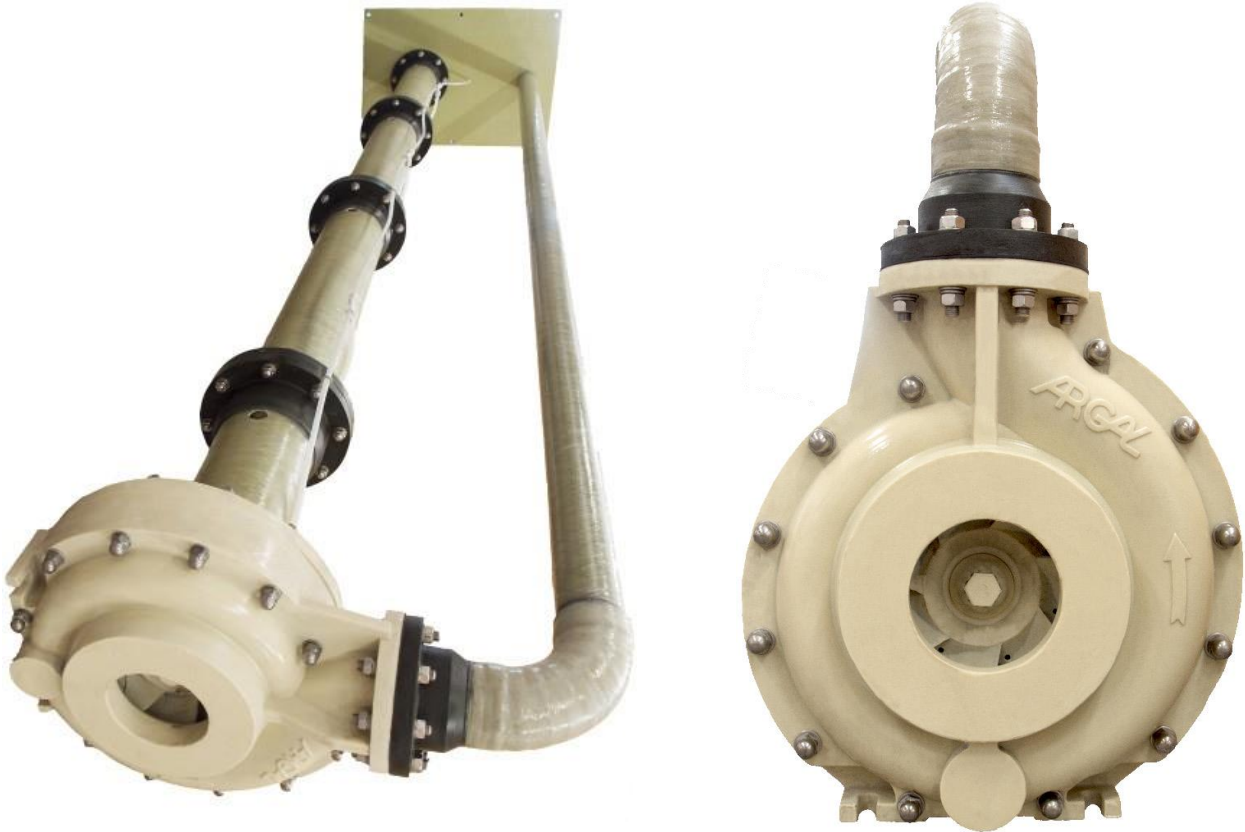


# ARGAL

## USER MANUAL

# KGS



EAC CE

DEALER

for Maintenance

date of commissioning:

.....


position / system reference:

.....

service:

.....

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## IDENTIFICATION CODE

KGS SATURN SUMP	PUMP DATA					MOTOR DATA			
	Model	Version	O-ring Material	Internal Structure	Vapour Seal	Under Plate Length (mm)	rpm	Voltage	Phase
<input type="checkbox"/> 1.5x1x6 <input type="checkbox"/> 1.5x1x8 <input type="checkbox"/> 3x1.5x6 <input type="checkbox"/> 3x1.5x8 <input type="checkbox"/> 3x2x6 <input type="checkbox"/> 3x2x8 <input type="checkbox"/> 3x2x10 <input type="checkbox"/> 4x3x8 <input type="checkbox"/> 4x3x10 <input type="checkbox"/> 6x4x10 <input type="checkbox"/> 6x4x13 <input type="checkbox"/> 8x6x13	<input type="checkbox"/> V1G Epoxy VinylEster Resin <input type="checkbox"/> V1C Epoxy Vinyl Ester Resin mixture <input type="checkbox"/> V1X Epoxy Vinyl Ester Resin Mixture with Conductive Resine Liner <input type="checkbox"/> V1F Epoxy Vinyl Ester Resin mixture	<input type="checkbox"/> V (FKM) <input type="checkbox"/> E (EPDM) <input type="checkbox"/> K (FFKM)	<input type="checkbox"/> N (PTFE+C) <input type="checkbox"/> PEEK (Polietere Etere Chetone)	<input type="checkbox"/> VR V-ring <input type="checkbox"/> VM Mechanical Seal	_____	<input type="checkbox"/> 1450 <input type="checkbox"/> 2900 <input type="checkbox"/> 1750 <input type="checkbox"/> 3500	<input type="checkbox"/> E=Ex-proof	<input type="checkbox"/> 3 <input type="checkbox"/> 1	_____

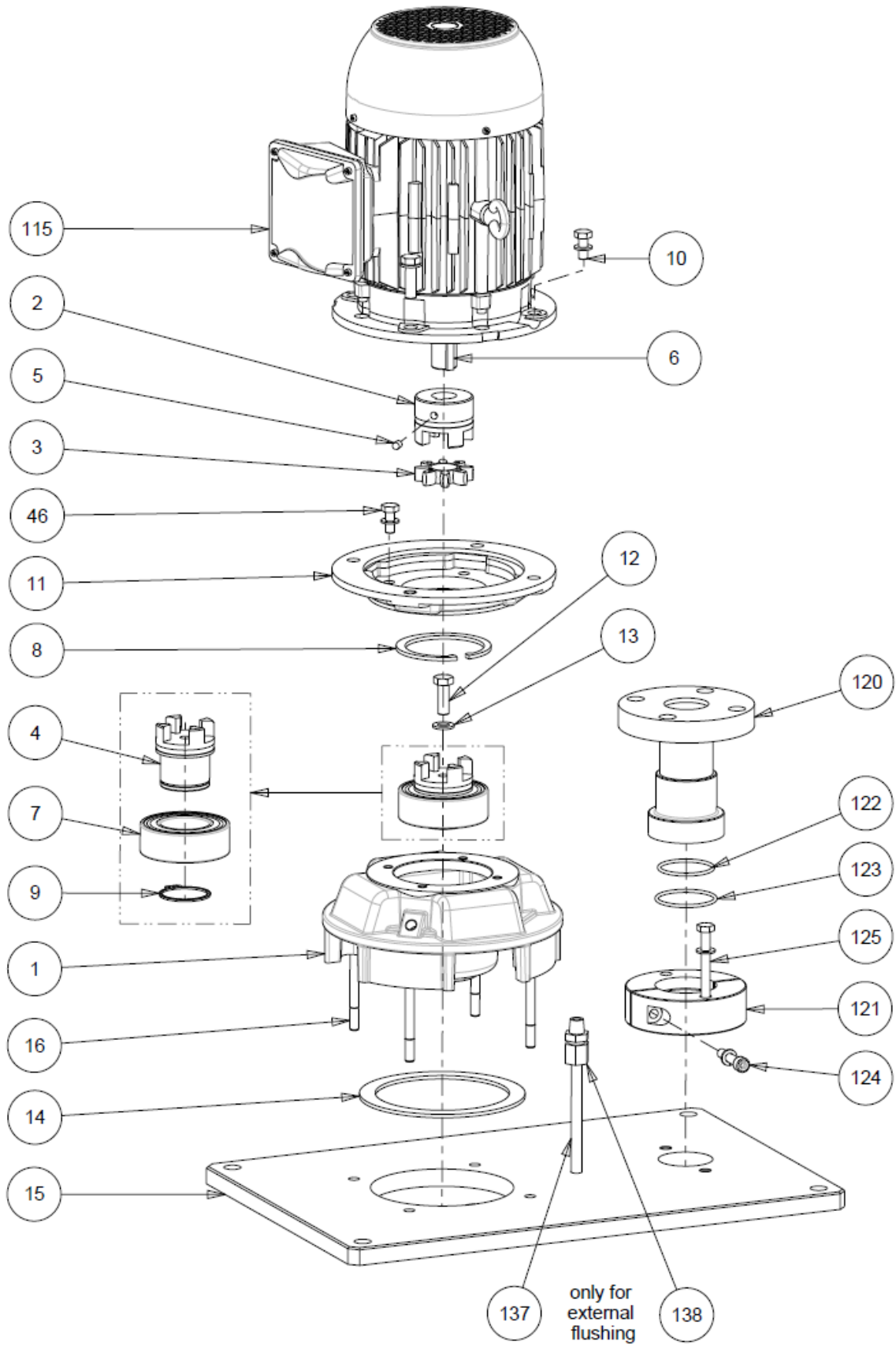
Each pump is supplied with the serial and model abbreviation and the serial number on the rating plate, which is riveted onto the support side. Check these data upon receiving the goods. Any discrepancy between the order and the delivery must be communicated immediately.

In order to be able to trace data and information, the abbreviation, model and serial number of the pump must be quoted in all correspondence.

## NAMEPLATE

clockwise rotation looking at the motor-fan	
CENTRIFUGAL PUMP   Nr	Serial n°
Type	Model
Customer ITEM	
PERFORMANCE Q  m3/h	
n  RPM	H  m H2O
manufacturing year	MADE IN ITALY
 Via Labirinto 159 BRESCIA-ITALY	
	

**EXPLODED VIEW (1) - size 1.5X1X6/8 – 3X1.5X6/8 – 3X2X6**

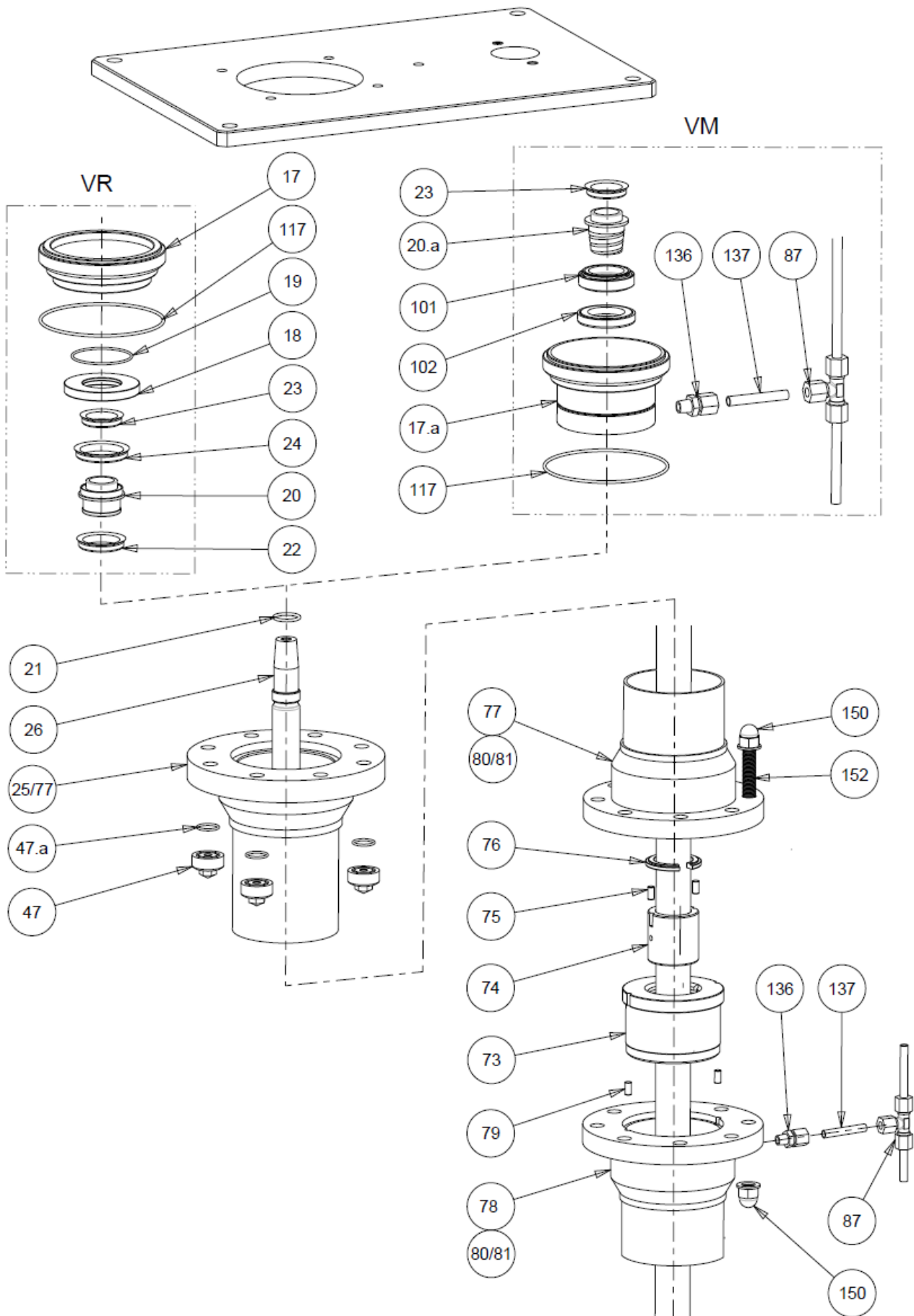


## PART LIST (1) - size 1.5X1X6/8 – 3X1.5X6/8 – 3X2X6

Pos.	Ref.	Part Name	Q.ty.	Disassembling Steps Sequence										Spare Parts Stock		
				1	2	3	4	5	6	7	8	9	10	start up	2 years	
1	330	Bearing Support	1									•				
2	841	Flexible coupling (motor side)	1				•									
3	848	Spider	1			•									1	
4	842	Flexible coupling (pump side)	1									•				
5	904	Grub screw (UNI 5925 M8)	1			•										
6	940	Key (motor)	1					•								
7	321	Rolling Bearing	1									•				
8	932	Seeger ring (upper)	1					•								
9	932.1	Seeger ring (lower)	1						•							
10	910	Fixing Set: motor lock flange / motor	1	•												
11	807	Motor lock flange (1)	1				•									
12	914	Shaft locking screw	1			•										
13	552	Spring washer	1				•									
14	334	Support centering ring	1										•			
15	890	Base plate	1									•				
16	910.1	Joint pin	4										•			
46	910.1	Fixing Set: bearing support / motor lock flange (1)	1			•										
120	700	Discharge flange assembly	1			•										
121	488	Discharge flange locking ring	1			•										
122	412	O-ring (discharge flange/discharge pipe)	1				•									1
123	412.1	O-ring (discharge flange/base plate)	1				•									1
124	910.2	Fixing Set: Discharge locking ring	1	•												
125	910.3	Fixing Set: Discharge locking ring/base plate	1	•												
137	418	Flush pipe (3)	1	•												1
138	718	Flush fitting (external flushing) (3)	1			•										1
115	800	Electric motor	1			•										

