



CENTRIFUGE FEED PUMP STATION

HANDOVER PACKAGE

Oxley WRP

Document No: JHG-8542-HOP-003

**Controlled Copy
No:** 1

Revision: B

Date: 10 May 2012

Revision List

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[illegible]

Name		Signature	Date
JHG	Tate Brammer		11/05/12
JHG	Mason Grieco		11/5/12

Name		Hard Copy	Soft Copy	Signature	Date
QUU	Paul Fisher	1	1		16/5/12
JHG	Mason Grieco	1	1		16/5/12



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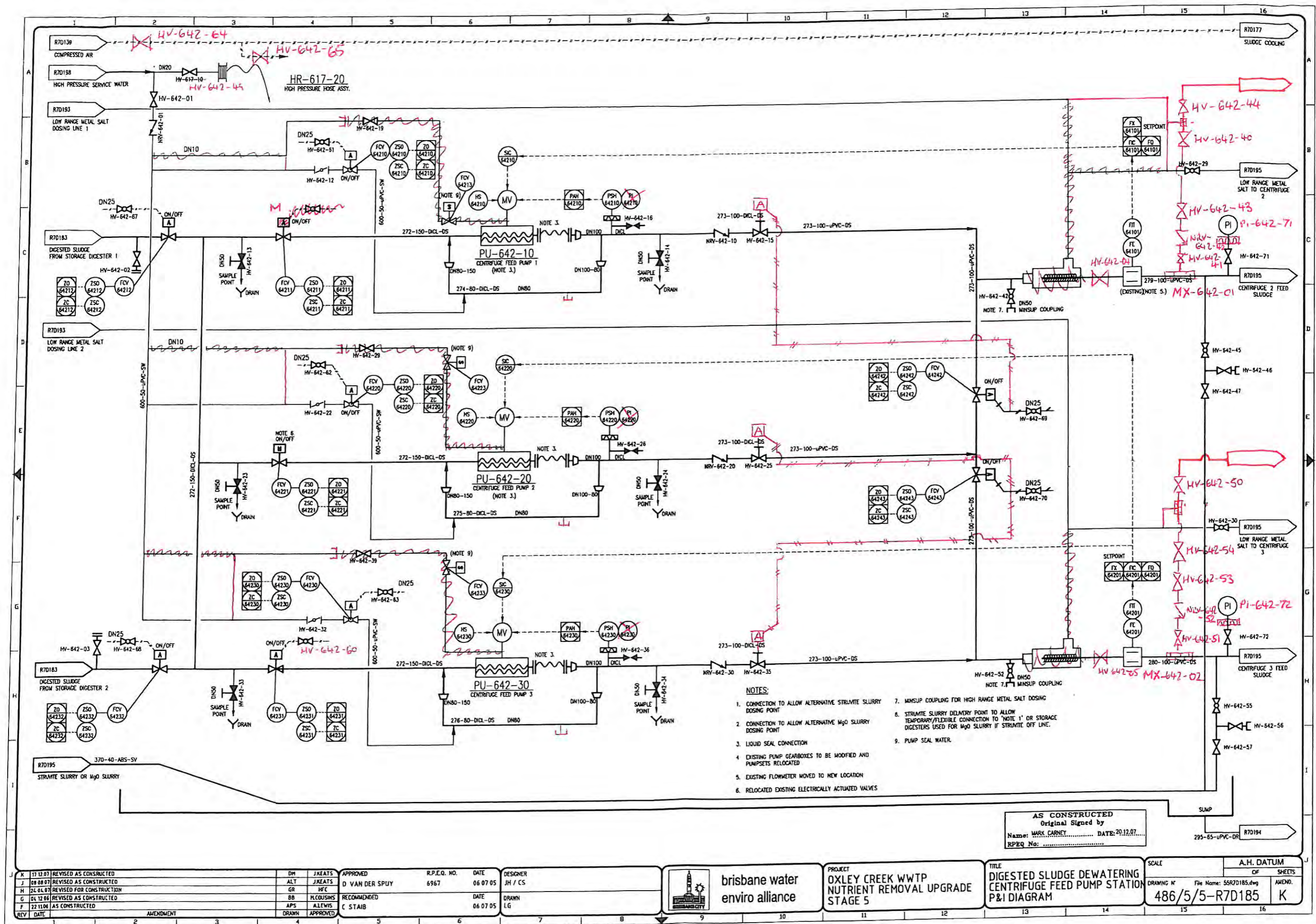
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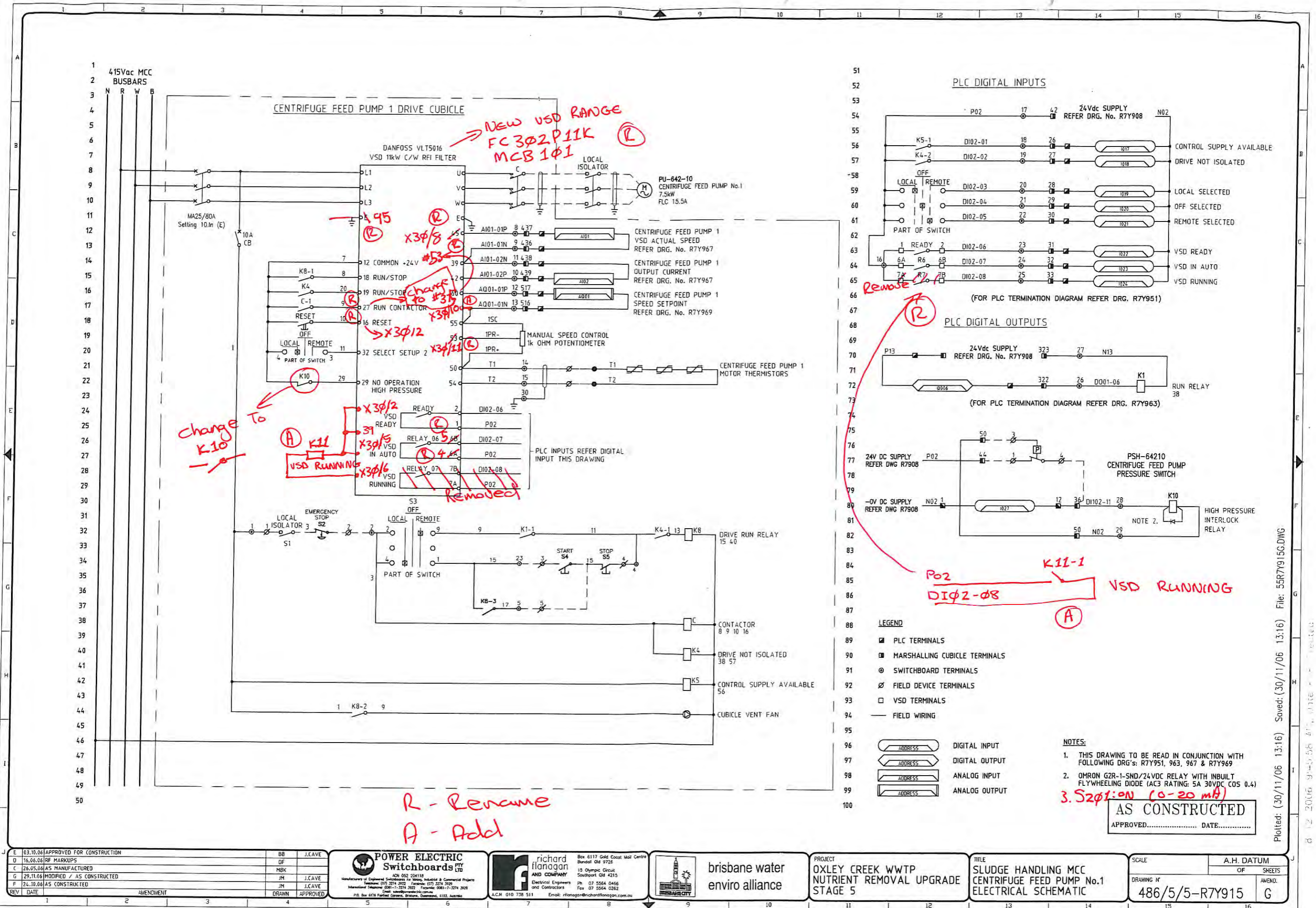
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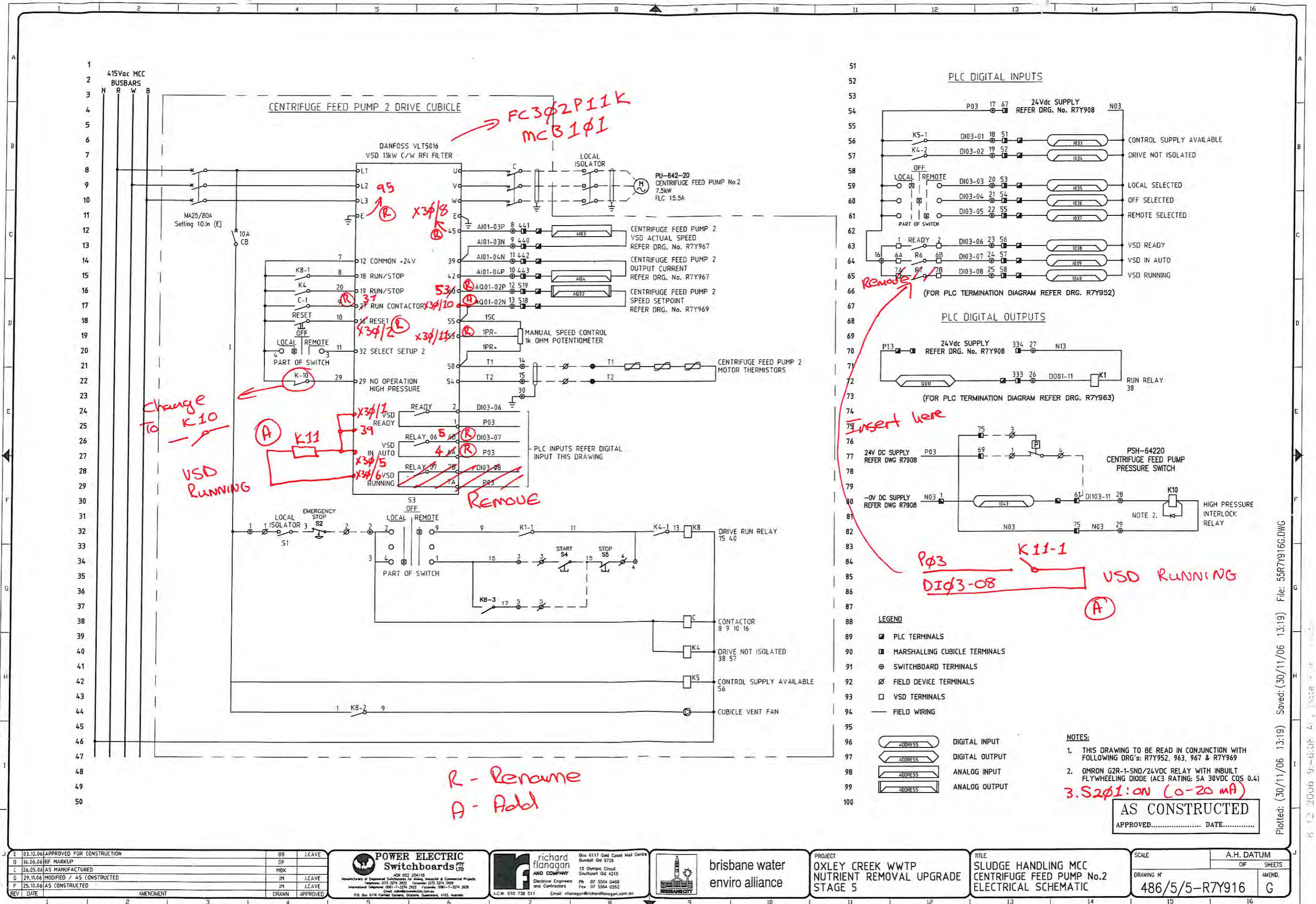
1. As Constructed Drawings

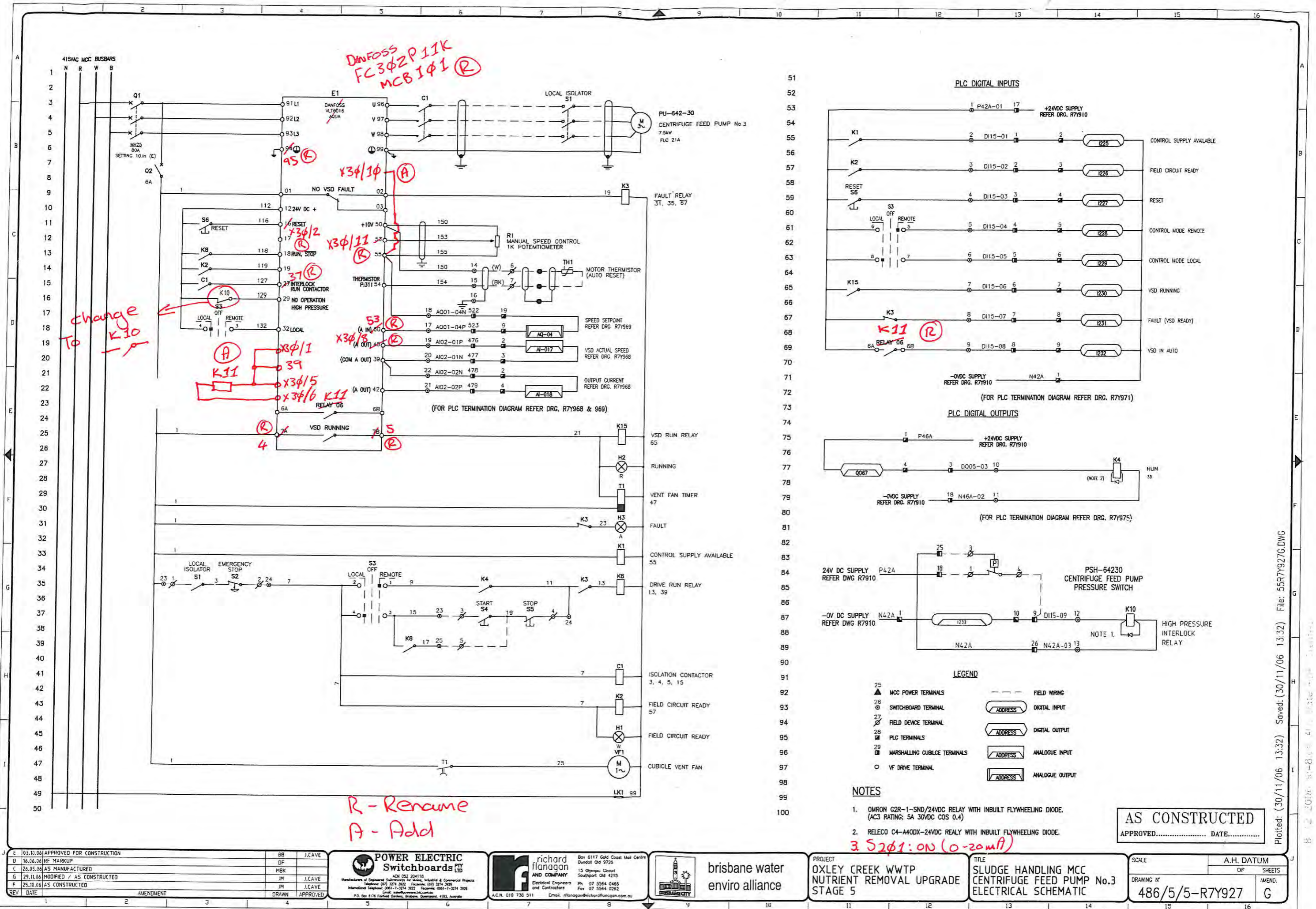
1.1. P&ID



1.2. Electrical Drawings









2. Quality Assurance



2.1. Inspection & Test Plans

INSPECTION AND TEST PLAN			Document Title	CENTRIFUGE FEED PUMP STATION		
ITP No:	8452-003-CENT	Project:	Oxley WRP Flood Recovery	Inspection Key: W - Witness, H - Hold, S - Surveillance	Responsibility Key: SV- Supervisor, SV- Surveyor, PE - Project Engineer Sup- Superintendent PM- Project Manager	
Revision:	A	Project Number:	8542			
Date of Issue:	13.02.12	Approved by:				

Item No.	Activity Details	Reference Procedure	Verifying Document of Report incl check sheet number.	Verify or Test by					Remarks/Records
				JHG			QUU		
				Key	Resp.	Sign/Date	Key	Sign/Date	
1.01	Ensure Civil Installation Check Sheets are complete		Refer to handover register.	—	—	NA	—	—	
2.01	Mechanical Pump Installation Check Sheets are complete (PU-642-10, PU-610-20, PU-610-30)		Refer to handover register.			JB/12/3/12			Need to complete pump capacity tests with sludge from digesters.
			Refer to handover register.			JB/12/3/12			
			Refer to handover register.			JB/12/3/12			
2.02	Mechanical Valve Installation Check sheets are complete		Refer to handover register.			JB/12/3/12			
			Refer to handover register.			JB/12/3/12			
2.03	Mechanical Instrument Installation Check sheets are complete		Refer to handover register.			JB/12/3/12			
2.4	Mechanical Pipework Installation Check sheets are complete	8542-M-CENT-501	Refer to handover register.			JB/12/3/12			
3.01	Electrical Check Sheets Complete	Refer to reference Electrical.	Refer to handover register.			JB/12/3/12			
4.01	Energisation of equipment	Refer to energisation procedure.	Refer to handover register.			JB/12/3/12			
5.01	HANDOVER from Construction to Commissioning Certificates Complete		Refer to handover register.			JB/12/3/12			
6.01	Pre-commissioning Checks Complete		Insert commissioning ITP reference.			JB/12/3/12			NOTE: PUMP CAPACITY TESTING TO BE COMPLETED AS ABOVE AND PRESSURE SWITCHES TO BE TESTED ON SLUDGE

PRESSURE SWITCHES TESTED ON WATER 3/5/12

INSPECTION AND TEST PLAN			Document Title	CENTRIFUGE FEED PUMP STATION		
ITP No:	8452-003-CENT	Project:	Oxley WRP Flood Recovery	Inspection Key: W - Witness, H - Hold, S - Surveillance Responsibility Key: SV- Supervisor, SV- Surveyor, PE – Project Engineer Sup- Superintendent PM- Project Manager		
Revision:	A	Project Number:	8542			
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Item No.	Activity Details	Reference Procedure	Verifying Document of Report incl check sheet number.	Verify or Test by						Remarks/Records
				JHG			QUU			
				Key	Resp.	Sign/Date	Key	Sign/Date		
FINAL APPROVAL FOR CLOSE OUT OF ITP										
	NAME	SIGNATURE		DATE						
JH	TATE BRAMMER			13/03/12						
QUU										

Centrifuge Feed PS Mech/Elec and Energisation Register

Date: 20/02/2012


Rev: A

TAG				MECHANICAL			ELECTRICAL			ENERGISATION					
Item	P&ID	Prefix	Number	Description	Mech Complete Sign off	LOT. No.	Date	Elec Complete Sign off	Doc. No.	Date2	Equipment Energised	Doc. No.4	Date3	Handover to Commissioning	Date4
1	R7D185	PU	642-10	Centrifuge Feed Pump 1	JB	8542-M-CENT-001	28/2	JB		13/3	JB	001	28/2	JB	28/2
2	R7D185	PU	642-20	Centrifuge Feed Pump 2	JB	8542-M-CENT-002	28/2	JB		13/3	JB	001	28/2	JB	28/2
3	R7D185	PU	642-30	Centrifuge Feed Pump 3	JB	8542-M-CENT-003	28/2	JB		13/3	JB	001	28/2	JB	28/2
4	R7D185	STM	642-01	Ferric chloride dosing to centrifuge 2 ferric mixer	JB	8542-M-CENT-601	21/2	NA	-	-	NA	-	-	-	-
5	R7D185	STM	642-02	Ferric chloride dosing to centrifuge 3 ferric mixer	JB	8542-M-CENT-602	21/2	NA	-	-	NA	-	-	-	-
8	R7D185	FIT	641-01	Centrifuge 2 sludge feed flow meter	JB	8542-M-CENT-201	21/2	JB		13/3	JB	001	28/2	JB	28/2
9	R7D185	FIT	642-01	Centrifuge 3 sludge feed flow meter	JB	8542-M-CENT-202	21/2	JB		13/3	JB	001	28/2	JB	28/2
13	R7D185	PI	642-71	Dig Sludge to centrifuge 2 pressure indicator	JB	8542-M-CENT-701	8/2	NA	-	-	NA	-	-	JB	28/2
14	R7D185	PI	642-72	Dig sludge to centrifuge 3 pressure indicator	JB	8542-M-CENT-701	8/2	NA	-	-	NA	-	-	JB	28/2
15	R7D185	PSH	642-10	CFP 1 Discharge Pressure Switch High	JB	8542-M-CENT-701	21/2	JB		13/3	JB	001	28/2	JB	28/2
16	R7D185	PSH	642-20	CFP 2 Discharge Pressure Switch High	JB	8542-M-CENT-701	21/2	JB		13/3	JB	001	28/2	JB	28/2
17	R7D185	PSH	642-30	CFP 3 Discharge Pressure Switch High	JB	8542-M-CENT-701	21/2	JB		13/3	JB	001	28/2	JB	28/2
21	R7D185	FCV	642-10	DSD CFP 1 SW Inlet Flushing Valve	JB	8542-M-CENT-101	21/2	JB		13/3	JB	001	28/2	JB	28/2
22	R7D185	FCV	642-11	DSD CFP 1 Inlet Line Flow Isol. (Existing)	JB	8542-M-CENT-102	21/2	JB		13/3	JB	001	28/2	JB	28/2
23	R7D185	FCV	642-12	DSD CFP 1 Inlet Line Flow Isol.	JB	8542-M-CENT-103	21/2	JB		13/3	JB	001	28/2	JB	28/2
25	R7D185	FCV	642-20	DSD CFP 2 SW Inlet Flushing Valve	JB	8542-M-CENT-105	21/2	JB		13/3	JB	001	28/2	JB	28/2
26	R7D185	FCV	642-21	DSD CFP 2 Inlet Line Flow Isol. (Existing)	JB	8542-M-CENT-106	21/2	JB		13/3	JB	001	28/2	JB	28/2
28	R7D185	FCV	642-30	DSD CFP 3 SW Inlet Flushing Valve	JB	8542-M-CENT-108	21/2	JB		13/3	JB	001	28/2	JB	28/2
29	R7D185	FCV	642-31	DSD CFP 3 Inlet Line Flow Isol. (Existing)	JB	8542-M-CENT-109	21/2	JB		13/3	JB	001	28/2	JB	28/2
30	R7D185	FCV	642-32	DSD CFP 3 Inlet Line Flow Isol.	JB	8542-M-CENT-110	21/2	JB		13/3	JB	001	28/2	JB	28/2
32	R7D185	FCV	642-42	Centrifuge feed pumps distribution valve 1	JB	8542-M-CENT-112	21/2	JB		13/3	JB	001	28/2	JB	28/2
33	R7D185	FCV	642-43	Centrifuge feed pumps distribution valve 2	JB	8542-M-CENT-113	21/2	JB		13/3	JB	001	28/2	JB	28/2
42	R7D185	HV	642-15	DSD CFP 1 Discharge isol.	JB	8542-M-CENT-115	21/2	NA	-	-	NA	-	-	-	-
48	R7D185	HV	642-25	DSD CFP 2 Discharge isol.	JB	8542-M-CENT-116	21/2	NA	-	-	NA	-	-	-	-
54	R7D185	HV	642-35	DSD CFP 3 Discharge isol.	JB	8542-M-CENT-117	21/2	NA	-	-	NA	-	-	-	-
83	R7D185	HV	642-84	FIT64101 Feed isolation valve	JB	8542-M-CENT-301	21/2	NA	-	-	NA	-	-	-	-
84	R7D185	HV	642-85	FIT64201 Feed Isolation valve	JB	8542-M-CENT-302	21/2	NA	-	-	NA	-	-	-	-

2.2. Mechanical/Pre-commissioning Checksheets

Revision: /
 Approved By: Tate Brammer


Date Issue: 13.02.12

DICL PIPEWORK INSTALLATION CHECK SHEET			AREA:		CENTRIFUGE FEED PUMP STATION				
ITP ref. No:	8542-003-CENT	Project:	Oxley WRP Flood Recovery		Inspection Key: W - Witness, H - Hold, S - Surveillance		Responsibility Key: SV- Supervisor, SV- Surveyor, PE - Project Engineer, Sup- Superintendent, PM- Project Manager		
Checksheets No.:	8542-M-CENT-501	Project Number:	8542						
EQUIPMENT DESCRIPTION:		CENTRIFUGE FEED PUMP STATION PIPEWORK							
PIPE ID:		TO:				FROM:			
Item No.	Activity Details	REFERENCE DOCUMENT/ DRAWINGS	Verify or Test by						Remarks/Records
			S/C			JH			
			Key	Resp.	Sign/Date	Key	Resp.	Sign/Date	
1.01	Pipework issued as per specification					H	PE	JB 29/2	
2.00 Pipework installation incl DICL									
2.01	Correct installation of joints	Manufacturer's Instruction				S	SV	JB 28/2/12	
2.02	Pipe and flange alignment correct (Square, grade, horizontal)	NA				S	SV	JB 28/2/12	
2.03	Ensure bolts are all tightened correctly.	NA				S	SV	JB 28/2/12	
2.04	Correct gaskets installed (3mm insertion rubber)	NA				S	SV	JB 28/2/12	
2.05	Check installation of pipe supports (Site to confirm centrelines)	Drawing				S	SV	JB 28/2/12	
2.06	Instruments installed as per P&ID including pressure indicators etc.	486/5/5-R7D185				S	SV/PE	JB 28/2/12	
2.07	Ensure that all valves are consistent with P&ID and equipment schedule.	486/5/5-R7D185				H	PE	JB 29/2	
2.08	Ensure all instrumentation is installed and consistent with the P&ID and equipment schedule.	486/5/5-R7D186				W	PE	JB 29/2	
2.09	Equipment labels are in place and consistent with P&ID.	486/5/5-R7D185				W	PE	JB 9/3/12	
3.00 PE Installation									
3.01	All poly ethylene pipework completed by qualified welder.					S	SV	JB 28/2/12	
3.02	Pipework pressure test completed - record pressure test sheet reference number and attach.					H	SV/PE	JB 28/2/12	

Revision: A
 Approved By: Tate Brammer

Date of Issue: 13.02.12

PIPE ID:		TO:		FROM:						
Item No.	Activity Details	REFERENCE DOCUMENT/DRAWINGS	Verify or Test by						Remarks/Records	
			S/C			JH				
			Key	Resp.	Sign/Date	Key	Resp.	Sign/Date		
3.03	Check for damage and leave area tidy and clean for next discipline.					W	PE	JB 29/2		
3.04	MECH INSTALLATION COMPLETE	NA				H	SV	[Signature] 12/3/12		
APPROVAL										
	NAME				SIGNATURE				DATE	
JH	JANE BEECHER				Jane Beecher				12/3/12	

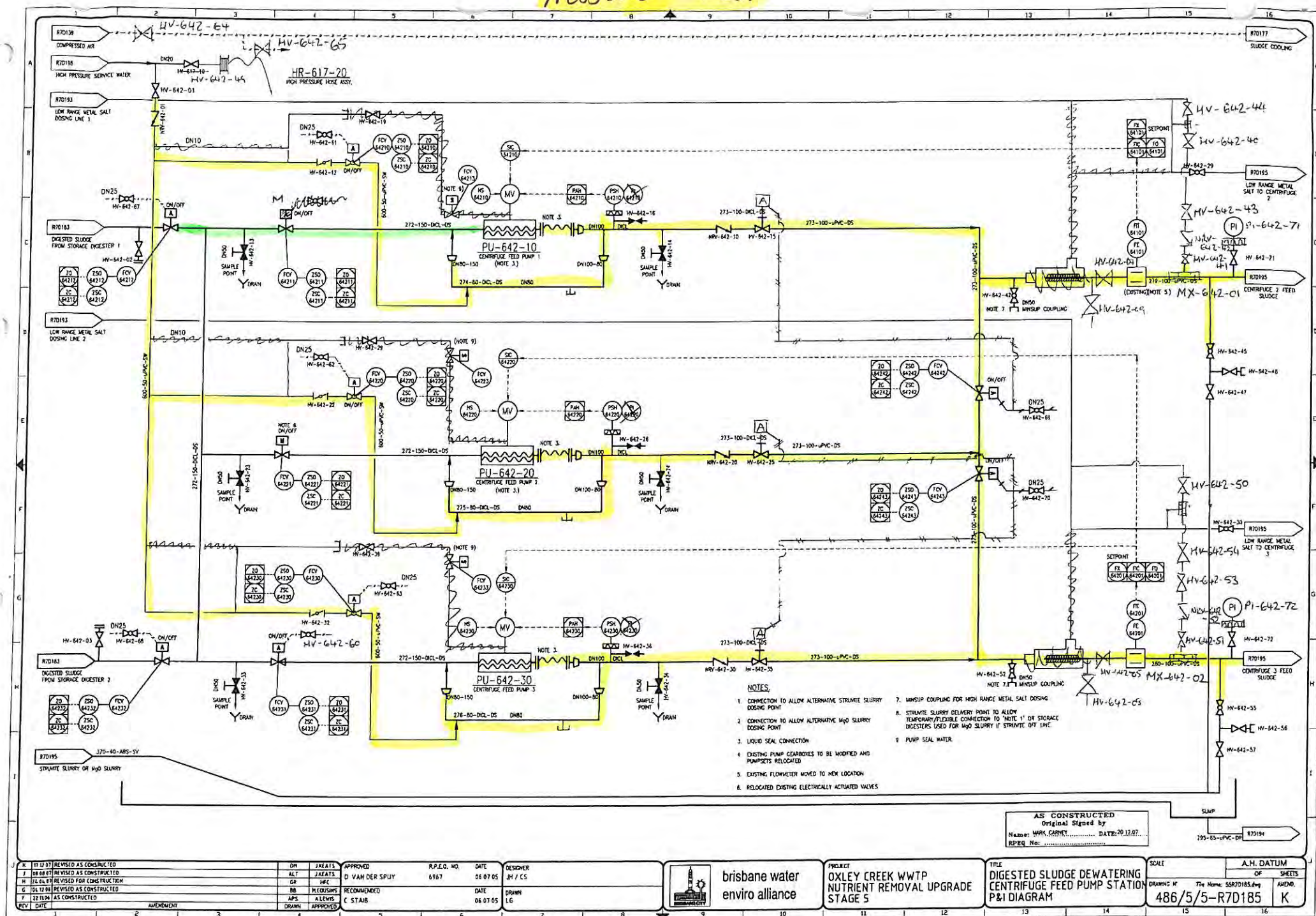
Form:	HYDRO STATIC TESTING RECORD PIPELINES Oxley STP Flood Recovery Stage 2	 Page 1 of 1
Revision: 0		

(To be attached to ITP-~~8542-003~~^{8542-003-CENT} as support documentation)
 (Testing in accordance with AS 2566)

Pipe Details: <u>DISCHARGE PIPEWORK CENTRIFUGE FEED PUMPS</u>		
Hydro Test Operator: <u>THEO CHANARIS</u>	Date: <u>20/1/12</u> <u>1 SERVICE WATER</u>	
Hydro test Equipment: <u>ROTHERBERGER</u>		
Pipe Test Pressure (KPa):	<u>900 KPA (300) (600) 900</u>	
Water Temperature:	<u>24°C</u>	
Ambient Temperature:	<u>28°C</u>	
Holding Time (Specify Hours or Minutes):	<u>15m @ 300 ^{GPA} 15m @ 600 ^{KPA} /hr + 900 KPA</u>	
Pressure Drop:	<u>0 KPA.</u>	
Hydro test Complies:	<u>YES</u>	
Pipe Water Quality Tested Complies:		
Test Water Dumped (location):	<u>TO DRAIN.</u>	
Pipe Has been swabbed / pigged:		
<u>N/A.</u>		
Hydro test witnessed by:		
Name: <u>Don Pill</u>	Company: <u>JHG</u>	Date: <u>20/1/12</u>
Pipeline is <input checked="" type="checkbox"/> fit for service <input type="checkbox"/> not fit for service		
Name: <u>Don Pill</u>	Company: <u>JHG</u>	Date: <u>28/1/12</u>

NB: Hydro test as per attached P&ID.

Pressure test





Industrial Training

** Welding * Boilermaking * RPL * Poly Welding **

STATEMENT OF ATTAINMENT

XLT Industrial Training Pty Ltd

National provider code: 6220

A Statement of Attainment is issued by a Registered Training Organisation when an individual has completed one or more units of competency from nationally recognised qualification(s)/course(s)

This is a statement that

Paul Guthrie

has attained

PMBWELD301B	Butt weld polyethylene plastic pipelines
PMBWELD302B	Electrofusion weld polyethylene pipelines

Qualification Stamp No: Q0217

These competencies form part of the

Certificate III
in
Polymer Processing
(PMB30107)

Recommended requalification 25 Nov 2013

These competencies have been delivered and assessed in English.

This Statement of Attainment is recognised within the Australian Qualification Framework.

Signed:
Clive Langley
Managing Director


Certificate Number: S 1757/416
Issued on: 25 Nov 2011



'TRAINING FOR A BETTER FUTURE'


Revision: A
 Approved By: Tate Brammer

Date of Issue 02.12
 Page 1 of 2

PUMP INSTALLATION CHECK SHEET			AREA:		CENTRIFUGE FEED PUMP STATION					
ITP ref. No:	8542-003-CENT	Project:	Oxley WRP Flood Recovery		Inspection Key: W - Witness, H - Hold, S - Surveillance		Responsibility Key: SV- Supervisor, SV- Surveyor, PE - Project Engineer Sup-Superintendent PM- Project Manager			
Checksheet No.:	8542-M-CENT-001	Project Number:	8542							
EQUIPMENT DESCRIPTION:			CENTRIFUGE FEED PUMP 1				Tag Number: PU-642-10		PU-642-10	
Item No.	Activity Details	REFERENCE DOCUMENT/ DRAWINGS	Verify or Test by						Remarks/Records	
			S/C			JH				
			Key	Resp.	Sign/Date	Key	Resp.	Sign/Date		
1.01	Set out and Levels are correct to drawing.					S	SV	20/2	as per existing G.A.	
2.00 Pump Storage										
2.01	Pump delivered as specified					H	PE	20/2		
2.02	Clean and free of debris					S	SV	20/2		
2.03	Visual inspect pump and ensure there is no damage. Record notes.					W	SV	20/2		
3.00 Record nameplate data:										
Pump - Record any variances to below										
Manufacturer: Mono Pumps										
3.01	Pump type: Compact EZ Strip Range					W	PE	20/2		
	Model No.: Z17AC81RMB/G13J									
	Record Serial No.: 11L7836									
Motor										
Type: SK180 MH/4 TF SK42F VL-160 MH/4 TF										
Record Serial No.: 3011429189.01										
Phase: 3										
Frequency: 50Hz										
3.02	Protection: IP56					W	PE	20/2		
	Power: 20.6/11.9 kW									
	Voltage: 380-420/660-725 V									
	Current: 21-20/12 A									
	cos φ: 0.86									
	Revs: 1465/min									
4.00 Pump Installation										
4.01	Anchors as per manufacturers requirements					W	PE/SV	20/2		
4.02	Confirm gasket type (3mm insertion rubber)	NA				S	SV	20/2		
4.03	Pipework aligned correctly	NA				S	SV	20/2		
4.04	Base grouted	NA				S	SV	20/2	Cementitious grout.	

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Approved By: Tate Brammer


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PUMP INSTALLATION CHECK SHEET			AREA:		CENTRIFUGE FEED PUMP STATION					
ITP ref. No:	8542-003-CENT	Project:	Oxley WRP Flood Recovery	Inspection Key: W - Witness, H - Hold, S - Surveillance		Responsibility Key: SV- Supervisor, SV- Surveyor, PE - Project Engineer Sup-Superintendent PM- Project Manager				
Checksheet No.:	8542-M-CENT-001	Project Number:	8542							
EQUIPMENT DESCRIPTION:			CENTRIFUGE FEED PUMP 1				Tag Number:		PU-642-10	
Item No.	Activity Details	REFERENCE DOCUMENT/ DRAWINGS	Verify or Test by						Remarks/Records	
			S/C			JH				
			Key	Resp.	Sign/Date	Key	Resp.	Sign/Date		
4.05	Check all nuts, bolts, securing flanges and base mounting fixtures are tightened	NA				S	SV	29/2	checked 3 times	
4.06	Check oil levels and top up if required. Recommended oil: KLUBER SYNTHESO D460 EP OIL or MOBIL GEAR OIL SHC 320	Mono Pump O&M: EZ Strip Range. MPA600				W	SV	28/2	Oil levels to witness mark.	
4.07	Check alignment of pump and gearbox.	Mono Pump O&M: EZ Strip Range. MPA601				W	SV	20/2		
4.08	Equipment labels are in place and consistent with P&ID.	486/5/5-R7D185				W	PE	JB 9/3/12		
MECH INSTALLATION COMPLETE										
5.00 Pump Pre-com Mech										
5.01	Remove gearbox breathers if required.					W	SV	NA		
5.02	Verify that pump is energised. Check energisation register for specific area.	Insert energisation procedure number.				H	PE	JB 29/2		
5.03	Ensure pump is filled with liquid and check rotation of pumps (Anti-clockwise gives inlet at drive end)					W	PE	JB 29/2	CHECK OPERATION OF PSH-642-10 AND ENSURE HARDWARE CONNECTION IS OPERATIONAL	
5.04	Check for damage to pump and leave area tidy and clean for next discipline.					W	PE	JB 29/2		
APPROVAL										
	NAME		SIGNATURE					DATE		
JH	JANE BEECHER		Jane Beecher					12/3/12		

NOTE: SLUDGE QUALITY NOT YET SUITABLE TO PERFORM PUMP CAPACITY TESTING JB 8/3/12

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 Approved By: Tate Brammer


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PUMP INSTALLATION CHECK SHEET			AREA:		CENTRIFUGE FEED PUMP STATION					
ITP ref. No:	8542-003-CENT	Project:	Oxley WRP Flood Recovery		Inspection Key: W - Witness, H - Hold, S - Surveillance		Responsibility Key: SV- Supervisor, SV- Surveyor, PE - Project Engineer Sup-Superintendent PM- Project Manager			
Checksheet No.:	8542-M-CENT-002	Project Number:	8542							
EQUIPMENT DESCRIPTION:			CENTRIFUGE FEED PUMP 2				Tag Number: PU-642-20		PU-642-20	
Item No.	Activity Details	REFERENCE DOCUMENT/ DRAWINGS	Verify or Test by						Remarks/Records	
			S/C			JH				
			Key	Resp.	Sign/Date	Key	Resp.	Sign/Date		
1.01	Set out and Levels are correct to drawing.					S	SV	NA	as per original C.A.	
2.00 Pump Storage										
2.01	Pump delivered as specified					H	PE	JB 29/2		
2.02	Clean and free of debris	NA				S	SV	JB 20/2/12		
2.03	Visual inspect pump and ensure there is no damage. Record notes.	NA				W	SV	JB 20/2/12		
3.00 Record nameplate data:										
Pump - Record any variances to below										
Manufacturer: Mono Pumps										
3.01	Pump type: Compact EZ Strip Range					W	PE	JB 29/2		
	Model No.: Z17AC81RMB/G13J									
	Record Serial No.: 1117835									
Motor										
Type: SK160 MH/4 TF										
3.02	Record Serial No.: 3011429189.01					W	PE	JB 29/2		
	Phase: 3									
	Frequency: 50Hz									
	Protection: IP56									
	Power: 20.6/11.9 kW									
	Voltage: 380-420/660-725 V									
	Current: 21-20/12 A									
	cos φ: 0.86									
	Revs: 1465/min									
4.00 Pump Installation										
4.01	Anchors as per manufacturers requirements					W	PE/SV	JB 20/2/12		
4.02	Confirm gasket type (3mm insertion rubber)	NA				S	SV	JB 20/2/12		
4.03	Pipework aligned correctly	NA				S	SV	JB 20/2/12		
4.04	Base grouted	NA				S	SV	JB 20/2/12	Cementitious grout.	

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PUMP INSTALLATION CHECK SHEET			AREA:		CENTRIFUGE FEED PUMP STATION					
ITP ref. No:	8542-003-CENT	Project:	Oxley WRP Flood Recovery	Inspection Key: W - Witness, H - Hold, S - Surveillance		Responsibility Key: SV- Supervisor, SV- Surveyor, PE - Project Engineer Sup- Superintendent PM- Project Manager				
Checksheet No.:	8542-M-CENT-002	Project Number:	8542							
EQUIPMENT DESCRIPTION:			CENTRIFUGE FEED PUMP 2				Tag Number:		PU-642-20	
Item No.	Activity Details	REFERENCE DOCUMENT/ DRAWINGS	Verify or Test by						Remarks/Records	
			S/C			JH				
			Key	Resp.	Sign/Date	Key	Resp.	Sign/Date		
4.05	Check all nuts, bolts, securing flanges and base mounting fixtures are tightened	NA				S	SV	JB 20/2/12		
4.06	Check oil levels and top up if required. Recommended oil: KLUBER SYNTHESO D460 EP OIL or MOBIL GEAR OIL SHC 320	Mono Pump O&M: EZ Strip Range. MPA600				W	SV	JB 20/2/12	OIL LEVELS TO WITNESS MARK.	
4.07	Check alignment of pump and gearbox.	Mono Pump O&M: EZ Strip Range. MPA601				W	SV	JB 20/2/12		
4.08	Equipment labels are in place and consistent with P&ID.	486/5/5-R7D185				W	PE	JB 29/3/12		
MECH INSTALLATION COMPLETE										
5.00 Pump Pre-com Mech										
5.01	Remove gearbox breathers if required.	NA				W	SV	NA		
5.02	Verify that pump is energised. Check energisation register for specific area.	Insert energisation procedure number.				H	PE	JB 29/2		
5.03	Ensure pump is filled with liquid and check rotation of pumps (Anti-clockwise gives inlet at drive end)	Mono Pump O&M: EZ Strip Range. MPA601				W	PE	JB 29/2	CHECK PSH-642-20 HARDWARE CONNECTIONAL IS OPERATIONAL	
5.04	Check for damage to pump and leave area tidy and clean for next discipline.	NA				W	PE	JB 29/2		

APPROVAL			
	NAME	SIGNATURE	DATE
JH	JANE BEECHER		12/3/12

NOTE: SLUDGE QUALITY NOT YET SUITABLE TO PERFORM PUMP CAPACITY TESTING JB 8/3/12

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PUMP INSTALLATION CHECK SHEET			AREA:		CENTRIFUGE FEED PUMP STATION					
ITP ref. No:	8542-003-CENT	Project:	Oxley WRP Flood Recovery		Inspection Key: W - Witness, H - Hold, S - Surveillance		Responsibility Key: SV- Supervisor, SV- Surveyor, PE - Project Engineer Sup-Superintendent PM- Project Manager			
Checksheet No.:	8542-M-CENT-003	Project Number:	8542							
EQUIPMENT DESCRIPTION:			CENTRIFUGE FEED PUMP 3				Tag Number: PU-642-30		PU-642-30	
Item No.	Activity Details	REFERENCE DOCUMENT/ DRAWINGS	Verify or Test by						Remarks/Records	
			S/C			JH				
			Key	Resp.	Sign/Date	Key	Resp.	Sign/Date		
1.01	Set out and Levels are correct to drawing.					S	SV	NA	As per original C.A's	
2.00 Pump Storage										
2.01	Pump delivered as specified					H	PE	JB 28/2/12		
2.02	Clean and free of debris	NA				S	SV	JB 29/2/12		
2.03	Visual inspect pump and ensure there is no damage. Record notes.	NA				W	SV	JB 29/2/12	No Visual Damage.	
3.00 Record nameplate data:										
Pump - Record any variances to below										
Manufacturer: Mono Pumps										
3.01	Pump type: Compact EZ Strip Range					W	PE	JB 29/2		
	Model No.: Z17AC81RMB/G13J									
	Record Serial No.: 11L 7834									
Motor										
Type: SK160 MH/4 TF										
3.02	Record Serial No.: 3011429189.01					W	PE	JB 29/2		
	Phase: 3									
	Frequency: 50Hz									
	Protection: IP56									
	Power: 20.6/11.9 kW									
	Voltage: 380-420/660-725 V									
	Current: 21-20/12 A									
	cos φ: 0.86									
	Revs: 1465/min									
4.00 Pump Installation										
4.01	Anchors as per manufacturers requirements					W	PE/SV	JB 29/2/12		
4.02	Confirm gasket type (3mm insertion rubber)	NA				S	SV	JB 29/2/12		
4.03	Pipework aligned correctly	NA				S	SV	JB 29/2/12		
4.04	Base grouted	NA				S	SV	JB 29/2/12		

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PUMP INSTALLATION CHECK SHEET			AREA:		CENTRIFUGE FEED PUMP STATION					
ITP ref. No:	8542-003-CENT	Project:	Oxley WRP Flood Recovery	Inspection Key: W - Witness, H - Hold, S - Surveillance		Responsibility Key: SV- Supervisor, SV- Surveyor, PE - Project Engineer Sup- Superintendent PM- Project Manager				
Checksheet No.:	8542-M-CENT-003	Project Number:	8542							
EQUIPMENT DESCRIPTION:			CENTRIFUGE FEED PUMP 3				Tag Number:		PU-642-30	
Item No.	Activity Details	REFERENCE DOCUMENT/ DRAWINGS	Verify or Test by						Remarks/Records	
			S/C			JH				
			Key	Resp.	Sign/Date	Key	Resp.	Sign/Date		
4.05	Check all nuts, bolts, securing flanges and base mounting fixtures are tightened	NA				S	SV	JB 2/2/12		
4.06	Check oil levels and top up if required. Recommended oil: KLUBER SYNTHESO D460 EP OIL or MOBIL GEAR OIL SHC 320	Mono Pump O&M: EZ Strip Range. MPA600				W	SV	JB 2/2/12	OK TO WITNESS WORK.	
4.07	Check alignment of pump and gearbox.	Mono Pump O&M: EZ Strip Range. MPA601				W	SV	JB 2/2/12		
4.08	Equipment labels are in place and consistent with P&ID.	486/5/5-R7D185				W	PE	JB 9/3/12		
MECH INSTALLATION COMPLETE										
5.00 Pump Pre-com Mech										
5.01	Remove gearbox breathers if required.	NA				W	SV	NA		
5.02	Verify that pump is energised. Check energisation register for specific area.	Insert energisation procedure number.				H	PE	JB 29/12		
5.03	Ensure pump is filled with liquid and check rotation of pumps (Anti-clockwise gives inlet at drive end)	Mono Pump O&M: EZ Strip Range. MPA601				W	PE	JB 29/12	CHECK PSH-642-30 HARDWARE CONNECTION IS OPERATIONAL	
5.04	Check for damage to pump and leave area tidy and clean for next discipline.	NA				W	PE	JB 29/12		

APPROVAL			
	NAME	SIGNATURE	DATE
JH	JANE BEECHER	Jane Beecher	12/3/12

NOTE: SLUDGE QUALITY NOT YET SUITABLE TO PERFORM PUMP CAPACITY TESTING JB 8/3/12

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AIR ACTUATED VALVE >DN50 INSTALLATION CHECK SHEET			AREA:		CENTRIFUGE FEED PUMP STATION						
ITP ref. No:	8542-003-CENT	Project:	Oxley WRP Flood Recovery		Inspection Key: W - Witness, H - Hold, S - Surveillance		Responsibility Key: SV- Supervisor, SV- Surveyor, PE - Project Engineer Sup-Superintendent PM- Project Manager				
Checksheet No.:	8542-M-CENT-101	Project Number:	8542								
EQUIPMENT DESCRIPTION:			CENTRIFUGE FEED PUMP 1 Service Water Flush Valve					Tag Number:		FCV-642-10	
Item No.	Activity Details	REFERENCE DOCUMENT/ DRAWINGS	Verify or Test by						Remarks/Records		
			S/C			JH					
			Key	Resp.	Sign/Date	Key	Resp.	Sign/Date			
1.00 Record nameplate data - record any variances to below											
	Actuator Type: Air actuator DN50										
	Serial No.: 2623077 D Code: 1053						W	PE	JB 29/2		
1.02	Valve issued as per specification/ purchase order						W	PE	JB 28/2		
2.00 Valve installation											
2.01	Check internal pipework and clear any debris						S	SV	JB 20/2/12		
2.02	Confirm gasket type (3mm insertion rubber)						S	SV	JB 20/2/12		
2.03	Confirm flange alignment and install valve making sure of correct bolting sequence and torques.						S	SV	JB 20/2/12		
2.04	Check installation direction of valves and ensure it is as per vendor manual or arrow on valve body.						S	SV	JB 20/2/12		
2.05	Check manual handles have correct access and no restriction for operation						S	PE	NA		
3.01 Actuator Installation											
3.01	If installing the actuator separately ensure valve is secure before fitting the actuator.						S	SV	JB 20/2/12		
3.02	Fit the actuator to valve as per vendor recommendations.						S	SV	JB 20/2/12		
3.03	Verify silences/speed adjustments are installed.						S	SV/PE	JB 20/2/12		
3.04	Connect compressed air. Verify compressed air is within manufacturers recommendations. (5.6 bar to 10bar).						S	SV/PE	JB 2/3/12		
3.05	Equipment labels are in place and consistent with P&ID.	486/5/5-R7D185					W	PE	JB 9/3/12		
3.06	Ensure Limit Switches are installed and ready for wiring.						S	SV	JB 20/2/12		
MECH INSTALLATION COMPLETE											

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Item No.	Activity Details	REFERENCE DOCUMENT/ DRAWINGS	Verify or Test by						Remarks/Records
			S/C			JH			
			Key	Resp.	Sign/Date	Key	Resp.	Sign/Date	
4.00	Pre-commissioning								
4.01	Energise compressed air and check for leaks.					S	SV	J 20/2/12	
4.02	Stroke the valve manually and ensure gearbox operating normally. Adjust stroke and speed if required.					W	PE	JB 2/3/12	
4.05	Check for damage and leave area tidy and clean for next discipline.					W	PE	JB 29/2	

APPROVAL			
	NAME	SIGNATURE	DATE
JH	JANE BEECHER	Jane Beecher	12/3/12

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MOTORISED ACTUATED VALVE >DN50 INSTALLATION CHECK SHEET			AREA:		CENTRIFUGE FEED PUMP STATION					
ITP ref. No:	8542-003-CENT	Project:	Oxley WRP Flood Recovery		Inspection Key: W - Witness, H - Hold, S - Surveillance		Responsibility Key: SV- Supervisor, SV- Surveyor, PE - Project Engineer Sup-Superintendent PM- Project Manager			
Checksheet No.:	8542-M-CENT-102	Project Number:	8542							
EQUIPMENT DESCRIPTION:			CENTRIFUGE FEED PUMP 1 SUCTION ACTUATED VALVE				Tag Number:		FCV-642-11	
Item No.	Activity Details	REFERENCE DOCUMENT/ DRAWINGS	Verify or Test by						Remarks/Records	
			S/C			JH				
			Key	Resp.	Sign/Date	Key	Resp.	Sign/Date		
1.00 Record Actuator data - record any variances to below										
1.01	Manufacturer: Rotork					W	PE	JB 29/2		
	Actuator Type: IQ10 F10 A									
	Serial No.: AB6817-01									
	Wiring Diagram: 3000-000									
	Speed: 24 rpm									
	Torque max.: 34 Nm									
	Protection: IP68									
	Motor rating: 0.07kW									
	Nominal Motor Current: 0.5A									
Unit Weight: 32kg										
1.02	Valve issued as per specification/ purchase order					W	PE	JB 28/2		
2.00 Valve installation										
2.01	Check internal pipework and clear any debris	NA				S	SV	JB 20/2/12		
2.02	Confirm gasket type (3mm insertion rubber)	NA				S	SV	JB 20/2/12		
2.03	Confirm flange alignment and install valve making sure of correct bolting sequence and torques.	NA				S	SV	JB 20/2/12		
2.04	Check installation direction of valves and ensure it is as per vendor manual or arrow on valve body.	NA				S	SV	JB 20/2/12		
2.05	Check manual handles have correct access and no restriction for operation	NA				S	PE	JB 29/2	Spindles greased with lanolin	
3.01 Actuator Installation										
3.01	If installing the actuator separately ensure valve is secure before fitting the actuator.	NA				S	SV	JB 20/2/12		

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Item No.	Activity Details	REFERENCE DOCUMENT/ DRAWINGS	Verify or Test by						Remarks/Records
			S/C			JH			
			Key	Resp.	Sign/Date	Key	Resp.	Sign/Date	
3.02	Fit the thrust base to the valve correctly as per vendor instructions. Refer to torque tables in manual pg 11.	Rotork Manual: IQ Range E170-3E				S	SV	20/2/12	
	Ensure sealing plug in centre of handwheel is sealed with PTFE tape.	Rotork Manual: IQ Range E170-3E						20/2/12	
303	Equipment lables are in place and consistent with P&ID.	486/5/5-R7D185				W	PE	20/2/12	
3.04	Ensure Limit Switches are installed and ready for wiring.	486/5/5-R7D185				S	SV	20/2/12	NA - These switches are internal.
MECH INSTALLATION COMPLETE									
4.00 Pre-commissioning									
4.01	Check for damage and leave area tidy and clean for next discipline.	NA				W	PE	20/2/12	
4.02	Verify that valve is energised. Check energisation register for specific area.	Insert engerisation procedure number.				H	PE	20/2/12	
4.03	Set Rotork Parameters								
	Diection of close - 'CLOCKWISE'	Rotork Manual: IQ Range E170-3E (IQ10)				H	PE	20/2/12	
	Close Action - 'LIMIT'					H	PE	20/2/12	
	Open Action - 'LIMIT'					H	PE	20/2/12	
	Close Torque - '60%' If there are issues with torque trips this may need to be increased.					H	PE	20/2/12	
	Open Torque - '60%' If there are issues with torque trips this may need to be increased.					H	PE	20/2/12	
	Close Limit - Move valve manually to close position and set as close limit.					H	PE	20/2/12	
	Open Limit - Move valve manually to open position and set as open limit.					H	PE	20/2/12	
4.04	Stroke the valve manually and ensure gearbox operating normally. Monitor valve for unusual noise, movement and vibration.						W	PE	20/2/12

APPROVAL			
	NAME	SIGNATURE	DATE
JH	JANE BEECHER	Jane Beecher	12/3/12

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AIR ACTUATED VALVE >DN50 INSTALLATION CHECK SHEET			AREA:		CENTRIFUGE FEED PUMP STATION						
ITP ref. No:	8542-003-CENT	Project:	Oxley WRP Flood Recovery		Inspection Key: W - Witness, H - Hold, S - Surveillance		Responsibility Key: SV- Supervisor, SV- Surveyor, PE - Project Engineer Sup-Superintendent PM- Project Manager				
Checksheet No.:	8542-M-CENT-103	Project Number:	8542								
EQUIPMENT DESCRIPTION:			CENTRIFUGE FEED PS 1 Inlet Line Flow Isolation Valve					Tag Number:		FCV-642-12	
Item No.	Activity Details	REFERENCE DOCUMENT/ DRAWINGS	Verify or Test by						Remarks/Records		
			S/C			JH					
			Key	Resp.	Sign/Date	Key	Resp.	Sign/Date			
1.00 Record nameplate data - record any variances to below											
1.01	Manufacturer: WISE Pneumatic CO LTD										
	Actuator Type: HWC 125-170						W	PE	JB 29/12		
	Serial No.: 13611										
1.02	Valve issued as per specification/ purchase order						W	PE	JB 28/12		
2.00 Valve installation											
2.01	Check internal pipework and clear any debris						S	SV	JB 20/12	Pipe flushed.	
2.02	Confirm gasket type (3mm insertion rubber)						S	SV	JB 20/12		
2.03	Confirm flange alignment and install valve making sure of correct bolting sequence and torques.						S	SV	JB 20/12		
2.04	Check installation direction of valves and ensure it is as per vendor manual or arrow on valve body.						S	SV	JB 20/12		
2.05	Check manual handles have correct access and no restriction for operation						S	PE	NA		
3.01 Actuator Installation											
3.01	If installing the actuator separately ensure valve is secure before fitting the actuator.						S	SV	JB 20/12		
3.02	Fit the actuator to valve as per vendor recommendations.						S	SV	JB 20/12		
3.03	Verify silences/speed adjustments are installed.						S	SV/PE	JB 20/12		
3.04	Connect compressed air. Verify compressed air is within manufacturers recommendations. (5.6 bar to 7bar).						S	SV/PE	JB 23/12		
3.05	Equipment labels are in place and consistent with P&ID.	486/5/5-R7D185					W	PE	JB 19/12		
3.06	Ensure Limit Switches are installed and ready for wiring.						S	SV	JB 20/12		
MECH INSTALLATION COMPLETE											

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Item No.	Activity Details	REFERENCE DOCUMENT/ DRAWINGS	Verify or Test by						Remarks/Records
			S/C			JH			
			Key	Resp.	Sign/Date	Key	Resp.	Sign/Date	
4.00	Pre-commissioning								
4.01	Energise compressed air and check for leaks.					S	SV	20/2/12	
4.02	Stroke the valve manually and ensure gearbox operating normally. Adjust stroke and speed if required.					W	PE	23/2	
4.05	Check for damage and leave area tidy and clean for next discipline.					W	PE	29/2	

APPROVAL			
	NAME	SIGNATURE	DATE
JH	JANE BEECHER	Jane Beecher	12/3/12

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AIR ACTUATED VALVE >DN50 INSTALLATION CHECK SHEET			AREA:		CENTRIFUGE FEED PUMP STATION						
ITP ref. No:	8542-003-CENT	Project:	Oxley WRP Flood Recovery	Inspection Key: W - Witness, H - Hold, S - Surveillance			Responsibility Key: SV- Supervisor, SV- Surveyor, PE - Project Engineer Sup-Superintendent PM- Project Manager				
Checksheet No.:	8542-M-CENT-105	Project Number:	8542								
EQUIPMENT DESCRIPTION:			CENTRIFUGE FEED PUMP 2 Service Water Flushing valve					Tag Number:		FCV-642-20	
Item No.	Activity Details	REFERENCE DOCUMENT/ DRAWINGS	Verify or Test by						Remarks/Records		
			S/C			JH					
			Key	Resp.	Sign/Date	Key	Resp.	Sign/Date			
1.00 Record nameplate data - record any variances to below											
	Actuator Type: Air actuator DN50										
	Serial No.: 2623077 D Code: 1166										
1.02	Valve issued as per specification/ purchase order						W	PE			
2.00 Valve installation											
2.01	Check internal pipework and clear any debris						S	SV			
2.02	Confirm gasket type (3mm insertion rubber)						S	SV			
2.03	Confirm flange alignment and install valve making sure of correct bolting sequence and torques.						S	SV			
2.04	Check installation direction of valves and ensure it is as per vendor manual or arrow on valve body.						S	SV			
2.05	Check manual handles have correct access and no restriction for operation						S	PE		NA	
3.01 Actuator Installation											
3.01	If installing the actuator separately ensure valve is secure before fitting the actuator.						S	SV			
3.02	Fit the actuator to valve as per vendor recommendations.						S	SV			
3.03	Verify silences/speed adjustments are installed.						S	SV/PE			
3.04	Connect compressed air. Verify compressed air is within manufacturers recommendations. (5.6 bar to 10bar).						S	SV/PE			
3.05	Equipment labels are in place and consistent with P&ID.	486/5/5-R7D185					W	PE			
3.06	Ensure Limit Switches are installed and ready for wiring.						S	SV			
MECH INSTALLATION COMPLETE											
4.00 Pre-commissioning											

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Item No.	Activity Details	REFERENCE DOCUMENT/ DRAWINGS	Verify or Test by						Remarks/Records
			S/C			JH			
			Key	Resp.	Sign/Date	Key	Resp.	Sign/Date	
4.01	Energise compressed air and check for leaks.					S	SV	<i>[Signature]</i>	
4.02	Stroke the valve manually and ensure gearbox operating normally. Adjust stroke and speed if required.					W	PE	<i>JB 2/3/12</i>	
4.05	Check for damage and leave area tidy and clean for next discipline.					W	PE	<i>JB 1/3</i>	

APPROVAL			
	NAME	SIGNATURE	DATE
JH	JANE BEECHER	<i>Jane Beecher</i>	12/3/12

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MOTORISED ACTUATED VALVE >DN50 INSTALLATION CHECK SHEET			AREA:		CENTRIFUGE FEED PUMP STATION					
ITP ref. No:	8542-003-CENT	Project:	Oxley WRP Flood Recovery		Inspection Key: W - Witness, H - Hold, S - Surveillance		Responsibility Key: SV- Supervisor, SV- Surveyor, PE - Project Engineer Sup-Superintendent PM- Project Manager			
Checksheet No.:	8542-M-CENT-106	Project Number:	8542							
EQUIPMENT DESCRIPTION:			CENTRIFUGE FEED PUMP 2 SUCTION ACTUATED VALVE				Tag Number:		FCV-642-21	
Item No.	Activity Details	REFERENCE DOCUMENT/ DRAWINGS	Verify or Test by						Remarks/Records	
			S/C			JH				
			Key	Resp.	Sign/Date	Key	Resp.	Sign/Date		
1.00	Record Actuator data - record any variances to below									
1.01	Manufacturer: Rotork									
	Actuator Type: IQ10 F10 A									
	Serial No.: AB6817-02									
	Wiring Diagram: 3000-000									
	Speed: 24 rpm									
	Torque max.: 34 Nm									
	Protection: IP68									
	Motor rating: 0.07kW									
	Nominal Motor Current: 0.5A									
	Unit Weight: 32kg									
1.02	Valve issued as per specification/ purchase order						W	PE	JB 29/12	
2.00	Valve installation									
2.01	Check internal pipework and clear any debris	NA					S	SV	20/12/12	
2.02	Confirm gasket type (3mm insertion rubber)	NA					S	SV	20/12/12	
2.03	Confirm flange alignment and install valve making sure of correct bolting sequence and torques.	NA					S	SV	20/12/12	
2.04	Check installation direction of valves and ensure it is as per vendor manual or arrow on valve body.	NA					S	SV	20/12/12	
2.05	Check manual handles have correct access and no restriction for operation	NA					S	PE	JB 29/12	Spindles greased with lanolin
3.01	Actuator Installation									
3.01	If installing the actuator separately ensure valve is secure before fitting the actuator.	NA					S	SV	20/12/12	

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Item No.	Activity Details	REFERENCE DOCUMENT/ DRAWINGS	Verify or Test by						Remarks/Records
			S/C			JH			
			Key	Resp.	Sign/Date	Key	Resp.	Sign/Date	
3.02	Fit the thrust base to the valve correctly as per vendor instructions. Refer to torque tables in manual pg 11.	Rotork Manual: IQ Range E170-3E				S	SV	20/2/12 JH	
	Ensure sealing plug in centre of handwheel is sealed with PTFE tape.	Rotork Manual: IQ Range E170-3E						20/2/12 JH	
303	Equipment lables are in place and consistent with P&ID.	486/5/5-R7D185				W	PE	JB 2/3/12	
3.04	Ensure Limit Switches are installed and ready for wiring.	486/5/5-R7D185				S	SV	NA	These switches are internal.
MECH INSTALLATION COMPLETE									
4.00	Pre-commissioning								
4.01	Check for damage and leave area tidy and clean for next discipline.	NA				W	PE	JB 1/3	
4.02	Verify that valve is energised. Check energisation register for specific area.	Insert engerisation procedure number.				H	PE	JB 1/3	
4.03	Set Rotork Parameters								
	Diectron of close - 'CLOCKWISE'	Rotork Manual: IQ Range E170-3E (IQ10)				H	PE	JB 1/3	
	Close Action - 'LIMIT'					H	PE	JB 1/3	
	Open Action - 'LIMIT'					H	PE	JB 1/3	
	Close Torque - '60%' If there are issues with torque trips this may need to be increased.					H	PE	JB 1/3	
	Open Torque - '60%' If there are issues with torque trips this may need to be increased.					H	PE	JB 1/3	
	Close Limit - Move valve manually to close position and set as close limit.					H	PE	JB 1/3	
	Open Limit - Move valve manually to open position and set as open limit.					H	PE	JB 1/3	
4.04	Stroke the valve manually and ensure gearbox operating normally. Monitor valve for unusual noise, movement and vibration.						W	PE	JB 1/3

APPROVAL			
	NAME	SIGNATURE	DATE
JH	JANE BEECHER	Jane Beecher	12/3/12

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AIR ACTUATED VALVE >DN50 INSTALLATION CHECK SHEET			AREA:		CENTRIFUGE FEED PUMP STATION						
ITP ref. No:	8542-003-CENT	Project:	Oxley WRP Flood Recovery	Inspection Key: W - Witness, H - Hold, S - Surveillance			Responsibility Key: SV- Supervisor, SV- Surveyor, PE - Project Engineer Sup-Superintendent PM- Project Manager				
Checksheet No.:	8542-M-CENT-108	Project Number:	8542								
EQUIPMENT DESCRIPTION:		CENTRIFUGE FEED PUMP 3 Service Water Flushing valve				Tag Number:		FCV-642-30			
Item No.	Activity Details	REFERENCE DOCUMENT/ DRAWINGS	Verify or Test by						Remarks/Records		
				S/C			JH				
				Key	Resp.	Sign/Date	Key	Resp.		Sign/Date	
1.00	Record nameplate data - record any variances to below										
	Actuator Type: Air actuator DN50										
	Serial No.: 2623077 D Code: 10424										
1.02	Valve issued as per specification/ purchase order						W	PE	JB 28/2		
2.00	Valve installation										
2.01	Check internal pipework and clear any debris						S	SV	JB 29/2	Pipework flushed.	
2.02	Confirm gasket type (3mm insertion rubber)						S	SV	JB 29/2		
2.03	Confirm flange alignment and install valve making sure of correct bolting sequence and torques.						S	SV	JB 29/2		
2.04	Check installation direction of valves and ensure it is as per vendor manual or arrow on valve body.						S	SV	JB 29/2		
2.05	Check manual handles have correct access and no restriction for operation						S	PE	NA		
3.01	Actuator Installation										
3.01	If installing the actuator separately ensure valve is secure before fitting the actuator.						S	SV	JB 29/2		
3.02	Fit the actuator to valve as per vendor recommendations.						S	SV	JB 29/2		
3.03	Verify silences/speed adjustments are installed.						S	SV/PE	JB 29/2		
3.04	Connect compressed air. Verify compressed air is within manufacturers recommendations. (5.6 bar to 10bar).						S	SV/PE	JB 29/2		
3.05	Equipment labels are in place and consistent with P&ID.	486/5/5-R7D185					W	PE	JB 9/3/12		
3.06	Ensure Limit Switches are installed and ready for wiring.						S	SV	JB 28/02/12.		
MECH INSTALLATION COMPLETE											

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Item No.	Activity Details	REFERENCE DOCUMENT/ DRAWINGS	Verify or Test by						Remarks/Records
			S/C			JH			
			Key	Resp.	Sign/Date	Key	Resp.	Sign/Date	
4.00	Pre-commissioning								
4.01	Energise compressed air and check for leaks.					S	SV	SB 2/2/12	
4.02	Stroke the valve manually and ensure gearbox operating normally. Adjust stroke and speed if required.					W	PE	SB 2/3/12	
4.05	Check for damage and leave area tidy and clean for next discipline.					W	PE	SB 2/3/12	

APPROVAL			
	NAME	SIGNATURE	DATE
JH	JANE BEECHER	Jane Beecher	12/3/12

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AIR ACTUATED VALVE >DN50 INSTALLATION CHECK SHEET			AREA:		CENTRIFUGE FEED PUMP STATION						
ITP ref. No:	8542-003-CENT	Project:	Oxley WRP Flood Recovery	Inspection Key: W - Witness, H - Hold, S - Surveillance			Responsibility Key: SV- Supervisor, SV- Surveyor, PE - Project Engineer Sup-Superintendent PM- Project Manager				
Checksheet No.:	8542-M-CENT-109	Project Number:	8542								
EQUIPMENT DESCRIPTION:		CENTRIFUGE FEED PUMP 1 SUCTION ACTUATED VALVE				Tag Number:		FCV-642-31			
Item No.	Activity Details	REFERENCE DOCUMENT/ DRAWINGS	Verify or Test by						Remarks/Records		
				S/C			JH				
				Key	Resp.	Sign/Date	Key	Resp.	Sign/Date		
1.00 Record Valve Details - record any variances to below											
1.01	Manufacturer: WISE Pneumatic CO LTD						W	PE	JB 29/2		
	Actuator Type: HWC 125-170										
	Serial No.: 13611										
1.02	Valve issued as per specification/ purchase order						W	PE	JB 28/2		
2.00 Valve installation											
2.01	Check internal pipework and clear any debris						S	SV	20/2/12	Pipeline flushed	
2.02	Confirm gasket type (3mm insertion rubber)						S	SV	20/2/12		
2.03	Confirm flange alignment and install valve making sure of correct bolting sequence and torques.						S	SV	20/2/12		
2.04	Check installation direction of valves and ensure it is as per vendor manual or arrow on valve body.						S	SV	20/2/12		
2.05	Check manual handles have correct access and no restriction for operation						S	PE	NA		
3.01 Actuator Installation											
3.01	If installing the actuator separately ensure valve is secure before fitting the actuator.						S	SV	20/2/12		
3.02	Fit the actuator to valve as per vendor recommendations.						S	SV	20/2/12		
3.03	Verify silences/speed adjustments are installed.						S	SV/PE	20/2/12		
3.04	Connect compressed air. Verify compressed air is within manufacturers recommendations. (5.6 bar to 7bar).						S	SV/PE	JB 2/3/12		
3.05	Equipment lables are in place and consistent with P&ID.	486/5/5-R7D185					W	PE	JB 9/3/12		
3.06	Ensure Limit Switches are installed and ready for wiring.						S	SV	JB 28/2/12		
MECH INSTALLATION COMPLETE											

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			S/C			JH			
			Key	Resp.	Sign/Date	Key	Resp.	Sign/Date	
4.00	Pre-commissioning								
4.01	Energise compressed air and check for leaks.					S	SV	JP/12 2/12	
4.02	Stroke the valve manually and ensure gearbox operating normally. Adjust stroke and speed if required.					W	PE	JB 2/3/12	
4.05	Check for damage and leave area tidy and clean for next discipline.					W	PE	JB 1/3	

APPROVAL			
	NAME	SIGNATURE	DATE
JH	JANE BEECHER	Jane Beecher	12/3/12

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AIR ACTUATED VALVE >DN50 INSTALLATION CHECK SHEET			AREA:		CENTRIFUGE FEED PUMP STATION						
ITP ref. No:	8542-003-CENT	Project:	Oxley WRP Flood Recovery		Inspection Key: W - Witness, H - Hold, S - Surveillance		Responsibility Key: SV- Supervisor, SV- Surveyor, PE - Project Engineer Sup-Superintendent PM- Project Manager				
Checksheet No.:	8542-M-CENT-110	Project Number:	8542								
EQUIPMENT DESCRIPTION:			CENTRIFUGE FEED PS 1 Inlet Line Flow Isolation Valve					Tag Number:		FCV-642-32	
Item No.	Activity Details	REFERENCE DOCUMENT/ DRAWINGS	Verify or Test by						Remarks/Records		
			S/C			JH					
			Key	Resp.	Sign/Date	Key	Resp.	Sign/Date			
1.00 Record nameplate data - record any variances to below											
1.01	Manufacturer: WISE Pneumatic CO LTD										
	Actuator Type: HWC 125-170						W	PE	JB 29/2		
	Serial No.: 14311										
1.02	Valve issued as per specification/ purchase order						W	PE	JB 28/2		
2.00 Valve installation											
2.01	Check internal pipework and clear any debris						S	SV	20/2/12	Pipework checked.	
2.02	Confirm gasket type (3mm insertion rubber)						S	SV	20/2/12		
2.03	Confirm flange alignment and install valve making sure of correct bolting sequence and torques.						S	SV	20/2/12		
2.04	Check installation direction of valves and ensure it is as per vendor manual or arrow on valve body.						S	SV	20/2/12		
2.05	Check manual handles have correct access and no restriction for operation						S	PE	NA		
3.01 Actuator Installation											
3.01	If installing the actuator separately ensure valve is secure before fitting the actuator.						S	SV	20/2/12		
3.02	Fit the actuator to valve as per vendor recommendations.						S	SV	20/2/12		
3.03	Verify silences/speed adjustments are installed.						S	SV/PE	20/2/12		
3.04	Connect compressed air. Verify compressed air is within manufacturers recommendations. (5.6 bar to 7bar).						S	SV/PE	JB 21/3/12		
3.05	Equipment lables are in place and consistent with P&ID.	486/5/5-R7D185					W	PE	JB 9/3/12		
3.06	Ensure Limit Switches are installed and ready for wiring.						S	SV	JB 28/2/12		
MECH INSTALLATION COMPLETE											

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Item No.	Activity Details	REFERENCE DOCUMENT/ DRAWINGS	Verify or Test by						Remarks/Records
			S/C			JH			
			Key	Resp.	Sign/Date	Key	Resp.	Sign/Date	
4.00	Pre-commissioning								
4.01	Energise compressed air and check for leaks.					S	SV	20/2/12	
4.02	Stroke the valve manually and ensure gearbox operating normally. Adjust stroke and speed if required.					W	PE	JB 2/3/12	
4.05	Check for damage and leave area tidy and clean for next discipline.					W	PE	JB 1/3	

APPROVAL			
	NAME	SIGNATURE	DATE
JH	JANE BEECHER	Jane Beecher	12/3/12

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AIR ACTUATED VALVE >DN50 INSTALLATION CHECK SHEET			AREA:		CENTRIFUGE FEED PUMP STATION						
ITP ref. No:	8542-003-CENT	Project:	Oxley WRP Flood Recovery	Inspection Key: W - Witness, H - Hold, S - Surveillance			Responsibility Key: SV- Supervisor, SV- Surveyor, PE - Project Engineer Sup-Superintendent PM- Project Manager				
Checksheet No.:	8542-M-CENT-112	Project Number:	8542								
EQUIPMENT DESCRIPTION:		CENTRIFUGE FEED PS Distribution Valve 1						Tag Number:		FCV-642-42	
Item No.	Activity Details	REFERENCE DOCUMENT/ DRAWINGS	Verify or Test by						Remarks/Records		
			S/C			JH					
			Key	Resp.	Sign/Date	Key	Resp.	Sign/Date			
1.00	Record nameplate data - record any variances to below										
	Actuator Type: George Fischer										
	Model: PA40 Single Acting FC										
	IP: 65 Pmax = 7bar										
	Serial No.: 20110629										
1.02	Valve issued as per specification/ purchase order						W	PE	JB 28/12		
2.00	Valve installation										
2.01	Check internal pipework and clear any debris						S	SV	21/12/12	Pipe flushed.	
2.02	Confirm gasket type (3mm insertion rubber)						S	SV	21/12/12		
2.03	Confirm flange alignment and install valve making sure of correct bolting sequence and torques.						S	SV	21/12/12		
2.04	Check installation direction of valves and ensure it is as per vendor manual or arrow on valve body.						S	SV	21/12/12		
2.05	Check manual handles have correct access and no restriction for operation						S	PE	NA		
3.01	Actuator Installation										
3.01	If installing the actuator separately ensure valve is secure before fitting the actuator.						S	SV	21/12/12		
3.02	Fit the actuator to valve as per vendor recommendations.	Refer to GF Manual: for Pneumatic actuator PA30 - PA90.					S	SV	21/12/12		
3.03	Verify silences/speed adjustments are installed.						S	SV/PE	21/12/12		
3.04	Connect compressed air. Verify compressed air is within manufacturers recommendations. (5.6 bar to 7bar).						S	SV/PE	JB 2/3/12		

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			S/C			JH			
			Key	Resp.	Sign/Date	Key	Resp.	Sign/Date	
3.05	Equipment lables are in place and consistent with P&ID.	486/5/5-R7D185				W	PE	JB 9/3/12	
3.06	Ensure Limit Switches are installed and ready for wiring.					S	SV	2/12/12	LIMIT SWITCHES REROUTED 2/12/12.
MECH INSTALLATION COMPLETE									
4.00 Pre-commissioning									
4.01	Energise compressed air and check for leaks.					S	SV	21/12/12	
4.02	Stroke the valve manually and ensure gearbox operating normally. Adjust stroke and speed if required.					W	PE	JB 2/3/12	
4.05	Check for damage and leave area tidy and clean for next discipline.					W	PE	JB 1/3	

APPROVAL			
	NAME	SIGNATURE	DATE
JH	JANE BEECHER	Jane Beecher	12/3/12

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AIR ACTUATED VALVE >DN50 INSTALLATION CHECK SHEET			AREA:		CENTRIFUGE FEED PUMP STATION						
ITP ref. No:	8542-003-CENT	Project:	Oxley WRP Flood Recovery		Inspection Key: W - Witness, H - Hold, S - Surveillance		Responsibility Key: SV- Supervisor, SV- Surveyor, PE - Project Engineer Sup-Superintendent PM- Project Manager				
Checksheet No.:	8542-M-CENT-113	Project Number:	8542								
EQUIPMENT DESCRIPTION:			CENTRIFUGE FEED PS Distribution Valve 2					Tag Number:		FCV-642-43	
Item No.	Activity Details	REFERENCE DOCUMENT/ DRAWINGS	Verify or Test by						Remarks/Records		
			S/C			JH					
			Key	Resp.	Sign/Date	Key	Resp.	Sign/Date			
1.00	Record nameplate data - record any variances to below										
	Actuator Type: George Fischer										
	Model: PA40 Single Acting FC										
	IP: 65 Pmax = 7bar										
	Serial No.: 20110919										
1.02	Valve issued as per specification/ purchase order						W	PE			
2.00	Valve installation										
2.01	Check internal pipework and clear any debris						S	SV	21/2/12		Pipe/line flushed.
2.02	Confirm gasket type (3mm insertion rubber)						S	SV	21/2/12		
2.03	Confirm flange alignment and install valve making sure of correct bolting sequence and torques.						S	SV	21/2/12		
2.04	Check installation direction of valves and ensure it is as per vendor manual or arrow on valve body.						S	SV	21/2/12		
2.05	Check manual handles have correct access and no restriction for operation						S	PE	NA		
3.01	Actuator Installation										
3.01	If installing the actuator separately ensure valve is secure before fitting the actuator.						S	SV	21/2/12		
3.02	Fit the actuator to valve as per vendor recommendations.	Refer to GF Manual: for Pneumatic actuator PA30 - PA90.					S	SV	24/2/12		
3.03	Verify silences/speed adjustments are installed.						S	SV/PE	26/2/12		
3.04	Connect compressed air. Verify compressed air is within manufacturers recommendations. (5.6 bar to 7bar).						S	SV/PE	28/2/12		

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Item No.	Activity Details	REFERENCE DOCUMENT/ DRAWINGS	Verify or Test by						Remarks/Records
			S/C			JH			
			Key	Resp.	Sign/Date	Key	Resp.	Sign/Date	
3.05	Equipment lables are in place and consistent with P&ID.	486/5/5-R7D185				W	PE	JB 9/3/12	
3.06	Ensure Limit Switches are installed and ready for wiring.					S	SV	2/2/12	Limit Switches RETROFITTED .
MECH INSTALLATION COMPLETE									
4.00 Pre-commissioning									
4.01	Energise compressed air and check for leaks.					S	SV	2/2/12/1.	
4.02	Stroke the valve manually and ensure gearbox operating normally. Adjust stroke and speed if required.					W	PE	JB 2/3/12	
4.05	Check for damage and leave area tidy and clean for next discipline.					W	PE	JB 1/3	

APPROVAL			
	NAME	SIGNATURE	DATE
JH	JANE BEECHER	Jane Beecher	12/3/12

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AIR ACTUATED VALVE >DN50 INSTALLATION CHECK SHEET			AREA:		CENTRIFUGE FEED PUMP STATION						
ITP ref. No:	8542-003-CENT	Project:	Oxley WRP Flood Recovery		Inspection Key: W - Witness, H - Hold, S - Surveillance		Responsibility Key: SV- Supervisor, SV- Surveyor, PE - Project Engineer Sup-Superintendent PM- Project Manager				
Checksheet No.:	8542-M-CENT-115	Project Number:	8542								
EQUIPMENT DESCRIPTION:			CENTRIFUGE FEED PS 1 Discharge Isolation					Tag Number:		FCV-642-15	
Item No.	Activity Details	REFERENCE DOCUMENT/ DRAWINGS	Verify or Test by						Remarks/Records		
			S/C			JH					
			Key	Resp.	Sign/Date	Key	Resp.	Sign/Date			
1.00 Record nameplate data - record any variances to below											
	Actuator Type: George Fischer										
	Model: PA40 Single Acting FC										
	IP: 65 Pmax = 7bar										
	Serial No.: 20110919										
1.02	Valve issued as per specification/ purchase order						W	PE			
2.00 Valve installation											
2.01	Check internal pipework and clear any debris						S	SV	21/2/12		PIPELINE FLUSHED.
2.02	Confirm gasket type (3mm insertion rubber)						S	SV	21/2/12		
2.03	Confirm flange alignment and install valve making sure of correct bolting sequence and torques.						S	SV	21/2/12		
2.04	Check installation direction of valves and ensure it is as per vendor manual or arrow on valve body.						S	SV	21/2/12		
2.05	Check manual handles have correct access and no restriction for operation						S	PE	NA		
3.01 Actuator Installation											
3.01	If installing the actuator separately ensure valve is secure before fitting the actuator.						S	SV	21/2/12		
3.02	Fit the actuator to valve as per vendor recommendations.	Refer to GF Manual: for Pneumatic actuator PA30 - PA90.					S	SV	21/2/12		
3.03	Verify silences/speed adjustments are installed.						S	SV/PE	21/2/12		
3.04	Connect compressed air. Verify compressed air is within manufacturers recommendations. (5.6 bar to 7bar).						S	SV/PE	22/2/12		

