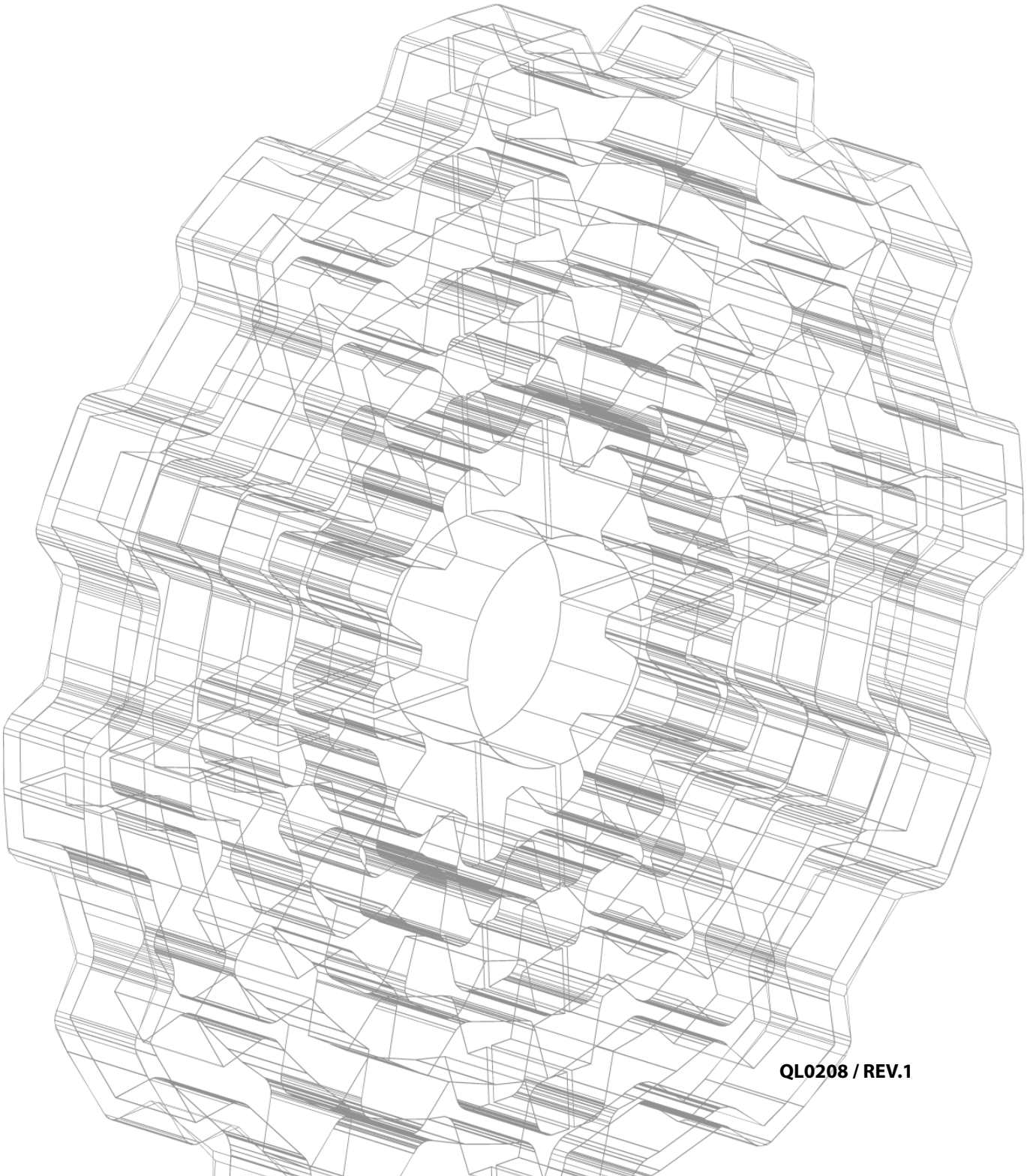
MOTOVARIO®
HEART OF MOTION
a TECO Group company

SPAGGIARI TRASMISSIONI™

UK

USE AND MAINTENANCE INSTRUCTIONS



QL0208 / REV.1

USE AND MAINTENANCE INSTRUCTIONS FOR MOTOVARIO-SPAGGIARI PRODUCTS:

Standard

Atex 2G/2D

Atex 3G/3D

GEAR REDUCERS, GEARMOTORS, VARIATORS, MOTOVARIATORS, VARIATOR GEAR REDUCERS AND MOTOVARIATOR-GEAR REDUCERS SERIES H, B, S, NMRV, NMRX, SW, SWX, SWFX, RT, TX, S, VH, SRT

ORIGINAL VERSION IN ITALIAN ENGLISH VERSION - TRANSLATION

IMPORTANT! The data and information given in this document substitute those given in previous editions which are thus to be considered obsolete; periodically consult the technical documentation available on www.motovario-group.com for up-to-date performance information and specifications. For the motor section relating to motorvariators and geared motors, consult the motors manual available on www.motovario-group.com.

CONTENTS

1. GENERAL INFORMATION

1.1 Purpose

This manual has been provided by **Motovario Group** to give information to authorised persons regarding transport, installation, maintenance, repair, disassembly and scrapping of the unit.

Information regarding the electric motor can be found in the motor's User and Maintenance Instructions. Failure to follow the instructions is a health and safety hazard and can result in economic damages. The information must be kept carefully by the person charged with doing so and be available at all times for reference in good condition. In case of damage or loss, the documentation can be requested directly from **Motovario Group**.

1.2 Symbols

Important - Danger
Indicates a serious personal health and safety hazard.

Important information
Indicates important technical information.

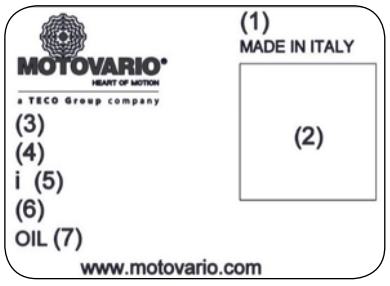
1.3 Atex symbols

ATEX 2014/34/EU DIRECTIVE REFERENCE
Requirements for equipment in conformity with ATEX 2014/34/EU.

1.4 Product identification

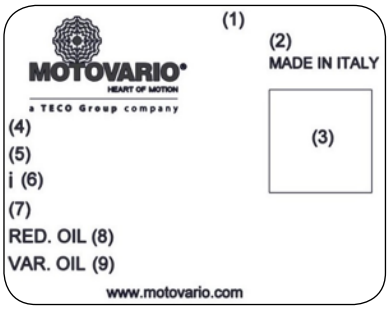
In order to identify the product the unit bears a label of the following models.

GEAR REDUCER LABEL



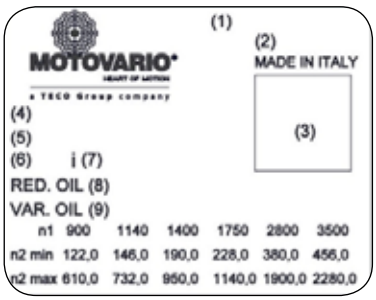
Information contained on the nameplate:
1. Mounters team.
2. QR CODE.
3. Serial number (Order number-Order progressive number-Manufacturing year).
4. Unit abbreviation.
5. i: reduction ratio.
6. Operating position.
7. Oil type.

S SERIES VARIATOR LABEL



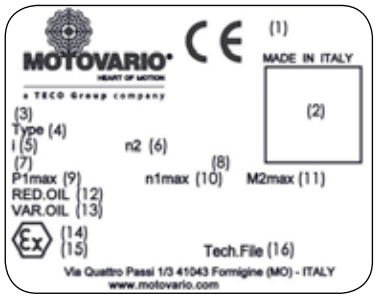
Information contained on the nameplate:
1. Pump (not present if not installed).
2. Mounters team.
3. QR CODE.
4. Serial number (Order number-Order progressive number-Manufacturing year).
5. Unit abbreviation.
6. i: reduction ratio.
7. Operating position.
8. Gear reducer oil type.
9. Variator oil type.

TX SERIES VARIATOR LABEL



Information contained on the nameplate:
1. Special features (if any).
2. Mounters team.
3. QR CODE.
4. Serial number (Order number-Order progressive number-Manufacturing year).
5. Unit abbreviation.
6. Operating position.
7. i: reduction ratio.
8. Gear reducer oil type.
9. Variator oil type.

ATEX GEAR REDUCER/VARIATOR LABEL

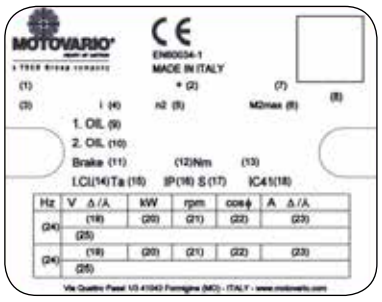


Information contained on the nameplate:
1. Mounters team.
2. QR CODE (if any).
3. Serial number (Order number-Order progressive number-Manufacturing year).
4. Type: Unit abbreviation.
5. i: reduction ratio;
   - For variator-gear reducers it refers only to the gear reducer.
6. n2: Number of output revolutions [rpm];
   - For min. / max. rpm variator. If provided without motor, they refer to n1=1400 rpm.
7. Operating position.
8. Presence of thermal protector = TP
9. P1max: maximum input power [kW].
10. n1max: number of maximum input revolutions [rpm].
11. M2max: maximum transmissible torque [Nm].
12. Red. OIL: gear reducer oil.
13. Var. OIL: variator oil.
14. Atex identification field
    - For area 2, 22 II 3GD c IIB Tc (Tn)
    - For area 1, 21 II 2GD ck IIB Tc (Tn)

    Tc: maximum surface temperature [°C]
    Tn: class of temperature: T4 or T3
15. Min./max. working place temperature [°C].
16. Tech. File: No. of technical file registration (only 2GD).

The nameplate must not be removed and must be kept intact and readable. In case you need a copy of it just contact the technical assistance by Motovario.

GEARMOTOR NAMEPLATE (LOCATED ON THE MOTOR)



Information contained on the nameplate:
1. Gear motor symbol.
2. Motor type identification symbol (series/size/no. of poles).
3. Operating position.
4. i: reduction ratio.
5. n2: Number of output revolutions [rpm].
6. M2max: maximum transmissible torque [Nm].
7. Order number-Progressive number-Year.
8. Mounters team.
9. OIL: gear reducer oil.
10. OIL: variator oil.
11. Brake type.
12. Nominal braking torque [Nm].
13. Brake supply voltage.
14. Insulation class.
15. Maximum ambient operating temperature.
16. Protection rating.
17. Duty.
18. Cooling method.
19. Motor voltage (depending on connection).
20. Nominal power output [kW].
21. Nominal speed [rpm].
22. Nominal power factor.
23. Nominal current (depending on connection) [A].
24. Supply frequency [Hz].
25. Code IE1, IE2 or IE3 (depending on the type of motor and whether applicable) followed by efficiency values at 4/4, 3/4 and 2/4 of nominal power (brake motors only).

If the nameplate is illegible, request another from **Motovario Group**.

1.5 Service

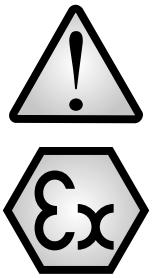
For any service request please contact the Motovario sales network directly indicating the data on the nameplate.

2. COMPLIANCE

Gearmotors, motovariators and motovariator-gear reducers are designed in compliance with the safety requirements of the Machinery Directive 2006/42/EC and are supplied with a Declaration of Incorporation. We recommend considering the Machinery Directive 2006/42/EC on the entire system where the MOTOVARIO product is installed.
Motovario electric motors comply with the Low Voltage Directive 2006/95/EC and the Directive EMC 2004/108/EC regarding the intrinsic characteristics concerning emissions and immunity levels.

If used in accordance with the instructions enclosed the units in question can be used in the following environments:
Group II
Category 2G and 2D
Zone 1/21 for gases and dusts (gas group IIB) with the following protection methods:
EN13463-5 (c) constructional safety
EN13463-8 (k) liquid immersion
Group II
Category 3G and 3D
Zone 2/22 for gases and dusts with the following protection methods:
EN13463-5 (c) constructional safety
The groups so classified are part of standard manufacture, and are marked to conform to. comply with the provisions of Directive ATEX 2014/34/EU

2.1 Use conditions and limits



NEVER:
- Use outside of the ranges indicated on the nameplate;
- Use the unit in an area classified (explosive atmosphere) as more dangerous than the level stated on the label;
- Use the unit in an area with equipment class I (mines subject to risks arising from firedamp);
- Connect the unit to sources of energy other than those quoted or values other than those provided by the manufacturer;
- Modify the mounting position or arrangement.

Without authorization, the ATEX approval is void.

3. TECHNICAL INFORMATION

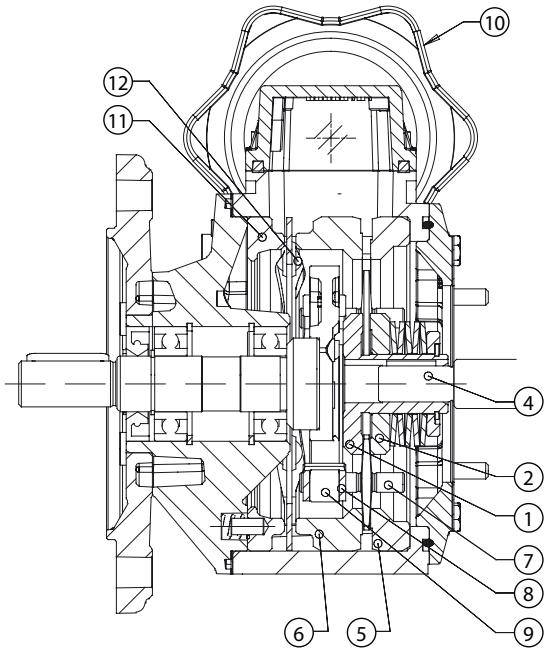
3.1 Product description

The unit has been designed to be used in specific applications and, to satisfy particular requirements, it may be supplied in several mounting arrangements and configurations, including accessories and optional variants, to do so.
THE user is responsible for using it appropriately and in line with the warnings given in this manual and the instructions on the product identification labels.

3.2 Operation of the variator

The motor variator is composed of two internal tracks (1 and 2) secured by Belleville washers (3) locked to the motor shaft (4), two external tracks (5 and 6) secured to the casing and a certain number of planets (7) mounted on bushes (8) which run radially on the planet carrier (9) which transmits the drive. The planets in contact with the internal tracks that drive them, and with the fixed external tracks, have a double motion: rotation around their own axes, and rotation around the external tracks which drives the planet carrier, itself mounted to the output shaft. The speed is changed by operating the handwheel (10), which moves track (6), supported on a ball bearing race (12), angularly on the countertrack with cams (11). This movement modifies the space between the tracks (5 and 6) and thus varies the radial displacement of the planets and hence the drive transmitted to the planet carrier.

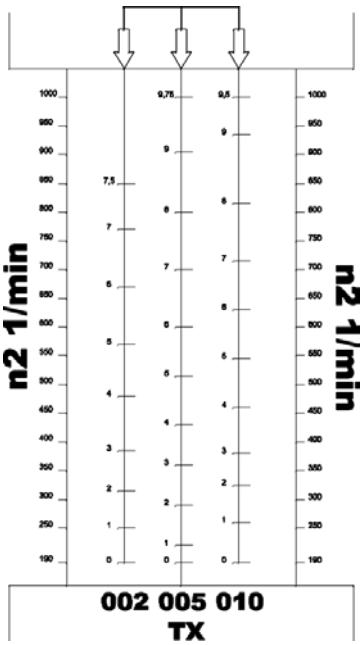
N.B.: This adjustment may only be made with the unit running.



1 Internal fixed track
2 Internal mobile track
3 Belleville washer
4 Shaft
5 External fixed track
6 External mobile track
7 Planet
8 Planet bush
9 Planet carrier
10 Handwheel
11 External adjuster track
12 Ball bearing race

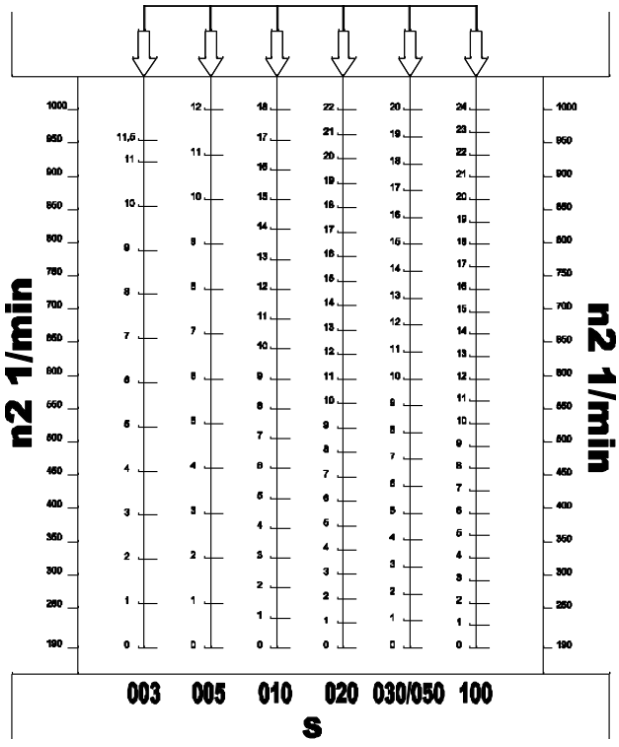
3.2.1 Comparison of control handwheel revolutions with tx series variator output revolutions:

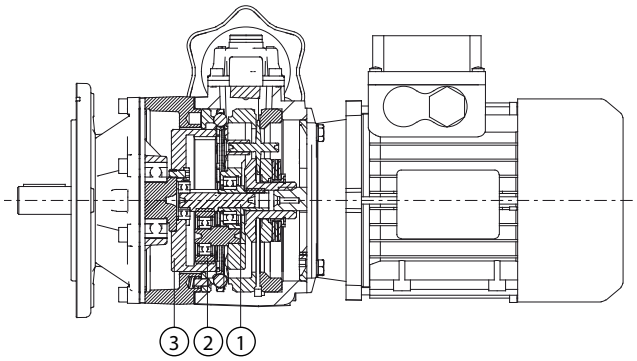
CONTROL HANDWHEEL REVOLUTIONS



3.2.2 Comparison of control handwheel revolutions with s series variator output revolutions:

CONTROL HANDWHEEL REVOLUTIONS





3.2.3 Differential

The motor variator can be supplied complete with planetary unit/differential which allows for variations of the output speed from zero to the maximum allowed speed. This is possible because the constant input speed is also transmitted to the drive pinion (1) of the planetary variator/reducer. The constant input speed is transformed into variable variator speed and retransmitted to the planets (2) of the planetary reducer/variator. This makes the speed of the planets (2) equal to that of the drive pinion (1); in these conditions the speed of the outer track is zero and hence the output shaft speed is zero.

3.3 Critical applications

The performance specified in the catalogue corresponds to position B3 or similar, i.e. when the first stage is not completely submerged in oil. For different mounting positions or particular input speeds, refer to the tables which give diverse critical situations for each size of unit. Also bear in mind the following applications, and refer to our Technical Service for further information: Technical Service:

- Use in conditions which could lead to injury if the unit fails;
- Applications with very high inertia;
- Use as a lifting hoist;
- Applications with high dynamic loading of the unit casing;
- Use in conditions with ambient temperature lower than -5°C or higher than 40°C;
- Use in chemically aggressive conditions;
- Use in a salty environment (recommended use of gear reducers/gearmotors NMRX, SWX);
- Operating positions not provided by the catalogue;
- Use in a radioactive environment;
- Use in ambient with pressure other than the atmospheric one;
- Use of self-braking motors coupled to variators/variable-gearboxes;
- Applications providing immersion, even partial, of the unit;
- Use as multiplier.

Note: The maximum torque (*) bearable by the unit can get twice the M2max stated on the nameplate, but only intended for momentary, non-repetitive overloads due to starting at full load, braking, impacts and other dynamic causes.
(*) intended as instantaneous overload due to starting at full load, braking, impacts and other causes, especially dynamic.

A	Application not recommended

B	Check the application and/or contact our technical service

H	030	040	050	060	080	100	125	140
V5 - V1: 1500 < n1 < 3000	-	-	-	-	-	-	B	B
n1 > 3000	B	B	B	B	B	B	A	A
V3 - V6	B	B	B	B	B	B	B	B

H	A31	A30	A40	A50	A60
V5 - V1: 1500 < n1 < 3000	-	-	-	-	-
n1 > 3000	B	B	B	B	B
V3 - V6	B	B	B	B	B

B	060	080	100	125	140	150	160
2000 < n1 < 3000	-	-	-	B	B	B	B
V6	B	B	B	B	B	B	B
n1 > 3000	B	B	B	B	A	A	A
…L : B6 - B7	B	B	B	B	B	B	B

B	A40	A50	A70
2000 < n1 < 3000	-	-	-
V6	B	B	B
n1 > 3000	B	B	B
…L : B6 - B7	B	B	B

S	050	060	080	100	125	140	150
2000 < n1> 3000	-	-	-	-	-	-	-
V6	B	B	B	B	B	B	B
n1>3000	B	B	B	B	B	B	B
…L : V5 - V6	B	B	B	B	B	B	B

NMRV	025	030	040	050	063	075	090	105	110	130	150
V5: 1500 < n1 < 3000	-	-	-	-	-	B	B	B	B	B	B
n1 > 3000	B	B	B	B	B	A	A	A	A	A	A
V6	B	B	B	B	B	B	B	B	B	B	B

NMRX	040	050	063	075	090
V5: 1500 < n1 < 3000	-	-	B	B	B
n1 > 3000	B	B	B	B	B
V6	B	B	B	B	B

NMRV - P	063	075	090	110
V5: 1500 < n1 < 3000	B	B	B	B
n1 > 3000	B	B	A	A
V6	B	B	B	B

HW+NMRV-P	030+063	030+075	040+090	040+110
1500 < n1 < 3000	B	B	B	B
n1 > 3000	A	A	A	A
V5-V6	B	B	B	B

SW-SWX-SWFX	030	040	050	063	075	090	105
V5: 1500 < n1 < 3000	-	-	-	-	B	B	B
n1 > 3000	B	B	B	B	A	A	A
V6	B	B	B	B	B	B	B

TXF - SF	002-003	005	010	020	030	050	100
2000 < n1 < 3000	-	-	-	B	A	A	A
n1 > 3000	B	B	B	A	A	A	A
V3 - V6	B	B	B	B	B	B	B

R	040	040	050	063	080	100	125
1500 < n1 < 3000	-	-	-	-	B	B	B
n1 > 3000	A	A	A	A	A	A	A
V3 - V6	B	B	B	B	B	B	B

4. SAFETY INFORMATION

Carefully read the manual and any instructions marked directly on the nameplates fixed to the unit.
Staff working on the unit must be technically qualified and experienced to do so, and must also be equipped with the necessary safety equipment (according to the current laws). Failure to observe this requirement may result in injury or damage.
Use the unit only for the purposes specified by Motovario Group. Improper use is a health and safety hazard and may cause economic damages.
Keep the unit in good running order with programmed maintenance operations.
The unit can reach high temperatures in operation (in the case of variators, even when running under no or reduced load). Do not touch the casings with bare hands - use appropriate safety equipment.

For proper maintenance ensure full safety precautions have been applied, including the use of safety clothing and equipment, as required by current workplace safety legislation.

Use only original Motovario spare parts. Use only oils and greases recommended by Motovario Group.
Do not dump polluting materials - dispose of them according to environmental regulations.
After changing the lubricant, clean the reducer/variator's casing as well as the work area.