(1) if required by the bearing support (3) only for external flushing

**EXPLODED VIEW (2) - size 1.5X1X6/8 – 3X1.5X6/8 – 3X2X6**



## PART LIST (2) - size 1.5X1X6/8 – 3X1.5X6/8 – 3X2X6

### VM VAPOR SEAL

Pos.	Ref.	Part Name	Q.ty.	Disassembling Steps Sequence										Spare Parts Stock		
				1	2	3	4	5	6	7	8	9	10	start up	2 years	
24	415.3	V-ring	1									•				
101	472	Mechanical seal (rotating ring)	1										•			
102	475	Mechanical seal (static ring)	1											•		
103	713.1	Shaft upper ending sleeve VM	1									•				
106	479	Mechanical seal housing VM (v-ring)	1										•			
107	718.1	Flush-fitting mechanical seal (pump side)	1		•											
109	718.2	Flush-fitting mechanical seal (Tee)	1		•											
117	412.4	O-ring (counterface housing VM)	1											•		
137	418.1	Flush pipe	1	•												

### VR VAPOR SEAL

Pos.	Ref.	Part Name	Q.ty.	Disassembling Steps Sequence										Spare Parts Stock		
				1	2	3	4	5	6	7	8	9	10	start up	2 years	
17	476	Counterface housing VR (v-ring)	1										•			
18	414	Counterface VR (v-ring)	1										•			
19	412.2	O-ring (counterface)	1											•		
20	713	Shaft upper ending sleeve VR	1										•			
22	415	Lower V-ring	1									•				
23	415.1	Intermediate V-ring	1									•				
24	415.2	Upper V-ring	1									•				
117	412.3	O-ring (counterface housing VR)	1											•		

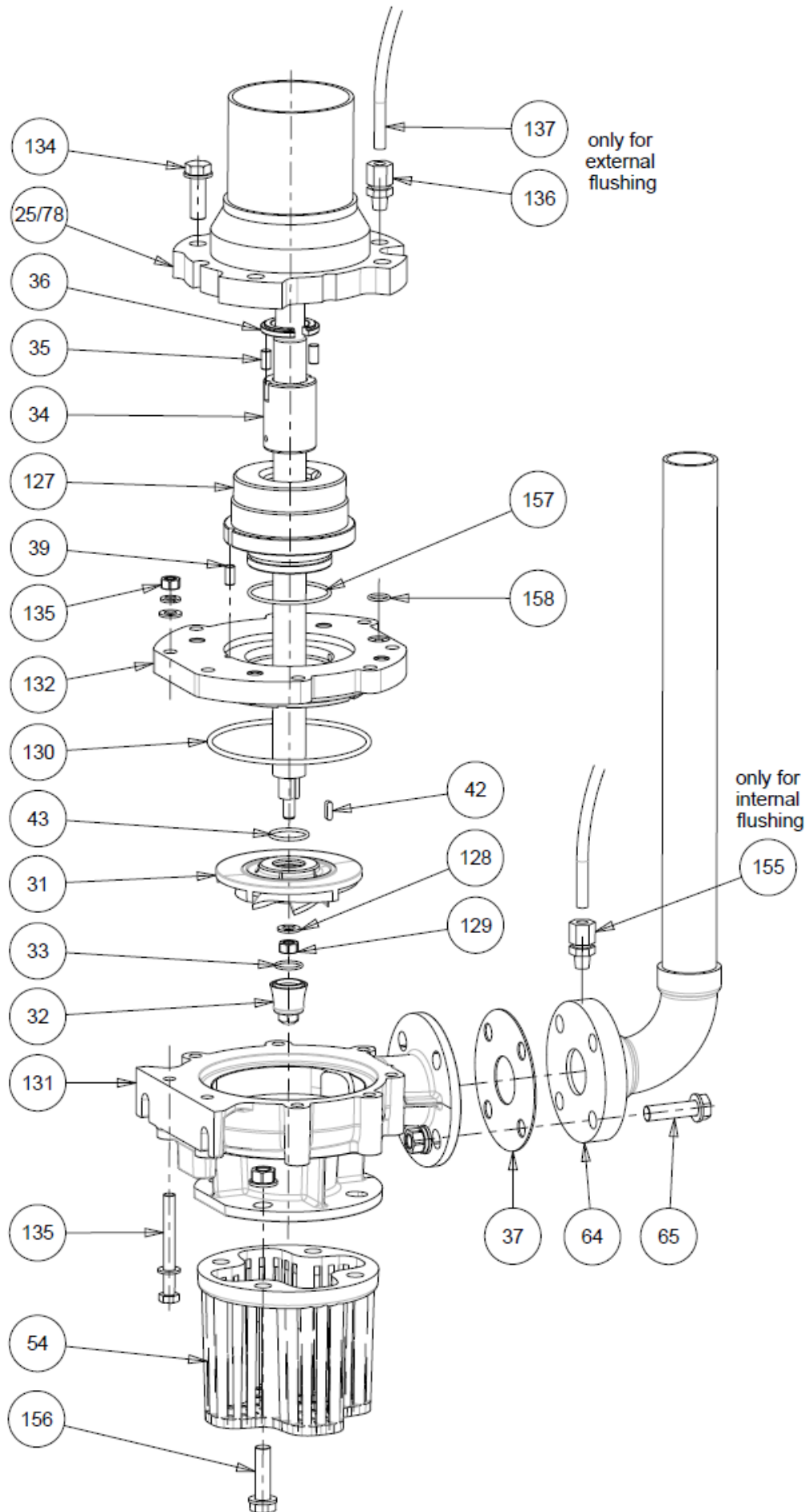
Pos.	Ref.	Part Name	Q.ty.	Disassembling Steps Sequence										Spare Parts Stock		
				1	2	3	4	5	6	7	8	9	10	start up	2 years	
21	412.5	O-ring (shaft)	1											•		
25	711	Integral column (2)	1										•			
26	210	Shaft	1							•						
47	910.4	Cap-nut (column-baseplate)	4							•						
47.a	412.5	O-ring (cap-nut)	4									•				
73	491	Intermediate bushing housing (4)	1										•			
74	545	Guide bushing (intermediate) (4)	1											•	1	1
75	560	Safety pin (guide bushing) (4)	2											•		
76	922	Locking ring (guide bushing) (4)	1										•			
77	711.1	Upper column (4)	1									•				
78	711.2	Lower column (4)	1									•				
79	560.1	Safety pin (housing) (4)	2										•			
80	711.3	Upper intermediate column (4)	1									•				
81	711.4	Lower intermediate column (4)	1									•				
87	718.3	Flush fitting (tee) (4)	1		•											
136	718.4	Flush fitting (4)	1		•											
137	418.2	Flush pipe (4)	1	•												
150	920	Nut (4)	8	•												
152	905	Screw (4)	4		•											

(2) only for integral column

(4) quantity for one intermediate guide



**EXPLODED VIEW (3) - size 1.5X1X6/8 – 3X1.5X6/8 – 3X2X6**

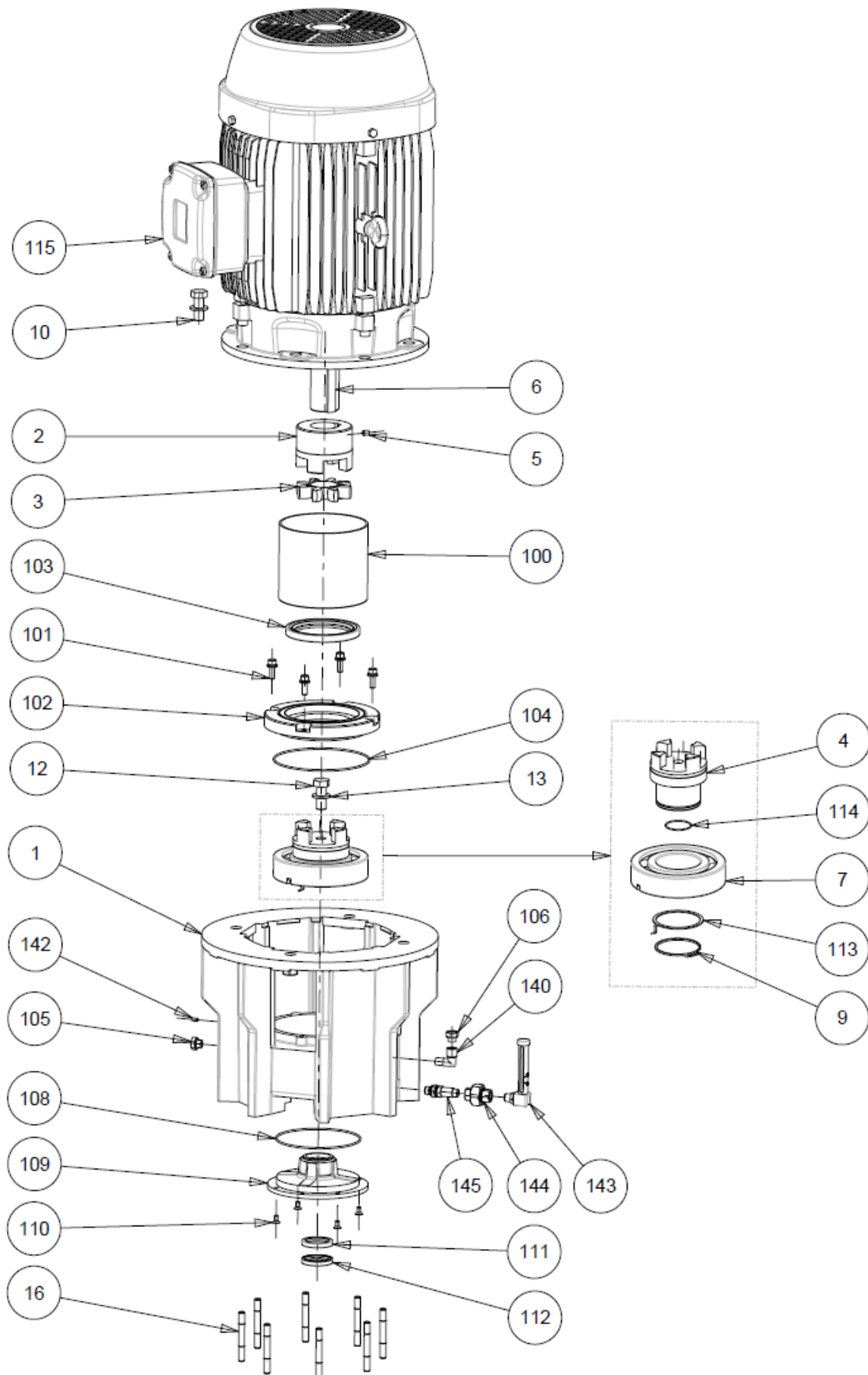


**PART LIST (3) - size 1.5X1X6/8 – 3X1.5X6/8 – 3X2X6**

Pos.	Ref.	Part Name	Q.ty.	Disassembling Steps Sequence										Spare Parts Stock		
				1	2	3	4	5	6	7	8	9	10	start up	2 years	
25	711	Integral Column (2)	1									•				
31	230	Impeller	1						•							1
32	260	Ogive	1			•										1
33	412.6	O-ring (ogive)	1				•									1
34	545.1	Guide bushing (lower)	1										•		1	1
35	560.2	Safety pin (bushing)	2										•			1
36	922.1	Locking ring (guide bushing)	1										•			1
37	412.7	discharge flange gasket	1			•										1
39	560.3	Safety pin (bushing housing)	1 / 2										•			1
42	940.2	Key (impeller)	1							•						
43	412.8	O-ring (impeller)	1							•						1
54	745	Strainer	1		•											
64	700.1	Discharge pipe	1		•											
65	910.5	Fixing set (volute/discharge pipe)	1	•												
78	711.2	Lower column	1									•				
127	161	Guide bushing housing	1										•			
128	934	Impeller washer	1					•								
129	920.1	Locking nut	1				•									1
130	412.9	O-ring (volute back flange)	1			•										1
131	103	Volute casing	1		•											
132	102	Volute back flange	1									•				
134	910.6	Fixing Set (lower column/volute back flange)	1							•						
135	910.7	Fixing Set (volute casing/volute back flange)	1	•												
136	718.5	Flush fitting (external flushing) (3)	1		•											1
137	418.2	Flushing pipe (3)	1	•												1
155	718.4	Flush fitting (discharge flushing) (5)	1		•											1
156	910.8	Fixing Set (strainer)	1	•												
157	412.10	O-ring (guide bushing housing) (3)	1										•			1
158	412.11	O-ring (volute back flange external flushing) (3)	1											•		1

(2) only for integral column    (3) only for external flushing    (5) only for flushing from discharge pipe

