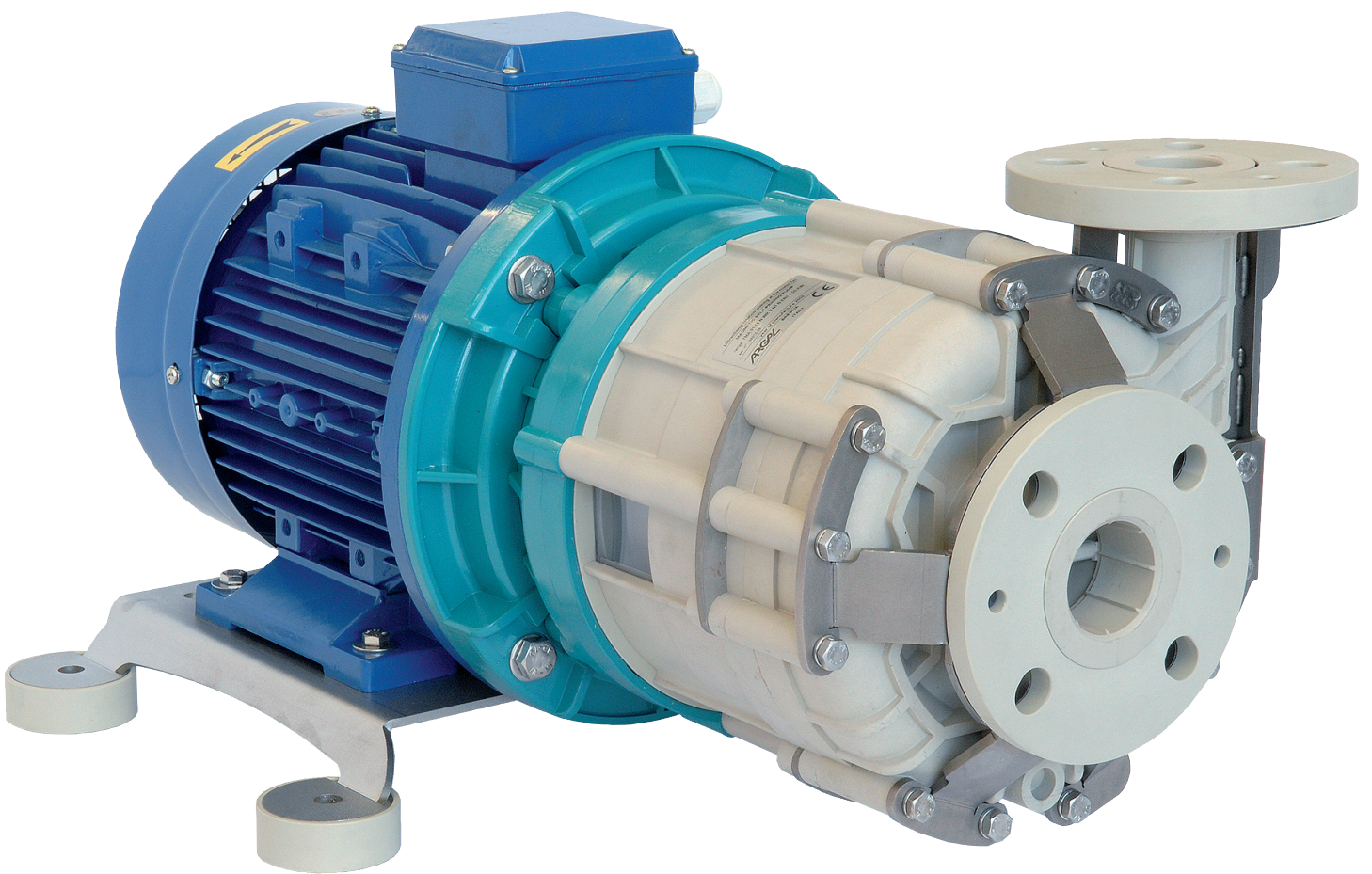


ARGAL

USE MANUAL

ROUTE (ZMR G3)



ERLCE

DEALER

for Maintenance

date of commissioning:

.....

position / system reference:

.....

service:

.....

INDEX

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
















24 MANUFACTURER DATA

25 ATTACHMENTS

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

- **MOTOR USE MANUAL**

IDENTIFICATION CODE

Pump data				Motor data					
range	model	Execution (materials)		mechanical seal		rpm	power	phase	
ZMR	<input type="checkbox"/> 20.15	<input type="checkbox"/> WR (polypropylene PP)		external single	<input type="checkbox"/> SF1  (1) (2)	<input type="checkbox"/> 1450	<input type="checkbox"/> 0.18 kW	<input type="checkbox"/> 1 (monofase)	
	<input type="checkbox"/> 20.20	<input type="checkbox"/> GF (ethylene-chloro trifluoro ethylene E-CTFE)			<input type="checkbox"/> SF2  (1) (2)	<input type="checkbox"/> 2900	<input type="checkbox"/> 0.25 kW	<input type="checkbox"/> 3 (trifase)	
	<input type="checkbox"/> 20.27	<input type="checkbox"/> GX (ethylene-chloro trifluoro ethylene E-CTFE) 			<input type="checkbox"/> TS5  (1) (2)	<input type="checkbox"/> 1740	<input type="checkbox"/> 0.37 kW		
	<input type="checkbox"/> 20.36				<input type="checkbox"/> TS6  (1) (2)	<input type="checkbox"/> 3480	<input type="checkbox"/> 0.55 kW	voltage/EEEx	
	<input type="checkbox"/> 30.15	version	connections		<input type="checkbox"/> TS7  (1) (2)		<input type="checkbox"/> 0.75 kW	<input type="checkbox"/> 0 (senza motore)	
	<input type="checkbox"/> 30.25	<input type="checkbox"/> N standard	<input type="checkbox"/> B (BSP threaded)		<input type="checkbox"/> TS8  (1) (2)	standard	<input type="checkbox"/> 1.1 kW	<input type="checkbox"/> N (tensione STD)	
	<input type="checkbox"/> 36.30	<input type="checkbox"/> P powered	<input type="checkbox"/> N (NPT threaded)		internal single	<input type="checkbox"/> BS5  (1) (2)	<input type="checkbox"/> E (IEC)	<input type="checkbox"/> 1.5 kW	<input type="checkbox"/> S (tensione speciale)
	<input type="checkbox"/> 21.18	<input type="checkbox"/> S strong-pow.	<input type="checkbox"/> Z (ISO ANSI JIS flanged)			<input type="checkbox"/> BS6  (1) (2)	<input type="checkbox"/> N (NEMA)	<input type="checkbox"/> 2.2 kW	<input type="checkbox"/> E (EEX) 
	<input type="checkbox"/> 21.25					<input type="checkbox"/> BS7  (1) (2)		<input type="checkbox"/> 3 kW	
	<input type="checkbox"/> 21.28	O-ring				<input type="checkbox"/> BS8  (1) (2)		<input type="checkbox"/> 4 kW	
	<input type="checkbox"/> 21.43	<input type="checkbox"/> V (FKM)			<input type="checkbox"/> BF3  (1) (2)		<input type="checkbox"/> 5.5 kW		
	<input type="checkbox"/> 31.22	<input type="checkbox"/> E (EPDM)			double	<input type="checkbox"/> MSF1 		<input type="checkbox"/> 7.5 kW	
	<input type="checkbox"/> 31.30	<input type="checkbox"/> K (FFKM)				<input type="checkbox"/> MSF2 		<input type="checkbox"/> 11 kW	
	<input type="checkbox"/> 31.40					<input type="checkbox"/> MTS5 		<input type="checkbox"/> 15 kW	
						<input type="checkbox"/> MTS6 			
					<input type="checkbox"/> MTS7 				
				<input type="checkbox"/> MTS8 					

