IMPULSE

SEVERODONETSK RPA "IMPULSE"

ELECTROTECHNICAL PRODUCTS

TABLE OF CONTENTS:

3. ABOUT THE ENTERPRISE

6. IA-3 SMOOTH START-UP DEVICE

8. IA-4 SMOOTH START-UP DEVICE

11. RShch-1 PANEL ELECTRONIC MULTI-CHANNEL REGISTRATOR

15. AVR-1 EMERGENCY BACKUP ACTUATION DEVICE

16. AVR-2 EMERGENCY BACKUP ACTUATION DEVICE

17. UBP-14 UNINTERRUPTIBLE POWER SUPPLY DEVICE

19. BKTU-1 LEAK CURRENT MONITORING UNIT

20. PT-3 and PT-4 CURRENT TRANSDUCERS

21. BKSI-2 INSULATION RESISTANCE MONITORING UNIT

23. BKSI-3 INSULATION RESISTANCE MONITORING UNIT

25. PrS-2 SIGNAL TRANSDUCER

28. NAS-5 ANALOG SIGNAL NORMALIZER

29. PT-1 and PT-2 CURRENT TRANSDUCERS

30. PN-18 and PN-19 VOLTAGE TRANSDUCERS

31. PN-23 VOLTAGE TRANSDUCER

32. BPt-157 POWER SUPPLY UNIT

34. BPt-161 POWER SUPPLY UNIT

35. BPt-208 POWER SUPPLY UNIT

36. BPt-213 POWER SUPPLY UNIT

37. BPt-222 POWER SUPPLY UNIT

38. BPt-228 and BPt-229 POWER SUPPLY UNITS

39. MPt-2 POWER SUPPLY MODULE

40. BVn-118 and BVn-124 FAN UNITS

41. ShR-1 DISTRIBUTION CABINET

42. ShchV-1 INPUT PANEL

44. ShchOAB-1 PANEL TO SWITCH OFF ACCUMULATOR BATTERIES

46. INSTRUMENT MOBILE RACK (CART)

47. MANUFACTURING CAPABILITY

50. LICENCES, CERTIFICATES

ABOUT THE ENTERPRISE

Severodonetsk Research and Production Association “Impulse” is a designer, manufacturer, and supplier of highly reliable instrumentation and control systems (I&C systems) for power engineering and railways.

1 Factory
288 persons

2 R&D
223 persons

3 Management and engineering departments
162 persons

4 Quality assurance departments
67 persons

The company was established in 1956 as the basic enterprise in the USSR for development of instrumentation and control systems for automation of technological processes. For more than sixty-year-long history of work, the enterprise has developed and commissioned tens of thousands of instrumentation and control systems for nuclear and thermal power engineering, oil and gas, chemical, aerospace industries, railway transport, metallurgy, mechanical engineering, geophysics, defence, etc.

During this time several generations of developers have changed, a team of professionals with experience and skills for critical branches has been formed and has been constantly renewed. This experience includes all stages of equipment life cycle – from inspection of a facility and design to author's support and technical support of operation.

Main products of SRPA “Impulse” are automation hardware, software, and I&C systems, complex of which assures execution of all functions important for safety of critical facilities. SRPA “Impulse” is one of few companies in the world possessing technical solutions and technologies allowing implementing full-function digital I&C systems of NPP units. Equipment manufactured by SRPA “Impulse” operates successfully at critical facilities in Ukraine, Armenia, Bulgaria, Russia, Slovakia, and other countries.

93405, Ukraine, Severodonetsk of Lugansk region, pl. Pobedy, 2
Telephone/fax: (+38-06452) 2-95-87
impuls@imp.lg.ua, www.imp.lg.ua

PARTNERS OF SRPA “IMPULSE”

	SE “NNEGC “Energoatom”
	State Nuclear Regulatory Inspectorate of Ukraine
	State Scientific and Technical Centre for Nuclear and Radiation Safety
	Ukrainian State Centre for Supply and Service Quality Regulation (SE “Goscentrkachestva”)
	National Scientific Centre “Institute of Metrology”
	Institute for Nuclear Research of National Academy of Sciences of Ukraine
	SE “Kharkiv Research Institute of Integrated Automation”
	PJSC “Kyiv Research and Design Institute “Energoproekt”
	OJSC “Kharkiv Research and Design Institute “Energoproekt”
	“Research and Production Association “Impulse-Kyiv” Ltd
	CERTATOM Quality System and Product Certification Authority
	AREVA GmbH, Germany
	Photonis, France
	VUJE, a.s., Slovakia

ŠKODA JS a.s., Czech Republic

Interpriborservice LTD., Bulgaria

SE Specialna Energotechnika LTD., Bulgaria

PJSC “Ukrzaliznytsia”

Donetsk Railway Regional Branch

Lviv Railway Regional Branch

Odessa Railway Regional Branch

Prydniprovska (Near-Dnipro) Railway Regional Branch

Pivdenno-Zakhidna (Southwestern) Railway Regional Branch

Pivdenna (Southern) Railway Regional Branch

TIS Group of Companies

IA-3 SMOOTH START-UP DEVICE

The IA-3 device is designated for direct or reverse start-up of three-phase asynchronous alternating current electric motors of actuators of control, stop, and other valves with capacity from 3 to 15 kW in accordance with control signals at inputs. The following is stipulated in IA-3: protection of electric motors against short-circuit currents, overloads, and phase loss, generation of an emergency signal in case of an emergency, as well as monitoring of 24 V power supply to control circuits.

IA-3 can be used at power plants and other facilities, where improved reliability and environmental resistance are required.

Design: a remote device for wall or panel mounting.

Technical characteristics of IA-3

Parameters	Value
Power supply from a three-phase alternating-current network	220 / 380 Vac
Capacity of controlled electric motors	from 3 to 15 kW
Basic peculiarities and functions:	- receiving control signals from external sources or from an internal source of 24 V through a switching element to DU-O or DU-Z inputs; - filtering control signals from spurious response; - outputting supply voltage +24 V or pulsating one 24 V to arrange control signals through contacts of “dry contact” type or “thyristor keys”; - switching off electric motors in case two control signals are available simultaneously; - electrodynamically braking electric motors.
Modes of operation:	- continuous; - short-term; - recursive short-term with frequency up to 630 switching on/hour
Variants of control:	- from local regulators; - from controllers of monitoring and control systems; - from a console of a process operator (manually)
Possibility of regulation by means of local regulators:	- of braking time of electric motors after removal of a control signal; - of smooth start-up and smooth braking of electric motors.

Indication:	- readiness and correctness of phase connection; - modes of operation.
Rated load current on each of three AC voltage commutation circuits	30 A
Actuation time of protection against disappearance of at least one of phases: - with a switched off electric motor, not less than - with a switched on electric motor, not more than	 (0.6±0.06) s 10 s
Time of start-up smoothness, braking smoothness, braking time at opening and closing is regulated within the limits	from 0 to 0.25 s
Time of command execution on each of inputs for control signals, not less than	50 ms
Operability of a device at smooth and ramp change of power supply voltage from a rated value and a network drop for a time not more than 20 ms	–15 %, +10 %
Direct or pulsating voltage of channels receiving control signals of switching on of electric motors (DU-O and DU-Z commands): - channel with the “1” level - channel with the “0” level	 from 18 to 32 V from 0 to 3 V
Output direct or pulsating (with duty ratio 2 with period 20 ms) voltage of a source	(+24 ±4.8) V
Current of external load of a source, not more than	100 mA
Setting range of overload protection current	from 13.5 to 66 A
Peak current overload, not more than	500 A
Type of connectors to connect facility cables	- plug one on a case; - clip one inside a case through sealed lead-ins.
Range of operating temperatures	from +5 to +75 ºC
Power consumption, not more than	20 W
Protection degree	IP 54
Safety class and category	3 B
Version	“General purpose industrial grade” and “NPP”
Dimensions WxHxD	320x350x170 mm
Weight, not more than	14 kg

IA-4 SMOOTH START-UP DEVICE

The IA-4 device is designated for direct or reverse start-up of three-phase asynchronous alternating current electric motors of actuators of control, stop, and other valves with capacity from 0.06 до 3.5 kW in accordance with control signals at inputs, protection of electric motors against short circuits, overloads, and phase loss, generation of an emergency signal in case of an emergency.

It is permitted to use IA-4 to control three-phase synchronous electric motors of the following types:

- 2DSTR 135-1.8-136D01 power consumption 220 W;
- 2DSTR 135-4.5-136D01 power consumption 360 W;
- DSTR 190-11-60D02 power consumption 150 W;
- DSTR 230-19-136D02 power consumption 600 W;
- DSR-63/60 power consumption 250 W;
- DSR-160/136 power consumption 1150 W.

For the above listed synchronous electric motors there is no thermal protection as to current consumption, due to its small increase for locked electric motors.

IA-4 can be used at power plants and other facilities, where improved reliability and environmental resistance are required.

Design: a remote device for wall or panel mounting.

