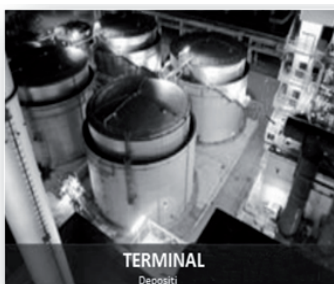


USER and MAINTENANCE MANUAL



P.D. Meters BM Series

MA/0004/00/EN/12
rev. 07/2020



FOREWORD

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GENERAL CONSIDERATION

All operating and maintenance instructions and recommendations described in this manual must be respected. The Manufacturer recommends regular cleaning and maintenance to keep the device in the best conditions and achieve optimal results. Training of the user is of particular importance, both as regards the use of the equipment, and for maintenance and compliance with the operating procedures and all the safety standards indicated in this manual. In any case, the Manufacturer is always available for any clarification or further information.

Isoil Impianti S.p.A. reserves the right to update and improve the products without obligation of notice and notification. **Isoil Impianti S.p.A.** is not liable for the use of data that may have been modified.





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ATTACHMENTS

BM 200 WITH MECHANICAL COUNTER OVERALL DIMENSIONS.....	dwg.7885/M
BM 400 WITH MECHANICAL COUNTER OVERALL DIMENSIONS.....	dwg. 7886/M
BM 600 WITH MECHANICAL COUNTER OVERALL DIMENSIONS.....	dwg. 7887/M
BM 200 WITH PULSE EMITTER OVERALL DIMENSIONS.....	dwg.7885/1M
BM 400 WITH PULSE EMITTER OVERALL DIMENSIONS.....	dwg. 7886/1M
BM 600 WITH PULSE EMITTER OVERALL DIMENSIONS.....	dwg. 7887/1M
BM 200 ASSEMBLY.....	dwg.6980/M
BM 400 ASSEMBLY.....	dwg. 6254/M
BM 600 ASSEMBLY.....	dwg. 6979/M
MECHANICAL SEAL.....	dwg. 5649/M
MAGNETIC TRANSMISSION.....	dwg. 6478/M
CALIBRATION MECHANISM.....	dwg.672/M

GLOSSARY SYMBOLS

The instructions in this manual may be accompanied by the following pictograms:

SYMBOL	MEANING
	Safety instruction: failure to observe may result in a dangerous situation
	Important tips and recommendations
	Prohibition
	Remarks about maintenance

1. INTRODUCTION

1.1. IDENTIFICATION OF THE DEVICE

DEVICE	TYPE
P.D.METER	BM 200/400/600

The following name plate is permanently fixed on the device .

CE *		11			
Item	1	Year	2	S/N	3
TS	4	°C	DN	5	
PS	6	bar	Flow Rate Min	7	L/min
PT	8	bar	Flow Rate Max	9	L/min
Fluid	10				

* In case of CE marking only

1. ITEM: p.d. meter model
2. YEAR: production year
3. S/N: serial number
4. TS: design temperature range
5. DN: nominal diameter
6. PS: maximum design pressure
7. FLOW RATE MIN: minimum flow rate of the p.d. meter
8. PT: test pressure
9. FLOW RATE MAX: maximum flow rate of the p.d. meter
10. FLUID: product
11. Manufacturer information



Data field layout in the name plate may change.

When ordering please specify serial number and type/model of device.

1.2.1. NAME PLATES AND LABELS

On the device there may be warning labels or name plates indicating the correlation between the meter and its electronic counter. When required, metric plates are fixed on the device according to PED, ATEX or MID standards.

1.3. EU CONFORMITY DECLARATION

The EU conformity declarations are supplied separately but they are to be considered as an integral part of this service and operator's manual

1.4. WARRANTY

1.4.1. VALIDITY

Devices are guaranteed for twelve months after the delivery date unless otherwise agreed in the purchasing order.

1.4.2. CONDITIONS

The warranty covers only manufacturing or manufacturing defects and does not cover damage due to wear, dirt, modifications or variations of the instrument not authorized by Isoil Impianti S.p.A.. The replacement under warranty of the defective parts is made ex works.

1.4.3. EXCLUSIONS AND LIMITATIONS

Warranty is valid only if original spares are used and it is null and void in case of improper use or when the technical specification of the instrument are not respected. Isoil Impianti S.p.A is the sole authority with the right to decide if the warranty can be applied. If the supply contract provides for different warranty conditions, the standard warranty conditions will be exceeded by those agreed upon in the purchasing order.

2. GENERAL SAFETY PRINCIPLES

This operator's manual contains basic safety instructions that must be followed during system installation, operation and maintenance. Failure to comply with these instructions may result in personal injury and can lead to personal, industrial or environmental accidents.

Some examples of possible hazards caused by non-compliance with these instructions are:

- Failure of the system and/or of its components.
- Damages to people caused by exposition to electrical, mechanical or chemical hazard.
- Pollution of the environment due to the leaking of hazardous substances.

Carefully follow the safety instructions described in this manual; in case of doubt, please contact the Manufacturer.

2.1. GENERAL INSTRUCTIONS

- Carefully read the User and Maintenance Manual.
- Make sure that all the personnel assigned to the installation, operation and maintenance is properly trained.
- Make sure that the contents of the User and Maintenance Manual are completely understood by all personnel assigned to the operations on the system.
- Inspect parts under pressure in compliance with national regulations before the installation of the system.
- Make sure that a copy of the User and Maintenance Manual is available to the personnel on site.
- Make sure that the system operates in compliance with the relevant operational limits.
- The operators must also adhere to the national laws and to the safety, accident prevention and environmental protection regulations applicable to the location and field in which the devices are used.

2.2. DEVICE OPERATION

- The device must be operated exclusively by the personnel trained and authorized to its operation
- The device must not be operated in presence of foreign, unauthorized or not adequately trained personnel.
- The device must be used only for the purposes it was made for; the manufacturer is not responsible for any damage resulting from failure to comply with the conditions of use.
- The device must be operated only within the technical limits described in the User and Maintenance Manual; the Manufacturer is not responsible for any damage resulting from failure to comply with the operational limits






2.3. INSTRUCTIONS FOR THE OPERATOR

- The operator must not, on own initiative, carry out any operation that is outside his competence.
- The operator must carefully comply with all the safety instructions contained in this manual.
- Do not use petrol, solvents or other flammable substances to clean the device or its parts. Use only approved commercial solvents that are non-flammable and non-toxic.

2.4. MAINTENANCE INSTRUCTIONS

- Carefully read the name plates on each part of the equipment.
- All maintenance operations, either ordinary or extraordinary, must be performed by authorized and trained personnel.
- The maintenance operator must wear adequate clothing according to the working environment and to the situation: loose or voluminous clothes, chains, bracelets, rings, earrings or anything that might get caught in the mechanical parts of the system must be avoided.
- The maintenance operator must wear adequate protective devices in accordance with safety and accident-prevention regulations.
- In explosive environments use only anti sparking equipment.

As an example, basic individual protections are indicated below.

PERSONAL PROTECTIVE EQUIPMENT		
	Safety helmet	Protects from elements or substances that may fall from above or from possible risks of collision
	Work clothes	Appropriate clothing e.g.: to protect from getting caught in any moving part of a device or of the plant
	Safety goggles	Protect eyes from any contact with hot or corrosive substances
	Safety gloves	If there is a danger of injury to the hands due to very hot substances and / or corrosive or sharp parts
	Safety boots	Protect from the fall of heavy elements and from hot or corrosive substances



Carefully check that the system and its parts are not under pressure before disassembling the equipment or its accessories for inspection, maintenance or replacement of components.
Also make sure that all electric or electronic part, if any, are disconnected from their power supply.

2.5. EXPLOSION PROTECTION INSTRUCTIONS



When working in potentially explosive atmospheres, carefully follow the explosion protection instructions indicated in this chapter.

In potentially explosive atmospheres only use explosion-proof components provided with specific identification and suitable for such application.

According to EU Directive 2014/34/EU (ATEX) the Ex protection is valid only if the p.d. meter is used in compliance with the instructions at par.3.1 (intended use).



Never exceed (above or below) the limits indicated on the device name plate.



Absolutely avoid unauthorized operation modes.

2.5.1. TEMPERATURE CLASS

ATEX Marking: Ex II 2 G Ex h IIB T6...T4 Gb.

Temperature classes according to the maximum liquid temperature are indicated in the following table:

MAX ALLOWED TEMPERATURE OF THE LIQUID	TEMPERATURE CLASS ACCORDING TO ISO 80079-36 DIRECTIVE
100 °C	T4
70 °C	T5
50 °C	T6

3. TECHNICAL DESCRIPTION

3.1. INTENDED USE

ISOIL positive displacement meters are precision measuring instruments designed for use with a variety of petrochemical products and liquids. Each meter is tested and calibrated in the factory before shipment.

A good and regular maintenance ensures perfect operation with high precision over time.

The equipment has been designed and built to operate safely but it is necessary to comply with the following indications:

- Use it within the technical limits indicated on the contract and/or in this manual;
- Follow the procedures mentioned in this manual;
- Do not exceed maximum pressure and flow rate indicated on the label;
- Use the special tools to perform all the assembling / reassembling procedures;
- Schedule ordinary maintenance (periodic check with proving tanks);
- Perform extraordinary maintenance promptly if necessary;
- Do not disable safety devices.

3.2. MAIN COMPONENTS

P.d. meters are composed of the following parts, as shown in f g.1.

1	Manifold
2	Body
3	Rotor
4	Vanes

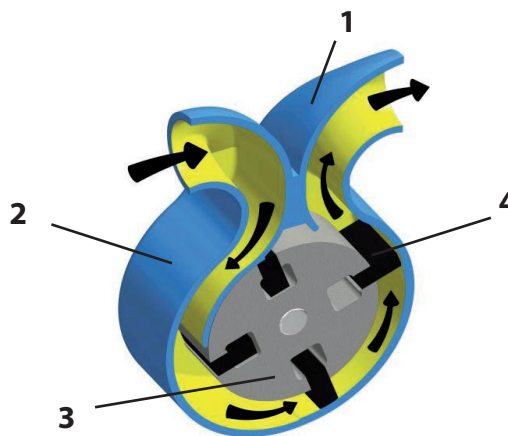


Fig.1

3.2.1. WORKING PRINCIPLE

P.d. meters are measuring instruments for liquids.

Fluid enters the meter through the manifold thus exerting pressure on the vanes and rotating the rotor inside the measuring chamber.

Since the measuring chamber has a fixed and known volume for each meter type, flowing liquid can be measured by multiplying the number of rotor rotations by the measuring chamber volume.

The meter is equipped with a counter, either mechanical or electronic, in order to calculate the number of rotations and the total flow.

3.3. OPERATING PRECAUTIONS

The meter must be calibrated following the instructions of the User Manual and in the Manual of Petroleum Measurement Standards (API) with particular attention to the following chapters:

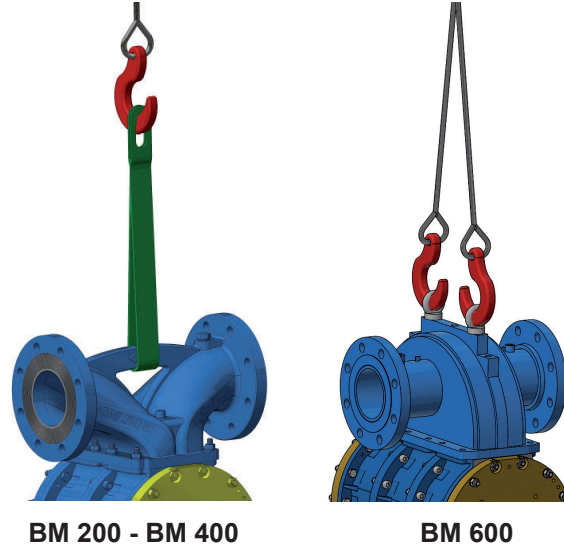
- *Chapter 4: "Proving systems"*
- *Chapter 5: "Metering"*
- *Chapter 6: "Metering assemblies"*
- *Chapter 11, section 2.3: "Water calibration of volumetric provers"*
- *Chapter 12, section 2: "Calculation of petroleum quantities"*.

4. INSTALLATION AND OPERATION

4.1. HANDLING



Handle the P.D Meter with a suitable lifting device: use straps / ropes of appropriate length and capacity by positioning them as shown in the figure.



BM 200 - BM 400

BM 600

4.1.1. WEIGHTS AND PACKAGING

The weights and dimensions are purely indicative and refer to standard bare shaft configuration.

