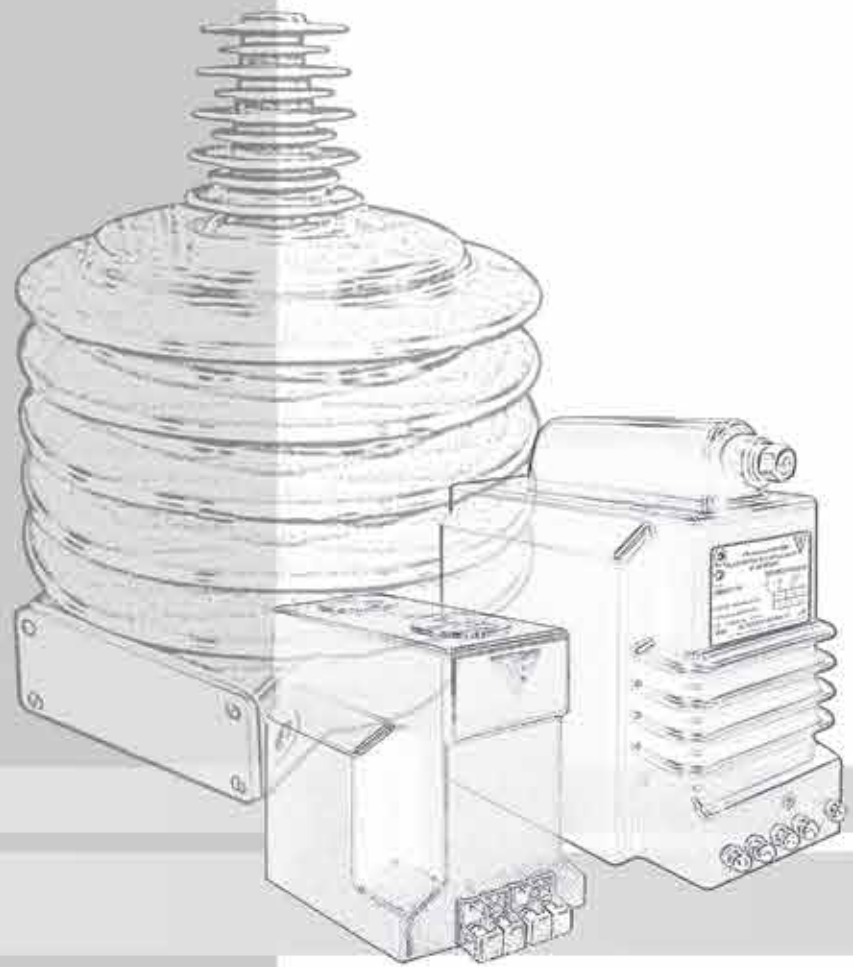
ELECTROSHIELD-C°

Current instrument transformers
Voltage instrument transformers
Insulators and other cast electrical products



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All products are certified by the Rossiiskie Seti (PAO)

Electroshield-C° (LLC)
Quality Management System implemented and supported with certificates of conformity with requirements, regulations and standards DIN EN ISO 9001:2008 quality management systems relating to design, development, manufacture and supply of instrument transformers, audits by specialists of EUROCERT, Germany on an annual basis.

ELECTROSHIELD-C° (LLC) holds a number of licenses and certificates:
Licenses issued by the Federal Service for Ecological, Technological and Nuclear Supervision entitling to develop and manufacture electrical equipment for nuclear power plants.

Trade mark certificate No. 255242.

All the transformers are on the Russian Federation State Register of Measuring Instruments, Electroshield-C° (LLC) has certificates approving measuring instrument types, conformity declarations of Gosstandard of Russia Certification System, and transformers are as well listed in the Registers in the State Systems of Uniformity of Measuring of the Belarus Republic, Kazakhstan Republic, Ukraine.


Certificate

EUROCERT

Elektroshit-K° LLC
p. Babinino Kaluschskoi oblasti
Russland

quality management system

DIN EN ISO 9001:2008


СВИДЕТЕЛЬСТВО

№ 255242


ЛИЦЕНЗИЯ


ЛИЦЕНЗИЯ

Due to the unique technological cycle and customtailored approach to each and every order, we create one-and-only products in Russia

Production is based on specified operating characteristics

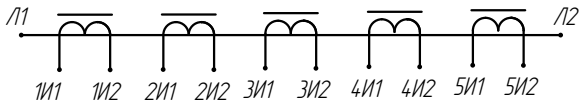
- Developing transformers with specified geometry
- Current transformers with 5 secondary windings
- Transformers with standardized measurement error from 0.1% to 200% of rated current with 0,2S accuracy class
- Any combination of accuracy class (up to 0,2S) and burden (from 1 V·A and higher). Electronic meters have considerably less inductance and current winding resistance if compared to analog meters, to ensure measurement accuracy, transformers with a realistic measurement circuit burden should be used:

  TLO-10 M1AC-0,2SFS10/0,5/10P-2,5/10/15-200/5 N3 b 20 kA.
- Thermal resistance 1.5-2 times higher than that demonstrated by products of other manufacturers, and high thermal resistance of 40 kA for two-winding transformers starts with a 100 A rated value.

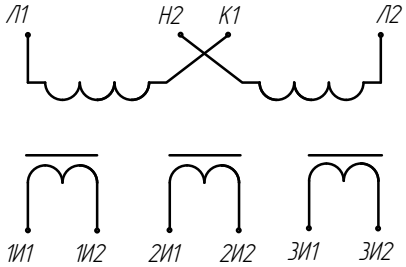
  TLO-10 M1AC-0,5SFS5/0,5FS5/10P10-5/10/20-100/5 N2 b 40 kA.
- TLO-10, TLO-24 and TLO-35 current transformers are suitable to switch over the primary current precisely by a half (for example 150 A and 300 A), which enables you in case of an increased system capacity to use the same transformer, having mechanically reconnected primary winding terminals:

  TLO-10 M3ACF-0,5SFS5/0,5FS5/10P10-10/10/20-800(1500)/5 N2 b 40 kA.

An example for current transformer connection diagram



An example of connection diagram for current transformers with switching over on the primary winding



- Current transformers with different transformation ratios on the measuring and protective windings, which is important when replacing available current transformers connected into power transformer differential protection circuits, when actual peak primary current does not comply with the requirements of PUE (Electrical Installation Code) 1.5.17 and amounts to less than 40% of rated current:

  TLO-10 M1AC-0,2SFS5/0,5FS5/10P10-10/10/15-300-300-600/5 N2 b 60 kA.
- Current transformers with protective winding with accuracy class of 5P; 10P, ensuring accuracy class of 0.5 with regard to current error and phase displacement.
- Capability to manufacture transformers with different windings on the secondary circuit, which is important for facilities with planned change in the capacity.
- Transformers with different values of limit factors. Correct value of the limit factor prevents from false triggering the protection: 10P17; 10P24.
- Transformers with different instrument security factors, the right choice of which will prevent from wasted costs on additional protective systems for measuring instruments:

  TLO-10 M1AC-0,2SFS5/10P27-5/5-800/5 N3 b 60 kA

  TLO-10 M1AC-0,5FS10/10P10/10P14-10/5/5-800/5 N3 b 60 kA.
- Metrology with respect to the lower limit of the permissible secondary burden, which ensures operation of the current transformer within the specified accuracy class, for example, with a capacity of 30 V·A in class 0.2S secondary

measuring winding enables, provided that the transformer is installed in a switchgear compartment, to install the meter in heated places at a distance of 40-300 meters and to group meters on panels and in metering cabinets in electrical control rooms.

TLO-10 M3AC-0,2SFS5/0,5SFS5/10P20/10P20/10P20-20/20/20/30/30-3000/5 N3 b 40 kA

TLO-10 M7ACE-0,2SFS7/0,5FS5/10P20/10P20-5/20/30/30-1500(2000)-2000-2000-2000/5 N2 b 40 kA

TLO-10 M7AC-0,5SFS10/10P10/10P10/10P10-10/30/30/30-2500/1 N2 b 40 kA

TLO-10 M1B-0,5FS16/10P10-10/10-1500/5 N3 b 100 kA

TJIП-10-1 M1DX-0,2SFS19/0,5FS19/5P15/10P15-10/10/10/10-3000/5 N3 b 100 kA

TJIП-10-1 M2DX-0,5SFS19/0,5FS19/10P15/10P15-20/20/30/30-3000/5 N3 b 100 kA.

- The lower limit of secondary burden for transformers with a rated secondary burden of up to 20 V·A and accuracy classes of 0.2S; 0.2; 0.5S – 0 V·A.

All listed examples of transformer versions are based on implemented projects.

Ensuring reliability in systems with heightened safety requirements

- Parametrical test laboratory of Electroshield-C° is equipped for testing current error and phase displacement in current transformers up to 32 kA by a direct method, it as well performs tests of equipment with parameter range exceeding GOST-specified parameters.
- Quality of manufacturing processes is controlled according to flow charts with the use of an identification bar code. A reading device fixes all stages of the product flow through the check points, ensuring product quality monitoring at all manufacturing stages.
- Magnetic cores with identical excitation parameters are included in orders.
- Transformers are tested with measurement of partial discharge factor.
- Partial discharge factor amounts to not more than 5 pC, which is 4 times less than permissible for class “a” insulation
- High quality polymeric insulation with a comparative tracking index CTI 450.
- Highly homogeneous compound ensures insulation durability, fire and environmental safety
- Transformer design specifics make an increase in the creeping distance possible, which enables a transformer to operate under high air humidity conditions (up to 98%).
- TLO-10 and TLP-10 transformers are tested with voltage of 42 kV equally with porcelain products.
- Transformer mechanical durability complies with M5 mechanical modification group, frequency range 5-200 Hz, maximum acceleration 30 m/s2, resistance to earthquake attacks at SSE 9.0 in line.
- Secondary terminals may be protected with a transparent cover, which ensures service personnel safety and enables to seal the terminals to prevent unauthorized access, which is important for fiscal metering.

THE RIGHT CHOICE OF TRANSFORMER PARAMETERS WILL SAFEGUARD YOU AGAINST SIGNIFICANT FINANCIAL LOSSES IN ELECTRIC POWER METERING

WHEN ORDERING A TRANSFORMER, PARAMETERS SHOULD BE AGREED WITH THE MANUFACTURER

CAST SUPPORT-TYPE CURRENT TRANSFORMERS OF TLO-10 VERSION

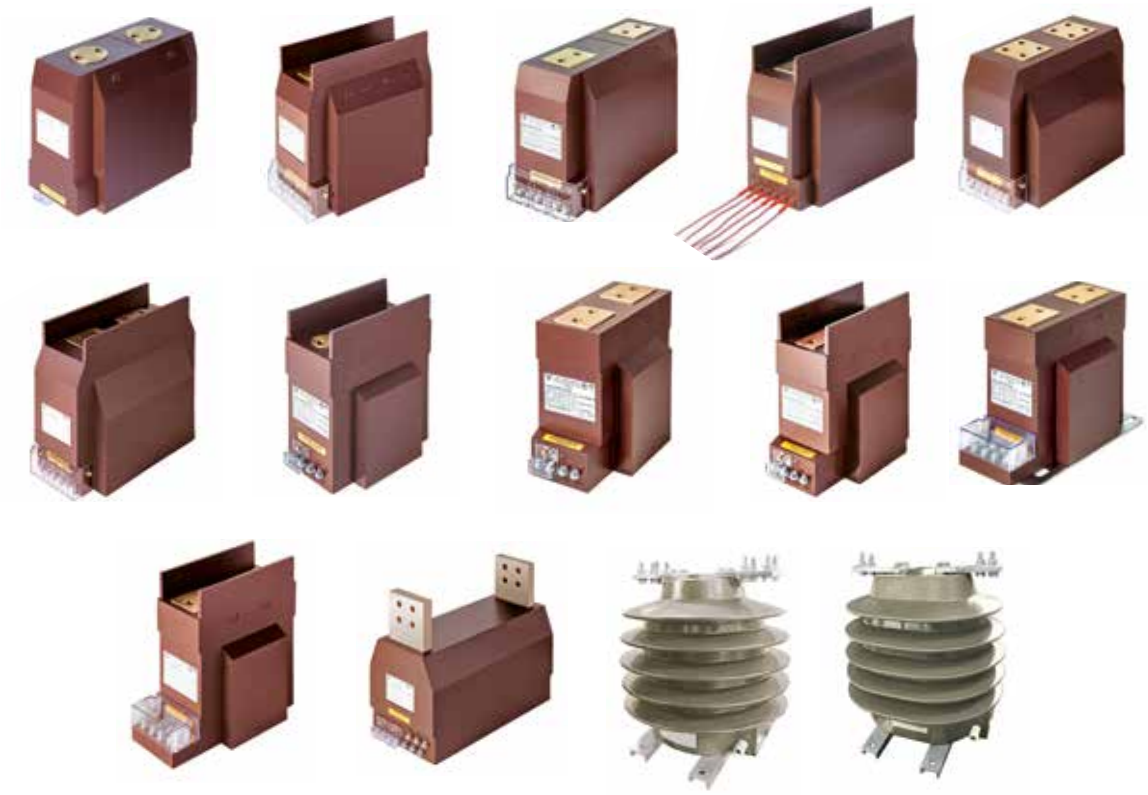
Description

TLO-10 current transformer for 6-10 kV is designed for installation in indoor and outdoor switchgears and in single-end service assembled chambers.

The current transformer ensures transmitting of the measuring information signal to the measuring instruments and protection and control devices to insulate secondary wiring from high voltage in alternating current electrical units for up to 10 kV voltage class. Climatic modifications N (temperate climate), T (tropical climate) or NF (temperate and cold climate), placement categories 1, 2 or 3.

Production on the basis of the specification: TU 3414-003-52889537-01.

Guaranteed service life – 5 years.



Technical parameters and characteristics

Parameters	Possible values for parameters	Standard parameters
Rated voltage, kV	10	
Maximum operating voltage, kV	12	
Rated primary current, A	5-4000	-
Rated secondary current, A	1, 5	-
Rated frequency, Hz	50, 60	
Number of secondary windings	from 5	up to 3
Rated secondary burdens with cosφ=0,8: measuring windings, V·A protective winding, V·A	 1-50 1-50	 10 15
Rated accuracy class: measuring windings protective windings	0,2; 0,2S; 0,5; 0,5S; 1; 3 5P or 10P	
Accuracy limit factor K_{rated} of secondary protective winding	from 2 up to 30	10
Rated instrument security factor FS_{rated} of secondary measuring winding	from 3 up to 30	-
Short-time (one second) thermal current kA, at rated primary current		
5-20 A	2,5; 5	
30 - 50 A	5; 10; 20	
75 -100 A	10; 20; 31,5; 40	
150 A	15; 20; 31,5; 40	
200 A	20; 31,5; 40-60	
300 A	31,5; 40-100	
400-4000 A	40-100	
Dynamic current kA, at rated primary current		
5-20A	6,25; 12,8	
30 - 50 A	12,8; 26; 52	
75 - 100 A	26; 52; 81; 100	
150 A	39; 52; 81; 100	
200 A	52; 81; 100-150	
300 A	81; 100-250	
400-4000 A	100-250	
Weight, kg, not more	from 15 up to 150	

1.1.1. CAST SUPPORT-TYPE CURRENT TRANSFORMERS OF TLO-10 VERSION

TLO-10 M1 and M2 current transformers can be made in modifications as follows:

Modification	Description
A	secondary terminals from the transformer end surface
B	secondary terminals on the transformer bottom
C	seal cover availability
D	with flexible secondary terminals
E	with switching over on the secondary winding
F	with switching over on the primary winding

An example of identification of TLO-10 current transformer in M1 dimension:

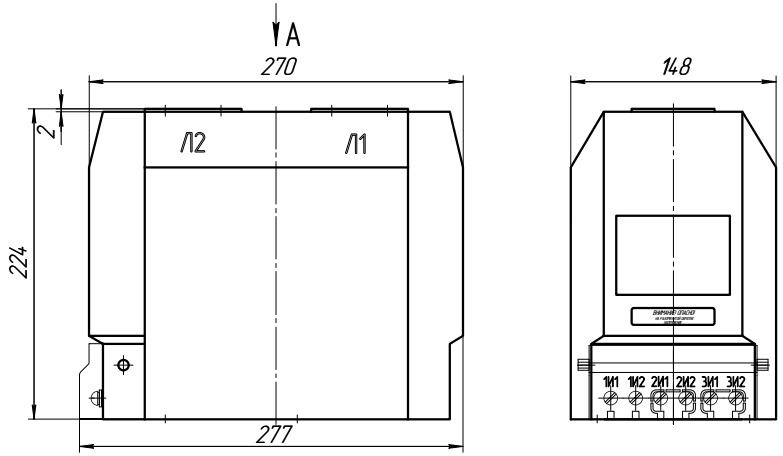
TLO-10 M1AC-0,5FS10/10P10-10/15-100/5 N3 a 10 kA

M1	transformer dimension
A	secondary terminals on the transformer body are located at the end surface
C	availability of a cover to protect and seal the measuring winding
0,5	accuracy class of the measuring secondary winding
FS10	instrument security factor of the measuring secondary winding
10P	accuracy class of the protective secondary winding
10	rated accuracy limit factor of the protective winding
10	rated secondary burden of the measuring secondary winding
15	rated secondary burden of the protective secondary winding
100	rated primary current
5	rated secondary current
N	climatic modification
3	placement category
a	insulation level
10 kA	short-time (one-second) thermal current

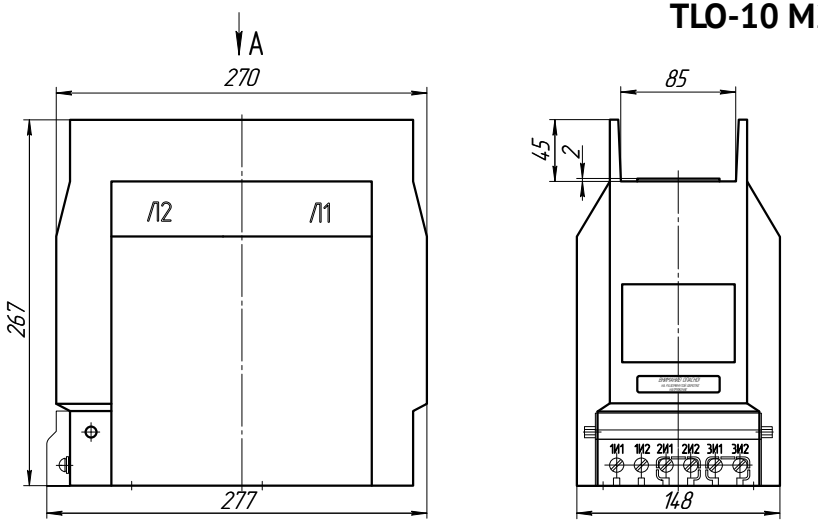
Technical parameters and characteristics

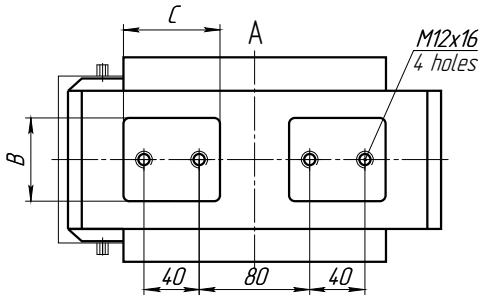
Parameters	Values for parameters
Rated voltage, kV	10
Maximum operating voltage, kV	12
Rated primary current, A	5; 7,5; 10; 11; 12; 13; 14; 16; 15; 18; 20; 22; 25; 27,5; 30; 32,5; 35; 37,5; 40; 50; 55; 60; 65; 70; 75; 80; 90; 100; 150; 200; 250; 300; 350; 400; 500; 550; 600; 650; 700; 750; 800; 900; 1000; 1050; 1100; 1150; 1200; 1250; 1300; 1400; 1500; 1550; 1600
Rated secondary current, A	1; 5
Rated frequency, Hz	50; 60
Number of secondary windings	up to 4
Rated secondary burdens with cosφ=0,8: measuring windings, V·A protective winding, V·A	 from 1 up to 30 from 1 up to 30
Rated accuracy class, according to GOST 7746: measuring windings protective windings	 0,2S; 0,2; 0,5S; 0,5; 1; 3 5P or 10P
Accuracy limit factor K_{rated} of secondary protective winding:	from 2 up to 30
Rated instrument security factor FS_{rated} of secondary measuring winding:	from 3 up to 30
Short-time (one second) thermal current kA, at rated primary current	
5-20 A	2,5; 5
30-50 A	5; 10; 20
75-100 A	10; 20; 31,5; 40
150 A	15; 20; 31,5; 40
200 A	20; 31,5; 40-60
300 A	31,5; 40-100
400-1600 A	40-100
Dynamic current kA, at rated primary current:	
5-20 A	6,25; 12,8
30-50 A	12,8; 26; 52
75-100 A	26; 52; 81; 100
150 A	39; 52; 81; 100
200 A	52; 81; 100-150
300 A	81; 100-250
400-1600 A	100-250
Weight, kg, not more	21
Overall dimensions (LxWxH), mm	270x148x224/270x148x267

