ABS ZEiM Automation

PRODUCT CATALOGUE

ABS Electro

FACTORY WAS FOUNDED IN 1958

ABOUT US

ABS ZEiM Automation Open Joint-Stock Company (part of ABS Electro group) develops and offers turn-key production of industrial process automated control systems, manufactures a wide range of industrial automation means since 1958.

ABS ZEiM Automation OJSC has a complete set of demanded technologies and equipment for metal processing including those for aluminum alloy die casting, mechanical processing, laser cutting, chemical treatment, etc. Highly automated equipment from the world leading manufacturers allows quick launching of new products and swift reaction to the customers' needs.

ABS ZEiM Automation OJSC develops, manufactures, supplies and services the following equipment:

- electric actuators МЭО, МЭОФ, ПЭМ, МЭМ, ПЭП, МЭП, МЭПК for shutoff and regulating pipeline valves in general industrial use and explosion-proof versions including intelligent actuators and actuators for NPPs;
- electric actuator and pipeline valve (gate valves, globe valves, ball valves, butterfly valves, etc.) sets;
- bundled bus ducts ТЭНЕ, ТЗК (ТЗКР) and ШЗК;
- industrial controllers КРОСС-500;
- process control and regulation devices (ПБР, БРУ, РЗД, РП);
- measuring instruments and automation means for industrial facilities;
- low-voltage switchgears РТЗО, РУСН, etc.

All the factory products are certified and comply with the regulating documents of the Federal service for environmental, technological and nuclear supervision (license ВО-12-101-2599), of the Customs Union defining the rules of manufacturing and sales of explosion-proof electric actuators (certificates ТС RU C-RU.ГБ04.В.00048, ТС RU C-RU.ГБ04.В.00131, ТС RU C-RU.ГБ04.В.00329, ТС RU C-RU.ГБ04.В.00457). The company quality management system compliance with the ISO 9001:2008 requirements is confirmed by certificates from Russky Registr and IQNet.

Factory testing laboratory and metrological service is certified by the Federal agency for technical regulation and metrology.

The present catalogue contains only general information – a list of products manufactured by the company and description of their major specifications and engineering services offered.

To choose a product and to place an order we recommend to consider detailed descriptions given in operating manuals available at the company web-site **www.abs-zeim.ru**

CONTENT

Electric actuators are designed to drive operating units of pipeline valves within automated control systems of industrial processes according to commands from regulating and controlling devices.

Actuators are divided in the following categories according to the type of connection to a pipeline valve:
I. actuators connected by means of pull-rods and arms (МЭО);
II. actuators mounted directly on valves (МЭОФ, МЭП, МЭПК, МЭМ, ПЭМ, ПЭП).

Types of electric actuators

- МЭО constant and variable speed single-turn actuators.
- МЭОФ constant and variable speed single-turn flanged actuators.
- МЭМ constant speed multi-turn actuators.
- МЭП constant speed linear actuators.
- МЭПК crank-type linear actuators.
- ПЭМ and ПЭП constant and variable speed multi-turn drives.

Power supply

- Single-phase current 220, 230, 240 V, 50 Hz; 220 V, 60 Hz.
- Three-phase current 380, 400, 415 V, 50 Hz; 380 V, 60 Hz.

Protection from solid particles and water

- IP54 – basic rating for actuators in general industrial use version up to model index 08 (МЭО(Ф), МЭМ, МЭП, МЭПК, ПЭМ, ПЭП);
- IP65 – basic rating for explosion-proof actuators up to model index 08 (МЭО(Ф)-IIХТ4; МЭО(Ф)-IIВТ5; МЭП-IIВТ4-00, МЭПК-IIХТ4-00) (IP67 optional);
- IP65 – basic rating **for general industrial use actuators with model index 08 and above (МЭО(Ф)-08К, 09К, 10К, ПЭМ-12(11), ПЭП) (IP67(IP68) optional);**
- IP67 – basic rating for explosion-proof actuators **with model index 08 and above (МЭО(Ф)-IIХТ4-08К, 09К, 10К; ПЭМ-IIХТ4-12(11), ПЭП-IIХТ4-12(11)) (IP68 optional).**

Actuator type	Function	Valve type
МЭО, МЭОФ	Actuation of regulating and shutoff-and-regulating units of part-turn valves	Ball and plug valves, butterfly valves
МЭМ	Actuation of shutoff-and-regulating units of multi-turn valves	Shutoff-and-regulating valves
ПЭМ	Actuation of regulating and shutoff-and-regulating units of multi-turn valves	Shutoff-and-regulating gate valves and globe valves
МЭП, МЭПК, ПЭП	Actuation of regulating and shutoff-and-regulating translational movement units	Shutoff and shutoff-and-regulating valves, etc.

Noise level

Level of noise produced by electric actuators doesn't exceed 80 dBA.

Explosion-proof version

Electric actuators in explosion-proof version are designed for operation in explosive areas belonging to class 1 and 2 of premises and outdoor facilities in compliance with the explosion protection marking and requirements of ГОСТ Р МЭК 60079, the Rules of electric facilities engineering and with other documents regulating operation of electric equipment in explosive environments. Electric actuators comply with requirements of ТР ТС 012/2011 "Regarding safety of equipment designed for operation in explosive environments". Explosion-proof properties of electric actuators are provided by sealing electric components inside a flameproof enclosure and by ensuring grade "c" "constructional safety" explosion protection level of non-electric components.

Properties of flameproof enclosure:
- mechanical strength and resistivity to explosions;
- explosion-proof properties preventing explosion from infiltration to the surrounding explosive environment.

Marking of explosion-proof electric actuators:
- МЭОФ-IIВТ5 – 1ExdIIBT5;
- МЭПК-IIВТ4 – 1ExdIIBT4;
- МЭП-IIВТ4 – 1ExiadIIBT4;
- МЭО(Ф)-IIХТ4 – **1Ex d IIC T4 Gb or 1Ex d IIB T4 Gb;**
- МЭО(Ф)-IIХТ4 – 2ExdIICT4X or 1ExdIIBT4;
- ПЭМ-IIХТ4 – 1ExiadIIBT4 or 1Ex d IIB T4 Gb;
- ПЭМ-IIХТ4 – **1Ex d IIC T4 Gb or 1Ex d IIB T4 Gb;**
- ПЭП-IIХТ4 – **1Ex d IIB T4 Gb or 1Ex d IIC T4 Gb.**

Testing

All actuators are subject to thorough quality checks and to a complete cycle of tests involving modern testing and metrological equipment. Sufficiency of testing equipment, its technical level and qualification of testing laboratory and metrological service employees is confirmed by certificates from the Federal agency for technical regulation and metrology.

Corrosion protection

To improve resistance to corrosion we apply zinc and chrome plating to parts and units. Product body parts are covered with primer and painted with durable enamel.

Resistance to external factors

In compliance with ГОСТ 15150-69 conditions of electric actuators operation shall comply with climatic version as follows (according to ГОСТ 15150-69):
- **У1** or **У2** — at temperature ranging from - 40 to +60 °C (up to + 85 °C for high-temperature general industrial use versions);
- **УХЛ1** or **УХЛ2** — at ambient temperature from - 60 to + 60 °C ;
- **Т1** or **Т2** — at temperature ranging from - 10 to + 50 °C and at relative humidity of air of 100 % at + 35 °C.

Electric actuators are resistive to interference and comply with group III requirements (group IV for version for NPPs) in terms of electromagnetic compatibility providing class A of operation under ГОСТ 32137-2013 terms. Electric actuators can resist earthquake of up to 9 points on MSK-64 scale if installed at up to 70 m above zero level according to ГОСТ 30546.1-98 terms and remain functional while impacted by the said seismic activity.

Main functions

- Automatic, remote or manual opening and closing of valves, positioning of valve working unit and its stopping in any intermediate position.
- Indication of valve opening (closing) progress on a local indicator or on a digital display (LCD).
- Formation of discrete signals indicating valve working unit intermediate and end positions, formation of analog position signal.
- Formation of motor shutdown signal when valve working unit reaches either end position (Open, Close), when torque at actuator output shaft reaches a set value.
- Setting and adjustment of torque (force for linear actuators) within a wide range.
- Torque protection from overload and jamming of valve movable parts (actuators equipped with torque limiters).
- Local and remote valve control (actuators equipped with КИМ1, КИМ2, КИМ3).

Special features

- Actuators maintain the aforementioned specifications even in case of power supply voltage deviation within the range **from -15 to +10% of the rated values**;
- Regulation mode — **up to 1500 starts per hour with duty rating of 25%**;
- Actuators operation time in regulation mode – u**p to 80 000 hours** (depending on torque/force), in shutoff mode – **up to 15 000 cycles**;
- Product life cycle — **up to 30 years**;
- Operation in extreme conditions: high temperature, dust, strong vibrations;
- Reliability, simple maintenance, serviceability.

Intelligent controlling units КИМ3, КИМ2, КИМ1 are designed for control of МЭО and МЭОФ single-turn actuators, ПЭМ multi-turn actuators, ПЭП linear actuators, МЭПК crank-type actuators and feature extended functionality.

1.1. ELECTRIC ACTUATORS EQUIPPED WITH КИМ INTELLIGENT UNITS

1.1.1. Intelligent controlling units

» КИМ3

Controlling unit offering extended functionality for actuators with model index 08, 09, 10, 11 and 12

Technical features

- Mounted on actuator or on a wall.
- Local control panel with a digital display (graphical and symbol), light indicators of actuator state, control and adjustment buttons (open, close), mode selector (local, remote).
- Actuator adjustment and control on site doesn't require enclosure opening.
- КИМ3 body and front panel can be rotated according to actuator position.
- Contactless reversing thyristor starter.
- Current and voltage control.
- Absolute contactless digital sensor of position and torque.
- USB interface for setup using PC (Configurator application).
- Two RS-485 channels (Modbus RTU) and Profibus DP providing redundancy of controller link.
- ZigBee – wireless interface for setup and diagnostics of КИМ3 using a ПН-3 console if actuator installed in hard-to-reach locations.
- Bluetooth – wireless interface for connection to a handheld Android-based device or a PC using original software.
- Terminal block compartment for power supply and control cables connection.
- Local control panel allowing control mode locking.
- Two built-in galvanically isolated non-stabilized power sources providing =24 V, 150 mA for external circuits supply.
- Autonomous power supply battery for indication of current position in case of main power supply disruption. External =24V backup power source connection available.
- Events log (extended format featuring graphs).
- Functioning at control signal loss.
- RPM control.

» КИМ2

Controlling unit for actuators with model index 08, 09, 10, 11 and 12

Technical features

- Mounted directly on actuator.
- Operation in harsh conditions (temperature up to + 85 °C, strong vibrations).
- Local control panel with digital display, LED indicators of actuator state, control and OPEN/CLOSE buttons, mode switch (Remote/Stop/Local).
- Local control panel can be rotated depending on actuator position.
- Allows setup and control without enclosure opening:
  - using local control panel;
  - over Bluetooth channel using original software and an Android-based handheld device or PC (range – up to 10 m);
  - over PC service interface (using Configurator application) or using ПН1 setting console.
- Settings storing in non-volatile memory.
- Built-in stabilized power source =24V, 50 Hz for external circuits power supply.
- Contactless (thyristor) reversing starter.
- Absolute contactless digital position and torque sensor.
- Events log (full running hours, number of starts, number of torque exceeding, etc.).

» КИМ1

Controlling unit for actuators with model index up to 08

Technical features

- Mounted on actuator.
- Local control panel with digital display, actuator state indicators, control and adjustment buttons (open, close) and mode switch (local, remote).
- Actuator adjustment and control on site requires no enclosure opening.
- Wireless interface for setup using ПН-2 console.
- Built-in power source for supply of external discrete circuits (in explosion-proof versions).
- Cable connection with quickly-detachable connectors.
- Contactless (thyristor) reversing starter.
- Absolute contactless position sensor.

Single-turn electric actuators МЭО with arm and КИМ intelligent controlling unit are available in general industrial use and explosion-proof versions with the following model index: 08, 09, 10 – with КИМ3 and КИМ2; 00, 01, 02, 07 – with КИМ1. **Climatic versions:** У1, У2, УХЛ1, УХЛ2, Т1, Т2.
Protection rating: in general industrial use version – up to IP67, in explosion-proof version – up to IP68.

