Operating instructions for worm gear boxes

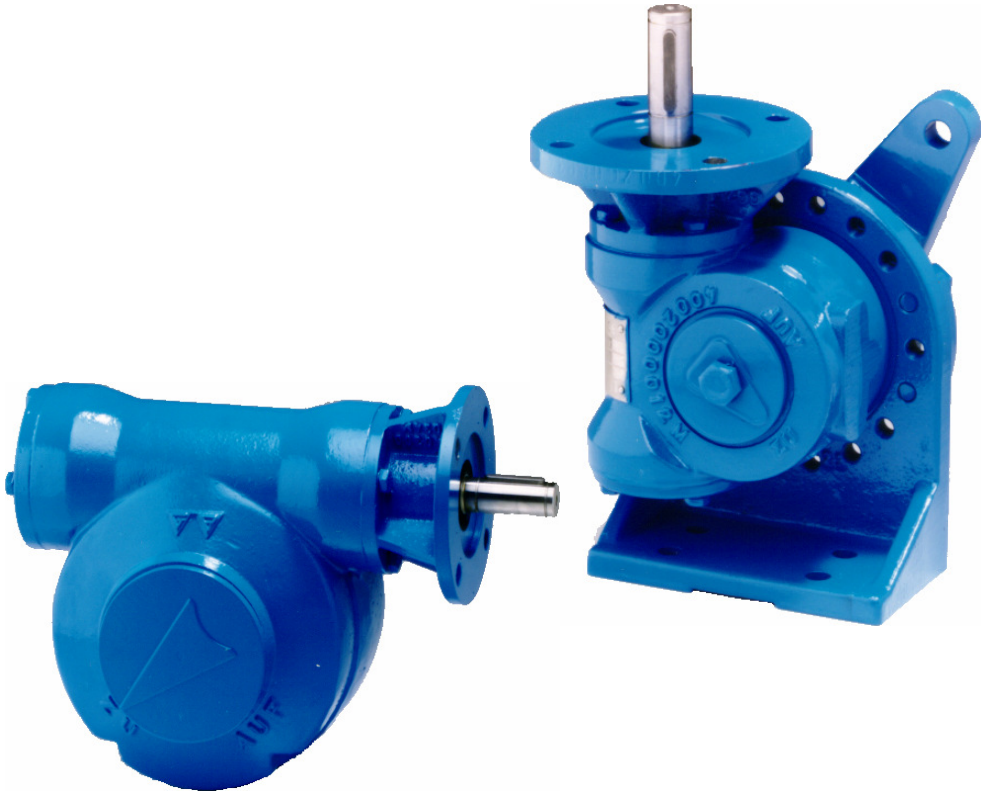
DREHMO®

Sales and Service of
EMG-Actuators

Direct mounting
Foot and lever

ON/OFF- and Modulating duty

Type
MSG 25-S to MSG 8000-S
MSG 12-R to MSG 2500-R



TÜV MANAGEMENT SERVICE ISO 9001

English
EN_166675 Rev.2

General information

This manual applies to all worm gear boxes that are directly installed (MSG) on valves both with and without additional spur gear (MVG). This manual covers installation, operation and service.

This manual also includes the use of worm gears in potentially explosive environments.

This manual should be read before commissioning the worm gear. Not observing the information contained in this manual may lead to personal injury, material damage and invalidate warranty claims.

This sign means "Information"
Not observing may lead to consequential problems.

This sign means "Warning"
Not observing may lead to personal injury or material damage.

Table of contents

1. Safety information

1.1 Field of application

MSG worm gears are designed for operating industrial valves. They may be operated in any position, either manually or power-driven using an actuator. They are self-locking.

When gears are used for purposes not intended by the manufacturer, liability for damage cannot be accepted. In case of doubt, please contact the manufacturer.

1.2 Operation, service and maintenance

This operating manual contains information which must be observed, otherwise, the proper operation of the worm gear cannot be guaranteed.

2. Design and factory settings

In the standard version, all worm gears are provided with a coupling. In the case of extra-large valve shafts and foot and lever, the finished hole is provided directly in the worm wheel. When looking at the valve shaft, the direction of rotation is to the right for closing. When being delivered, the gear is "closed" position.

2.1 90° version

This version is factory-set to approx. 90°. The mechanical stops must be adjusted to suit the valve once the gear has been installed (see chapter 7. Installation and setting)

2.2 360° version

This version has no mechanical stops. Adjusting is reduced to the position indicated (indicator cover).

