



INSTALLATION, SERVICE AND MAINTENANCE INSTRUCTIONS



***Electric part-turn actuators Rematic
with the DMS 3 electronic control SPR 0.1PA***

TEST CERTIFICATE

ELECTRIC PART-TURN ACTUATOR SPR 0.1PA	
Type number 238.....	Power supply V Hz
Serial number	Max. load torqueNm
Production year	Operating time s/90°
Wiring diagram	Operating angle°
.....	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

1. General data.....	2
1.1 Purpose and applications	2
1.2 Safety instructions.....	2
1.3 Instructions for staff training	2
1.4 Warning for safety use	3
1.5 Data specified on electric actuator	3
1.6 Warranty conditions	3
1.7 Under-guarantee and after-guarantee service.....	4
1.8 Operation conditions	4
1.9 Description.....	6
1.10 Basic specifications.....	8
1.11 Packing, transport, storing and unpacking.....	13
1.12 Assessment of the product and packaging and removal of contamination.....	13
2. Installation and dismantling of actuator	14
2.1 Installation.....	14
2.2 Dismantling	16
3. Adjusting of actuator	17
3.1 EA control set-up options (regulating)	19
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.	20
3.3 Putting an EA into operation when the stroke and parameter setting done by the producer suit to your needs	21
3.4 Putting an EA into operation when the stroke and parameter setting done by the producer suit to your needs	21
3.5 Putting an EA into operation when it is necessary to do a change to the angle (setting new end positions), and the other parameter setting done by the producer suits to your needs.....	22
3.6 Setting other parameters.....	22
3.7 Error messages from the control unit.....	22
3.8 Adjusting of stop ends (Fig.8).....	23
4. Service, maintenance and troubleshooting	23
4.1 Service.....	23
4.2 Maintenance - extent and periodicity	24
4.3 Troubleshooting	25
5. Accessories and spare parts.....	26
5.1 Accessories.....	26
5.2 Spare part list.....	26
6. Accessories	27
6.1 Wiring diagrams	27
6.2 Dimensional drawings	30
6.3 Guarantee service check report	37
6.4 Post guarantee service check report	38
6.5 Commercial representation	39

1. General data

1.1 Purpose and applications

Electric part-turn actuators REMATIC (hereinafter referred as EA only) with the DMS electronic control of the SPR 0.1PA 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 part-turn actuators are high-powered electric-mechanical products designed for direct installations onto controlled devices (regulating bodies - valves, etc.). EA of SPR 0.1PA 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 or 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 controlled devices with a flange according to ISO 5211 and connecting component or using a stand and connecting component / lever.

Note:



1. It is forbidden to use EA as a lifting mechanism!

1.2 Safety instructions

Product characteristics from risk point of view



EA of SPR 0.1PA 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+A1 in terms of valid certificate, assigned for installation category II (overvoltage category), pollution degree 2.

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, EN IEC 61000-6-2, EN IEC 61000-3-2+A1 and EN 61000-3-3+A1, in the edition in terms of valid certificate.

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 62 dB (A) .

1.3 Instructions for staff training

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



The electrical connection of the actuator can only be carried out by a person in accordance with legislative requirements of the given country, depending on the required areas of location/use. Service can be performed only by workers professionally qualified and trained by the producer or contracted service centre.

1.4 Warning for safety use



1. Products are assigned for operation in environment consist of gas, steam and vapours, with temperature range: -25°C to $+55^{\circ}\text{C}$, with pressure range from 0.8 to 1.1 bar.
2. If the actuator is placed on device which regulate medium with higher temperature than $+55^{\circ}\text{C}$, protect the actuator by additional construction in order to maintain ambient temperature max. $+55^{\circ}\text{C}$ and also to stop temperature transmitting through junction component!
3. Cable glands blinds are assigned only for transport and storage period, i.e. for period till the actuator is builded into operation, than blinds must be replace by connecting cable.
4. In case of not using one of the cable gland, it has to be replaced with a suitable blinding plug.

Temperature at the point where the cables enter the actuator can reach max. 90°C . When choosing the connection cables for the actuator, it is therefore necessary to consider this temperature as well

Product protection

EA SPR 0.1PA does not have own short-circuit protection, therefore there must be included suitable protective device into the supply power (circuit breaker, or fuse), which serves at the same time as main switch.

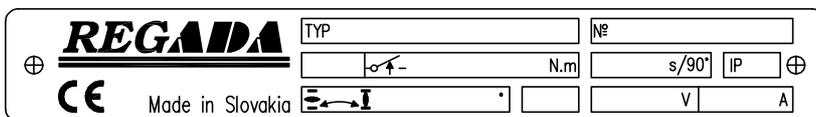
EA SPR 0.1PA has own short-circuit protection of motor power supply circuits and space heater. For protection, we recommend to use a fuse type "T" or a contactor type "C".

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

1.5 Data specified on electric actuator

Name plate:

Warning plate:



Type plate contains the basic data concerning identification, performance and electricity: indication of producer, type, serial number, max. load torque and switching-off torque, operating time, protection code, operating angle, 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.

	Dangerous voltage	(EN ISO 7010-W012)
	Stroke of the electric part-turn actuator	
	Switching-off torque	
	Manual control	(0096 ISO 7000)
	Protection terminal	(5019 IEC 60417)

1.6 Warranty conditions

The supplier is responsible for completeness of the delivery and guarantees these specifications of the product which are stated in the Contract.

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

1.7 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.

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 type plate (type code, 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), max. load torque, 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.

1.7.1 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 part-turn 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.

1.8 Operation conditions

1.8.1 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, to the button for disengaging the transmission, 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.
- Operating angle adjusted by stop ends must be greater than angle set electronically to the actuator. The stop ends are used only for position setting by manual adjusting of the actuator. Use the stop ends in motor-operated operation of actuator is inadmissible!

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.

1.8.2 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:

- warm mild to very hot dry with temperature in range -25°C to +55°C **AA 7***
- with relative humidity 10 to 100 %, including the condensation of up to 0,028 kg water content per 1 kg of dry air at 27 °C, with temperatures from -25°C up to +55°C **AB 7***
- with height above sea level 2 000 m, with barometric pressure range 86 to 108 kPa **AC 1***
- with shallow dive – (product in protection IP x 7) **AD 7***
- with submersion – (product with enclosure IPx8)..... **AD 8***
- 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<fp and acceleration amplitude 19,6 m/s² for f>fp; (transition frequency fp 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 persons frequent touching 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

1.8.3 Power supply and duty cycle

Power supply

- electric motor..... 220/230 V AC ±10%, resp. 24 V AC ±10%
- control for EA SP 0PA binary inputs 24 V DC ±10%
.....input control signal 0/4/12 to 20 mA, 4 to 12 mA resp. 20 to 0/4/12 mA, 12 to 4 mA or 0/2 to 10 V, resp. 10 to 0/2 V
- electronic positional transmitter (EPV) without power supply (passive)..... 18 up to 30 V DC ±10%

Frequency of power supply..... 50 Hz or 60 Hz ± 2%

Note: At frequency of 60 Hz operating time is reduced by 1.2 times.

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

EA SPR 0.1PA 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.

Warning: If the mode of the operation is not met, breakdown of EA can occur, due to disconnection of built-in thermal fuse (protection) of the electromotor.

1.9 Description

The **SPR 0.1PA** 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 to 20 mA, 4 to 12 mA (0/2 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, 1A**):

The electric actuator is driven by an **electric motor (1)** supplied and controlled from the **source board (3)** and **control unit (2)** of the DMS3 electronics.

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

On the electronic board DMS3 there is **electronic transmitter (EPV)** without power supply (passive) with output signal 4 - 20 mA.

Space heater (5) 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, maintenance and troubleshooting

Standard equipment of electronic module DMS3 for SPR 0.1PA:

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 torque scanner and sourcing board and communication connector (connection to PC for adjustment and diagnostic), 2 free programmable relays R1 a R2, 1 relay READY and terminals for electric connection.

Sourcing board for single-phase version (3) – secures power supply of electronic and provides an output voltage of 24 V DC, 40 mA for the user, 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.

LED display (7) – shows instant position of EA output member and reports and displays potential errors, which would occur when EA is operated. Signalling motion and failure of the EA is also indicated by LEDs diode. LED display is used only pro type of construction EA without local control.

Manual control: made up by a handwheel with a worm gearing.

Other accessories – as optional accessories:

Module 3, or 6 additional relays (8).

