DREHMO
VALVE ACTUATORS

s-range

Electric actuator
(standard version/Ex version according to ATEX, IECEx and CCC)

Operation instructions
Assembly and commissioning

Read operation instructions first.

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

Target group:

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

Table of contents

1 Safety

1.1 Prerequisites for the safe handling of the product

Standards/directives

The end user or the contractor must ensure that all legal requirements, directives, guidelines, national regulations and recommendations with respect to assembly, electrical connection, commissioning and operation are met at the place of installation.

Depending on the device version, this includes:

- Standards and directives such as IEC 60079:
  Part 14: Electrical installations design, selection and erection
  Part 17: Electrical installations inspection and maintenance
- Configuration guidelines for the respective fieldbus or network applications

Safety instructions/warnings

All personnel working with this device must be familiar with the safety and warning instructions in this manual and heed the instructions given. Safety instructions and warning signs on the device must be observed to avoid personal injury or property damage.

Qualification of staff

Assembly, electrical connection, commissioning, operation, and maintenance must be carried out by suitably qualified personnel authorised by the end user or contractor of the plant only.

Prior to working on this product, the staff must have thoroughly read and understood these instructions and, furthermore, know and observe officially recognised rules regarding occupational health and safety.

Work performed in potentially explosive atmospheres is subject to special regulations which have to be observed. The end user or contractor of the plant is responsible for respect and control of these regulations, standards, and laws.

Electrostatic charging

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

To prevent electrostatic charging, the actuator may only be cleaned using a moist cloth.

Ignition hazards

Gearings were subjected to an ignition hazard assessment in compliance with the currently applicable standard according to EN ISO 80079-36/ -37. Hot surfaces, mechanically generated sparks as well as static electricity and stray electric currents were identified and assessed as major potential ignition sources. Protective measures to prevent the likelihood that ignition sources arise were applied to the gearings. This includes in particular lubrication of the gearings, the protection level of enclosure protection and the warnings and notes contained in these operation instructions.

Commissioning

Prior to commissioning, imperatively check that all settings meet the requirements of the application. Incorrect settings might present a danger to the application, e.g. cause damage to the valve or the installation. The manufacturer will not be held liable for any consequential damage. Such risk lies entirely with the user.

Operation

Prerequisites for safe and smooth operation:

- Correct transport, proper storage, mounting and installation, as well as careful commissioning.
- Only operate the device if it is in perfect condition while observing these instructions.
- Immediately report any faults and damage and allow for corrective measures.
- Heed recognised rules for occupational health and safety.
- Heed national regulations.
- During operation, the housing warms up and surface temperatures > 60 °C may occur. To prevent possible burns, we recommend checking the surface temperature using an appropriate thermometer and wearing protective gloves, prior to working on the device.

Protective measures

The end user or the contractor are responsible for implementing required protective measures on site, such as enclosures, barriers, or personal protective equipment for the staff.

Maintenance

To ensure safe device operation, the maintenance instructions included in this manual must be observed.

Any device modification requires prior written consent of the manufacturer.

1.2 Range of application

DREHMO actuators are designed for the operation of industrial valves, e.g. globe valves, gate valves, butterfly valves and ball valves.

If temperatures are to be expected at the valve flange or the valve stem, which exceed the permissible ambient temperatures, (e.g. due to hot media), please consult 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 (S1)
- Buried service
- Continuous underwater use (observe enclosure protection)
- Potentially explosive atmospheres (except the explosion-proof version)
- Potentially explosive atmospheres 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 operation instructions are valid for the clockwise closing standard version, i.e. driven shaft turns clockwise to close the valve.

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.**

The ⚠ safety symbol warns of a potential personal injury hazard.

The signal word (e.g. DANGER) indicates the level of hazard.

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. For commissioning, service and maintenance, additional actuator-relevant data is indicated on the name plates.

Figure 1: Actuator name plate for Ex

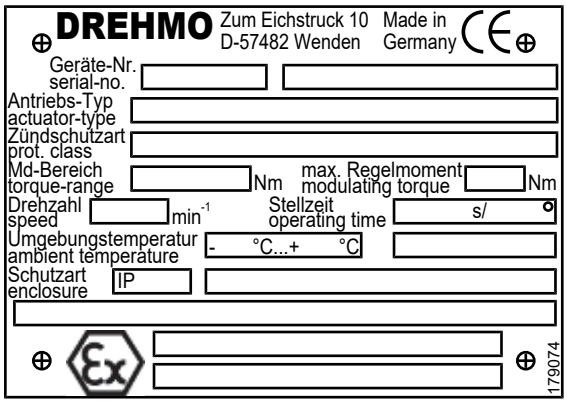


Figure 2: Actuator name plate for non-Ex

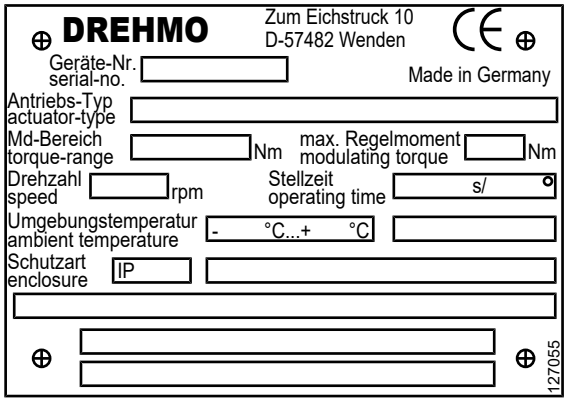
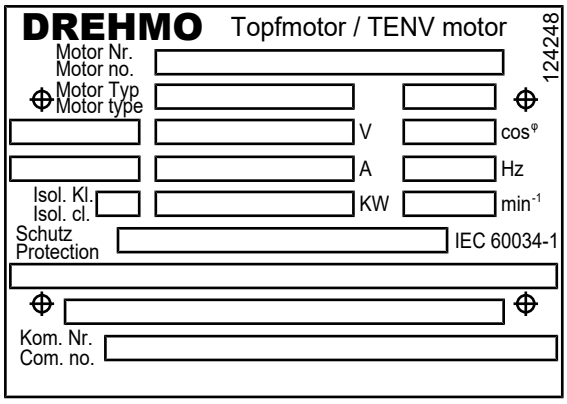


Figure 3: Motor name plate



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

Please always state the device 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:

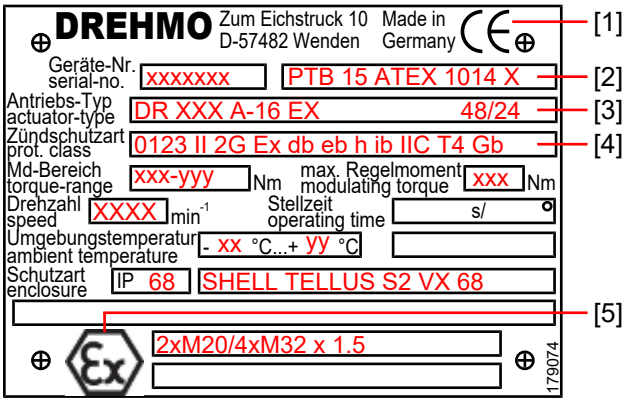
Table 1: Type code

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 integral controls
4		Actuator for open-close operation, type of duty S2 ≤ 15 min
	R	Type of duty for modulating actuator: S4 max. 35 % on time
5	30 – 2,000	Nominal torque in Nm for multi-turn actuators
	75 – 1,800	Nominal torque in Nm for part-turn actuators
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/DIN 3338
	B, V, W, L/D, H, FH, FW	Valve attachment types for part-turn actuators according to EN ISO 5211/DIN 3210
8	-	Line
9	5 – 200	Output speed in rpm for multi-turn actuators. The indication always refers to the 50 Hz value. Apply the 1.2 factor for actuators with 60 Hz (6 – 240). The exact speed is shown in a separate field.
	7 – 75	Operating time for 90° in seconds for part-turn actuators. The indication always refers to the 50 Hz value. Apply the 0.8 factor for actuators with 60 Hz (6 – 63). The exact speed is shown in a separate field.
10		Blank
11		Standard actuator
	Ex	Explosion-proof actuator

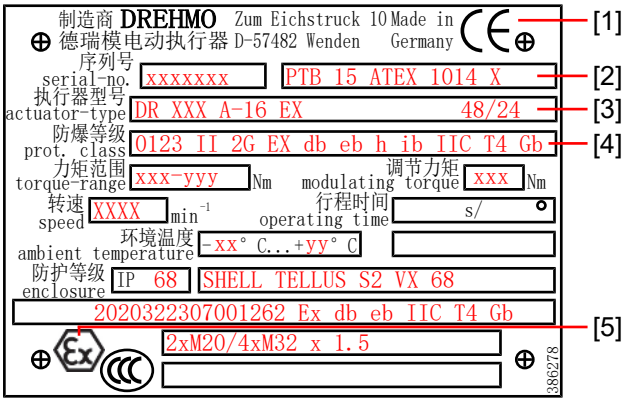
2.3 Description of the marking according to ATEX and IECEx

Figure 4: Ex marking (in our example according to ATEX)



[1]	CE code	[2]	Type examination certificate
[3]	Assembly week/Year of manufacture	[4]	Ex marking (refer to description)
[5]	Ex symbol		

Figure 5: Ex marking according to CCC



[1]	CE code	[2]	Type examination certificate
[3]	Assembly week/Year of manufacture	[4]	Ex marking (refer to description)
[5]	Ex symbol		

Table 2: Ex marking

Marking	Signification
0123	ID number of the notified body
II	Group
2G	Device category
Ex	Ex followed by protection types
db	Flameproof enclosure: Motor
eb	Increased safety: Terminal compartment and limit switch compartment
h	Constructional safety: Actuator gearings and pertaining output drives
ib	Intrinsic safety: electronic position transmitter
IIC	Explosion group
T4	Temperature class
Gb	Equipment protection level

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

Suspended load!

