INSTALLATION, SERVICE AND MAINTENANCE INSTRUCTIONS

Electric linear actuators Rematic with the DMS 3 electronic control STR 0PA

REGADA®

74 1050 02

TEST CERTIFICATE

ELECTRIC LINEAR THRUST ACTUATOR STR 0PA

Type number 430..... Power supply.....V .....Hz

Serial number ..... Max. load thrust .....N

Production year ..... Switch-off thrust .....N

Wiring diagram ..... Operating speed .....mm/min

..... Set stroke ..... mm

..... Input operation signal .....

Warranty period ..... months Output signal .....

Serial number of electric motor .....

Serial number of control unit .....

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!

Preventive and safety-measures applied on the actuator can not offer required safety level till the actuator and its safety systems are not applied by required and described way and if installation and maintenance is not applied according to applicable instructions and rules!

Contents

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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 linear actuators **Rematic** (hereinafter referred as EA only) with the DMS 3 electronic control of the **STR 0PA** type are set up by the program to be controlled on the 24 V DC voltage level; are set up by the program to be controlled by **analogue input signal.**
Electric linear actuators **STR 0PA** types are high-powered electric-mechanical products designed for direct installations onto controlled devices (regulating bodies - valves, etc.). EA of STR 0PA types are provided for remote control of closing bodies, or for automotive control of regulating bodies in both directions of their movement. They can be equipped with means of measuring and control of technological processes where an unified analogue direct current resp. voltage signal is an information bearer on their input and/or output. 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 the controlled devices with flanges according to EN 15714-2 or using pillars and flanges
Note:

It is forbidden to use EA as a lifting mechanism!

1.2 Safety instructions

EA of STR 0PA types 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 2014/35/EU and standard EN 61010--1:2010+A1:2019 assigned for installation category II (overvoltage category), pollution degree 2.

1.2.1 Product influence to environment

Electromagnetic compatibility (EMC): the product complies with the requirements of the Directive 2014/30/EU 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 61000-6-4:2019, EN IEC 61000-6-2:2019, EN IEC 61000-3-2:2018 and EN 61000-3-3:2013+A1:2019.
Vibrations caused by the product: product influence is negligible
Noise produced by the product: the maximum allowable noice level (A) of the product measured in a place of operation is 78 dB (A).

1.2.2 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 authorized to verify professional qualification.*

1.2.3 Instructions for stuff training

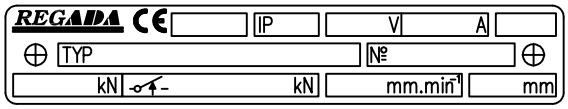
Service can be performed only by workers professionally qualified and trained by the producer or contracted service centre.

1.3 Warning for safety use

Product protection:
There must be included suitable protective device into the supply power (circuit breaker or fuse) which serves at the same time as main switch.
EA STR 0PA has own short-circuit protection of motor power supply circuits and space heater.
Type of equipment from a connection point of view: The equipment is designed for permanent connection.

1.4 Data specified on electric actuator

Nameplate:



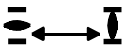
Warning plate:

Nameplate contains the basic data concerning identification, performance and electricity: indication of producer, type, serial number, load thrust and switching-off thrust, operating speed, protection code, operating stroke, supply voltage and current.

Graphic symbols on electric actuator

The graphic symbols used on electric actuator substitute the text messages. Some of them are in accordance with EN ISO 7010, ISO 7000 and IEC 60417 within valid edition.


Dangerous voltage (EN ISO 7010-W012)


Stroke of the electric linear actuator


Switching-off thrust


Manual control (0096 ISO 7000)


Protection terminal (5019 IEC 60417)

1.5 Guaranty Conditions

The supplier is responsible for completeness of the delivery and guarantees proprieties of the product, stated by technical conditions (TC), or proprieties agreed upon on purchase contract.

The supplier is not responsible for product deteriorated properties caused by the customer during storing, non professional assembly, or non professional operation.

1.6 Under-guarantee and after-guarantee service

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 thrust), set switching-off thrust, contact to the company implementing the installation and electric connection
- 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. Serviceman makes the record about service mission after warranty actions and sends it to the production company.

1.6.1 Lifetime of actuators

The lifetime of an electric actuator (EA) is at least 6 years.
EA used for closing mode (closing valves) comply with the requirements for at least **15,000 working cycles** (cycle C – O – C: for linear EA).
EA used for regulating/modulating operation (control valves) comply with the below stated numbers of **operating hours** at the total number of 1 million start-ups:

Switching frequency				
max. 1,200 [h^{-1}]	1,000 [h^{-1}]	500 [h^{-1}]	250 [h^{-1}]	125 [h^{-1}]
Minimal lifetime expectancy – number of operating hours				
850	1,000	2,000	4,000	8,000

Time of **net operation** is min. 200 hours, max. 2,000 hours.
Lifetime at operating hours depends on loading and switching frequency.
Note : High switching frequency does not ensure better regulation. Setting of regulation parameters should be therefore made with the inevitably necessary switching frequency needed for the process in question.

1.7 Operation conditions

1.7.1 Product location 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).
- Electric actuators must be placed with access to the manual control wheel (2), Fig.2, to the cover of control box, to control box, to cable glands.
- 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. Avoid to arrange the electric actuator under the armature if possible.

Warning:

Actuator installed on the open place must be protected against a direct climate effects by shelter, mainly from sunshine. In applications placed in an ambient of a relative moisture above 80%, in external ambient under shed, it is necessary to change the preset thermostat temperature +25°C to +70°C by a PC and program to prevent switching off the heating resistor.

1.7.2 Operation Environment

According to valid standard IEC 60 721-2-1, there are delivered these versions of electric actuators:
1) Version **„standard“** for type climate temperate
2) Version **„tropical wet“** for type climate tropical wet
3) Version **„tropical dry and dry“** for type climate tropical dry and dry
4) Version **„marine“** for type climate marine

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°C .....**AA 7***

- with relative humidity 10 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 effect of salient water from all directions - (product in enclosure IP x4).....**AD 4***
- a possibility of partial or complete immersion - (products with protection enclosure IP x7) .....**AD 7***
- with submersion – (product with enclosure IPx8).....**AD 8***
- with mild dustiness - with possibility of nonflammable effect, nonconducting and explosion-proof dust; medium layer of dust; descent of dust more than 35 but not more than 350 mg/m^2 per day (product in enclosure 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/m^2 per day (products with protection enclosure of IP 6x) .....**AE 6***
- with atmospheric appearance of corrosive and spoiling materials (with high degree of corrosive aggressiveness of the atmosphere; the presence of the corrosive spoiling materials is significant .. ..**AF 2***
- with a possibility of influences of mechanical stress:.
  - of mean sinusoid vibrations with frequency in range 10 to 150 Hz, with amplitude of shift 0,075 mm for f<f_p and with amplitude of acceleration 9,8 m/s^2 for f>f_p; (contact frequency f_p is 57 to 62 Hz).....**AH 2***
  - of mean sinusoid vibrations with frequency in range 10 to 150 Hz, with amplitude of shift 0,15 mm for f<f_p and with amplitude of acceleration 19,6 m/s^2 for f>f_p; (contact frequency f_p is 57 to 62 Hz) – applies for 4 pillars version .....**AH 2***
  - medium impacts, shakings and vibrations ..... **AG 2***
- growing of plants and moulds .....**AK 2***
- with strong danger of presence of animals (insects, birds, small animals) .....**AL 2***
- with harmful effects of radiation:
  - of escaping stray current .....**AM 2-2*** with intensity of magnetic field (direct and alternating of power supply frequency) to 400 A.m^{-1}
  - mean sunshine with intensity > 500 a ≤ 700 W/m^2 .....**AN 2***
- mean seismic effects 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 frequent contact of the staff with earth potential (persons often touch conductive parts or they stand on the conductive basement) ..... **BC 3***
- without occurrence of dangerous media in the object .....**BE 1***

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

1.7.3 Power Supply and Operation Modes

Power supply:

Electric motor.....110/120 V AC, 220/230/240 V AC, resp.24 V AC ±10%

Control .....binary inputs 24 V DC ±10%

..input control signal 0/4/12 up to 20 mA, 4 up to 12 mA resp. 20 up to 0/4/12 mA, 12 up to 4 mA, or 0/2 up to 10 V, or 10 up to 0/2 V

Frequency of power supply ..... 50/60***** Hz ±2%

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

Duty cycle (according to IEC 60034-1 within valid edition)**:**

EA STR 0PA are designed - **for *remote control:***

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

- for automatic regulation:

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

Note:
The operation modes consist of the loading type, load factor and connection/switching frequency.

1.8 Description

The **STR 0PA** electric actuator is controlled by 24 V DC voltage fed to the electric actuator's terminals according to the wiring diagram, resp. by 0/4/12 up to 20 mA, 4 up to 12 mA (0/2 up to 10 V) (input control signal and provides for moving the output part of the EA automatically to a position corresponding to the value of the input signal) and other functions as well.

The electric actuator consists of these main parts (**Fig. 1**):

The electric actuator is driven by an **electric motor (1)** supplied and controlled from the **source board (3)** and **control unit (2)** of the DMS 3 electronics. **Thrust switches (5)** switched by thumb are activated when switching thrust is reached.

Position of output element of EA is scanned by **contactless absolute sensor (4)**.

Depending on the version, the DMS3 electronic circuit board may include **an electronic position switch** (EPV) without power supply (passive) with output signal 4 through 20 mA.

Space heater (6) is placed at the control board.

In case of power cut or damage of switches the actuator can be controlled **manually** according to instructions stated in chapter 4. Service and Maintenance.

Basic modules of DMS3 electronic control system for STR 0PA:

- **Control unit (2)** – main part of system DMS3 – it contains microprocessor, 6 signal LED and 4 buttons for simple adjustment and control of EA, connectors for connection of thrust scanner, sourcing board and communication connector (connection to PC for adjustment and diagnostic), 2 free programmable relays R1 and R2,, 1 relay READY and terminals for electric connection.
- **Sourcing board (3)** – secures power supply of electronic, it contains user terminal board, switching circuits, connector for connection with control unit.
- **Position scanning unit (4)** – secures contactless magnetic position scanning of output element.

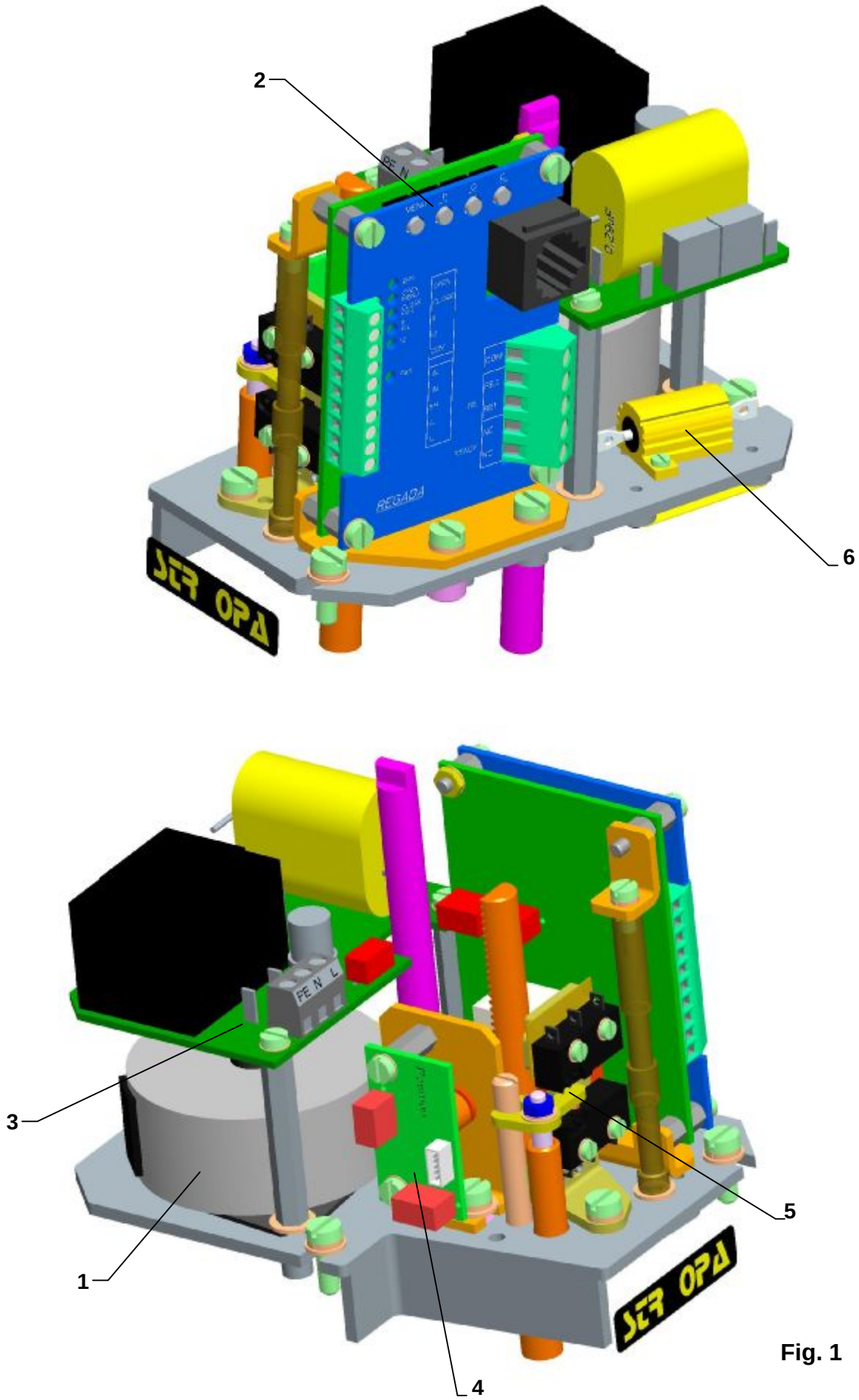


Fig. 1

1.9 Basic specifications

Basic EA specifications:
switch-off thrust [N], **operating speed** [mm/min], **operating stroke** [mm] and electric motor parameters are given in Table 1.

Table 1: Basic EA Specifications

Type/ type number	Operating speed ±10[%]		Max. operating stroke	Max. load thrust (regulation mode)	Max. load thrust (remote control)	Switching -off thrust ±10 [%]	Weight	Electric motor					
								Supply voltage nominal voltage		Nominal power	Nominal revolutions	Nominal current	Capacitor capacity
	[mm/min]		[mm]	[N]	[N]	[N]	[kg]		[V] ±10%	[W]	[1/min]	[A]	[µF/V]
	50Hz	60Hz											
1	2	3	4	5	6	7	8	9	10	11	12	13	14
STR 0PA type number **430** typové číslo **490**	5	6	28* 40*	3 200	4 000	4 500	2,9 – 4,9	Single phase	220/230/ 240 AC or 24 AC or 110/120 AC	2,75	375	0,04 – for 220/230/240 V AC 0,38 – for 24 V AC 0,08 – for 110/120 V AC	0,27/500 – for 220/230/240 V AC 25/63 – for 24 V AC 1,5/500 – for 110/120 V AC
				2 500	3 200	3 800							
				1 280	1 600	1 900							
				640	800	950							
	10	12		3 200**	4 000**	4 500**							
				2 500	3 200	3 800							
				1 280	1 600	1 900							
				640	800	950							
	16	19		2 000**	2 500**	2 900**							
				1 280	1 600	1 900							
				640	800	950							
	20	24		1 280	1 600	1 900							
				640	800	950							
	40	48		640	800	950							
				500	630	725							
				250	320	360							

* Is valid according to specific mechanical connection. Min. operating stroke is 10 mm.
** For U_N – 10% is valid: $F(U_N - 10\ \%) = 0.9F$; and for –25°C is valid: $F_{(-25\,^\circ C)} = 0.9F$
*** The total current of EA is the sum of the electronics current (0.15 A) and the electric motor current according to the EA version

Other specifications:

Protection enclosure of EA:..... IP 67, IP 68 IEC 60 529 within valid edition
According to definition for EA, enclosure IP68 fulfills following requirements:
-water column max. 10m
-time of continious submersion in water max. 96 hours.