3. Technical data

3.1 Application conditions

Protective system according to EN 60529: IP67

Operating mode in accordance with the actuator (EN 60034-1):

- ON/OFF Duty KB S2-10min (opened-closed operation)
- Modulating Duty AB S4-25% duty 600c/h

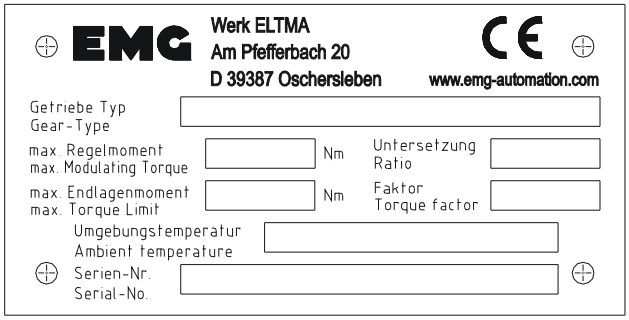
Ambient temperature:

Temperature range	ON/OFF Duty	Control Duty
Standard	-25 bis +80°C	-25 bis +60°C
Low Temperature	-40 bis +50°C	-

3.2 Identification

For operation, service and maintenance, the data related to the gear can be found on the nameplate (see illustration 1):

Illustration 1



3.3 Technical parameters

The worm wheel / the worm wheel segment for the ON/OFF gear is made from spheroidal graphite iron; for the control gear, the worm wheel / the worm wheel segment is made from bronze.

Gear Box ON/OFF Duty Type	Max. Input Torque (Nm)	Max. Output Torque (Nm)	Gear Box Control Duty Type	Max. Input Control-torque (Nm)	Max. Control-torque (Nm)	Valve-* Adaption (DIN EN ISO 5211)
MSG25-S	24	250	**MSG12-R**	12	125	F07 (F10)
MSG35-S	22	350	**MSG17-R**	11	175	F10 (F12)
MSG50-S	31	500	**MSG25-R**	15	250	F10 (F12)
MSG75-S	46	750	**MSG35-R**	22	350	F10 (F12)
MSG100-S	42	1000	**MSG50-R**	20	500	F12
MSG150-S	62	1500	**MSG75-R**	31	750	F12
MSG200-S	*(1)	2000	**MSG100-R**	*(1)	1000	F14 (F16)
MSG300-S	*(1)	3000	**MSG150-R**	*(1)	1500	F14 (F16)
MSG400-S	*(1)	4000	**MSG200-R**	*(1)	2000	(F14) F16
MSG560-S	*(1)	5600	**MSG280-R**	*(1)	2800	F16 (F25)
MSG800-S	*(1)	8000	**MSG400-R**	*(1)	4000	F25 (F30)
MSG1000-S	*(1)	10000	**MSG500-R**	*(1)	5000	F25 (F30)
MSG1600-S	*(1)	16000	**MSG800-R**	*(1)	8000	(F25) F30
MSG2000-S	*(1)	20000	**MSG1000-R**	*(1)	10000	(F25) F30
MSG3200-S	*(1)	32000	**MSG1600-R**	*(1)	16000	(F30) F35
MSG4000-S	*(1)	40000	**MSG2000-R**	*(1)	20000	F35 (F40)
MSG5000-S	*(1)	50000	**MSG2500-R**	*(1)	25000	(F35) F40
MSG6300-S	*(1)	63000				F40
MSG8000-S	*(1)	80000				F40

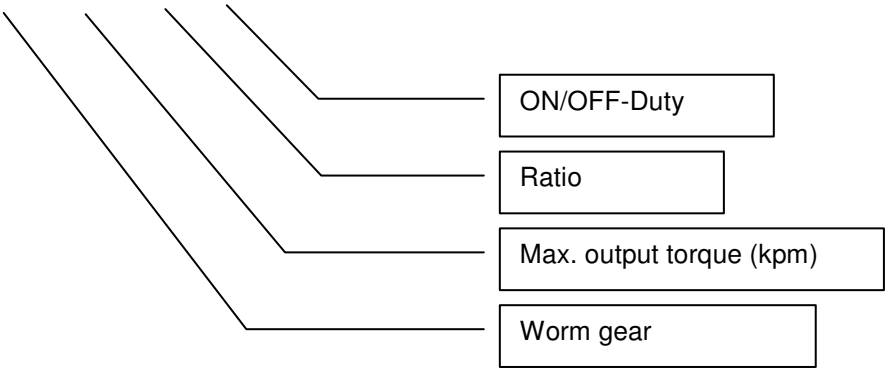
1. The Maximum input torque depends on the used intermediate gear box.
Please pay attention to the nameplate! M($M_{ax.Inp}$)=M($M_{ax.Outp.}$) / Torque factor

The max. torque (input and output torque) must not be exceeded, otherwise the gear components or the vlave may be damaged.