In environments with potentially explosive atmospheres, only ATEX units are allowed, after verifying their certification limits.
In case of non-ATEX units, or ATEX units with certification non-compliant with environmental conditions, it is compulsory to disconnect the unit power supply.
Adopt all the necessary measures of environmental safety.

5. HANDLING AND STORAGE

5.1 Handling

Upon receipt of the unit check, consulting the identification nameplate of the product, that it corresponds to the purchase order specifications, and that the application limits mentioned comply with the intended conditions of use. Check that the unit is not damaged and/or malfunctioning. If so please contact the Motovario store. For painted units check that the paint is intact and, if not, provide for its restoration.
Dispose of the packaging material in accordance with current rules.
Who is entitled to the handling of the unit will be required to ensure all necessary safety conditions.

It is not always possible to move the unit manually due to its shape and weight; use appropriate handling equipment to prevent damage and injury. The weight to be handled is listed in the catalogue.
Locate the attachment points of the unit (grommets on the B-series reducer, hole on the S-series reducer, solid shaft threaded hole on the H, R series reducer and variators, foot holes for NMRV-series reducer). For handling of the SW series gear reducer use the belts, securing it in the pam connection area. The gearmotors must be handled by securing the gearmotor with belts in the pam connection area and motor grommet (for motors from 100 to 132). Never use only the motor grommet. Proceed carrying out all handling operations with extreme caution. The precautions to be taken during handling are appropriate to ensure the safety of the operator and protect from breakage or damage the external parts due to shocks or accidental falls.

5.2 Storage

The units must be stored according to the following requirements:
- Be placed, filled with oil, as per specified mounting position of the nameplate;
- Be free from vibrations and protected from accidental impacts
- Be kept at relative humidity <60%, absence of intense temperature change, of ultraviolet light and direct sunlight, and in case of low temperatures (Tam < -5°C) take special care to avoid shocks and vibrations that could damage the structure.

In the event of prolonged storage/downtime periods (4/6 months) and/or environmental conditions other than those listed:
- Completely fill the unit with oil. The appropriate level should be restored at the time of commissioning of the unit;
- If the filling plug is missing, we suggest replacing any sealing ring not submerged in lubricant;
- Apply plenty of grease and/or suitable protective and waterproofing products in order to prevent deterioration of shafts and rubber parts;
- Periodically rotate the shafts to prevent gluing of the oil seals.

During storage, the gearboxes must:
- Have the unpainted and machined surfaces protected with oil: the ATEX certification would no longer be valid in case of surface oxidation;

6. INSTALLATION

Pay special attention to the installation conditions as these are the principal cause of damage and downtime. When choosing the motor, consider the mounting position and presence, below the motor itself, of parts, things or materials which may be damaged by oil leaks, however limited in amount. Choosing the right mounting position can eliminate many problems. It is often sufficient to place a guard under the drive to ensure operation in optimal safety.

The unit can only be mounted in the operating position indicated on the nameplate: a different operating position must be authorised by Motovario. Changes in angle or inclination with respect to the horizontal are allowed by +/-5°.

Before the commissioning of the unit, carry out the following operations:
- Check the nameplate data of the unit and/or electric motor;
- Make sure the equipment supplied corresponds to the equipment ordered;
- Fixing to the structure of the machine must be stable, vibration-free. The structure shall not be subject to torsional movements, must ensure a continuity of transmission of any electrical and electrostatic discharges. Otherwise provide a grounding system, via a cable securely attached to the mounting areas, making sure to remove any paint in the contact area and using conductors of adequate cross section.
- For fixing use the fixing screws of minimum 8.8 quality and be careful not to buckle the casings due to improper fixing, making sure that the support surface is coplanar to the fixing surface.
- Do not install the unit in mounting positions other than those stated in the order, since different positions provide different positions of the loading, unloading and oil level plugs, in addition to a different amount of lubricant, if indicated/present;
- Check the position of the level plug. If the casing is provided with a hole with closed plug symmetric with respect to the level plug itself, if necessary, for level visibility, reverse their positions. Check the accessibility to oil loading/unloading plugs.
- Check, if possible, the correct quantity of oil, according to the operating position required. If the oil level of the unit is restored, do it according to the plug diagram and use oil of the same type indicated on the label.
- Replace, if any, the closing plug with the vent plug provided in the supplied kit, in the suitable operating position indicated in the relevant drawings.
- Check for any leakage of lubricant;
- Eliminate, if possible, any traces of dirt, from the shafts and from the areas around the sealing rings;
- Lubricate the contact surfaces to prevent oxidation or seizure;
- Check the static seals and the bolted joints;
- Do not install the unit in an environment with fumes or abrasive and/or corrosive dust;
- Do not install the unit in direct contact with food products in bulk. Occasional contact with foodstuff is allowed only with series SWFX gearmotors;
- Install all the protections designed for the rotary organs so as to ensure the system safety according to the current rules;
- Check the correct rotation direction of the output shaft of the unit;

- In case of shaft mounting configuration it is recommended to use the torque arms that can be supplied by Motovario, specially designed;
- Ensure proper cooling of the motor through a good flow of air from the fan side;
- Avoid solar radiation or other heat sources, the cooling air temperature must never exceed 40°C;
- Check that the assembly of the various parts (pulleys, sprockets, couplings, etc.) on shafts is performed by using the proper threaded holes or any other systems able to ensure a correct operation without risking damage to the bearings or the outer parts of the units.

For the operating fields with temperatures below 0°C, please consider the following:
- The motors must be suitable for operation with the expected ambient temperature:
- The electric motor power must be adjusted when exceeding the higher starting torques required.

In addition for variators:
- The change in revolutions, using the appropriate command, must be executed solely when the unit is running;
- There must be an oil seal in the coupling area between the variator and the motor.

Additional procedures for ATEX units:
- Check all nameplate data to ensure they are consistent with the application: group, category, area, maximum surface temperature, P1, n1 and M2 maximum limits, installation position, ambient temperature;
- Check for the absence of solar radiation or other heat sources;
- In case of expected ambient temperatures <-20°C or >40°C contact in advance the Technical Service by Motovario;
- Check there are no fumes or abrasive and/or corrosive dust;
- Make sure not to be in close proximity to sources of ultrasound and/or ionizing radiation;
- Check that the facility has adequate protection from lightning fall;
- Check for any leakage of lubricant (if detected, stop the installation and consult the Technical Service by Motovario);
- Eliminate any traces of dirt from the shafts and from the areas around the oil seal, using materials that do not generate electrostatic charges;
- Check that the environment has been cleared from the presence of a potentially explosive atmosphere, and that such a condition is maintained for the whole duration of the installation.
- Check that the components connected to the unit at both the input and output are ATEX approved.
- Use the torque arms that can be supplied;
- Ensure proper cooling of the motor through a good flow of air from the fan side; check that there are no obstructions or covers preventing the cooling of the unit;
- Check the accessibility to the warning light (or dipstick) for oil level check;
- Install the unit and connect to appropriate intervention system, any sensor thermal protection, supplied separately and when provided for. Specific instructions are given in the Annex to the manual.

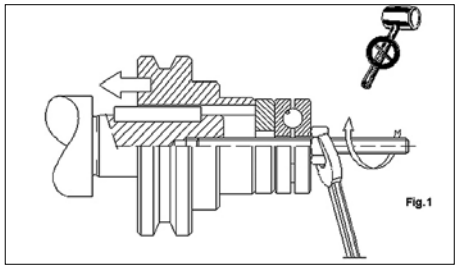
7. SPECIFIC ASSEMBLING

7.1 Output shaft connections

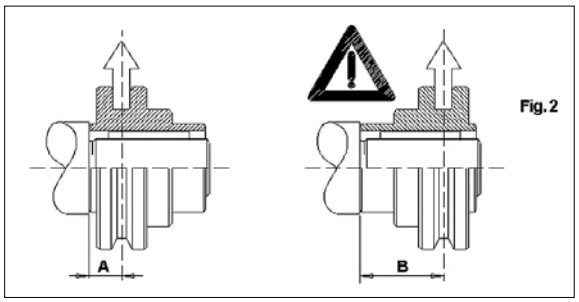
7.1.1 Solid shaft

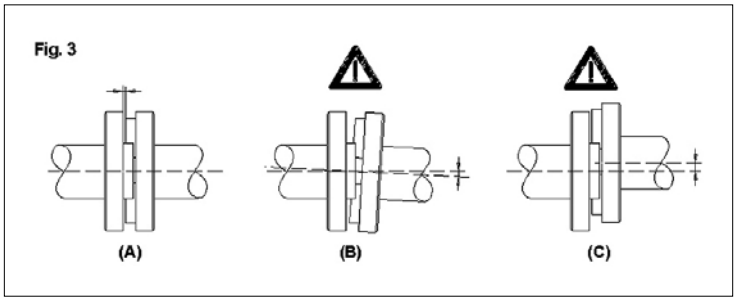
See the information supplied by the following figures 1-2-3

• Fig. 1 Example of correct installation of a part to the slow shaft of a reducer. We recommend to avoid using inadequate tools.



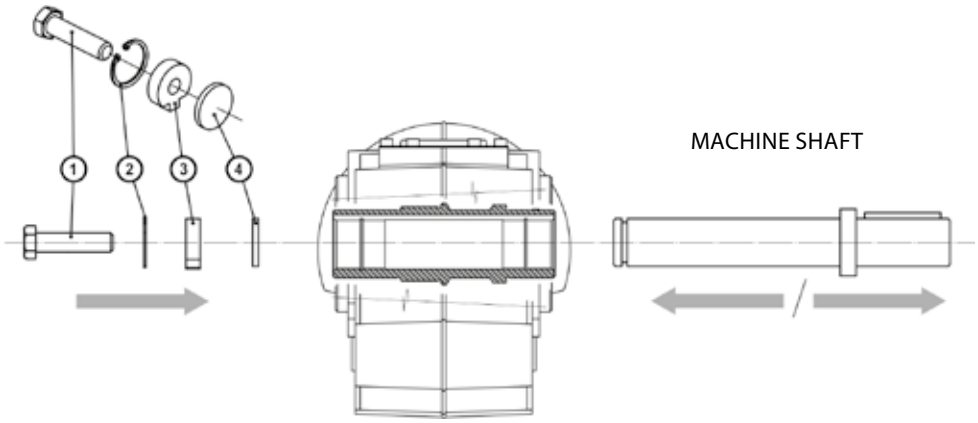
• Fig. 2, 3: Examples of correct and incorrect installation (⚠) on the output shaft of the reducer.





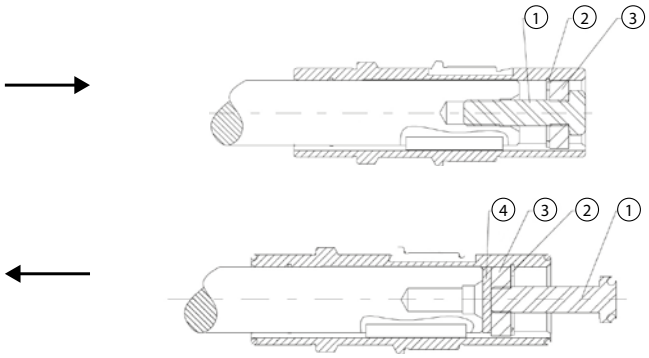
7.1.2 Hollow shaft with key (only B,S gear reducers)

Series B and S reducers (except sizes S140 and S150) may be fitted with a locking set to mount the hollow shaft to the driven shaft.



The consignment includes:l

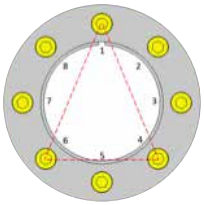
1. Mounting bolt
2. Safety ring
3. Lug nut
4. Thrust disk



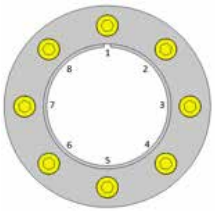
Installation
Fit the safety ring (2), insert the lug nut (3) and tighten down the bolt (1) from the Motovario installation kit on the end of the driven machine's shaft.

Removal
Fit the thrust disk (4) and lug nut (3) from the Motovario removal kit between the driven machine's shaft and the safety ring (2). Insert the safety ring (2) and tighten down the mounting bolt (1). You can now extract the reducer from the shaft.

7.1.3 Mounting with locking set (only B, S gear reducers):
Series B, S reducers may be fitted with a locking set to lock the hollow shaft on the driven shaft.
For fitting the locking unit proceed as follows:
- Undo the locking set screws, in sequence and gradually;
- Degrease with care the surfaces of the hollow shaft and of the machine pin to couple;
- Ensure the compliance of the diameter of the locking shaft (h7);
- Mount the locking unit on the gear reducer hollow shaft, lubricating beforehand the outer surface of the hollow shaft;
- Tighten slightly a first set of three screws placed at approx. 120° as shown in the figure;



- Tighten the locking unit gradually and uniformly with a torque wrench up to the toque indicated in the table below, with continuous sequence (not crossed) making ¼ of a turn at a time until reaching the prescribed tightening torque;
- Keep applying the torque for 1 or 2 further steps and at the end check the bolt tightening torque;
- In case of stressful working cycles with frequent motion inversions, check again, after a few hours of operation, the screws' tightening torque.
- The S140-150 series gear reducer does not require any torque wrench.



B	MT 12.9 (Nm)
BA40-50-70 B063-083-103 S050-060-080-100	15
B123-S125	40
B143	50
B153	70
B163	70

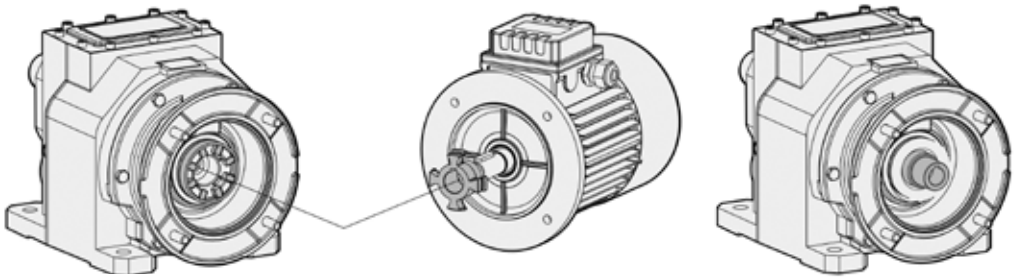
For disassembling the locking unit proceed as follows:
Clean all the oxidized areas.
Loosen one fixing screw after the other only by rotating them of ½ a turn at a time, with continuous sequence (not crossed), until the locking unit can be moved on the hollow shaft.
Remove the customer's shaft or gear reducer.

Do not remove completely the fixing screws before releasing the locking rings. Risk of serious injury!

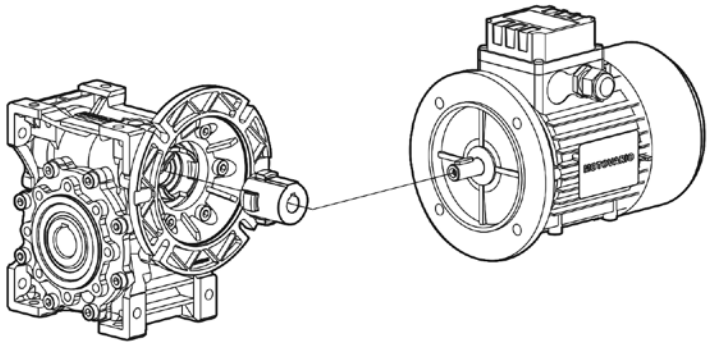
7.2 Input shaft connections
7.2.1 Assembling motor on pam flanges

When the unit is supplied without motor, observe the following recommendations to ensure proper installation of the electric motor:
- Check that the tolerances of the shaft and of the motor flange correspond at least to a "normal" quality class;
- Thoroughly clean the shaft, the centring and surface of the flange from dirt or traces of paint;
- Put on the motor shaft protective paste that promotes mating and prevents oxidation (recommended MACONGREASE TBL SPECIAL 2 antifretting grease);
- Place the proper gasket (supplied by Motovario on request) on the motor flange and proceed to the mechanical connection to the reducer.

7.2.1.1 For input version with elastic coupling:
Before the mechanical connection to the reducer, proceed mounting the coupling half (see figure) on the shaft of the electric motor that must be done without applying excessive force to avoid damaging the motor bearings. Otherwise check the correct position and the tolerance of the motor key.
Then mount the motor complete with half-coupling, timing the motor side half-coupling drive teeth with those of the elastic element on the reducer side half-coupling.



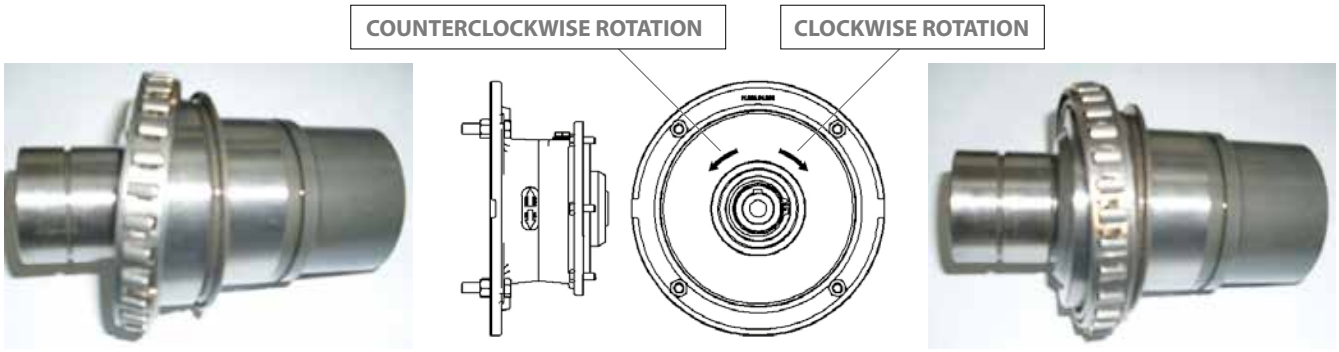
7.2.1.2 For version with input bushing (NMRV-P):
Before the mechanical connection to the reducer, proceed checking the mounting of the bushing (see figure) on the shaft of the electric motor, that must take place without applying excessive strength, to avoid damaging the motor bearings. Otherwise check the correct position and the tolerance of the motor key.
Then reassemble the bushing on the reducer, timing the teeth of the bushing with those of the screw. Then mechanically connect the motor to the reducer.

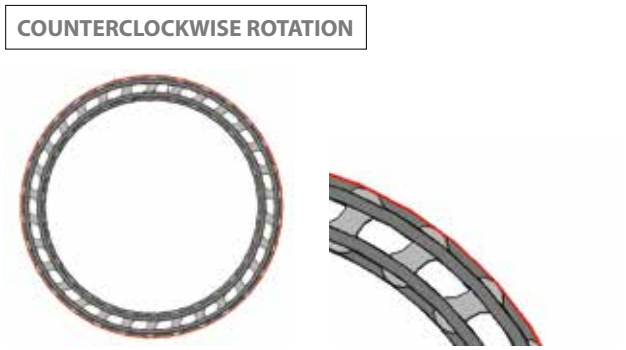


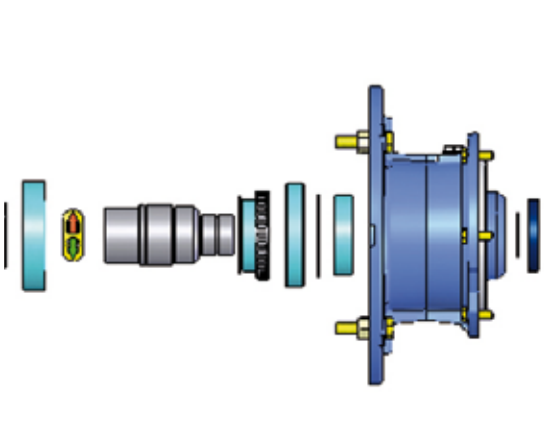
Check the direction of rotation of the output shaft of the unit' before installing the unit on the machine.

7.3 Accessories
7.3 .1 Backstop device (only H, B, S gear reducers)

The gear reducer may be supplied with a backstop device on the fast axis. The backstop device allows the rotation of the shafts in one direction only; depending on the size is available in the PAM flange or in the motor, without additional space (with the exception of the PAM configurations for H/B/S configurations, flange type PAM 100/112).
In the S series the device is not available for sizes S140-150.
It IS essential to specify the input side direction of rotation (clockwise/counterclockwise) in the order. The PAM flange bears a nameplate giving the direction of free rotation of the unit. Check this against the order.

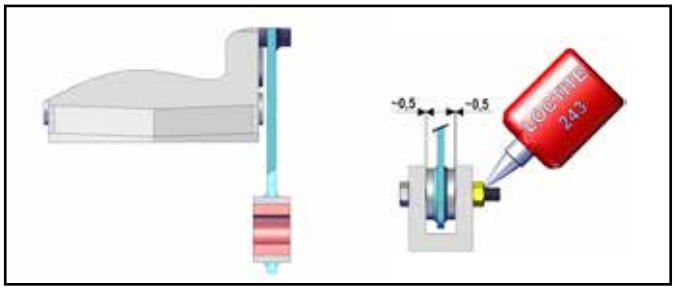




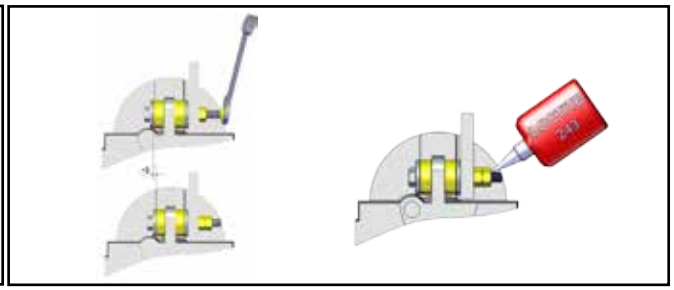


7.3.2 Shaft mounting with reaction arm (only B, S, NMRV, NMRV-P, SW GEAR REDUCERS)

The B, NMRV, NMRV-P, SW, S140-150 series gearboxes can be equipped with anti-vibration torque arm; the S-series gearboxes (of remaining sizes) can only be equipped with anti-vibration anchors. Make sure, upon mounting completed, that the axial pre-load of the anti-vibration anchor is absent (for B, NMRV, NMRV-P, SW series gearboxes, with anchor to support on both sides) or moderate (for S series gearboxes). Check the absence of abnormal vibrations, during the start-up, of both the unit and the support structure.



B, NMRV, NMRV-P, S140-150



S050-060-080-100-125

7.3.3 Reinforced seals

Series H-B-S-NMRX-SWX-SWFX reducers may be equipped with reinforced seals. Reinforced seals, depending on the size of the unit, will be composed of two seal rings or a standard seal ring + VRM ring. Coaxial reducers, sizes 060 to 140 (excluding single stage units) in mounting positions V1/V5 already have 2 seal rings as standard supply. It is not necessary to pay special attention during installation, only make sure that the machine is running at start-up.

7.3.4 Torque limiter:

The torque limiter is a mechanical device for safeguarding the transmission from accidental overloads or anomalies in the absorbed torque. It is mounted at the gear reducer output and acts as an internal clutch on the output shaft, which may be calibrated manually from the outside by means of a self-locking adjusting collar.
With respect to the electronic devices or external mechanical devices it has the following advantages:
- Limited additional dimensions with respect to the version without torque limiter;
- Output hollow shaft without diameter variations with respect to the standard version;
- Fast operation directly along the transmission to safeguard;
- Its oil bath operation does not require maintenance and ensures reliability over time;
- Calibration of the manually-adjustable slipping torque
- With values higher than the limit, the unit is nonetheless engaged, ensuring that the operated machine restarts automatically without external intervention;
- By means of the torque limiter it is also possible to turn the gear reducer shaft, loosening properly the adjusting collar, for example in the event of mechanical jams due to screw irreversibility.

