



J O I N T S T O C K C O M P A N Y

ELECTROPRIBOR

CATALOG OF DIGITAL DEVICES
FOR MEASURING THE ELECTRICAL PARAMETERS

ELECTRIC MEASUREMENT DEVICES WITH DIGITAL INDICATION



POWER QUALITY ANALYZERS WITH TECHNICAL AND COMMERCIAL ACCOUNTING

MULTIFUNCTIONAL POWER QUALITY ANALYZERS WITH TECHNICAL AND COMMERCIAL ACCOUNTING



ЩМК96



ЩМК120C

ЩМК96 and ЩМК120 devices are intended for control of class A power energy quality parameters in accordance with GOST 30804.4.30-2013, GOST 32144-2013. They are designed for measurement of all power energetic parameters at the connection point and power energy technical record-keeping.

ЩМК120C devices are intended for commercial accounting of the power energy in accordance with the GOST 31819.22-2012 (0,2 S class), GOST 31819.23-2012 (1 class) and quality control of the class A power energy parameters in accordance with GOST 30804.4.30-2013, GOST 32144-2013, electrical current parameters, voltage, power, active and reactive energy in the three-phase electric mains and AC systems. The devices satisfy all the requirements for the commercial accountings devices.

Also these devices can integrate into the telemetry systems, they can simultaneously transfer data for several directions independently.

Scopes of application:

- power energy quality parameters monitoring at the power energy distribution systems;
- electric power quality parameters control in Automated measuring and information system for electric power commercial accounting, at production areas and Housing and public utilities;
- 8-tariff electric power iscal metering (ЩМК120C);
- measuring of the circuits parameters and its transmission to the telemetry control systems and ACS;
- emergency registration;
- measuring of energy loss in power line.

ЩМК96, ЩМК120 (ЩМК120C) is put on the State Register of the Measuring Devices RF №60431-15, the validity period is to April 14, 2020.

Quality of electric power

Class A

GOST 30804.4.30-2013

GOST 32144-2013

GOST 30804.4.15-2013

GOST 30804.4.7-2013

GOST R8.655-2009

- RMS of voltage
- frequency
- Duration and depth of voltage fail and voltages swell
- Temporary voltages swell duration
- Long and short flicker batch
- Temporary voltage swell coefficient
- n-harmonical voltage component coefficient
- voltage waveform distortion factor
- voltage unbalance factor for inverted sequence
- voltage unbalance factor for null sequence

Electric power

commercial accounting

only for
ЩМК120C

GOST 31819.22-2012(0,2S class)

GOST 31819.23-2012(1 class)

- metering of the consumed active electric energy in increment total in summarily and severally as per tariff
- eight tariffs
- active and reactive energy
- active and reactive loss energy
- flags of energy metering misconduct

Measurement and display of electric system parameters

GOST 22261-94

GOST R52931-2008

GOST 29322-2014

- electric current, tolerance not above $\pm 0,1\%$
- voltage, tolerance not above $\pm 0,1\%$
- electric power, tolerance not above $\pm 0,5\%$
- electric energy, tolerance not above $\pm 0,5\%$

Device Type	Overall dimensions, mm	Character height, mm	Weight, kg
ЩМК96	96x96x93 (without safety cover) 96x96x103 (with safety cover)	20,14	0,7
ЩМК120, ЩМК120С	120x120x93 (without safety cover) 120x120x103 (with safety cover)	20,14	0,7

Electric energy quality parameters	Range of measurement	Measurement error limit*
RMS of voltage(U), V	(0...200) % U_{nom}	$y=\pm 0,1\%$
Overdeviation($\delta U_{(+)}$), %**	(0...100) %	$\Delta=\pm 0,1$
Underdeviation($\delta U_{(-)}$), %**	(0...90) %	$\Delta=\pm 0,1$
Frequency (f), Hz	(42,5...57,5) Hz	$\Delta=\pm 0,01$
Frequency deviation(Δf), Hz	(-7,5...7,5)Hz	$\Delta=\pm 0,01$
Short flicker batch(P_{st}), rel. un.	(0,2...10)	$\delta=\pm 5\%$
Long flicker batch(P_{lt}), rel. un.	(0,2...10)	$\delta=\pm 5\%$
n-harmonical voltage component coefficient to the 50 degree ($K_{U(n)}$), %***	(0,05...30)	$\Delta=\pm 0,05$ ($K_{U(n)} < 1\%$)
		$\delta=\pm 5,0\%$ ($1\% < K_{U(n)} < 30\%$)
Aggregate harmonical voltage component coefficient (voltage waveform distortion factor)(K_U), %	(0,1...30)	$\Delta=\pm 0,05$ ($0,1\% < K_U < 1\%$)
		$\delta=\pm 5,0\%$ ($1\% < K_U < 30\%$)
Voltage unbalance factor for inverted sequence (K_{2U}), %	(0...20)	$\Delta=\pm 0,15$
Voltage unbalance factor for null sequence (K_{0U}), %	(0...20)	$\Delta=\pm 0,15$
Duration of the voltage fail (Δt_n), sec	(0,02...60) s	$\Delta=\pm 0,02$
Depth of the voltage fail (δU_n), %	(10...99) %	$\Delta=\pm 0,2$
Duration of the voltage interruption (Δ_{int}), sec	(0,02...60) s	$\Delta=\pm 0,02$
Duration of the temporary over-voltage (Δ_{tov}), sec	(0,02...60) s	$\Delta=\pm 0,02$
Temporary over-voltage factor (K_{ov}), rel. un.	(1,1...2,0)	$\Delta=\pm 0,002$

* error identifications: Δ – absolute; δ , % – fractional; y , % – reduced

** relatively to the U_n which is equal to the nominal U_n or approved U_{app} value of voltage as per GOST32144

*** the harmonic subgroup number n is from 2 to 50 as per GOST 30804.4.7

Data display	
LED indication (single or seven-segment dispalys)	- 3 blocks of the seven-segment displays (4 indicators in each block) - single LED displays for displaying of the measurement units, different indexes, signs of the di displayed parameters Height of character: 20 mm and 14 mm (ЩМК96, ЩМК120), 20 mm (ЩМК120С) For ЩМК120С there is a row of seven-segment indicators in the bottom part of the front panel, they are used for displaying of the current values and sum results for every tariff and total for all tariffs, current tariff number, date and time.
Additional Features	To display telemetry at the optional device: Connection of the indication modules (МИ120, МИ80) or indication panel Т44, Т54, Т74 on the RS485 interface or Ethernet (for МИ120.5) To communicate with telemetry control unit: Connection of the telemetry controller ЭЛКТ on the RS485 interface for data transferring to the upper level as per IEC6 1850-8-1 protocol (Ethernet interface)
Telemetry	
Input signal	Current:1A,5A Voltage:100V, 400 V Nominal effective voltage:57.7/230V – phase, 100/400 V – phase-to-phase Measurement frequency of the current/voltage input signal:42,5-57,5Hz Maximum wire section 4mm ²
Measuring time	0,2sec.(current and voltage),1 sec (frequency)
Galvanic isolation of the input and output circuits, supply circuits	Yes
Minimum input resistance in Current circuits: Voltage circuits:	0,02 Om (1A, 5A) 0,4 MOm (100V), 1,6 MOm (400V)

Communication interfaces	
RS485	Protocols: Modbus RTU, IEC 60870-5-101 Note: It is possible to have one RS485 port for ЩМК96, ЩМК120, two RS485 ports – for ЩМК120C
Ethernet	Ethernet 10/100 BASE TX (socket RJ45) or Ethernet 100 BASE FX (socket ST) Protocols: IEC 60870-5-104, IEC 61850-8-1 Note: It is possible to have one Ethernet port for ЩМК96, ЩМК120, two Ethernet ports – for ЩМК120C
Remote human-computer interface	HTTP(Embedded WEB-server)
Integration with Electric Energy Quality Control Parameters System	HTTP(integration in to the software package for visualization and monitor ingofindicators of the quality of electricity supplied with the device)
Device time synchronization	NTP (RFC5905)/PTP (IEEE'1588)
Integration into the systems	IEC 60870-5-101/104, IEC 61850-8-1
For ЩМК120C: optic "optoport" interface (IEC 61107), impulse output interface	
Power supply	
Voltage	- main: 220 V (90-264V of AC with frequency of (50 ± 0,5) Hz or 130-370V of DC) - stand-by: «STAND-BY» (for ЩМК120C)
Power from the supply circuit (not above)	10V-A (full power) when powered by a single-phase alternating current source 50 Hz, 10W when powered from the direct current source
Device reprogramming (trim)	
Reprogramming	-via the Configurator software (RS485 interface, Ethernet), -via WEB-interface, -via control buttons on the front panel. The reprogramming parameters are described in the Device Manual
Operational Conditions	
Working temperature range	-40 - +55°C
Dust/moisture protection	IP51
Resistance to mechanical stress	Group 4 as per GOST22261
Electromagnetic capability	Immunity: GOSTR51317.6.5, Electromagnetic emission: International special committee on radio interference 22 for A class
Mounting	At the panel
Calibration period	10 years
Guaranteeperiod	36 months
Average lifetime, not less	30 years
Mean time between errors	250000 hours

ORDERING FORM

ЩМК a - b - c - d - e - f - g - h - i

a – device performance depending on the overall dimensions

- ЩМК96 – overall dimensions 96x96 mm
- ЩМК120 – overall dimensions 120x120 mm
- ЩМК120C – overall dimensions 120x120 mm, fiscal electric energy metering function

b – rated voltage:

- electric line voltage – 100 V, 400 V;
- U/100 – voltage ratio
(rated voltage of the secundary winding 100 V);

c – rated current:

- phase current, -1 A, 5 A,
- I/1, I/5 – current ratio
(rated current of the secondary winding 1 A, 5A);

d – main Ethernet interface indication

- 1REO – Ethernet interface (optics), except ЩМК120C
- 1REC – Ethernet interface (copper), except ЩМК120C
- 2REO – 2 Ethernet interfaces (optics), only for ЩМК120C
- 2REC – 2 Ethernet interface (copper), only for ЩМК120C

e – main RS485 interface indication (only for REC devices)

- x – no RS485 interface, except ЩМК120C
- RS – additional RS485 interface, except ЩМК120C
- 2RS – two RS485 interfaces, always for ЩМК120C

f – metering scheme designation

- 3П – three-wire connection scheme
- 4П – four-wire connection scheme

g – indicator color:

- K – red color;
- 3 – green color;
- Ж – yellow color;

h – ambient class

- УХЛ3.1 –for operation conditons of -40 – +55°C, ralative humidity not above 90%, +30°C

i – Special design:

- if no, do not complete;
- IEC 61850-8-1 – digital substations protocol support

ЩМК device type	Code parameter of the full designation							
	Rated value or transformation ratio		Ethernet interface	RS485 interface	Metering scheme	Color of indication	Ambient class	Special design
	b	c	d	e	f	g	h	i
ЩМК96	U; U/100	I; I/1; I/5	REO	x	+	+	+	+
			REC	x; RS				
ЩМК120	U; U/100	I; I/1; I/5	REO	x	+	+	+	+
			REC	x; RS				
ЩМК120C	U; U/100	I; I/1; I/5	2REO	2RS	+	+	+	+
			2REC					

Notes:
“+” sign shows presence of all possible options in the order formula.
“x” sign means, that this parameter is absent.
The unused i parameter is not stated

ORDERING EXAMPLE

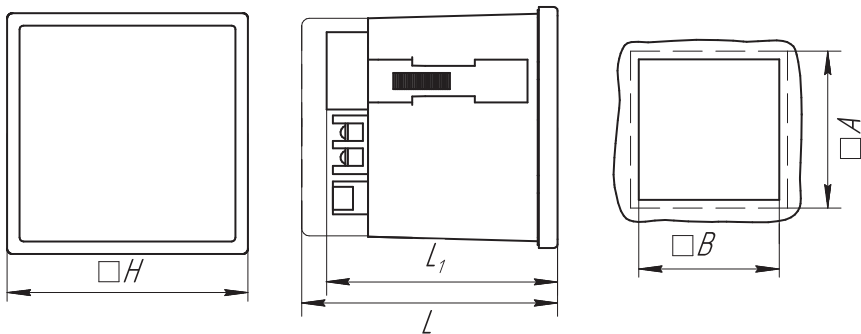
As for ЩМК96 device with the following parameters – rated voltage – 100 V, rated current – 1A, Ethernet interface (copper), three-wire connection scheme, red color of indicators, for working temperature -40.. +55°C, relative humidity not above 90%, +30°C.
ЩМК96 - 100 B - 1 A - REC- x - 3П-К-УХЛ3.1 ТУ 25-7504.227-2014

As for ЩМК120 device with the following parameters – rated voltage – 400 V, rated current – 5A, Ethernet interface (copper), RS485 interface, four-wire connection scheme, green color of indicators, for working temperature -40.. +55°C, relative humidity not above 90%, +30°C.
ЩМК120 - 400 B - 5 A - REC- RS - 4П-3-УХЛ3.1 ТУ 25-7504.227-2014

As for ЩМК120C device with the following parameters – rated voltage – 400 V, rated current – 5A, 2 Ethernet interfaces (optics), 2 RS485 interfaces, four-wire connection scheme, red color of indicators, for working temperature -40.. +55°C, relative humidity not above 90%, +30°C, IEC 61850-8-1 protocol
ЩМК120C - 400 B - 5 A - 2REO - 2RS - 4П-К-УХЛ3.1 - IEC 61850-8-1 ТУ 25-7504.227-2014

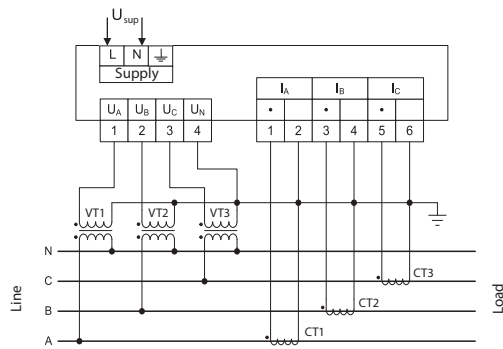
OVERALL AND INSTALLATION DIMENSIONS

ЩМК96, ЩМК120, ЩМК120C

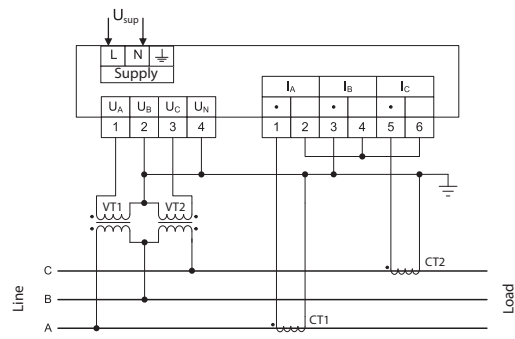


Device type	H, mm	L, mm	L1, mm	A, mm	B, mm
ЩМК96	96	103	93	100	92 ^{+0,8}
ЩМК120, ЩМК120C	120	103	93	125	112 ^{+0,9}

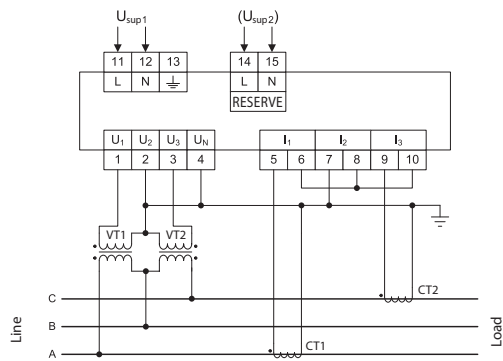
CONNECTION DIAGRAMS



ЩМК96, ЩМК120 connection diagram
(three-phase, four-wire, three-element)
Connection with 3 CT and 3 VT



ЩМК96, ЩМК120 connection diagram
(three-phase, three-wire, two-element)
Connection with 2CT and 2 VT



ЩМК120C connection diagram
(three-phase, three-wire, two-element)
Connection with 2CT and 2 VT

Notes:

U_{sup1} –voltage on the main power supply

U_{sup2} –voltage on the additional power supply

COMMERCIAL ACCOUNTING DEVICE
WITH FUNCTIONS OF POWER QUALITY CONTROL



ЩМК120СП

ЩМК120СП is intended for electric power commercial accounting in accordance with the GOST 31819.22-2012 (0,2 S class), GOST 31819.23-2012 (1 class), A class quality parameters measurement in accordance with the GOST 30804.4.30-2013 GOST 32144-2013, electric current parameters, voltage, power, active and reactive energy in the three-phase electrical circuits and AC systems. They are also intended for metering in the connection points and keeping the metering results, displaying of the metered energy values and power quality parameters, and forwarding data via the communication interfaces.

The devices satisfy all the requirements for the commercial accounting devices.

ЩМК120СП is put on the State Register of the Measuring Devices RF №68977-17, the validity period is to October 23, 2022.

Quality of electric power

Class A
GOST 30804.4.30-2013
GOST 32144-2013
GOST 30804.4.15-2013
GOST 30804.4.7-2013
GOST R 8.655-2009

- RMS of voltage
- frequency
- Duration and depth of voltage fail and voltage swell
- Temporary voltage swell duration
- Long and short flicker batch
- Temporary voltage swell coefficient
- n-harmonical voltage component coefficient
- voltage waveform distortion factor
- voltage unbalance factor for inverted sequence
- voltage unbalance factor for null sequence

Electric power commercial accounting

GOST 31819.22-2012 (0,2S class)
GOST 31819.23-2012 (1 class)

- metering of the consumed active electric energy in increment total in summarily and severally as per tariff
- eight tariffs
- active and reactive energy
- active and reactive loss energy
- energy malmetering flags

Measurement and display
of electric system parameters

GOST 22261-94
GOST R 52931-2008
GOST 29322-2014

- electric current, tolerance not above $\pm 0,1 \%$
- voltage, tolerance not above $\pm 0,1 \%$
- electric power, tolerance not above $\pm 0,5 \%$
- electric energy, tolerance not above $\pm 0,5 \%$

Device Type	Overall dimensions, mm	Character height, mm	Weight, kg
ЩМК120СП	173×290×88	14	2,0

Electric energy metering parameters	Measurement error
Received active energy (A+) as per n-tariff (n = 1,2,...,8,0 – summarily as per tariffs)	In accordance with the accuracy class 0,25 as per GOST 31819.22
Transferred active energy (A-) as per n-tariff (n = 1,2,...,8,0 - summarily as per tariffs)	In accordance with the accuracy class 0,25 as per GOST 31819.22
Total active energy ((A+)+(A-)) as per n-tariff(n = 1,2,...,8, 0 - summarily as per tariffs)	In accordance with the accuracy class 0,25 as per GOST 31819.22
Reactive energy as per r-quadrant (Qr) (r = 1, 2, 3 or 4) as per n-tariff (n = 1,2,...,8,0 - summarily as per tariffs)	In accordance with the accuracy class 1 as per GOST 31819.23
Received reactive energy (R+ = Q1+Q2) as per n-tariff (n = 1, 2,..., 8, 0 - summarily as per tariffs)	In accordance with the accuracy class 1 as per GOST 31819.23
Transferred reactive energy (R- = Q3+Q4) as per n-tariff (n = 1, 2,...,8, 0 - summarily as per tariffs)	In accordance with the accuracy class 1 as per GOST 31819.23
Total reactive energy ((R+)+(R-)) as per n-tariff (n = 1, 2,..., 8, 0 - summarily as per tariffs)	In accordance with the accuracy class 1 as per GOST 31819.23
Averaging time of energy differential measurement (metering interval), min	1, 2, 3, 4, 5, 6, 10, 12, 15, 20, 30, 60
Preoscillation current (sensitiveness) for active energy metering, A	$0,001 \cdot I_{nom}$
Preoscillation current (sensitiveness) for reactive energy metering, A	$0,002 \cdot I_{nom}$
Quantity of the impulse-number metering interfaces (terminals)	4 configurable terminals

Electric energy quality parameters	Range of measurement	Measurement error limit*
RMS of voltage (U), V	(0... 200) % U_{nom}	$\gamma = \pm 0,1$ %
Overdeviation (δU_{+}), % **	(0...100) %	$\Delta = \pm 0,1$
Underdeviation (δU_{-}), %**	(0...90) %	$\Delta = \pm 0,1$
Frequency (f), Hz	(42,5...57,5) Hz	$\Delta = \pm 0,01$
Frequency deviation (Δf), Hz	(-7,5...7,5) Hz	$\Delta = \pm 0,01$
Short flicker batch (P_{st}), rel. un.	(0,2...10)	$\delta = \pm 5$ %
Long flicker batch (P_L), rel. un.	(0,2...10)	$\delta = \pm 5$ %
n-harmonical voltage component coefficient to the 50 degree ($K_{U(n)}$), %***	(0,05...30)	$\Delta = \pm 0,05$ ($K_{U(n)} < 1$ %) $\delta = \pm 5,0$ % ($1 \% \leq K_{U(n)} < 30$ %)
Aggregate harmonical voltage component coefficient (voltage waveform distortion factor) (K_U), %	(0,1...30)	$\Delta = \pm 0,05$ ($0,1 \% \leq K_U < 1$ %) $\delta = \pm 5,0$ % ($1 \% \leq K_U < 30$ %)
Voltage unbalance factor for the inverted sequence (K_{2U}), %	(0...20)	$\Delta = \pm 0,15$
Voltage unbalance factor for the sequence (K_{0U}), %	(0...20)	$\Delta = \pm 0,15$
Duration of the voltage fail (Δt_n), sec	(0,02...60) s	$\Delta = \pm 0,02$
Depth of the voltage fail (δU_n), %	(10...99) %	$\Delta = \pm 0,2$
Duration of the voltage interruption (Δt_{int}), sec	(0,02...60) s	$\Delta = \pm 0,02$
Duration of the temporary over-voltage (Δt_{ov}), sec	(0,02...60) s	$\Delta = \pm 0,02$
Temporary over-voltage factor (K_{ov}), rel. un	(1,1...2,0)	$\Delta = \pm 0,002$

* error identifications: Δ - absolute; δ , % - fractional; γ , % - reduced

** relatively to the U_n which is equal to the nominal U_n or approved U_{app} value of voltage as per GOST 32144

*** the harmonic subgroup number n is from 2 to 50 as per GOST 30804.4.7

Data display	
LED indication (single or seven-segment displays)	- 1 row of the seven-segment displays (8 displays, character height is 14 mm) - single seven-segment display for displaying the number of the selected tariff - single LED displays for displaying of the different operational factors
Additional Features	To display telemetry at the optional device: Connection of the indication modules (МИ120, МИ80) or indication panel T44, T54, T74 on the RS485 interface or Ethernet (for МИ120.5) To communicate with telemetry control unit: Connection of the telemetry controller ЭЛКТ on the RS485 interface for data transferring to the upper level as per IEC 61850-8-1 protocol (Ethernet interface)
Telemetry	
Input signal	Current: 1 A, 5 A Voltage: 100 V, 400 V Nominal effective voltage: 57.7/230 V - phase, 100/400 V - line-to-line Measurement frequency of the current/voltage input signal: 42,5 - 57,5 Hz Maximum wire section 4 mm ²
Measuring time	0,2 sec. (current and voltage), 1 sec (frequency)
Galvanic isolation of the input and output circuits, supply circuits	Yes
Input resistance Current circuits: Voltage circuits:	0,02 Ом (1 A, 5 A) 0,4 МОм (100 V), 1,6 МОм (400 V)
Communication interfaces	
RS485	Quantity: 2; Protocols: Modbus RTU, IEC 60870-5-101
Ethernet	Ethernet 10/100 BASETX (socket RJ45) or Ethernet 100 BASE FX (socket ST) Quantity: 2; Protocols: IEC 60870-5-104, IEC 61850-8-1
Remote human-computer interface	HTTP (Embedded WEB-server)
Integration with Electric Energy Quality Control Parameters System	HTTP (integration into the software package for visualization and monitoring of indicators of the quality of electricity supplied with the device)
Device time synchronization	NTP (RFC 5905)/PTP (IEEE' 1588)
Integration into the systems	RS485 (Modbus RTU, IEC 60870-5-101), Ethernet (IEC 60870-5-104, IEC 61850-8-1), Optical interface «optoport» (IEC 61107), impulse output interface
Power supply	
Voltage	- main: 220 V (90-264 V of AC with frequency of (50 ± 0,5) Hz or 130-370 V of DC) - stand-by: «STAND-BY» (90-264 V of AC with frequency of (50 ± 0,5) Hz or 130-370 V of DC)
Power from the supply circuit (not above)	10 V-A (full power) when powered by a single-phase alternating current source 50 Hz, 10 W when powered from the direct current source
Device reprogramming (trim)	
Reprogramming	- via the Configurator software (RS485 interface, Ethernet), - via control buttons on the front panel, - via WEB-interface The reprogramming parameters are described in the Device Manual
Operational Conditions	
Working temperature range	-40 - +55 °C
Dust/moisture protection	IP51
Resistance to mechanical stress	Group 4 as per GOST 22261
Electromagnetic capability	Immunity: GOST R 51317.6.5, Electromagnetic emission: International special committee on radio interference 22 for A class
Mounting	At the panel
Calibration period	12 years
Guarantee period	36 months
Average lifetime, not less	25 years
Mean time between errors	250000 hours

ORDERING FORM

ЩМК120СП – a – b – c – d

a – rated voltage:

- electric line voltage - 100 V, 400 V;
- $U/100$ – voltage ratio (rated voltage of the secondary winding 100 V);

b – rated current:

- phase current - 1 A; 5 A;
- $I/1$; $I/5$ – current ratio (rated current of the secondary winding 1 A and 5 A);

c – indicator color:

- K – red color;
- 3 – green color;
- Ж – yellow color;

d – special design:

- if no, do not complete;

Measurement device design	Code parameter of the full designation		
	Rated value or transformation ratio		Color of indication
	a	b	c
ЩМК120СП	U; U/100	I; I/1; I/5	+

Notes:

“+” sign shows presence of all possible options in the order formula.

The unused “d” parameter is not stated.

ORDERING EXAMPLE

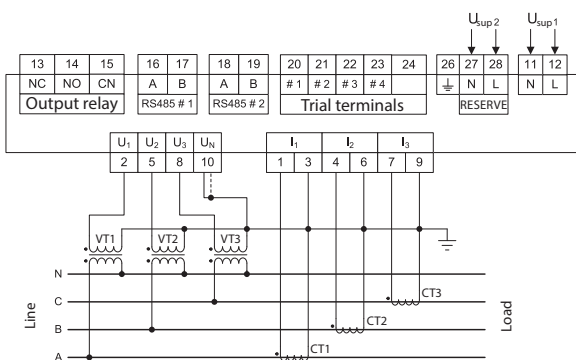
As for ЩМК120СП with the following parameters: rated voltage – 400 V, rated current – 5A, red color of indicator:

ЩМК120СП – 400 В - 5 А – К ТУ 26.51.43-233-05763903-2017

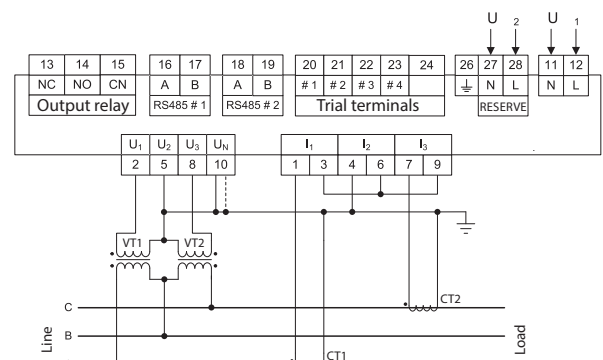
As for ЩМК120СП with the following parameters: rated voltage – 100 V, rated current – 1A, red color of indicator:

ЩМК120СП – 100 В - 1 А – К ТУ 26.51.43-233-05763903-2017

CONNECTION DIAGRAMS



Meter connection diagram
(three-phase, four-wire, tree-element)
Connection with 3 CT and 3 VT



Meter connection diagram
(three-phase, four-wire, two-element)
Connection with 2 CT and 2 VT

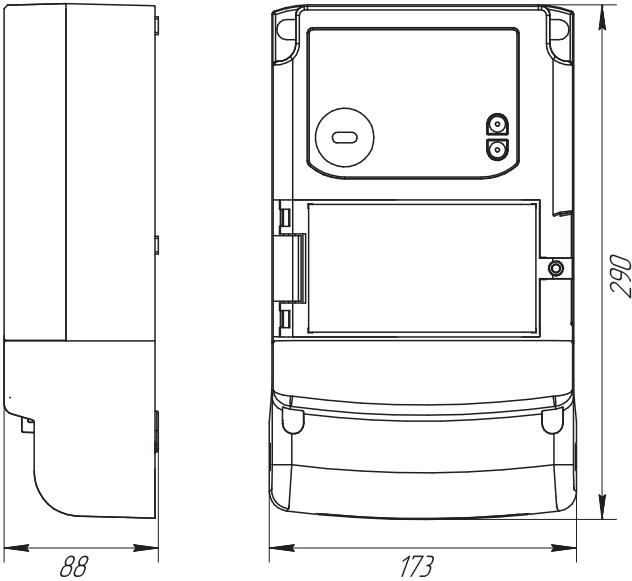
Notes:

U_{sup1} – voltage on the main power supply

U_{sup2} – voltage on the additional power supply

OVERALL DIMENSIONS

ЩМК120СП



PORTABLE POWER
QUALITY CONTROL DEVICE

МПК1



МПК2

Portable МПК1 devices are intended for electric power quality parameters metering for current and voltage in the three-phase circuits and alternative current systems, МПК2 are intended for electric power quality parameters metering for voltage at the connection points of the metering devices for substation, monitoring systems and quality control systems, it is provided to keep results as for defined algorithms for time periods, which are measured by real-time clocks.

Quality parameters calculation is performed as for A class in accordance with GOST 30804.4.30-2013, GOST 32144-2013.

МПК1, МПК2 are put on the State Register of the Measuring Devices RF №71684-18, the validity period is to June 28, 2023.

Quality of electric power

Class A

GOST 30804.4.30-2013

GOST 32144-2013

GOST 30804.4.15-2013

GOST 30804.4.7-2013

GOST R 8.655-2009

- RMS of voltage
- frequency
- Duration and depth of voltage fail and voltage swell
- Temporary voltage swell duration
- Long and short flicker batch
- Temporary voltage swell coefficient
- n-harmonical voltage component coefficient
- voltage waveform distortion factor
- voltage unbalance factor for inverted sequence
- voltage unbalance factor for null sequence

Device Type	Overall dimensions, mm		Weight, kg, no more (not including case, wires and clips)
	Device	Case	
МПК1	175×86×280	280×120×330	0,84
МПК2	95×53×175	229×85×275	0,45

Comes standard with:

- МПК device
- Case
- Wires with clips for input signals connection
- Clamp meters or Rogowski coils (for МПК1, optional)
- Supply cable
- Operation manual and calibration procedure for 10 pcs.
- Logbook



Electric energy quality parameters	Range of measurement	Measurement error limit*
RMS of voltage (U), V	(0... 200) % U _{nom}	γ = ±0,1 %
Overdeviation (δU ₍₊₎), % **	(0...100)	Δ = ±0,1
Underdeviation (δU ₍₋₎), %**	(0...90)	Δ = ±0,1
Frequency (f), Hz	(42,5...57,5)	Δ = ±0,01
Frequency deviation (Δf), Hz	(-7,5...7,5)	Δ = ±0,01
Short flicker batch (P _{st}), rel. un.	(0,2...10)	δ = ±5 %
Long flicker batch (P _{lt}), rel. un.	(0,2...10)	δ = ±5 %
n-harmonical voltage component coefficient to the 50 degree (K _{U(n)}), %***	(0,05...30)	Δ = ±0,05 (K _{U(n)} < 1 %)
		δ = ±5,0 % (1 % ≤ K _{U(n)} < 30%)
Agreegate harmonical voltage component coefficient (voltage waveform distortion factor) (K _U), %	(0,1...30)	Δ = ±0,05 (0,1 % ≤ K _U < 1%)
		δ = ±5,0 % (1 % ≤ K _U < 30%)
Voltage unbalance factor for the inverted sequence (K _{2U}), %	(0...20)	Δ = ±0,15
Voltage unbalance factor for the sequence (K _{0U}), %	(0...20)	Δ = ±0,15
Duration of the voltage fail (Δt _n), sec	(0,02...60)	Δ = ±0,02
Depth of the voltage fail (δU _n), %	(10...99)	Δ = ±0,2
Duration of the voltage interruption (Δt _{int}), sec	(0,02...60)	Δ = ±0,02
Duration of the temporary over-voltage (Δt _{ov}), sec	(0,02...60)	Δ = ±0,02
Temporary over-voltage factor (K _{ov}), rel. un.	(1,1...2,0)	Δ = ±0,002

The parameters depend on the device design
* error identifications: Δ - absolute; δ,% - fractional; γ,% - reduced
** relatively to the U_n which is equal to the nominal U_n or approved U_{app} value of voltage as per GOST 32144
*** the harmonic subgroup number n is from 2 to 50 as per GOST 30804.4.7

Data display	
LED indication (single or seven-segment dispalys)	-3 blocks of the seven-segment displays (4 indicators in the block, character height is 14 mm) - single LED indicators for displaying of the different operational factors – depending on the order It is possible to choose the displayed parameters by the control button on the device front panel.
Telemetry	
Input signal	Voltage: 100 V, 400 V; U/100 Current: 1 A, 5 A, 250 A (KT), 800 A (KT), 3000 A (KT), 3000 A (KP); I/1; I/5 Measurement frequency of the current/voltage input signal: 42,5 - 57,5 Hz Note: KT – clamp meters, KP – Rogowski coil
Measuring time	0,2 sec. (current and voltage), 1 sec (frequency)
Galvanic isolation of the input and output circuits, supply circuits	Yes
Input Resistance, not less Current circuits: Voltage circuits:	0,02 Om (1A, 5 A) 0,42 MOm (100 V), 1,66 MOm (400 V)
Communication interfaces	
RS485	Quantity: 0,1; Protocols: Modbus RTU, IEC 60870-5-101
Ethernet	Ethernet 10/100 BASETX (socket RJ45) or Ethernet 100 BASE FX Quantity: 1; Protocols: IEC 60870-5-104, IEC 61850-8-1
Remote human-computer interface	HTTP (Embedded WEB-server)
Integration with Electric Energy Quality Control Parameters System	HTTP (integration into the software package for visualization and monitoring of indicators of the quality of electricity supplied with the device)
Device time synchronization	NTP (RFC 5905)/PTP (IEEE' 1588)

Power supply	
Voltage	220 V (90-264 V of AC with frequency of $(50 \pm 0,5)$ Hz or 130-370 V of DC)
Power from the supply circuit (not above)	10 V-A (full power) when powered by a single-phase alternating current source 50 Hz, 10 W when powered from the direct current source
Device reprogramming (trim)	
Reprogramming	- via the Configurator software (RS485 interface, Ethernet), - changing of the lightening intensity of the indicators (if applicable) (via the Configurator software for RS485 interface, Ethernet) or via control buttons on the front panel - selection of current parameters displaying (if applicable) (via control buttons on the front panel) The reprogramming parameters are described in the Device Manual
Operational Conditions	
Working temperature range	-40 - +55 °C
Dust/moisture protection	IP41
Resistance to mechanical stress	Group M7 as per GOST 30631-99
Electromagnetic capability	In accordance with the requirements established in CISPR-22 for class A equipment
Mounting	At the panel
Calibration period	10 years
Guarantee period	24 months
Average lifetime, not less	25 years
Mean time between errors	250000 hours

ORDERING FORM

МПК a - b - c - d - e - f - g

a – device performance depending on the overall dimensions

- 1 – overall dimensions 175x86x280 mm
- 2 – overall dimensions 95x53x175 mm

b – nominal rates of the metering input parameters (depending on the device performance)

Performance options:

b1 – one metering parameter (voltage) (for МПК2 only)

- electric line voltage - 100 V, 400 V; - U/100 – voltage ratio (rated voltage of the secondary winding 100 V);

b1, b2 – two metering parameters (voltage, current) (for МПК1 only)

- electric line voltage - 100 V, 400 V; - U/100 – voltage ratio (rated voltage of the secondary winding 100 V);
 - 1,0A, 5,0A, 250 A(KT), 800 A(KT), 3000 A(KP) – phase current, or I/1, I/5 – current ratio (rated current of the secondary winding 1 A, 5A);
- Note: KT – clamp meters, KP – Rogowski coil

c – main Ethernet interface indication

- REO – Ethernet interface (optics)
- REC – Ethernet interface (copper)

d – main RS485 interface indication (only for REC devices)

- x – no RS485 interface
- RS – RS485 interface

e – indicator color:

- x – device without indicators (for МПК2 only)
- K – red color (МПК1);
- 3 – green color(МПК1);
- Ж – yellow color(МПК1);

f – clips options

- A – 1 option of clips (pic.1);
- B – 2 option of clips(pic.2);
- C – 3 option of clips(pic.3);

Clip A (clip 1) – alligator clip, length 92 mm, diameter – 32 mm;
Clip B (clip 2) – alligator clip, length 155 mm, diameter – 11,5 mm;
Clip C (clip 3) – tweezer clip, length 159 mm, diameter – 4 mm;

- g – special design:**
- if no, do not complete;
- IEC 61850-8-1 – digital substations protocol support (for МПК1 only)



Fig. 1



Fig. 2



Fig. 3

Measurement device design	Code parameter of the full designation					
	Rated value or transformation ratio		Ethernet interface	RS485 interface	Color of indication	Clips options
	b		c	d	e	f
	b 1	b2				
МПК1	100V, 400V U/100	1 A, 5 A, 250 A (KT), 800 A (KT), 3000 A (KT), 3000 A (KP), I/1, I/5	REO	x	R, Y, G	A, B, C
			REC	x; RS		
МПК2	100V, 400V U/100	x	REO	x	x	A, B, C
			REC	x; RS		

KT – clamp meters; KP – Rogowski coil
Notes:
Sign “x” means that the parameter is absent
The unused g paramer is not stated
The design with IEC 61850-8-1 protocol support is possible for МПК1.