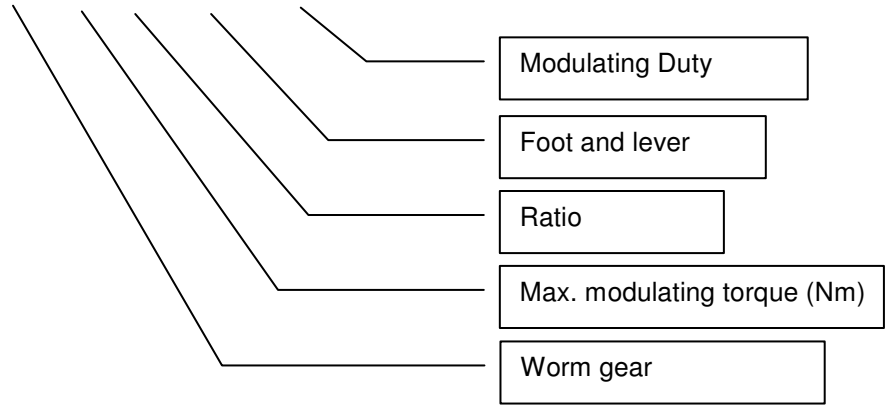
* Excerpt from "Technical possibilities". Further details are available on request.

3.4 Type code

MSG 1000 . 82 - S



MSG 25 . 50 - FHA - R



For conversion purposes, 10 Nm is equal to 1 kpm.

The torque is always related to the service mode, i.e. in the case of control gears, the max. moment of power output is indicated, whereas in the case of control duty gears the max. modulating torque is indicated.

4. Transport and storage

- Transport only in sturdy boxes or on Euro pallets, where the gear must be firmly tied down
- Hoists must not be fastened to hand wheels
- Store in aerated, dry rooms
- Gears must be protected against humidity and dust
- When stored for a longer time, the temporary corrosion protection must be checked and touched up, if necessary

5. Model

5.1 Direct installation

This model is equipped with a flange according to DIN EN ISO 5211 (DIN 3210) for connection to the valve. It can be directly mounted to the valve. The load torque is transmitted directly through the connection of gear and valve.

The maximum torque transmitted by the flange must not be exceeded. Figures are specified in DIN EN ISO 5211 (DIN 3210).