Overall dimensions, fitting and connecting dimensions TLO-10 M1



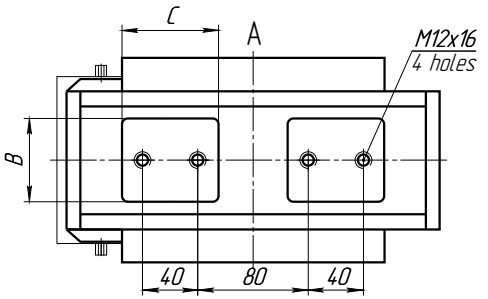
Overall dimensions, fitting and connecting dimensions TLO-10 M2

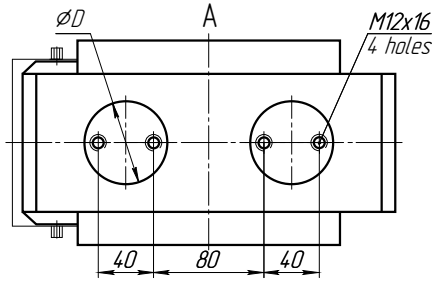




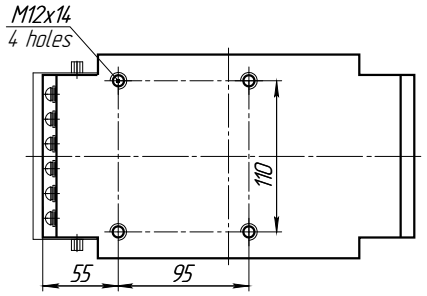
Primary terminals design variant for TLO-10 M1 and M2

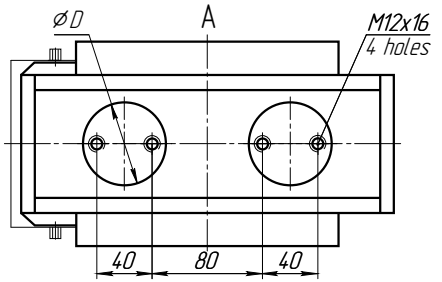
Rated primary current, A	Dimensions of terminals for primary winding, mm		
	ØD	B x C	
5...600	60	60x60	60x70
5...1600	–	–	60x70





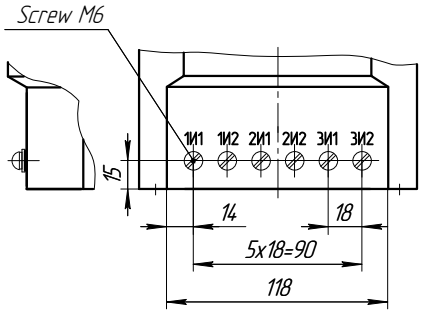
Fitting dimensions for TLO-10 M1 and M2



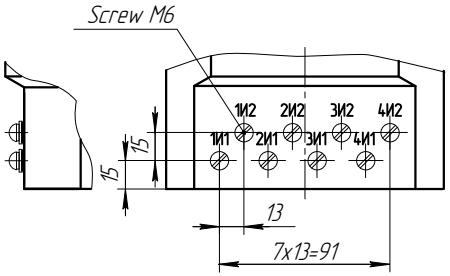


Different modifications

Modification A
secondary terminals from the transformer end surface

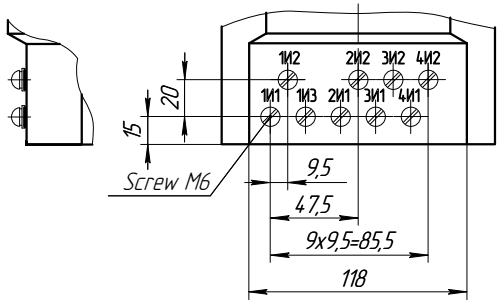


Transformers with secondary windings
from one up to three

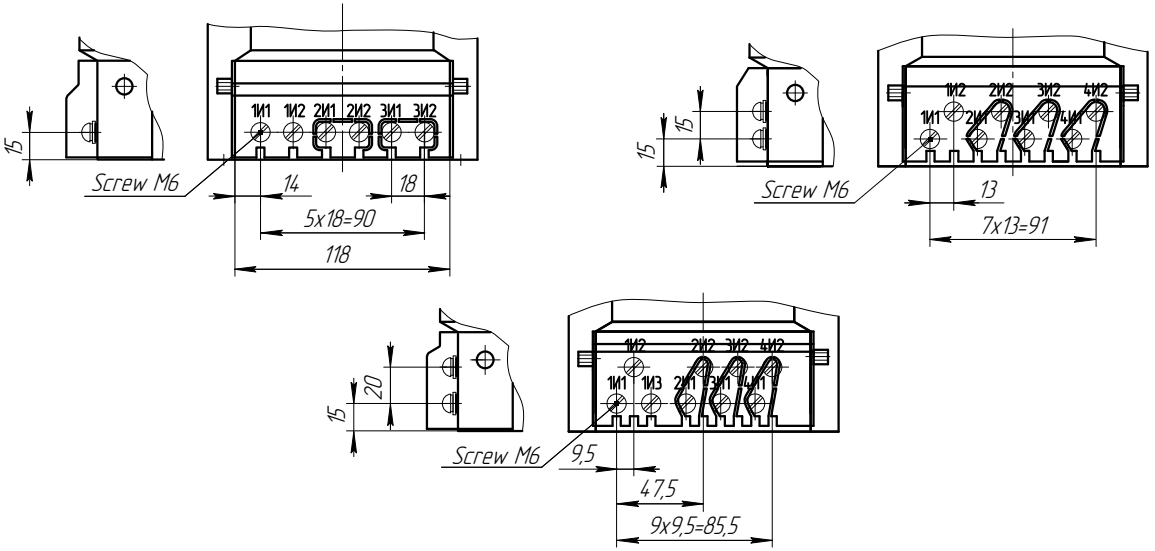


Transformers with secondary windings
from one up to four

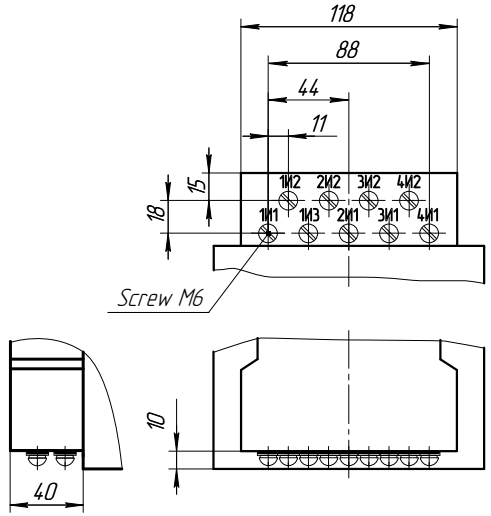
Modification AE
with switching over on the secondary winding
located at the end surface



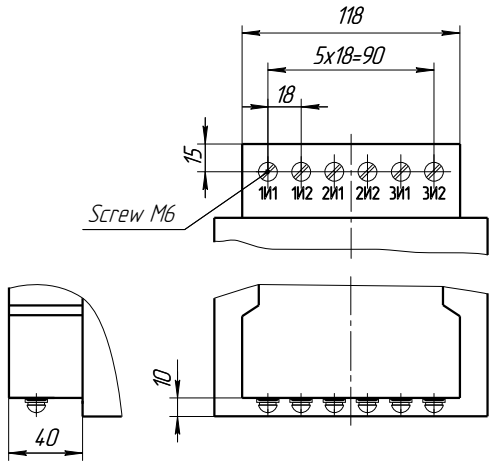
Modification AC
secondary terminals from the transformer end surface
with a seal cover



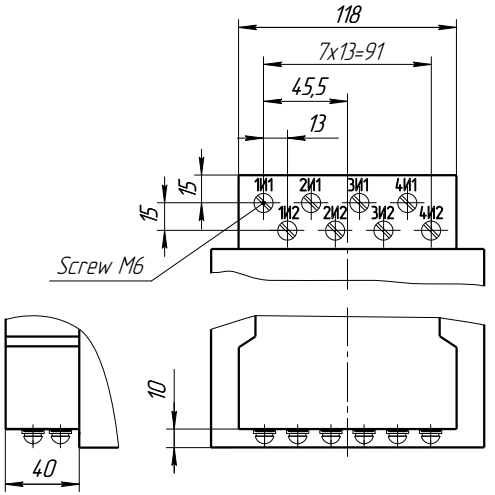
Modification BE
with switching over on the secondary winding
located on the bottom



Modification B
secondary terminals on the transformer bottom

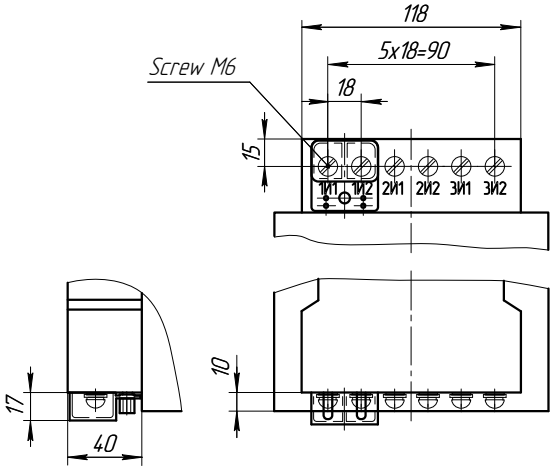


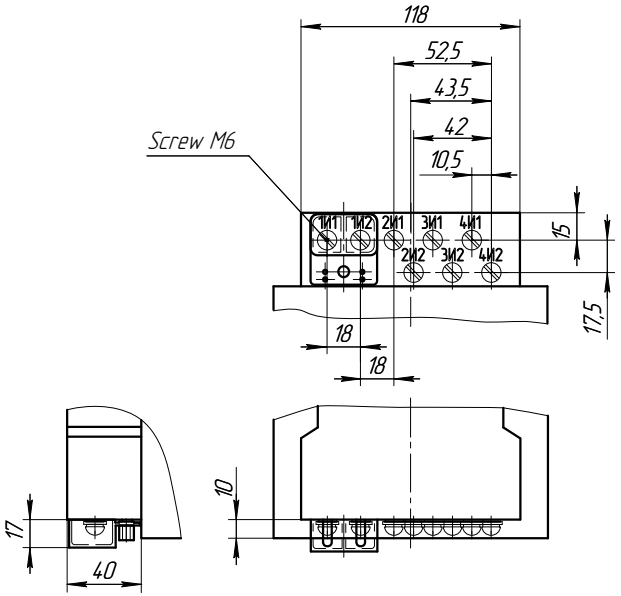
Transformers with secondary windings,
from one up to three



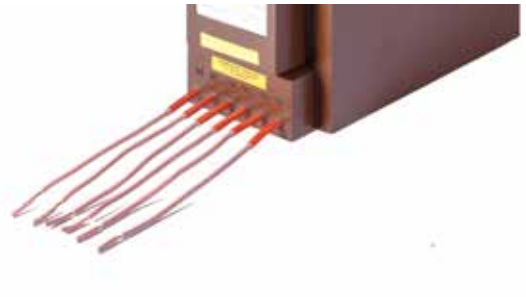
Transformers with secondary windings,
from one up to four

Modification BC
secondary terminals on the transformer bottom,
seal cover

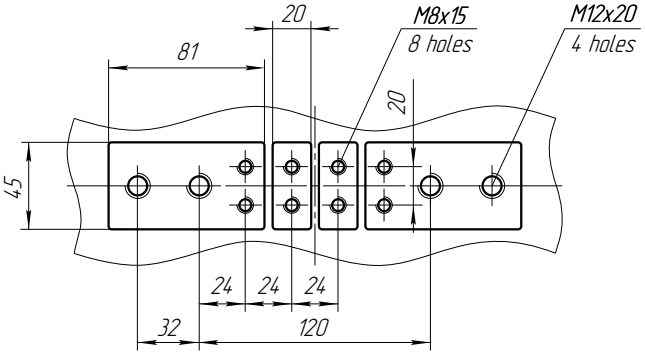




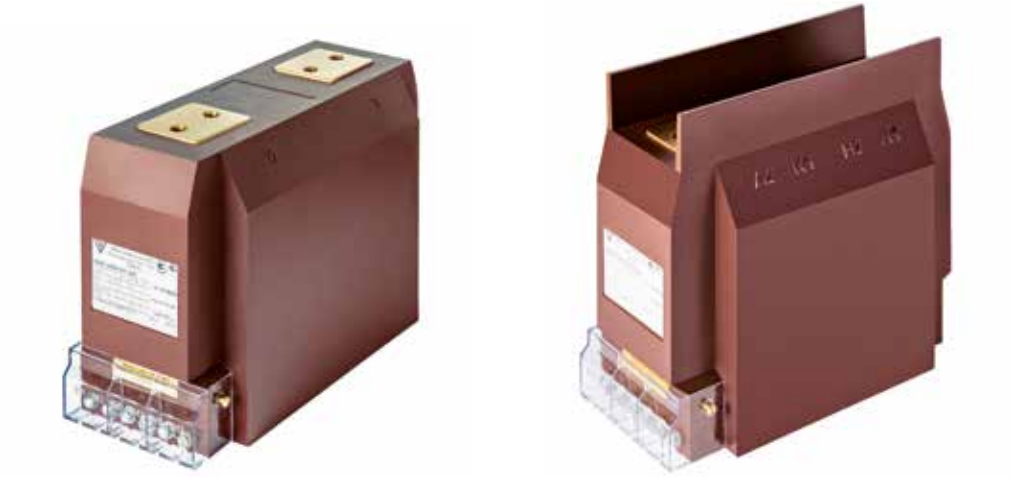
Modification D
with flexible secondary terminals



Modification F
with switching over on the primary winding
(an example of identification of transformation ratio for
a transformer with 2 windings:100(200)/5)



1.1.2. CAST SUPPORT-TYPE CURRENT TRANSFORMERS OF TLO-10 VERSION



TLO-10 M3 and M4 current transformers can be made in modifications as follows:

Modification	Description
A	secondary terminals from the transformer end surface
B	secondary terminals on the transformer bottom
C	seal cover availability
D	with flexible secondary terminals
E	with switching over on the secondary winding
F	with switching over on the primary winding

An example of identification of TLO-10 current transformer in M3 dimension:

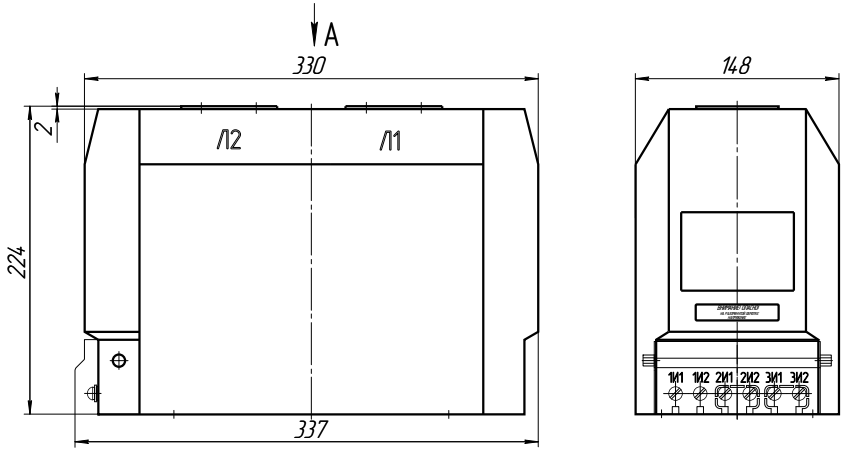
TLO-10 M3AC-0,5FS10/10P10-10/15-100/5 N3 a 10 kA

M3	transformer dimension
A	secondary terminals on the transformer body are located at the end surface
C	availability of a cover to protect and seal the measuring winding
0,5	accuracy class of the measuring secondary winding
FS10	instrument security factor of the measuring secondary winding
10P	accuracy class of the protective secondary winding
10	rated accuracy limit factor of the protective winding
10	rated secondary burden of the measuring secondary winding
15	rated secondary burden of the protective secondary winding
100	rated primary current
5	rated secondary current
N	climatic modification
3	placement category
a	insulation level
10 kA	short-time (one-second) thermal current

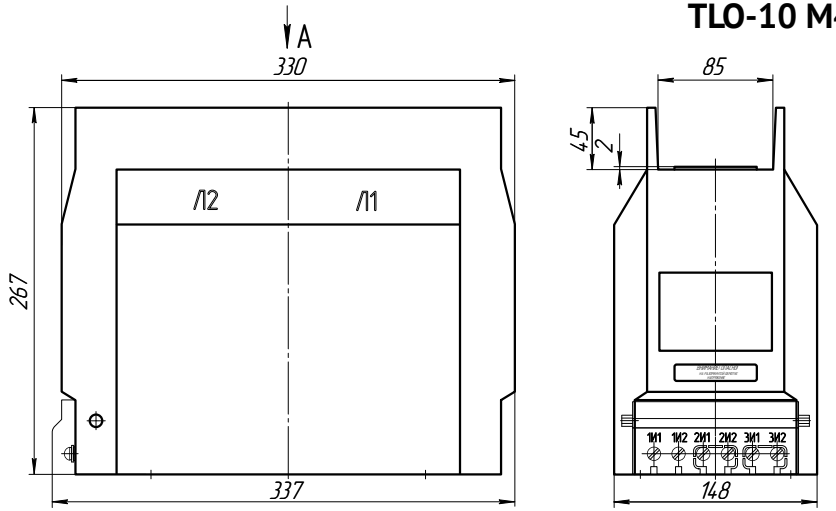
Technical parameters and characteristics

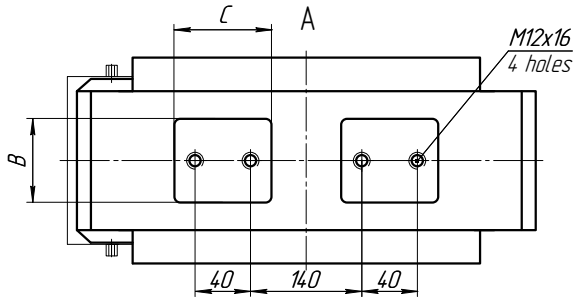
Parameters	Values for parameters
Rated voltage, kV	10
Maximum operating voltage, kV	12
Rated primary current, A	5; 7,5; 10; 11; 12; 13; 14; 16; 15; 18; 20; 22; 25; 27,5; 30; 32,5; 35; 37,5; 40; 50; 55; 60; 65; 70; 75; 80; 90; 100; 150; 200; 250; 300; 350; 400; 500; 550; 600; 650; 700; 750; 800; 900; 1000; 1050; 1100; 1150; 1200; 1250; 1300; 1400; 1500; 1550; 1600
Rated secondary current, A	1; 5
Rated frequency, Hz	50; 60
Number of secondary windings	up to 5
Rated secondary burdens with cosφ=0,8: measuring windings, V·A protective winding, V·A	 from 1 up to 30 from 1 up to 30
Rated accuracy class, according to GOST 7746: measuring windings protective windings	 0,2S; 0,2; 0,5S; 0,5; 1; 3 5P or 10P
Accuracy limit factor K_{rated} of secondary protective winding:	from 2 up to 30
Rated instrument security factor FS_{rated} of secondary measuring winding:	from 3 up to 30
Rated short-time (one second) thermal current kA, at rated primary current	
5-20 A	2,5; 5
30-50 A	5; 10; 20
75-100 A	10; 20; 31,5; 40
150 A	15; 20; 31,5; 40
200 A	20; 31,5; 40-60
300 A	31,5; 40-100
400-1600 A	40-100
Dynamic current kA, at rated primary current:	
5-20 A	6,25; 12,8
30-50 A	12,8; 26; 52
75-100 A	26; 52; 81; 100
150 A	39; 52; 81; 100
200 A	52; 81; 100-150
300 A	81; 100-250
400-1600 A	100-250
Weight, kg, not more	from 21 up to 60
Overall dimensions (LxWxH), mm	330x148x224/ 330x148x267