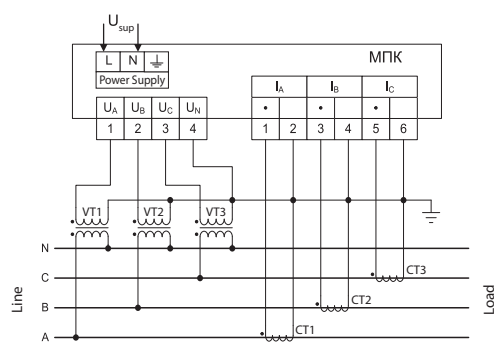
ORDERING EXAMPLE

As for МПК device with the following parameters: overal dimension: 175x86x280 mm, input parameters - rated voltage – 100 V, rated current – 1A, Ethernet interface (optics), green color of indicators, 1 clips option
МПК1-100 B, 1A-REO-x-3-A TY25-7504.231-2016

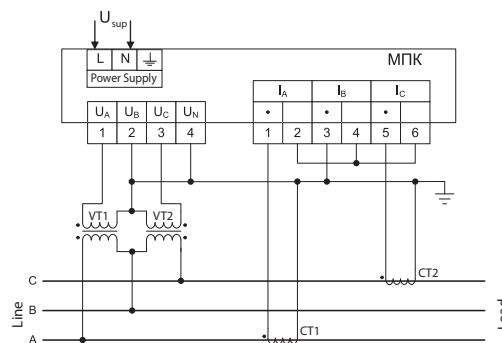
As for МПК device with the following parameters: overal dimension: 175x86x280 mm, input parameters - rated voltage – 400 V, rated current – 5A, Ethernet interface (copper), red color of indicators, 2 clips option, digital substations IEC 61850-8-1 protocol support
МПК1-400 B, 5A-REC-RS-K-B-IEC 61850-8-1 TY25-7504.231-2016

As for МПК device with the following parameters: overal dimension: 95x53x175 mm, input parameters - rated voltage – 100 V, Ethernet interface (copper),RS485 interface 3 clips option
МПК2-100 B-REC-RS-x-C TY25-7504.231-2016

CONNECTION DIAGRAMS



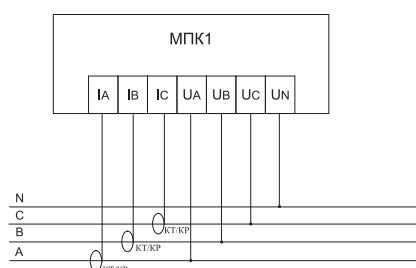
three-phase, four-wire, tree-element
Connection with 3 CT and 3 VT



three-phase, three-wire, two-element
Connection with 2 CT and 2 VT

Note:

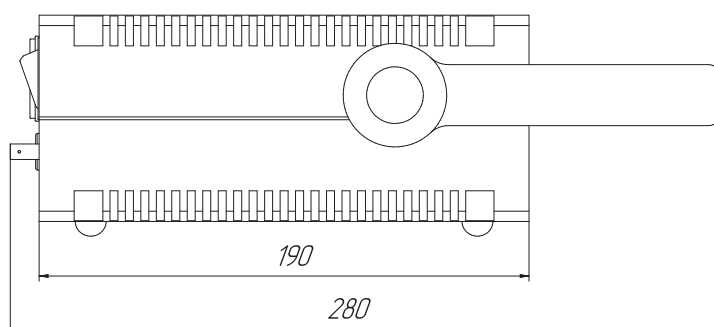
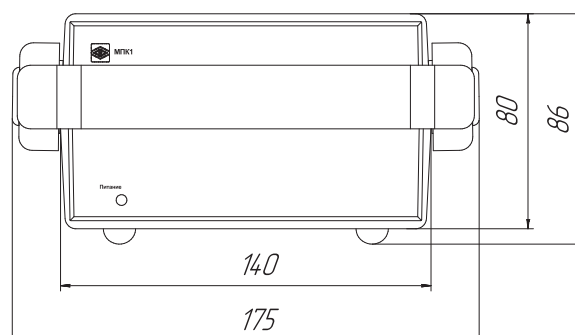
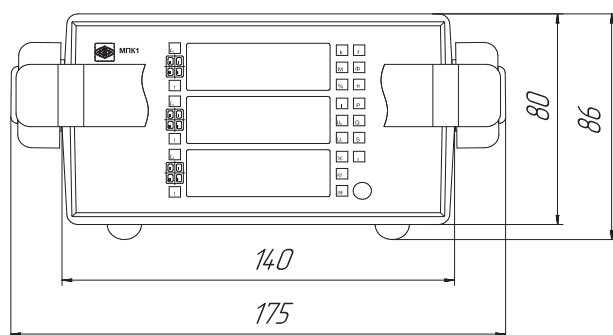
Current circuits are not used for МПК2 device connection



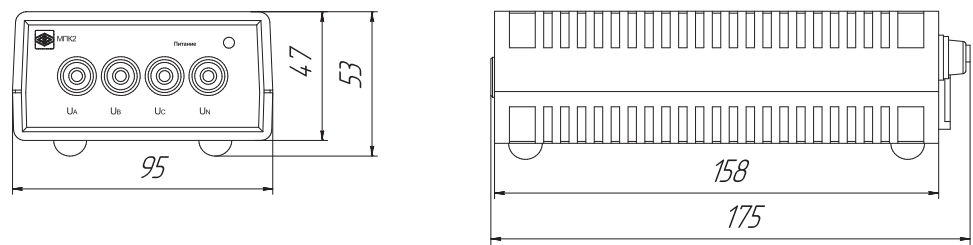
МПК1 device connection diagram
with Rogowski coil (КР) and clamp meters

OVERALL AND INSTALLATION DIMENSIONS

МПК1



МПК2



ONE-PHASE POWER QUALITY CONTROL DEVICE



ППОТЕКТ

Power quality control devices "ППОТЕКТ" are intended for:

- Measurement of the Electric power quality control parameters as for S class
- Measurement of the voltage parameters in the AC one-phase circuits, with keeping the results in the defined time intervals, determined by the internal real-time clocks;
- Match-making of the power quality parameters and norms of the utility power supply circuits with standard voltage as per GOST R8.655

These devices can be used at the energetic venues for electric parameters control, for complex automatization and for the automated control systems for all industrial fields.

Device Type	Overall dimensions, mm
ППОТЕКТ	55x90x63

Data display	
Indication	- LED indication (single indication) - Monochrome OLED display (by order)
General parameters	
Metering input signals range	$U_{nom} = 230\text{ V}$
Communication interface	U_{SB} (for measured and calculated parameters transfer to the external devices and internal parameters adjusting)
Operation temperature range	-40 - +70 °C
Power supply	- from the measuring circuit with voltage range of 20 -276 V - from the internal accunulator (if no external power supply) – not less then 15 minutes
Memory	Nonvolatile: Fixed (128 Mb) Portable (max 32 Gb, MicroSD type) for the following work at PC
Mounting	On DIN-molding
Warranty operating life	24 months
Electric energy quality parameters	
Power quality parameters metering	- Root-mean-square voltage (U); - Frequency (f) - Voltage fall duration (Δt_n) - Duration of the voltage fail (δU_n) - Depth of the voltage fail (Δt_{int}) - Duration of the voltage interruption ($\Delta t_{int U}$) - Duration of the temporary over-voltage (Δt_{ov}) - Temporary over-voltage factor (K_{ov})
Metrological characteristics	As per GOST 30804.4.30 for S class metering

ORDERING FORM

ППОТЕКТ a - b

a – device type depending on the complement

100 – device with input signal rated voltage – 230 V

101 – device with input signal rated voltage – 230 V and monochrome display OLED

b – special design

SD – with removable MicroSD memory card

- if no, do not complete;

ORDERING EXAMPLE

As for one phase power quality parameters control metering device for S class with the rated voltage of the input signal – 230 V

ППОТЕКТ 100 TY 26.51.43-237-05763903-2017

As for one phase power quality parameters control metering device for S class with the rated voltage of the input signal – 230 V and OLED monochrome display

ППОТЕКТ 101 TY 26.51.43-237-05763903-2017

DEVICES FOR ELECTRICAL CIRCUIT PARAMETERS

MULTIFUNCTIONAL ELECTRIC MEASURING DEVICES



ЩМ120, ЩМ96

ЩМ120, ЩМ96 devices are intended for the measuring the parameters of the three-wire and four-wire three-phase AC circuits with frequency of 45-55 Hz with symmetrical and asymmetrical load.

The devices are used in the data collection systems for transferring to the upper level systems or as a universal metering device instead of several metering devices: amperemeter, voltagemeter, wattmeter, varmeter, frequency meter.

The device has the following options:

- Reprogramming of the displayed ranges;
- Min and max set points adjustment in the metering range;
- Indication brightness adjustments;
- Connection of the external indication modules;

Application fields:

- Energetics;
- Gas and oil industry

ЩМ120, ЩМ96 devices have a certificate of type approval of the Russian Maritime Registry of Shipping (Ambient class OM2)

ЩМ120, ЩМ96 are put on the State Register of the Measuring Devices RF №63217-16, the validity period is to February 17, 2021. ЩМ120 matches the requirements of PJSC ROSSETI and PJSC FGC UES and are recommended for PJSC ROSSETI and PJSC FGC UES venues.

Device Type	Overall dimensions, mm	Character height, mm	Weight, kg
ЩМ96	96x96x75,6 (without safety cover) 96x96x103 (with safety cover)	20, 14	0,5
ЩМ120	120x120x75,6 (without safety cover) 120x120x103 (with safety cover)	25, 20	0,9

Note: the rare safety cover is supplied in the complete

Metering and calculating parameters	Designation	Intrinsic error	Measurement in accordance with measurement scheme (parameter g*)		Displayed on the indicator**	Interface transferring**
			g = 3П	g = 4П		
Actual value of the phase voltage	U_A U_B U_C	$\pm 0,2 \%$	- - -	+ + +	-/+ -/+ -/+	-/+ -/+ -/+
Average actual value of the phase voltage	U	$\pm 0,2 \%$	-	+	-/+	-/+
Actual value of the phase-to-phase voltage	U_{AB} U_{BC} U_{CA}	$\pm 0,2 \%$	+ + +	+ + +	+ + +	+ + +
Average actual value of the phase-to-phase voltage	U_n	$\pm 0,2 \%$	+	+	+	+
Actual value of the phase current	I_A I_B I_C	$\pm 0,2 \%$	+ - +	+ + +	+ -/+ +	+ -/+ +
Average actual phase current	I	$\pm 0,2 \%$	+	+	+	+
Actual power of the load phase***	P_A P_B P_C	$\pm 0,5 \%$	- - -	+ + +	-/+ -/+ -/+	-/+ -/+ -/+

Metering and calculating parameters	Designation	Intrinsic error	Measurement in accordance with measurement scheme (parameter g*)		Displayed on the indicator**	Interface transferring**
			g = 3Π	g = 4Π		
Sum actual power***	P	±0,5 %	+	+	+	+
Reactive power of the load phase***	Q _A	±0,5 %	-	+	-/+	-/+
	Q _B		-	+	-/+	-/+
	Q _C		-	+	-/+	-/+
Sum reactive power***	Q	±0,5 %	+	+	+	+
Total power of the load phase	S _A	±0,5 %	-	+	-/+	-/+
	S _B		-	+	-/+	-/+
	S _C		-	+	-/+	-/+
Sum total power	S	±0,5 %	+	+	+	+
Every phase power ratio	cosφ _A	±0,5 %	-	+	-/+	-/+
	cosφ _B		-	+	-/+	-/+
	cosφ _C		-	+	-/+	-/+
Total power ratio	cosφ	±0,5 %	+	+	+	+
Circuit frequency	F	±0,01 Гц	+	+	+	+

* Indication parameter code ЩМ a - b - c - d - e - f - g - h - i - j
** Possibility of the special parameters indication display and value transferring via interfaces depending on the metering schemes.
***ЩМ device metering parameters with special design P, Q, PQ (depending on the order)
Note: Average actual value of the phase current (phase and phase-to-phase voltage) is arithmetic average sum of the actual phase current values (phase and phase-to-phase voltage).

Data display	
LED indication (single or seven-segment displays)	-3 blocks of the seven-segment displays (4 indicators in the block); character height: 25 mm and 20mm (ЩМ120), 20 mm and 14 mm (ЩМ96) - single LED displays for displaying of the measurement units, identification indexes and signs of the displayed parameters
Additional Features	Connection of the indication modules (ММ120, ММ80) or indication panel on the RS485 interface or Ethernet (for ММ120.5)
Telemetry	
Input signal	A:0,5; 1, 2,5; 5 V: 100, 400 Hz: 45...55
Measuring time	0,1 sec.
Input analog signal transition time, not above	0,5 sec.
Intrinsic error limit	- For current and voltage:±0,2%; - For power:±0,5%; - For frequency: ±0,01 Hz; - For analog output:±0,5%;
Galvanic isolation unit of input and output circuits, supply circuits	Yes
Short-time input signal (with multiplicit, maximum value) overload	Multiplicity: 20, number of overloads:2; time of the each overload, sec: 0,5; time interval between two overloads, sec: 0,5.
Input resistance, not less: For current circuits For voltage circuits	0,02 Ом 2 Мом
Communication interfaces/Analog outputs	
RS485	Quantity: 1,2; Protocols: Modbus RTU Data transferring speed: 9600, 19200, 38400, 57600 bit/sec.
Ethernet (100BASETX)	Quantity: 0,1; Protocols: Modbus RTU, IEC 60870-5-104,
Analog outputs	Quantity: 0,1,2,3 Reprogramming ranges: 0...5 mA, 4...20 mA, 0...20 mA, 0...2,5...5 mA, 4...12...20 mA, 0...10...20 mA, -5...0...±5 mA
Remote signal system	
Discrete inputs	Quantity: 0,4, 6, 8; input signal type "clean contact", volatage at the opened device terminals=24 V, current 10mA (do not required external dampening)
Remote control	
Discrete inputs	Quantity: 0,1,2,3 (modes: on, off, block etc) = 300V, ~200V, 100mA

Power supply	
Voltage	- 220 VU – universal power supply; power supply voltage 85-270 V of AC with frequency of 50 Hz or for 100-265 V of DC -24 VN (24+12/-6) V of DC
Power consumption from the supply circuit (not above)	15 VA
Device reprogramming (trim)	
Reprogramming	- via the Configurator software (RS485 interface, Ethernet), - via control buttons on the front panel (if applicable)
Reprogramming parameters	<ul style="list-style-type: none"> • Scale range • Password assignment • Indication refreshment period: 0,1 – 10 sec • Decimal point position • Set point for every electric value (for discrete inputs) • RS485, Ethernet interfaces parameters • Output signals parameters • Indication brightness • Modbus RTU, Modbus TCP, IEC 60870-5-104 (via the Configurator software) • Output and input signals calibration
Operational Conditions	
Working temperature range	-40 - +70 °C -40 - +55 °C (for devices with Maritime register acceptance)
Protection class	IP50; IP52 (for devices with Maritime register acceptance)
Mounting	On the shield
Wire cross-section	2,5 mm ²
Maximum overload for internal signal (duration)	150% (2 hours)
Calibration period	10 years
Warranty operating lifetime	60 months
Average lifetime, not less	30 years
Average mean time to failure	250 000 hours

ORDERING FORM

ШМ a - b - c - d - e - f - g - h - i - j

a – device performance depending on the overall dimensions

ШМ96 overall dimensions 96x96mm

ШМ120 overall dimensions 120x120mm

b – nominal voltage:

- linear voltage-100 V, 400 V

- transformer voltage ratio (nominal voltage of the secondary winding 100 V);

c – nominal current:

- phase current: 0,5 A; 1,0 A; 2,5 A; 5,0 A

- transformer current ratio (nominal current of the secondary winding – 1 A and 5 A);

d – supply voltage designation:

220B–universal supply: supply voltage 85-270 V of AC, frequency 50 Hz, or 100-265 V of DC

24B–DC current supply, voltage (24+12/-6) V

e- Designation for additional interface RS485 interface and discrete outputs)

x – no additional interface and discrete outputs;

RSX – RS485 additional interface and no discrete outputs;

RS04 - RS485 additional interface and 4 discrete outputs;

RS06 - RS485 additional interface and 6 discrete outputs (only for ШМ120);

X08 - no additional interface and 8 discrete outputs

Note: If there are no discrete outputs (e=x, e=RSX) the device can have output signals design (analog or discrete)

f – Designation for Ethernet interface and real-time clocks

- x – device without Ethernet interface and real-time clocks
- RE - device with Ethernet interface

g – metering scheme designation

- 3П-three-wire connection scheme
- 4П-four-wire connection scheme

h – indicators color designation

- K – red color (MPK1);
- З – green color(MPK1);
- Ж – yellow color(MPK1);

i - existence of output signals:

- x - there is no such parameter;
 - 01-one discrete output signal;
 - 02- two discrete output signals;
 - 03- three discrete output signals;
 - 10(a) - one analog output signal;
 - 20(a,b) - two analog output signals;
 - 30(a,b,c) - three analog output signals;
- where - a,b,c - designations of output analog signals measuring ranges
(A=0...5mA; B=4...20mA; C=0...20mA; AP=0...2,5...5mA; BP=4...12...20mA; CP=0...10...20mA; EP=-5...0...+5mA)
(Example: (30(C,A,B);30(B,B,C);20(C,B);20(A,A);10(A));

j- Special design:

- if no, do not complete;
- P – design for actual power metering;
- Q – design for reactive power metering;
- PQ – design for actual and reactive power metering;

Note: For device with the digital indicators, which are intended for marine vehicles it is necessary to state the ambient class OM2 at the end of the ordering form.

Measure- ment device type	Code parameter of the full designation									Note
	Rated value or transformation ratio		Supply voltage	Additional interface and discrete outputs	Ethernet interface	Metering scheme designation	Color of indication	Output signals	Special design	
	b	c	d	e	f	g	h	i	j	
ЩМ96	U; U/100	I; I/1; I/5	+	x; RSX	x; RE	+	R, G, Y	+	+	OM2
				RS04; X08				x		
ЩМ120	U; U/100	I; I/1; I/5	+	x; RSX	x; RE	+	R, G, Y	+	+	OM2
				RS04; RS06; X08				x		

Notes:

“+” sign shows presence of all possible options in the order formula.

“x” sign means, that this parameter is absent.

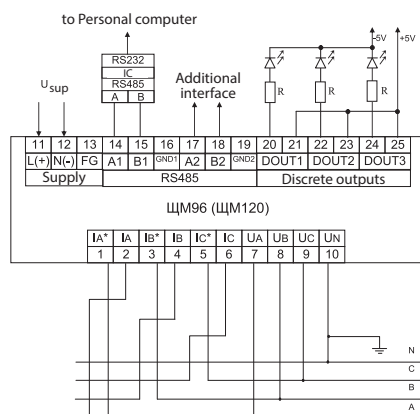
ORDERING EXAMPLE

As for ЩМ120 device with the following characteristics: nominal voltage 400 V, nominal current 5A, supply voltage 85 – 270 V of AC, Frequency 50 Hz or 100 – 265 V of DC, additional RS485 interface, four-wire metering scheme, yellow color of indicator, 3 analog outputs (0...5)mA; (4...20)mA; (0...10...20)mA;

ЩМ120-400 B-5A-220BY-RSX-x-4П-Ж-30 (A, B, CP) ТУ 25-7504.211.1-2010

CONNECTION DIAGRAMS

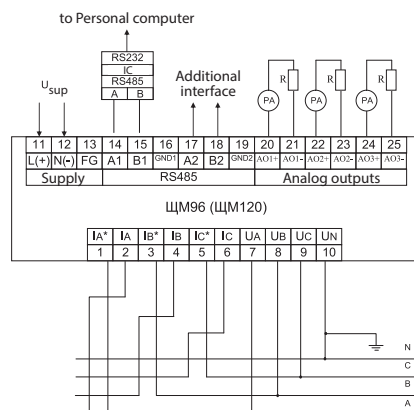
Connection schemes for three-phase three-wire circuits



Notes:

1. Additional interface RS485 (terminals 17-19) depends on the device design
2. Resistor R=430 Ohm

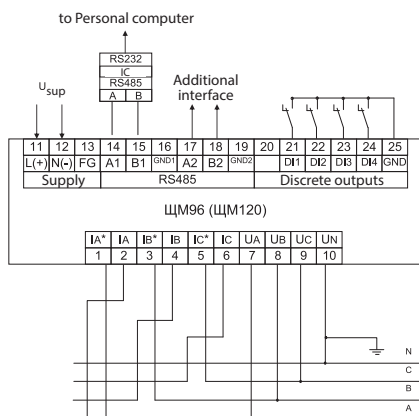
For device with discrete outputs design (e=RSX)



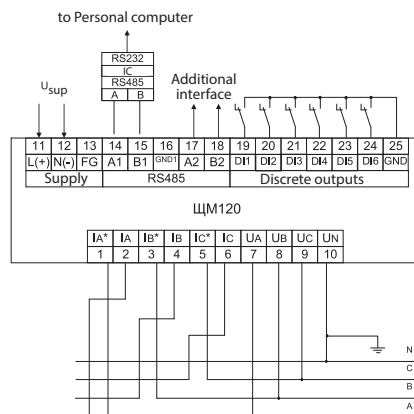
Notes:

1. Additional interface RS485 (terminals 17-19) depends on the device design
2. Resistor R=430 Ohm
3. PA- milli amperemeter

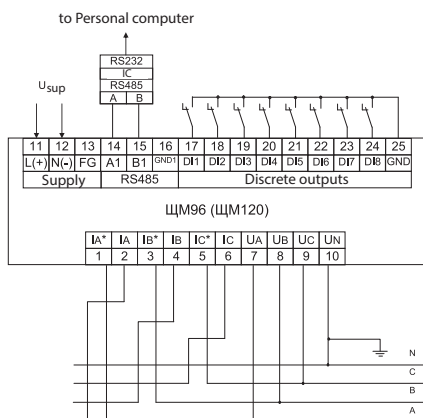
For device with analog outputs design (e=RSX)



For device with discrete outputs and additional interface Design RS485 (e=RS04)

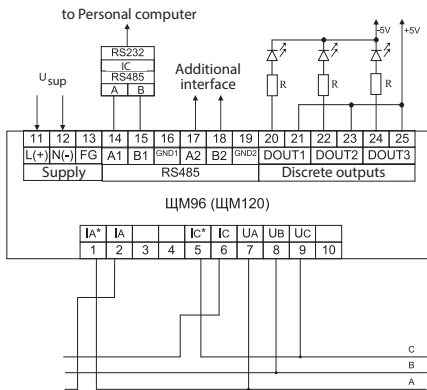


For device with discrete outputs and additional interface Design RS485 (e=RS06)



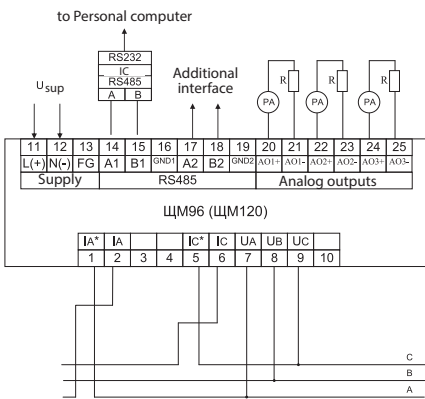
For device with discrete outputs and without additional interface Design RS485 (e=x08)

Connection schemes for three-phase four-wire circuits



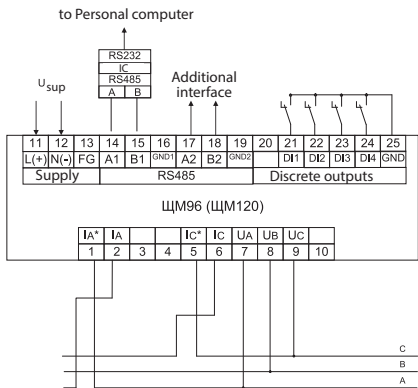
- Notes:**
- 1. Additional interface RS485 (terminals 17-19) depends on the device design
 - 2. Resistor R=430 Om

For device with discrete outputs design (e=RSX)

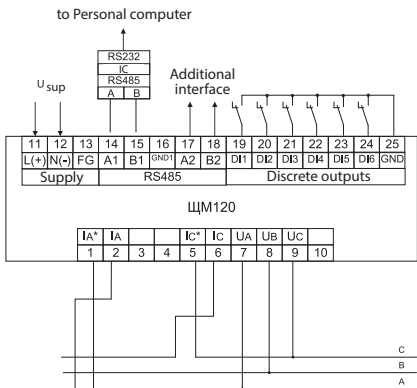


- Notes:**
- 1. Additional interface RS485 (terminals 17-19) depends on the device design
 - 2. Resistor R=430 Om
 - 3. PA- milli amperemeter

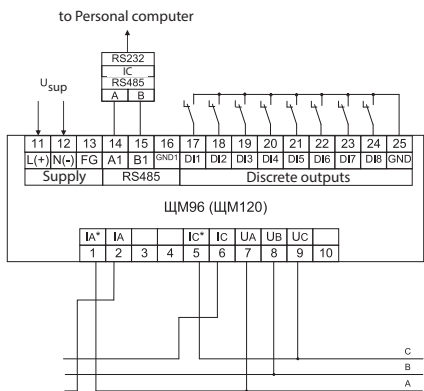
For device with analog outputs design (e=RSX)



For device with discrete outputs and additional interface Design RS485 (e=RS04)



For device with discrete outputs and additional interface Design RS485 (e=RS06)

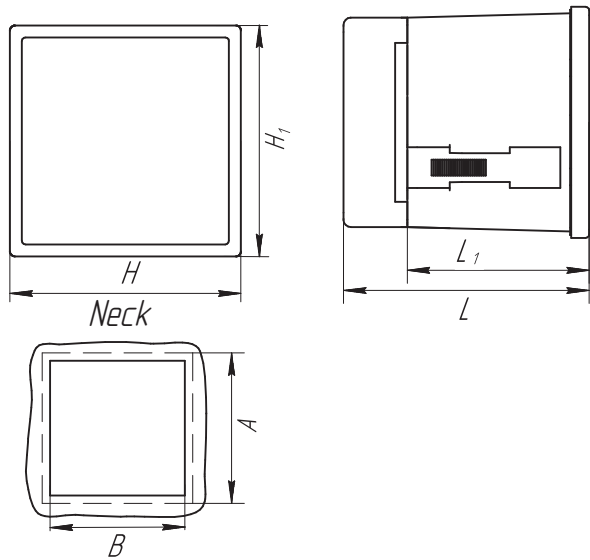


For device with discrete outputs and without additional interface Design RS485 (e=x08)

For more detailed connection diagrams, see the Devices Operation Manual on the website www.elpribor.ru


OVERALL AND INSTALLATION DIMENSIONS

ЩМ120, ЩМ96




Device type	H, mm	L, mm	L1, mm	A, mm	B, mm
ЩМ96	96x96	103	75,6	100	92 ^{+0,8}
ЩМ120	120x120	103	75,6	125	112 ^{+0,9}


INDICATION MODULES




МИ120.1




МИ120.2



МИ120.3



МИ120.5



МИ80.3

Indication modules are intended for displaying the results of metering devices and transformers and can be used at the electro stations, substations and distribution units of energetic and industrial companies.

Modules depending on the modification or the model can display the parameters of three-wire or four-wire alternating current circuits (measured or calculated parameters), display parameters of direct current circuits, discrete output status via RS495 or Ethernet interfaces.

Several modules can be connected to one metering device or transforming device.

One measuring device or converter can be connected to one of the МИ120.1, МИ120.2, МИ120.3, МИ80.3 modules; up to 4 measuring devices and converters can be connected to the 120.5 module.

Module type	Overall dimensions, mm	Display type	Displayed parameters	Climate conditions
МИ120.1 МИ120.2 МИ120.3	120x120x102,1 (with safety cover)	LED	P, Q, I U	-40..+70°C, relative humidity not above 95%, t=35 °C
МИ120.5	Device is supplied with the safety cover	LCD color (sensor)	All parameters of the following devices: ЩМ120, ЩМ96, Е849ЭЛ, Е900ЭЛ, Е3854ЭЛ, Е854ЭЛ, Е856ЭЛ, Е1845ЭЛ, Е1856ЭЛ, Е1858ЭЛ, ЩК96, ЩК120, ЩП02, ЩП72, ЩП96, ЩП120, ЩЧ02, ЩЧ72, ЩЧ96, ЩЧ120, Щ00П, Щ01П, Щ02.01П, ЩП00П, ЩП01П, ЩП02.01П, ЩЧ00П, ЩЧ02.01 П etc.	
МИ80.3	80x80x85 (with safety cover) Note: Device is supplied with the safety cover	LED		-40..+70 °C, relative humidity not above 95%, t=35 °C

Note: For МИ120.5 indication of all parameters of any devices and converters is possible

Displayed parameters	Designation	МИ120.1	МИ120.2*	МИ80.3, МИ120.3	МИ120.5
Actual value of the phase voltage	U_A, U_B, U_C	-	+	+	+
Actual value of the phase-to-phase voltage	U_{AB}, U_{BC}, U_{CA}	-	+	+	+
Average actual value of the phase-to-phase voltage	U_{cp}	-	-	+	+
Actual value of the phase current	I_A, I_B, I_C	-	-	+	+
Average actual value of the phase current	I_{cp}	+	-	+	+
Actual power of the load phase	P_A, P_B, P_C	-	-	+	+
Sum actual power	P_{Σ}	+	-	+	+
Reactive power of the load phase	Q_A, Q_B, Q_C	-	-	+	+
Sum reactive power	Q_{Σ}	+	-	+	+
Total power of the load phase	S_A, S_B, S_C	-	-	+	+
Sum total power	S_{Σ}	-	-	+	+
Phase power ratio	$\cos\varphi_A, \cos\varphi_B, \cos\varphi_C$	-	-	+	+
Average power ratio	$\cos\varphi_{cp}$	-	-	+	+
Circuit frequency	F	-	-	+	+
Discrete inputs status	DI	-	-	+	-

Note: Sign + means, that this parameter can be displayed, sign-means, that this parameter cannot be displayed.
* Displayed parameters (phase and phase-to-phase values) depend on the type of connected metering device or transformer.

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LED indication	Displaying measured data from the external devices (metering devices, transformers)
Sevensegmented indicators (LCD for MI120.5)	MI120.1, MI120.2, MI120.3 – three four digit seven segmented LED indicators; MI80.3 - one four digit seven segmented LED indicator
Interface	RS485 (Modbus RTU protocol), data rate: 9600, 19200, 38400, 57600 bit/sec For MI120.5 only: - Ethernet (IEC 60870-5-104 protocol), data rate 100 Mbit/sec - RS485 (IEC 60870-5-101 protocol),
Additional options (for MI120.5 only)	It is possible to connect external SD card (data backup), real-time clocks. Event logging
Power supply parameters	5 VN-(5+4/-0,5) V DC (besides MI120.5); 12VN -(12+6/3) V DC; 24VN- (24+12/-6) V DC; 220 VU – universal power supply: power voltage 85-253 V AC, frequency 50 Hz or 120-256 V DC
Power consumption, not above	MI80.3 – 2 V-A MI120.1, MI120.2, MI120.3 – 4 V-A MI120.5 – 10 V-A
Reprogramming parameters	Configuration via Configurator software: - Connected address of the metering device and transformer - Connected address of the digital interfaces - Data rate for RS485 interface - Separate parameters of the digital interfaces - Set points for values, displayed on the indicators (besides MI120.5) - Indicators brightness It is possible to configure MI120.5 via Settings menu of the module (sensor panel)
Weight, kg, not above	0,4 kg (MI80.3 – 0,2 kg)
Warranty operating lifetime	24 months
Average lifetime, not less	MI80.3, MI120.1, MI120.2, MI120.3 – 25 years MI120.5 – 20 years
Average mean time to failure	200000 hours

ORDERING FORM

MI a - b - c - d - e - f - g - h

a – module type

MI80 – 80x80 mm (only for universal led module)

MI120 - 120x120 mm

b – design according to the displayed parameters and indicator panels

1 – load indication module (P, Q, I), LED – displays actual and reactive power, average load current

2 – voltage indication module (U), LED – displays phase and linear voltage

3 – universal indication module, LED – displays the main measured and calculated parameters;

5 – universal indication module, LCD – displays the main measured and calculated parameters;

c – supply voltage designation:

5BH-(5+4/-0,5) V DC (besides MI120.5);

12BH -(12+6/3) V DC;

24BH- (24+12/-6) V DC;

220BY – universal power supply: power voltage 85-253 V AC, frequency 50 Hz or 120-256 V DC

d - Designation for additional interface RS485 interface and discrete outputs)

x – this parameter is absent (only for MI120.5 with RE design)

RS – RS485 additional interface

e – Designation for Ethernet interface

(this parameter is only for MI120.5)

x – device without Ethernet interface (only for MI120.5 with RE design)

RE – device with Ethernet interface

f – SD card connection, real-time clocks
 (this parameter is only for МИ120.5 with possibilty of event-logging)
 x – this parameter is absent
 SD- it is possible to connect SD card

g – indicator color
 K – red color;
 3 – green color;
 Ж – yellow color;
 TS – colored touch screen (only for МИ120.5)

h- Special design:
 x - this parameter is absent

Mia module type	Designation code parameters					
	Supply voltage	Interfaces		SD-card	Indication color	Special design
	c	d	e	f	g	h
МИ80.3	+	RS	×	×	R, G, Y	×
МИ120.1	+	RS	×	×	R, G, Y	×
МИ120.2	+	RS	×	×	R, G, Y	×
МИ120.3	+	RS	×	×	R, G, Y	×
МИ120.5	12BH, 24 BH, 220BY	×	RE	×, SD	TS	×
		RS	×			
		RS	RE			

Notes:
 “+” sign shows presence of all possible options in the order formula.
 “x” sign means, that this parameter is absent.

ORDERING EXAMPLE

As for the module with the following characteristics: frst frame size is 120x120 mm, base load indication module, LED, supply voltage – 85-253 V AC, Frequency (50 ±0,5 Hz) or 120 – 265 V DC; RS485 digital interface, green indication color.
МИ120.1-220BY-RS-x-x-x-3-x TY25-7504.213-2011

As for the module with the following characteristics: frst frame size is 120x120 mm, universal indication module, LCD, supply voltage – 24V DC; RS485 digital interface..
МИ120.5-24BH-RS-X-X-TS-X TY25-7504.213-2011

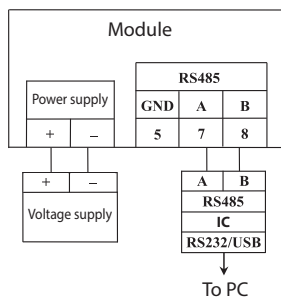
As for the module with the following characteristics: frst frame size is 120x120 mm, universal indication module, LCD sensor colored, supply voltage – 12V DC; Ethernet digital interface, SD-card, real-time clocks.
МИ120.5-12BH-x-RE-SD-TS-X TY25-7504.213-2011

As for the module with the following characteristics: frst frame size is 120x120 mm, universal indication module, LCD sensor colored, supply voltage – 12V DC; RS485, Ethernet digital interface, SD-card, real-time clocks.
МИ120.5-12BH-RS-RE-SD-TS-X TY25-7504.213-2011

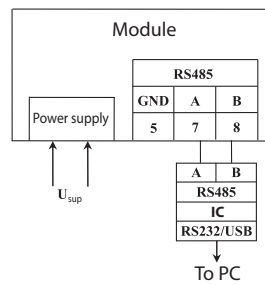
As for the module with the following characteristics: frst frame size is 80x80 mm, universal indication module, LED, supply voltage – 5V DC; RS485 digital interface, yellow indication color.
МИ80.3-5BH-RS-x-x-Ж-x TY25-7504.213-2011

CONNECTION DIAGRAMS

Connction to the PC

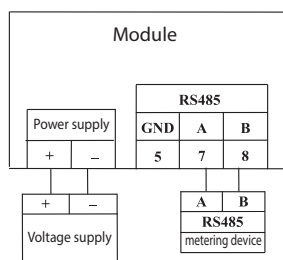


For modules with voltage of 5VN, 12VN, 24 VN

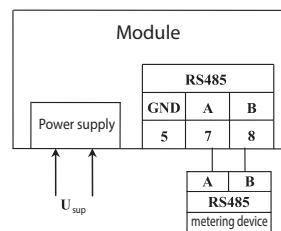


For modules with voltage of 220VU

Connction to metering device or transformer



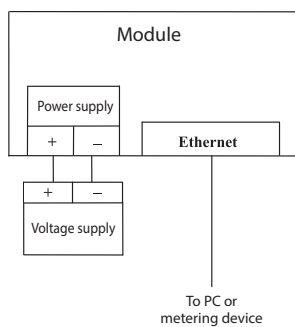
For modules with voltage of 5VN, 12VN, 24 VN



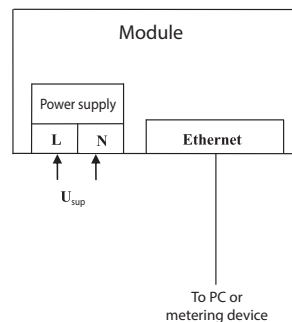
For modules with voltage of 220VU

Note: If one МИ120.5 module is used for displaying the parameters of several devices it is necessary to connect all metering devices on one RS485 bus.

Connction of МИ120.5 to metering device, transformer, PC by Ethernet interface

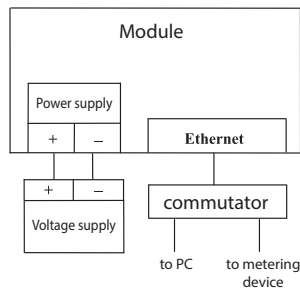


For modules with voltage of 12VN, 24 VN

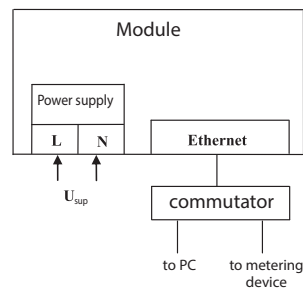


For modules with voltage of 220VU

Connexion of МИ120.5 to metering device, transformer, PC by Ethernet interface via computer



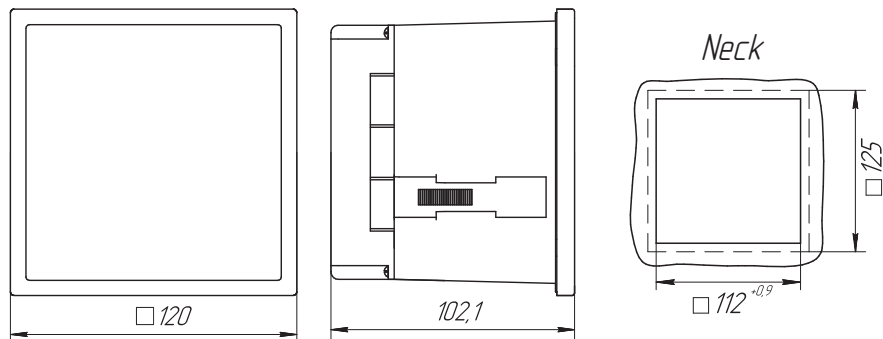
For modules with voltage of 12VN, 24 VN



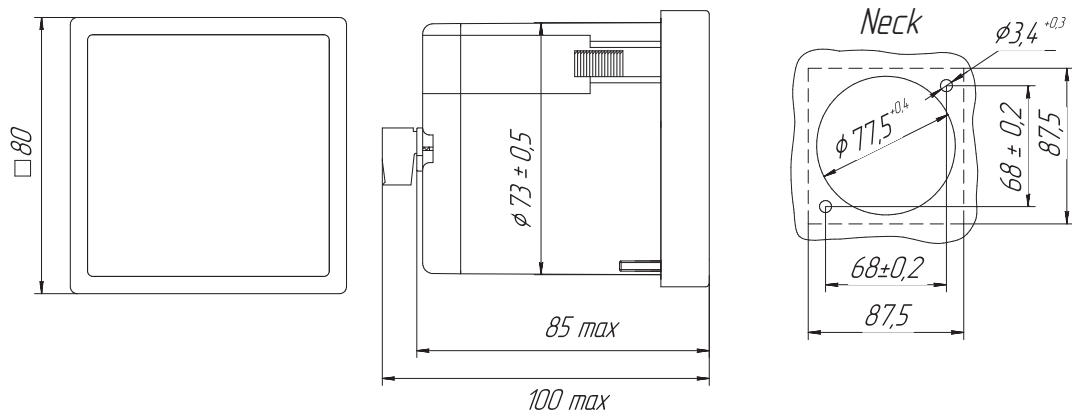
For modules with voltage of 220VU

OVERALL DIMENSIONS

МИ120.1, МИ120.2, МИ120.3, МИ120.5



МИ80.3



METERING DEVICES FOR ALTERNATIVE CURRENT, VOLTAGE AND FREQUENCY



The ЩП120, ЩП96, ЩП72, ЩП02 devices are intended for metering and transformation of the actual current, voltage and frequency parameters in the one-phase circuits and other AC circuits into unified output signals of DC and transferring the results data via RS485 digital interface.

The devices can be used in three-phase electric circuits for measuring and transforming the parameters of one phase.