Type	Flanges ANSI 150 RF	Weight (kg)
BM 200	3"	70
BM 400	4"	108
BM 600	6"	155



During shipment, the electrical and process connections are protected by special plugs. **These must not be removed** until installation in the system.

4.2. INSTALLATION REQUIREMENTS

- The material and equipment operating conditions must be compliant with plant and environmental requirements. Please check the data on the nameplate.
- Root valves installation at the inlet and outlet is recommended to ease servicing operations.



The device is not suitable for installation in plants where vibrations are transmitted along the pipes. Under these conditions, the customer must provide for an adequate system of staffing of the pipes and, if necessary, a damping system.



Flow through the meter must be regular and uniform: avoid pulsating and irregular flow.



Before installation of the p.d. meter ,cleaning of the plant pipings is suggested to remove dirt and foreign particles, especially in the case of a new plant.



Leave enough space around the device to easily perform commissioning, servicing and disassembly



If the device is installed in a section of pipe intercepted by two valves, this section must be protected by an adequate thermal relief valve against the thermal expansion of the liquid.

4.3. INSTALLATION



The installation must be performed by qualif ed personnel who have read and understood the maintenance and operator’s manual.

For p.d. meters with mechanical counter only

USER GUIDELINES WARNING	
BEFORE USING THIS METER FILL THE CALIBRATION MECHANISM WITH SAE 10 LUB OIL UP TO SIGHT GLASS LEVEL. TO AVOID FREEZING DURING WINTER ADD 10ml OF ANTIFREEZE CAR ADDITIVE TO THE OIL	IN ORDER TO PROTECT THE METER, A SUITABLE STRAINER OF NOT LESS THAN: 100 MESH FOR GASOLINE, 60 MESH FOR DIESEL AND 40 MESH FOR OIL MUST BE INSTALLED UPSTREAM OF THE METER.
IN CASE OF PROLONGED INACTIVITY FILL THE METER WITH DIESEL OIL OR LUB OIL.	RESIDUAL DIESEL OIL OR LUB OIL MAY BE PRESENT IN THE METER! ISOIL CANNOT BE HELD LIABLE FOR ANY PRODUCT CONTAMINATION: WASH THE METER CAREFULLY WHEN CHANGING PRODUCT.
WATER MUST NOT ENTER THE METER	
FOR FURTHER INFORMATION SEE THE SERVICE AND OPERATOR’S MANUAL <small>ISOIL cat.135</small>	



Make sure that the f ow direction through the device is the same indicated by the arrow on the device itself.



The line upstream of the meter must always be full of product to avoid air from entering the meter’s measuring chamber. If the pipe allows reversal f ow, a non-return valve must be installed.



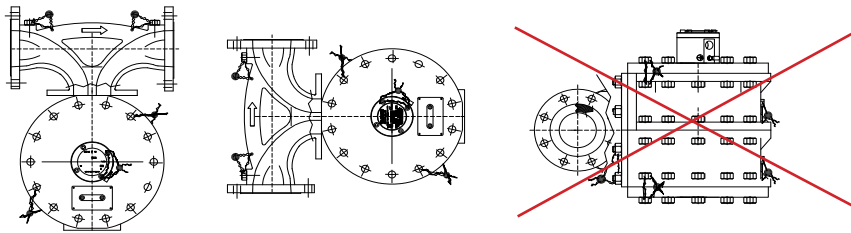
In the event that the f ow rate of the line exceeds the maximum f ow rate of the volumetric meter, it is necessary to install a f ow limiting valve downstream of the meter itself.



To protect the meter from possible damages due to foreign particles in the product, install a suitable strainer with correct mesh type upstream of the meter.

MESH	VISCOSITY	MESH	VISCOSITY	MESH	VISCOSITY
40	20 -150 cSt	60	6 - 20 cSt	100	< 6 cSt

BM p.d. meters can be installed horizontally or vertically. In both cases the rotor axis must be kept horizontal.



- To ensure the seal between flange and pipe a gasket must be inserted between the flanges. The gasket must be suitable to the product.



Check that the connections between the equipment are adequately tight. The connected pipes must not exert any force/load on the device: the device is designed to support only its weight, the pipes or other devices connected to it must be equipped with appropriate supports.



Meters must be installed in such a way that air or vapor cannot enter the liquid under measurement. It is suggested to install an air separator upstream of the meter.

When starting the equipment for the first time, slowly fill it in with operating fluid as follows:

- Slowly open the upstream isolation valve;
- Slowly open the downstream isolation valve making flow rate rise smoothly to the operating value.

4.3.1. PUMP INSTALLATION

Carefully follow the recommendations of the Manufacturer:

- In order to minimize problems due to air and vapors when installing pumps, pay particular attention to factors such as the use of foot valves, inlet pipes dimension and conformity with NPSH when there are suction pumps.
- For flashing of liquids (quick gasification of the liquid) or easily vaporising liquids at high environmental temperatures, e.g. light hydrocarbon, it is advisable to use submerged or submersible aspirations and pipes larger than the nominal dimension of the pump.

5. MAINTENANCE

Maintenance includes interventions (inspection, verification, control, adjustment and replacement) that become necessary due to normal use of the device.



Maintenance personnel must be well trained and must perform all work carefully, adhering to all necessary safety measures. Non-authorized personnel must not stay in the working area during maintenance operations.

Maintenance operations can be divided operationally into two main categories:

Ordinary maintenance	All those operations that the operator must carry out, preventively, to ensure correct operation over time
Extraordinary maintenance	All those operations that the operator must carry out when the device needs it.

Before removing the device from pipeline for any repair, check the Troubleshooting table in this manual.



When starting the equipment after any maintenance, slowly fill it in with operating fluid as follows:

- Slowly open the upstream isolation valve;
- Slowly open the downstream isolation valve making flow rate rise smoothly to the operating value.

5.1. ORDINARY MAINTENANCE

The maintenance table reported below is purely indicative. The user must define a maintenance schedule according to the real operating conditions of the device.

Servicing intervals may greatly vary depending on the product, the environmental conditions, the actual workload, the operating conditions etc.

Isoil Impianti S.p.A. accepts no responsibility for the breach of the instructions of use mentioned in this manual.

DEVICE	MONTHLY	6 MONTHS	12 MONTHS	24 MONTHS
Meter	CV			
Body, rotor and vanes inspection				Rev

CV: Visual inspection

Rev.: General revision check

5.1.1. GENERAL REVISION CHECKS

The following list for meter check is purely indicative and it is the result of our experience in the field. Proceed as follows:

COMPONENT	REVISION CHECK
Body	Turn rotor shaft in the opposite direction to the arrow on the manifold by using the special tool. the rotor must rotate without any problem.
	Check status of bearings.
	Check status of the gaskets and their slots.
Calibrating mechanism	Check if the gears work properly.
	Check the oil level.
	Visually inspect the calibrating mechanism for integrity (i.e. breaking of gear-teeth or pins).
Rotor/ vanes	Check if vanes are damaged or worn out. If so, replace them.

5.2. EXTRAORDINARY MAINTENANCE

The user must define a maintenance schedule according to the fluid used, the operational conditions, the estimated/actual workloads and the environmental conditions.

For all extraordinary maintenance needed after a failure and/or a fault preventing normal operation of the system, please contact the Customer Care Department of Isoil Impianti S.p.A..

5.3. DISASSEMBLY



All parts under pressure must be released before disassembling the meter or its accessories for adjustment inspection, servicing or substitution of its components.

Also make sure that all electric or electronic parts, if any, are disconnected from their power supply.

For maintenance operations and spare parts ordering, see attached drawings.



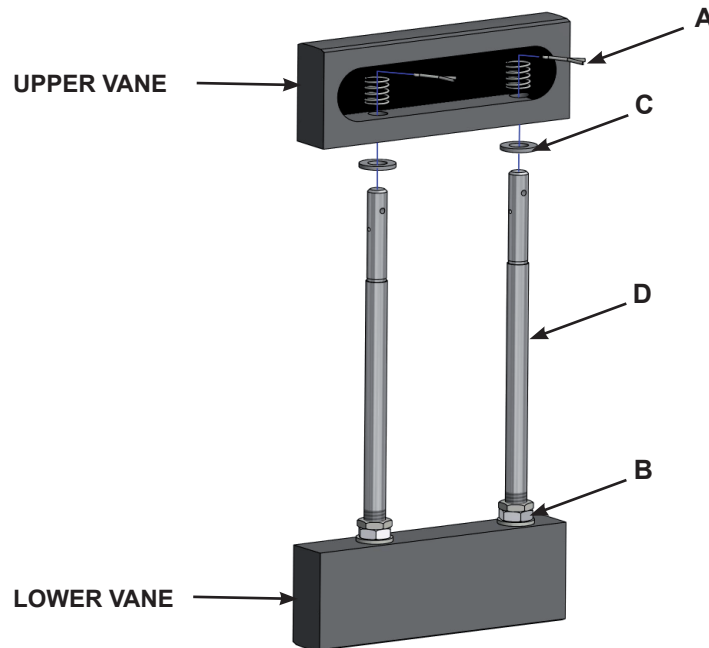
**Gaskets dimensions may be altered due to contact with operating fluid.
We suggest to always have a gasket kit when performing maintenance operations.**

5.3.1. VANES DISASSEMBLING

NOTE: Never remove the vanes unless they are damaged or worn out.

Vanes are not interchangeable and, if they can be reused, they must be placed in their original position. Marking each vane and each slot will therefore ease the reassembling procedure.

Vanes disassembling can be performed as indicated in the table: refer to the drawing below.



Step	Action
1	Mark each vane and each corresponding slot in the rotor.
2	Remove the split pins (pos. A) on the upper vane Do not loosen or remove the vanes adjusting nuts (pos.B).since vanes clearance inside the measuring chamber may change.
3	Remove the upper vane and its springs.
4	Remove the two washers (pos.C). Keep the washers in the original position and do not turn them upside down.
5	Extract the lower vane from the rotor together with its tie-rods (pos. D).



Do not trade places of the vanes tie rods.

5.3.2. REASSEMBLY

Reassembly is the exact reversal of the disassembling procedure.

5.4. CALIBRATING MECHANISM (FOR MECHANICAL COUNTER ONLY)

The calibrating mechanism includes a group of gears which transmits movement from the rotor to the counter. Operational failures of this mechanism are rare and they generally include breaking of tension pins due to an excessive strain.(see dwg.672/M).

It is recommended to carry out repairs without changing the calibration setting.

5.4.1. FLOW METER CALIBRATION

To carry out meter calibration follow the procedure indicated here below (see Fig.2):

Step	Action
a.	Remove the plug (pos.8) under the housing (pos. 1) and drain the lubricant oil;
b.	Break and remove seals (pos. 10) on the cover (pos. 11);
c.	Remove the three screws (pos. 9) securing the cover to the housing (pos. 1) in which calibrating mechanism is fitted (pos. 7);
d.	Remove cover (pos. 11);
e.	By using a square key (4 mm) (pos. 5) turn the shaft (6) till the holes (pos. 3a -3b-3c) on the bracket and on friction roller are properly aligned;
f.	Insert the stop pin (pos. 4) in this hole (pos. 3) then using the square key (pos. 5) operate on the shaft (pos. 6) as follows: <ul style="list-style-type: none"> • By turning it in counter-clockwise direction, even if the quantity of fluid does not vary, an higher volume indication appears on the counter; • By turning it in clockwise direction a smaller volume indication is shown <p>Note: one complete turn of the screw varies the volume indicated on the meter by approximately 0,18%.</p>
g.	Put the cover (pos. 11) back to the housing, screw the screws (9) and set the seals (10); then fill the housing with lube oil.

Square key (pos.5) and stop pin (pos.4) are always supplied when the p.d.meter has a mechanical counter.

