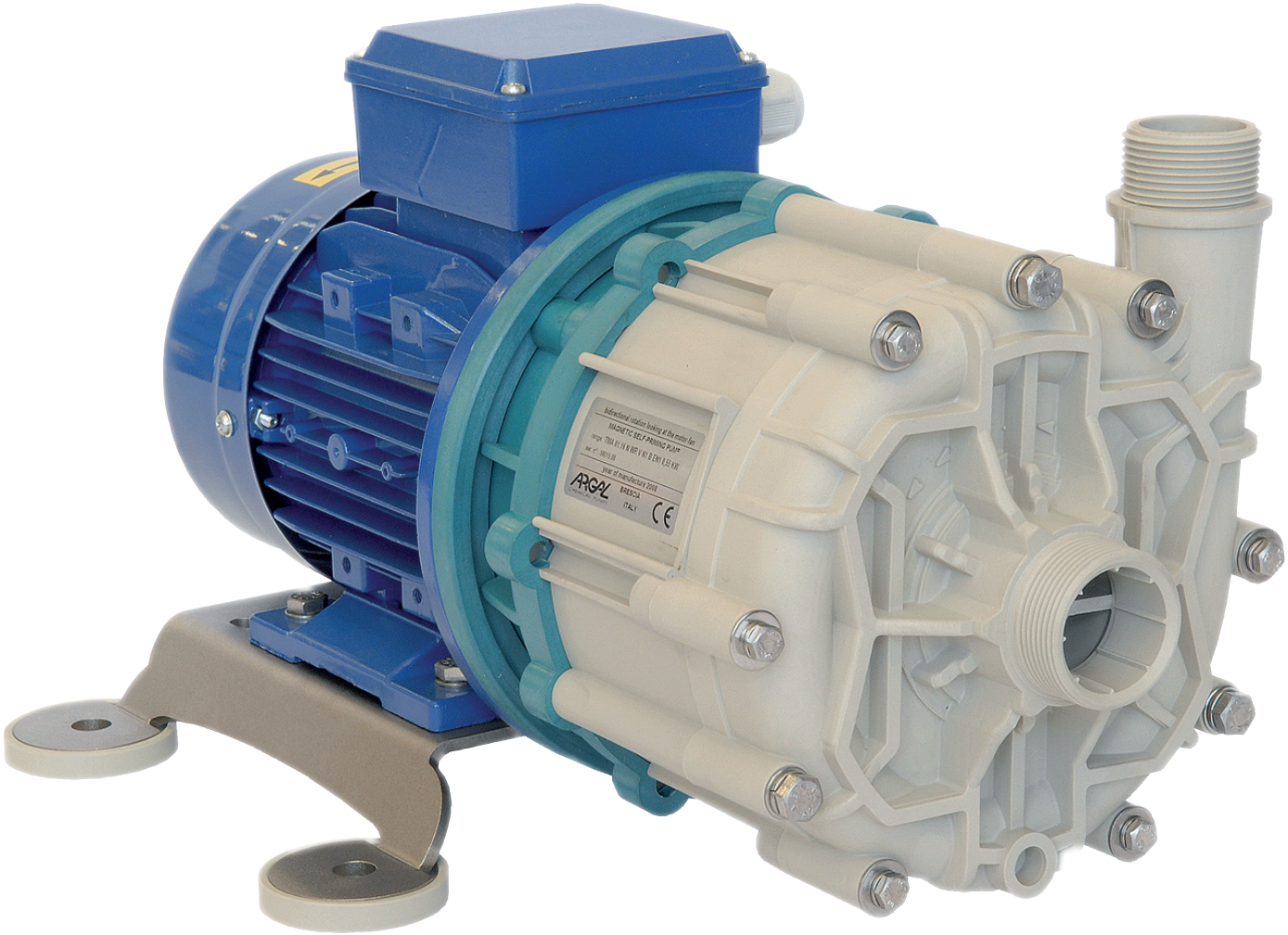
# USE MANUAL

# TMR G2



Part number _____

DEALER

for Maintenance
date of commissioning:
.....
position / system reference:
.....
service:
.....

## IDENTIFICATION CODE

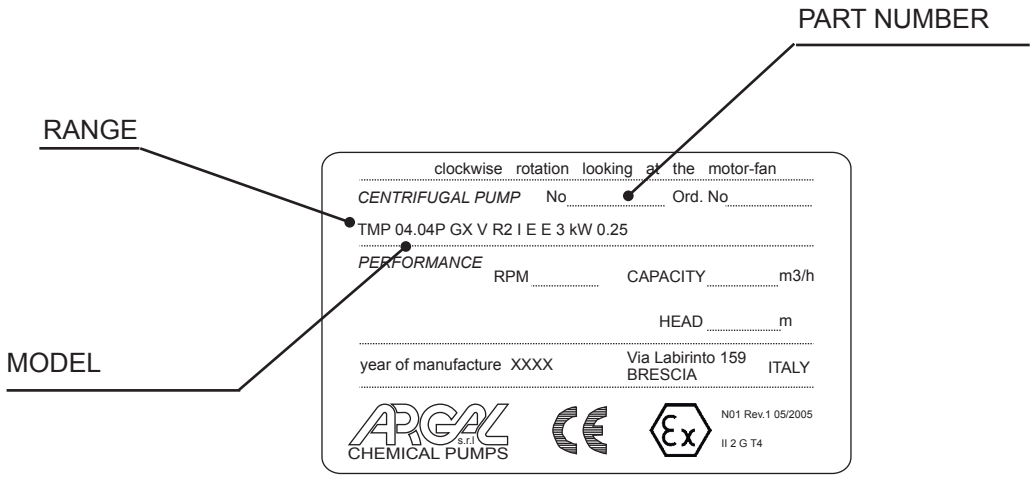
| Pump data | | | | | Motor data | | |
|---|---|---|---|---|---|---|---|
| range | model | execution (materials) | | internal structure | rpm | power | phase |
| TMR | □ 06.10<br>□ 10.10<br>□ 10.15<br>□ 16.15<br>□ 16.20<br>□ 02.30<br>□ 07.11<br>□ 07.15<br>□ 11.15<br>□ 11.23<br>□ 17.25<br>□ 03.35 | □ WR (polipropilene PP)<br>□ GF (etilene-cloro trifluoro etilene E-CTFE)<br>□ GX (etilene-cloro trifluoro etilene E-CTFE) ⟨Ex⟩ | | □ R1 ($C/Al_2O_3$)<br>□ X1 ($SiC/Al_2O_3$)<br>□ N1 (CFF+PTFE/$Al_2O_3$)<br>□ R2 (C/SiC) ⟨Ex⟩<br>□ X2 (SiC/SiC)<br>□ N2 (CFF+PTFE/SiC) ⟨Ex⟩ | □ 1450<br>□ 2900<br>□ 1740<br>□ 3480<br>standard<br>□ E (IEC)<br>□ N (NEMA) | □ 0.18 kW<br>□ 0.25 kW<br>□ 0.37 kW<br>□ 0.55 kW<br>□ 0.75 kW<br>□ 1.1 kW<br>□ 1.5 kW<br>□ 2.2 kW<br>□ 3 kW<br>□ 4 kW | □ 1 (monofase)<br>□ 3 (trifase)<br>voltage/EEx<br>□ 0 (senza motore)<br>□ N (tensione STD)<br>□ S (tensione speciale)<br>□ E (EEX) ⟨Ex⟩ |
| | | version | connections | | | | |
| | | □ N normale<br>□ P potenziata<br>□ S sovrapoten. | □ B (BSP threaded)<br>□ N (NPT threaded)<br>□ Z (ISO ANSI JIS flanged) | | | | |
| | | O-ring | outside structure | | | | |
| | | □ V (FPM)<br>□ E (EPDM)<br>□ K (FFKM) | □ Integral<br>□ Armoured | | | | |

⟨Ex⟩: scelta per versioni ATEX

| Year of manufacture _____ | Part number _____ |
|---|---|

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.



## DISASSEMBLING SEQUENCE

TOOLS
Spanner No 13

EXECUTION NOTES
- To facilitate the pump disassembling operations, first disassembly the HYDRAULIC PARTS from the MOTOR PARTS
- unscrew the connections (POS.1)
- warning! The disassembly operations of parts magnetically connected involve great opposed forces: keep the MOTOR PARTS fixed on floor during the removing of the HYDRAULIC PARTS.

