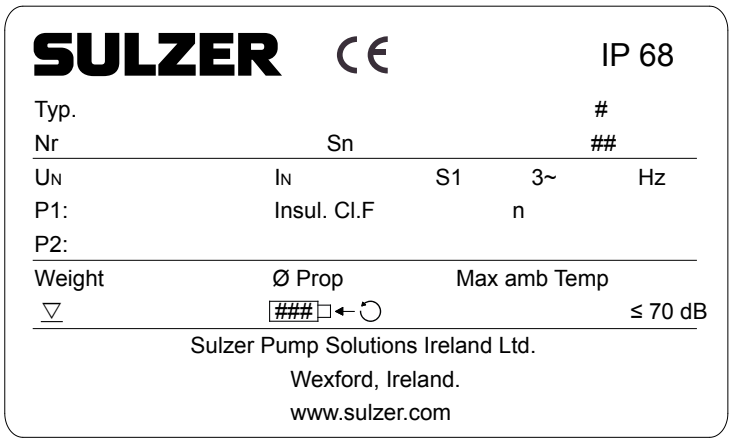
Figure 4. Flange dimensions

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.



1555-00

Figure 5. Nameplate 50 Hz

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

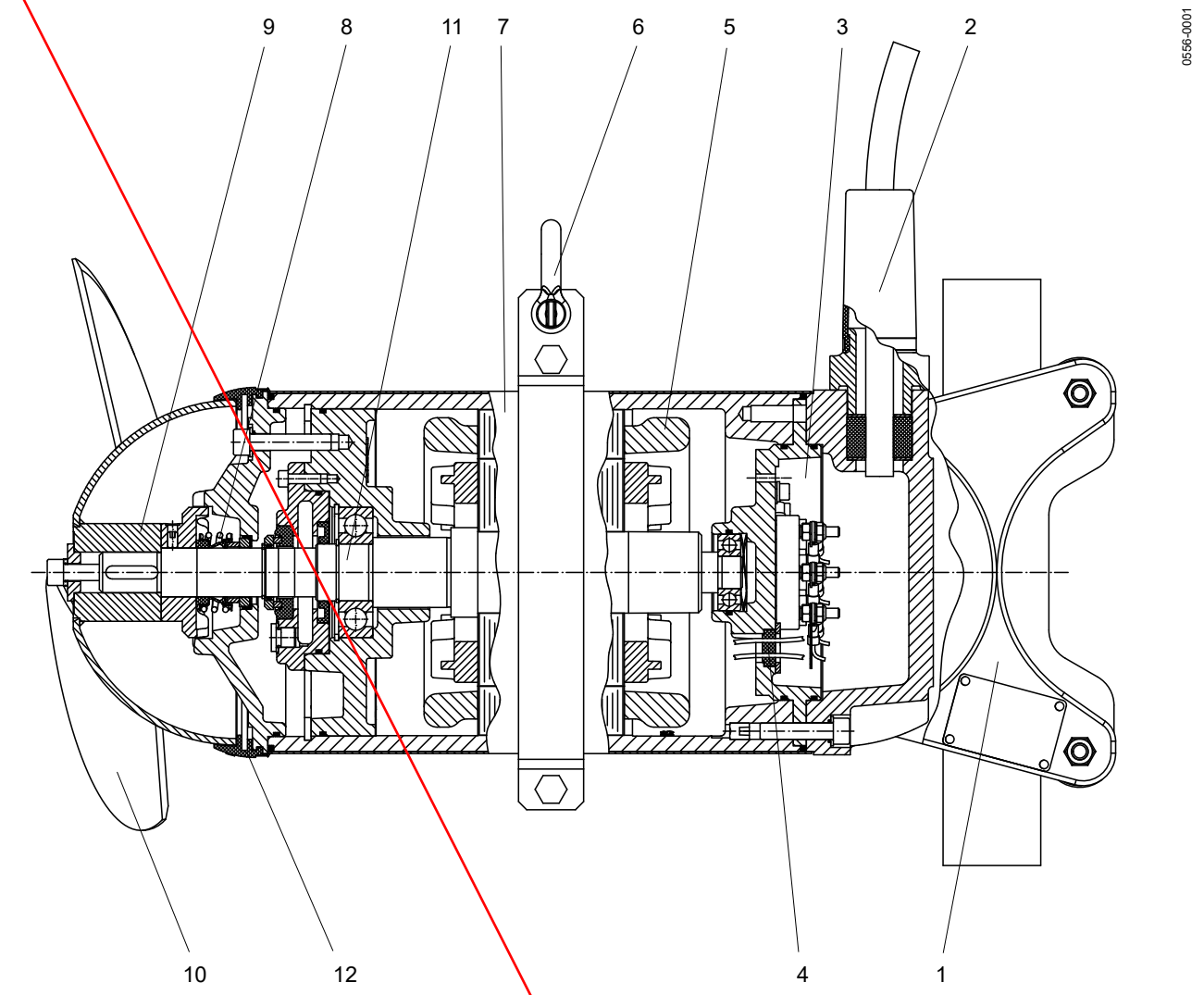


Figure 7. RW 400/650

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

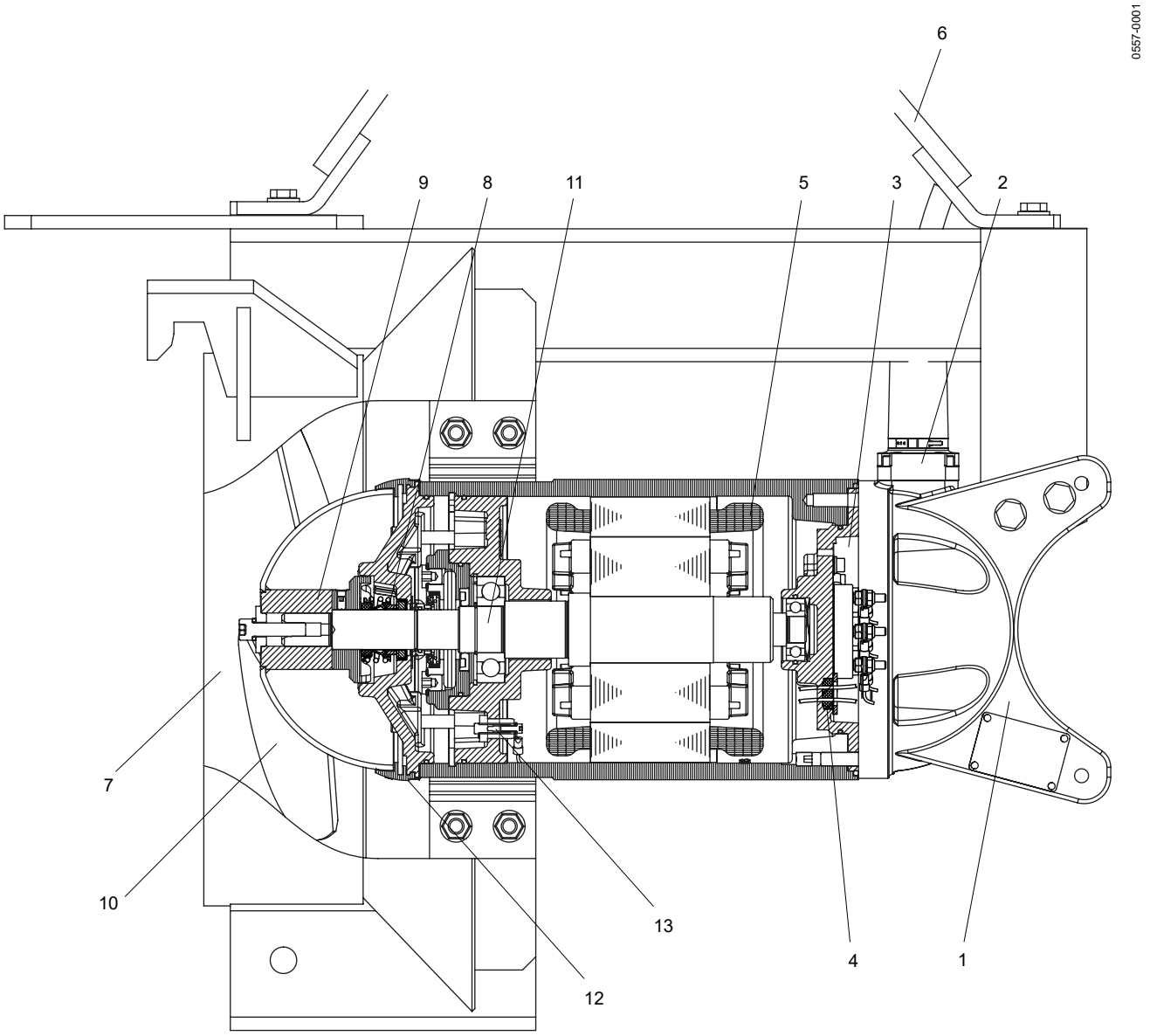


Figure 8. RCP 400/500

Legend

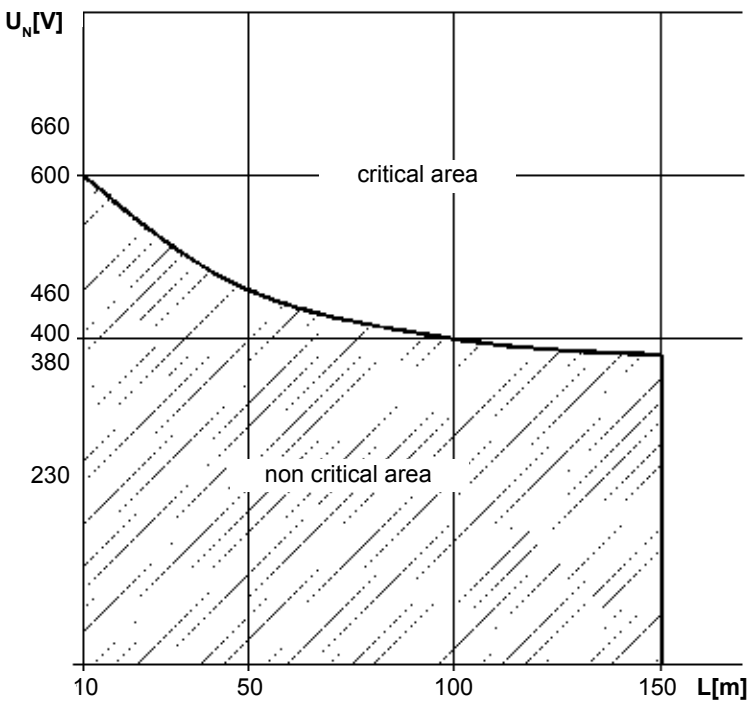
1	Bracket	**8**	Mechanical seal
2	Cable inlet	**9**	Propeller boss
3	Connection chamber	**10**	Propeller
4	Sealing of the motor chamber	**11**	Shaft unit with rotor and bearings
5	Stator	**12**	SD ring
6	Lifting hook	**13**	DI-electrode (seal monitor)
7	Inlet cone		

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.



L = total length (from frequency inverter to motor)

Figure 9. Critical/non critical area

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.

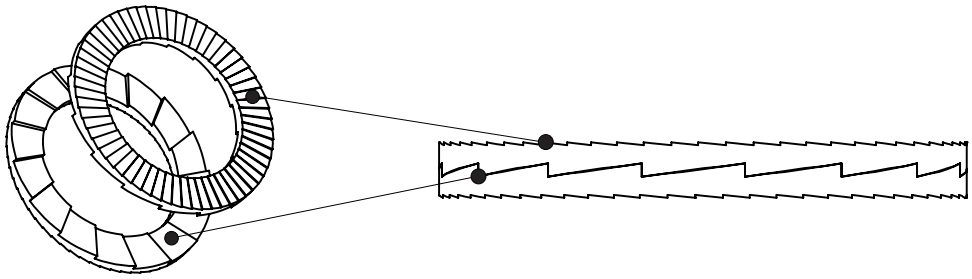
The electrical connection is carried out in accordance with section 5.7 Electrical connection.

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



1176-00

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

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*).

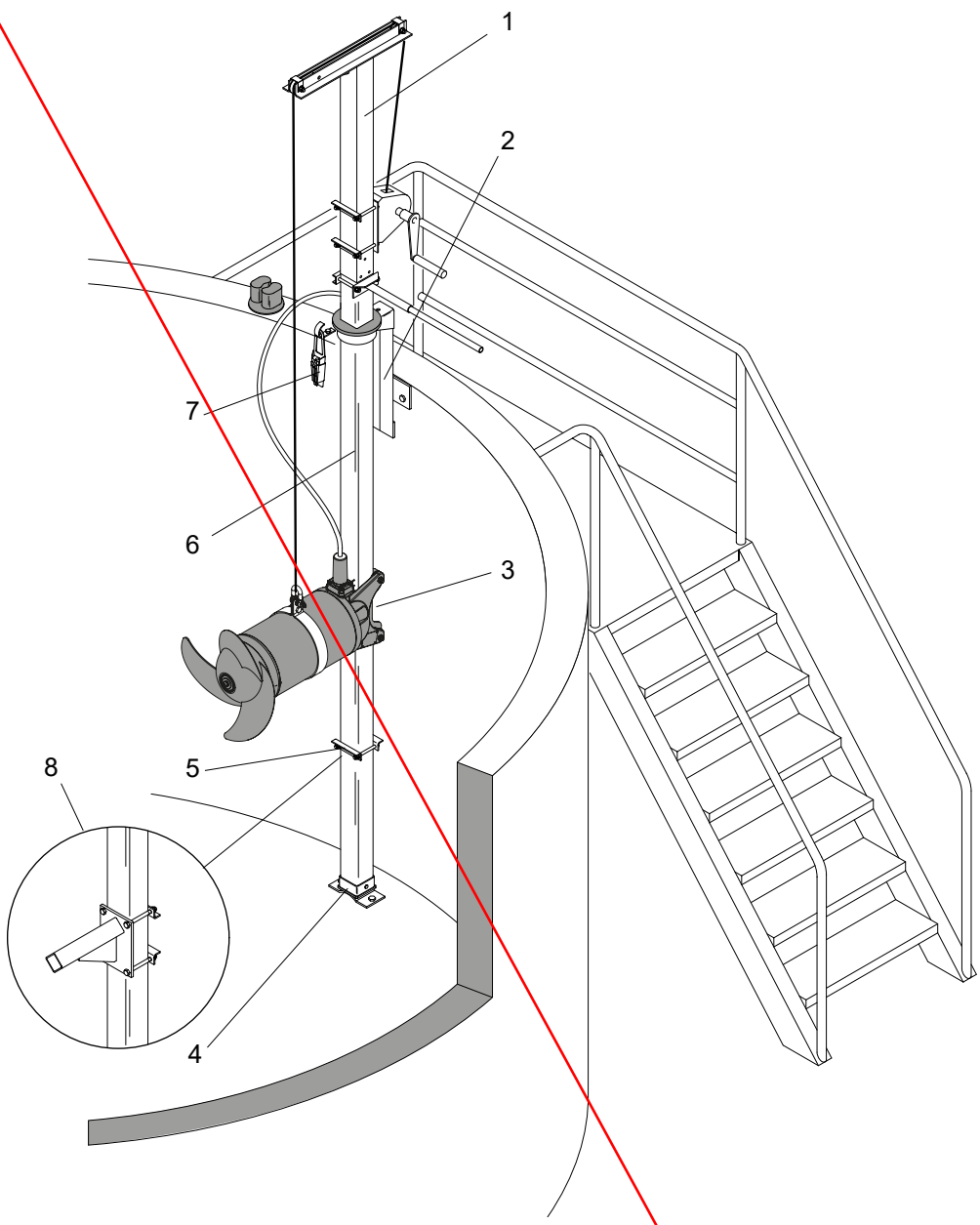


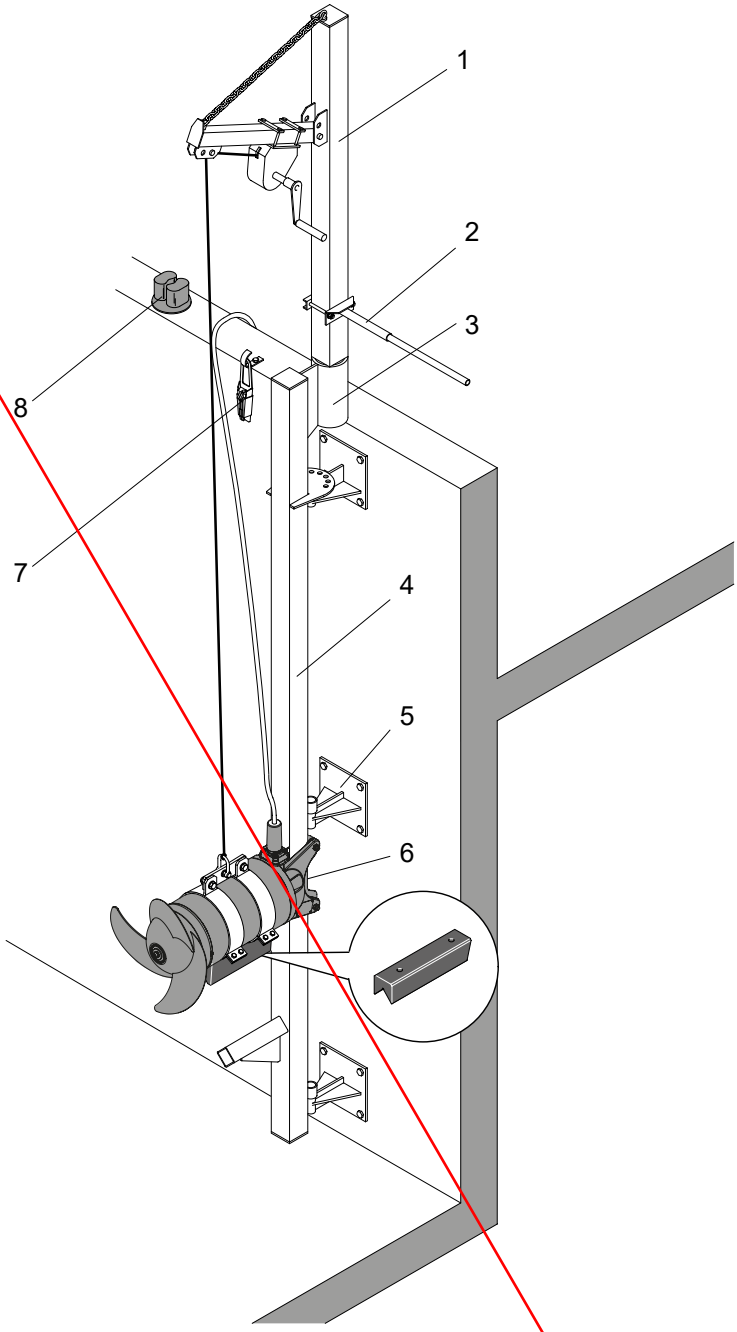
Figure 11. Installation example with exising accessories

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*).



0559-0001

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*).

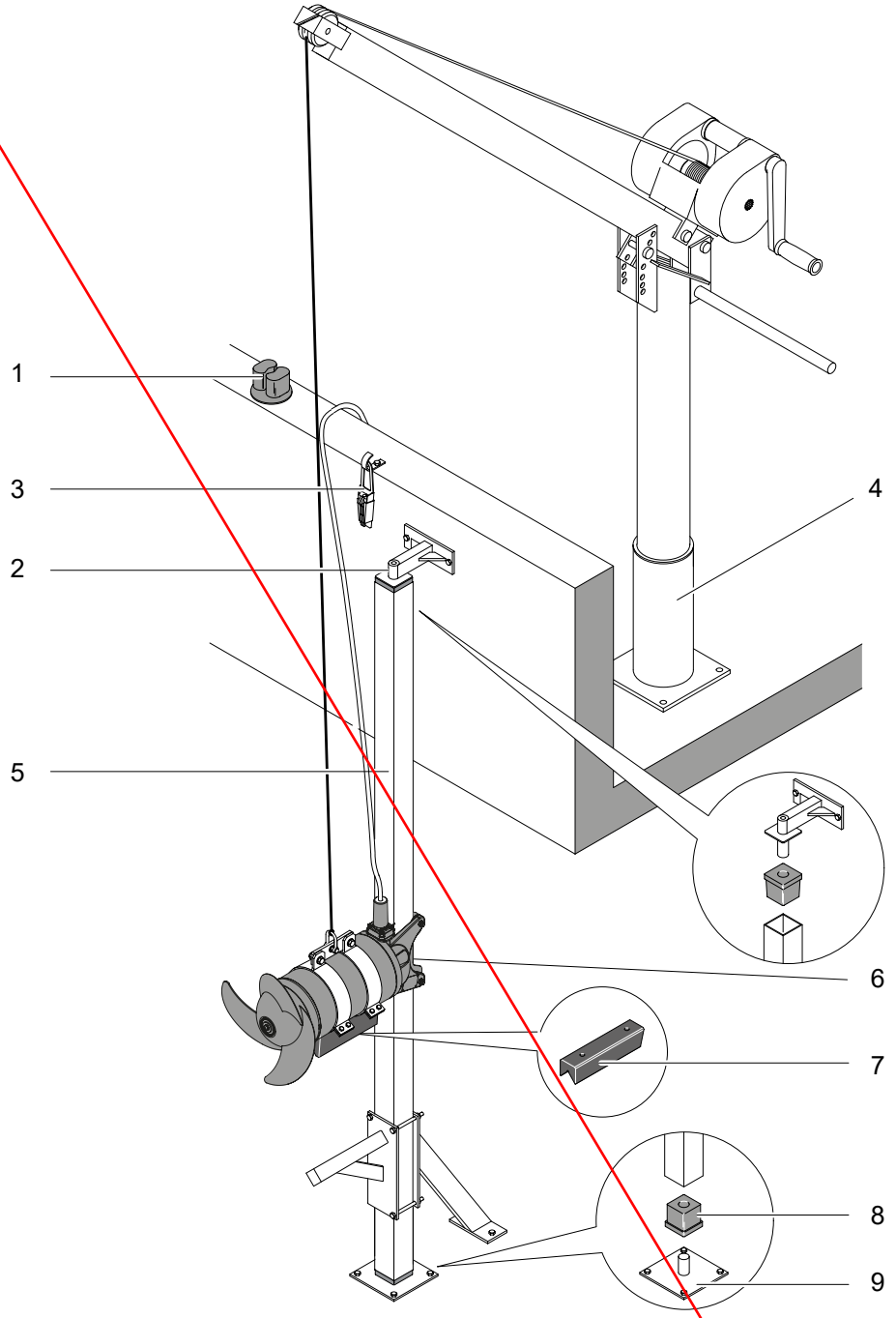


Figure 13. Installation example with fixed installation as flow booster

Legend

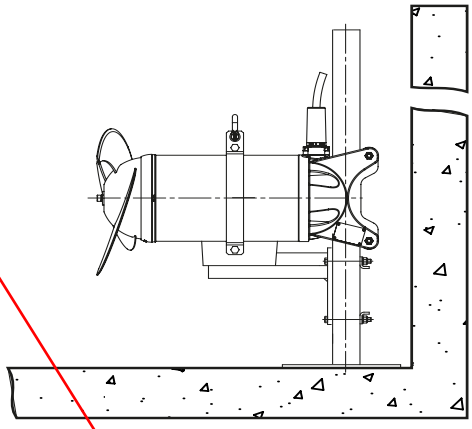
1 Rope block
2 Tube retainer
3 Cable clamp with cable hook
4 Sulzer lifting unit 5 kN
5 Square guide tube
6 Open bracket
7 Vibration damper
8 Tube connector
9 Bottom plate