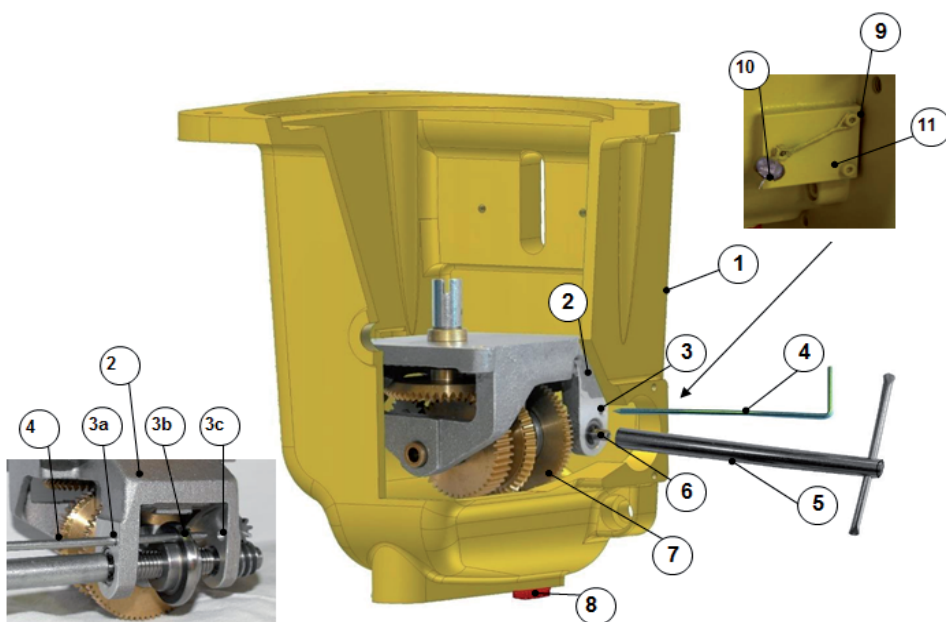


Fig.2a

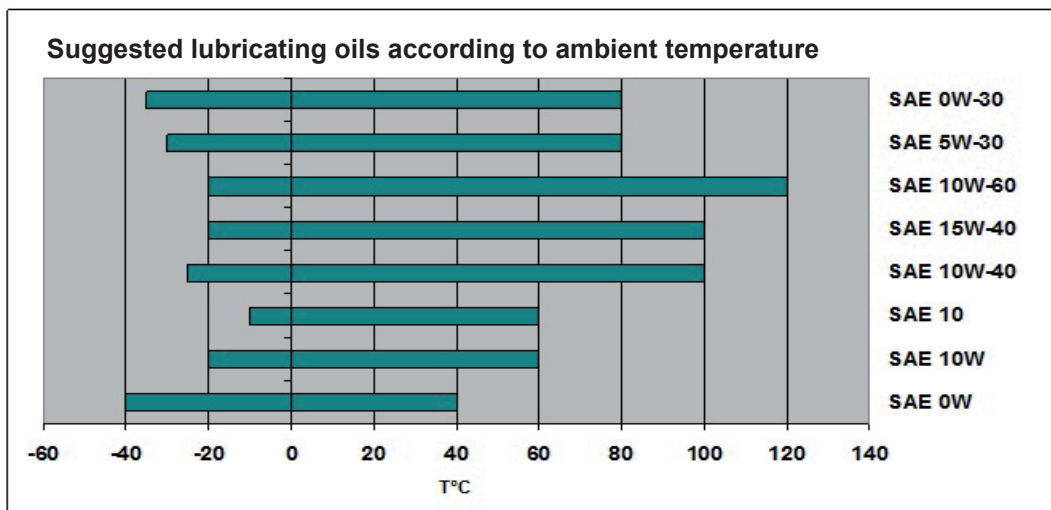
Fig.2

5.5. SUGGESTED LUBRICATING OILS FOR CALIBRATING MECHANISM

To allow proper lubrication of the gears, follow the procedure below:

Step	Action
1	Fill the box with lubricating oil by using the black plug on the side of the calibrating mechanism box (pos. 4 dwg.672/M)
2	Make sure that the oil level reaches the sight glass. (pos.13 dwg.672/M)

In Table 1 here below you can choose the lubricating oil according to the expected ambient temperature range during installation / operation.



The oil suggested by ISOIL for standard application is SAE10 for a temperature range from -10°C to $+60^{\circ}\text{C}$. To avoid ice forming in wintertime, add 10 ml of car antifreeze.

5.6. TESTS AFTER OVERHAUL

After overhaul the p.d. meters must be tested with suitable proving systems.

Error between the value stated by the p.d.meter counter and the value stated by the proving device is calculated as below:

Example:

Measured by the meter	Measured by the proving tank	Error (%)
1000 l	1003 l	-0,3%
1000 l	997 l	+0,3%

The formula is:

$$E \% = \frac{V - V_0}{V_0} \cdot 100$$

V = Measured by the meter

V_0 = Measured by the proving tank

5.7. STORAGE

If the meter and its accessories are not going to be installed and used after receipt, follow the instructions below:

- Close the inlets and outlets of the meter and of its accessories with blind flanges and fill all the devices with clean kerosene or lubricated oil.
- Fill the carter of the calibrating mechanism with oil till the sight glass level is reached.
- Protect counters with waterproof bags.

If after a working period the meter has to be stored for a long time, follow this procedure:

- Drain the meter and its accessories, close the inlets and outlets of the meter and of its accessories with blind flanges and fill all the devices with clean kerosene or lubricated oil.
- Fill the carter of the calibrating mechanism with oil till the sight glass level is reached.
- Protect counters with waterproof bags.

5.8. SPARE PARTS



Provide serial number and type / model of the device.
Specify exact code number shown on drawings

In case of gaskets storage, remember that they need to be preserved from damages caused by humidity and/or sunlight.



Spare parts must be stored carefully. Pay attention that:

- Parts protected with oil are properly lubricated;
- Packaging is not damaged/broken;
- Spare parts are kept in a dry place.

For correct maintenance use only spare parts recommended by Isoil impianti S.P.A.

Isoil Impianti S.p.A. is not liable for any problem resulting from the use of non original spare parts.

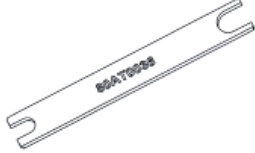
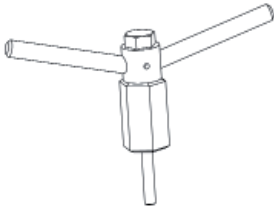
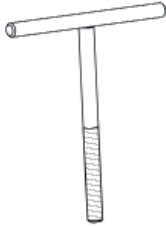
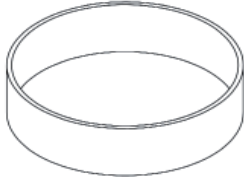
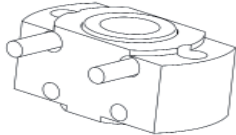
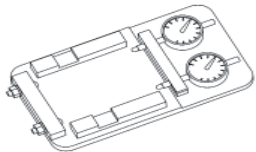
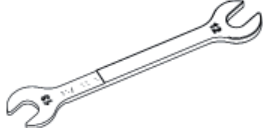
5.9. TROUBLESHOOTING

This table illustrates a few examples of possible breakdowns.

For further information contact the Customer Service Dept. of ISOIL Impianti S.p.A.

F... T	POSSIBLE CAUSE	CORRECTIVE ACTION
Liquid is flowing with normal flow rate but counter fails to register.	With mechanical counter	
	Defective mechanical counter	Remove and check the counter by rotating bottom coupling
	Drive from the rotor fails to reach the counter due to sheared pin in the calibrating mechanism.	Check pins of the calibrating mechanism. Check the presence of lubricating oil in the mechanical box
	With electronic counter	
	Electrical connection between EM6422 and electronic counter	Check electrical connection between EM6422 and electronic counter
	Defective electronic counter	See operator's manual for electronic counter
	Defective encoder EM6422	See operator's manual for EM6422
No liquid passing through p.d.meter	Control valve downstream of p.d.meter is closed	Check the correct operation of the control valve
	Clogged strainer basket	Clean strainer basket
	Jammed rotor assembly	Inspect front, rear covers and rotor for scoring marks. Inspect vanes and bearings for damage.
	Causes of rotor jamming :	
	Solid particles trapped on rotor surface	Clean rotor surfaces. Check strainer basket.
	Rotor bearings jammed	Clean bearings and cover and inspect them for damage
	Rotor bearings worn out	Replace the bearings, if excessive clearance is observed
	Broken vanes	Replace vanes
Liquid is leaking from the joint between front cover and calibrating mechanism (for mechanical counter)	Rotor spindle seal is damaged	Replace spindle seal. Inspect rotor spindle for wear and/or scratch marks
Liquid is leaking from the joint between front cover and body or rear cover and body	Damaged or dirty O-rings, loose cover bolts	Clean o-rings, replace o-rings and check the tightening torque of the screws/bolts
Excessive fluid delivery beyond 1%.	Damaged/worn out vanes	Inspect and replace damaged/worn vanes
	Excessive bearing clearance	Replace the bearings, if excessive clearance is observed

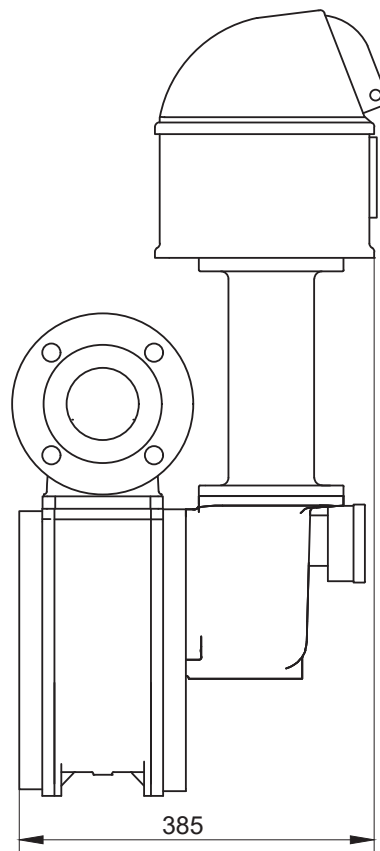
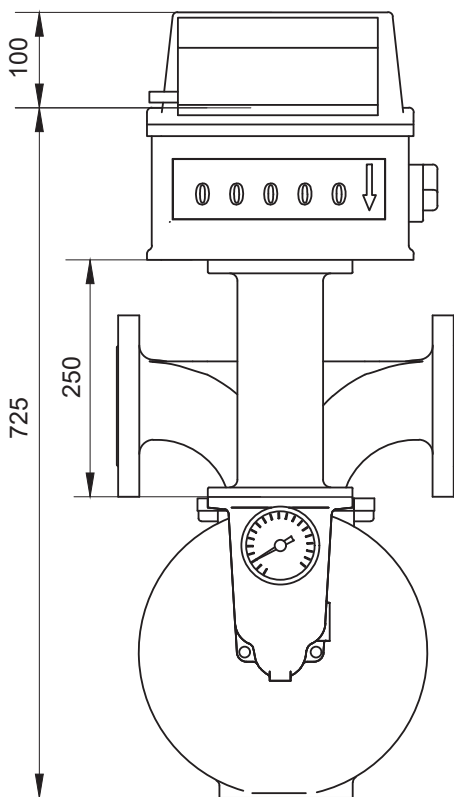
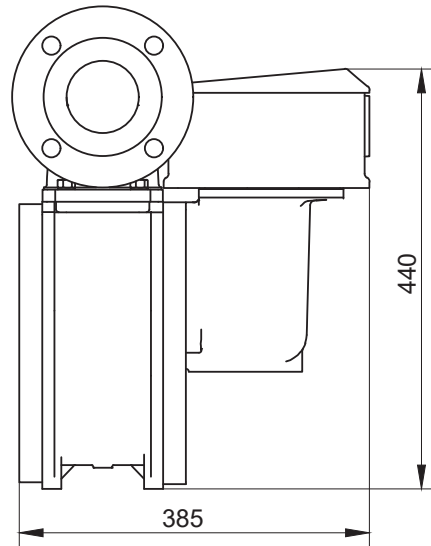
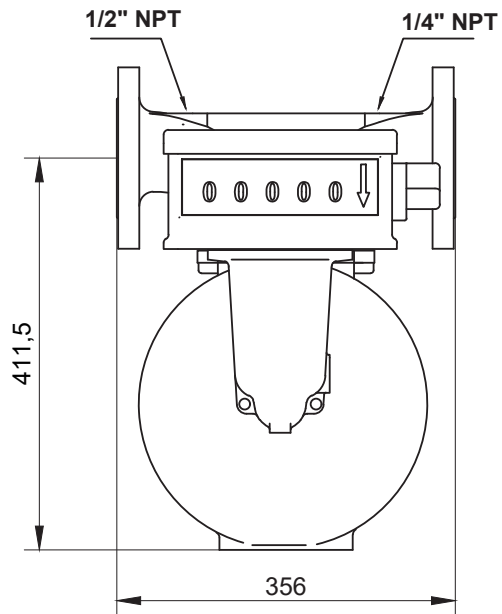
6. SPECIAL TOOLS