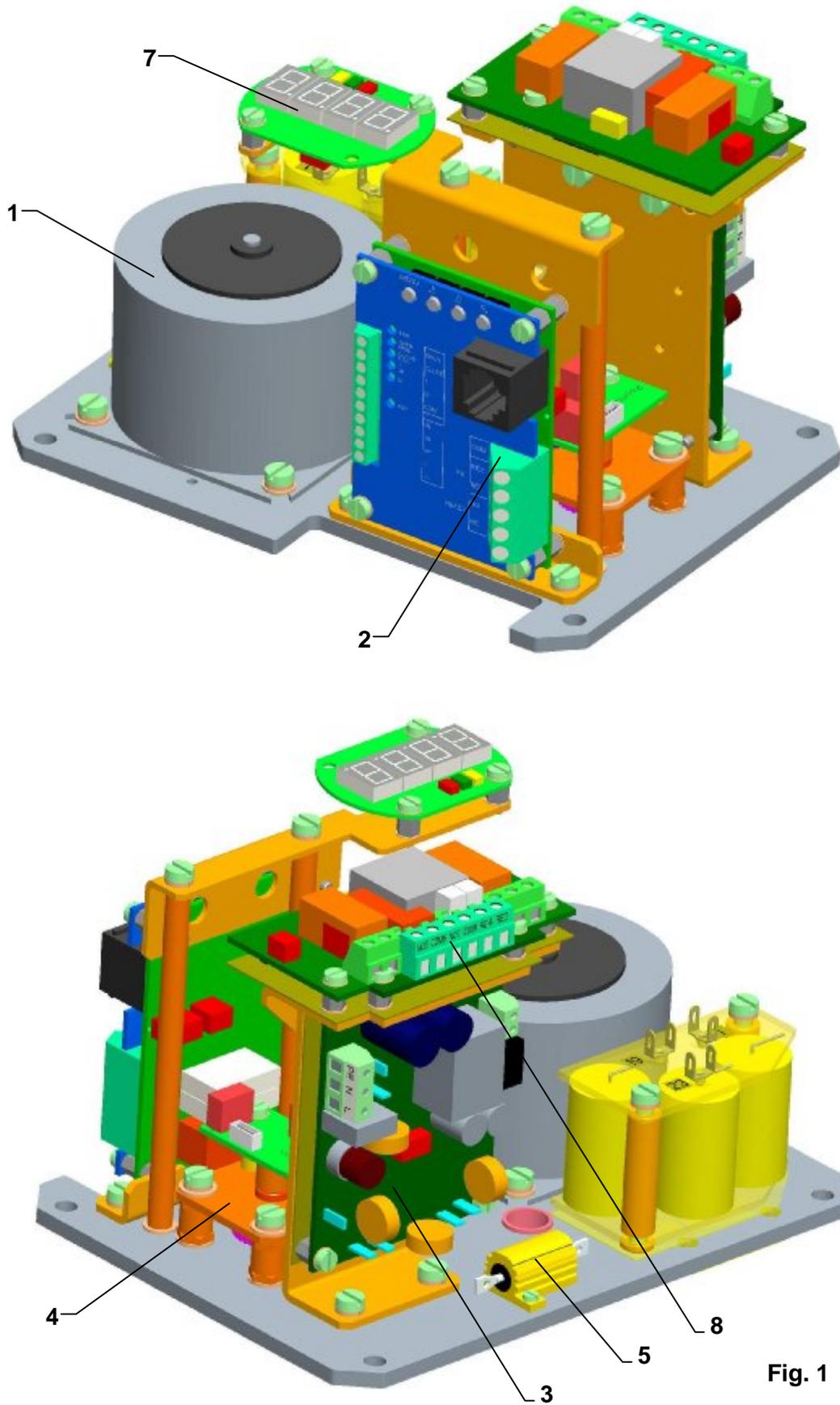


Fig. 1

1.10 Basic specifications

Basic EA specifications:

max. load torque [Nm], operating time [s/90°], operating angle [°] and electric motor parameters are given in Table 1.

Type Number	Operating time	Operation angle	Max. load torque for remote control	Max. load torque regulation mode	Weight	Electric motor						
						Power supply nominal voltage	Nominal power	Nominal speed	Nominal current 230/220 (24) V AC	Capacitor capacity		
										24 V AC	230/220 V AC	
[s/90°]	[°]	[Nm]	[Nm]	[kg]	[V] ±10%	[W]	[1/min]	[A]	[µF/V]			
SPR 0.1PA type number 238	10	90° - version with stop ends ¹⁾	16	13	3,2 - 5,2	Single-phase	230/220 AC resp. 24 AC	7,3	375	0,080 (0,80)	46/63	0,47/500
			20 ²⁾	16 ²⁾								
	20		32	25				4,7	375	0,051 (0,51)	30/63	0,33/500
	40											
	80		50	40				2,75	375	0,04 (0,4)	25/63	0,27/500
	120											
	160		1	300				0,025 (0,25)	-	0,165/400		
	40											
	60		7,3	375				0,080 (0,80)	46/63	0,47/500		
	120											
	160		4,7	375				0,051 (0,51)	30/63	0,33/500		
	120											
	160		2,75	375				0,04 (0,4)	25/63	0,27/500		
	160											
160	1	300	0,025 (0,25)	-	0,165/400							

1) At EA version without stop ends it is possible, depending on its specification, adjust output angle at intervals: 50° to 120°, 90° to 160°, 160° to 360°

2) EA with maximal load torque 20 Nm are self-locking until values of torque 10 Nm only

3) 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:

EA protection code 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 continuous submersion in water max. 96 hours.

Mechanical ruggedness:

sinusoid vibrationssee Chapter 1.7.2

resistance by drops 300 drops with acceleration of 5 m.s⁻²

seismic resistance6 degrees of Richter's scale

Self-locking: guaranteed within 0% till 100% load torque except load torques listed in the Table 1.

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 to 20 mA, 4 to 12 mA, resp. 0/2 to 10 V by of version.

Power supply of electronics:

- Power supply ZS is used for single phase versions and feeds the electronic modules built in EA. It provides the 24V DC, 40 mA output voltage.

Power sources contain a protective fuse with parameters according to chapter 2.1.2 Electric connection.

Position scanning:

Contactless absolute magnetic.

Limit positions adjustment:

Limit position relays are adjusted with accuracy to specific operating angle $\pm 2^\circ$.

Output relay :

- 3x relays (standard) (**READY, R1, R2**) max. 250 V AC/1 A/cos phi=1; max. 30 V DC/2A
- 3x additional relays (options) (**RE3, RE4, RE5**) max. 250 V AC/1 A/cos phi=1; max. 30 V DC/2A
- 6x additional relays (options) (**RE1, RE2, RE3, RE4, RE5, READY**) max. 250 V AC/1 A/cos phi=1; max. 30 V DC/2A
- relays **READY, R1, R2, RE3, RE4 and RE5** are free programmable (their function can be changed with buttons on the control unit, with buttons on the electric local control, 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. Relay READY on the control unit and supply unit are doubled (it is not possible to set different functions on these units)

R1 and R2, RE1, RE2, RE3, RE4 and RE5 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.
Relay R1 is doubled with relay RE1 and relay R2 is doubled with relay RE2. Individual relay factory set is shown in the chapter 3 "Adjusting of actuator".

Transmitter (output signal)

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

- Current signal 4 ÷ 20, resp. 20 ÷ 4 mA (DC)
- Voltage at connection of EPV passive 18 up to 30 V DC $\pm 10\%$
- Load resistance max. $R_L = 500 \Omega$
- Tolerance of value of output signal of electronic transmitter in end positions: $\pm 0,5 \%$ ¹⁾
- Tolerance of linearity of transmitter $\pm 1 \%$ 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".

Electronic controller (N) - actuation by input control signal

- Input control signals - analogue: 0 - 20 mA (0 – 10 V by version)
- 4 - 20 mA (2 – 10 V by version)
- 12 - 20 mA
- 4 - 12 mA
- 20 - 0 mA (10 – 0 V by version)
- 20 - 4 mA (10 – 2 V by version)
- 20 - 12 mA
- 12 - 4 mA
- Input resistance for signal 0/4/12 to 20 mA. 4 to 12 mA: $R_{in} = 120 \Omega$
- Input resistance for signal 0/2 to 10 V: $R_{in} = 3 k\Omega$

Tolerance of controller's linearity: 0,5 %
 Dead of controller: 1 – 10 % - (adjustable)
 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, remote releasing - not valid for this type of the EA); STOP
- for the input **I2**: DISABLED; ESD; DBL (local releasing, remote 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 of output signal is described in the chapter "Adjusting".

Programming possibilities of reaction SAFE: OPEN, CLOSE, STOP, SAFE POSITION

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

Adjustable elements :

The EA is possible to adjust with or resetting to different parameters operating the control unit buttons, local control buttons (following the version) 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

Space heater power output: SPR 0.1PA 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:

Turning the handwheel clockwise causes the electric actuator output shaft to move in "C" direction (Close).

Output part clearance: max. 1° (at 5 % of maximum switching torque load)

Grease: see chapter 4.2 Maintenance - extent and periodicity.

1.10.1 Mechanical Connection

- with flanges
- stand and lever and pull-rod

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

1.10.2 Electric connection

To the terminal board (X, X1):

- 3 clamps (PE, N, L) on the sourcing board with intersection of connection wire 0,05 - 1,5 mm² for solid wire, 0,05 - 1,5 mm² for flexible wire. Max. terminal screw tightening torque 0,5 N.m., max. voltage 300 V
- 7 clamps (READY, R1, R2) with intersection of connection wire 0,05 – 1,5 mm² for solid wire, 0,05 - 1,5 mm² for flexible wire. Max. terminal screw tightening torque 0,5 N.m., max. voltage 300 V
- 10 clamps (COM, CLOSE, OPEN, I1, I2, +IN, -IN, +L, -L) with intersection of connection wire 0,05 – 1 mm² for solid wire, 0,05 - 1,5 mm² 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

- 1 cable gland M20x1,5, diameter of cable 8 to 14,5 mm
- 2 cable glands M16x1,5, diameter of cable 6 to 10,5 mm

Protection clamp:

During start-up - during installation of device:



- for safety operation of the actuator use EA be unavoidable connect external and internal ground terminal. The position of the external a internal ground terminal can be seen in fig. 2 and fig.2a. 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.

External and internal, are together connected and marked with the mark of protection grounding.