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)

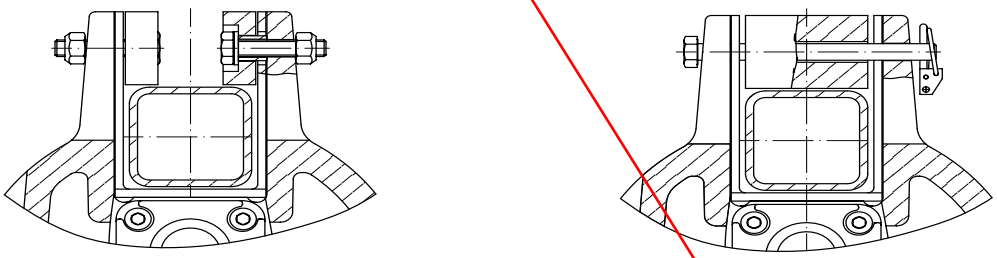


0561-0001

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.



open **closed**

0563-0001

Figure 15. Open bracket / closed bracket

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

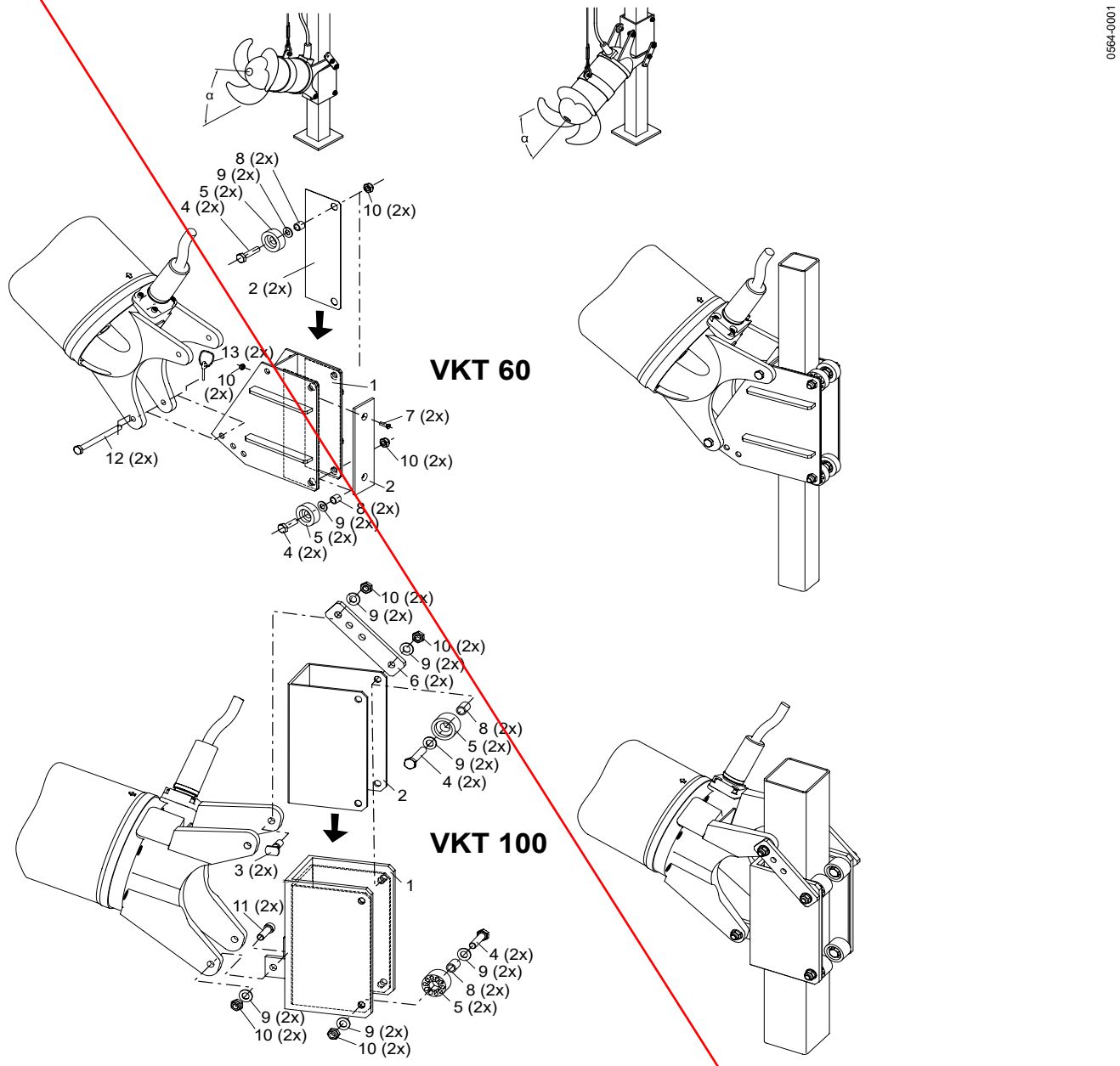


Figure 16. Open bracket with vertical swivelling

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)

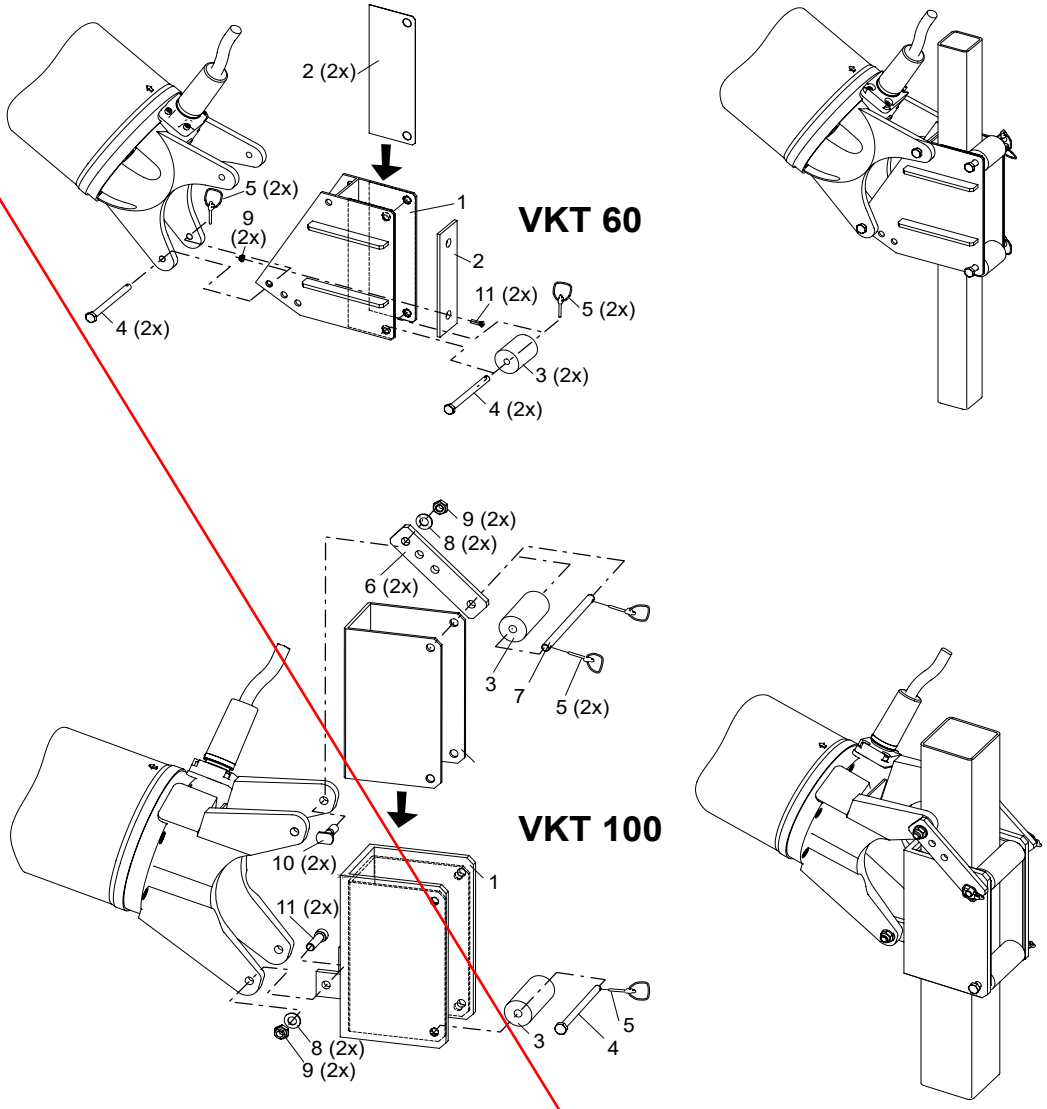


Figure 17. Closed bracket with vertical swivelling

Legend

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

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.

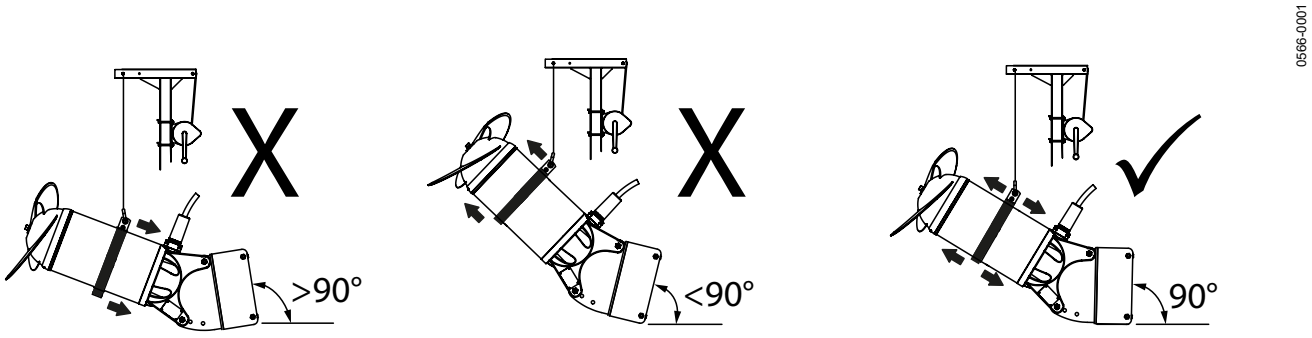
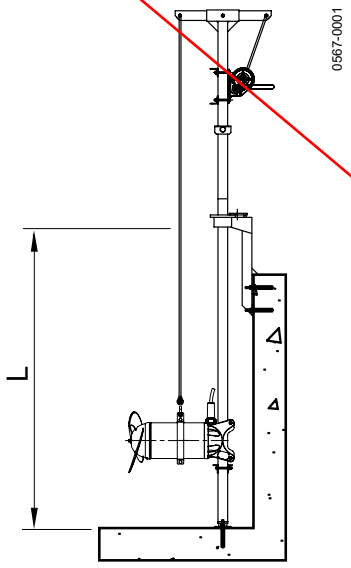
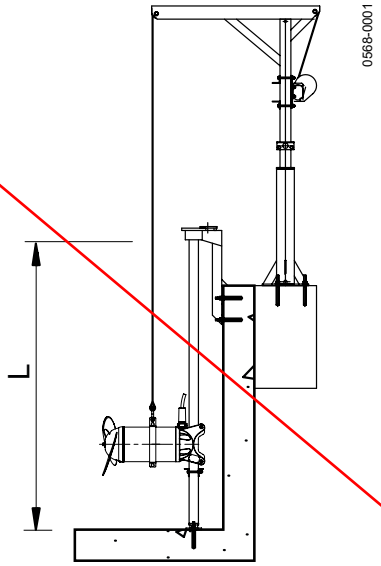
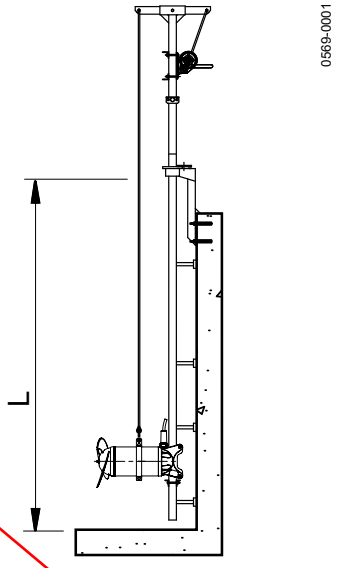


Figure 18. Setting up with fully mounted bracket

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 kg/m³ 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

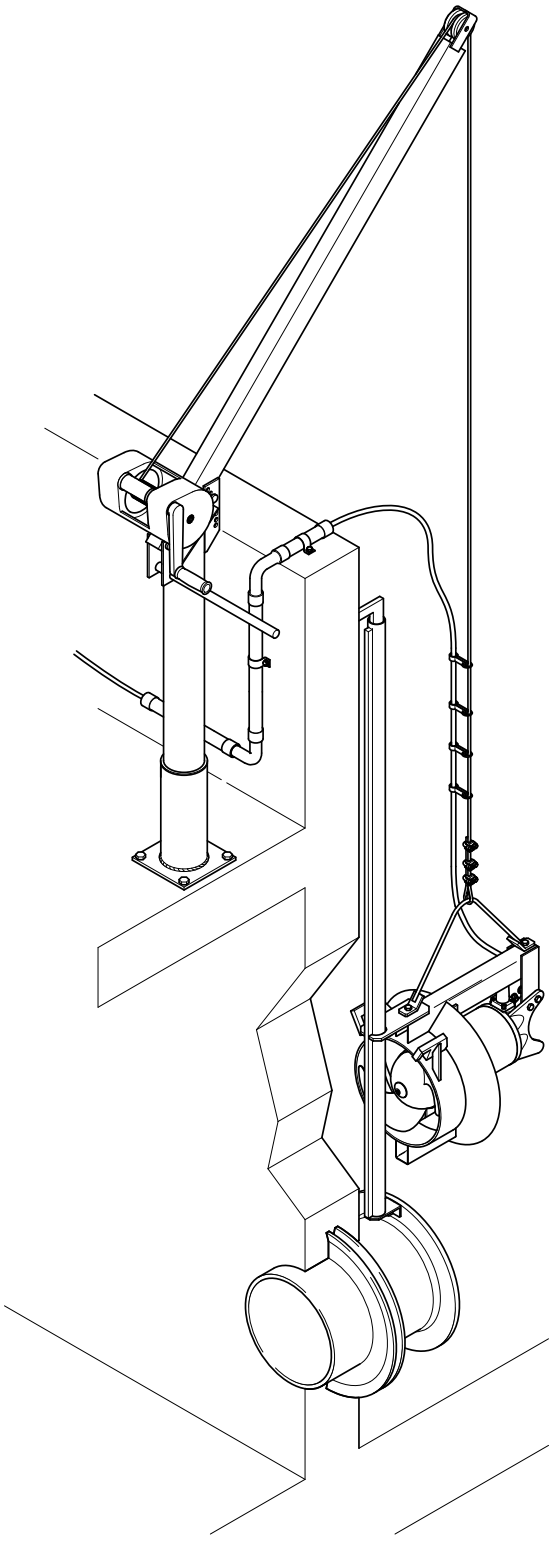


Figure 19. Installation example with Sulzer lifting unit 5 kN

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.***

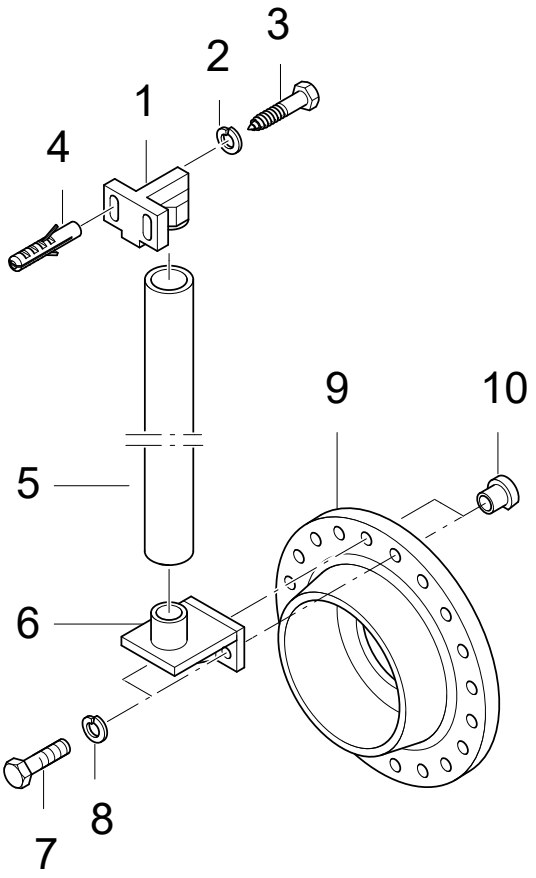


Figure 20. Guide tube installation

- 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.***

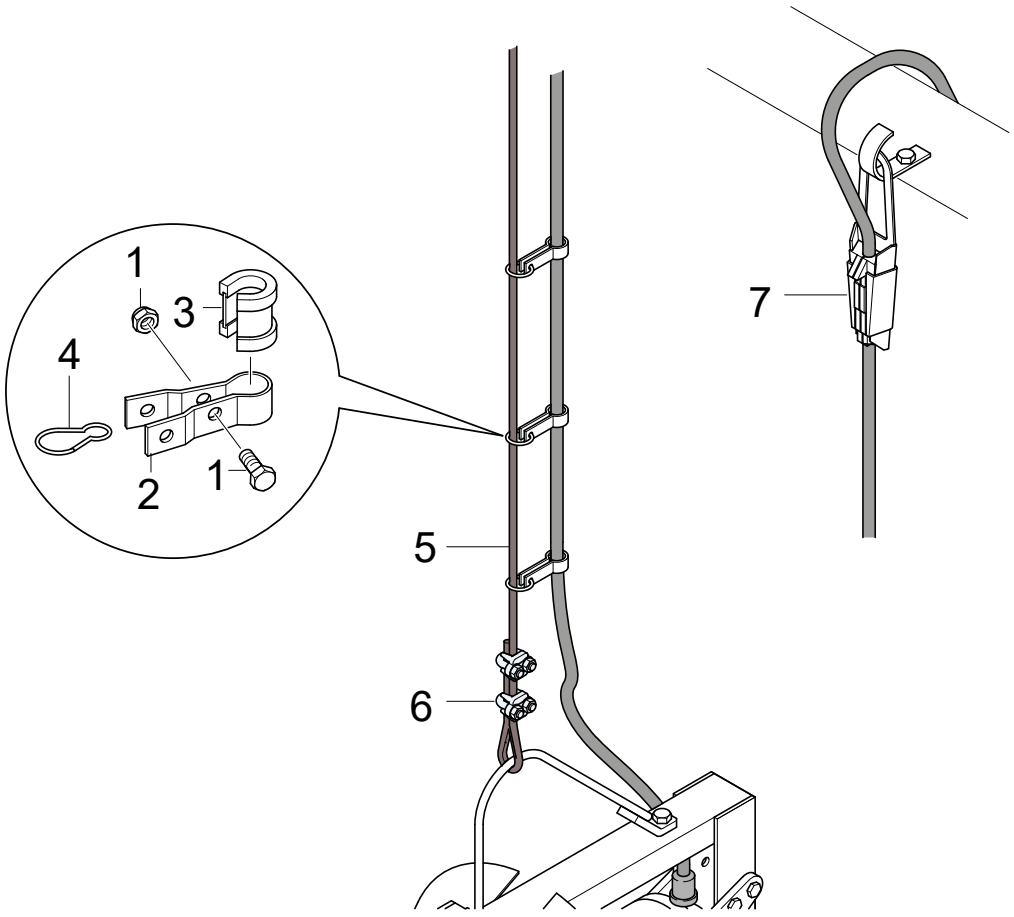


Figure 21. Securing and positioning of the motor connection cables of the RCP

- 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 it‘s 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).