1.1.2. МЭО single-turn actuators with arm

» General industrial use version

MODEL INDEX **08 and above**		Output shaft nominal torque (maximum shutdown torque) Nm	Output shaft full travel nominal time s	Output shaft nominal full travel rev.	Voltage (and frequency)	Overall dimensions, up to mm	Weight, up to kg	Controlling unit
	**МЭО-250**	250 (380)	10; 25	0,25 (90°); 0,63 (225°)	380, 400, 415 V (50 Hz)	630x490x380	78	**КИМ2**
	МЭО-630	630 (950)	25; 63; 160				83	
	МЭО-1000	1000 (1500)	10; 25; 63; 160			635x540x380	84	
	МЭО-1600	1600 (2400)	25; 63; 160				83	
	МЭО-2000	2000 (3000)				695x620x380	106	
	МЭО-2500	2500 (3750)	63; 160				103	
	МЭО-4000	4000 (6000)						

MODEL INDEX **up to 08**

	**МЭО-16**	16	10; 25; 63; 160	0,25 (90°); 0,63 (225°)	220 V (50 Hz); 380, 400, 415 V (50 Hz)	205x185x245	9	**КИМ1**
	МЭО-40	40 (68)	10; 25; 63; 160				10	
	МЭО-100	100	10; 25; 63			205x185x280	11	
	**МЭО-100**	100 (170)	10; 25; 63		380, 400, 415 V (50 Hz)	315x300x370	29	
	МЭО-250	250 (425)	25; 63; 160					

» Explosion-proof version

MODEL INDEX **08 and above**		Output shaft nominal torque (Maximum shutdown torque) Nm	Output shaft full travel nominal time s	Output shaft nominal full travel rev.	Voltage (and frequency)	Overall dimensions, up to mm	Weight, up to kg	Controlling unit
	**МЭО-250-IIXT4**	250 (380)	10; 25	0,25 (90°); 0,63 (225°)	220 V; 380, 400, 415 V (50 Hz)	490x655x450	85	**КИМ3**
	МЭО-630-IIXT4	630 (950)	10; 25; 63; 160				90	
	МЭО-1000-IIXT4	1000 (1500)	10; 25; 63			540x665x450		
	МЭО-1600-IIXT4	1600 (2400)	25; 63; 160					
	МЭО-2000-IIXT4	2000 (3000)	25; 63			610x725x450	112	
	МЭО-2500-IIXT4	2500 (3750)	63; 160					
	МЭО-4000-IIXT4	4000 (6000)	63; 160					
	**МЭО-250-IIXT4**	250 (380)	10; 25	0,25 (90°); 0,63 (225°)	380, 400, 415 V (50 Hz)	625x380x550	77	**КИМ2**
	МЭО-630-IIXT4	630 (950)	10; 25; 63; 160				85	
	МЭО-1000-IIXT4	1000 (1500)	10; 25; 63			635x380x600		
	МЭО-1600-IIXT4	1600 (2400)	25; 63; 160					
	МЭО-2000-IIXT4	2000 (3000)	25; 63			695x380x675	105	
	МЭО-2500-IIXT4	2500 (3750)	63; 160					
	МЭО-4000-IIXT4	4000 (6000)	63; 160					

MODEL INDEX **up to 08**

	**МЭО-10-IIXT4**	10	6; 8; 10; 15; 20; 25	0,25 (90°); 0,63 (225°)	220 V, 380, 400, 415 V (50 Hz)	375x376x387	19	**КИМ1**
	МЭО-16-IIXT4	16					20	
	МЭО-32-IIXT4	32	15; 37				19	
	МЭО-40-IIXT4	40	6; 8; 10; 15; 20; 25; 50; 63				20	
	**МЭО-100-IIXT4**	100	6; 8; 10; 15; 20; 25; 50; 63; 160			395x376x387	41	
	МЭО-250-IIXT4	250	8; 10; 20; 25; 63; 160				41	
	**МЭО-630-IIXT4**	630	25; 63; 160			540x425x429	54	

МЭОФ single-turn flanged electric actuators with КИМ intelligent controlling unit are available in general industrial use and explosion-proof versions with the following model index: 08, 09, 10 – with КИМ3 and КИМ2; 00, 01, 02, 07 – with КИМ1. **Climatic version:** У1, У2, УХЛ1, УХЛ2, Т1, Т2. **Protection rating:** in general industrial use version – up to IP67, in explosion-proof version – up to IP68.

1.1.3. МЭОФ single-turn flanged actuators

» General industrial use version

MODEL INDEX **08 and above**	Output shaft nominal torque (Maximum shutdown torque) Nm	Output shaft full travel nominal time s	Output shaft nominal full travel rev.	Voltage (and frequency)	Overall dimensions, up to mm	Weight, up to kg	Controlling unit
МЭОФ-100	100 (150)	10; 25; 63; 160	0,25 (90°); 0,63 (225°)	220 V, 380, 400, 415 V (50 Hz)	475x410x475	51	КИМ3
МЭОФ-250	250 (380)						
МЭОФ-400	400 (600)	25; 63; 160			500x410x475		
МЭОФ-320	320 (480)	10; 25			525x410x475	52	
МЭОФ-630	630 (950)	25; 63; 160					
МЭОФ-1000	1000 (1500)	10; 25; 63			440x620x450	88	
МЭОФ-1600	1600 (2400)	25; 63; 160					
МЭОФ-2000	2000 (3000)	25; 63				110	
МЭОФ-2500	2500 (3750)	63; 160			440x660x450		
МЭОФ-4000	4000 (6000)						
МЭОФ-100	100 (150)	10; 25; 63; 160	0,25 (90°); 0,63 (225°)	220 V, 380, 400, 415 V (50 Hz)	490x385x410	47	КИМ2
МЭОФ-250	250 (380)				520x385x410		
МЭОФ-400	400 (600)	25; 63; 160					
МЭОФ-320	320 (480)	10; 25			540x385x450	48	
МЭОФ-630	630 (950)	25; 63; 160					
МЭОФ-1000	1000 (1500)	10; 25; 63		380, 400, 415 V (50 Hz)	440x340x590	84	
МЭОФ-1600	1600 (2400)	25; 63; 160					
МЭОФ-2000	2000 (3000)	25; 63				106	
МЭОФ-2500	2500 (3750)	63; 160			440x340x625		
МЭОФ-4000	4000 (6000)						

MODEL INDEX **up to 08**

МЭОФ-16	16	10; 25; 63; 160	0,25 (90°); 0,63 (225°)	220 V (50 Hz); 380 V (50 Hz)	200x185x250	9	КИМ1
МЭОФ-40	40 (68)					10	
МЭОФ-100	100	25; 63; 160		380, 400, 415 V (50 Hz)	200x185x280	11	
МЭОФ-100	100 (170)	10; 25; 63			315x300x450	29	
МЭОФ-250	250 (425)	25; 63; 160					

» Explosion-proof version

MODEL INDEX **08 and above**	Output shaft nominal torque (Maximum shutdown torque) Nm	Output shaft full travel nominal time s	Output shaft nominal full travel rev.	Voltage (and frequency)	Overall dimensions, up to mm	Weight, up to kg	Controlling unit
МЭОФ-100-IIXT4	100 (150)	10; 25; 63; 160	0,25 (90°); 0,63 (225°)	220 V, 380, 400, 415 V (50 Hz)	510x475x410	55	КИМ3
МЭОФ-250-IIXT4	250 (380)	10; 25; 63; 160			530x475x410	63	
МЭОФ-400-IIXT4	400 (600)	25; 63; 160			550x475x410	60	
МЭОФ-320-IIXT4	320 (480)	10; 25			440x340x625	65	
МЭОФ-630-IIXT4	630 (950)	25; 63; 160					
МЭОФ-1000-IIXT4	1000 (1500)	10; 25; 63			440x450x590	90	
МЭОФ-1600-IIXT4	1600 (2400)	25; 63; 160					
МЭОФ-2000-IIXT4	2000 (3000)	25; 63			440x450x625	112	
МЭОФ-2500-IIXT4	2500 (3750)	63; 160					
МЭОФ-4000-IIXT4	4000 (6000)	63; 160					
МЭОФ-100-IIXT4	100 (150)	10; 25; 63; 160	0,25 (90°); 0,63 (225°)	220 V, 380, 400, 415 V (50 Hz)	490x385x410	45	КИМ2
МЭОФ-250-IIXT4	250 (380)	10; 25; 63; 160			540x385x410	53	
МЭОФ-400-IIXT4	400 (600)	25; 63; 160			560x385x410	50	
МЭОФ-320-IIXT4	320 (480)	10; 25			560x385x450	55	
МЭОФ-630-IIXT4	630 (950)	25; 63; 160					
МЭОФ-1000-IIXT4	1000 (1500)	10; 25; 63		380, 400, 415 V (50 Hz)	600x385x500	85	
МЭОФ-1600-IIXT4	1600 (2400)	25; 63; 160					
МЭОФ-2000-IIXT4	2000 (3000)	25; 63			640x385x500	105	
МЭОФ-2500-IIXT4	2500 (3750)	63; 160					
МЭОФ-4000-IIXT4	4000 (6000)	63; 160					

MODEL INDEX **up to 08**

МЭОФ-10-IIXT4	10	6; 8; 10; 15; 20; 25	0,25 (90°); 0,63 (225°)	220 V, 380, 400, 415 V (50 Hz)	395x376x387	19	КИМ1
МЭОФ-16-IIXT4	16					20	
МЭОФ-32-IIXT4	32	15; 37				19	
МЭОФ-40-IIXT4	40	6; 8; 10; 15; 20; 25; 50; 63				20	
МЭОФ-100-IIXT4	100	6; 8; 10; 15; 20; 25; 50; 63; 160			395x376x387	41	
МЭОФ-250-IIXT4	250	8; 10; 20; 25; 63; 160					
МЭОФ-630-IIXT4	630	25; 63; 160			540x425x429	49	

ПЭМ multi-turn electric actuators and ПЭП linear electric actuators with КИМ intelligent controlling unit are available in general industrial use and explosion-proof versions with the following model index: 11, 12 – with КИМ3 and КИМ2. **Climatic version:** У1, У2, УХЛ1, УХЛ2, Т1, Т2. **Protection rating:** in general industrial use – up to IP67, in explosion-proof version – up to IP68.

1.1.4. ПЭМ multi-turn actuators

» General industrial use

MODEL INDEX **11 and above**

	Range of output shaft torque adjustment, Nm	Start torque, at least, Nm	Output shaft rotation speed, rpm.	Number of output shaft turns (min – max), rev.	Voltage (and frequency)	Overall dimensions, up to, mm	Weight, up to, kg	Controlling unit
ПЭМ-А100	40-100	130	7; 12; 22; 48; 96	0,5-1000 (0,5-40000 – optional)	380, 400, 415 V (50 Hz or 60 Hz) (220 V - optional)	790x460x255 (IP54) 780x460x275 (IP67)	47	КИМ3
ПЭМ-Б250	100-250	325	6; 12; 24; 48; 96			895x470x320 (IP54) 810x470x320 (IP67)	57	
ПЭМ-В630	250-630	820	25; 50			640x630x595 (IP54, IP67)	120	
ПЭМ-В1000	500-1000	1300	25; 50					
ПЭМ-В1500	900-1500	1950	25					
ПЭМ-А100	40-100	130	7; 12; 22; 48; 96	0,5 – 1000 (0,5 – 40000 – optional)	380, 400, 415 V (50 Hz or 60 Hz)	770x400x270 (IP54) 800x400x270 (IP67)	42	КИМ2
ПЭМ-Б250	100-250	325	6; 12; 24; 48; 96			890x400x320 (IP54) 840x400x320 (IP67)	52	
ПЭМ-В630	250-630	820	25; 50			655x630x670 (IP54) 655x630x595 (IP67)	115	
ПЭМ-В1000	500-1000	1300	25; 50					
ПЭМ-В1500	900-1500	1950	25					

» Explosion-proof version

MODEL INDEX **11 and above**

	Range of output shaft torque adjustment, Nm	Start torque, at least, Nm	Output shaft rotation speed, rpm.	Number of output shaft turns, rev.	Voltage (and frequency)	Overall dimensions, up to, mm	Weight, up to, kg	Controlling unit
ПЭМ-А100-IIXT4	40-100	130	7; 12; 22; 48; 96	0,5-1000 (0,5-40000 – optional)	380, 400, 415 V (50 Hz or 60 Hz) (220 V – optional)	780x465x275	49	КИМ3
ПЭМ-Б250-IIXT4	100-250	325	6; 12; 24; 48; 96			810x470x320	57	
ПЭМ-В630-IIXT4	250-630	820	25; 50			640x630x595	120	
ПЭМ-В1000-IIXT4	500-1000	1300	25; 50					
ПЭМ-В1500-IIXT4	900-1500	1950	25					
ПЭМ-А100-IIXT4	40-100	130	7; 12; 22; 48; 96	0,5-1000 (0,5-40000 – optional)	380, 400, 415 V (50 Hz or 60 Hz)	750x400x375	44	КИМ2
ПЭМ-Б250-IIXT4	100-250	325	6; 12; 24; 48; 96			790x400x320	52	
ПЭМ-В630-IIXT4	250-630	820	25; 50			615x630x595	115	
ПЭМ-В1000-IIXT4	500-1000	1300	25; 50					
ПЭМ-В1500-IIXT4	900-1500	1950	25					

Application of **КИМ intelligent units** allows to improve reliability and safety of automated control system and to extend functionality of actuator and valve state control.

1.1.5. ПЭП linear actuators

» General industrial use version

MODEL INDEX **11 and above**

	Nominal force at stem, N	Range of force adjustment at stem, N	Stem full travel nominal time, s	Output stem nominal full travel, mm	Voltage (and frequency)	Overall dimensions, up to, mm	Weight, up to, kg	Controlling unit
 **ПЭП-А10000 (25000)**	10000; 25000	10000-25000	50; 86; 100; 170; 290	50; 100; 170	220, 380, 400, 415 V (50 Hz)	790x460x720	55	**КИМ3**
 **ПЭП-А10000 (25000)**	10000; 25000	10000-25000	50; 86; 100; 170; 290	50; 100; 170	220, 380, 400, 415 V (50 Hz)	790x485x720	50	**КИМ2**

» Explosion-proof version

MODEL INDEX **11 and above**

	Nominal force at stem, N	Range of force adjustment at stem, N	Stem full travel nominal time, s	Output stem nominal full travel, mm	Voltage (and frequency)	Overall dimensions, up to, mm	Weight, up to, kg	Controlling unit
 **ПЭП-А10000 (25000)**	10000; 25000	10000-25000	50; 86; 100; 170; 290	50; 100; 170	220, 380, 400, 415 V (50 Hz)	790x376x720	55	**КИМ3**
 **ПЭП-А10000 (25000)**	10000; 25000	10000-25000	50; 86; 100; 170; 290	50; 100; 170	220, 380, 400, 415 V (50 Hz)	750x400x720	50	**КИМ2**

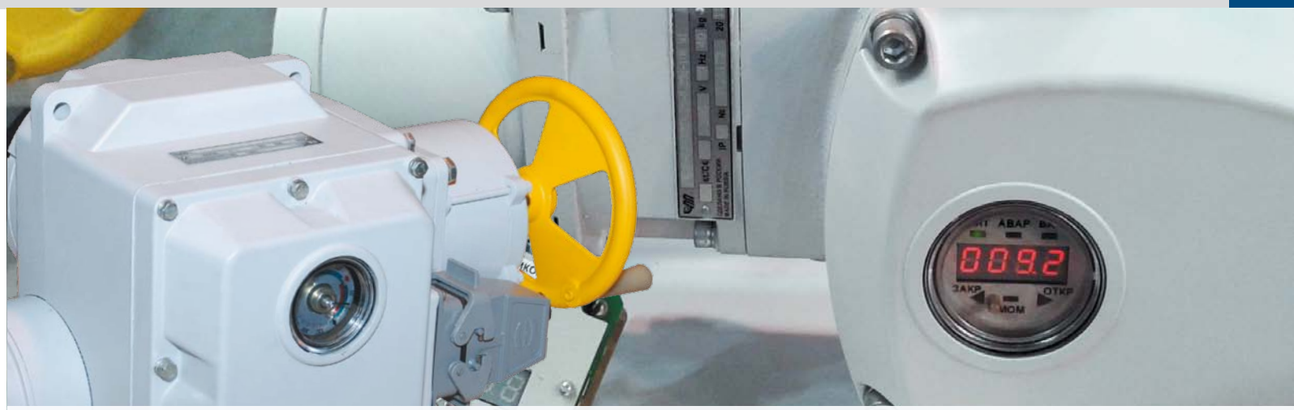
1.1.6. МЭПК crank-type linear actuators

МЭПК crank-type linear actuators with КИМ intelligent unit are available in explosion-proof version with the following model index: 00, 01, 02, 03 – with КИМ1. **Climatic version:** У1, У2, УХЛ1, УХЛ2, Т2. **Protection rating:** in explosion-proof version – up to IP67.

