

DREHMO

VALVE ACTUATORS

A member of the AUMA Group

S-range

**Electric actuator
(for normal version/ explosion-proof versions)**



Assembly, operation and servicing instructions
for multi-turn, part-turn and linear actuators

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This operating manual is part of the supply and should be kept for future use.

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1 Safety instructions

This section deals with basic, safety-relevant information relating to DREHMO actuators. We would like to ask you to thoroughly read the instructions prior to working on the actuators.

1.1 Basic information on safety

Standards/directives

DREHMO 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. Plant operators or plant manufacturers 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 by suitably qualified personnel authorised by the plant operators or plant manufacturers 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 plant operators or plant manufacturers 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 national regulations.
- During operation, the housing warms up and surface temperatures $>60^{\circ}\text{C}$ 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 plant operators or plant manufacturers 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

DREHMO actuators are designed for the operation of gate valves, butterfly valves, and ball valves. If temperatures outside the range for ambient temperature specifications as marked on the name plate (e.g. due to hot media) are to be expected, you are requested to contact the manufacturer. 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
- Buried service
- Continuous submersion (observe enclosure protection)
- Potentially explosive areas of zones 0, 20 and 21
- Potentially explosive areas of group I (mining)
- 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.

Information: These instructions apply to the clockwise closing standard version, i.e. the driven shaft turns clockwise to close the valve.

1.3 Warnings

The following warnings draw special attention to safety-relevant sections 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 could result 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 may result in minor or moderate injury. May also be used with property damage.
NOTICE	Potentially hazardous situation. Failure to observe this warning may result in property damage. Not used for injuries or death.

Structure of the warning instructions for **DANGER**, **WARNING**, **CAUTION** and **NOTICE**:



WARNING

Type of hazard and respective source!

Possible cause(s) in case of failure to respect safety instructions, actions for risk avoidance and further optional measures.

The safety symbol of the triangle on the base line is used for warning of an potential risk of injury. The signal word indicates the level of hazard. Failure to observe the blue information symbol may result in property damage (not used for injuries or death).



NOTICE

Type of hazard and respective source!

Possible cause(s) in case of failure to respect safety instructions, actions for risk avoidance and further optional measures.

2 Identification

The following section describes the characteristics allowing identification of the respective DREHMO actuator.

2.1 Name plates

Each actuator is equipped with an actuator and a motor name plate including information required for unambiguous identification (refer to figure 2.1). For commissioning, service and maintenance, additional actuator-relevant data is indicated on the name plates.

DREHMO Zum Eichstruck 10 Made in Germany
Geräte-Nr. serial-no.
Antriebs-Typ actuator-type Bauj.
Zündschutzart
prot. class
Md-Bereich Nm max. Regelmoment Nm
torque-range
Drehzahl speed min⁻¹ Stellzeit operating time s/
Umgebungstemperatur ambient temperature °C
Schutzart enclosure IP
Ex

Figure 2.1: Actuator name plate for explosion-proof version

DREHMO Zum Eichstruck 10 Made in Germany
Geräte-Nr. serial-no. D/En
Antriebs-Typ actuator-type Bauj.
Zündschutzart
prot. class
Md-Bereich Nm max. Regelmoment Nm
torque-range
Drehzahl speed min⁻¹ Stellzeit operating time s/
Umgebungstemperatur ambient temperature °C
Schutzart enclosure IP

Figure 2.2: Actuator name plate

DREHMO -Topfmotor
Motor-Nr.
Motor-No.
Motor-Typ
Motor-Type
V cos φ
A Hz
kW min⁻¹
Schutz Protection IEC 60034-1
124248

Figure 2.3: Motor name plate

The actuator name plate is selected according to the actuator version and fixed to the actuator.

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

2.2 Actuator designation

The following example is used to explain the actuator designation:

Value range	D	*	*	*	*	-	*	-	*		*
Position	1	2	3	4	5	6	7	8	9	10	11

Position	Value range	Signification
1	D	DREHMO actuator
2		Multi-turn actuator
	P	Part-turn actuator
3		Actuator without controls
	MC	Actuator with C-matic controls
	iM	Actuator with i-matic or i-maticC controls
4		Actuator for open-close operation, type of duty S2 <15 Min
	R	Type of duty for modulating actuator: S4 max. 35 %ED
5	30 to 2000	Nominal torque in Nm for multi-turn actuators D...
	30 to 1800	Nominal torque in Nm for part-utrn actuators DP...
6	-	Line
7	A, AF, B, B1, B2, B3, B3DO, B4, C, D, DO, DOU, DSTO, DSTU, E, EDO	Valve attachment types for multi-turn actuators according to EN ISO 5210
	B, V, W, L/D, H, FH, FW	Valve attachment types for part-turn actuators according to EN ISO 5211
8	-	Line
9	5 to 160 (50 Hz) 6 to 192 (60 Hz)	Output drive speed in rpm for multi-turn actuators D...
	8 to 60 (50 Hz)	Operating time for 90° in seconds for part-turn actuators DP...
	6 to 50 (60 Hz)	
10		Blank
11		Standard actuator
	Ex	Explosion-proof actuator

Table 2.2: Type code

3 Transport, storage and packaging

This section of the operation instructions deals with safe transport, appropriate storage and packaging. The information given shall avoid property damage and personal injury.

3.1 Transport

DANGER

Hovering load! Risk of death or serious injury



- Do NOT stand below hovering load.
- Fix ropes or slings around housing, NOT to handwheel, stem protection cover or motor eyebolt.
- If the actuator is mounted to a valve, fix ropes or slings at the valve.
- If a gearbox is mounted to the actuator, fix ropes or slings at gearbox.

Please refer to figure 3.1 below for appropriate actuator transport.



Figure 3.1: Transport

3.2 Storage

Mounting or storage in humid environments requires appropriate actions for avoiding condensation inside the actuator. If the actuator is equipped with an externally supplied additional heater, this heater must be used. If the device is to be stored for a long period (more than 6 months), the following points must be observed:

- Protect uncoated surfaces, in particular the output drive parts and mounting surface with corrosion protection agent prior to storage.
- Check uncoated surfaces for corrosion approximately every 6 months.
- Ensure that actuators are fully operational by performing a test run every 6 months.

NOTICE

Danger of corrosion and damage to the control unit due to inappropriate storage



- Store in a well-ventilated, dry and closed room.
- Protect against dampness from the floor and ambient humidity.
- Cover to protect against dust and dirt.
- Apply suitable corrosion protection agent to uncoated surfaces.
- Switch on device heater.

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 Mounting to valve

This section deals with mounting the actuator on a valve, while detailing the specialities of the different version. In any case, check the actuator first for any damage. Replace damaged parts by original spare parts.

DREHMO actuators can be mounted in any position. Mounting is easiest if the vertically fitted valve shaft is freely accessible. To fix the DREHMO actuator to the valve, threaded holes are provided at the actuator mounting flange. The dimensions of the actuator mounting flange with output drive types comply with standards EN ISO 5210 (multi-turn actuators) or EN ISO 5211 (part-turn actuators).

4.1 Handwheel operation

Both actuator or valve can be operated manually at any time via the handwheel in case of power failure. Switching between motor operation and handwheel operation is not required. Clockwise rotation of handwheel results in clockwise rotation of output drive (for view on motor name plate).

WARNING

Damage to actuator and mounted elements by handwheel operation



- The set tripping torques do not limit the forces applied by the handwheel.
- Manual operation only
- Power drive for handwheel operation is only available on request with the manufacturer.
- Use of levers of any type is not permitted.

4.2 Removal and fitting of stem nut (output drive type A)

For output drive type A, make sure that the unbored stem nut (delivered unbored unless stated otherwise) must be provided with a thread bore in compliance with available stem prior to mounting the DREHMO actuator onto the valve.

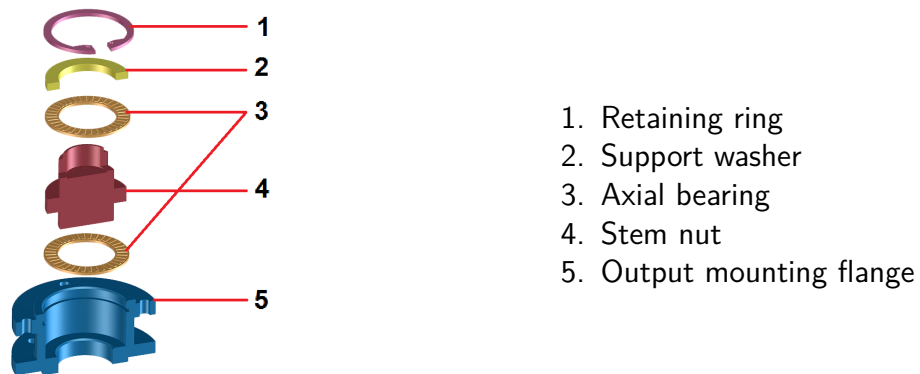


Figure 4.1: Stem nut type A

Remove output mounting flange (5) from actuator. Remove retaining ring (1) and remove stem nut (4) including support washer (2) and axial bearing (3). Perform thread bore. Reverse the process to reassemble stem nut. Apply a thin film of sealing agent (e.g. Curil K2) at sealing faces of output mounting flange (5) prior to assembly.

4.3 Removal and fitting of stem nut (output drive type A-HP)

For better distinction, each of the new stem nuts is marked with a turned marking groove at the shoulder circumference.

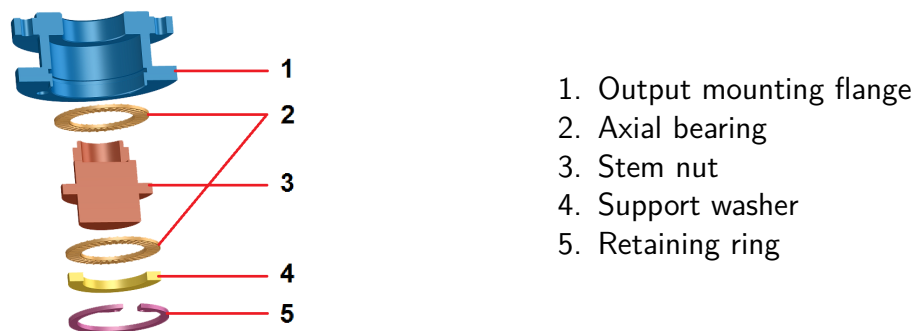


Figure 4.2: Stem nut type A HP with retaining ring

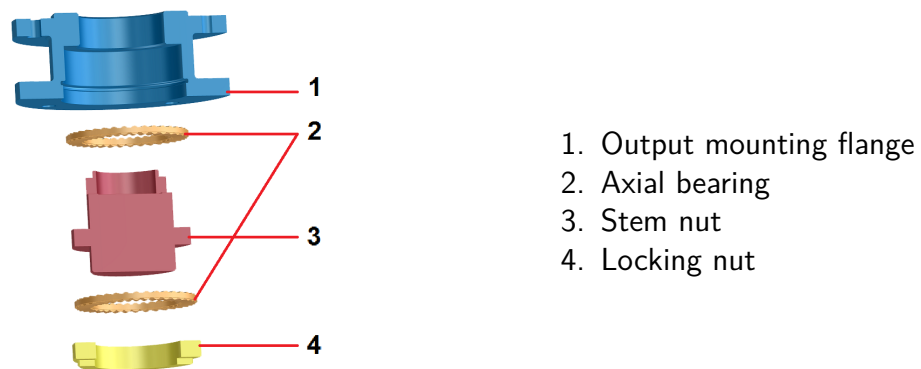


Figure 4.3: Stem nut type A HP with thread ring

Remove retaining ring (5) / locking nut (4) and remove stem nut (3), axial bearing (2). If the output drive has a retaining ring the support washer (4) has to be removed too. Perform thread bore. Reverse the process to reassemble stem nut.

NOTICE

Excessive lubricant application can impair the tightness of the actuator



- The actuators have a lifetime lubrication
- A device for permanent lubrication of a stem (only output drive type A and A-HP) can be inquired of the manufacturer

4.4 Insulating flange

When using an insulating flange, heed the length of the screws used. They must not be too long: otherwise the insulating caps within the flange or even the flange as such will be damaged. We therefore recommend using studs according to DIN 938 with a depth of thread of $1 \times D$ (refer to figure 4.4) for assembly. A remaining width of joint of 0 mm must not be fallen short of.

