

Multi-turn gearboxes
GHT 320.3 – GHT 1200.3



Read operation instructions first.

- Heed safety instructions.
- These operation instructions are part of the product.
- Store operation instructions during product life.
- Pass on instructions to any subsequent user or owner of the product.

Target group:

This document contains information for assembly, commissioning and maintenance staff.

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1 Safety instructions

1.1 Prerequisites for the safe handling of the product

Standards/directives	The end user or the contractor must ensure that all legal requirements, directives, guidelines, national regulations and recommendations with respect to assembly, electrical connection, commissioning and operation are met at the place of installation.
Safety instructions/warnings	All personnel working with this device must be familiar with the safety and warning instructions in this manual and heed the instructions given. Safety instructions and warning signs on the device must be observed to avoid personal injury or property damage.
Qualification of staff	Assembly, electrical connection, commissioning, operation, and maintenance must be carried out by suitably qualified personnel authorised by the end user or contractor of the plant only. Prior to working on this product, the staff must have thoroughly read and understood these instructions and, furthermore, know and observe officially recognised rules regarding occupational health and safety. Work performed in potentially explosive atmospheres is subject to special regulations which have to be observed. The end user or contractor of the plant is responsible for respect and control of these regulations, standards, and laws.
Electrostatic charging	Highly efficient charge generating processes (processes more efficient than manual friction) on the device surface must be excluded at any time. Highly efficient charge generating processes will lead to brush discharges or propagating brush discharges and therefore to ignition of a potentially explosive atmosphere. This safety instruction also applies to fireproof coatings or covers available as an option.
Commissioning	Prior to commissioning, imperatively check that all settings meet the requirements of the application. Incorrect settings might present a danger to the application, e.g. cause damage to the valve or the installation. The manufacturer will not be held liable for any consequential damage. Such risk lies entirely with the user.
Operation	Prerequisites for safe and smooth operation: • Correct transport, proper storage, mounting and installation, as well as careful commissioning. • Only operate the device if it is in perfect condition while observing these instructions. • Immediately report any faults and damage and allow for corrective measures. • Heed recognised rules for occupational health and safety. • Heed national regulations. • During operation, the housing warms up and surface temperatures > 60 °C may occur. To prevent possible burns, we recommend checking the surface temperature using an appropriate thermometer and wearing protective gloves, prior to working on the device.
Protective measures	The end user or the contractor are responsible for implementing required protective measures on site, such as enclosures, barriers, or personal protective equipment for the staff.
Maintenance	To ensure safe device operation, the maintenance instructions included in this manual must be observed. Any device modification requires prior written consent of the manufacturer.

1.2 Range of application

AUMA GHT multi-turn gearboxes are designed for the operation of industrial valves, e.g. gate valves and globe valves.

Other applications require explicit (written) confirmation by the manufacturer.

The following applications are not permitted, e.g.:

- Industrial trucks
- Lifting appliances
- Passenger lifts
- Service lifts
- Escalators
- Radiation exposed areas in nuclear power plants

No liability can be assumed for inappropriate or unintended use.

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

Specific conditions of use

Notes on use in potentially explosive atmospheres of zones 1, 2, 21 and 22:

- To minimise the risk of an electrostatic charging in potentially explosive atmospheres, please refer to: [Prerequisites for the safe handling of the product](#) [► 3]
- Imperatively heed the ambient temperatures, type of duty and input speeds specified in the technical data and on the name plate.

1.3 Warnings and notes

The following warnings draw special attention to safety-relevant procedures in these operation instructions, each marked by the appropriate signal word (DANGER, WARNING, CAUTION, NOTICE).



Indicates an imminently hazardous situation with a high level of risk. Failure to observe this warning results in death or serious injury.



Indicates a potentially hazardous situation with a medium level of risk. Failure to observe this warning could result in death or serious injury.



Indicates a potentially hazardous situation with a low level of risk. Failure to observe this warning could result in minor or moderate injury. May also be used with property damage.



Potentially hazardous situation. Failure to observe this warning could result in property damage. Is not used for personal injury.

The  safety symbol warns of a potential personal injury hazard.
The signal word (e.g. DANGER) indicates the level of hazard.

1.4 References and symbols

The following references and symbols are used in these instructions:



The ⓘ symbol stands for the **Information** concept. This text provides important notes and information.

Information: If the **Information** term is part of instruction, the text will give important notes and information to this action step.

 Symbol for CLOSED (valve closed)

 Symbol for OPEN (valve open)

 **Result of a process step**

Describes the result of a preceding process step.

➔ **Action step**

Describes one single action step.

▶ **Reference to the page number**

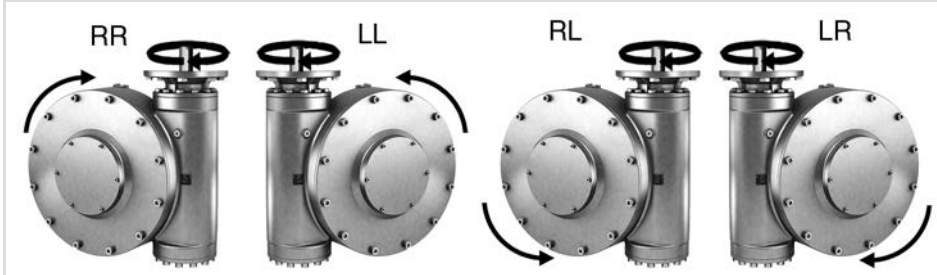
Refers to the page number for further information. To return from the target to the previous view, it is possible to jump back to the previous view within PDF documents: When using Adobe Acrobat via **Menu > Previous view** or using the key combination **Alt + left**.

