auma® india

# Operation & Instructions Manual

## Wormgear Operators GS 160 - GS 500


**auma® india pvt ltd**

***Registered Office & Works :***

PLOT NO. 39-B, II PHASE, PEENYA INDUSTRIAL AREA, BANGALORE - 560 058.
PHONE : 080-28394656 / 28392808 FAX : 080-28392809 E-MAIL : info@auma.co.in

***Branches :***

NEW DELHI : 8-C, BLOCK-B-H, MUNIRKA, NEW DELHI - 110 067
PHONE : 011 - 26187063 FAX : 011 - 26109637 E-MAIL : aumandl@auma.co.in

PUNE : 712, 713, BLDG. NO.1, SIDDHARTH TOWERS, KOTHRUD, PUNE - 411038
PHONE : 020 -25410465 FAX : 020-25443186 E-MAIL : aumapune@auma.co.in



Certificate Registration No.: 44 100 950262- E3

## Warnings and notes

Failure to observe the warnings and notes may lead to serious injuries or damage. Qualified personnel must be thoroughly familiar with all warnings and notes in these operation instructions.
Correct transport, proper storage, mounting and installation, as well as careful commissioning are essential to ensure a trouble-free and safe operation.

The following references draw special attention to safety-relevant procedures in these operation instructions. Each is marked by the appropriate pictograph.

**This pictograph means : Note!**
"Note" marks activities or procedures which have major influence on the correct operation. Non-observance of these notes may lead to consequential damage.

**This pictograph means : Warning!**
"Warning" marks activities or procedures which, if not carried out correctly can affect the safety of persons or material.

### 1. Transport and Storage

**Transport:**

- Transport to the place of Installation (till the last destination)
- Avoid packages from exposing to open atmospheres during transit
- Protect against rains

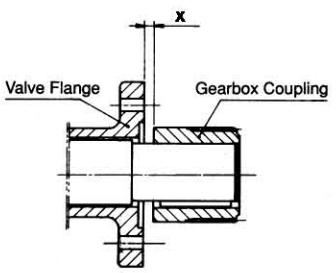
**Storage:**

- Store in well ventilated and dry rooms
- Protect against humidity from floor by storage on wooden frame, on pallets, in cage boxes or on shelves
- Cover Gearboxes with plastic foil to protect against dust and dirt etc.
- Protect suitably against mechanical damages
- During long time storage, protect bright surfaces especially output drive parts and mounting surface by applying log life corrosion protection agent. Also check once in six months for corrosion. If corrosion has started, clean and apply corrosion protection agent.

### 2. Mounting of worm gear operators

2.1 Unless ordered as finished machined, the coupling (9) must be bored and keyed to suit the valve shaft.

2.2 Put coupling sleeve onto valve shaft. Check that dimension X is observed, refer to table :




| Type GS | x min. | x max. |
|---|---|---|
| 160 | 0 | 12 |
| 200 | 0 | 22 |
| 250 | 0 | 22 |
| 315 | 0 | 26 |
| 400 | 0 | 36 |
| 500 | 0 | 40 |

2.3 Secure coupling sleeve against axial movement either by grub screw or by tightening with bolt and washer against shoulder on the shaft.

2.4 In order to have max. adherence and avoid radial movement of the worm gear operator while in service, the mounting face has to be degreased prior to mounting.

2.5 Mount the worm gear operator. If required, tilt gear operator slightly till toothing of coupling does engage.

2.6 A spigot is provided on the mounting flange for centering the gear operator. Check for proper seating and total support.

2.7 Fix worm gear operator with bolts or stud bolts of min. quality 8.8 (8G) and spring washers. For fastening torques refer to table below :