NOTICE

Risk of damage at insulating flanges when using motors with mounted terminal box (standard motors) and horizontal mounting position!



- Due to the limited permissible forces on the insulating flange, horizontal mounting positions are not allowed for actuators with standard motors (external clamp cage).

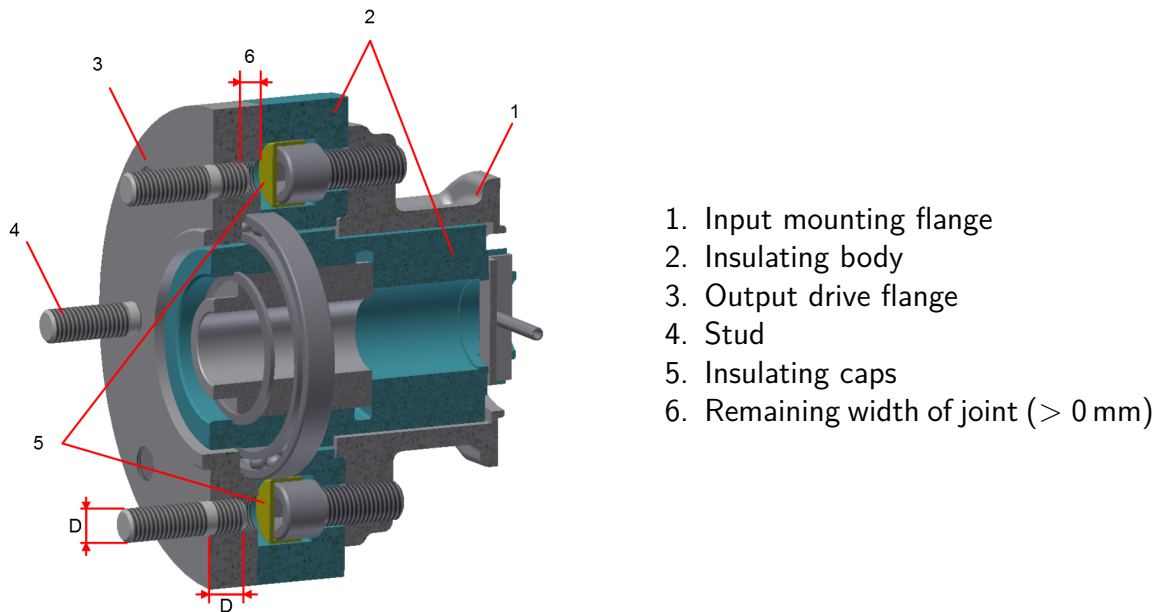


Figure 4.4: insulating flange

4.5 Rain protection hood

For HEW-RUF motors, the rain protection hood (2) is always used in combination with the fan cover (1) (siehe Abbildung 4.5). This is the responsibility of the supplier! The hood must only be disassembled at the customers' for upward mounted shafts (protection hood points downward). For this, the fan cover (1) must be disassembled first. After this, the rain hood (2) with positive connection can be removed. For this, straighten the four lugs (3) using appropriate universal pliers. Finally, the fan cover (1) must be refitted.

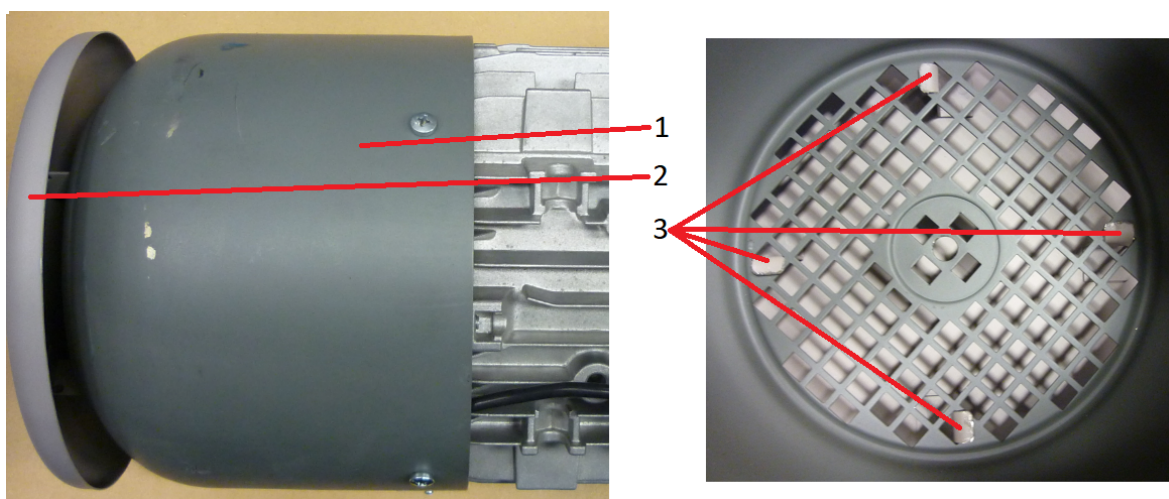


Figure 4.5: Regenschutzhaube

4.6 Assembly

Direct mounting

For direct mounting, the actuator is fitted without intermediate gearing to the valve. For this purpose, part-turn actuators are equipped with an unbored (standard) output drive plug sleeve. The output drive plug sleeve is equipped with splines on the outside (to be coated with appropriate grease prior to assembly) and can therefore be inserted into the actuator at different angles. As standard, multi-turn actuators are available with output drive type B3. Output drives A, B1, B2, B4, E, C and D are available on request.

Align actuator on valve, then rotate the device until fixing holes of actuator and valve align and the output drive is correctly placed on the valve flange. Fasten actuator crosswise to valve using appropriate screws.

Output drive type A is an exception. This output drive type must be fastened to the valve first. Rotate the drive assembly down the valve shaft to mate with the valve flange. Align the fixings and attach loosely, rotate the drive coupling to take up the free play and ensure close coupling of the flanges, before fastening tightly. Then the actuator is placed on the drive assembly and can be rotated to the correct position via the handwheel before fixing tightly into position.

Screw strength class 8.8 ($\mu_t \approx 0.12$)										
Threads	M6	M8	M10	M12	M14	M16	M18	M20	M30	M36
Tightening torque in Nm	10	25	49	85	135	210	300	425	1450	2600

Table 4.1: Tightening torques

The actuator is mounted to the valve using an output drive plug sleeve (refer figure 4.6). Ensure compliance of fitting dimensions according to table 4.2 below.

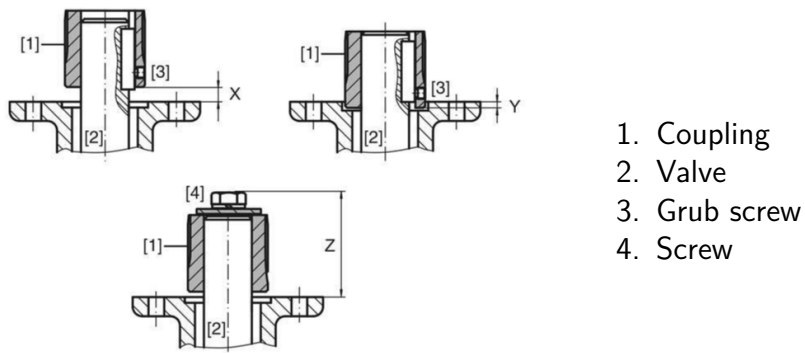


Figure 4.6: Cross sections of different couplings

NOTICE

Increased fastening torque for powder coated flanges possibly required



- Thanks to powder coating on flange surfaces and flange threads, we achieve top quality and permanent corrosion protection. However, increased fastening torque of up to 2 Nm across all screw dimensions might be required. Consequently, tools might already be required when fastening the screws (typically a socket is sufficient). This was considered when specifying the screw connection and is totally uncritical in practice.

1. Use handwheel to run actuator to mechanical end stop.
2. Thoroughly degrease mounting surfaces of output mounting flanges and apply appropriate sealing agent (e.g. Curil K2).
3. Apply a small quantity of grease to the valve shaft [2].
4. Place coupling [1] onto valve shaft [2] and secure against axial slipping by using a grub screw [3], a retaining ring or a screw. Thereby, ensure that dimensions X, Y or Z are observed (refer to figure 4.6 and table 4.2).
5. Apply non-acidic grease at splines of coupling.
6. Fit part-turn actuator.
7. If flange bores do not match thread:
 - a) Slightly rotate handwheel until bores line up.
 - b) If required, shift actuator position by one tooth on the coupling.
8. Fix actuator using suitable screws.

We recommend applying liquid thread sealing material to the screws. Fasten screws cross-wise to a torque according to table 4.1.

Type, size - output mounting flange	X _{max} in mm	Y _{max} in mm	Z _{max} in mm
DP..(R)75/150/299-F05/07	3	2	40
DP..(R)75/150/299-F10	3	2	66
DP..(R)300/450-F10	4	5	50
DP..(R)300/450-F12	4	5	82
DP..(R)600/900-F12	5	10	62
DP..(R)600/900-F14	5	10	102
DP..(R)1200/1800-F14	8	10	77
DP..(R)1200/1800-F16	8	10	127
DP..30,59,119	1		
DP..319,799	1.5		
DP..1599	3		

Table 4.2: Coupling fitting dimensions

Indirect mounting

For indirect mounting DREHMO actuators can be supplied with base and lever or with base and shaft. Connection between actuator and valve is provided by the customer (e.g. via lever arrangement).

4.7 Additional settings for part-turn actuators

End stops in part-turn actuator

The internal end stops limit the swing angle. They protect the valve in the event of manual handwheel operation. End stop setting is generally performed by the valve manufacturer prior to installing the valve into the pipework.

CAUTION

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

Hazard of crushing hands or feet and damage to valve or actuator.



- End stops should be set by suitably qualified personnel only.
- Never completely remove the setting screws [2] and [4] to avoid grease leakage (refer to figure 4.8).

Note: The setting sequence for the end stops depends on the valve. We recommend to start with the end stop CLOSE for butterfly valves and with end stop OPEN for ball valves.

On delivery, unfasten both screws for the end stop (figure 4.7) to allow alignment of actuator to valve. The minimum and maximum dimensions for adjustment indicated in tables 4.3, 4.4 and 4.5 must not be exceeded. The valve must be in CLOSED position during actuator mounting.

Type of actuator 90°	Mid position a	Max.	Min.
DP30, 59,119 (Ex)	11 mm	14 mm	8 mm
DP319, 799 (Ex)	35 mm	40 mm	31 mm
DP1599 (Ex)	40 mm	46 mm	35 mm

Table 4.3: Setting limits of hexagon and pin-shaped stop screws with lock nuts

Type of actuator 90°	Mid position a	Max.	Min.
DP319, 799 (Ex)	3.5 mm	8.5 mm	-0.5 mm
DP1599 (Ex)	3 mm	9 mm	-2 mm

Table 4.4: Setting limits of pin-shape stop screws without lock nut

Type of actuator 90°	T	T _{min}
DP75/150/299 (Ex)	17mm	11mm
DP300/450 (Ex)	20mm	12mm
DP600/900 (Ex)	23mm	13mm
DP1200/1800 (Ex)	23mm	12mm

Table 4.5: Setting limits of stop screws for planetary gearings

The end stop screws are mechanical limits for manual operation and may not be approached during motor operation!

Turn handwheel clockwise to mechanical stop, then slowly rotate one turn counterclockwise. The output drive plug sleeve must be fitted in the actuator. After finish boring, slide output drive plug sleeve on valve shaft and secure if required.

Apply a thin film of sealing agent (e.g. Curil K2) at output mounting flanges prior to assembly. Align actuator to the possible angle steps and slowly push on output drive plug sleeve.

In case the dog of the hollow shaft does not engage into the respective keyway of the output drive plug sleeve, rotate the handwheel until hollow shaft engages. Slowly rotate handwheel until flange bores align, then fasten actuator using flange screws. If more than one handwheel turn is required, put the actuator to the initial position, lift it and place it again onto the output drive plug sleeve by moving one indent.

