INSTALLATION, SERVICE AND MAINTENANCE INSTRUCTIONS

Electric part-turn actuators SP 0, SPR 0

REGADA®

74 0802 02

TEST CERTIFICATE

ELECTRIC PART-TURN ACTUATOR SP 0, SPR 0

Type number 280. ..... Power supply ..... V ..... Hz

Serial number ..... Max. load torque ..... Nm

Production year ..... Operating time ..... s/90°

Wiring diagram ..... Operating angle ..... °

..... Transmitter .....

Warranty period ..... months Input operating signal .....

Serial number of electric motor .....

Serial number of transmitter .....

Serial number of position controller .....

Tests made in accordance with TP 74 0877 00

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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Nr.: 74 0802 02

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

1. General data

1.1 Purpose and applications

Electric part-turn actuators (hereinafter **EA**) of **SP 0** (hereinafter **SP**) or **SPR 0** (hereinafter **SPR**) types are high-powered electric-mechanical products designed for direct installations onto controlled devices (regulating bodies - valves, etc.). EA of SP types are provided for remote control of closing bodies, and EA of SPR types for automatic 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 or using a stand and a lever or lever and pull-rod.

Notes:

With EA having a built-in controller, in end position it is impossible to expect that the tight closing will be achieved by means of control signals.

Switching of actuator by a semiconductor components/switches have to be consulted with producer.

It is forbidden to use EA as a lifting mechanism!

1.2 Safety instructions

Characteristics of the Product Regarding Its Exposure Rate

EA of SP and SPR 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 2006/95/EC 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 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 noice level (A) of the product measured in a place of operation is 62 dB (A).

1.3 Instructions for stuff 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°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°C, protect the actuator by additional construction in order to maintain ambient temperature max. +55°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.
5. 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

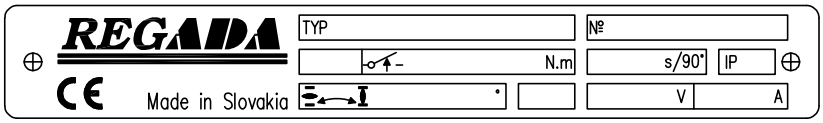
Product protection

EA **SP and SPR** 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. 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

Nameplate:



Warning plate:

Nameplate 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 within valid edition.

	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 nameplate (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), set switching-off torque),
- it is recommended to place also Installation certificate.

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

1.7.1 Life 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

- EA can be installed and operated at sheltered areas of industrial plants without temperature and humidity regulation, protected against climate effects (e.g. direct sunshine).
- Electric actuators must be placed with access to the manual control wheel, to the cover of control box and to cable glands.
- Installation and operation of EA is possible in **any position.** Vertical position of output part axis and with the control part above the valve is usual.

Warning:

*When the EA is installed in open air, **it must be** sheltered lightly to protect is against direct effects of atmosphere.*

When installed in the areas with relative humidity more than 80%, in open air under a shelter is needed to connect the space heater directly – without a thermal switch.

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 and 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***

in industrial environment: at temperatures stated above

- 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 spraying or jet water from all directions–(protection enclosure IP x4) .....**AD 4***
- with shallow dive – (product in protection IP x 7) .....**AD 7***
- with submersion – (product with enclosure IPx8).....**AD 8***
- with medium level of dust content – with possibility of effects of flame-proof, non-conducting and explosion-proof dust, medium cover of dust; dust fall more than 35 but at most 350 mg/sq m. or 350 to 1000 mg/sq m per day (protection enclosure IP5x, or IP 6x| ....**AE 5*, AE6***
- with atmospheric occurrence of corrosive and pollution media (with high degree of atmosphere corrosive aggressiveness); important presence of corrosive pollution.....**AF 2***
- with permanent exposure of big amount of corroding or contaminated chemicals and salt fog in execution for sea environment, for sewage water disposal plant and some chemical..... .....**AF 4***
- 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/m^2 ..... **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***

** 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 ..... **230/220 V AC** ±10%, or **24 V AC/DC** ±10%
control..... **230/220 V AC** ±10%, or **24 V AC/DC** ±10%
transmitter .....see chapter 1.8

Power supply frequency ..... 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 SP are designed for ***remote control:***

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

EA SPR are designed for ***automatic regulation:***

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

Note: EA SP is possible connect with external regulator and use it as regulated EA and for this EA stand duty cycle and power parameters like for type SPR with built-in regulator.

1.9 Description and function

The actuators are driven with synchronous electric motor (3) (Fig. 1). The torque from the electric motor is transferred through the spur gear train located in the bottom case (1) representing the base of the actuator. The whole gear train is covered with the gear board (2) where shafts of pinions are placed in sliding bearings. The gear train is equipped with a mechanism for disengagement in case of manual control of the actuator. The electric motor is controlled directly with position switches (4) switched by turning of cams (5) placed directly on the output shaft leading from the gear board to the control part. The gear board can be optionally equipped also with the terminal board for electric motor connection (6), the terminal board for transmitter connection (7) and a resistive transmitter (potentiometer) (8). Plugs for cables (9), an earthling clamp (10) and the disengagement button (11) are located at the actuator sides. The actuators SP 0 can be equipped also with a hand wheel placed on the upper cover.

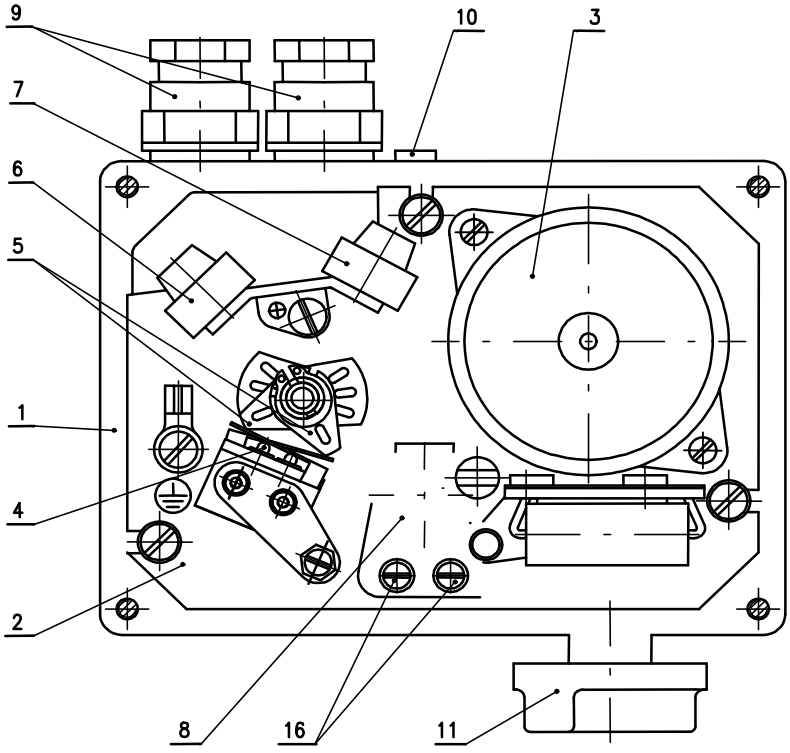


Fig.1

The **SPR** version is equipped with an **electronic controller**.

Legend:

1 .....bottom case
2 .....gear boar
3 .....electric motor
4 ....position switches
5 .....cams
6 .....terminal board for electric motor connection
7 .....terminal board for transmitter connection
8 ....resistive transmitter (potentiometer)
9 ...plugs
10 ..earthling clamp
11 ...disengagement button
16 ...screws

1.10 Basic specifications

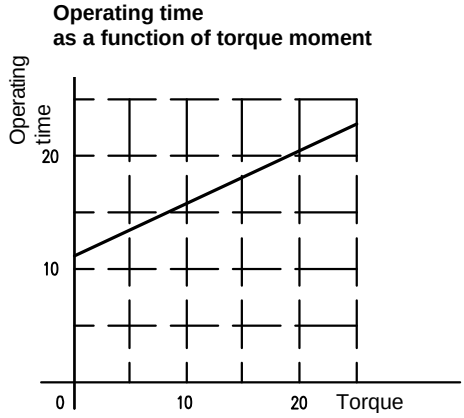
1.10.1 Basic EA specifications

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

Table 1: Basic EA specifications

Type Number	Operating time ±10[%][2]	Operation angle	Max. load torque	Weight	Electric motor[4]						
					Power supply nominal voltage		Nominal		Nominal current		
							power	speed	24 V AC	24 V DC[3]	220/230 V AC
	[s/90°]	[°]	[Nm]	[kg]		[V] ±10%	[W]	[1/min]	[A]		
1	2	3	4	5	6	7	8	9	10		
SP 0 / SPR 0, type number **280**	20	90°; 120°; 160°; without transmitter 0°up to 270° (≤220° version with S5 and S6)	4	1,4 – 2 (SP 0); 1,8 – 2,4 (SPR 0)	Single-phase	220/230AC or 24 AC/DC	1	300	0,25	-	0,025
	40		8								
	80		16								
	120		25								
	160		32								
	130		40				2,75	375	0,4	-	0,04
	15		12[1]								
	30		25[1]								
	60		32								
	100		40								
	20		25				6	1700	-	I_N = 0,26 I_Z = 0,76	

1) Actuators with max. load torque 12 Nm are self-locking up to torque value 7 Nm, only
Actuators with max. load torque 25 Nm are self-locking up to torque value 15 Nm, only
2) For 24 V DC : -50% ÷ +30%
3) Operating time as a funkcion of torque (diagram No.1)
4) Switching elements for different type of load (also for EA) defines standard EN 60 947-4-1.