Death or serious injury.

- → Do NOT stand below suspended load.
- → Fix ropes or slings around housing, NOT to handwheel, stem protection cover or motor eyebolt.
- → Actuators mounted on valves: Attach ropes or hooks for the purpose of lifting by hoist to valve and NOT to actuator.
- → Actuators mounted to gearboxes: Attach ropes or hooks for the purpose of lifting by hoist only to the gearbox using eyebolts and NOT to the actuator.
- → Secure load against falling, sliding or tilting.
- → Perform lift trial at low height to eliminate any potential danger e.g. by tilting.

Please refer to the illustration below for appropriate actuator transport.

Figure 6: 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, use this heater.

NOTICE

Danger of corrosion 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.

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

- Prior to storage: Protect uncoated surfaces, in particular output drive parts and mounting surfaces using long-term corrosion protection agents.

- At an interval of approx. 6 months: Check uncoated surfaces for corrosion. Should traces of corrosion be detected, renew the corrosion protection.
- Ensure that actuators are fully operational by performing a test run every 6 months.

3.3 Packaging

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

4 Valve attachment

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

DREHMO actuators can be mounted in any position. If the perpendicular valve shaft is freely accessible, this requires the least effort. To fix the DREHMO actuator to the final element (valve), threaded holes are provided at the actuator mounting flange. The dimensions of the actuator mounting flange with output drive types comply with EN ISO 5210/DIN 3338 (multi-turn actuators) or EN ISO 5211/DIN 3210 (part-turn actuators) standards.

a) DREHMO actuators are self-locking up to output speeds of 80/96 rpm (@ 50/60 Hz).

b) Actuators with speeds of 120/160 rpm @ 50 Hz, or 144/192 rpm @ 60 Hz are not self-locking and therefore not suitable for pulling loads.

c) For more information on actuators with brakes, refer to Types of duty for different versions [▶ 36].

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 the handwheel results in clockwise rotation of the output drive (view on the motor name plate).

NOTICE

Damage to actuator and mounted elements by handwheel operation!

→ The set tripping torques do not limit the forces applied by the handwheel.

→ Operation via handwheel 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 Dismantling and mounting of the stem nut (output drive type A)

For output drive type A, make sure that the unbored stem nut (delivered unbored if not stated otherwise in the order) must be provided with a thread bore in compliance with the available stem, prior to mounting the DREHMO actuator onto the valve.

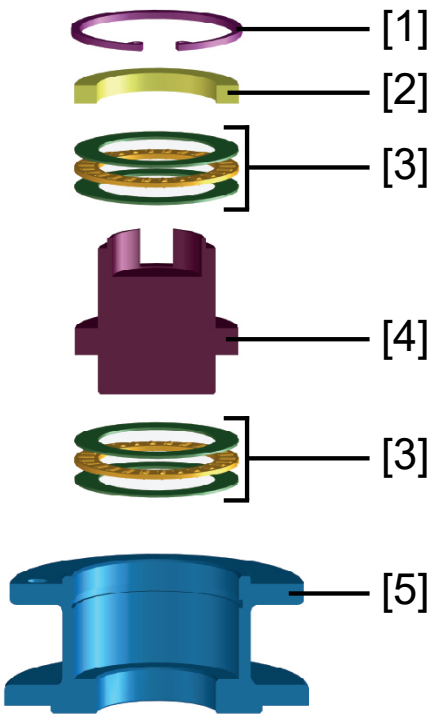
NOTICE

Lubrication of bearing points required!

→ Apply sufficient Lithium soap EP multi-purpose grease to axial needle roller and cage assemblies and contact bearing faces when mounting stem nut A.

→ Ensure that all hollow spaces of the bearings are filled with grease.

Figure 7: Stem nut A



[1]	Retaining ring	[2]	Shim washer
[3]	Axial bearing with two bearing washers	[4]	Stem nut
[5]	Output mounting flange		

How to proceed

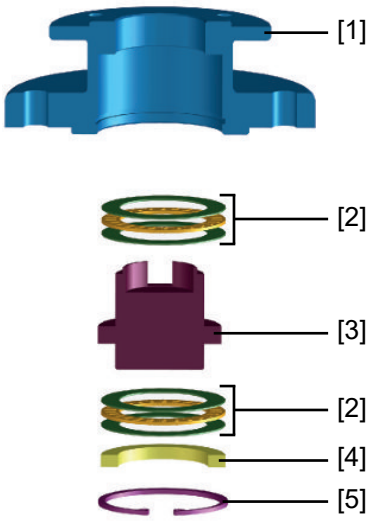
1. Dismantle output mounting flange [5] from actuator.
2. Remove retaining ring [1].
3. Remove stem nut [4] including shim washer [2] and axial bearing with the two bearing washers [3].
4. Drill threaded hole.
5. Fit stem nut in reversed order while greasing the bearings.
6. Apply a thin film of sealing agent (e.g. Marston Durapress) at sealing faces of output mounting flange [5] prior to assembly.

4.3 Dismantling and mounting of the modified stem nut (output drive type A-HP)

For better distinction, these stem nuts are marked with a turned marking groove at the shoulder circumference.

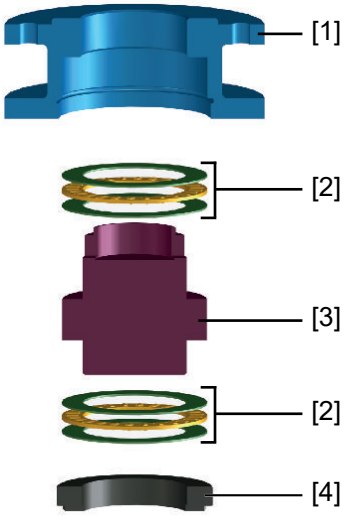
NOTICE! Lubrication of bearing points required!

Figure 8: Stem nut A-HP with retaining ring



[1] Output mounting flange
[2] Axial bearing with two bearing washers
[3] Stem nut
[4] Shim washer
[5] Retaining ring

Figure 9: Stem nut A-HP with locking nut



[1] Output mounting flange
[2] Axial bearing with two bearing washers
[3] Stem nut
[4] Locking nut

How to proceed

1. Remove retaining ring [5]/locking nut [4].
2. Take out stem nut [3] and axial bearing with two bearing washers [2].
3. If it is an output drive with retaining ring, also remove the shim washer [4].
4. Drill threaded hole.
5. Fit stem nut in reversed order while greasing the bearings.

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 x D (refer to figure Insulating flange [▶ 14]). A remaining width of joint of 0 mm must not be fallen short of.

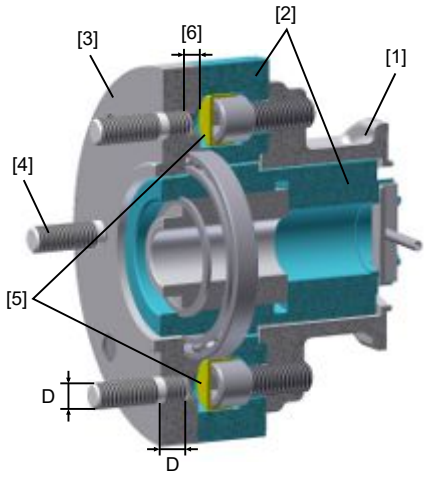
Caution: Isolating spark gaps for lightning conditions between multi-turn actuator and pipeline are not included in the delivery! A potential supplier is the DEHN company, product TFS (Trennfunkenstrecke, German for isolation spark gaps).

NOTICE

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

→ Due to the restricted permissible force at the insulating flange, horizontal mounting is not permissible for actuators with standard motors (with separate terminal box) and with TM2 or TB2 pot-type motors.

Figure 10: Insulating flange

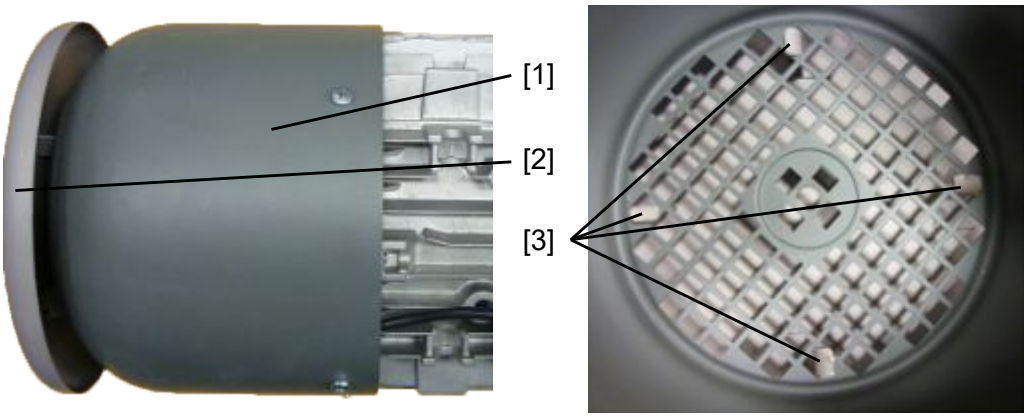


[1]	Input mounting flange	[2]	Insulating body
[3]	Output drive flange	[4]	Stud
[5]	Insulating caps	[6]	Remaining width of joint (> 0 mm)

4.5 Rain protection hood

For HEW-RUF motors, the rain protection hood [2] is always used in combination with the fan cover [1] (refer to Rain protection hood [▶ 14]). 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 protection hood [2] with positive connection can be removed. For this, straighten the four lugs [3] using appropriate universal pliers or similar. Finally, the fan cover [1] must be refitted.