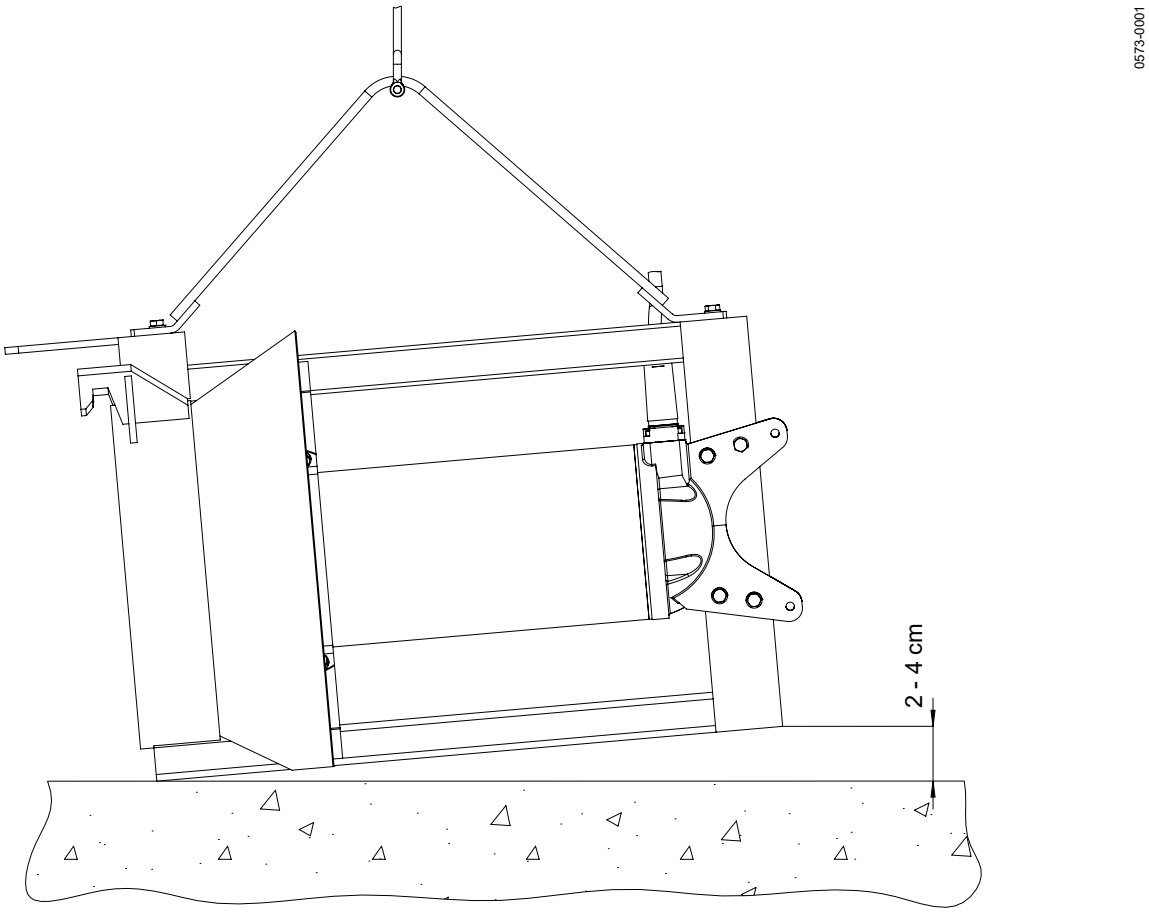


Figure 22. checking installation angle of pump

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.

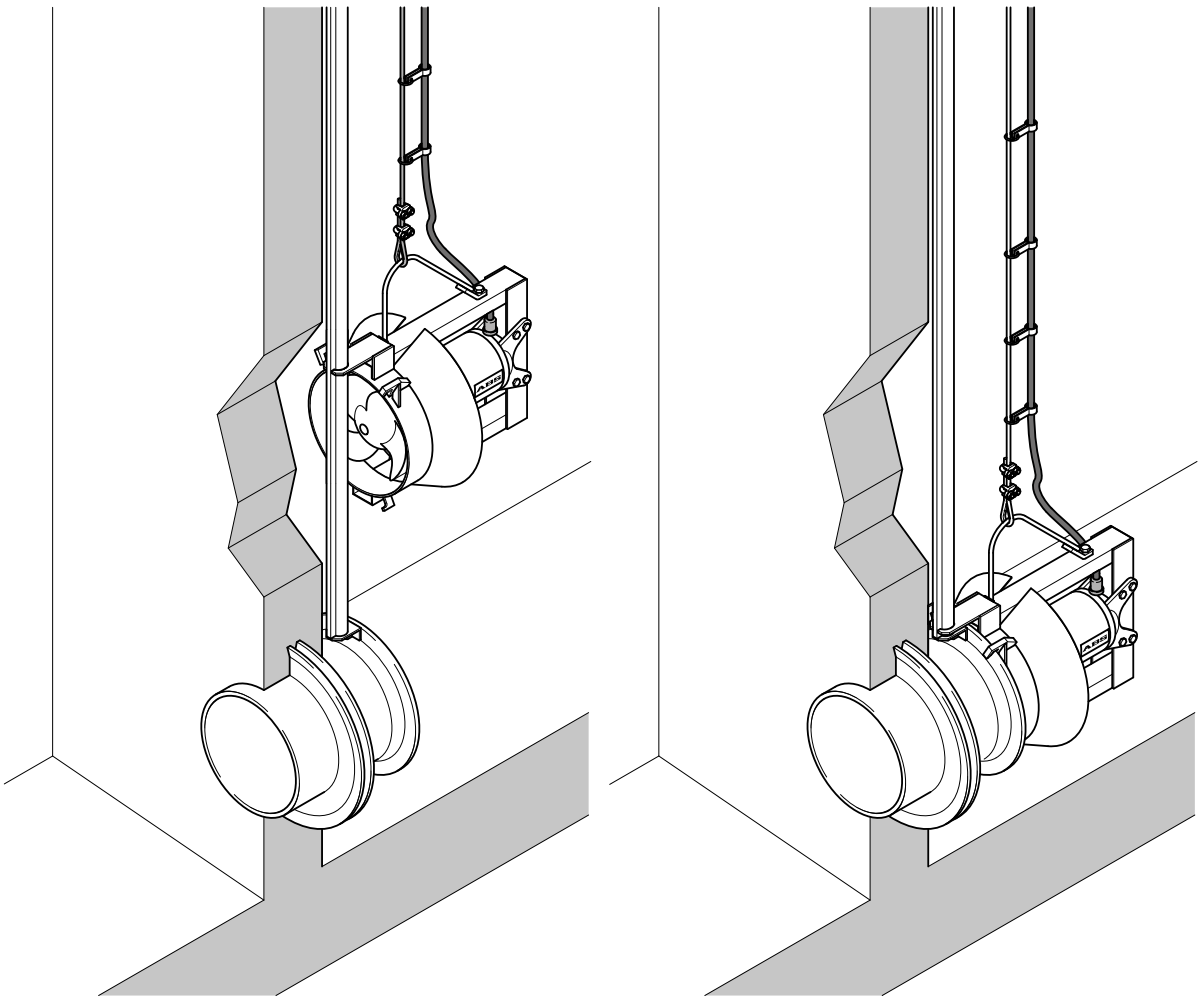


Figure 23. **RCP lowering** **RCP connected**

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.

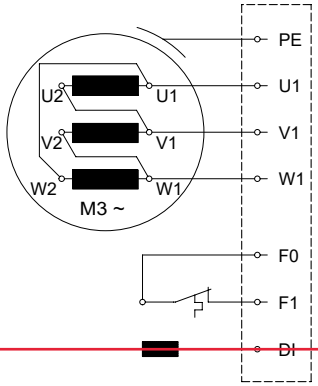
In pump stations/tanks potential bonding must be carried out in accordance with EN 60079-14:2014 [Ex] or IEC 60364-5-54 [non-Ex] (Regulations for the installation of pipe lines, protective measures in power plants).

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.

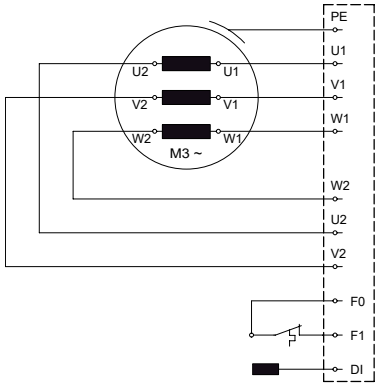
5.7.1 Standard connection diagrams. mains voltage 380 - 420 V at 50 Hz / 460 V at 60 Hz



0575-0001

50 Hz	60 Hz
A 30/8	A 35/8

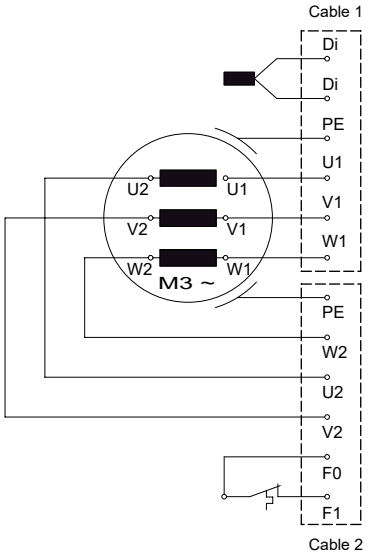
Figure 24. One power cable with integrated control leads (internal connection in the motor only for motor < 3 kW)



0576-0001

50 Hz	60 Hz
A 40/8	A 46/8
A 50/12	A 60/12
A 75/12	A 90/12
	A 120/12

Figure 25. One power cable with integrated control leads

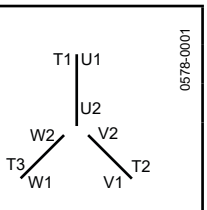
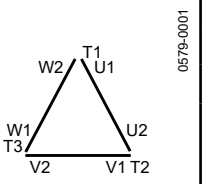


0577-0001

50 Hz
A 100/12

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.

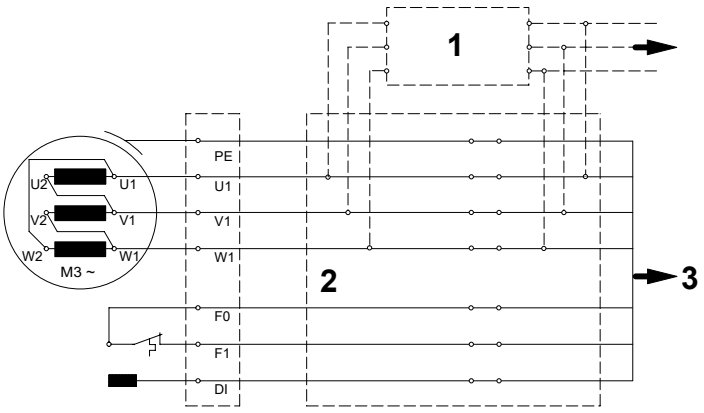
ATTENTION ***The temperature limiting switches may only be operated as specified by the manufacturer (see following table).***

Operating voltage**...AC**	**100 V to 500 V ~**
Rated voltage **AC**	**250 V**
Rated current **AC cos φ = 1.0**	**2.5 A**
Rated current **AC cos φ = 0.6**	**1.6 A**
Max. switching current at $\mathbf{I_N}$	**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.***



0580-0019

Legend

1 soft starter
2 terminal box
3 to control panel

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.***

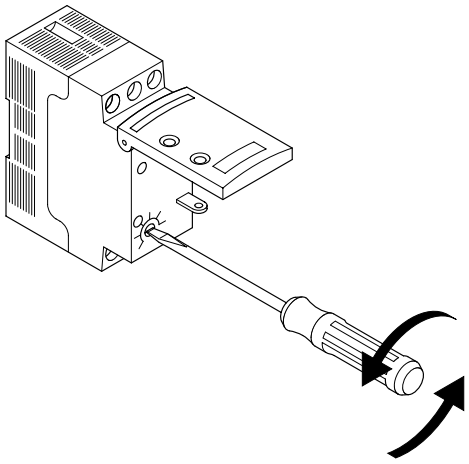
For further information consult the installation and operating instructions of the soft start manufacturer. These are supplied with the unit.

Test:

- First test with potentiometer setting “C”.

Setting:

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



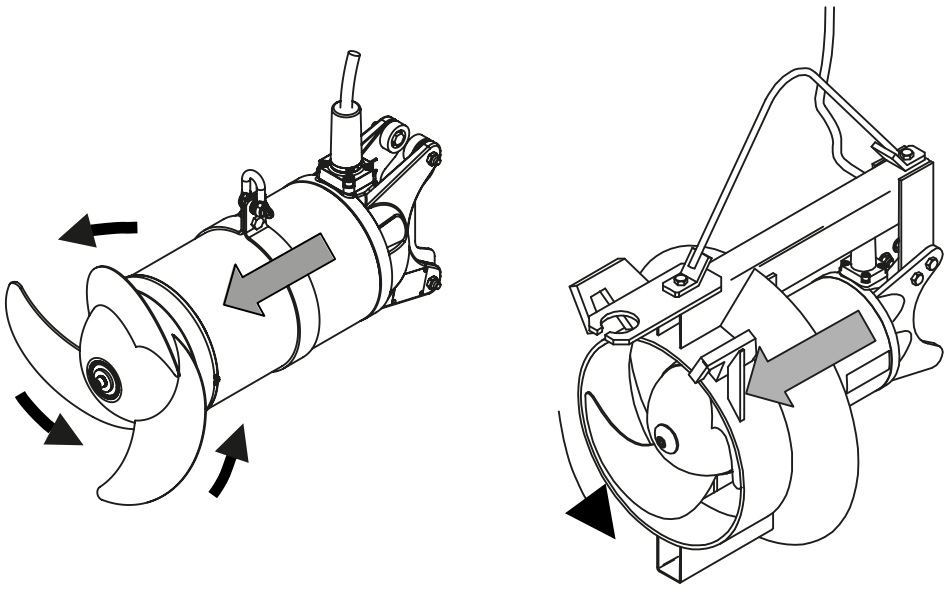
0581-0001

Figure 28. Testing and adjustment of soft starter

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!



0582-0001

Figure 29. 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.

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.***

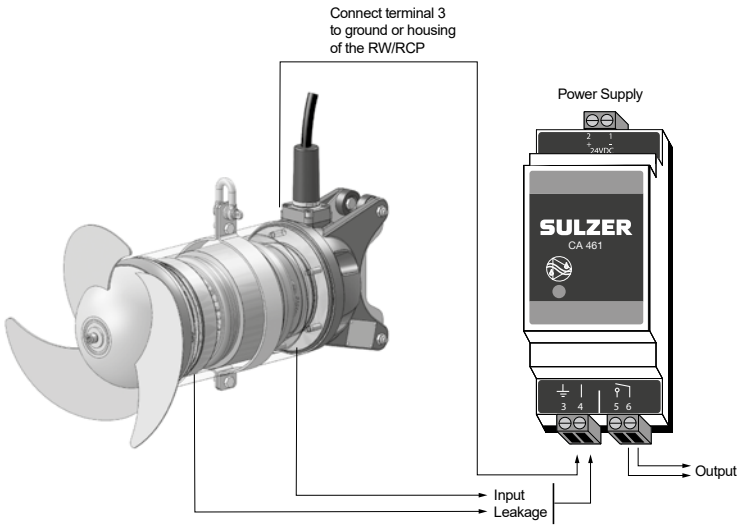


Figure 30. Electronic amplifier with collective signalling

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

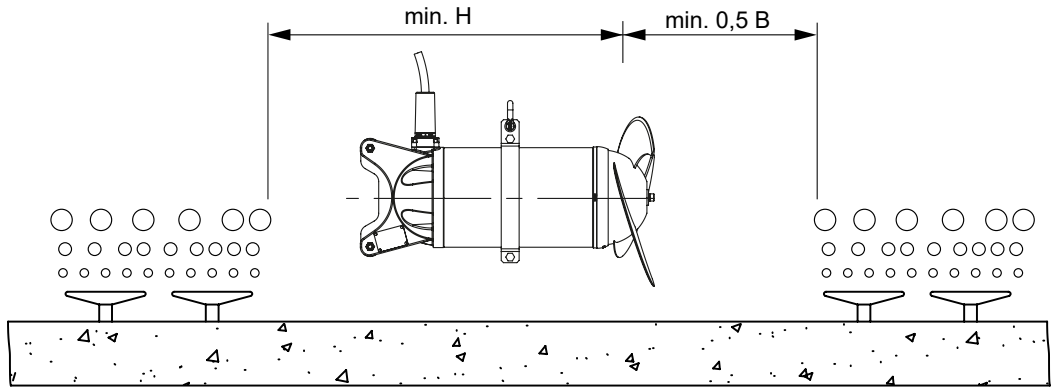
6 Commissioning

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!

PERIOD OF TIME:	**Regulation: once a month**
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.

PERIOD OF TIME:	**Recommendation: once a month**
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.

PERIOD OF TIME:	**Regulation: every 3 months**
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 of 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.

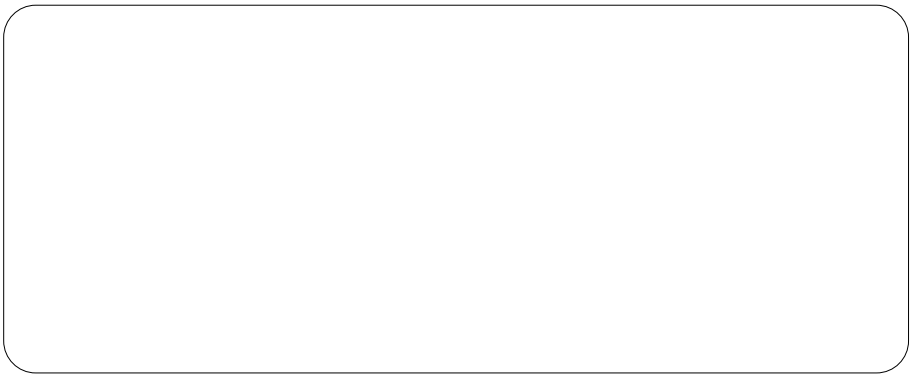
PERIOD OF TIME:	**Recommendation: every 6 months**
ACTIVITY:	Insulation resistance check.
DESCRIPTION:	Within the scope of the maintenance work the insulation resistance of the motor winding should be measured every 4,000 hours, and/or at least once a year. If the proper insulation resistance level is 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.

PERIOD OF TIME:	**Recommendation: once a year**
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 5.1).*

1.	Manufacturer:	Sulzer Pump Solutions Ireland Ltd. Clonard Road, Wexford Ireland
2.	Year of production:	
3.	Serial no.:	
4.	Type:	
5.	Check before first operation:	on: by:

Recurring checks (at least once a year)					
Date	**Remarks**	**Operating hours**	**Signature**	**Repaired on/by**	

Recurring checks (at least once a year)					
Date	Remarks	Operating hours	Signature	Repaired on/by	



Sulzer Pump Solutions Ireland Ltd. Clonard Road, Wexford, Ireland
Tel. +353 53 91 63 200. www.sulzer.com

SECTION 5

PRODUCT 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 by 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 conected to line voltage. Contact with this voltage may cause serious bodilly 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!

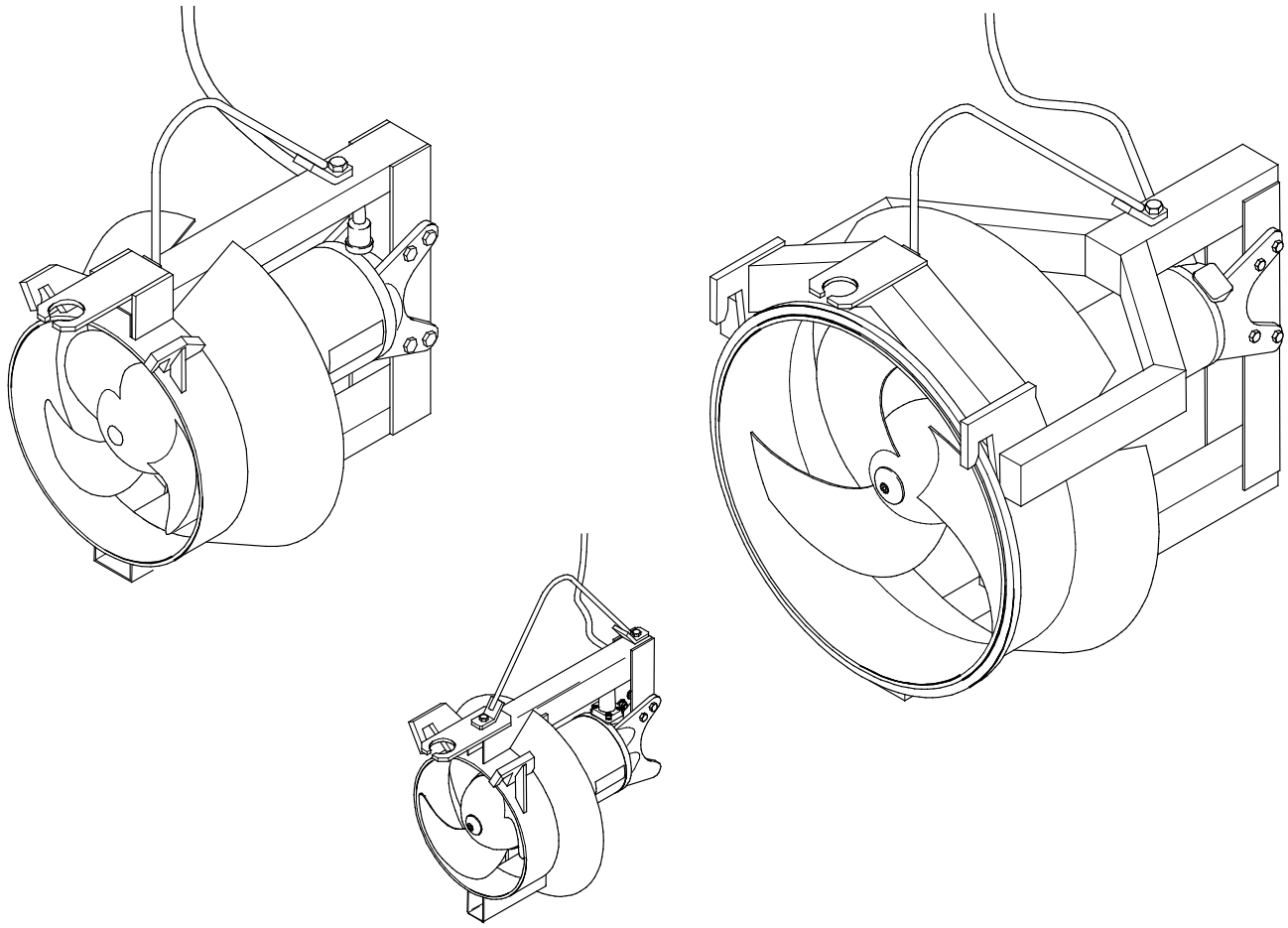
SECTION 6

WORKSHOP MANUAL

SULZER

RCP

400 / 500 / 800



Werkstatthandbuch
Workshop Manual

Änderungen im Sinne der Technische Weiterentwicklung vorbehalten!
We reserve the right to make modifications in the progress of technical development!

