INSTALLATION, SERVICE AND MAINTENANCE INSTRUCTIONS

Electric linear actuators UL 0, UL 1, UL 2

REGADA®

74 1024 02

TEST CERTIFICATE

ELECTRIC LINEAR THRUST ACTUATOR UL 0, UL 1, UL 2

Type number ....

Serial number ....

Production year ....

Wiring diagram ....

....

....

Warranty period .... months

Power supply.................................. V .... Hz

Switching-off thrust .... N

Set switching-off thrust .... N

Operating speed .... mm/min

Stroke.. mm

Transmitter ....

Input operating signal ....

Serial number of electric motor ....

Serial number of transmitter ....

Serial number of position controller ....

Tests made 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!

Contents

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Ev. Nr.: 74 1024 02

The Installation, Service and Maintenance Instructions are drawn up according to requirements of EC Executive Nr. 89/392/EEC "Uniform requirements for machines and devices from the point of view of safety and health care", to save life and health of users and to avoid material damages and exposure environment to danger.

1. General data

1.1 Purpose and applications

Electric linear actuators (hereinafter EA) types **UL 0, UL 1, UL 2** are high-powered electric-mechanical products, designed for direct installations onto controlled devices (regulating bodies -valves, etc.). EA of **UL 0, UL 1, UL 2** types are provided for remote control of closing bodies, and EA with controller 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, 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, EN 15714-2 or using a pillars and flanges.

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

1.2 Safety instructions

Product characteristics from risk point of view

EA are reserved technical devices with higher rate of danger (group A), with possibility of installation in areas specially danger regarding casualties caused by electric current. EA are according to directive LVD 2014/35/EU and standard EN/IEC 61010-1 within valid edition assigned for installation category **II** (overvoltage category), pollution degree 2.

In order to demonstrate the compliance with the requirements of the European Council directive on machinery 2006/42/EC, European Parliament and Council Directive **2014/34/EU** on equipment and protective systems intended for use in potentially explosive environment (designated as Directive ATEX 100a), directive of the Council 2014/35/EU on LVD and Council Directive 2014/30/EU on EMC, the electric actuators are subject to certification by authorized certification facilities.
The product meets the essential safety requirements according to EN 60204-1 and is in compliance with EN 55011/A1 within valid edition.

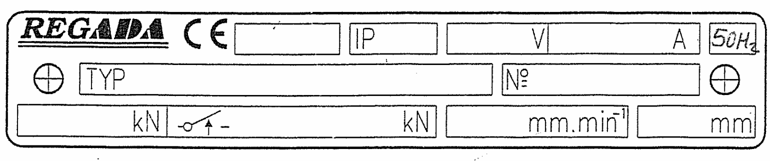
A are reserved technical devices with higher rate of danger*, with possibility of installation in areas specially danger regarding casualties caused by electric current.*

1.3 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 61000-3-3 and EN/IEC61000-3-2 within valid edition.
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 max. 62 dB (A) (to UL 0,), max.. 75 dB (A) (to UL 1) and max. 80 dB (A) (to UL 2).

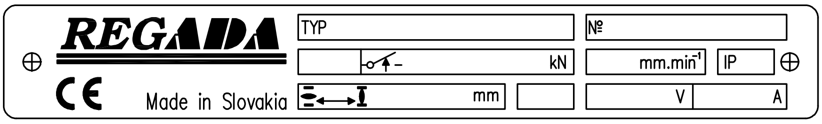
1.4 Data specified on electric actuator

Nameplate for UL 0



Warning plate:

Nameplate for UL1 and UL 2



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

Graphic symbols on electric actuator

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

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

1.5 Instructions for stuff training

Requirements for specialized skills of persons performing assembly, operation and maintenance

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

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

1.6 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 or –50°C to +40°C or -60°C to +40°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 the case of not using a cable outlet, it must be replaced with a certified blanking plug of an approved type.
5. Temperature on entry cables is max. 90°C.

Product protection

EA UL 0, UL 1, UL 2 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.

1.7 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.

1.8 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:

- type code
- serial number
- ambient parameters (temperature, humidity...)
- duty cycle including frequency of switching
- type of switching-off (position or thrust)
- set switching-off thrust
- type of fault - description of claimed fault
- 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, with national laws.

1.8.1 Lifetime of actuators

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

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

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

1.9 Operation conditions

1.9.1 Product location and operation position

EA may be installed and operated in enclosed locations of industrial facilities with no temperature and moisture regulation, protected from direct climatic effects (such as direct sunlight). Moreover, special “marine” versions may be used in waste water treatment applications, water management, selected chemical applications, tropical environments and coastal areas.

Warning:

Actuator installed on the open place must be protected against a direct climate effects by shelter.

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.

1.9.2 Working enviroment

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 **„cold“ -** for type climate cold
4) Version **„tropical dry and dry“** for type climate tropical dry and dry
5) Version **„marine“** for type climate marine
6) Version **„arctic“** for type climate arctic.

In accordance with IEC 60 364-1, IEC 60 364-5-51 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*
- cold to warm mild and dry with temperatures in range -50°C to +40°C ....AA 8*
- cold to mild hot dry with temperatures in range -60°C až +40°C .... AA 1*+AA 5*
- with relative humidity 10 to 100 %, including the condensation of up to 0,029 kg water content per 1 kg of dry air, at above stated temperature ....AB 7*
- with relative humidity of 15÷100%, including the condensation of up to 0,036 kg water content per 1 kg of dry air, at above stated temperature ....AB 8*
- with relative humidity 5 to 100 %, including the condensation of up to 0,025 kg water content per 1 kg of dry, at above stated temperature .... AB 1*+AB 5*
- with elevation up to 2000 m, with barometric pressure range from 86 kPa up to 108 kPa .... AC 1*
- with exposure to intensive water jets (IPx6) .... AD 6*
- 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/m^2 per day (products with protection enclosure of IP 6x) ....AE 6*
- expose to corroding or pollute chemical substances during producing or using of these substances); at places where is handled with small quantity of chemical products and these can accidentally get in contact with an electric device ....AF 3*
- with permanent exposure of big amount of corroding or contaminated chemical and salt fog in execution for sea environment, fog sewage water disposal plant and some chemical plant ....AF 4*
- with a possibility of influences of mechanical stress:
  - medium impacts, shocks and vibrations .... AG 2*
  - medium sinusoid vibrations with frequency in range 10 up to 150 Hz, with shift amplitude of 0,075 mm for f<fp and acceleration amplitude 9,8 m/s2 for f>fp; (transition frequency fp is from 57 up to 62 Hz) (applies to 2 pillars version).. AH 2*
  - 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) (applies to 4 pillars version).. AH 2*
- with serious danger of plants and mould growing ....AK 2*
- with serious danger of animal occurrence (insects, birds, small animals) ....AL 2*
- with detrimental influence of radiation:
  - of stray current with intensity of magnetic field (direct or alternate, of mains frequency) up to 400A.m^{-1}AM2*
  - of sun radiation with intensity > 500 and $\leq$ 700W/m^2.. AN 2*
- with effects of medium seismic activity with acceleration > 300 Gal $\leq$ 600 Gal ....AP 3*
- with indirect endanger by storm.. AQ 2*
- with quick air movement and strong wind .... AR 3 , AS 3*
- stand on a conductive bottom) .... BC 3*
- without any danger media with object .... BE 1*

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

1.9.3 Power supply and duty cycle

Power supply:

electric motor........... 24 V AC/DC; 120 V AC, 230 resp. 220 V AC; 3x400 resp. 3x380 resp. 3x415 V AC resp. 3x460 V AC ±10%, according to valid certificates

control.. 24 V AC resp. 220-240 V AC ±10%

Power supply frequency...50 Hz, or 60**Hz ± 2 %

*** <u>Note</u>: At frequency of 60 Hz operating speed is reduced by 1.2 times.*

Duty cycle - according to EN/IEC 60034-1 within valid edition**:**

EA UL 0, UL 1, UL 2 are designed for ***remote control:***

- short-time operation S2-10 min
- intermitted operation S4-25%, max. 90 cycles per hour

EA with controller are designed for ***automatic regulation:***

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

Notes:

1. *Duty cycle consist of load type, load factor and switching rate.*
2. *Once EA is connected to the external controller unit, also use it as a control EA where the max. load thrust reaches the 0.7 multiple of the maximum loading thrust for remote operated EA UL 0, UL 1, UL 2.*

1.10 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 of **UL 0, UL 1 UL 2** are delivered in solid packages guaranteeing resistance in accordance with EN/IEC 60 654.

Package is a box. Products in boxes is possible to load on the pallets (pallet is returnable). On the outer side of the package is stated:

- manufacturer label,
- name and type of product,
- number of pieces,
- other data – notices and stickers.

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

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

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

After receiving EA check whether during transport or storage the actuator was not damaged. Compare also whether the parameters on their nameplates are in accordance with accompanying documentation or the Contract. If any discrepancy or fault occur inform immediately your supplier.

If the actuators and accessories are not immediately installed, they have to be stored in dry, well-ventilated sheltered rooms, protected against dirt, dust, soil humidity (with placing onto shelves or onto pallets), chemical impacts and encroachment, at ambient temperature from -10°C up to +50 °C and relative humidity max. 80 %, in special version at temperature –70°C do +40°C.

- It is forbidden to store EA outside or in areas not prevented against direct impact of climate.
- Strains of the surface finishing should be promptly removed if any – it can prevent the product against corrosion damages.
- While storing more than one year it is necessary to check lubrication filling before the actuator is put into operation.
- The EA installed but not operated are to be protected the same way as when storing (e.g. with a wrapping).
- After it is mounted onto a valve in free and wet areas or in areas where temperature is changing it is necessary to connect the space heater – to prevent the actuator against corrosion resulted from water condensed in the control part.
- Remove odd conservation grease as late as before putting into operation.

1.11 Assessment of the product and packaging and removal of contamination

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

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

2. Description, function and specifications

2.1 Description and function

EA **UL 0-Ex, UL 1-Ex, UL 2-Ex** are of compact construction. They are composed of two functionally different main parts:

The **gear part** is made up by a flange with a connecting part, resp. linear mechanism for connection onto a controlled device, and gears placed in the bottom; on the other side drive mechanisms for control part units are surfaced.

The **control part (Fig. 1, 1a, 1b)** is placed on a control board (1) consisting of:

- electric motor (2) (at single-phase version with capacitor)
- thrust unit (5) - controlled with a worm axial shift
- position-signalling unit (3) with a position transmitter (6)- positioner (resistive - potentiometer, capacitive or electronic position transmitter)(7) and with a mechanical local position indicator (4)
- space heater with thermal switch (8)
- electronic module (9)
- electrical connection through terminals (10), located in the control area and cable glands Ex d version

Additional accessories:

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

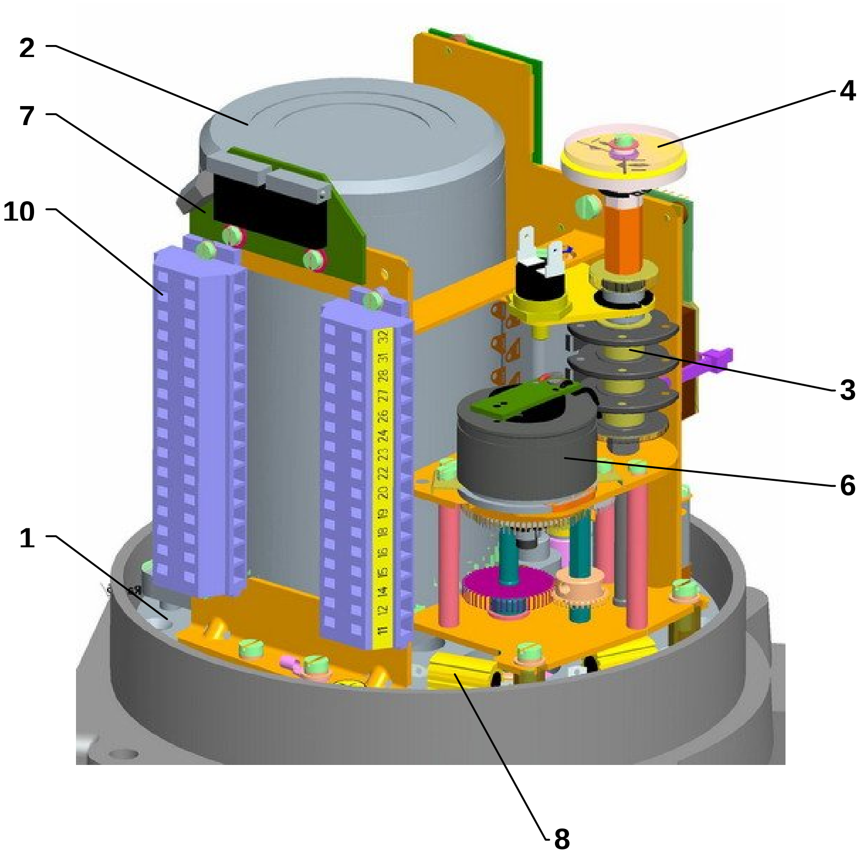


Fig.1

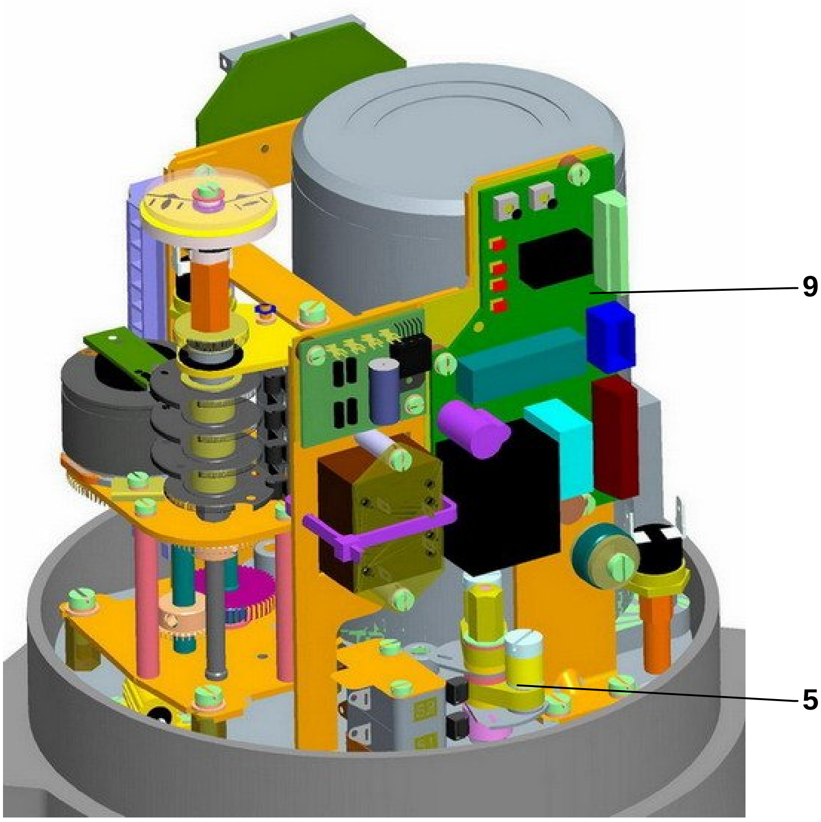


Fig.1a

Fig.1b

2.2 Basic specifications

Basic EA specifications: are given in Table 1.

Table 1: Basic EA specifications

Type number		Operating speed ±10[%][2)] 50Hz	Operating speed ±10[%][2)] 60Hz	Operating stroke	Max. load thrust	Switching-off thrust ±10 [%]	Weight	Electric motor [1)]	Power supply nominal voltage	Nominal power	Nominal speed	Nominal current: nominal	Nominal current: starting ±20 %	Capacitor capacity
		[mm/min]	[mm/min]	[mm]	[kN]	[kN]	[kg]		[V]	[W]	[1/min]	[A]	[A]	[µF/V AC]
UL 0	type number 540	10		4 - 40 Without transmitter	6,0	6,9	6,5 - 8	Single-phase	230 (220) resp. 24	13,8	375	0,135 resp. 1,35	0,13 resp. 1,43	0,82/500 resp. 82/63
		15												
		20												
		40			2,9	3,4								
		80			1,2	1,4								
		10	12		6,0	6,9			110	13,8 14,2	375/450	0,27	0,3	3,3/250
		15	18											
		20	24											
		40	48		2,9	3,4								
		80	96		1,2	1,4								
UL 1	type number 541	10		4 - 80 Without transmitter	10	7,5-12,5	16 - 19	Single-phase	230 (220)	40	1300 (1250)	0,53	1	5/400
		20												
		40			8,5	6,3-10								
		80			6,3	4,8-8								
		10	12		10	7,5-12,5			120 (110) 60Hz	40	1500	0,67	1,27	9,0
		20	24											
		40	48		8,5	6,3-10								
		80	96		6,3	4,8-8								
		10			10	7,5-12,5		Single-phase/ Direct current	24 AC/DC	53	2600	3,1	-	-
		20												
		40			8,5	6,3-10								
		80			6,3	4,8-8								
								Three-phase	3x400 (3x380) resp. 3x415	40	1300	0,21	0,4	-
		10			10	7,5-12,5								
		20												
		40			8,5	6,3-10								
		80			6,3	4,8-8								

Type number		Operating speed ±10[%][2)]		Operating stroke	Max. load thrust	Switching -off thrust ±10 [%]	Weight	Electric motor [1)] Power supply nominal voltage		Nominal power	Nominal speed	Nominal current nominal	Nominal current starting ±20 %	Capacitor capacity.
		[mm/min]		[mm]	[kN]	[kN]	[kg]		[V]	[W]	[1/min]	[A]		[µF/V AC]
		50Hz	60Hz											
UL 2	type number 542	14		4- 100 Without transmitter	21,5	15-25	26 až 34,2	Single-phase	230 (220)	60	2750	0,7	1,35	7/400
		25												
		40												
		60												
		80			17	12-20				120	2600	1,0	1,9	8/450
		100			12,5	9-15								
		120			10	7-12								
		14	17		21,5	15-25			120 60Hz	70	3380	1,1	2	16/250
		25	30											
		40	48											
		60	72											
		80	96		17	12-20				120	3100	2,0	3,8	8/450
		100	120		12,5	9-15								
		120	144		10	7-12								
		14			21,5	15-25		Single-phase/ Direct current	24 AC/DC	100	3350	4,9	-	-
		25												
		40												
		60												
		80			17	12-20								
		100			12,5	9-15								
		120			10	7-12								
		14			21,5 resp. 14	15-25 resp. 10-16		Three-phase	3x400 (3x380) resp. 3x415	90	2740	0,35	1,3	-
		25												
		40												
		60			21,5 resp. 14	15-25 resp. 10-16				180	2650	0,6	2,4	-
		80												
		100												
		120												

1) Switching elements for different type of load (also for EA) defines standard EN/IEC 60 947-4-1.
2) Anomaly of operating speed ±10% at 230 V resp. 220 V AC, 3x400 resp. 3x380V resp. 3x415 V AC.

Additional technical data:

EA protection enclosure:.. IP 66/IP 68 (EN/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:

sinusoidal vibrations: with frequency in range 10 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 = 57 to 62 Hz)

drop resistance:..300 drops with acceleration 2 $m.s^{-2}$
seismic resistance:...amplitude of the shock off 6 on Richter scale

Self-locking: ....the EA is self-locked
Electric motor protection: ....with thermal switch, except UL 0
EA braking: ....by roller bief
Output part backlash:..max. 0,5 mm at load of 5%-of maximum thrust
Electric control:

- remote control (the output element of the EA is controlled with supply voltage), resp. by feeding of unified signal

Adjustment of the limit positions:
The limit position switches are set to operating stroke with accuracy of +/-3% of the stroke specified in the EA nameplate.
Additional position relays (S5,S6) are adjustment ....cca 0,5 mm beneath the limit switches
Hysteresis of position switches .... max. 2,5% from stroke on nameplate

Adjustment of the thrust switches:

Switching – off thrust in case EA UL 0-Ex cannot by adjusted at customer!

Switches (S1,S2,S3,S4,S5,S6)

UL 0:

Type **DB 6 -** equipped with the sliver contacts – standard version
250 V AC; 20mA - 2 A; cosφ = 0.6;
24 V and 48 V DC; 20mA -1A; T=L/R=3ms;
min. voltage : 20 V
insulation resistance: 50 MΩ

Type **DB 3-** gold-plated contacts (valid for switches S5, S6, resp. after agreement for switches S3, S4, too)
max. 250 V AC; 1mA - 0,1 (0,05)A;
24 V and 48 V DC, 1mA - 0,1 A ; T=L/R=3ms

UL 1, UL 2:

Type **D 38: sliver contacts** – standard version
- voltage 250 V(AC); 50/60 Hz; 16(4) A; cos φ=0,6 resp.: 24 V(DC); T=L/R=3ms; min. current 100mA

Type **D 41:gold-plated contacts (is not valid for sitches** S1, S2 in the version with reverse contactors)
- voltage 0,1 (0,05) A, max. 250 VAC; 0,1 / 24 VDC; T=L/R=3ms; min. current 5mA

Relay thrust of switch S1, resp. S2 (ReS11, ReS12):
Model RT 424
- 250 V AC, 8 A; 24 VDC, 8 A; max. switching-on power AC 2000 VA

Space heaters (**E1**)
The space heater – supply voltage:.............according to the supply voltage of the motor (24,max. 250 V AC);

UL 0:
Heating power: .... cca 10 W/55°C
Switching resistor.. with thermal switch

UL 1:
Heating power for range temperature from -50 °C: .... cca 20 W/55 °C
Switching resistor.. with thermal switch

UL 2:
Heating power for range temperature from -50 °C: .... cca 40 W/55 °C
Switching resistor.. with thermal switch

Thermal switch of space heater (F2)

Supply voltage: .... corresponding with motor supply voltage (max. 250V AC, 5 A)
Switching-off temperature:................ +30°C ± 4K
Switching-on temperature:................ +20°C ± 3K

Manual control:

By handwheel after unscrewing the locking screw (except UL 0). Rotate the handwheel clockwisely to move the output shaft in the direction „Z“.