**EXPLODED VIEW (1) - size 3X2X8/10 - 4X3X8/10**

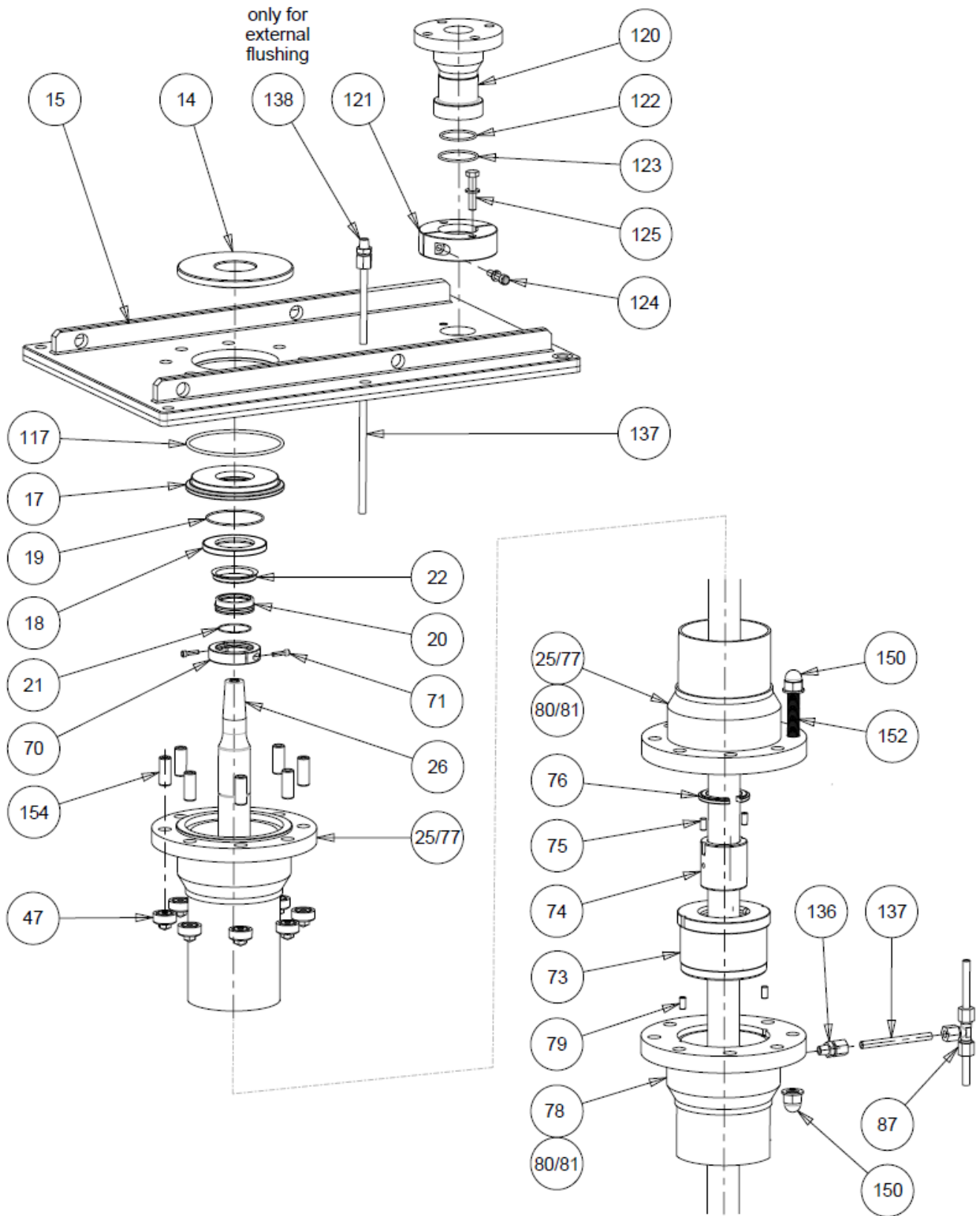


## PART LIST (1) - size 3X2X8/10 - 4X3X8/10

Pos.	Ref.	Part Name	Q.ty.	Disassembling Steps Sequence										Spare Parts Stock		
				1	2	3	4	5	6	7	8	9	10	start up	2 years	
1	330	Bearing Support	1													
2	841	Flexible coupling (motor side)	1				•									
3	848	Spider	1		•										1	
4	842	Flexible coupling (pump side)	1							•						
5	904	Grub screw (UNI 5925 M5x8)	1			•										
6	940.1	Key (motor)	1				•									
7	321	Rolling Bearing	1							•						
9	932	Seeger ring	1						•							
10	910	Fixing set: bearing support / motor	1	•												
11	807	Bearing support lock flange (1)	1		•											
12	914	Locking screw (ISO 4762 - M16 x 40)	1		•											
13	552	Spring washer (UNI 1751 - A 16)	1			•										
16	910.1	Joint pin (UNI 5914 M10x65)	8	•												
46	910.2	Fixing Set: bearing support / flange (1)	1													
100	875	Coupling guard	1		•											
101	910.3	Fixing Set: bearing cover/ support	1			•										
102	360	Bearing cover	1				•									
103	421.1	Elastic seal ring	1					•							1	
104	412.1	O-ring (bearing cover)	1					•							1	
105	643	Plug G1/4"	1	•												
106	637	Inlet Oil-Plug	1	•												
108	412.2	O-ring (oil chamber cover)	1							•					1	
109	360	Oil chamber cover	1						•							
110	910.4	Fixing Set: oil chamber cover/ support	1					•								
111	421.2	Elastic seal ring (MIM 40 52 7)	1				•								1	
112	421.3	Elastic seal ring (MIM 40 52 7)	1			•									1	
113	123	Lubricating ring	1							•						
114	412.3	O-ring (flexible coupling)	1													
115	800	Electric motor	1		•											
140	763	Oil-charge fitting	1		•											
142		grub screw	1	•												
143	643	Oil level	1	•												
144	726	Union	1		•											
145	731	Oil-discharge fitting	1			•										

(1) if required by the bearing support

**EXPLODED VIEW (2) - size 3X2X8/10 - 4X3X8/10**



## PART LIST (2) - size 3X2X8/10 - 4X3X8/10

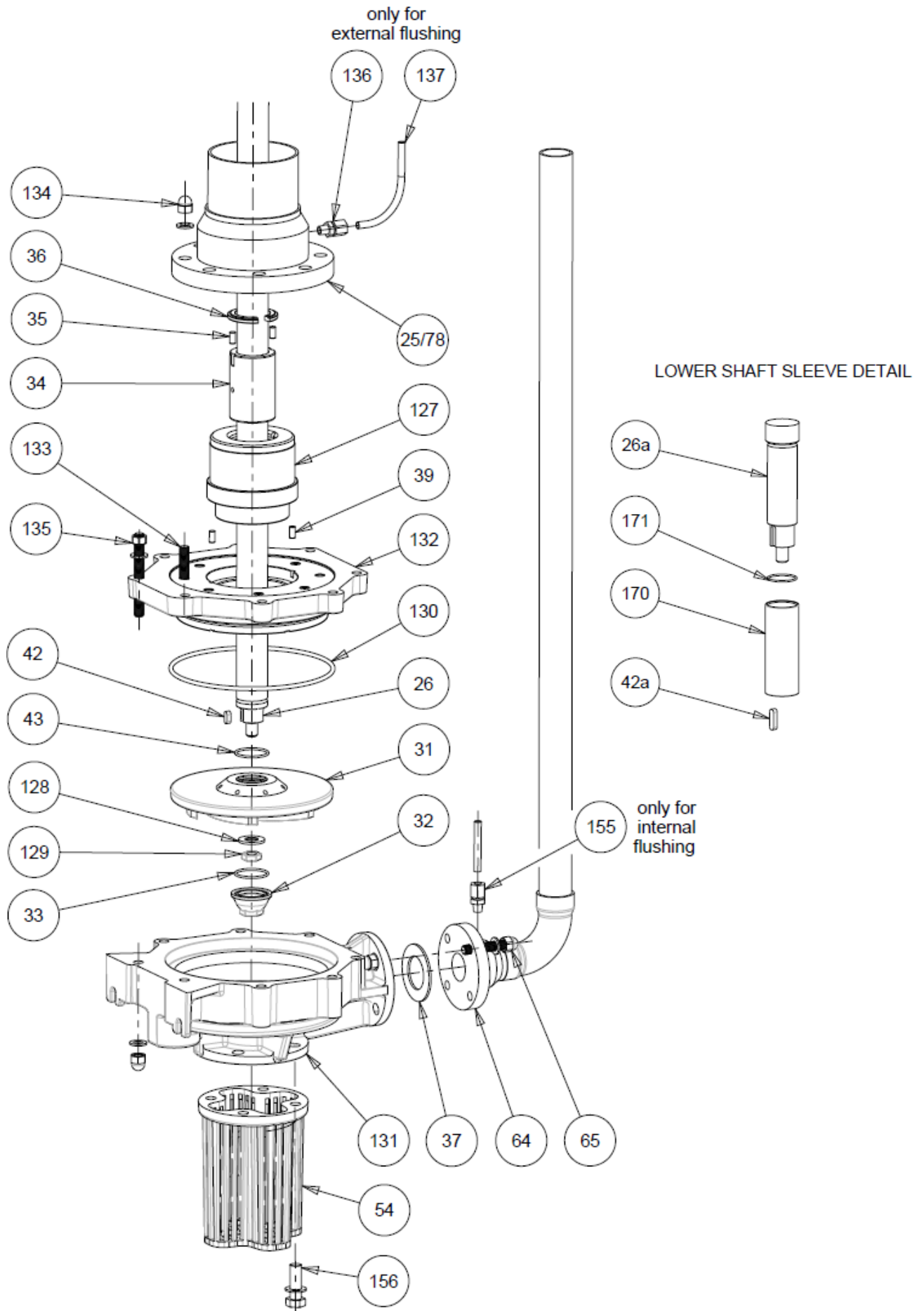
Pos.	Ref.	Part Name	Q.ty.	Disassembling Steps Sequence										Spare Parts Stock		
				1	2	3	4	5	6	7	8	9	10	start up	2 years	
14	334	Support plate	1		•											
15	890.1	Base plate	1													
17	476	Counterface housing (v-ring)	1							•						
18	414	Counterface (v-ring)	1							•						1
19	412.4	O-ring (counterface)	1								•					1
20	713.1	Vapor gasket seat	1					•								1
21	412.5	O-ring (Vapor gasket seat)	1						•							1
22	415	V-ring	1			•										1
25	711.1	Column (2)	1		•											
26	210	Shaft	1							•						
47	910	Cap-nut	8	•												
70	488.1	locking ring (v-ring seat)	1				•									
71	910.5	Fixing Set: locking ring (v-ring seat)	1			•										
77	711.1	Upper Column	1		•											
117	412.6	O-ring (counterface housing)	1								•					1
120	700.1	Discharge flange assembly	1			•										
121	488.2	Discharge flange locking ring	1		•											
122	412.7	O-ring (discharge flange/discharge pipe)	1				•									1
123	412.8	O-ring (discharge flange/base plate)	1				•									1
124	910.6	Fixing Set: Discharge locking ring	1	•												
125	910.7	Fixing Set: Discharge locking ring/base plate	1	•												
137	418.1	Flush pipe (3)	1		•											1
138	718.1	Flush fitting (external) (3)	1	•												1
154	526	Centering sleeve for column	8			•										

(2) only for integral column (3) only for external flushing

Pos.	Ref.	Part Name	Q.ty.	Disassembling Steps Sequence										Spare Parts Stock		
				1	2	3	4	5	6	7	8	9	10	start up	2 years	
25	711.1	Column (2)	1		•											
73	491	Intermediate bushing housing (4)	1				•									
74	545.2	Intermediate guide bushing (4)	1						•						1	1
75	560.1	Safety pin (guide bushing) (4)	2							•						
76	922.2	Locking ring (Intermediate guide bushing) (4)	1					•								1
77	711.2	Upper column (4)	1			•										
78	711.3	Lower column (4)	1			•										
79	560.2	Safety pin (housing) (4)	2					•								
80	711.4	Upper intermediate column (4)	1			•										
81	711.5	Lower intermediate column (4)	1			•										
87	718.2	Flush fitting (tee) (4)	1		•											1
136	718.4	Flush fitting (4)	1		•											1
137	418.3	Flush pipe (4)	1	•												1
150	920	Nut (4)	16	•												
152	905.2	Screw (4)	8		•											1

(2) only for integral column (4) quantity for one intermediate guide

**EXPLODED VIEW (3) - size 3X2X8/10 - 4X3X8/10**



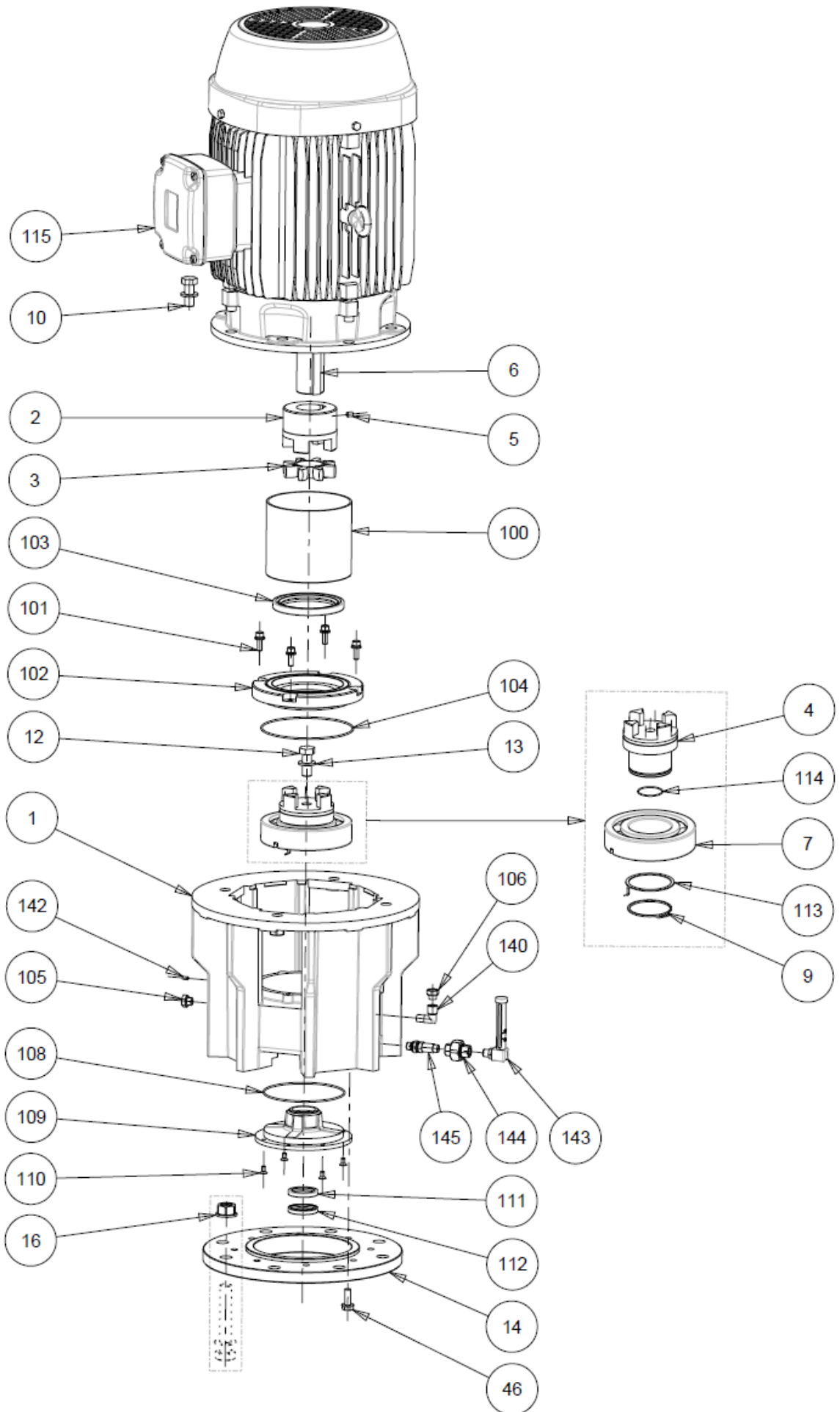
**PART LIST (2) - size 3X2X8/10 - 4X3X8/10**

Pos.	Ref.	Part Name	Q.ty.	Disassembling Steps Sequence										Spare Parts Stock		
				1	2	3	4	5	6	7	8	9	10	start up	2 years	
25	711.1	Column (2)	1						•							
26	210	Shaft	1			•										
26a	210	Shaft for lower sleeve (6)	1			•										
31	230.1	Impeller	1						•							1
32	260	Ogive	1			•										1
33	412.9	O-ring (ogive)	1				•									1
34	545.1	Guide bushing (lower)	1										•		1	1
35	560.3	Safety pin (bushing)	2										•			1
36	922.1	Locking ring (guide bushing)	1										•			1
37	412.9	discharge flange gasket	1			•										1
39	560.4	Safety pin (bushing housing)	2										•			1
42	940.2	Key (impeller)	1							•						
42a	940.2	Key (impeller – lower sleeve) (6)	1							•						
43	412.10	O-ring (impeller)	1							•						1
64	700.2	Discharge pipe	1		•											
65	910.8	Fixing set (discharge pipe)	1	•												
78	711.3	Lower column	1						•							
127	161	Guide bushing housing	1										•			
128	934	Impeller washer	1					•								
129	920	Locking nut	1				•									1
130	412.11	O-ring (volute back flange)	1			•										1
131	103	Volute casing	1		•											
132	102	Volute back flange	1								•					
133	905.1	Screw	8								•					
134	260.1	Nut	8							•						
135	910.9	Fixing Set: volute casing/volute back flange	1	•												
136	718.3	Flush fitting (3)	1		•											1
137	418.2	Flushing pipe (external) (3)	1	•												1
155	718.4	Flush fitting (internal) (5)	1		•											1
170	523.1	Shaft lower sleeve (6)	1							•						
171	412.12	O-ring (lower sleeve) (6)	1										•			

(2) only for integral column    (3) only for external flushing    (5) only for internal flushing    (6) only for lower shaft sleeve option



