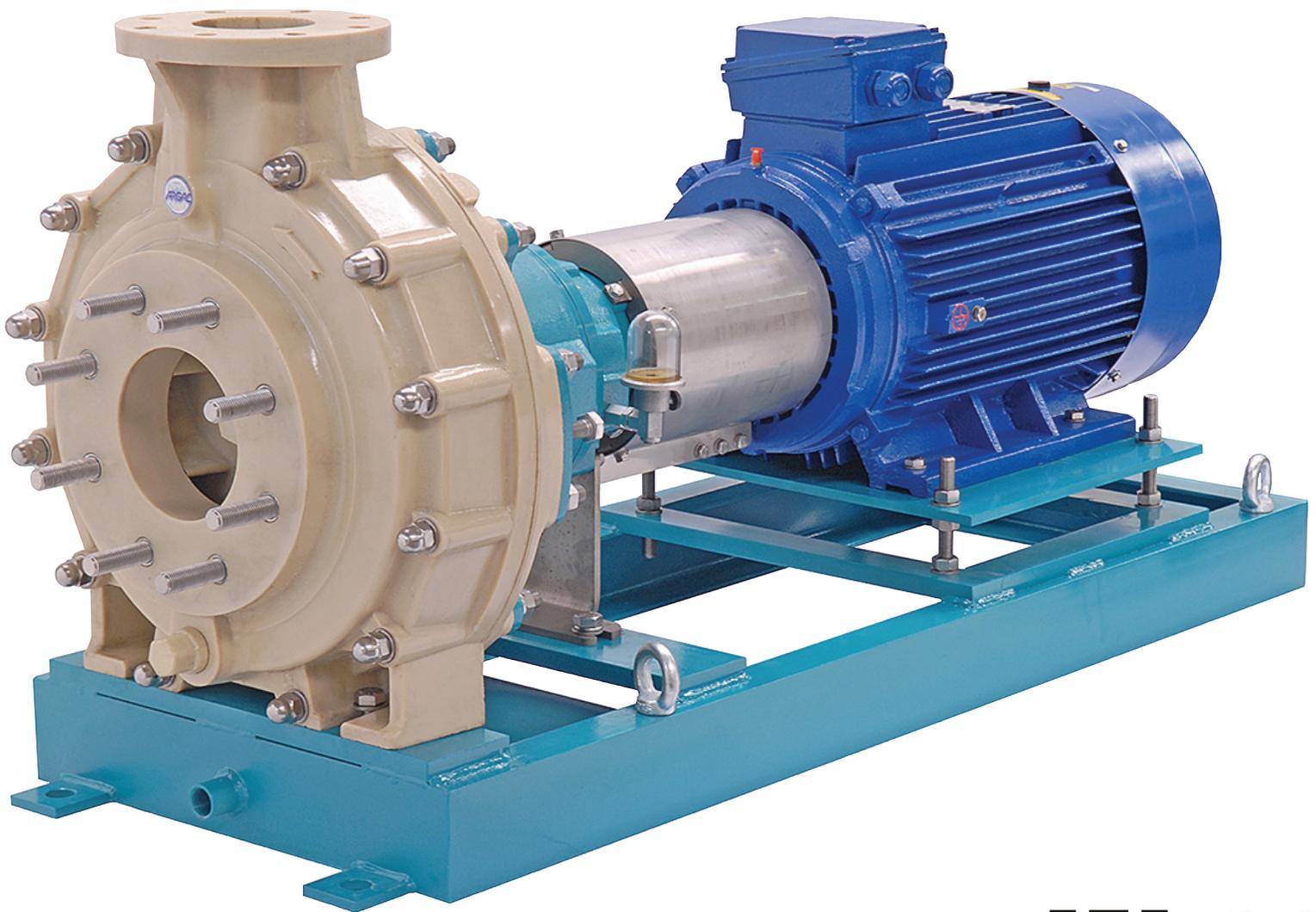


ARGAL

USE MANUAL SATURN ZGS



ERC CE

DEALER

For maintenance:
date of commissioning

Position / system reference:

Service:

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ATTACHEMENT:

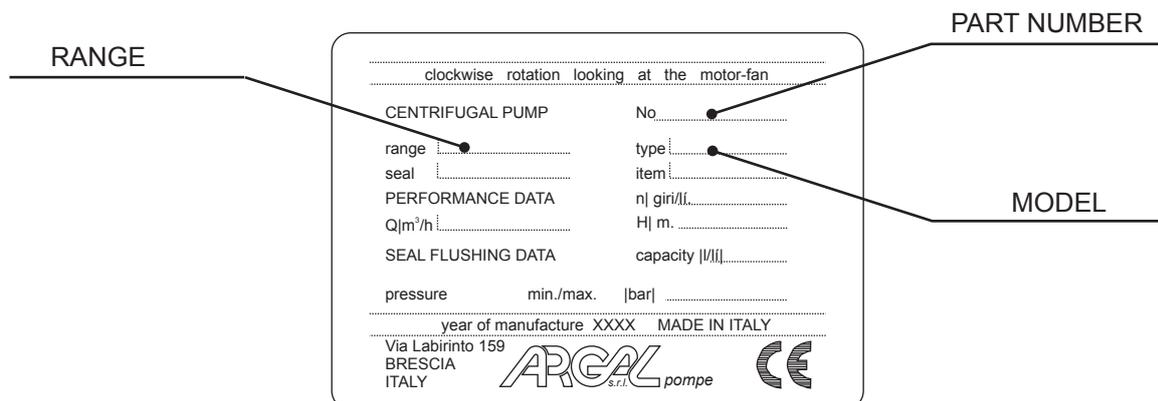
- **DECLARATION OF CONFORMITY (MACHINERY DIRECTIVE 2006/42/EC)**

- **MOTOR USE MANUAL**

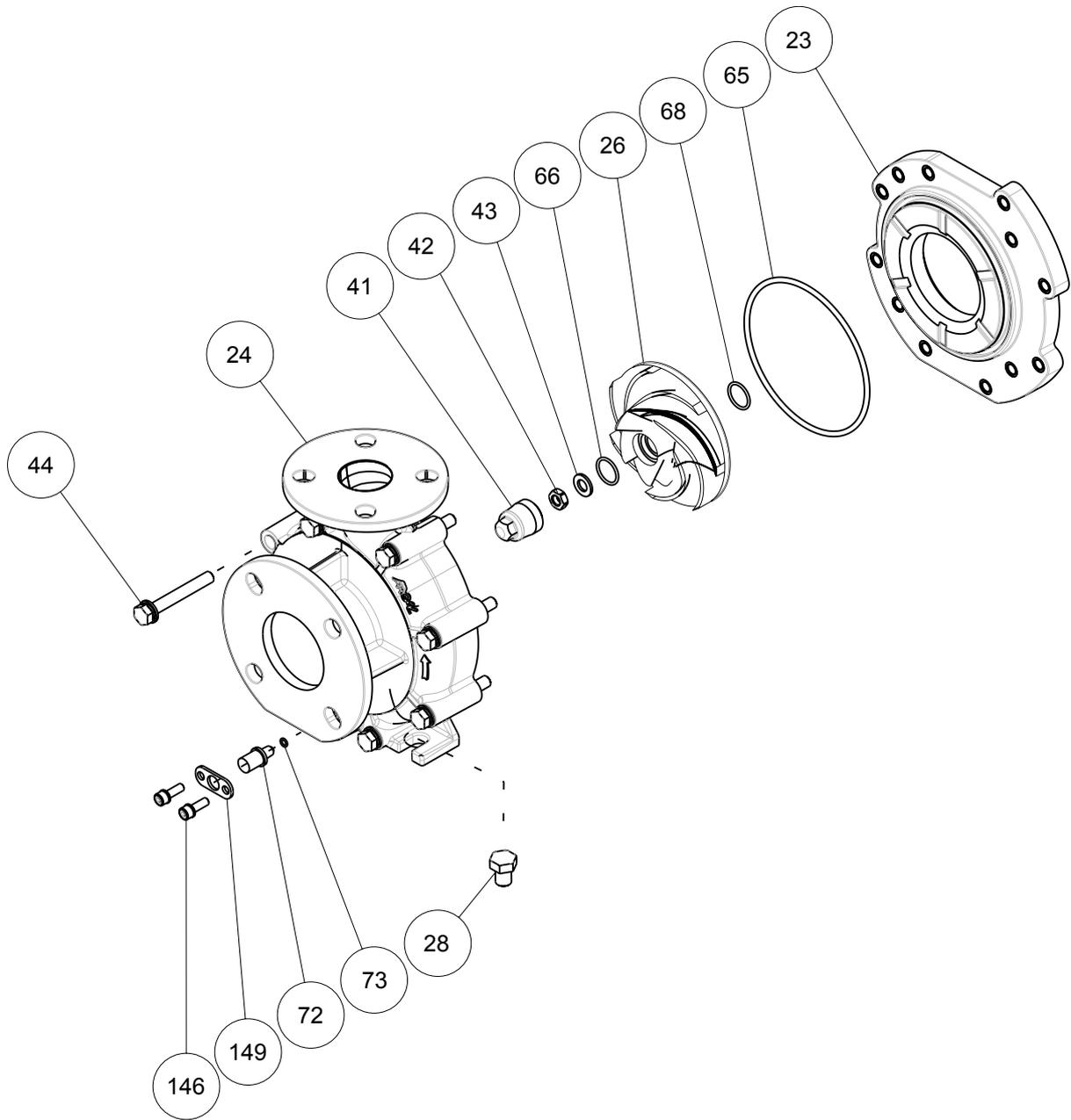
IDENTIFICATION CODE

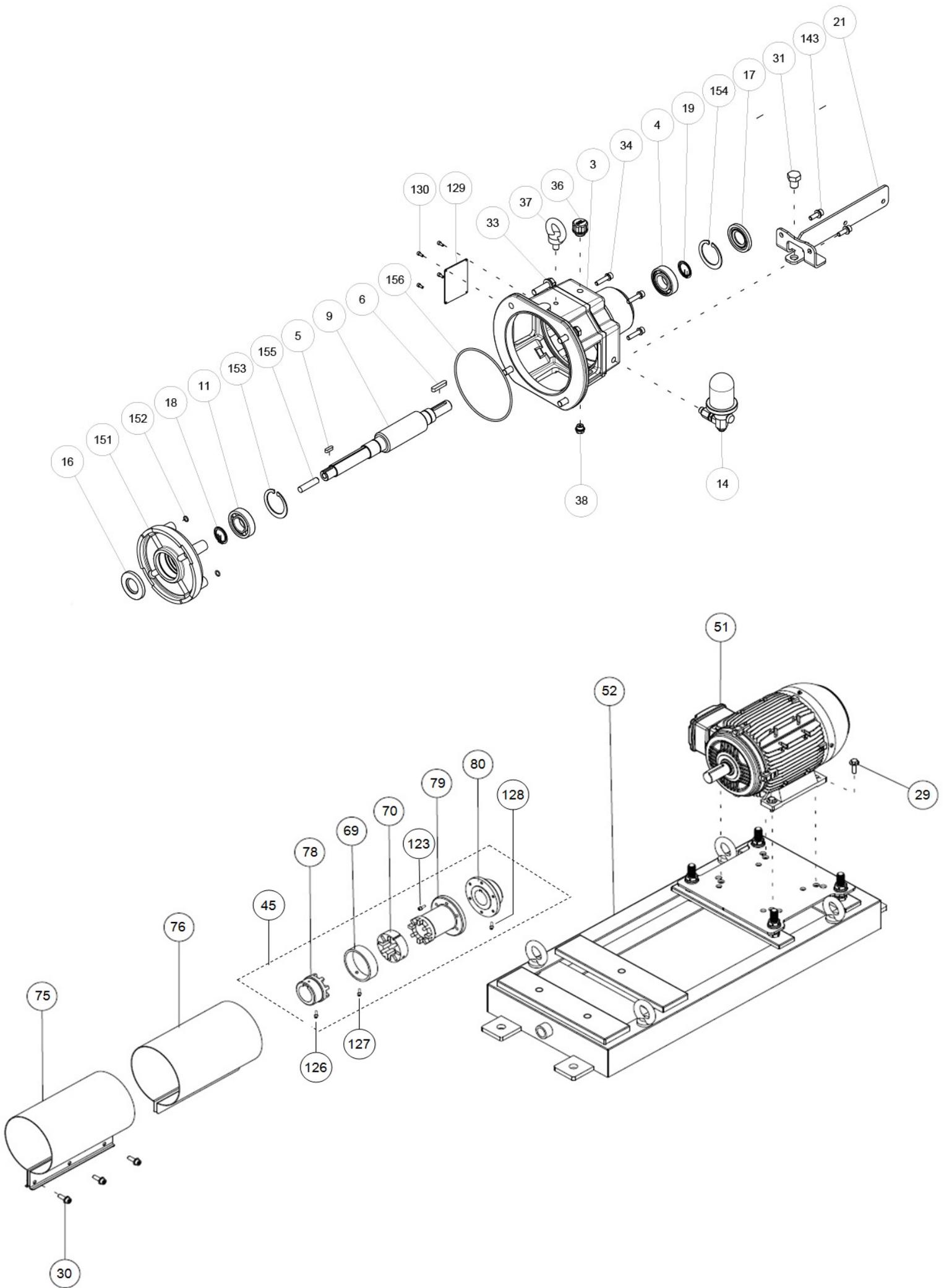
DATI POMPA									
Range	Model	Version	O-Ring Material	Mechanical Seal		External Structure	Motor Standard	Elastic Coupling	Flange
ZGS (G1)	<input type="checkbox"/> 1.5X1X6	<input type="checkbox"/> V1G Epoxy Vinyl Ester Resin	<input type="checkbox"/> V FPM	<input type="checkbox"/> TR5-1	Single External (API PLAN 02)	<input type="checkbox"/> R Integral	<input type="checkbox"/> E IEC	<input type="checkbox"/> 0 Without Joint	<input type="checkbox"/> A ANSI
	<input type="checkbox"/> 1.5X1X8	<input type="checkbox"/> V1A Epoxy Vinyl Ester Resin Mixture	<input type="checkbox"/> E EPDM	<input type="checkbox"/> TR8-1					
	<input type="checkbox"/> 3X1.5X6	<input type="checkbox"/> V1C Epoxy Vinyl Ester Resin Mixture	<input type="checkbox"/> F FEP	<input type="checkbox"/> BF8-1	Single Internal (API PLAN 03)				
	<input type="checkbox"/> 3X2X6	<input type="checkbox"/> V1F Epoxy Vinyl Ester Resin Mixture	<input type="checkbox"/> K FFKM	<input type="checkbox"/> MTR5-1	External Double Flushed with External Flush (API PLAN 54)				
	<input type="checkbox"/> 3X1.5X8	<input type="checkbox"/> V1X Epoxy Vinyl Ester Resin Mixture with Conductive Resine Liner		<input type="checkbox"/> MTR8-1					
ZGS (G2)	<input type="checkbox"/> 3X2X8				<input type="checkbox"/> MC8-1	External Double Cartridge Flushed with External Flush (API PLAN 54)			
	<input type="checkbox"/> 3X2X10								
	<input type="checkbox"/> 4X3X8				<input type="checkbox"/> CS8-F-1		Single Internal Cartridge Flushed with External Quench (API PLAN 03)		
	<input type="checkbox"/> 4X3X10				<input type="checkbox"/> CS8-1		Single Internal Cartridge with Flushing Inlet on Pump (API PLAN 03)		
	<input type="checkbox"/> 4X3X13								
	<input type="checkbox"/> 6X4X10								
	<input type="checkbox"/> 6X4X13								
ZGS (G3)	<input type="checkbox"/> 8X6X13								
	<input type="checkbox"/> 10x8x15								
	<input type="checkbox"/> 12X10X16								
ZGS (G4)	<input type="checkbox"/> 20X16X20								