A correct use of the torque limiter involves its installation as a device for accident prevention and not for compensating an incorrect choice of gear reducer (for example if the duty factor of the chosen gear reducer is low with respect to the real application requirements).

The torque limiter is available in the versions SWL 040-050-063-075-090, NMRL 050 / NMRL-P 063-075-090 and it fits in all combined gear reducer configurations provided in the catalogue, usually on the last gear reducer.
If necessary it is possible to mount the torque limiter on the output shaft of the gear reducer in positions J or K.

For safety reasons its use is highly discouraged in lifting mechanisms since, if due to overloads or anomalies the output shaft and the crown wheel slip, the weight might not be sustained.

Adjustment of the slipping torque:

The calibration is easily adjustable from the outside by turning the self-locking collar, featuring 4 marks to define the number of turns performed (each mark corresponds to ¼ of a turn). The unit is calibrated during installation

	Collar Rotation
040	1/2(*)
050	1/2(*)
063	3/4(*)
075	1(*)
090	1(*)

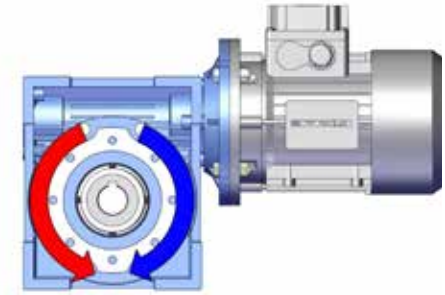
(*) of a turn.

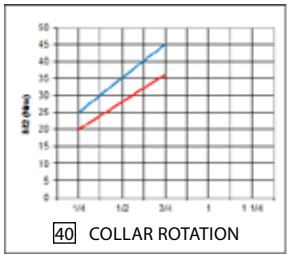
The factors that may affect the calibration value are: temperature, running-in, presence of vibrations. It is therefore advised, during machine installation, to calibrate the torque limit depending on the actual requirements of the application.

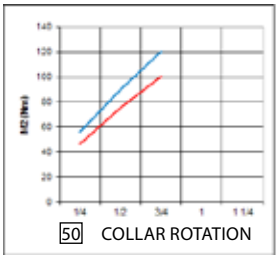
The standard rotation direction for the adjusting collar is clockwise, defined by looking straight on from the side of the adjusting collar the slow gear reducer axis with the motor on the RH side, if the collar is mounted in the J position, or with the motor on the LH side, if the collar is in the K position.
In version NMRL050 and in all the SWL sizes, the installation of the torque limiter is possible only in the J position.

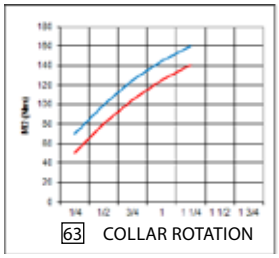
IMPORTANT: even if the torque limiter ensures to restart automatically the operating machine after slipping (exceeding the calibration nominal torque), it is good practice, for prolonged slipping, to restore the collar to its initial position and perform the calibration again.

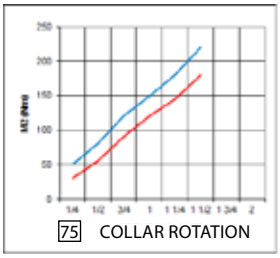
For each size of gear reducers (040-050-063-075-090) the admissible nominal torque range varies, as previously stated, depending on the reducing ratio and the gear reducer rotation direction, which influences tolerances between the two semi-tapered components that generate the slipping (there is an axial component with the tendency to bring them closer or move them apart).
In the calibration diagrams there are two straight lines representing the limits of the slipping torque value variation ensured by the gear reducer with torque limiter.
The calibration must always be checked afterwards in order to determine whether the number of revolutions imposed to the collar results in the desired torque value.

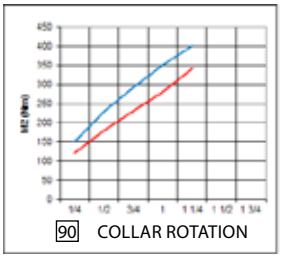



40 COLLAR ROTATION


50 COLLAR ROTATION


63 COLLAR ROTATION

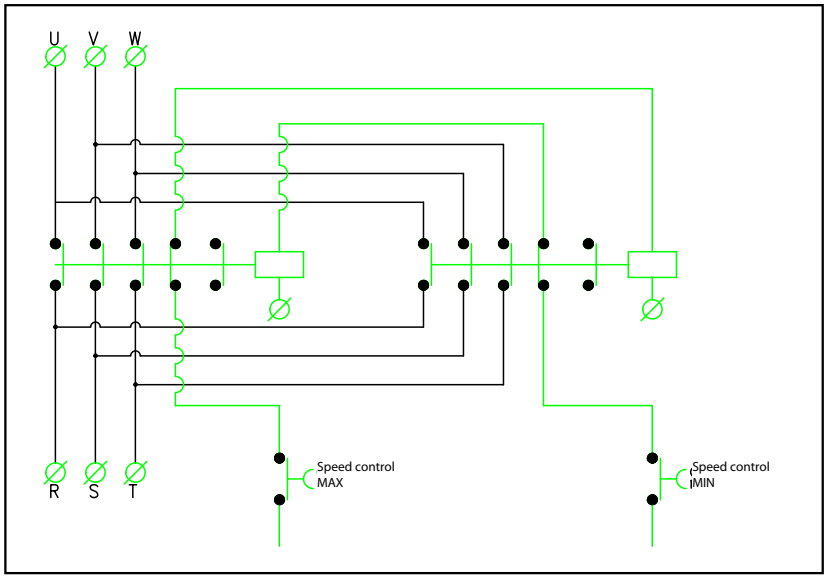

75 COLLAR ROTATION


90 COLLAR ROTATION

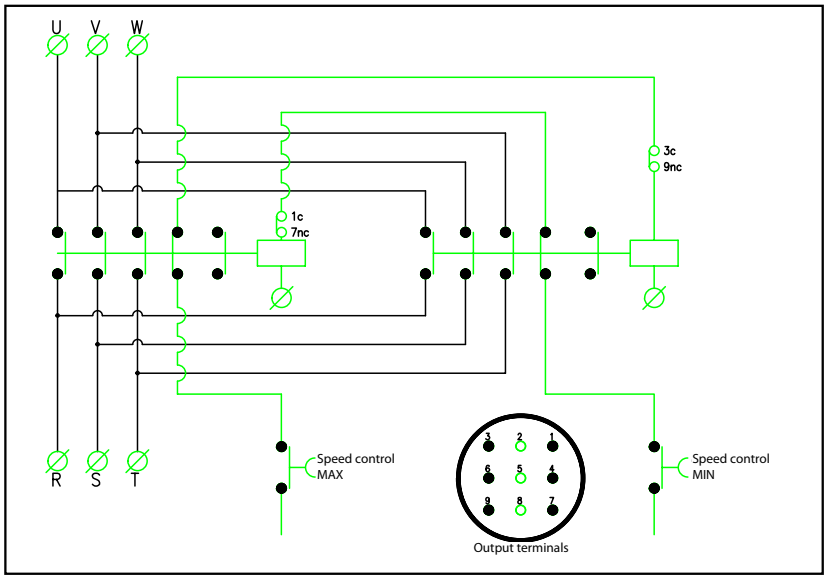
7.4 Variator accessories

In order to know exactly the number of revolutions of the variator, it is possible to fit directly on the variator casing (or on the differential casing) a NAMUR-compliant inductive sensor ~1mm distant from a crown wheel (9 or 18 teeth).
For reading the number of revolutions it is possible to use a digital tachometer, connected to the probe that reads on the wheel (9/18 teeth) the speed of the motovariator (both powered by voltage in direct or alternating current 24V/110V/220V; for the calibration refer to the corresponding instruction in the box).
Instead the gravitational indicator is enclosed (installed by the customer) and it is used for showing the variator adjusting position. If the handwheel is in position 1, the gravitational indicator reading scale is counter-clockwise, in position 2 it is clockwise. For the calibration bring the two hands to position "0".

Three-phase connection diagram of variator electrical servo-control



Three-phase connection diagram of variator electrical limit switch

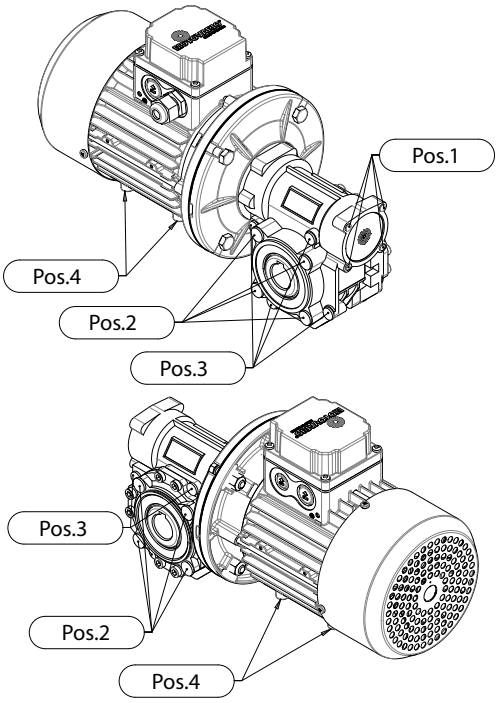


7.5 Units for difficult environments and food industry

In the event of accidentally damaging the paint, restore it as soon as possible by using the repair kit available on request.

Close the unused fixing holes with the plugs provided according to the enclosed diagram:

SWX-SWFX GEARMOTOR AND GEAR REDUCER

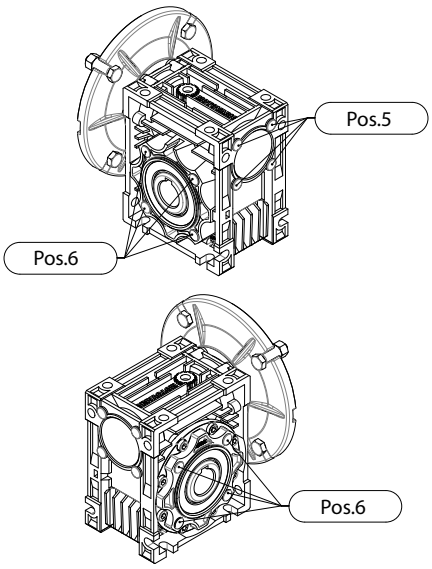


SWX SWFX	Screw axis in pos. 1		Output flange connection in pos. 2		Fixing feet connection in pos. 3	
	Plug	Qty	Plug	Qty	Plug	Qty
030	D4.7	4	D5	8	No	No
040	D4.7	4	D5	8	D5	8
050	D6	4	D7	8	D5	8
063	D6	4	D7	16	D7	8
075	D6	4	D7	16	D7	8
090	D6	4	D8,8	16	D8,8	8
105	D6	4	D8,8	16	D7	16

Motor	Feet connection in pos. 4	
	Plug	Qty
063	D6	4
071	D6	4
080	D6	4
090	D8	4
100	D8	4
112	D8	4

- The screw axis hole covering plug in pos. 1 must always be mounted
- The output flange connection hole covering plugs in pos. 2 must be mounted depending on the accessories installed
- The fixing feet connection hole covering plugs in pos. 3 must be mounted if the fixing feet are not installed
- The feet connection hole covering plugs in pos. 4 must always be mounted

NMRX GEAR REDUCER



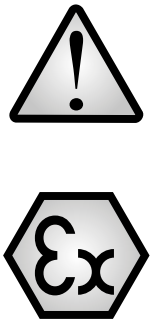
NMRX	Screw axis in pos. 5		Output connection in pos. 6	
	Plug	Qty	Plug	Qty
040	D6	3	D5	8
050	D6	4	D7	8
063	D8	4	D7	16
075	D8	4	D7	16
090	D8	4	D8,8	16

- The screw axis hole covering plug in pos. 5 must always be mounted
- The output axis hole covering plug in pos. 6 must be mounted depending on the accessories installed

8. STARTUP

Before starting up the machine incorporating the unit make sure that:
- The machine is compliant with Machinery Directive 2006/42/EC, in addition to any other safety regulations in force;
- It is compliant with regulations EN60204-1 and EN50014;
- The voltage corresponds to the expected one;
- The facility complies with all applicable standards on safety and health of people at the workplace;

Moreover:
- Check for correct amount of oil through the appropriate level indicator, or dipstick, if any. In life lubricated units, without the level control, the right quantity of oil is ensured by Motovario. If the gear reducers are supplied without oil, fill them up with the quantity and type of oil indicated on the proper label on the gear reducer. Fill in the label. If topping up is necessary, use the same brand and type of lubricant as the one already used. Use Motovario approved lubricants (see table);
- Make sure that the vent plug is free from obstructions;
- The start-up should be done in a gradual manner, avoiding the immediate application of the maximum load the machine can bear, in order to check for the absence of operating failures or residual application criticality;
- During start-up, to allow the oil to spread and reach optimum temperature and viscosity, it is advisable to make the device run with no load for some minutes (see step 6. STARTUP);
- For the variator/variator-gear reducer the change in revolutions, using the appropriate command, must be done absolutely when the unit is running;
- During the first hour of operation check for any anomalous vibrations and noises or overheating. If necessary stop immediately the motor and contact the Technical Service. After stopping the motor, wait 30' before disassembly.



Additional procedures for ATEX units:
- Check the level of external cleaning of the units, especially in the areas most affected by cooling;
- Check for leaks of lubricant, especially in areas of the sealing rings.
- To clean, use materials that do not generate electrostatic discharges.
- Check for correct amount of oil through the appropriate level indicator, or dipstick, if any. In life lubricated units, without the level control (ATEX 3GD), the right quantity of oil is ensured by Motovario. Should it be necessary to top up with lubricant follow the instructions on section 9. LUBRICATION;
- In case of any abnormal noise and vibration, or high overheating, immediately stop the motor and contact the Technical Service by Motovario.
- It is recommended to run in the unit at reduced load (approx. max. 40% of nominal) for 24 hours. In the running-in phase the unit is subject, for a short time, to condition of internal friction, and therefore temperature, higher than the usual ones, but still compatible with the specified limits. It is normal during this phase to detect a small release of grease from the oil seals.

PLEASE NOTE: In the event of prolonged storage at low temperature it is necessary to bring the oil to the normal fluidity with a gradual dry start. Only after bringing the surface of the unit to at least 10°C, proceed, necessarily, to the above-mentioned running in phase.
- After about 3 hours of operation at full load, it is necessary to measure the surface temperature as indicated in section SURFACE TEMPERATURE. In the event that the rating value is exceeded, immediately shut off the motor and contact the Technical Service by Motovario.
- In case of need, after stopping the motor, wait 30' before disassembly.

Surface temperature

The temperature data on the nameplate indicate maximum admissible values on the unit, referring to the ambient temperature between –20 °C and +40 °C: operation is not allowed at different ambient temperatures. If necessary contact the Technical Service.

Measuring the surface temperature

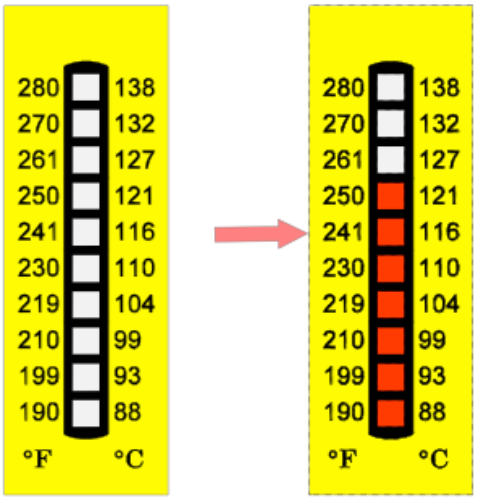
- During start-up it is important to detect the surface temperature of the unit under the conditions provided by the application. The detection is to be repeated periodically as shown in table CHECKS AND MAINTENANCE.
- The surface temperature must be measured in the vicinity of the fast axis (for gearboxes and variators) or in the connection area between the motor and the unit (for motor gearboxes/motor variable-gearboxes) and in any case in the less favourable point of the air flow.
- The measured surface temperature (Ts) plus the difference between the maximum ambient temperature (Tam) allowed and the measured ambient temperature (Ta) must be at least 10°C lower than the maximum surface temperature allowed (Tc, indicated on the label):

Ts+(Tam-Ta) < Tc –10 °C

In the case of unsuitable temperature stop the unit and contact the Technical Service.

Using adhesive thermo-sensitive detectors (if any)

The surface temperature can also be detected through the use of adhesive indicators. These can be provided for special units or upon request.



Thermal protector (when present)

It is a PTC probe (see Fig. 1) with a trigger temperature of 120 °C.

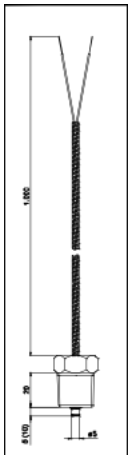
THE customer shall perform the electric connection to the main electric panel to ensure the resistance thermometer correct operation regardless of the connections necessary for the system operation.

The connection must apply the positive safety logic.

Main powerboard, connections and logic must, taken together, provide a locking system to prevent, in the event of a shutdown, the unwanted start-up of the device.

In case of intervention of the PTC probe, wait about 10 min. before resetting the main powerboard.

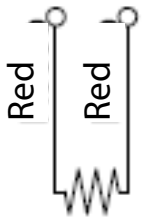
Fig. 1 PTC probe



Unit electric characteristics:

Power to sensor	<280 mW
Voltage to sensor	<30 Vdc
Current to sensor	<8 mA

Connection:



Do not use the unit:
- In an environment with fumes or abrasive and/or corrosive dust;
- In direct contact with food products in bulk.

Dangerous zone
The dangerous area of the unit is the rotating shaft extension where any person could be subject to mechanical risks from direct contact (cutting, dragging, crushing).
Make the machine compliant with DIRECTIVE 2006/42/EC providing a safety guard when the unit works in accessible zones.

For series B, S, NMRV and SW reducers the units can be fitted with protective boots if so required.

9. MAINTENANCE

Maintenance must be done by a technician familiar with workplace safety legislation and environmental issues.
Do not dump polluting fluids, replaced parts or maintenance waste.
Never improvise repairs!

Before working on the unit disconnect its power supply, being careful to be protected against inadvertent reactivation, and in any case against the mobility of the components of the unit itself.
Wait until the unit reaches the ambient temperature.
Inform staff that work and the nearby one, areas defining the close areas and preventing access.
Put in place all necessary measures for environmental safety (dust, gas ...).

The precise machining of the unit's internal components ensures correct operation with minimum maintenance.
In general the following rules are valid: periodic check of the unit external cleaning, especially in the areas more involved in the cooling process; periodic check of any leaks of lubricant, especially in the areas of the sealing rings; check and cleaning of the breather plug hole. For the products non-lubricated for life, check periodically by means of the specific level indicators the correct quantity of lubricant. If topping up is necessary, use the same brand and type of lubricant as the one already used, or in any case compatible with it. Use oils and greases recommended by Motovario. During an oil change (products non-lubricated for life) follow the above mentioned recommendations.
Do not hesitate to replace unreliable components. Replace worn parts only with original spare parts. Using non-original spare parts can compromise the operation of the unit, and also voids the warranty. If you require spare parts, follow the instructions given in the spare parts section for the unit in question.
1. Keep the unit in good running order with periodic checks of vibration and noise, absorption and tension, wear of friction surfaces, lubricant leaks, gaskets, bolted gaskets for wear, deformation and corrosion and restore them as necessary; keep the unit clean of dust and process residue (do not use solvents or other products incompatible with the materials of construction, and do not direct high pressure jets of water directly at the unit).
For the units used in AGGRESSIVE ENVIRONMENTS AND FOOD INDUSTRIES:
In the event of accidentally damaging the paint, restore it as soon as possible by using the repair kit available on request.

Following the above mentioned rules ensures the operation of the unit and the provided safety level.

ORDINARY MAINTENANCE TABLE

Frequency	Object	Check	Operation
Weekly	Breather plug	Obstruction due to the presence of dust. For the positions of the plugs please refer to the operating positions.	Release the vent plug.
1000h/ 5 months	Oil	Level.	Topping up.
	Sealing rings, gaskets and plugs	Oil leaks and ageing	Replacement
	Torque arms (polymer bushings).	Ageing.	Replacement.
4000h/ 3 years	Mineral oil (gear reducers non-lubricated "for life").	None.	Replacement.
8000h/6years	Synthetic oil (gear reducers non-lubricated "for life").	None.	Replacement.

9.1 ATEX CERTIFIED PRODUCTS

Frequency, type of checks and related operations are shown in Table MAINTENANCE CHECKS AND OPERATIONS. Their respect is essential for the maintenance of the ATEX certification.
All operations involving replacement of components must be reported in the "REDUCER MAINTENANCE SHEET" (enclosed with the reducer), filling in all the fields provided.

Observe the following precautions:
- On units equipped with cover plate for any reason not to remove the said cover;
- All operations involving the removal of covers and/or flanges should be made by experts from the Technical Centres by Motovario authorized to Atex maintenance;
- Always use official Motovario spare parts. For the request of the components, follow the instructions given in the spare parts section of the specific unit.

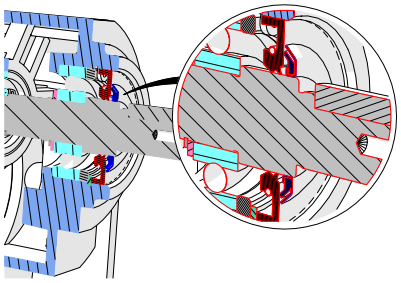
In case you need to replace the oil seals be sure to replace only those externally accessible without removing covers and/or flanges. For other oil seals, contact an authorized Technical Service authorized to ATEX maintenance.

9.1.1 REPLACEMENT PROCEDURE OF EXTERNAL SEALING RINGS

Locate the seal to be replaced and proceed as follows:
- Remove the sealing ring taking the utmost care not to cause any kind of damage to the seat and to the shaft (scratches, dents, etc.);
- Always use new gaskets, and in case of the same brand of those removed;

Before assembly, the new ring should be greased on the lip (the one with double lip TC also in the space between the two sealing lips) which lip must slide always on a protection if on the shaft there are slots for keyways and/or grooves for elastic rings (e.g., spinner, ...); the grease used must be clean and free of dust, shavings and other impurities, the recommended grease to be used is AGIP-MU EP 2 (For sealing rings with double lip in VITON use the special grease TECNOLUBE BC 101);
- Be careful not to match the position of the lip in the same position of the seal lip just gotten off;
- Never insert any kind of lubricant in the outer area of the oil seal in as it would facilitate the release and make sure that the housing is clean and free of grease;
- Clean the surface of the reducer with materials that do not generate electrostatic discharges;
- After 24-hour check for leaks, in the case of oil leakage contact an authorized Technical Service by Motovario authorized for Atex maintenance.

Note, in case of presence of external VRM ring (see the figure below):
- Proceed to the installation of oil seal rings, following the directions above, after having disassembled the VRM. While disassembling be careful not to damage the shaft;
- After the installation of the oil seal rings, fit the outer VRM ring with the following precautions;
- Fill with grease the volume between the oil sealing ring and the VRM;
- Make sure that the rubber lip of the VRM enter, uniformly, in contact with the sealing ring;
- Ensure that the metal ring of the VRM does not touch the oil sealing ring.