» Explosion-proof version

MODEL INDEX **up to 08**

	Nominal force at stem, N	Stem full travel nominal time, s	Stem nominal full travel, mm	Voltage (and frequency)	Overall dimensions, up to, mm	Weight, up to, kg	Controlling unit
 **МЭПК-6300**	6300	50	30; 40; 60	380, 400, 415 V (50 Hz); 380 V (60 Hz)	375x716x426	23	**КИМ1**



Electric actuators can be equipped with **output shaft contact or contactless position indication units**, torque sensors (if equipped with torque limiters). For actuators with model index 08 and above **sensor units БД-2 or БСПЦ (explosion-proof version of БД-2)** offering extended functionality are applied. **Typical position indication devices applied in** electric actuators with model index up to 08 are: БКВ, БСПМ – limit switches units; БСПТ, БСПР, БСПИ – position indication units. Actuators with model index up to 08 can be equipped with **digital sensor unit БД-1**.

1.2. ELECTRIC ACTUATORS WITH DIGITAL SENSOR UNITS

1.2.1 Position and torque indication units

» БД-1, БД-2, БСПЦ

Digital sensor units featuring extended functionality

БД sensor unit (named БСПЦ in explosion-proof version) consists of position and torque sensors, is equipped with limit, travel and torque switches implemented by discreet preset values of position (limit and travel switches) and torque (torque switches).

Switches are based on relays that trigger at reaching a set position or torque value. These values are set by operator. These relays can also be set to provide motor overheating, malfunction, readiness signals. БД unit is set up using a PC with Configurator application, or using a PN-1 setting console, or control buttons at the front panel. БД unit is equipped with a 4-character digital display and buttons for settings input, indication of shaft position, limit and torque switches state, main power supply and backup battery state.

Technical features

- Electric actuator output shaft position transduction into a proportionate electric signal. Input signal – shaft rotation within the (0 - 360)° range for single-turn actuators and within (0 - 40000) range for multi-turn actuators. Range shall be set by operator;
- Indication of shaft position and its locking in end limit and intermediate positions; indication of current torque at output shaft and shaft locking at reaching set torque value; motor overheating alarm and protective shutdown at reaching set temperature;
- provision of information on actuator state by “dry contacts” state and unified DC signal (4 - 20), (0 - 20) or (0 - 5) mA. Output signal non-linearity – up to ± 1,5% from the measurement range;
- provision of complete information on actuator position and state over RS-485 digital interface using MODBUS protocol to a controlling device. Electric actuator equipped with БД sensor unit featuring digital interface can be operated only in combination with ПБР-ИМ-БД starter.

МЭО(Ф) arm and flanged single-turn electric actuators are available in general industrial and explosion-proof versions: models before 08 are equipped with position indication units including БД1 or with limit switches unit (some models are available with КИМ1); models 08, 09 and 10 are equipped with БД-2 (БСПЦ) sensor unit.*
Climatic version: У1, У2, УХЛ1, УХЛ2, Т1, Т2. **Protection rating:** in general industrial use version – up to IP67; in explosion-proof version – up to IP68; in version for NPPs – up to IP54.

1.2.2. МЭО single-turn electric actuators with arm

» General industrial use version

MODEL INDEX **08 and above**	Output shaft nominal torque (Maximum shutdown torque) Nm	Output shaft full travel nominal time s	Output shaft nominal full travel rev.	Voltage (and frequency)	Overall dimensions, up to mm	Weight, up to kg	Position indication unit
МЭО-250	250 (380)	10; 25	0,25 (90°); 0,63 (225°)	380, 400, 415 V (50 Hz)	490x340x570	70	**БД-2**
МЭО-630	630 (950)	10; 25; 63; 160				75	
МЭО-1000	1000 (1500)					72	
МЭО-1600	1600 (2400)	25; 63; 160				75	
МЭО-2000	2000 (3000)					112	
МЭО-2500	2500 (3750)	63; 160				110	
МЭО-4000	4000 (6000)					110	

MODEL INDEX **up to 08**	Output shaft nominal torque (Maximum shutdown torque) Nm	Output shaft full travel nominal time s	Output shaft nominal full travel rev.	Voltage (and frequency)	Overall dimensions, up to mm	Weight, up to kg	Position indication unit/ Controlling unit
МЭО-6,3	6,3; 12,5; 16; 25	12,5; 25; 30; 63	0,25 (90°)	220, 230, 240 V (50 Hz); 220 V (60 Hz)	205x175x114	4	**БКВ;** БСПР; БСПТ
МЭО-40	6,3; 16; 40 (68)	8; 10; 20; 25; 50; 63; 130; 160	0,25 (90°); 0,63 (225°)	220, 230, 240 V (50 Hz); 220 V (60 Hz) 380, 400, 415 V (50 Hz); 380 V (60 Hz)	245x200x185	10	**БД-1** (БСПТ, БСПИ, БСПР, БКВ)/**КИМ1**
	100				280x200x185	11	
МЭО-250	40; 100 (170); 250 (425)	10; 25; 63; 160	0,25 (90°); 0,63 (225°)		475x315x305	29	**БД-1** (БСПТ-10АМ; БСПИ; БСПР; БКВ)/**КИМ1**
	400					37	
МЭО-630	250; 630 (1070)	10; 25; 63; 160	0,25 (90°); 0,63 (225°)	380, 400, 415 V (50 Hz); 380 V (60 Hz)	445x452x402	74	**БД-1;** БСПТ-10АМ; БСПИ; БСПР; БСПТ; БКВ/ **КИМ1**
МЭО-1600	630; 1600 (2700)	10; 25; 63; 160	0,25 (90°); 0,63 (225°)		495x515x467	135	
МЭО-4000	4000	63; 160	0,25 (90°); 0,63 (225°)		590x670x605	270	**БД-1;** БСПТ-10АМ; БСПИ; БСПР; БКВ/ **КИМ1**
МЭО-10000	10000	63; 160	0,25 (90°); 0,63 (225°)		990x850x600	580	

* More detailed information is available at www.abs-zeim.ru and in operating manuals

» Explosion-proof version

MODEL INDEX **08 and above**	Output shaft nominal torque (Maximum shutdown torque) Nm	Output shaft full travel nominal time s	Output shaft nominal full travel rev.	Voltage (and frequency)	Overall dimensions, up to mm	Weight, up to kg	Position indication unit
МЭО-250-IIXT4	250 (380)	10; 25	0,25 (90°); 0,63 (225°)	380, 400, 415 V (50 Hz)	550x625x340	77	**БСПЦ**
МЭО-630-IIXT4	630 (950)	10; 25; 63; 160			600x635x340	85	
МЭО-1000-IIXT4	1000 (1500)						
МЭО-1600-IIXT4	1600 (2400)	25; 63; 160					
МЭО-2000-IIXT4	2000 (3000)						
МЭО-2500-IIXT4	2500 (3750)	63; 160			675x695x340	115	
МЭО-4000-IIXT4	4000 (6000)						

MODEL INDEX **up to 08**	Output shaft nominal torque (Maximum shutdown torque) Nm	Output shaft full travel nominal time s	Output shaft nominal full travel rev.	Voltage (and frequency)	Overall dimensions, up to mm	Weight, up to kg	Position indication unit
МЭО-40-IIXT4	10; 16; 32; 40	10; 15; 25; 63	0,25 (90°); 0,63 (225°)	220 V (50 Hz); 380, 400, 415 V (50 Hz); 380 V (60 Hz)	410x256x305	14	**БСПР; БСПМ; БСПТ**
МЭО-250-IIXT4	100; 250	10; 25; 63; 160			575x395x305	37	
МЭО-630-IIXT4	630	63	0,25 (90°)	380, 400, 415 V (50 Hz); 380 V (60 Hz); 220 V (50 Hz)	544x472x426	50	

» Version for NPPs

	Output shaft nominal torque (Maximum shutdown torque) Nm	Output shaft full travel nominal time s	Output shaft nominal full travel rev.	Voltage (and frequency)	Overall dimensions, up to mm	Weight, up to kg	Position indication unit
МЭО-40-А	6,3; 16; 32; 40	10; 25; 63; 160	0,25 (90°); 0,63 (225°)	220, 230, 240 V (50 Hz); 220 V (60 Hz)	310x200x200	8	**БСПТ-10АА;** БСПИ; БСПР; БКВ
МЭО-250-А(М)	40; 100; 250				550x315x305	28	**БСПТ-10АА;** БСПТ; БСПИ; БСПР; БКВ
МЭО-630-КА(М)	250; 630	10; 25; 63; 160		380, 400, 415 V (50 Hz); 380 V (60 Hz)	445x452x402	80	**БСПТ-10АА;** БКВ
МЭО-1600-КА(М)	630; 1600				495x515x467	137	
МЭО-4000-КА	4000	63; 160			590x670x605	270	**БСПТ-10АА**
МЭО-10000-КА	10000	63; 160			990x850x600	580	

1.2.3. МЭОФ single-turn flanged electric actuator

» General industrial use version

MODEL INDEX **08 and above**

		Output shaft nominal torque (Maximum shutdown torque) Nm	Output shaft full travel nominal time s	Output shaft nominal full travel rev.	Voltage (and frequency)	Overall dimensions, up to mm	Weight, up to kg	Position indication unit
	**МЭОФ-100**	100 (150)	10; 25; 63; 160	0,25 (90°); 0,63 (225°)	220 V (50 Hz); 380, 400, 415 V (50 Hz)	500x290x410	41	**БД-2**
	МЭОФ-250	250 (380)						
	МЭОФ-320	320 (480)	10; 25			520x290x450		
	МЭОФ-400	400 (600)	25; 63; 160			500x290x410		
	МЭОФ-630	630 (950)				520x290x450	43	
	**МЭОФ-1000**	1000 (1500)	10; 25; 63; 160		380, 400, 415 V (50 Hz)	620x440x340	75	
	МЭОФ-1600	1600 (2400)	25; 63; 160					
	МЭОФ-2000	2000 (3000)				600x440x340	110	
	МЭОФ-2500	2500 (3750)	63; 160					
	МЭОФ-4000	4000 (6000)						

MODEL INDEX **up to 08**

		Output shaft nominal torque (Maximum shutdown torque) Nm	Output shaft full travel nominal time s	Output shaft nominal full travel rev.	Voltage (and frequency)	Overall dimensions, up to mm	Weight, up to kg	Position indication unit/ Controlling unit
	**МЭОФ-6,3**	6,3; 12,5; 16; 25; 40	12,5; 25; 30; 63	0,25 (90°)	220, 230, 240 V (50 Hz); 220 V (60 Hz); 380 V (50 Hz)	220x160x114	4	**БСПР; БКВ; БСПТ**
	**МЭОФ-40**	6,3; 16; 20; 32; 40 (68)	8; 10; 15; 20; 25; 37; 50; 63; 130; 160	0,25 (90°); 0,63 (225°)	220, 230, 240 V (50 Hz); 220 V (60 Hz) 380, 400, 415 V (50 Hz); 380 V (60 Hz)	250x200x185	9	**БД-1;** БСПТ-10АМ; БСПР; БСПИ; БКВ/ **КИМ1**
		100				280x200x185	11	
	**МЭОФ-250**	40; 100 (170); 250 (425)	10; 25; 63; 160		220 V (50 Hz) 380, 400, 415 V (50 Hz); 380 V (60 Hz)	475x315x300	29	**БД-1;** БСПТ-10АМ; БСПР; БСПИ; БКВ/ **КИМ1**
		400					37	
	**МЭОФ-630**	320; 630 (1070); 1000 (1700)	10; 15; 25; 37; 63; 160		380, 400, 415 V (50 Hz); 380 V (60 Hz)	472x400x405	67	**БД-1;** БСПТ-10АМ; БСПР; БСПИ; БКВ/ **КИМ1**
	**МЭОФ-1600**	630; 1000; 1600 (2700); 2500	10; 15; 25; 37; 63; 160			535x450x467	124	**БД-1;** БСПТ-10АМ; БСПР; БСПИ; БКВ/ **КИМ1**
	**МЭОФ-4000**	4000	63; 160	0,25 (90°)		830x640x630	265	**БД-1;** БСПТ-10АМ; БСПР; БСПИ; БКВ/ **КИМ1**

Sensor units БД-1 and БД-2 differ from each other by the method of installation in an actuator. БД-1 sensor unit in electric actuators with model index up to 08 replaces БСПТ-10М and БСПТ-10АМ sensor units offering extended functionality.