Overall dimensions, fitting and connecting dimensions TLO-10 M3



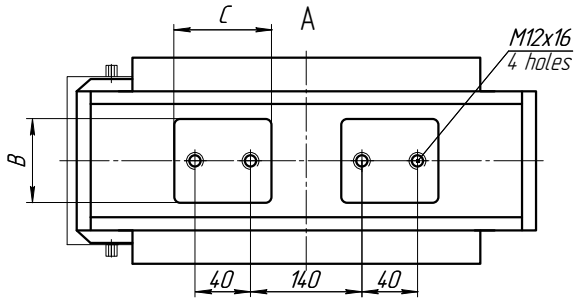
Overall dimensions, fitting and connecting dimensions TLO-10 M4

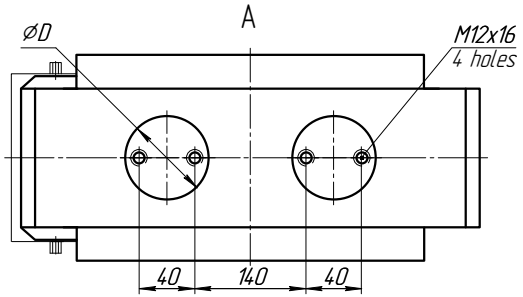




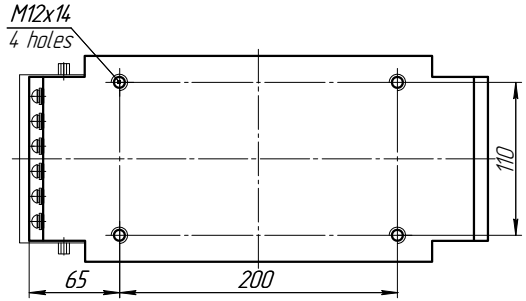
Primary terminals design variant for TLO-10 M3 and M4

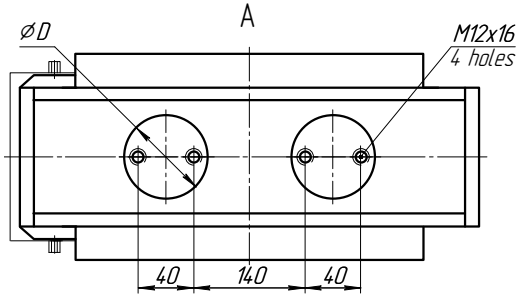
Rated primary current, A	Dimensions of terminals for primary winding, mm		
	ØD	B x C	
5...600	60	60x60	60x70
5...1600	–	–	60x70





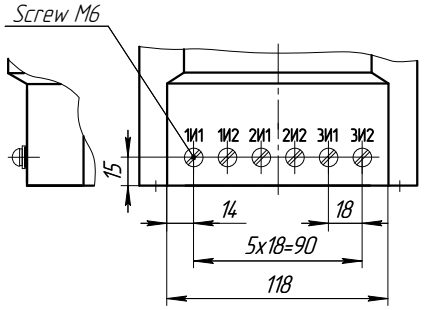
Fitting dimensions for TLO-10 M3 and M4



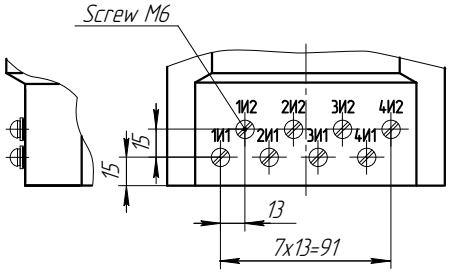


Different modifications

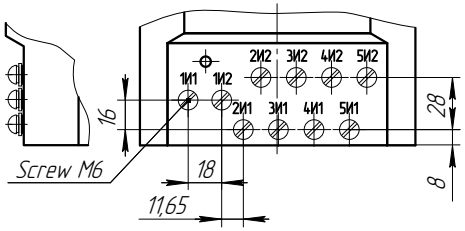
Modification A
secondary terminals from the transformer end surface



Transformers with secondary windings from one up to three

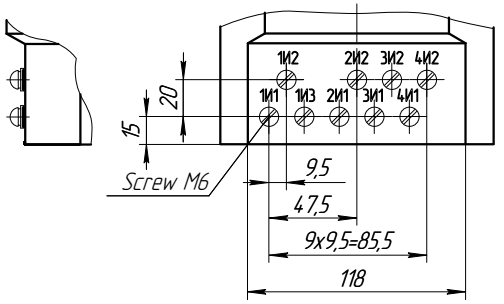


Transformers with secondary windings from one up to four

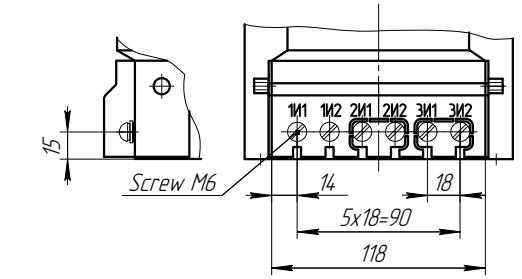


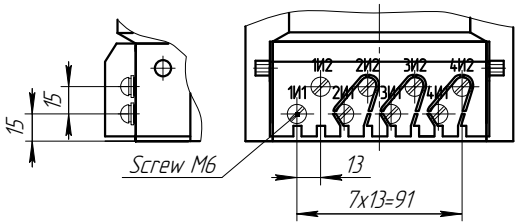
Transformers with secondary windings from one up to five

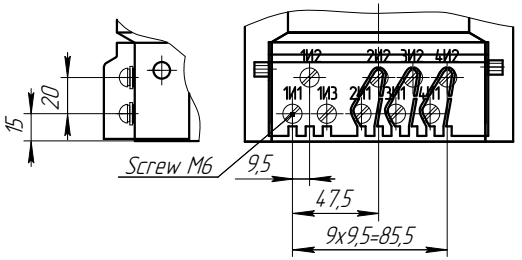
Modification AE
with switching over on the secondary winding located at the end surface

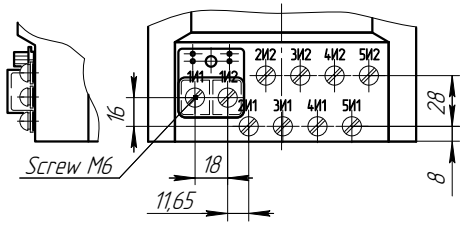


Modification AC
secondary terminals from the transformer end surface with a seal cover

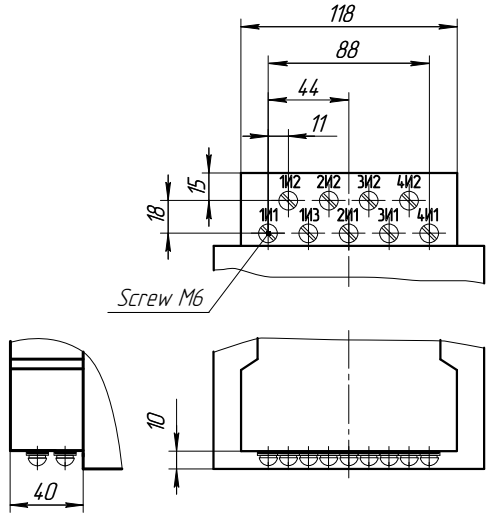




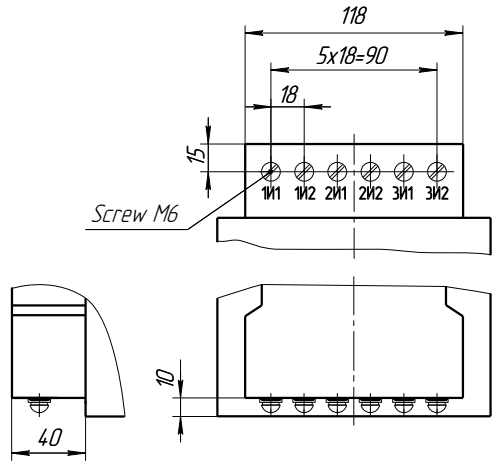




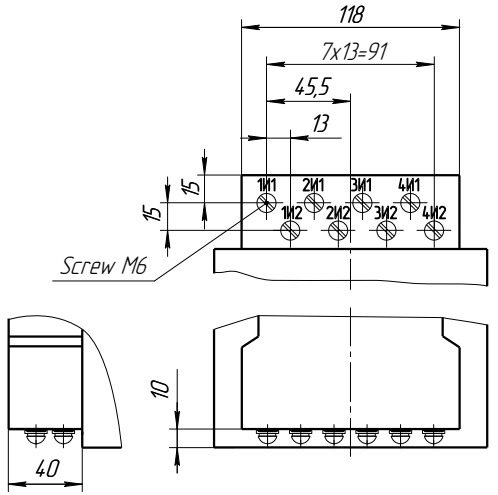
Modification BE
with switching over on the secondary winding located on the bottom



Modification B
secondary terminals on the transformer bottom

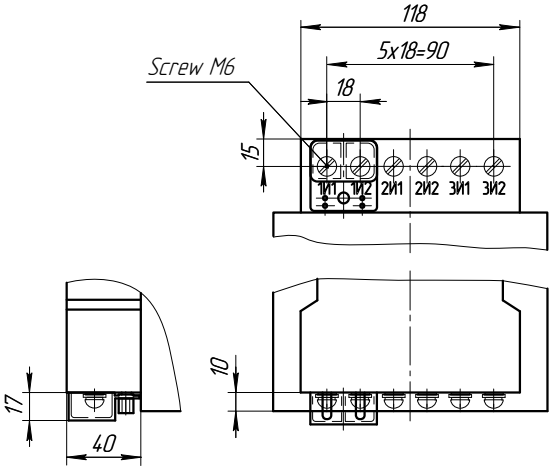


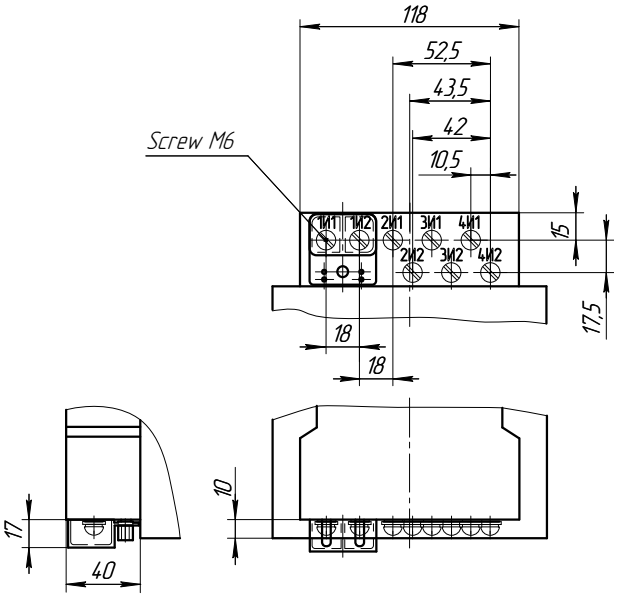
Transformers with secondary windings,
from one up to three



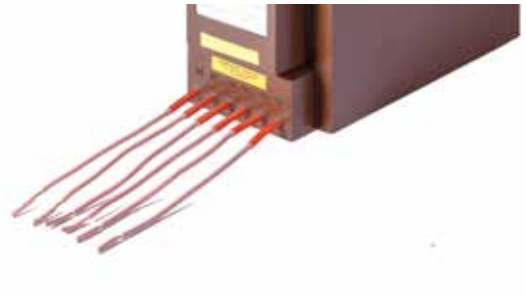
Transformers with secondary windings,
from one up to four

Modification BC
secondary terminals on the transformer bottom,
seal cover

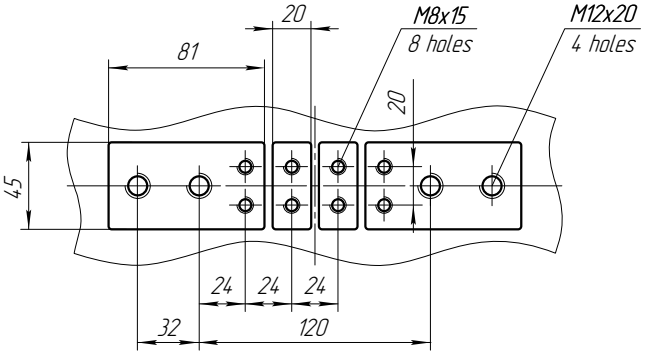




Modification D
with flexible secondary terminals



Modification F
with switching over on the primary winding
(an example of identification of transformation ratio for
a transformer with 2 windings:100(200)/5)



1.1.3. CAST SUPPORT-TYPE CURRENT TRANSFORMERS OF TLO-10 VERSION

TLO-10 M5 and M6 current transformers can be made in modifications as follows:

Modification	Description
A	secondary terminals from the transformer end surface
B	secondary terminals on the transformer bottom
C	seal cover availability
D	with flexible secondary terminals
E	with switching over on the secondary winding
F	with switching over on the primary winding

An example of identification of TLO-10 current transformer in M5 dimension:

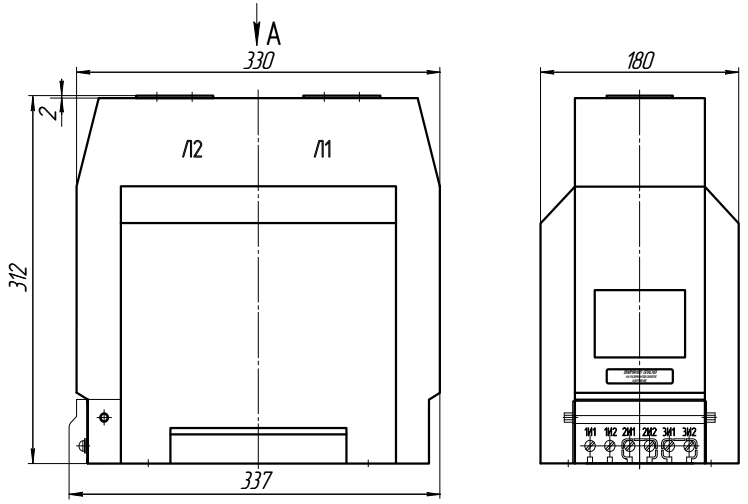
TLO-10 M5AC-0,5FS10/10P10-10/15-100/5 N3 a 10 kA

M5	transformer dimension
A	secondary terminals on the transformer body are located at the end surface
C	availability of a cover to protect and seal the measuring winding
0,5	accuracy class of the measuring secondary winding
FS10	instrument security factor of the measuring secondary winding
10P	accuracy class of the protective secondary winding
10	rated accuracy limit factor of the protective winding
10	rated secondary burden of the measuring secondary winding
15	rated secondary burden of the protective secondary winding
100	rated primary current
5	rated secondary current
N	climatic modification
3	placement category
a	insulation level
10 kA	short-time (one-second) thermal current

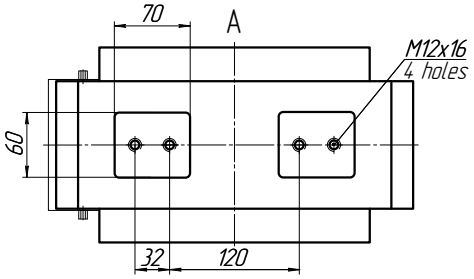
Technical parameters and characteristics

Parameters	Values for parameters
Rated voltage, kV	10
Maximum operating voltage, kV	12
Rated primary current, A	5; 7,5; 10; 11; 12; 13; 14; 16; 15; 18; 20; 22; 25; 27,5; 30; 32,5; 35; 37,5; 40; 50; 55; 60; 65; 70; 75; 80; 90; 100; 150; 200; 250; 300; 350; 400; 500; 550; 600; 650; 700; 750; 800; 900; 1000; 1050; 1100; 1150; 1200; 1250; 1300; 1400; 1500; 1550; 1600; 1650; 1700; 1750; 1800; 1900; 2000; 2100; 2200; 2250; 2300; 2500; 2550; 2600; 2650; 2700; 2750; 2800; 2900; 3000
Rated secondary current, A	1; 5
Rated frequency, Hz	50; 60
Number of secondary windings	up to 5
Rated secondary burdens with cosφ=0,8: measuring windings, V·A protective winding, V·A	 from 1 up to 50 from 1 up to 50
Rated accuracy class, according to GOST 7746: measuring windings protective windings	 0,2S; 0,2; 0,5S; 0,5; 1; 3 5P or 10P
Accuracy limit factor K_{rated} of secondary protective winding:	from 2 up to 30
Rated instrument security factor FS_{rated} of secondary measuring winding:	from 3 up to 30
Short-time (one second) thermal current kA, at rated primary current	
5-20 A	2,5; 5
30-50 A	5; 10; 20
75-100 A	10; 20; 31,5; 40
150 A	15; 20; 31,5; 40
200 A	20; 31,5; 40-60
300 A	31,5; 40-100
400-3000 A	40-100
Dynamic current kA, at rated primary current:	
5-20 A	6,25; 12,8
30-50 A	12,8; 26; 52
75-100 A	26; 52; 81; 100
150 A	39; 52; 81; 100
200 A	52; 81; 100-150
300 A	81; 100-250
400-3000 A	100-250
Weight, kg, not more	50
Overall dimensions (LxWxH), mm	330x180x312/ 330x180x335

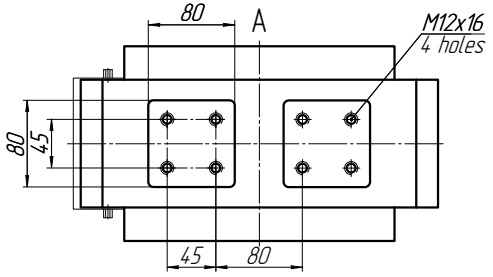
Overall dimensions, fitting and connecting dimensions TLO-10 M5



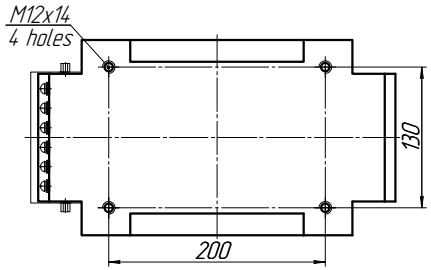
up to 1500 A



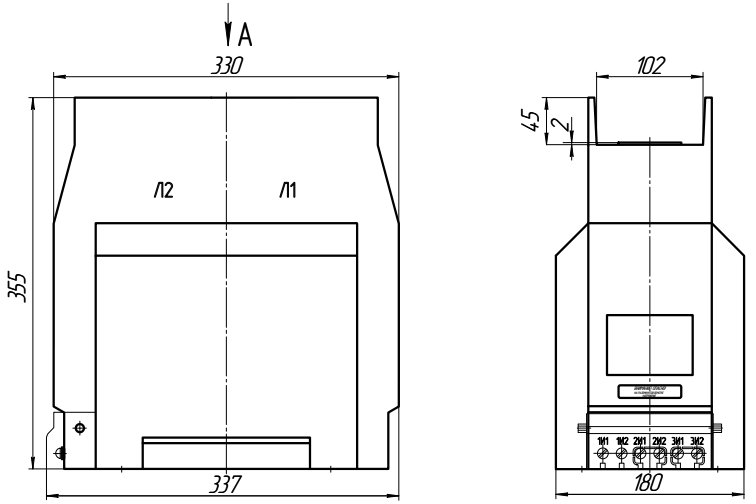
from 1500 A



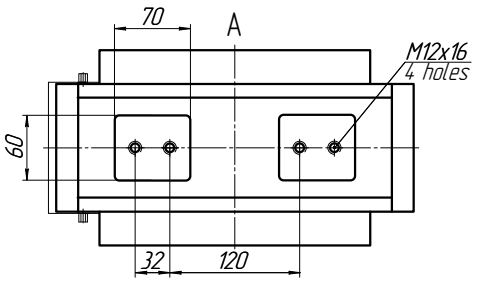
Fitting dimensions for TLO-10 M5 and M6



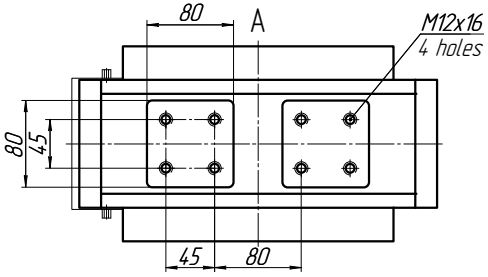
Overall dimensions, fitting and connecting dimensions TLO-10 M6



up to 1500 A



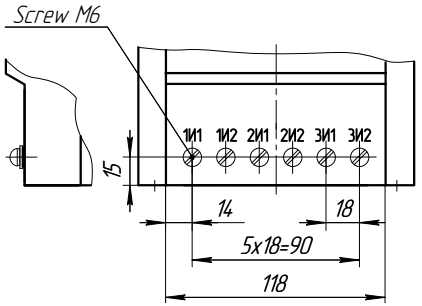
from 1500 A



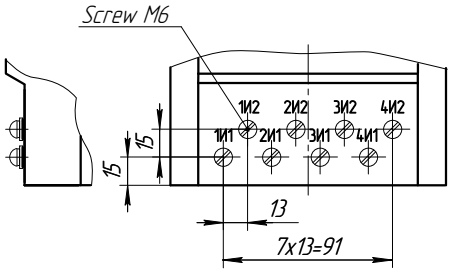
1.1.3. CAST SUPPORT-TYPE CURRENT TRANSFORMERS OF TLO-10 VERSION