9.1.2 Oil change procedure

Bring the reducer to a surface temperature below 40 °C before changing the oil: with warm oil, the emptying procedure and the removal of deposits is easier. Take all necessary precautions to avoid burns due to high temperature of the reducer and/or oil.
- In the case of life lubricated units (see section LUBRICATION) do not perform any oil change;
- The oil must be of the same type as the one replaced (see table “Characteristics” and “amount” in section LUBRICATION and check if there is any lubricant nameplate affixed to the unit); use lubricants approved by Motovario. Wanting to change the family is required to run a wash with the same type of oil you are going to use.
- Locate the loading and unloading plugs (the loading plug can match the vent plug or the dipstick); place a container of suitable capacity under the reducer at the unloading plug (for amounts see the relevant tables in section LUBRICATION);
- Unscrew the loading and unloading plugs paying attention to progressively reduce any internal overpressure;
- Completely drain the oil and collect it in the underlying container;
- Replace the seal of the unloading plug and tighten it again by applying the appropriate tightening torque (see table "OIL PLUGS TIGHTENING TORQUE”);
- Fill the reducer with new oil until the level reaches the centre line of the indicator plug or the top notch on the dipstick;
- Replace the seal of the loading plug and tighten it again by applying the appropriate tightening torque (see table "oil plugs tightening torque”);
- After about 30 minutes check the correctness of the level (if necessary, provide to its restoration) and any oil leaks. Clean the surface of the reducer with materials that do not generate electrostatic discharges;
- Dispose of used oil in accordance with current regulations.

Table of OIL PLUGS TIGHTENING TORQUE

Plug	Torque Nm
1/4”	7
3/8”	7
1/2”	12

CHECKS AND MAINTENANCE TABLE

a) Checks

Frequency (hours of operation/ time of installation)	Object	Check	Possible intervention
A responsibility of the user, depending on the environmental conditions	Whole unit	Thickness of deposits of dust < 2mm	Eliminating the dust
	Breather plug	Obstruction due to the presence of dust. For the positions of the plugs, please refer to the operating positions.	Release the vent plug
1 week	Whole unit	Noise and/or mechanical vibrations	Change the oil (if not lubricated "for life"), and if the problem persists, stop immediately the unit for general overhaul (1).
	Unit surface	State of the protection (painting/treatment)	Restore the missing or damaged protection
1 month	Adhesive thermal sensors (if any) (2)	Surface temperature (colour of the adhesive)	If excessive, compared to what is stated on the label, change the oil (products non-lubricated "for life"), and apply a new sensor. If the problem persists, immediately stop the unit for general overhaul (1)
	Oil level (life lubricated products)	Level: use the appropriate indicator or dipstick/measuring rod. For the positions of the plugs please refer to the operating positions.	Topping up the oil.
	Oil plug indicator (if any)	Functions	Replacement
1,000 hours/3 months	Unit surface	Operating temperature. For value and check position (see "SURFACE TEMPERATURE")	If excessive, compared to what is stated on the label, change the oil. If the problem persists, immediately stop the unit for general overhaul (1).
	Sealing rings and plugs externally accessible	Oil leaks and ageing	Replacement (see "Procedure for the replacement of external oil sealing rings")
	Sealing rings not externally accessible, seals	Oil leaks	Replacing seals and gaskets (1)
	Torque arms (polymer bushings)	Ageing/cracking	Replacing the bushings
6 months	Thermal protection (if any)	Functionality of thermal protector and user circuit	Replacing the thermal protector (2)
1 year	Product data labels	Readability	Request for a copy and Motovario S.p.A. Technical Service

b) Maintenance

4,000 hours/3 years	Oil (if mineral and/or Tam <5°C, and/or sudden changes in temperature) gearboxes not lubricated for life	Replacement
8,000 hours/5 years	Oil, sealing rings, gaskets and plugs	Replacement (1)
(8000 F.N.K) hours (3) (4)	Whole unit	General overhaul (1)

Notes: (1) At Motovario S.p.A. or at an authorised Motovario Atex certified Technical Service. The list of Atex authorized centres is available on the website www.motovario.com

(2) The user is responsible for checking the circuit to which the thermal protector is connected

(3) - $F = (fs)^3$, where: fs=M2max/Mr2, with:

M2max=maximum transmissible torque, on the product nameplate

Mr2=required torque to the output shaft; if not known, use the maximum torque of the motor installed

- N = 1500/n1, in the case of the variable-reducer, for the reducer (second element): n1=n2 max variator
- k = 1 in case of application areas 1,21 (category 2)
- k = 1.5 in case of application areas 2,22 (category 3)

(4) in case of coupled products, consider, for the assembly, the closest overhaul date

Attention: The customer must keep updated and available the documentation on all routine and unscheduled maintenance on the unit (see "Annex 1: REDUCER MAINTENANCE SHEET")

10. PROBLEMS DURING OPERATION

If during start-up or the first running hours there were problems of any kind, please contact the after-sales technical service at Motovario. The table lists a series of problems with the description of possible remedies. The descriptions below are merely indicative and are only for information purposes.
Any tampering with the unit without Motovario authorisation voids the warranty.

PROBLEM	CAUSE	SOLUTION (1)	INTERVENTION
The motor does not start.	Power supply problems. Faulty motor. Incorrect dimensioning of the motor.	Check power supply.	Replace electric motor. Check application.
Motor electric absorption greater than nameplate values.	Incorrect dimensioning of the motor.	Check application.	Replace electric motor and if necessary also the gear reducer/variator.
The measured temperature on the motor casing is high.	Faulty motor. Incorrect dimensioning of the motor.	Check application.	Replace the electric motor and if necessary also the gear reducer/variator.
The measured temperature on the gear reducer/variator casing is high.	Incorrect dimensioning of the gear reducer/variator. Non-compliant operating position.	Check application.	Restore the correct work conditions: operating position and/or lubricant level.
The output shaft revolutions of the gear reducer/variator are different from the ones expected.	Gear reducer/variator ratio different than the one expected.	Check the ratio of the gear reducer/variator.	Replace the gear reducer/variator and/or the electric motor.
	Motor with polarity different from the one expected.	Check the polarity of the motor.	
Oil leaks from the sealing ring.	Faulty sealing ring.	Replace the ring	Replace the component ship the unit to Motovario.
	Sealing ring damaged during shipping.	If the shaft seat is damaged restore it (if possible).	
	Damaged shaft seat.		
Oil leaks from surfaces.	Flat gasket or O-ring damaged.	Replace the gasket or the O-ring.	Ship the unit to Motovario.
The output shaft of the gear reducer/variator turns in the opposite direction.	Incorrect connection of the electric motor.	Invert two phases of the power supply of the electric motor.	
Cyclic noise of the kinematic motion.	Dents on the gears.	No practical problem if the noise is not determinant in the specific application.	Ship the unit to Motovario if the noise is important in the specific application.
Non-cyclic noise of the kinematic motion.	Dirt inside the gear reducer/variator.	No practical problem if the noise is not determinant in the specific application.	Ship the unit to Motovario if the noise is important in the specific application.
Noise (whistle) coming from the kinematic motion.	Incorrectly adjusted bearings.	Check the correct quantity of lubricant.	Ship the unit to Motovario.
	Gears with meshing errors.		
	Insufficient quantity of lubricant.		
Vibrations on the electric motor.	Geometrical errors on the coupling motor/gear reducer/variator.	Check the geometric tolerances of the flange of the electric motor.	Replace the electric motor.
		Check the tolerance and the geometry of the key of the motor shaft.	

11. LUBRICATION

Check the oil level before starting up the unit, operation that must be carried out when the unit is arranged in the predetermined mounting position, if necessary restore the level with oil of the same type (see the table ALTERNATIVES TO FIRST SUPPLY LUBRICANTS) shown on the nameplate. In case of unavailability, contact the Technical Service by Motovario. For possible use of different oil (after checking with the Technical Service by Motovario), replace completely and in case of synthetic oil, only after washing the inside of the reducer.
PLEASE NOTE: For units supplied without oil, check, in the specific additional nameplate, the oil that may be used and the required quantity according to the operating position and specify the indications required on the same nameplate. Fill the unit with oil following the plug diagram.

If there is an oil leak, find the cause before restoring the lubricant level.
Do not dump the lubricant in the environment, adopt all the necessary environmental safety measures, dispose of the lubricant in compliance with the current regulations.

In case of ambient temperature not listed in the table, contact our Technical Service. If the temperature is lower than -30°C or higher than 60°C use special mixture seal rings.
For oil changes follow what indicated in the "ORDINARY MAINTENANCE Table".

Check the oil level before starting up the unit, operation that must be carried out when the unit is arranged in the predetermined mounting position, if necessary restore the level with oil of the same type as the one supplied by the Manufacturer (see the table in FIRST SUPPLY LUBRICANTS, ATEX CERTIFIED FOR USE BY MOTOVARIO) shown on the nameplate. In case of unavailability, contact the Technical Service by Motovario.

Table ALTERNATIVES TO FIRST SUPPLY LUBRICANTS

	H A30 ÷ A60 H 030 ÷ 140 B 060 ÷ 160 S 050 ÷ S 150 R040 ÷ 125		B A40 ÷ A70	NMRV 025 ÷ 150 NMRV-P 063 ÷ 110 HW 030 ÷ 040 SW 030 ÷ 105 NMRX 040 ÷ 090 SWX 030 ÷ 105	SWXF 030 ÷ 105	TX002 ÷ 010 S003 ÷ 100
	Mineral oil		Mineral oil	Synthetic oil	Synthetic oil	Mineral oil
*T°C ISO/SAE	(-5) ÷ (+40) ISO VG 220	(-15) ÷ (+25) ISO VG 150	(-5) ÷ (+40) SAE 85W-140	(-25) ÷ (+50) ISO VG320	(-15) ÷ (+40) ISO VG320	(-10) ÷ (+40) ISO VG32
ENI	BLASIA 220	BLASIA 150	ROTRA MP (85W-140)	TELIUM VSF320	-	ROTRA ATF IID
SHELL	OMALA OIL 220	OMALA OIL 150	SPIRAX A 85W-140	TIVELA OIL S320	-	A.T.F. DEXRON
KLUBER	Kluberoil GEM 1-220N	Kluberoil GEM 1-150N	Klubesynth GH 6-460	Klubesynth GH 6-320	Klubesynth UH1-6 320	-
MOBIL	MOBILGEAR 600 XP220	MOBILGEAR 600 XP150	-	SHC 632	-	A.T.F. 220
CASTROL	ALPHA MAX 220	ALPHA MAX 150	-	ALPHASYN PG320	-	DEXRON II
BP	ENERGOL GR-XP220	ENERGOL GR-XP150	-	ENERGOL GR-XP320	-	AUTRAN DX

All units are supplied with ENI oil, unless otherwise specified by the client.
*T°C Operating ambient temperature

First supply lubricant

Table of FIRST SUPPLY LUBRICANTS, ATEX CERTIFIED FOR USE BY MOTOVARIO

	ISO/SAE	H A30 ÷ A60 H 030 ÷ 140 B 060 ÷ 160 S 050 ÷ 125		B A40 ÷ A70		NMRW 025 ÷ 150 NMRW-P 063 ÷ 110 HW 030 ÷ 040 SW 030 ÷ 105	S 003 ÷ 030 S100	
		Mineral oil	Synthetic oil	Mineral oil	Synthetic oil	Synthetic oil	Mineral oil	Synthetic oil
		ISO VG220		SAE 85W-140	ISOVG640	ISOVG320	ISOVG320	
Standard	ENI	BLASIA 220		ROTRAMP (85W-140)		TELIUM VSF320	ROTRA ATF II D	
Food industry	KLUBER		KLUBERSYNTH UH1-6 220		KLUBERSYNTH UH1-6 460	KLUBERSYNTH UH1-6 320		

Note: products in special versions may be operated with a different oil. Always check the name of the oil on the product nameplate.

SPECIAL LUBRICANTS Table

OIL SPECIFICATIONS (Synthetic)		*T° C IS0 VG...	H-B-S-HA-R	BA	VSF+PC+HW	Variator
Oil for low ambient temperatures	ENI	(-25) ÷ (+20)	BLASIA 150 S (ISO VG150)	BLASIA 220 S (ISO VG 220)	BLASIA 150 S (ISO VG 150)	**
	KLUBER	(-35) ÷ (+10)	Klubersynth GH 6-80 (ISO VG68)	Klubersynth GH 6-150 (ISO VG150)	Klubersynth GH 6-80 (ISO VG68)	**
	MOBIL	(-40) ÷ (+5)	SCH 624 (ISO VG32)	SCH 626 (ISO VG68)	SCH 626 (ISO VG68)	**
	KLUBER	(-40) ÷ (+5)	Klubersynth GH 6-32 (ISO VG32)	Klubersynth GH 6-32 (ISO VG32)	Klubersynth GH 6-32 (ISO VG32)	**
Oil for low ambient temperatures Food industry	KLUBER	(-30) ÷ (+10)	Klubersynth UH1 6-100 (ISO VG100)	Klubersynth UH1 6-100 (ISO VG100)	Klubersynth UH1 6-100 (ISO VG100)	Kluber Summit HySyn FG32 (ISO VG32)
Oils for high temperatures	KLUBER	(-10) ÷ (+50)	Klubersynth UH1 6-460 (ISO VG460)	**	Klubersynth UH1 6-460 (ISO VG460)	Klubersynth GH 6-80 (ISO VG68)
	KLUBER	(-10) ÷ (+70)	Klubersynth UH1 6-680 (ISO VG680)	Klubersynth UH1 6-680 (ISO VG680)	Klubersynth UH1 6-680 (ISO VG680)	**
Oils for high temperatures Food industry	KLUBER	(-10) ÷ (+50)	Klubersynth UH1 6-460 (ISO VG460)	Klubersynth UH1 6-680 (ISO VG680)	Klubersynth UH1 6-460 (ISO VG460)	Klubersynth UH1- 6 100 (ISO VG100)
Food industry	KLUBER	(-10) ÷ (+40)	Klubersynth UH1 6-220 (ISO VG220)	Klubersynth UH1 6-460 (ISO VG460)	Klubersynth UH1 6-320 (ISO VG320)	Kluber Summit HySyn FG32 (ISO VG32)

* T°C ambient
** Cases where the first supply oil meets the requirement.
For using special lubricants, contact Motovario Technical Service.

The amount of oil in the table are merely indicative only and for the proper topping up you will have to refer to the level plug or the dipstick, if any. Any deviations in level can depend on construction tolerances but also by the placement of the unit or by the mounting surface at the customers' premises. For this reason it is appropriate that the customer checks and, if necessary, restores the level when the unit are installed.

OIL AMOUNT table (LITRES)

H - CH	HA31	HA41	CHA41	A51	A61	A32	A42	A52	A62	A33	A43	A53	A63
B3 - B5	0.07	0.23	0.13	0.25	0.62	0.68	0.7	1.2	1.9	1.1	1.16	1.9	2.4
B8													
B6 - B7													
V5 - V1								1.6	2.1			2.5	3.1
V6 - V3													

H - CH	041	051	061	081	101	121	041M	051M	061M	081M	101M	121M
B3 - B5	0.5	0.7	0.7	1.45	3.5	4.7	0.5	0.5	0.5	1.5	3.5	3.9
B8	0.5	0.5	0.5	1.5	3.5	3.9	0.5	0.7	0.7	1.45	3.5	4.7
B6 - B7	0.5	0.7	0.7	1.5	3.5	4.1	0.5	0.7	0.7	1.5	3.5	4.1
V5 - V1	0.5	0.7	0.9	1.5	3.5	4.7	0.5	0.7	0.9	1.5	3.5	4.7
V6 - V3	0.5	0.7	0.7	1.5	3.5	4.1	0.5	0.7	0.7	1.5	3.5	4.1

H - CH	032/ ..3	042/ ..3	052/ ..3	062/ ..3	082/ ..3	102/ ..3	122/ ..3	142/ ..3
B3 - B5	0.8	1.2	1.4	2.4	4.5	8.1	12.5	22.5
B8	0.85	1.2	1.4	3.1	5	8.9	12.5	20
B6 - B7	1	1.2	1.8	3	4.6	8.4	12.1	22.5
V5 - V1	1.3	1.75	2.15	3.9	7.6	12.7	20.5	30.5
V6 - V3	1.2	1.7	2.1	4.4	7.5	14.2	21	38

B	A42	A52	A53	A72	A73
B3	0.33	0.42	0.63	1	1.21
B8					
B6 - B7					
V5					
V6					

CB	A42	A52	A53	A72	A73
B3	0.33	0.42	0.55	1	1.13
B8					
B6 - B7					
V5					
V6					

B - CB	063	083	103	123	143	153	163
B3	1.2	2.5	3.7	5.7	11.1	19	33
B8	1.5	2.8	4.2	7.9	13	17.5	42.8
B6	1.5	3.5	6	8.5	14.5	26	43
B7		2.8	3.9	7.3	11.8	19	30
V5	2.1	3.7	7	9.9	18.5	32.5	54.5
V6	1.3	2.6	4.5	6.7	10.8	16.5	37.3

S - CS	052-053	062-063	082-083	102-103	122-123	142	143	152	153
B3	2.05	2.4	6	9	14.7	22	20	29.7	27
B8	1.8	2.3	4	6	11.8	20	20	31	31
B6	2.4	2.9	5.7	8	16	22 (25)	18 (24.5)	29.3 (42)	24 (40)
B7	2.1	2.6	4.5	6.8	11.3	17.5	14	22.5	18
V5	2.8	3.5	6.8	10.3	19	24.5	23.5	34.4	33
V6	2.4	2.9	6.4	9.9	18	20.8	20	33.3	32

(...) Position B6 sizes 142-143-152-153 backstop units

NMRV	025	030	040	050	063	075	090	105	110	130	150
B3	0.02	0.04	0.08	0.15	0.3	0.55	1	1.6	3	4.5	7
B8									2.2	3.3	5.1
B6 - B7									2.5	3.5	5.4
V5									3	4.5	7
V6									2.2	3.3	5.1

The gear reducers NMRV040 and NMRV050 may be supplied with reduction pre-stage unit and may be mounted with gear reducer HA31, for the corresponding oil quantity refer to the relevant table.

NMRV-P	063	075	090	110
B3	0.33	0.55	1	1.6
B8				
B6 - B7				
V5				
V6				

NMRV-P/HW	HW030		HW040	
	063	075	090	110
B3	0.06	0.09	0.11	0.12

NMRX	040	050	063	075	090
B3	0.08	0.15	0.3	0.55	1
B8					
B6 - B7					
V5					
V6					

SW-SWX-SWFX	030	040	050	063	075	090	105
B3	0.04	0.08	0.15	0.3	0.55	1	1.6
B8							
B6 - B7							
V5							
V6							

TX	002	005	010
B5 - B6 - B7	0.11	0.15	0.38
B5 - V1 - V5	0.29	0.46	0.86
V3 - V6	0.29	0.46	0.86

Var S	003	005	010	020	030/050	100
B3 - B5 - B6 - B8	0.17	0.24	0.41	0.69	1.38	2.29
V1 - V5	0.24	0.38	0.78	1.23	2.46	4.10
V3 - V6	0.26	0.38	0.41	0.69	2.46	3.68

RM	40/1	50/1	63/1	80/1	100/1	125/1
B3	0.18	0.3	0.55	1.1	1.6	3.7
B6 - B7	0.2	0.3	0.68	1.1	2.7	3.7
B8	0.18	0.35	0.68	1.67	3.6	5.4
V5	0.16	0.3	0.6	1.2	1.45	2.8
V6	0.21	0.3	0.68	1.75	3.6	4.9

RT - RF/1	40/1	50/1	63/1	80/1	100/1	125/1
B3 - B5	0.18	0.35	0.68	1.67	3.6	5.4
B6 - B7	0.2	0.3	0.68	1.1	2.7	3.7
B8	0.18	0.3	0.55	1.1	1.6	3.7
V1 - V5	0.16	0.3	0.6	1.2	1.45	2.8
V3 - V6	0.21	0.3	0.68	1.75	3.6	4.9

RT - RF/2	40/2	50/2	63/2	80/2	100/2	125/2
B3	0.42	0.8	1.5	3.6	6.8	13
B6 - B7	0.42	0.8	1.5	3.2	6.8	11
B8	0.42	0.8	1.4	3.6	6.2	13
V5	0.42	0.86	1.6	3.45	7	12
V6	0.63	1.1	2.2	4.2	10.6	17

RT - RF/3	40/3	50/3	63/3	80/3	100/3	125/3
B5	0.42	0.8	1.5	3.6	6.8	13
B6 - B7	0.42	0.8	1.5	3.2	6.8	11
B8	0.42	0.8	1.4	3.6	6.2	13
V5	0.63	1.1	2.2	4.7	9.2	16.2
V6	0.7	1.25	2.4	4.9	11.4	18

SRT - SRF/1	003-40/1	005-50/1	010-63/1	020-80/1	030/050-100/1	100-125/1
B3 - B5	0.18	0.35	0.6	1.3	2.7	4.2
B6D - B6S	0.18	0.32	0.6	1.1	2.7	3.7
B8	0.16	0.32	0.55	1.1	1.8	2.8
V1 - V5	0.18	0.35	0.65	1.2	1.45	2.8
V3 - V6	0.2	0.32	0.65	1.5	3.4	4.5

SRM/1	003-40/1	005-50/1	010-63/1	020-80/1	030/050-100/1	100-125/1
B3	0.16	0.32	0.55	1.1	1.8	2.8
B6D - B6S	0.18	0.32	0.6	1.1	2.7	3.7
B8	0.18	0.35	0.6	1.3	2.7	4.2
V5	0.18	0.35	0.65	1.2	1.45	2.8
V6	0.2	0.32	0.65	1.5	3.4	4.5

SRT-SRF/2-3	003-40/2-3	005-50/2-3	010-63/2-3	020-80/2-3	030/050-100/2-3	100-125/2-3
B3 - B5	0.42	0.8	1.6	3.8	6.8	14
B6D - B6S	0.42	0.8	1.2	3.2	6.2	12
B8	0.42	0.8	1.4	3.6	6.2	13
V1 - V5	0.6	1	2.2	4.7	9.2	16.2
V3 - V6	0.5	1.1	2.2	4.7	9.2	17

For SRT-SRF-SRM units the quantity indicated in the table applies only to the gearboxes, for the variator part please consult the values in table Var S.

12. UNIT DISPOSAL

During unit disassembling the plastic material must be separated from the metal or the electric material.

The operation may be performed only by skilled operators and in compliance with the current regulations concerning health and safety at the workplace.

