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APPLICATION

- The controllers are used for joint controls of servomotors MODACT with motors of type J9A (16 W), J10A (25 W), J11A (50 W) by Atas elektromotory Náchod a.s.

DESCRIPTION

The controllers are designed on printed circuit boards in sliding units of the construction kit EGS, refer to Figure1. The unit has two connecting connectors, one for power circuits and the other for signal circuits. On the front cover, there are fuses and holes for access to potentiometers for adjustment.
The controllers of type 511 21 and 511 25 represent sliding units that are delivered separately.
In case of controllers 511 22 and 511 26, the sliding unit is installed into a box from steel sheet covered with a lid. Wires are brought with sealing outlets.

TECHNICAL DATA

The device is designed pursuant to ČSN EN 61010-1 as an electrical equipment of protection class I for the application in networks with category of overvoltage in installation II and pollution grade 2. The device has internal and external protective terminals, which are mutually interconnected. The inner source for power supply of the feedback circuit corresponds to the Article 6.3 of the standard and complies with the SELV and PELV circuits. The sliding unit is only designed for building-in.
The controllers have a fuse of mains power supply; the controller in box also has an external current protection. Before removing or sliding in the sliding unit, mains power supply shall be switched off.

Electric strength:

Power circuits:	2200 V AC
Signal circuits:	3700 V AC
Input circuit for control signal against / feedback input:	500 V AC (type No. 511 25, 26)
Power input -without motor	max. 20 VA
-for motor 50 W	approx. 330 VA
-for motor 25 W	approx. 230 VA
-for motor 16 W	approx. 150 VA
Electric insulation resistance:	min. 20 MΩ

Power supply:

Type of supply mains:	1 / N / PE AC 230 V, 50 Hz
Tolerance of supply voltage:	±10 %
Tolerance of mains frequency:	48 to 62 Hz
Coefficient of upper harmonics:	max. 10%

Heating period after switching of feeding: 10 minutes

Ingress protection: pursuant to ČSN EN 60529:
- sliding units: IP 00
- in box: IP 54.
- independent sliding units shall be located within Ingress Protection IP 54

Operation position: - discretionary,
- for the controllers in box, outlets to be situated downwards

Type of operation: continuous

Weights of controllers:
- Sliding unit: approx. 1.6 kg
- In box: approx. 5 kg

Applied materials:

Frame sliding units	galvanic coating
Box	from steel sheet and painted with grey varnish

The product contains precious metals (relay contacts).
Input and output terminals of the controllers in box are of a screw type.

OPERATION CONDITIONS

The device is designed for the environment defined by a group of parameters and their severity grades IE 33/IE 36 pursuant to ČSN EN 60721-3-3, but the level of vibrations only to amplitude 0.15 mm and the following operation conditions.

Ambient temperature: -20 to 55 °C
Relative ambient humidity:
5 to 85 % with upper level of water content 25 g H_2O/ m^3 of dry air
Atmospheric pressure: 70 to 106 kPa
Vibrations:
- Frequency range [Hz] 10 to 150
- Drift amplitude [mm] 0.15
- Acceleration amplitude [$m.s^{-2}$] 19.6

METROLOGICAL DATA

Input control signal - input resistor:

0 to 10 V	60 kΩ
0 to 20 mA	approx. 40 Ω
4 to 20 mA	approx. 50 Ω

As for the type No. 511 25 and 511 26, the input resistor for the control signal has galvanic separation from the input circuit for the feedback signal. These types have a fixed range for input signals:
4 to 20 mA input resistor approx. 50 Ω

Amplification of input signal: continually adjustable in ratio 1 : 4

Proportional band of input signal:
max. 1 % at biggest amplification

Dead band of input signal:
max. ± 0.2 % at biggest amplification within the whole range of operation conditions

Feedback signal - input resistor:

0 to 10 mA	approx. 40 Ω for types 511 21 and 511 22
4 to 20 mA	approx. 50 Ω for types 511 21 and 511 22
4 to 20 mA	approx. 50 Ω for types 511 25 and 511 26

Output voltage for servomotor:
0 to min. 209 V at supply voltage AC 230 V
In case of a change of the supply voltage, the change of the output voltage is proportional.

Carrying capacity of signalling contact:
of all types: 30 VA, max. 48 V

ELECTROMAGNETIC COMPATIBILITY (EMC)

Limit values of interfering voltage:
pursuant to ČSN EN 55011: class A, group 1
Electrostatic discharges:
pursuant to ČSN EN 61000-4-2: level 3, functional criterion 1
External electromagnetic field:
pursuant to ČSN EN 61000-4-3: level 1, functional criterion 2
Fast transient phenomena:
pursuant to ČSN EN 61000-4-4: level 2, functional criterion 2
Surge impulse:
pursuant to ČSN EN 61000-4-5: level 2, functional criterion 2
Magnetic fields of mains frequency:
pursuant to ČSN EN 61000-4-8: level 5, functional criterion 1