2 Short description

Multi-turn gearboxes of the type GHT are worm gearboxes transmitting a rotary movement to the valve. The worm gearboxes are driven either via electric motor (by means of a multi-turn actuator) or manually (e.g. via a handwheel). In combination with an AUMA multi-turn actuator, output torques up to 120,000 Nm can be reached.

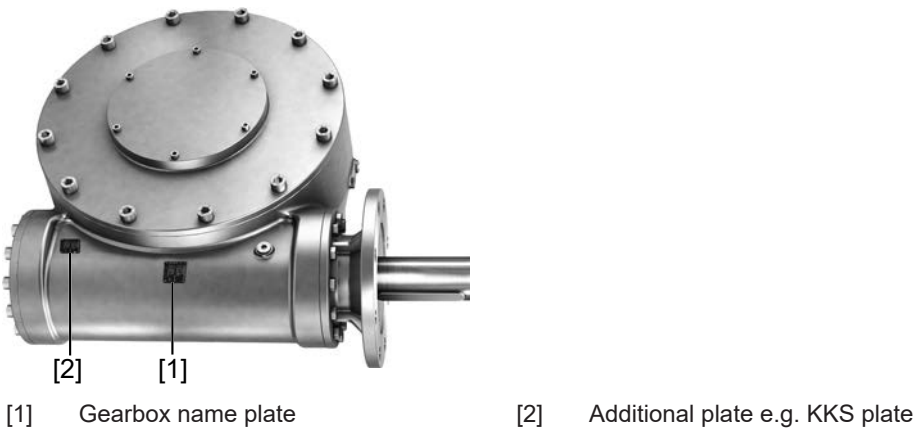
- Versions
- The first letter of the version indicates the position of worm shaft to the worm wheel (view on input shaft).
- The second letter indicates the direction of rotation at the valve shaft (view on housing cover) for clockwise rotation at the input shaft.

Table 1: Versions

Worm shaft position and direction of rotation		
		
Description of the versions (view on housing cover):		
Code	Position of worm shaft	Direction of rotation at the valve shaft
RR	R = Right	R = Clockwise rotation
LL	L = Left	L = Counterclockwise rotation
RL	R = Right	L = Counterclockwise rotation
LR	L = Left	R = Clockwise rotation

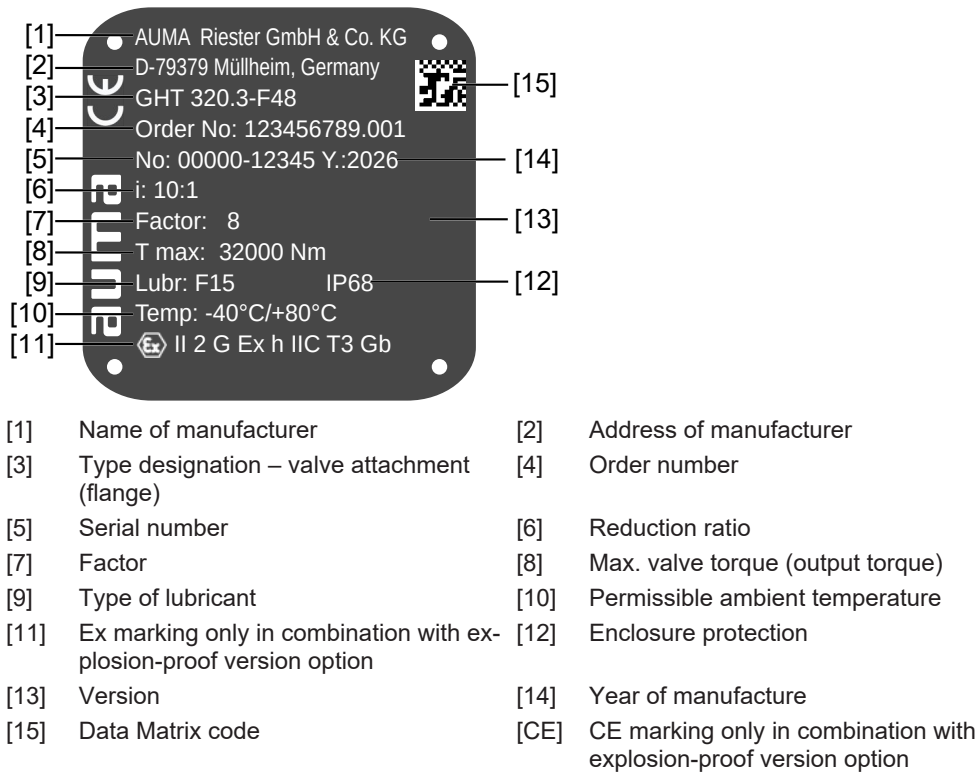
3 Name plate

Figure 1: Arrangement of name plates



Gearbox name plate

Figure 2: Gearbox name plate (example)