Other specifications:

EA protection code ..... IP 54, 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 ..... with frequency in range from 10 up to 150 Hz,
with shift amplitude of 0.15 mm for $f<f_p$
with acceleration amplitude of 19.6 m/s^2 for $f>f_P$
(transition frequency f_P is from 57 up to 62 Hz)

resistance by drops …… 300 drops with acceleration of 5 $m.s^{-2}$

seismic resistance ……..6 degrees of Richter's scale

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

Position transmitters

Resistive – potentiometer:

Resistance (single **B1**): .....100 Ω, 2000 Ω

Operating life of transmitter ..... 1.10^6 cycles

Load power output:.....0.5 W up to 40°C (0 W/125°C)

Maximum current of sliding contact .....max. 35 mA

Maximum supply voltage:……..……$\sqrt{PxR}$ V DC/AC

Potentiometer linearity error:.....±2 [%][1)]

Potentiometer hysteresis:..... max. 1.5 [%][1)]

For SP0: "O" (open) ..... ≥ 93%, "Z" (closed) .....≤ 5%

For SPR0: "O" (open)..... ≥ 85% and ≤ 95%, "Z ≥ 3 % and ≤ 7%

Electronic positional transmitter (EPV) - converter R/I (B3)

a) 2-wire version - without built-in power supply, or with built-in power supply

Current signal ..... 4 ÷ 20 mA (DC)

Power supply voltage (at version without build-in power supply) .....15 ÷ 30 V DC

Power supply voltage (at version with build-in power supply) .....24 V DC ±1,5%

Load resistance (at version without build-in power supply).....max. $R_L=(U_n-9V)/0,02A$ [Ω]
(U_n - power supply voltage [V])

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

Values tolerance of output signal of EPV......"Z"..... +0,2 mA
....."O"..... ±0,1 mA

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

Current signal ..... 0 ÷ 20 mA (DC)

Current signal ..... 4 ÷ 20 mA (DC)

Current signal ..... 0 ÷ 5 mA (DC)

Power supply voltage (at version without built-in power supply) ..... 24 V DC ±1,5%

Load resistance ..... max. 3 kΩ

Output signal values at limit positions: ..... "O".... 20 mA or 5 mA (clamps 81,82)
..... "Z"..... 0 mA or 4 mA (clamps 81,82)

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

EPV transmitter linearity error:..... ± 2 %[1)]

EPV transmitter hysteresis:..... ..... max. 1,5 %[1)]

[1)] *from rated value of transmitter referred to output values*

Electronic position controller (N)

Controller software equipment:

A) Function and parameters

programmable **functions:**

- ..with functional buttons SW1, SW2 and LED diodes D3, D4 directly placed on controller
- ..with computer or terminal equipped with corresponding programme, using RS 232 interface.

programmable **parameters:**

- ..control signal

- ..response to SYS-TEST signal
- ..mirroring (ascending/descending characteristics)
- ..insensitiveness
- ..EA limit positions (only with computer and ZP2 programme)
- ..way of regulation

B) Operation states of controller

Error message from error memory: (using LED diodes and RS 232 and personal computer)

- ..control signal missing or faulty
- .. input value of current control signal under 3.5 mA
- ..existence of SYS-TEST signal
- ..activity of switches
- ..failure of feedback position transmitter

Statistic data: (using RS 232 and personal computer)

- ..number of controller operation hours
- ..frequency of relay switching in direction "opening"
- ..frequency of relay switching in direction "closing"

Supply voltage: ..... terminal 61 (L1) -1(N) ..... 230 V AC, ±10%
Frequency: ..... 50/60 Hz ±2%
Input control signals - analogue: .... 0 - 20 mA
4 - 20 mA
0 - 10 V
(Actuator opens at rising of control signal.)
Controller linearity: ..... 0.5 %
Controller insensitiveness: ..... 1 - 10% (adjustable)
Feedback (position transmitter): ..... resistive 100 up to 10,000 Ω
..... current 4 up to 20 mA
Power outputs: ..... 2x relay 5A/250V AC
Digital outputs:
4x LED (supply, error, adjustment, "opening", "closing" - with two-colour LED)
Error status: ..... control switch 24 V, 2W - POR
Reaction at error situation: ..... transmitter error - error message LED
Control signal missing: ..... error message LED
SYS mode: ..... error message LED
Adjusters: ..... communication connector
..... 2x calibrating and adjusting button

Switching-off: 2 A - 250 V AC, $\cos\varphi = 0.8$
0,1 A - 250 V DC,
2 A - 24 V DC, T=L/R=3ms
min. switching voltage: 20V
min. switching current: 100 mA
switching time: max.. 20 ms
insulation resistance: 50 MΩ

Manual control: ..... with handwheel;
rotating clockwisely EA output part is moving in direction "O" – open.

Electric control:

- remote control (output motion of actuator is operated by power supply voltage)

Output part backlash: ..... max. 1° (at 5% of max. load torque).

Adjustment of limit positions:

Limit position switches are adjusted with accuracy ± 1°.
Additional position switches (S5, S6) are adjusted 15°before end positions.

Weight: 1,4 to 2 kg
SP 0 –1,4 to 2 kg
SPR 0 –1,8 to 2,4 kg - in accordance with version of mechanical connection of EA;

1.10.2 Mechanical connection:

Basic and connecting dimensions are given in dimensional drawings.

1.10.3 Electric connection

- **To terminal board (X):** max. 12 terminals with nominal connecting cable size max. 1.5 mm^2, max. 2,5 mm^2 (**hold for SP 0**), or to 12 terminals with nominal connecting cable size max. 1.5 mm^2, max. 2,5 mm^2 + 5 terminals, connecting cable size max. 0.5 mm^2 (**hold for SPR**).
  3 cable glands with cable of diameter 6 up to 10,5 mm.

When using two types of extended cable glands of diameter from 9 to 13 mm (max for 2 positions, without combination with cable glands of diameter from 14 to 18 mm), resp. of diameter from 14 to 18 mm (just for one position).

With protection terminal:

external and internal, mutually connected and marked with protection earthling mark.

Electric connection - according to wiring diagrams.

1.11 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 SP or SPR** are delivered in solid packages guaranteeing resistance in accordance with EN 60 654 (IEC 60654-1 and 60654-3).

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 0.029 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 pa-lettes), 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

Abide by safety measures!

Notes:

Repeatedly verify whether placing of EA correspondents 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 nameplate) are in compliance with the valve parameters.

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

2.1 Installation

EA is by the producer adjusted to parameters according to the nameplate. Put on the handwheel before assembly.

2.1.1 **Mechanical** *connection electric actuator with valve*

Note that before the mechanical connection it is needed to check whether the operation angle of the actuator (see the type label) and the valve are the same.

Electric actuators SP and SPR are designed for operation of butterfly, ball and mixing valves with operation angle to 270°.

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

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.

Mechanical connection is available in the following versions:

Legend:
A ..... electric actuator
1 ..... screw
2 ..... spring washer
B ..... valve

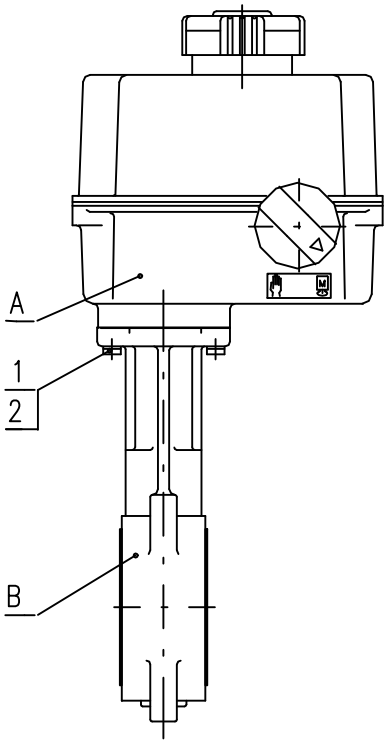


Fig.2

a) With a flange

While connection electric actuator with a flange follow these steps (Fig.2):

- check the labels whether operation angle of the actuator (A) is the same as the operation angle of the valve (B),
- put the actuator (A) and he valve (B) to the position closed,
- place the actuator (A) onto the valve (B),
- fix the sat actuator with four screws with thread of M5 (1) and spring
  washers (2), and tighten them (the screws are to be screwed into the valve flange in the depth of 10 mm),
- if the holes in the valve flange (B) do not fit with the thread holes in the actuator (A) rotate the hand wheel until they fit.

b) With a stand

The actuators with a stand are fixed to the base with two screws with thread M6. The screw depth in the steel base must not be less than 6 mm, in case of a base made of aluminium alloy not less than 12 mm.

They are connected with a controlled device:

- **directly** through a coupling
- **with a lever mechanism** consisting of the two levers (of the actuator and the controlled device) and one pull-rod connected with a tube with threads on the both ends (see dimensional drawing P-0100).

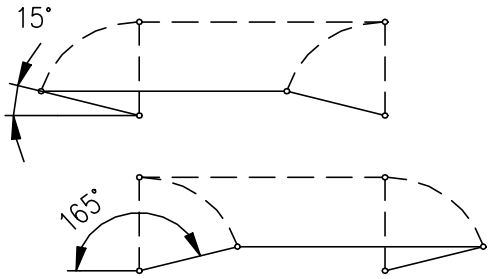


Fig.3

While mounting the lever mechanism the angle between the lever and the pull-rod is to be more than 15° and less than 165° . The coarse adjustment of any actuator lever position can be changed turning the hub on the output shaft by 90° or turning the lever on the hub by 60° or with the combination of the two operations by 30°.

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.
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 EA 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:

The EA can be controlled with: - a built-in position controller
- an external position controller

1. If the EA is controlled with an external controller using unified signal from a two- wire transmitter (capacitive or resistive with a converter in two-wire connection), it is needed to arrange connecting of the two-wire transmitter loop to electrical earth of the successive external controller!
2. Connection can be performed only in one point, in any part of loop out of the EA.
3. Electronics of the two-wire transmitters is galvanically insulated that is why it can serve as an external source for supplying of several transmitters (their number depends on current which the source can supply).
4. Do not connect and disconnect live connectors !

