auma®
Solutions for a world in motion

Part-turn gearboxes
GS 315 – GS 500
Primary reduction gearing
GZ 30.1 – GZ 40.1

Operation instructions

Assembly and commissioning

Read operation instructions first.

- Observe 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.

Table of contents

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 EU 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.

Electrostatic charging

Highly efficient charge generating processes (processes more efficient than manual friction) on the device surface must be excluded at any time, since they will lead to propagating brush discharges and therefore to ignition of a potentially explosive atmosphere.

This also applies to fireproof coatings or covers available as an option.

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 written consent of the manufacturer.

1.2. Range of application

AUMA part-turn gearboxes are designed for the operation of industrial valves, e.g. butterfly valves and ball 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 (S1 in accordance with IEC 60034–1)
- Modulating duty (class D according to EN 15714-2: Continuous modulating)
- Radiation exposed areas in nuclear power plants
- Potentially explosive atmospheres, except the explosion-proof version is explicitly specified on the name plate

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).

⚠ DANGER	**Indicates an imminently hazardous situation with a high level of risk. Failure to observe this warning results in death or serious injury.**
⚠ WARNING	**Indicates a potentially hazardous situation with a medium level of risk. Failure to observe this warning could result in death or serious injury.**
⚠ CAUTION	**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.**
NOTICE	**Potentially hazardous situation. Failure to observe this warning could result in property damage. Is not used for personal injury.**

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)

`Wiring diagram`

Texts extracted from other documents

Texts extracted from other documents are highlighted in a different font. For example `Wiring diagram`.

➥ **Result of a process step**

Describes the result of a preceding process step.

2. Identification

2.1. Name plate

Figure 1: Name plate arrangement

[1] Gearbox name plate

Gearbox name plate

Swing angle

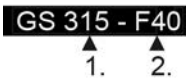
Figure 2: Gearbox name plate (example GS 315)

[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] **Explosion-proof version** (option)
[12] Can be assigned as an option upon customer request
[13] Enclosure protection
[14] **Version**
[15] Swing angle
[16] **Data Matrix code**

Descriptions referring to name plate indications

Type designation

Figure 3: Type designation (example)



1. Type and size of gearbox
2. Flange size for valve attachment

Type and size

These instructions apply to the following device types and sizes:

Part-turn gearboxes type **GS**, sizes **315 – 500**

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.

On the Internet at **http://www.auma.com** > Service & Support > myAUMA, we offer a service allowing authorised users to download order-related documents such as wiring diagrams and technical data (both in German and English), inspection certificate and the operation instructions when entering the order number.

Serial number

Description of serial number (example of 0520CG12345)			
05	20	CG12345	
05			Positions 1 + 2 : Assembly in week = week 05
	20		Positions 3+4: Year of manufacture = 2020
		CG12345	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

Type of lubricant

AUMA abbreviation for type of lubricant used in the gear housing.

DANGER

Danger of explosion when using inappropriate lubricant in potentially explosive atmospheres!

→ **Do not** use gearboxes with F21 lubricant in potentially explosive atmospheres.

→ Do not mix different lubricants.

Explosion-proof version (option)

Gearboxes may only be used in potentially explosive atmospheres if explosion-proof version is indicated on the name plate. In explosion-proof version, other (reduced) valve torques and input speeds apply than in weatherproof version.

Version

The first letter of the version indicates the **position of the worm shaft** in relation to the worm wheel (view on input shaft).

The second letter indicates the **direction of rotation** at the output drive (view on housing cover) for clockwise rotation at the input shaft.

Versions: Worm shaft position and direction of rotation of output drive GS 315 – GS 500

RR

LL

RL

LR

Description of the four different versions (view on housing cover):

Initials	Direction of rotation at input shaft	Position of worm shaft	Direction of rotation at output drive
RR	Clockwise	**R** = Right	**R** = Clockwise
LL	Clockwise	**L** = Left	**L** = Counterclockwise
RL	Clockwise	**R** = Right	**L** = Counterclockwise
LR	Clockwise	**L** = Left	**R** = Clockwise

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 4: Link to AUMA Assistant App:

For further Service & Support, software/apps/... refer to www.auma.com.

2.2. Short description

GS part-turn gearboxes are worm gearboxes, converting a rotary movement at the input shaft into a part-turn movement at the output drive. The worm gearboxes are driven either via electric motor (by means of a multi-turn actuator) or manually (e.g. via a handwheel). The required input torques are reduced due to high reduction ratios within the gearbox. Internal, mechanical end stops limit the swing angle at the output drive side to 0 ° – 135 ° (adjustable).

Worm gearboxes are available in different versions to comply with various mounting requirements and rotary directions.

3. Transport and storage

3.1. Transport

For transport to place of installation, use sturdy packaging.

WARNING

The coupling is not secured within the gearbox. Risk of falling out!

Injury hazard.

→ Remove coupling from gearbox housing prior to transport.

→ Bores within the coupling allow the use of eyebolts for separate transport. Ensure that eyebolts are firmly tightened.

Figure 5: Coupling

DANGER

Hovering load!

Risk of death or serious injury!

→ Do NOT stand below hovering load.

→ Check eyebolts for tight seat in housing (verify reach of the screw).

→ Observe manufacturer specifications for fixing lifting straps and round slings.

→ Respect total weight of combination (gearbox, primary reduction gearing).

→ Eyebolts are exclusively permitted for the weight of the represented arrangements (gearboxes and primary reduction gearings) of the respective sizes (gearboxes and primary reduction gearings).

→ Secure load against falling down, sliding or tilting.

→ Perform lift trial at low height to eliminate any potential danger e.g. by tilting.

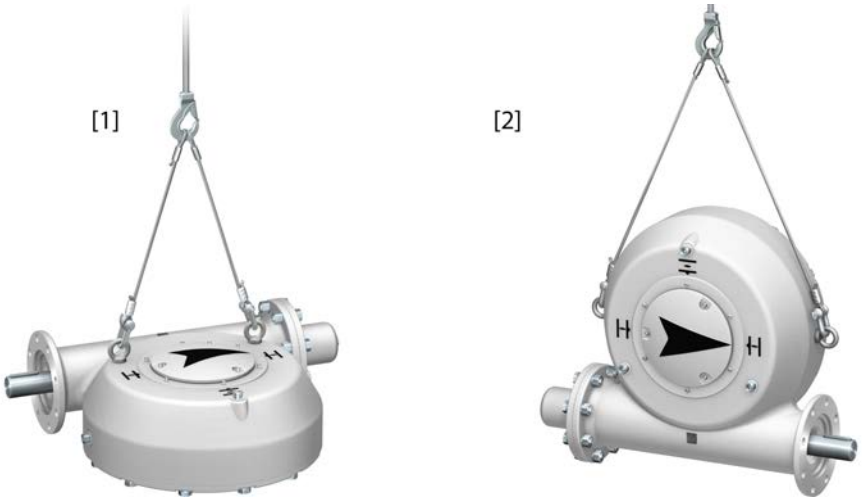
General notes

Actuators for worm gearboxes GS 315 – GS 500 are always supplied separately when leaving the factory and must be transported and lifted separately. For further information, refer to operation instructions pertaining to actuator.

