



INSTALLATION, SERVICE AND MAINTENANCE INSTRUCTIONS



Electric part-turn actuators MPR 52 220

TEST CERTIFICATE

ELECTRIC PART-TURN ACTUATOR MPR 52 220	
Type number 52 220	Power supply V Hz
Serial number	Rated torque..... Nm
Production year	Switching-off torque Nm
Wiring diagram	Operating time s/90°
.....	Operating angle °
Warranty period months	Transmitter (potentiometer)
Serial number of electric motor	
Serial number of transmitter	
Serial number of position controller	
Tests made in accordance with TPF 18 – 03 – 172/81/2	
Tests made by	Packed by
Date	Signature and stamp

COMPLETENESS CERTIFICATE

Used valve	
Assembled by: Firm	
Name.....	
Warranty period months	
Date	Signature and stamp.....

INSTALLATION CERTIFICATE

Location	
Installed by: Firm	
Name	
Warranty period..... months	
Date	Signature and stamp.....

*Please read these instructions carefully before mounting and operating
the actuator.*

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The Installation, Service and Maintenance Instructions are drawn up according to requirements of EC Executive Nr. 2006/42/EC "Uniform requirements for machines and devices from the point of view of safety and health care", to save life and health of users and to avoid material damages and exposure environment to danger.

1. General data

1.1 Purpose and applications

Electric part-turn actuators (hereafter referred to as EA), types **MPR 52 220** are high performance electro-mechanical products, designed for direct assembly on controlled devices (wedge-type and apron slide controllers and other equipments). EA are designed for remote control of armatures by reversing rotary motion in both directions of their movement. They are equipped by measuring and technological processes controlling means; the information carrier on their input and/or output is unified analogue direct current, or voltage signal. They can be used in heating, energy, gas, air-conditioning and other technological systems, which they are suitable for, regarding their features. They are connected with controlled devices with a lever



Switching of actuator by a semiconductor switches have to be consulted with producer
It is forbidden to use EA as a lifting mechanism!

1.2 Safety instructions



EA of MPR are reserved technical devices with higher rate of danger, with possibility of installation in areas specially danger regarding casualties caused by electric current.

Electric actuators are according to directive LVD 2006/95/EC and standard EN/IEC 61010-1 within valid edition assigned for installation category II (overvoltage category).

Product influence to environment

Electromagnetic compatibility (EMC): the product complies with the requirements of the Directive 2004/108/EC of the European Parliament and of the Council on the approximation of the laws the Member States relating to the electromagnetic compatibility and with the requirements of standards as well EN/IEC 61000-6-4+A1, EN/IEC 61000-6-2, EN/IEC 61000-3-2 and EN/IEC 61000-3-3 within valid edition.

Vibrations caused by the product: product influence is negligible

Noise produced by the product: The maximum allowable noise level (A) of the product measured in a place of operation is 78 dB (A).

Requirements for professional qualification of people performing installation, service and maintenance



Electric connection can be performed only by an acquainted person, i.e. an electrical engineer with professional education of electrical engineering at an apprentice school or a technical school (secondary, complete secondary or university education) and whose qualification was verified by an educational facility authorised to verify professional qualification.

Instructions for stuff training



Service can be performed only by workers professionally qualified and trained by the producer or contracted service centre.

Warning for safety use

Product protection

EA MPR does not have its own protection against a short-circuit therefore feeding voltage supply must include a breaker or a fuse which is also used as a master switch.

Type of equipment from a connection point of view: The equipment is designed for permanent connection.

1.3 Guarantee terms

The supplier is responsible for completeness of the delivery and guarantees these specifications of the product which are stated in Technical conditions (TP) or specifications agreed in the Contract.

The supplier is not responsible for any deterioration of parameters caused by the customer during storage, unauthorised installation or improper operation.

1.4 Under-guarantee and after-guarantee service

Our customers are provided with professional service of our firm in installation, operation, service, maintenance, revision and help in troubleshooting for all our products.

Trained professionals wait for you also in our contracted service centres.

Under-guarantee service is performed by the service department of the production plant, or by a contracted service centre according to a written claim.

In case of occurring of any fault please let us know it and state:

- basic data from nameplate: type code and serial number
- type of fault - description of claimed fault (actuator employment, ambient parameters (temperature, humidity...), duty cycle including frequency of switching, type of switching-off (position or torque), set switching-off torque)
- it is recommended to place also Installation certificate.

It is recommended to have **after-guarantee service** performed by the service department of the production plant, or by a contracted service centre.

1.5 Operation Conditions

1.5.1 Location of the Products and Operation Position

The assembly and operation of electric actuators in standard make can be on covered places of industrial objects without the regulation of temperature, humidity and with protection against direct exposure of climate influence (e.g. direct sun shine,).

Installation and operation of actuators is possible in either position. Common position is the one with vertical position of exit part axis and control box above.



Warning:

When the EA is installed in open air, it must be sheltered lightly to protect it against direct effects of atmosphere. When installed in the areas with relative humidity more than 80%, in open air under a shelter and in tropic environment it is needed to connect the space heater directly – without a thermal switch.

1.6 Operation Environment

According to valid standard IEC 60 721-2-1, there are delivered these versions of electric actuators:

- 1) Version „temperate“ for climate temperate
- 2) Version „tropical“ for climate tropical.

In accordance with IEC 60 364-1, IEC 60 364-5-51 and IEC 60 364-5-55 within valid edition the EA have to resist external effects and operate reliably:

In the conditions of the following types of environment:

- mild to hot dry with temperature in range -25°C to $+55^{\circ}\text{C}$ **AA 7***
- dry up to humid with temperature -25°C up to $+55^{\circ}\text{C}$ (MWDr/WDa) **AA 7***

in industrial environment: at temperatures stated above

- with relative humidity 5 to 100 %, with occasional condensation, with max. contain of water 0,028 kg/kg of dry air, with temperatures stated above **AB 7***
- with height above sea level 2 000 m, with barometric pressure range 86 to 108 kPa **AC 1***
- with spraying or jet water from all directions–(protection enclosure IP x5) **AD 5***
- with strong dustiness – with a possibility of influences of inflammable, non-conducted and non-explosive dust; the middle layer of dust; the dust drop more than 35 but not more than 350 mg/m² per day (products with protection enclosure of IP 5x) **AE 5***
- with strong dustiness – with a possibility of influences of inflammable, non-conducted and non-explosive dust; the middle layer of dust; the dust drop more than 350 but not more than 1000 mg/m² per day (products with protection enclosure of IP 6x) **AE 6***
- with atmospheric occurrence of corrosive and pollution media (with high degree of atmosphere corrosive aggressiveness); important presence of corrosive pollution **AF 2***
- with a possibility of influences of mechanical stress:
 - medium sinusoid vibrations with frequency in range 10 up to 150 Hz, with shift amplitude of 0,15 mm for $f < f_p$ and acceleration amplitude 19,6 m/s² for $f > f_p$; (transition frequency f_p is from 57 up to 62 Hz) **AH 2***
 - medium impacts, shocks and vibrations **AG 2***
- with serious danger of plants and moulds growing **AK 2***
- with serious danger of animals occurrence (insects, birds, small animals) **AL 2***
- with detrimental influence of radiation:
 - of stray current with intensity of magnetic field (direct and alternating of power supply frequency) to 400 A.m⁻¹ **AM 2-2***
 - of sun radiation with intensity > 500 a ≤ 700 W/m² **AN 2***
- with effects of medium seismic activity with acceleration > 300 Gal ≤ 600 Gal **AP 3***
- with indirect danger of storm activity **AQ 2***
- with fast moving of air and strong winds **AR 3***, **AS 3***
 - with the ability of expert persons :
- with frequent contacts of persons with ground potential (persons frequently touching conductive parts, or staying on conductive base) **BC 3***
- with the explosion risk of flammable gasses and vapours **BE 1***

* Marking in accordance with IEC 60364-1, IEC 60 364-5-51 and IEC 60 364-5-55 within valid edition

1.6.1 Power Supply and Duty cycle

Power supply:

Electric motor.....	230 V AC $\pm 10\%$
control	230 V AC $\pm 10\%$
Position transmitter.....	see chapter 1.8
Frequency of power supply	50/60* Hz $\pm 2\%$

* At frequency of 60Hz the operating time is 1,2 times reduced.

