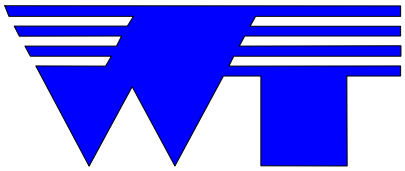

OPERATION & INSTALLATION MANUAL

LIW1000 Series Loss-In-Weight Feeder

Web-Tech Australia Pty Ltd

Head Office:
11 Electronic Street
EIGHT MILE PLAINS QLD 4113

Phone: +61 7 3841 2844
Fax : +61 7 3841 0005

PO Box 4006
EIGHT MILE PLAINS
BRISBANE QLD 4113
AUSTRALIA

MODEL LIW1000 LOSS-IN-WEIGHT FEEDER
OPERATION & MAINTENANCE MANUAL

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GENERAL DESCRIPTION

Web-Tech's LIW1000 Series Loss-In-Weight feeder handles a broad range of dry material feeding applications. Used to accurately deliver materials such as powders, pellets and granules, the LIW1000 Series is ideal for industries such as Food, Plastics, Chemical, Water Treatment and Building Products. Accuracy is typically in the range of +/- 0.25% to +/- 2.0% depending on the material type.

The LIW1000 Series comprises a supply hopper and variable speed screw feeder mounted on a scale platform, and Web-Tech's "Optimus Plus" microprocessor based electronic controller. The electronic controller measures the "loss-in-weight" of material as it is metered out of the screw feeder, and then calculates the actual discharge rate expressed in kg/Hr or tonnes/Hr. this calculated rate is continuously compared to the desired "setpoint" and any deviation is corrected by the controller. When the material in the supply hopper reaches a predetermined level, the screw speed remains constant whilst the hopper is re-filled. After the fill operation is completed and the weight reading is settled, the controller goes back into the "loss-in-weight" mode.

Metering screw type is selected based on the application. The size and pitch of the augers has been selected to provide a minimum of 110% of the required throughput.

MECHANICAL INSTALLATION

Refer to Drawing for General Arrangement of the Scale Platform, Feeder and Hopper.

The mechanical works involves:

1. Installing and Levelling Scale Platform.
2. Installing the auger and Front Face / Discharge Chute.
3. Installing the Hopper.
4. Making Inlet/Discharge connections.
5. Checking Oil Levels/Component Tightness.

When lifting the scale platform, always lift by the designated lifting lugs, or by placing a web sling around the base of the structure.
Damage will result if the equipment if lifted incorrectly.

1. Installing & Levelling Scale Platform.

The Scale Platform has 4 load cells attached to it's base. These load cells must be mounted on the feed supplied separately. The platform sits on the steel/rubber feet. The platform should be placed on a flat, level surface, and measures taken to ensure the feet will not move out of position (eg. Borders around the feet). Note that no sidewards forces should ever be placed on the feet.

When the scale platform is installed, check the level of the platform by placing a spirit level across the platform. The level should be checked in both directions, and if necessary adjust the bolts holding the rubber feet to the load cells until levelled. The level of the platform should be within +/ - 1° when fully tightened into position. After levelling, the lock nuts should be tightened.

NOTE: Exercise caution not to apply any downward loading on the scale platform as damage could result to the weighing mechanisms.

2. Installing the auger and Front Face / Discharge Chute.

The auger should be attached to the drive shaft inside the hopper and tightened. Remove the hand bolts on the front of the hopper. Ensure the front gasket is in it's correct position. The Front Face / Discharge Chute should then be slid over the auger, taking care not to put any forces on the auger. Replace and hand-tighten all of the hand bolts on the front of the feeder.

2. Installing Hopper – Unless Pre-assembled

The hopper is mounted onto the feeder by M8 bolts, which have been attached to the feeder for transit.

Take note of the 4 bolts at the discharge face of the hopper, as they have smaller heads than the rest of the bolts. Remove all bolts from the top of the feeder to allow the hopper to be installed.

Check the position of the hopper gasket, then carefully lower the hopper onto the feeder. Do not allow the feeder to drop onto the scale platform as damage may occur to the weighing mechanisms.

Align the feeder platform holes with the scale platform holes and secure bolts, remembering that the 4 bolts with the smaller heads are to be positioned along the discharge face.

MECHANICAL INSTALLATION (CONT.)

3. Inlet / Discharge Connections

The method used for flexible connections to the inlet / discharge of the feeder is critical to the performance of the feeder. As the whole of the feeder (including the supply hopper) is being weighed, the flexible connections must not influence the weighing accuracy of the system. The flexible connections must conform to the following :

a) Attach the supplied flange plate and pneumatic valve to the supply hopper.
b) Use the thinnest material possible for the connecting material.
c) A "bellow" should be formed in the connection to allow for expansion / contraction. (See diagram 1.0 at the end of this section).
d) The inlet / outlet flanges must be in-line and not offset. (See diagram 2.0).
e) There should be a minimum gap of approximately 75 mm between the ends of connecting flanges.
f) The connections must not be stretched when tightened.

4. Checking Oil levels / Component Tightness

Prior to running, the oil levels and component tightness should be checked.

The LIW3000 Series utilises two gearboxes which are proprietary items. For oil levels and selection of oil please refer to the SEW and WEG Installation / Commissioning / Maintenance Manual accompanying this manual.

Prior to operating a general inspection should be carried out to ensure that all fasteners are tight and that all guards are in place.

The Mechanical Installation is now complete.

PROCEED TO "SECTION 4 - ELECTRICAL INSTALLATION ".

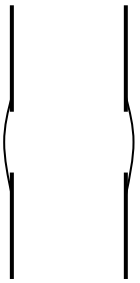


Figure 1.0 : Correct installation of flexible connection showing slight bellow.

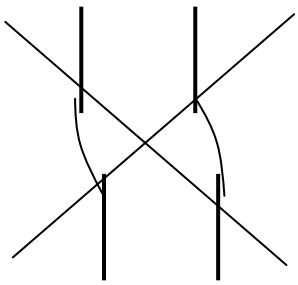


Figure 2.0 : Incorrect installation of flexible connection showing miss-alignment of pipes.

ELECTRICAL INSTALLATION

The electrical installation consists of the following :

1. Mounting of Optimus Plus controller.
2. Connections to Optimus Plus controller.
3. Mounting of Variable Speed Controller.
4. Connections to Variable Speed Controller.
5. Connections to Feeder Loadcell.
6. Connections to Feeder motor(s).

1. Optimus Plus Controller - Mounting

The Optimus Plus controller is supplied in an IP66 rated enclosure. This enclosure can be mounted via the pre-drilled and tapped 3/16” UNF holes in the back of the enclosure. Alternately, the supplied mounting feet can be attached to the enclosure with the supplied bolts, and then the enclosure can be mounted via the mounting feet.

2. Optimus Plus - Connections

Refer to Optimus and Junction Box Drawings for electrical connection details. Loadcell and signal cables should be instrumentation quality, and cable runs should be carried out as per low voltage instrumentation practice. The Intrinsic Safety Barriers should be mounted in the non-DIP rated area, and all cabling should comply with local DIP regulations.

3. Variable Speed Controller - Mounting

The AC variable speed controller can be mounted at any convenient location.

Refer to the manufacturer's manual in the following sections for mounting details.

4. Variable Speed Controller - Connections

Refer to relevant section of this manual for details regarding the connections to the variable speed controller.

5. Loadcell Connections

The Loss-In-Weight feeder scale assembly contains 4 shear beam loadcells, which are sized to support both the feeder weight, as well the material in the supply hopper. These loadcells should be wired to the supplied loadcell junction box, mounted close to the feeder platform. Loadcell cables must not be cut as this will void warranty.

6. Feeder Motor - Connections

The feeder contains two AC motors.

The first AC motor drives the auger gearbox and is wired to the output of the variable speed controller.

The supplied auger motor and inverter combination requires the auger motor to be wired in the three-phase “Delta” configuration.

The second AC motor drives the agitator gearbox and should be connected to a constant frequency (50Hz or 60Hz) three-phase supply. This supply should be controlled by the PLC, and the agitator motor should always be running when the feeder motor is running.

Ensure that the rotation of the motors is as per that shown on the back of the gearboxes.

PROCEED TO "OPTIMUS PLUS" CONTROLLER SET-UP.

Mechanical Tare

One of the advantages of using a torque tube is that the dead load can be supported, thus allowing the whole positive range of the load cell to be used.

To mechanically tare the Platform, proceed as follows:-

1. Make sure that the connections in the junction box have been made and that all connections to Optimus Plus have been made.

2. Switch on Optimus and observe that the "mass rate" and "total" display appears.

3. Using a digital multimeter of 3 1/2 digits or better and with the millivolt scale selected, place the probes across the load cell positive (green wire) and the loadcell negative (white wire). If the Web-Tech junction box is being used, then red probe is placed on TP1 and the black probe on TP2. Remove links LK1 & LK2. Now the load cell output has been isolated and the mechanical tare procedure can take place.

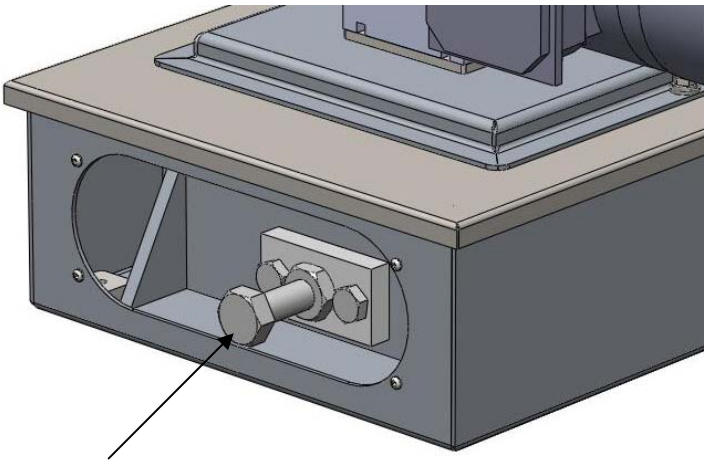
Observe the reading, which should be 2.5mV. If not, then adjust the tare screw so that approximately 2.5mV is achieved (2.5mV +/- 0.5mV).

By screwing in the tare screw, the reading will decrease until it goes to approximately -0.06mV. Screwing the screw out will cause the millivolt reading to increase. The maximum value is dependent on the capacity of the load cell and the weight of the Feeder.

Once the digital voltmeter reads approximately 2.5mV, lock the screw by tightening up the lock-nut, making sure that the action of tightening the lock-nut does not cause the tare screw to move and hence change the tare output from the load cell. If a digital multimeter is not available, then Optimus can be used to display the load cell output.

Finally, seal up the junction box and make sure that the water can't enter via conduit connections etc.

Remember: Water entering the junction box will adversely affect the performance of Optimus.



Tare Bolt

MAINTENANCE

MAINTENANCE

The LIW1000 Series Loss-In-Weight feeder is designed to reduce the need for continual maintenance. However, like all mechanical equipment, some maintenance must be carried out to ensure trouble free operation.

The maintenance schedule has been broken down into monthly, 3 monthly and yearly schedules. The following is a summary of the work to be carried out at each interval.

Monthly Maintenance

The following maintenance should be carried out on a monthly basis:

1. Visually check system for any obvious damage or loose items.
2. Check oil levels in both drive gear motors.
3. Check flexible connections are secure and are not packed solid.

Three (3) Monthly Maintenance

The following work should be carried out on a 3 monthly basis :

1. All items listed for the "Monthly Maintenance".
2. Check tightness of all locking screws on all bearings.

Yearly Maintenance

The following work should be carried out on a yearly basis :

1. All items listed in "Monthly" and "Three Monthly" maintenance.
2. Inspect augers for damage.
3. Remove front cover of feeder and inspect hopper for build-up or lumps of material Remove if found.
4. Re-calibrate system, as per **"OPTIMUS PLUS CONTROLLER SET-UP"**.
5. Recommended Gearmotor Services

1. Flexible Connections

When checking the flexible connections, the main items to check are that the following :

a) Check that the "socks" are not damaged.
b) Check that the clamps are tight.
c) Check that the connections have not been built up with product, and have set solid.

2. Greasing

There are no Grease Points on the bearings.

3. Oil Levels

The oil levels of both gearboxes require checking at 3 monthly intervals. There are two gearboxes to check. The details regarding checking / changing oil in the gearbox are detailed in the SEW gearbox manual.

5. Feeder Disassembly

The inside of the feeder should be inspected at yearly intervals, or if a blockage is suspected. Before opening the feeder, ensure that the equipment is isolated. Carry out the following steps:

a) Remove the flexible connection from the discharge of the auger tube.
b) Remove the knobs from the front of the hopper front plate.

c) Remove the whole front plate and

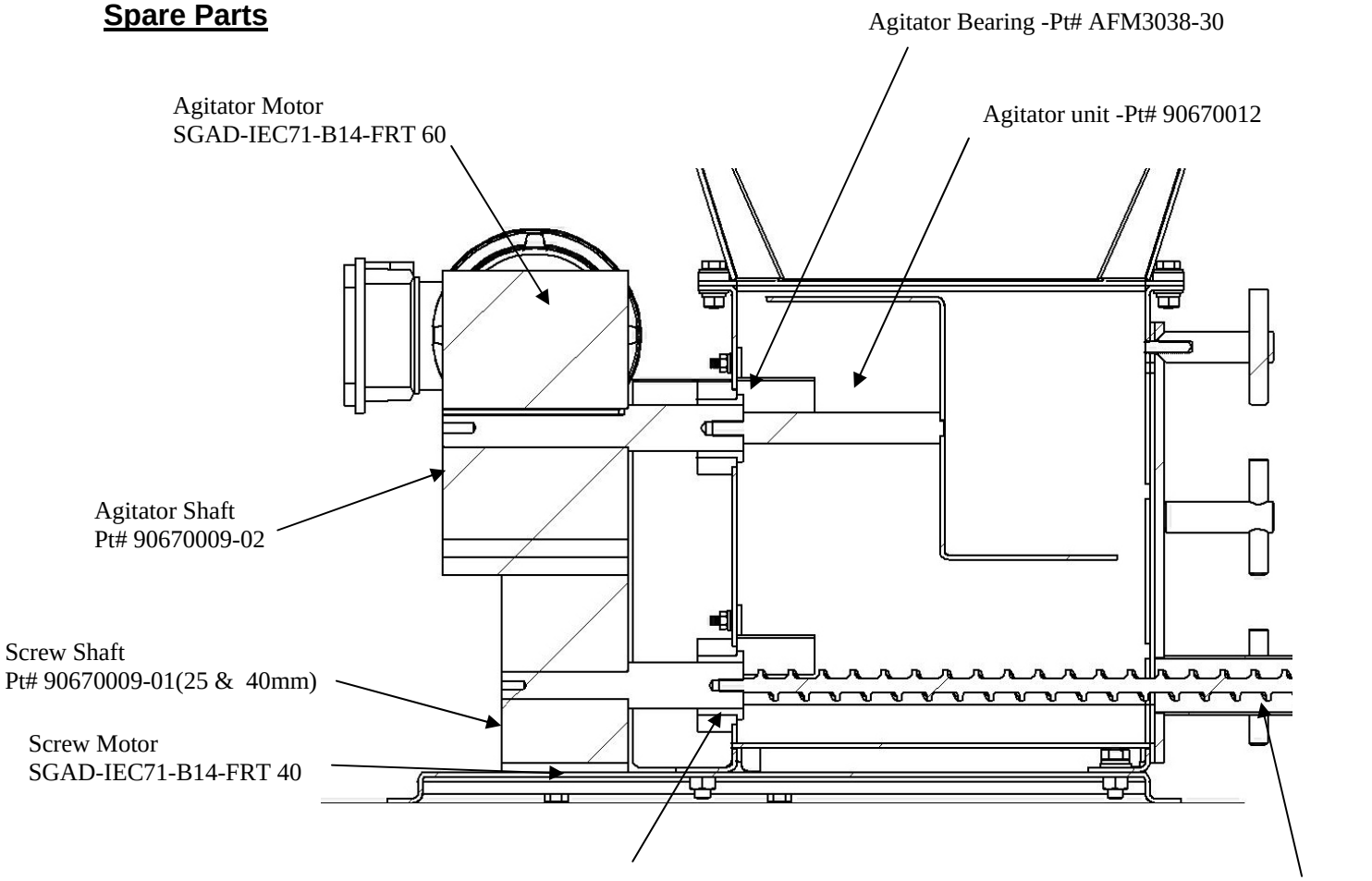
Mechanical Tare

metering tubes as one piece.

d) Inspect the augers for damage/wear.
e) Inspect the inside of the hopper for build-up or lumps of material. Remove as necessary.
f) Reinstall all components in reverse order.