- | | |
|---|---|
| [1] Name of manufacturer | [2] Address of manufacturer |
| [3] Type designation – valve attachment (flange) | [4] Order number |
| [5] Serial number | [6] Reduction ratio |
| [7] Factor | [8] Max. valve torque (output torque) |
| [9] Type of lubricant | [10] Permissible ambient temperature |
| [11] Ex marking only in combination with explosion-proof version option | [12] Enclosure protection |
| [13] Version | [14] Year of manufacture |
| [15] Data Matrix code | [CE] CE marking only in combination with explosion-proof version option |

Descriptions referring to name plate indications

Type designation **Table 2:** Description of type designation with the example of GHT 320.3-F48

GHT	320.3	-F48	
GHT			Type GHT = multi-turn gearbox
	320.3		Size The operation instructions apply to sizes 320.3, 500.3, 800.3, 1200.3
		F48	Flange size for valve attachment

Order number The product can be identified using this number and the technical data as well as order-related data pertaining to the device can be requested.
Please always state this number for any product inquiries.

We offer the service **myAUMA** on our website www.auma.com: When indicating the order number, authorised users can download the order-related documents like wiring diagrams, technical data (in German and English), the inspection certificate, the operation instructions and further order-related information.

Serial number *Table 3: Serial number, description with the example of 00000-12345*

00000-12345	
00000-12345	Serial number of sales article 11-digit, internal number for unambiguous product identification

Reduction ratio The reduction ratio within gearing and primary reduction gearing reduces the required input torques and increases the operating time.

Factor Mechanical conversion factor for actuator size determination:

Input torque = required valve torque (output torque)/factor

Output torque T_{max.} = max. achievable/missible output torque (valve torque) at valve attachment (output drive shaft of gearbox)

Data Matrix code When registered as authorised user, you may use our **AUMA Assistant App** to scan the Data Matrix code and directly access the order-related product documents without having to enter order number or serial number.

Figure 3: Link to AUMA Assistant App



For further Service & Support, Software/Apps/..., refer to www.auma.com.

4 Transport and storage

4.1 Transport

For transport to place of installation, use sturdy packaging.

Transport gearbox and actuator separately.

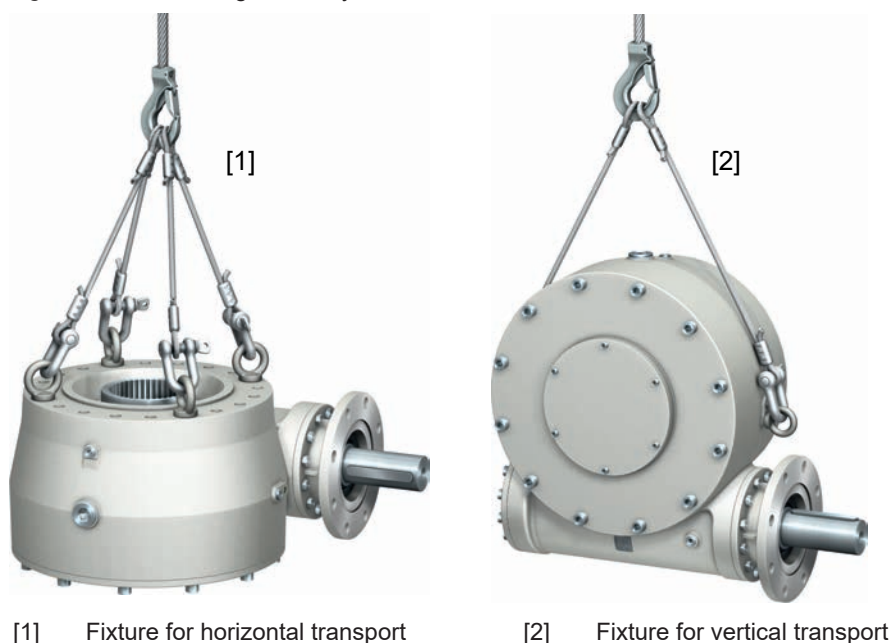
⚠ DANGER

Suspended load!

Death or serious injury.

- Do NOT stand below suspended load.
- Attach ropes or hooks for the purpose of lifting by hoist only to housing and NOT to handwheel.
- Observe manufacturer specifications for fixing lifting straps and round slings.
- Respect total weight of combination.
- Secure load against falling, sliding or tilting.
- Perform lift trial at low height to eliminate any potential danger e.g. by tilting.

Figure 4: Fixture using 4 M36 eyebolts



Supporting strength of eyebolts depend on angle of traction and the screw positions (lateral or top).

Table 4: Weight including output mounting flange

Type designation	Weight ¹⁾
	approx. [kg]
GHT 320.3-F48	477
GHT 500.3-F60	765
GHT 800.3-F60	995
GHT 1200.3-F60	1,280

- 1) Indicated weight includes gearbox with an input shaft, output drive type B, largest possible input mounting flange and standard lubricant.

4.2 Storage

NOTICE

Danger of corrosion due to inappropriate storage!