Different modifications

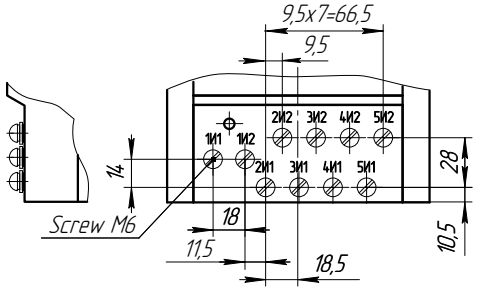
Modification A
secondary terminals from the transformer end surface



Transformers with secondary windings, from one up to three

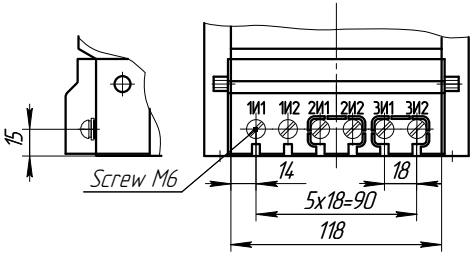


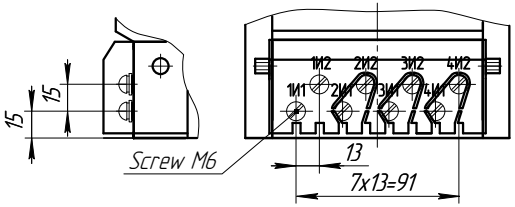
Transformers with secondary windings, from one up to four

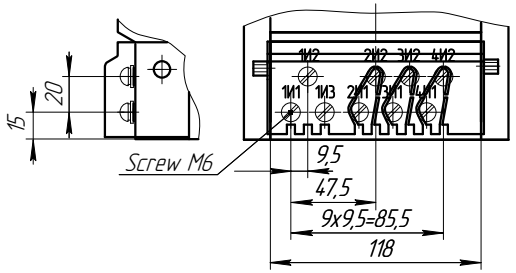


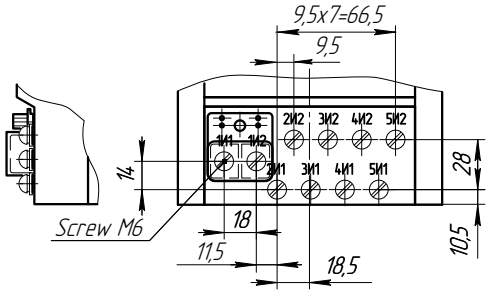
Transformers with secondary windings, from one up to five

Modification AC
secondary terminals from the transformer end surface, seal cover

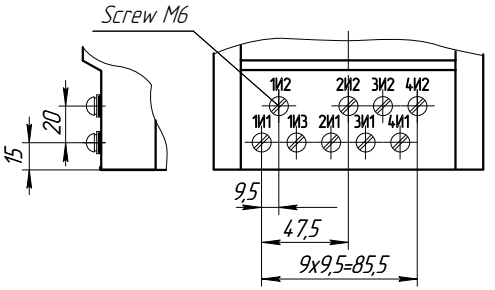




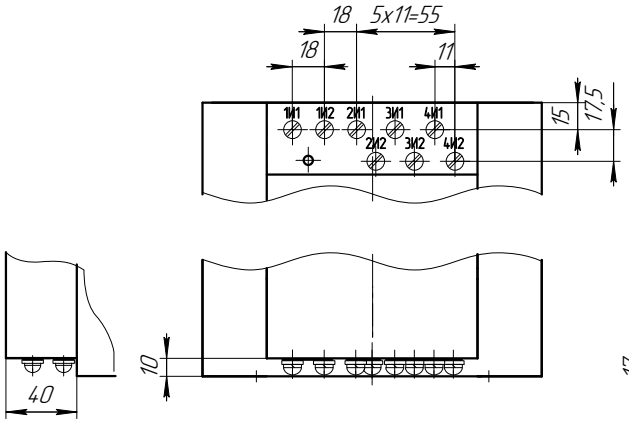




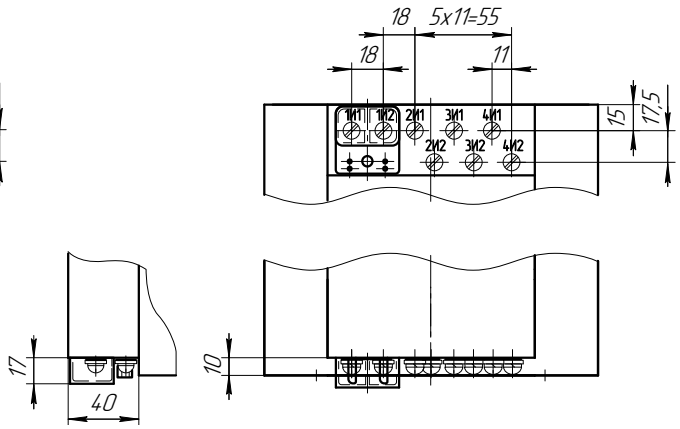
Modification AE
with switching over on the secondary winding located at the end surface



Modification B
secondary terminals on the transformer bottom

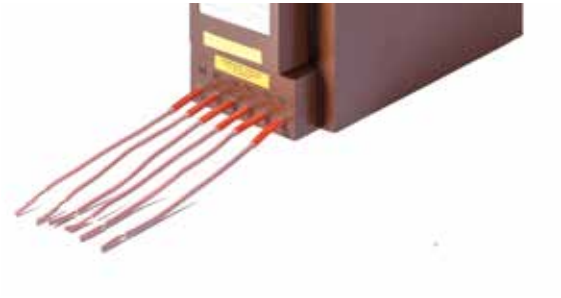


Modification BC
secondary terminals on the transformer bottom,
seal cover

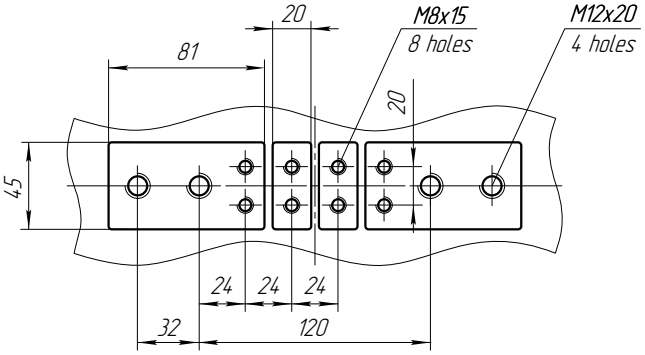


Transformers with secondary windings,
from one up to four

Modification D
with flexible secondary terminals



Modification F
with switching over on the primary winding
(an example of identification of transformation ratio for
a transformer with 2 windings:100(200)/5)



1.1.4. CAST SUPPORT-TYPE CURRENT TRANSFORMERS OF TLO-10 VERSION

TLO-10 M7 and M8 current transformers can be made in modifications as follows:

Modification	Description
A	secondary terminals from the transformer end surface
B	secondary terminals on the transformer bottom
C	seal cover availability
D	with flexible secondary terminals
E	with switching over on the secondary winding
F	with switching over on the primary winding

An example of identification of TLO-10 current transformer in M7 dimension:

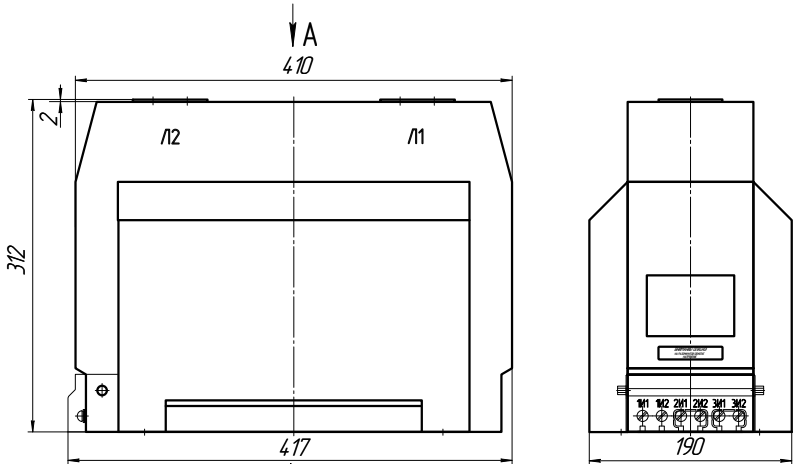
TLO-10 M7AC-0,5FS10/10P10-10/15-100/5 N3 a 10 kA

M7	transformer dimension
A	secondary terminals on the transformer body are located at the end surface
C	availability of a cover to protect and seal the measuring winding
0,5	accuracy class of the measuring secondary winding
FS10	instrument security factor of the measuring secondary winding
10P	accuracy class of the protective secondary winding
10	rated accuracy limit factor of the protective winding
10	rated secondary burden of the measuring secondary winding
15	rated secondary burden of the protective secondary winding
100	rated primary current
5	rated secondary current
N	climatic modification
3	placement category
a	insulation level
10 kA	short-time (one-second) thermal current

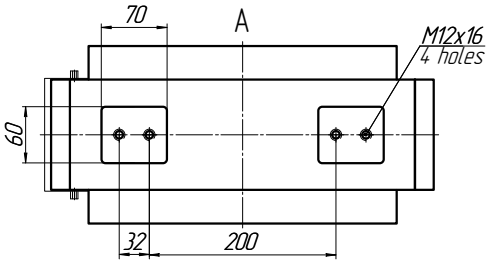
Technical parameters and characteristics

Parameters	Values for parameters
Rated voltage, kV	10
Maximum operating voltage, kV	12
Rated primary current, A	5; 7,5; 10; 11; 12; 13; 14; 16; 15; 18; 20; 22; 25; 27,5; 30; 32,5; 35; 37,5; 40; 50; 55; 60; 65; 70; 75; 80; 90; 100; 150; 200; 250; 300; 350; 400; 500; 550; 600; 650; 700; 750; 800; 900; 1000; 1050; 1100; 1150; 1200; 1250; 1300; 1400; 1500; 1550; 1600; 1650; 1700; 1750; 1800; 1900; 2000; 2100; 2200; 2250; 2300; 2500; 2550; 2600; 2650; 2700; 2750; 2800; 2900; 3000
Rated secondary current, A	1; 5
Rated frequency, Hz	50; 60
Number of secondary windings	up to 5
Rated secondary burdens with cosφ=0,8: measuring windings, V·A protective winding, V·A	 from 1 up to 30 from 1 up to 30
Rated accuracy class, according to GOST 7746: measuring windings protective windings	 0,2S; 0,2; 0,5S; 0,5; 1; 3 5P or 10P
Accuracy limit factor K_{rated} of secondary protective winding:	from 2 up to 30
Rated instrument security factor FS_{rated} of secondary measuring winding:	from 3 up to 30
Short-time (one second) thermal current kA, at rated primary current	
5-20 A	2,5; 5
30-50 A	5; 10; 20
75-100 A	10; 20; 31,5; 40
150 A	15; 20; 31,5; 40
200 A	20; 31,5; 40-60
300 A	31,5; 40-100
400-3000 A	40-100
Dynamic current kA, at rated primary current:	
5-20 A	6,25; 12,8
30-50 A	12,8; 26; 52
75-100 A	26; 52; 81; 100
150 A	39; 52; 81; 100
200 A	52; 81; 100-150
300 A	81; 100-250
400-3000 A	100-250
Weight, kg, not more	55
Overall dimensions (LxWxH), mm	410x190x312/410x190x355

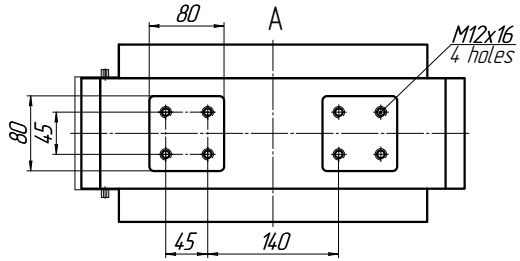
Overall dimensions, fitting and connecting dimensions TLO-10 M7



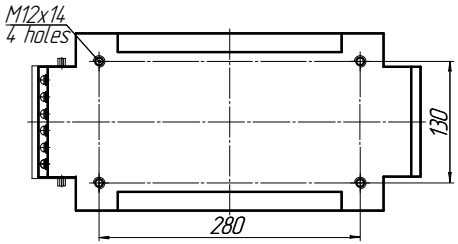
up to 1500 A



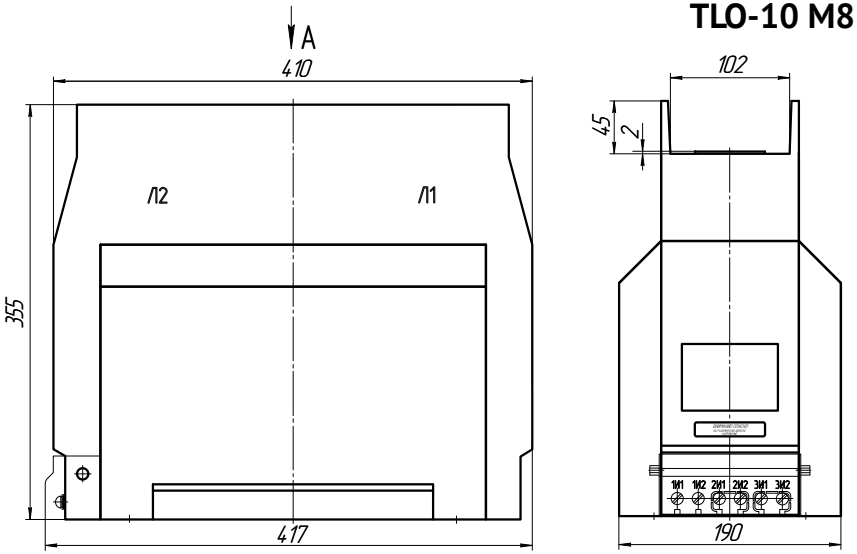
from 1500 A



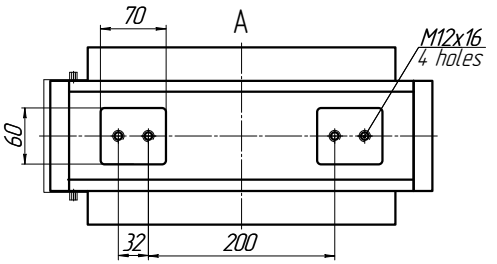
Fitting dimensions for TLO-10 M7 and M8



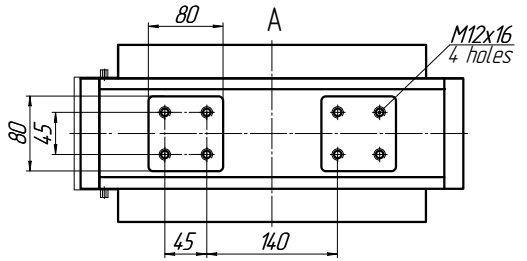
Overall dimensions, fitting and connecting dimensions TLO-10 M8



up to 1500 A

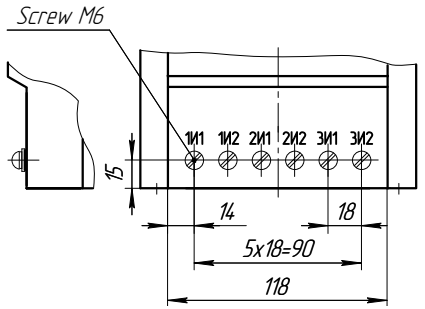


from 1500 A

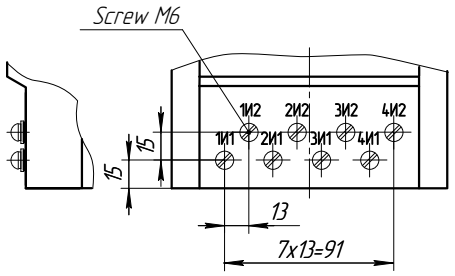


Different modifications

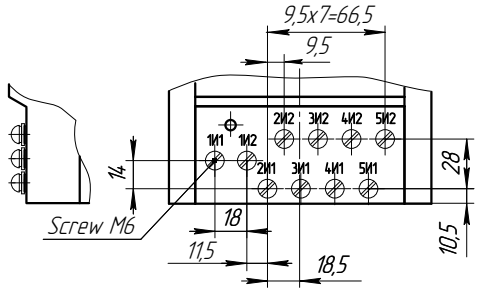
Modification A
secondary terminals from the transformer end surface



Transformers with secondary windings, from one up to three

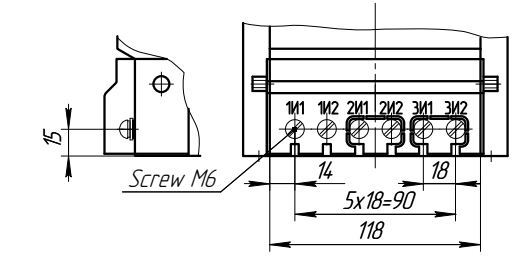


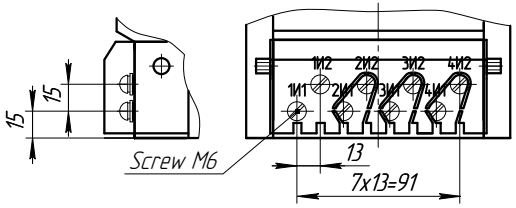
Transformers with secondary windings, from one up to four

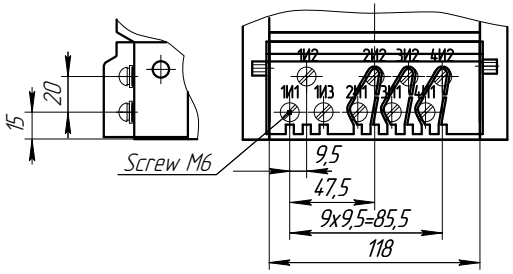


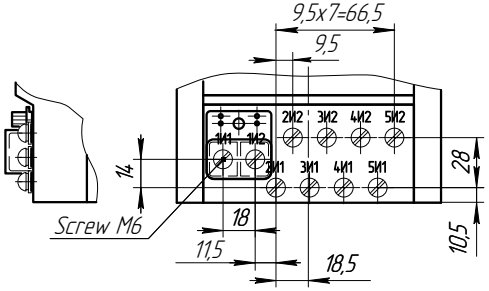
Transformers with secondary windings, from one up to five

Modification AC
secondary terminals from the transformer end surface, seal cover

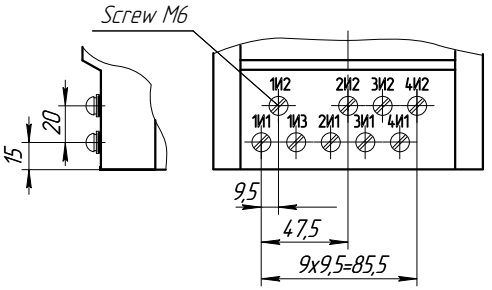




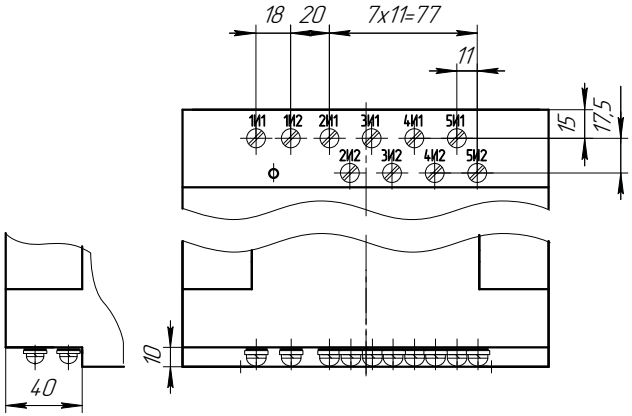




Modification AE
with switching over on the secondary winding located at the end surface

