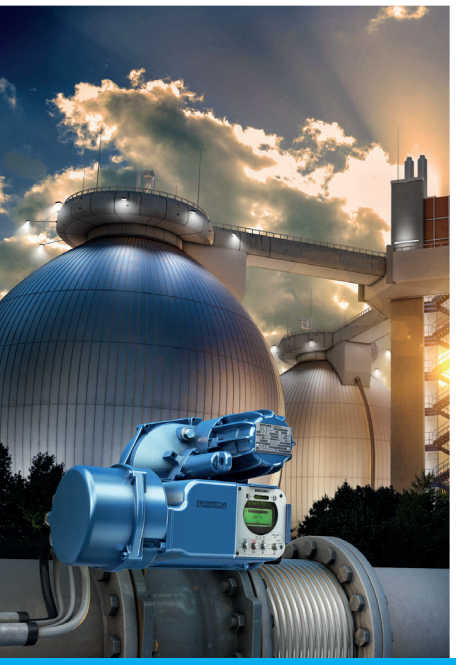


i-matic

ACTUATORS WITH INTEGRATED CONTROL AND NON-INTRUSIVE SETTING

DREHMO
VALVE ACTUATORS

Valve actuators for multiple applications

Wherever material flows through pipelines in liquid, gas or powder form, several kinds of valves are used to shut off or regulate the rate of flow or pressure. For reliable remote operation of these valves, whether they are globe, gate, ball or butterfly valves or dampers, DREHMO electromechanical actuators have been successfully deployed all over the world for several decades.

DREHMO actuators are used in power generation, water industry, oil and gas market segments as well as chemical and petrochemical process industry. Actuators have to move the valve to a mechanically defined final position or to intermediate positions and avoid excessive torque that could overload the valve during travel between the final

positions. Accordingly these special devices ensure that the actuator is switched off in dependence of the position, angle of rotation or torque. Special variants include part-turn actuators and thrust actuators, which convert the torque into an axial thrust by means of a thrust unit.
In plant areas in which explosive gases may be present, actuators have been type-tested and certified for explosion protection. The variety of torques and actuator speeds required in practice is covered by a wide range of DREHMO actuators. DREHMO actuators can be fitted with torque and combined sensor and signal processing systems to suit various remote control requirements. The following product lines are available for this purpose:

> S-RANGE ACTUATORS
with limit and torque switches

> I-MATIC ACTUATORS
with smart integrated control unit and non-intrusive settings as well as predictive maintenance features. x-matic actuators are specially designed i-matic types for the oil & gas industry. These are enhanced by a flameproof enclosure.

DREHMO i-matic

... with integrated control unit and non-intrusive setting and parameterisation

i-matic actuators are high-end sophisticated actuators. The actuators are operated via a user interface with LC-Display and push-buttons. They include an integrated control unit and a variety of programmable actuator functions and operating modes via remote and local settings, watchdog, electronic nameplate, datalogger as well as local valve diagnostics for predictive maintenance.

BASICS:

> DREHMO 3-phase AC squirrel cage motor, insulation class F, 3 thermoswitches

> Combined sensor for limit and torque sensing

> Controls:
- Switchgear: Interlocked reversing contactors (mechanically and electrically locked)
- Control:
  24 V DC, 4 digital inputs
  (programmable commands, potential-free)
- Feedback:
  6 normally open contacts and 1 change-over digital output (programmable signals, potential-free)

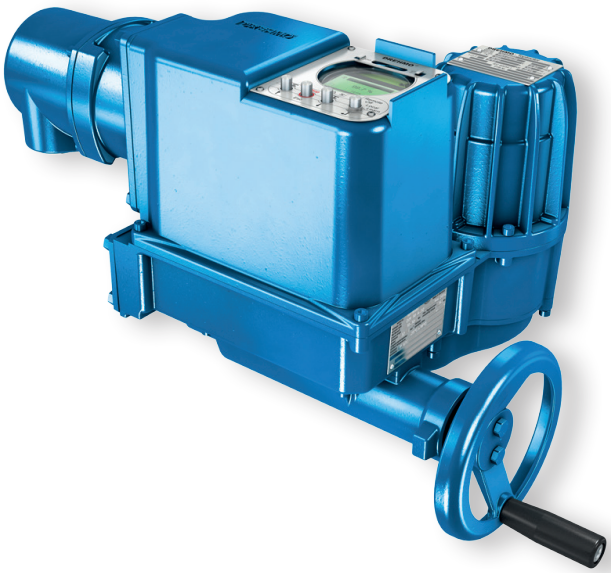
> Local controls:
- 4 multifunction push buttons
  Modes: LOCAL - OFF - REMOTE - LEARN
  Menu Navigation:
  UP, ESCAPE, DOWN, ENTER,
  Operation: OPEN - STOP - CLOSE
- 5 indications with selectable colours
- Interface: Bluetooth®

> Enclosure protection IP68 according to IEC 60529

> Ambient temperature –25 °C up to +70 °C

> Handwheel for manual operation/without switch-over mechanism

> Electrical connection:
plug/socket connector with screw-type connection



Overview

MULTI-TURN ACTUATORS

The design principle of multi-turn actuators provides multiple full turns at the output drive. The range is between 2 to 1,450 revolutions per stroke. More revolutions per stroke are available on request.
Multi-turn actuators are fitted mainly to gate and globe valves which transform the multiple rotation of the actuator's output drive into linear movement via a threaded spindle.
Flanges and output drive designs of the multi-turn actuators are standardised in accordance with DIN EN ISO 5210 or DIN 3210 respectively, and therefore fit onto any modern valve design.
Furthermore, a multitude of special flange designs are available. The multi-turn actuators are classified into four housing sizes according to their rated torque:

- 10 Nm – 60 Nm:
  actuator size DiM 30, 59
- 60 Nm – 250 Nm:
  actuator size DiM 60, 120, 249
- 250 Nm – 1,000 Nm:
  actuator size DiM 250, 500, 1000
- 1,000 Nm – 2,000 Nm:
  actuator size DiM 2000

Torque values exceeding 2,000 Nm are achieved by additional spur or bevel gearboxes.

PART-TURN ACTUATORS

Part-turn actuators are a special type of multi-turn actuator for operating butterfly valves, ball valves or damper, for instance, with an output drive movement of less than 360°. The internal gear of the part-turn actuator is designed for a travel range between 75° and 105°.

The mechanical design of the part-turn actuators DPiM(R) 75 – 1800 is based on a multi-turn actuator with an additional attached planetary gear stage.

DREHMO Compact actuators DPiM(R) 151 – 601 are based on planetary gear with BLDC motor.

The flange dimensions and the different output drives, such as plug bush with bore and groove or square bore, all correspond to the usual standards, e.g. DIN EN ISO 5211. This means that direct mounting on the valve is possible. Accessories such as foot and lever with ball joints make indirect operation of butterfly valves possible depending on the structural and design conditions of the valves.

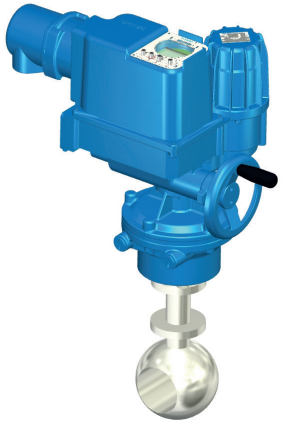
Torque values exceeding 1,800 Nm are achieved by multi-turn actuators with additional worm gearboxes.

THRUST ACTUATORS

DREHMO thrust actuators can be fitted to valves which require a linear movement.
The thrust actuator transforms the torque of a DREHMO multi-turn actuator into an axial thrust by means of an attached thrust unit.
The required actuating force (thrust or traction) can be adjusted continuously and reproducibly.

Thrust units fitted to the flange of a multi-turn actuator consist mainly of a trapezoidal threaded spindle, a metric screw bolt to join the valve shaft and an enclosure to protect the spindle from environmental influences.
The version described is used for direct mounting of the actuator to the valve. However, "fork joint" versions of the thrust actuators (indirect mounting) are primarily used to operate butterfly valves for which direct mounting of a 90° part turn actuator is not possible or not efficient for design reasons.

Cardanic suspension of the thrust unit at the fork joint is also available.



OPERATION MODES – OPEN-CLOSE, POSITIONING AND MODULATING DUTY

Valves are driven in compliance with the required application and their design. Actuator standard EN 15714-2 distinguishes between three cases:

> Class A: OPEN-CLOSE duty

The actuator is required to drive the valve through its entire travel from the fully open position to the fully closed position or vice versa.

> Class B: Inching or positioning duty

The actuator is required to occasionally drive the valve to any position (fully open, intermediate or fully closed).

> Class C: Modulating duty

The actuator is required to frequently drive the valve to any position between the fully open and fully closed position.

SWITCHING FREQUENCY AND MOTOR OPERATION MODE

Between modulating duty and open-close duty there are differences regarding the mechanical loads. Consequently, special actuator types are available for each operation mode.

The types of duty for actuators in compliance with DIN EN 60034-1 and EN 15714-2 are typical distinction criteria.

For modulating duty, additional information is provided on the permissible number of starts.

ACTUATORS FOR OPEN-CLOSE DUTY AND POSITIONING DUTY

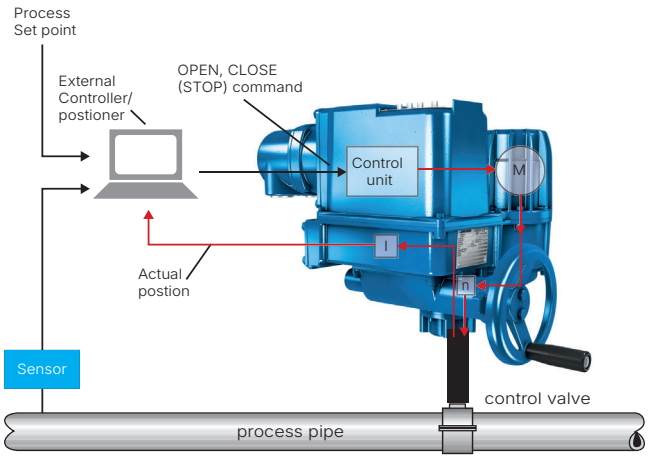
(classes A and B or types of duty S2 - 10 min/15 min)
DREHMO actuators for open-close and positioning duty are identified by the type designations DiM:

> DiM 30 – DiM 2000
> DPiM 75 – DPiM 1800
> DPiM 151 – DPiM 601 (DREHMO Compact)

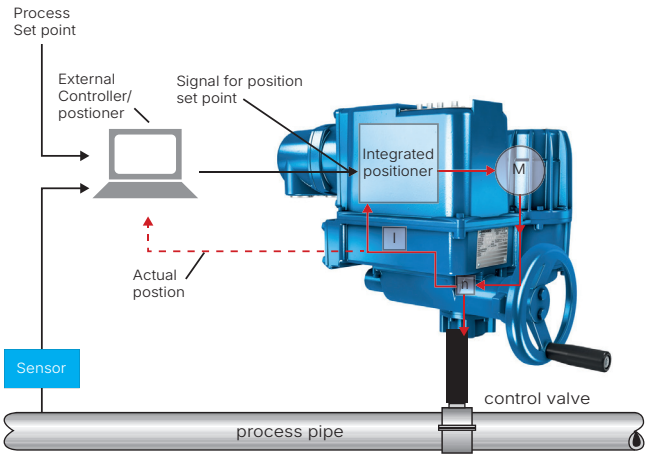
ACTUATORS FOR MODULATING DUTY

(class C or types of duty S4 - up to 35 %)
DREHMO actuators for modulating duty can be identified by type designations DiMR:

> DiMR 30 – DiMR 2000
> DPiMR 75 – DPiMR 1800
> DPiMR 151 – DPiMR 601 (DREHMO Compact)



Actuators with external positioner for modulating duty.



Actuators with integrated positioner for modulating duty.

Gear design and operating functions

The DREHMO actuators basically consist of a motor, a planetary gear arranged with a torque-bearing displacement worm, a handwheel and an integrated control unit. All parts of the planetary gear are arranged around the hollow shaft. As several teeth always mesh simultaneously with this planetary gear (unlike normal worm gears), it is possible to realise a very compact gear with a long service life.

FUNCTIONALITY OF MANUAL OPERATION

Changeover from motorised to manual operation is not necessary. During manual operation via the handwheel, forces are transmitted via the worm shaft (15), the sun wheel (8) and the planet wheel (4) to the driver plate (7), the hollow shaft (5) and the stem nut (6).

FUNCTIONALITY OF MOTOR OPERATION

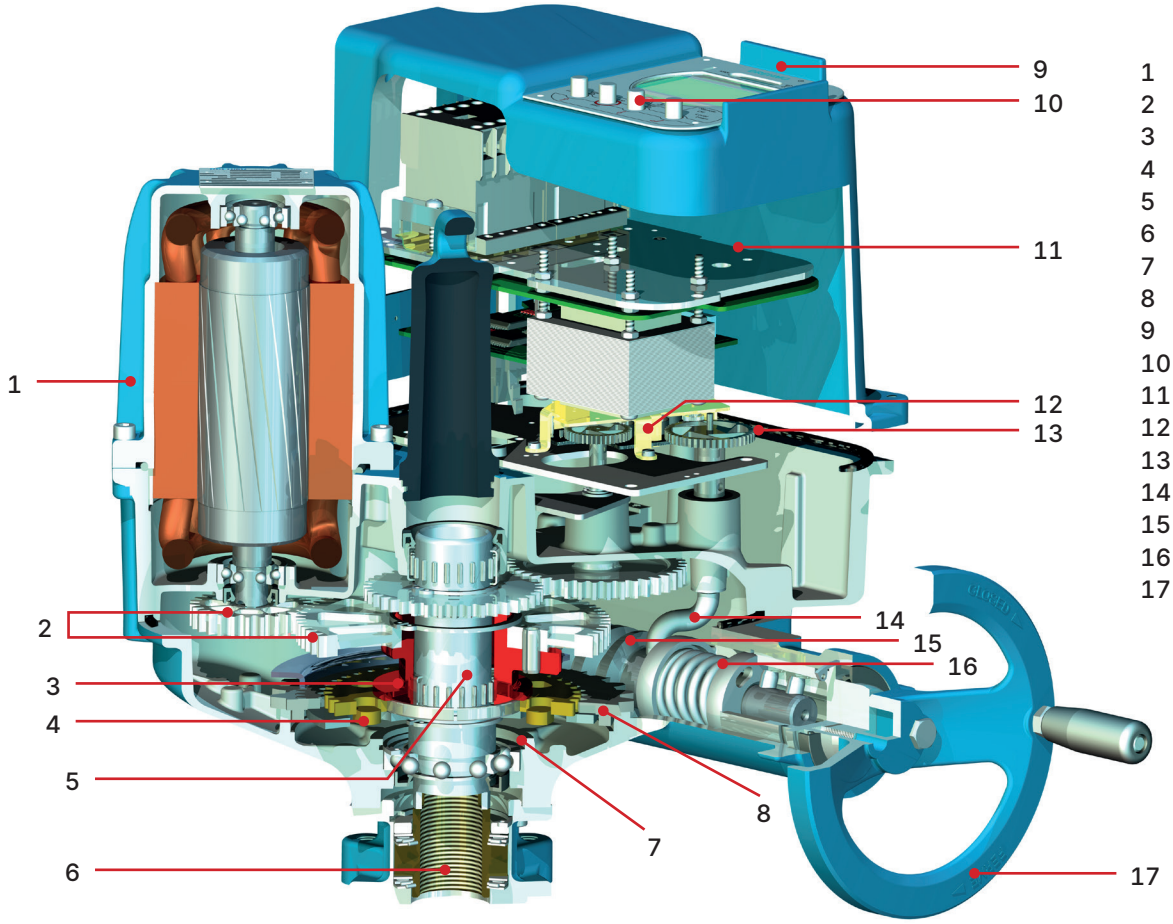
The motor (1) drives the eccentric (3) via the spur gear (2). The planet wheel (4), which is in mesh with the inner gear of the sun wheel (8), is pivoted on the eccentric (3). As the two wheels have a different number of teeth, a relative speed is generated which is transferred by driver pins of the planet wheel (4) to the driver plate (7). The driver plate (7) is interlocked with the hollow shaft (5) via a serration.

TORQUE MEASUREMENT

In addition to the inner gear tooth system, the sun wheel (8) also has an outer gear tooth system which meshes with the axially displaceable worm shaft (15). The worm shaft (15) is held in its central position by a pre-tensioned spring (16). If a torque is exerted on the actuator higher than the torque created by the pre-tensioned springs, the circumferential force on the sun wheel (8) moves the worm shaft (15) from its central position and thereby actuates the torque lever (14). The torque lever (14) activates the combined sensor (12). The related torque values can be used for remote torque feedback indication.

FEATURES OF THE ECCENTRIC PLANETARY GEAR

- Lifetime lubrication
- No mechanical switchover for handwheel operation is required
- No starting problems, even at low temperatures
- Long service life, even in modulating operation, due to low surface pressure combined with little relative movement between the meshing gears and optimum lubrication
- Can be mounted in any position
- Self-locking (up to 80 rpm at 50 Hz and up to 96 rpm at 60 Hz)



1	Encolsed Motor (TENV)
2	Spur Gear
3	Eccentric
4	Planet Wheel
5	Hollow Shaft
6	Stem Nut
7	Driving Plate
8	Sun Wheel
9	Local control station
10	Push buttons
11	i-matic Control Unit
12	Combined sensor
13	Torque Measurment unit
14	Torque Lever
15	Worm Shaft
16	Torque Spring
17	Handwheel

Characteristic features

GEAR DESIGN
The eccentric planetary gears are self-locking at all speeds up to 80 rpm (50 Hz)/96 rpm (60 Hz), including during manual operation.
Low surface loading of gear-tooth system because several teeth are always in mesh. Long lifetime is guaranteed because of permanent lubrication and airtight oil chamber, therefore the oil cannot oxidise.

Some high speed variants, all DiM 2000 and DPiM(R) 151 – 601 models use a different, highly efficient planetary gear design without self-locking. Self-locking and operation via handwheel require the use of a brake motor. The brake is designed as a holding brake. Pulling loads greater than the maximum adjustable torque cannot be dynamically stopped.

MANUAL OPERATION
As the handwheel is always engaged, manual operation is possible even if the equipment is temporarily blocked e.g. if a valve is jammed in the end position. The handwheel can be operated remotely without difficulty for inaccessible actuators via suitable linkages and bevel gears.

COMBINED SENSOR
An electronic position sensor is used for continuous position detection, including the detection of intermediate positions. Interacting with the i-matic control unit, the sensor switches off the actuator when it reaches limit positions that have been electronically programmed and are non-erasable.
At the same time the sensor can supply isolated limit position signals and an analogue 4 – 20 mA position signal. A second measuring input is used to make an analogue recording of the torque reached, which is then compared and evaluated with adjustable switch-off values in the control unit. Analogue measurement, signalling and evaluation of the torque is possible during actuator operation.

TENV MOTORS
DREHMO actuators are fitted with **T**otally **E**nclosed **N**on-ventilated Motors (**TENV** – 3-phase asynchronous motor) as standard. The motor housing is totally enclosed. This design guarantees a high level of protection against humidity and dust ingress and is therefore suitable for operation in extreme environmental conditions.
Operating mode:
Short-time duty S2 - 10/15 min; in modulating operation, S4 intermittent duty max. 35 % ED. Insulation class F.

IEC MOTORS AND SPECIAL MOTORS
Standard motors, such as single-phase or DC motors, can be supplied on request instead of TENV motors.

BLDC MOTORS
DREHMO Compact actuators are equipped with a brushless DC motor (BLDC). These are highly efficient motors which allow a soft start and stop.

MOTOR PROTECTION
To protect the motor against excessive temperatures, 3 thermoswitches connected in series are embedded within the end connection. The control circuit will be interrupted once 155 °C have been exceeded. Monitoring and tripping of the motor is performed in the i-matic control PCB. A fault signal is provided for the distributed control system.

