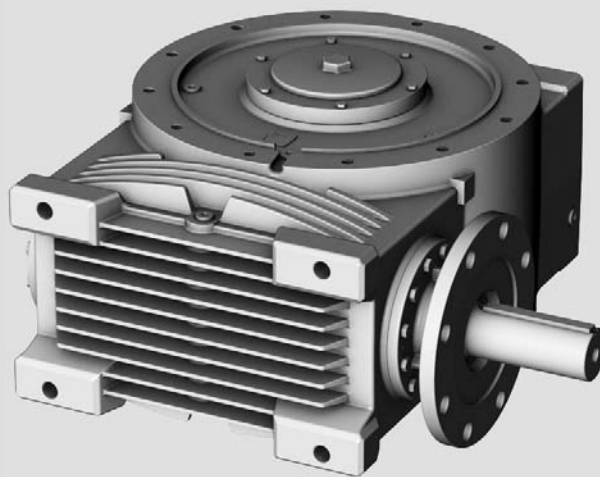




Multi-turn gearboxes
GHT 360.2



Read operation instructions first.

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

Purpose of the document:

This document contains information for installation, commissioning, operation and maintenance staff. It is intended to support device installation and commissioning.

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1. Safety instructions

1.1 Basic information on safety

Standards/directives Our products are designed and manufactured in compliance with recognised standards and directives. This is certified in a Declaration of Incorporation and an EC Declaration of Conformity.

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 observe 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 exclusively by suitably qualified personnel having been 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 are responsible for respect and control of these regulations, standards, and laws.

Commissioning Prior to commissioning, it is important to 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.
- Observe recognised rules for occupational health and safety.
- Observe the national regulations.
- During operation, the device warms up and increased surface temperature may occur. To prevent possible burns, we recommend checking the surface temperature using an appropriate thermometer and wearing protective gloves, if required, 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 consent of the manufacturer.

1.2 Range of application

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

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

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

- Industrial trucks according to EN ISO 3691

- Lifting appliances according to EN 14502
- Passenger lifts according to DIN 15306 and 15309
- Service lifts according to EN 81-1/A1
- Escalators
- Continuous duty
- 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.

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 could result 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 may result in minor or moderate injury. May also be used with property damage.



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

Arrangement and typographic structure of the warnings




Type of hazard and respective source!

Potential consequence(s) in case of non-observance (option)

→ Measures to avoid the danger

→ Further measure(s)

Safety alert symbol  warns of a potential personal injury hazard.

The signal word (here: DANGER) indicates the level of hazard.


1.4 References and symbols

The following references and symbols are used in these instructions:

Information The term **Information** preceding the text indicates important notes and information.

 Symbol for CLOSED (valve closed)

 Symbol for OPEN (valve open)

 Important information before the next step. This symbol indicates what is required for the next step or what has to be prepared or observed.

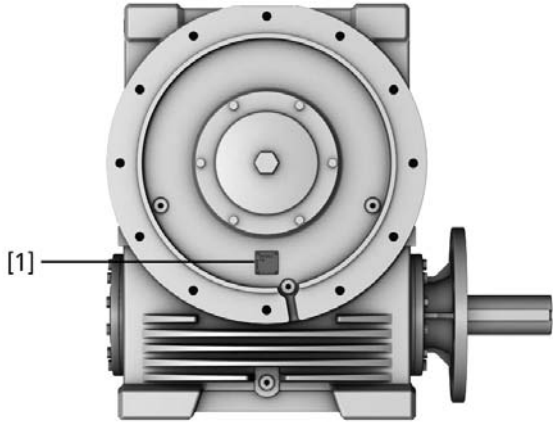
< > **Reference to other sections**

Terms in brackets shown above refer to other sections of the document which provide further information on this topic. These terms are either listed in the index, a heading or in the table of contents and may quickly be found.