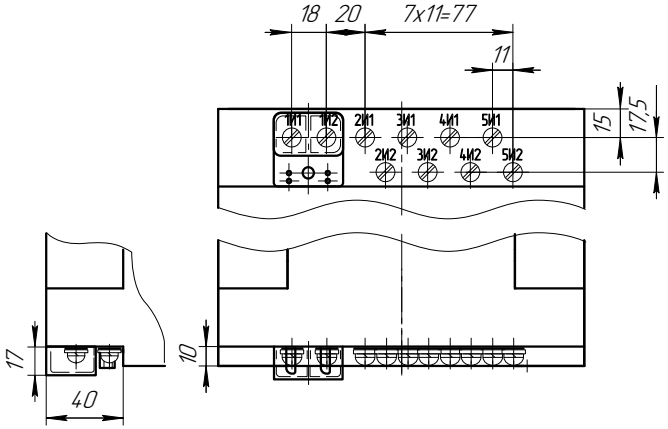


Modification B
secondary terminals on the transformer bottom

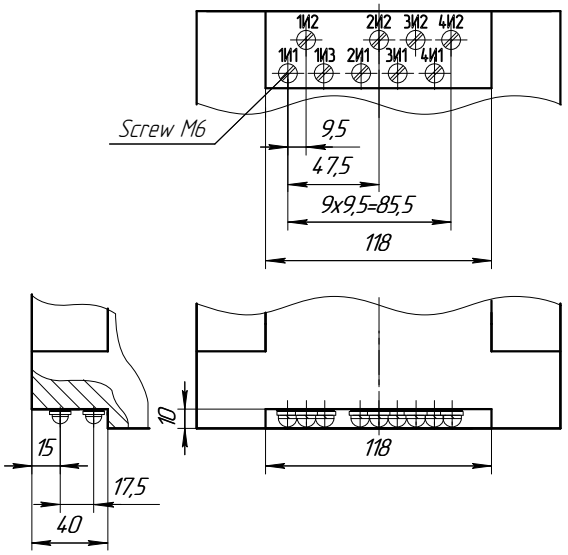


Transformers with secondary windings,
from one up to five

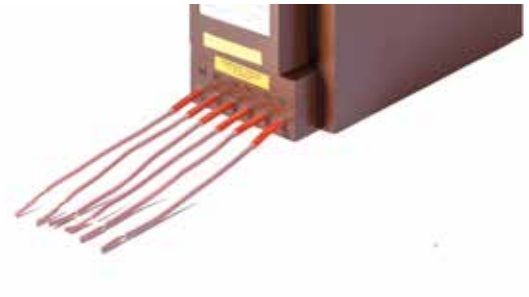
Modification BC
secondary terminals on the transformer bottom,
seal cover



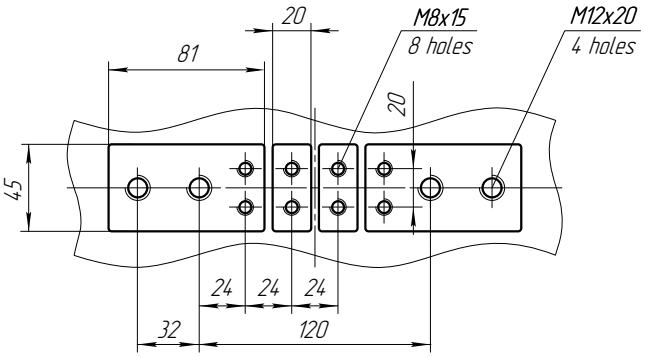
Modification BE
with switching over on the secondary winding
located on the bottom



Modification D
with flexible secondary terminals



Modification F
with switching over on the primary winding
(an example of identification of transformation ratio for
a transformer with 2 windings:100(200)/5)



1.1.5. CAST SUPPORT-TYPE CURRENT TRANSFORMERS OF TLO-10 VERSION

TLO-10 M9 and M10 current transformers can be made in modifications as follows:

Modification	Description
A	secondary terminals from the transformer end surface
C	seal cover availability
D	with flexible secondary terminals
E	with switching over on the secondary winding
F	with switching over on the primary winding

An example of identification of TLO-10 current transformer in M9 dimension:

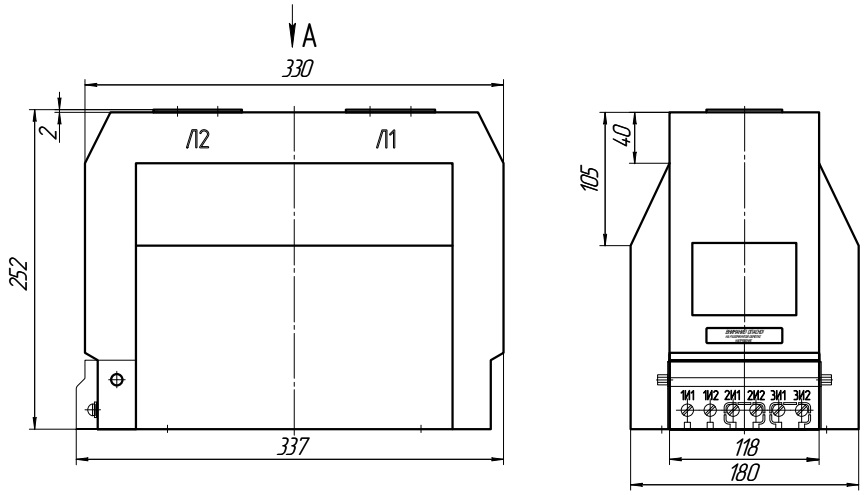
TLO-10 M9AC-0,5FS10/10P10-10/15-100/5 N3 a 10 kA

M9	transformer dimension
A	secondary terminals on the transformer body are located at the end surface
C	availability of a cover to protect and seal the measuring winding
0,5	accuracy class of the measuring secondary winding
FS10	instrument security factor of the measuring secondary winding
10P	accuracy class of the protective secondary winding
10	rated accuracy limit factor of the protective winding
10	rated secondary burden of the measuring secondary winding
15	rated secondary burden of the protective secondary winding
100	rated primary current
5	rated secondary current
N	climatic modification
3	placement category
a	insulation level
10 kA	short-time (one-second) thermal current

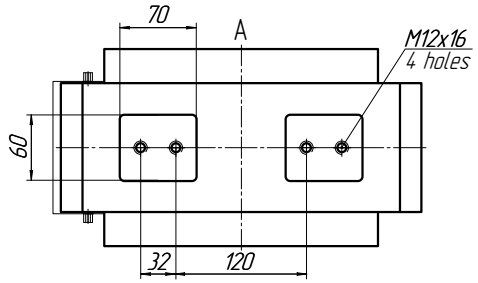
Technical parameters and characteristics

Parameters	Values for parameters
Rated voltage, kV	10
Maximum operating voltage, kV	12
Rated primary current, A	5; 7,5; 10; 11; 12; 13; 14; 16; 15; 18; 20; 22; 25; 27,5; 30; 32,5; 35; 37,5; 40; 50; 55; 60; 65; 70; 75; 80; 90; 100; 150; 200; 250; 300; 350; 400; 500; 550; 600; 650; 700; 750; 800; 900; 1000; 1050; 1100; 1150; 1200; 1250; 1300; 1400; 1500; 1550; 1600; 1650; 1700; 1750; 1800; 1900; 2000; 2100; 2200; 2250; 2300; 2500; 2550; 2600; 2650; 2700; 2750; 2800; 2900; 3000
Rated secondary current, A	1; 5
Rated frequency, Hz	50; 60
Number of secondary windings	up to 5
Rated secondary burdens with cosφ=0,8: measuring windings, V·A protective winding, V·A	 from 1 up to 50 from 1 up to 50
Rated accuracy class, according to GOST 7746: measuring windings protective windings	 0,2S; 0,2; 0,5S; 0,5; 1; 3 5P or 10P
Accuracy limit factor K_{rated} of secondary protective winding:	from 2 up to 30
Rated instrument security factor FS_{rated} of secondary measuring winding:	from 3 up to 30
Short-time (one second) thermal current kA, at rated primary current	
5-20 A	2,5; 5
30-50 A	5; 10; 20
75-100 A	10; 20; 31,5; 40
150 A	15; 20; 31,5; 40
200 A	20; 31,5; 40-60
300 A	31,5; 40-100
400-3000 A	40-100
Dynamic current kA, at rated primary current:	
5-20 A	6,25; 12,8
30-50 A	12,8; 26; 52
75-100 A	26; 52; 81; 100
150 A	39; 52; 81; 100
200 A	52; 81; 100-150
300 A	81; 100-250
400-3000 A	100-250
Weight, kg, not more	45
Overall dimensions (LxWxH), mm	330x180x252/ 330x180x295

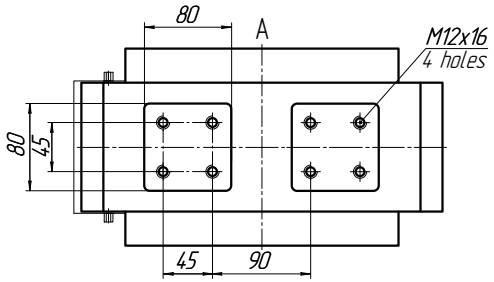
Overall dimensions, fitting and connecting dimensions TLO-10 M9



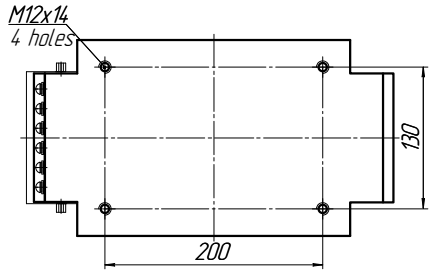
up to 1500 A



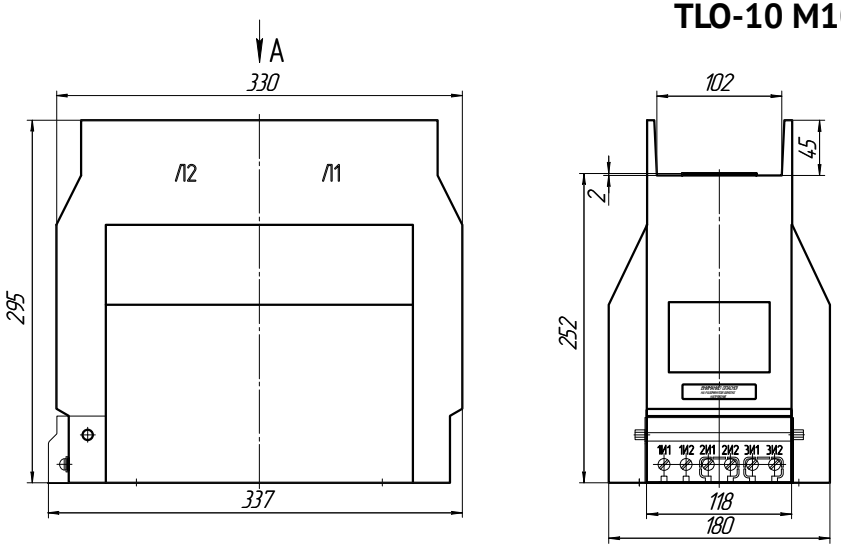
from 1500 A



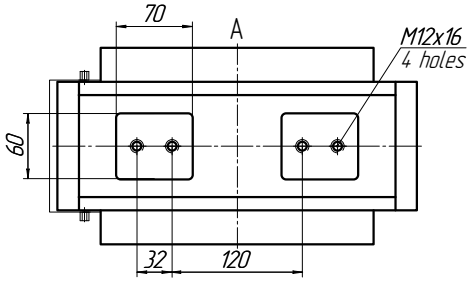
Fitting dimensions for TLO-10 M9 and M10



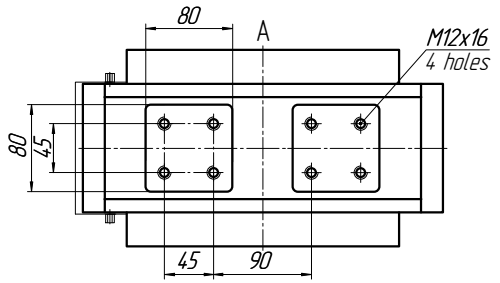
Overall dimensions, fitting and connecting dimensions TLO-10 M10



up to 1500 A



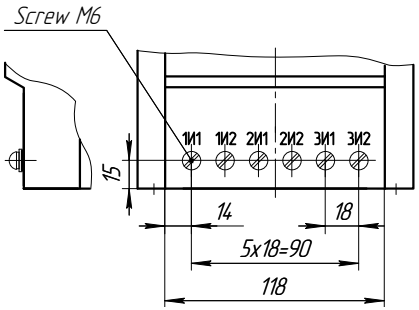
from 1500 A



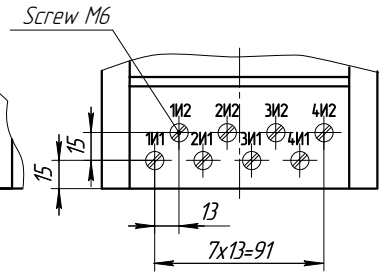
1.1.5. CAST SUPPORT-TYPE CURRENT TRANSFORMERS OF TLO-10 VERSION

Different modifications

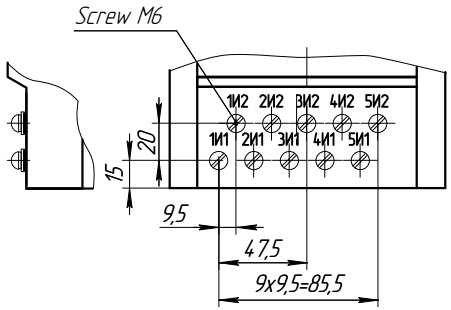
Modification A
secondary terminals from the transformer end surface



Transformers with secondary windings, from one up to three

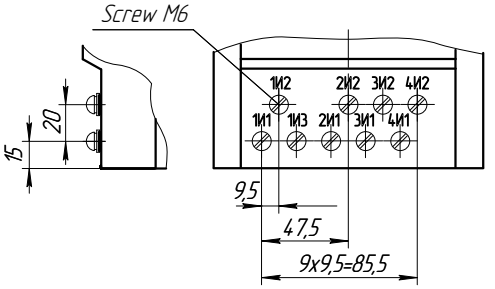


Transformers with secondary windings, from one up to four



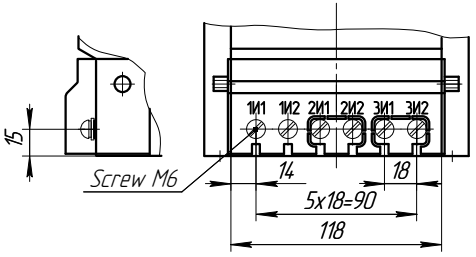
Transformers with secondary windings, from one up to five

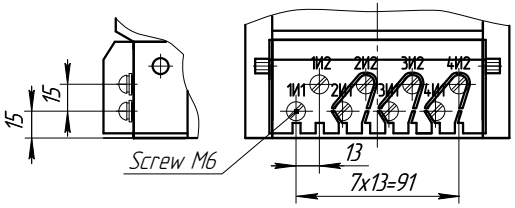
Modification AE
with switching over on the secondary winding located at the end surface

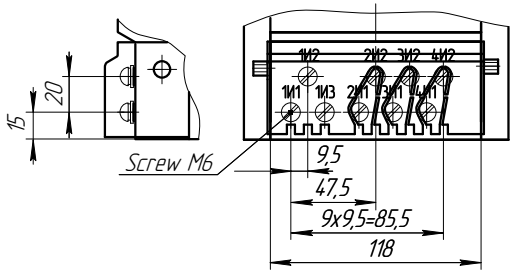


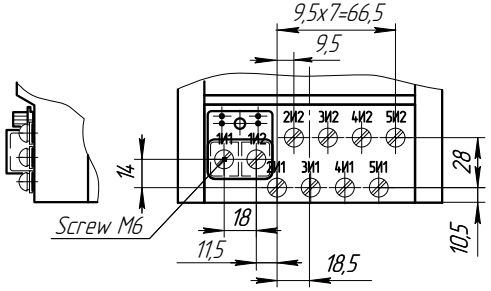
Modification D
with flexible secondary terminals

Modification AC
secondary terminals from the transformer end surface, seal cover

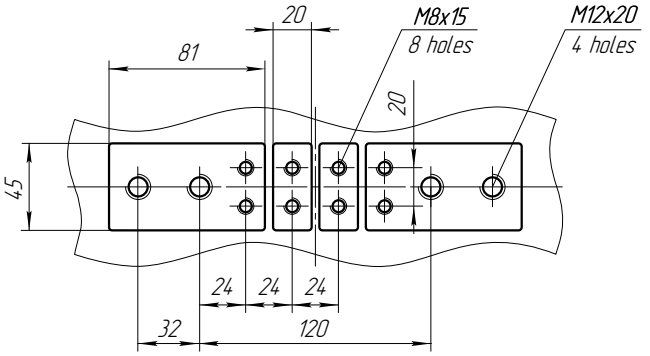








Modification F
with switching over on the primary winding (an example of identification of transformation ratio for a transformer with 2 windings:100(200)/5)



Technical parameters and characteristics

Parameters	Values for parameters
Rated voltage, kV	10
Maximum operating voltage, kV	12
Rated primary current, A	50; 55; 60; 65; 70; 75; 80; 90; 100; 150; 200; 250; 300; 350; 400; 500; 550; 600; 650; 700; 750; 800; 900; 1000; 1050; 1100; 1150; 1200; 1250; 1300; 1400; 1500
Rated secondary current, A	1; 5
Rated frequency, Hz	50; 60
Number of secondary windings	up to 2
Rated secondary burdens with cosφ=0,8: measuring windings, V·A protective winding, V·A	 from 1 up to 10 from 1 up to 15
Rated accuracy class, according to GOST 7746: measuring windings protective windings	 0,2S; 0,2; 0,5S; 0,5; 1; 3 5P or 10P
Accuracy limit factor K_{rated} of secondary protective winding:	from 2 up to 10
Rated instrument security factor FS_{rated} of secondary measuring winding:	from 3 up to 30
Short-time (one second) thermal current kA, at rated primary current	
50 A	5
75-100 A	10
150 A	15
200 A	20
300 A	31,5
400-1500 A	40
Dynamic current kA, at rated primary current:	
50 A	12,8
75-100 A	26
150 A	39
200 A	52
300 A	81
400-1500 A	100
Weight, kg, not more	15
Overall dimensions (LxWxH), mm	210x148x224/210x148x267

Modification	Description
A	secondary terminals from the transformer end surface
B	secondary terminals on the transformer bottom
C	seal cover availability
D	with flexible secondary terminals

TLO-10 M11 and M12 current transformers can be made in modifications as follows:

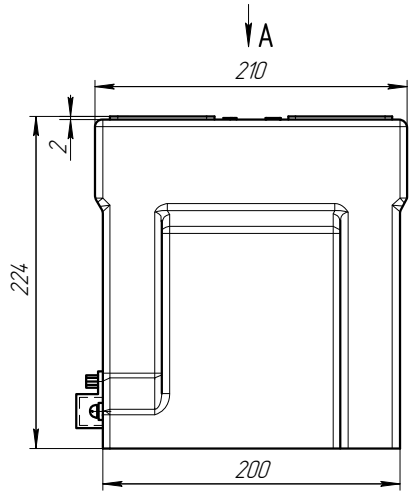
TLO-10 M11AC-0,5FS10/10P10-10/15-100/5 N3 a 10 kA