MECHANICAL COUPLING TYPES
Multi-turn actuators: Matched to the valve using coupling types and flange dimensions in accordance with DIN EN ISO 5210 or DIN 3210. Hollow shaft for ascending valve spindle. Coupling types: Stem nut, plug bush, bore with keyway, claw coupling, free shaft extension.
Special designs for special installation conditions are possible.
Part-turn actuators: Coupling types and flange dimensions in accordance with DIN EN ISO 5211.
Coupling types: Bore with keyway, dihedron, square bore.
Thrust actuators: Coupling type in accordance with DIN 3358.

ELECTRICAL CONNECTION
Electrical connection is provided by a plug/socket connector which connects the control and signal wires as well as the power supply. Screw terminals are used for control signals and for power supply wires.

LUBRICATION
Each actuator is factory filled with lifetime lubrication.

MOUNTING POSITION
Mounting and operation in any position are permitted.

AMBIENT TEMPERATURES
Basic design:
–25 °C to +70 °C (S2-Operation)
–25 °C to +60 °C (S4-Operation)

ENCLOSURE TYPE
According to EN 60529 and EN 60034 DREHMO actuators with enclosed motors are supplied as standard with enclosure type IP68 (5 m for 24 h).

PAINT COATING
Standard colour: RAL 5015 (skyblue)
Other colours are available on request.

CE-CONFORMITY
DREHMO actuators comply with the EC Machinery Directive 2006/42/EG, EC Low-Voltage Directive 2014/35/EU and the EMC Directive 2014/30/EU.

Corrosion protection

DREHMO actuators are available with various corrosion protection options for use in virtually all environmental conditions. According to EN ISO 12944-2 we have rated our corrosion protection system as follows:

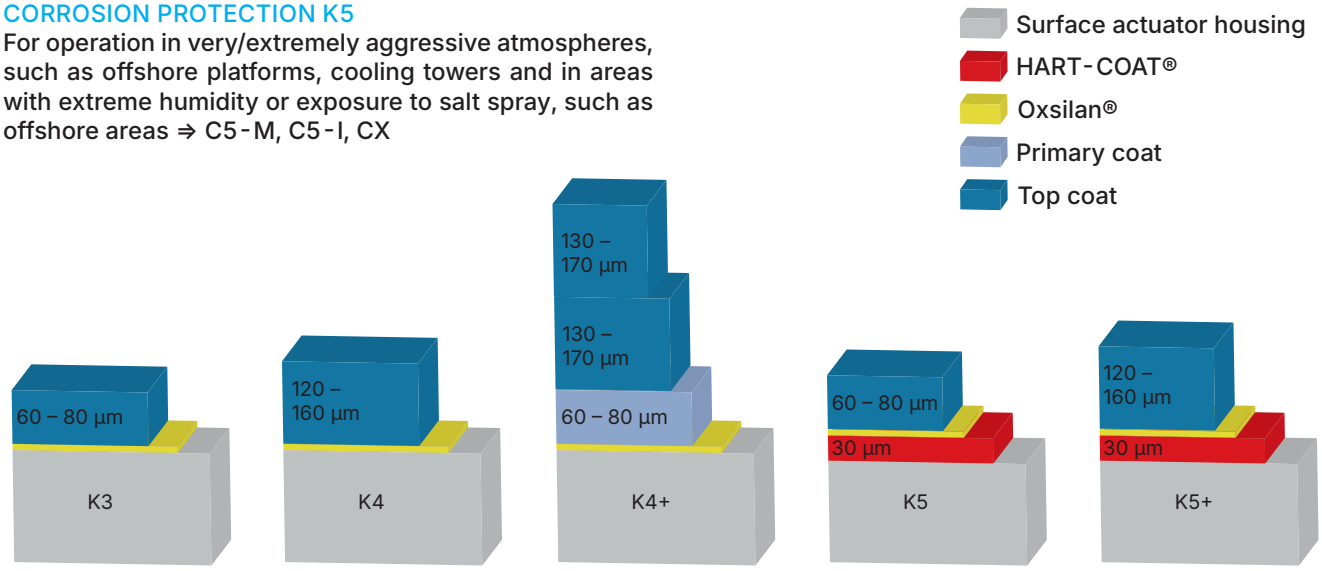
CORROSION PROTECTION K3
For operation in moderately aggressive atmospheres ⇒ C3

CORROSION PROTECTION K4
For operation in highly aggressive atmospheres ⇒ C4

CORROSION PROTECTION K5
For operation in very/extremely aggressive atmospheres, such as offshore platforms, cooling towers and in areas with extreme humidity or exposure to salt spray, such as offshore areas ⇒ C5-M, C5-I, CX

All coating systems include a highly efficient pre-treatment process, consisting of a multi-stage high-pressure cleaning, combined with an Oxsilan® treatment of all surfaces. For the primer and top coat, only high-quality two-component paints are used.

Other protection grades are available on request.



HART-COAT®

What is HART-COAT®?
The HART-COAT® process is an electrolytic treatment of aluminium components that results in the formation of a hard, ceramic-like aluminium oxide layer.

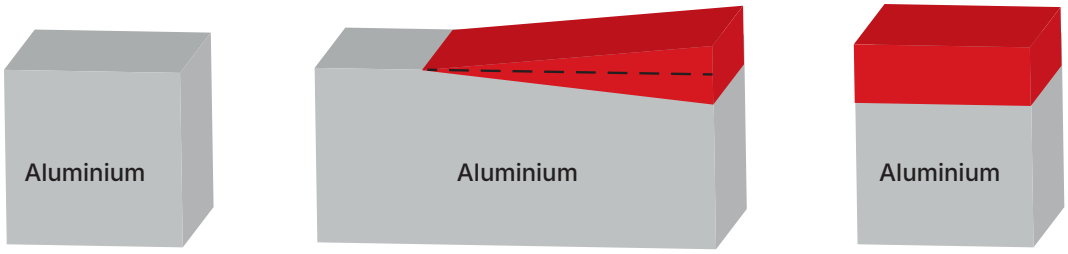
How are HART-COAT® layers built-up?
HART-COAT® layers are produced by anodic oxidation in a cold, acidic electrolyte of a special composition. An electric current is used to form a protective aluminium oxide layer on the surface of the workpiece. The hexagonal cell structure formed in this process is compacted in a final treatment step.

Compared to conventional anodised coatings, HART-COAT® coatings are thicker and more wear-resistant and exhibit stronger bonding to the base material.

The HART-COAT® layer builds up over time during electrolysis process. The layer grows 50 % into the base material and 50 % outward from the surface.

External components that cannot be hard-coated, such as flanges, are made from stainless steel or other highly corrosion-resistant materials.

Advantages of the HART-COAT® coating:
> high wear resistance
> excellent corrosion resistance
> excellent hardness
> heat-resistant



Base material

Coating process
Formation of the HART-COAT® layer over time during electrolysis

Coated end product

HART-COAT® is a registered trademark of Aalberts Surface Treatment GmbH.

Features

SELF-MONITORING

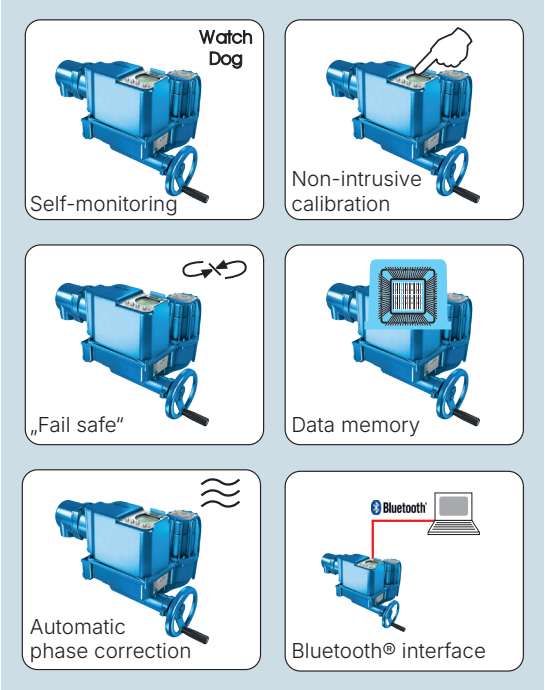
A self-monitoring process runs continuously within the actuator. To facilitate troubleshooting, the process distinguishes between the following messages:

> Hardware fault
> Sensor fault
> Electronics fault
> Software fault
> Electronics temperature exceeded
> Motor temperature exceeded

All malfunctions that occur are recorded chronologically in an error log.

COMMISSIONING/NON-INTRUSIVE CALIBRATION

The local control station consists of a graphical LC-Display, 4 buttons and a Bluetooth® interface. The actuator can be set and parameterised locally via the push-buttons (alternatively operated using a magnetic pen) without opening the control housing.
With a clearly structured menu navigation, the setting values can be easily adapted to the valve. Furthermore, all parameters of the actuator can be set easily. To prevent operating errors and manipulation, access to the commissioning mode can be protected with a password.



FAIL SAFE

Should the external reference signal fail or the bus communication break-down, a user-definable fail safe position can be set in line with process requirements. Alternatively, if the parameter “fail as is” is selected, the actuator remains in its current position.

DATA MEMORY

Actuator-specific data are stored in a non-volatile memory. These data include electronic nameplate, operating cycles, running times, an error log and information for predictive maintenance.

PHASE SEQUENCE CORRECTION/ SINGLE-PHASE MONITORING

This module ensures the correct direction of rotation for valve opening and closing, regardless of the phase sequence of the three-phase power supply. The closing direction (clockwise or counter-clockwise) is defined by local or remote parameterisation.
All phases are continuously monitored, and a corresponding error message is generated in the event of a phase failure.

BLUETHOOTH® INTERFACE

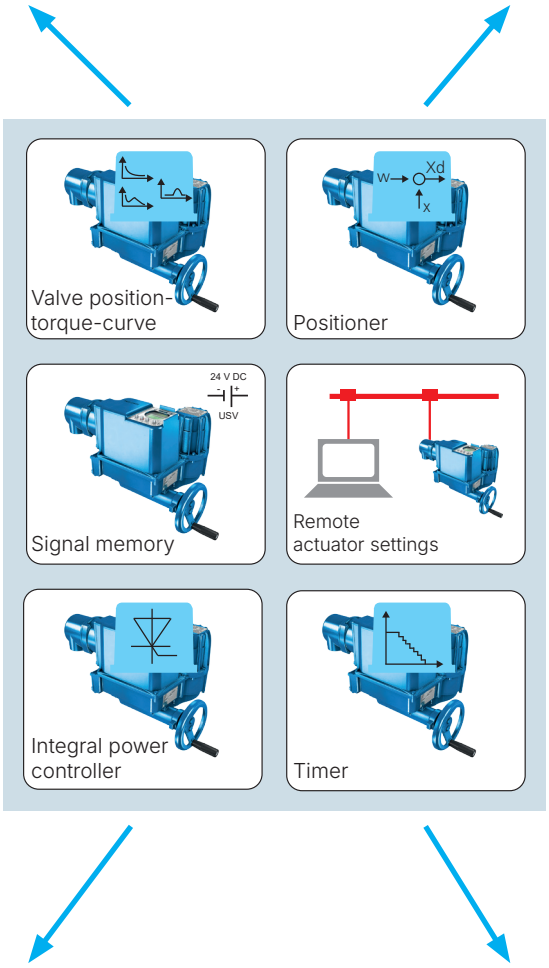
Each i-matic actuator is equipped with a Bluetooth® interface. This interface allows all data (diagnostic files) to be read out, parameters to be configured and firmware to be downloaded. With the software tool "i-matic Explorer", operating and setting tasks are made easily.

VALVE/POSITION-TORQUE-CURVE

The actuator comprises a function for displaying and recording the torque curve. The curves for valve commissioning on the valve and for cold and warm plant commissioning can be permanently stored in the actuator. Torque curves can be used for a demand-oriented maintenance of valves.

POSITIONER

Modulating actuators are directly controlled by a higher-level process controller (e.g. pressure, temperature, flow rate) via a 4 – 20 mA setpoint value. The integrated positioner compares the reference signal (setpoint value) with the analogue position signal generated by the actuator (actual position value) and generates corresponding driving commands. By adjusting the actuator drive, the modulating behavior parameters – such as sensitivity – can be set to optimally adapt the actuator to the control process.



SIGNAL MEMORY

In case of loss of main power supply feedback signals can remain at their current status with the following options:

> 24 V DC external supply of control voltage or
> Battery pack (automatic rechargeable) or
> Bistable relays

REMOTE PARAMETERISATION

While the plant is in operation, all settings can be remotely parameterised and permanently overwritten via the bus using the central parameterisation and visualisation tool. The original settings can be retrieved with a reset command. You can use:

> i-matic-Explorer
> SiMATIC PDM
> FDT/DTM

as a visualisation software.

POWER UNIT

Electrically and mechanically interlocked reversing contactors are used. For modulating duty, solid-state relays are available as an option.

TIMER

The timer can extend the actuating time over the entire stroke or over a user-definable partial section up to the limit position. Timer operation in the opening or closing direction can be parameterised. A further parameter determines whether the range for timer operation is specified using an internal setting or using an optional binary input on the interface for remote commands. Three values are applied for parameterizing the timer operation.

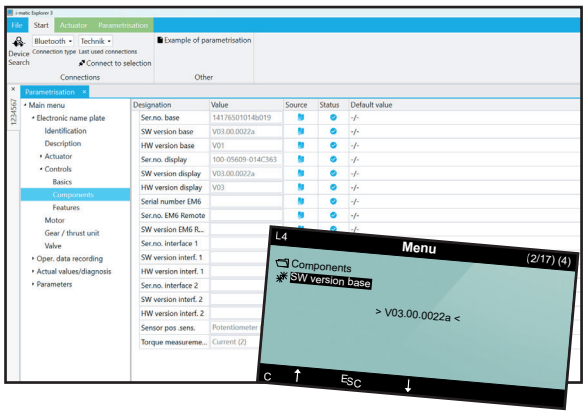
> Pulse time t_{on} (0.5 s to 30 s)
> Pulse time t_{off} (0.5 s to 30 s)
> Start of timer (0 % to 100 % of actuator travel)

Data and parameters

ELECTRONIC NAMEPLATE

All important MOV-relevant information can be found on the electronic nameplate. The relevant data include:

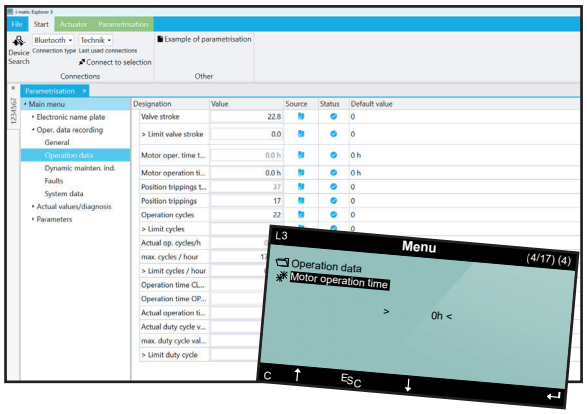
> Bluetooth® identification
> Information about the on-site installation, e.g. TAG/KKS-ID
> Actuator nameplate, e.g. torque range, type of duty, ...
> Control unit details, e.g. serial number, wiring diagram, ...
> Motor nameplate, e.g. power requirements, motor type, ...
> Gear/thrust unit information, e.g. gear ratio, factor, ...
> Valve information, e.g. torque range, type, manufacturer, ...



OPERATING DATA

Operating data are continuously logged and evaluated.

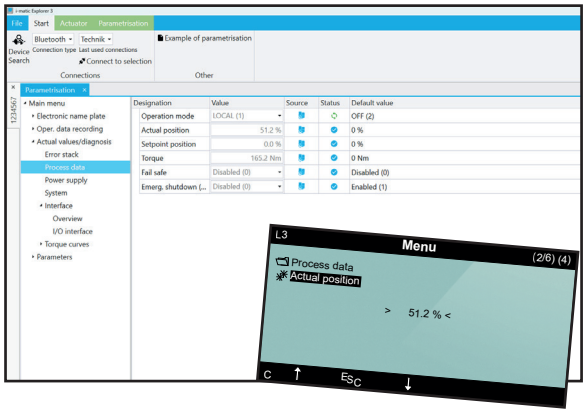
> General e.g. calibration date, configuration date, ...
> Operation data, e.g. motor operating time, operation cycles, ...
> Dynamic maintenance, e.g. mechanical ageing, ...
> Faults, e.g. number of torque warnings, thermal overloads, ...
> System data, e.g. up time electronic, number of power-on, ...



ACTUAL VALUES/DIAGNOSIS

Various parameters are available for maintenance and diagnostic purposes.

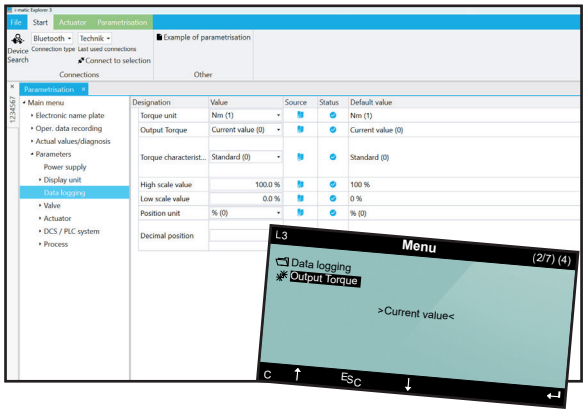
> Error stack, containing a list of occuring faults
> Process data, e.g. operation mode, actual and setpoint position, ...
> Power supply, e.g. phase sequence, 24 V internal status, ...
> System, e.g. electronic and sensor temperature, ...
> Interface, e.g. fieldbus and I/O board diagnosis information, ...
> Battery Backup, e.g. status and temperature of battery



PARAMETER

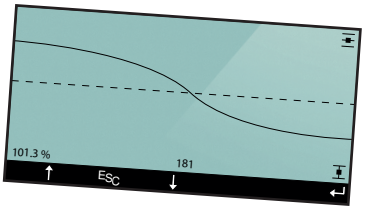
Suitable parameters are available for commissioning and configuration.

> Power supply, e.g. phase correction and monitoring
> Display unit, e.g. language, date, time, LED colour, ...
> Data logging, e.g. torque and position unit, ...
> Valve, e.g. settings, intermediate positions, monitoring, ...
> Actuator, e.g. thermal failure delay, ...
> DCS/PLC system, e.g. ESD, fail safe, collective failure, interface, ...
> Process, e.g. modulating behaviour of internal positioner, ...



TORQUE LINE CHART

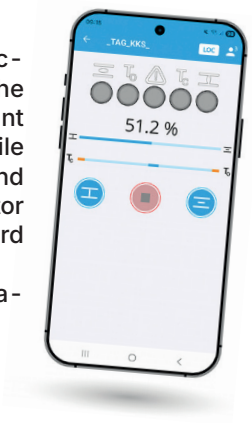
Beside the opportunity to store up to four different torque curves, it is possible to visualise the current torque values in a progress line chart.