Duty cycle (according to EN (IEC) 60034-1.8):

EA MPR 52 220 are designed for **remote control**:

- short-time operation **S2-10 min**
- intermitted operation **S4-25%, 6 up to 90 cycles per hour**

EA MPR 52 220 with controller are designed for **automatic regulation**:

- intermitted operation **S4-25%, 90 up to 1200 cycles per hour**

1.7 Description of the Actuator

The actuators MPR consist of the following modules:

Module M1 – an electric motor

Module M22 – a countershaft box

Module M3 – a gearbox with a manual control mechanism

Module M4 – a control box

Module M8 – a linear adapter

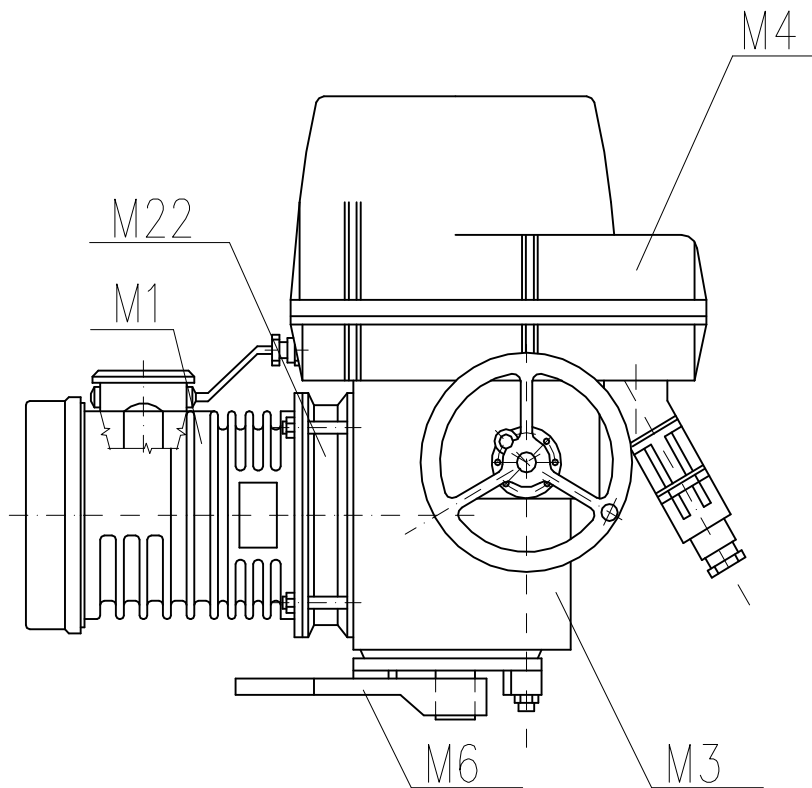


Fig.1

Module M 1 – electric motor

Special two-phase asynchronous electromotor for permanent operation of J9A10 type short run. The electromotor is equipped by electromagnetic brake and in working field has almost linear characteristic.

Module M22 – a countershaft box

It provides reduction of output speed of the electrical motor to a given gear value. The countershaft box consist of six pairs of meshing helical gear wheels and it is ended with a conical pinion meshing a conical wheel of a power gear of the module M3.

Module M3 – a gearbox with a manual control mechanism (Fig.2)

The gear train is located in the box (1). The gears are placed on the output shaft (3) and they make up an independent assembly set. The rim (44) with internal teeth provides gearing between the pinion of the electrical motor and the output shaft. The worm (2) designed for torque taking down and manual control is seated in the upper part. The resetting is made with the hand wheel (4). The worm is then sprung and the power caused by torque of the output moves the worm shaft axially against spring power. The movement of the worm is taking off by a fork and a pin through shafts (45) leading to the control box. The movement of the worm is measure of the torque. The fork meshes with the groove circumference to allow rotary movement of hand wheel it means its rotary movement in every position.

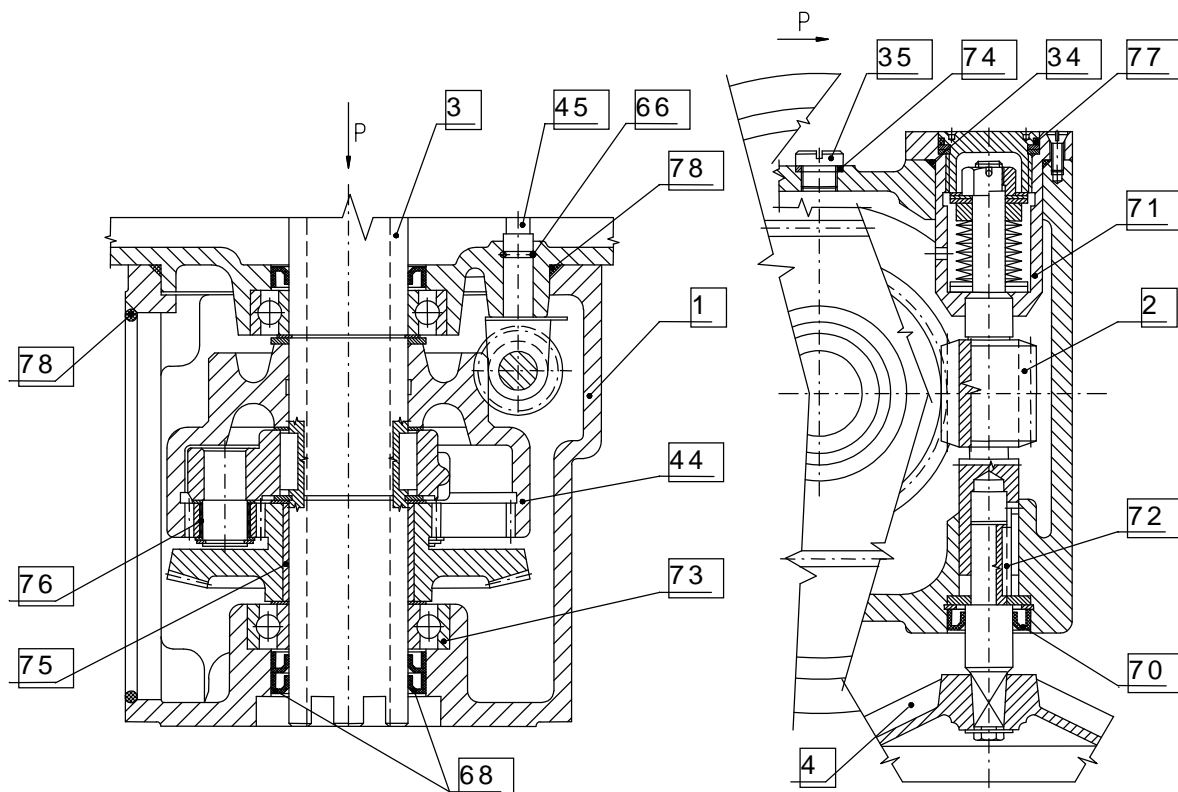


Fig.2

Module M 4 – control box (fig. 3) – a make with capacitive transmitter

Located in upper part of electric actuator. On the mounting base (46) closing a gear-box (1) are attached following functional units:

- Position unit (fig.4)
- Transmission unit (fig.5)
- Torque unit (fig.8)
- Heating resistor