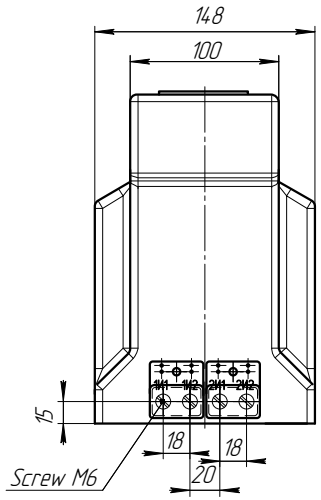
M11	transformer dimension
A	secondary terminals on the transformer body are located at the end surface
C	availability of a cover to protect and seal the measuring winding
0,5	accuracy class of the measuring secondary winding
FS10	instrument security factor of the measuring secondary winding
10P	accuracy class of the protective secondary winding
10	rated accuracy limit factor of the protective winding
10	rated secondary burden of the measuring secondary winding
15	rated secondary burden of the protective secondary winding
100	rated primary current
5	rated secondary current
N	climatic modification
3	placement category
a	insulation level
10 kA	short-time (one-second) thermal current

An example of identification of TLO-10 current transformer in M11 dimension:

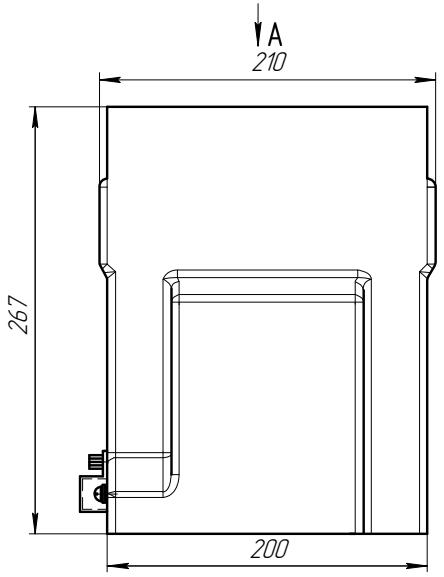
1.1.6. CAST SUPPORT-TYPE CURRENT TRANSFORMERS OF TLO-10 VERSION

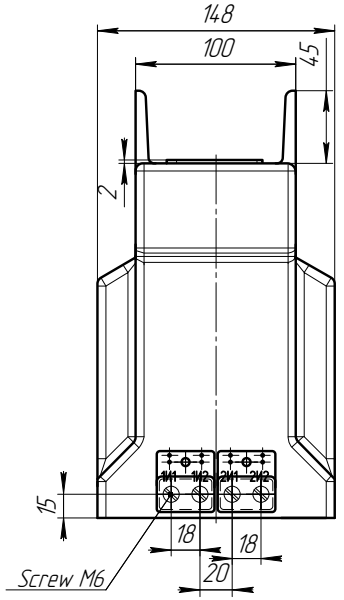
Overall dimensions, fitting and connecting dimensions TLO-10 M11





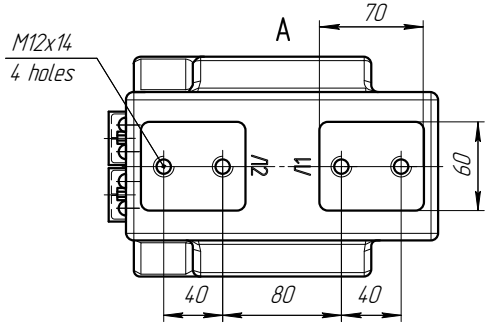
Overall dimensions, fitting and connecting dimensions TLO-10 M12

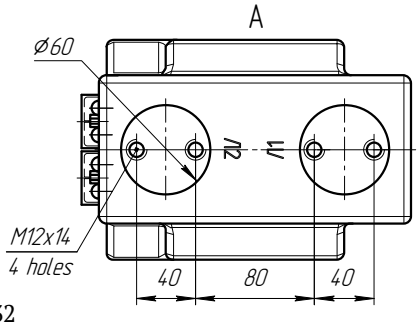




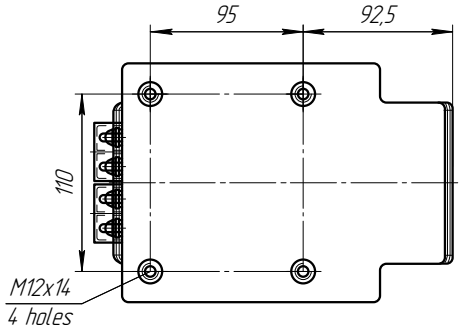
Primary terminals design variant for TLO-10 M11 and M12

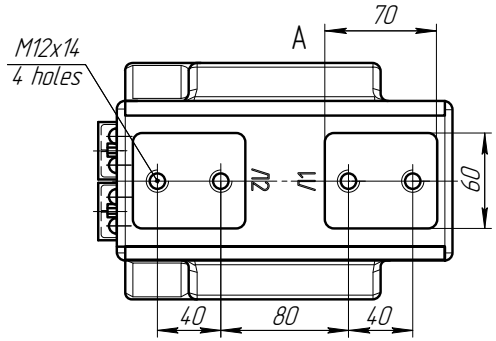
Rated primary current, A	Dimensions of terminals for primary winding, mm	
	ØD	B x C
50...200	40	–
200..600	60	40 x 70
600...1500	–	60 x 70

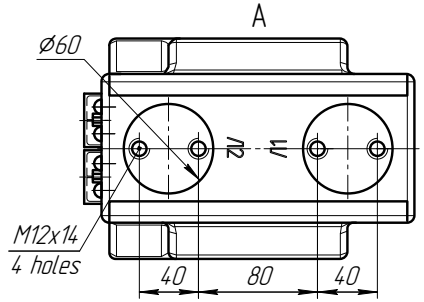




Fitting dimensions for TLO-10 M11 and M12

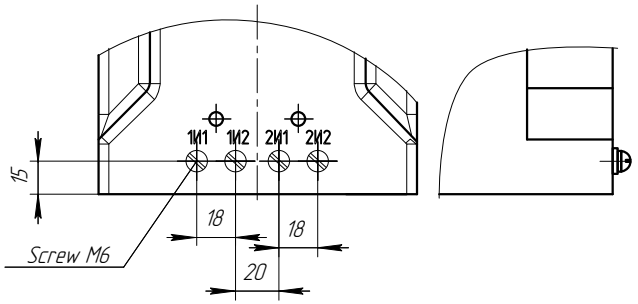






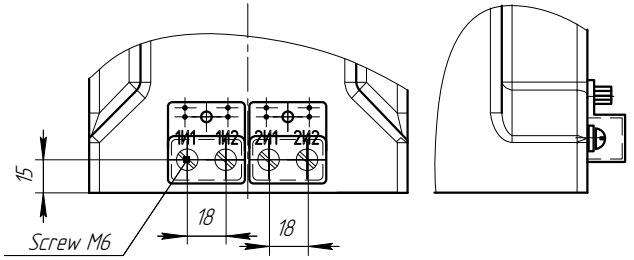
Different modifications

Modification A
secondary terminals from the transformer end surface



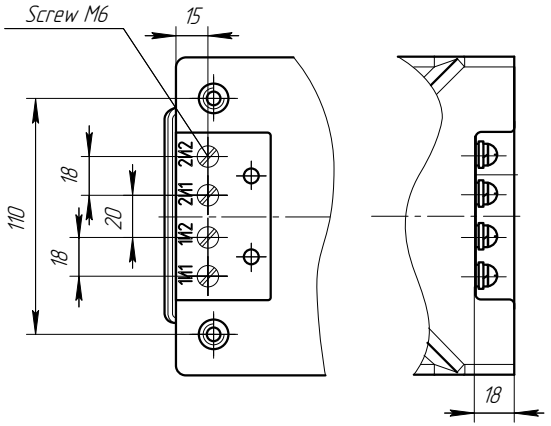
Transformers with secondary windings, one or two

Modification AC
secondary terminals from the transformer end surface seal cover



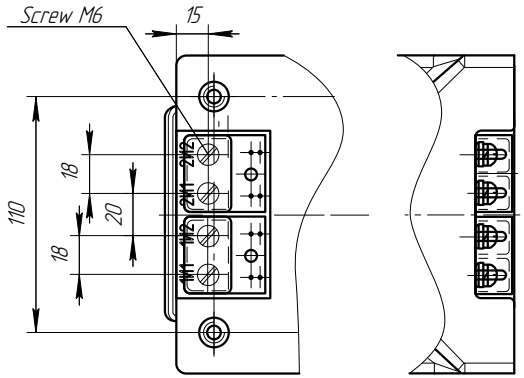
Transformers with secondary windings, one or two with a cover to protect and seal the measuring winding

Modification B
secondary terminals on the transformer bottom



Transformers with secondary windings, one or two

Modification BC
secondary terminals from the transformer end surface seal cover



Transformers with secondary windings one or two with a cover to protect and seal the measuring winding

Modification D
with flexible secondary terminals

1.1.7. CAST SUPPORT-TYPE CURRENT TRANSFORMERS OF TLO-10 VERSION

TLO-10 M13 and M14 current transformers can be made in modifications as follows:

Modification	Description
A	secondary terminals from the transformer end surface
B	secondary terminals on the transformer bottom
C	seal cover availability
D	with flexible secondary terminals

An example of identification of TLO-10 current transformer in M13 dimension:

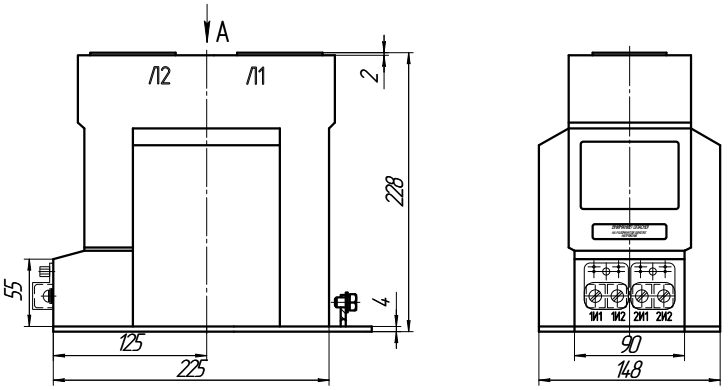
TLO-10 M13AC-0,5FS10/10P10-10/15-100/5 N3 a 10 kA

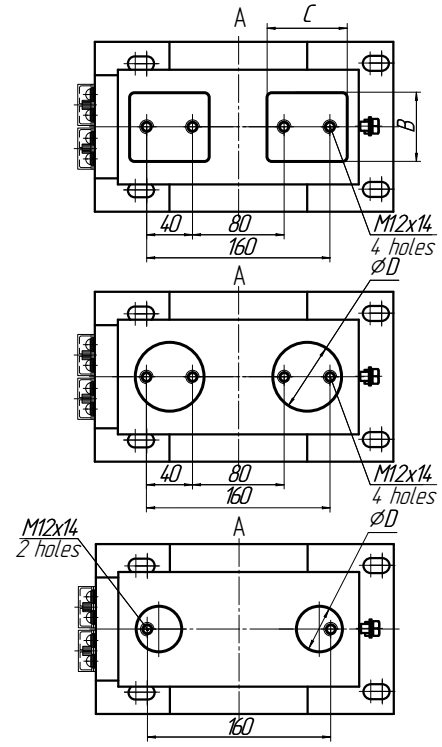
M13	transformer dimension
A	secondary terminals on the transformer body are located at the end surface
C	availability of a cover to protect and seal the measuring winding
0,5	accuracy class of the measuring secondary winding
FS10	instrument security factor of the measuring secondary winding
10P	accuracy class of the protective secondary winding
10	rated accuracy limit factor of the protective winding
10	rated secondary burden of the measuring secondary winding
15	rated secondary burden of the protective secondary winding
100	rated primary current
5	rated secondary current
N	climatic modification
3	placement category
a	insulation level
10 kA	short-time (one-second) thermal current

Technical parameters and characteristics

Parameters	Values for parameters
Rated voltage, kV	10
Maximum operating voltage, kV	12
Rated primary current, A	50; 55; 60; 65; 70; 75; 80; 90; 100; 150; 200; 250; 300; 350; 400; 500; 550; 600; 650; 700; 750; 800; 900; 1000; 1050; 1100; 1150; 1200; 1250; 1300; 1400; 1500
Rated secondary current, A	1; 5
Rated frequency, Hz	50; 60
Number of secondary windings	up to 2
Rated secondary burdens with cosφ=0,8: measuring windings, V·A protective winding, V·A	 from 1 up to 10 from 1 up to 15
Rated accuracy class, according to GOST 7746: measuring windings protective windings	 0,2S; 0,2; 0,5S; 0,5; 1; 3 5P or 10P
Accuracy limit factor K_{rated} of secondary protective winding:	from 2 up to 10
Rated instrument security factor FS_{rated} of secondary measuring winding:	from 3 up to 30
Short-time (one second) thermal current kA, at rated primary current	
50 A	5
75-100 A	10
150 A	15
200 A	20
300 A	31,5
400-1500 A	40
Dynamic current kA, at rated primary current:	
50 A	12,8
75-100 A	26
150 A	39
200 A	52
300 A	81
400-1500 A	100
Weight, kg, not more	15
Overall dimensions (LxWxH), mm	225x148x228/225x148x271

Overall dimensions, fitting and connecting dimensions TLO-10 M13

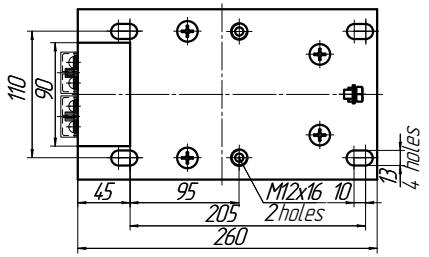




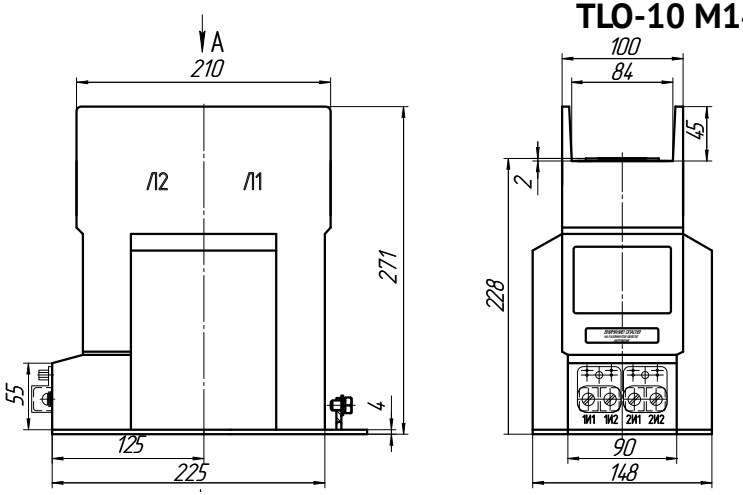
Primary terminals design variant for TLO-10 M13 and M14

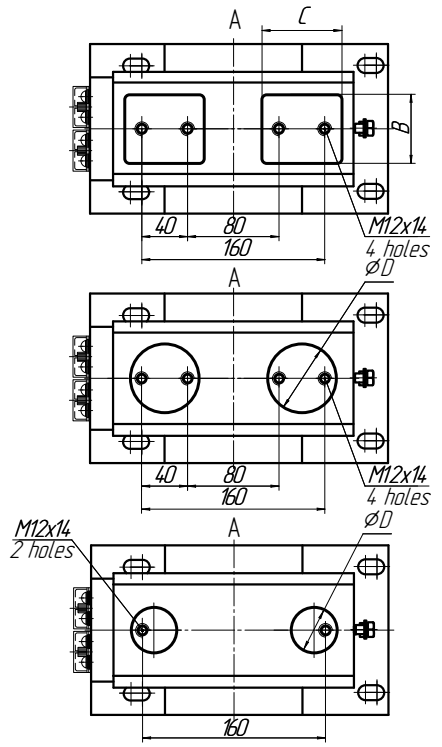
Rated primary current, A	Dimensions of terminals for primary winding, mm	
	ØD	B x C
50..200	40	–
200..600	60	40 x 70
600..1500	–	60 x 70

Fitting dimensions for TLO-10 M13 and M14



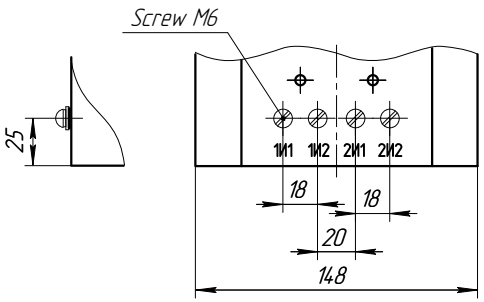
Overall dimensions, fitting and connecting dimensions TLO-10 M14





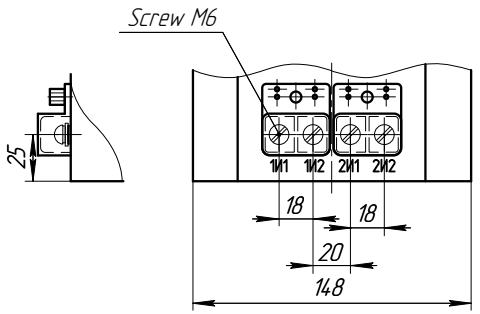
Different modifications

Modification A
secondary terminals from the transformer end surface



Transformers with secondary windings, one or two

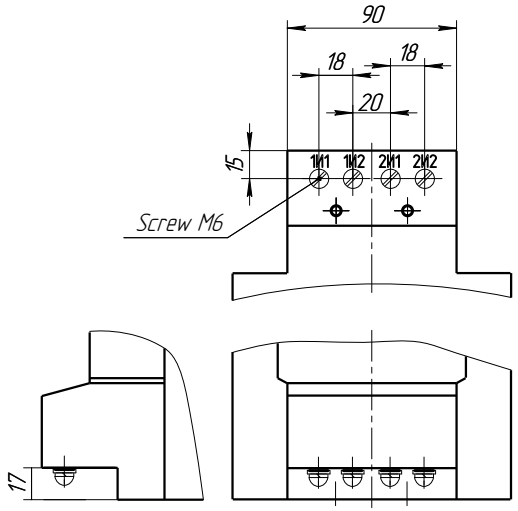
Modification AC
secondary terminals from the transformer end surface seal cover



Transformers with secondary windings, one or two with a cover to protect and seal the measuring winding

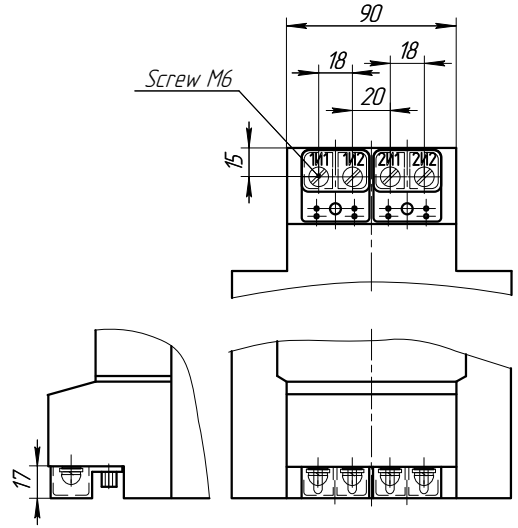
Modification D
with flexible secondary terminals

Modification B
secondary terminals on the transformer bottom



Transformers with secondary windings one or two

Modification BC
seal cover availability



Transformers with secondary windings, one or two with a cover to protect and seal the measuring winding

Technical parameters and characteristics

Parameters	Values for parameters
Rated voltage, kV	10
Maximum operating voltage, kV	12
Rated primary current, A	50; 55; 60; 65; 70; 75; 80; 90; 100; 150; 200; 250; 300; 350; 400; 500; 550; 600; 650; 700; 750; 800; 900; 1000; 1050; 1100; 1150; 1200; 1250; 1300; 1400; 1500
Rated secondary current, A	1; 5
Rated frequency, Hz	50; 60
Number of secondary windings	up to 2
Rated secondary burdens with cosφ=0,8: measuring windings, V·A protective winding, V·A	 from 1 up to 10 from 1 up to 15
Rated accuracy class, according to GOST 7746: measuring windings protective windings	 0,2S; 0,2; 0,5S; 0,5; 1; 3 5P or 10P
Accuracy limit factor K_{rated} of secondary protective winding:	from 2 up to 10
Rated instrument security factor FS_{rated} of secondary measuring winding:	from 3 up to 30
Short-time (one second) thermal current kA, at rated primary current	
50 A	5
75-100 A	10
150 A	15
200 A	20
300 A	31,5
400-1500 A	40
Dynamic current kA, at rated primary current:	
50 A	12,8
75-100 A	26
150 A	39
200 A	52
300 A	81
400-1500 A	100
Weight, kg, not more	15
Overall dimensions (LxWxH), mm	290x148x228/290x148x273