Position transmitters

Resistive position transmitter

Resistance (single **B1**) .... 100; 2 000 Ω
(double **B2**) .... 2x100 Ω, 2x2000 Ω
Operating life of transmitter .... 1.10^6 cycles
Load capacity .... 0,5 W do 40 °C, (0 W/125°C)
Maximum current of sliding contact .... max.35 mA
Maximum supply voltage.. $\sqrt{PxR}$ V DC/AC
Potentiometer linearity error .... ±2,5 [%][1)]
Potentiometer hysteresis .... max. 2,5 [%][1)]
Potentiometer values at limit positions: .... “O“ (open)...... ≥ 93%, ”Z“ (closed).......≤ 5%

Capacitive (B3): non-contact, life 10^8 cycles

2-wire connection with built-in power supply or without built-in power supply

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

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

DCPT2 – current transmitter (B3)

- 2-wire connection without built-in power supply or with built-in power supply

Current signal .... 4 ÷ 20 mA (DC) with optional mirroring (20 ÷ 4 mA)
Mode of operation .... contactless, magnetic resistance
Transmitter increments without gears .... 0.352 °
Loading resistor: .... 0 through 500 Ω
Operating stroke .... 35 to 100% of the rated stroke at the gear ratio
Non-linearity .... max. ±1 %
Non-linearity - geared .... max. ±2.5 %
Power supply voltage for version without power source .... 15 through 28 V DC, max.42 mA
Power supply voltage for version with built-in power source .... 24 V DC
Operating temperature .... -25 to +70°C
Linearity deviation: .... ±2.5 %1)
Hysteresis .... max. 2.5 %1)
Error messages .... by flashing LED

1) from rated value of transmitter referred to output values

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

2-wire version, resp. 3-wire (without built-in power supply, or with built-in power supply)

Output signal for 2-wire version 4 ÷ 20 mA (DC)
Output signal for 3-wire version 0 ÷ 5 mA (DC)
0 ÷ 20 mA (DC)
4 ÷ 20 mA (DC)
0 ÷ 10 V (DC) – only for UL 0
Power supply voltage for **2-wire version without built-in power supply**.................................. 15 to 30 V DC
Power supply voltage for **2-wire version with built-in power supply** .... 24 V DC ± 1,5%
Load resistance for **2-wire version**...max. RL=(Un-9V)/0,02A [Ω]
.... (U_n – voltage [V])
Power supply voltage for **3-wire version**..................................... 24 V DC ±20 %(pre UL 0), ±1,5 %(for UL1,2)
Load resistance for 3-wire version for UL1, UL 2 ....max. 3 kΩ
Load resistance for 3-wire version 0 - 5mA for UL 0 ....max. 3 kΩ
Load resistance for 3-wire version 0 - 20mA for UL 0 ....max. 750 Ω
Load resistance for 3-wire version 0 - 10 V for UL 0 ....min. 10 kΩ
Temperature dependency.. max. 0,020 mA / 10 C
Output signal values at limit positions on the terminal 81,82 .... „O“.... 20 mA (5 mA, 10 V)
.... „Z“..... 0 mA (4 mA, 0 V)
Values tolerance of output signal .... „Z“ +1,5 %[1)]
....„O“±1,5 %[1)]
Linearity deviation..±2,5 %[1)]
Hysteresis ....max. 2,5 %[1)]

---

1) from rated value of transmitter referred to output values

Lubricators :
- see chapter Maintenance - extent and periodicity

2.2.1 Mechanical connection

– flange or pillars

Basic and connecting dimensions are given in dimensional drawings.

2.2.2 Electrical connection

Terminals (X) for EA UL 0 - max. 24 screw-less terminals
with connecting wire cross-section of 0.08 to 1.5 mm^2
Terminals (X) for EA UL 1, UL 2 - max. 32 screw-less terminals
with connecting wire cross-section of 0.08 to 2.5 mm^2 ;

Cables input - as standard (temperature on entry of cables is max. 90°C)**:**

UL 0:
1 cable gland - 1xM16x1,5 (øD = 3,2 to 7,0 mm);
1 cable gland - 1xM16x1,5 (øD = 5,0 to 10,0 mm);
1 cable gland - 1xM16x1,5 (øD = 5,0 to 10,0 mm);
UL 1, UL 2:
1 cable gland - M20x1,5 (øD = 3,2 to 8,7 mm);
1 cable gland - M20x1,5 (øD = 6,1 to 11,7 mm);
1 cable gland - M20x1,5 (øD = 6,5 to 14,0 mm);

1) Encapsulation of cable:
For cable glands fixing there is used glue WEICONLOCK AN 302-43.
The cable used must be in accordance with STN EN 60079-14, chapter 10.6.2.

Attention: Thermic resistance incoming wires must be minimum +90°C.

Table 3: Wire cross-section conversion table (mm2 – AWG)

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

Protective terminal:

Upon start-up in operation - at equipment installation:

- for safe use of the actuator it is necessary to connect the outside and inside grounding terminal. The position of the outside and inside grounding terminal can be seen in Fig. 1c and Fig. 1d. HP3 insulated eyelet crimping pliers should be used to crimp wire to the outside grounding terminal (by CAMBER).

Outside and inside earth terminal are mutually interconnected and identified with a protective grounding symbol.

There must be power switch or motor circuit breaker included to the power supply which must be placed as close as possible to the device, easily accessible to the operator and marked as an disconnecting device of actuator.The electrical connection is made according to the wiring diagrams inserted or. glued to the top cover of the EA.

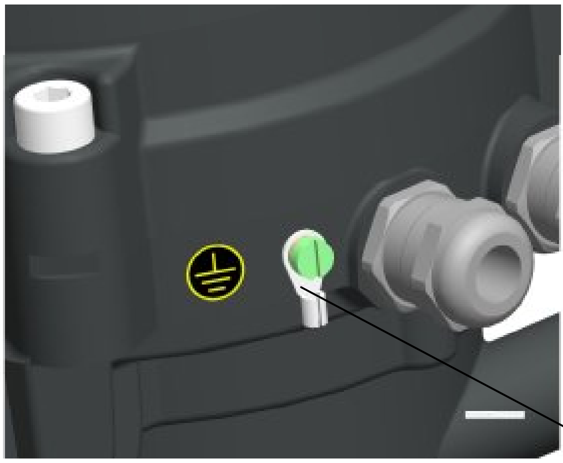
Product protection

To protect the product, we recommend using fuses or a suitable circuit breaker.

Table 4: Fuse values and characteristics

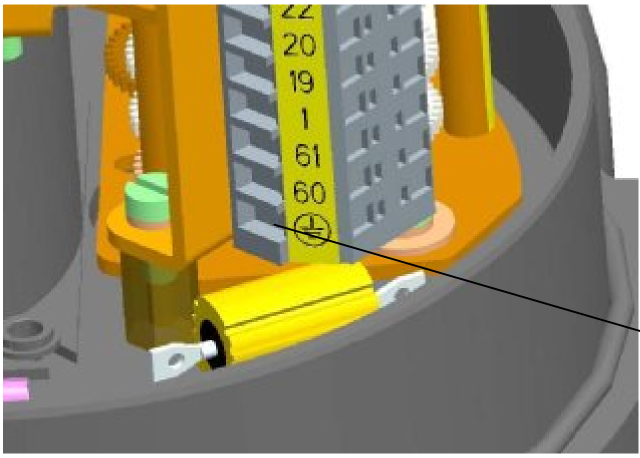
<table>
<tr><th>Type</th><th>Order code</th><th>Voltage</th><th>Frequency (Hz)</th><th>Electric motor Power / Power input (W)</th><th>max. curent EA (A)</th><th>Fuse values F3</th></tr>
<tr><td rowspan="3">UL 0 540</td><td>540.X-0XXXX/YY</td><td>230 VAC</td><td rowspan="2">50</td><td rowspan="3">13,8/31</td><td rowspan="2">0,22</td><td rowspan="2">T 0,500 A / 250 V</td></tr>
<tr><td>540.X-LXXXX/YY</td><td>220 VAC</td></tr>
<tr><td>540.X-3XXXX/YY</td><td>24 VAC</td><td>50/60</td><td>2,2</td><td>T 3,15 A / 250 V</td></tr>
<tr><td rowspan="4">UL 1 541</td><td>541.X-0XXXX/YY</td><td>230 VAC</td><td rowspan="2">50</td><td rowspan="2">40/90</td><td rowspan="2">0,5</td><td rowspan="2">T 1,6 A / 250 V</td></tr>
<tr><td>541.X-LXXXX/YY</td><td>220 VAC</td></tr>
<tr><td>541.X-1XXXX/YY</td><td>3x400 VAC
3x415 VAC</td><td rowspan="2">50</td><td rowspan="2">40/110</td><td rowspan="2">0,3</td><td rowspan="2">T 0,8 A / 250 V</td></tr>
<tr><td>541.X-MXXXX/YY</td><td>3x380 VAC</td></tr>
<tr><td rowspan="12">UL 2 542</td><td>542.X-0XXXX/YY</td><td>230 VAC</td><td rowspan="2">50</td><td rowspan="2">60/120</td><td rowspan="2">0,86</td><td rowspan="2">T 1,6 A / 250 V</td></tr>
<tr><td>542.X-LXXXX/YY</td><td>220 VAC</td></tr>
<tr><td>542.X-1XXXX/YY</td><td rowspan="2">3x400 VAC
3x415 VAC</td><td rowspan="4">50</td><td rowspan="4">90/150</td><td rowspan="4">0,56</td><td rowspan="4">T 1,0 A / 250 V</td></tr>
<tr><td>542.X-2XXXX/YY</td></tr>
<tr><td>542.X-MXXXX/YY</td><td rowspan="2">3x380 VAC</td></tr>
<tr><td>542.X-NXXXX/YY</td></tr>
<tr><td>542.X-0XXXX/YY</td><td>230 VAC</td><td rowspan="2">50</td><td rowspan="2">120/228</td><td rowspan="2">1,3</td><td rowspan="2">T 1,6 A / 250 V</td></tr>
<tr><td>542.X-LXXXX/YY</td><td>220 VAC</td></tr>
<tr><td>542.X-1XXXX/YY</td><td rowspan="2">3x400 VAC
3x415 VAC</td><td rowspan="4">50</td><td rowspan="4">180/300</td><td rowspan="4">0,82</td><td rowspan="4">T 1,6 A / 250 V</td></tr>
<tr><td>542.X-2XXXX/YY</td></tr>
<tr><td>542.X-MXXXX/YY</td><td rowspan="2">3x380 VAC</td></tr>
<tr><td>542.X-NXXXX/YY</td></tr>
</table>

Electric connection: - according to the wiring diagram stuck into the case of the EA.



OUTSIDE
GROUNDING
TERMINAL

Fig.1c



INSIDE
GROUNDING
TERMINAL

Fig.1d

3. Installation and dismantling of actuator

Abide by safety measures!

Note:

Check again if placement of EA reply to chapter "Operation conditions". In case that operation conditions are different from recommended, consultation with producer is needed.

Before starting of mounting the EA onto the valve:

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

3.1 Installation

EA is by the producer adjusted to parameters according to the nameplate.
Before installation put the handwheel on.

3.1.1 Mechanical connection flange connection

- Defat the abutting areas of the connecting flange of the EA valve or the gear carefully;
- Lubricate the output shaft of the valve/gear with a grease not containing any acids;
- Set the EA to the limit position “closed”, set the valve to the same position;
- Put the EA onto the valve with the output shaft reliably stalled in the valve coupling/gear;
- **Attention! Do not adjust EA on an armature forcibly because of damage of the gear!**
- Use the handwheel to turn the EA to fit the openings in the EA and valve flanges if needed;
- Check whether the connecting flange abuts with the valve/gear.
- Fix the flange with four screws (with mechanical strength min 8G) fixed the way the actuator can Be moved. Tighten the screws equally in cross.
- At the end check the correctness of the fixture with the valve with rotating the handwheel.

3.1.2 Cable routing and connection

Temperature on entry cables is max. 90°C.

3.1.3 Electric connection and checking of function

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

1. Follow instructions in the part "Requirements for professional qualification"!
2. While laying electrical line abide by the instructions for heavy current installations. *Power supply cables must be of the type approved. Minimum thermal resistance of power supply cables and wires must be +90°C.*
3. Cables to terminal boards or connectors lead through screw cable glands.
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. Thrust switching is not fitted with mechanical interlocking device (except for UL 2)

Connection with the terminal board:

Before the connection remove the actuator case and check whether the type of current, power supply and frequency correspond with the data on the actuator nameplate.

Electric connection:

- The electric connection should be realized according to the wiring diagram stuck into the case of the EA;
- The electric connection should be performed through two cable glands see No. 2.2.2.
- Once electrical services are completed put on the cover and fasten it evenly crosswise by bolts. Fasten the cable glands to ensure specified shielding.

Notes:

1. *To connect the input control signals and output signals is needed to use shielded wires with steel wire braid (Galvanised Steel Wire Braid GSWB Ξ), for example cable type "Bruflex ® HSLCH", 4x0, 5 (company Bruns Kabel).*
2. *The EA are delivered with cable glands which in case of correct tighten are onto the supply lead allow the protection enclosure of IP 68.*
3. *The cable is to be fixed the way corresponding with its allowable bending radius not to damage or deform the sealing element of the cable lead. The supply leads have to be fixed onto a fixed construction max. 150 mm from the leads.*
4. *It is recommended to connect the remote transmitters with shielded wires.*
5. *The face areas of the control part cover should be clean before fixing it back.*
6. *The EA is reversible if the time interval between the power supply is switched off and on for the reverse direction of the output part motion is at least 50 ms.*
7. *The allowed delay after it is switched off, i.e. time from the switches reaction up to the motor without any voltage is 20 ms maximally.*

Observe the valve manufacturer´s instructions with respect to the requirement to ensure switching-off in limit positions through position or thrust switches!

Caution:

1. Power supply to the actuator and connections with switching, protective and safety devices may be carried out only by personnel with appropriate qualification, in compliance with the corresponding standards and wiring diagrams, such as those specified in the Instruction Manual....
2. All terminal connections must be checked after connection of the power supply cables. The conductors must not apply any bending or tensile stress upon the connecting terminals. The following measures should be taken when using aluminum conductors:
3. Immediately before connecting the aluminum conductor, it is necessary to remove the oxide layer on the surface and prevent the oxidation by application of neutral vaseline to protect the connection.

After connection, check the correct direction of the actuator shaft rotation by short activation of the actuator in intermediate position. This can also be checked by using a stick made of insulating material to activate the corresponding micro-switch - limit, position or thrust (depending on the type of actuator control) during operation of the actuator.

If the actuator does not stop, but stops upon signal from micro-switch corresponding to the opposite rotation direction, you will need to change the direction of rotation of the actuator output shaft. In case of an actuator driven by single-phase electric motor, the direction of rotation can be changed by switching the supply cables on the terminals of the electric motor.

In case of actuators with three-phase electric-motor, interconnect one of the pairs of conductors on terminals U, V, W of the actuator terminal board. Repeat the function test again.

Important!

1) During adjustment, repair and maintenance, secure the actuator by prescribed means in order to prevent its power-up resulting in the possibility of electric shock injury or injury by rotating parts.

2) When reversing the operation of actuators with single-phase electric motor, power supply must never be connected simultaneously to both outputs of the start-up capacitor at the same time, otherwise the capacitor could discharge through thrust switch contacts resulting in their sticking together.

After adjustment of the actuator, check its operation using the control circuit. Especially make sure that the actuator starts-up correctly and that the electric motor is disconnected from power supply after triggering of the corresponding micro switch. Otherwise immediately disconnect the power supply to the actuator to prevent damage to the electric motor and try to locate the malfunction.

After the EA is electrically connected it is advised **to check functions:**

- After the EA is electrically connected to check the correct functions of the position and the thrust switches S1 - S6 and if needed adapt the order of the single phase leads for the 3-phase electric motor.
- Set the valve manually into mid-position.
- Connect the power supply to the terminal for supplying the EA in the direction “opening” and follow the direction of the output shaft of the actuator rotation. When EA is connected correctly, the output shaft of EA, into the actuator control part from the top, must rotate counterclockwisely. If not, it is necessary to change the phase leads L1 and L3 on the terminals 2 and 4 mutually, valid for 3-phase electric motor. After the exchange is made check the direction of the EA rotation.

- If any of the functions is not correct, check the switches whether they are wired properly according to the wiring diagrams.

3.2 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. Pull out the connectors in case of the connector version.
- Loosen the fixing screws of the EA flange and coupling screws 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.

4. Adjustment

Keep safety regulations! Follow the prescribed procedure to assure that the EA is not connected to mains when live not to cause any injury by electrical current!

The adjustment is performed with the EA mechanically and electrically connected and the connection and functions were checked. The chapter describes the adjustment of the EA to the parameters given in the nameplate in case that any of its parts is out of tune. The adjusting parts on Fig.1.

Definition of the direction of movement:

- movement direction "**close**" - the output shaft of the actuator rotates in the clockwise direction when looking into the actuator control part from the top.
-

4.1 Adjustment of the Thrust Unit

The switching - off thrust are adjusted by the producer for both directions, i.e. for the direction “opening” (the thrust switch S1) as well as for the direction “closing” (the thrust switch S2) to the specified value with tolerance of ±10%. If not stated else they are adjusted to the maximum rate.
It is impossible to align and adjust the thrust unit for EA **UL 0** actuator to alternative values of thrust without test equipment to measure thrust.

Adjustment and setting of the thrust unit for EA UL 1 actuator to alternative thrust values is possible through the use of adjustment screws according to Fig. 2. Switching-off thrust can be reduced by rotating the graduated screws along the gauge mark on the arm of the thrust unit. Adjustment to longest mark results in resetting the switching-off thrust to maximum value. Adjustment to the shortest mark results in the reduction of the switching-off thrust.

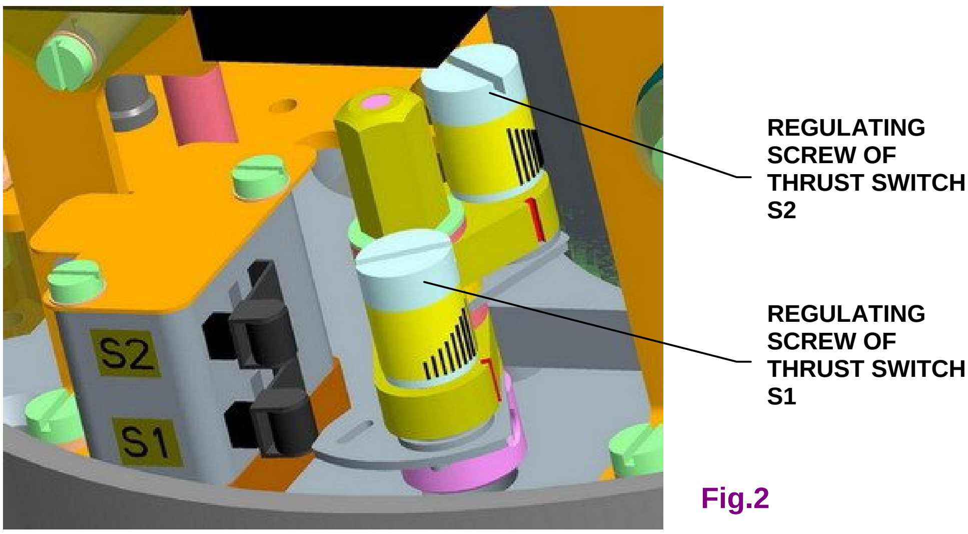


Fig.2

Adjustment and setting of the thrust unit for EA UL 2 actuator to alternative thrust values is possible through the use of adjustment segments according to Fig. 2a. Thrust can be reduced by releasing the screw and sliding the graduated segment along the gauge mark on the arm of the thrust unit.
Adjustment towards M results in resetting the switching-off thrust to maximum value. Adjustment towards 0 results in reduction of the switching-off thrust.