Technical characteristics of IA-4

Parameters	Value
Power supply from a three-phase alternating-current network	220 / 380 Vac
Capacity of controlled electric motors	from 0.06 to 3.5 kW
Basic peculiarities and functions:	- receiving control signals from external sources or from an internal source of 24 V through a switching element to DU-O or DU-Z inputs; - filtering control signals from spurious response; - outputting supply voltage +24 V or pulsating one 24 V to arrange control signals through contacts of “dry contact” type or semistors; - switching off electric motors in case two control signals are available simultaneously; - electrodynamically braking electric motors; - accident logging.
Modes of operation:	- continuous; - short-term; - recursive short-term with frequency up to 630 switching

	on/hour
Variants of control:	- from local regulators; - from controllers of monitoring and control systems; - from a console of a process operator (manually)
Possibility of regulation by means of regulators:	- of braking time of electric motors after removal of a control signal; - of smooth start-up and smooth braking of electric motors; - setting response of IA-4 and output circuits in case of an emergency.
Indication:	- readiness and correctness of phase connection; - modes of operation; - values of parameters; - emergency situations.
Rated load current on each of three AC voltage commutation circuits: - for versions IA-4/1 and IA4/3 - for versions IA-4/2 and IA4/4 - for version IA-4/5	 up to 1.2 A up to 3.5 A up to 8 A
Actuation time of protection against disappearance of at least one of phases: - with a switched off electric motor, not more than - with a switched on electric motor, not more than	 2 s 10 s
Time of start-up smoothness, braking smoothness, braking time at opening and closing is regulated within the limits	from 0 to 0.25 s
Time of command execution on each of inputs for control signals, not less than	50 ms
Operability of a device at smooth and ramp change of power supply voltage from a rated value and a network drop for a time not more than 20 ms	–15 %, +10 %
Direct or pulsating voltage of channels receiving control signals of switching on of electric motors (DU-O and DU-Z commands): - channel with the “1” level - channel with the “0” level	 from 18 to 32 V from 0 to 5 V
Output direct or pulsating (with duty ratio 2 with period 20 ms) voltage of a source	(+24 ±6) V
Current of external load of a source, not more than	100 mA
Setting range of overload protection current: - for versions IA-4/1 and IA4/3 - for versions IA-4/2 and IA4/4 - for version IA-4/5	 from 0.3 to 3.5 A from 0.7 to 8 A from 0.1 to 1.2 A
Peak current overload, for time up to 20 ms	10-multiple of a setpoint
Type of connectors to connect facility cables	- plug one on a case; - clip one inside a case through sealed lead-ins.
Range of operating temperatures	from +5 to +50 ºC

Power consumption, not more than	14 W
Protection degree	IP 54
Safety class and category	3 B
Version	“General purpose industrial grade” and “NPP”
Dimensions WxHxD	155x185x147 mm
Weight, not more than	6 kg

Designs of IA-4

Version	Arrangement		
	Maximum capacity of electric motors	Range of setpoints	Type of connectors
IA-4/1 421413.007	1.5 kW	from 0.3 to 3.5 A	clip one inside a case through sealed lead-ins
IA-4/2 421413.007-01	3.5 kW	from 0.7 to 8 A	
IA-4/3 421413.007-02	1.5 kW	from 0.3 to 3.5 A	plug one on a case
IA-4/4 421413.007-03	3.5 kW	from 0.7 to 8 A	
IA-4/5 421413.007-04	0.4 kW	from 0.1 to 1.2 A	

RShch-1 PANEL ELECTRONIC MULTI-CHANNEL REGISTRATOR

The RShch-1 registrator is designated to monitor and log up to 16 technological parameters presented with signals of voltage, current, and resistance. RShch-1 serves to be used as a measuring, logging, and warning device operating independently or within a system and is a structurally independent device designated for continuous around-the-clock operation. It is used in different systems to measure and monitor parameters of technological processes, to acquire, visualize, log, process, and assess data of measurements, to warn against their state as related to given values.

Technical characteristics of RShch-1

Parameters	Value
Quantity of universal analog galvanically isolated monitoring and logging channels	up to 16 (multiple of 4)
Quantity of discrete inputs	8
Quantity of discrete (relay) outputs	8 or 16
Quantity of DC output channels	8, 16, or 24
Quantity of monitored setpoints on each analog signal	up to 4
Basic peculiarities and functions:	- receiving and shaping signals; - converting, processing, logging, and archiving values of signals; - linearizing characteristics; - extracting a square root; - monitoring correspondence of an output DC signal; - monitoring opening of a circuit delivering a current signal; - monitoring sensor connection.
Type of connected thermal electric transducers	TKhK (L), TKhA (K), TPP (S), TPR (B), TVR (A-1), TVR (A-2), TVR (A-3), TMK (M), TKhKd
Type of connected resistive temperature transducers	50P, 100P, 50M, 100M, GR21 P, GR23 M
Sensors connected	of direct voltage, current, resistance
Compensation of free ends of thermal electric transducers with the possibility to be switched off in the menu	from 5 to 60 ºC
TFT display, dimensions	6.4" or 10.4"
Type of information representation	digital values, diagrams, and histograms

Time interval for outputting each next point to a screen	0.2, 0.5, 1, 2, 5, 10, 30, 60 s
Archive data storage volume at the logging interval 1 s, for time not less than	10 days and nights
Menu control	button
Data exchange through interfaces	RS-232 / RS-485
Archive data copying to an external memory (an access password is set)	USB 2.0
Limits of maximum permissible basic reduced error of conversion, depending on a conversion range	±0.1 % or ±0.25 %
Pool time of all channels, not more than	200 ms
Parameters of discrete inputs: - voltage, not more than - current, not more than	 30 V 5 mA
Parameters of discrete relay outputs: - AC switching voltage, max - DC switching voltage, max - switching current, not more than - switched power, max	 250 Vac 30 Vdc 3 A 50 W
Parameters of analog DC outputs	from 4 to 20 mA
Power supply from a single-phase AC network	from 187 to 242 Vac
Power consumption, not more than	50 V·A
Range of operating temperatures	from +5 to +60 ºC
Protection degree: - front panel - case	 IP 54 IP 20
Safety class and category	2 A
Version	“General purpose industrial grade” and “NPP”
Dimensions WxHxD: - with the display size 6.4" - with the display size 10.4"	 190x205x370 mm 240x320x400 mm
Weight, not more than: - with the display size 6.4" - with the display size 10.4"	 8 kg 10 kg

Designs of RShch-1

Version	Arrangement			
	Analog input	Discrete input	Discrete output	Current output
RShch-1 421411.001	16	8	16	–
RShch-1/*41 421411.001-01 (09)	16		8	–
RShch-1/*32 421411.001-02 (10)	12		16	–
RShch-1/*31 421411.001-03 (11)	12		8	–
RShch-1/*22 421411.001-04 (12)	8		16	–
RShch-1/*21 421411.001-05 (13)	8		8	–
RShch-1/*12 421411.001-06 (14)	4		16	–
RShch-1/*11 421411.001-07 (15)	4		8	–
RShch-1/*00 421411.001-08	16		16	–
RShch-1/*32-1T 421411.001-16 (28)	12		16	8
RShch-1/*31-1T 421411.001-17 (29)	12		8	8
RShch-1/*22-1T 421411.001-18 (30)	8		16	8
RShch-1/*22-2T 421411.001-19 (31)	8		16	16
RShch-1/*21-1T 421411.001-20 (32)	8		8	8
RShch-1/*21-2T 421411.001-21 (33)	8		8	16
RShch-1/*12-1T 421411.001-22 (34)	4		16	8
RShch-1/*12-2T 421411.001-23 (35)	4		16	16
RShch-1/*12-3T 421411.001-24 (36)	4		16	24
RShch-1/*11-1T 421411.001-25 (37)	4		8	8
RShch-1/*11-2T 421411.001-26 (38)	4		8	16
RShch-1/*11-3T 421411.001-27 (39)	4		8	24
*Remark – * "1" is specified in the version designation (after a slant) if a device is ordered with the display size 10.4"*				
Remark – (..) a value is specified in the version designation (instead of a number after a "dash") a device is ordered with the display size 10.4"				

RShch-1 assures operation with sensors and input signals in the ranges in accordance with Tables 1, 2, and 3.

Table 1

Designation of a thermal electric transducer	Temperature measurement ranges, ºC	Input signal change range, mV
TKhK (L)	from –70 to 800	from –4.107 to 66.442
TKhA (K)	from –70 to 1300	from –2.587 to 52.41
TPP (S)	from 0 to 1600	from 0 to 16.777
TPR (B)	from 300 to 1800	from 0.431 to 13.591
TVR (A-1)	from 0 to 1800	from 0 to 26.999
TVR (A-2)	from 0 to 1800	from 0 to 27.231
TVR (A-3)	from 0 to 1800	from 0 to 26.772
TMK (M)	from –170 to 100	from –5.572 to 4.725
TKhKd	from –50 to 50	from –4.19 to 4.25

Table 2

Nominal static characteristic of a resistive temperature transducer	Temperature measurement range, ºC	Temperature transducer resistance change range, Ω
50P, W=1.3850	from –70 to 500	from 36.165 to 140.49
50P, W=1.3910	from –70 to 500	from 35.95 to 141.945
100P, W=1.3850	from –70 to 500	from 72.33 to 280.98
100P, W=1.3910	from –70 to 500	from 71.9 to 283.89
50M, W=1.4260	from –50 to 180	from 39.345 to 88.355
50M, W=1.4280	from –50 to 180	from 39.225 to 88.5
100M, W=1.4260	from –50 to 180	from 78.69 to 176.71
100M, W=1.4280	from –50 to 180	from 78.45 to 177
GR21 P	from –50 to 650	from 36.80 to 153.30
GR23 M	from –50 to 180	from 41.71 to 93.64

Table 3

Type of a sensor connected	Input signal change ranges
Sensors with output signals of direct voltage	from –100 to +100 mV
Resistance sensors	from 0 to 250 Ω
Sensors with output signals of direct current	from 0 to 5 mA
	from 4 to 20 mA

AVR-1 EMERGENCY BACKUP ACTUATION DEVICE

The AVR-1 device is designated for connection of two power supply inputs and for automatic backup actuation for load transfer from the main power supply feeder to a backup one in case of a failure of the main feeder, and vice versa.