Each pump is supplied with the range and model abbreviation and the serial number on the rating plate, which is fixed onto the support side. Check these data upon receiving the goods. Any discrepancy between the order and the delivery must be communicated immediately. In order to be able to trace data and information, the range, model and serial number of the pump must be quoted in all correspondence.



EXPLODED VIEW - Size G1

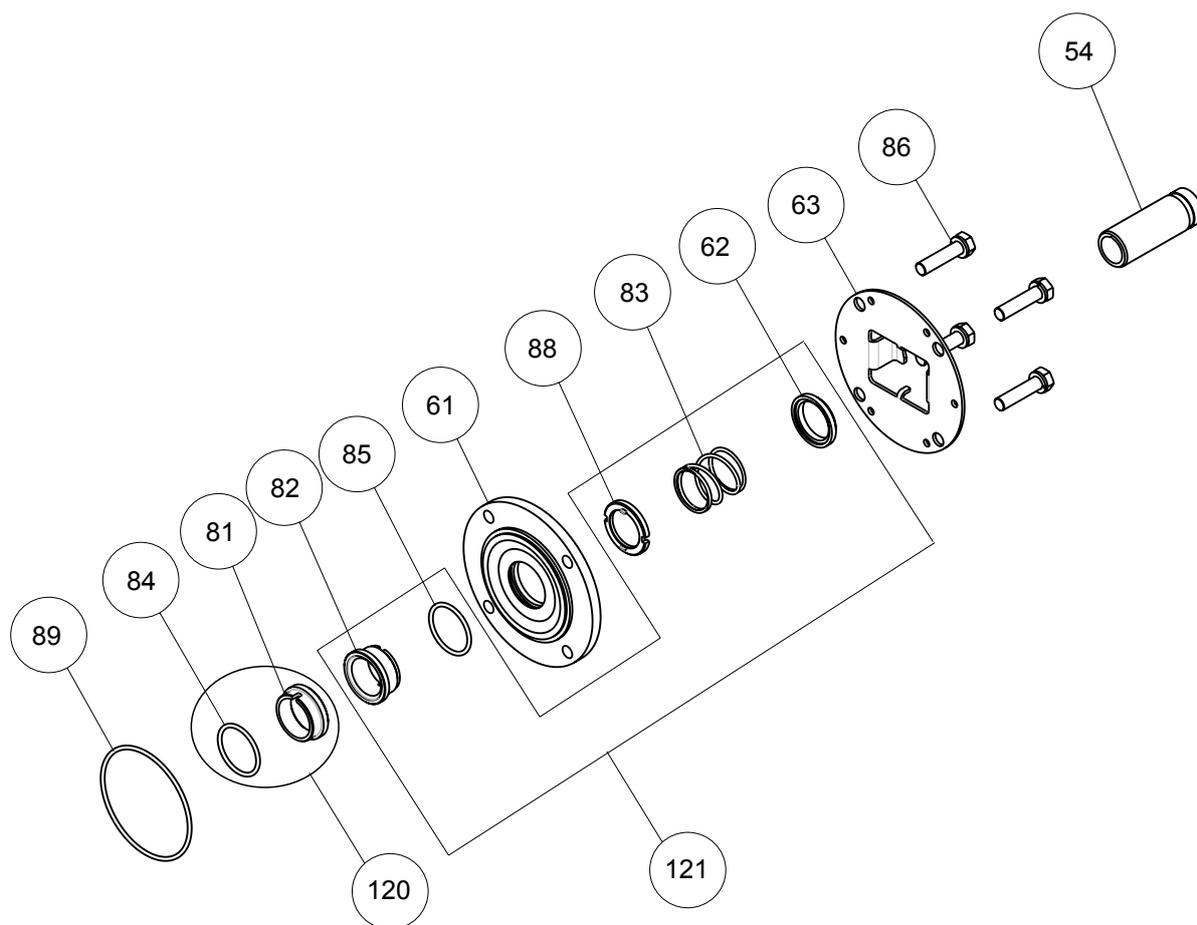




LEGEND - EXPLODED VIEW - Size G1

pos.	ref	Part name	Q.ty	Disassembling steps sequence (A1,....,A10,B1,....,B10,C1....)										Spare parts stock			
				1	2	3	4	5	6	7	8	9	10	start up	2 years	5 years	
3	807.1	Bearing Frame	1								B						
4	320.1	Bearing (Outboard)	1							B						1	1
5	940.1	Feather Key (Impeller)	1														
6	940.2	Feather Key (Motor)	1														
9	210	Shaft	1								B						
11	320.2	Bearing (Inboard)	1						B							1	1
14	643	Constant Level Oiler	1	A													1
16	421.1	Elastic Seal Ring (Inboard)	1				B									1	1
17	421.2	Elastic Seal Ring (Outboard)	1				B									1	1
18	932.1	Snap Ring	1					B									
19	932.2	Snap Ring	1					B									
21	183	Frame Leg	1														
23	134	Cover	1						A								
24	102	Volute Casing	1		A												
26	230	Impeller	1					A								1	1
28	910.1	FASTENERS Volute Casing / Baseplate	2	A													
29	910.2	FASTENERS Motor / Baseplate	4	A													
30	910.12	FASTENERS Coupling Guard	3	A													
31	910.4	FASTENERS Frame Leg / Baseplate	2	A													
33	910.9	FASTENERS Bearing Frame / Cover	4														
34	910.10	FASTENERS Bearing Frame / Bearing Housing		B													
36	638.1	Oil Fill Plug	1	A													1
37	918	Eyebolt	1														
38	638.2	Oil Drain Plug	1	A													1
41	260	Ogive	1				A									1	1
42	920	Nut (Impeller)	1					A									
43	925	Washer	1					A									
44	910.5	FASTENERS Volute Casing / Cover															
45	840	Coupling (Complete)	1				A										
51	800	Motor	1		A												
52	891	Baseplate	1														
65	412.1	O-Ring Volute Casing / Cover	1		A										1	1	1
66	412.2	O-Ring Impeller (Inboard)	1					A							1	1	1
68	412.3	O-Ring Impeller (Outboard)	1					A							1	1	1
69	850	Ring of Elastic Insert	1					A							1	1	1
70	848	Elastic Insert	1					A							1	1	1
72	638.3	Drain Plug	1		A												1
73	412.4	O-Ring Drain Plug	1		A											1	1
75	875.2	Coupling Guard (Fixed)	1		A												
76	875.3	Coupling Guard	1		A												
78	842	Coupling Part (Inboard)	1					A			A						1
79	862	Spacer	1					A									1
80	841	Coupling Part (Outboard)	1					A									1
123	901	FASTENERS Coupling						A									
126	904.1	Grub Screw Coupling Part (Inboard)	1					A									
127	904.2	Grub Screw Ring (Elastic Insert)	2					A									
128	904.3	Grub Screw Coupling (Outboard)	1					A									
129	135	Protection Shield	2		A												
130	910.20	FASTENERS Protection Shield / Bearing Frame	8	A													
143		FASTENERS Frame Leg / Bearing Frame	2														
146		FASTENERS Drain Plug	2	A													
149		Drain Plug Flange	1	A													
151		Bearing Housing	1					B									
152		O-Ring Bearing Frame / Bearing Housing	2					B								1	1
153		Snap Ring	1								B						
154		Snap Ring	1								B						
155		Grub Screw	1														
156		O-Ring Bearing Frame / Bearing Housing	1					B								1	1

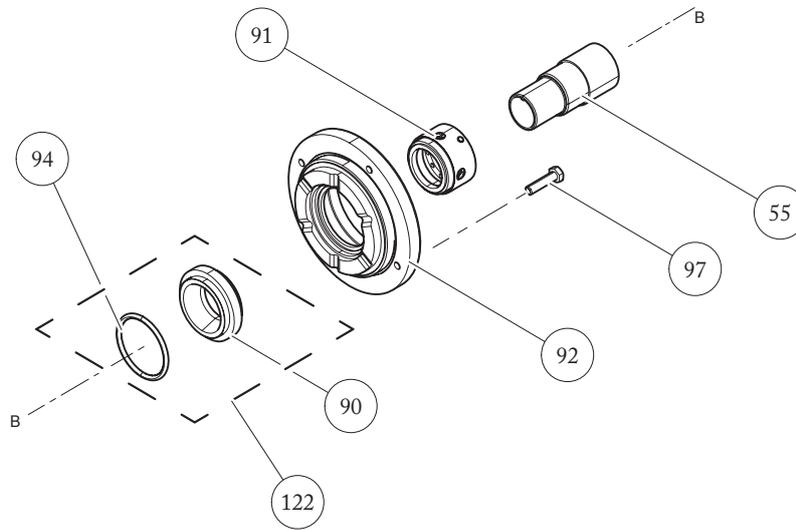
INTERNAL MECHANICAL SEAL: BF..



LEGEND INTERNAL MECHANICAL SEAL TYPE BF..

pos.	ref	Part name	Q.ty	Disassembling steps sequence (A1,...,A10,B1,...,B10,C1,...)										Spare parts stock				
				1	2	3	4	5	6	7	8	9	10	start up	2 years	5 years		
54	524.1	Shaft Sleeve (BF)	1													1	1	1
61	135.1	Diaphragm	1					C										1
62	488	Lock Ring	1			C												
63	360	Locking Counter-Plate	1		C													
81	472.1	Rotating Seal	1															
82	475.1	Fixed Seal	1				C											
83	477	Spring	1			C												
84	412.6	O-ring Rotating Seal	1															
85	412.7	O-ring Fixed Seal	1					C										
86	910.16	FASTENERS Counter-Plate / Diaphragm	1	C														
88	476	Stationary Seal Locking Ring	1			C												
89	412.8	O-ring Diaphragm / Cover	1					C								1	1	1
120		ROTATING SEAL COMPLETE														1	1	1
121		FIXED SEAL COMPLETE														1	1	1

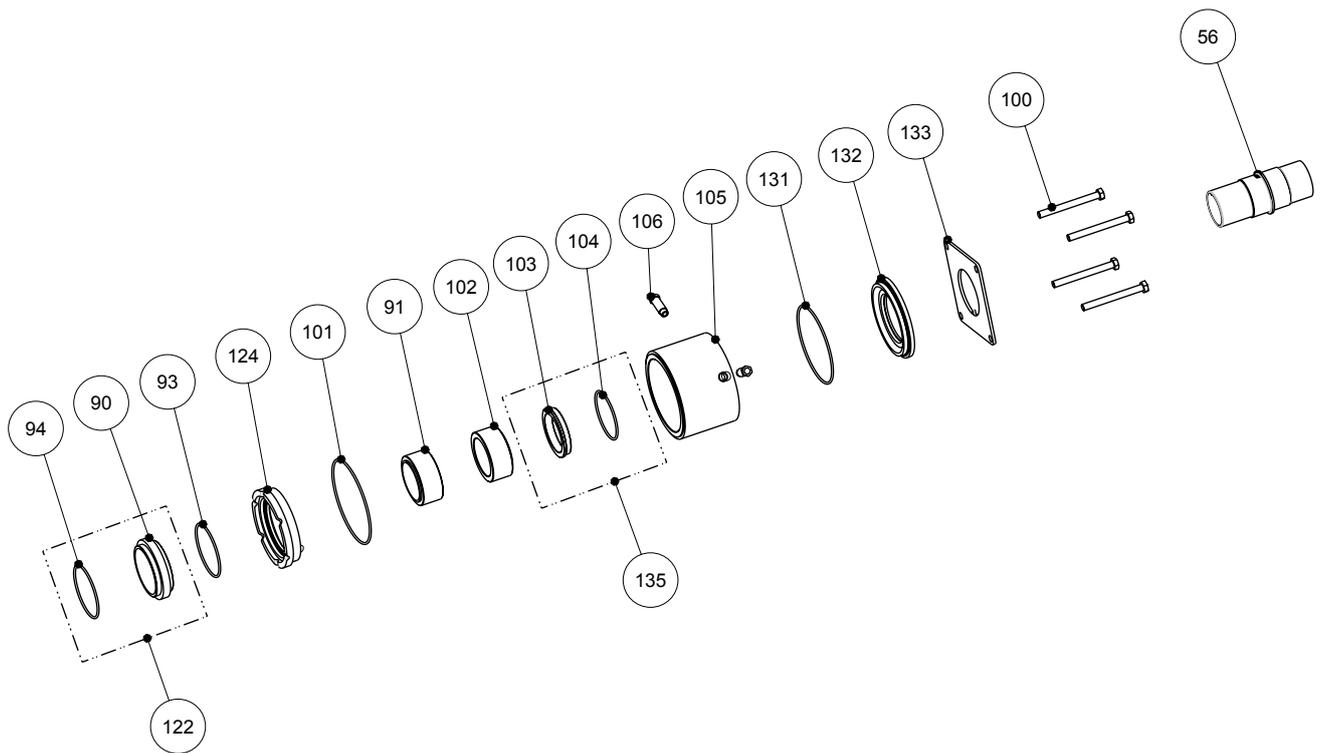
EXTERNAL MECHANICAL SEAL: TR..