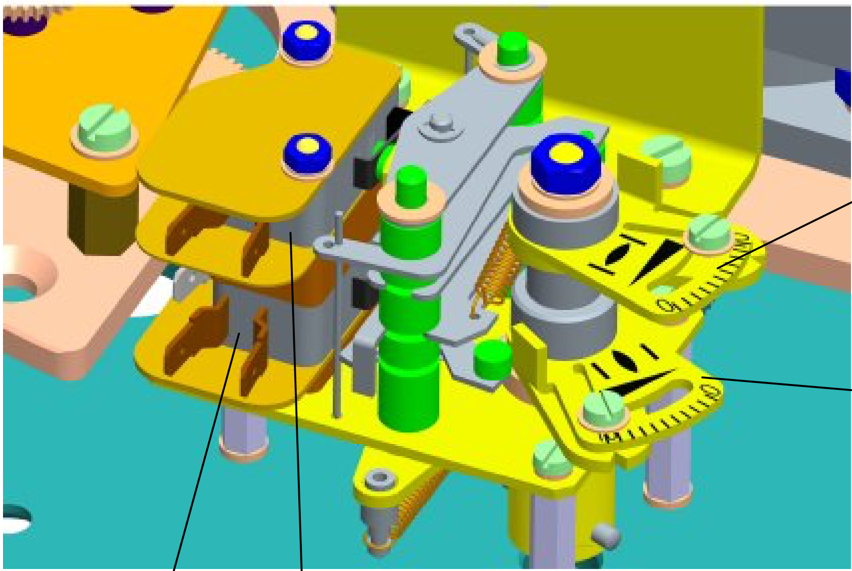


Fig. 2a

4.2 Adjustment of position-signalling unit

UL 1, UL 2 (Fig.3):

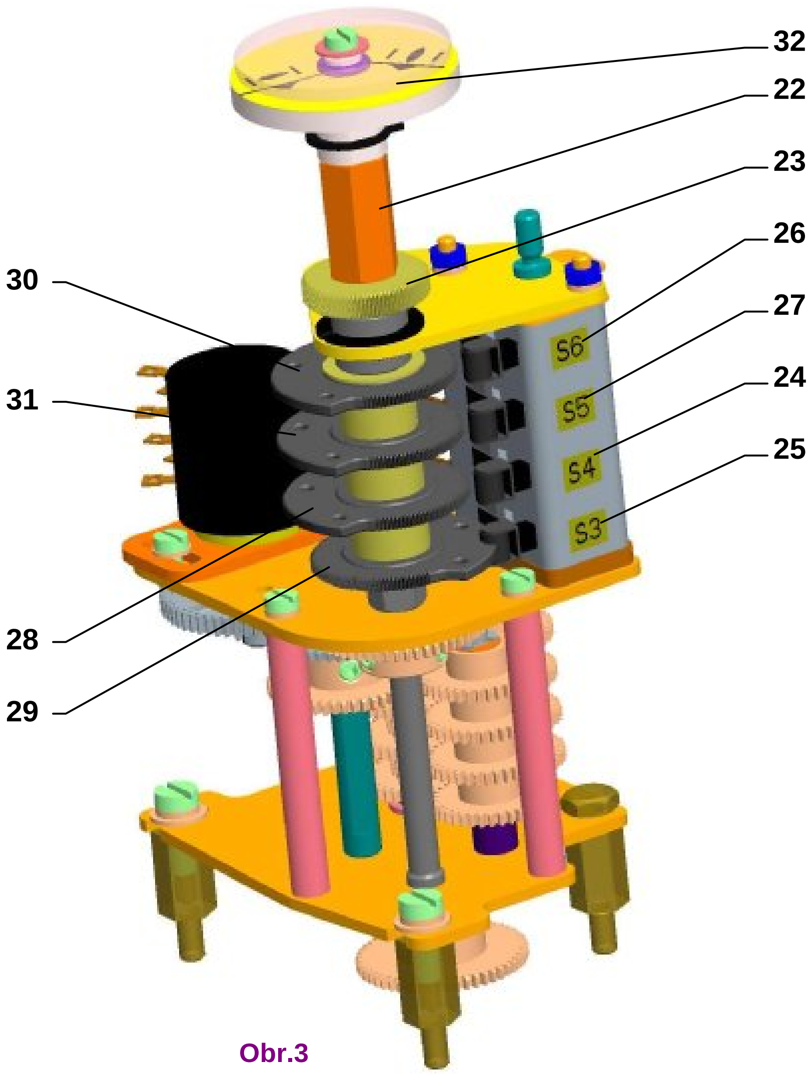
The EA are in the production plant adjusted to a fixed stroke (according to the specification), given on the nameplate. While setting, adjusting and resetting follow these steps (Fig. 3):

- Move the sliding gear about requested degree of the range according to the Table No. 5a and Fig. 3c by loosing the screw of the adjustable gear and tighten it after being set in the correct position. While adjusting the adjustable gear be careful that is meshes correctly with the gear of the given degree.
- in the version with a resistant transmitter (Fig.4) disengage the transmitter;
- loosen the nut (22) with simultaneous holding the central milled nut (23) and then loosen the nut (23) fixing the cams still having the belleville springs which create axial thrust;
- reset the EA to the “Open” position and rotate the cam (29) clockwise (when viewing the actuating plate from above) until switch S3 switches over (25);
- reset the EA by the angle where the “Open” position is to be indicated and turn the cam (31) clock-wise until switch S3 switches over (27);
- reset the EA to the “Closed” position and turn the cam (28) counter clockwise until switch S4 switches over (24);
- reset the EA back by the angle where the “Closed” position is to be indicated and turn the cam (30) counter clockwise until switch S6 switches over (26);
- once the EA is adjusted manually tighten the central milled nut (23) to lock the cams and tighten the lock nut (22) while simultaneous holding the milled nut;
- swing the position indicator discs (32) for the given operating stroke against the gauge mark on the top cover sight;
- once of the position- signalling unit is adjusted also adjust the position transmitter, converter or controller.

Note 1: Signalization possibility is available during the whole operating stroke in both directions, i.e. 100%.

Note 2:
- Marking switches

S3 - position switch "Open"
S4 - position switch "Close"
S5 - additional position (signalling) switch "Open"
S6 - additional position (signalling) switch "Close"



Obr.3

TABLE 5a			
STROKE LINE	STROKE ANGLE	MAX. OPERATING STROKE) FOR UL 1 (mm)	MAX. OPERATING STROKE FOR UL 2 (mm)
I.	1.°	10	3,75
	2.°	20	7,5
	3.°	40	15
	4.°	80	30
	5.°	**-**	**60**
	6.°	**-**	**120**
II.	1.°	12	5
	2.°	24	10
	3.°	48	20
	4.°	-	40
	5.°	**-**	**80**
III.	1.°	15	6
	2.°	30	12
	3.°	60	24
	4.°	-	48
	5.°	**-**	**96**

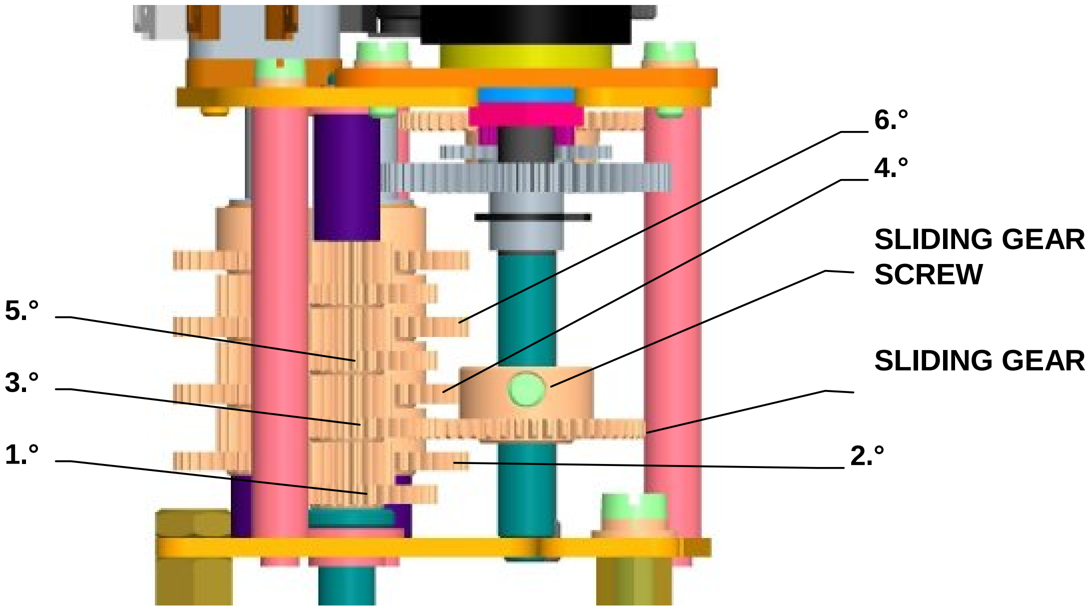


Fig.3c

UL 0 (Fig.3a):

By default the actuator is set by the manufacturer to standard stroke (according to specification), as specified in the nameplate. Unless the customer specifies the value of the particular operating stroke, the stroke is set to **5st degree** of the selected stroke order.

Proceed as follows to adjust, align and reset the limit and signaling switches (Fig.3a).

- set the adjustment wheel to the required degree of the range according to **table 5** and **Fig.**3b by loosening of the adjustment wheel screw and re-tightening after alignment. When adjusting the adjustment wheel, make sure there is correct alignment with the second level disc.
- Reset the actuator to the "opened" position and turn the V3 cam in the clockwise direction (viewing the control panel from the top), until switch S3 is activated
- Reset the actuator to the "closed" position and turn the V4 cam in the counter-clockwise direction (viewing the control panel from the top), until switch S4 is activated
- Reset the actuator to the position at which you want the S5 signaling switch to be activated when moving towards "open" position and rotate cam V5 in the clockwise direction until switch S5 is activated
- Reset the actuator to the position at which you want the S6 signaling switch to be activated when moving towards "closed" position and rotate cam V6 in counter-clockwise direction until switch S6 is activated
- Rotate the position indicator discs for the particular stroke with respect to the gauge mark on the sight of the top enclosure.
- After alignment of the position signaling unit it is necessary (if needed according to the equipment of the actuator) to align the position transmitter.

- *Note 1: Signaling from switches S5, S6 is possible from 40% of the maximum operating stroke adjusted according to* ***table 5*** *at the particular gear. If larger signaling range is required, it is possible to make use of the reversing function of the switches.*
- *Note 2: marking switches*

  S3 – position switch „open“
  S4 - position switch „close“
  S5 – position switch (signalling) „open“
  S6 - position switch (signalling) „close“
  Note 3: The thrust and position switches are connected in series (see the wiring diagram). If the valve needs to be tightly closed in the limit position by thrust in the corresponding direction, it is necessary to align the corresponding position switch (S3 or S4) so that it does not get activated before the switching-off thrust is reached. Observe the valve manufacturer´s instructions when aligning the actuator with the valve!

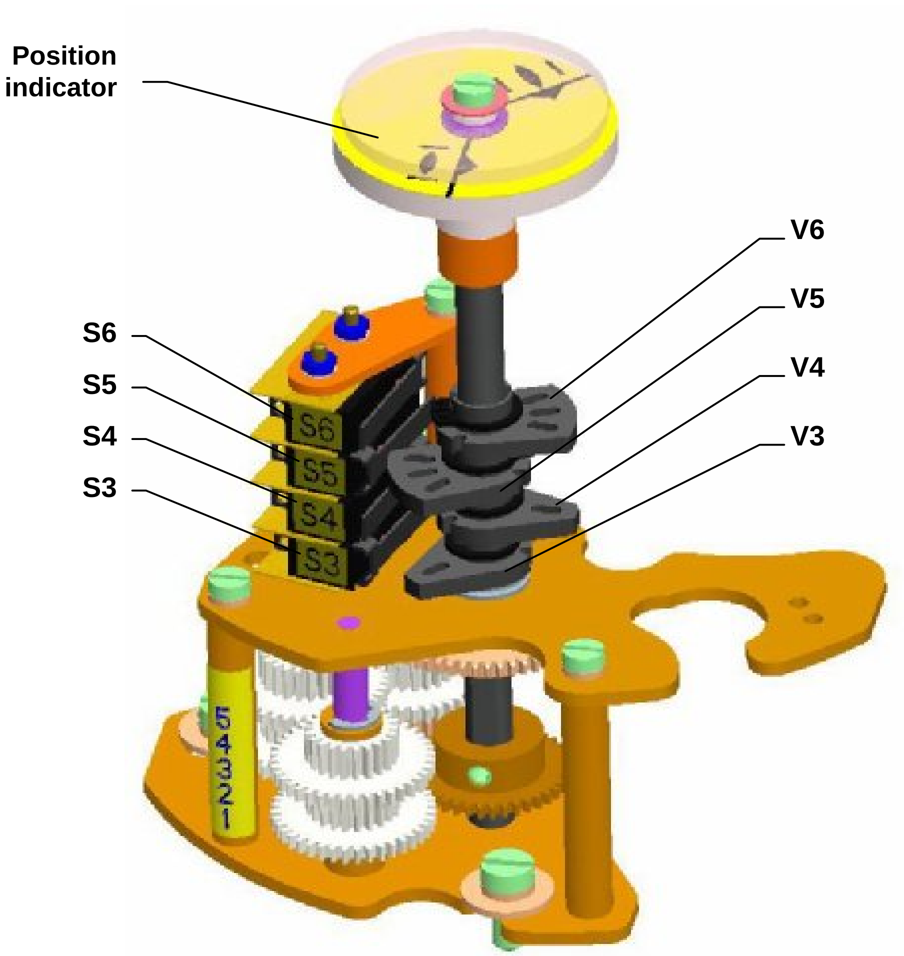


Fig.3a

TABLE 5		
STROKE LINE	**STROKE ANGLE**	**MAX. OPERATING STROKE (mm)**
I.	1.°	-
	2.°	4
	3.°	7,5
	4.°	14
	5.°	**25**
II.	1.°	-
	2.°	5
	3.°	8,5
	4.°	16
	5.°	**30**
III.	1.°	-
	2.°	6
	3.°	10,5
	4.°	20
	5.°	**35**
IV.	1.°	-
	2.°	7
	3.°	12,5
	4.°	22,5
	5.°	**40**

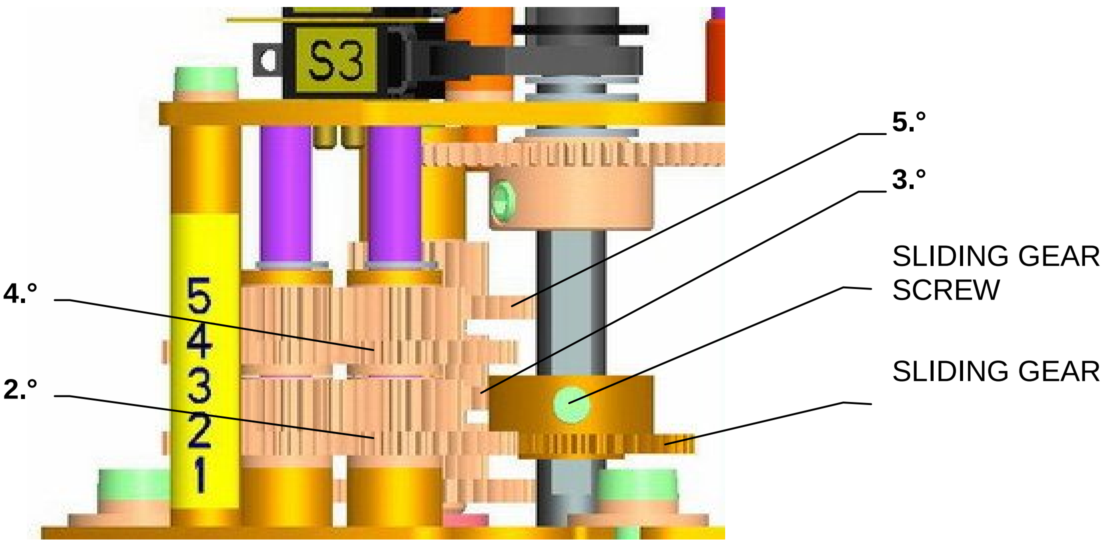


Fig.3b

4.3 Adjustment of resistant transmitter (Fig.4)

The **resistant transmitter** is in the EA **UL 0, UL 1, UL 2** used to function as a remote position indicator.

Before the resistant transmitter adjustment the position switches have to be adjusted (S3, S4).

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

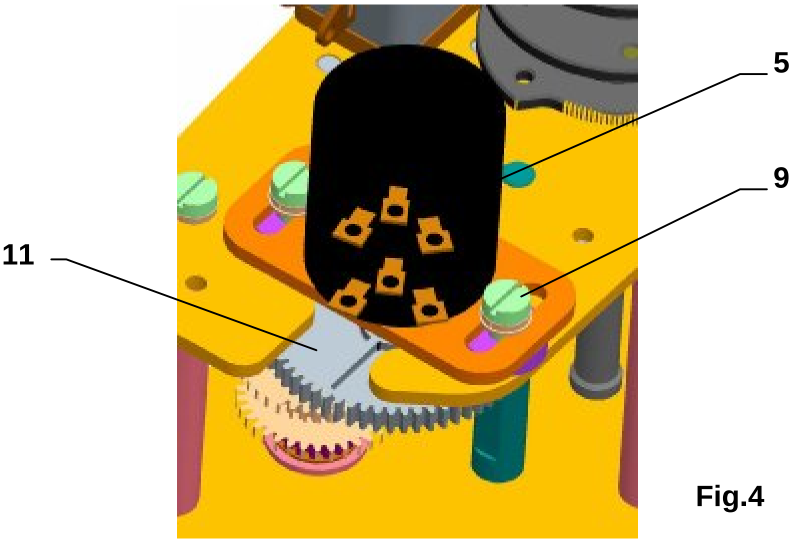


Fig.4

Notes:

In case that the EA is unused within the complete operating speed range following the angle selected on the particular stroke line, the "Open" limit position resistance value will un-dergo proportional reduction.

The transmitters are used with resistance according to the customer's specification. With EA of 2- wire converter a transmitter of 100 W resistance is used .

To adjust the transmitter follow these steps:

Loosen the fixing screws (9) of the transmitter holder and push the transmitter out of mesh.

- Put the actuator to the position "closed" (with the handwheel, until the corresponding position switch S2 or S4 switches).
- Connect a meter for resistance measuring to the terminals 71 and 73. Rotate the transmitter shaft (11) until resistance of ≤5% of the nominal transmitter resistance can be read on the meter.
- In the position put the transmitter to mesh with the drive wheel and fix the fixing screws on the transmitter holder.
- Please check the resistance value in both of the final positions and in case of need repeat the procedure. Once the device is adjusted in a correct way disconnect the meter from the terminal.

4.4 Adjustment of the Electronic Position Transmitter (EPV) - the Resistive Transmitter (Potentiometer) with the Converter

4.4.1 EPV – the 2-wire version (Fig. 5,5a)

The position transmitter with the converter 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:

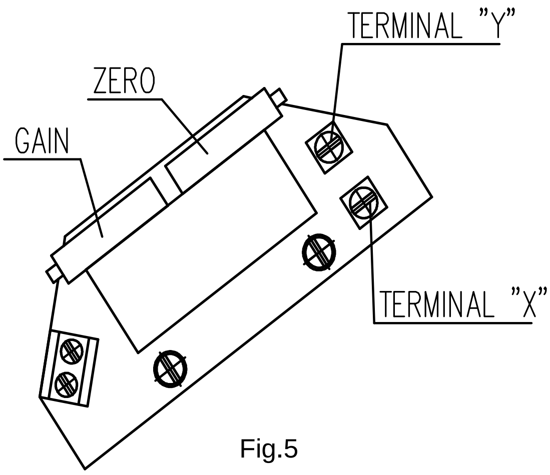


Fig.5

Adjustment of the EPV – 2 wire version

- 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, resp. R-R (Fig. 5,5a). The used transmitter resistance is *100* Ω*.*
- Switch the converter′s power supply on.
- Turn the adjusting trimmer **ZERO** to adjust the output current signal rate measured on the terminals 81-82 to 4 mA.
- Set the actuator to the position ”open“.
- Turn the adjusting trimmer **GAIN**, resp. **B** 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.

<u>*Note:*</u>
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.

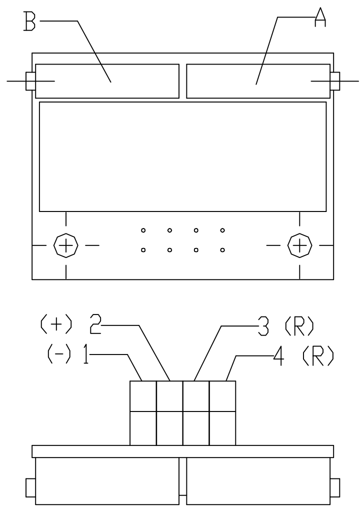


Fig. 5a

4.4.2 EPV – 3-wire version (Fig. 6, 6a)

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 or 4 mA

according to the specified version of the converter.