Setting the mechanical end stop screws

DP . . 30/59/119 (without gearbox) /319/799/1599 (with spur gearbox)

The actuator is in the respective end position. This position must match the valve end position. Insert and turn stop screw for the respective end position (figure 4.7) until resistance is felt. Then rotate by one turn in the opposite direction and secure with lock nut.

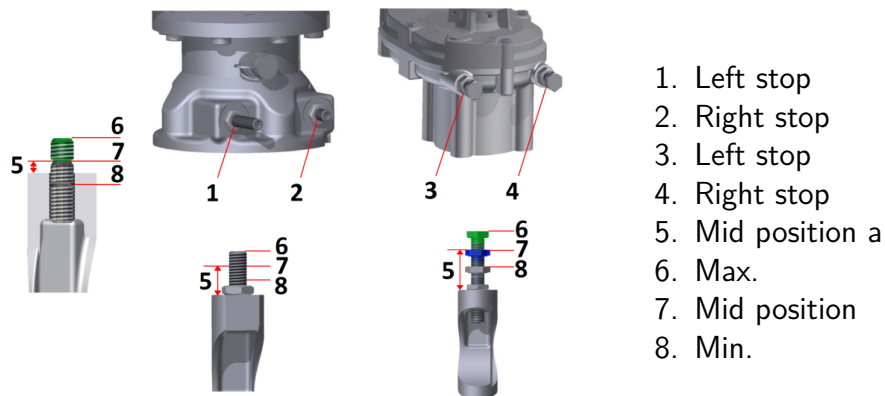


Figure 4.7: End stop screws

Slightly open valve by approximately half a turn of the handwheel (for end position CLOSED) or slightly close (for end position OPEN). Then perform end stop setting.

Setting end stop CLOSED

1. Move valve to end position CLOSED with handwheel.
2. If the valve end position is not reached:
 - Slightly turn setting screw [2] or [4] counterclockwise until valve end position CLOSED can be correctly set.
 - Turning the setting screw [2] or [4] clockwise decreases the swing angle.
 - Turning the setting screw [2] or [4] counterclockwise increases the swing angle.
3. Turn setting screw [2] or [4] clockwise until end stop is reached, then turn in opposite direction by one turn.
4. Secure setting screw [2] or [4] with lock nut.

Now, end stop CLOSED setting is complete and end position CLOSED setting can be performed. Having completed this procedure, end stop OPEN can be immediately set.

Setting end stop OPEN

1. Move valve to end position OPEN with handwheel.
2. If the valve end position is not reached:
 - Slightly turn setting screw [1] or [3] counterclockwise until valve end position OPEN can be correctly set.
 - Turning the setting screw [1] or [3] clockwise decreases the swing angle.
 - Turning the setting screw [1] or [3] counterclockwise increases the swing angle.
3. Turn setting screw [1] or [3] clockwise until end stop is reached, then turn in opposite direction by one turn.
4. Secure setting screw [1] or [3] with lock nut.

Setting the mechanical end stop screws**DP. . . (R)75-1800 (with planetary gearing)**

Note: The setting sequence for the end stops depends on the valve. We recommend to start with the end stop CLOSE for butterfly valves and with end stop OPEN for ball valves.

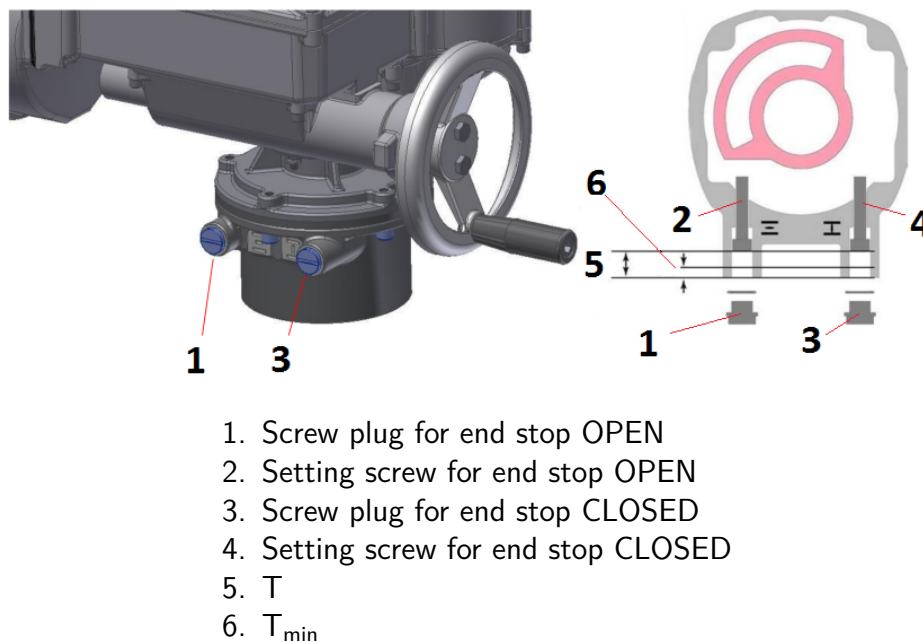


Figure 4.8: Cross section of compartment for end stop screws

Setting end stop CLOSED

1. Remove screw plug [3].
2. Move valve to end position CLOSED with handwheel.
3. If the valve end position is not reached:
 - Slightly turn setting screw [4] counterclockwise until valve end position CLOSED can be correctly set.
 - Turning the setting screw [4] clockwise decreases the swing angle.
 - Turning the setting screw [4] counterclockwise increases the swing angle.
4. Turn setting screw [4] clockwise until end stop is reached, then turn in opposite direction by one turn.
5. Check O-ring in screw plug and replace if damaged.
6. Fasten and tighten screw plug [3].

Now, end stop CLOSED setting is complete and end position CLOSED setting can be performed. Having completed this procedure, end stop OPEN can be immediately set.

Setting end stop OPEN

1. Remove screw plug [1].
2. Move valve to end position OPEN with handwheel.
3. If the valve end position is not reached:
 - Slightly turn setting screw [2] counterclockwise until valve end position OPEN can be correctly set.
 - Turning the setting screw [2] clockwise decreases the swing angle.
 - Turning the setting screw [2] counterclockwise increases the swing angle.
4. Turn setting screw [2] clockwise until end stop is reached, then turn in opposite direction by one turn.
5. Check O-ring in screw plug and replace if damaged.
6. Fasten and tighten screw plug [1].

Now, end stop OPEN setting is complete and end position OPEN setting can be performed.

5 Electrical connection

This section deals with the electrical connection of DREHMO actuators. Safety-related aspects, information on installation and modification of electrical connection are presented.

5.1 Important notes



DANGER

Explosion hazard for installation in explosive areas!

- Before opening, ensure that there is no voltage.



DANGER

Risk of direct contact with open live parts

- The electrical connection must be carried out exclusively by suitably qualified personnel.
- Prior to connection, observe basic information contained in this chapter.

Work on the electrical system or equipment and electrical installation work on actuators must only be carried out by skilled electricians themselves or by specially instructed personnel under the control and supervision of such an electrician and in accordance with the applicable electrical engineering rules.

Actuator installation and operation in Ex areas must additionally be in compliance with IEC/EN 60079-14 for gas explosive atmospheres.

The following points must also be observed:

- Observe indications on name plate
- Compare mains voltage
- Actuator is connected in compliance with the terminal plan supplied.
Should the terminal plan not be available, please request another copy from the manufacturer indicating the device number.
- For cable glands (including plugs!) make sure that the required IP enclosure protection is guaranteed and suitable for connecting cables.
- The connecting cables must comply with the requirements in terms of electrical connection data and load (mechanical, thermal and chemical).
- All actuators must be equipped with appropriate fuses for cable protection. Fuse specification must be calculated on the basis of published motor data.

In addition, the following points must be observed for explosion-proof actuators.

- According to IEC/EN 60079-14, actuators and the pertaining switching and distribution devices have to be considered within the framework of the protective actions for the connected mains.
- If a PTC thermistor is used to monitor the motor temperature a trigger with according certification has to be provided at plant level.
- If a thermal contact is used to monitor the motor temperature an overcurrent relay with according certification has to be provided at plant level.
- If the actuator is to be used in explosion-proof atmospheres, cable glands and plugs with appropriate certification must be used for the respective application.
- Electrical connection of explosion-proof actuators is exclusively made via appropriately certified connection terminals in compliance with the terminal plan supplied.
- To ensure required equipotential bonding, actuators must be connected via the outer earth terminal to the equipotential compensation system, provided that no fixed and secured metallic contacts with construction parts are available which are in turn connected to the equipotential compensation system.

DREHMO actuators are not equipped with an internal protective device against failures within the power circuit.

DANGER

Impermissible heating up of the motor (Explosion hazard for explosion-proof version!)



- Any protective measures have to be provided at plant level.
- Depending on the wiring an unexpected start of the actuator after a motor overheating is possible if the operation command is still active.

DANGER

Loss of explosion protection for explosion-protected versions



- If not ordered otherwise the actuator is supplied with non Ex-certified blanking plugs. They have to be replaced prior to commissioning by appropriate cable glands to maintain explosion protection.

DANGER

Hazardous voltage while protective earth conductor is NOT connected! Electric shock possible.



- Connect all protective earth conductors (if required use external earthing screw).
- Power the device only once the protective earth conductor has been connected.

5.2 Connection terminals

Different versions are available for actuator connections. Refer to chapter 9 for precise indications relating to possible cable cross sections and, if applicable, pertaining tightening torques.

6 Limit switching module

This chapter describes the limit switching module used in DREHMO actuators. The limit switching module is located below the housing cover. Remove the housing cover by loosening the four outer screws. Illustrations of the respective components might differ from the available components dependent upon actuator version, normal or explosion-proof, these can be identified by the components used.

6.1 Design of the conventional limit switching module

The limit switching module records limit positions and torques. In addition, it can be equipped with mechanical and/or electronic elements to display the valve position. A typical version is shown in figure 6.1.

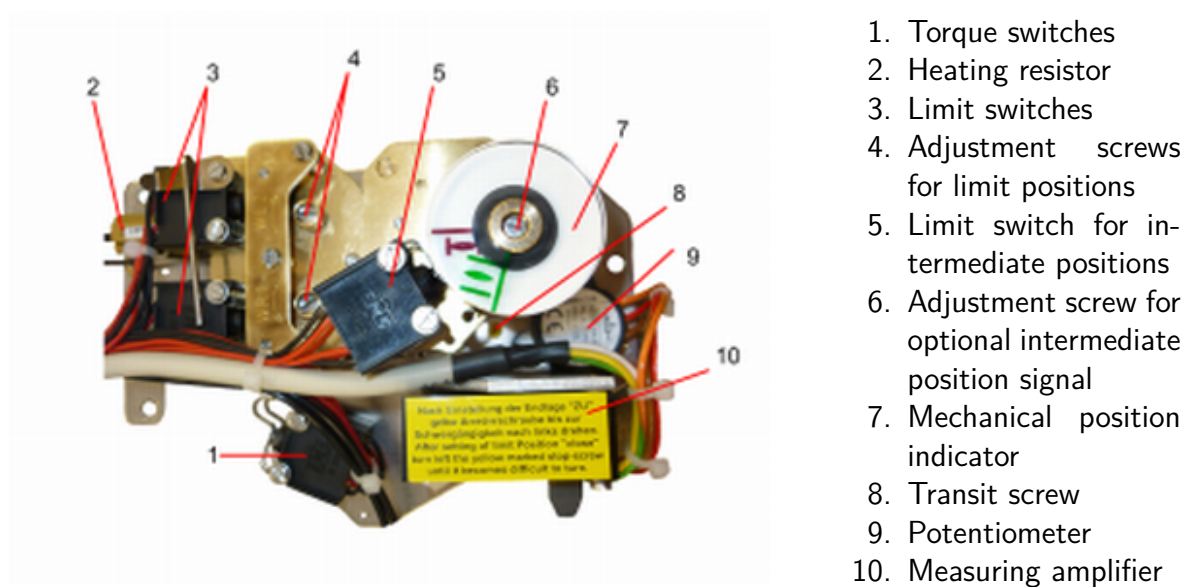


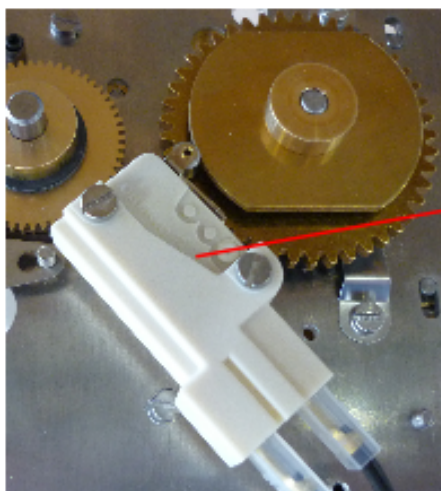
Figure 6.1: Limit switching module D(R)30...2000 in standard version

Torque and limit switches are operated by means of adjustable cams. As an option, torque and limit switches are available as tandem switches. For torque switches, labels are fixed to the cams indicating the permissible setting range.