LEGEND EXTERNAL MECHANICAL SEAL TYPE TR..

pos.	ref	Part name	Q.ty	Disassembling steps sequence (A1,.....A10,B1,.....B10,C1.....)										Spare parts stock			
				1	2	3	4	5	6	7	8	9	10	start up	2 years	5 years	
55	524.2	Shaft sleeve (TR)	1												1	1	1
90	475.2	Fixed Seal	1			C											
91	472.2	Rotating Seal	1	C											1	1	1
92	135.2	Diaphragm (TR)	1		C												1
94	412.8	O-ring Fixed Seal	1				C										
97	910.17	FASTENERS Diaphragm	4	C													
122		FIXED SEAL COMPLETE													1	1	1

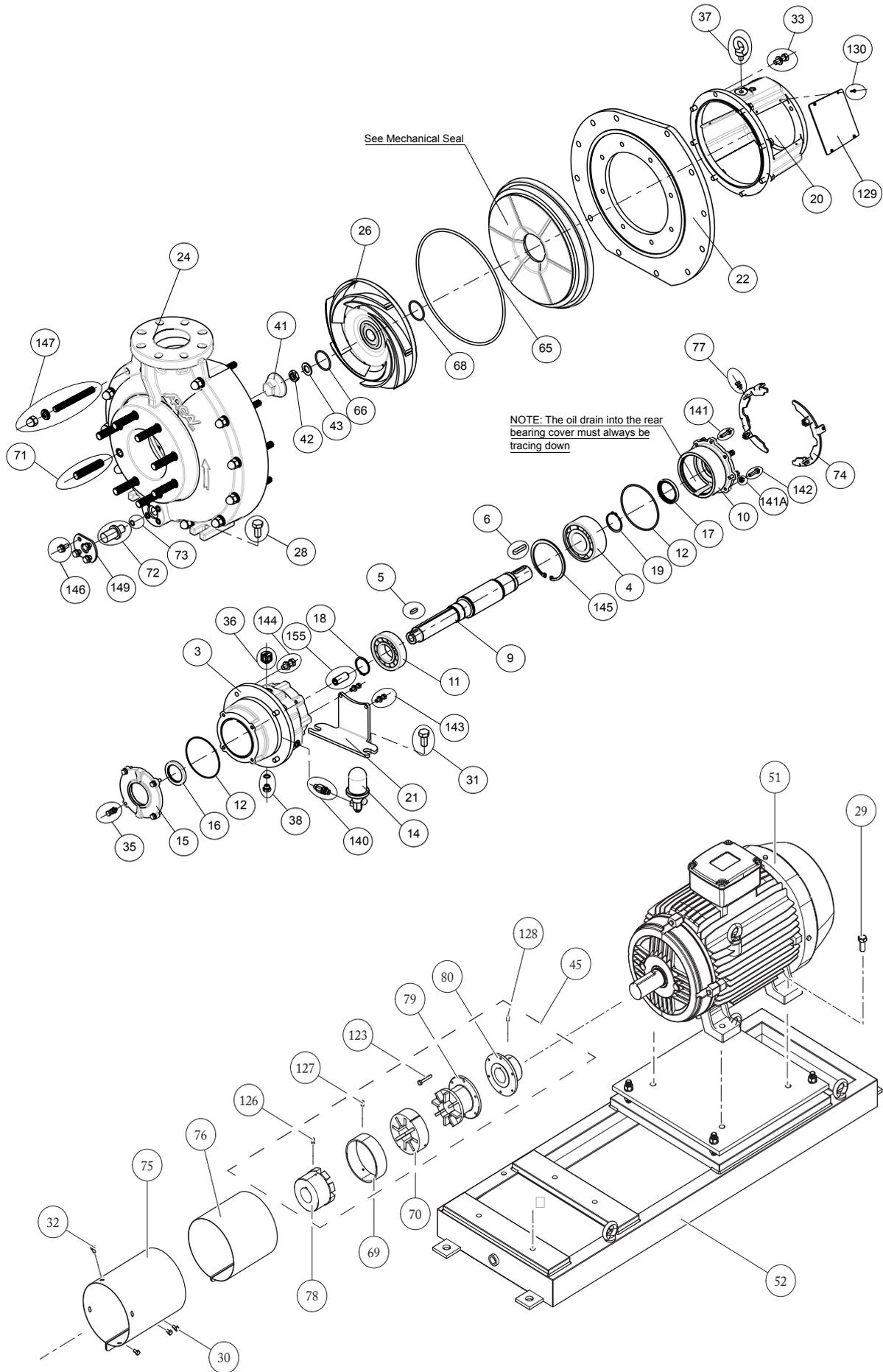
EXTERNAL DOUBLE MECHANICAL SEAL: MTR..



LEGEND EXTERNAL DOUBLE MECHANICAL SEAL TYPE MTR..

pos.	ref	Part name	Q.ty	Disassembling steps sequence (A1,....,A10,B1,....,B10,C1,....)										Spare parts stock			
				1	2	3	4	5	6	7	8	9	10	start up	2 years	5 years	
56	524.3	Shaft Sleeve (MTR)	1					C							1	1	1
90	475.2	Fixed Seal (Inboard)	1									C					
91	472.2	Rotating Seal (Inboard)	1						C						1	1	1
93	412.7	O-ring Fixed Seal / Diaphragm	1									C			1	1	1
94	412.8	O-ring Fixed Seal	1									C					
100	910.19	FASTENERS Flushing Chamber	4		C												
101	412.9	O-ring Flushing Chamber	1							C					1	1	1
102	472.3	Rotating Seal (Outboard)	1						C						1	1	1
103	475.3	Fixed Seal (Outboard)	1					C									
104	412.10	O-ring Fixed Seal	1					C									
105	471	Flushing Chamber	1						C								
106	910.18	Flushing Piping	2	C													
122		FIXED SEAL COMPLETE (Inboard)													1	1	1
124	605.3	Diaphragm (MTR)	1								C						1
131		O-ring Flushing Chamber / Flange	1					C							1	1	1
132		Flange Flushing Chamber	1				C										
133		Counter Plate Flushing Chamber	1			C											
135		FIXED SEAL COMPLETE (Outboard)													1	1	1

EXPLODED VIEW - Size G2



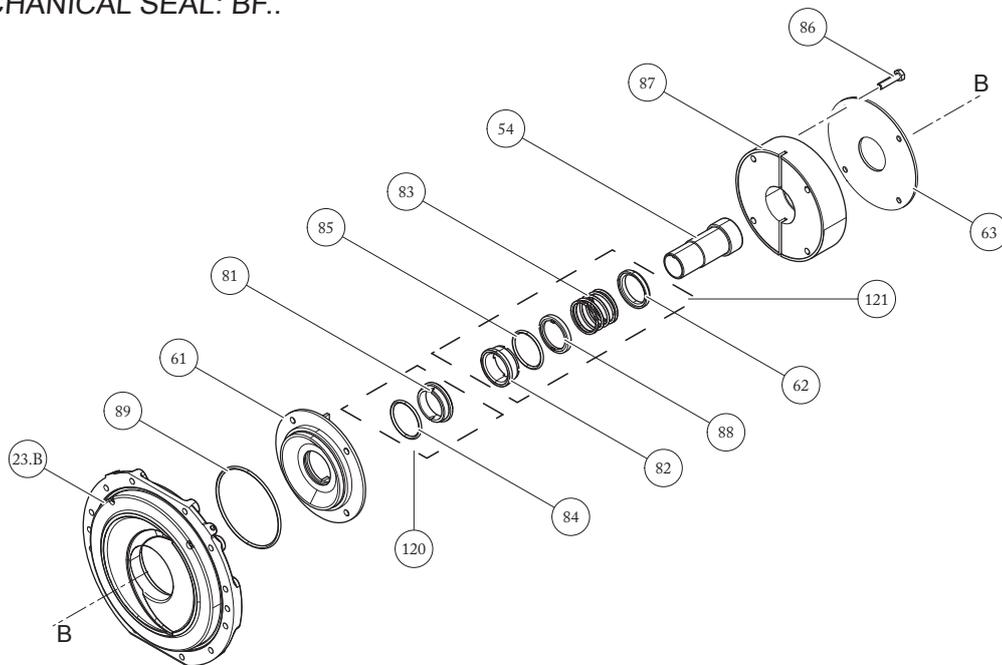
LEGEND - EXPLODED VIEW - Size G2

pos.	ref	Part name	Q.ty	Disassembling steps sequence (A1,....,A10,B1,....,B10,C1....)										Spare parts stock			
				1	2	3	4	5	6	7	8	9	10	start up	2 years	5 years	
3	807.1	Bearing Frame	1								B						
4	320.1	Bearing (Outboard)	1							B						1	1
5	940.1	Feather Key (Impeller)	1														
6	940.2	Feather Key (Motor)	1														
9	210	Shaft	1								B						
10		Bearing Housing (Outboard)	1									B					
11	320.2	Bearing (Inboard)	1							B						1	1
12LP	412.5	O-Ring (OR 3475)	1				B									1	1
12LM	412.5	O-Ring (OR 4525)	1				B									1	1
14	643	Constant Level Oiler	1	A													1
15	360.2	Bearing Housing (Inboard)	1			B											
16	421.1	Elastic Seal Ring (Inboard)	1				B									1	1
17	421.2	Elastic Seal Ring (Outboard)	1				B									1	1
18	932.1	Snap Ring	1					B									
19	932.2	Snap Ring	1					B									
20	331	Bracket	1														
21	183	Frame Leg	1			A											
22	155	Rear Flange															
24	102	Volute Casing	1		A												
26	230	Impeller	1						A							1	1
28	910.1	FASTENERS Volute Casing / Baseplate	2	A													
29	910.2	FASTENERS Motor / Baseplate	4	A													
30	910.12	FASTENERS Coupling Guard	3	A													
31	910.4	FASTENERS Baseplate / Frame Leg	2	A													
32	910.14	FASTENERS Coupling Cover Flange / Coupling Guard	1	A													
35	910	FASTENERS Bearing Frame / Bearing Housing	4		B												1
36	638.1	Oil Fill Plug	1	A													1
37	918	Eyebolt	1	A													
38	638.2	Oil Drain Plug	1	A													1
41	260	Ogive	1													1	1
42	920	Nut (Impeller)	1				A										
43	925	Washer	1					A									
45	840	Coupling (Complete)	1	A													
51	800	Motor	1		A												
52	891	Baseplate	1														
65	412.1	O-Ring Volute Casing / Cover	1			A										1	1
66	412.2	O-Ring Impeller (Inboard)	1							A						1	1
68	412.3	O-Ring Impeller (Outboard)	1							A						1	1
69	850	Ring of Elastic Insert	1				A									1	1
70	848	Elastic Insert	1					A								1	1
71	905	Tie Rods		A													
72	638.3	Drain Plug	1	A													1
73	412.4	O-Ring Drain Plug	1		A											1	1
74	875.1	Coupling Cover Flange	2			A											
75	875.2	Coupling Guard (Fixed)	1		A												
76	875.3	Coupling Guard	1		A												
77	910.15	FASTENERS Coupling Cover Flange / Coupling Guard	2		A												
78	842	Coupling Part (Inboard)	1							A							
79	862	Spacer	1							A							
80	841	Coupling Part (Outboard)	1								A						
123	901	FASTENERS Coupling						A									
126	904.1	Grub Screw Coupling Part (Inboard)	1			A											
127	904.2	Grub Screw Ring (Elastic Insert)	2			A											
128	904.3	Grub Screw Coupling (Outboard)	1			A											
129	135	Protection Shield	2		A												
130	910.20	FASTENERS Protection Shield / Bracket		A													
140	910.30	Oiler Kit Connection	1	A													
141		FASTENERS Bearing Housing Impeller Position	3	A													
141A		Locking Nut	3	A													
142		FASTENERS Bearing Housing	3	A													
143		FASTENERS Frame Leg / Bearing Frame	2	A													
144		FASTENERS Bearing Frame / Bracket	4				A										
145		Snap Ring Bearing Housing	1					B									
146		FASTENERS Drain Plug	4	A													
147		FASTENERS Volute Casing / Rear Flange	12	A													
149		Drain Plug Flange	1														
155		Joint Pin	1														