ENSURE ALL FASTENERS ARE RE-TIGHTENED.

Spare Parts

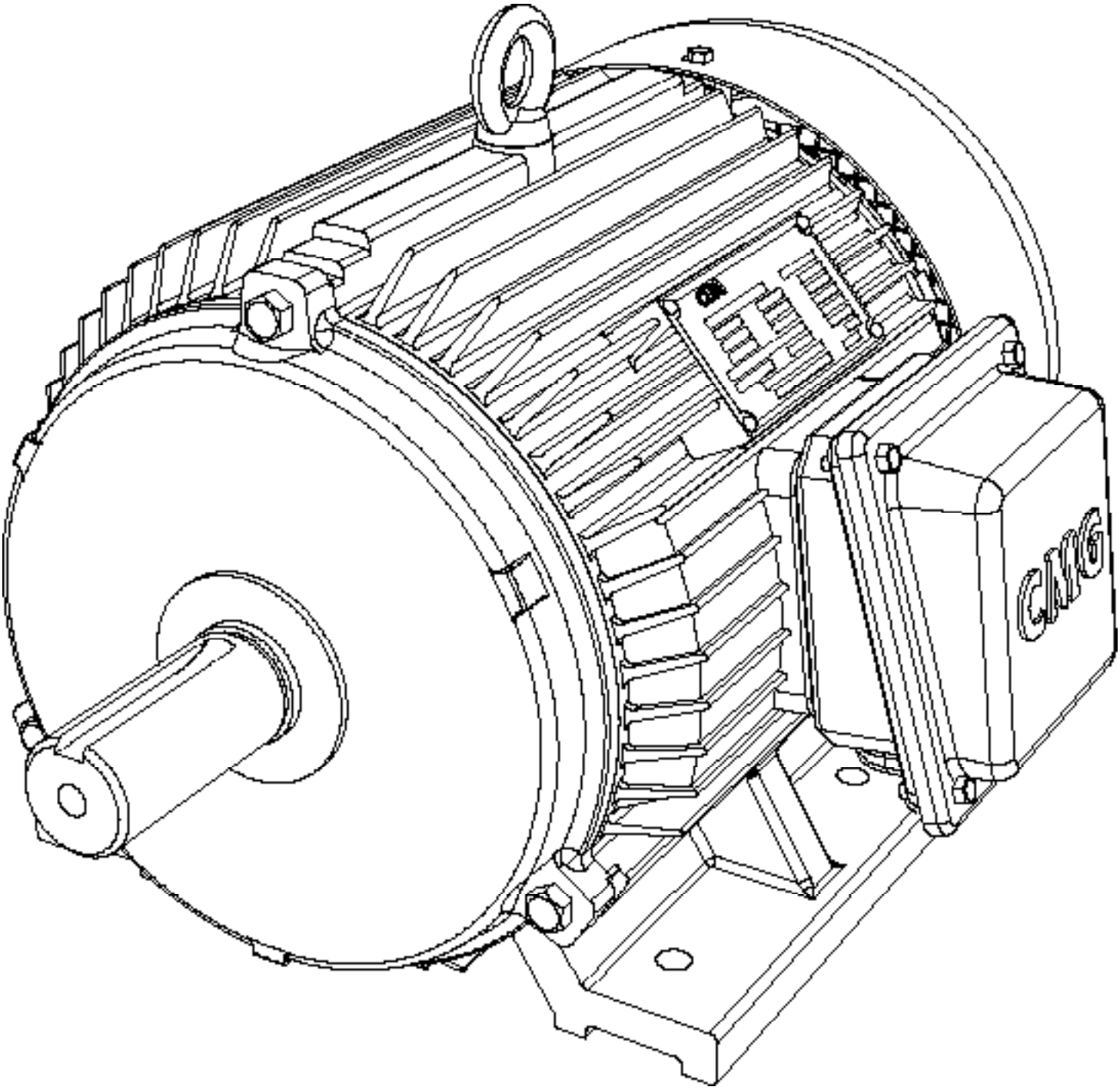


Helical Screw **25mm** Diameter Bearing-Pt# AFM3038-30
Helical Screw **40mm** Diameter Bearing-Pt# AFM3038-30
Screw end bearing **25mm** Diameter –Pt# AFM 0914-14
Screw end bearing **40mm** Diameter –Pt# AFM 1824-20

Helical Screw **25mm** Diameter-Pt# 90670013-01
Helical Screw **40mm** Diameter-Pt# 90670013-01

CMG

motors



SGA series motors

Installation, operation & maintenance instructions

The SGA series of cast iron motors are outstanding examples of the diverse range and product reliability that has built the CMG name. The SGA series from 0.37 to 315 kW is part of CMG's extensive range of electric motors.

CMG's world best practices and technologies, plus our international computerised sales, spare parts and service back-up mean we can offer a total commitment to every customer.

You can be sure every product supplied by CMG's Motors, Transmission or Drives divisions... be it an electric motor, geared motor, variable frequency drive, soft starter, or one of our many other associated products...will perform exactly to specification, and deliver reliable performance year after year with minimum maintenance and downtime.

CMG's Technology division is a recognised R & D leader offering professional engineering staff and facilities for design, testing, product development and quality control. When you think Motors, Transmission, Drives, or research and development Technology...think CMG.

ilac-MRA

NATA

Accreditation No. 14396

Certified ISO 9001 : 2000 by BVQI n° 149352

The CMG SGA series motors are designed and manufactured to be robust and reliable with minimal maintenance. The following items should be taken into consideration to ensure a trouble free installation and reliable running throughout the motor's life.

Inspection

CMG motors are delivered through safe and reliable transport in appropriate packing as to remain in as manufactured condition during transit. On receipt of the motor thoroughly inspect the unit for any transit damage, if need be in the presence of an insurance surveyor. Any equipment damage or shortfall should be immediately advised to the nearest CMG office.

Check the following:

- rating plate details and enclosure are as ordered,
- shaft turns freely (in absence of shaft locking clamp),
- condensation drain holes are in the correct position for the motor mounting application (they should be located at the lowest point of the motor when it is in its operating position),
- If the winding is Insulation Resistance (IR) tested to earth, ensure that the thermal protectors are not inadvertently damaged. (The thermistor leads should be shorted together whilst IR testing takes place.)

Storage

When the motor is not for immediate use store as follows:

- Clean and dry location,
- Free from vibration (vibration can damage bearings),
- Shaft locking clamps, where supplied, are fitted securely,
- Remove shaft locking clamps and turn rotor by one full rotation at least once a fortnight and replace shaft locking clamps,
- Anti-condensation heaters, where fitted, should be energised if the environment is likely to be damp.

Installation

The following items should be considered on installation to ensure reliable operation of the motor:

Surroundings

- Ensure that the motor is properly protected against ingress of oil, water or dust especially if construction work is in progress around the motor,
- Ensure air intake is not obstructed. Refer to dimension BL in the catalogue,
- When installing hazardous location motors, make sure that the zone and gas group or dust and temperature classification on motor nameplate are complied with.

Mounting

- Bed plates or slide rails should be firmly fixed to a solid, level foundation to ensure the motor remains rigid and vibration free,
- Shims or packers (if required) must be of adequate size and placed adjacent to and between base fixing screws,
- Protective transport coatings on shafts and/or flanges must be removed prior to connection to the driven load,
- A light coating of grease to shafts and/or flanges will inhibit corrosion during service and assist removal of pulleys or couplings.

Pulleys and couplings

- Pulleys or couplings should be independently balanced with a half key as the motor rotor is balanced with a half key during manufacture,
- In fitting pulleys or couplings to the motor shaft care must be taken to ensure the roller/ball bearings are not damaged. Both shaft and coupling bore should be cleaned and lubricated. If the fit is still too tight, the pulley or coupling should be pre-heated in air or oil to enable easy assembly,
- Shock methods must not be used in fitting or removing pulleys or couplings. Proper wheel or pulley removers should be used to prevent shaft and bearing damage. Tapped holes are provided in shaft extensions to assist in the fitment of couplings and/or pulleys.

Pulley and belts

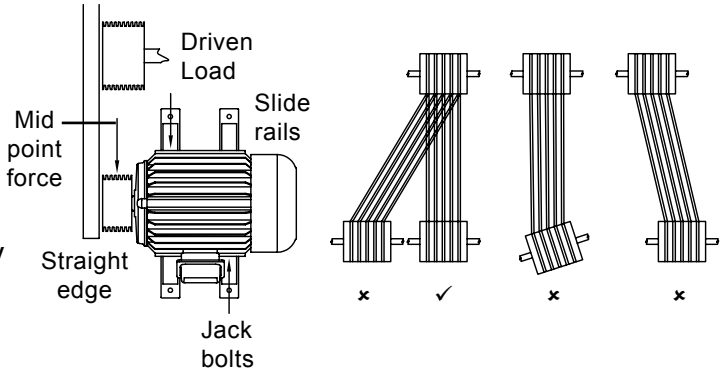
- If the motor is to be coupled to the load using pulleys and belts it is important to ensure that the belt tension does not exceed the safe working radial load of the motor. Excessive radial load will lead to reduced bearing life with the potential of breaking the motor shaft. Because of this care must be taken to ensure the correct selection of pulley size and type (toothed, vee or flat) and this is best done in consultation with the transmission supplier,
- The belt manufacturer's recommendations for installation, alignment and tensioning must be strictly adhered to when fitting belt drives.

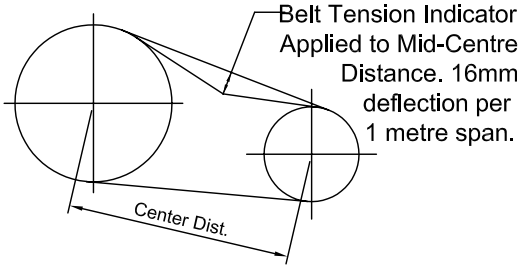
Alignment

- Great care must be taken in aligning the complete machine, since misalignment can cause rapid deterioration of bearings and lead to other mechanical failures due to the stress produced,
- After final tightening of foundation bolts, machine alignment should be rechecked as bed plates could move and/or distort during machine mounting,
- No end thrust should be applied without express approval,
- When slide rails are used in conjunction with pulley drives, the adjusting screw ends should be positioned between the motor and load at drive shaft end and the other diagonally opposite. This helps speedy and accurate belt aligning, tensioning and replacement.

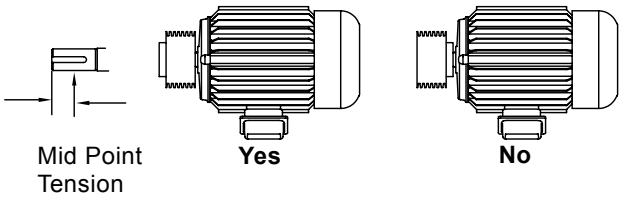
The correct alignment of the motor pulley with the load pulley is imperative. Both these pulley's must have matched centre distances between grooves and alignment must be carried out using a suitable metal straight edge or other recommended tools to ensure parallel offset or angular displacement of the pulley's with respect to each other is inside permissible limits as recommended by the transmission supplier. Correct alignment will result in a uniform distribution of belt tension across the width of the pulley (and the motor shaft) and ensure design life of both the belts and bearings is achieved.

Note: The pulley should always be mounted firmly against the shaft shoulder and should be a firm fit onto the shaft. **Impact force must not be used.**





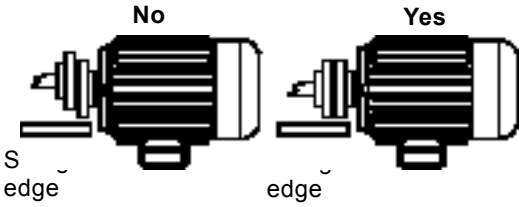
As a general rule the mid point of the applied force should be at the mid point of the shaft and it is good engineering practice to mount the motor pulley with hub and locking screw at the shaft end.



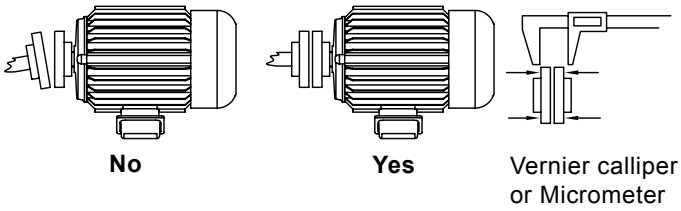
Direct coupled

Where direct coupling of the motor is required, proper alignment must be achieved to prevent bearing damage to both motor and load.

For parallel offset, use a straight edge or other recommended tools, as shown below.



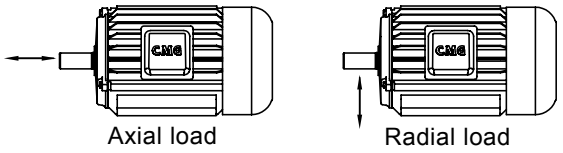
Excessive angular displacement must also be prevented. The recommended method to achieve correct angular alignment is shown below.



Axial loads

Where motors with standard bearings are required to be mounted in either vertical shaft up or vertical shaft down orientation, there are limits on the axial forces that must not be exceeded. This also applies to horizontal mounted motors with certain loads that produce axial thrust. Axial loads exceeding those listed in the catalogue will reduce bearing life and may lead to internal motor damage.

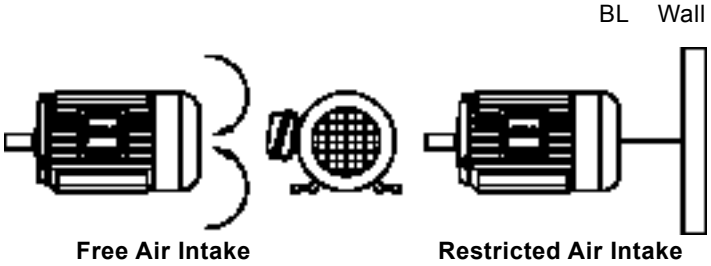
Where higher than recommended axial loads are necessary different bearing types will be required. (Refer to CMG).



There are various cooling formats for electric motors with IC411 (totally enclosed fan cooled) as the most common type that is used on our SGA motors. This type of cooling of motor is achieved by a fan mounted at the non drive end, inside a fan cowl, which has an air inlet grille at the rear. Air is drawn in through the grille and the fan distributes the airflow along the fins of the motor body. The fan is designed for either direction of rotation (unless otherwise indicated on the fan cowl).

With TEFC motors it is important that the cooling fins remain clear of debris to allow the airflow to be fully effective in maintaining motor winding temperature within the design limits.

It is equally important to ensure the installation provides good unrestricted access to normal ambient air at the fan entry point at all times and that inlet grill is clear of contaminants. Refer to dimension BL below.



Motor Frame	Dimensions BL (mm)
71 - 100	15
112 – 132	30
160 – 180	40
200 – 280	50
315 - 355	65

Hazardous location motors

Standard motors in the range of frame sizes 71 to 280 with appropriate modifications are certified for use in hazardous area as below:

Increased safety motors

Exe, Zone 1, Group II, Temperature class T3

Marking code:
E II 2G c Ex e II T3,
IP55 (OPTION IP66)
(T_{amb} -20°C to 40°C)

Non-sparking motors

Ex nA, Zone 2, Group II,
Temperature class T3

Marking code:
E II 3G c Ex nA II T3,
IP55 (OPTION IP66)
(T_{amb}-20°C to 50°C)

Dust Excluding Ignition Proof

Ex tD (formerly DIP), Practice A,
Zones 21 & 22, Temperature class T4

Marking code:
E II 2D c Ex tD A21 IP66 T135°C
(T_{amb} -20°C to 50°C)
OR
E II 3D c Ex tD A22 IP66 T135°C
(T_{amb} -20°C to 50°C)

Combination of Gas and Dust

Marking code:
E II 2G c Ex e II T3, IP66
E II 2D c Ex tD A21 IP66 T135°C
(Tamb -20°C to 40°C)
OR
E II 3G c Ex nA II T3, IP66
E II 3D c Ex tD A22 IP66 T135°C
(T_{amb} -20°C to 50°C)

Address of manufacturer

CMG Pty Ltd, 19 Corporate Avenue,
Rowville VIC 3178, AUSTRALIA.
Website: www.cmggroup.com.au

Classification of zone, group and temperature category are in accordance with the standards applied in the certificates. A general explanation of these is available in the product catalogue.

The hazardous location motor nameplates also carry the certification number in addition to the marking codes for the specific protection levels. Details of the standards to which these are certified are available on the actual certificates, copies of which can be accessed from the website or obtained from the nearest CMG office.

NOTE: Only motors that carry nameplates indicating E or Ex e or Ex nA or Ex tD (or DIP) or combination of them can be used in hazardous locations. Check nameplate before installing motors in hazardous locations.