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Item No.	Activity Details	REFERENCE DOCUMENT/ DRAWINGS	Verify or Test by						Remarks/Records
			S/C			JH			
			Key	Resp.	Sign/Date	Key	Resp.	Sign/Date	
3.05	Equipment lables are in place and consistent with P&ID.	486/5/5-R7D185				W	PE	JB 9/3/12	
3.06	Ensure Limit Switches are installed and ready for wiring.					S	SV	NA	
MECH INSTALLATION COMPLETE									
4.00	Pre-commissioning								
4.01	Energise compressed air and check for leaks.					S	SV	21/2/12	
4.02	Stroke the valve manually and ensure gearbox operating normally. Adjust stroke and speed if required.					W	PE	JB 2/3/12	
4.05	Check for damage and leave area tidy and clean for next discipline.					W	PE	JB 1/3	

APPROVAL			
	NAME	SIGNATURE	DATE
JH	JANE BEECHER	Jane Beecher	12/3/12

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AIR ACTUATED VALVE >DN50 INSTALLATION CHECK SHEET			AREA:		CENTRIFUGE FEED PUMP STATION						
ITP ref. No:	8542-003-CENT	Project:	Oxley WRP Flood Recovery	Inspection Key: W - Witness, H - Hold, S - Surveillance			Responsibility Key: SV- Supervisor, SV- Surveyor, PE - Project Engineer Sup-Superintendent PM- Project Manager				
Checksheet No.:	8542-M-CENT-116	Project Number:	8542								
EQUIPMENT DESCRIPTION:			CENTRIFUGE FEED PS 2 Discharge Isolation					Tag Number:		FCV-642-25	
Item No.	Activity Details	REFERENCE DOCUMENT/ DRAWINGS	Verify or Test by						Remarks/Records		
			S/C			JH					
			Key	Resp.	Sign/Date	Key	Resp.	Sign/Date			
1.00 Record nameplate data - record any variances to below											
	Actuator Type: George Fischer										
	Model: PA40 Single Acting FC										
	IP: 65 Pmax = 7bar										
	Serial No.: 20100527										
1.02	Valve issued as per specification/ purchase order						W	PE			
2.00 Valve installation											
2.01	Check internal pipework and clear any debris						S	SV			
2.02	Confirm gasket type (3mm insertion rubber)						S	SV			
2.03	Confirm flange alignment and install valve making sure of correct bolting sequence and torques.						S	SV			
2.04	Check installation direction of valves and ensure it is as per vendor manual or arrow on valve body.						S	SV			
2.05	Check manual handles have correct access and no restriction for operation						S	PE			
3.01 Actuator Installation											
3.01	If installing the actuator separately ensure valve is secure before fitting the actuator.						S	SV			
3.02	Fit the actuator to valve as per vendor recommendations.	Refer to GF Manual: for Pneumatic actuator PA30 - PA90.					S	SV			
3.03	Verify silences/speed adjustments are installed.						S	SV/PE			
3.04	Connect compressed air. Verify compressed air is within manufacturers recommendations. (5.6 bar to 7bar).						S	SV/PE			

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			S/C			JH			
			Key	Resp.	Sign/Date	Key	Resp.	Sign/Date	
3.05	Equipment lables are in place and consistent with P&ID.	486/5/5-R7D185				W	PE	JB 9/3/12	
3.06	Ensure Limit Switches are installed and ready for wiring.					S	SV	NA	
MECH INSTALLATION COMPLETE									
4.00 Pre-commissioning									
4.01	Energise compressed air and check for leaks.					S	SV	JB 2/3/12	
4.02	Stroke the valve manually and ensure gearbox operating normally. Adjust stroke and speed if required.					W	PE	JB 2/3/12	
4.05	Check for damage and leave area tidy and clean for next discipline.					W	PE	JB 1/3	

APPROVAL			
	NAME	SIGNATURE	DATE
JH	JANE BEECHER	Jane Beecher	12/3/12

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AIR ACTUATED VALVE >DN50 INSTALLATION CHECK SHEET			AREA:		CENTRIFUGE FEED PUMP STATION						
ITP ref. No:	8542-003-CENT	Project:	Oxley WRP Flood Recovery		Inspection Key: W - Witness, H - Hold, S - Surveillance		Responsibility Key: SV- Supervisor, SV- Surveyor, PE - Project Engineer Sup-Superintendent PM- Project Manager				
Checksheet No.:	8542-M-CENT-117	Project Number:	8542								
EQUIPMENT DESCRIPTION:			CENTRIFUGE FEED PS 3 Discharge Isolation					Tag Number:		FCV-642-35	
Item No.	Activity Details	REFERENCE DOCUMENT/ DRAWINGS	Verify or Test by						Remarks/Records		
			S/C			JH					
			Key	Resp.	Sign/Date	Key	Resp.	Sign/Date			
1.00 Record nameplate data - record any variances to below											
	Actuator Type: George Fischer										
	Model: PA40 Single Acting FC										
	IP: 65 Pmax = 7bar										
	Serial No.: <u>20111013</u>										
1.02	Valve issued as per specification/ purchase order						W	PE			
2.00 Valve installation											
2.01	Check internal pipework and clear any debris						S	SV	21/2/12		Pipework Flushed.
2.02	Confirm gasket type (3mm insertion rubber)						S	SV	21/2/12		
2.03	Confirm flange alignment and install valve making sure of correct bolting sequence and torques.						S	SV	21/2/12		
2.04	Check installation direction of valves and ensure it is as per vendor manual or arrow on valve body.						S	SV	21/2/12		
2.05	Check manual handles have correct access and no restriction for operation						S	PE	NA		
3.01 Actuator Installation											
3.01	If installing the actuator separately ensure valve is secure before fitting the actuator.						S	SV	21/2/12		
3.02	Fit the actuator to valve as per vendor recommendations.	Refer to GF Manual: for Pneumatic actuator PA30 - PA90.					S	SV	21/2/12		
3.03	Verify silences/speed adjustments are installed.						S	SV/PE	21/2/12		
3.04	Connect compressed air. Verify compressed air is within manufacturers recommendations. (5.6 bar to 7bar).						S	SV/PE	21/2/12		

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Item No.	Activity Details	REFERENCE DOCUMENT/ DRAWINGS	Verify or Test by						Remarks/Records
			S/C			JH			
			Key	Resp.	Sign/Date	Key	Resp.	Sign/Date	
3.05	Equipment lables are in place and consistent with P&ID.	486/5/5-R7D185				W	PE	JB 9/3/12	
3.06	Ensure Limit Switches are installed and ready for wiring.					S	SV	NA	
MECH INSTALLATION COMPLETE									
4.00 Pre-commissioning									
4.01	Energise compressed air and check for leaks.					S	SV	JB 2/1/12	
4.02	Stroke the valve manually and ensure gearbox operating normally. Adjust stroke and speed if required.					W	PE	JB 2/3/12	
4.05	Check for damage and leave area tidy and clean for next discipline.					W	PE	JB 1/3	

APPROVAL			
	NAME	SIGNATURE	DATE
JH	JANE BEECHER	Jane Beecher	12/3/12

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INSTRUMENT INSTALLATION CHECK SHEET			AREA:		CENTRIFUGE FEED PUMP STATION						
ITP ref. No:	8542-003-CENT	Project:	Oxley WRP Flood Recovery	Inspection Key: W - Witness, H - Hold, S - Surveillance			Responsibility Key: SV- Supervisor, SV- Surveyor, PE - Project Engineer Sup-Superintendent PM- Project Manager				
Checksheet No.:	8542-M-CENT-201	Project Number:	8542								
EQUIPMENT DESCRIPTION:			CENTRIFUGE 2 FEED FLOWMETER					Tag Number:		FIT-641-01	
Item No.	Activity Details	REFERENCE DOCUMENT/ DRAWINGS	Verify or Test by						Remarks/Records		
			S/C			JH					
			Key	Resp.	Sign/Date	Key	Resp.	Sign/Date			
1.00	Record nameplate data - record any variances to below										
1.01	Manufacturer: Endress & Hauser										
	Model: Promag W										
	Order Code: 50W1H-UC0A1AK2KAAH										
	Serial No.: <i>EC012720000</i>										
	k-FACTOR: 1.2594						W	PE	<i>JB 29/2</i>		
	Size: DN100										
	Pressure rating: 16bar										
	Temperature rating: -10°C - +50°C										
	Protection: IP68										
1.02	Instrument issued as per specifications/ purchase order						W	PE	<i>21/2/12</i>		
2.00	Instrument installation										
2.01	Check internal pipework and clear any debris	NA					S	SV	<i>21/2/12 g</i>	<i>Pipework flushed.</i>	
2.02	Install the instrument upstream from fittings i.e. valves, tees, elbows etc. and ensure the correct inlet and outlet run is maintained as follows: Inlet run: $\geq 5xDN$ and Outlet run: $\geq 2xDN$	E&H Manual for Magflow Meter.					S	SV/PE	<i>21/2/12</i>	<i>as per original design</i>	
2.03	Confirm flange alignment and install instrument making sure of correct bolting sequence and torques (20-44Nm).	NA					S	SV	<i>21/2/12 g</i>		
2.04	Install instruments with correct gaskets. (3mm insertion rubber)	NA					S	SV	<i>21/2/12</i>		
2.05	Equipment labels are in place and consistent with P&ID.	486/5/5-R7D185					W	PE	<i>JB 29/2</i>		
2.06	Roll up and fasten the cable ready for electrical installation	NA					S	SV	<i>JB 28/2</i>		

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Item No.	Activity Details	REFERENCE DOCUMENT/ DRAWINGS	Verify or Test by						Remarks/Records
			S/C			JH			
			Key	Resp.	Sign/Date	Key	Resp.	Sign/Date	
2.07	Check for damage and leave area tidy and clean for next discipline.	NA				W	PE	JB 29/2	
MECH INSTALLATION COMPLETE									

APPROVAL			
	NAME	SIGNATURE	DATE
JH	JANE BEECHER	<i>Jane Beecher</i>	12/3/12

Revision: A
Approved By: Tate Brammer

Date Issue: 13.02.12
Page 1 of 2

INSTRUMENT INSTALLATION CHECK SHEET			AREA:		CENTRIFUGE FEED PUMP STATION						
ITP ref. No:	8542-003-CENT	Project:	Oxley WRP Flood Recovery		Inspection Key: W - Witness, H - Hold, S - Surveillance		Responsibility Key: SV- Supervisor, SV-Surveyor, PE - Project Engineer Sup-Superintendent PM- Project Manager				
Checksheet No.:	8542-M-CENT-202	Project Number:	8542								
EQUIPMENT DESCRIPTION:			CENTRIFUGE 3 FEED FLOWMETER					Tag Number:		FIT-642-01	
Item No.	Activity Details	REFERENCE DOCUMENT/ DRAWINGS	Verify or Test by						Remarks/Records		
			S/C			JH					
			Key	Resp.	Sign/Date	Key	Resp.	Sign/Date			
1.00	Record nameplate data - record any variances to below										
1.01	Manufacturer: Endress & Hauser										
	Model: Promag W										
	Order Code: 50W1H-UC0A1AK2KAAH										
	Serial No.:										
	k-FACTOR: 1.2594					W	PE	NA			
	Size: DN100										
	Pressure rating: 16bar										
	Temperature rating: -10°C - +50°C										
	Protection: IP68										
1.02	Instrument issued as per specifications/ purchase order					W	PE	NA	EXISTING INSTRUMENT - NEW TRANSMITTER.		
2.00	Instrument installation										
2.01	Check internal pipework and clear any debris	NA				S	SV	21/2/12	Pipework flushed.		
2.02	Install the instrument upstream from fittings i.e. valves, tees, elbows etc. and ensure the correct inlet and outlet run is maintained as follows: Inlet run: $\geq 5xDN$ and Outlet run: $\geq 2xDN$	E&H Manual for Magflow Meter.				S	SV/PE	21/2/12	As per original design.		
2.03	Confirm flange alignment and install instrument making sure of correct bolting sequence and torques (20-44Nm).	NA				S	SV	21/2/12			
2.04	Install instruments with correct gaskets. (3mm insertion rubber)	NA				S	SV	21/2/12			
2.05	Equipment labels are in place and consistent with P&ID.	486/5/5-R7D185				W	PE	28/2/12			
2.06	Roll up and fasten the cable ready for electrical installation	NA				S	SV	21/2/12			

Revision: A
 Approved By: Tate Brammer


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Item No.	Activity Details	REFERENCE DOCUMENT/ DRAWINGS	Verify or Test by						Remarks/Records
			S/C			JH			
			Key	Resp.	Sign/Date	Key	Resp.	Sign/Date	
2.07	Check for damage and leave area tidy and clean for next discipline.	NA				W	PE	SB 29/2	
MECH INSTALLATION COMPLETE									

APPROVAL			
	NAME	SIGNATURE	DATE
JH	JANE BEECHER	<i>Jane Beecher</i>	12/3/12

Revision: A
Approved By: Tate Brammer

Date c Issue: 13.02.12
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MANUAL VALVE >DN80 INSTALLATION CHECK SHEET			AREA:		CENTRIFUGE FEED PUMP STATION					
ITP ref. No:	8542-003-CENT	Project:	Oxley WRP Flood Recovery	Inspection Key: W - Witness, H - Hold, S - Surveillance		Responsibility Key: SV- Supervisor, SV- Surveyor, PE - Project Engineer Sup- Superintendent PM- Project Manager				
Checksheet No.:	8542-M-CENT-301	Project Number:	8542							
EQUIPMENT DESCRIPTION:			CENTRIFUGE 2 FEED FLOWMETER ISOLATION VALVE				Tag Number:		HV-642-04	
Item No.	Activity Details	REFERENCE DOCUMENT/ DRAWINGS	Verify or Test by						Remarks/Records	
			S/C			JH				
			Key	Resp.	Sign/Date	Key	Resp.	Sign/Date		
1.01	Valve issued as per specification/ purchase order					W	PE	JB 28/2		
2.00	Valve installation									
2.01	Check internal pipework and clear any debris	NA				S	SV	21/2/12	Pipework flushed	
2.02	Confirm gasket type (3mm insertion rubber)	NA				S	SV	21/2/12		
2.03	Confirm flange alignment and install valve making sure of correct bolting sequence and torques.	NA				S	SV	21/2/12		
2.04	Check installation direction of valves and ensure it is as per vendor manual or arrow on valve body.	NA				S	SV	21/2/12		
2.05	Check manual handles (if applicable) have correct access and no restriction for operation	NA				S	SV/PE	21/2/12		
2.06	Stroke valve manually.	NA				S	SV	21/2/12		
2.07	Equipment lables are in place and consistent with P&ID.	486/5/5-R7D185				W	PE	JB 9/3/12		
2.08	Check for damage and leave area tidy and clean for next discipline.	NA				W	PE	JB 29/2		
3.06	Ensure Limit Switches are installed and ready for wiring. (IF REQUIRED)	NA				S	SV	HA		

APPROVAL		
	NAME	DATE
JH	JANE BEECHER	12/3/12

Revision: A
Approved By: Tate Brammer


Date: 13.02.12

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MANUAL VALVE >DN80 INSTALLATION CHECK SHEET			AREA:		CENTRIFUGE FEED PUMP STATION					
ITP ref. No:	8542-003-CENT	Project:	Oxley WRP Flood Recovery		Inspection Key: W - Witness, H - Hold, S - Surveillance		Responsibility Key: SV- Supervisor, SV- Surveyor, PE - Project Engineer Sup- Superintendent PM- Project Manager			
Checksheet No.:	8542-M-CENT-302	Project Number:	8542							
EQUIPMENT DESCRIPTION:			CENTRIFUGE 3 FEED FLOWMETER ISOLATION VALVE				Tag Number:		HV-642-05	
Item No.	Activity Details	REFERENCE DOCUMENT/ DRAWINGS	Verify or Test by						Remarks/Records	
			S/C			JH				
			Key	Resp.	Sign/Date	Key	Resp.	Sign/Date		
1.01	Valve issued as per specification/ purchase order					W	PE	JB 28/2		
2.00	Valve installation									
2.01	Check internal pipework and clear any debris	NA				S	SV	21/2/12	Pipework checked	
2.02	Confirm gasket type (3mm insertion rubber)	NA				S	SV	21/2/12		
2.03	Confirm flange alignment and install valve making sure of correct bolting sequence and torques.	NA				S	SV	21/2/12		
2.04	Check installation direction of valves and ensure it is as per vendor manual or arrow on valve body.	NA				S	SV	21/2/12		
2.05	Check manual handles (if applicable) have correct access and no restriction for operation	NA				S	SV/PE	21/2/12		
2.06	Stroke valve manually.	NA				S	SV	21/2/12		
2.07	Equipment labels are in place and consistent with P&ID.	486/5/5-R7D185				W	PE	JB 9/3/12		
2.08	Check for damage and leave area tidy and clean for next discipline.	NA				W	PE	JB 29/2		
3.06	Ensure Limit Switches are installed and ready for wiring. (IF REQUIRED)	NA				S	SV	21/2/12		
APPROVAL										
NAME		SIGNATURE				DATE				
JH	JANE BEECHER	Jane Beecher				12/3/12				

Revision: A
Approved By: Tate Brammer


Date Issue: 13.02.12
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INLINE MIXER INSTALLATION CHECK SHEET			AREA:		CENTRIFUGE FEED PUMP STATION				
ITP ref. No:	8542-003-CENT	Project:	Oxley WRP Flood Recovery		Inspection Key: W - Witness, H - Hold, S - Surveillance		Responsibility Key: SV- Supervisor, SV- Surveyor, PE - Project Engineer Sup-Superintendent PM- Project Manager		
Checksheet No.:	8542-M-CENT-601	Project Number:	8542						
EQUIPMENT DESCRIPTION:			FEED TO CENTRIFUGE 2 INLINE STATIC MIXER					Tag Number:	STM-642-01
Item No.	Activity Details	REFERENCE DOCUMENT/ DRAWINGS	Verify or Test by						Remarks/Records
			S/C			JH			
			Key	Resp.	Sign/Date	Key	Resp.	Sign/Date	
1.01	Mixer issued as per specification/ purchase order	NA				W	PE	JB 28/2	
2.01	Record name plate details.	NA				S	SV	JB 29/2	196.077.297.689 NO NAME PLATE 10 bar/20°C ASME 150 LBA PVC SULZER COMPACT DN4
2.00 Mixer installation									
2.03	Check internal pipework and clear any debris	NA				S	SV	21/2/12	Pipework Flushed
2.04	Confirm gasket type (3mm insertion rubber)	NA				W	SV	21/2/12	
2.05	Confirm flange alignment and install mixer making sure of correct bolting sequence and torques.	NA				S	SV	21/2/12	
2.06	Check installation direction of mixer and ensure it is as per vendor manual or arrow on valve body and dosing point is in correct position	NA				W	SV	21/2/12	
2.05	Equipment lables are in place and consistent with P&ID.	486/5/5-R7D185				W	PE	JB 9/3/12	
3.02	Check for damage and leave area tidy and clean for next discipline.	NA				W	PE	JB 29/2	
MECH INSTALLATION COMPLETE									

APPROVAL			
	NAME	SIGNATURE	DATE
JH	JANE BEECHER		12/3/12

Revision: A
Approved By: Tate Brammer

Date Issue: 13.02.12
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INLINE MIXER INSTALLATION CHECK SHEET			AREA:	CENTRIFUGE FEED PUMP STATION					
ITP ref. No:	8542-003-CENT	Project:	Oxley WRP Flood Recovery	Inspection Key: W - Witness, H - Hold, S - Surveillance		Responsibility Key: SV- Supervisor, SV- Surveyor, PE - Project Engineer Sup- Superintendent PM- Project Manager			
Checksheet No.:	8542-M-CENT-602	Project Number:	8542						
EQUIPMENT DESCRIPTION:			FEED TO CENTRIFUGE 3 INLINE STATIC MIXER				Tag Number:	STM-642-01	
Item No.	Activity Details	REFERENCE DOCUMENT/ DRAWINGS	Verify or Test by						Remarks/Records
			S/C			JH			
			Key	Resp.	Sign/Date	Key	Resp.	Sign/Date	
1.01	Mixer issued as per specification/ purchase order	NA				W	PE	JB 28/2	
2.01	Record name plate details.	NA				S	SV	JB 29/2	SULZER COMPAX DN4 106.077.297.689 NO NAME PLATE 10 bar/20°C ASME 150lb RVC
2.00 Mixer installation									
2.03	Check internal pipework and clear any debris	NA				S	SV	21/2/12	Pipework flushed.
2.04	Confirm gasket type (3mm insertion rubber)	NA				W	SV	21/2/12	
2.05	Confirm flange alignment and install mixer making sure of correct bolting sequence and torques.	NA				S	SV	21/2/12	
2.06	Check installation direction of mixer and ensure it is as per vendor manual or arrow on valve body and dosing point is in correct position	NA				W	SV	21/2/12	
2.05	Equipment labels are in place and consistent with P&ID.	486/5/5-R7D185				W	PE	JB 9/3/12	
3.02	Check for damage and leave area tidy and clean for next discipline.	NA				W	PE	JB 29/2	
MECH INSTALLATION COMPLETE									

APPROVAL			
	NAME	SIGNATURE	DATE
JH	JANE BEECHER		12/3/12

Revision: A
Approved By: Tate Brammer

Date Issue: 13.02.12

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INSTRUMENT INSTALLATION CHECK SHEET			AREA:		CENTRIFUGE FEED PUMP STATION					
ITP ref. No:	8542-003-CENT	Project:	Oxley WRP Flood Recovery		Inspection Key: W - Witness, H - Hold, S - Surveillance			Responsibility Key: SV- Supervisor, SV- Surveyor, PE - Project Engineer Sup-Superintendent PM- Project Manager		
Checksheet No.:	8542-M-CENT-701	Project Number:	8542							
EQUIPMENT DESCRIPTION:			INSTRUMENT INSTALLATION CHECK SHEET							
Tag Number	Description	Manufacturer	Model	Serial No.	Installed as per O&M	Set point	Additional Parameters Set & Attached	Test Operation	Remarks/Records	
PSH-64210	Centrifuge Feed Pump 1 Discharge Pressure Switch High	UNITED ELECTRIC CONTROLS	12 SERIES 12SHDMSC	K1691777-1	✓	6 bar	NA	✓	TEST HARDWIRE CONNECTION TO CORRESPONDING PUMP 1	
PSH-64220	Centrifuge Feed Pump 2 Discharge Pressure Switch High	UNITED ELECTRIC CONTROLS	12 SERIES 12SHDMSC	K1691777-3	✓	6 bar	NA	✓	TEST HARDWIRE CONNECTION TO CORRESPONDING PUMP 2	
PSH-64230	Centrifuge Feed Pump 3 Discharge Pressure Switch High	UNITED ELECTRIC CONTROLS	12 SERIES 12SHDMSC	K1691777-2	✓	6 bar	NA	✓	TEST HARDWIRE CONNECTION TO CORRESPONDING PUMP 3	
PI-64271	Centrifuge 2 Feed Pressure Indicators	WIKA	DN 80 FACE 0-160 kPa	185502-1	✓	NA	NA	✓	CALIBRATION DATE: 1/2/12	
PI-64272	Centrifuge 3 Feed Pressure Indicators	WIKA	DN 80 FACE 0-160 kPa	185502-2	✓	NA	NA	✓	" " 1/2/12	

APPROVAL			
	NAME	SIGNATURE	DATE
JH	JANE BEECHER	Jane Beecher	12/3/12

NOTE: WHEN SUITABLE QUALITY SLUDGE IS AVAILABLE, PRESSURE SWITCH INTERLOCK TO BE RETESTED. TESTED ON SERVICE WATER 3/5/12 JB-
INTERLOCKS TESTED + WORKING.

2.3. Electrical Checksheets

Cable Schedule



CHECKED
APPROVED

JACQUES JORDAAN
D. DOORSSCHOT

Project: John Holland Oxley Investigation Zone 3
Job No: 19216
Date: 27/02/2012
Version: V0.01

CABLE IDENTIFIER		CABLE DETAILS					ELECTRICAL CHECKS									TEST SUMMARY	COMMENT
AREA	CABLE ID	CABLE TYPE	SIZE	CABLE APPROX LENGTH (M)	CABLE RUN FROM	CABLE RUN TO	CONTINUITY	RED/WHITE	RED/BLUE	WHITE/BLUE	RED/EARTH	WHITE/EARTH	BLUE/EARTH				
CENTRIFUGE	FCV-64212-C01	8C+E OC	1.5MM	65	MCC-022-01	JB-64212	Y								Good		
CENTRIFUGE	FCV-64212-C02	3C+E OC	1.0MM	2	JB-64212	FCV-64212	Y								Good		
CENTRIFUGE	FCV-64210-C01	8C+E OC	1.5MM	65	MCC-022-01	JB-64210	Y								Good		
CENTRIFUGE	FCV-64210-C02	3C+E OC	1.0MM	2	JB-64212	FCV-64212	Y								Good		
CENTRIFUGE	FCV-64211-C01	O/C 3C & Earth	1.5MM	65	MCC-022-01	FCV-64211	Y								Good		
CENTRIFUGE	FCV-64211-PO1	O/C 3C & Earth	4	65	MCC-022-01	FCV-64211	Y	∞	∞	∞	∞	∞	∞	∞	GOOD		
CENTRIFUGE	FCV-64213-C01	8C+E OC	1.5MM	65	MCC-022-01	JB-64213	Y								Good		
CENTRIFUGE	FCV-64213-C02	3C+E OC	1.0MM	2	JB-64213	FCV-64213	Y									Removed From Install.	
CENTRIFUGE	FCV-64220-C01	8C+E OC	1.5MM	65	MCC-022-01	JB-64220	Y								Good		
CENTRIFUGE	FCV-64220-C02	3C+E OC	1.0MM	2	JB-64220	FCV-64220	Y								Good		
CENTRIFUGE	FCV-64221-C01	O/C 3C & Earth	1.5MM	65	MCC-022-01	FCV-64221	Y								Good		
CENTRIFUGE	FCV-64221-PO1	O/C 3C & Earth	4	45	MCC-022-01	FCV-64221	Y	∞	∞	∞	∞	∞	∞	∞	GOOD		
CENTRIFUGE	FCV-64223-C01	8C+E OC	1.5MM	65	MCC-022-01	JB-64223	Y								Good		
CENTRIFUGE	FCV-64223-C02	3C+E OC	1.0MM	2	JB-64223	FCV-64223	Y									Removed From Install	
CENTRIFUGE	FCV-64230-C01	8C+E OC	1.5MM	65	MCC-022-01	JB-64230	Y								Good		

Cable Schedule



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Project: John Holland Oxley Investigation Zone 3
Job No: 19216
Date: 27/02/2012
Version: V0.01

CABLE IDENTIFIER		CABLE DETAILS					ELECTRICAL CHECKS								TEST SUMMARY	COMMENT
AREA	CABLE ID	CABLE TYPE	SIZE	CABLE APPROX LENGTH (M)	CABLE RUN FROM	CABLE RUN TO	CONTINUITY	RED/WHITE	RED/BLUE	WHITE/BLUE	RED/EARTH	WHITE/EARTH	BLUE/EARTH			
CENTRIFUGE	FCV-64230-C02	2C+E 3C+E OC	1.0MM	2	JB-64230	FCV-64230	Y				1-E ∞	2-E ∞		Good		
CENTRIFUGE	FCV-64231-C01	8C+E OC	1.5MM	65	MCC-022-01	JB-64231	Y							Good		
CENTRIFUGE	FCV-64231-C02	2C+E 3C+E OC	1.0MM	2	JB-64231	FCV-64231	Y							Good		
CENTRIFUGE	FCV-64232-C01	8C+E OC	1.5MM	65	MCC-022-01	JB-64232	Y							Good		
CENTRIFUGE	FCV-64232-C02	2C+E 3C+E OC	1.0MM	2	JB-64232	FCV-64232	Y							Good		
CENTRIFUGE	FCV-64233-C01	2C+E OC	1.5MM	65	MCC-022-01	FCV-64233	Y							Good	FCV-64233-C02 Removed from Install.	
CENTRIFUGE	FCV-64242-C01	8C+E OC	1.5MM	65	MCC-022-01	JB-64242	Y							Good		
CENTRIFUGE	FCV-64242-C02	2C+E 3C+E OC	1.0MM	2	JB-64242	FCV-64242	Y							Good		
CENTRIFUGE	FCV-64243-C01	8C+E OC	1.5MM	65	MCC-022-01	JB-64243	Y							Good		
CENTRIFUGE	FCV-64243-C02	2C+E 3C+E OC	1.0MM	2	JB-64243	FCV-64243	Y							Good		
CENTRIFUGE	FIT-64101	DEKRON	1.5MM	65	MCC-022-01	FIT-64101	Y							Good		
CENTRIFUGE	FIT-64201	DEKRON	1.5MM	65	MCC-022-01	FIT-64201	Y							Good		
CENTRIFUGE	PU-642-10-P01	PVC/PVC-VSD	10	65	MCC-022-01	PU-642-10	Y	∞	∞	∞	∞	∞	∞	GOOD		
CENTRIFUGE	PU-642-20-P01	PVC/PVC-VSD	10	65	MCC-022-01	PU-642-20	Y	∞	∞	∞	∞	∞	∞	GOOD		
CENTRIFUGE	PU-642-30-P01	PVC/PVC-VSD	10	65	MCC-022-01	PU-642-30	Y	∞	∞	∞	∞	∞	∞	GOOD		

Cable Schedule



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Project
Job No
Date
VersionJohn Holland Oxley Investigation Zone 3
19215
27/02/2012
V0.01

CABLE IDENTIFIER				CABLE DETAILS			ELECTRICAL CHECKS								TEST SUMMARY	COMMENT
AREA	CABLE ID	CABLE TYPE	SIZE	CABLE APPROX LENGTH (M)	CABLE RUN FROM	CABLE RUN TO	CONTINUITY	RED/WHITE	RED/BLUE	WHITE/BLUE	RED/EARTH	WHITE/EARTH	BLUE/EARTH			
CENTRIFUGE	PU-642-10-P02	PVC/PVC-VSD	10	1.5m	ISOLATOR	PU-642-10	Y	∞	∞	∞	∞	∞	∞	Good		
CENTRIFUGE	PU-642-20-P02	PVC/PVC-VSD	10	1.5m	"	PU-642-20	Y	∞	∞	∞	∞	∞	∞	Good		
CENTRIFUGE	PU-642-30-P02	PVC/PVC-VSD	10	1.5m	"	PU-642-30	Y	∞	∞	∞	∞	∞	∞	Good		
CENTRIFUGE	PU-642-10-C01	8C+E	1.5	65	MCC-022-01	PU-642-10	Y							Good		
CENTRIFUGE	PU-642-20-C01	8C+E	1.5	65	"	PU-642-20	Y							Good		
CENTRIFUGE	PU-642-30-C01	8C+E	1.5	65	"	PU-642-30	Y							Good		
CENTRIFUGE	PU-642-10-C02	2C+E	1.5	65	"	PU-642-10	Y							Good		
CENTRIFUGE	PU-642-20-C02	2C+E	1.5	65	"	" 20	Y							Good		
CENTRIFUGE	PU-642-30-C02	2C+E	1.5	65	"	" 30	Y							Good		
CENTRIFUGE	PU-642-10-C03	2C+E	1.5	2	"	" 10	Y							Good		
CENTRIFUGE	PU-642-20-C03	2C+E	1.5	2	"	" 20	Y							Good		
CENTRIFUGE	PU-642-30-C03	2C+E	1.5	2	"	" 30	Y							Good		
CENTRIFUGE	PSH-64210-C01	2C+E	1.5	65	"	PSH-64210	Y							Good		
CENTRIFUGE	PSH-64210-C02	2C+E	1.5	65	"	" 20	Y							Good		
CENTRIFUGE	PSH-64210-C03	2C+E	1.5	65	"	" 30	Y							Good		



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Project	John Holland Oxley Investigation Zone 3
Job No	19216
Date	27/02/2012
Version	V0.01

[illegible]



Engineering Pty Ltd
Specialists in Machine Plant Automation

OXLEY WWTP

FLOOD RECOVERY

Sludge Handling Centrifuge Feed Pump No.1 SAT

THE ENGINEERS, THE IDEAS, THE SOLUTIONS

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TOWNSVILLE	Unit 1/43 Leyland St Garbutt Qld 4814	Tel: 07 4755 2022	Fax: 07 4755 2429
SYDNEY	8 Charles St St Marys NSW 2760	Tel: 02 9623 7066	Fax: 02 9623 7166
MELBOURNE	Unit 10/64 Oakover Rd Preston Vic 3072	Tel: 03 9480 8006	Fax: 07 9416 8591



Document Control			
Identification	Project name	OXLEY CREEK WWTP FLOOD RECOVERY PROJECT	
	Job No.	18304	
	Document Title	Sludge Handling Centrifuge Feed Pump No.1 SAT	
	Associated Documents		
	Document Number		
	Client Reference	QUU	
	Path\File Name		
Authority	Written by	Jalal Alikhani	Control Systems Engineer
	Authorised by	David Holman	Project Manager
	Client Authorisation		
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Revision History				
Rev	Date	By	Remarks	Checked
1	15 April 2011	JA	First Issue	

- Rev 1

Oxley creek WWTP flood recovery

Sludge Handling Centrifuge Feed Pump No.1 SAT

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PU-642-10 FC302P11K MCB 101 (GPIO) 55R7Y915			
Primary Test	Motor: Ok <input checked="" type="checkbox"/> Faulty <input type="checkbox"/>	Cables: Ok <input checked="" type="checkbox"/> Faulty <input type="checkbox"/>	Important Note: If primary test is ok then go ahead! <i>[Signature]</i>
Motor Data (50 Hz)	Motor Power (kW): 7.5 <i>11kW</i>	Motor Voltage (V): <i>415V</i>	<i>[Signature]</i>
	Motor Current (A): 15.5 <i>20.6A</i>	Motor Speed (RPM): <i>1465</i>	
Load Data	Torque Charac.: VT <input type="checkbox"/> CT <input checked="" type="checkbox"/>	Overload Mode: High <input checked="" type="checkbox"/> Normal <input type="checkbox"/>	
<div style="text-align: center;"></div>		Local	Remote
Motor Direction		<input checked="" type="checkbox"/>	
Thermal Protection		<input checked="" type="checkbox"/>	
Lamp	Running	<i>N/A</i>	
	Drive Ready	<i>N/A</i>	
	Field Circuit Ready	<i>N/A</i>	
	Others	<i>N/A</i>	
Switch	Mode	<input checked="" type="checkbox"/>	
	Start	<input checked="" type="checkbox"/>	
	Stop	<input checked="" type="checkbox"/>	
	Reset	<input checked="" type="checkbox"/>	
Pot. Reference Range		0% - 100%	0% - 0% Must be %0-%0 In Remote
Remote Reference Range		% - %	% - % Must be %0-%0 In Local

- Rev 1

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Oxley creek WWTP flood recovery

Sludge Handling Centrifuge Feed Pump No.1 SAT

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PU-642-10 FC302P11K MCB-101 (GPIO): 55R7Y915					
		Local	Remote	Comment	
Relay	Supply Available	✓	/		
	Field Circuit Ready	✓			
	Fault	N/A			
	Local Run	✓			
Load Test	Ramp Up				
	Ramp Down				
	Motor Power in 100% of Reference (kW)				
	Motor Current in 100% of Reference (A)				
	Speed Controllability				
Network or PLC connection			N/A		

Note:

[Signature] 2/3/12

12/3/12 - Modified T27 → T37 for safe stop
 - Converted PSH from 3w → 2w fail safe

[Signature]

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Sludge Handling Centrifuge Feed Pump No.1 SAT

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OXLEY WWTP

FLOOD RECOVERY

Sludge Handling Centrifuge Feed Pump No.2 SAT

THE ENGINEERS, THE IDEAS, THE SOLUTIONS

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HEAD OFFICE 221 448	Unit 3/ 22-24 Strathwyn St Brendale Qld 4500	Tel: 07 3881 0722	Fax: 07 3881 0723 Breakdown Service: 0411
IPSWICH	117 Toongarra Rd Ipswich Qld 4305	Tel: 07 3813 7100	Fax: 07 3813 7199
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SYDNEY	8 Charles St St Marys NSW 2760	Tel: 02 9623 7066	Fax: 02 9623 7166
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Document Control			
Identification	Project name	OXLEY CREEK WWTP FLOOD RECOVERY PROJECT	
	Job No.	18304	
	Document Title	Sludge Handling Centrifuge Feed Pump No.2 SAT	
	Associated Documents		
	Document Number		
	Client Reference	QUU	
	Path\File Name		
Authority	Written by	Jalal Alikhani	Control Systems Engineer
	Authorised by	David Holman	Project Manager
	Client Authorisation		
Ownership	Copyright	Copyright © MPA Engineering Pty Ltd. ABN 77 011 069 533	
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Revision History				
Rev	Date	By	Remarks	Checked
1	15 April 2011	JA	First Issue	

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Sludge Handling Centrifuge Feed Pump No.2 SAT

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PU 642-20 FC302P11K MCB 101 (GPIO) 55R7Y916			
Primary Test	Motor: Ok <input checked="" type="checkbox"/> Faulty <input type="checkbox"/>	Cables: Ok <input checked="" type="checkbox"/> Faulty <input type="checkbox"/>	Important Note: If primary test is ok then go ahead!
Motor Data (50 Hz)	Motor Power (kW): 7.5 11 kW	Motor Voltage (V): 415V	
	Motor Current (A): 15.5 20A	Motor Speed (RPM): 1145	
Load Data	Torque Charac.: VT <input type="checkbox"/> CT <input checked="" type="checkbox"/>	Overload Mode: High <input checked="" type="checkbox"/> Normal <input type="checkbox"/>	
		Local	Remote
Motor Direction		✓	
Thermal Protection		✓	
Lamp	Running	N/A	
	Drive Ready	N/A	
	Field Circuit Ready	N/A	
	Others	N/A	
Switch	Mode	✓	
	Start	✓	
	Stop	✓	
	Reset	✓	
Pot. Reference Range		0 % - 100 %	0 % - 0 % Must be %0-%60 in Remote
Remote Reference Range		% - %	% - % Must be %0-%60 in Local

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Oxley creek WWTP flood recovery


Sludge Handling Centrifuge Feed Pump No.2 SAT

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PU-642-20 FC302P11K MCB 101 (GPIO) 55R7Y916					
		Local	Remote	Comment	
Relay	Supply Available	✓	/		
	Field Circuit Ready	✓			
	Fault	N/A			
	Local Run	✓			
Load Test	Ramp Up				
	Ramp Down				
	Motor Power in 100% of Reference (kW)				
	Motor Current in 100% of Reference (A)				
	Speed Controllability				
Network or PLC connection				N/A	

Note:

~~2/3/12~~ 2/3/12
 12/3/12 - Modified T27-T37 for Safe Stop.
 - Converted FBH from 3w to 2w fail safe


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FLOOD RECOVERY

Sludge Handling Centrifuge Feed Pump No.3 SAT

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IPSWICH	117 Toongarra Rd Ipswich Qld 4305	Tel: 07 3813 7100	Fax: 07 3813 7199
TOWNSVILLE	Unit 1/43 Leyland St Garbutt Qld 4814	Tel: 07 4755 2022	Fax: 07 4755 2429
SYDNEY	8 Charles St St Marys NSW 2780	Tel: 02 9623 7068	Fax: 02 9623 7166
MELBOURNE	Unit 10/64 Oakover Rd Preston Vic 3072	Tel: 03 9480 8006	Fax: 07 9416 8591



Document Control			
Identification	Project name	OXLEY CREEK WWTP FLOOD RECOVERY PROJECT	
	Job No.	18304	
	Document Title	Sludge Handling Centrifuge Feed Pump No.3 SAT	
	Associated Documents		
	Document Number		
	Client Reference	QUU	
	Path\File Name		
Authority	Written by	Jalal Alkhani	Control Systems Engineer
	Authorised by	David Holman	Project Manager
	Client Authorisation		
Ownership	Copyright	Copyright © MPA Engineering Pty Ltd. ABN 77 011 069 533	
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Revision History				
Rev	Date	By	Remarks	Checked
1	15 April 2011	JA	First Issue	

- Rev 1

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Sludge Handling Centrifuge Feed Pump No.3 SAT

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PU-642-30 FC302P11K MCB 101 (GPIO). 55R7Y927			
Primary Test	Motor: Ok <input checked="" type="checkbox"/> Faulty <input type="checkbox"/>	Cables: Ok <input checked="" type="checkbox"/> Faulty <input type="checkbox"/>	Important Note: If primary test is ok then go ahead!
Motor Data (50 Hz)	Motor Power (kW): 7.5 11 kW	Motor Voltage (V): 419	
	Motor Current (A): 21 20.6 A	Motor Speed (RPM): 1465	
Load Data	Torque Charac.: VT <input type="checkbox"/> CT <input checked="" type="checkbox"/>	Overload Mode: High <input checked="" type="checkbox"/> Normal <input type="checkbox"/>	
	Local	Remote	Comment
Motor Direction	✓		
Thermal Protection	✓		
Lamp	Running	✓	
	Drive Ready	N/A	
	Field Circuit Ready	✓	
	Others		
Switch	Mode	✓	
	Start	✓	
	Stop	✓	
	Reset	✓	
Pot. Reference Range	0 % - 100 %	0 % - 0 %	Must be %0-%0 in Remote
Remote Reference Range	% - %	% - %	Must be %0-%0 in Local

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Sludge Handling Centrifuge Feed Pump No.3 SAT

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PU-642-30 FG302P11K-MCB 101 (GPIO) 55R7Y927					
		Local	Remote	Comment	
Relay	Supply Available	✓	/		
	Field Circuit Ready	✓			
	Fault	✓			
	Local Run	✓			
Load Test	Ramp Up				
	Ramp Down				
	Motor Power in 100% of Reference (kW)				
	Motor Current in 100% of Reference (A)				
	Speed Controllability				
Network or PLC connection			N/A		

Note:

[Signature] 2/3/12

12/3/12 - Modified T27-T37 for Safe Stop

- Converted RSH from SW to RW fail safe.

[Signature]

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1. FCV-64210

Instrument: FCV-64210		
Description:		
Area: CENTRIFUGE FEED PUMPS		
Primary Test	Is installation OK: Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	Is wiring OK: Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>
Device Data	Power Supply: 240 VAC <input type="checkbox"/> 24 DC <input checked="" type="checkbox"/>	Note: R7D185
	New Device	Comment
Open position (via electrical command)	<input checked="" type="checkbox"/>	
Close position (via electrical command)	<input checked="" type="checkbox"/>	
Open position (via manual override)	<input checked="" type="checkbox"/>	
Close position (via manual override)	<input checked="" type="checkbox"/>	
Open Feedback in PLC	<input checked="" type="checkbox"/>	
Close Feedback in PLC	<input checked="" type="checkbox"/>	
Note:  2/3/12		

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R7D185, Digital Valve SAT

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2. FCV-64211

Instrument: FCV-64211		
Description:		
Area: CENTRIFUGE FEED PUMPS		
Primary Test	Is installation OK: Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	Is wiring OK: Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>
Device Data	Power Supply: 240 VAC <input type="checkbox"/> 24 DC <input checked="" type="checkbox"/>	Note: R7D185
	New Device	Comment
Open position (via electrical command)	✓	No Auto/MAN in SCAOA. +24VDC to Open relay.
Close position (via electrical command)	✓	" to Close relay.
Open position (via manual override)	✓	
Close position (via manual override)	✓	
Open Feedback in PLC	✓	
Close Feedback in PLC	✓	
Note: ROTORK: WIRING DIAGRAM 3000-000, S/N = AB6817-01 415V, 0.07kW 0.5A.  21/3/12		

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R7D185, Digital Valve SAT

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3. FCV-64212

Instrument: FCV-64212		
Description:		
Area: CENTRIFUGE FEED PUMPS		
Primary Test	Is installation OK: Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	Is wiring OK: Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>
Device Data	Power Supply: 240 VAC <input type="checkbox"/> 24 DC <input checked="" type="checkbox"/>	Note: R7D185
	New Device	Comment
Open position (via electrical command)	✓	
Close position (via electrical command)	✓	
Open position (via manual override)	✓	
Close position (via manual override)	✓	
Open Feedback in PLC	✓	
Close Feedback in PLC	✓	
Note:  2/3/12		

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4. FCV-64213 *Removed From New Install*

Instrument: FCV-64213		
Description:		
Area: CENTRIFUGE FEED PUMPS		
Primary Test	Is installation OK: Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	Is wiring OK: Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>
Device Data	Power Supply: 240 VAC <input type="checkbox"/> 24 DC <input checked="" type="checkbox"/>	Note: R7D185
	New Device	Comment
Open position (via electrical command)		
Close position (via electrical command)		
Open position (via manual override)		
Close position (via manual override)		
Open Feedback in PLC		
Close Feedback in PLC		
Note: <i>2/13/12 - removed</i>		

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5. FCV-64220

Instrument: FCV-64220		
Description:		
Area: CENTRIFUGE FEED PUMPS		
Primary Test	Is installation OK: Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	Is wiring OK: Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>
Device Data	Power Supply: 240 VAC <input type="checkbox"/> 24 DC <input checked="" type="checkbox"/>	Note: R7D185
	New Device	Comment
Open position (via electrical command)	<input checked="" type="checkbox"/>	
Close position (via electrical command)	<input checked="" type="checkbox"/>	
Open position (via manual override)	<input checked="" type="checkbox"/>	
Close position (via manual override)	<input checked="" type="checkbox"/>	
Open Feedback in PLC	<input checked="" type="checkbox"/>	
Close Feedback in PLC	<input checked="" type="checkbox"/>	
Note:  2/3/12		

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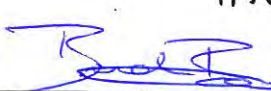
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R7D185, Digital Valve SAT

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6. FCV-64221

Instrument: FCV-64221		
Description:		
Area: CENTRIFUGE FEED PUMPS		
Primary Test	Is installation OK: Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	Is wiring OK: Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>
Device Data	Power Supply: 240 VAC <input type="checkbox"/> 24 DC <input checked="" type="checkbox"/>	Note: R7D185
	New Device	Comment
Open position (via electrical command)	✓	No Auto/Man in SCADA, +24VDC to Open Relay.
Close position (via electrical command)	✓	it to Close Relay.
Open position (via manual override)	✓	
Close position (via manual override)	✓	
Open Feedback in PLC	✓	
Close Feedback in PLC	✓	
Note: ROTORK: WIRING DIAGRAM 3000-000, S/N: ARSG17-02 415V, 0.07kW  2/13/12		

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7. FCV-64223

Removed From New Install

Instrument: FCV-64223		
Description:		
Area: CENTRIFUGE FEED PUMPS		
Primary Test	Is installation OK: Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	Is wiring OK: Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>
Device Data	Power Supply: 240 VAC <input type="checkbox"/> 24 DC <input checked="" type="checkbox"/>	Note: R7D185
	New Device	Comment
Open position (via electrical command)		
Close position (via electrical command)		
Open position (via manual override)		
Close position (via manual override)		
Open Feedback in PLC		
Close Feedback in PLC		
Note:  2/3/12 - Removed		

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8. FCV-64230

Instrument: FCV-64230		
Description:		
Area: CENTRIFUGE FEED PUMPS		
Primary Test	Is installation OK: Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	Is wiring OK: Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>
Device Data	Power Supply: 240 VAC <input type="checkbox"/> 24 DC <input checked="" type="checkbox"/>	Note: R7D185
	New Device	Comment
Open position (via electrical command)	✓	
Close position (via electrical command)	✓	
Open position (via manual override)	✓	
Close position (via manual override)	✓	
Open Feedback in PLC	✓	
Close Feedback in PLC	✓	
Note: <i>[Signature]</i> 2/3/12		

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9. FCV-64231

Instrument: FCV-64231		
Description:		
Area: CENTRIFUGE FEED PUMPS		
Primary Test	Is installation OK: Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	Is wiring OK: Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>
Device Data	Power Supply: 240 VAC <input type="checkbox"/> 24 DC <input checked="" type="checkbox"/>	Note: R7D185
	New Device	Comment
Open position (via electrical command)	✓	
Close position (via electrical command)	✓	
Open position (via manual override)	✓	
Close position (via manual override)	✓	
Open Feedback in PLC	✓	
Close Feedback in PLC	✓	
Note: <i>[Signature]</i> 2/3/12		

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10. FCV-64232

Instrument: FCV-64232		
Description:		
Area: CENTRIFUGE FEED PUMPS		
Primary Test	Is installation OK: Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	Is wiring OK: Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>
Device Data	Power Supply: 240 VAC <input type="checkbox"/> 24 DC <input checked="" type="checkbox"/>	Note: R7D185
	New Device	Comment
Open position (via electrical command)	✓	
Close position (via electrical command)	✓	
Open position (via manual override)	✓	
Close position (via manual override)	✓	
Open Feedback in PLC	✓	
Close Feedback in PLC	✓	
Note:  2/3/12		

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**11. FCV-64233**

Removed From New Install

Instrument: FCV-64233		
Description:		
Area: CENTRIFUGE FEED PUMPS		
Primary Test	Is installation OK: Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	Is wiring OK: Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>
Device Data	Power Supply: 240 VAC <input type="checkbox"/> 24 DC <input type="checkbox"/>	Note: R7D185
	New Device	Comment
Open position (via electrical command)		
Close position (via electrical command)		
Open position (via manual override)		
Close position (via manual override)		
Open Feedback in PLC		
Close Feedback in PLC		
Note: <i>Benjamin 2/3/12 - Removed</i>		

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12. FCV-64242

Instrument: FCV-64242		
Description:		
Area: CENTRIFUGE FEED PUMPS		
Primary Test	Is installation OK: Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	Is wiring OK: Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>
Device Data	Power Supply: 240 VAC <input type="checkbox"/> 24 DC <input checked="" type="checkbox"/>	Note: R7D185
	New Device	Comment
Open position (via electrical command)	✓	
Close position (via electrical command)	✓	
Open position (via manual override)	✓	
Close position (via manual override)	✓	
Open Feedback in PLC	✓	
Close Feedback in PLC	✓	
Note:  2/3/12		

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Oxley Creek WWTP flood recovery

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13. FCV-64243

Instrument: FCV-64243		
Description:		
Area: CENTRIFUGE FEED PUMPS		
Primary Test	Is installation OK: Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	Is wiring OK: Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>
Device Data	Power Supply: 240 VAC <input type="checkbox"/> 24 DC <input checked="" type="checkbox"/>	Note: R7D185
	New Device	Comment
Open position (via electrical command)	✓	
Close position (via electrical command)	✓	
Open position (via manual override)	✓	
Close position (via manual override)	✓	
Open Feedback in PLC	✓	
Close Feedback in PLC	✓	
Note: 		

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1. FIT64101

Instrument: FIT-64101

Description:

Area: CENTRIFUGE FEED PUMPS

Primary Test	Is installation OK: Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>		Is wiring OK: Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> <i>ISS</i> 2/3/12	
	Power Supply: 240 VAC <input checked="" type="checkbox"/> 24 DC <input type="checkbox"/>		Note: «Note»	
		Old Device	New Device	Comment
Unit Volume Flow			m ³ /hr	
Unit Totalizer			m ³ ✓	Reset all the Totalizers to zero after Unit setting
Is TAG set to «Tag_Name»			✓	
Bus Address (via Dip-Switch)			57	
Is "Set Unit to Bus" set to "SET UNITS"			✓	
ON-VALUE LOW FLOW CUT OFF			1.2 m ³ /hr	
OFF-VALUE LOW FLOW CUT OFF			50%	
Raw Value is Valid				Flow Meter In Simulation
Scaled Value is Valid				Flow Meter In Simulation

EMPTY PIPE DET OFF



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Instrument: FIT-64101
Description:
Area: CENTRIFUGE FEED PUMPS

If tube not changed whether S_DAT® memory chip replaced

N/A New Tube & Tx

Profibus PA Network is OK

Note:
2/3/12 - INSTRUMENT VISIBL ON PA NETWORK
To be parameterised with PDP when available

2/3/12

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1. FIT-64201

Instrument: FIT-64201			
Description:			
Area: CENTRIFUGE FEED PUMPS			
Primary Test	Is installation OK: Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>		Is wiring OK: Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>
Device Data	Power Supply: 240 VAC <input checked="" type="checkbox"/> 24 DC <input checked="" type="checkbox"/> Serial Number:		Note:
	Old Device	New Device	Comment
Unit Volume Flow		m ³ /hr	
Unit Totalizer		m ³ ✓	Reset all the Totalizers to zero after Unit setting
Is TAG set to FIT-64201		✓	
Bus Address (via Dip-Switch)		44	
Is "Set Unit to Bus" set to "SET UNITS"		✓	
ON-VALUE LOW FLOW CUT OFF		1.2 m ³ /hr	
OFF-VALUE LOW FLOW CUT OFF		50% ₆	
Raw Value is Valid			Flow Meter In Simulation
Scaled Value is Valid			Flow Meter In Simulation

EMPTY PIPE DET OFF

Rev 1

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Instrument: FIT-64201
Description:
Area: CENTRIFUGE FEED PUMPS

If tube not changed whether S_DAT® memory chip replaced

N/A - New tube & transmitter

Profibus PA Network is OK

Note:

 Model No - SOW14 - ~~SSO~~ A1AK2AAH
 S/Ns: D9043420000

 2/3/12 - Unit Visible on PA Bus.
 To be parameterised via PDM
 when available.

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1. PSH-64210

Instrument: PSH-64210			
Description:			
Area: CENTRIFUGE FEED PUMPS			
Primary Test	Is installation OK: Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>		Is wiring OK: Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>
Device Data	Power Supply: 240 VAC <input type="checkbox"/> 24 DC <input checked="" type="checkbox"/> Bus Powered <input type="checkbox"/>		
	Old Device	New Device	Comment
Unit			
Zero			
Get.Z			
Disp.			
Func.			
SP			
RSP			
TSP			
TRSP			
Fnc.2			
SP2			
RSP2			

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Instrument: PSH-64210

Description:

Area: CENTRIFUGE FEED PUMPS

TSP2			
TRSP2			
Is raw value valid			
Is scaled value valid			

Note:

MODEL: 12SHD MSC UNITED ELECTRIC CONTROLS
K1691777-1 (#457122)

SET @ 6 BAR RISE (OPTION M201)

[Signature] 12/3/12 - Tested by removal of NC signal

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2. PSH-64220

Instrument: PSH-64220			
Description:			
Area: CENTRIFUGE FEED PUMPS			
Primary Test	Is installation OK: Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>		Is wiring OK: Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>
Device Data	Power Supply: 240 VAC <input type="checkbox"/> 24 DC <input checked="" type="checkbox"/> Bus Powered <input type="checkbox"/>		
	Old Device	New Device	Comment
Unit			
Zero			
Get.Z			
Disp.			
Func.			
SP			
RSP			
TSP			
TRSP			
Fnc.2			
SP2			
RSP2			

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Instrument: PSH-64220

Description:

Area: CENTRIFUGE FEED PUMPS

TSP2			
TRSP2			
Is raw value valid			
Is scaled value valid			

Note:

MODEL: 12SHD MSC UNITED ELECTRIC CONTROLS

SN: K1691777-3 (#457122)

SET @ 6 BAR RISE (OPTION m201)

Paul B 12/3/12 - Tested by removal of NC signal.

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3. PSH-64230

Instrument: PSH-64230			
Description:			
Area: CENTRIFUGE FEED PUMPS			
Primary Test	Is installation OK: Yes <input type="checkbox"/> No <input type="checkbox"/>		Is wiring OK: Yes <input type="checkbox"/> No <input type="checkbox"/>
Device Data	Power Supply: 240 VAC <input type="checkbox"/> 24 DC <input type="checkbox"/> Bus Powered <input type="checkbox"/>		
	Old Device	New Device	Comment
Unit			
Zero			
Get.Z			
Disp.			
Func.			
SP			
RSP			
TSP			
TRSP			
Fnc.2			
SP2			
RSP2			

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Instrument: PSH-64230

Description:

Area: CENTRIFUGE FEED PUMPS

TSP2			
TRSP2			
Is raw value valid			
Is scaled value valid			

Note:

MODEL: 12SHD MSC UNITED ELECTRIC CONTROLS
 K1691777-2 (#457122)
 SET @ 6 BAR RISE (OPTION M201)

- Rev 1

Oxley creek WWTP flood recovery

Flow Meters SAT

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2.4. Unit Commissioning SAT Documents

As per note in hard copy manual:
Unit commissioning to be completed
when sufficient sludge quality is
available.

Note dated 10/05/2012.



3. OPERATION & MAINTENANCE MANUALS

3.1. CENTRIFUGE FEED PUMPS

The Centrifuge Feed Pumps installed at Oxley WRP are single stage Mono compact EZ Strip. These Mono pumps replace the existing Seepex pumps.

PUMP DETAILS

Manufacturer:	Mono	
Model:	Z17AC81RMB/G13J	
Serial Numbers:	PU-642-10	11L7836
	PU-642-20	11L7835
	PU-642-30	11L7834

3.2. CENTRIFUGE FEED PUMP MOTORS

New pump motors came complete with the new EZ Strip pumps

MOTOR DETAILS

Manufacturer:	Nord	
Model:	SK42F VL-160 MH/4 TF	
Serial Numbers:	PU-642-10	311429189.01
	PU-642-20	311429189.01
	PU-642-30	311429189.01

3.3. VALVE ACTUATORS

New valve actuators were installed on the suction control valves for pumps 1 & 2 (FCV-642-11 & FCV-642-21)

ACTUATOR DETAILS

Manufacturer:	Rotork	
Model:	IQ-10 F10A	
Serial Numbers:	FCV-642-11	AB6817.01
	FCV-642-21	AB6817.02

3.4. PRESSURE SWITCHES

New pressure switches were installed on pump discharge lines

PRESSURE SWITCH DETAILS

Manufacturer:	United Electrics Controls	
Model:	12SHDMSC	
Serial Numbers:	PSH-642-10	K169177-1
	PSH-642-20	K169177-3
	PSH-642-30	K169177-2

3.5. VALVE LIMIT SWITCHES

New valve limit switches were installed on control valves FCV-642-12, FCV-642-31 & FCV-642-32.

VALVE LIMIT SWITCH DETAILS

Manufacturer:	IFM Electronic	
Model:	EVC005 – ADOAH040MSS0005H04	

3. Operation & Maintenance Manuals

3.1. Centrifuge Feed Pumps – Compact EZ Strip Range Installation, Operation & Maintenance Instructions

English

Installation, Operation and Maintenance Instructions

Compact EZ Strip Range



ATEX Warning Statements

PUMPS AND PUMP UNITS

Where a pump or pump unit is to be installed in a potentially explosive atmosphere ensure that this has been specified at the time of purchase and that the equipment has been supplied accordingly and displays an ATEX nameplate or is supplied with a certificate of conformity. If there is any doubt as to the suitability of the equipment please contact Mono Pumps Limited before commencing with installation and commissioning.

Process liquids or fluids should be kept within specified temperature limits otherwise the surface of pump or system components may become an ignition source due to temperature rises. Where the process liquid temperature is less than 90°C the maximum surface temperature will not exceed 90°C provided the pump is installed, operated and maintained in accordance with this manual. Where the process fluid temperature exceeds 90°C the maximum surface temperature will be equal to the maximum process fluid temperature.

Cavities that could allow the accumulation of explosive gases, such as under guards, should where possible, be designed out of the system. Where this is not possible they should be fully purged before any work is carried out on the pump or system.

Electrical installation and maintenance work should only be carried out by suitably qualified and competent persons and must be in accordance with relevant electrical regulations.

All electrical equipment, including control and safety devices, should be suitably rated for the environment in to which they are installed.

Where there may be a risk of an accumulation of explosive gases or dust non-sparking tools should be used for installation and maintenance.

In addition to causing permanent damage to the stator, dry running of the pump could generate a rapid rise in the temperature of the stator tube or barrel, which could become an ignition source. It is therefore essential that a dry run protection device be fitted. This must shut the pump down immediately should a dry run situation occur. Details of suitable devices are available from Mono Pumps Limited.

To minimise the risk of sparking or temperature rises due to mechanical or electrical overload the following control and safety devices should be fitted in addition to a dry run protection system. A pressure relief system whereby the pump can not generate pressures in excess of the maximum rated pressure or an over pressure device which should shut the pump down when the maximum discharge pressure is exceeded. A control system that will shut the pump down if the motor current or temperature exceed specified limits. An isolator switch that will disconnect all electrical supply to the motor and ancillary electrical equipment and be capable of being locked in the off position. All control and safety devices should be fitted, operated and maintained in accordance with the manufacturer's instructions. All valves on the system should be open when the pump is started otherwise serious mechanical overload and failure may result.

It is important that the pump rotates in the direction indicated on the nameplate. This must be checked on installation and commissioning and after any maintenance has been carried out. Failure to observe this may lead to dry running or mechanical or electrical overload.

ATEX Warning Statements

When fitting drives, couplings, belts, pulleys and guards to a pump or pump unit it is essential that these are correctly fitted, aligned and adjusted in accordance with the manufacturer's instructions. Failure to do so may result in sparking due to unintended mechanical contact or temperature rises due to mechanical or electrical overload or slipping of drive belts. Regular inspection of these parts must be carried out to ensure they are in good condition and replacement of any suspect part must be carried out immediately.

Mechanical seals should be suitably rated for the environment. The seal and any associated equipment, such as a flushing system, must be installed, operated and maintained in accordance with the manufacturer's instructions.

Where a packed gland seal is fitted this must be correctly fitted and adjusted. This type of seal relies on the process liquid to cool the shaft and packing rings so a constant drip of liquid from the gland section is required. Where this is undesirable an alternative seal type should be fitted.

Failure to operate or maintain the pump and ancillary equipment in line with the manufacturer's instructions may lead to premature and potentially dangerous failure of components. Regular inspection, and where necessary replacement, of bearings and lubrication is essential.

The pump and its components have been designed to ensure safe operation within the guidelines covered by legislation. Accordingly Mono Pumps Limited have declared the machine safe to use for the duty specified as defined by the Declaration of Incorporation or Conformity that is issued with this instruction manual.

The use of replacement parts that are not manufactured by or approved by Mono Pumps Limited may affect the safe operation of the pump and it may therefore become a safety hazard to both operators and other equipment. In these circumstances the Declaration provided will become invalid. The guarantee referenced on the Terms and Conditions of Sale will also be invalidated.

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SECTION 1	INSTALLATION
	START-UP PROCEDURE
	ASSEMBLY AND DISMANTLING ADVICE
SECTION 2	FAULT FINDING
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EC Declaration as defined by Machinery Directive 98/37/EC.

EC Declaration of Incorporation

This declaration is only valid when the machinery has been supplied without drive unit.

In this case, the machinery meets the requirements of the said directive and is intended for incorporation into other machinery or for assembly with other machinery in order to constitute relevant machinery as defined by the said directive including any amendments, which are valid at the time of supply.

IMPORTANT

This machinery must not be put into service until the relevant machinery into which it is to be incorporated has been declared in conformity to the said directive.

This declaration is only valid when the machinery has been installed, operated and maintained in accordance with these instructions and safety guidelines contained within as well as instructions supplied for equipment assembled with or intended for use with this equipment.

The following harmonised standards are applicable:

BS EN 809

BS EN ISO 12100 Parts 1 & 2

EC Declaration of Conformity

This declaration is only valid when the machinery has been supplied with drive unit.

In this case the machinery meets the requirements of the said directive including any amendments which are valid at the time of supply.

IMPORTANT

This declaration is only valid when the machinery has been installed, operated and maintained in accordance with these instructions and safety guidelines contained within as well as instructions supplied for equipment assembled with or intended for use with this equipment.



Mr G.D. Thomas, Chief Engineer

Installation, Operation & Maintenance Instructions

INSTALLATION

1.1 INSTALLATION AND SAFETY RECOMMENDATIONS

In common with other items of process plant a pump must be installed correctly to ensure satisfactory and safe operation. The pump must also be maintained to a suitable standard. Following these recommendations will ensure that the safety of personnel and satisfactory operation of the pump is achieved.

1.2.1. GENERAL

When handling harmful or objectionable materials, adequate ventilation must be provided in order to disperse dangerous concentrations of vapours. It is recommended that wherever possible, Mono pumps should be installed with provision for adequate lighting, thus ensuring that effective maintenance can be carried out in satisfactory conditions. With certain product materials, a hosing down facility with adequate draining will simplify maintenance and prolong the life of pump components.

1.2.2. SYSTEM DESIGN & INSTALLATION

At the system design stage, consideration must be given to provision of filler plugs, and the installation of non-return and/or isolating valves. Pumps cannot be reliably used as non-return valves. Pumps in parallel and those with high static discharge head must be fitted with non-return valves.

The pumps must also be protected by suitable devices against over pressure and dry running.

i. HORIZONTAL MOUNTING

All ranges excluding P Range Mono pumps are normally installed in a horizontal position with baseplates mounted on a flat surface, grouted in and bolted, thus ensuring firm fixing and a reduction in noise and vibration.

The unit should be checked after bolting down to ensure that the alignment of the pump to its prime mover is correct.

ii. VERTICAL MOUNTING

P Range Pumps Only

The P range pumps are intended for vertical installation. Care must be taken when lifting the pump into the vertical position.

Normally 'P' range pumps will be designed with a sole plate that will be bolted to the customers framework.

If the pump is to be mounted in any way other than described above, confirmation of the installation must be agreed with Mono Pumps Limited. All the pipework should be independently supported.

1.3.1 HANDLING



During installation and maintenance, attention must be paid to the safe handling of all items. Where a pump or its components weigh in excess of 20 kg (45lb) it is recommended that suitable lifting tackle should be used to ensure that personal injury or damage to components does not occur.

For safe handling of both bareshaft pumps and pump units (pump/ gearbox/motor etc.) slings should be used. The position of the slings will depend upon the specific pump/unit construction and should be carried out by personnel with the relevant experience to ensure that the pump is not damaged and injury to personnel does not occur.

If eyebolts do exist then these should only be used for lifting the individual components for which they are supplied.

1.3.2 STORAGE AND INFREQUENT OPERATION

The situation where a pump is used infrequently is also covered by the instructions in this section.

SHORT TERM STORAGE

Where a pump has to be stored for 6 months or less then the following steps are advised:-

1. Store pump inside wherever possible or if this is not feasible then provide protective covering. Do not allow moisture to collect around the pump.
2. Remove the drain plug, if fitted. Any inspection plates fitted should also be removed to ensure that the suction housing can drain and dry completely.
3. Loosen the packed gland and inject sufficient grease into the stuffing box. Tighten the gland nut hand tight. If a water flush system is to be used do not grease, a small amount of light oil is recommended for these.
4. See Manufacturers Instructions for motor/gearbox/drive instructions for storage procedures.

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One Company, Unlimited Solutions

Installation, Operation & Maintenance Instructions

LONG TERM STORAGE

If the pump is to be kept in storage for more than six months then in addition to the above the following procedures should be carried out regularly (every 2 - 3 weeks if possible):

1. If practicable rotate the pump at least three quarters of one revolution to avoid the rotor setting in the stator.
2. Note, however, that the pump is not to be rotated for more than two revolutions each time because damage could be caused to the rotor/ stator elements.

IMMEDIATELY PRIOR TO INSTALLATION AND STARTING



Before installing the pump please ensure that all plugs and inspection plates are replaced and that excess grease/oil is removed from the stuffing box.

1.4 ELECTRICAL



Electrical connection should only be made using equipment suitable for both rating and environment. Where any doubts exist regarding the suitability of equipment, Mono Pumps Limited, should be consulted before proceeding. Normally the Mono pump should be installed with starting equipment arranged to give direct on line starting.

Earthing points will be provided on electric drives (if supplied) and it is essential that these are correctly connected. When the motor is being wired and checked for rotation, the start/stop sequence must be instantaneous to prevent dry running (see 2) or pressurising upstream equipment. (Check direction arrow on pump nameplate). The electrical installation should include appropriate isolating equipment to ensure that the pump unit is safe to work on.

1.5 PRESSURE RELIEF VALVES AND NON-RETURN VALVES

1. It is recommended that a suitable safety device is installed on the discharge side of the pump to prevent over-pressurisation of the system.
2. It is also recommended that a non-return valve is installed on the discharge side of the pump to prevent reverse flow through the system.

When both are installed it is advised that the relief valve is positioned closer to the pump than the non-return valve.

IMPORTANT



The pump must never run against a closed inlet or outlet valve, as this could result in mechanical failure.

1.6 GENERAL SAFETY



GREAT CARE MUST BE TAKEN TO PROTECT ALL ELECTRICAL EQUIPMENT FROM SPLASHING WHEN HOSING DOWN. WHERE MONO PUMPS LIMITED HAVE SUPPLIED A BARESHAFT PUMP THE ONUS IS ON THE USER TO FIT ADEQUATE GUARDS IN COMPLIANCE WITH THE REQUIREMENTS OF THE RELEVANT REGULATIONS.

All nuts and bolts, securing flanges and base mounting fixtures must be checked for tightness before operation. To eliminate vibration, the pump must be correctly aligned with the drive unit, and all guards must be securely fixed in position. When commissioning the plant, all joints in the system must be checked thoroughly for leakage.

If, when starting, the pump does not appear to operate correctly (see 2), the plant must be shut down immediately and the cause of the malfunction established before operations are recommenced. It is recommended that depending upon plant system operation, either a combined vacuum and pressure gauge, or a vacuum gauge only be fitted to the pump inlet port, and a pressure gauge fitted to the outlet port, these will then continuously monitor the pump operating conditions.

1.7 DUTY CONDITIONS

Pumps should only be installed on duties for which Mono Pumps Limited have specified the materials of construction, flow rates, pressure, temperature, speed etc. Where dangerous materials are to be pumped, consideration must be given to the safe discharge from relief valves, gland drains etc.

IF THE DUTY SHOULD BE CHANGED, MONO PUMPS LIMITED SHOULD BE CONTACTED AND THEIR RECOMMENDATIONS SOUGHT IN THE INTEREST OF APPLICATION, SAFETY OF PLANT, EFFICIENCY AND PUMP LIFE.

Installation, Operation & Maintenance Instructions

2. START-UP PROCEDURE

Pumps must be filled with liquid before starting. The initial filling is not for priming purposes, but to provide the necessary lubrication of the stator until the pump primes itself. When the pump is stopped, sufficient liquid will normally be trapped in the rotor/stator assembly to provide lubrication upon re-starting.

If, however, the pump has been left standing for an appreciable time, moved to a new location, or has been dismantled and re-assembled, it must be refilled with liquid and given a few turns before starting. The pump is normally somewhat stiff to turn by hand owing to the close rotor/stator fit. However, this stiffness disappears when the pump is running normally against pressure.

2.1 DRY RUNNING



NEVER RUN THE PUMP IN A DRY CONDITION EVEN FOR A FEW REVOLUTIONS OR THE STATOR WILL BE DAMAGED IMMEDIATELY. CONTINUAL DRY RUNNING COULD PRODUCE SOME HARMFUL OR DAMAGING EFFECTS.

2.2 PUMP ROTATION DETAILS

<u>PUMP RANGE</u>	<u>BI-DIRECTIONAL</u>	<u>COMMENT</u>
E	Yes	†
Monobloc B	Yes	†
Compact (inc EZ strip)	Yes	†
Merlin Industrial	Yes	†
S, SL	Yes	†
LF	Yes	†
W	No	**
Merlin Widethroat	No	**
MM ML	No	*
MS	No	**
G	No	*
CB/SB	No	*
Placer	No	**
Grout Injection	No	**
P	No	*
CP0011	No	**
CP0025,CP0800,CP1600	No	*

* Clockwise when viewed from drive end.

** Anti-clockwise when viewed from drive end.

† Anti-clockwise gives inlet at drive end.

DIRECTIONS OF ROTATION



BEFORE THE DIRECTION OF ROTATION IS CHANGED, MONO PUMPS LIMITED MUST BE CONSULTED SO THAT THE SUITABILITY OF THE PUMP CAN BE CONFIRMED WHEN OPERATING ON THE NEW DUTY.

2.3.1. GLAND PACKING

Where a pump is supplied fitted with gland packing (manufactured from a non-asbestos material), the gland will require adjustment during the initial running in period. Newly packed glands must be allowed to run-in with only finger tight compression on the gland follower nuts. This should continue for about 3 days. The gland follower should be gradually tightened over the next week to achieve a leakage rate as shown in the table below. Gland followers should be adjusted at regular intervals to maintain the recommended leakage flow rate. Under normal working conditions a slight drip from the gland under pressure assists in cooling and lubricating the packing. **A correctly adjusted gland will always have small leakage of fluid.**

Typical Leakage Rates from Packed Glands

<u>Up to 50mm shaft diameter</u>	<u>2 drops per minute</u>
<u>50 ... 75mm shaft diameter</u>	<u>3 drops per minute</u>
<u>75 ... 100mm shaft diameter</u>	<u>4 drops per minute</u>
<u>100 ... 125mm shaft diameter</u>	<u>5 drops per minute</u>
<u>125 ... 160mm shaft diameter</u>	<u>6 drops per minute</u>

A gland drip is, however, undesirable when handling corrosive, degreasing, or abrasive materials. Under these conditions the gland must be tightened the minimum amount whilst the pump is running to ensure satisfactory sealing when under pressure, or to stop entry of air when under suction conditions.

The gland leakage of toxic, corrosive or hazardous liquids can cause problems of compatibility with the pumps materials of construction.

Provision of a gland drain should be considered, especially for the leakage of hazardous products.



CARE IS REQUIRED WHEN ADJUSTING THE GLAND WHILST PUMP IS RUNNING.

2.3.2 MECHANICAL SEALS - ALL PUMPS

When a mechanical seal is fitted to the pump it may be necessary to provide a barrier fluid to some part of the seal. This should be provided in line with the seal manufacturers instructions.

2.4. GUARDS



In the interests of safety, and in accordance with the U.K. Health and Safety at Work Act 1974, all guards must be replaced after necessary adjustments have been made to the pump.

Installation, Operation & Maintenance Instructions

2.5 WARNING/CONTROL DEVICE

Prior to operating the pump, if any warning or control devices are fitted these must be set in accordance with their specific instructions.

2.6 PUMP OPERATING TEMPERATURE

The range of temperatures the pump surfaces will develop is dependent upon factors such as product temperature and ambient temperature of the installation. There may be instances where the external pump surface can exceed 50°C.

In these instances, personnel must be made aware of this and suitable warnings/guarding used.

2.7 NOISE LEVELS

1. The noise sound pressure level will not exceed 85dB at one metre distance from the pump.
2. This is based on a typical installation and does not necessarily include noise from other sources or any contribution from building reverberation.
3. For pumps identified below, the noise levels vary between 85 and 95dB but will not exceed 95dB at one metre distance from the pump.

Pump Sizes (based on E Range Pumping Element)

Single Stage	Size 12 and above
Two Stage	Size 9 and above
Four Stage	Size 7 and above
Six Stage	Size 7 and above
Eight Stage	Size 6 and above

2.8 LUBRICATION

Pumps fitted with bearings should be inspected periodically to see if grease replenishment is necessary, and if so, grease should be added until the chambers at the ends of the bearing spacer are approximately one third full.

Periodic bearing inspection is necessary to maintain optimum bearing performance. The most expedient time to inspect is during periods of regular scheduled equipment downtime - for routine maintenance or for any other reason.

Under tropical or other arduous conditions, however, a more frequent examination may be necessary. It is therefore advisable to establish a correct maintenance schedule or periodic inspection.

BP LC2 / Mobilgrease XHP 222 or their equivalent must be used for replenishment.

2.9 PUMP UNITS

Where a pump unit is dismantled and re-assembled, consideration must be given to ensure that where appropriate the following steps are covered.

1. Correct alignment of pump/gearbox
2. Use of appropriate couplings & bushes
3. Use of appropriate belts & pulleys correctly tensioned.

2.10 CLEANING PRIOR TO OPERATION

i. Non Food Use

During the commissioning of a new pump or recommissioning of an overhauled pump, it is advisable to clean the pump prior to the initial operation of the pump in the process.

ii. Food Use

When a pump has been supplied for a food application, it is important to ensure that the pump is clean prior to initial operation of the pump.

Therefore, it is important that a clean-in-place treatment is executed on the pump at the following times:-

1. When the pump is first commissioned for use.
2. When any spare components are fitted into the wetted area of the pump.

A recommended CIP procedure is as follows:

This procedure should not be used on the CP Pump Range. Please consult our application engineers for a suitable procedure.

Caustic Wash

LQ94 ex Lever Diversey or equivalent
2% concentration

Acid Wash

P3 Horolith 617 ex Henkel
Ecolab or equivalent 1% concentration

Procedure

1. Caustic wash @ 75°C for 20 mins
2. Water rinse @ 80°C for 20 mins

Installation, Operation & Maintenance Instructions

3. Acid wash @ 50°C for 20 mins
4. Water rinse @ 80°C for 20 mins

- CIP flow rates (hence pump speeds) should be maximised to achieve highest level of cleanability.

A C.I.P. liquid velocity of 1.5 to 2.0 m/s is required for removal of solids and soiling.

Pumps fitted with CIP by pass ports will permit higher flow rates without the need to increase pump speed.

- The use of neat active caustic and acid chemicals is not recommended. Proprietary cleaning agents should be used in line with manufacturers instructions.
- All seals and gaskets should be replaced with new if disturbed during maintenance.
- Pump internals should be regularly inspected to ensure hygienic integrity is maintained, especially with respect to elastomeric components and seals, and replaced if necessary.

The four stages constitute one cycle and we recommend that this cycle is used to clean the pump before use on food.

Once the pump has been commissioned, the cleaning process will depend upon the application. The user must therefore ensure that their cleaning procedures are suitable for the duty for which the pump has been purchased.

2.11 WIDETHROAT PUMPS

Specific pumps may have auger feed screws, with or without a bridge breaker system to feed the pumping element. If the pump installation requires that these cannot be enclosed, care must be taken to ensure personnel cannot gain access whilst the pump is operating. If this is not possible an emergency stop device must be fitted nearby.

2.12 EXPLOSIVE PRODUCTS/ HAZARDOUS ATMOSPHERES

In certain instances the product being pumped may well be of a hazardous nature.

In these installations consideration must be given to provide suitable protection and appropriate warnings to safeguard personnel and plant.

2.13 ACCESS PORTS



Where access ports are fitted then the following steps must be followed prior to removal:

1. Pump must be shut down and the electrical supply isolated.
2. Protective clothing should be worn, especially if the pumped product is obnoxious.
3. Remove access plate with care utilising where possible drip trays to collect product leakage.

Access ports are included to assist in removing blockages and to allow a visual check on the components within the suction chamber.

It is not to be considered as an additional method in dismantling the pump.

Re-assembly of the plate should be completed using new gaskets prior to the pump being switched on.

2.14 ADJUSTABLE STATORS

If adjustable stators are fitted then the following steps must be followed for adjusting the clamping devices.

The adjustable stator assembly is designed to give an even compression around the stator circumference. It is designed to be used when pump performance reduces through wear to an unacceptable level, to restore the required flow rate.

The stator compression is increased using the following steps:-

1. Release the six locking screws half a turn.
2. Tighten the eight clamp screws until adjustment allowed by releasing the lock screws has been taken up.
3. Repeat steps 1 and 2 until the pump performance has been restored to its former level.

NOTE

It is imperative that when adjusting the stator that only sufficient pressure is placed on the stator to enable the capacity of the pump to be reinstated.

Over tightening of the stator could easily result in damage to the driver by overload and so extreme care must be taken when carrying out these adjustments.

Installation, Operation & Maintenance Instructions

It is therefore advisable to make the adjustment while the pump is running and power readings can be monitored.

REMOVAL OF ADJUSTABLE STATOR

The procedure for removal of an adjustable stator is the same as that of a standard one, except it is necessary to remove the clamp plates before the stator can be twisted off the rotor.

This can be done by undoing the clamp screws; then releasing the clamp plate by using the locking screws as jacking screws to remove the clamp plates.

Re-assembly will be done using the reverse procedure.

2.15 MAINTENANCE OF WEARING COMPONENTS

2.15.1 ROTOR AND STATOR

The wear rate on these components is dependent on many factors, such as product abrasivity, speed, pressure etc.

When pump performance has reduced to an unacceptable level one or possibly both items will need replacing.