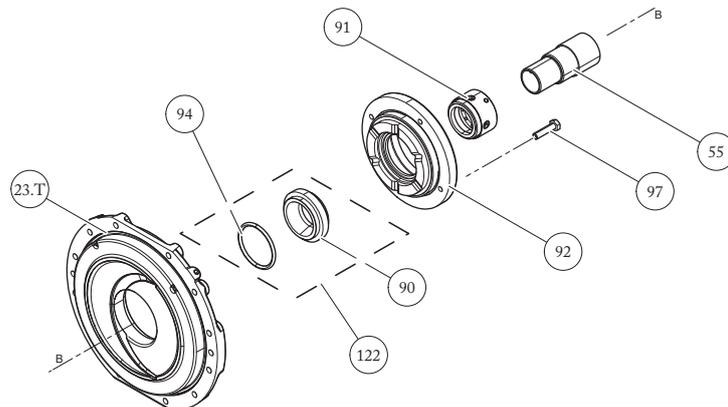
LEGEND - EXPLODED VIEW - Size G3

pos.	ref	Part name	Q.ty	Disassembling steps sequence (A1,....,A10,B1,....,B10,C1....)										Spare parts stock			
				1	2	3	4	5	6	7	8	9	10	start up	2 years	5 years	
3	807.1	Bearing Frame	1								B						
4	320.1	Bearing (Outboard)	1							B						1	1
5	940.1	Feather Key (Impeller)	1														
6	940.2	Feather Key (Motor)	1														
9	210	Shaft	1								B						
10		Bearing Housing (Outboard)	1									B					
11	320.2	Bearing (Inboard)	1							B						1	1
12LP	412.5	O-Ring (OR 3625)	1				B									1	1
12LM	412.5	O-Ring (OR 6645)	1				B									1	1
14	643	Constant Level Oiler	1	A													1
15	360.2	Bearing Housing (Inboard)	1			B											
16	421.1	Elastic Seal Ring (Inboard)	1				B									1	1
17	421.2	Elastic Seal Ring (Outboard)	1				B									1	1
18	932.1	Snap Ring	1					B									
19	932.2	Snap Ring	1					B									
20	155	Bracket	1														
21	183	Frame Leg	1			A											
24	102	Volute Casing	1		A												
26	230	Impeller	1						A							1	1
28	910.1	FASTENERS Volute Casing / Baseplate	2	A													
29	910.2	FASTENERS Motor / Baseplate	4	A													
30	910.12	FASTENERS Coupling Guard	3	A													
31	910.4	FASTENERS Baseplate / Frame Leg	2	A													1
32	910.14	FASTENERS Coupling Cover Flange / Coupling Guard	1	A													
35		FASTENERS Bearing Frame / Bearing Housing	4		B												1
36	638.1	Oil Fill Plug	1	A													1
37	918	Eyebolt	1	A													
38	638.2	Oil Drain Plug	1	A													1
41	260	Ogive	1													1	1
42	920	Nut (Impeller)	1				A										1
43	925	Washer	1					A									1
45	840	Coupling (Complete)	1	A													
51	800	Motor	1		A												
52	891	Baseplate	1														
65	412.1	O-Ring Volute Casing / Cover	1			A									1	1	1
66	412.2	O-Ring Impeller (Inboard)	1							A					1	1	1
68	412.3	O-Ring Impeller (Outboard)	1								A				1	1	1
69	850	Ring of Elastic Insert	1				A								1	1	1
70	848	Elastic Insert	1					A							1	1	1
71	905	Tie Rods		A													
72	638.3	Drain Plug	1	A													1
73	412.4	O-Ring Drain Plug	1		A											1	1
74	875.1	Coupling Cover Flange	2			A											
75	875.2	Coupling Guard (Fixed)	1		A												
76	875.3	Coupling Guard	1		A												
77	910.15	FASTENERS Coupling Cover Flange / Coupling Guard	2		A												
78	842	Coupling Part (Inboard)	1							A							1
79	862	Spacer	1								A						1
80	841	Coupling Part (Outboard)	1									A					1
123	901	FASTENERS Coupling						A									
126	904.1	Grub Screw Coupling Part (Inboard)	1			A											
127	904.2	Grub Screw Ring (Elastic Insert)	2			A											
128	904.3	Grub Screw Coupling (Outboard)	1			A											
129	135	Protection Shield	2		A												
130	910.20	FASTENERS Protection Shield / Rear Flange		A													
140	910.30	Oiler Kit Connection	1	A													
141		FASTENERS Bearing Housing Impeller Position	3	A													
141A		Locking Nut	3	A													
142		FASTENERS Bearing Housing	3	A													
143		FASTENERS Frame Leg / Bearing Frame	2	A													
144		FASTENERS Bearing Frame / Bracket	4				A										
145		Snap Ring Bearing Housing	1					B									
146		FASTENERS Drain Plug	4	A													
147		FASTENERS Volute Casing / Bracket	12	A													
149		Drain Plug Flange	1														

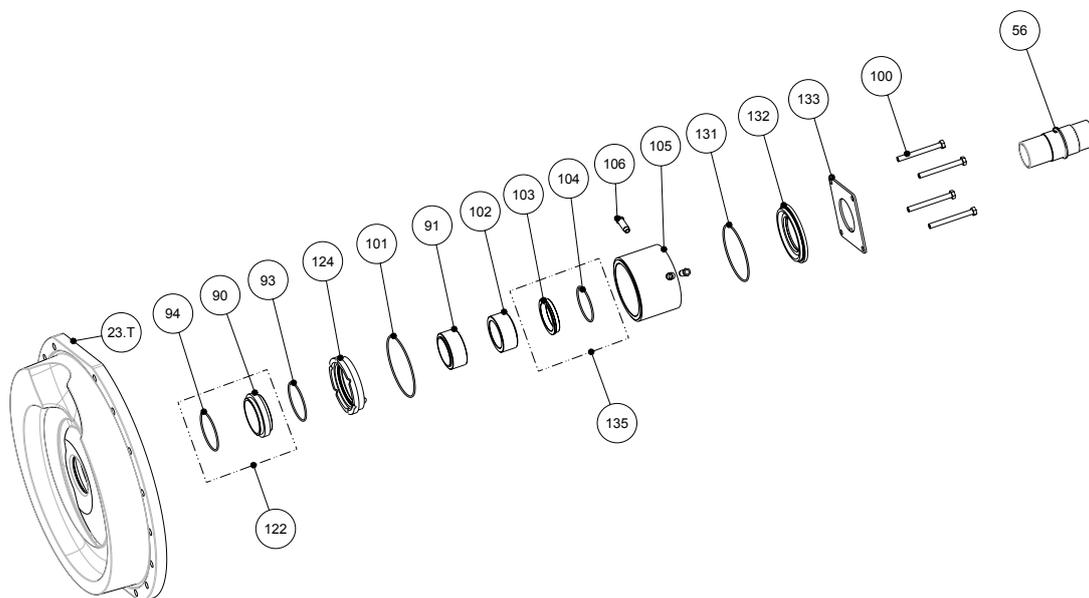
INTERNAL MECHANICAL SEAL: BF..



EXTERNAL MECHANICAL SEAL: TR..



DOUBLE MECHANICAL SEAL: MTR..



LEGEND INTERNAL MECHANICAL SEAL BF..

pos.	ref	Part name	Q.ty	Disassembling steps sequence (A1,...,A10,B1,...,B10,C1....)										Spare parts stock			
				1	2	3	4	5	6	7	8	9	10	start up	2 years	5 years	
23.B	134.1	Cover	1														
54	524.1	Shaft Sleeve (BF)	1											1	1	1	
61	135.1	Diaphragm	1							C						1	
62	488	Lock Ring	1				C										
63	360	Locking Counter-Plate	1		C											1	
81	472.1	Rotating Seal	1														
82	475.1	Fixed Seal	1					C									
83	477	Spring	1				C										
84	412.6	O-ring Rotating Seal	1														
85	412.7	O-ring Fixed Seal	1						C								
86	910.16	FASTENERS Counter-Plate / Spring Spacer	4	C													
87	478	Spring Spacer	1			C											
88	476	Stationary Seal Locking Ring	1					C									
89	412.8	O-ring Diaphragm / Cover	1								C			1	1	1	
120		ROTATING SEAL COMPLETE												1	1	1	
121		FIXED SEAL COMPLETE												1	1	1	

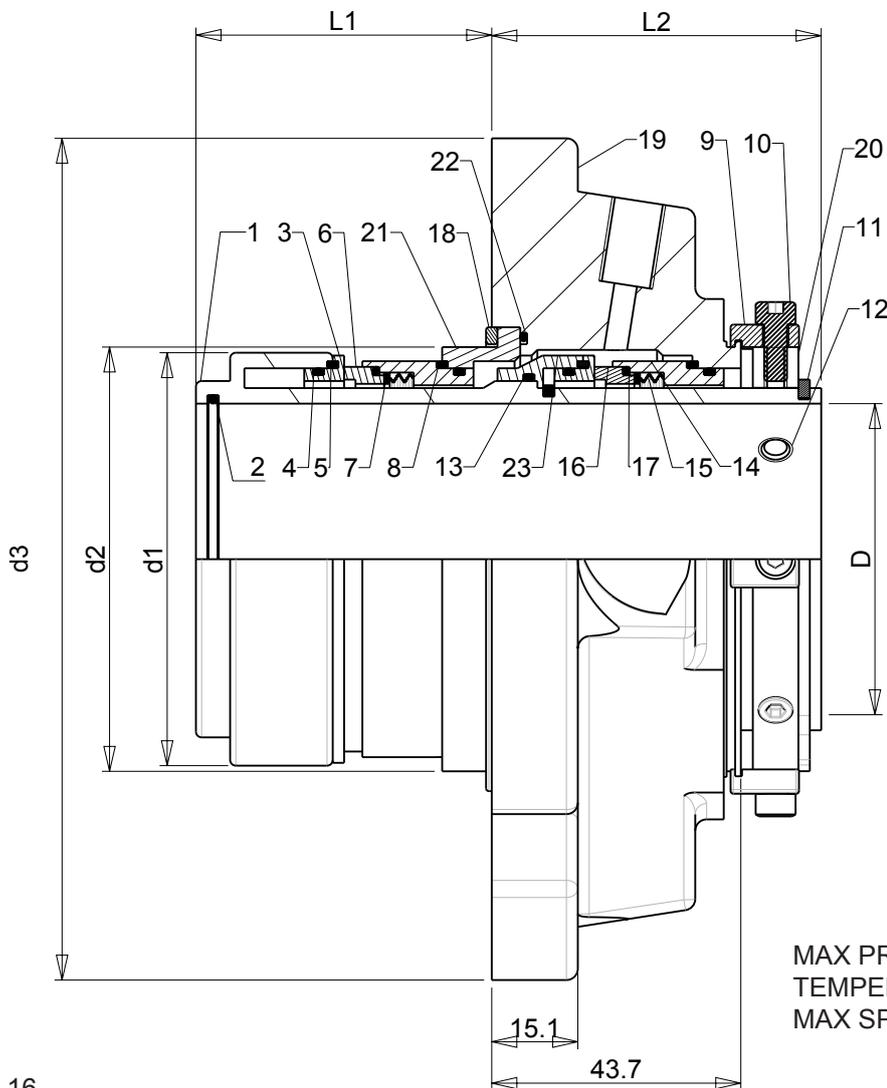
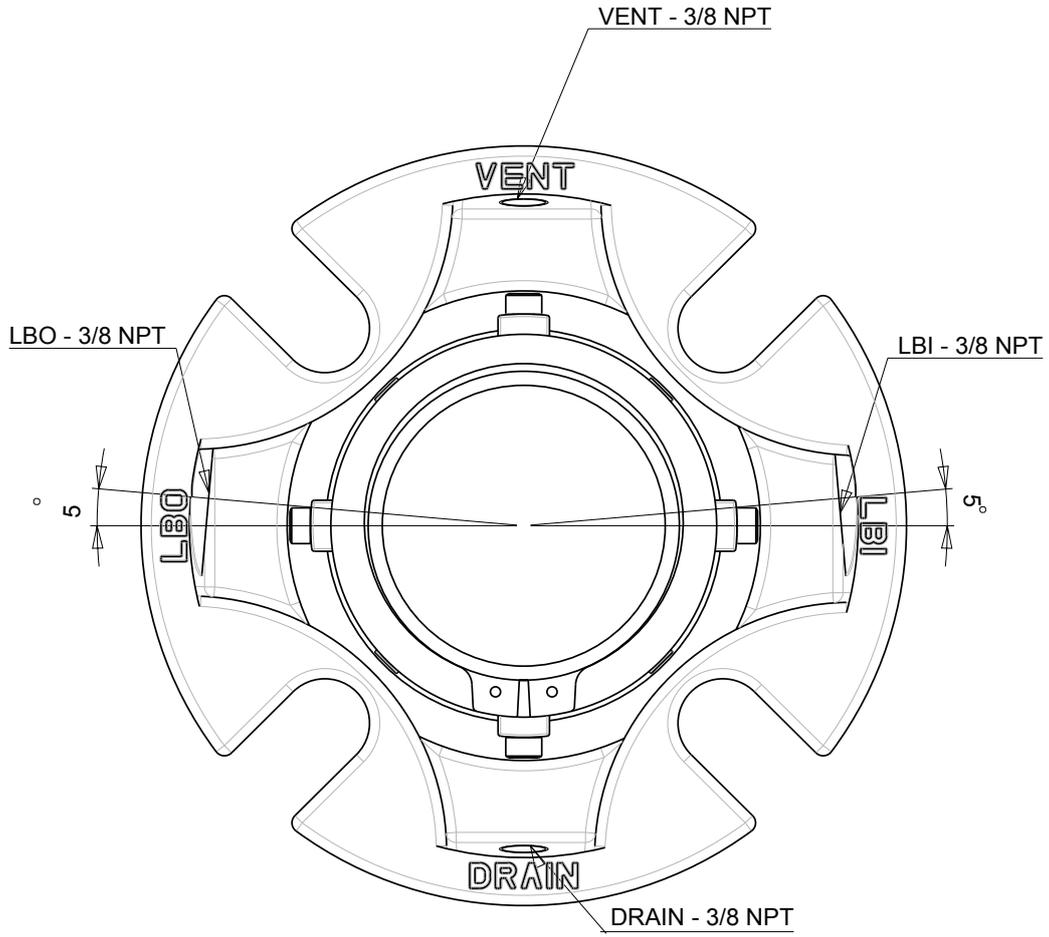
LEGEND EXTERNAL MECHANICAL SEAL TR..

pos.	ref	Part name	Q.ty	Disassembling steps sequence (A1,...,A10,B1,...,B10,C1....)										Spare parts stock		
				1	2	3	4	5	6	7	8	9	10	start up	2 years	5 years
23.T	134.2	Cover	1													
55	524.2	Shaft Sleeve (TR)	1											1	1	1
90	475.2	Fixed Seal	1				C									
91	472.2	Rotating Seal	1	C										1	1	1
92	135.2	Diaphragm (TR)	1		C											1
94	412.8	O-ring Fixed Seal	1					C								
97	910.17	FASTENERS Diaphragm (TR)	4	C												
122		FIXED SEAL COMPLETE												1	1	1

LEGEND DOUBLE MECHANICAL SEAL MTR..