WARNING
The interventions must be performed under supervision of qualified personnel.
Before starting remember:
- 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; open the drain valve
- use appropriate gloves, protective glosses and acid proof-clothing when disconnecting and washing the pump
- disconnect hydraulic connections: leave enough time for the residual liquid to exit the pump casing and atmosferic air to fill the empty volume
- wash the pump before starting maintenace operations
- do not scatter the washing 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
- warning! Operations near the magnets attract the tools. Proceed with caution to avoid damages.

For further details see paragraph 9.1 “Disassembling”

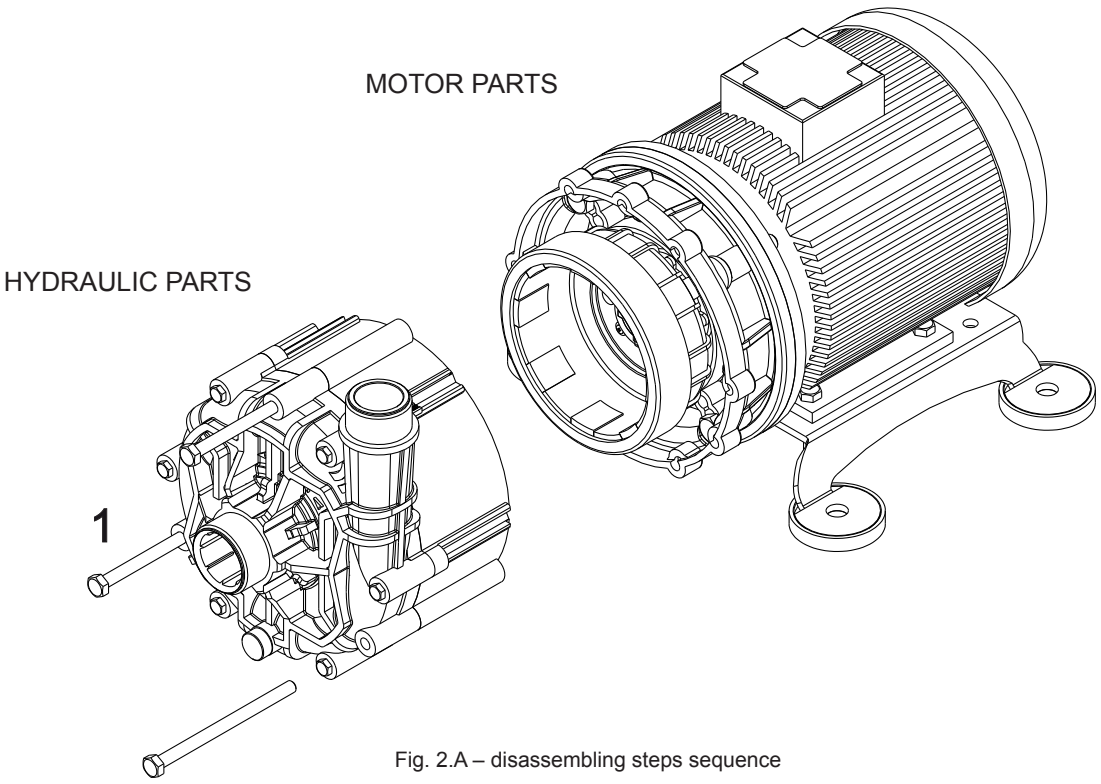



Fig. 2.A – disassembling steps sequence

| note | ref | pos. | Part name | Q.ty | Disassembling steps sequence | | | | | | | | | | Spare stock for working years | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 2 | 5 |
| | 1 | 910.1 | Connection volute casing/strainer | 3 | • | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | |

*HYDRAULIC PARTS LEGEND*

TOOLS
Spanner No 10

EXECUTION NOTES
- disassembly keeping the pump in vertical position (suction on top)
- unscrew the connections (POS.2)