AVR-1 can be used at the enterprises, where increased reliability is required. AVR-1 assures mechanical interlock and electrical protection eliminating possibility of simultaneous connection of the “Feeder 1” and “Feeder 2” inputs to its output circuits.

Design: a remote device for wall or panel mounting.

Technical characteristics of AVR-1

Parameters	Value
Rated input single-phase AC voltage (50±2) Hz	220 Vac
Allowed deviation from the rated voltage value	–15 %, +10 %
Basic peculiarities and functions:	- switching on and switching off each input feeder; - protecting against short circuit on the output; - light warning on availability of input and output voltages.
Load connection, not more than	10 A
Starting current, not more than	50 A
Time for switching from a feeder to a feeder, not more than	200 ms
Allowed interruption of input voltage with the duration up to 0.02 s and the recurrence interval not more than 10 s	from 187 V to zero and from 242 V to zero
Allowed depression of input voltage with the duration 2 s and the recurrence interval not more than 10 s	from 220 V to 154 V to zero
Allowed surge of input voltage from the rated value with the duration 2 s and the recurrence interval not more than 10 s	+25 %
Mean time between failures, not less than	300 000 h
Operating temperature range	from +5 to +70 ºC
Version	“General purpose industrial grade” and “NPP”
Dimensions WxHxD	126x148x175 mm
Weight, not more than	1.5 kg

AVR-2 EMERGENCY BACKUP ACTUATION DEVICE

The AVR-2 device is designated for connection of two power supply inputs and for automatic backup actuation for load transfer from the main power supply feeder to a backup one in case of a failure of the main feeder, and vice versa.

AVR-2 can be used at the enterprises, where increased reliability is required. AVR-2 assures mechanical interlock and electrical protection eliminating possibility of simultaneous connection of the “Feeder 1” and “Feeder 2” inputs to its output circuits.

Design: a device for panel mounting into a 19" rack.

Technical characteristics of AVR-2

Parameters	Value
Rated input voltage: - of alternating current (50±2) Hz - of direct current	 220 Vac 220 Vdc
Allowed deviation from the rated voltage value	±20 %
Basic peculiarities and functions:	- switching on and switching off each input feeder; - protecting against short circuit on the output; - light warning on availability of input and output voltages; - shapes the “MONITOR.” of the “dry contact” type.
Waveform distortion factor (at alternating current), not more than	10 %
Allowed voltage ripple (double amplitude) (at direct current), not more than	6 %
Load connection, not more than	8 A
Time for switching from a feeder to a feeder, not more than	140 ms
Voltage of priority on the “Feeder 1” input to shape output voltage, not less than	150 V
Mean time between failures, not less than	300 000 h
Operating temperature range	от +5 до +60 ºС
Version	“General purpose industrial grade” and “NPP”
Dimensions WxHxD	142x128x191 mm
Weight, not more than	3.0 kg

UBP-14 UNINTERRUPTIBLE POWER SUPPLY DEVICE

The UBP-14 device is designated to convert input voltage and to provide devices and units with power of alternating voltage 220 V and direct voltage 27 V. “Hot” swapping of units (possibility to replace faulty replacement units without loss of operability) is assured in UBP-14.

Design: a device for panel mounting into a 19" rack.

Technical characteristics of UBP-14

Parameters	Value
Rated input voltage: - of alternating current (50±2) Hz - of direct current - of direct current (for versions UBP-14/1, 14/2)	 220 Vac 220 Vdc 24 Vdc
Allowed deviation from the rated voltage value	±20 %
Basic peculiarities and functions:	- automatically switching on UBP when input voltage is switched on; - protecting against short circuit on the output; - softly transferring to operation from an accumulator battery; - softly returning to operation from input voltage; - signaling (audio) in case of overload, transfer to an accumulator battery and a fault of UBP; - indicating (light) operation of UBP units, charging of an accumulator battery, availability of input and output voltages.
Waveform distortion factor (at alternating current), not more than	10 %
Allowed voltage ripple (double amplitude) (with direct current), not more than	6 %
Allowed surge of input voltage from the rated value with the duration 2 s and the recurrence interval not more than 10 s	+25 %

Allowed interruption of input voltage with the duration 60 ms and the recurrence interval not less than 1 s	minus 100 %
Allowed depression of input voltage with the duration 2 s and the recurrence interval not more than 10 s	minus 30 %
Coefficient of efficiency, not less than	0.85
Coefficient of power at the input, not less than	0.96
Maximum current impulse at the input at the moment of its switching on with duration on the level 0.5 not more than 20 ms, not more than	50 A
Interface port	RS-232
Rated output voltage: - of alternating current (50±0.5) Hz - of direct current	 220±10 Vac 27±0.8 Vdc
Maximum value of load current: - of alternating current “220 Vac” - of direct current “27 Vdc”	 0.9 A 22.5 A
Maximum value of output power: - of alternating current “220 Vac” - of direct current “27 Vdc”	 200 W 600 W
Operation threshold for protection against current overloads at the output: - of alternating current “220 Vac” - of direct current “27 Vdc”	 from 1.0 to 1.4 A from 23 to 27 A
Allowed value of output voltage during operation from an accumulator battery (for version UBP-14)	from 28 to 18 Vdc
Time of UBP operation from a built-in accumulator battery (2 batteries with capacity 8 A·h each) (for version UBP-14), not less than	4 min
Mean time between failures, not less than	150 000 h
Operating temperature range	from +1 to +60 °C
Version	“General purpose industrial grade” and “NPP”
Dimensions WxHxD	482.6x132.6x479 mm
Weight, not more than - for version UBP-14 (with an accumulator battery) - for version UBP-14/1 - for version UBP-14/2	 19 kg 16 kg 10 kg

Designs of UBP-14

Version	Arrangement		
	Input voltage	Output voltage	Internal accumulator battery
UBP-14 435141.009	220 Vac ±20 % 220 Vdc ±20 %	220±10 Vac 27±0.8 Vdc	+
UBP-14/1 435141.009-01	220 Vac ±20 % 220 Vdc ±20 % 24 Vdc (21.6÷29 V)	220±10 Vac 27±0.8 Vdc	–
UBP-14/2 435141.009-02	24 Vdc (21.6÷29 V)	220±10 Vac 27 Vdc (20.6÷29 V)	–

BKTU-1 LEAK CURRENT MONITORING UNIT

The BKTU-1 unit is designated for monitoring of current state of a leak current in the range from 0 to 300 mA in 12 monitored circuits by means of PT-3 or PT-4 current transducers by comparison of a current value with the preset threshold and monitoring of connection integrity of each of current transducers in AC and DC power supply networks.

BKTU-1 is a multi-channel device and assures possibility of network address inputting to identify a device in a network.

Design: a unit for mounting onto a DIN rail.

Technical characteristics of BKTU-1

Parameters	Value
Supply voltage: - of alternating current (50±1) Hz - of direct current (for version BKTU-1/1)	 220 Vac 24 Vdc
Range of measurements of differential current in alternating and direct current networks	from 0 to 300 mA
Basic peculiarities and functions:	- acquiring data from PT-3 and PT-4 current transducers; - monitoring leak current values; - outputting information on each channel; - exchanging information with a BKSI-2 insulation resistance monitoring unit; - independently adjusting on each channel; - operating in radial and network topology of RS-485 interface; - outputting and receiving signals; - self-checking functions; - indicating (light).
Display format on a liquid-crystal display	alphanumeric and graphic
Control and adjustment of parameters	button
Interface port (galvanically isolated double-wire bidirectional)	2 x RS-485
Possibility of connection of PT-3 and PT-4 current transducers	up to 12
Mean time between failures, not less than	130 000 h
Operating temperature range	from +5 to +60 ºC
Version	“General purpose industrial grade” and “NPP”
Dimensions WxHxD	107x90x65 mm
Weight, not more than	0.35 kg

PT-3 and PT-4 CURRENT TRANSDUCERS

The PT-3 and PT-4 transducers are designated to operate with the BKTU-1 leak current monitoring unit, to convert input direct and alternating differential current, the value of which is within the limits from minus 300 to plus 300 mA, into voltage, which is in the range from minus 3 to plus 3 V.