Figure 11: Rain protection hood



[1]	Fan cover	[2]	Rain protection hood
[3]	Lugs		

4.6 Assembly

Direct mounting

For direct mounting, the actuator is fitted without intermediate gearing to the valve. For this, multi-turn actuators are equipped with output drive type B3 as a standard. A, AF, B, B1, B2, B3DO, B4, C, D, DO, DOU, DSTO, DSTU, E and EDO output drive types are also 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. If required, use handwheel to operate actuator to a suitable position. Fasten actuator crosswise to valve using appropriate screws.

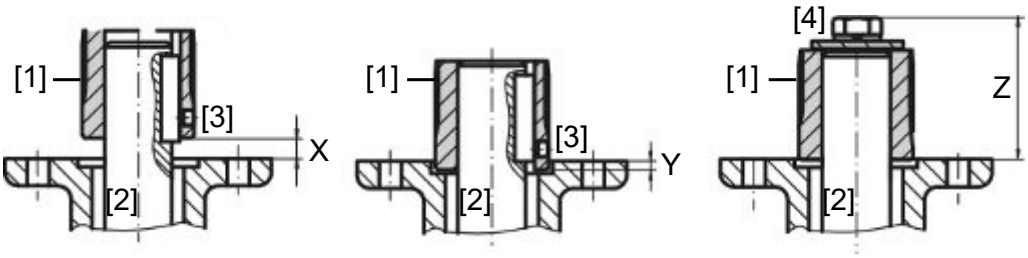
Output drive type A is an exception. First fasten output drive on the stem until it is flush on the valve. Rotate the drive assembly down the valve shaft to mate with the valve flange. Align the fixings and attach loosely, rotate the drive coupling to take up the free play and ensure close coupling of 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. Finally screw the flange tightly to the actuator.

Table 3: Tightening torques

Screw strength class 8.8 ($\mu_G \approx 0.12$)										
Threads	M6	M8	M10	M12	M14	M16	M18	M20	M30	M36
Tightening torques in Nm	10	25	49	85	135	210	300	425	1,450	2,600

Part-turn actuators are equipped with an unbored output drive plug sleeve as a standard. B, V, W, L/D and H output drive plug sleeves are also available on request. The output drive plug sleeve has splines at the outer diameter. Apply suitable grease to the splines prior to mounting to the valve. The output drive plug sleeves can be inserted into the actuator with an offset at certain angles. Heed the fitting dimensions according to Assembly [▶ 16].

Figure 12: Sectional view of various couplings



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

Increased fastening torque for powder coated flanges possibly required!

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

How to proceed

1. Operate actuator with handwheel to mechanical end stop.
2. Valve and part-turn actuator must be in the same position CLOSE/CLOSE or OPEN/OPEN.
3. Thoroughly degrease the bearing faces of the output mounting flanges and apply a suitable sealing agent (e.g. Marston Durapress).
4. Apply a small quantity of grease to the valve shaft [2].
5. Place coupling [1] onto valve shaft [2] and secure against axial slipping by using a grub screw [3], a retaining ring or a screw [4]. Observe dimensions X, Y or Z.

Table 4: Coupling fitting dimensions

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

6. Apply acid-free grease to splines on coupling.
7. Fit part-turn actuator.
8. Should the flange bores not match with the threads.
   ⇨ Slightly rotate handwheel until bores line up.
   ⇨ If required, shift actuator by one tooth on the coupling.
9. Fasten actuator with suitable screws.

We recommend fitting the screws using thread sealing agent. Tighten screws crosswise with a torque according to Tightening torques [▸ 15].

Indirect mounting

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

4.7 End stops for part-turn actuators

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

The internal end stops limit the swing angle. They protect the valve in manual 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

Caution: The end stop setting sequence depends on the valve. We recommend starting with end stop CLOSED for butterfly valves and with end stop OPEN for ball valves.

For butterfly valves, turn handwheel clockwise to mechanical end stop CLOSED, then slowly rotate one turn counterclockwise. For ball valves, turn counterclockwise until the actuator has reached end position OPEN.

Adjust actuator in accordance with the possible angular steps and slide it carefully onto the 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.

4.8 Setting the mechanical end stop screw for part-turn actuators

DP(R) 75 – 1800 (Ex) (with planetary gearing)

⚠CAUTION

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

Pinching and damage by 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.

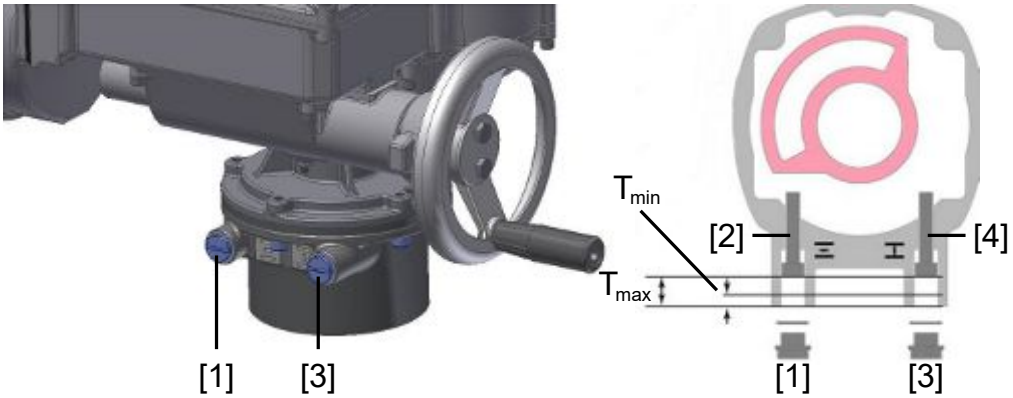
→ Observe dimension $T_{min...}$

On delivery, unfasten both screws for the end stop to allow alignment of actuator to valve. The minimum and maximum dimensions for adjustment indicated in the table below must neither be exceeded nor fallen short of. When setting up the actuator, the valve must be in position CLOSED.

Table 5: Setting limits of the stop screws for planetary gearings

Actuator type 90°	T_{max}	T_{min}
DP(R) 75/150/299 (Ex)	17 mm	11 mm
DP(R) 300/450 (Ex)	20 mm	12 mm
DP(R) 600/900 (Ex)	23 mm	13 mm
DP(R) 1200/1800 (Ex)	23 mm	12 mm

Figure 13: Cross section of compartment for end stop screws



[1]	Screw plug for end stop OPEN	[2]	Setting screw for end stop OPEN
[3]	Screw plug for end stop CLOSED	[4]	Setting screw for end stop CLOSED

4.8.1 Set end stop CLOSED

How to proceed

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.

4.8.2 Set end stop OPEN

How to proceed

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 critical aspects and information for installation and modification of the electrical connection are presented.

5.1 Important notes

DANGER

Electric shock due to presence of hazardous voltage if the PE conductor is NOT connected!

Death or serious injury.

→ Connect all protective earth conductors (if required use external earth connection).

→ Power the device only once the protective earth conductor has been connected.

WARNING

Electric shock due to presence of hazardous voltage!

Failure to observe this warning could result in death, serious injury, or property damage.

→ The electrical connection must be carried out exclusively by suitably qualified personnel.

→ Prior to connection, heed 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.

When setting up and operating the actuator in potentially explosive atmospheres, heed the provisions in compliance with IEC/EN 60079-14 for gas explosive atmospheres.

In addition, heed the following points:

- Observe indications on name plate.
- Compare mains voltage.
- The 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.
- Heed twisted signal cable pairs according to wiring diagram.
- For cable glands (including screw 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).
- Appropriate fuses for cable protection must be installed in front of each actuator. Fuse specifications must be calculated on the basis of published motor data.

WARNING

Danger of explosion for explosion-proof applications!

Death or serious injury.

→ Before opening, ensure that there is no explosive gas and no voltage.

⚠WARNING

Risk of explosion in case of damage to flameproof enclosure!

Risk of death or serious injury

→ Covers and housing parts must be free of damage.

→ Flameproof joints must neither be damaged nor soiled in any way.

→ Do not jam cover during fitting.

⚠WARNING

Danger of explosion by impermissible heating up of the motor.

Death or serious injury.

→ Plan and implement the required protective measures within the system.

→ Depending on the wiring, unexpected startup after heating of of the motor is possible if the operation command is still present.

⚠WARNING

Loss of explosion protection!

Death or serious injury.

→ Unless ordered otherwise, the actuator will be supplied with non-Ex certified screw plugs. Replace these screw plugs by suitable screw connections prior to commissioning to ensure explosion protection.