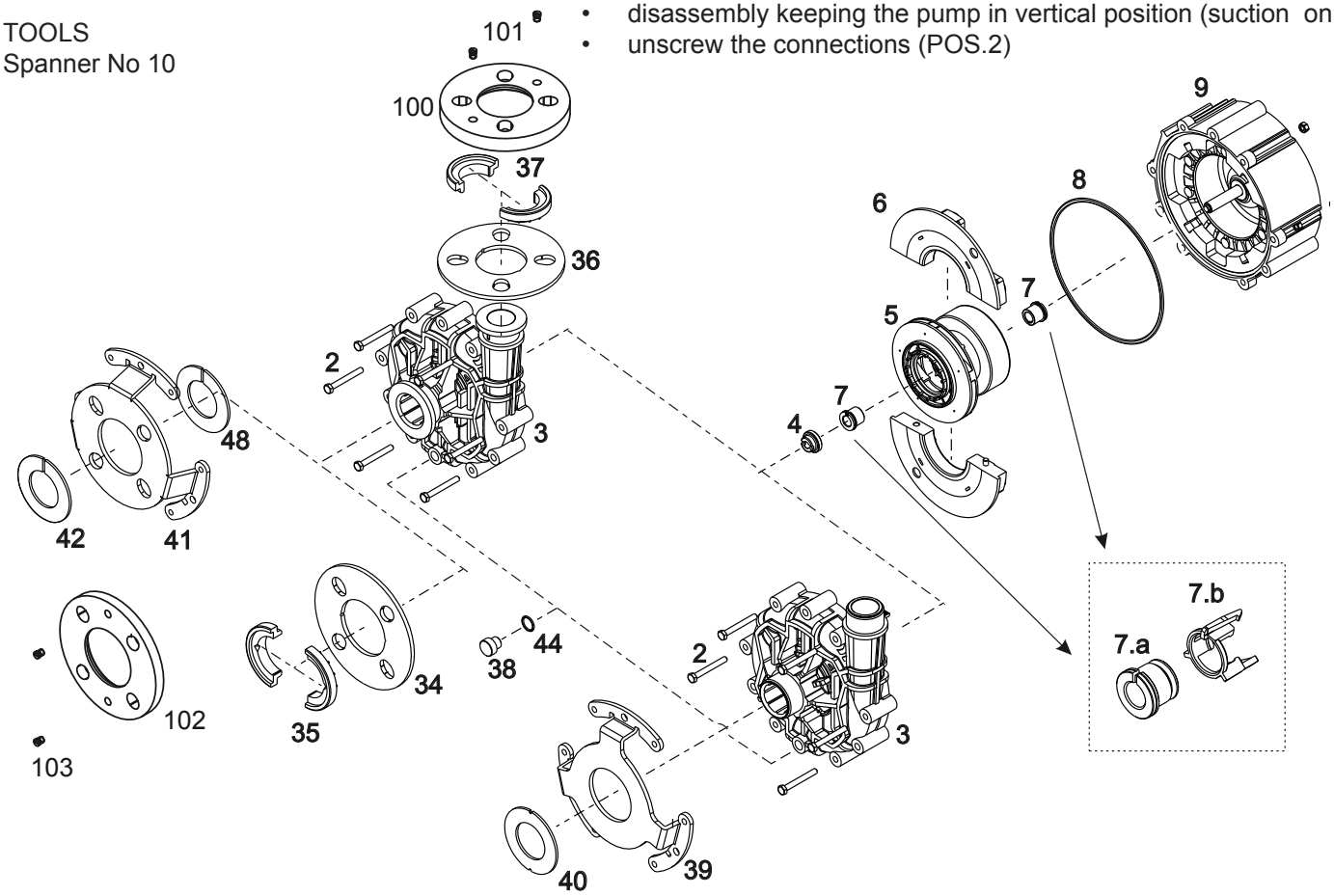



Fig. 2.1 A – disassembling sequence HYDRAULIC PARTS

| note | ref | pos. | Part name | Q.ty | Disassembling steps sequence | | | | | | | | | | Spare stock for working years | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 2 | 5 |
| | 2 | 910.2 | Connection volute casing/rear casing | 6 | | • | | | | | | | | | | |
| | 3 | 102 | VOLUTE CAGING | 1 | | | • | | | | | | | | | 1 |
| | 4 | 331 | FRONT THRUST BEARING | 1 | | | | • | | | | | | | 1 | 2 |
| | 5 | 233 | IMPELLER | 1 | | | | | • | | | | | | 1 | 1 |
| | 6 | 134 | CENTER DISC | 2 | | | | | • | | | | | | | |
| | 7 | 545 | GUIDE BUSHING WITH BUSHING FASTENER | 2 | | | | | | • | | | | | 2 | 4 |
| | 7.a | 545 | GUIDE BUSHING | 2 | | | | | | | | | | | | |
| | 7.b | 222 | BUSHING FASTENER | 2 | | | | | | | | | | | | |
| | 8 | 412 | OR VOLUTE CASING | 1 | | | | | | | • | | | | 1 | 2 |
| | 9 | 162 | REAR CASING | 1 | | | | | | | | • | | | | 1 |
| | 34 | 722.1 | INLET FLANGE | 1 | • | | | | | | | | | | | |
| | 35 | 727.1 | INLET FLANGE-ADAPTOR | 2 | • | | | | | | | | | | | |
| | 36 | 722.2 | OUTLET FLANGE | 1 | • | | | | | | | | | | | |
| | 37 | 727.2 | OUTLET FLANGE-ADAPTOR | 2 | • | | | | | | | | | | | |
| | 38 | 912 | DRAIN PLUG (optional) | 1 | • | | | | | | | | | | | |
| | 39 | 195.1 | ARMOURED (connect. B – N) (optional) | 1 | | | • | | | | | | | | | |
| | 40 | 922 | LOCK NUT (optional) | 1 | | • | | | | | | | | | | |
| | 41 | 195.2 | ARMOURED (connect.Y – Z) (optional) | 1 | | | • | | | | | | | | | |
| | 42 | 932.1 | SEEGER RING (optional) | 1 | | • | | | | | | | | | | |
| | 44 | 412.1 | OR DRAIN PLUG (optional) | 1 | | • | | | | | | | | | | |
| | 48 | 932.2 | SEEGER DI BLOCCAGGIO posteriore (optional) | 1 | | | • | | | | | | | | | |
| | 100 | 722.3 | OUTLET FLANGE FF | 1 | | • | | | | | | | | | | |
| | 101 | 910.8 | Connection outlet flange FF / outlet flange | 1 | • | | | | | | | | | | | |
| | 102 | 722.4 | INLET FLANGE FF | 1 | | • | | | | | | | | | | |
| | 103 | 910.9 | Connection inlet flange FF / inlet flange | 1 | • | | | | | | | | | | | |

‘*MOTOR PARTS LEGEND*

TOOLS
- Screw driver
- Type Phillipsq
- punch f < 4 mm

NOTE OPERATIVE
- Unscrew the connections (POS.10)
- Remove the collar from the drive magnet assembly using the punch (see paragraph 9.1)

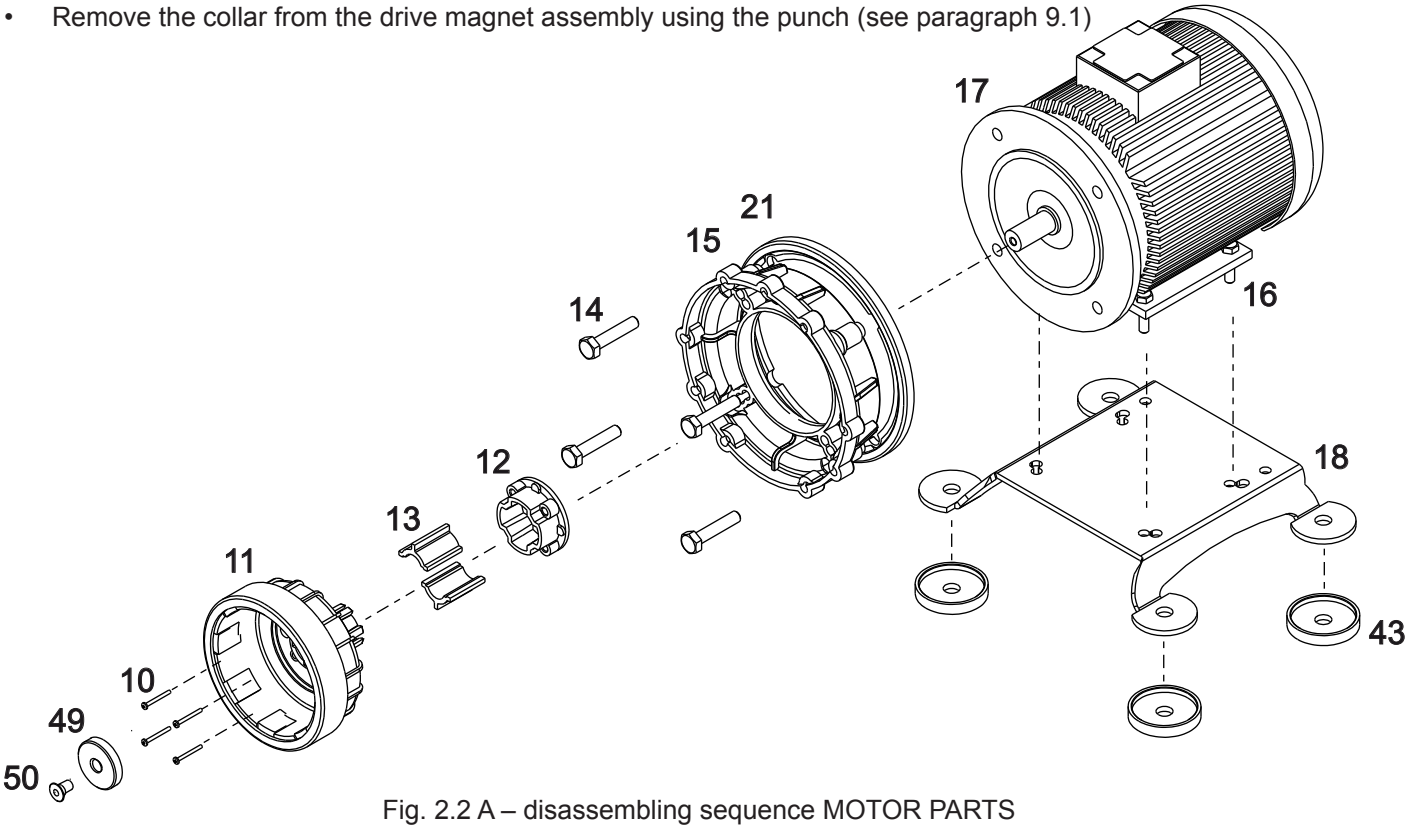



Fig. 2.2 A – disassembling sequence MOTOR PARTS

| note | ref | pos. | Part name | Q.ty | Disassembling steps sequence | | | | | | | | | | Spare stock for working years | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 2 | 5 |
| | 10 | 910.3 | Connection drive magnet assembly / electric motor | 4 | | | • | | | | | | | | | |
| | 11 | 855 | DRIVE MAGNET ASSEMBLY | 1 | | | | • | | | | | | | | |
| | 12 | 518 | COLLAR ( drive magnet assembly ) | 1 | | | | | • | | | | | | | 1 |
| | 13* | 523 | SOCKET | 2 | | | | | | | | | | | | |
| | 14 | 910.4 | Connection strainer / electric motor | 4 | | | | | | • | | | | | | |
| | 15 | 807 | BRACKET | 1 | | | | | | | • | | | | | |
| | 16 | 910.5 | Connection electric motor / baseplate | 4 | | | | | | | | • | | | | |
| | 17 | 800 | ELECTRIC MOTOR | 1 | | | | | | | | | • | | | |
| | 18 | 890 | BASEPLATE (optional) | 1 | | | | | | | | | | • | | |
| | 21 | 334 | PACKING RING | 1 | | | | | | | | • | | | | |
| | 43 | 185 | DISCO BASE (optional) | 4 | | | | | | | | | | | | |
| | 49 | 934 | SAFETY WASHER | 1 | | • | | | | | | | | | | |
| | 50 | 910.6 | Connection safety washer / motor shaft | 1 | | • | | | | | | | | | | |
| | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | |
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| | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | |

(*) with 3-4 Kw motor power , the sockets are replaced by a space ring

## GENERAL NOTES

“TRM” 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.