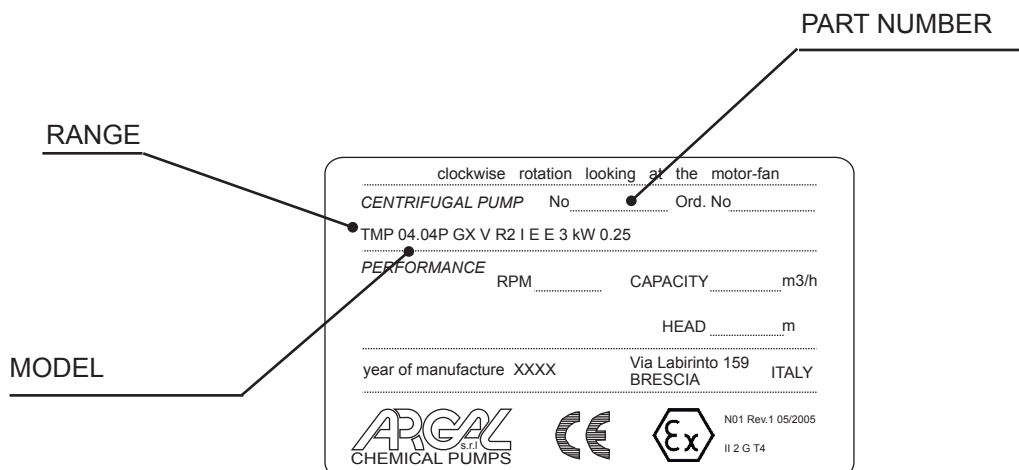
: ATEX choose

(1): is recommended to check that the auto-ignition temperature of the pumped media is above 300°C

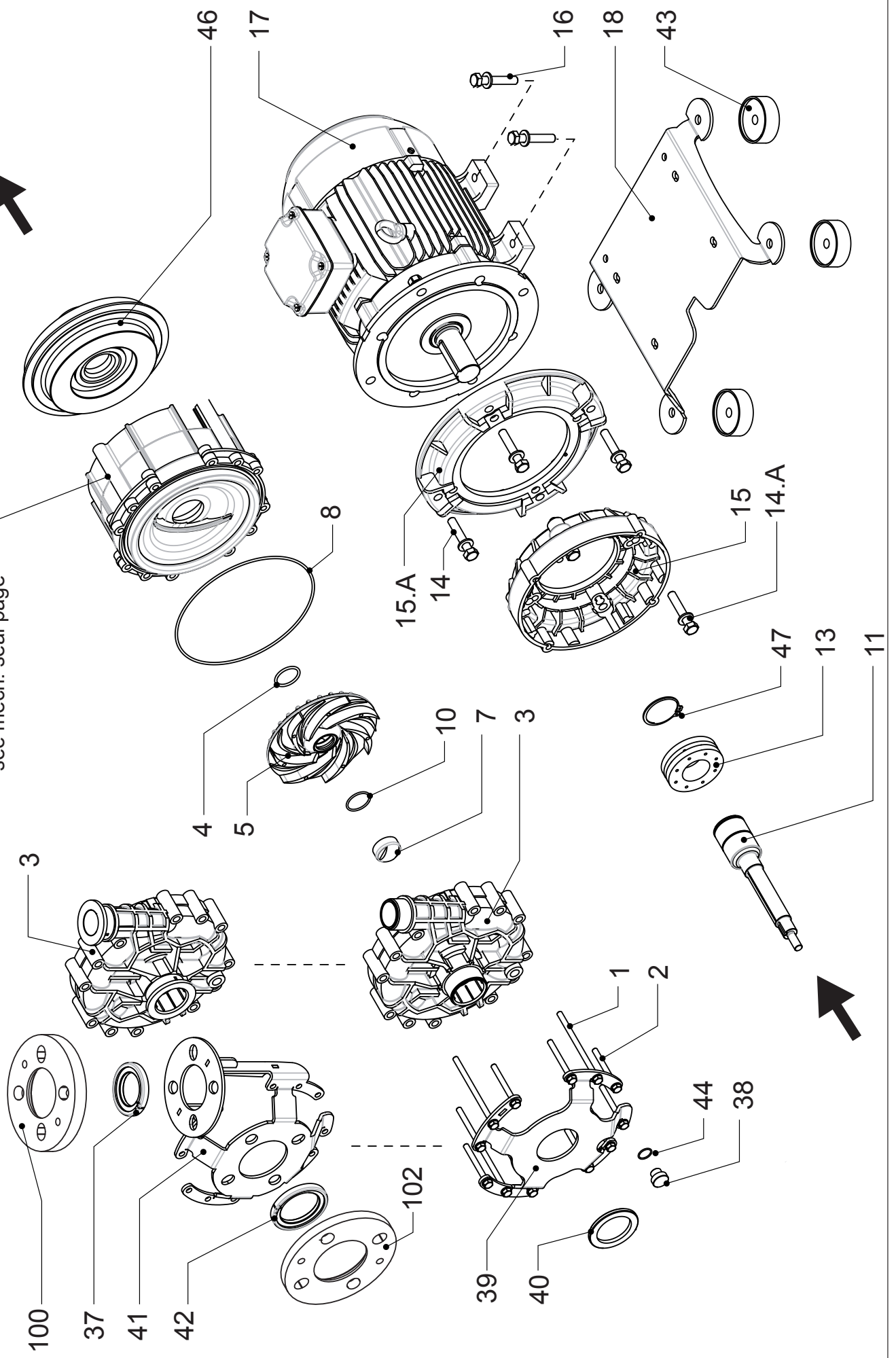
(2): is recommended the installation of a fluxmeter (stop the pump when an important decrease of capacity happens)

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.