A measuring amplifier converts the potentiometer position into an analogue position signal between 4 and 20 mA. The potentiometer is limited to an angle of 270°. Therefore, it is driven by a reduction gearing (please refer to tables 7.1 or 7.2 for the required gearing settings in relation to the respective travel).

In the factory, the potentiometer is set to valve position CLOSED and secured by means of the transit screw. To maintain the potentiometer rotary range, the driving pinion for the potentiometer is equipped with a slip clutch. A mechanical position indicator can be fitted to the same shaft as used for the potentiometer pinion. The position indicator must be adjusted in compliance with the set travel to report correct valve position.

In addition to the components described, a blinker transmitter is available as an option (refer to figure 6.2). The blinker transmitter is fitted to the lower side of the assembly plate and driven by a disc. This allows for a blinking actuator operation signal.



1. Blinker transmitter

Figure 6.2: Blinker transmitter in standard version

7 Commissioning

The following chapter describes the commissioning step for DREHMO s-range actuators .

NOTICE

All explanations below relating to commissioning apply to actuators with clockwise closing valves.



- Clockwise output drive rotation corresponds to direction CLOSE
- Counterclockwise output drive rotation corresponds to direction OPEN
- DR and WR switches are designated for torque and limit position in direction CLOSE
- DL and WL switches are designated for torque and limit position in direction OPEN
- Even if the output signal of the measuring amplifier is not to be used, the transit screw must be unscrewed (refer to ?? in picture 6.1)

CAUTION

All working steps are performed while cover is open. Danger of pinching and contact with live parts



- The actuator may only be opened by suitable trained and qualified staff

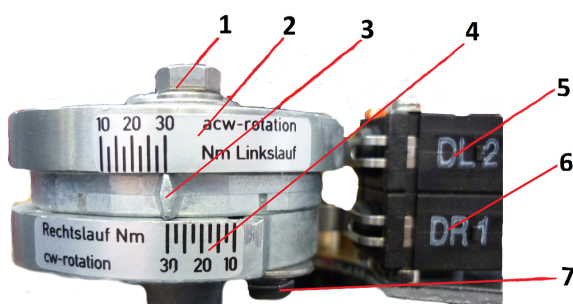
7.1 Checking the rotary direction

Checks have to be performed in any intermediate valve position. Switch off immediately in case of incorrect rotary direction and change direction of rotation (for 3-phase motors by exchanging two phases of customer connection). Operate DREHMO actuator in both directions and try to switch off through manual operation i.e. by means of manual operation of the switching lever via limit and/or torque switches. If the motor does not switch off, check power cables or controls. Applying load up to the stall torque for oversized motors (for 80 % mains voltage) can cause damage to the actuator or the valve. Ensure limit and torque switching is always connected into the control circuits.

7.2 Setting the torque values

The torques are set by manufacturer as instructed according to the order. The torques are only indicated on the name plate if this is specifically requested. If no torques are specified on the order, the smallest possible torque is set by the manufacturer. The torque can be infinitely varied within the range given on the name plate by means of the torque scales affixed to the unit.

Use the setting screws for torque setting if torque signals are to be used (refer to figure 7.1). Loosen screw on top of the cams if torque setting is to be performed in direction OPEN. The screw on the bottom of the cams is used for torque setting in direction CLOSE. After unfastening the respective screw, the cams can be readjusted by turning. Turn the cam until the desired value on the scale is aligned with the mark. Finally, fasten the appropriate screw.



1. Locking screw for torque adjustment OPEN
2. Scale with setting range for torque in direction OPEN
3. Setting mark (in this instance 30 Nm for both directions)
4. Scale with setting range for torque in direction CLOSE
5. Torque switch for direction OPEN in standard version
6. Torque switch for direction CLOSE in standard version
7. Locking screw for torque adjustment CLOSE

Figure 7.1: Torque setting



DANGER

Exceeding the maximum permitted torque

- A setting above the maximum permitted torque is not permitted.



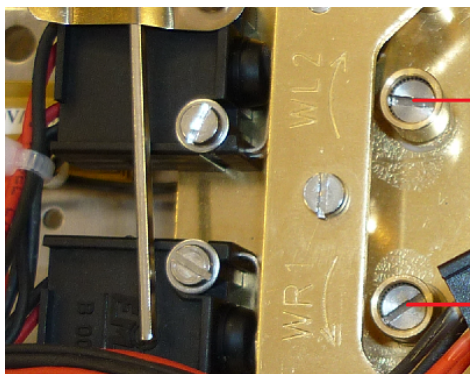
DANGER

Regard the permitted torque range for additional gears, if used

- For actuators that are delivered with an additional gear or thrust unit by the manufacturer, the permitted torque range is written outside the housing cover.

7.3 Setting the limit positions

For setting the limit positions for OPEN and CLOSE, use the setting screws as shown in figure 7.2.



1. Setting screw for limit position OPEN
2. Setting screw for limit position CLOSED

Figure 7.2: Limit switches in standard version

For setting a limit position, operate the actuators into the desired position. Press the screw downward by means of the screwdriver and turn in direction of the arrow. The limit position is set when the cam operates the appropriate limit switch. After the setting procedure, release the screw.

Setting screws for limit positions engage in short intervals while being turned. Once cam

lines up with switch and it operates, stop turning. If the cam is turned too far by mistake, repeat the entire setting process from the beginning.

If optional switches are fitted for intermediate position signalling, they are operated by means of the shaft cams of the mechanical position indicator. Operate to the respective intermediate position for the setting procedure. Then turn the handwheel by approx. 30° into the opposite direction. For setting the respective cam on the shaft of the mechanical position indicator, slightly unfasten the release screw (figure 7.6, item 1). After cam setting, fasten the screw (Not too tight! Do not exceed 0.5–0.7 Nm). Check the set tripping points by operating over full travel.

7.4 Setting the reduction gearing of the limit switching unit for multi-turn actuators

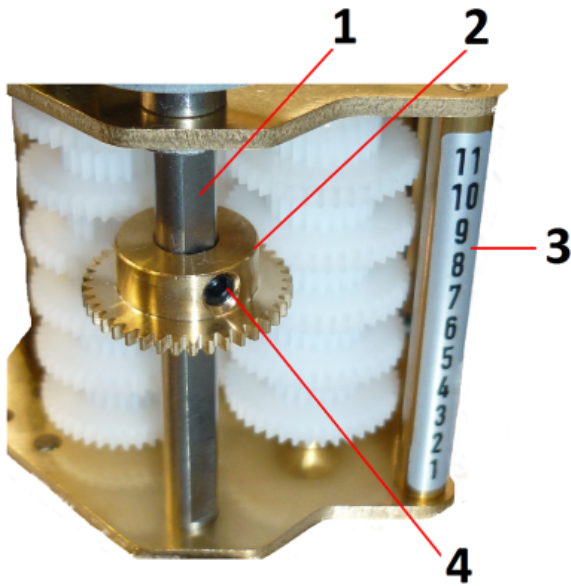
To reset the reduction gearing according to table 7.1, loosen the fixing screw item 4 in figure 7.3. After unfastening the screw, the sliding wheel can be moved up (smaller angle for the mechanical position indicator) and down (larger angle for the mechanical position indicator). As soon as the new position of the sliding wheel has been reached, fasten the fixing screw.



NOTICE

Observe correct position of the sliding wheel!

- The splines of the sliding wheel must fully engage into the counterwheel.



1. Shaft of the mechanical position indicator
2. Sliding wheel
3. Scale with possible setting ranges for the travel
4. Fixing screw for the sliding wheel

Figure 7.3: Reduction gearing

There is a gear wheel at the bottom of the base plate. The figure 7.4 shows the version for section III. For section II there would be a big instead of a little gear wheel. The opposite gear wheel is mounted on an output drive of the actuator.

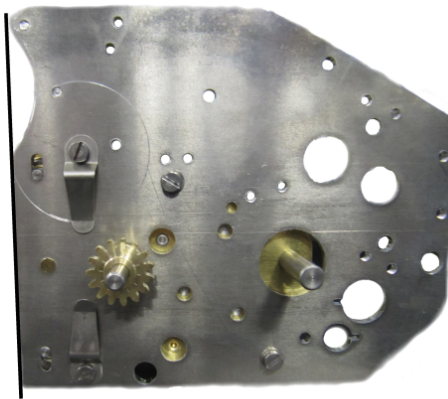


Figure 7.4: limit switching unit input drive gear wheel

The reduction gearing is available for a range between 1.38 – 1,450 turns/stroke. The range is divided into two sections: III (1.38 – 135 turns/stroke, large gear wheel to small gear wheel) and II (12.4 – 1450 turns/stroke; small gear wheel to large gear wheel). Changing between these ranges requires exchanging the gear wheels on the bottom of the limit switch base plate. By moving the sliding wheel in one of the positions 4 – 11, the required travel range can be selected.

Transmission ratio of limit switch wheels	Turns per travel (min. and max.)	Position of sliding wheel
1:3 (SectionIII)		1
1:3 (SectionIII)		2
1:3 (SectionIII)		3
1:3 (SectionIII)	1.38 – 2.49	4
1:3 (SectionIII)	2.5 – 4.5	5
1:3 (SectionIII)	4.6 – 8.2	6
1:3 (SectionIII)	8.3 – 15	7
1:3 (SectionIII)	15.1 – 27.2	8
1:3 (SectionIII)	27.3 – 49.6	9
1:3 (SectionIII)	49.7 – 90.1	10
1:3 (SectionIII)	90.2 – 135	11
3:1 (SectionII)		1
3:1 (SectionII)		2
3:1 (SectionII)		3
3:1 (SectionII)	12.4 – 22.4	4
3:1 (SectionII)	22.5 – 40.8	5
3:1 (SectionII)	40.9 – 74.2	6
3:1 (SectionII)	74.3 – 135	7
3:1 (SectionII)	135 – 245	8
3:1 (SectionII)	246 – 446	9
3:1 (SectionII)	447 – 811	10
3:1 (SectionII)	812 – 1450	11

Table 7.1: Setting the reduction gearing of the limit switching unit for multi-turn actuators

The values of the sliding wheel positions 1 – 3 are available on request.
 Selection of the highlighted options is recommended and preferred.

NOTICE

If no stroke range is specified on the order, the reduction gear will be preset at factory



- For output speed of 5–50 turns/minute the factory setting is section III
- For output speed of 80–160 turns/minute the factory setting is section II

Setting:

1. If the required rev/stroke ratio of the actuator is communicated to the manufacturer upon ordering, the actuator is correctly set in the factory.
2. Determine actuator revolutions per stroke (e.g. actuator speed per minute x acting time in minutes).
3. Determine factory-preset range II or III. Determine actuator speed (via type designation on the actuator rating plate, e.g. D60 A-40 = 40 rpm)
Range III preset: actuators with output speed 5-50 rev/stroke.
Range II preset: actuators with output speed 25 -160 rev/stroke.