PT-3 and PT-4 single out differential current in single-phase power supply lines and provide connection to power supply lines with current up to 30 A, AC voltage up to 250 V, DC voltage up to 350 V.

Design: a unit for mounting onto a DIN rail.

Technical characteristics of PT-3 and PT-4

Parameters	Value
Power supply from a direct current source	24 Vdc
Allowed deviation of supply voltage	from +20 to +30 V
Range of converted differential current	from –300 to +300 mA
Basic peculiarities and functions:	- singling out differential current in electrical power lines; - converting differential current; - outputting converted direct voltage.
Output voltage	from –3 to +3 V
Allowed deviation of output voltage, not more than	±0.05 V
Power consumption, not more than	0.5 W
Mean time between failures, not less than	130 000 h
Operating temperature range	from +5 to +60 ºC
Version	“General purpose industrial grade” and “NPP”
Dimensions WxHxD	26x76x112 mm
Weight, not more than	0.3 kg

BKSI-2 INSULATION RESISTANCE MONITORING UNIT

The BKSI-2 unit is designated for monitoring and online indication of electrical insulation resistance in electrical networks:

- a network of alternating current with a floating neutral;
- a network of alternating current with a floating neutral containing galvanic coupled rectifiers;
- a network of direct current with floating poles.

BKSI-2 can operate in conjunction with the BKTU-1 leak current monitoring units, thus assuring exact localization of insulation damage. The BKSI-2 unit has two galvanically isolated double-wire bidirectional RS-485 interfaces and can assure data acquiring from 384 monitored circuits.

BKSI-2 assures possibility to input a network address to identify a device in a network.

Design: a unit for mounting onto a DIN rail.

Technical characteristics of BKSI-2

Parameters	Value
Voltage of a monitored network of alternating or direct current	up to 650 V
Supply voltage: - of alternating current (50±1) Hz - of direct current - of direct current (for version BKSI-2/1)	 220 Vac 220 Vdc 24 Vdc
Basic peculiarities and functions:	- acquiring data from BKTU; - monitoring a value of electrical insulation resistance; - indicating electrical insulation resistance; - independently setting resistance thresholds; - independently adjusting on each control input; - outputting and receiving signals; - testing self-check of functions; - powering an external contact; - indicating (light).
Parameters of a measuring circuit	
Measuring voltage	from 49 to 51 V
Maximum measuring current	from 170 to 180 μA
Output resistance of a measuring circuit	285 kΩ
Range of insulation resistance measurement	from 1 to 10 000 kΩ
Allowed measurement error, not more than	10 %
Leak capacity of a measuring circuit	500 μF
Measurement time with leak capacity in a measuring circuit 1.0 μF	20 s

Signaling parameters	
Quantity of adjusted resistance thresholds	2
Setting limits for a value of resistance thresholds	from 1 to 10 000 kΩ
Hysteresis of resistance thresholds, of a threshold value	10 %
Signaling relay parameters	
Switched voltage, not more than - of alternating current - of direct current	 250 V 220 V
Switched current: - of alternating current - of direct current	 from 0.001 to 5 A from 0.001 to 0.25 A
Switched power: - of alternating current - of direct current	 60 V·A 60 W
Parameters of external control inputs	
Supply voltage of an external contact	from 3 to 3.5 V
Internal resistance of an external contact	from 0 to 3.5 kΩ
Time of response to activation of an external contact	100 ms
Other parameters	
Display format on a liquid-crystal display	alphanumeric and graphic
Control and adjustment of parameters	button
Interface port (galvanically isolated double-wire bidirectional)	2 x RS-485
Support of the leak current monitoring units (BKTU) to exchange information	up to 32
Quantity of monitored circuits	up to 384
Power consumption, not more than	10 V·A
Mean time between failures, not less than	130 000 h
Operating temperature range	from +5 to +60 ºC
Version	“General purpose industrial grade” and “NPP”
Dimensions WxHxD	107x90x65 mm
Weight, not more than	0.5 kg

BKSI-3 INSULATION RESISTANCE MONITORING UNIT

The BKSI-3 unit is designated for monitoring and online indication of electrical insulation resistance in electrical networks:

- a network of alternating current with a floating neutral;
- a network of alternating current with a floating neutral containing galvanic coupled rectifiers;
- a network of direct current with floating poles.

BKSI-3 is a one-channel device.

Design: a unit for mounting onto a DIN rail.

Technical characteristics of BKSI-3

Parameters	Value
Voltage of a monitored network of alternating or direct current	up to 350 V
Supply voltage of direct current	24 Vdc
Basic peculiarities and functions:	- acquiring data from a sensor; - indicating electrical insulation resistance; - independently setting resistance thresholds; - receiving a control signal from an external contact; - function self-checking; - powering an external contact; - indicating (light).
Parameters of a measuring circuit	
Measuring voltage	from 9 to 12 V
Maximum measuring current	from 90 to 110 μA
Output resistance of a measuring circuit	88 kΩ
Range of insulation resistance measurement	from 1 to 1 000 kΩ
Allowed measurement error, not more than	10 %
Measurement time with leak capacity in a measuring circuit 1.0 μF	20 s
Leak capacity of a measuring circuit	20 μF
Signaling parameters	
Quantity of resistance thresholds	2
Setting limits for a value of resistance thresholds	from 1 to 1 000 kΩ
Hysteresis of resistance thresholds, of a threshold value	10 %
Signaling relay parameters	
Switched voltage, not more than - of alternating current - of direct current	 250 V 220 V

Switched current: - of alternating current - of direct current	 from 0.001 to 5 A from 0.001 to 0.25 A
Switched power: - of alternating current - of direct current	 60 V·A 60 W
Parameters of external control inputs	
Supply voltage of an external contact	12 V
Internal resistance of an external contact	from 0 to 3.5 kΩ
Time of response to activation of an external contact	100 ms
Other parameters	
Display format on a liquid-crystal display	alphanumeric and graphic
Control and adjustment of parameters	button
Power consumption, not more than	5 V·A
Mean time between failures, not less than	130 000 h
Operating temperature range	from +5 to +60 ºC
Version	“General purpose industrial grade” and “NPP”
Dimensions WxHxD	35x90x65 mm
Weight, not more than	0.5 kg

PrS-2 SIGNAL TRANSDUCER

The PrS-2 transducer is designated to convert a signal from a primary or normalizing transducer into a unified output electrical signal of direct current or voltage and a digital signal. PrS-2 can be used for continuous, twenty-four-hour operation.

PrS-2 can be used for power supply of primary measuring transducers of “Sapphir-22” type or analogs, as well as when replacing an EP 4700 AS measuring transducer, an EP 4701 AS measuring transducer, an EP 4710 AS rooting unit. Design: a device for panel mounting.

Technical characteristics of PrS-2

Parameters	Value
Rated input voltage: - of alternating current (50±2) Hz - of direct current (from a backup source)	 220 Vac 24 Vdc
Allowed deviation from the rated input voltage value	from 187 to 242 Vac from 20.4 to 28.2 Vdc
Basic peculiarities and functions:	- receiving and shaping signals; - converting and processing signal values; - linearizing characteristics; - extracting a square root; - monitoring sensor connection; - powering transducers with direct voltage 24 V; - adjusting to a selected sensor type.
Type of connected thermal electric transducers	TKhK (L), TKhA (K), TPP (S), TPR (B), TVR (A-1), TVR (A-2), TVR (A-3), TMK (M), TKhKd
Type of connected resistive temperature transducers	50P, 100P, 50M, 100M, GR21 P, GR23 M
Connected sensors	of direct voltage, current, resistance
Output direct current voltage for power supply of primary measuring transducers	24 Vdc
Indication on a display	- input analog signal; - ranges of input and output signals; - value of temperature of free ends and an output analog signal; - emergency; - indication of the first and the second setpoint (for PrS-2/1).
Maximum switching voltage	250 V
Switching current, not more than	0.2 A

Limits of maximum permissible basic reduced error of conversion	±0.1 % or ±0.25 %
Outputting signals through a digital channel	RS-485
Mean time between failures, not less than	200 000 h
Operating temperature range	from minus 10 to +60 ºC
Version	“General purpose industrial grade” and “NPP”
Dimensions WxHxD - for version PrS-2 - for version PrS-2/1	 85x190x320 mm 85x190x360 mm
Weight, not more than - for version PrS-2 - for version PrS-2/1	 3.5 kg 4.0 kg

Designs of PrS-2

Version	Arrangement	
	Functional differences	Type of a liquid-crystal display
PrS-2 421415.002	Availability of two discrete inputs of control of an output analog signal.	Alphanumeric
PrS-2/1 421415.007	Availability of two discrete outputs of “dry contact” type of warning on the fact that an input analog signal goes out of the first or second setpoints.	Graphic

PrS-2 assures operation with sensors and input signals in the ranges in accordance with Tables 1, 2, and 3.