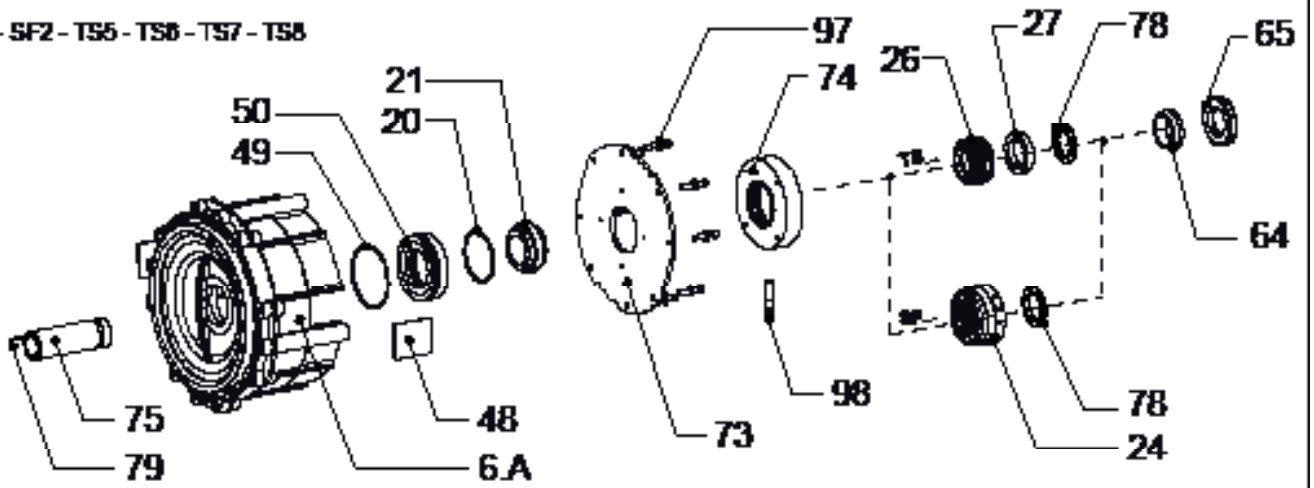
vedere pagina tenute
see mech. seal page



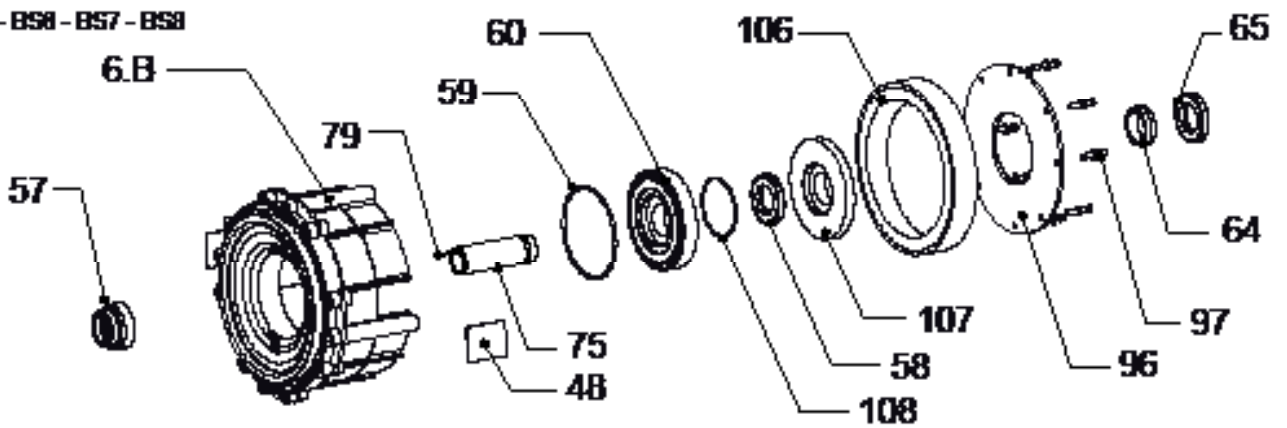
LEGEND

note	ref	pos.	Part name	Q.ty	Disassembling steps sequence										Spare stock		
					1	2	3	4	5	6	7	8	9	10	start up	2 year	
	910.1	1	FIXING SET: volute casing/strainer	1	•												
	910.2	2	FIXING SET: volute casing/rear casing	1	•												
	102	3	Volute casing	1		•											
	412.5	4	O-ring Impeller (OR 4137)	1							•						•
	230	5	Centrifugal impeller	1						•							•
	260	7	Ogive	1				•									•
	412.1	8	O-ring volute casing (ORM 2200)	1				•									•
	412.2	10	O-ring ogive (OR 3137)	1				•									•
	210	11	Shaft	1							•						
	840	13	Shrink disc	1											•		
	910.3	14	FIXING SET: for electric motor	1							•						
	910.4	14.A	FIXING SET: bracket /motor adapter flange	1								•					
	807	15	Bracket	1									•				
	334	15.A	Adapter Flange for Motor	1										•			
	910.5	16	FIXING SET: electric motor / baseplate	1	•												
	800	17	Electric motor	1													
	890	18	Baseplate	1		•											
	932.3	37	Seeger	1				•									
	912	38	Drain plug (optional)	1	•												•
	195.1	39	Armoured shield (connection: B - N)	1					•								
	922	40	Lock nut	1				•									
	195.2	41	Armoured shield (connection: Y - Z)	1					•								
	932.1	42	Seeger	1				•									
	185	43	Foot ring (with base option)	4	•												
	412.6	44	O-ring drain plug (with plug option) (OR 2075)	1		•											•
	493	46	Bracket centring Ring	1							•						
	932.2	47	Seeger ring for Shrink Disc locking	1								•					
	722.1	100	discharge flange FF	1		•											
	722.2	102	Inlet flange FF	1		•											