2.15.2 DRIVE SHAFT - PACKED GLAND

The wear rate of the gland area is dependent on many factors such as product abrasivity and speed. Regular gland maintenance will maximise the life of the shaft. Replacement of both the gland packing and shaft will be necessary when shaft sealing becomes difficult to achieve.

2.15.3 COUPLING ROD JOINTS

Regular maintenance and lubrication will maximise life of the joints.

Replacement of one or both joint assemblies and possibly the coupling rod may be necessary when wear is apparent.

It is essential to replace all the joint items with genuine Mono parts to ensure maximum life.

2.15.4 FLEXISHAFT DRIVE PUMPS

With this design there are no wearing items to replace in the drive train, however, if during routine inspection the shaft is visibly damaged / distorted or the protective coating is damaged, then this item should be replaced to avoid unexpected breakdowns.

2.16 MECHANICAL SPEED VARIATORS

Refer to the manufacturers instructions.

These machines require regular maintenance, which typically includes weekly adjustment through the full speed range.

3.0 ASSEMBLY AND DISMANTLING

Section 4 contains the steps to dismantle and re-assemble the pump. All fastenings must be tightened securely and when identified the appropriate torque figures should be used.

3.1 USE OF ITEMS NOT APPROVED OR MANUFACTURED BY MONO PUMPS LIMITED

The pump and its components have been designed to ensure that the pump will operate safely within the guidelines covered by the legislation.

As a consequence Mono Pumps Limited have declared the machine safe to use for the duty specified as defined by the Declaration of Incorporation or Conformity that is issued with this Instruction Manual.

The use of replacement items that are not approved by or manufactured by Mono Pumps Limited may affect the safe operation of the pump and it may therefore become a safety hazard to both operators and other equipment. In these instances the Declaration provided will therefore become invalid. The guarantee referenced in the Terms and Conditions of Sale will also be invalidated if replacement items are used that are not approved or manufactured by Mono Pumps Limited.



DISPOSAL OF WORN COMPONENTS

When replacing wearing parts, please ensure disposal of used parts is carried out in compliance with local environmental legislation. Particular care should be taken when disposing of lubricants.

Diagnostic Chart

SYMPTOMS		POSSIBLE CAUSES	
1.	NO DISCHARGE	1.	2. 3. 7. 26. 28. 29.
2.	LOSS OF CAPACITY	3.	4. 5. 6. 7. 8. 9. 10. 22. 13. 16. 17. 21. 22. 23. 29
3.	IRREGULAR DISCHARGE	3.	4. 5. 6. 7. 8. 13. 15. 29.
4.	PRIMING LOST AFTER START	3.	4. 5. 6. 7. 8. 13. 15
5.	PUMP STALLS AT START UP	8.	11. 24.
6.	PUMP OVERHEATS	8.	9. 11. 12. 18. 20
7.	MOTOR OVERHEATS	8.	11. 12. 15. 18. 20.
8.	EXCESSIVE POWER ABSORBED BY PUMP	8.	11. 12. 15. 18. 20
9.	NOISE AND VIBRATION	3.	4. 5. 6. 7. 8. 9. 11. 13. 15. 18. 19. 20. 22. 23. 27. 31
10.	PUMP ELEMENT WEAR	9.	11.
11.	EXCESSIVE GLAND OR SEAL WEAR	12.	14. 25. 30.
12.	GLAND LEAKAGE	13.	14.
13.	SEIZURE	9.	11. 12. 20.
LIST OF CAUSES		REMEDIAL ACTIONS	
1.	INCORRECT DIRECTION OF ROTATION	1.	REVERSE MOTOR
2.	PUMP UNPRIMED	2.	BLEED SYSTEM OF AIR/GAS
3.	INSUFFICIENT N.P.S.H. AVAILABLE	3.	INCREASE SUCTION HEAD OR REDUCE SPEED/TEMP.
4.	PRODUCT VAPORISING IN SUPPLY LINE	4.	INCREASE N.P.S.H. AVAILABLE (SEE 3 ABOVE)
5.	AIR ENTERING SUPPLY LINE	5.	CHECK PIPE JOINTS/GLAND ADJUSTMENT
6.	INSUFFICIENT HEAD ABOVE SUPPLY VESSEL OUTLET	6.	RAISE VESSEL/INCREASE PIPE SIZE
7.	FOOTVALVE/STRAINER OBSTRUCTED OR BLOCKED	7.	CLEAN OUT SUCTION LINE/VALVES
8.	PRODUCT VISCOSITY ABOVE RATED FIGURE	8.	DECREASE PUMP SPEED/INCREASE TEMP.
9.	PRODUCT TEMP. ABOVE RATED FIGURE	9.	COOL THE PRODUCT
10.	PRODUCT VISCOSITY BELOW RATED FIGURE	10.	INCREASE PUMP SPEED/REDUCE TEMP.
11.	DELIVERY PRESSURE ABOVE RATED FIGURE	11.	CHECK FOR BLOCKAGES IN DELIVERY LINE
12.	GLAND OVERTIGHT	12.	ADJUST GLAND SEE O&M INSTRUCTIONS
13.	GLAND UNDERTIGHT	13.	ADJUST GLAND SEE O&M INSTRUCTIONS
14.	GLAND FLUSHING INADEQUATE	14.	CHECK FLUID FLOWS FREELY INTO GLAND
15.	PUMP SPEED ABOVE RATED FIGURE	15.	DECREASE PUMP SPEED
16.	PUMP SPEED BELOW RATED FIGURE	16.	INCREASE PUMP SPEED
17.	BELT DRIVE SLIPPING	17.	RE-TENSION BELTS
18.	COUPLING MISALIGNED	18.	CHECK AND ADJUST ALIGNMENT
19.	INSECURE PUMP/DRIVE MOUNTING	19.	CHECK AND TIGHTEN ALL PUMP MOUNTINGS
20.	SHAFT BEARING WEAR/FAILURE	20.	REPLACE BEARINGS
21.	WORN PUMP ELEMENT	21.	FIT NEW PARTS
22.	RELIEF VALVE CHATTER	22.	CHECK CONDITION OF VALVE/RENEW
23.	R.V. INCORRECTLY SET	23.	RE-ADJUST SPRING COMPRESSION
24.	LOW VOLTAGE	24.	CHECK VOLTAGE/WIRING SIZES
25.	PRODUCT ENTERING PACKING AREA	25.	CHECK PACKING CONDITION AND TYPE
26.	DRIVE TRAIN BREAKAGE	26.	CHECK AND REPLACE BROKEN COMPONENTS
27.	NEGATIVE OR VERY LOW DELIVERY HEAD	27.	CLOSE DELIVERY VALVE SLIGHTLY
28.	DISCHARGE BLOCKED/VALVE CLOSED	28.	REVERSE PUMP/RELIEVE PRESSURE/CLEAR BLOCKAGES
29.	STATOR TURNING	29.	REPLACE WORN PARTS/TIGHTEN UP STATOR BOLTS
30.	STUFFING BOX 'EATS' PACKING	30.	CHECK FOR WORN SHAFT AND REPLACE
31.	VEE BELTS	31.	CHECK AND ADJUST TENSION OR REPLACE

Drawing Reference Numbers

Z14A & ABOVE EXCLUDING Z18B

<u>DRG. REF</u>	<u>DESCRIPTION</u>
01A	BODY STD C.I.
06A	NP E RANGE SOG PACK SIZE=100
06B	NP E RANGE DOG PACK SIZE=100
10A	M/SEAL
15A	THROWER GUARD
20B	GASKET GLAND
20C	SLEEVE GASKET
20D	SUC CHAM GASKETS
22A	STATOR MTM NITRILE RUBBER
23A	SUCT CHAM C.I.
23C	SUC CHAM EXT FLANGE
23D	SUC CHAM EXT PIECE
23E	SUC CHAM HALF
24A	END COVER C.I.
25A	ROTOR (ST STL H.C.P.)
26B	SPLIT COUPLING
26C	SPLIT COUPLING
26D	SLEEVE HALVES ASSEMBLY
28A	SEALING COVER
28B	SEALING COVER
29A	COUPLING ROD PIN
29B	COUPLING ROD PIN
29C	SHAFT PIN SS
32A	316SS DRIVESHAFT
42A	THROWER
62A	SUPPORT FOOT
65A	M/SEAL CARRIER
66A	ABUTMENT RING ST STL
75A	SLEEVE (ROTOR SHAFT)
75B	SLEEVE (ROTOR SHAFT)
95A	TIE ROD

<u>DRG. REF</u>	<u>DESCRIPTION</u>
P104	STL HEX HD BOLT
P105	STL HEX NUT
P106	STL BRIGHT WASHER
P107	SNGL COIL SPR WASHER
P109	STL HEX NUT
P201	CARBON STL TAPER PLUG
P202	CARBON STL TAPER PLUG
P301	SOC CAPSCREW
P401	TORL SEAL RING BK NITR
P402	TORL SEAL RING BK NITR
P403	SPIRAL RET RING SS SHAFT
P404	SPIRAL RET RING SS SHAFT
P405	TIE SEALING COVER
P406	TIE SEALING COVER
P502	MAL IRON TAPER PLUG
P503	STL HEX NUT
P504	STL BRIGHT WASHER
P505	SNGL COIL SPR WASHER
P506	STL HEX NUT
P507	STL BRIGHT WASHER
P508	SNGL COIL SPR WASHER
P510	TORL SEAL RING BK NITR
P519	MAL IRON TAPER PLUG
P520	STL STUD (1-1/2D)
P521	STL HEX NUT
P522	STL BRIGHT WASHER
P523	SNGL COIL SPR WASHER
P527	STL HEX HD BOLT
P528	SNGL COIL SPR WASHER
P529	STL BRIGHT WASHER
P530	STL HEX NUT
P531	STL HEX HD BOLT
P532	SNGL COIL SPR WASHER
P533	STL BRIGHT WASHER
P534	STL HEX NUT
P540	SOC CAPSCREW
P541	STL HEX NUT
P601	STL HEX HD BOLT
P602	SNGL COIL SPR WASHER
P603	STL BRIGHT WASHER
P604	STL HEX NUT

IMPORTANT NOTE

THE DRAWING REFERENCES SHOWN GIVE THE DESCRIPTION OF ALL THE PARTS DETAILED ON THE SECTIONAL DRAWINGS IN THIS SECTION OF THE BOOK. THEREFORE SOME OF THE REFERENCES MAY NOT BE SHOWN ON ANY ONE.

Drawing Reference Numbers

Z18B

**DRG.
REF.**

DESCRIPTION

01A	BODY STD C.I.
01B	BODY ADAPTOR C.I.
06A	NP E RANGE SOG PACK SIZE
06B	NP E RANGE DOG PACK SIZE
10A	M/SEAL
15A	THROWER GUARD
20A	GASKET GLAND
20B	GASKET GLAND
20C	SLEEVE GASKET
20D	SUC CHAM GASKET
22A	STATOR MTM NITRILE RUBBER
23A	SUCT CHAM C.I.
23C	SUC CHAM EXT FLANGE
23D	SUC CHAM EXT PIECE
23E	SUC CHAM HALF
24A	END COVER C.I.
25A	ROTOR (ST STL H.C.P.)
26B	SPLIT COUPLING ROD
26C	SPLIT COUPLING ROD
26D	SLEEVE HALVES ASSEMBLY
28A	SEALING COVER
28B	SEALING COVER
29A	COUPLING ROD PIN
29B	COUPLING ROD PIN
29C	SHAFT PIN SS
32A	316SS DRIVESHAFT
42A	THROWER
62A	SUPPORT FOOT
65A	M/SEAL CARRIER
66A	ABUTMENT RING ST STL
75A	SLEEVE (ROTOR SHAFT)
75B	SLEEVE (ROTOR SHAFT)
95A	TIE ROD

**DRG.
REF.**

DESCRIPTION

P104	STL HEX HD BOLT
P105	STL HEX NUT
P106	STL BRIGHT WASHER
P107	SNGL COIL SPR WASHER
P109	STL HEX NUT
P201	CARBON STL TAPER PLUG
P202	CARBON STL TAPER PLUG
P301	SOC CAPSCREW
P401	TORL SEAL RING BK NITR
P402	TORL SEAL RING BK NITR
P403	SPIRAL RET RING SS
P404	SPIRAL RET RING SS
P405	TIE SEALING COVER
P406	TIE SEALING COVER
P501	MAL IRON TAPER PLUG
P502	MAL IRON TAPER PLUG
P503	STL HEX NUT
P504	STL BRIGHT WASHER
P505	SNGL COIL SPR WASHER
P506	STL HEX NUT
P507	STL BRIGHT WASHER
P508	SNGL COIL SPR WASHER
P509	TORL SEAL RING BK NITR
P510	TORL SEAL RING BK NITR
P511	STL STUD (1.5D)
P512	SNGL COIL SPR WASHER
P513	STL BRIGHT WASHER
P514	STL HEX NUT
P519	MAL IRON TAPER PLUG
P523	STL STUD (1.5D)
P524	SNGL COIL SPR WASHER
P525	STL BRIGHT WASHER
P526	STL HEX NUT
P527	STL STUD (1.5D)
P540	SOC CAPSCREW
P541	STL HEX NUT
P601	STL HEX HD BOLT
P602	SNGL COIL SPR WASHER
P603	STL BRIGHT WASHER
P604	STL HEX NUT

IMPORTANT NOTE

THE DRAWING REFERENCES SHOWN GIVE THE DESCRIPTION OF ALL THE PARTS DETAILED ON THE SECTIONAL DRAWINGS IN THIS SECTION OF THE BOOK. THEREFORE SOME OF THE REFERENCES MAY NOT BE SHOWN ON ANY ONE.

Pump Coding

Range	Monobloc Compact EZ Strip	Z																		
Design Mk No	Monobloc		1																	
Size	22m³/h @ 1000 rpm			4																
	37m³/h @ 800 rpm			5																
	57m³/h @ 700 rpm			6																
	79m³/h @ 600 rpm			7																
	97m³/h @ 500 rpm			8																
	125m³/h @ 450 rpm			9																
	165m³/h @ 400rpm			A																
Stages	Single stage				A															
	Two stage				B															
	Single stage - extended pitch				K															
Casing Material	Cast Iron					C														
Rotating Parts 1	Code 1						1													
	Code 5						5													
	Code 8						8													
Rotor Mk No	Mk 0 (Oversized)						0													
	Mk1 (Standard)						1													
	Mk3 (Temperature)						3													
	Mk5 (Temperature)						5													
Stator Material	RA, RR etc.							R												
Seal Type	Mechanical Seal								M											
	Packed Gland								P											
Build Option	Refer to product manual section 2 & 3, drive selections									A										
										B										
										H										
/											/									
Variation	For special requirements contact Mono Pumps Ltd																A	1	2	3

Example

Z **1** **4** **A** **C** **8** **1** **R** **M** **A**
 EZ Strip Range Design Mk 1 Size 04 Single Stage Cast Iron Code 8 Rot Parts Mk 1 Rotor Nitrile Stator Mechanical Seal Build Option A

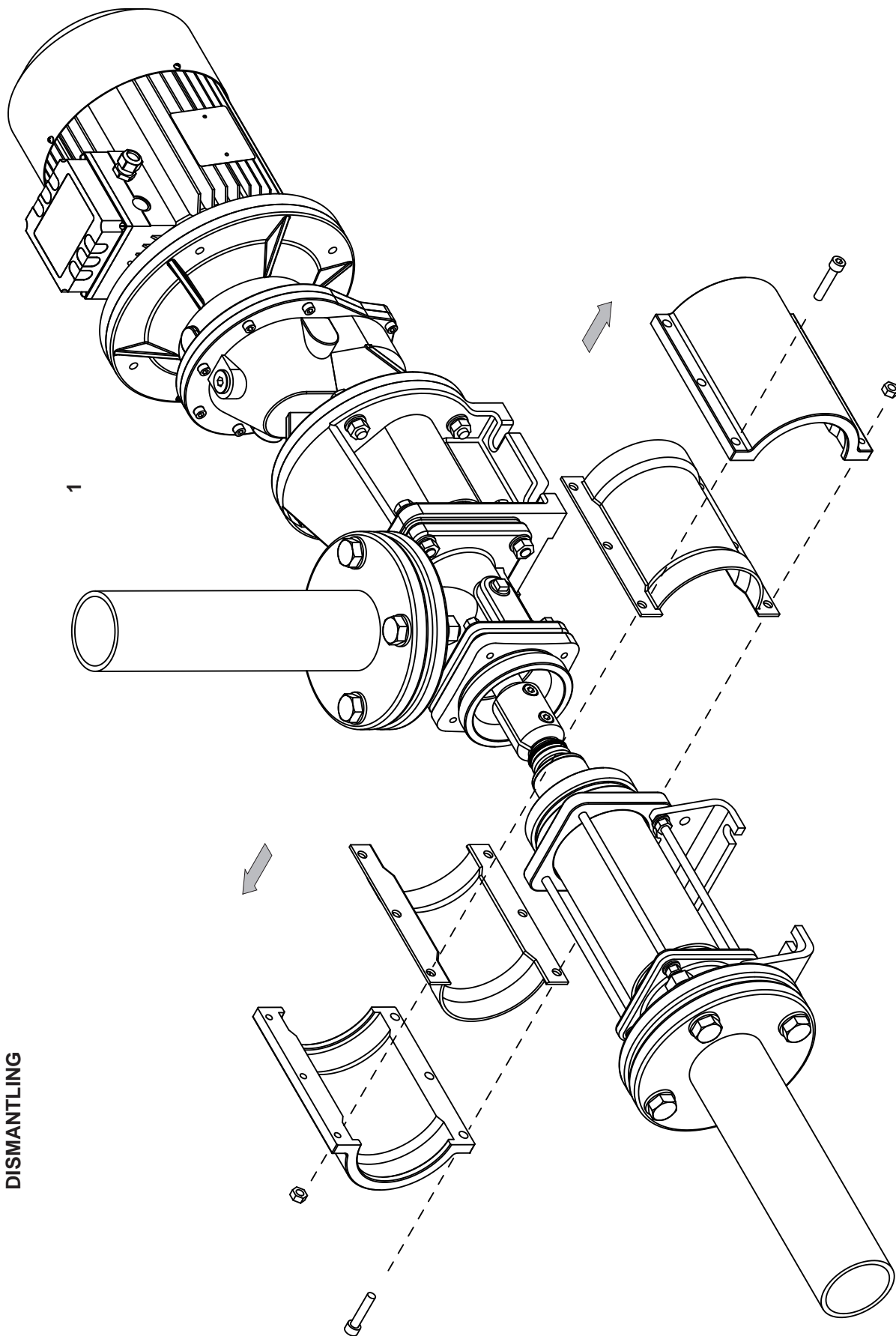
Note: Z1AB is not currently available

Note: Refer to Pre Selection Table for availability of pump models.

1 : For other material options please contact Mono Pumps Limited.

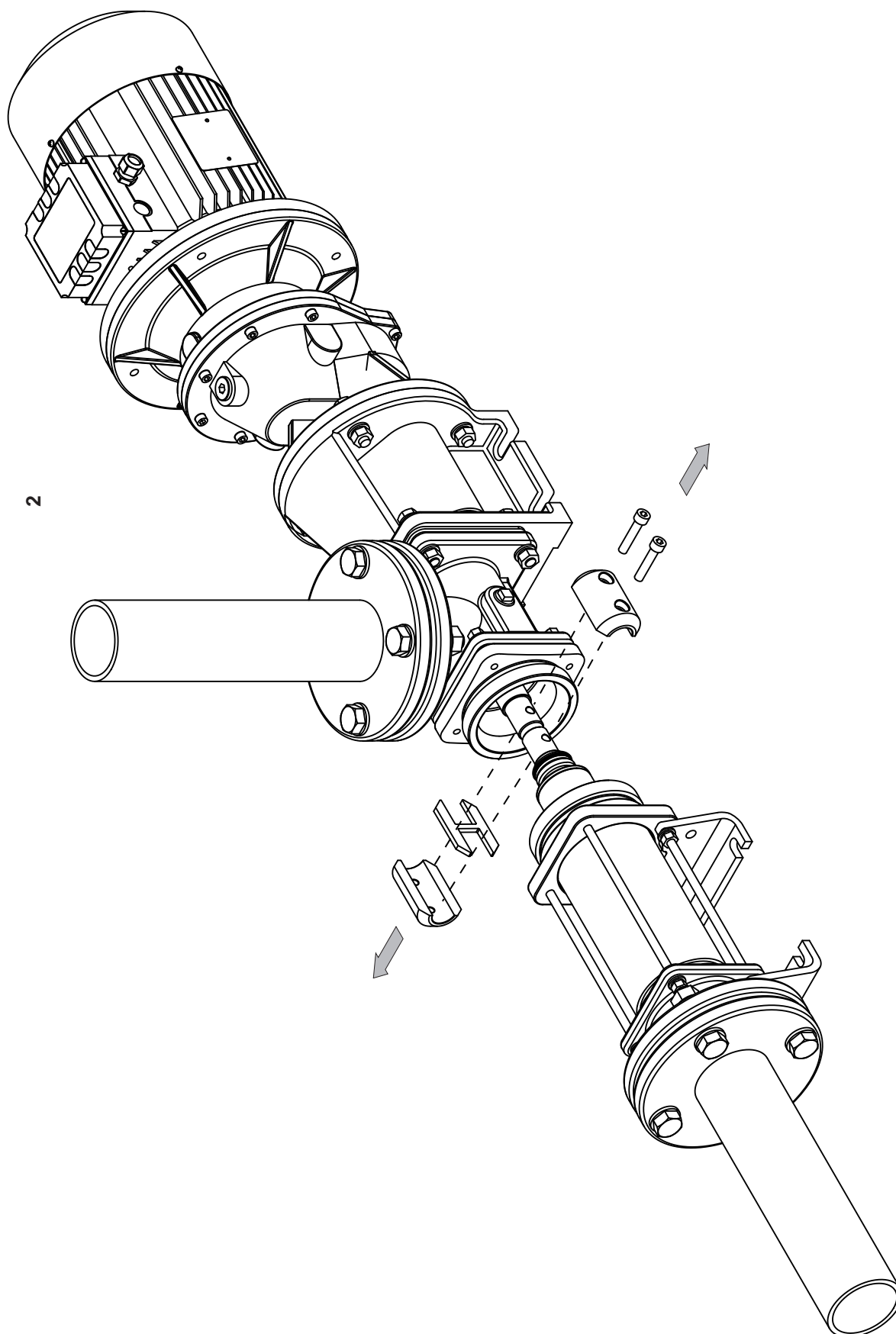
Dismantling & Assembly Diagrams

ROTOR & STATOR CHANGE
DISMANTLING

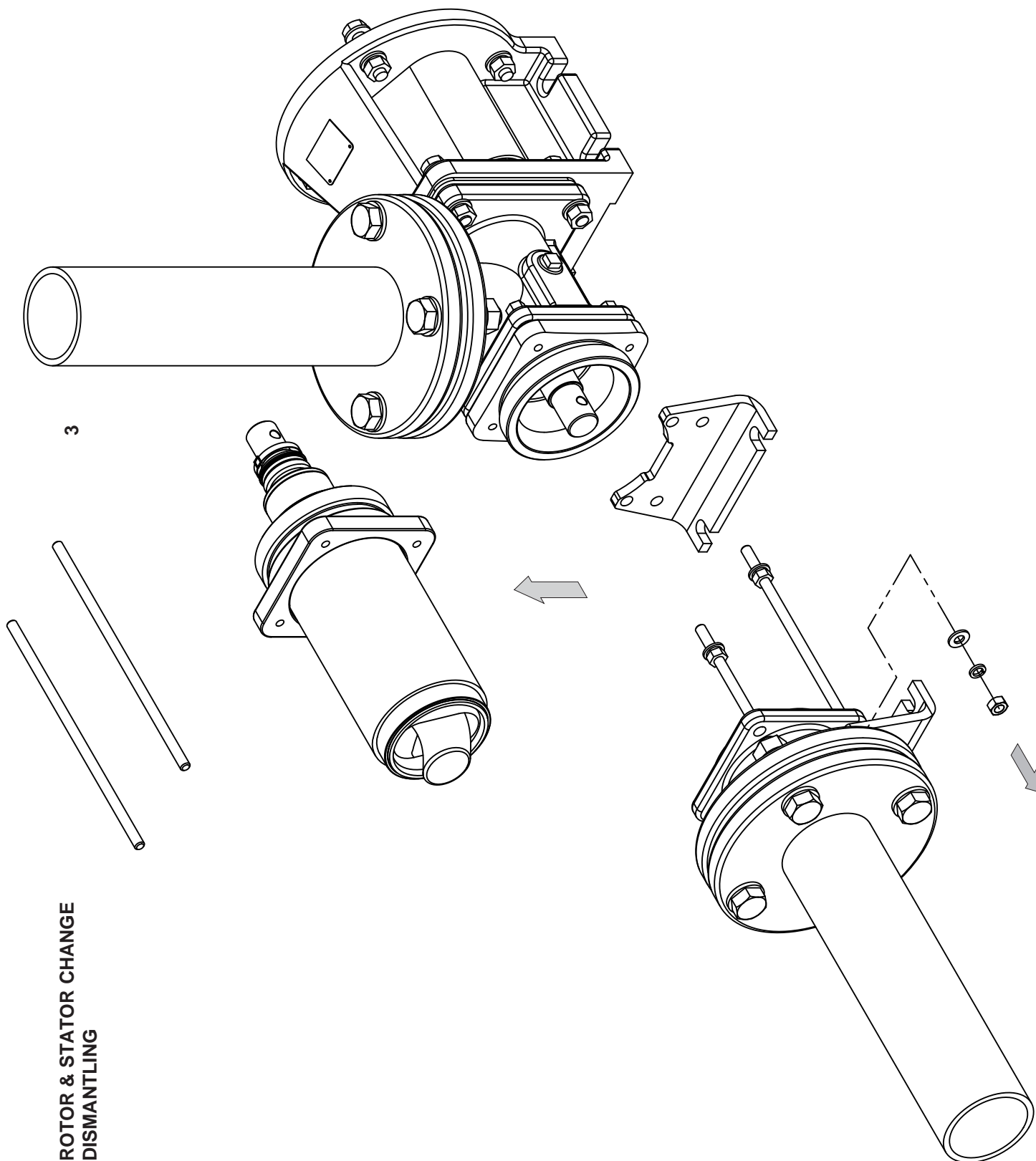


Dismantling & Assembly Diagrams

ROTOR & STATOR CHANGE
DISMANTLING

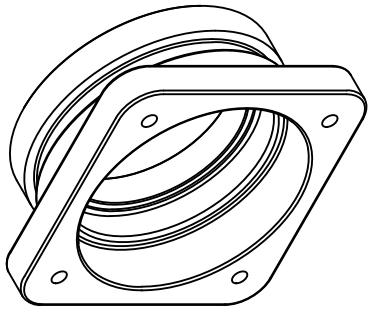


Dismantling & Assembly Diagrams

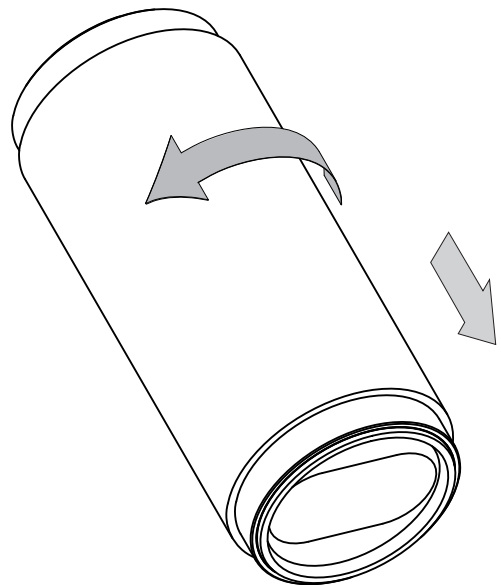
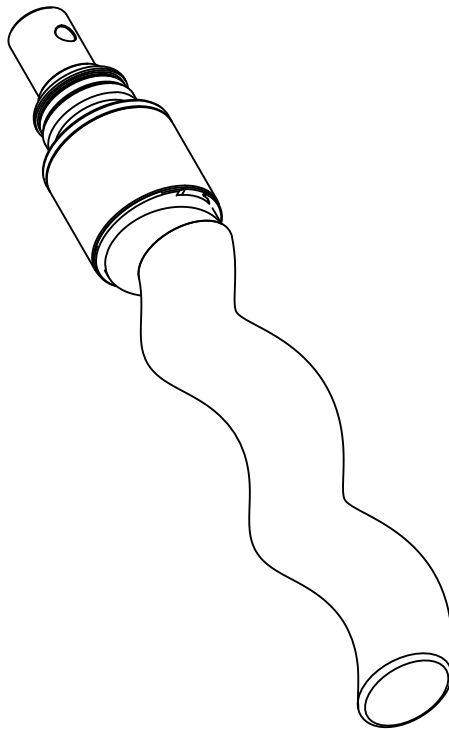


ROTOR & STATOR CHANGE
DISMANTLING

Dismantling & Assembly Diagrams



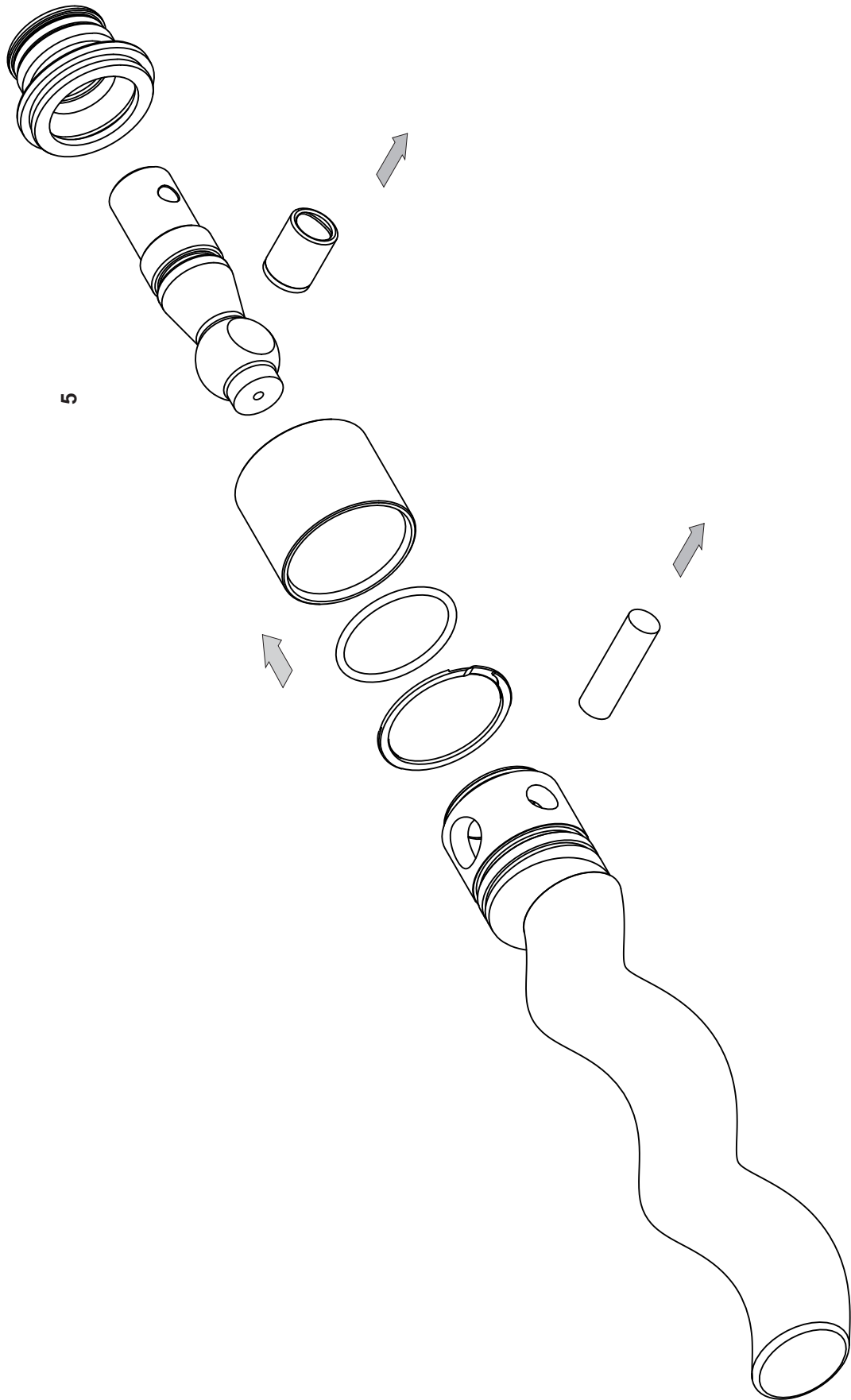
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ROTOR & STATOR CHANGE
DISMANTLING

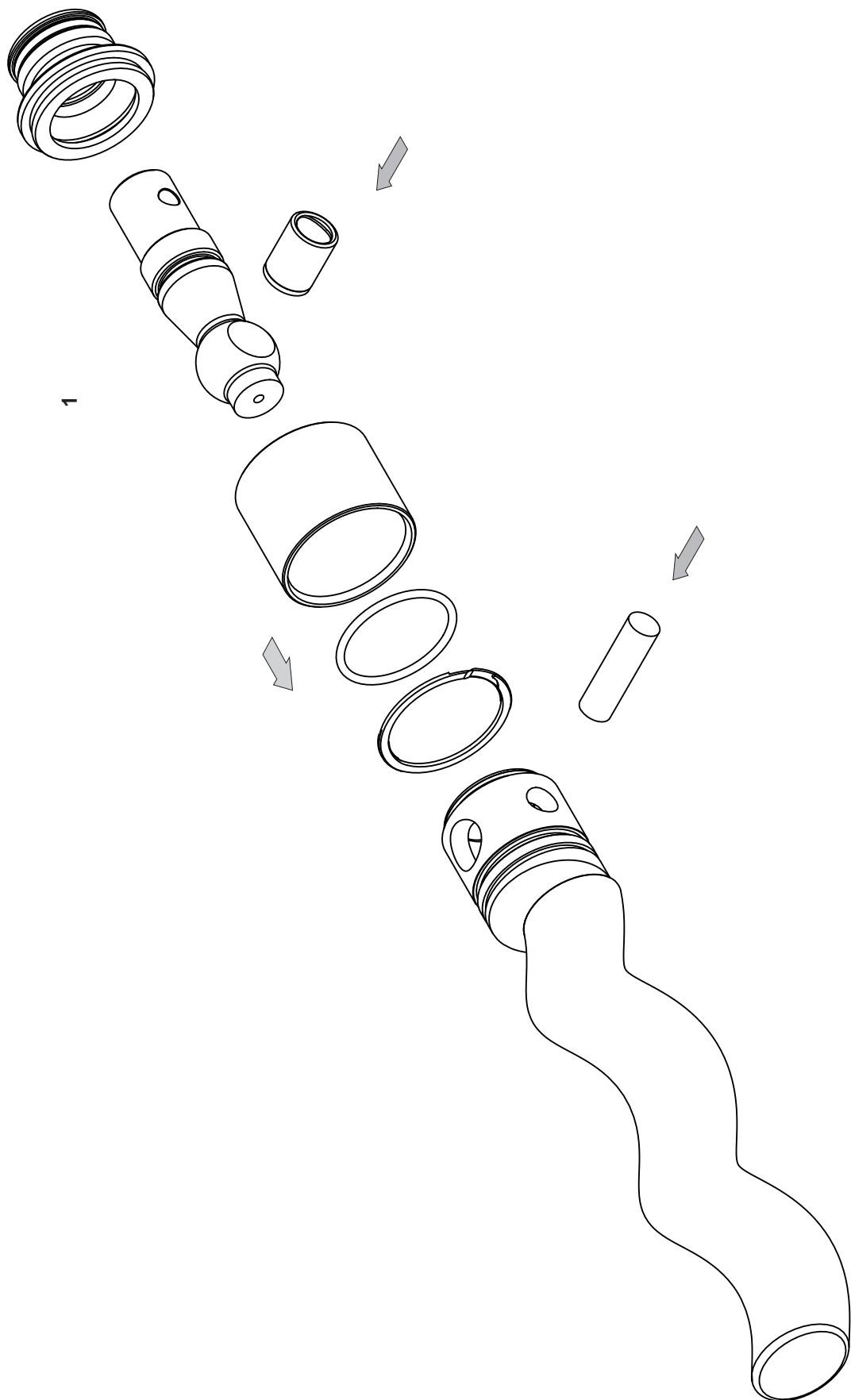
Dismantling & Assembly Diagrams

ROTOR & STATOR CHANGE
DISMANTLING



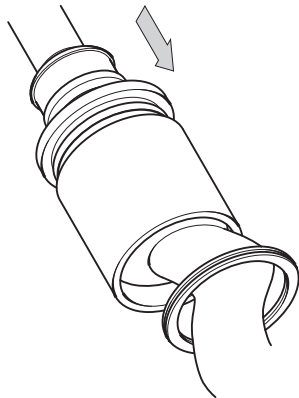
Dismantling & Assembly Diagrams

ROTOR & STATOR CHANGE
ASSEMBLY

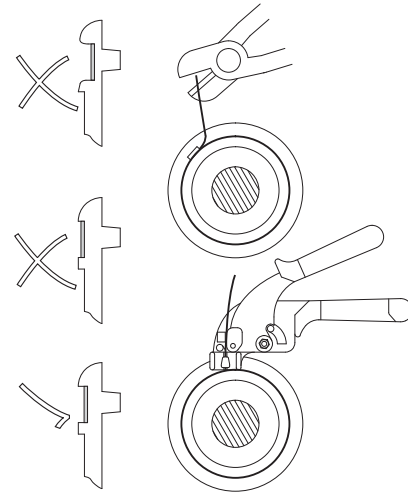
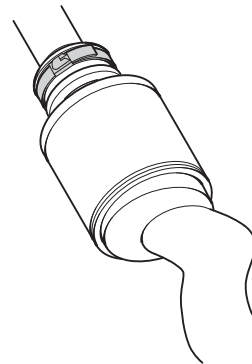


Dismantling & Assembly Diagrams

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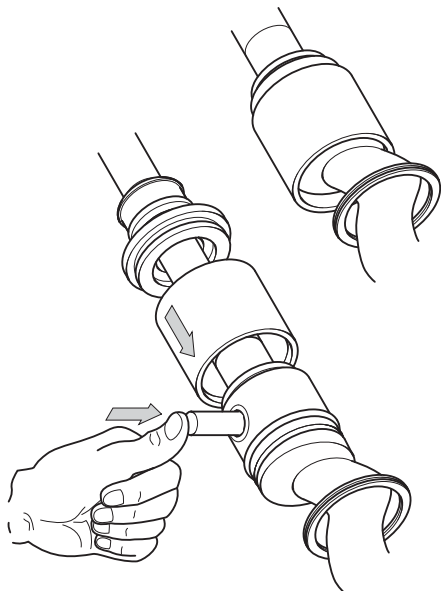
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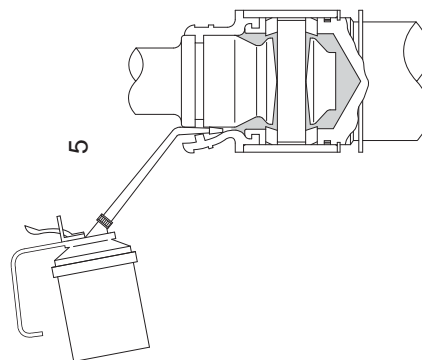
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Part Number: 80D1331

ROTOR & STATOR CHANGE ASSEMBLY

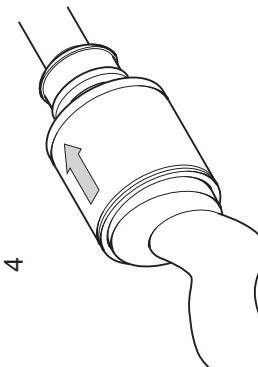
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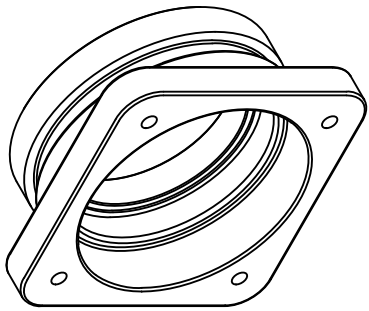
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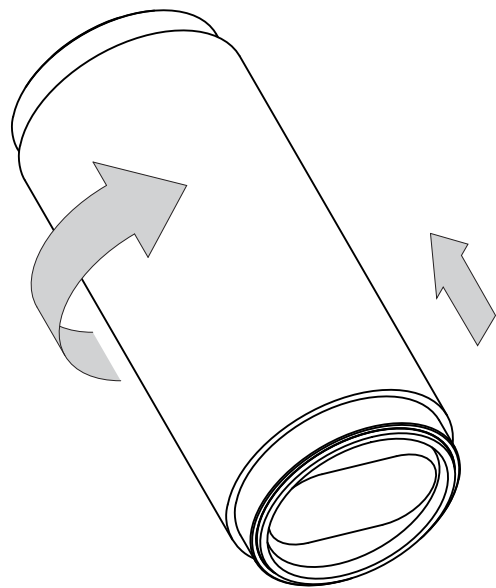
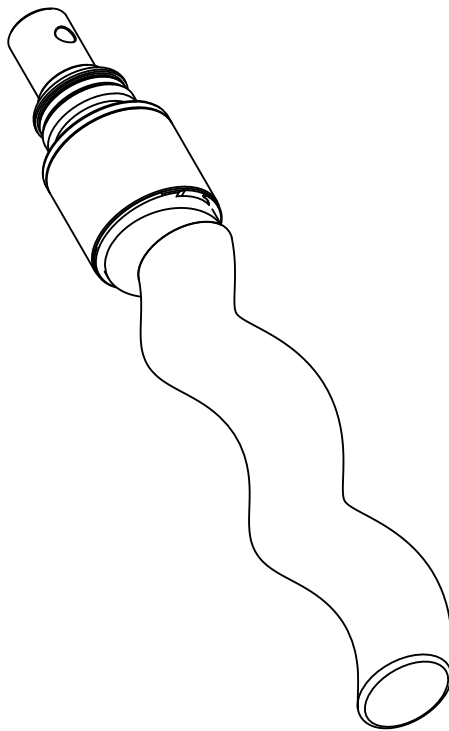
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Dismantling & Assembly Diagrams

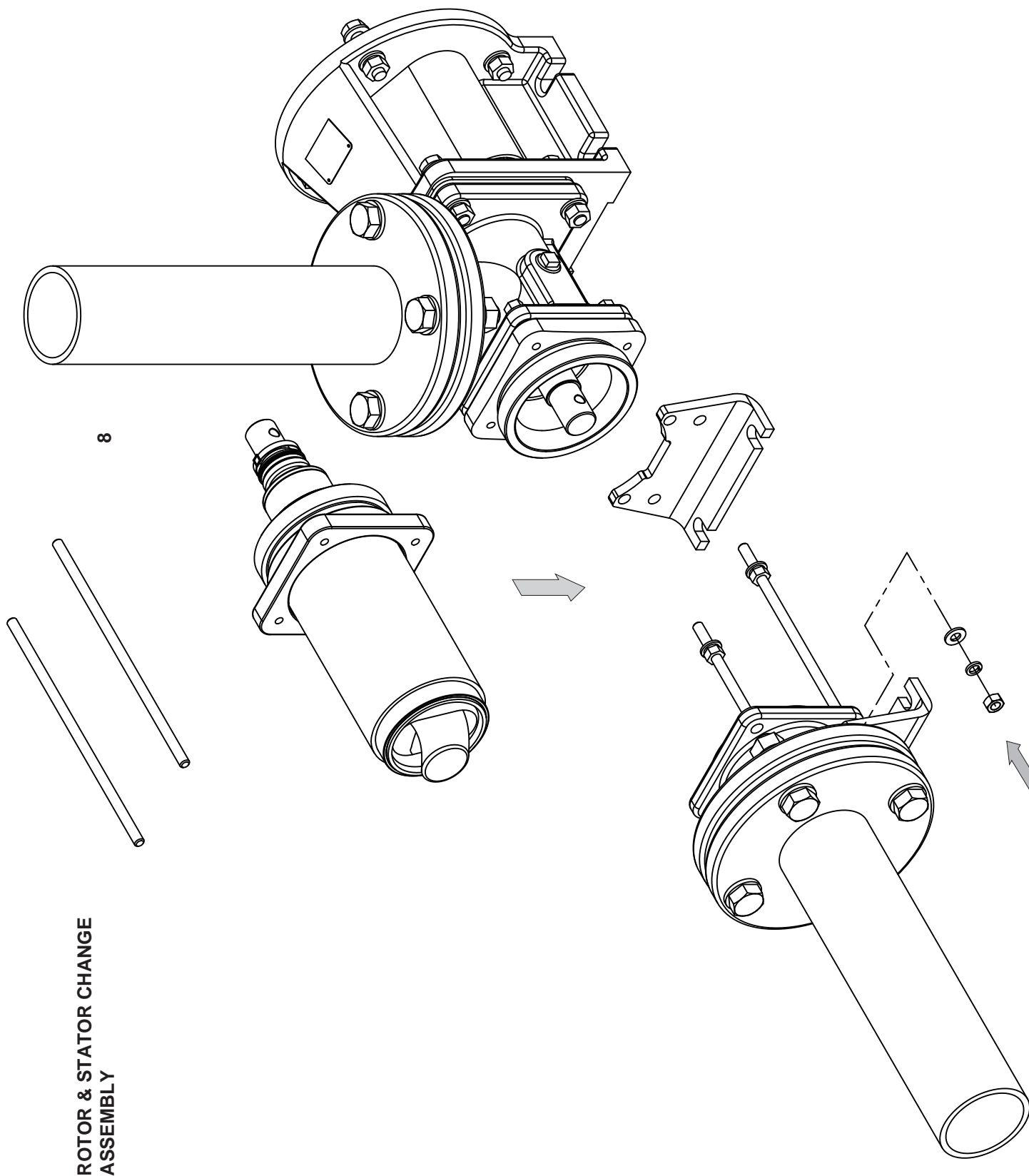


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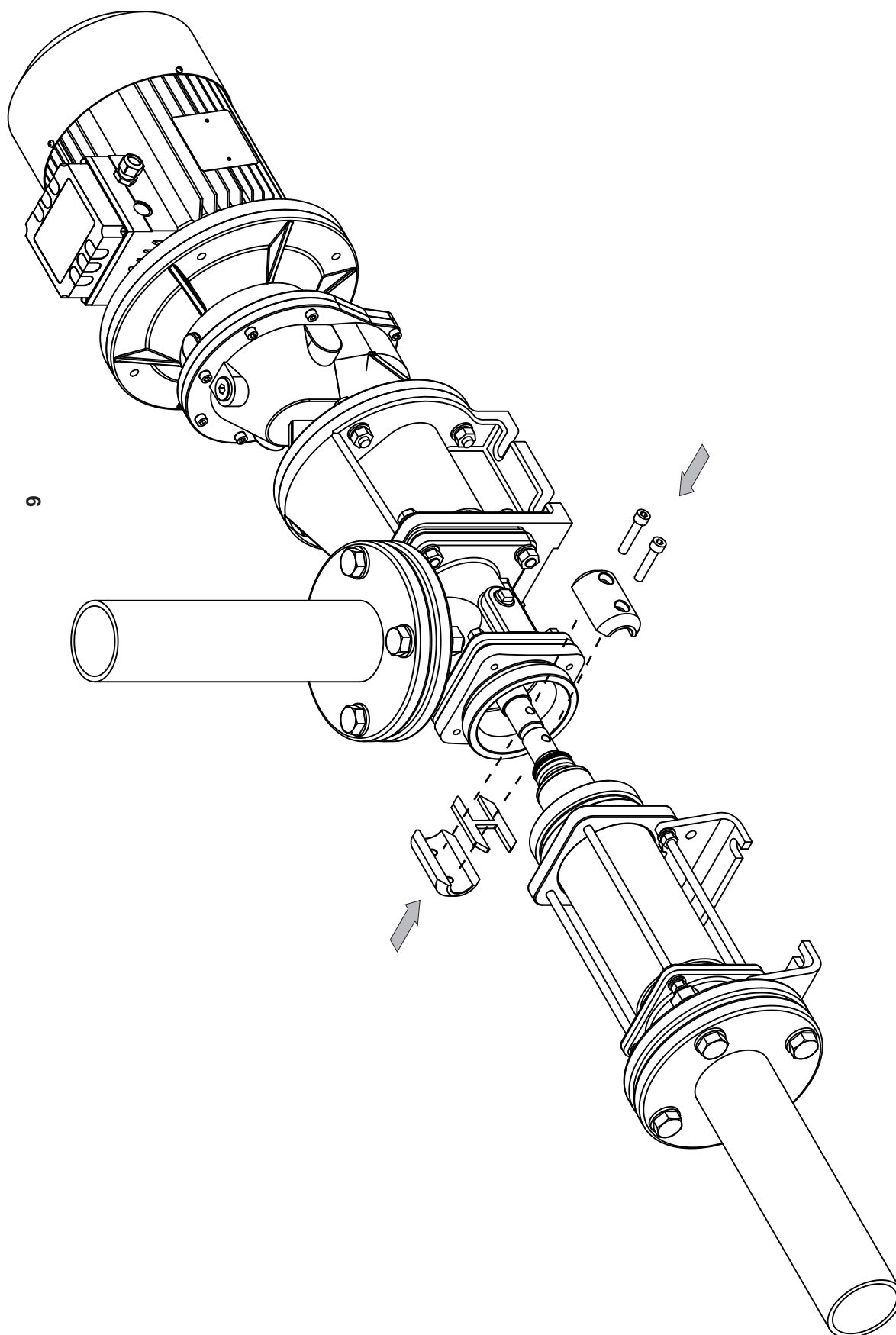
ROTOR & STATOR CHANGE
ASSEMBLY

Dismantling & Assembly Diagrams



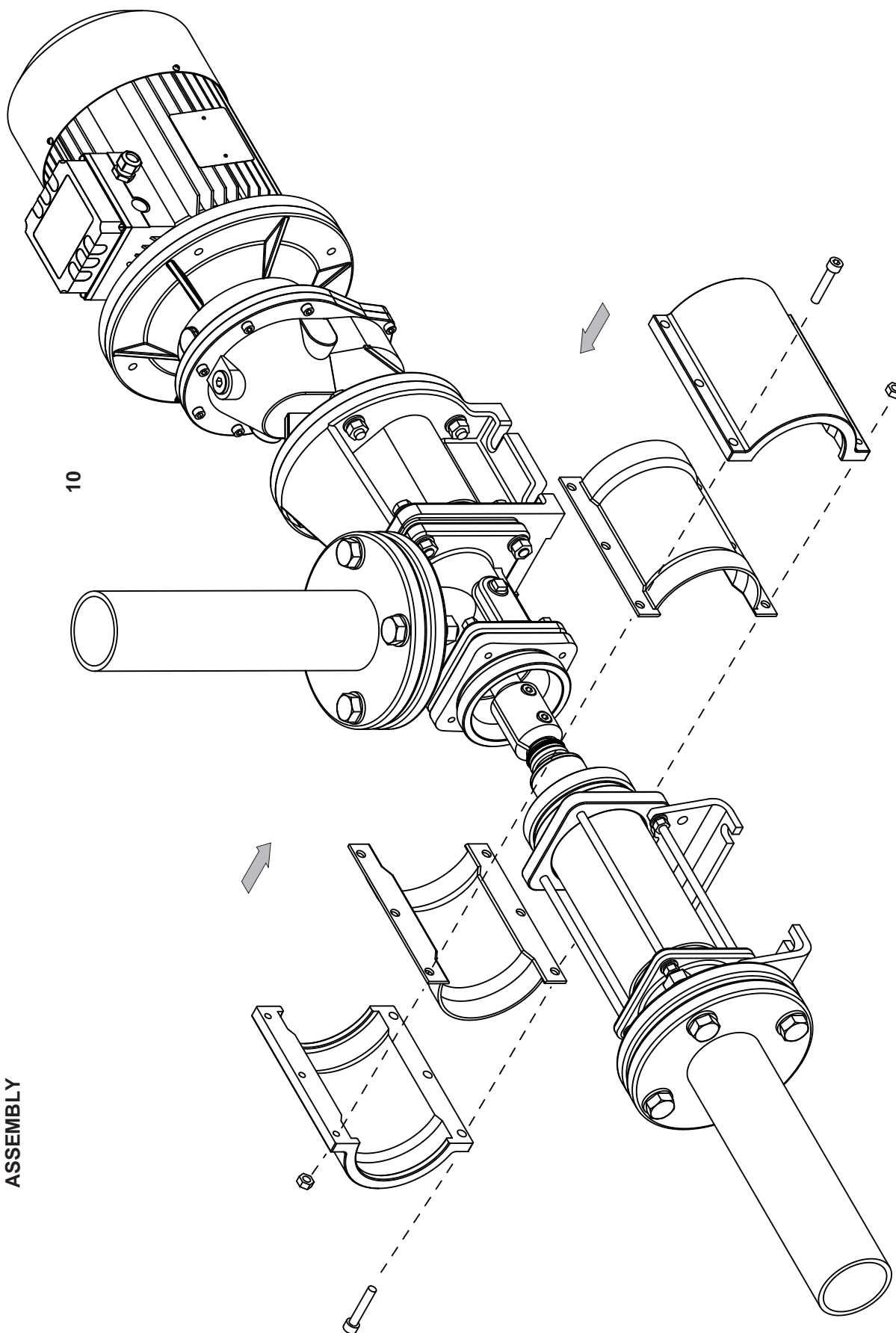
Dismantling & Assembly Diagrams

ROTOR & STATOR CHANGE ASSEMBLY



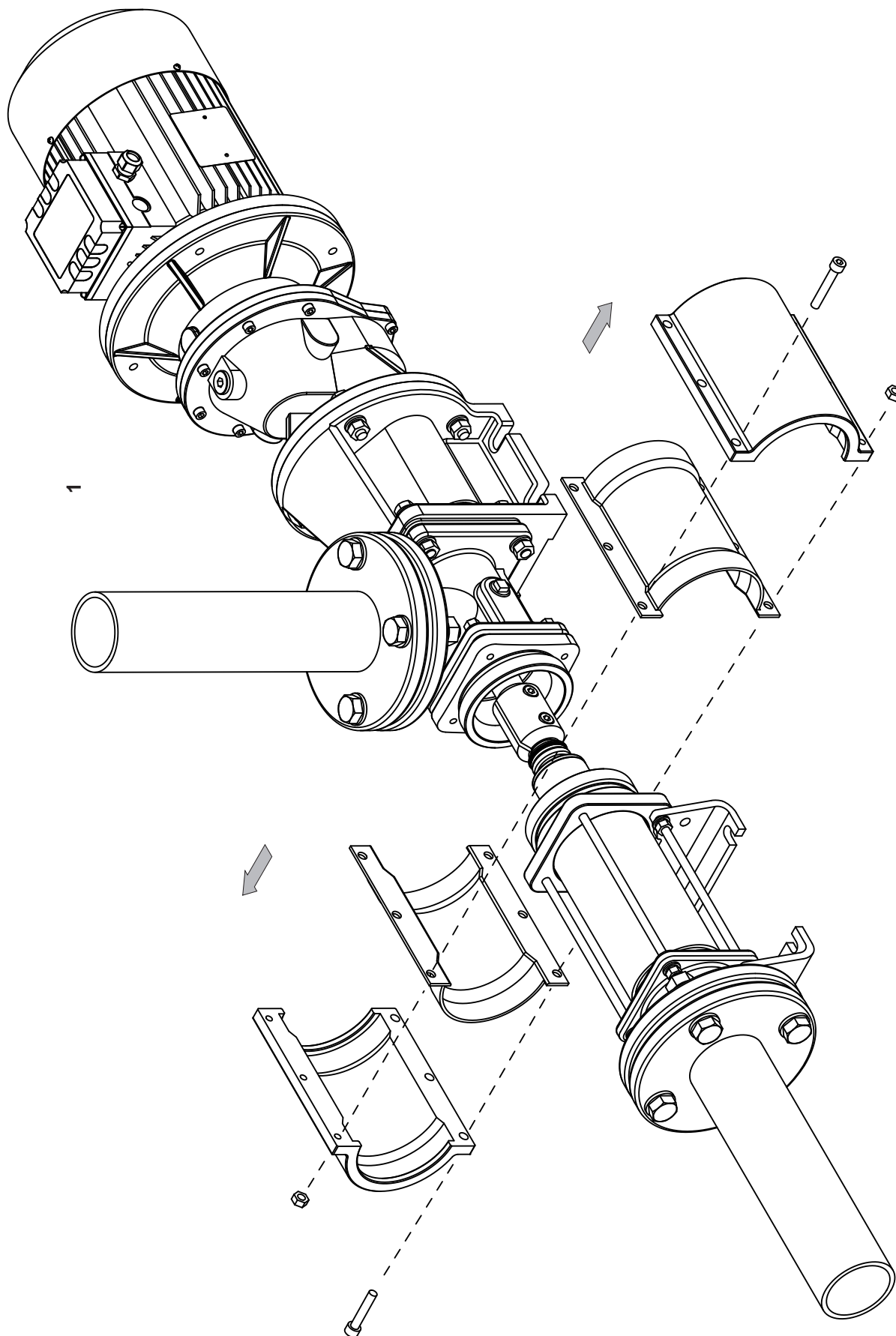
Dismantling & Assembly Diagrams

ROTOR & STATOR CHANGE ASSEMBLY



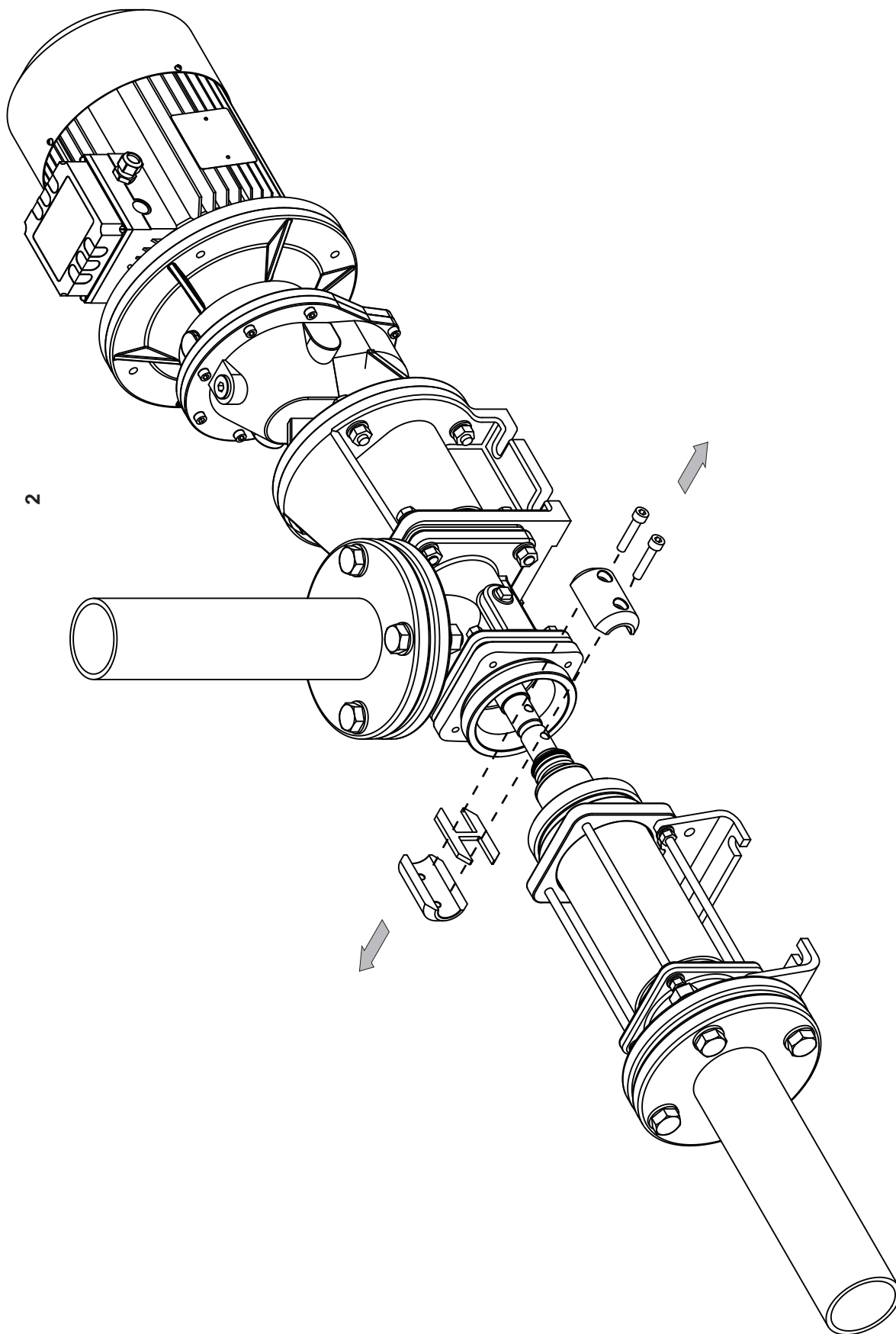
Dismantling & Assembly Diagrams

COMPLETE DISMANTLING

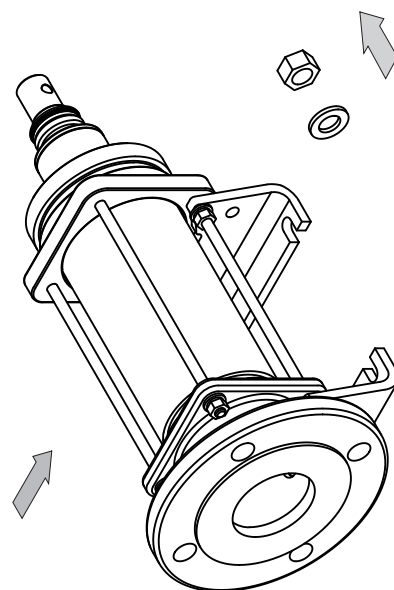
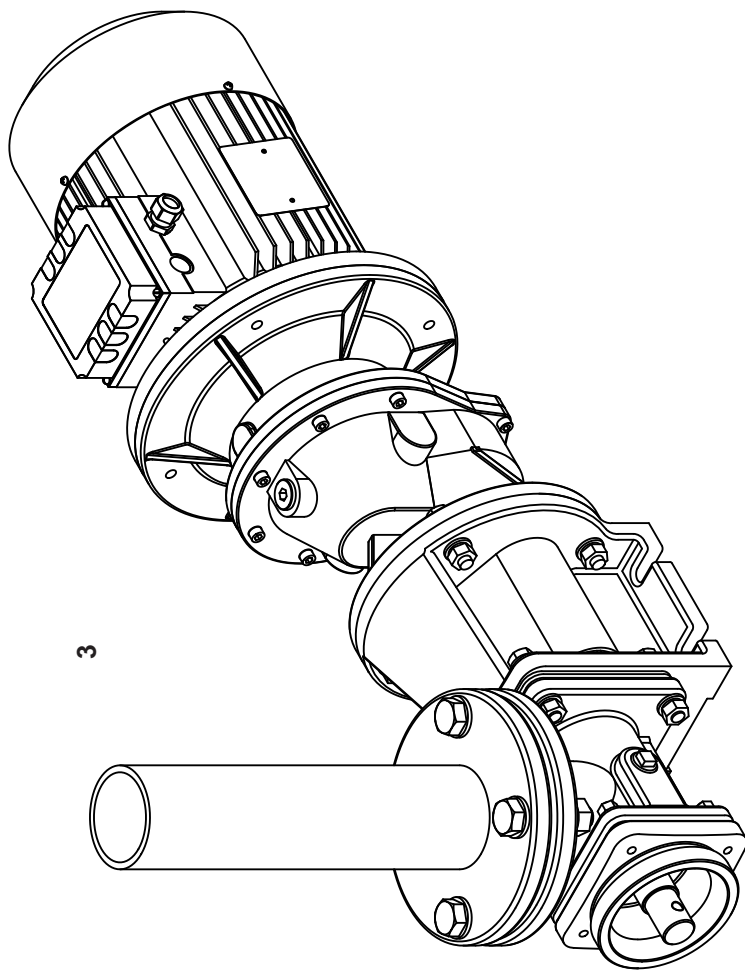


Dismantling & Assembly Diagrams

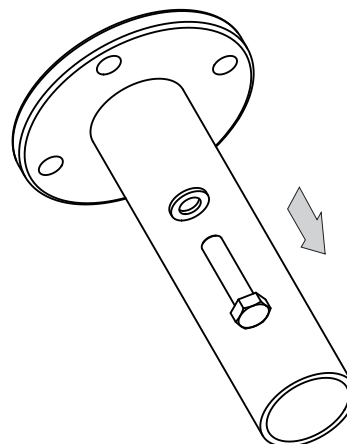
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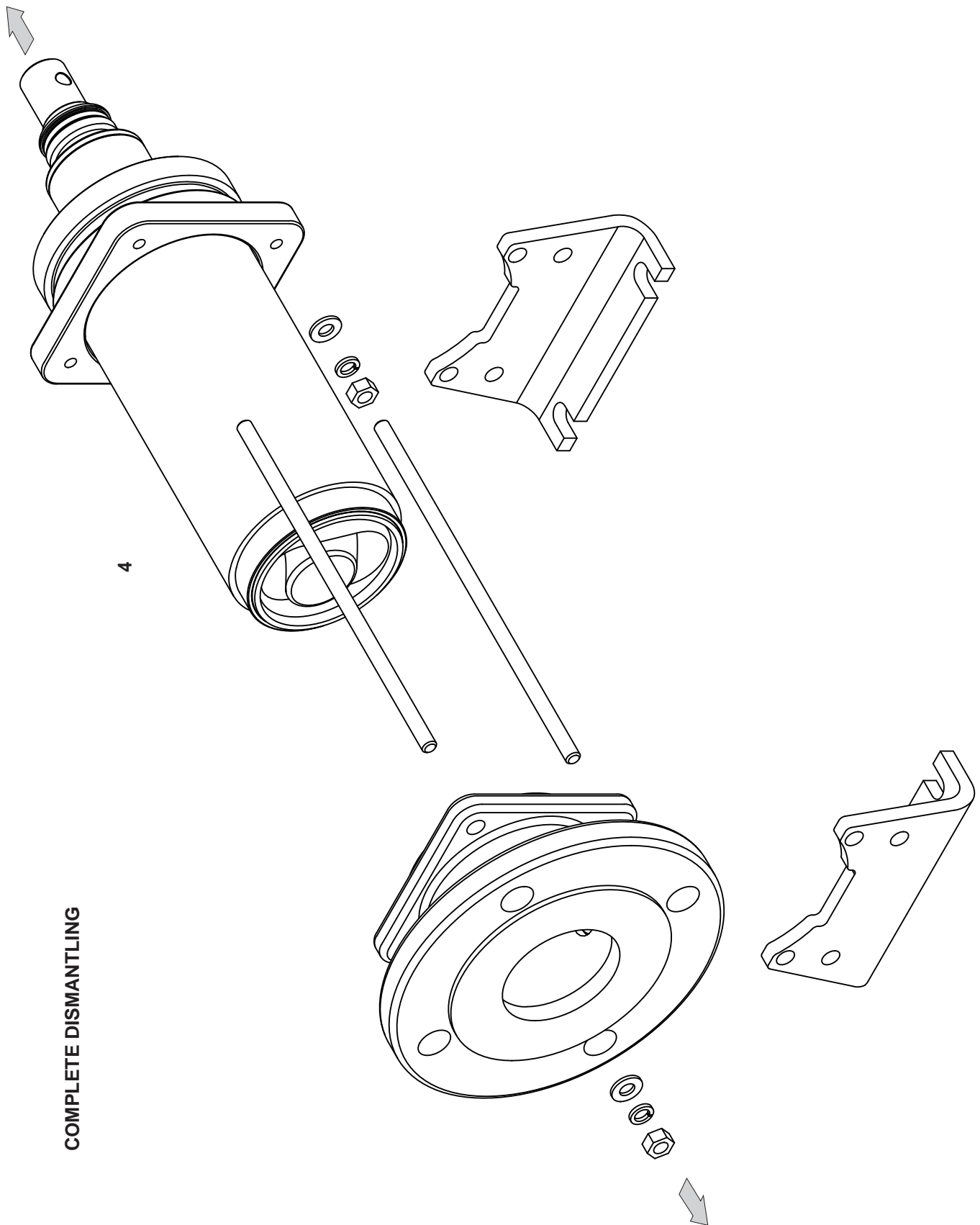
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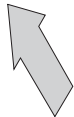
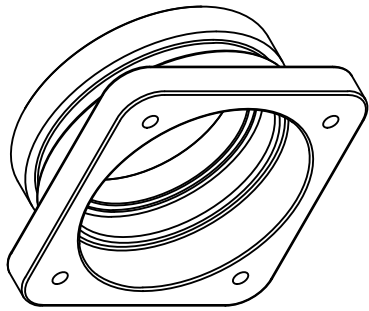
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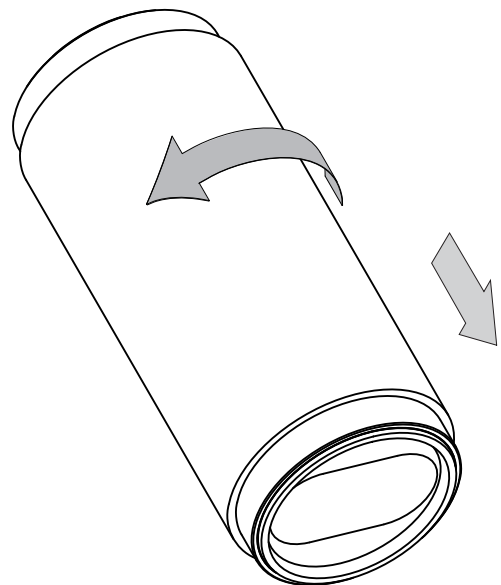
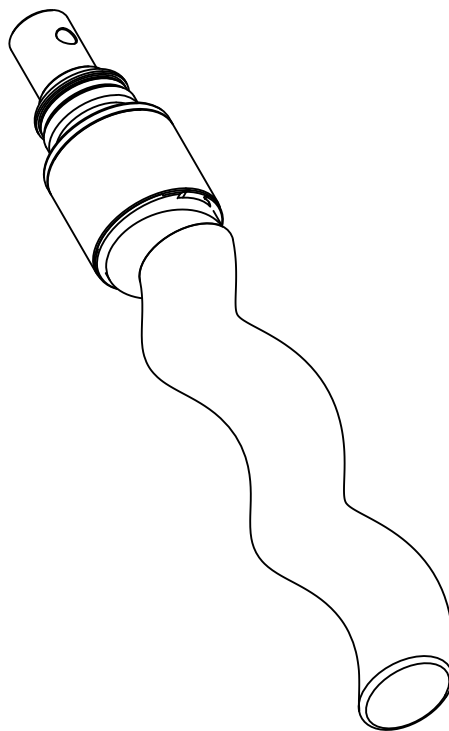
Dismantling & Assembly Diagrams



Dismantling & Assembly Diagrams



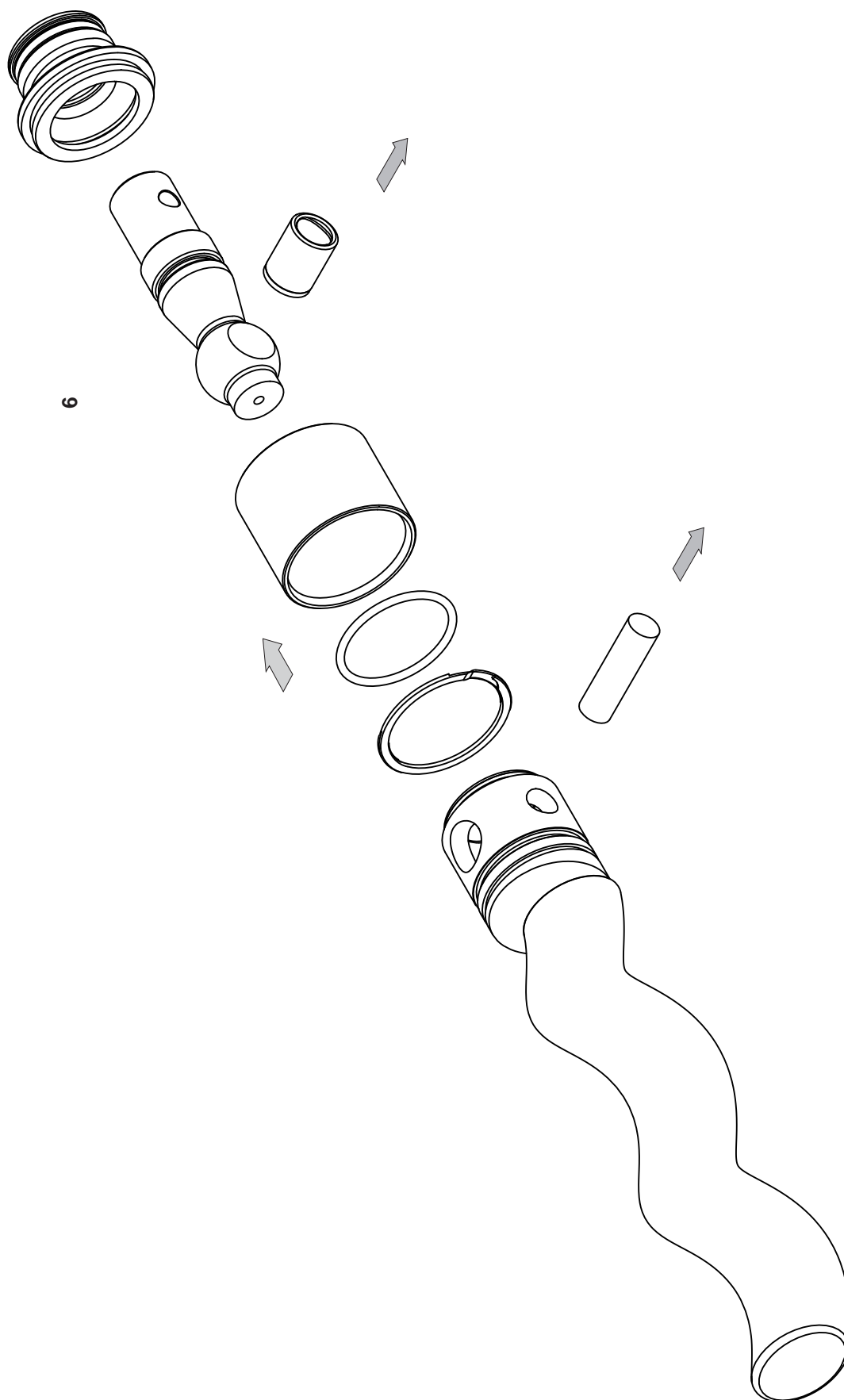
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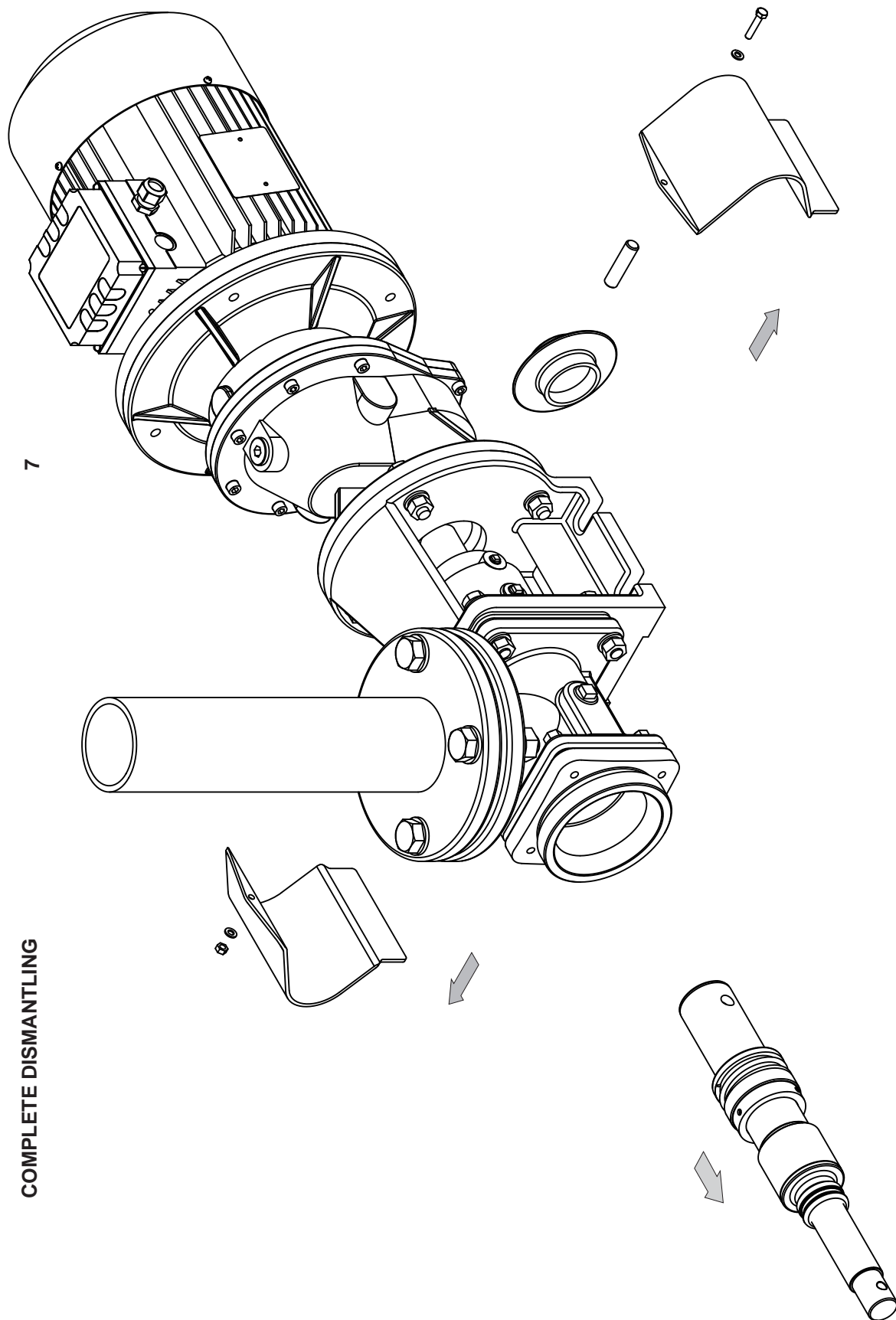
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Dismantling & Assembly Diagrams

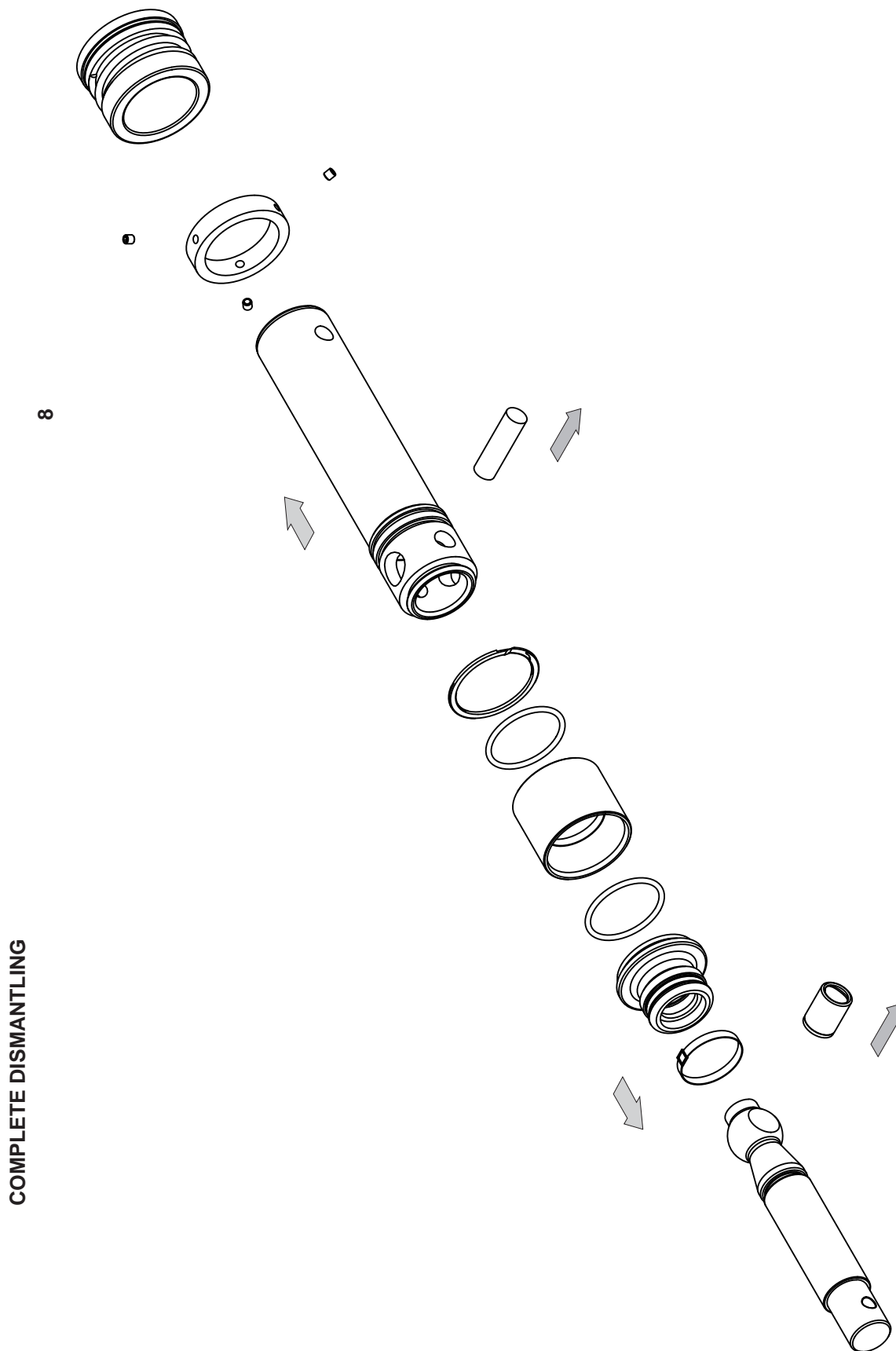
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Dismantling & Assembly Diagrams