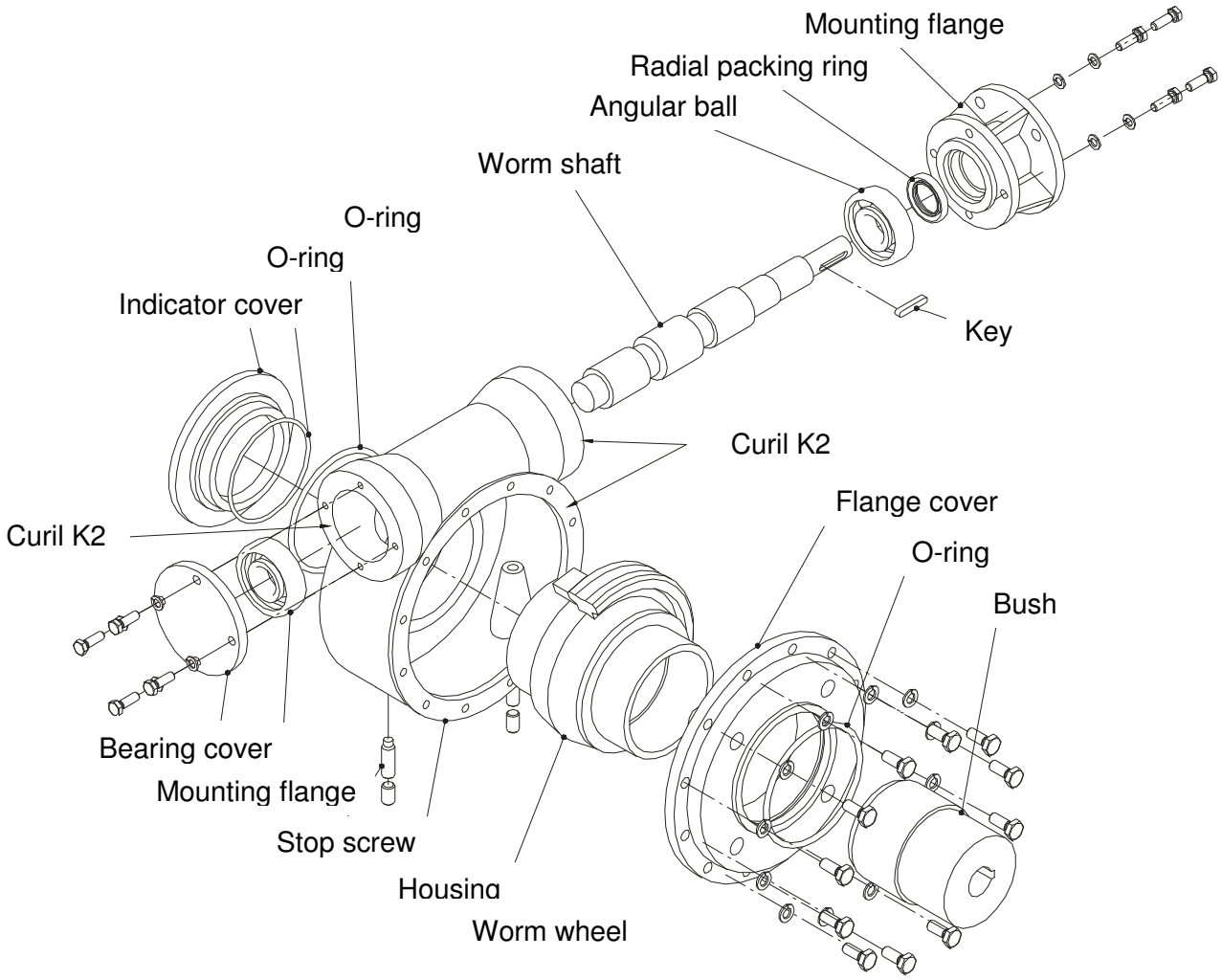


Illustration 2 (Example of application)

5.2 Foot and lever

This model is equipped with a lever for valve connection. It is connected to the lever of the valve by a system of rods. The load torque act through the base.

When lengths and angles of the two levers on the gear and on the valve are different, the lever kinematics must be taken into account. This means that the levers act as an additional gear step together with the transmission and thus have an effect on the resulting forces and torques.

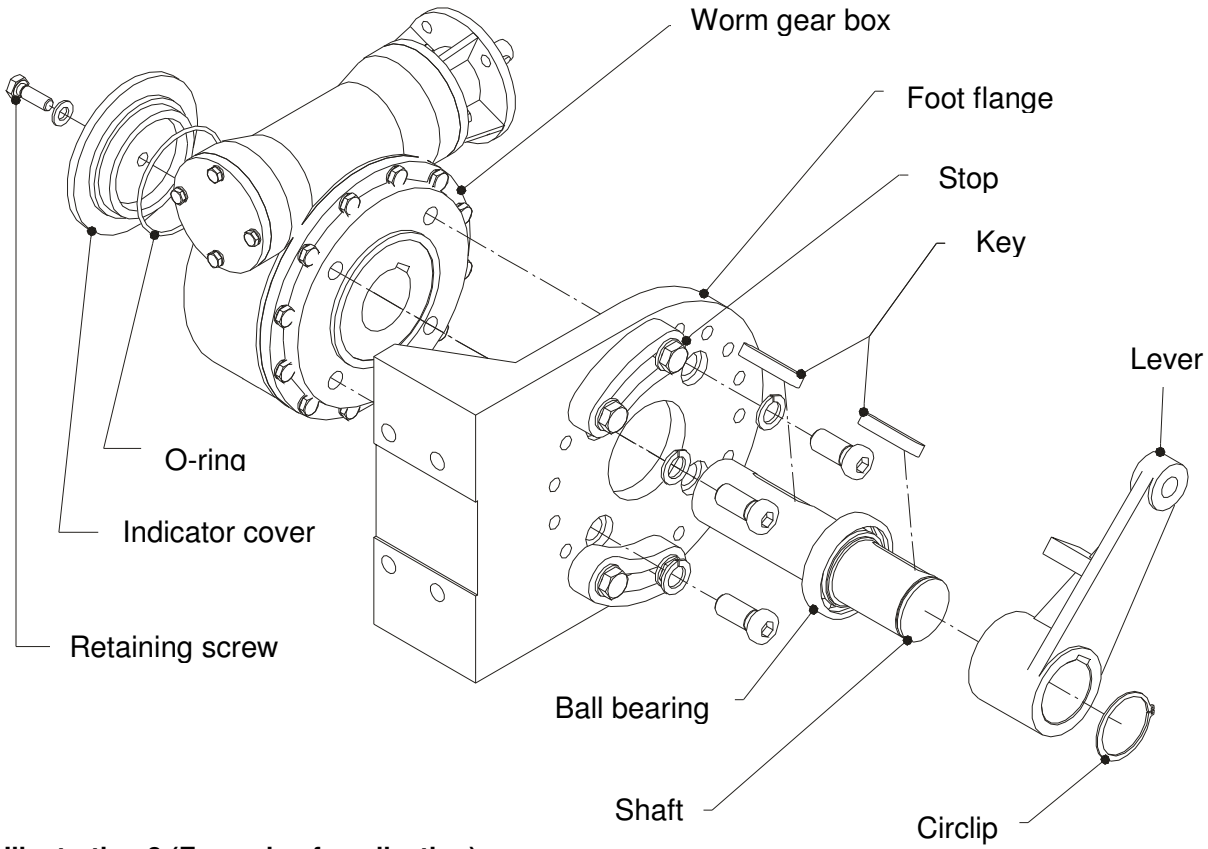
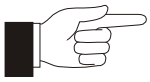