2. Identification

2.1 Name plate

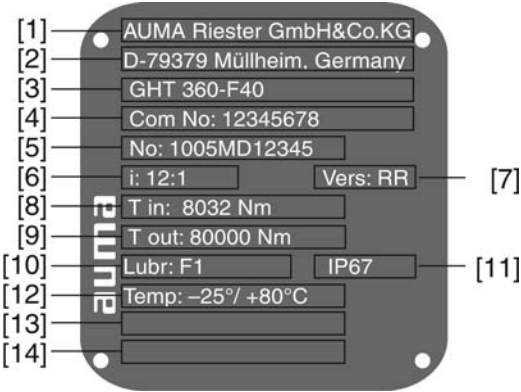
Figure 1: Arrangement of name plates



[1] Gearbox name plate

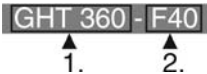
Description of gearbox name plate

Figure 2: Gearbox name plate (example)



- [1] Name of manufacturer
- [2] Address of manufacturer
- [3] **Type designation** (see explanation below)
- [4] **Commission number** (see explanation below)
- [5] Serial number (works number)
- [6] Reduction ratio
- [7] **Version** (see explanation below)
- [8] Max. input torque
- [9] Max. output torque
- [10] Lubricant
- [11] Enclosure protection
- [12] Ambient temperature
- [13] Customer information (option)
- [14] Customer information (option)

Type designation Figure 3: Type designation (example)



1. Type and size of gearbox
These instructions apply to the following devices:
GHT = **G**earbox **H**igh **T**orque (multi-turn gearbox)
Size 360.2
2. Flange size

Commission number An order-relevant commission number (order number) is assigned to each device. This commission number can be used to directly download the wiring diagram (in German and English language), inspection records and further information regarding the device from the Internet: <http://www.auma.com>. For some details, the customer number might be required.

Version Rotary direction RR or LL
For clockwise rotation of the input shaft (actuator), the first character of the **version** indicates the worm shaft position with reference to the worm wheel, the second character indicates the valve shaft rotary direction.

Table 1: Versions

Version	Rotary direction at input shaft	Position of worm shaft	Rotary direction of valve shaft
RR	clockwise	right	clockwise
LL	clockwise	left	counterclockwise

2.2 Short description

This gearbox is used to generate a rotating movement and is appropriate for industrial plants.

The gearbox is motor-driven via a multi-turn actuator.

3. Transport, storage and packaging

3.1 Transport

For transport to place of installation, use sturdy packaging.
Transport gearbox and actuator separately.

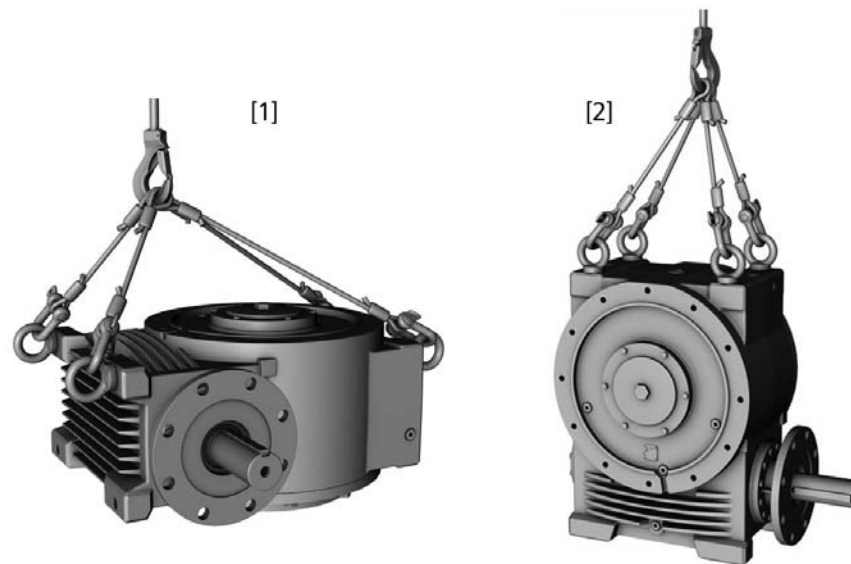


Hovering load!

Risk of death or serious injury.

- Do NOT stand below hovering load.
- Check available eyebolt for tight seat in housing (verify reach of the screw).
- Fix ropes or hooks to gearbox using available eyebolts only.
- Respect total weight of combination (gearbox, actuator, ...).