GS 315 – GS 500

Gearbox sizes 315– 500 leave the factory with two eyebolts. The gearboxes are suspended horizontally or vertically using the two eyebolts. The suspension also applies to gearboxes with mounted GZ primary reduction gearing.

Figure 6: Examples of horizontal and vertical suspension of GS 315 – GS 500



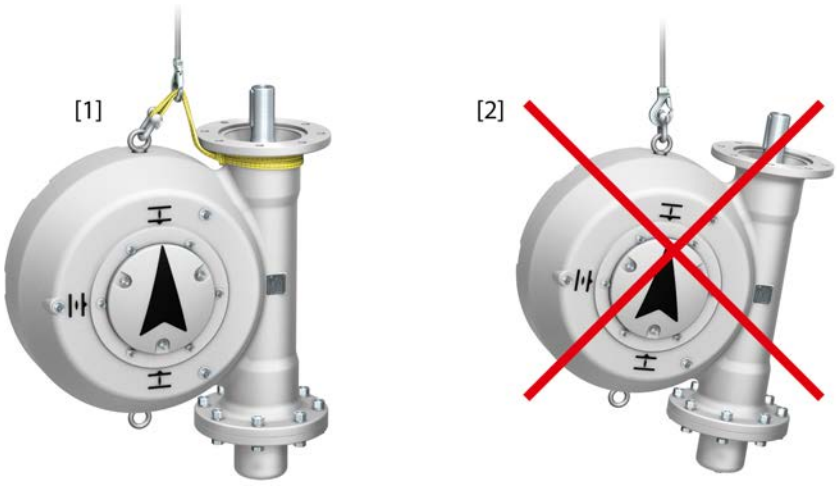
[1] Horizontal suspension
[2] Vertical suspension

GS 315 only

In addition, GS 315 can also be vertically lifted using a combination of an eyebolt with a round sling.

This type of suspension is only permitted for GS 315 type gearboxes without primary reduction gearing. Suspension using an eyebolt without round sling is not permitted.

Figure 7: Example of vertical suspension of GS 315



[1] Permissible: Vertical suspension via eyebolt and round sling
[2] Not permissible: Vertical suspension without round sling

Table 1:

Gearbox weight with coupling (without bore), grease filling in the gear housing and the smallest flange size	
Type	Weight [kg]
GS 315	520
GS 315/GZ 30.1	630
GS 400	980
GS 400/GZ 35.1	1,100
GS 500	1,800
GS 500/GZ 40.1	2,000
GS 500/GZ 16.1 + GZ 40.1	2,030

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

For long-term storage (more than 6 months), observe the following points:

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.

4. Assembly

4.1. Mounting position

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

NOTICE

Damage due to radial forces!

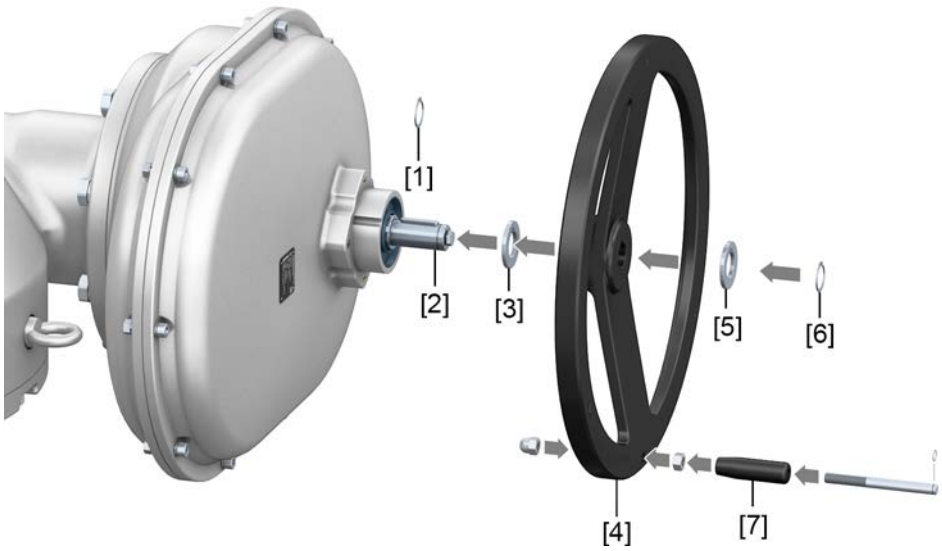
Risk of gear damage for applications requiring transmission of radial forces to the input shaft.

→ In these cases, do NOT directly mount connection shaft to input shaft but fit a coupling or a cardan shaft to the input shaft.

4.2. Handwheel fitting

Gearboxes designed for manual operation are supplied with a separate handwheel. Fitting is performed on site according to the description below.

Figure 8: Handwheel (example)



[1] Retaining ring for input shaft (partly required)
[2] Gear input shaft
[3] Spacer (partly required)
[4] Handwheel
[5] Spacer (partly required)
[6] Retaining ring
[7] Ball handle

1. For input shafts with keyway: Place retaining ring [1] onto input shaft [2].
2. If required, fit spacer [3].
3. Slip handwheel [4] onto input shaft.
4. If required, fit spacer [5].
5. Secure handwheel [4] using the retaining ring [6] supplied.
6. Fit ball handle [7] to handwheel.

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

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).

WARNING

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, presenting the risk that the device performs a radial shift with respect to the gearbox. This can lead to shearing of the screws.

4.3.1. Mounting positions Multi-turn actuators with part-turn gearboxes

Mounting positions A – D for multi-turn actuators with part-turn gearboxes

A

B

C

D

The mounting positions are not available for all sizes/reduction ratios. Risk of crushing due to insufficient distance between handwheel ball handle and the housing for certain sizes.