- Store in a 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.
 - Apply suitable corrosion protection agent to uncoated surfaces.
-

- Long-term storage For long-term storage (more than 6 months), observe the following points:
1. Prior to storage: Protect uncoated surfaces, in particular output drive parts and mounting surfaces using long-term corrosion protection agents.
 2. At an interval of approx. 6 months: Check uncoated surfaces for corrosion. Should traces of corrosion be detected, renew the corrosion protection.

5 Assembly

5.1 Mounting position

The described product can be operated without restriction in any mounting position.

5.2 Mount the multi-turn actuator

Refer to the operation instructions pertaining to the multi-turn actuator for indications on how to mount multi-turn actuators to gearboxes.

This chapter supplies basic information and instructions which should be heeded in addition to the operation instructions of the multi-turn actuator.

Figure 5: Mounting example: AUMA multi-turn actuator SA 35.1 with GHT 800.3



Multi-turn actuators and flanges

Table 5: Suitable multi-turn actuators and input mounting flanges

Type Gearboxes	Input mounting flanges for mounting multi-turn actuators EN ISO 5210	Permissible actuator weight max. kg	Suitable AUMA multi-turn actuator
GHT 320.3	F25, F30	260	SA/SAR 25.1 / SA/SAR 30.1
GHT 500.3	F25, F30, F35	425	SA/SAR 30.1 / SA 35.1
GHT 800.3	F35, F40	510	SA 35.1
GHT 1200.3	F35, F40	510	SA 35.1/SA 40.1

Screws to actuator

Screws are included in the scope of delivery of the gearbox for mounting AUMA multi-turn actuators. When mounting other actuators, the screws might either be too long or too short (insufficient reach of screws).

WARNING

Risk of actuator falling off in case inappropriate screws used should break.

Risk of death or serious injury!

- Check length of screws.
- Only use screws according to the strength class specified hereafter.

The reach of screws must be sufficient for the internal threads to ensure the supporting strength of the actuator and to accept the lateral forces due to the applied torque.

Screws which are too long could make contact with the housing parts, presenting the risk that the actuator performs a radial shift with respect to the gearbox. This can lead to shearing of the screws. For tightening torques refer to [Tightening torques for screws](#) [► 21]

Torque switching

- The setting of the torque switching within the multi-turn actuator may not exceed the max. permissible input torque for both directions (refer to technical data or name plate).
- Set the torque switching within the multi-turn actuator to the following value to prevent any damage to the valve:
 $T_{\text{torque switch}} = T_{\text{valve}} / \text{factor}$
 Factor = Conversion factor from output torque to input torque. Values are specified in the technical data section.

5.3 Mount gearbox to valve

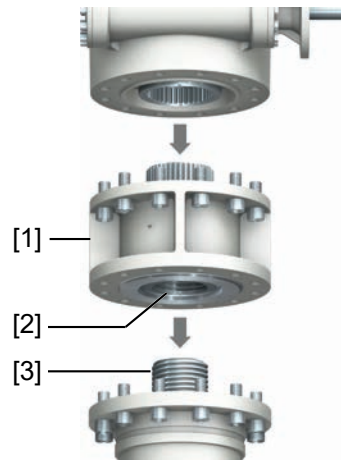
NOTICE

Risk of corrosion due to damage to paint!

- After all assembly work at the device, check housing for damage to paint.
- Carefully touch up damage to paint so that the initial delivery status is restored. Original paint in small quantities can be supplied by AUMA.

5.3.1 Output drive type A

Figure 6: Design of output drive type A



- [1] Output mounting flange
[3] Valve stem

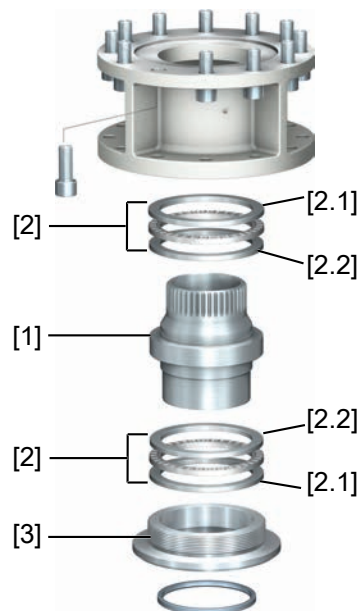
- [2] Stem nut with splines

Short description Output drive type A consisting of output mounting flange [1] with axial bearing stem nut [2]. The stem nut transmits the torque from the actuator hollow shaft to the valve stem [3]. Output drive type A can withstand thrusts.

5.3.1.1 Finish machining of stem nut for output drive type A

This working step is only required if stem nut is supplied unbored or with pilot bore.

Figure 7: Design output drive type A, example of A 48.2, for the grease quantities refer to [Preventive measures for servicing and safe operation](#) ► 18



- [1] Stem nut
[2.1] Housing washer
[3] Spigot ring

- [2] Axial cylinder roller bearing
[2.2] Shaft bearing race

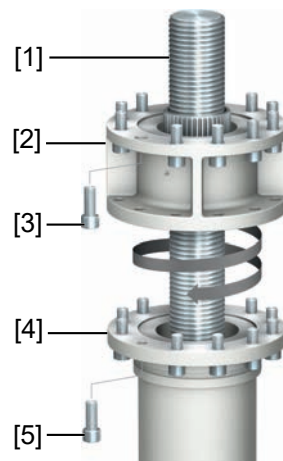
How to proceed

1. Remove spigot ring [3] from output drive.
2. Remove stem nut [1] together with axial cylinder roller bearing [2].
3. Remove axial cylinder roller bearing [2] from stem nut [1].
Information: Record the order of the bearing races [2.1/2.2].