For determining the consecutive and interconnected stages of the company products (life cycle), from the acquisition of raw materials up to final disposal, the different parts of the products that must be sent to recycling / disposal in compliance with the current environmental laws are listed here below:

Part of the gear reducer/motor	Material
Gear wheels, shafts, bearings, connecting keys, safety rings...	Steel
Casing, parts of the casing	Cast iron
Light alloy casing, parts of the light alloy casing	Aluminium
Crowns, bushings	Bronze
Sealing rings, covers, rubber parts	Elastomers with steel springs
Coupling elements, protection covers, variator knobs, motor terminal boards	Plastic
Flat gaskets	Sealing material
Motor terminal boards, variator screw blocks	Brass
Rotor and stator	Copper
Gear reducer oil	Mineral oil
Gear reducer oil	Synthetic oil
Sealants	Resins
Packaging materials	Paper, cardboard

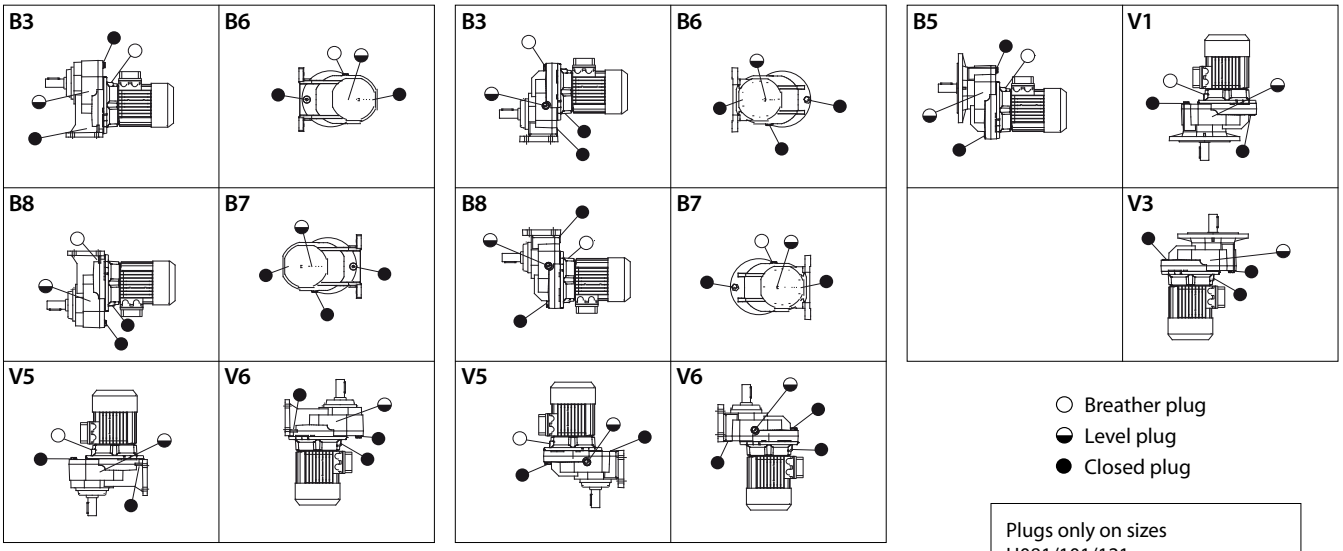
Do not dump in the environment non-biodegradable material, oils, non-ferrous components (PVC, rubber, resins, etc.).

Do not reuse components which may appear in good order on inspection, have them replaced by specialised persons only.

13. MOUNTING

Install the unit in the intended mounting position.
Otherwise contact our Technical Service.

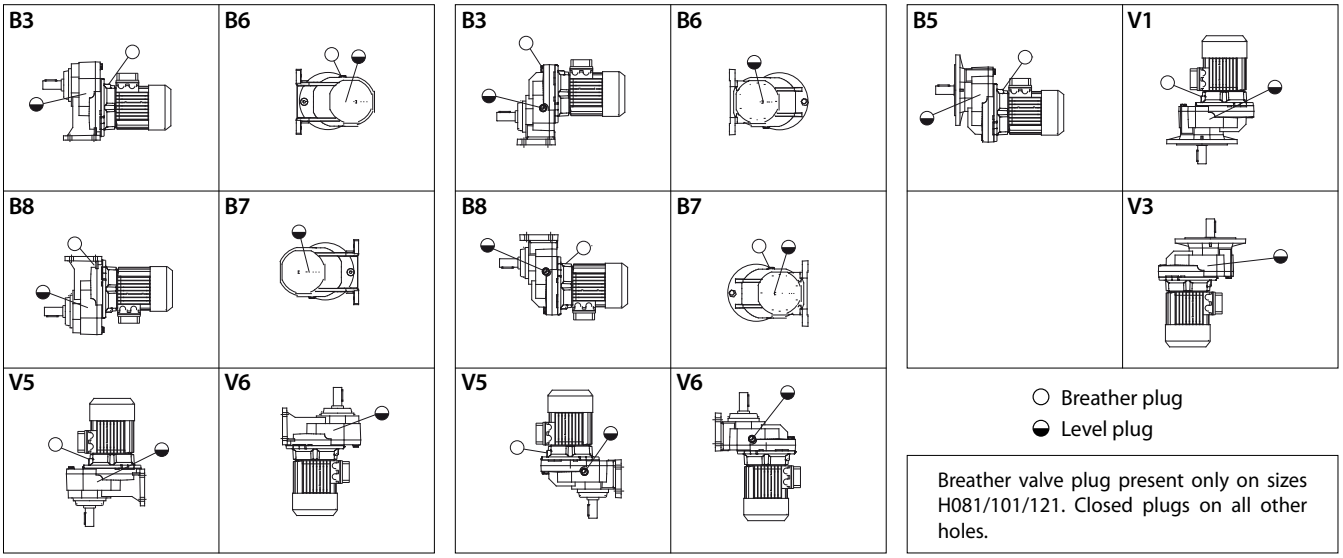
MOUNTING POSITIONS STANDARD, ATEX 3G/3D HA-H/1



○ Breather plug
◒ Level plug
● Closed plug

Plugs only on sizes
H081/101/121

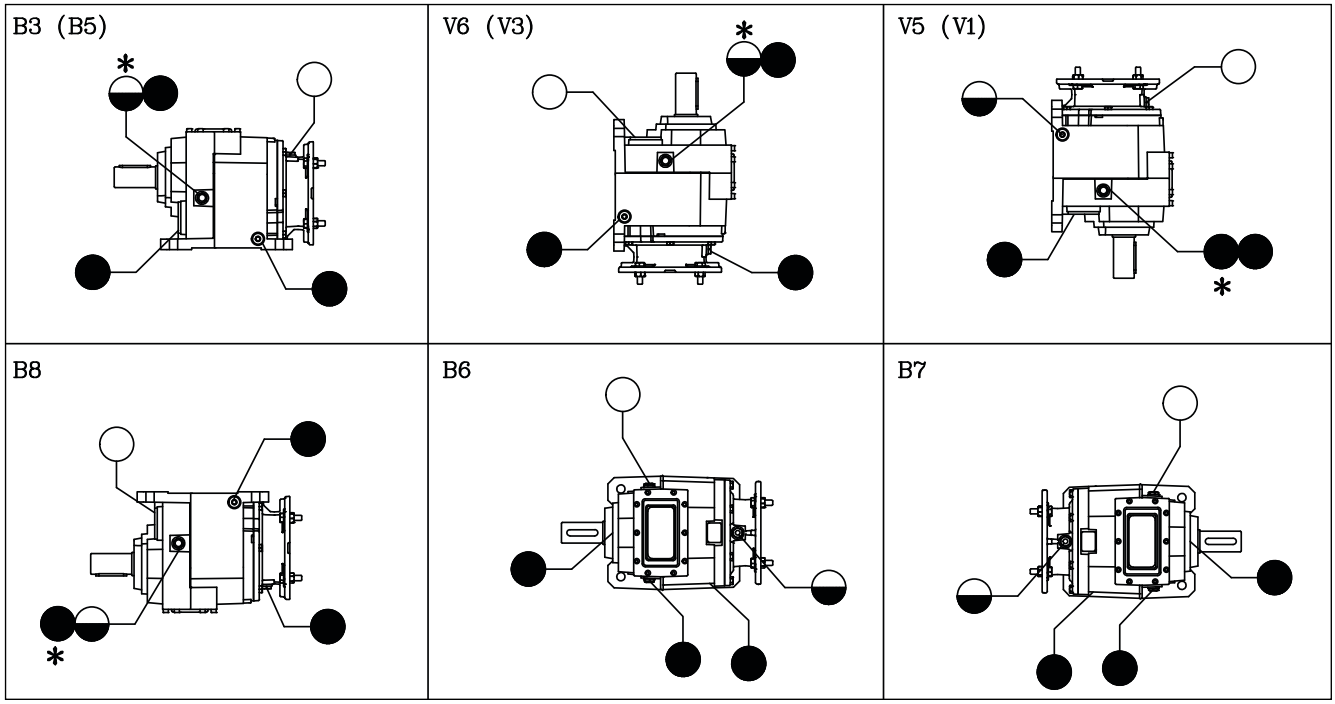
MOUNTING POSITIONS ATEX 2G/2D H /1-HA31



○ Breather plug
◒ Level plug

Breather valve plug present only on sizes H081/101/121. Closed plugs on all other holes.

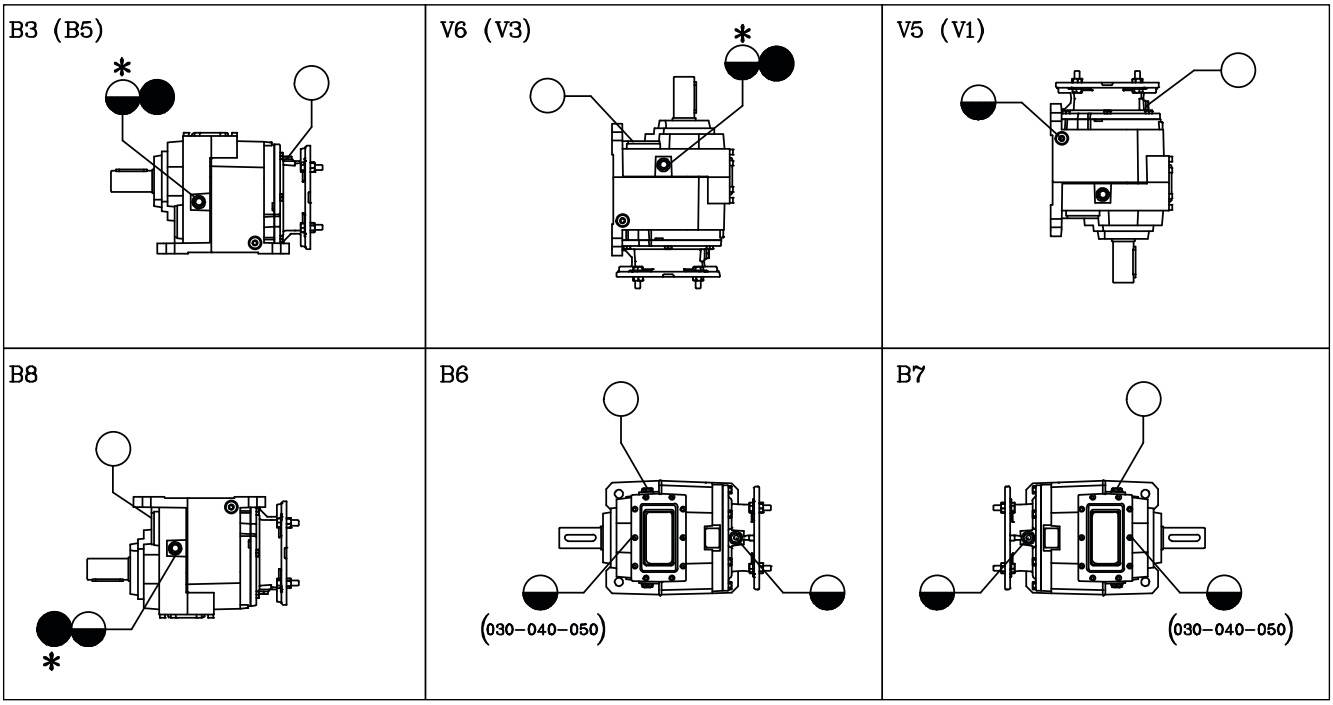
MOUNTING POSITIONS STANDARD, ATEX 3G/3D HA - H /2-3



Plugs only on H060/080/100/125/140 sizes
* Plug on the opposite side

○ Breather plug
◒ Level plug
● Closed plug

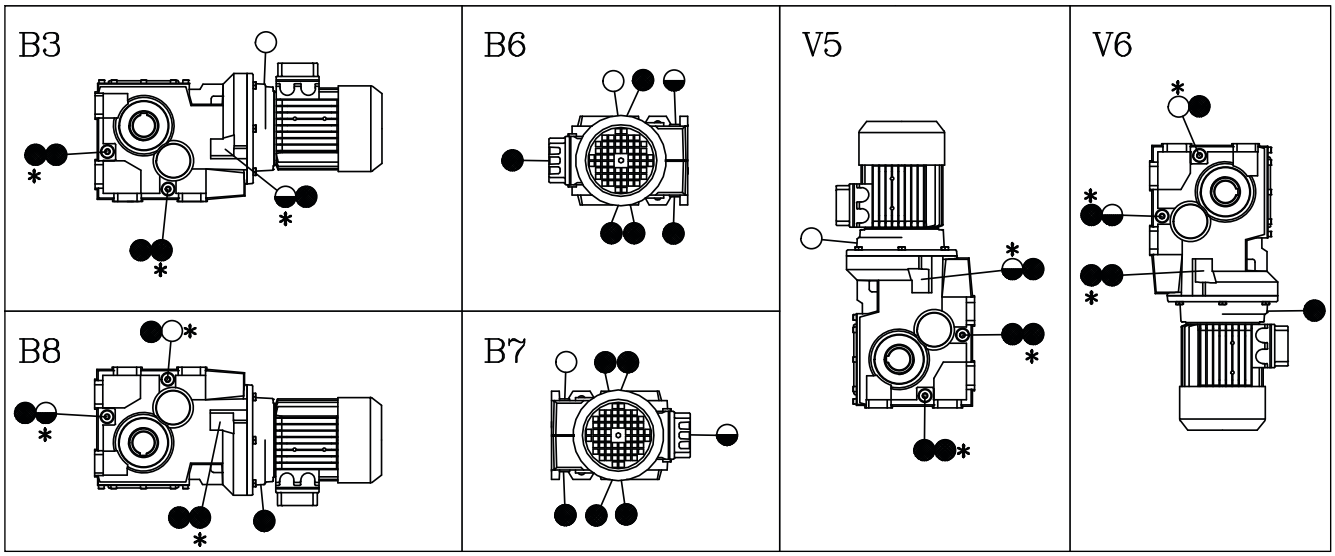
MOUNTING POSITIONS ATEX 2G/2D H /2-3



Breather valve plug present only on sizes H060/080/100/125/140
Closed plugs on all other holes.
*Plug on the opposite side

○ Breather plug
◒ Level plug

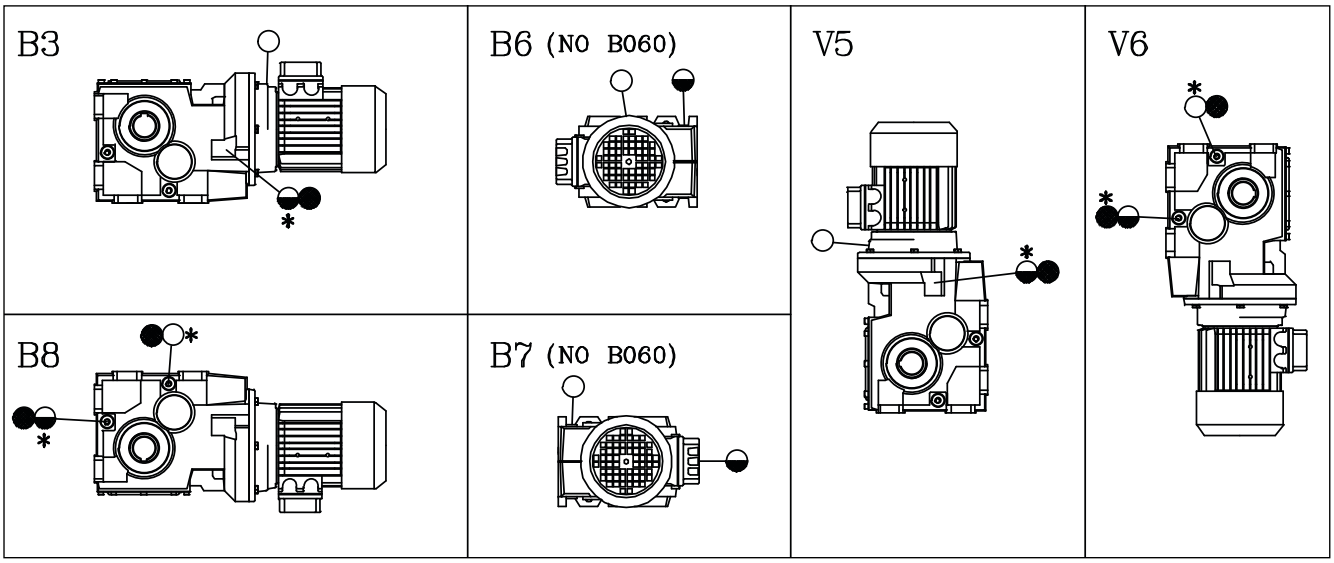
MOUNTING POSITIONS STANDARD, ATEX 3G/3D BA - B



Plugs present only on sizes B080/100/125/140/150/160
* Plug on the opposite side

○ Breather plug
◒ Level plug
● Closed plug

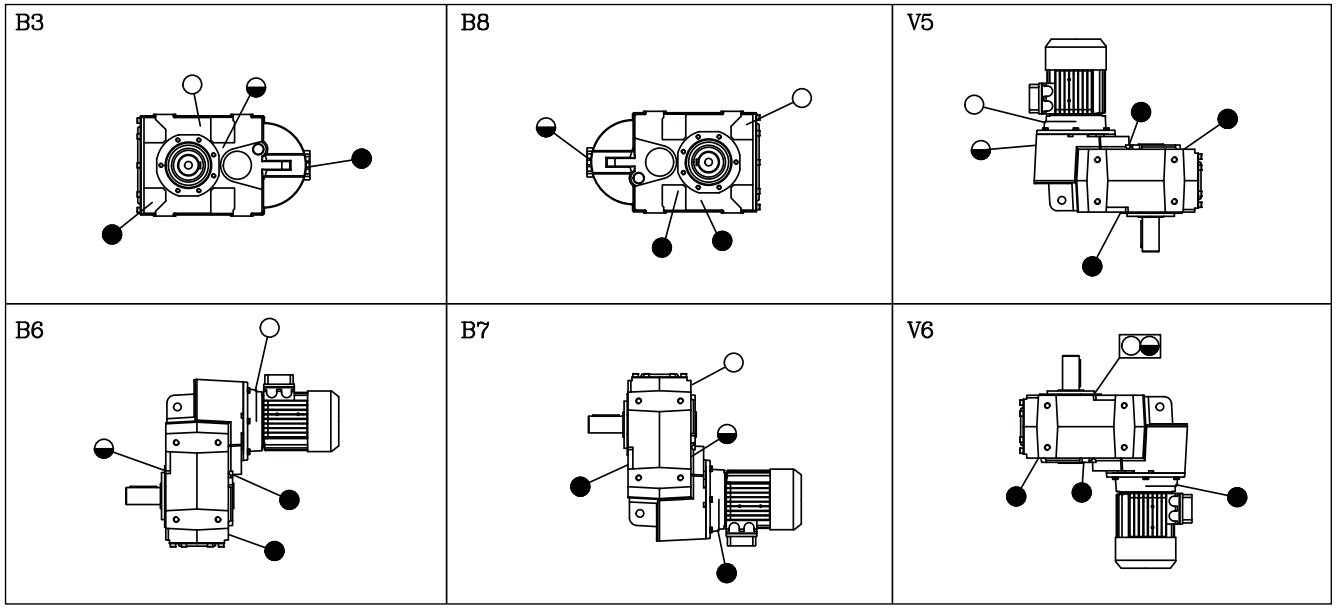
MOUNTING POSITIONS ATEX 2G/2D B



Breather valve plug present only on sizes B080/100/125/140/150/160
Closed plugs on all other holes.
* Plug on the opposite side

○ Breather plug
◒ Level plug
● Closed plug

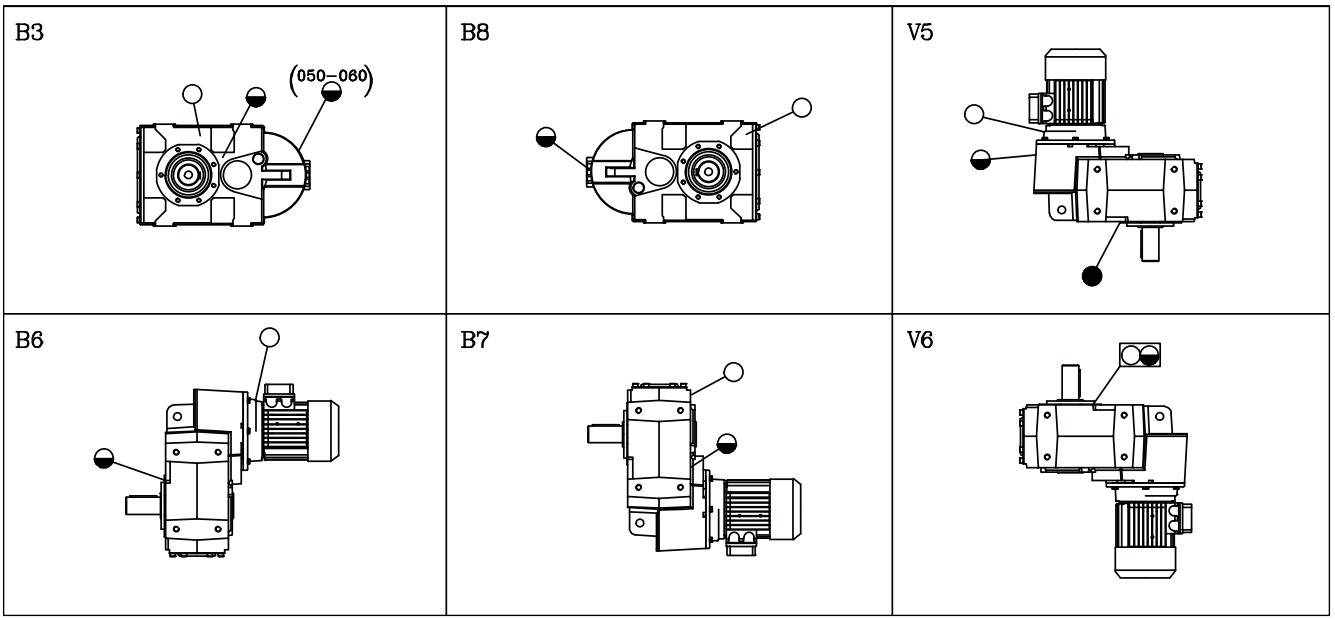
MOUNTING POSITIONS STANDARD, ATEX 3G/3D S052/3-062/3-082/3-102/3-122/3



Plugs present only on sizes S080/100/125
▭ Vent plug with dipstick

○ Breather plug
◒ Level plug
● Closed plug

MOUNTING POSITIONS ATEX 2G/2D S052/3-062/3-082/3-102/3-122/3

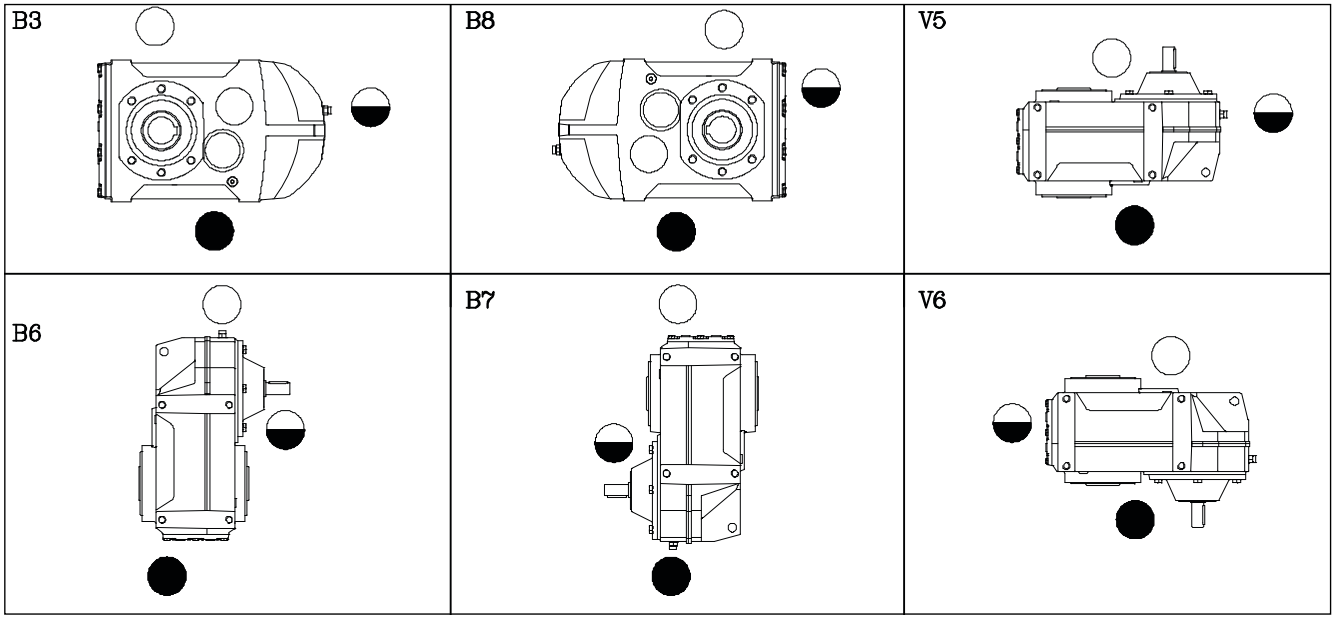


Breather valve plug present only on sizes S080/100/125
Closed plugs on all other holes.