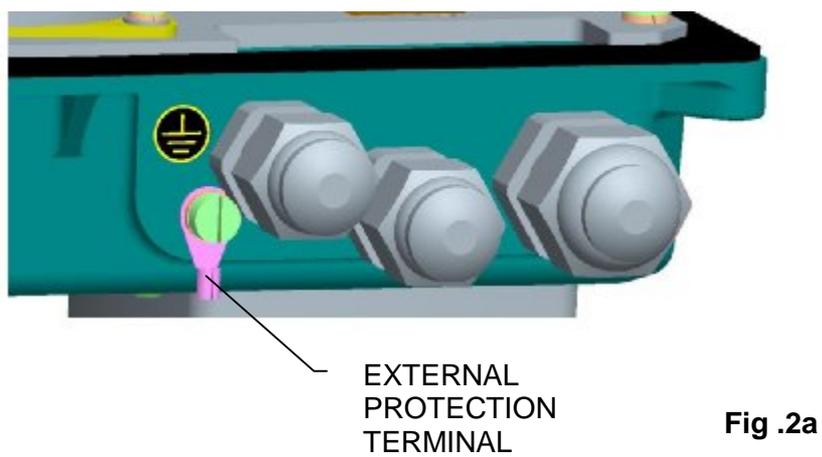
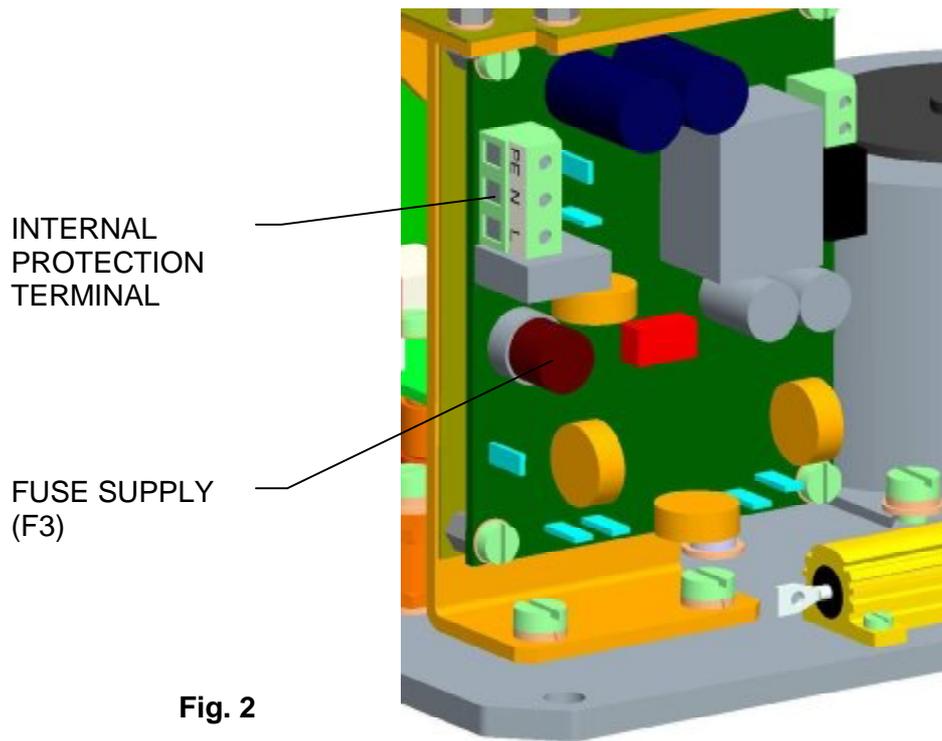
The electric connection should be made according to wiring diagrams pasted into the upper cover of the EA.

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.2**.

Product	Order code	Voltage	Frequency (Hz)	Motor Power / Input (W)	max. Current EA (A)	Fuse F3 value
SPR 0.1PA 238	238.1-0XXXX/YY	230 VAC	50	4/25	0,2	F 2,5 A / 250 V
	238.1-LXXXX/YY	220 VAC	50	5/28		
	238.1-3XXXX/YY	24 VAC	50	5/28	2,2	F 3,15 A / 250 V
	238.1-VXXXX/YY	240 VAC	60	4/25	1,9	F 2,5 A / 250 V
	238.1-TXXXX/YY	120 VAC	60	5/28		
	238.1-BXXXX/YY	110 VAC	60	15/39	0,3	
	238.1-JXXXX/YY	24 VAC	60	18/48		F 3,15 A / 250 V

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



1.11 Packing, transport, storing and unpacking

The EA SPR 0.1PA are delivered in solid packages guaranteeing resistance in accordance with EN 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 pallets), 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.

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.

1.12 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

2.1 Installation



Abide by safety measures!

Notes:

Repeatedly verify whether placing of EA corresponds to part "Operating conditions". If actual conditions differ from recommended, it is necessary to consult it with manufacturer.

Before starting of mounting the EA onto the valve:

- Check again whether the EA was not damaged during storing.
- Check whether the adjusted operation angle and connecting dimensions of the actuator (see the type plate) are in compliance with the valve parameters.

In case of inconsonance, perform adjusting according to the part Adjustment.

2.1.1 Mechanical connection

The actuators can be installed and operated in any position. While installing leave enough space for dismantling of the upper cover to allow adjusting of the control parts.

Before installation clean the contact areas of the actuator and the valve, coat the output shaft and sliding areas with a grease without any acids.

The actuators SP(R) 0.1 are available in the following versions:

a) With a flange F 03, F 04 or F05 in accordance with ISO 5211 Standard

b) With a stand and a lever, a lever and a pull-rod or without any lever with output shaft of square section 11x11 mm or circular section $\varnothing 22$ mm.

The flange actuators are to be connected with a valve using four bolts with a thread M5 (F03 and F04 flanges) or M6 (F05 flange). The screw has to be screwed into depth of 10 mm or 12 mm.

The actuators with a stand are fixed to the base with two screws with thread 10. The screw depth in the steel base must not be less than 10 mm, in case of a base made of aluminium alloy not less than 16 mm.

The actuators with a small lever are connected with a controlled device with a lever mechanism consisting of the two pull-rod TV-160 and a 1/4 " tube with threads on the both ends. The actuators with a large lever are connected with a controlled device with a lever mechanism consisting of the two pull-rod TV-160 and a 1/2 " tube with threads on the both ends. While mounting the coarse setting of the small lever on the actuator can be changed with turning of the hub on the output shaft by 90 ° or with turning of the lever on the hub by 60 ° or with the combination of the two operations by 30 °. Setting of the large lever position can be reached with turning of the lever on the splined shaft.

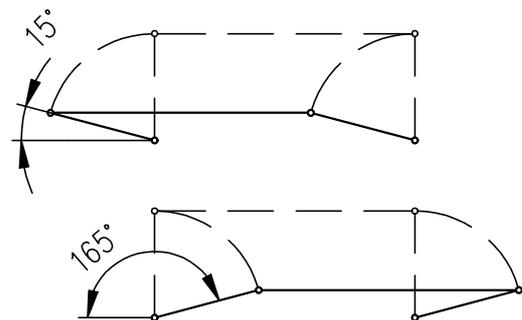


Fig.3

Mechanical flange connection

- Clean contact surfaces of connecting parts of the EA and valve.
- If necessary, connect an additional adapter to the EA or interface adapter (e.g. adapter with a hand lever, which is used also as position indicator and stop end).
- Adjust the valve to the limit position opened, or closed.
- Perform a disengagement of the gear on the EA by turning the button from the position “motor-drive” to the position “manual”.
- Adjust the output shaft of the EA, by the handwheel or the hand lever, to the same limit position as the valve was adjusted.
 - to the stop end for version with stop ends
 - to the limit position until corresponding position switch is switched-on, for version without stop ends
- Turn the output shaft of the EA by the handwheel or the hand lever until connecting spots of the EA and the valve are aligned (flange holes, junction coupling).
- For the mechanical connection of the EA (adapter, interface adapter) with the valve use fixing screws (they are not part of the delivery)
- Return back the button for disengagement of the gear to the original position “motor-drive”

Mechanical pull-rod and lever connection

- Clean contact surface of connecting area on the base plate of the damper – operated device for mounting of the stand
- Fix the stand of the EA to the base plate with the fixing screws or studs (they are not part of the EA delivery)
- Perform a disengagement of the gear on the EA by turning the button from the position “motor-drive” to the position “manual”.
- Adjust the levers of the EA and the damper identically to one of the limit positions – opened or closed.
- Connect the control levers of the EA and the damper by the pull-rod TV 160, or TV 360

During the assembly of the pull rod to the levers of the EA and the damper it is necessary to meet the following:

- same arms length of mounting the pull rod
- Angle between the lever and the pull rod at the limit positions shall not be less than 15° and greater than 165° (Fig.3).
- By turning the coupling endings on the pull rod adjust limit position of the damper (closed or opened).
- Return back the button for disengagement of the gear to the original position “motor-drive”

Notes

1. It is possible to change the position of the lever on the EA:

a.) Small lever P-1235/A:

- by pushing out the hub (together with the lever) and turning by 90° (4x90°)

- and by pushing out the lever from the guiding pins on the hub and by turning by 60° (6x60°)

b.) Big lever P-1235/B: by pushing out the lever from the grooved shaft and by turning by 20° (18 grooves).

c.) Small lever P-1300 (replacement for KP II):

- by pushing out the hub (together with the lever) and turning by 90° (4x90°)

- and by pushing out the lever from the guiding pins on the hub and by turning by 45° (8x45°)

d.) Big lever P-1298:

- by putting the lever on the key and by securing it through locking joint

The pull-rod TV 160, or TV 360, belongs to the extended equipment of the EA. The pull-rod delivery is performed on the basis of the specification. Interconnecting tube is not part of the pull-rod delivery.

Necessary tube length is measured only during assembly.