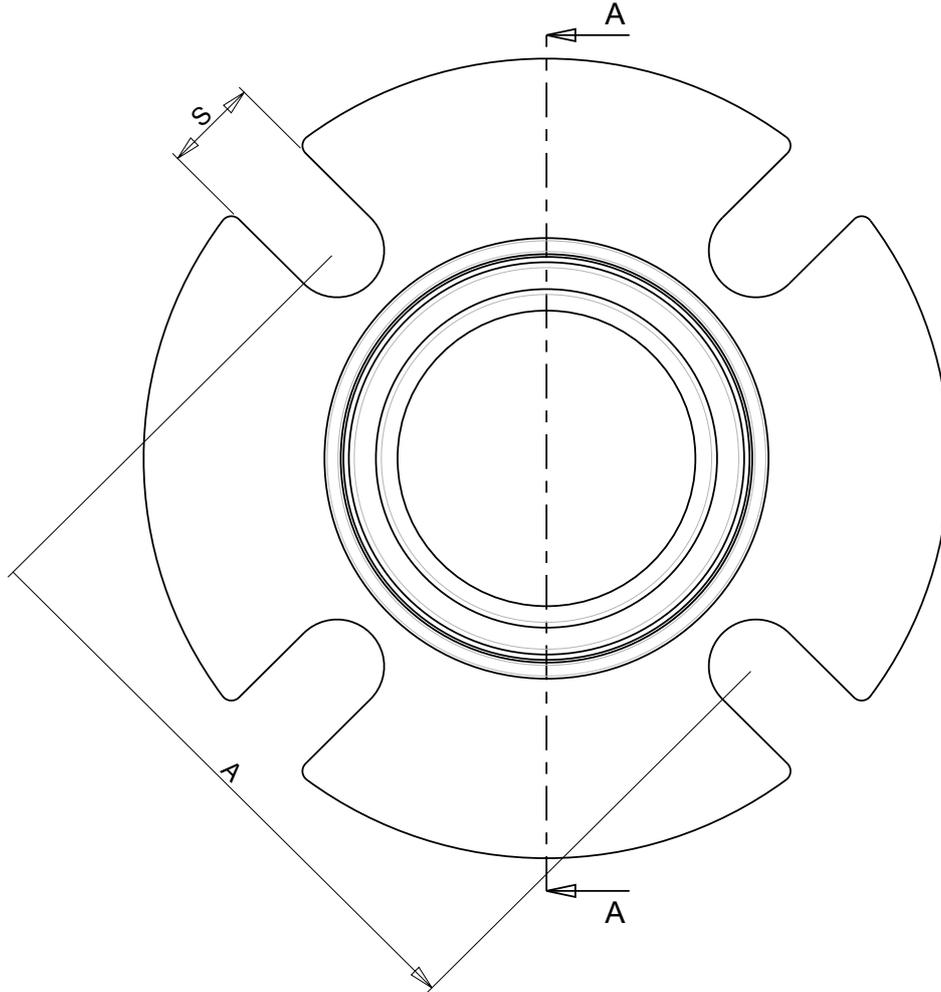
pos.	ref	Part name	Q.ty	Disassembling steps sequence (A1,...,A10,B1,...,B10,C1....)										Spare parts stock		
				1	2	3	4	5	6	7	8	9	10	start up	2 years	5 years
23.T	134.2	Cover	1													
56	524.3	Shaft Sleeve (MTR)	1					C						1	1	1
90	475.2	Fixed seal (pump side)	1									C				
91	472.2	Rotating seal (pump side)	1						C					1	1	1
93	412.7	O-ring fixed seal / diaphragm	1									C				
94	412.8	O-ring fixed seal	1										C			
100	910.19	FASTENERS flushing chamber	4		C											
101	412.9	O-ring flushing chamber	1							C				1	1	1
102	472.3	Rotating seal (motor side)	1						C					1	1	1
103	475.3	Fixed seal (motor side)	1						C							
104	412.10	O-ring fixed seal	1						C							
105	471	Flushing chamber	1							C						1
106	910.18	Flushing piping	2	C												1
122		FIXED SEAL COMPLETE (pump side)												1	1	1
124	605.3	Diaphragm (MTR)	1									C				1
131		O-ring flushing chamber / flange	1						C							
132		Flange flushing chamber	1				C									
133		Counter plate flushing chamber	1			C										
135		FIXED SEAL COMPLETE (motor side)												1	1	1

DOUBLE MECHANICAL SEAL CARTRIDGE: MC8-1 / 2,125"



MAX PRESSURE: 2.1 MPa
 TEMPERATURE: -30°C / 205°C
 MAX SPEED: 25 m/s

D	d1	d2	d3	L1	L2	A	S
54	72.9	75	148.8	51.9	58.7	96.1	17.4



LEGEND DOUBLE MECHANICAL SEAL CARTRIDGE: MC8-1 / 2,125"

Item	Description	Q.ty	Material
1	Shaft Sleeve	1	SUS316
2	O-ring	1	VITON
3	Mate Ring	2	SUS316
4	O-ring	4	SUS316
5	Pin	4	SUS316
6	Face Ring	1+1	PTFE
7	Pusher	2	VITON
8	Pin	4	SUS316
9	Clip	4	HAST.C
10	Screw	4	SUS316
11	Snap Ring	2	VITON
12	Set Screw	4	SUS316
13	O-ring	1	SUS316
14	Spring Holder	2	SUS304
15	Wave Spring	2	SUS304
16	Back Ring	2	SUS316
17	O-ring	2	SUS316
18	Gasket	1	SiC+CARBON
19	Gland	1	SUS316
20	Collar	1	VITON
21	Retainer	1	SiC
22	O-ring	1	VITON
23	Holder	1	SUS316

GENERAL NOTES

“ZGS” pumps are designed and built for the transfer of liquid chemical products having a specific weight, viscosity, temperature and stability of state appropriate for use with centrifugal pumps in a fixed installation, from a tank at a lower level to a tank or a pipe to a higher level. The characteristics of the liquid (pressure, temperature, chemical reactivity, specific weight, viscosity, vapour tension) and the environmental conditions must be compatible with the characteristics of the pump and are defined upon ordering. Impeller and static casings, in contact with the liquid, are constructed from thermosetting resins; other parts in high chemical-resistant materials.

The pump’s performance (capacity, head, rpm) is defined upon ordering and specified on the identification plate.

“ZGS” series pumps are manufactured in compliance with **ASME B73.1** dimensional standards. They are of the centrifugal, horizontal, single-stage type, with self-supporting shaft. ZGS pumps are coupled to a non-synchronous electric motor by means of flexible coupling and spacer; with axial inlet and radial outlet for connection to the hydraulic system. These pumps are of the foot-mounted type for fixing onto base-plate in compliance with ASME B73.1.

“ZGS” are in conformity with the essential health and safety requirements and technical construction file requirements of the **Machinery Directive 2006/42/EC**. Therefore these pumps are not dangerous for the operators if used according to the instructions contained within this Manual.

“ZGS” pumps (atex version) are also in compliance with the **Atex Directive 2014/34/EU**.

“ZGS” pumps are not self priming.

“ZGS” pumps cannot run dry.

The liquid being pumped may contain a maximum 5% of solid non-abrasive particles not greater than 0,1 mm in size. The presence of fibrous, adhesive or abrasive bodies is not allowed. The maximum allowed size for bodies occasionally present is 0,5 mm.

SUSPENDED SOLIDS AND MECHANICAL SEAL:

	MOD.	TR5-1	TR8-1	BF8-1	CS8-1	CS8F-1	MTR5-1	MTR8-1	MC8-1
Max quantity in weight	(%)	3	3	6	10	10	3	3	6
Max diameter	(mm)	0.5	0.5	3	5	5	0.5	0.5	3
Max hardness index Mohs	(-)	3	6	6	6	6	3	3	6

Clockwise rotation seen from the motor side.

Make sure that the chemical and physical characteristics of the liquid have been carefully evaluated for pump suitability.

The specific weight which can be pumped at a temperature of 25°C (both of the liquid and the ambient) depends upon the diameter of the impeller (shown on the identification plate) and the installed motor power (shown on the motor identification plate) and has to be defined upon ordering.

The level of kinematic viscosity must not exceed 40 cSt so as not to significantly modify the pump’s performance. Higher values up to a maximum of 120 cSt are possible provided that the pump is equipped with suitable impeller and motor to be defined upon ordering.

The maximum continuous working temperature referred to water depends on the choice of materials (specified on the identification plate):

80 °C	execution V1G
80 °C	execution V1A
80 °C	execution V1C
80 °C	execution V1F
80 °C	execution V1X

modifications may occur depending upon the operating pressure value.

The ambient temperature interval is related to the choice of materials (specified on the identification plate).

The maximum pressure the pump may be subjected to is 1.5 times the head value developed with the outlet closed.

The vapour pressure value of the liquid to be pumped must exceed (by at least 1m w.c) to the difference between the absolute total head (suction side pressure added to the positive suction head, or subtracted by the suction lift) and the pressure drops in the suction side piping (including the inlet NPSHr drops shown on the specific tables).

In case of double mechanical seal, the value of the pressure in the seal chamber must be equal to one third of value of the operating pressure of the pump.

In case of double mechanical seal, the flushing liquid must be clean and must not lead to violent chemical reactions on contact with the liquid being pumped. The capacity of flushing liquid must be **from 1 to 3 l/min (at 0.5 bar more than the measured delivery pressure)**.

The pump shaft is supported by rolling bearings packed with oil (to be periodically recharged).

The pump does not include any non return valve nor any liquid flow control or motor stop device.

The coupling guard must be fitted before starting up the pump.

OPERATING PRINCIPLES OF THE PUMP

HYDRAULICALLY alike to all centrifugal pumps, it is equipped with a blade-type impeller rotating within a fixed housing. It has a radial outlet (facing the upper part of the pump, with an internal deflector) and, by creating a depression in the center, it allows the liquid to flow from the central suction side. Then, flowing through the impeller's blades the fluid acquires energy and is conveyed towards the outlet.

MECHANICALLY, the static stress caused by the piping is borne by the pump body. Directly the pump shaft causes the impeller to rotate and is driven by rolling bearings that transfer all the mechanical impeller loads onto the support. The pump is connected to the electric motor (**IEC, B3 frame, to be fixed onto a common base**) by means of a flexible coupling and spacer. A guard (non-hermetically sealed) prevents unauthorised access. The spacer allows worn components (pump rotor) to be removed without having to disconnect the piping and remove the motor.

THE MECHANICAL SEAL, placed at the point where the shaft enters the pump body to drive the impeller, is made up of two main sections: a fixed section inserted in the pump body and a rotating section integral with the shaft. The tight contact between these two parts guarantees a seal against leakage whether the pump is rotating or not. The rubbing action that occurs between these two parts when the pump is operating generates heat by friction; this heat is absorbed by the liquid being pumped in the case of single mechanical seal and by the cooling liquid (generally water) in the case of double seal. The presence of the thin layer of liquid between the sealing surfaces, as well as its cooling action, is indispensable for the life of the seal.

MOTOR

ELECTRICAL CONNECTIONS

The electrical connection to the motor terminal determines the direction of rotation of the motor and can be verified by looking at the cooling fan at the rear of the motor (for the Argal pump this has to rotate clockwise looking at the front end).

With single phase motors the direction of rotation may be reversed by changing the position of the connection plates.

With three-phase motors the direction of rotation may be changed by swapping any two of the three conductors independently of the type of connection to the windings:

Star/Delta starting is used when the motor power is above 7.5 kW (10 HP) only in case of frequent starts and short running times, but always when the motor power is above 15 kW (20 HP). All this is also to safeguard the structure of the pump.



PROTECTION LEVEL

The initials IP are followed by two numbers:

the first number indicates the level of protection against penetration of solid objects and the second number indicates the protection against the penetration of liquids.

According to the IP protection indicated on the identification plate of the motor and to the environmental conditions, arrange for opportune extra protections allowing in any case correct ventilation and rapid drainage of rainwater.

DIRECTIONS FOR USE

TRANSPORT

- Cover the hydraulic connections;
- When lifting the unit do not exert force on the plastic fittings;
- Lay the pump on its base or fixing plate during transport;
- If the road is particularly rough, protect the pump by means of adequate shock absorbing supports;
- Bumps and shocks may damage important working parts vital for safety and functionality of the machine.