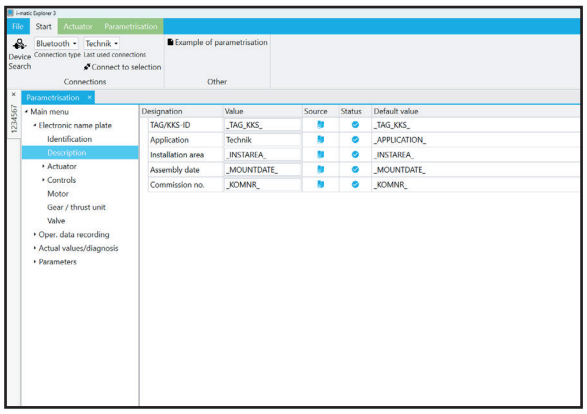


Configuration and diagnostic tools

TOOLS

For configuration and diagnostics of i-matic actuators the i-matic Explorer tool is available. The i-matic Explorer is available as a desktop variant and for mobile devices (i-matic Explorer Mobile for Android an iOS) such as smartphones and tablets. Unauthorised online access to the actuator is protected by means of a Bluetooth® password protection and user access levels.
The i-matic Explorer supports the following features:



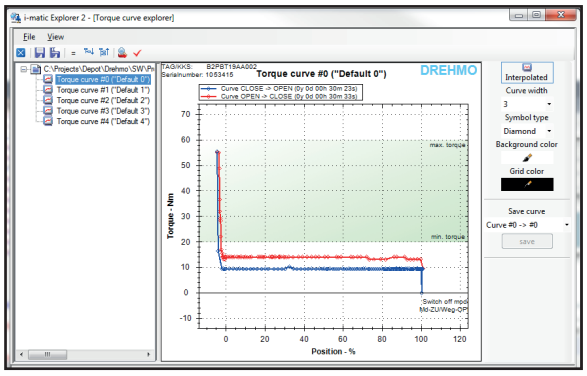


PARAMETER EXPLORER

An identical representation of the actuator menu tree is accessible in a convenient manner. The parameter Explorer enables the configuration and diagnosis of i-matic actuators. For later analysis, the parameter sets can be saved and compared with current values.

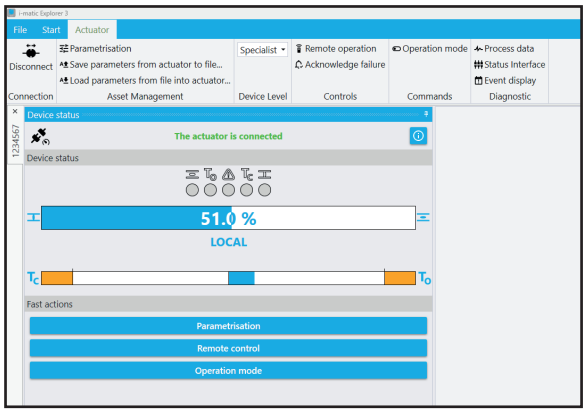
TORQUE CURVES EXPLORER

This dialog visualises the torque values at different valve positions read from the actuator as a torque curve. Torque curves can be stored, compared and analysed. In this way valve degradation and potential problems can be determined.



VIRTUAL CONTROL STATION

Manual operation of the actuator via a Virtual Control Station is possible. This allows access to hard-to-reach actuators.

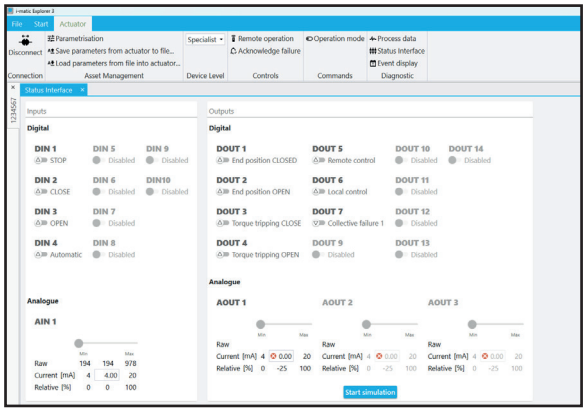


FIRMWARE UPDATE MANAGER

A dialog-controlled firmware update makes it easy to integrate new functions without requiring specialised expertise.

DCS/PLC INTERFACE EVALUATION

Analogue and digital feedback signals can be simulated. Analogue and digital commands from DCS/PLC are visualised. Using these signals, the connection between DCS/PLC and the actuator can be evaluated during commissioning and maintenance.



Electrical connection

The plug-in electrical connector is a key element of the modular actuator design. The connector is a separate unit. The different connection types are compatible across all type ranges and can be used for actuators with or without integral controls.

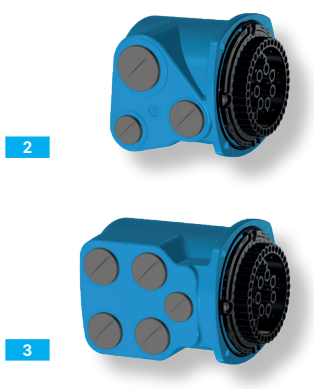
During maintenance work, the wiring remains undisturbed; electrical connections can be quickly separated and reconnected. This reduces downtimes and prevent wiring faults when reconnecting.

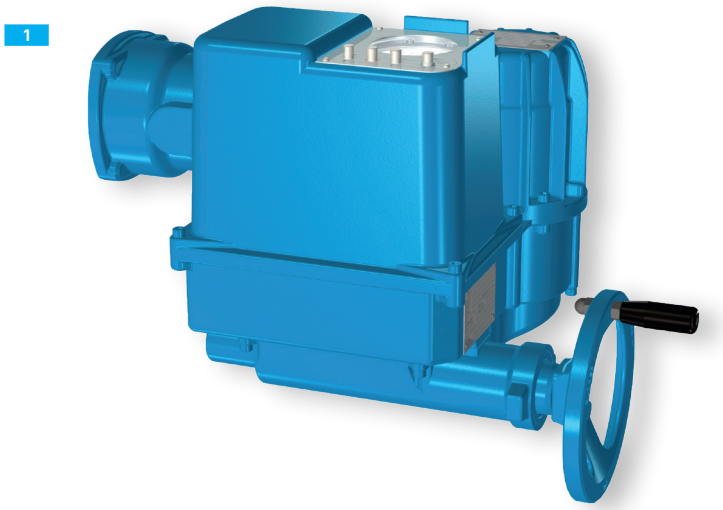
The actuators are optionally available with a double-sealed electrical connection. With these actuators, the connection compartment facing the control unit is potted, preventing water from entering the control unit during commissioning or via a leaking electrical connection.

1 Plug/socket connector
The 50-contact plug/socket connector is the core element for all connection types. Incorrect connection is prevented by special coding pins. Power cable 2.5 ... 6.0 mm², Control cable 0.75 ... 2.5 mm²

2 Plug for electrical connection S
With three cable entries. Basic version: 1 x M20 x 1.5, 1 x M25 x 1.5, 1 x M32 x 1.5

3 Plug for electrical connection SH
With additional cable entries, it offers 75 % more space than standard version.



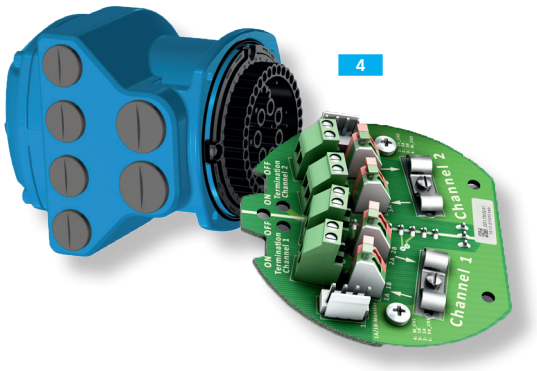


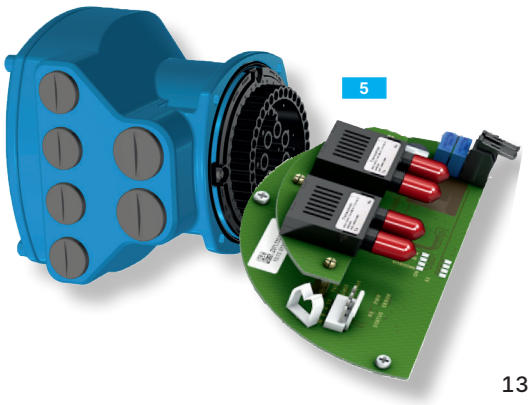
FIELDBUS CONNECTION

When using fieldbus technology, special connectors with integrated connection board are deployed. Additional I/O signals are connected directly to the socket of this plug. Like the other connectors, they are based on a plug-in design.

4 Fieldbus connection SD
A connection board for easy connection of fieldbus cables is integrated. Fieldbus communication is not interrupted even when the connector is removed. The connection is implemented according to fieldbus-specific requirements. For example, as shown for Profibus, termination resistors are integrated.

5 Fieldbus connection SF with FO couplers
For direct connection of fibre optic cables to i-matic controls. Comparable in design to the SD connection but with a larger diameter to comfortably accommodate the specified FO cable bending radii. The FO module contains diagnostic functions to monitor fibre optic cable quality.





Additional Equipment

DETACHED I-MATIC CONTROL UNIT/ DETACHED LOCAL CONTROL STATION

If the actuator is difficult to access or in case of extreme vibration or high ambient temperatures at the valve installation site, control unit with operating elements can be mounted separately from the actuator on a wall bracket.

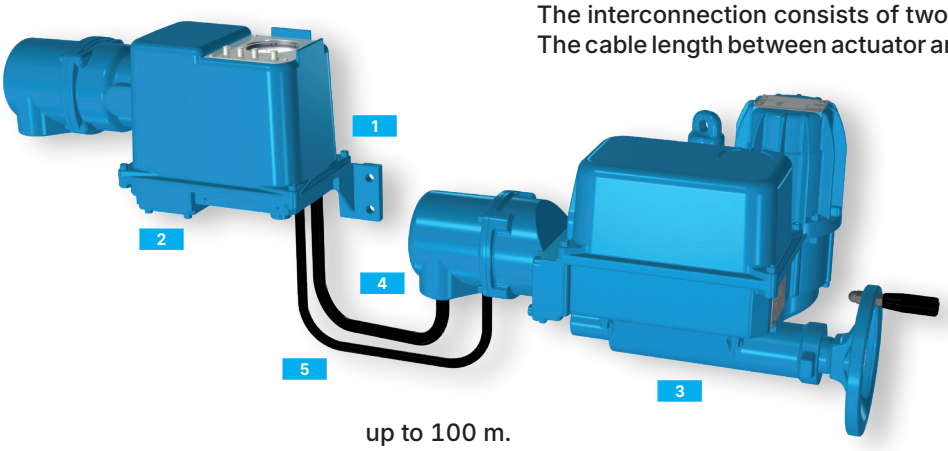
1 Wall bracket
The actuator control unit is mounted on a separate wall bracket and fullfills protection class IP68.

2 Detached i-matic control unit
The actuator control unit is separated.

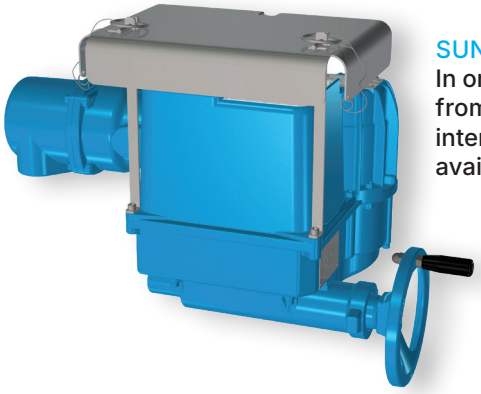
3 Actuator housing
A special housing is used to cover the sensor area.

4 Electrical connection
Electrical connection is done by a plug/socket connector.

5 Interconnection
The interconnection consists of two lines, power and data.
The cable length between actuator and control unit may be up to 100 m.



up to 100 m.



SUN SHADES

In order to protect the control unit from overheating due to high-intensity sunlight, sunshades are available as an option.

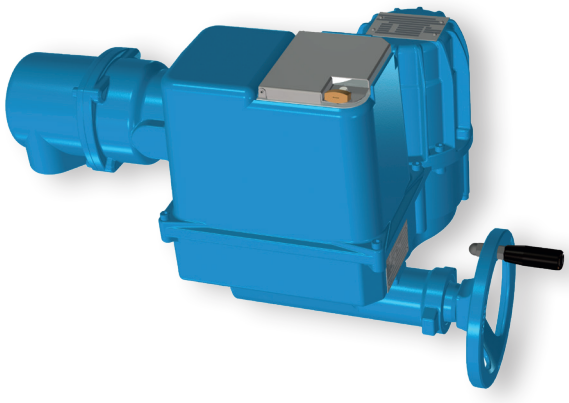
SIDE MOUNTED DISPLAY

The electronic housing is also available in a special side-mounted display design.

PROTECTION AGAINST UNAUTHORISED ACCESS AT LOCAL CONTROLS

Following solutions are avaiable:

- Password protection: Different user levels can be configured to protect against unauthorised local operation or parameter changes.
- Padlock protection: The push button for operation mode (REMOTE - OFF - LOCAL - LEARN) can be locked with a commercially available padlock. When locked, the operating mode cannot be changed.
- Magnetic pen operation (option): Instead of the push buttons operation can be performed using a special magnetic pen. Operation is only possible with this dedicated magnetic pen.
- Lockable protection cover (option): The lockable protection cover provides including protection, even against damage to the local controls.
- Remote release of the local controls: Remote release ensures optimum protection against unauthorised operation. The local controls can only be operated after a release signal from the higher-level controls.
- Bluetooth® communication can be completely disabled.



Clearly structured operation

For i-matic actuators, access to significantly more detailed data is provided through a clearly structured and intuitive user interface.

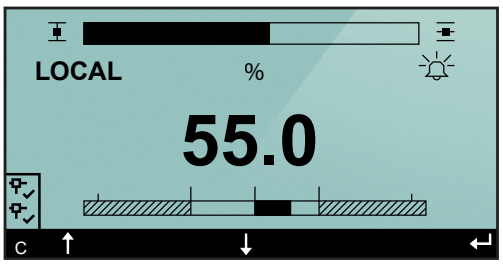
All device settings can be performed without requiring any additional parameterisation tool. The display structure is user-friendly, presented in plain text, and available in a wide range of languages.

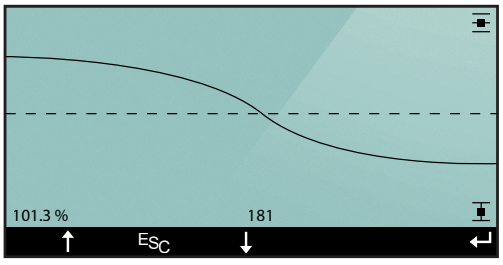
1 Display
The graphic display shows texts and graphic elements as well as torque curves.

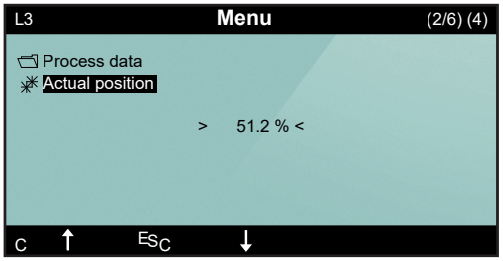
2 Indication lights
Visual status signals via indication lights can be programmed. The signals indicated via LEDs are clearly visible even from longer distances.

3 Multifunctional push buttons
Operation is performed using four convential push buttons or optionally by means of a magnetic pen.

4 Bluetooth® Interface
Data exchange between the actuator and the i-matic Explorer.







Tailor-made interfaces

The mechanical interface to the valve is standardised. On the other hand the interfaces between the control station and operator are constantly evolving.

Parallel control, fieldbus, or both for reasons of redundancy? When fieldbus, which protocol to use?
Regardless of the chosen interface, DREHMO actuators can be equipped with the suitable interface to match all systems established within process control engineering.

ACTUATOR COMMANDS AND FEEDBACK SIGNALS

In simple applications, operation commands OPEN and CLOSE, feedback signals, End position limit OPEN/End position limit CLOSED reached as well as Collective fault signal suffice. Any isolating valve can be reliably operated with these five discrete signals.

However, if the valve position is to be controlled, further continuous signals are required: Position setpoint and Position feedback signal (actual value), typically a 4 – 20 mA analogue signal for parallel communication.

Fieldbus protocols increase the bandwidth available for information transmission. Further to transmission of commands and feedback signals required for operation, access to all device parameters and operating data via fieldbus from the control station is made available.

I-MATIC

Signal assignment of the outputs can be modified later via i-matic device setting. Depending on the version, the following functions are provided:

- Up to four digital inputs e.g. operation commands OPEN, STOP, CLOSE, release signals for local controls, EMERGENCY commands, etc.
- Up to seven digital outputs e.g. for feedback of end positions, intermediate positions, selector switch position, failures, etc.
- One analogue input (4 – 20 mA) e.g. for receiving a setpoint to control the positioner.
- One analogue output (4 – 20 mA) e.g. for feedback of valve position or torque.

The digital inputs and outputs are potential-free. Optionally the analogue signals are galvanically isolated available.

ADDITIONAL I/O INTERFACE

This board is an optional station I/O interface that expands the i-matic with the following additional I/O's:

- 6 digital inputs (115 V AC or 24 V DC)
- 6 digital outputs (2x changeover contact, 4x normally open contact – optional as bistable signaling relay)

Fieldbus communication

DREHMO FIELDBUS DEVICES

Many different fieldbus systems are available on the market. Certain preferences have evolved on a regional level or are specific to particular plant applications. Since DREHMO actuators are used in all types of technical process plants worldwide, they are available with any communication system established in this industry.

> Profibus DP
> Modbus RTU
> Profinet
> HART

DREHMO devices are optionally available with digital and analogue inputs for connecting additional sensors to the fieldbus.

PROFIBUS

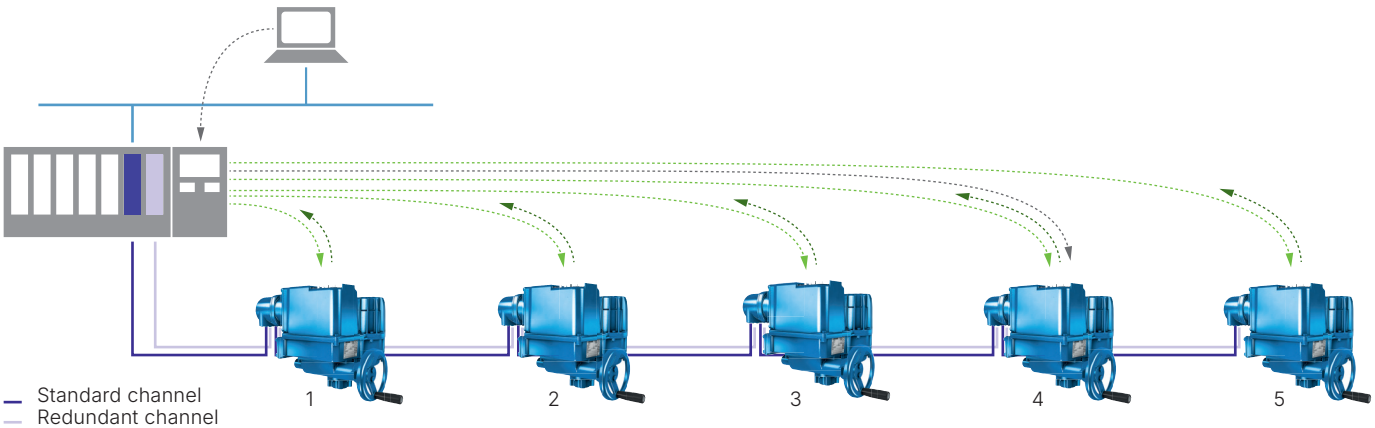
Profibus offers a complete family of fieldbus variants: Profibus PA for process automation, Profinet for Ethernet-based data transmission, and Profibus DP for automating plants, power plants and machines. Due to its simple and robust physical layer (RS-485) and the different service levels DP-V0 (fast cyclic and deterministic data exchange), DP-V1 (acyclic access to device parameters and diagnostic data) as well as DP-V2 (additional functions such as time stamp or redundancy), Profibus DP is the ideal solution for plant automation. International standard, IEC 61158/61784, www.profibus.com

> Large installation base
> Standardised integration within the DCS
> Large selection of devices (FDT, EDD)
> Worldwide distribution

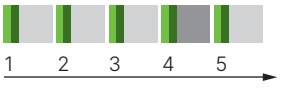
DREHMO actuators with Profibus DP

> Support Profibus DP-V0, DP-V1 and DP-V2
> High speed data exchange (up to 1.5 Mbit/s)
> Integration within the DCS via EDD or FDT
> Cable length up to approx. 10 km (without repeater up to 1,200 m)
> Up to 126 devices can be connected
> Option: Redundant line topology or master slave redundant
> Option: Data transmission via fibre optic cables
> Option: Over voltage protection up to 4 kV

PROFIBUS



Bus cycle with 5 actuators



Cyclic process data request from master
Cyclic process data feedback from slave
Acyclic diagnostics or parameter data transmission

MODBUS

In comparison with other fieldbus technologies, Modbus is simple but has a multifunctional fieldbus protocol. It offers all functions required for plant automation, e.g. exchange of simple, binary information, analogue values, device parameters or diagnostic data.

