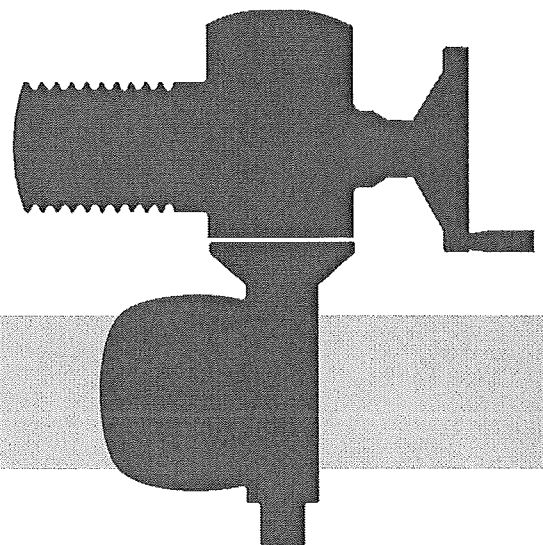


auma[®]

Worm gearboxes

GS 40.3 - GS 125.3

Operation instructions



Certificate Registration No.
12 100 4269

Scope of these instructions:

These instructions are valid for worm gearboxes GS 40.3 - GS 125.3 and primary reduction gearings VZ 2.3 - VZ 4.3 for manual operation and for motor operation.

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1. Version and delivery state

- Worm gearboxes GS for swing angles of 0 - 100°. Unless ordered otherwise, the end stops are set in the factory to 92° swing angle on GS for motor operation and to 90° on GS for manual operation.
- Worm gearboxes GS for swing angles > 100° are delivered without end stops (multi-turn).

When worm gearboxes GS 40.3 - GS 125.3/ reduction gearings VZ are supplied together with AUMA multi-turn actuators, assembly is already done in the factory.

The actuators leave the factory in position CLOSED.

2. Safety instructions

2.1 Range of application

AUMA worm gearboxes GS 40.3 - GS 125.3 are used for the operation of valves (e.g. butterfly valves and ball valves).

They are designed for manual operation as well as motor operation in conjunction with electric actuators.

For other applications, please consult us. AUMA is not liable for any possible damages resulting from use in other than the designated applications. Such risk lies entirely with the user.

Observance of these operation instructions is considered as part of the gearboxes' designated use.

2.2 Maintenance

The maintenance instructions (refer to page 13) must be observed, otherwise a safe operation of the worm gearboxes is no longer guaranteed.

2.3 Warnings and notes

Non-observance of the warnings and notes may lead to serious injuries or damages. 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.

2.4 Further notes



This pictograph means: Procedure may have been performed by valve manufacturer!

If actuators are delivered mounted to a valve, this step has been done in the valve manufacturer's plant.

Setting must be checked during commissioning!

3. Technical data

3.1 Operating conditions

AUMA worm gearboxes GS can be used in the following ambient temperatures:

Type GS (standard)	from – 25 °C up to + 80 °C
Type GS-L	from – 40 °C up to + 60 °C
Type GS-EL	from – 60 °C up to + 60 °C
Type GS-H	from 0 °C up to +120 °C

Table 1

Gearbox Type	Valve attachment DIN EN ISO 5211	Output torque ¹⁾ max. [Nm]			Torque for modulating ²⁾ max. [Nm]
		100 %	140 %	200 %	
GS 40.3	F 05 F 07	125	175	250	60
GS 50.3	F 07 F 10	250	350	500	125
GS 63.3	F 10 F 12	500	700	1 000	250
GS 80.3	F 12 F 14	1 000	1 400	2 000	500
GS 100.3	F 14 F 16	2 000	2 800	4 000	1 000
GS 125.3	F 16 F 25	4 000	5 600	8 000	2 000

1) with worm wheel made of spheroidal cast iron

2) requires worm wheel made of bronze

Further technical data see separate sheets "Technical data AUMA worm gearboxes and primary reduction gearings, GS 40.3 - GS 125.3 with VZ 2.3 - VZ 4.3"

4. Transport and storage

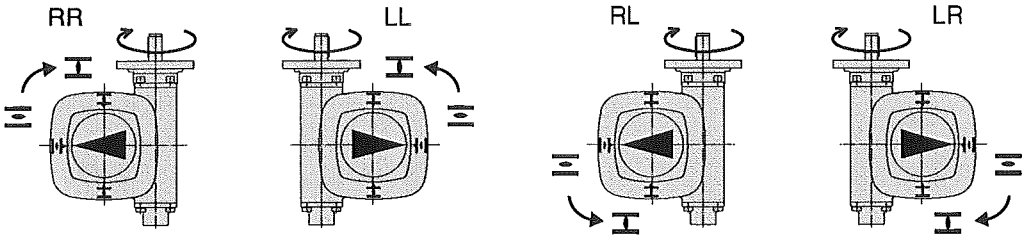
- Transport to place of installation in sturdy packing.
- If mounted together with actuator:
Attach ropes or hooks for the purpose of lifting by hoist only to the gearbox and not to the actuator.
- Store in well-ventilated, dry room.
- Protect against floor dampness by storage on a shelf or on a wooden pallet.
- Cover to protect against dust and dirt etc.
- Protect bright surfaces with suitable long-term corrosion protection agent (e.g. acid-free grease).