STORAGE INSTRUCTIONS

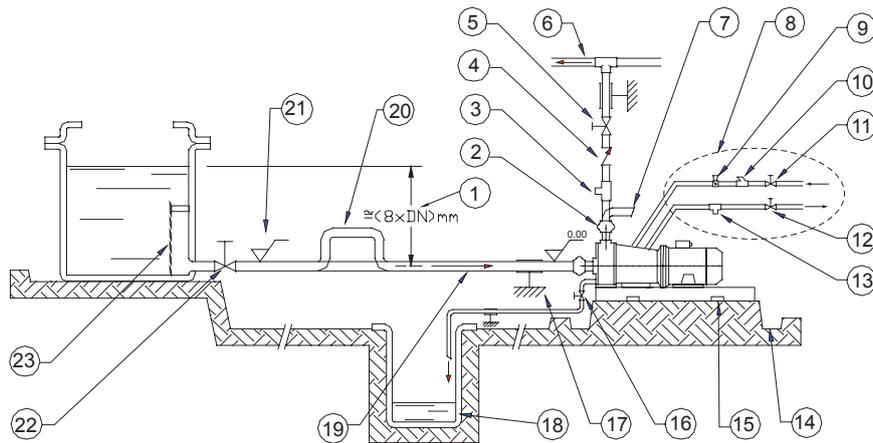
- When is necessary to store the pump before installation don't remove it from the original packaged. The packaged pump must be stored lifted from ground level, the ambient must be close, clean and dry;
- If at the receipt of the pump, package seems damaged it is necessary to extract the pump from the package in order to check its integrity and to store a new package;
- The place where the pump is stored must be closed with an ambient temperature not lower than -5°C and not higher than 40°C , the air humidity rate not higher than 80%, the package mustn't received shock, vibrations and loads rising above;
- If the storing period is higher than 6 months, before installation check the condition of the oil in the support, eventually provide to restore it.

INSTALLATION INSTRUCTIONS

- Clean the plant before connecting the pump;
 - Make sure that no foreign bodies are left in the pump. Remove safety caps on the hydraulic connections;
- Follow the instructions indicated in the following diagram:
- 1) Suction head adapts to delivery rate in order to prevent the air suction;
 - 2) YES: expansion joint (indispensable with long piping or hot liquids) and/or vibration damping system at inlet and outlet; anchor system near the pump;
 - 03) YES: connection point for pressure gauge or safety pressure switch;
 - 04) YES: non-return valve (particularly with long vertical or horizontal pipe runs; mandatory with pumps in parallel);
 - 05) YES: flow control valve on the discharge side;
 - 06) Maximum fluid speed on the discharge side: 3.5 m/sec;
 - 07) NO: bends (or other fittings) close to the pump (both at inlet and outlet);
 - 08) Auxiliary piping for double mechanical seal (only for M type seals);
 - 09) Pressure reducer;
 - 10) Inlet filter;
 - 11) Inlet shut-off valve;
 - 12) Delivery hand control valve;
 - 13) Pressure gauge for checking seal chamber pressure;
 - 14) YES: drain channel around the base plate;
 - 15) The pump must be installed using all of the fixing holes provided; the fixing points must be kept at the same level;
 - 16) YES: pipe drain (perfectly airtight); drain valve must be closed when the system is working;
 - 17) YES: firmly fix all piping by suitable brackets, close to the pump;
 - 18) YES: drain collecting sump (leak proof);
 - 19) Maximum fluid speed on suction side: 2.5 m/sec;
 - 20) NO: air pockets. The circuit must be linear and short;
 - 21) Incline the piping towards the pump;
 - 22) YES: shut off gate valve (one is also fitted near the pump in case of long piping);
 - 23) YES: filtering sector ($5\div 10$ mm mesh screen).
- Anchor the pump to an adequate base plate having a mass at least 5 times that of the pump;
 - Do not use anti-vibration mounts to fix the pump;
 - Anti-vibration joints are recommended on the pipe connections; mandatory over DN100;
 - Manually verify that all rotating parts are free to turn without abnormal friction by turning the motor cooling fan;
 - Make sure that the power supply is compatible with the data shown on the pump motor identification plate;
 - Connect the motor to the power supply via a magnetic/thermal control switch;
 - Ensure that star-delta starting is implemented for motors whose power is more than 15kW;
 - Install emergency stop devices to switch off the pump in case of low liquid level (floating, magnetic, electronic, pressure sensitive);
 - Ambient temperature as a function of the physical-chemical characteristics of the liquid to be pumped and in any case not greater or lower than the interval indicated in the GENERAL HINTS;

- Other environmental conditions in accordance with the IP protection of the motor;
- Install a drainage pit to collect any liquid overflow from the base drainage channel due to normal maintenance work;
- Leave enough free space around the pump for a person to move;
- Leave free space above the pump for lifting operations;
- Highlight the presence of aggressive liquids with coloured tags following the local safety regulations;
- Do not install the pump (made in thermosetting material) in close proximity to heating apparatus;
- Do not install the pump in areas subject to solid or liquid matter falling;
- Do not install the pump in an explosive atmosphere unless the motor and its coupling have been adequately pre-arranged;
- Do not install the pump in close proximity to workplaces or crowded areas;
- Install extra guards for the pump or persons as the need arises;
- Install a spare equivalent pump in parallel;

CAUTION: final alignment of the pump and driver through the flexible coupling must be done after the pump installation and before the pump start. During transit and subsequent handling any factory alignment may be disturbed. The pump must be fixed to the base of support and to the foundation. To access the elastic coupling remove the protections ref. 75 and 76. For the assembly and alignment instructions you refer to the instructions of the manufacturer of the coupling (attached the manual of standard elastic coupling).



FLANGE BOLT TORQUE	
[Nm]	FLANGE SIZE
16	1" - 1 1/2"
32	2"
40	3"
48	4"
64	6"
	8"
	10"
	12"

WARNING: All flanged connections to the pump should be full flat face with full contact gaskets. Raised face flanges or partial contact gaskets should not be used as excessive strains can be applied to the pump flanges upon tightening.

PRESSURE SWITCH TO PREVENT DRY RUNNING

The principal cause of pump malfunctions is dry-running (being it caused by improper use or cavitation). It is therefore advisable to install a simple device that will stop the pump motor when the pressure falls below a preset level. This is justified by the fact that such a condition is normally caused to an inadequate flooding of the impeller due to various causes: absence of liquid, suction valves closed at start-up, cavitation, clogged channels, dirty filters, etc.....

The pressure switch (pressure gauge with electrical contacts) must be fitted on the discharge side of the pump at approximately 20cm from the outlet. This device needs furthermore:

- 1) A fluid separator to transmit pressure to the instrument via a secondary fluid separated from the main one by a chemically resistant diaphragm.
- 2) Remote-control switch to energize the motor (controlled by a pushbutton or auxiliary relay) having the normally closed contact of the pressure switch in series with the latch circuit of said remote-control switch.

In order to obviate any pulsations of the pressure switch, it is necessary to set its setpoint to a pressure value equal to 65% of the working pressure. It is obvious that this device cannot be used to control working pressure.

On start-up the pressure switch contact must be by-passed for a sufficient time to allow pressure to build up in the system. In case of automatic start-up it is necessary to short circuit the latch with a timer for the pressure build-up time.

The system is not suitable for full capacity applications in which case it is advisable to install some control devices for the motor power absorption. All of the above must be adapted to the local safety rules and in particular when the classification of the environment requires explosion-proof equipment.

START-UP

- Verify that the instructions outlined in the INSTALLATION have been followed;
- Verify the correct direction of rotation (clockwise from the motor side) supplying the motor with short impulses;
- Ensure that the NPSH available is greater than that required by the pump (in particular for hot liquids, liquids with high vapour pressure, very long suction pipes or negative suction lift);
- Close the discharge valve; completely cover the suction pipe and the pump;
- Close the outlet valve. Start up the motor two or three times with short supplies of current in order to expel the air from the pump and the lubrication circuit between the guide shaft and bush;
- Start the pump with the suction valve completely open and the outlet valve semi-closed;
- Slowly adjust the flow by adjusting the outlet valve (never adjust the suction valve) and making sure that the motor absorption does not exceed the nominal power rating shown on the plate;
- Do not operate at the extremes of the operating curve: maximum head (discharge valve shut too tight) or maximum flow (total absence of loss and lift in discharge circuit);
- Set the operating point for which the pump has been requested;
- Check that there are no unusual vibrations or noises due to inadequate fixing or cavitation;
- Avoid excessively short and/or frequent start-ups by adjusting the consent appliances;

Motor power	kW	0,75÷5,5	7,5÷30	37÷110	132÷200	250÷315
Max. no. starts/hour	2-47 poli	20-40	10-20	6-12	2-4	1-2

- Check that temperature, pressure and characteristics of liquid match order specifications.

USE

- Switch automatic control on;
- Do not activate valves while the pump is in operation;
- Risks of dangerous water hammer effects in case of sudden or improper valve actuation (only trained personnel should operate valves);
- Completely empty and wash the pump before using a different liquid;
- Isolate or empty the pump if the crystallization temperature of the liquid is the same or lower than the ambient temperature;
- Stop the pump if the liquid temperature exceeds the maximum allowed temperature indicated in the general notes; if the increase is of approximately 20%, check internal parts;
- Close the valves in case of leaks;
- Wash with water only if compatible from the chemical point of view. As alternative use an appropriate solvent that will not generate dangerous exothermal reactions;
- Contact the liquid supplier for information on the appropriate fire precautions;
- Empty the pump in case of long periods of inactivity (in particular with liquids which would easily crystallize).

SHUTDOWN

- Disconnect the motor;
- Before starting maintenance, turn off the suction and discharge valves.

MAINTENANCE

- All these maintenance operations must be performed under the supervision of qualified personnel;
- make periodic inspections (2 to 30 days depending on the type of liquid and the operating conditions) cleaning filtering sections;
- Make periodic inspections (1 to 6 months depending on the type of liquid and the operating conditions) on the rotating parts of the pump (pump rotor); clean or replace or lubricate as necessary (see RECOMMENDATIONS);
- Make periodic inspections (3 to 5 months depending on the type of liquid and the operating conditions) on the functionality of the motor control system; efficiency must be guaranteed;
- Excessive current consumption could be an indication of impeller problems;
- Unusual vibrations could be due to unbalanced impeller (due to damage or presence of foreign material obstructing its blades);
- Reduced pump performance could be due to an obstruction of the impeller or damages to the motor;
- Motor damages could be due to abnormal friction within the pump;
- Damaged parts must be replaced with new original parts;
- The replacement of damaged parts must be carried out in a clean dry area.

INSPECTION

Check:

- the pump shaft for cracks and excessive wear
- excessive wear of seal rings
- counterthrust bushing for cracks or excessive wear
- the impeller, volute and intermediate disk for abrasion and corrosion
- that the pressure balancing holes on the impeller blades are not blocked
- for lumps and clusters created by the pumped liquid (especially at the bottom of the rear chamber)

Replace broken, cracked or deformed parts.

Reopen all the blocked pipes and eliminate any chemical agglomeration.

Clean all surfaces before reassembly; in particular seal rings (risk of leakage or premature wear) and O-ring seats (risk of leakage).

SAFETY RISKS

WARNING! CHEMICAL HAZARD. The pumps are designed to pump different types of liquid and chemical. Follow the specific instructions to decontaminate during inspection or maintenance.

WARNING! Safety risks for personnel mainly arise from improper use or accidental damages.

These risks may be of an electrical nature as far as the non-synchronous motor is concerned and may cause injury to hands if working on an open pump. Risks may also arise due to the nature of the liquids pumped. It is therefore of utmost importance to closely follow all the instructions contained in this manual so as to eliminate the causes that may lead to pump failure and the consequent leakage of liquid dangerous for both personnel and the environment.

Risks may also arise from improper maintenance or dismantling practices.

In any case five general rules are important:

A - all services must be carried out by specialised personnel or supervised by qualified personnel depending on the type of maintenance required;

B - install protection guards against eventual liquid sprays (when the pump is not installed in remote areas) due to an accidental pipe rupture. Arrange for safety basins to collect possible leakage;

C - when working on the pump always wear acid-proof protective clothing;

D - arrange for proper conditions for suction and discharge valve closing during disassembly;

E - make sure that the motor is completely disconnected during disassembly.

Proper design and building of the plants, with well positioned and well marked piping fitted with shut-off valves, adequate passages and work areas for maintenance and inspections are extremely important (since the pressure developed by the pump could give some kind of damage to the plant in case this one should be faulty made or wear and tear-damaged).

It must be stressed that the major cause of pump failures leading to a consequent need to intervene is due to the pump running dry in manually operated plants. This is generally due to:

- the suction valve being open at start-up or
- the suction tank being emptied without stopping

INSTALLATION AND START-UP PERSONNEL

Interventions allowed only to specialised personnel who may eventually delegate to others some operations depending on specific evaluations (technical capability required: specialisation in industrial plumbing or electric systems as needed).