“TMR” and pumps are centrifugal, horizontal, single stage, coupled to a non-synchronous electric motor via a magnetic coupling, with axial inlet and radial outlet for connection to the hydraulic system. They are foot-mounted for floor fixing.

“TMR” pumps are not self priming.

R1-R2 execution “TMR” pumps can run dry.

The liquid to be pumped must be clean for the R1-2 execution, the X1-2 execution may contain solid (%, dimension and solid part hardness must be agreed during the offer).

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.

Verify the compatibility with the phisical-chemical characteristics of the liquid.

The specific weight that can be pumped at 25 °C (liquid and environment) referred to max flow (50 e 60 Hz) depend upon the type of construction:

| | | |
|---|---|---|
| standard contruction N (stamped on the rating plate) | 1,05 | kg/dm3 |
| powered construction P (stamped on the rating plate) | 1,35 | kg/dm3 |
| strong-powered construction S (stamped on the rating plate) | 1,80 | kg/dm3 |

The specific weight that can be pumped at 70°C is 10% less than that at 25°C.

The level of cinematic viscosity must not exceed 30 cSt so as not to significantly modify the pump’s performance. Higher values up to a maximum of 100 cSt are possible provided that the pump is equipped with suitable impeller 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) | execution WR |
| 110 °C (230 °F) | execution GF |

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

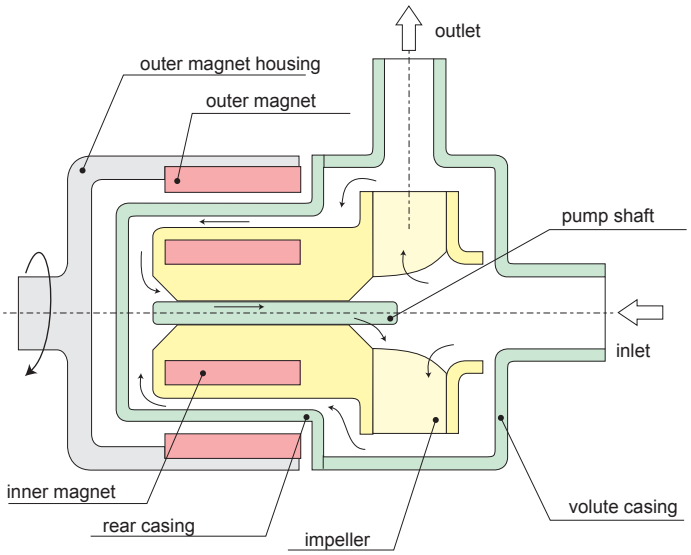
| | |
|---|---|
| 0 - +40°C (14¸104 °F) | execution WR |
| -20 - +40°C (-4 ¸104 °F) | execution GF |

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).

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 blade-type impeller rotating within a fixed housing. It has a tangential outlet (or radial with an internal deflector) and, by creating a depression in the center, it allows the liquid to flow from the central suction side. Then, flowing through the impeller's blades, the fluid acquires energy and is conveyed towards the outlet.

MECHANICALLY different from the traditional centrifugal pumps in the impeller motion drive thanks to the magnetic field created between the primary outer magnet and the inner magnet (not visible because housed inside the impeller hub). The magnetic field crosses the plastic parts and the liquid, and firmly couples the two magnet assemblies. When the motor causes the outer magnet to rotate together with its housing, the inner magnet assembly is dragged at the same speed. As a result the impeller, which is integral to it, is maintained in rotation.

The SHAFT, totally within the housing, is not involved in the transmission of rotary motion; its only function is to act as a centering guide and support for the impeller. To this end the components are designed so that a spontaneous cooling circuit (due to a simple effect of pressure) is established to cool the surfaces subject to friction. Periodic inspections prevent the build-up of sediments between the shafts and the guide bushes significantly lengthening their working life.

## 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 pentetration)

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.

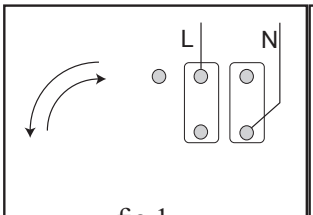


fig.1

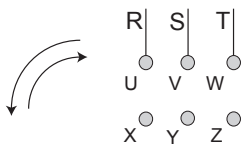


fig.2

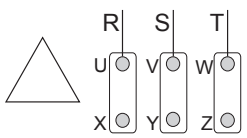


fig.3

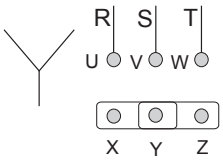


fig.4

## DRY RUNNING SURVEY

Though the pump can run dry (execution R1-R2) , it is therefore suitable to safeguard the pump and the plant to use:
- pressure switch;
- fluxmeter;
- control devices for the motor power absorbtion.

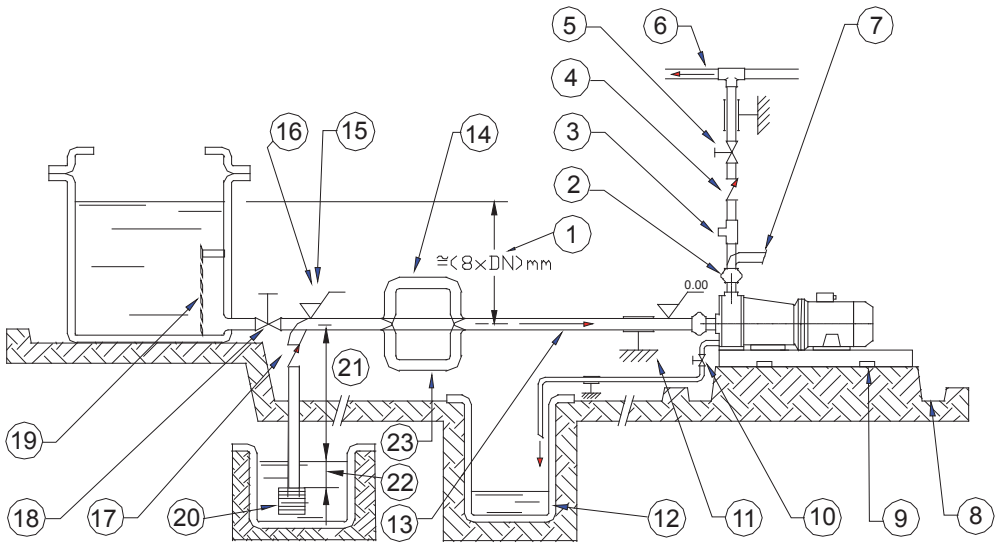
## INSTRUCTIONS ON INSTALLATION AND USE

*TRANSPORT*

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

*INSTALLATION*

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 varies according to flow in order to prevent windage (min. 0.5 m, max. 15% of pump head)
2) YES: expansion joint (indispensable with long pipes or hot liquids) and/or anti-vibration facility during discharge and suction; anchored near to pump
3) YES: attachment for gauge or safety pressure switch
4) YES: check value (especially for long vertical or horizontal pipes; compulsory with parallel pumps).
5) YES: adjusting gate valve on outlet
6) speed of delivered fluid: 3.,5 m/s max. .
7) NO: elbow joints (and other parts) on the pump (discharge and suction lines)
8) YES: drainage channel around base
9) Fix the pump by the fixing holes provided: the supports must be level
10) YES: pipe discharge (completely sealed), discharge value shut during normal operations
11) YES: pipe fixing parts
12) YES: discharge collection well (does not leak)
13) Fluid speed suction: 2.5 m/s
14) NO: air pockets: the circuit must be short and straight
15) With positive head: tilt of piping towards pump
16) With negative suction lift: tilt of piping towards suction tank
17) YES: check vale (with negative suction lift)
18) YES: gate valve (may also be near pump in the case of long piping)
19) YES: strainer (3-5 mm mesh)
20) YES: strainer (3-5 mm mesh)
21) Suction head, 3 m max.
22) Immersion depth: 0.3 m min.
23) YES: overcoming obstacles at lower depths.