In case worm gearboxes are to be stored for a long period (more than 6 months) the following points must be observed additionally:

- Prior to storage: Protect bright surfaces, in particular the mounting surface, with long-term corrosion protection agent.
- Check for corrosion approximately every 6 months. If first signs of corrosion show, apply new corrosion protection.

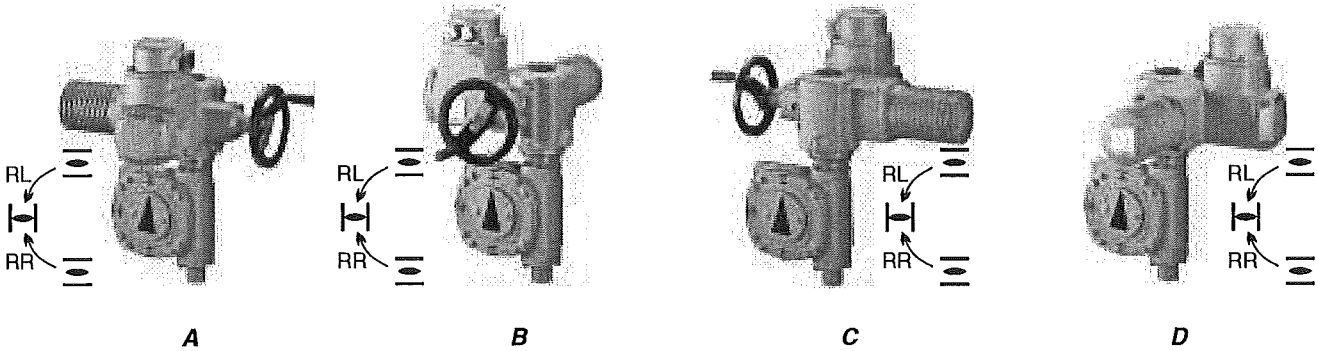
5. Mounting positions of the various versions

Description of the 4 various versions (viewed at the pointer cover):

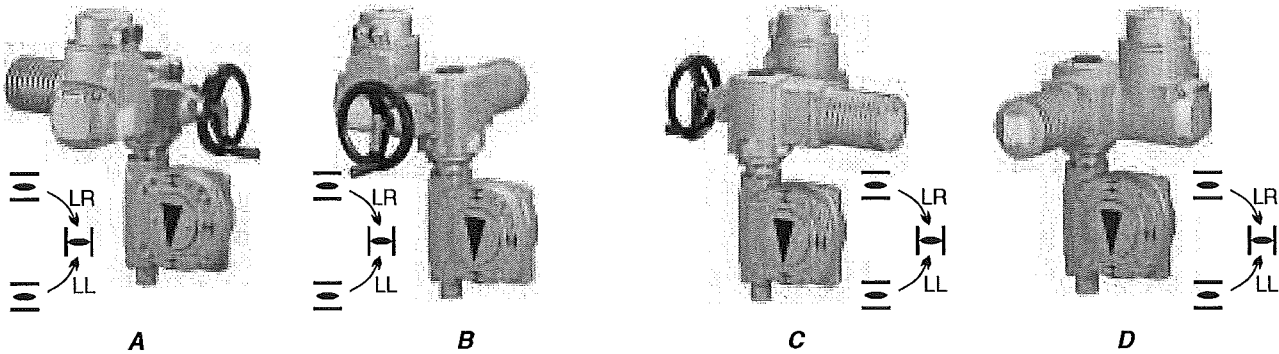


Code	Direction of rotation at input shaft	Position of the worm shaft	Direction of rotation at output drive
RR	clockwise	Right side	clockwise
LL	clockwise	Left side	counter-clockwise
RL	clockwise	Right side	counter-clockwise
LR	clockwise	Left side	clockwise

Mounting positions of AUMA multi-turn actuator with AUMA worm gearbox for motor operation
GS version RR / RL (position of worm shaft Right side viewed at the pointer cover)



GS version LL / LR (position of worm shaft Left viewed at the pointer cover)

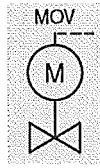


Limitation: For SA 14.1 / GS 125.3 and SA 14.5 / GS 125.3 mounting positions "C", version RR / RL and "A", version LL / LR are not possible.



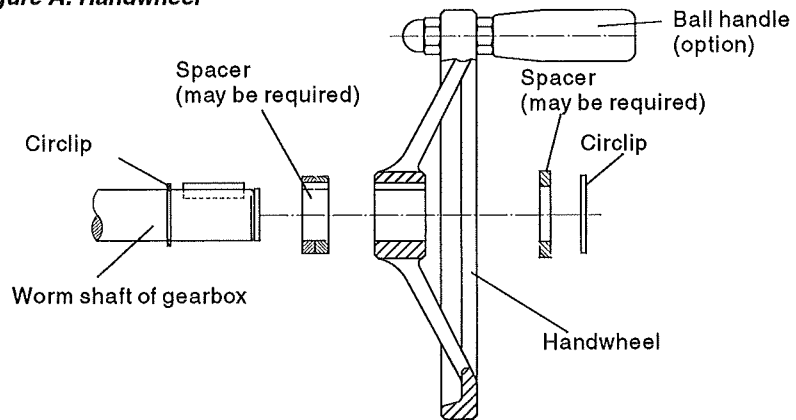
Mounting positions can easily be changed at a later date.