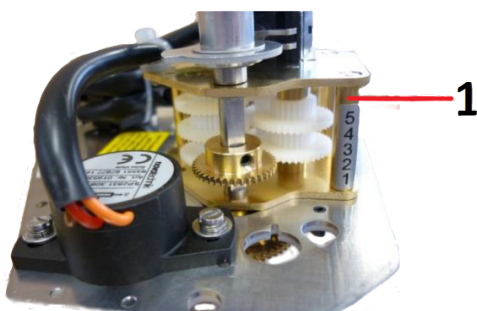
Alternative determination:

Turn sliding wheel into position 1. Perform approx. 13 handwheel turns while observing the mechanical position indication (if existing) or the operating cams of the intermediate position switches. If the angle of rotation is $> 150^\circ$, range III has been preset otherwise range II.

4. Set the reduction gearing according to the calculated value by shifting the sliding wheel with regard to table 7.1.

7.5 Setting the reduction gearing of the limit switching unit for part-turn actuators

This limit switching unit is of similar design, however equipped with a reduction gearing including mere 5 stages (refer to figure 7.5).



1. Reduction gearing with five stages

Figure 7.5: Setting the reduction gearing of the limit switching unit for part-turn actuators

The reduction gearing has a variable setting range, resulting from the plug-in sequence of the gear wheels at the bottom of the mounting plate. The sections II (small on large gear wheel) + III (large on small gear wheel) can be respectively preselected by exchanging the gear wheels on the bottom of the limit switching base plate. For section I, use two gear wheels of identical size. The setting options of this reduction gearing are specified in the following table 7.2.

Additional gearing	Without	SQ	SQ	SQ
Size	DP30...DP119	DP75... DP450	DP600... DP900	DP1200... DP1800
Swing angle	90° 180°	90°	90°	90°
Reduction ratio	none none	5,5	11	25,3
Number of teeth LS	III/15:45 III/15:45	I/30:30	II/45:15	II/45:15
tr/stroke min.	0.25 0.5	1.375	2.75	6.325
Sliding wheel position	1 2	2	1	2
Turning angle α Cam shaft	175.4 193	177.5	214.5	271.3
Settling time %	58.5 64.3	59.1	71.5	90.4

Table 7.2: Setting the reduction gearing of the limit switching unit for part-turn actuators

NOTICE

Different layout for DP319, DP799, DP1599



- The actuators DP319, DP799 und DP1599 are equipped with a limit switching unit with 11 stages (refer to section 7.4)

7.6 Setting the mechanical position indicator

Figure 7.6 shows the components of the mechanical position indicator.

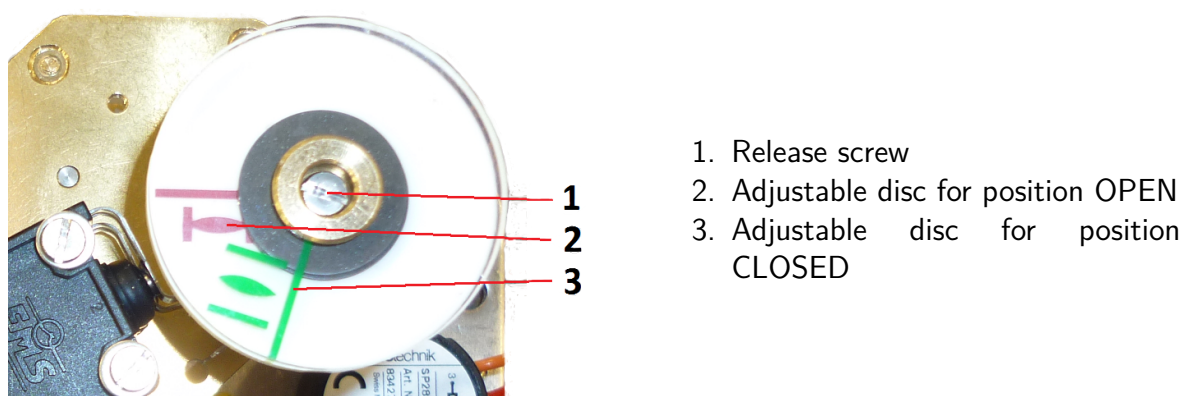


Figure 7.6: Mechanical position indicator

Turn the disc to adjust the mechanical position indication. Both discs can be turned by hand (do not unfasten the screw). For this purpose, the valve must be operated to the respective limit position.

If the mechanical position indication moves more than 270° or less than 90° for the selected travel, check the setting at the reduction gearing and adjust if required (please also refer to table 7.1).

7.7 Resistance transducer B1 (optional)

Normally, the resistance transducer B1 sets itself by moving into the CLOSED position using a clip clutch. If the resistance transducer does not show zero (0%) in the CLOSED position, turn the shaft of the resistance transducer to set the zero point by hand. When connecting the resistance transducer, check whether resistance value and permitted load are compatible.

If the actuator is equipped with a position sensor for connection to intrinsically safe circuits, make sure the relevant and valid standards are observed (EN 60079-11).

7.8 Setting the analogue position transmitter B3

The transmitter B3 (EM5.004, Em5.005 or EM7.005) is supplied in position CLOSED corresponding to an analogue signal of 0(4) mA. After having set the mechanical limit switches, loosen the potentiometer transit screw (screw marked in yellow next to the potentiometer) for transmitter commissioning. The actuator must be in position CLOSED and can now be operated in direction OPEN. As soon as the actuator is in limit position OPEN, set the 20 mA output signal by means of screw (1) at the transmitter in figure 7.7. To change the signal range from 0 – 20 mA to 4 – 20 mA for weatherproof devices, it is possible to fit a link on the transmitter (figure 7.7 terminals 3 and 4). For explosion-proof actuators only 2-wire-sensing with fixed range of 4 – 20 mA is available.



1. Adjusting screw for amplification

Figure 7.7: Transmitter

Screw (1) cannot be used for setting the signal in position CLOSED (4 mA), since the screw only has an impact on the amplification of the transmitter. Retightening of the potentiometer transit screw is not required.

In case of repairs: If the actuator has been supplied in explosion-proof version, potentiometer and transmitter for the analogue position signal must always be replaced by ex certified components (refer to figure 7.8 or figure 7.9)!

The valid regulations for the establishment of intrinsically safe circuits have to be followed

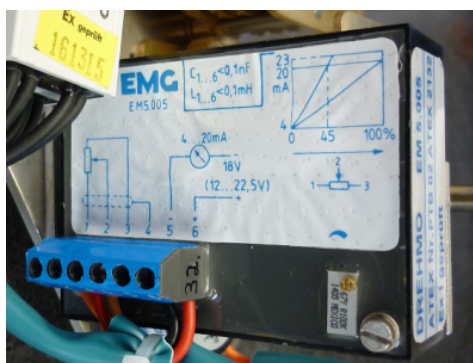
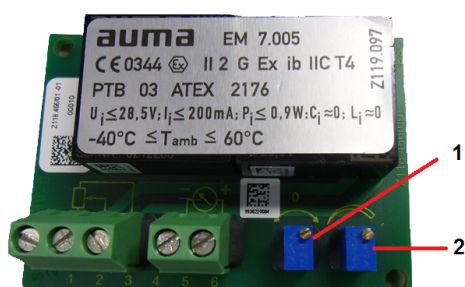


Figure 7.8: Transmitter and potentiometer in explosion-proof version



1. Adjusting screw for offset
2. Adjusting screw for amplification

Figure 7.9: Transmitter EM7.005 in explosion-proof version

Connection type 2-wire-sensing: maximum current amplitude 20 mA.

Connection type 3- und 4-wire-sensing: maximum current amplitude 24 mA or 20 mA (according to additional manual: DREHMO - EM5.00x analogue position transmitter or DREHMO - EM7.005 analogue position transmitter). The setting has to be repeated by resetting the whole sensor unit to factory default, if the expected values are not reached.

Resetting to factory default by:

- Retightening of the potentiometer transit screw.
- Drive the actuator to the previous set position CLOSED.
- Check: the factory preset is reached if the 4 — 20 mA signal is at 0 or 4 mA and does not change while the actuator is running (transit screw tightened).

**NOTICE**

Damage to mechanical components by tightened transit screw

- Loosen the potentiometer transit screw even if the position transmitter is not in use.

7.9 Heater with heating resistor

The heating resistor (E1 at terminal diagram) can be operated as an idle-state heater. It only heats if the heater supply voltage is applied to the corresponding terminals (refer to terminal diagram).

Heating resistor data:

$$U_{\text{heating resistor}} = 230 \text{ V}$$

$$P_{\text{heating resistor}} = 10 \text{ W}$$

Heating resistor data for explosion proof version:

$$U_{\text{heating resistor}} = 230 \text{ V}$$

$$P_{\text{heating resistor}} = 6 \text{ W}$$

Heating resistors with 24 V, 10 W oder 110 V, 10 W are also available.

7.10 Self regulating heater (Option)

The use of a self regulating heater band (self-limiting parallel heating cable) with the actuator (E1 at terminal diagram) allows an extension of the temperate range to low temperature. The self regulating heater is installed if the operating temperature is below -25°C with the use of electronic position transducer B3 or if it is below -50°C without electronic position transducer B3.

Heater band data above -25°C :

$$U_{\text{heater band}} = 230 \text{ V}$$

$$P_{\text{heater band}} < 10 \text{ W}$$

Heater band data above -30°C :

$$U_{\text{heater band}} = 230 \text{ V}$$

$$P_{\text{heater band}} < 60 \text{ W}$$

At -25°C or colder the self regulating heater has to be powered at least one hour before switching on the position transducer B3.

8 Servicing and maintenance

In this section, information is given to be observed when maintaining, cleaning or disposing of DREHMO actuators.

8.1 Maintenance

We recommend participation in the regular trainings for performing maintenance tasks. Basic special knowledge in electrical installation and mechanical engineering is sufficient (in Germany: industrial training - apprenticeship). Permitted maintenance work:

- Replace handwheel
- Replace output drive
- Check oil level

Before further use of the actuator, make sure it is reset to original condition.



DANGER

Explosion hazard for explosion-proof version, due to incorrect repairs of the flameproof joints

- Only the manufacturer ist allowed to do repairs of the flame-proof joints



NOTICE

Excessive lubricant application can impair the tightness of the actuator

- The actuators have a lifetime lubrication
- A device for permanent lubrication of a stem (only output drive type A and A-HP) can be inquired of the manufacturer

Correct commissioning is a prerequisite for reliable actuator operation. We recommend to checking the fixing screws between actuator and valve or gearbox for tightness once a year.

Open-close actuators must be checked for wear after a cumulated operating time of 150 hours, modulating actuators however at the latest after 10^6 starts! For safe and reliable service, we recommend - especially if infrequently operated - performing a test run every 6 months. Apply a thin film of Molykote 165 LT to the threads of unfastened housing screws prior to refastening. Apply a thin film of Klüber Isoflex Topas NB5051 to the sealing joints between the housing parts.

For technical queries, please contact our service department, always stating your device number (This number is indicated on the actuator name plate). Overhauling defective actuators is only permitted in the factory or with an authorised service centre.

8.2 Troubleshooting and corrective actions

After maintenance, perform functional tests in compliance with operation instructions. Commissioning of actuator/valve must be performed if tripping parameters, valve or additional gearing have been changed.

8.3 Oil filling

The actuator oil filling is specified for the actuator lifetime. It is indispensable part of the non electrical explosion protection of devices for explosive areas. For this reason, only oils approved by DREHMO GmbH may be used for the actuators. The actuators are filled with oil for ambient temperatures of -25°C to $+60^{\circ}\text{C}$ for Ex, -25°C to $+80^{\circ}\text{C}$ for non Ex and -25°C to $+60^{\circ}\text{C}$ for non Ex regulating actuators according to table 8.1.