DESIGNATION

Data on the controller:

- Trade mark of the manufacturer
- Made in Czech Republic
- Product number
- Manufacturing number
- Type of supply mains
- IP grade
- CE mark

DELIVERY

Unless agreed otherwise with the customer, each delivery includes

- Delivery note
- Products pursuant to the purchase order
- The controllers are delivered with interconnecting tips for the selection of ranges, feedback and monitoring of interruption of signals pursuant to the table of designs
- Two connector sockets are delivered with the sliding unit
- Accompanying technical documentation in Czech in the following scope:
  - Product quality and completeness certificate (it declares compliance with Technical conditions and also serves as the warranty certificate)
  - Installation, operation and maintenance manual
  - Delivery note

If it is established in the purchase contract or agreed otherwise, the following documentation can be also delivered with the product

- EC Compliance Certificate
- Other documents

RELIABILITY

The informative value of mean time between failures is 90,000 hours. The mean service life is 10 years.

PACKING

The device and accessories are packed pursuant to controlled packing regulations identified by the technological procedure for the applicable product.

The devices are delivered in a packing ensuring resistance to the impact of thermal effects pursuant to ČSN EN 60654-1 and mechanical effects pursuant to ČSN IEC 654-3.

TRANSPORT

The devices may be transported on conditions corresponding to the set of combinations of classes IE 21 pursuant to ČSN EN 60721-3-2.

STORAGE

The devices may be stored on conditions corresponding to the set of combinations of classes IE 11 pursuant to ČSN EN 60721-3-1.

The devices may be stored at ambient temperature from 0 to 35°C with relative air humidity 75% with max. content of 22g H2O/m3 of dry air. Air may not contain other substances causing corrosion. The storage life is max. 12 months. After this period, control piece tests shall be performed.

ORDERING

The purchase order shall specify

- Name
- Product ordering number
- Number of pieces

TABLE OF DESIGNS

SPECIFICATION		ORDERING NUMBER		
		511	xxx	001
With current feedback	sliding unit		210	
	in box		220	
With galvanic separation	sliding unit		250	
	in box		260	

PURCHASE ORDER EXAMPLE

- Servomotor controller
- 511 210 001
- 5 pcs

INSTALLATION AND CONNECTION

Dimensional drawings are specified in Figures 1 and 2.

The sliding units themselves are slid in the tanks EGS. They are connected with connectors.

The controllers in box are connected onto a wall by four screws pursuant to the dimensional drawing. They are connected by means of the terminal board.

To enable the installation, it is possible to place inserts behind the controllers of line 511 02, 511 07, 511 09 pursuant to the drawing in Figure 2. The set of 2 inserts, 4 screws, 4 nuts and 4 washers is delivered with the ordering number 405 035 464 015.

Connection schemes of controllers are specified in Figure 4. Cu wires with insulation resistance min. 20 MΩ are used for the connection of input signals. These wires may not be placed together with power supply wires. To connect the devices to the power supply mains, insulated copper wires dimensioned pursuant to ČSN 33 2000-4-43 shall be used.

The installation at the device shall include a switch or a circuit breaker enabling to disconnect the device from the power supply mains.

After the connection, all outlets shall be sealed with a suitable sealing material, e.g. Colorplast.

COMMISSIONING

The servomotor is expected to be adjusted in the manufacturing plant.

The required range of the input control and feedback signal is selected pursuant to Figure 4.

Adjusting controllers 511 21, 511 22, 511 25 and 511 26:

The controller is switched over to manual control and the maximum proportional band is adjusted with potentiometer P. Milliammeter shall be connected serially to terminal L (6) of the servomotor (plus on wire to the controller). The servomotor shall be switched over to zero position and current shall be zero in this position. Otherwise it is necessary to adjust the induction transmitter at the servomotor mechanically in order to achieve zero current. Then readjust the servomotor to the other limit position, in which current shall correspond to the end of the range. Possible small deviations in this position can be corrected with a potentiometer located in the induction transmitter. The servomotor shall be readjusted to the position, in which current measured by the milliammeter equals to one half of the range of the feedback signal. Bring 50 % signal, for which the controller is adjusted, to the control input of the controller. The controller shall be switched over to automatic control. The servomotor shall settle in 50 % position.

In case of a change of the input signal, the position is changed. If the servomotor rotates regardless of the input signal to any extreme position, the feedback in the control loop is positive. In this case, switch off the mains and replace inlets to terminals I, G (2, 6) of the servomotor.

Note:

After the adjustment, it is possible to increase amplification in loop by potentiometer P, as required, and stability shall be considered. In case of using signal 4 to 20 mA, it is possible to use circuit for monitoring drop-out of these signals. Monitoring is selected pursuant to the table SELECTION OF RANGES OF CONTROLLERS, type 511 21 to 511 26.

DELIVERY OF CONTROLLERS FROM FACTORY

The controllers in box are delivered with pre-selected ranges:

Type	511 22	511 26
Input signal	4 to 20 mA	4 to 20 mA
Feedback	4 to 20 mA	4 to 20 mA
Signal interruption control	ON	ON

Tips A - B are not connected for all types, i.e. manual control is introduced.