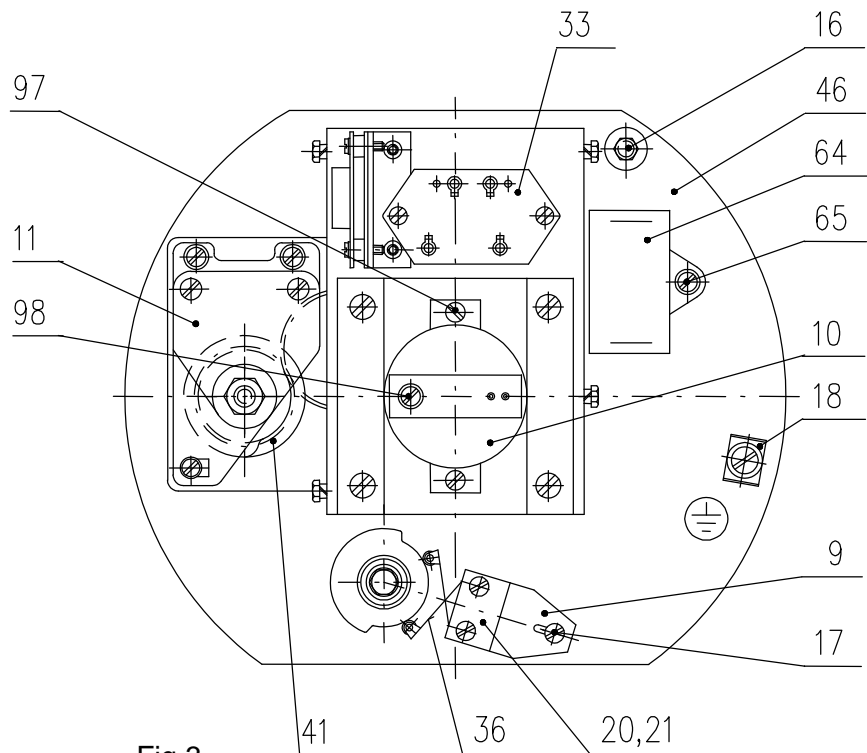


Fig.3

Position unit (4)

After loosen a nut of the position unit (51) is possible to rotate (53),(54),(56),(57). The construction of position unit is designed so that transforming one of the cams, it does not disturb the others. After adjusting the position unit is needed to tight the nut (51).

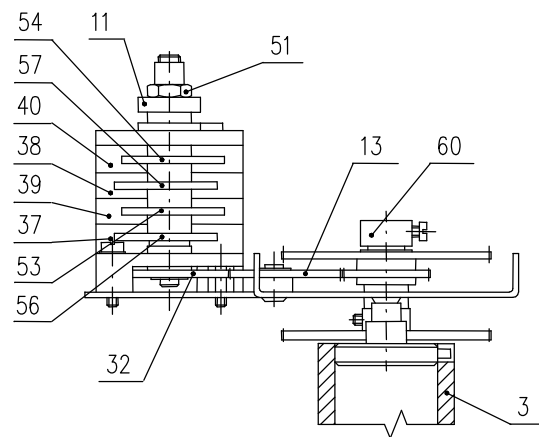


Fig. 4

Transmitter unit (Fig. 5)

The unit is derived from the gear unit. Gear wheels (43a), (43b), (43c) and (43d) and the transmitter joint (60) make up a module. Rotary movement from the gears to the transmitter is transferred via the clutch after tightening of the screw (50).

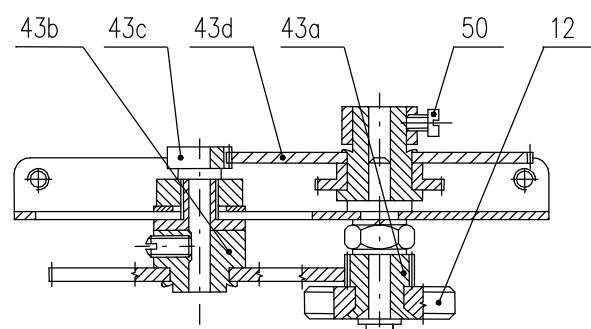


Fig.5

Module M 4 – control box (fig. 6) – a make with resistive transmitter

Located in upper part of electric actuator. On the mounting base (46) closing a gear-box (1) are attached following functional units:

- Position unit (fig.4)
- Transmission unit (fig.5)
- Torque unit (fig.8)
- Heating resistor

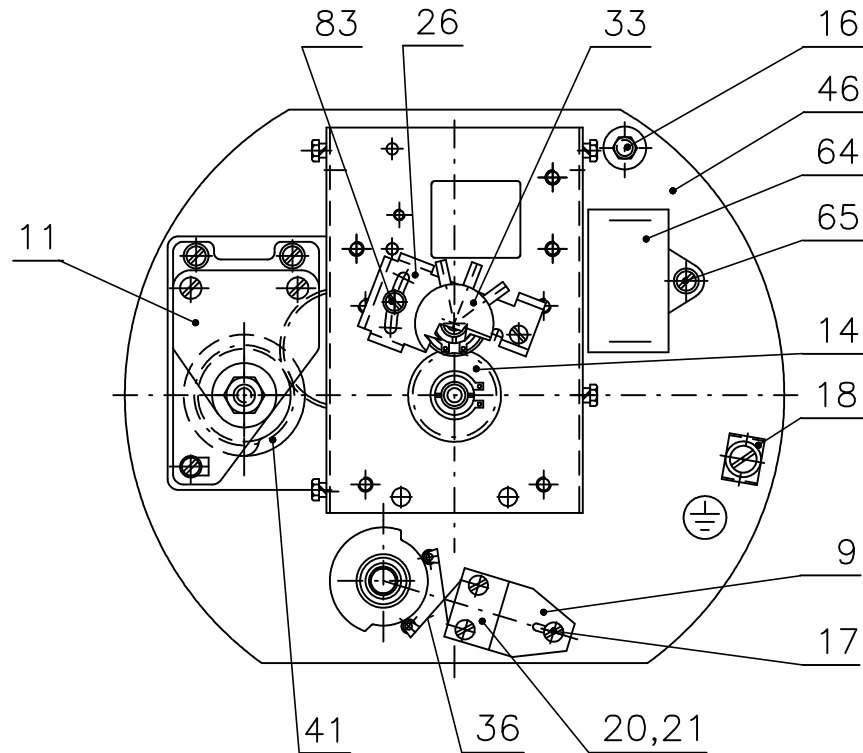


fig.6

Torque switch unit consists (Fig.8)

of the following parts:

Switch element (9) (Fig 3) is formed by two micro-switches S1 and S2. It is put into operation after loosening of the screw (17)

Cam unit (Fig.8) is formed by two adjustable cams (19) and (22) placed on the shaft of the torque control element (45) Fig.2). The cams are turned according to the set switch-off force.

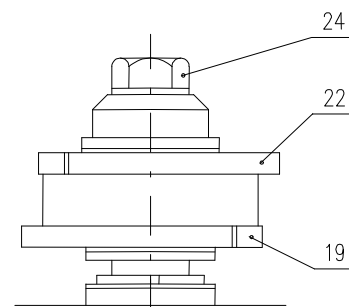


Fig. 8

The space heater

The actuator is equipped with two parallel space heaters(16)(Fig.3,6) with total power output 20W. Connection of the space heater is conditional by operation environment.

Electric connection can be either to terminal board, or to sliding connection -jack.

Module M6 – lever mechanism

The lever mechanism is made up with the flange with a groove (27), where a slider (32) with a screw (28) carries the stop ends (29). The flange (27) is screwed onto the actuator box (1) penetrated output a shaft and on its free end the lever (30) is mounted.

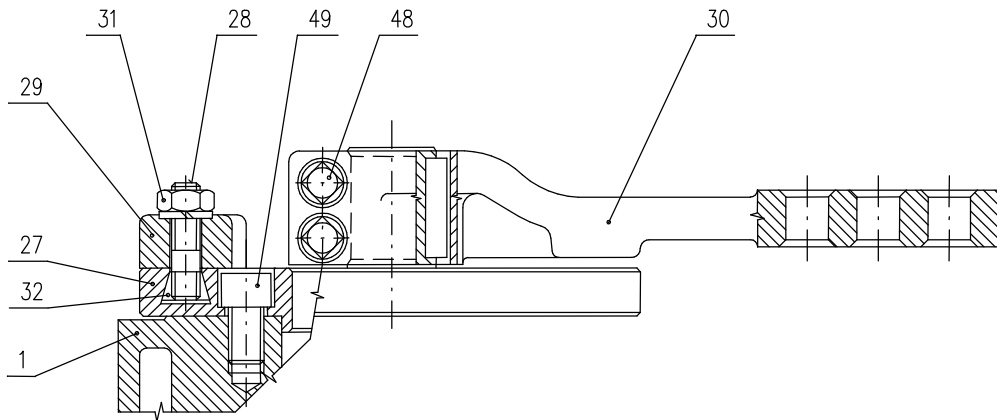


Fig.9

1.8 Technical data of actuator

The basic technical data of actuator are given in the table 1.