4. Drill and bore stem nut [1] and cut thread.
Information: When fixing in the chuck, make sure stem nut runs true!
5. Clean the machined stem nut [1].
6. Apply Lithium soap EP multi-purpose grease to axial cylinder roller bearings [2], then place them on stem nut.
Information: Respect correct order of bearing races [2.1/2.2].
7. Re-insert stem nut [1] with axial cylinder roller bearing [2] into output drive.
Information: Ensure that dogs or splines are placed correctly in the keyway of the hollow shaft.
8. Screw in spigot ring [3] until firm seat against the shoulder.
9. Press in Lithium soap EP multi-purpose grease on mineral oil base at the grease nipple with a grease gun. For grease quantities, refer to [Preventive measures for servicing and safe operation](#) ► 18].

5.3.1.2 Gearbox with output drive type A: mount to valve

Figure 8: Assembly of output drive type A



- | | |
|----------------------------|-------------------------|
| [1] Valve stem | [2] Output drive type A |
| [3] Screws to gearbox | [4] Valve flange |
| [5] Screws to output drive | |

1. If output drive type A is already mounted to the gearbox: Loosen screws [3] and remove output drive type A [2].



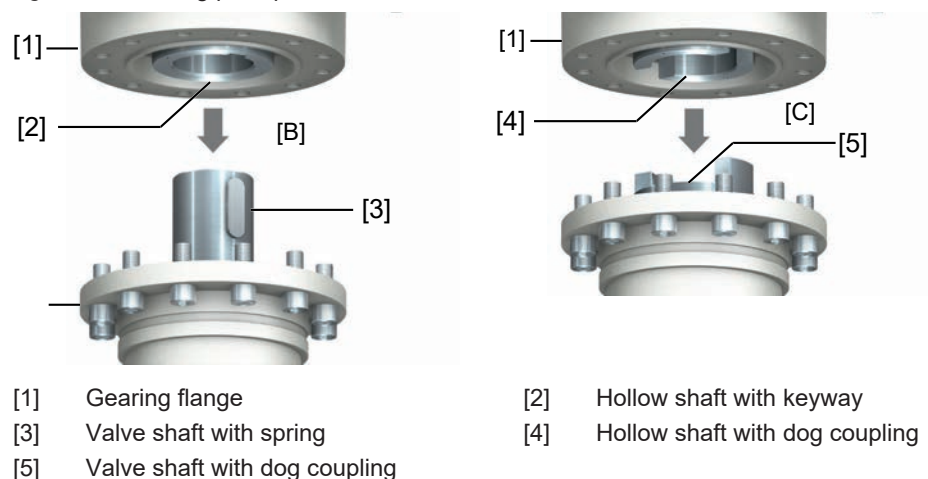
For an unbored or pilot bore stem nut, the stem nut must be finish-machined prior to mounting valve stem and prior to performing the following steps: Finish machining of stem nut for output drive type A

2. Apply a small quantity of grease to the valve stem [1].
3. Place output drive type A [2] on valve stem [1] and turn until output drive type A [2] is flush on the valve flange [4].
4. Turn output drive type A [2] until alignment of the fixing holes.
5. Fasten screws [5] between valve and output drive type A [2] without completely tightening them.
6. Fit gearbox on the valve stem [1] so that the stem nut dogs engage into the output drive sleeve.
⇒ The flanges are flush with each other if properly engaged.
7. Adjust gearbox until alignment of the fixing holes.
8. Fasten gearbox with screws [3].

9. Fasten screws [3] crosswise with a torque according to table [Tightening torques for screws](#) [► 21].
10. Turn gearbox with handwheel in direction OPEN until the valve flange [4] and the output drive type A [2] are firmly placed together.
11. Tighten screws [5] between valve and output drive type A crosswise. For torques, refer to table [Tightening torques for screws](#) [► 21].