For plant automation and similarly to Profibus, the simple and robust physical layer RS-485 is often used.

Based on this physical layer, Modbus supports various telegram formats, such as Modbus RTU or Modbus ASCII. When using the Ethernet-based Modbus TCP/IP version, vertical integration into a higher-level automation system is often implemented.

- International standard, IEC 61158/61784, www.modbus.org
- Simple protocol
- Worldwide distribution
- Largely sufficient for many simple automation tasks

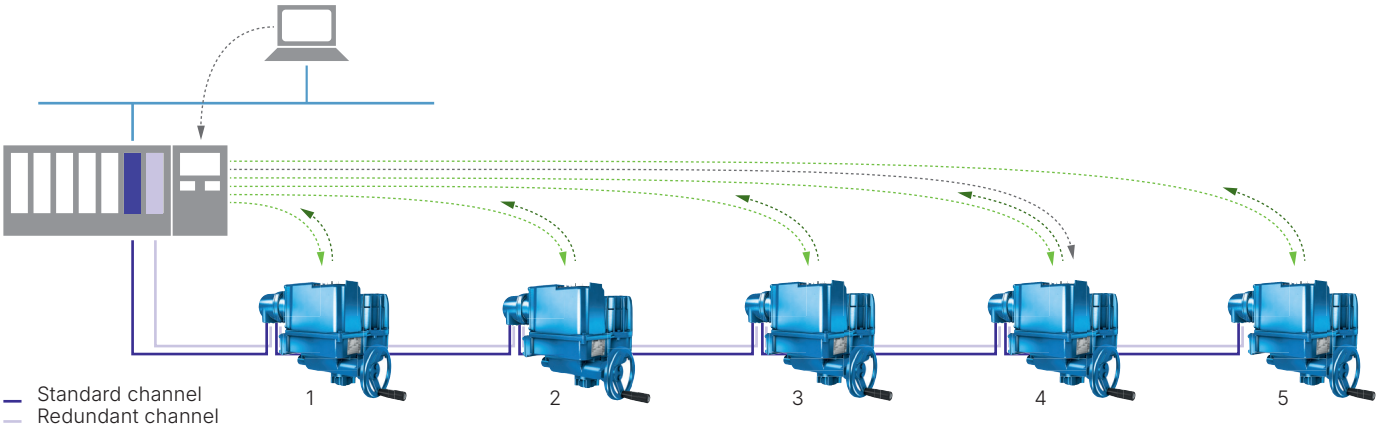
DREHMO actuators with Modbus RTU

- Fast data exchange (up to 38,400 bit/s)
- Cable length up to approx. 10 km (without repeater up to 1,200 m)
- Up to 247 devices can be connected
- Option: Redundant line topology
- Option: Redundant loop topology
- Option: Data transmission via fibre optic cables
- Option: Overvoltage protection up to 4 kV

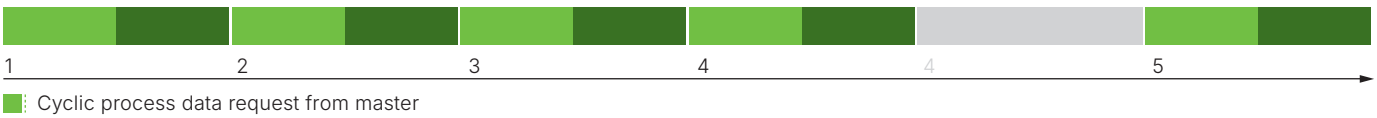
DREHMO actuators with Modbus TCP/IP

- Modbus TCP/IP is available by means of a Modbus RTU gateway inside the plug-in electrical connector
- Data exchange 10/100 Mbit/s
- Field-mountable RJ-45 connector (Cat. 6 A)

MODBUS



Bus cycle with 5 actuators



Cyclic process data request from master
Cyclic process data feedback from slave
Acyclic diagnostics or parameter data transmission

PROFINET

Profinet I/O is a communication protocol for industrial automation engineering based on Ethernet and standardised by the PROFIBUS Nutzerorganisation e.V. (PNO) worldwide. Profinet enables real-time communication (RT) with short cycle times as well as acyclic communication (non-RT) for configuration and diagnostics. An unlimited number of devices can be connected in Profinet systems. The maximum distance between network participants is 100 m. This distance can be increased by using switches with fiber optic communication.

The media redundancy available for PROFINET ensures high availability within the plant. The actuator is equipped with two physically separate communication channels to the host controller. If the first channel fails, for example due to a line interruption, the secondary communication channel is automatically used.

Profinet system redundancy allows for redundant operation of several controllers or CPUs within one network. By this, failure or replacement of one controller during operation on the site is possible without interruption.

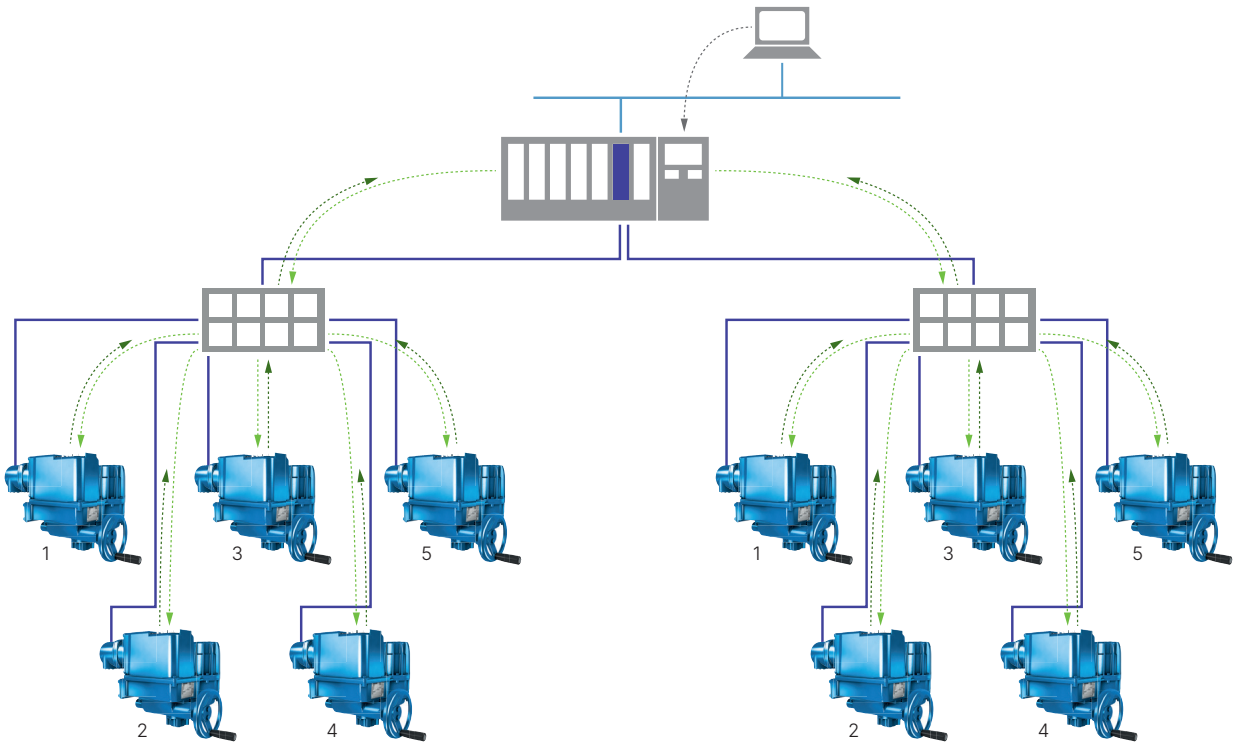
DREHMO actuators with star topology
> Point-to-point topology
> Devices only have one connection to the control system or to an Ethernet switch

DREHMO actuators with line topology
> Connection of actuators via integrated switches (to increase overall availability, supply via external 24 V DC is recommended)
> Only the first device has a connection to the control system

DREHMO actuators with ring topology
> Actuator connection via integrated switches
> Redundancy via integral MRP (Media Redundancy Protocol)
> The first and last devices are connected to the control system

DREHMO actuators with tree topology
> Central, external Ethernet switches to connect field devices
> Any combination is possible

PROFINET



— Standard channel
Cyclic process data request from master
Cyclic process data feedback from slave

HART

HART makes use of the known 4 – 20 mA standard signal for analogue data transmission. HART communication is superimposed on the analogue signal as an additional modulated signal. Advantages: Simultaneous transmission of digital HART information to the analogue signal. Bidirectional transmission of HART information. No termination or line screen required. Wiring test with multimeter. Existing 4 – 20 mA infrastructure is also available for digital communication. Facilitates reading additional parameters and diagnostic data from field devices. HART uses the master-slave principle and offers various commands for data transmission. Normally, the conventional point-to-point topology is used.

> International standard, IEC 61158/61784 (CPF9)
> Worldwide distribution
> Large installation base
> Standardised integration within the DCS (FDT, EDD)
> Large selection of devices

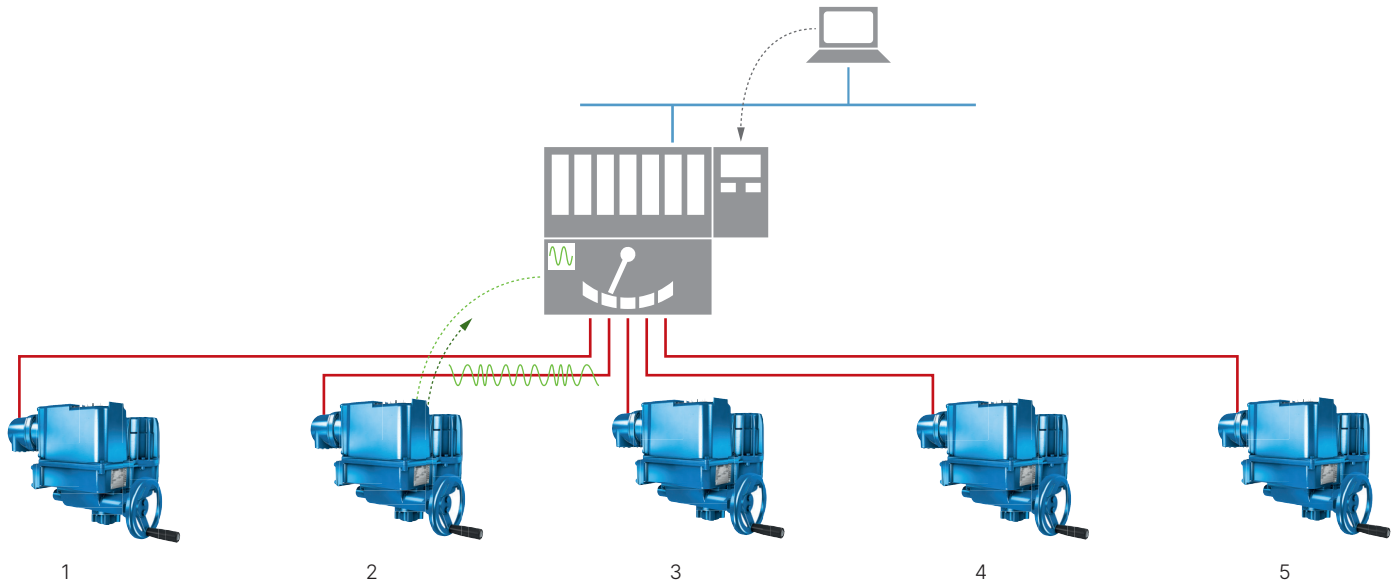
DREHMO actuators with HART

> Support of 2 device categories
  - Actuator:
    HART signal based on analogue setpoint from DCS
  - Current Output:
    HART signal based on analogue actual position from actuator
> Transmission of parameter and diagnostic data via digital HART communication
> Data exchange at 1.2 kBits (Bell 202, telephone std.)
> Integration within the DCS via EDD or FDT/DTM
> Length of cable approx. 3 km

DREHMO actuators with Wireless HART

> Device categorie Current Output
> With wireless-adapter mounted inside special plug connector frame
> Option: Separation of wireless-adapter for any mounting position

HART



Conventional 4 – 20 mA signal cable
Digital HART communication

Cycle with 5 actuators

Parameter or diagnostic data request from master
Parameter or diagnostic feedback from slave
Analogue process signal

CENTRAL FIELD DEVICE MANAGEMENT

EDD and FDT/DTM are two independent technologies for harmonisation of device integration within fieldbus systems across all field devices. This includes for example device configuration, device replacement, fault analysis, device diagnostics, or documentation of these activities. For this reason, EDD and FDT are key technologies for Plant Asset Management and Life Cycle Management of a plant.

Besides the imperative main functions, field devices possess diagnostic functions and many specialised application functions to adapt the device to the process and environmental conditions as required. If certain prerequisites are fulfilled, for Profibus e.g. the DP-V1 protocol, data exchange connected to these functions can directly take place between control station and field device. For DREHMO actuators, this further includes status and diagnostic signals in compliance (according to NAMUR NE 107 only at HART), parameter modifications of user functions, information of the electronic device ID or operational data for preventive maintenance.
EDD or FDT is used to harmonise access from the control station to the data available with the various field devices.

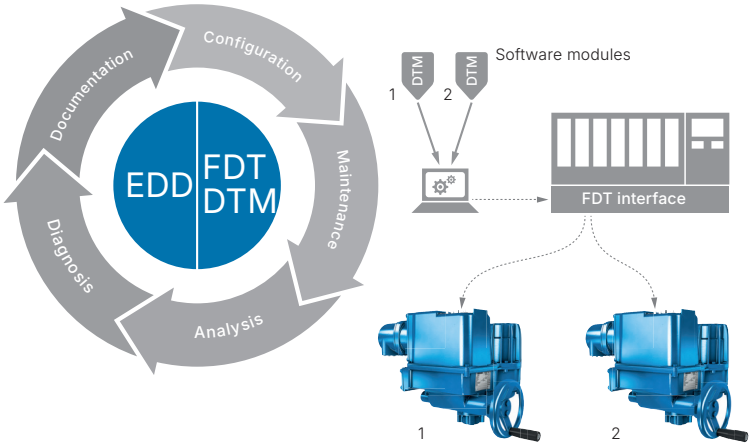
EDD

Each field device supporting this technology is provided with an EDD (Electronic Device Description). This file combines device parameters described in ASCII using standardised and platform neutral EDD language. This technology helps to create a uniform user interface philosophy with identical parameter visualisation across all field devices.

FDT/DTM

FDT (Field Device Tool) is a software interface definition to integrate DTM (Device Type Manager) into the FDT system of the maintenance processor. DTM is a software module supplied by field device manufacturers. Similar to a printer driver, DTM is installed within the FDT frame application to visualise settings and information available from the field devices.

DTMs are available on request. EDDs for DREHMO actuators can be downloaded at: www.drehmo.com



DATA TRANSMISSION VIA FIBRE OPTIC CABLE

Long distances between the devices combined with the high demands for data transmission security - in this instance, fibre optic cables are a suited transmission medium.

Long distances

Low attenuation of light signals in fibre optic cables allows coverage of long distances between participants, resulting in a considerably higher total fieldbus system length. With multimode cables, distances up to 2.6 km between devices can be achieved.

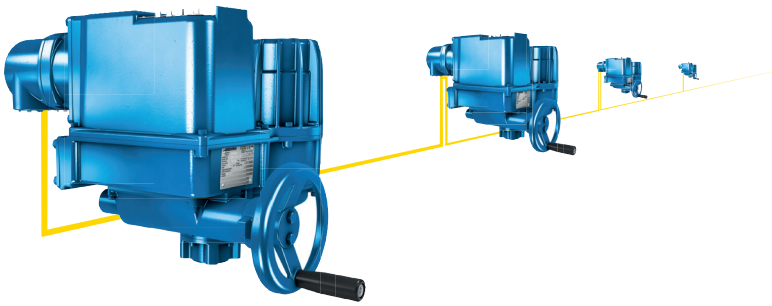
Integral overvoltage protection

Contrary to copper cables, fibre optic cables are resistant to electromagnetic interference. Separated installation of signal cables and power cables is no longer required. Fibre optic cables provide galvanic isolation between actuators. This offers particular protection against overvoltages, for example in the event of lightning.

DREHMO actuators with fibre optic interface (FO)

FO module for converting actuator-internal electrical signals into fibre optic signals is integrated within the electrical connection of the actuator. Connection of fibre optic cables is made via conventional FSMA plug/socket connectors.

When using Profibus DP, line, star and ring topology are possible. In this case, the availability of the fibre optic ring is monitored. If the ring is interrupted, a warning will be sent. This warning is integrated within the signalling pattern of i-matic actuator controls, visualised on the display and transmitted to the control station in compliance with the specified signalling pattern.



Comparison of max. distances between bus participants

SIMA² - the fieldbus system solution

SIMA² MASTERSTATION

SIMA² is the ideal master station for perfect integration of actuators into a DCS. Entire communication is based on open fieldbus protocols.

> SIMA² supports the user with a mostly automated procedure for commissioning the connected actuator network, irrespective of the DCS - plug and play.
> SIMA² manages and monitors communication to field devices including all redundant data channels and hot standby components.
> SIMA² as data concentrator collects all actuator status signals and sends the signals relevant for normal service to the DCS.
> SIMA² facilitates status information access to the connected actuators.
> In the event of failures, SIMA² supports fast fault identification and remedy.
> SIMA² serves the purpose of gateway to adapt fieldbus communication with actuators to the available interfaces of the DCS.

> Configuration interface

SIMA² can be operated from your favourite end device: Either directly via the integral 7" multi-touchscreen or remotely via PC, laptop, tablet or smartphone. Thanks to the integral web server, the same comfortable user interface is available for both the touchscreen and also the standard web browser. SIMA² Master Station diagnostic representation is based on the diagnostic classification and icons by NAMUR NE 107. Settings and configurations are password protected for different user levels.

> SIMA² Master Station

SIMA² Master Station uses state-of-the-art hardware and software design. The entire hardware is housed in a robust 19" rack-mount enclosure.

> Hot Standby SIMA²

Increased availability and reliability can be achieved by installing a backup SIMA², taking over all tasks of the primary SIMA² in case of failure. This Hot Standby SIMA² can be integrated in the same enclosure to minimise installation space.

> Redundant Modbus loop

The major advantage of this topology is the integrated redundancy. If the loop is interrupted, SIMA² considers both segments as separate lines and all actuators remain accessible. Actuators selected for this topology are equipped with a repeater function for galvanic isolation of loop segments and for Modbus signal amplification.

> Redundant line topology with Modbus RTU or Profibus DP

The connection from SIMA² Master Station to the field devices is made on two channels; this means that two separate fieldbus cables are installed for each actuator. Failure of one of the communication channels initiates immediate change-over to the second channel.