6. Fitting of handwheel



For worm gearboxes for manual operation the handwheel is supplied loose. Fitting is done on site according to figure A.

Figure A: Handwheel



7. Subsequent mounting of actuator SA(R)



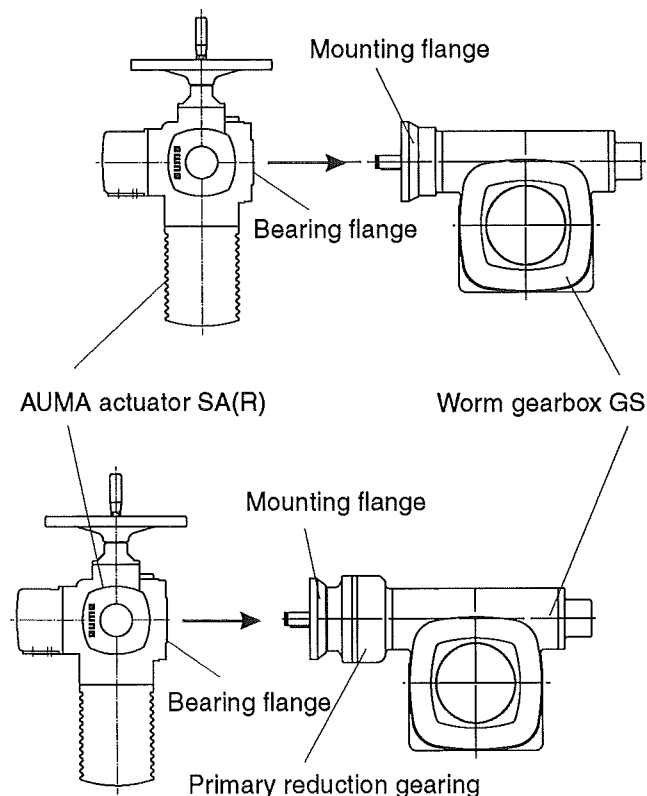
When worm gearboxes are supplied together with AUMA primary reduction gearings VZ and/ or AUMA actuators SA(R) the mounting will have been done in the factory.

Subsequent mounting to actuator is done as described here.

In case mounting flange is not attached to gearbox or reduction gearing:

- Thoroughly degrease mounting faces of gearbox or reduction gearing as well as mounting flange.
- Fit mounting flange and fasten with 4 bolts and lock washers.

Figure B



- Thoroughly degrease the faces of the mounting flange at the gearbox or reduction gearing as well as the actuator's bearing flange.
- Place the multi-turn actuator on the worm gearbox or reduction gearing. The multi-turn actuator can be mounted on the valve at every 90° (see page 5, mounting positions).
- Ensure that the spigot mates uniformly in the recess and that the mounting faces are in complete contact.
- Fasten actuator with bolts (quality min. 8.8, see table 2) and lock washers on to the mounting flange.
Fasten bolts crosswise with torque wrench (fastening torques see table 3, page 8).



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.

Table 2: Bolts for mounting of AUMA actuators to worm gearboxes/ primary reduction gearings

Worm gearbox/ reduction gearing	SA 07.1-F07			SA 07.1-F10/G0			SA 07.5-F07			SA 07.5-F10/G0		
	Bolt	Lock washer	Qty.	Bolt	Lock washer	Qty.	Bolt	Lock washer	Qty.	Bolt	Lock washer	Qty.
GS 40.3	M 8 x 20	B 8	4	M 10 x 25	B 10	4						
GS 50.3	M 8 x 20	B 8	4	M 10 x 25	B 10	4						
GS 63.3	M 8 x 20	B 8	4	M 10 x 25	B 10	4	M 8 x 20	B 8	4	M 10 x 25	B 10	4
GS 80.3							M 8 x 20	B 8	4	M 10 x 25	B 10	4
GS 100.3												
GS 100.3/VZ				M 10 x 25	B 10	4						
GS 125.3												
GS 125.3/VZ										M 10 x 25	B 10	4

Worm gearbox/ reduction gearing	SA 10.1			SA 14.1			SA 14.5		
	Bolt	Lock washer	Qty.	Bolt	Lock washer	Qty.	Bolt	Lock washer	Qty.
GS 80.3	M 10 x 25	B 10	4						
GS 100.3	M 10 x 25	B 10	4	M 16 x 40	B 16	4			
GS 100.3/VZ	M 10 x 25	B 10	4						
GS 125.3				M 16 x 40	B 16	4	M 16 x 40	B 16	4
GS 125.3/VZ	M 10 x 25	B 10	4	M 16 x 40	B 16	4			

8. Mounting to valve



AUMA worm gearboxes GS and primary reduction gearings VZ can be operated in any mounting position.

- For **butterfly valves** the recommended mounting position is end position CLOSED. (Prior to mounting, bring the gearbox to the mechanical end stop CLOSED by turning the handwheel clockwise)
- For **ball valves** the recommended mounting position is end position OPEN. (Prior to mounting, bring the gearbox to the mechanical end stop OPEN by turning the handwheel counter-clockwise)
- Thoroughly degrease mounting faces at mounting flange.
- Place coupling sleeve on to valve shaft and secure (refer to figure C, detail A or B), ensure that dimensions X, Y and Z are observed (refer to table 3).
- Apply non-acidic grease at splines of coupling.
- Mount gearbox and ensure its correct alignment.
- Fasten with bolts of minimum quality 8.8 using lock washers; fasten bolts crosswise to the appropriate torque according to Table 3.