The ЩП120, ЩП96, ЩП72, ЩП02 devices have a certificate of type approval of the Russian Maritime Registry of Shipping (Ambient class OM2)

ЩП120, ЩП96, ЩП72, ЩП02

ЩП120, ЩП96, ЩП72, ЩП02 devices are included into the State Register of the Measuring Devices RF №68259-17, the validity period is to August 22, 2022

Device Type	Overall dimensions, mm	Weight, kg, not above
ЩП02	96x48x148 (with safety cover) 96x48x121,5 (without safety cover)	0,4
ЩП72	72x72x103 (with safety cover) 72x72x75,6 (without safety cover)	0,4
ЩП96	96x96x103 (with safety cover) 96x96x75,6 (without safety cover)	0,5
ЩП120	120x120x103 (with safety cover) 120x120x75,6 (without safety cover)	0,5

Note: The device is supplied with the rare safety cover

Data display	
LED indication (single or seven-segment displays)	<ul style="list-style-type: none"> - 4 digit seven-segment LED indicator (for current and voltage parameters) - 4 digit seven-segment LED indicator (for frequency parameter – by the order) - single seven-segment indicators for displaying the RS485 interface, signalization of discrete outputs. Height of character: ЩП02 – 20 mm ЩП72 – 14,2 mm ЩП96 – 20 mm ЩП120 – red, green, yellow – 26 mm ЩП120 – with colored indicators – 20 mm
Additional Indication	Colored barographic (discrete-analog) scale (31 segment) – for ЩП120 only, with colored combined indicators.
Additional Features	Connection of the indication modules or indication panel on the RS485 interface
Telemetry	
Input signal	mV: 100,150, 200, 250, 500, 1000, 2000 V: 1,2,5,10, 20, 50, 100, 150, 200, 250, 380, 500, 600, 750 mA: 2,5,10,20,50,100,200, 500, 1000, 2000 A: 1,2,5,10,20 Hz:15...100, 100...850
Registration of the Maximum measured value	Yes
Measuring time	0,2 sec.

Input analog signal transition time, not above	1,0 sec.
Intrinsic error limit	- For current and voltage: $\pm 0,2\%$; $\pm 0,5\%$; - For frequency: $\pm 0,01$ Hz (from 15 to 100 Hz); $\pm 0,1$ Hz (from 100 to 850 Hz); - For analog output: $\pm 0,5\%$;
Galvanic isolation unit of input and output circuits, supply circuits	Yes
Short-time input signal (with multiplicity, maximum value) overload	Current: Multiplicity: 20, number of overloads: 2; time of the each overload, sec: 0,5; time interval between two overloads, sec: 0,5. Voltage: Multiplicity: 1,5, number of overloads: 9; time of the each overload, sec: 0,5; time interval between two overloads, sec: 15
Input resistance for alternative current voltage metering	(1+0,012/-0,005) Mom
Electric energy quality parameters	
Electric energy quality parameters control	- Frequency deviation - Voltage fail duration - Voltage fail depth - Voltage interruption duration - Duration of temporary overload (the energy quality parameters are stored at PC via Configurator software)
Communication interfaces/Analog outputs	
RS485	Quantity: 0,1,2; Protocols: Modbus RTU, IEC 60870-5-101 Data transferring speed: 4800, 9600, 19200, 38400, 57600, 115200 bit/s
Analog outputs	Quantity: 0,1,2 Reprogramming ranges: 0...5 mA, 4...20 mA, 0...20 mA
Remote control	
Discrete inputs	Quantity: 0,1,2 DC voltage 350 V, 200mA, or AC voltage 250 V, 200mA
Power supply	
Voltage	5 VN - (5+4/-0,5) V DC 12 VN - (12+6/3) V DC; 24 VN - (24+12/-6) V DC; 220 VU - 85-264 V AC, frequency (50 \pm 3) Hz or 100-370 V DC 230 V - 85-264 V AC, frequency (50 \pm 3) Hz
Power consumption from the supply circuit (not above)	2,5 VA - for ЩП02, ЩП72 supply voltage 5VN, 12VN, 24 VN; 3,0 VA - for ЩП96, ЩП120 supply voltage 5VN, 12VN, 24 VN; 5(4*) VA - for ЩП02, ЩП72, ЩП96, ЩП120 supply voltage 220VU, 230V * for devices without RS485 interface
Device reprogramming (trim)	
Reprogramming	- via the Configurator software (RS485 interface), - via control buttons on the front panel (if applicable)
Reprogramming parameters	- Scale range - Indication parameters setting - Trigger levels of the discrete outputs (set points) - Analog outputs parameters - Interfaces parameters - Selection of the scale type for displaying of the results - Calibration
Operational Conditions	
Working temperature range	-40 - +70 °C
Protection class	IP54
Mounting	On the shield
Wire cross-section	2,5 mm ²
Maximum overload for internal signal (duration)	150% (2 hours)
Calibration period	10 years
Warranty operating lifetime	60 months
Average lifetime, not less	20 years
Average mean time to failure	200 000 hours

ORDERING FORM

ЩП a - b - c - d - e - f - g - h - i

a – device performance depending on the overall dimensions

ЩП02 - 96x48 mm, ЩП72 - 72x72 mm
ЩП96 - 96x96 mm, ЩП120 - 120x120 mm

b1 – input signal range designation for direct connection, transformation ratio for connection via external current or voltage transformer :

mV: 100,150, 200, 250, 500, 1000, 2000
V: 1,2,5,10, 20, 50, 100, 150, 200, 250, 380, 500, 600, 750
mA: 2,5,10,20,50,100,200, 500, 1000, 2000
A: 1,2,5,10,20
Hz:15...100, 100...850

Default frequency range for the input signal is 15..100 Hz for frequency designation of 50 Hz (it is not stated in the order).

In the case of order the device with frequency range of 100..850 Hz with the main indicator only it is necessary to specify the frequency designation of b1 – 400 Hz in brackets.

Note: If scale range is different to the direct metering range of the input signal, please additionally specify the ordered scale range in the ordering formula.

b2 – frequency scale range designation of the input signal of the additional indicator (except ЩП02)

50 Hz for 15..100 Hz
400 Hz for 100..850 Hz
- it is not specified, if there is no such parameter, or d=x

c – supply voltage

5BH – (5+4/-0,5)V of DC
12BH – (12+6/-3)V of DC
24BH – (24+12/-6)V of DC
230B – supply voltage 85-264 V AC, frequency 50 Hz
220BY – universal supply: supply voltage 85-264 V AC, frequency 50 Hz or 100 – 370 V DC.

d – RS485 interface

1RS – one interface
2RS – two interfaces (for ЩП96 and ЩП120 only)
x - when parameter is absent

e – analog and discrete outputs

02 – two discrete outputs, no analog outputs
11 – one analog output and one discrete output
12 – one analog output and two discrete outputs
20 – two analog outputs, no discrete outputs
22 – two analog outputs and two discrete outputs

Without analog and discrete outputs.

After the numbers please specify analog output signals A=0..5mA, B=4..20 mA, C=0..20mA in brackets
if ordering two analog outputs, designations should be separated by the comma

f – indicator color

K – red color;
3 – green color;
Ж – yellow color;
Ц – colored combined (only for ЩП120)

g – accuracy class

0,2 – for all designs (except the devices without RS485 interface, and/or with operational design)
0,5 – for all designs

h – operational design

OM2 – for Marine Vehicles
A – for NPP (safety class 4)
X – in other cases

i – special design (only for ЩП120 with colored combined indicators)

1Б- one barographic (discrete-analog) scale
2Б- two barographic (discrete-analog) scales, only if b2 parameter was selected
- do not stated, if there is no such parameter

ЩПа device design	Designation code parameters							
	b1, b2	c	d	e	f	g	h	i
	Range scale	Supply voltage	Interface	Analog and discrete outputs	Indication color	Accuracy class	Operational design	Special design
ЩП02	b1	+	1RS	x, 12, 20, 22	R, G, Y	+	x	-
		12VN, 24VN, 220VU, 230V	x	x		0,5	+	
ЩП72	+	+	1RS	x, 02, 11, 20	R, G, Y	+	x	-
	b1	12VN, 24VN, 220VU, 230V	x	x		0,5	+	
ЩП96	+	+	1RS, 2RS	x, 12, 20, 22	R, G, Y	+	x	-
	b1	12VN, 24VN, 220VU, 230V	x	x		0,5	+	
ЩП120	+	+	1RS, 2RS	x, 12, 20, 22	+	+	x	+
	b1	12VN, 24VN, 220VU, 230V	x	x	R, G, Y	0,5	+	-

Notes:
"+" sign shows presence of all possible options in the order formula.
"x" sign means, that this parameter is absent in the order formula.
"- " sign means, that there is no this parameter.

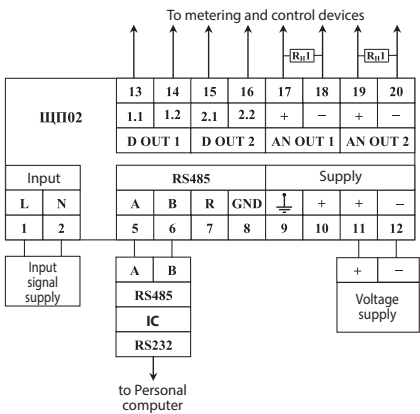
ORDERING EXAMPLE

ЩП120 device, main indicator – output signal scale range – 0-500 V, additional indicator – frequency range – 15-100 Hz, supply voltage 85-264 V AC, Frequency 50Hz, or 100-370 V DC, two RS485 interfaces, two analog outputs 0.5 mA and 0.20 mA, two discrete outputs, red indicator, Accuracy class – 0,5, operation at Marine vehicles.
ЩП120-500 B, 50Гц-220BY-2RS-22(A,C)-K-0,5-OM2- TY26.51.43-235-05763903-2017

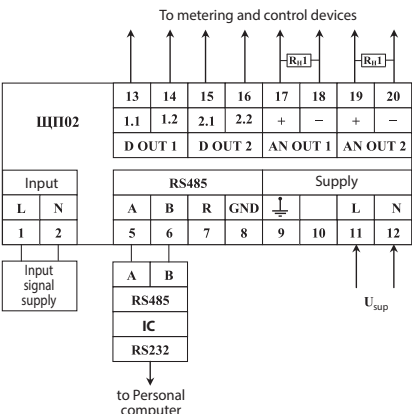
ЩП120 device, main indicator – output signal scale range – 0-500 V, additional indicator – frequency range – 100-850 Hz, supply voltage 85-264 V AC, Frequency 50Hz, or 100-370 V DC, two RS485 interfaces, two analog outputs 0.5 mA and 0.20 mA, two discrete outputs, colored combined indicator, Accuracy class – 0,5, operation at NPP, two barographic(discrete-analog) scales.
ЩП120-500 B, 400Гц-220BY-2RS-22(A,C)-Ц-0,5-A-2B- TY26.51.43-235-05763903-2017

CONNECTION DIAGRAMS

Design with RS485 interface

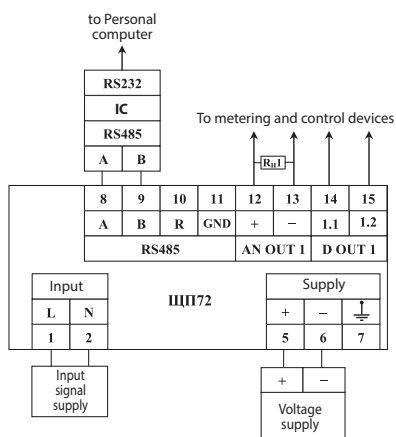


For ЩП02 with voltage of 5VN, 12VN, 24 VN

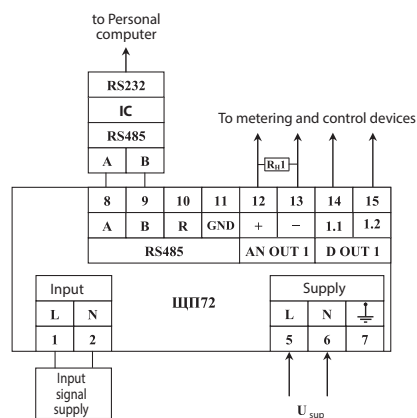


For ЩП02 with voltage of 220VU, 230 V*

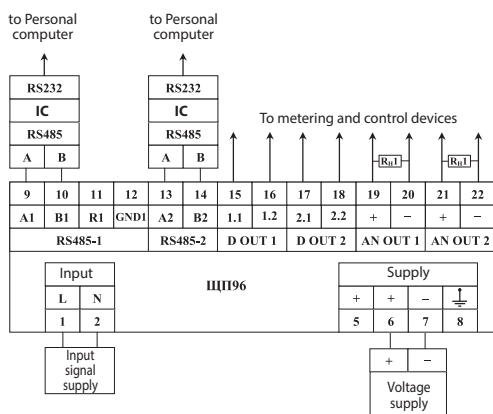
*U_{sup} – supply voltage 85-264 V of AC with frequency of 50 Hz or 100-370 V of DC (220V), supply voltage 85-264 V of AC with frequency of 50 Hz (230V)



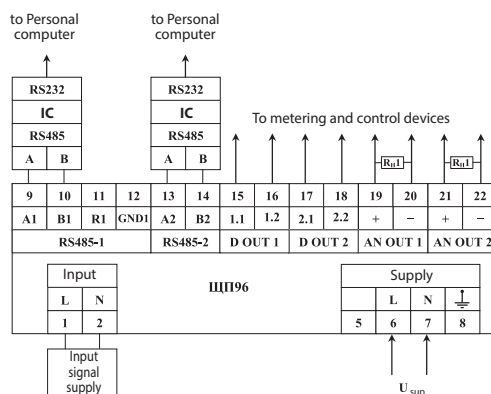
For ЩП72 with voltage of 5VN, 12VN, 24 VN



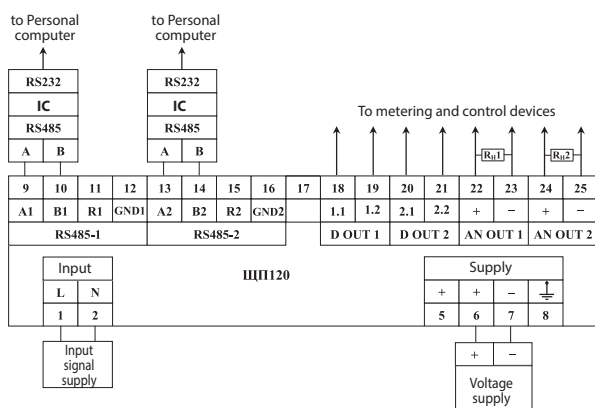
For ЩП72 with voltage of 220VU, 230 VU*



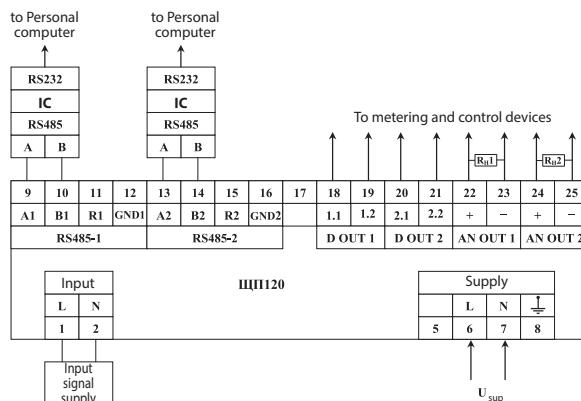
For ЩП96 with voltage of 5VN, 12VN, 24 VN



For ЩП96 with voltage of 220VU, 230 VU*



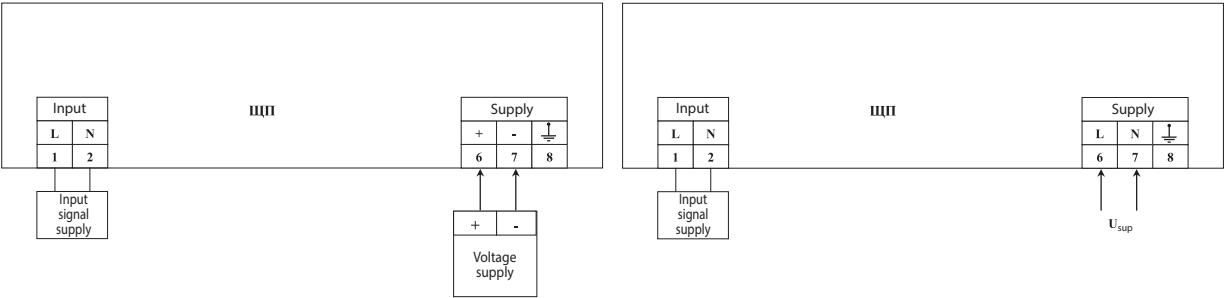
For ЩП120 with voltage of 5VN, 12VN, 24 VN



For ЩП120 with voltage of 220VU, 230 V*

*U_{sup} – supply voltage 85-264 V of AC with frequency of 50 Hz or 100-370 V of DC (220V), supply voltage 85-264 V of AC with frequency of 50 Hz (230V)

Design without RS485 interface

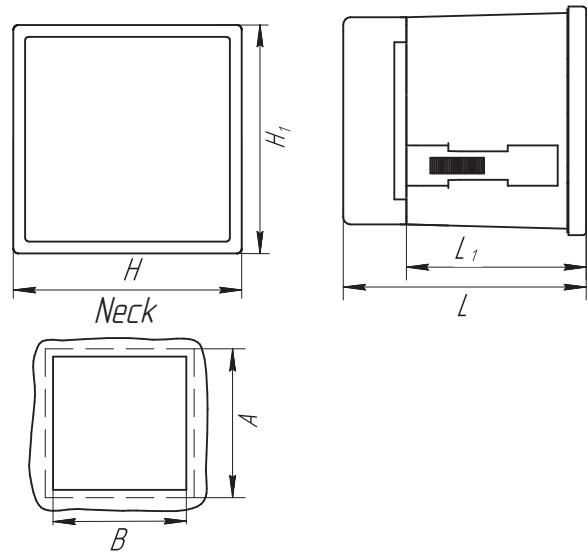


For designs with voltage of 12VN, 24 VN

For designs with voltage of 220VU, 230 V*

*U_{sup} – supply voltage 85-264 V of AC with frequency of 50 Hz or 100-370 V of DC (220V), supply voltage 85-264 V of AC with frequency of 50 Hz (230V)

OVERALL AND INSTALLATION DIMENSIONS



Device type	HxH, mm	L1, mm	L, mm	A, mm	B, mm
ЩП120	120x120	75,6	103	125x125	112 ^{+0,9}
ЩП96	96x96	75,6	103	100x100	92 ^{+0,8}
ЩП72	72x72	75,6	103	75x75	68 ^{+0,7}
ЩП02	96x48	121,5	148	100x50	92 ^{+0,8} x45 ^{+0,6}

SMALL SIZE METERING DEVICES FOR ALTERNATIVE CURRENT, VOLTAGE AND FREQUENCY



ЩП00П, ЩП01П, ЩП02.01П

The small size digital devices ЩП00П, ЩП01П, ЩП02.01П are intended for metering and transformation of the actual current, voltage and frequency parameters in the one-phase circuits and other AC circuits into unified output signals of DC and transferring the results data via RS485 digital interface.

The devices one-channel, one-limit and have designs according to the overall dimensions, measuring ranges, scale ranges, supply voltage, interfaces, discrete and analog outputs, accuracy class and special design.

One-phase devices can be used in three-phase electric circuits for measuring and transforming the parameters of one phase.

The devices are used in energy industry and other industrial spheres for electric parameters control.

ЩП00П, ЩП01П, ЩП02.01П devices are included into the State Register of the Measuring Devices RF №64095-16, the validity period is to June 02, 2021

Device Type	Overall dimensions, mm	Height of character, mm	Weight, kg, not above
ЩП00П	48×24×86	9,9	0,2
ЩП01П	96×24×86	9,9	0,2
ЩП02.01П	96×48×95	20	0,3

Data display	
LED indication (single or seven-segment displays)	-4-digit seven-segment LED indicators (for voltage and current parameters display) - single LED indicators for displaying work of interface, discrete outputs status, lightening of the measurement units prefix
Additional Features	Connection of the indication modules or indication panel on the RS485 interface
Telemetry	
Input signal	For direct connection: mV: 100, 150, 200, 250, 500, 1000, 2000 V: 1;2;5;10;20;50;100;150;200;250;380 (except ЩП00П); 500 (except ЩП00П); 750 (except ЩП00П; ЩП01П); mA: 2;5;10;20;50; 100; 200;500; 1000;2000 A: 1;2 Note: It is possible to connect devices via voltage transformer 100V or current transformer 1
Measured/transformed frequency scale	45-65 Hz (by default) 100-300 Hz (by the order)
Accuracy class	- For measuring of current and voltage of AC – 0,2 or 0,5; - For measuring of the input signal frequency–0,5; - For transforming–0,5;
Maximum scale range	0-9999
Measuring time	0,1 sec.
Input analog signal transition time, not above	0,5 sec.
Intrinsic error limit	- For current and voltage: ±0,2%; ±0,5%; - For frequency: ±0,01 Hz; ±0,1 Hz; - For analog output: ±0,5%;
Galvanic isolation unit of input and output circuits, supply circuits	Yes (ЩП00П devices don't have Galvanic isolation unit for RS interface circuit)
Short-time input signal (with multiplicity, maximum value) overload	Current: Multiplicity: 2, number of overloads: 10; time of the each overload, sec: 10; time interval between two overloads, sec: 10

Input resistance for voltage AC circuits	(1±0,005) MOm
Communication interfaces/Analog outputs	
RS485	Quantity: 0 or 1; Protocols: Modbus RTU Data transferring speed: 9600, 19200, 38400, 57600 bit/sec
Analog outputs	Quantity: 0,1,2; Reprogramming ranges: 0...5 mA, 4..20 mA, 0..20 mA, 0...2,5...5 mA, 4...12..20 mA, 0..10..20 mA
Remote control	
Discrete outputs	Quantity:0,1,2; Direct voltage 300 V, 100 mA, or alternative voltage 200 V, 100 mA
Power supply	
Voltage	-5V-(5±0,25) V of DC -12V-(12±0,6) V of DC -24V-(24±1,2) V of DC -5VN-(5±4/-0,5) V of DC -12VN-(12±6/-3) V of DC (there is a safety function to prevent wrong pole connection) -24VN-(24±12/-6) V of DC (there is a safety function to prevent wrong pole connection) -external block of stabilized supply 5 V (for ЩП00П). Devices ЩП02.01П provide reserve supply for designs with supply voltage (12+6/-3) V and (24+12/-6)V
Power consumption from the supply circuit (not above)	ЩП00П -1,7 VA ЩП01П -2,7 VA ЩП02.01П -3,2 VA
Device reprogramming (trim)	
Reprogramming	- via the Configurator software (RS485 interface),
Reprogramming parameters	- Indication parameters: Indication refreshment period; decimal point position; scale type and parameters selection, display parameters; - Interface parameters: device address, data rate, paritet, stop-bit; - Metering part parameters: metering type, input signal calibration, metering time, unsensitive zone value - Discrete output parameters; - Analog output parameters;
Operational Conditions	
Working temperature range	-40 - +50 °C
Protection class	IP50
Mounting	On the shield
Wire cross-section	2,5 mm²
Maximum overload for internal signal (duration)	150% (2 hours)
Calibration period	10 years
Warranty operating lifetime	36 months
Average lifetime, not less	20 years
Average mean time to failure	200 000 hours

ORDERING FORM

ЩП a – b – c – d – e – f – g – h

ЩПа – device performance depending on the front frame size

ЩП00П - 48x24,
ЩП01П - 96x24,
ЩП02.01П - 96x48,

b – input signal metering scale range:

For direct connection:

mV: 100, 150, 200, 250, 500, 1000, 2000

V: 1;2;5;10;20;50;100;150;200;250;380 (except Щ00П); 500 (except Щ00П);

750 (except Щ00П; Щ01П);

mA: 2;5;10;20;50; 100; 200;500; 1000;2000

A:1;2

It is possible to connect devices via voltage transformer 100V or current transformer 1 A.

Default frequency range: 45-65 Hz (it is not stated in the order)

If order the device with frequency range of 300 – 500 Hz, please, specify in b parameter 400 Hz (in brackets).

Note: If scale range is different to the direct metering range of the input signal, please additionally specify the ordered scale range in the ordering formula.

c – nominal voltage:

-5B-(5±0,25) V of DC

-12B-(12±0,6) V of DC

-24B-(24±1,2) V of DC

-5BH-(5±4/-0,5) V of DC

-12BH-(12±6/-3) V of DC

-24BH-(24±12/-6) V of DC

X – with external stabilized voltage block 5 V (for ЩП00П)

d – RS485 interface:

- 1RS – one interface;

x – without interface

e - Designation for analog and discrete outputs:

01 - one discrete outputs, no analog outputs

10 – one analog output and no discrete outputs

11 – one analog output and one discrete output

12 – one analog output and two discrete outputs

20 – two analog outputs, no discrete outputs

22 – two analog outputs and two discrete outputs

x - Without analog and discrete outputs.

AP=0...2.5...5 mA, BP=4...12...20 mA, CP=0...10...20 mA

if ordering two analog outputs, designations should be separated by the comma

f – indicator color

- K – red color ;

- 3 – green color;

- Ж – yellow color;

g – accuracy class

0,2 or 0,5

h – special design

A – for NPP (safety class 4)

The parameter is not stated if there is no special design

Measurement device type	Designation code parameters						
	Scale range	Supply voltage	Interface	Analog and discrete outputs	Color of indication	Accuracy class	Special design
	b	c	d	e	f	g	h
ЩП00П	+	x, 5V, 12V, 24V	x, 1RS	x	+	+	+
ЩП01П	+	5V, 12V, 24V	x, 1RS	x, 01, 10, 11	+	+	+
ЩП02.01П	+	5VN, 12VN, 24VN	1RS	x, 12, 20, 22	+	+	+

Notes:

“+” sign shows presence of all possible options in the order formula.

“x” sign means, that this parameter is absent.

The unused h parameter is not stated.

For ЩП00П device interface RS485 is without galvanic isolation unit.

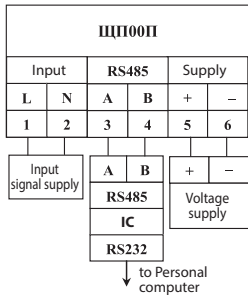
ORDERING EXAMPLE

ЩП00П device with transformation ratio – 10kV/100V, with external block of stabilized power supply 5 V, without interface, without discrete and analog outputs, red indicator color, accuracy class – 0,5
ЩП00П-10кВ/100В-х-х-х-К-0,5 – TY25-75.04.228-2015

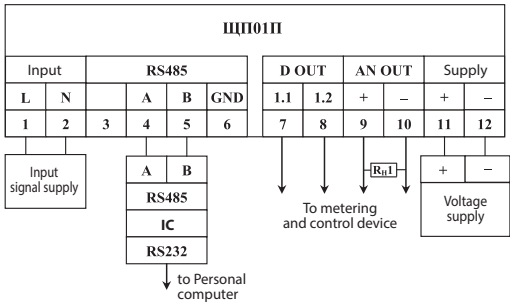
ЩП01П device with output signal scale range of 0-100mA, voltage supply of 24 V DC, stabilized, one RS485 interface, without discrete and analog outputs, red indicator color, accuracy class – 0,5, special design A, indication range – 0..50 m
ЩП01П-100mA-24В-1RS-X-K-0,5-A – TY25-75.04.228-2015 Note indication range – 0..50 m

CONNECTION DIAGRAMS

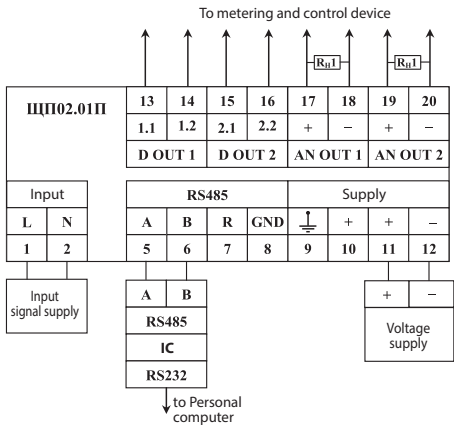
ЩП00П



ЩП01П

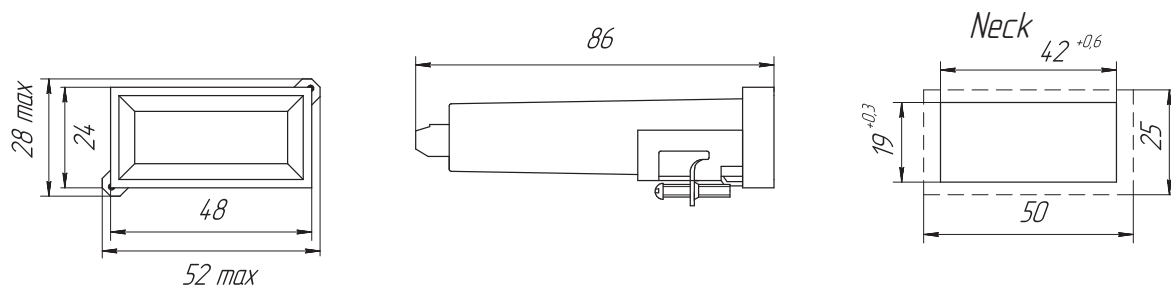


ЩП02.01П

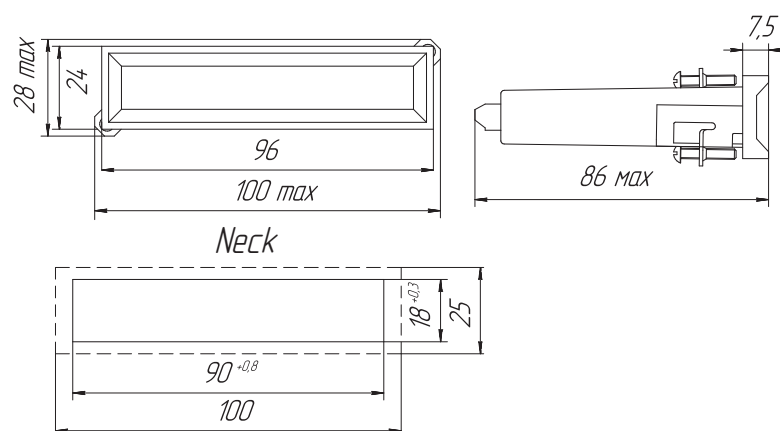


OVERALL AND INSTALLATION DIMENSIONS

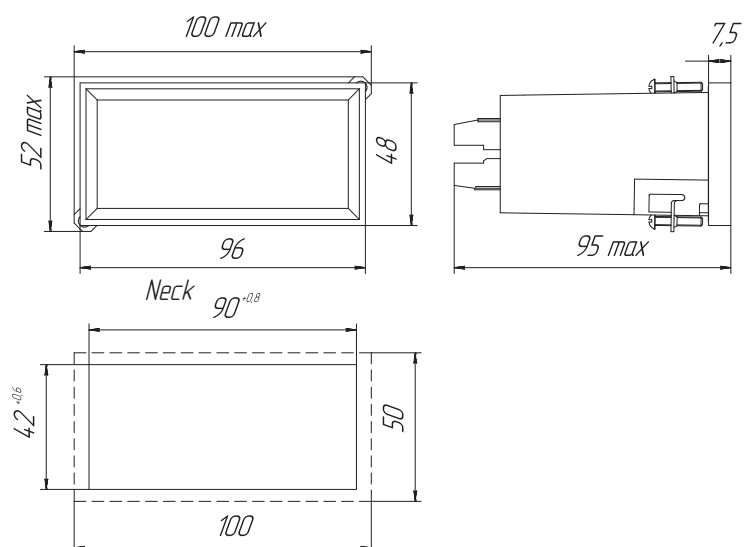
ЩП00П



ЩП01П



ЩП02.01П



METERING DEVICES FOR ALTERNATIVE CURRENT, VOLTAGE AND FREQUENCY



ЩК120, ЩК96

The ЩК120, ЩК96, devices are intended for metering of the actual current, voltage and frequency parameters in the one-phase and three-phase AC circuits.

Devices provide possibility of transferring the results data via RS485 digital interface (Modbus RTU protocol) and unified output signals of DC. That is why these devices can be used in different automated control systems.

The devices are multichannel and multilimit, they have designs for output signals, scale ranges, number of channels, supply voltage, interfaces, discrete and analog outputs, indication color, accuracy class and overall dimensions.

The devices have a possibility to program the scale range (channel rated current – 1 A, 5 A, voltage 100 V) and level of the controlled values of input signals (set points), fast changing of the indicators brightness.

ЩК120, ЩК96 devices are included into the State Register of the Measuring Devices RF №42450-11, the validity period is to July 6, 2021

Device Type	Overall dimensions, mm	Height of character, mm	Weight, kg, not above
ЩК96	96x96x103 (with safety cover) 96x96x75,6 (without safety cover)	14	0,4
ЩК120	120x120x103 (with safety cover) 120x120x75,6 (without safety cover)	20	0,5

Note: The device is supplied with the rare safety cover

Data display	
LED indication (single or seven-segment dispalys)	- 4 digit seven-segment LED indicator (for frequency, current and voltage parameters) - single LED indicators for displaying work of interface, discrete outputs status, lightening of the measurement units prefix
Additional Features	Connection of the indication modules or indication panel on the RS485 interface
Telemetry	
Input signal	V: 50, 100, 250, 500 mA: 500 A: 1, 2, 5 Examples of the scale ranges (connection via voltage transformer or current transformer) (scale range can be any in the range of 2-120 V for connection via voltage transformer of 100 V, From 0,020 – 1,000 A for connection via current transformer 1 A or 0,10 – 5,000 A for connection via current transformer 5 A) V: 380, 660 kV: 3,6, 10, 11, 15, 20, 35, 100, 150, 220, 330, 400, 500, 750 A: 1, 5, 10, 15, 20, 30, 40, 50, 75, 80, 100, 150, 200, 300, 400, 500, 600, 750, 800 kA: 1; 1,2; 1,5; 2; 3; 4; 5; 6; 7; 8; 10; 12; 14; 16; 18; 20; 25; 28; 30; 32; 35; 40 Hz: 45..65
Measured/transformed frequency scale accuracy class	45-65 Hz (by default)
Maximum scale range	0,5 or 1,0
Measuring time	0-9999
Input analog signal transition time, not above	1,0 sec.
Registration of the Maximum measured value	1,0 sec.
Intrinsic error limit	±0,5%; ±1,0%;
Galvanic isolation unit of input and output circuits, supply circits	Yes
Short-time input signal (with multiplicit, maximum valuey) overload	Current: Multiplicity: 20, number of overloads: 2; time of the each overload, sec: 0,5; time interval between two overloads, sec: 0,5. Voltage: Multiplicity: 1,5, number of overloads: 9; time of the each overload, sec: 0,5; time interval between two overloads, sec: 15

Input resistance for alternative current voltage metering	- 50 kOm – for devices with the effective range of 50 V - 100 kOm – for devices with the effective range of 100 V - 250 kOm – for devices with the effective range of 250 V - 450 kOm – for devices with the effective range of 500 V
Voltage drop at the input for current metering (not above): for scale range 500mA, 1000mA, 2000mA, 1A, 2A, 5 A	30 mV
Communication interfaces/Analog outputs	
RS485	Quantity: 1; Protocols: Modbus RTU Data transferring speed: 9600, 19200, 38400, 57600 bit/s
Analog outputs	Ranges: 0...5 mA, 0..20 mA, 4..20 mA (for each parameter)
Remote control	
Discrete outputs	DC voltage 300 V, 100mA, or AC voltage 200 V, 100mA
Power supply	
Voltage	- 12VN – (12+6/3) V DC; - 24VN – (24+12/-6) V DC; - 220 VU – 85-253 V AC, frequency (50± 0,5) Hz or 120-265 V DC - 230 V – 85-253 V AC, frequency (50± 0,5) Hz
Power consumption from the supply circuit (not above)	12 VA
Device reprogramming (trim)	
Reprogramming	- via the Configurator software (RS485 interface), - via control buttons on the front panel
Reprogramming parameters	• Scale range selection and adjustment • Trigger levels of the discrete outputs (set points) • Interfaces parameters adjustment • Calibration of metering channels and analog outputs
Operational Conditions	
Working temperature range	-40 - +55 °C
Protection class	IP40
Mounting	On the shield
Wire cross-section	Solid wires with cross-section 4 mm ² , multipair wires – with cross-section to 2,5 mm ²
Maximum overload for internal signal (duration)	150% (2 hours)
Calibration period	3 years
Warranty operating lifetime	24 months
Average lifetime, not less	15 years
Average mean time to failure	100 000 hours

ORDERING FORM

ЩК a - b1, b2, b3 - c - d - e - f - g - h - i

a – Device type (as for overall dimensions, mm)

ЩК96 - 96x96 mm,
ЩК120 - 120x120 mm

b1, b2, b3 – range scale :

V: 50, 100, 250, 500

mA: 500

A: 1, 2, 5

Examples of the scale ranges (connection via voltage transformer or current transformer)(scale range can be any in the range of 2-120 V for connection via voltage transformer of 100 V,

From 0,020 – 1,000 A for connection via current transformer 1 A or 0,10 – 5,000 A for connection via current transformer 5 A)

V: 380, 660

kV: 3,6, 10, 11, 15, 20, 35, 100, 150, 220, 330, 400, 500, 750

A: 1, 5, 10, 15, 20, 30, 40, 50, 75, 80, 100, 150, 200, 300, 400, 500, 600, 750, 800

kA: 1; 1,2; 1,5; 2; 3; 4; 5; 6; 7; 8; 10; 12; 14; 16; 18; 20; 25; 28; 30; 32; 35; 40

Hz*: 45..65

*Range scale should be completed for every channel

** Frequency of the first channel voltage

c – number of digits

4,0

d – supply voltage

12BH – (12+6/-3)V of DC

24BH – (24+12/-6)V of DC

220BY – supply voltage 85-253 V AC, frequency (50±0,5) Hz or 120-265 V DC.

230B – supply voltage 85-253 V AC, frequency (50±0,5) Hz;

e – RS485 interface

RS – RS485 (necessary to be stated)

f – discrete outputs

21 – discrete output for every channel

00 – no discrete outputs, no analog outputs

q – analog outputs

A=0..5mA – for every channel

B=4..20 mA – for every channel

C=0..20mA – for every channel

- if this parameter is absent, do not complete

h – indicator color

- K – red color;

- 3 – green color;

- Ж – yellow color;

i – accuracy class

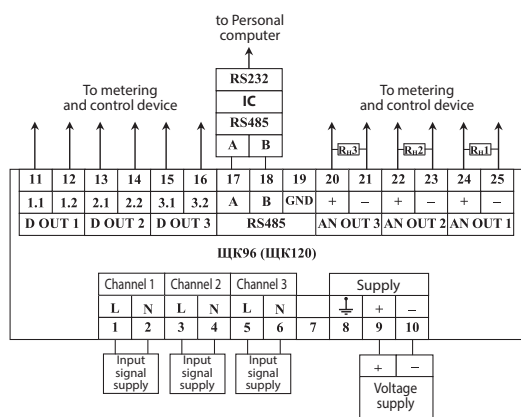
0,5;1,0.

ORDERING EXAMPLE

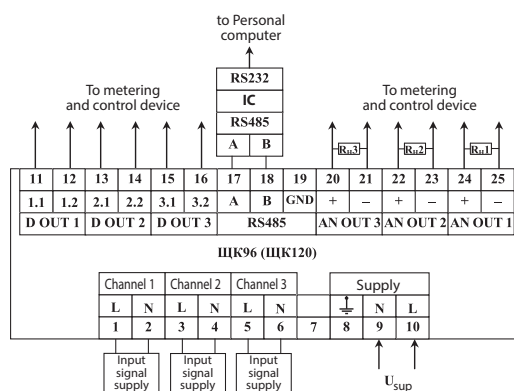
ЩК120 device, first channel range scale 0-500 V, the second and the third channels – 0-250 V with the direct connection, supply voltage 24 V DC, RS485 interface, discrete outputs, analog outputs 0.5 mA, red indicator, accuracy class 0,5;

ЩК120-500 В, 250 В, 250 В -4,0 – 24ВН-RS-21-A-K- 0,5 ТУ25-7504.206-2009

CONNECTION DIAGRAMS



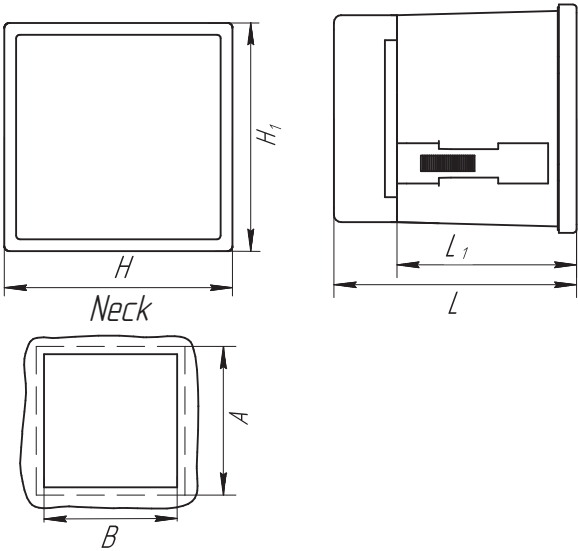
For designs with supply voltage of 12VN, 24 VN



For designs with supply voltage of 220VU, 230 V

*U_{sup} – supply voltage 85-253 V of AC with frequency of 50 Hz or 120-265 V of DC (220V), supply voltage 85-265 V of AC with frequency of 50 Hz (230V)

OVERALL AND INSTALLATION DIMENSIONS



Device type	HxH, mm	L ₁ , mm	L, mm	A, mm	B, mm
ЩК96	96x96	75,6	103	100	92 ^{+0,8}
ЩК120	120x120			125	112 ^{+0,9}

ALTERNATIVE CURRENT FREQUENCY MEASURING DEVICES



Щ4120, Щ496, Щ472, Щ402

The ШЧ120, ШЧ96, ШЧ72, ШЧ02 devices are intended for metering and transformation of the AC frequency parameter in the one-phase circuits and other AC circuits into unified output signals of DC and transferring the results data via RS485 digital interface.