Cable entries

Cable entries are via appropriate cable glands or conduits fitted to the threaded entries in the wall of the terminal box or the gland plate attached to it. Cable entries for various frame sizes are as per the following table .

Motor Frame	No. of Entries	Entry Size x Pitch	Reference drawing for Ex motors
71 - 80	2	M20 x 1.5 or M25 x 1.5	SGA118A, SGA118B
71 - 132	2	M20 x 1.5 or M25 x 1.5	SGA112A, SGA112B, SGA119A, SGA119B
160 - 180	2	M25 x 1.5 or M32 x 1.5 or M40 x 1.5	SGA136, SGA137, SGA140
200 - 280	2	M32 x 1.5 or M40 x 1.5 or M50 x 1.5	SGA158, SGA158A, SGA159, SGA162

Cable glands used on hazardous location motors must be of ATEX approved type or IEC Ex certified type as appropriate to the installation requirements. Unused cable entries must be blanked off using ATEX approved or IEC Ex certified conduit stops as appropriate.

Supply terminals

Supply terminals are located in the terminal box. They are suitable for receiving crimped lugs on the supply cables. In addition the terminal box also houses an earthing terminal.

Motor Frame	Terminal Size
71 – 132	M5
160 – 180	M6
200 – 225	M8
250 – 280	M10

Electrical connection

- Ensure all electrical connections are solid and continuous,
- Check motor starter and overloads for correct rating and trip setting,
- All circuit breakers, HRC fuses or protective devices associated with the motor must be rated to suit motor running current and starting characteristics,
- Supply cables must be appropriately selected considering the voltage drop,
- When using long supply cables with VVVF drive, check with CMG for proper recommendations to avoid high voltage transients occurring at motor terminals,
- Check the connection diagram on the motor terminal box and make sure the supply leads are properly connected considering the supply phase sequence,
- Ensure that the supply cable termination on to the motor terminal board is firm, without loss of strands while using crimped lugs and all washers are used in the correct order as provided,
- Ensure enough clearances are provided between supply cable lugs and to earth especially so in case of hazardous location motors,
- Ensure that proper earthing connection is made with all washers as provided,
- Check that the cable glands used on hazardous location motors are Ex approved by the standards organisation. Gland plugs to be of approved type,
- If using conduit for the supply leads, ensure the conduit is completely threaded in and seal the threads appropriately,
- If RTDs of hazardous location motors are connected to monitor the winding temperature, the maximum voltage to the RTDs must be kept to 90V(peak) or below.

Initial start up

Prior to initial start-up check the following-

- Insulation resistance of motor winding to earth to be over 1 MΩ for motors up to 600V and over 10 MΩ for over 600V,
- Thermistors or RTDs if fitted, should be checked for continuity with a multimeter,
- Ensure thermistors are wired up to the motor protection relay as to trip the supply to the motor in the event of an over temperature,
- Do not megger test thermal protective devices across their terminals. Short the entire protector leads together and apply the test voltage between the shorted leads and earth and/or phases,
- Hazardous location motors supplied by a VVVF drive must have the thermal protection devices connected into the motor control circuit in such a manner as to disconnect the source of supply in the event of an over temperature thus preventing the nominated temperature class being exceeded,

- Anti-condensation heaters if provided must be so connected as to switch on when the motor supply is disconnected and switch off when the motor supply gets connected,
- Ensure that the supply voltage and frequency correspond to the motor nameplate ratings,
- Ensure shaft turns freely before initial start,
- Measure winding resistance between supply terminals and record in the log book.

Operation

- Before running the motor make sure that the terminal box lid is closed and secured with appropriate clearance to live parts,
- Make sure that appropriate earthing is done,
- Make sure that the coupling and/or transmission is adequately guarded for safety,
- Check the mounting bolts and/or flanges are firmly secured,
- Make sure of no loose objects around that may be sucked by the cooling fan on the motor,
- Make sure that the load applied is within the nameplate specification,
- Make sure that the ambient temperature is inside 40ºC or nameplate specification,
- Avoid frequent starting of motor. Refer to motor catalogue or nearest CMG office for recommendation on frequency and duration of starts,
- If a VVVF drive is used on Ex nA motor, make sure that the applied load is inside the limits specified by the loadability curve shown in drawing SGA208,
- On Ex e motors, make sure that the starting method employed keeps the starting current and duration within the nameplate figures of I_A/I_N ratio and t_E time,
- Check that the running current on no load and full load are reasonably balanced within 10% of the average and record the figures in the log book for future reference. Note that the current imbalance can be higher, typically 10 times the voltage imbalance if there is an imbalance in supply voltage,
- Brake motors used in hazardous locations must have a limited number of repeat stops to 20 per hour.

Number of starts per hour

The number of starts per hour is dependant on the inertia of the driven load and the load torque demand. When high inertia load is applied (flywheel, heavy fan etc) please refer to your nearest CMG office for advice. A guide to generally acceptable starts per hour would be as per table.

For greater number of starts per hour, please contact your nearest CMG office for advice.

	Starts per Hour			
Frame	2 Pole	4 Pole	6 Pole	8 Pole
71 *	-	40	-	-
80 *	20	40	40	-
90	16	30	40	-
100	16	30	40	40
112	16	30	40	40
132	10	20	25	25
160	10	20	25	25
180	8	15	20	20
200	6	12	12	12
225	5	10	10	10
250	4	8	8	8
280	3	6	6	6
315	3	4	4	4

*** 20 Starts / Hour for Ex tD brake Motors**

Permitted starting time

In respect to the temperature rise of the motor, starting time (i.e., from rest to operational speed) should not exceed the time indicated in the following table. Motor must be allowed to cool prior to each start.

Note: For Ex e motors t_E time stated on motor name plate takes precedence over these times

Frame	Starting method	Maximum starting time [sec]			
		2 pole	4 pole	6 pole	8 pole
71	D.O.L.	-	26	-	-
80	D.O.L	15	26	40	-
90	D.O.L.	10	15	25	-
100	D.O.L.	12	13	18	40
112	D.O.L.	10	10	18	35
132	D.O.L.	14	12	12	25
160-355	D.O.L.	15	15	20	20
160-355	Star-delta	45	45	60	60

Maintenance

Reliable, trouble free operation of a motor needs regular maintenance. Exact maintenance needs vary based on the site conditions. To obtain reliable service from the motor, the following maintenance schedule may be used as a guide. An authorised service agent must carry out maintenance of hazardous location motors SGAE, SGAN or SGAD.

A. Ensure air intake space is unobstructed.

B. On a weekly basis use an air hose to ensure all air ways are clear and free of dust.

C. Once every month, check motor for condensation. Replace drain plugs before starting if they are blocked or found missing.

D. Do not wash the motor down unless it is IP66 rated.

E. On a quarterly basis-
   (i) Check the motor terminals for tightness and proper contact,
   (ii) If terminal lug/s are discoloured, re-terminate with fresh lugs,
   (iii) Check operation of starting equipment, ensuring all terminations are tight.
   (iv) Check mechanical operation of thermal overload relays, if any,
   (v) Check mechanical operation of thermistor relays, if fitted,
   (vi) Check operation of anti-condensation heaters, if fitted.

F. On a six monthly basis, in addition to the items in 'E' -
   (i) Check winding resistance between supply terminals and compare to original value and enter in log book.
   (ii) Check supply voltage at motor terminals and record in log book.
   (iii) Check bearings for abnormal noise/ overheating.

G. On an annual basis, in addition to the items in 'E' and 'F' -
   (i) Re-grease the bearings as recommended in the following table. Frames 71-180 use sealed bearings. Frames 200-280 use open re-greasable bearings. When re-greasing bearings ensure that the correct type of grease is used. If in doubt about the existing grease type, clean out the old grease thoroughly from bearings and bearing housings, prior to regreasing.
   WARNING: NEVER MIX GREASE OF DIFFERENT TYPES
   Use lithium based grease such as Shell Alvania R3 or equivalent unless otherwise specified. SGAH, SGASS and SGAHS motors require extra high temperature grease such as Magnalube G or equivalent.
   (ii) Completely disassemble stator, rotor apart and clean thoroughly.
   (iii) Check bearings for wear/damage – replace as necessary.
   (iv) Check all bolts and nuts for cracks or damage – replace as necessary.
   (v) Check all holding down bolts for signs of fatigue or damage – replace as necessary.
   (vi) After re-assembly, check and record in the log book-
   Insulation resistance by megger
   No load current and voltages
   Full load current and voltages
   Ensure that these figures compare well with the original records in the log book.
   (vii) Check and ensure that the cooling fan is operational.

Sealed bearings

The required replacement interval for sealed bearings is generally determined by the grease life which is dependant on operating temperature, operating speed, the limiting speed of the bearing and the type of grease. Under normal operating conditions the following relationship applies:-

$$\log t = 6.54 - 2.6\frac{n}{N} - (0.025 - 0.012\frac{n}{N})T$$

Where:
t = Average grease life (hours)
n = Speed (RPM)
N = Bearing limiting speed with grease lubrication (RPM)
T = Operating temperature (°C)

For further information, please contact your nearest CMG office for advice.

Open (regreasable) bearings

It should be noted that for motors fitted with Ball and Roller bearings, the lubrication intervals for both bearings should be based on the roller bearing data.

The re-lubrication intervals recommended are calculated on the basis of normal working conditions.
Note: Under arduous conditions please contact CMG or the bearing manufacturers catalogue. Air operated grease guns should not be used.

Replenishment of grease media should be by means of a hand held grease gun whilst motor is running with relief plate removed.

Recommended Grease Replenishment Intervals (Hours) [1)]

Bearing number [2)]	Bearing bore [mm]	Qty of grease [g]	3000 r/min		1500 r/min		1000 r/min		750 r/min	
			Ball	Roller	Ball	Roller	Ball	Roller	Ball	Roller
6312/NU312	60	20	3800	1900	10100	5050	16000	8000	20000	10800
6313/NU313	65	25	3400	1700	9400	4700	15100	7500	20000	10300
6314/NU314	70	30	3000	1500	8800	4400	14300	7150	19500	9750
6315/NU315	75	30	2570	1285	8200	4100	13500	6750	18500	9250
6316/NU316	80	35	2200	1100	7600	3800	12800	6400	17700	8850
6317/NU317	85	40	1800	900	7100	3550	12100	6050	16800	8400
6318/NU318	90	45	1650	825	6600	3300	11500	5750	16000	8000
6319/NU319	95	45	1500	750	5700	2850	9000	4500	14600	7300
6322/NU322	110	60	1200	600	4800	2400	8300	4150	13400	6700

[1)] Based on maximum grease service life of 20,000 hours [2)] Refer to Nameplate / Motor to confirm Bearing size.

HEAD OFFICE

19 Corporate Ave
PO Box 2340
Rowville VIC 3178
Australia
Tel: +61 (0)3 9237 4000
Fax: +61 (0)3 9237 4010

AUSTRALIA

Sales : 1300 888 853
Support : 1800 676 722
www.cmggroup.com.au
CMG Pty Ltd
ABN 15 248 126 938

VICTORIA
19 Corporate Ave
Rowville VIC 3178
Tel: +61 (0)3 9237 4040
Fax: +61 (0)3 9237 4050

NEW SOUTH WALES
8/26 Powers Road
Seven Hills NSW 2147
Tel: +61 (0)2 9674 1555
Fax: +61 (0)2 9674 4652

NORTH NEW SOUTH WALES
13B Old Punt Road
Tomago NSW 2322
Tel: +61 (0)2 4964 9144
Fax: +61 (0)2 4964 8537

QUEENSLAND
1/6-8 Radium Street
Crestmead QLD 4132
Tel: +61 (0)7 3803 2033
Fax: +61 (0)7 3803 2683

NORTH QUEENSLAND
Cnr. John Vella Drive & Connors Rd
Paget, Mackay NQLD 4740
Tel: +61 (0)7 4952 6244
Fax: +61 (0)7 4952 6277

NORTHERN TERRITORY
24 Benison Road
Winnellie NT 0820
Tel: +61 (0)8 8947 2633
Fax: +61 (0)8 8947 1499

WESTERN AUSTRALIA
2/9 Noble Street
Kewdale WA 6105
Tel: +61 (0)8 9353 5600
Fax: +61 (0)8 9353 2244

SOUTH AUSTRALIA
2/24 Richard Street
Hindmarsh SA 5007
Tel: +61 (0)8 8340 8333
Fax: +61 (0)8 8340 8800

TASMANIA
112 Tarleton Street
East Devonport TAS 7310
Tel: +61 (0)3 6427 9911
Fax: +61 (0)3 6427 9922

ASIA PACIFIC

www.cmggroup.com.sg

SINGAPORE
CMG Electric Motors (Asia Pacific) Pte Ltd
Registration No. 200414611G
21 Tuas South Street 1
Singapore 638032
Tel: +65 6863 3473
Fax: +65 6863 3476

CHINA

www.cmggroup.co.cn

SHANGHAI
CMG Electric Motors Trading (Shanghai) Co Ltd
Registration No. 040714
775 Siping Road, 1st building Room 1915
Hong Kou District
Shanghai 200092
Tel: +86 (0)21 6508 8873
Fax: +86 (0)21 6508 8785

EUROPE

www.cmggroup.co.uk

UNITED KINGDOM
CMG Electric Motors (UK) Ltd
Registration No. 0459 5019
Unit A Stafford Park 2
Telford
Shropshire TF3 3AR UK
Tel: +44 (0)1952 299 606
Fax: +44 (0)1952 299 667

MIDDLE EAST

www.cmggroup.co.il

ISRAEL
CMG Electric Motors (Israel) Ltd
Company No. 513713107
9 Bareket St, Zone 23
North Industrial Park
Caesarea 38900
Tel: +972 (0)4 627 0777
Fax: +972 (0)4 627 0779

NEW ZEALAND

Sales : 0800 676 722
www.cmggroup.co.nz
CMG Electric Motors (NZ) Ltd
NZCN : 567 351

AUCKLAND
315A Rosebank Road
Rosebank, Avondale
Auckland
Tel: +64 (0)9 820 3550
Fax: +64 (0)9 828 9288

CHRISTCHURCH
Cnr Lunns & Annex Road
Middleton
Christchurch
Tel: +64 (0)3 348 3740
Fax: +64 (0)3 348 3760

ROTORUA
62 Pururu Street
Rotorua
Tel: +64 (0)7 347 8624
Fax: +64 (0)7 347 8629

SOUTH AFRICA

www.cmggroup.co.za
CMG Electric Motors South Africa (Pty) Ltd
Registration No. 2003/001379/07

JOHANNESBURG
212 Albert Amon Road
Millennium Business Park
Meadowdale
Johannesburg 1610
Tel: +27 (0)11 453 1930
Fax: +27 (0)11 453 9560

DURBAN
Unit 4 Constantia Park
1415 North Coast Road
Redhill 4051
Tel: +27 (0)31 569 5551
Fax: +27 (0)31 569 5549

CMG
motors
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CMG products are sold and recommended by :

VARVEL

RC

RD

RP

RS

RT

VR

XA

WORKING INSTRUCTIONS AND MAINTENANCE

VARVEL®

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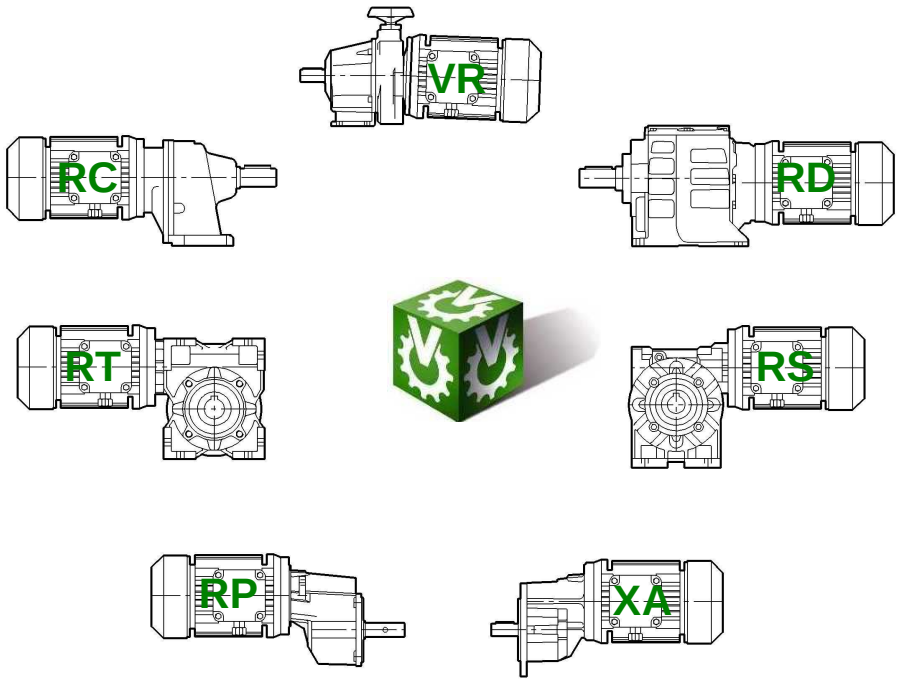
WORKING INSTRUCTIONS AND MAINTENANCE

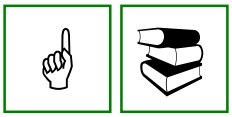
SPEED REDUCERS

RC - Helical Gearboxes
RD - Helical Gearboxes
RP - Helical Gearboxes
RS - Worm Gearboxes
RT - Worm Gearboxes
XA - Helical Gearboxes

VARIATORS

VR - Mechanical, dry friction





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1 GENERAL INFORMATION

Varvel speed reducers and variators are not in the field of application of the Machinery Directive, Article 1(2), and they must be not put into service until the machinery into which they are to be incorporated, has been declared in conformity with the provisions of Article 4(2), Annex II (B) of Machinery Directive 98/37/CE and, for Italy only, of DL 459/96.