SELECTION OF RANGES OF CONTROLLERS, TYPE 511 21 TO 511 26

It is realized by:

- Interconnection of tips on signal connector for 511 21 and 511 25
- Interconnection of soldering tips on interconnection bar for 511 22 and 511 26.

Type		Signal	to be connected
511 21 and 511 22	Feedback	4 to 20 mA	
	Input signal	4 to 20 mA	A21 - A23
		0 to 20 mA	A21 - A23, C23 - C25, A11 - C11
		0 to 10 V	A21 - C21, A11 - C11
	Feedback	0 to 20 mA	A25 - A27
	Input signal	4 to 20 mA	A21 - A23, C11 - C13
		0 to 20 mA	A21 - A23, C23 - C25
		0 to 10 V	A21 - C21
511 25 and 511 26	Feedback	4 to 20 mA	A21 - A23
	Input signal	4 to 20 mA	

MONITORING OF SIGNAL INTERRUPTION 4 to 20 mA:

Type	Input signal	Feedback
511 21, 511 22	C7 - C5	A5 - C5
511 25, 511 26	C7 - C5 or S2	A5 - C5 or S1

Manual control is eliminated by interconnecting tips A - B on the power board, refer to the Annex.

OPERATION AND MAINTENANCE

The device does not require any operation and maintenance.

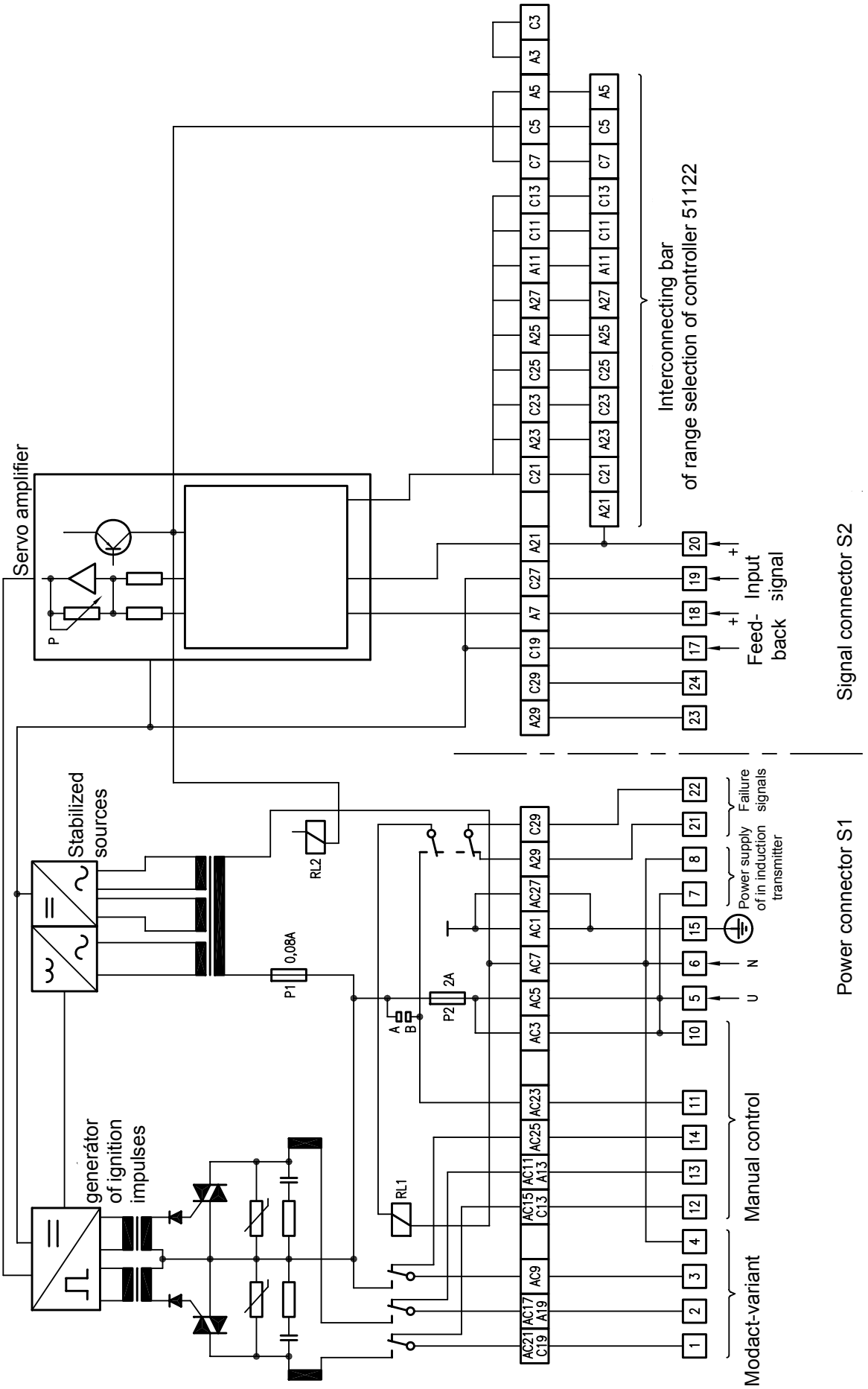
SPARE PARTS

The design of the device does not require any delivery of spare parts.