» Explosion-proof version

MODEL INDEX **08 and above**

		Output shaft nominal torque (Maximum shutdown torque) Nm	Output shaft full travel nominal time s	Output shaft nominal full travel rev.	Voltage (and frequency)	Overall dimensions, up to mm	Weight, up to kg	Position indication unit
	**МЭОФ-100-IIXT4**	100 (150)	10; 25; 63; 160	0,25 (90°); 0,63 (225°)	220 V (50 Hz); 380, 400, 415 V (50 Hz)	540x410x385	45	**БСПЦ**
	МЭОФ-250-IIXT4	250 (380)			380, 400, 415 V (50 Hz)		53	
	МЭОФ-320-IIXT4	320 (480)	10; 25			560x450x385	55	
	МЭОФ-400-IIXT4	400 (600)	25; 63; 160			540x410x385	50	
	МЭОФ-630-IIXT4	630 (950)			220 V (50 Hz); 380, 400, 415 V (50 Hz)	560x450x385	55	
	**МЭОФ-1000-IIXT4**	1000 (1500)	10; 25; 63			575x500x340	77	
	МЭОФ-1600-IIXT4	1600 (2400)	25; 63; 160				85	
	МЭОФ-2000-IIXT4	2000 (3000)			380, 400, 415 V (50 Hz)	610x500x340	105	
	МЭОФ-2500-IIXT4	2500 (3750)	63; 160					
	МЭОФ-4000-IIXT4	4000 (6000)						

MODEL INDEX **up to 08**

		Output shaft nominal torque (Maximum shutdown torque) Nm	Output shaft full travel nominal time s	Output shaft nominal full travel rev.	Voltage (and frequency)	Overall dimensions, up to mm	Weight, up to kg	Position indication unit / controlling unit
	**МЭОФ-6,3-IIBT5**	6,3; 16; 25; 40	12,5; 25; 30; 63	0,25 (90°); 0,63 (225°)	220, 230, 240 V (50 Hz); 380, 400, 415 V (50 Hz); 380 V (60 Hz)	320x175x215	7,7	**БСПТ-12;** БСПР; БКВ
	**МЭОФ-40-IIXT4**	10; 16; 32; 40	10; 15; 25; 63		380, 400, 415 V (50 Hz); 380 V (60 Hz); 220 V (50 Hz)	410x265x305	14	**БСПТ; БСПР; БСПМ**
	**МЭОФ-250-IIXT4**	100; 250	10; 25; 63; 160			575x395x305	37	
	**МЭОФ-630-IIBT4**	630	63	0,25 (90°)		544x472x426	45	
	**МЭОФ-1000-IIBT4**	1000	10		380, 400, 415 V (50 Hz)	472x438x405	80	

» Version for NPPs

		Output shaft nominal torque (Maximum shutdown torque)	Output shaft full travel nominal time	Output shaft nominal full travel	Voltage (and frequency)	Overall dimensions, up to	Weight, up to	Position indication unit
		Nm	s	rev.		mm	kg	
	**МЭОФ-40-(К)А(М)**	16; 32; 40	10; 15; 25	0,25 (90°)	220, 230, 240 V (50 Hz); 220 V (60 Hz) 380, 400, 415 V (50 Hz); 380 V (60 Hz)	320x200x200	11	**БСПТ-10АА;** БКВ
	**МЭОФ-250-КА(М)**	100; 250	10; 25		380, 400, 415 V (50 Hz); 380 V (60 Hz)	522x315x305	32,5	**БСПТ-10АА;** БСПР; БКВ
	**МЭОФ-630-КА(М)**	320; 630; 1000	10; 15; 25; 63; 160	0,25 (90°); 0,63 (225°)	380, 400, 415 V (50 Hz)	480x402x389	69	**БСПТ-10АА**; БКВ
	**МЭОФ-1600-КА(М)**	630; 1000; 1600; 2500	10; 15; 25; 63; 160		380, 400, 415 V (50 Hz); 380 V (60 Hz)	540x490x467	128	

1.2.4. МСП position indication device

МСП-1 position indication devices are designed for transduction of multi-turn shaft rotation into a proportionate DC signal, for indication of shaft position and its locking in intermediate and limit positions, for local indication of shaft position on a digital (МСП-1М) or analog (МСП-1) indicator. **Climatic version:** У2, Т2, У3, Т3. **Protection rating:** IP54.

» General industrial use version

		Output shaft full travel	Input signal	Output signal	Voltage (and frequency)	Overall dimensions, up to	Weight, up to	Position indication unit
						mm	Kg	
	**МСП-1**	МСП-1М — 0,5 ÷ 4000 rev. МСП-1-1 — 35 rev.; МСП-1-2, МСП-1-5 — 18,8 rev. МСП-1-3, МСП-1-6 — 7,5 rev.; МСП — 0,63 rev.	Number of actuator shaft turns	DC 4-20, 0-20 mA at a load of 0,5 kOhm or 0-5 mA at a load of 2,0 kOhm	220, 230, 240 V (50 Hz); 220 V (60 Hz)	125x175x225	3,4	**БД-2**; БСПТ-10АМ; БСПИ

» Version for NPPs

		Output shaft full travel	Input signal	Output signal	Voltage (and frequency)	Overall dimensions, up to	Weight, up to	Position indication unit
						mm	Kg	
	**МСП-1А**	МСП-1А-1 — 35 rev.; МСП-1А-2 — 18,8 rev. МСП-1А-3 — 7,5 rev.	Number of actuator shaft turns	DC 4-20, 0-20 mA at a load of 0,5 kOhm or 0-5 mA at a load of 2,0 kOhm	220, 230, 240 V (50 Hz); 220 V (60 Hz)	125x175x225	3,4	**БСПТ-10АА**

Multi-turn electric actuators МЭМ, ПЭМ and linear electric actuators ПЭП, МЭП(К) are available in general industrial use, explosion-proof version and in version for NPPs: model before 08 – equipped with position indication unit or with limit switches unit; models 11, 12 – equipped with БД-2 (БСПЦ) sensor unit. **Climatic version:** У1, У2, УХЛ1, УХЛ2, Т1, Т2. **Protection rating:** in general industrial use and in explosion-proof version – up to IP68, in version for NPPs – up to IP55.

1.2.5. ПЭМ, МЭМ multi-turn electric actuators

» General industrial use version

MODEL INDEX **11 and above**

		Output shaft torque adjustment range	Start torque, at least	Output shaft rotation speed	Number of output shaft revolutions (min – max)	Voltage (and frequency)	Overall dimensions, up to	Weight, up to	Position indication unit
		Nm	Nm	rpm	rev.		mm	Kg	
	**ПЭМ-А100**	40-100	130	7; 12; 22; 48; 96	0,5-1000 (0,5-40000 – option)	380, 400, 415 V (50 or 60 Hz)	635x380x254 (IP54) 632x380x275 (IP67)	36	**БД-2**
	**ПЭМ-Б250**	100-250	325	6; 12; 24; 48; 96	0,5-1000 (0,5-40000 – option)		720x380x320 (IP54) 665x380x320 (IP67)	47	
	**ПЭМ-В630**	250-630	820	25; 50	0,5 – 1000 (0,5 – 40000 – option)		492x580x665 (IP54) 492x580x595 (IP67)	105	
	ПЭМ-В1000	500-1000	1300	25; 50			492x580x663 (IP54) 492x580x595 (IP67)		
	ПЭМ-В1500	900-1500	1950	25					

MODEL INDEX **up to 08**

		Output shaft torque adjustment range	Start torque, at least	Output shaft rotation speed	Voltage (and frequency)	Overall dimensions, up to	Weight, up to	Position indication unit / controlling unit
		Nm	Nm	rpm.		mm	kg	
	**ПЭМ-А**	25-70; 70-110	130	12; 24	380 V (50 Hz)	527x400x332	23	**БСПТ-10АМ;** БКВ/ КИМ1
	**ПЭМ-Б**	100 – 300	325	25; 50		648x410x415	46	
	**ПЭМ-В00...ПЭМ-В31**	250-630	820			580x480x685	97	**БСПТ-10АМ;** БКВ
	ПЭМ-В32...ПЭМ-В63	500-1000	1300					
	ПЭМ-В64...ПЭМ-В67	900-1500	1950				98	

		Output shaft nominal torque	Output shaft full travel nominal time	Output shaft nominal full travel	Voltage (and frequency)	Overall dimensions, up to	Weight, up to	Position indication unit
		Nm	s	rev.		mm	kg	
	**МЭМ-100**	**100**	**160; 400**	25; 63	220/380, 230/400, 240/415 V (50 Hz) and 220/380 V (60 Hz)	510x380x330	21	**БД-10АМ;** БСПР; БКВ

» Explosion-proof version

MODEL INDEX **11 and above**

		Output shaft torque adjustment range, Nm	Start torque, at least, Nm	Output shaft rotation speed, rpm	Number of output shaft revolutions (min – max), rev.	Voltage (and frequency)	Overall dimensions, up to, mm	Weight, up to, kg	Position indication unit
	**ПЭМ-А100**	40-100	130	7; 12; 22; 48; 96	0,5-1000 (0,5-40000 – option)	380, 400, 415 V (50 Hz) (220 V - option)	750x480x270	40	**БСПЦ**
	**ПЭМ-Б250**	100-250	325	6; 12; 24; 48; 96	0,5-1000 (0,5-40000 – option)		800x480x320	54	
	**ПЭМ-В630**	250-630	820	25; 50	0,5 – 1000 (0,5 – 40000 – option)		615x630x595	110	
	ПЭМ-В1000	500-1000	1300	25; 50					
	ПЭМ-В1500	900-1500	1950	25				115	

MODEL INDEX **up to 08**

		Output shaft torque adjustment range, Nm	Start torque, at least, Nm	Output shaft rotation speed, rpm.	Voltage (and frequency)	Overall dimensions, up to, mm	Weight, up to, kg	Position indication unit
	**ПЭМ(2)-А-IIВТ4**	25-70; 70-110	130	12; 24	380, 400, 415 V (50 Hz)	570x375x393	28	**БСП-IIВТ6; БКВ** + intrinsic safety barrier
	**ПЭМ(2)-Б-IIХТ4**	100 – 300	325	25; 50		830x425x415	55	**БСП-IIВТ6; БКВ** + intrinsic safety barrier

» Version for NPPs

		Output shaft nominal torque, Nm	Output shaft full travel nominal time, s	Output shaft nominal full travel, rev.	Voltage (and frequency)	Overall dimensions, up to, mm	Weight, up to, kg	Position indication unit
	**МЭМ-А**	60; 100	45; 64; 160; 400	7; 10; 25; 63	380, 415 V (50 Hz); 380 V (60 Hz)	475x415x350	21	БСПТ-10КШ; БД-10А; БСПР

1.2.6. ПЭП linear electric actuators

» General industrial use version

MODEL INDEX **11 and above**

		Nominal force at stem, N	Range of adjustment of force at stem, N	Stem full travel nominal time, s	Stem nominal full travel, mm	Voltage (and frequency)	Overall dimensions, up to, mm	Weight, up to, kg	Position indication unit
	**ПЭП-А10000 (25000)**	10000; 25000	10000-25000	50; 86; 100; 170; 290	50; 100; 170	220, 380, 400, 415 V (50 Hz)	720x380x610	44	**БД-2**

» Explosion-proof version

	**ПЭП-А10000 (25000)**	10000; 25000	10000-25000	50; 86; 100; 170; 290	50; 100; 170	220, 380, 400, 415 V (50 Hz)	790x485x720	49	**БСПЦ**

1.2.7. Linear МЭП and crank-type МЭПК electric actuators

» General industrial use version

MODEL INDEX **up to 08**

		Nominal force at stem, N	Force at stem in the medium position, N	Stem full travel nominal time, s	Stem nominal full travel, mm	Voltage (and frequency)	Overall dimensions, up to, mm	Weight, up to, kg	Position indication unit / controlling unit
	**МЭПК-800**	800	365; 440	25; 63; 125	20; 40	220, 230, 240 V (50 Hz); 220 V (60 Hz); 380 V (50 Hz)	200x230x355	5,2	БСПР-12; БКВ
	МЭПК-1600	1600	730; 940						
	МЭПК-2500	2500	1440						
	**МЭПК-6300**	6300	960	20	30		240x240x474	11	**БСПТ-10АМ;** БД-1; БСПИ; БСПР; БКВ/ **КИМ1**
			2470	50					
			2000		40				
			1250		60				
	**МЭП-18000**	18000	-	170	180	380, 400, 415 V (50 Hz); 380 V (60 Hz)	327x377x750	30	**БД-1;** БСПР; БСПТ; БКВ/ **КИМ1**
	МЭП-20000	20000		200; 240; 340	100; 240; 340	220, 230, 240 V (50 Hz); 220 V (60 Hz); 380 V (50 Hz)	325x330x940		
	МЭП-25000	25000		50; 60; 100	25; 100	380, 400, 415 V (50 Hz); 380 V (60 Hz)	327x377x750		

» Explosion-proof version

MODEL INDEX **up to 08**

		Nominal force at stem, N	Force at stem in the medium position, N	Stem full travel nominal time, s	Stem nominal full travel, mm	Voltage (and frequency)	Overall dimensions, up to, mm	Weight, up to, kg	Position indication unit
	**МЭПК-630-IIВТ4**	6300	1250; 2000; 2470	50	30; 40; 60	380, 400, 415 V (50 Hz); 380 V (60 Hz)	372x306x570	18	**БСПТ; БСПР; БСПМ**
	**МЭП-10000-IIВТ4**	10000	-	60	30		390x370x995	52	**БСПТ; БСПМ**
	МЭП-16000-IIВТ4	16000		50; 60	30; 50				
	МЭП-18000-IIВТ4	18000		170	170				
	МЭП-20000-IIВТ4	20000		200; 240	100; 120				
	МЭП-25000-IIВТ4	25000		30; 60; 100; 340	30; 50; 150; 170				

Our company offers **ready-to-use electric actuator and valve sets** and a complex of services in selection and configuration of equipment, design, installation and adjustment, testing and warranty servicing.