WHB (2) 1 597 0508 GB 07.2000

Sulzer Pump Solutions Germany GmbH ● Scheiderhöher Str. 30-38 • D-53797 Lohmar • Tel. Int.+49.2246.900-0 • Fax +49.2246.900-200 • www.sulzer.com

SULZER

WHB (2) 1 597 0508 GB 07.2000

Werkstatthandbuch RCP 400 / 500 / 800
Workshop Manual RCP 400 / 500 / 800

1. Allgemeines

Abbildungshinweise, z.B. (3/2) geben mit der ersten Ziffer die Bild- Nummer, mit der zweiten Ziffer die Position im gleichen Bild an.

1.1 Sicherheit

Bei der Instandsetzung sind die Sicherheitshinweise des Anhangs "Sicherheit für Pumpen und Rührwerke" sowie der "Einbau- und Betriebsanweisung" zu beachten.

HINWEIS *Die Einbau- und Betriebsanweisung ist dem Werkstatthandbuch als Anlage beigefügt.*

1.2 Generelle Instandsetzungshinweise

- Vor der Montage sind alle Teile sorgfältig zu prüfen.
- Einwandfreie, wiederverwendbare Teile sind vor dem Einbau sorgfältig zu reinigen.

ACHTUNG *Gleitringdichtungen, Wellendichtringe, O-Ringe und sonstige Dichtungen sind **grundsätzlich** zu erneuern. Nur im Notfall und nach sorgfältigster Prüfung sollten diese Teile wieder verwendet werden!*

- Es dürfen nur Öle gem. Spezifikation **(siehe Abschnitt 3.2)** verwendet werden.

⚠ Altöl ist vorschriftsmäßig zu entsorgen!

ACHTUNG *Die in den einzelnen Abschnitten beschriebenen Dichtigkeitsprüfungen müssen korrekt und mit äußerster Sorgfalt durchgeführt werden!*

1.3 Beschreibung der RCP

Die Beschreibung der RCP entnehmen Sie bitte der Einbau- und Betriebsanweisung (Anlage zu diesem Werkstatthandbuch).

1.4 Aufbau der RCP

Der Aufbau der RCP ist ausführlich in der Einbau- und Betriebsanweisung beschrieben.

1.5 Technische Daten

Die technischen Daten der RCP entnehmen Sie bitte der Einbau- und Betriebsanweisung.

2. Installation

Die Installation der RCP erfolgt gemäß Einbau- und Betriebsanweisung.

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 Manual.*

1.2 General maintenance hints

- Before assembly all parts should be carefully checked.
- 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 like specified in **section 3.2** 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 RCP

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

1.4 Design of RCP

The design of the RCP 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 RCP should be installed as described in the Installation and Operating Instructions.

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www.abspumps.com

3. Wartung

ACHTUNG Vor Beginn der Wartungsarbeiten sind die **Abschnitte 7. bis 7.3** der Einbau- und Betriebsanweisung sorgfältig zu studieren.

Bei Einsatz der RCP in kontaminierten Medien, wie z.B. in fäkalienhaltigen Abwässern, sind die Aggregate und deren Zubehör grundsätzlich vor jeglicher Wartung sorgfältig zu reinigen und zu dekontaminieren. Die spezifischen Hygienevorschriften der jeweiligen Verwenderländer sind zu beachten.

Bei Wartungs- und Instandsetzungsarbeiten sind die Sicherheitsregeln für Arbeiten in umschlossenen Räumen von abwassertechnischen Anlagen sowie die allgemein anerkannten Regeln der Technik zu beachten.

Vor Beginn der Wartungsarbeiten sind die RCP allpolig vom elektrischen Netz zu trennen und gegen Wiedereinschalten zu sichern.

ACHTUNG *Eingriffe an explosionsgeschützten Motoren dürfen nur in/von dafür ermächtigten Werkstätten / Personen ausgeführt werden. Bei Reparaturen dürfen nur Originalteile des Herstellers verwendet werden.*

HINWEIS *ABS gewährleistet im Rahmen der Liefervereinbarungen nur dann, wenn Reparaturen durch eine autorisierte ABS-Vertretung ausgeführt und nachweislich original ABS-Ersatzteile verwendet wurden.*

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 RCP 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 recognised rules of good technical practice should be observed.

Before commencing any repair work the RCP must be totally disconnected from the mains and steps taken 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 authorised ABS workshop and where original ABS spare parts have been used.*

3.1 Ausbau

3.1 Removal

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www.abspumps.com

3.1.1 Ausbau des RCP 400

Vor Beginn der Wartungsarbeiten ist das RCP allpolig vom elektrischen Netz zu trennen und gegen Wiedereinschalten zu sichern.

Die Hebevorrichtung muß für das Gesamtgewicht der RCP (inkl. dem ggf. angebauten Zubehör) ausreichend groß bemessen sein und den jeweils geltenden Sicherheitsbestimmungen entsprechen.

Nicht im Schwenkbereich von schwebenden Lasten aufhalten oder arbeiten!

Die Lasthakenhöhe muß die Gesamthöhe der RCP sowie die Länge der Anschlagkette berücksichtigen!

Ausbau:

- RCP mit Hilfe eines Hebezeuges aus dem Behälter heben und auf einer festen, ebenen Fläche lagern.

HINWEIS *Wenn der Propeller (1/4) vorab demontiert wird ist es einfacher die Motoreinheit aus dem Tragrahmen (1/11) zu demontieren* ***(siehe Abschnitt 3.1.4).***

- Propeller (1/4) gemäß **Abschnitt 3.1.4** demontieren.

HINWEIS *Für die Demontage der Motoreinheit (1/9) aus dem Tragrahmen (1/11) kann eine passende Ringschraube (M12) in die Gewindebohrung der Propellerwelle eingeschraubt werden.*

- Sechskantschrauben (1/10) am Tragrahmen sowie (1/8) an den beiden Halbschellen (1/7) lösen – **nicht komplett herausdrehen!**
- RCP vorsichtig mit Tragrahmen anheben und in eine senkrechte Position bringen.
- Schrauben (1/8 und 1/10) komplett herausdrehen.
- Beide Halbschellen (1/7) demontieren.
- Die Motoreinheit (1/9) kann nun aus dem Tragrahmen (1/11) gehoben werden.

3.1.1 Removal of the RCP 400

Before beginning any maintenance work the FlowBooster must be totally disconnected from the mains, and secured against being inadvertently switched back on.

The hoist must be adequately dimensioned for the weight of the RCP (incl. any possibly added accessories) and must comply with the applicable valid safety regulations.

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

When dimensioning the height of the lifting unit, the entire height of the RCP as well as the length of the lifting chain must be taken into consideration.

Removal:

- Lift the RCP with the aid of a hoist out of the tank and place it onto an even firm flat surface.

NOTE *If the propeller (1/4) is to be dismantled, it is easier to take it out of the supporting frame (1/11) prior to disassembly* ***(see section 3.1.4)***

- Dismantle propeller (1/4) in accordance to **section 3.1.4**

NOTE *For further disassembly of the motor unit (1/9) out of the supporting frame (1/11) a suitable ring screw (M12) can then be screwed into the thread hole of the propeller shaft.*

- Loosen hex screws (1/10) at the supporting frame and the screws (1/8) at the both semi-clamps (1/7). **Do not screw out the screws (1/8 and 1/10) completely!**
- Carefully lift up the RCP motor with supporting frame in a vertical upright position.
- Remove screws (1/8) and (1/10)
- Remove both semi-clamps (1/7).
- Motor unit (1/9) can be lifted out of the supporting frame (1/11) now.

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HINWEIS *Für die weitere Demontage sollte die Motoreinheit ein wenig angehoben und so weit gedreht werden, daß Kabel und Kabeleinführung an den Befestigungsnocken für die Halbschellen vorbei passen.*

ACHTUNG *Anschlußkabel und Kabeleinführung dürfen nicht beschädigt werden!*

NOTE *For the disassembly the motor unit must firstly be lifted up a bit and then turned in a way that the cable and cable inlet are not damaged. Cable inlet and support must be led past at the fastening bows for the clamps.*

ATTENTION *Connection cable and cable inlet must not be damaged!*

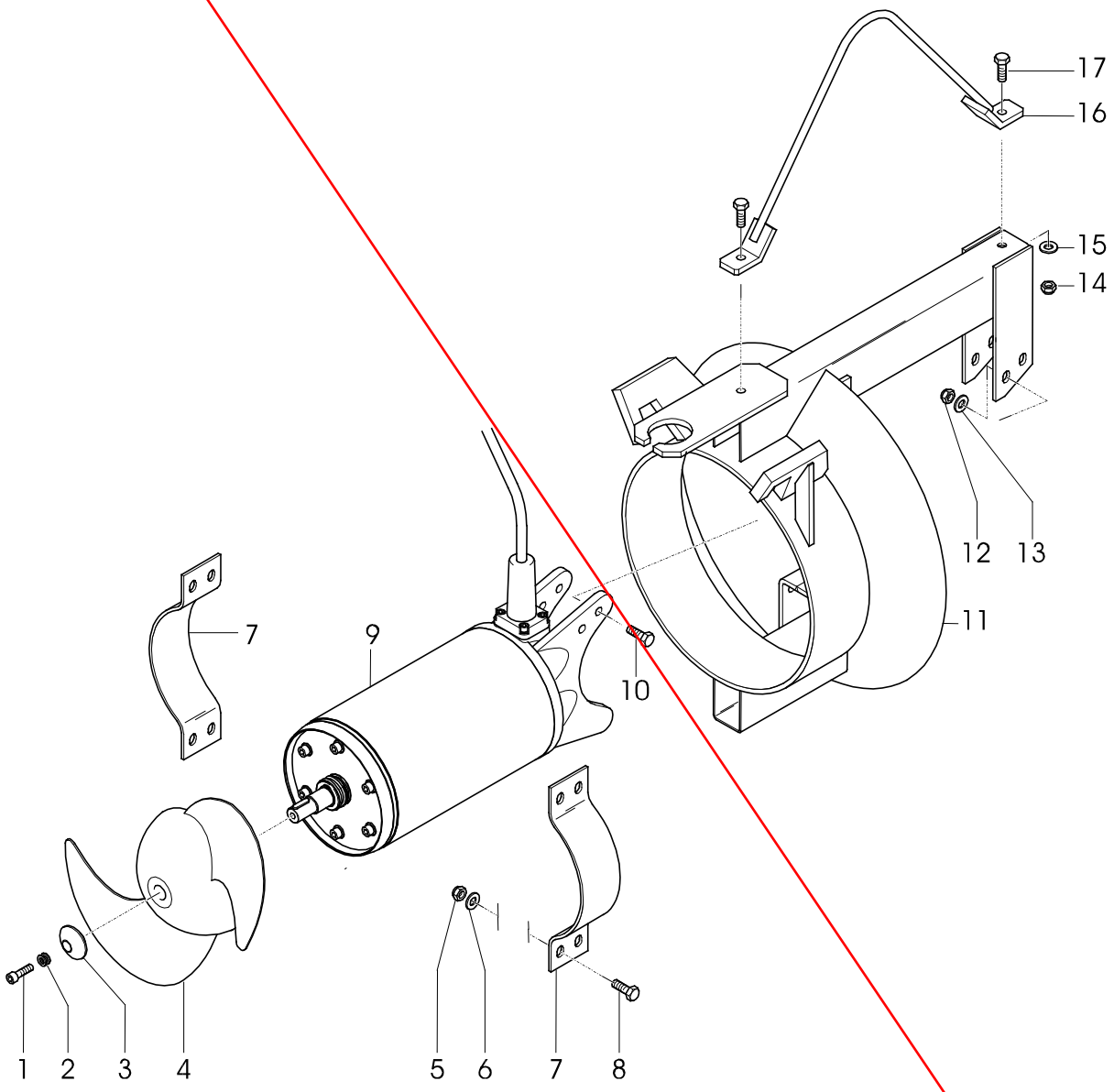

Bild 1 RCP 400 Explosionszeichnung

Montage:

- Die Montage erfolgt im umgekehrter Reihenfolge.

Fig. 1 RCP 400 explosive drawing

Assembly:

- The reassembly must be effected in reverse manner.

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3.1.2 Ausbau des RCP 500

Vor Beginn der Wartungsarbeiten ist das RCP allpolig vom elektrischen Netz zu trennen und gegen Wiedereinschalten zu sichern.

Die Hebevorrichtung muß für das Gesamtgewicht der RCP (inkl. dem ggf. angebauten Zubehör) ausreichend groß bemessen sein und den jeweils geltenden Sicherheitsbestimmungen entsprechen.

Nicht im Schwenkbereich von schwebenden Lasten aufhalten oder arbeiten!

Die Lasthakenhöhe muß die Gesamthöhe der RCP sowie die Länge der Anschlagkette berücksichtigen!

Demontage:

- RCP mit Hilfe eines Hebezeuges aus dem Behälter heben und auf einer festen, ebenen Fläche lagern.

HINWEIS *Wenn der Propeller (2/4) vorab demontiert wird ist es einfacher die Motoreinheit aus dem Tragrahmen (2/10) zu demontieren* ***(siehe Abschnitt 3.1.4).***

- Propeller (2/4) gemäß **Abschnitt 3.1.4** demontieren.

HINWEIS *Für die Demontage der Motoreinheit (2/9) aus dem Tragrahmen (2/10) kann eine passende Ringschraube (M12) in die Gewindebohrung der Propellerwelle eingeschraubt werden.*

- Sechskantschrauben (2/11) am Tragrahmen sowie (2/6) an den beiden Halbschellen (1/5) lösen – **nicht komplett herausdrehen!**
- RCP vorsichtig mit Tragrahmen anheben und in eine senkrechte Position bringen.
- Schrauben (2/6 und 2/11) komplett herausdrehen.
- Beide Halbschellen (2/5) demontieren.
- Die Motoreinheit (2/9) kann nun aus dem Tragrahmen (2/10) gehoben werden.

HINWEIS *Für die weitere Demontage sollte die Motoreinheit ein wenig angehoben und so weit gedreht werden, daß Kabel und Kabeleinführung an den Befestigungsnocken für die Halbschellen vorbei passen.*

3.1.2 Removal of the RCP 500

Before beginning any maintenance work the FlowBooster must be totally disconnected from the mains, and secured against being inadvertently switched back on.

The hoist must be adequately dimensioned for the weight of the RCP (incl. any possibly added accessories) and must comply with the applicable valid safety regulations.

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

When dimensioning the height of the lifting unit, the entire height of the RCP as well as the length of the lifting chain must be taken into consideration.

Removal:

- Lift the RCP with the aid of a hoist out of the tank and place it onto an even firm flat surface.

NOTE *If the propeller (2/4) is to be dismantled, it is easier to take it out of the supporting frame (2/10) prior to disassembly* ***(see section 3.1.4)***

- Dismantle propeller (0/4) in accordance to **section 3.1.4**

NOTE *For further disassembly of the motor unit (2/9) out of the supporting frame (2/10) a suitable ring screw (M12) can then be screwed into the thread hole of the propeller shaft.*

- Loosen hex screws (2/11) at the supporting frame and the screws at the both semi-clamps (2/6). **Do not screw out the screws (2/5 and 1/10) completely!**
- Carefully lift up the RCP motor with supporting frame in a vertical upright position.
- Remove screws (2/6) and (2/11).
- Remove both semi-clamps (2/5).
- Motor unit (2/9) can be lifted out of the supporting frame (2/10).

NOTE *For the disassembly the motor unit must firstly be lifted up a bit and then turned in a way that the cable and cable inlet are not damaged. Cable inlet and support must be led past at the fastening bows for the clamps.*

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ACHTUNG *Anschlußkabel und Kabeleinführung dürfen nicht beschädigt werden!*

ATTENTION *Connection cable and cable inlet must not be damaged!*

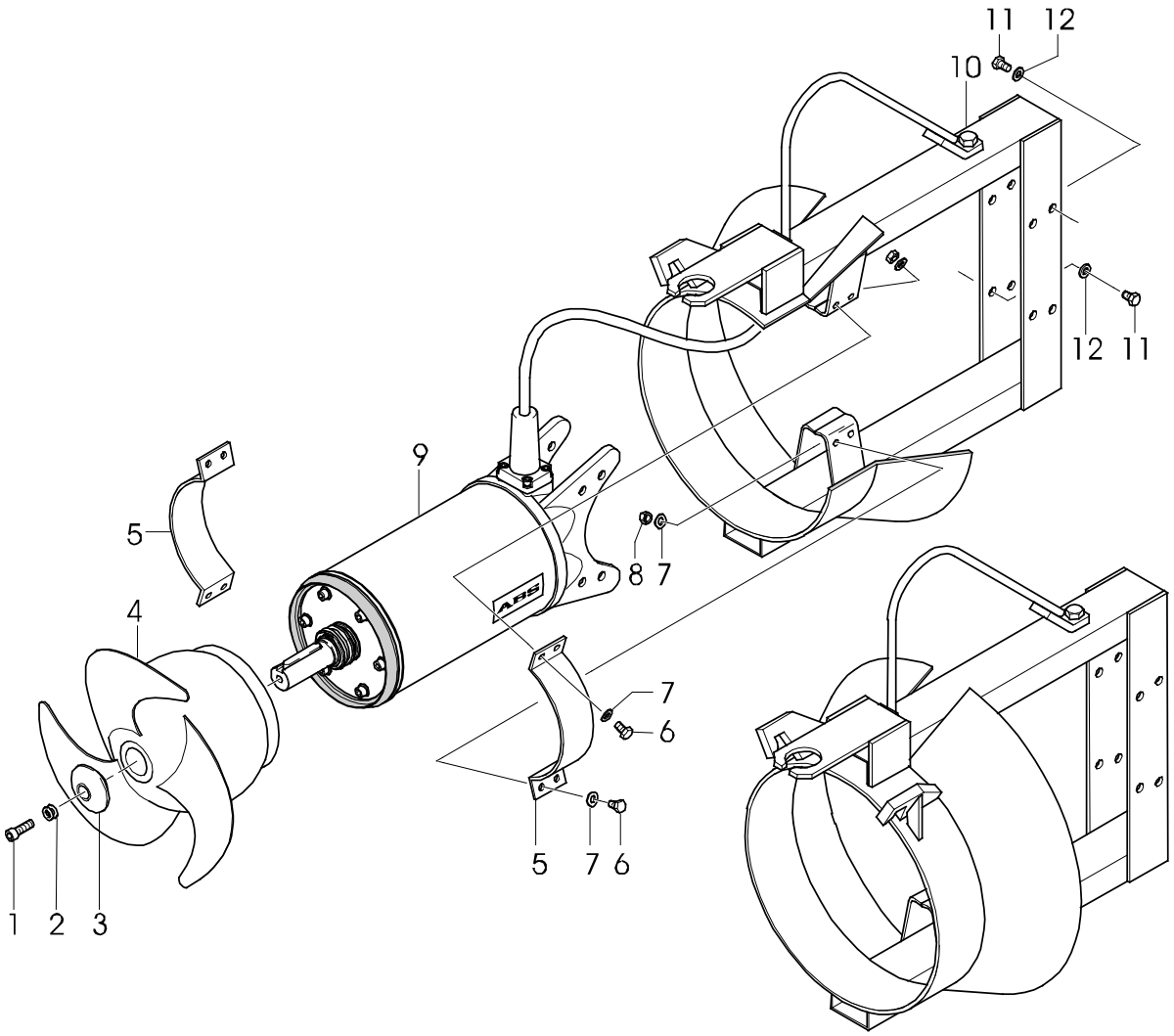

Bild 2 RCP 500 Explosionszeichnung

Montage:

- Die Montage erfolgt im umgekehrter Reihenfolge.

Fig. 2 RCP 500 explosive drawing

Assembly:

- The reassembly must be effected in reverse manner.

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3.1.3 Ausbau des RCP 800

Vor Beginn der Wartungsarbeiten ist das RCP allpolig vom elektrischen Netz zu trennen und gegen Wiedereinschalten zu sichern.

Die Hebevorrichtung muß für das Gesamtgewicht der RCP (inkl. dem ggf. angebauten Zubehör) ausreichend groß bemessen sein und den jeweils geltenden Sicherheitsbestimmungen entsprechen.

Nicht im Schwenkbereich von schwebenden Lasten aufhalten oder arbeiten!

Die Lasthakenhöhe muß die Gesamthöhe der RCP sowie die Länge der Anschlagkette berücksichtigen!

Demontage:

- RCP mit Hilfe eines Hebezeuges aus dem Behälter heben und auf einer festen, ebenen Fläche lagern.

HINWEIS *Wenn der Propeller (3/4) vorab demontiert wird ist es einfacher die Motor- Getriebeeinheit aus dem Tragrahmen (3/14) zu demontieren* ***(siehe Abschnitt 3.1.4).***

- Propeller (3/4) gemäß **Abschnitt 3.1.4** demontieren.

HINWEIS *Für die Demontage der Motor- Getriebeeinheit (3/12) aus dem Tragrahmen (3/14) kann eine passende Ringschraube (M12) in die Gewindebohrung der Propellerwelle eingeschraubt werden.*

- Schrauben (3/15) zusammen mit Scheiben (3/16) und Muttern (3/13) demontieren.
- Schrauben (3/8+9) zusammen mit Scheiben (3/6) und Muttern (3/5). Schellensegmente (3/7) entfernen.
- RCP vorsichtig mit Tragrahmen anheben und in eine senkrechte Position bringen.
- Die Motor-Getriebeeinheit (3/12) kann nun aus dem Tragrahmen (3/14) gehoben werden.

HINWEIS *Für die weitere Demontage sollte die Motor-Getriebeeinheit ein wenig angehoben und so weit gedreht werden, daß Kabel und Kabeleinführung an den Befestigungslaschen für die Schellensegmente vorbei passen.*

3.1.3 Removal of the RCP 800

Before beginning any maintenance work the FlowBooster must be totally disconnected from the mains, and secured against being inadvertently switched back on.

The hoist must be adequately dimensioned for the weight of the RCP (incl. any possibly added accessories) and must comply with the applicable valid safety regulations.

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

When dimensioning the height of the lifting unit, the entire height of the RCP as well as the length of the lifting chain must be taken into consideration.

Removal:

- Lift the RCP with the aid of a hoist out of the tank and place it onto an even firm flat surface.