Actuator type	Oil quantity [l]	Oil type
DP 30/59/119 (Ex)	1.4	Shell Tellus S2 VX 15
DP 319/799/1599 (Ex)	1.4	Shell Tellus S2 VX 68
DP 75/150...1800 (Ex)	1.4	Shell Tellus S2 VX 68
D/DR 30/59 (Ex)	1.4	Shell Tellus S2 VX 68
D/DR 60/120/249 (Ex)	2.4	Shell Tellus S2 VX 68
D/DR 250/500/1000 (Ex)	3	Shell Tellus S2 VX 68
D 2000 (Ex)	9	Shell Omala S2 G 100

Table 8.1: Oil filling

The oil filling may differ for other temperature ranges. If required, please contact the manufacturer for appropriate data. Tight sealing of the device must be checked at appropriate intervals during scheduled inspections. Particular attention must be paid to following parts:

- Oil leakage at handwheel hub
- Oil leakage at joints of the housing
- Oil leakage at seals of hollow shaft
- Oil leakage at shaft seal in the limit switch or control room

**DANGER**

Impermissible heating up of actuator by oil leakage (Explosion hazard if the actuator is certified for use in potentially explosive atmospheres!)

- Seals must be replaced in case of leakage.
- Make sure to refill to the correct oil level.

8.4 Cleaning

Clean the actuator using conventional soap solutions (alkaline solutions). To prevent heat accumulation or excessive surface temperatures, make sure that the motor cooling fins are never covered.

The warning references on the device may not be removed or covered with color!

**DANGER**

Explosion hazard for explosion-proof version, due to electrostatic discharge!

- All outer actuator parts e.g. painted surfaces, indicator glass, labels, etc. may only be cleaned using a moist cloth.
- The device must be equipped with appropriate labels which must be readable at all times!

**DANGER**

Impermissible heating up by paint coating (Explosion hazard for explosion-proof version!)

- It is not permitted to repaint the actuator!



NOTICE

Residues of conductible foreign particles within the actuator

- Use of compressed air for cleaning the actuator is not permitted!

Use of any cleaning agents within the actuator is not permitted. Any contamination may be removed using lintless cloths free of any contamination. Use of compressed air is not permitted.

8.5 Disposal

During decommissioning and disassembly of actuators, please observe any potential installation-specific hazards. If required, appropriate disposal can be offered by the manufacturer. Actuators can easily be separated and sorted according to materials used:



- electronic scrap
- various metals
- plastics
- 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.
- Observe the national regulations for waste disposal.

9 Technical data

This section comprises the summary of all technical data of DREHMO actuators described in these operation instructions.

9.1 Contact and water protection

The type of enclosure protection (IPxx) is indicated on the actuator name plate. In normal version, the actuator is suitable for outdoor installation and completely protected against dangerous contact, ingress of dust and ingress water for temporary immersion in water (enclosure protection IP67 in compliance with EN 60529 / IEC 60529). Further IP enclosure protection types are available on request as options.

DANGER
Risk of deviating IP enclosure protection



- Ensure use of correct cable glands.
- Unused cable entries must be sealed using appropriate blanking plugs.
- If the actuator has a K5 corrosion protection, ensure use of plastic cable glands to prevent damage of the protecting cover.

DANGER
Explosion hazard caused by incorrect cable glands and cable entries!



- If the actuator is to be used in explosion-proof atmospheres, cable glands and plugs with appropriate certification must be used for the respective application.

NOTICE

Damage due to ingress of humidity



- Mounting or storage in humid environments requires appropriate actions for avoiding condensation inside the actuator. (refer to chapter 3)
- Despite the IP enclosure protection the humidity of the surrounding air can enter the actuator.

DANGER

Impermissible heating up of actuator by direct sunlight (Explosion hazard for explosion-proof version!)



- Make sure to regard the permissible operation temperature of the actuator when it is exposed to direct sunlight (use shading if necessary)

9.2 Overview Technical data

Rated voltage	refer to indications on motor name plate in $V \pm 10\%$
Ex	refer to indications on motor name plate in $V \pm 5\%$
Rated current	refer to indications on motor name plate in A
Mains frequency	refer to indications on motor name plate in Hz $-5\% - +3\%$
Ex	refer to indications on motor name plate in Hz $\pm 2\%$
Rated power	refer to indications on motor name plate in kW $\pm 10\%$
Insulation category	Overvoltage category II according to EN 61010-1

Electrical connection	<p>Cable cross section to be determined on the basis of motor data, of cable length and national regulations!</p> <p>Applicable cross sections:</p> <p><i>Compact plug</i> Ø150 mm: Signal cables: 0.5 mm² – 2.5 mm² Power: 0.5 mm² – 2.5 mm² optional: 0.5 mm² – 6 mm² or 1.5 mm² – 16 mm²</p> <p><i>Compact plug/socket connector</i> Ø100 mm: Signal cables: 0.75 mm² – 1.5 mm² Power¹: 2.5 mm² – 6 mm²</p>
Electrical connection Ex	<p><i>Terminal compartment in Ex e:</i> For available cable cross sections as well as pertaining tightening torques, refer to table 9.1.</p>
Contact rating thermo switch	<p>max. 6.3 A: 250 V AC: 3000 cycles 2.5 A: 250 V AC: $\cos \varphi=1.0$: 10000 cycles 1.6 A: 250 V AC: $\cos \varphi=0.6$: 10000 cycles 0.5 A: 250 V AC: $\cos \varphi=0.6$: 10000 cycles 1.6 A: 24 V DC resistive: 10000 cycles 1.25 A: 48 V DC resistive: 10000 cycles</p>
Silver contacts	<p>400 V AC : 2 A 250 V AC : 7 A 250 V DC : 0.5 A</p>
Gold contacts	<p>Voltage: 5-30 V Current: 4-40 mA The product of multiplied factors of current and voltage may not exceed 0.2 VA. For 1-phase AC currents, these values have to be interpreted as peak values.</p>
Electrical load	<p>refer BAA_EM500x or BAA_EM700x</p>
Motor heat class	<p>refer to indications on motor name plate</p>
Explosion protection	<p>ATEX type examination certificate. For respective marking, refer to name plate</p>

¹6 mm² with little clamping disc

Ambient temperature range	Refer to indications on name plate in °C
Enclosure protection	Refer to indications on name plate
Degree of pollution	Inside the actuator: pollution degree 1 (IEC 60664-1) Outside the actuator: pollution degree 2
Vibrations	The actuators are designed for vibrations in the range between 10–100 Hz with an amplitude of 2g (with high transition frequency according to EN 60068-2-6).



DANGER

Reduced heat dissipation for places of installation of > 2000 m above sea level. (Explosion hazard for explosion-proof version!)

- When exceeding the value, please contact the manufacturer, since load and isolation restrictions prevail for constant ambient temperature.

9.3 Permitted Cable cross sections

Connector type	Designation	Cross sections of cables (min./max.)	Insulation stripping length	Tightening torque
Weidmüller	WDU 4N	1) 0.5–6 mm ² / 1.5–6 mm ² 2) 0.5–4 mm ² / 0.5–4 mm ²	11 mm	0.5–1.0 Nm
Weidmüller	WPE 4N	1) 0.5–6 mm ² / 1.5–6 mm ² 2) 0.5–4 mm ² / 0.5–4 mm ²	10 mm	0.5–1.0 Nm
Wago	264-120	0.5–4 mm ²	8–9 mm	Label of handling
Wago	264-220	0.5–4 mm ²	8–9 mm	Label of handling
Phoenix	MXK4	1) 0.2–4 mm ² / 0.2–4 mm ² 2) 0.2–4 mm ² / 0.25–2.5 mm ²	8 mm	0.6–0.8 Nm
Phoenix	MSLKG 5	1) 0.2–4 mm ² / 0.2–4 mm ² 2) 0.2–4 mm ² / 0.25–2.5 mm ²	8 mm	0.6–0.8 Nm
Phoenix	MBK 3/E-Z	1) 0.2–4 mm ² / 0.2–4 mm ² 2) 0.2–2.5 mm ² / 0.25–1.5 mm ²	8 mm	0.6–0.8 Nm
Phoenix	USLKG 10N6	1) 0.5–16 mm ² / 0.5–16 mm ² 2) 0.5–10 mm ² / 0.5–6 mm ²	10 mm	1.5–1.8 Nm
Phoenix	UK 10 N	1) 0.5–16 mm ² 2) 0.5–10 mm ² / 0.5–6 mm ²	10 mm	1.5–1.8 Nm

Table 9.1: Connection terminals

1) solid wire / stranded

2) fine stranded / fine stranded with wire end sleeve

The following table 9.2 lists the weights, the output drive speeds and the maximum modulating torques of the actuators.

Actuator type	Output drive speed / operating time	Maximum modulating torque	Average weight in kg
D 30 Ex	5 – 160	15	23
DR 30 Ex	5 – 40	15	23
D 59 Ex	5 – 160	30	25
DR 59 Ex	5 – 40	30	25
D 60 Ex	5 – 160	30	29.5
DR 60 Ex	5 – 40	30	29.5
D 120 Ex	5 – 160	60	33.5
DR 120 Ex	5 – 40	60	33.5
D 249 Ex	5 – 80	125	33.5
D 250 Ex	5 – 50	125	69.5
D 250 Ex	80 – 160	125 ¹	69.5
DR 250 Ex	5 – 40	125	69.5
D 500 Ex	5 – 80	250	80.5
D 500 Ex	120	250 ¹	80.5
D 500 Ex	160	200¹	80.5
DR 500 Ex	5 – 40	200	80.5
D 1,000 Ex	5 – 50	500 ¹	90.5
D 1,000 Ex	80	400¹	90.5
DR 1,000 Ex	5 + 10	500	90.5
D 2,000 Ex	40 – 80	1000	220
D 2,000 ² Ex	160	300	220
DP 30 Ex	8 – 60	15	24
DP 59 Ex	8 – 60	30	24
DP(R) 75 Ex	8 – 34	33.5	38
DP 119 Ex	8 – 60	60	24
DP(R) 150 Ex	8 – 34	75	38
DP(R) 299 Ex	8 – 34	150	38
DP(R) 300 Ex	8 – 34	150	40
DP 319 Ex	8 – 60	160	39
DP(R) 450 Ex	8 – 34	225	40
DP(R) 600 Ex	8 – 67	300	46
DP 799 Ex	8 – 60	400	39
DP(R) 900 Ex	8 – 67	450	46
DP 1,200 Ex	7 – 75	600	51

¹For these actuators the heating of the gear exceeds that of the motor. The heating of the gear is not detected by the actuator. Do not exceed modulating torques and operation modes.

²The maximum torque for this actuator is limited to 1000 Nm

Actuator type	Output drive speed / operating time	Maximum modulating torque	Average weight in kg
DP(R) 1,200 Ex	18 – 75	600	51
DP 1,599 Ex	8 – 60	800	48
DP 1,800 Ex	7 – 75	900	51
DP(R) 1,800 Ex	18 – 75	900	51

Table 9.2: Technical data


DANGER

Excessive temperature when exceeding the max. permissible modulating torque (Explosion hazard!)

- Make sure that the modulating torque of the valve does not exceed 50 % of the maximum permissible torque of the actuator, if not indicated otherwise in table 9.2.

9.4 Types of duty for different versions

The actuator duty should be adhered to, even if the operation times from open to close exceed the limit of the operating time. The type of duty depends upon the temperature range on the actuator name plates. Type of duty S2–xx min (short-time duty) for multi-turn actuators and S4–xx % on time (periodic intermittent duty with influence on starting procedure) for modulating actuators are to be considered.

With S2 duty rating, the maximum operating time of the actuator is indicated. After this time, the actuator must go in pause mode until cooling down to ambient temperature +2 K. With S4 duty rating, the on time value indicates the permitted running time with reference to the switching cycle. A switching cycle is defined as time between actuator start and next start (sum of actuator running time and pause time).

In general, modulating actuators are always limited to 1,200 switching operation per hour (indicated as c/h on the name plate) (refer to EN 60034-1). Multi-turn actuators are limited to max. S2–15 min.



DANGER

Danger of sparks (Explosion hazard for explosion-proof version!)

- When selecting the adapted moving elements of valves in combination with the output drive of the actuator, make sure that the material pairs are not subject to potential forming of sparks (in compliance with EN 13463-5)



DANGER

Excessive temperature when exceeding the max. permissible number of starts (Explosion hazard for explosion-proof version!)