Figure 4: Fixture using 4 M36 eyebolts



[1] Fixture for horizontal transport

[2] Fixture for vertical transport

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

Table 2: GHT 360.2 weights with/without valve flange

Flange	Total weight in kg ¹⁾
without	965
F40	1,115 (965 + 150)
F48	1,145 (965 + 180)
F60	1,195 (965 + 230)

1) without lubricant in gear housing

3.2 Storage

NOTICE**Danger of corrosion due to inappropriate storage!**

- Store in a well-ventilated, dry room (maximum humidity 70 %).
 - 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

If the device must be stored for a long period (more than 6 months) the following points must be observed in addition:

1. Prior to storage:
Protect uncoated surfaces, in particular the output drive parts and mounting surface, with long-term corrosion protection agent.
2. At an interval of approx. 6 months:
Check for corrosion. If first signs of corrosion show, apply new corrosion protection.

3.3 Packaging

Our products are protected by special packaging for transport when leaving the factory. The packaging consists of environmentally friendly materials which can easily be separated and recycled. We use the following packaging materials: wood, cardboard, paper, and PE foil. For the disposal of the packaging material, we recommend recycling and collection centres.

4. Assembly

4.1 Mounting position

The gearboxes described here can operated without restriction in any mounting position.

4.2 Multi-turn actuators for motor operation

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 notes which should be considered in addition to the operation instructions of the multi-turn actuator.

Multi-turn actuators

Table 3: AUMA multi-turn actuators, flanges and suitable screws

AUMA multi-turn actuator	Flange for mounting EN ISO 5210	Screws		Tightening torque T _A [Nm]
		Size	Pieces	Strength class 8.8
SA 30.1	F30	M20 x 45	8	431
SA 35.1	F35	M30 x 60	8	1 489
SA 40.1	F40	M36 x 70	8	2 595

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 be either too long or too short (insufficient reach of screws).



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

Risk of death or serious injury!

- Check length of screws.
- Only use screws with strength class specified herein.

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

Screws which are too long could make contact with the housing parts. This causes a risk that the device could shift radially with respect to the gearbox. This can lead to shearing off the screws.

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. For values, refer to technical data.

4.3 Gearbox: mount to valve



Danger of corrosion due to damage to paint finish!

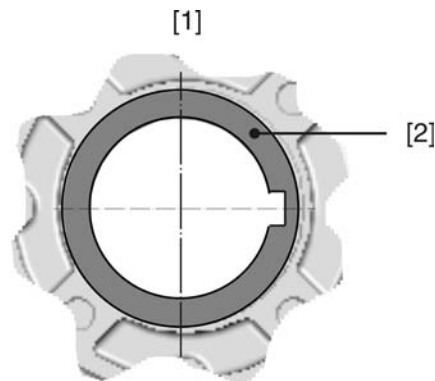
- Touch up damage to paint finish after work on the device.

4.3.1 Output drive type B2

- Application**
- For rotating, non-rising valve stem
 - Not capable of withstanding thrust
- Design** Output drive bore with keyway:

Keyway according to DIN 6885.1

Figure 5: Output drive



- [1] Output drive type B2
 [2] Hollow shaft with keyway

Information Spigot at valve flanges should be loose fit.

4.3.1.1 Gearbox (with output drive type B2): mount to valve

1. Check if mounting flanges fit together.
2. Check whether bore and keyway match the valve shaft.
3. Apply a small quantity of grease to the valve shaft.
4. Fit gearbox.

Information: Ensure that the spigot fits uniformly in the recess and that the mounting faces are in complete contact.

5. Fasten gearbox with screws.

Information: We recommend applying liquid thread sealing material to the screws to avoid contact corrosion.