Figure C

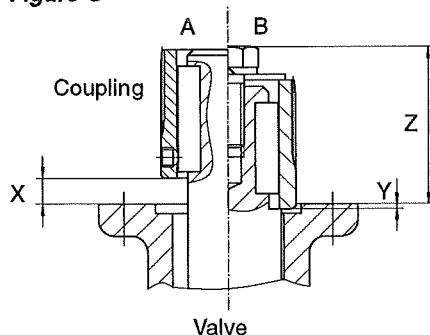


Table 3

Type	X max	Y max	Z max	8.8	T _A [Nm]
GS 40.3 F05	6	5	53	4xM 6	10
GS 40.3 F07	6	3	55	4xM 8	25
GS 50.3 F07	14	5	61	4xM 8	25
GS 50.3 F10	14	5	61	4xM10	50
GS 63.3 F10	7	18	73	4xM10	50
GS 63.3 F12	10	13	76	4xM12	86
GS 80.3 F12	13	18	78	4xM12	86
GS 80.3 F14	23	5	88	4xM16	220
GS 100.3 F14	22	13	123	4xM16	220
GS 100.3 F16	22	8	123	4xM20	420
GS 125.3 F16	17	35	126	4xM20	420
GS 125.3 F25	17	27	126	8xM16	220

9. Setting of the end stops for manual operation

9.1 Setting for butterfly valves



If worm gearboxes GS are supplied on a valve the end stops are already set.

End position CLOSED

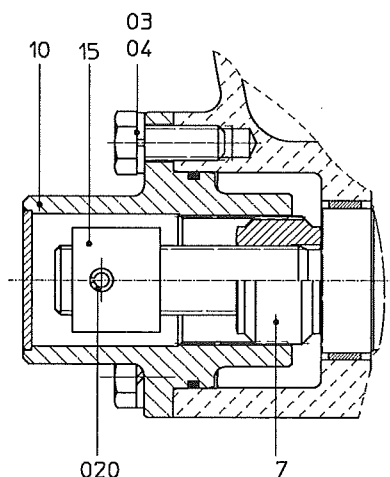


- Remove all bolts (03) at end stop (10) (figure D).
- Turn valve manually to end position CLOSED.
- In case end stop (10) has not yet rotated, turn it clockwise up to the stop.
- In case the holes of end stop (10) do not correspond to the threads of the housing, take off the end stop (10) and place it in a suitable position.
- Fit bolts (03) with lock washers (04) and fasten them evenly.

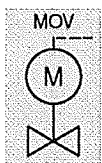
End position OPEN

The end stop need not be set since the required swing angle has been set in the factory.

Figure D: End stop



9.2 Setting for ball valves



- If worm gearboxes GS are supplied on a valve the end stops are already set.
- In case end stops need to be adjusted, set end position OPEN first. If the exact end position of the valve can not be seen through a position marking at the valve shaft, the setting may have to be done with the valve removed.

End position OPEN

- Remove all bolts (03) at end stop (10) (figure D).
- Turn valve manually to end position OPEN.
- In case end stop (10) has not yet rotated, turn it counter-clockwise up to the stop.
- In case the holes of end stop (10) do not correspond to the threads of the housing, take off the end stop (10) and place it in the required position.
- Fit bolts (03) with lock washers (04) and fasten them evenly.

End position CLOSED

The end stop need not be set since the required swing angle has been set in the factory.

10. Setting of the end stops with mounted actuator



- If worm gearboxes GS and multi-turn actuators are supplied on a valve the end stops, limit and torque switching are already set.
- The valve manufacturer has to determine whether the valve should be limit or torque seated.

10.1 Setting for butterfly valves

End position CLOSED

- Determine the overrun of the multi-turn actuator for both directions, i. e. how much does the valve move after the motor has been switched off?
- Remove all bolts (03) at end stop (figure E).
- Change to manual drive and move the valve manually to the end position CLOSED.
- In case end stop (10) has not yet rotated, turn it clockwise up to the stop.
- Turn end stop (10) back by 1/2 a turn counter-clockwise. This ensures that the mechanical end stop is not reached in electric operation and thus the valve can close tightly in case of torque seating.
- If the holes of the end stop (10) do not correspond to the threads of the housing, take off the end stop (10) and place it in a suitable position.
- Fit bolts (03) with lock washers (04) and fasten them evenly crosswise.

Limit seating in end position CLOSED

- Turn back the valve from the end position by an amount equal to the overrun.
- Set limit switching according to operation instructions SA 07.1 - SA 48.1.
- Check torque switching for the end position CLOSED according to the operation instructions SA 07.1 - SA 48.1 and, if necessary, set it to required value (according to valve manufacturer's data).

Torque seating in end position CLOSED.

- Turn handwheel counter-clockwise by 4 - 6 turns.
- Set limit switching of multi-turn actuator for the end position CLOSED according to the operation instructions SA 07.1 - SA 48.1 (for signalisation).
- Check setting of torque switching CLOSE and, if required, set it to the required value (according to valve manufacturer's data).