These devices are used in energy industry and other industrial spheres for control of electric parameters.

The possibility of information exchange via RS485 interface (Modbus RTU protocol) and unified output signals of direct current allow to use the devices in the automated systems.

The devices are one-channel, one-limit and have designs according to their overall dimensions, scale ranges, metering ranges, supply voltage, interfaces, discrete and analog outputs, indication color, accuracy class and special design.

Щ4120, Щ496, Щ472, Щ402 devices are included into the State Register of the Measuring Devices RF №67465-17, the validity period is to May 10, 2022

Device Type	Overall dimensions, mm	Weight, kg, not above
Щ402	96x48x148 (with safety cover) 96x48x121,5 (without safety cover)	0,4
Щ472	72x72x103 (with safety cover) 72x72x75,6 (without safety cover)	0,4
Щ496	96x96x103 (with safety cover) 96x96x75,6 (without safety cover)	0,4
Щ4120	120x120x103 (with safety cover) 120x120x75,6 (without safety cover)	0,5

Note: The device is supplied with the rare safety cover

Data display	
LED indication (single or seven-segment display)	- 4 digit seven-segment LED indicator (for current and voltage parameters) - single LED indicators for displaying work of interface, discrete outputs. Height of character: 14402 – 14,2 mm (for 5-digit device) and 20 mm (for 4-digit device) 14472 – 10 mm (for 5-digit device) and 14,2 mm (for 4-digit device) 14496 – 14,2 mm (for 5-digit device) and 20 mm (for 4-digit device) 144120 – 20 mm (for 5-digit device) and 26 mm (for 4-digit device) 144120 – with colored combined character indicator – 20 mm
Additional Indication	Colored barographic (discrete-analog) scale (31 segment) – for 144120 only, with colored combined indicators.
Additional Features	Connection of the indication modules or indication panel on the RS485 interface
Telemetry	
Indication range	10...9999 Hz, 10...15000 Hz
Input voltage range	U _{nom} =150 V (22,5...180V) U _{nom} =500 V (75...600 V)
Accuracy class	0,01; 0,05 – for measuring 0,5 – for transforming
Maximum scale range	4-digits: 0 – 9999 5-digits: 0 - 99999
Measuring time	0,1 sec.

Input analog signal transition time, not above	0,5 sec.
Intrinsic error limit	Measuring: ±0,05% (4—digit); ±0,01% (5—digit); Transforming: ±0,5%
Galvanic isolation unit of input and output circuits, supply circuits	Yes
Input resistance for alternative current voltage metering	(1+0,005) Mom
Communication interfaces/Analog outputs	
RS485	Quantity: 0,1,2; Protocols: Modbus RTU Data transferring speed: 9600, 19200, 38400, 57600 bit/s
Analog outputs	Quantity: 0,1,2 Ranges: 0...5 mA, 4...20 mA, 0...20 mA, 0...2,5...5 mA, 4...12...20 mA, 0...10...20 mA Note: can be different combinations of outputs depending on the design.
Remote control	
Discrete inputs	Quantity: 0,1,2 DC voltage 350 V, 200mA, or AC voltage 250 V, 200mA Note: can be different combinations of outputs depending on the design.
Power supply	
Voltage	- 12VN – (12+6/3) V DC; - 24VN – (24+12/-6) V DC; - 220 VU – 85-264 V AC, frequency (50± 0,5) Hz or 120-370 V DC - 230 V – 85-264 V AC, frequency (50± 0,5) Hz
Power consumption from the supply circuit (not above)	3,5 VA – for devices with supply voltage 12VN, 24 VN; 6,0 VA – for devices with supply voltage 220VU, 24 230 V;
Device reprogramming (trim)	
Reprogramming	- via the Configurator software (RS485 interface), - via control buttons on the front panel (if applicable)
Reprogramming parameters	<ul style="list-style-type: none"> • Indication operation parameters • Decimal point position • Frequency to output signal transforming range • Parameters of Outputs changing • Trigger levels of the discrete outputs (set points) • Interface parameters • Calibration
Operational Conditions	
Working temperature range	-40 - +70 °C
Protection class	IP50
Mounting	On the shield
Wire cross-section	2,5 mm ²
Maximum overload for internal signal (duration)	150% (2 hours)
Calibration period	10 years
Warranty operating lifetime	24 months
Average lifetime, not less	20 years
Average mean time to failure	200 000 hours

ORDERING FORM

ЩЧ a – b – c – d – e – f – g – h

a – device performance depending on the overall dimensions of the front panel

ЩЧР02 - 96x48 mm, ЩЧ72 - 72x72 mm
ЩЧ96 - 96x96 mm, ЩЧ120 - 120x120 mm

b – input voltage designation:

150 V, 500 V

c – supply voltage

12BH – (12+6/3) V DC;
24BH – (24+12/-6) V DC;
220BY – 85-264 V AC, frequency (50± 0,5) Hz or 120-370 V DC
230B – 85-264 V AC, frequency (50± 0,5) Hz

d – RS485 interface

x – if there is no such parameter
1RS – main interface
2RS – main and additional interfaces (for ЩЧ96 and ЩЧ120 only)
Note: if there is no such parameter (d=x) devices can have limited functions

e – analog and discrete outputs

x – without discrete and analog outputs
02 – two discrete outputs, no analog outputs
11(a) – one analog output and one discrete output
12(a) – one analog output and two discrete outputs
22(a,b) – two analog outputs and two discrete outputs
20 (a,b) – two analog outputs, no discrete outputs
Where a,b – designations of the output analog signals changing: A=0..5mA, B=4..20 mA, C=0..20mA
AP=0...2.5...5 mA, BP=4...12...20 mA, CP=0...10...20 mA

f – indicator color

K – red color;
3 – green color;
Ж – yellow color;
Ц – colored combined (only for ЩЧ120)

g – digits

-4,0 (scale range 10...9999 Hz, accuracy class – 0,05);
-5,0 (scale range 10...15000 Hz, accuracy class – 0,01); (except the devices without RS485 interface)

h – special design

-b- barographic (discrete-analog) scale only for ЩЧ120 with colored combined indicators
- do not stated, if there is no such parameter

ЩЧa device design	Designation code parameters						
	Input voltage	Supply voltage	Interface	Analog and discrete outputs	Color of indication	Accuracy class	Special design
	b	c	d	e	f	g	h
ЩЧ02	+	+	1RS	x, 12, 20, 22	R, G, Y	+	-
			x	x		4,0	
ЩЧ72	+	+	1RS	x, 02, 11, 20	R, G, Y	+	-
			x	x		4,0	
ЩЧ96	+	+	1RS, 2RS	x, 12, 20, 22	R, G, Y	+	-
			x	x		4,0	
ЩЧ120	+	+	1RS, 2RS	x, 12, 20, 22	+	+	+
			x	x	R, G, Y	4,0	-

* Only for devices with colored combined indicators

Notes:

"+" sign shows presence of all possible options in the order formula. "-" sign means that this parameter shall not be stated

"x" sign means, that this parameter is absent in the order formula.

Analog output ranges shall be stated in the brackets after number of outputs.

Do not specify h parameter, if it is not stated.

ORDERING EXAMPLE

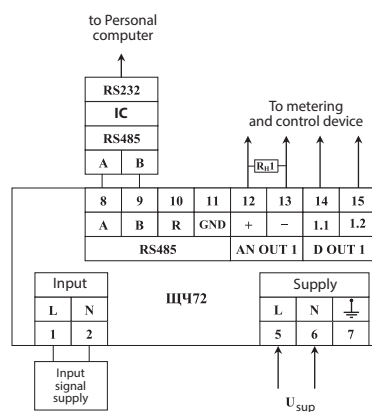
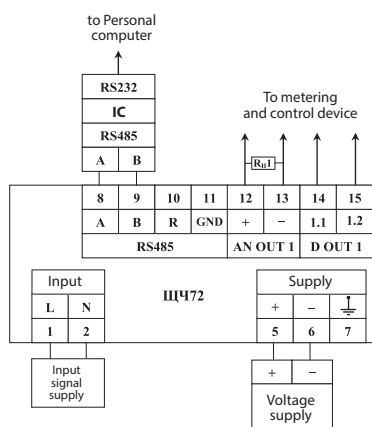
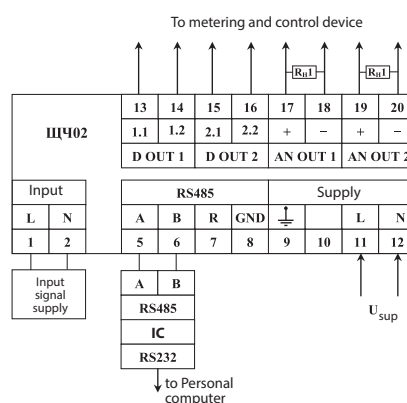
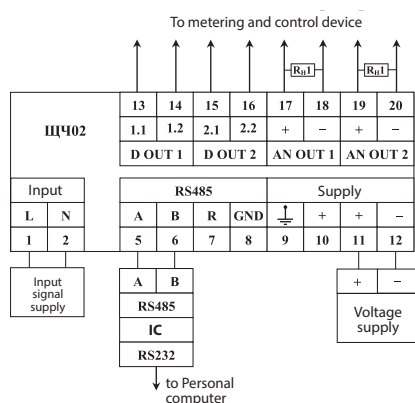
ЩЧ120 device, input voltage 150 V, supply voltage 85-264 V AC, frequency 50 Hz or 120-370 V DC, 2 interfaces, 2 analog outputs, 4..20 mA, two discrete outputs, red indicator, 5 digits.

ЩЧ120-150 B-220B-2RS-22(B,B)-K-0,5 TY25-7504.224-2014

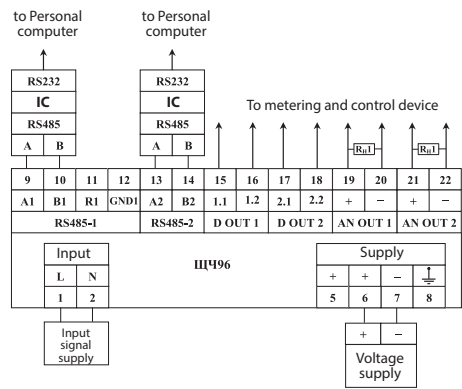
ЩЧ120 device, input voltage 500 V, supply voltage 85-264 V AC, frequency 50 Hz or 120-370 V DC, 2 interfaces, 2 analog outputs, 4..20 mA, two discrete outputs, red indicator, 5 digits.

ЩЧ120-150 B-220B-2RS-22(B,B)-K-0,5 TY25-7504.224-2014

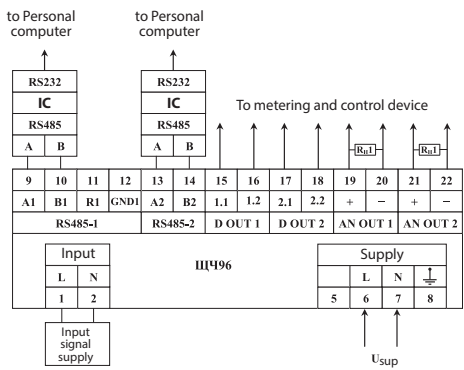
CONNECTION DIAGRAMS



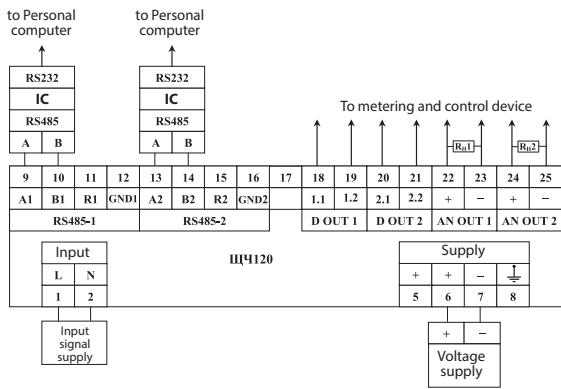
*U_{sup} – supply voltage 85-264 V of AC with frequency of 50 Hz or 100-370 V of DC (220V), supply voltage 85-264 V of AC with frequency of 50 Hz (230V)



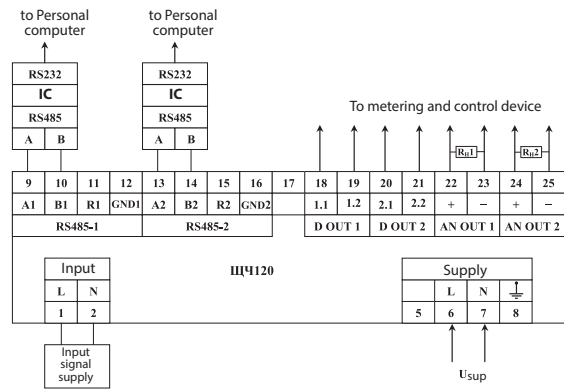
For ЩЧ96 with voltage of 12VN, 24 VN



For ЩЧ96 with voltage of 220VU, 230 V*

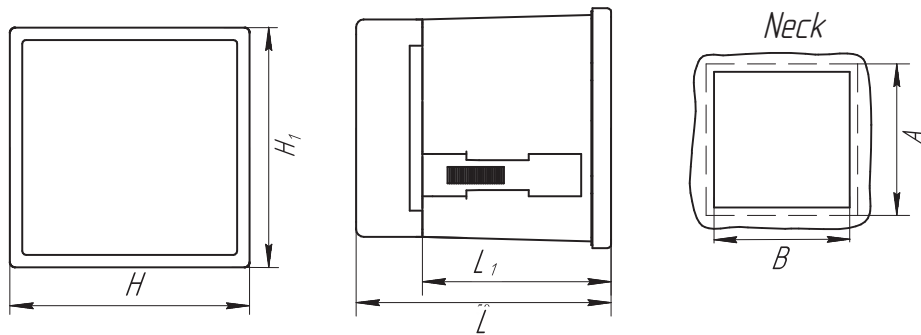


For ЩЧ120 with voltage of 12VN, 24 VN



For ЩЧ120 with voltage of 220VU, 230 V*

*U_{sup} – supply voltage 85-264 V of AC with frequency of 50 Hz or 200-370 V of DC (220V), supply voltage 85-264 V of AC with frequency of 50 Hz (230V)



Device type	HxH, mm	L ₁ , mm	L, mm	A, mm	B, mm
ЩЧ02	96x48	148	121,5	100x50	92 ^{+0,8} x45 ^{+0,6}
ЩЧ72	72x72	103	75,6	75	68 ^{+0,7}
ЩЧ96	96x96	103	75,6	100	92 ^{+0,8}
ЩЧ120	120x120	103	75,6	125	112 ^{+0,9}

SMALL SIZE METERING DEVICES FOR ALTERNATIVE CURRENT FREQUENCY



Щ400П, Щ401П, Щ402.01П

The small size digital devices Щ400П, Щ401П, Щ402.01П are intended for metering and transformation of the alternative current frequency parameter in the one-phase circuits and other AC circuits into unified output signals of DC and transferring the results data via RS485 digital interface.

The devices one-channel, one-limit and have designs according to the overall dimensions, measuring ranges, scale ranges, supply voltage, interfaces, discrete and analog outputs, accuracy class and special design. The devices have a frequency range scale (normal frequency metering range) from 10 to 9999 Hz, 4 digits.

Frequency transforming range can be different depending on the scale range. It is possible to change transforming range by the client duration operation.

Щ400П, Щ401П, Щ402.01П devices are included into the State Register of the Measuring Devices RF №64095-16, the validity period is to June 02, 2021

Device Type	Overall dimensions, mm	Height of character, mm	Weight, kg, not above
Щ400П	48x24x86	9,9	0,2
Щ401П	96x24x86	9,9	0,2
Щ402.01П	96x48x95	20	0,3

Data display	
LED indication (single or seven-segment dispalys)	- 4-digit seven-segment LED indicators for frequency current parameters display - single LED indicators for displaying work of interface, discrete outputs status, lightening of the measurement units prefix
Additional Features	Connection of the indication modules or indication panel on the RS485 interface
Telemetry	
Input voltage range	150 V, 250V, 500 V
Frequency transforming range	45-55 Hz (by default) Frequency transforming range can be different in the frequency metering range of 10-9999 Hz
Accuracy class	For input signal frequency metering: 0,05 For transforming – 0,5
Maximum scale range	0-9999
Measuring time	0,1 sec.
Output analog signal setting time, not above	0,5 sec.
Intrinsic error limit	- For frequency meterng : $\pm 0,05\%$; - For frequency transforming : $\pm 0,5\%$;
Galvanic isolation unit of input and output circuits, supply circuits	Yes (Щ400П devices don't have Galvanic isolation unit for RS interface circuit)
Short-time input signal (with multiplicit, maximum valuey) overload	Current: Multiplicity: 2, number of overloads:10; time of the each overload, sec: 10; time interval between two overloads, sec: 10
Input resistance for alternative current voltage metering	($1 \pm 0,005$) MOm
Communication interfaces/Analog outputs	
RS485	Quantity: 0 or 1 ; Protocols: Modbus RTU Data transferring speed: 9600, 19200, 38400, 57600 bit/sec
Analog outputs	Quantity: 0,1,2 Ranges: 0...5 mA, 4..20 mA, 0..20 mA, 0..2,5..5 mA, 4..12..20 mA, 0...10..20 mA

Remote control	
Discrete outputs	Quantity: 0,1,2; Direct voltage 300 V, 100 mA, or alternative voltage 200 V, 100 mA
Power supply	
Voltage	-5V-(5±0,25) V of DC -12V-(12±0,6) V of DC -24V-(24±1,2) V of DC -5VN-(5±4/-0,5) V of DC -12VN-(12+6/-3) V of DC (there is a safety function to prevent wrong pole connection) -24VN-(24+12/-6) V of DC (there is a safety function to prevent wrong pole connection) -external block of stabilized supply 5 V (for Щ400П). Devices Щ402.01П provide reserve supply for designs with supply voltage (12+6/-3) V and (24+12/-6)V
Power consumption from the supply circuit (not above)	Щ400П -1,7 VA; Щ401П -2,7 VA; Щ402.01П -3,2 VA
Device reprogramming (trim)	
Reprogramming	- via the Configurator software (RS485 interface),
Reprogramming parameters	- Indication parameters: Indication refreshment period; decimal point position; scale type and parameters selection, display parameters; - Interface parameters: device address, data rate, paritet, stop-bit; - Metering part parameters: metering type, input signal calibration, metering time, unsensitive zone value - Discrete output parameters; - Analog output parameters;
Operational Conditions	
Working temperature range	-40 - +50 °C
Protection class	IP50
Mounting	On the shield
Wire cross-section	2,5 mm ²
Maximum overload for internal signal (duration)	150% (2 hours)
Calibration period	10 years
Warranty operating lifetime	36 months
Average lifetime, not less	20 years
Average mean time to failure	200 000 hours

ORDERING FORM

ЩЧ a - b - c - d - e - f - g

a – device performance depending on the front frame size, mm

ЩЧ400П - 48x24,
ЩЧ401П - 96x24,
ЩЧ402.01П - 96x48,

b – Input voltage range designation:

250 V- for ЩЧ400П, ЩЧ401П
150 V, 500 V- for ЩЧ402.01П

c – Designation of supply voltage:

-5B-(5±0,25) V of DC
-12B-(12±0,6) V of DC
-24B-(24±1,2) V of DC
-5BH-(5±4/-0,5) V of DC
-12BH-(12±6/-3) V of DC
- 24BH-(24+12/-6)V of DC
X – with external stabilized voltage block 5 V (for ЩЧ400П)

d – RS485 interface:

- 1RS – one interface;
x – without interface

e - Designation for analog and discrete outputs

01 - one discrete output, no analog outputs
 10 – one analog output and no discrete outputs
 11 – one analog output and one discrete output
 12 – one analog output and two discrete outputs
 20 – two analog outputs, no discrete outputs
 22 – two analog outputs and two discrete outputs
 X – without analog and discrete outputs
 After the numbers please specify analog output signals A=0..5mA, B=4..20 mA, C=0..20 mA, AP=0..2,5..5mA, BP=4..12..20 mA, CP=0..10..20 mA in brackets,
 For two analog outputs in order, please separate them by comma.

f – indicator color

- K – red color ;
- 3 – green color;
- Ж – yellow color;

g - digits

4,0 (range scale – 10...9999 Hz, accuracy class – 0,05)

Measurement device type	Code parameter of the full designation					
	b	c	d	e	f	g
ЩЧ00П	250	x, 5V, 12V, 24V	x, 1RS	x	+	4,0
ЩЧ01П	250	5V, 12V, 24V	x, 1RS	x, 01, 10, 11	+	4,0
ЩЧ02.01П	150, 500	5VN, 12VN, 24VN	1RS	x, 12, 20, 22	+	4,0

Notes:
 "+" sign shows presence of all possible options in the order formula.
 "x" sign means, that this parameter is absent.
 For ЩЧ00П device interface RS485 is without galvanic isolation unit.

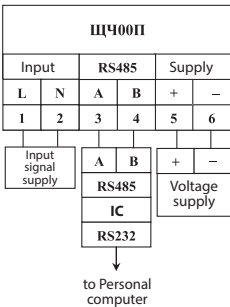
ORDERING EXAMPLE

ЩЧ00П device with supply voltage 250 V, with external block of stabilized power supply 5 V, without interface, without discrete and analog outputs, green indicator color, 4 digits
ЩЧ00П -250 B-x-x-x-3-4,0 – TY25-7504.228-2015

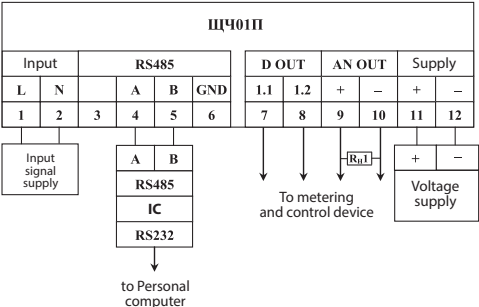
ЩЧ01П device with supply voltage 250 V, Stabilized power supply 12 V DC, one RS485 interface, without discrete and analog outputs, green indicator color, 4 digits
ЩЧ01П-250 B-12B-1RS-x-3-4,0 – TY25-7504.228-2015

CONNECTION DIAGRAMS

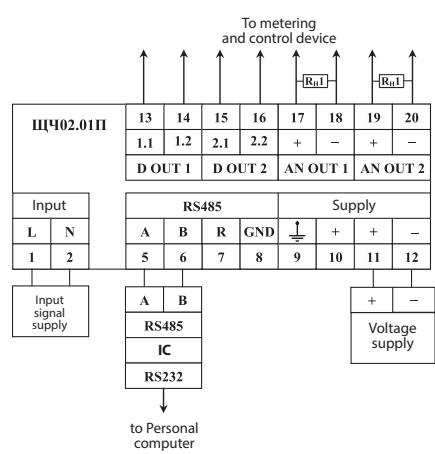
ЩЧ00П



ЩЧ01П

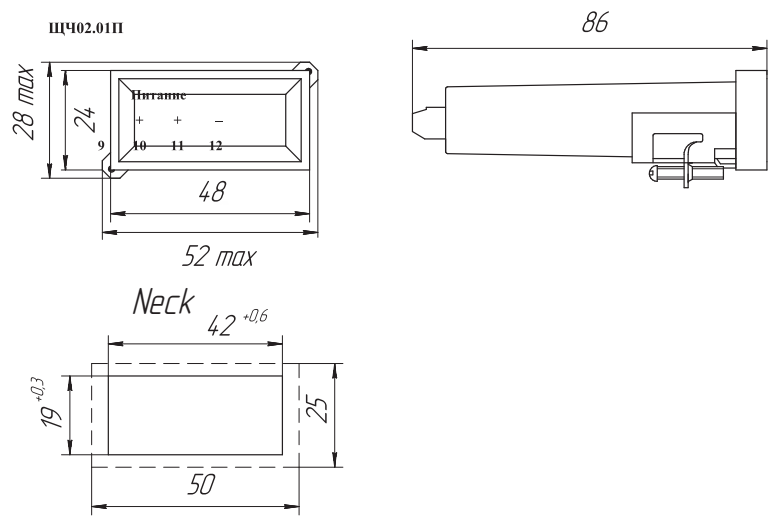


ЩЧ02.01П

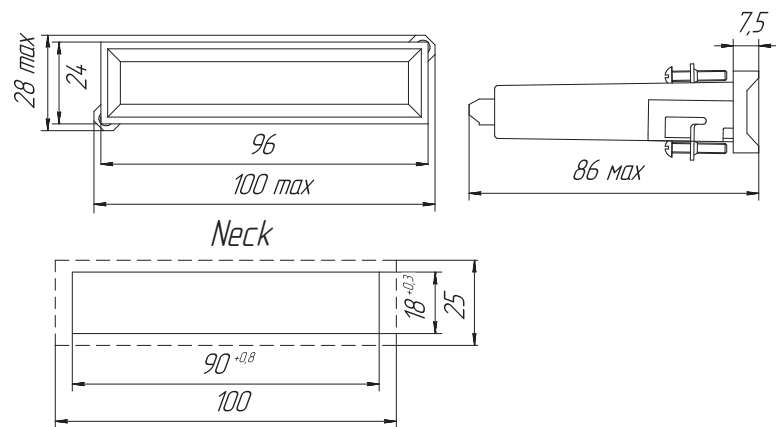


OVERALL AND INSTALLATION DIMENSIONS

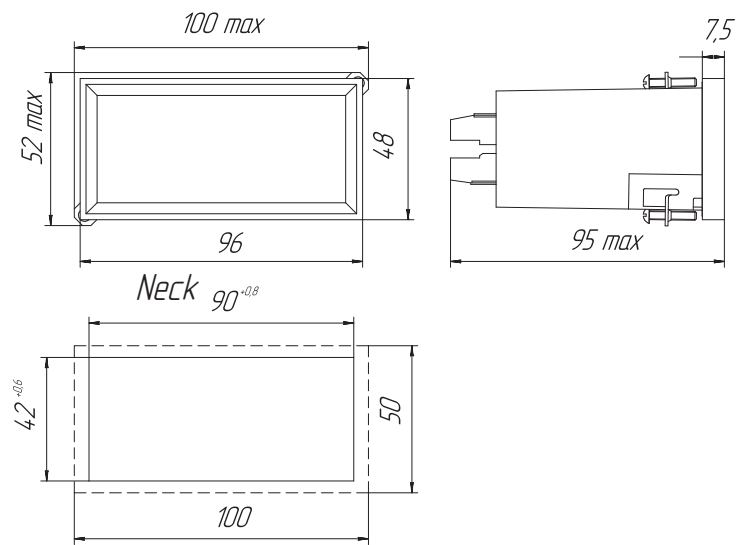
ЩЧ00П




ЩЧ01П



Щ402.01П



METERING DEVICES FOR POWER METERING OF THE ONE-PHASE CIRCUITS



ЩБ120.1, ЩБ96.1, ЩБ72.1, ЩБ02.1

The ЩБ120.1, ЩБ96.1, ЩБ72.1, ЩБ02.1 devices are intended for metering and transformation of the actual and reactive power of one-phase circuits into unified output signals of DC and transferring the results data via RS485 digital interface.

The possibility of information exchange via RS485 interface (Modbus RTU protocol) and unified output signals of direct current allow to use the devices in the automated systems.

It is possible to program the following parameters of device by using integrated buttons and interface:

- Scale range and decimal point position
- Set points level
- Changing of digital indicators brightness
- Interface parameters

ЩБ120.1, ЩБ96.1, ЩБ72.1, ЩБ02.1 devices are included into the State Register of the Measuring Devices RF №64916-16, the validity period is to September 7,2021.

Device Type	Overall dimensions, mm	Height of character, mm	Weight, kg, not above
ЩБ02.1	96x48x148 (with safety cover) 96x48x121,5 (without safety cover)	20	0,4
ЩБ72.1	72x72x103 (with safety cover) 72x72x75,6 (without safety cover)	14	0,4
ЩБ96.1	96x96x103 (with safety cover) 96x96x75,6 (without safety cover)	20	0,4
ЩБ120.1	120x120x103 (with safety cover) 120x120x75,6 (without safety cover)	20	0,5

Note: The device is supplied with the rare safety cover

Data display	
LED indication (single or seven-segment dispalys)	- 4 digit seven-segment LED indicator (for displaying of different parameters, depending on the order) - single LED indicators for displaying work of interface, discrete outputs, lightening of the measurement units prefix
Additional Features	Connection of the indication modules or indication panel on the RS485 interface
Telemetry	
Input signal	A: 0,5; 1; 2,5; 5 I/1;I/5 – through the current tranformator with secondary winding 1 A and 5 A V: 100, 380 (400) U/100 through a voltage transformer with a rated secondary winding voltage of 100 V.
Measurement unit	W, kW, MW, ±VAR, ±kVAR, ±MVAR, W/±VAR, kW/±kVAR, MW/±MVAR,
Rated power ratio	For wattmetre cosφ=1, for varmetre - sinφ=1
Nominal frequency value of measuring signals	50 Hz
Accuracy class	0,5
Maximum scale range	-9999 to+9999
Measuring time	0,1 sec.
Input analog signal transition time, not above	0,5 sec.
Voltage drop for current of 5 A, not above	30 mV
Intrinsic error limit	±0,5%

Galvanic isolation unit of input and output circuits, supply circuits	Yes
Short-time input signal (with multiplicity, maximum value) overload	Current: Multiplicity: 20, number of overloads: 2; time of the each overload, sec: 0,5; time interval between two overloads, sec: 0,5. Voltage: Multiplicity: 1,5, number of overloads: 9; time of the each overload, sec: 0,5; time interval between two overloads, sec: 15
Input resistance for alternative current voltage metering	- Not above 0,02 Ohm for series circuit - Not less 500 kOhm for parallel circuit
Communication interfaces/Analog outputs	
RS485	Quantity: 1,2; Protocols: Modbus RTU Data transferring speed: 4800, 9600, 19200, 38400 bit/s
Analog outputs	Quantity: 0,1,2 Ranges: 0...5 mA, 4...20 mA, 0...20 mA, 0...2,5...5 mA, 4...12...20 mA, 0...10...20 mA.
Remote control	
Discrete inputs	Quantity: 0,1,2 DC voltage 300 V, 100mA, or AC voltage 200 V, 100mA
Power supply	
Voltage	- 5VN – ((5+4/-0,5) V DC - 12VN – ((12+6/3) V DC; - 24VN – (24+12/-6) V DC; - 220 VU – 85-253 V AC, frequency (50± 0,5) Hz or 120-265 V DC
Power consumption from the supply circuit (not above)	6,0 VA
Device reprogramming (trim)	
Reprogramming	-via the Configurator software (RS485 interface), -via control buttons on the front panel (if applicable)
Reprogramming parameters	- Range scale, Decimal point position - Set points level - Changing of digital indicators brightness - Interface parameters
Operational Conditions	
Working temperature range	-40 - +50°C
Protection class	IP50
Mounting	On the shield
Wire cross-section	2,5 mm ²
Maximum overload for internal signal (duration)	150% (2 hours)
Calibration period	10 years
Warranty operating lifetime	2 years
Average lifetime, not less	25 years
Average mean time to failure	200 000 hours

ORDERING FORM

ЩБ a - b - c - d - e - f - g - h - i

a – device type depending on the overall dimensions

ЩБ02.1 - 96x48 mm, ЩБ72.1 - 72x72 mm
ЩБ96.1 - 96x96 mm, ЩБ120.1 - 120x120mm

b – nominal voltage or voltage transformation ratio

100 V, 380 V, 400 V – nominal voltage
U/100 – U – nominal voltage of the primary winding of the voltage transformer, nominal voltage of the secondary winding is 100V.

c – nominal current or current ratio

0,5 A, 1 A, 2,5A, 5 A – nominal current
I/1, I/5 – I – nominal current of the primary winding of the voltage transformer, nominal current of the secondary winding is 1A or 5 A.

d – Measurement unit

W, kW, MW, ±VAr, ±kVAr, ±MVar, W/±VAr, kW/±kVAr, MW/±MVar,

e – power supply

220BY – universal supply; supply voltage - 85-253 V AC, frequency 50 Hz or 120-265 V DC
5BH –(5+4/-0,5) V DC
12BH –(12+6/3) V DC;
24BH- (24+12/-6) V DC;

f – interface

1RS – main interface
2RS –main and additional interfaces
Note: ЩБ02.1 and ЩБ72.1 devices are produced on;y with onle interface (f=1RS).

g – output analog signal changing range

x – the parameter is absent
X – one output analog signal (for example: A, B,C,BP)
X/Y – two output analog signals (for example: A/A, A/B, C/BP) (A=0..5mA, B=4..20 mA, C=0..20Ma, AP=0..2,5..5 mA, BP=4..12..20 mA, CP=0..10..20mA);

h – analog and discrete outputs (depends on the number of output signals)

x – without discrete and analog outputssignals
20,02,11 – ЩБ72.1
12,20,22 – ЩБ02.1, ЩБ96.1, ЩБ120.1, where
11 – one analog output and one discrete output
12 – one analog output and two discrete outputs
02 – two discrete outputs, no analog outputs
20 – two analog outputs, no discrete outputs (this parameter shall be stated for the device, where the measurement unit is xW/xVar)
22 – two analog outputs and two discrete outputs (this parameter shall be stated for ЩБ120.1, SV96.1, ЩБ02.1 devices, where the measurement unit is xW/xVar)

i – indicator color

K – red color;
3 – green color;
Ж – yellow color;

ЩBa device design	Designation code parameters							
	Nominal value or transformation ratio		Measure-ment unit	Supply voltage	Number of interfaces	Analog syn-gnal changing range	Analog and discrete outputs	Indication color
	b	c	d	e	f	g	h	i
ЩБ02.1	U, U/100	I, I/5, I/1	W, Var, ±Var	+	1RS	+	x, 12, 20, 22	+
ЩБ72.1	U, U/100	I, I/5, I/1	W, Var, ±Var				x, 02, 11, 20	
			W/Var, W/±Var	+	1RS	+	x, 02, 20	+
ЩБ96.1	U, U/100	I, I/5, I/1	W, Var, ±Var				x, 12, 20, 22	
			W/Var, W/±Var	+	1RS, 2RS	+	x, 20, 22	+
ЩБ120.1	U, U/100	I, I/5, I/1	W, Var, ±Var				x, 12, 20, 22	
			W/Var, W/±Var	+	1RS, 2RS	+	x, 20, 22	+

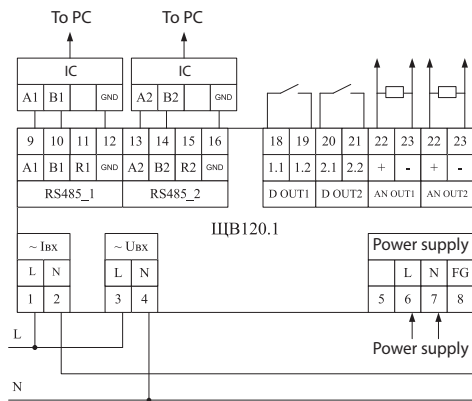
Notes:
“+”sign shows presence of all possible options in the order formula.
“-”sign means, that this parameter is absent in the order formula.

ORDERING EXAMPLE

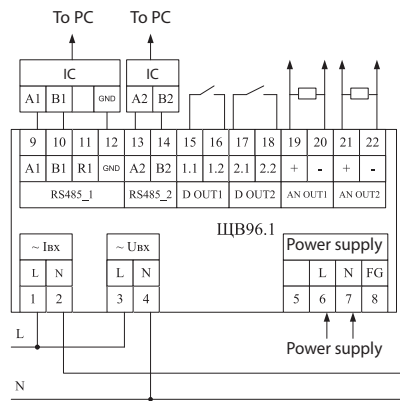
For device, which has the following characteristics: ЩБ02.1 device, nominal voltage – 100 V, nominal current – 5A, power measurement unit – MW, supply voltage – 85-253 V AC, frequency 50 Hz, or 120-265 V DC, one RS485 interface, analog output changing range – 0..10..20 mA, two discrete outputs, green color of indication
ЩБ02.1-100 B-5A-MBt-220BY-1RS-CP-12-3 TY25-7504.217-2015

CONNECTION DIAGRAMS

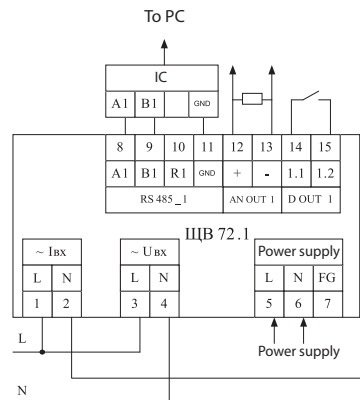
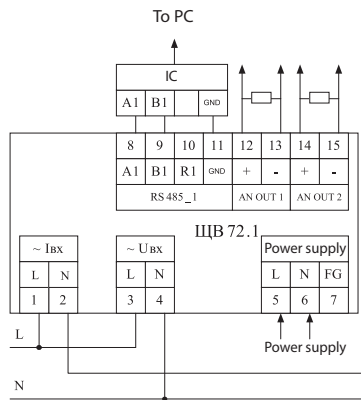
ЩБ120.1



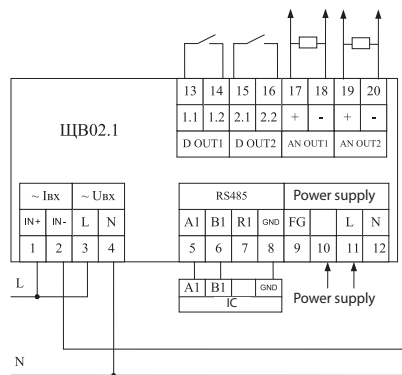
ЩБ96.1



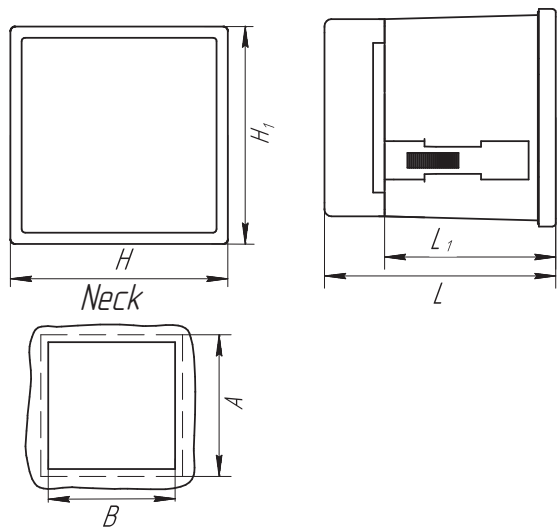
ЩБ72.1



ЩБ02.1



OVERALL AND INSTALLATION DIMENSIONS



Device type	HxH ₁ , mm	L, mm	L ₁ , mm	A, mm	B, mm
ЩБ02.1	96x48	148	121,5	100x50	92 ^{+0,8} x45 ^{+0,6}
ЩБ72.1	72x72	103	75,6	75	68 ^{+0,7}
ЩБ96.1	96x96	103	75,6	100	92 ^{+0,8}
ЩБ120.1	120x120	103	75,6	125	112 ^{+0,9}

METERING DEVICES FOR DIRECT CURRENT AND VOLTAGE



Щ120, Щ96, Щ72, Щ02

The Щ120, Щ96, Щ72, Щ02 devices are intended for metering and transformation of the current and voltage parameters in direct circuits into unified output signals of DC and transferring the results data via RS485 digital interface.