2.1.2 Electric connection and checking of function



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. The cable jacket diameters must conform to the extent specified in Chapter 1.8.3!
4. Before initiation ES into operation internal and external protection terminals are needed to be connected.
5. Feeding cables are to be fixed to the solid construction at most 150 mm from the cable glands.
6. Cables of input controlling signals into a controller and output signals from a converter must be conducted separately from power conductors or it is possible to use shielded cables.
7. 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: - analogue signals through the built-in position controller
- 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 glands. 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. Reversion 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.



*With **SPR 0.1PA** electric actuator, the optimal functioning needs to perform autocalibration as stated in chapter 3.1 during the process of operation.*



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

2.2 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 cable glands .
- Loosen the fixing screws of the EA flange 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 chapter 1.2.2 Requirements for professional qualification ...
Observe safety regulations!

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

The adjustment can be performed at a mechanically and electrically connected EA. This part describes adjustment of EA to specified parameters in case that any unit of EA is reset. Laying of adjusters of the control board is shown 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 appendix **74 1053 02**.

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; RE1 to RE5**: disabled; open position; close position; torque-open (not valid for this type of the EA); torque – close (not valid for this type of the EA); torque open or torque close (not valid for this type of the EA); torque open or position open (not valid for this type of the EA); torque close or position close (not valid for this type of the EA); open; close; movement; movement flasher; to position; from the position; warning; remote control; local control; control shut off.
- **relay READY**: errors, errors or warnings, errors or no remote, errors or warnings or no remote.
- **output signal** (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 to 20 mA, 4 to 12 mA, resp. 0/2 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 (for control programme option 3P/2P I2 allows control using the binary 24V DC inputs with I2 input activated).
- 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.

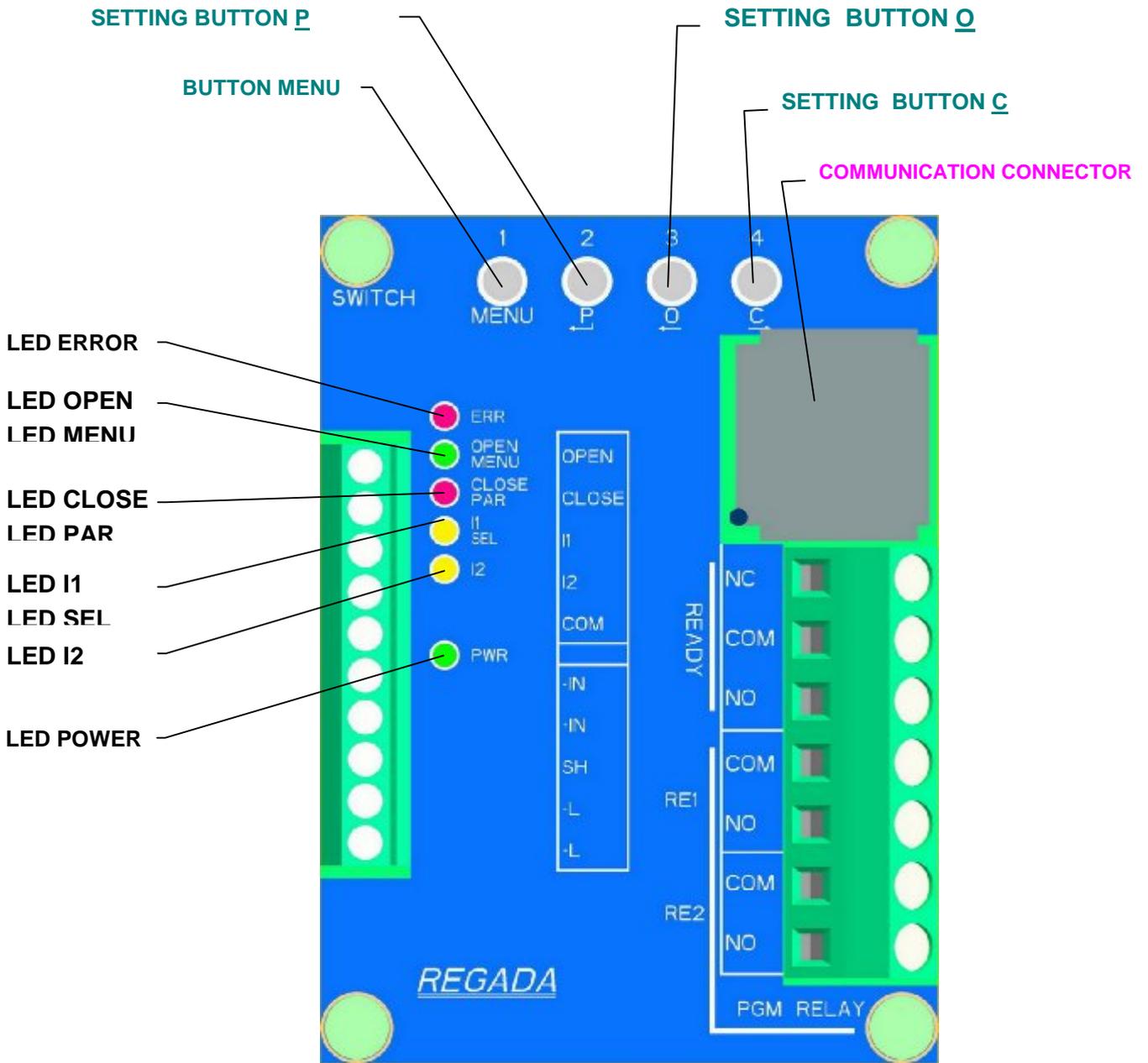


Fig. 6

3.1 EA control set-up options (regulating)

2P CONTROL

Setting-up: 2P control + other functions, in addition to STOP on I1 outlet:

The EA moves either to the OPEN or CLOSE direction with **24V DC** voltage supplied to clamps **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 to 20 mA, 4 to 12 mA (0/2-10V) input control signal** supplied on clamps **+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 EA 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 clamp.

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 to 20 mA, 4 to 12 mA (0/2-10V) input control signal** supplied on clamps **+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 to **0/4/12 to 20 mA, 4 to 12 mA (0/2 to 10 V) input control signal** and rests in case of **I2 active input** (with 24V AC / 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 clamps **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 to 20 mA, 4 to 12 mA (0/2-10V)** 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.

The EA stops to respond to 0/4 – 20 mA input control signal and rests in case of **I2 active input** (with 24V AC / DC constantly ON or OFF – as per I2 function set-up to ACTIVE – or supplied on I2 clamp). The EA is allowed to move either to the OPEN or CLOSE direction with **24 V DC** voltage pulse supplied connectors **OPEN** or **CLOSE**.

The EA stops once the 24V AC / DC voltage is supplied on I1 clamp (STOP) or the set 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.

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	SWITCHING-OFF TORQUE	not valid for this type of the EA	
2	END POSITION	C = Position + O = Position – shutting off at end limit Open and Closed from the position (there are no other options acceptable for this EA type).	
3	TORQUE BLOCKING TIME & POSITION	not valid for this type of the EA	
4	READY RELAY	- errors (READY COM-NO relay contacts closed in error free conditions)	
5	RELAY R1, R2	- position O for relay R1 - position C for relay R2 - from position 95% for relay RE 3 - to position 5% for relay RE 4 - disabled for R5 relay	
6	CPT (output signal)	4 to 20 mA	
7	REGULATION – (according to specification)	2P	3P
	CONTR. SIGNAL	-	4 to 20 mA
8	DEAD ZONE	-	3 %
9	SAFE	STOP	
Other parameters set-up is possible to change only by using the PC			
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: When 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 (0V) input signal).

Warning 2: *Auto-calibration process doesn't run if triggered in time when the EA is in error state, e.g. EA is overloaded (EA is switched -off from torque). In such case is necessary to resolve issue, e.g. the EA must be moved in a position in which is not switch-off from torque and to start the auto-calibration again.*

Warning 3: *Calibration process must be performed at any change of the operating angle value of more than 10%.*

Warning 4: *Operate adjusting button **P** on the control to activate the calibration process or start it from **MENU 4** in the version with local control (use the buttons on local control) or from the programme once the EA is connected to the PC. All calibration start methods have been equal.*

Rotation direction definition of the electric actuator's output element

Electric actuator is set by the producer in the following way: while looking at the output shaft of the actuator from the upper cover side, the output shaft moving in the direction "Close" is rotating clockwise. It means that the direction of rotation of the actuator is set as clockwise

In case the direction of rotation shall be changed the parameter „Direction of rotation of the actuator“ must be 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 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 auto-calibration by pressing the **P** button on the control unit **for 2 seconds as minimum** until LED ERROR (red) and LED MENU (green) 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 auto-calibration procedure starts
- after the auto-calibration procedure is finished, the ES 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 mid- position (see Note 2 presented above)
- switch on the supply voltage
- start the EA auto-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 auto-calibration procedure starts - inertia measuring
- after the auto-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 angle (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..., switch on the supply voltage and switch off control signals fed to the EA (input control signal (EA reports error No.2), eventually binary inputs)
- move the EA in the „Closed“ end position and write the „Closed“ end position into the memory by pressing the **C** button **for 2s as minimum** (until the LED ERROR (red), LED MENU (green) and LED PAR (red) lights up) – see also the procedure presented in the separate attachment No.74 1053 02
- release the **C setting button**
- move the EA in the „Opened“ end position and write the „Opened“ end position into the memory by pressing the **Q** button **for 2s as minimum** (until the LED ERROR (red), LED MENU (green) and LED PAR (red) lights up) – see also the procedure presented in the separate attachment No.74 1053 02
- release the **O setting button**
- introduce the EA into an intermediate position (see *Note 2* presented above)
- start the EA auto-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 auto-calibration procedure starts
- switch on control signals, 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

* 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!