Regular operation and the right to guarantee servicing request the observance of information contained in this manual that must be read before the gearbox is put into service.

2 SAFETY WARNINGS

2.1 Products Operation

During operation, outer surfaces of gearboxes and variators may warm up because of in motion parts and also by external environmental conditions.

Everything referred to transport, stocking, assembling, setting up, starting and maintenance must be performed by trained personnel and that follows this manual within specific national / regional regulations about safety and prevention of accidents.

2.2 Prevalent Use

Gearboxes and variators referred to in this manual are destined to operate industrial applications and they correspond to standards and regulations where applicable.

Performances and technical data are available in the unit's nameplate and from the related documentation.

2.3 Transport

Carefully check the state of the goods at their receipt and immediately notify the possible damages to the carrier.

2.4 Long-Term Storage

Stocked units must be kept in dry warehouse and dust free.

For storage longer than 3 months, apply antioxidants on the shafts and machined surfaces paying special attention to oilseal lips.

Storages longer than one year reduce bearing grease lifetime.

2.5 Environmental Management

In conformity with Environmental Certification ISO14001, we recommend the following to dispose of

- scrapped gearbox components: to deliver to authorised centres for metal object collection:
- drained oils and lubricants: to deliver to Exhausted Oil Centres;
- product accompanying packages (pallets, carton boxes, paper, plastic, etc.): to deliver into regeneration / recycling circuits as far as possible, by delivering separate waste classes to authorised companies.

3 PRODUCTS LAYOUT

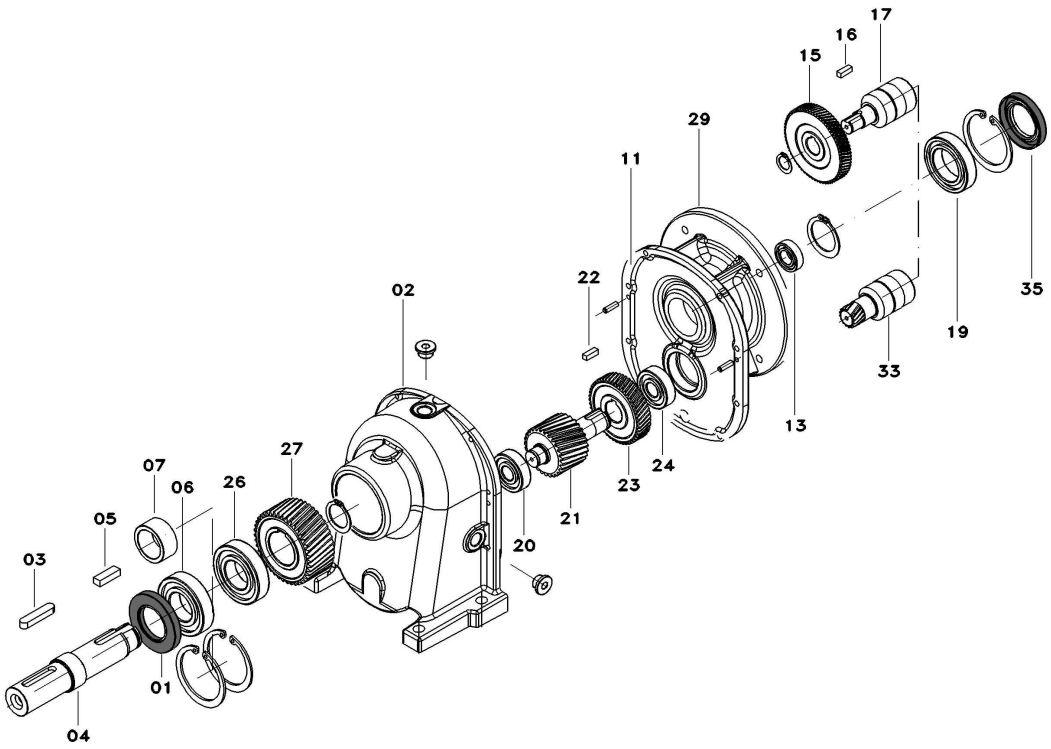
The following layouts supply a generic help in finding out the most significant parts of the products.

Various design executions of sizes, assembling versions, number of stages actually origin a variety of solutions and therefore, we recommend to refer to the appropriate catalogue.

PRODUCTS LAYOUT

3.1 Series RC

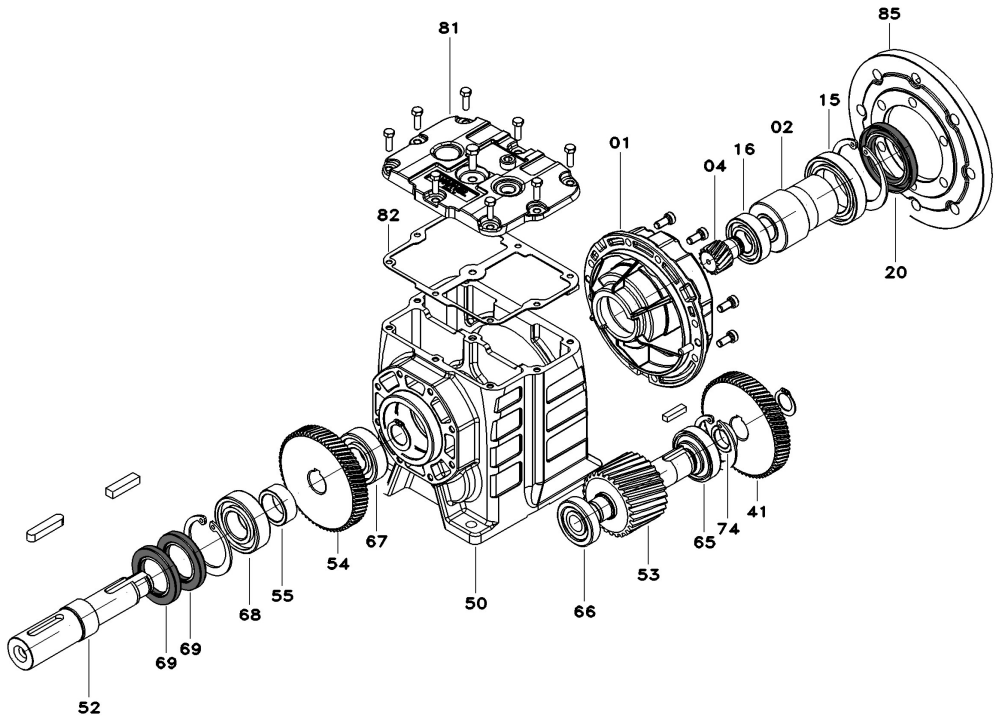
The layout shows the general structure of a two-stage foot-mounted helical gearbox type FRC.
The exact identification of spare parts is sent to the appropriate Catalogue MRC.



01	Oilseal	19	Bearing
02	Housing	20	Bearing
03	Key	21	Pinion
04	Output shaft	22	Key
05	Key	23	Gear
06	Bearing	24	Bearing
07	Spacer	26	Bearing
11	Gasket	27	Gear
13	Bearing	29	IEC input cover
15	Pinion	33	Hollow input
16	Key	35	Oilseal
17	Hollow input		

3.2 Series RD

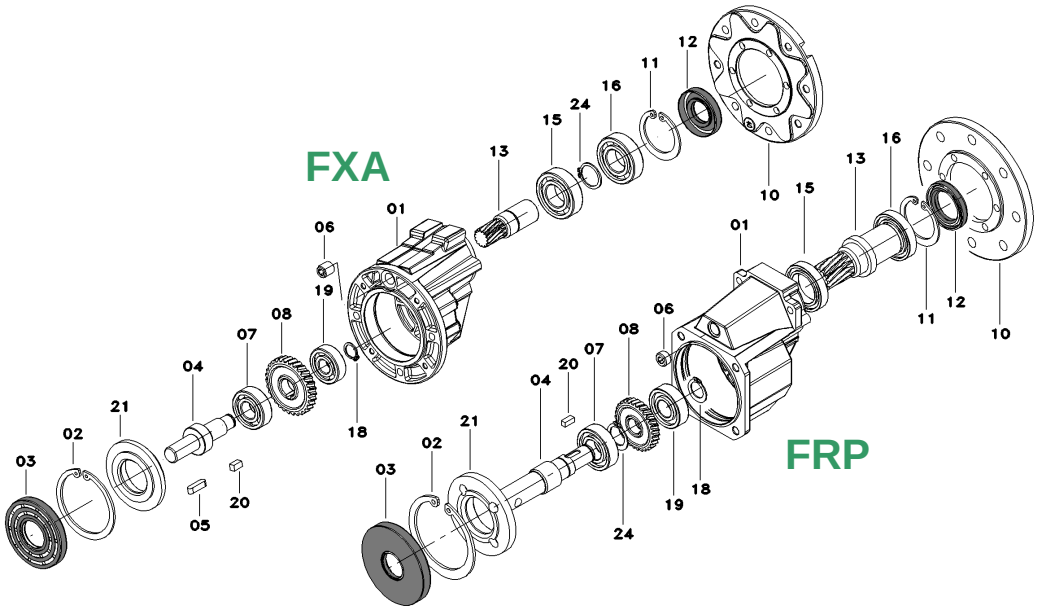
The layout shows the general structure of a two-stage foot-mounted helical gearbox type FRD.
The exact identification of spare parts is sent to the appropriate Catalogue MRD.



01	Input cover	55	Spacer
02	Hollow input	65	Bearing
04	Pinion	66	Bearing
15	Bearing	67	Bearing
16	Bearing	68	Bearing
20	Oilseal	69	Oilseal
41	Gear	74	Circlip
50	Housing	81	Cover
52	Output shaft	82	Gasket
53	Pinion	85	Flange IEC
54	Gear		

3.3 Series RP and XA

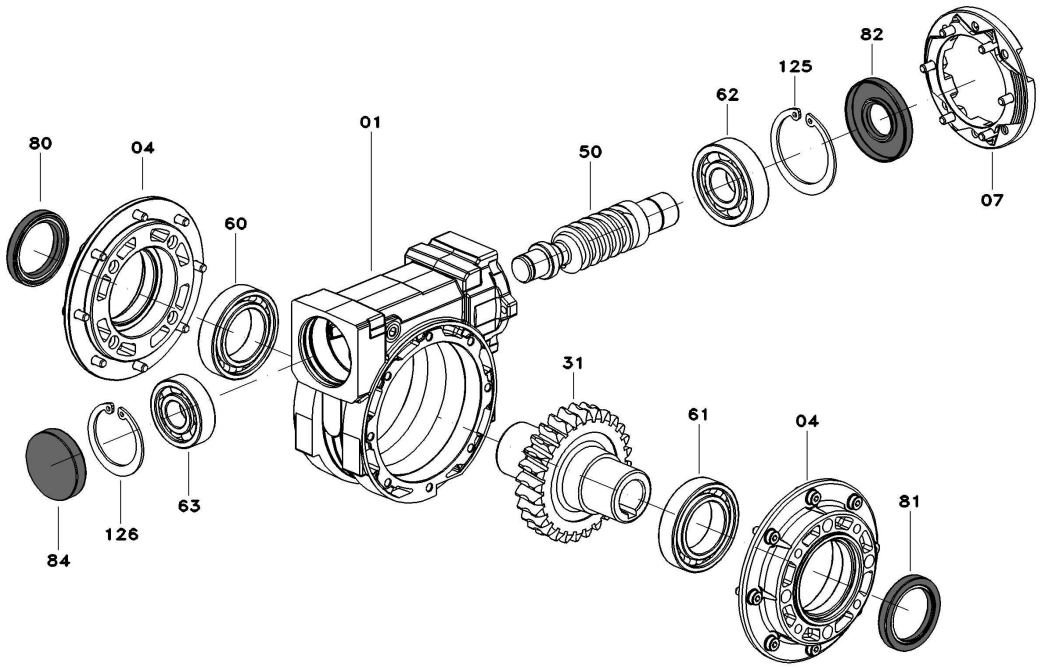
The layout shows the general structure of a one-stage flange-mounted helical gearbox type FRP and FXA.
The exact identification of spare parts is sent to the appropriate Catalogue MRP or MXA.



01	Housing	12	Oilseal
02	Circlip	13	Pinion
03	Oilseal	15	Bearing
04	Output shaft	16	Bearing
06	Screw	18	Circlip
07	Bearing	19	Bearing
08	Gear	20	Key
10	Flange IEC	21	Adapter
11	Circlip	24	Circlip

3.4 Series RS

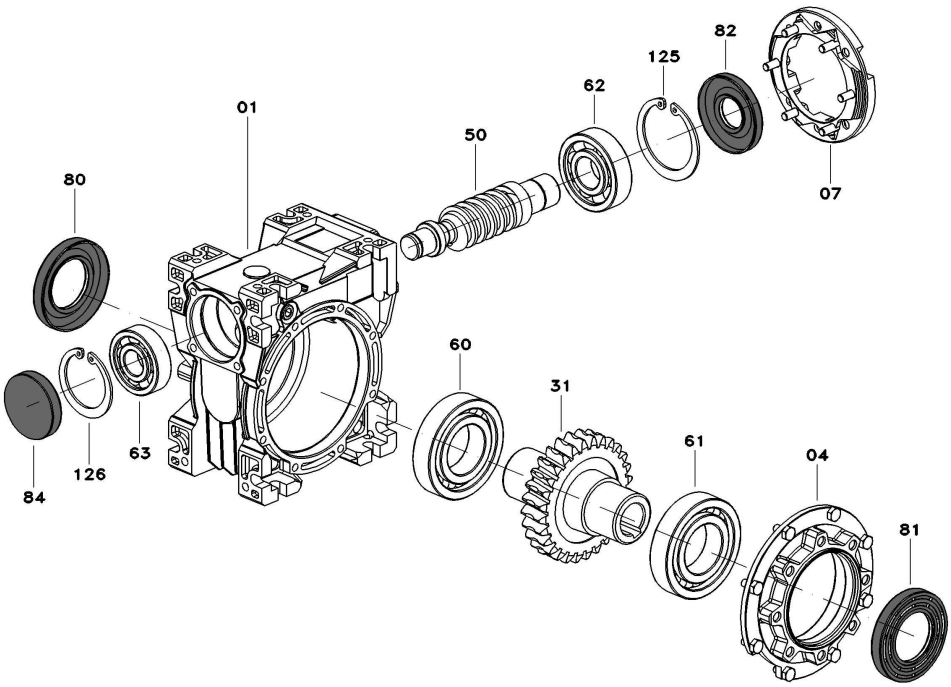
The layout shows the general structure of a foot-mounted worm gearbox type FRS.
The exact identification of spare parts is sent to the appropriate Catalogue MRS.