Please consider possible space confinements on site when selecting the mounting position.

Mounting positions may easily be changed at a later date.

4.3.2. Mount input mounting flange

An input mounting flange is required for mounting a multi-turn actuator. Depending on the version, the flange for mounting the multi-turn actuator is already fitted in the factory.

Table 2:

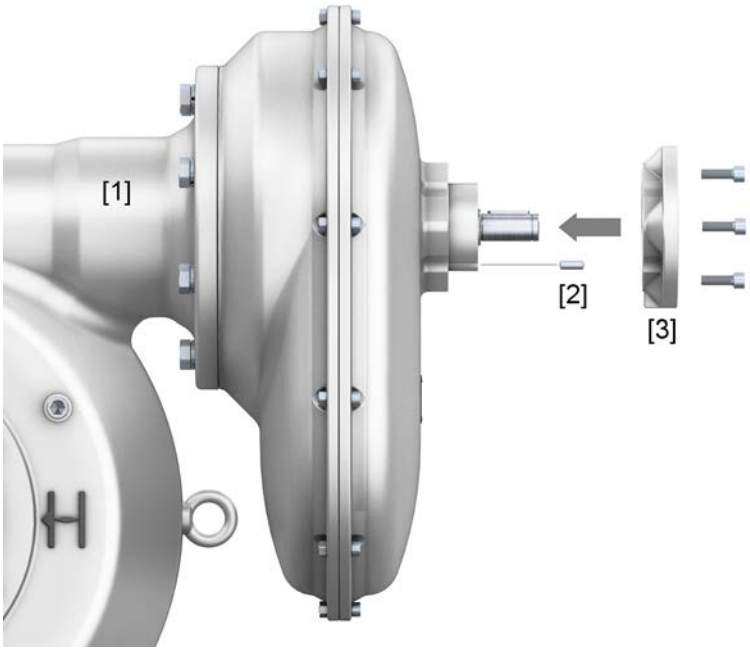
Suitable input mounting flanges

Gearboxes	Reduction ratio	Input shaft	Input mounting flange for mounting multi-turn actuators	
		[mm]	EN ISO 5210	DIN 3210
GS 315	53:1	60	F30	–
GS 315/GZ 30.1 - 4:1	212:1	40	F16	G3
GS 315/GZ 30.1 - 8:1	424:1	30/40	F14	G1/2
GS 315/GZ 30.1 - 16:1	848:1	30/40	F14	G1/2
GS 315/GZ 30.1 - 32:1	1,696:1	20	F10	G0
GS 315/GZ 30.1 - 40:1	2,120.1	20	F10	G0
GS 400	54:1	80	F35	–
GS 400/GZ 35.1 - 4:1	216:1	50	F25	G4
GS 400/GZ 35.1 - 6:1	324:1	40	F16	G3
GS 400/GZ 35.1 - 8:1	432:1	40	F16	G3
GS 400/GZ 35.1 - 8:1	432:1	30	F14	G1/2
GS 400/GZ 35.1 - 16:1	864:1	30	F14	G1/2
GS 400/GZ 35.1 - 32:1	1,728:1		F14	G1/2
GS 500	52:1	100	F40	–
GS 500/GZ 40.1 - 8:1	416:1	40	F25	–
GS 500/GZ 40.1 - 16:1	832:1	40	F16	G3
GS 500/GZ 40.1 - 32:1	1,664:1	30	F14	G1/2
GS 500/GZ 40.1 - 45:1	2,340:1		F14	G1/2
GS 500/GZ 16.1 (4:1) + GZ 40.1 (16:1) - 64:1	3,328:1		F14	G1/2

Assembly steps

1. Clean mounting faces, thoroughly degrease uncoated mounting surfaces.

Figure 9: Mounting example, input mounting flange fitted to gearbox with primary reduction gearing



[1] Gearbox with primary reduction gearing
[2] Parallel pin
[3] Input mounting flange

2. Mount parallel pin [2].
3. Place input mounting flange [3] and fasten with screws.
4. Fasten screws crosswise to a torque according to table.

Table 3:

Tightening torques for screws (for mounting multi-turn actuator and input mounting flange)	
Threads	Tightening torque [Nm]
	Strength class A4-80
M10	48
M16	200
M20	392
M30	1,422
M36	2,481

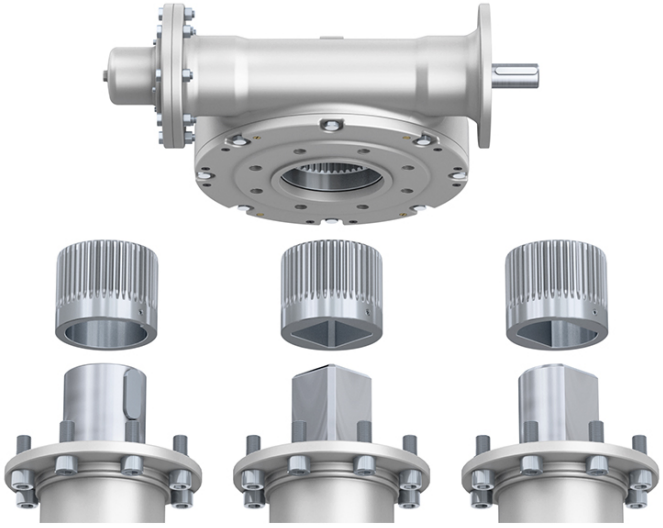
5. Mount AUMA actuator in compliance with the operation instructions pertaining to the multi-turn actuator.

4.4. Mount gearbox to valve

4.4.1. Overview on coupling variants

Design

Figure 10: Valve attachment via coupling



[1] Bore with keyway
[2] Square bore
[3] Bore with two-flats

Application

- For valve attachments according to EN ISO 5211
- For rotating, non-rising valve stem

4.4.2. Mount gearbox with coupling to valve

Unbored couplings or couplings with pilot bore must be machined to match the valve shaft prior to mounting the gearbox to the valve (e.g. with bore and keyway, two-flat or square bore).

Information

Assemble valve and gearbox in the same end position. As a standard, the gearbox is supplied in end position CLOSED.

- Recommended mounting position for **butterfly valves**: End position CLOSED.
- Recommended mounting position for **ball valves**: End position OPEN.

NOTICE

Damage due to radial forces!

Risk of valve damage for applications requiring transmission of radial forces from the valve shaft to the coupling.