For explosion-proof actuators, additionally heed the points below:

- 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.
- The Ex approval has to be legible.
- When using a PTC thermistor in the motor, provide the pertaining certified tripping device within the system.
- When using a thermal protector in the motor, provide the pertaining certified overcurrent relay within the plant.
- When deploying the actuator in potentially explosive atmospheres, use cable glands and screw plugs with certification 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, connect actuators 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.

5.2 Connection terminals

Various options are available for actuator connections. For precise indications relating to possible cable cross sections and, if applicable, pertaining tightening torques, refer to Technical data overview [▶ 34].

6 Limit switching module

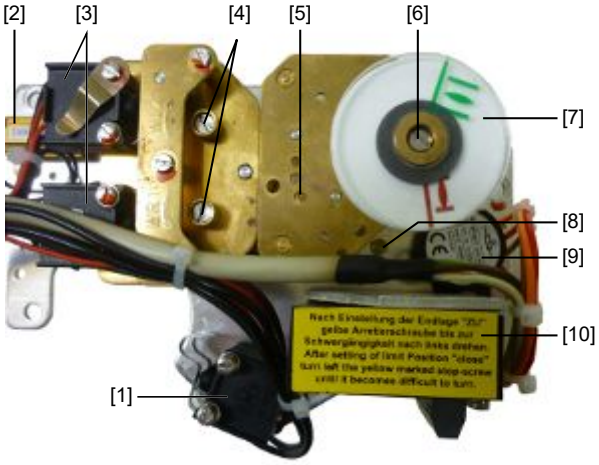
In this chapter, the limit switching module used in DREHMO actuators is described. The limit switching module is located below the housing cover. The housing cover can be removed by unfastening the four outer screws.

Depending on the actuator version, the illustrations of the respective components may deviate from the standard or explosion-proof version. The actuator version can be identified by the components used.

6.1 Design of the 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. The illustration below shows a typical version.

Figure 14: Limit switching module D(R)30 – 2000 in standard version



[1]	Torque switches	[2]	Heating resistor
[3]	Limit switches	[4]	Adjustment screws for limit positions
[5]	Mounting position of limit switches for intermediate positions	[6]	Adjustment screw for optional intermediate position signal
[7]	Mechanical position indicator	[8]	Transit screw
[9]	Potentiometer	[10]	Measuring amplifier

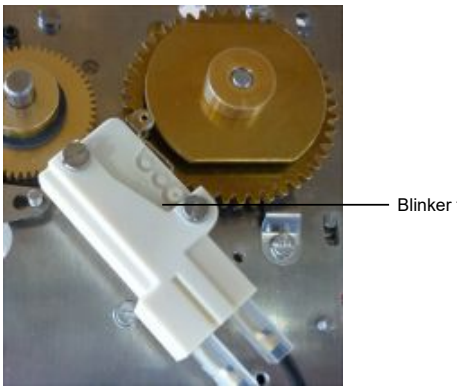
The torque and limit switches are operated via adjustable cams and are also available as tandem switches as an option. For torque switches, labels are fixed to the cams indicating the permissible setting range.

A measuring amplifier converts the potentiometer position into an analogue position signal between 4 – 20 mA. The potentiometer is limited to an angle of 270°. Therefore, it is driven by a reduction gearing. Please refer to Setting the reduction gearing for multi-turn actuators [▶ 26] or Setting the reduction gearing for part-turn actuators [▶ 27] 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. As an option, a mechanical position indicator can be fitted to the same shaft as used for the potentiometer pinion. Adjust the position indicator 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. 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.

Figure 15: Blinker transmitter in standard version



7 Commissioning

The procedure for commissioning DREHMO s-range actuators is described below.

⚠WARNING

All working steps are performed while cover is removed.

Danger of pinching and contact with live parts

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

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

a) Clockwise rotation of the output drive shaft corresponds to direction CLOSE.

b) Counterclockwise rotation of the output drive shaft corresponds to direction OPEN.

c) DR and WR switches are designated for torque and limit position in direction CLOSE.

d) DL and WL switches are designated for torque and limit position in direction OPEN.

e) Even if the output signal of the measuring amplifier is not to be used, unscrew the transit screw (refer to Design of the limit switching module [▶ 21]).

7.1 Checking the rotary direction

Checks have to be performed in any intermediate valve position. In case of incorrect direction of rotation, immediately switch off and change direction of rotation. 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 control cables or controls. In particular in case of oversized motors (e.g. for 80 % mains voltage) for actuators or valves, do not apply load to the motor stall torque since this could cause damage to valve or actuator. Make sure that limit and torque switches are always connected.

7.2 Setting the torque values

Torques are set in the factory according to the indications in the purchase order. They will only be entered on the name plate if explicitly ordered. If no torques are indicated in the order, the minimum adjustable torque will be set in the factory. Torques can be adjusted within the range indicated on the name plate, using the attached dials.

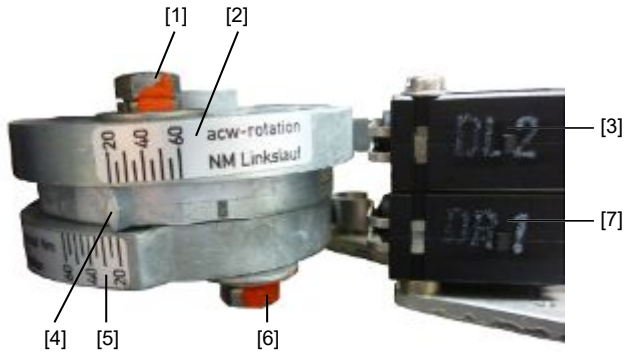
NOTICE

Maximum permissible torque exceeded!

→ Settings exceeding the maximum indicated torque are not permissible.

Use setting discs to set the torques for which a torque signal will be issued. To set the torque in direction OPEN, loosen the upper transit screw. To set the torque in direction CLOSE, loosen the bottom transit screw. Once the respective screw has been loosened, turn the pertaining disc until the desired value on the scale is aligned with the setting mark. Fasten the respective screw again.

Figure 16: Torque setting

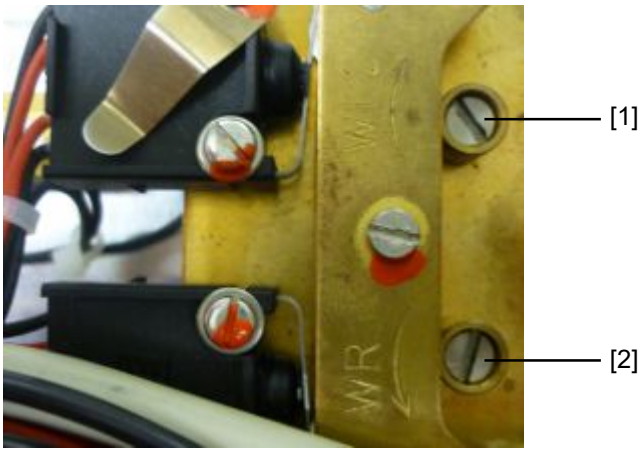


[1]	Transit screw for torque adjustment OPEN	[2]	Scale with setting range for torque in direction OPEN
[3]	Torque switch for direction OPEN (in standard version)	[4]	Setting mark
[5]	Scale with setting range for torque in direction CLOSE	[6]	Transit screw for torque adjustment CLOSE
[7]	Torque switch for direction CLOSE (in standard version)		

7.3 Setting the limit positions

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

Figure 17: Limit switches in standard version



[1]	Setting screw for limit position OPEN	[2]	Setting screw for limit position CLOSED

For setting a limit position, operate the actuator 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. Therefore, make sure not to modify the selected position while operating the desired switch. Once the respective limit switch has tripped, refrain from turning the setting screw! Repeat the complete setting procedure if you have accidentally turned too far.

If optional switches are fitted for intermediate position signalling, they are operated by means of the shaft cams of the mechanical position indicator. Approach the respective intermediate position for setting. Then turn the handwheel by approx. 30° into the opposite direction. To set the respective cam on the shaft of the mechanical position in-

dicator, slightly loosen the transit screw (refer to Setting the mechanical position indicator [▶ 28]). After cam setting, fasten the screw (not too tight! Do not exceed approx 0.5 − 0.7 Nm). Check the set tripping points by operating over full valve stroke.

7.4 Setting the reduction gearing for multi-turn actuators

Depending on the actuator running time, set the reduction gearing according to the tables below. The reduction gearing converts the travel into a 300° angle signal. The signal is required for both the mechanical position indication and the 4 – 20 mA position feedback (both optional).

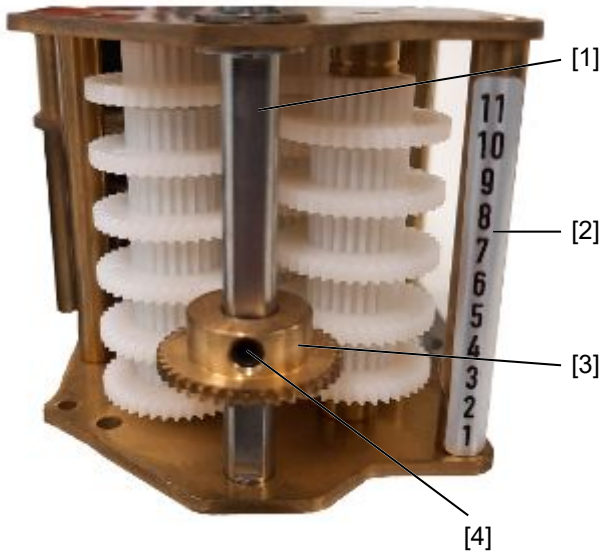
To re-set the reduction gearing, loosen the fastening screw and retain the shaft. After unfastening the screw, the sliding gear wheel can be moved up (smaller angle for the mechanical position indicator) or down (larger angle for the mechanical position indicator). Once the new position of the sliding gear wheel has been reached, tighten fastening screw again.