> Fieldbus Networks per SIMA² Master Station

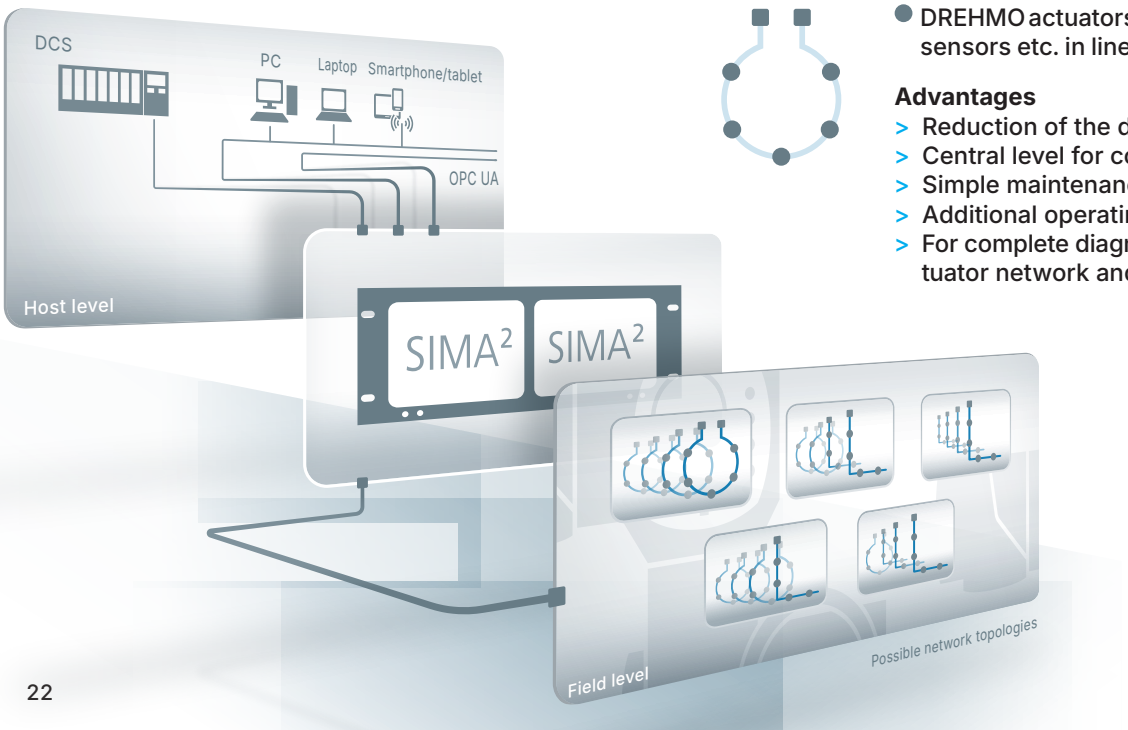
A single SIMA² Master Station can manage up to four independent, galvanically isolated and logically separated actutor networks. Altogether 247 network participants can be controlled per network – a total of up to 988 actuators per SIMA² Master Station. Maximum cable length up to 296 km.

> DREHMO actuators

DREHMO actuators are equipped with the suitable interface matching selected fieldbus protocol and topology. Individual devices can be separated from the fieldbus without interrupting fieldbus communication to other devices.

> Communication with DCS

DCS communication is possible using Modbus RTU (redundant), OPC UA or Modbus TCP/IP (redundant).



● DREHMO actuators, other actuators, sensors etc. in line or loop topology

Advantages

> Reduction of the data volume to the DCS
> Central level for control and diagnostic
> Simple maintenance for network loops
> Additional operating function
> For complete diagnostic of the entire actuator network and simple DCS integration

Technical data

MULTI-TURN ACTUATOR DiM

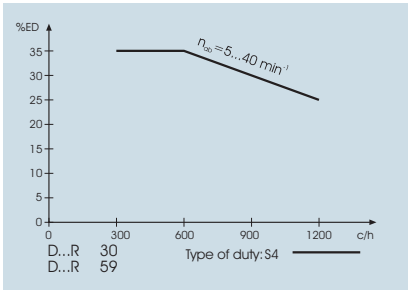
Actuator Model	Actuator speed [rpm]	Torque Adjustment Range [Nm]	Connection Flange According to DIN EN ISO 5210 (standard)	Connection Flange According to DIN EN ISO 5210 (special request)	Connection Flange According to DIN 3210 (special request)	Max. allowable spindle diameter at form "A"[1] [mm]	Max. allowable axial force at form "A" [kN]
DiM 30	5, 10, 16, 25, 32, 40, 50, 80, 120[2], 160[2]	10 – 30	F07 -	- F10	- G0	24 28	30 40
DiM 58	10, 16, 32, 80, 160	20 – 60	- F10	F07 -	- G0	24 28	30 40
DiM 59	5, 10, 16, 25, 32, 40, 50, 80, 120[2], 160[2]	20 – 60	- F10	F07 -	- G0	24 28	30 40
DiM 60		20 – 60	- F10 -	F07 - F14	- G0 G1/2	32 40 40	60 60 60
DiM 120		40 – 120	F10 -	- F14	G0 G1/2	40 40	60 60
DiM 249	5, 10, 16, 25, 32, 40, 50, 80	80 – 250	- F14	F10 -	G0 G1/2	40 40	60 60
	120[2]	80 – 200					
DiM 250	5, 10, 16, 25, 32, 40, 50, 80, 120[2], 160[2]	80 – 250	F14	F16	G1/2	52	120
DiM 500	5, 10, 16, 25, 32, 40, 50, 80, 120[2], 160[2]	150 – 500	F14	F16	G1/2	52	160
	80[3], 120[3], 160[3], 200[3]						
DiM 1000	5, 10 16, 25, 32, 40, 50, 80	300 – 1,000	F16	-	G3	65	190
	80[3], 120[3], 160[3]						
	200[3]	300 – 800					
DiM 2000[3]	40, 80, 120, 160, 200	800 – 2,000	F25	[4]	[4]	80	380

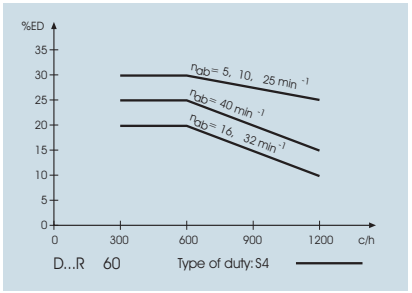
[1] For form B, B1, B2, C dimension d5 to be observed.
[2] Actuators with this speed are not self-locking.
[3] At this speed, brake motors with planetary gears are used. Special safety provisions have to be implemented for pulling loads.
[4] On request.

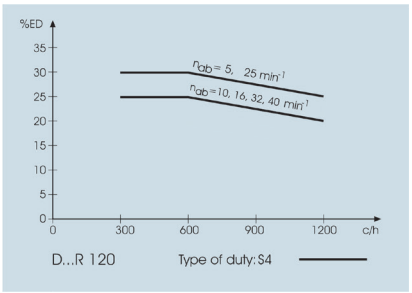
Technical data

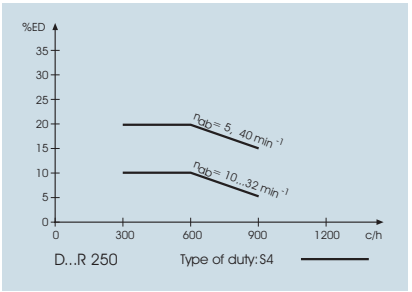
MULTI-TURN ACTUATOR FOR MODULATING DUTY DiMR

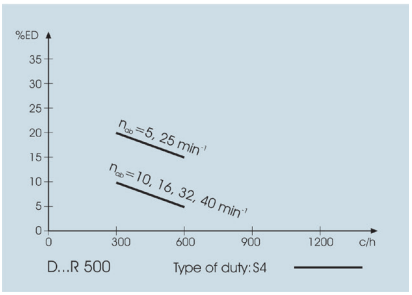
Actuator Model	Actuator Speed [rpm]	Required min. Length of Signal for Operating into Same Direction [ms][3]	Hysteresis [ms]	Torque Adjustment Range [Nm]	Max. Modulating Torque [Nm]	Connection Flange to DIN EN ISO 5210 (Standard)	Connection Flange to DIN EN ISO 5210 (Special Request)	Connection Flange to DIN 3210 (Special Request)	Max. Allowable Stem Diameter Output Drive "A"[1] [mm]	Max. Allowable Axial Force Output Drive "A" [kN]
DiMR 30	5	65	290	15 – 30	15	F07	-	-	24	30
	10	65	84							
	16	65	53							
	25	65	34			-	F10	G0	28	40
	32	65	26							
	40	65	22							
DiMR 59	5	65	290	30 – 60	30	-	F07	-	24	30
	10	65	84							
	16	65	53							
	25	65	34			F10	-	G0	28	40
	32	65	26							
	40	65	22							
DiMR 60	5	65	400	30 – 60	30	-	F07	-	32	60
	10	65	200							
	16	65	122							
	25	65	48			F10	-	G0	40	60
	32	65	39							
	40	65	31			-	F14	G1/2	40	60
DiMR 120	5	65	127	60 – 120	60	F10	-	G0	40	60
	10	65	64							
	16	65	39							
	25	65	48			-	F14	G1/2	40	60
	32	65	39							
	40	65	31							
DiMR 250	5	65	127	120 – 250	120	F14	F16	G1/2	52	120
	10	65	64							
	16	65	39							
	25	65	25							
	32	65	21							
	40	65	16							
DiMR 500	5	65	127	200 – 500	200	F14	F16	G1/2	52	160
	10	65	64							
	16	65	39							
	25	65	25							
	32	65	21							
	40	65	16							
DiMR 1000[2]	6	65	117	500 – 1,000	500	F16	-	G3	65	190
	10	65	66							
	16	65	[4]							
	25	65	[4]							











[1] For model B, B1, B2, C please consider dimension d5.
[2] Max. duty cycle 10 % max. operations per hour 300 (c/h).
[3] Without consideration of signal running times caused by control processes.
[4] On request.

Percentage of operation (% ED) within one hour in relation to number of duty cycles (c/h) per hour for different actuator output speeds (n_{ab}) at a temperature of max. 60 °C.

Actuator Dimensions

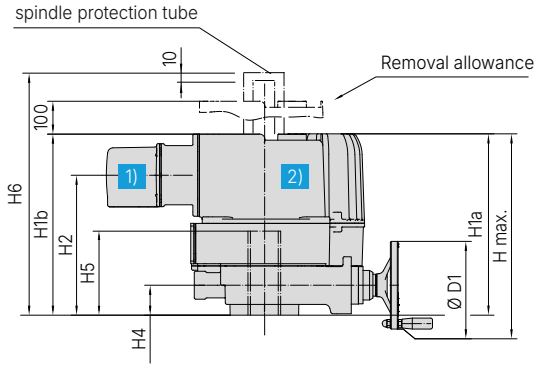
MULTI-TURN ACTUATOR DiM

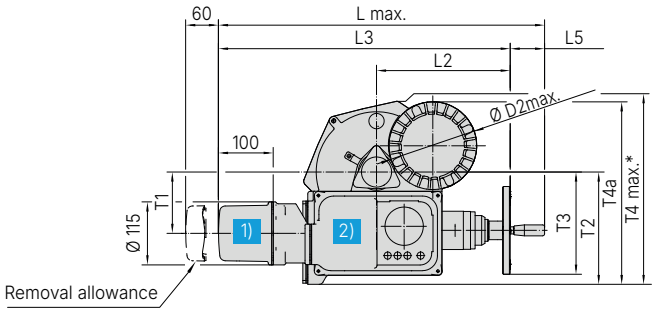
MULTI-TURN ACTUATOR FOR MODULATING DUTY DiMR

Actuator Models DiM(R)	30	58[1]	59	60	120	249[1]	250	500	1000	2000[1]
Weight [kg]	23	25	25	30	33.5	33.5	69.5	80.5	90.5	146
Dimensions [mm]										
L max.	561	561	561	596	601	601	661	732	732	811
T4 max.	287	287	287	334	360	360	455	530	580	757
H max.	344	344	344	357	402	402	570	695 (770[2])	745 (820[2])	934
D1	Ø160	Ø160	Ø160	Ø160	Ø250	Ø250	Ø250	Ø400	Ø500	Ø500
D2 max.	Ø127	Ø127	Ø127	Ø160	Ø160	Ø160	Ø245	Ø245	Ø245	Ø245
H1a	280	280	280	331	331	331	492	542 (639[2])	542 (723[2])	730
H1b	313	313	313	331	331	331	404	404	404	471
H2	238	238	238	256	256	256	306	306	306	373
H4	49	49	49	55	55	55	69	69	69	125
H5	140	140	140	160	160	160	210	210	210	169
H6	250	250	250	270	270	270	452	452	452	500
	352	352	352	372	372	372	702	702	702	-
	452	452	452	472	472	472	952	952	952	-
	552	552	552	572	572	572	-	-	-	-
	652	652	652	672	672	672	-	-	-	-
L2	209	209	209	244	232	232	264	311	311	348
L3	499	499	499	533	521	521	581	628	628	706
L5	63	63	63	63	80	80	80	105	105	105
T1	102	102	102	112	112	112	128	128	128	205
T2	179	179	179	205	205	205	214	214	214	294
T3	178	178	178	187	232	232	260	335	385	450
T4a	287	287	287	334	334	334	412	412	412	601
IM-unit 2)	408 x 153 x 163 (L x T x H)						420 x 170 x 185 (L x T x H)			

[1] Only available as actuator model DiM.

[2] Dimension for actuator with brake motor.





1) Cover for electrical connection S refer to page 13. Options available.

2) Electronic unit (IM-unit) coversize including cover for electrical connection.

* Depending on the device, the outer dimension is either defined by handweehl or housing.

Motor data

MULTI-TURN ACTUATOR DiM

Actuator Model	Motor (400 V/3 ph/50 Hz, 480 V/3 ph/60 Hz)											
	Output speed[1]	Max. torque	Motor type	Nominal Power[2]	Speed	Nominal Current[3]	load data		Starting Current	cos phi	DREHMO power class for switchgear	
							50 % Current[4]	100 % Current[5]			Contactor	Thyristor
	[rpm]	[Nm]		P_N [kW]	[rpm]	I_N [A]	$I_{50\,\%}$ [A]	$I_{100\,\%}$ [A]	I_N [A]			
DiM 30 S2 - 15 min	5	30	TM4.0105	0.12	1,360	0.53	0.4	0.4	1.5	0.66	A1	C1
	10		TM4.0105	0.12	1,360	0.53	0.4	0.4	1.5	0.66	A1	C1
	16		TM4.0105	0.12	1,360	0.53	0.4	0.5	1.5	0.66	A1	C1
	25		TM4.0105	0.12	1,360	0.53	0.5	0.7	1.5	0.66	A1	C1
	32		TM4.01013	0.34	2,840	1.10	1.1	1.1	4.8	0.62	A1	C1
	40		TM4.0106	0.25	1,360	1.10	1.0	1.1	2.7	0.65	A1	C1
	50		TM4.01013	0.34	2,840	1.10	1.0	1.2	4.8	0.62	A1	C1
	80		TM4.01013	0.34	2,840	1.10	1.4	1.8	4.8	0.62	A1	C1
	120		TM4.01013	0.34	2,840	1.10	1.4	2.0	4.8	0.62	A1	C1
	160		TM4.01014	0.75	2,800	2.00	2.0	2.5	10.0	0.70	A1	C1
DiM 58 S2 - 15 min	10	60	TM4.0105	0.12	1,360	0.53	0.4	0.6	1.5	0.66	A1	C1
	16		TM4.0106	0.25	1,360	1.10	0.9	1.0	2.7	0.65	A1	C1
	32		TM4.01013	0.34	2,840	1.10	1.1	1.4	4.8	0.62	A1	C1
	80		TM4.01014	0.75	2,800	2.00	2.1	2.9	10.0	0.70	A1	C1
	160		TM4.01014	0.75	2,800	2.00	2.5	4.1	10.0	0.70	A1	C1
DiM 59 S2 - 15 min	5	60	TM4.0105	0.12	1,360	0.53	0.4	0.5	1.5	0.66	A1	C1
	10		TM4.0105	0.12	1,360	0.53	0.4	0.6	1.5	0.66	A1	C1
	16		TM4.0106	0.25	1,360	1.10	0.9	1.0	2.7	0.65	A1	C1
	25		TM4.0106	0.25	1,390	1.10	0.9	1.2	2.7	0.65	A1	C1
	32		TM4.01013	0.34	2,840	1.10	1.1	1.4	4.8	0.62	A1	C1
	40		TM4.0107	0.40	1,390	1.50	1.4	1.8	5.1	0.63	A1	C1
	50		TM4.01014	0.75	2,800	2.00	1.8	2.2	10.0	0.70	A1	C1
	80		TM4.01014	0.75	2,800	2.00	2.1	2.9	10.0	0.70	A1	C1
	120		TM4.01014	0.75	2,800	2.00	2.1	3.2	10.0	0.70	A1	C1
	160		TM4.01014	0.75	2,800	2.00	2.5	4.1	10.0	0.70	A1	C1
DiM 60 S2 - 15 min	5	60	TM1.01005	0.12	1,360	0.57	0.6	0.7	1.5	0.62	A1	C1
	10		TM1.01000	0.21	2,670	0.65	0.7	0.9	2.3	0.76	A1	C1
	16		TM1.01001	0.42	2,700	1.15	1.0	1.3	4.6	0.81	A1	C1
	25		TM1.01006	0.18	1,320	0.76	0.8	1.2	2.0	0.64	A1	C1
	32		TM1.01001	0.42	2,700	1.15	1.0	1.3	4.6	0.81	A1	C1
	40		TM1.01007	0.34	1,310	1.30	1.2	1.8	3.5	0.63	A1	C1
	50		TM1.01001	0.42	2,700	1.15	1.4	1.9	4.6	0.81	A1	C1
	80		TM1.01002	0.90	2,670	2.30	2.0	2.7	9.0	0.80	A1	C1
	120		TM1.01002	0.90	2,670	2.30	2.7	4.2	9.0	0.80	A1	C1
	160		TM1.01002	0.90	2,670	2.30	2.8	4.6	9.0	0.80	A1	C1
DiM 120 S2 - 15 min	5	120	TM1.01007	0.34	1,310	1.30	1.0	1.2	3.5	0.63	A1	C1
	10		TM1.01001	0.42	2,700	1.15	1.0	1.4	4.6	0.81	A1	C1
	16		TM1.01002	0.90	2,670	2.30	1.7	2.1	9.0	0.80	A1	C1
	25		TM1.01008	0.56	1,325	1.70	1.5	2.1	5.7	0.72	A1	C1
	32		TM1.01002	0.90	2,670	2.30	1.8	2.3	9.0	0.80	A1	C1
	40		TM1.01009	0.75	1,345	2.50	2.3	3.1	8.6	0.62	A1	C1
	50		TM1.01002	0.90	2,670	2.30	2.2	3.4	9.0	0.80	A1	C1
	80		TM1.01003	1.50	2,710	3.10	2.9	4.4	14.6	0.89	A1	C1
	120		TM1.01004P	1.60	2,820	3.70	4.4	6.6	20.5	0.80	A1	C1
	160		TM1.01004P	1.60	2,820	3.70	5.0	8.0	20.5	0.80	A1	C1
DiM 249 S2 - 15 min	5	250	TM1.01007	0.34	1,310	1.30	1.1	1.8	3.5	0.63	A1	C1
	10		TM1.01008	0.56	1,325	1.70	1.4	1.9	5.7	0.72	A1	C1
	16		TM1.01008	0.56	1,325	1.70	1.7	2.5	5.7	0.72	A1	C1
	25		TM1.01009	0.75	1,345	2.50	2.5	4.1	8.6	0.62	A1	C1
	32		TM1.01003	1.50	2,710	3.10	2.4	4.0	14.6	0.89	A1	C1
	40		TM1.01010	0.80	1,390	3.60	3.6	6.0	11.2	0.50	A1	C1
	50		TM1.01003	1.50	2,710	3.10	3.5	6.6	14.6	0.89	A1	C1
	80		TM1.01004	1.60	2,820	3.70	5.3	9.6	20.5	0.80	A1	C1
	120	200	TM1.01004P	1.60	2,820	3.70	[6]	[6]	20.5	0.80	A1	C1