Table 1

Designation of a thermal electric transducer	Temperature measurement ranges, ºC	Input signal change range, mV
TKhK (L) *	from –70 to 800	from –4.107 to 66.442
TKhA (K) *	from –70 to 1300	from –2.587 to 52.41
TPP (S) *	from 0 to 1600	from 0 to 16.777
TPR (B) *	from 300 to 1800	from 0.431 to 13.591
TVR (A-1) *	from 0 to 1800	from 0 to 26.999
TVR (A-2) *	from 0 to 1800	from 0 to 27.231
TVR (A-3) *	from 0 to 1800	from 0 to 26.772
TMK (M) *	from –170 to 100	from –5.572 to 4.725
TKhKd	from –50 to 50	from –4.19 to 4.25
*Remark – * “l” is specified in the designation if the transducers with the included linearization function are ordered.*		

Table 2

Nominal static characteristic of a resistive temperature transducer	Temperature measurement range, °C	Temperature transducer resistance change range, Ω
50P, W=1.3850 (X * 1l **)	from –70 to 500	from 36.165 to 140.49
50P, W=1.3910 (X * 2l **)	from –70 to 500	from 35.95 to 141.945
100P, W=1.3850 (X * 1l **)	from –70 to 500	from 72.33 to 280.98
100P, W=1.3910 (X * 2l **)	from –70 to 500	from 71.9 to 283.89
50M, W=1.4260 (X * 1l **)	from –50 to 180	from 39.345 to 88.355
50M, W=1.4280 (X * 2l **)	from –50 to 180	from 39.225 to 88.5
100M, W=1.4260 (X * 1l **)	from –50 to 180	from 78.69 to 176.71
100M, W=1.4280 (X * 2l **)	from –50 to 180	from 78.45 to 177
GR21 P (X * l **)	from –50 to 650	from 36.80 to 153.30
GR23 M (X * l **)	from –50 to 180	from 41.71 to 93.64
*Remark – * instead of X "3" is specified in case of work with a resistive temperature transducer according to the three-wire scheme; instead of X "4" is specified in case of work with a resistive temperature transducer according to the four-wire scheme.*		
*Remark – ** "l" is specified in the designation if the transducers with the included linearization function are ordered.*		

Table 3

Type of a sensor connected	Designation	Input signal change ranges
Sensors with output signals of direct voltage	U	from –100 to 100 mV
Resistance sensors	R	from 0 to 250 Ω
Sensors with output signals of direct current	I 5 (n * SQ ** н ***)	from 0 to 5 mA
	I 20 (n * SQ ** н ***)	from 4 to 20 mA
*Remark – * "n" is specified in the designation in case of work with the included dead space at the initial section;*		
*Remark – ** "SQ" is specified in the designation in case of work with the included square-rooting function.*		
*Remark – *** "н" is specified in the designation in case of work with the dependency between an input and output signal in accordance with the table inputted by a user.*		

NAS-5 ANALOG SIGNAL NORMALIZER

The NAS-5 normalizer is designated to convert an input analog signal (of direct voltage, the value of which is within the limits from 0 to 36 V or from 0 to 100 mV, depending on the mode selected) into an output direct current directly proportional to it with the value, which is in the range from 4 to 20 mA.

NAS-5 has a design to be mounted onto a DIN rail and assures galvanic isolation of NAS's nodes from a 24 V power supply sourse.

Technical characteristics of NAS-5

Parameters	Value
Rated direct supply voltage	24 Vdc
Allowed deviation from the rated voltage value	–4 V, +6 V
Basic peculiarities and functions:	- receiving a signal; - converting a signal; - outputting a converted signal; - possibility to select the input signal range.
Input signal range	from 0 to 36 V from 0 to 100 mV
Output signal	from 4 to 20 mA
Reduced conversion error, not more than	±1 %
Output signal pulsation, not more than	±0.5 %
Output signal setting time, not more than	50 ms
Maximum load resistance value, not more than	500 Ω
Mean time between failures, not less than	500 000 h
Operating temperature range	from minus 5 to +45 ºC
Version	"General purpose industrial grade" and "NPP"
Dimensions WxHxD	26x76x112 mm
Weight, not more than	0.5 kg

PT-1 and PT-2 CURRENT TRANSDUCERS

The PT-1 and PT-2 transducers are designated to convert input alternating current, the value of which is within the range from 0 to 7 A, into output direct current proportional to it with the value from 0 to 10 mA.

PT-1 and PT-2 have a design to be mounted onto a DIN rail and possibility to adjust output current using a variable resistor, for access to which there is a hole (Reg.) on the front part of the unit.

Technical characteristics of PT-1 and PT-2

Parameters	Value
Input alternating current	0÷7 A
Basic peculiarities and functions:	- converting current; - outputting converted direct current; - possibility to select the output current range.
Output direct current	from 0 to 10 mA
Allowed deviation, not more than	±10 %
Reduced conversion error, not more than	±1 %
Mean time between failures, not less than	12 000 000 h
Operating temperature range	from minus 5 to +50 ºC
Version	“General purpose industrial grade” and “NPP”
Dimensions WxHxD	26x75x110 mm
Weight, not more than	0.15 kg

PN-18 and PN-19 VOLTAGE TRANSDUCERS

The PN-18 transducer is designated to convert input alternating voltage, the value of which is within the limits from 0 to 40 V, into output direct current directly proportional to it with the value, which is within the range from 0 to 20 mA.

The PN-19 transducer is designated to convert input alternating voltage, the value of which is within the limits from 0 to 242 V, into output direct current directly proportional to it with the value, which is within the range from 0 to 15.5 mA.

PN-18 and PN-19 have a design to be mounted onto a DIN rail and an output value regulator.

Technical characteristics of PN-18 and PN-19

Parameters	Value
Input alternating voltage: - PN-18 - PN-19	 0÷40 Vac 0÷242 Vac
Basic peculiarities and functions:	- converting voltage; - outputting converted direct current; - possibility to select the output current range..
Output direct current: - PN-18 - PN-19	 from 0 to 20 mA from 0 to 15.5 mA
Allowed deviation, not more than	±10 %
Reduced conversion error, not more than	±1 %
Voltage pulsation value at the output with maximum input voltage, not more than - PN-18 - PN-19	 30 mV 50 mV
Mean time between failures, not less than	500 000 h
Operating temperature range	from +1 to +40 ºC
Version	“General purpose industrial grade” and “NPP”
Dimensions WxHxD	26x75x110 mm
Weight, not more than	0.15 kg

PN-23 VOLTAGE TRANSDUCER

The PN-23 transducer is designated for power supply of devices and conversion of input direct voltage 27 V into stabilized alternating voltage 220 V (effective value) of sinusoidal form with frequency 50 Hz.

PN-23 endures starting load current with amplitude up to 30 A with duration not more than 1 ms, up to 5 A – with duration up to 5 ms, up to 2 A – with duration up to 20 ms. In PN-23 operation of an inverter is controlled with a built-in microcontroller.

Design: a device for panel mounting into a 19" rack.

Technical characteristics of PN-23

Parameters	Value
Rated input direct voltage	27 Vdc
Allowed deviation from the rated input voltage value	from 18 to 30 V
Basic peculiarities and functions:	- operation monitoring; - protecting unit's outputs against short-circuits from load; - light signaling on availability of input and output voltages; - shapes a "MONITOR." signal of "dry contact" type
Rated effective output AC voltage (50±0.5) Hz	220 Vac
Allowed deviation from the rated output voltage value	±3 %
Waveform distortion factor, not more than	10 %
Rated output power	250 V·A
Rated power with resistive load	150 W
Coefficient of efficiency, not less than	0.84
Trigger threshold for protection against overloads	from 1.0 to 1.3 A
Mean time between failures, not less than	500 000 h
Operating temperature range	from +1 to +60 ºC
Version	"General purpose industrial grade" and "NPP"
Dimensions WxHxD	107x129x190 mm
Weight, not more than	2.5 kg

BPt-157 POWER SUPPLY UNIT

The BPt-157 unit is designated for power supply of circuits of “Sapphir”-type devices and conversion of alternating voltage 220 V, 50 Hz into direct voltage 36 V (six isolated from each other outputs).

BPt-157 has three versions and is structurally compatible with a 22-BP 36 unit used for power supply of “Sapphir”-type devices.

The unit’s outputs are protected against short circuits from load and are isolated from each other. Current in the short-circuit mode doesn’t exceed 0.1 A.

Technical characteristics of BPt-157

Parameters	Value
Rated input AC voltage (50±2) Hz	220 Vac
Allowed deviation from the rated input voltage value	–15 %, +10 %
Basic peculiarities and functions:	- powering transducers with direct voltage 36 V; - converting voltage; - indicating (light).
Waveform distortion factor, not more than	10 %
Allowed interruption of input voltage with the duration up to 400 ms and the recurrence interval not more than 10 s	minus 100 %
Allowed depression of input voltage with the duration 2 s and the recurrence interval not more than 10 s	minus 30 %
Allowed surge of input voltage from the rated value with the duration 2 s and the recurrence interval not more than 10 s	+25 %
Output DC voltage (six isolated outputs)	36 Vdc
Allowed deviation of output voltage	±0.18 Vdc
Maximum value of load current	0.035 A
Power consumption, not more than	25 V·A
Mean time between failures, not less than	300 000 h
Operating temperature range	from +5 to +60 ºC
Version	“General purpose industrial grade” and “NPP”
Dimensions WxHxD: - BPt-157, BPt-157/1 - BPt-157/2	 80x180x305 mm 80x180x340 mm
Weight, not more than	4.2 kg

Designs of BPt-157

Version	Arrangement	
	Features of construction	Remark
BPt-157 436711.001	with a “NETWORK” switch	-
BPt-157/1 436711.001-01	without a “NETWORK” switch	-
BPt-157/2 436711.001-02	without a “NETWORK” switch and with a BSd aligner	to replace obsolete power supply units earlier produced for “Sapphir”-type devices

BPt-161 POWER SUPPLY UNIT

The BPt-161 unit is designated for power supply of monitoring equipment and conversion of alternating mains voltage 220 V with frequency 50 Hz or direct mains voltage 220 V into stabilized direct voltage +24 V (two isolated from each other outputs) with load current on each output 3 A.