NOTICE

Heed correct position of the sliding gear wheel!

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

Figure 18: Reduction gearing



[1]	Shaft of the mechanical position indicator	[2]	Scale with possible positions
[3]	Sliding gear wheel	[4]	Fastening screw

On the bottom of the mounting plate, the limit switching module is equipped with a driving gear. The variant for section III is shown in the illustration below. For section II, a larger gear is installed instead of a small one. The counter gear is mounted on a shaft within the actuator.

Figure 19: Drive pinion

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

Table 6: Setting options for the reduction gearing for multi-turn actuators

Transmission ratio of limit switch wheels	Turns per stroke (min. and max.)	Position of the sliding gear wheel
1:3 (section III)		1
1:3 (section III)		2
1:3 (section III)		3
1:3 (section III)	**1.38 – 2.49**	**4**
1:3 (section III)	**2.5 – 4.5**	**5**
1:3 (section III)	**4.6 – 8.2**	**6**
1:3 (section III)	**8.3 – 15**	**7**
1:3 (section III)	**15.1 – 27.2**	**8**
1:3 (section III)	**27.3 – 49.6**	**9**
1:3 (section III)	**49.7 – 90.1**	**10**
1:3 (section III)	**90.2 – 135**	**11**
3:1 (section II)		1
3:1 (section II)		2
3:1 (section II)		3
3:1 (section II)	12.4 – 22.4	4
3:1 (section II)	22.5 – 40.8	5
3:1 (section II)	40.9 – 74.2	6
3:1 (section II)	74.3 – 135	7
3:1 (section II)	**135 – 245**	**8**
3:1 (section II)	**246 – 446**	**9**
3:1 (section II)	**447 – 811**	**10**
3:1 (section II)	**812 – 1 450**	**11**

The values of the sliding gear wheel positions 1 – 3 are available on request.

Preferably use **the marked** setting ranges.

Default setting unless ordered otherwise!

a) For output speed of 5 – 50 rpm, the factory setting is section III.

b) For output speed of 80 – 160 rpm, the factory setting is section II.

How to proceed

During setting, proceed as follows:

1. If the desired turns/stroke ratio was available on delivery, the actuator has been correctly set in the factory.
2. Determine output rotations per travel (e.g. output speed **per minute** multiplied by operating time **in minutes**).
3. Determination of section II or III set in the factory. Determine output speed (e.g. by name plate designation on the actuator name plate e.g. D 60 A-40 = 40 rpm).
   Section III set: Actuators with output speed 5 – 50 rpm
   Section II set: Actuators with output speed 25 – 160 rpm

Alternative determination:

Move sliding gear [3] to position 1. Apply approx. 13 handwheel turns while observing the mechanical position indicator (if available) or the cams of the intermediate position switches. If the rotation angle detected exceeds 150°, section III has been set, otherwise section II.

4. Setting the reduction gearing according to the calculated value by re-positioning the sliding gear wheel in accordance with the tables on the setting options [▶ 26].

7.5 Setting the reduction gearing for part-turn actuators

The limit switching module includes a five-stage reduction gearing.

Figure 20: Limit switching module DP 75 – 1800

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. The setting options of this reduction gearing are specified in the following table.

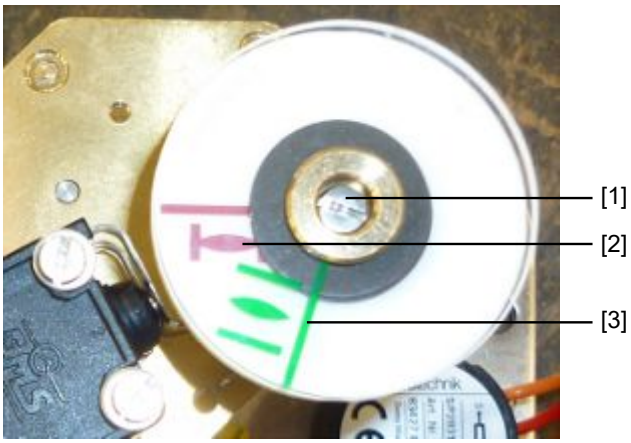
Table 7: Setting options for the reduction gearing for part-turn actuators

Additional gearing	**SQ**	**SQ**	**SQ**
Size	DP 75 – DP 450	DP 600 – DP 900	DP 1200 – DP 1800
Swing angle	90°	90°	90°
Reduction ratio	5.5	11	25.3
Number of teeth LS module	II/45:15	II/45:15	II/45:15
turns/stroke min	1.375	2.75	6.325
Sliding gear wheel position	2	1	2
Turning angle α cam shaft	177.5	214.5	271.3
Modulation in %	59.1	71.5	90.4

7.6 Setting the mechanical position indicator

The figure below shows the components of the mechanical position indicator.

Figure 21: Mechanical position indicator



[1] Transit screw
[2] Adjustable disc for position CLOSED
[3] Adjustable disc for position OPEN

Turn the indication elements to adjust the mechanical position indicator. Both discs can be turned against each other 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 is set higher than approx. 270° or lower than approx. 90° for the selected travel, check the setting at the reduction gearing below and adjust, if required (refer to Setting the reduction gearing for multi-turn actuators [▶ 26]).

7.7 Resistance position transducer B1 (option)

Usually, resistance position transducer B1 adjusts itself by operation to end position CLOSED via a slip clutch. If the resistance position transducer is not set to zero (0 %) in end position CLOSED, the zero point can be set manually by turning the shaft of the resistance position transducer. When connecting the resistance position transducer, the resistance value as well as the permissible load capacity are to be considered.

If the sensor potentiometer is used for connection to intrinsically safe circuits, it is imperative to heed the respectively valid regulations for setting up intrinsically safe circuits (IEC 60079-11).

7.8 Electronic position transmitter B3 (option)

The electronic position transmitter B3 (EM5.004 or EM7.005) is supplied in position CLOSED which corresponds to an analogue signal of 0/4 mA. Once the mechanical limit switches have been set, loosen the transit screw (refer to Design of the limit switching module [▶ 21]) of the potentiometer (the screw next to the potentiometer marked in yellow) to commission the electronic position transmitter. 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 the screw [1] at the electronic position transmitter. In order to change the signal range from 0 – 20 mA to 4 – 20 mA, a link can be installed in the electronic position transmitter (terminals 3 and 4). For explosion-proof actuators, the electronic position transmitter is only available in 2-wire technology within the 4 – 20 mA range.

NOTICE

Damage to the mechanical components of the sensor system due to locked transit screw.

→ Also unfasten transit screw if the electronic position transmitter is not used.

Figure 22: Electronic position transmitter EM5.004

The setting screw cannot be used to set the signal in position CLOSED (4 mA) since the screw only has an impact on the amplification of the electronic position transmitter. 4 mA have been set in the factory.

In case of repair: In case of an explosion-proof actuator, always replace the potentiometer and the measuring amplifier for the analogue position signal by the respective component in explosion-proof version.

It is imperative to heed the valid regulations for setting up intrinsically safe circuits!

Figure 23: Electronic position transmitter B3 (EM7.005) in explosion-proof version

[1] Setting screw for zero point [2] Setting screw for amplification

Connection type 2-wire technology: Current end value 20 mA

Connection type 3-wire and 4-wire technology: Current end value 24 mA or 20 mA (for the specification refer to supplementary operation instructions DREHMO EM7.005 electronic position transmitter).
If the setting was not satisfactory, reset the limit sensor setting to the factory setting and repeat the above setting procedure. The factory settings are restored by:

- Screw in yellow transit screw to the stop.
- Operate the actuator to the end position CLOSED defined at the beginning.
- Check: The factory setting is reached once the 0/4 – 20 mA signal does no longer change during actuator operation whereas the signal must either be 0 or 4 mA (sensor locked).

7.9 Heater with heating resistor

The heating resistor (E1 in the terminal plan) can be operated as standstill heater. Heating power is only achieved if the power supply is connected to the respective terminals (heed terminal plan) for the heater.

Heating resistor data:
$U_{heating\ resistor}$ = 230 V
$P_{heating\ resistor}$ = 10 W

Heating resistor data for explosion-proof version:
$U_{heating\ resistor}$ = 230 V
$P_{heating\ resistor}$ = 6 W

As an option, heating resistors with 24 V, 10 W or 110 V, 10 W are available.

Protect heating resistors against short circuits or earth faults as well as overloads by using a circuit breaker.

7.10 Self-regulating additional heater (option)

When using a self-regulating heater band (self-regulating parallel heater cable) (E1 in the terminal plan), the temperature range can be extended downwards. The self-regulating additional heater is installed if:

- The operating temperature is below −25 °C when using the electronic position transmitter B3
- The operating temperature is below −50 °C without the electronic position transmitter B3.