NOTE *If the propeller (3/4) is to be dismantled, it is easier to take the motor- gear box unit out of the supporting frame (3/14) prior to disassembly* ***(see section 3.1.4)***

- Dismantle propeller (3/4) in accordance to **section 3.1.4**

NOTE *For further disassembly of the motor-gear box unit (3/12) out of the supporting frame (3/14) a suitable ring screw (M12) can then be screwed into the thread hole of the propeller shaft.*

- Screw out the screws (3/15) together with washers (3/16) and nuts (3/13).
- Dismantle the screws (3/8+9) together with nuts (3/5) and washers (3/6) and remove the clamp segments (3/7).
- Carefully lift up the RCP motor with supporting frame in a vertical upright position.
- Motor-gear box unit (3/12) can be lifted out of the supporting frame (3/14) now.

NOTE *For the disassembly the motor- gear box unit must firstly be lifted up a bit and then turned in a way that the cable and cable inlet are not damaged. Cable inlet and support must be led past at the fastening brackets for the clamp segments.*

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ACHTUNG *Anschlußkabel und Kabeleinführung dürfen nicht beschädigt werden!*

ATTENTION *Connection cable and cable inlet must not be damaged!*

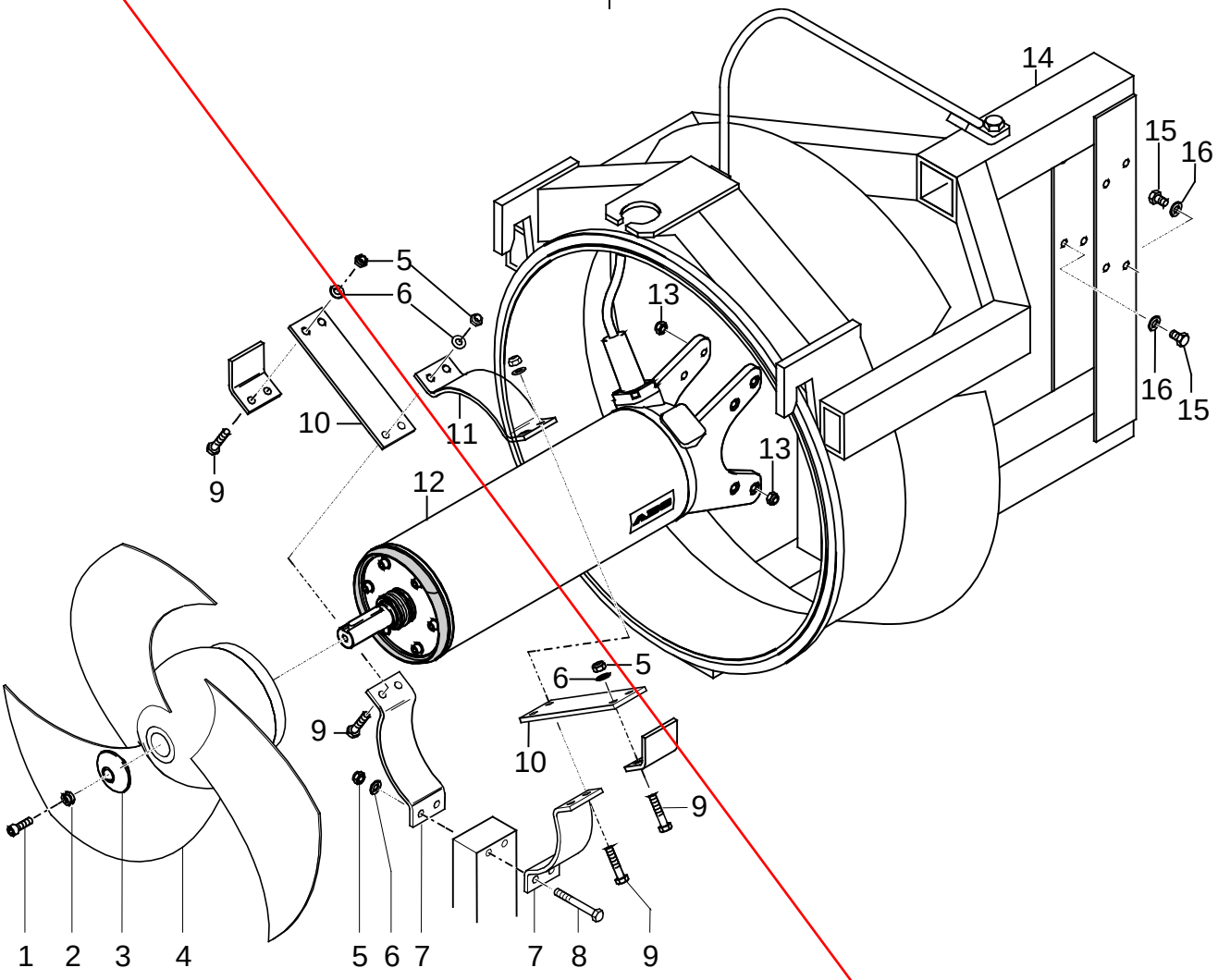

Bild 3 RCP 800 Explosionszeichnung

Fig. 3 RCP 800 explosive drawing

Montage:

- Die Montage erfolgt im umgekehrter Reihenfolge.

Assembly:

- The reassembly must be effected in reverse manner.

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3.1.4 Demontage und Austausch des Propellers

Demontage des Propellers:

Vor Beginn der Wartungsarbeiten ist das RCP allpolig vom elektrischen Netz zu trennen und gegen Wiedereinschalten zu sichern.

- Zylinderschraube (4/1) zusammen mit Laufradscheibe (4/3) Sicherungsscheiben (13/3) lösen und Propeller (4/6) abziehen.

HINWEIS *Das Klemmenband (6/3) für den SD-Ring (6/1) und der SD-Ring selbst brauchen nicht demontiert werden, wenn der Propeller gewechselt werden soll!*

HINWEIS *Auf dem Umfang der Propellernabe, im Bereich der Überdeckung des SD-Ringes, können bedingt durch dessen Funktion Einlaufriefen entstehen. Dies beeinflußt aber nicht die Funktion, auch nicht bei Austausch des SD-Ringes.*

3.1.4 Dismantling and exchange of the propeller

Dismantling the propeller:

Before beginning any maintenance work the FlowBooster must be totally disconnected from the mains, and secured against being inadvertently switched back on.

- Open socket head screws (4/1) together with impeller washer (4/2), securing washers (4/3) and pull off propeller (4/6).

NOTE *The fixing strap (6/3) for the SD-ring (6/1) and the SD-ring itself don't need to be dismantled when changing the propeller!*

NOTE *At the circumference of the propeller hub, in the area where it overlaps with the solid deflection ring, wear groves may be visible. These are normal signs of use and have no negative effect on the operation. This means that it is not necessary to change the hub when changing the Solid Deflection Ring.*

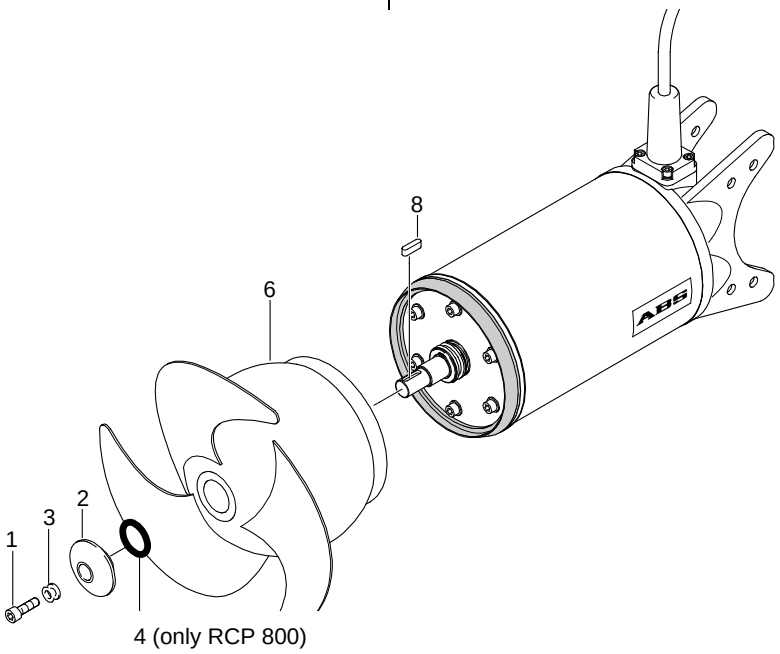

Bild 4 Propellerwechsel

Montage des Propellers:

- Propellernabe und Wellenstumpf leicht einfetten
- Propeller aufschieben (4/6)
- Propellerscheibe (4/2) und *Dichtring (4/4) (*nur bei RCP 800) einsetzen.

Fig. 4 Propeller exchange

Assembly of the propeller:

- Lightly grease propeller hub and shaft end
- Fit the propeller (4/6)
- Fit propeller washer (4/2) and (*only in case of RCP 800 the additional *sealing ring (4/4)

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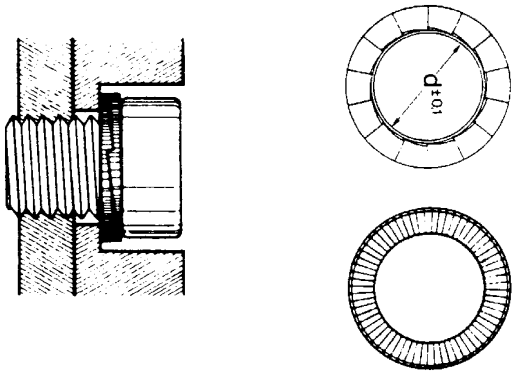
- Sicherungsscheiben (4/3) einlegen und Einbaulage beachten - siehe auch Bild 5
- Zylinderschraube (4/1) mit einem **Anzugsmoment** von **36 Nm** anziehen.



Innenseite der 2 Sicherungsscheiben

inside of the 2 securing washers

Außenseite der 2 Sicherungsscheiben

outside of the 2 securing washers

Bild 5 Sicherungsscheiben

3.1.5 Austausch des SD-Ringes (Solid-Deflection-Ring)

Durch betriebsbedingten Verschleiß kann es erforderlich werden, den SD-Ring (6/1) nach Überprüfung auszutauschen.

- Klemmenband (6/3) durch Abkneifen der Bandklammer (6/4) demontieren.
- SD-Ring (6/1) vorsichtig aus der Nut des Motordeckels (6/2) ziehen und abstreifen.
- Bei der Montage des SD-Ringes (6/1) ist dieser gemäß Bild 6 von Hand umlaufend überzustülpen und in die Nut des Motordeckels zu drücken.
- Klemmenband (6/3) mit neuer Bandklammer (6/4) mit **Spezialwerkzeug (BAND-IT Spannwerkzeug) Art.-Nr. 96990340** montieren.

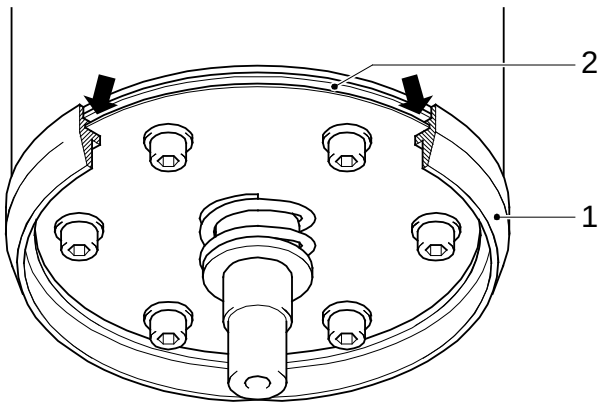


Bild 6 Wechseln des SD-Ringes

3.2 Ölfüllung und Ölwechsel

Altöl ist vorschriftsmäßig zu entsorgen.

- Fit the securing washers (4/3) -observe also assembly situation in fig.5
- Fit the socket head screw (4/1) with a **tightening torque** of **36 Nm**

Fig. 5 Securing washers

3.1.5 Change of the SD-ring **(solid deflection ring)**

Due to wear during operation, it may be necessary to check the SD-ring (6/1) and change it.

- Cut off the clamp (6/4) and dismantle the fixing strap (6/3).
- Pull the SD-ring (6/1) carefully out of the groove of the motor cover (6/2) and strip back.
- When refitting the SD-ring (6/1), this should be pressed around its circumference by hand as shown in Fig. 6 and pressed down into the groove of the motor cover.
- Fix the fixing strap (6/3) with a new clamp (6/4) with the aid of a special tool **(BAND-IT Clamping tool) Art.-Nr. 96990340**

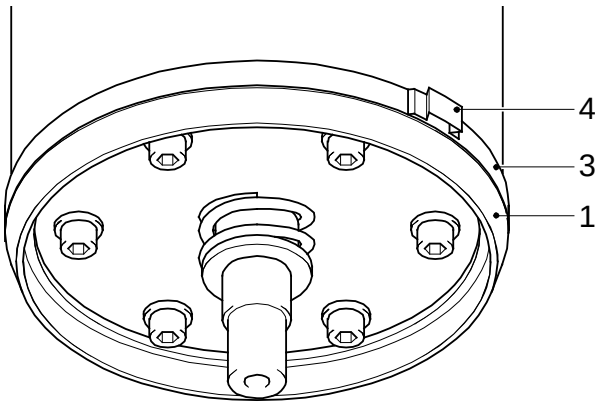


Fig. 6 Change of the SD-ring

3.2 Oil fill and oil change

Waste oil must be disposed of in the proper

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3.2.1 Gleitölwechsel (Dichtungsdeckel)

Um Reparaturarbeiten am RCP durchzuführen ist es meist notwendig zuerst das Gleitöl abzulassen um das Gerät vollständig zu demontieren. In jedem Fall kann das Gleitöl der Dichtungsdeckel erst nach Demontage des Propellers gewechselt werden.

⚠ Die Dichtungsdeckel der Rezirkulationspumpen kann unter leichtem Überdruck stehen. Beim Lösen der Zylinderschraube (7/1.1) ist diese vorsichtshalber mit einem Lappen abzudecken, bis der Druck ausgeglichen ist.

- Obenliegende Zylinderschraube (7/1.1) vorsichtig lösen und Druck entweichen lassen
- Untenliegende Zylinderschraube (7/1.2) zusammen mit Scheibe (7/2) und O-Ring (7/3) demontieren und das Öl vollständig in ein geeignetes, ausreichend dimensioniertes Auffanggefäß ablassen.

⚠ Altöl ist vorschriftsmäßig zu entsorgen!

3.2.1 Changing of the lubrication oil (seal cover)

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.

⚠ As there may be a slight pressure build-up in the seal cover of the mixer care should be taken when removing the plug screw (7/1.1) and this should be covered as a precaution with a cloth until the pressure has been released.

- Carefully open the upper socket head screw (7/1.1) and release the air pressure.
- Remove the lower socket head screw (7/1.2) together with washer (7/2) and O-ring (7/3) and allow the oil to flow out fully into a suitable adequately dimensioned container.

⚠ Waste oil should be disposed of in a proper manner!

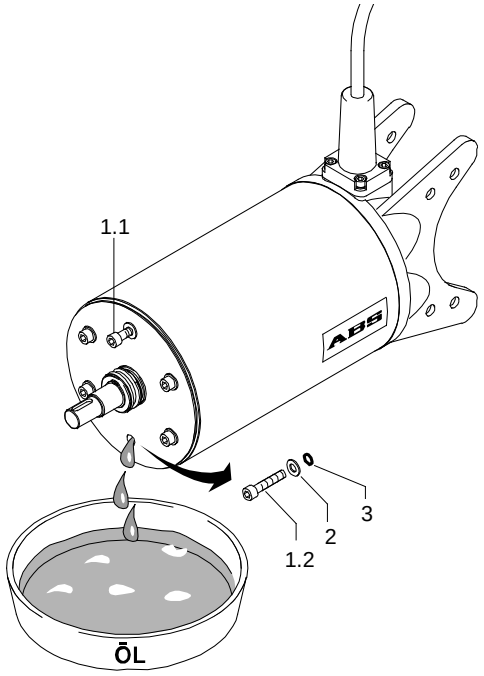

Bild 7 Ölablssen

Fig. 7 Releasing the oil

Öl einfüllen:

ACHTUNG *Die O-Ringe (7/3) **müssen** in jedem Fall erneuert werden, wenn die Schrauben (7/1) gelöst worden sind.*

Filling in the oil:

ATTENTION *The O-rings (7/3) **must** always be renewed if the srews (7/1) have been removed.*

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HINWEIS *Falls die Gleitringdichtung ausgewechselt werden muss, ist es unbedingt erforderlich, nach dem Einbau neues Gleitöl einzufüllen.*

ACHTUNG *Nach Montage der neuen Gleitringdichtung, vor dem Einfülen des neuen Gleitöls ist ein **Drucktes**t durchzuführen. Die Tests sind in **Abschnitt 5** detailliert beschrieben.*

⚠ Zum Einfüllen des neuen Gleitöls ist das Gerät senkrecht mit dem Wellenstumpf nach oben zeigend, auf der Halterung abzustellen und gegen Kippen zu sichern.

- Das Befüllen geschieht in gleicher Weise, wie zuvor das Ablassen, durch eines der Durchgangslöcher des Dichtungsdeckels.

ACHTUNG *Die in der nachstehenden Tabelle angegebenen Füllmengen sind genau einzuhalten. Die zulässige Abweichung von den angegebenen Werten beträgt **max. + 10%***

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 RCP is placed vertically on its bracket with the shaft end faceing 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 (10/53 or 11/71).

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%**.*

Hydraulik / Hydraulic	**Motorgröße / Motorsize**	**Füllmenge der Dichtungsdeckel Oil filling quantity seal cover**
RCP 400	all motor sizes	0,35 l + 10%
RCP 400 Ex	all motor sizes	0,20 l + 10%
RCP 500	all motor sizes	0,60 l + 10%
RCP 500 Ex	all motor sizes	0,35 l + 10%
RCP 800	all motor sizes	0,50 l + 10%
RCP 800 Ex	all motor sizes	0,35 l + 10%

Gleitölspezifikation: **ISO VG Klasse 46**
Specification of the lubrication oil: **ISO VG class 46**

3.2.2 Ölfüllung Getriebe (nur RCP 800)

3.2.2 Oil fill gearbox (only for RCP 800)

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ACHTUNG *Das Getriebe (8/3) ist werkseitig mit hochwertigem Synthetik öl gefüllt.* ***Es ist nicht notwendig das Getriebeöl zu wechseln!***

ATTENTION *The gearbox unit (8/3) has been filled at the works with high grade synthetic oil.* ***It is not necessary to change the gearbox oil!***

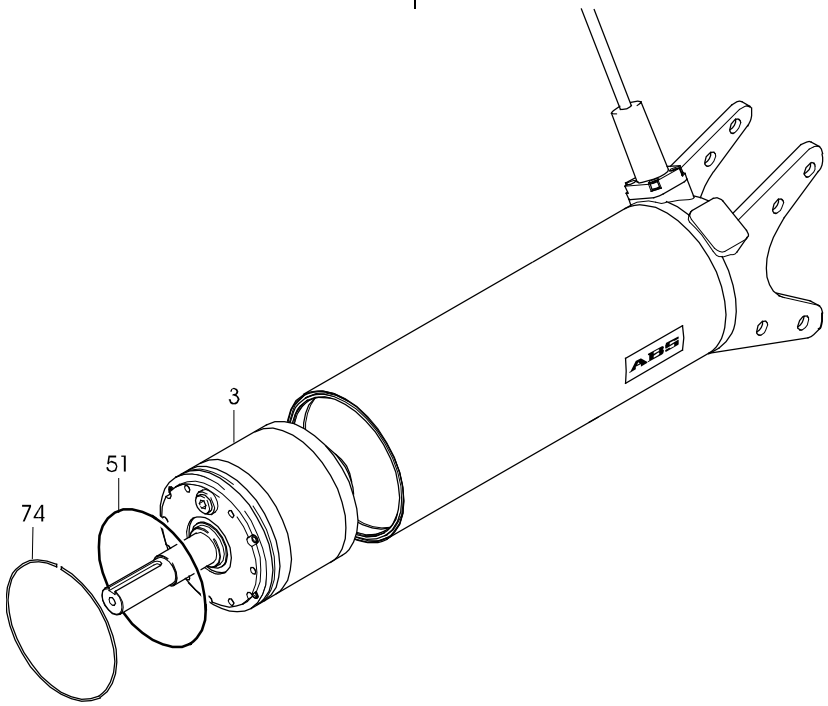

Bild 8 Ölablassen

Fig. 8 Releasing the oil

HINWEIS *Im Falle eines Getriebeschadens wird ein Austauschgetriebe komplett mit Ölfüllung geliefert. Der Ausbau der Getriebeeinheit wird ausfürhlich im* ***Abschnitt 4.4*** *beschrieben.*

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 4.4***

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4. Instandsetzung

4.1 Ausbau der RCP

- RCP gemäß **Abschnitt 3.1** ausbauen und auf einer festen, ebenen und sauberen Fläche abstellen.

⚠ Aus Sicherheitsgründen sollte das RCP während der Demontage / Montage immer mit einem geeigneten Hebezeug bzw. Anschlagmittel gesichert werden. Ebenso ist darauf zu achten, daß das Gerät nicht wegrollen kann.

4.2 Gleitringdichtung und Dichtungsdeckel aus- und einbauen

Demontage der Gleitringdichtung:

- Propeller demontieren.

ACHTUNG *Nach der Demontage der Gleitringdichtung muß diese vor erneuter Verwendung sorgfältig auf Beschädigungen überprüft werden. Bei der Überprüfung muß besonders auf Riefen oder Einlaufspuren geachtet werden. Nur bei einwandfreier Oberflächenbeschaffenheit (glatt, wie poliert) der Gleitflächen und einwandfreien Gummiteilen kann die Gleitringdichtung erneut verwendet werden. Ein dynamischer Dichtungstest* ***(siehe Abschnitt 5)*** *ist in jedem Falle nach der Montage durchzuführen!*

ACHTUNG *Sollten Einlaufspuren an den Dichtflächen sichtbar bzw. fühlbar sein oder Gummiteile spröde und rissig sein, ist die Gleitringdichtung in jedem Fall zu erneuern. Das Gleiche gilt, wenn Wasser (milchige Emulsion) in die Dichtungsdeckel eingedrungen ist. In solchen Fällen ist meist eine defekte Gleitringdichtung die Ursache.*

⚠ Vor Demontage der Gleitringdichtung ist das Gleitöl vollständig abzulassen!