- 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 prearranged
- 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 that fixing elements(screws and bolts) are closed
- 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 drain valve (pos. 19); totally flood the suction pipe and the pump
- start the pump with the suction valve completely open and 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

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

- ensure that the temperature, pressure and liquid characteristics are as those specified at the time of order.
- 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: size 10-13 socket spanner, screw driver (Phillips drive type), punch Ø < 4mm.
Bolts have right-hand thread

- 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
- warning: operations near the magnet attract the tools. Proceed with cau-

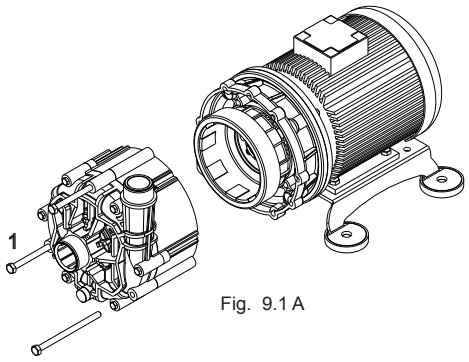


Fig. 9.1 A

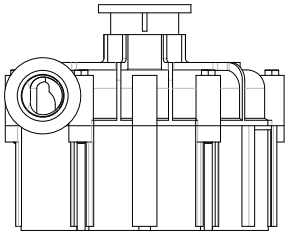


Fig. 9.1 B

tion to avoid damage.

- As described on paragraph no. 2 “Disassembling sequence”, unscrew the connections (POS.1) and remove the HYDRAULIC PARTS from the MOTOR PARTS
- Proceed separately to disassembly the HYDRAULIC PARTS or the MOTOR PARTS following the sequence described on paragraph no. 2 “ Disassembling sequence ”.
- warning! The disassembly operations of parts magnetically connected involve great opposed forces: keep the MOTOR PARTS fixed on floor during the removing of the HYDRAULIC PARTS.
- to facilitate the disassembly operations keep the pump in vertical position (suction on top)Fig. 9.1 B
- warning! During the disassembly of the hydraulic parts do not bump the guide components
- warning! After the dismantling of the pump casing extract together the impeller and the central disc; extract avoiding radial movementsFig. 9.1 C
- disassembly the MOTOR PARTS: unscrew the 4 Phillips drive screws inside the drive magnet assembly, POS. E in Fig. 9.1 D
- warning! During the use of screw driver inside the drive magnet assembly you must oppose the magnetic attraction
- warning! After unscrewing the 4 screw (POS. E in Fig. 9.1 D) insert the punch Ø < 4mm in one of two extraction holes (POS. D in Fig. 9.1 D) to remove the collar (POS.C in Fig. 9.1 E) from the back and to allow the removing of the drive magnet assembly, sockets and collar (POS.A, POS.B, POS.C in Fig. 9.1 E) from the motor shaft.

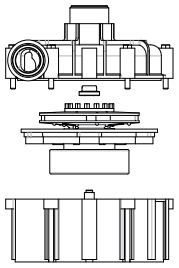


Fig. 9.1 C

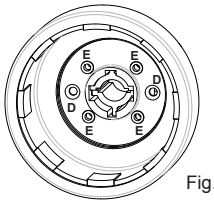



Fig. 9.1 D

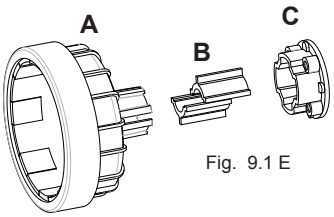



Fig. 9.1 E

*INSPECTION*

Check:

- the pump shaft for cracks and excessive wear
- guide bushing for excessive wear(@ 5 %)
- counterthrust bushing for cracks or excessive wear
- pump shaft clutch
- that the guide bushing cooling circuit is not blocked
- the impeller, volute and rear chamber for abrasion and corrosion
- that the pressure balancing holes on the impeller blades are not blocked
- for lumps and clusters created by the pumped liquid (especially at the bottom the rear chamber)
- for infiltration of liquid into the chamber containing the inner magnets
- abrasions on the outside surface of the reinforcement chamber due to scratching of the outer magnets

Replace broken, cracked or deformed parts.
Reopen all the blocked pipes and eliminate any chemical agglomeration.
Clean all the surfaces before re-assembly, especially the O-ring seats (risk of drip leaks).

*ASSEMBLY*

Tools required: size 10-13 socket spanner, screw driver (Phillips drive type)
Bolts have right-hand thread

| Bolt torque setting: | | M4 | M6 | M8 | M10 | M12 |
|---|---|---|---|---|---|---|
| (reduce by 25% on plastic parts) | Nm | 4 | 14 | 24 | 25 | 40 |

- all these maintenance operations must be performed under supervision of qualified personnel
- before the inspection, check that you have spare o-ring ready to hand for re-installing at the end of operations
- Proceed separately to disassembly the HYDRAULIC PARTS or the MOTOR PARTS following the backward sequence described on paragraph no. 2 " Disassembling sequence ".
- warning! Assembly the hydraulic parts to the motor parts only after the complete assembling of these two sub-assembly groups
- assembling the hydraulics and the motor parts, oppose the magnetical force keeping the hydraulic parts by the inlet and the outlet connectors
- warning! Locate the strainer on the motor flange as shown in Fig. 9.3 A
- the right location of the strainer allow the assembly of the hydraulic parts as shown in Fig. 9.3 B.
- if necessary insert sockets (POS.B) in the back of the drive magnet assembly (POS.A) Fig. 9.3 C
- the relative position of drive magnet assembly and sockets is shown in Fig. 9.3 C (a and b planes)
- insert the collar (POS. C) on the back of the drive magnet assembly keeping the side pump collar surface far as possible from the plane e
- verify that the collar surface with visible brass inserts is motor side
- remove possibile traces of grease from motor shaft
- insert the assembled group (drive magnet assembly, sockets, collar) on the motor shaft
- after assembling on motor shaft verify the right position of sockets POS.B in drive magnet assembly POS.A (referring to planes a and b shown in Fig. 9.3 C)
- screw the 4 Phillips drive screws repeating the sequence E1, E2 ,E3 ,E4 and applying a torque @ 6 N m
- at the end of the screwing operation the collar will be at about 3-4 mm from the e plane shown in Fig. 9.3 C)
- warning! during the HYDRAULIC PARTS assembling keep the parts in vertical position
- assembly central disc and impeller before insert them in the rear casing, POS.F in Fig. 9.3 E
- warning! There are magnetical attraction forces in action assembling the central disc and impeller: avoid bump opponing manual force
- avoid radial movements during assembling the sub-assembly central disc-impeller in the rear casing
- the pumps range ROUTE are provided of a bidirectional axially alignment system (patented system)
- warning! verify that the value of the dimension Q shown in Fig. 9.3 F is 3 mm

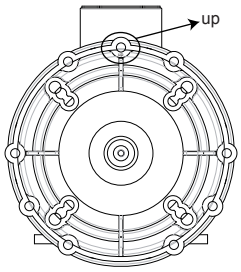


Fig. 9.3 A

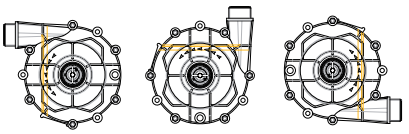


Fig. 9.3 B

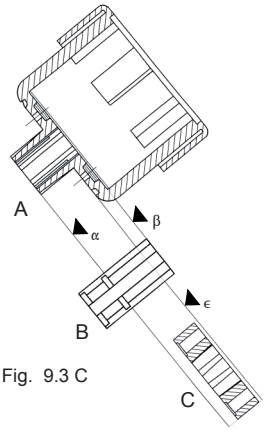


Fig. 9.3 C

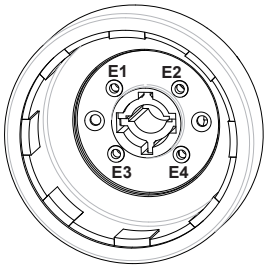


Fig. 9.3 D

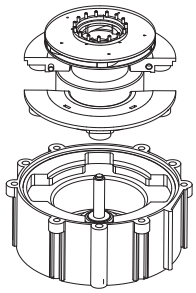


Fig. 9.3 E

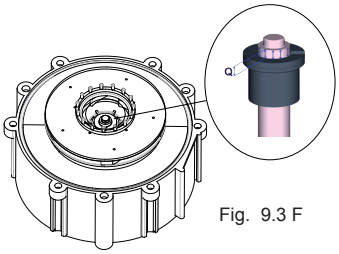


Fig. 9.3 F

## SAFETY RISKS

WARNING! MAGNETIC FIELDS. Magnetic pumps contain some of the most powerful magnets in existence. The magnets are positioned on the back of the impeller and the outer magnet housing. The magnetic fields may adversely affect persons fitted with electronic devices (e.g. pacemakers and defibrillators): such persons must not be allowed to handle magnetic pumps and magnetic pump components.
WARNING! MAGNETIC FORCE. Exercise extreme caution and follow instructions carefully during pump assembly/dismantling. Magnetic force attract (cause insertion of) internal and magnetic units, and are therefore a potential source of injury to fingers and hands.
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