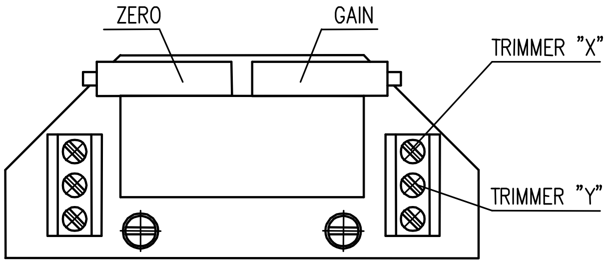


Fig. 6

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**, resp. **0%-100%** (Fig. 6, 6a). The used transmitter resistance is *2000 W or 100 W.*
- Switch the converter′s power supply on.
- Turn the adjusting trimmer **ZERO**, resp. **A** to adjust the output current signal rate measured on the terminals 81-82 to 0mA or 4 mA, resp. 0V.
- Set the actuator to the position ”open“.
- Turn the adjusting trimmer **GAIN**, resp. **B** to adjust the output current signal rate measured on the terminals 81-82 to 20mA, resp. 5 mA, resp. 10V.
- Check the output signal of the converter in the both limit positions, and repeat the procedure if needed.

Note:

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.

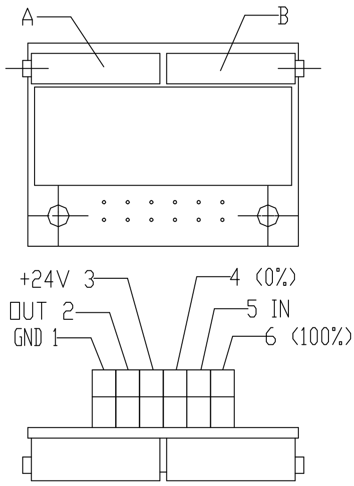


Fig .6a

4.5 Adjustment of Capacitive Transmitter CPT1/A (Fig.7)

The chapter describes adjustment of the capacitive transmitter to the specified parameters (standard values of output signals) in case they are reset. The capacitive transmitter serves as a position transmitter of electric actuators with unified output signal of 4÷20 mA.

Note:
In case that reversed output signals are needed (in the position ”OPEN” minimum output signal) contact personnel of service centres.

The capacitive transmitter CPT1/A is adjusted by the producer to the fixed operation angle according to the order and wired according to the wiring diagrams placed into the cover. Check the power supply of the user after connecting to terminal of the terminal board before the transmitter is electrically checked. Adjustment of the capacitive transmitter can be performed when the position switches are adjusted. The adjustment is performed with the power supply of 230 V/50 Hz and ambient temperature of 20± 5°C.

The following versions of electric actuators with built capacitive transmitters can be specified:

A) The version without any power supply (2-wire version)
B) The version with a power supply (2-wire version) for

A.) Adjustment of the Capacitive Transmitter without any Power Supply

Before connecting check the power supply. The measured voltage should be in range from **18 up to 28 V DC.**

*The voltage of the power supply **must not be in any case higher than 30 V DC**. The transmitter can be irreversibly damaged!*

While checking or adjusting the output signal of 4÷20 mA follow these steps:

- Connect a mA meter of precision class 0,5 and loading resistance lower than 500 Ω serially with the transmitter (pole “-“; terminal 82)
- Put the actuator to the position ”CLOSED”, the signal value should decrease.
- Check the signal value for the position ”CLOSED” (4 mA).
- Tune the signal with loosening the fixing screws (15) and turning the trimmer (10) until the required value of 4 mA is reached. Tighten the fixing screws.
- Put the actuator to the position ”OPEN”, the signal value should raise.

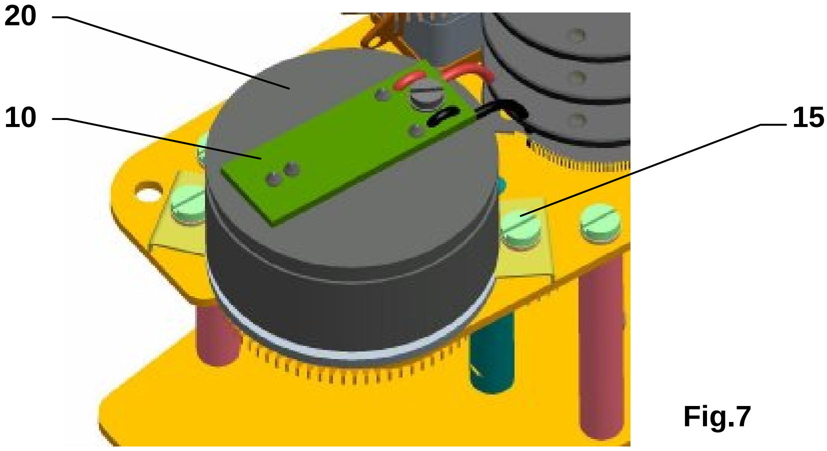


Fig.7

- Check the signal value for the position ”OPEN” (20 mA).
- Tune the signal with turning the trimmer (20) until the required value of 20 mA is reached.
- Check the signal value for the position ”CLOSED” and then for the position ”OPEN”.
- Repeat the procedure until the change from 4 to 20 mA is reached with deviation less then 0,5 %.
- Disconnect the meter and lock the screws with a varnish.

B.) Adjustment of the Capacitive Transmitter with the Power Supply

1.) Check the power supply: 230 V AC, resp. 24 V AC (according to version) ±10%, on the terminals 1, resp. 60 and 61

2.) While checking or adjusting the output signal of 4÷20 mA follow these steps:

- Connect a mA meter of precision class 0,5 and loading resistance lower than 500 Ω on the terminals 81, 82.
- Follow the procedure described in the previous chapter A.

The user has to arrange grounding of the 2-wire circuit of the capacitive transmitter to the electrical ground of a joined controller, computer, etc. The grounding should be performed only in one place in any part of the circuit outside the electric actuator!

Note:
The trimmer (20) can be used to adjust the output signal of the capacitive transmitter to any value of operation stroke in range from ca 40% up to 100% of the value of the operation stroke adjusted by the producer and stated on the actuator's nameplate.

4.6 Adjustment of the DCPT3M transmitter

Before the transmitter **DCPT3M (Fig.8)** adjustment the position switches S3 and S4 have to be adjusted. Adjustment consists in setting of the output signal value in the limit positions of the actuator.

By default (unless determined otherwise by the customer), the manufacturer aligns the DCPT3M transmitter so that output signal value 4mA is set for the limit position "closed" and 20 mA for the position "opened". By default the characteristics of the output signal is set to 20-4 mA (descending).

Notes 1: -this type of transmitter enables the assignment 4 mA / 20 mA of the output signal value to any limit position of the actuator.
2:-the transmitter is adjustable within the range of 35 to 100% of the full stroke specified in the nameplate.

4.6.1 Setting of limit positions

If limit positions require re-adjustment, proceed as follows:

Adjustment of the "4 mA" position:

- Turn on the power supply voltage to DCPT3M
- Reset the actuator to the limit position that you want to assign **4** mA signal value to and press (for about 2 seconds) the pushbutton "4", until LED flashes

Adjustment of the "20 mA" position:

- Turn on the power supply voltage to DCPT3M
- Reset the actuator to the limit position that you want to assign **20 mA** signal value to and press (for about 2 seconds) the pushbutton "**20**", until LED flashes

Notes 1: Transmitter error code may result when the first limit position is saved (2x LED flash). The error code is erased by saving of the second limit position, provided that the saved limit positions are within 35 to 100% of the rated stroke specified in the nameplate.

If necessary, please change the characteristic of the output signal from descending to ascending or vice versa, according to the following chapter.

4.6.2 Setting of the ascending/descending characteristic of the output signal

When the characteristic of the transmitter output signal is changed, the set limit positions "4 mA" and "20 mA" are maintained, however the operating range (stroke of DCPT2) between these two positions is changed to the complement of the original operating range.

When the DCPT2 transmitter is set so that output signal value **4mA** is set for the limit position "**closed**" and **20 mA** for the position "opened", the characteristic must be set to **20-4 mA (descending)**.

When the DCPT2 transmitter is set so that output signal value **20 mA** is set for the limit position "closed" and **4 mA** for the position "**opened**", the characteristic must be set to **4-**20 mA (ascending).

If you need to toggle the characteristic of the transmitter output signal 4-20 mA (ascending), or 20-4 mA (descending), please proceed as follows:

- Turn on the power supply voltage to DCPT3M
- For **4-20 mA (ascending characteristic)** press the pushbutton "20" and subsequently "4" and hold both buttons pressed until LED flashes.
- For **20-4 mA (descending** characteristic) press the pushbutton "4" and subsequently "20" and hold both buttons pressed until LED flashes.

4.6.3 Calibration MENU

The calibration menu enables setting of default parameters and calibration of current values 4 and 20 mA (fine tuning of the value of the output current signals 4 and 20 mA in the limit positions).

Adjustment of default parameters:

- Turn off the power supply to the transmitter power supply source.
- Press and hold the "4" and "20" adjustment pushbuttons.
- Turn on the power supply to the transmitter power supply source.
- Hold both pushbuttons until the first and on to the second flash of LED.

Caution: By saving the default parameters the calibration of the transmitter is overwritten and therefore the transmitter must be re-calibrated.

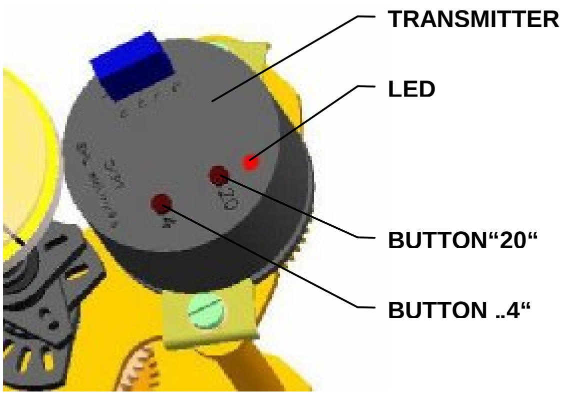


Fig.8

How to access the calibration MENU:

- Turn off the power supply to the transmitter power supply source.
- Press and hold the "4" and "20" adjustment pushbuttons.
- Turn on the power supply to the transmitter power supply source.
- Hold both pushbuttons until the first flash of LED and then release them.

Toggling between 4 and 20 mA in the calibration mode:

- For 4 mA press the pushbutton "20" and subsequently "4" and hold both buttons pressed until LED flashes.
- For 20 mA press the pushbutton "4" and subsequently "20" and hold both buttons pressed until LED flashes.

Setting of 4/20 mA current values in the calibration MENU:

- To reduce the current value, press "20". By holding the button depressed, auto repeat is activated to continuously reduce the value of the output current and when the button is released, the actual value is saved.
- To increase the current value, press "4". By holding the button depressed, auto repeat is activated to continuously increase the value of the output current and when the button is released, the actual value is saved.

4.6.4 Transmitter error messages

Error is indicated by flashing LED. The number of repeated LED flashes indicates the error code as per **table 6.**

TABLE 6

Number of LED flashes	Error
1x	Transmitter position outside operating range
2x	Incorrectly set operating range for the transmitter angle of rotation
3x	Tolerance level of magnetic field outside permitted range
4x	Incorrect parameters in EEPROM
5x	Incorrect parameters in RAM

4.7 Electric local control (Fig.15)

- additional equipment

If necessary (accession, function check and so on), it is possible to preset EA by local electric control with secured power feeding. Upon switching the local control to "LOCAL" mode, it is possible to use OPEN and CLOSE buttons to control the movement of the output element in the entered direction. LEDs indicate individual modes of the local control.

The control is possible after removing the padlock (1). Control mode selection is changed by sequential pressing of the button (2) **REMOTE-OFF-LOCAL** to "**Remote**" "**Shut off**", "**Local**", "**Shut off**". Individual modes are cycled by sequential pressing. The selection is indicated by LEDs visible on the front panel of the local control.

LED**PWR** (6) indicates the presence of supply voltage to control the local control.

Individual local control modes:
The„**OFF**" mode - this mode does not enable remote or local control of EA. The mode is indicated by LEDs **REMOTE** (7) and **LOCAL** (8) being off
The „**LOCAL**" mode - this mode enables EA control in the open and close direction and to stop using buttons **OPEN** (3) (open), **CLOSE** (4) (close) and **STOP** (5). The „**LOCAL**" mode is indicated by **LOCAL** (8) LED being lit. When **OPEN** button is pressed in this mode, it is indicated by **OPEN** LED being lit (9). When **CLOSE** button is pressed in this mode, it is indicated by **CLOSE** LED being lit (10). When **STOP** button is pushed, the signal LEDs **OPEN** (9) and **CLOSE** (10) are switched off.
The„**REMOTE**" mode - in this mode the EA can be remotely controlled by commands from master system. The „**REMOTE**" mode is indicated by **REMOTE** (7) LED being lit. In this ode the OPEN, STOP and CLOSE buttons are not functional.

After finishing the work with electrical local control, we recommend to return the padlock to button (2) in mode „**REMOTE**" and lock out the device to avoid unwanted tampering by unauthorized person.

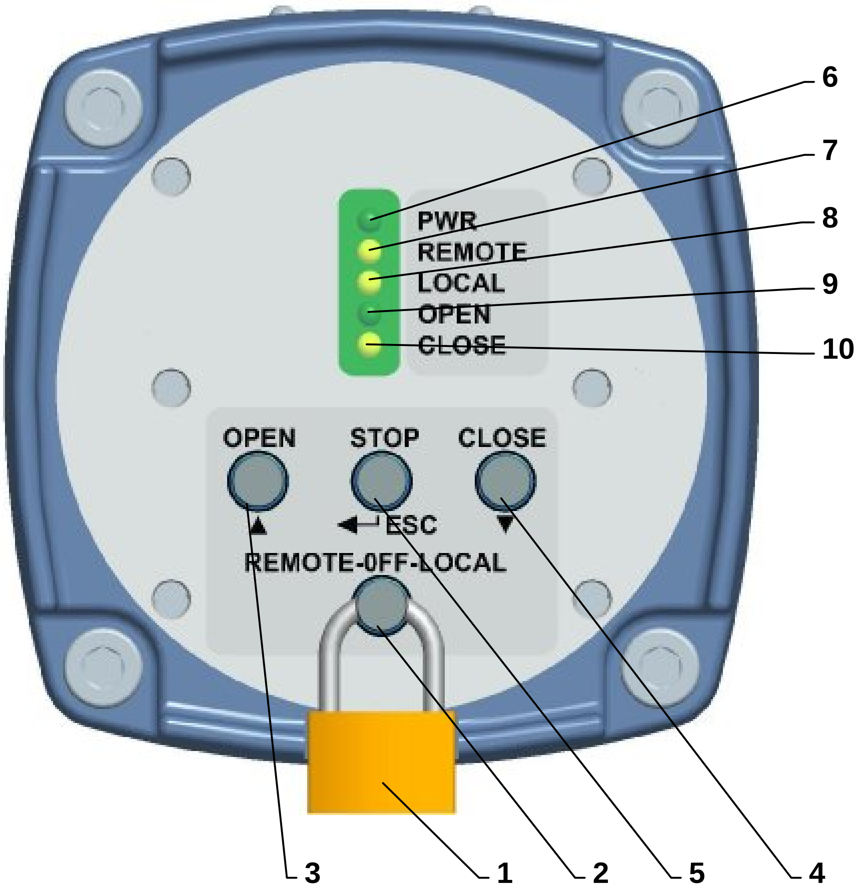


Fig. 15

5. Service and Maintenance

5.1 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 requires just an insignificant service. The reliable operation is determined by the correct putting into operation.
- The service of the EA results from the operation conditions and generally consists in treating the information for subsequent performing of a required function. The EA can be controlled by remote control electrically or manually on the place of their installation. The manual control is available with a handwheel.
- The service staff should arrange the required maintenance and prevent the actuator during operation against impacts of environment and climate what exceed the frame of allowed influences stated in the Chapter "Operation Conditions".
- It is necessary to avoid overheating of the EA surface, exceeding of parameters stated on the nameplate and abnormal vibrations of the EA.

Manual control:

- If the manual control is needed (adjustment, function checking, failures etc.) the staff can reset the regulated member using the handwheel. While rotating the handwheell clockwisely the output element moves in the direction "CLOSING".

5.2 Maintenance - extent and periodicity

All screws and nuts affecting tightness and protection (IP) must be tighten during the inspection and maintenance. 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 internal between two preventive inspections is four years.

In case of damage or after 6 years of the actuator´s operation the replacement of cover seals and oil filling seals must be done.

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.
During inspection, replace the sealing O-ring (see Chapter 6) between the bottom and top cover - replace with original O-ring from manufacturer.

Lubrication:

- - gear part - in versions for climate with temperatures -25°C till +55°C – grease HF 401/0 (GLEIT-μ) resp. GLEITMO 585 K
  - in versions for climate with temperatures -50°C till +40°C grease ISOFLEX TOPAS AK 50
  - in versions for climate with temperatures -60°C till +40°C grease DISCOR R-EP 000
- - linear adapter – grease GLEIT- μ - HP 520M (to –25°C) resp. HP 520S (to –60°C).

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.

5.3 Maintenance to assure protection

- The fixing screws of the upper cover have to be always in full numbers, i.e. 4 pcs, with flexible washers and tightly fastened.
- While connecting and disconnecting of the EA check the sealing rings of the cable leads – damaged and worn sealing should be replaced by original rings!
- 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.

<u>Caution:</u>
After disassembly and re-assembly of top enclosure and bottom enclosure (if any damage occurs) the sealing O-ring must be replaced according following table:

O- Ring	Dimension	Standard	PNm	Material	Manufacturer
Bottom enclosure and top enclosure (UL 0-Ex)	134,5x3	AS 568 B/BS 1806	62 732 XXX	NBR	
Bottom enclosure and top enclosure (UL 1-Ex)	180x3	AS 568 B/BS 1806	62 732 XXX	NBR	TRELLEBORG SEALING SOLUTIONS
Bottom enclosure and top enclosure (UL 2-Ex)	202,79x3,53	AS 568B/B S 1806	62 732 XXX	NBR	
Local control	105x3	STN 02 9281.9	62 732 390	MVQ	Rubena Náchod

5.4 Troubleshooting

- In case of a mains failure the EA stands in the position where it was before the failure occurred. If needed the EA can be reset using the manual control (with the handwheell). When necessary EA can by manually operated (handwheel), at doing this, pay attention to keep the movement of the EA output part within the range of the set stroke so as to avoid loosing the adjustment of the limit position switches or position transmitter or regulator. After supply voltage recovery EA is prepared for operation.
- In case of a failure of a part of the EA the part can be replaced by a new one. The exchange is to be committed by the producer or a contracted service firm.
- In case of an EA failure, witch cannot be eliminated directly in operation, follow instructions for under-guaranty and after-guaranty service.

Table 7

Failure	Cause	Troubleshoot
There are no revolutions of motor rotor when operating the push-buttons.	1. No voltage on the electric motor connectors.	Check connection and voltage presence.
	2. No voltage on the control part.	Check connection of the control part.
The EA fails to stop at the limit positions.	1. Incorrect setting-up of the switches.	Perform adjustment.
	2. The microswitch is defective	Replace the microswitch for a new one and adjust.
	3. Incorrect actuator connection	Check connection of position and torque switches in control circuit
The EA stops at the mid-position.	There is an obstacle in the valve or part of it seizes.	Perform reversing of the EA, move it to the original direction and, in the case that the failure repeats, repair the armature.
There is no indication of reaching these positions in the final positions.	1. The LEDs fail to operate.	Replace the LEDs for new ones.
	2. Incorrect adjustment of the position signal switches.	Adjust the position signal switches.
		In case that some EA failures still remain, contact the service centres.

- *Note: If the EA has to be dismantled follow the procedure of the Chapter "Dismantling"*

The EA can be dismantled to be repair purpose by qualified and trainer persons only! The training can be preformed by the producer or by a contracted service firm.

6. Accessories and Spare Parts

As accessories the **handwheel** is packed with the product.