The possibility of information exchange via RS485 interface and output analog signals of direct current and discrete outputs allow to use the devices in different automated systems.

These devices are used in energetic industry and other industrial spheres for control of the electric parameters, the devices have continuous operation mode.

Щ120, Щ96, Щ72, Щ02 devices are included into the State Register of the Measuring Devices RF №68258-17, the validity period is to August 7, 2022.

Device Type	Overall dimensions, mm	Weight, kg, not above
Щ02	96x48x148 (with safety cover) 96x48x121,5 (without safety cover)	0,4
Щ72	72x72x103 (with safety cover) 72x72x75,6 (without safety cover)	0,4
Щ96	96x96x103 (with safety cover) 96x96x75,6 (without safety cover)	0,5
Щ120	120x120x103 (with safety cover) 120x120x75,6 (without safety cover)	0,5

Note: The device is supplied with the rare safety cover

Data display	
LED indication (single or seven-segment displays)	<ul style="list-style-type: none"> - digital seven-segment LED indicators, which are intended for displaying of The metering signal for metering channel; - single LED indicators for displaying work of interface, discrete outputs, lightening of the measurement units prefix Height of character: Щ02 – 14,2 mm (with RS485 interface), 20 mm (without RS485 interface) Щ72 – 10 mm (with RS485 interface), 14,2 mm (without RS485 interface) Щ96 – 14,2 mm (with RS485 interface), 20 mm (without RS485 interface) Щ120 – 20 mm (with RS485 interface), 26 mm (without RS485 interface)
Additional Indication	Colored barographic (discrete-analog) scale (31 segment) – for Щ120 only, with colored combined indicators.
Additional Features	Connection of the indication modules or indication panel on the RS485 interface
Telemetry	
Input signal	mV: 60, 75, 100, 150, 200, 250, 500, 1000, 2000 V: 1,2,5,10, 2..10, 20, 50, 100, 150, 200, 250, 300, 500, 750 mA: 1, 2, 5, 10, 20, 4..20, 50, 100, 200, 500, 1000, 2000 A: 1,2
Indication range	-19999...+19999 -9999...+9999 (for device without interface)

Maximum measured value registration	YES
Measuring time	0,2 sec.
Input analog signal transition time, not above	1,0 sec.
Intrinsic error limit	Measuring of current and voltage of DC: $\pm 0,1\%$, $\pm 0,2\%$ Transforming: of current and voltage of DC: $\pm 0,5\%$
Galvanic isolation unit of input and output circuits, supply circuits	Yes
Short-time input signal (with multiplicity, maximum value) overload	Current: Multiplicity: 2, number of overloads: 10; time of the each overload, sec: 10 ; time interval between two overloads, sec: 10 Voltage: Multiplicity: 1,5, number of overloads: 9; time of the each overload, sec: 0,5; time interval between two overloads, sec: 15
Input resistance for alternative current voltage metering	(1+0,012/-0,005) MOm
Communication interfaces/Analog outputs	
RS485	Quantity: 0,1,2; Protocols: ModbusRTU Data transferring speed: 4800, 9600, 19200, 38400, 57600, 115200 bit/s
Analog outputs	Quantity: 0,1,2 Ranges: 0...5 mA, 4...20 mA, 0...20 mA, , 0...2,5 mA, 4...12...20 mA, 0...10...20 mA.
Remote control	
Discrete inputs	Quantity: 0,1,2 DC voltage 350 V, 200mA, or AC voltage 250 V, 200mA
Powersupply	
Voltage	5VN – (5+4/-0,5) V DC; 12VN – (12+6/3) V DC; 24VN – (24+12/-6) V DC; 220 VU – 85-264 V AC, frequency (50 \pm 3) Hz or 120-370 V DC 230 V – 85-264 V AC, frequency (50 \pm 3) Hz
Power consumption from the supply circuit (not above)	2,5 VA – for Щ02, Щ72 – with supply voltage of 5 VN, 12VN, 24VN 3,0 VA – for Щ96, Щ120 – with supply voltage of 5 VN, 12VN, 24VN 5(4*) VA – for Щ02, Щ72, Щ96, Щ120 – with supply voltage of 220VU, 230V *for devices without RS485 interface
Device reprogramming (trim)	
Reprogramming	-via the Configurator software (RS485 interface), -via control buttons on the front panel (if applicable)
Reprogramming parameters	- Range scale - Indication parameters setting - Trigger levels of the discrete outputs (set points) - Interface parameters - Scale type selection for displaying of the results - Calibration
Operational Conditions	
Working temperature range	-40 - +70°C
Protection class	IP54
Mounting	On the shield
Wire cross-section	2,5 mm ²
Maximum overload for internal signal (duration)	150% (2 hours)
Calibration period	10 years
Warranty operating lifetime	60 months
Average lifetime, not less	20 years
Average mean time to failure	200 000 hours

ORDERING FORM

Ш a - b - c - d - e - f - g - h - i

a – device performance depending on the overall dimensions

Ш02 – 96x48 mm, Ш72 – 72x72 mm
Ш96 – 96x96 mm, Ш120 – 120x120mm

b – designation of the range scale for direct connection and transformation ratio for connection via the external bypass.

mV: 60, 75, 100, 150, 200, 250, 500, 1000, 2000
V: 1,2,5,10, 2..10, 20, 50, 100, 150, 200, 250, 300, 500, 750
mA: 1, 2, 5, 10, 20, 4..20, 50, 100, 200, 500, 1000, 2000
A: 1,2

Note: If the range of indications differs from the range of direct measurement of the input signal, additionally indicate the ordered range of indications in the note to the order formula.

c – supply voltage

5BH – (5+4/-0,5) V DC;
12BH – (12+6/3) V DC;
24BH – (24+12/-6) V DC;
220B – 85-264 V AC, frequency (50± 3) Hz or 120-370 V DC
230BY – 85-264 V AC, frequency (50± 3) Hz

d – RS485 interface

1RS – main interface
2RS – two interfaces (for Ш96 and Ш120 only)
x – if there is no such parameter
Note: if there is no such parameter (d=x) devices can have limited functions

e – analog and discrete outputs

02 – two discrete outputs, no analog outputs
11 – one analog output and one discrete output
12 – one analog output and two discrete outputs
20 – two analog outputs, no discrete outputs
22 – two analog outputs and two discrete outputs
x – without discrete and analog outputs
After the numbers please specify analog output signals A=0..5mA, B=4..20 mA, C=0..20mA, A=0..2,5..5mA, B=4..12..20 mA, C=0..10..20mA in brackets. For two analog outputs in order, please separate them by comma.

f – indicator color

K – red color;
3 – green color;
Ж – yellow color;
Ц – colored touch screen (only for Ш120)

g – accuracy class

0,1 – for all designs (except devices without RS485 interface or/and with operational design)
0,2 – for all designs

h – operational design

A – for NPP (safety class 4)
X – in other cases

i – special design

-B- barographic (discrete-analog) scale only for Ш120 with colored combined indicators
- do not stated, if there is no such parameter

Щa device design	Designation code parameters							
	b	c	d	e	f	g	h	i
	Range scale	Supply voltage	Interface	Analog and discrete outputs	Indication color	Accuracy class	Operational design	Special design
Щ02	+	+	1RS	x, 12, 20, 22	R, G, Y	+	x	-
		12VN, 24VN 220VU, 130V	x	x		0,2	+	
Щ72	+	+	1RS	x, 02, 11, 20	R, G, Y	+	x	-
		12VN, 24VN 220VU, 130V	x	x		0,2	+	
Щ96	+	+	1RS, 2RS	x, 12, 20, 22	R, G, Y	+	x	-
		12VN, 24VN 220VU, 130V	x	x		0,2	+	
Щ120	+	+	1RS, 2RS	x, 12, 20, 22	+	+	x	+
		12VN, 24VN 220VU, 130V	x	x	R, G, Y	0,2	+	-

Notes:
" +"sign shows presence of all possible options in the order formula.
"x"sign means, that this parameter is absent in the order formula.
"- "sign means, that this parameteis not indicated

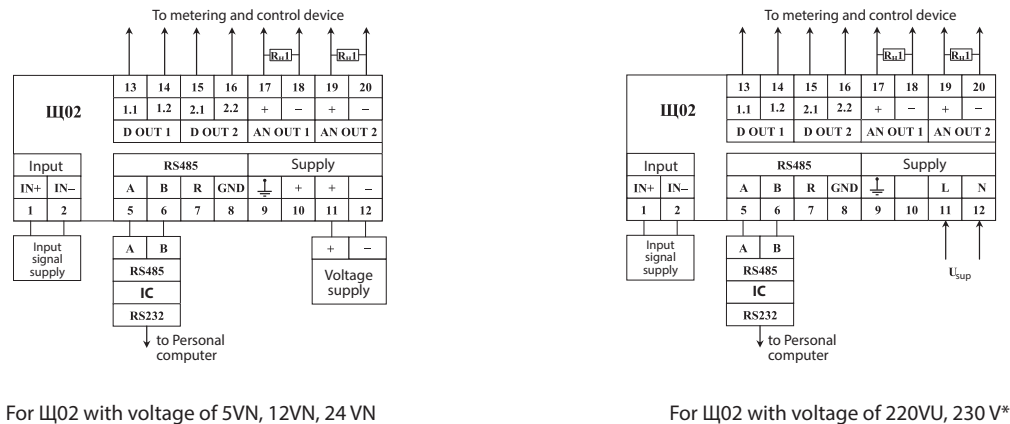
ORDERING EXAMPLE

Щ120 device, scale range (– 100..+100V), supply voltage 85-264 V of AC, frequency 50 Hz or 100-370 V DC, two RS485 interfaces, two analog outputs 0..5mA and 0..20 mA, two discrete outputs, red indication color, accuracy class – 0,2; operation at NPP, indication range – fro, -20 to +50OC
Щ120-100B-220BY-2RS-22 (A,C)-K-0,2-A- TY 26.51.43-236-05763903-2017
Note: indication range – 20...+50 OC

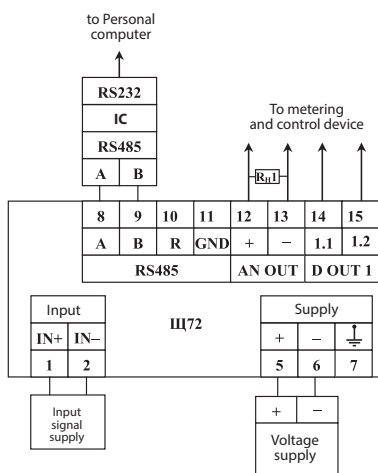
Щ120 device, scale range (– 100..+100V), supply voltage 85-264 V of AC, frequency 50 Hz or 100-370 V DC, two RS485 interfaces, two analog outputs 0..5mA and 0..20 mA, two discrete outputs, colored combined indicator, accuracy class – 0,2; barographic (discrete-analog) indicators scale
Щ120-100B-220BY-2RS-22 (A,C)-Щ-0,2-x- TY 26.51.43-236-05763903-2017

CONNECTION DIAGRAMS

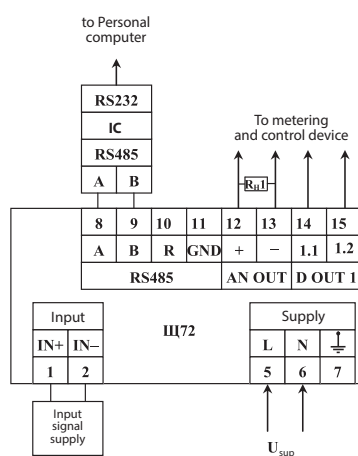
Design of device with RS485 interface



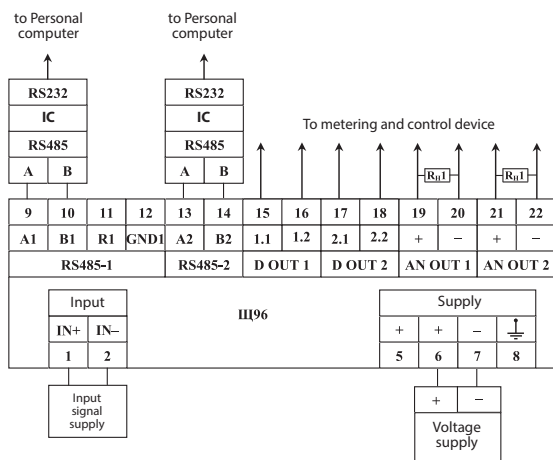
*U_{sup} – supply voltage 85-264 V of AC with frequency of 50 Hz or 100-370 V of DC (220V), supply voltage 85-264 V of AC with frequency of 50 Hz (230V)



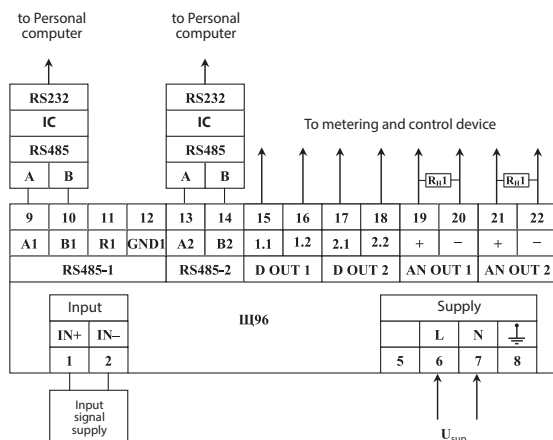
For III72 with voltage of 5VN, 12VN, 24 VN



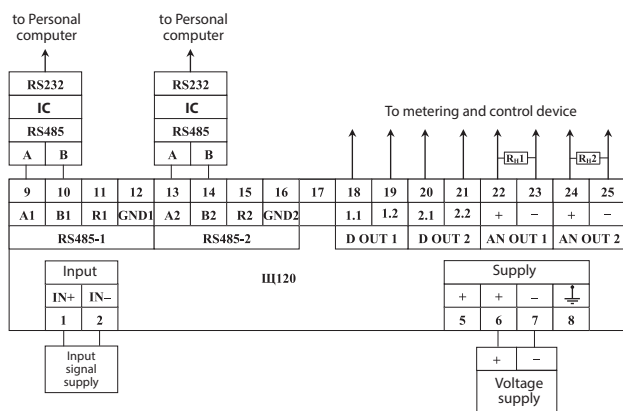
For III72 with voltage of 220VU, 230 V*



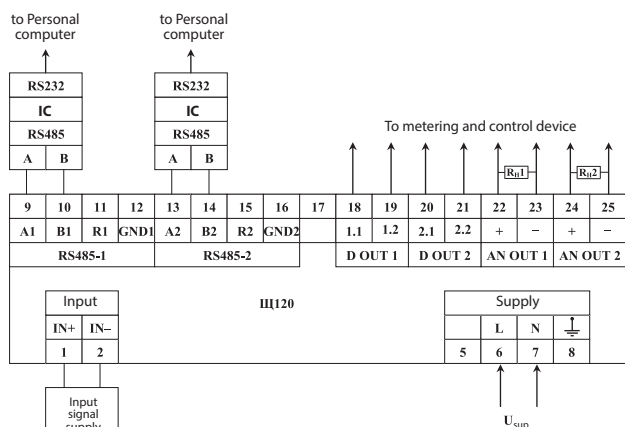
For III96 with voltage of 5VN, 12VN, 24 VN



For III96 with voltage of 220VU, 230 V*



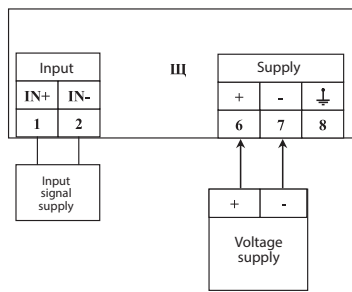
For III120 with voltage of 5VN, 12VN, 24 VN



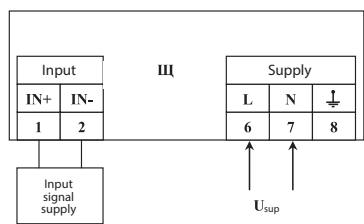
For III120 with voltage of 220VU, 230 V*

*U_{sup} – supply voltage 85-264 V of AC with frequency of 50 Hz or 100-370 V of DC (220V), supply voltage 85-264 V of AC with frequency of 50 Hz (230V)

Design of device without RS485 interface



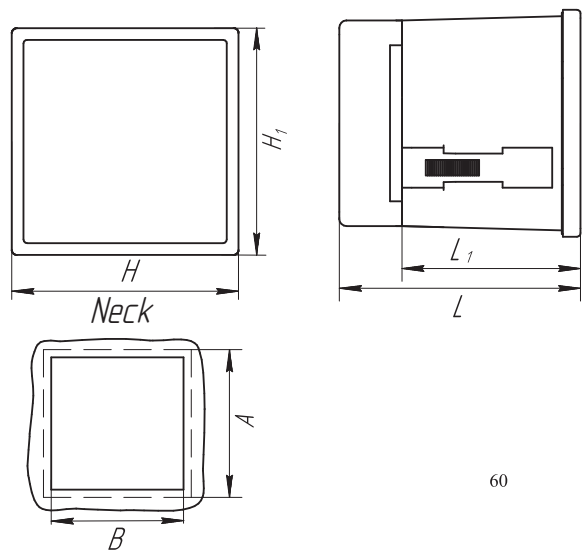
For device with voltage of 12VN, 24 VN



For device with voltage of 220VU, 230 V*

*U_{sup} – supply voltage 85-264 V of AC with frequency of 50 Hz or 100-370 V of DC (220V), supply voltage 85-264 V of AC with frequency of 50 Hz (230V)

OVERALL AND INSTALLATION DIMENSIONS



60

Device type	HxH ₁ , mm	L, mm	L ₁ , mm	A, mm	B, mm
Щ02	96x48	148	121,5	100x50	92 ^{+0,8} x45 ^{+0,6}
Щ72	72x72	103	75,6	75	68 ^{+0,7}
Щ96	96x96	103	75,6	100	92 ^{+0,8}
Щ120	120x120	103	75,6	125	112 ^{+0,9}

SMALL SIZE METERING DEVICES FOR ALTERNATIVE CURRENT, VOLTAGE AND FREQUENCY



Щ00П, Щ01П, Щ02.01П,
Щ02.00

The small size digital devices Щ00П, Щ01П, Щ02.01П, Щ02.00 are intended for metering and transformation of the current and voltage parameters in direct circuits into unified output signals of DC and transferring the results data via RS485 digital interface (if applicable).

The devices one-channel, one-limit and have designs according to the overall dimensions, measuring ranges, scale ranges, supply voltage, interfaces, discrete and analog outputs, accuracy class and special design.

Щ00П, Щ01П, Щ02.01П, Щ02.00 devices are included into the State Register of the Measuring Devices RF №64095-16, the validity period is to June 02, 2021

Device Type	Overall dimensions, mm	Height of character, mm	Weight, kg, not above
Щ00П	48×24×86	9,9	0,2
Щ01П	96×24×86	9,9	0,2
Щ02.01П	96×48×95	20	0,3
Щ02.00	96×48×64	9,9	0,2

Data display	
LED indication (single or seven-segment displays)	- 4-digit seven-segment LED indicators (for voltage and current parameters display) - single LED indicators for displaying work of interface, discrete outputs status, lightening of the measurement units prefix
Additional Features	Connection of the indication modules or indication panel on the RS485 interface
Telemetry	
Input signal	mV: 60;75, 100, 150, 200, 250, 500, 1000, 2000 V: 1;2;5;10;2..10; 20;50;100;150;200;250;300 (except Щ00П); 500 (except Щ00П); 750 (except Щ00П; Щ01П); mA: 2;5;10;20; 4..20; 50; 100; 200;500; 1000;2000 A:1;2
Accuracy class	For measuring of current and voltage of DC – 0,1 or 0,2; For transforming–05;
Maximum scale range	Щ01П, Щ02.01П: -9999 ...+9999 Щ00П: -1999 ...+9999 Щ02.00: -1999 ...+1999
Measuring time	0,1 sec.
Input analog signal transition time, not above	0,5 sec.
Intrinsic error limit	Щ00П, Щ01П, Щ02.01П: For current and voltage measuring :±0,1%;±0,2%; For current and voltage transforming :±0,5%; Щ02.00: For current and voltage measuring :±0,2%;
Galvanic isolation unit of input and output circuits, supply circuits	Yes (Щ00П devices don't have galvanic isolation unit for RS interface circuit)
Short-time input signal (with multiplicity, maximum value) overload	Current: Multiplicity: 2, number of overloads:10; time of the each overload, sec: 10; time interval between two overloads, sec: 10

Input resistance for voltage AC circuits	(1±0,005) MOm
Communication interfaces/Analog outputs	
RS485	Quantity: 0 or 1; Protocols: ModbusRTU Data transferring speed: 9600, 19200, 38400, 57600 bit/sec
Analog outputs	Quantity: 0,1,2 Ranges: 0...5 mA, 4...20 mA, 0..20 mA, 0...2,5...5 mA, 4...12...20 mA, 0..10..20 mA.
Remote control	
Discrete outputs	Quantity: 0,1,2; Direct voltage 300 V, 100 mA, or alternative voltage 200 V, 100 mA
Powersupply	
Voltage	-5V-(5±0,25) V of DC -12V-(12±0,6) V of DC -24V-(24±1,2) V of DC -5VN-(5±4/-0,5) V of DC -12VN-(12±6/-3) V of DC (there is a safety function to prevent wrong pole connection) -24VN-(24±12/-6) V of DC (there is a safety function to prevent wrong pole connection) -external block of stabilized supply 5 V (for Щ00П). Devices Щ02.01П provide reserve supply for designs with supply voltage (12+6/-3) V and (24+12/-6)V
Power consumption from the supply circuit (not above)	Щ00П -1,7 VA Щ01П -2,7 VA Щ02.01П -3,2 VA Щ02.00 -2,5 VA
Device reprogramming (trim)	
Reprogramming	-via the Configurator software (RS485 interface),
Reprogramming parameters	- Indication parameters: Indication refreshment period; decimal point position; scale type and parameters selection, display parameters; - Interface parameters: device address, data rate, paritet, stop-bit; - Metering part parameters: metering type, input signal calibration, metering time, unsensitive zone value - Discrete output parameters; - Analog output parameters;
Operational Conditions	
Working temperature range	-40 - +50°C
Protection class	IP50
Mounting	On the shield
Wire cross-section	2,5 mm ²
Maximum overload for internal signal (duration)	150% (2 hours)
Calibration period	10 years
Warranty operating lifetime	36 months
Average lifetime, not less	20 years
Average mean time to failure	200 000 hours

ORDERING FORM

Ш a - b - c - d - e - f - g - h

a – device performance depending on the front frame size, mm

Ш00П - 48x24,
Ш01П - 96x24,
Ш02.01П - 96x48,
Ш02.00 - 96x48,

b – designation of the range scale for direct connection and transformation ratio for connection via the external bypass.

mV: 60, 75, 100, 150, 200, 250, 500, 1000, 2000

V: 1,2,5,10, 2..10, 20, 50, 100, 150, 200, 250, 300 (except Ш00П), 500 (except Ш00П), 750(except Ш00П, Ш01П),

mA: 1, 2, 5, 10, 20, 4..20, 50, 100, 200, 500, 1000, 2000

A: 1,2

Note: If scale range is different to the direct metering range of the input signal, please additionally specify the ordered scale range in the ordering formula.

c – nominal voltage:

-5B-(5±0,25) V of DC

-12B-(12±0,6) V of DC

-24B-(24±1,2) V of DC

-5BH-(5±4/-0,5) V of DC

-12BH-(12±6/-3) V of DC

-24BH-(24+12/-6)V of DC

X – with external stabilized voltage block 5 V (for Ш00П)

d – RS485 interface:

-1RS – one interface;

x – without interface

e - Designation for analog and discrete outputs

01 - one discrete outputs, no analog outputs

10 – one analog output and no discrete outputs

11 – one analog output and one discrete output

12 – one analog output and two discrete outputs

20 – two analog outputs, no discrete outputs

22 – two analog outputs and two discrete outputs

x – without discrete and analog outputs

After the numbers please specify analog output signals A=0..5mA, B=4..20 mA, C=0..20mA, A=0..2,5..5mA, B=4..12..20 mA, C=0..10..20mA in brackets. For two analog outputs in order, please separate them by comma.

f – indicator color

K – red color ;

3 – green color;

Ж – yellow color (except Ш02.00);

g - accuracy class

0,1 or 0,2

Note: For Ш02.00 device instrument rating is 0,2

h – special design

A – for NPP (safety class 4)

The parameter is not stated if there is no special design

Measurement device type	Code parameter of the full designation						
	b	c	d	e	f	g	h
Ш00П	+	x, 5V, 12V, 24V	x, 1RS	x	+	+	+
Ш01П	+	5V, 12V, 24V	x, 1RS	x, 01, 10, 11	+	+	+
Ш02.01П	+	5VN, 12VN, 24VN	1RS	x, 12, 20, 22	+	+	+
Ш02.00	+	5V, 12V, 24V	x	x	K, 3	0,2	+

ORDERING EXAMPLE

Щ00П device with scale range (-10..+10 mA), with external stabilized voltage block 5V, without an interface,without discrete and analog outputs, red indication color, instrumental rating 0,1
Щ00П-10mA-x-x-K-0,1 TY 25-7504.228-2015

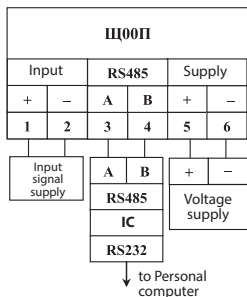
Щ01П device transformaion ratio – 200 A/ 75mV. supply voltage 12V DC stabilized,one RS485 interface, without discrete and analog outputs, red indication color, instrumental rating 0,1
Щ01П-200 A/75 mB-12B-1RS-x-K-0,1 TY 25-7504.228-2015

Щ02.01П device with scale range (2..+10 V), supply voltage 24V DC nonstabilized,one RS485 interface, one analog output 4..200 mA. Two discrete outputs, red indication color, instrumental rating 0,2, special design A, indication scale (-5..+5 mА)
Щ02.01П-2..10V-24BH-1RS-12B-K-0,2-A, TY 25-7504.228-2015

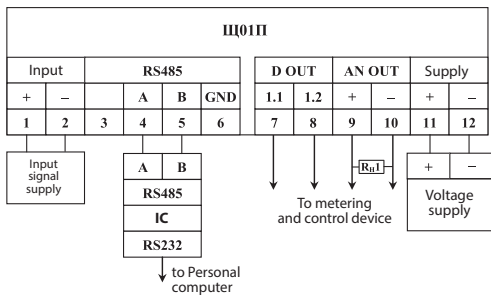
Щ02.00 device, shorted body, with scale range (-2..+2mA), supply voltage 24V DC stabilized, red indication color, instrumental rating 0,2.
Щ02.00-2mA-24B-x-x-K-0,2, TY 25-7504.228-2015

CONNECTION DIAGRAMS

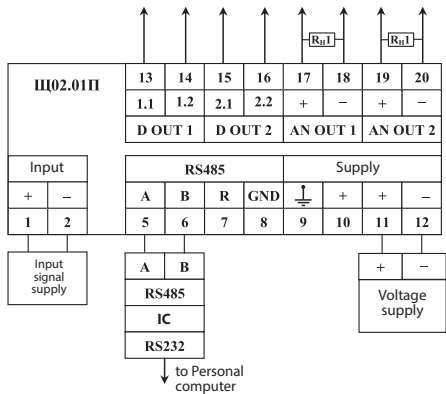
Щ00П



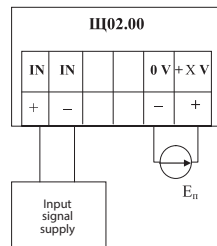
Щ01П



Щ02.01П



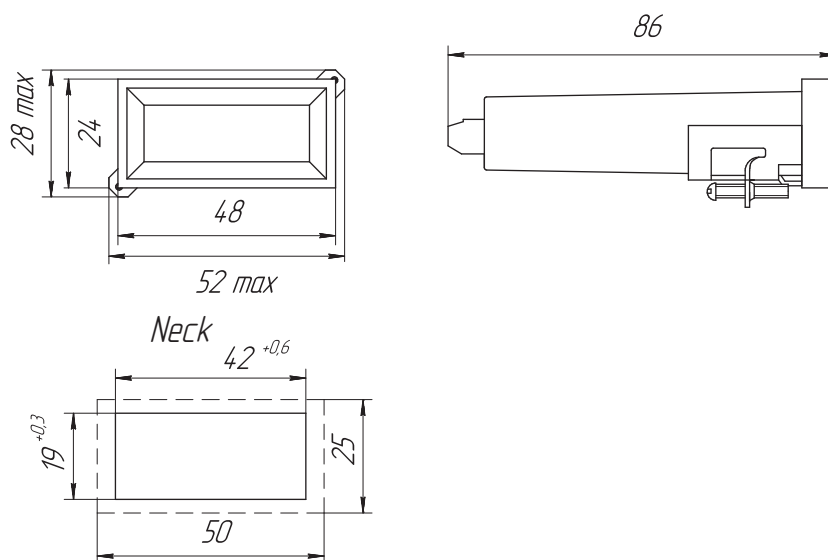
Щ02.00



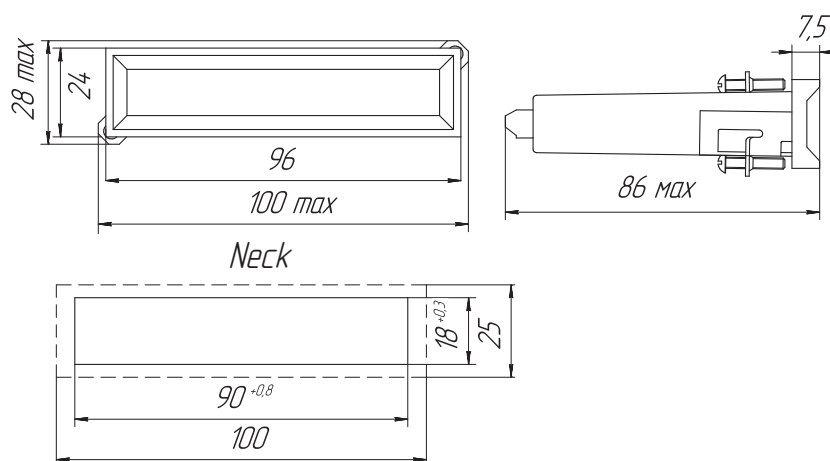
Es- voltage supply.
X value depands from the device design
according to the power supply and can be 5,12,24

OVERALL AND INSTALLATION DIMENSIONS

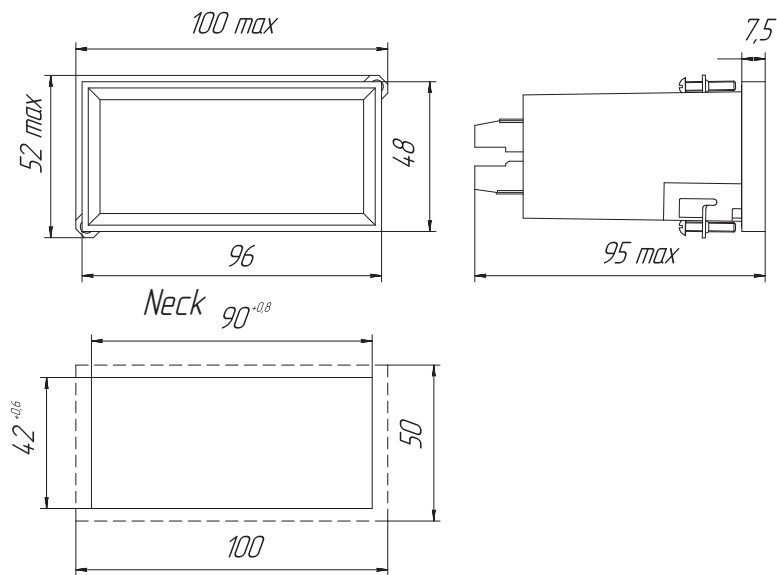
Щ00П



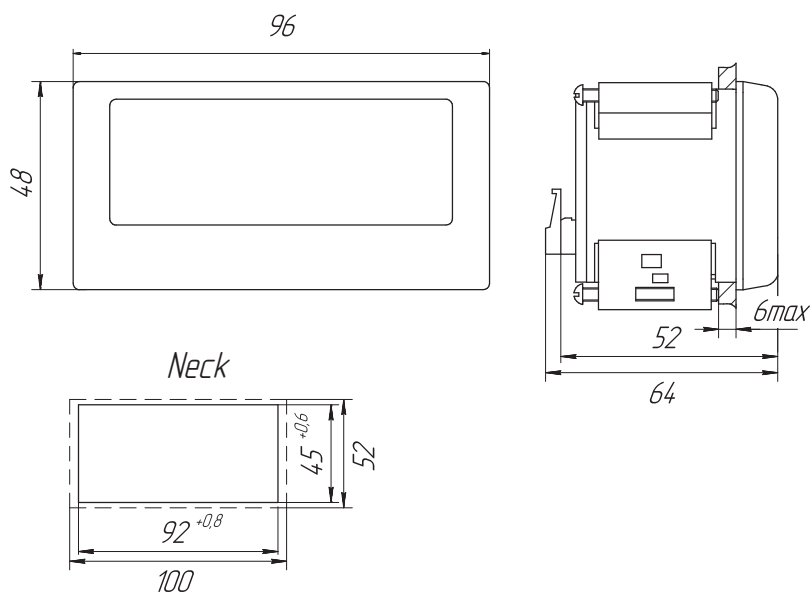
Щ01П



Щ02.01П



Щ02.00



POSITION INDICATORS ECP OF POWER TRANSFORMERS



ЩУП96, ЩУП120

The ЩУП96, ЩУП120 indicators are intended for transformation of sensors signals of the transforming switching devices under the load into the digital signal for displaying the position number at the digital indicator. Indicators are mounted at the control shield and are used for installation on the MZ-2, MZ-4 drivers (Bulgaria) and at the other drivers with resistive sensor. These devices can be used as a resistor gauge. 4-wire connection.

Device Type	Overall dimensions, mm	Height of character, mm	Weight, kg, not above
ЩУП96	96x96x100 (with safety cover)	20	0,4
ЩУП120	120x120x102,1 (with safety cover)	20	0,6

Note: Indicators are supplied with a safety cover.

Data display	
LED indication (single or seven-segment dispalsy)	- 4-digit seven-segment digital indicator (for display of the determined signal value) - additional single indicators P, K1, K2, showing the indicators operation mode.
Signal transforming parameters	
Number of steps	2-99
Step resistance	5-20 Om (1 Om step)
Maximum measured resistance	1000 Om (999,9)
Maximum relay current	100 mA
Maximum allowable voltage at the relay output terminals	300 V (as for amplitude)
Intrinsic error limit	±0,5%
Communication interfaces/Analog outputs	
RS485	Quantity: 0,1; Protocols: ModbusRTU Data transferring speed: 4800, 9600, 19200, 38400, 57600 bit/s
Powersupply	
Voltage	85-242 V AC, frequency (50±0,5) Hz or 100 -265 V DC
Power consumption from the supply circuit (not above)	7 VA
Device reprogramming (trim)	
Reprogramming	-via tuning panel, connected through connector pin -via RS485 interface,
Reprogramming parameters	- Trigger levels of the discrete outputs (set points) with indication at the discrete-analog indicator - Indicators brightening - Calibration values - Interface parameters
Operational Conditions	
Working temperature range	+5 - +50°C (O4.1 ambient class) -40- +55°C (YXJ13.1 ambient class)
Protection class	IP2X
Mounting	On the shield
Wire cross-section	Not above 1,5 mm ²
Warranty operating lifetime	2 years
Average lifetime, not less	10 years
Average mean time to failure	10 000 hours

ORDERING FORM

ЩУПa – b – c – d – e

a – device performance depending on the overall dimensions

ЩУП96 - 96x96 mm,
ЩУП120 - 120x120 mm,

b – step resistance value

5-20 (if it is not specified in the order, the default value is 6 Om)

c – interface:

-RS – RS485 interface (Modbus RTU);
x – without interface, do not complete

d – indicator color

K – red color ;
3 – green color;
Ж – yellow color

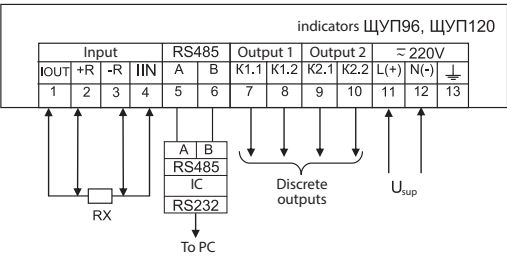
e – ambient class

+5 - +50°C (O4.1 ambient class)
-40- +55°C (YXЛ3.1 ambient class)

ORDERING EXAMPLE

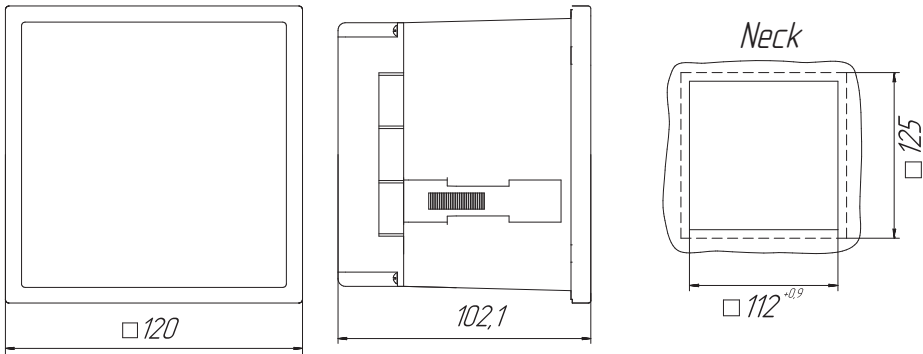
ЩУП120 device, step resistance 6 Om, RS485 interface, red indicator color, temperature range 40- +55°C.
ЩУП120-6-RS-K-YXЛ3 3.1 TY 25-7504.205-2008

CONNECTION DIAGRAMS

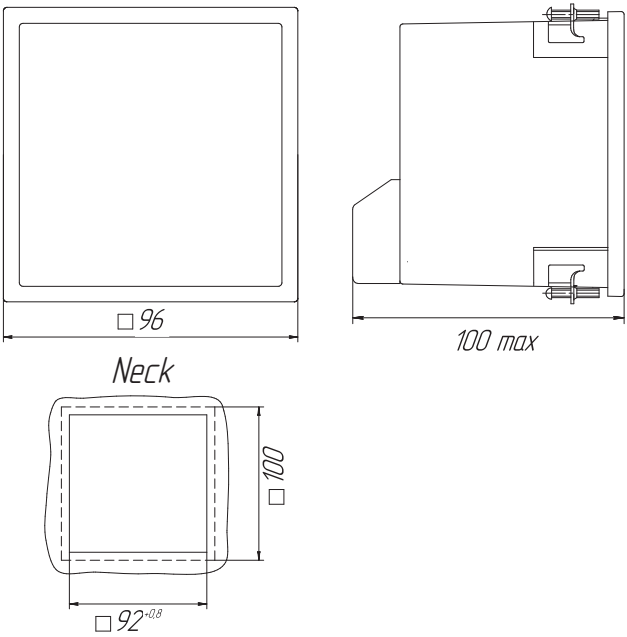


OVERALL AND INSTALLATION DIMENSIONS

ЩУП120



ЩУП96



POSITION INDICATORS ECP OF POWER TRANSFORMERS



ЩУП120У

The ЩУП120У indicator is a modification of ЩУП120 indicator. It can be mounted at the control shield and it is compatible with UP30 indicating cross-coil instrument.