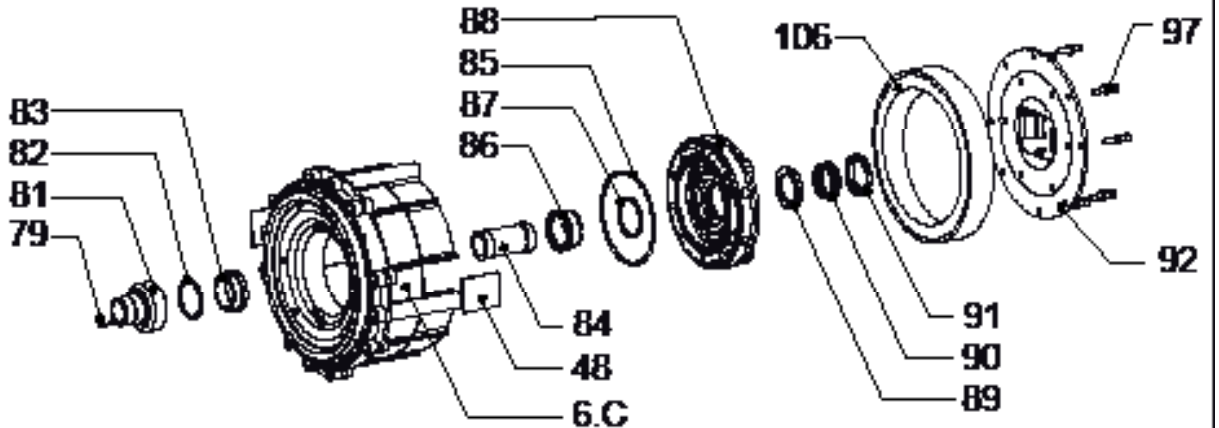
SF1 - SF2 - TS5 - TS6 - TS7 - TS8



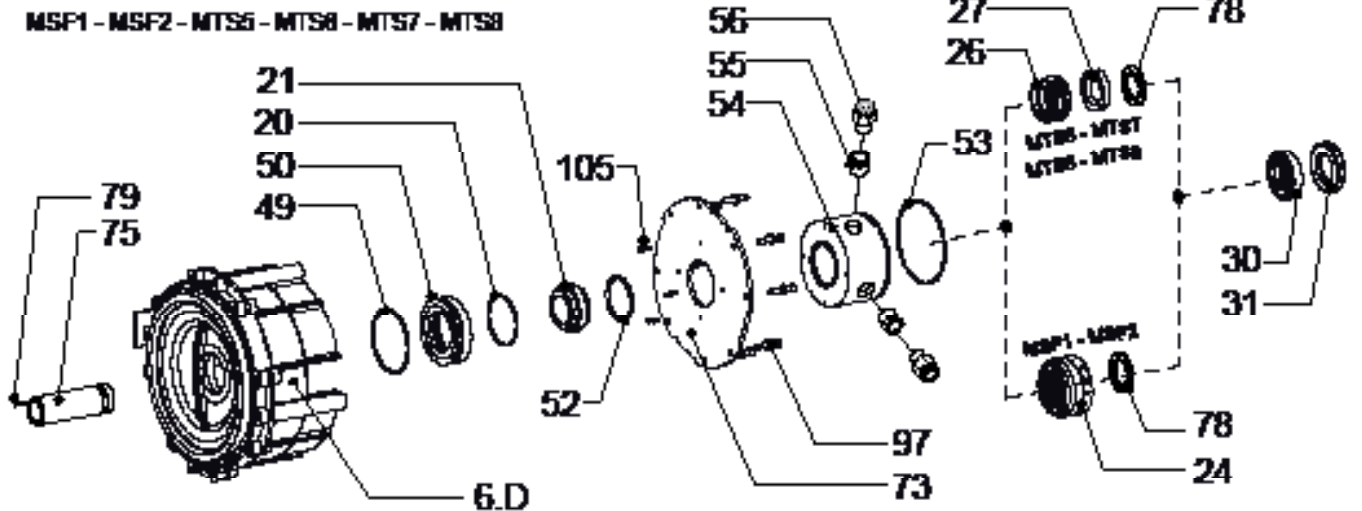
BS6 - BS8 - BS7 - BS8



BF3



MSP1 - MSP2 - MTS6 - MTS8 - MTS7 - MTS8



note	ref	pos.	Part name	Q.ty	Disassembling steps sequence										Spare stock		
					1	2	3	4	5	6	7	8	9	10	start up	2 year	
	134.1	6.A	Rear casing (SF_ - TS_ type)	1	•												
	134.2	6.B	Rear casing (BS_ type)	1	•												
	134.3	6.C	Rear casing (BF3 type)	1	•												
	134.4	6.D	Rear casing (M___ type)	1	•												
	412.3	20	O-ring fixed seal (OR 3237)	1			•								•	•	
	922	21	Fixed seal	1			•								•	•	
	472.1	24	Rotating seal (SF_ type)	1						•					•	•	
	472.2	26	Rotating seal (TS_ type)	1						•					•	•	
	504.2	27	Spacer (TS_ type)	1						•							•
	472.3	30	Rotating seal	1						•					•	•	
	475.2	31	Fixed seal (with gasket)	1						•					•	•	
	164	48	Mech. Seal protection	1		•											
	412.4	49	O-ring Diaphragm (OR 3300)	1			•								•	•	
	443	50	Diaphragm	1			•								•	•	
	412.7	52	O-ring Seal Chamber (OR 3400)	1			•								•	•	
	412.8	53	O-ring Seal Chamber (OR 4200)	1					•								•
	471	54	Seal Chamber	1			•										
	761	55	Adaptor nipples	2					•								
	762	56	Fittings for seal-flushing	2					•								
	472.4	57	Rotating seal (BS_ type)	1						•					•	•	
	475.3	58	Fixed seal (BS_ type)	1				•							•	•	
	412.9	59	O-ring Diaphragm (OR 4437)	1			•										•
	443.2	60	Diaphragm (BS- type)	1			•								•	•	
	415.1	64	V-ring	1		•											
	414.1	65	CounterfaceV-ring	1		•											
	198.1	73	Counter-plate	1			•										
	605	74	Conveyor	1				•									
	521	75	Shaft Sleeve	1					•						•	•	
	510	78	Edge Ring	1							•						•
	941	79	Feather Key	1						•							•
	489	81	Counter-Bushing	1		•									•	•	
	412.11	82	O-ring: counter-bushing/rotating seal (OR 4175)	1		•									•	•	
	472.5	83	Rotating Seal (BF3)	1		•									•	•	
	524	84	Bushing (BF3)	1		•									•	•	
	412.12	85	O-ring: diaphragm/intermediate plate (OR 4437)	1					•								•
	475.4	86	Fixed Seal (BF3)	1						•					•	•	
	412.13	87	O-fixed seal/lock ring (OR 4175)	1						•					•	•	
	135	88	Outer diaphragm	1					•						•	•	
	488	89	Lock ring	1			•										
	477	90	Spring	1			•										
	424	91	Counter-ring	1				•									
	198.2	92	Locking counter-plate	1			•										
	198.3	96	Conunter-plate	1			•										
	910.6	97	Fixing Set: screws for counter-plate/rear casing	1		•											
	910.7	105	Conveyor drain	1			•										
	504.3	106	Locking counter-plate spacer	1			•										
	504.4	107	Fixed ring spacer (BS)	1					•								
	412.14	108	O-ring: diaphragm/fixed seal (OR 3237)	1						•					•	•	

GENERAL NOTES

“ZMR” 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 ambient atmosphere must be compatible with the characteristics of the pump and are defined upon ordering.