01	Housing	63	Bearing
04	Side cover	80	Oilseal
07	Flange IEC	81	Oilseal
31	Worm wheel	82	Oilseal
50	Worm shaft	84	Oilseal RCA
60	Bearing	125	Circlip
61	Bearing	126	Circlip
62	Bearing		

3.5 Series RT

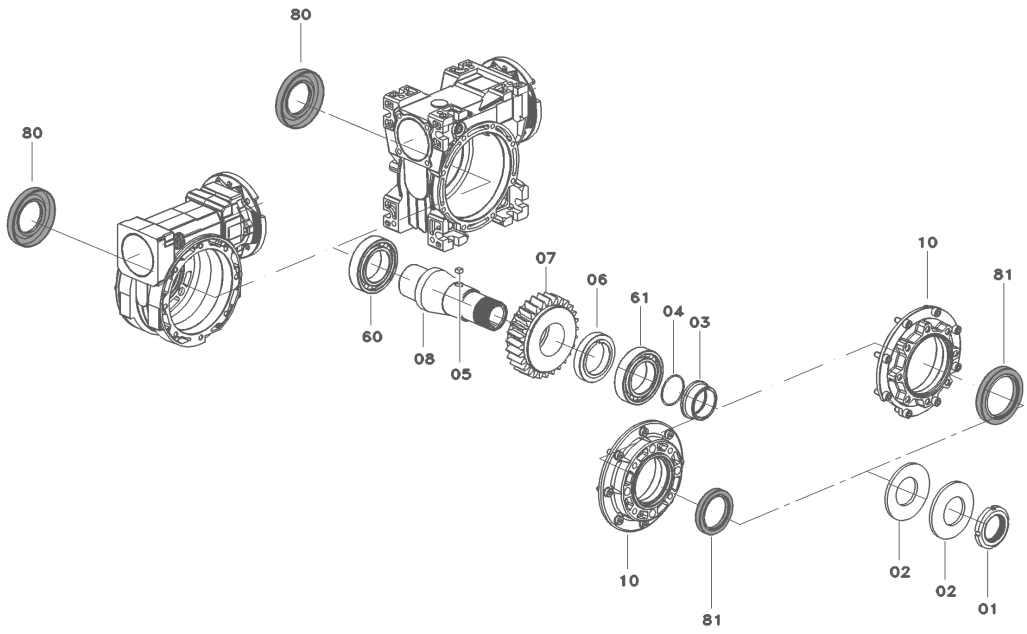
The layout shows the general structure of a foot-mounted worm gearbox type FRT.
The exact identification of spare parts is sent to the appropriate Catalogue MRT.



01	Housing	63	Bearing
04	Side cover	80	Oilseal
07	Flange IEC	81	Oilseal
31	Worm wheel	82	Oilseal
50	Worm shaft	84	Oilseal RCA
60	Bearing	125	Circlip
61	Bearing	126	Circlip
62	Bearing		

3.6 Torque Limiter Option TLI

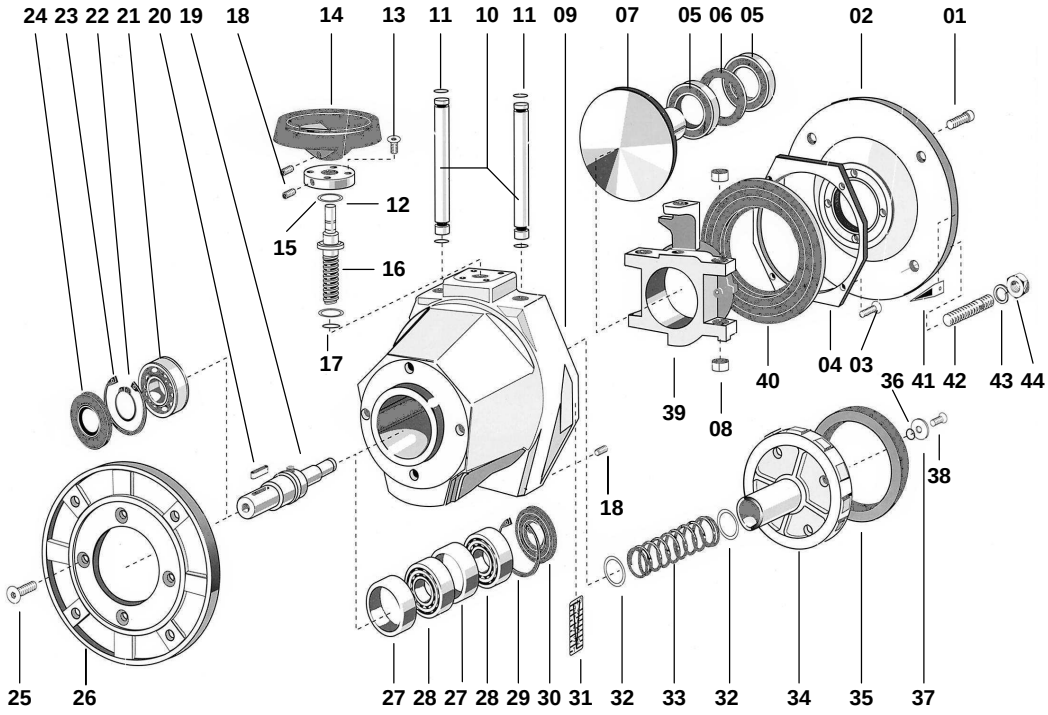
The layout shows the general structure of a built-in torque limiter type TLI fitted inside a worm gearbox MRS or MRT.
The exact identification of spare parts is sent to the appropriate Catalogue TL.



01	Lock nut	08	Hollow output shaft
02	Bellville washer	10	Cover
03	Bush	60	Bearing
04	Oilseal	61	Bearing
05	Key	80	Oilseal
06	Spacer	81	Oilseal
07	Worm wheel		

3.7 Series VR

The layout shows the general structure of a flange-mounted variator without gearbox type FVR.
The exact identification of spare parts is sent to the appropriate Catalogue MVR.



02	Flange IEC	24	Oilseal
04	Seal plate	26	Output flange
05	Bearing	27	Spacer
06	Spacer	28	Bearing
07	Cone	30	Oilseal
09	Housing	31	Index scale
10	Cylindrical slide	33	Spring
14	Control hand wheel	34	Driving flange
15	Control-shaft lock	35	Friction ring
16	Control shaft	39	Cone support
19	Output shaft	40	Bellows seal
21	Bearing		

4 INSTALLATION

4.1 Tolerances

Tolerances are recommended according to DIN 748 as follows

- Shafts: solid input or output ISO h6
  hollow input ISO E8
  hollow output ISO EH7
  centre hole DIN 332, DR
- Flanges: spigot ISO h7

4.2 Precautions

Check that the unit to be put into service is rightly sized to perform the required function and that its mounting position complies with the order. Such data are shown in the nameplate fitted on the unit.

Check mounting stability so that the unit operates without vibrations or overloads, or insert damping couplings or torque limiters.

Care must be taken to ensure exact positioning and steadiness when handling the units to not origin damages to normal operation of the unit.

When hoisting, use relevant locations of the housing or eyebolts if provided, or foot or flange holes.

Never hoist on any moving part (input or output shafts).

4.3 Groundwork

Clean carefully all the surfaces of shafts and flanges paying attention that the used product for cleaning does not came in contact with sealing lips of oilseals to avoid any damage and lubricant leakages.

4.4 Set up

The unit may be connected for clockwise or counter-clockwise rotation.

Stop immediately the unit when unexpected running or noise occurs: if the part originating the anomaly is not identified, other parts may be damaged with consequent difficulty in going back to the cause.

4.5 Pulleys, Pinions, Couplings

Bore tolerance F7 is recommended when fitting pulleys, pinions, couplings, etc. on the output shaft.

It is also recommended to not fit or extract with mallets or hammer hits to not damaging internal parts, but to use the shaft-head threaded bore as reaction to fitting or extraction.

- Belt drives: the force imposed on the shaft due to belt tension to not exceed the maximum permissible radial force of the unit.
- Chain drives: properly lubricate the chain drive and check that no pitch differences hinder its smooth running.

4.6 Torque arm

The torque arm Type BR (Series RS) or Type BT (Series RT) can rotate by 45° within the range 45° to 315°.

4.7 Painting

Carefully protect oilseals, coupling faces and shafts when units are re-painted.

5 STARTING

5.1 Series RS, RT

The worm gearbox originates the following rotations of input and output shafts, with worm shaft upwards:

- inverse rotation
  one-stage gearboxes (RS, RT);
- original rotation
  helical/worm gearboxes (RA, TA);
- inverse rotation
  two-stage gearboxes (RS/RS, RT/RT).

Worm shaft downwards: opposite situations.

5.2 Series RC, RD, RP, XA, VR

The helical gearbox and the variator originate the following rotations of input and output shafts:

- inverse rotation
  odd-stage gearboxes (one, three, etc.)
  and variators with odd-stages;;
- original rotation
  even-stage gearboxes (two, four, etc.)
  and variators without stages or even-stages.

6 INSPECTIONS AND MAINTENANCE

6.1 Intervals

Although the units are no-load run tested in the factory before despatch, it is advisable not to run them at maximum load for the first 20-30 hours to allow proper running in.

For variators, run throughout the full speed range at reduced load before the full load is applied.

The units are delivered already filled with synthetic long-life oil: no servicing or refilling within the average lifetime of 15,000 hours for operation according to SF1.0.

Refer to the Catalogues as appropriate to the right definition of Service Factor.

Variators Series VR run dry and bearings are lifetime grease packed; thereore, there is no part needing periodical maintenance, the friction ring replacement excepted on normal wearing conditions.

6.2 Maintenance Servicing

Units supplied without any oil plugs:

- Series RC (sizes 05, 10, 20, 30)
- Series RD (sizes 0, 1, 2, 3, 4)
- Series RP (size 71)
- Series RS (sizes 28, 40, 50, 60, 70, 85)
- Series RT (sizes 28, 40, 50, 60, 70, 85, 110)
- Series XA (sizes 63, 71, 80)
- Series VR (sizes 63, 71, 80, 90)

Units supplied with oil plugs:

- Series RC (sizes 40, 50, 60)
- Series RS (sizes 110, 130, 150)

Periodically check the state of seals and possible evidence of lubricant leakages.

If lubricant replacement or topping is required, do not mix with mineral based lubricants.

Variation section, dry running and with lifetime grease-packed bearings, does not require any periodic servicing, excepted the friction ring replacement on normal wearing conditions.

6 INSPECTIONS AND MAINTENANCE

6.2 Maintenance Servicing

Observance of maintenance intervals is recommended to ensure the appropriate working conditions.

- **GEARBOXES**

  ➔ **According to working conditions:**
  Eliminate by means of a vacuum cleaner any dust accumulation thicker than 5 mm

  ➔ **Every 500 working hours or every month:**
  Oilseal visual check to monitoring any lubricant leakage.

  ➔ **Every 3000 working hours or every 6 months:**
  Oilseal check and replacement if considerably used.

  ➔ **Every 5 years:**
  Replace synthetic oil.

- **VARIATORS**

  For variators VR only, please also consider the following prescriptions in addition to the above ones

  ➔ **According to working conditions**:
  Replace friction ring, if considerably used.

  ➔ **Every 3000 working hours or every 6 months:**
  Check output shaft angular play and oilseal and corrugated hood integrity.

  ➔ **Every 6000 working hours or every year:**
  Replace friction ring.

7 MALFUNCTIONING

7.1 Major Events

- **Running noise, continuous**

  ➔Grinding sound: damaged bearing
  Replace bearing & check the oil

  ➔Knocking sound: irregular gearing
  Contact Customer Service

- **Running noise, intermittent**

  ➔ Foreign bodies in the oil
  Contact Customer Service

  ➔Series VR - Damaged friction ring
  Rectify the cause and replace friction ring.
  See the following Section « Friction Ring Replacement »

- **Oil leakages**
  (see also the following note)

  ➔ Damaged oilseal
  Replace oilseal

  ➔ Loosen screws
  Tighten the screws

  ➔ Inner overpressure
  Contact Customer Service

- **No rotation of output shaft**

  ➔ Internal connection cut off
  Contact Customer Service

  ➔Series VR - Friction ring end of life
  Replace the friction ring
  See the following Section « Friction Ring Replacement »

  ➔Series VR - Contaminated friction ring
  Clean carefully cone and ring working areas with solvent of similar product.
  See the following Section « Friction Ring Replacement »

Note: Oil evidence nearby the oilseal lip is a normal situation due to possible melting of lubricant used when fitting the oilseal.

7.2 Customer Service

We recommend to always provide the Customer Service with the following information:

- Full data of name plate
- Type of application
- Duty cycle
- Circumstances of malfunctioning
-

8 LUBRICANTS

8.1 Recommended Types

The units are delivered already filled with synthetic long-life oil.

The safe operation of the units with ISO VG 320 grade lubricant is recommended in the ambient temperature range -20 e +55 °C.

Temperatures beyond this range require specific recommendations for low or high temperatures to ask for the Customer Service.

Type	ISO VG	ARAL	bp	Castrol	EXXON	Mobil	TEXACO	TOTAL	Shell
Synthetic Oil	320	Degol GS 320	Energol SG-XP 320	Alphasyn PG 320	Glycolube 320	Glygoyle HE 320	Synlube CLP 320	---	Tivela SC 320
Food-grade Synthetic Oil	320 460	Eural Gear 460	---	Vitalube GS 460	Gear Oil FM 460	Mobil DTE FM 460	---	---	Cassida Fluid GL 460

8.2 Quantity [litres]

RC

1c	l_1	l_2	l_3	2c	l_1	l_2	l_3	3c	l_1	l_2	l_3
RC105	0,05	0,65	0,05	RC205	0,13	0,15	0,15	RC305	0,17	0,30	0,30
RC110	0,10	0,13	0,10	RC210	0,17	0,25	0,17	RC310	0,25	0,50	0,35
RC120	0,17	0,25	0,17	RC220	0,50	0,60	0,50	RC320	0,60	0,80	0,60
RC130	0,30	0,50	0,30	RC230	0,70	1,15	0,80	RC330	1,15	1,50	1,15
RC140	0,60	1,15	0,60	RC240	1,15	2,25	2,00	RC340	1,50	3,00	2,25
RC150	1,50	2,25	1,50	RC250	2,25	4,40	4,00	RC350	3,75	6,00	5,00
RC160	3,00	4,40	3,00	RC260	6,00	8,80	8,00	RC360	8,00	10,00	8,80

1c - One stage
2c - Two stages
3c - Three stages

l_1 - B3, B6, B7, B8, B5
l_2 - V1, V5
l_3 - V3, V6

Refer to Catalogue MRC for detailed mounting positions

RD

2c	H	V	3c	H	V
RD02	0,40	0,50	RD03	0,40	0,50
RD12	0,50	0,70	RD13	0,50	0,70
RD22	0,80	1,00	RD23	0,80	1,00
RD32	1,30	1,80	RD33	1,60	2,10
RD42	2,20	3,00	RS43	2,20	3,40

2c - Two gear sets
3c - Three gear sets

H - H1, H2, H3, H4
V - V5, V6

Refer to Catalogue MRD for detailed mounting positions

8.2 Quantity [litres]

RP

FRP	l
71	0,50

RS

RS	l	RA	l_1 / l_2	RS / RS	l_3 / l_4
28	0,03	63 / 40	0,04 / 0,10	28 / 28	0,03 / 0,03
40	0,10	63 / 50	0,04 / 0,15	28 / 40	0,03 / 0,10
50	0,15	63 / 60	0,04 / 0,25	28 / 50	0,03 / 0,15
60	0,25	71 / 50	0,06 / 0,15	28 / 60	0,03 / 0,25
70	0,35	71 / 60	0,06 / 0,25	40 / 70	0,10 / 0,35
85	0,63	71 / 70	0,06 / 0,35	40 / 85	0,10 / 0,63
110	1,50	71 / 85	0,06 / 0,63	50 / 110	0,15 / 1,50
130	2,75	80 / 60	0,10 / 0,25	60 / 130	0,25 / 2,75
150	4,40	80 / 70	0,10 / 0,35	70 / 150	0,35 / 4,40
		80 / 85	0,10 / 0,63		
		80 / 110	0,10 / 1,50		
		130	0,20 / 2,75		
		150	0,20 / 4,40		

l - Litres FRS
l_1 / l_2 - Litres FXA / FRS
l_3 / l_4 - Litres FRS / FRS

RT

RT	l	TA	l_1 / l_2	RT / RT	l_3 / l_4
28	0,03	63 / 40	0,04 / 0,08	28 / 28	0,03 / 0,03
40	0,08	63 / 50	0,04 / 0,13	28 / 40	0,03 / 0,08
50	0,13	63 / 60	0,04 / 0,20	28 / 50	0,03 / 0,13
60	0,20	71 / 50	0,06 / 0,13	28 / 60	0,03 / 0,20
70	0,35	71 / 60	0,06 / 0,20	40 / 70	0,08 / 0,35
85	0,60	71 / 70	0,06 / 0,35	40 / 85	0,08 / 0,60
110	1,50	71 / 85	0,06 / 0,60	50 / 110	0,13 / 1,50
		80 / 60	0,10 / 0,20		
		80 / 70	0,10 / 0,35		
		80 / 85	0,10 / 0,60		
		80 / 110	0,10 / 1,50		

l - Litres FRT
l_1 / l_2 - Litres FTA / FRT
l_3 / l_4 - Litres FRT / FRT

XA

FXA	l
63	0,30
71	0,40
80	0,65

9 DIRECTIVE 94/9/CE

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9.2 Prevalent Use 18
9.3 References 18
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9.1 General Information

Directive relates not only to electrical equipment, but also to all kind of machines and control components, separately or jointly, for use in potentially explosive atmospheres.