Basic Specifications

Table No.1

Type/ type number	Operating time [%]	Operating angle $\pm 1^\circ$	Switching-off torque ⁵⁾⁶⁾ ± 10 [%]	Weight	Electric motor ¹⁾				
					Supply voltage.	Power output	Speed	Current	
	[s/90°]	[°]	[Nm]	[kg]		[V] $\pm 10\%$	[W]	[1/min]	[A]
1	2	3	6	7	8	9	10	11	12
MPR Type No. 52 220	32	60 ÷ 160	63 - 125	cca 32,5 - 34	Single-phase	230	16	138	0,31
	16		40 - 100						
	8		25 - 63						

1) Switching elements for different type of load (also for EA) defines standard EN (IEC) 60 947-4-1.
 5) State the switching-off torque in your order by words. If not stated it is adjusted to the maximum rate of the corresponding range. The load torque equals minimally the maximum switching-off torque of the choosing range multiplied by 1.3.
 6) The maximum load torque equals the max. switching-off torque multiplied by:
 0,8 for duty cycle S2-10 min, or S4-25%, 6-90 cycles per hour
 0,6 for duty cycle S4-25%, 90-1200 cycles per hour

Other technical data:

Protection enclosure of EA:..... **IP 67** ((EN (IEC) 60 529))

Mechanical ruggedness:

sinusoid vibrations with frequency in range from 10 up to 150 Hz,
 with shift amplitude of 0.15 mm for $f < f_p$
 with acceleration amplitude of 19.6 m/s² for $f > f_p$
 (transition frequency f_p is from 57 up to 62 Hz)

drop resistance:..... 300 drops with acceleration 5 m.s-2

Self-locking: guaranteed within 0% till 100% switching – off torque

Switching-off: DB 6 (Cherry)

Switching-off voltage 250V(AC), 50/60 Hz, 2A or 250V (DC); 0.1A

Space heater (E1)

Space heater - supply voltage: corresponding with motor supply voltage (max. 250 V AC)

Space heater power output: max. 20 W / 55 °C

Thermal switch of space heater (F2)

Supply voltage: corresponding with motor supply voltage (max. 250V AC)
 Switching-on temperature: +20°C ± 3°C
 Switching-off temperature: +30°C ± 4°C

Adjustment of the positions switches

The end position of switches operating angle ±1°
 Additional position switches 5° in front of the end position

Adjustment of the torque switches:

If other adjustment not specified the switching torque is set to the maximum value with tolerance of ±15 %.

Position transmitter**Resistive – potentiometer:**

Resistance (single B1): 100 Ω, 2000 Ω
 Resistance (double B2): 2x100 Ω, 2x2000 Ω
 Operating life of transmitter 1.10⁶ cycles
 Load capacity: 0,5 W do 40°C, (0 W/125°C)
 Maximum current of sliding contact max. 35 mA
 Maximum supply voltage: $\sqrt{P \times R}$ V DC/AC
 Potentiometer linearity error: ±1.5 [%]1)
 Potentiometer hysteresis: max. 1.5 [%]1)
 Output signal values at limit positions: "O" (open) ≥93%, "Z" (closed) ≤ 5%

Capacitive (B3): non-contact, life 10⁸ cycles

2-wire connection with power supply or without power supply

The current signal **4 ÷ 20 mA** (DC) is acquired from the capacitive transmitter supplied from the internal or an external voltage supply source. The electronics of the transmitter is protected against eventual wrong polarity and current overloading. The entire transmitter is galvanic insulated so several transmitters can be connected to one external voltage source.

Power supply voltage (with power supply) 24 V DC
 Power supply voltage (without power supply) 18 to 28 V DC
 Ripple voltage max. 5%
 Max power input 0,6 W
 Load resistance 0 to 500 Ω
 Load resistance can be single side grounded.
 Influence of resistance on output current 0,02%/100 Ω
 Influence of voltage on output current 0,02%/1V
 Temperature dependency 0.5% / 10 °C
 Output signal values at limit positions: "O" 20 mA (terminals 81,82)
 "Z" 4 mA (terminals 81,82)
 Values tolerance of output signal of capacitive transmitter "Z" +0,2 mA
 "O" ±0,1 mA

Electronic positional transmitter (EPV) - converter R/I (B3)**a) 2-wire version - without built-in power supply, or with built-in power supply**

Current signal 4 ÷ 20 mA (DC)
 Power supply voltage 15 ÷ 30 V DC
 Power supply voltage (at version with build-in power supply) 24 V DC ±1,5%
 Load resistance (at version without build-in power supply) max. $R_L = (U_n - 9V) / 0,02A$ [Ω]
 (U_n - power supply voltage [V])
 Load resistance (at version with build-in power supply) max. $R_L = 750 \Omega$

Output signal values at limit positions: "O".... 20 mA (terminals 81,82)
 "Z"..... 4 mA (terminals 81,82)

Values tolerance of output signal of capacitive transmitter "Z" +0,2 mA
 "O" ±0,1 mA

b) 3-wire version - without built-in power supply, or with built-in power supply

Current signal 0 ÷ 20 mA (DC)
 Current signal 4 ÷ 20 mA (DC)
 Current signal 0 ÷ 5 mA (DC)
 Power supply voltage (at version without built-in power supply) 24 V DC ±1,5%
 Load resistance max. 3 kΩ
 Temperature dependency max. 0,020 mA / 10 °C
 Output signal values at limit positions: "O".... 20 mA or 5 mA (terminals 81,82)
 "Z"..... 0 mA or 4 mA (terminals 81,82)
 Values tolerance of output signal of EPV transmitter "Z" +0,2 mA
 "O" ±0,1 mA
 EPV linearity error:..... ±1.5 %¹⁾
 EPV hysteresis: max. 1.5 %¹⁾

¹⁾ from rated value of transmitter referred to output values

1.8.1 Mechanical Connection

- Lever-joint mechanism
- Main and connecting dimensions are given in the dimensional drawings.

1.8.2 Electric connection

to the terminal board(X): max.32 terminals with wire diameter max.2,5mm²
2 cables bushings – M25x1,5 with cables diameter 12,5 up to 19 mm

to the connector:..... max.32 terminals with wire diameter max.0,5mm²
 2 cables bushings – M20x1,5 and M25x1,5 - cables diameter 8-14,5 mm and 12,5-19 mm.

the protection terminal:

- external and internal ones, mutually joined and marked with the protection earthing mark.
 Electric connection is provided according to the **wiring diagrams**.

1.9 Packaging, Transport, Storing and Unpacking

Surfaces without surface treatment are treated by conservation preparation MOGUL LV 2-3 before packaging .

Conservation is not necessary if the following storage conditions are complied with:

- Storage temperature: -10 to +50 °C
- Relative air humidity max.80 %
- Electric actuators and their accessories must be stored in dry, well ventilated covered spaces, protected against impurities, dust, soil humidity (by placement to racks, or on palletes), chemicals and foreign interventions
- There shall be no corrosive gases present in the storage areas.

The EA MPR are delivered in solid packages guaranteeing resistance in accordance with EN/IEC 60 654 (EN/IEC 60 654-1 and EN/IEC 60 654-3).

The package is made by a box. The products in the boxes can be packed on pallets (the pallet is returnable). The following information is given on the outside of the package:

- the producer
- the name and the type of the product
- number of pieces
- other data – inscriptions and labels.

The forwarder is obliged to protect the packed products loaded into transport means against spontaneous motion, in case of an open transport mean they are to be protected against rainfalls and flowing water. Location and fixing of the products in transport means should guarantee their fixed position, avoid possibility of mutual bumps and bumps against the walls of the transport means.

The transport in non-heated and non-pressurized transport means with conditions in range:

- temperature: -25°C to +70°C
- humidity: 5 to 100% with maximum water content of 0.028 kg/kg of dry air
- barometric pressure: 86 to 108 kPa .

After receiving of the EA check whether during their transport or storing no damage occurred. Compare the data on their nameplates with the accompanying documentation/the purchase agreement (the order). In case of any discrepancy, failure or damage inform about the fact the producer immediately.

If not installed immediately the EA and their equipment should be stored in dry, well-conditioned sheltered areas, protected against impurities, dust and soil humidity (with keeping them on shelves or pallets), chemical and unauthorized impacts, at ambient temperature from -10°C to +50°C and at relative air humidity max. 80 %.