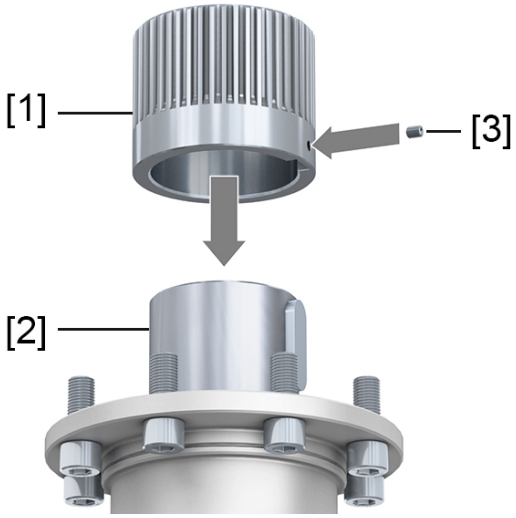
→ In these cases, do NOT directly mount gearbox to valve but use torque reaction lever as connection.

Assembly steps

1. If required, move gearbox in same end position as valve using the handwheel.
2. Clean mounting faces, thoroughly degrease surfaces.
3. We recommend applying a surface sealing agent to the mounting faces.
4. Use a corrosion protection agent for the valve shaft as well as for the inner and outer parts of the coupling (recommendation: CorrosionX HD).

5. Place coupling [1] onto valve shaft [2] and secure against axial slipping by using a grub screw [3] or a clamping washer. Thereby, ensure that dimensions X, Y or L are observed (refer to figure and table <Mounting positions for coupling>).

Figure 11: Example: Fit coupling



[1] Coupling
[2] Valve shaft
[3] Grub screw

Figure 12: Mounting positions for coupling

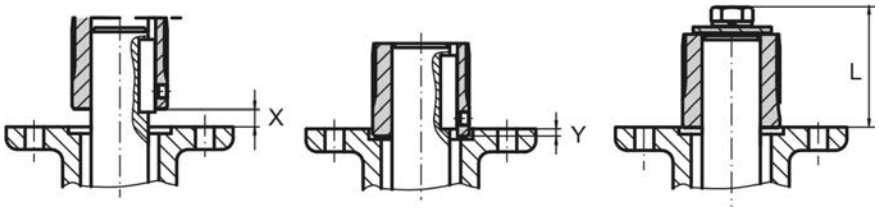


Table 4:

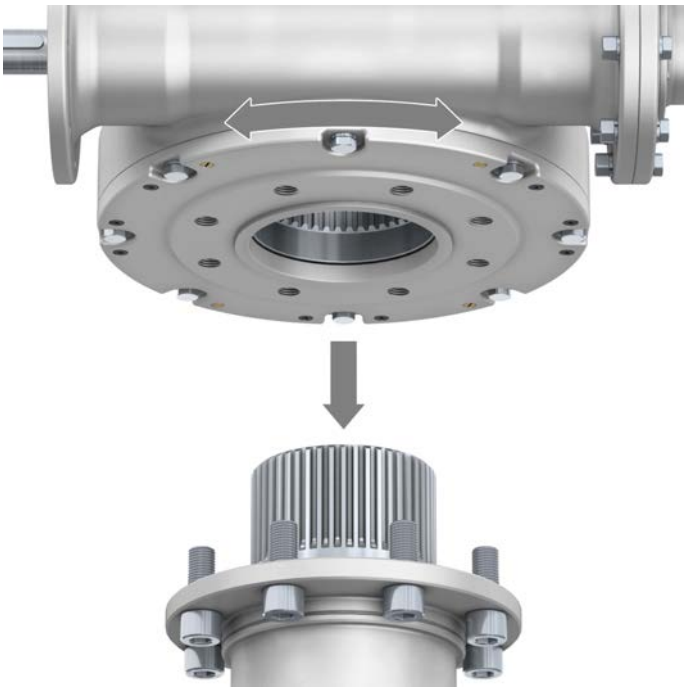
Dimensions [mm]	GS 315		GS 400		GS 500
EN ISO 5211	F40	F48[1)]	F48	F60[1)]	F60 (F60/AUMA)
X max.	26		36		40
Y max.	0		0		0
L max.	280		285		375

1) Coupling dimensions not according to EN ISO 5211 specifications

Information

Experience showed that it is difficult to fasten screws or nuts of size M30 or larger at defined torques. There is a risk that the worm gearbox might shift radially with regard to the valve mounting flange. To improve adhesion between valve and gearbox we recommend applying a thin film of Loctite 243 (or similar threadlocking adhesive) to screw threads.

6. Fit gearbox. If required, slightly turn gearbox until splines of coupling engage.
   Figure 13:



Information Ensure that the spigot (if provided) fits uniformly in the recess and that the flanges are in complete contact.

7. If flange bores do not match thread:
   7.1 Slightly rotate handwheel until bores line up.
   7.2 If required, shift gearbox position by one tooth on the coupling.
8. Fasten gearbox with screws.
   Information: We recommend applying liquid thread sealing material to the screws to avoid contact corrosion.
9. Fasten screws crosswise to a torque according to table.

Table 5:

Tightening torques for screws	
Threads	Tightening torque [Nm]
	Strength class 8.8
M36	2,600
M42	4,000

5. Indications

5.1. Mechanical position indicator/running indication

Figure 14: Mechanical position indicator

[1] Housing cover
[2] Pointer cover
[3] Indicator mark
[4] Symbol for position OPEN
[5] Symbol for position CLOSED

Properties

Mechanical position indicator:

- Used as running indication
  (Pointer cover [2] with mark [3] rotates during actuator operation)
- Continuously indicates the valve position
  (The marks [3] follows the travel of the valve and rotates from OPEN to CLOSED and vice versa by approx. 90°)
- Indicates that end positions (OPEN/CLOSED) have been reached
  (Mark [3] points to symbol for position OPEN [4] or to symbol for position CLOSED [5].)

6. Commissioning

6.1. End stops in gearbox

The internal end stops limit the swing angle. They protect the valve against overload.

End stop setting is performed by the valve manufacturer **prior** to installing the valve into the pipework.

In the factory, end stops are set to a swing angle of 90° unless indicated otherwise in the order.

⚠ CAUTION

Exposed, rotating parts (discs/balls) at the valve!

Pinching and damage at the valve.

→ End stops should be set by suitably qualified personnel only.