DESCRIPTION	USAGE	FIGURE
Spring compression tool. Code 80AT0036	To compress vane spring when assembling or dismounting split pins.	A 
Rotor removal and turning tool. Code 80AT0039	To remove the rotor	B 
Cover removal tool (n.2 pieces are necessary). Code 80AT0042	To extract meter cover	C 
Ring support tool. Code 80AT0048	To support the meter during disassembling and/or reassembling	D 
Bearings extractor. Code 80ES0012	To disassemble the internal ring of the bearing when the external ring is broken	E 
Vanes checking tool. Code 80AT0057	To measure the vanes length.	F 
Special spanner for vane adjustment. Code 80AT0040	To tight adjusting nuts when calibrating vane assembly.	G 

CONTATORE BM 200
BM 200 P.D. METER

DIS. 7885/M

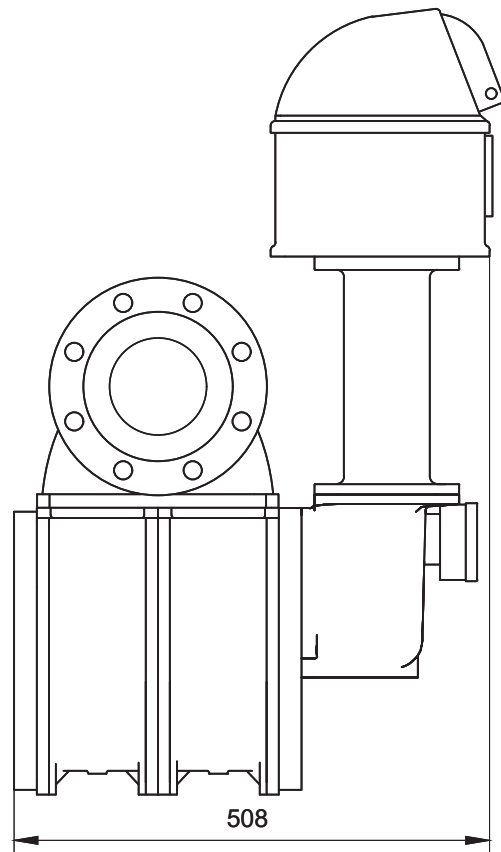
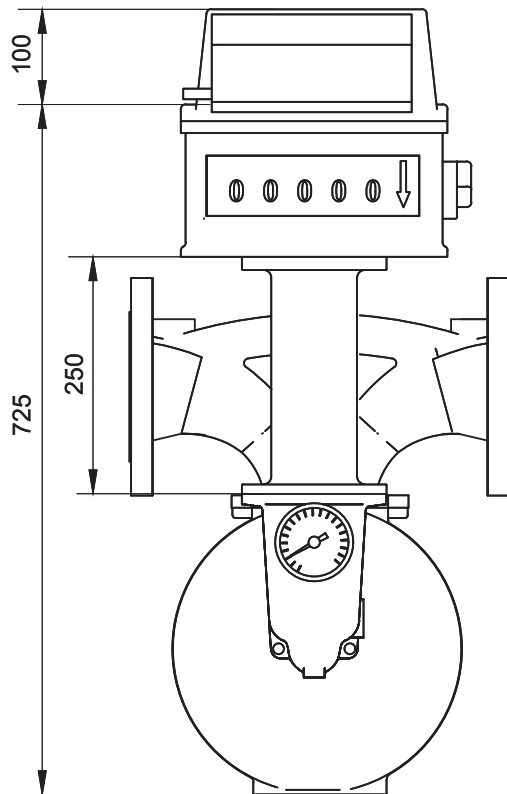
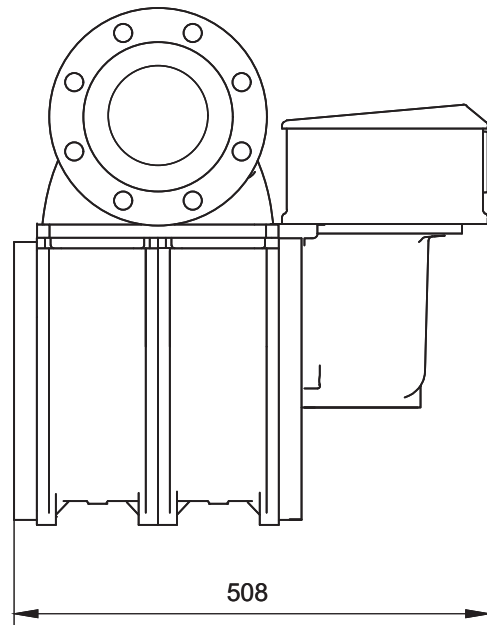
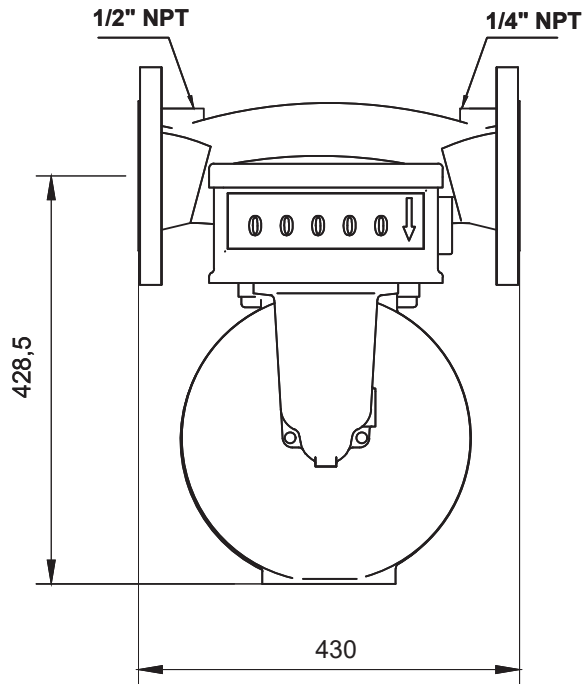
REV.: /



CONTATORE BM 400
BM 400 P.D. METER

DIS. 7886/M

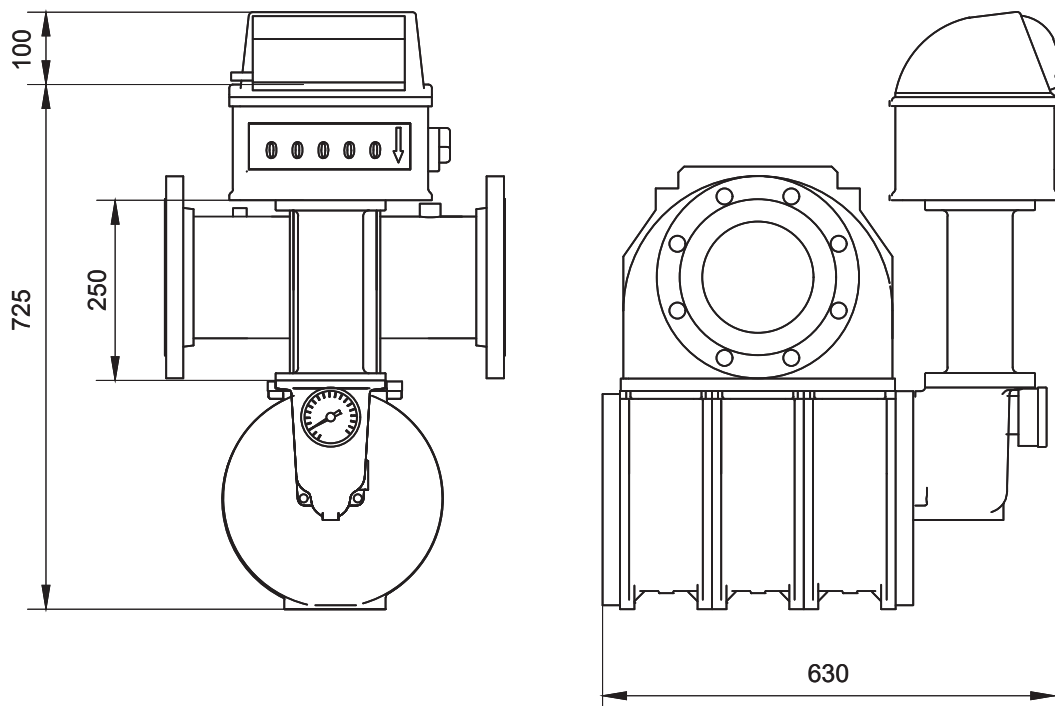
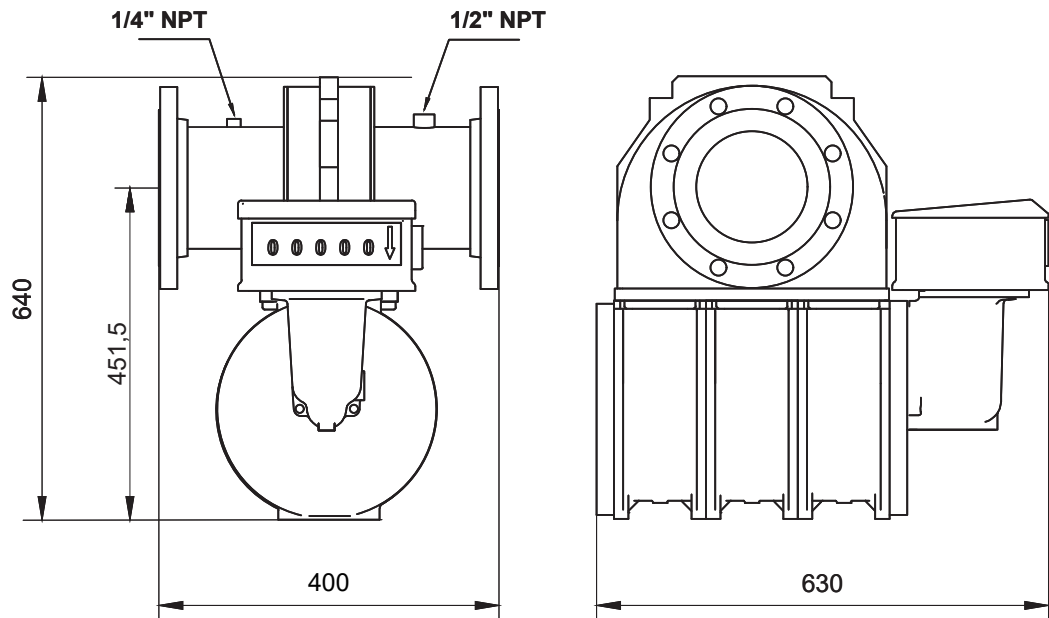
REV.: /