End position OPEN

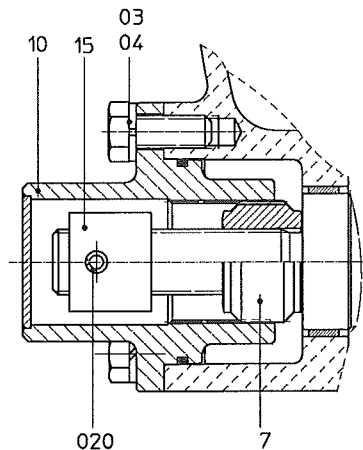
The end stop need not be set since the required swing angle has been set in the factory.

- Move gearbox to the end stop in position OPEN.



The last part of the travel has to be made manually.

- Turn valve back manually from the end position by an amount equal to the overrun (4 to 6 turns at handwheel).
- Set limit switching in actuator for the end position OPEN according to the operation instructions SA 07.1 - SA 48.1.

Figure E: End stop

10.2 Setting for ball valves



In case end stops need to be adjusted, set end position OPEN first. If the exact end position of the valve can not be seen through a position marking at the valve shaft, the setting may have to be done with the valve removed.

End position OPEN

Switching off in end position OPEN

End position CLOSED

- Determine the overrun of the actuator for both directions, i. e. how much does the valve move after switching-off the motor?

- Remove all bolts (03) (figure E).
- Change to manual drive and move the valve manually to the end position OPEN.
- In case end stop (10) has not yet rotated, turn it counter-clockwise up to the stop.
- Turn end stop (10) back by 1/2 turn clockwise. This ensures that the mechanical end stop is not reached in electric operation.
- If the holes of the end stop (10) do not correspond to the threads of the housing, take off the end stop (10) and place it in the required position.
- Fit bolts (03) with lock washers (04) and fasten them evenly crosswise.
- Turn back the valve from the end position by an amount equal to the overrun.
- Set limit switching according to the operation instructions SA 07.1 - SA 48.1.

- The end stop need not be set since the required swing angle has been set in the factory.
- Move gearbox to the end stop in position CLOSED.



The last part of the travel has to be made manually.

- Turn valve back manually from the end position by an amount equal to the overrun (4 to 6 turns at handwheel).
- Set limit switching in actuator for the end position CLOSED according to operation instructions SA 07.1 - SA 48.1.

10.3 Torque switching with mounted actuator

Check torque switch setting according to the operation instructions SA 07.1 - SA 48.1 and, if necessary, set to required value (according to valve manufacturer's data).

11. Changing the swing angle (option)

For swing angles between 80° and 100° in direction OPEN, a version with adjustable end stop is available as an option. The adjustment is done in steps of approx. 0,5°.

Refer to figure F

Increasing the swing angle (max. 100°)

- Unscrew protective cap (16) at end stop (10).
- Remove roll pin (020) with appropriate tool (available from AUMA).
- Turn back end stop nut (15) counter clockwise, observe dimension A (refer to table 4).
- Move valve into the desired end position
- Turn end stop nut (15) clockwise until it is tight up to the stop nut (7).
- Tap in roll pin (020) with tool. If slot in end stop nut (15) does not correspond to the hole in the worm shaft, turn end stop nut slightly counter-clockwise until it is in alignment, then tap in roll pin.
- Replace protective cap (16).
- If gearbox is mounted to an electric multi-turn actuator, set the limit switching for the end position "OPEN" anew according to the operation instructions SA 07.1 - SA 48.1. Allow for overrun.

Figure F: End stop open (option)

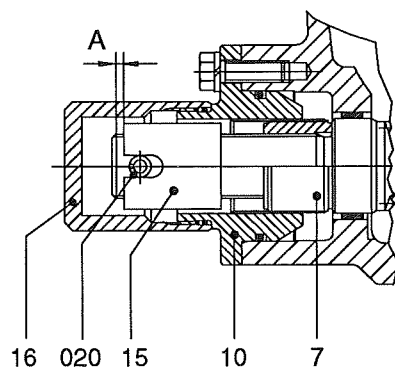


Table 4

Type	A min. [mm]	A max. [mm]
GS 40.3	1,5	4
GS 50.3	1,5	4,5
GS 63.3	1	5
GS 80.3	0	4
GS 100.3	4	9
GS 125.3	4	9

Reducing the swing angle (min 80 °)

- Move valve into the desired end position (figure F).
- Unscrew protective cap (16) at end stop (10).
- Remove roll pin (020) with appropriate tool (available from AUMA).
- Turn end stop nut (15) clockwise until it is tight up to the stop nut (7) and observe dimension A (refer to table 4).
- Tap in roll pin (020) with tool. If slot in end stop nut (15) does not correspond to hole in the worm shaft, turn end stop nut slightly counter-clockwise until it is in alignment, then tap in roll pin.
- Replace protective cap (16).
- If gearbox is mounted to an electric multi-turn actuator, set the limit switching for the end position "OPEN" anew according to operation instructions SA 07.1 - SA 48.1. Allow for overrun.

12. Maintenance

After commissioning, check worm gearbox for damages to paint finish. Do a thorough touch-up to prevent corrosion. Original paint in small quantities can be supplied by AUMA.

AUMA worm gearboxes require only very little maintenance. Precondition for reliable service is correct commissioning.