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 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). For identifying the reason of the error, the EA can be connected to a PC and the program helps you find the type of the error.

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 (chapter 4.3).

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

3.8 Adjusting of stop ends (Fig.8)

Mechanical stop ends is possible to adjust in scale from $-5\text{ }^{\circ}\text{C}$ to $10\text{ }^{\circ}\text{C}$ for each position dependently. Electric actuator is by producer adjusted to operating angle according to the specification.

While setting, adjusting and resetting stop ends follow next steps:

- loosen the counter nut of specific stop end
- set the stop end to the new position
- lock the stop end screw with the counter nut
- adjust the electric end position for switch S3 or S4 as is signified in article 3.5.

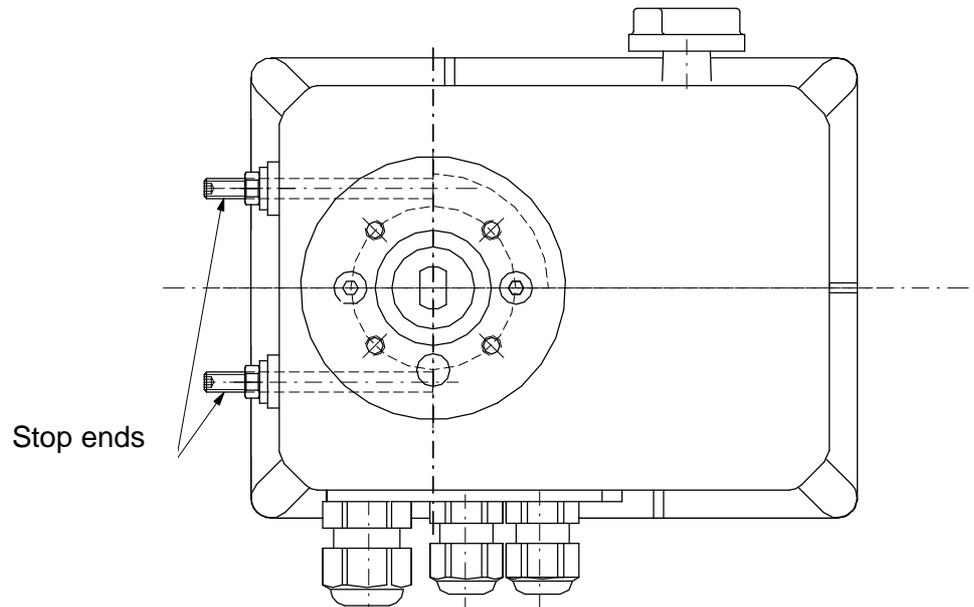


Fig.8: Flange of actuator from bottom.

Attention!

Operating angle adjusted by stop ends must be greater than angle set electronically to the actuator. The stop ends are used only for position setting by manual adjusting of the actuator. Use the stop ends in motor-operated operation of actuator is **inadmissible!**

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 EA SP/SPR 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.

While mains failure the actuator stops in the position where it was before the failure. If needed the actuator can be reset with the handwheel.

Manual control:

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

Instructions for manual control:

- Switch the power supply off.
- Turn the button for gear disengagement to the right by 90° (Fig. 9), the button arrow shows the symbol of hand) what disengages the gear in the actuator. In case of lever actuator it is needed to hold the lever to prevent the device with load against stroke to the end position.
- Set the valve to the chosen position:

a) *For actuators with manual control:* push and turn the hand wheel located on the actuator upper cover. While turning counter-clockwise the valve is turning in the direction "closing". Having the valve in the required position turn the button for gear disengagement to the position "motored operation" what engages the gears. Put the hand wheel back to its original position.

b) *For actuators without manual control* of the version with a stand and lever - using the lever. After resetting of the valve put the gear disengagement button to the original position.

Note:

After putting the button for disengaging of gearing again to the position of motor operation if the gearing is not connected it is needed to turn the handwheel or the lever to put the gears into mesh.

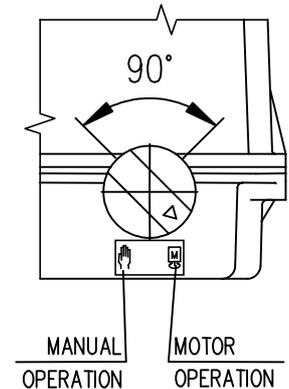


Fig.10

In case of manual control the set end positions are not mistuned.

Actuators without gear disengagement cannot be manually controlled.

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 - igrease HF 401/0 (GLEIT-μ) 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.
- 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 handwheel). 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.

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

For repairing eventually the electronics use the fuse – see Fig.1a (F3) for example SHURTER MSF 250, or a 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!

The EA electronics makes possible to identify some failures of the electric actuator. The control unit blinking LED ERROR indicates the failure (**Fig. 6**) or the error is displayed on the LED (**see Fig. 1**), or the LCD display (**see Fig. 7**). 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 4**. 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
Safe		X
Input control signal		X
Torque setting	X	
Torque		X
Position Range		X
Rotation	X	
EEPROM		X
Setting Modem		X
RAM	X	
Parameters	X	
Torque sensor	X	
Position sensor 1	X	
Position sensor 2	X	
Position sensor 3	X	
Position sensor 4	X	
Auto calibration		X
Actuator doesn't move	X	
Temperature <		X
Temperature >		X
Module LED	X	
Module Torque	X	
Module Position	X	X
Bus		X
TP		
PWR	X	
Phase	X	
Relays		X
Reset		X
ROM	X	

Module LCD	X	
Wrong Command	X	
Hand control	X	
Wrong Position	X	
Unknown type of modules Position	X	
Unknown type of modules Moment	X	
Unknown type of modules LED	X	
Unknown type of modules LCD	X	
Unknown type of modules PWR	X	
I2C	X	

Notes: **X** – the error or warning flag is activated.

With the **error flag**, the EA takes the position defined for the SAFE 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), eventually through the program after connecting the EA with a PC.

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 : One of the possible errors may be failure to return disengagement button after the manual control to the position mechanical control. In such case the EA will remain standing.

5. Accessories and spare parts

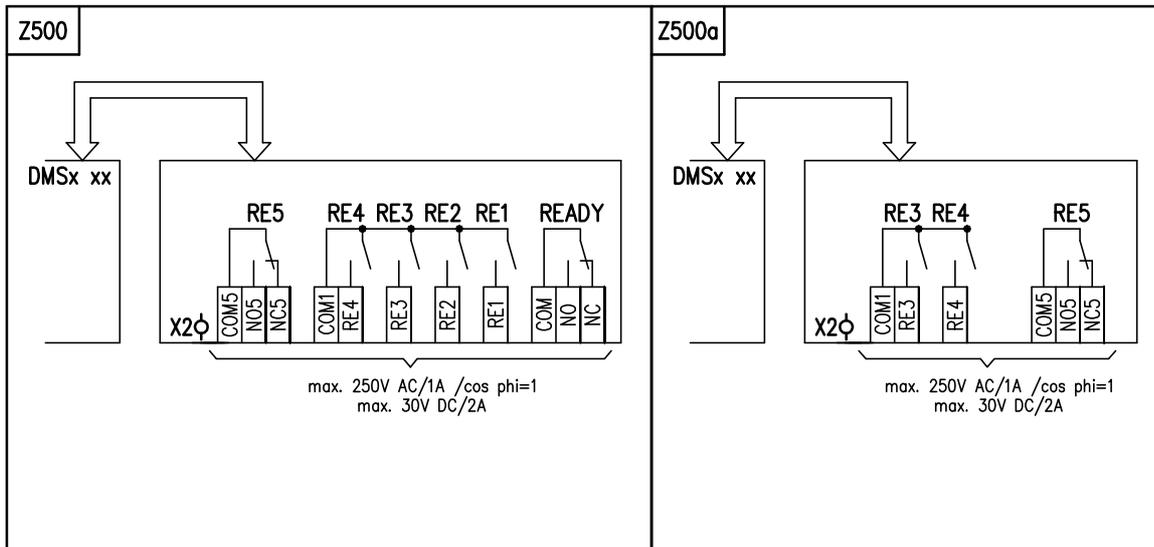
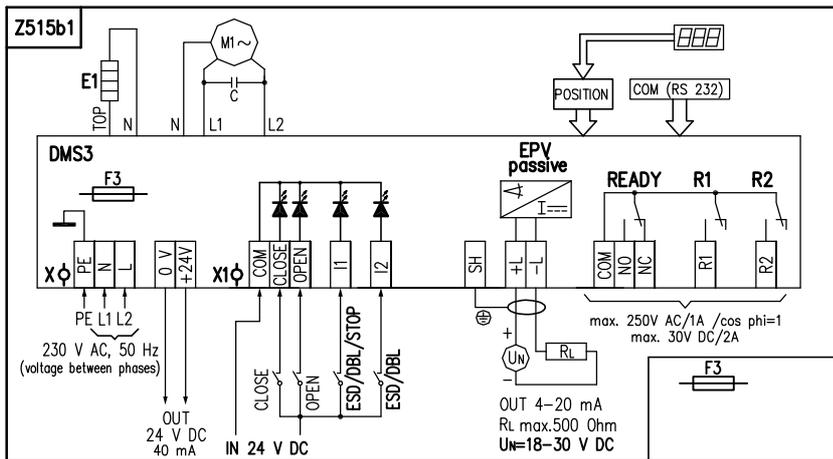
5.1 Accessories

The EA is delivered with the handwheel and cable glands.