CONTATORE BM 600
BM 600 P.D. METER

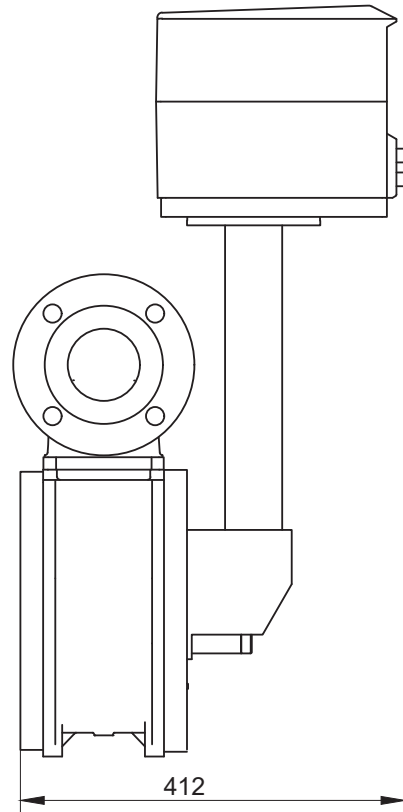
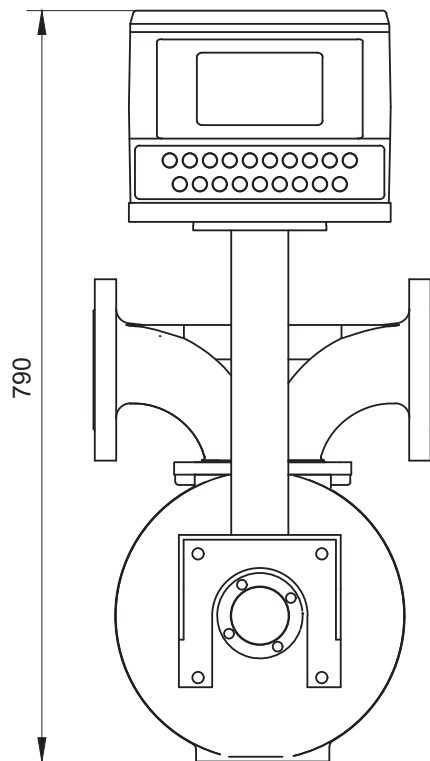
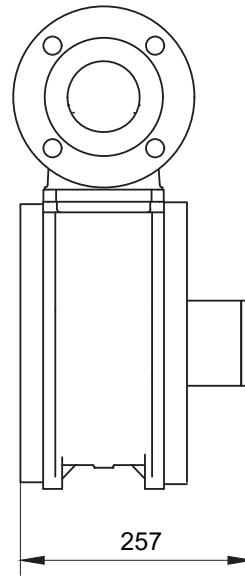
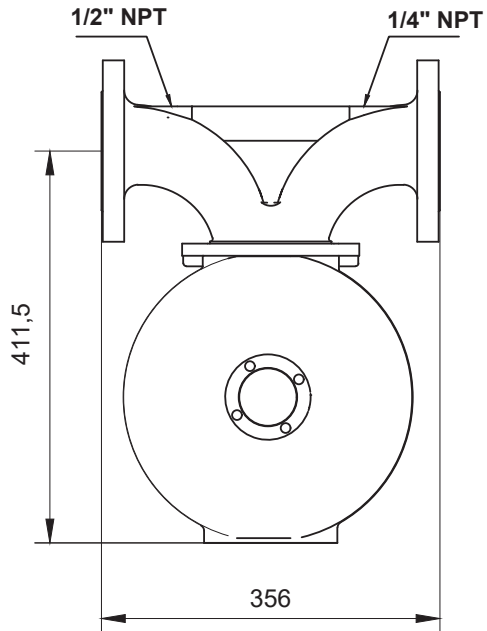
DIS. 7887/M

REV.: /



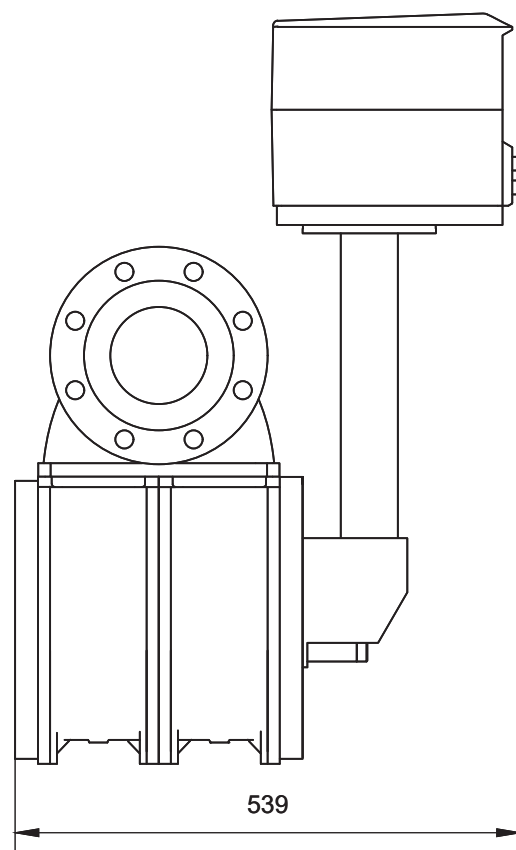
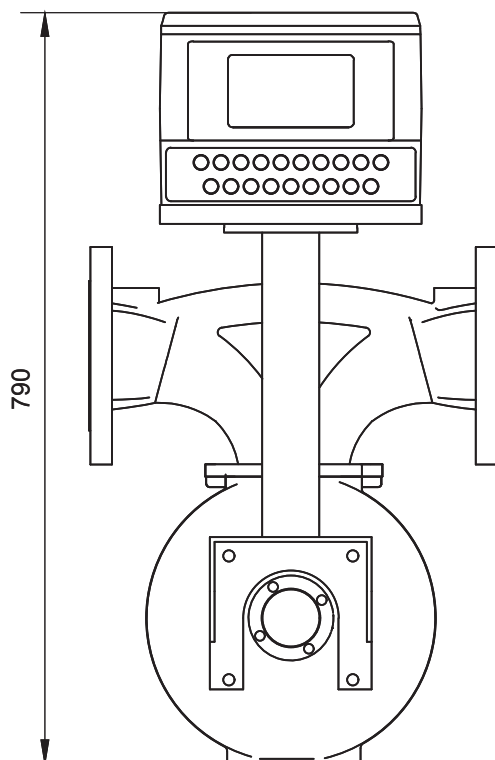
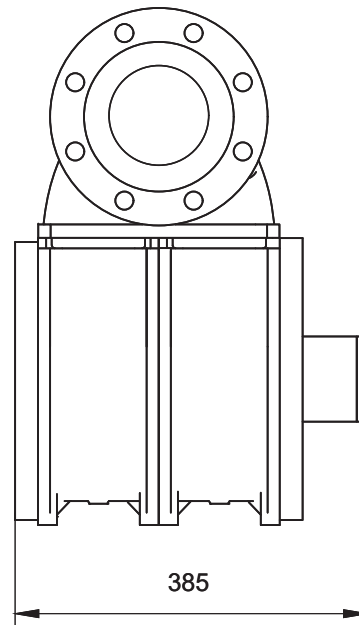
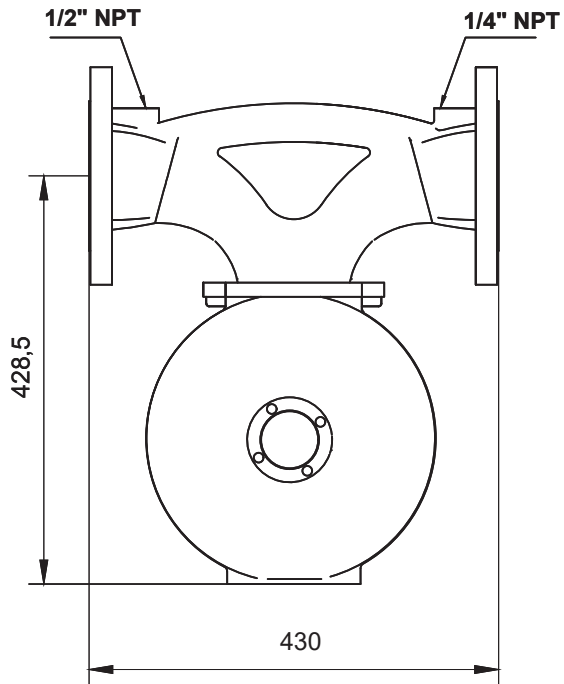
CONTATORE BM 200 + EM6422
BM 200 P.D. METER + EM6422

DIS. 7885/1M
REV.: /



CONTATORE BM 400 + EM6422
BM 400 P.D. METER + EM6422

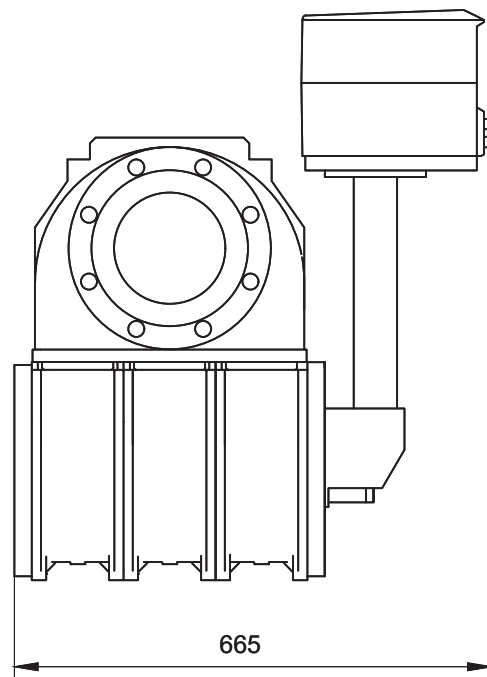
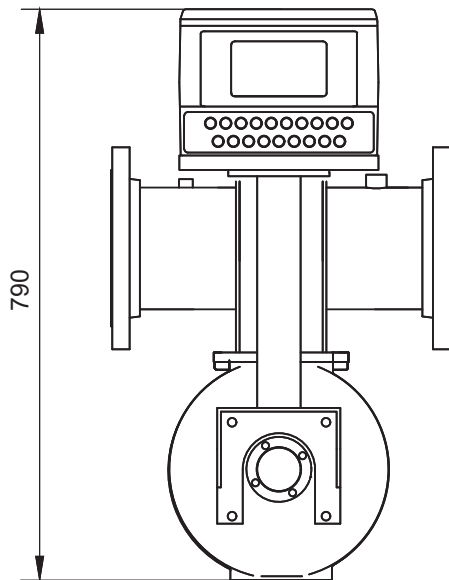
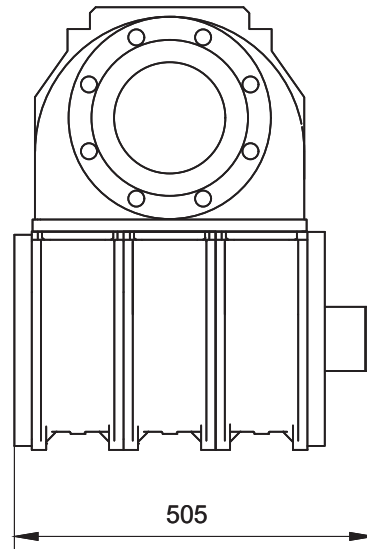
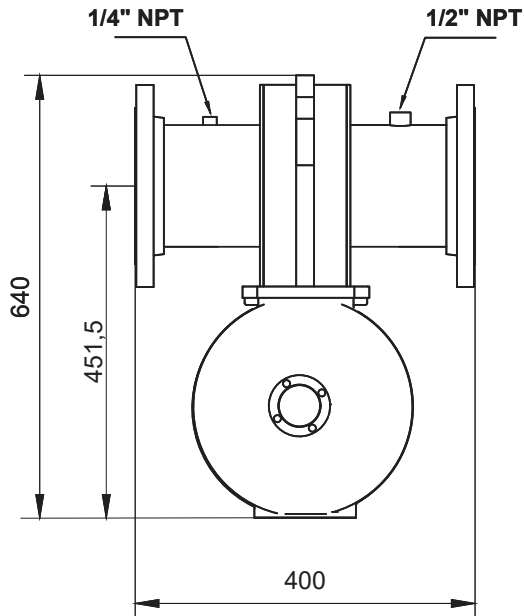
DIS. 7886/1M
REV.: /