MAINTENANCE AND OPERATIONAL PERSONNEL

Interventions allowed to general operators (after training on the correct use of the plant):

- pump starting and stopping
- opening and closing of valves with the pump at rest
- emptying and washing of the pump body via special valves and piping
- cleaning of filtering elements

Interventions allowed to qualified personnel (technical capacities required: general knowledge of the mechanical, electrical and chemical features of the plant being fed by the pump and of the pump itself):

- verification of environmental conditions
- verification of the condition of the liquid being pumped
- inspections of the control/stop devices of the pump

- inspections of the rotating parts of the pump
- trouble shooting

PERSONNEL RESPONSIBLE FOR REPAIRS

Interventions allowed to general operators under the supervision of qualified personnel:

- stopping of the pump
- closing of the valve
- emptying of pump body
- disconnection of piping from fittings
- removal of anchoring bolts
- washing with water or suitable solvent as needed
- transport (after removal of electrical connections by qualified personnel)

Interventions by qualified personnel (technical capacities required: general knowledge of machining operations, awareness of possible damage to parts due to abrasion or shocks during handling, know-how of required bolt and screw tightening required on different materials such as plastics and metals, use of precision measuring instruments):

- opening and closing of the pump body
- removal and replacement of rotating parts

WASTE DISPOSAL

Materials: separate plastic from metal parts. Dispose of by authorized companies.

RECOMMENDATIONS

DISASSEMBLING

- All these maintenance operations must be performed under supervision of qualified personnel;
- cut off the power supply from the motor and disconnect the electrical wiring; pull the wires out from the terminal box and isolate their extremities accordingly;
- close discharge valves;
- Use gloves, safety glasses and acid-proof overalls when disconnecting and washing the pump;
- Disconnect the piping and leave enough time for the residual liquid to exit the pump body and atmospheric air to fill the empty volume;
- Wash the pump before carrying out any maintenance work;
- Do not scatter the liquid in the environment;
- Lift the pump vertically avoiding to exert traction on the liner;
- Before attempting to dismantle the pump ensure that its motor is disconnected and that it may not be started accidentally;
- Now open the pump following the sequence indicated in the respective table of the LEGEND and following the suggestions outlined in the RECOMMENDATIONS section;
- The threads are right handed;

The impeller, once the pump rotor is disconnected, must be removed by blocking the opposite end of the shaft (removing the half coupling if necessary); unscrew the protection cap (ogive) and locking nut (right hand thread), then remove the impeller axially.

Follow the specific attached instructions when working on the mechanical seal.

Remove the shaft from its support (with the bearing on the motor side) by sliding it in direction of the coupling side; the bearing on the pump side must be in position before refitting the shaft (see Table 5: bearings and oil seal rings).

Replace the parts that was: broken, cracky, smelt.

Clean all surfaces before reassembly; in particular seal rings (risk of leakage or premature wear), O-RING seats (risk of leakage). bearings rings and seats of the support.

Shaft run-out on the impeller side must not exceed 30µm.

Check alignment and end play among the flexible components of the coupling after reassembling:

Max. radial deviation <0,5 mm; **max. angular displacement <1°;** **end play: 2÷4 mm**

Screw fastening torque		M4	M6	M8	M10	M12	M16	M20	M24
to be reduced by 25 % clamping plastic components	Nm	4	14	24	48	60	75	120	175

IMPROPER USE

The pump must not be used for purposes other than the transfer of liquids.

The pump cannot be used to generate isostatic or counter pressures.

The pump cannot be used to mix liquids generating an exothermal reaction

The pump must be installed vertically on a firm structure.

The pump must be installed on a suitable hydraulic plant with outlet connection to proper discharge pipe.

The plant must be able to shut off the liquid flow independently from the pump.

Handling of aggressive liquids requires specific technical knowledge

OPERATING FAULTS AND POSSIBLE CAUSES

The pump does not deliver:

01- wrong sense of rotation

02- suction piping is too long or has too many bends

03- not enough suction head on the pump

04- air intake from suction and secondary piping

05- pump or suction piping not completely flooded

06- impeller blades obstructed by impurities

07- non-return valve on the discharge pipe blocked

08- the geodetic head of the plant is greater than the maximum head developed by the pump

09- impeller blocked by a considerable layer of crystals or by melting due to dry running

The pump has reduced capacity or insufficient pressure: see 01, 02, 03, 04, 05, 06

10- the head required by the plant is greater than that expected

11- insufficient nominal diameter of suction piping, shut-off valve or other suction parts

12- insufficient geodetic suction head on the pump

13- damaged or worn impeller

14- viscosity of liquid greater than that expected

15- excessive quantities of air or gases in the liquid

16- bends, non-return valve or other parts close to the outlet

17- liquid (especially if hot) liable to change to gaseous state

The pump is overloaded: see 14

18- capacity is higher delivery than expected

19- the specific weight of the liquid is greater than expected

20- impurities inside the pump generate abnormal friction

21- the power supply voltage is not the one on the motor identification plate

The pump vibrates and is noisy: see 20

22- the pump is working at free capacity (zero head)

23- the pump or piping are not firmly fixed

24- damaged or dry central support bearings

25- wrong alignment of the flexible coupling

The pump shows signs of premature wear of internal parts: see 20

26- liquid is excessively abrasive

27- frequent recurrence of cavitation (see 02, 11, 15, 17)

28- high tendency of the liquid to crystallize or polymerize in stand-by

29- pump execution with materials not suitable for the liquid being pumped

LUBRICATION

The pump is supplied without oil (bearing housing is empty); before starting pump fill with lubricating oil as per ISO 6743: Kinematics viscosity ref. to 50 °C (125°F): 2,8÷3,3 °E (≈ 20 cSt) - Operating conditions: temperature increment 40°C; max. temperature 100 °C; max. rpm 4000.

Business names: **ESSO Teresso 68; SHELL Tellus T68; MOBIL DTE 68; BP Energol HLC 68; AGIP Blasias 68 (re-mark: 68 mm²/s at 40°C with gradation SAE 20).**

Add oil in the bulb lubricator (100 cc) approximately every 300 hours of working.

Feed rate: 100cc/300hrs.

Completely drain and replace oil after 2000 operating hours.

Quantity required for the first filling: **2000 cc for G2 size / 7500 cc for G3 size.**

INSTRUCTIONS FOR FILLING LUBRICATING OIL

1. Purpose:

Indicate the filling method of the bearing lubrication oil.

2. Applicability:

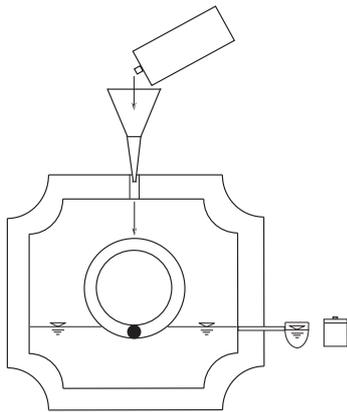
This statement refers to SATURN ZGS pumps.

3. Areas / corporations concerned:

REPAIRS - Customer.

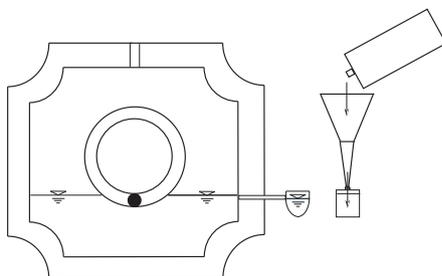
4. Operating method:

Filling phases.



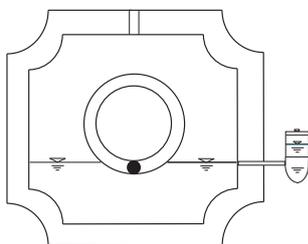
PHASE 1.

Fill with lubricant the appropriate oil hole at the top of the carrier.
During the filling phase keep open the ampoule.
The phase 1 is considered ended when the oil begins to overflow into the ampoule elbow.
This step is to be performed only during the starting of the pump.



PHASE 2.

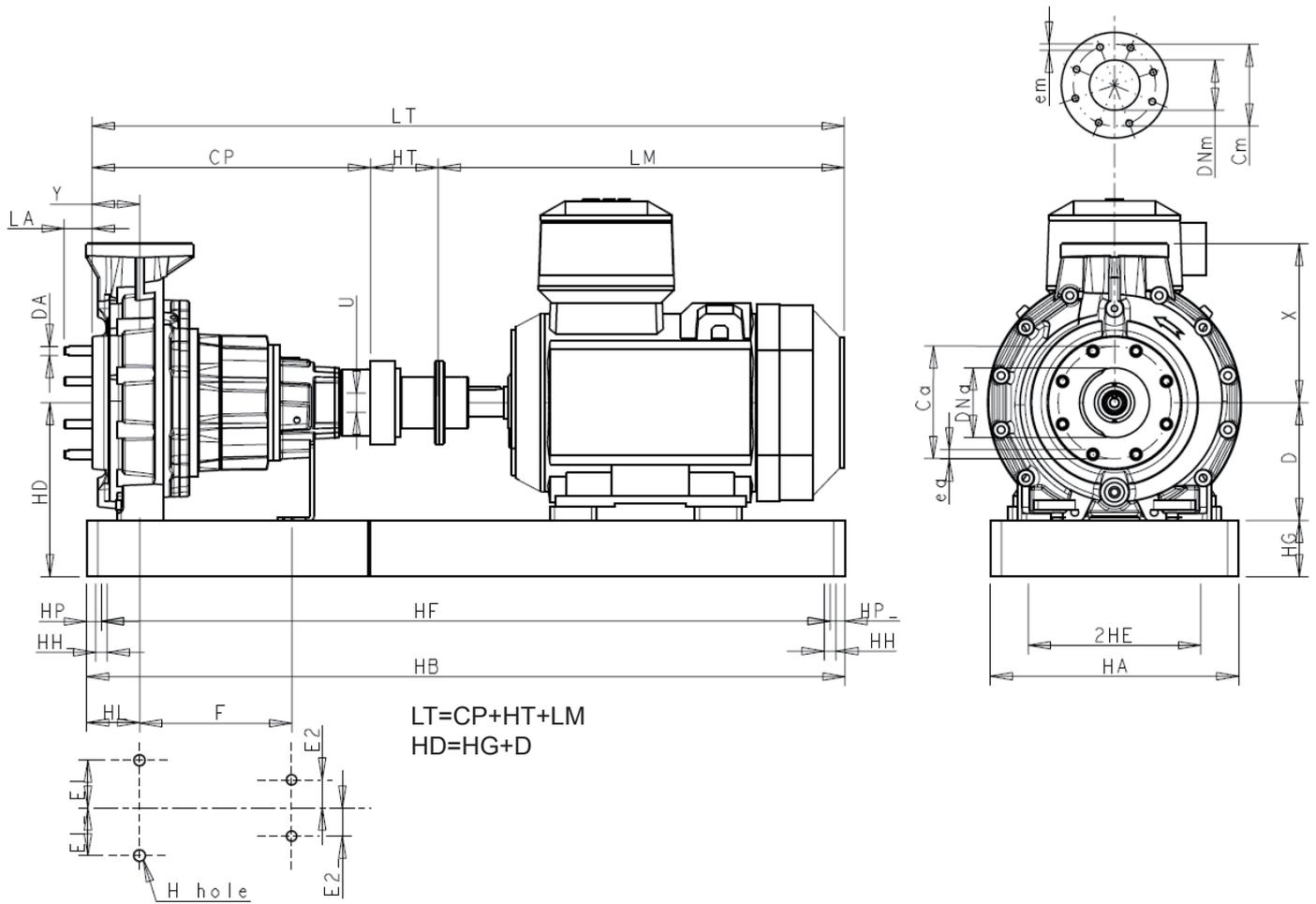
Unscrew the cup from its seat and fill it with lubricating oil through the upper spout.
Finally screw it on the ampoule.



PHASE 3.

- Working conditions: the ampoule must be closed.
- Ordinary maintenance: repeat the step 2 only once the ampoule is being emptied completely of oil.

TECHNICAL DATA - CONSTRUCTION DIMENSIONS



TAB. 1 PUMP ASME B73.1

MODEL	CP	Y	D	X	F	E1	E2	H	U	LA	DA	Weight (kg)
1.5 x 1 x 6	445	102	133	165	184	76	n.a.	16	22,2	n.a.	n.a.	28
1.5 x 1 x 8	445	102	133	165	184	76	n.a.	16	22,2	n.a.	n.a.	29
3 x 1.5 x 6	445	102	133	165	184	76	n.a.	16	22,2	n.a.	n.a.	28
3 x 1.5 x 8	445	102	133	165	184	76	n.a.	16	22,2	n.a.	n.a.	29
3 x 2 x 6	445	102	133	165	184	76	n.a.	16	22,23	n.a.	n.a.	26
3 x 2 x 8	597	102	210	242	318	124	92	16	41.3	n.a.	n.a.	95
3 x 2 x 10	597	102	210	242	318	124	92	16	41.3	n.a.	n.a.	95
4 x 3 x 8	597	102	210	280	318	124	92	16	41.3	n.a.	n.a.	105
4 x 3 x 10	597	102	210	280	318	124	92	16	41.3	n.a.	n.a.	105
4 x 3 x 13	597	102	254	318	318	124	92	16	41,3	n.a.	n.a.	115
6 x 4 x 10	597	102	254	343	318	124	92	16	41.3	60	M20	120
6 x 4 x 13	597	102	254	343	318	124	92	16	41.3	60	M20	120
8 x 6 x 13	860	152	368	483	476	203	114,5	22	60,3	100	M20	280
10 x 8 x 15	892	178	457	660	541	280	178	25	60,3	100	M20	425
12 x 10 x 16	1500	400	710	1000	850	500	250	32	80	110	M24	950
20 x 10 x 16	1500	400	710	1000	850	500	250	32	80	110	M24	950