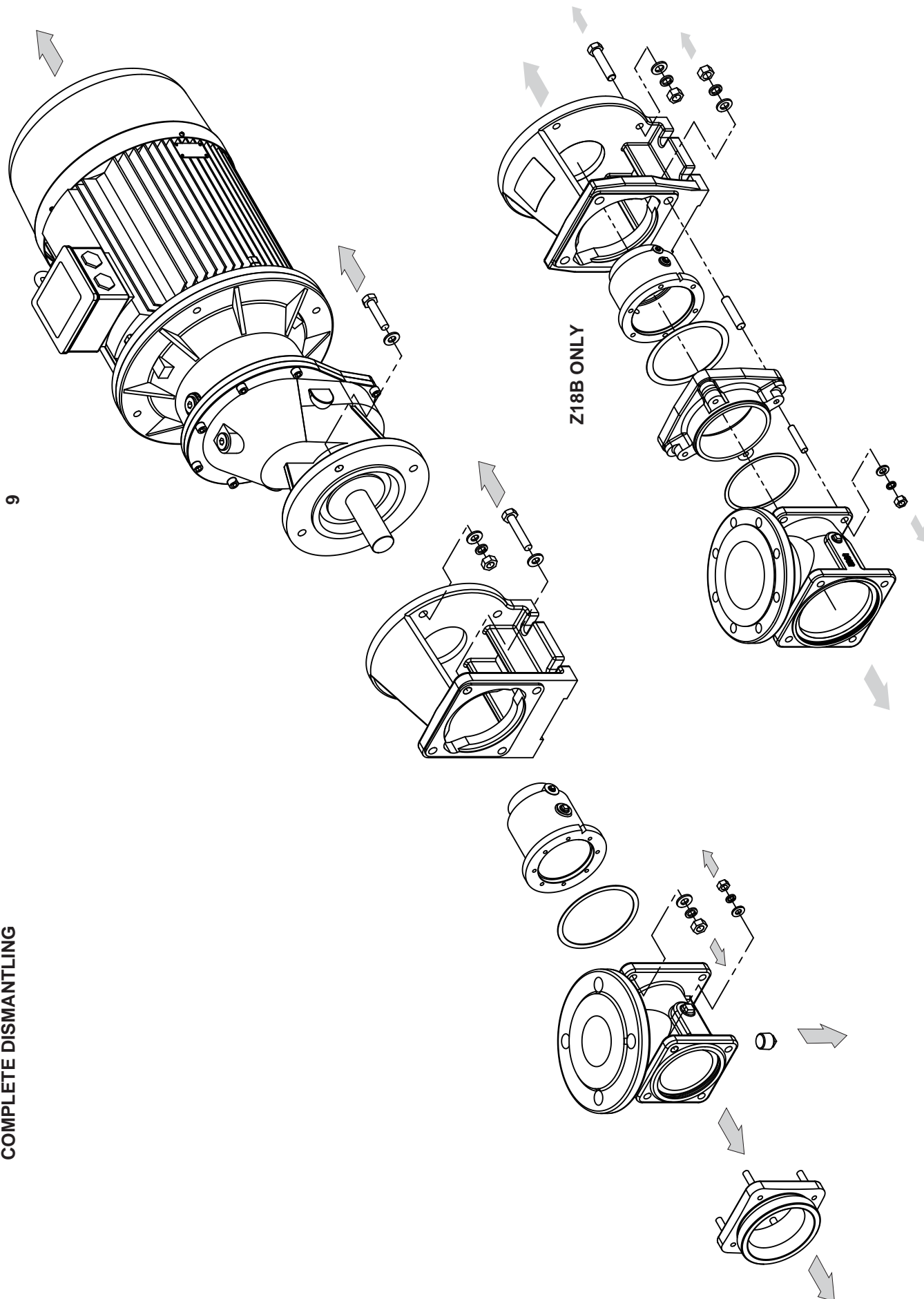
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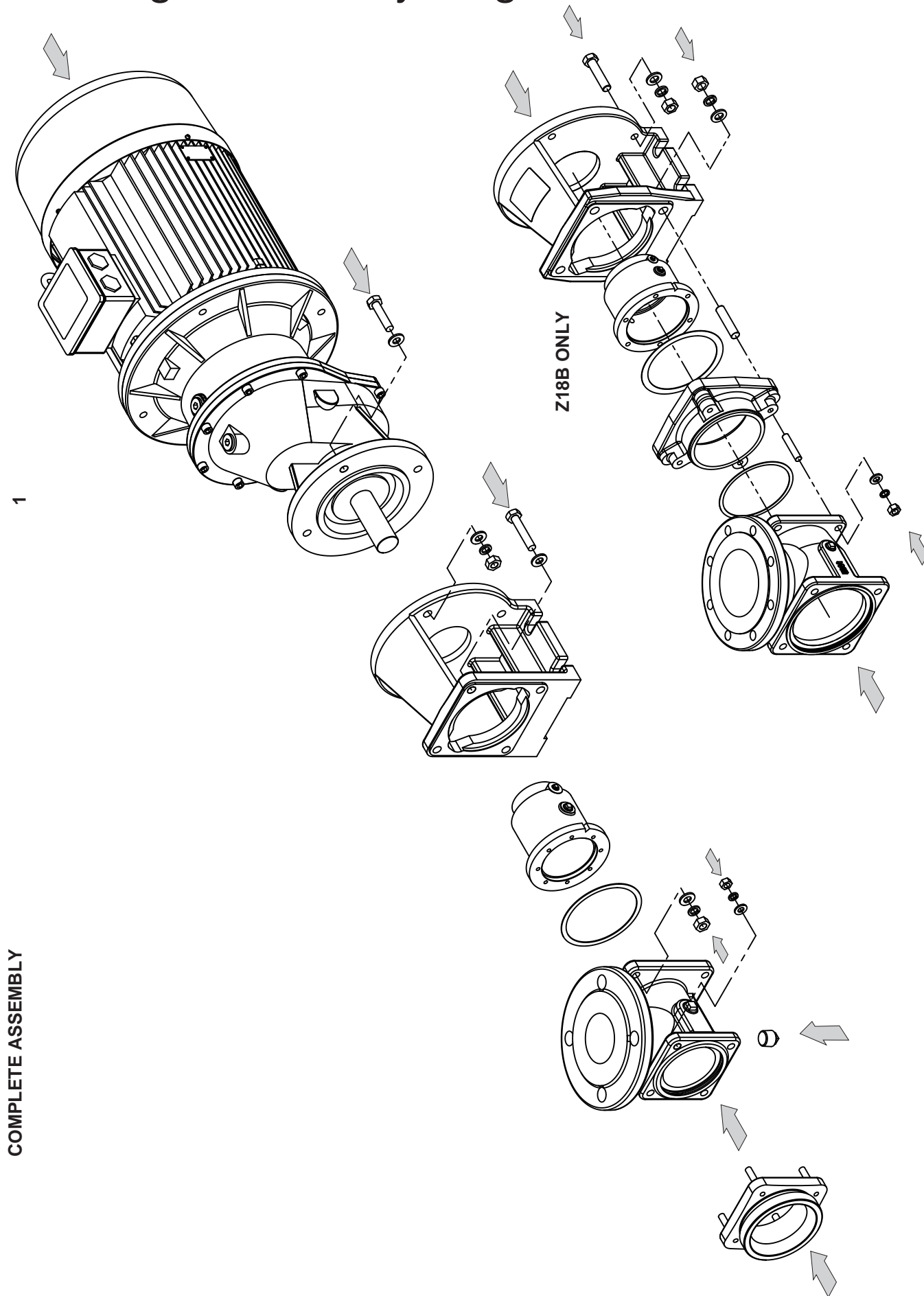
Dismantling & Assembly Diagrams

COMPLETE DISMANTLING

9



Dismantling & Assembly Diagrams



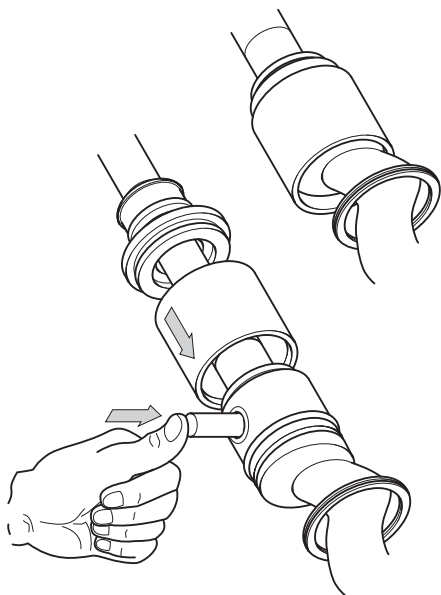


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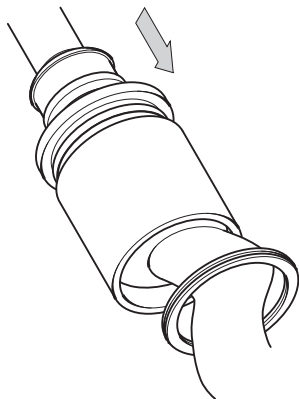
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FULL PUMP ASSEMBLY

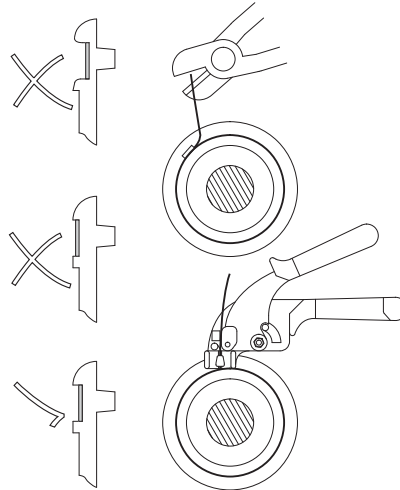
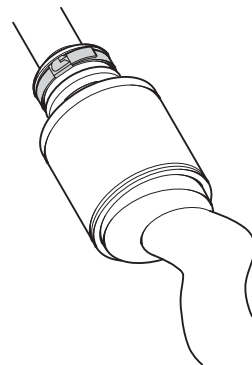
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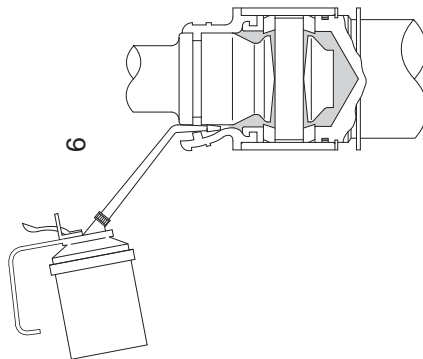
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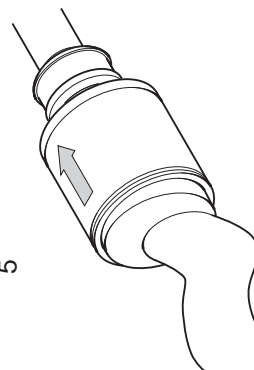
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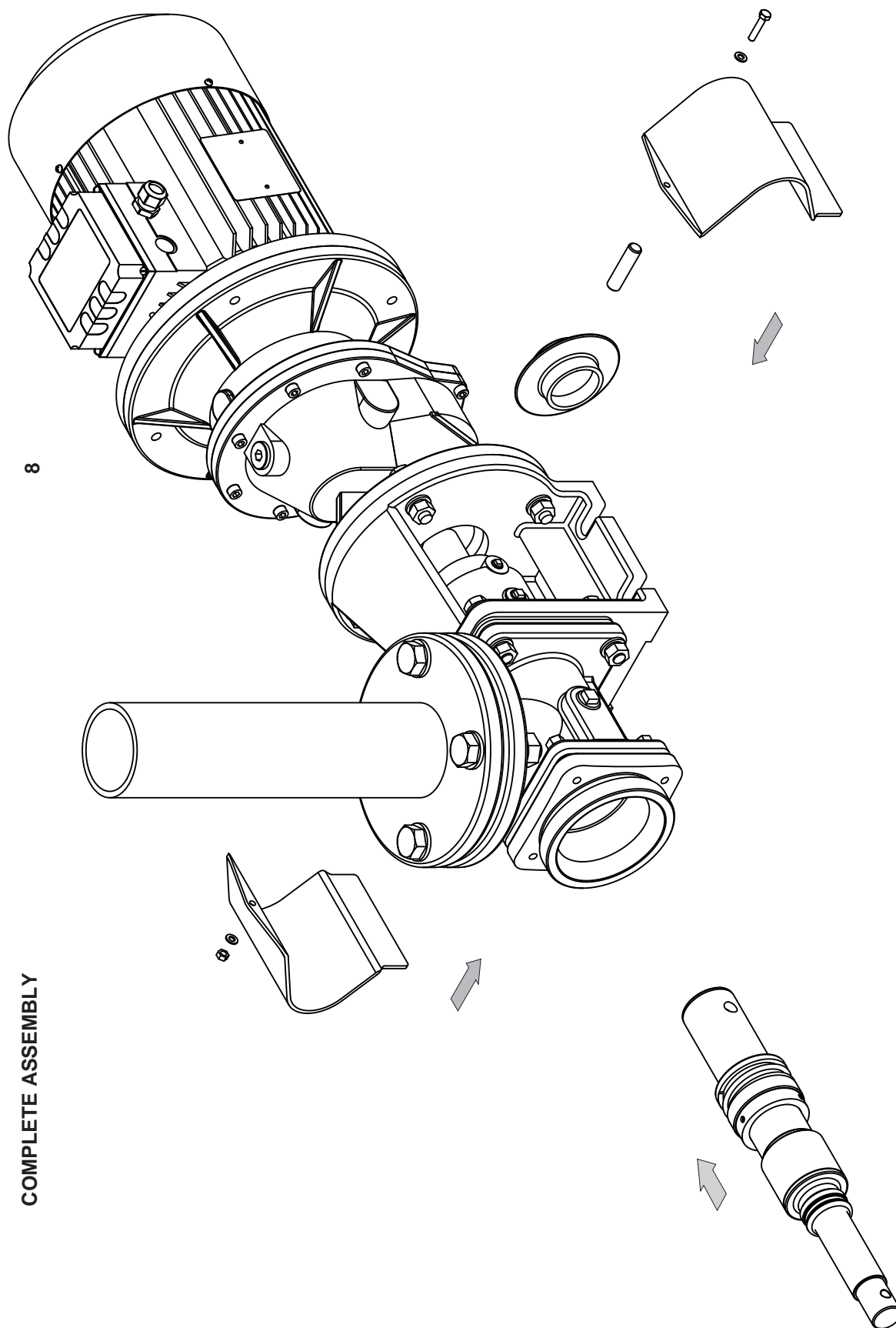
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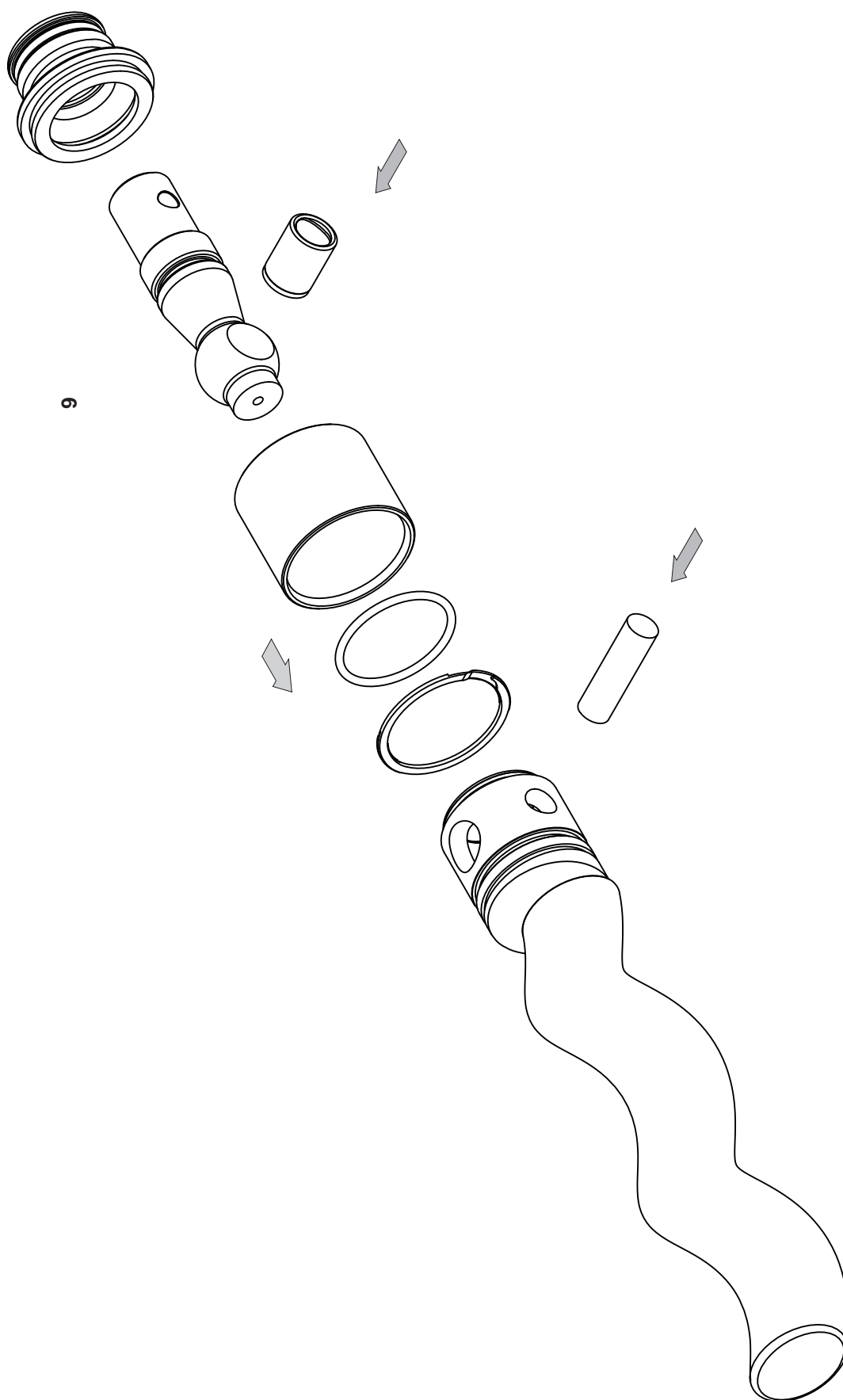


Dismantling & Assembly Diagrams



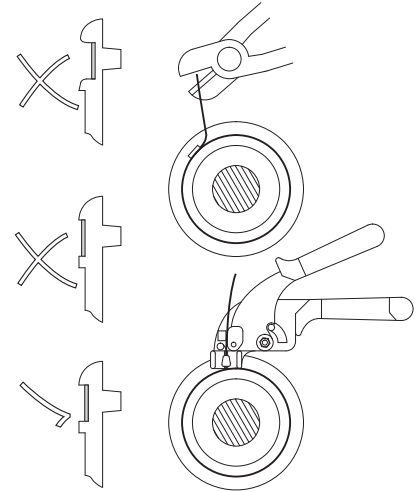
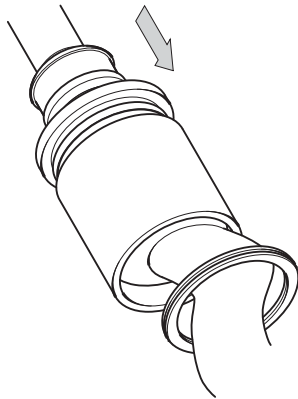
Dismantling & Assembly Diagrams

COMPLETE ASSEMBLY



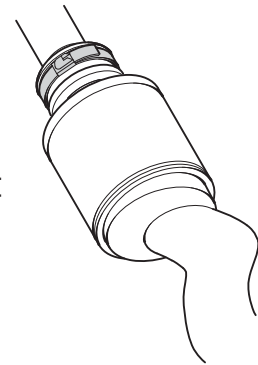
Dismantling & Assembly Diagrams

11



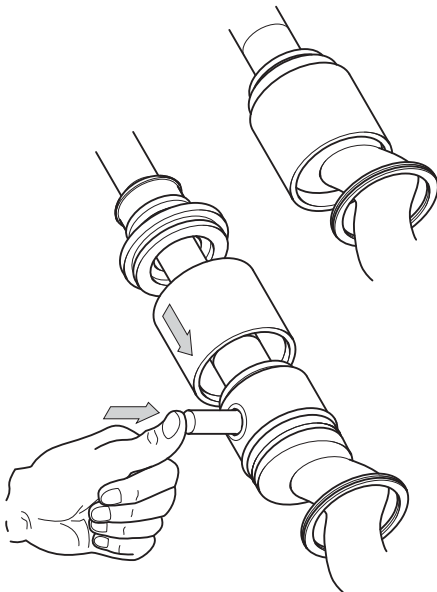
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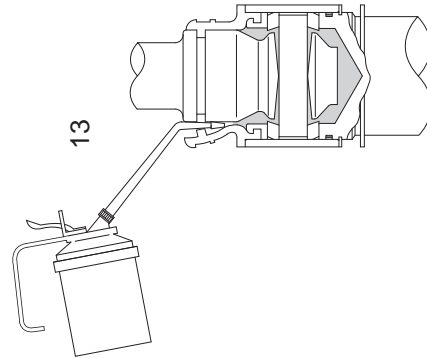


FULL PUMP ASSEMBLY

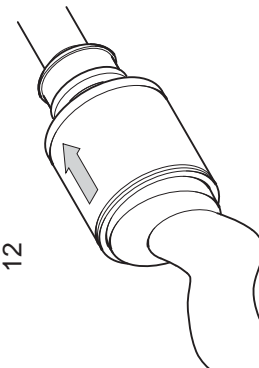
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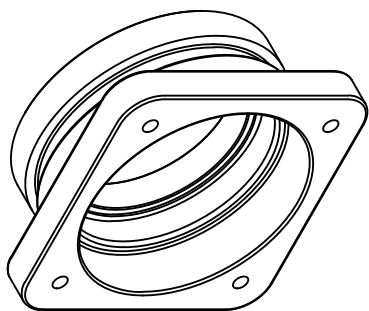
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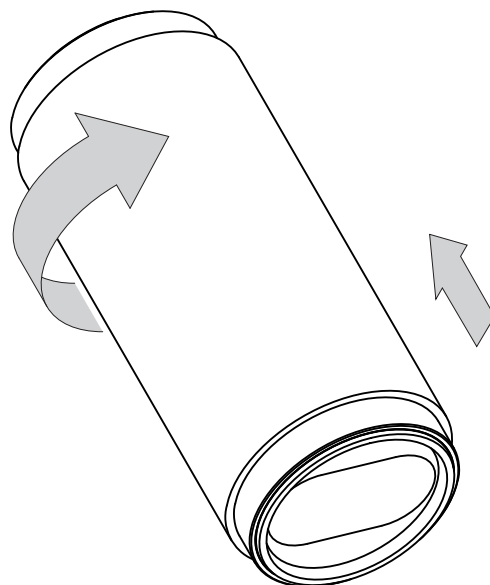
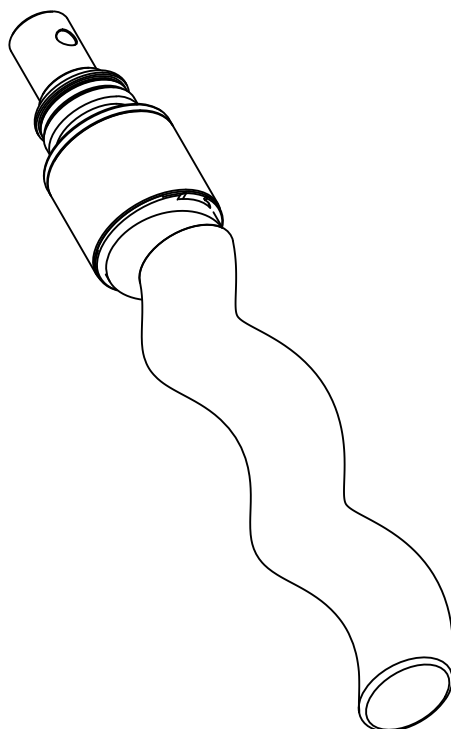
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Dismantling & Assembly Diagrams

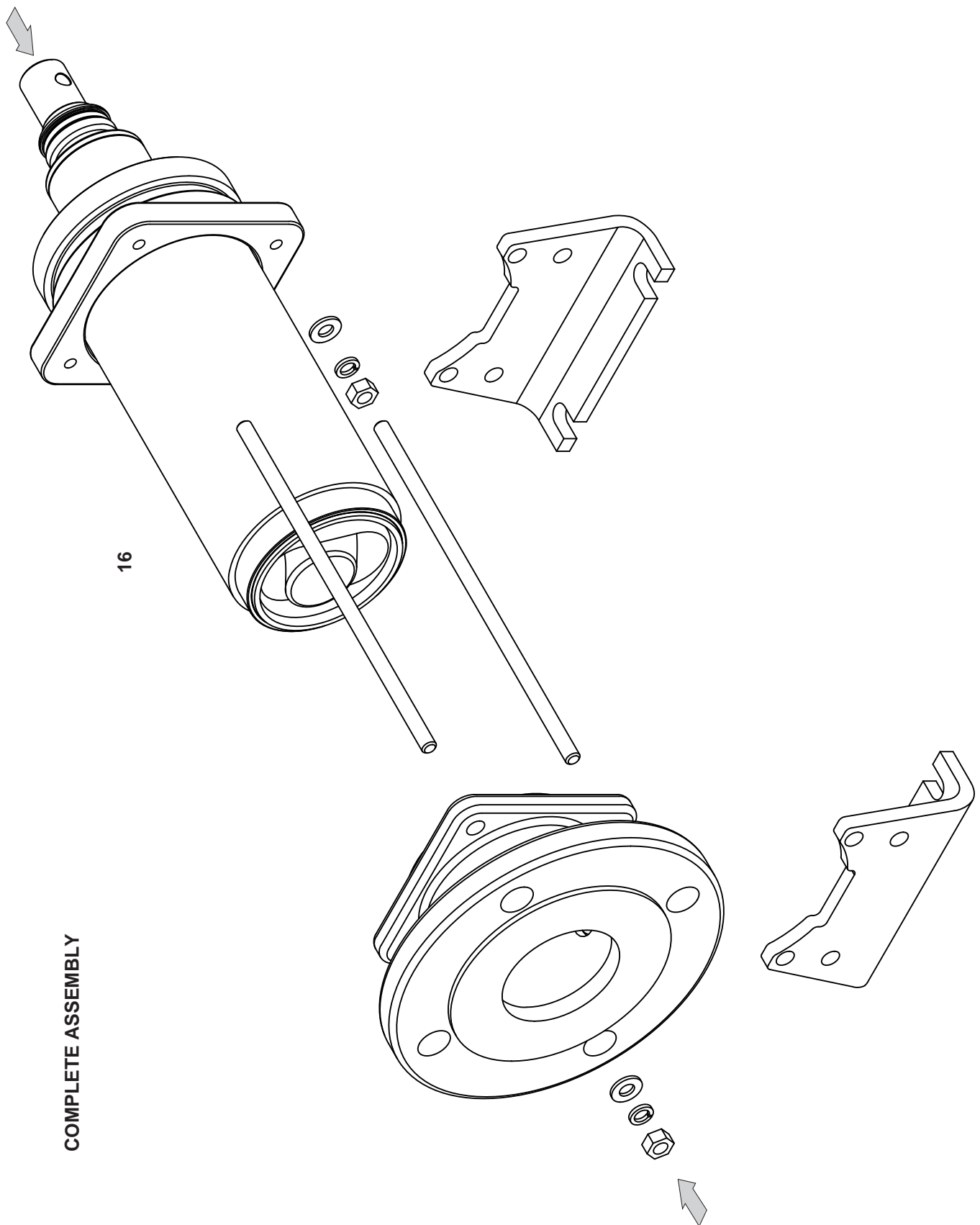


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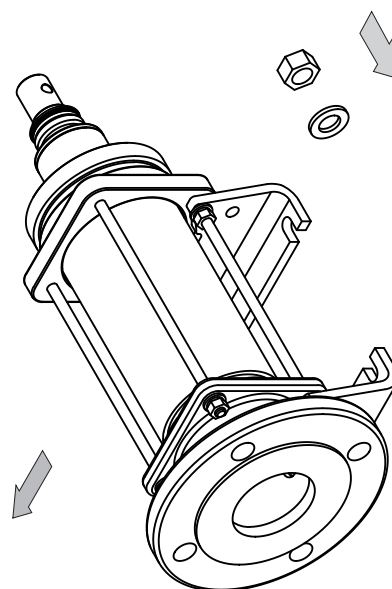
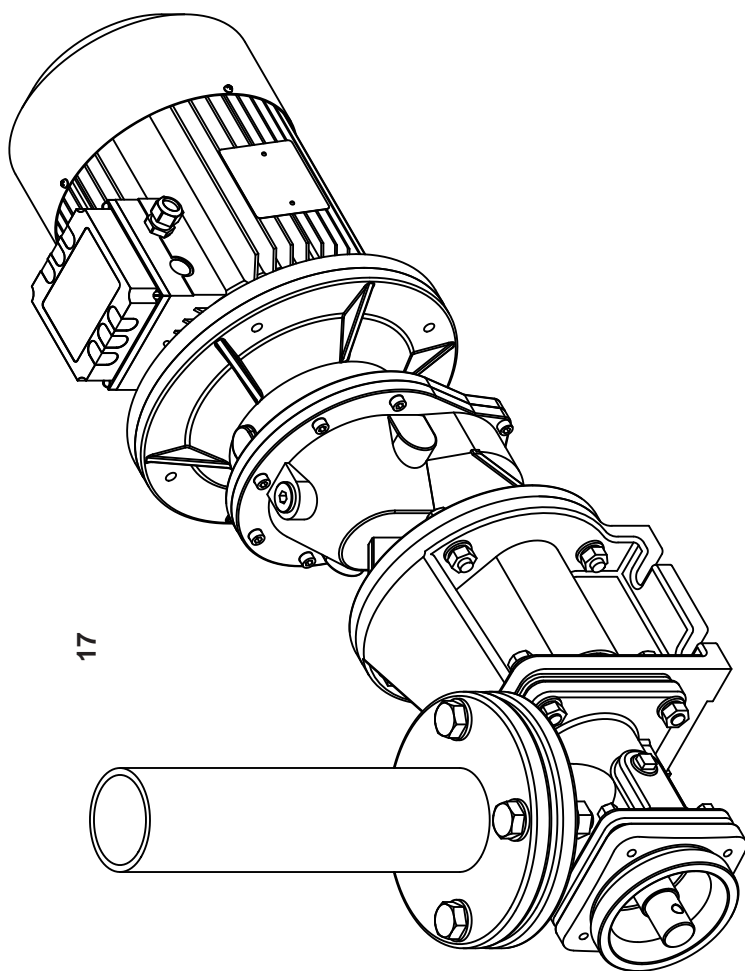


COMPLETE ASSEMBLY

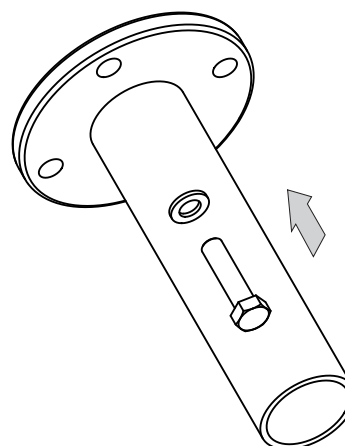
Dismantling & Assembly Diagrams



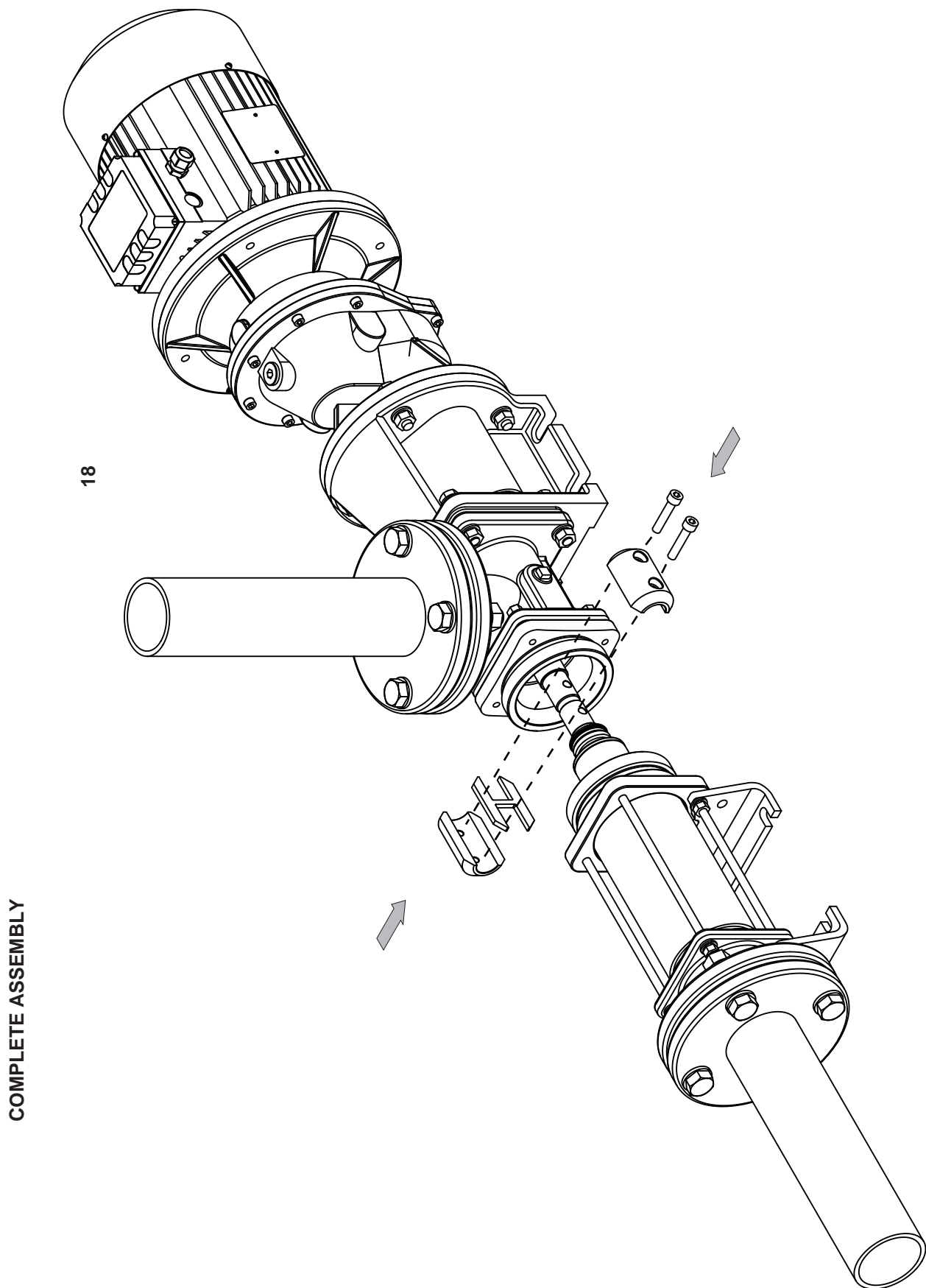
Dismantling & Assembly Diagrams



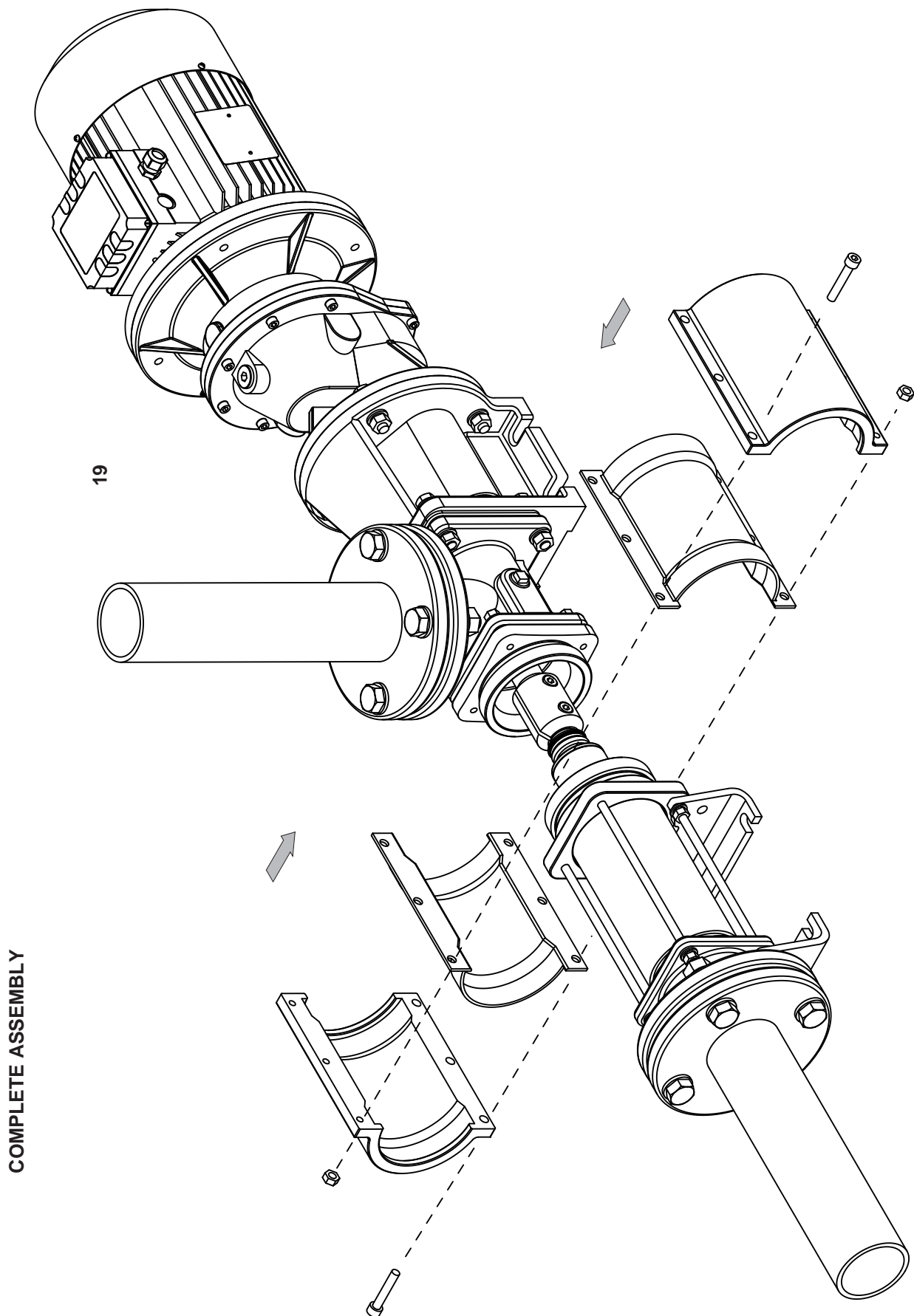
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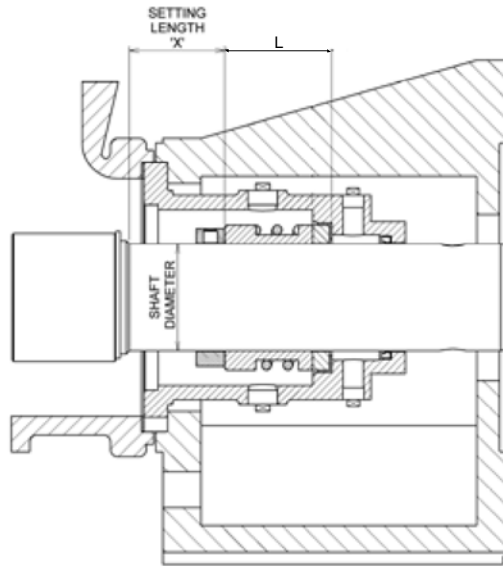
Dismantling & Assembly Diagrams



Dismantling & Assembly Diagrams



Setting Length - Mechanical Seal



Pump Size	Drive Type	Shaft Diameter mm	Seal Part No	Seal Working Length L mm	Setting Distance 'X' mm
Z14A	Pin Joint	45	M045139G	45.0	41
Z14B					
Z14K					
Z15A					
Z15K					
Z15B	Pin Joint	55	M055139G	47.5	34.5
Z16A					
Z16K					
Z16B	Pin Joint	65	M065139G	52.5	33.5
Z17A					
Z17B					
Z17K					
Z18A					
Z18K	Pin Joint	85	M085139G	60.0	33
Z18B					
Z19A					
Z19B					
Z19K					
Z1AA					
Z1AK					

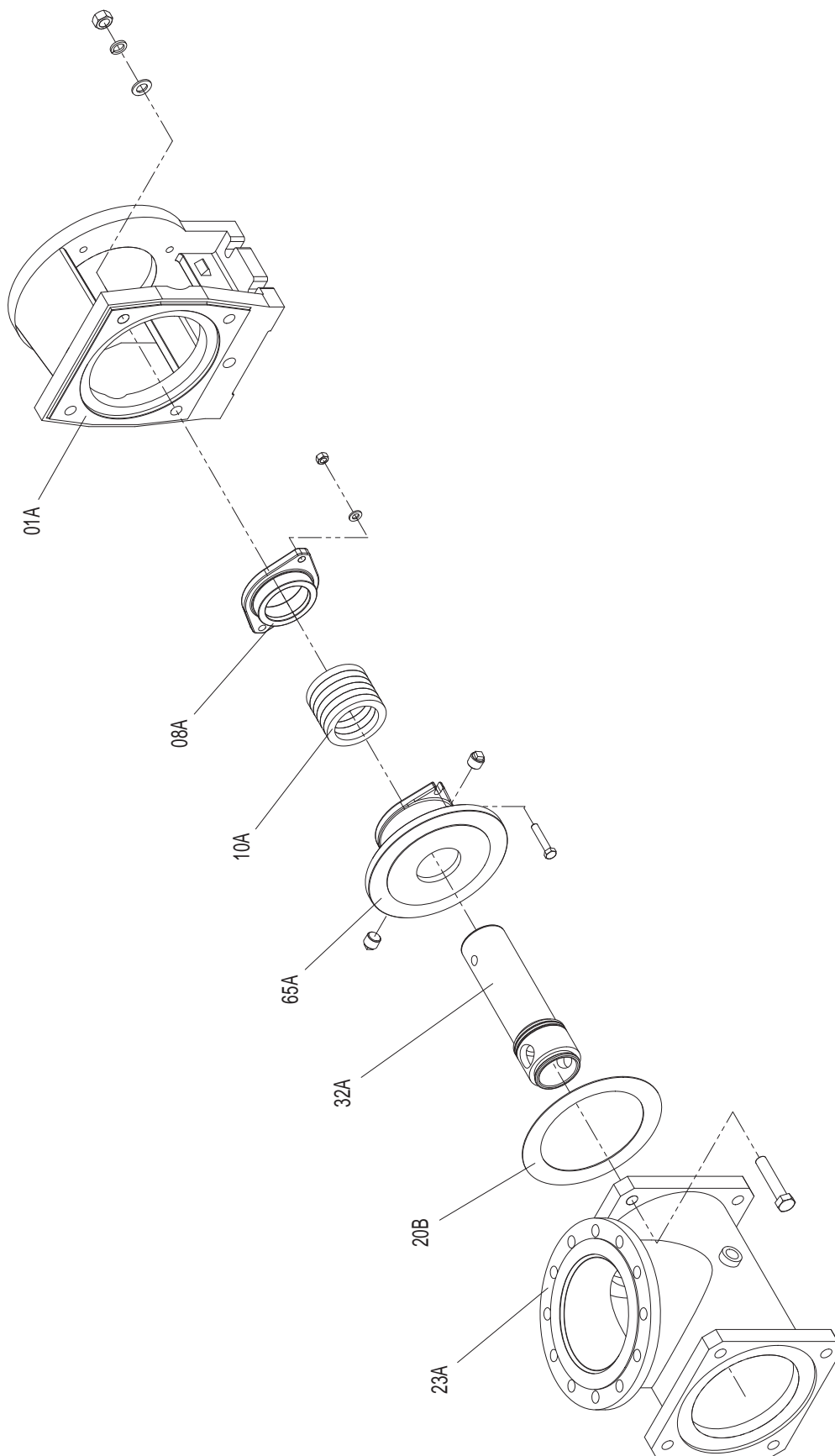
NOTE: All seal working lengths are to DIN L1K dimensions.

This table is not to be used for standard or DIN L1N working length seals.

All seals use 'M' type seat except for 85mm which uses 'BS' type or 'M' type.

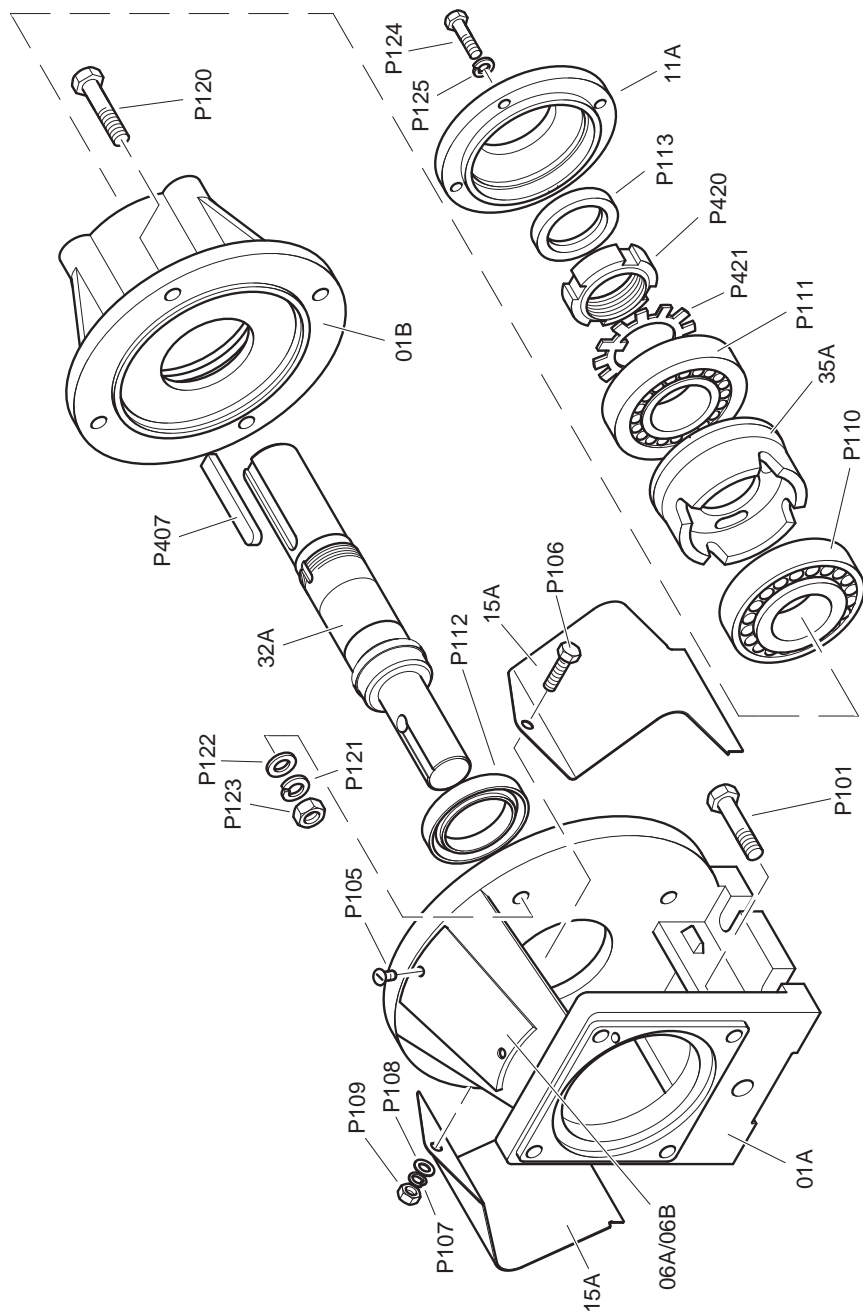
This table is not necessarily compatible with any other seal type - check with Mono Pumps Technical Dept.

Exploded Views - Packed Gland



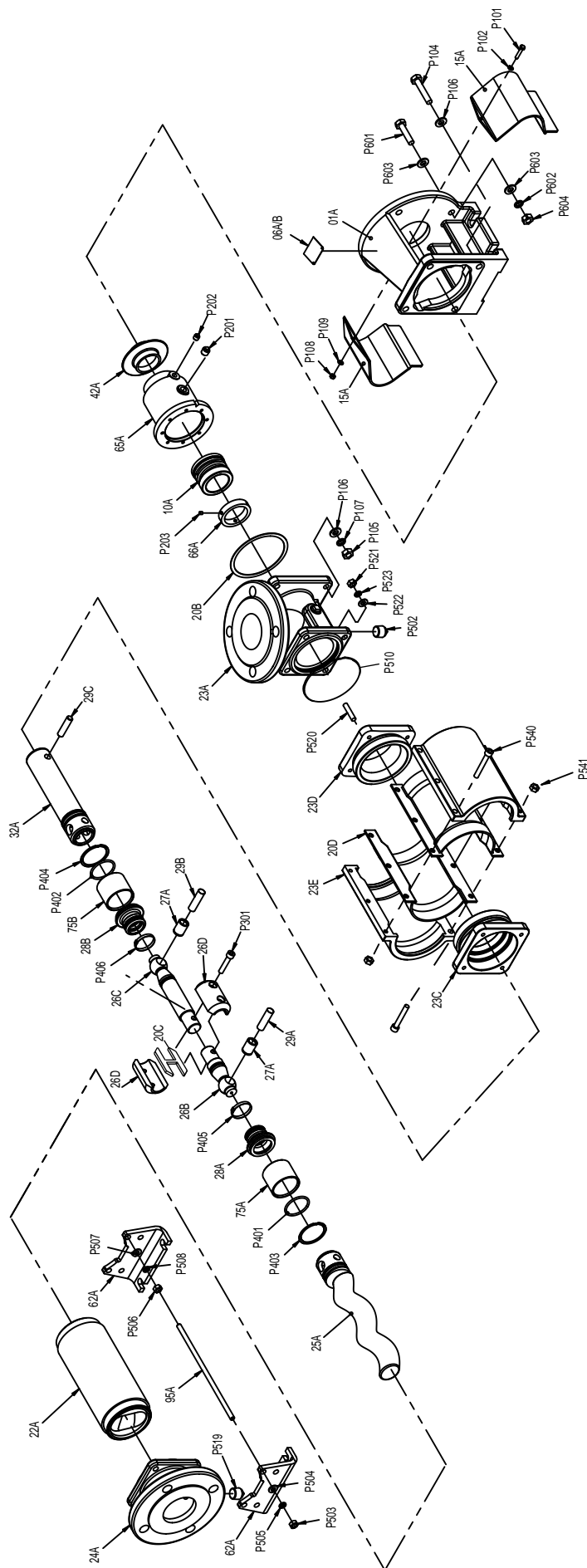
Exploded Views

BEARING HOUSING ONLY



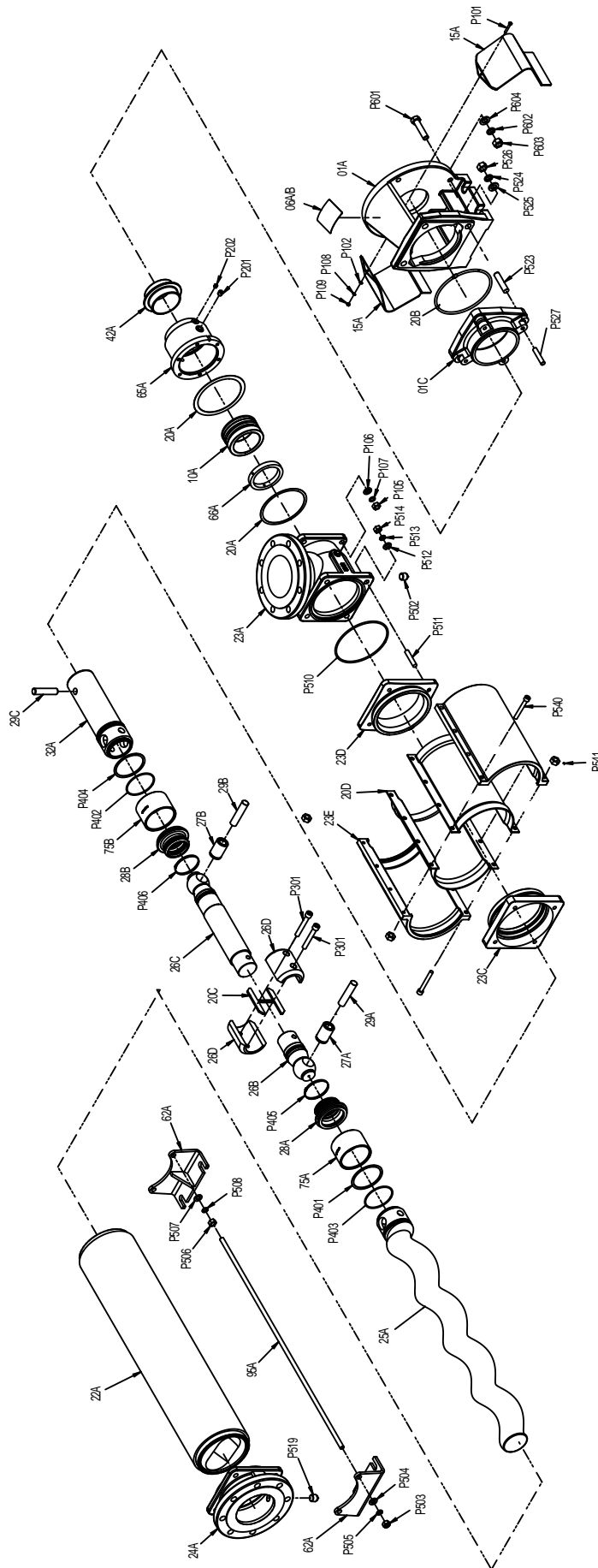
Exploded View

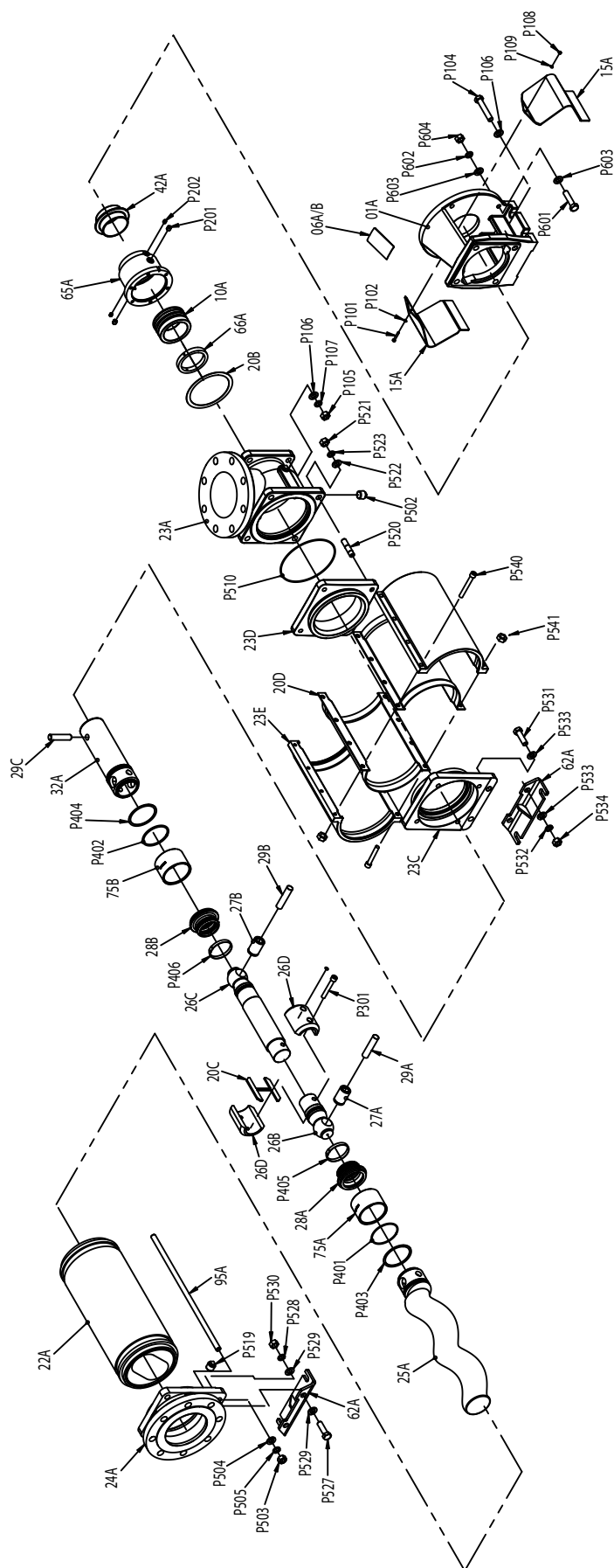
**Z14A - Z18K
(EXCEPT Z18B)**



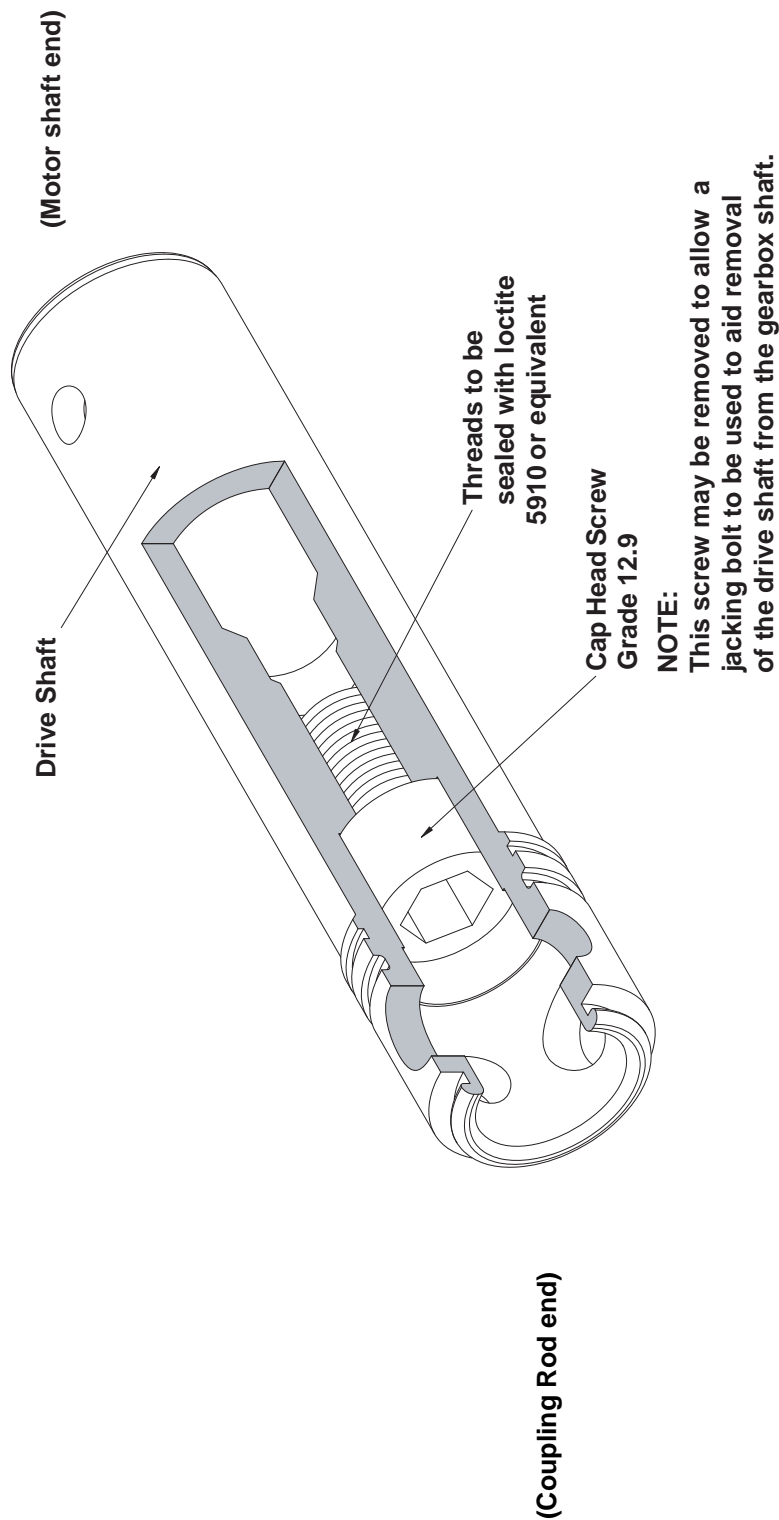
Exploded View

Z18B ONLY





Drive Shaft Assembly with Plug



NOTE: ENSURE THE CAP HEAD SCREW IS TIGHTEND & SEALED BEFORE ASSEMBLING WITH COUPLING ROD

Torque Tightening Figures

Pump Size	Body/Suct Chamber			Stator Tie Bars		Split Coupling Rod	Split Suction Chamber Halves
	Nm			Nm		Nm	Nm
	P526	P105	P530	P506	P503	P301	P540
Z14A		11		11		22	25
Z14K		11		11		22	25
Z14B		11		11		22	25
Z15A		11		11		22	35
Z15K		21		11		22	35
Z15B		21		11		43	35
Z16A		21		24		43	35
Z16K		21		24		43	35
Z16B		36		24		75	35
Z17A		36		24		75	45
Z17K		36		24		75	45
Z17B		36		24		75	45
Z18A		36		40		75	55
Z18K		36		40		75	55
Z18B	50	-	36	40		75	55
Z19A		90		75		75	70
Z19K		90		75		75	70
Z19B		90		75		75	70
Z1AA		90		75		75	70
Z1AK		90		75		75	70

Pin Joint Lubrication

PUMP MODEL	JOINT LUBRICATION CAPACITY (APPROX.) PER JOINT (ml)*	NON-FOOD APPLICATIONS ONLY		FOOD APPLICATIONS	
		RECOMMENDED	SUITABLE ALTERNATIVE		
Z14A Z14B Z14K Z15A	22	KLUBER SYNTHESO D460 EP OIL	<div>MOBILITH SHC 007 SEMI-FLUID GREASE</div> <div>SHELL RETINAX CSZ</div>		KLUBEROIL 4 UHI 460
Z15B Z16A Z16K	45				
Z16B Z17A Z17B Z17K Z18A Z18K	55				
Z18B Z19A Z19K Z1AA Z1AK	95				

Recommended Lubrication & Service Intervals

COMPONENTS	ALL APPLICATION EXCEPT FOOD	FOOD APPLICATIONS ONLY	SERVICE COMMENTS
PUMP DRIVE JOINTS	SEE SECTION 5 PAGE 2		INSPECT AND LUBRICATE AS NECESSARY EVERY 4000 OPERATING HOURS
PUMP BEARINGS (WHERE FITTED)	BP Energrease LC2 OR EQUIVALENT		INSPECT AND RE- GREASE IF NECESSARY EVERY 12 MONTHS
GEARED DRIVERS (WHERE FITTED)	AS RECOMMENDED BY THE MANUFACTURER		
NOTE: ABOVE SERVICE AND LUBRICATION INTERVALS ARE FOR GUIDANCE ONLY TO ENSURE MAXIMUM COMPONENT LIFE. PUMP WILL OPERATE FOR CONSIDERABLY LONGER PERIODS WITHOUT ATTENTION DEPENDING ON SERVICE CONDITIONS			

Installation, Operation & Maintenance Instructions

3. Acid wash @ 50°C for 20 mins
4. Water rinse @ 80°C for 20 mins

- CIP flow rates (hence pump speeds) should be maximised to achieve highest level of cleanability.

A C.I.P. liquid velocity of 1.5 to 2.0 m/s is required for removal of solids and soiling.

Pumps fitted with CIP by pass ports will permit higher flow rates without the need to increase pump speed.

- The use of neat active caustic and acid chemicals is not recommended. Proprietary cleaning agents should be used in line with manufacturers instructions.
- All seals and gaskets should be replaced with new if disturbed during maintenance.
- Pump internals should be regularly inspected to ensure hygienic integrity is maintained, especially with respect to elastomeric components and seals, and replaced if necessary.

The four stages constitute one cycle and we recommend that this cycle is used to clean the pump before use on food.

Once the pump has been commissioned, the cleaning process will depend upon the application. The user must therefore ensure that their cleaning procedures are suitable for the duty for which the pump has been purchased.

2.11 WIDETHROAT PUMPS

Specific pumps may have auger feed screws, with or without a bridge breaker system to feed the pumping element. If the pump installation requires that these cannot be enclosed, care must be taken to ensure personnel cannot gain access whilst the pump is operating. If this is not possible an emergency stop device must be fitted nearby.

2.12 EXPLOSIVE PRODUCTS/ HAZARDOUS ATMOSPHERES

In certain instances the product being pumped may well be of a hazardous nature.

In these installations consideration must be given to provide suitable protection and appropriate warnings to safeguard personnel and plant.

2.13 ACCESS PORTS



Where access ports are fitted then the following steps must be followed prior to removal:

1. Pump must be shut down and the electrical supply isolated.
2. Protective clothing should be worn, especially if the pumped product is obnoxious.
3. Remove access plate with care utilising where possible drip trays to collect product leakage.

Access ports are included to assist in removing blockages and to allow a visual check on the components within the suction chamber.

It is not to be considered as an additional method in dismantling the pump.

Re-assembly of the plate should be completed using new gaskets prior to the pump being switched on.

2.14 ADJUSTABLE STATORS

If adjustable stators are fitted then the following steps must be followed for adjusting the clamping devices.

The adjustable stator assembly is designed to give an even compression around the stator circumference. It is designed to be used when pump performance reduces through wear to an unacceptable level, to restore the required flow rate.

The stator compression is increased using the following steps:-

1. Release the six locking screws half a turn.
2. Tighten the eight clamp screws until adjustment allowed by releasing the lock screws has been taken up.
3. Repeat steps 1 and 2 until the pump performance has been restored to its former level.

NOTE

It is imperative that when adjusting the stator that only sufficient pressure is placed on the stator to enable the capacity of the pump to be reinstated.

Over tightening of the stator could easily result in damage to the driver by overload and so extreme care must be taken when carrying out these adjustments.

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3.2. Centrifuge Feed Pump Motors –

3.2.1. Nord SK42 Operating & Assembly Instructions

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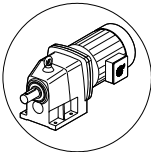






B1000

Operating and Assembly Instructions for
Gear Units and Geared Motors



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1. Notes

1. Notes

1.1 General information

Read the Operating Manual carefully prior to performing any work on or putting the gear unit into operation. Strict compliance with the instructions in this Operating Manual is essential. Getriebebau NORD accepts no liability for damage to persons, materials or assets as a result of the non-observance of this Operating Manual, operating errors or incorrect use. General wearing parts, e.g. radial seals are excluded from the warranty.

If additional components are attached to or installed in the gear unit (e.g. motor, cooling system, pressure sensor etc.) or components (e.g. cooling system) are supplied with the order, the operating instructions for these components must be observed.

If geared motors are used, compliance with the Motor Operating Manual is also necessary.

If you do not understand the contents of this Operating Manual or additional operating instructions, please consult Getriebebau NORD!

1.2 Safety and information symbols

Please always observe the following safety and information symbols!

	Danger!
	Risk of fatalities and injury
	Attention!
	Machine may be damaged
	Note!
	Useful information

1.3 Correct use

These gear units generate a rotational movement and are intended for use in commercial systems. The gear unit must only be used according to the information in the technical documentation from Getriebebau NORD.

	Danger!
	Use in explosion hazard areas is prohibited.

Strict compliance with the technical data on the rating plate is essential.

The documentation must be observed.

Appropriate safety measures must be taken for applications where failure of a gear unit or geared motor may result in injury.



1. Notes

1.4 Safety information

All work including transportation, storage, installation, electrical connection, commissioning, servicing, maintenance and repair must be performed **only by qualified specialist personnel**. It is recommended that repairs to NORD Products are carried out by the NORD Service department.

	Danger!
	Installation and maintenance work must only be performed when gear units are at a standstill and have cooled down. The drive must be isolated and secured to prevent accidental start-up. Tighten the drive elements or secure the parallel key before switching on.

	Danger!
	Only transport use the eyebolts attached to the gear unit. No additional loads may be attached. Transportation aids and lifting gear must have an adequate load-bearing capacity.

If geared motors have an additional eyebolt attached to the motor, this must also be used. Avoid pulling the eyebolts at an angle. The thread of the eyebolt must be fully screwed in.

Observe all safety information, including that provided in the individual sections of this Operating Manual. All national and other regulations on safety and accident prevention must also be observed.

	Danger!
	Serious physical and property damage may result from inappropriate installation, non-designated use, incorrect operation, non-compliance with safety information, unauthorised removal of housing components or safety covers and structural modifications to the gear unit.



1. Notes

1.5 Other documents

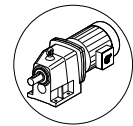
Further information may be obtained from the following documents:

- Gear unit catalogues (G1000, G2000, G1011, G1012, G1034, G1035)
- Operating and maintenance instructions for the electric motor
- if applicable, operating instructions for attached or supplied options

1.6 Disposal

Observe the current local regulations. In particular, lubricants must be collected and disposed of correctly.

Gear unit components:	Material:
Toothed wheels, shafts, rolling bearings, parallel keys, locking rings, ...	Steel
Gear unit housing, housing components, ...	Grey cast iron
Light alloy gear unit housing, light alloy gear unit housing components, ...	Aluminium
Worm gears, bushes, ...	Bronze
Radial seals, sealing caps, rubber components,...	Elastomers with steel
Coupling components	Plastic with steel
Flat seals	Asbestos-free sealing material
Gear oil	Additive mineral oil
Synthetic gear oil (rating plate code: CLP PG)	Polyglycol-based lubricants
Cooling spiral, embedding material of the cooling spiral, screw fittings	Copper, epoxy, yellow brass



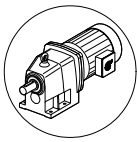
2. Description of Gear Units

2. Description of gear units

2.1 Type designations and gear unit types








	Versions / Options
<p><u>Helical gear units</u> SK 11E, SK 21E, SK 31E, SK 41E, SK 51E (single-stage) SK 02, SK 12, SK 22, SK 32, SK 42, SK 52, SK 62N (2-stage) SK 03, SK 13, SK 23, SK 33N, SK 43, SK 53 (3-stage) SK 62, SK 72, SK 82, SK 92, SK 102 (2-stage) SK 63, SK 73, SK 83, SK 93, SK 103 (3-stage)</p>	<p>- Foot mounting with solid shaft A Hollow shaft version V Solid shaft version L Solid shaft both sides Z Drive flange B14 F Output flange B5</p>
<p><u>NORDBLOC helical gear units</u> SK 320, SK 172, SK 272, SK 372, SK 472, SK 572, SK 672, SK 772, SK 872, SK 972 (2-stage) SK 273, SK 373, SK 473, SK 573, SK 673, SK 773, SK 873, SK 973 (3-stage) SK 072.1, SK 172.1, SK 272.1, SK 372.1, SK 472.1, SK 572.1, SK 672.1, SK 772.1, SK 872.1, SK 972.1 (2-stage) SK 373.1, SK 473.1, SK 573.1, SK 673.1, SK 773.1, SK 873.1, SK 973.1 (3-stage)</p>	<p>X Foot mounting XZ Base and output flange B14 XF Base and output flange B5 AL Reinforced axial drive bearings 5 Reinforced output shaft (Standard helical gear unit)</p>
<p><u>Standard helical gear units</u> SK 0, SK 01, SK 20, SK 25, SK 30, SK 33 (2-stage) SK 010, SK 200, SK 250, SK 300, SK 330 (3-stage)</p>	<p>V Reinforced drive shaft (Standard helical gear unit) D Torque support K Torque console</p>
<p><u>Parallel shaft gear units</u> SK 0182NB, SK 0282NB, SK 1282, SK 2282, SK 3282, SK 4282, SK 5282, SK 6282, SK 7282, SK 8282, SK 9282, SK 10282, SK 11282 (2-stage) SK 1382NB, SK 2382, SK 3382, SK 4382, SK 5382, SK 6382, SK 7382, SK 8382, SK 9382, SK 10382, SK 11382, SK 12382 (3-stage)</p>	<p>S Shrink disc VS Reinforced shrink disc EA Hollow shaft with internal spline G Rubber buffer VG Reinforced rubber buffer</p>
<p><u>Bevel gear units</u> SK 92072, SK 92172, SK 92372, SK 92672, SK 92772 (2-stage) SK 9012.1, SK 9016.1, SK 9022.1, SK 9032.1, SK 9042.1, SK 9052.1, SK 9062.1, SK 9072.1, SK 9082.1, SK 9086.1, SK 9092.1, SK 9096.1 (3-stage) SK 9013.1, SK 9017.1, SK 9023.1, SK 9033.1, SK 9043.1, SK 9053.1 (4-stage)</p>	<p>R Back stop B Fixing element H Covering cap as contact guard H66 Covering cap IP66 VL Reinforced bearings VL2 Agitator design VL3 Drywell agitator design</p>
<p><u>Contrate worm gear unit</u> SK 02040, SK 02050, SK 12063, SK 12080, SK 32100, SK 42125 (2-stage) SK 13050, SK 13063, SK 13080, SK 33100, SK 43125 (3-stage)</p>	<p>IEC Standard motor mounting NEMA Standard motor mounting W With free drive shaft VI Viton radial seals</p>
<p><u>MINIBLOC worm gear units</u> SK1 S32, SK1 S40, SK 1S50, SK 1S63, SK 1SU... SK 1SM31, SK 1SM40, SK 1SM50, SK 1SM63 (single-stage) SK 2S32NB, SK 2S40NB, SK 2S50NB, SK 2S63NB, SK 2SU..., SK 2SM40, SK 2SM50, SK 2SM63 (2-stage)</p>	<p>OA Oil expansion vessel OT Oil level tank SO1 Synthetic oil ISO VG 220 CC Casing cover with cooling spiral DR Spring Loaded Breather</p>
<p><u>UNIVERSAL worm gear units</u> SK 1SI31, SK 1SI40, SK 1SI50, SK 1SI63, SK 1SI75, SK 1SIS31,..., SK 1SIS75, SK 1SD31, SK 1SD40, SK 1SD50, SK 1SD63, SK 1SIS-D31,..., SK 1SIS-D63 (single-stage) SK 2SD40, SK 2SD50, SK 2SD63, SK 1SI.../31, SK 1SI.../H10, SK 2SIS-D40,..., SK 2SIS-D63 (2-stage)</p>	<p>H10 Modular contrate pre-stage /31 Worm pre-stage /40 Worm pre-stage</p>

Double gear units consist of two single gear units. They are to be treated as per the instructions in this Manual, i.e. as two individual gear units. Type designation of double gear units: e.g. SK 73/22 (consisting of single gears SK 73 and SK 22)



2. Description of Gear Units

2.2 Name plate

 NORD DRIVESYSTEMS Getriebebau NORD GmbH & Co.KG D-22941 Bargteheide/Hamburg		 1 085 03470	
Type SK 9282ASH - IEC280 - 280S/4 2			
2		S1 3	2010 4
No. 200537905 - 100		12596508 5	
M2 12971 Nm 6	i 26,89 9	M3 10	
P1 75 kW 7	n2 52 11 min ⁻¹		
 1277 kg 8	 CLP PG 220 / 55L 12		
 1234567890 13		fB 1,3 14	
www.nord.com			

Explanation of the Name Plate

- | | |
|----|--|
| 1 | Matrix – Barcode |
| 2 | NORD gear unit type |
| 3 | Operating mode |
| 4 | Year of manufacture |
| 5 | Serial number |
| 6 | Rated torque of gear unit output shaft |
| 7 | Drive power |
| 8 | Weight according to ordered version |
| 9 | Overall gear unit ratio |
| 10 | Installation orientation |
| 11 | Rated speed of gear unit output shaft |
| 12 | Lubricant type, viscosity and quantity |
| 13 | Customer's part number |
| 14 | Operating factor |



3. Assembly instructions, storage, preparation, installation



3. Assembly instructions, storage, preparation, installation

Please observe all of the general safety information in Section 1.4, 1.3 and in the individual sections.

3.1 Storing the gear unit

For short-term storage before commissioning, please observe the following:

- Store in the fitting position (see Section 6.1) and secure gear units against falling
- Lightly grease bare metal housing surfaces and shafts
- Store in dry rooms
- Temperature must not fluctuate beyond the range of -5°C to $+40^{\circ}\text{C}$
- Relative humidity less than 60%
- No direct exposure to sunlight or UV light
- No aggressive, corrosive substances (contaminated air, ozone, gases, solvents, acids, alkalis, salts, radioactivity etc.) in the immediate vicinity
- No vibration or oscillation

3.2 Long-term storage

	Note!
	<p>For storage or standstill periods in excess of 9 months, Getriebebau NORD recommends the long-term storage option. With the long-term storage option and the use of the measures listed below, storage for up to 2 years is possible. As the actual influences on the unit greatly depend on the local conditions, these times should only be regarded as guide values.</p>

Conditions of the gear unit and storage area for long-term storage prior to commissioning:

- Store in the fitting position (see Section 6.1) and secure gear units against falling
- Transportation damage to the external paint must be repaired. Check that a suitable rust inhibitor is applied to the flange bearing surfaces. If necessary apply a suitable rust inhibitor to the surfaces.
- Gear units with the long-term storage option are completely filled with lubricant or have VCI corrosion protection agents added to the gear oil. (See label on gear unit)
- The sealing band in the vent plug must not be removed during storage. The gear unit must remain sealed tight.
- Store in a dry place.
- In tropical regions, the drive unit must be protected against damage by insects
- Temperature must not fluctuate beyond the range of -5°C to $+40^{\circ}\text{C}$
- Relative humidity less than 60%
- No direct exposure to sunlight or UV light
- No aggressive, corrosive substances (contaminated air, ozone, gases, solvents, acids, alkalis, salts, radioactivity etc.) in the immediate vicinity
- No vibration or oscillation

Measures during storage or standstill periods

- If the relative humidity is $<50\%$ the gear unit can be stored for up to 3 years.

Measures before commissioning

- If the storage or standstill period exceeds 2 years or the temperature during short-term storage greatly deviates from the standard range, the lubricant in the gear unit must be replaced before commissioning.
- If the gear unit is completely filled, the oil level must be reduced before commissioning.



3. Assembly instructions, storage, preparation, installation



3.3 Transporting the gear unit

	Danger!
	To prevent injury, the danger area must be generously cordoned off . Standing under the gear unit during transport is extremely dangerous .
	Attention!
	<p>Avoid damage to the gear unit. Impacts to the free ends of the shafts may cause internal damage to the gear unit.</p> <p>Use adequately dimensioned and suitable means of transportation. Lifting tackle must be designed for the weight of the gear unit. The weight of the gear unit can be obtained from the dispatch documents.</p>

3.4 Preparing for installation

The drive unit must be inspected and may only be installed if no transportation damage or leaks are visible. In particular the radial seals and the sealing caps must be inspected for damage.

All bare metal surfaces and shafts of the gear unit are protected against corrosion with oil, grease or corrosion protection agents before shipping.

Thoroughly remove all oil, grease or corrosion protection agents and any dirt from the shafts and flange surfaces before assembly.

In applications where an incorrect rotational direction may result in damage or potential risk, the correct rotational direction of the drive shaft is to be established by test running the drive when uncoupled and guaranteeing such for subsequent operation.