The following recommendations, issued to operations in potentially explosive environment, are meant as specific completion to general-purpose «Working instructions».

VARVEL-ATEX gearboxes and variators are manufactured with housings and covers of metallic material, incorporating the transmission elements fitted on ball and roller bearings, with Viton oilseals on input and output shafts et with the adequate oil quantity to assure the design operation.

9.2 Prevalent Use

VARVEL-ATEX gearboxes and variators are identified like « components », fundamental but without any autonomous function to operate units and protection systems for production, transport, storage, measurement, control and conversion of energy, or the processing of materials which are capable of causing an explosion through their own potential source of ignition.

9.3 References

VARVEL-ATEX gearboxes and variators are designed and produced according to Directive 94/9/CE, and the following standards

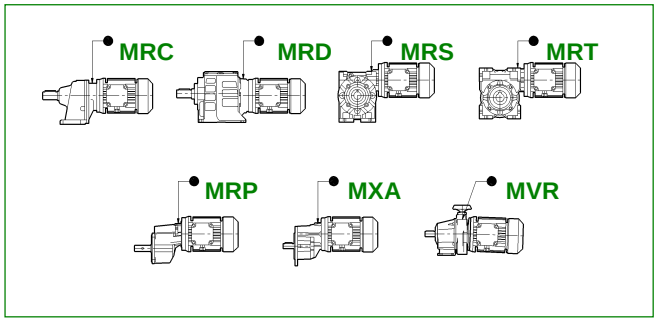
- EN 1127-1 - Explosion prevention and explosion protection
  Fundamental notions and methodology.
- EN 13463-1 - Not electrical devices for potentially explosive atmospheres
  Basic methods and required conditions.
- PrEN 13463-5 - Not electrical devices for potentially explosive atmospheres
  Section 5: protection by construction safety « c ».
- PrEN 13463-6 - Not electrical devices for potentially explosive atmospheres
  Section 6: protection by trigger source control « b ».
- PrEN 13463-8 - Not electrical devices for potentially explosive atmospheres
  Section 8: protection by construction safety « k ».

9.4 Temperature

The units must be properly ventilated: ckeck that ventilation temperature does not exceed 55 ℃.

Measure housing temperature after 2 hours from start up and check that the difference between measured temperature (see the following sketch) and ambient temperature does not exceed the max. value of 80 ℃ .

In such a case, immediately stop the unit and call for Customer Service.



9.5 Safety Instructions

The electric motors and all the other elements, also enclosed the combinations of other power transmission elements to fit at the input or at the output of the products VARVEL-ATEX, must be ATEX approved according the Directive 94/9/CE.

Temperature classes and max. temperature must be compatible with expected temperature limits of different product types.

VARVEL gearboxes and variators must be installed and serviced according to installation and servicing standards for classified environments against explosion hazard because of gas or dust presence (e.g. EN 60079-14, EN 60079-17, EN 50281-1-2 and any other acknowledged national standard).

In case of combustible dusts, it is mandatory the regular cleaning to avoid any accumulation of dust layers on product surfaces.

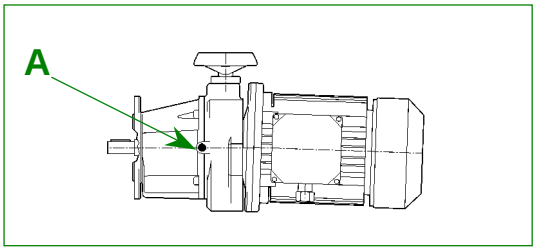
The variators series VR (to run in category 2GD, or 3GD with overload possibilities) must be put into operation only when fitted with a control device of output shaft rotation, made of impulse generator and speed control device (antiskid device), that should be properly installed and calibrated by trained and qualified personnel.

Carefully check the speed control operation before starting the variator up.

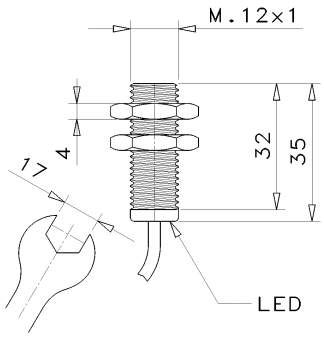
Unique identification of the variators Series VR VARVEL-ATEX is threaded hole (A) on the housing to install a pulse generator (see drawing).

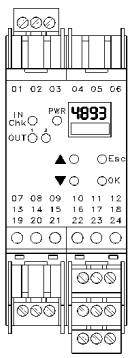
Speed control device and pulse generator are not included in the standard configuaration of Variators VARVEL-ATEX.

Nevertheless, ask when ordering for the built in pulse generator and output shaft speed control with the following specifications.



	Pulse Generator	Speed Control Device
- Make:	Pepperl+Fuchs,GmbH	Pepperl+Fuchs, GmbH
- Type:	NCB2-12GM35-N0 according to DIN 60947-5-6 (NAMUR) with cable 2 m long	KFD2-DWB-Ex1.D according to DIN 60947-5-6 (NAMUR) ……
- Housing threaded hole:	M12x1	……
- ATEX Certification:	PTB 00 ATEX 2048 X (II 1 G Eex ia IIC T6) ZELM 03 ATEX 0128 X (II 1 D Ex iaD 20 T..)	TUV 99 ATEX 1408 (II 1 G Eex ia IIC)

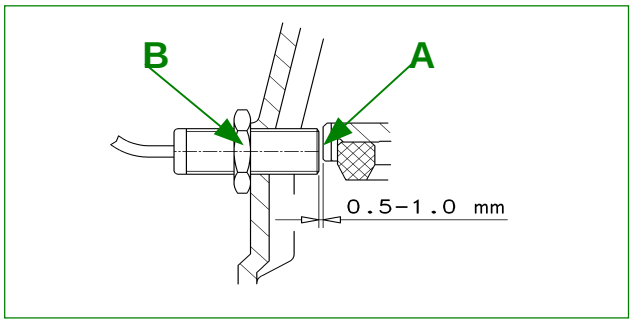




9.5 Safety Instructions

Pulse generator wiring must be made before variator installation:

- rotate the variator output shaft until a pole piece (A) of the friction ring holder is shown through the side threaded hole of the housing;
- apply adeguate quantity of liquid locking threadsealing on housing threaded hole M12x1, warning do not introduce liquid sealing inside the housing;
- carefully screw the pulse generator to get in touch with the pole piece;
- unscrew the pulse generator of 360°;
- apply adeguate quantity of liquid locking threadsealing between enclosed lock-nut (B) and housing;
- secure pulse generator by screwing the equipped lock-nut (B).



We recommned the utmost attention during the pulse generator adjustment because a mistake in screwing depth would cause wrong impact with friction ring holder and the consequent damaging of both the parts and a mistake in pulse generator sealing would cause the not ermetic sealing of variator and the IP66 protection level.

Speed control device adjustment

The above set up distance gives six pulses for each friction ring revolution.

Speed control device must be fitted and put into operation according to manufacturer's documentation and installed outside the potential esplosive atmosphere.

When installing:

- note working speed of variator on operation conditions;
- set stop speed of speed control device (according to working instructions of the used device) to 90% of the above working speed;
- modify the stop speed according to working speed modifications.

Maximum operating time of speed control device must be shorther than 3 seconds: detect and remove the variator slipping cause prior to switch the variator on again.

In case vibrations or anomalous noise occur during the variator starting, stop the variator and replace the friction ring damaged by slipping (friction ring replacement at page 22).

The right wiring of the pulse generator to speed control device and to main control board is left to the sole responsibility of the appointed technician.

9.6 ATEX Marking

The Varvel Series RC, RD, RP, RS, RT, XA, VR are according to design requirements asked by Group II, Category 2 and to operate in areas with explosion danger of gas (Zone 1 and Zone 2) and of combustive dusts (Zone 21 and Zone 22).

- Temperature class and Surface temperature: see below
- Dust accumulation: max. thickness on surface 5 mm maximum (EN50281-1-2)
- Carter: IP66 (Ingress Protection)

The VARVEL-ATEX products are identified by the following technical files:

- Series RC	**"ATEX 03RC"**	- Series XA	**"ATEX 03XA"**	and marked	**II 2 GD ck IP66**
- Series RD	**"ATEX 03RD"**	- Series RS	**"ATEX 03RS"**		T_{max}=120℃ or
- Series RP	**"ATEX 03RP"**	- Series RT	**"ATEX 03RT"**		T_{max}=135℃ T_{amb} -20/+55 ℃
- Series VR	**"ATEX 03VR"**			and marked	**II 2 GD cb IP66**
					T_{max}=185℃ or
					T_{max}=200℃ T_{amb} -20/+55 ℃

where **:**

II - Group II (surface industries)
2 - Category 2
G - Explosive atmosphere with presence of gas, vapours or clouds
Zone 1 (2G) and Zone 2 (2G or 3G)
D - Explosive atmosphere with presence of dust
Zone 21 (2D) and Zone 22 (2D or 3D)
b - Trigger Source Control « b »
c - Construction Safety « c »
k - Dipping in liquid « k »

T_{max} - Max. Surface Temperature
T_{amb} - Ambient Temperature
ATEX 03XX - Deposited Technical File Ref. No.
IP66 - Protection

9.7 Maintenance Servicing

The rigorous observance of maintenance intervals is recommended to ensure appropriate working conditions and explosion-proof protection.

- GEARBOXES

➔**According to working conditions:**
Elimination of any dust accumulation thicker than 5 mm by means of a vacuum cleaner.

➔**Every 500 working hours or every month:**
Visual inspection of oilseals to monitor any lubricant leakage.

➔**Every 3000 working hours or every 6 months:**
Inspection of oilseals and replacement if considerably used.

➔**Every 5 years:**
Replacement of synthetic oil.

- VARIATORS

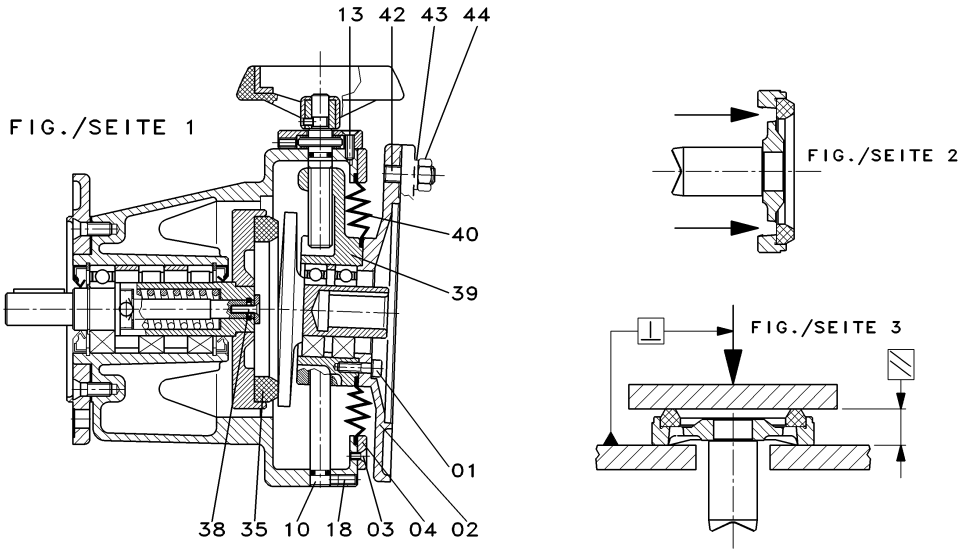
For variators VR, consider also the following prescriptions

➔**According to working conditions:**
Replacement of friction ring if worn out.

➔**Every 3000 working hours or every 6 months:**
Inspection of the angular play of output shaft,
the integrity of oilseals and corrugated hood,
the right operation of monitoring device of output shaft rotation (antiskid device),
the over-temperature of variator housing (≤ 80 K in comparison with T_{amb}).

➔**Every 6000 working hours or every year:**
Replacement of friction ring.

VARIATORS SERIES VR
Friction ring replacement



Friction ring replacement of variators VR VARVEL-ATEX must be carried out by appointed Service Centres.

- Unscrew the nuts (44) and remove the motor
- Unscrew the screws (01) and remove motor flange (02)
- Unscrew the screws (03) and remove the seal plate (04) and the bellows seal (40)
- Unscrew the screws (13) and turn the hand wheel together with the shaft until the full disengagement is achieved
- Unscrew the screws (18) and pull off the slides (10) to disengage the cone (07) with its support (39) and bearings (05)
- Pull off the driving flange (34)
- Push outwards the used friction ring (35) from its seat, same as shown in Fig. 2
- Certainly, the hits will damage the friction ring to remove and therefore clean carefully the seat before fitting the new friction ring
- Fit the new friction ring according to Fig. 3: the fit assembling needs accurate centred pressure and parallel adjustment
- Re-assembling of the variator classified ATEX provides for Loctite 281 sealing of screws (01), (03), (13) and sealing checking with air pressure test (40 mbar for 40 seconds)

Correspondence among Materials, Dangerous Zones and Categories (according to Directive 94/9/CE)

Products VARVEL-ATEX in our supply

MATERIALS	DANGEROUS ZONES	CATEGORIES		
Gases, Vapours or Clouds	Zone 0	1G		
	Zone 1	1G	2G	
	Zone 2	1G	2G	3G
Dusts	Zone 20	1D		
	Zone 21	1D	2D	
	Zone 22	1D	2D	3D

ATTESTATO DI CONFORMITÀ (Esempio)
ATTESTATION OF CONFORMITY (Specimen)

VARVEL SpA
Via 2 Agosto 1980, 9
I-40056 Crespellano BO

dichiara sotto la propria responsabilità che il prodotto

declares under sole responsibility that the product

Riduttori/*Gearboxes* **Serie/s RS**
Serie/s RT
Serie/s RC
Serie/s RD
Serie/s RP
Serie/s XA

Variatori/*Variators* **Serie/s VR**

al quale questa dichiarazione si riferisce, è conforme alla seguente Direttiva

to which this declaration relates to, complies with the following Directive

94/9/EC (ATEX).