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. *The EA are delivered with bushings, which in case of tight putting on the leads assure protection enclosure up to IP 68. For required protection enclosure it is needed to use rings according to the actual cable diameter.*
3. *While fixing the cable it is needed to count with allowed bend radius to avoid damaging or deformation of the sealing element of the bushing. The leads are to be fixed with the solid construction at most 150 mm from the bushings.*
4. *It is recommended to use screened cables to connect remote transmitters.*
5. *The face areas of the control part cover have to be before re-mounting clean, coated with a grease without any acid (e.g. vaseline) and sealing not damaged to avoid joint corrosion.*
6. *Reversation of the EA is sure, if the period between switching-off and switching-on of power supply for the reversed movement of the output part is minimally 50 ms.*
7. *Delay after switching-off, i.e. time since a reaction of switches till the motor is dead can be maximally 20 ms.*
8. *It is recommended to have the corresponding direction protection switched-off directly with the corresponding position or torque switches.*

After electric connection it is recommended:

Checking of wiring. Set the actuator into a mid-position. Check the right direction of output shaft movement with pressing the button "closing" (on a manual control board or on a test button panel) and the output shaft should turn clockwisely looking from above. If not change the order of the mains phases.

Checking of position switches. While the actuator is running in the chosen direction consequently switch contacts of switches pressing springs of correspondent switches. In case of correct connection the actuator is to stop. If any of the functions is not correct check the connection in accordance with the wiring diagram.

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. *The EA are delivered with bushings, which in case of tight putting on the leads assure protection enclosure up to IP 68. For required protection enclosure it is needed to use rings according to the actual cable diameter.*
3. *While fixing the cable it is needed to count with allowed bend radius to avoid damaging or deformation of the sealing element of the bushing. The leads are to be fixed with the solid construction at most 150 mm from the bushings.*
4. *It is recommended to use screened cables to connect remote transmitters.*
5. *The face areas of the control part cover have to be before re-mounting clean, coated with a grease without any acid (e.g. vaseline) and sealing not damaged to avoid joint corrosion.*
6. *Reversation of the EA is sure, if the period between switching-off and switching-on of power supply for the reversed movement of the output part is minimally 50 ms.*
7. *Delay after switching-off, i.e. time since a reaction of switches till the motor is dead can be maximally 20 ms.*
8. *It is recommended to have the corresponding direction protection switched-off directly with the corresponding position or torque switches.*

In the **SPR version** with the built-in electronic controller it is needed to perform **autocalibration** for assuring optimal functioning.

The procedure is as follows

Press the button **SW1** for about 2 sec (i.e. till the **D3** diode is got on) to set the controller to the **autocalibration** mode. During this process the controller checks the feedback transmitter and the sense of turning, puts the EA to the positions open and closed, measures inertia mass in the directions "opening" and "closing", and loads the adjusted parameters into the EEPROM memory. In case that during the initialisation process an error occurs (e.g. in connection or adjustment) the initialisation process will be interrupted and the controller with the **D4** diode reports about the type of the error. Else after finishing the initialisation process the controller is put into the **regulation mode**. If needed to change adjusted parameters of the controller follow instructions given in the part Adjusting of actuator.

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 on professional competence…*
Disconnect the electrical servo-drive from electrical power network!
Observe safety regulations!

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.

The control parts designed for adjustment are accessible after removing of the actuator upper cover. Unscrew the four screws fixing the cover to the bottom case, and remove the cover.

After adjustment fix again the cover with the four screws.

3.1 Adjustment of position switches (Fig.4)

In the plant the actuators are adjusted to the fixed angle (90°, 120° or 160°) in accordance with the name plate. While adjusting follow these steps:

- Set the actuator to the end position "closed" and turn the cam (13) clockwisely until the switch S4 (18) will switch. Adjust also the additional position switch S6 (20) turning the cam (15) in the same direction as the cam (13) for the switch S4.
- Set the actuator to the position „open“ and turn the cam (12) counterclockwisely until the switch S3 (17) will switch. Adjust also the additional position switch S5 (19) turning the cam (14) in the same direction as the cam (12) for the switch S3.

Legend
12 ..... cam of switch S3
13 ..... cam of switch S4
14 ..... cam of switch S5
15 ..... cam of switch S6
17 ..... position switch “open”
18 ..... position switch “closed”
19 ..... additional position switch “open”
20 ..... additional position switch “closed”

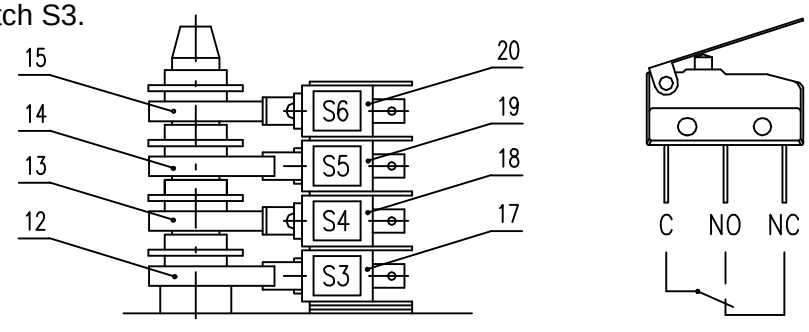


Fig.4

Note:
The position switches of the actuator with the position transmitter can be set in connection with the range possibilities of the transmitter.

3.2 Adjustment of resistant transmitter (Fig.5)

The **resistant transmitter** is in the EA **SP** used to function as a remote position indicator; in the EA **SPR** to function as a feedback in the position controller and if needed also in the position of a remote resistant position indicator.

Before the resistant transmitter adjustment the position switches have to be adjusted.

Resistant transmitter does not need adjustment, because of self-adjustment by adjusting actuator to both end positions. Transmitter is not possible set up to other operating angle, than is shown on name-plate of actuator.

Adjustment consists in setting of the resistance in the defined limit position of the EA.

Notes:

1. *In case that the EA is not used in the whole stroke range given on the nameplate, the resistance in the limit position "open" is proportionally reduced.*
2. *In the EA **SPR** 2000W resistant transmitters are used. In the other cases if the resistant branch is lead to the terminal board the resistance of the transmitters is according to the customer's specification.*

To adjust the transmitter follow these steps:

- Loosen the fixing screws (9) of the transmitter holder and push the transmitter out of mesh.
- Connect a meter for resistance measuring to the terminals 71 and 73 of the EA **SP** terminal board, or to the terminals 7 and 10 of the EA **SPR** terminal board.
- Put the actuator to the position “closed“ (with the handwheel, or with the local electric position control until the corresponding position switch S4).
- Rotate the transmitter shaft until resistance of ≤5% of the nominal transmitter resistance can be read on the meter in case of EA **SP**, and 3 up to 7 % of the nominal transmitter resistance in case of EA **SPR,** i.e. with the resistant transmitter with the converter PTK1.
- In the position put the transmitter to mesh with the drive wheel and fix the fixing screws on the transmitter holder.
- Disconnect the meter from the terminal board.

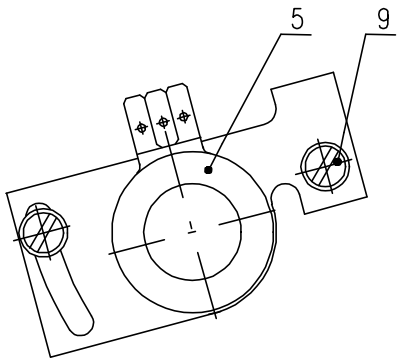


Fig.5

3.3 Adjustment of the Electronic Position Transmitter (EPV) - the Resistive Transmitter (Potentiometer) with the Converter PTK 1

EPV – the 2-wire version (Fig. 6,6a)

The position transmitter with the converter PTK1 is in the plant adjusted to have the output current signal on the terminals 81-82 as follows:

- in the position “open“ ..... 20 mA
- in the position “closed“ .....4 mA

If the transmitter requires a new adjustment follow these steps:

- Put the actuator to the position “closed“ and switch the power supply off.
- Adjust the resistive transmitter according to the previous chapter. The resistance is to be metered on the terminals X-Y (Fig. 6,6a). The used transmitter resistance is 100 Ω.
- Switch the converter′s power supply on.
- Turn the adjusting trimmer ZERO (Fig. 6,6a) to adjust the output current signal rate measured on the terminals 81-82 to 4mA.
- Set the actuator to the position “open“.
- Turn the adjusting trimmer GAIN (Fig. 6,6a) to adjust the output current signal rate measured on the terminals 81-82 to 20mA.
- Check the output signal of the converter in the both limit positions, and repeat the procedure if needed..