Motor data

MULTI-TURN ACTUATOR DiM

Actuator Model		Motor (400 V/3 ph/50 Hz, 480 V/3 ph/60 Hz)											
		Output speed[1]	Max. torque	Motor type	Nominal Power[2]	Speed	Nominal Current[3]	load data		Starting Current	cos phi	DREHMO power class for switchgear	
								50 % Current[4]	100 % Current[5]				
		[rpm]	[Nm]		P_N [kW]	[rpm]	I_N [A]	$I_{50\,\%}$ [A]	$I_{100\,\%}$ [A]	I_N [A]		Contactor	Thyristor
DiM 250	S2 - 15 min	5	250	TM1.01008	0.56	1,325	1.70	1.2	1.6	5.7	0.72	A1	C1
		10		TM1.01002	0.90	2,670	2.30	1.6	2.5	9.0	0.80	A1	C1
		16		TM1.01003	1.50	2,710	3.10	1.8	3.0	14.6	0.89	A1	C1
		25		TM1.01009	0.75	1,345	2.50	2.2	3.5	8.6	0.62	A1	C1
		32		TM1.01003	1.50	2,710	3.10	2.2	4.3	14.6	0.89	A1	C1
	S2 - 10 min	40		TM2.01079	2.00	1,440	4.80	4.0	6.3	25.0	0.77	A2	C1
	S2 - 15 min	50		TM1.01003	1.50	2,710	3.10	2.7	6.1	14.6	0.89	A1	C1
		80		TM1.01004	1.60	2,820	3.70	4.4	10.1	20.5	0.80	A1	C1
	S2 - 10 min	120		TM2.01075	4.00	2,900	9.00	7.8	17.6	57.0	0.80	A2	C2
		160		TM2.01076	6.00	2,870	13.90	9.9	19.9	76.0	0.78	A2	C2
DiM 500	S2 - 15 min	5	500	TM1.01009	0.75	1,345	2.50	2.1	2.7	8.6	0.62	A1	C1
		10		TM1.01003	1.50	2,710	3.10	2.0	3.9	14.6	0.89	A1	C1
		16		TM1.01004	1.60	2,820	3.70	3.2	5.8	20.5	0.80	A1	C1
	S2 - 10 min	25		TM2.01079	2.00	1,440	4.80	4.4	8.3	25.0	0.77	A2	C1
		32		TM2.01075	4.00	2,900	9.00	5.0	9.6	57.0	0.80	A2	C2
		40		TM2.01081	4.50	1,435	11.10	7.4	11.7	57.0	0.77	A2	C2
		50		TM2.01075	4.00	2,900	9.00	6.2	14.5	57.0	0.80	A2	C2
		80		TM2.01076	6.00	2,870	13.90	10.6	22.7	76.0	0.78	A2	C2
		80		TB2.01080	3.00	1,420	8.10	6)	6)	40.0	0.71	A2	C2
		120		TM2.01078	8.50	2,875	18.70	14.4	31.6	112.0	0.82	A2	-
		120		TB2.01081	4.50	1,435	11.10	6)	6)	57.0	0.77	A2	C2
		160		TM2.01078	8.50	2,875	18.70	16.3	37.7	112.0	0.82	A2	-
	S2 - 15 min	160		TB2.01076	6.00	2,870	13.90	6)	6)	76.0	0.78	A2	-
	S2 - 10 min	200		TB2.01076	6.00	2,870	13.90	10.4	23.1	76.0	0.78	A2	-
DiM 1000	S2 - 15 min	5	1,000	TM1.01010	0.80	1,390	3.60	6)	6)	11.2	0.50	A1	C1
		10		TM1.01004	1.60	2,820	3.70	3.6	7.2	20.5	0.80	A1	C1
	S2 - 10 min	16		TM2.01075	4.00	2,900	9.00	6.5	14.3	57.0	0.80	A2	C2
		25		TM2.01081	4.50	1,435	11.10	8.6	16.9	57.0	0.77	A2	C2
		32		TM2.01075	4.00	2,900	9.00	8.1	21.8	57.0	0.80	A2	C2
		40		TM2.01082	6.00	1,420	15.10	12.4	24.9	64.0	0.73	A2	C2
		50		TM2.01076	6.00	2,870	13.90	11.8	30.2	76.0	0.78	A2	C2
		80		TM2.01078	8.50	2,875	18.70	18.4	46.1	112.0	0.82	A2	-
		80		TB2.01082	6.00	1,420	15.10	11.5	20.0	64.0	0.73	A2	C2
	S2 - 15 min	120		TB2.01082	6.00	1,420	15.10	13.3	27.3	64.0	0.73	A2	C2
		160		TB2.01078	8.50	2,875	18.70	17.7	40.9	112.0	0.82	A2	-
	S2 - 10 min	200	800	TB2.01078	8.50	2,875	18.70	6)	6)	112.0	0.82	A2	-
DiM 2000 S2 - 15 min		40	2,000	RUF112/4K	5.00	1,420	11.50	6)	6)	52.0	0.81	A2	C2
		80		RUF112M/20KS	7.50	2,900	16.50	6)	6)	75.0	0.85	A2	-
		120		RUF132M/20KS	14.00	2,900	26.50	6)	6)	170.0	0.87	A3	-
		160		RUF132M/20KS	14.00	2,900	26.50	6)	6)	170.0	0.87	A3	-
		200		RUF160L/2K	22.00	2,900	41.00	6)	6)	312.0	0.90	A4	-

[1] Output speed: increased by factor 1.2 at 60 Hz.
[2] Nominal power P_N: Mechanical power at motor shaft (data on nameplate); increased by factor 1.2 at 60 Hz.
[3] Nominal current I_N: Rated current of the motor (data on nameplate).
[4] 50 % current $I_{50\,\%}$: Current at 50 % of maximum adjustable torque.
[5] 100 % current $I_{100\,\%}$: Current at 100 % of maximum adjustable torque.
[6] On request.

Motor data

MULTI-TURN ACTUATOR FOR MODULATING DUTY DiMR

Actuator Model	Motor (400 V/3 ph/50 Hz, 480 V/3 ph/60 Hz)											
	Output speed[1]	Max. torque	Motor type	Nominal Power[2]	Speed	Nominal Current[3]	load data		Starting Current	cos phi	DREHMO power class for switchgear	
							50 % Current[4]	100 % Current[5]				
	[rpm]	[Nm]		P_N [kW]	[rpm]	I_N [A]	$I_{50\,\%}$ [A]	$I_{100\,\%}$ [A]	I_N [A]		Contactor	Thyristor
DiMR 30	5	30	TM4.0105	0.12	1,360	0.53	0.4	0.4	1.5	0.66	A1	C1
	10		TM4.0105	0.12	1,360	0.53	0.4	0.4	1.5	0.66	A1	C1
	16		TM4.0105	0.12	1,360	0.53	0.4	0.5	1.5	0.66	A1	C1
	25		TM4.0105	0.12	1,360	0.53	0.5	0.7	1.5	0.66	A1	C1
	32		TM4.01013	0.34	2,840	1.10	1.1	1.1	4.8	0.62	A1	C1
	40		TM4.0106	0.25	1,360	1.10	1.0	1.1	2.7	0.65	A1	C1
DiMR 59	5	60	TM4.0105	0.12	1,360	0.53	0.4	0.5	1.5	0.66	A1	C1
	10		TM4.0105	0.12	1,360	0.53	0.4	0.6	1.5	0.66	A1	C1
	16		TM4.0106	0.25	1,360	1.10	0.9	1.0	2.7	0.65	A1	C1
	25		TM4.0106	0.25	1,390	1.10	0.9	1.2	2.7	0.65	A1	C1
	32		TM4.01013	0.34	2,840	1.10	1.1	1.1	4.8	0.62	A1	C1
	40		TM4.0107	0.40	1,390	1.50	1.4	1.8	5.1	0.63	A1	C1
DiMR 60	5	60	TM1.01005	0.12	1,360	0.57	0.6	0.7	1.5	0.62	A1	C1
	10		TM1.01000	0.21	2,670	0.65	0.7	0.9	2.3	0.76	A1	C1
	16		TM1.01001	0.42	2,700	1.15	1.0	1.3	4.6	0.81	A1	C1
	25		TM1.01006	0.18	1,320	0.76	0.8	1.2	2.0	0.64	A1	C1
	32		TM1.01001	0.42	2,700	1.15	1.0	1.3	4.6	0.81	A1	C1
	40		TM1.01007	0.34	1,310	1.30	1.2	1.8	3.5	0.63	A1	C1
DiMR 120	5	120	TM1.01007	0.34	1,310	1.30	1.0	1.2	3.5	0.63	A1	C1
	10		TM1.01001	0.42	2,700	1.15	1.0	1.4	4.6	0.81	A1	C1
	16		TM1.01002	0.90	2,670	2.30	1.7	2.1	9.0	0.80	A1	C1
	25		TM1.01008	0.56	1,325	1.70	1.5	2.1	5.7	0.72	A1	C1
	32		TM1.01002	0.90	2,670	2.30	1.8	2.3	9.0	0.80	A1	C1
	40		TM1.01009	0.75	1,345	2.50	2.3	3.1	8.6	0.62	A1	C1
DiMR 250	5	250	TM1.01008	0.56	1,325	1.70	1.2	1.6	5.7	0.72	A1	C1
	10		TM1.01002	0.90	2,670	2.30	1.6	2.5	9.0	0.80	A1	C1
	16		TM1.01003	1.50	2,710	3.10	1.8	3.0	14.6	0.89	A1	C1
	25		TM1.01009	0.75	1,345	2.50	2.2	3.5	8.6	0.62	A1	C1
	32		TM1.01003	1.50	2,710	3.10	2.2	4.3	14.6	0.89	A1	C1
	40		TMR2.01079	2.00	1,440	4.80	4.0	6.3	25.0	0.77	A2	C1
DiMR 500	5	500	TM1.01009	0.75	1,345	2.50	2.1	2.7	8.6	0.62	A1	C1
	10		TM1.01003	1.50	2,710	3.10	2.0	3.9	14.6	0.89	A1	C1
	16		TM1.01004	1.60	2,820	3.70	3.2	5.8	20.5	0.80	A1	C1
	25		TMR2.01079	2.00	1,440	4.80	4.4	8.3	25.0	0.77	A2	C1
	32		TMR2.01075	4.00	2,900	9.00	5.0	9.6	57.0	0.80	A2	C2
	40		TMR2.01081	4.50	1,435	11.10	7.4	11.7	57.0	0.77	A2	C2
DiMR 1000	6	1,000	TMR2.01079	2.00	1,440	4.80	3.1	7.2	25.0	0.77	A1	C1
	10		TMR2.01080	3.00	1,420	8.10	6.0	7.9	40.0	0.71	A1	C1
	16		TMR2.01082	6.00	1,420	15.10	7.6	13.7	100.0	0.73	A2	C2
	25		TMR2.01082	6.00	1,420	15.10	10.4	15.8	100.0	0.73	A2	C2

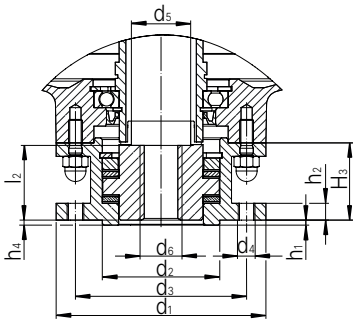
[1] Output speed: increased by factor 1.2 at 60 Hz.
[2] Nominal power P_N: Mechanical power at motor shaft (data on nameplate); increased by factor 1.2 at 60 Hz.
[3] Nominal current I_N: Rated current of the motor (data on nameplate).
[4] 50 % current $I_{50\,\%}$: Current at 50 % of maximum adjustable torque.
[5] 100 % current $I_{100\,\%}$: Current at 100 % of maximum adjustable torque.

Connection Dimensions

MULTI-TURN ACTUATOR DiM

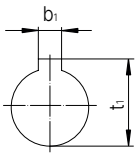
MULTI-TURN ACTUATOR FOR MODULATING DUTY DiMR

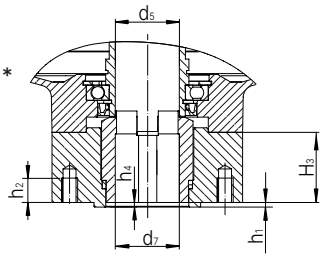
Output drive form A
Stem nut for rising stem



Actuator Model DiM		30	58 59	60 120	249	250 500	1000	2000
Actuator Model DiMR		30	59	60 120		250 500	1000	
size	DIN EN ISO 5210	F07	F10	F10	F14	F14	F16	F25
	DIN 3210	-	G0	G0	G1/2	G1/2	G3	-
Dimensions [mm]								
d_1	FORM A	90	125	125	175	175	210	350
$d_{2\ f8}$	DIN EN ISO 5210	55	70	70	100	100	130	200
	DIN 3210	-	60	60	100	100	130	-
d_3		70	102	102	140	140	165	254
d_4	4 x	M8	M10	M10	M16	M16	M20	8 x M16
d_5		26	30	40.5	40.5	52.5	65.5	85
$d_{6\ max}$		24	28	40	40	52	65	85
$h_1 = h_4$		3	3	3	4	4	5	5
h_2		12	16	16	22	23	35	24
H_3		36	42	46	58	56	70	130
l_2		34	41	40	54	54	68.5	130

Output drive form B1, B2, B
Bore for output shaft*

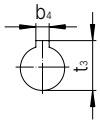


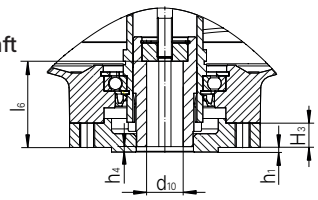


$b_{1\ JS9}$	FORM B1, B	8	12	12	18	18	22	28
d_5		26	30	40.5	40.5	52.5	65.5	85
$d_{7\ H9}$	B1, B	28	42	42	60	60	80	100
$d_{7\ max}$	B2, B	28	42	42	60	65	80	100
H_3		36	46	46	70	66	81	130
$h_1 = h_4$		3	3	3	4	4	5	5
t_1	FORM B1, B	31.3	45.3	45.3	64.4	64.4	85.5	106.4

* missing dimensions see form A.

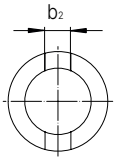
Output drive form B3, B4, E
Bore for output shaft

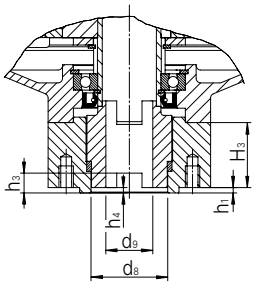




$b_{4\ JS9}$	FORM B3, E	5	6	6	8	8	12	14
$d_{10\ H9}$	B3, E	16	20	20	30	30	40	50
$d_{10\ max}$	B4, E	16	20	30	30	40	50	50
H_3		18	17	16	22	23	28	30
$h_1 = h_4$		3	3	3	4	4	5	5
l_6		41	56	56	79	79	98	118
t_3	FORM B3, E	18.3	22.8	22.8	33.3	33.3	43.3	53.8

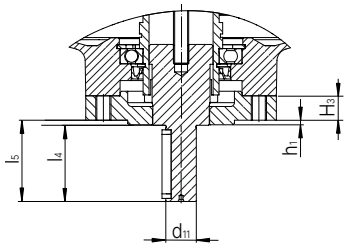
Output drive form C
Claw coupling





$b_{2\ H11}$	FORM C	14	14	14	20	20	24	30
d_8		42	54	54	80	85	110	139.9
d_9		26	28	28	38	38	47	85
H_3		36	46	46	70	66	81	130
$h_1 = h_4$		3	3	3	4	4	5	5
h_3		11	11	11	14	14	17	16

Output drive form D
Shaft extension



$b_{3\ H9}$	FORM D	5	6	6	8	8	12	-
d_{11}		16	20	20	30	30	40	-
H_3		18	17	16	22	23	28	30
h_1		3	3	3	4	4	5	5
l_4		40	50	50	70	70	90	-
l_5		45	55	55	76	76	96	-
t_2		18	22.5	22.5	33	33	43	-

Technical data

PART-TURN ACTUATOR FOR DPiM

PART-TURN ACTUATOR FOR MODULATING DUTY DPiMR

Actuator Models	Operating Time for 90° ⊀ [sec] 50 Hz	Operating Time for 90° ⊀ [sec] 60 Hz	Torque adjustment range [Nm]	Torque adjustment range modulating actuator [Nm]	Max. modulating torque [Nm]	Connection Flange According to DIN EN ISO 5211	Max. bore diameter of output drive V [mm]	Max. width of square bore output drive L/D [mm]	Type of Duty S2 - ... [min]	Type of Duty S4 - ... [% ED]
DPiM(R) 75	8, 16, 24, 34	7, 13, 20, 28	25 – 75	37.5 – 75	37.5	F05 F07 F10*)	28	22	15	35
DPiM(R) 150			50 – 150	75 – 150	75	F05 F07 F10*)	28	22	15	35
DPiM(R) 299			125 – 300	150 – 300	150	F07 F10*)	28	22	15	35
DPiM(R) 300			125 – 300	150 – 300	150	F10 F12*)	38	30	15	35
DPiM(R) 450			250 – 450	225 – 450	225	F10 F12*)	38	30	15	35
DPiM(R) 600	8, 16, 32, 48, 67	7, 13, 26, 40, 56	200 – 600	300 – 600	300	F12 F14*)	50	36	15	35
DPiM(R) 900			500 – 900	450 – 900	450	F12 F14*)	50	36	15	35
DPiM(R) 1200	7**), 18, 36, 55, 75	6, 15, 30, 46, 63	500 – 1,200	600 – 1,200	600	F14 F16*)	60	46	15	35
DPiM(R) 1800			1,000 – 1,800	900 – 1,800	900	F14 F16*)	60	46	15	35

*) On special request.

**) Not available as modulating actuator.

The max. torques given by DIN EN ISO 5211 to each flange size must not be exceeded.

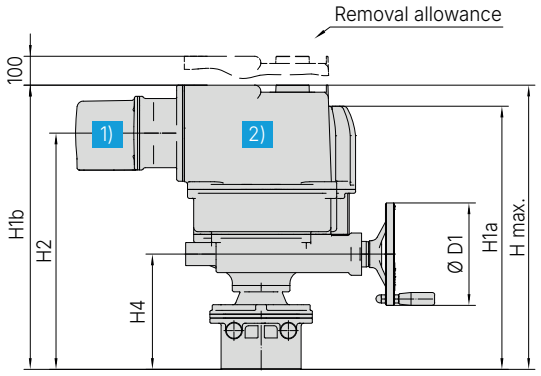
For higher torques please request more information.

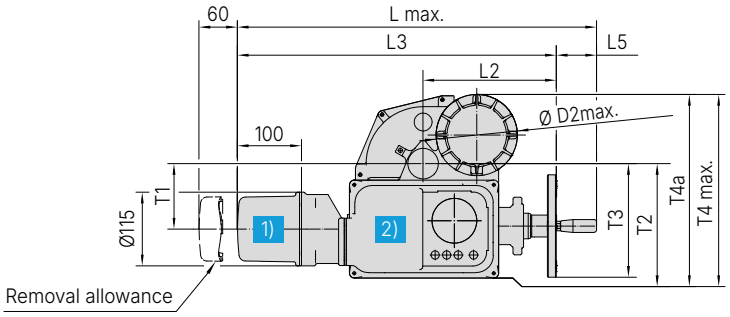
Actuator dimensions

PART-TURN ACTUATOR FOR DPiM

PART-TURN ACTUATOR FOR MODULATING DUTY DPiMR

Actuator Models DPiM(R)	75/150/299	300/450	600/900	1200/1800
Weight [kg]	32	34	40	45
Dimensions [mm]				
L max.	561			
T4 max.	287			
H max.	427	444	463	528
D1	Ø160			
D2 max.	Ø127			
H1a	394	411	430	495
H1b	427	444	463	528
H2	352	369	388	453
H4	163	180	199	264
L2	209			
L3	499			
L5	63			
T1	102			
T2	179			
T3	178			
T4a	287			
IM-unit 2)	408 x 153 x 163 (L x T x H)			





1) Cover for electrical connection S refer to page 13. Options available.

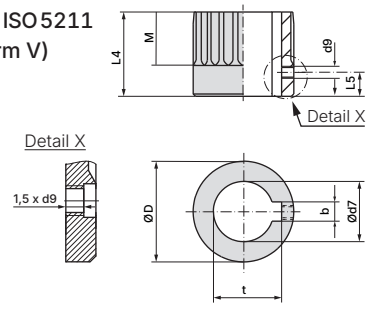
2) Electronic unit (IM-unit) coversize including cover for electrical connection.