This indicator is used for installation on the MZ-2, MZ-4 drivers (Bulgaria) instead of LKM step pointer and at the drivers MR, EM, ED-S type (Germany) and also at the other drivers with resistive sensor, with output signal of current loop type. The indicator works together with rotating selsyn BD404 type or BD1404 type and can be installed at the all drivers (RNT13, PDP-1, PDP-4 and others)

It is possible to determine maximum allowable drivers position.

Digital and analog outputs allow to transfer driver step information into automated control and mechanics systems.

Device Type	Overall dimensions, mm	Height of character, mm	Weight, kg, not above
ЩУП120У	120x120x102,1 (with safety cover)	20	1,0

Note: Indicators are supplied with a safety cover.

Data display	
LED indication (single or seven-segment display)	- 2-digit digital indicator (for display of the determined signal value) - additional single indicators
Indicator brightness	1000 mcd
Signal transforming parameters	
Maximum number of steps	99
Minimal impedance of the resistor gauge	25 Om
Selsyn gauge voltage	24..27 V
Resistor gauge voltage	5 V
Input resistance of the indicator for work with current loop type sensor, not above	820 Om
Maximum allowable voltage of DC at the control relay terminals, relay output	400 V
Maximum allowable current at the control block relay	120 mA
Communication interfaces/Analog outputs	
RS485	Quantity: 1; Protocols: Modbus RTU Interface data rate: 9600 baud – by default; 4800, 19200, 38400 baud – can be reprogrammed by the user.
Analog output	4..20 mA – by default; 0..20 mA; 0..5 mA– can be reprogrammed by the user.
Remote control	
Relay outputs	300 V, 100 mA
Power supply	
Voltage	220 V, 50 Hz
Power consumption from the supply circuit (not above)	15 VA
Device reprogramming (trim)	
Reprogramming	-via RS485 interface, -via control buttons on the front panel
Reprogramming parameters	- Step value - One step adjustment - Initial angle of the selsyn-sensor setting - Connection wires compensation (from sensor to the indicator) - Changing of device internal registers values - Password setting

Operational Conditions	
Working temperature range	-40- +55°C
Protection class	IP20
Mounting	On the shield
Wire cross-section	Not above 2,5 mm²
Warranty operating lifetime	2 years
Average lifetime, not less	10 years
Average mean time to failure	10 000 hours

ORDERING FORM

ЩУП120U a - b - c - d

a – designation for the output parameters

x – this parameter is absent
 TP(X), Bl, RV – sensor:
 TP (X) – current loop output signal sensor, where
 X- output analog signal
 A=0..5 mA, B=4..20 mA , C=0..20 mA;
 Bl – blocking relay;
 RB – relay output;

b – indicator color

K – red color ;
 3 – green color;

c – number of drivers positions:

from 1 to 99, selected by the client.

d – the angle between step or step resistance value:

X°C – step value for drivers with the selsyn-sensor;
 YR- step value (Om) for drivers with resistor sensors.

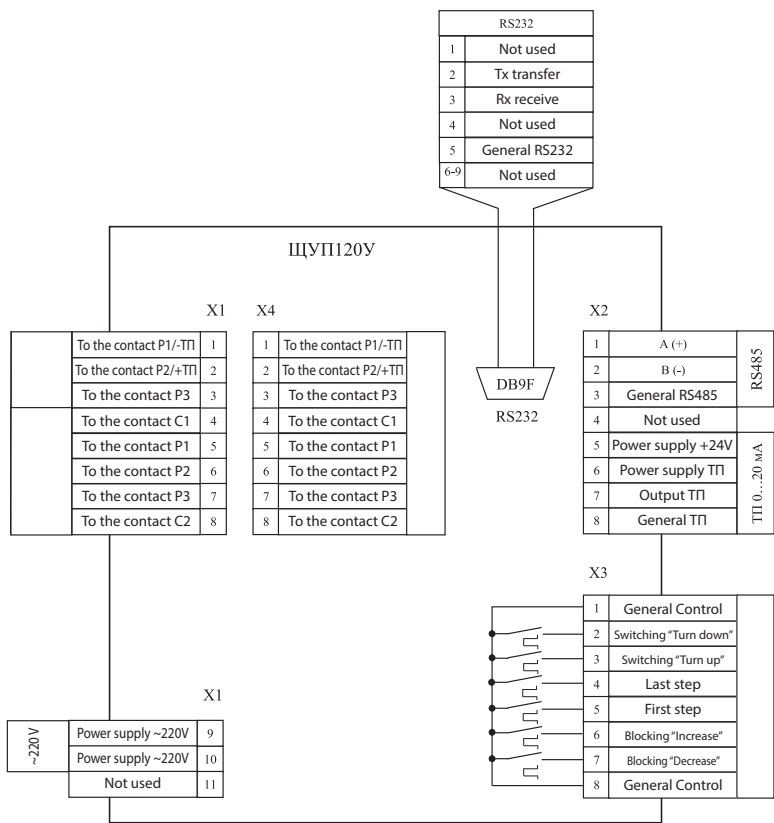
Note! If you need a BCD-code output, please specify in the order additionally, by the comma “BCD-output”

ORDERING EXAMPLE

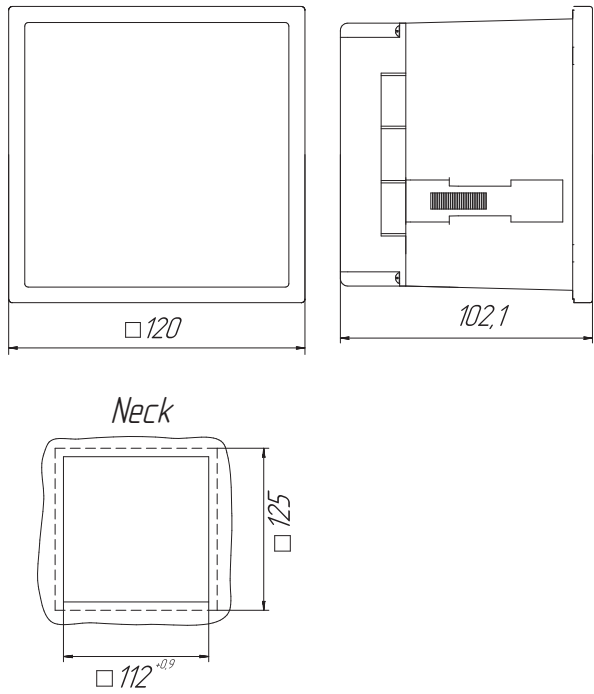
For ЩУП120U indicator with the following characteristics: current loop output signal, 0..20 mA. Blocking output, relay output, number of drivers positions – 10, step resistance – 5 Om, red indicator color, BCD-output.

ЩУП120У-ТП(С), Бл,РВ-К-10-5R, BCD-выход, ТУ 25.7504.214-201

CONNECTION DIAGRAMS



OVERALL AND INSTALLATION DIMENSIONS



METERING INDICATOR PANEL



T44, T54, T74

Digital information panels T44, T54, T74 are intended for metering and displaying all electric and physics parameters (alternative and direct current, voltage, pressure, temperature, frequency, etc.) and digital values of RS485 interface, Modbus RTU protocol.

Advantages:

- Maximum scale range – 1999...+9999
- Change mode settings by remote control or by RS485 interface
- Brightness adjustment (12 steps)
- Programming of input signal parameters, change of display scale
- Min and max set points setting
- Forming of discrete signal for control of commutation equipment
- If the limit value is achieved, Indicator flashes
- Indicator color selection: red, green, yellow

Type	T44	T54	T74
Data display			
LED indication	Height of character, mm		
	100	140	180
Parameters display	-metering of input signals values (any electric or physical); - data from RS485 interface - value of temperature (by the order)		
General parameters			
Input signal	Direct current and voltage: mV:60, 75, 100, -75..0..75 V: 5, 10, 20, 50, 100, 200, 250, 500 mA: 2;5;10;20; 4..20;-5..0..5 Alternative current and voltage: mV:100 V: 5, 10, 20, 50, 100, 200, 250, 380, 500 mA: 2;5;10;20; 50, 100, 200 85..253 V for 10-5000 Hz frequency displaying		
Maximum scale range	-1999 ...+9999		
Transforming time	0,5 sec		
Intrinsic error limit	±0,5%		
Galvanic isolation unit of input and output circuits, supply circuits	Yes		
Communication interfaces			
RS485	Quantity: 1; Protocol: Modbus RTU Data rate: 9600, 19200, 38400, 57600 baud		
Remote control			
Discrete outputs	Quantity:1; Direct voltage 300 V, 100 mA, or alternative voltage 200 V, 100 mA		
Power supply			
Voltage	85-253 V AC (50±0,5) frequency, 120 – 265 V DC		
Power consumption from the supply circuit (not above)	15 VA	17 VA	20VA
Panel reprogramming (trim)			
Reprogramming	- via remote control board - via RS485 interface		
Reprogramming parameters	- Output signal parameters - displaying scale changing - Indicators brightness changing		

Type	T44	T54	T74
Data display			
Working temperature range	-5 - +50°C		
Overall dimensions. mm	420x130x40	500x170x40	585x210x40
Weight, kg, not above	1,2	1,6	2,0
Protection class	IP50		
Mounting	On any surface		
Wire cross-section	Not above 2,5 mm²		
Average lifetime, not less	10 years		
Average mean time to failure	50 000 hours		



Maximum distance from a spectator to the red indicator (mm), where it is convenient to read the numbers from the panel (for digital panels with green indicators this parameter is two times smaller)

Attention!
Users are strongly requested to pay a special attention on completing b-parameters in the following Ordering form.

As a reference:
- When ordering a DC panel in accordance with the order form, the range 0...X is indicated (x – scale range)
- When ordering a AC panel the end value of range X is indicated (x – scale range)

ORDERING FORM

T a - b - c - d - e

a – device performance depending on the indicator height

T44 – indicator height is 100 mm
T54 – indicator height is 140 mm
T74 – indicator height is 180 mm

b – designation of the range scale for direct connection

0..X – DC voltage/current (example: 0..10 V – DC voltage)
X – AC voltage/current (example: 100 V – AC voltage)
85...253 V – for displaying of frequency 10...5000 Hz

c– displaying value range

d - displaying value measurement unit

f – indicator color

K – red color ;
3 – green color;
Ж – yellow color

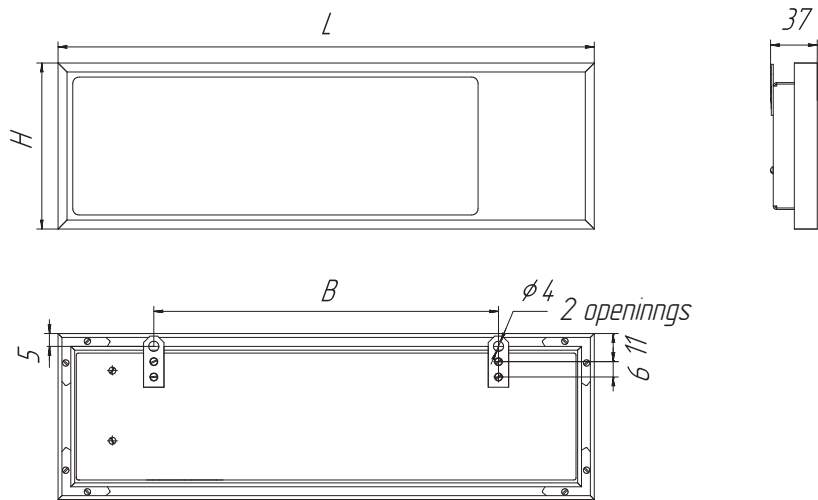
ORDERING EXAMPLE

- DC panel
For information DC panel T44 with displaying and metering range value 100 V, measurement unit V, red color of indicators
T44-0...100B-0...100-B-K TY 25-7504.225-2014

- AC panel
For information AC panel T44 with displaying and metering range value 100 V, measurement unit V, red color of indicators
T44-0...100B-0...100-B-K TY 25-7504.225-2014

For information panel T54 with metering range value 85...253 V and displaying range value 45..65 Hz , measurement unit Hz, green color of indicators
T54-85...253B-45...65 - ГИ - 3 ТУ 25-7504.225-2014

OVERALL AND INSTALLATION DIMENSIONS



Panel design	L, mm	H, mm	B, mm
T44	420	130	270
T54	500	170	340
T74	585	210	430

METERING INDICATOR PANEL-CLOCKS



T444, T454, T474

Electronic panel-clocks T444, T454, T474 are intended for displaying the current time, date and temperature. These panels have a huge potential for using at different companies and organizations. Besides, functionality of the electronic panel allows to control microclimate (temperature) of the offices, that is why this panel can be used at education facilities.

Line-up of the electric panel-clocks includes the following models: T444, T454, T474 (indicators height – 100 mm, 140 mm, 180 m allows to read all information from 40 m, 55 m and 65 m).

All digital panels are produced according to the modern requirements – thin metal body, thickness- 40 m. The designed construction allows to produce the devices of different overall dimension in short terms. According to the client requirements.

Ultra bright LEDs and sensors are used for electronic panels-clocks, that is why the clocks are reliable and stable. The bright indicators allow to read the actual information even on sunny days. Observation angle is 120o.

It is possible to program the clocks by remote control (RC-5) and RS485 interface.

Type	T444	T454	T474
Data display			
LED indication	Height of character, mm		
	100	140	180
Parameters display	- date and time - temperature		
Range scale	Temperature: -50...+50°C Time: 0 – 23.59		
Intrinsic error limit	0,1 sec/dat (accuracy movement) ±2°C for -50...-20 °C scale range ±2°C for -20...+50 °C scale range		
Communication interface			
RS485	Quantity: 1; Protocol:ModbusRTU Data rate: 9600, 19200, 38400, 57600 baud		
Remote control			
Discrete outputs	Quantity:1; Direct voltage 300 V, 100 mA, or alternative voltage 200 V, 100 mA		
Power supply			
Voltage	85-253 V AC (50±0,5) frequency, 120 – 265 V DC		
Power consumption from the supply circuit (not above)	15 VA	17 VA	20VA
Panel reprogramming (trim)			
Reprogramming	-via remote control board -via RS485 interface		
Reprogramming parameters	- Indicators brightness changing - Indicators flashing adjustment -interval and time value of the sound signal; - date and time adjustment		
Operational Conditions			
Working temperature range	-5 - +50°C		
Overall dimensions. mm	420x130x40	500x170x40	585x210x40
Weight, kg, not above	1,2	1 6	2,0
Protection class	IP50		
Mounting	On any surface		
Wire cross-section	Not above 2,5 mm²		
Average lifetime, not less	10 years		
Average mean time to failure	50 000 hours		



Maximum distance from a spectator to the red indicator (mm), where it is convenient to read the numbers from the panel (for digital panels with green indicators this parameter is two times smaller)

ORDERING FORM

T4a - b

a – device performance depending on the indicator height

T444 – indicator height is 100 mm
T454 – indicator height is 140 mm
T474 – indicator height is 180 mm

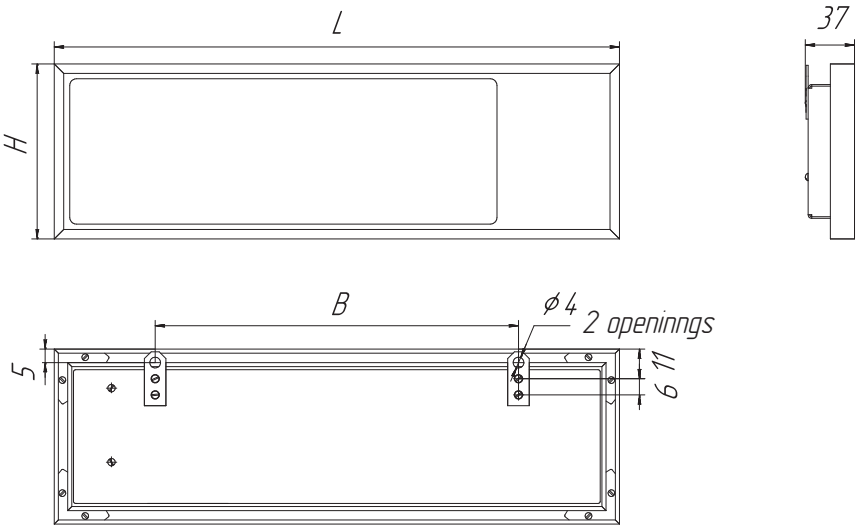
b – indicator color

K – red color ;
3 – green color;
Ж – yellow color

ORDERING EXAMPLE

Panel-clocks with red indication
T444-K TY 25-7504.225-2014

OVERALL AND INSTALLATION DIMENSIONS

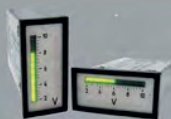


Panel design	L, mm	H, mm	B, mm
T444	420	130	270
T454	500	170	340
T474	585	210	430

METAL-ENCLOSED DIGITAL ELECTRIC METERING DEVICES Щ20, Щ21, Щ22, Щ23 FOR NPP



Щ20.1



Щ20.3



Щ21.1



Щ21.2



Щ21.3



Щ21.5



Щ21.7



Щ22.1



Щ22.2



Щ22.4



Щ22.5



Щ22.6



Щ23.3



Щ23.4



Щ23.6



Щ23.7



Щ23.8



ПН-2

Panel-mounted digital electric metering devices Щ20, Щ21, Щ22, Щ23 are intended for metering of current or voltage values in DC circuits (for operation at NPP and other industrial spheres).

If electric output signal ranges of the primary transducers satisfy the input signal range of the device, the devices can be used together with primary transducers for metering of the nonelectric values.

Input signal metering ranges: 0..5 mA, 0..20 mA, 4..20 mA, 0..75 mV, 0..200mV, 0..1 V, 0..10 V, 2..10 V.

The devices meet the requirements of electromagnetic capability in accordance with GOST R 50746-2000 for 4 class of NPP(technical equipment for NPP and radiation-hazardous facilities).

Communication interface - RS485 (Protocols: Modbus RTU, ASCII).

Industrial noise level does not exceed the values determined by the GOST 30805.22-2013 for B class equipment. As for solid bodies' effect resistance, the devices have IP20 code as per GOST 14254-2015.

Average mean time to failure – not less than 150000 hours.

Average lifetime – not less than 15 years.

All devices are metal-enclosed, they are fireproof, don't have any moving parts, they are stable to the mechanical effects in accordance with M40 group, seismic resistance is 9 points for the installation level under 0 point – 10 m, 8 points for the installation level under 0 point – 25 m, as for GOST 17516.1-90, the devices fall into the first category of seismic resistance, according to the NP 031-01.

The mounting construction is designed for mounting on the 50mm panel. According to the client requirements it is possible to install the device at the panel of another thickness.

The devices are intended for NPP, they can be used in the safety systems and normal operation systems, the devices fit into a 2,3,4 safety class (depending on the order) and have the classified designation 2NU, 3NU in accordance with NP-001-2015.

Operation conditions:

- Ambient temperature -10 ..+50°C;
- Relative humidity – not above 98%, 35°C;
- Atmospheric pressure – 84..106,7 kPa;
- Supply voltage – (24±4)V DC

It is possible to choose output signal metering range, change the scale range and measurement units.

As for devices Щ21.3, Щ22.4, Щ22.6, Щ23.3, Щ23.4, Щ23.6 there is a possibility to program indicator color changing limits of discrete-analog device.

As for devices Щ20.3, Щ21.7, Щ23.7, Щ23.8.6 there is a possibility to determine color signalization zones of the discrete-analog device, which are formed by the number of single color indicators by the order.

Щ20, Щ21, Щ22, Щ23 devices are put on the State Register of the Measuring Devices RF №61450-15, the validity period is to September 1, 2020.

Metering value	Output signal range		Group of output signals ranges (for Щ20)
	Design 1 (one pole)	Design 2 (two poles)	
DC Voltage	0-75 mV	-75..0..75 mV	-
	0-200 mV	-200..0..200 mV	-
	0-1 V	-1..0..1 V	-
	0-10 V	-10..0..10 V	I
	2-10 V	-6..2..10 V	
DC Current	0-5 mA	-5..0..5 mA	-
	0-20 mA	-20..0..20 mA	II
	4-20 mA	-12...4...20 mA	

Device type	Maximum range of digital indicating device indications*	Number of indicators for the digital indicating device	Number of the single indicators of the digital indicating device, type of the indicator**	Discrete-analog indicating device type
Devices with digital indicating device				
Щ20.1	-1999...9999	4	–	–
Щ21.1	-1999...9999	4	–	–
Щ21.2	-19999...19999	5	–	–
Щ21.5	-9999..9999	4 and “-” sign	–	–
Щ22.1	-1999...9999	4	–	–
Щ22.2	-19999...19999	5	–	–
Щ22.5	-9999..9999	4 and “-” sign	–	–
Devices with discrete-analog indicating device				
Щ20.3	–	–	30, pellet	line
Щ21.3	–	–	31, pellet (trick)	Line
Щ21.7	–	–	45, trick (pellet)	Line
Щ23.3	–	–	61, pellet (trick)	curve
Щ23.7	–	–	91, trick (pellet)	curve
Devices with discrete-analog and digital indicating devices				
Щ22.4	-1999...9999	4	25, pellet (trick)	Line
Щ22.6	-9999..9999	4 and “-” sign	25, pellet (trick)	Line
Щ23.4	-1999...9999	4	61, pellet (trick)	curve
Щ23.6	-9999..9999	4 and “-” sign	61, pellet (trick)	curve
Щ23.8	-9999..9999	4 and “-” sign	91, trick (pellet)	curve

* The scale range can be changed by the Client via remote control panel.

** Factory setting is stated without brackets.

Device type	Programming parameters				
	Output signal metering range	Digital indicating device range scale	Indicators brightness	Limits of indicators color changing for discrete-analog indicating device	Type of the pointer for the discrete-analog indicating device
Devices with digital indicating device					
Щ20.1	+	+	+	-	-
Щ21.1	+	+	+	-	-
Щ21.2	+	+	+	-	-
Щ21.5	+	+	+	-	-
Щ22.1	+	+	+	-	-
Щ22.2	+	+	+	-	-
Щ22.5	+	+	+	-	-
Devices with discrete-analog indicating device					
Щ20.3	+	-	+	-	-
Щ21.3	+	-	+	+	+
Щ21.7	+	-	+	-	+
Щ23.3	+	-	+	+	+
Щ23.7	+	-	+	-	+
Devices with discrete-analog and digital indicating devices					
Щ22.4	+	+	+	+	+
Щ22.6	+	+	+	+	+
Щ23.4	+	+	+	+	+
Щ23.6	+	+	+	+	+
Щ23.8	+	+	+	-	+

Note:
sign + means, that this parameter is programmable
sign - means, that this parameter is not programmable

ORDERING FORM

Щa.b.c - d - e - f - g - h - i - j

- a – device type** (according to the front frame overall dimensions, mm)
Щ20 -50x25
Щ21 -100x25
Щ22 -100x50
Щ23 -100x100
- b –design** according to the type of the indicating device, scale range, of the digital indicating device and number of the single indicators of the discrete-analog indicating device:
1 – digital indicating device, range scale -1999...9999;
2 – digital indicating device, range scale ±19999;
3 – discrete-analog indicating device, number of single indicators – to 61;
4 – digital indicating device, range scale -1999...9999 and discrete-analog indicating device, number of single indicators – to 61;
5 – digital indicating device, range scale ±9999;
6 – digital indicating device, range scale ±9999 and discrete-analog indicating device, number of single indicators – to 61;
7 - discrete-analog indicating device, number of single indicators – more than 61;
8 - digital indicating device, range scale ±9999 anf discrete-analog indicating device, number of single indicators – more than 61;

c – construction design
Г- horizontal
В - vertical

d – output signal range

e – scale range

f – measurement unit of the physical value;

g – color of the front panel
Б – white
С – grey
Ч – black

h – color of the front frame
Б – white
С – grey
Ч – black

i – color of the indicator of the digital indicating device
К – red ;
З – green;
Ж – yellow;

j – discrete-analog indicating device parameters
- color changing limits and indication color (К - red, Ж - yellow, З - green) for Щ21.3, Щ22.4,Щ22.6, Щ23.3, Щ23.4, Щ23.6 (from the start of the scale range), - number and color (К - red, Ж - yellow, З - green) for single indicators of each signalization zone for Щ20.3, Щ21.7,Щ23.7, Щ23.8 (from the start of the scale range).

The unused parameter j shall be replaced by x sign in the ordering formula. Do not specify the unused parameters c and j.

Should be stated addiionally:
1) Safety class,class designation as for NP-001-2015 (2NU, 3NU or 4)
2) Installation panel thickness, if it is differ from 50 mm;
3) language, if you need Marks, Operation Manual and Calibration Methods in English, the default language is Russian.
4) Number or copies for Operation Manual and Calibration Methods

Щаа device type	Code of Designation parameter								
	b	c	d	e	f	g	h	i	j
Щ20	1	–	+	+	+	+	+	+	–
	3	H(V)	+	+	+	+	+	–	+
Щ21	1	–	+	+	+	+	+	+	–
	2	–	+	+	+	+	+	+	–
	3	H(V)	+	+	+	+	+	–	+
	5	–	+	+	+	+	+	+	–
	7	H(V)	+	+	+	+	+	–	+
Щ22	1	–	+	+	+	+	+	+	–
	2	–	+	+	+	+	+	+	–
	4	H(V)	+	+	+	+	+	+	+
	5	–	+	+	+	+	+	+	–
	6	H(V)	+	+	+	+	+	+	+
Щ23	3	–	+	+	+	+	+	–	+
	4	–	+	+	+	+	+	+	+
	6	–	+	+	+	+	+	+	+
	7	–	+	+	+	+	+	–	+
	8	–	+	+	+	+	+	+	+

Note:

sign + means, that this parameter is in the ordering formula

sign - means, that this parameter is not in the ordering formula

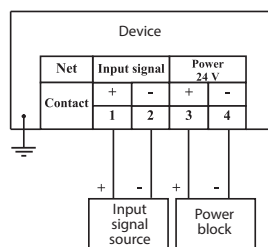
ORDERING EXAMPLE

Щ22.2, front frame size is 100x50 mm, digital indicating device, the maximum scale range of 19999, output signal range is 0..5 mA, indication range -20...+50, measurement unit °C, front panel color – white, front frame color - black, indication color – green, safety class – 2 N.

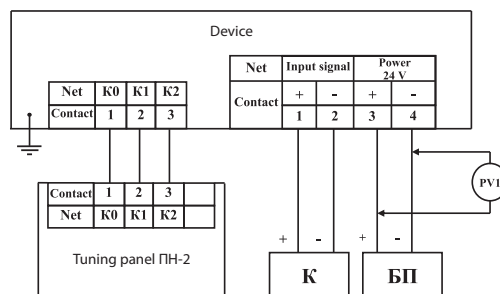
Щ22.2-0...5мА-минус 20.00...плюс 50.00-°С-Б-Ч-3, ТУ 25-7504.210-2010, класс безопасности - 2Н

Щ22.4, front frame size is 100x50 mm, digital and discrete-analog indicating device, construction design – horizontal, output signal range is 0..5 mA, indication range -20...+50, measurement unit °C, front panel color – white front frame color - black, indication color – red, limit of color change – minus 20 – red, minus 10 – yellow, 0 – green, plus 30 – yellow, plus 40 - red, safety class – 4.

Щ22.4.Н-0..5 мА - минус 20.00..плюс 50.00 - °С-Б-Ч-3-минус 20(К), минус 10 (Ж), 0 (З), плюс 30 (Ж), плюс 40 (К) , ТУ 25-7504.210-2010, класс безопасности - 4

CONNECTION DIAGRAMS

General connection diagram for output signal metering

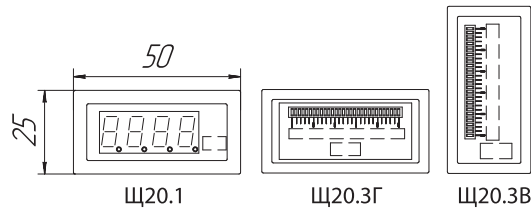


Connection diagram for calibration and programming (except Щ20.3 device)*

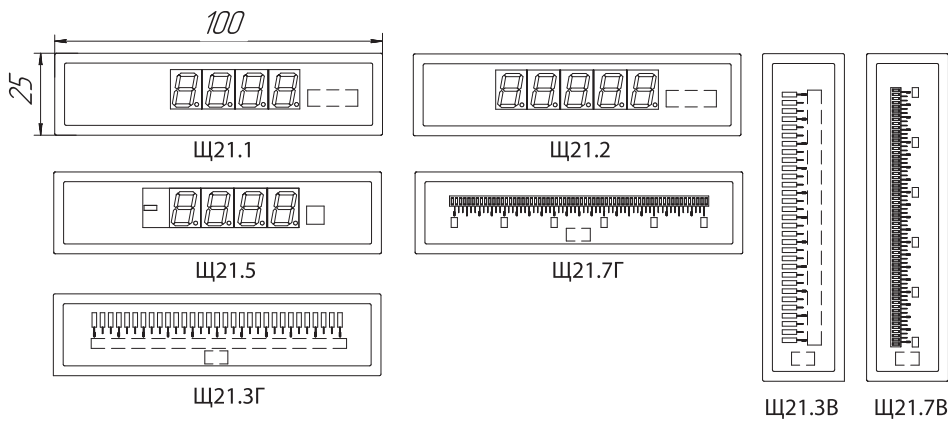
*К- calibrator, БП – power block, PV1- combined digital device

OVERALL AND INSTALLATION DIMENSIONS

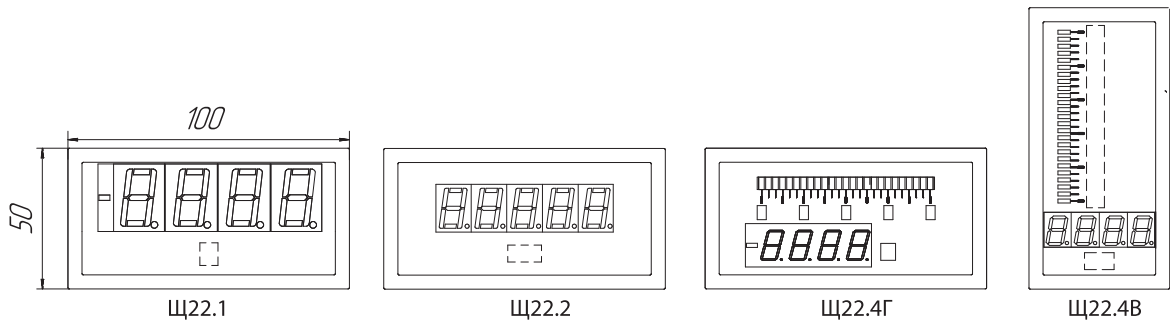
Щ20



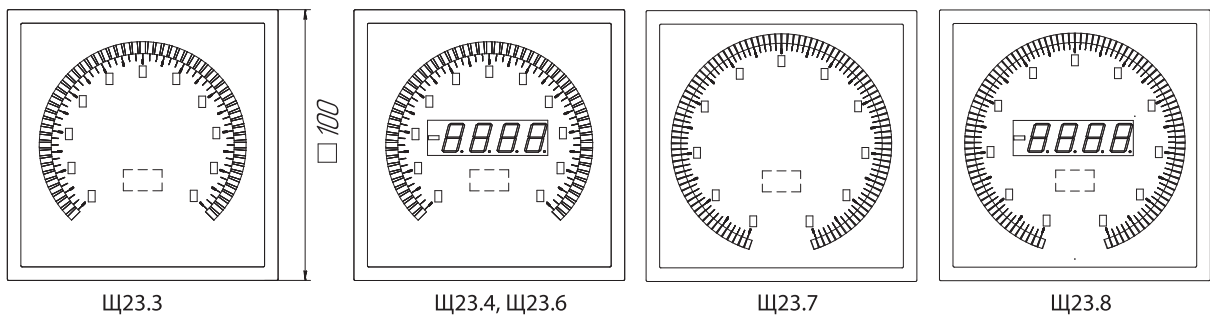
Щ21



Щ22



Щ23



For more detailed information about overall and installation dimensions see Operation Manual at www.elpribor.ru

POWER UNITS FOR DIGITAL DEVICES



БПИ5-1

БПИ-5 power units are intended for power supply of the digital devices with power voltage +5 V.
Overall dimensions – 96x48x90 mm.
Weight – 0,3 kg.

Power unit type	Power voltage, V	Output voltage, V	Load current	Output power, VA
БПИ5-1, 1 A	220 VU – 85-253 V AC, 50 Hz frequency, 100 -265 V DC	5 ± 5 %	1 A	5
БПИ5-1, 3 A			3 A	15

БПИ5-1 power unit for group power supply for devices with galvanic power separation.

Warranty life – 2 years.

Average lifetime, not less – 10 years.

Mean time between errors – 10000 hours

ORDERING EXAMPLE

For impulse one-channel power unit, load current 3 A, $U_{out}=5\text{ V}$

БПИ5-1, 3 А ТУ 25-7504.166-2003

POWER UNITS FOR DIGITAL DEVICES



KCH 1

Are intended for panel digital device adjustment for changing the parameters for RS485 interface.

Adjustment tool set 1:

- Interface convector (USB into RS485 ЭЛПИ-1);
- Software
- Operation Manual

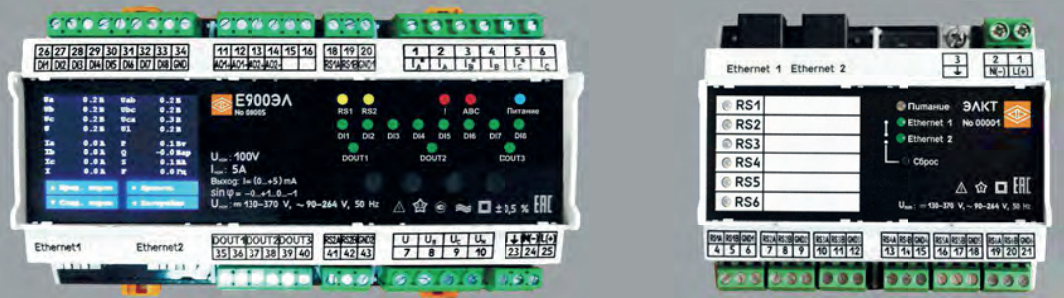


KCH 2

Adjustment tool set 2:

- Laptop
- Interface convector (USB into RS485 ЭЛПИ-1);
- Software
- Operation Manual

INSTRUMENT CONVERTERS AND TELEMETRY CONTROL DEVICES



INSTRUMENT CONVERTERS

MULTIFUNCTIONAL INSTRUMENT CONVERTERS



E900ЭЛ, E849ЭЛ

E900ЭЛ, E849ЭЛ converters are intended for metering and converting of electric parameters in three-phase three-wire AC circuits and three-phase four-wire AC circuits into output signals of DC and digital signal sequence for transferring data via RS485 interface (Modbus RTU, IEC 60870-5-101) and Ethernet interface (TCP, IEC 60870-5-104 protocols).

The converters can be used for:

- Three-phase circuits parameters control (E900ЭЛ) and metering of actual/reactive or actual and reactive power (E849ЭЛ);
- Electric energy quality control (E900ЭЛ).

E900ЭЛ, E849ЭЛ converters have a certificate of type approval of the Russian Maritime Registry of Shipping (Ambient class OM2).

E900ЭЛ, E849ЭЛ converters are included into the State Register of the Measuring Devices RF №66759-17, the validity period is to February 27, 2022

Converter Type	Overall dimensions, mm	Weight, kg, not above
E900ЭЛ, E849ЭЛ	162x90x61	0,7

Three-phase circuit parameters	Designation	E900ЭЛ		E849ЭЛ	
		3П	4П	3П	4П
Actual phase voltage	U_A U_B U_C	- - -	+ + +	- - -	- - -
Average actual phase voltage	$U_{cp.\phi}$	-	+	-	-
Actual phase-to-phase voltage	U_{AB} U_{BC} U_{CA}	+ + +	+ + +	- - -	- - -
Average actual phase-to-phase voltage	$U_{cp.\Delta}$	+	+	-	-
Actual zero-sequence voltage	U_0	-	+	-	-
Actual phase current	I_A I_B I_C	+ - +	+ + +	- - -	- - -
Average actual phase current	I_{cp}	+	+	-	-
Actual zero-sequence current	I_0	-	+	-	-
Actual power of the load phase	P_A P_B P_C	- - -	+ + +	- - -	+ + +
Sum actual power	P	+	+	+	+
Reactive power of the load phase	Q_A Q_B Q_C	- - -	+ + +	- - -	+ + +
Sum reactive power	Q	+	+	+	+
Total power of the load phase	S_A S_B S_C	- - -	+ + +	- - -	+ + +
Sum total power	S	+	+	+	+
Power ratio in the each phase	$\cos\varphi_A$ $\cos\varphi_B$ $\cos\varphi_C$	- - -	+ + +	- - -	+ + +
Total power ratio	$\cos\varphi$	+	+	-	-
Circuit frequency	F	+	+	-	-

Electric quality parameters	E900ЭЛ		E849ЭЛ	
	3П	4П	3П	4П
Frequency deviation, HZ (-5..5Hz)	+	+	-	-
Voltage fail duration, c (0,02..60 sec)	-	+	-	-
Voltage fail depth, % (10..95%)	-	+	-	-
Voltage interruption duration, sec (0,02..60 sec)	-	+	-	-
Duration of temporary overload, sec (0,02..60 sec)	-	+	-	-

Notes:

Signs "+" and "-" show if this parameter is measured or not for this type of the converter or connection scheme.

Average actual value of the phase current (phase and phase-to-phase voltage) is arithmetic average sum of the actual phase current values (phase and phase-to-phase voltage).