Attention!

It is forbidden to store EA outside or in areas not prevented against direct impact of climate.

1.10 Assessment of the product and packaging and removal of contamination

The product was made from recycled materials - metal (steel, aluminium, brass, bronze, copper, and cast iron), plastics (PP, PA, POM, PC, PVC) and products from the rubber.

The package and product is necessary after the end of their lifespan to disassembly, to sort their parts by the type of used material and deliver them to recycling, eventually disposing places.

Neither the product itself nor its packing represents a contamination source for the environment and involves hazardous waste.

2. Installation and Dismantling of the Actuator



Follow safety regulations!

Note:

Check again whether the EA is placed in accordance with the Chapter "Operation Conditions". If the installation conditions are different than recommended it is needed to consult the situation with the producer.

Before starting the installation onto the valve:

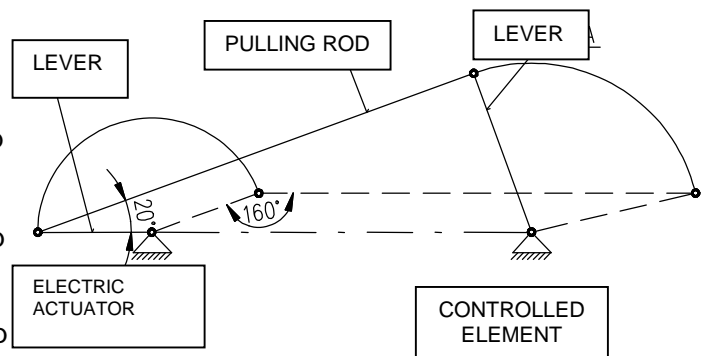
- Check again whether the EA was not damaged while storing.
- Check compliance of the stroke adjusted by the producer and the connecting dimensions of the EA with the parameters of the valve.
- In case of any difference perform the adjustment according to the Chapter "Adjustment".

2.1 Mechanical connection

EA is by the producer adjusted to parameters according to the nameplate, with connecting dimensions according to the corresponding dimensional drawing and put it to a mid-position.

Mechanic lever – joint connection of electric actuator

- Clean bearing surface of connecting place of mounting base for stand attachment.
- Fasten electric actuator to the mounting base by fastening bolts, respectively by screw bolts.
- Shift the levers of electric actuator and control flap identically to one of either open or closed terminal position.
- Connect control levers of electric actuator and flap by TV 360 drawing rod. For drawing rod assembly make sure that:
 - The arm lengths of electric actuator and a flap are identical
 - The angle between the lever and drawing rod in terminal position is within 15° and 165°.
- Set up the flap terminal position (e.g. closed) by swiveling of drawing rod end pieces.



2.2 Electric connection to the network, respectively control system



1. Adhere to instructions stated in chapter 1.2 Safety instructions – Requirements for professional skills...
2. During deposition of electric line is necessary to adhere to regulations for installations of heavy-current equipment.
3. Line wires to terminal boards, respectively to connector lead by screw cable bushings.
4. Before putting the electric actuator into operation is necessary to connect inner and outer grounding terminal

Uncover control box of electric actuator and perform connection in accordance with connection drawing, which is glued-on to inner side of control box cover.

After electric connection perform **functional check of:**

a) Connection of terminal board.

Electric connection of the motor to terminal board of electric actuator is performed in production plant. Electric connection of the control and motor is performed through 2 connecting cable glands M25 x 1,5 to terminal board with size of terminal 1,5 mm². Total number of terminals is max. 32. They

are marked by numbers corresponding to connection in the scheme placed inside the cover. The diameter of connecting cable is 12,5 up to 19 mm.

b) Connector connection.

Electric connection is performed through 2 connecting cable glands of connector M20x1,5 and M25x1,5 – the diameter of connecting cable is 8-14,5 mm a 12,5-19 mm

Control connection check. The electric actuator is shifted by hand wheel (4) (fig. 1) to half-position. Proper connection is checked by pressing pushbutton "close" (on the box of local control resp. on panel of testing pushbutton box) and the output shaft must rotate clockwise from the top view on an electric actuator. If it is not so, the sequence of electric line input phases must be changed.

Warning:

Due to protection of electric actuator against mechanic damage must be switches S1 and S2 connected in series to the electromotor.

The check of torque switches. Switch over contacts of switch S2 (21) (fig. 3) during the movement of electric actuator towards "close" by pressing switch pushbutton. The electric actuator must stop, if the connection is properly done. Analogically repeat the check for direction "open" by switch over of contacts of switch S1 (20). Should any function is incorrect, check the connection of switches according to connection drawing.

The check of terminal switches. Switch over contacts of switch S4 (37) resp. S6 (38) (fig. 6) during the movement of electric actuator towards "close" by pressing cut-out spring of relevant switch. The electric actuator must stop when contacts of switch S4 are switched over and start to glow when contacts of switches S6 are switched over. Analogically repeat the check for direction "open". By pressing of switching off spring of switches S3 (39) resp. S5 (40) must the electric actuator stop, resp. signalize. Again, should some of the functions is incorrect; check the connection of switches according to connection drawing.

2.3 Dismantling



***Before dismantling it is required to disconnect the EA from mains!
Do not connect and disconnect live connectors!***

- Disconnect the EA from mains.
- Disconnect the leads from the EA terminal boards and loosen the cables from bushings. Pull out the connectors in case of the connector version.
- Loosen the fixing screws of the EA flange and disconnect the EA from the valve/gearing.
- While sending the EA to be repaired put it into a package solid enough to avoid damages of the EA during transportation.

3. Adjusting of actuator



Attention! See article 1.2.
Switch OFF the electric actuator from electric power line!
Adhere to safety regulations!

Perform set up on mechanically and electrically connected electric actuator. This chapter describes set up of electric actuator to parameters specified in specification table in case if any element of electric actuator is mistuned. The layout of control plate adjusting elements is in the fig.3,4.

EA is set up to firm working travel – angle (specified by the customer in the order) in production plant. If you want to adjust EA to other parameters, proceed as follows:

Electrically connect an electric actuator to special source with decoupling transformer.

Set up of output part stroke

The electric actuators are in production plant adjusted only to firm stroke of out-put part, according to specification table. Adjusted stroke is stated on type label. The adjustment of electric actuator can be performed only in production plant, resp. in some of contractual service centers.

Adjustment of position unit (Fig.4)

The position unit is in the plant set with limiting of the operation stroke of out-put part in accordance with the dimensional drawing. The starting position is defined as the lower position, it means “closed”. Up of this position the set stroke of out-put part of the actuator can be measured. The lower position of the stroke is in accordance with the dimensional drawing as well as whole stroke set with a tolerance of $\pm 1^\circ$. The indication switches are set next to the position switches. Fine adjustment of the position and indication switches in the end positions can be made as follows:

Set the actuator to the position “closed”. Loosed the switching-off cam(57) from the nut(51) and turn it clockwise until it meets the switching-off pin (37). The pin then will switch the S4 switch (37). The S6 signalling switch (38) is also adjusted by turning the switching-off cam (53) clockwise. Fix the switching-off cams by tightening the nut (51). Then reset the actuator to the position "open" Adjust S3(39) and S5(40) switches the same way as the S4 and S5 are adjusted but in the position “open“ the switching-off cams (54) and (56) are to be turned counterclockwise. The S5 and S6 signalling switches are recommended to be adjusted to indicate next to the end positions.

Adjustment of capacitive transmitter unit

The force from the gears is led through the friction brake after tightening of the screw (50), and that is why no special adjustment of the transmitter unit is necessary. Loosen the screw (50) to disconnect the transmitter drive, and tighten it to connect the drive.

The output signals from the capacitive transmitter 4-20mA or 20-4 mA is set in relation with the stroke the end position switches with tolerance of $\pm 1\%$ of max. value.

Fine adjustment of the output signals (4mA – position “closed” , 20mA position “open” can be made following these steps (Fig.3)):

- Connect a digital amperemeter into the capacitive transmitter circuit.
- Set the actuator to the position “closed”
- Loosen the fixing screws (97) on the transmitter holder.
- Rotate the transmitter in both directions to adjust the signal 4mA finely.
- Tighten the screws (97)
- Set the actuator to the position “open”.
- Adjust the signal 20mA finely with the trimer (98)
- Check set of signals 4 – 20 mA.