1.3. PIPELINE VALVES COMBINED WITH ELECTRIC ACTUATORS

1.3.1 Wedge and gate valves with electric actuators

Applicability (depends on version)	Water, steam, oils, crude oil, liquid and non-aggressive petrochemicals, non-aggressive liquids and gases (incapable of valve materials erosion), natural gas.
Valve function	Shutoff action
Means of connection to pipeline	Flange, welding
Nominal diameter, DN	50; 80; 100; 150; 200; 250; 300; 350; 400; 500; 600; 700; 800 mm
Nominal pressure, PN	0,6; 10; 16; 25; 40; 63; 80; 160; 250; 400; 600 kgs/cm^2
Operating medium temperature	up to 425 °C, up to 565 °C
Impermeability class	A, B under ГОСТ 54808-2011
Climatic version under ГОСТ 15150-69	У, ХЛ, Т

1.3.2 Butterfly valves with electric actuators

Applicability (depends on version)	Acids: sulfuric, hydrochloric, nitric, phosphoric, acetic, formic, chloracetic, lactic, lemon. Alkalis. Air. Drinking and sea water. Steam of up to +140 °C. Ethylene glycol, diathylene glycol. Ethanol, methanol. Acetone. Methyl ethyl ketone. Ethyl acetate. Dibutyl phthalate. Dioctylphtalate. Hydrogen pyroxide, Anhydrous ammonia. Formaldehyde, acetaldehyde, ethylenediamine. Water solution of chlore of up to 600 mg/l and others. Oils. Diesel fuel. Natural gas. Mediums containing solid particles of up to 1 mm (pneumatic and hydrotransportation).
Valve function	Shutoff and regulating action
Means of connection to pipeline	Flange-to-flange
Nominal diameter, DN	32; 40; 50; 80; 100; 125; 150; 200; 250; 300; 400; 500; 600; 700; 800; 900; 1000 mm
Nominal pressure, PN	10; 16 kgs/cm^2
Operating medium temperature	up to 140 °C, up to 250 °C
Impermeability class	A under ГОСТ P54808-2011
Climatic version under ГОСТ 15150-69	У, ХЛ, Т

1.3.3 Triple offset valves with electric actuators

Applicability (depends on version)	Used for shutoff purpose at pipelines transporting hot steam, light oil products, liquid and gaseous non-aggressive and aggressive mediums, including those with increased content of hydrogen sulfide and carbon dioxide at temperatures up to 425 °C.
Valve function	Shutoff action
Means of connection to pipeline	Flange, welding
Nominal diameter, DN	15; 20; 25; 32; 40; 50; 65; 80; 100; 125; 150; 200; 250; 300; 350; 400; 500; 600 mm
Nominal pressure, PN	16; 25; 40; 65; 80; 100; 160 kgs/cm^2
Operating medium temperature	up to 140 °C, up to 250 °C
Impermeability class	A under ГОСТ P54808-2011
Climatic version under ГОСТ 15150-69	У, ХЛ, УХЛ, Т

1.3.4 Ball valves with electric actuators

Applicability (depends on version)	Oil products, gas, crude oil, liquid, vapor, aggressive mediums and non-polymerizing mediums that do not cause swift erosion of applied materials.
Valve function	Shutoff, regulating shutoff-and-regulating action
Means of connection to pipeline	Flange, welding
Nominal diameter, DN	15; 20; 25; 32; 40; 50; 65; 80; 100; 125; 150; 200; 250; 300; 350; 400; 500; 600 mm
Nominal pressure, PN	16; 25; 40; 65; 80; 100; 160 kgs/cm^2
Operating medium temperature	up to 140 °C, up to 250 °C
Impermeability class	A under ГОСТ P54808-2011
Climatic version under ГОСТ 15150-69	У, ХЛ, УХЛ, Т

1.3.5 Globe valves with electric actuators

Applicability (depends on version)	Liquid and gaseous medium neutral to materials of parts contacting with it. Operating medium temperature depending on body material – up to 530 °C.
Valve function	Shutoff, regulating, shutoff-and-regulating action
Means of connection to pipeline	Flange
Nominal diameter, DN	25; 32; 40; 50; 65; 80; 100; 150; 200; 250; 300 mm
Nominal pressure, PN	16; 25; 40; 63; 160, 200 kgs/cm^2
Operating medium temperature	up to 220 °C, up to 450 °C, up to 530 °C
Impermeability class	VI under ГОСТ 12815-80 and A under ГОСТ P54808-2011 (for liquid mediums)
Climatic version under ГОСТ 15150-69	У, ХЛ, Т

1.3.6 Disc valves with electric actuators

Applicability (depends on version)	Liquid and gaseous medium neutral to materials of parts it is contacting with. Operating medium temperature depending on body material – up to 530 °C.
Valve function	Shutoff, regulating, shutoff-and-regulating action
Means of connection to pipeline	Flange, welding
Nominal diameter, DN	32; 40; 50; 65; 80; 100; 125; 150; 175; 200; 225; 250; 300; 350; 400; 450; 500; 600; 700; 800; 900; 1000 mm
Nominal pressure, PN	16; 25; 40; 64; 100; 160; 250; 400 kgs/cm^2
Operating medium temperature	up to 450 °C, up to 560 °C
Impermeability class	I, II, III, VI under ГОСТ 123860
Climatic version under ГОСТ 15150-69	У, УХЛ, ХЛ, Т

ПБР intelligent contactless reversing starters are designed for contactless control of regulating and shutoff actuators of pipeline valves within an industrial processes automated control system involving single-phase and three-phase synchronous and asynchronous electric motors. **Climatic version:** УХЛ3.1, ТВ4.1, Т3. **Protection rating:** in general industrial use version and in version for NPPs – IP20.

2.1 INTELLIGENT STARTING AND REGULATING DEVICES (STARTERS)

2.1.1 ПБР-И, ПБР-ИК contactless reversing starters

» ПБР-И, ПБР-ИК

Intelligent contactless reversing starters

ПБР-2И(К) – control of electric actuators equipped with single-phase electric motors;

ПБР-3И(К) – control of electric actuators equipped with three-phase electric motors.

ПБР-И starters – intelligent starting and regulating devices offering extended functionality for actuator electric motor control and protection. A wide range of switchgears is manufactured on the basis of ПБР-И devices. ПБР-И(К) starters are a complete replacement for ПБР-3А and ПБР-2М providing additional options and better characteristics.

Technical features

- Electric motor slowing down by reverse starting with time adjustment.
- Motor protective shutdown, formation of MALFUNCTION and READY signals, indication of malfunction with a LED indicator (power switch overcurrent, power switch currents break, etc.).
- Contactless reversing control of electric actuator by OPEN, CLOSE commands sent to starter discrete inputs.
- Actuator protection and self-diagnostics.

Additionally for ПБР-И:

- Control using analog signal (positioner) and over RS-485 digital interface (Modbus RTU protocol).
- Electric motor stopping in limit positions of valve operating unit travel upon signals from limit or torque switches.
- Transmission of information on valve operating unit position to a controlling device by discrete or analog signals or by digital signal over RS-485 interface (depending on version).
- Adjustment, control and monitoring of starter and actuator state using an external PN1 setting console or a PC with Setting console emulator or Configurator application connected via RS-232, RS-485, USB.
- Valve operating unit seating/breakaway at closing/opening by short pulses.
- Locking of actuator control upon receipt of INHIBIT command at discrete control inputs.

Configurations

Configuration	Brief description
ПБР-И (basic)	Discrete control inputs **OPEN, CLOSE, INHIBIT** and **LSO, LSC** for limit switches and **TORQUE** for torque switches (galvanically insulated) for connection of DC 24 V signals regardless of polarity. **MALFUNCTION** and **READY** discrete outputs for actuator state indication. Two built-in power sources for input-output circuits power supply.
ПБР-ИР (PID regulator)	Starter with built-in PID regulator function. In addition to the ПБР-И basic set of inputs-outputs this model has analog inputs **PARAMETER, SETTING** for regulator signals and **PS** for signal from actuator output unit position sensor. **POSITION** analog output for position indication based on **PS** signal. Operation in **OPEN-CLOSE** and **POSITIONING** modes is also available.
ПБР-ИМ (reduced)	**OPEN** and **CLOSE** discrete control inputs. Single built-in power source for supply of power circuits
ПБР-ИМ-ДТ (electric actuator control unit)	Functions in combination with electric actuators equipped with БД-10АМ sensor units. Discrete control inputs **OPEN, CLOSE, INHIBIT** and **TORQUE** input for galvanically insulated torque switches receive DC 24 V signals (regardless of polarity). Discrete outputs **LSO, LSC** for limit switches state signals, **POSITION** analog output for position indication. **LSO, LSC, POSITION** output signals are based on **PS** analog input signal from actuator position sensor. **MALFUNCTION** and **READY** starter state discrete signals. One built-in power source for supply of I/O circuits.
ПБР-ИМ-БД (electric actuator control unit)	Functions in combination with electric actuators equipped with digital sensor units БД featuring option C. Galvanically insulated discrete control inputs **OPEN, CLOSE, INHIBIT** for DC 24V signals (regardless of polarity). **LSO, LSC** discrete inputs for limit switches, **TSO, TSC** discrete inputs for torque switches, **POSITION** analog signal output for position indication. **LSO, LSC, TSO, TSC, POSITION** output signals are based on signals from actuator received via RS-485 digital interface (signals from position, torque and motor temperature sensors). **MALFUNCTION** and **READY** starter state discrete outputs. One built-in power source for I/O circuits supply. Actuator control commands formation upon pressing БД sensor unit local control buttons.
ПБР-ИК (compact size)	**OPEN, CLOSE** discrete control inputs. **MALFUNCTION** and **READY** starter state discrete outputs. One built-in power source for control circuits power supply
ПБР-ИА (for NPPs)	**OPEN, CLOSE, INHIBIT** discrete control inputs and **LSO, LSC** inputs for limits switches and **TORQUE** input for torque switches (galvanically insulated) receive DC 24 V signals (regardless of polarity). **MALFUNCTION** and **READY** starter state discrete signals. One built-in power source for supply of I/O circuits.

» General industrial use version

		Nominal current of connected electric motor, up to, A	Voltage	Mounting	Overall dimensions, up to, mm	Weight, up to, kg
	**ПБР-2И-5**	5	220, 230, 240 V (50 or 60 Hz)	Wall-mounted (screw attachment) or cabinet-mounted (on a DIN rail)	162x113x102	2
	ПБР-2И-10	10				
	ПБР-3И-9	9	380, 400, 415 V (50 or 60 Hz)			
	ПБР-3И-16	16				
	ПБР-3И-25	25				
	**ПБР-2ИК-4**	4	220, 230, 240 V (50 or 60 Hz)	Cabinet-mounted (on a DIN rail)	132x45x100	0,3
	ПБР-3ИК-4		380, 400, 415 V (50 or 60 Hz)			

» Version for NPPs

	**ПБР-2ИА-5**	5	220, 230, 240 V (50 or 60 Hz)	On a DIN rail or wall-mounted	171x113x110	2
	ПБР-2ИА-10	10				
	ПБР-3ИА-9	9	380, 400, 415 V (50 or 60 Hz)			
	ПБР-3ИА-16	16				

Safety class - 2, 3, 4 under НП-001-15

PN-1 setting console

	**PN-1**	Universal device for configuration (adjustment) of microprocessor-based devices from ABS ZEiM Automation OJSC: **ПБР-И, ПБР-ИА** starters, **БД, БСПЦ** sensor units, **КИМ1, КИМ2, КИМ3** controlling units, KPOCC-500 industrial controllers, etc. Console is connected to a device subject to configuration via a service socket marked “Console”.

2.2 STARTING AND REGULATING DEVICES (STARTERS)

2.2.1 ФЦ thee-position thyristor amplifier

ФЦ devices allow starting, reversing, braking upon input signal absence, provide protection of induction motors with short-circuited rotor from overloads, indication of power loss or inconsistency of input and output signals, allow to adjust protection settings and braking duration. **Climatic version:** УХЛ4; УХЛ3.1; О4; Т3. **Protection rating:** in general industrial version – up to IP54, in version for NPPs – up to IP44.

» General industrial use version

		Input resistance	Maximum switched current	Max. duration of braking, up to	Power supply	Overall dimensions, up to	Weight, up to
		Ohm	A	ms		mm	kg
	ФЦ-0610	(850±200)	4	200	380 V (50 or 60 Hz); 400 or 415 V (50 Hz)	117x195x302	5
	ФЦ-0611						
	ФЦ-0620			-		106x195x302	
	ФЦ-0621						

» Version for NPPs

	ФЦ-0650*	(850±200)	4	100	380 V (50 or 60 Hz); 400 or 415 V (50 Hz)	117x195x302	5

2.2.2 ПБР contactless reversing starter

ПБР devices allow contactless control of pipeline valve regulating and shutoff electric actuators employing synchronous and asynchronous electric motors. **Climatic version:** УХЛ4.2; Т3. **Protection rating:** in general industrial use version and in version for NPPs – up to IP20.

» General industrial use version

		Maximum switchable current	Switching time at instant reversing, at least	Power supply	Overall dimensions, up to	Weight, up to
		A	ms		mm	kg
	ПБР-2М	4	10	220 V (50 or 60 Hz); 230, 240 V (50 or 60 Hz)	240x90x198 – ПБР-2М; 240x90x117 – ПБР-2М2.1	2,8
	ПБР-3А	3	20	380 V (50 or 60 Hz); 400, 415 V (50 or 60 Hz)	240x90x198	2,6

» Version for NPPs

	ПБР-2МА*	4	10	220 V (50 or 60 Hz); 230, 240 V (50 or 60 Hz)	240x90x198	2,8
	ПБР-3АА*		20	380 V (50 or 60 Hz); 400, 415 V (50 or 60 Hz)		2,6

* – Not recommended for new projects. Shall be replaced with new products – ПБР-3ИА, ПБР-2ИА.

2.3 PANELS

2.3.1 РЗД manual setting device

РЗД manual setting devices allow manual setting of signals for stabilizing controllers and ratio controllers, transduction of one unified DC or voltage signal into another (РЗД-22). **Input signals** (for РЗД-22): current signal (0-5) mA, $R_{IN} \leq 500$ Ohm; current signal (0-20) mA, $R_{IN} \leq 100$ Ohm; current signal (4-20) mA, $R_{IN} \leq 100$ Ohm; voltage (0-10) V, $R_{IN} > 10$ kOhm. **Output signals:** for РЗД-12 – smooth change of division ratio of a 10 or 2,2 kOhm potentiometer depending on version for РЗД-22 – current signal (0-5) mA, $R_N \leq 2,5$ kOhm; current signal (0-20) mA, $R_N \leq 1$ kOhm; current signal (4-20) mA, $R_N \leq 1$ kOhm; voltage signal (0-10) V, $R_N > 2$ kOhm.
Consumed power: up to 4 VA. **Climatic version:** УХЛ4.2; О4.1.