6.1 List of the Spare Parts

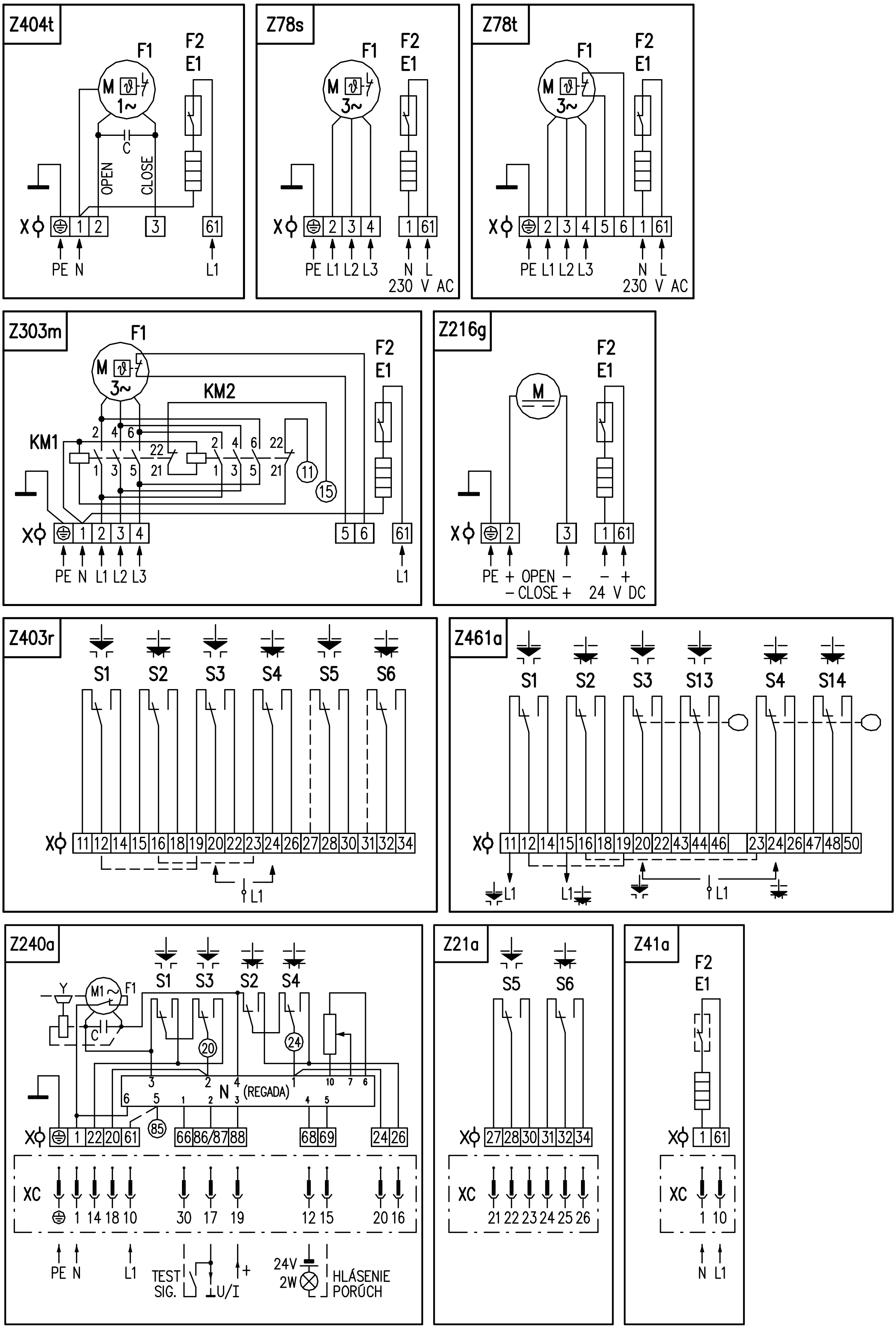
Spare part	Order Nr.	Position	Figure
Electric motor; 13,8 W; 230 VAC; (UL 0)	63 592 408	2	1
Electric motor; 13,8 W; 24 VAC; (UL 0)	63 592 413	2	1
Electric motor; 53 W; 24 VAC; (UL 1)	63 592 XXX	2	1
Electric motor; 100 W; 24 VAC; (UL 2)	63 592 XXX	2	1
Electric motor; 40 W/90 VA; 230V AC; (UL1)	63 592 076	2	1
Electric motor; 40 W/110 VA; 3x400V AC; 3x415V AC; (UL1)	63 592 054	2	1
Electric motor; 120 W/228VA; 230V AC; (UL 2)	63 592 394	2	1
Electric motor; 60 W/120VA; 230V AC; (UL 2)	63 592 322	2	1
Electric motor; 180 W/300VA; 3x400V AC; 3x415V AC; (UL 2)	63 592 330	2	1
Electric motor; 90 W/150VA; 3x400V AC; (UL 2)	63 592 328	2	1
Electric motor; 13,8 W/14,2W; 120 V AC; 50Hz /60Hz; (UL 0)	63 592 412	2	1
Electric motor; 40 W/90 VA; 115 V AC, 60 Hz; (UL 1)	63 592 XXX	2	1
Electric motor; 70 W/125VA; 120 V AC, 60 Hz; (ULR 2PA)	63 592 XXX	2	1
Elektromotor; 120 W/228VA; 120 V AC, 60 Hz; (ULR 2PA)	63 592 XXX	2	1
Electric motor; 7,5 W; 3x400 V AC; 50Hz; 3x400V AC; (UL 0)	63 592 XXX	2	1
Electric motor; 6,2 W; 3x400 V AC; 60Hz; 3x400V AC; (UL 0)	63 592 XXX	2	1
Electric motor; 6,5 W; 3x400 V AC; 50Hz; 3x400V AC; (UL 0)	63 592 XXX	2	1
Electric motor; 7 W; 3x400 V AC; 60Hz; 3x400V AC; (UL 0)	63 592 XXX	2	1
Electric motor; 15 W; 3x400 V AC; 50Hz; 3x400V AC; (UL 0)	63 592 XXX	2	1
Electric motor; 13 W; 3x400 V AC; 60Hz; 3x400V AC; (UL 0)	63 592 XXX	2	1
Capacitor 0,82µF (UL 0)	63 540 002 63 540 007	2	1
Capacitor 82µF (UL 0)	63 540 006 63 540 003	2	1
Capacitor 5µF (UL 1)	63 540 001	2	1
Capacitor 7µF (UL 2)	63 540 181	2	1
Capacitor 8µF (UL 2)	Súčasť motora	2	1
Capacitor 3,3µF (UL 0)	63 542 038	2	1
Capacitor 9µF (UL 1)	Súčasť motora	2	1
Capacitor 16µF (ULR 2PA)	63 540 251	2	1
Capacitor 20µF (ULR 2PA)	63 540 252	2	1
Microswitch DB 6G A1LB (UL 0)	64 051 466	S3,S4,S5,S6	3a
Microswitch DB3C-A1 (gold-plated contacts) (UL 0)	64 051 200	S3,S4,S5,S6	3a
Microswitch D443-S1LD (UL 2)	64 051 737	24,25,26,27	3
Microswitch D383-Q3RA (UL1-Ex, UL 2)	64 051 738	24,25,26,27	3
Microswitch D413-V3 RA (gold-plated contacts) (UL 1, UL 2)	64 051 470	24,25,26,27	3
Capacitive transmitter CPT 1	64 051 499	10	7
Resistant wire transmitter (potentiometer) RP19; 1x100	64 051 812	5	4
Resistant wire transmitter (potentiometer)RP19; 1x2000	64 051 827	5	4
Resistant wire transmitter (potentiometer)RP19; 2x100	64 051 814	5	4
Resistant wire transmitter (potentiometer)RP19; 2x2000	64 051 825	5	4
Transmitter DCPT3M	64 051 059	-	8
Power supply DX3004.P24	64 051 184	-	-
Ring 134,5x3 SMS 1586; BS 4518 (UL 0)	62 732 XXX	-	-
Ring 180x3 AS 568 B/BS 1806 (UL 1)	62 732 XXX	-	-
Ring 202,79x3,53 AS 568 B/BS 1806 (UL 2)	62 732 XXX	-	-
O-Ring 105 x 3	62 732 390	-	-
Stearing ring 22 (UL 0)	STN 029295 62 732 014	-	-
Ring 30x22 MVQ (UL 0)	STN 029280.9 62 731076	-	-
Stearing ring 28 (UL 1)	STN 029295 62 732 255	-	-
Stearing ring 28x35,6x4,2 (UL 1)	62 732 391	-	-
Ring 36x28 MVQ (UL 1)	STN 029280.9 62 732 338	-	-
Stearing ring 40 (UL 2)	62 732 164	-	-
Stearing ring 40x48,8x6,3 (UL 2)	62 732 158	-	-
O-ring 44,12x2,62 (UL 2)	62 732 157	-	-
Ring 50x40 MVQ (UL 2)	STN 029280.9 62 732 404	-	-

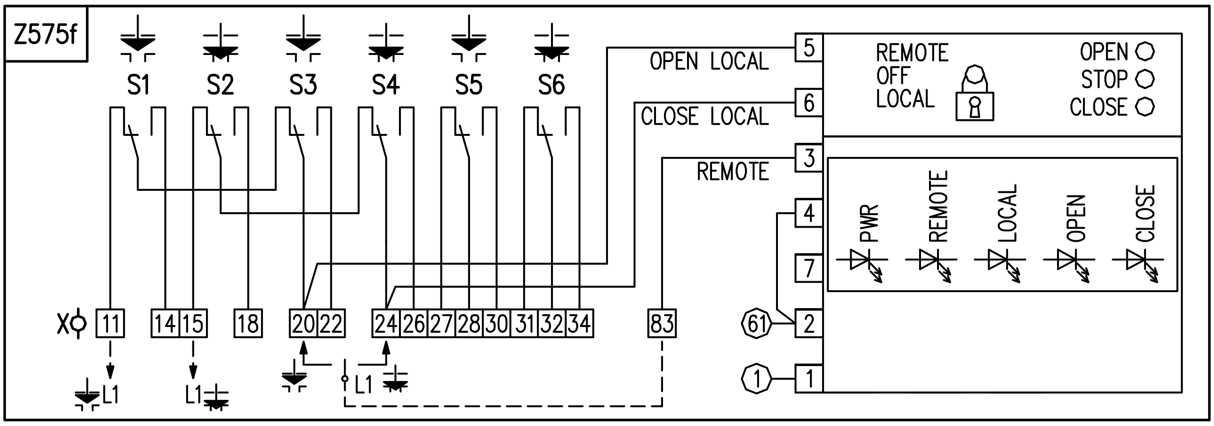
The disassemble of EA for the purpose of repair is possible only for the manufacturer!

7. Enclosures

7.1 Wiring diagrams UL 1, UL 2

Electrical connection to the terminal block:

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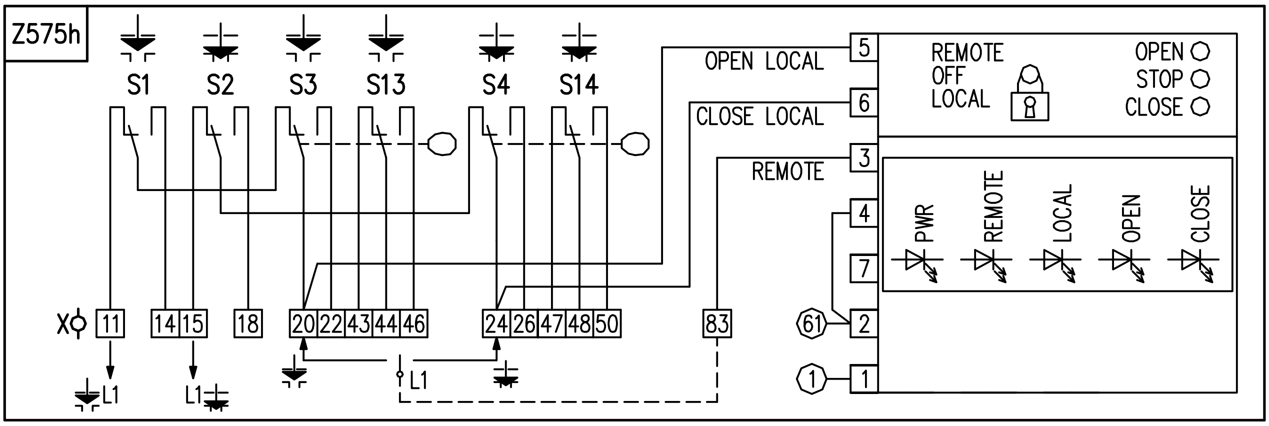
CLOSE LOCAL
REMOTE
REMOTE OFF LOCAL
OPEN STOP CLOSE
PWR REMOTE LOCAL OPEN CLOSE
X 11 14 15 18 20 22 24 26 27 28 30 31 32 34 83
L1
5 6 3 4 7 2 1
61 1


Z575h
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CLOSE LOCAL
REMOTE
REMOTE OFF LOCAL
OPEN STOP CLOSE
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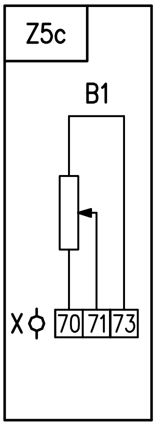
L1
5 6 3 4 7 2 1
61 1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B1
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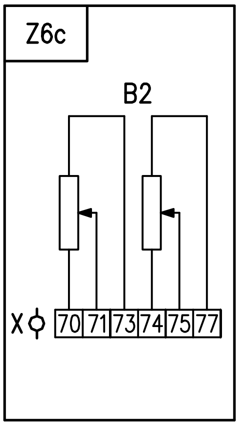
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B2
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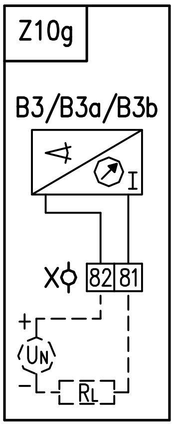
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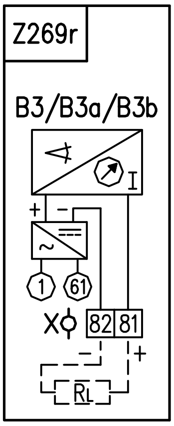
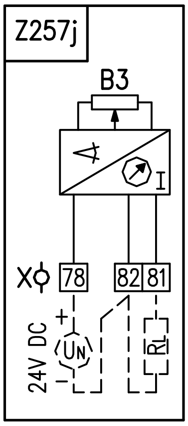
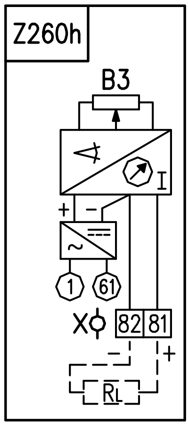
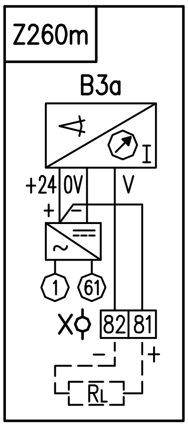
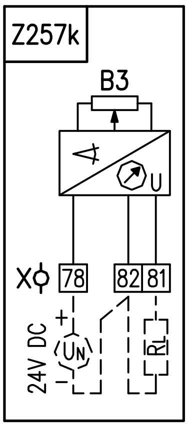
B3/B3a/B3b
I
X 82 81
UN
RL

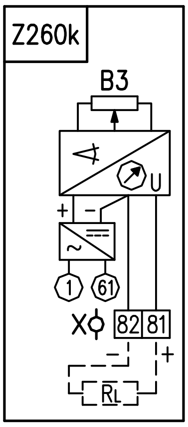

Z269r
B3/B3a/B3b
I
1 61
X 82 81
RL


Z257j
B3
I
X 78 82 81
24V DC
UN
RL

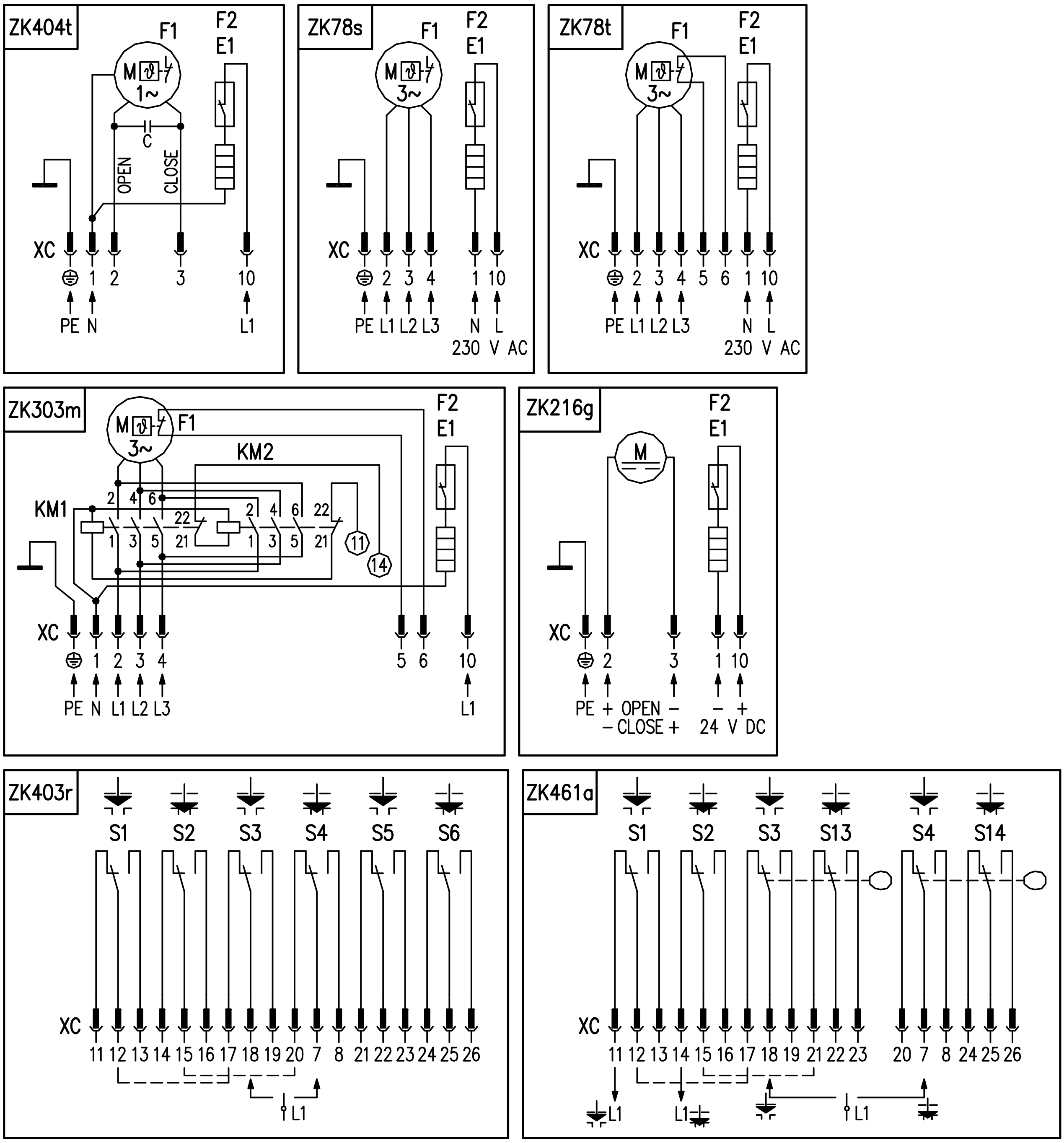

Z260h
B3
I
1 61
X 82 81
RL

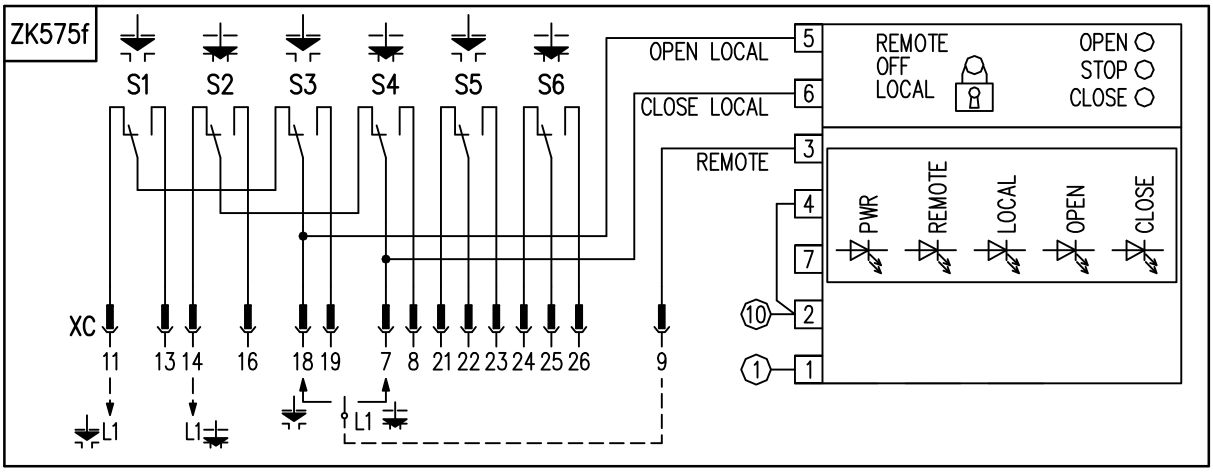

Z260m
B3a
I
+24 0V V
1 61
X 82 81
RL

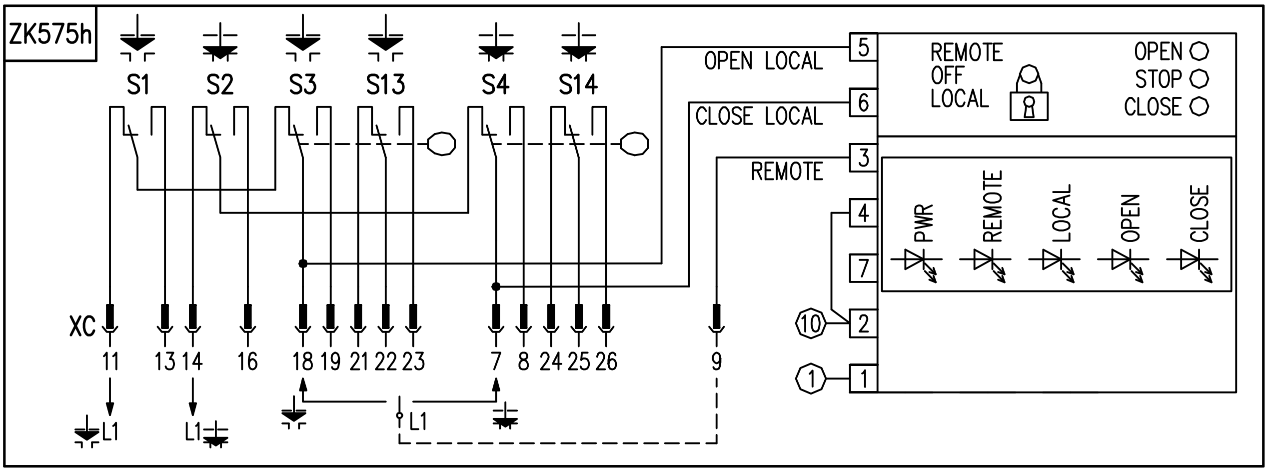

Z257k
B3
U
X 78 82 81
24V DC
UN
RL

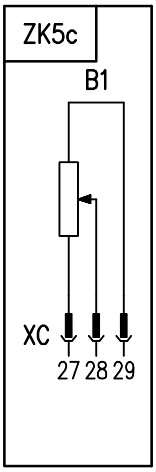

Z260k
B3
U
1 61
X 82 81
RL

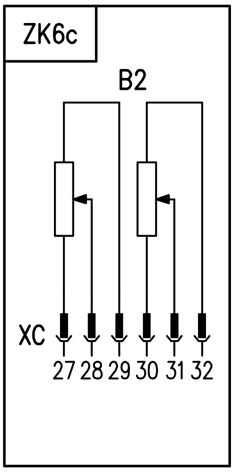
Electrical connection to the connector:

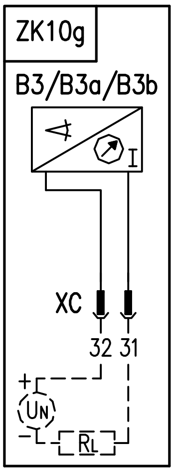


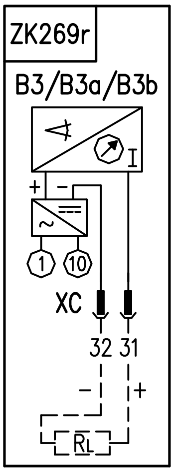

ZK575f
S1
S2
S3
S4
S5
S6
OPEN LOCAL
CLOSE LOCAL
REMOTE
REMOTE
OFF
LOCAL
OPEN
STOP
CLOSE
PWR
REMOTE
LOCAL
OPEN
CLOSE
5
6
3
4
7
2
1
10
XC
11
13 14
16
18 19
7 8 21 22 23 24 25 26
9
L1
L1
L1

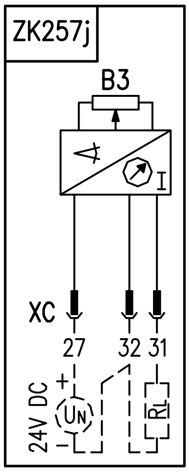

ZK575h
S1
S2
S3
S13
S4
S14
OPEN LOCAL
CLOSE LOCAL
REMOTE
REMOTE
OFF
LOCAL
OPEN
STOP
CLOSE
PWR
REMOTE
LOCAL
OPEN
CLOSE
5
6
3
4
7
2
1
10
XC
11
13 14
16
18 19 21 22 23
7 8 24 25 26
9
L1
L1
L1

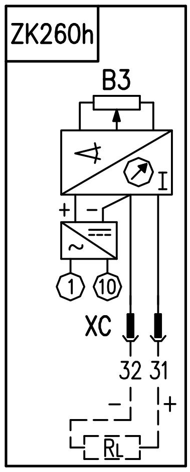

ZK5c
B1
XC
27 28 29

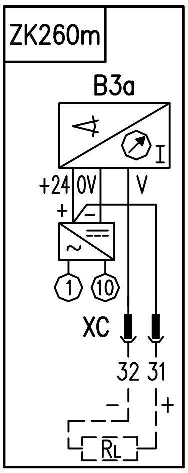

ZK6c
B2
XC
27 28 29 30 31 32

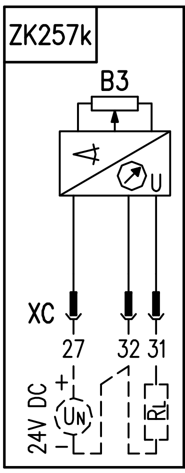

ZK10g
B3/B3a/B3b
I
XC
32 31
+
UN
–
RL

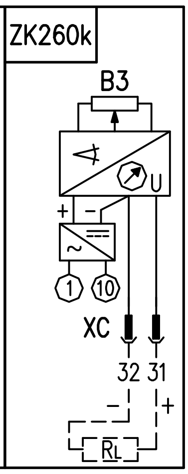

ZK269r
B3/B3a/B3b
I
+
–
1
10
XC
32 31
–
+
RL


ZK257j
B3
I
XC
27
32 31
24V DC
+
UN
–
RL

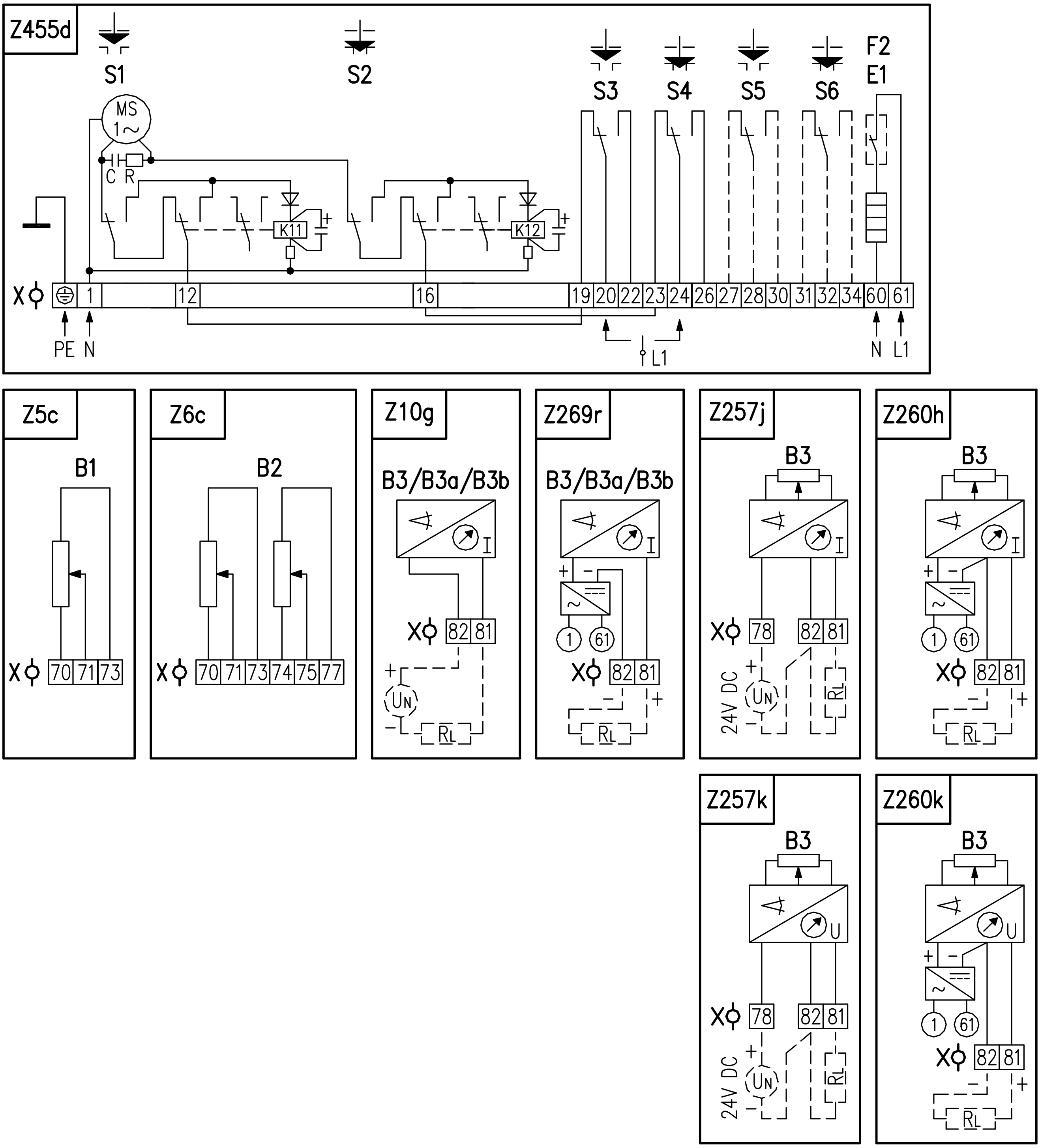

ZK260h
B3
I
+
–
1
10
XC
32 31
–
+
RL


ZK260m
B3a
I
+24
0V
V
+
–
1
10
XC
32 31
–
+
RL


ZK257k
B3
U
XC
27
32 31
24V DC
+
UN
–
RL


ZK260k
B3
U
+
–
1
10
XC
32 31
–
+
RL

7.2 Wiring diagrams UL 0



Legend:

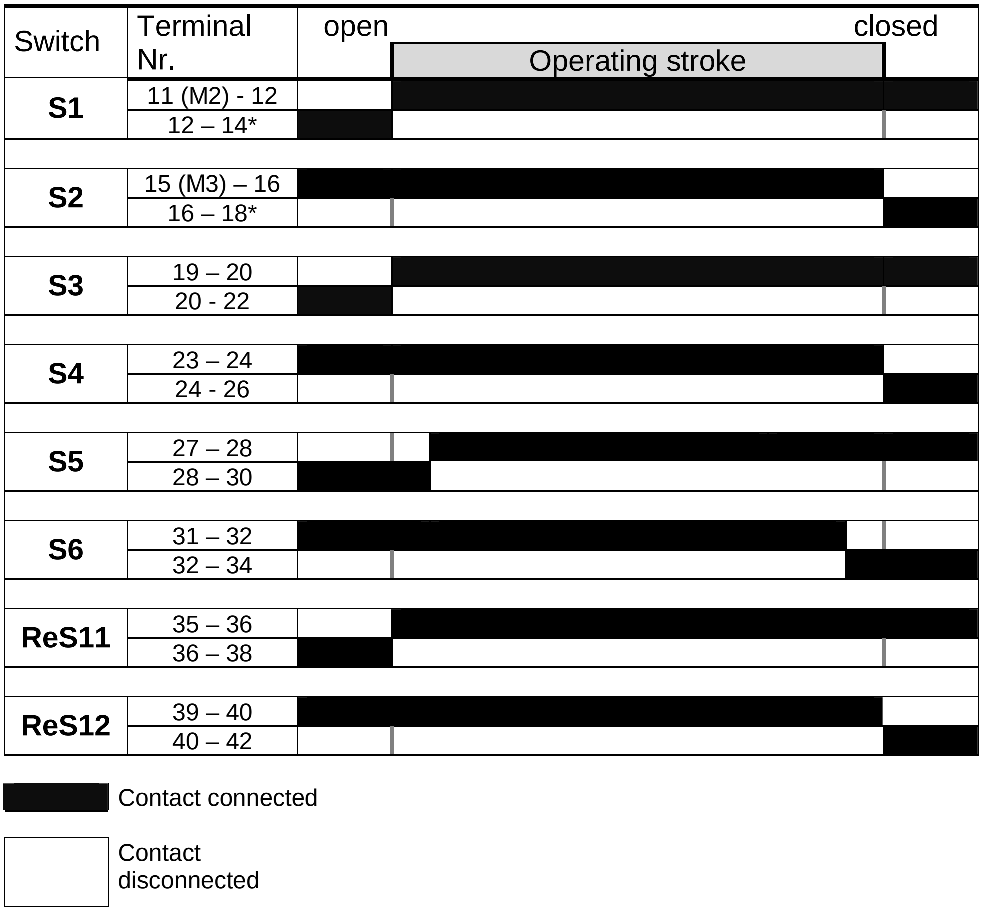
Z5c, ZK5c................... wiring diagram of single resistant transmitter
Z6c, ZK6c................... wiring diagram of double resistant transmitter
Z10a, Z10g, ZK10g.... wiring diagram of resistive with current controller or capacitive transmitter -
.... 2 - wire without supply
Z455d, ZK455d .... wiring diagram of electric motor with thrust and position switch and with space heater
Z78s, ZK78s, ... wiring diagram of 3-phase electric motor and space heater
Z78t, ZK78t, ... wiring diagram of 3-phase electric motor and space heater
Z303m, ZK303m .... wiring diagram of EA 2 with 3~ phase electric motor with reverse contactor
Z257j, ZK257j .... 3-wire version of EPV - without power supply connection
Z260h, ZK260h .... 3-wire version of EPV – with power supply connection
Z269r, ZK269r............ 2-wire version of EPV – with power supply connection
Z403r, ZK403r............ wiring diagram of force and position switches
Z404t, ZK404t .... wiring diagram with 1~ phase electric motor
Z575f, ZK575f .... wiring diagram of force and position switches and local control.
Z241a......................... wiring diagram with controller with current feedback for 1-phase electric motor
Z41a .... wiring diagram of space heater and space heater's thermal
Z21a........................... wiring diagram of additional position switches connectio

B1.....................resistive transmitter (potentiometer) single
B2.....................resistive transmitter (potentiometer) double
B3.....................capacitive transmitter
S1..................... thrust switch "open"
S2..................... thrust switch "closed"
S3..................... position switch "open"
S4..................... position switch "closed"
S5..................... additional position switch "open"
S6..................... additional position switch "closed"
ReS11 ....relay of thrust of switch S1
ReS12 ....relay of thrust of switch S2
M, MS..........electric motor

C................. capacitor
Y................. brake of electric motor (valid for EA UL 2-Ex)
E1............... space heater
K11,K12 ..... coil of relay
KM1, KM2 .. coil of contactor (valid for EA UL 2-Ex)
F1 .... electric motor thermal protection
F2 .... space heater thermal switch
X, X2 .... terminal board
XC .... connector (is not valid for these types EA)
I/U............... output current (voltage) signal
R_L .... loading resistor
R................. reducing resisitor (valid for EA UL 0)

<u>Note 1:</u> *Thermal protection of single-phase electric motor (Z404t) is standardly built-in in electric motor, on the neutral wire.*
<u>Note 2:</u> *Force switching is not fitted with mechanical interlocking device.*
<u>Note 3 :</u> *Jumpers 12-19 and 16-23 terminal board in wiring diagram Z455d are standardly delivered from the producer.*

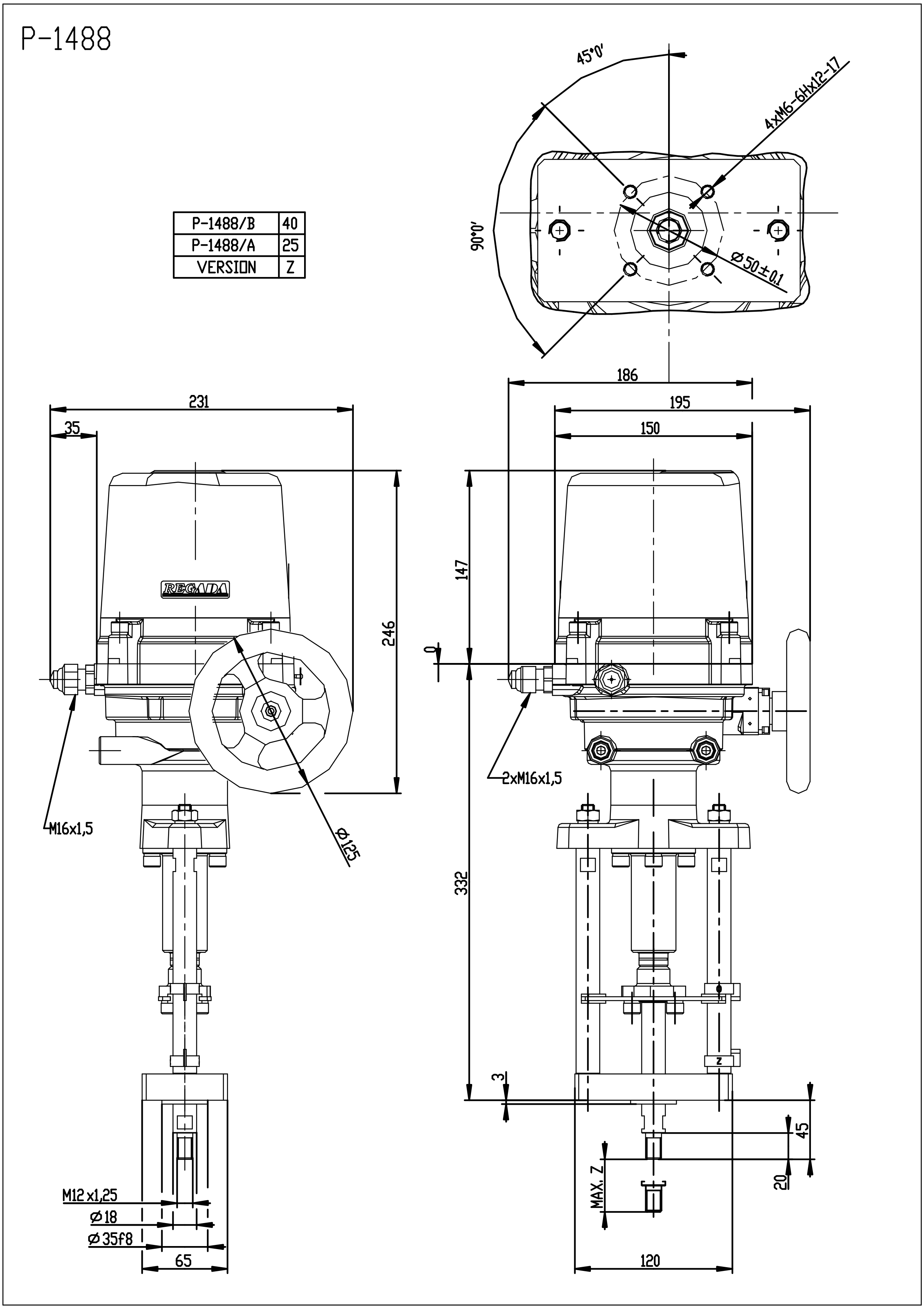
7.3 Operation Logic Diagram of switches and relays



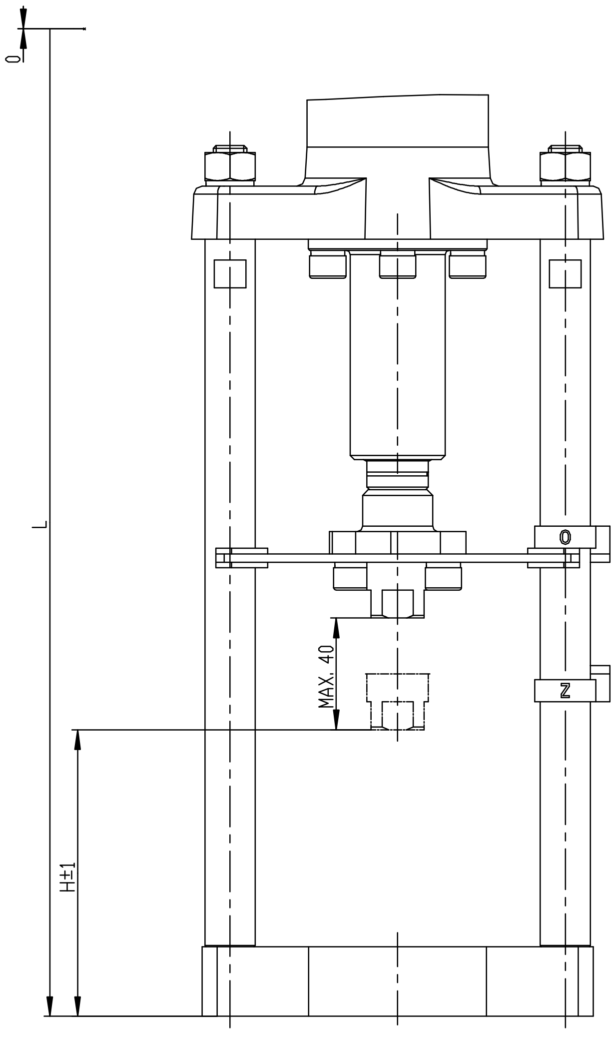
<u>Note 1</u>: Signaling from switches S5, S6 for EA UL 0, is possible from 40% of the maximum operating stroke adjusted (mentioned in the nameplate) before end position. If larger signaling range is required, it is possible to make use of the reversing function of the switches.
*<u>Note 2</u>: *- contacts 11,14 and 15,18 of switches S1 a S2 for EA model UL 0 have not been taken out to the terminal board. For EA model UL 1 and UL 2 contacts 14 and 18 have not been taken out.*
<u>Note 3:</u> Relay ReS11 switches simultaneously with switch S1 and relay ReS12 switches simultaneously with switch S2.