Band heater data below −25 °C:
$U_{band\ heater}$ = 230 V
$P_{band\ heater}$ < 10 W

Band heater data below −30 °C:
$U_{band\ heater}$ = 230 V
$P_{band\ heater}$ < 60 W

For operation below −25 °C, switch on the self-regulating additional heater one hour before commissioning the electronic position transmitter B3.

The band heater must be protected against short circuits, earth faults and overloads. Use C type variants as circuit breakers. An RCD is not required as the band heater is part of the actuator.

8 Servicing and maintenance

In this section, information is provided to be followed for maintenance, cleaning and disposing of DREHMO actuators.

8.1 Maintenance

We recommend participation in the regular training 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

In any case, the actuator has to be restored to the original state prior to continue using it.

⚠WARNING

Explosion hazard due to inexpert repair of flameproof joints!

Death or serious injury.

→ Repairs on flameproof joints must only be performed by the manufacturer.

⚠WARNING

Explosion protection due to inexpert handling of housing parts with flameproof joints!

Death or serious injury.

→ Opening of the mechanical interfaces available at the device with flameproof joints may only be performed by the manufacturer or staff trained by the manufacturer.

NOTICE

Leaking of the actuator due to excessive lubricant!

→ The actuators are lubricated for life.

→ A fixture for permanent stem lubrication (output drive type A and A-HP) can be requested from the manufacturer.

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

Check open-close actuators 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 an actuator test run every 6 months.

Apply Klüber Isoflex Topas NB5051 to the sealing faces between the housing parts.

For technical questions, please contact the service. Have the device number ready. The device number can be found on the actuator name plate. Only have defective actuators overhauled in the factory of the manufacturer or an authorised workshop.

8.2 Troubleshooting and corrective actions

A functional test is required after corrective maintenance. 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 an indispensable part of the non electrical explosion protection of the device. For this reason, only oils approved by DREHMO GmbH may be used for the actuators. Actuators for ambient tem-

peratures between –25 °C to +60 °C for Ex, –25 °C to +80 °C for non-Ex and –25 °C to +60 °C for non-Ex as modulating actuators are filled with oil according to the table below. The indicated oil filling applies to open-close and modulating actuators.

⚠WARNING

Danger of explosion due to impermissible heating up caused by oil leakage!

Death or serious injury.

→ The seals must be replaced in case of leakage.

→ Refill the correct quantity of oil.

Table 8: Oil filling

Actuator types	Quantity [l]	Oil type
DP(R) 75…1800 (Ex)	1.4	Shell Tellus S2 VX 68
D(R) 30/59 (Ex)	1.4	Shell Tellus S2 VX 68
D(R) 60/120/249 (Ex)	2.4	Shell Tellus S2 VX 68
D(R) 250/500/1000 (Ex)	3.2	Shell Tellus S2 VX 68
D(R) 250/500/1000 (Ex)[1)] Speed [rpm @ 50 Hz]: 81, 121, 161, 201	3.7	Shell Tellus S2 VX 68
D(R) 250/500/1000 (Ex)[1)] Speed [rpm @ 60 Hz]: 97, 145, 193	3.7	Shell Tellus S2 VX 68
D 2000 (Ex)[1)]	9	Shell Omala S2 GX 100

1) Applies to actuators with planetary gearing and brake motor.

For other temperature ranges, the oil filling may deviate. The pertaining data can be requested from the manufacturer.

Ensure leak tightness of the device by inspections at regular intervals. Pay special attention to the following issues:

- Oil leakage at handwheel hub
- Oil leakage at joints of the housing
- Oil leakage at seals of hollow shaft
- Oil leakage at radial seals in limit switch and controls compartment

8.4 Cleaning

Clean the actuator using conventional soap solutions (alkaline solutions). To avoid heat accumulation or excessive surface temperatures, motor cooling fins must never be covered.

⚠WARNING

Risk of explosion by electrostatic discharge!

Death or serious injury.

→ 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 an appropriate label which must be readable at all times!

⚠WARNING

Danger of explosion due to impermissible heating up caused by wet painting layer!

Death or serious injury.

→ 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!

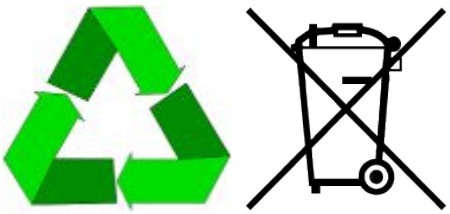
Warning instructions on the device must neither be removed nor covered by paint!

Use of any cleaning agents inside 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, 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.
- Heed 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 enclosure protection (IP...) is marked on the name plate of the actuator. In the standard version, the actuator is suitable for outdoor installation. It is completely protected against dangerous contact, ingress of dust and harmful ingress of water for temporary immersion in water (enclosure protection IP68 (5 m for 24 hours) in compliance with EN 60529 / IEC 60529). Further IP enclosure protection types are available on request as options.

⚠WARNING

Danger of explosion due to incorrect screw connections and cable conduits!

Death or serious injury.

→ Use of cable glands and screw plugs with certification for the respective application.

⚠WARNING

Danger of explosion due to excessive heating up by direct exposure to sunlight!

Death or serious injury.

→ For places of installation with direct exposure to sunlight, ensure respect of permissible operating temperatures (ensure appropriate shading if required).

NOTICE

Enclosure protection not guaranteed!

→ Ensure use of proper cable glands while observing the enclosure protection and the cable diameters.

→ Seal unused cable entry openings with suitable screw plugs.

→ For K5 corrosion protection, use plastic cable glands to prevent damage to the protection layer.

NOTICE

Damage within the actuator due to ingress of humidity!

→ When setting up or storing the actuator at humid ambient conditions, suitable measures for preventing condensation within the actuator are required (refer to Storage [▶ 9]).

→ Irrespective of the enclosure protection, humidity might enter the actuator via the ambient air.

9.2 Technical data overview

Rated voltage		Refer to indications on motor name plate in V ±10 %.
	Ex version:	Refer to indications on motor name plate in V ±5 %.
Rated current consumption	Refer to indications on motor name plate in A	
Mains frequency		Refer to indications on motor name plate in Hz–5 % – +3 %
	Ex version:	Refer to indications on motor name plate in Hz ±2 %.
Rated power	Refer to indications on motor name plate in kW	
Insulation strength	Overvoltage class II according to EN 61010-1	

Electrical connection		Determine cable cross section on the basis of motor data, cable length and the regional regulations! Available cross sections: Compact connector ø150 mm: Signal cables: 0.5 mm^2 – 2.5 mm^2 Power: 0.5 mm^2 – 2.5 mm^2 Option: 0.5 mm^2 – 6 mm^2 or 1.5 mm^2 – 16 mm^2 Compact plug/socket connector ø100 mm: Signal cables: 0.75 mm^2 – 1.5 mm^2 Power[1]: 2.5 mm^2 – 6 mm^2
	Ex version:	Terminal compartment in Ex e: For available cable cross sections as well as pertaining tightening torques, refer to table Approved connection terminals [▶ 36].
Contact rating	Thermoswitches:	max. 6.3 A: 250 V AC: 3,000 cycles 2.5 A: 250 V AC: cos φ = 1.0: 10,000 cycles 1.6 A: 250 V AC: cos φ = 0.6: 10,000 cycles 0.5 A: 250 V AC: cos φ = 0.6: 10,000 cycles 1.6 A: 24 V DC resistive: 10,000 cycles 1.25 A: 48 V DC resistive: 10,000 cycles
	Fine silver contacts:	400 V AC: 2 A 250 V AC: 7 A 250 V DC: 0,5 A
	Gold-plated contacts:	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, interpret these values as peak values.
Electrical load	Refer to separate description Electronic position transmitter EM700x.	
Motor temperature class	Refer to indications on name plate	
Explosion protection	ATEX type examination certificate, IECEx Certificate of Conformity or CCC Certificate for China Compulsory product certification. For respective marking, refer to name plate.	
Ambient temperature range	Refer to indications on name plate in °C	
Enclosure protection	Refer to indications on name plate	
Pollution degree	Within the actuator, pollution degree 1 (IEC 60664-1). Outside the actuator, pollution degree 2.	
Vibration	The actuators are designed for a vibration range of 10 – 100 Hz with 2 g (high cross-over frequency according to IEC 60068-2-6).	

1) 6 mm^2 with small clamp washers

⚠WARNING

Danger of explosion due to reduced heat dissipation for places of installation > 2 000 m above sea level.

Death or serious injury.

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

9.3 Types of duty for different versions

It is imperative to heed the types of duty even if the running times per valve cycle (OPEN and CLOSED) exceed the limited operating times. The type of duty depends upon the temperature range on the actuator name plate. Type of duty S2-xx min (short-time duty) for multi-turn actuators and S4-xx % (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. Once this time has expired, the actuator has to pause until it has cooled down to ambient temperature +2 Kelvin. In S4 type of duty, 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).

Modulating actuators are generally limited to a maximum of 1,200 starts per hour (marked on the name plate as c/h) (refer to IEC 60034-1). Multi-turn actuators are limited to max. S2 - 15 min.

⚠WARNING

Excessive temperature when exceeding the max. permissible number of starts (danger of explosion!)

Death or serious injury.

→ The maximum number of starts must not exceed 1,200 c/h for modulating applications. Depending on the actuator type and the ambient temperature range, it is imperative to heed the restriction indicated on the name plate.