Modification	Description
A	secondary terminals from the transformer end surface
C	seal cover availability

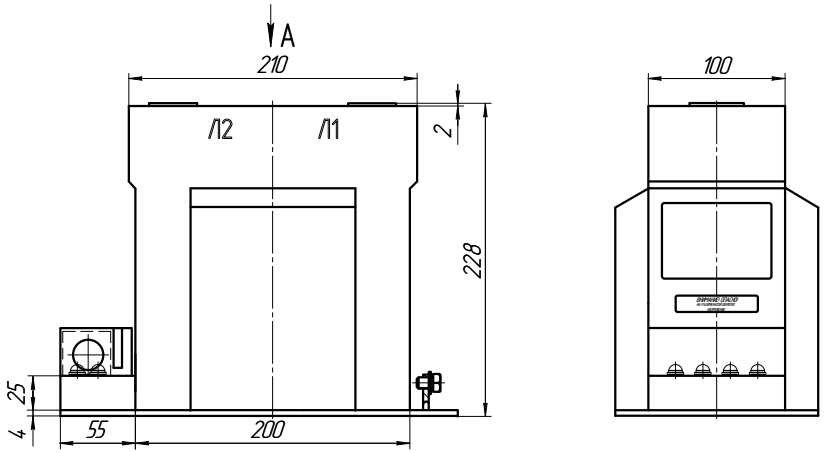
TLO-10 M15 and M16 current transformers can be made in modifications as follows:

TLO-10 M15AC-0,5FS10/10P10-10/15-100/5 N3 a 10 kA

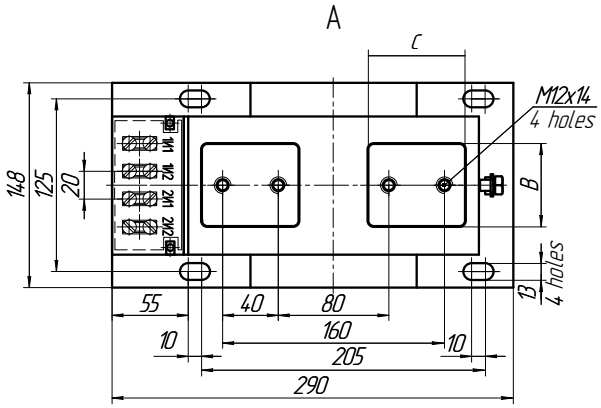
M15	transformer dimension
A	secondary terminals on the transformer body are located at the end surface
C	availability of a cover to protect and seal the measuring winding
0,5	accuracy class of the measuring secondary winding
FS10	instrument security factor of the measuring secondary winding
10P	accuracy class of the protective secondary winding
10	rated accuracy limit factor of the protective winding
10	rated secondary burden of the measuring secondary winding
15	rated secondary burden of the protective secondary winding
100	rated primary current
5	rated secondary current
N	climatic modification
3	placement category
a	insulation level
10 kA	short-time (one-second) thermal current

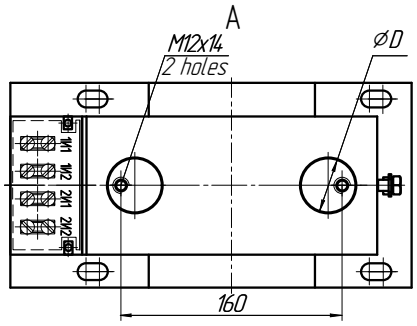
An example of identification of TLO-10 current transformer in M15 dimension:

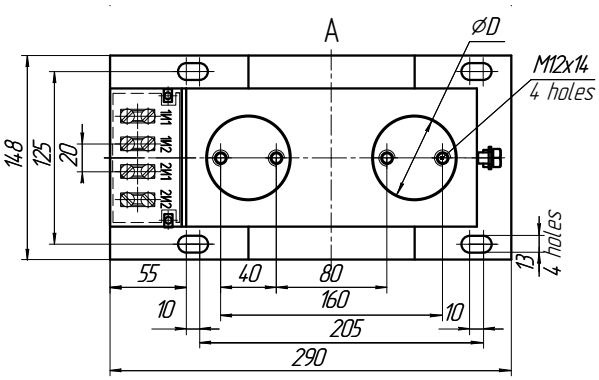
Overall dimensions, fitting and connecting dimensions
TLO-10 M15



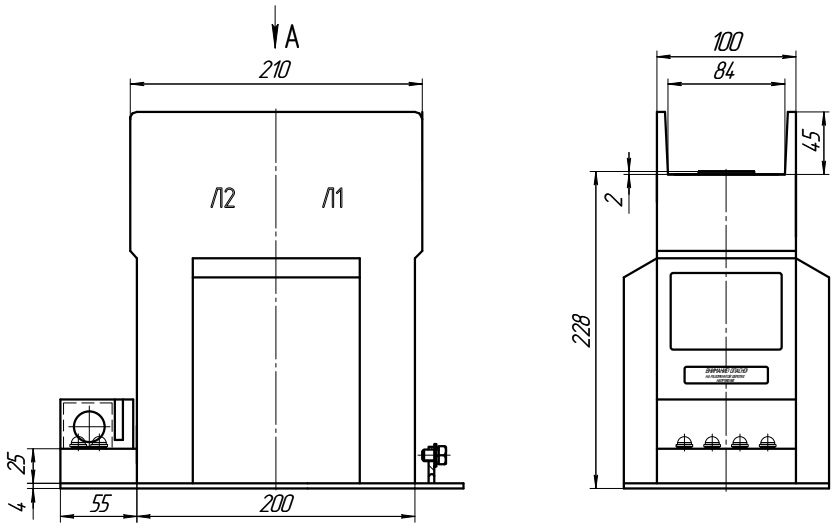
Rated primary current, A	Dimensions of terminals for primary winding, mm	
	ØD	B x C
50..200	40	–
200..600	60	40 x 70
600..1500	–	60 x 70



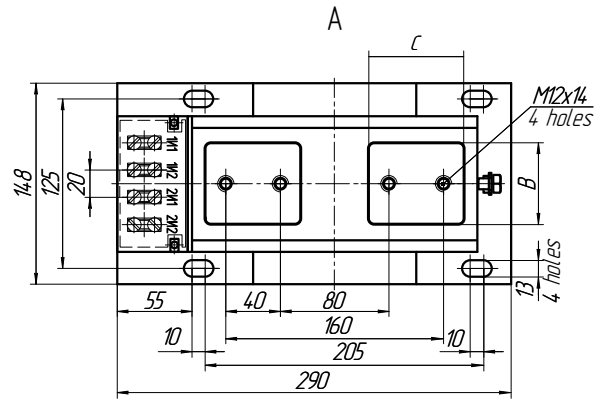


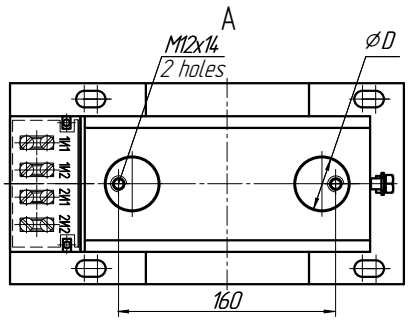


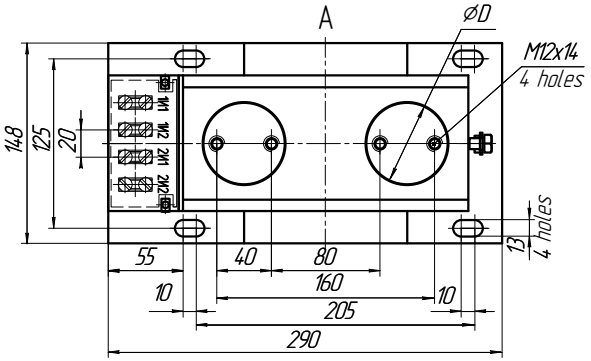
Overall dimensions, fitting and connecting dimensions
TLO-10 M16



Rated primary current, A	Dimensions of terminals for primary winding, mm	
	ØD	B x C
50...200	40	–
200...600	60	40 x 70
600...1500	–	60 x 70







1.1.9. CAST SUPPORT-TYPE CURRENT TRANSFORMERS OF TLO-10 VERSION

TLO-10 M17 current transformers can be made in modifications as follows:

Modification	Description
A	secondary terminals from the transformer end surface
C	seal cover availability
D	with flexible secondary terminals

An example of identification of TLO-10 current transformer in M17 dimension:

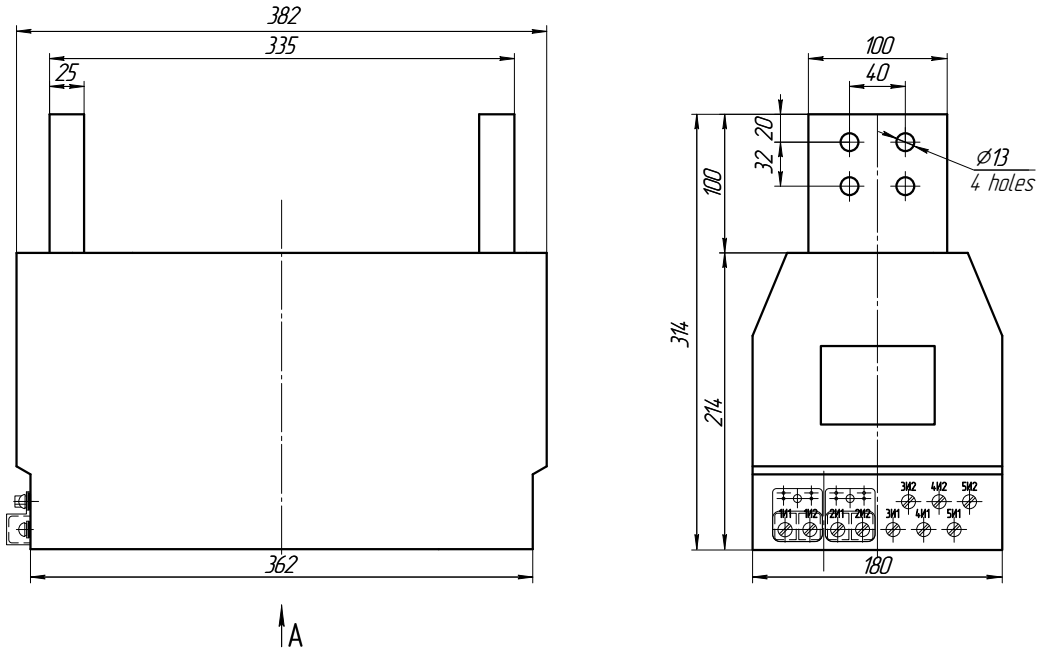
TLO-10 M17AC-0,5FS10/10P10-10/15-4000/5 N3 a 80 kA

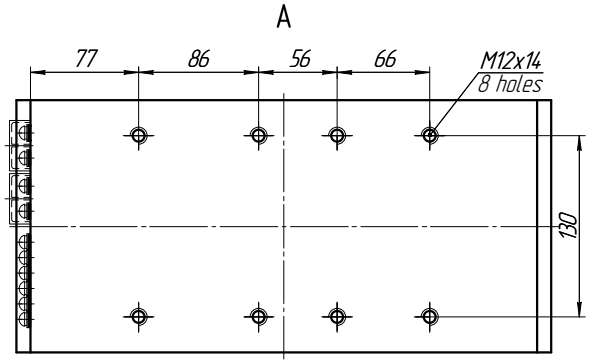
M17	transformer dimension
A	secondary terminals on the transformer body are located at the end surface
C	availability of a cover to protect and seal the measuring winding
0,5	accuracy class of the measuring secondary winding
FS10	instrument security factor of the measuring secondary winding
10P	accuracy class of the protective secondary winding
10	rated accuracy limit factor of the protective winding
10	rated secondary burden of the measuring secondary winding
15	rated secondary burden of the protective secondary winding
4000	rated primary current
5	rated secondary current
N	climatic modification
3	placement category
a	insulation level
80 kA	short-time (one-second) thermal current

Technical parameters and characteristics

Parameters	Values for parameters
Rated voltage, kV	10
Maximum operating voltage, kV	12
Rated primary current, A	4000
Rated secondary current, A	1; 5
Rated frequency, Hz	50; 60
Number of secondary windings	up to 5
Rated secondary burdens with cosφ=0,8: measuring windings, V·A protective winding, V·A	 from 1 up to 50 from 1 up to 50
Rated accuracy class, according to GOST 7746: measuring windings protective windings	 0,2S; 0,2; 0,5S; 0,5; 1; 3 5P or 10P
Accuracy limit factor K_{rated} of secondary protective winding	from 2 up to 30
Rated instrument security factor FS_{rated} of secondary measuring winding	from 3 up to 30
Short-time (one second) thermal current kA, at rated primary current	
4000 A	40-100
Dynamic current kA, at rated primary current:	
4000 A	100-250
Weight, kg, not more	60
Overall dimensions (LxWxH), mm	382x180x314

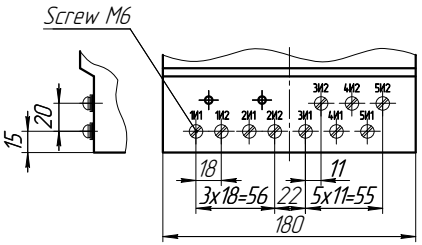
Overall dimensions, fitting and connecting dimensions TLO-10 M17





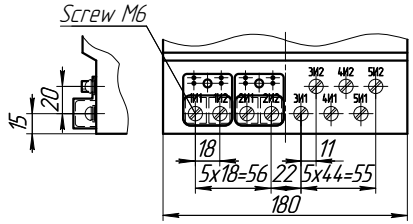
Different modifications

Modification A
secondary terminals from the transformer end surface



Transformers with secondary windings, from one up to five

Modification AC
secondary terminals from the transformer end surface
seal cover



Transformers with secondary windings, from one up to five

Modification B
with flexible secondary terminals

1.1.10. CAST SUPPORT-TYPE CURRENT TRANSFORMERS OF TLO-10 VERSION

TLO-10 M19 and M20 current transformers can be made in modifications as follows:

Modification	Description
A	secondary terminals from the transformer end surface
C	seal cover availability
D	with flexible secondary terminals
E	with switching over on the secondary winding
F	with switching over on the primary winding

An example of identification of TLO-10 current transformer in M19 dimension:

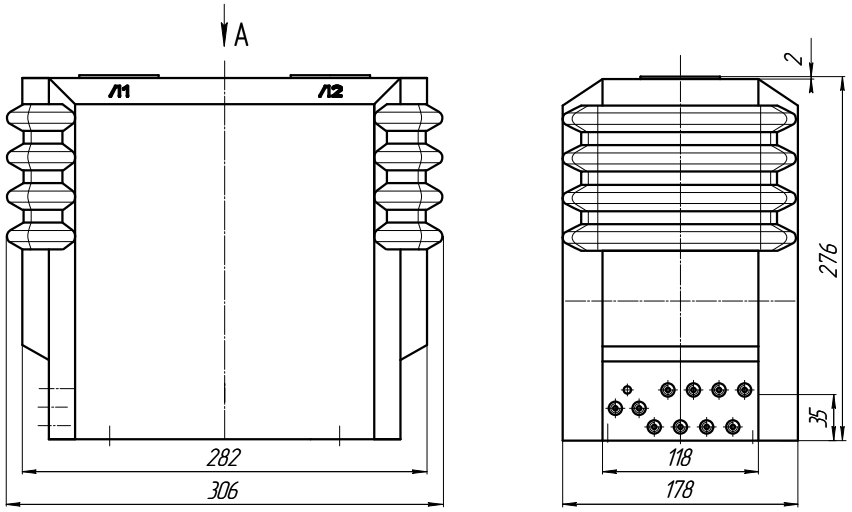
TLO-10 M19AC-0,5FS10/10P10-10/15-2500/5 N3 a 60 kA

M19	transformer dimension
A	secondary terminals on the transformer body are located at the end surface
C	availability of a cover to protect and seal the measuring winding
0,5	accuracy class of the measuring secondary winding
FS10	instrument security factor of the measuring secondary winding
10P	accuracy class of the protective secondary winding
10	rated accuracy limit factor of the protective winding
10	rated secondary burden of the measuring secondary winding
15	rated secondary burden of the protective secondary winding
2500	rated primary current
5	rated secondary current
N	climatic modification
3	placement category
a	insulation level
60 kA	short-time (one-second) thermal current

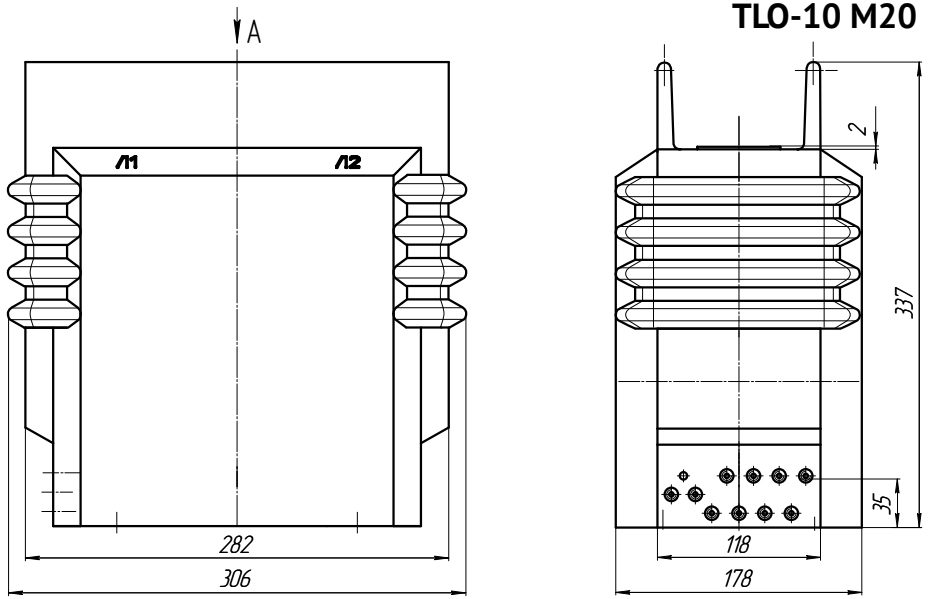
Technical parameters and characteristics

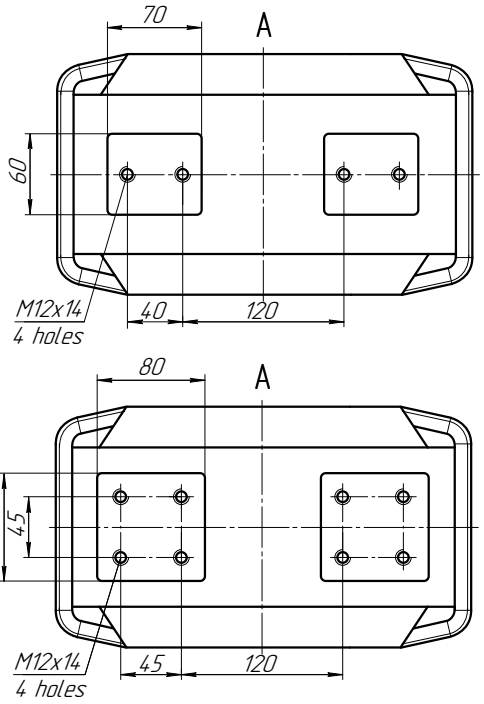
Parameters	Values for parameters
Rated voltage, kV	10
Maximum operating voltage, kV	12
Rated primary current, A	5; 7,5; 10; 11; 12; 13; 14; 16; 15; 18; 20; 22; 25; 27,5; 30; 32,5; 35; 37,5; 40; 50; 55; 60; 65; 70; 75; 80; 90; 100; 150; 200; 250; 300; 350; 400; 500; 550; 600; 650; 700; 750; 800; 900; 1000; 1050; 1100; 1150; 1200; 1250; 1300; 1400; 1500; 1550; 1600; 1650; 1700; 1750; 1800; 1900; 2000; 2100; 2200; 2250; 2300; 2500
Rated secondary current, A	1; 5
Rated frequency, Hz	50; 60
Number of secondary windings	up to 5
Rated secondary burdens with cosφ=0,8: measuring windings, V·A protective winding, V·A	 from 1 up to 30 from 1 up to 30
Rated accuracy class, according to GOST 7746: measuring windings protective windings	 0,2S; 0,2; 0,5S; 0,5; 1; 3 5P or 10P
Accuracy limit factor K_{rated} of secondary protective winding:	from 2 up to 30
Rated instrument security factor FS_{rated} of secondary measuring winding:	from 3 up to 30
Short-time (one second) thermal current kA, at rated primary current	
5-20 A	2,5; 5
30-50 A	5; 10; 20
75-100 A	10; 20; 31,5; 40
150 A	15; 20; 31,5; 40
200 A	20; 31,5; 40-60
300 A	31,5; 40-100
400-2500 A	40-100
Dynamic current kA, at rated primary current:	
5-20 A	6,25; 12,8
30-50 A	12,8; 26; 52
75-100 A	26; 52; 81; 100
150 A	39; 52; 81; 100
200 A	52; 81; 100-150
300 A	81; 100-250
400-2500 A	100-250
Weight, kg, not more	45
Overall dimensions (LxWxH), mm	306x178x276/306x178x337