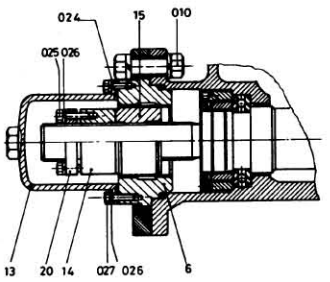
| Recommended Fastening Torque Gear Operator | |
|---|---|
| 8.8 G min. | |
| Size | Torque (Nm) |
| M 6 | 14 |
| M 8 | 35 |
| M 10 | 70 |
| M 12 | 120 |
| M 16 | 300 |
| M 20 | 400 |
| M 24 | 600 |

| Recommended Fastening Torque to mount Gearbox on Valve | | |
|---|---|---|
| 8.8 G min. | | |
| **Type** | Size | Torque (Nm) |
| **GS 160** | M 16 | 200 |
| **GS 200** | M 20 | 400 |
| **GS 250** | M 30 | 1500 |
| **GS 315** | M 36 | 2500 |
| **GS 400** | M 36 | 2500 |
| **GS 500** | M 42 | 4000 |

**Attention :** In case the worm gear operator shows radial movement in respect to the mounting flange, the operator flange can break since the torque may be acting on one bolt only. As a consequence, the housing can break, too.

Our experience is that bolts of size M30 and larger cannot be fastened with the torque specified. Therefore worm gear operators tend to move in respect to the mounting flange. We recommend to apply Loctite No.242 (or similar adhesive) between the mounting faces to improve adherence.

2.8 After mounting the gear operator to the valve, the end stops must be checked and, if necessary, adjusted.



ADJUSTMENT OF ENDSTOPS

## 3. Adjustment of end stops :

End stops are factory-set for rotation of 90°, if no other angle of rotation was specified. For dispatch, actuators will not be mounted on gear operators type GS 160 and larger.

3.1 Procedure for adjustment of gear operators with actuators.

We recommend to begin adjustment when valve is in the fully CLOSED position.

3.1.1 Loosen nuts (010).

3.1.2 Engage manual drive at the actuator (press on clutch lever) and move valve manually to end position CLOSED.

3.1.3 Rotate End stop guide (6) together with cap (13) in clockwise direction to bring travelling nut (15) on the worm shaft up to the stop face.

3.1.4 Reverse end stop guide (6) by ¼ to ½ rotation anti-clockwise to avoid that end stop is run against in electric operation.

3.1.5 Tighten all nuts (010) crosswise.

3.1.6 Loosen nuts (09) at pointer cover (8), turn pointer cover till arrow corresponds with the mark CLOSE, then tighten nuts (09) again.

(These adjustments are not required for version GSD gear boxes i.e., the gear box is designed for 360° rotation. This adjustment is not necessary at version for buried service).

3.2. **Attention :** The valve manufacturer has to define whether the valve should be position seated or torque seated.

3.3 For **position seating** in end position CLOSED :

3.3.1 Set limit switch of actuator for the end position, refer to operation instructions of actuator SA 6 - SA 100.

3.4 For **torque seating** in end position CLOSED :

3.4.1 Turn handwheel approx. 2 turns anti-clockwise to move valve out of the end position, then rotate approx. 1 turn clockwise so that valve is almost in end position but end stop is not reached.

2.4.2 Set limit switch in actuator for the end position (for signalisation), refer to operation instructions of actuator SA 6 - SA 100.

3.4.3 Check setting of torque switch resp. set to required value.

3.5 Move valve to the end position OPEN (till limit stop in gear operator is reached).

**Attention :** last part of travel should be driven manually !

3.6 Check for correct setting of end stop, if necessary re-adjust as described below :

3.6.1 Remove all bolts (027) and take off cap (13).

3.6.2 Loosen bolts (025) on clamping nut (20).

3.6.3 If the travel must be increased, rotate end stop nut (14) along with clamping nut (20) anti-clockwise. If nut does not rotate freely remove 2 opposite bolts (025) and use pin spanner.

3.6.4 Bring valve to required position OPEN.

3.6.5 Rotate end stop nut (14) along with clamping nut (20) clockwise till it touches the travelling nut.

3.6.6 Move valve several times out of end position and back against the end stop.

3.6.7 Re-tighten all bolts (025) at clamping nut equally.

3.6.8 Replace cap (13) observing correct position of O-ring (024). Secure with bolts and spring washers (026/027).

3.7 Bring gear operator manually out of end position by amount of overrunning.

Approx. ¼ to max. ½ turns at handwheel when actuator is mounted directly.

Approx. 1 to 2 turns at handwheel when primary reduction gear GZ is mounted.