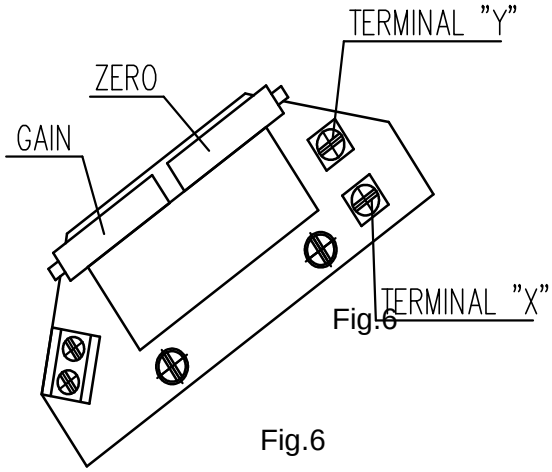


Fig.6

Fig.6

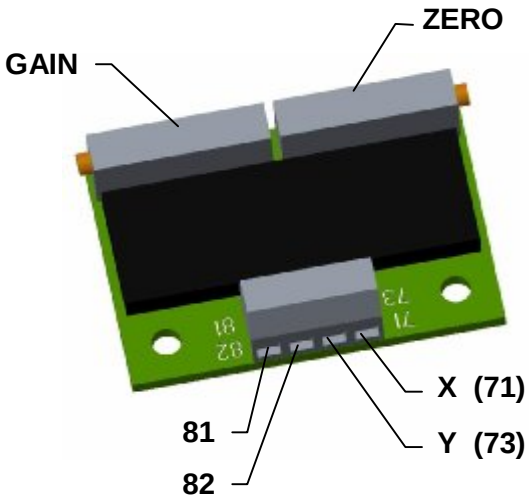


Fig. 6a

Note:

The output signal of 4-20mA can be adjusted at the range from 75 up to 100% of the rated stroke stated on the actuator's nameplate. At values less than 75% the value 20mA is reduced proportionally.

EPV – 3-wire version (Fig. 7,7a)

The resistive transmitter with the converter is in the plant adjusted to have the output current signal metered on the terminals 81-82 as follows:

- in the position „open“ ..... 20 mA or 5 mA
- in the position „closed“ ..... 0 mA or4 mA

according to the specified version of the converter.
If the transmitter requires a new adjustment follow these steps:

- Put the actuator to the position „closed“ and switch the power supply off.
- Adjust the resistive transmitter according to the previous chapter. The resistance is to be metered on the terminals X-Y (Fig. 7,7a). The used transmitter resistance is *2000W or 100 W.*
- Switch the converter’s power supply on.
- Turn the adjusting trimmer ZERO (Fig. 7,7a) to adjust the output current signal rate measured on the terminals 81-82 to 0 mA or 4mA.
- Set the actuator to the position „open“.
- Turn the adjusting trimmer GAIN (Fig. 7,7a) to adjust the output current signal rate measured on the terminals 81-82 to 20mA or 5 mA..
- Check the output signal of the converter in the both limit positions, and repeat the procedure if needed.

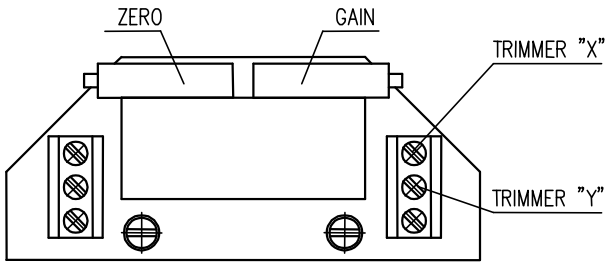


Fig. 7

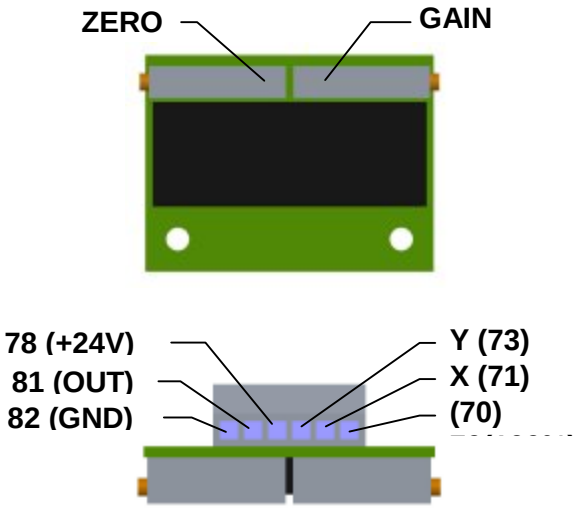


Fig.7a

<u>*Note:*</u>
The output signal of (0-20mA, 4-20mA or 0-5mA - according to the specification) can be adjusted at the range from 85 up to 100% of the rated stroke stated on the actuator¢s nameplate. At values less than 85% the value of the output signal is reduced proportionally.

3.4 Adjustment of position controller (Fig. 8)

The built-in position controller REGADA of new generation is a user-friendly control system to control actuators with an analogue signal. The controller takes advantages of high-power RISC processor MICROCHIP to perform all functions. It provides also continuous automotive diagnostics of the system, error messages as well as number of relay switching and number of controller's operation hours. Placing an analogue signal onto the input terminals of the terminal board 86/87 (GND, -) and 88 (+) causes that the EA output is reset.
Required parameters and functions can be programmed using function buttons SW1 - SW2 and LED diodes D3 - D4 placed directly on the controller, see Table 2.

Setting of controller

The controller's microprocessor unit is in the production plant programmed to parameters given in **Table 2** (Note 2).

Setting of the controller is performed using buttons and LED diodes.

Adjust the position and torque switches and the position transmitter before adjustment of the controller.

Laying of adjusters and signalling elements on the board of the REGADA controller is shown on Fig. 8:

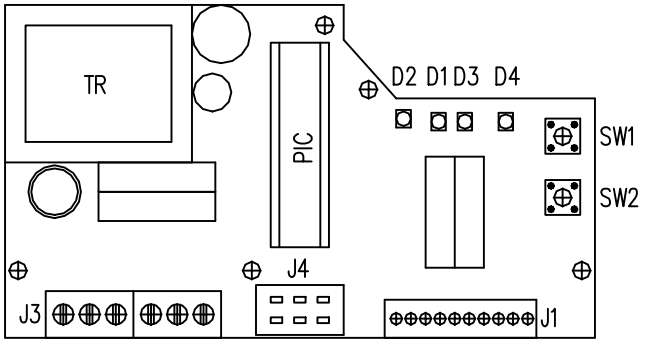


Fig.8

SW1 button	starts an initialisation routine an allows listing in the adjust menus
SW2 button	setting of parameters in the chosen menu
D1 diode	power on indication
D2 diode	motion to the direction "opening" indication (green) - "closing" (red) indication
D3 diode	(yellow light) number of blinking codes indicates chosen adjust menu
D4 diode	(red light) number of blinking codes indicates adjusted parameter of the controller from the chosen menu

Table 2:

D3 (yellow) diode number of blinking	**Adjust menu**	**D4 (red) diode** number of blinking	**Adjusted parameter**
1 blink	control signal	1 blink	0-20mA
		2 blinks	**4-20 mA (*) (**)**
		3 blinks	0-10V DC
2 blinks	response for signal SYS-TEST	1 blink	EA opens receiving signal SYS
		2 blinks	EA closes receiving signal SYS
		3 blinks	**EA stops receiving signal SYS (*)**
3 blinks	mirroring (ascending/descending characteristics)	1 blink	EA CLOSING at increasing of control signal
		2 blinks	**EA OPENING at increasing of control signal (*)**
4 blinks	insensitiveness of controller	1 to 10 blinks	insensitiveness of controller of 1-10% (3% set by the producer) (*)
5 blinks	way of regulation	1 blink	narrow torque
		2 blinks	**narrow position (*)**
		3 blinks	wide torque
		4 blinks	wide position

Notes:
1. *The controller at autocalibration automatically sets the feedback type - resistant/current*
2. *(*) Parameters set in the production plant, if customer has not stated else.*
3. *(**) Input signal 4 mA - position "closed"*
   20 mA - position "open"

Standard setting of controller (programmed RESET of controller) - in case of any problems with setting of the parameters it is possible with pressing both **SW1 and SW2** at the same time and then switching power on to set the standard parameters.

Controller setting procedure:

The initialisation routine starts at the switched-on controller, zero system deviation and short pressing of the SW1 button for ca 2 sec (i.e. until the diode D3 got on). Loosing the button some of the default menus starts (usually control signal) what is shown with 1 blink on the D3 diode as well as one of the default parameters (usually control signal of 4-20mA) what is shown with 1 blink on the D4 diode. Then the required parameters of the controller can be changed according to Table 2:

- press shortly the SW1 button to list the menu shown with the blinking number on the D4 diode.
- press shortly the SW2 button to set parameters shown with the blinking number on the D4 diode.

After changing the parameters according to the user's requirements, switch the controller to autocalibration using the SW1 button pressed for approx. 2 sec (i.e. until the diode D3 lights up), which is signaled by flashing the yellow LED D3 6 times. During this process, the controller checks the feedback transmitter and the direction of rotation, moves the ES to the open and closed positions, measures the inertial masses in the "OPEN" and "closes" directions and saves the set parameters in the EEPROM memory.

In case that during the initialisation process an error occurs (e.g. in connection or adjustment) the initialisation process will be interrupted and the controller with the D4 diode reports about the type of the error. Else after finishing the initialisation process the controller is put into the regulation mode.

Error messages of the controller with D4 diode at initialisation

4 blinks .....improper connection of the torque switches
5 blinks .....improper connection of the feedback transmitter
8 blinks .....bad sense of actuator's turning direction or adverse connection of the feedback transmitter

Watching operation and error states

Watching operation and error states is possible with the EA open.

a) Operation status with the D3 LED diode indicating:

- it is continuously lighting - the controller regulates
- it is continuously not lighting - system deviation in the insensitiveness range - the EA has stopped

b) Error state with the D4 and D3 LED diodes indicating - D4 continuously lighting, D3 indicates error state with blinking

- 1 blink (repeated): indication of the "TEST" mode - the EA is put to the position according to the signal in the "TEST" menu (at connecting the 66 and 86/87 terminals)
- 2 blinks (repeating after short pause): missing of control signal - the EA is put to the position according to the signal in the "TEST" menu
- 4 blinks (repeating after short pause): torque switches activity indication (the EA switched-off with the torque switches in a mid-position)
- 5 blinks (repeating after short pause): failure of the feedback transmitter - the EA is put to the position according to the signal in the "TEST" menu
- 7 blinks (repeating after short pause): control signal (current at range 4-20mA less than 4mA (3.5mA).