5.3.2 Output drive types B/C

Figure 9: Mounting principle



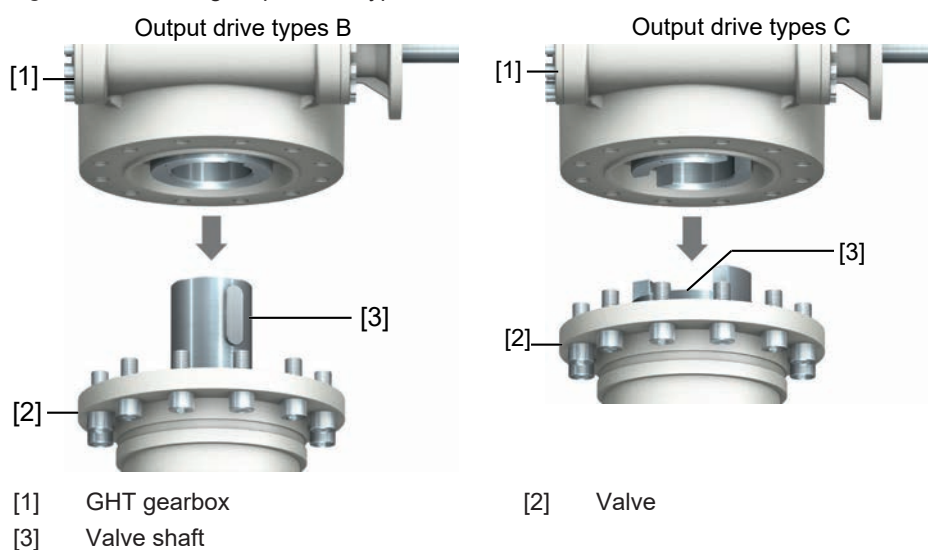
- Short description
- Output drive type B with bore and keyway
 - Output drive type C:
Output drive sleeve with bore based on EN ISO 5210.



Spigot at valve flanges should be loose fit.

5.3.2.1 Mount gearbox with output drive type B/C to the valve

Figure 10: Mounting output drive types B/C



- How to proceed
1. Check if mounting flanges fit together.
 2. Check if output drive of gearbox [2] matches the output drive of valve/valve shaft [2/3].

3. Apply a small quantity of grease to the valve shaft [3].
4. Gearbox [1] and ensure that the spigot fits uniformly in the recess and that the mounting faces are in complete contact.
5. Fasten gearbox with screws [4].
Information: We recommend applying liquid thread sealing material to the screws to avoid contact corrosion.
6. Fasten screws [4] crosswise with a torque according to table [Tightening torques for screws ► 21](#).

6 Commissioning

6.1 Test run

NOTICE**Risk of gear damage if running time is exceeded!**

→ Heed actuator operation mode (e.g. S2 – 15 min.).

1. Run gearbox at partial load for several minutes.
2. Perform functional test observing the following points:
 - Unusual noise
 - Vibration
 - Smoke and vapour formation

Shut down gearbox and contact AUMA Service.

3. Check gearbox for tightness after functional operation.

7 Servicing and maintenance

CAUTION

Damage caused by inappropriate maintenance!

- Servicing and maintenance must be carried out exclusively by suitably qualified personnel having been authorised by the end user or the contractor of the plant. We recommend contacting our service for any interventions.
- Only perform servicing and maintenance tasks when the device is switched off.

Service & Support

AUMA offers extensive service such as servicing and maintenance as well as customer product training. Contact addresses are indicated on our website (www.auma.com).

7.1 Preventive measures for servicing and safe operation

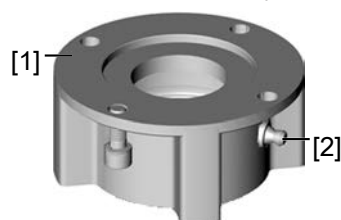
The following actions are required to ensure safe device function during operation:

- When deployed in areas where dust formation represents a potential explosion hazard, perform visual inspection for deposit of dirt or dust on a regular basis. Clean devices if required.
- Regularly check the gearbox for unusual running or grinding noise and vibration. Unusual noises might be an indication of a bearing or gear damage.

6 months after commissioning and then once a year

- Carry out visual inspection:
Check gearbox for damage as well as for grease or oil leakage.
The seals must be replaced in case of leakage at the gearbox.
Thoroughly touch up any possible damage to paint.
- Recommendation for plants subject to strong vibration:
Check fastening screws between actuator and gearbox/valve for tightness. If required, fasten screws while applying the tightening torques as indicated in Tightening torques for screws chapter. This action is not required for screws which are glued with e.g. thread sealing material.
- For devices with output drive type A: Press in Lithium soap EP multi-purpose grease on mineral oil base at the grease nipple with a grease gun.

Figure 11: Output drive type A



[1] Output drive type A

[2] Grease nipples

- Lubrication of the valve stem must be done separately.
Exception: For output drive type A in version with stem lubrication (option), the stem is lubricated together with the output drive. If the valve manufacturer interval specifications are shorter for lubricating the valve, the shorter lubrication intervals of the valve manufacturer apply.

Table 6: Grease quantities per axial cylindrical roller bearing, output drive type A

Valve attachment	A 48.2	A 60.2
Quantity [g] ¹⁾	150	1,000

1) For grease with density $\rho = 0.9 \text{ kg/dm}^3$

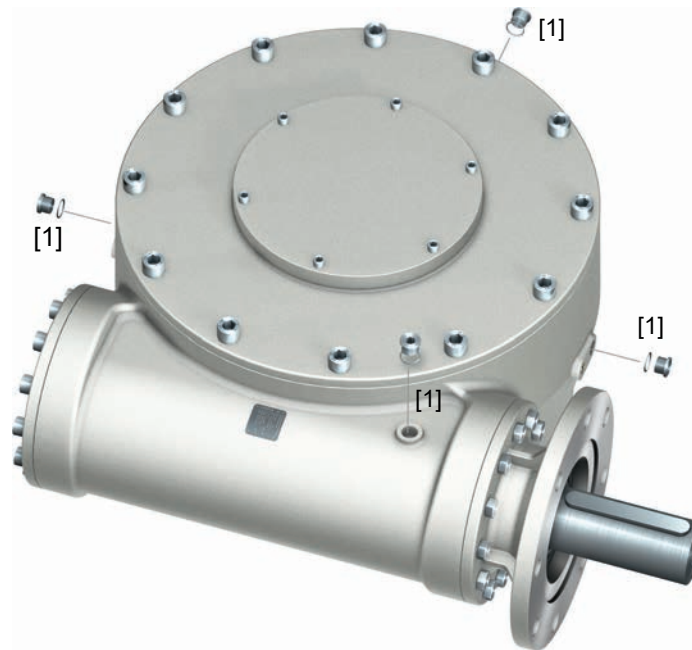
Every 5 years after commissioning

Test gearbox function in detail. Record the results for future reference.