▭ Vent plug with dipstick

○ Breather plug
◒ Level plug

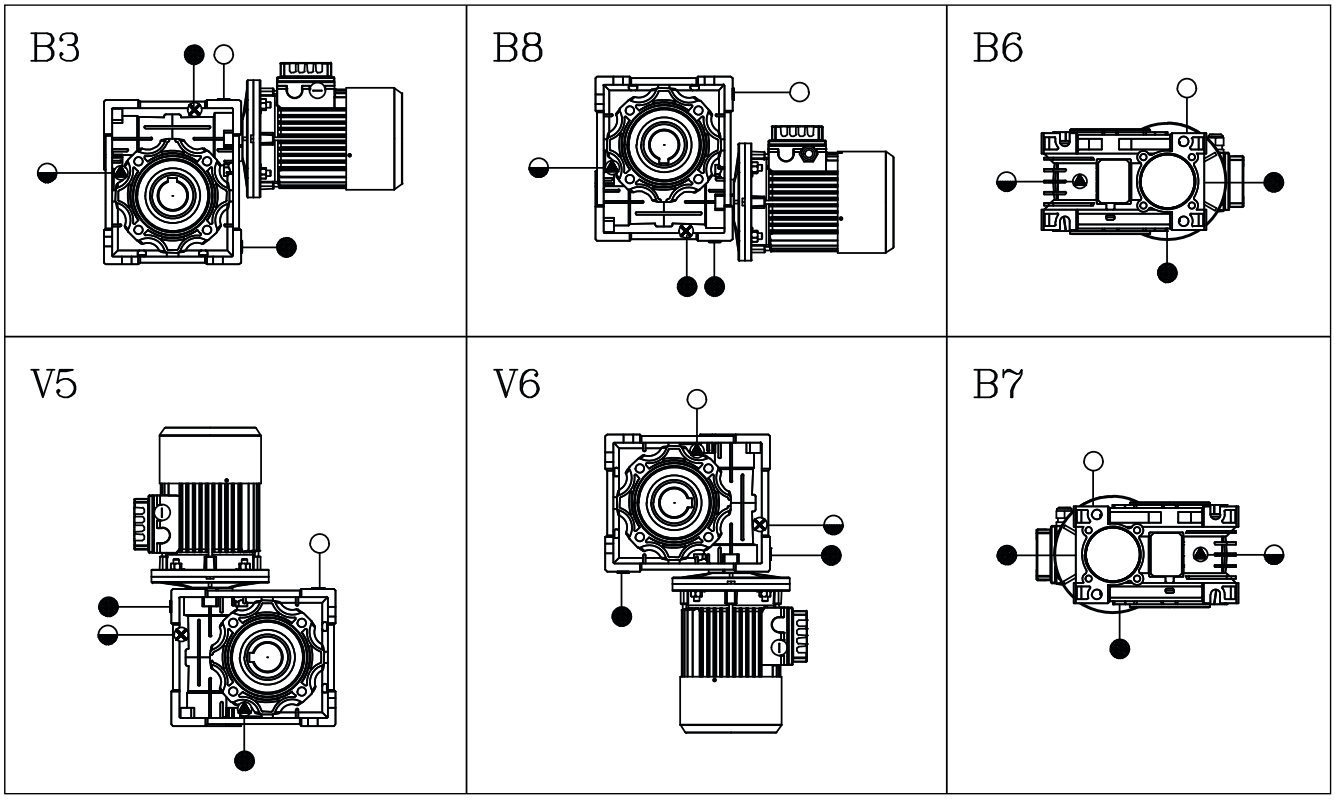
MOUNTING POSITIONS STANDARD S142/3-152/3



○ Breather plug
◒ Level plug
● Closed plug

OPERATING POSITION STANDARD
NMRV - NMRV-P - SW - NMRV-P+HW, NMRX, SWX, SWFX

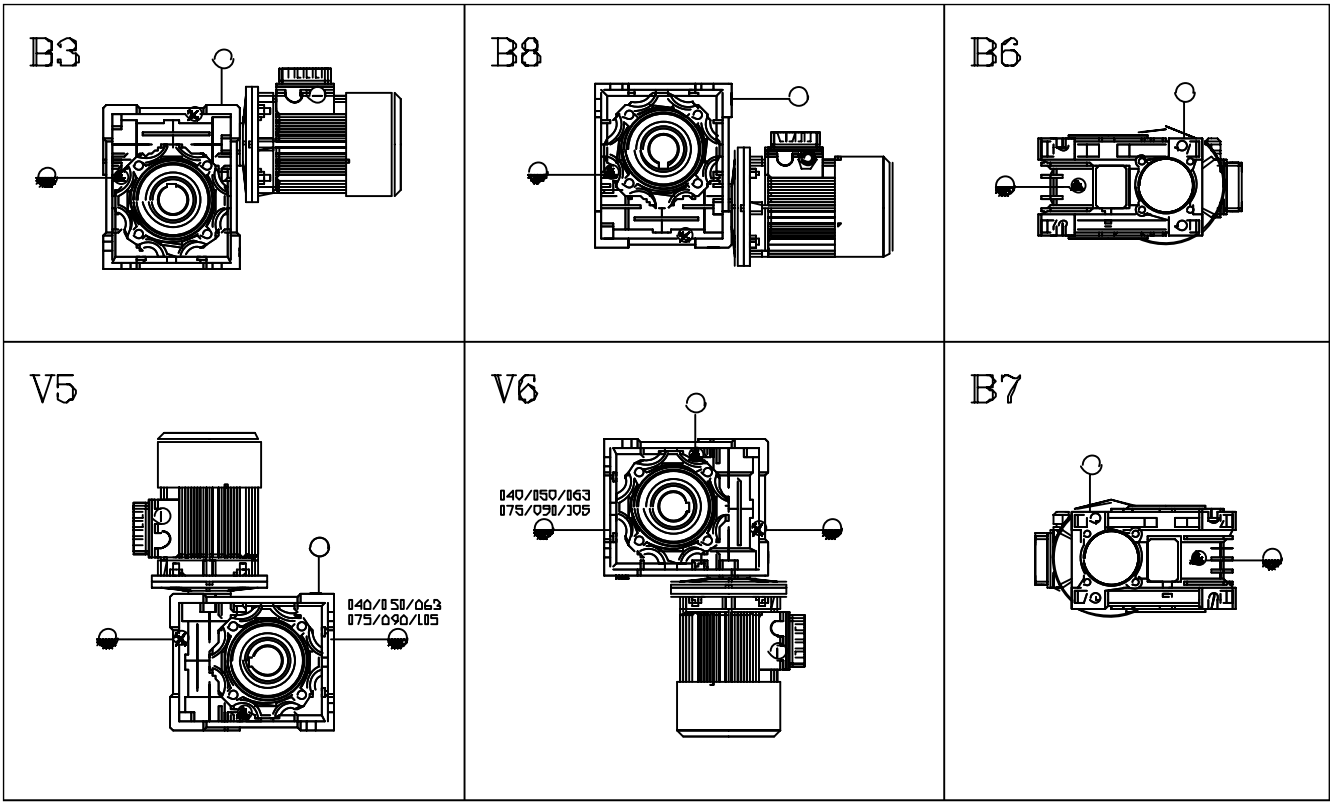
MOUNTING POSITIONS ATEX 3G/3D
NMRV - NMRV-P - NMRV-P+HW



Plugs only present on NMRV110/130/150 sizes

○ Breather plug
◒ Level plug
● Closed plug

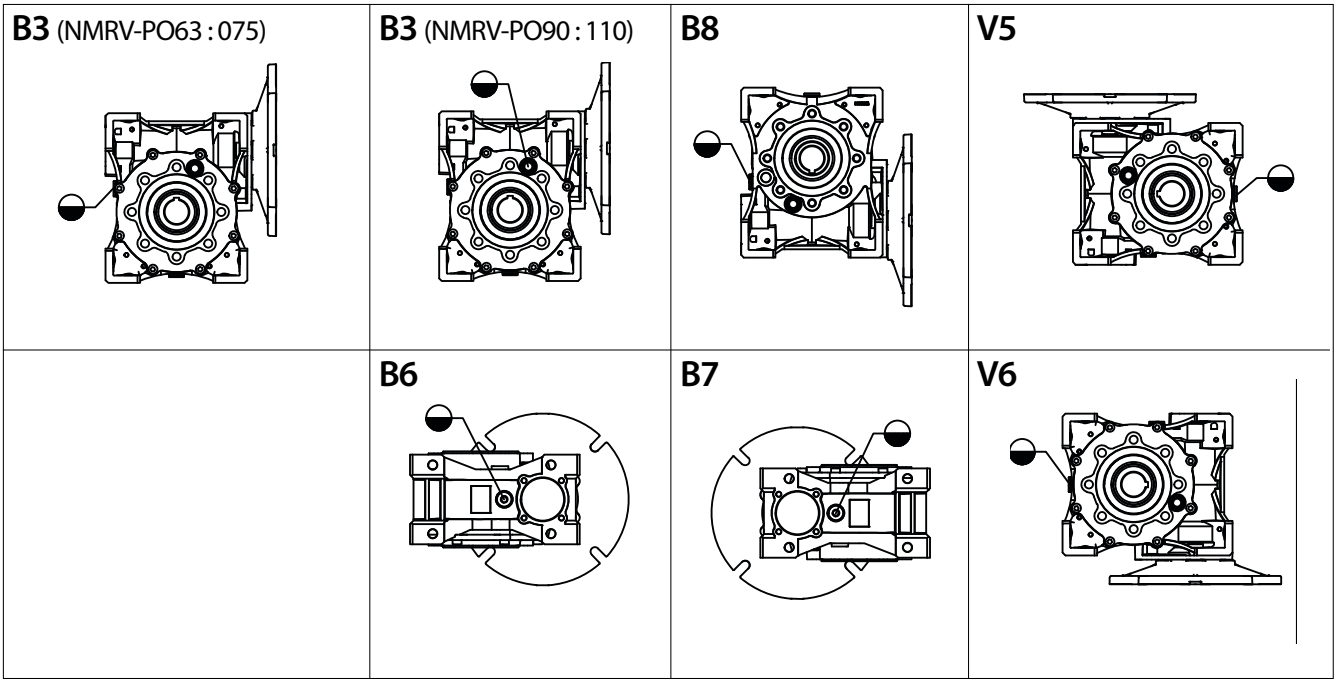
MOUNTING POSITIONS ATEX 2G/2D NMRV



Position V5 and V6 not foreseen for sizes NMRV030.
Breather valve plug present only on sizes NMRV110/130/150.
Closing plugs on all other holes

○ Breather plug
◒ Level plug

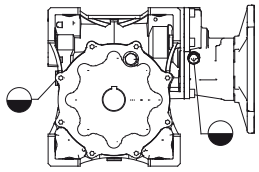
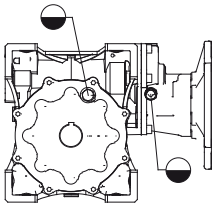
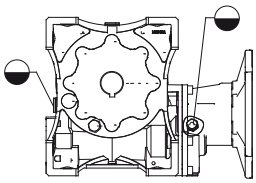
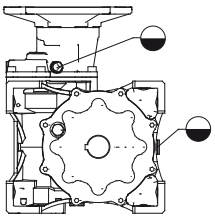
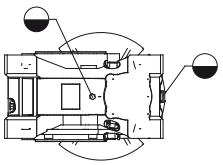
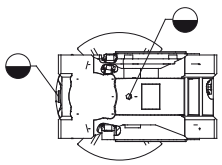
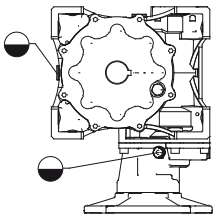
MOUNTING POSITIONS ATEX 2G/2D NMRV-P



Closed plugs on all other holes.

◒ Level plug

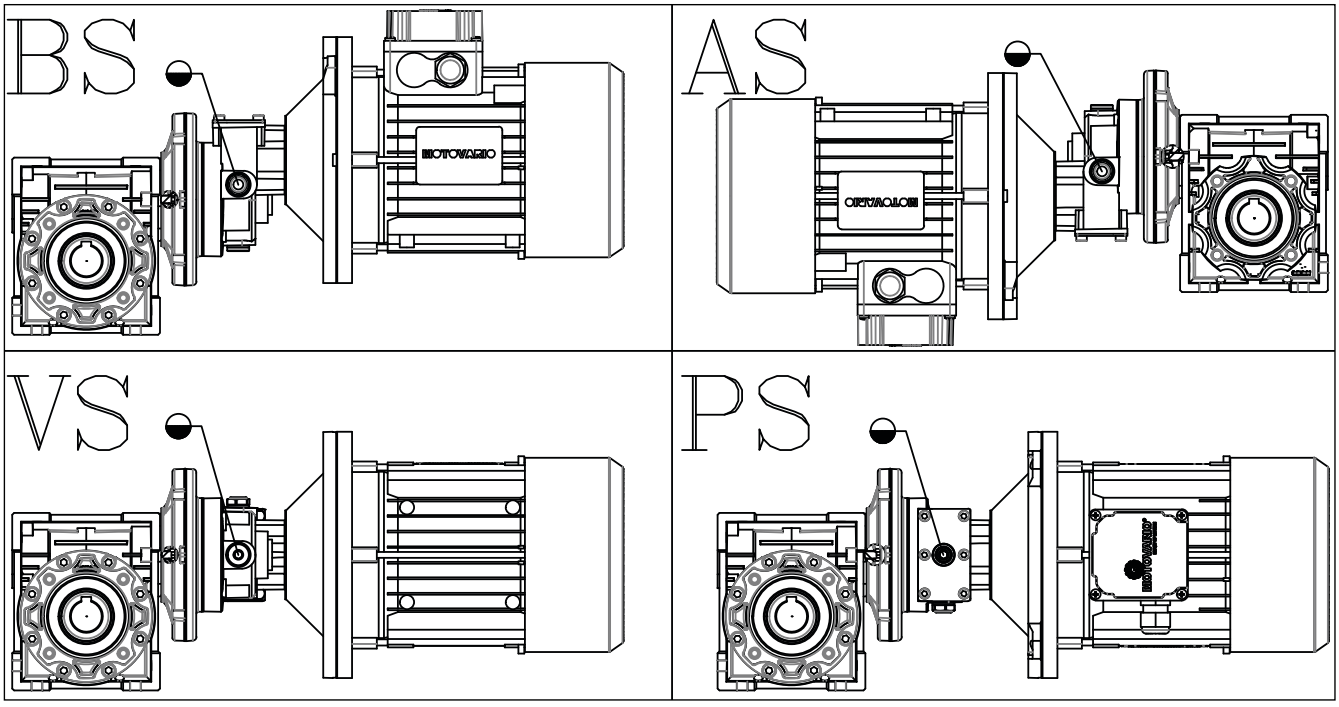
MOUNTING POSITIONS ATEX 2G/2D NMRV-P/HW

B3 NMRV-PO63 : 075/HW030 	**B3** NMRV-PO90 : 110/HW040 	**B8** 	**V5** 
	B6 	**B7** 	**V6** 

Closed plugs on all other holes.

◒ Level plug

MOUNTING POSITIONS ATEX 2G/2D NMRV+HA31

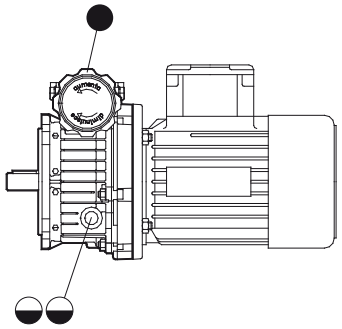


Closing plugs on all other holes.
For the location of the plugs on the NMRV reducer, see the relevant positioning page

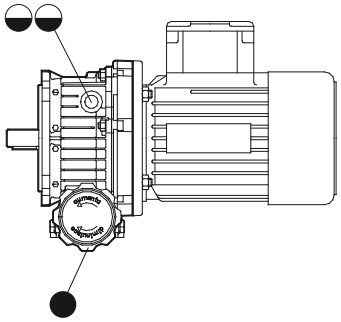
◒ Level plug

MOUNTING POSITIONS STANDARD TXF

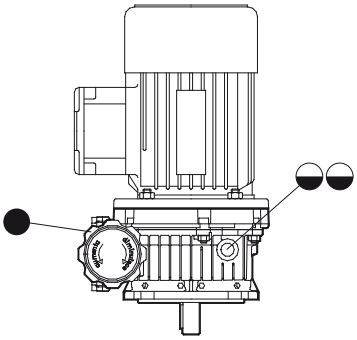
B5



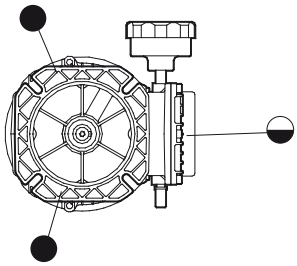
B8



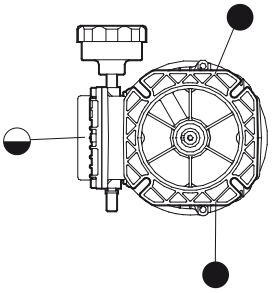
V1



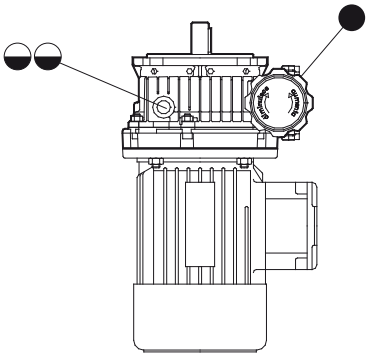
B6



B7



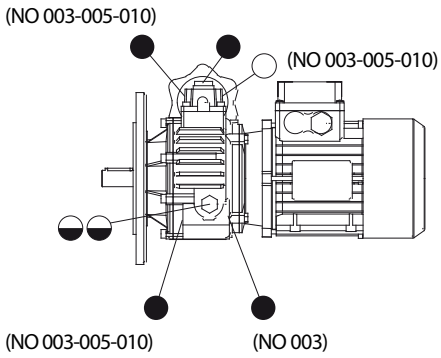
V3



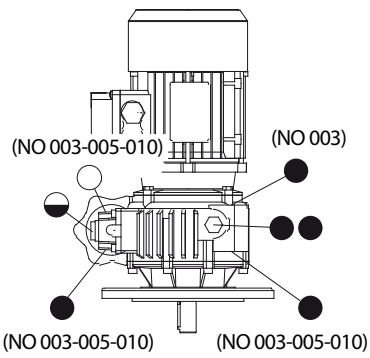
● Closed plug
◒ Level plug

MOUNTING POSITIONS STANDARD, ATEX 3G/3D SF

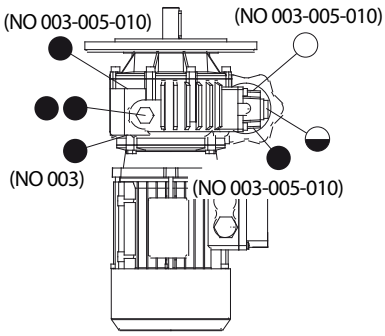
B5



V1



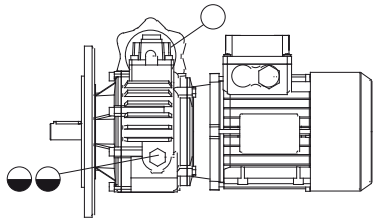
V3



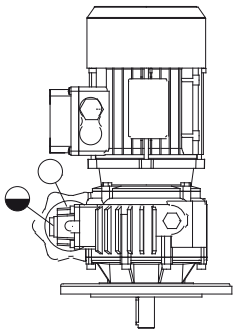
○ Breather plug
◒ Level plug
● Closed plug

MOUNTING POSITIONS ATEX 2G/2D SF

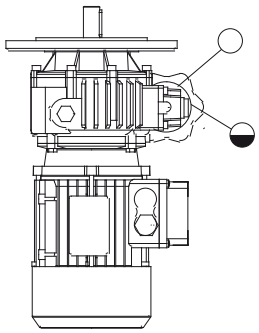
B5



V1



V3



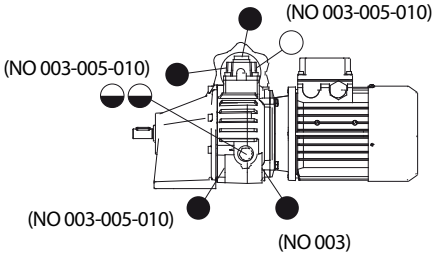
Breather valve plugs
Closed plugs on all other holes.