La conformità è stata verificata sulla base dei requisiti delle norme o dei seguenti documenti normativi

The conformity is under observance of the following standard documents

EN 1127-1
EN 13463-1
prEN 13463-5
prEN 13463-6 ⇔ solo Variatori
Variators only
prEN 13463-8 ⇔ solo Riduttori
Gearboxes only

Modo di protezione:

Type of protection:

Serie/s RS, RT, RC, RD, RP, XA

II 2 GD ck IP66
Tmax = 120℃ oppure/*or*
Tmax = 135℃ Tamb. -20/+55℃

Serie/s VR

II 2 GD cb IP66
Tmax = 185℃ oppure/*or*
Tmax = 200℃ Tamb. -20/+55℃

I File Tecnici

The Technical Files

ATEX 03RS, ATEX 03RT, ATEX 03RC, ATEX 03RD, ATEX 03RP, ATEX 03XA, ATEX 03VR

sono stati depositati presso l'Organismo Notificato di deposito del fascicolo tecnico

were deposited at the Notified Body of Technical File Deposit

0080 INERIS, F-60550 Verneuil en Halatte

Firma autorizzata
(Funzione: Presidente)
Authorized Signature
(Function: President)

VARVEL SpA

(Francesco Berselli)

Luogo e data dell'emissione
Place and Date of Issue

Crespellano, 25.07.2003

VARVEL

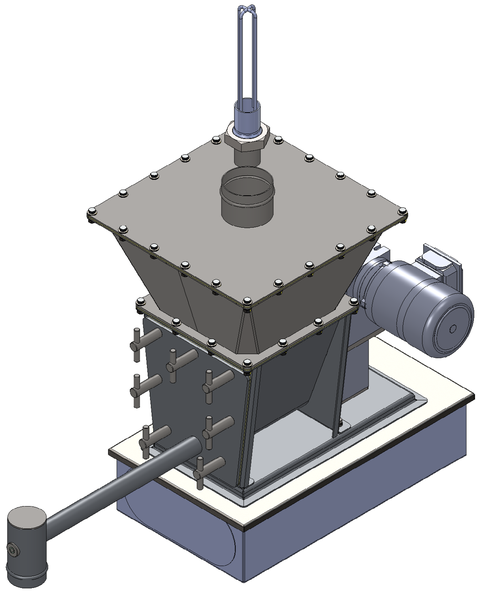
SIC +39 051 327700

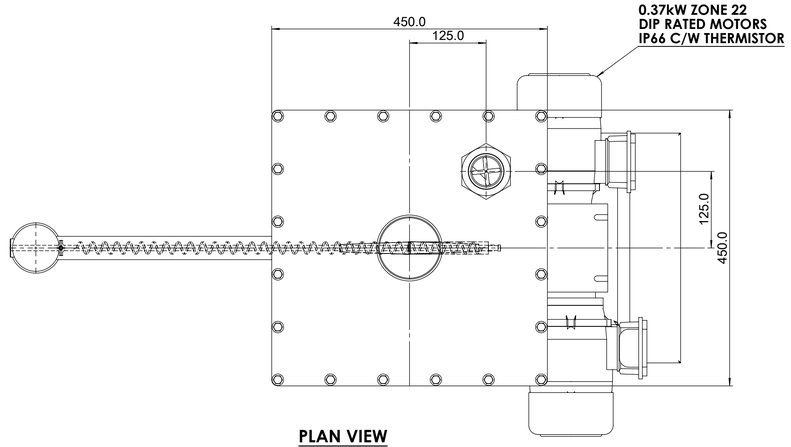
VARVEL®
RIDUTTORI · VARIATORI

Varvel S.p.A. - Via 2 Agosto 1980, 9 - 40056 Crespellano (BO) Italy
Tel. +39 051 6721811 - Fax +39 051 6721825
e-mail:varvel@varvel.com • http://www.varvel.com

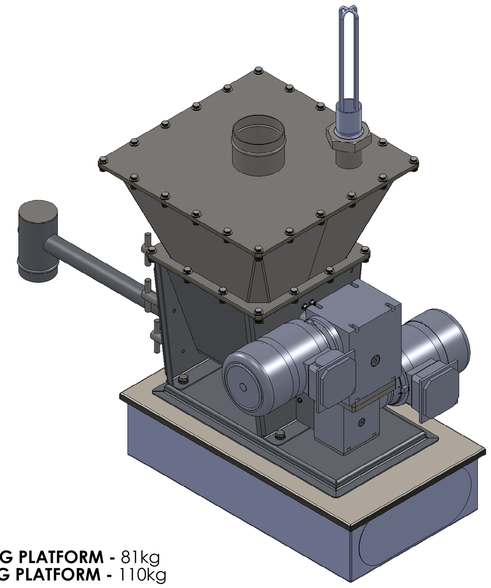
SINCERT CERMET AZIENDA CERTIFICATA
REG. N. 310
UNI EN ISO 9001:1994

SINCERT CERMET AZIENDA CERTIFICATA
REG. N. 310-E
UNI EN ISO 14001:1996

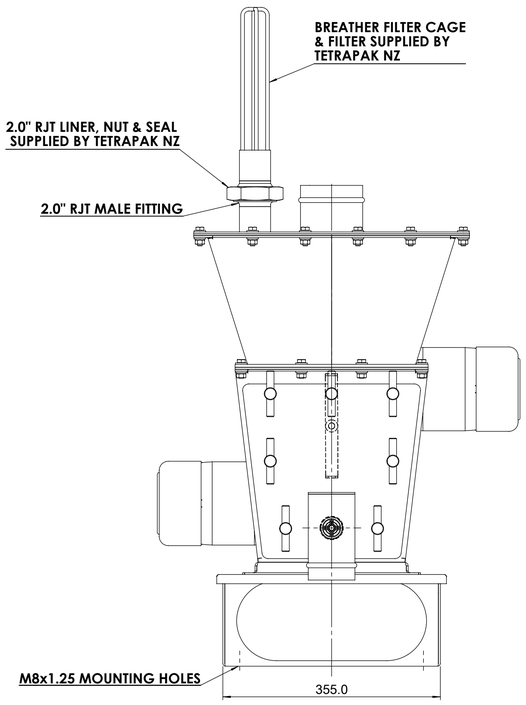




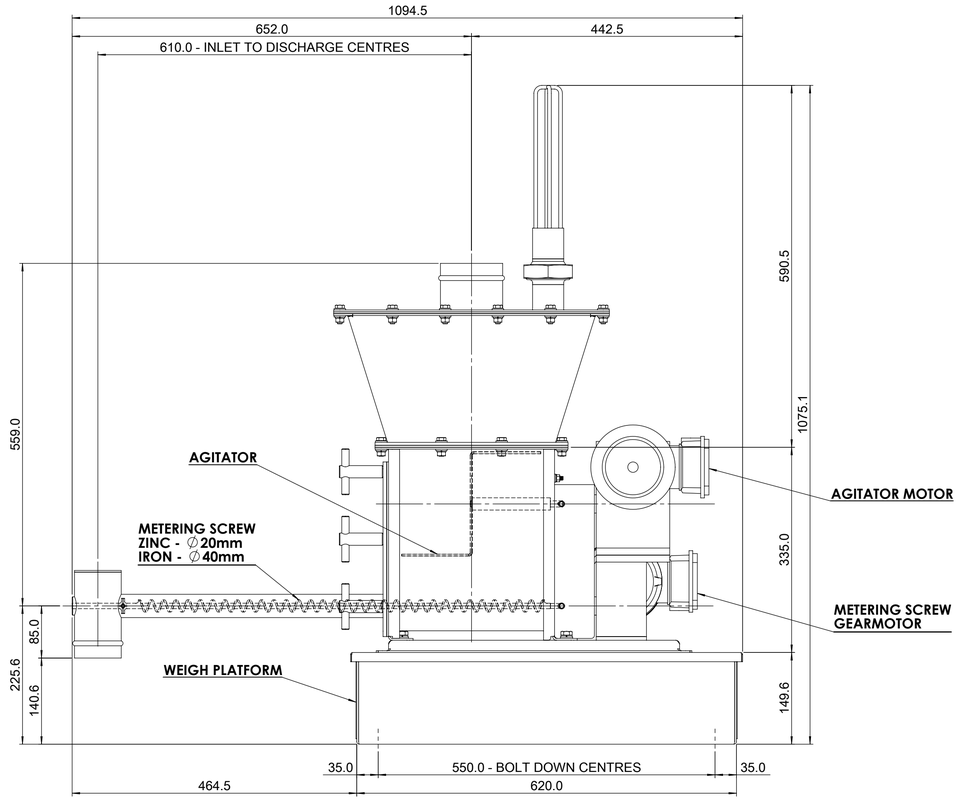
PLAN VIEW



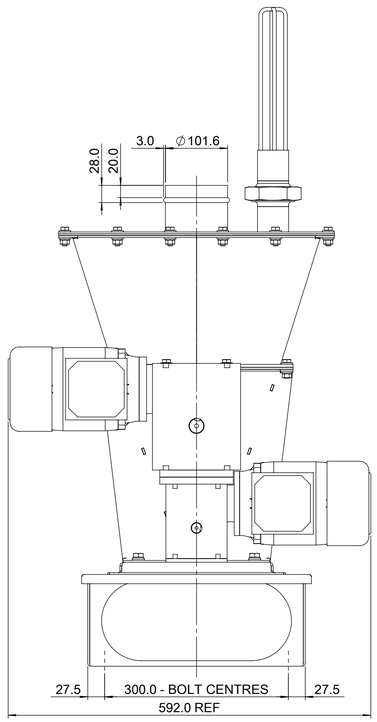
APPROX. EMPTY WEIGHT EXCLUDING PLATFORM - 81kg
APPROX. EMPTY WEIGHT INCLUDING PLATFORM - 110kg



VIEW FROM DISCHARGE END



ELEVATION



VIEW FROM MOTOR END

REVISIONS	
A: 04/03/09 R. BELL	ORIGINAL ISSUE
B: 10/03/09 R. BELL	BREATHER CAGE ADDED INLET & DISCHARGE SWAGING ADDED
0: 11/03/09 R. BELL	ISSUED AS FINAL

CERTIFICATION

CUSTOMER: TETRAPAK NZ DATE: 04/03/09
PROJECT: FONTERRA EDENDALE
Q/No.: TETR93090/M00249
W-T C/No.: 9067
CERTIFIED BY: L.HARTLEY DATE: 04/03/09

UNLESS OTHERWISE STATED
UNTOLERANCED DIMENSIONS
TO BE WITHIN THE LIMITS SHOWN

NOMINAL SIZE	UP TO 50	ABOVE 50 UP TO 150	ABOVE 150 UP TO 300	ABOVE 300 UP TO 1000	ABOVE 1000
MACHINING	±0.1	±0.2	±0.3	±0.5	±1.0
FABRICATION	±0.5	±0.5	±0.5	±1.0	±2.0
ASSEMBLIES	±0.5	±0.5	±0.5	±1.0	±2.0

DRAWN	RICHARD BELL
CHECKED	L. HARTLEY
APPROVED	L. HARTLEY
DATE APP'D	04/03/09
SCALE	1:5

DO NOT SCALE
IF IN DOUBT
ASK

ALL DIMENSIONS IN MILLIMETRES
UNLESS OTHERWISE SPECIFIED

WEB-TECH AUSTRALIA PTY. LTD.
A.C.N. 010 764 431
11 ELECTRONICS STREET EIGHT MILE PLAINS, QUEENSLAND, 4113, AUSTRALIA
P.O. BOX 4006 EIGHT MILE PLAINS, QUEENSLAND, 4113, AUSTRALIA
Phone +61-7-3841 2844 Fax +61-7-3841 0005

TITLE
MODEL LIW1000 LOSS-IN-WEIGHT FEEDER
C/W AGITATION & EXTENSION HOPPER
GENREAL ARRANGEMENT

SIZE	DRAWING No.	
A1	NUMBER 90670001	REV. 0

CUSTOMER
TetraPak NZ

PROJECT
Fonterra Edendale Drier 4 Powder Project

CAD FILE
90670001 Rev0-Loss In Weight Feeder-With Agitation-TetraPak

Certification of

EXPLOSION PROTECTED ELECTRICAL EQUIPMENT

AUSEx Scheme

Certificate of Conformity

Certificate No:	AUS Ex 3025X	**Issue 0:** **Issue 3**	Original Issue 17/2/1994 Revalidation 3/5/2005
Date of Expiry:	31/12/2006		
Certificate Holder:	CMG Pty Ltd 19 Corporate Avenue ROWVILLE VICTORIA 3178		
Electrical Equipment:	Range of Induction Motors frame sizes SGA 71 to SGA 280		
Type of Protection:	Ex e Ex n DIP		
Marking Code:	Ex e II T3 Ex n II T3 (Tamb 50 °C) DIP T_AT4 (Tamb 50 °C) AUS Ex 3025X		
Manufactured By:	CMG Pty Ltd 19 Corporate Avenue ROWVILLE VICTORIA 3178		Zhejiang Jinlong Stock Co Ltd China

Issued by:

Test Safe AUSTRALIA

919 Londonderry Road Londonderry NSW 2753
Australia

Phone: +61 2 4724 4900 **Fax: +61 2 4724 4999**

JAS-ANZ

Accreditation by the Joint Accreditation System of Australia and New Zealand, Acc No. Z2221100AS

Certification of

EXPLOSION PROTECTED ELECTRICAL EQUIPMENT

AUSEx Scheme

This certificate is granted subject to the conditions as set out in Standards Australia Miscellaneous Publication MP69 and the Procedure (Doc Q7134) of the scheme.

The electrical equipment and any acceptable variation to it specified in the schedule to this certificate and the identified documents, was found to comply with the following standards:

AS 2380.1-1989	Electrical equipment for explosive atmospheres - Explosion-protection techniques - General requirements (incorporating Amendment 1)
AS 2380.6-1988	Electrical equipment for explosive atmospheres - Explosion-protection techniques - Increased safety 'e'
AS 2380.9-1991	Electrical Equipment for Explosive atmospheres - Explosion-protection Techniques - Non-sparking Apparatus - Type of protection 'n'
IEC 61241-1-1:1999	Electrical apparatus for use in the presence of combustible dust – Part 1.1: Electrical apparatus protected by enclosures and surface temperature limitation – Specification for apparatus.
AS 60529-2004	Degrees of protection provided by enclosures (IP Code)
IEC 60529:2001	Degrees of protection provided by enclosures (IP Code)

This certificate does not ensure compliance with electrical safety requirements and performance other than those included in the Standards listed above.

The equipment listed successfully met the examination and test requirements as recorded in

Test Report No: TestSafe 25400,26292,26293

File Reference: TestSafe 2003/025246

Signed for and on behalf of issuing authority

Quality & Certification Manager
Position

3/5/2004
Date of Issue

Ex 3025X-3

This certificate and schedule may not be reproduced except in full.

This certificate is not transferable and remains the property of the issuing body to whom it must be returned in the event of it being revoked or not renewed.

Issued by:

Test Safe AUSTRALIA

919 Londonderry Road Londonderry NSW 2753
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Certification of

EXPLOSION PROTECTED ELECTRICAL EQUIPMENT

AUSEx Scheme

Schedule

Certificate No: AUS Ex 3025X **Issue:** 3 **Date of Issue:** 3/5/2005

Certified Equipment: The SGA range of squirrel cage induction motors is manufactured from cast iron and comprises a main body with a separate bolt-on terminal box. The motors are designed to operate on 3 phase, 100 V to 750 V, 40 Hz, 50 Hz or 60 Hz. Motors may be supplied with auxiliary terminal boxes as required for the connection of optional anti-condensation heaters, RTD'S, thermocouples and thermistors. Motors are available as foot mounted, flange mounted or foot and flange mounted. The bearings have V-ring seals with an 'O' ring seal on the lid of the main terminal box to give the motors an IP rating of IP55, and a gamma seal option to give the motors an IP66 rating. Electrical connection is via a threaded entry in the main terminal box wall, designed to accommodate either a gland or conduit.

The range of motors are listed in Table 1A and 1B. The equipment may include one or more of the options detailed in Table 2.

Schedule of Variations

Variations Permitted by Issue 3:

1. Revalidation of certificate AUS Ex 3025X

2. Change of address of certificate holder and manufacturer.

3. The range of motors is extended to include motors as listed in Table 1A and Table 1B and with options listed in Table 2.

Table 1A
Range of motors SGA

2 POLE		4 POLE		6 POLE		8 POLE	
Frame size	**Output Australian kW/Frame**	**Frame size**	**Output Australian kW/Frame**	**Frame size**	**Output Australian kW/Frame**	**Frame size**	**Output Australian kW/Frame**
80A	0.75	71	0.37	80A	0.37	100L	1.1
80B	1.1	80A	0.55	80B	0.55	112M	1.5
90S	1.5	80B	0.75	90S	0.75	132S	2.2

Issued by:

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Accreditation by the Joint Accreditation System of Australia and New Zealand, Acc No. Z2221100AS

Addendum to Certificate No: 3025X-3.

Table 1A cont'd
Range of motors SGA

2 POLE		4 POLE		6 POLE		8 POLE	
90L	2.2	90S	1.1	90L	1.1	132M	3
100L	3	90L	1.5	100L	1.5	160MA	4
112M	4	100LA	2.2	112M	2.2	160MB	5.5
112MB	5.5	100LB	3	132S	3	160L	7.5
132SA	5.5	112M	4	132MA	4	180L	11
132SB	7.5	132S	5.5	132MB	5.5	200L	15
132MB	11	132M	7.5	160M	7.5	225S	18.5
160MA	11	132MB	11	160L	11	225M	22
160MB	15	160M	11	180L	15	250M	30
160L	18.5	160L	15	200LA	18.5	280S	37
180M	22	180M	18.5	200LB	22	280M	45
200LA	30	180L	22	225M	30		
200LB	37	200L	30	250M	37		
225M	45	225S	37	280S	45		
250M	55	225M	45	280M	55		
280S	75	250M	55				
280M	90	280S	75				
		280M	90				

Table 1B
SGA Range of motors

Range of motors SGA
Two Speed Ratings

Frame size	SINGLE WINDING (tapped)			SEPARATE WINDINGS	
	kW output (High/Low speed)			kW Output (High/Low speed)	
	2/4 Poles	4/8 Poles	6/12 Poles	4/6 Poles	6/8 Poles
80A	0.6/0.12	0.45/0.10	0.25/0.06	0.37/0.12	0.25/0.06
80B	0.8/0.16	0.6/0.12	0.37/0.08	0.55/0.18	0.37/0.08
90S	1.2/0.24	0.8/0.16	0.55/0.12	0.75/0.25	0.55/0.24
90L	1.7/0.34	1.2/0.24	0.75/0.18	1.1/0.36	0.75/0.32
100LA	2.4/0.48	1.7/0.34	1.1/0.25	1.5/0.50	1.1/0.47
100LB	-	2.4/0.5	-	2.2/0.75	-

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Addendum to Certificate No: 3025X-3.