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

“ZMR” pumps are not self priming.

“ZMR” pumps cannot run dry.

The type of the solid particles contained in the pumped liquid depend on the mechanical seal; the presence of fibrous, adhesive or abrasive bodies is not allowed.

Exame of the solid particles:	SF1 - TS5 SF2 - TS7	TS6 - TS8	BF3	MSF1 - MSF2 MTS5 - MTS6 MTS7 - MTS8
max quantity in weight %	1 ÷ 3	1 ÷ 3	1 ÷ 5	1 ÷ 11
max dimension in mm	0.1 ÷ 0.6	0.1 ÷ 0.6	1 ÷ 2	0.1 ÷ 0.8
max hardness Mohs index	1 ÷ 2	3 ÷ 6	3 ÷ 6	1 ÷ 2

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 plate) and has to be defined upon ordering.

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 250 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 (176°F) version WR
110°C (230°F) version GF

variations may occur, depending on operating pressure

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

0 ÷ 40 °C (14 ÷ 104 °F) version WR
-20 ÷ 40 °C (-4 ÷ 104 °F) version GF

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 the same to the operating pressure value 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 pump does not include any non return valve nor any liquid flow control or motor stop device.

OPERATING PRINCIPLE

-HYDRAULICALLY alike to all centrifugal pumps, it is equipped with a vane-type impeller rotating within a fixed housing. It has a tangential outlet and, by creating a depression in the centre, 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 impeller is driven directly by the shaft. The axiality of the pump-motor assembly is guaranteed by the selfcentring coupling system jointing the pump shaft and the motor shaft; All the mechanical loads, of a reduced nature in this type of pump, are borne by the motor bearings.

-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 (trim the inlet pressure between 0.3 and 1 bar - flow approx. 0,1÷0,3 l/minute). 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(fig.1)

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(fig.2)

The windings of three-phase motors (e.g. with (a) 230-400 V; (b) 400-600 V) require a delta-connection for lower voltage (230 volts for a ; 400 volts for b)(fig.3)

They require a star-connection for higher voltage (400 volts for a; 690 volts for b)(fig.4)

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 15kW (20 HP). All this is also to safeguard the structure of the pump.

Protection level

The initials IP are followed by two numbers :

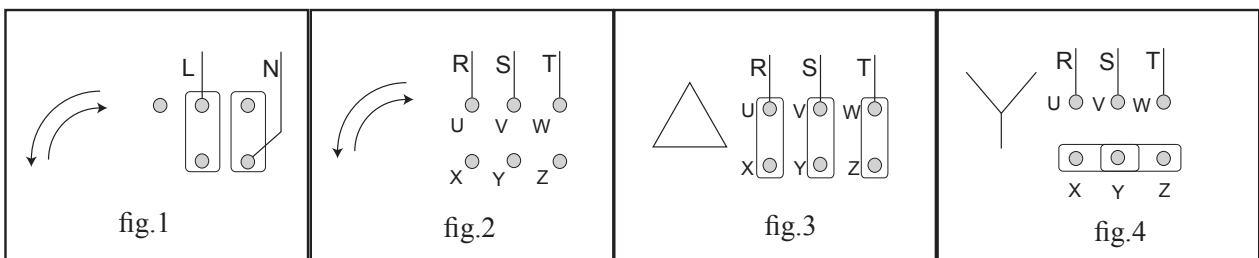
The first number indicates the level of protection against penetration of solid objects and in particular :

- 4 for solids whose dimension is greater than 1mm
- 5 for dust (eventual internal deposits will not harm operation)
- 6 for dust (no penetration)

The second number indicates the protection against the penetration of liquids. In particular:

- 4 for water sprays from all directions
- 5 for jets of water from all directions
- 6 for tidal and sea waves.

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.



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.

INSTRUCTION ON INSTALLATION AND USE

TRANSPORT INSTRUCTIONS

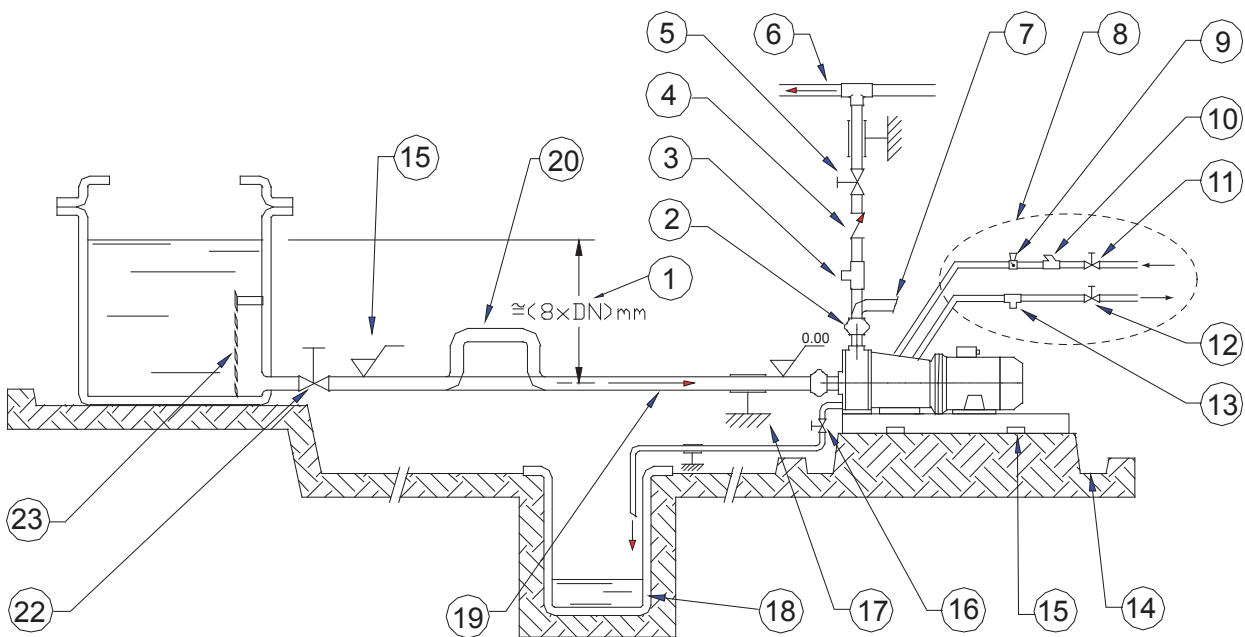
- cover the hydraulic connections
- when lifting the unit do not exert force on the plastic fittings
- lay the pump on its base or fixing plate during transport
- if the road is particularly rough, protect the pump by means of adequate shock absorbing supports
- bumps and shocks may damage important working parts vital for safety and functionality of the machine