To ensure that the worm gearbox is always ready to operate we recommend:

- If operated seldom, perform a test run approximately every six months.
- Approximately six months after commissioning and then every year check bolts between multi-turn actuator, worm gearbox and valve for tightness. If required, re-tighten applying the torques given in table 3, page 9.

The worm gearboxes are filled with lubricant in the factory. This filling lasts for several years of service.

A grease change is recommended after the following operation time:

- if operated seldom after 10 - 12 years
- if operated frequently after 6 - 8 years
- in modulating service after 4 - 6 years

Detailed maintenance instructions can be sent if required.

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Deutschland / Germany

D WERNER RIESTER GmbH & Co. KG
Industriegebiet West
Postfach 13 62
79373 Mühlheim/Baden
Tel +49 76 31 609-0
Fax +49 76 31 13 218
e-mail: Riester@auma.com

D WERNER RIESTER GmbH & Co. KG
Postfach 11 51
73747 Ostfildern
Tel +49 71 13 48 03-0
Fax +49 71 13 48 03 34
e-mail: Riester@wof.auma.com

D WERNER RIESTER GmbH & Co. KG
Service-Center Köln
Mathias-Brüggen-Str. 164
50629 Köln
Tel +49 22 15 97 72-0
Fax +49 22 15 97 72-19
e-mail: Service@scm.auma.com

D WERNER RIESTER GmbH & Co. KG
Service-Center Magdeburg
Am Stadtborg 1
39167 Niedemünde
Tel +49 39 20 47 59-0
Fax +49 39 20 47 59-19
e-mail: Service@scm.auma.com

D WERNER RIESTER GmbH & Co. KG
Service-Center Bayern
Robert-Bosch-Strasse 14
85748 Garching-Hochbrück
Tel 0 89 / 32 88 85-17
Fax 0 89 / 32 88 85-18
e-mail: Riester@scb.auma.com

D WERNER RIESTER GmbH & Co. KG
Büro Nord
Krelingen 150
29664 Walsrode
Tel +49 51 67 504
Fax +49 51 67 565
e-mail: HandwerkerE@auma.com

D WERNER RIESTER GmbH & Co. KG
Büro Nord
Berelch Schiffbau
Tempowerkring 1
21079 Hamburg
Tel +49 40 79 14 02 85
Fax +49 40 79 14 02 86
e-mail: DierksS@auma.com

D WERNER RIESTER GmbH & Co. KG
Büro West
Rathausplatz 7
45549 Sprockhövel
Tel +49 23 39 92 12-0
Fax +49 23 39 92 12 15
e-mail: KettnierM@auma.com
SuchhardIP@auma.com

D WERNER RIESTER GmbH & Co. KG
Büro Süd-West
Mozartstr. 4
69468 Birkenau
Tel +49 62 01 37 31 49
Fax +49 62 01 37 31 50
e-mail: WagnerD@auma.com

D WERNER RIESTER GmbH & Co. KG
Büro Baden
Postfach 13 62
79373 Mühlheim/Baden
Tel +49 76 31 60 91 83
Fax +49 76 31 60 92 84
e-mail: HenselR@auma.com

D WERNER RIESTER GmbH & Co. KG
Büro Württemberg
Postfach 11 51
73747 Ostfildern
Tel +49 71 13 48 03 80
Fax +49 71 13 48 03 81
e-mail: KoeglerS@wof.auma.com

D WERNER RIESTER GmbH & Co. KG
Büro Bayern
Kagerberg 12
83356 Teugn/Niederbayern
Tel +49 94 05 94 10 24
Fax +49 94 05 94 10 25
e-mail: JochumM@auma.com

D WERNER RIESTER GmbH & Co. KG
Büro Ost
Am Stadtborg 1
39167 Niedemünde
Tel +49 39 20 47 59 80
Fax +49 39 20 47 59 89
e-mail: ZanderC@scm.auma.com

Europa / Europe

A AUMA Armaturen- und
Gesellschaft m.b.H.
Betriebsgebiet Traskirchen Süd
Handelsstr. 14
2512 Tribuswinkel
Tel +43 22 52 82 540
Fax +43 22 52 82 54 050
e-mail: office@auma.at

CH AUMA (Schweiz) AG
Chörnenmattstr. 43
8985 Benken
Tel +41 56 64 00 945
Fax +41 56 64 00 948
e-mail: RetlichP.ch@auma.com

CZ AUMA Servopohony spol. s r.o.
Kazanská 121
10200 Praha 10
Tel +420 2 72 70 00 56
Fax +420 2 72 70 41 25
e-mail: auma-s@auma.cz

F AUMA France
10 - 18 Rue Constantin Pecqueur
Z.A.C. Les Châtagniers III
95157 Taverny Cedex
Tel +33 13 93 27 272
Fax +33 13 93 21 755
e-mail: servocom@auma.fr

FIN OY AUMATOR AB
Pi 21 / Hytjokula 5
02271 Espoo 27
Tel +358 95 84 022
Fax +358 95 84 02 300
e-mail: auma@aumator.fi

GB AUMA ACTUATORS Ltd.
Britannia Way
Clevedon
North Somerset BS21 6QH
Tel +44 12 75 87 11 41
Fax +44 12 75 87 54 92
e-mail: auma@auma.co.uk

I AUMA ITALIANA S.r.l.
Via Don Luigi Sturzo, 29
20020 Lainate/Milano
Tel +39 02 83 17 911
Fax +39 02 83 74 387
e-mail: info@auma.it