Table 1B cont'd
SGA Range of motors

Frame size	SINGLE WINDING (tapped) kW output (High/Low speed)			SEPARATE WINDINGS kW Output (High/Low speed)	
	2/4 Poles	4/8 Poles	6/12 Poles	4/6 Poles	6/8 Poles
112M	3.3/0.66	3.3/0.7	1.5/0.37	3.0/1.0	1.5/0.65
132SA	4.4/0.88	4.4/0.9	2.2/0.45	4.0/1.3	2.2/0.95
132SB	6.1/1.2	-	-	-	-
132MA	-	6.1/1.2	3.0/0.6	5.5/1.8	3.0/1.3
132MB	-	-	4.0/0.8	-	4.0/1.7
160MA	8.3/1.7	8.3/1.7	5.5/1.1	7.5/2.5	5.5/2.4
160MB	12/2.4	-	-	-	-
160L	17/3.4	12/2.4	7.5/1.5	11/3.5	7.5/3.2
180M	20/4.0	17/3.4	-	-	-
180L	-	20/4.0	11/2.2	15/5.0	11/4.7
-	-	-	-	-	-
200LA	24/4.8	24/5.0	15/3.0	18.5/6.1	13/5.5
200LB	33/6.6	-	-	22/7.3	-
225S	-	33/6.6	18.5/3.7	-	15/6.5
225M	41/8.2	41/8.2	22/4.4	33/11	21/9.0
250M	50/10	50/10	-	45/15	26/11
280S	61/12	61/12	-	-	30/13
280M	83/17	83/17	-	55/18	37/16

Table 2

Options for SGA71 to 280 Ex e, n, DIP	
1	Left hand or right hand terminal box when viewed from the drive-end or top terminal box.
2	Anti-condensation heaters for frames 112 – 280. Anti-condensation heaters fitted in accordance with drawing SGA201.
3	Additional sets (3) of PTC thermistors. Fitting of thermistors in accordance with drawing SGA201.
4	Auxiliary terminal box for the termination of the thermistors, RTD's and heaters. Auxiliary box fitted in accordance with drawings SGA203A, SGA 203B and SGA 203C

Table 2 cont'd

	Options for SGA71 to 280 Ex e, n, DIP
5	Winding RTD's – PT100 RTD's Fitted into the motor windings. RTD's fitted in accordance with drawing SGA201.
6	Bearing thermistors fitted into the bearing housing with leads sleeved and routed into auxiliary terminal box. Leads shall be covered with vidaflex fibreglass sleeve or equivalent.
7	Vibration sensors fitted in tapped blind hole in endshield or as shown in drawing SGA 207
8	Stainless steel fasteners
9	Stainless steel shaft. Magnetic grades of stainless steel only for 2 pole motors. Other poles can have magnetic or non-magnetic grades of stainless steel.
10	Alterations to shaft extension diameter and/or length. Shaft diameter shall comply with IEC 60072-1 Table 4 "Shaft extension keys and keyways dimensions. Greatest permissible torque on continuous duty for AC motors". Alternatively, shaft design shall meet requirements of AS 1403-1985: Design of Rotating Steel Shafts.
11	Alternative types of rolling bearings i.e. ball, roller, angular contact.
12	Flange size and type changes external to motor enclosure.
13	Operation on VVVF drives for Ex n and DIP motors. Motors shall be fitted with a thermistor to limit the relevant surface temperature of the motor housing.
14	Operation of motors with electronic soft starters. Electronic soft starters shall be disconnected form the circuit once the motor is started and supply of the motor shall be direct from the mains only. t_E times shall be stated as obtained for DOL mains supply , for safety considerations. Refer to drawing SGA 161 for t_E times
15	Forced ventilation by separately driven cooling fan - the main motor protected by thermistors. The motor driving the fan shall have the same protection as the main motor. The cooling unit shall be fitted as shown on drawing SGA205.
16	Fan and fan cover design changes for noise reduction shall maintain required clearances and airflow.
17	Fan material may be cast iron.
18	Additional eyebolt for vertical lifting
19	Rain canopy for vertical mount (shaft down) motors shall not reduce airflow over motor.
20	Sun shields.
21	Extended leads and blanking plate shall be fitted in accordance with drawing SGA204.
22	Brass, aluminium or steel gland plate in place of cast iron. Alloys to contain < 6% magnesium by mass.
23	Larger terminal box – Next size up
24	Larger terminal block with larger box (both next size up)

Table 2 cont'd

Options for SGA71 to 280 Ex e, n, DIP	
25	Supply terminals to suit star-delta starting with six supply leads
26	Other supply voltages within 100V to 500V for SGA 71 to 132 and 100 V to 800 V for SGA 160 to 280 – 40 Hz, 50 Hz or 60 Hz.
27	Lower kW output rating other than standard provided I_A/I_n ratio is still inside the permissible limits for new rating. Other rating data for lower kW rating to be declared by test and / or calculation based on test for standard kW rating.
28	IP66 for Exe and Ex n when gamma seals for motor shaft are used.
29	Location of drain plug at lowest point for different mounting arrangements.
30	Two speed motors for Ex n and DIP applications.
31	Fitment of brakes to frames 71 and 80. Ref to drawings SGA 115 and SGA 118.

Conditions of Certification Relating to Variations Permitted by Issue 3

1. It is a condition of manufacture that each motor shall have a routine high voltage test carried out in accordance with Section 6 of AS 2380.1.

2. It is a condition of manufacture that, when fitted, the assembly of each anti-condensation heater shall be carried out in the following manner:

   a) A suitably rated insulation sleeve shall be passed over the full length of each of the flexible leads between the terminal block and the point at which they enter the heater element.

   b) The heater strip shall be wrapped around the overhang of the windings and securely taped to them.

   c) The heater ends, with the flexible leads' sleeving, shall be carefully and securely bound by tape to the winding overhang to ensure that no strain is taken by heater element connection points.

   d) The heater element, with the motor winding, shall be varnish impregnated and made integral with the winding as recommended by the heater element manufacturer. Varnish used shall be suitable for the specified insulation class and completely cured as recommended by the varnish manufacturer.

   NOTE: With the heater elements specified for this Exe motor range, it is not regarded as sound practice to add them to a winding after initial assembly and varnish impregnation.

3. It is a condition of safe use that for any Ex n or DIP motor operated from a VVVF drive the following shall apply:

   a) The applied load shall be inside the limits specified by the loadability curve shown in drawing SGA208. The motors are suitable for operation with VACON brand variable frequency drive types or equivalent types.

Conditions of Certification Relating to Variations Permitted by Issue 3 cont'd.

b) The thermal protection devices shall be connected into the motor control circuit in such a manner as to disconnect the source of supply in order to prevent the nominated temperature class from being exceeded.

Drawings Relating to Variations Permitted by Issue 3.

Drawing No.	Drawing Description	Revision	Date
SGA100	General Arrangement for SGA 71 frame	B	16/09/2004
SGA101	General Arrangement for SGA 80-132	B	16/09/2004
SGA102	PARTS LIST 71	B	21/09/2004
SGA103	PARTS LIST 80	B	21/09/2004
SGA104	PARTS LIST 90	B	21/09/2004
SGA105	PARTS LIST 100	B	21/09/2004
SGA106	PARTS LIST 112	B	21/09/2004
SGA107	PARTS LIST 132	B	21/09/2004
SGA108	ROTOR / STATOR AIR GAPS 71-132	B	16/04/2004
SGA109	NAMEPLATE Ex e, Ex n & DIP 71 (Alternative)	C	16/03/2005
SGA110	NAMEPLATE Ex e, Ex n & DIP 71 - 112	C	16/03/2005
SGA111	OPTIONS LIST 71-132	E	23/02/2005
SGA112A	TERMINAL BOX ARRANGEMENT Ex e, Ex n & DIP 71-132 (OPTION 1)	B	21/09/2004
SGA112B	TERMINAL BOX ARRANGEMENT Ex e, Ex n & DIP 71-132 (OPTION 2)	C	22/03/2005
SGA113	FAN CLEARANCES 71-132	B	15/09/2004
SGA114	t_E times 71-132	B	17/02/2005
SGA115	General Arrangement for 71 - 80 BRAKE MOTORS DIP	C	22/12/2004
SGA116	PART LIST 71 BRAKE MOTORS DIP	B	21/09/2004
SGA117	PART LIST 80 BRAKE MOTORS DIP	B	21/09/2004
SGA118A	TERMINAL BOX ARRANGEMENT FOR SGA BRAKE MOTORS 71-80 DIP	B	21/09/2004
SGA118B	TERMINAL BOX ARRANGEMENT FOR SGA BRAKE MOTORS 71-80 DIP	C	22/03/2005
SGA119A	TERMINAL BOX 2 SPEED SGA Motor frame 71-132 (500 V) Ex n & DIP (OPTION 1)	C	01/03/2005

Addendum to Certificate No: 3025X-3.

Drawings Relating to Variations Permitted by Issue 3 cont'd

Drawing No.	Drawing Description	Revision	Date
SGA119B	TERMINAL BOX 2 SPEED SGA Motor frame 71-132 (500 V) Ex n & DIP (OPTION 2)	C	01/03/2005
SGA120A	RATINGS SINGLE SPEED SGA Motor frame 71 – 280 Ex e Ex n & DIP Protection	B	23/02/2005
SGA120B	RATINGS 2 SPEED SGA Motor frame 71 – 280 Ex e Ex n & DIP Protection	B	23/02/2005
SGA130	General Arrangement for 160 - 180	B	16/09/2004
SGA131	PARTS LIST 160	B	21/09/2004
SGA132	PARTS LIST 180	B	21/09/2004
SGA133	ROTOR / STATOR AIR GAPS 160-180	A	13/05/2004
SGA134	NAMEPLATE Ex e, Ex n & DIP 132-180	C	16/03/2005
SGA135	OPTIONS LIST 160-180	B	17/02/2005
SGA136	TERMINAL BOX ARRANGEMENT Ex e 160-180	C	23/03/2005
SGA137	TERMINAL BOX ARRANGEMENT Ex n & DIP 160-180	D	23/03/2005
SGA138	FAN CLEARANCES 160-180	B	15/09/2004
SGA139	t_E times 160-180	B	17/02/2005
SGA140	2 SPEED - TERMINAL BOX ARRANGEMENT Ex e, Ex n & DIP 160-180	C	01/03/2005
SGA150	General Arrangement for 200 - 280	B	16/09/2004
SGA151	PARTS LIST 200	B	21/09/2004
SGA152	PARTS LIST 225	B	21/09/2004
SGA153	PARTS LIST 250	B	21/09/2004
SGA154	PARTS LIST 280	B	21/09/2004
SGA155	ROTOR / STATOR AIR GAPS 200 - 280	A	09/06/2004
SGA156	NAMEPLATE Ex e, Ex n & DIP 200 - 280	C	16/03/2005
SGA157	OPTIONS LIST 200 - 280	B	17/02/2005
SGA158	TERMINAL BOX ARRANGEMENT Ex e 200 - 280	C	23/03/2005
SGA158A	TERMINAL BOX ARRANGEMENT Ex e 200 – 280 (Option 2)	B	23/03/2005

Addendum to Certificate No: 3025X-3.

Drawings Relating to Variations Permitted by Issue 3 cont'd.

Drawing No.	Drawing Title	Revision	Date
SGA159	TERMINAL BOX ARRANGEMENT Ex n & DIP 200 - 280	D	23/03/2005
SGA160	FAN CLEARANCES 200 - 280	B	15/09/2004
SGA161	t_E times 200 - 280	A	09/06/2004
SGA162	2 SPEED - TERMINAL BOX ARRANGEMENT Ex n & DIP 200 - 280	C	01/03/2005
SGA200	STATOR INTERNAL CONNECTIONS	A	29/03/2004
SGA201	PLACEMENT OF PROTECTION DEVICES	B	06/04/2005
SGA202	DRAIN PLUG FITMENT	A	29/03/2004
SGA203A	AUXILIARY TERMINAL BOX FITMENT	A	29/03/2004
SGA203B	AUXILIARY TERMINAL FITMENT (Alternative)	A	29/03/2004
SGA203C	AUXILIARY TERMINALS (For RTD's Thermistors & heaters)	A	17/02/2005
SGA204	BLANKING PLATE & EXTENDED LEADS	A	29/03/2004
SGA205	FORCE VENTILATION	A	09/06/2004
SGA206	DETERMINATION OF t_E times for Ex e	A	29/03/2004
SGA207	VIBRATION SENSOR ARRANGEMENT	A	29/03/2004
SGA208	FREQUENCY CONVERTER LOADABILITY (Ex n)	A	10/12/2004
SGA210	WARNING LABELS	C	16/03/2005
7138	NAMEPLATE Ex e, Ex n & DIP 71 - 112	D	24/02/2000
7139	NAMEPLATE Ex e, Ex n & DIP 132 - 180	D	24/02/2000
7140	NAMEPLATE Ex e, Ex n & DIP 200 - 225	D	24/02/2000
7141	NAMEPLATE Ex e, Ex n & DIP 250 - 280	D	24/02/2000
CMG Motors/Cat SGA 01-04	SGA™ Series Motors (Instructions)	6th Ed	01/2004

IECEx Certificate of Conformity

INTERNATIONAL ELECTROTECHNICAL COMMISSION
IEC Certification Scheme for Explosive Atmospheres
for rules and details of the IECEx Scheme visit www.iecex.com

Certificate No.: **IECEx SIM 06.0012X** Issue No.: **0**

Status: **Current**

Date of Issue: **2007-03-02** Page **1** of **3**

Applicant: **Pepperl+Fuchs GB Ltd**
77 Ripponden Road
Oldham, LANCASHIRE OL1 4EL
United Kingdom

Electrical Apparatus: **Z Series Diode Safety Barriers**
Optional accessory:

Type of Protection: **ia**

Marking: **[Ex ia] I/IIC**
-20°C ≤ Tamb ≤ +60°C
IECEx SIM 06.0012X

Approved for issue on behalf of the IECEx Certification Body: Ashraf Chowdhury

Position: Principal Engineer - Certification

Signature:
(for printed version)

Date:

1. This certificate and schedule may only be reproduced in full.
2. This certificate is not transferable and remains the property of the issuing body.
3. The Status and authenticity of this certificate may be verified by visiting the Official IECEx Website.

Certificate issued by:

Safety in Mines Testing and Research Station (Simtars)
2 Smith Street
REDBANK QLD 4301
Australia

Simtars
Queensland Government

IECEx Certificate of Conformity

Certificate No.: **IECEx SIM 06.0012X**

Date of Issue: **2007-03-02** Issue No.: **0**

Manufacturer: **Pepperl+Fuchs GmbH**
Königsberger Allee 87
68307 Mannheim
Germany

Manufacturing location(s):

Pepperl+Fuchs Pte Ltd
18 Ayer Rajah Crescent
139942
Singapore

This certificate is issued as verification that a sample(s), representative of production, was assessed and tested and found to comply with the IEC Standard list below and that the manufacture'rs quality system, relating to the Ex products covered by this certificate, was assessed and found to comply with the IECEx Quality system requirements. This certificate is granted subject to the conditions as set out in IECEx Scheme Rules, IECEx 02 and Operational Documents as amended.

STANDARDS:
The electrical apparatus and any acceptable variations to it specified in the schedule of this certificate and the identified documents, was found to comply with the following standards:

IEC 60079-0 : 2000 Edition: 3.1	Electrical apparatus for explosive gas atmospheres - Part 0: General requirements
IEC 60079-11 : 1999 Edition: 4	Electrical apparatus for explosive gas atmospheres - Part 11: Intrinsic safety 'i'

*This Certificate **does not** indicate compliance with electrical safety and performance requirements other than those expressly included in the Standards listed above.*

TEST & ASSESSMENT REPORTS:
A sample(s) of the equipment listed has successfully met the examination and test requirements as recorded in

Test Report:

AU/SIM/ExTR07.0001/00

Quality Assessment Report:

DE/PTB/QAR06.0007/01
DE/PTB/QAR06.0008/01

IECEx Certificate of Conformity

Certificate No.: **IECEx SIM 06.0012X**

Date of Issue: **2007-03-02** Issue No.: **0**

Schedule

EQUIPMENT:
Equipment and systems covered by this certificate are as follows:

The Z Series Diode Safety Barriers are designed to restrict the transfer of energy from unspecified non-intrinsically safe circuits to intrinsically safe circuits by the limitation of voltage and current.

The series comprises single, dual or triple output shunt diode barriers in a single unit. Each barrier consists of fuse protected, triplicated zeners with resistive output current limitation. Components on which Intrinsic Safety depends are encapsulated.

Models covered by this certificate are listed in the Annex.

Manufacturer's documents: Refer Annex

CONDITIONS OF CERTIFICATION: YES as shown below:

Entity parameters listed in the Annex apply to the apparatus.

Annexe: IECEx SIM 06.0012X Annex.pdf