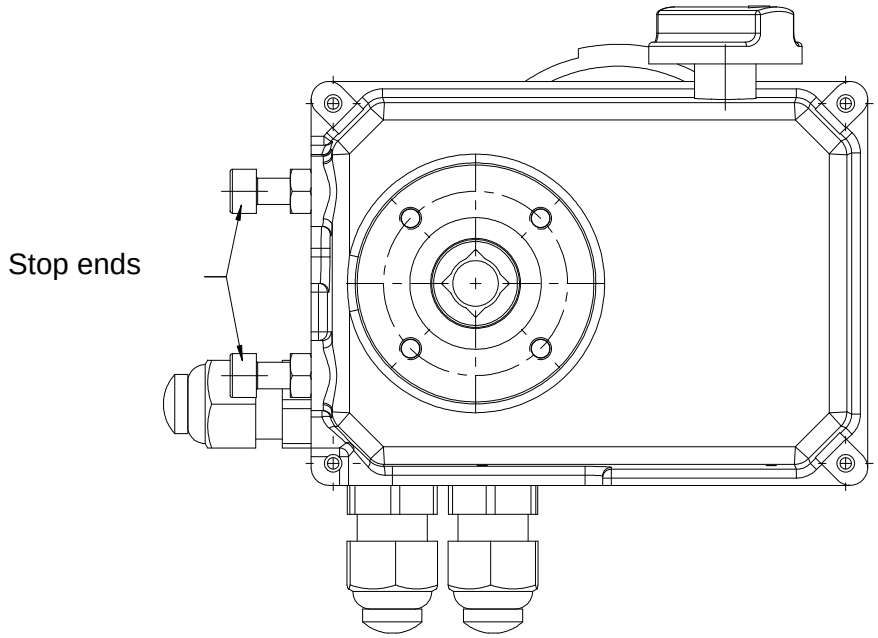
3.5 Adjusting of stop ends

Mechanical stop ends is possible to adjust in scale from –5 °C to 10 °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 significated in article 3.1.

Attention!

Operating angle adjusted by stop ends must be greater than angle adjusted by switches S3 and S4. Fixed stop ends are used only for localisation of a position by manual adjusting of the actuator. Use of fixed stop ends in motor-operated operation of actuator is <u>impermissible</u>!



Pic.9: Flange of actuator from bottom.

4. Service and Maintenance

4.1 Service

1. In general it is supposed that the EA is serviced by a qualified person as required in the Chapter 1!
2. After the EA is put into operation it is necessary to check whether during manipulation its surface finishing was not damaged – the damages should be eliminated to prevent the surface against deterioration caused by corrosion!

The EA SP and 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.

At a power outage or voltage breaking off, an electric actuator will stop in a position, in which it had been before the power outage occurred. In case of need it is possible to preset the electric actuator with manual operation (if the electric actuator is equipped with a mechanism for a gear release).

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. 10), 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 actuator to the chosen position:

a) *For actuators with manual control:* push and turn the hand wheel located on the actuator upper cover. While turning counterclockwisely 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.

<u>Note:</u>
When after turning the button for gear disengagement to the position "motored operation", the gears does not engage, is needed to turn by handwheel or lever to engage the gears.

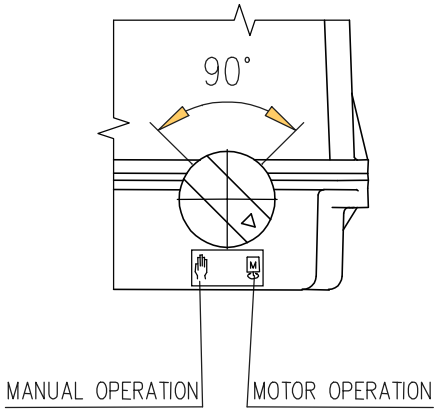


Fig. 10

In case of manual control the set end positions and transmitter 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 - grease 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.

For controller repair a F1,6 A subminiature fuse for PCB should be used, alternativelly also F 2A, 250 V e.g. Siba type 164 050.1,6 or MSF 250, and for DB .... voltage source repair a M160 mA, 250V fuse, e.g. Siba, or MSF 250.

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. Spare part list

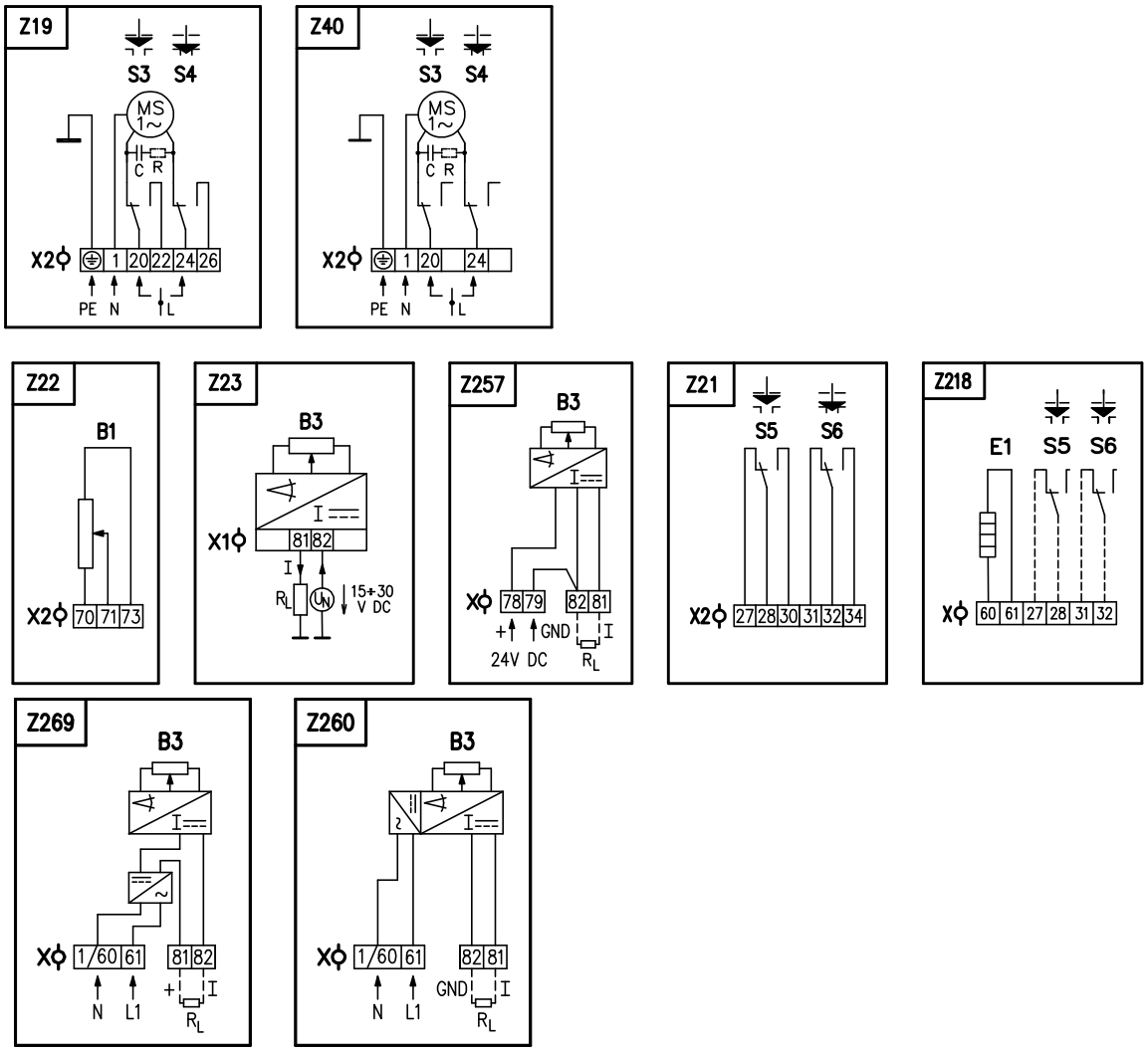
Spare part	Order Nr.	Position	Figure
Electric motor; 1 W; 220/230 V AC	63 592 006	3	1
Electric motor; 2,75 W; 220/230 V AC	63 592 004	3	1
Electric motor; 2,75 W; 24 V AC	63 592 007	3	1
Electric motor; 6 W; 24 V DC	63 592 399	3	1
Capacitor KPI 300.047F 290NF	63 540 305	-	-
Capacitor 100nF WIMA MKS4J031004C00KSSD	63 540 192	-	-
Capacitor MKT 200 MKT 200-030 25 UF	63 540 309	-	-
Micro switch CHERRY DB 6G A1LB	64 051 466	4	1
Resistant wire transmitter (potentiometer) RP19; 1x100	64 051 812	8	1
Resistant wire transmitter (potentiometer) RP19; 1x2000	64 051 827	8	1
Cable glands	63 457 021	9	1
Sealing 118x2,5 NFR 70 – IP 67	62 732 270	-	-
Sealing – IP 65	04 790 800	-	-
Terminal board EKL 0 EDS PA	63 456 710	6,7	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.