NL AUMA BENELUX B.V.
La Poolweg 9
2314 XT Leiden
Tel +31 71 58 14 040
Fax +31 71 58 14 049
e-mail: office@benelux.auma.com

PL AUMA Polska Sp. z o.o.
Ul. Pukowca 15
40-816 Katowice
Tel +48 32 25 05 412
Fax +48 32 25 05 412
e-mail: R.Ludzien@auma.com.pl

RUS AUMA Moscow
Representative Office
8/9, 1-y Tverskoy-Yamskoy pereulok,
Moscow, 125047, Post Box 220
Tel: +7 095 973 29 43
Fax: +7 095 973 35 28
e-mail: georgelp@aha.ru

DK GROENBECH & SOENNER A/S
Scandigade 25
2450 Copenhagen SV
Tel +45 33 26 63 00
Fax +45 33 26 63 01
e-mail: GS@groenbech-sons.dk

E IBEROPLAN S.A.
Marques de Hoyos, 10
28027 Madrid
Tel +34 91 37 17 130
Fax +34 91 74 27 126
e-mail: iberoplan@iberoplan.com

GR D.G. Bellos & Co O.E.
64, Malsonos str.
10438 Athens
Tel +30 15 22 38 48
Fax +30 15 23 22 46
e-mail: dgb@eext.gr

N SIGURD SOERUM A.S.
Jongsasvaten 3
Postboks 85
1301 Sandvika
Tel +47 67 57 26 00
Fax +47 67 57 26 10
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Equipamentos Industriais, Lda.
Estrada de Albaraque 5º
Centro Empresarial Sintra-Estoril
Bloco A3-Linh 2710-297 Sintra
Tel +351 2 19 10 95 00
Fax +351 2 19 10 95 95
e-mail: Industria@mail.telepac.pt

S ERICHS ARMATUR AB
Travbanegatan 8
Box 91 44
20039 Malmö
Tel +46 40 31 15 50
Fax +46 40 94 55 15
e-mail: Ulf.Elowsson@erichs.se

TR MEGA Endüstri Kontrol Sistemleri
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Cethin Emec Bulvarı 6.CAD
78.SK. 17/18
06460 Övedler - Ankara
Tel +90 31 24 78 08 13
Fax +90 31 24 78 08 31
e-mail: megatid@escortnet.com

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IND AUMA (INDIA) Ltd.
Plot No. 39-B, II Phase
Peenya Industrial Area
Bangalore 560 058
Tel +91 80 83 94 655
Tlx 08 45 50 63 auma in
Fax +91 80 83 92 809

J AUMA JAPAN Co., Ltd.
596-4 Futago-Cho
273-0034 Funabashi-Shi
Chiba
Tel +81 47 30 29 551
Fax +81 47 30 29 555
e-mail: auma.jp@oregano.ocn.ne.jp

PRC AUMA Beijing Representative Office
Room 602, Yuanchenxin Building
12 Yumin Road, Madlan
Chaoyang District
100029 Beijing
Tel +86 10 62 02 24 91
Fax +86 10 62 02 24 97
e-mail: AUMABS@lh.com.cn

UAE AUMA Middle East
Representative Office
Sponsorship: Euro Mechanical
P.O. Box 46153
Tourist Club Street
Abu Dhabi
Tel +971 26 44 92 43
Fax +971 26 44 85 61
e-mail: auma@emirates.net.ae

SGP AUMA ACTUATORS
(Singapore) Pte Ltd.
32, Ang Mo Kio Industrial Park 2
#01 - 02, Sing Industrial Complex
Singapore 569510
Tel +65 48 18 750
Fax +65 48 18 269
e-mail: aumasing@mbbox5.singnet.com.sg

HK PERFECT CONTROLS Ltd.
Suite 202, Block 1,
Hofal Commercial Centre
218 Sal Lau Kok Road
Tsuen Wan, Kowloon, Hongkong
Tel +852 24 93 77 26
Fax +852 24 16 37 63
e-mail: pcitd@netvigator.com

KWT AL-ARFAJ Eng. Company W.L.L.
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Salmiyah 22004
Tel +965 48 17 448
Fax +965 48 17 442
e-mail: arfaj@qualitynet.net

Q BEHZAD Trading
P.O. Box 11 23
Rayyan Road
Doha, Qatar
Tel +974 43 32 38
Fax +974 43 32 37

RC Top Advance Enterprises Ltd.
2nd Fl., No.32, Lane 308, Section 3,
Ho-Ping East Road
Taipei, Taiwan, R.O.C.
Tel +886 2 2733 3530
Fax +886 2 2736 5528
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ROK DONG WOO Valve Control Co.,
Ltd.
Youl do
P.O.Box 293
Seoul, Korea
Tel +82 27 61 62 33
Fax +82 27 61 12 78
e-mail: dw7994@users.unitel.co.kr

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232/ 13 Yen-A-Kart Sol 2
Yannawa, Bangkok 10120
Tel +66 22 40 06 58
Fax +66 22 40 10 95
e-mail: swvong@mozart.inet.co.th

Nord- und Südamerika / North and South America

USA AUMA ACTUATORS INC.
4 Zesta Drive
Pittsburgh, PA 15 205
Tel +1 41 27 87 13 40
Fax +1 41 27 87 12 23
e-mail: mailbox@auma-usa.com