3.8 Set limit switch in actuator for end position OPEN.

## 4. Manual Operation :

End stop setting sequences are same but instead of actuator, hand wheel is mounted on worm gear operator to turn and set the end stops manually.

## 5. Maintenance :

Worm-gear operators require only little maintenance if operated under normal conditions. After running for approx. 100 hours, mounting screws may be checked for tightness and retightened if necessary.

## 6. Lubrication :

Worm-gear operators and primary reductions are supplied filled with grease. If no other specification was given when placing the order, the grease is suitable for ambient temperature from -20°C to +80°C. Liquids and gases passing through the valve may have temperature up to 200°C. For higher temperatures please enquire.

"AUMA supplies valve gearboxes, which might see small amount of grease (EP0/EP00) seeping out in some cases. After the initial seeping, stabilization takes place and further seeping stops. The gearboxes have enough grease inside so a proper function of the gearbox is guaranteed."

### 6.1 Lubrication instructions for GS

Grease should be changed :

if operated frequently, after approx. 3 years

if operated rarely, after approx. 8 years

### 6.2 Working sequence for changing grease

Reference document : exploded view GS 160 - 500

(in the text, part numbers are mentioned in brackets)

For changing grease, the worm-gear operator has to be taken off the valve.

**Note :** With butterfly valves, the system must be without pressure.

If ball valves are under pressure, they must either be fully opened or fully closed.

6.2.1 Mark the mounting position of the worm-gear operator on the valve and of the coupling sleeve in the hub.

6.2.2 Remove the fixing bolts/nuts and take off the worm-gear operator.

6.2.3 Remove bolts (02) and take off the mounting flange (2) from the worm-gear operator.

6.2.4 Remove old grease completely and clean the chamber. Kerosene or some other suitable cleaning agent may be used.

6.2.5 Clean mounting faces at housing and mounting flange.

6.2.6 Fill new grease in correct quantity (see table below) :

| GS | 160 | 200 | 250 | 315 | 400 | 500 |
|---|---|---|---|---|---|---|
| KG | 3 | 6 | 12 | 25 | 50 | 100 |

6.2.7 Grease used at works (for ambient temperature -20°C to 80°C) : IOCL - SERVOGEM EPO

For other versions see table of lubricants.

**Note :** Use only suitable grease ! Do not mix different greases !

6.2.8 To improve adhesion and to prevent radial movement during operation, apply Loctite 307 (or similar products) on mounting faces at housing and on mounting flange.

6.2.9 Use new o-rings (018 and 019).

6.2.10 Replace mounting flange to gearhousing, turn in bolts with spring washers (02/012) and tighten them uniformly crosswise.

6.2.11 Replace worm-gear box to the valve, check correct position (see marking).

6.2.12 Check setting of end stops by manual drive, if necessary readjust.

6.2.13 If operated with actuator, check in manual operation that limit switches operate in correct position in both end positions.

### 6.3 Lubrication Instruction for spur reductions GZ

6.3.1 If actuator is mounted, take it off.

6.3.2 Remove bolts and take off cover (2). The housing (1) can remain at the worm-gear box.

6.3.3 Remove old grease and possible wear.

6.3.4 Fill in new grease to the spur gear.

Grease used at works : see point 6.2.7

Following quantities are required :

| Type GZ | 14 | 16 | 25 | 30 | 35 | 40 |
|---|---|---|---|---|---|---|
| Kg. | 2 | 4 | 5 | 12 | 16 | 30 |