Gears with integrated return stops are marked with arrows on the driven/driving sides. The arrows point in the rotation direction of the gear unit. It must be ensured, when connecting the motor and during motor control, that the gear unit can only operate in the rotation direction, e.g. by means of a rotary field test. (For further details, please refer to Catalogue G1000 and WN 0-000 40)

	Attention!
	With gear units with an integrated back stop, switching the drive motor to the blocked rotation direction, i.e. incorrect rotation direction, can lead to gear damage.

Ensure that no aggressive or corrosive substances are present in the area surrounding the installation site or are subsequently expected during operation, which attack metal, lubricants or elastomers. In case of doubt, please contact Getriebebau NORD and take the recommended action.

Oil expansion tanks (Option OA) must be fitted in accordance with the attached works standard WN 0-530 04. For gear units with an M10x1 vent plug, works standard WN 0-52135 must be observed.

Oil storage tanks (Option OT) must be fitted in accordance with the attached works standard WN 0-521 30.

If venting of the gear unit is provided, the vent or the pressure vent must be activated before commissioning. To activate, remove the transport securing devices (sealing cord). Position of the vent plug: see Section 6.1.



3. Assembly instructions, storage, preparation, installation

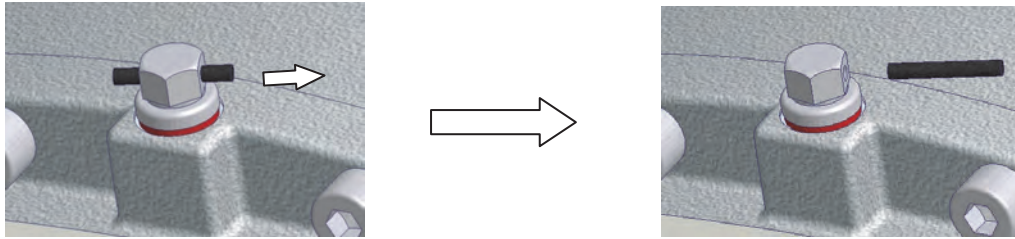


Figure 3-1: Activating the vent plug

Special pressure vents are supplied as loose parts. Before commissioning, the vent plug must be replaced with the pressure vent which is supplied as a loose part. This is achieved by screwing out the vent fitting and replacing it with the pressure vent and seal (refer to Section 6.2 for torque values). Double gear units consist of two single units and are equipped with 2 oil chambers and 2 pressure vents.

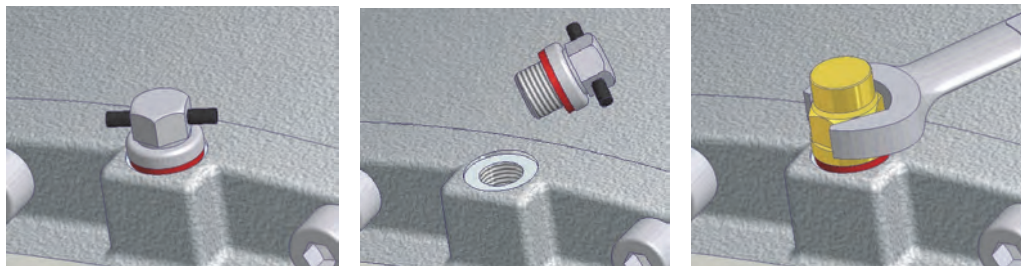


Figure 3-2: Removing vent plug and fitting the pressure vent

3.5 Installing the gear unit

The eyebolts screwed into the gear units must be used during installation. The safety notes in Section 1.4 must be observed.

The base and/or flange to which the gear unit is fitted should be vibration-free, torsionally strong and flat. The smoothness of the mating surface on the base or flange must be according to tolerance class K of DIN ISO 2768-2. All contamination to the bolting surfaces of gear unit and base and/or flange must be thoroughly removed.

The gear unit must be precisely aligned with the drive shaft of the machine in order to prevent additional forces from being imposed on the gear unit due to tension.

Welding of the gear unit is prohibited. The gear unit must not be used as the earth connection for welding work, as this may cause damage to the bearings and gear wheels.



3. Assembly instructions, storage, preparation, installation



The gear unit must be installed in the correct configuration (see Section 6.1) (UNIVERSAL gear unit types SI and SIS are independent of the configuration). Changes to the installation position after delivery require adjustment of the quantity of oil, and often other measures such as e.g. the installation of encapsulated roller bearings. **Damage may result if the stated installation position is not observed.**

All gear unit feet and/or all flange bolts on each side must be used. Bolts must have a minimum quality of 8.8. The bolts must be tightened to the correct torques (refer to Section 6.2 for torque values). Tension-free bolting must be ensured, particularly for gear units with a foot and flange.

	Danger!
	<p>To ensure that the gearbox does not get too warm and to avoid injury to persons, observe the following during installation:</p> <ul style="list-style-type: none"> • The surfaces of gear units or geared motors may become hot during or shortly after operation. Attention: danger of burns!! Protection against accidental contact may need to be installed. • With geared motors, the cooling air of the motor fan must be able to flow unobstructed onto the gear unit.

3.6 Fitting hubs on the gear shafts

	<p>Attention!</p> <p>Do not subject the gear unit to harmful axial forces when fitting the hubs.</p>
--	---

Drive and driven elements, e.g. coupling and chain-wheel hubs must be mounted onto the drive and driven shaft of the gear unit using suitable pullers that will not apply damaging axial forces onto the gear unit. In particular, do not hit the hubs with a hammer.

Use the end thread of the shafts for pulling. Fitting can be aided by coating the hub with lubricant or heating it up to approx. 100°C beforehand.

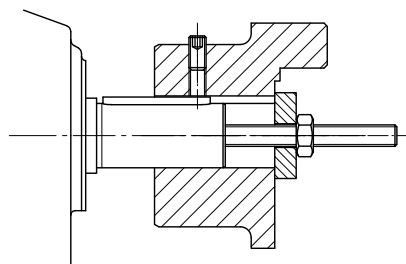


Figure 3-3: Example of a simple pulling device

	<p>Danger!</p> <p>Drive and driven elements, such as belt drives, chain drives and couplings must be fitted with contact protection.</p>
--	--

Driven elements may only subject the drive units to the maximum radial force F_R and axial force F_A as specified in the catalogue. Observe the correct tension, particularly on belts and chains. Additional loads due to unbalanced hubs are not permitted. The radial force must be applied to the gear unit as closely as possible.



3. Assembly instructions, storage, preparation, installation



3.7 Fitting push-on gear units

	Attention!
	The bearings, gear wheels, shafts and housing may be damaged by incorrect fitting.

The push-on gear unit must be fitted onto the shaft using a suitable puller, which will not exert damaging axial forces on the gear unit. In particular, do not hit the gear unit with a hammer.

Assembly and subsequent dismantling is aided by applying an anti-corrosive lubricant to the shaft before fitting.

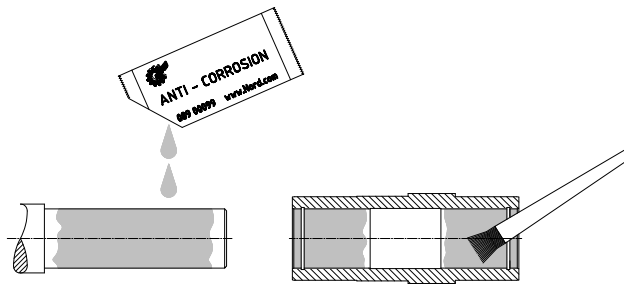


Figure 3-4: Applying lubricant to the shaft and the hub

	Note!
	The gear unit can be fitted to shafts with and without a shoulder using the fastening element (Option B). Tighten the bolt of the fastening element to the correct torque. (See Chapter 6.2 for torque values) For gear units with option H66, the factory-fitted closing cap must be removed before assembly.

For shaft mounted gear units with option H66 and fastening element (Option B) the pressed-in closing cap must be pushed out before fitting the gear unit. The pressed-in closing cap may be destroyed during dismantling. As standard a second closing cap is supplied as a loose spare part. After fitting the gear unit, fit the new / new condition closing cap as described in Section 3.11.

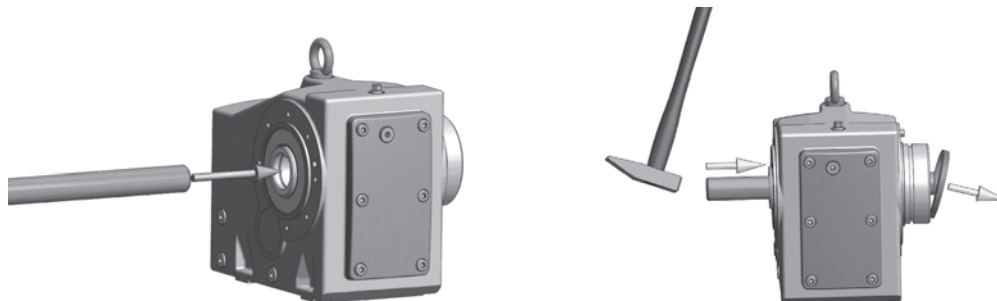


Figure 3-5: Removing the factory-fitted closing cap



3. Assembly instructions, storage, preparation, installation

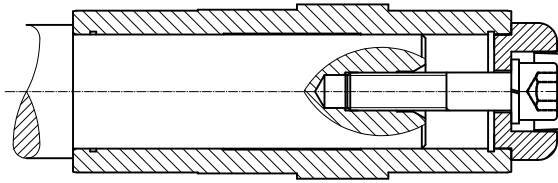


Figure 3-6: Gear unit mounted to shaft with a shoulder using the fastening element

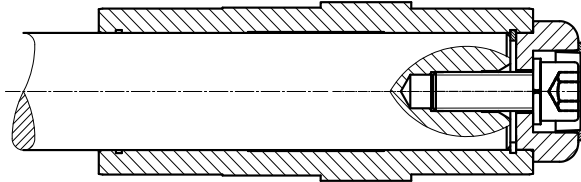


Figure 3-7: Gear unit mounted to shaft without a shoulder using the fastening element

A gear unit can be dismantled from a shaft with shoulder using the following device, for example.

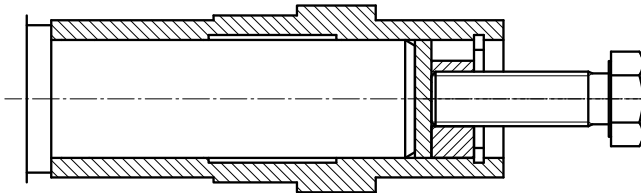


Figure 3-8: Dismantling using dismantling device

When mounting push-on gears with torque supports, the support must not be distorted. Tension-free mounting is aided by the rubber buffer (Option G and/or VG).

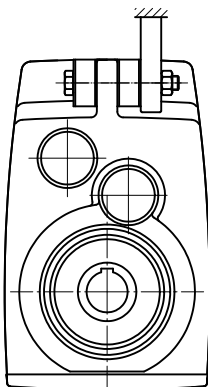


Figure 3-9: Mounting the rubber buffer (Option G and/or VG) on parallel shaft gear units

To fit the rubber buffer, tighten the screw fastening until there is no play between the contact surfaces when there is no load. Then turn the fastening nut (only applies for screw fastenings with adjusting threads) half a turn in order to pre-tension the rubber buffer. Greater pre-tension is not permissible. Secure the screw fastening from coming loose, e.g. with Loctite 242 or a second nut.



3. Assembly instructions, storage, preparation, installation

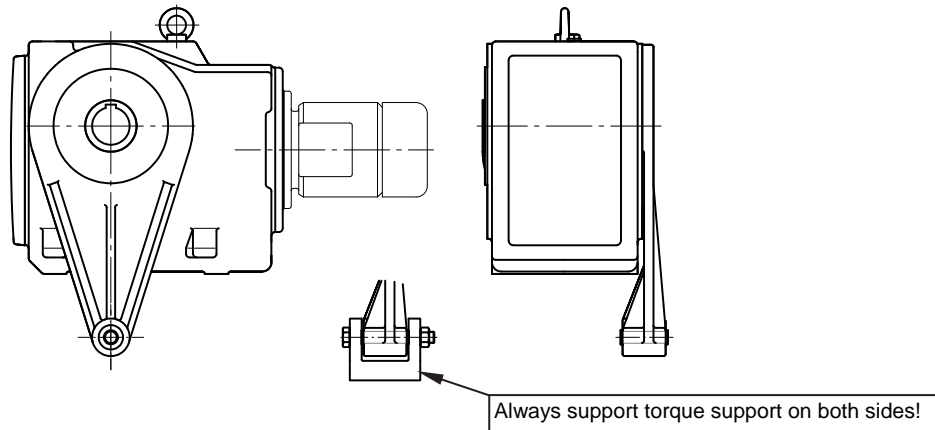


Figure 3-10: Attaching the torque support on bevel gear and worm gear units

Tighten the bolts on the torque support to the correct torque (see Section 6.2 for torque values) and secure to prevent loosening (e.g. Loctite 242, Loxeal 54-03).

3.8 Fitting shrink discs

Shrink disc type, Mat. No.
and torque details for tensioning screws

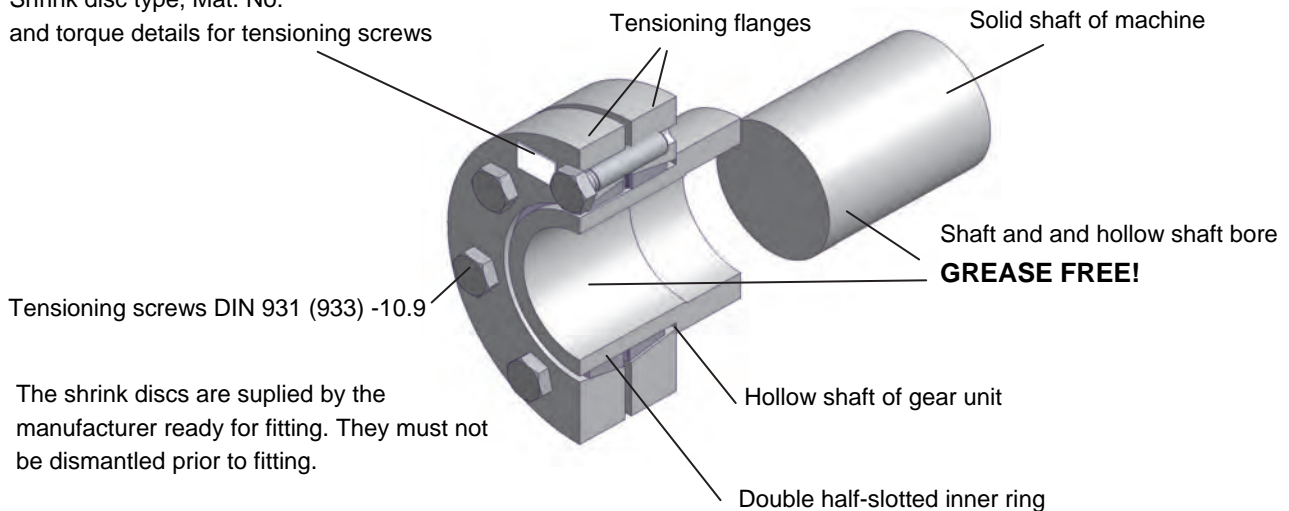


Figure 3-11: Hollow shaft with shrink disc

	Attention!
	Do not tighten bolts if the solid shaft is not inserted!

Assembly sequence:

1. Remove any transport securing devices.
2. Loosen but do not remove tightening bolt and tighten gently by hand until there is no play between the flanges and the inner ring.



3. Assembly instructions, storage, preparation, installation



3. Slide the shrink disc onto the hollow shaft until the outer clamping flange is flush with the hollow shaft. The shrink disc is easier to slide on if the bore of the inner ring is lightly greased.
4. Prior to mounting, grease the solid shaft only in the area which will later come into contact with the bronze bush in the hollow shaft of the gear unit. Do not grease the bronze bush, in order to prevent grease penetrating the area around the shrink connection.
5. The hollow shaft of the gear unit must be completely de-greased and **completely free of grease**.
6. In the area of the shrink connection the solid shaft of the machine must be degreased and **completely free of grease**.
7. Insert the solid shaft of the machine into the hollow shaft so as to completely fill the area around the shrink connection.
8. Position the clamping flange by gently tightening the bolts.
9. Tighten the bolts successively in a clockwise direction by several turns – not crosswise – with approx. $\frac{1}{4}$ rotation per turn. Tighten the bolts with a torque wrench to the torque indicated on the shrink disc.
10. When the tensioning bolts have been tightened, there must be an even gap between the clamping flanges. If this is not the case, the gear unit must be dismantled and the shrink disc connection checked for correct fit.

	Danger!
	Risk of injury from incorrect mounting and dismantling of the shrink disc.

Dismantling sequence:

1. Loosen the bolts successively in a clockwise direction by several turns with approx. $\frac{1}{4}$ rotation per turn. Do not remove the bolts from their thread.
2. Loosen the clamping flanges from the cone of the inner ring.
3. Remove the gear unit from the solid shaft of the machine.

3.9 Fitting the covers

	Danger!
	Shrink discs and exposed rotating shaft ends require contact guards in order to prevent injuries. A cover (Option H and Option H66) can be used as a guard. If this does not achieve sufficient protection against contact according to the required protection type, the machinery and plant constructor must ensure this by means of special attached components.

All fixing screws must be used and tightened to the correct torque. (See Section 6.2 for torque values) For covers with option H66, press in the new / new condition closing cap by tapping it lightly with a hammer.



3. Assembly instructions, storage, preparation, installation



Figure 3-12: Fitting the covers, Option SH, Option H, and Option H66

3.10 Fitting a standard motor

The maximum permitted motor weights indicated in the table below must not be exceeded when attaching the motor to an IEC- / NEMA adapter

Maximum permitted motor weights														
IEC motor size	63	71	80	90	100	112	132	160	180	200	225	250	280	315
NEMA Motor size		56C	143T	145T	182T	184T	210T	250T	280T	324T	326T	365T		
Max. motor weight [kg]	25	30	40	50	60	80	100	200	250	350	500	700	1000	1500

Assembly procedure to attach a standard motor to the IEC adapter (Option IEC)/NEMA adapter

1. Clean motor shaft and flange surfaces of motor and IEC /NEMA adapter and check for damage. Mounting dimensions and tolerances of the motor must conform to DIN EN 50347/NEMA MG1 Part 4.
2. Push the coupling sleeve onto the motor shaft so that the motor parallel key engages into the groove in the sleeve on tightening.
3. Tighten the coupling sleeve on the motor shaft in accordance with the motor manufacturer's instructions until it touches the collar. With motor sizes 160, 180 and 225, any spacer bushes must be positioned between the coupling sleeve and the collar. With standard helical gear units, dimension B between the coupling sleeve and the collar must be observed (see Figure 3-13). Certain **NEMA adapters** require the adjustment of the coupling in accordance with the specifications indicated on the adhesive plate.
4. Secure the coupling half with the threaded pin. The threaded pin must be coated prior to use with a securing lubricant e.g. Loctite 242, Loxeal 54-03 and tightened to the correct torque. (See Chapter 6.2 for torque values)
5. Sealing of the flange surfaces of the motor and the IEC /NEMA adapter is recommended if the motor is installed outdoors or in a humid environment. **The flange surfaces** of motor and adapter must be completely coated with **surface sealant** Loctite 574 or Loxeal 58-14 prior to mounting so that the flange seals after mounting.
6. Mount the motor to the IEC /NEMA adapter, do not forget to fit the gear rim or the sleeve. (See Figure 3-13)
7. Tighten the IEC /NEMA adapter bolts to the correct torque. (See Chapter 6.2 for torque values)



3. Assembly instructions, storage, preparation, installation

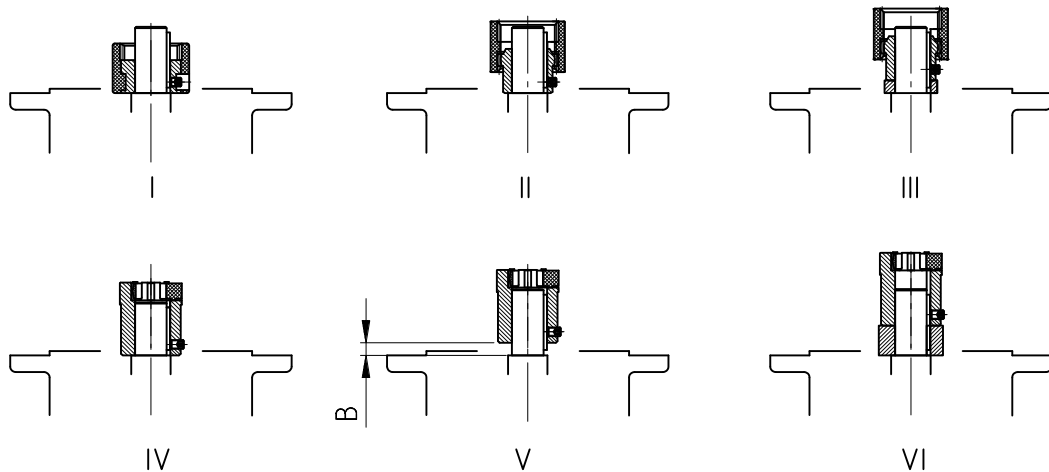


Figure 3-13: Fitting the coupling onto the motor shaft - various types of coupling

- I Gear coupling, one-part
- II Gear coupling, two-part
- III Gear coupling, two-part with spacer bush
- IV Claw coupling, two-part
- V Claw coupling, two-part, observe dimension B:

Standard helical gear unit:	SK0, SK01, SK20, SK25, SK30, SK33 (2-stage)	
	SK010, SK200, SK250, SK300, SK330 (3-stage)	

	IEC size 63	IEC size 71
Dimension B (Fig. 3-13V)	B = 4.5mm	B = 11.5 mm

- VI Claw coupling, two-part with spacer bush

3.11 Retrospective paintwork



Attention!

For retrospective painting of the gear unit, the radial seals, rubber elements, pressure venting valves, hoses, type plates, adhesive labels and motor coupling components must not come into contact with paints, lacquers or solvents, as otherwise components may be damaged or made illegible.



3. Assembly instructions, storage, preparation, installation



3.12 Fitting the cooling coil to the cooling system

Cutting ring screw threads (see Item 1, Figs. 3-14) are located at the casing cover for the connection of a pipe with an external diameter of 10 mm according to DIN 2353. **Remove the drain plug from the screw neck prior to assembly to avoid any contamination of the cooling system.** The screw necks should be connected with the coolant circuit, which must be provided by the operator. The flow direction of the coolant is irrelevant.

Make sure not to twist the screw necks during or after assembly as the cooling coil may be damaged (see Item 3, Fig. 3-14). You must ensure that no external forces act on the cooling coil.

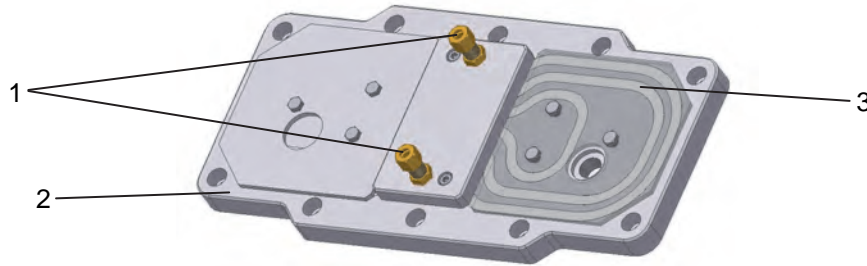


Figure 3-14: Cooling cover

	Danger!
	The pressure released from the cooling circuit before carrying out any work on the gear unit.



4. Commissioning

4. Commissioning

4.1 Checking the oil level

The oil level must be checked prior to commissioning. See Section 5.2.

4.2 Activating the automatic lubricant dispenser

Some gear unit types with standard motor (Option IEC/NEMA) have an automatic lubricant dispenser for the rolling bearings. This dispenser must be activated prior to commissioning. The cartridge case cover has a red information sign for the activation of the lubricant dispenser.

Activating the Automatic Lubricant Dispenser:

1. Loosen and remove cylinder bolts M8x16 (1)
2. Lift off cartridge case cover (2)
3. Insert activation screw (3) into the lubricant dispenser (5) until the lug (4) breaks off at the defined fracture point
4. Refit cartridge case cover (2) and fasten using cylinder bolt (1). (See Chapter 6.2 for torque values)
5. Mark activation date on the adhesive plate (6) indicating month/year

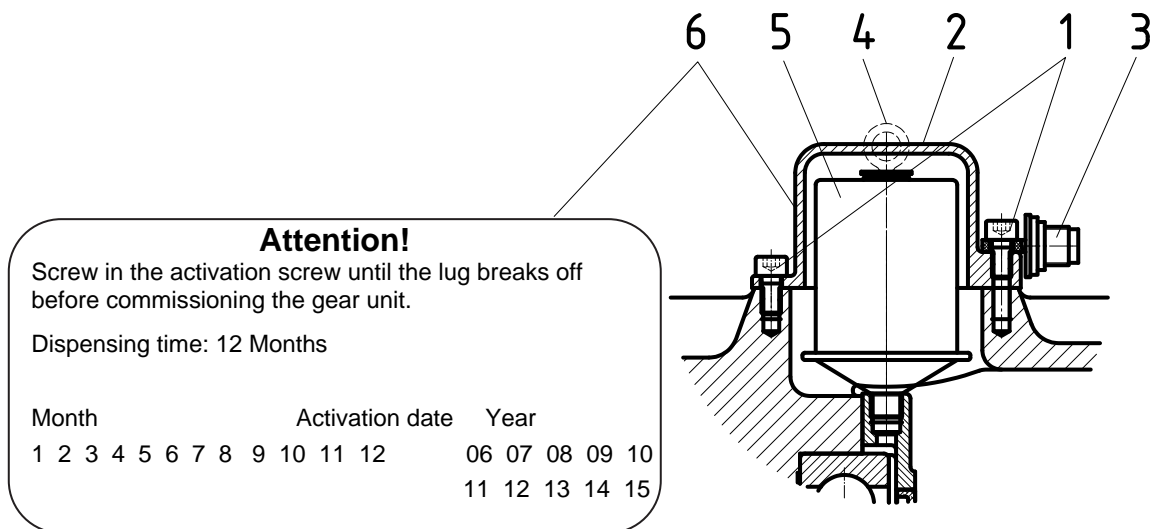



Figure 4-1: Activating the automatic lubricant dispenser with standard motor mounting



4. Commissioning

4.3 Operation with lubricant cooling

Water cooling

	Caution!
	The drive may only be commissioned after the cooling spiral has been connected to the cooling circuit, and the cooling circuit has been put into operation.

The coolant must have a similar thermal capacity as water (specific thermal capacity at 20°C $c=4.18 \text{ kJ/kgK}$). Industrial water without any air bubbles or sediments is recommended as a coolant. The water hardness must be between 1° dH and 15° dH, and the pH value must be between pH 7.4 and pH 9.5. No aggressive liquids should be added to the coolant!

The **coolant pressure** must not exceed **8 bar**. The required **quantity of coolant** is **10 litres/minute**, and the **coolant inlet temperature** should not exceed 40°C; we recommend **10°C**.

We also recommend fitting a pressure reducer at the coolant inlet to avoid any damage due to excessive pressure.


If there is a danger of frost the operator should add a suitable anti-freeze solution to the cooling water.

The **temperature of the cooling water** and the **cooling water flow rate** must be **supervised** and **ensured** by the operator.

Air/Oil cooler

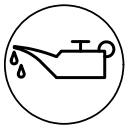
This version and all important data concerning the air/oil cooler can be obtained from Catalogue G1000, or contact the manufacturer of the cooling unit.

4.4 Running-in time for the worm gear unit

	Note!
	In order to achieve maximum efficiency of the worm gear unit, the gear unit must be subjected to a running-in period of approx. 25 h – 48 h under maximum load. There may be a reduction in efficiency before the running-in period is complete.

4.5 Checklist

Checklist		
Object of the check	Checked on:	Information – see Section
Is the vent plug activated or the pressure vent screwed in?		Sec. 3.4
Does the required configuration conform with the actual installation?		Sec. 6.1
Are the external gear shaft forces within permitted limits (chain tension)?		Sec. 3.6
Is the torque support correctly fitted?		Sec. 3.7
Are contact guards fitted to rotating components?		Sec. 3.9
Is the automatic lubricant dispenser activated?		Sec. 4.2
Is the cooling cover connected to the cooling circuit?		Sec. 3.12/4.3



5. Service and Maintenance

5. Service and maintenance

5.1 Service and maintenance intervals

Service and Maintenance Intervals	Service and Maintenance Work	Information – see Section
At least every six months	<ul style="list-style-type: none"> - Visual inspection - Check for running noises - Check oil level - Re-grease (applicable only to free drive shaft / Option W and on agitator bearings / Option VL2 / VL3) - Replace automatic lubricator (for operating times < 8 h/day: a replacement interval for the lubricant dispenser of 1 year is permissible) (only with IEC/NEMA standard motors) 	5.2 5.2 5.2 5.2 5.2
For operating temperatures up to 80°C Every 10000 operating hours at least every 2 years (The interval is double this if the unit is filled with synthetic products) For higher temperatures or extreme operating conditions (high humidity, aggressive environments and large temperature fluctuations) the oil change intervals must be halved.	<ul style="list-style-type: none"> - Change the oil - Clean or replace the vent plug. 	5.2 5.2
At least every 10 years	- General overhaul	5.2

5.2 Service and maintenance work

Servicing and maintenance work must only be performed by qualified specialist personnel.

Installation and maintenance work must only be performed when gear units are at a standstill. The drive must be isolated and secured to prevent accidental start-up.

Visual inspection

The gear unit must be checked for leaks. In addition, the gear unit must be inspected for external damage and cracks in the hoses, hose connections and rubber buffers. Have the gear unit repaired in case of leaks, e.g. dripping gear oil or cooling water, damage or cracks. Please contact the NORD service department.

Note:

SI type universal worm gear drives, IEC/NEMA adapters for NORDBLOC.1 up to size 673.1 and SEP/SEK servo motor adapters are sealed on the drive side by means of a shaft sealing ring which is located directly in the oil space. **This ensures that the shaft sealing ring is especially well supplied with lubricating oil, and has low friction and a long service life.**

The drive shaft bearing has two cover discs, which form a non-contact seal (See Fig. 5-1). These form a long sealing gap between the shoulder of the inner ring. Because of this, the bearing is almost frictionless, friction losses are minimal and there is no temperature increase in the drive shaft bearing.



5. Service and Maintenance

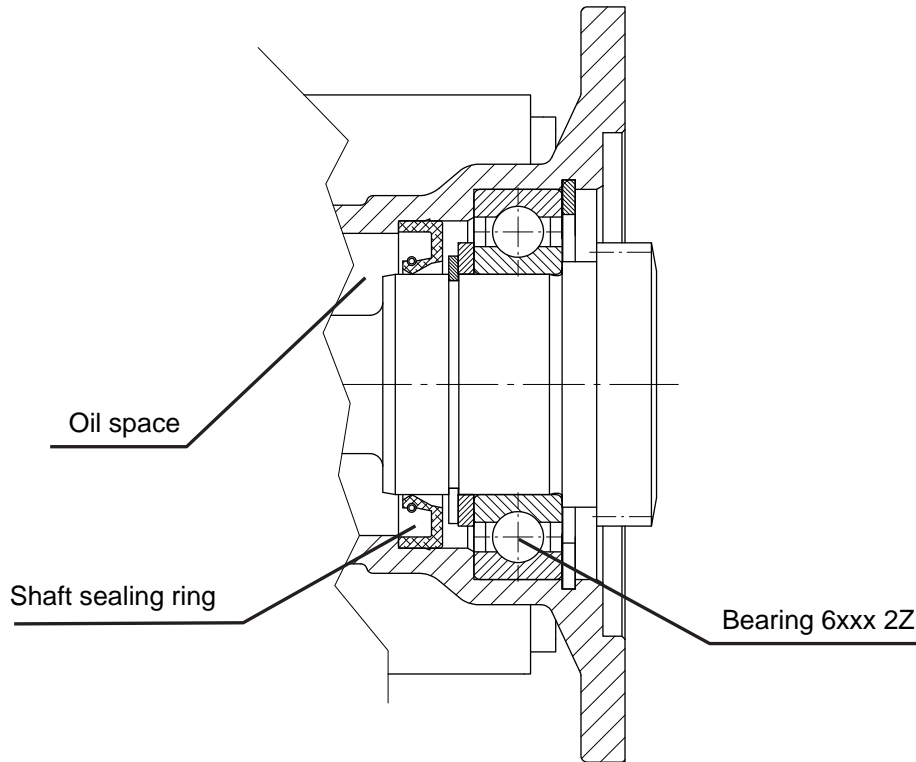


Fig. 5-1: Drive shaft bearing and seal on the coupling side of universal worm gear units

Due to the internal construction of the bearing, there may initially be a very slight apparent leakage on the drive shaft, which is caused by transport or storage. I.e. there may be a slight escape of oil from the bearing grease before commissioning and in the initial phase of operation.

We hereby explicitly point out that any slight escape of oil does not constitute technical faults and does not impair the reliability of the gear unit and the bearing.

Check for running noises

If the gear unit produces unusual running noises and/or vibrations, this could indicate damage to the gear unit. In this case the gear should be shut down and a general overhaul carried out.

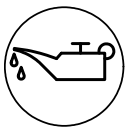
Check the oil level

Section 6.1 describes the versions and the corresponding oil level screws. With double gear units, the oil level must be checked on both units. The pressure vent must be at the position marked in Section 6.1.

The oil level does not need to be checked on gear units without oil level screw (see Section 6.1). Gear unit types that are not supplied full of oil must be filled before the oil level is checked. (see "Changing the oil")

Checking the oil level:

1. The oil level may only be checked when the gear unit is **at a standstill and has cooled down**. The gear unit must be secured to prevent accidental switch-on.
2. The oil level screw corresponding to the version must be screwed out. (See Section 6.1)



5. Service and Maintenance



Note!

At the first oil level check a small amount of oil may escape, as the oil level may be below the lower edge of the oil level hole.

3. Gear units with oil level screw: The maximum oil level is the lower edge of the oil level hole. The minimum oil level is 4 mm below the oil level hole. If the oil level is too low, this must be corrected using the correct type of oil. An oil level glass is available instead of the oil level screw
4. Gear units with an oil level vessel: The oil level must be checked **in the oil level vessel** with the aid of the dipstick plug (thread G1 1/4). The oil level must be between the upper and lower mark when the dipstick is completely screwed in (see Fig. 5-2). The oil level must be corrected with the correct type of oil if necessary. These gearboxes may only be operated in the configuration stated in Section 6.1.
5. The oil level screw or the cap screw with dipstick and all other loosened screws must be correctly re-tightened.

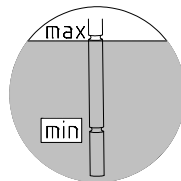


Figure 5-2: Check the oil level with a dipstick

Regreasing

Some gear unit designs (free drive shaft, Option W, agitator designs VL2 and VL3) are equipped with a regreasing device.

For agitator versions VL2 and VL3, the vent screw located opposite to the grease nipple must be unscrewed before regreasing. Grease should be injected until a quantity of 20-25g escapes from the vent hole. After this, the vent plug must be reinserted and tightened.

For Option W and some IEC adapters, the outer roller bearing must be regreased with approx. 20-25g of grease via the grease nipple provided

Recommended grease: Petamo GHY 133N (see Section 6.4: Klüber Lubrication).

Replacing the automatic lubricant dispenser

Screw-off the cartridge case cover (2), (see Fig. 4-1). The lubrication dispenser (5) is screwed out and replaced with a new component (Part No. 283 0100). Then activate (see Chapter 4.2)!

Changing the oil

The figures in Section 6.1 show the oil drain screw, the oil level screw and the pressure vent screw for various designs.

Sequence:

1. Place the drip tray below the oil drain screw or the oil drain cock
2. Completely remove oil level screw, screwed sealing plug with dipstick if an oil level tank is being used and oil drain screw.




Danger!

Warning: Hot oil!



5. Service and Maintenance

3. Drain all the oil from the gear unit.
4. If the screw lock coating of the oil drain screw or oil level screw is damaged in the thread, a new oil level screw must be used or the thread cleaned and coated with securing lubricant, e.g. Loctite 242, Loxeal 54-03 prior to inserting. The seal ring must be replaced if damaged.
5. Support the seal ring, insert the oil drain screw into the hole and tighten to the correct torque! (See Section 6.2 for torque values)
6. Using a suitable filling device, refill with oil of the same type through the oil level hole until oil emerges from the oil level hole. (The oil can also be filled through the pressure vent screw or a sealing plug located higher than the oil level). If an oil level vessel is used, fill the oil through the upper inlet (thread G1¼) until the oil level is set as described in Section 5.2.
7. Wait at least 15 minutes, or at least 30 minutes if an oil level tank is used, and then check the oil level. Proceed as described in Section 5.2.

	Note!
	<p>The oil does not need to be changed on gear units without oil level screw (see Section 6.1). These gear units are lubricated for life.</p> <p>Standard helical gear units have no oil level screw. Here, the oil is topped up through the pressure vent bolt using the quantities listed in the table in Section 6.5.</p>

Cleaning or replacing the vent plug

In case of severe dirt, unscrew the vent plug and clean it thoroughly. If necessary screw in a new vent plug with a new sealing ring.

General overhaul

The gear units must be completely dismantled The following work must be carried out:

- Clean all gear unit components
- Examine all gear unit components for damage
- All damaged components must be replaced
- All roller bearings must be replaced
- Replace back stops if fitted
- Replace all seals, radial seals and Nilos rings
- Replace plastic and elastomer components of the motor coupling

The general overhaul must be carried out by qualified personnel in a specialist workshop with appropriate equipment in observance of national regulations and laws. We recommend that the general overhaul is carried out by the NORD service department.

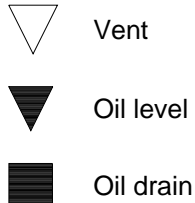


6. Appendix

6. Appendix

6.1 Versions and maintenance

Explanation of symbols for the following version illustrations:



	Note!
	SK 320, SK 172, SK 272, SK 372K, SK 273 and SK373 as well as SK 01282 NB, SK 0282 NB, SK 1382 NB and UNIVERSAL / Minibloc gear units are lubricated for life. These gear units do not have an oil filler screw.

Parallel shaft gear units with oil level vessel

The following applies for SK 9282, SK 9382, SK 10282, SK 10382, SK 11282, SK 11382 parallel gear units and SK 12382 in the M4 configuration with oil level vessels:

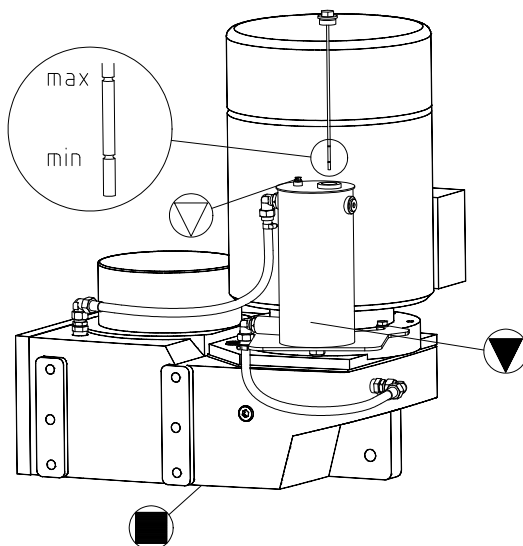
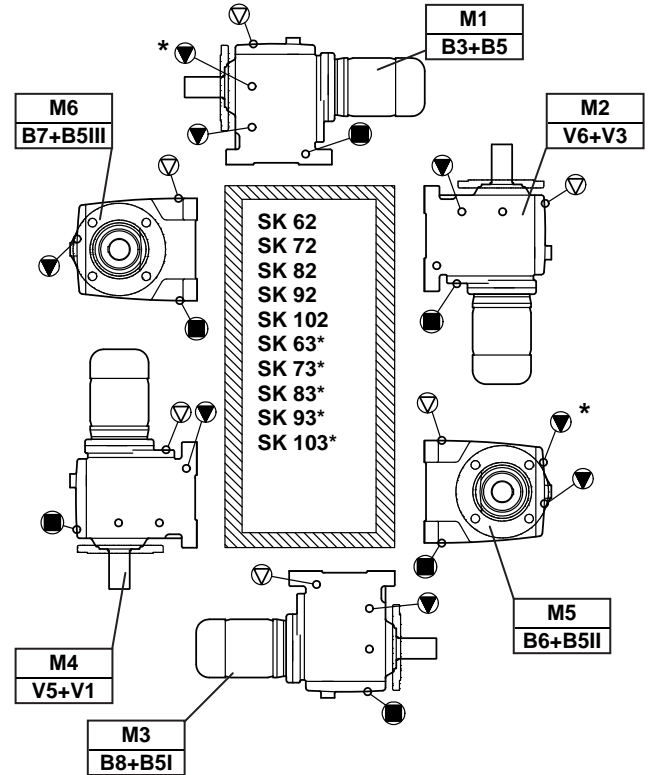
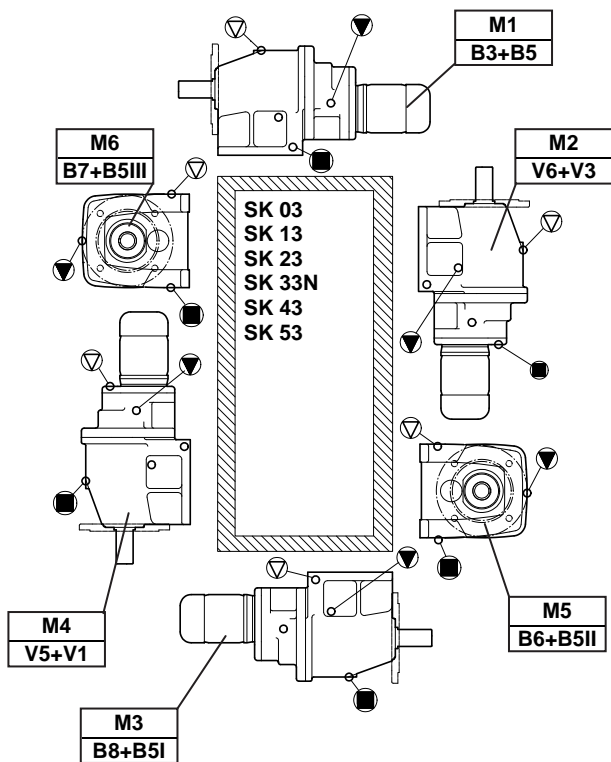
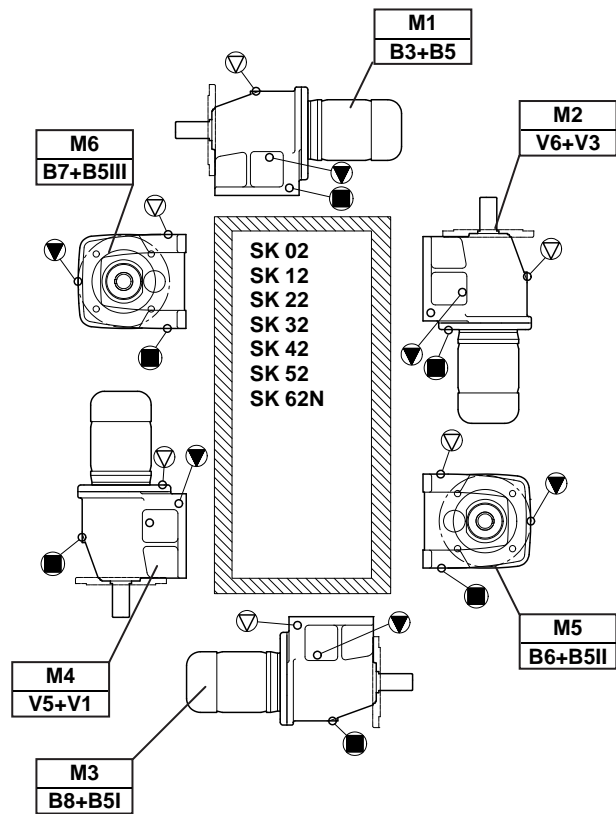
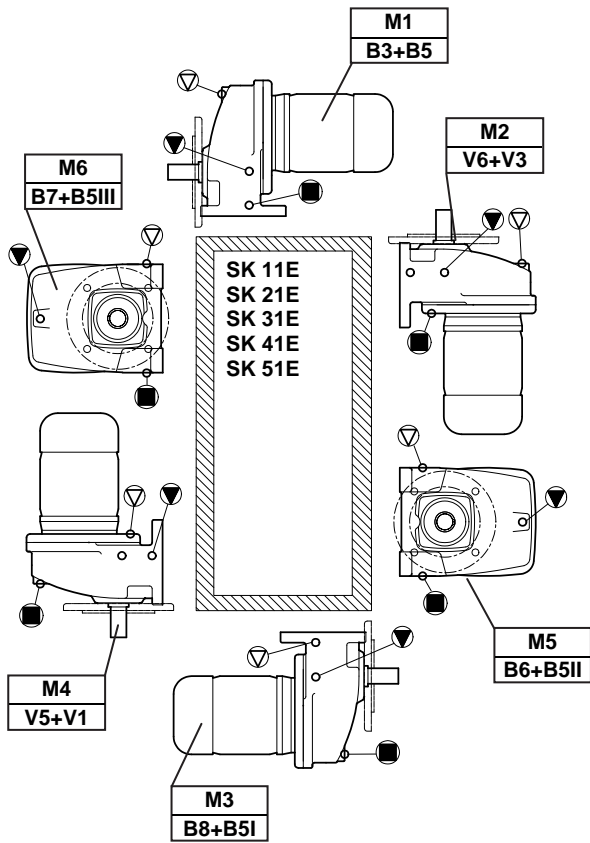
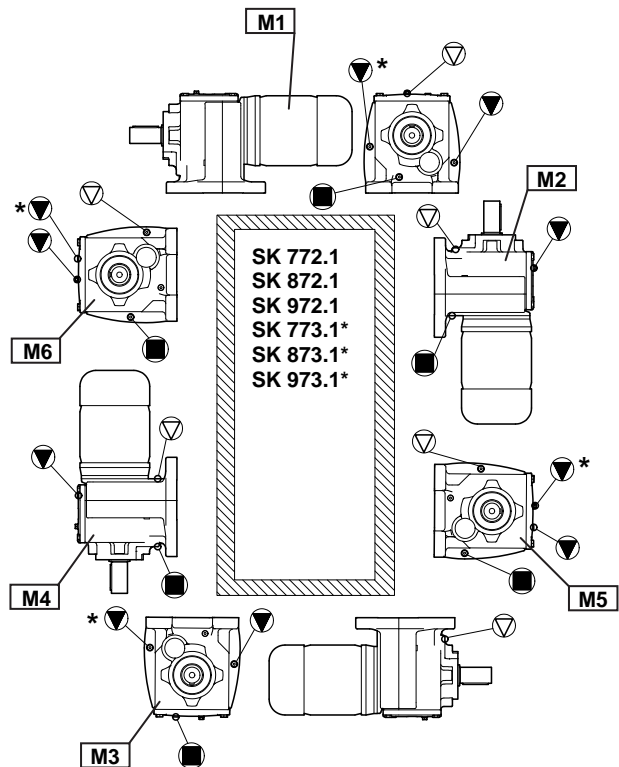
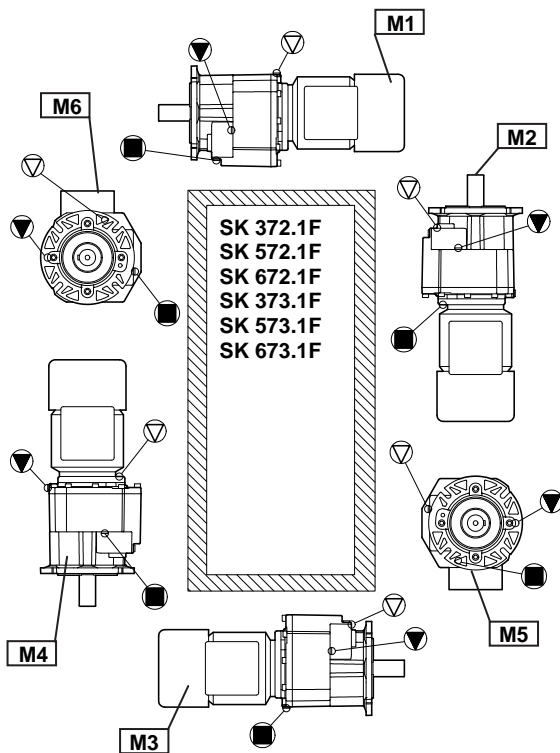
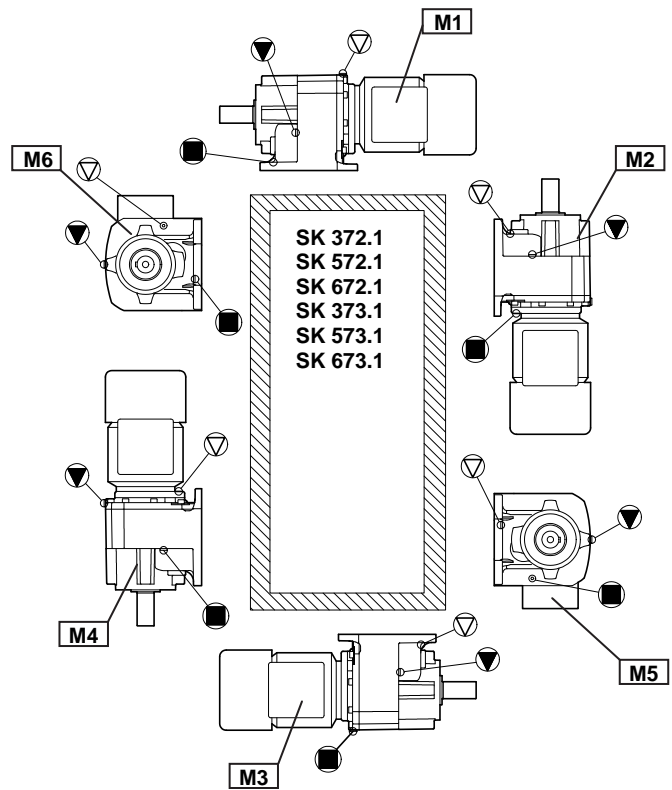
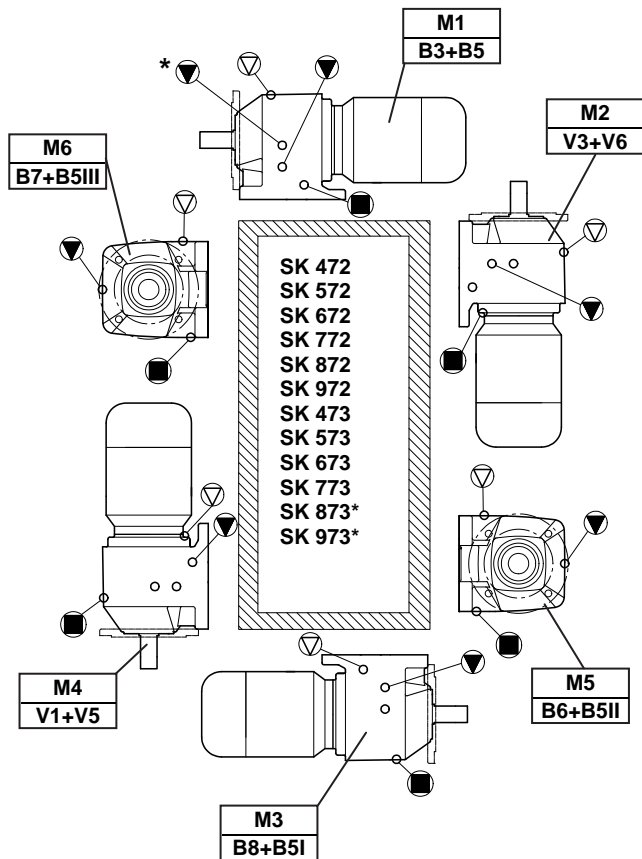
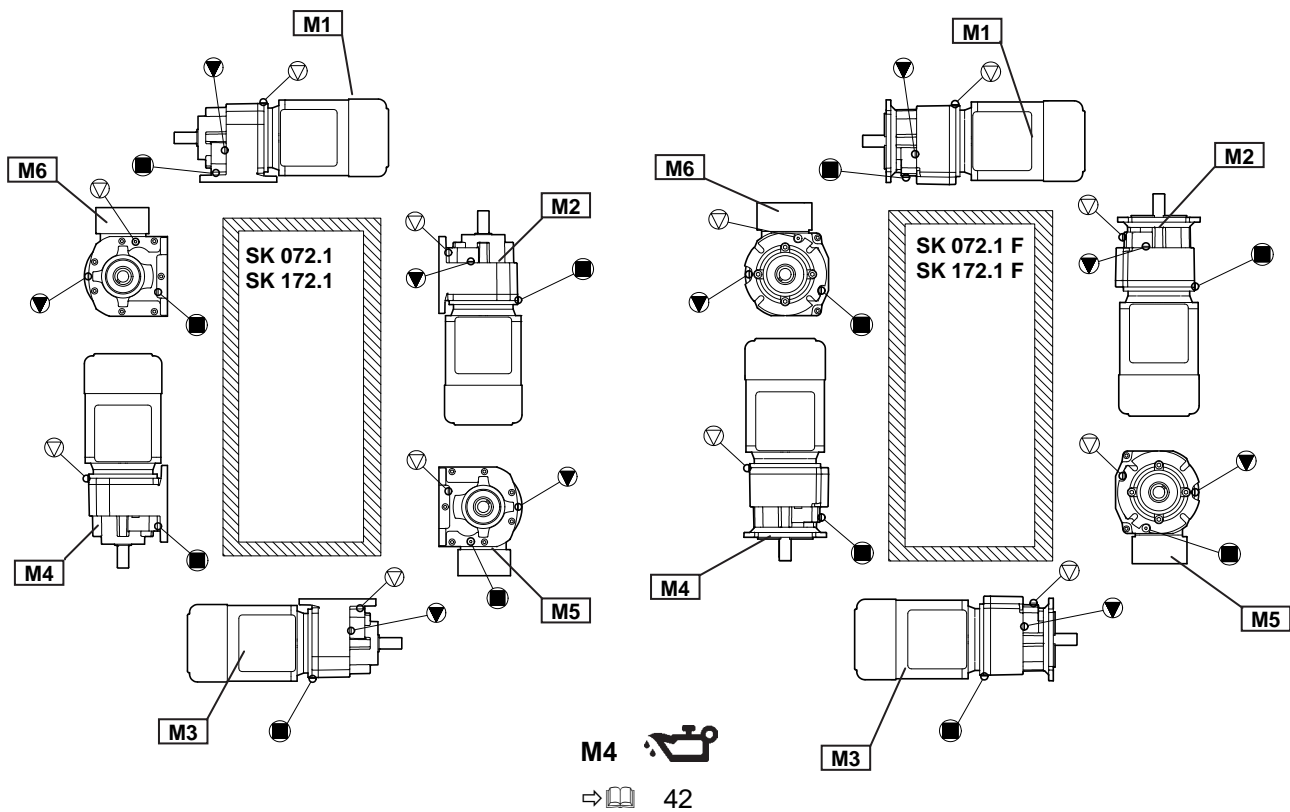
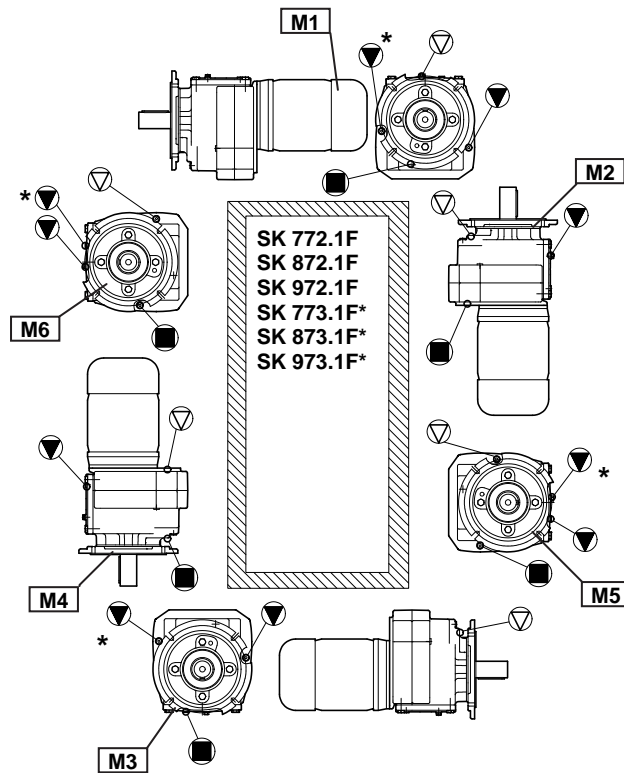
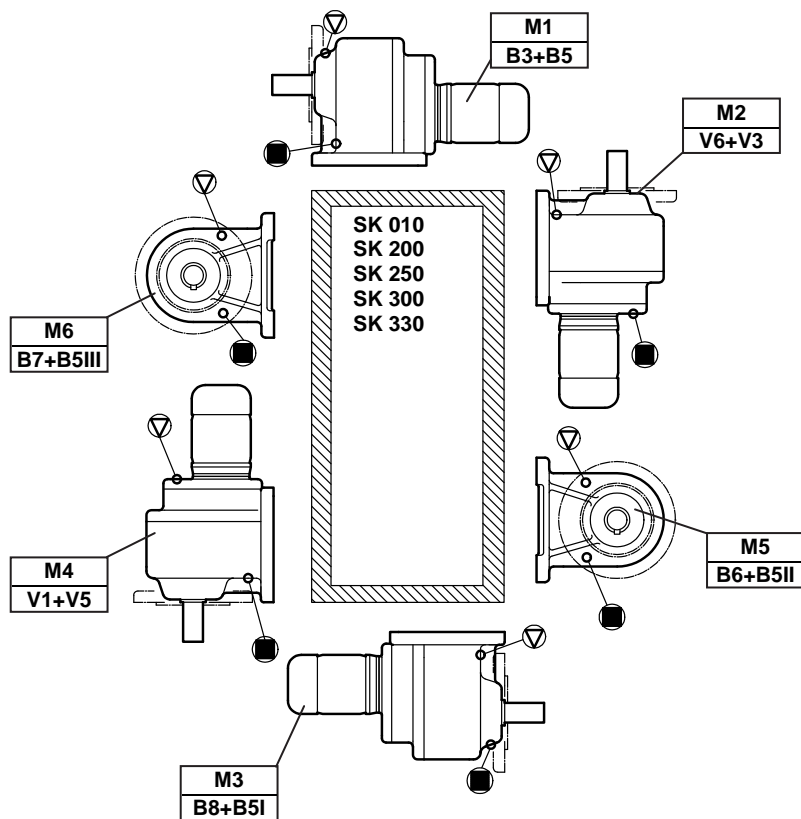
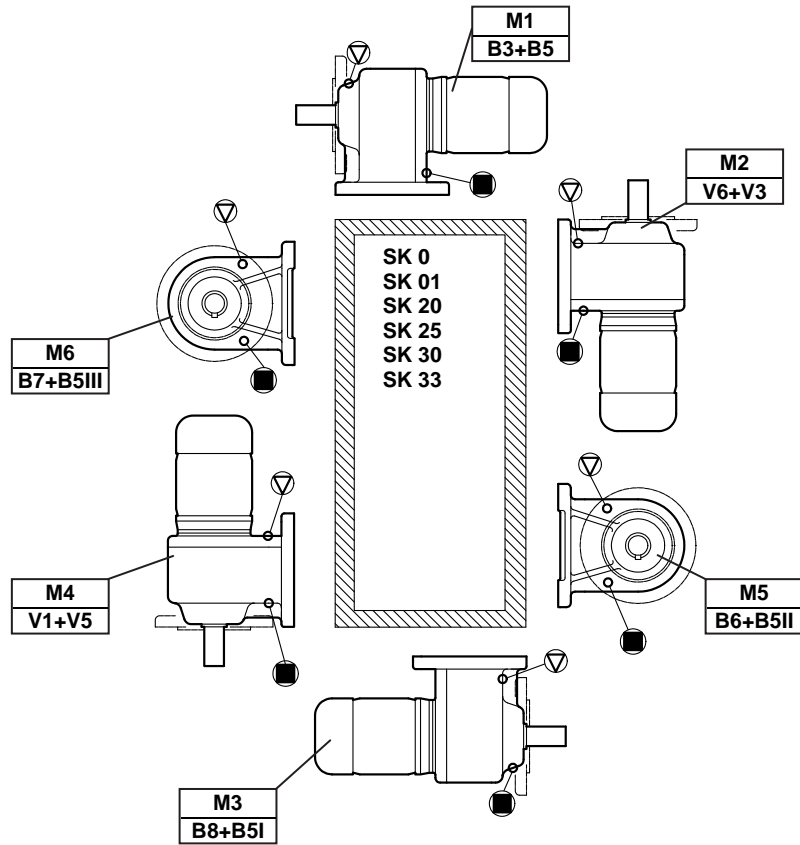


Figure 6-1: Oil level check with oil level tank

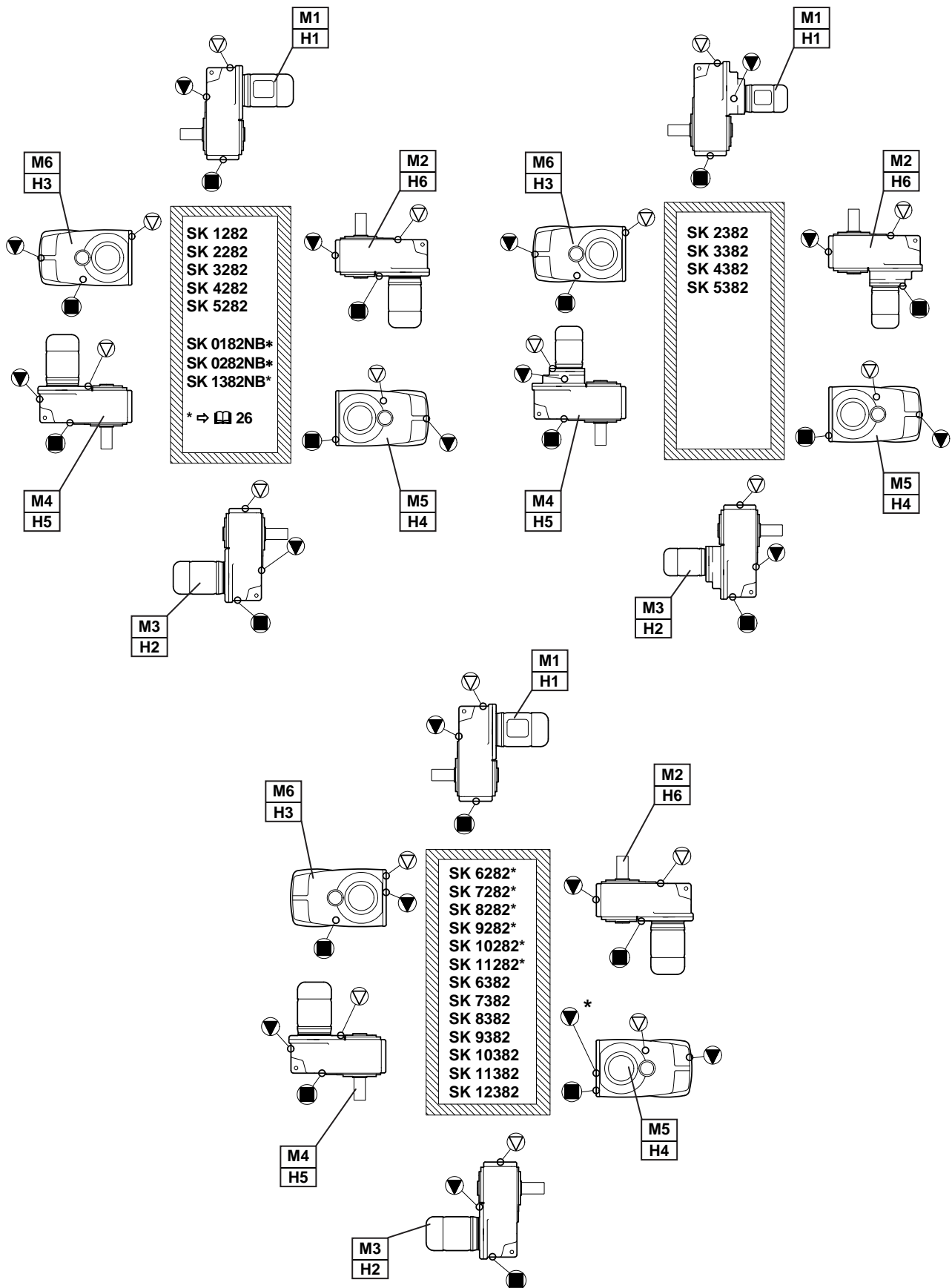


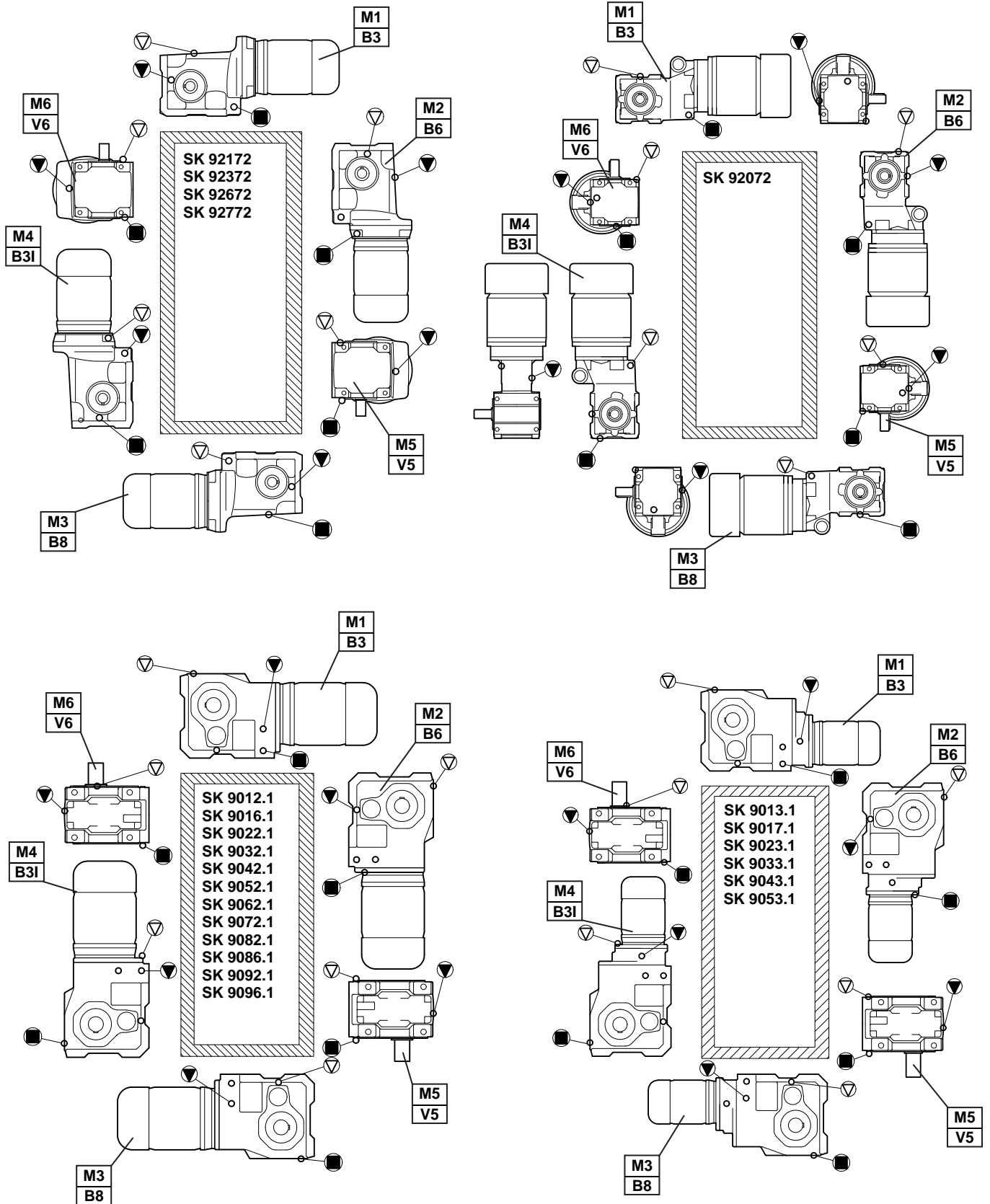


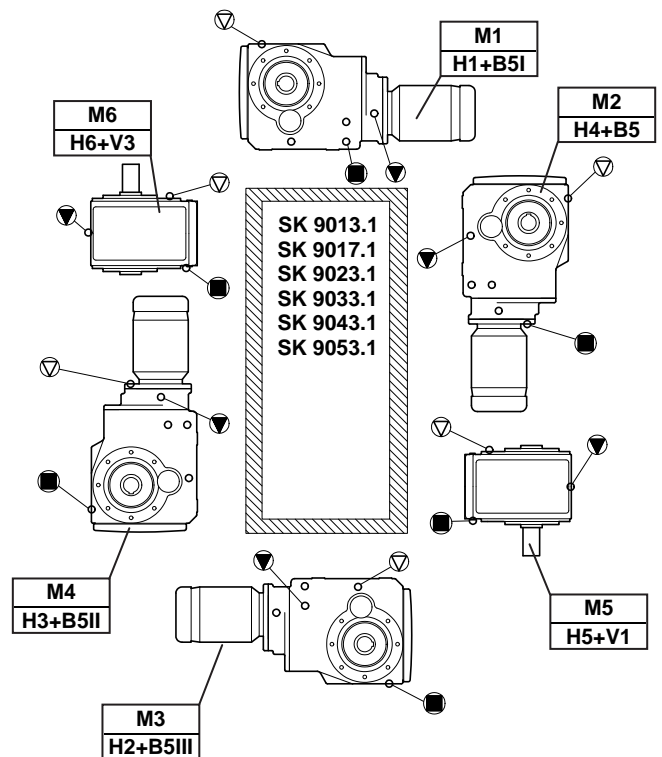
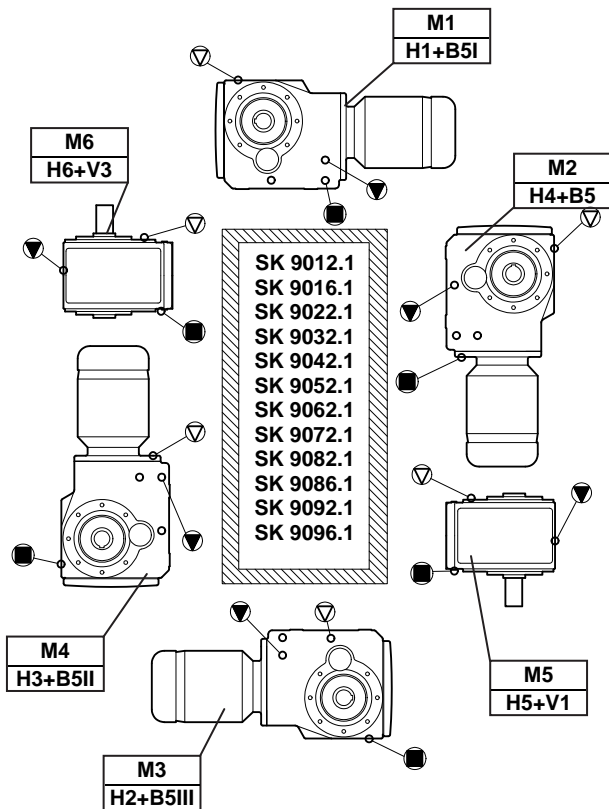
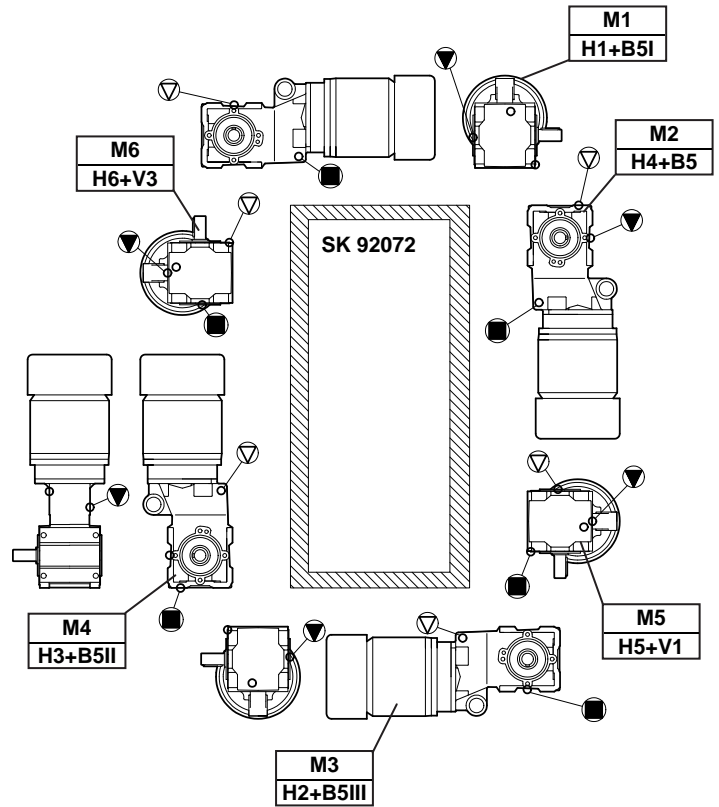
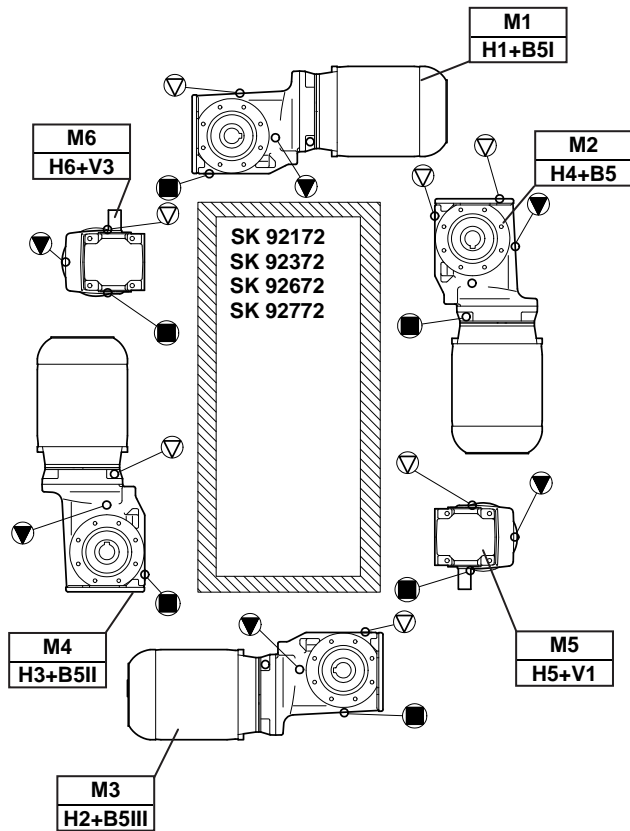


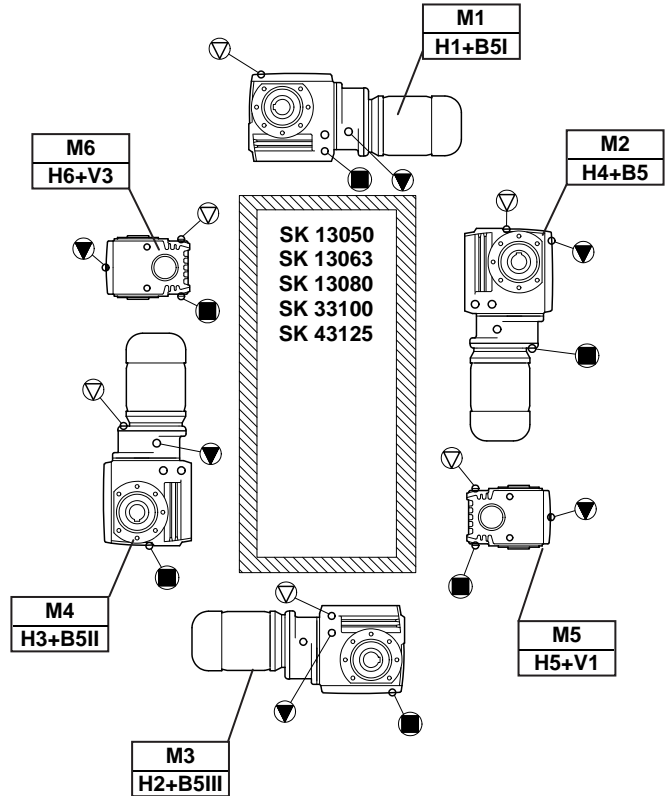
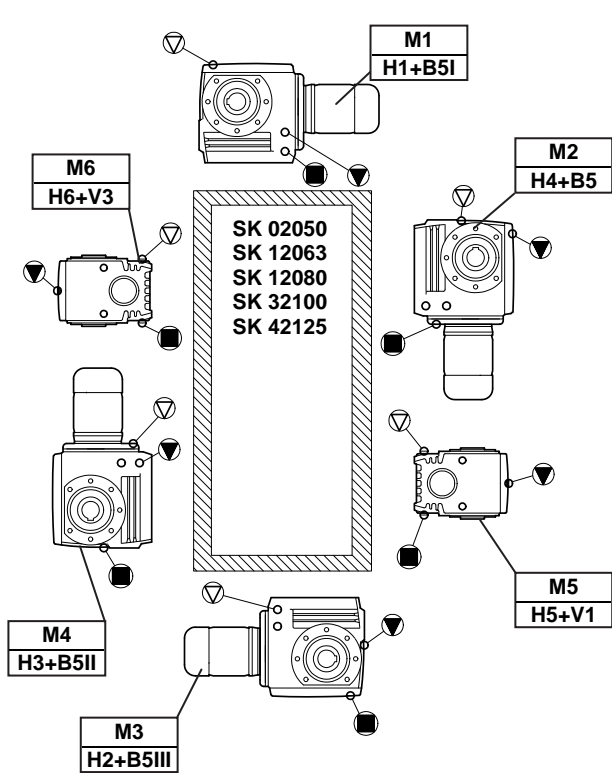
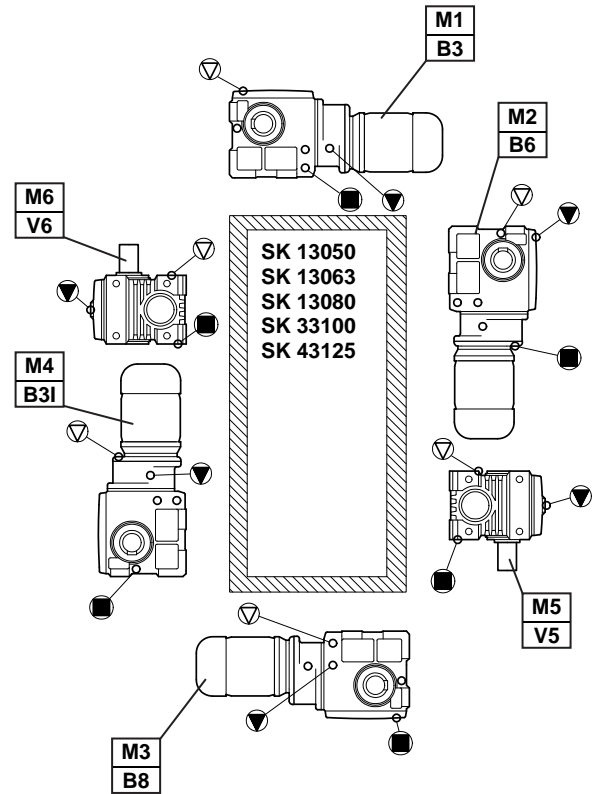
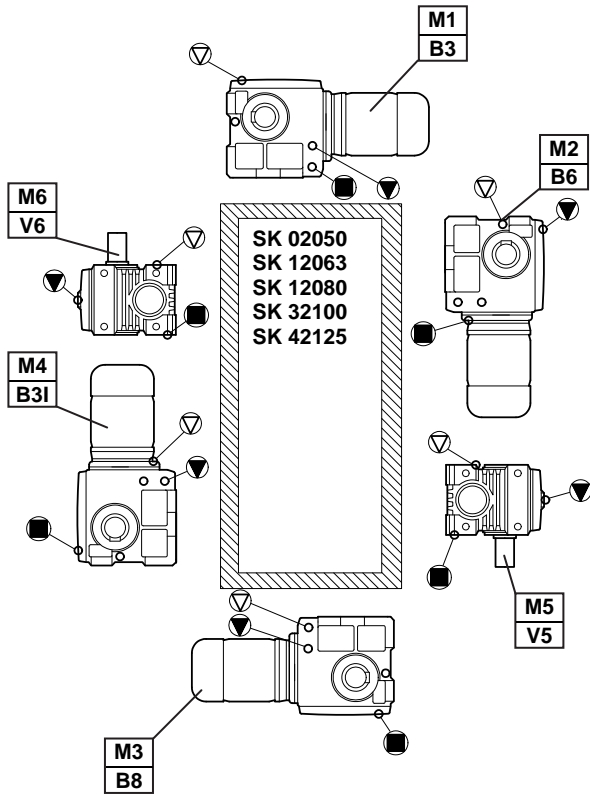


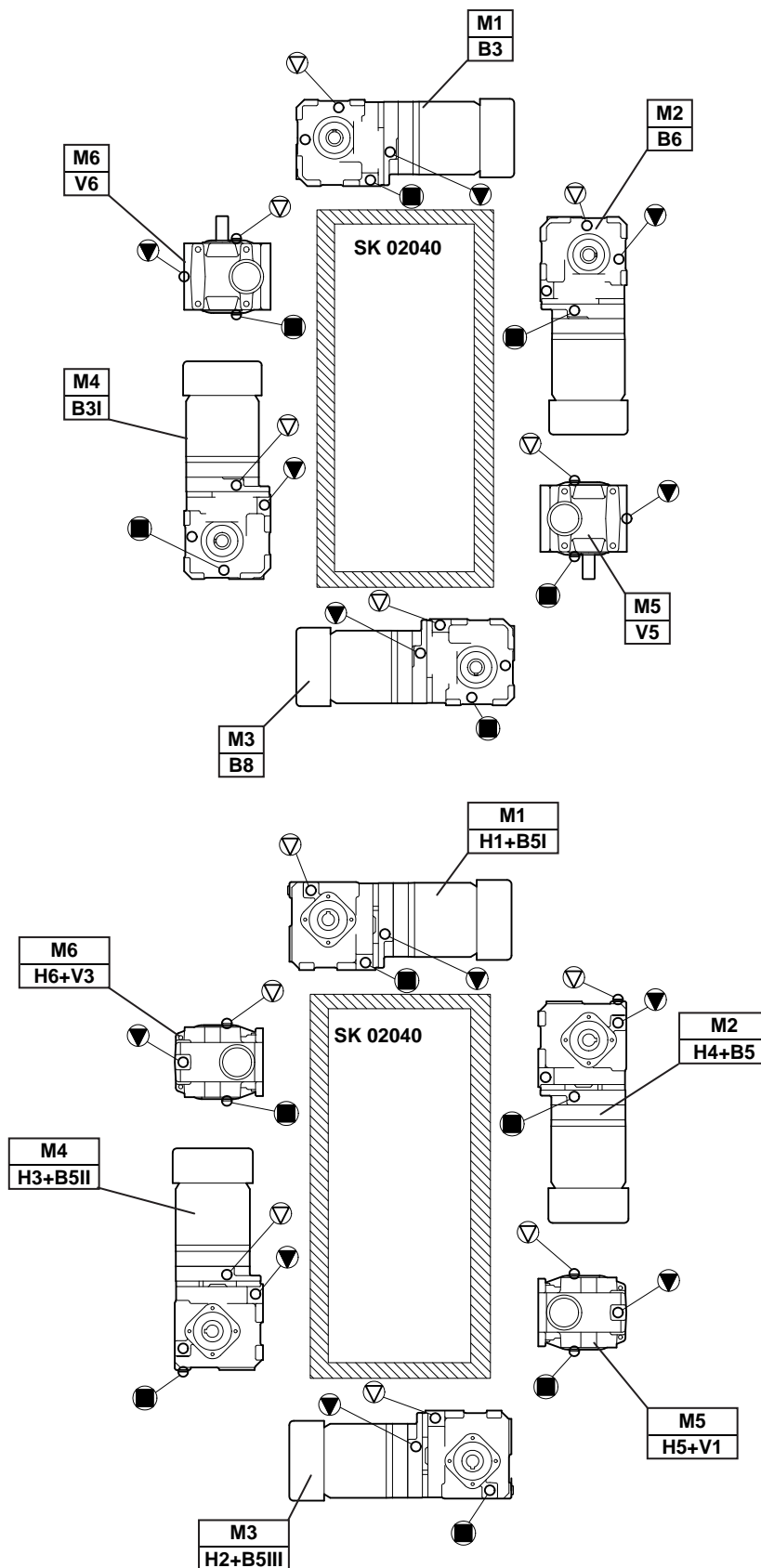
⇒ 43





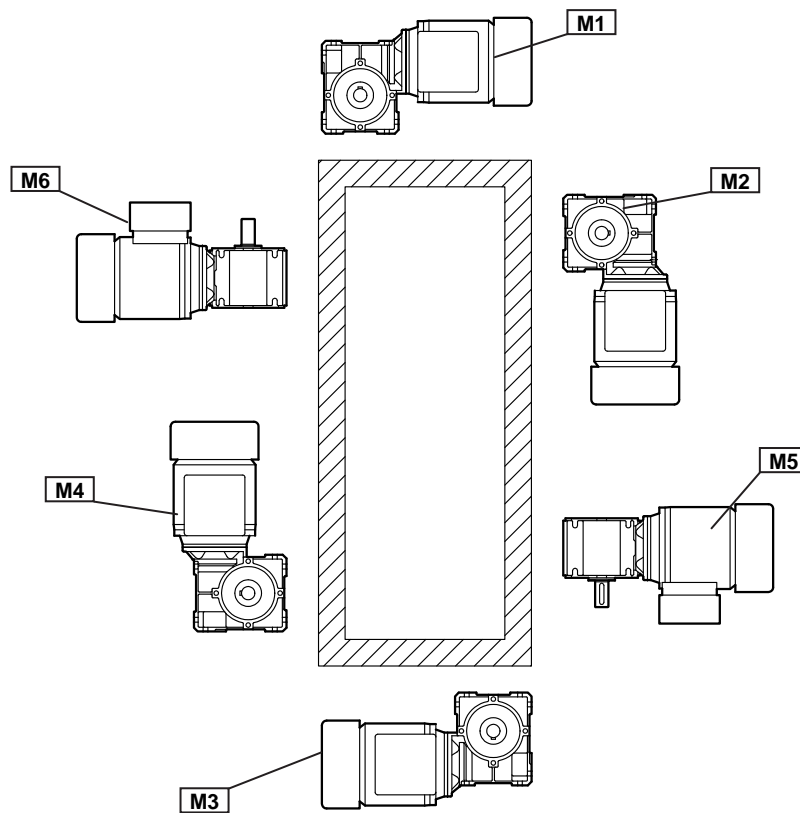








SK 1SI31 – SK 1SI75
 SK 1SIS31 – SK 1SIS75
 SK 1SIS-D31 – SK 1SIS-D63
 SK 2SIS-D40 – SK 2SIS-D63
 SK 1S32 - SK 1S63
 SK 2S32NB – SK 2S63NB
 SK 1SU32 – SK 1SU63
 SK 2SU32NB- SK 2SU63NB
 SK 1SM31 – SK 1SM63
 SK 2SM40 – SK 2SM63



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6. Appendix

6.2 Torque values

Bolt Torques [Nm]						
Size	Screw connections in the strength classes			Sealing screws	Threaded pin on coupling	Screw connections on protective covers
	8.8	10.9	12.9			
M4	3.2	5	6	-	-	
M5	6.4	9	11	-	2	
M6	11	16	19	-	-	6.4
M8	27	39	46	5	10	11
M10	53	78	91	8	17	27
M12	92	135	155	27	40	53
M16	230	335	390	-	-	92
M20	460	660	770	-	-	230
M24	790	1150	1300	80	-	460
M30	1600	2250	2650	170	-	
M36	2780	3910	4710	-	-	
M42	4470	6290	7540	-	-	
G1¼	-	-	-	20	-	

6.3 Troubleshooting

Gear unit malfunctions		
Fault	Possible cause	Remedy
Unusual running noises, vibrations	Oil too low or bearing damage or toothed wheel damage	Consult NORD Service
Oil escaping from gear unit or motor	Defective seal	Consult NORD Service
Oil escaping from pressure vent	Incorrect oil level or incorrect, contaminated oil or unfavourable operating conditions	Oil change Use oil expansion tank (Option OA)
Gear unit becomes too hot	Unfavourable installation conditions or gear unit damage	Consult NORD Service
Shock when switched on, vibrations	Defective motor coupling or loose gear unit mounting or defective rubber element	Replace elastomer gear rim, tighten motor and gear unit fastening bolts, replace rubber element
Drive shaft does not rotate although motor is running	Fracture in gear unit or defective motor coupling or shrink disc slippage	Consult NORD Service

	Attention!
	Warning: shut down the gear unit immediately should any of the above faults occur!