		Definition	Error: task setting using indicating device scale	Error: Input signals conversion	Output signal pulsing, up to	Power supply	Overall dimensions, up to	Weight, up to
							mm	kg
	РЗД-12	0,5 % of the signal maximum value	–		–	–	40x40x141	0,2
	РЗД-22		± 2,5 % of the output signal maximum value	± 1,5 % of the output signal maximum value	0,3 % of the output signal maximum value	220 V, 240 V, 24 V (50 or 60 Hz)	80x40x207	0,7

2.3.2 БРУ-42И manual control unit

БРУ-42И manual control unit (featuring function of position setting device operating via RS-485 as option) is designed for manual and remote switching between automatic and manual control modes, indication of actuator control mode, output shaft position and torque, local control of actuator.
Position input signal: from a ПБР-И starter via RS-232 (versions: -01, -02); via RS-485 (versions: -03, -04), current signal (0-5) mA, $R_{IN} \leq 400$ Ohm; current signal (0-20) or (4-20) mA, $R_{IN} \leq 100$ Ohm. Voltage (0-10) V, $R_{IN} \geq 10$ kOhm (versions: -00, -02; -04). **Position indication:** on a 4-character 7-segment LED display with discretization of 0,1 % and on an analog dial with discretization of 4 %. **Consumed power:** up to 3 VA.
Protection rating: in general industrial use version – up to IP54. **Climatic version:** УХЛ3.1 or Т3 for operation at temperatures ranging from - 10 to + 55 °C and at relative humidity of air up to 98 % at + 35 °C and below without moisture condensation.

» General industrial use version

		Power supply	Overall dimensions, up to	Weight, up to
			mm	kg
	БРУ-42И	Via “Console” socket from ПБР-И (ver.: -01, -02) From 220V power mains, (ver.: -00; -03, -04)	(standard size of front panel is 48x96 mm under DIN43700)	0,35

2.3.3 ДУП-М remote position indicator

ДУП-М remote position indicator is designed for remote determination of position of output shaft of actuator equipped with rheostatic and inductive sensors. **Consumed power:** up to 3 ВА. **Climatic version:** УХЛ4.2, Т3 – for operation at temperatures ranging from - 10 to + 55 °C and relative humidity of air up to 80 % for УХЛ climatic version and up to 98 % for Т climatic version at t = 35 °C and below.

» General industrial use version

		Power supply	Overall dimensions, up to	Weight, up to
			mm	Kg
	ДУП-М	220 V (50 Hz), 240 V (60 Hz)	80x120x105	0,6

2.3.4 РП4-М1 regulating device

РП4-М1 regulating devices form P, PI laws of regulation in industrial processes automated control systems employing constant speed electric actuators, and PID laws of regulation using external differentiator.
Input signals: РП4-У-М1 – analog DC (0-5) mA non-scalable signal; (0-5), (0-20), (4-20) mA scalable signal; analog – DC (0-10) V; discrete – closing of external contacts; analog – signal from an external rheostatic setting unit ± 5 %. РП4-Т-М1: analog – change of resistance thermometer readings within (0-20) Ohm; analog – EMF of thermoelectric transducers within (0-5) mV; discrete – closing of external contacts 50 V, 0,03 A; analog – DC (0-10) V; analog – DC (0-5) mA; analog – external rheostatic setting device signal ± 5 %. РП4-П-М1: analog – mutual inductivity change (10-0-10) mH; AC (1-0-1) V, (0-2) V; discreet – external contacts closing 50 V; 0,03 A; analog – DC (0-10) V; analog – external rheostatic setting device ± 5%.
Output signals: discrete output: nominal voltage – (0-24) V, current – up to 0,3 A, type – non-stabilized DC; current setting device analog output: (0-5) mA DC – for РП4-У-М1; (0-50) mV DC – for РП4-Т-М1; setting signal analog output (0-50) mV – РП4-Т-М; unbalance analog output signal – (0-10) V for РП4-Т-М1; AC 12 V, sensors power supply in РП4-Т-М1.
Nominal ranges of smooth setting: constant value of integration time – from 5 to 500 s, from 20 to 2000 s; constant value of damping time – from 0 to 10 s; minimum pulse duration from 0,1 to 1 s.
Consumed power: up to 15 VA – РП4-У-М1, РП4-Т-М1; up to 25 VA – for РП4-П-М1.
Climatic version: УХЛ4.2; О4.2 – for operation at temperatures ranging from + 5 to + 50 °C and relative humidity of air up to 80 %.

» General industrial use version

		Sensor type	Sensor power supply	Version	Device power supply	Overall dimensions, up to	Weight, up to
						mm	kg
	**РП4-У-М1**	Unified DC	12 V; 0,125 A DC	No remote adjustment, with discrete adjustment, with analog adjustment	220 V (50 Hz)	80x160x526	4
	РП4-Т-М1	Thermocouple transducers ТХК, ТХА, ТПП, ТПР; resistance thermometers ТСМ, ТСП; unified DC					
	РП4-П-М1	Differentially transforming, ferrodynamic ПФ2, ПФ4, inductive; unified DC					4,6

2.4 POWER UNITS

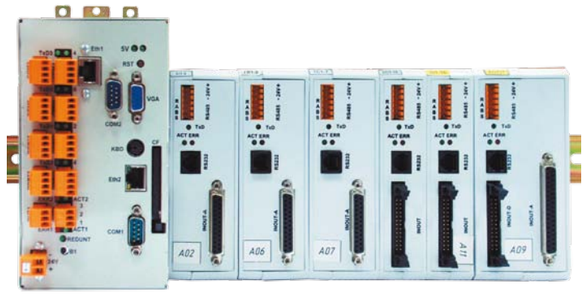
БП-24(И) power units are designed for supply of measuring transducers ИП-Т10(И), ИП-С10(И) and normalizing transducers НП-Н10, НП-Р10 (БП-24И) with non-stabilized DC transformed from single-phase AC. **БП-20АМ power units** are designed for power supply and filtration of analog input signal from БД-10АМ sensor to ensure stability of parameters in harsh electromagnetic environment. **Consumed power:** up to 11 VA – for БП-24; up to 7 VA – for БП-24И and up to 5 VA for БП-20АМ. **Protection rating:** up to IP40. **Climatic version:** УХЛ4.2, О4.2.

» General industrial use version

		Nominal output voltage	Nominal load	Maximum load	Power supply	Overall dimensions, up to	Weight, up to
		V	A	A		mm	kg
	**БП-24**	24	0,24	0,3	220 V (50 Hz); 240 V (60 Hz)	60x162x174 – cabinet-mounted; 60x162x164 – wall-mounted	1,2
	БП-24И		0,12			60x162x174 – cabinet-mounted; 60x162x172 – wall-mounted	1,1
	**БП-20АМ**		0,1	0,15	220 V (50 Hz)	72x87,5x62 – cabinet-mounted	0,25

Main purpose – **construction of highly-efficient (inexpensive and reliable) systems of various industrial facilities automation**. Facilities subject to automation – complex concentrated and distributed objects.

3.1 KPOCC-500 CONTROLLER



» KPOCC-500

Microprocessor controller

Registered in the State register of measuring instruments with the No 28849-05

Certificate of measuring instrument type approval – RU.C.34.000.A №20186/2

Certificate of compliance with Technical regulations of the Customs Union TP TC 004/2011 “Regarding safety of low-voltage equipment” and TP TC 020/2011 “Electromagnetic compatibility of equipment”

KPOCC-500 controllers are designed for measurement of analog output signals from sensors, formation of analog and discrete controlling signals, transfer and storing of process data in open-end automated control systems in various industries.

Major specifications

- Maximum number of analog (discrete) input/output signals – 7616;
- Basic reduced error – ±0,2 %; ±0,1 %;
- Galvanic isolation – 500; 1500 V.

KPOCC-500 controller features a powerful central processor unit and extended range of modules and units. All controller elements operate in parallel and autonomously: module I/Os, modules themselves controlling input/output and primary processing of data (filtering, linearization, calibration); controller features up to 8 internal busses providing data exchange between modules and CPU; CPU executing a process program. KPOCC-500 controller provides redundancy of БЦП2 central processor unit, input/output devices, field bus links.

KPOCC-500 controller components

KPOCC-500 controller can be customized for a particular project and consists of the following basic units: БЦП2 central processor unit; MK2 programmable controller; MK1 programmable controller; T-MK1 programmable microcontroller unit; basic input/output modules; configurable input/output modules (ADIO1 and AIO2) and units (T-DIO1 и T-ADIO1); terminal units; switching units БПР-10, БПР-11; PN1 setting console; power units and modules; software; flexible connectors.

Input/output modules

Input/output modules in groups of up to 30 pieces are connected with the БЦП2 central processor unit via RS-485 interface. Maximum number of modules – 238 pieces. Each module has a built-in microprocessor performing asynchronously and independently from the central processor various functions of signals processing and equipment diagnostics. Each module has own RS-232 interface for connection to a PC or setting console thus allowing module configuration and testing outside controller.

Terminal units

Terminal units connected to modules by flexible connectors allow termination of external circuits to I/O modules and MK1 microcontroller, conversion of levels, amplification of discrete signals and provide galvanic insulation of signals.

Discrete input/output: ~220 V, =220 V, ~110 V, =110 V, ~24 V, =24 V. Maximum switched current – 1 A at maximum switched voltage of ~220 V.

Controller features:

- high system-forming qualities;
- customizable configuration and wide range of I/O modules;
- extended programming options, complex firmware and supporting software;
- functionally decentralized architecture;
- remote or local (using a portable setting console) adjustment, programming, maintenance, testing of controller (using a workstation consisting of a PC and an IDE-system);
- continuous and periodic self-control and diagnostics of all the controller components, representation of controller state information to servicemen;
- wide networking capabilities;
- precise customization to a facility (zero redundancy);
- project-oriented configuration of a field controller (up to 8 field buses connected to a host controller, up to 30 field units in a single segment of field bus);
- project-oriented configuration of field unit inputs/outputs;
- standard means of programming and adjustment.

» Analog signal input/output modules

I/O module	Channels	Signals		Basic reduced error	Power consumed via 24 V circuit, W, up to
		Input	Output		
TC1-7	7 inputs	from -5 to 65 mV from thermocouples	13 bit	± 0,2 %	1,3
	1 input	(39-100) Ohm			
TR1-8	8 inputs	(39-100), (78-200) Ohm from resistance thermometers	13 bit	± 0,2 %	1,2
AI1-8	8 inputs	Analog signal: voltage (0-10) V; DC (0-5), (0-20), (4-20) mA	13 bit	± 0,2 %	0,92
AI01-8/4	8 inputs	Analog signal: voltage (0-10) V; DC (0-5), (0-20), (4-20) mA	13 bit	± 0,2 %	0,5
	4 outputs	12 bit	Analog signal: DC (0-5), (0-20), (4-20) mA		
AI01-8/0	8 inputs	Analog signal: voltage (0-10) V; DC (0-5), (0-20), (4-20) mA	13 bit	± 0,2 %	0,44
AI01-0/4	4 outputs	12 bit	Analog signal: DC (0-5), (0-20), (4-20) mA	± 0,2 %	0,10

» Discrete I/O modules

I/O module	Number and type of channels	Input/output signal	Power consumed via 24 V circuit, W, up to
DI1-16	2 groups of 8 inputs	Discrete signal – DC voltage: (0-7) V logical “0”, (24±6) V logical “1”	0,24
DIO-8/8	1 group of 8 inputs	Discrete signal – DC voltage: (0-7) V logical “0”, (24±6) V logical “1”	0,4
	1 group of 8 outputs	Discrete signal – contactless key: Switched DV voltage – up to 40 V; current – 0,3 A; total current – up to 2 A	
DO1-16	2 group of 8 outputs	Discrete signal – contactless key: switched DC voltage – up to 40 V; current – 0,3 A; total current – up to 2 A	0,55

» Analog cells of project-customizable modules ADIO1, AIO2, MK1 microcontroller, MK2 controller and T-MK1, T-ADIO1 units

Cell designation	Cell characteristics
AI1	1 input: (0-10) ± (0-10) B; (0-5) ± (0-5), (0-20), ± (0-20), (4-20) mA Time of single channel conversion is 60 ms. Basic reduced error: ± 0,1 % (capacity 15 bit).
AI2	1 input: (0-10) V; (0-5), (0-20), (4-20) mA. Time of single channel conversion is 2 μs. Basic reduced error: ± 0,1 % (capacity 12 bit).
AI3	4 inputs: (0-10), ± (0-10) B; (0-5), ± (0-5), (0-20), ± (0-20), (4-20) mA. Time of single channel conversion is 60 ms. Basic reduced error: ± 0,1 % (capacity 15 bit).
AO1	1 output: (0-5), (0-20), (4-20) mA. Time of single channel conversion is 20 μs. Basic reduced error: ± 0,1 %.
AO2	2 output channels (with common +): (0-5), (0-20), (4-20) mA. Time of single channel conversion is 20 μs. Basic reduced error: ± 0,1 %.
AO3	2 output channels (with common -): (0-5), (0-20), (4-20) mA. Time of single channel conversion is 20 μs. Basic reduced error: ± 0,1 %.
TC1	1 voltage input: ± (0-35), ± (0-70), ± (0-140), ± (0-280), ± (0-560), ± (0-1120), ± (0-2240) mV; Signals from thermocouples: ± (0-35), ± (0-70) mV. Basic reduced error: ± 0,1 % (capacity 15 bit).
TR1	1 resistance input: (0-100), (0-200), (0-400) Ohm from resistance thermometers. Three-wire connection. Basic reduced error: ± 0,1 % (capacity 15 bit).
TR2	1 resistance input: (0-100), (0-200), (0-400) Ohm from resistance thermometers. Four-wire connection. Basic reduced error: ± 0,1 % (capacity 15 bit).
TR3	2 resistance inputs: (0-100), (0-200), (0-400) Ohm from resistance thermometers. Four-wire connection. Basic reduced error: ± 0,1 % (capacity 15 bit).
FI1	2 frequency inputs (2-2000) Hz. Amplitude: 5, 12, 24 V. Basic absolute error: ± 0,1 %. Frequency signal measurement.
FI2	4 frequency inputs up to 2000 Hz. Amplitude: 5, 12, 24 V. Basic absolute error ± 0,1 %. Number of pulses – (2^{32}-1).

» Discrete cells of MK2 project-customizable controller and T-MK1, T-ADIO1 units

Cell designation	Cell characteristics
DI2	4 inputs: DC voltage (0-7) V – logical “0”, (24±6) V – logical “1”; Maximum current of 0,01 A per channel in 24 V circuit
DO2	4 outputs: contactless key – switchable DC voltage of up to 40 V, Maximum current up to 0,3 A per channel; 1,0 A per 4 channels

Built-in and supporting software

1. IsaGRAF Workbench process programming system, comprising 6 technological languages: sequential function chart (SFC); flow chart (FC); function block diagram (FBD) added with an extensive library of P-130 controller algorithms and other algorithms; linear diagrams (LD), structured text (ST), instructions language (IL) – for БЦП2, MK1, MK2.
2. CONFIGURATOR software complex.
3. Software means of connection to high level devices:
   - OPC-server providing interface between controller and SCADA compatible with (InSAT ООО), КАСКАД (Kaskad-ASU ООО), TRACE MODE (AdAstra), WinCC (Siemens) and others;
   - sub-program libraries for communication between high level devices and I/O modules and microcontrollers.