Mechanical ruggedness:
sinusoid vibrations .....see Chapter 1.7.2
resistance by drops..... 300 drops with acceleration of 5 $m.s^{-2}$
seismic resistance ..... 6 degrees of Richter's scale
Self-locking: .....declared in range 0% to 100% of rated thrust
Motor´s thermal protection: .....motor has not own thermal protection

Electric control:
remote control - movement of output part of the electric actuator is controlled :
- by binary inputs 24 V DC, or
- by unified input signal 0/4/12 up to 20 mA, 4 up to 12 mA resp. 0/2 - 10 V according to version.

Supply source for the electronics:
- for supplying voltage to electronics modules built-in EA a supply source **Z1** is used, protected with a protection fuse the size of which is given in chapter 4.3 – Troubleshooting.

Position scanning:
- contactless absolute magnetic.

End positions adjustment:
End position relays are adjusted to the specified stroke with accuracy of ± 0.5mm.
It is possible to set up (with buttons situated on the control unit, resp. with buttons situated on the local control, resp. program after connecting the EA with PC) the shutting off in end positions as follows:
- Z = Torque + O = Torque
- Z = Torque + O = Position
- Z = Position + O = Torque
- Z = Position + O = Position

Notes:
C = Torque - shutting off at end limit - thrust „Closed“
O = Torque - shutting off at end limit - thrust „Opened“
C = Position - shutting off at end limit - position „Closed “
O = Position - shutting off at end limit - position „Opened“
Factory’s setup of shutting off in end positions is described in the chapter “Adjusting of actuator”.

Thrust sensing: - using thrust switches.

Thrust switches adjustment:
Thrust switches switch-off in the interval stated in the Specification table and they cannot be adjusted by user.

Thrust blocking:
The switching-off from thrust can be blocked within a certain range of the stroke starting from a stroke end position (max..5%), for time agreed on, in range of 0 to 20 sec..

Output relay :
- 3x relays (**READY**, **R1**, **R2**) max.250 V AC/cos phi=1; max. 30 V DC/2A
- relays **READY**, **R1**, **R2** are free programmable (their function can be changed with buttons on the control unit or through a PC with the program).

READY relay: - programme selections option – error indication, error or warning, error or not remote, error or warning or not remote. READY relay factory set is shown in the “Adjusting of actuator" Chapter.

R1 and R2 relay: - programme selections option – disabled, Position O (position open), Position C (position close), Torque O (torque open), Torque C (torque close), Torque O or Torque C, Torque O or Position O, Torque C or Position C, opens, closes, movement, movement – flasher, to position, from position, warning, control – remote, control – local, (not valid for EA without local control), control OFF.

Factory setting up of the individual relays is shown in the “Adjusting of actuator" Chapter.

Transmitter (output signal)

Electronic position transmitter (EPV) passive, 2-wire connection (without inbuilt power supply)

Current signal	4 ÷ 20, resp. 20 ÷ 4 mA (DC)
Voltage at connection of EPV passive	18 up to 30 V DC
Load resistance	max. R_L= 500 Ω
Tolerance of value of output signal of electronic transmitter in end positions:	±0,5 %[1)]:
Tolerance of linearity of transmitter	±1 [%][1)]
Hysteresis of transmitter	max. 1 [%][1)]
Galvanic separation	output signal is galvanically separated from input control signal

1) from nominal value of transmitter referred to output values

Program possibilities of output signal : 4 ÷ 20 mA, 20 ÷ 4 mA.

Factory’s setup of output signal is described in the chapter “Adjusting of actuator”.

Electronic controller (N) – actuation by input control signal

Input control signals - analogue: ..... 0 - 20 mA (0 – 10 V according to version)
..... 4 - 20 mA(2 – 10 V according to version)
.....12 - 20 mA
.....4 - 12 mA
..... 20 - 0 mA(10 – 0 V according to version)
..... 20 - 4 mA(10 – 2 V according to version)
.....20 - 12 mA
.....12 - 4 mA
Input resistor for signal 0/4/12 up to 20 mA. 4 up to 12 mA..... Rin = 120 Ω
Input resistor for signal 0/2 up to 10 V..... Rin = 30 kΩ
Tolerance of controller's linearity: ..... 0,5 %
Dead of controller: ..... program adjustable within 1 - 10% Dead of controller:

Factory's setup of input signal is described in the chapter "Adjusting of actuator".

Control by binary inputs 24 V DC:
by feeding of 24 V DC to terminals CLOSE and OPEN

Programming possibilities of binary inputs I1 and I2 (change is possible only through the programme of PC):

- for the input **I1** : DISABLED; ESD; DBL (local releasing - not valid for this type of the EA), STOP
- for the input **I2**: DISABLED, ESD; DBL (local releasing - not valid for this type of the EA), 2P (the EA can undergo control for the opening direction or closing with the controller ON and I2 input activated with 24 V DC voltage supplied to the terminals to OPEN or CLOSE).

Factory's setup is described in the chapter "Adjusting of actuator".

Programmable FAILURE REACTION : OPEN, CLOSE, STOP, SAFE POSITION

Factory's setup is described in the chapter "Adjusting of actuator".

Adjustable elements of electronics
The EA is possible to adjust with or resetting to different parameters operating the control unit buttons, or once it is connected to the PC using the programme and the communication cable connected to the EA control unit communication connector and the EA cover removed.

Space heater (E1)

Space heater - supply voltage: .....corresponding with motor supply voltage (max. 250 V AC)
Space heater power output: ..... cca 10 W/55°C

Electronic board provides switching of heating element. It is possible to change switching temperatures of the switch from –40°C to +70°C with help of PC and particular software. Factory's setup for shut down of heating element (thermostat) is +25°C.

Manual control:
- manual wheel upon disconnection of the gear. Turn the hand wheel clockwise to move the output shaft of the EA in the direction "Z – closed".

Output part clearance: .....max. 0,25 mm (at 5 % of maximum thrust load)

Grease: see chapter 4.2 Maintenance - extent and periodicity.

1.9.1 Mechanical Connection

- with pillars
- with flanges

Main and connecting dimensions are given in the **dimensional drawings**.

1.9.2 Electric connection

To the terminal board (X, X1):

- 3 terminals (PE, N, L) on the sourcing board with cross-section of connection wire 0,05 - 1,5 mm^2 for solid wire and for flexible wire. Max. terminal screw tightening torque 0,5 N.m , max. voltage 300 V
- 5 terminals (READY, R1, R2) with cross-section of connection wire 0,05 – 1,5 mm^2 for solid wire and for flexible wire. Max. terminal screw tightening torque 0,5 N.m. , max. voltage 300 V
- 10 terminals (COM, CLOSE, OPEN, I1, I2, +IN, -IN, SH, +L, -L) with cross-section of connection wire 0,05 – 1 mm^2 for solid wire and for flexible wire. Max. terminal screw tightening torque 0,19 N.m., max. voltage 300 V.

Attention: Thermic resistance incoming wires must be minimum +80°C

Wire cross-section conversion table (mm^2 – AWG)	
Wire cross-section	
mm^2	AWG
0,05	30
0,2	24
0,34	22
0,5	20
0,75	18
1,5	16
2,5	14

Tightening torque conversion table (N.m – lbs.-in)	
Tightening torque	
N.m	lbs.-in
0,2	2,7
0,3	4
0,5	7

Cable glands :

- 3 cable glands - cable diameter from 6 to 10,5 mm.

Protection terminals:

During start-up - during installation of device:

- outside and inside ground terminal must be connected for safe operation of the actuator. The position of the outside and inside ground terminal can be seen in Fig. 1a and Fig. 1b. For forcing - in wires in external ground terminal be needed use pliers HP3 for insulated eyelet (firm CEMBRE).
- a switch / circuit breaker must be installed on the power supply line, as close as possible to the device, easily accessible to operators and identified as the actuator isolation switch.

Outside and inside, are together connected and marked with the mark of protection grounding.

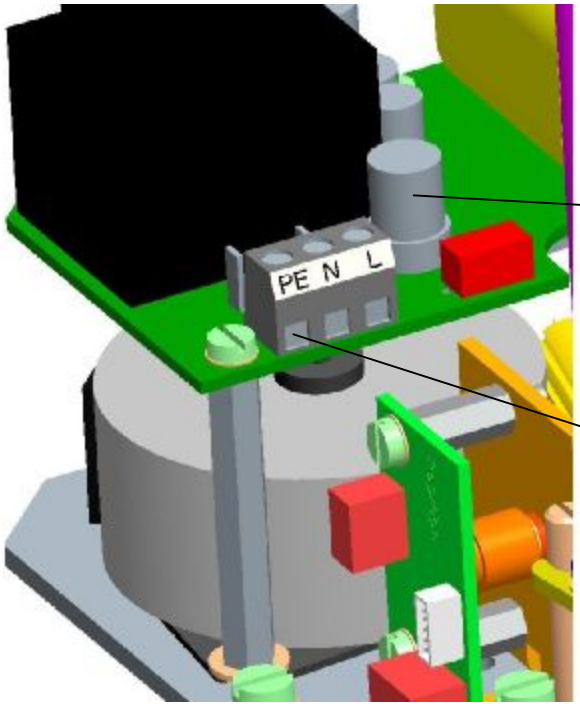
The electric connection should be made according to wiring diagrams pasted into the upper cover of the EA.

Fuses:

Actuator power supply board is installed with power supply fuse (F3). Location of the fuse on the power supply board can be seen in **Fig.1a**.

Fuse values and parameters:
- for voltage 24 V AC T 1,6 A /250V
- for voltage 110-120 V AC T 0,315 A /250V
- for voltage 220-240 V AC T 0,160 A /250V

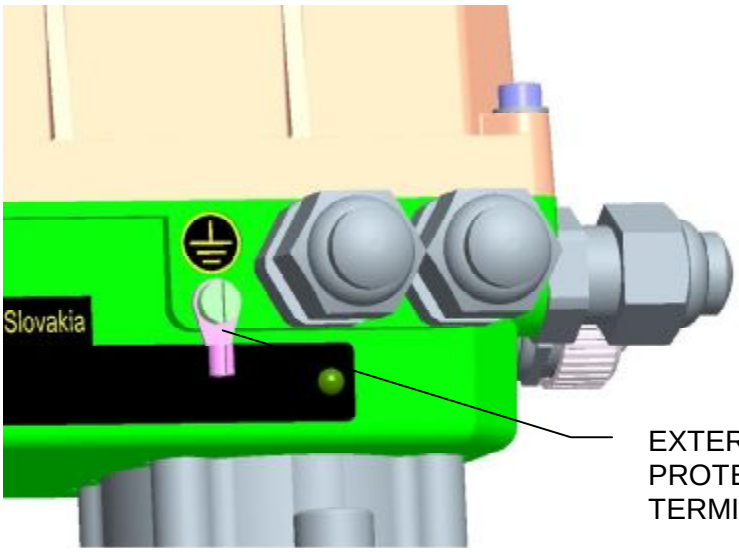
Warning: Minimum thermal resistance of power supply cables and wires must be +80°C.



FUSE SUPPLY (F3)

INTERNAL
PROTECTION
TERMINAL

Fig.1a



EXTERNAL
PROTECTION
TERMINAL

Fig.1b

1.10 Conservation, packing, 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 palettes), chemicals and foreign interventions
- There shall be no corrosive gases present in the storage areas.

The EA are delivered in solid packages guaranteeing resistance in accordance with IEC 60 654.
Package is a box. Products in boxes is possible to load on the pallets (pallet is returnable). On the outer side of the package is stated:

- manufacturer label,
- name and type of product,

- number of pieces,
- other data – notices and stickers.

The forwarder is obliged to secure packed products, loaded on transportation means, against self-motion; if open transportation means are used, to secure their protection against atmospheric precipitations and splashing water. Displacement and securing of products in transportation means must provide their stable position, exclude the possibility of their inter-collision and their collision with the vehicle walls.

Transportation can be executed by heatless and non hermetic spaces of transportation vehicles with influences within the range:

- temperature: -25° C up to +70° C (a strange version – 45 ° C up to + 45 ° C)
- humidity : 5 up to 100 %, with max. water content 0.028 kg/kg of dry air
- barometric pressure 86 up to 108 kPa.

Upon receiving of EA examine, if during transportation, resp. storing did not come to its damage. At the same time verify, if the data on the labels corresponds to accompanying documentation and purchase-sale contract / order. Eventual discrepancies, faults and damages should be reported without any delay to supplier.

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 palettes), chemicals and foreign interventions, at ambient temperature from -10°C up to +50°C and at relative air humidity max. 80 %.

It is not acceptable to store EA outdoors, or in areas not protected against direct climate influence!

Eventual damages to surface finish remove without delay – thus preventing damage by corrosion.

If storing takes longer than 1 year, it is necessary to inspect lubrication fillings before putting EA into operation and in case of need perform maintenance.

Assembled EA, but not put into operation is necessary to protect by the equivalent method as during storage (for example suitable protective cover).

After assembly to the armature in free and wet areas, or in areas with temperature changes, connect without delay heating resistor – thus preventing damages caused by corrosion from liquefied water in the control area.

Excessive preserving grease remove just before putting EA into operation.

1.11 Assessment of the product and packaging and removal of contamination

The product and its package are made of recycling materials. Do not throw the single parts of the package and of the product after their life but sort them according to instructions in corresponding executives or regulations of environment protection, and allow their recycling.

The product and its packing are not a source of any environment pollution or contamination and do not contain any dangerous waste.

2. Installation and dismantling of actuator

Note: Check again whether the EA is place 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 of mounting the EA onto the valve:

- Check again whether the EA was not damaged during storing.
- Check whether the adjusted operating stroke and connecting dimensions of the actuator (see the nameplate) are in compliance with the valve parameters.
- In case of inconsonance, perform adjusting according to the part Adjusting of actuator.

2.1 Installation

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 half-position.

2.1.1 Mechanic connection of electric actuator to the armature

STR 0PA electric actuators can be assembled and operated in any position. In horizontal position an actuator with two columns should be placed with columns above each other

During assembly must be take care for the space for disassembly of upper cover and with the option to set up elements.

Mechanic connection with connecting dimensions in accordance with standard DIN – Fig.2

Connecting procedure:

- Check the labels, whether the travel of electric actuator and travel of armature are corresponding.
- Set the armature (B) and electric actuator into position „closed".
- Put electric actuator (A) on the armature (B).
- Screw the actuator shaft (8) into the valve coupling (15) until the actuator flange seats on the valve body (13).
- Tighten the screws (9) to connect the actuator flange (5) with the valve body (13).
- Check connection dimensions in accordance with Fig.
- Turn the valve output shaft by one revolution and lock it with the nut (12).