Output drive forms

PART-TURN ACTUATOR FOR DPiM

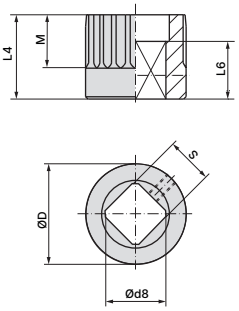
PART-TURN ACTUATOR FOR MODULATING DUTY DPiMR

Bore according to ISO 5211
With keyway (form V)
according to
DIN 6885-1



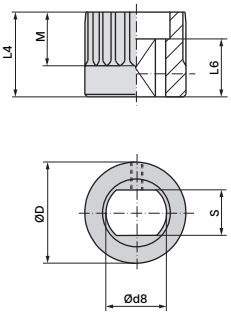
Dimensions	DPiM(R) 75/150		DPiM(R) 299		DPiM(R) 300/450		DPiM(R) 600/900		DPiM(R) 1200/1800	
ISO 5211	F05	F07	F07	F10	F10	F12	F12	F14	F14	F16
Ø D	41.75		41.75		51.75		67.6		81.6	
b JS9[1]	6		6		8		10		14	
Ø d7 H8[2]	18		22		28		36		48	
Ø d7 max.	28		28		38		50		60	
d9[3]	M5		M5		M6		M6		M6	
L4	35		35		45	75	55	95	65	115
L5[3]	8		8		10		10		10	
M	20		20		30		40		47	40
t[1]	20.8		24.8		31.3		39.3		51.8	

Square bore (form L/D)
according to ISO 5211



Dimensions	DPiM(R) 75/150		DPiM(R) 299		DPiM(R) 300/450		DPiM(R) 600/900		DPiM(R) 1200/1800	
ISO 5211	F05	F07	F07	F10	F10	F12	F12	F14	F14	F16
Ø D	41.75		41.75		51.75		67.6		81.6	
Ø d8 min.[2]	18.1		22.2		28.2		36.2		48.2	
Ø d8 max.	28.2		28.2		40.2[2]		48.2		60.2	
L4	35		35	60	45	75	55	95	65	115
L6 min.	30		30		30		30		40	
M	20		20		30		40		47	40
s H11[2]	14		17		22		27		36	
s H11 max.	22		22		30[4]		36		46	

Dihedral bore (form H)
according to ISO 5211

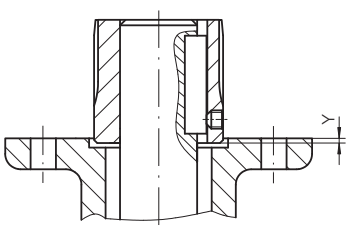


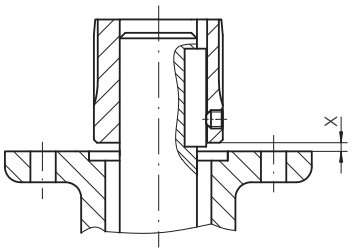
Dimensions	DPiM(R) 75/150		DPiM(R) 299		DPiM(R) 300/450		DPiM(R) 600/900		DPiM(R) 1200/1800	
ISO 5211	F05	F07	F07	F10	F10	F12	F12	F14	F14	F16
Ø D	41.75		41.75		51.75		67.6		81.6	
Ø d8 min.[2]	18.1		22.2		28.2		36.2		48.2	
Ø d8 max.	28.2		28.2		36.2		48.2 (48[5])		60.2	
L4	35		35	60	45	75	55	95	65	115
L6 min.	25		25		25		30		40	
M	20		20		30		40		47	40
s H11[2]	14		17		22		27		36	
s H11 max.	22		22		27		36 (41[5])		46	

Mounting position of coupling

Dimensions	DPiM(R) 75/150/299	DPiM(R) 300/450	DPiM(R) 600/900	DPiM(R) 1200/1800
X max.	3	4	5	8
Y max.	2	5	10	10

[1] Dimensions depend on Ø d7, refer to DIN 6885-1.
[2] Recommended size according to ISO 5211.
[3] Thread with grub screw.
[4] According to DIN 79.
[5] According to DIN 475.





Motor data

PART-TURN ACTUATOR FOR DPiM

PART-TURN ACTUATOR FOR MODULATING DUTY DPiMR

Actuator Models	Operating Time for 90° ⊀ [sec] 50 Hz	Operating Time for 90° ⊀ [sec] 60 Hz	Rated Power 50 Hz[1] [kW]	Rated Power 60 Hz[1] [kW]	Rated Current[2] [A]	Starting Current [A]	cos phi	Eta [%]
DPiM(R) 75	8	7	0.04	0.05	0.18	0.51	0.81	39
	16	13	0.04	0.05	0.18	0.51	0.81	39
	24	20	0.10	0.12	0.49	1.24	0.57	56
	34	28	0.08	0.10	0.61	0.98	0.55	43
DPiM(R) 150	8	7	0.12	0.14	0.53	1.50	0.66	50
	16	13	0.12	0.14	0.53	1.50	0.66	50
	24	20	0.10	0.12	0.49	1.24	0.57	56
	34	28	0.08	0.10	0.61	0.98	0.55	43
DPiM(R) 299	8	7	0.12	0.14	0.53	1.50	0.66	50
	16	13	0.12	0.14	0.53	1.50	0.66	50
	24	20	0.10	0.12	0.49	1.24	0.57	56
	34	28	0.08	0.10	0.61	0.98	0.55	43
DPiM(R) 300	8	7	0.12	0.14	0.53	1.50	0.66	50
	16	13	0.12	0.14	0.53	1.50	0.66	50
	24	20	0.10	0.12	0.49	1.24	0.57	56
	34	28	0.08	0.10	0.61	0.98	0.55	43
DPiM(R) 450	8	7	0.25	0.30	1.10	2.70	0.65	50
	16	13	0.12	0.14	0.53	1.50	0.66	50
	24	20	0.10	0.12	0.49	1.24	0.57	56
	34	28	0.08	0.10	0.61	0.98	0.55	43
DPiM(R) 600	8	7	0.34	0.41	1.10	4.80	0.62	59
	16	13	0.12	0.14	0.53	1.50	0.66	50
	32	26	0.12	0.14	0.53	1.50	0.66	50
	48	40	0.10	0.12	0.49	1.24	0.57	56
	67	56	0.08	0.10	0.61	0.98	0.55	43
DPiM(R) 900	8	7	0.34	0.41	1.10	4.80	0.62	59
	16	13	0.25	0.30	1.10	2.70	0.65	50
	32	26	0.12	0.14	0.53	1.50	0.66	50
	48	40	0.10	0.12	0.49	1.24	0.57	56
	67	56	0.08	0.10	0.61	0.98	0.55	43
DPiM(R) 1200	7[3]	6[3]	0.34	0.41	1.10	4.80	0.62	59
	18	15	0.34	0.41	1.10	4.80	0.62	59
	36	30	0.12	0.14	0.53	1.50	0.66	50
	55	46	0.10	0.12	0.49	1.24	0.57	56
	75	63	0.12	0.14	0.53	1.50	0.66	50
DPiM(R) 1800	7[3]	6[3]	0.75	0.90	2.00	10.00	0.70	59
	18	15	0.34	0.41	1.10	4.80	0.62	59
	36	30	0.12	0.14	0.53	1.50	0.66	50
	55	46	0.10	0.12	0.49	1.24	0.57	56
	75	63	0.12	0.14	0.53	1.50	0.66	50

All shown figures are based on 400 V/3 ph/50 Hz and 480 V/3 ph/60 Hz.

[1] Nominal power P_N: Mechanical power at motor shaft (data on nameplate).

[2] Nominal current I_N: Rated current of the motor (data on nameplate).

[3] Operating time for 90°: No modulating duty available.

Connection dimensions

PART-TURN ACTUATOR FOR DPiM

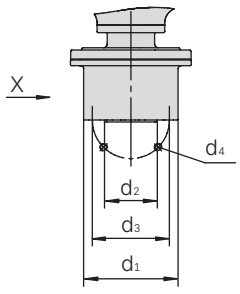
PART-TURN ACTUATOR FOR MODULATING DUTY DPiMR

Actuator Models DPiM(R)	75/150/299			300/450		600/900		1200/1800	
Size DIN EN ISO 5211	F05	F07	F10	F10	F12	F12	F14	F14	F16
Dimensions [mm]									
d_1	90	90	125	125	150	150	175	175	210
d_2 f8	35	55	70	70	85	85	100	100	130
d_3	50	70	102	102	125	125	140	140	165
d_4	M6	M8	M10	M10	M12	M12	M16	M16	M20
d_5	16			16		22		22	
d_6	11			11		14		18	
h*	2.5			2.5		2.5		2.5	
h_1	12			12		16		16	
h_2	110			130		170		180	
threat depth d_4	12	15	16	18	19	22	25	29	32
L max.	40		66	50	82	61	102	75	127
l_6	10			10		16		19	
l_7	40			40		45		45	
l_8	20			20		26		26	
l_9	80			80		90		100	
l_{10}	40			40		45		50	
l_{11}	25			25		30		35	
l_{13}	80			80		110		110	
l_{14}	150			150		190		225	
r_1	150			150		150		150	
r_2	200			200		200		200	
r_3	-			-		250		250	
r_4	218			218		273		273	

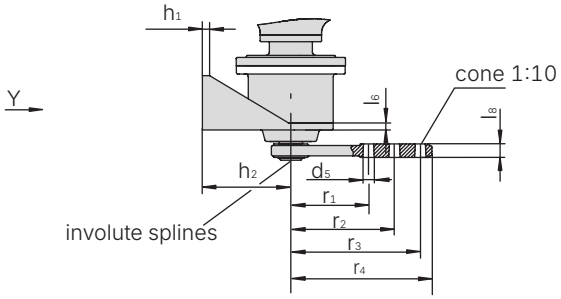
Length unit: mm

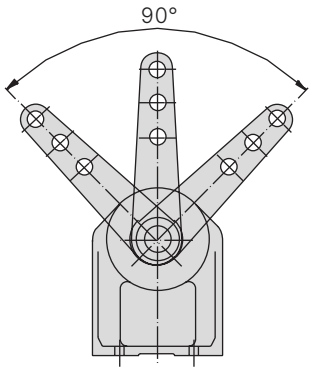
* Allowance for spigot is not available as standard. The spigot ring is a separate component, available as option.

DIRECT MOUNTING

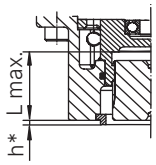


FOOT AND LEVER

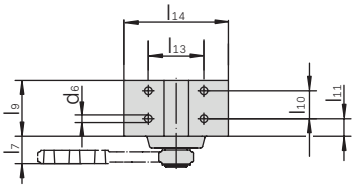




Detail X



Detail Y



DREHMO Compact

The DREHMO Compact is a compact part-turn actuator with intelligent functions and a flexible platform concept for customised automation solutions. It is suitable for butterfly valves and ball valves, covers a wide performance range with just a few sizes, and supports numerous communication technologies for easy system integration. Firmware upgrades enable adaptations to new requirements. Thanks to the compact design, it is ideally suited for space constraints, e.g., in skids.

> Valves are positioned according to the operation commands and setting specifications of the DCS.

> The current valve position is continuously reported back to the DCS and also shown on the display and via the local lamps of the actuator.

> Commands and signals are transmitted via the selected communication technology, either conventionally (via 24 V or 4 – 20 mA signal), serially via fieldbus or Ethernet (as digital data), or via local control.

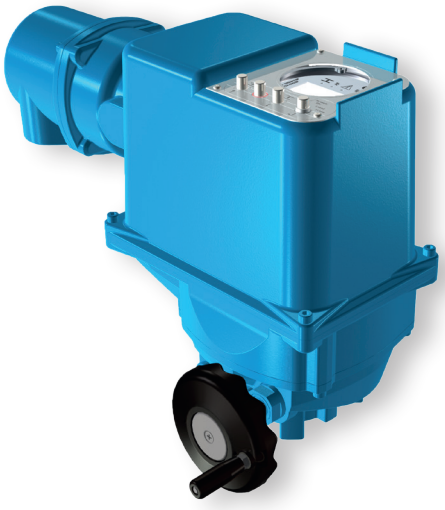
> The part-turn actuator has two independent automatic seating facilities:
- Limit seating: occurs when the end position is reached
- Torque seating: occurs as soon as the torque limit value is reached in the valve. It serves as permanent overload protection and can also be used for conventional tripping in the end position.

> Supports OPEN-CLOSE duty, positioning and modulating duty:
- OPEN-CLOSE valves: approaching the end positions.
- Positioning valves: flow control by approaching the end positions or intermediate positions.
- Modulating valves: flow control via valve position in intermediate positions.

> Functions based on flexible speed enable high positioning accuracy and soft valve management.

> Integrated safety functions ensure predictable valve behavior even in the event of operational deviations, e.g., signal failure.

> A handwheel is available for emergency operation in the case of power failure and also facilitates adjustment of the device during commissioning.



SUSTAINABLE & RELIABLE

DREHMO Compact part-turn actuators are reliable, economical, low-maintenance, and future-proof. Efficient energy use is ensured by low standby consumption and premium efficiency. High availability is achieved through predictive maintenance. Potential malfunctions are detected early via the diagnostic function, which helps with rapid fault analysis and troubleshooting.

The part-turn actuators are engineered and made entirely in Germany, ensuring the highest quality and a long lifetime. The robust metal housing makes for a durable design. Combined with C5-M or C5-I corrosion protection according to EN ISO 12944-2, the part-turn actuators work even under tough conditions. Thanks to their IP68 protection class and a permissible temperature range of –30 °C to +70 °C, DREHMO Compact part-turn actuators can be used in all types of process engineering systems, both indoors and outdoors, even in climatically demanding environments.

UNDERSTANDABLE

Installation and commissioning of the part-turn actuator is simple and can be carried out with minimal effort. It can be adjusted and parameterised using the push buttons (depending on the version, via the magnetic pen operation) on the local control panel without opening the housing. The clearly structured menu navigation allows the setting values to be easily adapted to the valve. Each DREHMO Compact has a Bluetooth interface that can be used to connect the part-turn actuator to our “i-matic Explorer 3” software tool on a PC or mobile device. This allows all data to be read out, parameters to be set, and the firmware to be downloaded.

FLEXIBLE

The operating speed can be selected in 8 (10) steps for each step of the stroke. This enables precise positioning of the part-turn actuator. The end positions are softly approached which reduces the mechanical load and increase the lifetime.

DREHMO Compact actuators are equipped with a wide range power supply unit for 220/230 V 1-phase AC and 230 – 500 V 3-phase AC/50 – 60 Hz. The power supply unit has been specifically developed for the operation of the BLDC motor within the actuator. The power supply unit has a continuous nominal power of 60 W and a special short-time boost of 120 W.

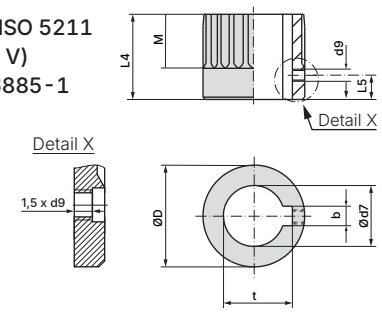
UNIVERSAL

The DREHMO Compact enables the automation of all part-turn valves, such as butterfly valves or ball valves. A homogeneous operating concept ensures simple and safe handling. The actuator system covers a wide range of performance with only three sizes, making it a solution for a huge variety of applications.

Output drive forms

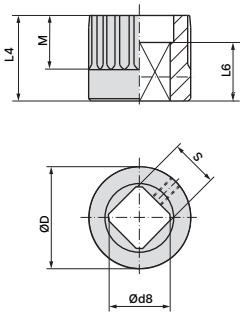
PART-TURN ACTUATOR FOR DREHMO COMPACT

Bore according to ISO 5211
with keyway (form V)
according to DIN 6885-1



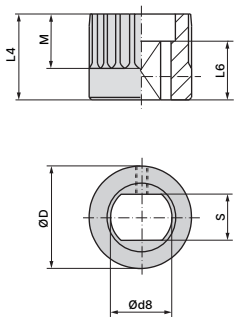
Dimensions	DPiM 151	DPiM 301	DPiM 601
ISO 5211	F05/F07/F10	F07/F10	F07/F10
ØD	31.75	51.75	51.75
b JS9[1]	according to DIN 6885-1		
Ød7 max.	20	38	38
d9[2]	M4	M6	M6
L4	35	45	45
L5[2]	8	10	10
M[4]	20	30	30
t[1]	according to DIN 6885-1		

Square bore (form L/D)
according to ISO 5211



Dimensions	DPiM 151	DPiM 301	DPiM 601
ISO 5211	F05/F07/F10	F07/F10	F07/F10
ØD	31.75	51.75	51.75
Ød8 max.	22.2	40.2[3]	40.2[3]
L4	35	45	45
L6 min.	30	30	30
M[4]	20	30	30
s H11 max.	17	30[3]	30[3]

Dihedral bore (form H)
according to ISO 5211

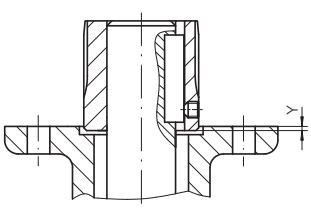


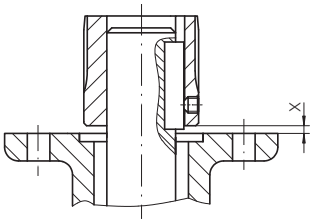
Dimensions	DPiM 151	DPiM 301	DPiM 601
ISO 5211	F05/F07/F10	F07/F10	F07/F10
ØD	31.75	51.75	51.75
Ød8 max.	22.2	36.2	36.2
L4	35	45	45
L6 min.	25	25	25
M[4]	20	30	30
s H11 max.	17	27	27

Mounting position of coupling

Dimensions	DPiM 151	DPiM 301	DPiM 601
X max.	3	4.5	4.5
Y max.	2	4.5	4.5

[1] Dimensions depend on Ø d7, refer to DIN 6885-1.
[2] Thread with grub screw.
[3] According to DIN 79.
[4] Usable length of splines.





Electrical Data

PART-TURN ACTUATOR FOR DREHMO COMPACT

Actuator Model DPiM	Operating time for 90°[1]	Torque range[2]	Modulating torque[3]	Power P_N[4]	Nominal current[5]	Max. current[6]	Nominal current[5]	Max. current[6]
	[Seconds]	[Nm]	Max. [Nm]	[W]	@400 V [A]		@380 V [A]	
151	8 – 80	60 – 150	75	52	0.24	0.48	0.25	0.5
301	22 – 160	120 – 300	150	44	0.18	0.38	0.19	0.4
601	45 – 320	240 – 600	300	51	0.24	0.38	0.25	0.4

[1] The values for operating times refer to an operation across 90° of travel at a load of 70 % of the maximum torque.
[2] Adjustable tripping torque.
[3] Maximum permissible torque for modulating duty S4 - 50 %.
[4] Effective power consumed by the actuator at 35 % of maximum torque.
[5] Nominal current at 35 % of maximum torque and shortest possible operating time.
[6] Current at maximum torque and shortest possible operating time.