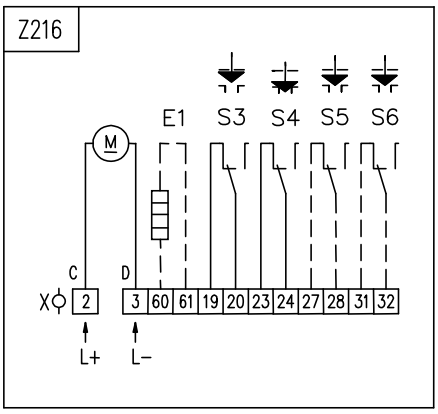
6. Accessories

6.1 Wiring diagrams

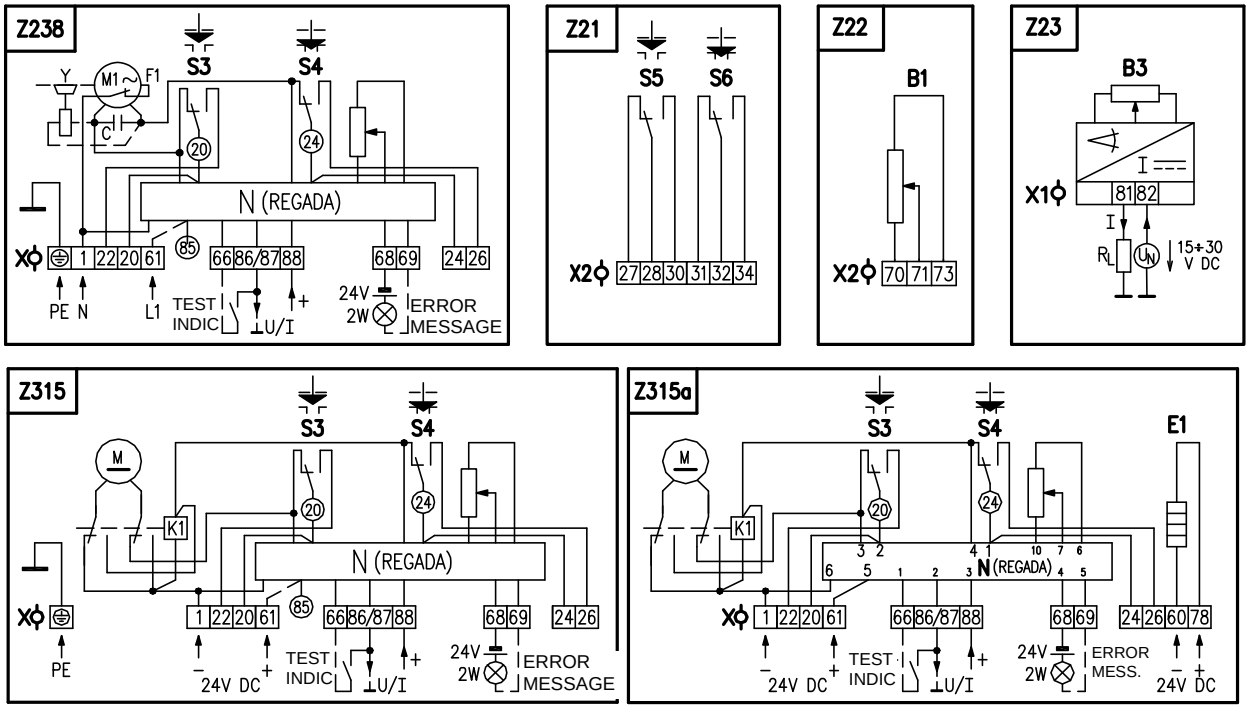
Wiring diagrams for EA SP 0



Wiring diagrams for EA SP 0 – 24 V DC



Wiring diagrams foe EA SPR with regulator



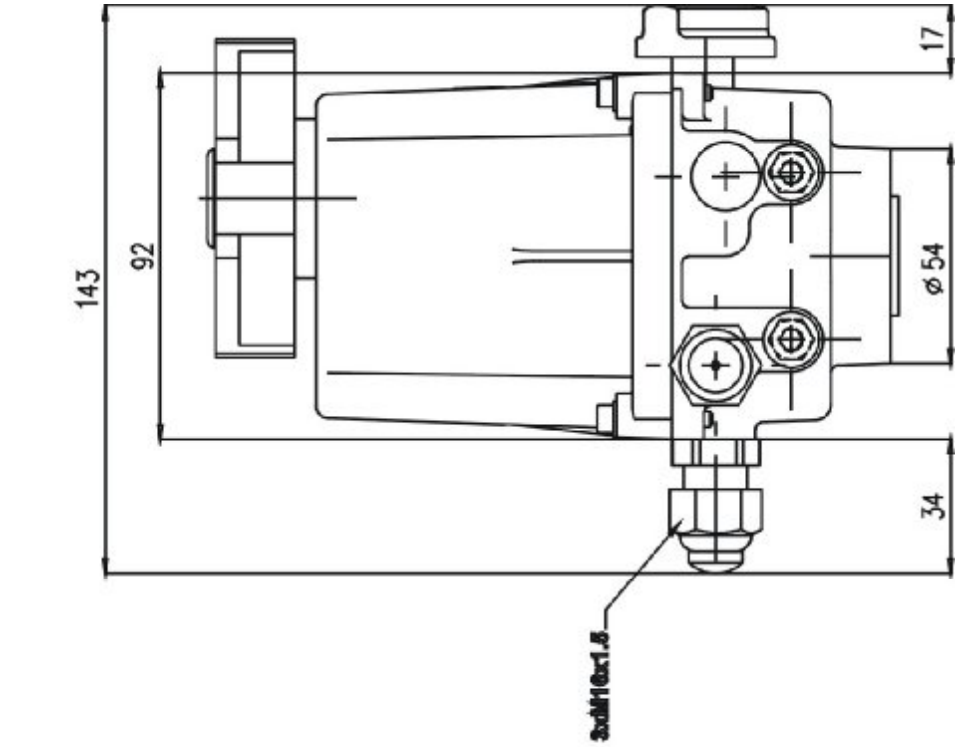
Legend:

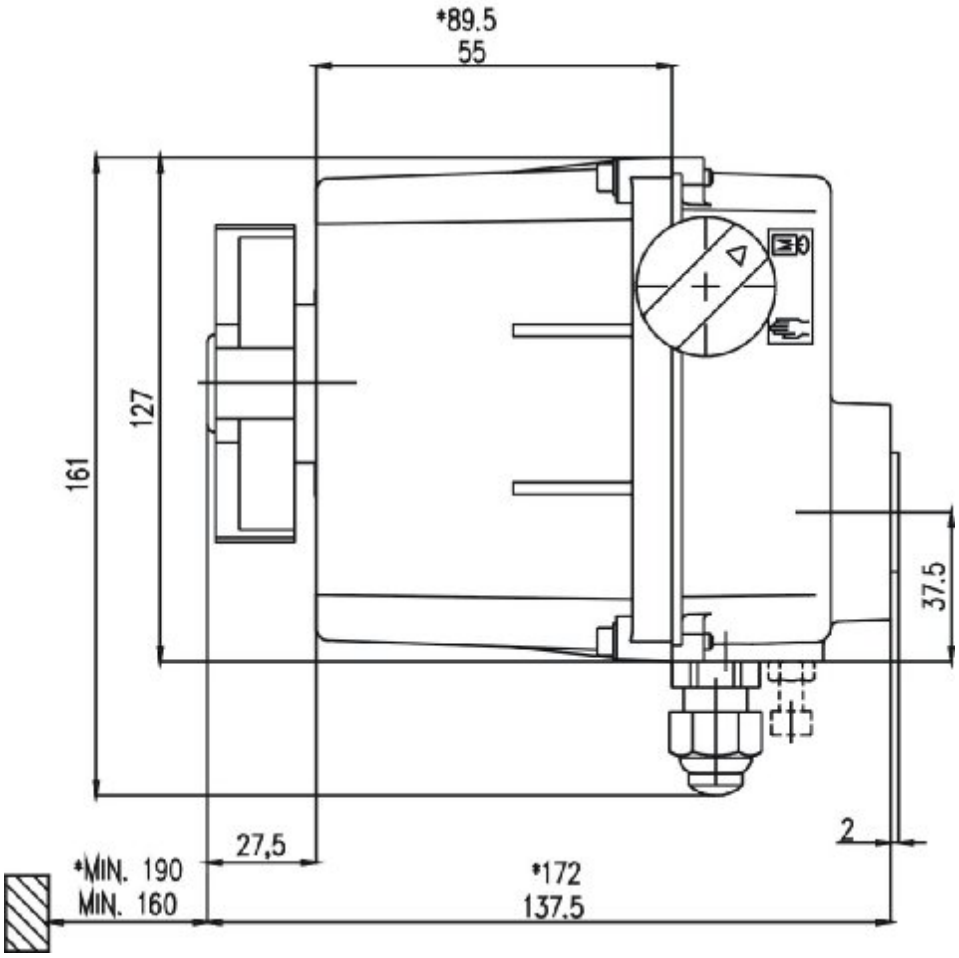
Z19..... electrical motor connection
Z21 ..... additional position switches connection
Z22 ..... single resistant transmitter connection
Z23 ..... 2-wire converter - without power supply connection
Z40 ..... electrical motor with additional positional switches connection (for version with Z21+Z22)
Z216 …… connection of EA with electric motor 24 V DC
Z218 ..... space heater with additional positional switches connection
Z238 …….position controller with resistant feedback connection
Z257..... 3-wire converter - without power supply connection
Z260 ..... connection of resistive transmitter with current converter -3-wire version with power supply
Z269 ..... connection of resistive transmitter with current converter -2-wire version with power supply
Z315 …... connection of EA SPR 24 V DC with resistant feedback
Z315a …. connection of EA SPR 24 V DC with resistant feedback and with space heater

B1 .....remote transmitter-resistive, single
B3 .....electronic position transmitter (EPV)
S3 .....positional switch "open"
S4 .....positional switch "closed"
S5 .....additional positional switch "open"
S6 .....additional positional switch "closed"
M1, MS, M .electric motor
C .....capacitor
Y ..... brake of electric motor
E1 .....space heater
F1 ..... electric motor thermal protection
X, X1, X2 ..... terminal board
N .....controller REGADA
I(U) .....output (input) current (voltage) signals
R .....resistor
R_L.....loop resistance (load resistance)

Note: 1 The version of EA with additional positional switches (S5, S6) and together with terminate resistive transmitter (B1) is connected according to wiring diagrams Z40+Z21+Z22.
2. The version of EA with 3-wire converter without power supply (wiring diagram Z257) are terminals 78 and 82 interconnected into one terminal marked as 82.
3. The version of EA with power supply 24 V~ is not needed join ground wire PE.