→ Set end stops as to ensure that they are NOT approached during normal motor operation.

Information

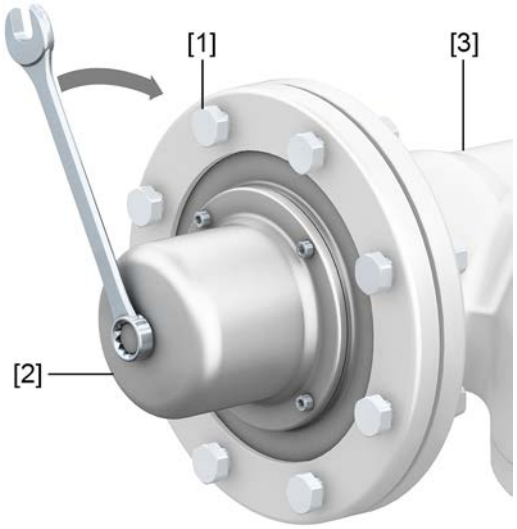
The setting sequence depends on the valve:

- Recommendation for **butterfly valves**: Set end stop CLOSED first.
- Recommendation for **ball valves**: Set end stop OPEN first.

To check the valve shaft position, the pointer cover may be disassembled.

6.1.1. Set end stop CLOSED (butterfly valves)

Figure 15: End stop



[1] Screws
[2] End stop
[3] Housing

1. Loosen the eight screws [1] at end stop [2], but do not remove. The end stop must freely turn.

NOTICE

No overload protection at valve for unfastened end stop!

→ In motor operation: Stop travel before reaching the valve end position (consider overrun).

→ The last part of the travel must be completed in manual operation mode.

2. Turn valve via handwheel to position CLOSED. Check whether end stop [2] rotates simultaneously.

3. Turn end stop [2] after reaching the CLOSED position using ring spanner **clockwise** until stop. With mounted multi-turn actuator (not required for manual operation): Turn end stop [2] counterclockwise by 1/4 turn.

➥ This ensures that the gearbox end stop cannot be reached during motor operation if a multi-turn actuator is mounted and that the valve can close tightly for torque seating.

4. Fasten screws [1] crosswise with a torque according to table.

Table 6:

Tightening torques for screws at end stop		
Gearbox	Screws [1]	Tightening torque T_A [Nm]
GS 315	M20	392
GS 400	M30	1422
GS 500	M36	2481

Further settings hereafter:

- If the gearbox is equipped with a pointer cover: Check whether the mark aligns with the symbol CLOSED. Refer to <Set mechanical position indicator>.
- If the gearbox is mounted to a multi-turn actuator, set the seating in end position CLOSED straight after completion of the current setting position: <Seating in end positions via multi-turn actuator>.

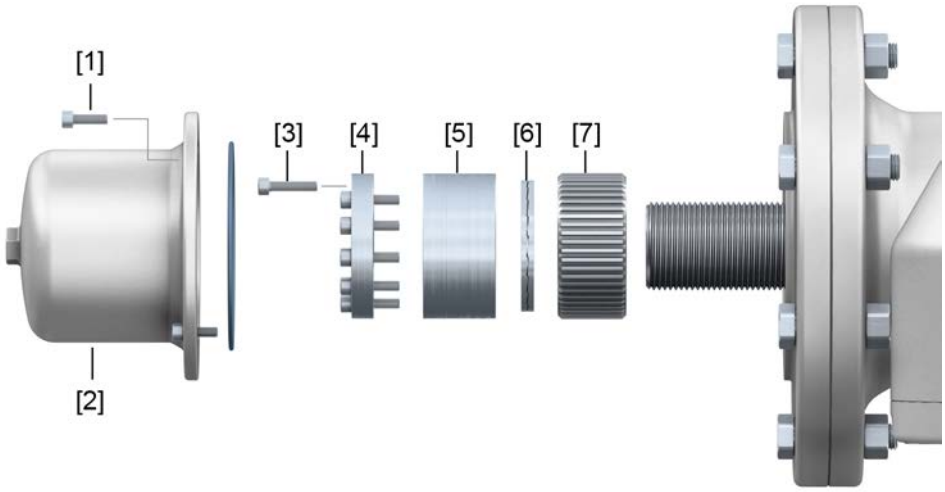
6.1.2. Set end position OPEN (butterfly valves) or modify swing angle at gearbox

The swing angle must only be changed if the swivel range for end stop setting is not sufficient.

Figure 16: Name plate indicating the swing angle

Adjustments are generally made in end position OPEN.

Figure 17: End stop (figure shows size 315)



[1] Screw
[2] Protective cap
[3] Screws for clamping nut
[4] Clamping nut
[5] End stop nut
[6] Pair of safety wedge discs (for OPEN and CLOSED)
[7] Travelling nut

1. Remove all four screws [1] and pull off protective cap [2].
2. Loosen the screws [3] but do not remove.
3. **Change swing angle:**

NOTICE

Valve damage due to incorrect assembly of safety wedge discs!

→ Do not completely unscrew end stop nut.
→ The wedge surfaces of the safety wedge discs must face each other.

3.1 Turn end stop nut [5] including clamping nut [4] until the end of worm shaft thread but do not completely unscrew.
3.2 Move valve manually to the desired end position OPEN.
3.3 Turn end stop nut [5] including clamping nut [4] **clockwise** until their tight seat at the safety wedge discs [6] and end stop nut [7].

4. Tighten clamping nut [4] and end stop nut [5] using screws [3]. Respect specified tightening torque!

Table 7:

Tightening torque for screws [3]	
Gearbox	Tightening torque [Nm]
GS 315	35
GS 400	70
GS 500	70

5. Check whether O-ring at protective cap is in good condition, replace if damaged.
6. Fit protective cap [2] and fasten screws [1] crosswise.

   Information: We recommend applying a surface sealing agent to the mounting faces.

Information

If the gearbox is mounted to a multi-turn actuator, the limit switching for end position OPEN must be set first in compliance with the operation instructions of the multi-turn actuator.