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
13.magnets release a much greater specific weight and flow rate of liquid than planned
14.the magnets release due start-up made while impeller is CCW moving (feed-back of the liquid in the discharge side)

Pump discharge rate or pressure insufficient:

see 01, 02, 03, 04, 05, 06, 10, 11, 12, 13
15.system's resisting head is greater than expected
16.suction pipe, closing valve and other items have an insufficient nominal diameter
17.small geometric pump suction head
18.damaged or worn impeller
19.liquid viscosity greater than expected
20.excessive quantities of air or gas in liquid
21.elbow joints, check valves or other items on the outlet port
22.liquid (especially if hot) with tendency to change into gaseous state

Pump absorbs too much power:

see 19
23.pump operates at greater capacity than expected
24.specific weight of liquid is greater than expected
25.impurities inside pump create abnormal wear
26.electric motor supply voltage is not rated voltage

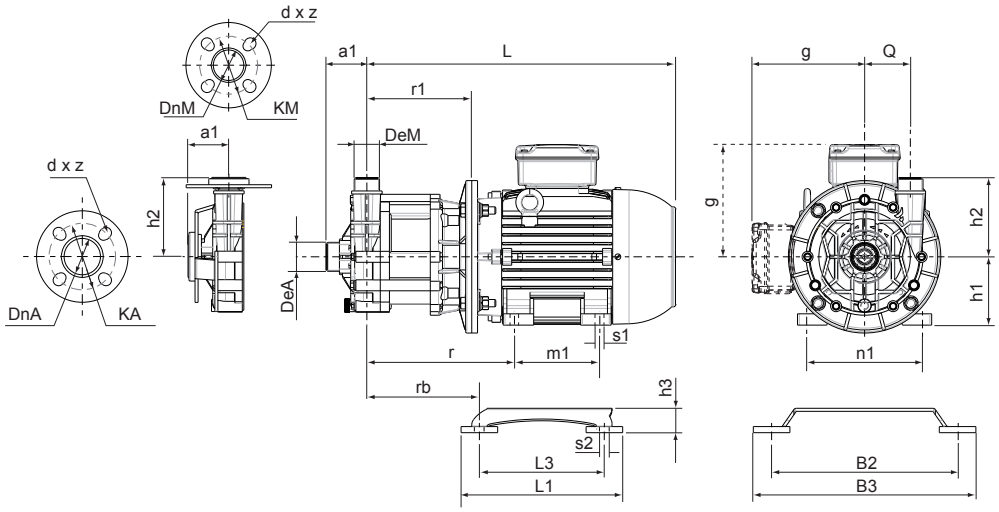
Pump vibrates and is noisy:

see 25
27.operates at full capacity (no head)
28.pump or pipes inadequately fixed
29.eccentric impeller operation because of worn bushes

Pump's internal parts wear out too quickly:

see 25
30.liquid excessively abrasive
31.recurring cavitation problems (see. 02, 15, 19, 17)
32.high tendency of liquid to crystallise or polymerise when pump is not operating.
33.pump made of materials that are unsuitable for pumped liquid
34.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(1) | Q | h1 | h2 | r | r1 | rb | m1 | n1 | s1 | g(1) | L3 | B2 | S2 | L1 | B3 | h3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| IEC - 50 Hz | 06.10 | N | 71 | 40 - 1" ½ | 32 - 1" ¼ | 1" ½ | 1" ¼ | 110 / 98 / 105 | 100 / 89 / 100 | 18 x 4 / 16 x 4 / 19 x 4 | 67 | 356 | 75 | 71 | 130 | 194 | 149 | 161 | 90 | 112 | 7 | 106 | 185 | 248 | 14 | 245 | 308 | 40 |
| | | P | 80A | | | | | | | | | 385 | | 80 | | 199 | | | 100 | 125 | 8 | 110 | | | | | | |
| | | S | 80B | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 10.10 | N | 80A | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | P | 80B | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | S | 90S | | | | | | | | | 405 | | 90 | | 205 | | | | 140 | | 142 | | | | | | |
| | 10.15 | N | 80B | | | | | | | | | 385 | | 80 | | 199 | | | | 125 | | 110 | | | | | | |
| | | P | 90S | | | | | | | | | 405 | | 90 | | 205 | | | 125 | 140 | | 142 | | | | | | |
| | | S | 90L | | | | | | | | | 430 | | | | | | | | | | | | | | | | |
| | 16.15 | N | 90S | | | | | | | | | 405 | | | | | | | 100 | | | | | | | | | |
| | | P | 90L | | | | | | | | | 430 | | | | | | | 125 | | | | | | | | | |
| | | S | 100 | | | | | | | | | 478 | | 100 | | 227 | 164 | 176 | 140 | 160 | 10 | 155 | 205 | 305 | | 259 | 359 | |
| | 16.20 | N | 90L | | | | | | | | | 430 | | 90 | | 205 | 149 | 161 | 125 | 140 | 8 | 142 | 185 | 248 | | 245 | 308 | |
| | | P | 100 | | | | | | | | | 478 | | 100 | | 227 | 164 | 176 | 140 | 160 | 10 | 155 | 205 | 305 | | 259 | 359 | |
| | | S | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 02.30 | N | 90L | | | | | | | | | 430 | | 90 | | 205 | 149 | 161 | 125 | 140 | 8 | 142 | 185 | 248 | | 245 | 308 | |
| | | P | 100 | | | | | | | | | 478 | | 100 | | 227 | 164 | 176 | 140 | 160 | 10 | 155 | 205 | 305 | | 259 | 359 | |
| | | S | | | | | | | | | | | | | | | | | | | | | | | | | | |

| | model | | IEC frame | DnA | DnM | DeA | DeM | KA iso / ansi / jis | KM iso / ansi / jis | d x z iso / ansi / jis | a1 | L(1) | Q | h1 | h2 | r | r1 | rb | m1 | n1 | s1 | g(1) | L3 | B2 | S2 | L1 | B3 | h3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| IEC - 60 Hz | 07.11 | N | 80A | 40 - 1" ½ | 32 - 1" ¼ | 1" ½ | 1" ¼ | 110 / 98 / 105 | 100 / 89 / 100 | 18 x 4 / 16 x 4 / 19 x 4 | 67 | 385 | 75 | 80 | 130 | 199 | 149 | 161 | 100 | 125 | 8 | 110 | 185 | 248 | 14 | 245 | 308 | 40 |
| | | P | 80B | | | | | | | | | 405 | | | | | | | | | | | | | | | | |
| | | S | 90S | | | | | | | | | 430 | | 90 | | 205 | | | | 140 | | 142 | | | | | | |
| | 07.14 | N | 80B | | | | | | | | | 385 | | 80 | | 199 | | | | 125 | | 110 | | | | | | |
| | | P | 90S | | | | | | | | | 405 | | 90 | | 205 | | | 125 | 140 | | 142 | | | | | | |
| | | S | 90L | | | | | | | | | 430 | | | | | | | | | | | | | | | | |
| | 11.15 | N | 90S | | | | | | | | | 405 | | | | | | | 100 | | | | | | | | | |
| | | P | 90L | | | | | | | | | 430 | | | | | | | 125 | | | | | | | | | |
| | | S | 100 | | | | | | | | | 478 | | 100 | | 227 | 164 | 176 | 140 | 160 | 10 | 155 | 205 | 305 | | 259 | 359 | |
| | 11.23 | N | 90L | | | | | | | | | 430 | | 90 | | 205 | 149 | 161 | 125 | 140 | 8 | 142 | 185 | 248 | | 245 | 308 | |
| | | P | 100 | | | | | | | | | 478 | | 100 | | 227 | 164 | 176 | 140 | 160 | 10 | 155 | 205 | 305 | | 259 | 359 | |
| | | S | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 17.25 | N | 112 | | | | | | | | | 487 | | 112 | | 234 | 164 | 176 | 140 | 190 | 10 | 168 | 205 | 305 | | 259 | 359 | |
| | | P | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | S | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 03.35 | N | 112 | | | | | | | | | 487 | | 112 | | 234 | 164 | 176 | 140 | 190 | 10 | 168 | 205 | 305 | | 259 | 359 | |
| | | P | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | S | | | | | | | | | | | | | | | | | | | | | | | | | | |