A ..... electric actuator
1 ..... disengagement button
2 ..... hand wheel
5 ..... actuator flange
6 ..... pillar
8 ..... actuator output shaft
9 ..... screw

B ..... valve
10 ..... valve output shaft
12 ..... locking nut
13 .....valve body
15 .....valve coupling

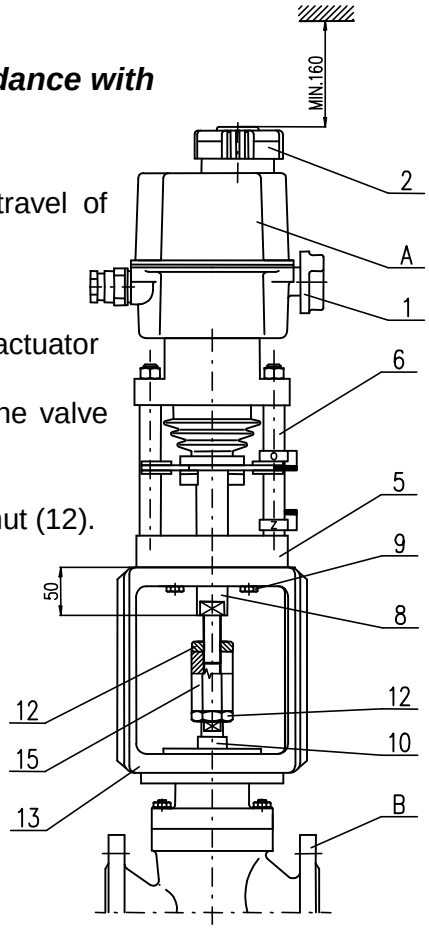


Fig.2

Mechanical connection for pillar version - Fig. 3

Connection procedure:

- Check the labels, whether the travel of electric actuator and travel of armature are corresponding.
- The valve (B) is put to the position „closed“ and the actuator (A) to a half-position.
- Loosen the nuts (4) on the pillars (6).
- Screw the pillars (6) with the cross system into the valve flange (13).
- Tighten the pillars (6) nuts.
- Unscrew the coupling (3) screws (7) to dismantle the coupling into parts.
- Screw the coupling (3) nut onto the valve shaft (10) to reach the connecting size L in accordance with the table and the actuator nameplate.
- Unscrew the coupling (3) nut by one revolution and lock it by a nut (12).
- Use the hand wheel (2) to put the actuator output shaft next to the valve (10), and screw the coupling parts together.

A ..... electric actuator
1 ..... disengagement button
2 ..... hand wheel
3 ..... coupling nut
4 ..... pillar nut
6 ..... pillar
7 ..... coupling screw
B .....valve
10 .....valve shaft
12 .....locking nut
13 .....valve flange

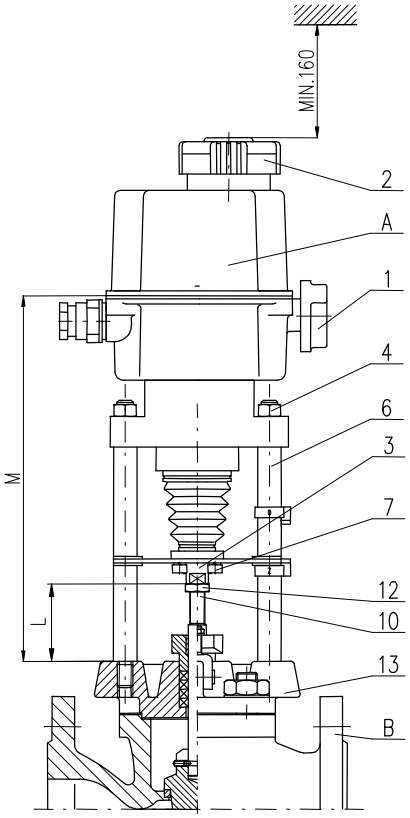


Fig. 3

Mechanic connection with the flange - (Fig. 4)

Connecting procedure:

- Check the labels, whether the travel of electric actuator and travel of armature are corresponding.
- Set the armature (B) into position „closed“ and set electric actuator (A) into half-position.
- Put electric actuator (A) on the armature (B).
- Unscrew the clutch bolts (3) and disassembly parts of the clutch.
- Screw the nut of clutch (3) on output shaft of armature (10) in a way, that the flange of electric actuator (5) will fit to the flange of armature (13).
- Connect the flanges by tightening of central nut (11).
- Check connecting dimension "H" between the clutch and the flange (13) in the position of contact with pillars according to dimensional drawing and a type number on the plate of electric actuator.
- Release the clutch nut (3) by one turn counter clockwise and secure it by nut (12), thereby reaching pre-stress securing proper seating of armature.
- By hand wheel (2) approach output shaft of electric actuator to the shaft of armature (10) and fasten parts of the clutch by bolts.

A ..... electric actuator
1 ..... disengagement button
2 ..... hand wheel
3 ..... coupling nut
4 ..... pillar nut
5 ..... actuator flange
6 ..... pillar
B ..... valve
10 ..... valve shaft
11 ... connecting nut
12 .....locking nut
13 .....valve flange

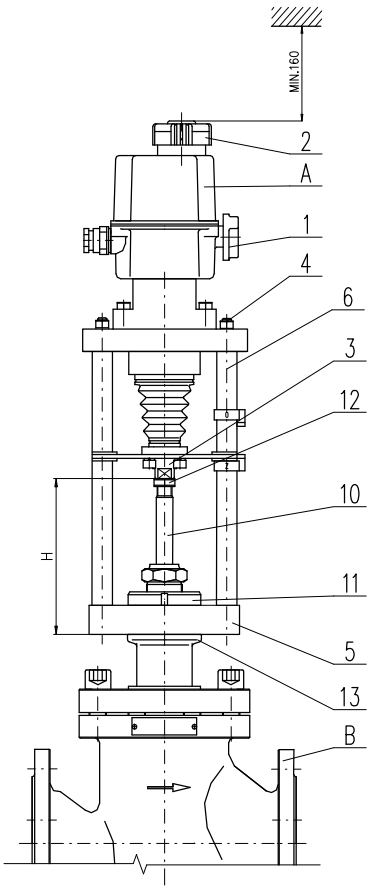


Fig.4

Mechanical connection for versions with flange TGL (Fig. 5)

Connection procedure:

- Check the labels, whether the travel of electric actuator and travel of armature are corresponding.
- Set the armature (B) into position „closed“ and set electric actuator (A) into half-position.
- Put electric actuator (A) on the armature (B).
- Unscrew the clutch bolts (3) and disassembly parts of the clutch.
- Screw the nut of clutch (3) on output shaft of armature (10) in a way, that the flange of electric actuator (5) will fit to the flange of armature (13).
- Connect the flanges by tightening of central nut (11).
- Check connecting dimension "L" between the clutch and the flange (13) in the position of contact with pillars according to dimensional drawing and a type number on the plate of electric actuator.
- Release the clutch nut (3) by one turn counter clockwise and secure it by nut (12), thereby reaching pre-stress securing proper seating of armature.
- By hand wheel (2) approach output shaft of electric actuator to the shaft of armature (10) and fasten parts of the clutch by bolts.

A ..... electric actuator
1 ..... disengagement button
2 ..... hand wheel
3 ..... coupling nut
5 ..... actuator flange
6 ..... pillar

B ..... valve
10 ..... valve shaft
11 ..... connecting nut
12 ..... locking nut
13 ..... valve flange

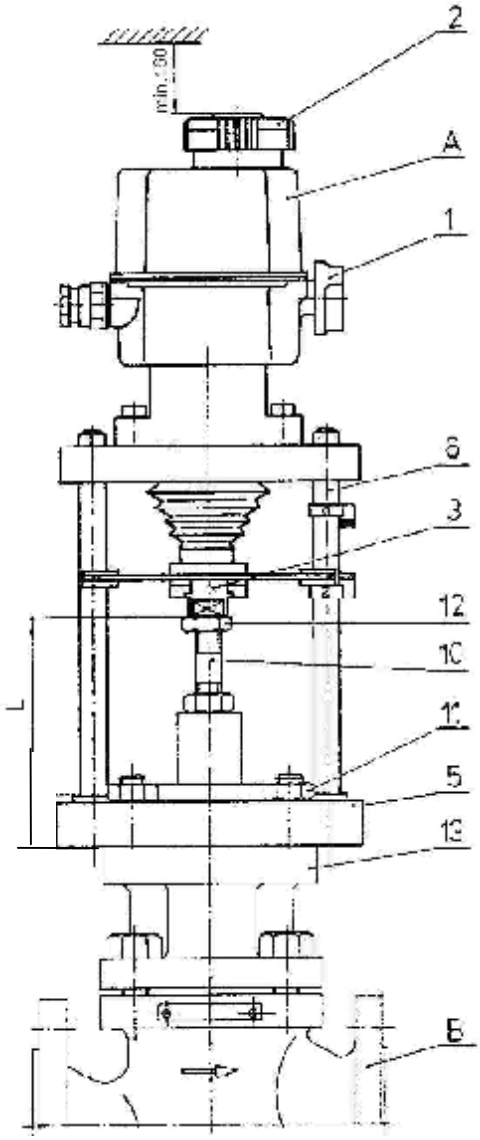


Fig. 5

2.1.2 Electric connection and checking of function

Follow up with connecting the EA with mains or master system.

1. *Follow instructions in the part "Requirements for professional qualification"!*
2. *While laying electrical line abide by the instructions for heavy current installations. Power supply cables must be of the type approved. Minimum thermal resistance of power supply cables and wires must be +80°C.*
3. *Cables to terminal boards or connectors lead through cable glands.*
4. *Before putting EA into operation it is necessary to connect inside and outside grounding terminal.*
5. *Wires of input control signals to controller and output signals from current converter it is necessary to lead them separately with thrust wires or it is necessary to use shielded wires.*
6. *To prevent moisture from entering the actuator around the connecting cables, the cables must be sealed with silicone material at the point of penetration through device shell.*

Connecting with the master system:

EA can be controlled by: - by analogue signals through the built-in controller
- by binary inputs 24 V DC

EA is connected according to wiring diagram under the cover of EA.

Notes:

1. Wires of input control signals to controller and output signals from current converter it is necessary to lead them separately with thrust wires or it is necessary to use shielded wires.
2. Together with EA are delivered sealing cable glands which make possible enclosure protection IP68 in case of tight mounting onto supply lead. For required enclosure it is necessary to use rings according to real diameter of cable and required thermal resistance.
3. When fastening the cable it is necessary to count with allowable diameter of bending so it will not be damaged or there will not be deformation of sealing element of cable bushing. Supply cable have to be fastened to solid construction furthest 150 mm from cable glands.
4. Sealing areas of cover of the control part have to be clean before repeated fastening.
5. Reversation of EA is guaranteed when time interval between switch-on and switch-off the power supply for reverse direction movement of output part is min. 50 ms.

In version ***STR 0PA*** it is necessary to do **autocalibration** in operation according by enclosure assure the optimal function.

Abide by instructions of valve producers, whether switching-off in end positions is to be realised with position or thrust .

2.2 Dismantling

Before dismounting it is required to disconnect the EA from power supply!
Do not connect and disconnect live connectors!

- Disconnect the EA from mains phases.
- Disconnect the leads from the EA terminal boards and loosen the cables from cable glands.
- Loosen the fixing screws of the EA flange and of the coupling and disconnect the EA from the valve.
- 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 the Chapter 1.2.3 Requirements for Professional Qualification …*
Keep safety regulations!

EA are delivered adjusted onto parameters according to nameplate from Production plant.

Adjustment is made onto mechanical and electrical connected actuator. This chapter describes how to set up the EA to parameter values within a range applicable for the software. Location of adjustable parts of control board is on **Fig. 6**.

Adjusting is possible:

- by operating the control unit buttons **(see Fig. 6);**
- through the programme once the EA is connected to the PC using the communication cable.

For the specific adjustment procedure or individual parameters reset see individual appendixes **74 1053 02**.

For facilitating the simple setting of required operation parameters, the control unit is equipped with :

- four setting buttons: MENU, P, O, C
- six signal lamps according (LED diode) to **Fig. 6**

Status indication by means of LED diodes:
LED ERROR (red) – blinks red in case of failure eventually lights in the parameter setting mode
LED OPEN / MENU (green) – in the ON/OFF mode it lights with a control action for the **opening** direction eventually blinks with accessing the MENU mode
LED CLOSE / PAR (red) – in the ON/OFF mode it lights with a control action for the closing direction eventually blinks besides the chosen parameter in the menu and lights up at writing the parameter into the memory
- LED I1 / SEL (yellow) – permanent lights with active input I1, or flash in the mode of parameters set up.
- LED I2 (yellow) – permanent lights with active input I2
- LED POWER (green) – it light on at leading the power supply

Electronics - programme selections option

- **relay R1; R2**: : disabled; open position, close position, torque-open, torque – close, torque open or torque close, torque open or position open, torque close or position close, open, close, movement, movement flasher, to position, from position, warning, remote control, local control (not valid for this type of the EA), control shut off.
- **relay READY**: errors, errors or warnings, errors or no remote, errors or warnings or no remote.
- **output signál** (from EPV passive): 4 to 20 mA; 20 to 4 mA.
- **control programme options** (regulating): 2P, 3P, 3P/2P I2
- **input control signal** (N): 0/4/12 up to 20 mA, 4 up to 12 mA, resp. 0/2 up to 10 V.

- **input I1**: DISABLED, ESD, DBL (local releasing - not valid for this type of the EA), STOP
- **input I2:** DISABLED, ESD, DBL (local releasing - not valid for this type of the EA), 2P (with active controller - to enable program control 3P/2P I2 - enables control by binary inputs 24V DC with active input I2).
- **FAILURE REACTION**: OPEN, CLOSE, STOP, SAFE POSITION

The identical functions cannot be set on **I1** & **I2** inputs in addition to the OFF state (e.g., if the ESD) function is set on I1 input, it is not possible to select the ESD function on **I2** input at the same time.