CONTATORE BM 600 + EM6422
BM 600 P.D. METER + EM6422

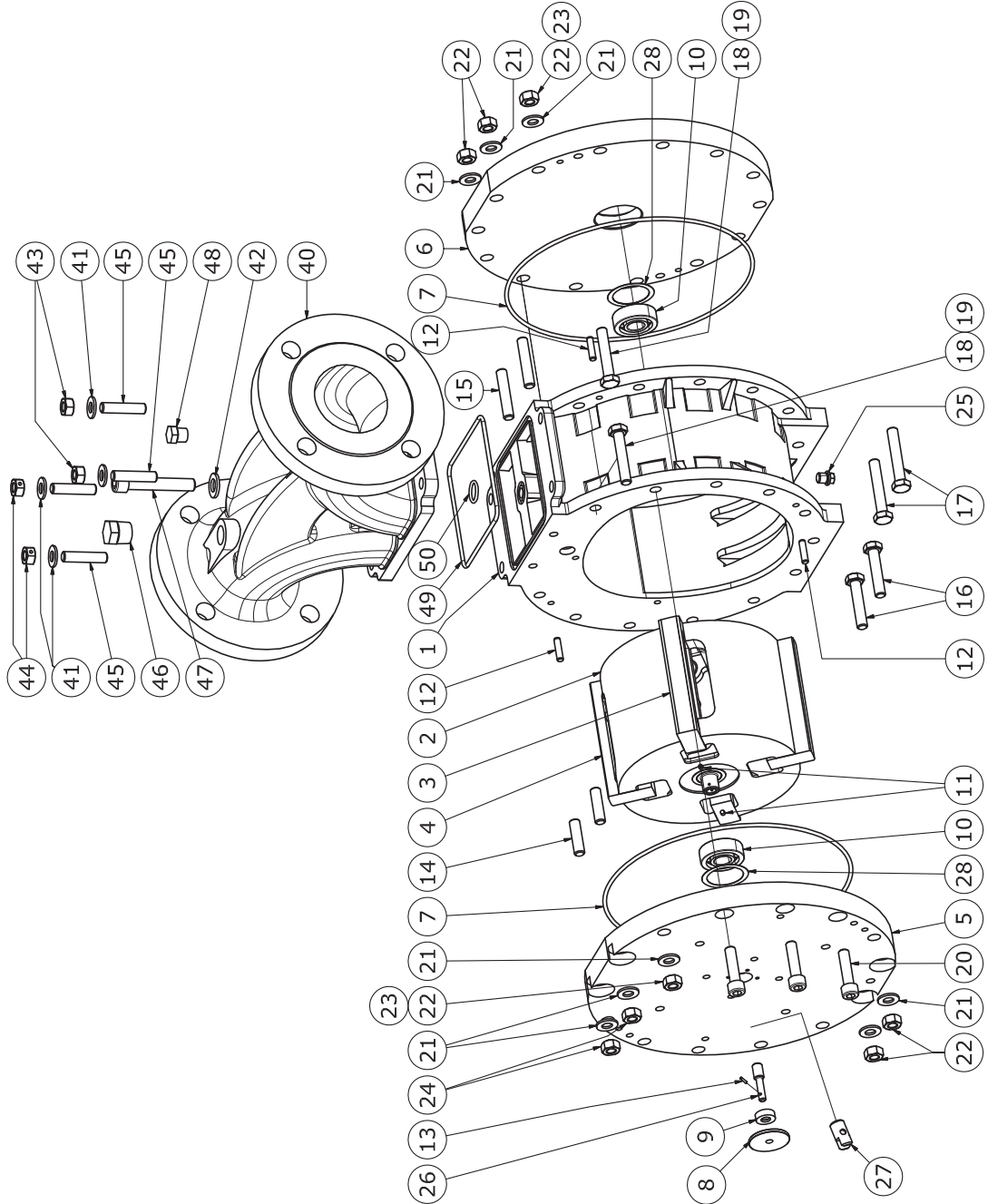
DIS. 7887/1M

REV.: /



CONTATORE BM200
P.D. METER BM200

DIS. 6980/M
REV.: D



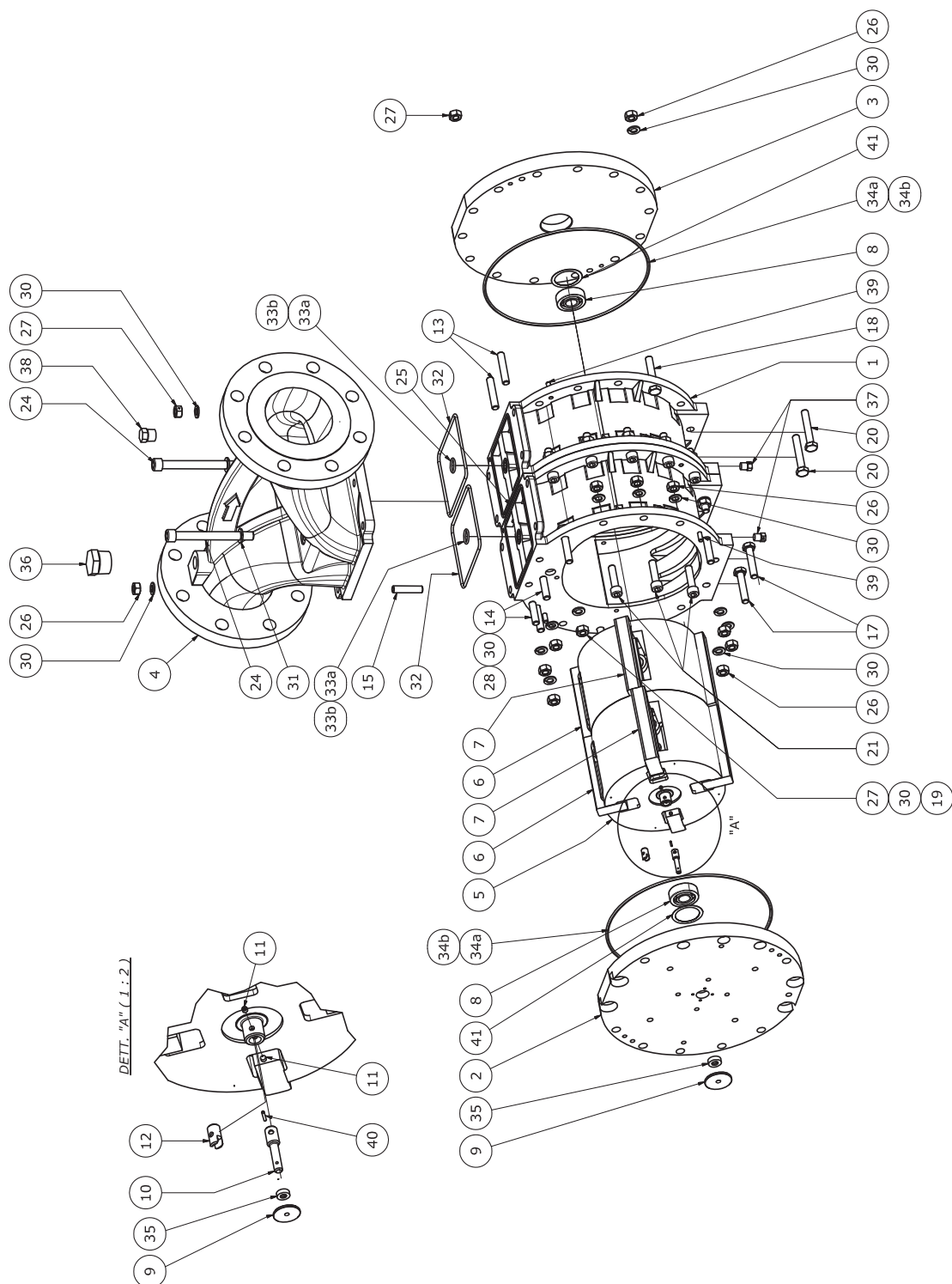
POS.	CODICE CODE	DESCRIZIONE - DESCRIPTION		MATERIALE - MATERIAL		Q.TÀ Q.TY
1	80COG503	CORPO	BODY	ACC. CARBONIO	CARBON STEEL	1
2	80RO2081	ROTORE	ROTOR	ALLUMINIO	ALUMINIUM	1
3	80COC045	COPPIA PATTINI DX	VANES	GRAFITE	GRAPHITE	1
4	80COC075	COPPIA PATTINI SX	VANES	GRAFITE	GRAPHITE	1
5	80COB501	COPERCHIO ANTERIORE	COVER	ACC. CARBONIO	CARBON STEEL	1
6	80COB509	COPERCHIO POSTERIORE	COVER	ACC. CARBONIO	CARBON STEEL	1
7a	80GU1627	GUARNIZIONE OR	OR GASKET	FKM	FKM	2
7b	80GU1630	GUARNIZIONE OR	OR GASKET	NBR	NBR	2
8-9	80KI0134	KIT BM36/1	BM36/1 KIT	FKM	FKM	1
10	80CU1100	CUSCINETTO	BEARING	ACC. INOX	ST.STEEL	2
11	80GR1034	GRANO	DOWEL	ACC. INOX	ST.STEEL	2
12	80SP6021	SPINA	PIN	ACC. CARBONIO	CARBON STEEL	4
13	80SP5009	SPINA	PIN	ACC. CARBONIO	CARBON STEEL	1
14	80PR3060	PRIGIONIERO	STUD	ACC. CARBONIO	CARBON STEEL	2
15	80PR3075	PRIGIONIERO	STUD	ACC. CARBONIO	CARBON STEEL	2
16	80VI2171	VITE	SCREW	ACC. CARBONIO	CARBON STEEL	2
17	80VI2173	VITE	SCREW	ACC. CARBONIO	CARBON STEEL	2
18	80VI2172	VITE	SCREW	ACC. CARBONIO	CARBON STEEL	15
19	80VI2160	VITE	SCREW	ACC. CARBONIO	CARBON STEEL	2
20	80VI4285	VITE	SCREW	ACC. CARBONIO	CARBON STEEL	3
21	80RO1180	RONDELLA	WASHER	ACC. CARBONIO	CARBON STEEL	28
22	80DA1018	DADO	NUT	ACC. CARBONIO	CARBON STEEL	22
23	80DA1006	DADO	NUT	ACC. CARBONIO	CARBON STEEL	4
24	80DA1063	DADO	NUT	ACC. CARBONIO	CARBON STEEL	2
25	80TA1120	TAPPO	PLUG	ACC. INOX	ST.STEEL	1
26	80AL0291	ALBERINO TRASMISSIONE	TRANSMISSION SHAFT	ACC. INOX	ST.STEEL	1
27	80BU0046	BUSSOLA	BUSH	ACC. INOX	ST.STEEL	1
28	/	SPESSORE	SHIM	ACC. INOX	ST.STEEL	/
40a	80CO0368	COLLETTORE - ANSI150RF	MANIFOLD - ANSI150RF	ALLUMINIO	ALUMINIUM	1
40b	80CO0389	COLLETTORE - DN80 PN16	MANIFOLD - DN80 PN16	ACC. CARBONIO	CARBON STEEL	1
41	80RO1180	RONDELLA	WASHER	ACC. CARBONIO	CARBON STEEL	4
42	80RO1183	RONDELLA	WASHER	ACC. CARBONIO	CARBON STEEL	1
43	80DA1018	DADO	NUT	ACC. CARBONIO	CARBON STEEL	2
44	80DA1006	DADO	NUT	ACC. CARBONIO	CARBON STEEL	2
45	80PR3066	PRIGIONIERO	STUD	ACC. CARBONIO	CARBON STEEL	4
46	80TA1183	TAPPO	PLUG	ACC. INOX	ST.STEEL	1
47	80VI4331	VITE	SCREW	ACC. CARBONIO	CARBON STEEL	1
48	80TA1187	TAPPO	PLUG	ACC. INOX	ST.STEEL	1
49a	80GU1549	GUARNIZIONE OR	OR GASKET	NBR	NBR	1
49b	80GU1546	GUARNIZIONE OR	OR GASKET	FKM	FKM	1
50a	80GU1288	GUARNIZIONE OR	OR GASKET	NBR	NBR	1
50b	80GU1285	GUARNIZIONE OR	OR GASKET	FKM	FKM	1

Parti di ricambio consigliate in grassetto/ Suggested spare parts in bold

NOTE: Per bassa temperatura (T < -10°C) la viteria è in INOX / Acciaio per bassa temperatura –
For low temperature (T < -10°C) Stainless steel / Steel for low temperature is used for bolts and screws.