7.2 Maintenance

The gearbox is lubricated for life. Generally, the lubricant filling level should be checked every 6 months.

Figure 12: Inspecting/refilling lubricant



[1] Screw plugs

NOTICE

Gear damage due to incorrect grease!

- Only use original lubricants.
- The lubricant type is marked on the name plate.
- Do not mix different lubricants.

7.3 Disposal and recycling

Our devices have a long service life. However, they have to be replaced at one point in time. The devices have a modular design and may therefore easily be disassembled, separated, and sorted according to materials, i.e.:

- Electronic scrap
- Various metals
- Plastic materials
- Greases and oils

The following generally applies:

- Generally, greases and oils are hazardous to water and must not be released into the environment.
- Arrange for controlled waste disposal of the disassembled material or for separate recycling according to materials.
- Heed the national regulations for waste disposal.

8 Technical data



The following tables include standard and optional features. For detailed information on the specific version, refer to the order-related data sheet. The order-related data sheet can be downloaded from our website at www.auma.com in both German and English (please state the order number).

8.1 Technical data Multi-turn gearboxes

Features and functions		
Worm wheel material	Bronze	
Direction of rotation	Standard:	RR = Worm shaft right, clockwise rotation at input shaft results in clockwise rotation at output shaft LL = Worm shaft left, clockwise rotation at input shaft results in counterclockwise rotation at output shaft
	Options:	RL = Worm shaft right, clockwise rotation at input shaft results in counterclockwise rotation at output shaft LR = Worm shaft left, clockwise rotation at input shaft results in clockwise rotation at output shaft
Housing material	Standard:	Cast iron (EN-GJL-250)
	Option:	Spheroidal cast iron (EN-GJS-400-15)
Self-locking	Not self-locking	
Input shaft	Standard:	Cylindrical with parallel key according to DIN 6885-1
	Option:	Second shaft end Cylindrical with parallel key according to DIN 6885-1
Operation		
Type of duty	Open-close duty:	Short-time duty S2 - 15 min, classes A and B according to EN ISO 22109 Short-time duty S2 - 30 min, classes A and B according to EN ISO 22109, on request
	Modulating duty:	Intermittent duty S4 - 25 %, class C according to EN ISO 22109, on request
Motor operation	Directly via electric multi-turn actuator Flanges for mounting the multi-turn actuator, refer to table	
Maximum input speed	90 rpm	
Valve attachment		
Output drive types	Standard:	B based on EN SO 5210
	Options:	C based on EN ISO 5210 A according to ISO 5210 AF
Service conditions		
Mounting position	Any position	
Ambient temperature	Standard:	−40 °C to +80 °C
	Options:	−60 °C to +60 °C 0 °C to +120 °C
Enclosure protection	For exact version, refer to name plate.	
Corrosion protection	Standard:	KS Suitable for use in areas with high salinity, almost permanent condensation, and high pollution.
	Option:	KX Suitable for use in areas with extremely high salinity, permanent condensation, and high pollution.
Coating	Two-component iron-mica combination	
Colour	Standard:	AUMA silver-grey (similar to RAL 7037)
	Option:	Available colours on request
Lifetime	AUMA multi-turn gearboxes meet or exceed the lifetime requirements of EN ISO 22109. Detailed information can be provided on request.	
Accessories		
Stem protection tube	On request	