6. Fasten screws crosswise to a torque according to table.

Table 4: Tightening torques for screws

Screws	Tightening torque T_A [Nm]
Threads	Strength class 8.8
M36	2,594

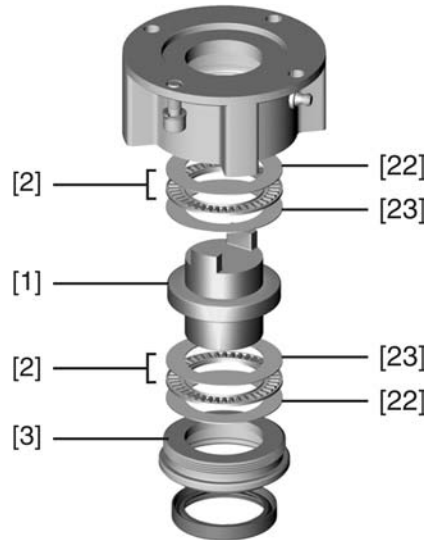
4.3.2 Output drive type A

- Application**
- Output drive for rising, non-rotating valve stem
 - Capable of withstanding thrust

4.3.2.1 Stem nut (for A 40.2 – A 60.2): finish machining

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

Figure 6: Design output drive type range A 40.2 – A 60.2



- [1] Stem nut
- [2] Axial cylinder roller bearing
- [22] Housing washer
- [23] Thrust bearing race
- [3] Spigot ring

1. Remove spigot ring [3] from output drive.
2. Remove stem nut [1] together with axial cylinder roller bearing [2].
Information: Record the order of the bearing races [22/23].
3. Remove axial cylinder roller bearing [2] from stem nut [1].
4. Drill and bore stem nut and cut thread.
Information: When fixing in the chuck, make sure stem nut runs true!
5. Clean the machined stem nut.
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 [22/23].
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 until it is firm against the shoulder.
9. Press in Lithium soap EP multi-purpose grease on mineral oil base at the grease nipple with a grease gun.

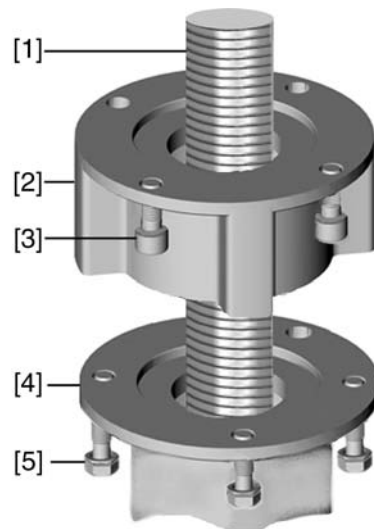
Table 5: Grease quantities for bearing of output drive type A

Output drive type	A 40.2	A 48.2	A 60.2
Quantity [g] ¹⁾	100	150	1,000

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

4.3.2.2 Gearbox (with output drive type A): mount to valve

Figure 7: Assembly using output drive type A



- [1] Valve stem
- [2] Output drive type A
- [3] Screws to actuator
- [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].
2. Check if the flange of output drive type A matches the valve flange [4].
3. Apply a small quantity of grease to the valve stem [1].
4. Place output drive type A on valve stem and turn until it is flush on the valve flange.
5. Turn output drive type A until alignment of the fixing holes.
6. Screw in fastening screws [5], however do not completely tighten.
7. Fit gearbox on the valve stem so that the stem nut dogs engage into the output drive sleeve.
- ➔ The flanges are flush with each other if properly engaged.
8. Adjust gearbox until alignment of the fixing holes.
9. Fasten gearbox with screws [3].
10. Fasten screws [3] crosswise with a torque according to table.

Table 6: Tightening torques for screws

Screws	Tightening torque T_A [Nm]
Threads	Strength class 8.8
M36	2,594

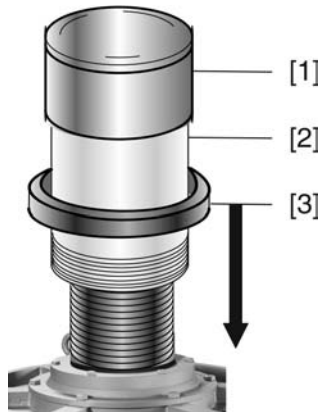
11. Turn gearbox with handwheel in direction OPEN until valve flange and output drive type A are firmly placed together.
12. Tighten fastening screws [5] between valve and output drive type A crosswise applying a torque according to table.