Controllers are equipped with Ethernet, RS-485, RS-232 and USB interface to provide information and control functions to operator and other levels according to set tasks. Data exchange with high level system and with other equipment is provided by application of TCP/IP, Telnet, FTP and Modbus protocols.

Controllers installation

All controller modules and terminal units except БПР-10 switching unit of КРОСС-500 allow installation on a DIN rail, cross-module connections are made with flexible connectors. Controllers can be mounted in any enclosure featuring depth of at least 200 mm. Module dimensions are as follows: height – 130 mm, length (depth) – 100 mm, width – 30 or 45 or 60 mm depending on type. Each module has three inputs and RS-485 and RS-232 sockets. Terminal unit dimensions: width – 85 mm, length is determined by module type and ranges from 62 to 115 mm. Modules are mounted facing a DIN rail with narrow side, terminal units – facing a DIN rail with wide side.

» Cells of T-DIO1 project-customizable units

Cell designation	Cell characteristics
DI1	2 discrete signal inputs
DI3/220 **DI3/110** **DI3/24**	1 discrete signal input, triggering voltage: ~220 V; ~110 V; ~24 V
DI4/220 **DI4/110** **DI4/24**	1 discrete signal input, triggering voltage: =220 V =110 V =24 V
DO1	2 discrete signal outputs, transistor key = 24 V (0,3 A)
DO3	1 discrete signal output. relay ~=250 V (0,01-5 A)
DO4	1 discrete signal output, triac key ~250 V (1 A)
DO5/220 **DO5/110** **DO5/24**	1 discrete signal output, switching voltage, transistor key: ~=220 V (0,12 A); ~=110 V (0,17 A); ~=24 V (1,00 A)

БШ-2 gateway unit

БШ-2 gateway unit is designed for application in automated control and regulation systems and allows connection of automation equipment by ABS ZEiM Automation to various field buses.

БШ-2 gateway unit is an adjustable microprocessor device offering hardware and software support of various industrial digital interfaces and data transfer protocols. It allows connection of such devices as ПБР-И starters and КИМ1 controllers to **Profibus DP** field bus.

Power supply

Controller power supply parameters:

- from single-phase AC mains featuring 90 – 264 V, 50 Hz and higher harmonics ration of up to 5 %;
- from an external non-stabilized DC power source featuring 18 – 36 V (24 V).

Controller power supply is provided by various power units and modules including those for backup power supply.

Characteristics

- Operating temperatures range: from + 5 °C to + 50 °C (for MK2, T-MK1, T-ADIO1, T-DIO1 the range can be extended to - 40 ... + 85 °C), relative humidity of air – up to 95 % at + 35 °C.
- Devices require no forced ventilation while operating within the stated temperature range.
- Warranty period – 18 months.
- Average life cycle – 10 years.

Starters and controllers are connected to gateway unit via RS-485 interface using Modbus RTU modified protocol providing fastest data exchange rate. Links between gateway and starters and controllers can be backed up.

Gateway unit connection to high level of automated systems can be established via: RS-485, Ethernet. Gateway unit supports the following standard data transfer protocols: **Modbus RTU; Modbus TCP; Profibus DP.**

Support of additional digital interfaces and data transfer protocols is available on demand.

Gateway unit also allows logging of information on its state and state of connected devices to non-volatile memory, logging of sent control commands and their performance, etc.

Our company offers low-voltage switchgears for electric power input and distribution, for power supply and control of electric actuators of shutoff and regulating valves, for power supply and control of pumps, various auxiliary electric motors at thermal and hydroelectric power plants.

4.1 KCATO SERIES

» KCATO

Low-voltage switchgears

Configuration of KCATO series input and distribution switchgears is determined by terms of reference for a particular project defined on the basis of a questionnaire.

KCATO switchgears are supplied to customer with all the equipment of main and auxiliary circuits mounted and properly adjusted according to a questionnaire and working drawings.

0,4 kV KCATO series low-voltage switchgears are designed for control of various systems of industrial facilities, for input and termination of electric power supply to consumers.

Low-voltage switchgears are manufactured from Russian and foreign components and are available in standard and custom configurations.

These switchgears are designed for input and distribution of electric power and for control of electric actuators in networks using up to 1000 V with solid-grounded neutral, for monitoring, control and protection of equipment. Outgoing lines are equipped with short-circuit protection devices rated for up to 630 A and total input current of up to 4000 A.

Low-voltage switchgears differ by means of units installation: fixed or dismountable (socket-connected or retractable). This can be implemented on the basis of Prisma Plus principle – all the devices are installed on dismountable circuit boards that are directly connected to vertical buses by means of clamps. Upgrade or servicing of switchgears can be carried out without powering off that ensures uninterrupted operation in any situation. Dismountable circuit boards can be easily installed from the front side. Easy connection by clamps is used allowing to avoid intermediate connections and to ensure reliability of electric contact.

4.2 CABINETS WITH RETRACTABLE UNITS

Cabinets with retractable units are an upgraded version of KCATO series cabinets with increased usable space for electric motor power supply units, shutoff and regulating valve actuator control units and for electric power distribution. Upgrade and maintenance of KCATO series cabinets with retractable units can be carried out without cabinet powering off thus ensuring uninterrupted operation in any conditions. KCATO series cabinets with retractable units for power supply and control of electric actuators and more demanding consumers are available in the same enclosure thus allowing their integration in the existing industrial processes automated control system at the customer's facility.

Retractable units are rated for up to 630 A. For currents above 630 A there can be user socket-connected or retractable devices inside a standard unit. Cabinets can be equipped with devices from various manufacturers upon customer's demand.

4.3 AUXILIARY SWITCHGEARS РУСН-0,4 kV (AUXILIARY TRANSFORMER MINI SUB-STATION)

РУСН series switchgears rated for 250...2500 kVA are designed for input of industrial frequency three-phase AC of 6-10 kV, its transformation into 0,4 kV and distribution among consumers. Mini sub-station consists of a set of electric cabinets:

- HV input cabinets;
- LV input cabinets (bus inlet, cable inlet);
- LV sectionalization cabinets;
- LV outgoing section cabinets.

Control, indication, protection and automation circuits of mini sub-stations can be made using electromechanical relays or microprocessor devices. More detailed information on specifications, electric circuit diagrams, overall dimensions and other parameters is available in the catalogue of switchgears by ABS ZEiM Automation.

4.4 БЭЗ GATE VALVE ACTUATOR CONTROL PANELS

Gate valve actuator control panels are designed for power supply and control of gate valve and other shutoff and regulating valve actuators providing connection between switchgears and electric actuators.

Operating position in space – vertical, mounted on a pipe by an attachment unit (sleeve) providing dismounting resistance of at least 50 N. Allowed inclination of unit - 5° in any direction.

4.5 УВРУ-П-31 (ПРП-9) SERIES CONTROL PANEL

УВРУ-П-31 (ПРП-9) series control panels are designed for real-time control of power equipment at electric plants and sub-stations and constitute an operator's workplace. Available in cabinet or panel version.

Front side of panel accommodates measuring instruments, displays, indicators, buttons and control switches. Terminal clams for AC and DC electric circuits connection are located inside panels and are accessible through a service door.

4.6 INPUT (ВРУ8), INPUT AND DISTRIBUTION (ВРУ8-2Н) AND DISTRIBUTION (ПР8503, ПР11) SWITCHGEARS

ВРУ8(-2Н) (УВРУ-Я-12), ПР8503 and **ПР11 (УВРУ-Я-22) switchgears** are designed for input and distribution of three-phase AC 380/220 V, 50 Hz in networks with solidly-grounded neutral and with TN-S, TN-C-S grounding for protection of circuits from overloads and short circuits and for rare switching in real-time mode.

Input box is made of sheet metal and accommodates knife switch or packet switch and fuses. Boxes are classified according to rated current and type of input device. Feeding cables input and outgoing lines output is located on top or bottom side.

4.7 УВРУ-Я-32 (Я5000) SERIES CONTROL BOXES

УВРУ-Я-32 series control boxes are designed for control of asynchronous electric motors with short-circuited rotor of up to 90 kW operating in continuous, intermittent or intermittent-periodic mode. These coxes comply with ГОСТ Р51321.1 requirements.

Control boxes comprise a unified metal enclosure with a mounting panel and are equipped according to marking and type with the following units: automatic circuit breakers, starters with temperature relays, light indicators and controls (buttons, switches).

4.8 ЩАП (УВРУ-Я(Ш)-52(51)) AUTOMATIC TRANSFER EQUIPMENT

УВРУ-Я-52 and УВРУ-Ш-51 series panels and boxes are designed for automatic switching of lighting and power supply circuits and automation equipment to backup power source in case of main power supply failure. Reverse switching to main power source is performed automatically upon its restoration.

Cabinets and boxes comprise a unified metal enclosure that accommodates all the equipment. Cables are led in/out through holes in top/bottom side.

Boxes and cabinets differ in:
- type and rated current of automatic circuit breakers;
- presence of ammeter and voltmeter;
- wall-mounted or floor-mounted version.

4.9 CONTROL CABINETS FEATURING SOFT STARTERS OR FREQUENCY CONVERTERS

Cabinets featuring soft starters or frequency converters are designed for energy efficient control of various facilities employing electric motors (smooth starting and stopping of three-phase induction motors): centrifugal and piston pumps, fans, screw compressors, conveyors, special mechanisms (mixers), etc.

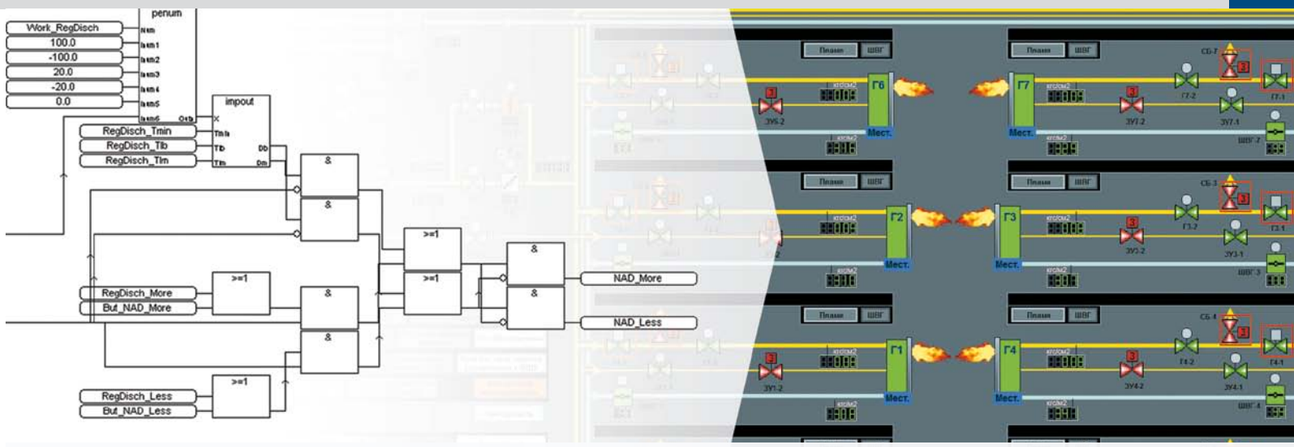
Control cabinets featuring soft starters or frequency converters improve reliability and safety of equipment, make commissioning and maintenance easier.

Control cabinets are supplied with soft starters and frequency converters programmed and ready for operation. Such a cabinet provides electric motor protection from overheating and allows easy monitoring and control of motor parameters right after installation on a site.

4.10 CUSTOM SWITCHGEARS

Besides those stated in the switchgears catalogue our company accepts custom orders for low-voltage switchgears based on technical documentation from a Customer or on documentation developed by our engineers. Highly qualified specialists would provide you with assistance in design, selection of equipment, drawing of electric circuit diagrams and would offer different solutions for equipment configuration including those for explosive environments.

Our company is also experienced in installation of modern technical means in standard products (РТЗО, Я5000, etc.) to facilitate, for example, transmission of date on network, actuators, switches state using digital systems. Such solutions are conditionally called intelligent РТЗО (ИРТЗО).



ABS ZEiM Automation offers turn-key development of industrial processes automated control systems, automated dispatching systems and other industrial automation systems, designs and supplies control cabinets base on different controllers.

Combined heat and power generation

Implementation of project of processes automation and dispatching at combined heat and power generation facilities (thermal power plants, state regional power plants, regional heating stations, boiler units, heating mains). We offer automated control systems for:
- steam boilers, water heating boilers;
- power plant boilers, waste-heat boilers;
- common boiler unit (power plant) equipment;
- autonomous boiler units;
- heating units (central and standalone).

Power generation

We offer automated control systems for:
- gas turbine, gas piston and diesel generators (acquisition of data, automation of heat utilization and oil feeding systems);
- main and distribution switchboards, distribution centers (acquisition of data from main and distribution switchboards, distribution centers, remote control of cells);
- turbine units, steam turbines (low-voltage switchgears, data acquisition);
- utility networks at non-serviceable sub-station and other facilities (control of ventilation, heating, lighting and other systems).

Industry

Implementation of projects of automation, dispatching of industrial processes and various industrial facilities.

Construction of automated control systems for:
- production processes of chemical, petrochemical, oil extracting, oil and gas processing, food, metal, construction material industry and others;
- thermal processes at various facilities (boiler units, furnaces);
- energy-consuming equipment and utility networks (lighting, power supply, ventilation, water supply, heating, etc.).