7.4 Dimensional drawings

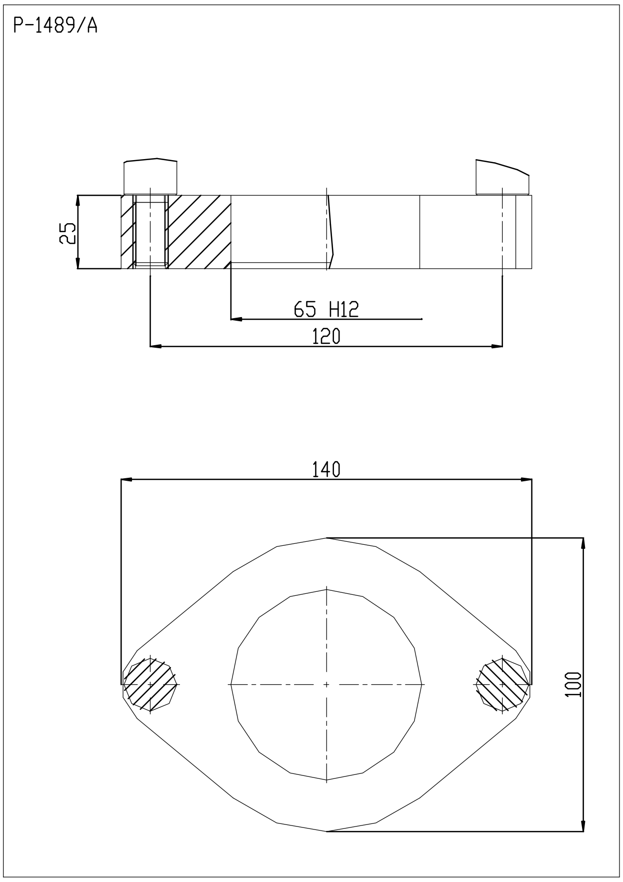
Electric linear actuators **UL 0**

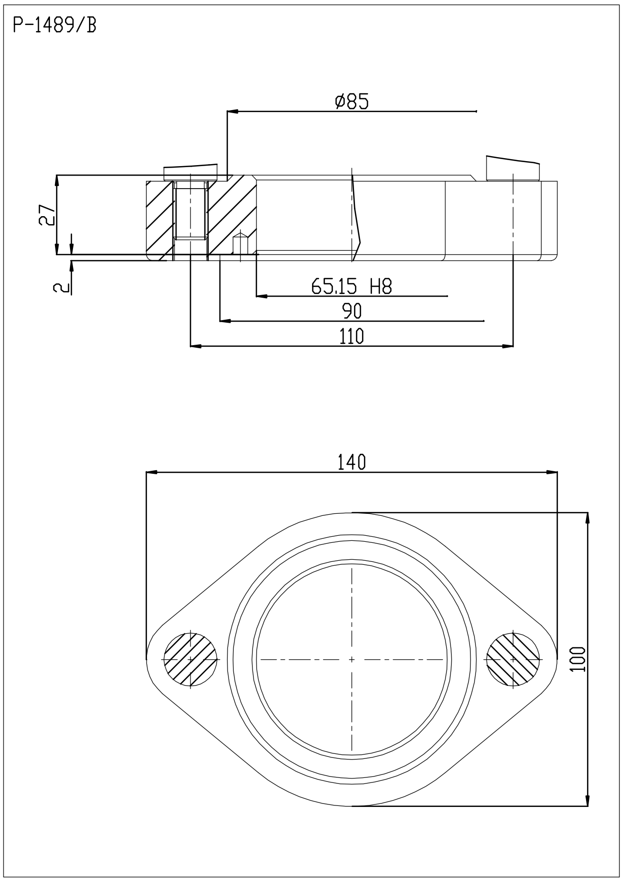


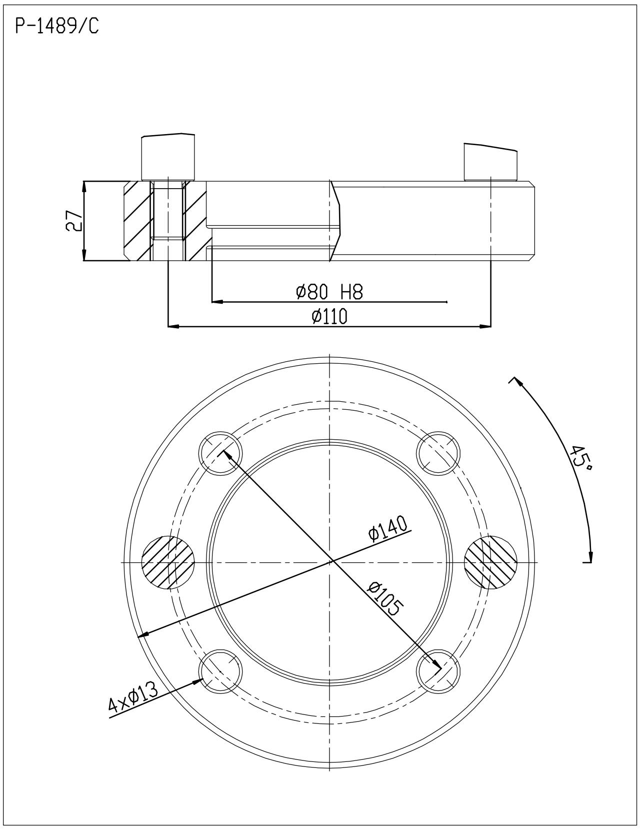
P-1489

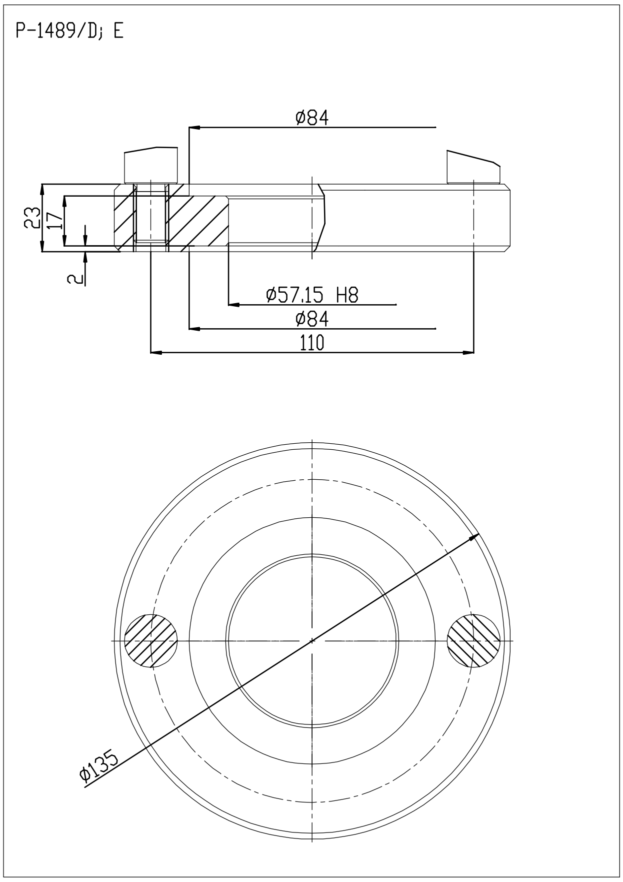


P-1489/G	86	402
P-1489/F	59	375
P-1489/E	102	420
P-1489/D	94	410
P-1489/C	112	428
P-1489/B		
P-1489/A	103	419
VERSION	H	L

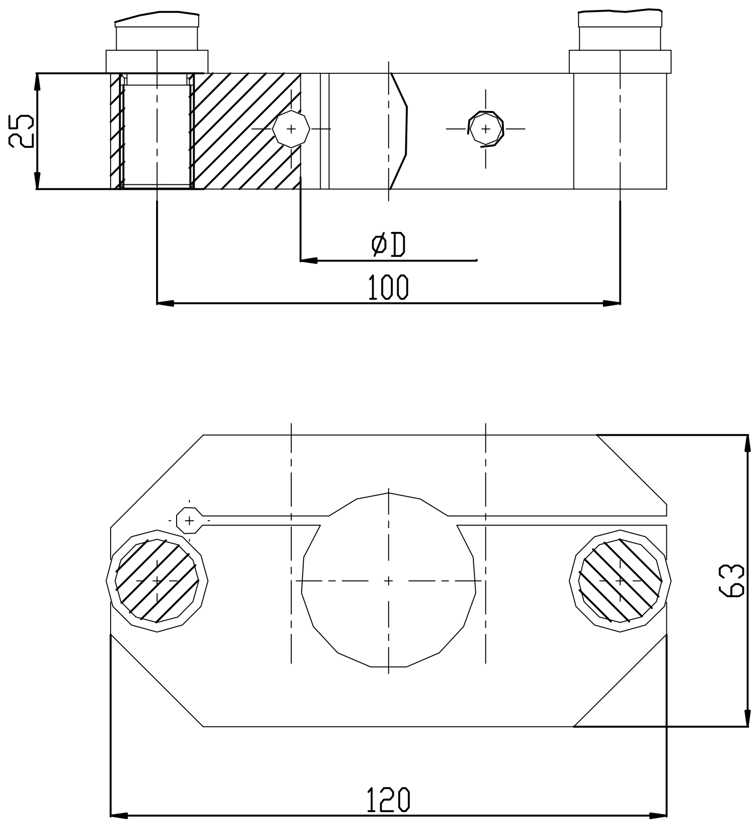

P-1489/A
25
65 H12
120
140
100


P-1489/B
ø85
27
2
65.15 H8
90
110
140
100


P-1489/C
27
ø80 H8
ø110
45°
ø140
ø105
4xø13

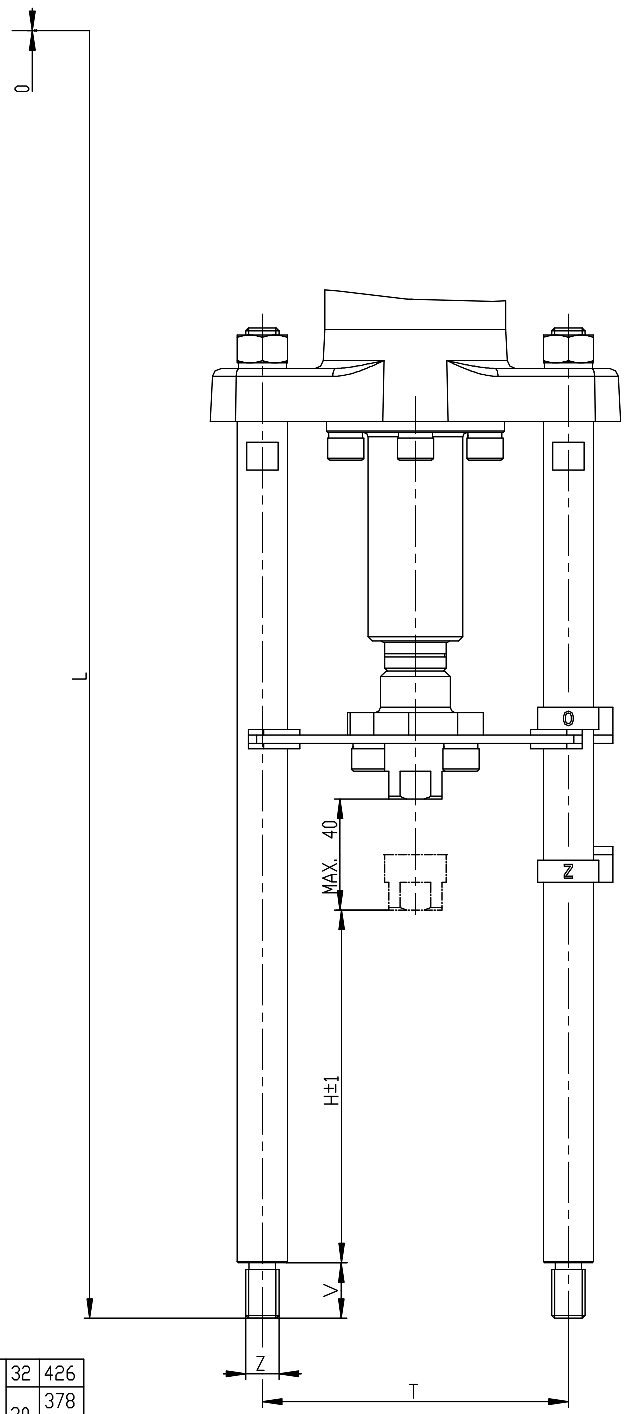

P-1489/D; E
ø84
23
17
2
ø57.15 H8
ø84
110
ø135

P-1489/F; G



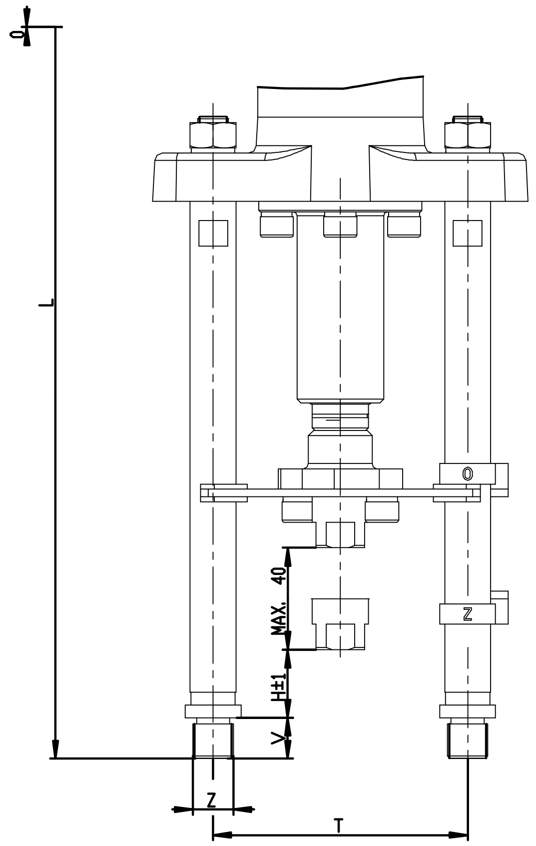
P-1489/G	60
P-1489/F	38
VERSION	D

P-1490/A; B; C



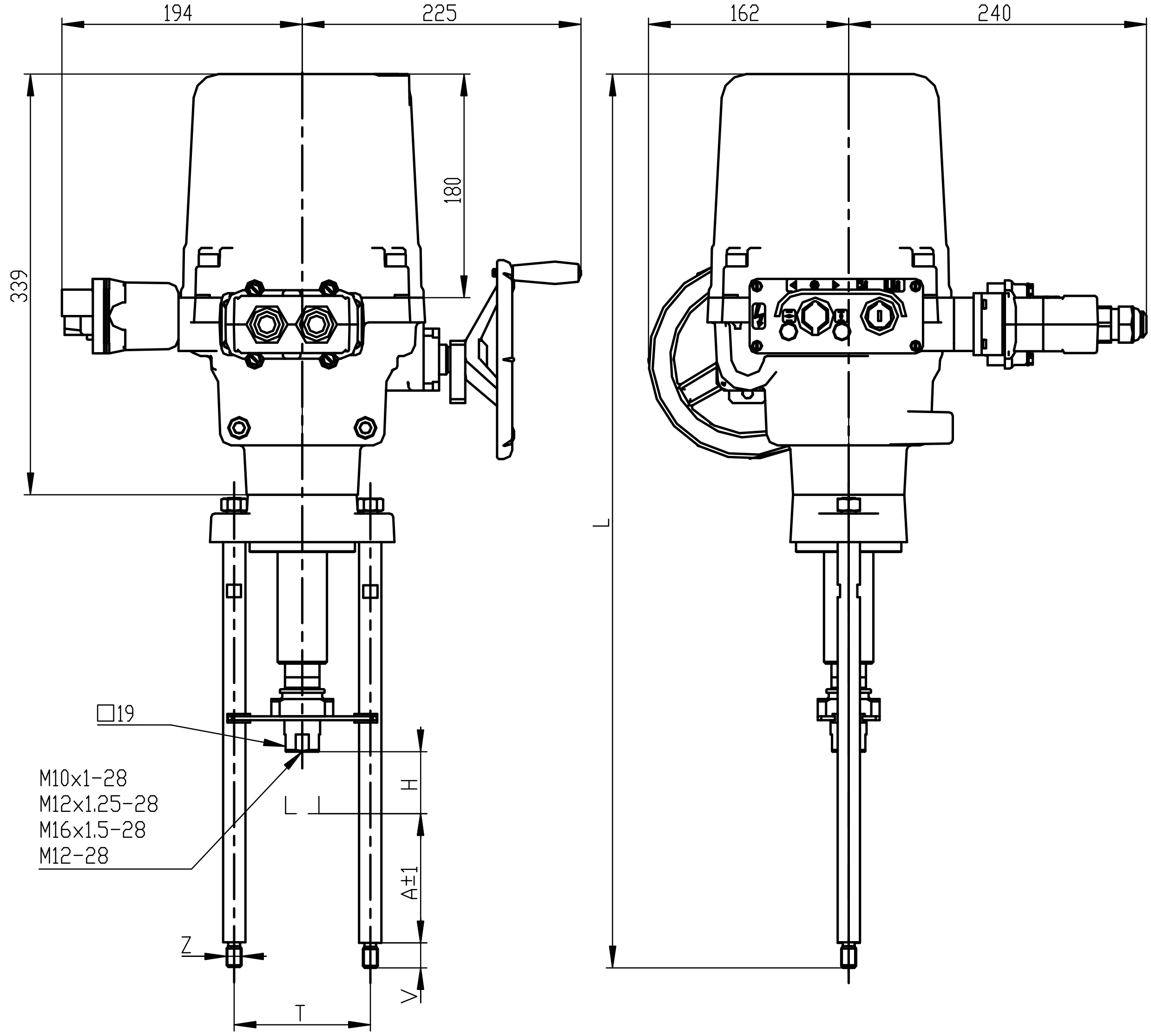
VERSION	T	H	Z	V	L
P-1490/C		80		32	426
P-1490/B	110	42	M12	20	378
P-1490/A		127			463

P-1490/D; E; F



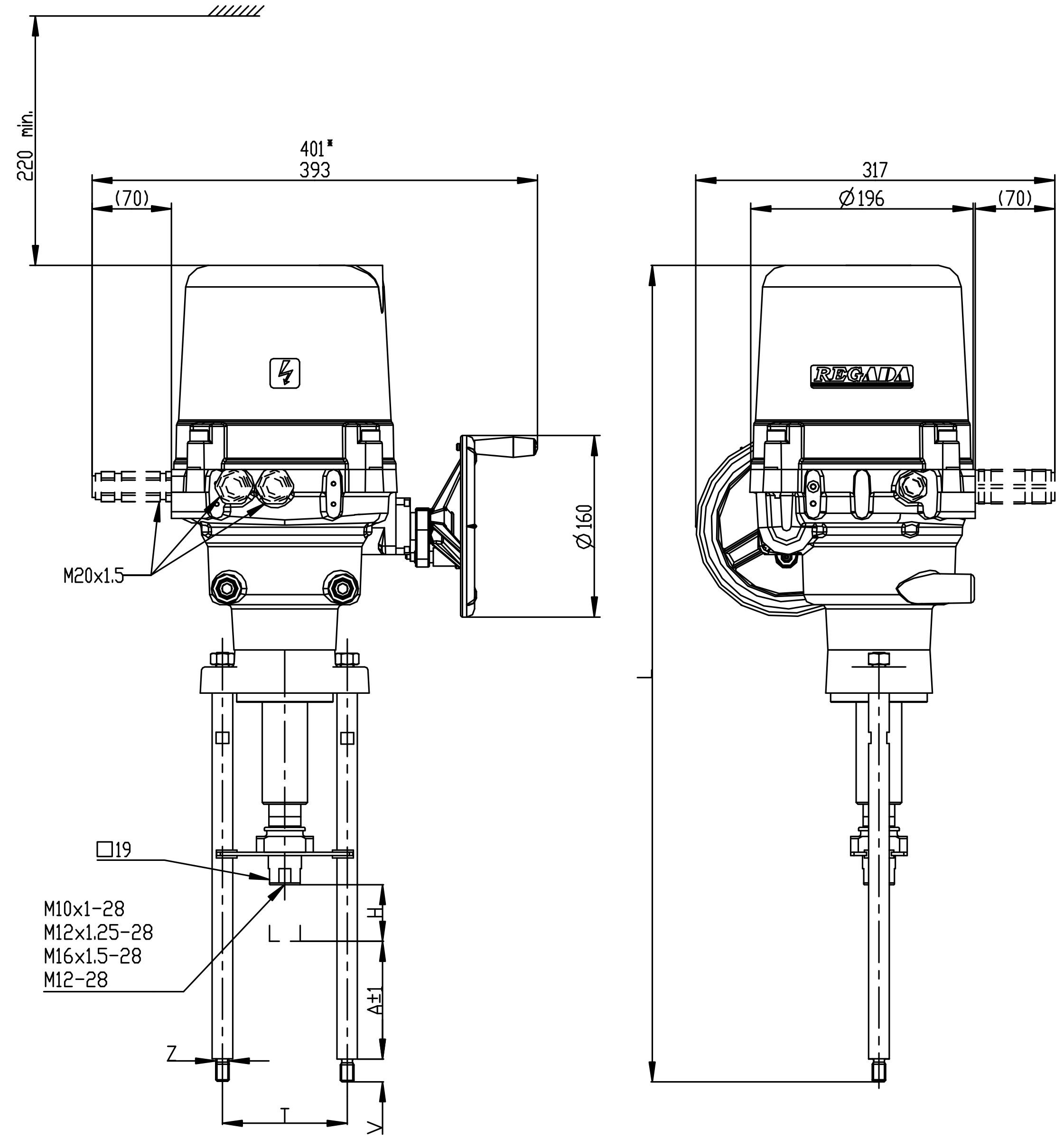
P-1490/F	100	110	M16	16	442
P-1490/E		57			389
P-1490/D		27			359
VERSION	T	H	Z	V	L