- RCP so auf der Werkbank abstellen, daß die Zylinderschrauben (09 bzw. 10/73) zugänglich sind.

⚠ Vor Demontage der Gleitringdichtung ist das Gleitöl vollständig abzulassen!

3.2.2 Repair

4.1 Removal of the RCP

- Remove the RCP in accordance to **section 3.1** and place it on a solid, clean level surface.

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

4.2 Mechanical seal and seal cover - removal and fitting

Dismantling mechanical seal:

- Remove the propeller.

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 visual 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 seal cover. 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.

- RCP should be placed on a work bench in such a manner that the socket head screws (9 or 10/73) are accessible.

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

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- Paßfeder (9 bzw. 10/19) entfernen.
- Sicherungsring (9/77 bzw. 10/102) lösen.

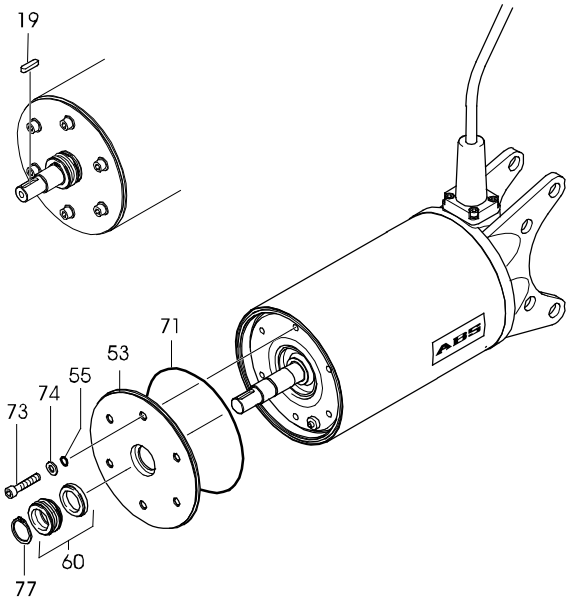


Fig. 9

Dismantling of the mechanical seal RCP 400/500

- Remove key (9 or 10/19).
- Remove circlip (9/77 or 10/102).

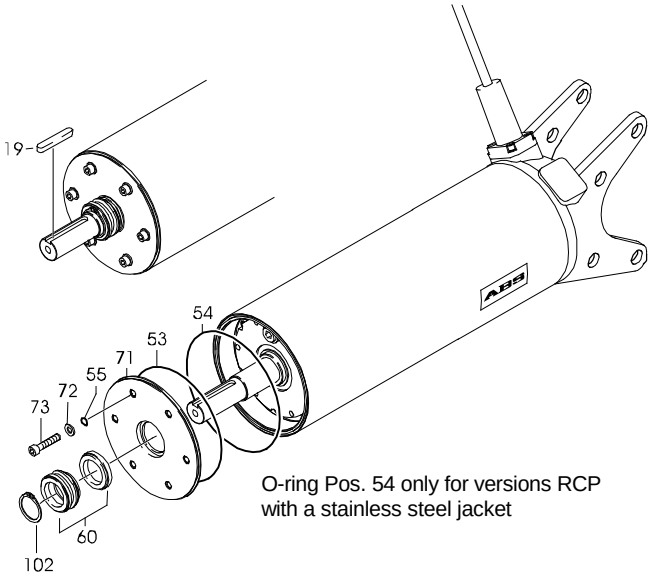
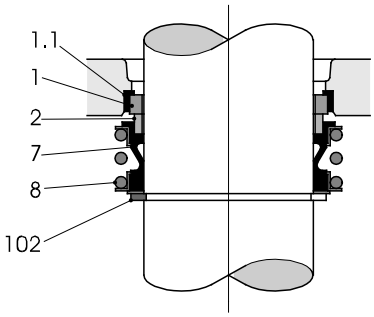


Fig. 10

Dismantling of the mechanical seal RCP 800



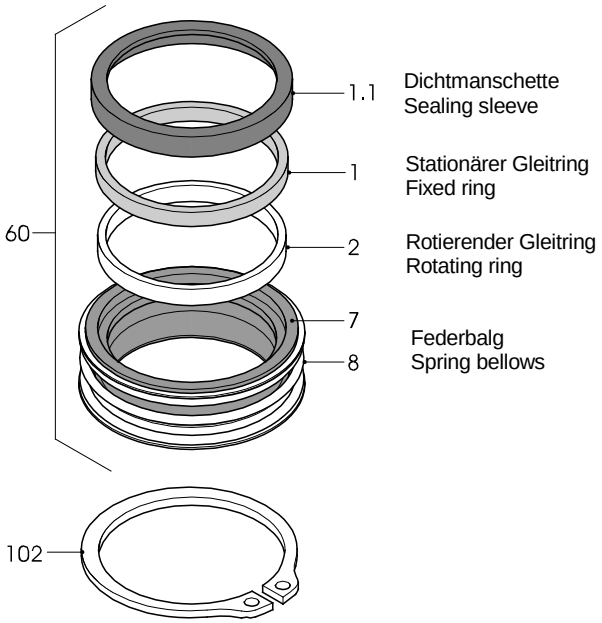


Bild 11 Gleitringdichtung

- Rotierenden Teil der Gleitringdichtung (11/2,7,8) vorsichtig mit drehenden Bewegungen von der Welle ziehen. **(Siehe auch Abb. 9 bzw. 10)**

Fig. 11 Mechanical seal

- Remove the rotating section of the mechanical seal (11/2,7,8) carefully from the shaft in a rotating movement **(see also Figs. 9 or 10)**

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HINWEIS *Soll nur die Gleitringdichtung ausgetauscht werden, so kann der Gegenring auch vorsichtig aus dem Sitz des Dichtungsdeckels (9/53 bzw. 10/71) gedrückt werden. In diesem Fall braucht der Dichtungsdeckel nicht komplett demontiert zu werden.*

- Zylinderschrauben (9/73 bzw. 10/73) zusammen mit Scheiben und Dichtringen herausdrehen.
- Dichtungsdeckel (9/53 bzw. 10/71) zusammen mit dem stationären Gleitring (Gegenring) vorsichtig, ohne anzukanten über die Motor- bzw. bei RCP 800 Getriebewelle ziehen.
- Stationären Gleitring zusammen mit Dichtmanschette vorsichtig aus dem Sitz des Dichtungsdeckels ausdrücken.

HINWEIS *Die Ausführungen mit Edelstahlmantel haben abweichend von der Darstellung in Bild 9 zwei O-Ringe, wie in Bild (10/ 54) dargestellt.*

Einbau der Gleitringdichtungseinheit und des Dichtungsdeckels:

ACHTUNG *Bei der Montage des Dichtungsdeckels sind immer neue O-Ringe (9/71) bzw.10/53 u.54) zu verwenden. Die O-Ringe (9 bzw. 10/55) sind zu erneuern. Die Scheiben (9/74 bzw. 10/72) sind vor Einbau zu überprüfen und im Bedarfsfall zu erneuern.*

- Neuen O-Ring (9/71 bzw. 10/53) einsetzen.
- Dichtungsdeckel (9/53 bzw. 10/71) vorsichtig über Welle in die Zentrierung des Motorgehäuses schieben.
- Scheiben (9/74 bzw. 10/72) sowie neue O-Ringe (9/55 or 10/72) auf die Zylinderschrauben (9/73 or 10/73) aufstecken und diese eindrehen.
- Die Zylinderschrauben (9/73 und 10/73) sind **zuerst überkreuz** und anschließend **mehrmals umlaufend** mit einem **Drehmoment von 33 - 36 Nm** anzuziehen, bis sich die O-Ringe entsprechend gesetzt haben!

NOTE *If the mechanical seal itself is only being replaced then the fixed ring can be carefully pressed out of the seating of the seal cover (9/53 or 10/71). In this case it is not necessary to fully dismantle the seal coverr.*

- Unscrew socket head screws (9/73 or 10/73) together with washers and seals.
- Withdraw the seal cover (9/53 or 10/71) together with the fixed ring carefully and without tilting it over the motor housing or in the case of RCP 800 the gearbox shaft.
- Carefully press out the fixed ring together with sealing sleeve out of its seating in the seal cover lid.

NOTE *The versions using stainless steel jacket have two O-rings as shown in Fig. (10/54) and deviate from the illustration in Fig. 9.*

Fitting of the mechanical seal unit and seal cover:

ATTENTION *When fitting the seal cover lid always use new O-rings (9/71) or (10/53) and 54). Also the o-rings (9 or 10/55) should be renewed! The washers (9/74 and 10/74 should be checkt and be renewed if necessary.*

- Insert new O-ring (9/71 or 10/53).
- Slide seal cover (9/53 or 10/71) carefully over the shaft into the central location in the motorhousing.
- Insert washers (9/74 or 10/72) and new o-rings (9/55 or 10/72) to the socket head screws (9/73 or 10/73) and screw in the socket head screws.
- The socket head screws (9/73 or 10/73) 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!

Anzugsmomente für ABS Edelstahlschrauben: **Tightening torques for ABS-stainless steel screws:**	*M6 = 7 Nm*	*M8 = 18 Nm*	*M10 = 33 Nm*	*M12 = 57 Nm*

*Bei Schraubenverbindungen, die mit **Nord-Lock-Scheiben** gesichert sind (Propellerbefestigungsschraube) ist das angegebene **Anzugsmoment um 10 % zu erhöhen!***

*In the case of screwed connections, using **Nord-Lock-Washers** (propeller fixing screw) the torque figures given above should be **increased by 10%!***

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ACHTUNG *Bei der Montage der Gleitringdichtung ist auf absolute Sauberkeit und Sorgfalt zu achten. Die Dichtflächen der Gleitringe müssen sauber und fettfrei sein, daher ist eine Berührung dieser Flächen zu vermeiden!*

- Den stationären Gegenring (11/1) der Gleitringdichtung zusammen mit der Dichtmanschette (11/1.1) leicht mit sauberem Gleitöl benetzen und mit einer Montagehülse (Sonderwerkzeug) in den Sitz des montierten Dichtungsdeckels eindrücken.
- Die Gleitfläche sowie die Innenseite des Gummibalges (11/2,7,8)des rotierenden Gleitringes leicht mit sauberem Gleitöl benetzen.

ACHTUNG *Um Beschädigungen der Gummiteile (Federbalg 11/7,8) zu vermeiden, ist die Phase am Wellenbund sowie der Einstich für den Sicherungsring (11/102) auf evtl. vorhandene Grate zu überprüfen. Diese sind vor Montage der Dichtung zu entfernen!*

- Federbalg mit Gleitring vorsichtig über Motor- bzw. Getriebewellenende ansetzen und unter drehenden Bewegungen bis auf Anschlag an den stationären Gegenring schieben.
- Federbalg mit Gleitring vorsichtig gegen den stationären Gegenring, bis über die Nut des Sicherungsringes drücken und mit der Montagehülse bis an die Endposition drücken.
- Sicherungsring (9/77 bzw. 10/102) einsetzen.
- Die Gleitringdichtung setzt sich durch mehrmaliges Drehen der Welle von Hand.

ACHTUNG *Nach Montage der Gleitringdichtung ist in jedem Fall eine Dichtigkeitsprüfung durchzuführen.*
(Siehe Abschnitt 5)

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!*

- The fixed ring (11/1) of the mechanical seal together with the sealing sleeve (11/1.1) is lightly smeared with clean lubricating oil and pressed into the seating of the fitted seal cover using a mounting sleeve (special tool).
- The sliding surfaces as well as the insides of the rubber bellows (11/2,7,8) of the rotating ring should be lightly smeared with clean lubricating oil.

ATTENTION *In order to avoid damage to the rubber parts (rubber bellows 11/7,8) check carefully that the transition location on the shaft end, as well as the groove for the circlip (11/102) 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 (9/77 or 10/102).
- 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).

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4.3 Motorwellen-/Festlagereiheit bei RCP 400 und 500 aus- und einbauen

Ausbau der Motorwellen / Festlagereinheit bei RCP 400 und 500:

- Gleitringdichtungseinheit gem. **Abschnitt 4.2** demontieren.

HINWEIS *Soll nur der Wellendichtring (12/16) der Festlagereinheit bei RCP 400 u. 500 ausgetauscht werden, braucht die Welleneinheit nicht ausgezogen werden. Der Wellendichtring kann mit einem Schraubendreher aus seinem Sitz gedrückt werden. Die beidseitig geschlossenen Wälzlager (12/12 u. 18) der RCP 400 u. 500 sind grundsätzlich mit einer Lebensdauer-Fettfüllung versehen.*

4. Motor shaft/fixed bearing unit on RCP 400 and 500 - removal and refitting

Dismantling of motor shaft/fixed bearing unit on RCP 400 and 500:

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

NOTE *If it is only intended to exchange the lipseal (12/16) of the fixed bearing unit on the RCP 400 and 500, 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) (12/12 and 18) of the RCP 400 and 500 should always be filled with a life-time grease fill.*

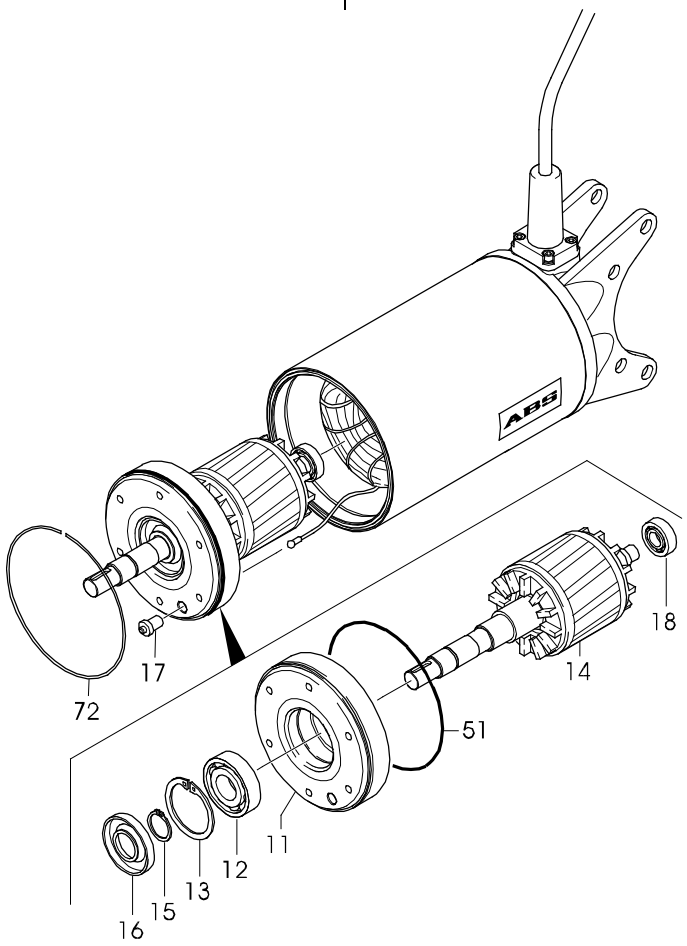

Bild 12 Demontage der Motorwellen-/Festlagereinheit (RCP 400 und 500)

Fig. 12 Dismantling the motor shaft/fixed bearing unit (RCP 400 and 500)

- Mit Kunststoffhammer leicht gegen den Lagerdeckel (12/11) schlagen, damit sich die Festlagereinheit nach hinten setzen kann und somit

- Carefully tap on the bearing lid (12/11) with a plastic hammer so that the fixed bearing unit can be move backwards and take the pressure off the

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der Sprengring entlastet wird.

- Sprengring (12/72) mit Schraubendreher aus der Nut drücken.
- Motorwelle zusammen mit der Festlagereinheit vorsichtig soweit ausziehen, daß die Steckverbindung zwischen DI-Elektrode (12/17) und Anschlußader zugänglich ist.

HINWEIS *Sollte sich die Wellen / Festlagereinheit sich nicht von Hand ausziehen lassen, so kann der Dichtungsdeckel (09/53 bzw. 10/71) als Ausziehhilfe verwendet werden.*

- Zwischen Dichtungsdeckel und Motorgehäuse zwei Kanthölzer legen. Die Durchgangsbohrungen des Dichtungsdeckels müssen mit den Gewindebohrungen fluchten. In drei der Gewindebohrungen (120° versetzt) im Lagerdeckel (12/11) passende Gewindestangen eindrehen und Scheiben mit Muttern montieren. Nun kann die Welle mit der Festlagereinheit durch überkreuzweises Anziehen der Muttern ausgezogen werden.
- DI-Anschlußader (Druckstecker-Verbindung) am DI (12/17) lösen und Wellen / Festlagereinheit komplett herausziehen.
- Radial-Wellendichtring (12/16) aus dem Sitz drücken und Sicherungsring (12/15) von der Wellennut (am Lagerinnenring) entfernen.
- Lagerdeckel (12/11) komplett mit Festlager (12/12) und Sicherungsring (12/13) über die Welle abziehen.
- Sicherungsring (12/13) aus dem Lagersitz des Lagerdeckels entfernen.
- Wälzlager (12/12) mit passender Hülse aus Lagersitz drücken.
- Wälzlager (12/18) von der Welle drücken

HINWEIS *Die Motorwelle ist besonders im Bereich der Dichtlippe des Radialwellendichtringes auf evtl. Einlaufspuren zu kontrollieren. Wenn dies der Fall sein sollte, so kann in den Sitz des Radialwellendichtringes z.B. eine Distanzscheibe (ca. 1 mm dick) eingelegt werden. Die Dichtlippe des neuen Radialwellendichtringes wird dadurch ca. 1 mm axial versetzt.*

clamping ring.

- Press clamping ring (12/72) 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 (12/17) and the connecting lead is accessible.

NOTE *If it is not possible to withdraw the shaft/fixed bearing unit manually, then the seal cover (9/53 or 10/71) can be used as a withdrawal tool.*

- Place two pieces of timber between the seal cover and the motorhousing. The through holes of the seal cover lid must line up with the threaded holes. Screw in three suitable studs into the threaded holes (offset 120°) in the bearing lid (12/11) 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 (12/17) and fully withdraw shaft/fixed bearing unit.
- Press the lip seal (12/16) out of its seating and remove the circlip (12/15) from the groove on the shaft (on the inner bearing ring).
- Withdraw the bearing lid (12/11) complete with fixed bearing (12/12) and circlip (12/13) over the shaft
- Remove circlip (12/13) out of the bearing seating of the bearing lid.
- Press the bearings (12/12) out of the bearing seat using a suitable sleeve.
- Press the bearings (12/18) 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.*

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Montage der Motorwellen / Festlagereinheit bei RCP 400 und 500:

- Die Montage der Festlagereinheit bzw. das Vormontieren erfolgt in umgekehrter Reihenfolge.

⚠ Beim Einbau der vormontierten Wellen / Festlagereinheit ist das Motorgehäuse senkrecht zu stellen und gegen Kippen zu sichern.

ACHTUNG *Vor der Montage der Wellen / Festlagereinheit ist ein passender **Glasseidenschlauch** über die DI-Anschlußader zu stülpen. Somit werden Beschädigungen an der Isolation der DI-Anschlußader bei der Montage vermieden!*

- Passende Ringschraube in das Wellenende eindrehen und Wellen / Festlagereinheit mit einer geeigneten Hebevorrichtung über dem Motorgehäuse soweit absenken, daß noch die DI-Anschlußader (mit Glasseidenschlauch!) in die DI-Elektrode (12/17) gesteckt werden kann.

ACHTUNG *Auf richtige Positionierung des Lagerdeckels zum Motorgehäuse achten**. Der Lagerdeckel hat eine Markierung in Form eines Pfeils**, der in Einbaulage des RW nach oben zeigen muß. Somit ist die richtige Positionierung der DI-Elektrode gewährleistet.*

- Die vormontierte Wellen / Festlagereinheit ist (mit neuem gefetteten O-Ring 12/51) mit einer geeigneten Hebevorrichtung vorsichtig in das Motorgehäuse abzusenken, so daß der Lagerdeckel (12/11) bis an den O-Ring in seinen Sitz gleitet.

ACHTUNG *Bei der Montage der Wellen / Festlagereinheit bei RCP 400 und 500 ist darauf zu achten, daß bei den Motorgehäuseausführungen in Edelstahl der Edelstahlmantel nicht beschädigt wird!*

- Mit einem Kunststoffhammer gegen den Lagerdeckel schlagen, bis der Widerstand des O-Ringes überwunden ist und die Wellen / Festlagereinheit bis auf Anschlag im Motorgehäuse sitzt bzw. die Nut des Sprengringes (12/72) freiliegt.

- Sprengring in Nut einsetzen

ACHTUNG *O-Ring am Lagerdeckel (12/51) erneuern!*

Fitting the shaft / fixed bearing unit on RCP 400 and 500:

- 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 (12/17).

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 RCP. This ensures that the position of the DI-Electrode is correct.*

- The preassembled shaft/fixed bearing unit is (with a newly greased O-ring 12/51) lowered carefully into the motorhousing with the aid of a suitable hoist so that the bearing lid (12/11) slides as far as the O-ring in its seating.

ATTENTION *During assembly of the shaft/fixed bearing unit of the RCP 400 and 500 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. The groove of the circlip (12/72) must be easily accessible.

- Place the circlip into the groove.