4.4 Accessories for assembly

4.4.1 Stem protection tube for rising valve stem

— Option —

Figure 8: Assembly of the stem protection tube



- [1] Cap for stem protection tube
- [2] Stem protection tube
- [3] Sealing ring

1. Seal thread with hemp, Teflon tape, or thread sealing material.
2. Screw stem protection tube [2] into thread and tighten it firmly.
3. Push down the sealing ring [3] onto the housing.
4. Check whether cap for stem protection tube [1] is available and in perfect condition.

5. Commissioning

5.1 Test run

1. Run gearbox **without load** or at partial load for several minutes.
2. Perform functional test observing the following points:
 - Unusual noise
 - Vibration
 - Smoke and vapour formation



Risk of gearbox damage in case of obvious malfunctions!

- Shut down gearbox.
 - Consult AUMA service.
-

3. Check gearbox for tightness after functional operation.

6. Corrective action



Risk of damage at gearbox if faults occur!

- Shut down gearbox.
- Search for possible cause.
- Eliminate fault or inform AUMA service.

Error	Possible cause	Remedy
Unusual gearbox noises	Changed bearing backlash Toothing damage Defective bearing	Notify AUMA service
Increased operating temperature	Incorrect lubricant filling level	Check lubricant filling level, correct accordingly
	Defective bearing	Notify AUMA service
Lubricant leaking at housing	Loose housing cover screws, defective seal	Retighten housing cover screws, notify AUMA service if leakage persists
	Defective radial seal	Notify AUMA service
	Lubricant filling level exceeded	Check lubricant filling level, correct accordingly

Information During the warranty period, repairs performed by the user are not permitted. If you are unable to locate the defect, we recommend calling the AUMA service.

7. Servicing and maintenance



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. Therefore, we recommend contacting our service.
- Only perform servicing and maintenance tasks when the device is switched off.

**AUMA
Service & Support**

AUMA offer extensive service such as servicing and maintenance as well as customer product training. For the relevant contact addresses, please refer to <Addresses> in this document or to the Internet (www.auma.com).

7.1 Preventive measures for servicing and safe operation

The following measures are required to ensure safe device operation:

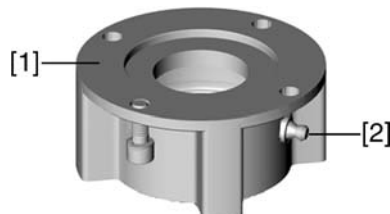
Every 3 months after commissioning

Check the gearbox for lubricant leakage.

Every 6 months after commissioning

- Visual inspection for:
 - Lubricant leakage
 - Unusual noise
 - Vibration
- When rarely operated: Perform test run.
- 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.
- Lubrication of the valve stem must be done separately.

Figure 9: Output drive type A



- [1] Output drive type A
- [2] Grease nipple

Table 7: Grease quantities for bearing of output drive type A

Output drive type	A 30.2	A 35.2	A 40.2
Quantity [g] ¹⁾	14	20	25

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

Every 6 months after commissioning and then once a year

- Check fastening screws between actuator, gearbox and valve for tightness. If required, fasten screws while applying the tightening torques as indicated in chapter <Assembly>.
- Clean gearbox if required.

Every 5 years after commissioning

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

7.2 Maintenance intervals

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

NOTICE**Gearing damage due to inappropriate grease!**

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

7.3 Disposal and recycling

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

- electronic scrap
- various metals
- plastics
- greases and oils

The following generally applies:

- 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.
- Observe the national regulations for waste disposal.

8. Technical data

Information The following technical data includes standard and optional features. For detailed information on the customer-specific version, refer to the order-relevant data sheet. This data sheet can be downloaded from the Internet at <http://www.auma.com> in German and English (indication of commission number required).