Illustration 3 (Example of application)

6. Combination of actuator and gear



Limit- and torque switches of the actuator must be adjusted in such a manner that the mechanical stops of the gear box are not reached in the electrical operating mode, and therefore also valve closed by torque like metallic seated butterfly valves can be closed tightly (see operating manual "Actuator").

MSG worm gears are mainly used for actuating valves. If a gear is operated by an electrical actuator, the switch-off function must be ensured by limiting the travel (by adjusting the limit switches on the actuator). The limit stops must not be approached electrically. The limit stops and the adjusting screws are designed for a maximum load resulting from 1/3 of the maximum output torque. Thus, they only serve for rough positioning. In no case, they must be used as mechanical safety stops for the fitting. This may lead to serious damage.

7. Direct installation and setting

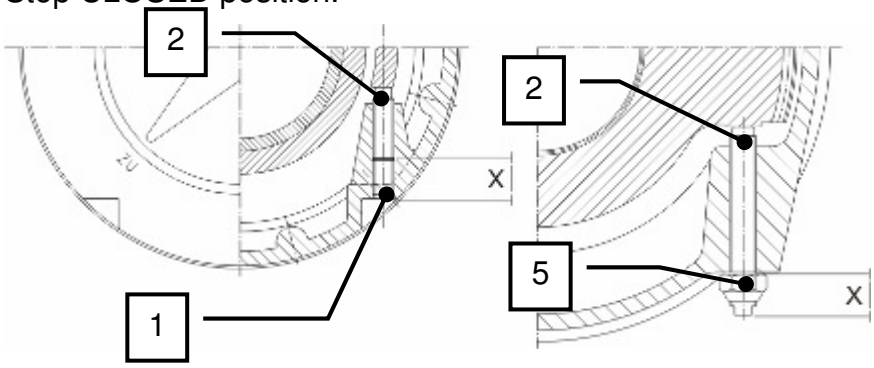
7.1 Installation

- Remove any temporary corrosion protection from the flanges. Apply a thin layer of liquid seal (Curil K2) to the flanges.
- When the worm gear is equipped with a coupling, the coupling must be slipped on to the prepared shaft and secured as necessary.
- The end positions (OPENED/CLOSED) of the fitting and of the actuator gear combination must match each other.
- Install the worm gear / the actuator gear combination on the fitting. The axes of gear and fitting must be in line.
- Fasten the worm gear using screws of minimum quality class 8.8 and washers, tighten the screws crosswisely alternately. Pay particular attention to the correct screw depth.

In the case of electrical activation using an actuator, switching must be carried out in dependency of the travel. Stop screws (items (2) and (4) shown in illustrations 4 and 5) must **not** be actuated electrically. When using hand wheels, special care must be taken, as moments are not monitored. The reduction gears installed upstream must also be taken into account.