Data display	
LED indication (single indicators)	-Power supply voltage; - RS485 interface operation; -discrete output status; -analog output status; - event indicator; -phase sequence error
LCD (by the order)	Color, LCD size: 46,7x35,4 mm (2,2")
Additional Features	Connection of the indication modules (МИ120, МИ80) or indication panel on the RS485 interface or Ethernet (for МИ120.5). For communication with telemetry control point the ЭЛКТ telemetry controller can be connected via RS485 Interface for data transferring to the upper level via IEC 61850-8-1 protocol (Ethernet interface)
Telemetry	
Input signals	A: 1,0; 5,0 range from 0 to 2,0 Inom B: 100, 380, 400 (range – 0-1,2 Unom) Hz: 45..55
Measuring time	0,1 sec.
Intrinsic error limit	- For current and voltage: $\pm 0,2\%$; - For power: $\pm 0,5\%$; - For frequency: $\pm 0,01$ Hz; - For analog output: $\pm 0,5\%$;
Galvanic isolation unit of input and output circuits, supply circuits	Yes
Short-time input signal (with multiplicit, maximum value) overload	Multiplicity: 20, number of overloads: 2; time of the each overload, sec: 0,5; time interval between two overloads, sec: 0,5.
Input resistance	For current circuits – not less 0,02 Ом For voltage current circuits – not less 1 МОм
Communication interfaces/Analog outputs	
RS485	Quantity: 1,2; Protocols: Modbus RTU, IEC 60870-5-101 Data transferring speed: 4800, 9600, 19200, 38400, 57600 baud
Ethernet	Quantity: 0,1, 2; 100BASETX Protocols: Modbus RTU, IEC 60870-5-104,
Analog outputs	Quantity: 0,1,2,3 Reprogramming ranges: 0...5 mA, 4...20 mA, 0...20 mA, 0...2,5...5 mA, 4...12...20 mA, 0...10...20 mA,
Output analog signal setting time, not above	0,5 sec
Remote signal system	
Discrete inputs	Quantity: 8; input signal type "clean contact", volatage at the opened device terminals=24 V, current 10mA (do not required external dampening)
Remote control	
Discrete inputs	Quantity: 0,1,2,3 (modes: on, off, block etc)~250 V,=30V, current 5 A
Power supply	
Voltage	-24 VN –(24+12/-6) V DC 220 VU –90-264 V of AC with frequency of 50 Hz or for 130-270 V of DC; Measuring circuit
Power consumption from the supply circuit (not above)	7 VA
Device reprogramming (trim)	
Reprogramming	- via the Configurator software (RS485 interface, Ethernet), - via Web-Interface, via control buttons on the front panel - via the control buttons on the front panel (if applicable)

Reprogramming parameters	<ul style="list-style-type: none"> - Connection scheme (three or four wires) - Scale range (devices with rated current of 1A, 5A and voltage of 100 V) - Password assignment - Indication refreshment period: 0,1 – 10 sec - Decimal point position - Set point for every electric value (for discrete outputs – to three control signals for commutation equipment) - RS485, Ethernet interfaces parameters - Output signals parameters - Indication brightness - Modbus RTU, Modbus TCP, IEC 60870-5-104, IEC 60870-5-101 - Output and input signals calibration
Operational Conditions	
Working temperature range	-40 – +70 °C
Protection class	IP20
Mounting	DIN-bar, 35 mm
Wire cross-section	2,5 mm ²
Maximum overload for internal signal (duration)	150% (2 hours)
Calibration period	11 years (with LCD – 8 years)
Warranty operating lifetime	24 months
Average lifetime, not less	20 years (with LCD – 15 years)
Average mean time to failure	250 000 hours (with LCD – 150 000 hours)

ORDERING FORM

E a – b – c – d – e – f – g – h – i – j – k

a – converter type according to the functionality

849ЭЛ – measuring power converter;
900ЭЛ – multifunctional instrument converter;

b – nominal voltage:

- 100 V, 380V, 400 V -linear voltage-
- U/100 - transformer voltage ratio (rated voltage of the secondary winding 100 v);

c – nominal current:

- 1 A, 5 A - phase current
- I/1, I/5 - transformer current ratio (nominal current of the secondary winding – 1 A and 5 A);

d – supply voltage designation:

24BH –DC current supply, voltage (24+12/-6) V
220BY –universal supply: supply voltage 90-264 V of AC, frequency 50 Hz, or 130-270 V of DC;
From measuring circuit - 90-264 V

e- Designation for RS485 interfaces

1RS – one main RS485 interface;
2RS – one main and one additional RS485 interfaces;

f – Designation for Ethernet interfaces

x – device without Ethernet interface
1RE - device with one Ethernet interface
2RE - device with two Ethernet interface

g – Designation for 8 discrete outputs:

x – device without discrete outputs;
DI – 8 discrete outputs

h - Designation for analog and discrete outputs

x – no discrete outputs, no analog outputs
01 – one discrete output, no analog outputs
02 – two discrete outputs, no analog outputs
03 – three discrete outputs, no analog outputs
10(a) – one analog output and no discrete outputs
11(a) – one analog output and one discrete output
12(a) – one analog output and two discrete outputs
13(a) – one analog output and three discrete outputs
20(a,b) – two analog outputs, no discrete outputs
21(a,b) – two analog outputs, one discrete output
22(a,b) – two analog outputs and two discrete outputs
23(a,b) – two analog outputs and three discrete outputs
30(a,b,c) – three analog outputs, no discrete outputs
31(a,b,c) – three analog output and one discrete output
32(a,b,c) – three analog output and two discrete outputs
33(a,b,c) – three analog output and three discrete outputs
Where a,b,c – designations of the analog output signals scale ranges
(A=0..5mA, B=4..20 mA, C=0..20mA, AP=0..2,5..5 mA, BP=4..12..20 mA, CP=0..10..20mA, EP=-5..0..5 mA)
(Example: (12(A); 21(B,B); 33 (C,A,B); 30 (C,B,C));

i - Indication type

x- null parameter (base design)
LCD – color LCD

j - operation design

x – for general purpose industrial device (base design)
OM2 – for Marine vehicles (except design with LCD)

k - Special design:

- if no, do not complete;
- P – design for actual power metering;
- Q – design for reactive power metering;
- PQ – dedign for actual and reactive power metering;

Measurement device type	Code parameter of the full designation									
	Rated value or transformation ratio		Supply voltage	RS485 interface	Ethernet interface	Discrete inputs	Output signals	Indication	Operation design	Special design
	b	c	d	e	f	g	h	i	j	k
E849ЭЛ	U, U/100	I, I/1; I/5	220VU 24VN	1RS, 2RS	×, 1RE, 2RE	×, DI	+	×, LCD	+	+
E900ЭЛ	U, U/100	I, I/1; I/5	220VU 24VN	1RS, 2RS	×, 1RE, 2RE	×, DI	+	×, LCD	+	×

Notes:
“+” sign shows presence of all possible options in the order formula.
“×” sign means, that this parameter is absent.
For E900ЭЛ do not complete K parameter.

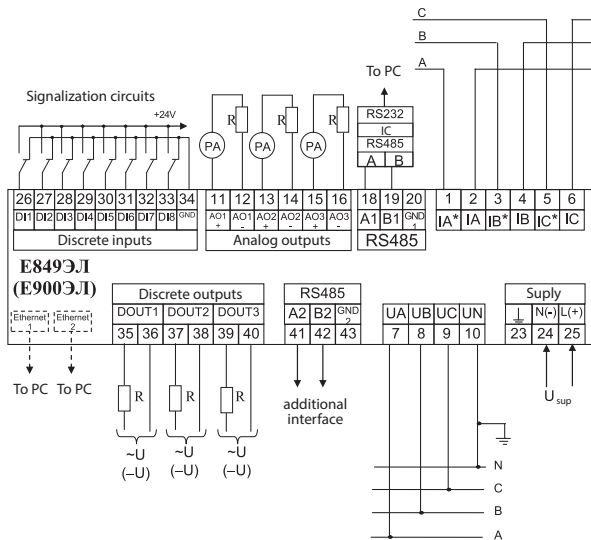
ORDERING EXAMPLE

For power converter with the following parameters: rated voltage – 100 V, rated current 1 A, supply voltage – 90-264 V AC, frequency 50 Hz or 130-370 V DC, main RS485 interface, Ethernet interface, discrete inputs, analog output 0..5 mA, two discrete outputs, operation at marine vehicles, metering of actual and reactive power.
E849ЭЛ-100B-1 A-220BY-1RS-1RE-DI-12(A)-x-OM2-PQ TY 25-7504.232-2016

For power converter with the following parameters: transformer voltage ratio – 10000/100, transformer current ratio 600/5, supply voltage – (24+12/-6) V DC, main and additional RS485 interfaces, one discrete output, LCD, metering of actual power.
E849ЭЛ-10000/100-600/5-24BH-2RS-x-x-01-LCD-x-P TY 25-7504.232-2016

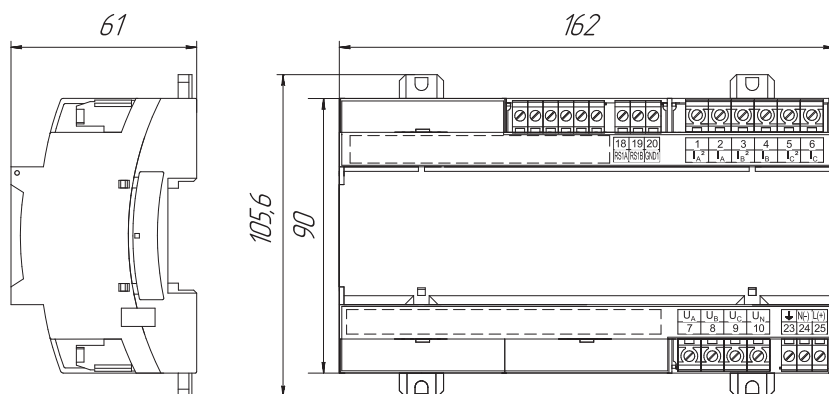
For power converter with the following parameters: rated voltage – 400 V, rated current 5 A, supply voltage – 90-264 V AC, frequency 50 Hz or 130-370 V DC, main RS485 interface, two Ethernet interfaces, discrete inputs, three analog output 0..5 mA, 4..20 mA, 0...5 mA, three discrete outputs.
E900ЭЛ-400B-5A-220BY-1RS-2RE-DI-33(A,B,A)-x-x TY 25-7504.232-2016

CONNECTION SCHEMES




- Notes:**
- 1. Supply voltage U_{sup} depends on the converters design.
 - 2. Number of analog outputs (connectors 11-16) depends on the converters design.
 - 3. Number of discrete inputs (connectors 26-34) depends on the converters design.
 - 4. Number of discrete outputs (connectors 35-40) depends on the converters design.
 - 5. Additional RS485 interface (connectors 41-43) depends on the converters design.
 - 6. Connection of the converters with one or two Ethernet interfaces is showed by dotted line.


OVERALL AND INSTALLATION DIMENSIONS



INSTRUMENT CONVERTERS OF DIRECT CURRENT AND VOLTAGE



Design with RS485



Design without RS485

E856ЭЛ

E856ЭЛ converters are intended for metering of electric current and voltage in DC circuits.

The converters can be used for control of current and voltage of the electric systems, installation and automation of different electric energy facilities, defense facilities, safety and industry.

RS485 interface allows to use the converters for data transferring in the digital code of ACS. The converters can be designed without RS485 interface.

Converters have a certificate of type approval of the Russian Maritime Registry of Shipping (Ambient class OM2).

E856ЭЛ converter is included into the State Register of the Measuring Devices RF №68159-17, the validity period is to **Огдн 26, 2022**

Converter Type	Design	Overall dimensions, mm	Weight, kg, not above
E856ЭЛ	with RS485	70x85,5x89	0,4
	without RS485	70x86x80	0,5

Input signal	Output signal		Load resistance, not above
	Output 1	Output 2	
0..5 mA, 4..20 mA, 0..20 mA, -5..0..5 mA, 0..75mV, -75..0..75 mV, 0..60 V, 0..100 V, 0..150 V, 0..250 V, 0..500 V, 0... 1000 V	0..5 mA, 4..20 mA, 0..20 mA, 0..2,5..4 mA, -5..0..+5 mA, 4..12..20 mA, 0..10..20 mA'	0..5 mA, 4..20 mA, 0..20 mA, 0..2,5..5 mA, -5..0..+5 mA, 4..12..20 mA, 0..10..20 mA	For analog output 2,5 kOm (0..5 mA, 0..2,5..5 mA); 2,0 kOm (-5..0..5 mA, 0..20 mA, 4..20 mA, 4..12..20 mA, 0..10..20 mA)

Data display	
Additional Features	Connection of the indication modules or indication panel on the RS485 interface
Telemetry	
Input signals	mA: 0..5, 4..20, 0..20, -5...0..5 mV: 0..75, -75..0..75 V:0..60, 0..100, 0..150, 0..250, 0..500, 0..1000
Intrinsic error limit	±0,5%
Galvanic isolation unit of input and output circuits, supply circuits	Yes
Short-time input signal (with multiplicit, maximum valuey) overload	Current: Multiplicity: 20, number of overloads:2; time of the each overload, sec: 0,5; time interval between two overloads, sec: 0,5. Voltage: Multiplicity: 1,5, number of overloads:9; time of the each overload, sec: 0,5; time interval between two overloads, sec: 15.
Input resistance	(1-0,005) MOm
Communication interfaces/Analog outputs	
RS485	Quantity: 0,1,2; Protocol: Modbus RTU Data transferring speed: 4800, 9600, 19200, 38400 baud
Analog outputs	Quantity:0,1,2 Ranges: 0...5 mA, 4..20 mA, 0..20 mA, 0...2,5...5 mA, 4...12..20 mA, 0..10..20 mA
Input analog signal transition time, not above	0,5 sec.

Power supply	
Voltage	-12 VN -(12+6/-3) V DC -24 VN -(24+12/-6) V DC 230 VU -85-264 V of AC with frequency of 50 Hz; 220 V -85-264 V of AC with frequency of 50 Hz or for 130-370 V of DC;
Power consumption from the supply circuit (not above)	1 W from the circuit of input signal (for parallel circuit) 0,01 W from the circuit of input signal (for series circuit) 6 VA – from the supply circuit
Operational Conditions	
Working temperature range	-40 - +50 °C
Protection class	IP50
Mounting	DIN-bar
Wire cross-section	4 mm ² (solid wires) 2,5 mm ² (multicore wires)
Maximum overload for internal signal (duration)	120% (2 hours)
Calibration period	10 years
Warranty operating lifetime	2 years
Average lifetime, not less	20 years
Average mean time to failure	200 000 hours

ORDERING FORM

E856ЭЛ - a - b - c - d - e - f

a – input signal metering (converting) range

mA: 0..5, 4..20, 0..20, -5...0..5

mV: 0..75, -75..0..75

V: 0..60, 0..100, 0..150, 0..250, 0..500, 0..1000

b – voltage supply:

- 220BY – universal supply: supply voltage – 85-264 V AC, frequency 50 Hz or 100-370 V DC 230 V- supply voltage 85-264 V AC, frequency 50 Hz

-12BH-(12+6/-3) V DC

-24BH -(24+12/-6) V DC

c – designation for analog output signal changing range

A=0..5mA, B=4..20 mA, C=0..20mA,

AP=0..2,5..5 mA, BP=4..12..20 mA, CP=0..10..20mA,

EP=-5...0..5 mA

X – no such parameter (only for converters with RS485)

d – designation for additional analog output signal changing range (there is no such parameter for converter without interfaces)

A=0..5mA, B=4..20 mA, C=0..20mA,

AP=0..2,5..5 mA, BP=4..12..20 mA, CP=0..10..20mA,

EP=-5...0..5 mA

X – no such parameter

e - Designation of interfaces

1RS – one main RS485 interface;

2RS – one main and one additional RS485 interfaces;

X – no interfaces

f - Special design

OM2 – for Marine vehicles

A – for NPP (safety class 4)

- Do not complete, if there is not such parameter

ORDERING EXAMPLE

For power converter with the following parameters: converter type – E856ЭЛ, input signal metering (converting) range 0-250V, supply voltage – 85-264 V AC, frequency 50 Hz, or 100-370 V DC, output analog signal changing range 0..10..20 mA, one RS485 interface, operation at marine vehicles.

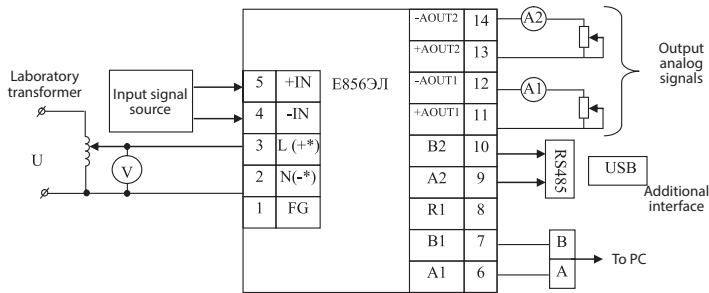
E856ЭЛ-0..250 B - 220 BY-CP-x-1RS-OM2 TY 25-7504.216 – 2011

For power converter with the following parameters: converter type – E856ЭЛ, input signal metering (converting) range 0-75V, supply voltage – 85-364 V AC, frequency 50 Hz, output analog signal changing range 0..5 mA, no RS485 interface.

E856ЭЛ-0..75 B - 230 B-A-x-x- TY 25-7504.216 - 2011

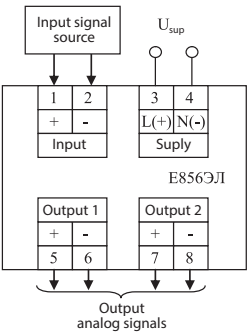
CONNECTION SCHEMES

E856ЭЛ (with RS485)



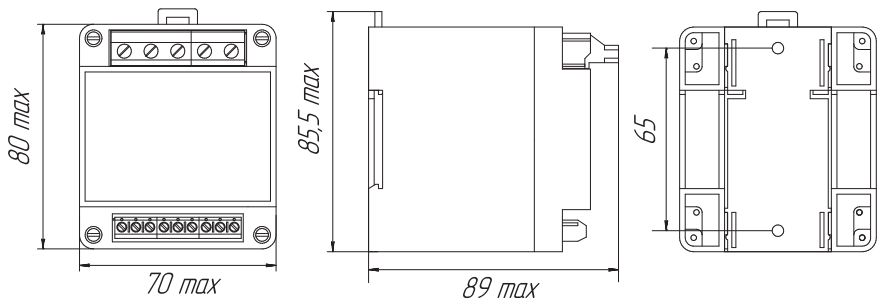
A1, A2 – standard milliamperimeters
V- standard voltmeter
* contacts for connection to the direct current power supply (12VN, 24VN)

E856ЭЛ (without RS485)

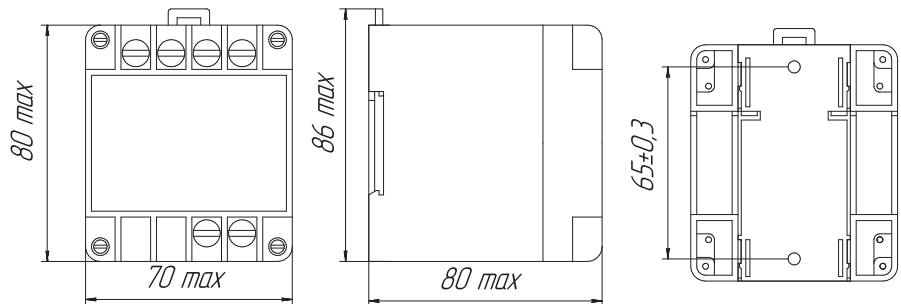


OVERALL AND INSTALLATION DIMENSIONS

E856ЭЛ (with RS485)



E856ЭЛ (without RS485)



INSTRUMENT CONVERTERS OF DIRECT CURRENT AND VOLTAGE



E1856ЭЛ

E1856ЭЛ converters are intended for metering of electric current and voltage in DC circuits. The converters can be used for control of current and voltage of the electric systems, installation and automation of different electric energy and industrial facilities.

RS485 interface allows to use the converters for data transferring in the digital code of ACS. The converters can be designed without RS485 interface.

Converters have the following options:

- Program selection of the analog input signal;
- Program selection of the analog output signal;
- Forming of the discrete output signal for achievement of the set limit value;
- Displaying of the input signal (percentagewise from the rated value) at the indicator;
- Data transferring by RS485 interface (Modbus RTU protocol);
- It is possible to produce converters without interface and analog outputs.

Possibility of the program selection of output and input signals range allows to quickly solve issues with usage of converters with different ranges and types of input signals.

Converters parameters can be changed via Configurator software or control buttons at the front panels.

E1856ЭЛ converter is included into the State Register of the Measuring Devices RF №59809-15, the validity period is to February 6, 2020

Converter Type	Overall dimensions, mm	Weight, kg, not above
E1856ЭЛ	23x111x115	0,3

Data display	
LED indication (single or seven-segment displays)	-2-digit seven-segment LED indicators for input percentage scale display - two single LED indicators for displaying work of interface and supply voltage
Additional Features	Connection of the indication modules or indication panel on the RS485 interface
Telemetry	
Input signals	Programmable ranges: mA: 0..5, 4..20, 0..20, -5...0..5 mV: 0..75, -75..0..75 V: 0..60, 0..100, 0..150, 0..250, 0..500
Intrinsic error limit	±0,5%
Galvanic isolation unit of input and output circuits, supply circuits	Yes
Short-time input signal (with multiplicity, maximum value) overload	Current: Multiplicity: 20, number of overloads: 2; time of the each overload, sec: 0,5; time interval between two overloads, sec: 0,5. Voltage: Multiplicity: 1,5, number of overloads: 9; time of the each overload, sec: 0,5; time interval between two overloads, sec: 15.
Input resistance	For each series circuits (current) – not less 0,02 Ом For parallel circuits (voltage) for converters with power supply from AC circuit – not less 1 МОм
Communication interfaces/Analog outputs	
RS485	Quantity: 0,1; Protocol: Modbus RTU Data transferring speed: 4800, 9600, 19200, 38400 bit/sec
Analog outputs	Quantity: 0,1 Programmable Ranges: 0...5 mA, 4..20 mA, 0..20 mA, 0...2,5...5 mA, 4...12..20 mA, 0..10..20 mA
Input analog signal transition time, not above	0,5 sec.

Discrete output	
Discrete output	Quantity:0,1 Direct voltage: 300 V, 100 mA; Alternative voltage: 200 V, 100 mA
Power supply	
Voltage	-12 VN –(12+6/-3) V DC -24 VN –(24+12/-6) V DC 230 V –85-253 V of AC with frequency of 50 Hz; 220 VU –85-253 V of AC with frequency of 50 Hz or for 120-265 V of DC;
Power consumption from the supply circuit (not above)	0,5 W from the circuit of input signal (for parallel circuit) 0,01 W from the circuit of input signal (for series circuit) 6 VA – from the supply circuit
Device reprogramming (trim)	
Reprogramming	- via the Configurator software (RS485 interface), - via the control buttons on the front panel
Reprogramming parameters	- Range and type of input signal; - Range of changing of analog output signals; - Discrete input triggering parameters - RS485 interface parameters
Operational Conditions	
Working temperature range	-40 - +50 °C
Protection class	IP50
Mounting	DIN-bar
Wire cross-section	0,08 - 2,5 mm ²
Maximum overload for internal signal (duration)	150% (2 hours)
Calibration period	8 years
Warranty operating lifetime	2 years
Average lifetime, not less	20 years
Average mean time to failure	200 000 hours

ORDERING FORM

E1856ЭЛ – a – b – c – d – f

a – input signal metering (converting) range

mA: 0..5, 4..20, 0..20, -5...0..5
mV: 0..75, -75..0..75
V:0..60, 0..100, 0..150, 0..250, 0..500

b – voltage supply:

220BY – universal supply: supply voltage – 85-253 V AC, frequency 50 Hz or 120-265 V DC
230B- supply voltage 85-253 V AC,
frequency 50 Hz
-12BH–(12+6/-3) V DC
-24BH –(24+12/-6) V DC

c – designation for analog output signal changing range (reprogramming of output analog signal is made under the selected option)

X – no such options
Option 1: A1;B1;C1; AP1;BP1; CP1;
Option 2: A2;B2;C2; AP2;BP2; CP2;EP2;
Where:
A1(A2)=0..5mA, B1(B2)=4..20 mA, C1(C2)=0..20mA, AP1(AP2)=0..2,5..5 mA, BP1(BP2)=4..12..20 mA, CP1(CP2)=0..10..20mA,
EP1(EP2)=–5...0..5 mA

Note: If there is no output signal (c=x), the converters have a design with the digital interface RS485 (f=RS)

d – discrete input

X – no discrete input
01 – one discrete input

f - Special design (digital interface)

x-no interface;
RS- there is an interface

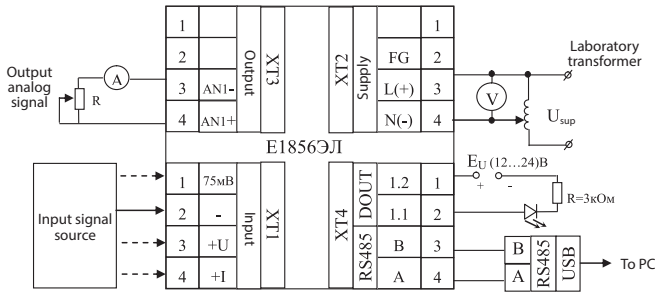
Converter design	Code parameter of the full designation				
	Metering (converting) range of input signal	Supply voltage	Range of output analog signal changing	Discrete inputs	Special design
	a	b	c	d	f
E1856ЭЛ	+	12VN 24VN 220VU, 230V	x	x, 01	RS
			A1, B1, C1, AP1, BP1, CP1		x, RS
			A2, B2, C2, AP2, BP2, CP2, EP2		

ORDERING EXAMPLE

For converter with the following parameters:converter type – E1856ЭЛ, input signal metering range 0-20 mA, supply voltage – 85-253 V AC, frequency 50 Hz, output signal changing range 0..10..20 mA (option 1), discrete output, no interface.
E1856ЭЛ-0..20 mA-220BY CP1-01-x TY 25-7504.226 – 2014

For power converter with the following parameters:converter type – E1856ЭЛ, input signal metering range (-75..+75)V, supply voltage – 85-253 V AC, frequency 50 Hz, output analog signal changing range 4..20 mA(option 2), no discrete output, RS485 interface, operation at NPP (safety class 4)
E1856ЭЛ- -75..0..75mB-230 B-B2-x-RS, A- TY 25-7504.226 – 2014

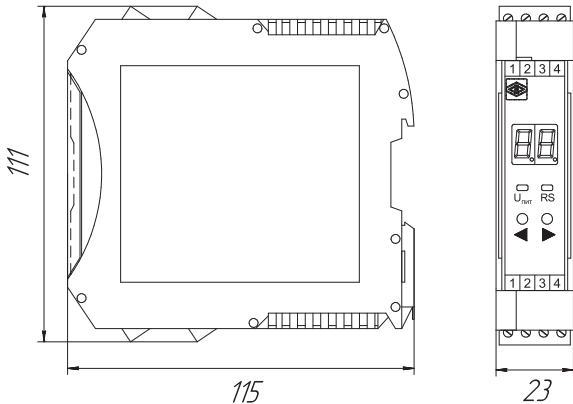
CONNECTION SCHEMES



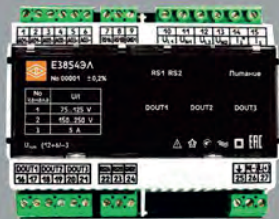
Notes:

- 1 Existence of interface (XT4 block) depends on the converters design
- 2 The possible output signals connections depending on the converters design are shown by the dotted line.
- A– standard milliamperimeter
- V- standard voltmeter

OVERALL AND INSTALLATION DIMENSIONS



THREE-CHANNEL INSTRUMENT CONVERTERS
OF ALTERNATIVE CURRENT AND VOLTAGE



E3854ЭЛ

E3854ЭЛ converters are intended for metering and converting of electric parameters in one-phase, three-phase AC circuits and other circuits into output discrete and analog signals, transferring the results by the continuous digital RS485 interface.

One-phase converters can be used in three-phase circuits for metering and converting parameters of the one phase.

Three-phase converters can be used for metering and converting electric parameters in three-phase three-wire circuits and three-phase four-wire AC circuits.

Data exchange via RS485 interface and existence of analog and discrete output signals allows to use these converters in different systems of automation control.

E3854ЭЛ converter is included into the State Register of the Measuring Devices RF №70318-18, the validity period is to January,31 2023.

Converter Type	Overall dimensions, mm	Weight, kg, not above
E3854ЭЛ	108x90x61,1	0,35

Data display	
LED indication (single or seven-segment dispalys)	- RS485 interface operation; -discrete output status; -supply voltage
Additional Features	Connection of the indication modules or indication panel on the RS485 interface
Telemetry	
Input signals	For one-phase converter: V: 50, 100, 75..125, 125, 150..250, 250, 500 (U/100- via voltage transformer 100V) A: 1, 5 (I/5, I/1 – via current transformer 1 A, 5A) Hz:45..65 For three-phase converter: U/100, 100 V -57,7 (100)V (phase (linear) voltage), 400 V- 230 (400) V (phase (linear) voltage),
Instrument rating	for measuring - 0.2; for conversion - 0.5
Intrinsic error limit	Alternative voltage and current metering: $\pm 0,2\%$; Frequency metering in the range 45-65 Hz: $\pm 0,01\%$; Converting of Alternative voltage and current, frequency (45-55 Hz): $\pm 0,5\%$;
Galvanic isolation unit of input and output circuits, supply circuits	Yes
Short-time input signal (with multiplicit, maximum valuey) overload	Current: Multiplicity: 20, number of overloads:2; time of the each overload, sec: 0,5; time interval between two overloads, sec: 0,5. Voltage: Multiplicity: 1,5, number of overloads:9; time of the each overload, sec: 0,5; time interval between two overloads, sec: 15.
Input resistance	-50 kOm – for converter with measurement limit 50 V -100 kOm – for converter with measurement limit 100 V -125 kOm – for converter with measurement limit 125 V -250 kOm – for converter with measurement limit 250 V -450 kOm – for converter with measurement limit 450 V
Communication intefaces/Analog outputs	
RS485	Quantity: 0,1; Protocol: Modbus RTU Data transferring speed: 4800, 9600, 19200, 38400, 57600 baud
Analog outputs	Quantity: 0,1,2,3 Ranges: 0...5 mA,4..20 mA,0..20 mA
Input analog signal transition time, not above	0,2 sec.
Discrete output	
Discrete outputs	Quantity: 0,1,2,3 (relay or opto-coupler)

Power supply	
Voltage	-12 VN –(12+6/-3) V DC -24 VN –(24+12/-6) V DC 220 VN –90-264 V of AC with frequency of (50±3) Hz or for 130-370 V of DC; 230 V –90-264 V of AC with frequency of (50±3) Hz 230(MC) V – supply from metering circuit -90-264 V of AC with frequency of (50±3) Hz or for 130-370 V of DC
Power consumption from the supply circuit (not above)	-3 (0 VN) (for one phase converter) for rated values of output signals with maximum set of analog and discrete outputs) -0,6 VA –(from voltage metering circuits) -0,1 VA –(from current metering circuits) 3 VA (from voltage metering circuits with power supply from metering circuit)
Device reprogramming (trim)	
Reprogramming	- via the Configurator software (RS485 interface)
Reprogramming parameters	- Converter connection mode (1,2,3-channel) - Metering channel adjustment - Frequency to analog output signal conversion range adjustment - Operation mode and analog outputs binding; - Discrete inputs (set points) triggering parameters - Main and additional interfaces parameters - Calibration of input metering channels
Operational Conditions	
Working temperature range	-40 - +70 °C
Protection class	IP30
Mounting	DIN-bar
Wire cross-section	To 4 mm ² – solid wires To 2,5 mm ² – multicore wires
Maximum overload for internal signal (duration)	150% (2 hours)
Calibration period	10 years
Warranty operating lifetime	3 years
Average lifetime, not less	20 years
Average mean time to failure	200 000 hours

ORDERING FORM

E38543Л – a1, a2, a3 – b – c – d – e – f

a1, a2, a3 – scale ranges

Design options:

1) One-phase, two-, three-channel converter

- two metering/converting parameters (do not specify a3 parameter)

a1, a2 – rated value or voltage(current) ratio of the first and the second channels

- three metering/converting parameters:

a1, a2, a3 – rated value or voltage(current) ratio of the first, the second and the third channels

2) Three-phase converter

a1- rated input voltage;

U/100. 100 V- 57,7 (100) V (phase (linear) voltage),

400 V-230 (400) V (phase (linear) voltage),

b – voltage supply:

12BH – direct current supply, voltage (12+6/-3) V

24BH – direct current supply, voltage (24+12/-6) V

230B supply voltage 90-264 V AC,

frequency (50±3) Hz;

230B (1L) – supply voltage from metering circuit, 90-264 V AC,

frequency (50±3) Hz or 130 -370 V DC (only for one-phase converters);

220B – supply voltage – 85-253 V AC,

frequency 50 Hz or 120-264 V DC

230B supply voltage 90-264 V AC (50±3) Hz,

or 130 – 370 V DC.

Note: Power supply from metering circuit is applied only for converters with the first-channel 0-100 V or 0-250 V.

c - additional RS485 interface

x-no interface;
RS- onde additional RS485 interface

d - Designation for analog outputs and analog signal changing ranges

number of analog outputs (first digit – number of analog outputs)
x –no analog outputs
10(x) – one analog output;
20(x,y) – two analog outputs;
30(x,y,z) – three analog outputs;
Where x,y,z – designations of the analog output signals scale ranges A, B, C
Where A=0..5mA, B=4..20 mA, C=0..20mA
(Example: (10(A); 20(B,B); 30(C,A,B); 30 (C,B,C));

e - Designation for discrete outputs

number of discrete outputs (second digit – number of discrete outputs)
current in signalization circuits (is specified in brackets after the number of outputs, depending on the order)
x – no discrete outputs
01(x) - one discrete output, no analog outputs
02(x) - two discrete outputs, no analog outputs
03(x) - three discrete outputs, no analog outputs
X – maximum current in signalization circuits: 0,2 A; 0,5 A.
(Example: 01(0,2A); 0,3(5A)

f - Special design:

- if no, do not complete;

Converter design	Code parameter of the full designation							
	Rated value of transformer ratio			Supply voltage	Additional interface*	Analog outputs	Discrete outputs	Special design
	a1	a2	a3	b	c	d	e	f
E3854ЭЛ	U, I	U, I	–	12VN, 24VN, 230V, 220VU 230V (ИЦ)	x, RS	x, 10, 20, 30	x, 01, 02, 03	+
	U, I	U, I	U, I	12VN, 24VN, 230V, 220VU 230V (ИЦ)	x, RS	x, 10, 20, 30	x, 01, 02, 03	+
E3854ЭЛ	U	–	–	12VN, 24VN, 230V, 220VU	x, RS	x, 10, 20, 30	x, 01, 02, 03	+

* main RS485 interface is default

Notes:

“+” sign shows presence of all possible options in the order formula.
“x” sign means, that this parameter is absent.
Number of analog and discrete outputs – one analog and(or) one discrete output for every displayed parameter.
The ranges of the analog outputs should be specified in brackets after number of outputs.
The maximum current of discrete outputs should be specified in brackets after number of outputs.
Do not specify unused a2, a3, f parameters.

ORDERING EXAMPLE

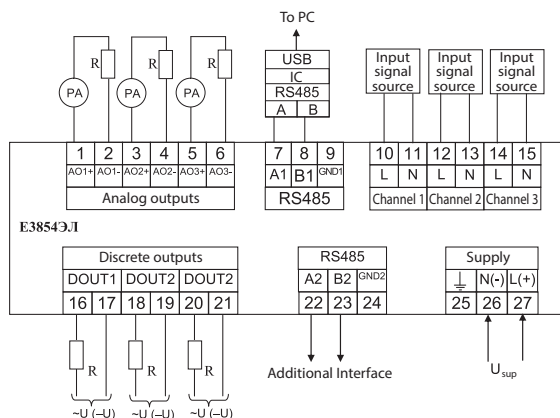
E3854ЭЛ converter,three-phase, linear(phase-to-phase) voltage 400 V, universal supply voltage, additional interface, three analog outputs 4..20 mA, three discrete outputs with maximum current of 5A.
E3854ЭЛ-400 B-220BY-RS-30(B,B,B)-03(5A) TY 26.51.43-234-05763903-2017

E3854ЭЛ converter, one-phase,two-chanel, first chanel changing range – 0-500 V with direct connection (rated value 500 V), for the second chanel – 0-1,5 A with the direct connectio (rated value 1A), supply voltage 24 V DC, additional interface, two analog outputs 0..5 mA, 0..20 mA, two discrete outputs with maximum current of 0,2 A.
E3854ЭЛ-500 B, 1A-24BH-RS-20(A,C)-02(0,2 A) TY 26.51.43-234-05763903-2017

E3854ЭЛ converter, one-phase,three-chanel, changing range for the first, the second and the third chanel – 0-10 kV with connection through voltage transformer (rated value 100 V),universal power supply, additional interface, no analog and discrte outputs
E3854ЭЛ-10кВ/100В, 10кВ/100В, 10кВ/100В -220V0-RS-X-X TY 26.51.43-234-05763903-2017

CONNECTION SCHEMES

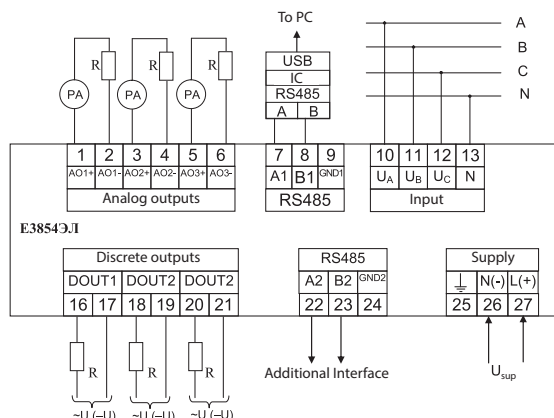
E3854ЭЛ, one-phase design



Notes:

1. Supply voltage U_{sup} depends on the converters design.
2. Number of analog outputs (connectors 1-6) depends on the converters design.
3. Number of discrete outputs (connectors 16-21) depends on the converters design.
4. Additional RS485 interface (connectors 22-24) depends on the converters design.
5. Depending on the converters design L and N parameters can have the following values: $L=I_n^*/U_{Ln}$; $N=I_n^*/U_{Nn}$, where n – channel number (n=1,2,3)

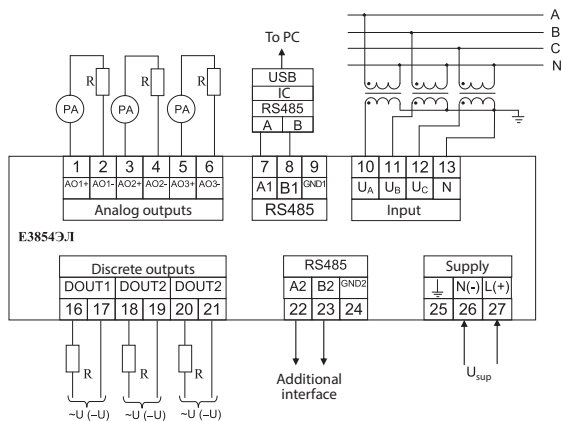
E3854ЭЛ, three-phase design



Notes:

1. Supply voltage U_{sup} depends on the converters design.
2. Number of analog outputs (connectors 1-6) depends on the converters design.
3. Number of discrete outputs (connectors 16-21) depends on the converters design.
4. Additional RS485 interface (connectors 22-24) depends on the converters design.
5. A phase is connected to the contact 10, B phase – to the contact 11, c phase – to the contact 12, neutral phase is connected to the contact 13.

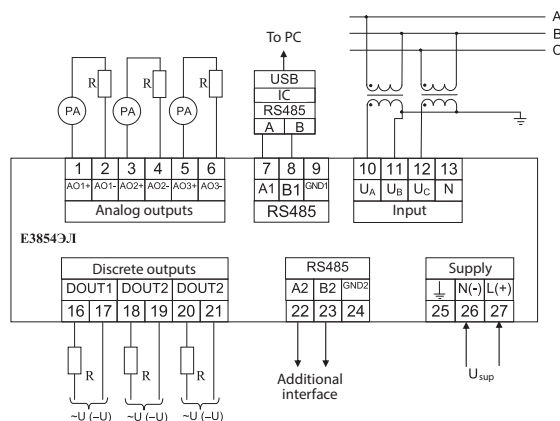
E3854ЭЛ, three-phase design via three voltage transformers



Notes:

1. Supply voltage U_{sup} depends on the converters design.
2. Number of analog outputs (connectors 1-6) depends on the converters design.
3. Number of discrete outputs (connectors 16-21) depends on the converters design.
4. Additional RS485 interface (connectors 22-24) depends on the converters design.

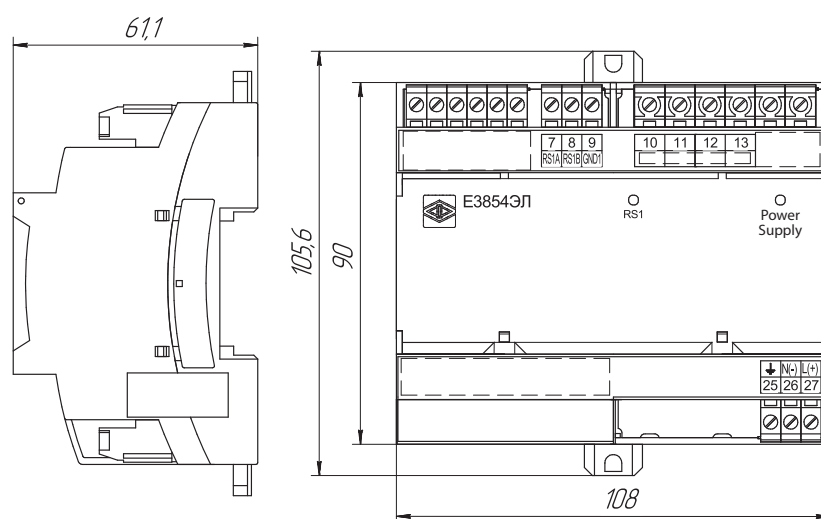
E3854EL4ЭЛ, three-phase design via two voltage transformers



Notes:

1. Supply voltage U_{sup} depends on the converters design.
2. Number of analog outputs (connectors 1-6) depends on the converters design.
3. Number of discrete outputs (connectors 16-21) depends on the converters design.
4. Additional RS485 interface (connectors 22-24) depends on the converters design.