- The max. number of switching operations per hour for modulating applications must not exceed 1,200 c/h. Depending on type of actuator and ambient temperature, restrictions according to the name plate must be observed.



DANGER

Failure to comply with specifications (Explosion hazard for explosion-proof version!)

- Any restrictions (refer to name plate) applicable for the actuators must be adhered to!



DANGER

Pulling load

- The following actuators are equipped with an additional brake motor: D1000 output speed 120 rpm and 160 rpm
D2000 all output speeds.
The brake and the respective wiring is designed as a spring-applied brake. Stopping while pulling loads are active can be guaranteed up to an effective torque at the output drive of 300 Nm.

10 External warnings

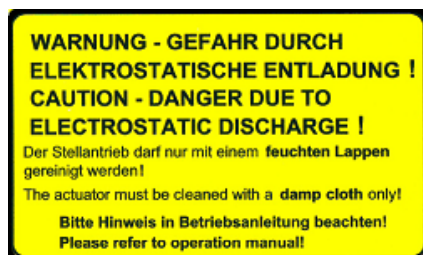
This chapter contains a list of warnings and service advices that have to be placed on the actuator and have to be visible for the lifetime of the actuator. It is not permitted to cover these warnings with paint! All given positions are relative to the viewing direction on the display.



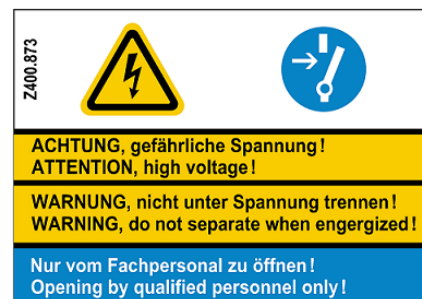
Label with adress of the manufacturer



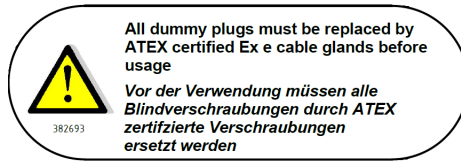
Label if the actuator is of correspondig type



Label with warning for actuators of explosion-proof version



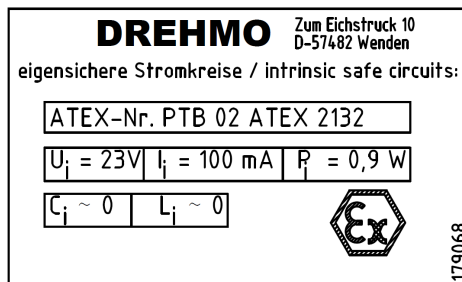
Label with warning of dangerous voltages



Label with warning for actuators of explosion-proof version ATEX type



Label with warning for actuators of explosion-proof version IECEx type



Label for intrinsic safe circuits with EM5.005



Label for intrinsic safe circuits with EM7.005

11 Certificates

The following section contains the Declarations of Conformity and Incorporation, Type Test Certificates as well as additional Certificates for the actuator type range described in these operation instructions if any.



NOTICE

The printed Documents are up-to-date to the date of publication of these instructions

- Please refer to <http://site.drehmo.com/en/downloads> for downloading further supplements to the printed documents.



DREHMO GmbH
Zum Eichstruck 10
57482 Wenden/Germany

DREHMO
VALVE ACTUATORS

EU Declaration of Conformity / Declaration of Incorporation

As the manufacturer DREHMO GmbH hereby declares that the electro-mechanical DREHMO® actuators and accompanying components from the following series

Standard

D(R) 15 - D(R) 2000
DP(R) 30 - DP(R) 1800

Matic C

DMC(R) 15 - DMC(R) 2000
DPMC(R) 30 - DPMC(R) 1800

i-matic

DiM(R) 15 - DiM(R) 2000
DPiM(R) 30 - DPiM(R) 1800

comply with the fundamental requirements of the Electromagnetic Compatibility Directive (2014/30/EU), the Low Voltage Directive (2014/35/EU) and the Machinery Directive (2006/42/EC).

EU Declaration of Conformity according to the Council Directive on the approximation of laws of the member states relating to the Electromagnetic Compatibility Directive (2014/30/EU) and the Low Voltage Directive (2014/35/EU)

The following harmonised standards in terms of the specified directives have been applied:

Electromagnetic Compatibility (2014/30/EU)

EN 61000-6-2: 2005

EN 61000-6-4: 2007+A1:2011

EN 61000-3-2: 2006+A1,A2:2009¹⁾ EN 61000-3-11: 2000¹⁾

¹⁾Matic C and i-matic

Low Voltage Directive (2014/35/EU)

EN 61010-1: 2010

EN 60034-1: 2010

Declaration of incorporation in terms of EC Machinery Directive (2006/42/EC) Appendix II B

The following harmonised standards in terms of the Machinery Directive (2006/42/EC) have been applied:

EN ISO 12100: 2010

DREHMO® actuators are intended for assembly with valves. The commissioning phase should only be implemented if it has been ensured that the entire machine in which the DREHMO® actuators are installed complies with the regulations of the EC Machinery Directive (2006/42/EC). We comply with the following basic requirements according to appendix I of the Machinery Directive (2006/42/EG): Appendix I 1.1.2, 1.1.3, 1.1.5, 1.2.1, 1.2.6, 1.3.1, 1.3.7, 1.5.1, 1.6.3, 1.7.1, 1.7.3, 1.7.4

The manufacturer is obligated to electronically submit the documents for the incomplete machine to national authorities on request. The special technical documents pertaining to the machine according to Appendix VII part B have been compiled.

Person responsible for documentation:

Dr. Rüdiger Stenzel, Zum Eichstruck 10, 57482 Wenden/Germany

Wenden, 2016-04-20

W. Händel, General Manager



DREHMO GmbH
Zum Eichstruck 10
57482 Wenden/Germany

DREHMO
VALVE ACTUATORS

EU Declaration of Conformity / Declaration of Incorporation in compliance with Machinery Directive

As the manufacturer DREHMO GmbH hereby declare that the electro-mechanical DREHMO[®] actuators and accompanying components from the following series

Standard

D(R) 30 Ex - D(R) 2000 Ex
DP(R) 30 Ex - DP(R) 1800 Ex

comply with the fundamental requirements of the ATEX Directive (2014/34/EU), the Electromagnetic Compatibility (2014/30/EU), the Low Voltage Directive (2014/35/EU) and the Machinery Directive (2006/42/EC).

EU Declaration of Conformity according to the Council Directive on the approximation of laws of the member states relating to the ATEX Directive (2014/34/EU), the Electromagnetic Compatibility Directive (2014/30/EU) and the Low Voltage Directive (2014/35/EU)

Notified body:	TÜV SÜD Product Service GmbH - Zertifizierstelle -
Identification number:	0123
Address:	TÜV SÜD Ridlerstraße 65; 80339 München
Certification number:	TPS 17 ATEX Q 78524 004
Type approval test certificates:	PTB 15 ATEX 1014 X

The following harmonised standards in terms of the specified directives have been applied:

ATEX Directive (2014/34/EU)	
EN 60079-0:2012+A11:2013	EN 60079-1:2014
EN 60079-7:2015	EN 60079-11:2012
EN 13463-1:2009	EN 13463-5:2011
EN 1127-1:2011	

Electromagnetic Compatibility Directive (2014/30/EU)	
EN 61000-6-2:2005	EN 61000-6-4:2007+A1:2011

Low Voltage Directive (2014/35/EU)	
EN 61010-1:2010	EN 60034-1:2010

Declaration of Incorporation in terms of EC Machinery Directive (2006/42/EC) Appendix II B

The following harmonised standards in terms of the Machinery Directive (2006/42/EC) have been applied:

EN ISO 12100:2010

DREHMO[®] actuators are intended for assembly with valves. The commissioning phase should only be implemented if it has been ensured that the final machinery in which the DREHMO[®] actuators are installed complies with the regulations of the EC Machinery Directive (2006/42/EC). DREHMO[®] as manufacturer declares herewith, that the above mentioned linear thrust units meet the following basic requirements of the EC Machinery Directive (2006/42/EC):
Appendix I, articles: 1.1.2, 1.1.3, 1.1.5, 1.2.1, 1.2.6, 1.3.1, 1.3.7, 1.5.1, 1.6.3, 1.7.1, 1.7.3, 1.7.4

The manufacturer is obliged to electronically submit the documents for the partly completed machinery to national authorities on request. The relevant technical documents pertaining to the machinery according to Appendix VII part B have been complied.

Person responsible for documentation:

Dr. Rüdiger Stenzel, Zum Eichstruck 10, 57482 Wenden/Germany

Wenden, 2018-03-02

W. Händel, General Manager



(1) **EU-TYPE EXAMINATION CERTIFICATE**
(Translation)

(2) Equipment or Protective Systems Intended for Use in
 Potentially Explosive Atmospheres - **Directive 2014/34/EU**

(3) EU-Type Examination Certificate Number:

PTB 15 ATEX 1014 X

Issue: 01

(4) Product: Actuator, type D***-**-* Ex

(5) Manufacturer: Drehmo GmbH

(6) Address: Zum Eichstruck 10, 57482 Wenden, Germany

(7) This product and any acceptable variation thereto is specified in the schedule to this certificate and the documents therein referred to.

(8) The Physikalisch-Technische Bundesanstalt, notified body No. 0102 in accordance with Article 17 of the Directive 2014/34/EU of the European Parliament and of the Council, dated 26 February 2014, certifies that this product has been found to comply with the Essential Health and Safety Requirements relating to the design and construction of products intended for use in potentially explosive atmospheres, given in Annex II to the Directive.

The examination and test results are recorded in the confidential Test Report PTB Ex 18-18095.

(9) Compliance with the Essential Health and Safety Requirements has been assured by compliance with:
EN 60079-0:2012+A11:2013, EN 60079-1:2014, EN 60079-7:2015, EN 60079-11:2012

(10) If the sign "X" is placed after the certificate number, it indicates that the product is subject to the Specific Conditions of Use specified in the schedule to this certificate.

(11) This EU-Type Examination Certificate relates only to the design and construction of the specified product in accordance to the Directive 2014/34/EU. Further requirements of the Directive apply to the manufacturing process and supply of this product. These are not covered by this certificate.

(12) The marking of the product shall include the following:



II 2 G Ex db eb ib IIB, IIC T4, T3 Gb

Konformitätsbewertungsstelle, Sektor Explosionsschutz

Braunschweig, September 17, 2018

On behalf of PTB:

Dr.-Ing. F. Lienesch
 Direktor und Professor



sheet 1/4

EU-Type Examination Certificates without signature and official stamp shall not be valid. The certificates may be circulated only without alteration. Extracts or alterations are subject to approval by the Physikalisch-Technische Bundesanstalt. In case of dispute, the German text shall prevail.

(13)

SCHEDULE

(14) **EU-Type Examination Certificate Number PTB 15 ATEX 1014 X, Issue:01**

(15) Description of Product

The actuator, type D***-*-* Ex, consists of the following elements:

- Two-part housing for the gear unit, consisting of the housing top and bottom part made from aluminium alloy.
The housing houses the planetary gear unit. The planetary gear unit does not form part of this type approval.
- The housing top part with the cover forms the switching and signalling compartment, which is designed to Increased Safety "eb" type of protection. It is optionally provided with an inspection window and can be fitted with switching and signalling elements, optional heating elements, an optional electronic measuring amplifier or an electronic position transmitter of Increased Safety "ib" type of protection, and terminals for intrinsically safe and non-intrinsically safe circuits. A separate type approval is available for the installed elements.
- Terminal box, flanged to the housing; made from aluminium alloy and designed to Increased Safety "eb" type of protection. It can be fitted with terminals for intrinsically safe and non-intrinsically safe circuits. A separate type approval is available for the installed elements.
- Canned motor, flanged to the housing top part; made from aluminium alloy and designed to Flameproof Enclosure "db" type of protection; type TM1.003/P ; TM2.003/P or TM4.001/P.
- Optional separately certified motors of Flameproof Enclosure "db" or Increased Safety "eb" type of protection.
- For feeding cables into the customer's connection unit, or for closing openings, separately certified screwed cable glands and screwed blind plugs of Increased Safety "eb" type of protection may be used.