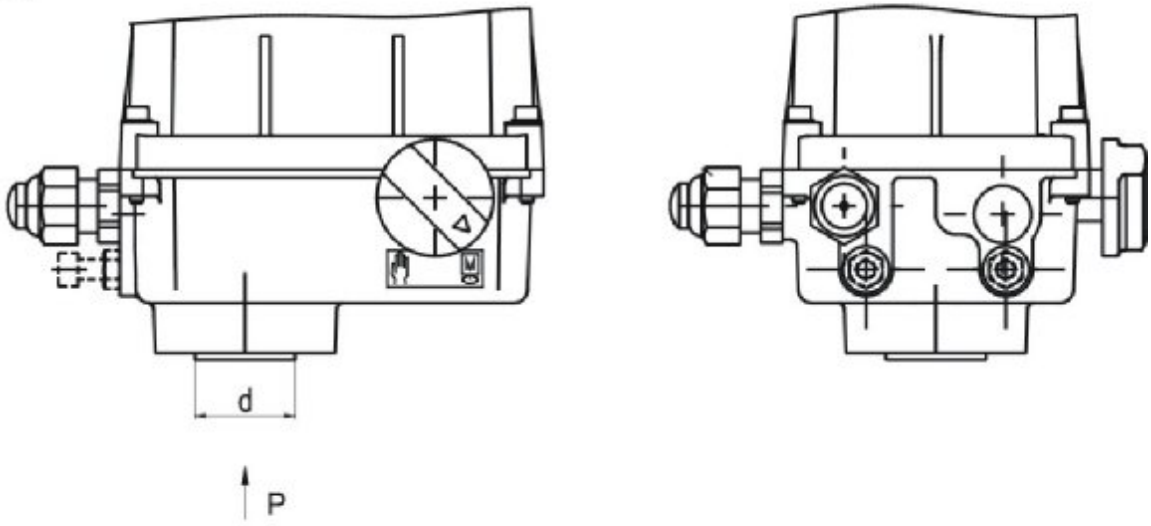
6.2 Dimensional drawings





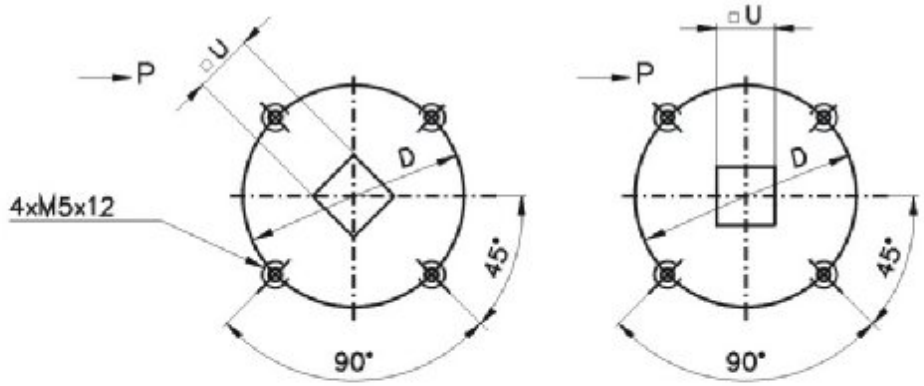
* The dimensions are valid for version with convertern and SPR 0 with controller

P - 1172



TVAR A
\SHAPE A\

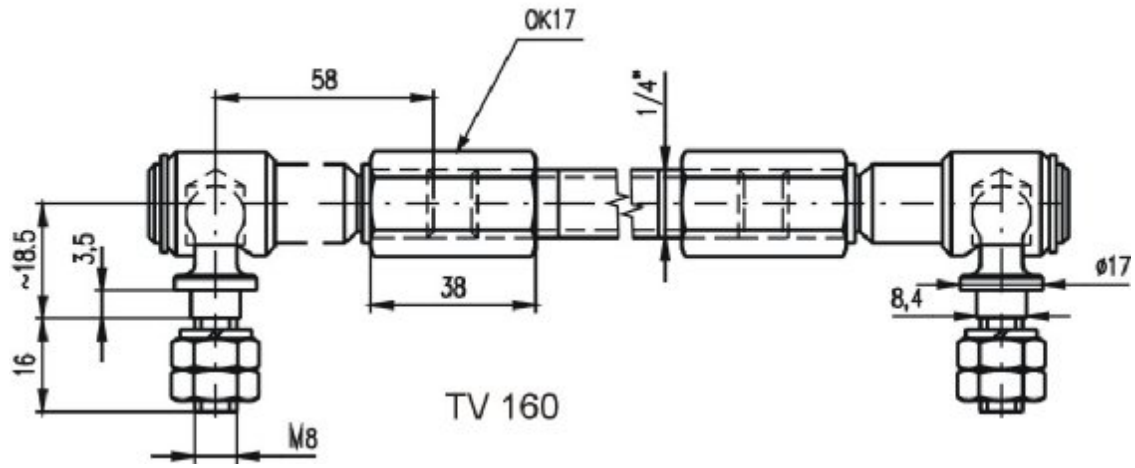
TVAR B
\SHAPE B\



F 03	⌀36	⌀25f8	9
F 04	⌀42	⌀30f8	11
Príruba \Flange\ ISO 5211	D	d	U

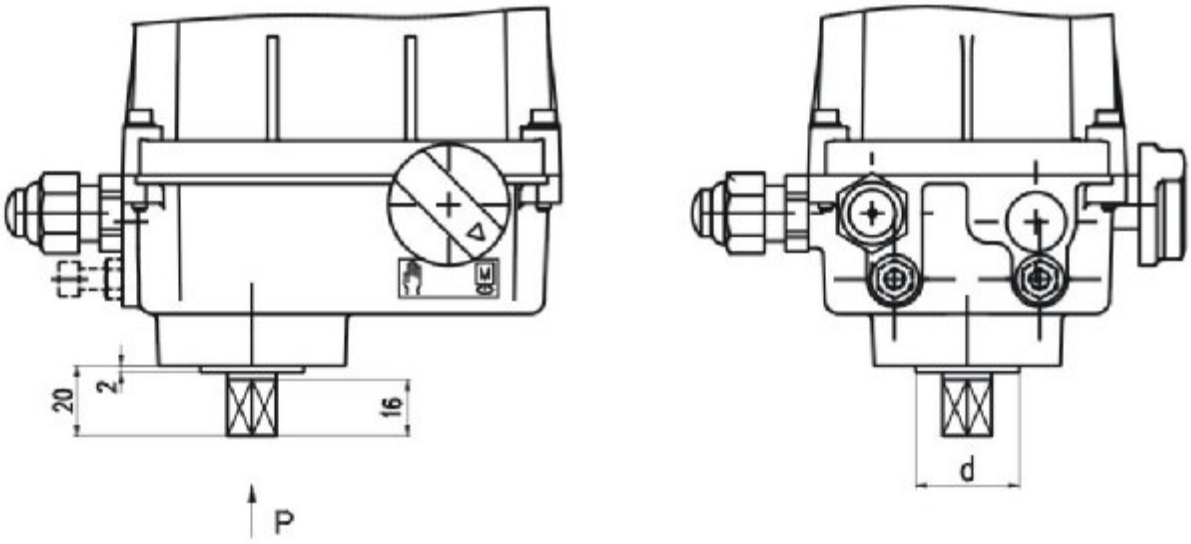
*) Platí pre ES SP 0 s prevodníkom a pre ES SPR 0 s regulátorom
\Valid for SP 0 with converter and SPR 0 with possitioner\