⚠WARNING

Danger of explosion caused by sparks!

Death or serious injury.

→ 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 (according to EN ISO 80079-37).

⚠WARNING

Risk of explosion when not respecting the type of duty!

Death or serious injury.

→ Adhere to any restrictions (refer to name plate) applicable for the actuators!

⚠CAUTION

Pulling loads

→ A brake motor is used for the following actuators:
D 250/500/1000
- Speed [rpm @ 50 Hz]: 81, 121, 161, 201
- Speed [rpm @ 60 Hz]: 97, 145, 193
D 2000 all speeds

→ For TB motors:
The brake including connection is designed as spring-applied brake. Stopping for pulling loads can be guaranteed up to a torque effective at the output drive of 300 Nm.

→ For standard motors:
The brakes of standard motors are generally not designed for stopping pulling loads.

9.4 Approved connection terminals

Table 9: Connection terminals

Manufacturer	Designation	Cross sections	Dismantling length	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 for handling
Wago	264 – 220	0.5 – 4 mm^2	8 – 9 mm	Label for handling
Phoenix	MUT 4	1) 0.2 – 6 mm^2 2) 0.2 – 6 mm^2/0.25 – 4 mm^2	9 mm	0.6 – 0.8 Nm
Phoenix	MSLKG 6	1) 0.5 – 6 mm^2 2) 0.5 – 6 mm^2/0.5 – 6 mm^2	10 mm	1.5 – 1.8 Nm
Phoenix	MUT 2.5	1) 0.2 – 4 mm^2 2) 0.2 – 2.5 mm^2/0.25 – 2.5 mm^2	9 mm	0.5 – 0.6 Nm
Phoenix	USLKG 10N	1) 0.5 – 10 mm^2/0.5 – 10 mm^2 2) 0.5 – 10 mm^2/0.5 – 6 mm^2	10 mm	1.5 – 1.8 Nm
Phoenix	UK 6 N	1) 0.2 – 10 mm^2 2) 0.2 – 6 mm^2	10 mm	1.5 – 1.8 Nm

Manufacturer	Designation	Cross sections	Dismantling length	Torque
Phoenix	UK 10 N	1) 0.5 – 16 mm² 2) 0.5 – 10 mm²/0.5 – 6 mm²	10 mm	1.5 – 1.8 Nm
1. solid wire/stranded 2. fine stranded/fine stranded with wire end sleeve				

9.5 Weights and maximum tripping torques

In the table below, weights, speeds and maximum run torques of the actuators are indicated.

⚠WARNING

Excessive temperature when exceeding the max. permissible number of starts (danger of explosion!)

Death or serious injury.

→ Ensure that the run torque of the valve does not exceed 50 % of the maximum permissible device torque unless there are further restriction applicable for the different versions.

Table 10: Technical data

Actuator type	Output speed in rpm or operating speed in s/90° at 50 Hz	Maximum run torque in Nm	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 249[1)]	120	100	33.5
D 250 Ex	5 – 50	125	69.5
D 250 Ex	80 – 160	125[2)]	69.5
DR 250 Ex	5 – 40	125	69.5
D 500 Ex	5 – 80	250	80.5
D 500 Ex	120	250[2)]	80.5
D 500 Ex	160	200[2)]	80.5
DR 500 Ex	5 – 40	200	80.5
D 1000 Ex	5 – 50	500[2)]	90.5
D 1000 Ex	80	400[2)]	90.5
DR 1000 Ex	5 – 10	500	90.5
D 2000 Ex	40 – 80	1,000	220
D 2000 Ex[3)]	160	300	220
DP(R) 75 Ex	8 – 34	33.5	38
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(R) 450 Ex	8 – 34	225	40
DP(R) 600 Ex	8 – 67	300	46
DP(R) 900 Ex	8 – 67	450	46
DP 1200 Ex	7 – 75	600	51
DP(R) 1200 Ex	18 – 75	600	51
DP 1800 Ex	7 – 75	900	51
DP(R) 1800 Ex	18 – 75	900	51

1) 200 Nm maximum tripping torque.
2) For these devices, the gearing heats up more than the motor. The heating up is not detected by the actuator. It is therefore imperative to heed the maximum run torque and the type of duty.
3) For this version, the maximum tripping torque is restricted to 1 000 Nm.

10 Externally fixed notes

Warning and service instructions, which must be visibly attached to the actuator for the entire lifetime, are listed in this chapter. It is not permitted to apply a top coat on these warnings.

Figure 24: Label with address of the manufacturer

Figure 25: Label for pertaining version

Figure 26: Label for explosion-proof version

Exclude any kind of charge-generating processes (e.g. only wipe with a damp cloth, not with leather), as they can lead to ignitable electrostatic discharges. High charge generating processes are processes stronger than manual friction, e.g.:

- Particles moving fast along the surface of the device
- Pneumatic transport of dust
- Spraying of charges in an electrostatic coating process

Figure 27: Label with warning of hazardous voltage

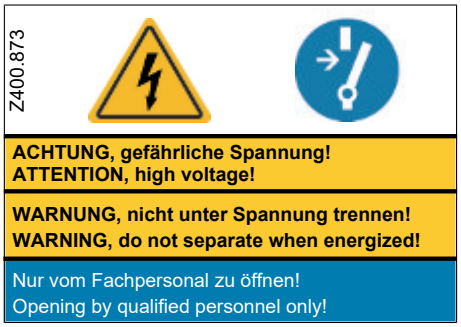


Figure 28: Label for ATEX version

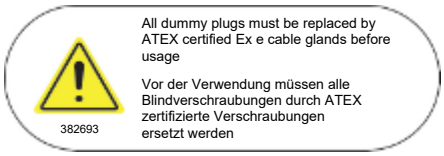


Figure 29: Label for ATEX/CCC version

Figure 30: Label for IECEx version

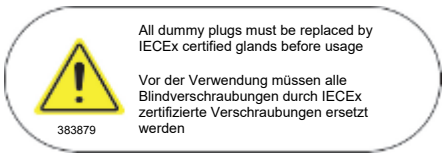
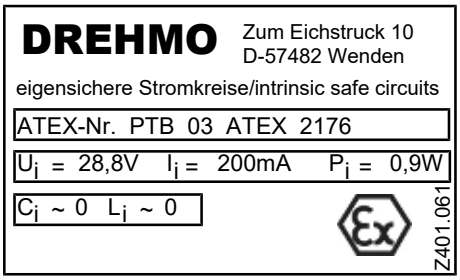


Figure 31: Label for intrinsically safe circuits with EM7.005



11 Certificates

The following section contains the Declarations of Conformity and Incorporation as well as the Type Examination Certificates and any further certificates if applicable for the actuator type range described in these operation instructions.

NOTICE

The printed documents are up to date to the date of publication of these operation instructions.

→ The latest version of the respective document can be downloaded from our website www.drehmo.com.

Refer to

- EU Declaration of Conformity [▷ 42]
- EU Declaration of Conformity Ex [▷ 43]
- EU-Type Examination Certificate [▷ 44]
- Certificate for China Compulsory Product Certification [▷ 48]
- IECEx Certificate of Conformity [▷ 52]

DREHMO GmbH
Zum Eichstruck 10
57482 Wenden/Germany

DREHMO
VALVE ACTUATORS

CE

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	Matic C	i-matic
D(R) 30 - D(R) 2000	DMC(R) 30 - DMC(R) 2000	DiM(R) 30 - DiM(R) 2000
DP(R) 75 - DP(R) 1800	DPMC(R) 75 - DPMC(R) 1800	DPiM(R) 75 - 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/AC2005
EN 61000-6-4:2007/A1:2011
EN 61000-3-2:2014[1)]
EN 61000-3-11:2000[1)]

[1)] Matic C and i-matic

Low Voltage Directive (2014/35/EU)

EN 61010-1:2010
EN 60034-1:2010/AC: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 complied.

Person responsible for documentation:
Dr. Rüdiger Stenzel, Zum Eichstruck 10, 57482 Wenden/Germany

Wenden, 2022-01-01

K. Ewald, General Manager

This declaration does not imply an assurance of properties. The safety precautions in the supplied product documents are to be observed. This declaration shall lose its validity in the event of unauthorised modification of the equipment.

DREHMO GmbH
Zum Eichstruck 10
57482 Wenden/Germany

DREHMO
VALVE ACTUATORS

CE

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) 75 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 23 ATEX Q 078524 0008
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 IEC 60079-0:2018	**EN 60079-1:2014**
EN IEC 60079-7:2015/A1:2018	**EN 60079-11:2012**
EN ISO 80079-36:2016	**EN ISO 80079-37:2016**
EN 1127-1:2019	

Electromagnetic Compatibility Directive (2014/30/EU)

EN 61000-6-2:2005/AC:2005	**EN 61000-6-4:2007/A1:2011**

Low Voltage Directive (2014/35/EU)

EN 61010-1:2010/A1:2019	**EN 60034-1:2010/AC: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, 2023-10-19

K. Ewald, General Manager

This declaration does not imply an assurance of properties. The safety precautions in the supplied product documents are to be observed. This declaration shall lose its validity in the event of unauthorised modification of the equipment.

Physikalisch-Technische Bundesanstalt
Braunschweig und Berlin
Nationales Metrologieinstitut

(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: 3**

(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 25-12076.