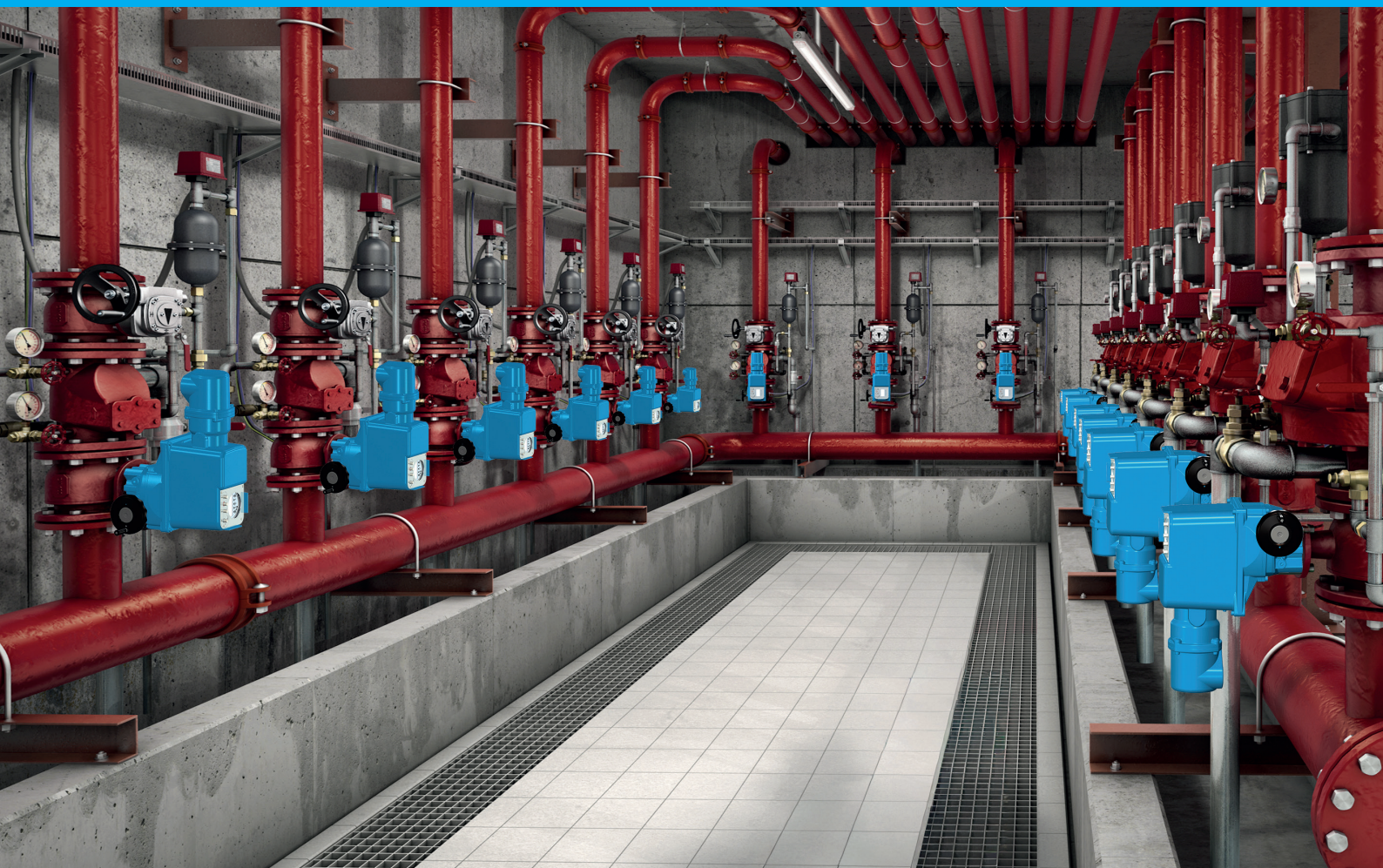
NOTES ON INSTALLATION AND SIZING

Motor data

> Motor data is approximate.
> Due to usual manufacturing tolerances, there may be deviations from the values given.

Mains voltage, mains frequency

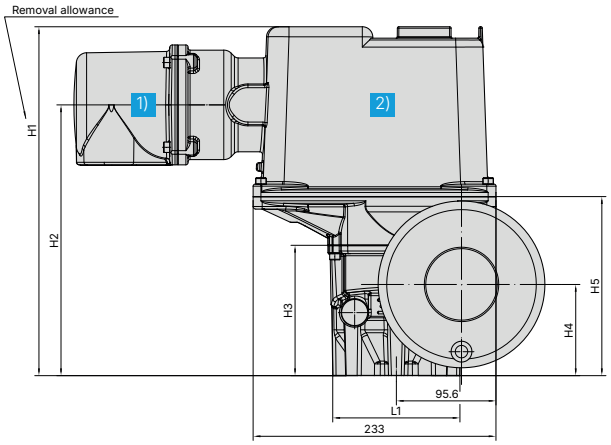
> 220/230 V 1-phase AC and 230 – 500 V 3-phase AC/50 – 60 Hz
> Permissible variation of mains voltage: ±10 %
> Permissible variation of mains frequency: ±5 %

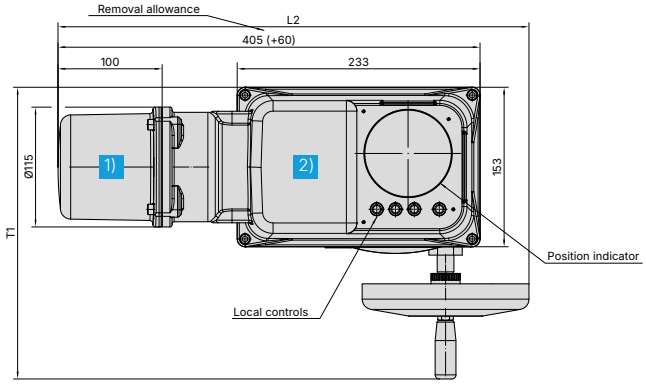


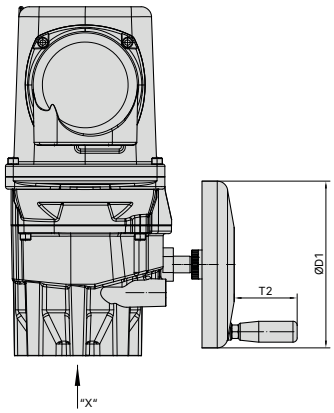
Actuator Dimensions

PART-TURN ACTUATOR FOR DREHMO COMPACT

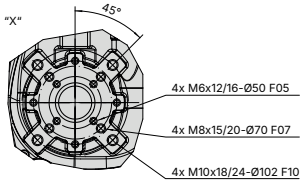
Actuator Model DPiM	151	301	601
Weight [kg]	10	12	13
Dimensions [mm]			
H1	299 (+90)	335 (+90)	335 (+90)
H2	224	260	260
H3	89.3	125.1	125.1
H4	57.2	87.5	87.5
H5	135.7	171.8	171.8
L1	98	122	122
L2	409	452	452
T1	253	280	280
T2	47	60.3	60.3
ØD1	Ø100	Ø160	Ø160
IM-unit 2)	408 x 153 x 163 (L x T x H)		



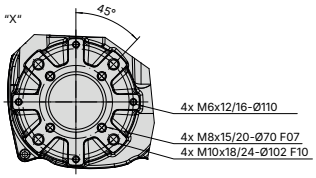




DPiM 151



DPiM 301/601



1) Plug for electrical connection. Options available.

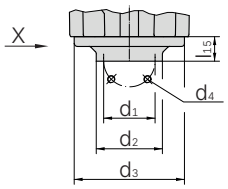
2) Electronic unit (IM-unit) coversize including plug for electrical connection.

Connection dimensions

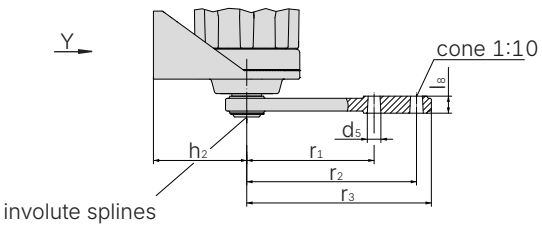
PART-TURN ACTUATOR FOR DREHMO COMPACT

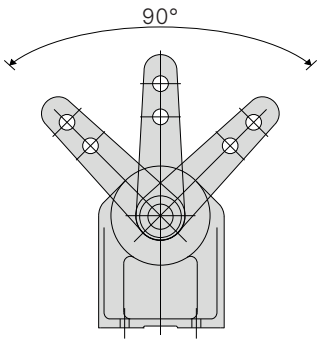
Actuator Model DPiM	151	301	601
Size DIN EN ISO 5211	F05/F07/F10	F07/F10	F07/F10
Dimensions [mm]			
d_1	Ø42	-	-
d_2 f8	Ø54	-	-
d_3	Ø90	-	-
d_4	M5	-	-
d_5	Ø16	Ø16	Ø16
d_6	Ø11	Ø11	Ø11
h_2	110	110	110
threat depth d_4	10	-	-
l_8	20	20	20
l_9	80	80	80
l_{10}	40	40	40
l_{11}	25	25	25
l_{13}	80	80	80
l_{14}	150	150	150
l_{15}	20	-	-
r_1	150	150	150
r_2	200	200	200
r_3	218	218	218

DIRECT MOUNTING

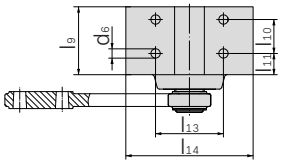


FOOT AND LEVER





Detail Y



Output speeds

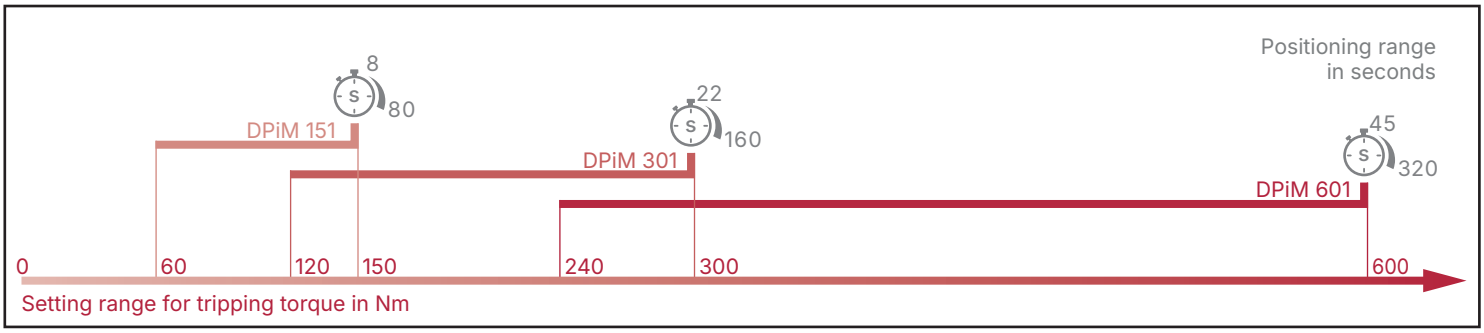
PART-TURN ACTUATOR FOR DREHMO COMPACT

DPiM 151								
Time/90° [s]	8	11	16	22	32	63	72	80
Nominal target speed [rpm/min]	3,162	2,300	1,581	1,150	791	402	351	316

DPiM 301								
Time/90° [s]	22	45	63	72	90	125	150	160
Nominal target speed [rpm/min]	3,072	1,502	1,073	939	751	541	451	422

DPiM 601										
Time/90° [s]	45	63	72	90	125	150	180	210	250	320
Nominal target speed [rpm/min]	3,091	2,208	1,932	1,546	1,113	927	773	662	556	435

Nominal target speed of the motor required to achieve the operating time or the output speed.



Mechanical Data

PART-TURN ACTUATOR FOR DREHMO COMPACT

Actuator Model DPiM	Operating times for 90° in seconds[1] (selection of 8 levels)[2]	Torque range[3]	Modulating torque[4]	Valve attachment	Valve shaft			Handwheel		Weight[5]
		Max. [Nm]	Max. [Nm]	Standard EN ISO 5211	Cylindrical Max. [mm]	Square Max. [mm]	Two-flat Max. [mm]	Ø [mm]	Turns for 90°	approx. [kg]
151	8 – 80	60 – 150	75	F05/F07/F10	20	17	17	100	20.2	10
301	22 – 160	120 – 300	150	F07/F10	38	30	27	160	16.3	12
601	45 – 320	240 – 600	300	F07/F10	38	30	27	160	16.3	13

[1] The values for operating times refer to an operation across 90° of travel at a load of 70 % of the maximum torque. Operating times without considering soft start/soft stop. Soft start/soft stop is preselected for the factory setting.

[2] Operating times can be selected in 8 (10) levels when placing the order. Otherwise, the fastest speed is selected as default value in the factory. Settable via Bluetooth in steps of 1 % within the range.

[3] The tripping torque is adjustable for directions OPEN and CLOSE within the indicated torque range. The „Torque bypass" function (can be activated) allows increasing the pre-set tripping torque to 127 % (unseating torque). This increase only applies during actuator start for an adjustable time period. This allows unseating blocked valves.

[4] Maximum permissible torque for modulating duty. The values from the „Torque range" column still apply as tripping torques.

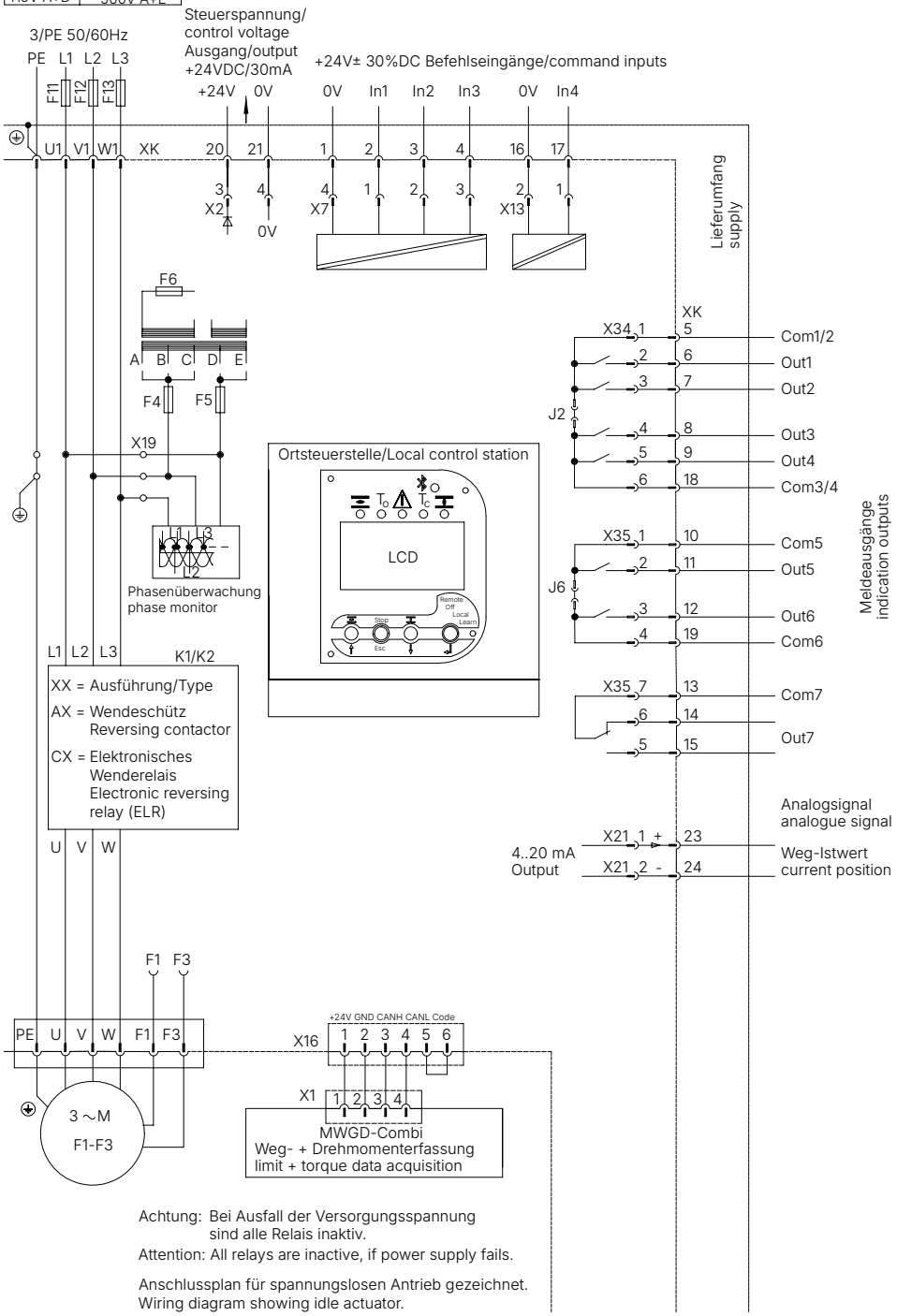
[5] Specified weight includes part-turn actuator, S100 connector, unbored coupling and handwheel.

Wiring diagrams

WIRING DIAGRAM VERSION IMC003 FOR INCHING DUTY

380V C+D	440/460V C+E
400V B+D	480V B+E
415V A+D	500V A+E

Befehlsein- und Meldeausgänge frei programmierbar (Werkseinstellung siehe Konfigurationsliste)
command inputs and indication outputs are free programmable (factory setting acc. to configuration list)



Achtung: Bei Ausfall der Versorgungsspannung sind alle Relais inaktiv.
Attention: All relays are inactive, if power supply fails.

Anschlussplan für spannungslosen Antrieb gezeichnet.
Wiring diagram showing idle actuator.

In1:	Stop
In2:	Close
In3:	Open
In4:	Automatic (at IMC003 "free")

Out1:	Position close(d)
Out2:	Position open
Out3:	Closing torque
Out4:	Opening torque
Out5:	Remote control
Out6:	Local control
Out7:	Operational OK (Available)

Specification

TYPES: DiM 30 ... DiM 2000, DPiM 75 ... DPiM 1800

BASIC VERSION

> **Valve attachment:** According to EN ISO 5210 or DIN 3210, EN ISO 5211
> **Mains voltage:** 380, 400, 415, 440, 460, 500 V at 50 Hz/60 Hz
> **Motor:** DREHMO 3-phase AC squirrel cage motor, insulation class F, 3 thermoswitches
> **Type of duty:** Short-time duty S2 - max. 15 min
> **Actuator self-locking**
> **Control unit:** Combined sensor for position and torque sensing
> **Controls**
- **Switchgear:** Reversing contactors (mechanically and electrically locked)
- **I/O interface:** Control signals (programmable, potential-free) 24 V DC, 3 + 1 potential-free and freely programmable command inputs
  Status indication (programmable, potential-free): 2 + 2 + 1 + 1 NO contacts and 1 change-over contact
  analogue position indication 4 – 20 mA

> **Local Controls**
- **Operation:** 4 multifunction push buttons, Modes: LOCAL - OFF - REMOTE - LEARN
  Menu Navigation: UP, ESCAPE, DOWN, ENTER, (lockable)
  Operation: OPEN - STOP - CLOSE
- **Indication lights:** 6 indication lights (colour coding programmable for 5): End position CLOSED, torque fault CLOSE, fault, torque fault OPEN, end position OPEN, Bluetooth® (blue)

> **Output drive:** for valve connection acc. to DIN EN ISO 5210 respectively DIN EN ISO 5211
> **Interface:** Bluetooth®
> **Display:** Graphical LC-Display 200 x 100 Pixel
> **Wiring diagramm:** iMC003-XX-AA-XA0/1001
> **Enclosure protection:** IP68 according to IEC 605293
> **Ambient temperature:** –25 °C to +70 °C
> **Corrosion protection:** K3
> **Colour:** RAL 5015/sky blue
> **Handwheel:** Handwheel for manual operation/without switch-over mechanism
> **Electrical connection:** plug/socket connector with screw-type connection

OPTIONS

> Mains voltage 1-phase AC or DC
> Various mains voltage options 110 V – 690 V, 3-phases AC, 50/60 Hz
> Integrated fieldbus interface Profibus DP, DP-V1, DP-V2, Modbus RTU, Modbus TCP/IP, Profinet, HART
> Solid-state relays for motors up to 6 kW
> Fieldbus redundancy; fibre optics interface
> Corrosion protection K4 (C4 according to EN ISO 12944-2) for aggressive atmospheres
> Corrosion protection K5 (C5 according to EN ISO 12944-2) for extremely aggressive atmospheres
> Plug/socket connector with different threaded holes
> Compact plug connector (with industrial power and control connectors)
> Detached control
> Various protection means
> Accumulator for control power supply
> Torque and limit switch unit in combination with detached control
> Enhanced temperature ranges in between –50 °C to +100 °C

Notes

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