ATTENTION *Renew the O-ring on the bearing lid (12/51)!*

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4.4 Getriebeeinheit bei RCP 800 aus- und einbauen

Ausbau der Getriebeeinheit bei RCP 800:

HINWEIS *Zum Ausbauen der Getriebeeinheit braucht der Anschlußkasten nicht demontiert werden.*

HINWEIS *Bei dem RCP 800 ist die untere Lagereinheit im Getriebe integriert. Das Getriebe darf nur als komplette Einheit ausgetauscht werden. Ein Wechsel der Lagereinheit und der internen Wellenabdichtung erübrigt sich im Falle des RCP 800, da es Teile der Getriebeeinheit sind. Das RCP 800 hat keinen DI in der Dichtungsdeckel.*

4.4 Gearbox unit of RCP 800 - removal and fitting

Dismantling of the gearbox unit in the case of RCP 800:

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

NOTE *In the case of the RCP 800 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 RCP 800 as these are parts of the gearbox unit. The RCP 800 has no DI in the seal cover.*

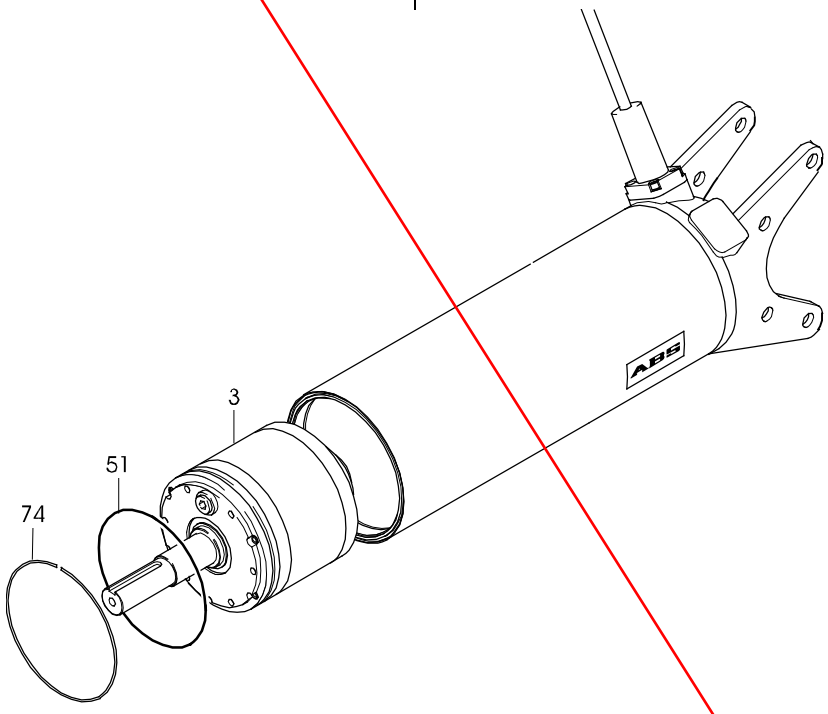

Bild 13 Demontage der Getriebeeinheit (RCP 800)

- Gleitringdichtungseinheit gem. **Abschnitt 4.2** demontieren.
- Mit Kunststoffhammer leicht gegen den Getriebedeckel schlagen, damit sich die Getriebeeinheit nach hinten setzen kann und der Sprengring entlastet wird.
- Sprengring (13/74) mit Schraubendreher aus der Nut drücken.
- Getriebeeinheit (13/03) ausziehen.

Fig. 13 Dismantling the gearbox unit (RCP 800)

- 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 back- wards and take the pressure off the circlip.
- Press out the circlip (13/74) out of its groove with the aid of a screwdriver.
- Withdraw gearbox unit (13/03).

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HINWEIS *Sollte sich die Getriebeeinheit nicht von Hand ausziehen lassen, so kann in die Gewindebohrung der Abtriebswelle eine Gewindestange eingeschraubt werden. Mit Hilfe einer simplen Ausziehvorrichtung (z.B. drei passende Vierkant-Hartholzleisten als Distanzstücke) kann der Getriebeblock mit Hilfe des Dichtungsdeckels, einer Scheibe und Mutter ausgezogen werden*

Einbau der Getriebeeinheit des RCP 800:

⚠ Bei der Montage der Getriebeeinheit ist das Motorgehäuse senkrecht zu stellen und gegen Kippen zu sichern.

- Passende Ringschraube in das Wellenende eindrehen und Getriebeeinheit vorsichtig mit einer geeigneten Hebevorrichtung über dem Motorgehäuse positionieren.
- Die Getriebeeinheit mit einer geeigneten Hebevorrichtung vorsichtig in das Motorgehäuse bis auf Anschlag abzusenken.

ACHTUNG *Bei den RCP 800 - Ausführungen mit Edelstahlmantel ist bei der Montage der Getriebeeinheit darauf zu achten, daß der Edelstahlmantel nicht beschädigt wird!*

- Mit einem Kunststoffhammer vorsichtig gegen den Getriebedeckel schlagen, bis die Nut des Sprengringes (13/74) freiliegt.
- Sprengring in Nut eindrücken

HINWEIS *Vor der Montage des Dichtungsdeckels sind **in jedem Fall neue O-Ringe** zu verwenden!*

- Der Einbau des Dichtungsdeckels erfolgt gem. **Abschnitt 4.2**

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 seal cover, a washer and nut.*

Refitting the gearbox unit of RCP 800:

⚠ 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.

ATTENTION *When assembling RCP 800 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 (13/74) is free.
- Press the circlip into the groove.

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

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

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4.5 Anschlusskasten aus- und einbauen

Demontage des Anschlusskastens:

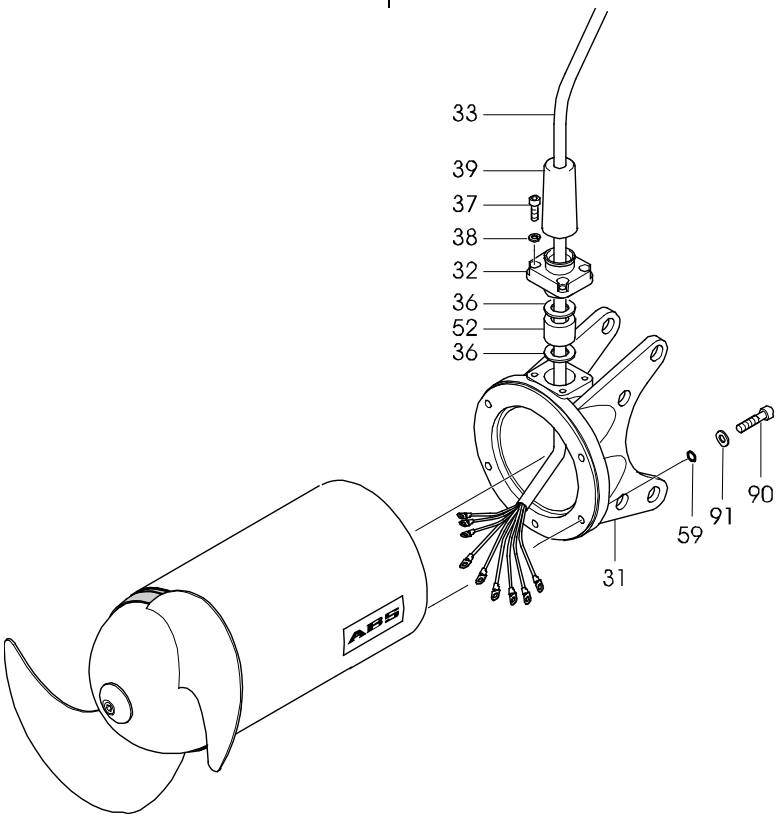

Bild 14 Demontage des Anschlusskastens

HINWEIS *Bedingt durch die Konstruktion der Getriebeversion ist der Ein- und Ausbau der Motorwelle des RCP 800 nur nach vorheriger Demontage des Anschlußkastens möglich.*

HINWEIS *Um nur die Motorwellen / Lagerdeckeleinheit auszubauen, muß die Getriebeeinheit nicht demontiert werden.*

- Zylinderschrauben (14/90) zusammen mit Scheiben (14/91) und Dichtringen (14/59) demontieren.
- Anschlußkasten (14/31) vorsichtig abziehen.

ACHTUNG *Den Anschlußkasten vorsichtig abziehen, da sonst das Klemmbrett bzw. die Anschlußadern abreißen können!*

- Kabelösen von Klemmbrett lösen. Dazu Muttern (15/86) und Scheiben (15/87) demontieren.

Einbau des Anschlußkastens:

4.5 Connection chamber - removal and fitting

Dismantling the connection chamber:

Fig. 14 Dismantling the connection chamber

NOTE *Because of the design of the gearbox version fitting and removal of the motor shaft of the RCP 800 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 (14/90) together with washers (14/91) and o-rings (14/59).
- Carefully lift off the connection chamber (14/31).

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 (15/86) and washers (15/87) beforehand.

Refitting of the connection chamber:

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- Die Montage des Anschlußkastens erfolgt in umgekehrter Reihenfolge.

ACHTUNG *Bei der Montage des Anschlußkastens ist auf die richtige Position des Motorgehäuses zum Anschlußkasten zu achten. Die Abdrückbohrung (einzige Durchgangsbohrung im Motorgehäuse) muß in Einbaulage des Rührwerkes nach unten (tiefster Punkt) zeigen.*

Alle O-Ringe sollten erneuert werden!

4.6 Motorklemmbrett und Kabeldurchführungen aus- und einbauen

- 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 RCP (lowest point).*

All o-rings should be renewed!

4.6 Motor terminal board and cable inlets - removal and fitting

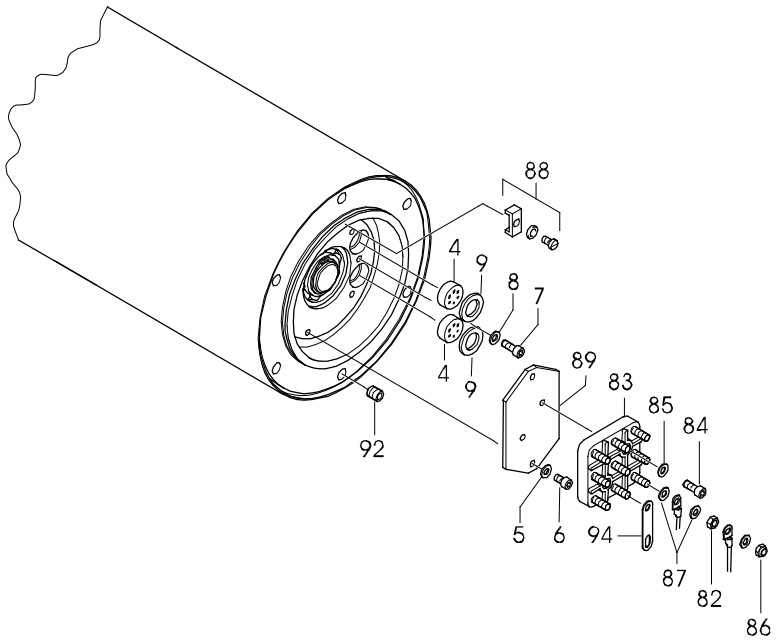

Bild 15 Demontage Motorklemmbrett / Kabeldurchführungen

Fig. 15 Dismantling motor terminal board/cable inlets

- Kabelösen wicklungsseitig abtrennen und Adern kennzeichnen.

ACHTUNG *Umgehend nach abtrennen jeder einzelnen Kabelöse ist die jeweilige Litzen zu kennzeichnen!*

- Klemmbrett (15/83) und Montageplatte (15/89) demontieren. Dazu Zylinderschrauben (15/84) und Scheiben (15/ 85) demontieren.

- Kabeldurchführungen (15/4) ausbauen. Dazu Zylinderschrauben (15/7) zusammen mit Scheiben (15/8) demontieren.

- Druckscheiben (15/9) entfernen.

- Kabeldurchführungen (15/4) aus der Senkung

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

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

- Dismantle terminal board (15/83) and mounting plate (15/89). This is done by opening the socket head screws (15/84) and removing the washers (15/85).

- Remove the cable inlets (15/4). To do this open socket head screws (15/7) and washers (15/8).

- Remove the compression washers (16/9).

- Press the cable inlets (15/4) out of the bore and

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drücken und über Wicklungslitzen schieben.

slide them over the stator leads.

Litzenkennzeichnung der Wicklung / Lead designation of stator

Wicklungs-Litzenstrang <u>mit Steuerleitungen</u> Stator lead <u>with control circuit</u>			***Wicklungs-Litzenstrang <u>ohne Steuerleitungen</u> Stator lead <u>without control circuit</u>***		
U1	***V1***	***W1***	***U2***	***V2***	***W2***
lang abisolieren long length of insulation removed	kurz abisolieren short length of insulation removed	nicht abisolieren do not remove insulation	lang abisolieren long length of insulation removed	kurz abisolieren short length of insulation removed	nicht abisolieren do not remove insulation
Steuerleitungen: *DI / F0 / F1 entsprechend kennzeichnen.* ***Control circuit leads:*** *DI / F0 / F1 should be suitably identified.*					
DI	***F0***	***F2***			
lang abisolieren long length of insulation removed	kurz abisolieren short length of insulation removed	nicht abisolieren do not remove insulation			

HINWEIS *Der Einbau des Anschlußkastens ist in **Abschnitt 4.5**, die Montage des Anschlußkabels in **Abschnitt 4.8** beschrieben.*

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 Motorwellen / Festlagereinheit bei RCP 800 aus- und einbauen

Ausbau der Motorwellen / Festlagereinheit bei RCP 800:

- Klemmbrett und Kabeldurchführungen gem. **Abschnitt 4.6** demontieren.
- Nun kann die Wellen / Festlagereinheit, bestehend aus Motorwelle (16/14) und Lagerdeckel (16/35) mit geeignetem Hebezeug ausgezogen werden.
- Sicherungsring (16/16) entfernen und Motorwelle (16/14) aus Lagerdeckel (16/35) drücken.
- Sicherungsring (16/15) entfernen und Wälzlager aus dem Lagerdeckel drücken.
- O-Ring (16/56) aus Lagersitz lösen und prüfen bzw. im Bedarfsfall erneuern.
- O-Ringe (16/63 bzw. 57) bei Montage erneuern.

4.7 Motor shaft / fixed bearing unit of RCP 800 - removal and fitting

Dismantling the motor shaft/fixed bearing unit in the case of RCP 800:

- Dismantle terminal board and cable inlets as described in **Section 4.6**
- It is now possible to withdraw the shaft/fixed bearing unit consisting of motor shaft (16/14) and bearing lid (16/35) using a suitable hoist.
- Remove circlip (16/16) and press the motor shaft (16/14) out of the bearing lid (16/35).
- Remove circlip (16/15) and press the bearing out of the bearing lid.
- Remove the O-ring (16/56) out of the bearing seating, check and replace if necessary.
- O-ring (16/63 or 16/57) should be renewed.

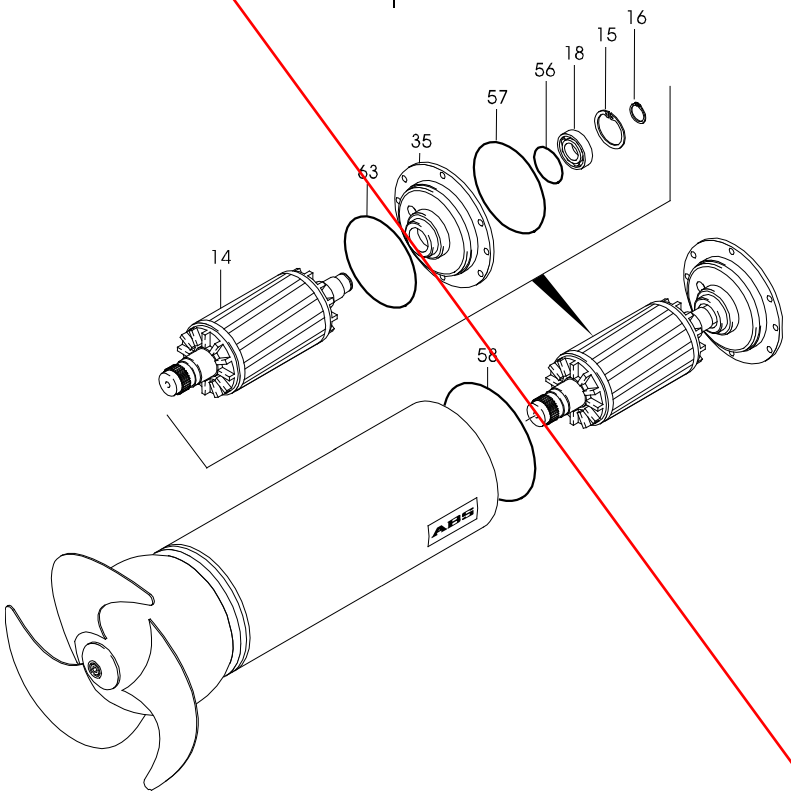

Bild 16 Aus- und Einbau bau der Motorwellen / Festlagereinheit bei RCP 800:

Fig. 16 Dismantling and refitting of the motor shaft of the RCP 800

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Einbau der Motorwellen / Festlagereinheit bei RCP 800:

- Die Montage der Motorwelle bzw. Lagereinheit erfolgt in umgekehrter Reihenfolge.

ACHTUNG *Aus Sicherheitsgründen vor der weiteren Montage alle O-Ringe (16/63,57 und 56) erneuern!*

(Die alten O-Ringe sollten nur im Notfall und nach sorgfältiger Prüfung wieder verwendet werden).

⚠ Bei der Montage der Wellen / Festlagereinheit ist das Motorgehäuse senkrecht zu stellen und gegen Kippen zu sichern.

- Passende Ringschraube in das Wellenende eindrehen und Wellen / Festlagereinheit vorsichtig mit einer geeigneten Hebevorrichtung so über dem Motorgehäuse positionieren, daß die Markierung (Gußrippe) nach oben zeigt und somit die Bohrungen des Motorgehäuses mit denen des Lagerdeckels fluchten.
- Die vormontierte Wellen / Festlagereinheit ist (mit neuem gefetteten O-Ring!) vorsichtig in das Motorgehäuse abzusenken, bis der Lagerdeckel (16/35) bis an den O-Ring in seinen Sitz gleitet.

ACHTUNG *Bei der Montage der Wellen / Festlagereinheit bei RCP 800 ist darauf zu achten, daß bei den Motorgehäuseausführungen in Edelstahl der Edelstahlmantel nicht beschädigt wird!*

- Mit einem Kunststoffhammer gegen den Lagerdeckel schlagen, bis der Widerstand des O-Ringes überwunden ist und die Wellen / Festlagereinheit bis auf Anschlag im Motorgehäuse sitzt.

HINWEIS *Vor der Montage des Anschlußkastens sollte eine Schraube (17/90) probeweise eingedreht werden, um die Flucht der Durchgangslöcher des Lagerdeckels und der Gewindebohrungen des Motorgehäuses zu gewährleisten.*

Refitting the motor shaft/fixed bearing unit of the RCP 800:

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

ATTENTION *We recommend that all O-rings (16/63, 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.

- Screw a suitable eyebolt into the shaft end and position the shaft/fixed 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/fixed bearing unit is carefully lowered into the motorhousing (using a newly greased O-ring!) until the bearing lid (16/35) slides in its seating as far as the O-ring.

ATTENTION *When assembling the shaft/fixed bearing unit of the RCP 800 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/fixed bearing unit slides fully home in the motorhousing.

NOTE *Before connecting the connection chamber a screw (17/90) 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.*

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4.8 Anschlußkabel aus- und einbauen

Demontage:

- *Anschlußkasten gemäß **Abschnitt 4.5** demontieren.*

4.8 Connection cable - removal and fitting

Dismantling:

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

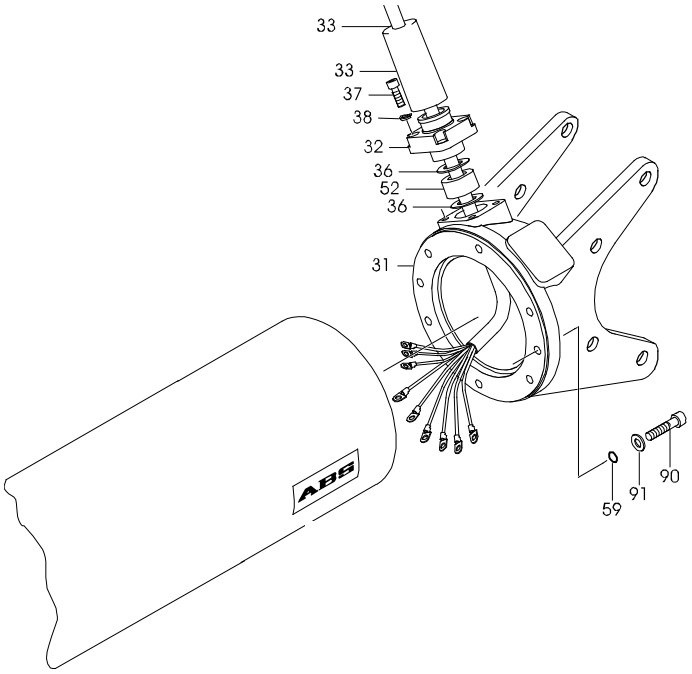

Bild 17 Anschlußkabel De- und Montage

- Knickschutztülle (17/33) über Wulst der Kabelkappe (17/32) ziehen.
- Zylinderschrauben (17/37) zusammen mit Federringen (17/38) herausdrehen.
- Anschlußkabel zusammen mit Kabelkappe (17/32), Dichtring (17/52), und Scheiben (17/36) aus Anschlußkasten (17/31) ziehen.

Montage:

- Vor dem Einbau des neuen Anschlußkabels ist der Mantel bzw. die einzelnen Adern entsprechend abzuisolieren und zu kennzeichnen. Das alte Kabel dient als Muster.

HINWEIS *Bei der Konfektionierung des Kabels ist der Mantel des Kabels ca. 150 mm - 200 mm - und die Isolierung der einzelnen Adern (für Quetschverbindung der Kabelösen) ca. 5 mm abzuisolieren.*

- Knickschutztülle (17/33) Kabelkappe (17/32)

Fig. 17 Dismantling and refitting of the cables

- Pull the antikink sleeve (17/33) over the thickened section of the cable cap (17/32).
- Unscrew socket head screws (18/37) together with spring washers (18/38).
- Withdraw the connection cable together with cable cap (17/32), seal (17/52), and washers (17/36) out of the connection chamber (17/31).

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.

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 (17/33) cable cap

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und Dichtring mit Scheiben (17/52 bzw.36) auf das fertig konfektionierte Kabel aufschieben.

- Kabelösen (Quetschverbinder) montieren, falls noch nicht geschehen
- Erdungsader des Anschlußkabels mit der Erdungsklemme (15/88) montieren
- Kabelösen der Litzen entsprechend der Adernbezeichnungen auf dem Klemmbrett montieren
- Dichtring (17/52) zusammen mit Scheiben (17/36) einsetzen

ACHTUNG *Vor dem Anziehen der Schrauben und Federringe (17/ 37 bzw. 38) der Kabelkappe (17/32) ist zu überprüfen, ob der Mantel des Anschlußkabels ca. 10 - 20 mm aus dem Dichtring übersteht und somit eine sichere Abdichtung zwischen Kabel und Dichtring gewährleistet ist.*

(17/32) and seal with washers (17/52 or 17/36) on to the prepared cable.