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 winage
 - 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÷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
- 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 thermoplastic 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 protection guards for the pump or persons as the need arises
- install a spare equivalent pump in parallel



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 is 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;	2-4 poles	20 - 40	10 - 20	6 - 12	2 - 4	1 - 2

- check that temperature, pressure and characteristics of liquid match order specifications
- Warning!!! At the start-up be sure that all the internal hydraulic parts are not in CCW rotation (the cooling fan of the motor must stand or CW rotate), to prevent decoupling among magnetic driven parts of the pump; if the CCW rotation is due to the feed-back of the liquid in the discharge side, add a no-return valve in the plant.

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)

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 6 months depending on the type of liquid and the operating conditions) on the rotating parts of the pump; clean or replace as necessary
- 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
- make periodic inspections (2 to 30 days depending on the type of liquid and the operating conditions) of the in-line and foot filters as well as of the bottom valve
- the presence of liquid below the pump could be a clue to pump problems
- 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

DISMANTLING

- Tools required: Open end wrenches CH6 , CH10 , CH13 , CH17 , CH19, Hex key wrench CH6, Phillips screw driver
- Right handed nuts and bolts
- 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 the suction and discharge valves and open the drain valve
- 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
- before attempting to dismantle the pump ensure that its motor is disconnected and that it may not be started accidentally
- before the inspection, check that you have spare O-rings ready to hand for re-installing at the end of operations
- proceed with opening of the pump according to sequence described on paragraph no. 1.1 in the column of the LE-GEND
- the access to the mech. Seal is possible only after dismantling of the impeller (remove ogive and take the impeller off) :removing the rotating part of the mechanical seal from the impeller you can reach the fixed part of the seal.
- the motor can be separated from strainer unscrewing the 4 bolts that fix the strainer itself to it ; then open the cone coupling
- by friction and take off the shaft of the pump from motor shaft.

INSPECTION

Check:

- excessive wear of seal rings
- counterthrust bushing for cracks or excessive wear
- for lumps and clusters created by the pumped liquid (especially at the bottom of the rear chamber)
- the impeller, volute and intermediate disk for abrasion and corrosion
- for infiltration of liquid outside the seal in the support

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).

ASSEMBLY

Tools required: wrench CH6, wrench CH10, wrench CH13, wrench CH17, wrench CH19, hex wrench CH5, hex wrench CH6, screw driver (Philips drive type). The nuts and bolts have a right-hand thread.

Bolt torque setting: M4 M6 M8 M10 M12 M16 M20 M24
(reduced by 25% on plastic parts) Nm 4 14 24 48 60 75 120 175

All the operations must be performed under supervision of qualified personnel.

All the time, close the pump sealing with new o-rings .

Assemble the pump by following the procedure set out in the LEGEND column in the reverse order

Clean out the motor shaft from any trace of dust and/or grease

Mount the pump shaft (pos.11) complete with cone coupling element (pos.13) and seeger ring (pos.47)

Lock up the screws of cone coupling element to block off the pump shaft to the motor

Assemble the strainer (pos.15) together with the motor flange (pos.15 A)

Install the strainer assembly (strainer + flange) on the motor

Installation of mechanical seal SF1 - SF2 – TS5 - TS6 – TS7 - TS8:

Assemble the parts in the following order :

- 1) bracket centring ring (pos.46)
- 2) feather key (pos.79)
- 3) shaft sleeve (pos.75) complete with edge ring (pos.78)
- 4) spacer (TS_type) (pos.27)
- 5) rotating seal (pos.24 o pos.26)
- 6) fit in the rear casing (pos.6.A), the diaphragm (pos.50) and the fixed seal (pos.21) with the relevant gaskets (pos.20 – pos.49) and then pack all by locking the counter-plate (pos.73) complete with conveyor (pos.74)
- 7) assembly the two transparent protections (pos.48) and then the intermediate casing with bracket centring ring (pos.46)

For mech. seal BS5 - BS6 – BS7:

Assemble the parts in the following order:

- 1) bracket centring ring (pos.46)
- 2) feather key (pos.79)
- 3) shaft sleeve (pos.75)
- 4) fit in the rear casing (pos.6.B), the diaphragm (pos.60) and the the fixed seal (pos.58) with the relevant gaskets OR (pos.59) and then pack all by locking the counter-plate (pos.96).
- 5) assemble the rear casing with the bracket centring ring (pos.46) only after have assembled the two transparent protections (pos.74)
- 6) slip the rotating seal (pos.57) on the shaft sleeve

For mech. seal BF3:

Assemble the parts in the followings order:

- 1) bracket centring ring (pos.46)
- 2) feather key (pos.79)
- 3) bushing (pos.84)
- 4) fit into the rear casing (pos.6.C) the outer diaphragm (pos.88) complete with fixed seal (pos.86) and relevant gaskets OR (pos.85 - pos.87), lock ring (pos.89), spring (pos.90), counter-ring (pos.91) and then pack all by closing the locking counter-plate (pos.92)
- 5) assemble the rear casing with the bracket centring ring (pos.46) only after have assembled the two transparent protections (pos.48)
- 6) mount the rotating seal (pos.83) into the counter bushing (pos.81) with relevant OR gasket (pos.82) and assembly all on the shaft

For mech. seals MSF1 – MSF2 – MTS5 – MTS6 – MTS7 - MTS8:

- 1) insert the fixed seal (pos.31) in the proper seat in the bracket centring ring (pos.46)
- 2) fit the rotating seal (pos.30) together with edge ring (pos.78) on the shaft sleeve (pos.75)
- 3) position the bracket centring ring complete with fixed seal on bracket
- 4) slip the equipped protection sleeve on the shaft the only after have assembled the key (pos.79)
- 5) spacer (pos.27)
- 6) rotating seal (pos.24 o pos.26)
- 7) fit in the rear casing (pos.6.D) the diaphragm (pos.50) and the fixed seal (pos.21) with the relevant OR gaskets (pos.20 – pos.49 - pos.52) and then pack all the parts by locking the counter-plate (pos.73) complete with seal chamber (pos.54), gasket (pos.53) and fasteners (pos.55 - pos.56)

8) assemble the rear casing with the strainer centring ring (pos.46)

Install the impeller (pos.5) complete with gasket (pos.4) on the shaft and then lock all with the reduced nut M12 with washer, fit the o-ring (pos.10) and ogive (pos.7)

In case of mech. seal SF1-SF1C set the pump in vertical position and lock the two locking screws by using the Allen key through the window of the rear casing deprived of the protections

In case of mech.seal MSFA-MSFAC remove one of the two fasteners (pos.56) to insert the Allen key and lock the two screws of seal locking rings

Then complete the assembly by placing the OR gasket (pos.8) and the volute casing (pos.3) complete with guard plate (pos.39 o pos.41)

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.

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 horizontally on a firm base.

The pump must be installed on a suitable hydraulic plant with inlet and outlet connections to proper suction and discharge pipes.

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:

1. rotates in wrong direction
2. suction pipe is excessively long and tortuous
3. insufficient geodetic pump head or excessive suction geodetic lift
4. air infiltration into the suction pipe or branches
5. pump or suction pipe not completely covered by liquid
6. impeller channels blocked by impurities
7. check valve on discharge pipe jammed
8. geodetic system height is greater than maximum potential pump head
9. impeller jammed by considerable layer of crystals or by melting of materials for dry rotation.
10. bottom valve blocked by mud or other debris
11. bottom valve insufficiently immersed
12. bottom valve faulty, thereby causing suction valve to empty when pump stops

Pump discharge rate or pressure insufficient: see 01, 02, 03, 04, 05, 06, 10, 11, 12

13. system's resisting head is greater than expected
14. suction pipe, closing valve and other items have an insufficient nominal diameter
15. small geometric pump suction head
16. damaged or worn impeller
17. liquid viscosity greater than expected
18. excessive quantities of air or gas in liquid
19. elbow joints, check valves or other items on the outlet port
20. liquid (especially if hot) with tendency to change into gaseous state

Pump absorbs too much power: see 17

21. pump operates at greater capacity than expected
22. specific weight of liquid is greater than expected
23. impurities inside pump create abnormal wear
24. electric motor supply voltage is not rated voltage

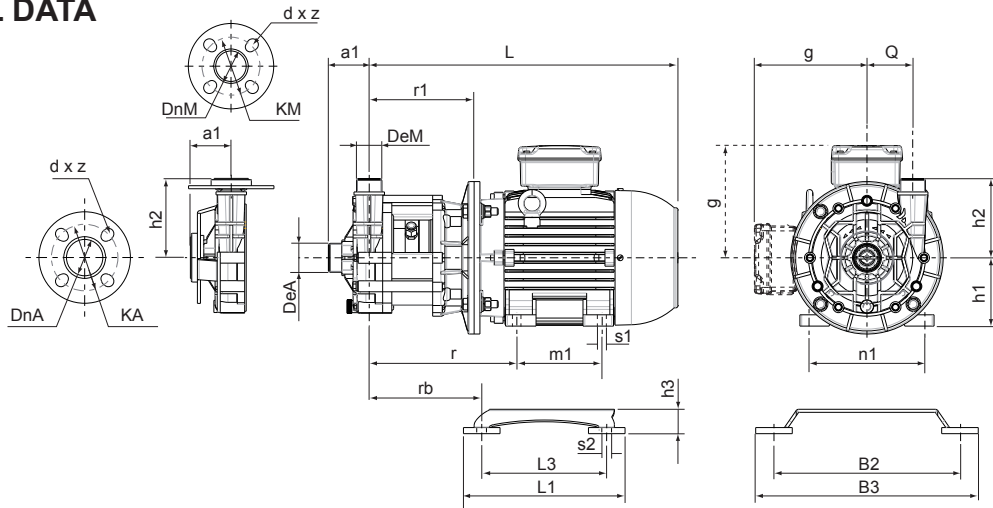
Pump vibrates and is noisy: see 23

25. operates at full capacity (no head)
26. pump or pipes inadequately fixed
27. eccentric impeller operation because of worn bushes
28. support bearing without grease

Pump's internal parts wear out too quickly : see 23

29. liquid excessively abrasive
30. recurring cavitation problems (see. 02, 14, 18, 16)
31. high tendency of liquid to crystallise or polymerise when pump is not operating.
32. pump made of materials that are unsuitable for pumped liquid
33. operation with capacity too reduced

TECHNICAL DATA



model		IEC frame	DnA	DnM	DeA	DeM	KA iso / ansi / jis	KM iso / ansi / jis	d x z iso / ansi / jis	a1	L(°)	Q	h1	h2	r	r1	rb	m1	n1	s1	g(°)	L3	B2	S2	L1	B3	h3																																												
20.15	N	90L	50 - 2"	40 - 1" 1/2	2"	1" 1/2	125 / 121 / 120	110 / 98 / 105	18 x 4 / 16 - 19 x 4 / 19 x 4	70	96	160	90	100	290	234	246	125	140	8	142	185	248	14	245	308	55																																												
	P	100L																										307	244	256	160	155	205	305	265	365																																			
	S	112M																										314			190	168																																							
20.20	N	100L																										558	100	307	140	140	10	181	263	359	333	429																																	
	P	112M																										567	112	314									160	155	205	305	265	365																											
	S	132SA																										624	132	353									264	282					216	181	263	359	333	429																					
20.27	N	112M																										567	112	314	140	140	10	168	205	305	265	365																																	
	P	132SA																										567	112	314									244	256	190	168	205	305	265	365																									
20.36	N	132SA																										50 - 2"	40 - 1" 1/2	2"	1" 1/2	125 / 121 / 120	110 / 98 / 105	18 x 4 / 16 - 19 x 4 / 19 x 4	70	96	160	132	160	353	264	282	210	254	14	215	335	405	14	405	475	55																			
	P	132SB																																																			864	160	402	294	312	210	254	14	215	335	405	405	475						
	S	160MA																																																			567	112	314	244	256	190	168	205	305	265	365								
30.15	N	112M																																																			624	132	343	140	140	10	181	263	359	333	429								
	P	132SA																																																			624	132	343									264	282	216	181	263	359	333	429
	S	132SB																																																			864	160	402									294	312	210	254	14	215	335	405
30.25	N	132SA																																																			624	132	353	140	140	10	181	263	359	333	429								
	P	132SB	624	132	353	264	282	140	216	10	181	263	359	333	429																																																								
36.30	N	132SB	624	132	353	140	140	10	181	263	359	333	429																																																										
	P	160MA	864	160	402									294	312	210	254	14	215	335	405	405	475																																																
	S	160MB	864	160	402									294	312	210	254	14	215	335	405	405	475																																																