6. Appendix

6.4 Lubricants

With the exception of type SK 11282, SK 11382 and SK 12382 gear units, all gear units are filled with lubricant ready for operation in the required installation position when delivered. This initial filling corresponds to a lubricant from the column for the ambient temperatures (normal version) in the lubricant table.

Roller bearing greases

This table shows comparable roller bearing greases from various manufacturers. The manufacturer can be changed for a given grease type. Getriebebau NORD must be contacted in case of change of grease type or ambient temperature range, as otherwise no warranty for the functionality of our gear units can be accepted.

Lubricant type	Ambient temperature						
Mineral oil-based grease	-30 ... 60°C	Energrease LS 2 Energrease LS-EP 2	Longtime PD 2	RENOLIT GP 2 RENOLIT LZR 2 H	-	Mobilux EP 2	Gadus S2 V100 2
	-50 ... 40°C	-	Optitemp LG 2	RENOLIT JP 1619	-	-	-
Synthetic grease	-25 ... 80°C	Energrease SY 2202	Tribol 4747	RENOLIT HLT 2 RENOLIT LST 2	PETAMO GHY 133 N Klüberplex BEM 41-132	Mobiltemp SHC 32	Cassida EPS2
Biodegradable grease	-25 ... 40°C	Biogrease EP 2	-	PLANTOGEL 2 S	Klüberbio M 72-82	Mobil SHC Grease 102 EAL	Naturelle Grease EP2
Foodstuff-compatible grease	-25 ... 40°C	-	Obeen UF 2	RENOLIT G 7 FG 1	Klübersynth UH1 14-151	Mobilgrease FM 222	Cassida RLS2



6. Appendix

Lubricant table


This table shows comparable lubricants from various manufacturers. The manufacturer can be changed within a particular viscosity or lubricant type. Getriebebau NORD must be contacted in case of change of viscosity or lubricant type, as otherwise no warranty for the functionality of our gearboxes can be accepted.

Lubricant type	Details on type plate	DIN (ISO) / Ambient temperature						
Mineral oil	CLP 680	ISO VG 680 0...40°C	Energol GR-XP 680	Alpha EP 680 Alpha SP 680 Optigear BM 680 Tribol 1100/680	RENOLIN CLP 680 RENOLIN CLP 680 Plus	Klüberoil GEM 1-680 N	Mobilgear 600 XP 680	Omala S2 G 680
	CLP 220	ISO VG 220 -10...40°C	Energol GR-XP 220	Alpha EP 220 Alpha SP 220 Optigear BM 220 Tribol 1100/220	RENOLIN CLP 220 RENOLIN CLP 220 Plus	Klüberoil GEM 1-220 N	Mobilgear 600 XP 220	Omala S2 G 220
	CLP 100	ISO VG 100 -15...25°C	Energol GR-XP 100	Alpha EP 100 Alpha SP 100 Optigear BM 100 Tribol 1100/100	RENOLIN CLP 100 RENOLIN CLP 100 Plus	Klüberoil GEM 1-100 N	Mobilgear 600 XP 100	Omala S2 G 100
Synthetic oil (Polyglycol)	CLP PG 680	ISO VG 680 -20...40°C	-	Alphasyn GS 680 Tribol 800/680	RENOLIN PG 680	Klübersynth GH 6-680	Mobil Glygoyle 680	Omala S4 WE 680
	CLP PG 220	ISO VG 220 -25...80°C	Enersyn SG-XP 220	Alphasyn GS 220 Alphasyn PG 220 Tribol 800/220	RENOLIN PG 220	Klübersynth GH 6-220	Mobil Glygoyle 220	Omala S4 WE 220
Synthetic oil (hydrocarbon)	CLP HC 460	ISO VG 460 -30...80°C	-	Alphasyn EP 460 Tribol 1510/460 Optigear Synthetic X 460	RENOLIN Unisyn CLP 460	Klübersynth GEM 4-460 N	Mobil SHC 634	Omala S4 GX 460
	CLP HC 220	ISO VG 220 -40...80°C	-	Alphasyn EP 220 Tribol 1510/220 Optigear Synthetic X 220	RENOLIN Unisyn CLP 220	Klübersynth GEM 4-220 N	Mobil SHC 630	Omala S4 GX 220
Bio-degradable oil	CLP E 680	ISO VG 680 -5...40°C	-	-	PLANTOGEAR 680 S	-	-	-
	CLP E 220	ISO VG 220 -5...40°C	-	Tribol BioTop 1418/220	PLANTOGEAR 220 S	Klübersynth GEM 2-220	-	Naturelle Gear Fluid EP 220
Food grade oil	CLP PG H1 680	ISO VG 680 -5...40°C	-	Tribol FoodProof 1800/680	-	Klübersynth UH1 6-680	Mobil Glygoyle 680	Cassida Fluid WG 680
	CLP PG H1 220	ISO VG 220 -25...40°C	-	Tribol FoodProof 1800/220	-	Klübersynth UH1 6-220	Mobil Glygoyle 220	Cassida Fluid WG 220
	CLP HC H1 680	ISO VG 680 -5...40°C	-	Optileb GT 680	GERALYN SF 680	Klüberoil 4 UH1-680 N	-	Cassida Fluid GL 680
	CLP HC H1 220	ISO VG 220 -25...40°C	-	Optileb GT 220	GERALYN SF 220	Klüberoil 4 UH1-220 N	Mobil SHC Cibus 220	Cassida Fluid GL 220
Gear unit liquid grease		-25 ... 60°C	Energrease LS-EP 00	Longtime PD 00 Tribol 3020/1000-00	RENOLIT DURAPLEX EP 00 RENOLIT LST 00	MICROLUBE GB 00 Klübersynth GE 46-1200	Mobil Chassis Grease LBZ Mobil Glygoyle Grease 00	Alvania EP(LF)2 Tivela GL00


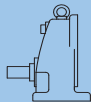
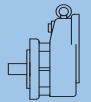

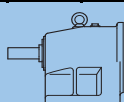
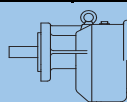

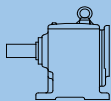
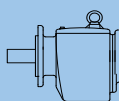

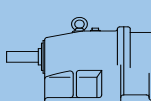
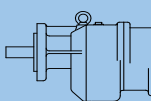

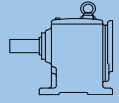
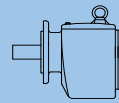


6. Appendix


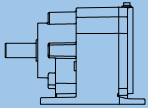

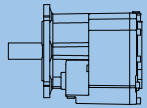

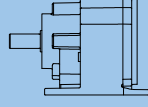
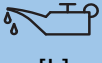
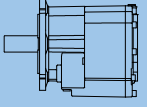
6.5 Lubricant quantities


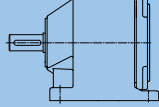
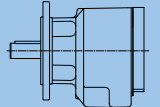

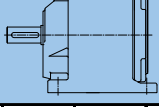
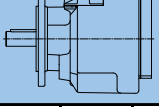
	<p>Note!</p> <p>After changing the lubricant, and in particular after the initial filling, the oil level may change during the first few hours of operation, as the oil galleries and hollow spaces only fill gradually during operation. The oil level is still within the permissible tolerance.</p> <p>If at the express request of the customer, an oil inspection glass is installed at an additional charge, we recommend that the customer corrects the oil level after an operating period of approx. 2 hours, so that when the gear unit is at a standstill and has cooled down, the oil level is visible in the inspection glass. Only then, is it possible to check the oil level by means of the inspection glass.</p> <p>The filling quantities stated in the following tables are for guidance only. The precise quantities vary depending on the exact gear ratio. When filling, always observe the oil level screw hole as an indicator of the precise quantity of oil.</p>
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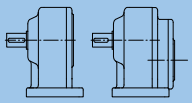

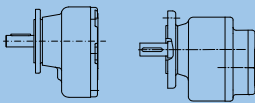
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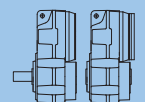

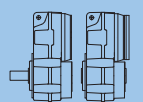

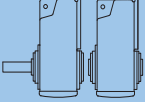

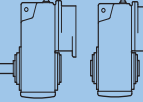

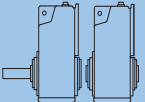

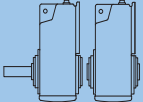

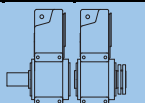

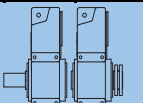
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SK11E	0,25	0,50	0,55	0,40	0,35	0,35	0,30	0,35	0,50	0,30	0,40	0,40
SK21E	0,60	1,20	1,20	1,00	1,00	1,00	0,50	1,40	1,10	0,70	0,90	0,90
SK31E	1,10	2,70	2,20	2,30	1,70	1,70	0,80	1,30	1,65	1,10	2,00	2,00
SK41E	1,70	2,60	3,30	2,50	2,60	2,60	1,00	2,60	2,80	1,60	3,30	3,30
SK51E	2,20	4,40	4,70	4,00	3,40	3,40	1,80	3,50	4,10	3,00	3,80	3,80
 [L]												
SK02	0,15	0,60	0,70	0,60	0,40	0,40	0,25	0,60	0,60	0,60	0,50	0,50
SK12	0,25	0,75	0,85	0,75	0,50	0,50	0,35	0,85	0,90	0,90	0,60	0,60
SK22	0,50	1,80	1,80	1,80	1,35	1,35	0,70	2,00	2,00	1,80	1,55	1,55
SK32	0,90	2,50	2,50	2,90	2,00	2,00	1,30	2,90	3,30	3,10	2,40	2,40
SK42	1,30	4,50	4,50	4,30	3,20	3,20	1,80	4,40	4,50	4,00	3,70	3,70
SK52	2,50	7,00	6,80	6,80	5,10	5,10	3,00	6,80	6,20	7,40	5,60	5,60
 [L]												
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SK72	10,00	23,00	18,00	26,00	23,00	23,00	10,00	23,00	18,50	28,00	23,00	23,00
SK82	14,00	35,00	27,00	44,00	32,00	32,00	15,00	37,00	29,00	45,00	34,50	34,50
SK92	25,00	73,00	47,00	76,00	52,00	52,00	26,00	73,00	47,00	78,00	52,00	52,00
SK102	36,00	79,00	66,00	102,00	71,00	71,00	40,00	81,00	66,00	104,00	72,00	72,00
 [L]												
SK03	0,30	1,00	0,80	0,90	0,60	0,60	0,50	0,80	0,90	1,10	0,80	0,80
SK13	0,60	1,25	1,10	1,20	0,70	0,70	0,85	1,20	1,20	1,20	0,95	0,95
SK23	1,30	2,40	2,30	2,35	1,60	1,60	1,50	2,60	2,50	2,80	2,80	2,80
SK33N	1,60	2,90	3,20	3,70	2,30	2,30	2,50	3,40	3,50	4,40	2,60	2,60
SK43	3,00	5,60	5,20	6,60	3,60	3,60	3,50	5,70	5,00	6,10	4,10	4,10
SK53	4,50	8,70	7,70	8,70	6,00	6,00	5,20	8,40	7,00	8,90	6,70	6,70
 [L]												
SK63	13,00	14,50	14,50	16,00	13,00	13,00	13,50	14,00	15,50	18,00	14,00	14,00
SK73	20,50	20,00	22,50	27,00	20,00	20,00	22,00	22,50	23,00	27,50	20,00	20,00
SK83	30,00	31,00	34,00	37,00	33,00	33,00	31,00	34,00	35,00	40,00	34,00	34,00
SK93	53,00	70,00	59,00	72,00	49,00	49,00	53,00	70,00	59,00	74,00	49,00	49,00
SK103	74,00	71,00	74,00	97,00	67,00	67,00	69,00	78,00	78,00	99,00	67,00	67,00



 [L]							 [L]						
⇒ 6.1	M1	M2	M3	M4	M5	M6	⇒ 6.1	M1	M2	M3	M4	M5	M6
SK072.1	0,16	0,32	0,21	0,23	0,18	0,20	SK072.1 F	0,16	0,32	0,21	0,23	0,18	0,20
SK172.1	0,27	0,59	0,42	0,45	0,32	0,39	SK172.1 F	0,27	0,59	0,42	0,45	0,32	0,39
SK372.1	0,45	1,05	0,75	1,00	0,60	0,65	SK372.1 F	0,45	1,05	0,75	1,00	0,60	0,65
SK572.1	0,75	1,90	1,50	2,00	1,10	1,15	SK572.1 F	0,75	1,90	1,50	2,00	1,10	1,15
SK672.1	1,10	2,60	2,15	2,70	1,55	1,65	SK672.1 F	1,10	2,60	2,15	2,70	1,55	1,65
SK772.1	1,15	3,65	2,25	3,15	1,35	2,15	SK772.1 F	1,15	3,65	2,25	3,15	1,35	2,15
SK872.1	3,20	8,00	5,30	7,00	2,80	4,60	SK872.1 F	2,60	8,00	5,30	7,00	2,80	4,60
SK972.1	4,50	12,90	8,10	12,70	4,60	7,80	SK972.1 F	4,50	12,90	8,10	12,70	4,60	7,80
 [L]							 [L]						
⇒ 6.1	M1	M2	M3	M4	M5	M6	⇒ 6.1	M1	M2	M3	M4	M5	M6
SK373.1	0,45	1,05	0,75	1,00	0,60	0,65	SK373.1 F	0,45	1,05	0,75	1,00	0,60	0,65
SK573.1	0,75	1,90	1,50	2,00	1,10	1,15	SK573.1 F	0,75	1,90	1,50	2,00	1,10	1,15
SK673.1	1,10	2,60	2,15	2,70	1,55	1,65	SK673.1 F	1,10	2,60	2,15	2,70	1,55	1,65
SK773.1	1,95	3,50	3,20	2,90	2,25	2,95	SK773.1 F	1,95	3,50	3,20	2,90	2,25	2,95
SK873.1	4,05	7,60	6,85	6,55	5,00	6,55	SK873.1 F	4,05	7,60	6,85	6,55	5,00	6,55
SK973.1	7,40	12,20	11,10	11,60	8,00	10,90	SK973.1 F	7,40	12,20	11,10	11,60	8,00	10,90


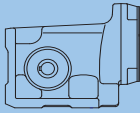
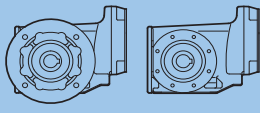

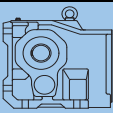
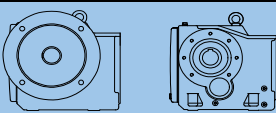

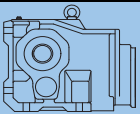
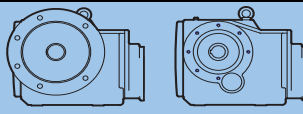
 [L]												
⇒ 6.1	M1	M2	M3	M4	M5	M6	M1	M2	M3	M4	M5	M6
⇒ 6.1	B3	V6	B8	V5	B6	B7	B5	V3	B5I	V1	B5II	B5III
SK172	0,35	0,50	0,50	0,50	0,50	0,50	0,35	0,50	0,50	0,50	0,50	0,50
SK272	0,60	1,00	1,00	1,00	1,00	1,00	0,60	1,00	1,00	1,00	1,00	1,00
SK372	0,60	1,00	1,00	1,00	1,00	1,00	0,60	1,00	1,00	1,00	1,00	1,00
SK472	1,00	1,90	1,90	2,00	1,80	1,80	1,00	1,90	1,90	1,90	1,90	1,50
SK572	1,00	1,90	1,90	2,00	1,80	1,80	1,00	1,90	1,90	1,90	1,90	1,50
SK672	1,40	3,40	3,10	3,15	1,45	3,15	1,15	3,40	2,70	2,80	1,25	2,70
SK772	2,00	3,30	3,50	4,20	2,70	3,30	1,60	3,30	3,50	3,30	3,10	3,10
SK872	3,70	9,60	9,10	7,30	4,70	8,00	3,50	9,00	7,90	7,70	3,90	7,20
SK972	6,50	16,00	15,70	14,70	8,50	14,00	6,50	15,00	13,00	13,50	6,50	12,00
 [L]												
SK273	0,62	1,10	1,10	1,10	1,10	1,10	0,62	1,10	1,10	1,10	1,10	1,10
SK373	0,55	1,10	1,10	1,10	1,10	1,10	0,55	1,10	1,10	1,10	1,10	1,10
SK473	1,30	2,50	2,10	2,40	2,10	2,10	1,25	2,40	2,10	2,50	2,10	2,10
SK573	1,30	2,50	2,10	2,40	2,10	2,10	1,25	2,40	2,10	2,50	2,10	2,10
SK673	1,80	3,80	3,20	3,40	2,90	3,00	1,70	3,80	3,00	3,20	3,00	3,00
SK773	2,50	4,50	3,70	4,60	3,30	3,30	2,30	5,00	3,60	4,50	3,90	3,90
SK873	6,20	8,40	7,50	9,10	7,50	7,50	5,00	8,80	7,60	8,00	8,00	8,00
SK973	11,00	15,80	13,00	16,00	13,30	13,00	10,30	16,50	13,00	16,00	14,00	14,00


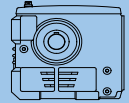

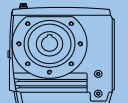

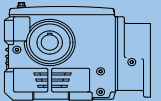

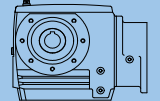

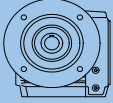

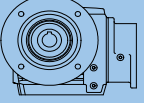
 [L]							 [L]						
⇒ 6.1	M1	M2	M3	M4	M5	M6	⇒ 6.1	M1	M2	M3	M4	M5	M6
SK0	0,13	0,22	0,13	0,22	0,13	0,13	SK0 F	0,13	0,22	0,13	0,22	0,13	0,13
SK01	0,22	0,38	0,22	0,38	0,22	0,22	SK01 F	0,22	0,38	0,22	0,38	0,22	0,22
SK20	0,55	1,00	0,55	1,00	0,55	0,55	SK20 F	0,35	0,60	0,35	0,60	0,35	0,35
SK25	0,50	0,90	0,50	0,90	0,50	0,50	SK25 F	0,50	0,90	0,50	0,90	0,50	0,50
SK30	0,80	1,40	0,70	1,40	0,70	0,70	SK30 F	0,80	1,40	0,70	1,10	0,70	0,70
SK33	0,80	1,60	1,00	1,60	0,80	1,00	SK33 F	1,00	1,60	1,00	1,60	0,80	1,00
SK000	0,24	0,41	0,24	0,41	0,24	0,24	SK000 F	0,24	0,41	0,24	0,41	0,24	0,24
SK010	0,38	0,60	0,38	0,60	0,38	0,38	SK010 F	0,38	0,60	0,38	0,60	0,38	0,38
SK200	0,80	1,30	0,80	1,30	0,80	0,80	SK200 F	0,60	1,04	0,60	1,04	0,60	0,60
SK250	1,40	1,50	1,40	1,50	1,40	1,40	SK250 F	1,40	1,50	1,40	1,50	1,40	1,40
SK300	1,40	1,50	1,40	1,50	1,40	1,40	SK300 F	1,40	1,50	1,40	1,50	1,40	1,40
SK330	1,50	1,58	1,50	1,58	1,50	1,50	SK330 F	2,00	1,58	1,50	2,80	1,50	1,50

 [L]							 [L]						
⇒ 6.1	M1	M2	M3	M4	M5	M6	⇒ 6.1	M1	M2	M3	M4	M5	M6
⇒ 6.1	H1	H6	H2	H5	H4	H3	⇒ 6.1	H1	H6	H2	H5	H4	H3
SK0182NB A	0,40	0,55	0,60	0,55	0,35	0,35							
SK0282NB A	0,70	1,00	0,80	1,10	0,90	0,90							
							SK1382NB A	1,30	2,30	1,40	2,10	2,00	1,90
 [L]							 [L]						
SK1282 A	0,90	1,30	0,90	1,20	0,95	0,95							
SK2282 A	1,65	2,40	1,90	2,00	1,80	1,80	SK2382 A	1,70	2,60	1,90	3,10	1,50	1,50
SK3282 A	3,15	4,10	3,25	4,10	3,15	3,15	SK3382 A	4,10	4,90	3,30	5,60	3,30	3,30
SK4282 A	4,70	6,10	4,75	5,40	4,70	4,70	SK4382 A	5,90	6,80	4,90	8,30	4,90	4,90
SK5282 A	7,50	8,80	7,50	8,80	7,20	7,20	SK5382 A	12,50	12,00	6,70	14,00	8,30	8,30
 [L]							 [L]						
SK6282 A	17,00	14,00	12,00	17,50	10,00	14,00	SK6382 A	16,50	13,00	9,60	18,00	14,00	12,50
SK7282 A	25,00	21,00	20,00	27,00	16,00	21,00	SK7382 A	22,00	20,00	16,00	25,00	23,00	19,00
SK8282 A	37,00	33,00	30,00	41,00	31,00	31,00	SK8382 A	34,00	32,00	25,00	38,00	35,00	30,00
SK9282 A	74,00	70,00	55,00	72,00	60,00	59,00	SK9382 A	73,00	70,00	45,00	74,00	65,00	60,00
 [L]							 [L]						
SK10282 A	90	90	40	90	60	82	SK10382 A	85	100	73	100	80	80
SK11282 A	165	160	145	195	100	140	SK11382 A	160	155	140	210	155	135
							SK12382 A	160	155	140	210	155	135

* ⇒ 38



 [L]												
⇒ 6.1	M1	M2	M3	M4	M5	M6	M1	M2	M3	M4	M5	M6
⇒ 6.1	B3	B6	B8	B3I	V5	V6	B5I	B5	B5III	B5II	V1	V3
							H1	H4	H2	H3	H5	H6
SK92072	0,40	0,60	0,50	0,50	0,40	0,40	0,40	0,60	0,50	0,50	0,40	0,40
SK92172	0,55	0,90	0,95	1,10	0,75	0,62	0,50	0,92	0,87	1,05	0,75	0,65
SK92372	0,90	1,30	1,45	1,60	1,20	1,20	1,15	1,50	1,20	1,70	1,15	1,15
SK92672	1,80	3,50	3,20	3,40	2,60	2,60	1,55	2,80	2,50	3,30	2,40	2,40
SK92772	2,30	4,50	4,60	5,30	4,10	4,10	2,75	4,40	4,50	5,50	3,50	3,50
 [L]												
SK9012.1	0,70	1,60	1,90	2,40	1,20	1,70	0,70	1,90	1,90	2,10	1,20	1,70
SK9016.1	0,70	1,60	1,90	2,40	1,20	1,70	0,70	1,90	1,90	2,10	1,20	1,70
SK9022.1	1,30	2,60	3,50	4,20	2,00	2,80	1,30	2,60	3,50	4,20	2,00	2,80
SK9032.1	1,70	4,80	6,40	6,70	4,10	5,10	1,90	5,20	6,40	7,30	3,30	5,10
SK9042.1	4,40	8,70	10,00	9,80	6,80	7,50	3,60	9,70	11,40	11,50	6,50	8,20
SK9052.1	6,50	16,00	19,00	21,50	11,00	15,50	7,50	16,50	20,00	22,50	11,50	18,00
SK9062.1	10,00	27,50	32,00	36,00	18,00	24,00	12,00	27,50	33,00	38,50	19,00	26,00
SK9072.1	10,00	27,50	32,00	36,00	18,00	24,00	12,00	27,50	33,00	38,50	19,00	26,00
SK9082.1	17,00	51,50	62,50	71,50	33,00	46,50	21,00	54,00	66,00	80,00	38,00	52,00
SK9086.1	29,00	73,00	85,00	102,00	48,00	62,00	36,00	78,00	91,00	107,00	53,00	76,00
SK9092.1	41,00	157,00	170,00	172,00	80,00	90,00	40,00	130,00	154,00	175,00	82,00	91,00
SK9096.1	70,00	187,00	194,00	254,00	109,00	152,00	80,00	187,00	193,00	257,00	113,00	156,00
 [L]												
SK9013.1	1,20	2,00	2,20	3,00	1,40	1,90	1,20	2,30	2,20	3,00	1,40	1,90
SK9017.1	1,20	2,00	2,20	3,00	1,40	1,90	1,20	2,30	2,20	3,00	1,40	1,90
SK9023.1	2,40	3,00	3,80	5,30	2,20	3,10	2,40	3,00	3,80	5,30	2,20	3,10
SK9033.1	3,30	6,60	7,00	7,80	4,30	5,10	3,80	5,70	6,90	8,50	3,60	5,60
SK9043.1	4,60	10,20	10,70	12,80	5,20	6,70	5,70	10,20	14,70	14,70	6,60	9,60
SK9053.1	10,00	17,00	20,00	24,20	11,50	16,50	12,50	18,00	21,50	26,50	13,00	17,00

 [L]							 [L]						
⇒ 6.1	M1	M2	M3	M4	M5	M6		M1	M2	M3	M4	M5	M6
⇒ 6.1	B3	B6	B8	B3I	V5	V6		B5I	B5	B5III	B5II	V1	V3
⇒ 6.1								H1	H4	H2	H3	H5	H6
SK02040	0,45	0,60	0,60	0,60	0,50	0,50	SK02040 A	0,40	0,80	0,65	0,60	0,50	0,50
SK02050	0,40	1,20	0,70	1,15	0,70	0,70	SK02050 A	0,45	1,10	0,90	1,10	0,80	0,80
SK12063	0,60	1,70	1,20	1,55	1,00	1,00	SK12063 A	0,50	1,45	1,20	1,40	1,10	1,10
SK12080	0,80	2,60	1,70	2,70	1,70	1,70	SK12080 A	0,90	3,10	3,00	3,00	2,20	2,20
SK32100	1,60	5,50	3,40	5,40	3,20	3,20	SK32100 A	1,50	5,20	3,80	5,30	3,80	3,80
SK42125	2,80	11,00	6,20	10,30	5,80	5,80	SK42125 A	3,20	12,90	6,10	10,50	6,30	6,30
 [L]							 [L]						
SK13050	0,95	1,55	1,10	1,45	0,95	0,95	SK13050 A	0,85	1,75	1,25	1,35	1,15	1,15
SK13063	0,85	2,30	1,60	2,00	1,25	1,25	SK13063 A	0,90	2,10	1,55	2,10	1,45	1,45
SK13080	1,70	3,20	2,10	3,40	1,95	1,95	SK13080 A	1,70	3,75	3,60	3,60	2,55	2,55
SK33100	2,10	7,60	4,00	6,80	3,70	3,70	SK33100 A	2,10	6,10	4,80	6,60	4,20	4,20
SK43125	7,80	14,00	7,20	13,50	6,70	6,70	SK43125 A	4,80	13,50	7,40	14,50	8,00	8,00
 [L]							 [L]						
SK02040 F	0,50	0,80	0,75	0,60	0,50	0,50							
SK02050 F	0,45	1,40	0,90	1,25	1,00	1,00	SK13050 F	0,90	1,80	1,15	1,75	1,25	1,25
SK12063 F	0,50	1,60	1,40	1,80	1,50	1,50	SK13063 F	0,95	2,10	1,65	2,15	1,75	1,75
SK12080 F	0,95	3,20	3,10	3,70	2,50	2,50	SK13080 F	1,40	4,20	3,35	4,20	2,75	2,75
SK32100 F	1,50	7,10	4,90	7,10	4,40	4,40	SK33100 F	2,30	7,60	5,50	7,80	4,85	4,85
SK42125 F	3,30	11,20	6,10	10,40	6,80	6,80	SK43125 F	4,30	14,50	7,10	12,10	7,70	7,70

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Operating and Maintenance Instructions

Three-phase Asynchronous Motors – Standard Design

Explosion-proof Motors with Type of Protection „e”

Dust Explosion-proof Motors (Zone 21+ Zone 22)

NORD
DRIVESYSTEMS



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Safety and information signs

Please comply with the following safety and information signs!



Danger!

Danger to life and risk of injury for humans



Attention!

Damage to the machine possible



Danger!

Important information for explosion protection



Information!



1. Information



1. General information

These Operating Instructions must be read before you transport, assemble, commission, maintain or repair NORD motors. All persons who are involved with such tasks must observe these Operating Instructions. All safety instructions provided in these Operating Instructions must be strictly observed for reasons of personal protection and protection of property.

Information and instructions provided in the manual supplied, safety and commissioning information and all other manuals must be observed.

This is absolutely essential in order to avoid hazards and damage!

Any applicable national, local and system-specific regulations and requirements must also be observed!

Custom designs and design variants may differ on technical details. If any points are not clear, it is urgently recommended that you consult the manufacturer stating the type designation and motor number or have the maintenance work performed by NORD.

Qualified staff are persons who, owing to their training, experience, instruction received, and their knowledge of relevant standards, accident prevention regulations and the appropriate operating conditions, are entitled to perform the activities necessary in order to put the motor into operation.

That also calls for knowledge of First Aid and local rescue facilities. It is assumed that the work for transport, assembly, installation, commissioning, maintenance and repair will be performed by qualified staff.

The following points in particular must be observed:

- Specifications and information about permissible use, assembly, connection, ambient and operating conditions, which are included in the catalogue, the order documentation and any other product documentation
- The local, system-specific regulations and requirements
- Expert use of tools, hoisting equipment and transport equipment
- Use of personal safety equipment

For reasons of simplicity the Operating Instructions cannot contain all detailed information about possible design variants so they cannot take into consideration every imaginable case of installation, operation or maintenance.

For this reason these Operating Instructions essentially only contain such instructions as are required for normal use by qualified staff. To prevent malfunctions it is necessary that the specified maintenance and inspection work be performed by appropriately trained staff.

- The engineering guideline 605 2101 must be included with the operating instructions when operated with the inverter.
- The additional operating instructions must be taken into account if an external fan is present.
- The brake operating instructions must also be taken into account with braking motors.

If, for any reason, the operating instructions or the engineering guidelines are lost, new documentation must be obtained from Getriebebau NORD.



2. Description

3. Information



2.1 Range of application

Use of the motors:

The motors may only be used for their intended purpose. The motors are designed with at least IP 55 protection (for degree of protection see rating plate). They can be installed in a dusty or moist environment. The necessary degree of protection and any additional precautions required always depend on the operating and environmental conditions. For outdoor installation and vertical designs, e.g. V1 or V5 with shaft pointing down, NORD recommends using the option of the double fan hood [RDD]. The motors must be protected against intense sunlight, e.g. by means of a protective roof. The insulation is tropic-proof.

Installation height: ≤ 1000 m

Ambient temperature: $-20^{\circ}\text{C} \dots +40^{\circ}\text{C}$. With standard motors, a greater ambient temperature range is permitted from $-20^{\circ}\text{C} \dots +60^{\circ}\text{C}$. The rated power must however be reduced to **82%** of the catalogue value. If the maximum value of the ambient temperature is between $+40^{\circ}\text{C}$ and $+60^{\circ}\text{C}$, the value of the power consumption can be inversely interpolated linearly between **100%** and **82%**.

The motor connection cables and the cable inlet glands must be suitable for temperatures $\geq 90^{\circ}\text{C}$.



3. Information on the designated use of electric motors

Work may only be performed if the system is disconnected from the mains supply.

3.1 Transport, storage

- For transport use all the hoisting lugs fitted to the motor!
- The hoisting lugs are designed for the weight of the motor; do not attach any additional loads!
- To transport machine sets (e.g. gear unit attachments) only use the hoisting lugs and pins provided!
- Machine sets must not be hoisted by attaching to individual machines!

To prevent damage to the motor, the motor must always be lifted with suitable hoisting equipment. The antifriction bearings should be replaced if the time between delivery and motor commissioning under favourable conditions (storage in dry, dust-free and vibration-free rooms) is more than 4 years. Under unfavourable conditions that time is reduced considerably. It may be necessary to treat unprotected, machine surfaces (flanging surface, shaft end; ...) with corrosion inhibitor. If necessary, check the insulation resistance of the winding, see section 3.6.

Changes in normal operation (higher power consumption, higher temperatures or higher vibrations, unusual noises or smells, response from the monitoring system, etc.) indicate that operation is impaired. To avoid personal injury and damage to property, the maintenance staff responsible must be informed about the change immediately.

In case of doubt switch off the motor without delay, as soon as the status of the system permits.



3. Information



3.2 Installation

- Screwed-in lifting eyes must either be screwed in fully or removed after erection!
- Running smoothness: Precise alignment of the coupling and a well-balanced drive element (coupling, belt pulleys, fans, etc.) are prerequisites for quiet, low vibration operation.
- Complete balancing of the motor with the drive elements may be necessary.
- The upper section of the terminal box and the terminal box position can be rotated by 4 x 90 degrees.
- IEC-B14 motors:
All four fixing screws, even if not required, must be screwed into the flanged bearing plate! The fixing screw threads must be inserted with a sealant, e.g. Loctite 242. The maximum screw-in depth in the bearing plate is $2 \times d$.
- The motor must be inspected for damage before installation and commissioning. A damaged motor must not be commissioned.

3.3 Balancing, output components



Fitting and removing output assemblies (coupling, pulleys, gear, ...) must be performed with a suitable device. The rotors are balanced with half key balancing as standard.

When fitting output assemblies to the motor shaft observe the appropriate type of balancing! The output assemblies have to be balanced in accordance with DIN ISO 1940!

Take the general precautions necessary for providing the output assemblies with shock protection. If a motor is put into operation without an output assembly, prevent the key from being flung out. This also applies if a second shaft end is fitted. Alternatively, remove the key.



3.4 Alignment

Especially if there is a direct coupling, align the shafts of the motor and the driven machine with one another axially and radially. Any inaccurate alignment can lead to bearing damage, excessive vibrations and shaft breakage.



3.5 Electrical connection

Feed the connecting leads into the terminal box with cable glands. The terminal box must be sealed so that it is dust-tight and water-tight. The mains voltage and mains frequency must agree with the figures on the rating plate. $\pm 5\%$ voltage deviations or $\pm 2\%$ frequency deviations are permissible without any reduction in performance. The connections and arrangement of the terminal board jumpers must conform to the circuit diagram provided in the terminal box. Connect the protective earth lead to that protective earth terminal.

Provide the ends of the connecting leads with cable lugs or curved ring eyes and connect them to the terminal board. That also applies to the protective earth connection and the external bonding lead.

For tightening torques at the screw connections of electric terminals and the terminal board connections (apart from terminal strips) refer to the table below:

	Tightening torques for terminal board connections				
	Thread diameter	M4	M5	M6	M8
	Tightening torque (Nm)	0,6 - 1,2	1,8 - 2,5	2,7 - 4,0	5,5 - 8,0

If the machine has an auxiliary heater, it must not be switched on during operation.



3. Information



3.6 Checking insulation resistance

Before putting the motor into operation for the first time, after a lengthy period of storage or standstill (approx. 6 months), the insulation resistance of the winding has to be determined. During and directly after measurement the terminals carry hazardous voltages in some cases and must not be touched.

Insulation resistance

The insulation resistance of new, cleaned, repaired windings against the housing and against one another is $>200 \text{ M Ohm}$.

Measurement

In the case of windings up to an operating voltage of 400 V the insulation resistance against the housing must be measured with a DC voltage of 500 V. At operating voltages up to 725 V measure with a DC voltage of 1000 V. When doing this the temperature of the windings should be $25^{\circ}\text{C} \pm 15^{\circ}\text{C}$.

Checking

If, in the case of a new, cleaned winding or a repaired motor which has been stored or shut down for any lengthy period, the insulation resistance of the winding against the housing is less than 50 M Ohm, the cause may be moisture. The windings will then have to be dried.

After any lengthy period of operation the insulation resistance may drop. As long as the measured value does not fall below the critical insulation resistance of $< 50 \text{ M Ohm}$, the motor may continue to be operated. If the value falls below the critical level, the cause must be established and if necessary, the windings or winding sections must be repaired, cleaned or dried.



3.7 Commissioning

Note: Electromagnetic compatibility

Emitted interference: If torques are not equal (e.g. drive of a piston compressor) a non-sinusoidal motor current is bound to develop, the harmonics of which may cause impermissible mains influence and hence impermissible emitted interference.

If power is fed via an inverter, different levels of emitted interference will occur, depending on the design of inverter (type, suppression, manufacturer). It is absolutely essential that the EMC information provided by the inverter manufacturer be observed. If the manufacturer recommends a screened motor supply lead, screening will be most effective if it is electrically connected to a large area of the metal terminal box of the motor (with EMC cable gland made of metal). In the case of motors with built-in sensors (e.g. PTC thermistors) interference voltages can occur on the sensor line, caused by the inverter.

Interference immunity: In the case of motors with built-in sensors (e.g. PTC thermistors) the user himself must ensure adequate interference immunity by making a suitable selection of sensor signal line (possibly with screening, interfacing as with motor supply lead) and the analysing instrument. Prior to commissioning always observe the information and instructions in the operating manuals for inverters as well as all other sets of instructions. After attaching the motors, check them to make sure they are operating properly! In the case of brake motors also check that the brake operates properly.

4. Maintenance Servicing



Safety precautions

Before commencing any work on the motor or device, but especially before opening covers in front of live components, always isolate the motor electrically according to the regulations. Apart from the main circuits also isolate any additional or auxiliary circuits.

The standard "5 safety rules", e.g. according to DIN VDE 0105, are:

- Isolate electrically
- Prevent equipment from being switched on again
- Check that there is no voltage
- Earth and short-circuit
- Cover any adjacent live components or prevent access with barriers

The above precautions may only be withdrawn when the maintenance work has been completed and the motor is fully assembled.

Inspect the motors properly at regular intervals. In particular look out for any physical damage, ensure that cooling passages are free, listen for any unusual noises, and ensure that electrical connections are performed in a proper manner.

With the exception of standardised, commercial or equivalent parts the only spare parts which may be used are genuine spare parts!



NOTE: Inasmuch as motors are provided with enclosed condensation ports, they must be opened from time to time so that any accumulated condensation can drain off. Condensation ports are always positioned at the lowest point of the motor. When installing the motor ensure that the condensation holes are at the bottom.



Bearing changes, grease filling

The period for changing bearings in operating hours [h] on IEC motors with coupling drive is as follows, under normal operating conditions and with the motor installed horizontally, depending on coolant temperature and motor speed:

	25°C	40°C
up to 1800 min ⁻¹	approx. 40000 h	approx. 20000 h
up to 3600 min ⁻¹	approx. 20000 h	approx. 10000 h

In the case of direct gearbox attachment or under special operating conditions, e.g. vertical motor, substantial vibrations or shock loads, frequent reversing, etc. the above-mentioned operating hours will be reduced considerably.

The motor must be subjected to a general overhaul every 5 years!

General overhaul

For this purpose the motor must be dismantled. Perform the following work:

- Clean all parts of the motor
- Inspect all parts of the motor for damage
- Replace all damaged parts
- Replace all antifriction bearings
- Replace all gaskets and shaft seals

The general overhaul must be performed in a specialised workshop with appropriate equipment and by qualified staff. We urgently recommend having the general overhaul performed by NORD Service.



5. Motors with protection type Increased Safety Exe



These motors are subject to the following supplementary or specific information.

The motors are suitable for use in Zone 1 and conform to equipment group II, category 2G, and can be used for an ambient temperature between -20°C and +40°C.

Type addition: 2G e.g.: 80 L/4 **2G** TF

The marking is 0102 II 2G Ex e II along with the temperature class

If the motor is connected to a gearbox, the Ex marking of the gearbox must also be observed.

Explosive gas mixtures or concentrations of dust in conjunction with hot, live and moving parts on electrical machinery can cause serious or lethal injuries.

The increased hazard in explosive areas calls for particularly careful compliance with the general safety and commissioning instructions. The staff responsible must be trained regarding correct use of motors in explosive areas.

Explosion-proof electrical machines comply with the standards in series EN 60034 (VDE 0530) as well as EN 60079-0 and 60079-7. It is the degree of explosion risk which determines zone classification. DIN EN 60079, Part 10, provides information on this. It is the user who is responsible for zone classification.

If motors are not certified for explosive areas, it is prohibited to use them in explosive areas.

Cable entries must be approved for explosive atmospheres. Ports which are not used must be closed off with approved blind plugs.

When connecting up the installation lines to the motor terminals and the protective earth lead must be laid with U-shaped lines under the respective terminals so that the wire clamps and the terminal studs are subjected to uniform loading and are not deformed under any circumstances. Alternatively, the connections can be made with a cable lug. The use of aluminium connecting cables is not permissible.

The motor is supplied with a certified cable gland. The clamping nuts of the cable gland must be tightened to the torque specified in the following table.

Cable gland	Clamping nut tightening torque [Nm]
M20x1.5	6
M25x1.5	8
M32x1.5	12
M40x1.5	16

When connecting up always ensure that the permissible clearance distances of 10 mm and the permissible creepage distances of 12 mm between live components and housing potential and between individual live components are observed.

Before the terminal box is closed, make sure that all the nuts on the terminals and the screw on the protective earth terminal are tight. The terminal box gaskets and the seals on the cable gland must be fitted properly and must not be damaged in any way.

If the shaft end is at the top, e.g. designs IMV3 or IMV6, and the motor has Exe protection, the user/installer must fit a cover which prevents foreign bodies from falling into the motor fan hood (see DIN EN 60079-0). It must not impair cooling of the motor by its fan. A handwheel at the second shaft end is not permitted. If the shaft end is at the bottom, e.g. designs IMV1 or IMV5, the motors are generally provided with a protective roof on the fan hood. The motors are designed for continuous duty and normal, non-recurring start-ups in which no substantial start-up heat develops.

Area A in EN 60034-1 (VDE 0530 Part 1) - voltage $\pm 5\%$, frequency $\pm 2\%$, characteristic, mains symmetry - must be observed so that the development of heat remains within the limits permitted. Any major deviations from the ratings can cause an impermissible increase in the development of heat in the electric machine.

The motor temperature class stated on the rating plate must at least conform to the temperature class of any combustible gas that may be emitted.



5. Motors with protection type Increased Safety Exe



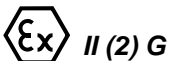
Each machine must be protected against impermissible development of heat by a current-dependent delayed protective switch tested for operation by an appointed body, with phase-failure protection in compliance with VDE 0660 or an equivalent system in all phases. The protective system must be set to the rated current. If windings are connected in a delta circuit the trips must be connected in series with the winding phases and set to 0.58 times the rated current. If such a configuration is not possible, additional precautions will be necessary (e.g. thermal machine protection).

If the rotor jams, the protective system must shut down within the t_E -time specified for the respective temperature class. Electric machines for heavy starting (ramp time $> 1.7 \times t_E$ -time) must be protected by a start-up monitoring system in accordance with the provisions of the EC type test certificate.

Thermal machine protection by means of direct thermal monitoring of the winding with PTC thermistor temperature sensor is permissible if it is certified and stated on the rating plate.

Do not connect any voltage higher than 30V to the PTC thermistor temperature sensor!

If the only protection is a PTC thermistor temperature sensor, a performance-tested, certified PTC tripping unit from an appointed body must be used. The PTC tripping unit must be provided with the following marks concerning the degree of protection:



II (2) G

In Germany reference is made to DIN 57165/VDE 0165 and ExeV for setting up electrical installations in explosive areas! In other countries the appropriate national regulations must be observed!

Operation in conjunction with an inverter must be explicitly certified. It is absolutely essential that the separate manufacturer's instructions be observed. For Exe protection the motor, inverter and protective systems must be identified as belonging together and the permissible operating data must be defined on the joint EC type test certificate. The levels of voltage peaks generated by the inverter may be subjected to unfavourable influences by the connecting cable installed between the inverter and the electric machine. In the system comprising inverter-cable-electric machine the maximum figure for voltage peaks at the connecting terminals on the machine must not be less than the figure specified in the separate manufacturer's instructions. In addition, the EMC Directive must also be observed.

Any repairs must be performed by NORD or accepted by an officially recognised independent expert. The work must be identified by means of an additional repair plate. With the exception of standardised, commercial and equivalent parts, the only spare parts which may be used are genuine spare parts (see spare parts list): this particularly applies to seals and connecting parts.

In the case of motors with closed condensation holes the threads of the plugs must be recoated with Loctite 242 or Loxeal 82-21 after condensation has been drained off. As soon as that has been done the plugs must be reinserted. Checking of electrical connections must be performed at regular intervals.

The connection terminals, protective earth terminal and equipotential bonding terminal must be inspected to make sure they are firm. When doing so, check to make sure that the cable entry, cable gland and terminal box gaskets are in good condition.

All work on electric machines must be performed with the machine vertical and with all terminals disconnected from the mains.

If installation resistance is being measured the motor must be removed. Measurement must not be performed in the explosive area. As soon as measurement has been completed discharge the connecting terminals again by shorting them in order to prevent any spark discharges occurring in the explosive area.



6. Motors for use in Zone 21 and Zone 22







6.1 General information

The following information applies additionally or especially to motors in categories 2D and 3D!

The motors are suitable for use in Zone 21 (category 2D) or Zone 22 – non-conductive dusts (category 3D) according to their designation.

Type addition: Zone 21: 2D e.g.: 80 L/4 **2D** TF
Zone 22: 3D e.g.: 80 L/4 **3D** TF

The designation is as follows:  ₀₁₀₂  II 2 D T 125°C for category 2 (Zone 21)
Certification number: BVS 04 ATEX E 037

  II 3 D T 125°C for category 3 (Zone 22 non-conductive dust)*

* the details of the surface temperature may deviate from 125°C and may be obtained from the identification plate

If the motor is connected to a gear, the Ex designation of the gear must also be taken into account!

6.2 Safety information

The increased danger in areas with combustible dust requires that the general safety and commissioning instructions are strictly complied with. Explosive dust concentrations can cause explosions if ignited by hot or sparking objects and this can cause severe or even lethal injuries to persons and significant damage to property.

It is absolutely essential that the persons authorised to use these motors in hazardous areas are trained in their correct use.

6.3 Commissioning instructions / application area

The motors are suitable for use in Zone 21 (category 2D) or Zone 22 – non-conductive dusts (category 3D) according to their designation. If the motors are intended for inverter operation, this must be specified when ordering. The motors must be protected against overheating with suitable monitoring equipment! The dust levels must not exceed 5 mm! The motors are designed for the voltage and frequency range A as in EN 60034 Part 1.

Electrical equipment for use in areas with combustible dust complies with the standards EN 50281-1-1, EN 60034 and EN 50014. The level of explosion hazard is determined by the zone separation. The operator/employer is responsible for zone separation (guideline 1999/92/EC).

If the designation is supplemented by an X, special documentation in the EC type examination certificate must be complied with. It is forbidden to use standard motors in hazardous areas that are not authorised for use in hazardous areas. In Zone 21, the cable entries must be authorised for Ex areas (protection class minimum IP 66) and must be secured against accidental loosening. Unused apertures must be sealed with authorised plugs (minimum protection class IP 66).

For Zone 22, the cable glands must as a minimum correspond to the protection type specified on the type plate. Unused openings must be closed with plugs, which as a minimum correspond to the protection class of the motor.

The motor must not be opened under hazardous atmospheres to connect the electrical cables or for any other work. The voltage must always be switched off and secured against being switched on again before opening the motor!



6. Motors for use in Zone 21 and Zone 22



If the motor is supplied with a certified cable gland, the clamping nuts of the cable gland must be tightened to the torque specified in the following table.

Cable gland	Clamping nut tightening torque [Nm]
M20x1,5	6
M25x1,5	8
M32x1,5	12
M40x1,5	16

The permissible ambient temperature range for all motors is -20°C...+40°C. A greater ambient temperature range of -20°C...+60°C is permissible with motors for operation in Zones 21 and 22. This does not however apply with the option brake and external fans! The rated power must then be reduced to **72%** of the catalogue value. If the maximum value of the ambient temperature is between +40°C and +60°C, the value of the power consumption can be inversely interpolated linearly between **100%** and **72%**. Thermal motor protection with a PTC temperature sensor is essential here. The motor connection cables and the cable glands must be suitable for temperatures $\geq 90^\circ\text{C}$.

IEC-B14 motors

The B14 flanged bearing plate must be covered with a protective foil which must be removed before the motor is fastened in place. All four fixing screws, even if not required, must be screwed into the flanged bearing plate! The fixing screw threads must be inserted with a sealant, e.g. Loctite 242. The maximum screw-in depth in the bearing plate is $\underline{2} \times d$.

If the shaft end faces upwards, e.g. models IMV3, IMV6, a cover must be positioned on the motor by the operator/installer to prevent foreign bodies from falling into the motor ventilation cover (see DIN EN 50 280-1-1). It must not hinder the motor from being cooled by the fans. Where shaft ends face down, e.g. models IMV1, IMV5, the motors for Zone 21 are generally equipped with a protective roof on the ventilation cover. A handwheel on the second shaft end is not permitted.

Unless otherwise specified for operating modes and tolerances in the test certificate or rating plate, electrical machinery is designed for continuous operation and normal infrequent start-ups where insignificant start-up heating occurs. The motors may only be used for the operating mode specified on the rating plate.

The installation regulations must be complied with!

6.4 Structure and operating mode

The motors are self-cooling. Rotary shaft seals are fitted both on the drive side (DS) and on the ventilation side (VS).

Motors for Zone 21 and Zone 22 have metal fans. The motors are designed for protection class IP 55 (Zone 22 – non-conductive dust) or IP 66 (Zone 21). Under normal operating conditions the surface temperature does not exceed that stated on the identification plate.

6.5 Minimum cross-sections of ground leads

Cross-section of phase conductor in installation S in mm^2	Minimum cross-section of the associated ground lead S_p in mm^2
$S \leq 16$	S
$16 < S \leq 35$	16
$S > 35$	$0,5 S$

When connecting a lead to the external ground, the minimum cross-section must be 4 mm^2 .



6. Motors for use in Zone 21 and Zone 22



6.6 Maintenance

The voltage must always be switched off and secured against being switched on again!

Attention! Higher temperatures than the maximum permitted surface temperature of the housing may be present inside the motor. The motor must therefore never be opened in hazardous dust atmospheres!

The motors must be checked and tested regularly for functional safety! The applicable national standards and regulations must be complied with!

Unpermitted high dust deposits > 5 mm may not be allowed to build up! If functional safety cannot be ensured, the motor may not be operated!

When the ball bearings are replaced, the rotary shaft seals must also be replaced. FKM rotary shaft seals as specified by Getriebebau NORD must be used. Ensure that they are fitted correctly!

The rotary shaft seals must be lubricated on the external rings and on the seal lips. If an explosion protected gear is flanged dust-tight to the motor, an NBR rotary shaft seal can be used on the drive side of the motor if the gear oil temperature does not exceed 85°C.

Only original parts may be used as spare parts with the exception of standardised, commercially available and equivalent parts. This also applies in particular to seals and connection components. Parts for terminal boxes or spare parts for external grounding must be ordered as per the spare parts list in the operating instructions.

The functionality of seals, rotary shaft seals and cable glands must be regularly checked!

Maintaining dust protection for the motors is of paramount importance for explosion protection.

Maintenance must be implemented by qualified personnel in a specialist workshop with suitable equipment.

We urgently recommend that general overhauls are implemented by NORD Service.



7. Options for motors used in Zone 22



7.1 Option inverter operation

ATEX NORD motors for Zone 22 are suitable for inverter operation due to their insulation system design. Because of the variable rpm range, temperature monitoring with PTC resistors or temperature monitors is necessary. For safe engineering and application, comply with the engineering guideline "Operation of ATEX motors with frequency inverters", No. 605 2101. The engineering guideline provides information about the necessary requirements for inverter operation and about the permitted rpm ranges.

7.2 Option external fan

Motors with the additional designation **F** (e.g. 80S/4 3D **F**) are equipped with an external fan and must be monitored via the integrated temperature sensor.



Attention!

The motor may only be operated together with the external fan! A failure of the external fan can lead to the motor overheating and therefore endanger property/persons. Comply with the operating instructions for the external fan!

The power supply for the external fan is provided independently via the external fan terminal box. The external fan power supply must be identical to the voltage rating given on the rating plate. The external fans must be protected against overheating with suitable monitoring equipment! The IP protection classes of the external fan and motor may be different. The lower IP protection class applies to the drive unit. The cable glands must as a minimum correspond to the protection type specified on the type plate. Unused openings must be closed with plugs, which as a minimum correspond to the protection class of the motor.

External fans and motors for use in hazardous areas have an Ex designation as per guideline 94/9 EC. This designation must be present on the external fan and on the motor. If the designations of the external fan and the motor differ, the lowest designated explosion protection applies to the entire drive. The maximum specified temperature given in the surface temperature data for the individual components applies for the entire drive unit. In this case, it may be necessary to take into account any gears that may be present. Contact Getriebebau NORD if there are any doubts.

If any component in the entire drive does not have an Ex designation, then the entire drive may not be operated in an Ex area.

7.3 Option return stop

Motors with the additional designation **RLS** (e.g. 80S/4 3D **RLS**) are equipped with a return stop.

Motors with return stops have an arrow marking the direction of rotation on the ventilation cover. The arrow points in the rotation direction of the motor. It must be ensured, when connecting the motor and during motor control, that the motor can only operate in the rotation direction, e.g. by means of a rotary field test. Switching the motor to the blocked rotation direction, i.e. incorrect rotation direction, can lead to damage.

Return stops operate without wear from a speed of ca. 800 1/min.. Return stops must not be operated at speeds under 800 1/min to prevent unpermitted heating and rapid wear of the return stop. This must be taken into account for motors with a frequency of 50 Hz and poles ≥ 8 , and for motors with frequency inverters.

7.4 Option brake

Motors with the additional designation **BRE** (e.g. 80S/4 3D **BRE 10**) are equipped with a brake and must be monitored via the integrated temperature sensor. If the temperature sensor of one of the components (motor or brake) is triggered, the entire drive must be securely shutdown. The motor and brake PTC's must be switched in series.

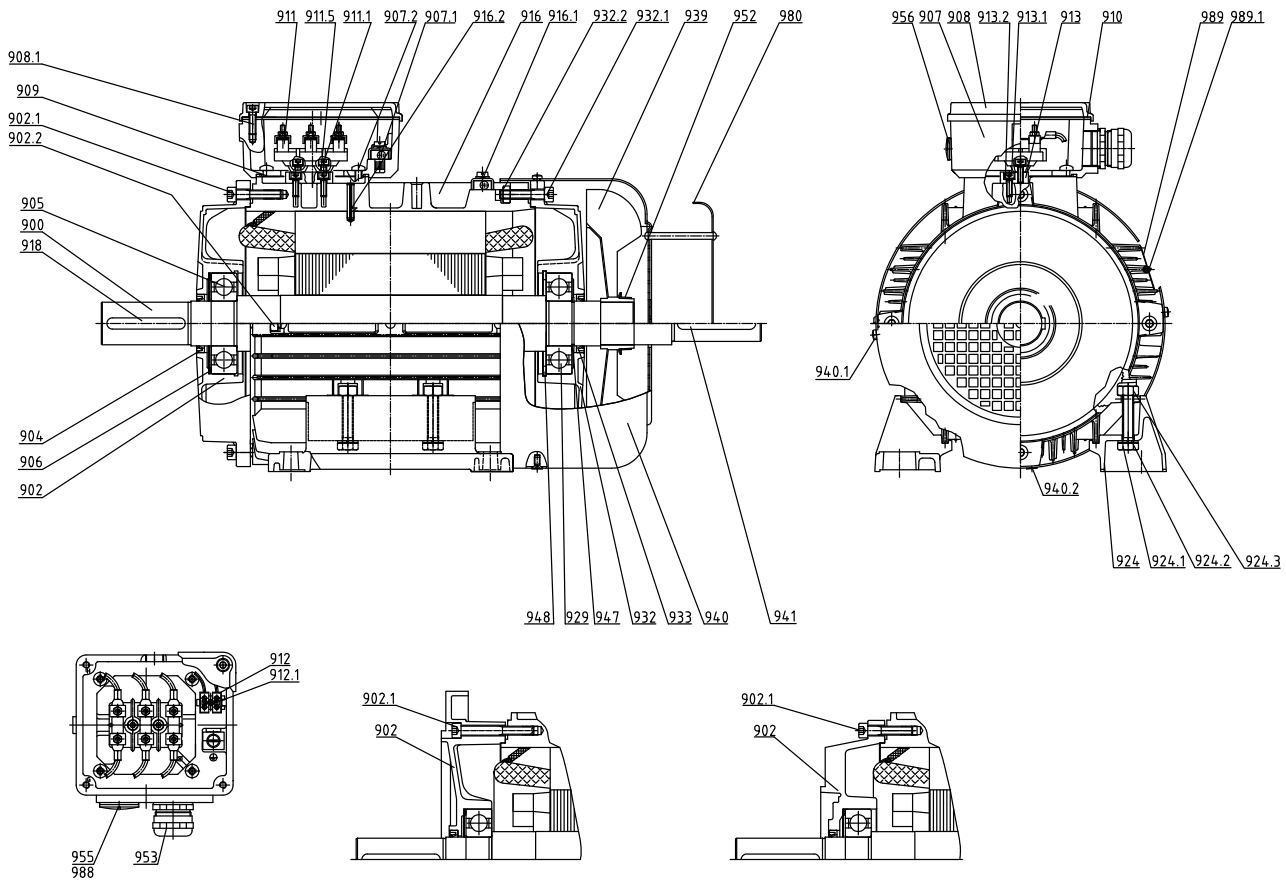


Attention!

The brake DC voltage supply must be implemented via a rectifier located in the motor terminal box or via a directly supplied voltage. The brake voltage shown on the rating plate must be complied with.

The power supply lines must not be laid in a cable together with the temperature sensor circuit. The brake functionality must be checked before start-up. There should be no grinding noises, as this could lead to unpermitted excessive heating.

8. Spare parts drawing and spare parts list



Item No.	Description	Item No.	Description
900	Rotor with shaft	918	Key
902	End shield at drive end	924	Screw-on foot (BG 100-132)
902.1	Cheese-head screw	924.1	Hexagon bolt
902.2	Hexagon nut	924.2	Spring lock washer
904	Shaft seal	924.3	Hexagon nut
905	Bearing at drive end	929	Bearing at ventilation end
906	Ball bearing shim	932	End shield at ventilation end
907	Terminal box frame	932.1	Cheese-head screw
907.1	Chassis connection terminal wire clamp	932.2	Hexagon nut
907.2	Oval-head screw	933	Shaft seal
908	Terminal box lid	939	Fan
908.1	Cheese-head screw	940	Fan hood
909	Terminal box frame gasket	940.1	Oval-head screw
910	Terminal box lid gasket	940.2	Countersink screw B3
911	Terminal board	941	Key
911.1	Cheese-head screw	942 947	Circlip
911.5	Spring lock washer	948	Circlip
912	Mini-terminal	952	Clamping bush
912.1	Oval-head screw	953	Cable gland
913	Spacer	955	Blind plug
913.1	Cheese-head screw	956	Blind plug
913.2	Spring lock washer	980	Protective roof
916	Stator with winding	988	Ring seal
916.1	Equipotential bonding terminal	989	Rating plate
916.2	Spring pin	989.1	Oval-head screw

9. Conformity declaration



Conformity declaration

(as per guideline 94/9/EC appendix VIII)

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Getriebebau NORD

has sole responsibility for issuing this EC conformity declaration. *The declaration is not an assurance in terms of product liability.*

Product

Three-phase asynchronous motor with cage rotor in device group II, category 2D
SK 63S/4 2D to SK 132M/40 2D

Getriebebau NORD declares the conformity of the above named product with the following guidelines:
94/9/EC

Applied standards:

EN 60034, EN 50281-1-1, EN 50014

Notified body:

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Getriebebau NORD

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Bargteheide, 27.08.2004

Place and date of issue

U. Küchenmeister, Managing director

i.V. Dr. B. Bouché, Engineering manager



9. Conformity declaration

Conformity declaration

(as per guideline 94/9/EC appendix VIII)

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Product

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SK 63S/4 3D to SK 132M/40 3D

Getriebebau NORD declares the conformity of the above named product with the following guidelines:
94/9/EC

Applied standards:

EN 60034, EN 50281-1-1, EN 50014

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Conformity declaration

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Product Three-phase asynchronous motor with cage rotor in device group II, category 2G
SK 80S/4 2G and SK 80L/4 2G

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Applied standards: EN 60034, EN 60079-0, EN 60079-7

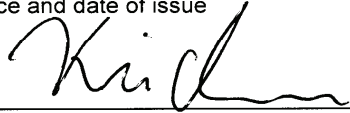
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28/02/2013


DRIVESYSTEMS

3.3. Centrifuge Feed Valve Actuators –

3.3.1. Rotork IQ-10 Installation & Maintenance Instructions

rotork electric



IQ Range Installation and Maintenance Instructions



The Rotork Setting Tool allows actuator control, indication and protection functions to be configured to suit site requirements. It is essential that all the actuator settings are checked for compatibility with the process and control system requirements before the actuator is put into service. Please read this publication.

When Rotork personnel or nominated agents are contracted to carry out site commissioning and/or acceptance, documentation of commissioned actuator configuration can be made available for customer records.

This manual provides instruction on:

- * Manual and electrical (local and remote) operation.
- * Preparation and installation of the actuator onto the valve.
- * Subsequent commissioning and adjustment of the Primary Settings for correct valve operation.
- * Commissioning and adjustment of the Secondary Settings to suit site-specific control and indication requirements.
- * Maintenance – Troubleshooting.
- * Sales and Service.

Refer to Publication E180E2 for repair, overhaul and spare part instructions.

THE ROTORK IQ RANGE – THE FIRST VALVE ACTUATOR THAT YOU CAN COMMISSION AND INTERROGATE WITHOUT REMOVING ELECTRICAL COVERS.

Using the supplied infra-red Setting Tool to access the actuator set up procedures, “point and shoot” setting of torque levels, position limits and all other control and indication functions can be made safely, quickly and conveniently, even in hazardous locations. The IQ allows commissioning and adjustment to be carried out with the main power supply to the actuator switched on or off.

Standard diagnostics access information about the control system, valve and actuator status in the form of display icons and help screens.

Instantaneous valve torque and position can be monitored on the actuator with a single key press of the Setting Tool.

The on board Datalogger captures operational and valve torque data enabling informed maintenance choices to be made. IQ Insight software for PC and PDA allows the Datalogger to be interrogated, as well as the complete actuator set up to be configured and recorded.

The actuator containing the Setting Tool will be identified with a yellow label on the terminal cover.

Visit our web site at www.rotork.com for more information on the IQ and other Rotork actuator ranges.

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Health and Safety

This manual is produced to enable a competent user to install, operate, adjust and inspect Rotork IQ range valve actuators.

The electrical installation, maintenance and use of these actuators should be carried out in accordance with the National Legislation and Statutory Provisions relating to the safe use of this equipment, applicable to the site of installation.

For the UK: Electricity at Work Regulations 1989 and the guidance given in the applicable edition of the "IEE Wiring Regulations" should be applied. Also the user should be fully aware of his duties under the Health and Safety Act 1974.

For the USA: NFPA70, National Electrical Code ® is applicable.

The mechanical installation should be carried out as outlined in the manual and also in accordance with relevant standards such as British Standard Codes of Practice. If the actuator has nameplates indicating that it is suitable for installation in Hazardous Gas Areas then the actuator is suitable for use in Zone 1 and Zone 2 (or Div 1 and Div 2) explosive atmospheres only. It should

not be installed in atmospheres where gases are present with an ignition temperature less than 135°C, unless suitability for lower ignition temperatures has been indicated on the actuator nameplate.

Any test instruments applied to the actuator should be of equivalent certification. The electrical installation, maintenance and the use of the actuator should be carried out in accordance with the code of practice relevant for that particular Hazardous Gas Area certification.

No inspection or repair should be undertaken unless it conforms to the specific Hazardous Gas Area certification requirements. Under no circumstances should any modification or alteration be carried out on the actuator as this could invalidate the conditions under which its certification was granted.

Access to live electrical conductors is forbidden in the hazardous area unless this is done under a special permit to work, otherwise all power should be isolated and the actuator moved to a non-hazardous area for repair or attention.

Only persons competent by virtue of their training or experience should be allowed to install, maintain and repair Rotork actuators. Work undertaken must be carried out in accordance with instructions in the manual. The user and those persons working on this equipment should be familiar with their responsibilities under any statutory provisions relating to the Health and Safety of their workplace.

WARNING: **Motor Temperature**

With excessive use the motor surface temperature could reach 132°C (270°F).

Thermostat Bypass

If the actuator is configured to bypass the motor thermostat, when using the ESD function, the hazardous area certification will be invalidated.

Control and Indication

Where the actuator build allows remote control and indication supplies higher than 150V a.c. but below 300V a.c. (refer to actuator wiring diagram) the remote control and indication supplies must be derived from a supply which is designated as installation category (overvoltage category) II as defined in

BSEN 61010 (Safety Requirements For Electrical Equipment for measurement, control and laboratory use).

Enclosure Materials

IQ10 to IQ35 are manufactured from aluminium alloy with stainless steel fasteners and the thrust bases are manufactured in cast iron. IQ40 to IQ95 enclosures are manufactured in aluminium alloy and cast iron with stainless steel fasteners and the thrust bases are manufactured in cast iron.

The user must ensure that the operating environment and any materials surrounding the actuator cannot lead to a reduction in the safe use of, or the protection afforded by, the actuator. Where appropriate the user must ensure the actuator is suitably protected against its operating environment.

Should further information and guidance relating to the safe use of the Rotork IQ range of actuators be required, it will be provided on request.

WARNING: Operating by Hand

With respect to handwheel operation of Rotork electric actuators, see warning on p3.

2

Storage

If your actuator cannot be installed immediately store it in a dry place until you are ready to connect incoming cables.

If the actuator has to be installed but cannot be cabled it is recommended that the plastic transit cable entry plugs are replaced with metal plugs which are sealed with PTFE tape.

The Rotork double-sealed construction will preserve internal electrical components perfectly if left undisturbed.

It is not necessary to remove any electrical compartment covers in order to commission the IQ actuator.

Rotork cannot accept responsibility for deterioration caused on-site once the covers are removed.

Every Rotork actuator has been fully tested before leaving the factory to give years of trouble free operation, providing it is correctly commissioned, installed and sealed.

3

Operating your IQ Actuator

3.1 Operating by Hand

WARNING

With respect to handwheel operation of Rotork electric actuators, under no circumstances should any additional lever device such as a wheel-key or wrench be applied to the handwheel in order to develop more force when closing or opening the valve as this may cause damage to the valve and/or actuator or may cause the valve to become stuck in the seated/backseated position.



Fig. 3

To engage handwheel drive depress the Hand/Auto lever into "Hand" position and turn the handwheel to engage the clutch. The lever can now be released when it will return to its original position. The handwheel will remain engaged until the actuator is operated electrically when it will automatically disengage and return to motor drive. If required the Hand/Auto lever can be locked in either position using a padlock with a 6.5mm hasp.

3.2 Operating Electrically

Check that power supply voltage agrees with that stamped on the actuator nameplate. Switch on power supply. It is not necessary to check phase rotation.

Do not operate the actuator electrically without first checking, using the infra-red Setting Tool, that at least the Primary Settings have been made (refer to Section 8 page 20).

Selecting Local/Stop/Remote Operation

The red selector enables either Local or Remote control, lockable in each position using a padlock with a 6.5mm hasp.

When the selector is locked in the Local or Remote positions the Stop facility is still available. The selector can also be locked in the Stop position to prevent electrical operation by Local or Remote control.



Fig. 3.1

Local Control

With the red selector positioned at Local (anti-clockwise) the adjacent black knob can be turned to select Open or Close. For Stop, turn red knob clockwise.

Remote Control

Rotate the red selector to the Remote position (clockwise), this gives remote

control only for Open and Close but local Stop can still be used by turning the red knob anti-clockwise.

3.3 Display-Local Indication

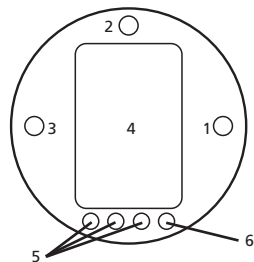


Fig. 3.2 The Actuator Display

The display consists of:

1. Red – position indication lamp
2. Yellow – position indication lamp
3. Green – position indication lamp
4. Liquid crystal display screen (LCD)
5. Infra-red sensors
6. Infra-red signal confirmation indicator (Red)

The liquid crystal display screen has 2 modes of position indication:

1. Valve position – power on
2. Valve position – power off

On power up the actuator's liquid crystal display screen is back-lit with a "soft amber" light and one of the indicator lamps will be on, dependent on position. The display screen will show percentage open or an end of travel symbol. (See Figs 3.3, 3.4 and 3.5)

As standard, red lamp signifies valve open, yellow intermediate, and green lamp signifies valve closed. Open and closed colour functions can be reversed on request.

Open

Red indicator and open symbol displayed

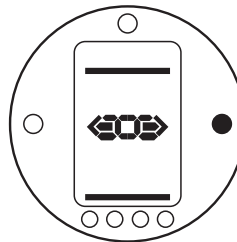


Fig. 3.3

Mid Travel

Yellow indicator and percentage open value displayed

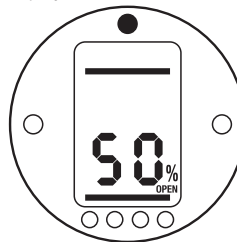


Fig. 3.4

Closed

Green indicator and closed symbol displayed

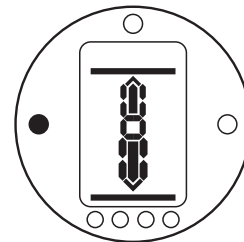


Fig. 3.5

With the main power supply switched off, the liquid crystal display screen is powered by a battery and continues to display actuator position. However, the battery does not support screen back-lighting, or position indicator lamps.

3.4 Display–Alarm Indication

The IQ display incorporates valve, control system, actuator and battery alarm indication in the form of four display icons. Located in the top portion of the display, each icon represents certain alarm conditions. Standard help screens are also available to assist in determining the actuator operational and alarm status (refer to *Help Screens* page 67).

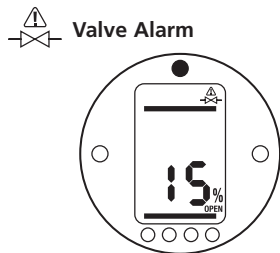


Fig. 3.6

The valve alarm icon, Fig 3.6, is displayed when a valve problem causes the actuator to “trip-off” due to the configured torque value being developed (refer to **[tC]/[tO]** pages 25/26). The possible causes are:

- Valve tight or obstructed in mid travel.
- Valve stuck or jammed
- Valve process conditions changed (increase in pressure, flow etc.)

Once the actuator has tripped off on torque, electrical operation in the same direction is inhibited. The icon will remain displayed until movement in the opposite direction takes place.

The valve alarm icon will not be displayed when stopping at end of travel for valves configured to torque seat or torque back seat at end of travel (refer to **[C2]/[C3]** pages 23/24).

Try handwheel operation of the valve to “feel” for stiffness (refer to page 3).



Fig. 3.7

The control system alarm icon, Fig 4.5, is displayed when the remote control system maintains an active ESD or interlock signal (the ESD, interlock function or conditional control having been enabled.)

Local and Remote operation will be inhibited while an active ESD or interlock signal is present (refer to **[A1]** ESD Action page 34, **[A8]** External Interlocks page 36 and Conditional Control **[A9]** page 36.)

Investigate the operational conditions of the actuator remote control system.

Actuator Alarm

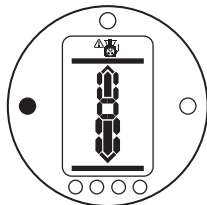


Fig. 3.8

The actuator alarm icon, Fig. 3.8, is displayed when an active actuator alarm is present.

Electrical operation will be inhibited while an alarm is present. The possible causes are:

- Transformer thermostat tripped
- Battery low on power up*
- Power supply fault

*see *Battery Alarm*

(To identify the specific cause of the alarm refer to *Help Screens* pages 67-71).

Battery Alarm

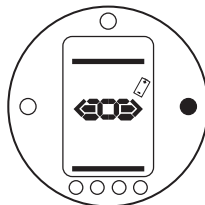


Fig. 3.9

The battery alarm icon, Fig. 3.9, is displayed when the actuator detects its battery as being low, discharged or missing.

If, on power up, the actuator detects a discharged battery and actuator power loss inhibit feature **[OS]** is enabled (refer to page 62), both battery and actuator alarm icons (Fig.3.8 and 3.9) will be displayed. Electrical operation will be inhibited.

When the battery alarm icon is displayed, the battery should be replaced immediately (refer to page 65).

The actuator checks the battery status at approximately 10 minute intervals. After replacing a battery the alarm icon will continue to be displayed until the next check indicates the battery is healthy. This may take up to 10 minutes.

4

Preparing Drive Bush

4.1 IQ10 to IQ35
Thrust Base Types A and ZRemoval of Drive Bush for
Machining

Fig. 4 Bronze Drive Bush Fitted into Thrust Taking Base

Turn actuator onto its side, remove the two cap-headed screws holding base plate onto thrust base, pull out the drive bush complete with its bearing assembly.