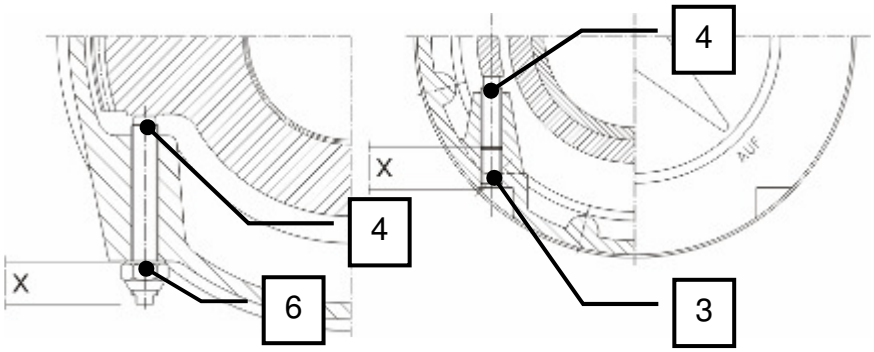
Stop CLOSED position:

Illustration 4



Stop OPENED position:

Illustration 5



Screw depth “X” (see illustrations 4 and 5)

Type	**Mitte**	**Min.**	**Max.**
MSG25S,12R	18	13	23
MSG35S,50S,75S,17R,25R,35R	12	5	19
MSG100S,150S,50R,75R	17	11	23
MSG200S,300S,400S,100R,150R,200R	22	15	29
MSG560S,280R	25	16	34
MSG800S,1000S,1600S,2000S,400R, 500R,800R,1000R	30	20	42
MSG3200S,1600R	40	30	58
MSG4000S,5000S,2000R,2500R	48	36	64
MSG6300S,8000S	67	44	90

7.2 Adjustment of the CLOSED position
(see illustration 4)

- Place the valve in the CLOSED position
- Remove hex-socket set screw (1) from the gearbox casing and undo counter nut (5), respectively.
- Adjust set screw (2) until the desired stop position is reached. Pay particular attention to the correct screw depth.
- Re-place self-sealing hex-socket set screw (1) and secure it with counter nut (5) and washer. Replace the washer, if necessary.
- Turn the indicator cover until the wording "CLOSED" on the gearbox casing matches the cast arrow. The indicator cover is retained in the worm wheel segment by means of an O-ring (see illustration 2).

Take care that the O-ring is not damaged when installing or adjusting the indicator cover. Otherwise, the O-ring might become detached.

7.3 Adjustment of the OPENED position
(see illustration 5)

- Place the valve in the OPEN position
- Remove hex-socket set screw (3) from the gearbox casing and undo counter nut (6), respectively.
- Adjust set screw (4) until the desired stop position is reached. Pay particular attention to the correct screw depth (see illustration 4).
- Re-place self-sealing hex-socket set screw (3) and secure it with counter nut (6) and washer. Replace the washer, if necessary.

If the travel is not sufficient for the desired stop position, the gear must be reinstalled on the fitting by relocating the coupling half.
For gears closing by left-handed rotation (types AL and BR) the stops have opposite functions.

8. Foot and lever installation and setting

8.1 Installation

- Fasten the worm gear / the actuator gear combination onto a suitable sub-base using screws of at least quality class 8.8. and washers.
- Remove temporary corrosion protection in the lever connection hole.
- Connect the fitting with the worm gear / with the actuator gear combination using a system of rods and ball-and-socket joints.

In the case of electrical activation using an actuator, switching-off must be carried out in dependency of the travel. Stop screws (items (8) and (10) shown in illustration 6) must **not** be actuated electrically. When using hand wheels, special