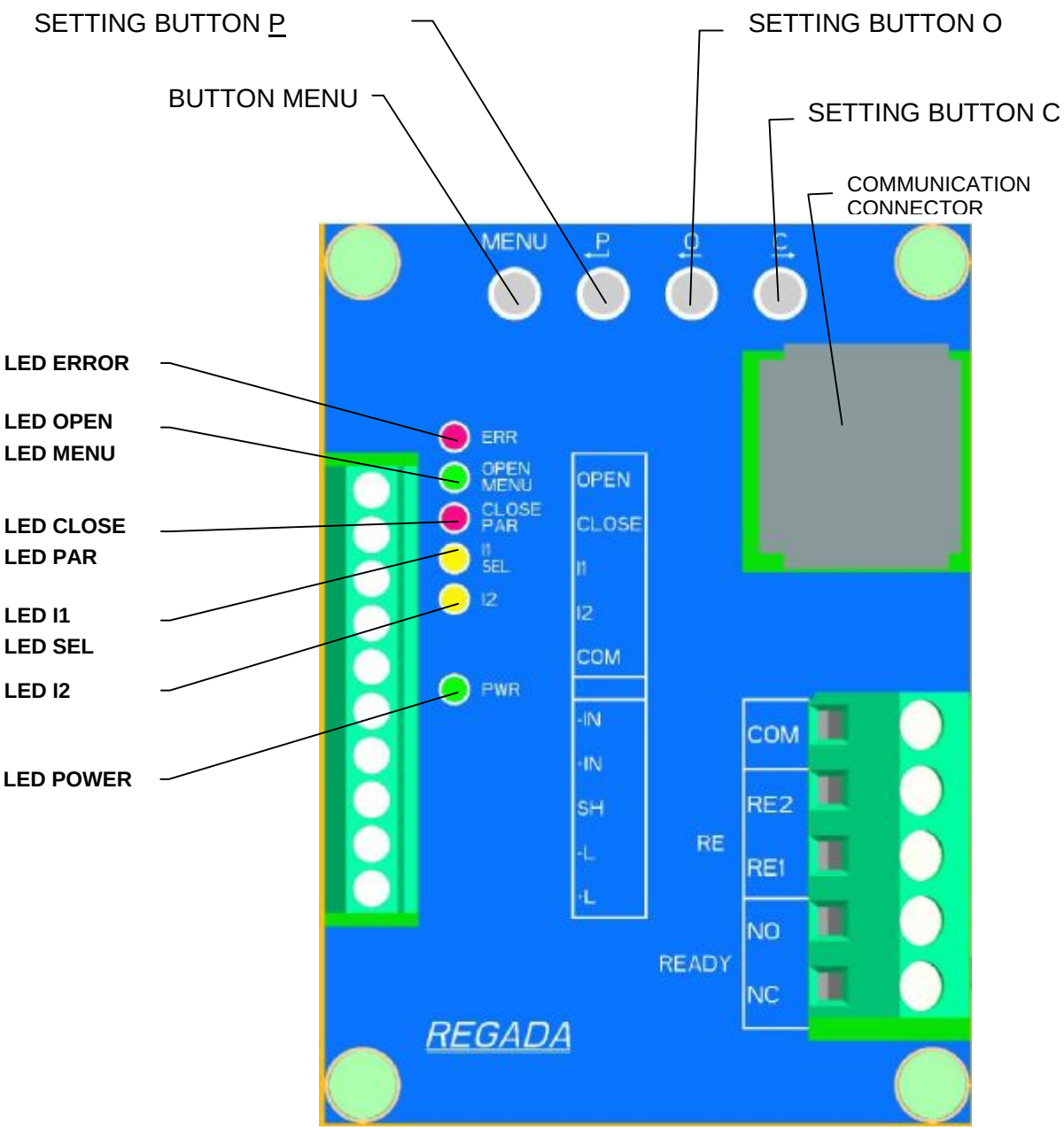


Fig. 6

3.1 EA control set-up options (regulating)

2P CONTROL
Setting-up: **2P** control + other functions, in addition to STOP on I1 terminal:
The EA moves either to the OPEN or CLOSE direction with **24V DC** voltage supplied to terminals **OPEN or CLOSE.** The EA stops if power supply is cut-off or the end position is reached.

2P PULSE CONTROL
Setting-up: **2P** control + **STOP** function on I1:
The EA moves either to the OPEN direction or closes with **24V DC** voltage pulse supplied on connectors **OPEN** or **CLOSE.** The pulse may not be shorter than xx seconds.
The EA stops – shutting off - once the 24V DC voltage is supplied on I1 connector (STOP) or the set end position is reached.

3P CONTROL (REGULATING)
Setting-up: 3P control + other functions, in addition to STOP on I1 and other ones in addition to 2P on I2 input.
The EA moves either to the OPEN or CLOSE direction with **0/4/12 up to 20 mA, 4 up to 12 mA (0/2 up to 10V) input control signal** supplied on terminals **+IN, -IN.** The EA stops once the required position is reached (corresponding with the input control signal supplied) or the set end position is reached.

Note: The ES fails to stop in case that the STOP function is selected on I1 input with 3P control mode and 24V DC voltage supplied on I1 terminal.

3P/2P switched over to I2
Setting-up: **3P/2P control switched over to I2** (2P function is automatically selected for I2 input function in selecting this control option) + other functions in addition to STOP on I1:
The EA moves either to the OPEN or CLOSE direction with **0/4/12 up to 20 mA, 4 up to 12 mA (0/2 up to 10V) input control signal** supplied on terminals +**IN, -IN.** The EA stops once the required position is reached (corresponding with the input control signal supplied) or the set end position is reached.

The EA stops to respond ***0/4/12 up to 20 mA, 4 up to 12 mA*** **(0/2 up to 10V)** input control signal and rests in case of **I2 active input** (with 24V DC constantly ON or OFF – as per I2 function set-up to ACTIVE – or supplied on I2 connector). The EA is allowed to move either to the **OPEN** or **CLOSE** direction with **24V DC** voltage supplied to terminals **OPEN** or **CLOSE.** The EA stops if power supply is cut-off or the end position is reached. The EA stops to respond to the input control signal and fixes its position once the supply voltage on I2 is OFF.

3P/2P switched over to I2 (PULSE 2P)
Setting-up: **3P/2P** control switched over to **I2** (2P function is automatically selected for I2 input function in selecting this control option) + other functions in addition to STOP on I1:
The EA moves either to the OPEN or CLOSE direction with **input control signal *0/4/12 up to 20 mA, 4 up to 12 mA* (0/2 up to 10V)** supplied on connectors **+IN, -IN.** The EA stops once the required position is reached (corresponding with the input control signal supplied) or the set end position is reached.
In case of active input I2 (permanent supply of voltage 24 V DC on the terminal I2 eventually by switching-off- according to the setting of the function I2 AKTIV) the electric actuator stops react on the input control signal ***0/4/12 up to 20 mA, 4 up to 12 mA*** (0/2 to 10V) and stops. In this condition it is possible to control the electric actuator in the direction OPEN, or CLOSE by 24V DC voltage impulse, that is supplied on the terminals OPEN, or CLOSE.
After supplying of 24 V DC impulse on the terminal I1 (STOP) or after reaching the setted end position the actuator stops.
After switching-off of supply voltage on the terminal I2 the electric actuator starts to react on the input control signal and moves in corresponding position.

3.2 Procedure for setting individual parameters and the register of errors and warnings

- is given in the separate attachment 74 1053 02 of these operating instructions.
The factory default setting of individual programmes shown in Table 2, as long as otherwise specified by the customer:

Table 2

Factory default settings of individual parameters in version without local control; possibility to set-up by operating the control unite buttons.
For the individual parameters set-up see appendix **74 1053 02**

MENU	**NAME**	**FACTORY SETTING-UP**	
1	TORQUE	100% of value shown on nameplate for OPEN & CLOSE direction.	
2	END POSITION	**- C = Position + O = Position** - end position switching closed and open from position **if valve type is not specified** **- C = Torque + O = Position** - closed in end by thrust position and end position switching open from position for single-seat valves **- C = Torque + O = Torque** – switching in both end positions by thrust for double-seat valves	
3	TORQUE BLOCKING	- 2 sec. blocking time - 5% blocking position for OPEN & CLOSE direction	
4	READY RELAY	- errors (READY COM-NO relay contacts closed in error free conditions)	
5	RELAY 1...5	- position O for relay relay R1 - position C for relay R2 - from position 95% for relay R 1 - from position 5% for relay R 2	
6	CPT (output signal)	4 to 20 mA	
7	REGULATION – (according to specification)	2P	3P
	ANALOG INPUT	-	4 to 20 mA (2 up to 10 V)
8	DEAD ZONE	-	3 %
9	FAILURE REACTION	STOP	

Other parameters set-up is possible to change only by using the PC software

TITLE	FACTORY SETTING-UP
THERMOSTAT TEMPERATURE	25 °(space heater OFF temperature)
INTERNAL DEAD ZONE	2 % (only for 3P)
SAFE POSITION	0 %
FUNCTION I1	ESD
ACTIVE I1	high level
FUNCTION I2	disabled
ACTIVE I2	high level
THERMAL FUSE FAILURE	functionless with this EA type
THERMAL FUSE RESET	functionless with this EA type
CYCLE MODE	disabled
CYCLE RUNNING TIME	10 s
CYCLE PAUSE	50 s
CYCLE POSITION O1	0 %
CYCLE POSITION O2	100 %
CYCLE POSITION C1	0 %
CYCLE POSITION C2	100 %
O AND C TOLERANCE	1 %
CREATE BACKUP	START
RESTORE FROM BACKUP	START
RESTORE FACTORY SETUP	START
ACTIVE ERRORS	CLEAR

Warning 1: W*hen the input control signal is set to the value 0 ¸ 20 mA (0¸10V**)**, or 20 ¸ 0 mA (10¸0V) and the input control signal fails, then the EA keeps the position as with a 0 mA input signal (EA doesn't recognise between input signal fail and 0 mA (0 V) input signal).*

Warning 2: Calibration process *doesn't run if triggered in time when the EA is overloaded (EA is switched off from overloading - i.e. one of the power switches S1 or S2 is switched on). In such case, the EA must be moved in a position in which no one of the S1 and S2 power switches is switched on, and to start the calibration again.*

Warning 3: Calibration must be completed after each stroke adjustment by more than 10%.

*Warning 4: Operate adjusting button **P** on control unit to activate the calibration process or from the programme once the EA is connected to the PC. All auto-calibration start methods have been equal.*

Rotation direction definition of the electric actuator´s output element

The output rod of the actuator while rotating in the direction "Close" protrudes from the actuator. It means that the direction of rotation of the actuator is set as **clockwise**.

In case the direction of rotation shall be changed the parater „Direction of rotation of the actuator" must je adjusted as **anticlockwise**. This parameter can be adjusted through the PC only by use of the EHL Explorer SW. The PC must be connected to the actuator via communication cable and the window "Parameters" used for direction adjustment.

3.3 Putting an EA into operation when the EA is set up and connected with the armature already in the production plant (starting the calibration)

If EA is delivered from manufacturing plant joined with valve, or with control device, **calibration** must be performed to ensure correct operation, under actual pipeline conditions.
The procedure is as follows:

- fit the given assembly into the specified technology complex
- connect the EA on the supply voltage electrically according to the wiring diagram and chapter Electrical connection....
- introduce the EA into an half-position (see *Note 2* presented above)
- switch on the supply voltage
- **start the EA calibration** by pressing the **P** button on the control unit **for 2 seconds as minimum** until LED ERROR (red), LED MENU (green) and LED PAR (red) light up – see also the procedure in the separate attachment **No.74 1053 02**
- release the **P** setting button
- after releasing the **P** button the calibration procedure starts – inertia measuring
- after the calibration procedure is finished, the EA is prepared for its operation and starts to response to control inputs
- if changes to some parameters would be necessary, proceed please according to the instructions given in the separate attachment **No. 74 1053 02**.

3.4 Putting an EA into operation when the stroke and parameter setting done by the producer suit to your needs

When an EA is delivered from the producer without armature and the setting of stroke (stroke end positions) and other parameters done by the producer suit Your needs, please proceed as follows:

- connect the EA with the armature to be controlled (**according to chapter 2**) and fit this assembly into the specified technology complex
- connect the EA electrically according to the wiring diagram and chapter Electrical connection ...
- introduce the EA into an half- position (see *Note 2* presented above)
- switch on the supply voltage
- start the EA calibration by pressing the **P** button on the control unit **for 2 seconds as minimum** until LED ERROR (red), LED MENU (green) and LED PAR (red) light up – see also the procedure in the separate attachment No. 74 1053 02
- release the **P** setting button
- after releasing the **P** button the calibration procedure starts

- after the calibration procedure is finished, the EA is prepared for its operation and starts to response to control inputs
- if changes to some parameters would be necessary, proceed please according to the instructions given in the separate attachment No. 74 1053 02.

3.5 Putting an EA into operation when it is necessary to do a change to the stroke (setting new end positions), and the other parameter setting done by the producer suits to your needs

When an EA is delivered from the producer without armature, and the setting of other parameters done by the producer suit to your needs, and it is necessary to do a change to the EA stroke, proceed as follows:

- connect the EA with the armature to be controlled (according to chapter 2) and fit this assembly into the specified technology complex,
- connect the EA electrically according to the wiring diagram and chapter Electrical connection... ,
- turn on the power supply, without connection of the control signals fed into ES (input control signal - ES reports error/warning No.2 - no binary input),
- set the ES (*using manual control**) to end position **closed** and push button **C for at least 2s,** until LED ERROR (red), LED MENU (green) and LED PAR (red) come on – the **closed** end position is thus recorded in memory – see description in separate annex **No. 74 1053 02**,
- release the **C** setting button,
- set the ES (*using manual control**) to end position **opened** and push button **O for at least 2s,** until LED ERROR (red), LED MENU (green) and LED PAR (red) come on – the **opened** end position is thus recorded in memory – see description in separate annex **No. 74 1053 02**,
- **release** the **O** setting button,
- **introduce** the EA into an half position (see *Note 2* presented above),
- by pressing the **P** pushbutton on the control unit **for at least 2s** activate the EA calibration until LED ERROR (red), LED MENU (green) and LED PAR (red) come on – see also description of the procedure in separate annex **No. 74 1053 02,**
- release the adjustment pushbutton **P -** upon release of the **P** pushbutton, the calibration process is started,
- turn on the control signals, EA is ready for operation and responds to control inputs,
- if any of the parameters need to be changed, proceed according to the instructions in separate annex **No. 74 1053 02,**

* *This* This applies to setting of EA to be controlled by 2P and 3P or 3P/2P switched by I2, at the same time with standard setting of menu 9 FAILURE REACTION: STOP!
If the input control signal is set to one of the ranges starting from 0 mA, it is necessary to change the range to a different one. If this is not the case and a control signal is not supplied, the servodrive output component will take up the position corresponding to 0 mA. After recording the new limit positions change the value of the input control signal and response to error to the required parameters.
Note: in cases where the sequence is implemented using a PC in the EHL Explorer programme or using local control, neither the change of response to error nor disconnection of the control signals is required.

3.6 Setting other parameters

If changes to some parameters would be necessary, proceed please according to the instructions given in the separate attachment **No 74 1053 02**.

3.7 Gear unit adjustment

Switching-off thrusts for the „Opening“ direction (S1 power switch) and for the „Closing“ direction (power switch S2) as well are set by the producer to a certain value with a ±10% tolerance. These values are given in the specification table No.1.

It isn’t possible to set and change the gear unit to different thrust values without using a test equipment for measuring the thrust. When overloaded, EA switches off in any position of the stroke beyond the set range of the blocking of the switching-off from thrust in the stroke end positions. The blocking of the switching-off from thrust can be chosen for a certain range of the stroke starting from the stroke end position, for a period from 0 up to 20 s (see setting the **MENU 3** in the separate attachment No. **74 1053 02**).

3.8 Error messages from the control unit

The EA electronics makes possible to identify some failures of EA. The failure is signalled by flickering LED ERROR (red) on the control unit **(Fig.6)**. An error has also been indicated on the LED display. An error is indicated on the LCD display in the local control EA version.
The list of errors and warnings compiled by the producer is presented in **table 3** (chapter 4.3).
The list of errors and warnings and the way for identifying a given error as well are presented in the separate attachment No **74 1053 02**.

A field serviceman is only entitled to change the errors and warnings set using the programme once the EA is connected to the PC.

4. Service and Maintenance

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 EA STR 0PA requires just negligible service. Proper putting into operation is a recondition of reliable operation.

The service of the EA leads from the operation conditions and usually resides in information processing for further arranging of required functions.

The stuff has to perform prescribed maintenance to prevent the EA during operation against impacts of environment, which exceed the frame of allowed influences.

Manual control:

If needed (during adjusting, function checking, failure etc.) the stuff can change setting of the controlled body using the handle.

Instructions for manual control:

- Switch the power supply off.
- Turn the button for gear disengagement to the right by 90° (Fig. 10), the button arrow shows the symbol of hand) what disengages the gear in the actuator.
- Push and turn the hand wheel located on the actuator upper cover. While turning counter clockwisely the valve is turning in the direction "open". Having the valve in the required position turn the button for gear disengagement to the position "motored operation" what engages the gears[1)]. Put the hand wheel back to its original position.