Before machining the drive bush the thrust bearing must be removed. IQ10, IQ12 and IQ18 actuators have a sealed thrust bearing located on the drive bush and retained by the steel



Fig. 4.1 Components of Type A Thrust Base

bearing stop ring. The bearing stop ring is locked with one socket set screw.

IQ20, IQ25 and IQ35 have a thrust race ball bearing within the steel bearing housing, located on the drive bush and retained by the steel bearing stop ring. The bearing is sealed within its housing by O-rings located on the drive bush and on the bearing stop ring. The bearing stop ring is locked with two socket set screws.

1. Locate and loosen the locking socket set screw(s) in the bearing stop ring.

2. Unscrew the bearing stop from the drive bush. Slide the bearing off the drive bush. Keep the drive bush and stop ring in a safe clean place.
3. For all sizes ensure the drive bush male thread (stop ring) is not damaged during machining. For sizes IQ20, IQ25 & IQ35, ensure the O-ring located in the drive bush is not damaged during machining. Machine drive bush to suit the valve stem, allowing generous clearance on the screw thread for rising stem valves.

Re-assembly

1. Remove all swarf from the drive bush, ensuring the O rings on the drive bush and bearing stop ring (where fitted) are undamaged, clean and greased.
2. Slide the bearing assembly onto the drive bush and ensure it is fitted down to the drive bush shoulder.
3. Screw the stop ring with the locking socket set screw(s) uppermost on to the drive bush until it comes to a stop – hand tight and lock with the locking socket set screws. The locking socket set screws must be done up tight to prevent the

assembly working loose, as shown in Fig 4.2. Refer to the table below for required tightening torques.

Socket set screw size	Allen key bit size	Torque Nm	Torque lbs/ft
M4	M2	2.2	1.62
M6	M3	7.8	5.75



Fig. 4.2

4. Refit the drive bush assembly into the base casting on the actuator, ensuring that the slots in the drive bush are located into the drive dogs of the hollow output shaft.
5. Refit the base plate and secure with cap-headed screws.

4.2 IQ10 to IQ35 Non-Thrust Base Type B

Undo the four set screws securing the base plate to the gearcase and remove the base plate.

The drive bush and its retaining clip can now be seen.

Types B3 and B4 removal: (refer to Fig. 4.3)

Using external circlip pliers, expand the circlip while pulling on the drive bush. The drive bush will detach from the actuator centre column with the circlip retained in its groove.



Fig. 4.3



Fig. 4.4

Type B1

(Refer to Fig. 4.4)

The procedure for removal and refitting of the B1 drive bush is the same as for B3 and B4. However the circlip is replaced with a custom spring clip. The spring clip operates in the same manner as the B3/B4 circlip but is expanded using long-nose pliers.

4.3 IQ40 to IQ95 Thrust Base Types A and Z

Removal of Drive Bush for Machining

Engage "hand" and turn handwheel until retainer set screw is visible through hole in actuator base.



Fig. 4.5 Locating Set Screw

Loosen set screw and unscrew retainer using hammer and punch. Remove drive bush and machine to suit valve stem or gearbox input shaft.

Allow generous clearance on screw thread for rising stem valves.



Fig. 4.6 Removal of Retainer



Fig. 4.7 Type A Drive Bush

If the actuator has a type A drive bush (Fig. 4.7) this can be fitted in position 1 or 2 to suit the position of the valve mounting flange.



Fig. 4.8 Type A Drive Bush in Position 1



Fig. 4.9 Type A Drive Bush in Position 2

If the actuator has a type Z3 drive bush (Fig. 4.10) this can only be fitted below the actuator base (Fig. 4.11).



Fig. 4.10 Type Z3 Drive Bush



Fig. 4.11 Type Z3 Drive Bush in Position 3

Re-Assembly

Having confirmed the position required, insert the machined drive bush ensuring that the actuator output shaft dogs are in full engagement with the bush. Fit drive bush retainer securely, turning clockwise until fully tightened using hammer and punch. Rotate by hand wheel to align retainer set screw with hole in the side of base and tighten.

4.4 IQ40 to IQ95 Non-Thrust Base Type B

Type B1

Output shaft bored and keyed to ISO 5210 standard. There is no drive bush to machine.



Fig. 4.12 Tightening Retainer Set Screw

Types B3 and B4

Identical drive bushes secured by cap headed screws.

B3 is supplied pre-machined to ISO 5210 standard.

B4 is supplied blank and must be machined to suit the input shaft of the gearbox or valve that it will drive.



Fig. 4.13 B3/B4 Drive Bush



Fig. 4.14 B3/B4 Drive Bush in Situ

5

Mounting the Actuator

(Refer to Weights and Measures page 74 for actuator weight.)

Ensure the valve is secure before fitting the actuator as the combination may be top heavy and therefore unstable.

If it is necessary to lift the actuator using mechanical lifting equipment certified slings should be attached as indicated in Fig.5 for vertical valve shafts and Fig.5.1 for horizontal shafts.

At all times trained and experienced personnel should ensure safe lifting, particularly when mounting actuators.

WARNING:

The actuator should be fully supported until full valve shaft engagement is achieved and the actuator is secured to the valve flange.

A suitable mounting flange conforming to ISO 5210 or USA Standard MSS SP101 must be fitted to the valve.

Actuator to valve fixing must conform to Material Specification ISO Class 8.8, yield strength 628 N/sq mm.

WARNING:

Do not lift the actuator and valve combination via the actuator. Always lift the valve/actuator assembly via the valve.

Each assembly must be assessed on an individual basis for safe lifting.



Fig. 5



Fig. 5.1

5.1 Rising Stem Valves – Top Mounting

a) Fitting the Actuator and Base as a Combined Unit – All Actuator Sizes



Fig. 5.2

Fit the machined drive bush into the thrust base as previously described, lower the actuator onto the threaded valve stem, engage “hand” and wind the handwheel in the opening direction to engage the drive bush onto the stem. Continue winding until the actuator is firmly down on the valve flange. Wind two further turns, fit securing bolts and tighten fully.

b) Fitting Thrust Base to Valve – Actuator Sizes 10 to 35 only

Fit the machined drive bush into the thrust base as previously described. Remove the thrust base from the actuator, place it on the threaded valve stem with the slotted end of the drive bush uppermost and turn it in the opening direction to engage the thread. Continue turning until the base is positioned onto the valve flange. Fit securing bolts but do not tighten at this stage. Lower the actuator onto the thrust base and rotate the complete actuator until the drive dogs on the actuator output shaft engage into the drive bush. Actuator flange should now be flush with base flange.



Fig. 5.3

Continue to turn actuator until fixing holes align. Using bolts supplied fix actuator to thrust base and tighten down. Open valve by two turns and firmly tighten down fixings onto valve flange.

5.2 Valve with Gearbox – Side Mounting

Check that the mounting flange is at right angles to the input shaft, and that the drive bush fits the shaft and key with adequate axial engagement. Engage “hand”, offer up actuator to the input shaft and turn handwheel to align keyway and key. Tighten mounting bolts.

5.3 Non-Rising Stem Valves – Top Mounting

Treat as for side mounting except that when thrust is taken in the actuator, a thrust nut must be fitted above the drive bush and securely tightened.

5.4 Handwheel Sealing

Ensure that sealing plug in centre of handwheel (or spindle cover tube depending on which is fitted) is sealed with PTFE tape and fully tightened, ensuring that moisture does not pass down the centre column of the actuator.

5.5 IQM Modulating Actuators

The IQM range of actuators are suitable for modulating control duty of up to 1200 starts per hour in accordance with IEC 34-1 to S4 50%.

IQM actuators have a dynamic braking facility as standard. If mechanical overrun of the actuator and valve prove to be excessive for accurate control, the brake can be enabled by fitting a link to the actuator terminal block as indicated by the wiring diagram. With dynamic braking enabled, motor heating effects increase and therefore the number of actuator starts should be reduced to prevent motor thermostat tripping (refer to publication E 410E for more information).

Commissioning of IQM range actuators is identical to the standard IQ (refer to Sections 7, 8 and 9 commencing on page 16).

5.6 IQML Linear Drive Unit

Consists of a lead screw assembly arranged attached to the base of the actuator in order to provide a linear output stroke between 8mm ($\frac{3}{8}$ in) minimum and 120mm ($4\frac{3}{4}$ in) maximum.

The IQML can be supplied with or without a yoke mounting adaptor. This adaptor consists of four pillars and a base flange to suit the valve.



Fig. 5.4 IQML with Yoke



Fig. 5.5 IQML without Yoke

5.7 IQML Adjusting Linear Stroke

With actuator securely fitted to valve, but with the linear drive disconnected, ensure valve is at its fully closed (down) position.

Remove cover tube from actuator handwheel, locate the down stop adjustment on the linear drive unit and with two spanners loosen the lock nut, run the lock nut and tubular down stop to the end of the thread.



Fig. 5.6 Down Stop two Spanners

5.7 IQML Adjusting Linear Stroke continued

Turn the actuator handwheel clockwise, linear drive will move down towards the valve spindle, couple linear drive to valve spindle.

Turn the tubular down stop clockwise into the actuator until it comes to a mechanical stop. If the valve must close onto its seat by "TORQUE ACTION" then back off (anti-clockwise) the down stop by one third of one turn (equivalent to 1mm). Run the lock nut down onto the tubular down stop and tighten with two spanners. There is no "up stop" (open) on the linear drive unit, the mechanical stop in the valve will give this position. Refit the top cover tube to the handwheel using PTFE tape to seal the thread.

The linear drive unit is pre-packed with grease type Rocol MTS 1000, use this or an equivalent high temperature-bearing grease.

A grease nipple is situated in the base of the actuator to enable lubrication of the lead screw. Periodically, depending on usage and temperature, apply two pumps of a grease gun.

6

Cable Connections

WARNING:

Ensure all power supplies are isolated before removing actuator covers.

Check that the supply voltage agrees with that stamped on actuator nameplate.

A switch or circuit breaker must be included in the wiring installation of the actuator. The switch or circuit breaker shall be mounted as close to the actuator as possible and shall be marked to indicate that it is the disconnecting device for that particular actuator. The actuator must be protected with overcurrent protection devices rated in accordance with Rotork publication No. E130E Electric motor performance data for IQ range actuators.

WARNING:

Actuators for use on phase to phase voltages greater than 600V a.c. must not be used on supply systems such as floating, or earth-phase systems, where phase to earth voltages in excess of 600V a.c. could exist.

Q-Pulse Id: TMS214

6.1 Earth/Ground Connections

A lug with a 6mm diameter hole is cast adjacent to the conduit entries for attachment of an external protective earthing strap by a nut and bolt. An internal earth terminal is also provided, however it must not be used alone as the protective Earth Connection.

6.2 Removing Terminal Cover

Using a 6mm Allen key loosen the four captive screws evenly. Do not attempt to lever off the cover with a screwdriver as this will damage the "O" ring seal and may damage the flamepath on a certified unit.



Fig. 6

Actuators containing a Setting Tool fitted to the inside of the terminal compartment cover are identified with a self-adhesive yellow label on the outside of the terminal compartment cover.

The wiring code card fixed in the cover is particular to each actuator and must not be interchanged with any other actuator. If in doubt check the serial number on the code card with that of the actuator.



Fig. 6.1

A plastic bag in the terminal compartment contains:
Terminal screws and washers.
Spare cover "O" ring seal.
Wiring diagram.
Instruction book.



Fig. 6.2

6.3 Cable Entry

Only appropriate certified Explosion-Proof entry reducers, glands or conduit may be used in hazardous locations.

Remove red plastic transit plugs. Make cable entries appropriate to the cable type and size. Ensure that threaded adaptors, cable glands or conduit are tight and fully waterproof. Seal unused cable entries with a steel or brass threaded plug. In hazardous areas an appropriately certified threaded blanking plug must be used.

6.4 Connecting to Terminals

On EExde enclosure units connections to the power and control terminals must be made using AMP type 160292 ring tabs for power and earth terminals and AMP type 34148 ring tabs for the control terminals.

Refer to the wiring diagram inside the terminal cover to identify functions of terminals. Check that supply voltage is the same as that marked on the actuator nameplate.

Remove power terminal screen.

Begin by connecting these cables and replace screen.

When all connections are made ensure wiring diagram is replaced in the terminal compartment.

6.5 Replacing Terminal Cover

Ensure cover "O" ring seal and spigot joint are in good condition and lightly greased before re-fitting cover.

Commissioning

7.1 The Setting Procedure

The Rotork IQ range of actuators is the first that enables commissioning to be carried out without removing covers.

Setting torque, limit and other functions is achieved by using the Infra-Red Setting Tool. The Setting Tool is certified Intrinsically Safe to allow commissioning in hazardous areas.

All the commissioning functions are stored in non-volatile memory in the actuator. The Setting Tool enables the user to view all the functions in turn via the actuator display window. As each function is viewed its setting can be checked and, if required, changed within the bounds of that function.

Commissioning may be carried out with main power switched on or off. Refer to page 20 for Power Off Setting.

The setting procedure is divided into two stages:

1. Primary Functions

Settings for end of travel limit actions, torque values, limit positions etc.

2. Secondary Functions

Settings covering the control, indication and optional equipment functions.

All IQ actuator functions are configured before dispatch to Rotork standard default settings unless alternatives have been specified with the order. Should difficulty be encountered during commissioning the default settings can be reinstated, returning the actuator configuration to its original manufactured state. Site commissioning can then begin again (refer to Section 9.16 page 63).

The default function should be used with caution as settings selected after manufacture may be essential for the safe operation of the valve and/or plant.

Actuator Display

Position Display

50

This may be an open or closed symbol or a percentage open value.

Torque and Position



Refer to Section 10.

Password

P?

PC

Ir

Ic

Setting Branch
(crossroad)

cr

Primary Functions

Direction
Limit Actions
Torque Values
Limit Positions

Secondary Functions

Indication Contacts
Control Mode
Options
Help Screens
Defaults






Note: The Primary Functions must be commissioned first.

7.2 The Setting Tool

Specification


Enclosure	IP67
Certification	EEx ia IIC T4 (intrinsically safe) FM, INT SAFE, Class I & II Div 1 Groups A B C D E F G, T4A CSA, Exia, Class I, II Div 1 Groups A B C D
Power supply	9V Battery (supplied and fitted)
Operating range	0.75m (from actuator display window)

Name Instruction

1.  Key* Display next function down
2.  Key* Display next function across
3.  Key Decrease/change displayed function's value or option setting
4.  Key Increase/change displayed function's value or option setting
5.  Key Enter displayed value or option setting

* Pressing the two arrow keys together returns the actuator display to the position indication mode

Infra-red local operation (when enabled)

5.  Key Stop actuator
6.  Key Open actuator
7.  Key Close actuator
8. Infra-red Transmitter Window

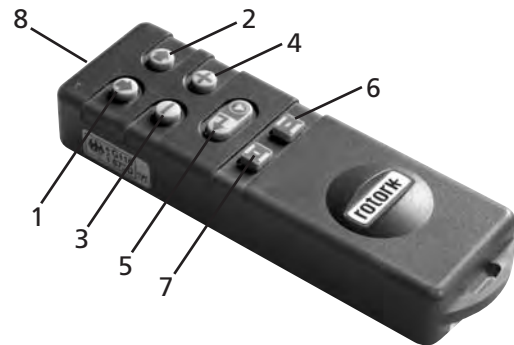


Fig. 7 The Setting Tool

Setting Tool Battery Replacement

Battery status can be checked by looking at the Infra-red transmitter window while depressing any Setting Tool button. A flashing red indicator should be seen.

Battery replacement must be carried out in a safe area. To replace the battery remove the six caphead screws in the back of the Setting Tool. Remove the back cover to expose the battery.

In order to maintain hazardous area certification fit only Duracell MN1604 or Rayovac Alkaline Maximum NoAL-9V battery types. Refit cover ensuring red indicator LED faces the transmitter window in the back cover.

When a button is depressed the Setting Tool transmits the relevant instruction to the actuator by infra-red pulses and must therefore be directly in front of the actuator indicator window and at a distance no greater than 0.75m.

7.3 Entering the Actuator Setting Procedure

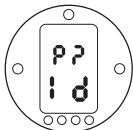
With the actuator securely mounted on the valve, the mains supply on and Local control or Stop selected.

PRESS THE ↓ KEY.

The actuator display will change and the Torque & Position display will be seen. (*For instantaneous torque & position monitoring, refer to Section 10, page 66.*)

PRESS THE ↓ KEY.

The actuator display will change and the password protection display will be seen.



The Actuator Function Settings can be protected by the Use of a Password

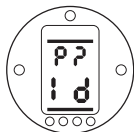
7.4 Setting Mode – Password

To enable setting and adjustment of the actuator functions the correct password must be entered. The factory set (default) password is **[Id]**. If the actuator has previously been set with a site password this must be displayed.

Use the + or – keys to scroll through the available passwords 00–FF (hexadecimal). With the correct password displayed press the enter key.

PRESS THE ← KEY.

Two “setting” bars will appear and will remain visible on every function display screen.



Default Password, Setting Mode Enabled

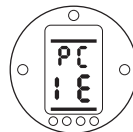
7.5 New Password [PC]

To configure a new password, the actuator must be in setting mode with the password display – setting mode enabled – showing,

PRESS THE → KEY.

The display will change to **[PC]**. Using the + or – key scroll through the available passwords until the desired password is displayed.

PRESS THE ← KEY.

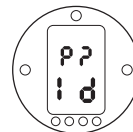


Password Changed to [IE]

NOTE: The new password becomes effective the next time setting mode is entered.

7.6 Checking Mode

The actuator function settings can be checked without entering the correct password. The settings can only be viewed and not altered. The setting bars will not be seen.



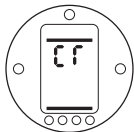
Password Display, Checking Mode

Once the procedure has been entered in the required mode

PRESS THE ↓ KEY.

The procedure branch **[Cr]** (crossroad) display can now be seen (*refer to Section 7.7 page 19*).

7.7 Procedure Branch – Crossroad [Cr]



To access the Primary Function settings **press the arrow ↓ key** (refer to *Section 8 Commissioning Primary Functions page 20*).

To access the Secondary Function settings **press the arrow → key** (refer to *Section 9 Commissioning Secondary Functions page 31*).

7.8 The Actuator Display – Setting/Checking Mode

Actuator functions as laid out in the Primary and Secondary commissioning stages, can be individually displayed by using the Setting Tool arrow keys.

The ↓ arrow key will always display the FIRST function on the next level DOWN within the procedure.

The → arrow key will always display the NEXT function on the SAME level and will wrap around the functions on the same level.

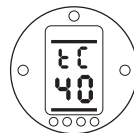
The actuator display indicator lamps will continue to indicate valve position.

Actuator functions are displayed in code form in the top portion of the liquid crystal display screen.

The setting for the displayed function is shown in the lower portion of the screen. Depending on the actuator function displayed, its setting may be an option or a value. In setting mode the Setting

Tool + or – keys will cause the setting to be changed. In checking mode the settings cannot be altered.

In setting mode, once displayed, a new setting can be entered into the actuator memory by **pressing the ← key**. The setting will flash off and back on, confirming its selection.



TOP PORTION

Function e.g.

tC = Torque Close

LOWER PORTION

Function Setting

e.g. Value = 40%

*Typical Actuator Function Display
Setting Mode Enabled*

7.9 Returning to Valve Position Display

There are four ways of returning to valve position display:

1. Approximately 5 minutes after the last Setting Tool operation the display will automatically return to position display.
2. Press the ↓ and → arrow keys together.
3. Press the ↓ arrow key until the display returns to position.
4. With any actuator function screen displayed, select Remote control using the red Local/Stop/Remote selector.

8

**Commissioning –
Primary Functions**

Fig. 8

The actuator's Primary Function settings affect the correct operation of the valve by the actuator. If the actuator has been supplied with the valve, the valve maker or supplier may have already made these settings.

ELECTRICAL OPERATION MUST NOT TAKE PLACE UNTIL THE PRIMARY SETTINGS HAVE BEEN MADE AND CHECKED.

This instruction assumes setting mode has been entered (*refer to section 7.4 page 18*).

Viewing the Primary Function Settings

With the actuator mounted on the valve, the power supply on and Local or Stop control selected, point the Setting Tool at the actuator indicator window from a distance of no more than 0.75m. By pressing the ↓ key and, when appropriate, the → key, it is possible to move through the procedure, displaying the various functions and their settings as shown in Fig. 8.1 (*refer to page 21*). The right-hand side of Fig.8.1 explains the function of each LCD display.

Power Off Setting

IQ allows settings to be viewed and set without main power. To enable this function, engage handwheel drive and rotate until the output drive moves (*refer to page 3*). The Setting Tool can now be used. As long as a Setting Tool key press takes place within the 30 seconds timeout period, Power Off Setting will remain enabled. If no infra-red Setting Tool communication takes place the display will return to indicating position. The actuator must then be operated by handwheel to re-enable Power Off Setting.

Settings and operation must be verified by electric operation and function test of the actuator to ensure correct operation.

Viewing the Primary Function Settings

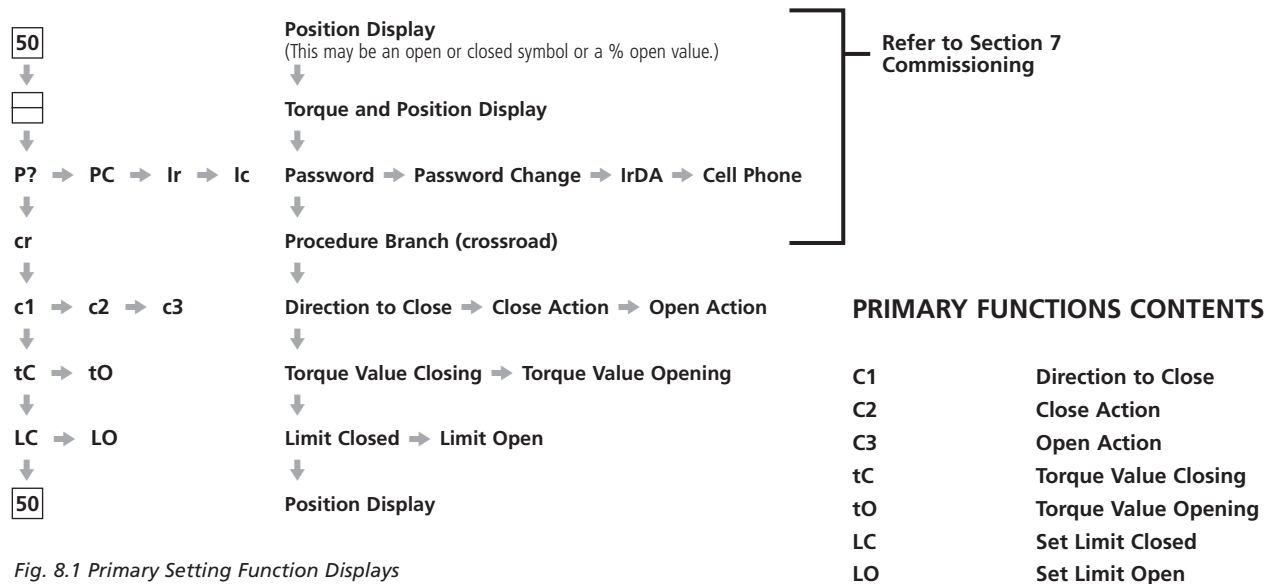


Fig. 8.1 Primary Setting Function Displays

The actuator can be configured to be clockwise or anti-clockwise to close.

C1**Direction to Close**

Manually operate actuator and valve to establish correct closing direction. If the handwheel labelling is found to be incorrect please apply to Rotork for conversion labels.

Using the + or – key, display character conforming to correct closing direction.

Having ensured that the display corresponds to the established closing direction

PRESS THE ← KEY.

The displayed option will flash, indicating that it has been set.

PRESS THE → KEY.

50



P? → PC → Ir → Ic



cr



c1 → c2 → c3



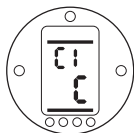
tC → tO



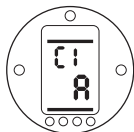
LC → LO



50



[C] in the Setting Field Indicating
Clockwise to Close



[A] in the Setting Field Indicating
Anti-clockwise to Close

C2

Close Action

The actuator can be configured to close on torque for seating valves and limit for non-seating valves.

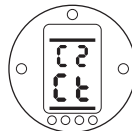
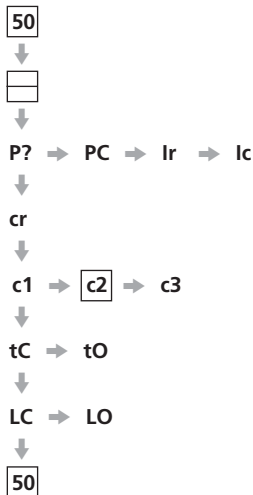
(Refer to valve manufacturer for recommended selection).

In the absence of valvemaker instructions refer to the following table

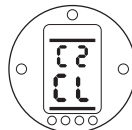
Valve type	Close	Open
Wedge gate	"torque"	"limit"
Globe	"torque"	"limit"
Butterfly	"limit"	"limit"
Thru conduit	"limit"	"limit"
Ball	"limit"	"limit"
Plug	"limit"	"limit"
Sluice gate	"limit"	"limit"
Penstock	"limit"	"limit"
Parallel slide	"limit"	"limit"

Using the + or – key, display the desired option.

NOTE: When set to close on torque, the actuator will apply the value of torque as set for [tC] in seating the valve (refer to [tC] page 25).



[Ct] in the Setting Field Indicating Close on Torque - default setting.



[CL] in the Setting Field Indicating Close on Limit

Having selected the required option

PRESS THE ← KEY.

The displayed option will flash, indicating that it has been set.

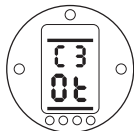
PRESS THE → KEY.

C3**Open Action**

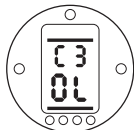
The actuator can be configured to open on torque for back seating valves or limit for non back seating valves. Refer to valve manufacturer for recommended setting. In the absence of valvemaking instructions set **"Open Limit"**.

Using the **+** or **-** key display the desired option.

NOTE: When set to open on torque, the actuator will apply the value of torque as set for **[tO]** in back seating the valve (refer to **[tO]** page 26).



[Ot] in the Setting Field Indicates Open on Torque - default setting.

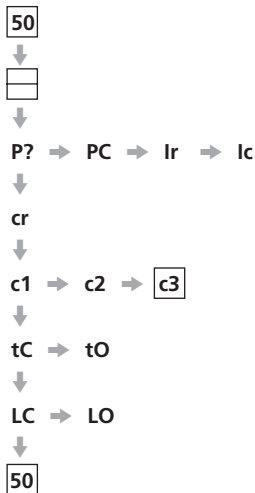


[OL] in the Setting Field Indicates Open on Limit

PRESS THE ← KEY.

The displayed option will flash, indicating that it has been set.

PRESS THE → KEY.

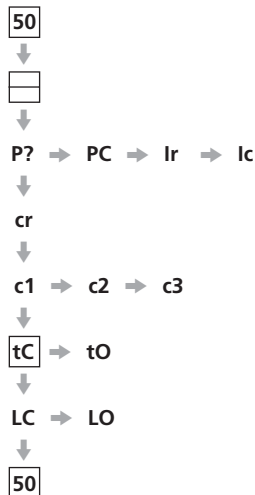


tC

Torque Value Closing

The value of torque available in the close direction can be configured. Refer to valve manufacturer for recommended value.

The closing torque value can be varied between 40% and Rated, in 1% increments.



Using the + and - keys display recommended value. In the absence of a recommended torque value, try a low setting and increase until satisfactory valve operation is achieved.

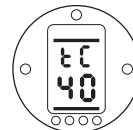
PRESS THE ← KEY.

The displayed value will flash, indicating that it has been set.

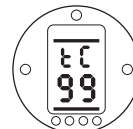
Should the set value of torque be developed in closing, the actuator will torque trip and stop.

PRESS THE → KEY.

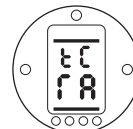
NOTE: Rated torque is quoted on the actuator nameplate.



40% of Rated Torque



99% of Rated Torque



Rated Torque

tO

Torque Valve Opening

The value of torque available in the open direction can be configured. Refer to valve manufacturer for recommended value.

The opening torque value can be varied between 40% and Rated, in 1% increments. In addition "Boost" can be configured when no open torque protection is required.

Should the set value of torque be developed in opening, the actuator will torque trip and stop.

PRESS THE ↓ KEY.

BOOST SHOULD NOT BE SELECTED WHEN THE ACTUATOR HAS BEEN CONFIGURED TO OPEN ON TORQUE (refer to [C3] page 24) unless back seating at Rated torque is acceptable.

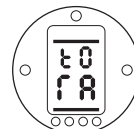
Using the + and - keys display the recommended torque value.

In the absence of a recommended torque value, try a low setting and increase until satisfactory valve operation is achieved.

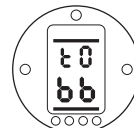
NOTE: Rated torque is quoted on the actuator nameplate. Boost torque is at least 140% of Rated torque.

PRESS THE ← KEY.

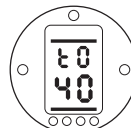
The displayed value will flash, indicating that it has been set.



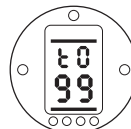
Rated



Boost

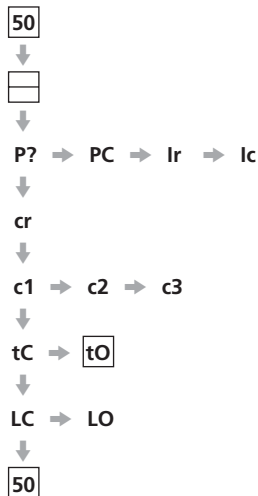


40%



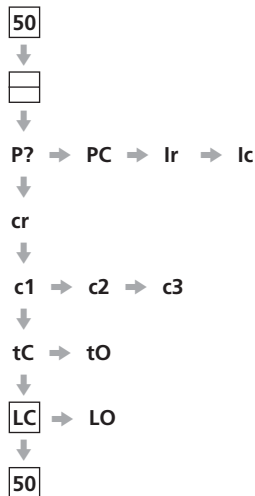
99%

In checking mode, on pressing the ↓ key after reviewing open torque setting, the display will revert to valve position.

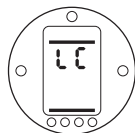


LC**Set Limit Closed**

NOTE: It is possible to set the Open Limit Position **[LO]** first.



NOTE: When in checking mode Set Limit Closed **[LC]** does not appear.

With [LC] displayed*Limit Closed*

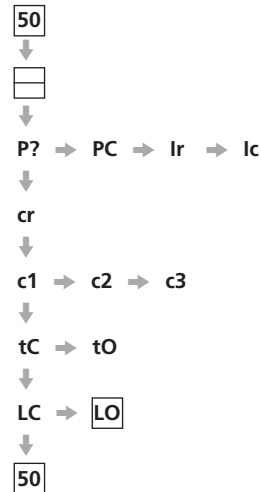
Move valve manually to the closed position. Allow for overrun by winding actuator output open by two handwheel turns.

PRESS THE ← KEY.

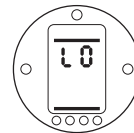
The two bars will flash and the closed indicator lamp will illuminate, indicating closed limit position has been set.

PRESS THE → KEY.

To check closed limit position hand wind valve open until the amber lamp illuminates. Wind valve back closed until the closed lamp illuminates.

LO**Set Limit Open**

NOTE: When in checking mode Set Limit Open **[LO]** does not appear.

With [LO] displayed*Limit Open*

Move valve manually to the open position. Allow for overrun by winding actuator output closed by two handwheel turns.

PRESS THE ← KEY.

The two bars will flash and the open indicator lamp will illuminate, indicating open limit position has been set.

PRESS THE ↓ KEY.

The open symbol (refer to Fig. 3.3. page 4) should now appear.



Return to Positional Display

50**P? → PC → Ir → Ic****cr****c1 → c2 → c3****tC → tO****LC → LO****50**

If the procedure has been followed as described, the positional display will indicate that the actuator is in the open position.

Select Remote control momentarily, using the red selector to exit setting procedure and then select required control: Local, Stop or Remote.

With the correct settings made electric operation can now be carried out safely.

9

**Commissioning –
Secondary Functions**

Fig. 9

The Secondary Functions can be configured to suit site control and indication requirements. It is important that Primary Functions such as limits and torque switch settings are set before work commences on commissioning the Secondary Functions (*refer to page 20*). The layout of the Secondary Functions accessed with the Setting Tool are detailed in Fig. 9.1. To successfully commission the Secondary Functions, information about the site or process control system will be required.

The supplied actuator Wiring Diagram details control and indication devices fitted to the actuator along with terminal connection detail and standard remote control wiring systems.

Power Off Setting

IQ allows settings to be viewed and set without main power. To enable this function, engage handwheel drive and rotate until the output drive moves by one turn (*refer to page 3*). The Setting Tool can now be used. As long as a Setting Tool key press takes place within the 30 seconds timeout period, Power Off Setting will remain enabled. If no infra-red Setting Tool communication takes place the display will return to indicating position. The actuator must then be operated by handwheel to re-enable Power Off Setting.

Settings and operation must be verified by electric operation and function test of the actuator to ensure correct operation.

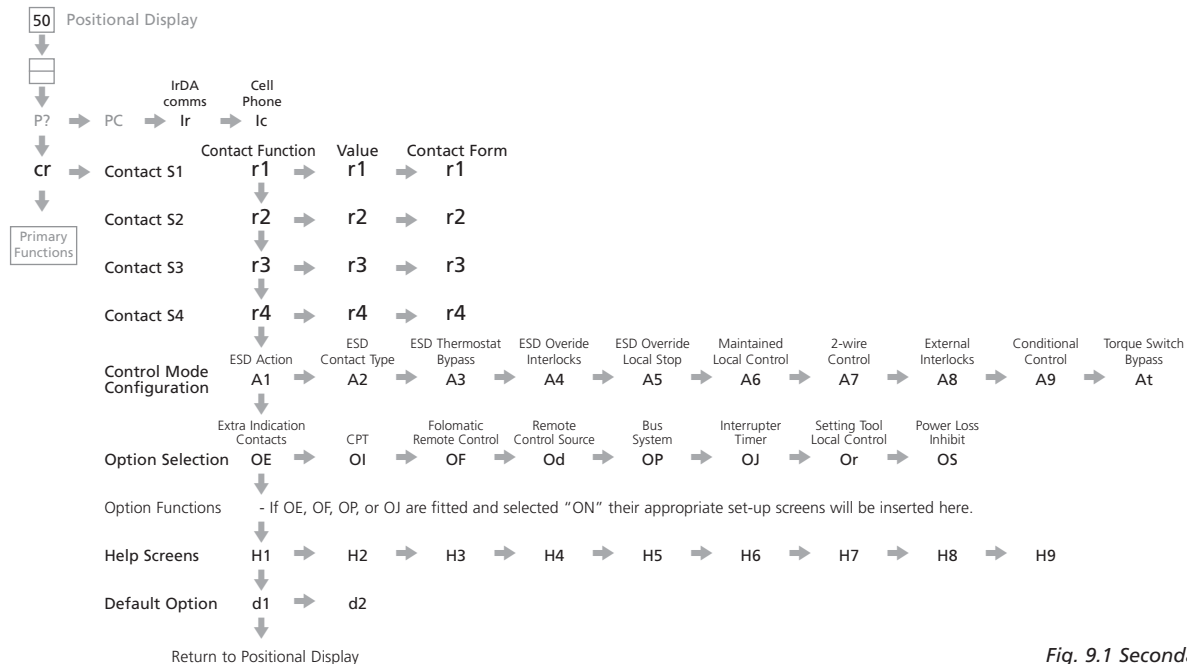


Fig. 9.1 Secondary Functions

9.1 Accessing the Secondary Functions

SECONDARY FUNCTIONS CONTENTS

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Having established that the Primary Functions have been correctly set, the Secondary Functions can now be configured to suit site control and indication requirements.

It is possible to move through the various Secondary Functions as shown in Fig. 9.1 using the ➡ and ↓ keys.

The actuator wiring diagram will indicate any options fitted.

Options Setting Tool Local Control [Or] and Power Loss Inhibit [OS] are standard features, their use being optional.

In order to display the Secondary Functions it is necessary to press the ↓ key until [Cr] appears.

If you have chosen to enter Secondary Functions in the checking mode the display will be as Fig. 9.2.

If you have chosen to enter Secondary Functions in the setting mode the display will be as Fig. 9.3 (refer to Section 7).

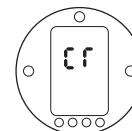


Fig. 9.2

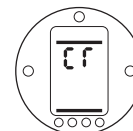


Fig. 9.3

PRESS THE ➡ KEY.

9.2 Indication Contacts S1, S2, S3 and S4

Indication contacts S1 [r1], S2 [r2], S3 [r3] and S4 [r4] may each be set to trip for any one of the following functions:

Code Function

[CL]	closed end position
[OP]	open end position
[Po]	intermediate position
[tC]	torque trip close
[tO]	torque trip open
[tt]	torque trip any position
[tl]	torque trip mid travel
[dC]	actuator closing
[dO]	actuator opening
[d?]	actuator rotating
[St]	motor stalled
[bA]	battery low
[HA]	hand operation
[bL]	blinker
[LS]	local stop
[OI]	open interlock
[CI]	close interlock
[IL]	interlock active
[ES]	ESD signal
[LP]	lost phase **
[Lo]	local selected
[rE]	remote selected
[AA]	actuator alarm *

[24]	24V power failure ***
[rr]	motor running
[UA]	Valve alarm*
[Ht]	thermostat tripped
[CA]	Control alarm*
[rP]	relay parity

The S contact form can be set normally open **[no]** or normally closed **[nc]**.

The procedures for setting up contacts S2, S3 and S4 are the same as those shown for S1.

Unless specified with order, the default settings for indication contacts are as follows:

S1 – [CL] closed end position [no]

S2 – [OP] open end position [no]

S3 – [CL] closed end position [nc]

S4 – [OP] open end position [nc]

* Contact alarm indication will operate under the same conditions as the display alarm indication icons (*refer to page 5 for information*).

** **[LP]** Function not available for phases 1 & 2, only for phase 3. For phase loss detection on phase 1 & 2 please use monitor relay

*** **[24]** Function not available if the 3 phase supply is lost.

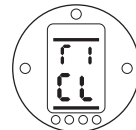
r1

Contact S1 - Function

Using the + or – key display the desired function.

PRESS THE ← KEY.

The displayed function will flash indicating that it has been set.



Contact S1 Configured to Trip at Valve Closed Limit

PRESS THE → KEY.

r1**Contact S1 - Value****r1****Contact S1
Contact Form**

When the S contact function is set to **[PO]**, the required intermediate position value must be set.

No other contact function requires a value to be set.

The value can be set from 1% open to 99% open in 1% increments.

Using the **+** or **-** key, display the required value.

PRESS THE ← KEY.

The displayed value will flash indicating that it has been set.



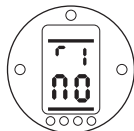
*Value Set to Indicate
25% Open*

PRESS THE → KEY.

Use the **+** or **-** keys to select between **[no]** (normally open) and **[nc]** (normally closed).

PRESS THE ← KEY.

The displayed option will flash indicating that it has been set.



*Contact S1 Configured as a
Normally Open Contact*

NOTE: If function **[PO]** is selected and it is configured as a normally open contact it will make at the set value with the actuator moving in the open direction.

To access S2–S4

PRESS THE ↓ KEY.

9.3 Control Mode Configuration

The Control Mode Configuration affects how the actuator will respond under conditions of emergency shut down, local control, remote control interlocks, and 2-wire remote control. Also included is an unseating torque switch bypass function. Unless specified with order, the control mode configuration will be set as shown for default configuration on page 63.

If it is necessary to change the configuration follow the instructions in this section.

There are 10 configurable control functions:

- A1 ESD action
- A2 ESD contact type
- A3 ESD thermostat bypass
- A4 ESD override interlock
- A5 ESD override local stop
- A6 Maintained local control
- A7 2-wire remote control
- A8 External interlocks
- A9 Conditional Control
- At Torque switch bypass.

A1 ESD Action

An active ESD signal applied to the actuator will override any existing or applied local or remote control signal. ESD can be configured to override the transformer thermostat, active interlocks or local stop selection. Refer to A3, A4 and A5.

The default action under an active ESD signal is to stay put **[SP]**.

Press the **+** or **-** key to select the required ESD action:

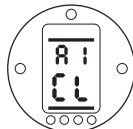
[CL] Close on ESD

[SP] Stay put on ESD

[OP] Open on ESD

PRESS THE  KEY.

The displayed option will flash indicating that it has been set.



ESD Set to Close

A2 ESD Contact Type

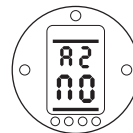
The default setting for ESD Contact Type is **[no]**.

The actuator responds to a remote control ESD signal derived from a normally open contact making. For ESD, where a remote control ESD signal is derived from a normally closed contact breaking, the signal being removed, press the **+** or **-** key.

The display will change to **[nc]**.

PRESS THE  KEY.

The displayed option will flash indicating that it has been set.



Actuator Responds to a Remote, Normally Open ESD Contact Making (Signal Applied)

*Note: If Folomatic analogue control is required A2 must be set to **[no]**.*

A3 ESD Thermostat Bypass

The default setting for Motor Thermostat Bypass is **[OF]** during ESD. The thermostats remain in circuit and enabled during ESD.

The motor thermostats can be bypassed during ESD as a factory set, hard-wired option only. Contact Rotork for information.

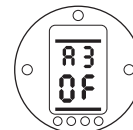
Danger: Actuator hazardous area certification is invalidated while the thermostats are bypassed.

A3 should be set to reflect the factory set configuration of thermostat bypass.

During an ESD event:

[A3]=**[OF]** thermostats enabled

[A3]=**[on]** thermostats bypassed



Thermostats Enabled During ESD

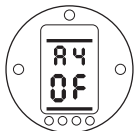
A4 ESD Override Interlocks

The default setting for ESD Override Interlocks is **[OF]**. ESD action will not override an active interlock applied to the actuator.

If an applied ESD signal is required to override active interlocks causing the ESD action as set for A1, press the **+** or **-** key. The display will change to **[ON]**.

PRESS THE KEY.

The displayed option will flash indicating that it has been set.



ESD Override Interlock – Off

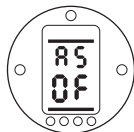
A5 ESD Override Local Stop

The default setting for ESD Override Local Stop is **[OF]**. ESD will not override local stop when selected.

If an applied ESD signal is required to override local stop causing the ESD action as set for A1, press the **+** or **-** key. The display will change to **[ON]**.

PRESS THE KEY.

The displayed option will flash indicating that it has been set.



ESD Override Local Stop – Off

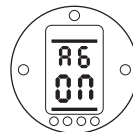
A6 Maintained Local Control

The default setting for Local Actuator Pushbutton control is self-maintained **[ON]**.

If non-maintained actuator pushbutton control is required (jogging, inching, push to run), press the **+** or **-** key. The display will change to **[OF]**.

PRESS THE KEY.

The displayed option will flash indicating that it has been set.



Self-Maintained Local Control

A7 2-wire Remote Control

The default setting for 2-wire Remote Control is Stayput **[SP]**. If a open and closed remote control signal are applied simultaneously the actuator will stayput (stop if running). Refer to actuator wiring diagram or publication E120E.

Use the **+** or **-** key to select the required priority:

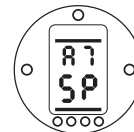
[OP] Open

[SP] Stay put

[CL] Close

PRESS THE KEY.

The displayed option will flash indicating that it has been set.



2-wire Control – Stayput Priority

A8**External Interlocks**

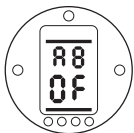
Actuators are delivered with the interlock facility disabled **[OF]**. Refer to the actuator wiring diagram or publication E120E for interlock control circuits.

To enable remote external interlocks press the **+** or **-** key.

The display will change to **[on]**.

PRESS THE  KEY.

The displayed option will flash indicating that it has been set.



Interlocks Disabled

Note: If interlocking is required in only one direction, it will be necessary to connect a link between the actuator terminals associated with the other direction.

A9**Conditional Control**

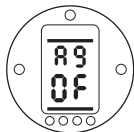
Where a high level of safety integrity is required, Conditional Control can be configured. In this mode two discreet signals are required for remote operation. Remote control will be conditional on both a control signal (open or close) and the appropriate interlock signal being applied simultaneously. Failure of either or a spurious signal will not cause operation.

Interlocks [A8] must be set **[on]**. Interlock signals are not required for local operation.

The default setting for conditional control is **[OF]**. To enable conditional control press the **+** or **-** key. The display will change to **[on]**.

PRESS THE  KEY.

The displayed option will flash indicating that it has been set.



Conditional Control Off

At**Torque Switch Bypass**

The default setting for Torque Switch Bypass is **[OF]**, the torque switches are not bypassed during the unseating movement.

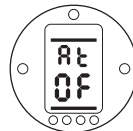
To bypass the torque switches during the unseating movement press the **+** or **-** key.

The display will change to **[on]**.

PRESS THE  KEY.

The displayed option will flash indicating that it has been set.

The torque switches will be bypassed from closed limit to 5% open when opening and from open limit to 95% when closing. Bypassing the torque switches makes torque in excess of rated and up to actuator stall available for unseating a "sticky" valve. Outside these positions the torque setting will revert to the values set for **[tC]**, see page 25 and **[tO]** page 26.



Torque Switch Bypass Off

9.4 Option Extra Indication Contacts

Extra indication contacts S5 [r5], S6 [r6], S7 [r7] and S8 [r8] are available as an option.

Check actuator circuit diagram for inclusion.

When the Extra Contact Option is included the set-up procedure and available contact functions for S5 – S8 are identical to S1–S4 (refer to Section 9.2 page 32).

Unless specified with order the default setting for the extra indication contacts will be as follows:

S5 [r5] Close limit indication

S6 [r6] Open limit indication

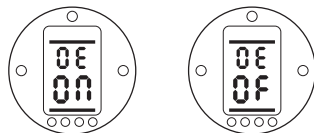
S7 [r7] Torque trip mid travel

S8 [r8] Remote control selected

NOTE: If the Extra Contact Option is not included in the actuator build, any settings made for S5–S8 will have no effect on the indication output of the actuator.

OE Display Extra Contact Set-up Screens

The action of turning on the Extra Contact Option makes an additional series of set-up screens available



Enabled Disabled
Extra Contact Set-up Displays

Press the + or – key to select the Extra Contact Option set-up screens [On].

PRESS THE ← KEY.

The displayed option will flash indicating that it has been set.

PRESS THE ↓ KEY TO ACCESS S5 TO S8 SET-UP DISPLAYS.

The procedure for setting S5 to S8 is the same as that for S1 to S4
(refer to Section 9.2 page 32).

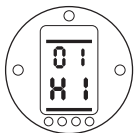
9.5

**Option CPT [OI]
(Current Position Transmitter)****Setting instructions for actuators including a CPT providing 4-20 mA analogue position feedback.**

The CPT is an optional extra. It may be internally or externally powered.

Check wiring diagram for inclusion and connection details.

NOTE: If the actuator has options Folomatic and CPT, redefining the CPT, will require the Folomatic to be recommissioned (*refer to Section 9.6 Folomatic [OI] page 39*).



*With [HI] Displayed, the (CPT)
20mA Output will Correspond to
Actuator Fully Open*

If 20mA is required to correspond to actuator closed use the + or – key to change to [LO].

PRESS THE  KEY.

The displayed option will flash indicating that the option has been set.

9.6 Option Folomatic Remote Control

Setting instructions for actuators including a Folomatic (proportional) Controller for use in (analogue) valve position control.

The Folomatic is an optional control device. Check actuator wiring diagram for inclusion.

Before setting the parameters for Option Folomatic ensure Remote Control Source [Od] has been selected to [bo] in Section 9.7.

Folomatic set-up screens can be turned OFF to provide extra security.

Once selected ON the option function displays allow commissioning of the Folomatic to be undertaken.

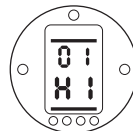
NOTE: Turning ON/OFF the Folomatic set-up screens (when fitted) does **not** affect its operation.

This instruction lists the Folomatic function displays in their sequence and assumes that all Folomatic functions are to be checked/set.

The actuator should be selected in Local or Stop with the set point signal connected to terminals 26(+ve) and 27(-ve) (refer to wiring diagram).

OI Folomatic Feedback

Before commissioning of the Folomatic functions can begin, the Folomatic Feedback must be set to suit the applied set point signal.



With **[HI]** displayed, an increasing set point signal will correspond to valve opening.

If a high set point signal is required to correspond to valve closing use the **+** or **-** key to change to **[LO]**.

PRESS THE ← KEY.

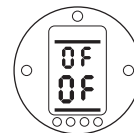
The displayed option will flash indicating that it has been set.

If setting **[OI]** is modified after commissioning the Folomatic, it will be necessary to recommission the Folomatic.

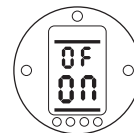
Press the **→** key to access the Folomatic set-up display **[OF]**.

OF Display Folomatic Set-up Screens

The action of turning on the Folomatic option makes an additional series of settings available.



*Folomatic
Set-up Screens
OFF*



*Folomatic
Set-up Screens
ON*

Use the **+** or **-** key to select Folomatic Display **[ON]**.

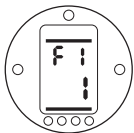
PRESS THE ← KEY.

The displayed option will flash indicating that it has been set.

Press the **↓** key to access the Folomatic set-up displays.

FI Set Point Signal Type

Using the **+** or **-** key select **[I]** for current set point signal or **[U]** for voltage set point signal.



Current Mode Selected

PRESS THE  KEY.

The displayed option will flash indicating that it has been set.

Press the **→** key to display **[Fr]**.

Fr Set Point Signal Range

Using the **+** or **-** key select **[05]**, **[10]** or **[20]** to correspond with the set point signals within the range of 0–5mA or volts, 0–10mA or volts or 0–20mA or volts (i.e. 4–20mA).



0–20mA or Voltage Range Selected

PRESS THE  KEY.

The displayed option will flash indicating that it has been set.

Press the **→** key to display **[FL]**.

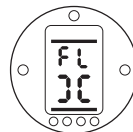
FL Valve Position LOW Set Point

APPLY MINIMUM SET POINT SIGNAL

Using the **+** or **-** key select:

- [I]** = valve closed
- [00] to [99]** = percent open
- [≡]** = valve open

to correspond with the **LOW** set point signal.



Valve Closed on LOW Signal

PRESS THE  KEY.

The displayed value will flash indicating that it has been set.

Press the **→** key to display **[FH]**.

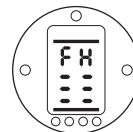
FH Valve Position HIGH Set Point

APPLY MAXIMUM SET POINT SIGNAL

Using the **+** or **-** key select:

- [I]** = valve closed
- [00] to [99]** = percent open
- [≡]** = valve open

to correspond with the **HIGH** set point signal.



Valve Open on HIGH Signal

PRESS THE  KEY.

The displayed value will flash indicating that it has been set.

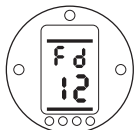
Press the **→** key to display **[Fd]**.

Fd**Deadband Adjustment**

If the actuator hunts or responds unnecessarily to a fluctuating set point signal the deadband must be increased. If more accurate control is required the deadband may be decreased.

Use the **+** or **-** key to select the deadband width. Range 00–99 corresponds to 0–9.9% of setpoint signal.

NOTE: Maximum deadband is 9.9% of valve stroke. Normally minimum deadband should not be less than 1%.



*Deadband Set to 1.2%
of Valve Stroke*

PRESS THE ← KEY.

The displayed value will flash indicating that it has been set.

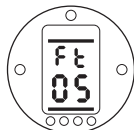
Press the → key to display **[Ft]**.

Ft**Motion Inhibit Timer Adjustment**

The motion inhibit timer introduces a delay in the actuator response to a rapidly fluctuating set point signal, preventing unnecessary movement.

Once the system stabilises the actuator will respond to steady changes in the set point signal as necessary.

Use **+** or **-** key to adjust motion inhibit time in seconds: range 0–99. Normally it is recommended that motion inhibit time should not be set to less than 5 seconds (*refer to note on page 62*).



*Motion Inhibit
Time Set to 5 Seconds*

PRESS THE ← KEY.

The displayed value will flash indicating that it has been set.

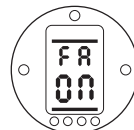
Press the → key to display **[FA]**.

FA**Action On Loss of Set Point Signal**

Use **+** or **-** key to enable **[On]** or disable **[OF]** action on loss of set point signal.

[On] – Failsafe as determined by **[FF]**.

[OF] – Failsafe to position corresponding to low set point.



Enabled

PRESS THE ← KEY.

The displayed option will flash indicating that it has been set.

NOTE: Failsafe action “ON” will be effective only for systems using an offset or live zero signal range, for example 4–20 mA.

Press the → key to display **[FF]**.

FF**Failsafe Action**

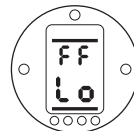
Failsafe action when **[FA]** enabled.

Use **+** or **-** key to select, on loss of set point signal:

[Lo] – move valve to position corresponding to minimum set point.

[SP] – stayput on loss of set point.

[HI] – move valve to position corresponding to maximum set point.



PRESS THE ← KEY.

The displayed option will flash indicating that it has been set.

Commissioning of the Folomatic is now complete. Remote control may be selected.

9.7

Remote Control Source

Od

Remote Control Source

The available forms of remote control are listed below:

Standard hardwired control
 Analogue control-Option Folomatic
 Network control including:
 Option Pakscan
 Option Modbus
 Option Profibus

The setting for Remote Control Source will depend on the type of remote control required and the option specified and fitted. Check actuator circuit diagram for remote control form.

The setting of Remote Control Source will be determined by the option that has been fitted, if any.

[rE] Standard hardwired remote control.

[bo] Option Folomatic.

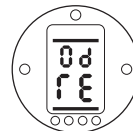
[oP] Options Pakscan, Profibus, Modbus, Foundation Fieldbus or DeviceNet.

[OF] All remote control disabled (Actuator available for local control only).

To change the remote source press the **+** or **-** key until the required setting is displayed.

PRESS THE ← KEY.

The displayed option will flash indicating that it has been set.



*Standard Hardwired
Remote Control*

9.8

Bus System
Option Pakscan [OP]

Setting instructions for actuators including an optional Pakscan Field Control Unit – check wiring diagram for inclusion.

Before setting the parameters for Option Pakscan ensure Remote Control Source [Od] has been selected to [oP] in Section 9.7. (refer to page 42)

Pakscan set-up screens can be turned off to provide extra security. The action of turning screens on or off does not affect its operation.

Use the **+** or **-** key to turn on Pakscan set-up screens.



Pakscan Set-up Screens ON

PRESS THE ← KEY.

The displayed option will flash indicating that it has been set.

Press the **↓** key to display the Pakscan set-up screens.

PA

Pakscan Address

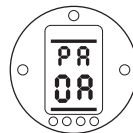
The actuator Pakscan Field Control Unit must be allocated a unique loop address.

The actuator must be in "Loopback" for its address to be set or changed. Loopback can be achieved in two ways:

1. Turn OFF the master station.
2. Isolate the actuator from the 2-wire control loop.

Using the **+** or **-** keys display the required loop address.

Address to be set within the range 01–F0 Hexadecimal. (refer to table on page 75).



PRESS THE ← KEY.

The displayed option will flash indicating that it has been set.

Press the **→** key to display [Pb].

Pb

Pakscan
Baud Rate

The actuator Pakscan Field Control Unit baud rate must be set to the loop baud rate. For a Pakscan 2-wire control loop the selected baud rate must be common to the master station and all the field control units included in the loop.

The actuator must be in "Loopback" for its baud rate to be set or changed.

Loopback can be achieved in two ways:

1. Turn OFF the master station.
2. Isolate the actuator from the 2-wire control loop.

Pb**Pakscan Baud Rate**

Using the + or – keys display the required baud rate.

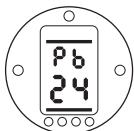
01 = 110 baud

03 = 300 baud

06 = 600 baud

12 = 1200 baud

24 = 2400 baud



2400 baud rate set

PRESS THE ← KEY.

The displayed option will flash indicating that it has been set.

Press the → key to display [PF].

PF**Pakscan Remote Auxiliary Input**

The IQ actuator has the facility to accept 4 auxiliary inputs (AUX1–AUX4). These are used when supplementary remote control or digital auxiliary inputs are required in addition to the standard control and feedback features incorporated into the Pakscan card. It is also possible to have a combination of both remote control and volt-free inputs to provide, for example, open and close control as well as a high and low tank level alarm indication, supplied via an external transducer.

The hexadecimal number displayed under PF can be considered as a “software mask”. It is this mask that tells the Pakscan card what type of input to expect, control or input signal, and what form the input will be, normally open or normally closed (refer to page 75 for Binary, Hexadecimal and Decimal Conversion Table).

To decipher the mask the number needs to be split into two separate hexadecimal characters, each of which can be sub-divided into 4 binary bits. The first 4 bits represent the function and the second 4 represent the input source (known as invert). Pictorially this can be represented as:

Left side hex character Aux 4 to 1 (function)				Right side hex character AUX 4 to 1 (Invert)				
Bits	4	3	2	1	4	3	2	1

When used for remote control of the actuator bits 4 to 1 of the function character have been designated as follows:

Bit 4 (AUX4)	–	ESD
Bit 3 (AUX3)	–	Stop/Maintain
Bit 2 (AUX2)	–	Close
Bit 1 (AUX1)	–	Open

(When used for digital signal inputs they are simply designated as AUX 4 to AUX 1)

PF**Pakscan Remote
Auxiliary Input****Rules****1. Function bit set to "0"**

Any function bit set to "0" indicates that the particular aux input is to be treated as a digital signal for field status reporting, e.g. a level switch or motor running status.

If the corresponding invert bit is set to a "0", an open contact is reported as a logic "1" and a closed contact is reported as a logic "0" (i.e. this will invert the input).

If the corresponding invert bit is set to a "1", an open contact is reported as a logic "0" and a closed contact is reported as a logic "1" (i.e. this gives a noninverting input).

2. Function bit set to "1"

Any function bit set to "1" indicates that the particular aux input is to be treated as a digital command to operate the actuator.

When the corresponding invert bit is set to a "0" this represents an N.C. contact as being the command source, i.e. a closing contact de-energises the input and an opening contact energises the input.

When the corresponding invert bit is set to a "1", this represents an N.O. contact as being the command source, i.e. a closing contact energises the input and an opening contact de-energises the input.

3. ESD Control

When using ESD (aux input 4), the ESD contact mode setting **[A2]** should be set to the default value of **[NO]**. The **[A1]**–ESD direction setting should be set to either Open or Close the valve (*refer to page 34*).

4. Stop/Maintain Control

When energised this will make the Aux input Open/Close/ESD control push-to-run, (non-maintained).

When de-energised, the Aux input Open/Close/ESD control will be maintained.

Q-Pulse Id: TMS214

5. Remote I/P Setting

Ensure that the correct **[Od]** setting is selected (refer to page 42).

For Pakscan this is **[oP]**.

The factory default for **[PF]** is **[OF]**.

Examples

1. The full range of remote controls is needed. Open and Close are NO and ESD and Stop/maintain is NC.

Aux I/P **4 3 2 1**

Function 1 1 1 1 = **F**

Invert 0 0 1 1 = **3** **i.e. set [PF] to [F3]**

2. Open and close control is required along with 2 inverted digital signal inputs (Note that with this setting the open and close commands will be maintained.)

Aux I/P **4 3 2 1**

Function 0 0 1 1 = **3**

Invert 0 0 1 1 = **3** **i.e. set [PF] to [33]**

3. Only an ESD input is needed. The requirement is for push to run control with a NO contact input.

Aux I/P **4 3 2 1**

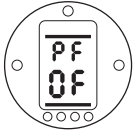
Function 1 1 0 0 = **C**

Invert 1 0 0 0 = **8** **i.e. set [PF] to [C8]**

PF**Pakscan Remote
Auxiliary Input****PP**

**Setting [PP] is not used by
Pakscan. Entered settings will be
ignored.**

Using the + or – keys display the
required mask setting.



Auxiliary Input Mask [OF]

PRESS THE ← KEY.

The displayed option will flash
indicating that it has been set.

If Pakscan positioning control is
required, return to the position display
by pressing ↓ and → keys together.

Display **[OF]** (refer to page 58).

9.9

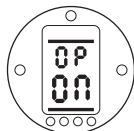
Bus System
Option Modbus [OP]

Setting instructions for actuators including an optional Modbus RTU module – check wiring diagram for inclusion.

Before setting the parameters for Option Modbus ensure Remote Control Source [Od] has been selected to [oP] in Section 9.7. (refer to page 42).

Modbus module set-up screens can be turned off to provide extra security. The action of turning screens on or off does not affect its operation.

Use the **+** or **–** keys to turn on Modbus set-up screens.



Modbus Set-up Screens [On]

PRESS THE ← KEY.

The displayed option will flash indicating that it has been set.

Press the **↓** key to display the Modbus set-up screens.

PA

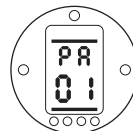
Modbus Address

The Modbus module must be allocated a unique address.

To set the address the Modbus module must be isolated from the host by disconnecting the RS485 highway or turning off the host device.

Using the **+** or **–** keys display the required address.

Address to be set within the range 01 to F7 Hexadecimal (refer to page 75 for conversion). If an address value outside this range is entered, the address set will revert to 01 (for 00) or F7 (for value above F7).



PRESS THE ← KEY.

The displayed option will flash indicating that it has been set.

Press the **→** key to display [Pb].

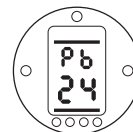
Pb

Modbus Baudrate

The Modbus module must be set to the RS485 highway baudrate. To set the baudrate the Modbus module must be isolated from the host by disconnecting the RS485 highway or turning off the host device.

Using the **or** keys display the required baudrate:

[01] 110	[06] 600
[03] 300	[24] 2400
[12] 1200	[96] 9600
[48] 4800	[38] 38400
[19] 19200	



2400 Baud

PRESS THE ← KEY.

The displayed option will flash indicating that it has been set.

Press the **→** key to display [PF].

PF

Modbus Remote
Auxiliary Input

The IQ actuator has the facility to accept 4 auxiliary inputs (AUX1 – AUX4). These are used when supplementary remote control or digital auxiliary inputs are required in addition to the standard control and feedback features incorporated into the Modbus module. It is also possible to have a combination of both remote control and volt-free inputs to provide, for example, open and close control as well as a high and low tank level alarm indication, supplied via an external transducer.

The hexadecimal number displayed under PF can be considered as a “software mask”. It is this mask that tells the Modbus module what type of input to expect, control or input signal, and what form the input will be, normally open or normally closed (*refer to page 75 for Binary, Hexadecimal and Decimal Conversion Table*).

To decipher the mask the number needs to be split into two separate hexadecimal characters, each of which can be sub-divided into 4 binary bits. The first 4 bits represent the function and the second 4 represent the input source (known as invert). Pictorially this can be represented as:

	Left side hex character Aux 4 to 1 (function)	Right side hex character AUX 4 to 1 (invert)
Bits	4 3 2 1	4 3 2 1

When used for remote control of the actuator bits 4 to 1 of the function character have been designated as follows:

Bit 4 (AUX4)	–	ESD
Bit 3 (AUX3)	–	Stop/Maintain
Bit 2 (AUX2)	–	Close
Bit 1 (AUX1)	–	Open

(When used for digital signal inputs they are simply designated as AUX 4 to AUX 1.)

Rules

1. Function bit set to “0”

Any function bit set to “0” indicates that the particular aux input is to be treated as a digital signal for field status reporting, e.g. a level switch or motor running status.

If the corresponding invert bit is set to a “0”, an open contact is reported as a logic “1” and a closed contact is reported as a logic “0” (i.e. this will invert the input).

If the corresponding invert bit is set to a “1”, an open contact is reported as a logic “0” and a closed contact is reported as a logic “1” (i.e. this gives a noninverting input).

2. Function bit set to “1”

Any function bit set to “1” indicates that the particular aux input is to be treated as a digital command to operate the actuator.

When the corresponding invert bit is set to a “0” this represents an N.C. contact as being the command source, i.e. a closing contact de-energises the input and an opening contact energises the input.

When the corresponding invert bit is set to a “1”, this represents an N.O. contact as being the command source, i.e. a closing contact energises the input and an opening contact de-energises the input.

3. ESD Control

When using ESD (aux input 4), the ESD contact mode setting **[A2]** should be set to the default value of **[NO]**. The **[A1]**–ESD direction setting should be set to either Open or Close the valve (*refer to page 34*).

PF**Modbus Remote
Auxiliary Input****4. Stop/Maintain Control**

When energised this will make the Aux input Open/Close control push-to-run. When de-energised, the Aux input Open/Close control will be maintained. ESD is always push to run (non maintained).

5. Remote I/P Setting

Ensure that the correct **[Od]** setting is selected (*refer to page 42*).

For Modbus this is **[rE]**.

The factory default for **[PF]** is **[OF]**.

Examples

1. The full range of remote controls is needed. Open and Close are NO and ESD and Stop/maintain is NC.

Aux I/P 4 3 2 1

Function 1 1 1 1 = F

Invert 0 0 1 1 = 3 i.e. set **[PF]** to **[F3]**

2. Open and close control is required along with 2 inverted digital signal inputs. (Note that with this setting the open and close commands will be maintained.)

Aux I/P 4 3 2 1

Function 0 0 1 1 = 3

Invert 0 0 1 1 = 3 i.e. set **[PF]** to **[33]**

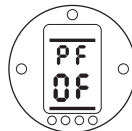
3. Only an ESD input is needed. The requirement is for push to run control with a NO contact input.

Aux I/P 4 3 2 1

Function 1 1 0 0 = C

Invert 1 0 0 0 = 8 i.e. set **[PF]** to **[C8]**

Using the or keys display the required mask setting.



Auxiliary Input Mask [OF]

PRESS THE ← KEY.

The displayed option will flash indicating that it has been set.

Press the → key to display **[PP]**.

PP**Modbus Parity**

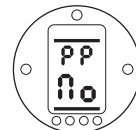
Where Modbus parity bit detection is used the module must be set with the parity bit setting of the host.

Using the + or – keys display the required parity bit:

[No] No parity bit

[En] Even parity bit

[Od] Odd parity bit



No Parity Bit

PRESS THE ← KEY.

The displayed option will flash indicating that it has been set.

Continued

For Modbus module positioning settings and action on loss of signal setting **[OF]** (*refer to page 58*).

If Modbus positioning control and action on loss of communication are required, return to the position display by pressing ↓ and → keys together.

Display **[OF]** (*refer to page 58*).

9.10

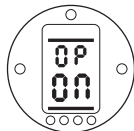
Bus System Option Profibus DP [OP]

Setting instructions for actuators including an optional Profibus DP module – check wiring diagram for inclusion.

Before setting the parameters for Option Profibus ensure Remote Control Source [Od] has been selected to [oP] in Section 9.7. (refer to page 42).

Profibus module set-up screens can be turned off to provide extra security. The action of turning screens on or off does not affect its operation.

Use the + or – keys to turn on Profibus set-up screens.



Profibus set-up screens [ON]

PRESS THE ← KEY.

The displayed option will flash indicating that it has been set.

Press the ↓ key to display the Profibus set-up screens.

PA

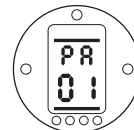
Profibus Address

The Profibus DP module must be allocated a unique address.

To set the address the Profibus module must be isolated from the host by disconnecting the RS485 highway or turning off the host device.

Using the + or – keys display the required address.

Address to be set within the range 01 to 7E Hexadecimal (refer to page 75 for conversion). If an address value outside this range is entered, the address set will revert to 01 (for 00) or 7E (for value above 7E).



PRESS THE ← KEY.

The displayed option will flash indicating that it has been set.

Press the → to display [Pb].

PF**Profibus Remote
Auxiliary Input**

The IQ actuator has the facility to accept 4 auxiliary inputs (AUX1–AUX4). These are used when supplementary remote control or digital auxiliary inputs are required in addition to the standard control and feedback features incorporated into the Profibus module. It is also possible to have a combination of both remote control and volt-free inputs to provide, for example, open and close control as well as a high and low tank level alarm indication, supplied via an external transducer.

The hexadecimal number displayed under PF can be considered as a “software mask”. It is this mask that tells the Profibus module what type of input to expect, control or input signal, and what form the input will be, normally open or normally closed (*refer to page 75 for Binary, Hexadecimal and Decimal Conversion Table*).

To decipher the mask the number needs to be split into two separate hexadecimal characters, each of which can be sub-divided into 4 binary bits. The first 4 bits represent the function and the second 4 represent the input source (known as invert). Pictorially this can be represented as:

	Left side hex character	Right side hex character
	Aux 4 to 1 (function)	AUX 4 to 1 (Invert)
Bits	4 3 2 1	4 3 2 1

When used for remote control of the actuator bits 4 to 1 of the function character have been designated as follows:

Bit 4 (AUX4)	–	ESD
Bit 3 (AUX3)	–	Stop/Maintain
Bit 2 (AUX2)	–	Close
Bit 1 (AUX1)	–	Open

(When used for digital signal inputs they are simply designated as AUX 4 to AUX 1.)

PF**Profibus Remote
Auxiliary Input****Rules****1. Function bit set to "0"**

Any function bit set to "0" indicates that the particular aux input is to be treated as a digital signal for field status reporting, e.g. a level switch or motor running status.

If the corresponding invert bit is set to a "0", an open contact is reported as a logic "1" and a closed contact is reported as a logic "0" (i.e. this will invert the input).

If the corresponding invert bit is set to a "1", an open contact is reported as a logic "0" and a closed contact is reported as a logic "1" (i.e. this gives a noninverting input).

2. Function bit set to "1"

Any function bit set to "1" indicates that the particular aux input is to be treated as a digital command to operate the actuator.

When the corresponding invert bit is set to a "0" this represents an N.C. contact as being the command source, i.e. a closing contact de-energises the input and an opening contact energises the input.

When the corresponding invert bit is set to a "1", this represents an N.O. contact as being the command source, i.e. a closing contact energises the input and an opening contact de-energises the input.

3. ESD Control

When using ESD (aux input 4), the ESD contact mode setting **[A2]** should be set to the default value of **[NO]**. The **[A1]**–ESD direction setting should be set to either open or close the valve (*refer to page 34*).

4. Stop/Maintain Control

When energised this will make the Aux input Open/Close control push to run. When de-energised, the Aux input Open/Close control will be maintained. ESD is always push to run (non maintained).

5. Remote Source Setting [Od]

Ensure that the correct **[Od]** setting is selected (*refer to page 42*).

For Profibus this is **[OP]**.

The factory default for **[PF]** is **[OF]**

Examples

1. The full range of remote controls is needed. Open and Close are NO and ESD and Stop/maintain is NC.

Aux I/P	4 3 2 1	
Function	1 1 1 1	= F
Invert	0 0 1 1	= 3 i.e. set [PF] to [F3]

2. Open and close control is required along with 2 inverted digital signal inputs. (Note that with this setting the open and close commands will be maintained.)

Aux I/P	4 3 2 1	
Function	0 0 1 1	= 3
Invert	0 0 1 1	= 3 i.e. set [PF] to [33]

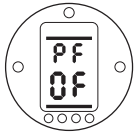
3. Only an ESD input is needed. The requirement is for push to run control with a NO contact input.

Aux I/P	4 3 2 1	
Function	1 1 0 0	= C
Invert	1 0 0 0	= 8 i.e. set [PF] to [C8]

PF**Profibus Remote
Auxiliary Input****PP**

**Setting [PP] is not used by
Profibus. Entered settings will
be ignored.**

Using the + or – keys display the
required mask setting.



Auxiliary Input Mask OF

PRESS THE ← KEY.

The displayed option will flash
indicating that it has been set.

If Profibus positioning control and
action on loss of communication are
required, return to the position display
by pressing ↓ and → keys together.
Display **[OF]** (refer to page 58).

9.11 Option DeviceNet

PA DeviceNet Address

Pb DeviceNet Baudrate

Setting instructions for actuators including an optional DeviceNet DFU module – check wiring diagram for inclusion.

DeviceNet module set up screens can be turned off to provide extra security. The action of turning screens on or off does not effect its operation.

Use the + or – key to turn on DeviceNet set up screens.

The DeviceNet module must be allocated a unique address.

Using the + or – keys display the required address.

Address to be set within the range 01 to 3F Hexadecimal. See page 72 for conversion. If an address value outside this range is entered, the address set will revert to 01 (for 00) or 3F (for value above 3F).

The DeviceNet module must be set to the DeviceNet highway baudrate.

Using the + or – keys display the required baudrate:

[01] 125 k baud

[03] 250 k baud

[06] 500 k baud

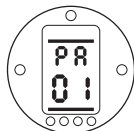


DeviceNet Set-up Screens ON

PRESS THE ← KEY.

The displayed option will flash indicating that it has been set.

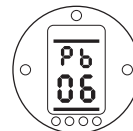
Press the ↓ key to display the DeviceNet set up displays.



PRESS THE ← KEY.

The displayed option will flash indicating that it has been set.

Press the → key to display [Pb].



PRESS THE ← KEY.

The displayed option will flash indicating that it has been set.

Press the → key to display [PF].

PF

**DeviceNet Remote
Auxiliary Input**

Press the ➡ key to display [PF].

The IQ actuator has the facility to accept 4 auxiliary inputs (AUX1–AUX4). These are used when supplementary remote control or volt free digital auxiliary inputs are required in addition to the standard control and feedback features incorporated into the DeviceNet module. It is also possible to have a combination of both remote control and volt free inputs to provide, for example, open and close control as well as a high and low tank level alarm indication, supplied via an external transducer.

The hexadecimal number displayed under PF can be considered as a “software mask”. It is this mask that tells the DeviceNet module what type of input to expect, control or input signal, and what form the input will be, normally open or normally closed.

To decipher the mask the number needs to be split into two separate hexadecimal characters, each of which can be sub-divided into 4 binary bits. The first 4 bits represent the function and the second 4 represent the input source (known as invert). Pictorially this can be represented as:

	Left side hex character Aux 4 to 1 (function)	Right side hex character AUX 4 to 1 (Invert)
Bits	4 3 2 1	4 3 2 1

When used for remote control of the actuator bits 4 to 1 of the function character have been designated as follows:

Bit 4 (AUX4)	–	ESD
Bit 3 (AUX3)	–	Stop/Maintain
Bit 2 (AUX2)	–	Close
Bit 1 (AUX1)	–	Open

(When used for digital signal inputs they are simply designated as AUX 4 to AUX 1.)

Rules**1. Function bit set to “0”**

Any function bit set to “0” indicates that the particular aux input is to be treated as a digital signal for field status reporting, e.g. a level switch or motor running status. If the corresponding invert bit is set to a “0”, an open contact is reported as a logic “1” and a close contact is reported as a logic “0” (i.e. this will invert the input).

If the corresponding invert bit is set to a “1”, an open contact is reported as a logic “0” and a close contact is reported as a logic “1” (i.e. this gives a non-inverting input).

2. Function bit set to “1”

Any function bit set to “1” indicates that the particular aux input is to be treated as a digital command to operate the actuator.

When the corresponding invert bit is set to a “0” this represents an N.C. contact as being the command source, i.e. a closing contact de-energises the input and an opening contact energises the input.

When the corresponding invert bit is set to a “1”, this represents an N.O. contact as being the command source, i.e. a closing contact energises the input and an opening contact de-energises the input.

3. ESD Control

When using ESD (aux input 4), the ESD contact mode setting **[A2]** should be set to the default value of **[NO]**. The **[A1]**–ESD direction setting should be set to either open or close the valve (*refer to page 34*).

PF**DeviceNet Remote
Auxiliary Input (continued)****4. Stop/Maintain Control**

When energised this will make the Aux input Open/Close control push-to-run. When de-energised, the Aux input Open/Close control will be maintained. ESD is always push to run (non maintained).

5. Remote I/P Setting

Ensure that the correct "Od" setting is selected (*refer to page 42*).

For DeviceNet this is **[OP]**.

The factory default for **[PF]** is **[OF]**.

Examples

1. The full range of remote controls is needed. Open and Close are NO and ESD and Stop/maintain is NC.

Aux I/P 4 3 2 1

Function 1 1 1 1 = F

Invert 0 0 1 1 = 3 i.e. set **[PF]** to **[F3]**

2. Open and close control is required along with 2 inverted digital signal inputs. (Note that with this setting the open and close commands will be maintained.)

Aux I/P 4 3 2 1

Function 0 0 1 1 = 3

Invert 0 0 1 1 = 3 i.e. set **[PF]** to **[33]**

3. Only an ESD input is needed. The requirement is for push to run control with a NO contact input.

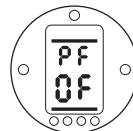
Aux I/P 4 3 2 1

Function 1 1 0 0 = C

Invert 1 0 0 0 = 8 i.e. set **[PF]** to **[C8]**

PP**DeviceNet Parity**

Using the + or - keys display the required mask setting.



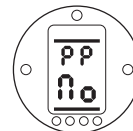
Auxiliary Input Mask OF

PRESS THE ← KEY.

The displayed option will flash indicating that it has been set.

Press the → key to display **[PP]**.

This option is not used by the DeviceNet DFU Module.



No Parity Bit

PRESS THE ← KEY.

The displayed option will flash indicating that it has been set.

9.12 Bus System Positioning Control Settings

OF Display Bus System Positioning Set-up Screens

If the system control strategy for Pakscan, Modbus or Profibus requires intermediate valve travel positioning, certain control parameters need to be checked: the Limited Range Position Settings, the Motion Inhibit Time and its Deadband. There are an additional two "Action on Loss of Signal" parameters relating only to Modbus and Profibus systems that also need to be checked.

Limited Range Positioning is a selectable option whereby positioning limits, 0% and 100%, can be at different positions to those used for digital Closed and Open limit commands. Limited range positioning can be set using the **[FL]** and **[FH]** screens.

It should be noted that the actuator will respond to a digital Open or Close host command by moving the valve to the set limits irrespective of settings made for positioning control.

Settings for Deadband and Motion Inhibit Time affect accuracy and response time.

Bus system positioning control set-up screens can be suppressed to provide extra security.

Use the **+** or **-** key to turn on the positioning set-up screens.



Bus System Positioning Control Screens [on]

PRESS THE ← KEY.

The displayed option will flash indicating that it has been set.

Press the **↓** key to display Bus System Positioning Control Settings.

Once **[FI]** is displayed, press the **→** key to display **[FL]**.

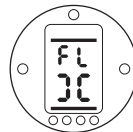
FL Bus System Valve Position at 0% DV

[FL] is the position to which the actuator will move if a 0% command is sent and is the position at which the actuator will report 0% to the host.

The default setting is for 0% to be the Close limit.

If altered, it is possible that the position indicated by the actuator display will differ to that indicated by the host.

Use the **+** or **-** key to select the desired valve position for a 0% command.



0% DV = Valve Closed

PRESS THE ← KEY.

The displayed option will flash indicating that it has been set.

Press the **→** key to display **[FH]**.

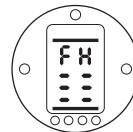
FH Bus System Valve Position at 100% DV

[FH] is the position to which the actuator will move if a 100% command is sent and is the position at which the actuator will report 100% to the host.

The default setting is for 100% to be the Open limit.

If altered, it is possible that the position indicated by the actuator display will differ to that indicated by the host.

Use the **+** or **-** key to select the desired valve position for a 100% command.



100% DV = Valve Open

PRESS THE ← KEY.

The displayed option will flash indicating that it has been set.

Press the **→** key to display **[Fd]**.

Fd**Bus System Deadband Adjustment**

All positioning commands are subject to a deadband tolerance.

The deadband sets the expected positioning accuracy of the actuator and is dependent on various factors including, actuator output speed, number of turns and valve torque. If the deadband is set too low the valve may "hunt" around the set point.

Use the **+** or **-** key to display the required setting:

[00] to [99] – 0% to 9.9% of valve stroke.



2.5% Deadband

PRESS THE  KEY.

The displayed option will flash indicating that it has been set.

Press the **→** key to display **[Ft]**.

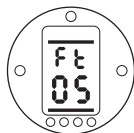
Ft**Bus System Motion Inhibit Time (MIT)**

MIT sets the minimum time between successive position commands being actioned. It is used in situations to reduce the number of starts per hour and to smooth out fluctuations if continuous positioning is implemented.

Setting the longest possible time while maintaining acceptable control will maximise the life of the motorised valve.

Use the **+** or **-** key to display the required setting:

[02] to [99] – 2 to 99 seconds.



5 Second MIT

PRESS THE  KEY.

The displayed option will flash indicating that it has been set.

Press the **→** key to display **[FA]**.

FA**Modbus, Profibus & DeviceNet Action on Loss of Signal**

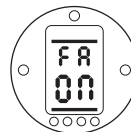
Modbus, Profibus & DeviceNet modules can be set to respond on loss of host communication by positioning the valve. Modbus checks for a loss of general highway communications whereas Profibus checks for a loss of communications addressed specifically to itself.

The default setting is off **[OF]** and the default timeout is 255 sec.