- Fit the cable eyelets (crimped connectors), if this has not already been done.
- Attach the earth clamp (15/88) 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 (17/52) together with washers (17/36).

ATTENTION *Before tightening the screws and washers (17/37 or 38) of the cable cap (17/32) 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.*

Bild 18 RCP 400 und 800 Lagerdeckel mit Klemmbrett

Fig. 18 RCP 400 and 800 bearing lid with terminal board

ACHTUNG *Litzenkennzeichnung der Wicklung **(Tabelle auf Seite 25)** und Position der DI-Lasche (18 bzw. 19/94) **- tiefster Punkt in Einbaulage -** beachten!*

HINWEIS *Soll das alte Anschlußkabel wiederverwendet werden, so ist es soweit zu kürzen, daß es nicht an der meist eingeschnürten Stelle des Mantels im Dichtring sitzt. Dabei ist auf die Markierungen der Kabellitzen zu achten!*

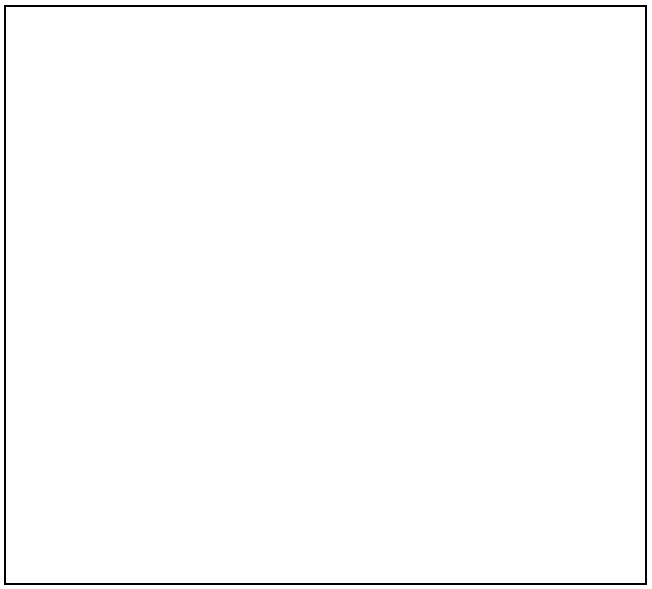

Bild 19 RCP 500 Lagerdeckel mit Klemmbrett

Fig. 19 RCP 500 bearing lid with terminal board

ATTENTION *Pay particular attention to the lead identification of the stator **(Table on Page 25)** and the positioning of the DI-bracket (18 or 19/94) - **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*

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Der Dichtring (17/52) ist in jedem Fall zu erneuern!

- DI-Lasche (20/94) auf Klemmbrett montieren und mit Steuerader **DI** verschrauben.
- Steueradern der Temperaturwächter **F0** und **F1** auf Klemmbrett montieren.

HINWEIS *Bei einigen Ausführungen der RCP 500 und 800 Baureihe sind abweichend von der bildlichen Darstellung zwei Kabeleinführungen im Anschlußkasten vorhanden.*

ACHTUNG *Vor weiterer Montage sollte mit einem Durchgangsprüfer die richtige Verschaltung überprüft werden!*

4.9 Lagerdeckel bei RCP 400 bis 800 aus- und einbauen

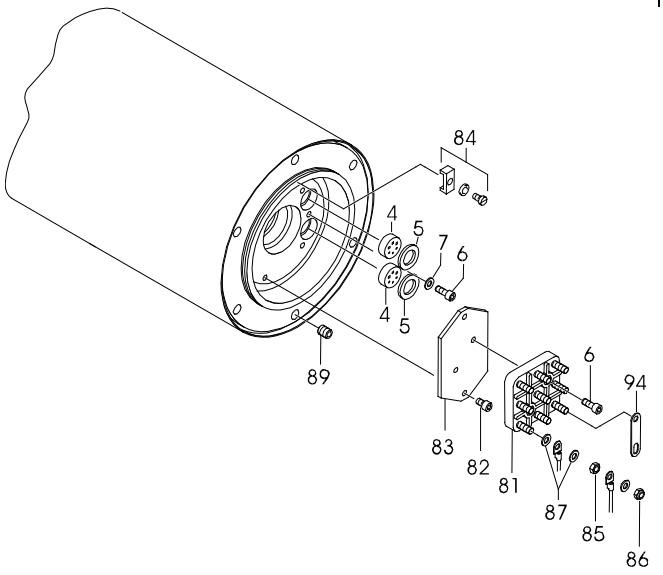

Bild 20 Ein- und Ausbau des Lagerdeckels

- Anschlußkastens gemäß **Abschnitt 4.5** demontieren.
- Montageplatte (20/83) und Klemmbrett (20/81) demontieren
- Wicklungslitzen direkt hinter der Quetschverbindung der Kabelösen abtrennen.
- Zylinderschrauben (20/6) zusammen mit Scheiben (20/7) demontieren.
- Litzendurchführungen (20/4) ausdrücken und über Wicklungs- und Steuerlitzen ziehen.
- Lagerdeckel (20/3) kann nun ausgezogen werden.

leads!
In all cases the seal (17/52) should be renewed!

- Mount the DI-bracket (20/94) to the terminal board 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 RCP 500 and 800 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!*

4.9 Bearing lid of RCP 400 to 800 - removal and fitting

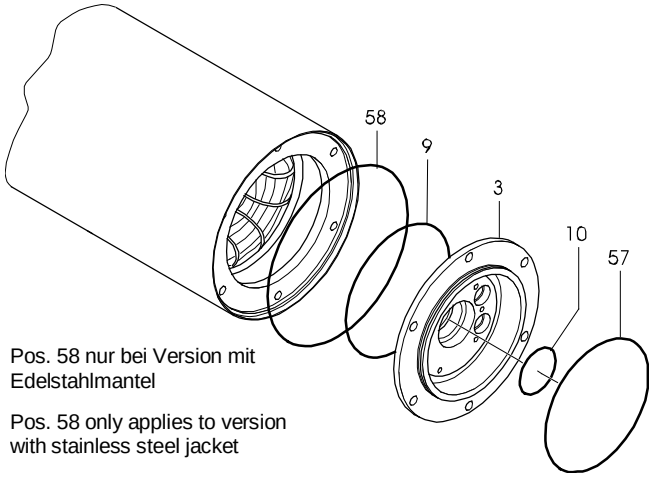

Fig. 20 Fitting and removal of the bearing lid

- Remove connection chamber as described in **Section 4.5.**
- Dismantle mounting plate (20/83) and terminal board (20/81).
- Disconnect stator leads directly at the crimped connectors of the cable eyelets.
- Remove socket head screws (20/6) together with washers (20/7).
- Press out the lead inlets (20/4) and withdraw over the stator and control circuit leads
- It is now possible to withdraw the bearing lid (20/3).

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- Die Montage erfolgt in umgekehrter Reihenfolge.

ACHTUNG *Bei der Montage des Lagerdeckels und des Klemmbrettes ist auf die Position der Litzendurchführungen zur Abdrückbohrung (Durchgangsbohrung im Motorgehäuse) zu achten. Die DI-Lasche (19 bzw. 20/94) muß in Einbaulage des RW am tiefsten Punkt montiert werden.*

HINWEIS *Bei der Montage sind die Hinweise bzw. Montageschritte wie in* ***Abschnitt 4.8*** *beschrieben zu beachten.*

4.10 Motorwicklung ein- und ausbauen

Die Wicklungen der RCP 400-800 Baureihe sind in die Motorgehäuse eingepresst. Die Motorgehäuse sind komplett als Baugruppe erhältlich, können jedoch auch mit Hilfe von speziellen Vorrichtungen und Werkzeugen demontiert und wieder gefügt werden. Die nötigen Vorrichtungen und Sonderwerkzeuge können auf Anfrage geliefert werden.

Ausbau:

- Um die Wicklung der RCP demontieren zu können, muß das RCP vollständig, bis auf das Motorgehäuse demontiert sein.
- Motorgehäuse propellerseitig auf eine ebene feste Unterlage (Pressentisch oder geeignete Konsole) stellen und Außpressstempel (Sonderwerkzeug) in der Statorbohrung zentrieren.

⚠ Motorgehäuse gegen Herunterfallen sichern!

- Mit hydraulischer Presse die Motorwicklung aus dem Motorgehäuse pressen.

ACHTUNG *Die Wicklung kann nicht zerstörungsfrei ausgepreßt werden. Das Statorpaket jedoch kann in der Regel und nach sorgfältiger Kontrolle neu bewickelt werden.*

ACHTUNG *Bei Versionen mit Edelstahlmantel ist darauf zu achten, daß dieser nicht beschädigt wird. Das Motorgehäuse ist ggf. so unterstützen, (z.B. durch passende Konsole) daß die Wicklung komplett ausgepreßt werden kann, falls der Pressentisch nicht über eine entsprechende Vorrichtung- oder die Presse nicht über genügend Hub verfügt.*

- 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 (19 or 20/94) must be at the lowest position when the RCP is installed.*

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

4.10 Stator - removal and fitting

Stators of the RCP 400-800 series are pressed into the motorhousing. Motorhousings 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 RCP it is necessary to totally dismantle the RCP 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.*

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Einbau:

- Motorgehäuse halterungsseitig mit Distanzstücken auf eine ebene feste Unterlage (Pressentisch oder Konsole) stellen und gegen Herunterfallen sichern.

ACHTUNG *Bei Ausführungen mit Edelstahlmantel steht dieser halterungsseitig einige mm über das Gußteil. Um eine feste Unterlage zu gewährleisten und* ***um Beschädigungen am Edelstahlmantel zu vermeiden, muß das Gußteil mit geeigneten Distanzstücken oder einem Distanzring unterlegt werden.*** *(Der Edelstahlmantel liegt nun nicht mehr auf dem Pressentisch auf und durch die Kraft der Presse wird nur das Gußteil belastet!)*

- Litzenbündel so in der Statorbohrung einlegen, daß sie beim Einpressen nicht beschädigt werden können.

- Wicklung vorsichtig über der Statorsitzbohrung des Motorgehäuses ansetzen und zentrieren.

HINWEIS *Schwere Wicklungen können auch mit einer Spezialvorrichtung (Sonderwerkzeug) in der Statorbohrung geklemmt werden und mit einem entsprechend dimensionierten Hebezeug angehoben werden.*

ACHTUNG *Die Statorsitzbohrung und auch das Blechpaket der Wicklung müssen absolut sauber sein. Es dürfen keine Späne oder Grate vorhanden sein!*

- Einpressglocke (Sonderwerkzeug) vorsichtig über den Wickelkopf stülpen. Dabei ist darauf zu achten, daß die Lackschicht (Isolation) des Wickelkopfes nicht beschädigt wird.

- Pressenstempel vorsichtig bis auf die Einpressglocke absenken und Wicklung bis zum Anschlag der Einpressglocke einpressen.

HINWEIS *Bei einigen RCP-Typen wird zusätzlich zur Einpressglocke noch eine entsprechende Verlängerung (Sonderwerkzeug) benötigt, um die Wicklung auf Endposition zu pressen.*

5. Tests

Um nach einer Reparatur eine einwandfreie Funktion, besonders der Dichtungselemente zu gewährleisten sind folgende Tests unbedingt mit äußerster Sorgfalt durchzuführen.

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 RCP 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.*

5. Tests

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

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ACHTUNG *Motor kann nur mit komplett montierter Halterung abgedrückt bzw. angeschlossen werden!*

ACHTUNG *Der Drucktest muß vor Einfüllen des Gleitöls in die Dichtungsdeckel erfolgen!*

5.1 Statischer Drucktest

ACHTUNG *Einseitiges Abdrücken ist nur an der Dichtungsdeckel möglich!*

- Eine Zylinderschraube (7/11) , Scheibe (7/2) und Dichtring (7/3) demontieren.
- Druckluftstutzen für Dichtungsdeckel durch die Durchgangsbohrung der Dichtungsdeckel einführen und soweit in das Gewinde des Lagerdeckels eindrehen, bis der Dichtring der Vorrichtung verpresst wird.
- Untere Zylinderschraube (17/ 90), die zur Madenschraube (15/92) im Motorgehäuse fluchtet zusammen mit Scheibe (17/91) und Dichtring (17/59) herausdrehen.
- Madenschraube (15/92) herausdrehen.

HINWEIS *Zwei unterschiedliche Druckluftstutzen für M10 Gewinde sind als Sonderwerkzeug erhältlich.*

- Beide Druckluftanschlüsse (an Dichtungsdeckel bzw. Halterung) **gleichzeitig** mit **max. 0,5 bar** Luftdruck beaufschlagen.

ACHTUNG *Es muß beim Drucktest ein beidseitiger Druckausgleich gewährleistet sein. Anderenfalls besteht die Gefahr, daß bei einseitiger Druckbeaufschlagung halterungsseitig der Radialwellendichtring aus seinen Sitz gedrückt wird.*

- Motor in geeignetes Prüfbecken tauchen und einige Sekunden mit angeschlossenen Druckluftanschlüssen **(bei max. 0,5 bar)** getaucht lassen.
- Nach dem Drucktest sind die Gewindebohrungen sorgfältig zu verschließen. Die Madenschraube (15/92) ist zusätzlich mit **LOCTITE TYP 242** zu einzuschrauben!

ACHTUNG *Um eine einwandfrei Funktion der Gleitringdichtung zu gewährleisten, sollte nach Möglichkeit ein dynamischer Drucktest durchgeführt werden.*

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 seal cover!*

5.1 Static pressure test

ATTENTION *One-sided pressure testing is only possible on the seal cover!*

- Remove a socket head screw (7/11), washer (7/2) and sealing ring (7/3).
- The compressed air nozzle for the seal cover is fed in through the hole in the seal cover 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 (17/90), which lines up with the grub screw (15/92) in the motorhousing together with washer (17/91) and sealing ring (17/59).
- Unscrew the grub screw (15/92).

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 seal cover or bracket).

ATTENTION *During the pressure test care should be taken that pressure equalisation 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 (15/92) 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.*

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5.2 Dynamischer Drucktest

Beim dynamischen Drucktest wird genauso verfahren, wie beim statischen Abdrücken des Motors. Zusätzlich wird der Motor an das Netz angeschlossen und im Prüfbecken (ohne Propeller und Paßfeder in der Welle!) anlaufen gelassen. So kann die einwandfreie Funktion der Gleitringdichtung sichergestellt werden.

⚠ Der Netzanschluß darf nur von einer Elektrofachkraft unter Einhaltung sämtlicher einschlägiger Sicherheitsbestimmungen vorgenommen werden!

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 Messen der Wicklungswiderstände

Durch das Messen der Wicklungswiderstände und dem Vergleichen mit den Vorgabewerten der nachstehenden Tabelle, kann die Wicklung überprüft werden.

ACHTUNG *Der Wicklungswiderstand muß an*

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.

ATTENTIO *The stator resistance should be*

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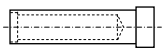
	den Wicklungslitzen des Motors, im kalten Zustand gemessen werden.	***N***	*checked at the stator leads on the motor while this is cold.*
HINWEIS	*Die Werte in der Tabelle gelten nur für die Wicklung ohne den Widerstand des Anschlußkabels.*	***NOTE***	*The values in the Table apply only to the stator without the resistance of the connection cable.*

Tabelle Wicklungswiderstände: **Table stator resitances:**			**(Toleranz +/- 10%)** **(Tolerance +/- 10%)**
RCP Baureihe **RCP Range**	**Motor**	**Nennspannung** **Rated voltage** **[V]**	**Wicklungswiderstand** **Stator resitance** **[Ω]**
RCP 400 50 Hz	A30/8	400 V	**5,90**
	A40/8	400 V	**1,80**
RCP 400 60 Hz	A35/8	460 V	
	A46/8	460 V	
RCP 500 50 Hz	A50/12	400 V	**3,40**
	A75/12	400 V	**2,10**
	A100/12	400 V	**1,50**
RCP 500 60 Hz	A60/12	460 V	
	A90/12	460 V	
	A120/12	460 V	
RCP 800 50 Hz	A110/4	400 V	**1,40**
	A150/4	400 V	**0,95**
	A220/4	400 V	**0,55**
RCP 800 60 Hz	A130/4	460 V	
	A170/4	460 V	
	A250/4	460 V	

Tabelle Spezialwerkzeuge: **Table special tools:**		
Werkzeug / Vorrichtung **Tool / fixture**	**Art.-Nr.** **Part-No.**	**Skizze** **Sketch**
Spezialwerkzeug für Klemmenband (Band-IT Werkzeug) Special tool for fixing strap (Band-IT Clamping tool)	**9 699 0340**	
Montagehülse für Gleitringdichtung 30 Assembly tool for mechanical seal 30		

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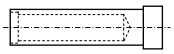
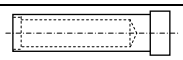
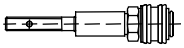
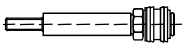
Montagehülse für Gleitringdichtung 40 Assembly tool for mechanical seal 40		
Montagehülse für Gleitringdichtung 45 Assembly tool for mechanical seal 45		
Druckluftstutzen für Ölkammmer M10 Air nozzle for seal cover M10		
Druckluftstutzen für Anschlußkasten M10 Air nozzle for connection chamber M10		
Auspresswerkzeug (Stator auspressen) Stator tool (press out the stator)		
Einpresswerkzeug (Stator einpressen) Stator pressing tool (press in the stator)		

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SECTION 7

RECOMMENDED SPARE PARTS

RECOMMENDED SPARE PARTS

We recommend that the Owner keep one (1) repair kit in stock. The repair kit includes bearings, mechanical seals and O-rings.

As of May 2023, the price for one (1) repair kit (part # 61702076-NG) is $1,721.65.

SECTION 8

MOISTURE AND OVERTEMP RELAYS

ABS temperature and leakage relay CA 462

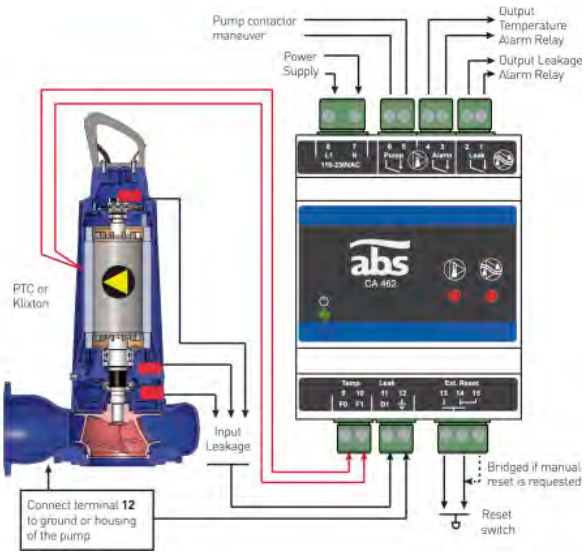
CA 462 is designed to spy and detect leakage and temperature in pumps and mixers.
The amplifier is housed in a norm enclosure fitted for DIN-rail mounting.
The unit is available in two executions, 24 VDC or 110-230 VAC supply.
To minimize the risk of false alarms the leakage failure has to be detected 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.

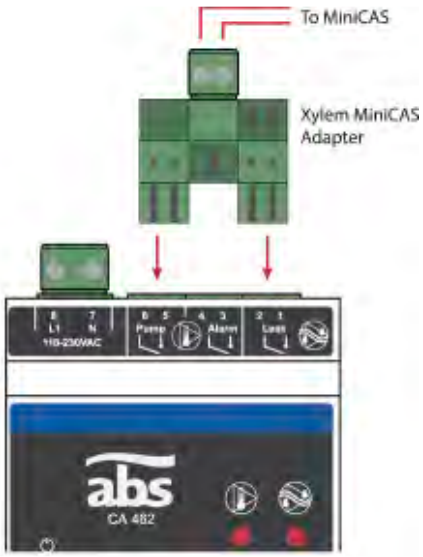
Features

- Leakage monitoring with 10 sec alarm delay
- Temperature monitoring
- Relay output 250 VAC 3 Ampere
- Connection via plug in connectors
- DIN-rail mounted

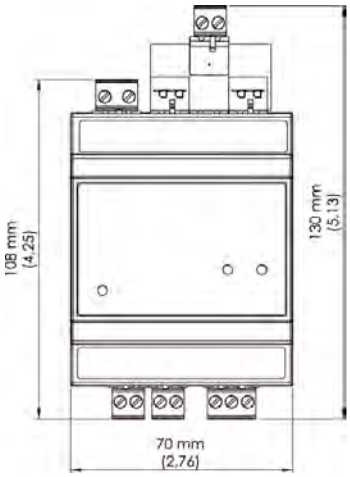
Technical specifications

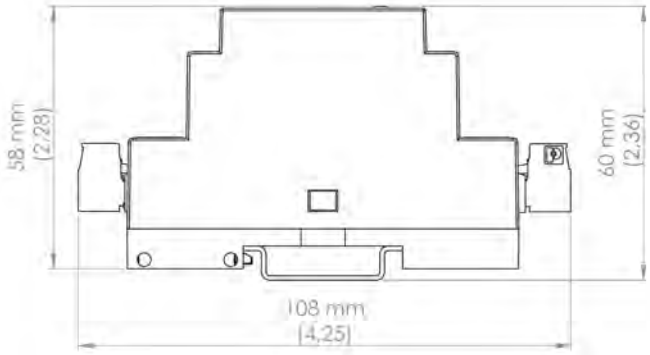
Leakage detection threshold (+/-10%)	< 100 kohm
Temp. input threshold (+/-10%)	> 3.3 kohm (PTC / Klixon)
Leakage alarm delay	10 seconds
Ambient operating temperature	-20 to +70 °C (-4 to +158 °F)
Ambient storage temperature	-30 to +80 °C (-22 to +176 °F)
Degree of protection	IP 20, NEMA: Type 1
Housing 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	**16907006**: 110-230 VAC / **16907007**: 18-36 VDC SELV or Class 2
Fuse	Max 10 A
Terminal wire size	Use copper (Cu) wire only. 0.2 - 2.5 mm^2 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 9

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.