Dimension: mm

TAB. 2 **CONNECTIONS - ISO PN 10**

MODEL	SUCTION					DELIVERY				
	DNa	Ca	ea	no.	type	DNm	Cm	em	no.	type
1.5 x 1 x 6	40	110	19	4	hole	25	85	14	4	hole
1.5 x 1 x 8	40	110	19	4	hole	25	85	14	4	hole
3 x 1.5 x 6	80	160	19	8	hole	40	110	19	4	hole
3 x 1.5 x 8	80	160	19	8	hole	40	110	19	4	hole
3 x 2 x 6	80	160	19	8	hole	50	125	19	4	hole
3 x 2 x 8	80	160	19	8	hole	50	125	19	4	hole
3 x 2 x 10	80	160	19	8	hole	50	125	19	4	hole
4 x 3 x 8	100	180	19	8	hole	80	160	19	8	hole
4 x 3 x 10	100	180	19	8	hole	80	160	19	8	hole
4 x 3 x 13	100	180	19	8	hole	80	160	19	8	hole
6 x 4 x 10	150	240	M20	8	tie	100	180	19	8	hole
6 x 4 x 13	150	240	M20	8	tie	100	180	19	8	hole
8 x 6 x 13	200	295	M20	8	tie	150	240	23	8	hole
10 x 8 x 15	250	350	M20	12	tie	200	295	23	8	hole
12 x 10 x 16	300	400	M20	12	tie	250	350	23	12	hole
20 x 16 x 20	500	620	M24	20	tie	400	515	28	16	hole

Dimension: mm

TAB. 3 **CONNECTIONS - ASME B16.5 150 psig**

MODEL	SUCTION					DELIVERY				
	DNa	Ca	ea	no.	type	DNm	Cm	em	no.	type
1.5 x 1 x 6	1,5"	98	16	4	hole	1"	79	16	4	hole
1.5 x 1 x 8	1,5"	98	16	4	hole	1"	79	16	4	hole
3 x 1.5 x 6	3"	152	19	4	hole	1,5"	98	16	4	hole
3 x 1.5 x 8	3"	152	19	4	hole	1,5"	98	16	4	hole
3 x 2 x 6	3"	152	19	4	hole	2"	121	19	4	hole
3 x 2 x 8	3"	152	19	4	hole	2"	121	19	4	hole
3 x 2 x 10	3"	152	19	4	hole	2"	121	19	4	hole
4 x 3 x 8	4"	191	19	8	hole	3"	152	19	4	hole
4 x 3 x 10	4"	191	19	8	hole	3"	152	19	4	hole
4 x 3 x 13	4"	191	19	8	hole	3"	152	19	4	hole
6 x 4 x 10	6"	241	3/4"	8	tie	4"	191	19	8	hole
6 x 4 x 13	6"	241	3/4"	8	tie	4"	191	19	8	hole
8 x 6 x 13	8"	298	3/4"	8	tie	6"	241	22	8	hole
10 x 8 x 15	10"	362	7/8"	12	tie	8"	298	22	8	hole
12 x 10 x 16	12"	432	7/8"	12	tie	10"	362	25	12	hole
20 x 16 x 20	20"	635	1"1/8	20	tie	16"	540	29	16	hole

Dimension: mm

TAB. 4 **BASEPLATE - ASME B73.1**

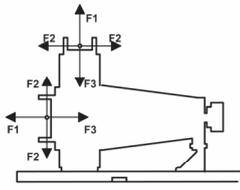
No.	HA	HB	HE	HF	HG	HH	HL	HP	Weight (kg)		
139	381	991	114	927	95	19	114	32	40		
148	457	1219	152	1156	125	19	114	32	55		
153	533	1346	191	1283	121	19	114	32	80		
233	381	838	114	774	95	19	114	32	30		
244	381	1143	114	1080	95	19	114	32	40		
245	381	1143	114	1080	95	19	114	32	45		
252	457	1321	152	1257	105	19	114	32	60		
258	533	1473	191	1410	121	25	114	32	85		
264	533	1626	191	1562	121	25	114	32	95		
268	660	1727	241	1664	121	25	114	32	125		
280	660	2032	241	1969	121	25	114	32	125		
368	660	1727	241	1664	121	25	165	32	140		
380	660	2032	241	1969	121	25	165	32	160		
398	660	2489	241	2426	121	25	165	32	190		
466	1350	3750	500	2550	250	25	450	50	1210		

Dimension: mm

TAB. 5 **SUPPORT: bearing and seal**

size	MODEL	Pump side		motor side	
		bearing	seal ring	bearing	seal ring
G1	1.5 x 1 x 6	QJ 206 MA	30x62x7	6206	30x62x7
	1.5 x 1 x 8				
	3 x 1.5 x 6				
	3 x 1.5 x 8				
	3 x 2 x 6				
G2	3 x 2 x 8	NUP310ECJ	50x72x8	3311A	55x72x8
	3 x 2 x 10				
	4 x 3 x 8				
	4 x 3 x 10				
	4 x 3 x 13				
	6 x 4 x 10				
	6 x 4 x 13				
G3	8 x 6 x 13	6314Z	70x90x10	3314A	70x90x10
	10 x 8 x 15				
	12 x 10 x 16				

TAB. 6 **CONNECTION LOADS**

	F1 (kg):	250
	F2 (kg):	250
	F3 (kg):	250
	momento (kgm):	28,5

TAB. 7 **PUMP PERFORMANCE**

MODEL		2 poles						4 poles						6 poles					
		Capacity max (m³/h)		Head Max (m)		Noise [dB(A)]		Capacity max (m³/h)		Head Max (m)		Noise [dB(A)]		Capacity max (m³/h)		Head Max (m)		Noise [dB(A)]	
Size	Frequency	50Hz	60Hz	50Hz	60Hz	50Hz	60Hz	50Hz	60Hz	50Hz	60Hz	50Hz	60Hz	50Hz	60Hz	50Hz	60Hz	50Hz	60Hz
G1	1.5 x 1 x 6	32	32	36	52	78	79	16	16	9	13	74	75						
	1.5 x 1 x 8	32	32	70	102	78	79	20	24	18	26	74	75						
	3 x 1.5 x 6	80	100	23	34	78	79	60	60	5	9	74	75						
	3 x 1.5 x 8	120	120	50	73	78	80	60	80	12	18	74	75						
	3 x 2 x 6	70	70	34	49	78	80	40	50	8	12	74	75						
G2	3 x 2 x 8	120	120	50	73	78	80	60	80	13	18	74	75						
	3 x 2 x 10	140	140	90	130	79	80	80	80	22	33	74	75						
	4 x 3 x 8	200	240	52	76	78	79	140	140	13	19	75	77						
	4 x 3 x 10	240	240	93	135	78	80	160	180	23	34	74	76						
	4 x 3 x 13							180	200	40	59	74	76	140	160	18	26	74	75
	6 x 4 x 10	400	400	84	123	78	80	250	300	21	31	74	76						
	6 x 4 x 13							300	400	34	50	75	76	200	250	16	24	74	75
G3	8 x 6 x 13							700	800	32	47	76	77	500	500	15	21	74	75
	10 x 8 x 15							1000	1000	45	66	76	77	700	800	20	30	75	76
	12 x 10 x 16							1200	1200	53	76	76	77	1200	1200	25	35	75	76
G4	20 x 16 x 20							1200	1200	82	117			1200	1200	38	54		

Frame Temperature (max): 70°C

Vibration Measuring Limits

Argal's factory vibration test complies to **ISO 10816-7** regulation, category I and applies to new pumps, preferred vibration band **Zone A**. Pumps comply if vibration are **up to or less than 2.5 mm/s**. This limit does **not apply** for measures made on site for vibrations are influenced by peculiar plant conditions (namely cavitation, vortexes, hydraulic load losses localized in close proximity of the pump).

For on site vibration test we suggest compliance to **ISO 10816-7** regulation, category I applied to long life pumps, admissible vibration band **Zone B** which prescribes admissible vibration limit of **4,0 mm/s**.

GENERAL CONDITIONS OF SALE

1. COMPLAINTS

Complaints of any type must be made upon receiving the goods and within **one week** of discovering the defect. Complaints about incomplete orders or deterioration during transit must be made to us **immediately** and all the proofs of the irregularity must be collected in order to substantiate any claims against the carrier.

2. LONG TERM STORAGE – HORIZONTAL AND VERTICAL PUMPS

The following storage procedure is recommended for pumps that will remain idle for extended periods prior to start-up (for accessory equipment such as motors and controls, refer to the appropriate equipment manufacturer for their recommended procedures).

1. Drain pump.
2. Cover suction and discharge flanges with flange protectors and plug all the auxiliary connections to exclude dust or dirt from pump internals.
3. Coat interior and exterior of all metallic items - in contact with the external atmosphere (unpainted) - with a rust preventative.
4. Remove breather and oiler and plug tapped holes in pump power frame.
5. Cover and wrap pump with barrier film sacks (suitable for a long-term preservation of materials that need a constant environment to maintain their properties). Protect with wooden box if storage area could result in damage to pump. Indoor storage is highly recommended.
6. Rotate shaft several times at 4-6 month intervals.

3. LONG TERM STORAGE PACKAGE

Due to their unique corrosion resistant design, **ARGAL Centrifugal Pumps** require very little special preparation for long term storage (more than **four** months). Those customers who find it necessary to store centrifugal pumps for long periods of time may purchase a special Long Term Storage Package at: a nominal price. This package includes items 1, 2, 3, 4, and 5 as stated above using our standard wooden box. Cut away area on box will be noted for shaft rotation.

THIS LONG TERM STORAGE PACKAGE HAS A COST PER PUMP.

4. WARRANTY

Specifications, dimensions and any other information contained in our catalogues is to the best of our knowledge accurate. However, the above information is merely illustrative and is subject to modification without warning. In all cases we reserve the right to - at any moment - make any changes to our products that we deem to be appropriate and such changes shall not entitle the purchaser to make any claims against us. All drawings remain our exclusive property and may not be passed on to third parties or be reproduced without our written approval.

DURATION OF WARRANTY: Argal manufactures its products from first-class materials, uses qualified personnel and tests the different production stages. Within **twelve** months from the time of installation and no more than **eighteen** months from delivery Argal undertakes to examine any defective parts and to promptly replace any faulty parts free of charge if it is responsible for the fault. Such faults must not be due to wear, inexpert use or carelessness on the purchaser's part, fortuitous events or force majeure. The warranty period is shortened to **six** months if the machines work continuously twenty-four hours a day.

Even machines that are under warranty must be sent to Argal carriage paid. Once the machines have been repaired they will be returned to the purchaser carriage forward. The replaced parts remain the property of Argal and must be returned to Argal.

The warranty is voided: **1a)** if the machines have not been properly maintained; **1b)** if they have not been used in accordance with the technical standards set out in the manuals supplied with the delivery; **1c)** if the machines are dismantled without our prior authorisation; **1d)** if the machines are 'mistreated'; **1e)** if the machines are used to circulate liquids in applications that are different from those which have been specifically approved beforehand by ARGAL. We shall not be liable for the downtime arising from repairs to or the replacement of any machines of ours that are under warranty.

Argal shall not be responsible for any direct, accidental or indirect damage, injury or loss (including, but not limited to accidental or indirect damage arising from loss of profit or sales, or for any personal injury or damage arising or any other accidental or indirect loss) or for damage and injury caused by use of the machine or inability to use the machine. Before using the machine the user must check the suitability of the machine for its intended purpose and shall use the machine entirely at his own risk and responsibility.

The user notes that the pumps supplied to him by us oblige him, in accordance with Article 2050 of the Italian Civil Cod, to comply with all the legislative and regulatory standards governing dangerous activities such as using, storing and conveying aggressive and polluting chemical products.

The user also undertakes to comply with the prescriptions that apply to the system (such as guards, washers, seals etc) in which the pumps will be used and to comply with the installation instructions, checks and maintenance prescribed for pumps and installations. The user must also allow us, if necessary, to check the operating efficiency of the systems and to subsequently check that the pump has been correctly installed.

If the user fails to comply with the prescriptions laid down by us or prevents us from carrying out the above inspection, he voids all contractual warranty rights and warranty rights under the terms of Articles 1667 and 1668 of the Italian Civil Code.

NOTE: The purchase of the **ARGAL Long Term Storage Package** does not extend the standard pump warranty in any manner, i.e., **twelve** months from start-up not to exceed **eighteen** months from factory shipment. If an extension of our standard warranty is to be considered, the Long Term Storage Package must be furnished and the customer must agree to allow a ARGAL representative to inspect the equipment prior to installation and start-up. The customer shall bear the cost of this visit plus traveling expenses for the representative. As we have no control over the actual storage conditions, any repairs or repair parts required to put the equipment back in an "as new condition" shall be billed to the customer. If an extension of our standard warranty is required and if the customer is agreeable to the above conditions, contact ARGAL Division management, who has the sole authority to extend our standard warranty.

BS, 13.11.2017
ARGAL S.r.l.

Rev. 02 - 2017

WARRANTY FORM

Company: _____	
Telephone: _____	Fax: _____
Address: _____	
Country: _____	Contact Name: _____
E-mail: _____	
Delivery Date: _____	Pump was installed (date): _____
Pump type: _____	Serial no.: _____
Description of the fault: _____	

The installation	
Liquid: _____	
Temperature (°C): _____	Viscosity (cPs): _____ Spec. grav. (Kg/m ³): _____ PH-value: _____
Contents of particles: _____ %, of max size (mm): _____	
Flow (l/min): _____	Duty (h/day): _____ No. of starts per day: _____
Discharge head (mwc): _____	Suction head/lift (m): _____
Other: _____	

Place for sketch of the installation	

MANUFACTURER DATA



Production head and legal office:

Via Labirinto, 159 I - 25125 BRESCIA

Tel: 030 3507011 Fax: 030 3507077

Administration: Tel: 030 3507019

Sales Operation Manager: Tel: 030 3507025

Customer service: Tel: 030 3507023

Web: www.argalpumps.com

E-mail: sales.engineer@argal.it

REV.13 - 09/18

The INSTRUCTION MANUAL must be delivered to the pump-user, who takes diligent note of it, fills in data for Maintenance Department (page 1), keeps the file for subsequent reference. Possible modifications do not imply updating of the existing manuals

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