(1) can change for motors of different brands

dimension in mm

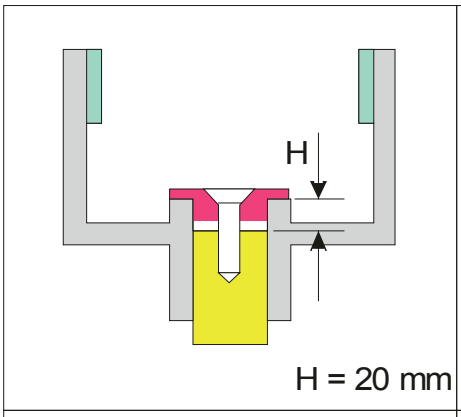
| | model | | IEC frame | DnA | DnM | DeA | DeM | KA (mm) iso / ansi / jis | KM (mm) iso / ansi / jis | d x z (mm) iso / ansi / jis | a1 | L(1) | Q | h1 | h2 | r | r1 | rb | m1 | n1 | s1 | g(1) | L3 | B2 | S2 | L1 | B3 | h3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| NEMA - 60 Hz | 07.11 | N | 56 | 40 - 1" ½ | 32 - 1" ¼ | 1" ½ | 1" ¼ | 110 / 98 / 105 | 100 / 89 / 100 | 18 x 4 / 16 x 4 / 19 x 4 | 2.65 | 14.94 | 2.94 | 4.5 | 5.125 | 8.44 | 6.625 | 7.125 | 3 | 7.5 | 0.41 | 5.44 | 8.06 | 12 | 0.56 | 10.2 | 14.13 | 10.2 |
| | | P | 56 | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | S | 145 | | | | | | | | | 16.94 | | 3.5 | | 8.125 | 5.875 | 6.34 | 5 | 5.5 | 0.375 | 5.9 | 7.28 | 9.75 | | 9.66 | 12.13 | |
| | 07.14 | N | 143 | | | | | | | | | 15.94 | | | | | | | 4 | | | | | | | | | |
| | | P | 145 | | | | | | | | | 16.94 | | | | | | | 5 | | | | | | | | | |
| | | S | 182 | | | | | | | | | 18.5 | | 4.5 | | 9.375 | 6.625 | 7.125 | 4.5 | 7.5 | 0.41 | 7 | 8.06 | 12 | | 10.2 | 14.13 | |
| | 11.15 | N | 145 | | | | | | | | | 16.94 | | 3.5 | | 8.125 | 5.875 | 6.34 | 5 | 5.5 | 0.375 | 5.9 | 7.28 | 9.75 | | 9.66 | 12.13 | |
| | | P | 182 | | | | | | | | | 18.5 | | 4.5 | | 9.375 | 6.625 | 7.125 | 4.5 | 7.5 | 0.41 | 7 | 8.06 | 12 | | 10.2 | 14.13 | |
| | | S | 184 | | | | | | | | | 19.5 | | | | 9.625 | | | 5.5 | | | | | | | | | |
| | 11.23 | N | 182 | | | | | | | | | 18.5 | | | | 9.375 | | | 4.5 | | | | | | | | | |
| | | P | 184 | | | | | | | | | 19.5 | | | | 9.625 | | | 5.5 | | | | | | | | | |
| | | S | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 17.25 | N | 184 | | | | | | | | | 19.5 | | 4.5 | | 9.625 | 6.625 | 7.125 | 5.5 | 7.5 | 0.41 | 7 | 8.06 | 12 | | 10.2 | 14.13 | |
| | | P | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | S | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 03.35 | N | 184 | | | | | | | | | 19.5 | | 4.5 | | 9.625 | 6.625 | 7.125 | 5.5 | 7.5 | 0.41 | 7 | 8.06 | 12 | | 10.2 | 14.13 | |
| | | P | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | S | | | | | | | | | | | | | | | | | | | | | | | | | | |

| IEC 50 HZ 2900 rpm | | | Model | 06.10 | | | 10.10 | | | 10.15 | | | 16.15 | | | 16.20 | | | 02.30 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Version | N | P | S | N | P | S | N | P | S | N | P | S | N | P | S | N | P | S |
| | | | | WR GF | WR GF | WR GF | WR GF | WR GF | WR GF | WR GF | WR GF | WR GF | WR GF | WR GF | WR GF | WR GF | WR GF | WR GF | WR GF | WR GF | WR GF |
| Weigh pump | no motor | Kg | | 3 4 | 3 4 | 3 4 | 3 4 | 3 4 | 3 4 | 3 4 | 3 4 | 3 4 | 3 4 | 3 4 | 3 4 | 3 4 | 3 4 | 3 4 | 3 4 | 3 4 | 3 4 |
| | + IEC 3 fasi (1) | Kg | | 10 11 | 11 12 | 13 14 | 11 12 | 13 14 | 16 17 | 13 14 | 16 17 | 20 21 | 16 17 | 20 21 | 25 26 | 20 21 | 25 26 | / / | 20 21 | 25 26 | / / |
| Max. head | | m.c.l | | 11 | | | 14.5 | | | 18 | | | 23.5 | | | 26.5 | | | 31 | | |
| Max. capacity | | $m^3/h$ | | 17 | | | 19 | | | 25 | | | 26 | | | 30 | | | 8 | | |
| Max. NPSH req.. | | m.c.l | | | | | | | | | | | | | | | | | | | |
| Noise | | dB | | 65 | | | 70 | | | 70 | | | 70 | | | 70 | | | 70 | | |
| Loads (ports-section) | | Kg | | Max. single strength value F(x,y,z) = 2,5 | | | | | | | | | | | | | | | | | |
| Motor | Frame | | | 71 | 80A | 80B | 80A | 80B | 90S | 80B | 90S | 90L | 90S | 90L | 100L | 90L | 100L | / | 90L | 100L | / |
| | Power | kW | | 0.55 | 0.75 | 1.1 | 0.75 | 1.1 | 1.5 | 1.1 | 1.5 | 2.2 | 1.5 | 2.2 | 3 | 2.2 | 3 | / | 2.2 | 3 | / |
| | Voltage | V | | 400 ± 5% 50 Hz | | | | | | | | | | | | | | | | | |
| | Phase | n° | | 3 - 1 (< 3 kW) | | | | | | | | | | | | | | | | | |
| | Protection | IP | | 55 | | | | | | | | | | | | | | | | | |