○ Breather plug
◒ Level plug

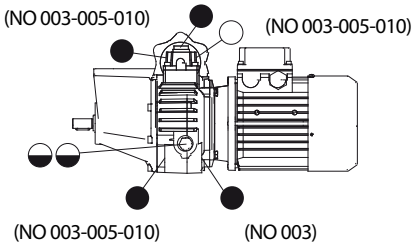
MOUNTING POSITIONS STANDARD, ATEX 3G/3D ST

○ Breather plug
◒ Level plug
● Closed plug

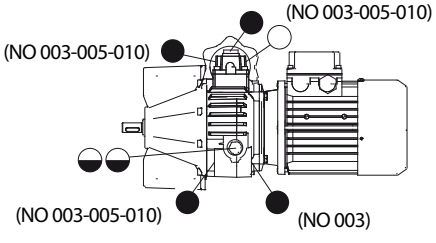
B3



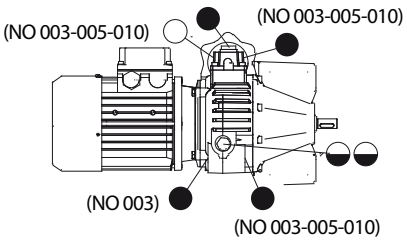
B8



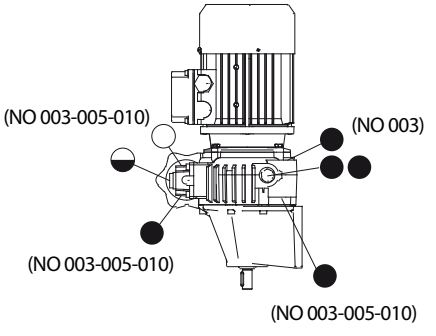
B6S



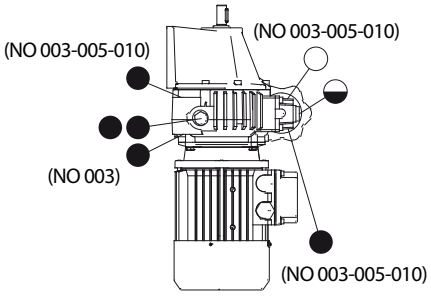
B6D



V5



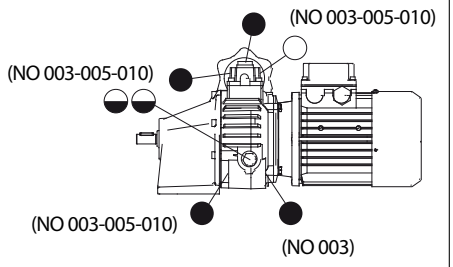
V6



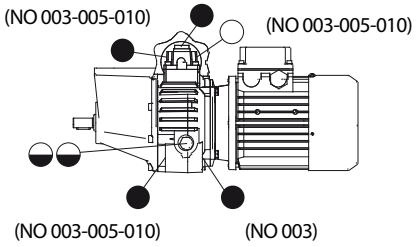
MOUNTING POSITIONS ATEX 2G/2D ST

○ Breather plug
◒ Level plug

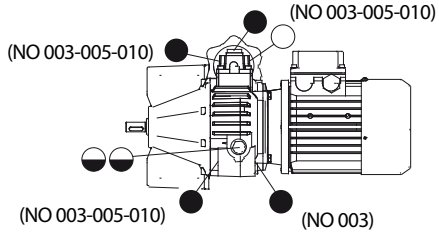
B3



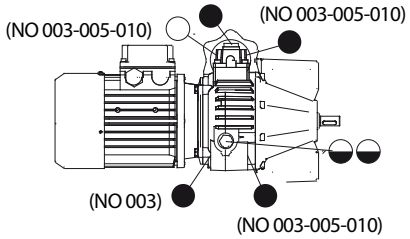
B8



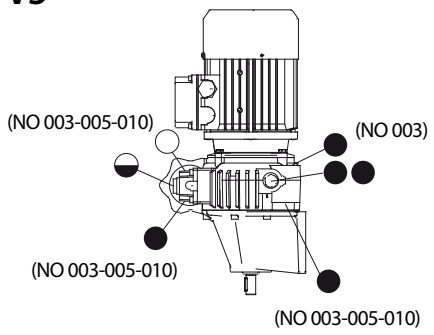
B6S



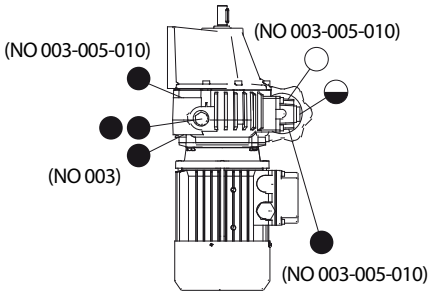
B6D



V5

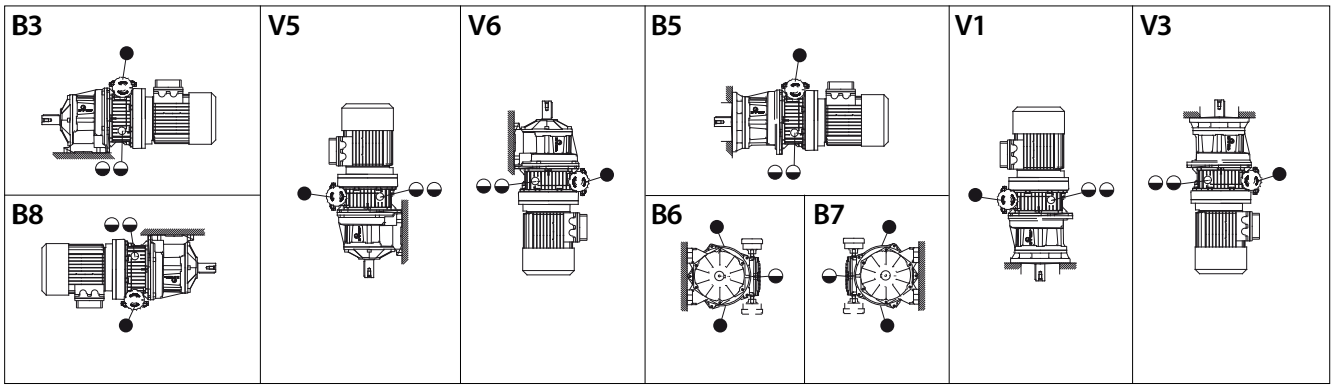


V6



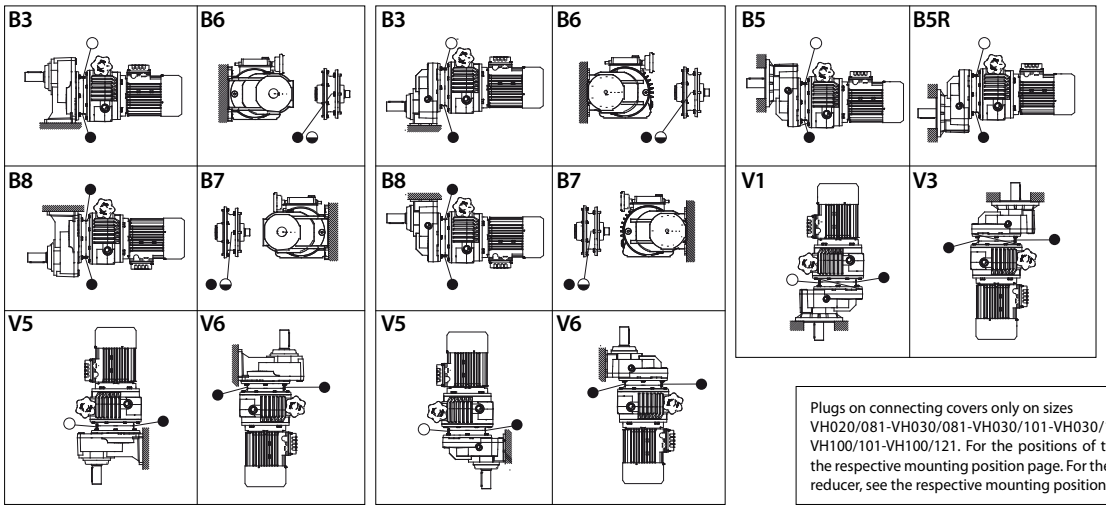
Breather valve plugs.
Closed plugs on all other holes.

MOUNTING POSITIONS STANDARD VH/A - VHF/A



◒ Level plug
● Closed plug

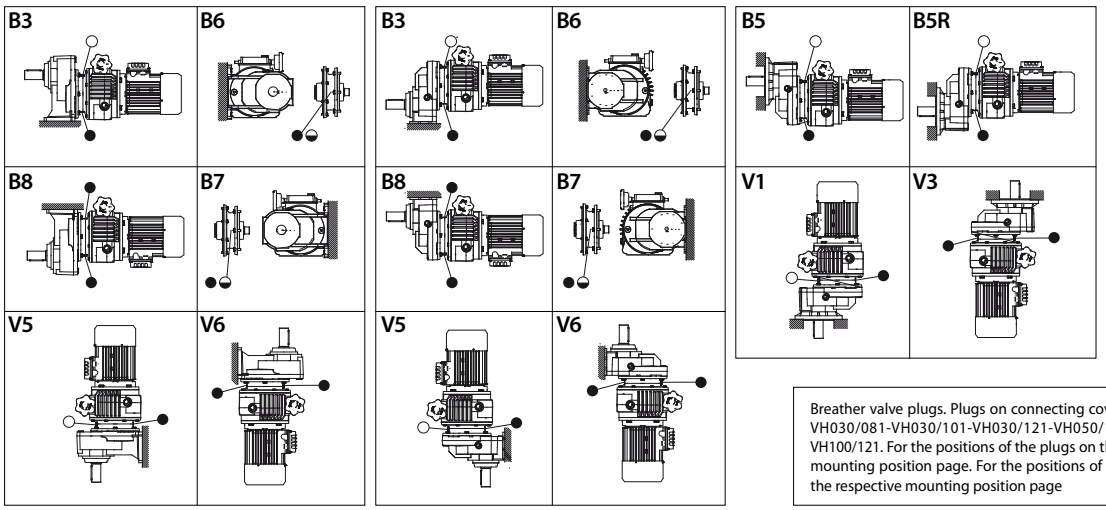
MOUNTING POSITIONS STANDARD, ATEX 3G/3D H/1-VHF/1-VHM



○ Breather plug
◒ Level plug
● Closed plug

Plugs on connecting covers only on sizes VH020/081-VH030/081-VH030/101-VH030/121-VH050/101-VH050/121-VH100/101-VH100/121. For the positions of the plugs on the variator, see the respective mounting position page. For the positions of the plugs on the reducer, see the respective mounting position page

MOUNTING POSITIONS ATEX 2G/2D VH/1-VHF/1-VHM

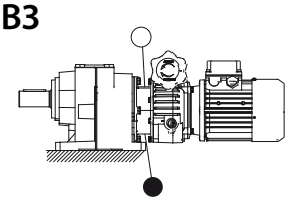


○ Breather plug
◒ Level plug
● Closed plug

Breather valve plugs. Plugs on connecting covers only on sizes VH020/081-VH030/081-VH030/101-VH030/121-VH050/101-VH050/121-VH100/101-VH100/121. For the positions of the plugs on the variator, see the respective mounting position page. For the positions of the plugs on the reducer, see the respective mounting position page

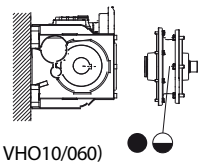
MOUNTING POSITIONS STANDARD, ATEX 3G/3D VH/2-3 – VHF/2-3

B3



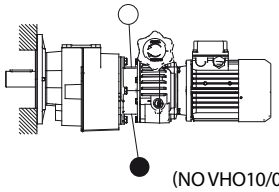
(NO VHO10/060)

B6



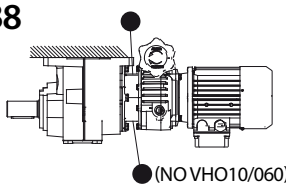
(NO VHO10/060)

B5



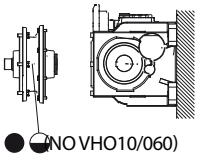
(NO VHO10/060)

B8



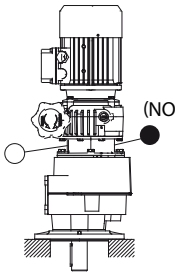
(NO VHO10/060)

B7



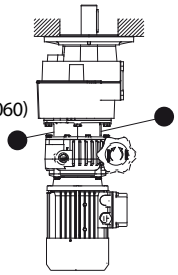
(NO VHO10/060)

V1



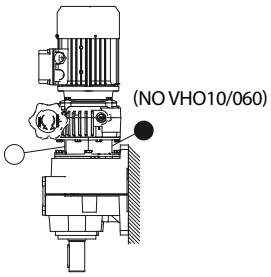
(NO VHO10/060)

V3



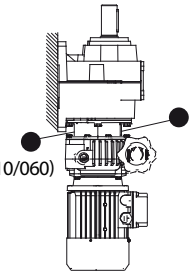
(NO VHO10/060)

V5



(NO VHO10/060)

V6



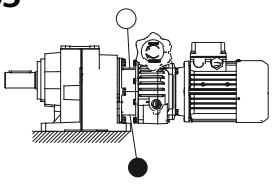
(NO VHO10/060)

○ Breather plug
◒ Level plug
● Closed plug

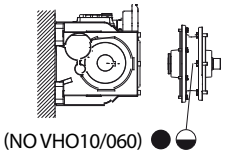
Breather valve plugs. Plugs on connecting covers only on sizes VH010/060-VH010/080-VH020/060-VH020/080- VH030/060-VH030/080-VH030/100-VH030/125- VH050/100- VH050/125- VH100/100- VH100/125. For the positions of the plugs on the variator, see the respective mounting position page.
For the location of the plugs on the NMRV see the relevant positioning page.

MOUNTING POSITIONS ATEX 2G/2D VH/2-3 – VHF/2-3

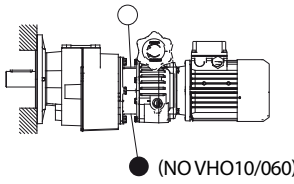
B3



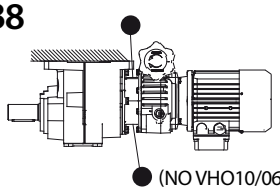
B6



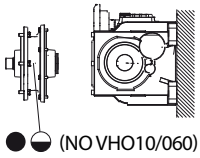
B5



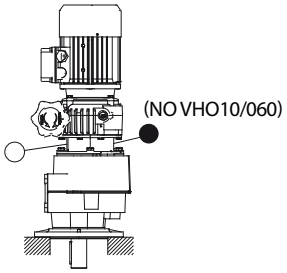
B8



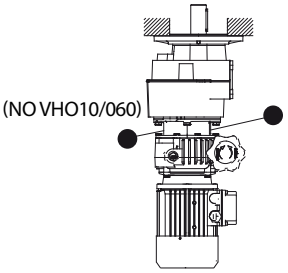
B7



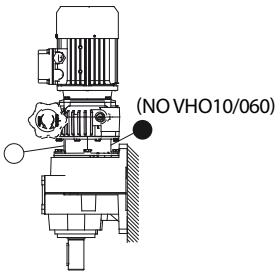
V1



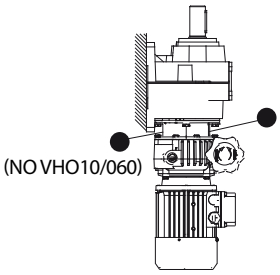
V3



V5



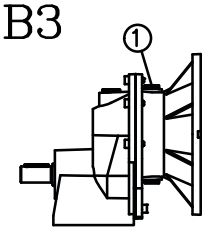
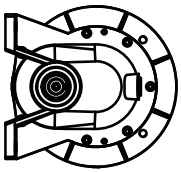
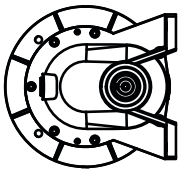
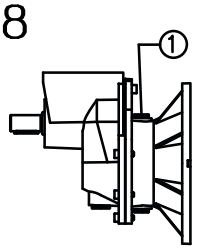
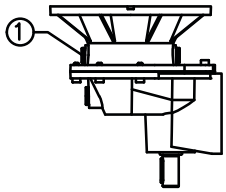
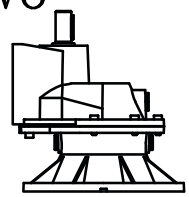
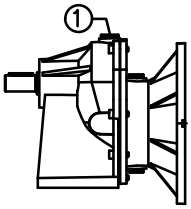
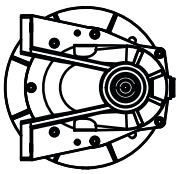
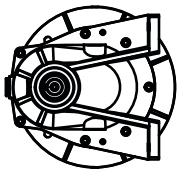
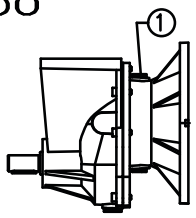
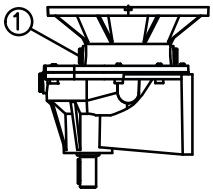
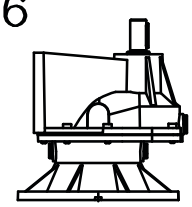
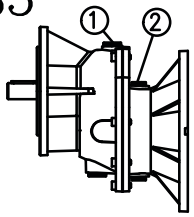
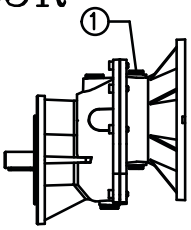
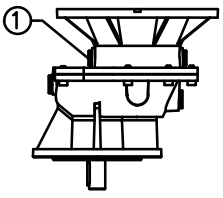
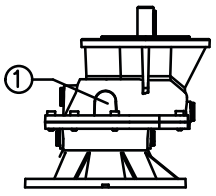
V6



○ Breather plug
◒ Level plug
● Closed plug

Breather valve plugs. Plugs on connecting covers only on sizes VH010/060-VH010/080-VH020/060-VH020/080- VH030/060-VH030/080-VH030/100-VH030/125- VH050/100- VH050/125- VH100/100- VH100/125
For the positions of the plugs on the variator, see the respective mounting position page. For the positions of the plugs on the reducer, see the respective mounting position page

MOUNTING POSITIONS STANDARD, ATEX 3G/3D RM-RT/1-RF/1

B3 	B6 	B7 	B8 	M
V5 	V6 			
B3 	B6 	B7 	B8 	T
V5 	V6 			
B5 	B5R 	V1 	V3 	F

MOUNTING POSITIONS STANDARD, ATEX 3G/3D RM-RT/1-RF/1

RM

		B3	B6	B7	B8	V5	V6
041 051 061	1						
081	1	○				○	
101 121	1	○			○	○	

RT

		B3	B6	B7	B8	V5	V6
041 061	1						
051	1	○					
081 101 121	1	○			○	○	

RF

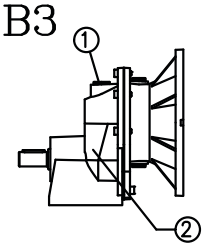
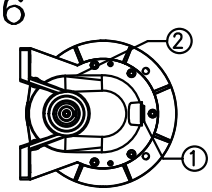
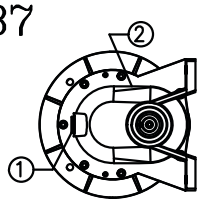
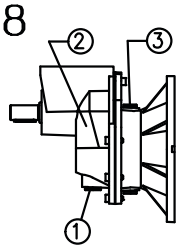
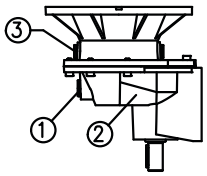
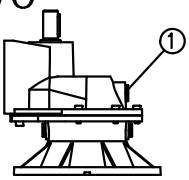
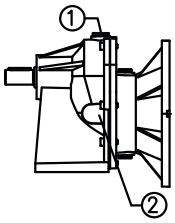
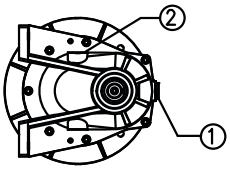
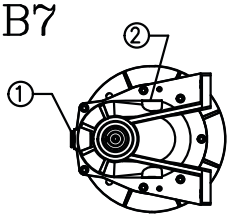
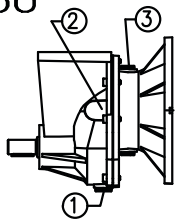
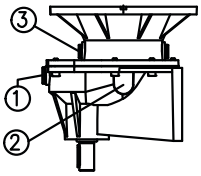
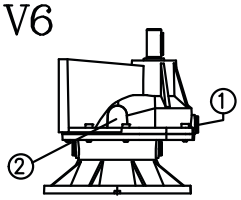
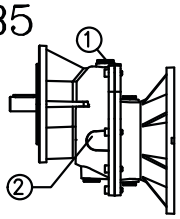
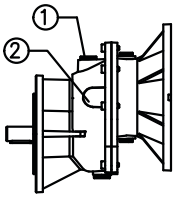
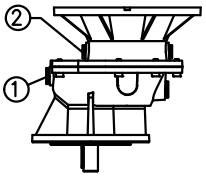
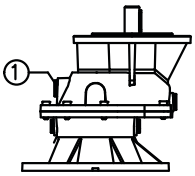
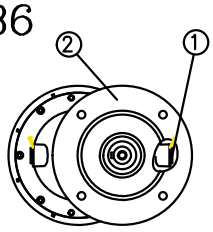
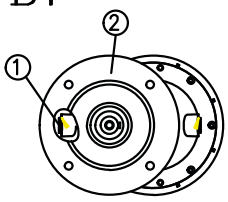
		B3	B6	B7	B8
041 051 061	1				
	2				
081	1	○	○	○	◒
	2				
101	1		○	○	
	2	○			
121	1	○	○	○	
	2				

Closing plugs on all other holes.

○ Breather plug

◒ Level plug

MOUNTING POSITIONS ATEX 2G/2D RM-RT/1-RF/1

B3 	B6 	B7 	B8 	M
V5 	V6 			
B3 	B6 	B7 	B8 	T
V5 	V6 			
B5 	B5R 	V1 	V3 	F
B6 	B7 			

MOUNTING POSITIONS ATEX 2G/2D RM-RT/1-RF/1

RT

		B3	B6	B7	B8	V5	V6
041	1		◒	◒		◒	
	2	◒			◒		◒
051	1		◒	◒		◒	
	2	◒			◒		◒
061	1		◒	◒		◒	
	2	◒			◒		◒
081	1	○	◒	◒		○	
	2	◒	○	○	◒	◒	
	3				○		
101	1	○	◒	◒		○	
	2	◒	○	○	◒	◒	
	3				○		
121	1	○	◒	◒		○	
	2	◒	○	○	◒	◒	
	3				○		

RF

		B3	B6	B7	B5R	V1	V3
041	1		◒	◒		◒	◒
	2	◒			◒		
051	1		◒	◒		◒	◒
	2	◒			◒		
061	1		◒	◒		◒	◒
	2	◒			◒		
081	1	○	◒	◒	○	◒	
	2	◒	○	○	◒	○	
101	1	○	◒	◒	○	◒	
	2	◒	○	○	◒	○	
121	1	○	◒	◒	○	◒	
	2	◒	○	○	◒	○	

RM

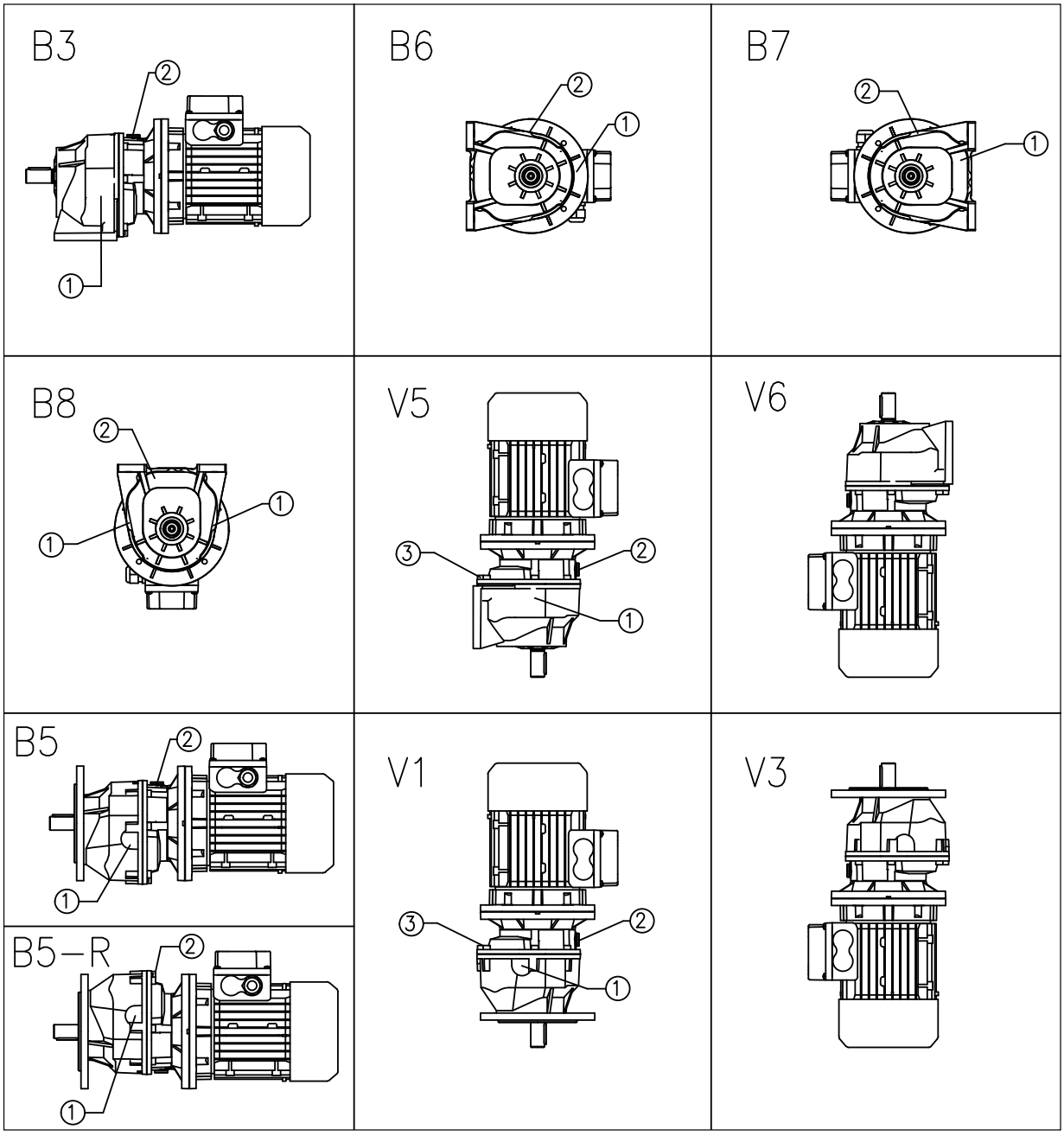
		B3	B6	B7	B8	V5	V6
041	1		◒	◒		◒	◒
	2	◒			◒		
051	1		◒	◒			◒
	2	◒			◒	◒	
061	1		◒	◒			◒
	2	◒			◒	◒	
081	1	○	◒	◒			
	2	◒	○	○	◒	◒	
	3				○	○	
101	1	○	◒	◒			
	2	◒	○	○	◒	◒	
	3				○	○	
121	1	○	◒	◒			
	2	◒	○	○	◒	◒	
	3				○	○	

Breather valve plug.
Closing plugs on all other holes.