**EXPLODED VIEW (1) - size 6X4X10/13 – 8X6X13**

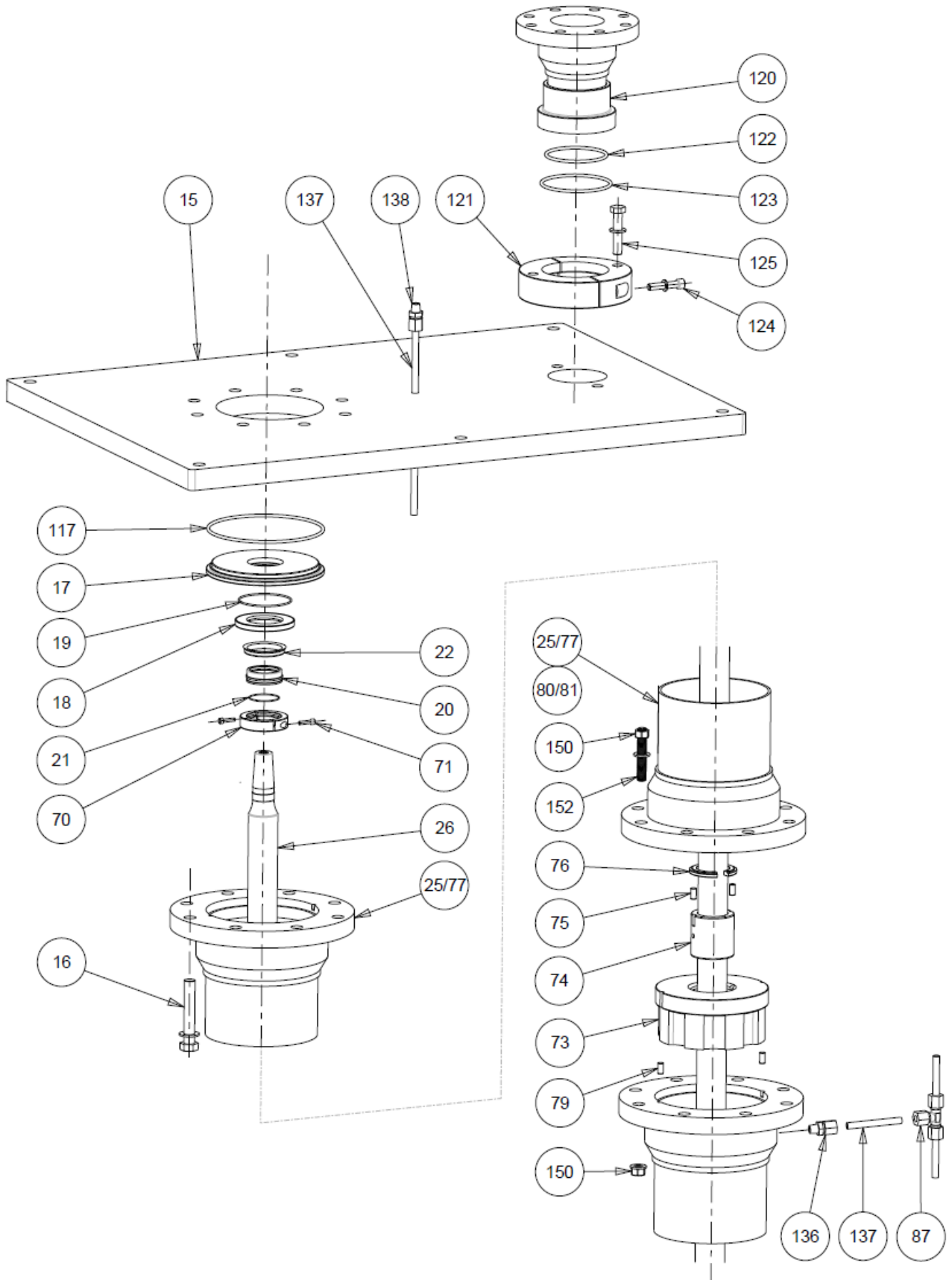


## PART LIST (1) - size 6X4X10/13 – 8X6X13

Pos.	Ref.	Part Name	Q.ty.	Disassembling Steps Sequence										Spare Parts Stock		
				1	2	3	4	5	6	7	8	9	10	start up	2 years	
1	330	Bearing Support	1													
2	841	Flexible coupling (motor side)	1				•									
3	848	Spider	1		•										1	
4	842	Flexible coupling (pump side)	1							•						
5	904	Grub screw (UNI 5925 M5x8)	1			•										
6	940.1	Key (motor)	1				•									
7	321	Rolling Bearing	1							•						
9	932	Seeger ring	1						•							
10	910	Fixing set: bearing support / motor	1	•												
11	807	Motor lock flange (1)	1			•										
12	914	Locking screw (ISO 4762 - M16 x 40)	1		•											
13	552	Spring washer (UNI 1751 - A 16)	1			•										
14	807	Bearing support lock flange	1		•											
16	910.1	Fixing Set: bearing support flange / base plate / column	8	•												
46	910.2	Fixing Set: bearing support / flange (1)	1													
100	875	Coupling guard	1		•											
101	910.3	Fixing Set: bearing cover/ support	1			•										
102	360	Bearing cover	1				•									
103	421.1	Elastic seal ring	1					•								1
104	412.1	O-ring (bearing cover)	1					•								1
105	643	Plug G1/4"	1	•												
106	637	Inlet Oil-Plug	1	•												
108	412.2	O-ring (oil chamber cover)	1							•						1
109	360	Oil chamber cover	1						•							
110	910.4	Fixing Set: oil chamber cover/ support	1					•								
111	421.2	Elastic seal ring (MIM 40 52 7)	1				•									1
112	421.3	Elastic seal ring (MIM 40 52 7)	1			•										1
113	123	Lubricating ring	1							•						
114	412.3	O-ring (flexible coupling)	1													
115	800	Electric motor	1		•											
140	763	Oil-charge fitting	1		•											
142		grub screw	1	•												
143	643	Oil level	1	•												
144	726	Union	1		•											
145	731	Oil-discharge fitting	1			•										

(1) if required by the bearing support

**EXPLODED VIEW (2) - size 6X4X10/13 – 8X6X13**



## PART LIST (2) - size 6X4X10/13 – 8X6X13

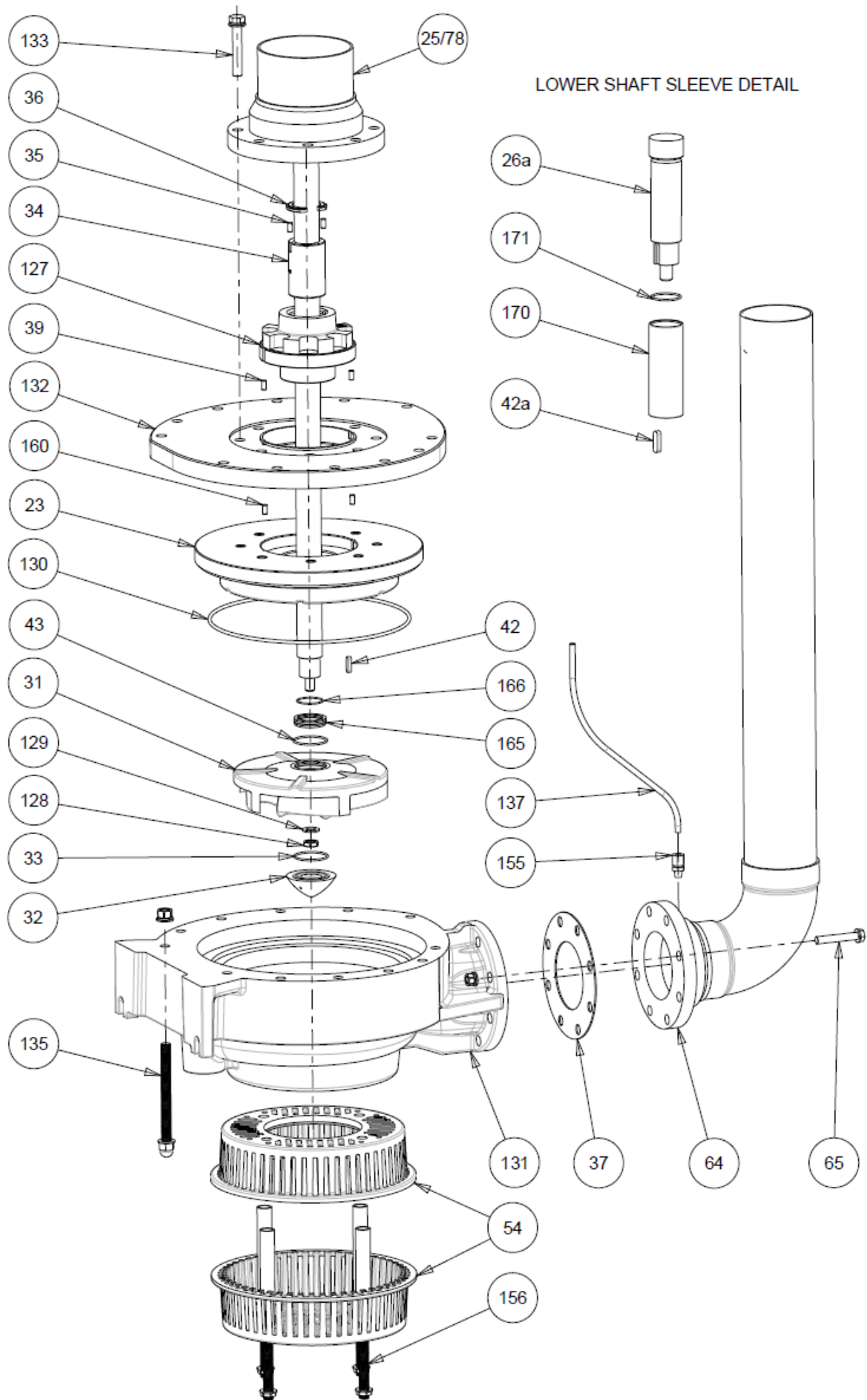
Pos.	Ref.	Part Name	Q.ty.	Disassembling Steps Sequence										Spare Parts Stock		
				1	2	3	4	5	6	7	8	9	10	start up	2 years	
15	890.1	Base plate (standard)	1													
16	910.1	Fixing Set: bearing support flange / base plate / column	8	•												
17	476	Counterface housing (v-ring)	1								•					
18	414	Counterface (v-ring)	1									•				1
19	412.4	O-ring (counterface)	1										•			1
20	713.1	Vapor gasket seat	1					•								1
21	412.5	O-ring (Vapor gasket seat)	1						•							1
22	415	V-ring	1			•										1
25	711.1	Column (2)	1		•											
26	210	Shaft	1							•						
70	488.1	locking ring (v-ring seat)	1				•									
71	910.5	Fixing Set: locking ring (v-ring seat)	1			•										
77	711.1	Upper Column	1		•											
117	412.6	O-ring (counterface housing)	1									•				1
120	700.1	Discharge flange assembly	1			•										
121	488.2	Discharge flange locking ring	1		•											
122	412.7	O-ring (discharge flange/discharge pipe)	1				•									1
123	412.8	O-ring (discharge flange/base plate)	1				•									1
124	910.6	Fixing Set: Discharge locking ring	1	•												
125	910.7	Fixing Set: Discharge locking ring/base plate	1	•												
137	418.1	Flushing pipe (3)	1		•											1
138	718.1	Flush fitting (external) (3)	1	•												1

(2) only for integral column (3) only for external flushing

Pos.	Ref.	Part Name	Q.ty.	Disassembling Steps Sequence										Spare Parts Stock		
				1	2	3	4	5	6	7	8	9	10	start up	2 years	
25	711.1	Column (2)	1		•											
73	491	Intermediate bushing housing (4)	1				•									
74	545.2	Intermediate guide bushing (4)	1						•						1	1
75	560.3	Safety pin (guide bushing) (4)	2							•						
76	922.2	Locking ring (Intermediate guide bushing) (4)	1					•								1
77	711.2	Upper column (4)	1			•										
78	711.3	Lower column (4)	1			•										
79	560.4	Safety pin (housing) (4)	1					•								
80	711.4	Upper intermediate column (4)	1			•										
81	711.5	Lower intermediate column (4)	1			•										
87	718.2	Flush fitting (tee) (4)	1		•											1
136	718.4	Flush fitting (4)	1		•											1
137	418.3	Flushing pipe (4)	1	•												1
150	920	Nut (4)	16	•												
152	905.2	Screw (4)	8		•											1