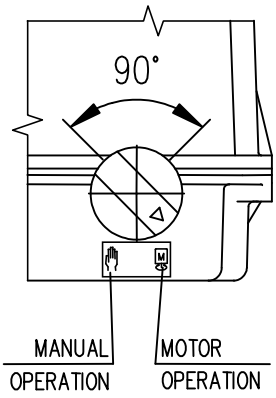


Fig.10

[1)] In case, when after return of pushbutton for gear disconnection to position motoric operation will the gear not be meshed, it is necessary to turn by the wheel of manual control in order to mesh the toohed wheels.

One of the possible errors may be that the button disconnecting the gear after the manual control was not released to motor control position. In this case the EA will stop after certain time of motor operation.

Manual control of the actuator does not result in derangement of the set limit positions provided that the connection dimensions are complied with according to a specific dimension sketch as well as the corresponding stroke

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.

Lubrication:

- gear part – grease HF 401/0 (GLEIT-μ) resp. GLEITMO 585 K
- linear adapter – grease GLEIT- μ - HP 520M.

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.

- Every six months it is recommended to perform one check move in frame of adjusted operation stroke to verify reliability of functioning with setting back to the original position.
- If the audit rules do not determine else the inspection of EA is performed ones a year and tightening of all connecting and grounded screws have to be checked to avoid overheating.
- After 6 months from putting of EA into operation and once a year it is recommended to check tightening of fixing screws between the EA and the valve. (Tighten the screws with the cross system.)

- While connecting and disconnecting of the EA check the tightness of cable glands – those with damaged sealings should be replaced by new ones of the approved type!
- Keep the EA clean and take care about removing impurities and dust. The cleaning has to be performed regularly according to the operation possibilities 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.

The EA electronics makes possible to identify some failures of the electric actuator. Failures are signalled with the flickering LED ERROR on the control unit **(Fig. 6)**. The list of errors and warnings and the way for identifying a given error as well are presented in the separate attachment No 74 1053 02.

The list of errors and warnings compiled by the producer is presented in table 3. A change to the list of errors and warnings in the EA is only possible within a service intervention, through the program installed in a PC.

Table 3 setting error flags and warning flags as at the delivery		
PARAMETER	**ERROR**	**WARNING**
ESD		X
Analog Input		X
Wrong command	X	
Torque		X
Torque check		X
Torque calibration	X	
Regulator calibration		X
Stroke (turns sum)	X	
Wrong position	X	
Spin	X	
Spin direction	X	
RAM	X	
ROM	X	
EEPROM		X
Bus	X	
I2C	X	
Reset		X
Voltage +5V		X
Parameters	X	
Set mode		X
Relay		X
Temperature <		X
Temperature >		X
Phase	X	
Power frequency	X	
Thermal fuse	X	
Manual control	X	
Position module	X	
Position module type	X	
Position sensor 1	X	
Position sensor 2	X	
Position sensor 3	X	
Position sensor 4	X	
Torque module	X	
Torque module type	X	
Torque sensor	X	
LED module	X	
LED module type	X	
LCD module	X	
LCD module type	X	
Power Supply/Relay module	X	
Power Supply/Relay module type	X	

Notes: **X** – the error or warning flag is activated.
With the **error flag**, the EA takes the positron defined for the FAILURE REACTION function eventually stops (depending on the kind of the error), and it will not operate until the error is removed.
With the **warning flag**, the EA continues in operation.
The user is advised on error or warning through the READY relay (according to the relay setting) *flickering LED ERROR on the control unit or such error is identifiable through the program after connecting a PC to the EA*
One of the possible errors may be that the button disconnecting the gear after the manual control was not released to motor control position. In this case the EA will stop after certain time of motor operation.

Note 1*: in some cases having the error removed the electric actuator must be restarted by switching-off the voltage supply to the electric actuator for about 3 sec.*
Note 2*: in case a manual control action is finished and the control button isn't returned to the position for the motor operation, after a certain time the control unit evaluates such condition as the error No 44 and signals it by the flickering LED ERROR on the control unit or such error is identifiable through the program after connecting a PC to the EA.* The EA remains stopped until the error is removed. Once the manual

control knob is brought to the motor drive operation position, disconnect the supply voltage for about 3 seconds and reconnect it.

If some EA element would fail it can be replaced with a new one. The **producer's service centre** only is allowed for such replacement.

If your EA would fail, proceed please according to the instructions for the under guarantee and after-guarantee service.

For repairing eventually the electronics use the fuse – see Fig.1a (F3) for example SHURTER MSF 250, or sub miniature SIBA 164050 xxx (see chapter 1.9.2), which is located on source board.

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

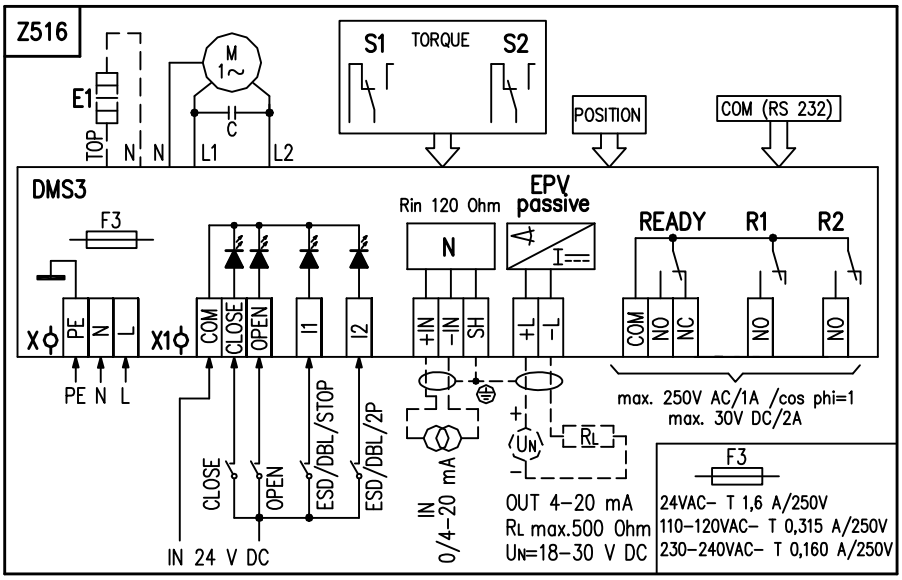
The EA is delivered with the service handle and communication cable DB-9F/RJ45.

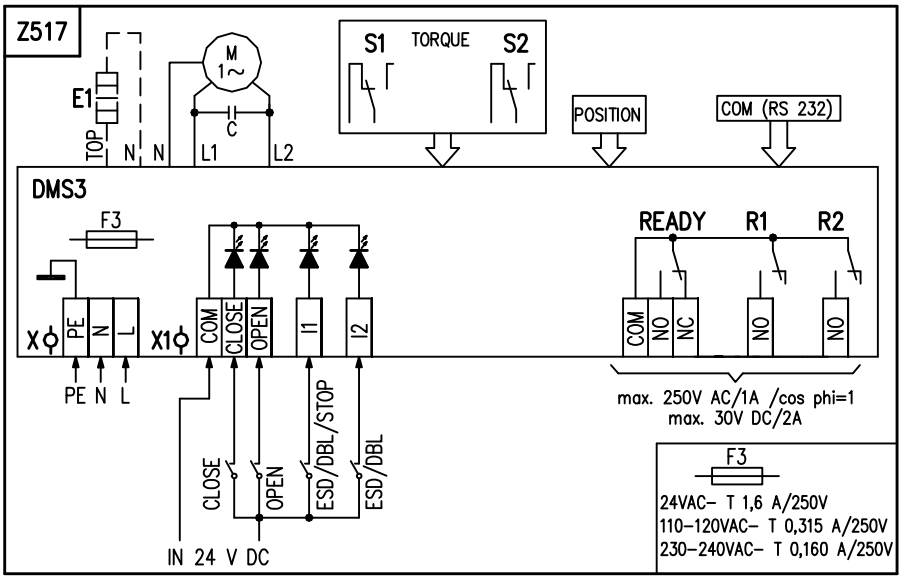
5.2 Spare part list

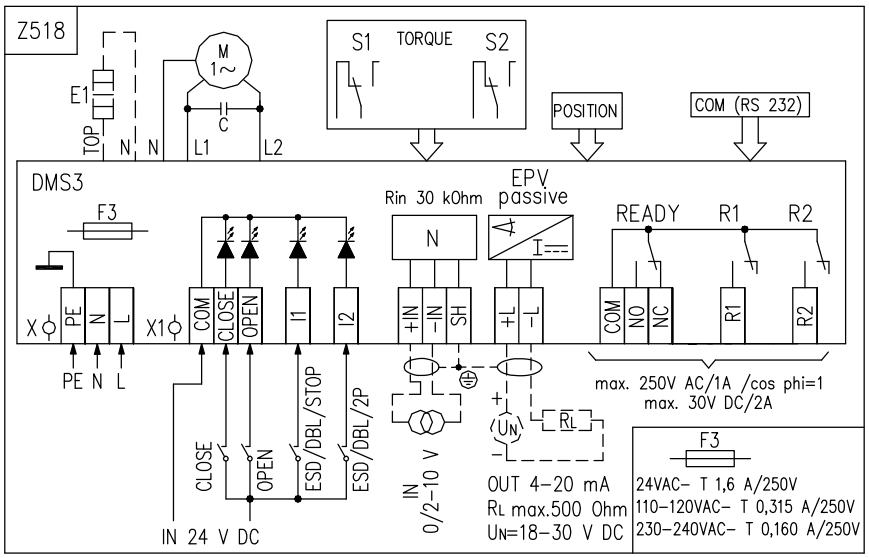
Table 4 Spare part	**Order Nr.**	**Position**	**Figure**
Electric motor; 2,75 W; 230/220 V AC	63 592 382	1	1
Electric motor; 2,75 W; 24 V AC	63 592 437	1	1
Control unit of the electronics DMS3 J1 (0/4/12 up to 20 mA, resp.4 up to 12 mA)	64 051 075	2	1
Control unit of the electronics DMS3 J3 (0/2 - 10 V)	64 051 061	2	1
Control unit of the electronics DMS3 J2 (without input and output)	64 051 060	2	1
DMS3 Z1 230 - source board of electronic for 230/220 V AC	64 051 076	3	1
DMS3 Z4 24A source board of electronic for 24 V AC	64 051 077	3	1
DMS3 Z2 115 source board of electronic for 115 V AC	64 051 062	3	1
Position scanning unit DMS3 SP	64 051 079	4	1
CHERRY DB 3G B1RB (the lever with roller is removed and outlets shortened)	64 051 198	5	1

6. Enclosures

6.1 Wiring diagrams







Legend:

Z517 ..... wiring diagram of EA STR 0PA for control ON/OFF
Z516 ..... wiring diagram of EA STR 0PA for control ON/OFF or for analoque input 0/4/12 up to 20 mA, 4 up to 12 mA and output signal 4 to 20 mA
Z518 ..... wiring diagram of EA STR 0PA for control ON/OFF or for analoque input 0/2 up to 10 m and output signal 4 to 20 mA

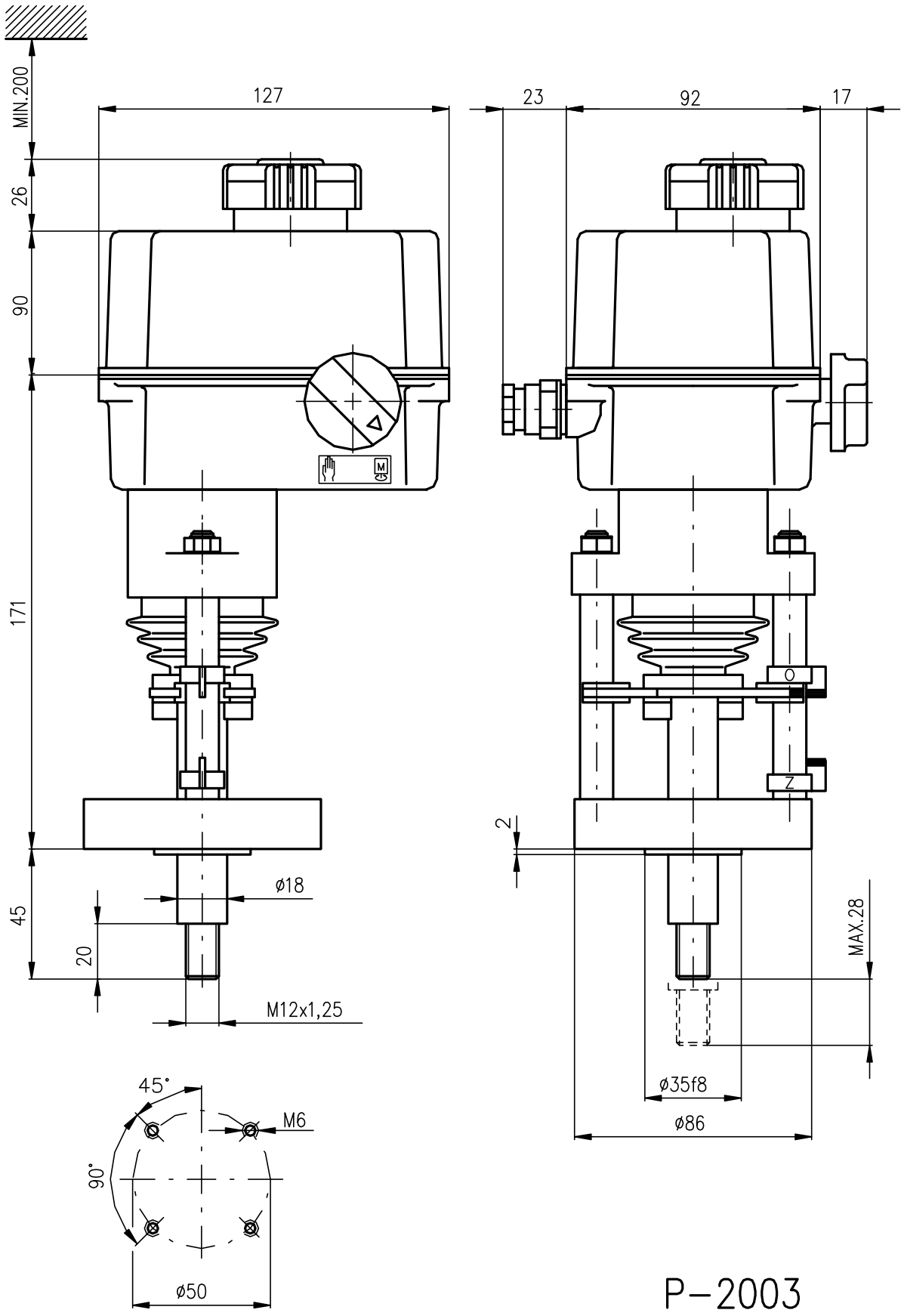
C .....capacitor
COM(RS232).....possibility for connecting the control unit to a PC
EPV passive .....electronic position transmitter is passive with current output signal
E1 .....space heater
F1.....motor`s thermal protection
F3.....fuse of voltage supply source
M.....single phase electric motor
N .....controller
POSITION .....position scanning
R_{in} .....input resistance
R_L .....load resistance
R1 .....free programmable relay
R2 .....free programmable relay
READY .....READY relay (free-programmable)
DMS 3.....electronic module
U_N.....voltage for EPV
S1 .....thrust switch „open“
S2 .....thrust switch „close“
TORQUE .....torque (thrust) scanning
X .....voltage supply source terminal board with screw terminals
X1 .....terminal board with screw terminals on the control unit