model		IEC frame	DnA	DnM	DeA	DeM	KA iso / ansi / jis	KM iso / ansi / jis	d x z iso / ansi / jis	a1	L(°)	Q	h1	h2	r	r1	rb	m1	n1	s1	g(°)	L3	B2	S2	L1	B3	h3																																														
21.18	N	100L	50 - 2"	40 - 1" 1/2	2"	1" 1/2	125 / 121 / 120	110 / 98 / 105	18 x 4 / 16 - 19 x 4 / 19 x 4	70	96	160	100	160	307	244	256	140	160	10	155	205	305	14	265	365	55																																														
	P	112M																										587	112	314	140	10	168	205	305	265	365																																				
	S	132SA																										624	132	353								264	282	216	181	263	359	333	429																												
21.25	N	112M																										587	112	314	140	140	10	168	205	305	265	365																																			
	P	132SA																										624	132	353									264	282	216	181	263	359	333	429																											
	S	132SB																										624	132	353									264	282	216	181	263	359	333	429																											
21.28	N	132SA																										624	132	353	140	140	10	181	263	359	333	429																																			
	P	132SA																										624	132	353									264	282	140	216	10	181	263	359	333	429																									
21.43	N	160MA																										50 - 2"	40 - 1" 1/2	2"	1" 1/2	125 / 121 / 120	110 / 98 / 105	18 x 4 / 16 - 19 x 4 / 19 x 4	70	96	160	160	160	402	294	312	210	254	14	215	335	405	14	405	475	55																					
	P	160MA																																																			864	160	402	294	312	210	254	14	215	335	405	405	475								
	S	160MB																																																			864	160	402	294	312	210	254	14	215	335	405	405	475								
31.22	N	132SA																																																			624	132	353	140	140	10	181	263	359	333	429										
	P	132SB																																																			624	132	353									264	282	140	216	10	181	263	359	333	429
	S	160MA																																																			864	160	402									294	312	210	254	14	215	335	405	405	475
31.30	N	132SB																																																			624	132	353	140	140	10	181	263	359	333	429										
	P	160MA	864	160	402	294	312	210	254	14	215	335	405	405	475																																																										
31.40	N	160MA	864	160	402	140	140	10	181	263	359	333	429																																																												
	P	160MA	864	160	402									294	312	210	254	14	215	335	405	405	475																																																		
	S	160MB	864	160	402									294	312	210	254	14	215	335	405	405	475																																																		

(*) can change for motors of different brands

model			NEMA frame	DnA	DnM	DeA	DeM	KA iso / ansi / jis	KM iso / ansi / jis	d x z iso / ansi / jis	a1	L(°)	Q	h1	h2	r	r1	rb	m1	n1	s1	g(°)	L3	B2	S2	L1	B3	h3													
NEMA - 60 HZ	21.18	N	184	2"	1" 1/2	2"	1" 1/2	125 / 121 / 120	110 / 98 / 105	18 x 4 / 16 - 19 x 4 / 19 x 4	2.75	3.78	6.3	4.5	6.3	12.74	9.86	9.37	5.5	7.5	0.41	7.5	8.07	12	0.5	10.43	14.4	2.16													
		P	184																										13.24	5.25	14.11	10.36	9.67	5.5	8.5	8.58	10.35	14.13	13.11	16.89	
		S	213																										14.9	5.25	12.74	9.86	9.37	5.5	7.5	7.5	8.07	12	10.43	14.4	
	21.25	N	184																										13.24	4.5	12.74	9.86	9.37	5.5	7.5	7.5	8.07	12	10.43	14.4	
		P	213																										14.9	5.25	14.11	10.36	9.67	5.5	8.5	8.58	10.35	14.13	13.11	16.89	
		S	215																										16.4	5.25	14.11	10.36	9.67	7	8.5	8.58	10.35	14.13	13.11	16.89	
	21.28	N	213																										14.9	5.25	14.11	10.36	9.67	5.5	8.5	8.58	10.35	14.13	13.11	16.89	
		P	215																										16.4	6.25	15.5	11	10.3	8.25	10	0.53	10	13.18	15.94	15.94	18.7
		S	254																										19.5	5.25	14.11	10.36	9.67	7	8.5	0.41	8.58	10.35	14.13	13.11	16.89
	21.43	N	215																										16.4	5.25	14.11	10.36	9.67	7	8.5	0.41	8.58	10.35	14.13	13.11	16.89
		P	254																										19.5	6.25	15.5	11	10.3	8.25	10	0.53	10	13.18	15.94	15.94	18.7
		S	256																										21.2	6.25	15.5	11	10.3	8.25	10	0.53	10	13.18	15.94	15.94	18.7
	31.22	N	213																										14.9	5.25	14.11	10.36	9.67	5.5	8.5	0.41	8.58	10.35	14.13	13.11	16.89
		P	215																										16.4	6.25	14.11	10.36	9.67	7	8.5	0.41	8.58	10.35	14.13	13.11	16.89
		S	254																										19.5	5.25	14.11	10.36	9.67	7	8.5	0.41	8.58	10.35	14.13	13.11	16.89
	31.30	N	215																										16.4	5.25	14.11	10.36	9.67	7	8.5	0.41	8.58	10.35	14.13	13.11	16.89
		P	254																										19.5	6.25	15.5	11	10.3	8.25	10	0.53	10	13.18	15.94	15.94	18.7
		S	256																										21.2	6.25	15.5	11	10.3	8.25	10	0.53	10	13.18	15.94	15.94	18.7
	31.40	N	254																										19.5	5.25	14.11	10.36	9.67	7	8.5	0.41	8.58	10.35	14.13	13.11	16.89
		P	256																										21.2	6.25	15.5	11	10.3	8.25	10	0.53	10	13.18	15.94	15.94	18.7
		S	-																										-	-	-	-	-	-	-	-	-	-	-	-	-

(*) can change for motors of different brands

dimensioni in inch

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.

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. 8 - 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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