(2) only for integral column (4) quantity for one intermediate guide

**EXPLODED VIEW (3) - size 6X4X10/13 – 8X6X13**

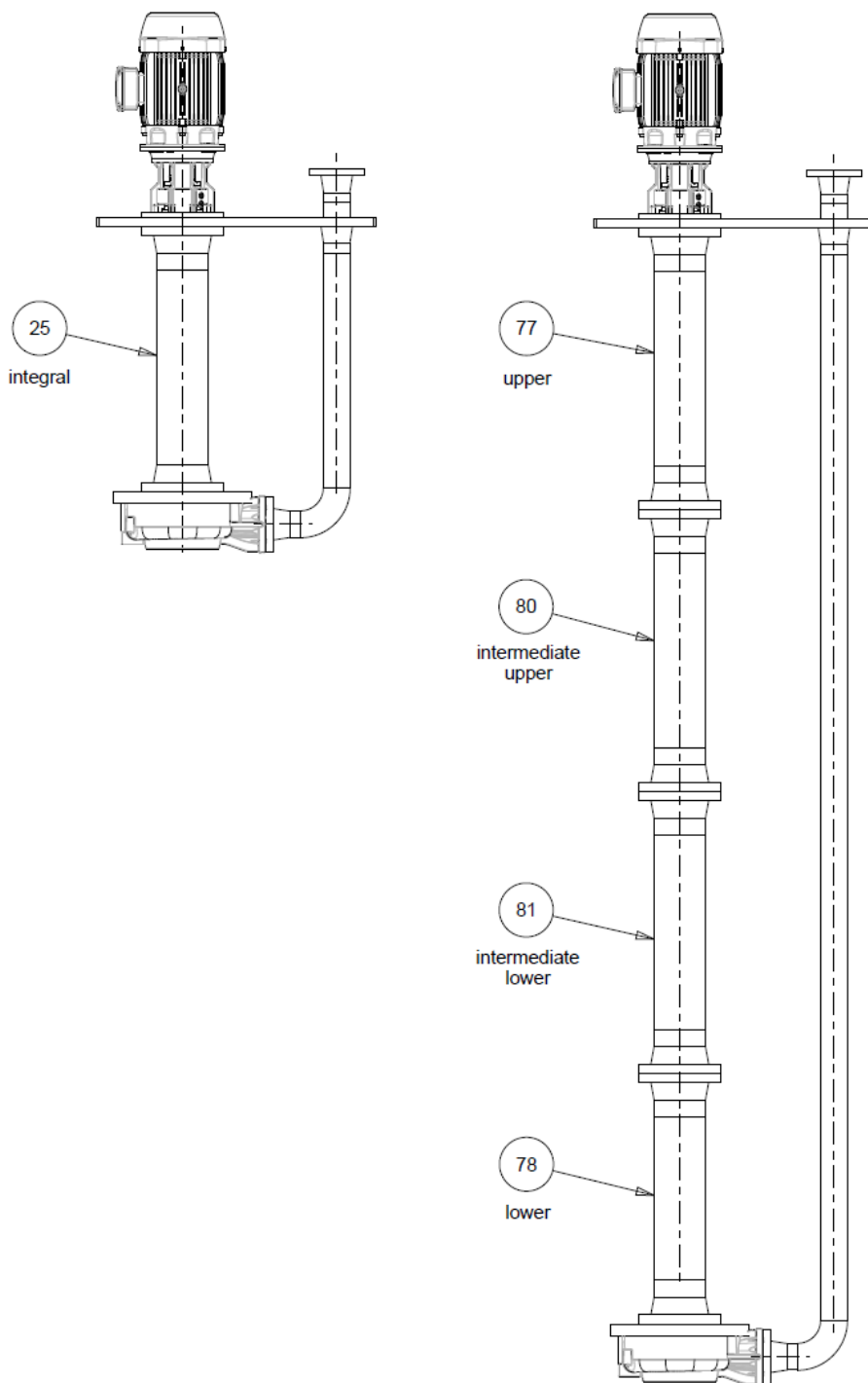


**PART LIST (3) - size 6X4X10/13 – 8X6X13**

Pos.	Ref.	Part Name	Q.ty.	Disassembling Steps Sequence										Spare Parts Stock		
				1	2	3	4	5	6	7	8	9	10	start up	2 years	
25	711.1	Column (2)	1							•						
26	210	Shaft	1			•										
26a	210	Shaft for lower sleeve (6)	1			•										
31	230.1	Impeller	1						•							1
32	260	Ogive	1			•										1
33	412.9	O-ring (ogive)	1				•									1
34	545.1	Guide bushing (lower)	1										•		1	1
35	560.1	Safety pin (bushing)	2										•			1
36	922.1	Locking ring (guide bushing)	1										•			1
37	412.9	discharge flange gasket	1			•										1
39	560.2	Safety pin (bushing housing)	2										•			1
42	940.2	Key (impeller)	1							•						
42a	940.2	Key (impeller – lower sleeve) (6)	1							•						
43	412.10	O-ring (impeller)	1							•						1
54	745	Strainer	1	•												
64	700.2	Discharge pipe	1		•											
65	910.8	Fixing set (discharge pipe)	1	•												
78	711.3	Lower column	1						•							
127	161	Guide bushing housing	1										•			
128	934	Impeller washer	1					•								
129	920	Locking nut	1				•									1
130	412.11	O-ring (volute back flange)	1			•										1
131	103	Volute casing	1		•											
132	102	Volute back flange	1										•			
133	905.1	Screw	8										•			
134	260.1	Nut	8							•						
135	910.9	Fixing Set: volute casing/volute back flange	1	•												
136	718.3	Flush fitting (3)	1		•											1
137	418.2	Flushing pipe (external) (3)	1	•												1
155	718.4	Flush fitting (internal) (5)	1		•											1
170	523.1	Shaft lower sleeve (6)	1							•						
171	412.12	O-ring (lower sleeve) (6)	1										•			

(2) only for integral column    (3) only for external flushing    (5) only for internal flushing    (6) only for lower shaft sleeve option

# COLUMNS SCHEME



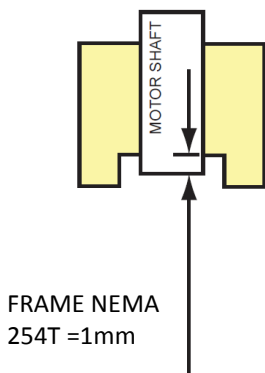
Pos.	Ref.	Part Name	Q.ty.	Disassembling Steps Sequence										Spare Parts Stock			
				1	2	3	4	5	6	7	8	9	10	start up	2 years		
25	711.1	Column (4)	1								•						
77	711.2	Upper column (3)	1			•											
78	711.3	Lower column (3)	1			•											
80	711.4	Upper intermediate column (3)	1			•									1	1	
81	711.5	Lower intermediate column (3)	1			•											

(3) quantity for one intermediate guide

(4) only for integral column

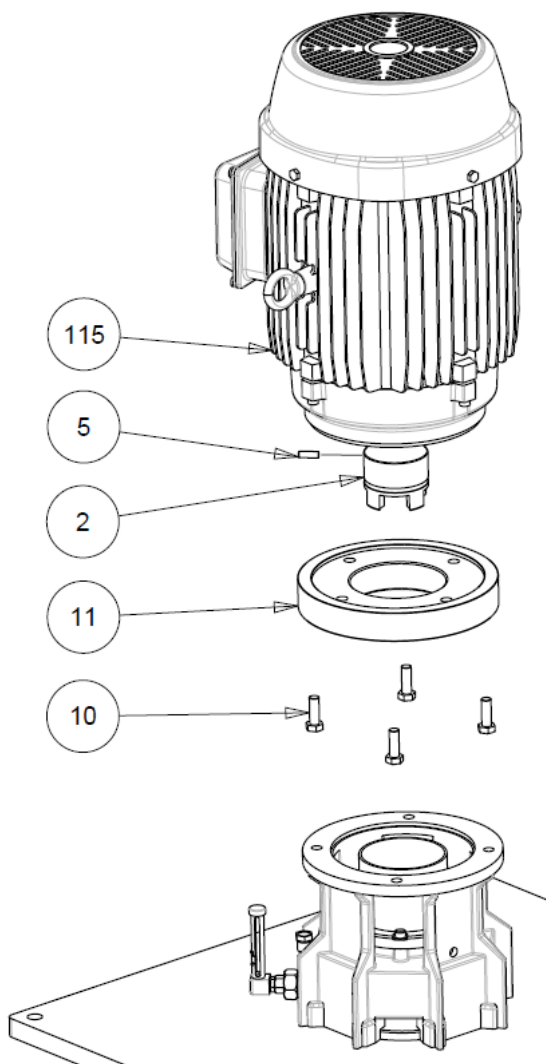
## INSTRUCTIONS FOR NEMA MOTOR ASSEMBLY PROCEDURE

1. assemble the flexible coupling -motor side- (Pos.2) on the motor shaft, then block it tightening the joint grub screw (Pos.5)

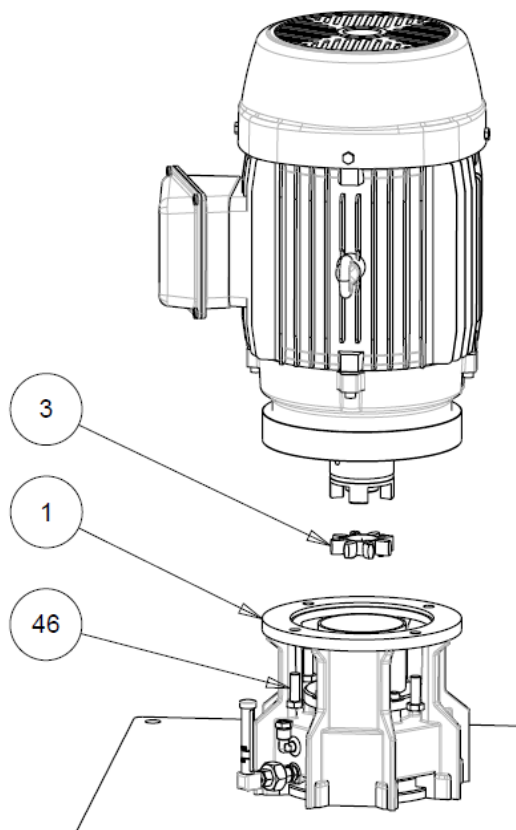


2. Insert the motor adaptor (Pos.11) into the motor's flange
3. Tighten the flange screws (Pos.10) - not included
4. Assemble the group "motor-motor adaptor" into the pump's bearing support
5. Tighten the screws (Pos. 46) – included

STEP#1



STEP#2





## GENERAL NOTES

“KGS” 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, static casings and columns, in contact with the liquid, are constructed from thermosetting materials; other parts in high chemical-resistant materials.

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

“KGS” pumps are centrifugal, vertical, with driven self-supporting pump shaft, single-stage with the volute casing directly dipping in the liquid to be pumped, coupled to a non-synchronous electric motor via a flexible coupling, with hydraulic connections to the axial inlet facing the bottom of the pump and radial outlet connected to a vertical piping system. The vertical piping ends with hydraulic connections to the system turned upwards on the base plate. This plate has to be mounted on a very rigid structure (see INSTALLATION INSTRUCTIONS).

“KGS” pumps are not self-priming and as a consequence they must start with the volute casing immersed in the liquid. After starting operation the liquid level can drop (see APPLICATION LIMITS).

“KGS” pumps cannot run dry. The shaft guide bushings must be constantly kept wet with the liquid being pumped or with a clean liquid external flushed.

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 maximum pressure the pump may be subjected to is 1.5 times the head value developed with the outlet closed. The fume seal, located at the base plate level, develops a back pressure (can vary according to the pump size) of approximately 60 mbar for standard execution (V-ring seal), and approximately 240 mbar for fluid barrier seal execution. To grant the correct running of the fluid barrier seal is required to feed with air the circuit of the seal with the following specifications: 3 bar air pressure; 50 l/min air capacity.

The submerged part (liner) must not be subject to lateral hydrodynamic thrusts by the liquid mass being moved.

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

When calculating the head, consider the actual level of the liquid in the suction tank and not the outlet connection.

## STRUCTURE

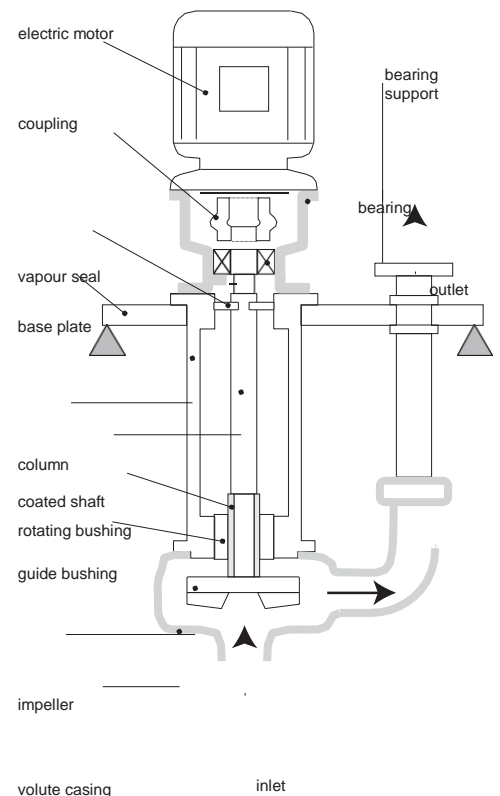
The impeller is rotated by the pump shaft coupled to the motor shaft by means of a flexible coupling. Inside the support (placed outside the tank, on the base plate), the pump shaft is driven and at the same time supported

by one rolling bearing packed with GREASE or OIL; near the impeller (for under plate length over 500 mm and also along the shaft) the pump

shaft is driven by a sliding friction bearing supporting all the radial mechanical loads caused by hydrodynamic stress, while the axial loads are borne by the support bearings. In order to ensure pump lifetime, it is essential that the sliding friction bearing is kept wet with the liquid being pumped or by external clean liquid. The pump is provided with a base plate to be fitted in the system and to be equipped with adequate supports to mount the pump on.

The delivery tube is fastened to the plate by two half clamps that prevent mechanical tension, deriving from the system, from affecting the pump body. It is necessary to reduce to a minimum any load on the connections. To do that, back the piping up with proper brackets in such a way to allow thermal expansions (e.g.: expansion coupling, proper configuration).

The pump shaft (not coated), where it crosses the base plate, is provided with fume seal ring (single or fluid barrier) to protect the motor bearing and to reduce fume dispersion in the environment in case of hot liquids.



## APPLICATION LIMITS

### TEMPERATURE

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

execution		under plate length (mm)
		500 ÷ 5000
version	material	ambient temperature range (°C)
V1G	Epoxy Vinyl Ester Resin	-10 ÷ 40
V1C	Epoxy Vinyl Ester Resin Mixture	-10 ÷ 40
V1F	Epoxy Vinyl Ester Resin Mixture	-10 ÷ 40
V1X	Epoxy Vinyl Ester Resin Mixture with conductive resin liner	-10 ÷ 40

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

execution		under plate length (mm)
		500 ÷ 5000
version	material	maximum temperature (°C)
V1G	Epoxy Vinyl Ester Resin	-10 ÷ 40
V1C	Epoxy Vinyl Ester Resin Mixture	-10 ÷ 40
V1F	Epoxy Vinyl Ester Resin Mixture	-10 ÷ 40
V1X	Epoxy Vinyl Ester Resin Mixture with conductive resin liner	-10 ÷ 40

### IMMERSION DEPTH

Immersion depth can be increased by adding a suction extension in order to prevent mud sediment in the tank (nevertheless ensure minimum distance from the bottom "S"). Should the extension-length be higher than 1,5 m, arrange for a bracket to keep lateral movements of the extension within 2 mm. The maximum length of the extension is 2,2 m; the nominal bore must be the same as the one of the pump inlet. With the suction extension installed, the level can drop under the centrifugal impeller (pump casing) during operation (not during startup) for the amount shown by the following values applying to water at 25°C.

Nominal Suction Diameter of the Pump (mm)	1,5"	3"	4"	6"	8"
maximum suction lift (negative) allowed:					
without foot strainer :	1,5 m	2 m	2 m	2 m	2 m
with foot strainer :	0,5 m	1 m	1 m	1 m	1 m

At 40°C reduce of 0,65 m; at 60°C the impeller must always be under positive suction head (minimum value 0,35 m).

As to the liquids having high vapour pressure (i.e.: much more evaporation in comparison to water at the same temperature, presence of detergent), positive suction head is advisable. The maximum level allowed is 150 mm under the lower surface of the base plate; vent holes on the columns must be visible.

### SOLID PARTICLES

The liquid being pumped may contain a maximum 10% of solid non-abrasive particles not greater than 1 mm in size. The presence of fibrous, adhesive or abrasive bodies is not allowed. The maximum allowed size for bodies occasionally present is 3 mm. Arrange for proper filtering or sedimentation stages to comply with above mentioned limits.

### SPECIFIC WEIGHT

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.

### KINEMATIC VISCOSITY

The level of kinematic viscosity must not exceed 20 cSt so as not to significantly modify the pump's performance. Higher values up to a maximum of 80 cSt are possible provided that the pump is equipped with suitable impeller and motor to be defined upon ordering.

VAPOUR PRESSURE	The vapour pressure value of the liquid to be pumped must exceed (by at least 1,5 m 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 thr filter-drops and the inlet NPSHr drops shown on the specific tables).
-----------------	---

MINIMUM CAPACITY	5% of the maximum capacity
------------------	----------------------------

EXTERNAL FLUSH BUSHING	Model 1.5x1x6/8 – 3x1.5x6/8 – 3x2x6: 100 litres/hour Model 3x2x8 → 8x6x13: 300 litres/hour pressure = 1,1 x pressure at duty point (max 8 bar)
------------------------	--

The liquid used for the external lubrication must be clean and compatible with the pumped liquid.

## ATEX SPECIFICATION

KGS pumps can fulfill the requirements of ATEX Directive **2014/34/EU** with the following rating:

**II 2/2GD:** Surface equipment for the use in areas with the presence of gases, vapors or mists in addition to clouds of combustible dust in the air that occur occasionally during normal operation (EN 1127-1 par. 6.3), both internally and externally (**ZONE 1**).

**c:** Protection by constructional safety (EN 13463-5).

**IIB:** Class of gas and vapor excluding the following products (hydrogen, acetylene, carbon disulfide).

**T4:** Class of admitted temperatures. The processed fluid temperature must fall within such class range and the user must comply with the instructions containing in the manual and with the current laws. Furthermore, the user must take into account the ignition point of the gases, vapors and mists in addition to the clouds of combustible powder existing in the air in the area of use.