OVERALL AND INSTALLATION DIMENSIONS



INSTRUMENT CONVERTERS OF ALTERNATIVE CURRENT AND VOLTAGE



Design with RS485



Design without RS485

E854ЭЛ

E854ЭЛ converters are intended for linear converting of input signal of alternative current and voltage, frequency 50 Hz into one or two potential free output DC signals.

The converters can be used for control of current and voltage of the electric systems, installation and automation of different electric energy facilities, defense facilities, safety and industry.

RS485 interface allows to use the converters for data transferring in the digital code of ACS.

E854ЭЛ converters have a certificate of type approval of the Russian Maritime Registry of Shipping (Ambient class OM2).

E854ЭЛ converter is included into the State Register of the Measuring Devices RF №68159-17, the validity period is to July 26, 2022

Converter Type	Design	Overall dimensions, mm	Weight, kg, not above
E854ЭЛ	with RS485	70x85,5x89	0,4
	without RS485	70x85,5x79	

Input signal		Output signal		Load resistance, not above, Ом
Alternative current, A	Alternative voltage, V	Output 1	Output 2	
-	0...125, 0...250, 75...125, 150...250, 0...100, 0...400, 0...500	0...5	0...5	0...2500
		4...20, 0...20	4...20, 0...20	0...500
0...0,5; 0...1; 0...2,5; 0...5	-	0...5	0...5	0...2500
		4...20, 0...20	4...20, 0...20	0...500

Data display	
Additional Features	Connection of the indication modules or indication panel on the RS485 interface
Telemetry	
Input signals	A: 0..0,5; 0..1; 0..2,5; 0..5. V: 0..125, 0..250, 75..125, 150..250, 0..100, 0..400, 0..500
Intrinsic error limit	±0,5%;
Galvanic isolation unit of input and output circuits, supply circuits	Yes
Short-time input signal (with multiplicit, maximum value) overload	Current: Multiplicity: 20, number of overloads: 2; time of the each overload, sec: 0,5; time interval between two overloads, sec: 0,5. Voltage: Multiplicity: 1,5, number of overloads: 9; time of the each overload, sec: 0,5; time interval between two overloads, sec: 15.
Input resistance	(1-0,005) MOm

Communication interfaces / Analog outputs	
RS485	Quantity: 0,1,2; Protocol: Modbus RTU Data transferring speed: 4800, 9600, 19200, 38400 baud
Analog outputs	Quantity:0,1,2 Ranges: 0...5 mA,4..20 mA,,0..20 mA
Input analog signal transition time, not above	0,5 sec.
Power supply	
Voltage	220 VU –85-264 V of AC with frequency of 50 Hz or for 100-370 V of DC; 230 V –85-264 V of AC with frequency of 50 Hz; -12 VN –(12+6/-3) V DC -24 VN –(24+12/-6) V DC
Power consumption from the supply circuit (not above)	1 W from the circuit of input signal (for parallel circuit) 0,01 W from the circuit of input signal (for series circuit) 6 VA – from the supply circuit
Operational Conditions	
Working temperature range	-40 - +50 °C
Protection class	IP50
Mounting	DIN-bar
Wire cross-section	4 mm² (solid wires)
Maximum overload for internal signal	2,5 mm² (multicore wires)
(duration)	120% (2 hours)
Calibration period	10 years
Warranty operating lifetime	2 years
Average lifetime, not less	20 years
Average mean time to failure	200 000 hours

ORDERING FORM

E854ЭЛ – a – b – c – d – e – f

- a – input signal metering (converting) range;**
b – voltage supply:
220BY – universal supply: supply voltage – 85-264 V AC, frequency 50 Hz or 100-370 V DC
230B- supply voltage 85-264 V AC, frequency 50 Hz
-12BH –(12+6/-3) V DC
-24BH –(24+12/-6) V DC

c – designation for analog output signal changing range
A=0..5mA, B=4..20 mA, C=0..20mA,
X – no such parameter (only for converters with RS485)
- d – designation for additional analog output signal changing range (there is no such parameter for converter without interfaces)**
A=0..5mA, B=4..20 mA, C=0..20mA,
X – no such parameter (only for converters with RS485)

e - Designation of interfaces
x - no interface
1RS – one main RS485 interface;
2RS – one main and one additional RS485 interfaces;

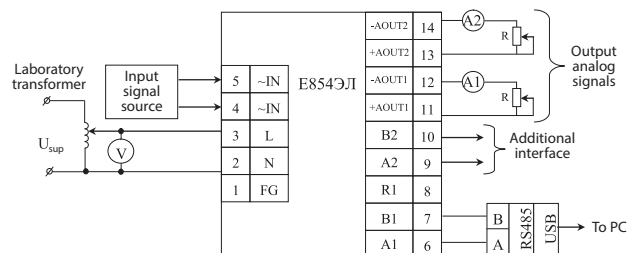
f - Special design
OM2 – for Marine vehicles
A – for NPP (safety class 4)
- Do not complete, if there is not such parameter

ORDERING EXAMPLE

- For power converter with the following parameters:converter type – E854ЭЛ, input signal metering (converting) range 0-2,5 A, supply voltage –(12+6/-3) , output signal changing range 4..20 mA, one RS485 interface.
E854ЭЛ-0..2,5 A-12 BH - B -x-1RS TY 25-7504.216 – 2011
- For power converter with the following parameters:converter type – E854ЭЛ, input signal metering (converting) range 75-125 V, supply voltage 85-264 V AC, frequency 50 Hz, output signal changing range 0.5 mA, additional output signal changing range 4..20 mA, two RS485 interfaces, opertation at marine vehicles.
E854ЭЛ-75..125 B-230 B-A-B-2RS-OM2 TY 25-7504.216 – 2011

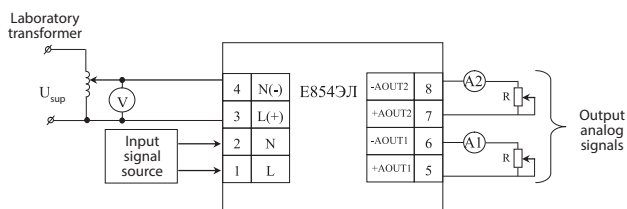
CONNECTION SCHEMES

E854ЭЛ (with RS485)



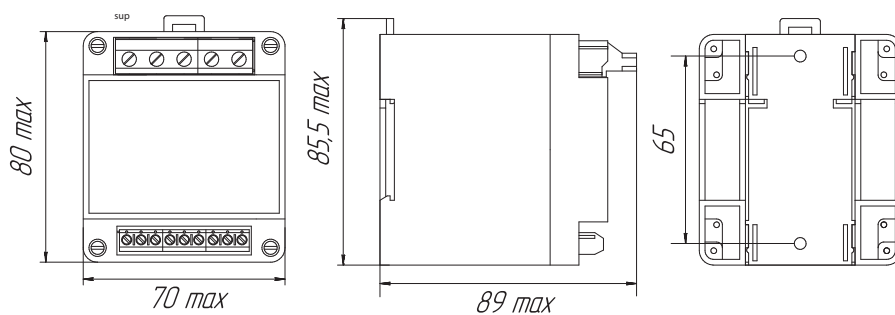
A1, A2 – standard milliamperimeters
V- standard voltmeter

E854ЭЛ (without RS485)

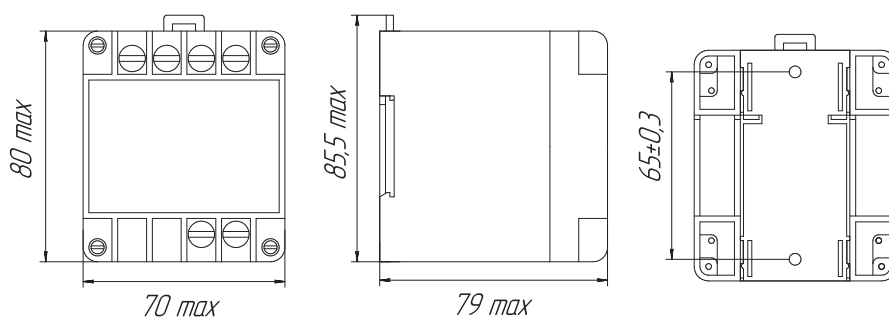


A1, A2 – standard milliamperimeters
V- standard voltmeter

E854ЭЛ (with RS485)



E854ЭЛ (without RS485)



INSTRUMENT CONVERTERS OF ALTERNATIVE
CURRENT AND VOLTAGE



E1854ЭЛ

E1854ЭЛ converters are intended for metering of electric current and voltage in one-phase AC circuits. The converters can be used for control of current and voltage of the electric systems, installation and automation of different electric energy and industrial facilities.

- Converters have the following options:
- Program selection of the analog input signal;
 - Program selection of the analog output signal;
 - Forming of the discrete output signal for achievement of the set limit value;
 - Displaying of the input signal (percentagewise from the rated value) at the indicator;
 - Data transferring by RS485 interface (Modbus RTU protocol);
 - It is possible to produce converters without interface and analog outputs.

Possibility of the program selection of output and input signals range allows to quickly solve issues with usage of converters with different ranges and types of input signals.

Converters parameters can be changed via Configurator software or control buttons at the front panels.

E1854ЭЛ converter is included into the State Register of the Measuring Devices RF №59809-15, the validity period is to February 6, 2020

Converter Type	Overall dimensions, mm	Weight, kg, not above
E1854ЭЛ	23x111x115	0,3

Data display	
LED indication (single or seven-segment display)	- 2-digit seven-segment LED indicators for input percentage scale display - two single LED indicators for displaying work of interface and supply voltage
Additional Features	Connection of the indication modules or indication panel on the RS485 interface
Telemetry	
Input signals	Programmable ranges: A: 0..0,5, 0...1; 0..2,5; 0..5 V: 0..125, 0..250, 0..500, 75..125, 150..200
Intrinsic error limit	±0,5%
Galvanic isolation unit of input and output circuits, supply circuits	Yes
Short-time input signal (with multiplicity, maximum value) overload	Current: Multiplicity: 20, number of overloads:2; time of the each overload, sec: 0,5; time interval between two overloads, sec: 0,5. Voltage: Multiplicity: 1,5, number of overloads:9; time of the each overload, sec: 0,5; time interval between two overloads, sec: 15.
Input resistance	For each series circuits (current) – not above 0,02 Ом For parallel circuits(voltage) for converters with power supply from AC circuit – not less 1 МОм
Communication interfaces/Analog outputs	
RS485	Quantity: 0,1; Protocol: Modbus RTU Data transferring speed: 4800, 9600, 19200, 38400 bit/sec
Analog outputs	Quantity: 0,1 Programmable Ranges: 0...5 mA, 4..20 mA, 0..20 mA
Input analog signal transition time, not above	0,5 sec.

Discrete output	
Discrete output	Quantity: 0,1 Direct voltage: 300 V, 100 mA; Alternative voltage: 200 V, 100 mA
Power supply	
Voltage	12 VN – (12+6/-3) V DC 24 VN – (24+12/-6) V DC 230 V – 85-253 V of AC with frequency of 50 Hz; 220 VU – 85-253 V of AC with frequency of 50 Hz or for 120-265 V of DC;
Power consumption from the supply circuit (not above)	- 0,5 W from the circuit of input signal (for parallel circuit) - 0,01 W from the circuit of input signal (for series circuit) - 6 VA – from the supply circuit
Device reprogramming (trim)	
Reprogramming	- via the Configurator software (RS485 interface), - via the control buttons on the front panel
Reprogramming parameters	- Range and type of input signal; - Range of changing of analog output signals; - Discrete input triggering parameters - RS485 interface parameters
Operational Conditions	
Working temperature range	-40 - +50 °C
Protection class	IP50
Mounting	DIN-bar
Wire cross-section	0,08 - 2,5 mm ²
Maximum overload for internal signal (duration)	150% (2 hours)
Calibration period	8 years
Warranty operating lifetime	2 years
Average lifetime, not less	20 years
Average mean time to failure	200 000 hours

ORDERING FORM

E18543П – a – b – c – d – f

a – input signal metering (converting) range

A: 0..0,5, 0...1; 0..2,5; 0..5

V: 0..125, 0..250, 0..500, 75..125, 150..200

b – voltage supply:

- 220BY – universal supply: supply voltage – 85-253 V AC, frequency 50 Hz or 120-265 V DC

-230B - supply voltage 85-253 V AC, frequency 50 Hz

-12BH – (12+6/-3) V DC

-24BH – (24+12/-6) V DC

c – designation for analog output signal changing range (reprogramming of output analog signal is made under the selected option)

X – no outputs.

A1;B1;C1

Where:

A1=0..5mA, B1=4..20 mA, C1=0..20mA,

Note: If there is no output signal (c=x) the converters have design with RS485 digital interface (f=RS)

d – discrete input

X – no discrete input

01 – one discrete input

f - Special design (digital interface)

x- no interface;

RS- there is an interface

Converter design	Code parameter of the full designation				
	Metering (converting) range of input signal	Supply voltage	Range of output analog signal changing	Discrete inputs	Special design
	a	b	c	d	f
E1854ЭЛ	+	12VN, 24VN, 220VU, 230V	x	x, 01	RS
			A1, B1, C1		x, RS

Notes:

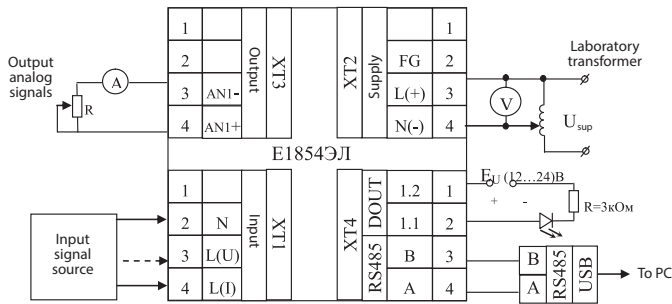
“+” sign shows presence of all possible options in the order formula.
“x” sign means, that this parameter is absent.
For converters which will be used at NPP (safety class 4), please specify A design in the end of the ordering formula (separated by a comma)

ORDERING EXAMPLE

For converter with the following parameters:converter type – E1854ЭЛ, input signal metering range 0-2,5 A, supply voltage – (12+6/-3) V DC, output signal changing range 4..20 mA, RS485 interface, operation NPP (safety class 4)
E1854ЭЛ-0..2,5 A-12 BH-B1-01-RS-A TY 25-7504.226 – 2014

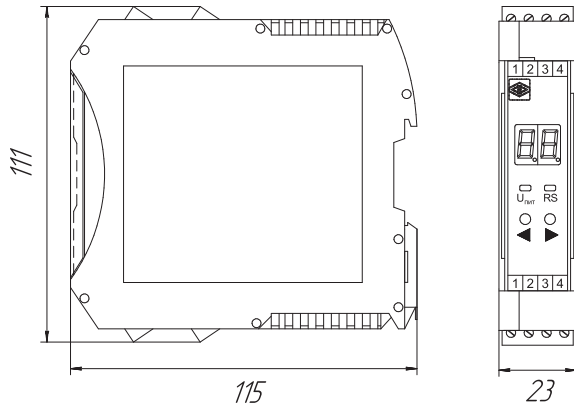
For power converter with the following parameters:converter type – E1854ЭЛ, input signal metering range 0-125 V, supply voltage – 85-253 V AC, frequency 50 Hz, output analog signal changing range 0..5 mA, no discrete output, no interface.
E1854ЭЛ-0..125 B-230 B-A1-x-x TY 25-7504.226 – 2014

CONNECTION SCHEMES



Notes:
Existence of interface (XT4 block) depends on the converters design
A– standard milliampermeter
V– standard voltmeter

OVERALL AND INSTALLATION DIMENSIONS



INSTRUMENT CONVERTERS OF ALTERNATIVE CURRENT



EP34C

ЭП34С converters are intended for linear conversion of alternative current in electric circuits with the rated value to 660 V into unified output signal of direct current. The converters can be used for electric current control systems and installations and for automation of energetic facilities and other industrial spheres.

Converters are one-phase devices. Converters are mounted at the DIN-bar 35 mm.

ЭП34С converter is included into the State Register of the Measuring Devices RF №32200-06, the validity period is to April 14, 2022.

Converter Type	Overall dimensions, mm	Weight, kg, not above
EP34C	70x85,5x79	0,4

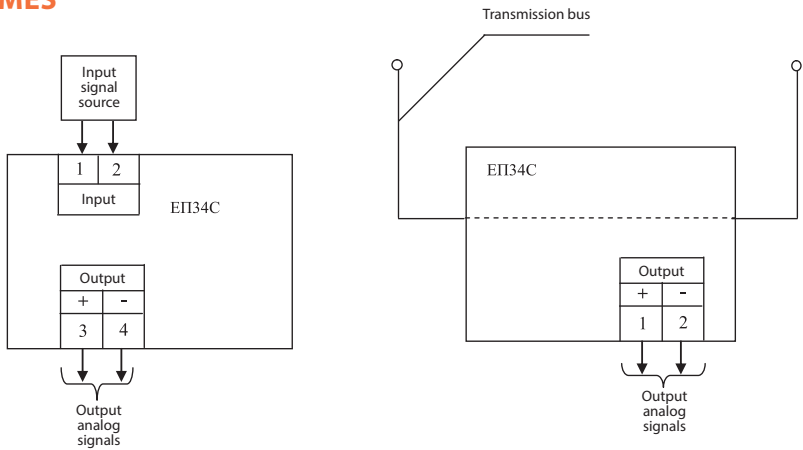
Input signal range Alternative current, A	Output current range, mA	Load resistance, Ohm	Power supply
0...0,5; 0...1; 0...2,5; 0...5	0...5 0...20	0...2500 0...500	From metering circuit
0...25; 0...50; 0...100	0...20	0...500	

Telemetry	
Input signals	A: 0..0,5, 0...1; 0..2,5; 0..5, 0..25; 0...50; 0..100
Intrinsic error limit	±0,5%
Galvanic isolation unit of input and output circuits, supply circuits	Yes
Short-time input signal (with multiplicit, maximum value) overload	Current: Multiplicity: 20, number of overloads:2; time of the each overload, sec: 0,5; time interval between two overloads, sec: 0,5. Voltage: Multiplicity: 1,5, number of overloads:9; time of the each overload, sec: 0,5; time interval between two overloads, sec: 15.
Analog output	
Analog output	Quantity: 1 Ranges: 0...5 mA, 0..20 mA
Input analog signal transition time, not above	0,5 sec.
Power supply	
Voltage	From metering circuit
Power consumption from the supply circuit (not above)	From power supply circuit, not above: 4,0 VA From input signal circuit, not above: 1,2 VA
Operational Conditions	
Working temperature range	-30 - +50 °C
Protection class	IP00
Mounting	DIN-bar
Wire cross-section	to 2,5 mm ²
Maximum overload for internal signal (duration)	120% (2 hours)
Calibration period	24 months (8 hours per day)
Warranty operating lifetime	4 years
Average lifetime, not less	10 years
Average mean time to failure	20 000 hours

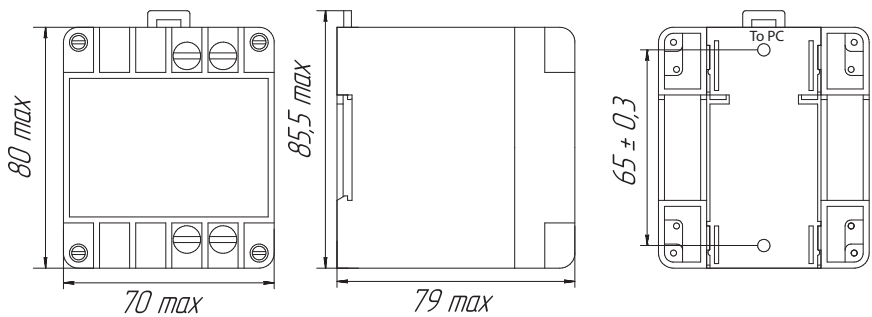
ORDERING EXAMPLE

For converter ЭП34С, input signal range 0-0,5 А, output current range 0..5 mА
ЭП34С-0..0,5 А – 0..5 mА ТУ 25-7504-189-2005

CONNECTION SCHEMES



OVERALL AND INSTALLATION DIMENSIONS



INSTRUMENT CONVERTERS OF DIRECT CURRENT FREQUENCY



E1858ЭЛ

E1858ЭЛ converters are intended for metering of alternative current frequency on the base of analog-digit conversion of inputs signals. .

Converters have the following options:

- Program selection of the analog input signal, scale range;
- Program selection of the analog output signal;
- Forming of the discrete output signal for achievement of the set limit value;
- Displaying of the input signal (percentagewise from the rated value) at the indicator;
- Data transferring by RS485 interface (Modbus RTU protocol);
- It is possible to produce converters without interface and analog outputs.

Possibility of the program selection of output and input signals range allows to quickly solve issues with usage of converters with different ranges and types of input signals.

Converters parameters can be changed via Configurator software or control buttons at the front panels.

E1854ЭЛ converter is included into the State Register of the Measuring Devices RF №59809-15, the validity period is to February 6, 2020

Converter Type	Overall dimensions, mm	Weight, kg, not above
E1858ЭЛ	23x111x115	0,3

Data display	
LED indication (single or seven-segment dispalys)	- 2-digit seven-segment LED indicators for input percentage scale display - two single LED indicators for displaying work of interface and supply voltage
Additional Features	Connection of the indication modules or indication panel on the RS485 interface
Telemetry	
Input signals	Programmable ranges: Hz: 45..65, 300..500
Rated input voltage	50 – 500 V
Intrinsic error limit	±0,5%;
Galvanic isolation unit of input and output circuits, supply circuits	Yes
Short-time input signal (with multiplicit, maximum valuey) overload	Current: Multiplicity: 20, number of overloads: 2; time of the each overload, sec: 0,5; time interval between two overloads, sec: 0,5. Voltage: Multiplicity: 1,5, number of overloads:9; time of the each overload, sec: 0,5; time interval between two overloads, sec: 15.
Input resistance	- For each series circuit (current) – not above 0,02 Om - For parallel circuits(voltage) for converters with power supply from AC circuit – not less 1 MOM
Communication interfaces/Analog outputs	
RS485	Quantity: 0,1; Protocol: Modbus RTU Data transferring speed: 4800, 9600, 19200, 38400 bit/sec
Analog outputs	Quantity: 0,1 Programmable Ranges: 0...5 mA, 4..20 mA, .0..20 mA, .0...2,5...5 mA, .4...12..20 mA, .0..10..20 mA,
Input analog signal transition time, not above	0,5 sec.

Discrete output	
Discrete output	Quantity:0,1 Direct voltage: 300 V, 100 mA; Alternative voltage: 200 V, 100 mA
Power supply	
Voltage	12 V –(12+6/-3) V DC 24 V –(24+12/-6) V DC 230 V –85-253 V of AC with frequency of 50 Hz; 220 V –85-253 V of AC with frequency of 50 Hz or for 120-265 V of DC;
Power consumption from the supply circuit (not above)	- 0,5 W from the circuit of input signal (for parallel circuit) - 0,01 W from the circuit of input signal (for series circuit) - 6 VA – from the supply circuit
Device reprogramming (trim)	
Reprogramming	- via the Configurator software (RS485 interface), - via the control buttons on the front panel
Reprogramming parameters	- Range of input signal; - Range of changing of analog output signals; - Discrete output triggering parameters - RS485 interface parameters
Operational Conditions	
Working temperature range	-40 - +50 °C
Protection class	IP50
Mounting	DIN-bar
Wire cross-section	0,08 - 2,5 mm²
Maximum overload for internal signal (duration)	150% (2 hours)
Calibration period	8 years
Warranty operating lifetime	2 years
Average lifetime, not less	20 years
Average mean time to failure	200 000 hours

ORDERING FORM

E1858ЭЛ – a – b – c – d – f

a – input signal metering range: 45..65 Hz, 300..500 Hz;

b – voltage supply:
- 220B – universal supply: supply voltage – 85-253 V AC, frequency 50 Hz or 120-265 V DC
230B supply voltage 85-253 V AC, frequency 50 Hz
-12B –(12+6/-3) V DC
-24B –(24+12/-6) V DC

c – designation for analog output signal changing range (reprogramming of output analog signal is made under the selected option)
X – no such options
Option 1: A1;B1;C1; AP1;BP1; CP1;
Option 2: A2;B2;C2; AP2;BP2; CP2;EP2;
Where:
A1(A2)=0..5mA, B1(B2)=4..20 mA, C1(C2)=0..20mA,
AP1(AP2)=0..2,5..5 mA, BP1(BP2)=4..12..20 mA, CP1(CP2)=0..10..20mA,
EP1(EP2)=–5...0..5 mA
Note: If there is no output signal (c=x) the converters have design with RS485 digital interface (f=RS)

d – discrete input
X – no discrete input
01 – one discrete input

f - Special design (digital interface)
x-no interface;
RS- there is an interface

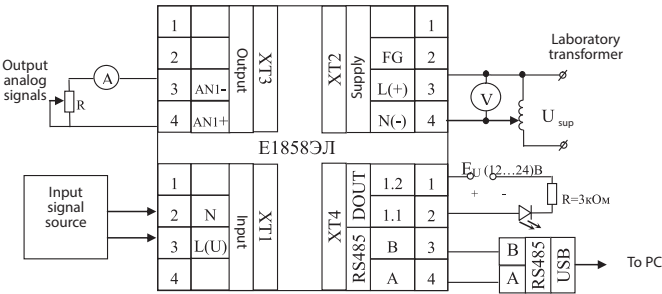
Converter design	Code parameter of the full designation				
	Metering (converting) range of input signal	Supply voltage	Range of output analog signal changing	Discrete inputs	Special design
	a	b	c	d	f
E1858ЭЛ	+	12VN, 24VN, 220VU, 230V	x	x, 01	RS
			A1, B1, C1, AP1, BP1, CP1		x, RS
			A2, B2, C2, AP2, BP2, CP2, EP2		

Notes:
“+” sign shows presence of all possible options in the order formula.
“x” sign means, that this parameter is absent.
For converters which will be used at NPP (safety class 4), please specify A design in the end of the ordering formula (separated by a comma)

ORDERING EXAMPLE

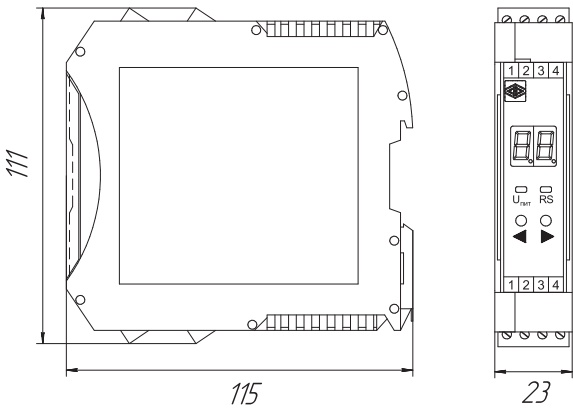
For power converter with the following parameters: converter type – E1854ЭЛ, input signal metering range 45-65 Hz, supply voltage – 85-253 V AC, frequency 50 Hz, output analog signal changing range 0..5 mA(option 1), discrete output, no interface.
E1858ЭЛ-45..65 Гц-230 В-А1-01-х-ТУ 25-7504.226 – 2014

CONNECTION SCHEMES



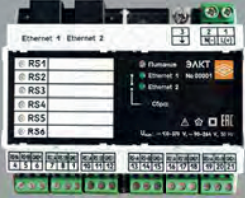
Notes:
1. Existence of interface (XT4 block) depends on the converters design
2. The possible output signals connections depending on the converters design are shown by the dotted line.
A – standard milliamperimeter
V – standard voltmeter

OVERALL AND INSTALLATION DIMENSIONS



TELEMETRY CONTROL DEVICES

TELEMETRY CONTROLLER



ЭЛКТ

ЭЛКТ controller can be used as a main telemetry control device of controlled point and provide data exchange with telemetry control point via Ethernet interface.

Its functions include polling of discrete input/output modules, metering devices and converter for 6 independent RS485 interfaces, local data archiving, interfaces/protocols conversion and data transmission to the upper level of telemetry control systems.

ЭЛКТ telemetry controller provides ability to program of local logics (PLC) on JavaScript (ECMAScript 5/5.1).

Facilities:

- 2000 channels at the controlled point:
 - 500 channels of remote signaling (“discrete inputs”) “two-way switch” type;
 - 500 channels of remote control (“discrete outputs”) “two-way switch” type;
 - 500 channels of telemetry of the current analog value (“analog inputs”);
 - 500 channels of remote adjusting of the current analog value (“analog outputs”);
- Connection of 200 external devices for:
 - Remote signaling with time mark (discrete input/output module ELMV OAO Electropribor or other modules, compatible with IEC 60870-5-101, Modbus RTU protocols);
 - Telemetry with time mark (devices and converters of Щ, ЩП, ЩМ, ЩМК, E series and other devices of OAO Electropribor or other digital devices, electric energy fiscal meters of other manufactures);
 - Remote control with time mark (discrete input/output module ELMV OAO Electropribor or other modules, compatible with IEC 60870-5-101, Modbus RTU protocols);
- Direct traffic pass-through between RS485 and Ethernet interfaces (interface conversion function).
- Data conversion and data transmission with mark time from the external devices to the upper level using IEC 61850-8-1 (MMS) protocol of Ethernet interface.
- Local data back-up depending on the input parameters.

Converter Type	Overall dimensions, mm	Weight, kg, not above
ЭЛКТ	107,6×60,7×91,6	0,3

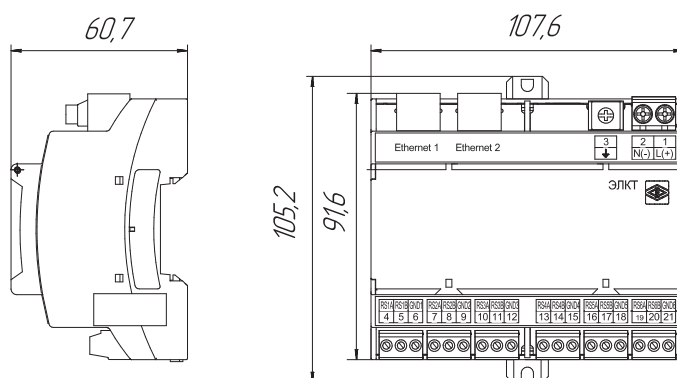
Data display	
LED indication (single indicators)	- Power supply; - Current status of data exchange via Ethernet interface and RS485 data interfaces (RS1-RS6)
Event log	
Event log (in the internal memory of - controller)	- Change of the internal configurated discrete outputs and controller outputs staus; - Controllers selfdiagnostics result, particulary including events of wrong cotrollers settings made by the user. - Fact of controllers configuration parameters change; - Events of turning on/off of power supply and controllers reset. - Web-interface connections with controller, particulary including wrong authorization event; - All data changes are saved on SD-card.
Communication interfaces	
Communication interface for polling of terminal devices	RS485 Quantity: 6 Protocols: IEC 60870-5-101, Modbus RTU (Support of other data exchange (including data from power energy meters) protocols is possible upon the request)
Communication interface for integratiion into telemetry or automated control systems	Ethernet 100 BASE-TX Quantity: 2 Protocols: IEC 60870-5-104, IEC 60850-8-1 (MMS), Modbus TCP
Additional features	Direct tunneling of RS485 channels through IP-interfaces

Time synchronisation	
Real-time clocks	Error of run – not above ± 1 sec.per day (if there is no external power supply the controller an provide operation of the real-time clocks for at least 30 days)
Synchronisation of telemetry controllers time	Protocol: NTP (RFC 5905)
Synchronisation of terminal devices time	Protocol: IEC 60870-5-101
Power supply	
Power supply voltage	220 VU – 90-264 V AC, frequency 50 Hz or 130-370 V DC
Power consumption from the power line, not above	-5VA (total power) – power supply from one-phase AC source, 50 Hz; - 5 W – power supply from DC source
Reprogramming of the device (trim)	
Reprogramming	-via Web-interface; -via Configurator software
Parameters of reprogramming	<ul style="list-style-type: none"> - Functional parameters of several RS485 traffic interfaces; - Controller connection parameters via RS485 interfaces of the external devices (discrete input/output modules, telemetry gauges, etc); - Parameters of analog and discrete outputs/inputs (several channels or remote signaling, remote control, telemetry and remote adjusting); - Parameters of IP-profile of Ethernet interfaces - Parameters of communication protocols (Modbus RTU, IEC 60870-5-104 and IEC 60850-8-1 (MMS)) support in device - Date and time (internal controllers real-time clocks data) and time synchronisation parameters; - Setting authorization parameters for access to the controller via digital Ethernet interfaces
Operational Conditions	
Working temperature range	-40 - +70 °C
Protection class	IP20
Mounting	DIN-bar
Wire cross-section	1,5 mm ²
Warranty operating lifetime	24 months
Average lifetime, not less	20 years
Average mean time to failure	200 000 hours

ORDERING EXAMPLE

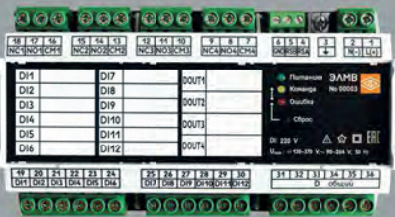
ЭЛКТ ТУ 26.51.43-239-05763903-2017

OVERALL AND INSTALLATION DIMENSIONS



The connection diagrams are listed in the Operation Manual of the Controller at www.elpribor.ru

DISCRETE INPUT-OUTPUT MODULE



ЭЛМВ

The distributed complex of telemetry devices is intended for using as a part of automated process control systems and telemetry at power energy facilities and other automated industrial venues.

- Discrete input-output module ЭЛМВ can provide the following functions as a part of telemetry complex:

- Collection and conversion of discrete signals into digital format and their transmission with time mark by the RS485 interface into different hardware and software complexes for industrial facilities control;

- Conversion of signals and control commands of industrial equipment, which were got from different hardware and software complexes through RS485 interface with time mark into output discrete signals for transmitting them to the equipment on facilities.

- Function of group remote signaling gauge (to 12 physical and 32 logical channels of remote signaling of "position of two-way switch" for one module) and function of remote control module for forming of discrete output signals for control of two-way objects (to 4 physical channels of discrete output of "two-way switch control" type).

ЭЛМВ discrete input-output module provides ability to program of local logics (PLC) on JavaScript (ECMAScript 5/5.1).

Converter Type	Overall dimensions, mm	Weight, kg, not above
ЭЛМВ	107,6×60,7×91	0,3
	161,6×60,7×91	0,65

Data display	
LED indication (single indicators)	- Power supply; - Status of data exchange via RS485 data interface - Excistance of possible internal software-hardware errors of the device
Communication iterafaces	
RS485	Quantity:1, protocols:IEC 60870-5-101, Modbus RTU Data rate:1200, 2400, 4800, 9600, 19200, 38400, 57600 and 115200 bit/sec
Time synchronisation	
Real-time clocks	Error of run – not above ± 1 sec.per day (if there is no external power supply the controller an provide operation of the real-time clocks for at least 30 days) IEC 60870-5-101, Modbus RTU (RS485)
Time sinchronisation	Quantity:12 or 6 (depending on the order)
Remote signaling	
Discrete inputs	2 designs: 1) 220 V DC (30 mA for a short moment in the case of short-circuit, then 1,15 mA) Guaranteed response threshold, V - $163 \pm 5\%$; Guaranteed shut-off threshold, V - $144 \pm 5\%$; Input type – "Clean contact" (requires for external wet-out) 2) 24 V DC (10 mA) Guaranteed response threshold, V - $15 \pm 5\%$; Guaranteed shut-off threshold, V - $13 \pm 5\%$; Input type – "Clean contact""wet contact" Debouncing time-out: Adjusting, 0-20 ms, step -1 ms Interference offset: Adjusting, 0-7 ms, step -1 ms Clip – "for screw", max. wire cross-section – 4 mm ²
Relay output	
Relay discrete outputs	Quantity: 4 or 2 (depending on the order) Modes: "Normal closed", "Normal opened" 220 V AC; 10A (15 A max, 4 sec) 250 V DC; 0,35 A Clip – "for screw", max. wire cross-section – 4 mm ²

Power supply	
Power supply voltage	220 VU – 90-264 V AC, frequency 50 Hz or 130-370 V DC
Power consumption from the power line, not above	- 5VA (total power) – power supply from one-phase AC source, 50 Hz; - 5 W – power supply from DC source
Reprogramming of the device (trim)	
Reprogramming	-via Configurator software
Parameters of reprogramming	Functional parameters of RS485 interface; Parameters of communication protocols (Modbus RTU, IEC 60870-5-104 and IEC 60850-8-1 (MMS)) support in device Date and time (internal controllers real-time clocks data) and time synchronisation parameters; Functional parameters of analog and discrete outputs/inputs; Setting authorization parameters for access (passwords) to prevent unauthorised parameters modification
Operational Conditions	
Working temperature range	-40 - +70 °C
Protection class	IP20
Mounting	DIN-bar
Wire cross-section	Screwed terminals of the external interfaces – to 4 mm ² Terminals of RS485 interface - to 1,5 mm ²
Warranty operating lifetime	24 months
Average lifetime, not less	20 years
Average mean time to failure	200 000 hours

ORDERING FORM

ЭЛМВ – а – b

a – number of discrete inputs/outputs:

6/2 - 6 discrete inputs, 2 discrete outputs;

12/4 - 12 discrete inputs, 4 discrete outputs;

b – voltage supply of discrete inputs:

24 V – 24 V voltage ("Clean contact", "wet contact");

220 V – 220 V voltage "Clean contact" (requires for external wet-out)

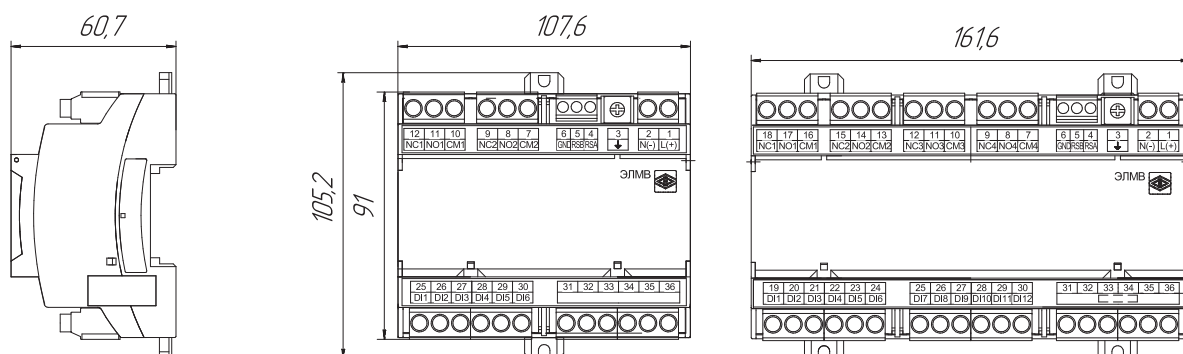
ORDERING EXAMPLE

For module cell controller with the following characteristics:

6 discrete inputs, 2 discrete outputs, 24 V voltage ("Clean" contact)

ЭЛМВ-6/2-24 В TY 26.51.43-238-05763903-2017

OVERALL AND INSTALLATION DIMENSIONS



The connection diagrams are listed in the Operation Manual of the Module at www.elpribor.ru



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