REPAIRS

The repairs shall be realized by the manufacturer. The devices shall be sent for repair in the original or equal packing without accessories.

Annex 1 **Block scheme of controllers 511 21 and 511 22 with current feedback**
Sheet 1/2



Annex 1 **Block scheme of controllers 511 25 and 511 26**
Sheet 2/2

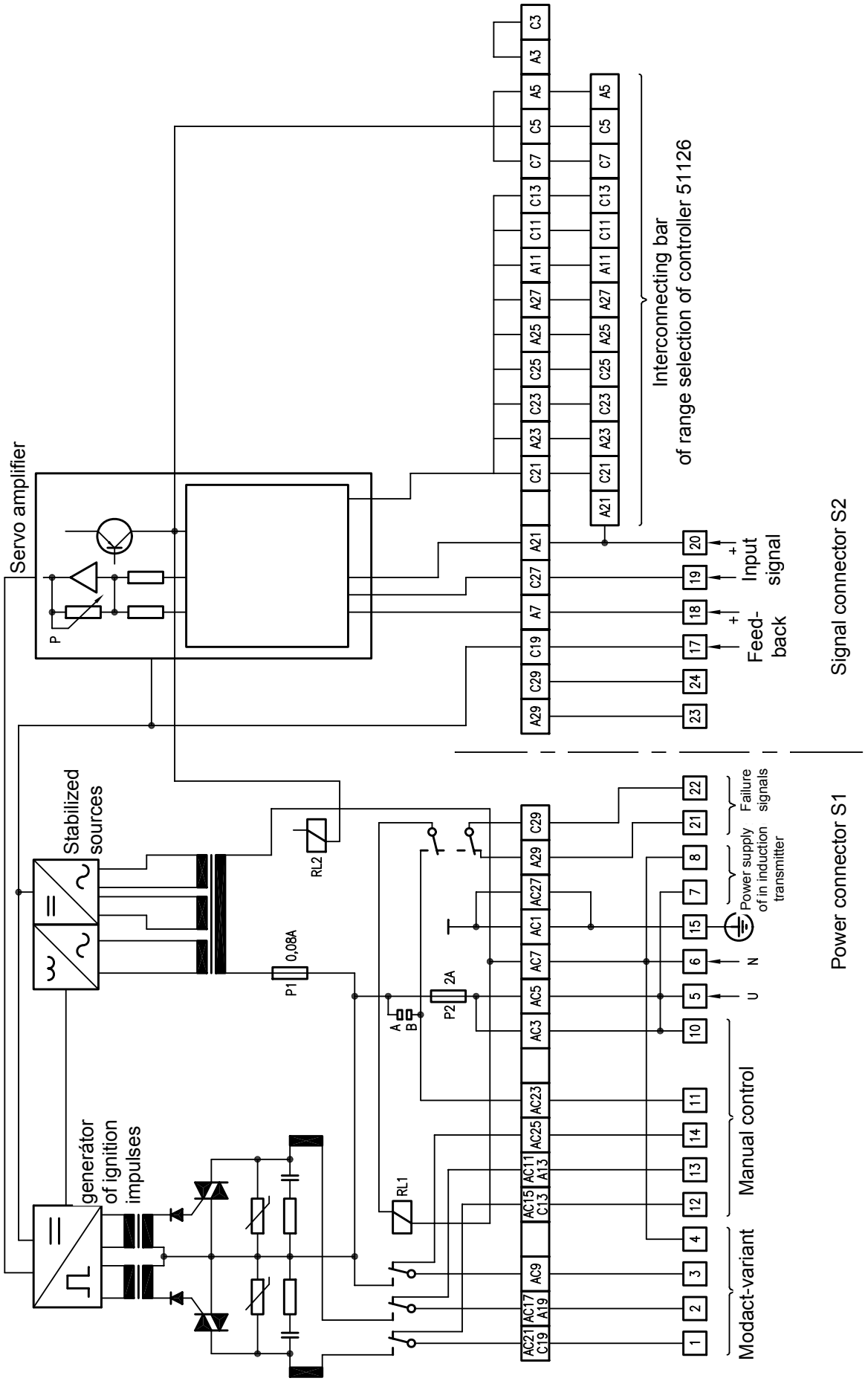
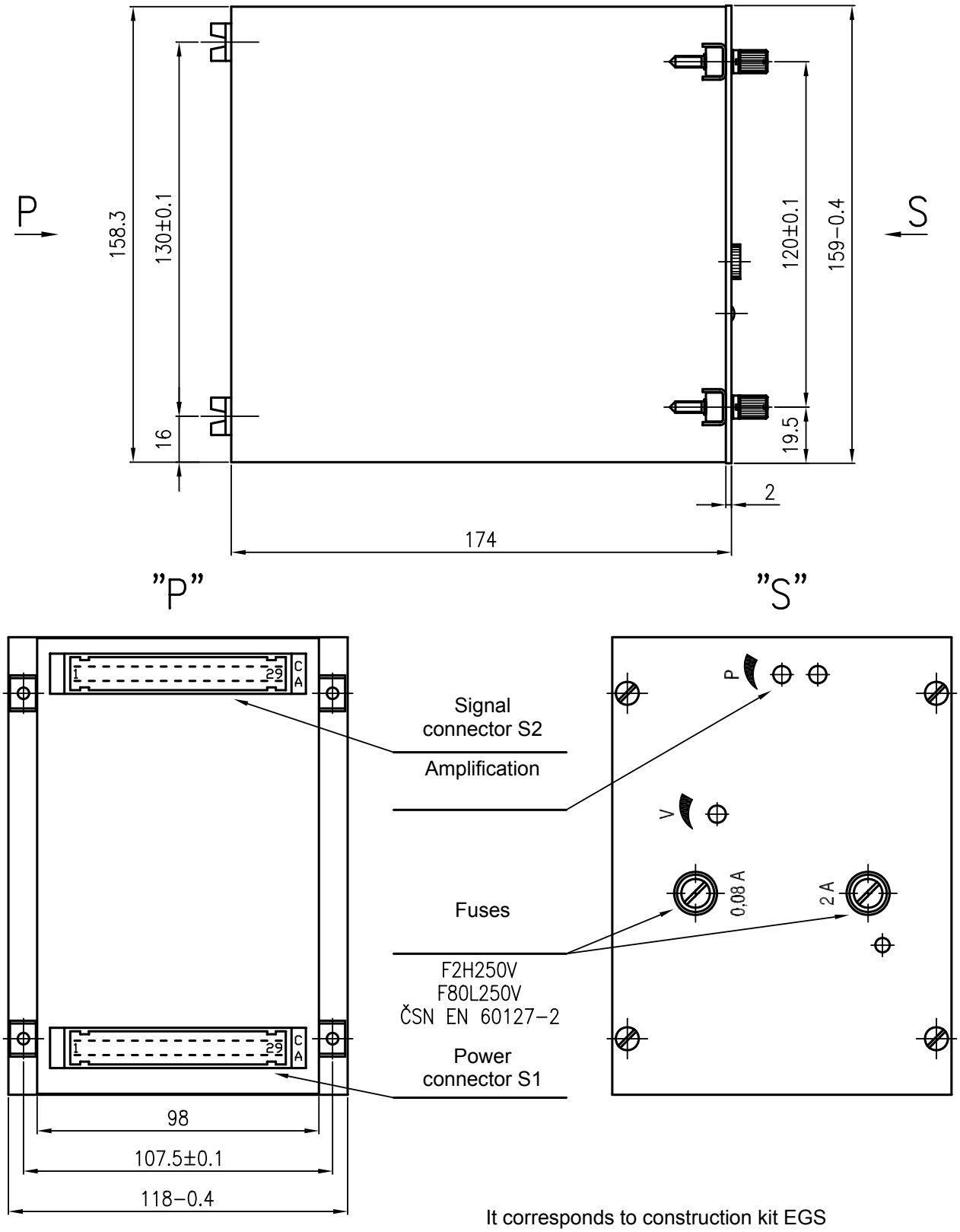