It is allowed to connect the unit's outputs both in parallel and in series. In this case, the unit becomes not two-channel, but one-channel with output voltage 24 V and load current 6 A or 48 V and load current 3 A.

Design: a unit for panel mounting into a 19" rack.

Technical characteristics of BPt-161

Parameters	Value
Rated input voltage: - of alternating current (50±2) Hz - of direct current	 220 Vac 220 Vdc
Allowed deviation from the rated input voltage value	from 100 to 264 Vac from 120 to 372 Vdc
Basic peculiarities:	- protecting against overvoltages and current overloads; - protecting the unit's outputs against short circuits from load; - indicating (light).
Waveform distortion factor (with alternating current), not more than	10 %
Allowed surge of input voltage from the rated value with the duration 2 s and the recurrence interval not more than 10 s	+25 %
Allowed voltage ripple (double amplitude) (with direct current), not more than	6 %
Output DC voltage (two isolated outputs)	24 Vdc
Allowed deviation of output voltage	±0,36 Vdc
Rated load current with: - two-channel connection (+24 V) - parallel connection of the outputs (24 V) - series connection of the outputs (48 V)	 3 A 6 A 3 A
Current consumption in the rated mode: - from the AC network, not more than - from the DC network, not more than	 1.4 A 0.9 A
Mean time between failures, not less than	500 000 h
Operating temperature range	from +5 to +70 °C
Version	"General purpose industrial grade" and "NPP"
Dimensions WxHxD	82x130x190 mm
Weight, not more than	1.7 kg

BPt-208 POWER SUPPLY UNIT

The BPt-208 unit is designated for power supply of processor modules and conversion of input direct voltage 27 V into direct stabilized voltages +3.3 V; +5 V; +5 Vsb; +12 V; minus 12 V.

BPt-208 consists of two voltage transducers operating in parallel for one load.

Design: a unit to be mounted into a case of industrial PCs.

Technical characteristics of BPt-208

Parameters	Value
Rated input direct voltage	27 Vdc
Allowed deviation from the rated input voltage value	– 9 V, +1 V
Basic peculiarities and functions:	- converting voltage; - monitoring unit's voltages; - protecting against overvoltages, voltage decrease, and current overloads; - protecting the unit's outputs against short circuits; - signaling (light and audio).
Unit's current consumption in the rated mode, not more than	14 A
Output DC voltage	+3.3 V; +5 V; +5 Vsb; +12 V (1); +12 V (2); –12 V
Allowed deviation of output voltage: - "+3.3 V", "+5 V", "+5 Vsb" - "+12 V (1)", "+12 V (2)" - "minus 12 V"	 ±0.1 V ±0.2 V ±1.0 V
Allowed range of load current: - "+3.3 V" - "+5 V" - "+5 Vsb" - "+12 V (1)" - "+12 V (2)" - "minus 12 V"	 from 0.5 to 18 A from 0.3 to 12 A from 0 to 2.5 A from 1.0 to 8 A from 1.0 to 13 A from 0 to 0.3 A
Total power of channels "+3.3 V" and "+5 V", not more than	120 W
Total power of all channels, not more than	300 W
Mean time between failures, not less than	500 000 h
Operating temperature range	from 0 to +60 ºC
Version	"General purpose industrial grade" and "NPP"
Dimensions WxHxD	86x155x205 mm
Weight, not more than	3.0 kg

BPt-213 POWER SUPPLY UNIT

The BPt-213 unit is designated for power supply of control systems and conversion of input alternating voltage 220 V into direct voltage 24 V with rated load current 10 A.

BPt-213 has a design for panel mounting and possibility to adjust output voltage using a variable resistor, for access to which there is a hole (Reg.) on the front part of the unit.

Technical characteristics of BPt-213

Parameters	Value
Rated input AC voltage (50±3) Hz	220 Vac
Allowed deviation from the rated input voltage value	–15 %, +10 %
Basic peculiarities:	- monitoring output voltage; - adjusting output voltage; - protecting against overvoltages, voltage decrease, and current overloads; - protecting the unit's outputs against short circuits; - indicating (light).
Waveform distortion factor, not more than	10 %
Output DC voltage	24 Vdc
Allowed deviation of output voltage	±0.5 V
Rated load current	10 A
Minimum load current	0.1 A
Coefficient of power at the input	0.95
Coefficient of efficiency, not less than	0.84
Trigger threshold for protection against overvoltage at the unit's output	from 26 to 28 V
Trigger threshold for protection against overloads at the unit's output	from 16 to 20 A
Mean time between failures, not less than	500 000 h
Protection degree	IP 21
Operating temperature range	from +5 to +60 ºC
Version	"General purpose industrial grade" and "NPP"
Dimensions WxHxD	155x302x79 mm
Weight, not more than	3.0 kg

BPt-222 POWER SUPPLY UNIT

The BPt-222 unit is designated for power supply of processor modules and conversion of input direct voltage 27 V into direct stabilized voltages +3.3 V; +5 V; 5 Vsb; +12 V.

BPt-222 consists of two voltage transducers operating in parallel for one load, where a current equalization system is used. In BPt-222 the following is stipulated: audio and light signaling if one of the units fails вwith the possibility to remove signaling with a button.

Design: a unit to be mounted into a case of industrial PCs.

Technical characteristics of BPt-222

Parameters	Value
Rated input direct voltage	27 Vdc
Allowed deviation from the rated input voltage value	– 9 V, +1 V
Basic peculiarities:	- monitoring voltages of the unit; - protecting against overvoltages, voltage decrease, and current overloads; - protecting the unit's outputs against short circuits; - signaling (light and audio).
Current consumption of the unit in the rated mode, not more than	14 A
Output DC voltage	+3.3 V; +5 V; +5 Vsb; +12 V (1); +12 V (2)
Allowed deviation of output voltage: - "+3.3 V" - "+5 V", "+5 Vsb" - "+12 V (1)", "+12 V (2)"	 ±0.1 V ±0.25 V ±0.6 V
Allowed range of load current: - "+3.3 V" - "+5 V" - "+5 Vsb" - "+12 V (1)" - "+12 V (2)"	 from 0.5 to 12 A from 0.3 to 10 A from 0 to 2.5 A from 1.0 to 8 A from 1.0 to 13 A
Total power of channels "+3.3 V" and "+5 V", not more than	90 W
Total power of channels "+12 V (1)" and "+12 V (2)", not more than	230 W
Total power of all channels, not more than	250 W
Mean time between failures, not less than	500 000 h
Operating temperature range	from +1 to +60 ºC
Version	"General purpose industrial grade" and "NPP"
Dimensions WxHxD	96x162x205 mm
Weight, not more than	2.5 kg

BPt-228 and BPt-229 POWER SUPPLY UNITS

The BPt-228 unit is designated for power supply of monitoring equipment and conversion of input alternating voltage 220 V into galvanically isolated direct voltage in the range 24÷27 V.

The BPt-229 unit is designated for power supply of monitoring equipment and conversion of input alternating voltage 220 V into galvanically isolated direct voltage in the range 48÷50 V.

BPt-228 and BPt-229 have a design for panel mounting into a 19" rack and a possibility to monitor output voltage using the "+ V" and "GENERAL" connectors located on the front part of the units.

Technical characteristics of BPt-228 and BPt-229

Parameters	Value
Rated input AC voltage (50±2) Hz	220 Vac
Allowed deviation from the rated input voltage value	–15 %, +10 %
Basic peculiarities:	- monitoring output voltage; - protecting against overvoltages, voltage decrease, and current overloads; - protecting the unit's outputs against short circuits; - indicating (light).
Waveform distortion factor, not more than	10 %
Output DC voltage: - BPt-228 - BPt-229	 24÷27 Vdc 48÷50 Vdc
Rated load current: - BPt-228 - BPt-229	 8 A 1.8 A
Coefficient of power at the input	0.95
Trigger threshold for protection against overvoltage at the unit's output: - BPt-228 - BPt-229	 from 27 to 29 V from 55 to 58 V
Trigger threshold for protection against overloads: - BPt-228 - BPt-229	 from 9 to 11 A from 2 to 3 A
Mean time between failures, not less than	500 000 h
Operating temperature range	from –5 to +40 ºC
Version	"General purpose industrial grade"
Dimensions WxHxD	71x262x250 mm
Weight, not more than - BPt-228 - BPt-229	 4.0 kg 3.81 kg

MPt-2 POWER SUPPLY MODULE

The MPt-2 module is designated for power supply of control systems and conversion of input alternating or direct voltage 220 V into direct voltage 24 V with load current 14 A.