6.2. Seating in end positions via multi-turn actuator

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

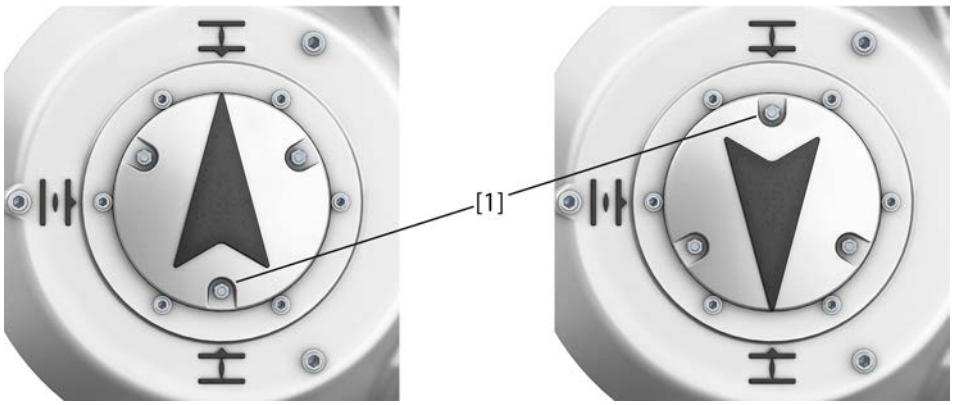
- End position seating must be set in compliance with the operating instructions pertaining to the multi-turn actuator.
- Part-turn gearboxes of GS 315 – GS 500 type are supplied separately from the actuator. End stop setting of gearbox and setting of limit and torque switches must be performed by the valve manufacturer or at the latest on site by specialised staff.
- When setting the torque switching within the multi-turn actuator, make sure that the tripping torque for both directions does not exceed the max. gearbox input torque (refer to technical data or name plate).
- Set the torque switching within the multi-turn actuator to the following value to prevent damage to the valve:
  Tripping torque = valve torque/factor (refer to name plate)
- Determine overrun of actuator for both directions, i.e. how much does the valve move after the motor has been switched off?

6.3. Set mechanical position indicator

End position CLOSED

1. Move valve to end position CLOSED and check setting.

➥ The setting is correct if the mark aligns with the symbol CLOSED.



2. If the mark position is not correct:
   2.1 Slightly loosen three nuts [1] at pointer cover.
   2.2 Turn pointer cover to symbol for position CLOSED.
   2.3 Tighten nuts again.

End position OPEN

3. Move valve to end position OPEN and check setting.

➥ The setting is correct if the mark aligns with the symbol OPEN.

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. Therefore, we recommend contacting our service.

→ Only perform servicing and maintenance tasks when the device is switched off.

AUMA Service & Support

AUMA offers extensive service such as servicing and maintenance as well as customer product training. For the contact addresses, refer to our website (www.auma.com).

7.1. Preventive measures for servicing and safe operation

- Before commissioning, perform visual inspection for grease leakage and paint damage (corrosion).
- Thoroughly touch up any possible damage to paint. Original paint in small quantities can be supplied by AUMA.

7.2. Maintenance intervals

Recommendation for plants subject to strong vibration

- For plants subject to strong vibration, 6 months after commissioning and then once a year: Check fastening screws between actuator and gearbox/valve for tightness. If required, fasten screws while applying the tightening torques as indicated in chapter <Assembly>. For screws sealed and secured with e.g. thread sealing material, this action is not required.

Recommendation for grease change and seal replacement:

- If rarely operated (typically in buried service), the gearboxes are maintenance-free. Grease change or re-lubrication is not necessary.
- If operated frequently (typically in modulating duty), we recommend changing both grease and seals after 4 – 6 years.

NOTICE

Gearing damage due to using inappropriate grease!

→ Only use original lubricants supplied by AUMA.

→ Do not mix lubricants.

Instructions for use in potentially explosive atmospheres of categories M2, 2G, 3G, 2D and 3D

- Imperatively heed ambient temperatures, type of duty and running times specified in the technical data and on the name plate.
- In hazardous areas where combustible dust is present in particular, perform visual inspection for deposit of dirt or dust on a regular basis. Clean devices if required.
- The pointer cover with indicator glass is only approved for use in potentially explosive atmospheres according to ATEX II 2G Ex h IIB T4 Gb or T3.
- When using mechanical microswitches (option), additionally observe the mounting and wiring instructions of the manufacturer.

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.:

- various metals
- Plastic materials
- 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 tables include standard and optional features. For detailed information on the customer-specific version, refer to the order-related data sheet. The technical data sheet can be downloaded from the Internet in both German and English at **http://www.auma.com** (please state the order number).

8.1. Technical data Part-turn gearboxes

Features and functions		
Worm wheel material	For open-close duty: Spheroidal cast iron For modulating duty: Bronze	
Version	Standard:	Clockwise rotation RR, counterclockwise rotation LL
	Option:	RL or LR
Housing material	Standard:	Cast iron (GJL-250)
	Option:	Spheroidal cast iron (GJS-400-15)
Self-locking	The gearboxes are self-locking when at standstill under normal service conditions; strong vibration may cancel the self-locking effect. While in motion, safe braking is not guaranteed. If this is required, a separate brake must be used.	
End stops	Positive for both end positions by travelling nut, sensitive adjustment	
Strength of end stop	Guaranteed strength of end stop (in Nm) for input side operation according to AWWA	

Type	GS 315			GS 400			GS 500			
Primary reduction gearing	GZ 30.1			GZ 35.1			GZ 40.1		GZ 40.1	GZ 16.1
Reduction ratio	8:1	16:1	32:1	8:1	16:1	32:1	16:1	32:1	16:1	4:1
[Nm]	450		250	450			450		450	

Strength of end stop for special reduction ratios	Guaranteed strength of end stop (in Nm) for input side operation

Type	GS 315			GS 400			GS 500	
Primary reduction gearing	GZ 30.1			GZ 35.1			GZ 40.1	
Reduction ratio	4:1	16:1	40:1	4:1	6:1	8:1	8:1	45:1
[Nm]	450		250	450			450	500

Swing angle GS 315 – GS 500	Standard:	Adjustable 0° – 135°; set in the factory to 92° unless ordered otherwise.
	Options:	Swing angle > 100°, multi-turn version without end stops, GSD version. Multi-turn version without end stop, up to max. 10 turns of worm wheel permissible. Heed special sizing!
Mechanical position indicator	Standard:	Pointer cover for continuous position indication
	Options:	• Sealed pointer cover for horizontal outdoor installation • Protection cover instead of pointer cover for buried service For gas applications with sealed pointer cover, an air vent valve in the pointer cover or venting keyways in the valve mounting flange must be provided.
Input shaft	Cylindrical with parallel key according to DIN 6885-1 (refer to table on page 1)	