8.1 Features and functions

Version (Direction of rotation)	Standard: RE = Clockwise rotation at input shaft results in clockwise rotation at output shaft Option: LL = Clockwise rotation at input shaft results in counterclockwise rotation at output shaft
Housing material	Spheroidal cast iron (GJL-400-15)
Self-locking	Not self-locking
Input shaft	D = 95 mm: Cylindrical with parallel key according to DIN 6885.1
Output torques	Nominal torque: max. 80,000 Nm Reduction ratio: 12:1
Input torques ¹⁾	8,330 Nm
Factor ²⁾	9.6

Operation

Motor operation	Directly via electric multi-turn actuator
-----------------	---

Valve attachment

Output drive types	Standard: C: Dog coupling ¹⁾ Options: A: Stem nut F40, F48 ²⁾ , F60 ²⁾ B2: Output drive plug sleeve F40, F48 ²⁾ , F60 ²⁾ AF: Spring-loaded stem nut F40, F48 ¹⁾ , F60 ¹⁾
--------------------	--

1) on request

2) in compliance with EN ISO 5211

8.2 Service conditions

Mounting position	Any position
Enclosure protection according to EN 60529	IP 67
Corrosion protection	Standard: • KN: Suitable for installation in industrial units, in water or power plants with a low pollutant concentration Options: • KS: Suitable for installation in occasionally or permanently aggressive atmosphere with a moderate pollutant concentration (e.g. in wastewater treatment plants, chemical industry) • KX: Suitable for installation in extremely aggressive atmospheres with high humidity and high pollutant concentration
Paint	Standard: Two-component iron-mica combination
Colour	Standard: Primer coated Options: AUMA silver-grey (similar to RAL 7037) if finish painted Other colours on request
Ambient temperature	Standard: -40 °C to +60 °C, version N Option: -60 °C to +60 °C, version EL For actual version, refer to name plate
Lifetime	Open-close duty: Operations (OPEN - CLOSE - OPEN) with 30 turns per stroke, 5,000 operations

1) At max. output torque

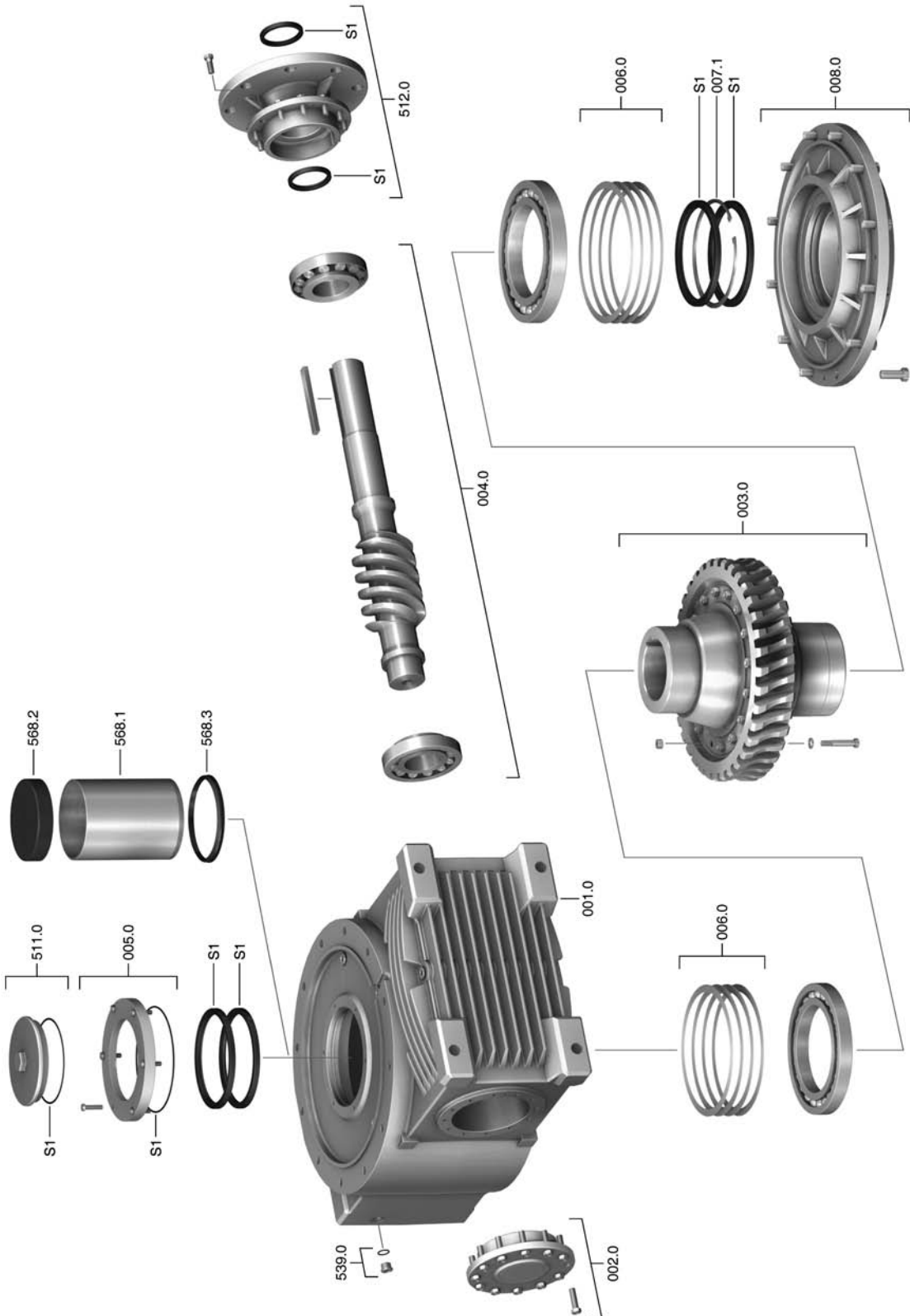
2) Conversion factor from output torque to input torque to determine the actuator size