5.2 Spare part list

Table 4 Spare part	Order Nr.	Position	Figure
Electric motor r; 1 W; 230 V	63 592 XXX	1	1
Electric motor; 2,75 W; 230 V AC	63 592 XXX	1	1
Electric motor; 4,7 W; 230 V	63 592 XXX	1	1
Electric motor; 7,3 W; 230 V	63 592 XXX	1	1
Sealing	62 732 376	-	-
DMS3 Z2 24A source board of electronic for 24 V AC	64 051 077	3	1,1A
DMS3 Z2 source board of electronic for 230 V AC	64 051 078	3	1,1A
Position scanning unit DMS3 SP	64 051 079	4	1
Control unit of the electronics DMS3 J1 (0/4/12 to 20 mA, resp. 4 to 12 mA)	64 051 075	2	1
Control unit of the electronics DMS3 J3 (0/2 to 10 V)	64 051 061	2	1
Control unit of the electronics DMS3 J2 (without input and output))	64 051 060	2	1
DMS3 L2 LED display	64 051 081	7	1
Module of the additional relays DMS3 RE3	64 051 065	8	1
Module of the additional relays DMS3 RE6	64 051 066	8	1

Warning: By supplying spare parts, the manufacturer is not responsible for damages caused by their disassembly and assembly. Installation, replacement of spare parts must be performed by authorized, qualified personnel.



Legend:

- Z500 wiring diagram module with 6 additional relays
- Z500a wiring diagram module with 3 additional relays
- Z514b wiring diagram of EA SPR 0.1PA for the ON/OFF control or for analogue input 0/4/12 up to 20 mA resp. 4 to 20mA and output signal 4 to 20 mA
- Z515b, Z515b1 wiring diagram of EA SPR 0.1PA for control ON/OFF
- Z523b wiring diagram of EA SPR 0.1PA for control ON/OFF or for analogue input 0/2 up to 10V 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
- E1 space heater
- F3 fuse of voltage supply source
- M single phase electric motor
- N controller
- POSITION position scanning
- R_{in} input resistance
- R_L load resistance
- U_N voltage for EPV
- READY relay (free-programmable)
- R1 and RE5 free programmable relay
- DMS3 electronic module
- X voltage supply source terminal board with screw terminals
- X1 terminal board with screw terminals on the control unit
- X2 screw terminal box on the additional relays board

Terminals:

PE, N, L – terminals (0,05-1,5 mm²) of supply (24 V AC resp. 110/120 V AC, resp. 230/240 V AC, 50/60 Hz
(according to the specification – voltage and frequency are stated on type plate of EA)

0 V, +24 V – terminals (max. 0,05 - 1 mm²) of output voltage 24 V DC (40 mA)

COM, CLOSE OPEN, I1, I2 – terminals (0,05 - 1 mm²) of control inputs 24 V DC

+IN, -IN, SH – terminals (0,05 - 1 mm²) of unified input current signal resp. voltage signal

+L, -L, SH – terminals (0,05 - 1 mm²) of output current signal (passive) 4-20 mA

COM, NO, NC, NO, NO – terminals (0,05 - 1,5 mm²) of relay READY, relay R1 a R2 (on control unit)

COM5, NO5, NC5 – terminals (0,05 - 1,5 mm²) relay RE5 (on the module of the additional relays)

COM1, RE4, RE3, RE2, RE1 – terminals (0,05 - 1,5 mm²) relay RE4, RE3, RE2, RE1 (on the module of the additional relays)

COM, NO, NC – terminals (0,05 - 1,5 mm²) of relay READY (on the module of the additional relays)

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: relay R1; R2; RE1 to RE5: disabled; open position; close position; torque-open (not valid for this type of the EA); torque – close (not valid for this type of the EA); torque open or torque close (not valid for this type of the EA); torque open or position open (not valid for this type of the EA); torque close or position close (not valid for this type of the EA); open; close; movement; movement flasher; to position; from the position; warning; remote control; local control; control shut off.

Program possibilities for **READY** relay: faults, faults or warnings, faults or no remote, faults 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, 20 to 4 mA, 0 to 20 mA, 20 to 0 mA.

Program possibilities for inputs I1: DISABLED, SAFE, DBL (local releasing, remote releasing), STOP.

Program possibilities for inputs I2: DISABLED, SAFE, DBL (local releasing, remote releasing), 2P (for control programme option 3P/2P I2) allows control using the binary 24V AC / DC inputs with I2 input activated.

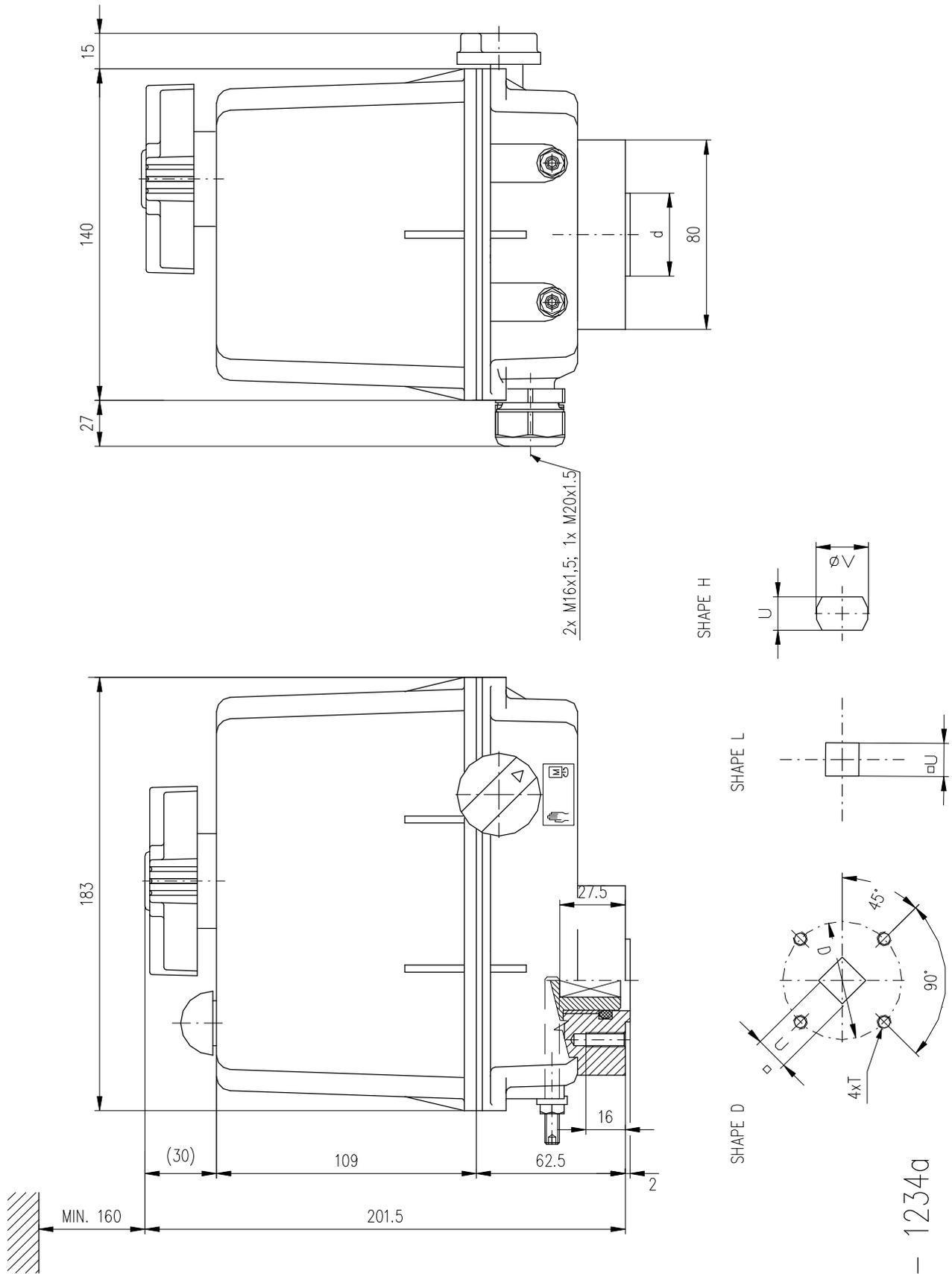
Program possibilities of reaction SAFE: OPEN, CLOSE, STOP, SAFE POSITION

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

Relay READY on the control unit is doubled with relay READY on the module of the additional relays.

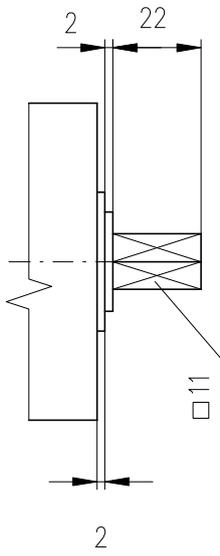
Relay R1 and relay R2 on the control unit is doubled with relay RE1 and relay RE2 on the module of the additional relays.