Operation

Motor operation

- With electric multi-turn actuator, directly or through VZ/GZ primary reduction gearing
- Input mounting flanges for multi-turn actuator (refer to table page 2)

Manual operation

Available handwheel diameters (according to EN 12570), selection according to output torque:

Type	GS 315					
Primary reduction gearing	–	GZ 30.1				
Reduction ratio	53:1	212:1	424:1	848:1	1,696:1	2,120.1
Handwheel Ø [mm]	–	–	800	500/830	400	400

Type	GS 400						
Primary reduction gearing	–	GZ 35.1					
Reduction ratio	54:1	216:1	324:1	432:1	432:1	864:1	1,728:1
Handwheel Ø [mm]	–	–	–	–	800	800	500/630

Type	GS 500					
Primary reduction gearing	–	GZ 40.1				GZ 16.1 + GZ 40.1
Reduction ratio	52:1	416:1	832:1	1,664:1	2,340:1	3,328:1
Handwheel Ø [mm]	–	–	–	800	800	500/630

Standard:

- Handwheel made of aluminium
- Handwheel with ball handle

Options:

- Handwheel made of GJL-200
- Handwheel lockable
- WSH limit switching device for signalling position and end positions

Primary reduction gearing

Primary reduction gearing

- Type GZ as coaxial spur gear with various reduction ratios for reducing the input torques .
- Combination with GK bevel gearbox directly on GS or on GS with GZ possible (90° deflection of input shaft)

Valve attachment

Valve attachment

Dimensions according to EN ISO 5211: The maximum torques of mounting flanges according to EN ISO 5211 are to be met.

Standard:

- With spigot

Splined coupling for connection to the valve shaft

Standard:

- With pilot bore
- Worm gearbox can be mounted at 4 x 90° increments on coupling

Options:

Finish machining with bore and keyway, square bore or two-flat with grub screw for secure fixing to valve shaft.

Limit sensing for signalling position and end positions

Valve position indicators

- WSG valve position indicator (hall sensors) for position and end position signalling to ensure precise and low-backlash feedback for swing angles ranging between 82° and 98°.
- WGD valve position indicator (counter gear mechanism) for position and end position signalling for swing angles > 180°

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 according to EN 60529	Standard:	IP67	
	Options:	IP68 IP68-10, dust-tight and water-tight up to max. 10 m head of water IP68-20, dust-tight and water-tight up to max. 20 m head of water	
Corrosion protection	Standard:	KN	Suitable for installation in industrial units, in water or power plants with a low pollutant concentration.
	Options:	KS	Suitable for use in areas with high salinity, almost permanent condensation, and high pollution.
		KX	Suitable for use in areas with extremely high salinity, permanent condensation, and high pollution.
Paint	Standard:	Primer coated	
	Option:	Two-component iron-mica combination	
Colour	Standard:	AUMA silver-grey (similar to RAL 7037)	
	Option:	Available colours on request	
Lifetime	Open-close duty:	Lifetime for 90° rotary movement	

Type	GS 315	GS 400	GS 500
Number of cycles for max. torque	2,500	1,200	1,200

AUMA worm gearboxes meet or exceed the lifetime requirements of EN 15714-2. Detailed information can be provided on request.

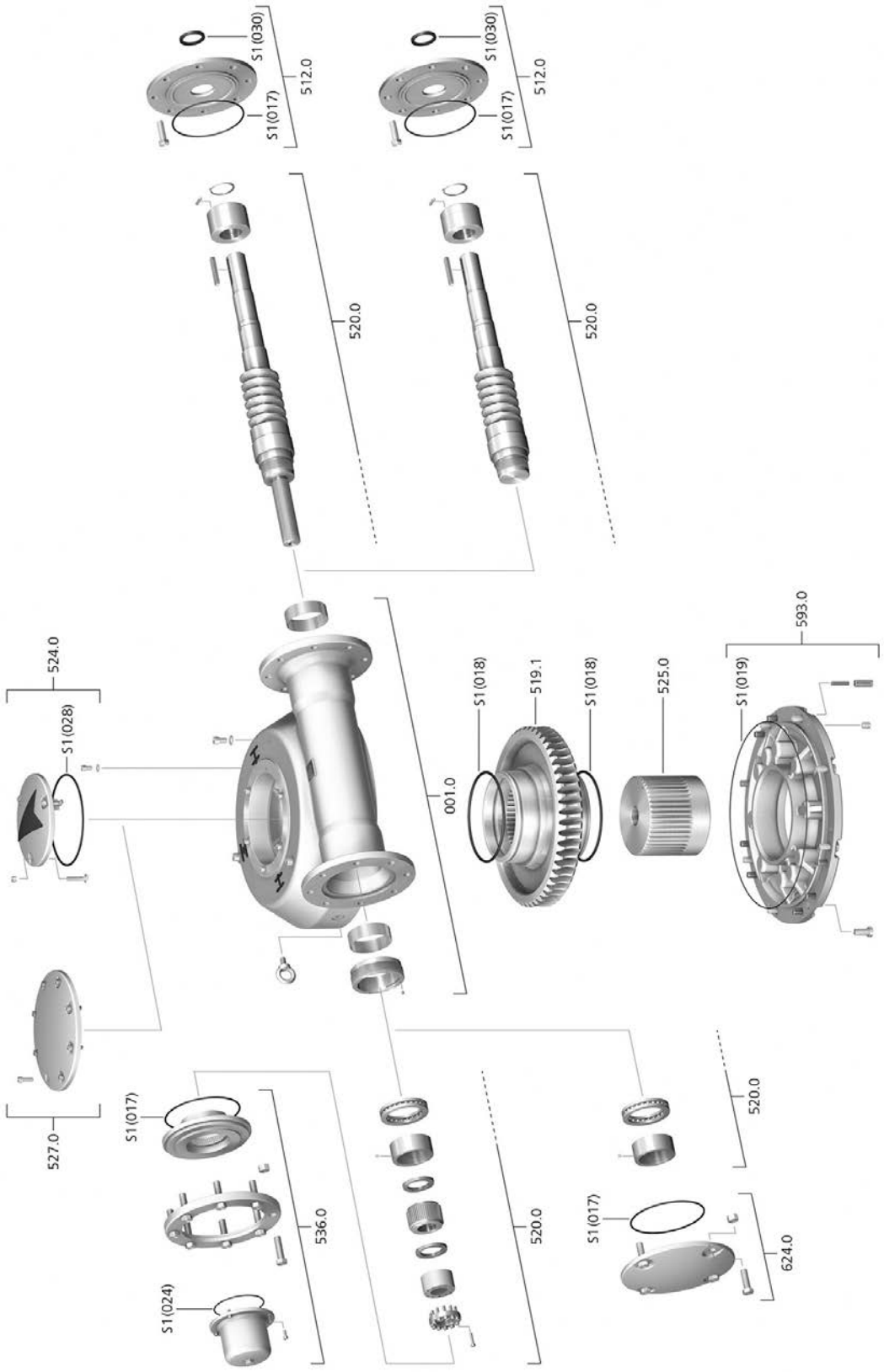
	Modulating duty:	2.5 million modulating steps