Figure 1 **Dimensional drawing of slide-in units of controllers, type 511 21 and 511 25**



It corresponds to construction kit EGS

Figure 2 Dimensional drawing of controllers in box, type 511 22 and 511 26

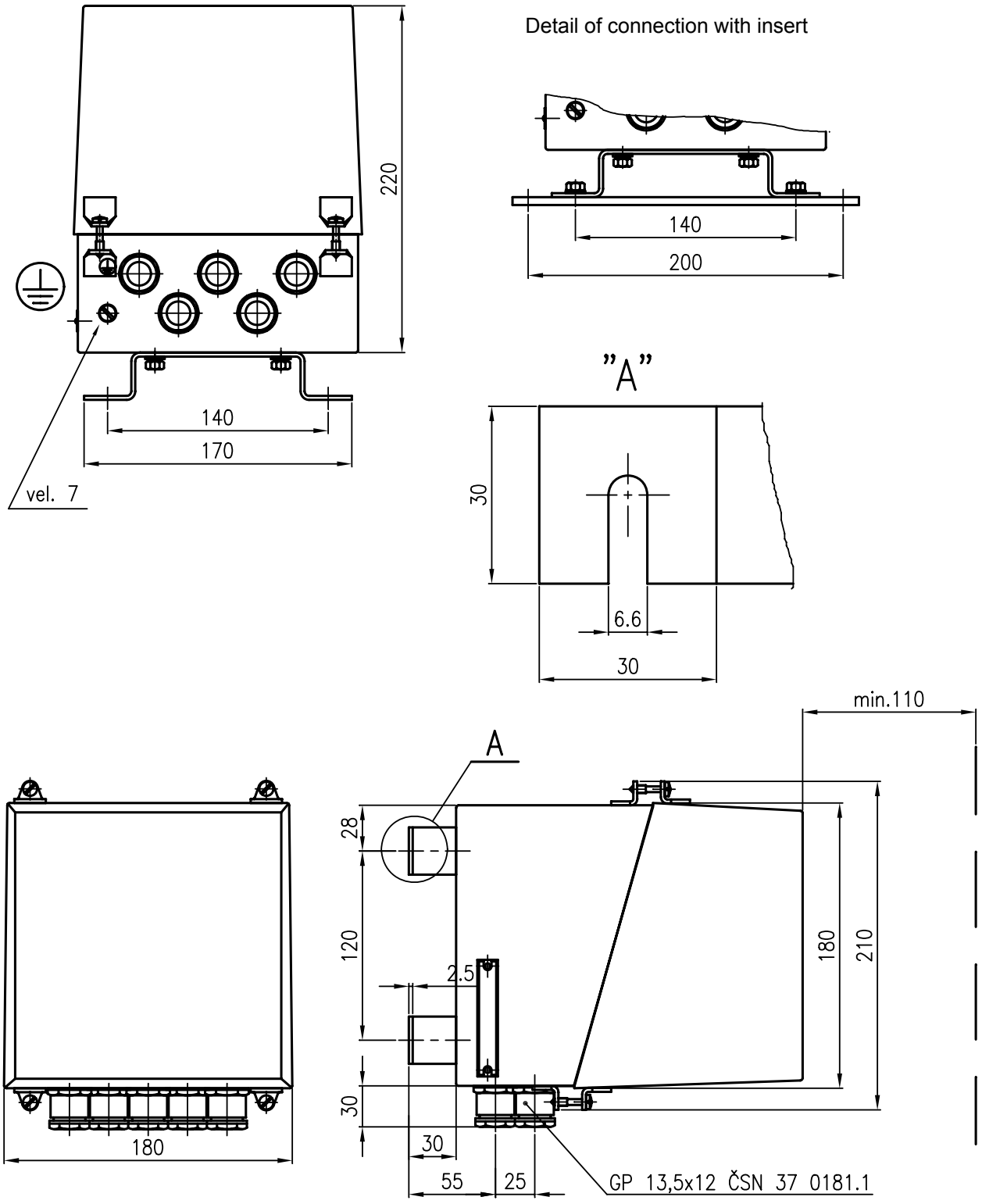


Figure 3 Connection scheme of controllers with servomotor in design "KBNS"