○ Breather plug

◒ Level plug

MOUNTING POSITIONS STANDARD RT/2-3 - RF/2-3



		RT 2/3						RF 2/3			
		B3	B6	B7	B8	V5	V6	B5	B5R	V1	V3
040 050	1										
	2					○				○	
060	1										
080 100	1	◒	◒	◒	◒	◒		◒	◒	◒	
	2	○	○	○	○	○		○	○	○	
125	1	◒			◒	◒		◒	◒	◒	
	2		○	○	○				○		
	3					○				○	

Closing plugs on all other holes present.

○ Breather plug

◒ Level plug

MOUNTING POSITIONS STANDARD, ATEX 3G/3D SRM-SRT/1-SRF/1

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 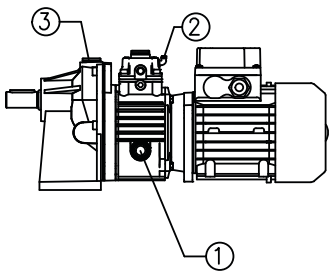
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 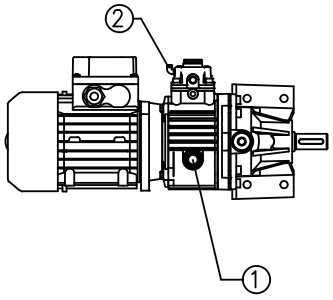
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 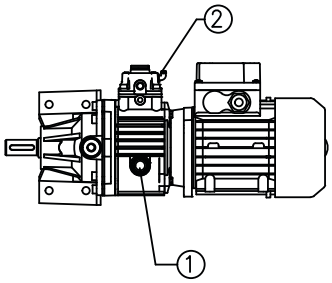
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 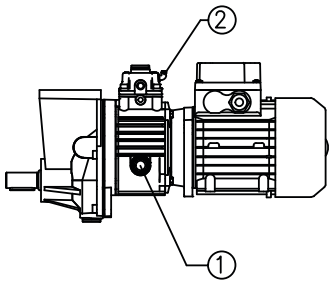
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 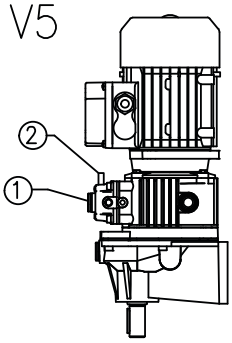
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 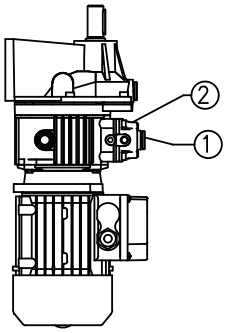
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 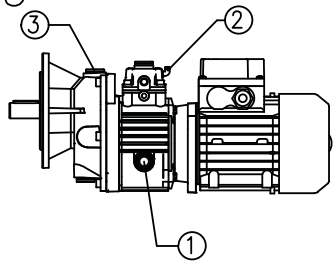
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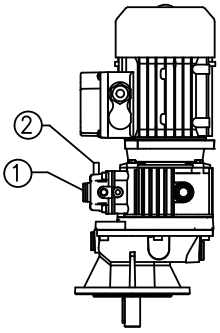
<td rowspan="2">V1
 
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 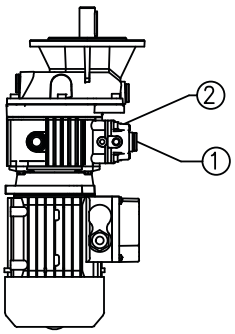
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 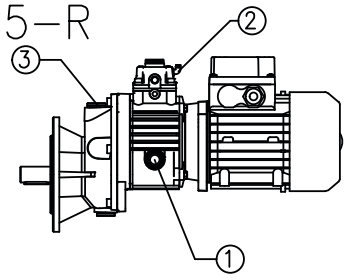
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MOUNTING POSITIONS STANDARD, ATEX 3G/3D SRM-SRT/1-SRF/1

SRM-SRT- 1 SRF-1

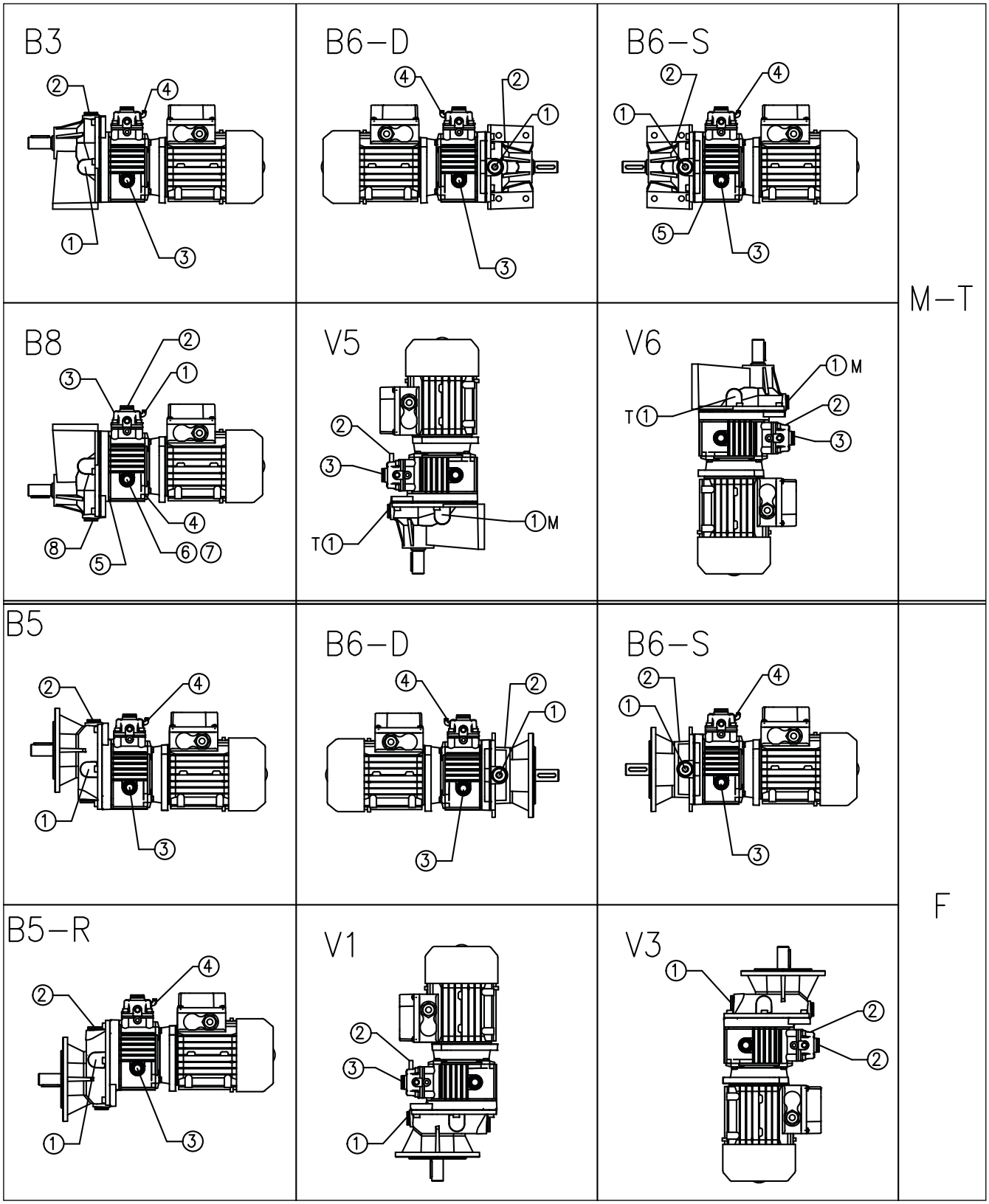
		B3	B6-D	B6-S	B8	V5	V6	B5	B5R	V1	V3
003/041	1	◒	◒	◒	◒	◒	◒	◒	◒	◒	◒
	2										
	3										
005/051	1	◒	◒	◒	◒	◒	◒	◒	◒	◒	◒
	2										
	3										
010/061	1	◒	◒	◒	◒	◒	◒	◒	◒	◒	◒
	2										
	3										
020/081	1	◒	◒	◒	◒	◒	◒	◒	◒	◒	◒
	2	○	○	○	○	○	○	○	○	○	○
	3	○						○			
030-050/101	1	◒	◒	◒	◒	◒	◒	◒	◒	◒	◒
	2	○	○	○	○	○	○	○	○	○	○
	3	○						○			
100/121	1	◒	◒	◒	◒	◒	◒	◒	◒	◒	◒
	2	○	○	○	○	○	○	○	○	○	○
	3	○						○			

Closing plugs on all other holes.

○ Breather plug

◒ Level plug

MOUNTING POSITIONS ATEX 2G/2D SRM-SRT/1-SRF /1



For SR050/…contact the Technical Service.

MOUNTING POSITIONS ATEX 2G/2D SRM-SRT/1-SRF /1

		SRM-SRT- 1						SRF-1					
		B3	B6-D	B6-S	B8	V5	V6	B5	B6-D	B6-S	B5R	V1	V3
003/041	1	◒	◒	◒	◒	◒	◒	◒	◒	◒	◒	◒	◒
	2												
	3	◒	◒	◒	◒	◒	◒	◒	◒	◒	◒	◒	◒
	4	○	○	○				○	○	○			
005/051	1	◒	◒	◒	◒	◒	◒	◒	◒	◒	◒	◒	◒
	2												
	3	◒	◒	◒	◒	◒	◒	◒	◒	◒	◒	◒	◒
	4	○	○	○				○	○	○			
010/061	1	◒	◒	◒	◒	◒	◒	◒	◒	◒	◒	◒	◒
	2												
	3	◒	◒	◒	◒	◒	◒	◒	◒	◒	◒	◒	◒
	4	○	○	○				○	○	○			
020/081	1	◒	◒	◒				◒	◒	◒	◒		
	2	○	○	○				○	○	○	○		
	3	◒	◒	◒				◒	◒	◒	◒		
	4	○	○	○				○	○	○	○		
030-050/101	1	◒	◒	◒				◒	◒	◒	◒		
	2	○	○	○				○	○	○	○		
	3	◒	◒	◒				◒	◒	◒	◒		
	4	○	○	○				○	○	○	○		
100/121	1	◒	◒	◒				◒	◒	◒	◒		
	2	○	○	○				○	○	○	○		
	3	◒	◒	◒				◒	◒	◒	◒		
	4	○	○	○				○	○	○	○		

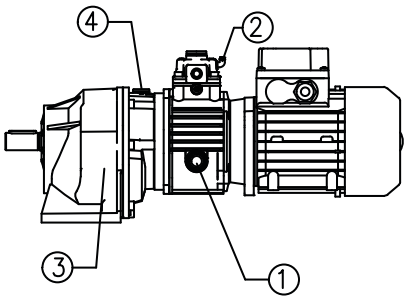
Vent plug with valve.
Closing plugs on all other holes.
For SR050/…contact the Technical Service.

○ Breather plug

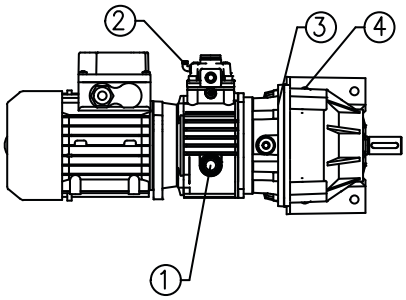
◒ Level plug

MOUNTING POSITIONS STANDARD SRT/2-3 – SRF/2-3

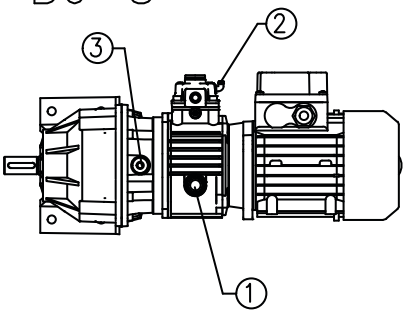
B3



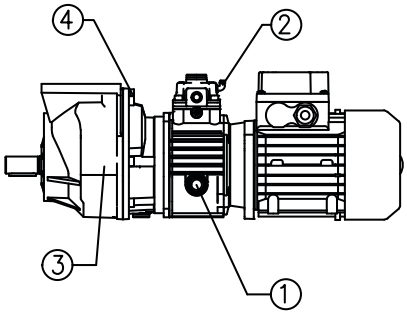
B6–D



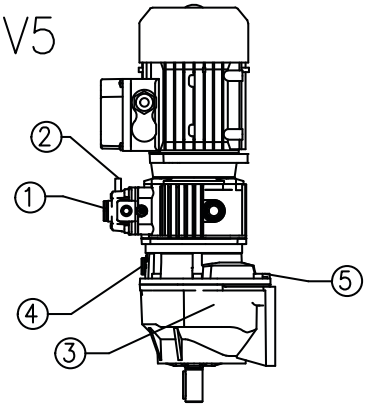
B6–S



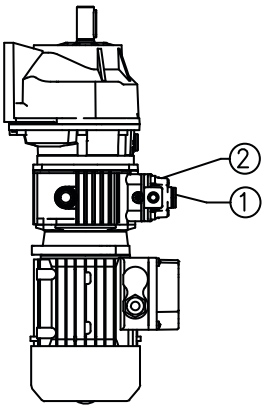
B8



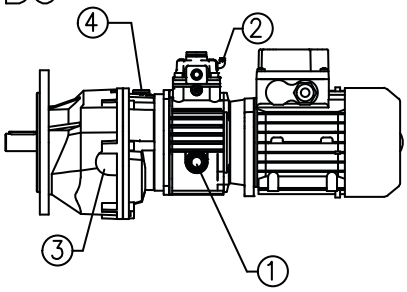
V5



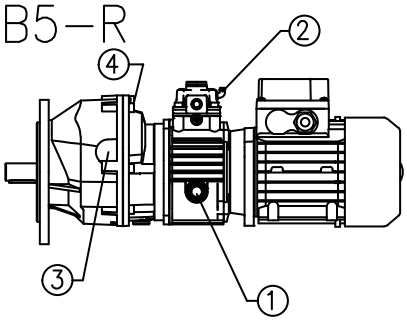
V6



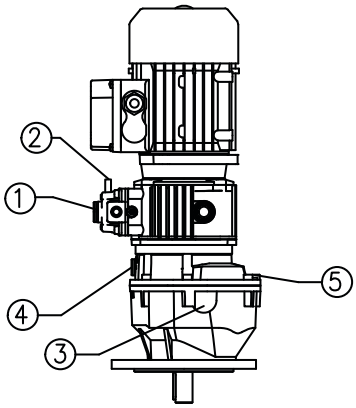
B5



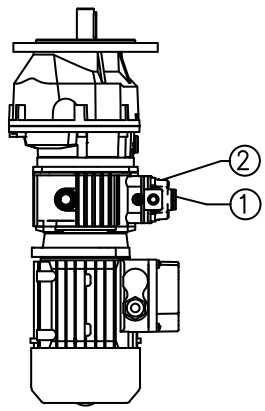
B5–R



V1



V3



MOUNTING POSITIONS STANDARD SRT/2-3 - SRF/2-3

		SRT- 2/3						SRF-2/3			
		B3	B6-D	B6-S	B8	V5	V6	B5	B5R	V1	V3
003/042-043 003/052-053-063 005/042-052-053 005/062-063 010/052-062-063 020/62	1	◒	◒	◒	◒	◒	◒	◒	◒	◒	◒
	2	○	○	○	○	○	○	○	○	○	○
	3										
	4										
	5										
005/083 010/082-083 010/103 020/082-083-102-103 030-050/082-102-103 100/102-103	1	◒	◒	◒	◒	◒	◒	◒	◒	◒	◒
	2	○	○	○	○	○	○	○	○	○	○
	3	◒	◒	◒	◒	◒		◒	◒	◒	
	4	○	○		○	○		○	○	○	
	5										
010/123 020/123 030-050/122-123 100/122-123	1	○	○	○	○	○	○	○	○	○	○
	2	◒	◒	◒	◒	◒	◒	◒	◒	◒	◒
	3	◒	○		◒	◒		◒	◒	◒	
	4				○				○		
	5					○					○

Closing plugs on all other holes.

○ Breather plug

◒ Level plug

14. SPARE PARTS TABLES

The spare parts tables of the products are available on Motovario website.
For spare parts tables of the above mentioned ATEX products please contact the Technical Service.
For ordering spare parts please refer to the data reported on the product nameplate.

15. RESPONSIBILITY

Motovario declines any responsibility in case of:
- Use of the reducer not compliant with national laws on safety and accident prevention;
- Work done by unqualified personnel;
- Incorrect installation;
- Tampering with the product;
- Incorrect or failure to follow the instructions in the manual;
- Incorrect or failure to follow the indications marked on the identification labels fixed on the units;
- For motor gearboxes, wrong delivery of electrical power;
- Incorrect connections and/or use of temperature sensors (when present).

The products supplied by Motovario are intended to be incorporated into "complete machines", so it is prohibited to put them into service until the entire machine has not been declared compliant.

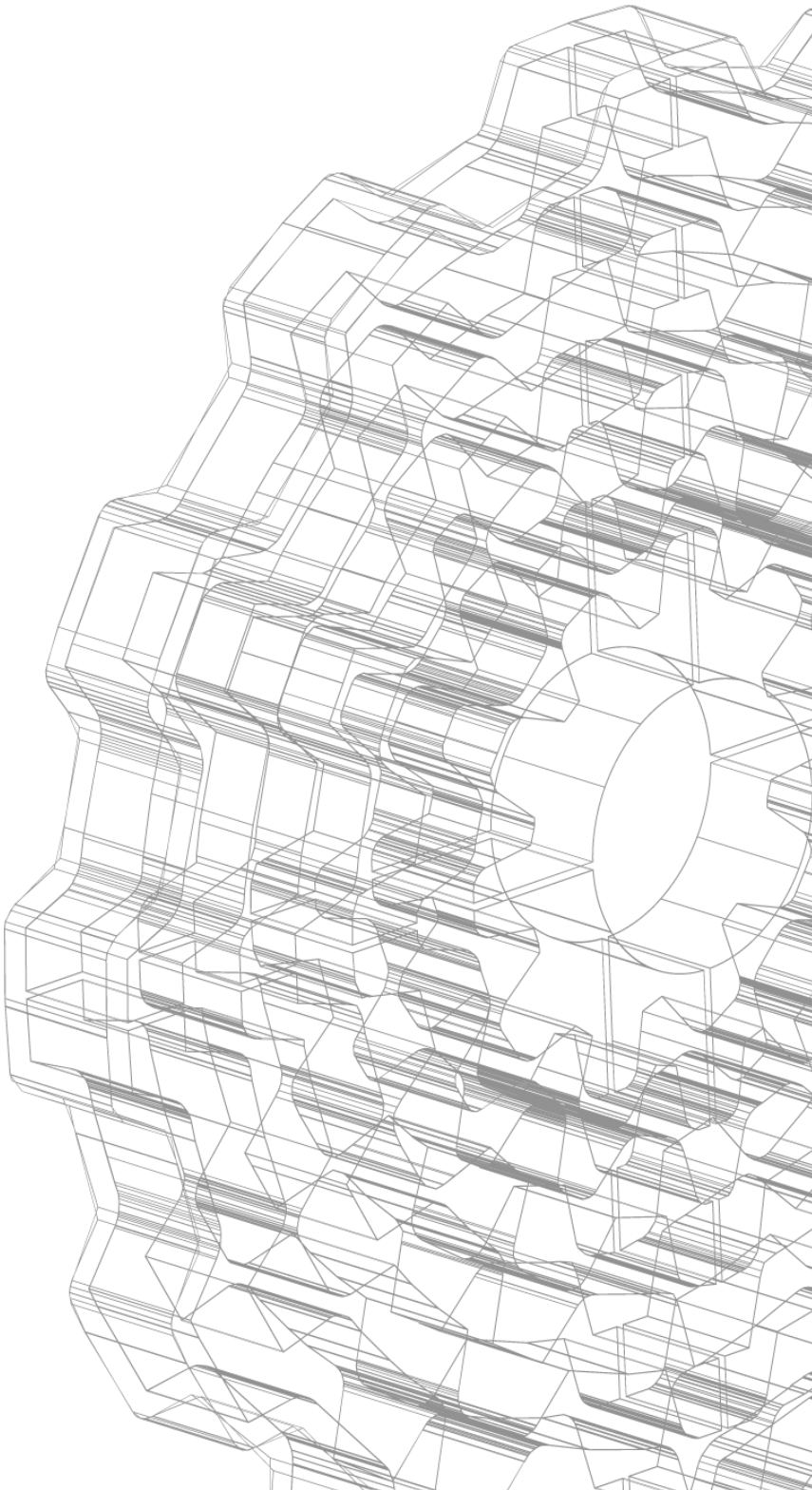
The configurations provided in the catalogue of the unit are the only ones allowed. Do not use the product in contrast with the indications provided in it. The instructions provided in this manual do not replace but compensate the obligations of current laws concerning safety regulations.

This manual refers to MOTOVARIO products on sale when it is issued.
Motovario reserves the right to modify in the future the data of this manual without prior communication.

16. DECLARATION OF INCORPORATION OF PARTLY COMPLETED MACHINERY

Valid for gearmotors/motovariator-gear reducers

MOTOVARIO®
HEART OF MOTION
a TECO Group company



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