Adjustment of resistive transmitter unit

The drive is to transmitter unit transferred through the toothed wheel (14) (fig.6), which pinion is fastened in the clutch (60), fig.4. The transmitter is disconnected from the drive by releasing the nut (83) and by rotation of transmitter holder (26) out of the mesh.

The set up is performed as follows:

1. Shift the electric actuator to position closed.
2. Disconnect the drive by uncovering of transmitter holder (26) (fig.6)
3. Shift the transmitter to position closed by rotation of the shaft. (Measured signal value must be max. 5Ω .)
4. Return the transmitter holder to its original position, restore meshing and fasten the nut (83).
5. Shift the electric actuator to position open.
6. Check the value of resistor on the transmitter (min. 93Ω).

Set up of torque-speed unit (fig. 8)

The set up of torque speed can be performed only by device for measuring torque speed and within relevant range 63 - 125 Nm only, by rotation of the cams (19) and (22).

4. Service, maintenance and troubleshooting

4.1 Service



1. In general it is provided that service of the EA is performed by a qualified worker in accordance with requirement given in Chapter 1!
2. After putting the EA into operation it is needed to verify whether during manipulation any scratch on surface occurred, it is to be removed to prevent actuator against corrosion!

The service of single-speed electric actuators comes out of operating conditions and usually is restricted only to transfer of impulses to individual functional tasks. Should the power supply is disconnected, perform shift of controlled element by a hand wheel. The operator takes care for maintenance execution, for protection of electric actuator against harmful ambient and weather influence, which is not in accordance with working environment description presented in chapter 1.6. The operation above the range of disconnecting torque-speed is not allowed. Torque switches are set up to their maximum values.

4.2 Maintenance - extent and periodicity

During inspections and maintenance is needed to tighten all screws and nuts that affect the tightness and coverage. Similarly, once a year should be checked and if necessary tighten mounting screws of the terminal wires and assuring of the slip-on joints with wires.

The interval between two preventive inspections is four years.

The replacement of cover gaskets and gasket of an oil filling is needed in case of damage or after 6 years of the operation.

The grease in the supplied actuators is designed for the lifetime of the product.

It is not necessary to change the grease during the operation of the actuator.

In case there is no leakage in the transmission box caused by damaged seal the oil filling is permanent. The change of oil filling shall be done after 6 years of the actuator's operation.

The oil level check must be carried out once in a 3 months interval. The oil level must reach the filling hole. Oil capacity is 1,6 l (1,5 kg).

Lubrication means:

- gearbox – gearbox oil Madit PP-80 (Slovnaft) SAE 80W
- control plate drive mechanism - grease GLEIT - μ HF 401/0, resp. GLEITMO 585 K



Lubrication of the valve stem is independent on maintenance of the EA!

After every potential flooding of the product check, whether there is no water inside. After eventual water penetration, dry the product before repeated putting into operation and replace damaged sealings, resp. other parts of EA. identically check also tightness of cable bushings and replace them, if they are damaged.

- It is recommended to perform inspection run every 6 months within adjusting working stroke to verify proper function, with reverse adjusting of original position.
- Unless otherwise stated in revision rules, perform inspection of EA once a four years, whereby check tightening of all connecting and grounding bolts, to prevent heat-up.
- 6 months after putting EA into operation and then once a year is recommended to check tightness of fastening bolts between EA and armature (bolts should be tightened by cross method).



- During electric connection and disconnection of EA check sealing rings of bushings – damaged and obsolete sealings replace by original ones!
- Maintain EA clean and take care for removal of impurities and dust. Cleaning should be performed regularly, according to operating options and requirements.

4.3 Troubleshooting

At failure of power supply the EA stops in the position where it was before the failure. If needed the EA can be set only with the manual control (the hand wheel). After restoration of power the EA is prepared for operation.

In case of failure of any element of the EA it can be changed by a new one. Entrust the change to a service centre.

In case of an EA failure, which cannot be eliminated directly in operation, follow instructions for under-guaranty and after-guaranty service.

Note:

If the EA requires dismantling follow the chapter "Dismantling".



Taking the EA to pieces for repair purposes is allowed only by professionally qualified persons trained in the production plant or by a contracted service centre!

5. Accessories and spare parts

5.1 Accessories

The EA is delivered with the **hand wheel and cable glands**.

5.2 Spare part list

a) Spare parts for 2 and 4 years of operation

If EA is used according to the conditions specified by the manufacturer in Installation, service and maintenance instructions, there is no need for replacement of spare parts in EA after 2 or 4 years of operation.