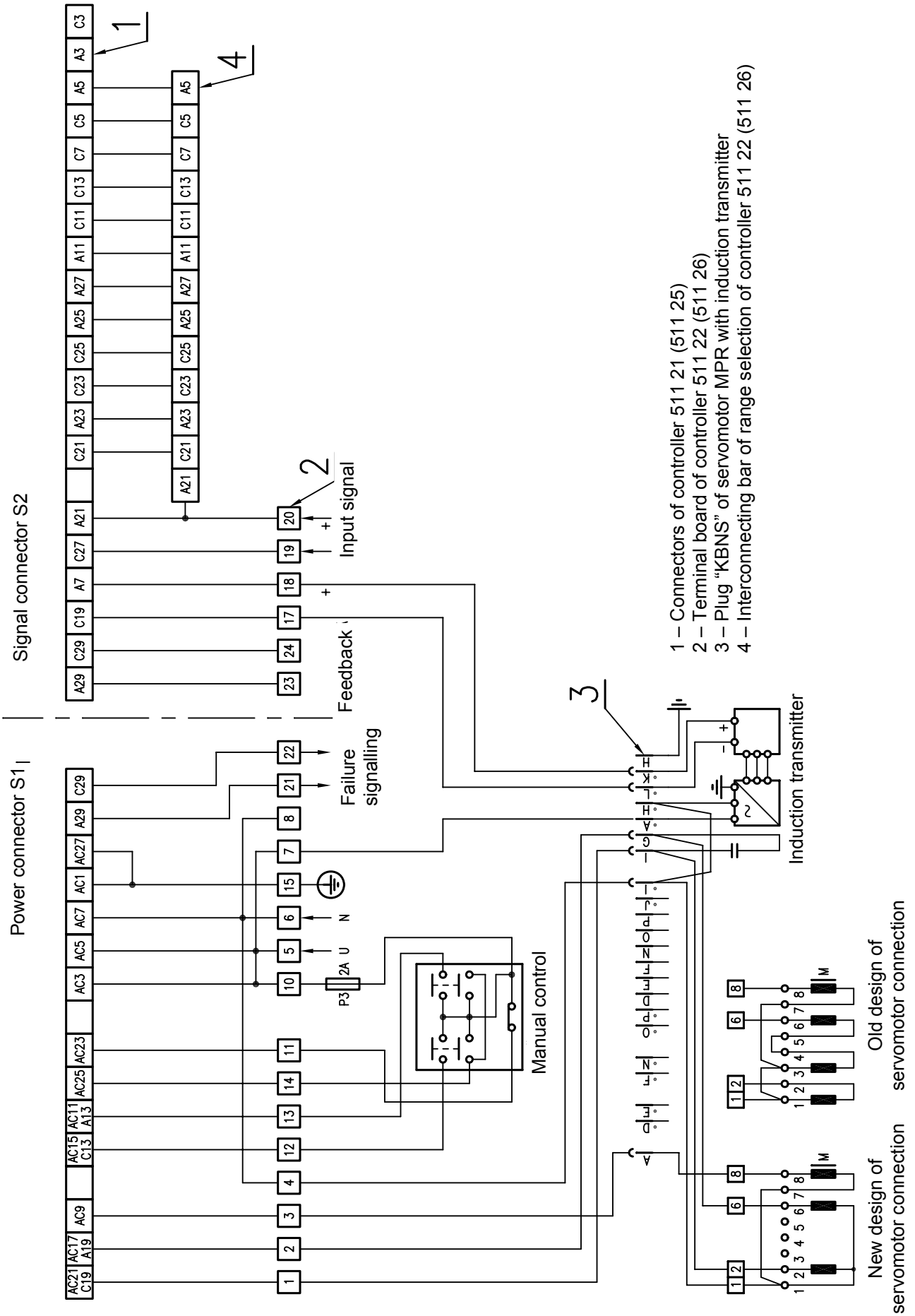


Figure 4 Connection scheme of controllers with servomotor in design "terminal board"