(9) Compliance with the Essential Health and Safety Requirements has been assured by compliance with:

EN IEC 60079-0:2018/A11:2024, EN 60079-1:2014+AC:2018, EN IEC 60079-7:2015+A1:2018, EN 60079-11:2012, EN ISO 80079-36:2016, EN ISO 80079-37:2016

(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 h IIC T4 Gb or Ex db eb ib h IIB T3 Gb

Konformitätsbewertungsstelle, Sektor Explosionsschutz Braunschweig, January 20, 2025
On behalf of PTB:

Dr.-Ing. S. Essmann
Technischer Oberregierungsrat

ZSEx001e d

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(13) # S C H E D U L E

(14) **EU-Type Examination Certificate Number PTB 15 ATEX 1014 X , Issue: 3**

(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 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 Intrinsic 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.
- Flanged motor, designed to Flameproof Enclosure "db" type of protection.
- 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 mm^2

[1)] Voltage tolerance ±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)]

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There may be restrictions regarding the operating mode, running torque or operating cycles (see instructions for operation).

1) 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.

2) 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 200 (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

ZSEx001e d

If components are attached to the drive, all necessary information for the operation and montoring of these components must also be provided. The operation of a standstill heater requires a separate back-up fuse to intercept faulty operating states.

abzusichern.

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SCHEDULE TO EU-TYPE EXAMINATION CERTIFICATE PTB 15 ATEX 1014 X , Issue:3

Changes with repspekt to to issue 2

The mechanical explosion protection is supplemented
The maximum output speed is up to 200 rpm.

(16) Test Report PTB Ex25-12076

(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.

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

(18) Essential health and safety requirements

Met by compliance with the aforementioned standards.

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中国国家强制性产品认证证书

证书编号：2020322307001262

认证委托人名称及地址
德国德瑞模有限公司
Zum Eichstruck 10,57482 Wenden Germany

生产者名称及地址
德国德瑞模有限公司
Zum Eichstruck 10,57482 Wenden Germany

生产企业名称及地址
德国德瑞模有限公司
Zum Eichstruck 10,57482 Wenden Germany

产品名称和系列、型号、规格
DREHMO 德瑞模电动执行器
D****-*-* Ex

产品标准和技术要求
GB/T 3836.1-2021、GB/T 3836.2-2021、GB/T 3836.3-2021

上述产品符合《强制性产品认证实施规则 防爆电气》
(CNCA-C23-01:2024)的要求，特发此证。
发证日期:2025 年 08 月 19 日　有效期至:2030 年 08 月 18 日

首次发证日期:2020 年 09 月 12 日
认证模式:型式试验+初始工厂检查+获证后监督

证书信息和有效性可扫描下方二维码或登录发证机构网站查验，
也可在认监委网站（www.cnca.gov.cn）查询。

批　准：

上海仪器仪表自控系统检验测试所有限公司

CERTIFICATE FOR CHINA COMPULSORY PRODUCT CERTIFICATION

CERTIFICATE NO.: 2020322307001262

NAME AND ADDRESS OF THE APPLICANT
DREHMO GmbH
Zum Eichstruck 10,57482 Wenden Germany

NAME AND ADDRESS OF THE MANUFACTURER
DREHMO GmbH
Zum Eichstruck 10,57482 Wenden Germany

NAME AND ADDRESS OF THE FACTORY
DREHMO GmbH
Zum Eichstruck 10,57482 Wenden Germany

NAME, SERIES, MODEL AND SPECIFICATION
DREHMO Actuators
D****-*-* Ex

THE STANDARDS AND TECHNICAL REQUIREMENTS FOR THE PRODUCTS
GB/T 3836.1-2021、GB/T 3836.2-2021、GB/T 3836.3-2021

This is to certify that the above-mentioned product(s)complies with the requirements of implementation rules for compulsory certification (CNCA-C23-01:2024).
Issue date:2025-08-19 Valid until:2030-08-18

Date of initial issue:2020-09-12
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The certificate details and validity can be verified by scanning the QR code below or logging into the issuing authority's official website. It can also be inquired on the CNCA website (www.cnca.gov.cn).

(In case of dispute, the Chinese text shall prevail.)

APPROVAL:

Shanghai Inspection and Testing Institute of Instruments and Automation Systems Co., Ltd.

http://www.sitias.com.cn 103 Cao Bao Road, Shanghai 200233,China Tel: +86 21 64518419

中国国家强制性产品认证证书

证书编号：2020322307001262

证书附页：第 1 页 共 2 页

产品名称：

DREHMO 德瑞模电动执行器

型号规格：

D ***a b c d -e -f*** Ex:

其中：***a*** 表示产品型式，可为空缺（多回转）或 P（部分回转）；

b 表示控制单元，可为空缺（不配控制单元）或 IM（im 型控制单元）；

c 表示工作制式，可为空缺（S2）或 R（S4）；

d 表示输出转矩，可为 30～2000（多回转）或 30～1800（部分回转）；

e 表示连接接口，与防爆无关；

f 表示输出转速/调节时间，可为 5~160 (50Hz), 6~192 (60Hz)（多回转）或 7~75 (50Hz), 6~63 (60Hz)（部分回转）

防爆标志：

Ex db eb ⅡC T4 Gb，Ex db eb ⅡB T3 Gb

电气参数：

U_m≤690V，I_m≤27A

相关报告编号：

2023S17402-013003

使用条件：

1.特殊（限制）使用条件：

（1）涉及隔爆接合面的维修须联系产品制造商。

（2）使用环境温度范围、防爆等级和温度组别关系如下：

使用环境温度	防爆等级	温度组别
-25℃～+40℃	默认使用环境温度范围	
-30℃～+40℃	ⅡC	T4
-30℃～+60℃	ⅡC	T4

本页为证书附页，应与证书主页同时使用。

批 准：

上海仪器仪表自控系统检验测试所有限公司

中国国家强制性产品认证证书

证书编号：2020322307001262

-55℃～+40℃	ⅡC （带加热器）	T4
-30℃～+65℃	ⅡB	T3

（3）产品存在静电电荷危险，仅能用湿布擦拭，详见说明书。

（4）使用时电缆引入口必须使用合适的有防爆证书的电缆引入装置。

2. 产品外壳防护等级为：IP68（1m/72h）。

本页为证书附页，应与证书主页同时使用。

批 准：

上海仪器仪表自控系统检验测试所有限公司

IECEx Certificate of Conformity

INTERNATIONAL ELECTROTECHNICAL COMMISSION
IEC Certification System for Explosive Atmospheres

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

Certificate No.: **IECEx PTB 15.0033X**

Page 1 of 5

Certificate history:
Issue 2 (2021-05-10)
Issue 1 (2018-01-22)
Issue 0 (2016-01-19)

Status: **Current**

Issue No: 3

Date of Issue: 2025-01-20

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

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

Optional accessory:

Type of Protection: **"db", "eb", "h"**

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

Approved for issue on behalf of the IECEx Certification Body: **Dr.-Ing. Stefan Essmann**

Position: **Head of Department "Explosion Protection in Energy Technology"**

Signature:
(for printed version)

Date:
(for printed version)

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 www.iecex.com or use of this QR Code.

Certificate issued by:

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

Physikalisch-Technische Bundesanstalt
Braunschweig und Berlin

IECEx Certificate of Conformity

Certificate No.: **IECEx PTB 15.0033X** Page 2 of 5

Date of issue: 2025-01-20 Issue No: 3

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

Manufacturing locations:

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 equipment 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 60079-0:2017 Edition:7.0	Explosive atmospheres - Part 0: Equipment - General requirements
IEC 60079-1:2014 Edition:7.0	Explosive atmospheres - Part 1: Equipment protection by flameproof enclosures "d"
IEC 60079-7:2017 Edition:5.1	Explosive atmospheres - Part 7: Equipment protection by increased safety "e"
ISO 80079-36:2016 Edition:1.0	Explosive atmospheres - Part 36: Non-electrical equipment for explosive atmospheres - Basic methods and requirements
ISO 80079-37:2016 Edition:1.0	Explosive atmospheres - Part 37: Non-electrical equipment for explosive atmospheres - Non electrical type of protection constructional safety "c", control of ignition source "b", liquid immersion "k"

This Certificate **does not** indicate compliance with 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 Reports:

DE/PTB/ExTR15.0038/03 DE/PTB/ExTR15.0041/00

Quality Assessment Report:

DE/TPS/QAR15.0004/08

IECEx Certificate of Conformity

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. (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)

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

- 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 Attachment.

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

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 Attachment.

IECEx Certificate of Conformity

DETAILS OF CERTIFICATE CHANGES (for issues 1 and above)

- The mechanical explosion protection is supplemented.
- The maximum output speed is up to 200 rpm.
- The name Markrolon is changed to Exolon

Annex:

COCA150033X-03_1.pdf

Applicant: DREHMO GmbH
Zum Eichstruck 10
57482 Wenden
Germany

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

Description of equipment

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

- Enclosure accommodating a planetary gear. (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)
- Optionally a – separately certified - plug connector type KP, KPH and KES in the type of protection Increased Safety "eb" (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).(i-matic).
- 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).

Electrical 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) -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
	30 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 200 (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

If components are attached to the drive, all necessary information for the operation and monitoring of these components must also be provided. The operation of a standstill heater requires a separate back-up fuse to intercept faulty operating states.

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