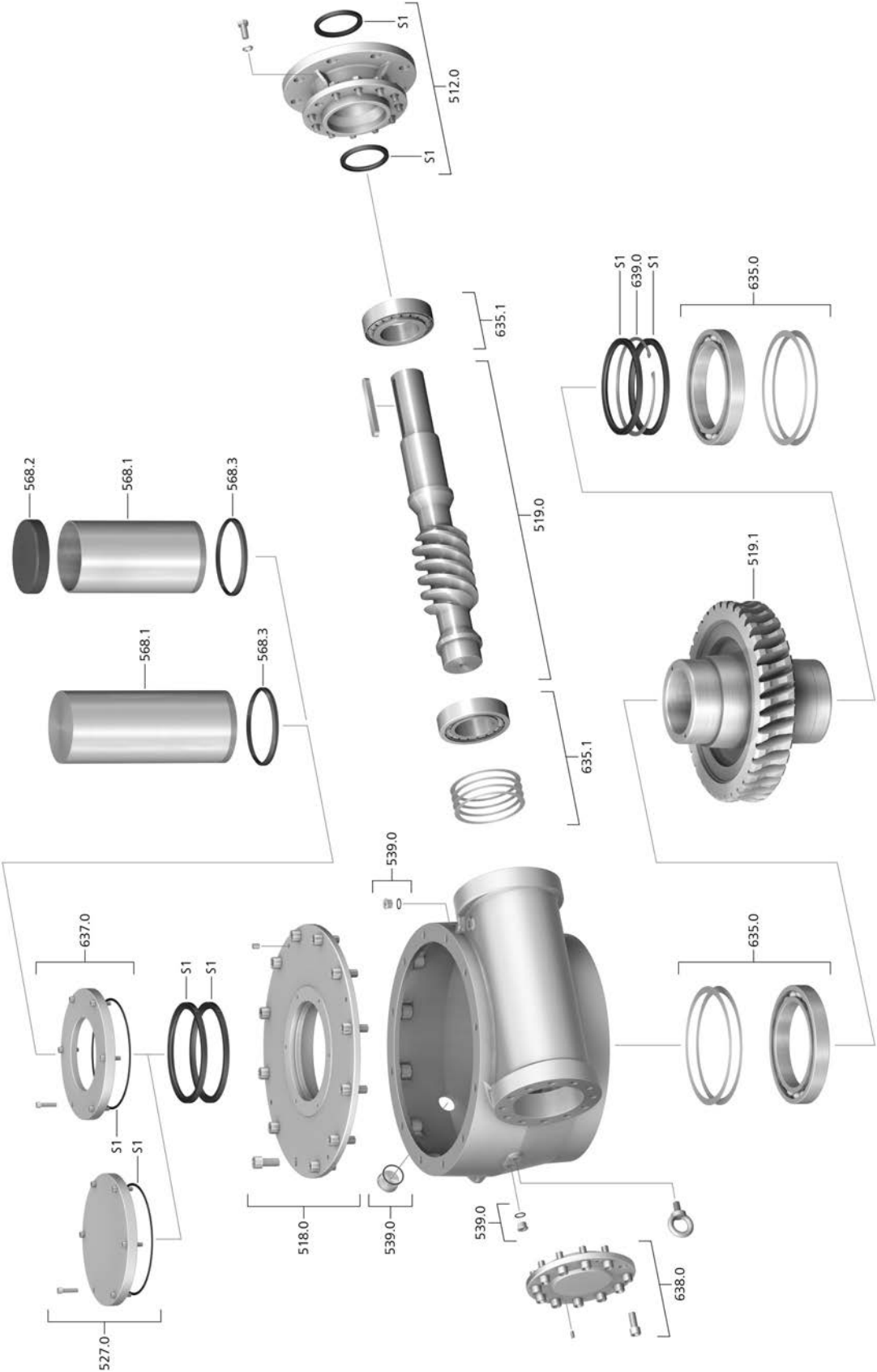
Accessories		
Eyebolts	2 eyebolts for transport	
Use in potentially explosive atmospheres		
Explosion protection in accordance with ATEX 2014/34/EU	Standard:	II 2G Ex h IIC T3 Gb II 2D Ex h IIIC T190°C Db
	Option: (On request)	II 2G Ex h IIC T4 Gb II 2D Ex h IIIC T130°C Db
Type of duty	Open-close duty:	Short-time duty S2 - 15 min, classes A and B according to EN ISO 22109 Short-time duty S2 - 30 min, classes A and B according to EN ISO 22109, on request
	Modulating duty:	Intermittent duty S4 - 25 %, class C according to EN ISO 22109, on request
Maximum input speeds	GHT 320.3: 90 rpm GHT 500.3: 45 rpm GHT 800.3: 45 rpm GHT 1200.3: 32 rpm Further input speeds on request	
Ambient temperature	Standard:	−40 °C to +80 °C (II 2G Ex h IIC T3 Gb; II 2D Ex h IIIC T190°C Db)
	Option: (On request)	−40 °C to +60 °C (II 2G Ex h IIC T4 Gb; II 2D Ex h IIIC T130°C Db)
Further information		
EU Directives	ATEX Directive 2014/34/EU Machinery Directive 2006/42/EC	

8.2 Tightening torques for screws

Table 7: Tightening torques for screws

Threads	Tightening torque [Nm]	
	Strength class	
	8.8	A2-80/A4-80
M5	6.1	5.7
M6	11	10
M8	25	24
M10	51	48
M12	87	82
M16	214	200
M20	431	392
M30	1,489	1,422
M36	2,594	2,481

9 Multi-turn gearboxes GHT 320.3 – GHT 1200.3



Please state device type and our order number (see name plate) when ordering spare parts.

Only original AUMA spare parts should be used. Failure to use original spare parts voids the warranty and exempts AUMA from any liability.

Representation of spare parts may slightly vary from actual delivery.

Ref. No.	Designation
512.0	Input mounting flange
519.0	Worm shaft
519.1	Worm wheel
527.0	Protection cover
539.0	Screw plug
568.1	Stem protection tube (without cap)
568.2	Protective cap for stem protection tube
568.3	V-seal
635.0	Ball bearing
635.1	Ball bearing for worm shaft
637.0	Protection cover with thread
638.0	Cover for worm shaft
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Solutions for a world in motion.

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