MPt-2 has a design for panel mounting and possibility to adjust output voltage using a variable resistor, for access to which there is a hole (Reg.) on the front part of the unit.

Technical characteristics of MPt-2

Parameters	Value
Rated input voltage: - of alternating current (50±1) Hz - of direct current	 220 Vac 220 Vdc
Allowed deviation from the rated input voltage value	–15 %, +10 % (Vac) ±20 % (Vdc)
Basic peculiarities:	- monitoring output voltage; - adjusting output voltage; - protecting against overvoltages, voltage decrease, and current overloads; - protecting the unit's outputs against short circuits; - indicating (light).
Waveform distortion factor (with alternating current), not more than	10 %
Allowed voltage ripple (double amplitude) (with direct current), not more than	6 %
Output DC voltage	24 Vdc
Allowed deviation of output voltage	±0.5 V
Rated load current	14 A
Coefficient of efficiency, not less than	85%
Trigger threshold for protection against overvoltage at the unit's output	from 27 to 29 V
Trigger threshold for protection against overloads at the unit's output	from 16 to 28 A
Mean time between failures, not less than	300 000 h
Protection degree	IP 20
Operating temperature range	from 0 to +60 ºC
Version	"General purpose industrial grade" and "NPP"
Dimensions WxHxD	220x350x89 mm
Weight, not more than	4.5 kg

BVn-118 and BVn-124 FAN UNITS

The BVn-118 and BVn-124 units are designated to cool units of elements or other electronic devices and reduce temperature inside cabinets by blowing with ambient air.

Design: a device for panel mounting onto telescopic guideways into a 19" rack.

Technical characteristics of BVn-118 and BVn-124

Parameters	Value
Rated supply voltage: - of alternating current (50±2) Hz - of direct current	 220 Vac 220 Vdc
Allowed deviation from the rated voltage value	–50 V, +25 V
Mode of operation:	- full power mode Pn - mode “0.25 Pn” - temperature-dependent Pt
Basic peculiarities:	- indicating (light); - shaping an “Output” monitoring digital signal.
Waveform distortion factor (with alternating current), not more than	10 %
Allowed voltage ripple (double amplitude) (with direct current), not more than	5 %
Power consumption of BVn: - from an AC network, not more than - from a DC source, not more than	 35 V·A 26.4 W
Current consumption in the rated mode: - from an AC network, not more than - from a DC source, not more than	 0.155 A 0.12 A
Efficiency in the full power mode, not less than	450 m^3/h
Mean time between failures, not less than	650 000 h
Operating temperature range	from +5 to +60 ºC
Version	“General purpose industrial grade” and “NPP”
Dimensions WxHxD: - BVn-118 - BVn-124	 483x44x234 mm 430x52x247 mm
Weight, not more than - BVn-118 - BVn-124	 3.7 kg 4.0 kg

ShR-1 DISTRIBUTION CABINET

The ShR-1 cabinet is designated for connection of 21 users (with rated power 880 V·A each) to a power network by means of automatic switches from two independent feeders.

ShR-1 is divided into two sections, each of which has 3 three-phase inputs with 7 single-phase outgoing lines and a “BLOCKING” panel. ShR-1 can be used both in mounted and floor versions in indoor areas.

Technical characteristics of ShR-1

Parameters	Value
Rated input three-phase AC voltage (50±2) Hz	220 / 380 Vac
Allowed deviation from the rated voltage value	–15 %, +10 %
Basic peculiarities and functions:	- inputting from two independent feeders; - blocking outgoing lines; - indicating (light).
Phase voltage waveform distortion factor, not more than	10 %
Rated current on each phase of a three-phase automatic switch	28 A
Mean time between failures, not less than	300 000 h
Operating temperature range	from +5 to +40 ºC
Protection degree	IP 21
Version	“General purpose industrial grade”
Dimensions WxHxD	800x1400x330 mm
Weight, not more than	95 kg

ShchV-1 INPUT PANEL

The ShchV-1 panel is designated to input, protect against impulse lightning overvoltages, and record electric power consumption of three feeders of three-phase voltage depending on the package.

Technical characteristics of ShchV -1

Parameters	Value
Rated input and output three-phase AC voltage (50±1) Hz	230 / 400 Vac
Allowed deviation from the rated AC input voltage value	–10 %, +5 %
Basic peculiarities and functions:	- remote switching-off; - manual selective switching-off; - protecting input and output circuits against overloads and short circuits; - recording electric power consumption on each feeder; - shaping discrete signals of modes of operation; - monitoring and diagnosing panel's components; - indicating (light).
Guaranteed DC voltage for power supply of control circuits	24 Vdc

Allowed deviation from the rated DC input voltage value	from 22 to 30 Vdc
Allowed load current of input guaranteed DC voltage, not more than	2 A
The maximum value of phase current of output three-phase voltage, not more than - for versions ShchV-1 and ShchV-1/1 - for versions ShchV-1/2 and ShchV-1/3 - for versions ShchV-1/4 and ShchV-1/5	 120 A 80 A 63 A
Allowed quantity of electric power meters	up to 3
Mean time between failures, not less than	50 000 h
Operating temperature range	from +1 to +50 ºC
Protection degree	IP 21
Version	“General purpose industrial grade”
Dimensions WxHxD	1010x1945x430 mm
Weight, not more than	280 kg

Designs of ShchV-1

Version	Arrangement	
	Load current	Availability of an electric power meter of a “3” feeder
ShchV-1 469114.069	120 A	available
ShchV-1/1 469114.069-01	120 A	not available
ShchV-1/2 469114.069-02	80 A	available
ShchV-1/3 469114.069-03	80 A	not available
ShchV-1/4 469114.069-04	63 A	available
ShchV-1/5 469114.069-05	63 A	not available

ShchOAB-1 PANEL TO SWITCH OFF ACCUMULATOR BATTERIES

The ShchOAB-1 panel is designated for inputting and emergency switching-off of a bus of direct voltage of accumulator batteries (AB) from a power supply system.

Technical characteristics of ShchOAB-1

Parameters	Value
Rated input and output power direct voltage during operation from ABs	24÷240 Vdc
Allowed deviation from the rated DC input voltage value: - during operation from ABs 240 Vdc - during operation from ABs 24 Vdc	 –30 V, +110 V –2 V, +6 V
Basic peculiarities and functions:	- remotely switching off ABs; - shaping discrete signals of modes of operation; - connecting an external sensor of temperature of ABs; - protecting input and output circuits against overloads and short circuits; - monitoring and diagnosing panel's components; - inputting-outputting circuits monitoring voltage on ABs; - indicating (light).
Allowed voltage ripple, not more than	6 %
Guaranteed DC voltage for power supply of control circuits	24 Vdc
Allowed deviation from the rated DC input voltage value	–2 V, +6 V
Allowed load current of input guaranteed DC voltage, not more than	2 A
The maximum value of phase current, not more than - for versions ShchOAB-1 - for versions ShchOAB-1/1 - for versions ShchOAB-1/2	 250 A 200 A 160 A

Mean time between failures, not less than	50 000 h
Operating temperature range	from –5 to +50 ºC
Protection degree	IP 21
Version	“General purpose industrial grade”
Dimensions WxHxD	600x676x250 mm
Weight, not more than	42 kg