6.3.5 Clean sealing faces at housing and cover.

6.3.6 Place new O-ring between housing parts.

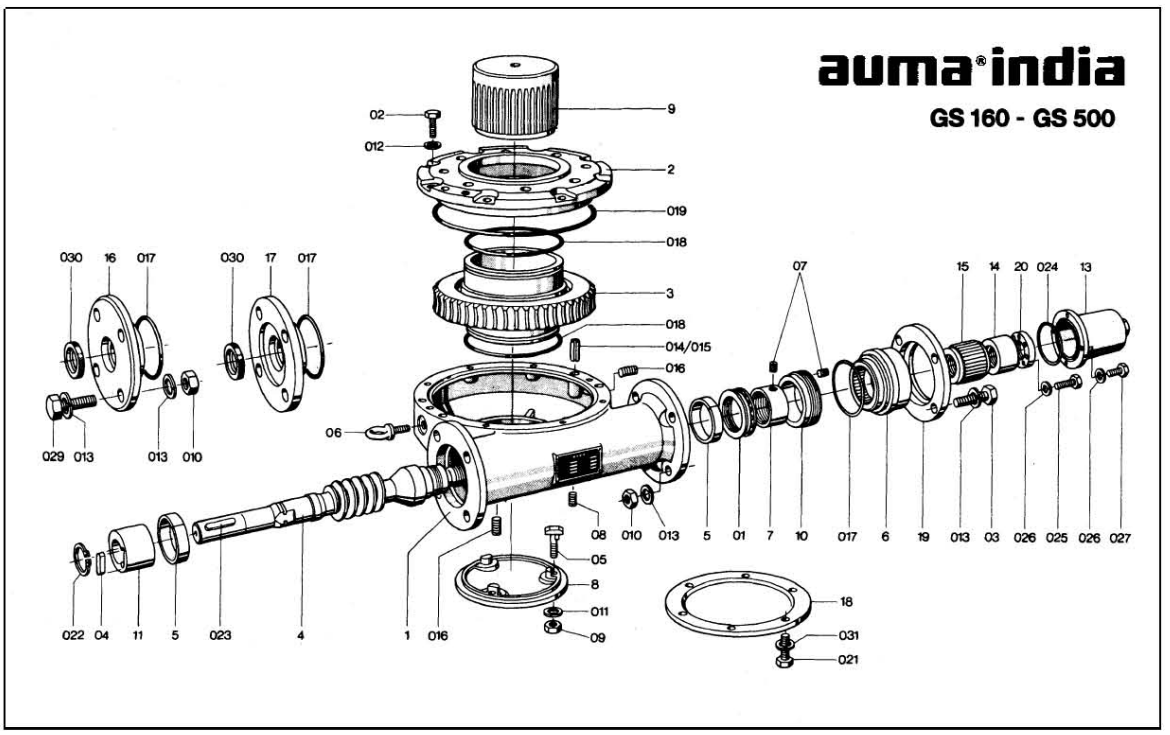
6.3.7 Re-assemble spur reduction, turn in bolts with spring washers, tighten them uniformly crosswise.

6.3.8 Mount actuator.

6.3.9 Check settings, see Point Nos.6.2.12 or 6.2.13.

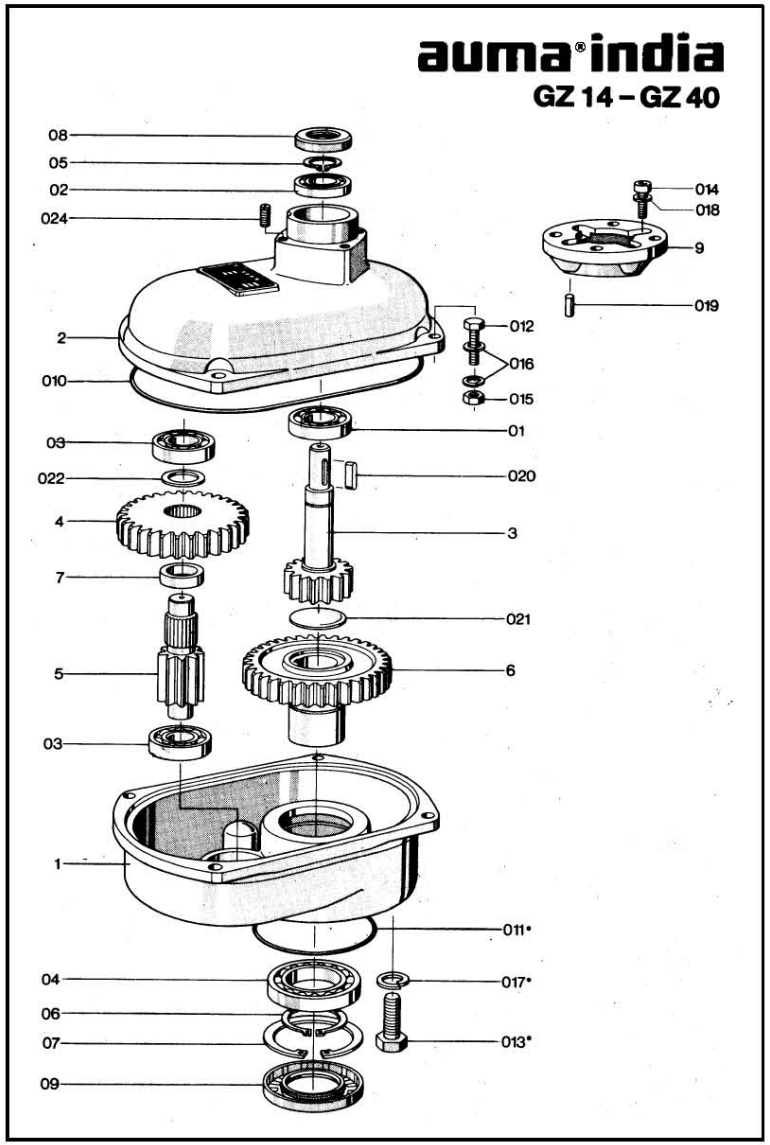
## 7. Mounting Multi turn Actuators SA/SAR