P - 0100



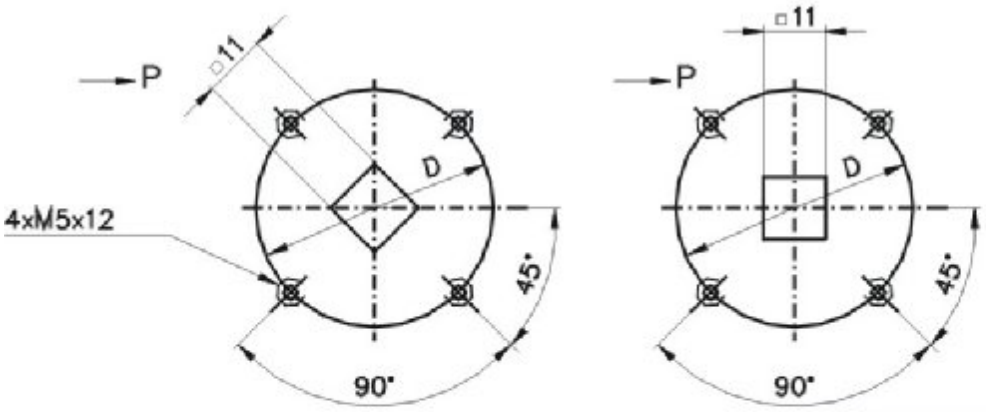
TV 160

P - 1173



TVAR A
\SHAPE A\

TVAR B
\SHAPE B\

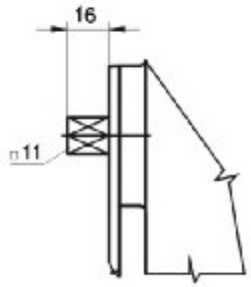


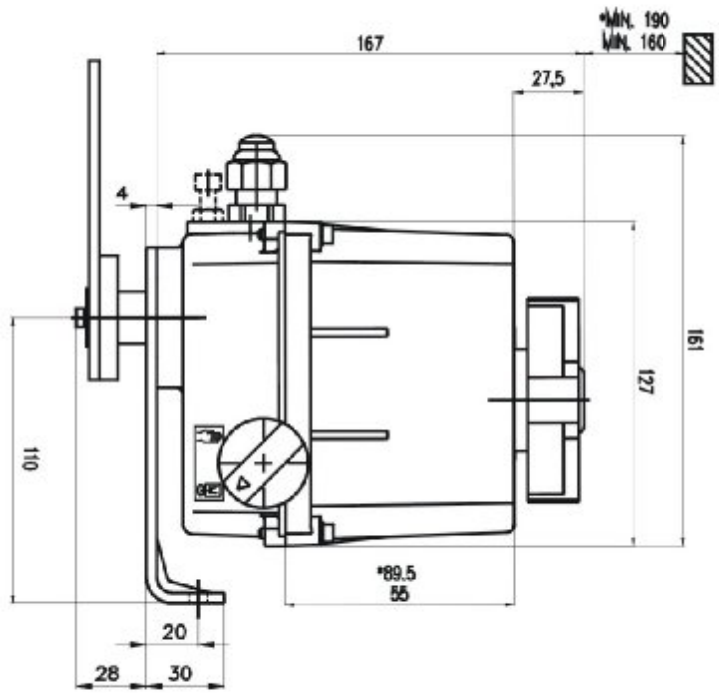
F 03	⌀36	⌀25f8
F 04	⌀42	⌀30f8
Príruba \Flange\ ISO 5211	D	d

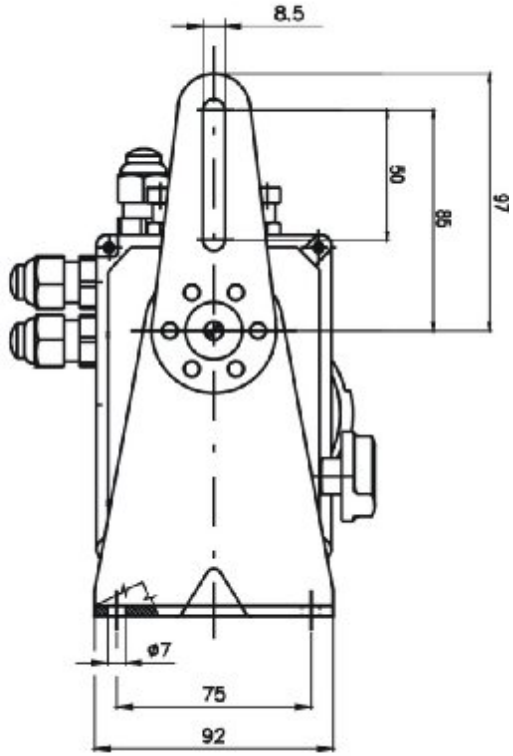
*) Platí pre ES SP 0 s prevodníkom a pre ES SPR 0 s regulátorom
\Valid for SP 0 with converter and SPR 0 with possitioner\

P - 1174

Mechanické pripojenie - kód E
podľa špecifikačnej tabuľky
\Mechanical connection - code E
according to specification table\

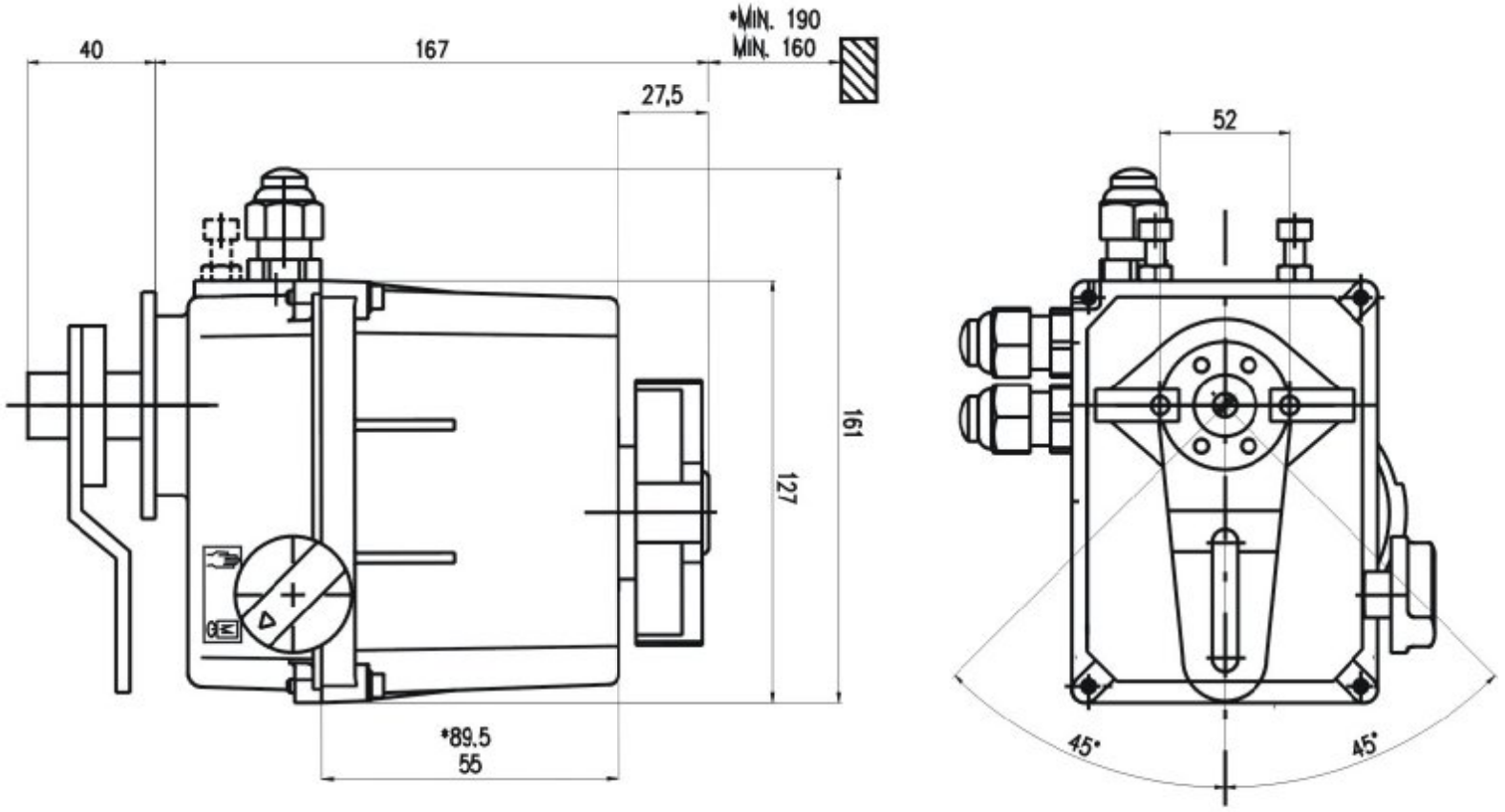






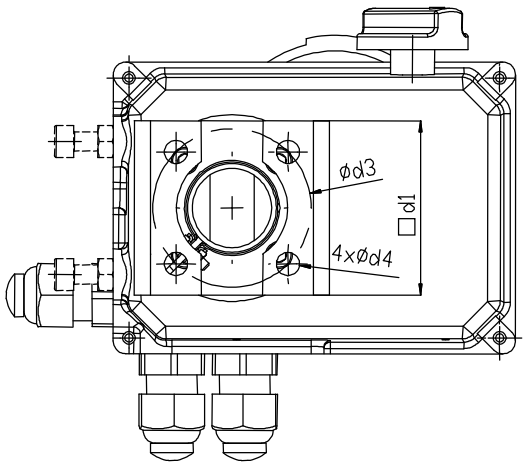
*) Platí pre ES SP 0 s prevodníkom a pre ES SPR 0 s regulátorom \Valid for SP 0 with converter and SPR 0 with possitioner\

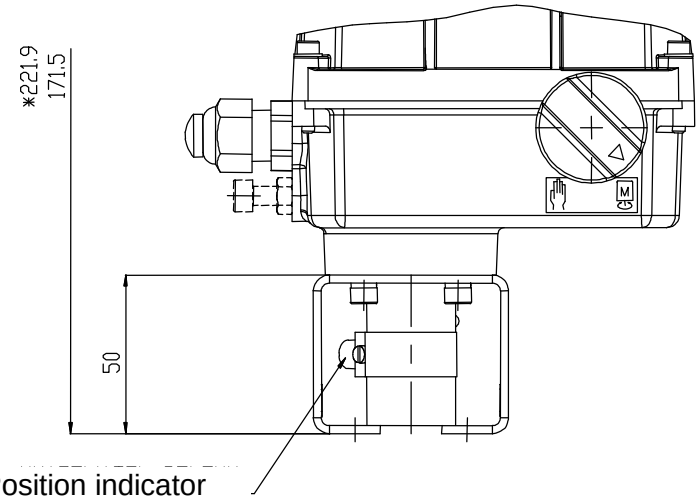
P - 1219

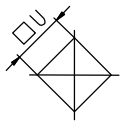
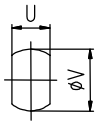


*) Platí pre ES SP 0 s prevodníkom a pre ES SPR 0 s regulátorom \Valid for SP 0 with converter and SPR 0 with possitioner\

P-1451





Shape A	Shape C
	

P–1451/F	F07	14	–	70	70	9	C
P–1451/E		14	18				A
P–1451/D		8	13				A
P–1451/C	F05	14	18	55	50	7	C
P–1451/B		11	–				A
P–1451/A		14	–				A
VERSION	FLANGE	U	øV	Ød1	ød3	ød4	SHAPE

* The dimensions are valid for version with converter