The technical file relating to the electrical pumps in this manual was given the number **N01-2017 rev. 0** and deposited with Bureau Veritas in ITALY.

### FLAME-PROOF MOTORS

Motors to be used in dangerous areas are designed to compliance with European standards, using protection methods that are suitable for guaranteeing safety in areas subject to risk of fire and explosion. Where these motors are used improperly or modified their safety may be impaired. See the motor's "Safety Instructions" manual.

Earthing is through the screw located inside the terminal box. Flame-proof motors are provided with a second earth stud located on the motor casing outside the terminal box.

### GENERAL PRECAUTIONS

**WARNING! ELECTRICAL RISK** The pump must always be earthed to a suitable electrical ground independently from other members connected to it.

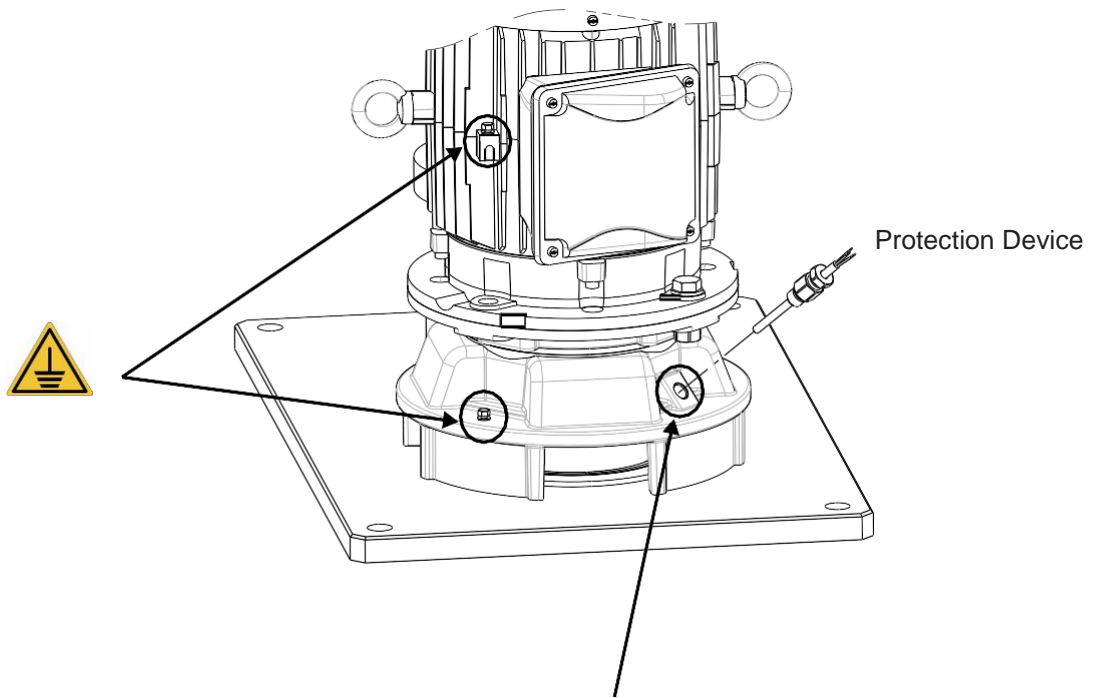
**Earths must be of sufficient size and installed according to relevant standards.** The area of contact of connections must be cleaned and protected against corrosion.

Lack of earthing or incorrect earthing will compromise the requirements for safety and protection against the risk of explosion.

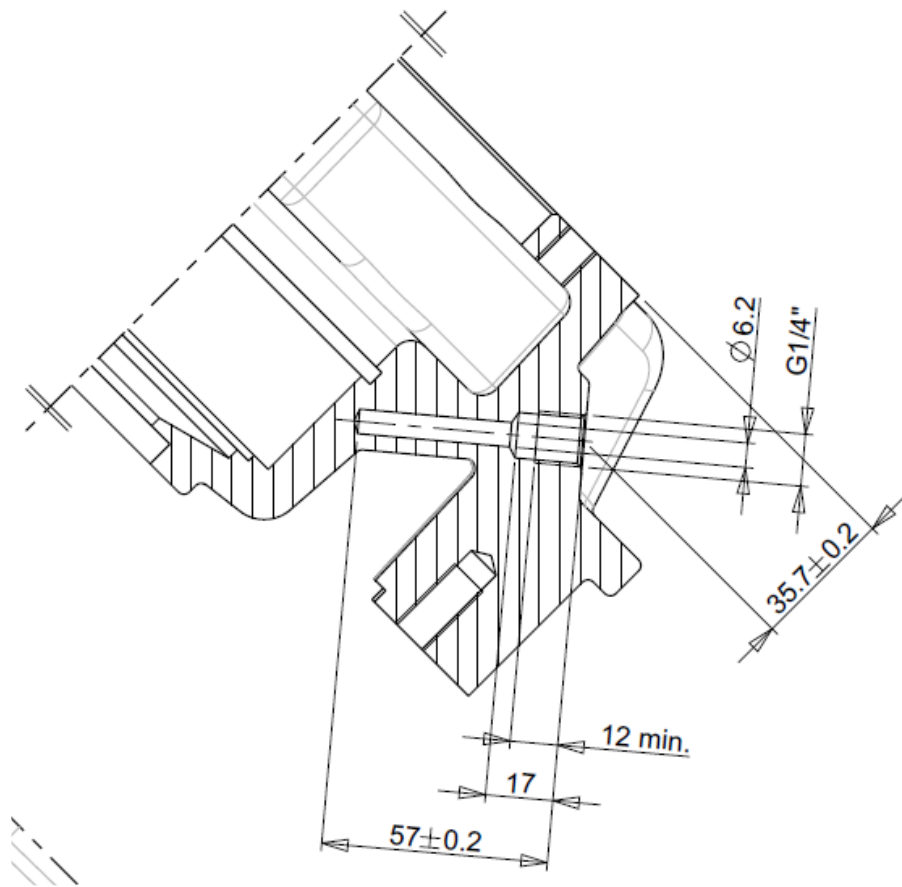
**WARNING:** Ascertain that no abnormal noise appears during operation. Otherwise, stop the pump immediately.

**WARNING:** Ascertain that the fluid at the delivery side does not contain gas. Otherwise, stop the pump immediately.

**WARNING! TEMPERATURE** In situations where the user foresees the possibility of exceeding the temperature limits indicated in this manual, **it is mandatory to install a protection device on the equipment to prevent exceeding the maximum operating temperature allowed.** If exceeded, respect to the maximum marked temperature is not guaranteed. Parts commonly most subjected to overheating are the electric motor and bearing support. The bearing support of ATEX pumps is provided by a threaded connection (G1/4") for the protection device



Standard seat for the temperature protection device:



## VAPORS MECHANICAL SEAL

If the ATEX pump is equipped with a vapor mechanical seal (VM/VR) the external flushing with a clean fresh liquid (eg. clean water, water+glycol) is mandatory, to avoid temperature rising and ensure its durability over the time.

If the flushing liquid is compatible with the pumped fluid, a single mechanical seal (VM) is enough. The flushing liquid, after cooling the mechanical seal, falls down into the tank.

If the flushing liquid (eg. clean water) is NOT compatible with the pumped fluid, a double mechanical seal (VR) is required. The flushing liquid enters in the lower side of the seal chamber, and after cooling the mechanical seal, exit from the upper side. A proper fitting brings the flushing liquid outside of the bearing support, over the pump baseplate.

Lacks of flushing leads to mechanical seal dry-running and to temperature rising.

To avoid accidental lack of flushing, a flow sensor in the flushing line is suggested.

Prescription for the mechanical seal flushing:

- Capacity: 1 to 3 litres per minute
- Pressure\*: 2 bar minimum – **5 bar maximum**

\* NOTE! If the flushing line is common for both the vapor seal and the shaft sleeve bearings, the pressure must be:

- **P flushing = P @duty point + 0.5bar and must not exceed 5 bar**

The pressure of flushing liquid can be settled with a pressure regulator (es. for water)

The capacity can be settled with a flow adjuster valve, a gate valve or similar.

## SLEEVE BEARINGS EXTERNAL FLUSHING

### 1. Description & Operating Principle:

In this arrangement the pump is provided with flush tubing to all the line bearings through the mounting plate where a connection is provided for a continuous source of clean liquid.

This is the most desirable method of bearing flush and will offer the longest bearing life.

The flush tubing are already assembled in factory and ready to use, no further adjustments are required.

The tubing and the fittings that compose the system are self-supporting.

The pump baseplate is provided with an adaptor with a female connection for the flushing liquid

The final user must only connect a source of clean liquid and start the pump.



**After the bearing flushing the clean liquid falls down into the tank.**



**The liquid used for the external lubrication must be clean and compatible with the pumped liquid.**

### 2. External connection:

The pump baseplate is provided with an adaptor with a male connection for the flushing liquid.

- Standard connection: **3/4" NPT** male thread
- Connection material: Polypropylene or PVDF

Prescriptions: Use an adequate fitting to connect the system with the pump

The connection must be leakproof to assure a constant supply of flushing liquid to the pump sleeve bearings: It is recommended the use of PTFE tape on the threads to assure the tightness



**The connection must be leakproof** to assure a constant supply of flushing liquid to the pump sleeve bearings: It is recommended the use of PTFE tape on the threads to assure the tightness.

### 3. Flow and Pressure prescriptions:

The following data are referred to the flushing liquid:

-Minimum Capacity: Model 1.5x1x6/8 – 3x1.5x6/8 – 3x2x6: 100 litres/hour  
Model 3x2x8 → 8x6x13: 300 litres/hour

-Minimum Pressure: 1.1 x pressure at duty point (max 8 bar)\*

\* NOTE! If the flushing line is common for both the vapor seal and the shaft sleeve bearings, the pressure must be:

**- P flushing = P @duty point + 0.5bar and must not exceed 5 bar.**

The pressure of flushing liquid can be settled with a pressure regulator (es. for water).  
The capacity can be settled with a flow adjuster valve, a gate valve or similar.

### 4. Start-up and use instrucion:

1. Connect the feeding of the flushing liquid to the baseplate connection
2. Start the flushing
3. Check the flow and the pressure of the liquid
4. Check the tightness of the joints
5. Then, start the pump



Periodically check the integrity of all the tubing and the threaded connections tightness, to avoid leakages that may affect the continuous source of liquid to the sleeve bearings

### 5. Warnings for Electrostatic Charges



Keep clean the surface of the pump using a damp cloth

# 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, 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 INSTRUCTIONS

- 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

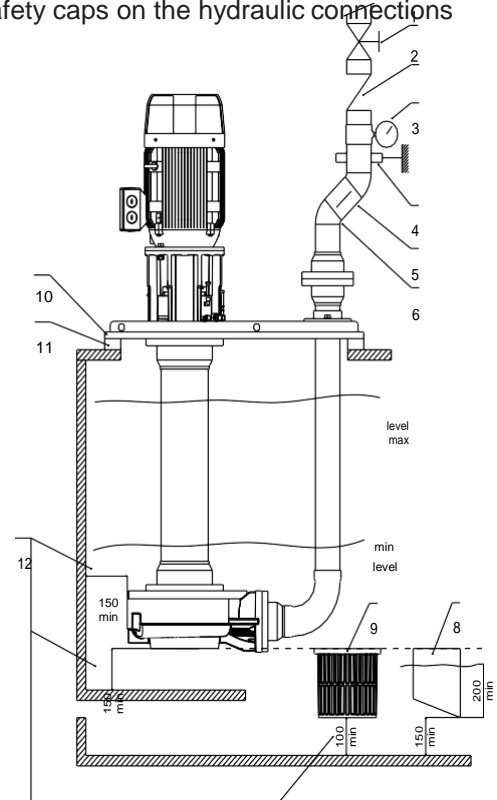
### STORAGE INSTRUCTIONS

- When is necessari to store the pump bifore 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 is necessary to free the pump 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  $-5^{\circ}\text{C}$  and not higher than  $40^{\circ}\text{C}$ , the air humidity rate not higher than 80%, the package pump mustn't received shock, vibrations and loads rising above
- If the storing period is higher than 6 months, bifore installation check the condition of the grease in the support, eventually provide to restore it

### INSTALLATION INSTRUCTIONS

- 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
- arrange for a particularly rigid carrying structure: maximum deflection lower than 0.2 mm referred to the pump weight on the installation site
- paint the carrying structure with epoxydic enamel or similar to prevent corrosion
- arrange for adequate passage and install protection guards for people safety; act in compliance with the relevant safety rules
- fit additional protection guards on motor frame in case of outdoor installation: make sure that the motor fun is duly ventilated and rain-water is quickly drained
- the tank under the pump must be covered in case of hot liquids or liquids emitting corrosive fumes (dangerous for the metallic part of the pump outside the tank). Seal the plate base by means of thin, not soft seals, well compressed by the locking screws
- do not use anti-vibration mounts to fix the pump
- anti-vibration joints are recommended on the outlet pipe connection
- 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. YES: flow control valve on the discharge side
2. YES: non-return valve (particularly with long vertical or horizontal pipe runs; mandatory with pumps in parallel)
3. YES: connection point for pressure gauge or safety pressure switch
4. YES: firmly fix all piping by suitable brackets, close to the pump; YES: expansion joint (indispensable with long piping or hot liquids)
5. Maximum fluid speed on the discharge side: 3 m/sec
6. YES: divert discharge (by means of 45° bend) in order to avoid hindrance over the plate (free space is required to lift the pump). NO: bends (or other fittings) close to the pump (both at inlet and outlet)
7. Min. suction head 0,35 m during startup; for suction head during pumping see "APPLICATION LIMITS"
8. Vertical extension on the suction side allowed (see APPLICATION LIMITS). NO: complex piping system on the suction side
9. YES: foot strainer (3-5 mm mesh screen) if solid bodies (open tanks) or rough impurities are present
10. YES: expansion joint (indispensable with long piping or hot liquids)
11. YES: firmly fix all piping by suitable brackets, close to the pump
12. YES: expansion joint (indispensable with long piping or hot liquids)





10. Arrange for drainage of liquids from the base plate)
11. Use all of the fixing holes provided to install the pump; the fixing points must be kept at the same level
12. Ensure lowest distance from the bottom “S” and the wall (or from other working pumps)

- 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 11 kW
- 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 NOTES
- other environmental conditions in accordance with the IP protection of the motor
- leave enough free space around the pump for a person to move
- leave enough free space over the pump for lifting operation
- arrange for a rigid wall to separate the inlet ports in case of pumps installed close to each other
- pump axis must not be positioned in the center of small tanks
- highlight the presence of aggressive liquids with coloured tags following the local safety regulations
- do not install the pump 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 protection guards for the pump or persons as the need arises

**TANK FILLING AT FIRST START-UP (pump with oil windows pos 143)**

**VALID ONLY FOR MODELS 3X2X8 → 8X6X13**

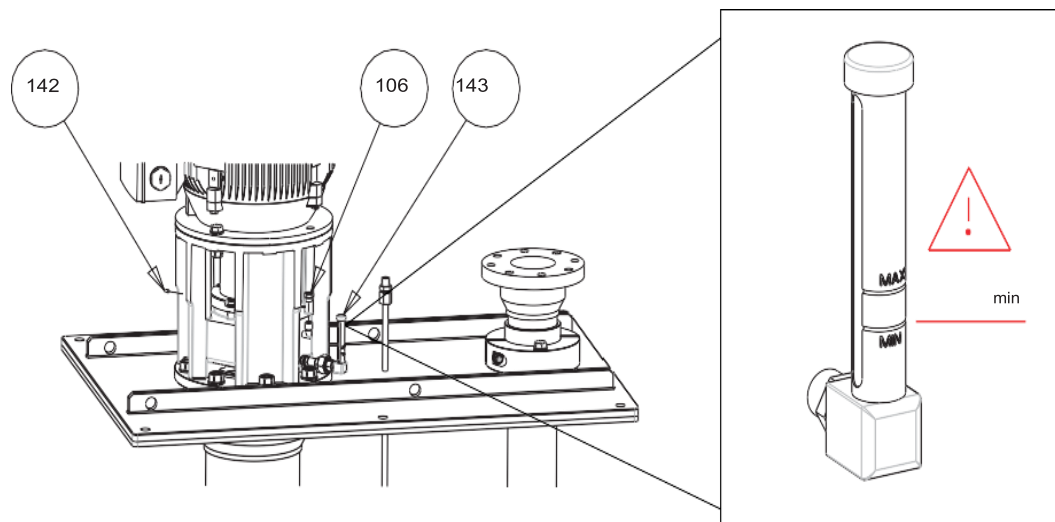
The pump is supplied without oil (bearing housing is empty); before starting pump fill with lubricating oil as per ISO 6743: Kinematics viscosity ref. to 50 °C (125°F): 2,8÷3,3 °E (≈ 20 cSt) - Operating conditions: temperature increment 40°C; max. temperature 100 °C; max. rpm 4000.