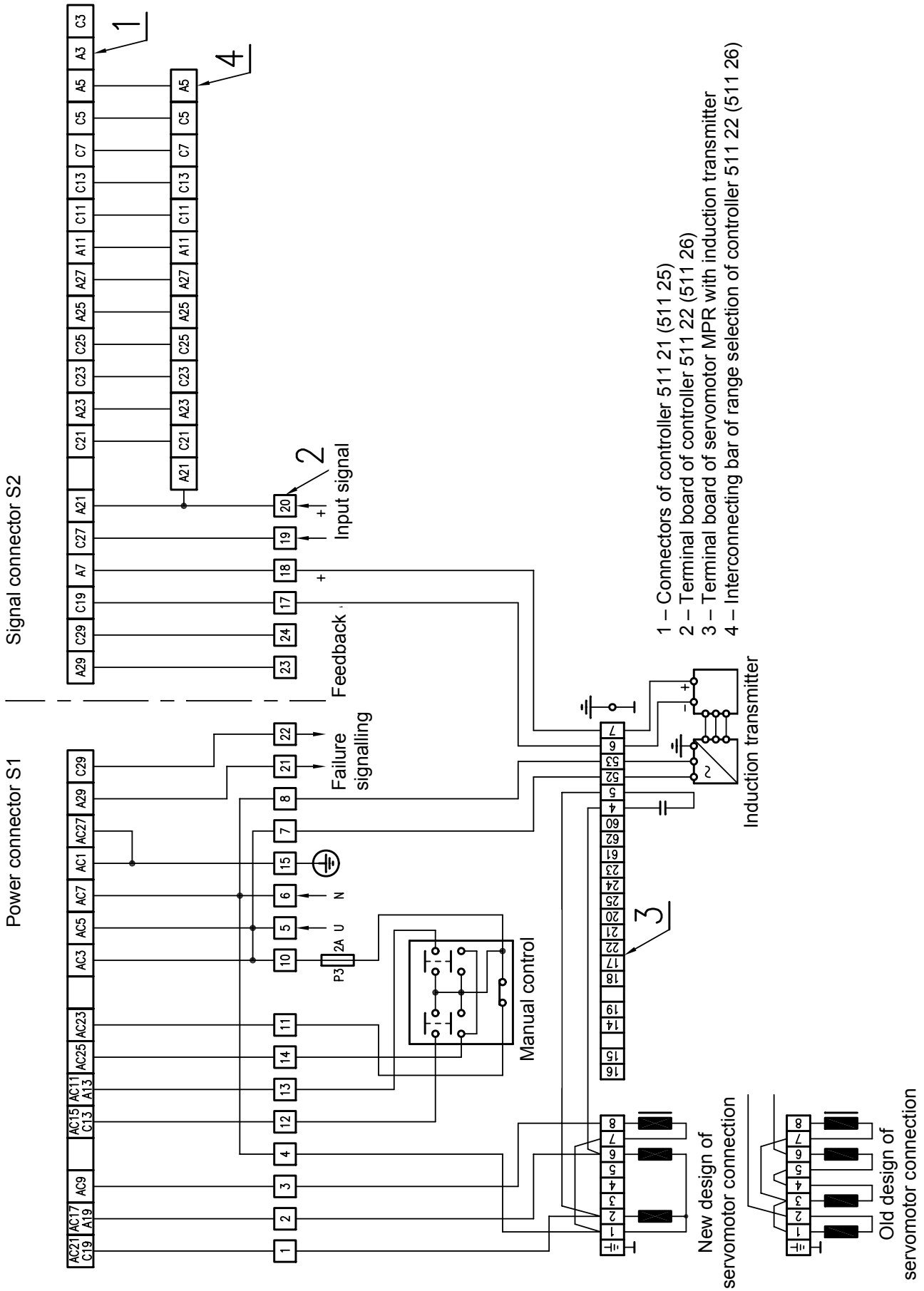
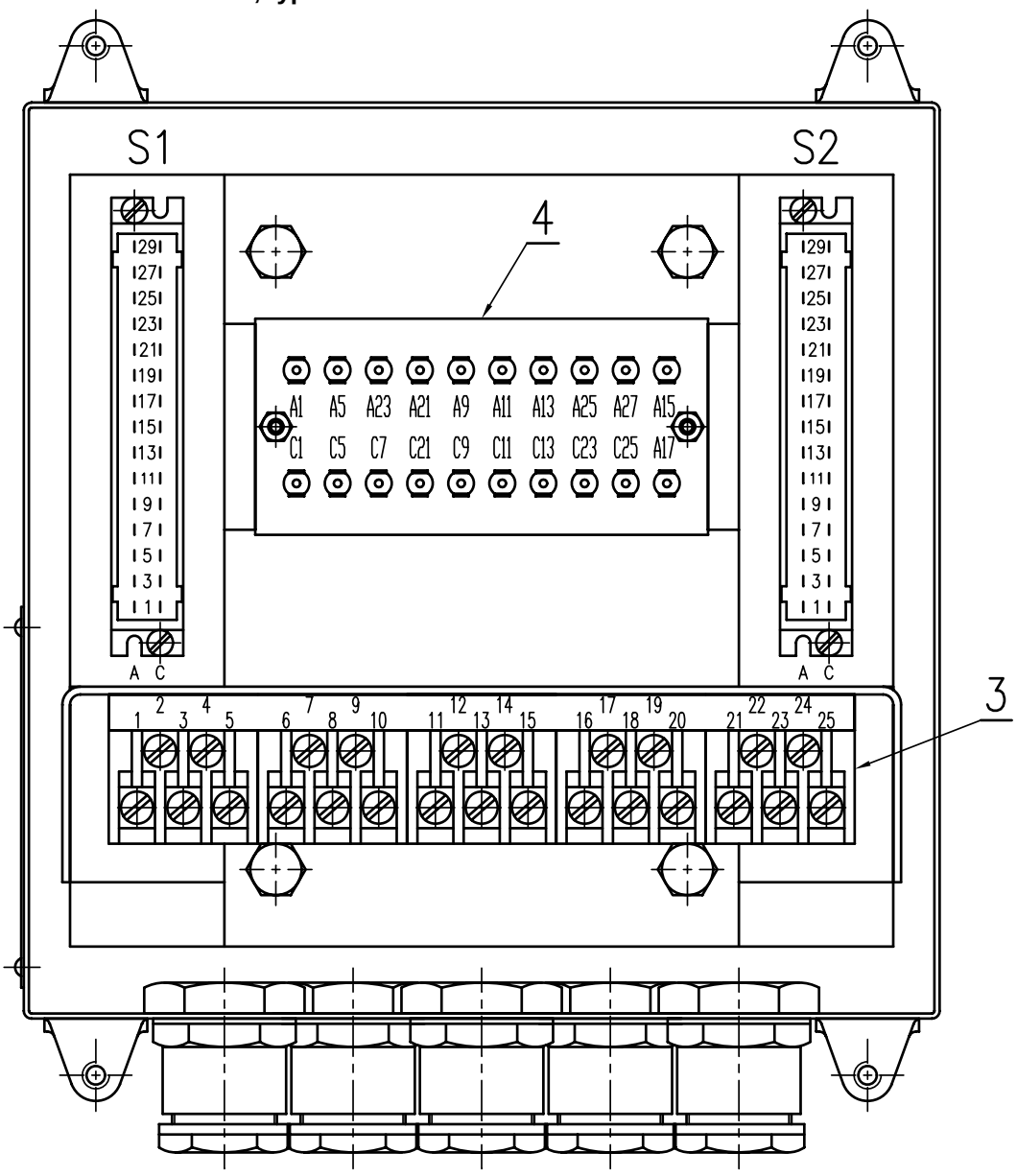


Figure 5 **Drawing of location of connectors, terminal board and interconnecting bar in box of controllers, type 511 22 and 511 26.**



S1 – Power connector
S2 – Signal connector
S3 – Terminal board
S4 – Interconnecting bar