6.2 Dimensional drawings

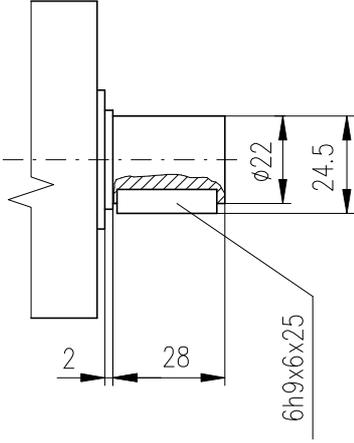


P- 1234a

SHAPE SL

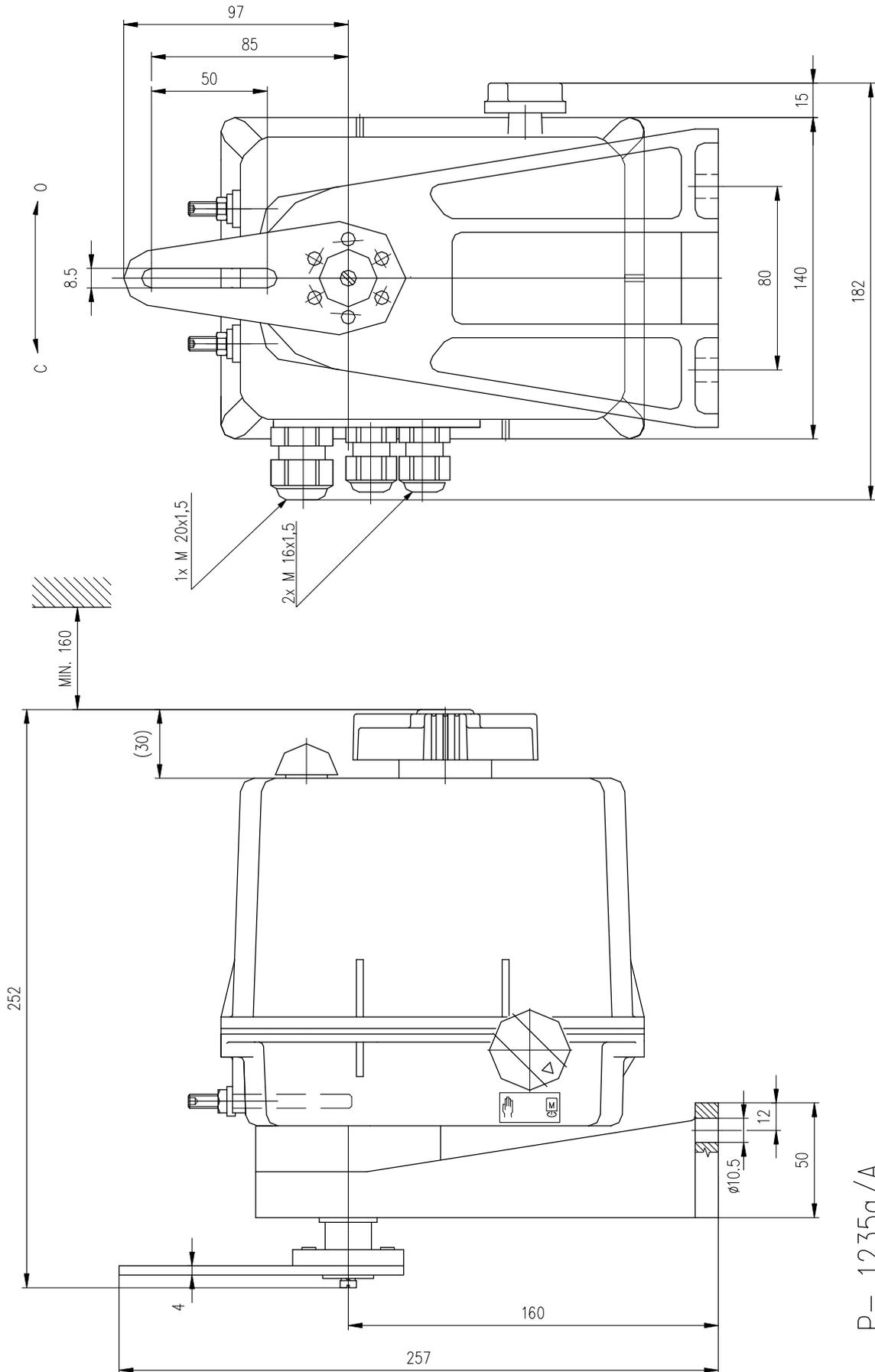


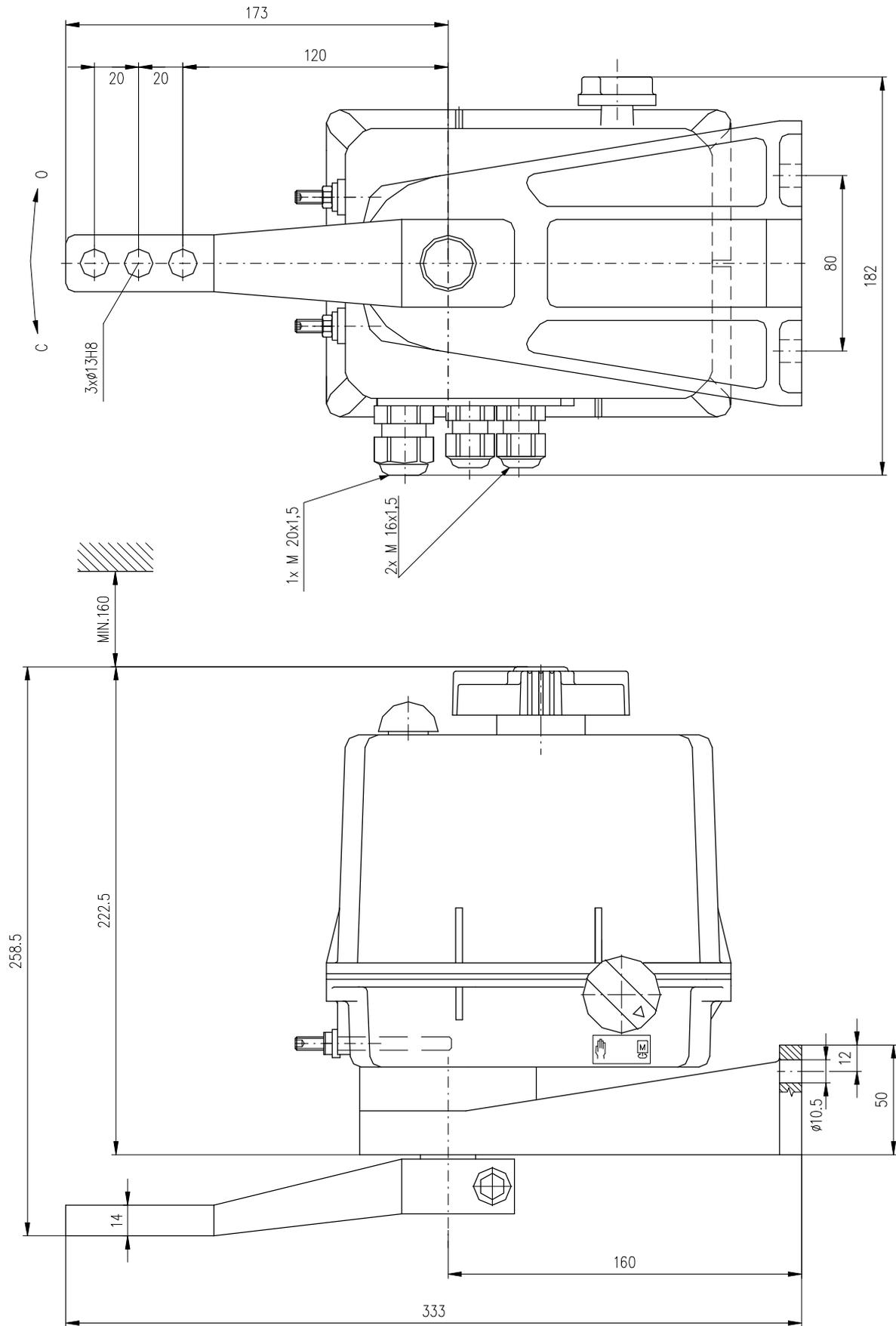
SHAPE SV



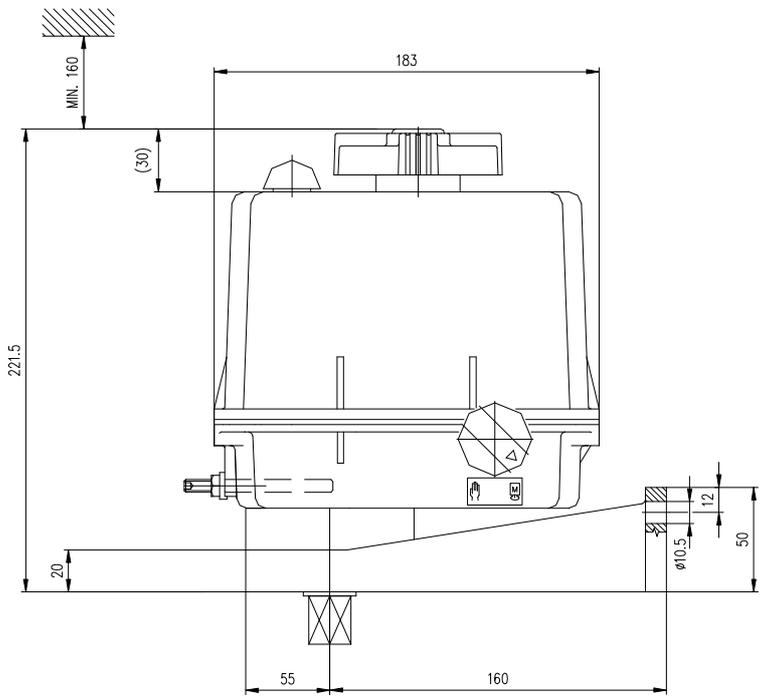
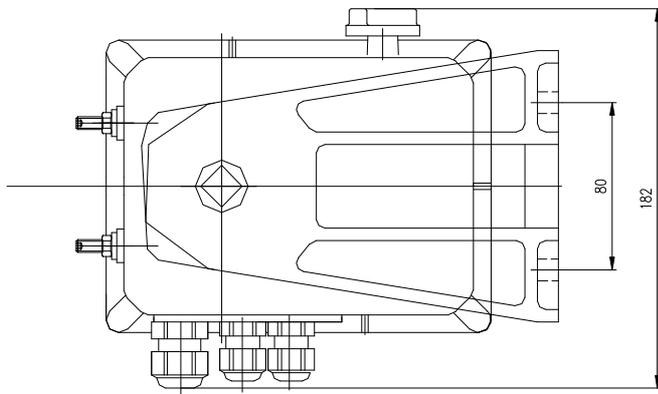
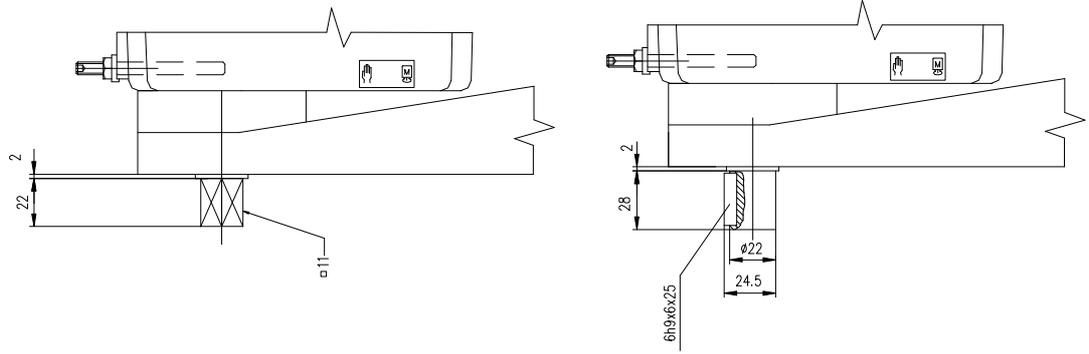
F 05	$\phi 50$	$\phi 35$	M6	14	18 ⁰ _{-0,4}	D, L, H, SV
F 05	$\phi 50$	$\phi 35$	M6	11	-	D, L, SL
F 04	$\phi 42$	$\phi 30$	M5	8	13	H
F 04	$\phi 42$	$\phi 30$	M5	11	18	D, L, H, SL, SV
F 03	$\phi 36$	$\phi 25$	M5	9	14	D, H, SL
FLANGE SIZE	D	d	T	U	V	COUPLING SHAPE