Business names: **ESSO Teresso 68; SHELL Tellus T68; MOBIL DTE 68; BP Energol HLC 68; AGIP Blasias 68 (remark: 68 mm<sup>2</sup>/s at 40°C with gradation SAE 20).**

Remove the filler plug (pos. 106) the breather grub screw (pos. 142) and fill the tank with oil

Engine Tolerance	Tank Capacity in c.c. (+/- 10%)
≤ 9.2 kW	800
≥ 11 kW	1300

Once the correct level has been reached (check the level indicator pos.143), replace the breather grub screw (pos. 142) and the filler plug (pos. 106). Re-fill if necessary (carry out this operation when pump is stopped).



- during this step take the constant level oiler opened
- fill oil; this phase is finished when oil begin to fill in the level oiler elbow
- fill oil into the constant level oil
- close the constant level oiler
- refill oil when when the constant level oiler is empty

Replace completely after approximately every 1500 hours of operation

## STARTUP

- 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, in presence of extension pipe with negative suction lift)
- totally flood the suction pipe (if present) and the pump
- start the pump with the discharge valve partially closed
- slowly regulate the flow by opening or closing the discharge valve (never the suction valve). Make sure that the power absorbed by the motor does not exceed the rated one indicated on the motor identification plate
- do not operate the pump at the limit values of its performance curve: maximum head (discharge valve excessively closed) or maximum capacity (total absence of drops and geodetic head on the discharge side)
- set the operating point to that for which the pump was requested
- ensure that there are no abnormal vibrations or noise due to inadequate mounting or cavitation
- avoid short and/or frequent starts by properly setting the control devices

The allowed number of startings in a hour is suitable from the following table; the additional moment of inertia (due to the loads installed directly on the shaft) have to be smaller than or equal to the moment of inertia of the rotor; every delay between two following startings has to be constant. For electric motors greater than 315 or double speed motors, please contact us. Ensure that the temperature, pressure and liquid characteristics are as those specified at the time of order.

Shaft height	Number of startings in a hour for 2 poles motors	Number of startings in a hour for 4 poles motors	Number of startings in a hour for > 4 poles motors
56 - 71	100	250	350
80 - 100	60	140	160
112 - 132	30	60	80
160 - 180	15	30	50
200 - 225	8	15	30
250 - 315	4	8	15

## USE

- switch automatic control on
- do not activate valves whilst 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)

## 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

## DISASSEMBLING

The nuts and bolts are right-threaded; the re- volving screwed-in parts are right-threaded.  
Empty the oil from the tank

1) The pump body (pos. 131) is fastened to the back flange (pos. 132) and to the discharge pipe (pos. 64) by tie rods.

To remove the pump body, unscrew the tie rods pos. 135 and the the tie rods pos. 65.

2) To remove the discharge pipe (pos.64) unthread the tie rods (pos. 65), and pull down the pipe.

3) To remove the discharge flange assembly (pos.120) unthread the screws pos. 124 and pos. 125, then remove the 2 delivery half clamps (pos.121).

4) The impeller (pos. 31), once the pump body is open, must be disconnected, blocking the shaft on the opposite side (remove the motor fan if necessary); proceed by unscrewing the ogive (pos. 32) and the locknut (pos. 129), the impeller is then axially unthreaded.

5) To access the lower drive bush (pos. 34): release the flushing pipe (pos. 137) by unscrewing its connection (pos. 87). Unscrew the locknuts (pos. 134) fastened to the lower column flange; unthread the back flange (pos. 132) and then the guide bushing housing (pos. 127) from the pump shaft (pos. 26). Using tongs, remove the snap ring (pos. 36). To release the guide bushing (pos. 34), push it from the impeller side to the motor side out of its seat.

6) To access any intermediate drive bush (pos. 74): release the flushing pipe (pos. 137) by unscrewing its connection (pos. 87). Unscrew the locknuts (pos. 150) and the tie rods (pos. 152) between the column's flanges; unthread the co - lumns and then the intermediate guide bushing housing (pos. 73) from the pump shaft (pos. 26). Using tongs, remove the snap ring (pos. 76). To release the guide bushing (pos. 74), push it from the impeller side to the motor side out of its seat.

7) To remove the columns, vertically position the pump, resting it against the motor flange, and remove the 8 fastening pos. 16; axially unthread the columns.

8) Once the columns and the discharge pipe (pos. 64) have been removed, the locking ring (pos. 70), the vapor gasket seat (pos. 20), the v-ring vapour seal (pos.22), the counterface housing (pos. 17), the v-ring counterface (pos. 18) and the bearing base plate (pos. 15) can be taken off.

9) The pump shaft is fastened to the flexible coupling by a locking screw. Loosen the screw, bang it on the head with a rubber mallet (in order to release the shaft); remove the screw and unthread the shaft.

10) Remove the lock cap (pos.102) to disassemble the coupling-bearing unit.

## SAFETY RISKS

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 (should the plant be faulty constructed or present wear-and-tear defects, the pressure developed by the pump could lead to failure).

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

### 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

## MALFUNCTIONS AND POSSIBLE CAUSES

The pump does not deliver:

- 01- The motor side semi-coupling was not assembled following maintenance operations
- 02- wrong sense of rotation
- 03- suction piping is too long or has too many bends
- 04- pump not completely flooded
- 05- impeller blades obstructed by impurities
- 06- non-return valve on the discharge pipe blocked
- 07- the geodetic head of the plant is greater than the maximum head developed by the pump
- 08- impeller blocked by a considerable layer of crystals or by melting due to dry running

The pump has reduced capacity or insufficient pressure:

see 02, 03, 04, 05

- 09- the head required by the plant is greater than that expected
- 10- insufficient geodetic suction head on the pump (make sure that the level of liquid is above the pump body - see part R)
- 11- damaged or worn impeller
- 12- worn bushings (guide and rotating) of the sliding bearing
- 13- viscosity of liquid greater than that expected
- 14- excessive quantities of air or gases in the liquid
- 15- excessive quantities of slurries in the liquid
- 16- bends, non-return valve or other parts close to the outlet
- 17- liquid liable to turn to the gaseous status (particularly if hot or containing surface active agents):

The pump starts up regularly and then disconnects:

- 18- make sure the min. suction head is reached at the inlet port
- 19- reduce or remove the suction extension

The pump is overloaded:

see 13, 15

- 20- capacity is higher delivery than expected
- 21- the specific weight of the liquid is greater than expected
- 22- impurities inside the pump generate abnormal friction
- 23- the power supply voltage is not the one on the motor identification plate

The pump vibrates and is noisy

see 12, 22

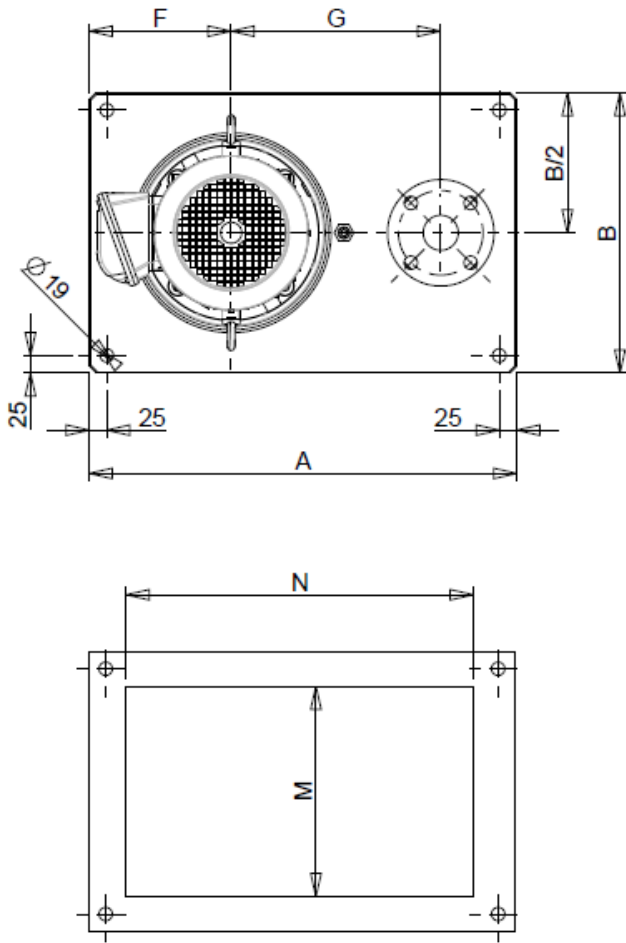
- 24- the pump is working at free capacity (zero head)
- 25- the pump or piping are not firmly fixed
- 26- the supporting structure must be made more rigid
- 27- damaged or dry central support bearings
- 28- "motor + coupling" unit not assembled correctly following maintenance operations

The pump shows signs of premature wear of internal parts:

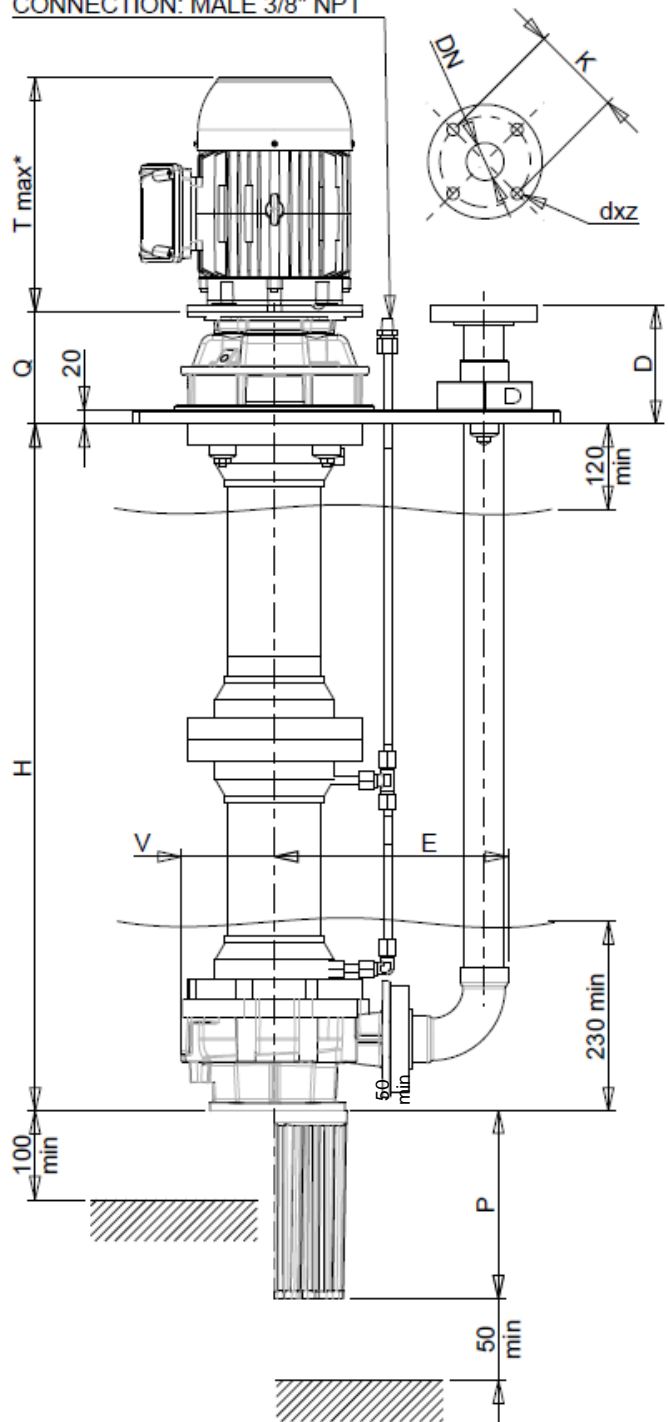
see 15, 22

- 29- liquid is excessively abrasive
- 30- frequent recurrence of cavitation (see 02, 13, 16)
- 31- high tendency of the liquid to crystallize or polymerize in stand-by
- 32- pump execution with materials not suitable for the liquid being pumped
- 33- operation at much reduced capacity