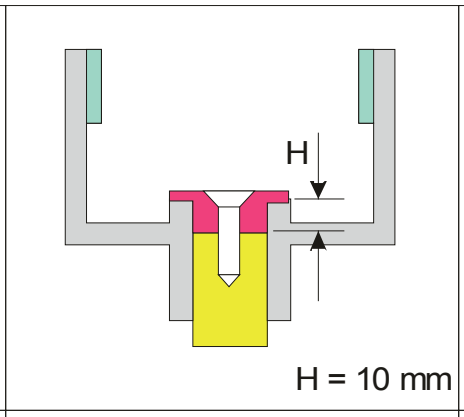
| IEC NEMA 60 HZ 3500 rpm | | | | Model | 07.11 | | | 07.14 | | | 11.15 | | | 11.23 | | | 17.25 | | | 03.35 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Version | N | P | S | N | P | S | N | P | S | N | P | S | N | P | S | N | P | S |
| | | | | | WR GF | WR GF | WR GF | WR GF | WR GF | WR GF | WR GF | WR GF | WR GF | WR GF | WR GF | WR GF | WR GF | WR GF | WR GF | WR GF | WR GF | WR GF |
| Weigh pump | no motor | | Kg | | 3 4 | 3 4 | 3 4 | 3 4 | 3 4 | 3 4 | 3 4 | 3 4 | 3 4 | 3 4 | 3 4 | 3 4 | 3 4 | 3 4 | 3 4 | 3 4 | 3 4 | 3 4 |
| | + IEC 3 phase (1) | | Kg | | 11 12 | 13 14 | 16 17 | 13 14 | 16 17 | 20 21 | 16 17 | 20 21 | 25 26 | 20 21 | 25 26 | / / | 34 35 | / / | / / | / / | 34 35 | / / | / / |
| | + NEMA 3 ph. (1) | | Lb | | 33 35 | 35 38 | 48 50 | 44 46 | 48 50 | 86 88 | 48 50 | 86 88 | 91 94 | 86 88 | 91 94 | / / | 91 94 | / / | / / | / / | 91 94 | / / | / / |
| Max. head | | | m.c.l | | 15.5 | | | 16.5 | | | 22 | | | 28 | | | 36 | | | 35 | | |
| Max. capacity | | | $m^3/h$ | | 15 | | | 19.5 | | | 24 | | | 27 | | | 30 | | | 10 | | |
| Max. NPSH req, | | | m.c.l | | | | | | | | | | | | | | | | | | | |
| Noise | | | dB | | 70 | | | 70 | | | 70 | | | 70 | | | 74 | | | 74 | | |
| Loads (ports-section) | | | Kg | | Max. single strength value F(x,y,z) = 2,5 | | | | | | | | | | | | | | | | | |
| Motor | IEC | Frame | | | 80A | 80B | 90S | 80B | 90S | 90L | 90S | 90L | 100L | 90L | 100L | | 112 | | | 112 | | |
| | | Power | kW | | 0.75 | 1.1 | 1.5 | 1.1 | 1.5 | 2.2 | 1.5 | 2.2 | 3 | 2.2 | 3 | | 4 | | | 4 | | |
| | | Voltage | V | | 460 ± 5% 60 Hz | | | | | | | | | | | | | | | | | |
| | | Phase | n° | | 3 - 1 (< 3 kW) | | | | | | | | | | | | | | | | | |
| | | Protection | IP | | 55 | | | | | | | | | | | | | | | | | |
| | NEMA | Frame | | | 56 | 56 | 145 | 143 | 145 | 182 | 145 | 182 | 184 | 182 | 184 | | 184 | | | 184 | | |
| | | Power | HP | | 1 | 1 ½ | 2 | 1 ½ | 2 | 3 | 2 | 3 | 5 | 3 | 5 | | 5 | | | 5 | | |
| | | Voltage | V | | 460 ± 5% 60 Hz | | | | | | | | | | | | | | | | | |
| | | Phase | n° | | 3 | | | | | | | | | | | | | | | | | |
| | | Protection | IP | | 55 | | | | | | | | | | | | | | | | | |

(*) can change for motors of different brands

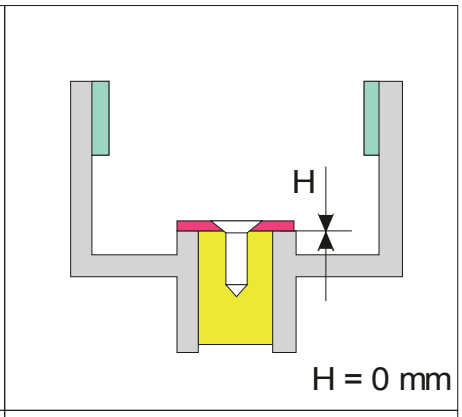
## POSITIONING DRIVE MAGNET ASSEMBLY



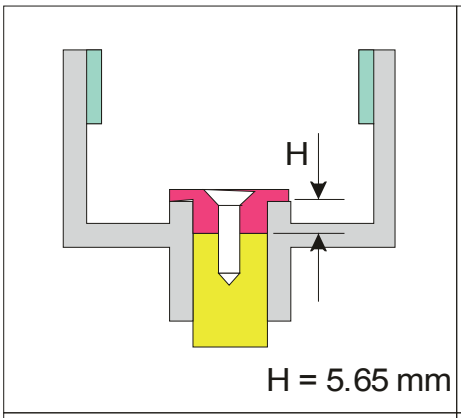

IEC 71



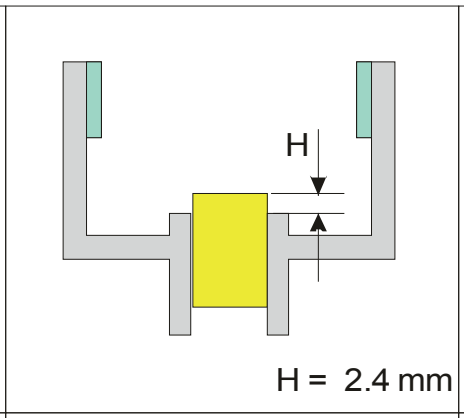

IEC 80



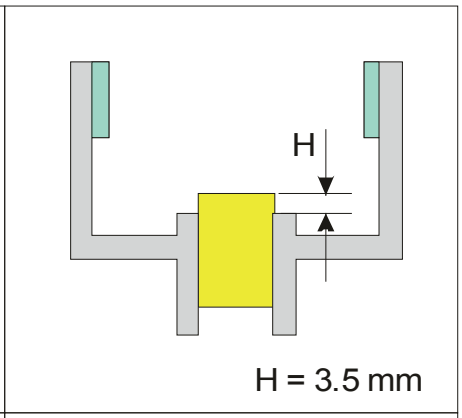

IEC 90



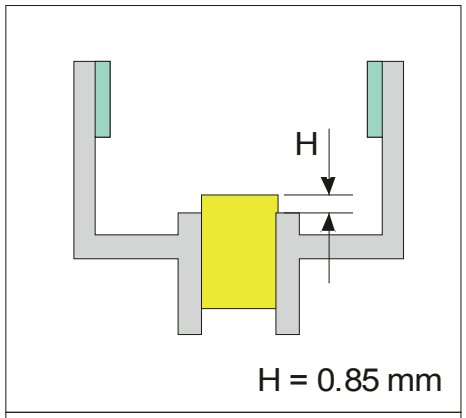

IEC 100-112



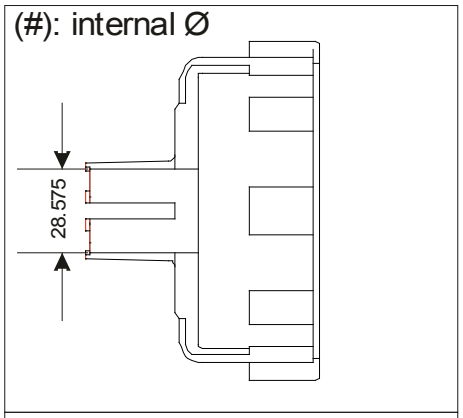

NEMA 56




NEMA 143-145




NEMA 182-184




NEMA 182-184

CAUTIONS

- Verify that there are not demage to motor shaft, fan cap, motor feet, terminal box
- Verify that the nameplat data are correct
- Verify that shaft is perfecly clean from greese or dust, unlike use alcohol to degrease shaft.

## MANUFACTURER DATA

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

| | |
|---|---|
| Administration: | Tel: 030 3507019 |
| Export manager: | Tel: 030 3507022 |
| Customer service: | Tel: 030 3507025 |
| Web: | www.argal.it |
| E-mail: | sales@argal.it |


| CONTRACTUAL DATA | |
|---|---|
| medium _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ | |
| conc. % _ _ _ _ _ _ _ | temperature °C _ _ _ _ _ _ _ |
| capacity $m^3/h$ _ _ _ _ _ _ | head m _ _ _ _ _ _ _ |

| w.o. |
|---|
| _ _ _ _ _ _ _ _ _ |
| |

REV. 18 - 11/09

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