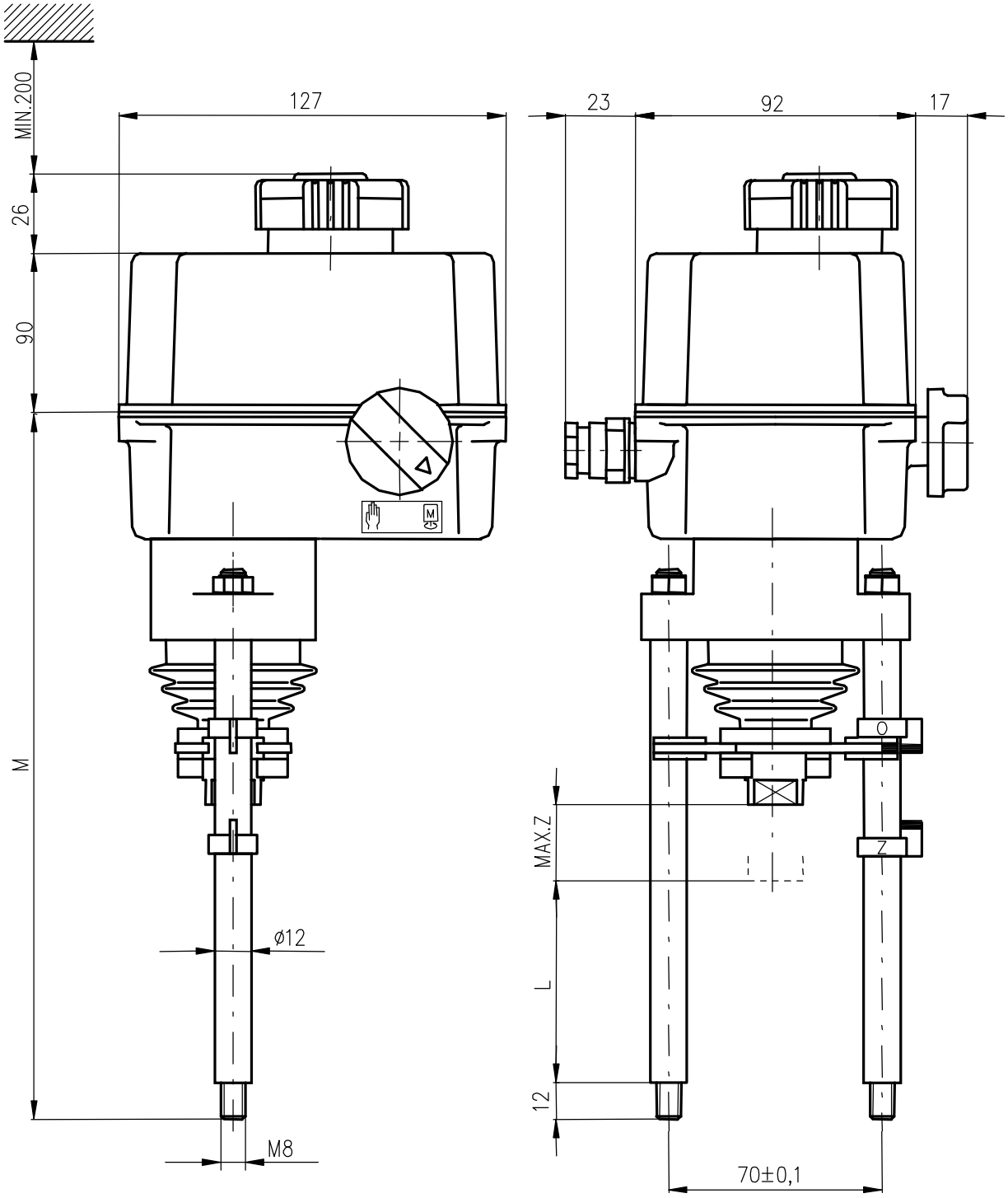
Terminals:
PE, N, L – terminals (0,05-1,5 mm^2) of supply 230/220 V AC or 24 V AC 50/60 (according to the specification)
COM, CLOSE OPEN, I1, I2 – terminals (0,05 - 1 mm^2) of control inputs 24 V DC
+IN, -IN, SH – terminals (0,05 - 1 mm^2) of unified input current signal resp. voltage signal
+L, -L, SH – terminals (0,05 - 1 mm^2) of output current signal (passive) 4-20 mA
COM, NO, NC – terminals (0,05 – 1,5 mm^2) of relay READY
COM, NO – terminals (0,05 – 1,5 mm^2) of relay R1, R2

Note 1: 230/220 V AC eventually 24 V AC supply voltage is to be fed to the N,L terminals of the voltage supply source terminal board (X) according to the chosen variant of the electric actuator. PE ground wire does not need to be connected when 24 V AC power supply is used.

Note 2:
Program possibilities for ***R1,* R2** relays: disabled, open position, close position, torque-open, torque – close, torque open or torque close, torque open or position open, torque close or position close, open, close, movement, movement flasher, to the position, from the position, warning, remote control, local control, control shut off.
Program possibilities for READY relay: errors, errors or warnings, errors or no remote, errors or warnings or no remote.
Program possibilities for output signal (from EPV passive): 4 to 20 mA, 20 to 4 mA.
Control programme options (regulating): 2P, 3P, 3P/2P switched over to I2
Program possibilities for **input control signal** (N): 4 to 20 mA, (2 up to 10V), 20 to 4 mA (10 up to 2 V), 0 to 20 mA (0 up to 10 V), 20 to 0 mA (10 up to 0 V), *4 up to 12 mA, 12 up to 4 mA, 12 up to 20 mA, 20 up to 12 mA.*
Program possibilities for **inputs I1**: disabled, DBL (local releasing – not valid for this type of the EA), STOP.
Program possibilities for inputs I2: disabled, DBL (local releasing - not valid for this type of the EA), 2P (for control programme option 3P/2P I2) allows control using the binary 24V AC/ DC inputs with I2 input activated.
Program possibilities: FAILURE REACTION: OPEN, CLOSE, STOP, SAFE POSITION..
The identical functions cannot be set on I1 & I2 inputs in addition to the OFF state (e.g., if the ESD function is set on I1 input, it is not possible to select the ESD function on I2 input at the same time.

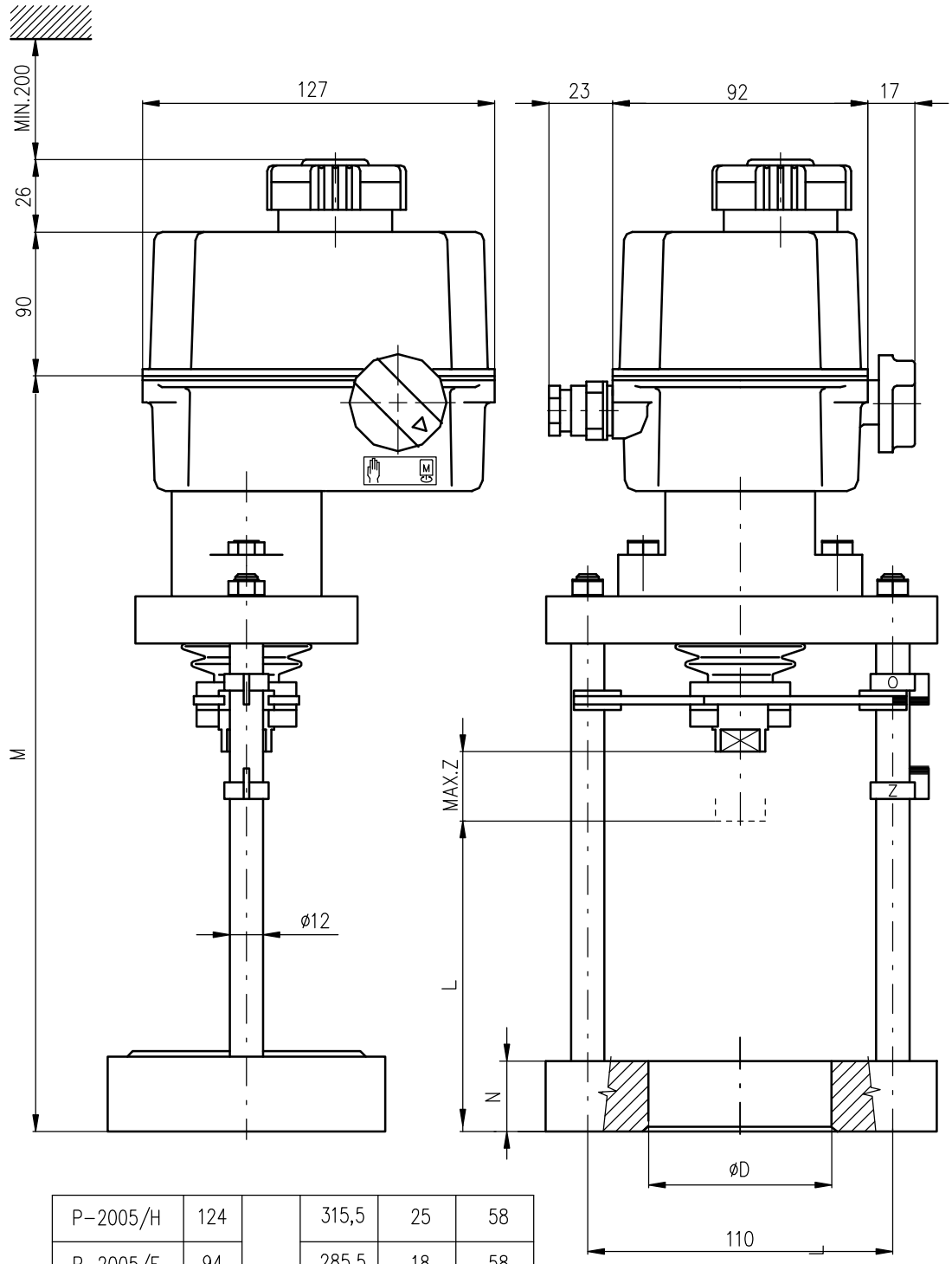
6.2 Dimensional drawings





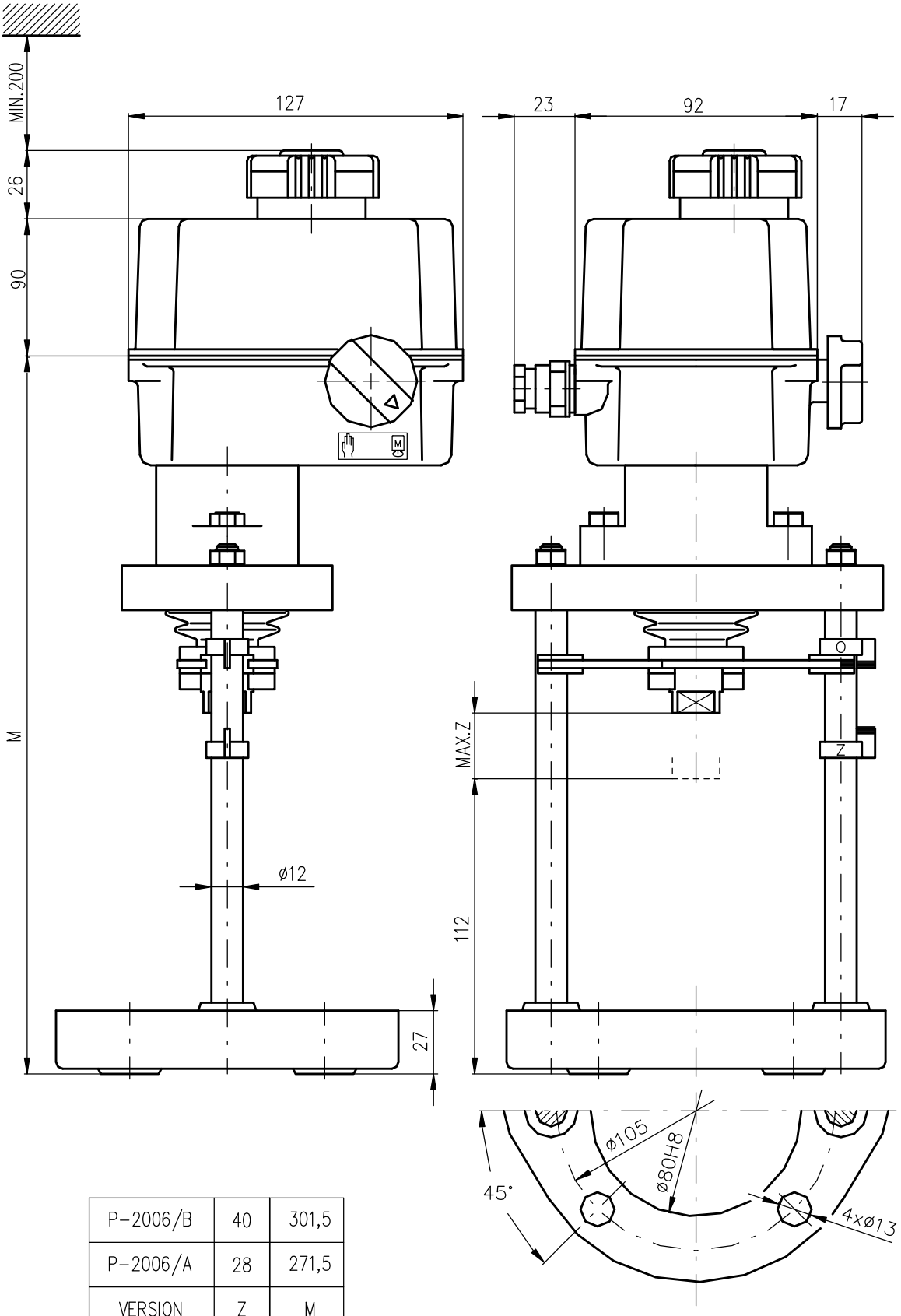
P–2004/D	92,5	294	40
P–2004/C	66	267,5	40
P–2004/B	92,5	264	28
P–2004/A	66	237,5	28
VERSION	L	M	Z