Designs of ShchOAB-1

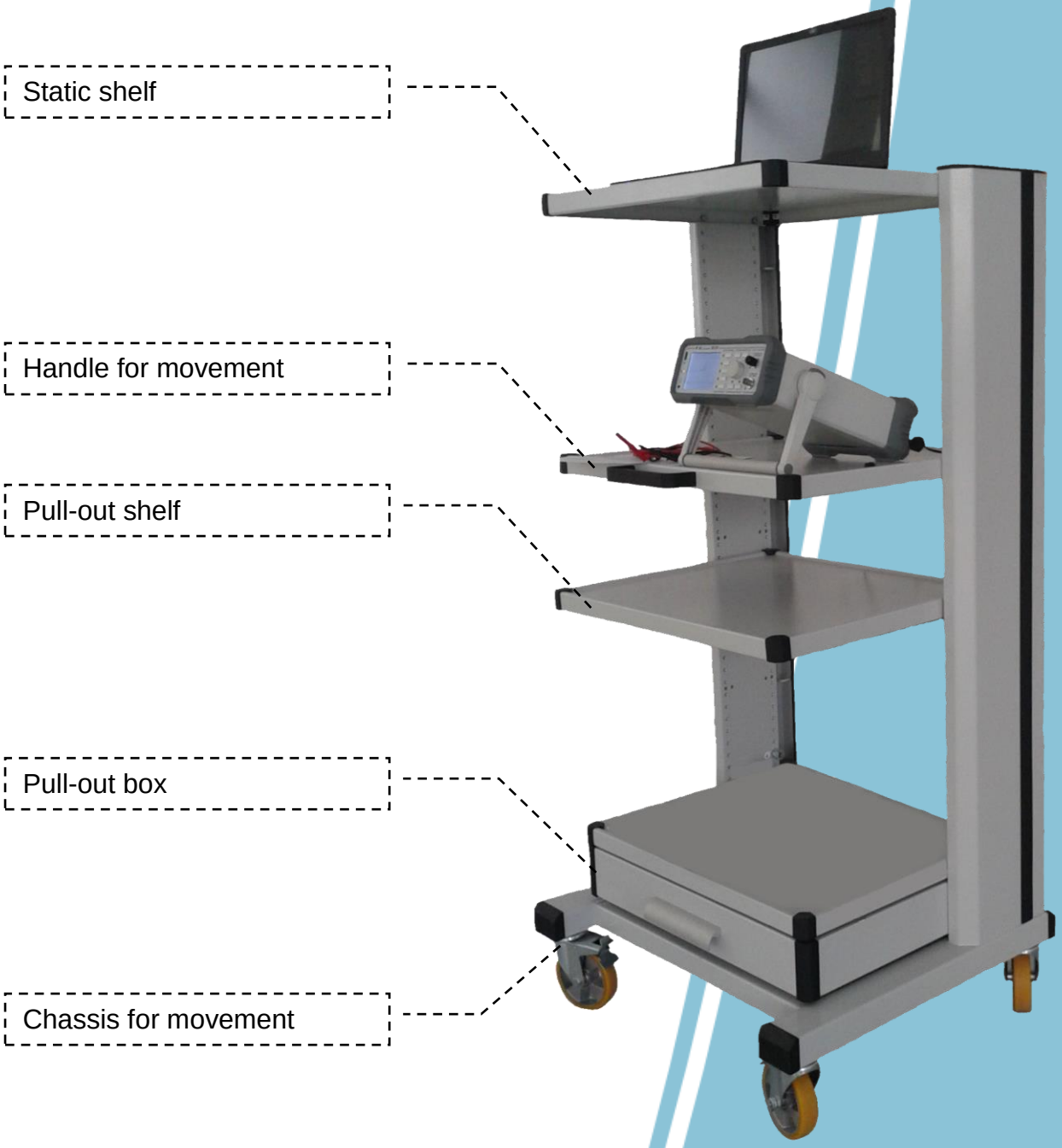
Version	Arrangement	
	Position of a switch $I_R(\times I_n)$	Load current
ShchOAB-1 469114.068	1.00	250 A
ShchOAB-1/1 469114.068-01	0.80	200 A
ShchOAB-1/2 469114.068-02	0.63	160 A

INSTRUMENT MOBILE RACK (CART)

The rack has a project-arranged structure and is designated for steady placement of measuring devices and other accessories with the possibility of their movement.

Basic peculiarities:

- robust construction of sheet steel;
- resistance of power coating to external impact;
- boxes are equipped with guides with a “PUSH” system assuring smooth and noiseless complete opening and closing with a slight push;
- shelves are equipped with telescopic guides with finishers;
- a unit of sockets with a power cable located on a backside;
- compact dimensions allowing going through a lift door (ground (chassis) dimension is not more than 714x670 mm, rack height is 1432 mm);
- load capacity of shelves is up to 23 kg;
- load capacity of boxes is up to 25 and 30 kg.



MANUFACTURING CAPABILITY

The factory of PJSC “SRPA “Impulse” is equipped with modern equipment allowing serial manufacturing and monitoring of items of industrial electronics, electrotechnics, project-arranged cabinets, panels, and structures. Area of the factory, the testing and adjustment grounds – over 30 thousand square metres.

The production facilities meet the requirements of Ukraine and international standards as to manufacturing, testing, and warehousing. The production rooms equipped with required equipment are protected against negative impact of dust, vibrations, and other influencing factors. Constant temperature is year-round maintained in them due to a heating system, ventilation and conditioning systems.

The quality control system at the enterprise is certified to meet the requirements of the Ukrainian standard DSTU ISO 9001:2015 and the international standard ISO 9001:2015.

Development of manufacturing technological processes, interaction of services when manufacturing products are determined with the package of standards, guides, instructions of the enterprise, as well as requirements specifications, design documentation, product quality and reliability assurance programs.

Purchased raw materials, materials, semi-finished products, componentry, and structural elements used during manufacturing undergo obligatory incoming inspection.

Details, assembly units, units of elements, devices, sets, hardware complexes, independent sets of spare parts, tools, and accessories during the manufacturing process undergo operational technical inspection in accordance with the enterprise’s standards.

Before handover-acceptance testing, all items (units of elements, devices, sets, hardware complexes) undergo technological run under the utmost permissible operation conditions. The technological run is done to detect and replace potentially unreliable elements in a product. Failures that emerged during the run are eliminated and their reasons are analyzed. The reliability service together with the quality control department regularly process and summarize information received during the runs and develop measures directed to increase quality of products manufactured.

After manufacturing, finished products are inspected by the quality control department, undergo special technical acceptance (to supply products to NPPs) and certification testing. Products having a certificate of correspondence are packed and

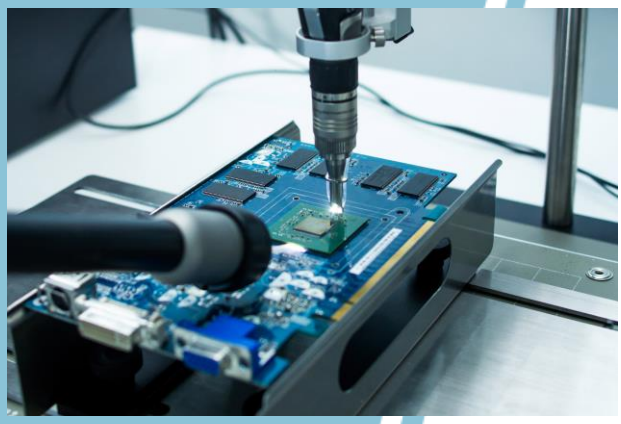
transmitted to the enterprise's warehouse, where they are stored till shipping to a user, a customer.

Production automated lines, machines and installations with computer numerical control are constantly renewed.

The following is done at the enterprise's production facilities:

- mechanical treatment:
  - material cutting using a Byjet Pro 3015 hydroabrasive cutting machine, an EVERISING BS-250 SSV contour band machine, a guillotine shearing press;
  - punching and bending using an Amada turret punch press, hydraulic presses, an Amada bending press, crank presses;
  - turning using Goodway GS-260, Nexturn 26E turning machining centres with CNC;
  - milling using all-purpose Takang and Doosan milling machines and milling centres with CNC;
  - grinding, polishing, bead-blasting treatment;
  - coordinating using coordinate boring machines;
  - welding for rough and stainless steels using a Fronius TT4000 job semiautomatic welder, spot and condenser welding;
  - washing machine to clean metal details;

- polymeric detail manufacturing by means of pressure die casting and moulding;
- application of electrochemical (zink, nickel, chrome, tin-bismuth) and paint-and-lacquer (powder painting) coatings to metals;
- application of polyurethane seals;
- application of marking symbols (thermal transfer, UV-print, engraving, burning-in decalcomania, punch marking);



- production of units of elements on the basis of printed circuit boards and other work to assemble electronic radio equipment:
  - installation of active and passive components to printed circuit boards using a Samsung automatic surface mounting line;
  - quality of assembly of printed circuit assemblies is monitored using an HV5000TLC automatic optical checking system (NEXSCIEN). Quality of microchip installation in BGA cases is monitored using a Flexia BGA videomicroscope (Optilia);
  - installation of pin components to printed circuit boards using modern digital soldering stations by PEACE, ERSA;
  - washing of printed circuit boards on a semiautomatic modular line in ultrasonic and jet installations;
  - installation and assembly of cabinets, panels, racks, cabinet bases, tables, etc.;
  - production of harnesses, cables, jumpers using standard lugs, connectors by Wago, Harting, etc.

Then the following processes are done at the enterprise:

- testing for resistance to external exposure factors, electromagnetic compatibility, and safety at the testing laboratory certified to meet ISO 17025 at the National Ukrainian Certification Agency, the laboratory is situated at the territory of the enterprise;
- equipment installation supervision, participation in adjustment, in testing, and in commissioning;
- continuous technical support for operational services and author's support during the whole life-cycle of equipment produced;
- warranty and post-warranty repair.

LICENCES, CERTIFICATES

PJSC “SRPA “Impulse” is a corporate supplier of SE “NNEGC “Energoatom”, PJSC “Ukrainska zaliznytsia”, as well as large companies-system integrators of I&Cs.

Products manufactured have been tested and meet the requirements of national and international standards for electromagnetic compatibility, resistance to environmental conditions and seismic conditions.

A full technological cycle of equipment production, its implementation at facilities, and subsequent support of operation are assured at PJSC “SRPA “Impulse”.

SEVERODONETSK
RESEARCH AND PRODUCTION ASSOCIATION
“IMPULSE”

Pl. Pobedy, 2, Severodonetsk,
Lugansk region, Ukraine, 93405

Tel./fax: (+38-06452) 2-95-87

E-mail: impuls@imp.lg.ua
www.imp.lg.ua