CONTATORE BM400
P.D. METER BM400

DIS. 6254/M
REV.: D



POS.	CODICE CODE	DESCRIZIONE - DESCRIPTION		MATERIALE - MATERIAL		Q.TÀ Q.TY
1	80COG503	CORPO	BODY	ACC. CARBONIO	CARBON STEEL	2
2	80COB501	COPERCHIO ANTERIORE	COVER	ACC. CARBONIO	CARBON STEEL	1
3	80COB509	COPERCHIO POSTERIORE	COVER	ACC. CARBONIO	CARBON STEEL	1
4a	80CO0431	COLLETTORE - ANSI150RF	MANIFOLD - ANSI150RF	ALLUMINIO	ALUMINIUM	1
4b	80CO0390	COLLETTORE - DN100 PN16	MANIFOLD - DN100 PN16	ACC. CARBONIO	CARBON STEEL	1
5	80RO2090	ROTORE	ROTOR	ALLUMINIO	ALUMINIUM	1
6	80COC075	COPPIA PATTINI SX	VANES	GRAFITE	GRAPHITE	2
7	80COC045	COPPIA PATTINI DX	VANES	GRAFITE	GRAPHITE	2
8	80CU1100	CUSCINETTO	BEARING	ACC. INOX	ST.STEEL	2
9-35	80KI0134	KIT BM36/1	BM36/1 KIT	FKM	FKM	1
10	80AL0291	ALBERINO TRASMISSIONE	TRANSMISSION SHAFT	ACC. INOX	ST.STEEL	1
11	80GR1034	GRANO	DOWEL	ACC. INOX	ST.STEEL	2
12	80BU0046	BUSSOLA	BUSH	ACC. INOX	ST.STEEL	1
13	80PR3075	PRIGIONIERO	STUD	ACC. CARBONIO	CARBON STEEL	2
14	80PR3060	PRIGIONIERO	STUD	ACC. CARBONIO	CARBON STEEL	2
15	80PR3066	PRIGIONIERO	STUD	ACC. CARBONIO	CARBON STEEL	8
17	80VI2171	VITE	SCREW	ACC. CARBONIO	CARBON STEEL	2
18	80VI2172	VITE	SCREW	ACC. CARBONIO	CARBON STEEL	15
19	80VI2160	VITE	SCREW	ACC. CARBONIO	CARBON STEEL	2
20	80VI2173	VITE	SCREW	ACC. CARBONIO	CARBON STEEL	2
21	80VI4285	VITE	SCREW	ACC. CARBONIO	CARBON STEEL	3
24	80VI4345	VITE	SCREW	ACC. CARBONIO	CARBON STEEL	2
25	80DA1000	DADO	NUT	ACC. CARBONIO	CARBON STEEL	2
26	80DA1018	DADO	NUT	ACC. CARBONIO	CARBON STEEL	41
27	80DA1006	DADO	NUT	ACC. CARBONIO	CARBON STEEL	6
28	80DA1063	DADO	NUT	ACC. CARBONIO	CARBON STEEL	2
30	80RO1180	RONDELLA	WASHER	ACC. CARBONIO	CARBON STEEL	48
31	80RO1183	RONDELLA	WASHER	ACC. CARBONIO	CARBON STEEL	2
32a	80GU1549	GUARNIZIONE OR	OR GASKET	NITRILE	NITRILE	2
32b	80GU1546	GUARNIZIONE OR	OR GASKET	FKM	FKM	2
33a	80GU1288	GUARNIZIONE OR	OR GASKET	NITRILE	NITRILE	4
33b	80GU1285	GUARNIZIONE OR	OR GASKET	FKM	FKM	4
34a	80GU1630	GUARNIZIONE OR	OR GASKET	NITRILE	NITRILE	3
34b	80GU1627	GUARNIZIONE OR	OR GASKET	FKM	FKM	3
36	80TA1183	TAPPO	PLUG	ACC. INOX	ST.STEEL	1
37	80TA1120	TAPPO	PLUG	ACC. INOX	ST.STEEL	20
38	80TA1187	TAPPO	PLUG	ACC. INOX	ST.STEEL	1
39	80SP6021	SPINA	PIN	ACC. CARBONIO	CARBON STEEL	6
40	80SP5009	SPINA	PIN	ACC. CARBONIO	CARBON STEEL	1
41	/	SPESSORE	SHIM	ACC. INOX	ST.STEEL	/

Parti di ricambio consigliate in grassetto/ Suggested spare parts in bold

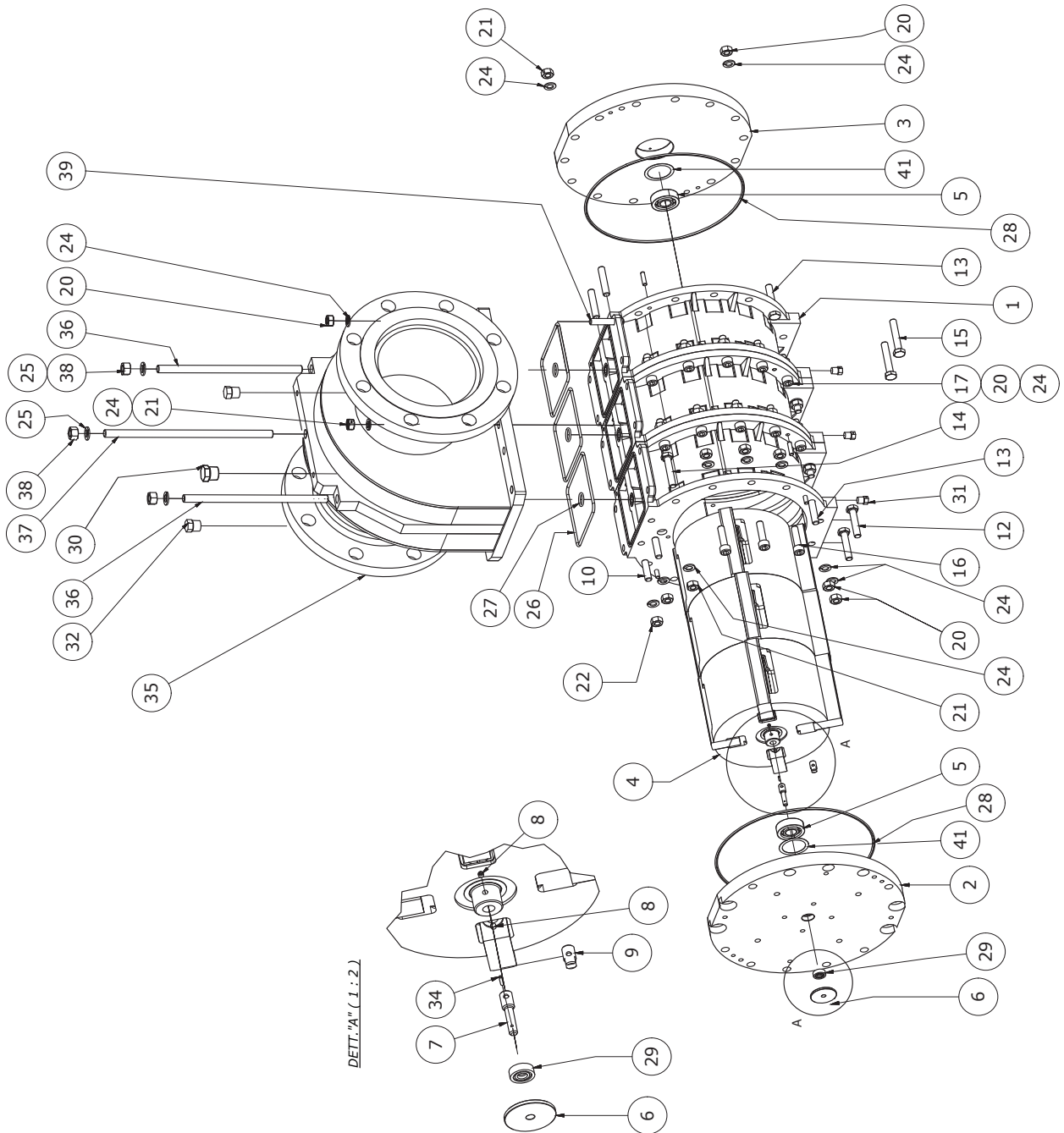
NOTE: Per bassa temperatura (T< -10°C) la viteria è in INOX / Acciaio per bassa temperatura –

For low temperature (T< -10°C) Stainless steel / Steel for low temperature is used for bolts and screws.

CONTATORE BM600
P.D. METER BM600

DIS. 6979/M

REV.: E



POS.	CODICE CODE	DESCRIZIONE - DESCRIPTION		MATERIALE - MATERIAL		Q.TÀ Q.TY
1	80COG503	CORPO	BODY	ACC. CARBONIO	CARBON STEEL	3
2	80COB147	COPERCHIO ANTERIORE	COVER	ACC. CARBONIO	CARBON STEEL	1
3	80COB579	COPERCHIO POSTERIORE	COVER	ACC. CARBONIO	CARBON STEEL	1
4	80RO2099	ROTORE	ROTOR	ALLUMINIO	ALUMINIUM	1
5	80CU1101	CUSCINETTO	BEARING	ACC. INOX	ST.STEEL	2
6	80AN1045	ANELLO TENUTA	SEAL RETAINER	OTTONE	BRASS	1
7	80AL0291	ALBERINO TRASMISSIONE	TRANSMISSION SHAFT	ACC. INOX	ST.STEEL	1
8	80GR1034	GRANO	DOWEL	ACC. INOX	ST.STEEL	2
9	80BU0046	BUSSOLA	BUSH	ACC. INOX	ST.STEEL	1
10	80PR3060	PRIGIONIERO	STUD	ACC. CARBONIO	CARBON STEEL	2
12	80VI2171	VITE	SCREW	ACC. CARBONIO	CARBON STEEL	2
13	80VI2172	VITE	SCREW	ACC. CARBONIO	CARBON STEEL	15
14	80VI2160	VITE	SCREW	ACC. CARBONIO	CARBON STEEL	2
15	80VI2173	VITE	SCREW	ACC. CARBONIO	CARBON STEEL	2
16	80VI4285	VITE	SCREW	ACC. CARBONIO	CARBON STEEL	3
17	80VI4294	VITE	SCREW	ACC. CARBONIO	CARBON STEEL	20
20	80DA1018	DADO	NUT	ACC. CARBONIO	CARBON STEEL	57
21	80DA1006	DADO	NUT	ACC. CARBONIO	CARBON STEEL	6
22	80DA1063	DADO	NUT	ACC. CARBONIO	CARBON STEEL	2
23	80RO1207	RONDELLA	WASHER	ACC. CARBONIO	CARBON STEEL	4
24	80RO1180	RONDELLA	WASHER	ACC. CARBONIO	CARBON STEEL	64
25	80RO1183	RONDELLA	WASHER	ACC. CARBONIO	CARBON STEEL	3
26a	80GU1549	GUARNIZIONE OR	OR GASKET	NBR	NBR	3
26b	80GU1546	GUARNIZIONE OR	OR GASKET	FKM	FKM	3
27a	80GU1288	GUARNIZIONE OR	OR GASKET	NBR	NBR	7
27b	80GU1285	GUARNIZIONE OR	OR GASKET	FKM	FKM	7
28a	80GU1630	GUARNIZIONE OR	OR GASKET	NBR	NBR	4
28b	80GU1627	GUARNIZIONE OR	OR GASKET	FKM	FKM	4
30	80TA1183	TAPPO	PLUG	ACC. INOX	ST.STEEL	1
31	80TA1120	TAPPO	PLUG	ACC. INOX	ST.STEEL	3
32	80TA1187	TAPPO	PLUG	ACC. INOX	ST.STEEL	1
34	80SP5009	SPINA	PIN	ACC. CARBONIO	CARBON STEEL	1
39	80PR3075	PRIGIONIERO	STUD	ACC. CARBONIO	CARBON STEEL	14
41	/	SPESSORE	SHIM	ACC. INOX	ST.STEEL	/
50a	80CO0089	COLLETTORE - ANSI150RF	MANIFOLD - ANSI150RF	ACC. CARBONIO	CARBON STEEL	1
50b	80CO0103	COLLETTORE - DN150 PN16	MANIFOLD - DN150 PN16	ACC. CARBONIO	CARBON STEEL	1
51	/	VITE	SCREW	ACC. CARBONIO	CARBON STEEL	3

Parti di ricambio consigliate in grassetto/ Suggested spare parts in bold

NOTE: Per bassa temperatura (T< -10°C) la viteria è in INOX / Acciaio per bassa temperatura –