⚠ Do not attach ropes or hooks for the purpose of lifting the actuator by hoist to the handwheel. If multi-turn actuator is mounted on gearbox, attach ropes or hooks for the purpose of lifting by hoist to gearbox and not to multi-turn actuator




## LIST OF PARTS

| Part No. | Designation | Part No. | Designation |
|---|---|---|---|
| 1 | Housing | 06 | Eye bolt |
| 2 | Mounting flange | 07 | Grub screw |
| 3 | Worm wheel | 08 | Grub screw |
| 4 | Worm shaft | 09 | Hexagon nut |
| 5 | Bearing bush | 010 | Hexagon nut |
| 6 | End stop guide | 011 | Spring washer |
| 7 | Round Nut | 012 | Spring washer |
| 8 | Pointer cover | 013 | Spring washer |
| 9 | Coupling | 014 | Spring washer |
| 10 | Bearing lock nut | 015 | Spring washer |
| 11 | Bearing sleeve | 016 | Grub screw |
| 13 | Cap | 017 | O-ring |
| 14 | End stop nut | 018 | O-ring |
| 15 | Travelling nut | 019 | O-ring |
| 16 | Cover | 021 | Hexagon bolt |
| 17 | Adapter flange | 022 | Circlip |
| 18 | Lid for buried service | 023 | Parallel key |
| 19 | Clamping ring | 024 | O-ring |
| 20 | Clamping nut | 025 | Hexagon bolt |
| 01 | Thrust bearing | 026 | Spring washer |
| 02 | Hexagon bolt | 027 | Hexagon bolt |
| 03 | Hexagon bolt | 029 | Hexagon bolt |
| 04 | Parallel key | 030 | Radial seal |
| 05 | Hammer head bolt | 031 | Spring washer |




## LIST OF PARTS

| Part No. | Designation |
|---|---|
| 1 | Housing |
| 2 | Cover |
| 3 | Pinion shaft |
| 4 | Change wheel |
| 5 | Pinion shaft |
| 6 | Output drive wheel |
| 7 | Distance ring |
| 9 | Actuator mounting flange |
| 01 | Ball bearing |
| 02 | Ball bearing |
| 03 | Ball bearing |
| 04 | Ball bearing |
| 05 | Circlip |
| 06 | Circlip |
| 07 | Circlip |
| 08 | Radial seal |
| 09 | Radial seal |
| 010 | O-Ring |
| 011* | O-Ring |
| 012 | Hexagon bolt |
| 013* | Hexagon bolt |
| 014 | Socket head cap screw |
| 015 | Hexagon nut |
| 016 | Spring washer |
| 017* | Spring washer |
| 018 | Spring washer |
| 019 | Dowel pin |
| 020 | Parallel key |
| 021 | Lid |
| 022 | Washer |
| 024 | Grub screw |

*Only provided when gear box is mounted to worm gear operators types GS 160 - GS 500