CDN TROY-ONTOR Inc.
230 Bayview Drive Unit 1A
Barrie, Ontario L4N 5E9
Tel +1 41 66 14 12 10
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BR Asvoteco Termointustrial Ltda.
Rod. Córrego Cyrilaco Scaranello
Pires, Km 01
Monte Mor-Sp, CEP 13190-000
Tel: +55 19 3879-87 35
Fax: +55 19 3879 87 38
e-mail: adm@asvoteco.com.br

RCH DIN INSTRUMENTO Ind. Ltda.
Avda. Holanda 2023
C.P.6651631 Casilla 335
Santiago de Chile
Tel +56 22 50 100
Fax +56 22 22 58 139
e-mail: valvulas@dininstrumentos.cl

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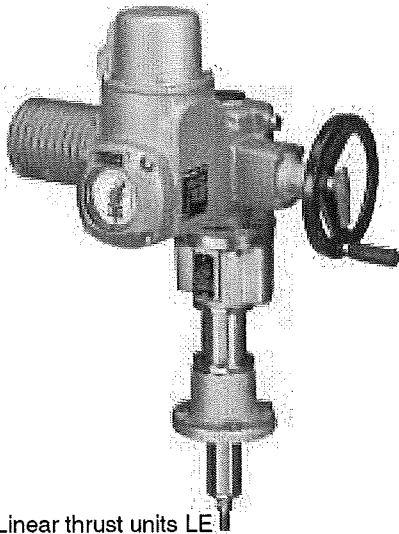
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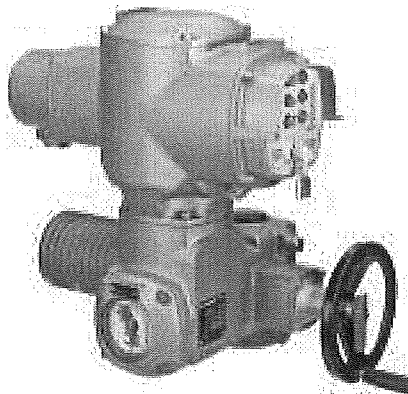
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Springs 1580
Tel +27 11 38 32 880
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Cairo - Egypt
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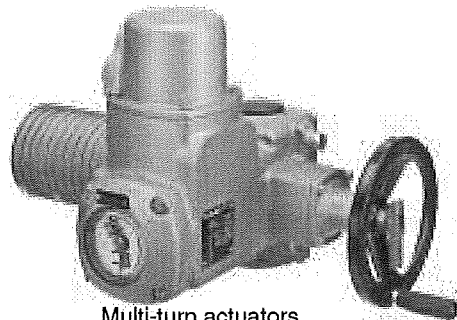
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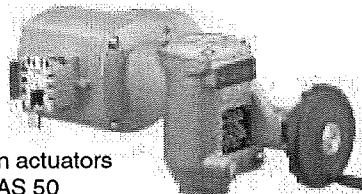
Controls AUMA MATIC
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Speeds from 4 to 180 min⁻¹



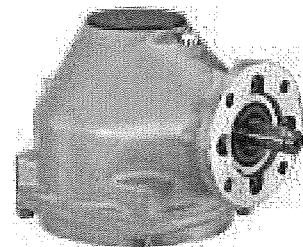
Multi-turn actuators
SA 07.1 - SA 16.1 / SA 25.1 - SA 48.1
Torques from 10 to 32 000 Nm
Output speeds from 4 to 180 min⁻¹



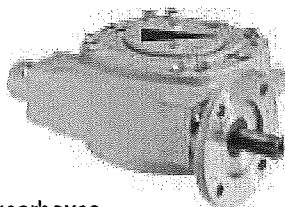
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SG 05.1 - SG 12.1
Torques from 100 to 1 200 Nm
Operating times for 90° from 4 to 180 s



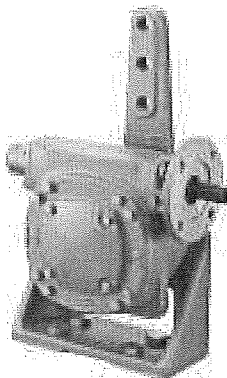
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Torques from 25 to 500 Nm
Operating times 90° from 4 to 90 s



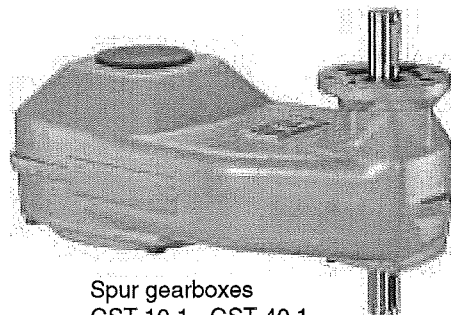
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WERNER RIESTER GmbH & Co. KG
Armaturen- und Maschinenantriebe
P.O.Box 1362 • D - 79373 Müllheim
Tel +49 7631/809-0 • Fax +49 7631/13218
e-mail riester@auma.com
www.auma.com

auma®

WERNER RIESTER GmbH & Co. KG
Armaturen- und Maschinenantriebe
P.O.Box 1151 • D - 73747 Ostfildern
Tel +49 711/34803-0
Fax +49 711/34803-34



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