P–2004



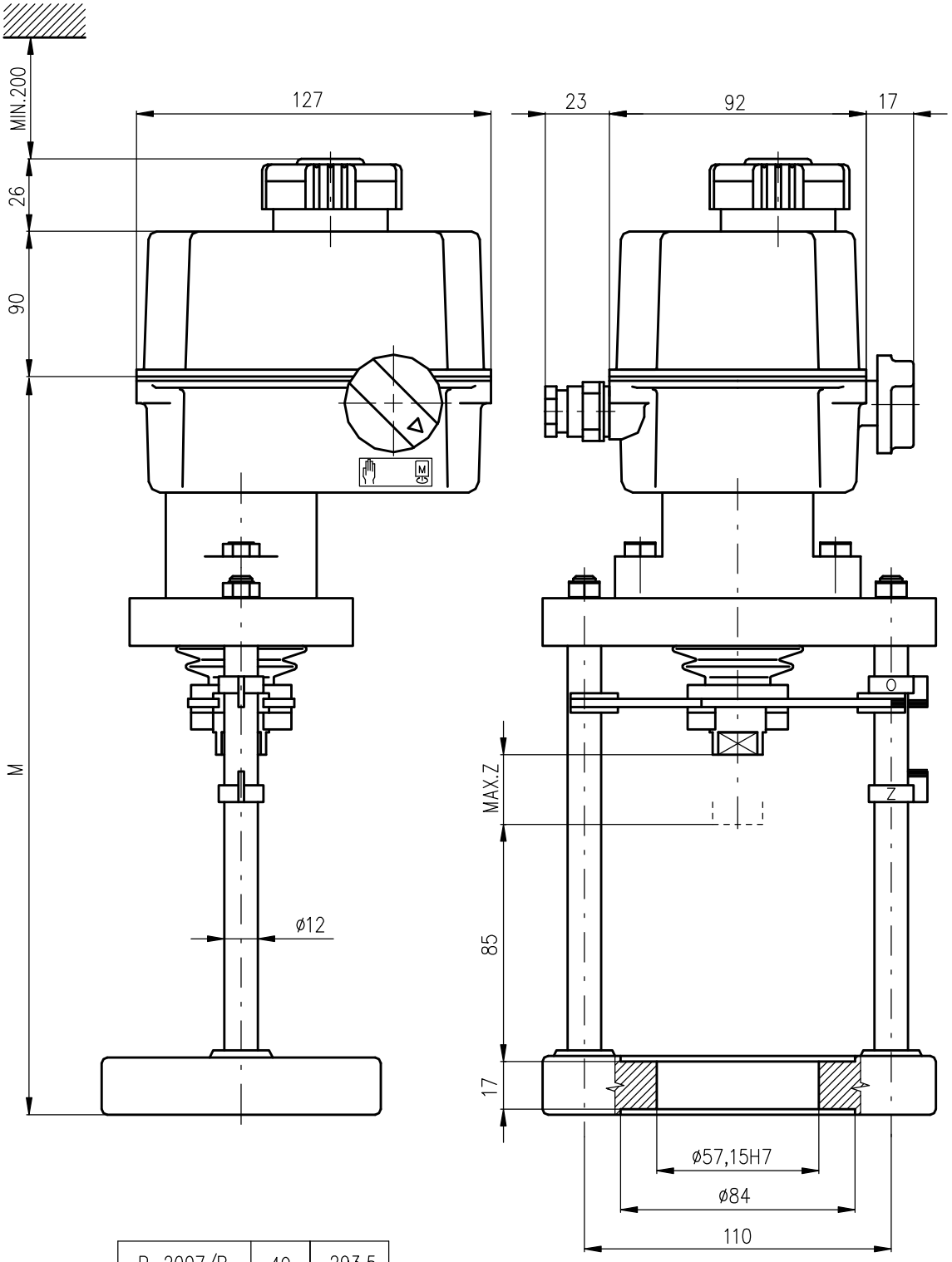
P–2005/H	124	40	315,5	25	58
P–2005/F	94		285,5	18	58
P–2005/E	103		294,5	25	65,1
P–2005/D	110		301,5		
P–2005/G	124	28	285,5	25	58
P–2005/C	94		255,5	18	58
P–2005/B	103		264,5	25	65,1
P–2005/A	110		271,5		
VERSION	L	Z	M	N	D

P–2005



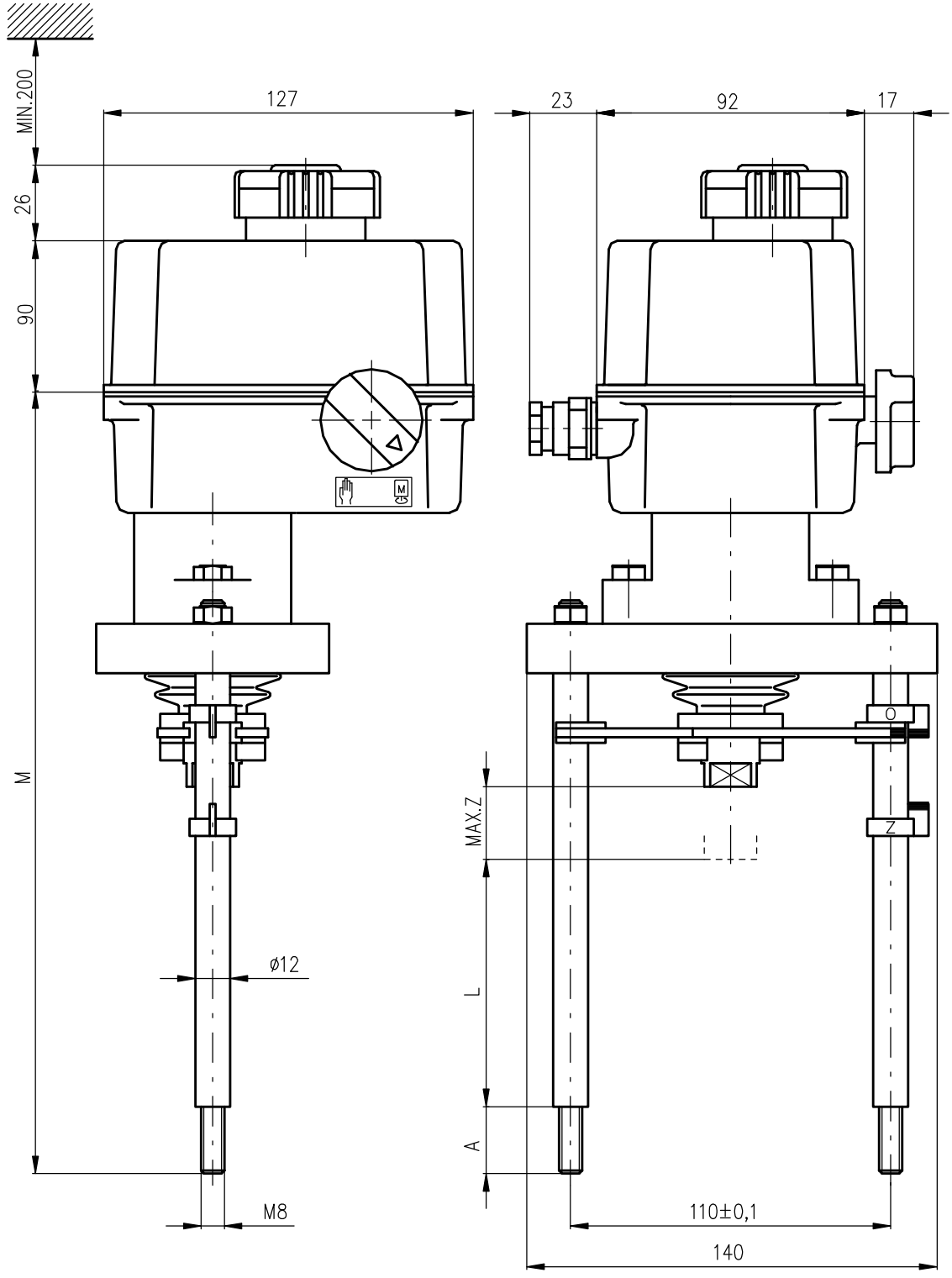
P–2006/B	40	301,5
P–2006/A	28	271,5
VERSION	Z	M

P–2006



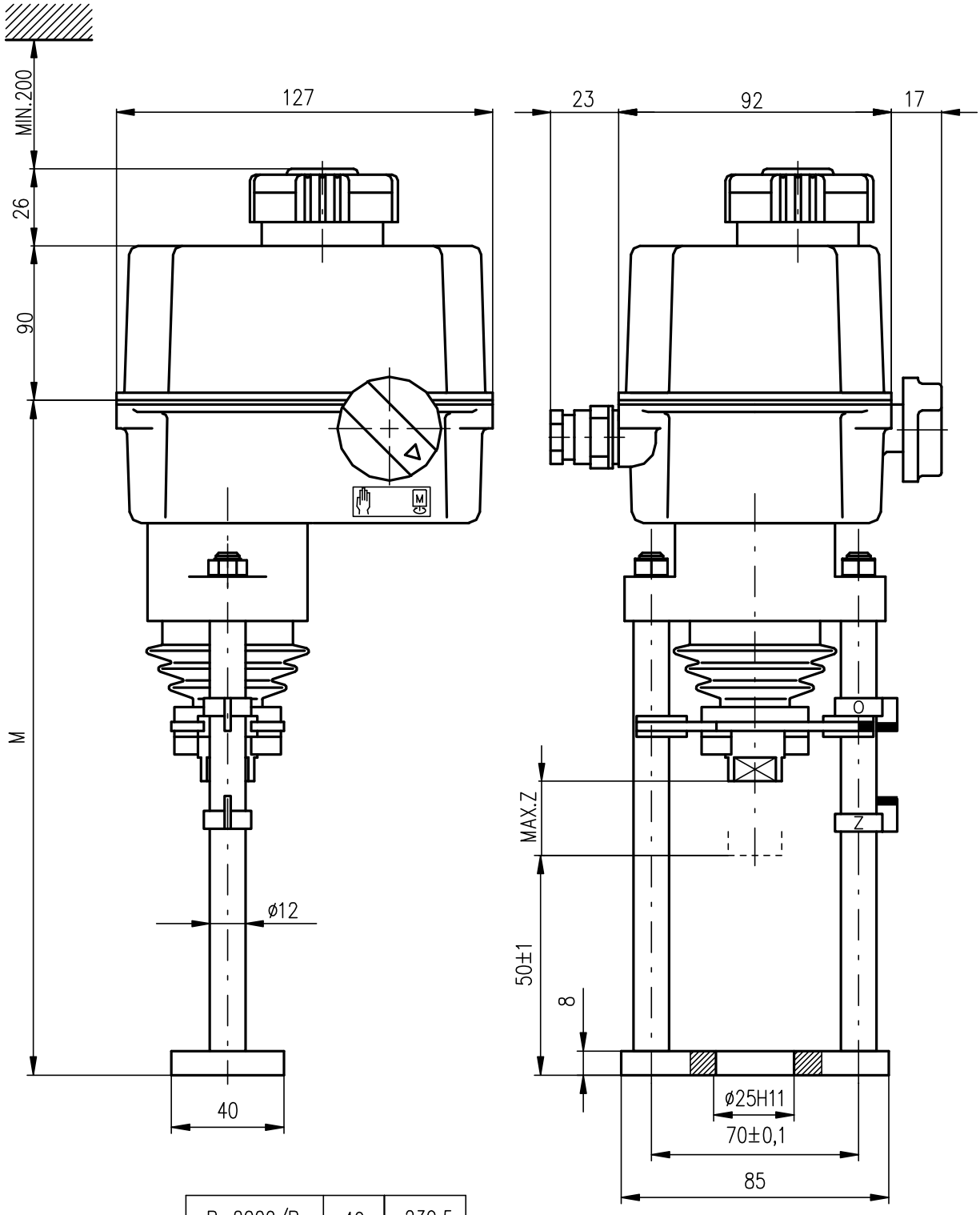
P–2007/B	40	293,5
P–2007/A	28	263,5
VERSION	Z	M

P–2007



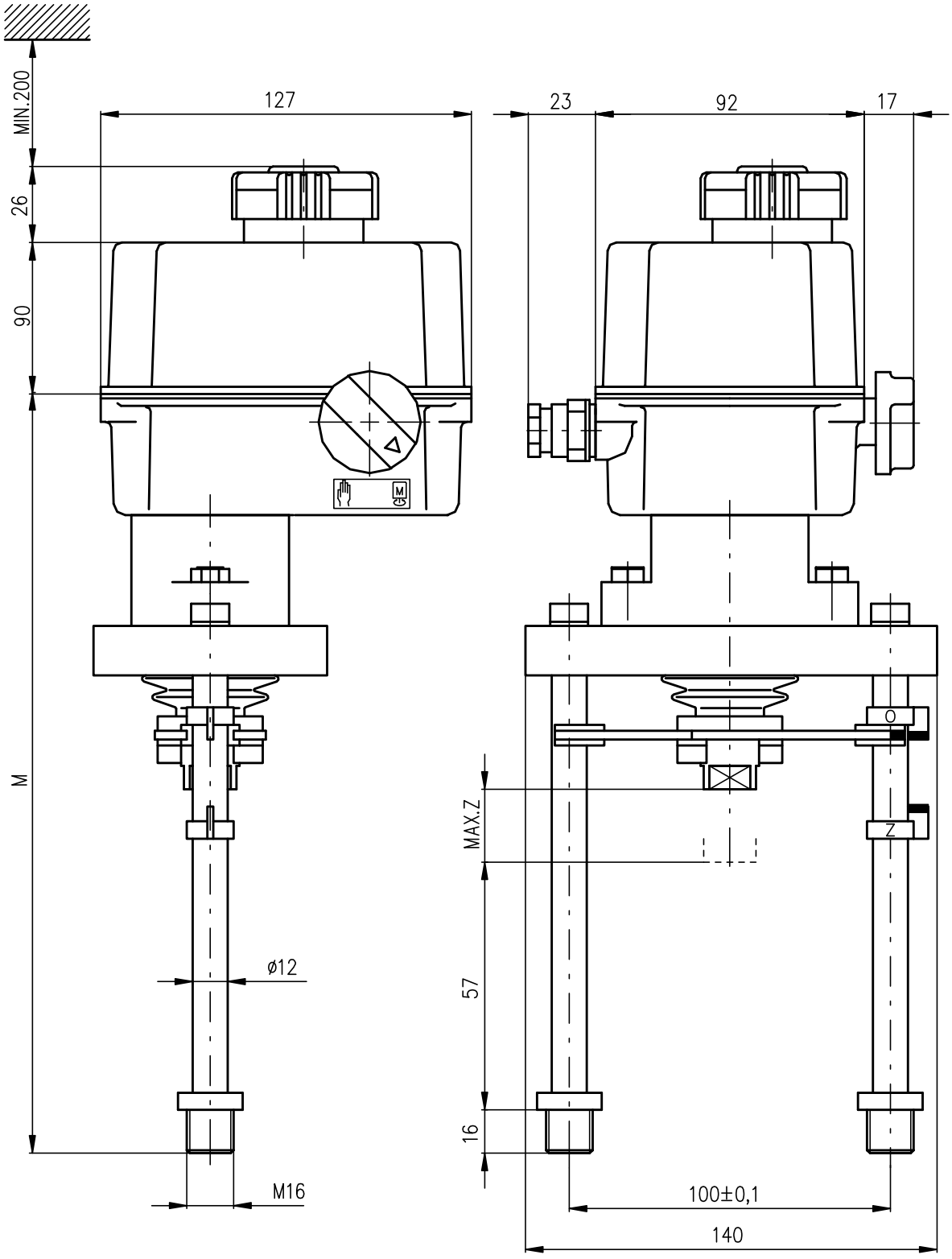
P–2008/D	110	18	317,5	40
P–2008/C	85	23	297,5	
P–2008/B	110	18	287,5	28
P–2008/A	85	23	267,8	
VERSION	L	A	M	Z