P- 1234a – continuation

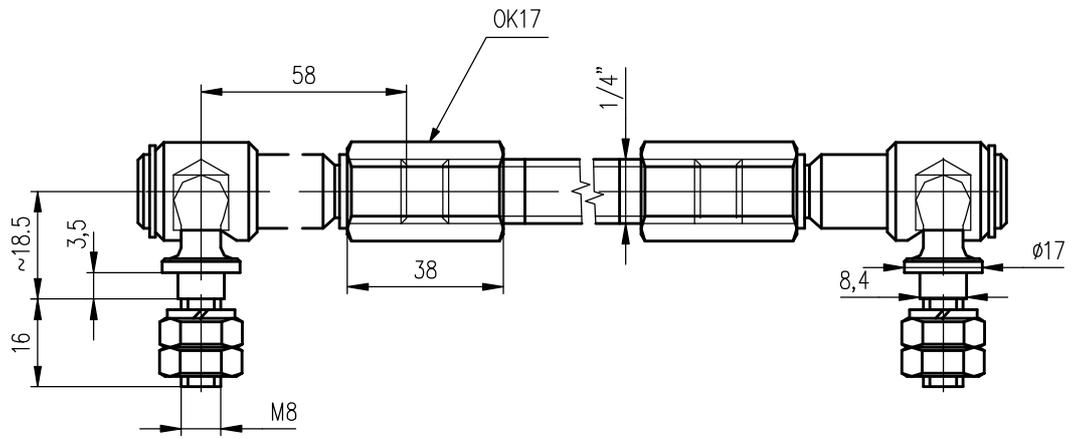




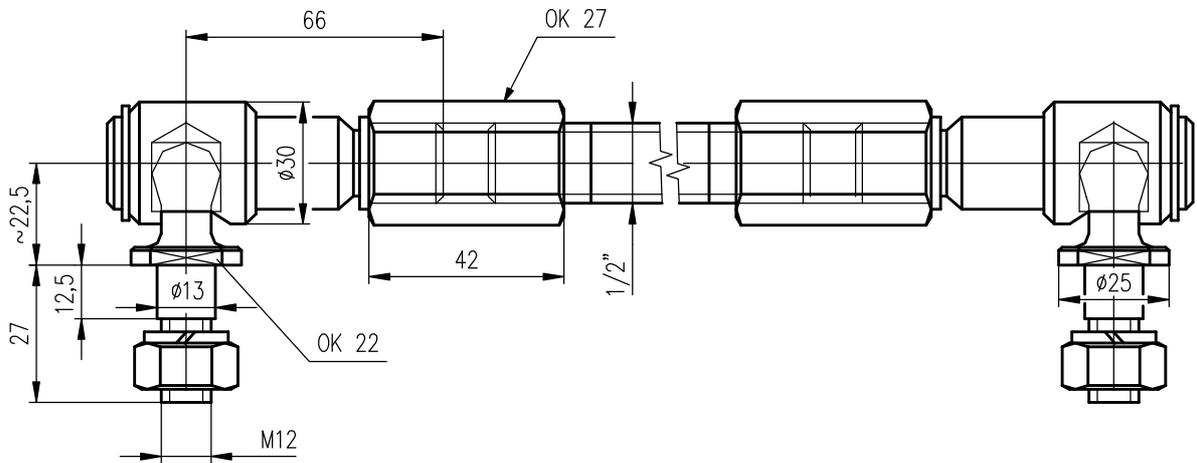
P- 1235a/B



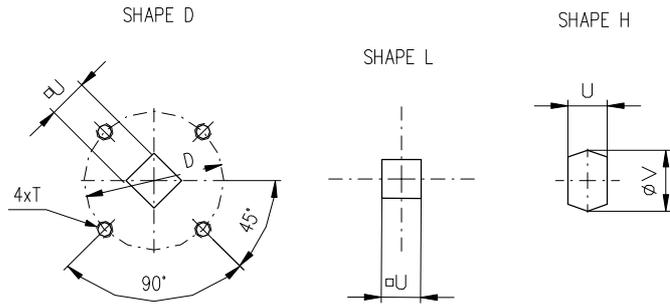
P- 1235a/C



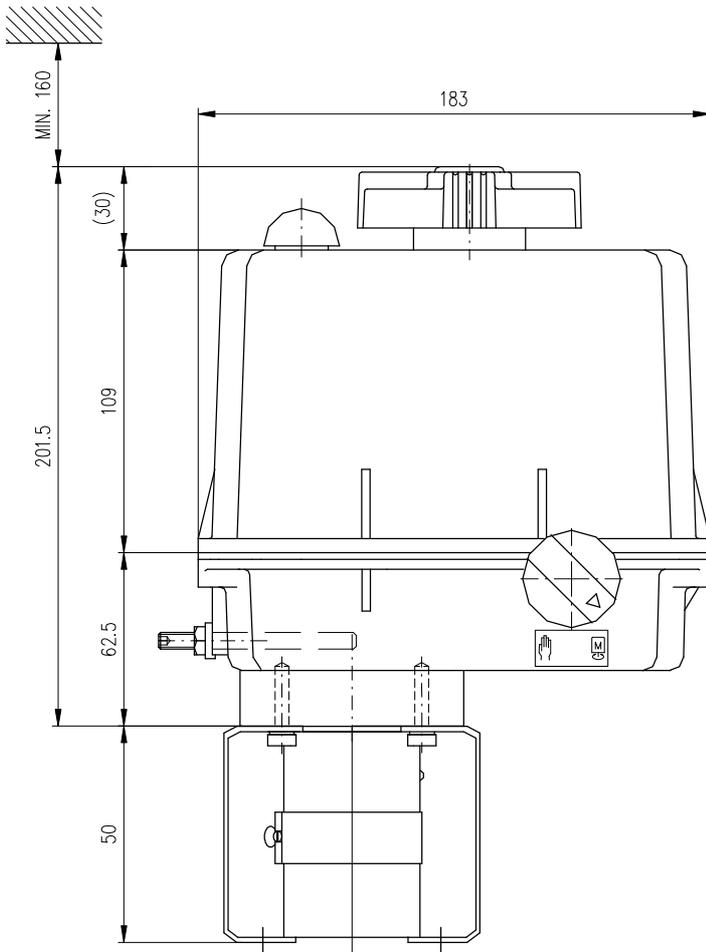
P-0100



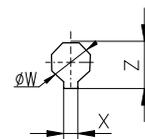
P-0210



F 07	ø70	M8	14	-	L-14
F 07	ø70	M8	14	18 ⁰ _{-0,4}	H-14
F 07	ø70	M8	14	-	D-14
F 07	ø70	M8	8	13	H-8
FLANGE SIZE	D	T	U	V	COUPLING SHAPE



SHAPE V-xx



F 07	20	6	22.5	V-20
F 07	16	5	18.1	V-16
F 07	12	4	13.6	V-12
FLANGE SIZE	W	X	Z	COUPLING SHAPE

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