8.3 Accessories

Eyebolts	For each order: 4 eyebolts M36 for transport purposes
----------	---

9. Spare parts

9.1 Multi-turn gearbox GHT 360.2



Spare parts

Information: Please state type and commission no. of the device (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. Delivered spare parts may slightly vary from the representation in these instructions.

No.	Designation	Type
001.0	Housing	Sub-assembly
002.0	Cover for worm shaft	Sub-assembly
003.0	Worm wheel	Sub-assembly
004.0	Worm shaft	Sub-assembly
005.0	Cover for worm wheel	Sub-assembly
006.0	Seating washers	Sub-assembly
007.1	Circlip	
008.0	Bearing cover	Sub-assembly
511.0	Threaded plug	Sub-assembly
512.0	Input mounting flange	Sub-assembly
539.0	Screw plug	Sub-assembly
568.1	Stem protection tube (without cap)	
568.2	Cap for stem protection tube	
568.3	V-Seal	
S1	Seal kit	Set

10. Certificates

10.1 Declaration of Incorporation

AUMA Riester GmbH & Co. KG
 Aumastr. 1
 79379 Müllheim, Germany
 www.auma.com

Tel +49 7631 809-0
 Fax +49 7631 809-1250
 Riester@auma.com



Original Declaration of Incorporation of Partly Completed Machinery (EC Directive 2006/42/EC)

for AUMA gearboxes of the type range

Multi-turn gearboxes GHT 360.2

AUMA Riester GmbH & Co. KG as manufacturer declares herewith, that the above mentioned gearboxes meet the following basic requirements of the EC Machinery Directive 2006/42/EC: Annex I, articles 1.1.2, 1.1.3, 1.1.5, 1.3.1, 1.3.7, 1.7.1, 1.7.3, 1.7.4

The following harmonised standards within the meaning of the Machinery Directive have been applied:

EN 12100-1: 2003 ISO 5210: 1996
 EN 12100-2: 2003

With regard to the partly completed machinery, the manufacturer commits to submitting the documents to the competent national authority via electronic transmission upon request. The relevant technical documentation pertaining to the machinery described in Annex VII, part B has been prepared.

AUMA multi-turn gearboxes are designed to be installed on industrial valves. AUMA multi-turn gearboxes must not be put into service until the final machinery into which they are to be incorporated has been declared in conformity with the provisions of the EC Directive 2006/42/EC.

Authorised person for documentation: Peter Malus, Aumastrasse 1, D-79379 Müllheim

Müllheim 2011-11-01

H. Newerla, General Management

This declaration does not contain any guarantees. The safety instructions in product documentation supplied with the devices must be observed. Non-concerted modification of the devices voids this declaration.

Y005.544/002/en

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Y005.535/003/en/4.12