P–2008



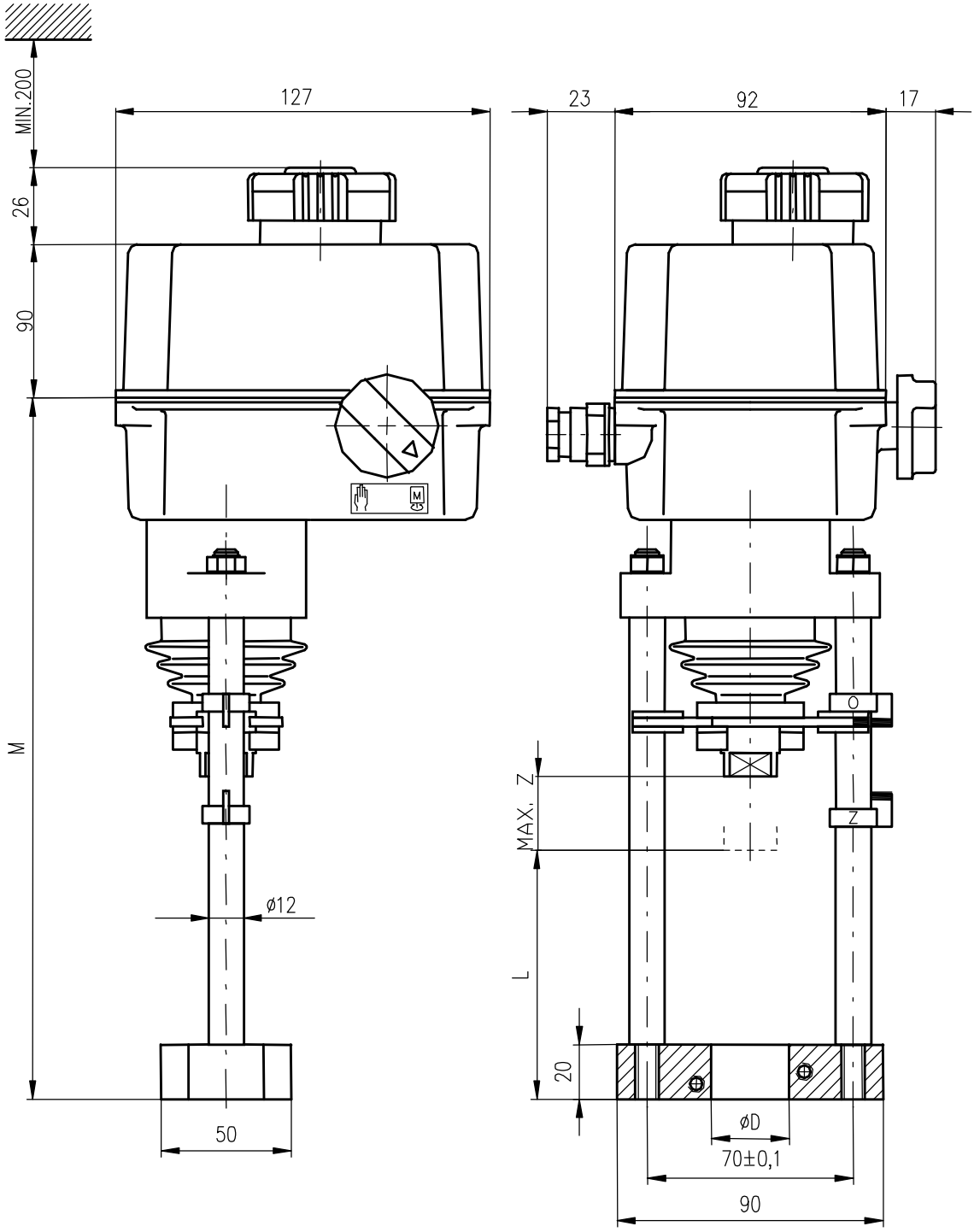
P–2009/B	40	239,5
P–2009/A	28	209,5
VERSION	Z	M

P–2009



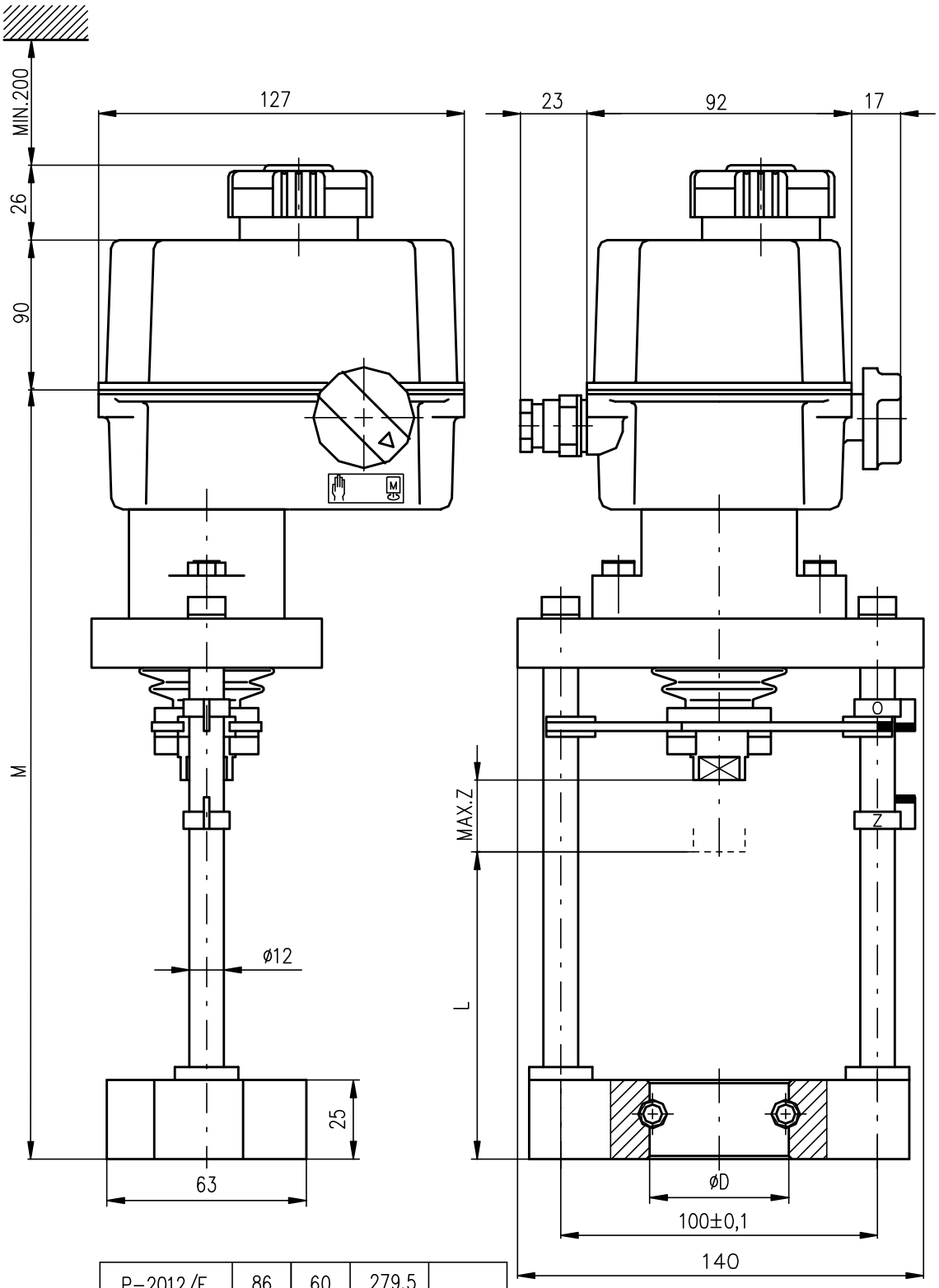
P–2010/B	40	269,5
P–2010/A	28	239,5
VERSION	Z	M

P–2010



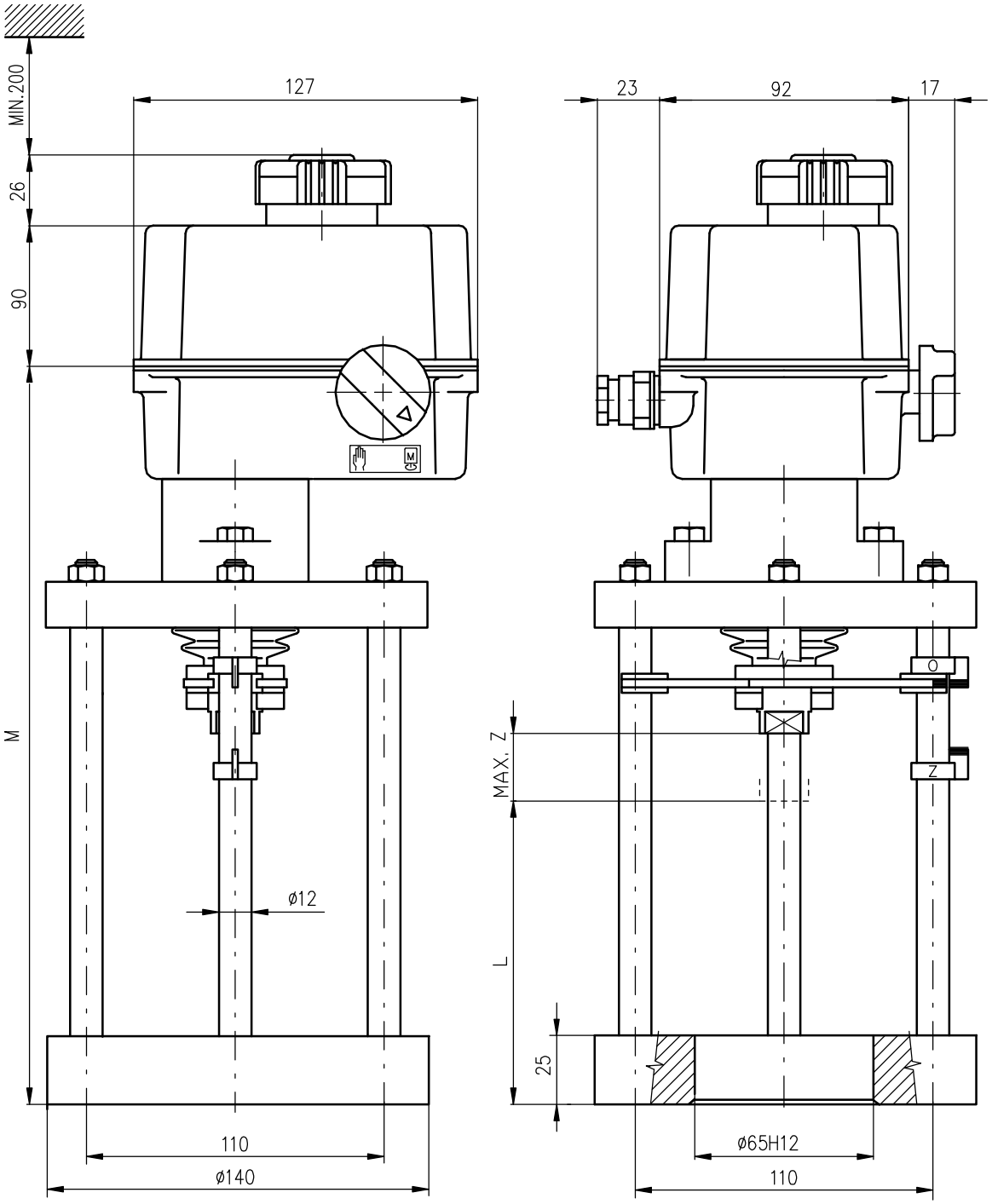
P–2011/D	66	ø40H9	259,5	40
P–2011/C	62	ø32H9	257,5	40
P–2011/B	66	ø40H9	229,5	28
P–2011/A	62	ø32H9	227,5	28
VERSION	L	øD	M	Z

P–2011



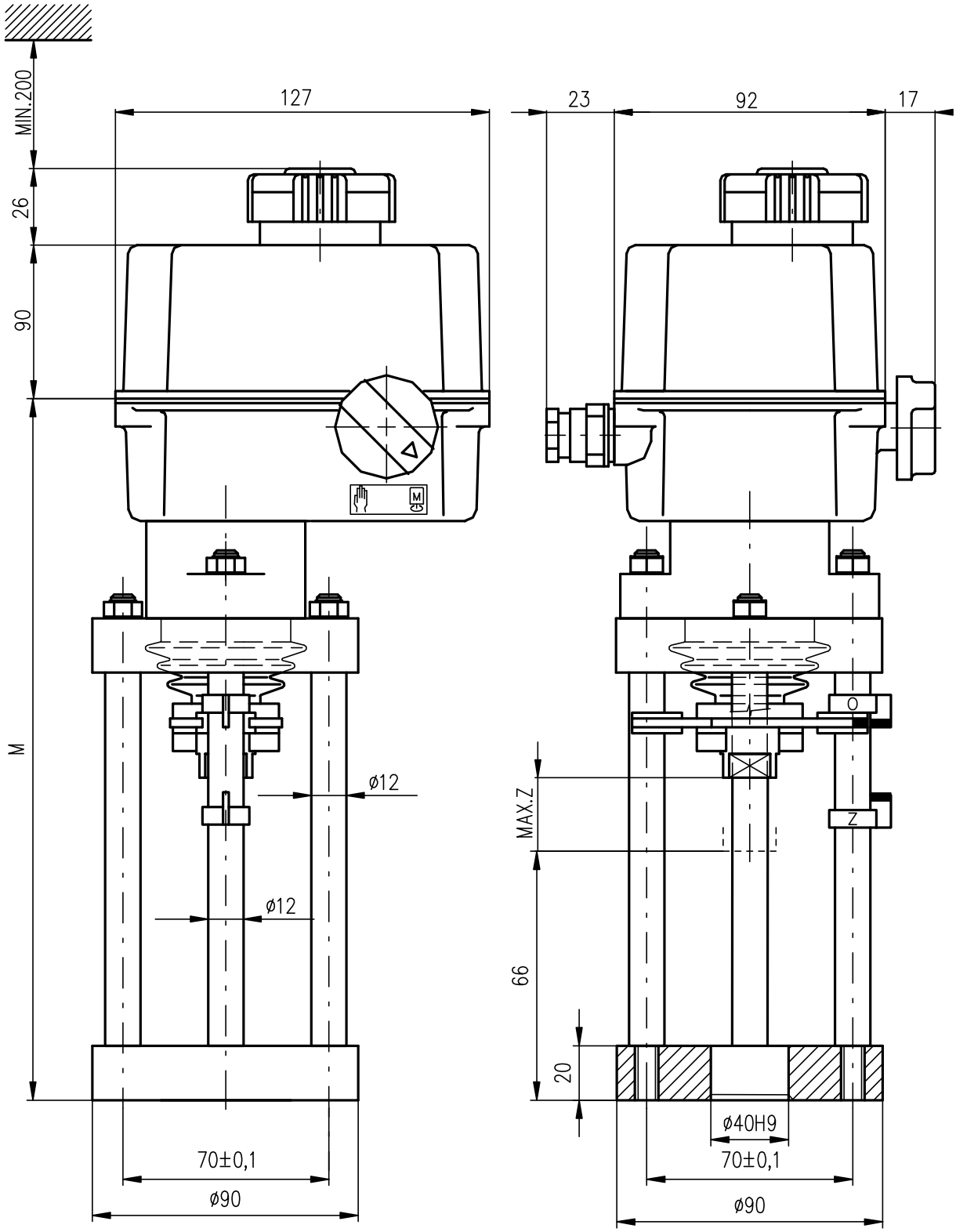
P-2012/F	86	60	279,5	40
P-2012/E	59	38	252,5	
P-2012/D	53	44	246,5	
P-2012/C	86	60	249,5	28
P-2012/B	59	38	222,5	
P-2012/A	53	44	216,5	
VERSION	L	D	M	Z

P-2012



P–2013/D	110	40	301,5
P–2013/C	103		294,5
P–2013/B	110	28	271,5
P–2013/A	103		264,5
VERSION	L	Z	M

P–2013



P–2014/B	257,5	40
P–2014/A	227,5	28
VERSION	M	Z

P–2014

6.3 Guarantee service check report

Service center:D	
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:***

6.4 *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:***

6.5 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

Regada Česká, s.r.o.
Kopaninská 109
252 25 Ořech
PRAHA – západ
Tel.: +420 257 961 302
Fax: +420 257 961 301