Electric linear actuator **UL 1**



A	H	T	Z	V	L
110	MAX. 50 (80)	100	M16	16	726
57		100	M16	16	673
27		100	M16	16	643
80		110	M12	32	696
42		110	M12	20	658
127		110	M12	20	743

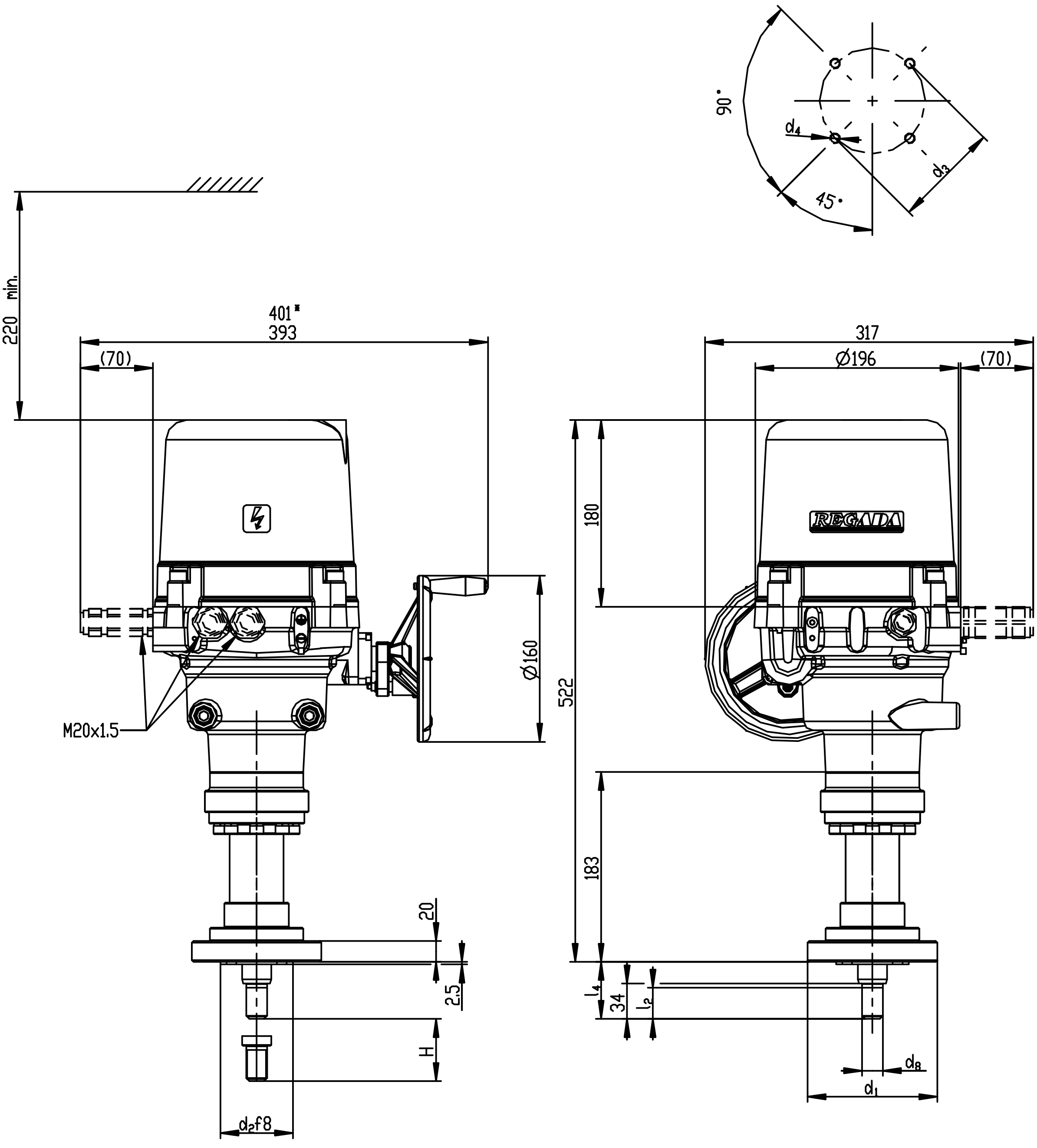
P-2053



A	H	T	Z	V	L
110	MAX. 50 (80)	100	M16	16	726
57		100	M16	16	673
27		100	M16	16	643
80		110	M12	32	696
42		110	M12	20	658
127		110	M12	20	743

* - PLATI PRE VYHOTOVENIE S MIESTNYM OVLADANIM
/* - VALID FOR VERSION WITH CONNECTOR/

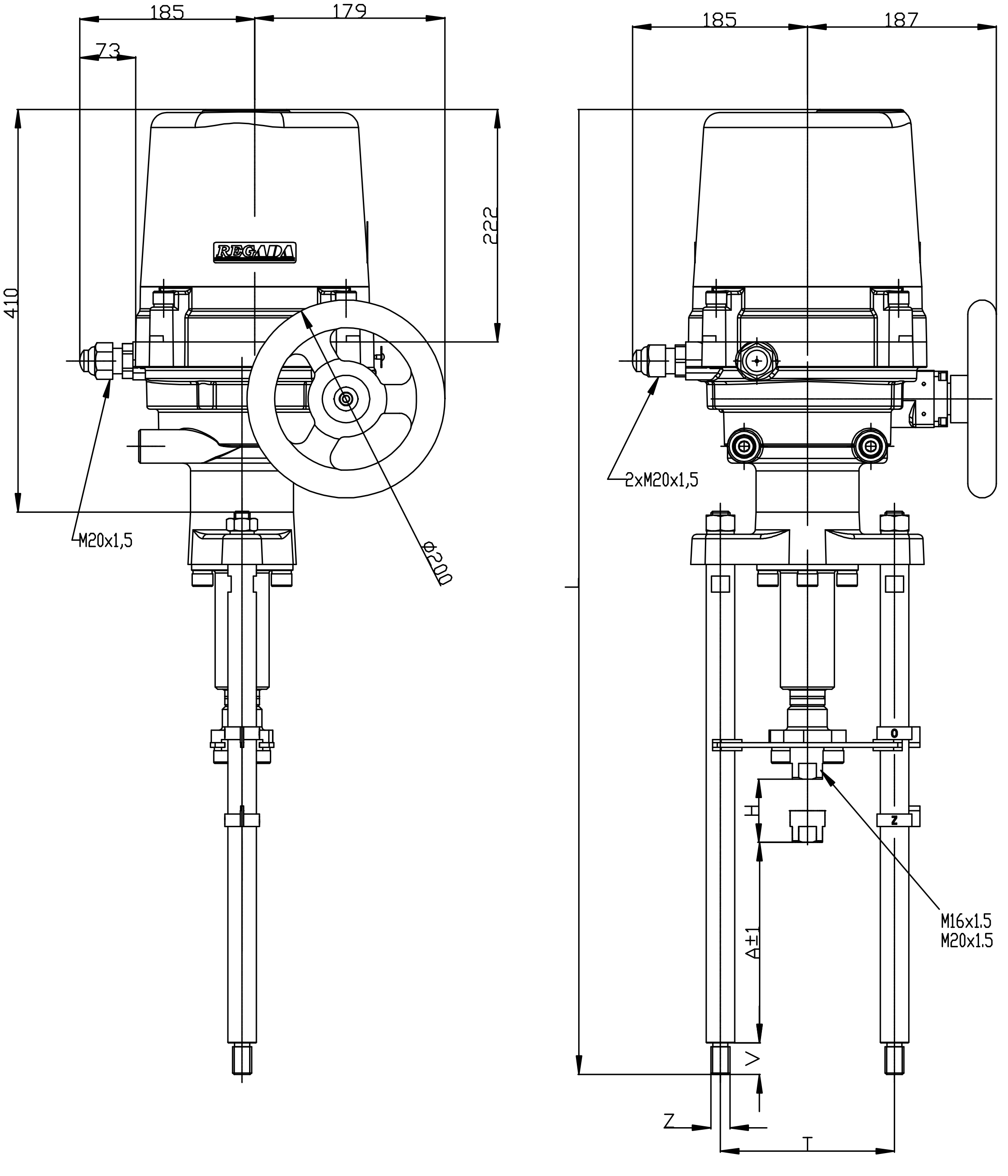
P-2055



P-2055/B	F10	125	70	102	M10	30	55	M20x1.5	60
P-2055/A	F07	90	55	70	M8	25	50	M15x1.5	40
VYHOTOVENIE	PRIRUBA /FLANGE/	d_1	d_2	d_3	d_4	l_2	l_4	d_8	H

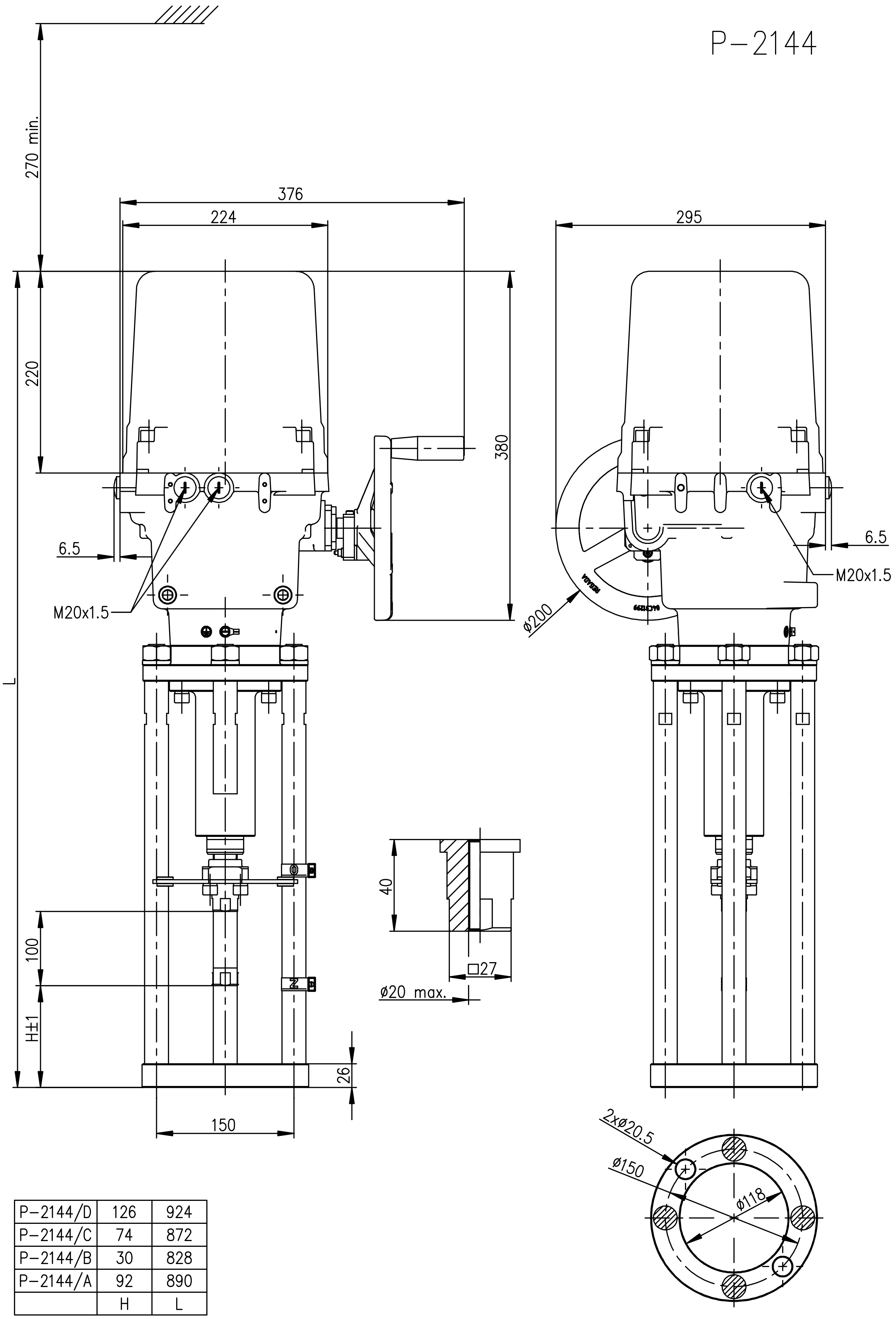
* - PLATI PRE VYHOTOVENIE S MIESTNYM OVLADANIM
/* - VALID FOR VERSION WITH CONNECTOR/

Electric linear actuators **UL 2**



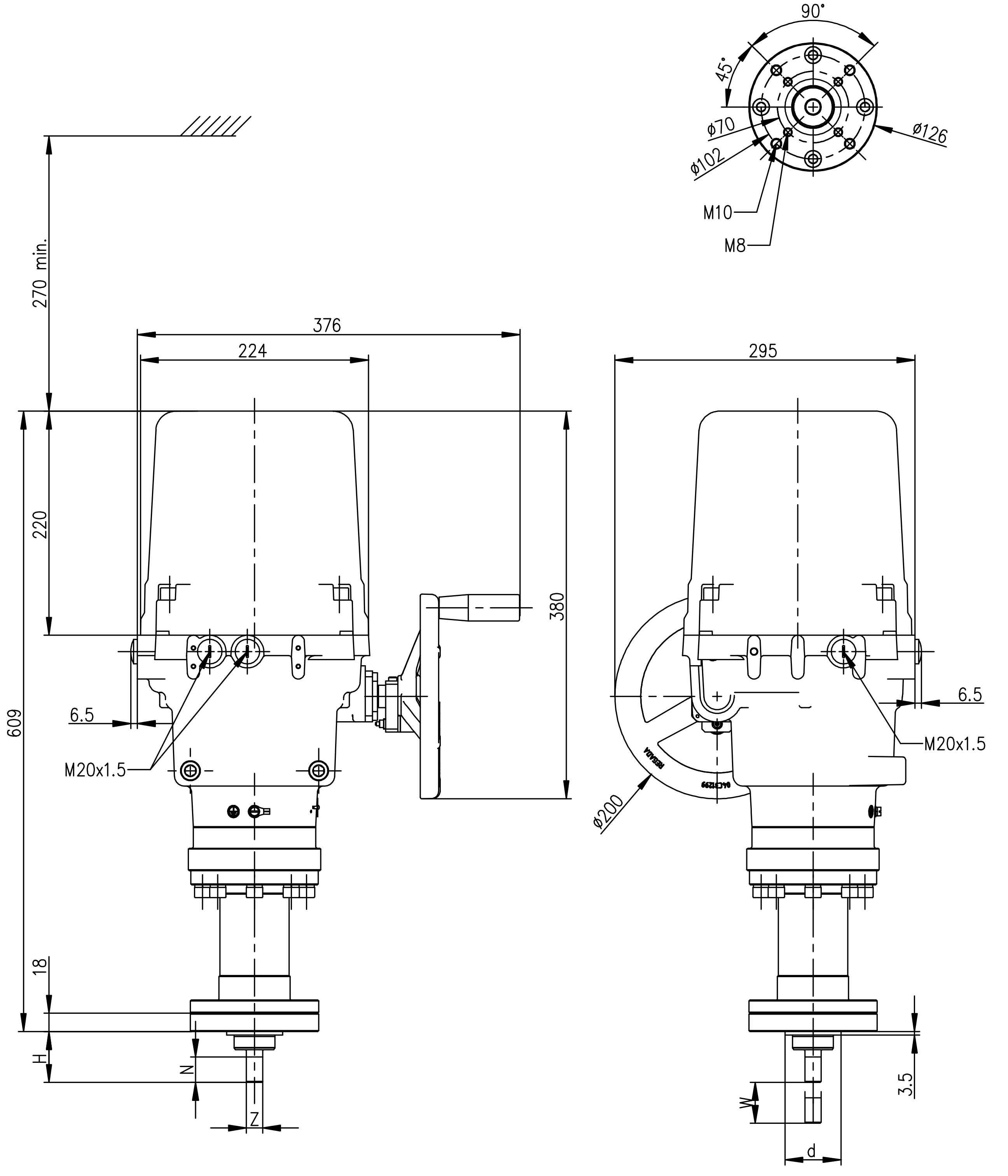
A	H	T	Z	V	L
126	MAX. 80	150	M20	25	797
74					745
30					701
92			M16	40	778

P-2144

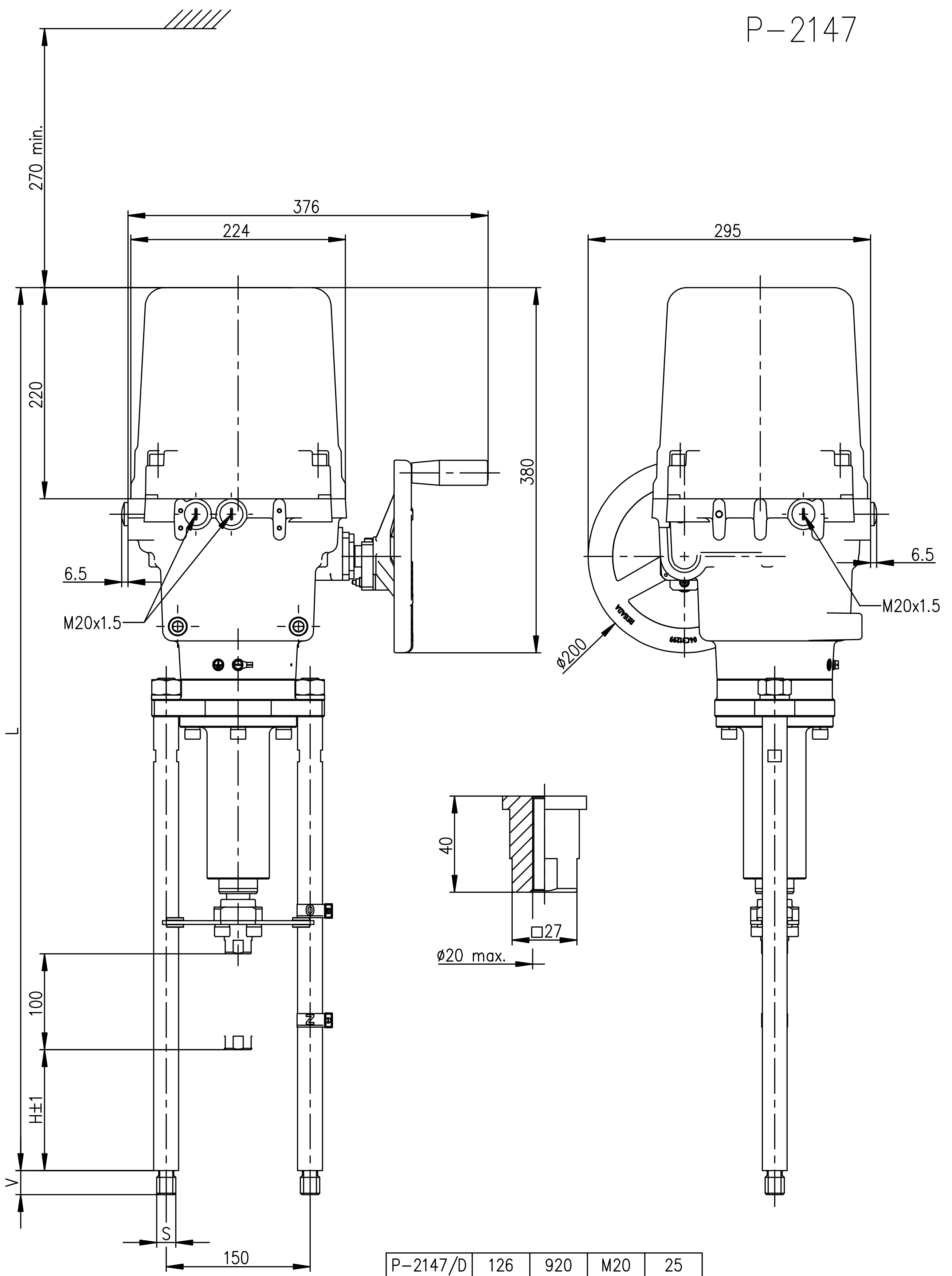


P-2144/D	126	924
P-2144/C	74	872
P-2144/B	30	828
P-2144/A	92	890
	H	L

P–2146



P–2146/B	ø70	55	30	60	M20x1.5
P–2146/A	ø55	50	25	40	M16x1.5
	d	H	N	W	Z



P-2147/D	126	920	M20	25
P-2147/C	74	868	M20	25
P-2147/B	30	824	M20	25
P-2147/A	92	886	M16	40
	H	L	S	V

7.5 Guarantee service check report

Service center:	
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:***

7.6 *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:***

7.7 Commercial representation

Slovak Republic:

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