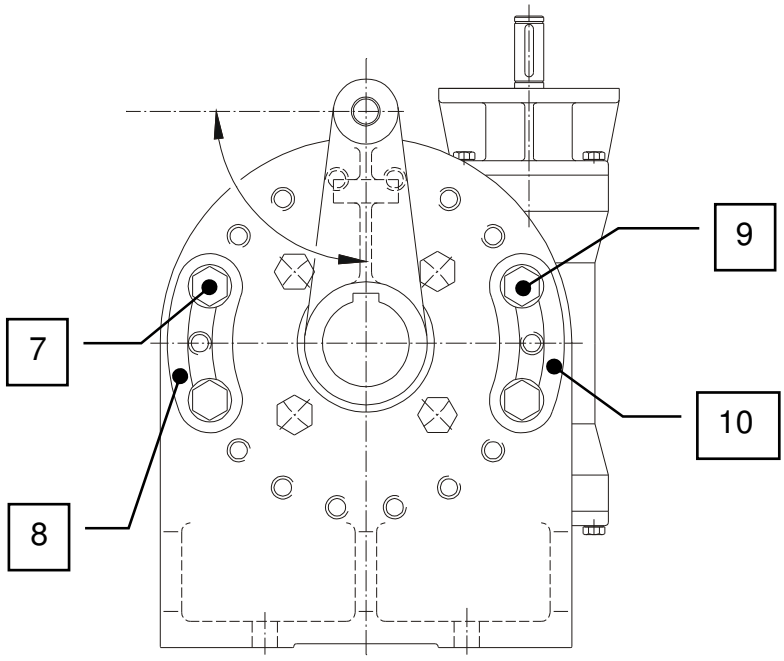
care must be taken, as moments are not monitored. The reduction gears installed upstream must also be taken into account.

The angle between the system of rods and the gear levers must remain in a range between 30° and 150°. Beyond this range, inadmissible high forces will occur which might destroy the gear and is fastening.

The area of the levers and the system of rods must be kept free from persons and objects. The applicable regulations for operational safety and for workers' protection must be observed.

Illustration 6

30-150°



8.2 Adjustment of the CLOSED position (see illustration 6)

- Place the valve in the CLOSED position
- Undo the hexagon head screws (7).
- Place stop (8) into the desired position and lock it using hexagon head screws (7) and washers.
- Turn the indicator cover until the wording "CLOSED" on the gearbox casing matches the cast arrow. The indicator cover is retained in the worm wheel by means of an O-ring (see illustration 3).

8.3 Adjustment of the OPENED position (see illustration 6)

- Place the valve in the OPEN position
- Undo the hexagon head screws (9).
- Place stop (10) into the desired position and lock it using hexagon head screws (9) and washers.

By changing the position of the hexagon head screws (7) and (9) any desired position is possible for stops (8) and (10).

For gears closing by left-handed rotation (types AL and BR) the stops have opposite functions.

9. Maintenance

Following commissioning, check the worm gears for damage to the paintwork. Any damage to the paintwork must be thoroughly repaired in order to avoid corrosion.

Correct commissioning is a precondition for reliable operation of the system.

We recommend an annual check on the fastening screws between actuator, gear and fitting for tight fit. The gears are provided with lifetime lubrication. It is nevertheless recommended to check the grease filling on the occasion of an inspection.

Lubricants for the worm gear for a temperature range between –25° and +80°C: Rhenus EP-4697

Lubricants for the transmission for a temperature range between–25° and +80°C: Shell Alvania G3

Lubricants for special temperature ranges: please contact us. Various types of grease should never be mixed.

The standard type of protection is IP 67 according to EN 60529. In order to preserve this type of protection, make sure that after a change of the grease all sealing surfaces are cleaned and sealed using liquid seal (Curil K2). The sealing elements (O-rings, radial packing rings) must be checked and replaced, if necessary.

Grease which has been removed in the course of repairs must be disposed of by a specialised company in accordance with the provisions for environmental protection.

10. Conformity

The MSG worm gear and the MVG transmissions correspond in their standard design to the following applicable provisions:

EC Machinery Directive:	2006/42/EG
Explosion protection directive:	94/9 EC (ATEX)
Non electrical devices for potentially explosive atmospheres – Part 1	EN 13463-1:2009
Non-electrical equipment for potentially explosive atmospheres – Part 5	EN 13463-5:2003
Electrical equipment for potentially explosive atmospheres	EN 50014:2000
Applied harmonised standards:	
Safe use of Machinery	EN 12100-1:2004

Our scope of supply:

Electrical actuators for on-off, inching and modulating duty

Actuators:

Multiturn actuators	D30-D1000	Max. 1000 Nm
Part-turn actuators	DP30-D1599	Max. 1600 Nm
Linear actuators	DL15-DL80	Max. 80 kN

Actuators with integral controls:

Multiturn actuators	DMC30-DMC1000	Max. 1000 Nm
Part-turn actuators	DPMC30-DPMC1599	Max. 1600 Nm
Linear actuators	DLMC15-DLMC80	Max. 80 kN

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