# DIMENSIONS – size 1.5X1X6/8 – 3X1.5X6/8 – 3X2X6



EXTERNAL FLUSHING  
CONNECTION: MALE 3/8" NPT



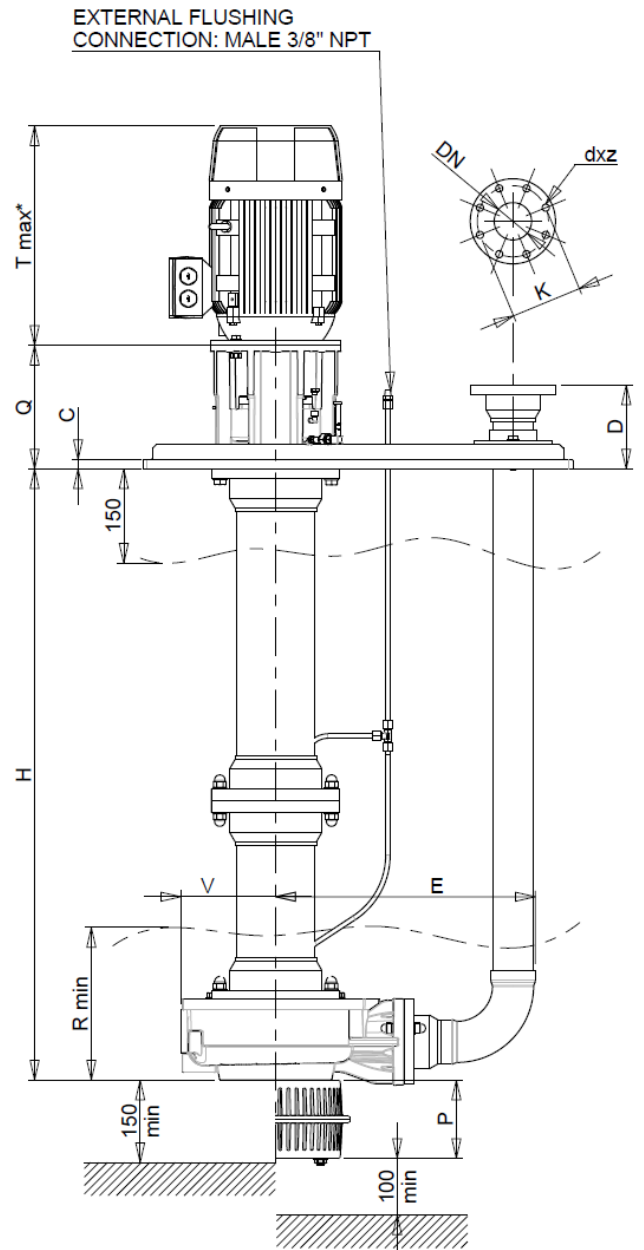
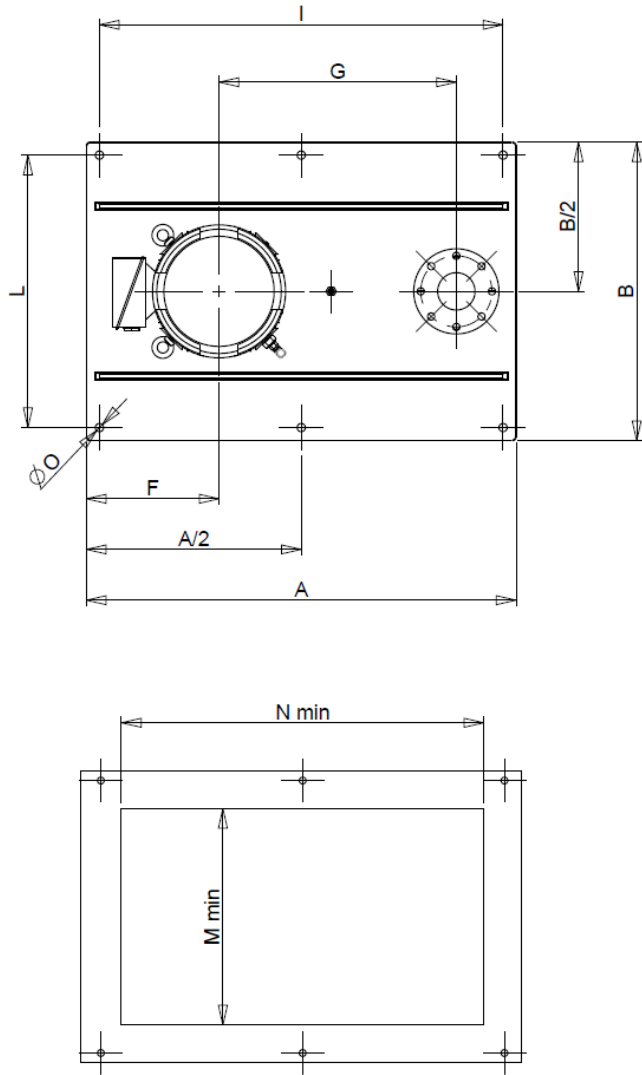
SIZE	G1			
MODEL	1,5X1X6/8	3X1,5X6/8	3X2X6	
MAX. IMPELLER DIA.	155/200	155/200	155	
<b>SUCTION FLANGE</b>				
ASME B16,5 CLASS #150	DN	1,5"	3"	3"
ISO/DIN PN 10	DN	40	80	80
<b>DISCHARGE FLANGE</b>				
ASME B16,5 CLASS #150	DN	1"	1,5"	2"
	K	79,4	98,4	120,6
	d	15,9	15,9	19
	z	4	4	4
ISO/DIN PN 10	DN	25	40	50
	K	85	110	125
	d	14	18	18
	z	4	4	4
V	133			
E	280	310	333	
H max	5000			
P	80	80		
A	560	600	610	
B	400	450	400	
D	140	150	150	
F	202,5			
G	260	284	299	
M	300	350	300	
N	445	485	495	
Q max	210			
T max*	580			

MAX TORQUE ON DISCHARGE FLANGE BOLTS (at 20°C)	
MAX TORQUE [Nm]	FLANGE DIMENSION
16	1"
16	1,5"
32	2"

**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

\*it depends on the motor's manufacturer

# DIMENSIONS – size 3x2x8/10 – 4x3x8/10 – 6x4x10/13 – 8x6x13



SIZE	G2		G3		
MODEL	3X2X8/10	4X3X8/10	6X4X10/13	8X6X13	
MAX. IMPELLER DIA.	200/265	200/265	265/330	330	
<b>SUCTION FLANGE</b>					
ASME B16.5 CLASS #150	DN	3"	4"	6"	8"
ISO/DIN PN 10	DN	80	100	150	200
<b>DISCHARGE FLANGE</b>					
ASME B16.5 CLASS #150	DN	2"	3"	4"	6"
	K	120,6	152,4	190,5	241,1
	d	19	19	19	22,2
	z	4	4	8	8
ISO/DIN PN 10	DN	50	80	100	150
	K	125	160	180	240
	d	18	18	18	22
	z	4	8	8	8
A	770	900	1100	1320	
B	530	620	800	880	
C	25	25	40	50	
D	170	180	240	260	
E	410	528	641	787	
F	280	290	355	450	
G	376	478,5	580	702	
H max	5000				
I	720	850	1030	1250	
L	480	570	730	810	
M	410	470	580	700	
N	650	770	920	1180	
O	19x6	19x6	22x6	22x6	
P	140	150	230	250	
R min	290	300	320	400	
Q max	360	360	360	380	
T max*	670	670	670	670	
V	210	210	254	368	

MAX TORQUE ON DISCHARGE FLANGE BOLTS (at 20°C)	
MAX TORQUE [Nm]	FLANGE DIMENSION
32	2"
40	3"
48	4"
64	6"

**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

\*It depends on the motor's manufacturer



## PUMP PERFORMANCE

MODEL	2 POLES						4 POLES						6 POLES					
	Capacity max (m <sup>3</sup> /h)		Head max (m)		Noise (dB(A))		Capacity max (m <sup>3</sup> /h)		Head max		Noise (dB(A))		Capacity max (m <sup>3</sup> /h)		Head max (m)		Noise (dB(A))	
Frequency	50 Hz	60 Hz	50 Hz	60 Hz	50 Hz	60 Hz	50 Hz	60 Hz	50 Hz	60 Hz	50 Hz	60 Hz	50 Hz	60 Hz	50 Hz	60 Hz	50 Hz	60 Hz
1.5x1x6	32	32	36	52	78	79	16	16	9	13	74	75						
1.5x1x8	32	32	70	102	78	79	20	24	18	26	74	75						
3x1.5x6	80	100	23	34	78	79	60	60	5	9	74	75						
3x1.5x8	120	120	50	73	78	80	60	80	12	18	74	75						
3x2x6	70	70	34	49	77	78	40	50	8	12	74	75						
3x2x8	120	120	50	73	78	80	60	80	12.5	18	74	75						
3x2x10	140	140	90	130	79	80	80	80	22	32	74	75						
4x3x8	200	240	52	76	78	79	140	140	13	19	75	77						
4x3x10	240	240	93	135	78	80	160	180	23	34	74	76						
6x4x10							250	300	21	31	74	76						
6x4x13							300	400	34	50	75	76	200	250	16	24	74	75
8x6x13							700	800	32	47	76	77	500	500	15	21	74	75

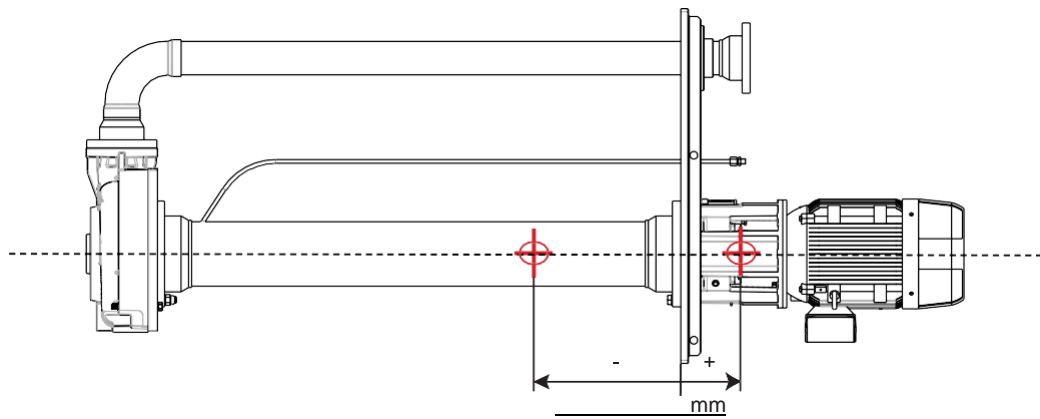
NOTE: max temperature on the support: 70°C

## MOTORS

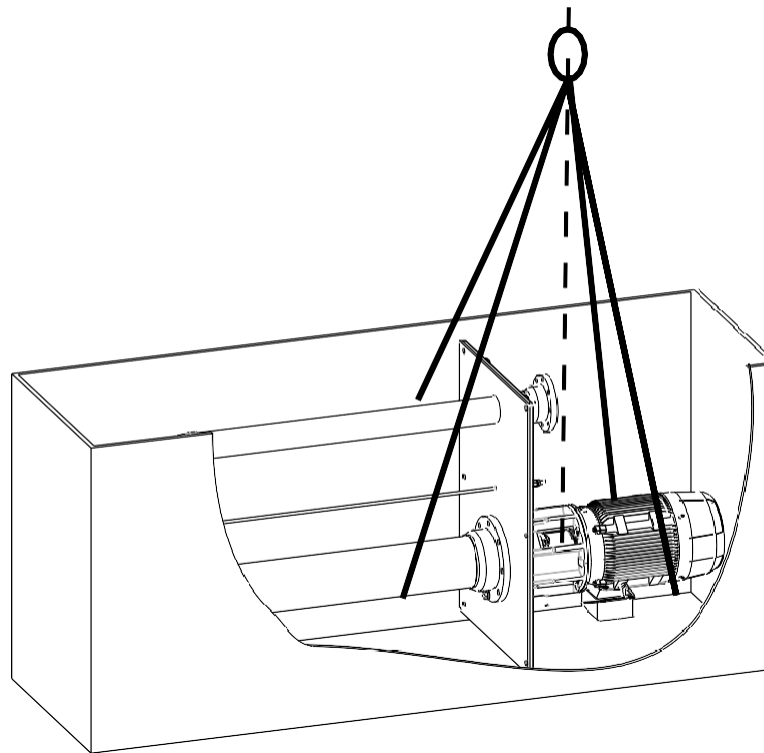
NOMINAL POWER kW	IEC FRAME			WEIGHT (kg) (1)			Dimension "Tmax" (1)		
	2 poles	4 poles	6 poles	2 poles	4 poles	6 poles	2 poles	4 poles	6 poles
3	100			22.5	25		326	326	
4	112			27	30.5		335	335	
5.5	132			38.5	40.5		356	356	
7.5	132		160	42	49.5	103	356	395	500
11	160			101	109	121	500	500	545
15	160		180	111	130	173	500	545	610
18.5	160	180	200	126	165	221	545	570	650
22	180		200	176	180	236	570	610	650
30	200		225	226	240	301	650	650	710
37	200	225		245	278		650	685	
45	225			280	308		710	710	

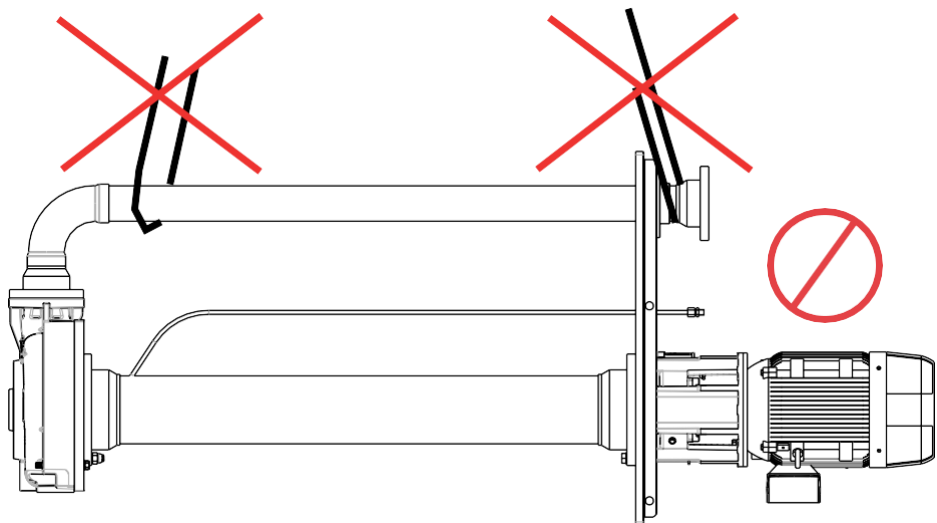
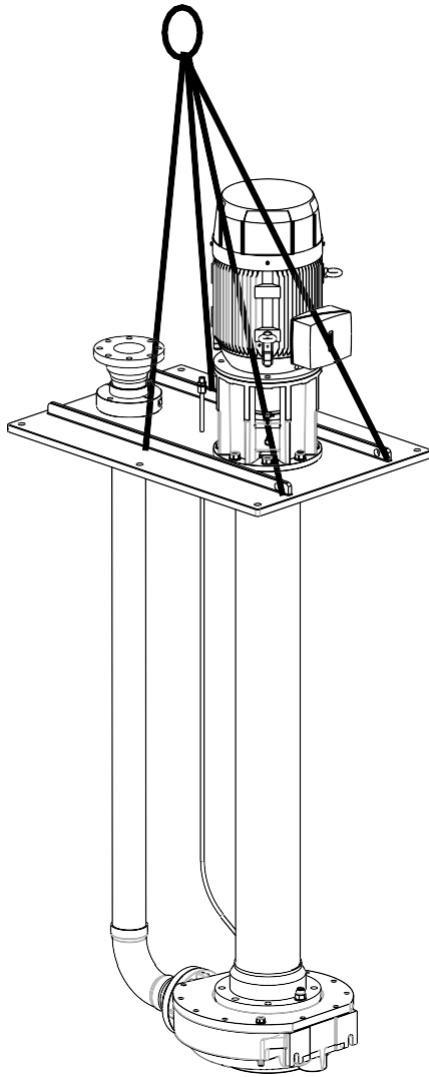
(1) CAN CHANGE FOR DIFFERENT BRANDS

## CENTRE OF GRAVITY POSITION



## LIFTING





## 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 Code, 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.

## 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: _____	
_____	
_____	
<b>The installation</b>	
Liquid: _____	
Temperature (°C): _____	Viscosity (cPs): _____ Spec. grav. (Kg/m <sup>3</sup> ): _____ 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): _____
<b>Other:</b> _____	
_____	
_____	
<b>Place for sketch of the installation</b>	

## MANUFACTURER DATA



Production head and legal office:  
Via Labirinto, 159 I - 25125 BRESCIA  
Tel: 030 3507011 Fax: 030 3507077

Export manager:	Tel: 030 3507035
Customer service:	Tel: 030 3507023
Web:	<a href="http://www.argal.it">www.argal.it</a>
E-mail:	<a href="mailto:sales@argal.it">sales@argal.it</a> <a href="mailto:customercare@argal.it">customercare@argal.it</a>

Rev.5 – 06/2020

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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