Special features for use in potentially explosive atmospheres in accordance with ATEX 2014/34/EU		
Explosion protection in accordance with ATEX 2014/34/EU	Standard:	II 2G Ex h IIC T4 Gb, II 2D Ex h IIIC T130°C Db
		Further versions available depending on the production configuration and on request.
Applied standards	EN ISO 80079-36:2016-12 EN ISO 80079-37:2016-12	
Type of duty (open-close duty, with worm wheel made of spheroidal cast iron)	Standard:	Maximum 3 cycles (OPEN - CLOSE - OPEN) in accordance with AUMA load spectrum (90° part-turn movement) and maximum permissible input speeds or with mean constant output torques according to technical data.
Type of duty (modulating duty with worm wheel made of bronze)	Standard:	Intermittent duty S4 – 25 % with modulating torque and max. input speed
Ambient temperature (open-close duty, with worm wheel made of spheroidal cast iron)	Standard:	–40 °C to +60 °C
	Options:	–50 °C to +60 °C –60 °C to +60 °C
Ambient temperature (modulating duty with worm wheel made of bronze)	Standard:	–40 °C to +60 °C
	Options:	0 °C to +60 °C –60 °C to +120 °C

Further information		
EU Directives	ATEX Directive: (2014/34/EU) Machinery Directive: (2006/42/EC)	

9. Spare parts

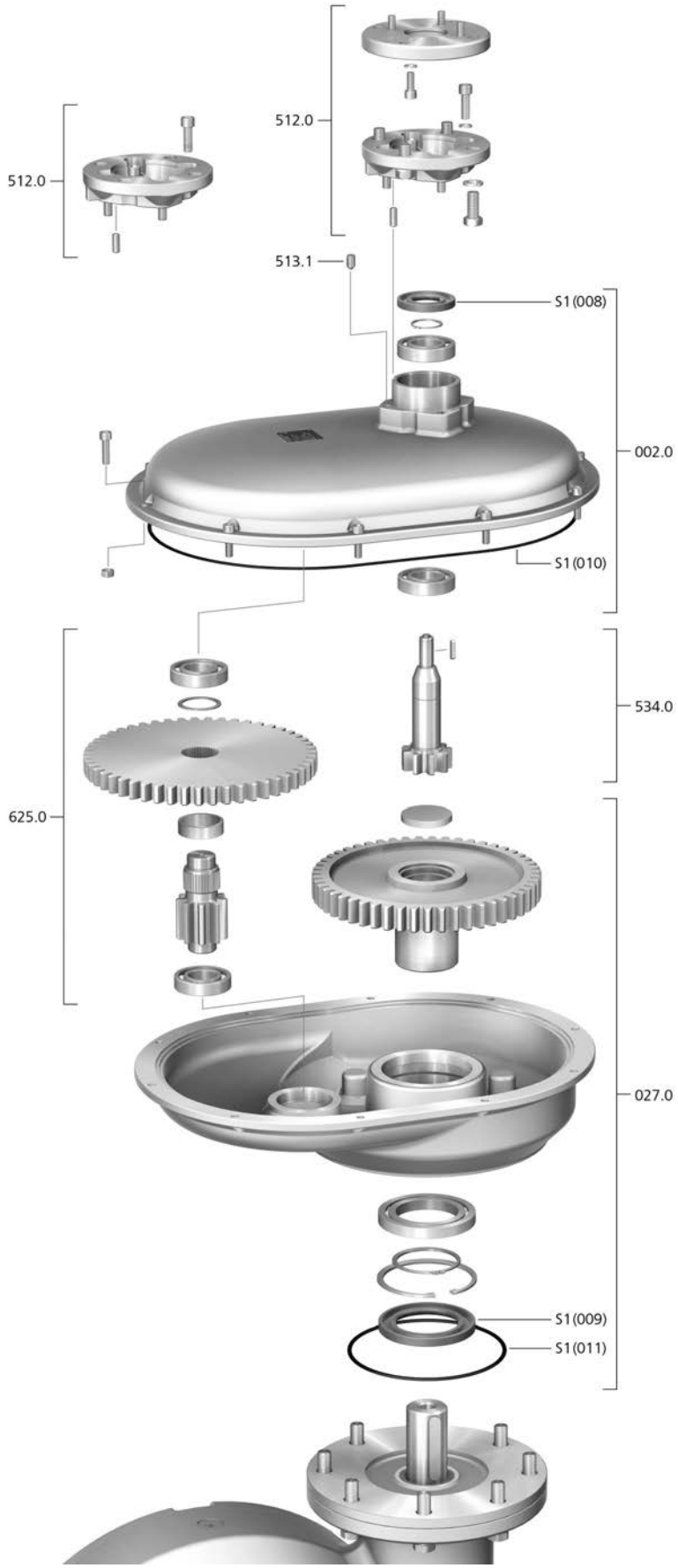
9.1. Part-turn gearboxes GS 315 – GS 500



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	Type
001.0	Housing	Sub-assembly
512.0	Input mounting flange	Sub-assembly
519.1	Worm wheel	
520.0	Worm shaft	Sub-assembly
524.0	Pointer cover	Sub-assembly
525.0	Coupling	Sub-assembly
527.0	Protection cover	Sub-assembly
536.0	Protective cap	Sub-assembly
593.0	Mounting flange	Sub-assembly
624.0	Cover	Sub-assembly
S1	Set of seals	Set

9.2. Primary reduction gearing for GS 315 – GS 500



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	Type
002.0	Housing cover	Sub-assembly
027.0	Housing	Sub-assembly
512.0	Input mounting flange	Sub-assembly
513.1	Grub screw	
534.0	Drive shaft	Sub-assembly
625.0	Gear shaft assembly	Sub-assembly
S1	Seal kit	Set

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