Technical data

Rated voltage up to 690 V ¹⁾
 Rated current max. 27 A ²⁾
 Rated cross section max. 16 mm²

¹⁾ Voltage tolerance $\pm 5\%$

²⁾ Can be higher when separately certified motors are used

Ingress protection IP64

Ambient temperatures -25 °C to +40 °C

Optional range of ambient temperatures -25 °C to +60 °C ¹⁾

..... -30 °C to +60 °C ^{1) + 2)}

..... -25 °C to +65 °C ^{1) + 3)}

..... -40 °C to +40 °C ²⁾

..... -55 °C to +40 °C ²⁾

sheet 2/4

EU-Type Examination Certificates without signature and official stamp shall not be valid. The certificates may be circulated only without alteration. Extracts or alterations are subject to approval by the Physikalisch-Technische Bundesanstalt. In case of dispute, the German text shall prevail.

SCHEDULE TO EU-TYPE EXAMINATION CERTIFICATE PTB 15 ATEX 1014 X, Issue: 01

- 1) There may be restrictions regarding the operating mode, running torque or operating cycles (see instructions for operation).
- 2) Depending on the installed elements, a heating unit has to be used, so the switching and signalling compartment will be heated to at least -25 °C.
- 3) For use up to +65 °C, the gas group must be downgraded to IIB and the temperature class to T3.

The range of admissible ambient temperatures may be limited by the selected components, or with the data sheet for the electrical rating.

The composition of the protection symbol depends on the types of protection of the components actually used.

Nomenclature

Range of values	D	*	*	*	-	*	-	*		Ex
Position	1	2	3	4	5	6	7	8	9	10

Position	Range of values	Indicates
1	D	DREHMO actuator
2		Multi-turn actuator
	P	Part-turn actuator
3		Actuator for open-close operation, duty type S2
	R	Actuator for modulating operation, duty type S4
4	30 to 2000	Nominal torque in Nm for multi-turn actuators
	30 to 1800	Nominal torque in Nm for part-turn actuators
5	-	Dash
6		W/o valve attachment
	A, AF, B, B1, B2, B3, B3DO, B4, C, D, DO, DOU, DSTO, DSTU, E, EDO	Valve attachment for multi-turn actuators in accordance with EN ISO 5210
	B, V, W, L/D, H, FH, FW	Valve attachment for part-turn actuators in accordance with EN ISO 5211
7	-	Dash
8	5 to 160 (50Hz)	Output speed in rpm (multi-turn actuators)
	6 to 192 (60Hz)	
	8 to 75 (50Hz)	Operating time for 90° in seconds (part-turn actuators)
	6 to 63 (60Hz)	
9		Blank
10	Ex	Explosion-proof actuator

Modifications

The min. ambient temperature shall be changed to -55 °C.

SCHEDULE TO EU-TYPE EXAMINATION CERTIFICATE PTB 15 ATEX 1014 X, Issue: 01

(16) Test Report PTB Ex18-18095

(17) Specific conditions of use

Repairs on the flameproof joints may only be made in accordance with the manufacturer's structural specifications. Repairs on the basis of the values in tables 1 and 2 of EN 60079-1 are not permitted.

The motors may be connected with suitable cable glands that meet the requirements in EN 60079-1, and for which a separate test certificate has been issued.

Openings that are not used must be closed in compliance with the specifications in EN 60079-1.

The screws used for delimitation of the flameproof enclosure must at least comply with strength class 8.8.

Measures have to be taken to ensure that the equipment can only be started after the temperature at the inside of the device is raised up to -25 °C min.

(18) Essential health and safety requirements

Met by compliance with the aforementioned standards.

Konformitätsbewertungsstelle, Sektor Explosionsschutz
On behalf of PTB:

Braunschweig, September 17, 2018

Dr.-Ing. F. Lienesch
Direktor und Professor





IECEx Certificate of Conformity

INTERNATIONAL ELECTROTECHNICAL COMMISSION IEC Certification Scheme for Explosive Atmospheres

for rules and details of the IECEx Scheme visit www.iecex.com

Certificate No.: IECEx PTB 15.0033X

Issue No: 1

Certificate history:

[Issue No. 1 \(2018-01-22\)](#)

[Issue No. 0 \(2016-01-19\)](#)

Status: **Current**

Page 1 of 5

Date of Issue: **2018-01-22**

Applicant: **DREHMO GmbH**
Zum Eichstruck 10
57482 Wenden
Germany

Equipment: **Actuator type D **** - * - * Ex**

Optional accessory:

Type of Protection: **"d", "e"**

Marking:
Ex db eb IIC T4 Gb or Ex db eb IIB T3 Gb

*Approved for issue on behalf of the IECEx
Certification Body:*

Dr.-Ing. Detlev Markus

Position:

Head of Department Explosion Protection in Energy Technology

*Signature:
(for printed version)*

Date:

1. This certificate and schedule may only be reproduced in full.
2. This certificate is not transferable and remains the property of the issuing body.
3. The Status and authenticity of this certificate may be verified by visiting the [Official IECEx Website](#).

Certificate issued by:

Physikalisch-Technische Bundesanstalt (PTB)
Bundesallee 100
38116 Braunschweig
Germany





IECEx Certificate of Conformity

Certificate No: IECEx PTB 15.0033X

Issue No: 1

Date of Issue: 2018-01-22

Page 2 of 5

Manufacturer: **DREHMO GmbH**
Zum Eichstruck 10
57482 Wenden
Germany

Additional Manufacturing location(s):

This certificate is issued as verification that a sample(s), representative of production, was assessed and tested and found to comply with the IEC Standard list below and that the manufacturer's quality system, relating to the Ex products covered by this certificate, was assessed and found to comply with the IECEx Quality system requirements. This certificate is granted subject to the conditions as set out in IECEx Scheme Rules, IECEx 02 and Operational Documents as amended.

STANDARDS:

The apparatus and any acceptable variations to it specified in the schedule of this certificate and the identified documents, was found to comply with the following standards:

IEC 60079-0 : 2011 Explosive atmospheres - Part 0: General requirements

Edition:6.0

IEC 60079-1 : 2014-06 Explosive atmospheres - Part 1: Equipment protection by flameproof enclosures "d"

Edition:7.0

IEC 60079-7 : 2015 Explosive atmospheres – Part 7: Equipment protection by increased safety "e"

Edition:5.0

*This Certificate **does not** indicate compliance with electrical safety and performance requirements other than those expressly included in the Standards listed above.*

TEST & ASSESSMENT REPORTS:

A sample(s) of the equipment listed has successfully met the examination and test requirements as recorded in

Test Report:

[DE/PTB/ExTR15.0038/01](#)

[DE/PTB/ExTR15.0041/00](#)

Quality Assessment Report:

[DE/TPS/QAR15.0004/01](#)



IECEx Certificate of Conformity

Certificate No: IECEx PTB 15.0033X

Issue No: 1

Date of Issue: 2018-01-22

Page 3 of 5

Schedule

EQUIPMENT:

Equipment and systems covered by this certificate are as follows:

Description

The actuator, type D****-* Ex, consists of the following components:

- Enclosure accommodating a planetary gear. The planetary gear does not form part of this type approval. (i-matic and standard)
- Flange-mounted motor of Flameproof Enclosure "db" type of protection. (i-matic and standard)
- Optionally a flange-mounted – separately certified – motor of Flameproof Enclosure "db" type of protection or Increased Safety "eb" type of protection. (i-matic and standard)
- Optionally motor terminal compartment of Increased Safety "eb" type of protection cast to the enclosure, with – separately certified – terminals.
It is connected to the motor and the electronics compartment by means of – separately certified – wire bushings. (always on i-matic)
- Optionally an electronics compartment of Flameproof Enclosure "db" type of protection cast to the enclosure, provided with an inspection window. (always on i-matic)
- A terminal box of Increased Safety "e" type of protection, with – separately certified – terminals (i-matic and standard)

SPECIFIC CONDITIONS OF USE: YES as shown below:

Repair and overhaul of the flameproof gaps are only allowed according constructive information given from the original manufacturer. A repair according the values given in Table 1 or Table 2 of IEC 60079-1 is not permitted.

Danger due to electrostatic discharge. The actuator must be cleaned with a damp cloth only. Please refer to operation manual.



IECEx Certificate of Conformity

Certificate No: IECEx PTB 15.0033X

Issue No: 1

Date of Issue: 2018-01-22

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EQUIPMENT (continued):

- Optionally a – separately certified - plug connector type KP, KPH and KES in the type of protection Increased Safety "e" (IECEx DEK 12.0022X). (i-matic).

- Optionally a - separately certified - terminal compartment type KES-Exd in the type of protection flameproof enclosure "d" (IECEx DEK 12.0022X). (i-matic).

- Optionally a - separately certified - plug connector type K.Exe and K.Exd in the type of protection Increased Safety "eb" and Flameproof Enclosure "db" (IECEx DEK 17.0012U).

- Optionally an external control system. The control system may be outside the potentially explosive area (no ex-protection) or in the type of protection Increased Safety "eb" and Flameproof enclosure "db", inside the potentially explosive area. The electronics compartment of the actuator of Flameproof Enclosure type of protection will in this case be filled with packing material. (i-matic).

Technical data and Nomenclature see Annex.



IECEx Certificate of Conformity

Certificate No: IECEx PTB 15.0033X

Issue No: 1

Date of Issue: 2018-01-22

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DETAILS OF CERTIFICATE CHANGES (for issues 1 and above):

- 1) New test according to IEC 60079-7:2015.
- 2) The - separately certified - plug connector type K.Exe and K.Exd in the type of protection Increased Safety "eb" resp. Flameproof Enclosure "db" (IECEx DEK 17.0012U) is supplemented.

Annex:

[COCA15.0033X-Issue1.pdf](#)



Applicant: DREHMO GmbH
Zum Eichstruck 10
57482 Wenden
Germany

Electrical Apparatus: Actuator type D****-**-* Ex

Technical data

Rated voltage	up to 690 V
Rated current	max. 27 A *)
Rated cross section	max. 16 mm ²
Ambient temperatures	-25 °C to +40 °C (standard) -30 °C to +40 °C (IIC, T4) -30 °C to +60 °C (IIC, T4) -55 °C to +40 °C (IIC, T4 with heater) -30 °C to +65 °C (IIB, T3)
Ingress protection	IP66 in accordance with EN 60529
*) may be higher for separately certified motors	

The electrical data are based on the connected motor as well as the electric components accommodated in the electronics compartment.

Nomenclature

D	*	*	*	*	-	*	-	*		Ex
1	2	3	4	5	6	7	8	9	10	11

Position	Range of values	Significance
1	D	DREHMO actuator
2		Multi-turn actuator
	P	Part-turn actuator
3		Actuator without control unit (standard)
	iM	Actuator with i-matic or i-matic C controls
4		Actuator for open-close operation, type of duty S2
	R	Actuator for modulating operation, type of duty S4
5	30 to 2000	Tripping torque in Nm for multi-turn actuator
	75 to 1800	Tripping torque in Nm for part-turn actuator
6	-	Dash
7		Without valve attachment (output drive)

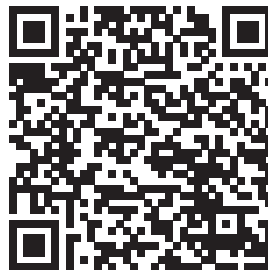


	A, AF, B, B1, B2, B3, B3DO, B4, C, D, DO, DOU, DSTO, DSTU, E, EDO, ...	Valve attachment for multi-turn actuators according to EN ISO 5210
	B, V, W, L/D, H, FH, FW, ...	Valve attachment for part-turn actuators according to EN ISO 5211
8	-	Dash
9	5 to 160 (50Hz)	Output speed in rpm (Multi-turn)
	6 to 192 (60Hz)	
	7 to 75 (50HZ)	Operating time for 90° in seconds (Part-turn)
	6 to 63 (60Hz)	
10		Blank
11	Ex	Explosion-proof actuator

DREHMO

VALVE ACTUATORS

A member of the AUMA Group



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