Housing, utility networks of buildings

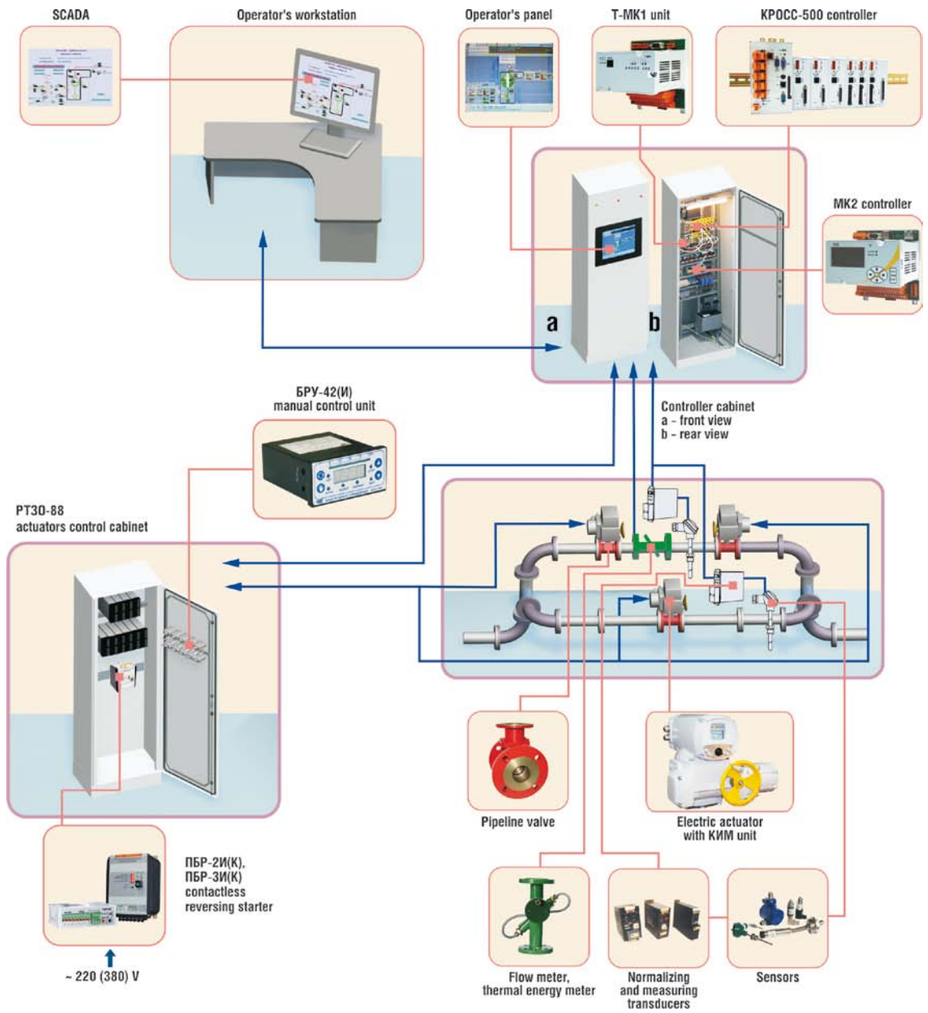
Construction of automated control, dispatching and metering systems for housing and small facilities:
- smart buildings (control and dispatching of heating, ventilation, air conditioning, cold and hot water supply, lighting, electric power supply systems and other utility networks of buildings);
- automation of heating centers (weather-determined control, metering of energy carriers consumption);
- automated real-time dispatching control of houses (metering of energy resources consumed by house/apartment, access control, representation of data to interested bodies).

Water supply and water disposal

Implementation of projects in automation and dispatching of water supply and water removal facilities operation (well, onshore, boosting and sewage pumping stations, water treatment facilities). Development and implementation of complex projects of water supply systems renovation using modern technologies (including complete automation of processes).

Gas supply

Implementation of projects in automation and dispatching of gas supply and distribution systems (gas-distribution points, stations, etc.): remote monitoring and parameters logging, gas pressure regulation.



» Dispatch control system based on equipment from ABS ZEiM Automation

Hardware and software complexes

- **ЗЭиМ-АСУТП** – complex applied for construction or renovation of process automated control systems in power generation, chemical, petrochemical, oil extractiong, oil and gas processing, food, metal, construction materials industry and in others;
- **ЗЭиМ-АСОДУ** – complex applied for construction of real-time dispatching systems for control of distributed heat supply (standalone boiler houses, central or standalone heating points), electric power supply (distribution stations, transformer stations, input switchgears), water supply and removal (boosting and sewage pumping stations), gas supply and distribution (gas-distribution stations and points) facilities and utility networks of buildings and facilities (office buildings, residential houses, enterprises and power generation facilities) and other sites.

ЗЭиМ-АСУТП and ЗЭиМ-АСОДУ hardware and software complexes are based on:

- КРОСС-500 controllers (by ABS ZEiM Automation OJSC);
- ОВЕН ПЛК and ОВЕН СПК controllers (РО OVEN ООО);
- SCADA MasterSCADA (inSAT ООО), КАСКАД (Kaskad-ASU ОО), TRACE MODE 6 (AdAstrA Research Group) and others;
- Modicon controllers, SCADA Vijeo Citect (Schneider Electric);
- SIMATIC automation system (TIA Portal, Siemens);
- Experion PKS control system (Honeywell);
- IndustrialIT 800xA control system (ABB) and others.

One of fields of activity of ABS ZEiM Automation OJSC is design and manufacturing of bus ducts. Our company incorporates a bus duct design department equipped with modern means of design. Our bus ducts are available in the following **climatic versions**: УХЛ1, УХЛ2, УХЛ3; У1, У2, У3; Т1, Т2, Т3.

» ТЭНЕ, ТЭНП, ТЗК(Р), ТЗП(Р), ТЗКЭП, ТЗМЭП, ШЗК

Bus ducts

Quality management system applied to design and manufacturing of bus ducts is certified for compliance with ISO 9001:2008 by Russky Registr certifying body.

ABS ZEiM Automation OJSC has a license for design and manufacturing of bus ducts for NPPs. Our bus ducts manufactured in accordance with ЯЛБИ.685571.001ТУ, ЯЛБИ.685571.002ТУ, ЯЛБИ.685571.003ТУ technical regulations have a certificate of compliance with ГОСТ Р requirements.

High quality of bus ducts is achieved by application of precise equipment from Russian and foreign manufacturers: SCODA, WAYTRAIN, SAHINLER, HAAS, PRINCING, SELKO, KOIKE ARONSON INC., FIRO, Donpressmash, Prima Industry, NZGP ZAO, NASO. Our equipment allows to bend cylindrical shields from 360 to 1500 mm in diameter and up to 3000 mm long and to form circumferential reinforcing ribs improving product rigidity.

Automatic welding equipment allows unmanned welding of linear and circumferential seams. Sealing of insulator attachment points is provided by application of gaskets made of special rubber featuring residual compression strain of 10-15 % that guarantee joint life cycle of up to 40 years. Shields and busbars are painted with powder painting ensuring reliable protection from atmospheric impact and high mechanical strength of coating.

Application of modern production equipment, qualified designers and technicians allow us to manufacture high-quality bus ducts for various purposes (including those made according to custom order).

Bus ducts can be equipped with various equipment depending on terms of reference:

- toroidal current transformers ТШ, ТШВ, ТШЛ, ТПЛА, ТШЛК, GSR, IGWG, IGE and others.;
- voltage transformers ЗНОЛ, ЗНОЛП, UGE;
- lightning arresters РВЭ, РВРД, РВМ, РВС, РВО, Siemens;
- surge arresters ОПН, Siemens;
- three-pole earth conductors;
- disconnectors РВПЗ, РВРЗ, РРЧЗ, РЗЧ and others;
- bushing insulators ИП and others;
- switchgear cells;
- ПСН panels or КТПСН-0,5 cabinets;
- SF6 circuit breakers by ABB, AREVA, ALSTOM and others.

6.1 ТЭНЕ, ТЭНП FULLY INSULATED BUS DUCTS

	Rated voltage	Rated current	Peak withstand current	Short-time thermal current	Weight of 1 linear meter of bus duct phase, up to
	kV	A	kA	kA	kg
ТЭНЕ-6	6	2000; 3150; 4000	128; 180	50; 70	26
ТЭНЕ-10	10	2000; 3150; 4000; 5000; 5500; 6000; 6300	128; 180; 250; 300; 375; 575	50; 70; 100; 120; 150; 230	80
ТЭНЕ-11	11	3150	128	50	25
ТЭНЕ-20	20	1000; 1600; 1800; 2000; 2500; 3150; 5000; 5500; 6300; 7200; 8000; 9000; 10000; 11250; 12500; 15000; 16000; 20000; 22000	128; 250; 300; 375; 400; 560; 600; 900	50; 100; 120; 150; 160; 220; 240; 360	320
ТЭНЕ-24	24	1600; 2000; 2500; 3150; 10000; 12000; 18000; 20000; 24000	400; 560; 750; 900; 1000	160; 220; 300; 360; 400	260
ТЭНП-24		30000; 31500; 33000; 37500	560; 600; 685	220; 240; 250	320
ТЭНЕ-27	27	5000; 20000; 20000; 31500	560; 750	220; 300	270
ТЭНЕ-35	35	1000; 3150; 9000; 10000; 20000	300; 560; 750	120; 220; 300	260
ТЭНП-35		30000	560	220	270

ТЭНЕ series isolated-phase bus ducts with external electromagnetic field compensation are designed for establishing electric connections at power plants in 3-phase 50 Hz AC networks connecting turbine generators of up to 1500 MW with step-up transformers, auxiliary transformers, converting transformers and generator thyristor excitation transformers, and at sub-stations for electric connection of power transformers and auxiliary transformers and switchgears. Generator voltage bus ducts can be applied at other power generating, industrial, transport, agricultural facilities, etc.

Design features of isolated-phase bus ducts:

- prevent phase-to-phase short circuits caused by foreign objects that may contact phases, prevent staff access to energized parts of bus duct;
- busbars and shields of bus duct are equipped with expansion joints compensating changes of linear dimensions caused by temperature changes;
- whole body of bus duct is solidly welded except for dismountable joints for connection to turbine generators, transformers and switches (breakers);
- bus ducts are resistive to peak currents;
- external electromagnetic field influencing a bus duct is compensated by joining shields together and grounding them;
- detachable aluminum-copper connections are made using durable contacts;
- bus ducts are protected from dust;
- support insulators are resistive to dew and hoarfrost;
- no capacitive discharges (sparking) are possible inside bus duct enclosure;
- bus duct design allows extraction of hydrogen in case of it leakage;
- attachment of shield to transversal support beams is detachable and insulated that prevents circulation of induced current in building structures;
- beams are attached to building structures by welding;
- measurement of insulation resistance between shield and transversal beams in support units can be carried out without whole structure disassembly;
- bus duct shields reduce heating of other bus ducts and building structures located nearby;
- joints connecting bus duct shield with generator and transformers prevent formation of induced current.

Bus duct components and design

Depending on route configuration and the scope of embedded equipment the following components comprise a bus duct:

- linear segments;
- angular segment, T- and Z-segments.
- segments with built-in electric equipment:
  - voltage transformers;
  - current transformers;
  - surge arresters;
  - bushing insulators.
- power transformer joining segments.
- disconnector joining segments.
- turbine generator joining segments and other elements.

6.2 ТЗК(Р), ТЗП(Р), ТЗКЭП, ТЗМЭП ENCLOSED BUS DUCTS

	Rated voltage	Rated current	Peak withstand current	Short-time thermal current	Weight of 1 linear meter of bus duct phase, up to
	kV	A	kA	kA	kg
ТЗК-0,4 (1; 3)	0,4 (1; 3)	1600; 2000; 4000	51; 81	20; 31,5	106
ТЗК-1,0 (1,2; 1,3)	1,0 (1,2)	2000; 4000; 4600	128; 170; 180	50; 67; 72	74
ТЗК(Р)-6	6	1600; 2000	81	31,5	75
ТЗК(Р)-10	10	1600; 2000; 3150; 4000	81; 128; 170	31,5; 50; 67	100
ТЗК(Р)-11	11	2000; 3150	128	50	75
ТЗМЭП-6	6	3150; 3600	128; 300	50; 120	26
ТЗМЭП-10	10				45
ТЗМЭП-11	11	3150	128	50	34
ТЗКЭП-6	6	3150; 3600	128; 300	50; 120	45
ТЗКЭП-10	10				
ТЗКЭП-11	11	3150	128	50	34
ТЗК-15	15	1600; 2000; 4000	81; 128	31,5; 50	110
ТЗК-20	20	2500; 4000			100
ТЗП(Р)-10	10	1000; 1600; 3200; 4000; 5000			130
ТЗП-20	20	1000; 3200; 4000			110

Enclosed bus ducts are used to connect transformers to switchgears, turbine generator excitation systems, to connect turbine generators to step-up transformers in 3-phase 50/60 Hz AC networks. Enclosed bus ducts can be applied at power generating, industrial, transport and agricultural facilities.

Bus ducts are supplied for installation as separate segments of up to 6 m. All segments are connected and welded by GMAW on site. Depending on configuration and purpose the following typed of bus duct segments are recognized: linear, angular, with current transformers, with bushing insulators, with surge arresters, with phases turning, with phases transposition, T-segments, joining a switchgear, transformer, other.

Bus duct components and design

Bus ducts are supplied for installation as separate segments of up to 6 m. All segments are connected and welded by GMAW on site. Depending on configuration and purpose the following typed of bus duct segments are recognized:

- linear;
- angular;
- with current transformers;
- with bushing insulators;
- with surge arresters;
- with phase turning;
- with phases transposition;
- T-segments;
- jointing a switchgear;
- joining a transformer;
- other.

6.3 ШЗК ENCLOSED BUS DUCTS

	Rated voltage	Rated current	Peak withstand current	Short-time thermal current	Weight of 1 linear meter of bus duct phase, up to
	kV	A	kA	kA	kg
ШЗК-0,4	0,4	1600; 2000	51	25*	35
ШЗК-1	1		81	40*	36
ШЗК-1,2	1,2	2000; 2500; 4000; 5000; 6300	51; 81; 128	20; 31,5; 50	70

* short-time thermal current applied for 0,5 s.

Enclosed ШЗК series DC bus ducts rated for 1, 1,2 and AC bus ducts rated for 0,4 kV, 50 Hz are designed for connection of excitation units to main and backup excitation switchgears of generators of up to 1200 MW at power plants, and for connection of auxiliary transformers of up to 1000 kVA to ПСН auxiliary panels and КТПСН-0,5 cabinets at power plants.

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