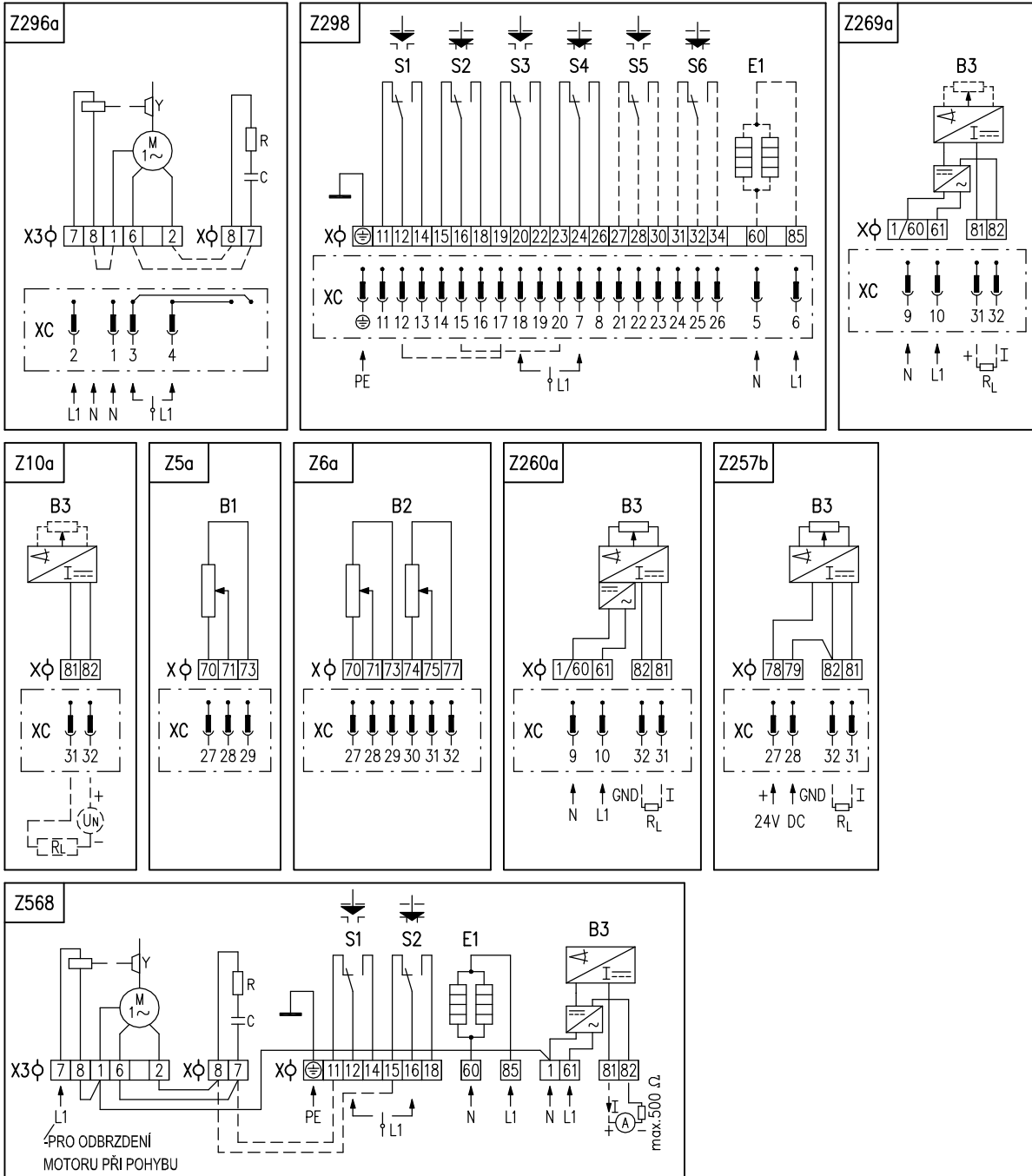
b) Spare parts for repairs

Table No.3 Spare parts for repairs

Spare part	Order Nr.	Position	Figure
Electric motor; 16W/; 230V AC	63 592 071	M1	1
Micro-switch CHERRY DB6G-B1RB	64 051 220	-	3,6
Resistant wire transmitter (potentiometer) 1x100Ω	64 051 812	33	6
Resistant wire transmitter (potentiometer) 1x2000Ω	64 051 827	33	6
Resistant wire transmitter (potentiometer) 2x100Ω	64 051 814	33	6
Resistant wire transmitter (potentiometer) 2x2000Ω	64 051 825	33	6
Capacitive Transmitter CPT1/A	64 051 499	10	3
Casing KU 40x30	63 249 037	75	2
Casing KU 14x12	63 243 150	76	2
Ringlet 10 x 6	62 732 017	66	2
Sealing ring 16 x 28 x 7	62 735 044	70	2
Sealing ring 40 x 52 x 7	62 735 043	68	2
Ringlet 32 x 2	62 731 015	77, 34	2
Ringlet 110 x 3	62 732 116	-	1
Ringlet 125 x 3	62 732 114	-	1
Ringlet 130 x 3	62 732 020	78	2
Sealing	04 A05 199	-	-
Cable glands M25	63 456 597	-	-
Cable glands M20	63 456 596	-	-
Terminal board LTA – 12 - 4	63 456 710	-	-

6. Enclosures

6.1 Wiring diagrams



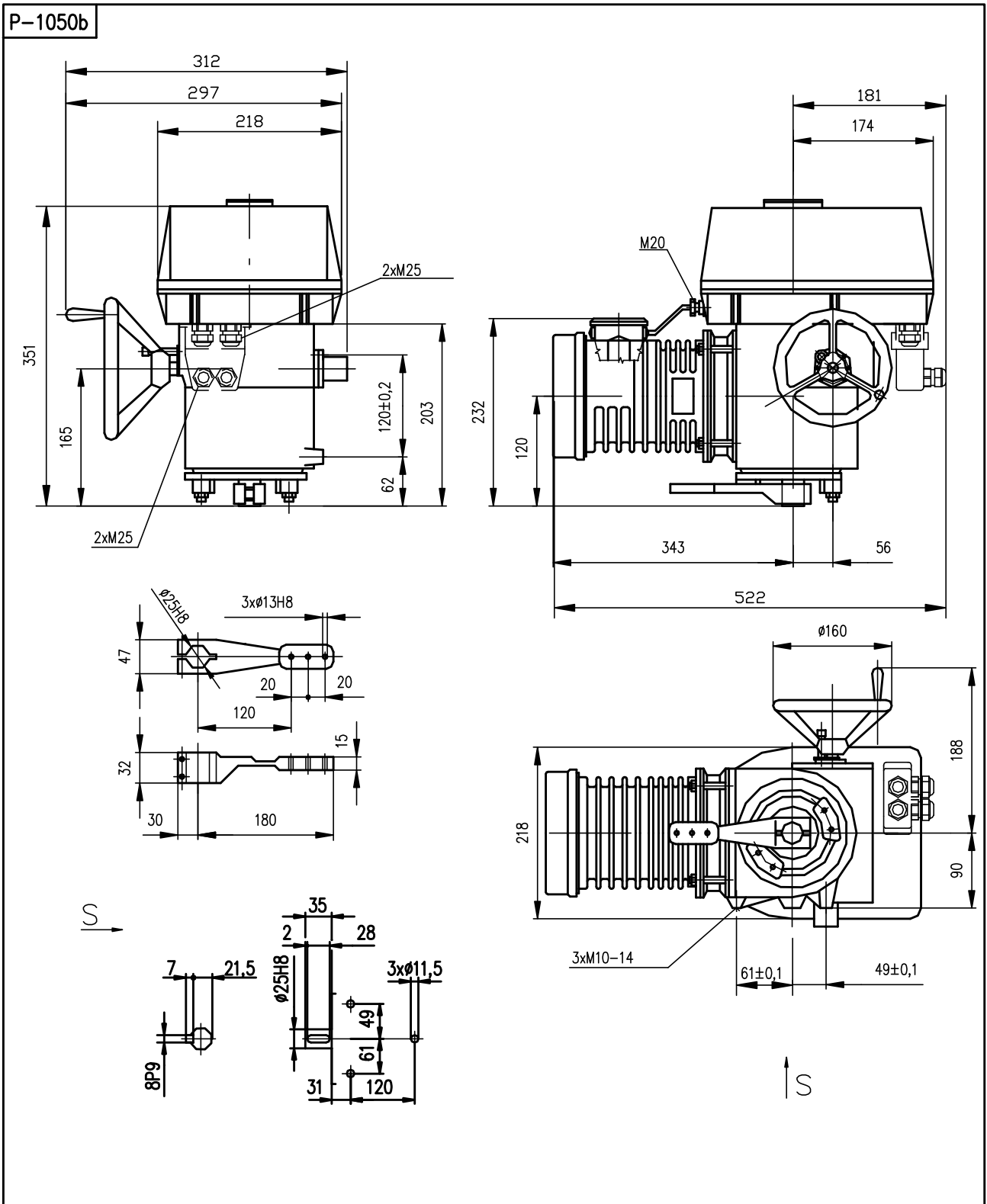
Notes:

1. For the EA version with connection to the terminal board the terminal 160 (the wiring diagrams Z269a and Z260a) is led out to the terminal No. 1.
2. For the EA version with connection to the terminal board the actuator is not equipped with the jumper X3:8-X3:1 and X3:6-X:7 resp. X3:2-X:8 (296a) in manufacturing plant (it is necessary to connect it by customer).
3. At control of the electric motor it is necessary to release the motor brake by supplying voltage 230 V AC to the terminals X3: 7 and X3: 8.
4. Standard actuator is supplied with electric connection to terminal board (terminal board of electric motor X3 and terminal board in the control box X). Connector XC is valid in the wiring diagrams only for electric connection to connector.

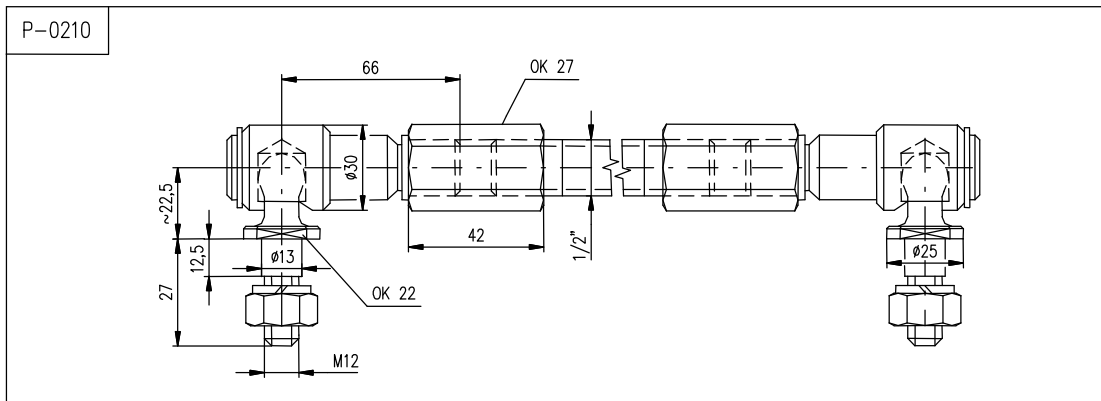
Legend:

Z5a.....	connection of single resistive transmitter
Z6a.....	connection of double resistive transmitter
Z10a.....	connection of resistive with current converter or capacitive transmitter – 2-wire without supply
Z257b....	connection of resistive transmitter with current converter– 3-wire without power supply
Z260a....	connection of resistive transmitter with current converter– 3-wire with power supply
Z269a....	connection of resistive transmitter with current converter or capacitive transmitter – 2-wire with power supply
Z296a....	connection of electric motor
Z298.....	connection of torque and position switches and space heater
Z568.....	connection of electric motor, of torque and position switches, space heater and capacitive transmitter, resp. of resistive transmitter
B1.....	resistive transmitter (potentiometer) single
B2.....	resistive transmitter (potentiometer) double
B3.....	capacitive transmitter
S1.....	torque switch „open“
S2.....	torque switch „close“
S3.....	position switch „open“
S4.....	position switch „close“
S5.....	additional position switch „open“
S6.....	additional position switch „close“
M.....	electric motor
C.....	capacitor
Y.....	motor's brake
E1.....	space heater
X.....	terminal board
X3.....	electric motor's terminal board
XC.....	connector
I/U.....	input (output) current (voltage) signals
R.....	reducing resistor
R _L	loading resistor

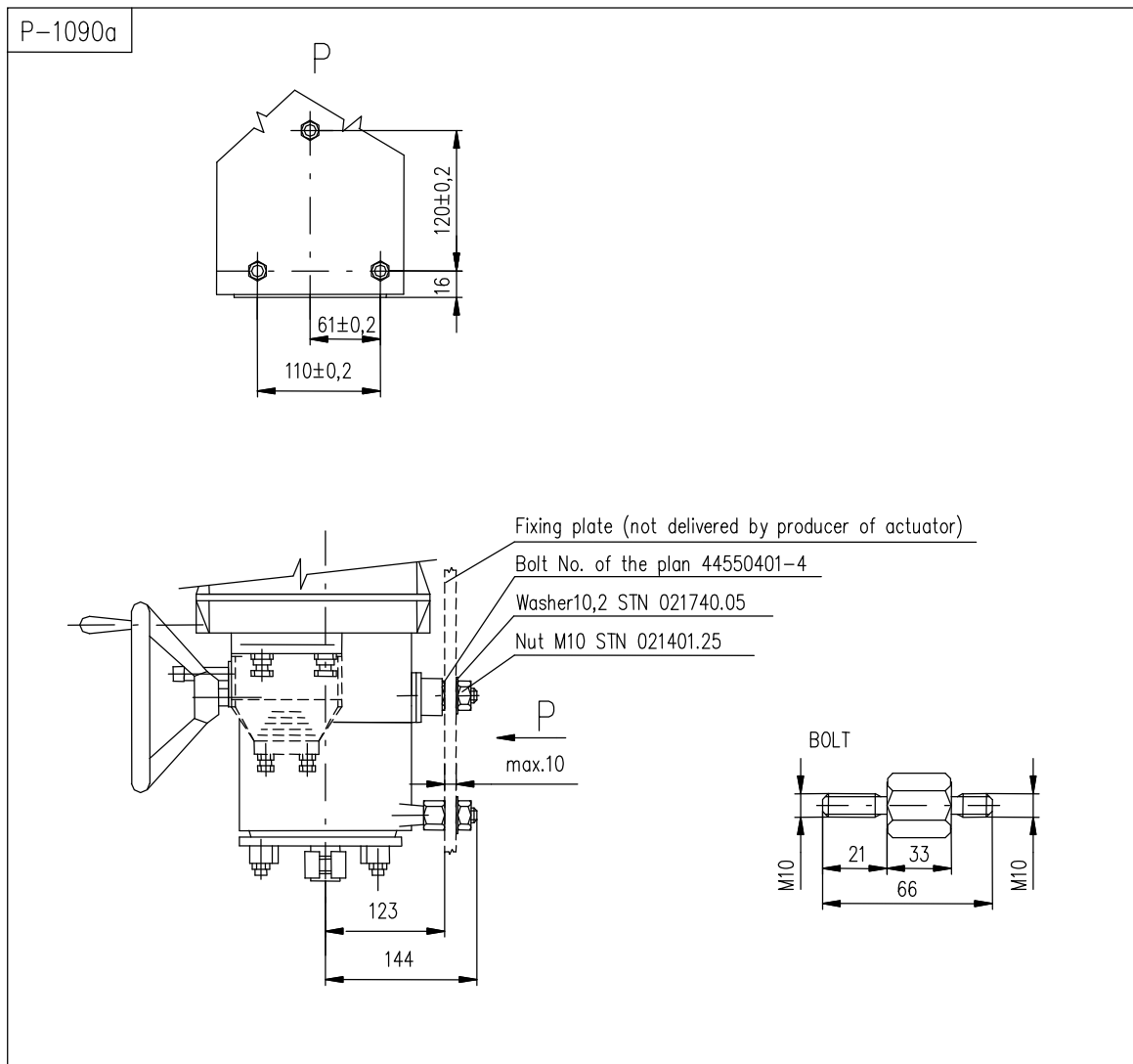
6.2 Dimensional drawings



Pulling rod TV 360



Piliers



6.3 Legend to the pictures

Pos	Name (Fig.)
1.....	Box(2,9)
2.....	Worm..... (2)
3.....	Output shaft (2,4)
4.....	Hand wheel(1,2)
9.....	Switch element (3,6)
10.....	Transmitter (3)
11.....	Position unit (3,6)
12.....	Transmission toothed gear (5)
13.....	Gear wheel (4)
14.....	Gear wheel (6)
16.....	Heating power (3,6)
17.....	Screw.....(3,6)
18.....	Screw(3,6)
19.....	The cam of switch S2 (8)
20.....	Switch S1(3,6)
21.....	Switch S2(3,6)
22.....	The cam (8)
24.....	Securing bolt(8)
26.....	Segment (6)
27.....	Grooved flange (9)
28.....	Screw..... (9)
29.....	Lever backstops (9)
30.....	Lever (9)
31.....	Nut(9)
32.....	Stone(9)
33.....	Transmitter unit (3,6)
37.....	Switch S4 (4)
38.....	Switch S6 (4)
39.....	Switch S3 (4)
40.....	Switch S5 (4)
41.....	Gear wheel (3,4,6)
43a.....	Gear wheel a(5)
43b.....	Gear wheel b(5)
43c.....	Gear wheel c(5)
43d.....	Gear wheel d(5)
44.....	Rim (2)
45.....	Shaft(2)
46.....	Mounting base (3,6)
48.....	Screw..... (9)
49.....	Screw..... (9)
50.....	Screw.....(5)
51.....	Nut (4)
53.....	The cam of switch S6 (4)
54.....	The cam of switch S3 (4)
56.....	The cam of switch S5 (4)
57.....	The cam of switch S4 (4)
60.....	Transmitter joint (4)
64.....	Capacitor (3,6)
65.....	Capacitor holder (3,6)
66.....	Sealing ringlet..... (2)
68.....	Sealing ringlet 40x52x7(1,2)
70.....	Sealing ringlet 16x28x7..... (2)
71.....	Casing(2)
72.....	Leaf spring(2)
73.....	Bearing(2)
74.....	Washer 14 x 8 (2)
75.....	Bronze(2)
76.....	Bronze.....(2)
77.....	Sealing ring Ø32x2(2)
78.....	Sealing ring Ø130x3(2)
79.....	Sealing ring Ø125x3(2)
97.....	Screw..... (3)
98.....	Trimmer (3)

6.4 Guarantee service check report

Service center: <i>D</i>	
Date of repair:	Guarantee repair no.:
User of actuator:	Claim applied by:
Actuator type number:	Actuator production number:
Product claim fault:	Detected product fault:
Used spare parts:	
Remarks:	
Issued on a day:	Signature:

6.5 Post guarantee service check report

Service center:	
Date of repair:	
User of actuator:	Actuator operating place :
Actuator type number:	Actuator production number:
Detected product fault:	
Used spare parts:	
Remarks:	
Issued on a day:	Signature:

6.6 Commercial representation

Slovak Republic:

Regada, s.r.o.
Strojnícka 7,
080 01 Prešov
Tel.: +421 (0)51 7480 460,
Fax: +421 (0)51 7732 096,
E-mail: regada@regada.sk

Czech republic:

REGADA Česká s.r.o. (Ltd.) – exclusive representation REGADA, s.r.o. (Ltd.) for sale of electric actuators
Kopaninská 109
252 25 Ořech
PRAHA – západ
Tel.: +420 257 961 302
Fax: +420 257 961 301