Use the **+** or **-** key to display the required setting:

[ON] Failsafe determined by setting **[FF]**

[OF] No failsafe action



Failsafe Action Enabled

PRESS THE  KEY.

The displayed option will flash indicating that it has been set.

Press the **→** key to display **[FF]**.

FF**Modbus, Profibus & DeviceNet Failsafe Action**

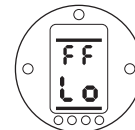
Modbus, Profibus & DeviceNet failsafe action when **[FA]** is enabled.

Use the **+** or **-** key to display the required setting:

[Lo] Close valve

[SP] Stay put

[Hi] Open valve



Failsafe Close

PRESS THE  KEY.

The displayed option will flash indicating that it has been set.

9.13 Option Interrupter Timer

Setting instructions for actuator including an interrupter timer.

The interrupter timer enables pulsed "stop/start" operation by the actuator as a response to local and remote control commands.

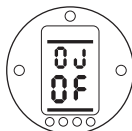
This effectively increases the valve stroke time and can be adjusted to prevent hydraulic shock (water hammer) and flow surges in pipelines.

The interrupter timer is an optional extra – check wiring diagram for inclusion.

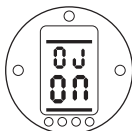
OJ Interrupter Timer Enabled/Disabled

When fitted, the timer will be made available for operation.

The Interrupter cannot be enabled or disabled using the Setting Tool.



Interrupter Timer Disabled



Interrupter Timer Enabled

When the timer option is available an additional series of settings can be accessed by pressing the ↓ key.

NOTE: If the timer option is not available pressing the ↓ key will not access setting.

Press the ↓ key to display interrupter timer set-up screens.

Jd Interrupter Timer Direction

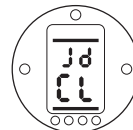
The default for timer direction is [CL], timer operation will **start in closing** and **stop in opening** – pulsing operation around the close position.

If pulsing operation is required to stop in closing and start in opening – around the open position, use the + or – key.

The display will change to [OP].

PRESS THE ← KEY.

The displayed option will flash indicating that it has been set.



Pulsed Operation Around the Closed Position

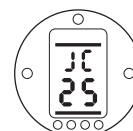
NOTE: Instructions [JC] and [JO] are for timer operation around the Closed position. For timing around the Open position, read stop for start [JC] and start for stop [JO].

Press the → key to display [JC].

JC Position in Valve Closing Stroke for Timer to Start

Using the + or – key select the position for the **TIMER TO START WHEN THE VALVE IS CLOSING.**

[11] = valve closed
[00] to [99] = percentage open
[≡≡] = valve open



Timer Set to Start Pulsing when Closing Valve Reaches 25% Open

PRESS THE ← KEY.

The displayed option will flash indicating that it has been set.

If the timing is not required in the closing stroke select [JC] to [11] valve closed position.

Press the → key to display [JO].

JO**Position in Valve Opening Stroke for Timer to Stop**

Using the **+** or **-** key select the position for the **TIMER TO STOP WHEN THE VALVE IS OPENING**.

[11] = valve closed
 [00] to [99] = percentage open
 [≡≡] = valve open



Timer Set to Stop Pulsing when Opening Valve Reaches 25% Open

PRESS THE ← KEY.

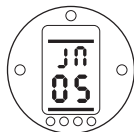
The displayed option will flash indicating that it has been set.

If timing is not required in the opening stroke select [JO] to [11].

Press the → key to display [Jn].

Jn**Contactor On Time**

Using the **+** or **-** key select the actuator run period in the range 1–99 seconds.



Actuator Run Period Set for 5 Seconds

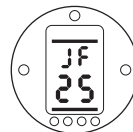
PRESS THE ← KEY.

The displayed option will flash indicating that it has been set.

Press the → key to display [JF].

JF**Contactor Off Time**

Using the **+** or **-** key select the actuator stop period in the range 1–99 seconds.



Actuator OFF Period Set for 25 Seconds

PRESS THE ← KEY.

The displayed option will flash indicating that it has been set.

Press the → key to display [JE] (refer to note on Page 62).

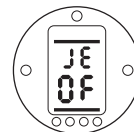
JE**ESD Override Interrupter Timer**

The interrupter timer may be overridden when the actuator is under ESD signal command. This will mean the actuator will run to limit without “stop/start” action under ESD command.

Refer to A1–A3 (refer to page 34 for ESD settings).

The default for ESD override interrupter timer is [OF]. The interrupter timer will continue “stop/start” action during ESD action.

If ESD must override the timer use the **+** or **-** to display [on].



ESD Override Timer OFF

PRESS THE ← KEY.

The displayed option will flash indicating that it has been set.

Example

An actuator fitted with the interrupter timer and set as the example shown in these instructions would operate at:

Rated speed from full Open to 25% Open.

1/6 rated speed from 25% Open to Fully Closed and from Fully Closed to 25% Open.

Rated speed from 25% Open to Fully Open.

Note

With a Folomatic option fitted *and* the Interrupter Timer enabled, the Folomatic Motion Inhibit Timer must be adjusted to the same time as that set for the Interrupter Timer "contactor off".

Failure to do so will cause the actuator response to defer to the lower time which may cause control or process problems.

For "ON" and "OFF" times in excess of 99 seconds apply to Rotork.

9.14 Setting Tool Local Control [Or]

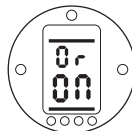
The default setting for Setting Tool Local Control is **[OF]**.

To enable Setting Tool Control press the **+** or **-** key to select **[ON]**.

PRESS THE  KEY.

The displayed option will flash indicating that it has been set.

With the red control selector in Local, the Setting Tool control keys are active (*refer to page 17*).



Local Setting Tool Control Enabled

Vandal resistant actuators ONLY (red/black selectors not supplied).
For control, the selection of **[Or]** is as follows:

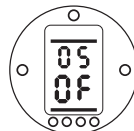
[On] Local Setting Tool control only.

[OF] Local/Remote Control disabled.

[RE] Remote Control only.

9.15 Inhibit Operation After Power Loss [OS]

The default setting for this protection option is disabled **[OF]**. When disabled it is important that the actuator is not manually operated during a power failure if the battery is low as changes in position cannot be tracked - refer to page 6 for battery level status display. Should this occur the limits must be reset before electric operation takes place- refer to LC/LO page 27. Locking the hand auto lever can prevent manual operation - refer to 3.1 page 2.



The protection may be enabled by using the **+** or **-** key to select **[On]**

PRESS THE  KEY.

The displayed option will flash indicating that it has been set.

When protection is enabled, on power up if a low battery is detected, the actuator will inhibit electrical operation and display Power Loss Inhibit via actuator alarm display (refer to page 6) and the monitor relay will de-energise. Limits must reset and the battery replaced - refer to page 65.

9.16 Default Options [d1] and [d2]

All IQ functions are configured to a set of Rotork default (standard) settings before despatch, see the table opposite. When requested, alternative settings specified with the order will be used. When site commissioning takes place, entered settings overwrite Rotork defaults and these "current" settings are used for operation along with the remaining unadjusted defaults.

Should difficulty be encountered during commissioning the default settings can be reinstated, returning the actuator configuration to its original manufactured state. Site commissioning must then begin again.

There are two levels of default:

d1 Rotork standard or customer specified primary and secondary settings.

d2 Limit positions only – factory set limits.

NOTE: Settings associated with control options Folomatic, Pakscan, Modbus Profibus and Foundation Fieldbus are not affected by d1 or d2. Functions will remain as set.

If d1 is entered, all Primary and Secondary Functions except limit positions will return to their default setting. See the table opposite for Rotork standard settings. Primary setting (except limits) and secondary settings must then be checked and reset as required (refer to Primary Functions page 15 and Secondary Functions page 29).

If d2 is entered the limits will be reset, with the actuator positioned at 50%. Limits must then be reset to the suit the valve (refer to Primary Functions page 20).

Rotork standard [d1] Default settings for IQ:

Function	[d1] Default Setting
[P?] Password	Unaffected – will remain as set
[Ir] IrDA – Insight	[On] IrDA Enabled
[Ic] Cell Phone	[OF] Disabled

Primary Functions

[C1] Close Direction	[C] Clockwise
[C2] Close Action	[Ct] Close Torque
[C3] Open Action	[Ot] Open Torque
[tC] Close Torque	[40] 40% of rated
[tO] Open Torque	[40] 40% of rated

Secondary Functions

[r1] Indication Contact S1	[CI]/[NO] Close, Normally Open
[r2] Indication Contact S2	[OP]/[NO] Open, Normally Open
[r3] Indication Contact S3	[CI]/[nC] Close, Normally Closed
[r4] Indication Contact S4	[OP]/[NO] Open, Normally Closed
[A1] ESD Action	[SP] Stay put on ESD
[A2] ESD Contact Type	[NO] Normally Open (make for ESD)
[A3] ESD Thermostat Override	[OF] Thermostats Active during ESD
[A4] ESD Override Interlocks	[OF] Interlocks Active during ESD
[A5] ESD Override Local Stop	[OF] Local Stop Active during ESD
[A6] Maintained Local Control	[On] Maintains in Local Control

9.17 Default Options [d1] and [d2]

Rotork standard [d1] Default settings continued:

Function	[d1]	Default Setting
[A7] 2-wire Remote Control	[SP]	Stayput on 2-wire signal
[A8] Interlocks	[OF]	I/L function disabled
[A9] Conditional Control	[OF]	Function disabled
[AE] Torque Switch Bypass	[OF]	Function disabled
[OE] Option Extra Indication Contacts	[OF]	Unless fitted. See wiring diagram
[OI] Option CPT	[HI]	4mA at Closed
[OF] Option Folomatic	[OF]	Unless fitted. See wiring diagram
[Od] Remote Source	[rE]	Unless option fitted (refer to 9.7 page 42.)
[OP] Option Bus System Control	[OF]	Unless fitted. See wiring diagram
[OJ] Option Interrupter Timer	[OF]	Unless fitted. See wiring diagram
[Or] Setting Tool Local Control	[OF]	Setting Tool Control disabled
[OS] Power Loss Inhibit	[OF]	Protection off

Option Extra Indication Contacts (when fitted) - refer to wiring diagram

[r5] Indication Contact S5	[CI]/[NO] Close, normally open
[r6] Indication Contact S6	[OP]/[NO] Open, normally open
[r7] Indication Contact S7	[tl]/[NO] Torque Trip Mid Travel, normally open
[r8] Indication Contact S8	[rE]/[NO] Remote Selected, normally open

The Rotork standard default settings are subject to change without notice.

If specified with order, [d1] settings will be configured as requested.

To reinstate [d1] settings, with [d1] displayed.

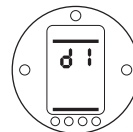
PRESS THE ← KEY.

The setting bars will flash, indicating the [d1] default settings have been reinstated.

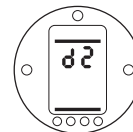
To reinstate factory set limits (actuator positioned at 50%) with [d2] displayed,

PRESS THE ← KEY.

The setting bars will flash, indicating the [d2] default limits have been reinstated.



[d1] Displayed



[d2] Displayed

Maintenance, Monitoring and Troubleshooting

Maintenance

Every Rotork actuator has been fully tested before dispatch to give years of trouble-free operation providing it is installed, sealed and commissioned in accordance with the instructions given in this publication.

The IQ actuator's unique double sealed, non-intrusive enclosure provides complete protection for the actuator components.

Covers should not be removed for routine inspection as this may be detrimental to the future reliability of the actuator.

The electrical control module cover is bonded by the Rotork quality control seal. It should not be removed as the module contains no site-serviceable components.

All electrical power supplies to the actuator must be isolated before any maintenance or inspection is carried out, except replacement of the battery.

Electrical supplies must be isolated before actuator covers are removed refer to Battery replacement instructions.

Routine maintenance should include the following:

- * Check actuator to valve fixing bolts for tightness.
- * Ensure valve stems and drive nuts are clean and properly lubricated.
- * If the motorised valve is rarely operated, a routine operating schedule should be set up.
- * Replace actuator battery every 5 years.
- * Check the actuator enclosure for damage, loose or missing fasteners.
- * Ensure there is not an excessive build up of dust or contaminant on the actuator.
- * Check for any loss of lubricant.

The Actuator Battery

The battery supports the actuator position updating circuits and the position (LCD) display when the main power supply is turned off. It ensures the current position is updated and displayed when manual operation takes place with the main power turned off.

The battery is not required to retain any actuator settings.

WARNING:

The battery holder in the actuator gearcase also protects the user from the hazardous live connections inside the actuator and therefore it must not be damaged. The actuator must be isolated or disconnected if the battery holder has to be removed from the actuator gearcase.

A unique circuit has been incorporated into the battery function of the IQ, effectively reducing the overall drain and significantly increasing the battery life.

In normal circumstances battery replacement interval should not exceed 5 years. Ambient temperature and plant operating conditions may affect battery life.

Battery level status is indicated by an icon on the actuator display, refer to Section 3.4 Alarm Indication (*refer to page 5*).

If the battery icon is displayed the battery must be replaced.

Battery Replacement

If the actuator is located within a hazardous area permission must be obtained in the form of a "hot work permit" or other local regulation before removal and/or replacement of the battery.

Removal of the battery with the main electrical power switched off will result in stored Datalogger records being lost. It is therefore recommended that the battery is replaced with the main electrical supply to the actuator switched on.

If main electrical power is not available or if main power has been switched off while the battery was discharged, it is recommended that the actuator limits be checked after battery replacement (*refer to Section 8 Commissioning Primary Functions, page 20*).

Battery Removal

The actuator must be selected to Stop using the red selector (*refer to page 3*). Access to the battery is via a labelled sealing plug situated on the main gearcase near the handwheel hub.

10

Maintenance, Monitoring and Troubleshooting cont.

Use an 8mm Allen key to remove the sealing plug, ensuring the "O" ring seal remains on the plug. Disconnect the battery wiring loom from the battery terminals. Using the black pull strap, lift the battery out of the rubber sealing pocket.



Fig. 10

Battery Types

For European hazardous area certified actuators (ATEX) use an Ultralife U9VL lithium manganese dioxide battery only.

For FM and CSA certified enclosures use an Ultralife U9VL lithium manganese dioxide battery. Equivalent, UL recognised, batteries may be used.

For watertight (WT) actuator enclosures use an Ultralife U9VL lithium manganese dioxide battery or any equivalent 9V battery.

If in doubt regarding the correct battery type, contact Rotork.

Fitting Replacement Battery

Fit the pull strap around the replacement battery and insert into the rubber sealing pocket. Reconnect the battery wiring loom to the battery terminals. Refit the battery sealing plug ensuring "O" ring is in good condition and correctly fitted. Hand tighten sealing plug using an 8mm Allen key.

Oil

Unless specially ordered for extreme climatic conditions, Rotork actuators are dispatched with gearcases filled with SAE 80EP oil which is suitable for ambient temperatures ranging from -22°F / -30°C to 160°F / 70°C.

IQ actuators do not require regular oil changes (refer to *Weights and Measures Section 11, page 74*).

Torque and Position Monitoring

The IQ range of actuators incorporate real time, instantaneous Torque & Position monitoring as standard.

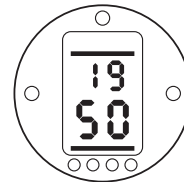
Torque & Position can be used to monitor valve performance during operation. The effect of process changes (differential pressure etc.) can be evaluated. Tight spots in valve travel can be pinpointed as well as gauging torque developed through stroke for torque value setting (refer to pages 25, 26).

Using the Setting Tool, the display can be set to indicate Torque and Position as follows:

With the actuator displaying Current Position and selected to Local or Stop, using the Setting Tool,

PRESS THE ← KEY.

The display will split, the top indicating the instantaneous torque (as a % of rated), the bottom indicating the measured position (% open).



Example shows 19% (of rated) torque at 50% open position. Display torque range: [00] to [99]% of rated torque in 1% increments. For values of torque above 99% the display will indicate [HI].

Display position range:

[11]	= valve closed
[00] to [99]	= percentage open
[≡≡]	= valve open

For a stationary actuator the display will indicate the actual torque value as applied by the actuator.

To keep the torque + position display active press the + or - keys. The display will remain active for approximately 5 minutes from the last key operation.

10

Maintenance, Monitoring and Troubleshooting cont.**Troubleshooting**

The IQ range of actuators is the world's first that can be commissioned and interrogated without removing electrical covers. Help Screen diagnostics enable fast and complete fault finding to be carried out.

With power off, the actuator display is not backlit. Position indicator lamp not illuminated.

With mains power on, the actuator's display should be backlit (*refer to Section 3.3 page 4 – The Actuator Display*).

Check that 3 phase supply is available and is of the correct voltage as stated on the actuator nameplate. Measure voltage phase to phase across terminals 1, 2 and 3 of the actuator terminal bung.

With power Off, the actuator does not display position.

With mains power off the actuator battery supports position indication liquid crystal display only.


(*Refer to Section 3.3 page 4 – The Actuator Display*).

If the display is blank the actuator battery must be replaced and the limits of travel reset (*refer to Section 10 page 65 – The Actuator Battery*).

10.1

Help Screens


With the actuator powered up and Local or Stop selected, eight Help Screens can be accessed using the Setting Tool (*refer to Fig. 9.1 page 30 for their location*).

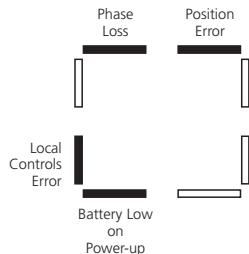
With Remote selected press the  key on the Setting Tool twice. The Help Screens will displayed.

Each screen uses bars to indicate the status of a particular control or indication function. Each bar reacts to changes in the status of its actuator function by turning "on" or "off".

For troubleshooting, access the following Help Screens and refer to text:

- H1** – Factors inhibiting electrical operation.
- H2** – Monitor battery level and ESD control input.
- H3** – Monitor the position limit and actuator power supply status.
- H4** – Monitor remote control inputs to the actuator.
- H5** – Monitor remote interlocks local control inputs and motor thermostats.
- H6** – Monitor torque switch status and IR Setting Tool communication for vandal proof applications.
- H7** – Monitor travel limits, centre column and position limit status.
- H8** – Monitor the actuator's position-sensing devices.
- H9** – Rotork use only.

Help screen bars shown  are undefined and may be ON, OFF or flashing.

H1**Factors Inhibiting Electrical Operation****H1**

Help Screen 1

POSITION ERROR

Bar ON = Current Position Error Present.

During power up the actuator position processor compares the current position to that stored in the Eeprom. If there is a discrepancy this is shown as a current position error.

Re-setting of both actuator limits should now be carried out (refer to page 27).

BATTERY LOW ON POWER UP

Bar ON = Low battery detected On Power Up.

If **[OS]** is selected **[ON]** (set as default) the actuator operation will be inhibited when powered up with a discharged battery (refer to **[OS]** page 58).

The battery should be replaced at the earliest opportunity (refer to page 65).

LOCAL CONTROLS ERROR

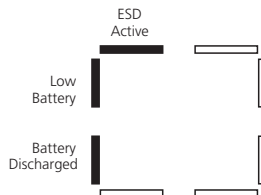
Bar ON = Invalid Local Control Signals Detected.

For example if a Local Open and Close signal is detected at the same time this would be classed as an invalid or fault condition.

PHASE LOSS

Bar ON = Phase Lost (3 Phase Actuators Only).

Loss of third monitored power supply phase connected to actuator terminal 3.

H2**Battery Level and ESD Control Input****H2**

Help Screen 2

BATTERY DISCHARGED

Bar ON = Battery Discharged.

Bar ON when the battery is no longer able to support actuator functions under loss of power conditions.

The battery must be replaced (refer to Section 10 page 65) and limit positions reset (refer to **[LC]** and **[LO]** page 27).

LOW BATTERY

Bar ON = Battery level low.
Bar OFF = Battery OK.

Bar ON when the battery is low but still able to support the necessary actuator functions.

The battery should be replaced at the earliest possible opportunity.

ESD SIGNAL ACTIVE

Bar ON = ESD Signal is present.

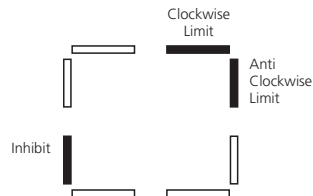
When applied, an Emergency Shutdown Signal will override any existing local or remote control signal, causing the actuator to respond in the direction selected for ESD.

The ESD function will be determined by the settings on Control Mode Configuration screens **[A1]** to **[A5]** (refer to Section 9.3 page 34).

The actuator will not respond to any local or remote control while an ESD signal is maintained.

H3 Factors Inhibiting Electrical Operation

H3



Help Screen 3

CLOCKWISE LIMIT

Bar ON = Actuator has reached clockwise limit of travel.

ANTI-CLOCKWISE LIMIT

Bar ON = Actuator has reached Anti-clockwise limit.

INHIBIT

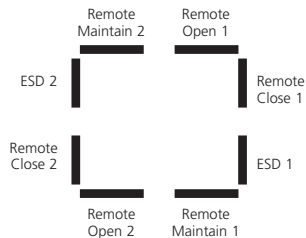
Bar ON = Actuator inhibited.

Possible Causes:

Phase Loss (3 phase only).
Power Loss Inhibit (page 62).
Internal Failure.

H4 Remote Control Inputs

H4



Help Screen 4

All remote signals designated with '1' are standard hard wired remote inputs.

When a Pakscan, Profibus or Foundation Fieldbus card is fitted, remote control inputs are designated with a '2'.

REMOTE OPEN 1

Bar OFF = Remote Open Signal Present.

REMOTE CLOSE 1

Bar OFF = Remote Close Signal Present.

ESD 1

Bar OFF = ESD signal present.

REMOTE MAINTAIN 1

Bar OFF = Remote Maintain signal present.
Bar ON = Remote Maintain not present and/or Remote Stop active.

REMOTE OPEN 2

Bar OFF = Remote Open signal present from BUS option pcb.

REMOTE CLOSE 2

Bar OFF = Remote Close signal present from BUS option pcb.

ESD 2

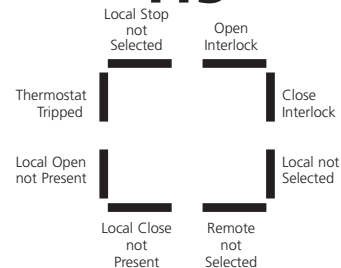
Bar OFF = ESD signal present from BUS option pcb.

REMOTE MAINTAIN 2

Bar OFF = Remote Maintain signal present from BUS option pcb.

H5 Remote Interlocks, Local Control Inputs, & T/stat

H5



Help Screen 5

OPEN INTERLOCK

Bar ON = Open Interlock Active. (Actuator disabled)

Unauthorised Open electrical operation can be prevented by interlocking the actuator (Open) control with an external interlock contact.

If external interlocks are not required the interlock function must be selected OFF.

H5**Remote Interlocks,
Local Control Inputs,
& T/stat continued****CLOSE INTERLOCK**

**Bar ON = Close Interlock Active.
(Actuator disabled)**

Unauthorised Close electrical operation can be prevented by interlocking the actuator (Close) control with an external interlock contact.

If external interlocks are not required the interlock function must be selected OFF.

REMOTE NOT SELECTED

**Bar ON = Remote control not selected.
Bar OFF = Remote control selected.**

LOCAL CLOSE NOT PRESENT

**Bar ON = Local Close signal not present.
Bar OFF = Local Close signal present.**

LOCAL OPEN NOT PRESENT

**Bar ON = Local Open signal not present.
Bar OFF = Local Open signal present.**

THERMOSTAT TRIPPED

Bar ON = Thermostat tripped.

The actuator motor is protected by thermostats.

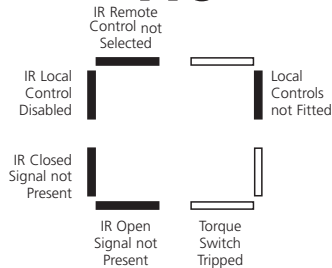
Should the motor become overheated the thermostats will trip and the actuator will stop. On cooling the thermostat will automatically reset, enabling operation. See the actuator nameplate for the motor rating.

LOCAL STOP NOT SELECTED

**Bar ON = Local Stop not selected.
Bar OFF = Local stop selected.**

LOCAL NOT SELECTED

**Bar ON = Local control not selected.
Bar OFF = Local control selected.**

H6**Torque Switch Status & IR
Setting Tool Comms for
Vandal Proof Applications****H6**

Help Screen 6

When actuators are supplied for Vandal Proof applications the local control knobs are removed to prevent unauthorised operation.

The local control functions are then carried out by using the Infra-red Setting Tool.

LOCAL CONTROLS NOT FITTED

**Bar OFF = Local controls fitted
(standard).
Bar ON = Local controls not fitted
(vandal proof).**

TORQUE SWITCH TRIPPED

Bar OFF = Torque switch tripped.

When the actuator generates a value of torque equal to that set for Open (when opening) or Close (when closing) it will stop, protecting itself and the valve from damage. This feature is known as Over Torque Protection.

Once a torque trip has occurred further operation IN THE SAME DIRECTION is prevented.

This "latching" of the event protects the actuator and valve from repeated "hammering" against the obstruction as a response to a maintained control signal.

To "de-latch" the actuator it must be reversed.

(For actuator torque adjustment, refer to [tc] and [to] pages 25 and 26)

H6

Torque Switch Status & IR Setting Tool Comms for Vandal Proof Applications cont.

H7

Travel Limits, Centre Column & Remote Indication Outputs

H3

Actuator Position Sensing Devices

IR OPEN SIGNAL NOT PRESENT
Bar OFF = IR Open signal present.

IR CLOSE SIGNAL NOT PRESENT
Bar OFF = IR Close signal present.

IR LOCAL CONTROL DISABLED
Bar OFF = IR Local control enabled.

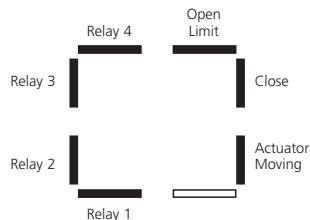
To operate the actuator locally with the IR Setting Tool refer to the option selection screen **[Or]** Section 9.14 page 62.

[Or] must be selected to **[On]**.

IR REMOTE CONTROL NOT SELECTED
Bar OFF = IR Remote control selected (vandal-proof units only).

When actuator is supplied without local controls for vandal proof applications the option selection screen **[Or]** must be set to **[re]** for

Remote operation (refer to Section 9.14 page 62).

H7

Help Screen 7

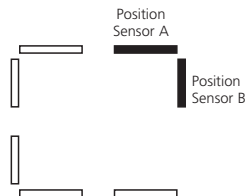
OPEN LIMIT
Bar ON = Actuator has reached open limit.

CLOSE LIMIT
Bar ON = Actuator has reached Close limit.

ACTUATOR MOVING
Bar ON = Actuator moving.

SWITCH CONTACTS S1, S2, S3, S4
Bar ON = S contact is close circuit.

Bar indication is real time and reactive (refer to Section 9.2 **[r1]** page 32 for configuration of "S" contacts).

H8

Help Screen 8


POSITION SENSOR A
Senses output rotation. Used for the position sensing circuit. Correct operation of the sensor is indicated by the bar being ON (and OFF) 12 times per output revolution. When the motor is running, ON and OFF bit duration should be equal.

POSITION SENSOR B
Senses output rotation. Used for the position sensing circuit. Correct operation of the sensor is indicated by the bar being ON (and OFF) 12 times per output revolution.

When the motor is running, ON and OFF bit duration should be equal.

For the two sensors, A and B, correct operation is indicated by the following truth table.

To observe this function, select manual operation and turn the actuator handwheel clockwise, starting with all sensors OFF:

	CLOCKWISE 30 Deg. 				
Sensor B	0	1	1	0	0
Sensor A	0	0	1	1	0

10.2

IrDA Diagnostics &
Config. IQ Insight –
IrDA Comms [Ir]

IQ Insight software tool for PC has been developed to enable the actuator configuration and onboard datalogger to be reconfigured and analysed.

To enable communication with IQ Insight the actuator IrDA interface must be enabled.

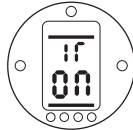
A PC running IQ Insight software may be located at the actuator or, using a cell phone link, at a remote site (for information on IQ Insight see www.rotork.com).

The default setting for IQ IrDA is **[on]**, enabling IrDA.

To disable IrDA use the **+** or **-** key. The display will change to **[OF]**.

PRESS THE ← KEY.

The displayed option will flash indicating it has been set.



*IQ Insight – IrDA Communication
Enabled.*

10.2

IrDA Diagnostics &
Config. IQ Insight –
Cell Phone [Ic]

Using IQ Insight software tool, remote diagnostics can be enabled using a cell phone located at the actuator to transmit and receive data to and from a remote PC running IQ Insight software.

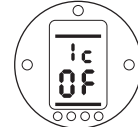
The cell phone must be IrDA compatible and have access to a transmit/receive data line (contact your cell phone manufacturer and service provider).

(For information on IQ Insight software refer to publication E111E).

The actuator IrDA feature must be enabled (refer to **[Ir]** IQ Insight – IrDA Comms).

Before starting, the cell phone must be configured for "data" as opposed to "voice" and be positioned in direct line of sight to the actuator display, no more than 0.5m (2ft) from the display.

The default setting for IQ Insight – Cell Phone is **[OF]**.



To enable remote diagnostics use the **+** or **-** key. The display will change to **[on]**.

PRESS THE ← KEY.

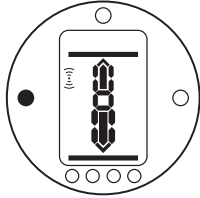
The actuator display will automatically return to indicating the current position.

The actuator will search for a compatible IrDA device within range for approximately 30 seconds.

On establishing communication, the actuator display will indicate the symbol shown below.



10.2

IrDA Diagnostics &
Config. IQ Insight –
Cell Phone [ic] cont.

The cell phone must be kept within range for the duration of the remote diagnostic session.

If communication is not established or is lost, after 30 seconds the actuator will stop searching.

To resume remote cell phone diagnostics the process outlined above must be started again.

IQ Insight software is available free of charge from the Rotork web site, www.rotork.com, or for sale as a "pak" which includes an IrDA serial link for convenient connection when using a notebook PC in the field.

NOTE: The use of a notebook PC or cell phone with actuators located in hazardous areas will be subject to local regulations.

It is the responsibility of the user to seek guidance and permission.

The IQ Setting Tool is certified Intrinsically Safe (IS) and therefore can be used in defined hazardous areas (*refer to page 17*).

Diagnostic devices are available for local configuration, analysis and transportation of actuator data to other areas.

Contact Rotork for further information.

11

Weights and Measures

Oil

Unless specially ordered for extreme climatic conditions, Rotork actuators are dispatched with gearcases filled with SAE 80EP oil suitable for ambient temperatures ranging from –22°F/ –30°C to 160°F/70°C.

NOTE: Excludes second stage gearbox if fitted.

Food grade lubricating oil is available as an alternative: contact Rotork.

Actuator Size	Nett Weight kg/lbs	Oil Capacity litres/pt.-US
IQ10	32/70	0.3/0.63
IQ12	32/70	0.3/0.63
IQ18	32/70	0.3/0.63
IQ20	52/115	0.8/1.7
IQ25	52/115	0.8/1.7
IQ35	75/165	1.1/2.3
IQ40	200/441	7.5/15.8
IQ70	215/474	7.0/14.7
IQ90	230/507	7.0/14.7
IQ91	220/485	7.0/14.7
IQ95	230/507	7.0/14.7

BINARY	HEX	DEC	BINARY	HEX	DEC	BINARY	HEX	DEC	BINARY	HEX	DEC	BINARY	HEX	DEC	BINARY	HEX	DEC	BINARY	HEX	DEC	BINARY	HEX	DEC	BINARY	HEX	DEC	BINARY	HEX	DEC		
0000	0000	00	0	0010	0000	20	32	0100	0000	40	64	0110	0000	60	96	1000	0000	80	128	1010	0000	A0	160	1100	0000	C0	192	1110	0000	E0	224
0000	0001	01	1	0010	0001	21	33	0100	0001	41	65	0110	0001	61	97	1000	0001	81	129	1010	0001	A1	161	1100	0001	C1	193	1110	0001	E1	225
0000	0010	02	2	0010	0010	22	34	0100	0010	42	66	0110	0010	62	98	1000	0010	82	130	1010	0010	A2	162	1100	0010	C2	194	1110	0010	E2	226
0000	0011	03	3	0010	0011	23	35	0100	0011	43	67	0110	0011	63	99	1000	0011	83	131	1010	0011	A3	163	1100	0011	C3	195	1110	0011	E3	227
0000	0100	04	4	0010	0100	24	36	0100	0100	44	68	0110	0100	64	100	1000	0100	84	132	1010	0100	A4	164	1100	0100	C4	196	1110	0100	E4	228
0000	0101	05	5	0010	0101	25	37	0100	0101	45	69	0110	0101	65	101	1000	0101	85	133	1010	0101	A5	165	1100	0101	C5	197	1110	0101	E5	229
0000	0110	06	6	0010	0110	26	38	0100	0110	46	70	0110	0110	66	102	1000	0110	86	134	1010	0110	A6	166	1100	0110	C6	198	1110	0110	E6	230
0000	0111	07	7	0010	0111	27	39	0100	0111	47	71	0110	0111	67	103	1000	0111	87	135	1010	0111	A7	167	1100	0111	C7	199	1110	0111	E7	231
0000	1000	08	8	0010	1000	28	40	0100	1000	48	72	0110	1000	68	104	1000	1000	88	136	1010	1000	A8	168	1100	1000	C8	200	1110	1000	E8	232
0000	1001	09	9	0010	1001	29	41	0100	1001	49	73	0110	1001	69	105	1000	1001	89	137	1010	1001	A9	169	1100	1001	C9	201	1110	1001	E9	233
0000	1010	0A	10	0010	1010	2A	42	0100	1010	4A	74	0110	1010	6A	106	1000	1010	8A	138	1010	1010	AA	170	1100	1010	CA	202	1110	1010	EA	234
0000	1011	0B	11	0010	1011	2B	43	0100	1011	4B	75	0110	1011	6B	107	1000	1011	8B	139	1010	1011	AB	171	1100	1011	CB	203	1110	1011	EB	235
0000	1100	0C	12	0010	1100	2C	44	0100	1100	4C	76	0110	1100	6C	108	1000	1100	8C	140	1010	1100	AC	172	1100	1100	CC	204	1110	1100	EC	236
0000	1101	0D	13	0010	1101	2D	45	0100	1101	4D	77	0110	1101	6D	109	1000	1101	8D	141	1010	1101	AD	173	1100	1101	CD	205	1110	1101	ED	237
0000	1110	0E	14	0010	1110	2E	46	0100	1110	4E	78	0110	1110	6E	110	1000	1110	8E	142	1010	1110	AE	174	1100	1110	CE	206	1110	1110	EE	238
0000	1111	0F	15	0010	1111	2F	47	0100	1111	4F	79	0110	1111	6F	111	1000	1111	8F	143	1010	1111	AF	175	1100	1111	CF	207	1110	1111	EF	239
0001	0000	10	16	0011	0000	30	48	0101	0000	50	80	0111	0000	70	112	1001	0000	90	144	1011	0000	B0	176	1101	0000	D0	208	1111	0000	F0	240
0001	0001	11	17	0011	0001	31	49	0101	0001	51	81	0111	0001	71	113	1001	0001	91	145	1011	0001	B1	177	1101	0001	D1	209	1111	0001	F1	241
0001	0010	12	18	0011	0010	32	50	0101	0010	52	82	0111	0010	72	114	1001	0010	92	146	1011	0010	B2	178	1101	0010	D2	210	1111	0010	F2	242
0001	0011	13	19	0011	0011	33	51	0101	0011	53	83	0111	0011	73	115	1001	0011	93	147	1011	0011	B3	179	1101	0011	D3	211	1111	0011	F3	243
0001	0100	14	20	0011	0100	34	52	0101	0100	54	84	0111	0100	74	116	1001	0100	94	148	1011	0100	B4	180	1101	0100	D4	212	1111	0100	F4	244
0001	0101	15	21	0011	0101	35	53	0101	0101	55	85	0111	0101	75	117	1001	0101	95	149	1011	0101	B5	181	1101	0101	D5	213	1111	0101	F5	245
0001	0110	16	22	0011	0110	36	54	0101	0110	56	86	0111	0110	76	118	1001	0110	96	150	1011	0110	B6	182	1101	0110	D6	214	1111	0110	F6	246
0001	0111	17	23	0011	0111	37	55	0101	0111	57	87	0111	0111	77	119	1001	0111	97	151	1011	0111	B7	183	1101	0111	D7	215	1111	0111	F7	247
0001	1000	18	24	0011	1000	38	56	0101	1000	58	88	0111	1000	78	120	1001	1000	98	152	1011	1000	B8	184	1101	1000	D8	216	1111	1000	F8	248
0001	1001	19	25	0011	1001	39	57	0101	1001	59	89	0111	1001	79	121	1001	1001	99	153	1011	1001	B9	185	1101	1001	D9	217	1111	1001	F9	249
0001	1010	1A	26	0011	1010	3A	58	0101	1010	5A	90	0111	1010	7A	122	1001	1010	9A	154	1011	1010	BA	186	1101	1010	DA	218	1111	1010	FA	250
0001	1011	1B	27	0011	1011	3B	59	0101	1011	5B	91	0111	1011	7B	123	1001	1011	9B	155	1011	1011	BB	187	1101	1011	DB	219	1111	1011	FB	251
0001	1100	1C	28	0011	1100	3C	60	0101	1100	5C	92	0111	1100	7C	124	1001	1100	9C	156	1011	1100	BC	188	1101	1100	DC	220	1111	1100	FC	252
0001	1101	1D	29	0011	1101	3D	61	0101	1101	5D	93	0111	1101	7D	125	1001	1101	9D	157	1011	1101	BD	189	1101	1101	DD	221	1111	1101	FD	253
0001	1110	1E	30	0011	1110	3E	62	0101	1110	5E	94	0111	1110	7E	126	1001	1110	9E	158	1011	1110	BE	190	1101	1110	DE	222	1111	1110	FE	254
0001	1111	1F	31	0011	1111	3F	63	0101	1111	5F	95	0111	1111	7F	127	1001	1111	9F	159	1011	1111	BF	191	1101	1111	DF	223	1111	1111	FF	255

Refer to actuator nameplate for unit specific approval details

European – Hazardous area

EExd IIB T4. ATEX (94/9/EC) II 2GD

CENELEC Norm EN50014 and EN50018

Temperature -20°C to +70°C (-4°F to +158°F).

*Option -30°C to +70°C (-22°F to +158°F).

*Option -40°C to +70°C (-40°F to +158°F).

*Option -50°C to +40°C (-58°F to +104°F).

EExd IIC T4. ATEX (94/9/EC) II 2GD

CENELEC Norm EN50014 and EN50018.

Temperature -20°C to +70°C (-4°F to +158°F).

EExde IIB T4. ATEX (94/9/EC) II 2GD

CENELEC Norm EN50014, EN50018 and EN50019.

Temperature -20°C to +70°C (-4°F to +158°F).

*Option -30°C to +70°C (-22°F to +158°F).

*Option -40°C to +70°C (-40°F to +158°F).

*Option -50°C to +40°C (-58°F to +104°F).

EExde IIC T4. ATEX (94/9/EC) II 2GD

CENELEC Norm EN50014, EN50018 and EN50019.

Temperature -20°C to +70°C (-4°F to +158°F).

International – Hazardous area

IEC. Exd IIB T4

IEC60079-0 and IEC60079-1 for Exd IIB T4

Temperature -20°C to +60°C (-4°F to +140°F)

IEC. Exd IIC T4

IEC60079-0 and IEC60079-1 for Exd IIC T4

Temperature -20°C to +60°C (-4°F to +140°F)

USA – hazardous Area

FM. Class 1, Division 1, Groups C, D, E, F, G hazardous areas.

Factory Mutual - Explosionproof to NEC Article 500.

Temperature -30°C to +60°C (-22°F to +140°F).

*Option -40°C to +60°C (-40°F to +140°F).

*Alternative for Group B hazardous area. Temperatures as for Groups C and D.

Canada – hazardous Area

CSA EP. Class 1, Division 1, Groups C and D hazardous areas.

Canadian Standard Association - Explosionproof

Temperature -30°C to +70°C -22°F to +158°F).

*Option -50°C to +40°C (-58°F to +104°F).

*Alternative for Group B hazardous area. Temperatures as for Groups C and D.

International Non hazardous

WT: Standard watertight, BS EN 60529 :1992, IP68, 7 metres/72 hours.

Temperature -30°C to +70°C (-22°F to +158°F).

*Option -40°C to +70°C (-40°F to +158°F).

*Option -50°C to +40°C (-58°F to +104°F).

US – Non hazardous

NEMA 4, 4X and 6.

Temperature -30°C to +70°C (-22°F to +158°F).

*Option -40°C to +70°C (-40°F to +158°F).

*Option -50°C to +40°C (-58°F to +104°F).

Canada – Non hazardous

CSA WT: Canadian Standard Association –Watertight.

Wiring and components complying with CSA Enclosure 4 and 4X.

Temperature -30°C to +70°C (-22°F to +158°F).

*Option -40°C to +70°C (-40°F to +158°F).

*Option -50°C to +40°C (-58°F to +104°F).

Rotork can supply actuators to national standards not listed above.

For details please contact Rotork.

Oxley Creek STP ST22 Sludge Treatment (Centrifuge Feed Pump Station OM Manual) General

If your Rotork actuator has been correctly installed and sealed, it will give years of trouble-free service.

Should you require technical assistance or spares, Rotork guarantees the best service in the world. Contact your local Rotork representative or the factory direct at the address on the nameplate, quoting the actuator type and serial number.

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ATTENTION: RED PLASTIC PLUGS IN CONDUIT ENTRIES ARE FOR TRANSIT ONLY.
FOR LONG TERM PROTECTION FIT SUITABLE METAL PLUGS.

ATTENZIONE: I TAPPI IN PLASTICA ROSSA PER L'ENTRATA CAVI SONO SOLO
TEMPORANEI. PER UNA PROTEZIONE PERMANENTE PREGO SOSTITUIRLI CON
APPOSITI TAPPI METALLICI.

ATENCION: LOS TAPONES ROJOS DE PLASTICO EN LAS ENTRADAS DE CABLE
SON UNICAMENTE PARA TRANSPORTE. PARA PROTECCION PERMANENTE
COLOCAR TAPONES METALICOS APROPIADOS.

ACHTUNG: DIE ROTEN PLASTIKSTOPFEN SIND NUR FÜR DEN TRANSPORT
GEEIGNET. FÜR DAUERHAFTEN SCHUTZ SIND DIESE GEGEN GEEIGNETE
BLINDSTOPFEN AUSZUTAUŠCHEN.

ATTENTION: LES BOUCHONS PLASTIQUES ASSURENT UNE PROTECTION
TEMPORAIRE. POUR UNE PROTECTION DEFINITIVE UTILISER DES BOUCHONS
METALLIQUES.

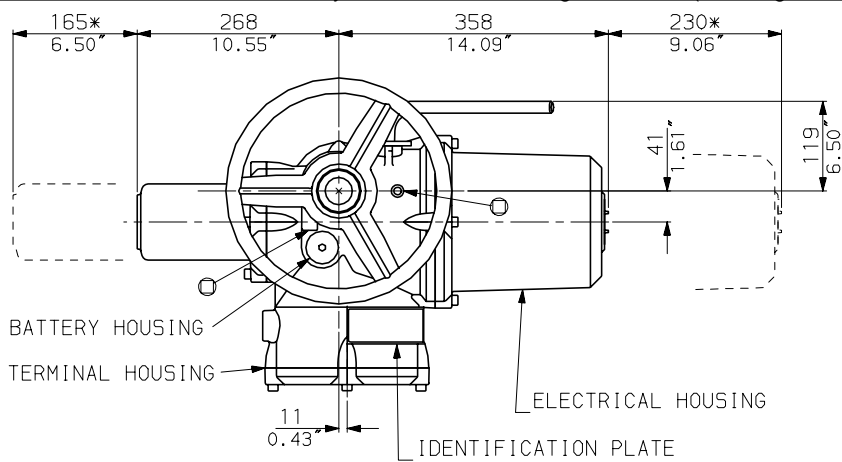
注意：コンジット口の赤色プラグは、輸送用を目的としたプラグです。
長期に渡る保護の場合、適切なメタルプラグをご使用ください。

注意：接线端红色塑料封口仅为运输途中使用。
长期正常保护时请用金属封口。

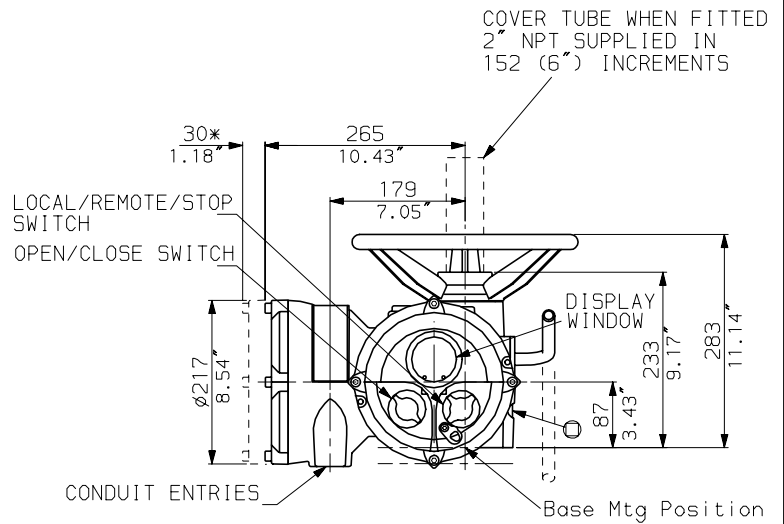
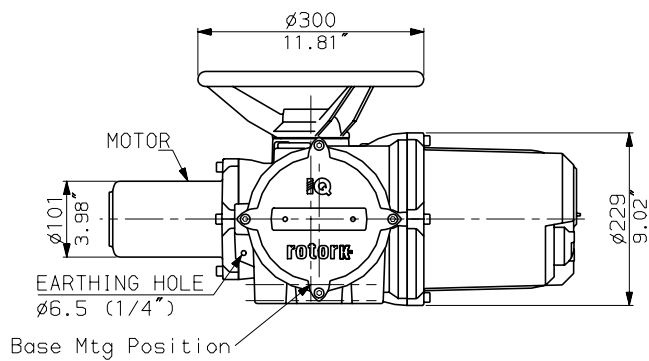
주의: 배선인입구의 빨간색 플라스틱 플러그는 오직 임시용입니다.
오래 보관하기 위해서는 규격에 맞는 금속 플러그를 사용하십시오.

As we are continually developing our products,
the design of Rotork actuators is subject to
change without notice. The latest product and
technical information is available at our
website: www.rotork.com.
The name Rotork is a registered trade mark.
Rotork recognises all registered trade marks.

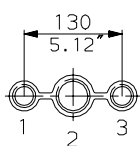
3.3.2. Rotork IQ-10 Dimensional Drawings



IQ10-18 WITH STANDARD HANDWHEEL



CONDUIT ENTRIES



Nos.1 & 3 TAPPED 1" NPT
No.2 TAPPED 1 1/2" NPT
STANDARD ALTERNATIVES IF SPECIFIED
2 X M25, 1 X M40
2 X PG16, 1 X PG29

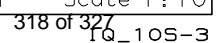
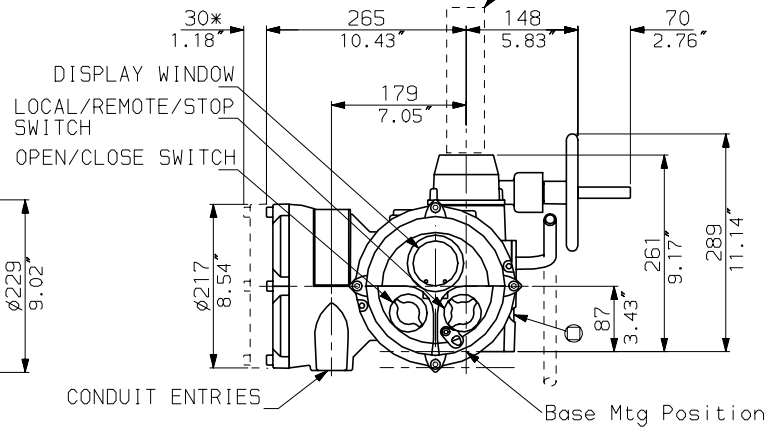
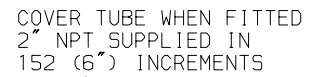
NOTES

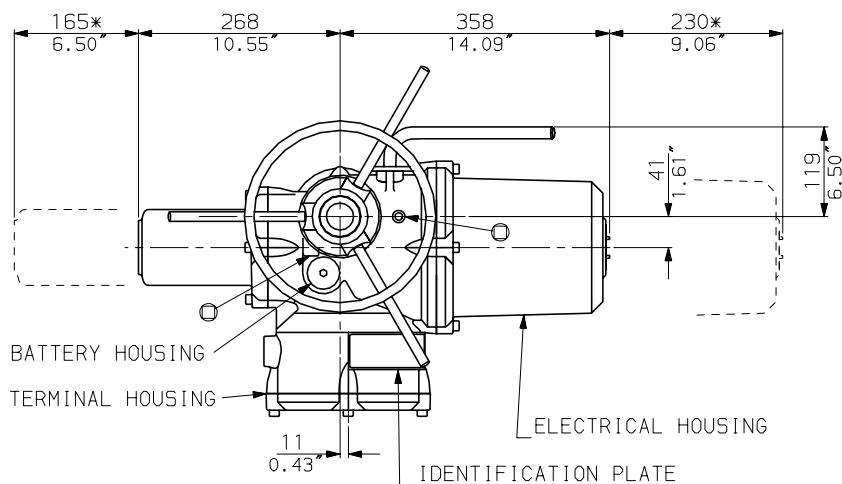
Three BASE options are detailed to suit the relevant Coupling arrangement.
The required BASE for the SIDE & END views should be loaded to position indicated. (The B4 base cannot be seen due to the conduit entries).

rotork

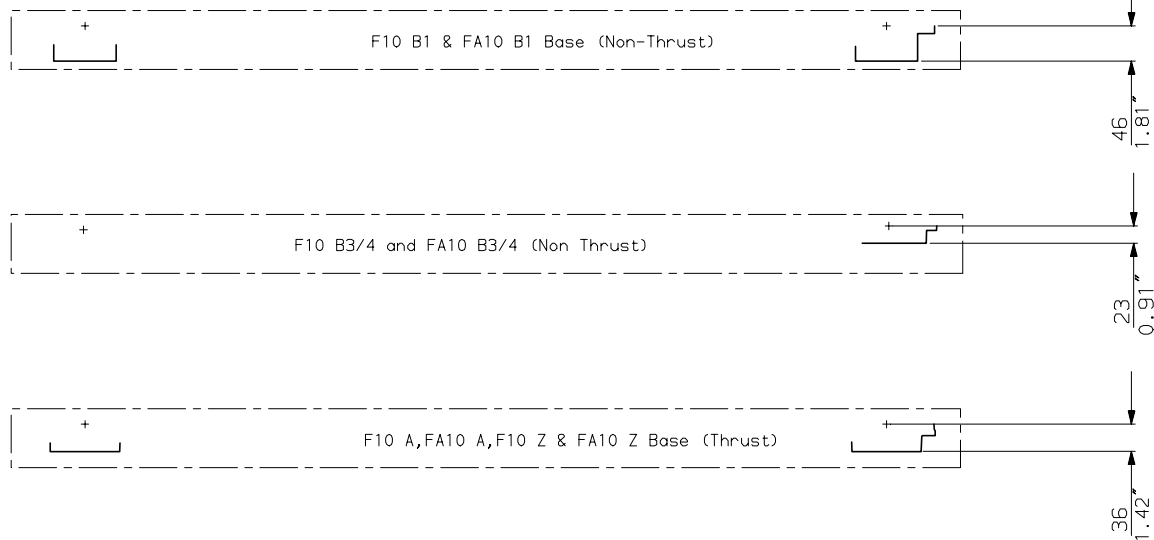
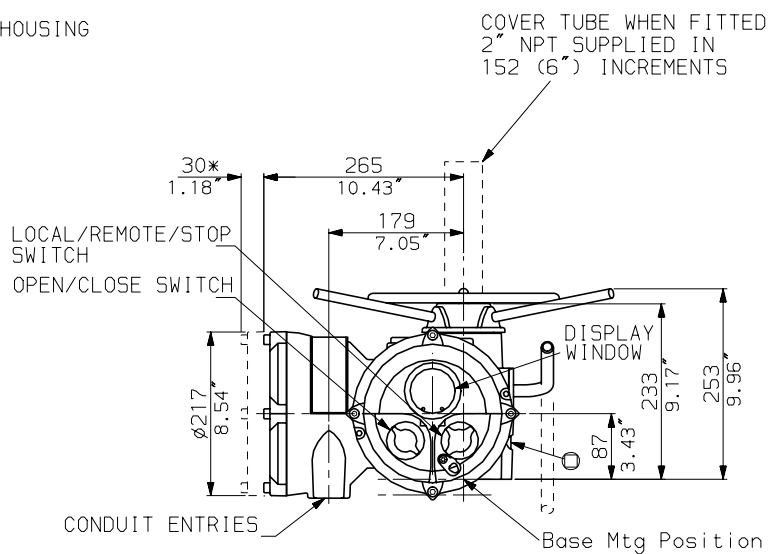
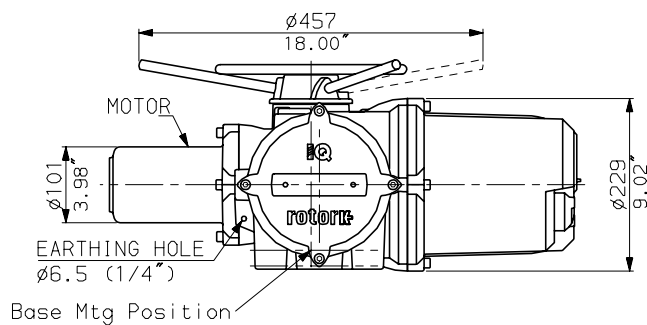
IQ10 (THW) DATA

Date 300301 Scale 1:10

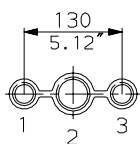




IQ10-18 WITH OPTIONAL LARGE TOP HANDWHEEL



CONDUIT ENTRIES



Nos.1 & 3 TAPPED 1" NPT
No.2 TAPPED 1 1/2" NPT
STANDARD ALTERNATIVES IF SPECIFIED
2 X M25, 1 X M40
2 X PG16, 1 X PG29

NOTES

Three BASE options are detailed to suit the relevant Coupling arrangement.
The required BASE for the SIDE & END views should be loaded to position indicated. (The B4 base cannot be seen due to the conduit entries).

rotork

IQ10 (LTHW) DATA

Date 300301 Scale 1:10

3.4. Centrifuge Feed Pressure Switches – UE Series Installation & Maintenance Instructions



12 Series Explosion-Proof, Pressure and Differential Pressure Switches



UNITED ELECTRIC
CONTROLS

Installation and Maintenance Instructions

Please read all instructional literature carefully and thoroughly before starting. Refer to the final page for the listing of Recommended Practices, Liabilities and Warranties.

GENERAL



MISUSE OF THIS PRODUCT MAY CAUSE EXPLOSION AND PERSONAL INJURY. THESE INSTRUCTIONS MUST BE THOROUGHLY READ AND UNDERSTOOD BEFORE UNIT IS INSTALLED.



THIS EQUIPMENT IS SUITABLE FOR USE IN CLASS I, DIVISIONS 1 & 2, GROUPS A, B, C AND D; CLASS II, DIVISIONS 1 & 2, GROUPS E, F AND G; CLASS III; OR NON-HAZARDOUS LOCATIONS ONLY. -50°C (-58°F) $\leq T_{\text{amb.}} \leq 95^{\circ}\text{C}$ (203°F), ENCLOSURE TYPE 4X.



THIS EQUIPMENT IS ATEX CERTIFIED FOR EQUIPMENT CATEGORY 2. SUITABLE FOR APPROPRIATE USE IN GAS ZONE 1 AND DUST ZONE 21 APPLICATIONS.

CE 0539 DEMKO Q8 ATEX 0717128X

Ex II 2 G Ex d IIC T6

Ex II 2 D Ex tD A21 IP66 T+85°C

$-50^{\circ}\text{C} \leq T_{\text{amb.}} \leq +80^{\circ}\text{C}$

UE declarations and third-party issued Agency certifications are available for download at www.ueonline.com/prod_approval.



BEFORE INSTALLING, CHECK THE SENSOR MODEL SELECTED FOR COMPATIBILITY TO THE PROCESS MEDIA IN CONTACT WITH THE SENSOR AND WETTED PARTS.



THE DUAL SEAL DEVICE METHOD OF PRIMARY SEAL FAILURE ANNUNCIATION IS VISIBLE LEAKAGE FROM THE ENCLOSURE. DEPENDING UPON MEDIA SENSED, ADDITIONAL METHODS OF LEAK DETECTION MAY BE REQUIRED.



PROOF PRESSURE* LIMITS STATED IN THE LITERATURE AND ON NAMEPLATES MUST NEVER BE EXCEEDED, EVEN BY SURGES IN THE SYSTEM. OCCASIONAL OPERATION OF UNIT UP TO PROOF PRESSURE IS ACCEPTABLE (E.G., START-UP, TESTING). CONTINUOUS OPERATION SHOULD NOT EXCEED THE DESIGNATED OVER RANGE PRESSURE** OR WORKING PRESSURE RANGE***.

***Proof Pressure** - the maximum pressure to which a pressure sensor may be occasionally subjected, which causes no permanent damage (e.g., start-up testing). (May require set-point adjustment).

****Over Range Pressure** - the maximum pressure to which a pressure sensor may be continuously subjected without causing damage and maintaining set point repeatability.

*****Working Pressure Range** - the pressure range within which two opposing sensors can be safely operated and still maintain set point repeatability.



THE EPOXY RESIN SHALL NOT BE SUBJECTED TO A TEMPERATURE GREATER THAN 125°C .

The 12 Series switch utilizes a diaphragm or a piston sensor to detect a pressure change. The response, at a predetermined set point, actuates a SPDT or DPDT snap-acting switch, converting a pressure signal into an electrical signal. Control set point may be varied by turning the internal slotted adjustment screw according to procedures outlined in Part II-Adjustments.



THESE PRODUCTS DO NOT HAVE ANY FIELD REPLACEABLE PARTS. ANY SUBSTITUTION OF COMPONENTS MAY IMPAIR SUITABILITY FOR CLASS DIVISION 1.

Please refer to product bulletin for product specifications. Product bulletin may be found at www.ueonline.com.

Date code format on nameplate is "YYWW" for year and week.

Part I - Installation

Tools Needed

1-1/6" Open end wrench

MOUNTING



ALWAYS LOCATE UNITS WHERE SHOCK, VIBRATION AND AMBIENT TEMPERATURE FLUCTUATIONS ARE MINIMAL. DO NOT MOUNT IN AMBIENT TEMPERATURE AREAS EXCEEDING 203°F (IF UL/cUL APPROVAL IS APPLICABLE) OR 80°C (IF ATEX APPROVAL IS APPLICABLE). IF SEVERE PRESSURE SURGES ARE EXPECTED, CONSIDER THE USE OF A PRESSURE SNUBBER.



FOR PRESSURE MODELS, MOUNT USING PRESSURE CONNECTION: ALWAYS USE A WRENCH ON PRESSURE CONNECTION WRENCH FLAT. (SEE FIGURE 1)

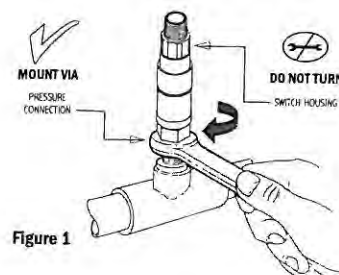


Figure 1



FOR DIFFERENTIAL PRESSURE MODELS, MOUNT UNIT AGAINST A RIGID SUPPORT USING THE MOUNTING BRACKET ATTACHED TO THE SENSOR ASSEMBLY. THEN CONNECT THE HIGH AND LOW PRESSURE CONNECTIONS (HIGH PRESSURE PORT IS ON THE LEFT, WHEN FACING THE UNIT).



UNIT MAY BE MOUNTED IN ANY POSITION. HOWEVER, IF INSTALLATION LOCATION RESULTS IN FREQUENT EXPOSURE TO LIQUID IT IS RECOMMENDED THAT THE UNIT BE MOUNTED VERTICALLY WITH THE PRESSURE CONNECTION DOWN. IF UNIT IS TO BE SET AFTER MOUNTING, VERIFY THAT ADJUSTMENT OPENING IS ACCESSIBLE. "FRONT" MARKING ON NAMEPLATE MUST FACE THE OPERATOR.

Panel Mounting via 1/2" NPTM or M20 Electrical Connection

When panel mounting, mount through 7/8" clearance hole in panel. Hold in place with serrated 1/2" or M20 conduit nut. Always support the unit by holding a wrench on the hex.

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TO ATTACH CONDUIT CONNECTION, HOLD ELECTRICAL CONNECTION STEADY WITH WRENCH ON HEX, THEN THREAD ON CONDUIT.

Surface Mounting Bracket Kit (P/N 62169-13), Option M449 (see Fig. 6)

Open the adjustment cover and orient the unit so that adjustment opening will be accessible when the switch is mounted. Close the adjustment cover ensuring that the bracket does not interfere with the cover as this serves as the Dual Seal device method of primary seal failure annunciation and venting. Failure to install the unit with the mounting bracket correctly may result in improper venting of the adjustment cover.

WIRING



DISCONNECT ALL SUPPLY CIRCUITS BEFORE WIRING UNIT. WIRE IN ACCORDANCE WITH LOCAL AND NATIONAL ELECTRICAL CODES. THE WIRES SHALL BE PROTECTED AGAINST MECHANICAL DAMAGE. E.G. BY USE OF A CONDUIT.



ELECTRICAL RATINGS STATED IN LITERATURE AND ON NAMEPLATE MUST NOT BE EXCEEDED. OVERLOAD ON A SWITCH CAN CAUSE FAILURE ON THE FIRST CYCLE.



EXTERNAL GROUNDING SCREW (OPTION M460) IS REQUIRED FOR NON-METALLIC CONDUIT SYSTEMS. (SEE FIGURE 2)



DIN CONNECTOR (OPTION M515) IS NOT APPROVED FOR CLASS I, DIV. 1/ HAZARDOUS LOCATIONS/FLAMEPROOF ATMOSPHERES.



THE WIRING TO THE PRESSURE SWITCH MUST ONLY BE CONNECTED IN THE SAFE AREA OR BY AN APPROVED TERMINAL BOX CERTIFIED TO EN 60079-1 OR EN 60079-7 FOR HAZARDOUS LOCATIONS.

1/2" NPT (male) or M20 (male) conduit connection is provided on top of the unit with 72" leadwires. Unit is available with SPDT or DPDT operation. External grounding screw and clamp is provided with option M460 (See Figure 2).

Factory Sealed Leadwires are color coded:

TERMINALS	SPDT	DPDT	
		SWT1	SWT2
Common	Brown	Brown	Yellow
Normally Closed	Red	Red	Black
Normally Open	Blue	Blue	Violet
Ground	Green	Green	

DIN Connector with 4 Male Terminals (see Figure 4)

Wire in accordance with local and national electrical codes. Connector conforms to DIN 43650. Use a mating DIN connector (female type). Coding:

TERMINALS

Terminal #1	Common
Terminal #2	Normally Closed
Terminal #3	Normally Open
	Ground

OPTION M460 EXTERNAL
GROUNDING SCREW



Figure 2

Part II - Adjustments

Tools Needed

Flathead screwdriver with 3/16" or 1/4" wide blade

1. Connect control to pressure source.
2. With power disconnected, slide cover toward electrical terminations while twisting it to over-come friction.
3. Connect power to terminals or leads.
4. Insert screwdriver into adjustment slot and turn **left** (clockwise) to **increase** setting or **right** (counterclockwise) to **decrease** setting. (See Figure 3)

For setting on RISE, apply desired pressure and turn adjustment left (clockwise) until switch actuates (circuit across N.O. and COM terminals closes).

For setting on FALL, apply pressure equal to normal system operating pressure. Reduce source pressure to setpoint value. Turn adjustment right (counter clockwise) until switch actuates (circuit across N.C. and COM terminals closes).

Zone Hazardous Locations Flameproof Gap and Joint Details

Electrical conduit fitting threaded connection: M20 x 1.5, 7 threads minimum engagement

Dimensions

Dimensional drawings for all models may be found at www.ueonline.com

Standard Configuration

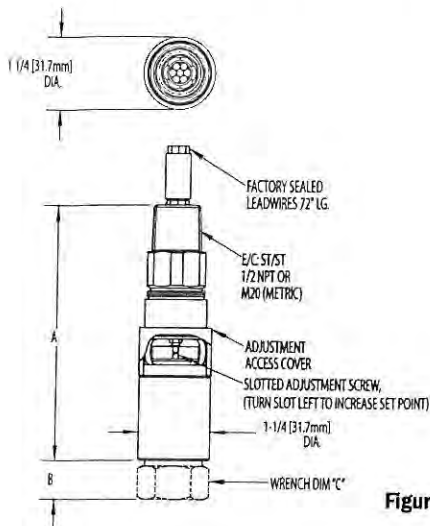
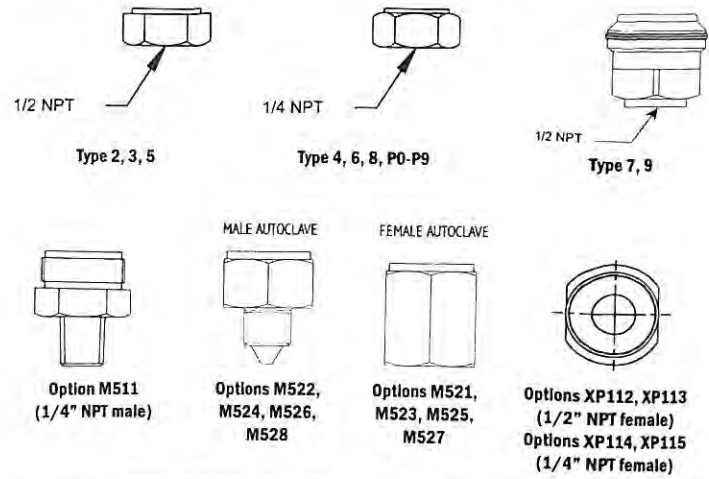


Figure 3

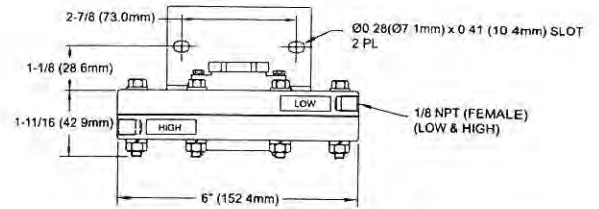
PRESSURE SWITCH / CONNECTION CHART

Type	Description	Dimension "A"		Dimension "B"		Dimension "C"	
		Inches	mm	Inches	mm	Inches	mm
2	1/2" NPT (female)	4.4	111.1	0.7	16.5	1-1/16	27.0
3, 5	1/2" NPT (female)	4.4	111.1	0.6	15.2	1-1/16	27.0
4, 6, 8	1/4" NPT (female)	4.4	111.1	0.6	15.2	1-1/16	27.0
7, 9	1/2" NPT (female)	4.0	100.3	1.6	40.6	1-1/8	28.6
P0-P9	1/4" NPT (female)	4.4	111.1	1.0	25.4	1-1/16	27.0
K1-K3	1/8" NPT (female)	4.4	111.1	1.7	42.9	N/A	N/A
K4-K6	1/8" NPT (female)	4.4	111.1	1.8	44.5	N/A	N/A
Option							
M511	1/4" NPT (male)			1.1	27.9	1-1/16	27.0
M521	LF4 Autoclave 1/4" (female)			1.2	29.7	1-1/16	27.0
M522	LM4 Autoclave 1/4" (male)			1.4	34.8	1-1/16	27.0
M523	LF6 Autoclave 3/8" (female)			1.4	36.1	1-1/16	27.0
M524	LM6 Autoclave 3/8" (male)			1.5	38.4	1-1/16	27.0
M525	HF4 Autoclave 1/4" (female)			1.2	29.7	1-1/16	27.0
M526	HM4 autoclave 1/4" (male)			1.3	32.8	1-1/16	27.0
M527	HF6 Autoclave 3/8" (female)			1.4	36.1	1-1/16	27.0
M528	HM6 Autoclave 3/8" (male)			1.5	37.6	1-1/16	27.0
XP112	1/2" NPT (female)			0.6	15.2	1-1/16	27.0
XP113	1/2" NPT (female)			0.6	15.2	1-1/16	27.0
XP114	1/4" NPT (female)			0.6	15.2	1-1/16	27.0
XP115	1/4" NPT (female)			0.6	15.2	1-1/16	27.0

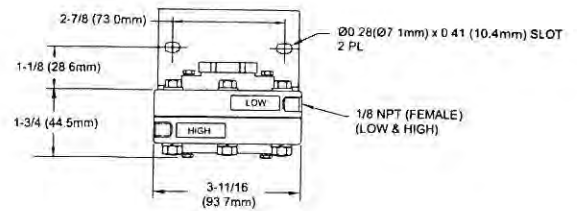
Pressure Connections



Differential Pressure Connections



Type K1-K3



Type K4-K6

Types K1-K3 and K4-K6 shown with mounting bracket attached

Option M515 DIN Connection

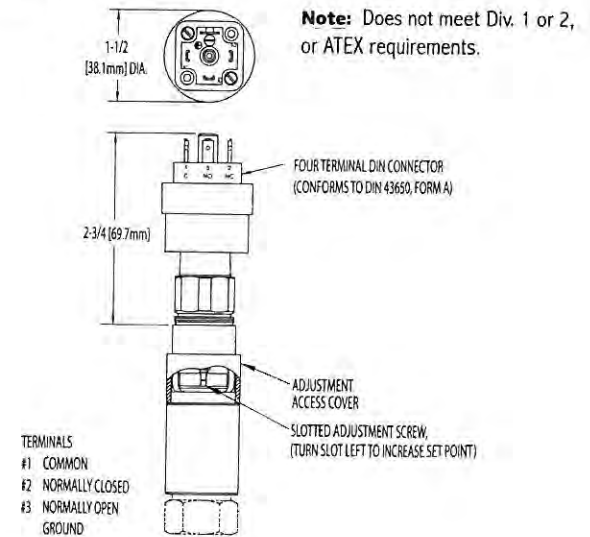


Figure 4

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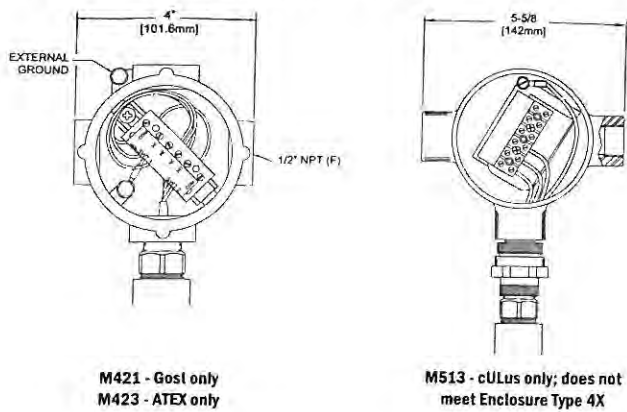
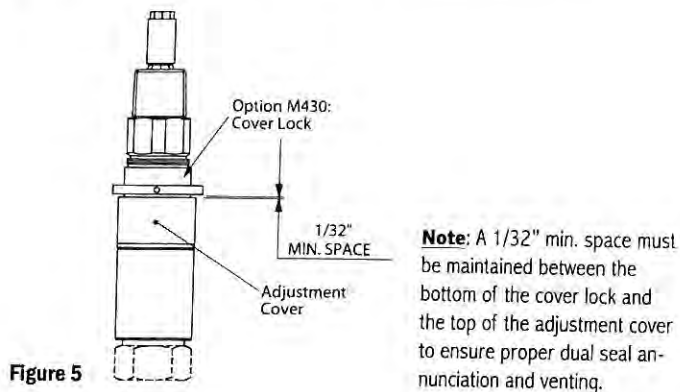
Option M421, M423 & M513 Junction Boxes**Option M430 Adjustment Cover Lock**

Figure 5

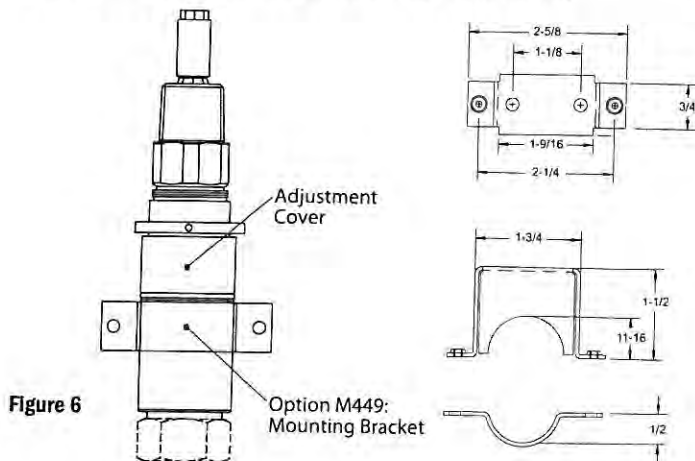
Option M449 Surface Mounting Bracket (Kit P/N 62169-13)

Figure 6

RECOMMENDED PRACTICES AND WARNINGS

United Electric Controls Company recommends careful consideration of the following factors when specifying and installing UE pressure and temperature units. Before installing a unit, the Installation and Maintenance instructions provided with unit must be read and understood.

- To avoid damaging unit, proof pressure and maximum temperature limits stated in literature and on nameplates must never be exceeded, even by surges in the system. Operation of the unit up to maximum temperature is acceptable on a limited basis (i.e., start-up, testing) but continuous operation must be restricted to the designated adjustable range. Excessive cycling at maximum temperature limits could reduce sensor life.
- A back-up unit is necessary for applications where damage to a primary unit could endanger life, limb or property. A high or low limit switch is necessary for applications where a dangerous runaway condition could result.
- The adjustable range must be selected so that incorrect, inadvertent or malicious setting at any range point cannot result in an unsafe system condition.
- Install unit where shock, vibration and ambient temperature fluctuations will not damage unit or affect operation. Orient unit so that moisture does not enter the enclosure via the electrical connection. When appropriate, this entry point should be sealed to prevent moisture entry.
- Unit must not be altered or modified after shipment. Consult UE if modification is necessary.
- Monitor operation to observe warning signs of possible damage to unit, such as drift in set point or faulty display. Check unit immediately.
- Preventative maintenance and periodic testing is necessary for critical applications where damage could endanger property or personnel.
- For all applications, a factory set unit should be tested before use.
- Electrical ratings stated in literature and on nameplate must not be exceeded. Overload on a switch can cause damage, even on the first cycle. Wire unit according to local and national electrical codes, using wire size recommended in installation sheet.
- Do not mount unit in ambient temp. exceeding published limits.

LIMITED WARRANTY

Seller warrants that the product hereby purchased is, upon delivery, free from defects in material and workmanship and that any such product which is found to be defective in such workmanship or material will be repaired or replaced by Seller (Ex-works, Factory, Watertown, Massachusetts. INCOTERMS); provided, however, that this warranty applies only to equipment found to be so defective within a period of 36 months from the date of manufacture by the Seller. Seller shall not be obligated under this warranty for alleged defects which examination discloses are due to tampering, misuse, neglect, improper storage, and in any case where products are disassembled by anyone other than authorized Seller's representatives. EXCEPT FOR THE LIMITED WARRANTY OF REPAIR AND REPLACEMENT STATED ABOVE, SELLER DISCLAIMS ALL WARRANTIES WHATSOEVER WITH RESPECT TO THE PRODUCT, INCLUDING ALL IMPLIED WARRANTIES OF MERCHANTABILITY OR FITNESS FOR ANY PARTICULAR PURPOSE.

LIMITATION OF SELLER'S LIABILITY

Seller's liability to Buyer for any loss or claim, including liability incurred in connection with (i) breach of any warranty whatsoever, expressed or implied, (ii) a breach of contract, (iii) a negligent act or acts (or negligent failure to act) committed by Seller, or (iv) an act for which strict liability will be inputted to seller, is limited to the "limited warranty" of repair and/or replacement as so stated in our warranty of product. In no event shall the Seller be liable for any special, indirect, consequential or other damages of a like general nature, including, without limitation, loss of profits or production, or loss or expenses of any nature incurred by the buyer or any third party.

UE specifications subject to change without notice.



**UNITED ELECTRIC
CONTROLS**

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<http://www.ueonline.com>

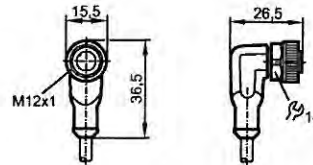
3.5. Centrifuge Feed Valve Limits – IFM Data Sheet & Mounting Instructions

ecomat 400®

ifm electronic



Connection technology

EVC005ADOAH040MSS0005H04
SocketFor sensors with
M12 connectorFree from silicone
Free from halogen
gold-plated contacts

Made in Germany

Electrical design

Operating voltage	[V]
Current rating	[A]
Design	
Ambient temperature	[°C]
Protection	
Material body	
Material nut	
Tightening torque for knurled nut [Nm]	
Connection	
Sheath color	
Drag chain suitability	
Weight	[kg]
Remarks	

AC/DC

250 AC / 300 DC	
4	
angled	
-25...90 *)	
IP 67 / IP 68 / IP 69K, II	
housing: TPU (urethane) orange; sealing: Viton	
brass; nickel-plated	
0.6...1.5	
PUR cable / 5 m;	
4 x 0.34 mm ² (42 x Ø 0.1 mm); Ø 4.9 mm; halogen-free	
black	
Bending radius for flexible applications:	min. 10 x cable diameter max. 3.3 m/s for a horizontal travel length of 5 m and max. acceleration of
Travel speed:	5 m/s ²
Bending cycles:	> 5 million
Torsional strain:	± 180 °/m
0.177	
*) cRUus; max. 50 °C	

Wiring

Core colors
BK black
BN brown
BU blue
WH white



1	BN
2	WH
3	BU
4	BK



Montagehinweis / Mounting instruction / Instruction de montage



Verbinden Sie den Steckverbinder mit dem Sensor, der Pfeil zeigt die richtige Lage der Kodierung. Um die angegebene Schutzart zu gewährleisten, muss die Überwurfmutter mit einem Anzugsdrehmoment von 0,6 Nm (handfest) bis 1,5 Nm (Schlüsselmontage) angezogen werden.

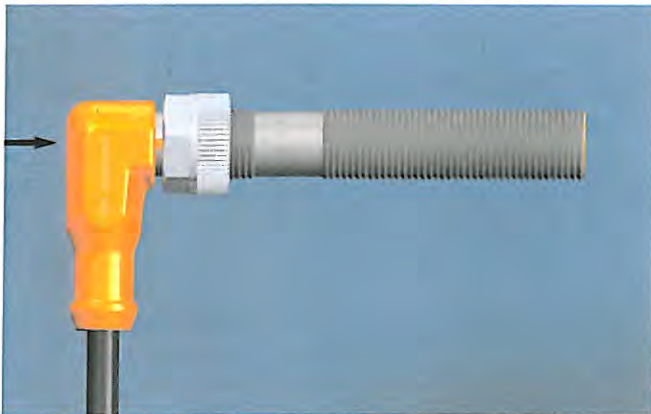
Connect the connector to the sensor; the arrow indicates the right position of the coding. To ensure the indicated protection rating, the coupling nut must be tightened with a tightening torque from 0.6 Nm (hand-tight) to 1.5 Nm (using a torque wrench).

Raccorder le connecteur au capteur, la flèche indique la bonne direction du codage. Afin d'assurer le degré de protection indiqué, il faut serrer l'écrou avec un couple de serrage de 0,6 Nm (à la main) à 1,5 Nm (avec une clé).

Zur Demontage lösen Sie die Überwurfmutter und drücken gleichzeitig den Steckverbinder gegen den Sensor.

For removal loosen the coupling nut and at the same time press the connector against the sensor.

Pour le démontage desserrer l'écrou et presser simultanément le connecteur contre le capteur.



Beim Einsatz in rauen Umgebungen ziehen Sie die Überwurfmutter mit einem Schlüssel (SW14) eine Raste weiter fest, um Schock- und Vibrationsfestigkeit zu erhöhen. Zur Demontage verwenden Sie ebenfalls einen Schlüssel (SW14).

For applications in harsh environments tighten the coupling nut by turning it one notch further with a key (width across flats 14) to increase shock and vibration resistance.

For removal also use a key (width across flats 14).

Pour les applications en environnement agressif serrer l'écrou en le tournant d'un cran d'arrêt supplémentaire, avec une clé (cote sur plat 14), afin d'augmenter la tenue aux chocs et vibrations. Utiliser également une clé (cote sur plat 14) pour le démontage.