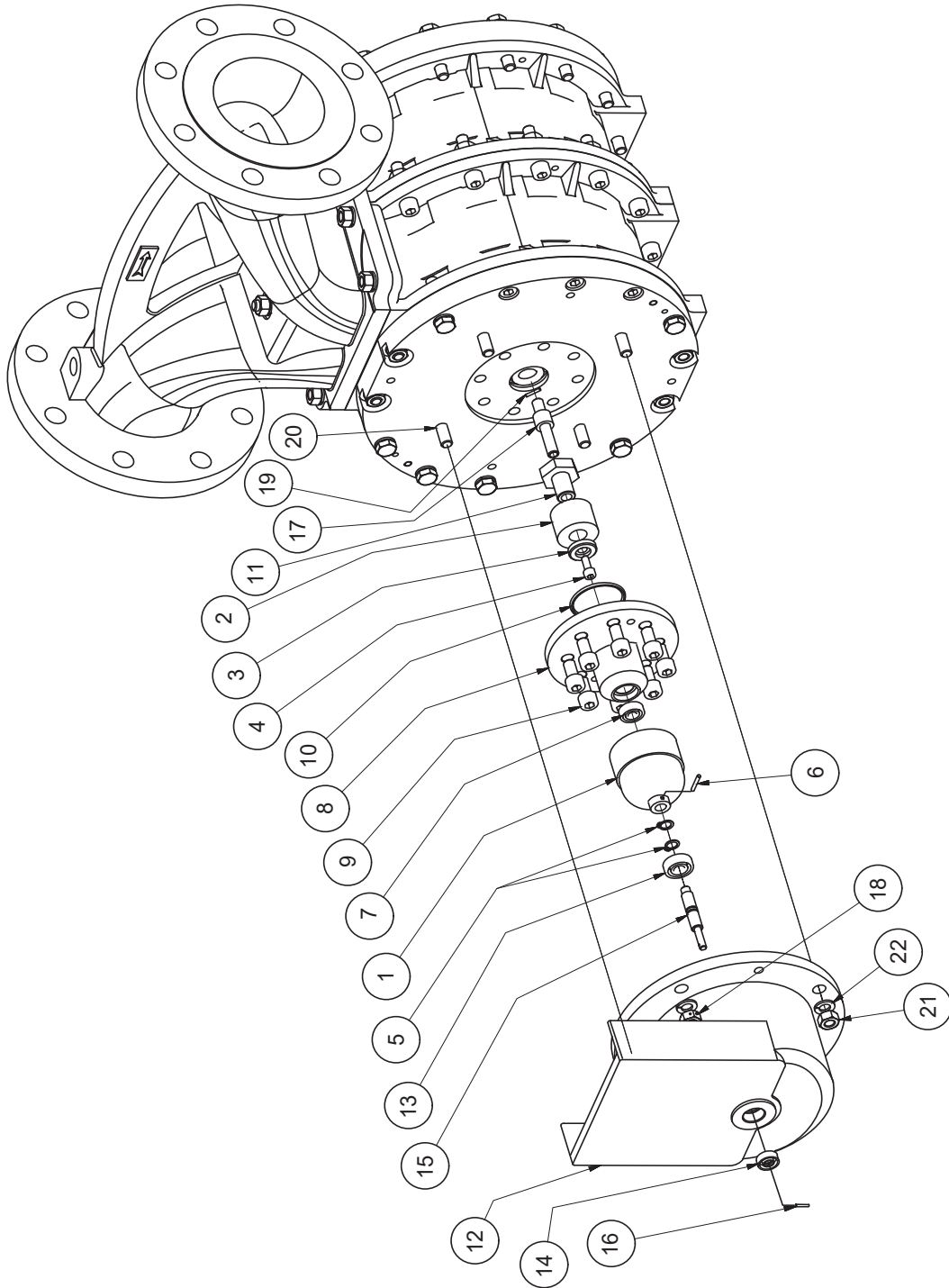
For low temperature (T< -10°C) Stainless steel / Steel for low temperature is used for bolts and screws.

POS.	CODICE CODE	DESCRIZIONE - DESCRIPTION		MATERIALE - MATERIAL		Q.TÀ Q.TY
1	80GU1315	GUARNIZIONE OR	OR GASKET	FKM	FKM	1
2	80SP5015	SPINA SPIRALE	SPIRAL PIN	ACC. INOX	ST.STEEL	1
3	80TE2020	TENUTA MECCANICA	MECHANICAL SEAL			1
4	80RO2099	FLANGIA E BOCCOLA	FLANGE AND BUSHING			1
5	80GU1459	GUARNIZIONE OR	OR GASKET	FKM	FKM	1
6		FLANGIA	FLANGE			1

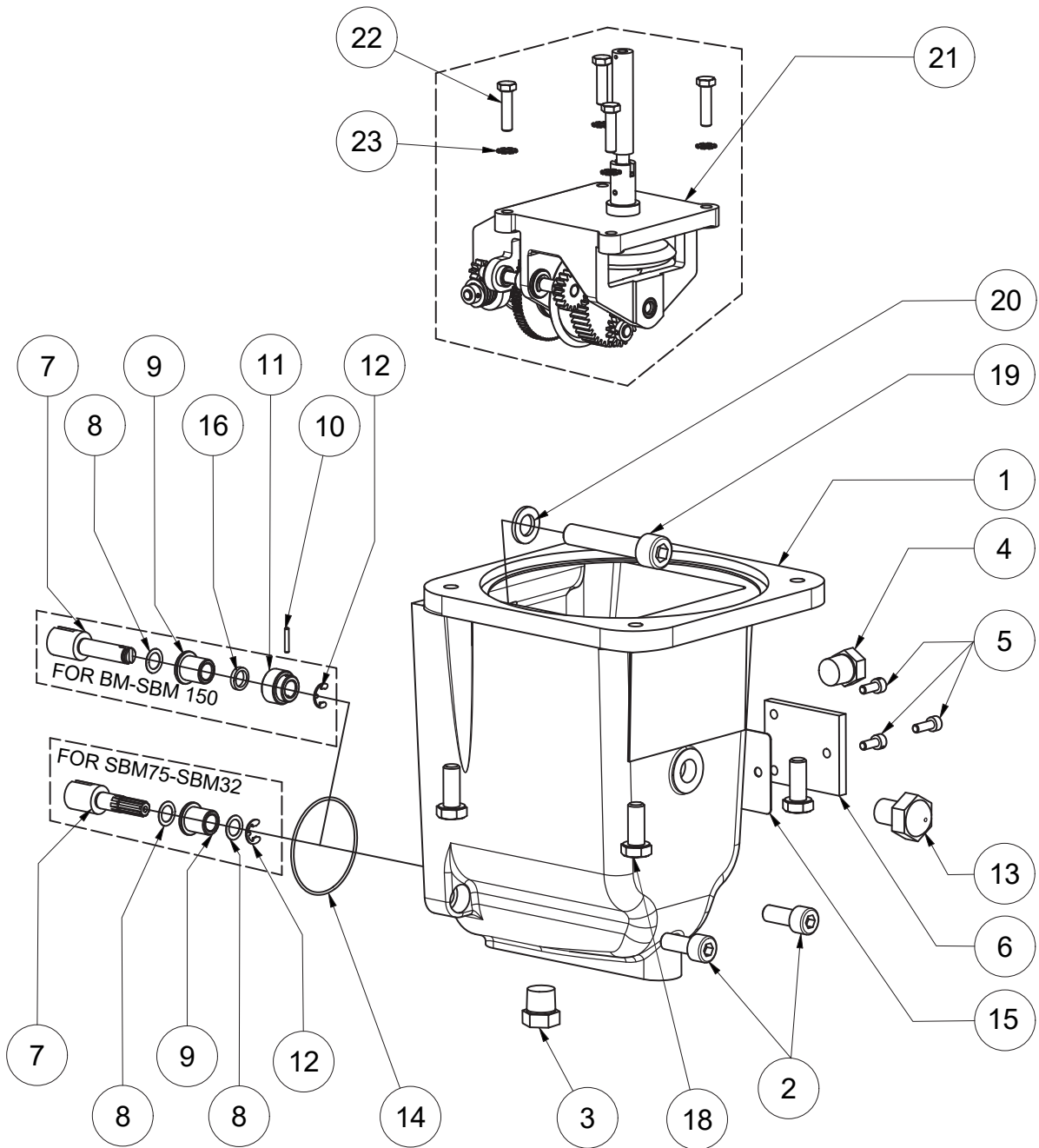
ASSIEME TRASMISSIONE MAGNETICA PER SBM150 E BM
MAGNETIC DRIVE ASSEMBLY

DIS. 6478/M

REV. A



POS.	CODICE CODE	DESCRIZIONE - DESCRIPTION		MATERIALE - MATERIAL		Q.TÀ Q.TY
1	80MA0051	MAGNETE ESTERNO	EXTERNAL MAGNET			1
2	80MA0050	MAGNETE INTERNO	INTERNAL MAGNET			1
3	80RO1400	RONDELLA DI FERMO	BACKING WASHER	ACC. INOX	ST.STEEL	1
4	80VI4145	VITE	SCREW	ACC. INOX	ST.STEEL	1
5	80AN1045	ANELLO ELASTICO	SNAP RING	OTTONE	BRASS	2
6	80SP5066	SPINA CILINDRICA	PIN	ACC. INOX	ST.STEEL	1
7	80CU1105	CUSCINETTO	BALL BEARING	ACC. INOX	ST.STEEL	1
8	80FL0306	FLANGIA	FLANGE	ACC. INOX	ST.STEEL	1
9	80VI4264	VITE	SCREW	ACC. INOX	ST.STEEL	8
10	80GU1089	GUARNIZIONE OR	GASKET OR	PTFE	PTFE	1
11	80DI7005	DISTANZIALE	SPACER	ACC. INOX	ST.STEEL	1
12	80COB402	COPERCHIO	COVER	ALLUMINIO	ALUMINIUM	1
13	80CU1066	CUSCINETTO	BALL BEARING	ACC. INOX	ST.STEEL	1
14	80AN1016	ANELLO DI TENUTA	SHAFT SEAL	NBR	NBR	1
15	80AL0452	ALBERINO	SHAFT	ACC. CARBONIO	ST.STEEL	1
16	80SP5009	SPINA SPIRALE	SPIRAL PIN	ACC. CARBONIO	CARBON STEEL	1
17	80AL0304	ALBERINO	SHAFT	ACC. INOX	ST.STEEL	1
18	80ADA1006	DADO	NUT	ACC. CARBONIO	CARBON STEEL	2
19	80SP5033	SPINA	PIN	ACC. CARBONIO	CARBON STEEL	1
20	80PR3075	PRIGIONIERO	NUT	ACC. CARBONIO	CARBON STEEL	4
21	80DA1018	DADO	NUT	ACC. CARBONIO	CARBON STEEL	2
22	80RO1180	RONDELLA ELASTICA	SPRING WASHER	ACC. CARBONIO	CARBON STEEL	4



POS.	CODICE CODE	DESCRIZIONE - DESCRIPTION		MATERIALE - MATERIAL		Q.TÀ Q.TY
1	80SC2000	SCATOLA MECC. CALIBR.	<i>CALIBR. MECH. BOX</i>	ALLUMINIO	<i>ALUMINIUM</i>	1
2	80VI4201	VITE	<i>SCREW</i>	ACC. CARBONIO	<i>CARBON STEEL</i>	2
3	80TA1072	TAPPO SCARICO	<i>DISCHARGE PLUG</i>	/	/	1
4	80TA1015	TAPPO CARICO OLIO	<i>OIL REFILL PLUG</i>	/	/	1
5	80VI5117	VITE	<i>SCREW</i>	ACC. CARBONIO	<i>CARBON STEEL</i>	1
6	80COB069	COPERCHIO ACCESSO	<i>CALIBRATING CAP</i>	ALLUMINIO	<i>ALUMINIUM</i>	1
7	80AL0282	ALBERINO TRASMISSIONE	<i>SHAFT</i>	AISI 420	<i>AISI 420</i>	1
8	80RO1075	RONDELLA	<i>WASHER</i>	ACC. CARBONIO	<i>CARBON STEEL</i>	1
9	80BO1009	BOCCOLA	<i>BUSH</i>	BRONZO	<i>BRONZE</i>	1
10	80SP5009	SPINA SPIRALE	<i>SPIROL PIN</i>	ACC. CARBONIO	<i>CARBON STEEL</i>	1
11	80IN3150	INGRANAGGIO	<i>Z = 20 GEAR</i>	AISI 420	<i>AISI 420</i>	1
12	80AN2000	ANELLO ELASTICO PER ALBERINO	<i>CIRCLIP FOR SHAFT</i>	ACC. CARBONIO	<i>CARBON STEEL</i>	1
13	81IN0006	INDICATORE LIVELLO OLIO	<i>OIL LEVEL INDICATOR</i>	/	/	1
14	80GU1243	GUARNIZIONE	<i>GASKET</i>	VITON	<i>VITON</i>	1
15	80GU0207	GUARNIZIONE	<i>GASKET</i>	GOMMA ANTIOLIO	<i>RUBBER</i>	1
16	80RO1093	RONDELLA	<i>WASHER</i>	OTTONE	<i>BRASS</i>	1
17	80VI9009	VITE	<i>SCREW</i>	ACC. CARBONIO	<i>CARBON STEEL</i>	1
18	80VI8048	VITE	<i>SCREW</i>	ACC. CARBONIO	<i>CARBON STEEL</i>	4
19	80VI4312	VITE	<i>SCREW</i>	ACC. CARBONIO	<i>CARBON STEEL</i>	1
20	80RO1081	RONDELLA	<i>WASHER</i>	ACC. CARBONIO	<i>CARBON STEEL</i>	1
21	80DI5018	DISPOSITIVO DI REGOLAZIONE.	<i>CALIBR. MECH. ASSEMBLY</i>	/	/	1
22	80VI2042	VITE	<i>SCREW</i>	ACC. CARBONIO	<i>CARBON STEEL</i>	4
23	80RO1033	RONDELLA	<i>WASHER</i>	ACC. CARBONIO	<i>CARBON STEEL</i>	4