Overall dimensions, fitting and connecting dimensions TLO-10 M19

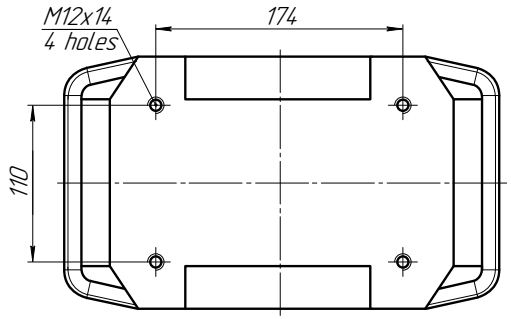


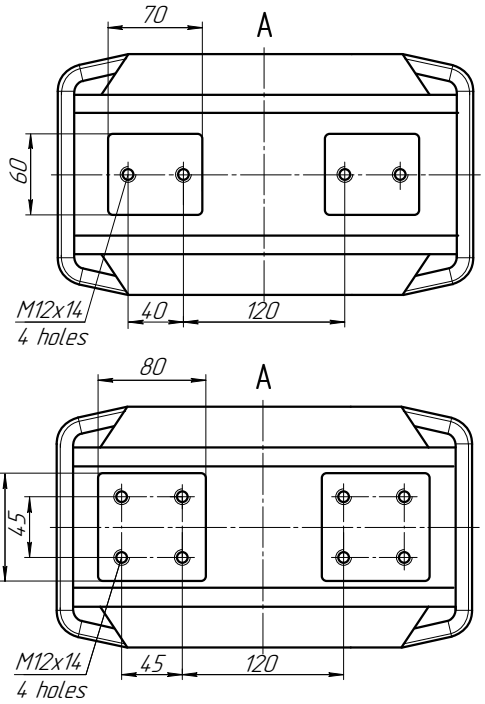
Overall dimensions, fitting and connecting dimensions TLO-10 M20





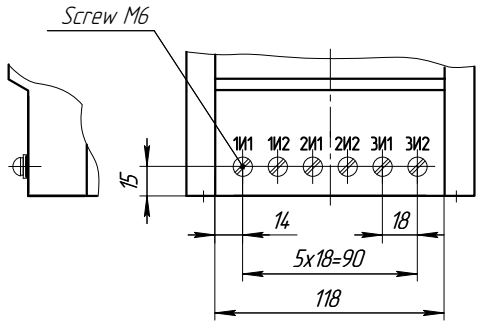
Fitting dimensions for TLO-10 M19 and M20





Different modifications

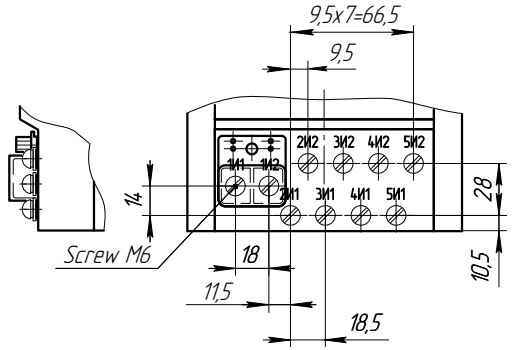
Modification A
secondary terminals from the transformer end surface



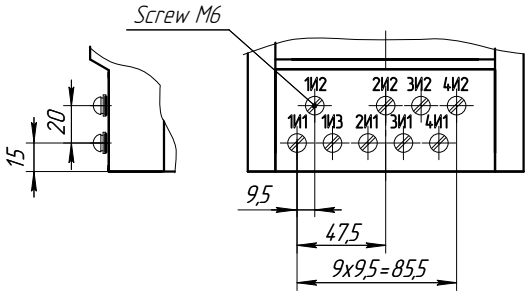
Transformers with secondary windings, from one up to three

Modification D
with flexible secondary terminals

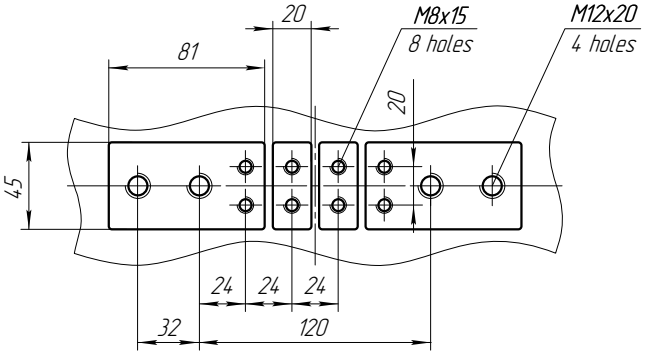
Modification AC
secondary terminals from the transformer end surface, seal cover



Modification AE
with switching over on the secondary winding located at the end surface



Modification F
with switching over on the primary winding
(an example of identification of transformation ratio for a transformer with 2 windings:100(200)/5)



Technical parameters and characteristics

Parameters	Values for parameters
Rated voltage, kV	10
Maximum operating voltage, kV	12
Rated primary current, A	5; 7,5; 10; 11; 12; 13; 14; 16; 15; 18; 20; 22; 25; 27,5; 30; 32,5; 35; 37,5; 40; 50; 55; 60; 65; 70; 75; 80; 90; 100; 150; 200; 250; 300; 350; 400; 500; 550; 600; 650; 700; 750; 800; 900; 1000; 1050; 1100; 1150; 1200; 1250; 1300; 1400; 1500; 1550; 1600; 1650; 1700; 1750; 1800; 1900; 2000; 2100; 2200; 2250; 2300; 2500
Rated secondary current, A	1; 5
Rated frequency, Hz	50; 60
Number of secondary windings	up to 5
Rated secondary burdens with cosφ=0,8: measuring windings, V·A protective winding, V·A	 from 1 up to 50 from 1 up to 50
Rated accuracy class, according to GOST 7746: measuring windings protective windings	 0,2S; 0,2; 0,5S; 0,5; 1; 3 5P or 10P
Accuracy limit factor K_{rated} of secondary protective winding:	from 2 up to 30
Rated instrument security factor FS_{rated} of secondary measuring winding:	from 3 up to 30
Short-time (one second) thermal current kA, at rated primary current	
5-20 A	2,5; 5
30-50 A	5; 10; 20
75-100 A	10; 20; 31,5; 40
150 A	15; 20; 31,5; 40
200 A	20; 31,5; 40-60
300 A	31,5; 40-100
400-2500 A	40-100
Dynamic current kA, at rated primary current:	
5-20 A	6,25; 12,8
30-50 A	12,8; 26; 52
75-100 A	26; 52; 81; 100
150 A	39; 52; 81; 100
200 A	52; 81; 100-150
300 A	81; 100-250
400-2500 A	100-250
Weight, kg, not more	55
Overall dimensions (LxWxH), mm	371x178x276/371x178x337

Modification	Description
A	secondary terminals from the transformer end surface
C	seal cover availability
D	with flexible secondary terminals
E	with switching over on the secondary winding
F	with switching over on the primary winding

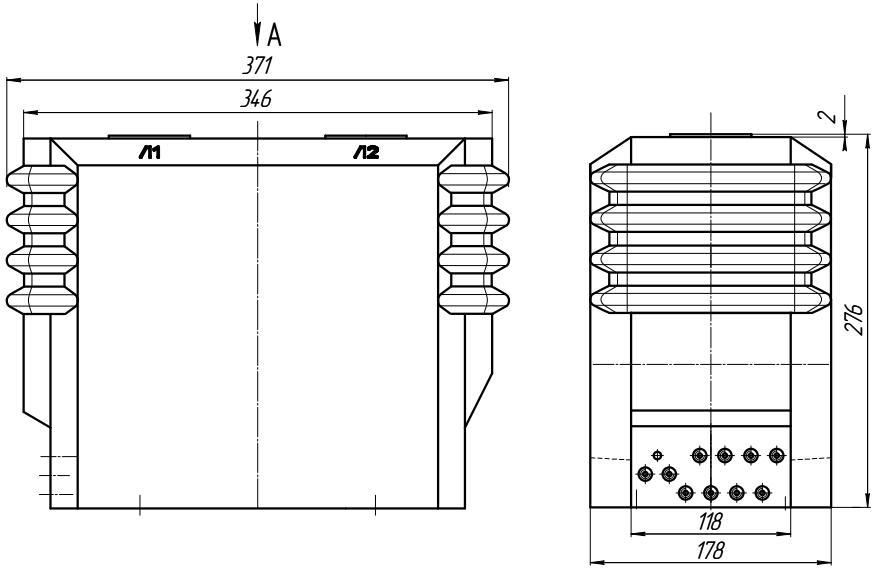
TLO-10 M21 and M22 current transformers can be made in modifications as follows:

TLO-10 M21AC-0,5FS10/10P10-10/15-800/5 N3 a 40 kA

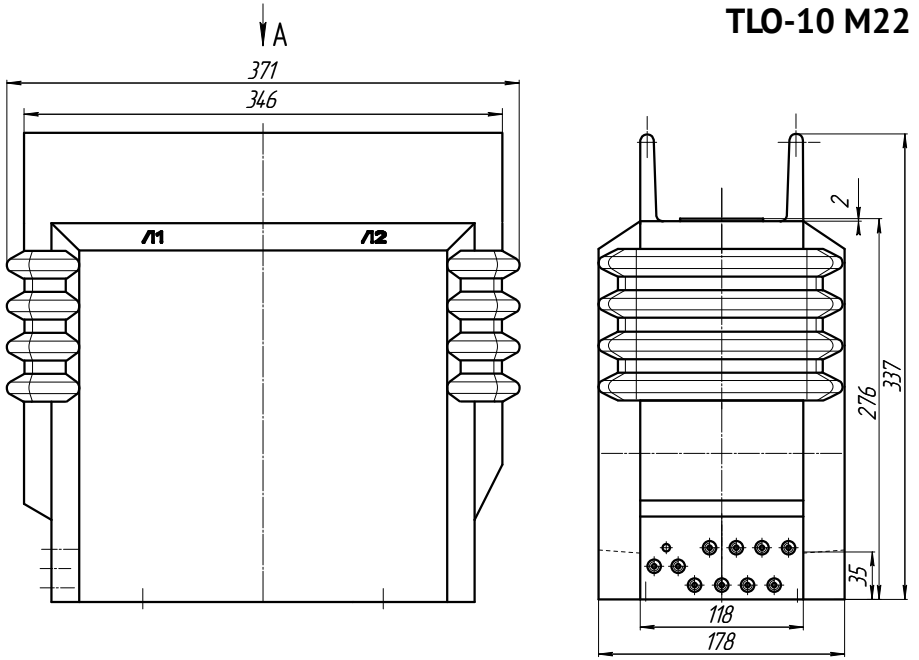
M21	transformer dimension
A	secondary terminals on the transformer body are located at the end surface
C	availability of a cover to protect and seal the measuring winding
0,5	accuracy class of the measuring secondary winding
FS10	instrument security factor of the measuring secondary winding
10P	accuracy class of the protective secondary winding
10	rated accuracy limit factor of the protective winding
10	rated secondary burden of the measuring secondary winding
15	rated secondary burden of the protective secondary winding
800	rated primary current
5	rated secondary current
N	climatic modification
3	placement category
a	insulation level
40 kA	short-time (one-second) thermal current

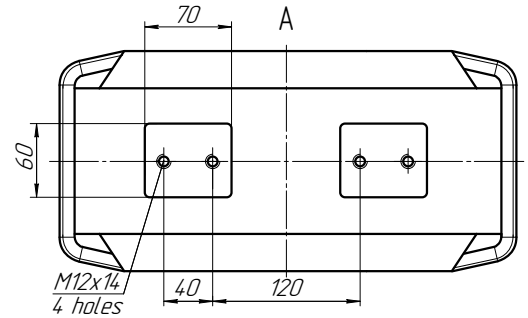
An example of identification of TLO-10 current transformer in M21 dimension:

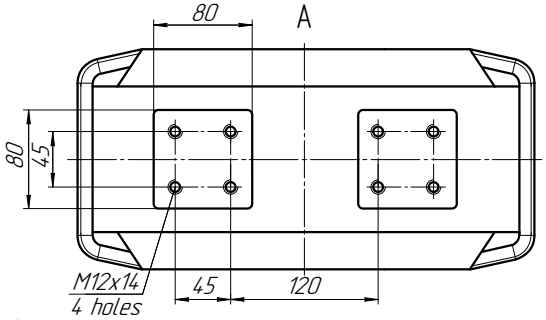
Overall dimensions, fitting and connecting dimensions TLO-10 M21



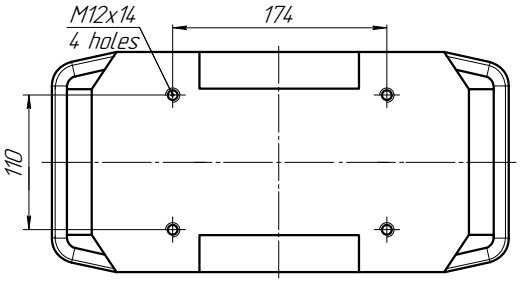
Overall dimensions, fitting and connecting dimensions TLO-10 M22

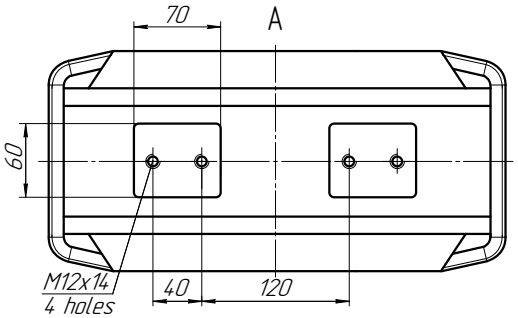


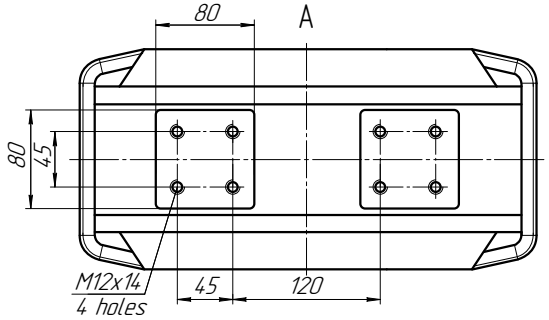




Fitting dimensions for TLO-10 M21 and M22

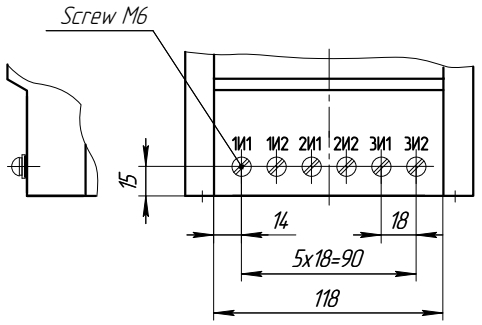






Different modifications

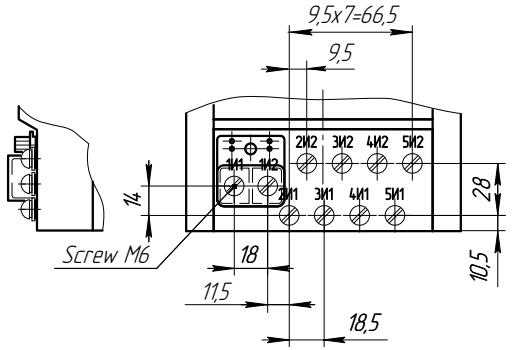
Modification A
secondary terminals from the transformer end surface



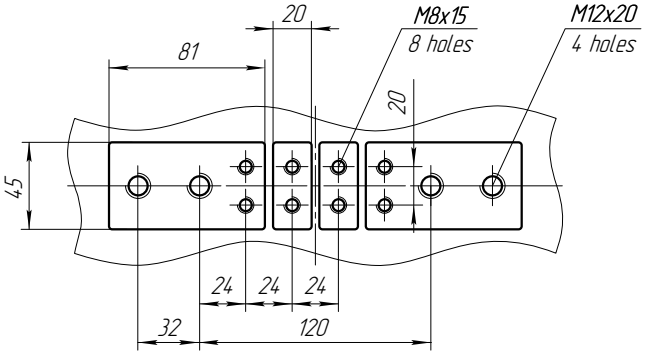
Transformers with secondary windings, from one up to three

Modification D
with flexible secondary terminals

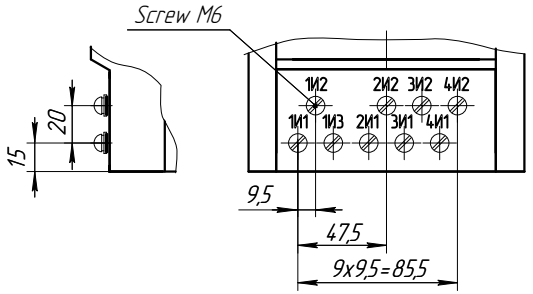
Modification AC
secondary terminals from the transformer end surface, seal cover



Modification F
with switching over on the primary winding
(an example of identification of transformation ratio for a transformer with 2 windings:100(200)/5)



Modification AE
with switching over on the secondary winding located at the end surface



1.1.12. CAST SUPPORT-TYPE CURRENT TRANSFORMERS TLO-10

Outdoor current transformers TLO-10 MH30 NF1

Modification	Description
F	with switching over on the primary winding

An example of identification of TLO-10 current transformer in MH30 dimension:

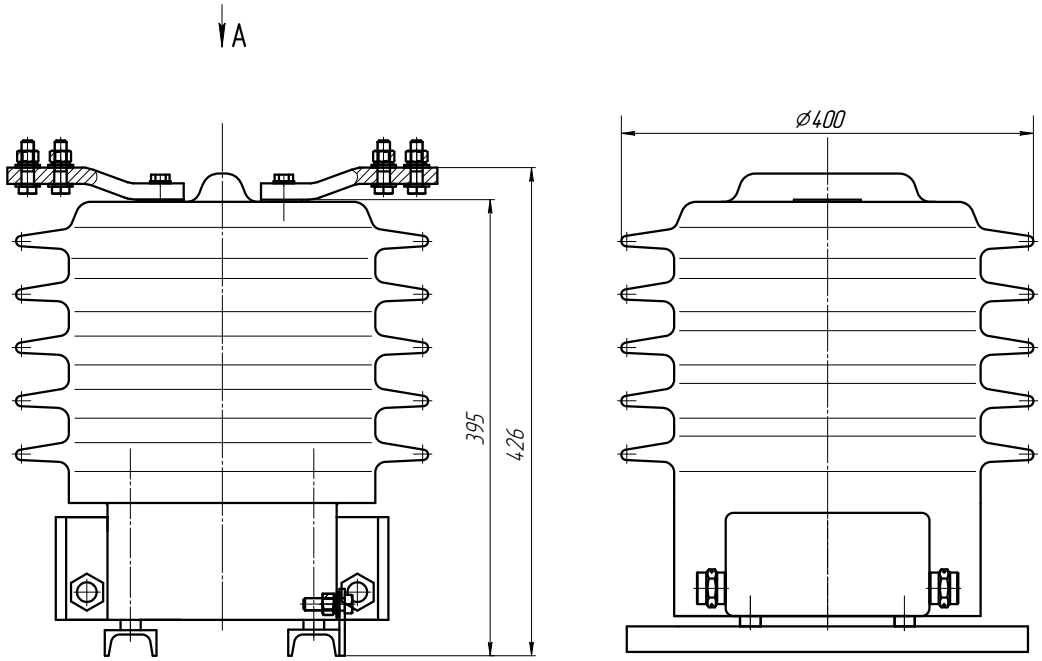
TLO-10 MH30-0,5FS10/10P10-10/15-1000/5 NF1 a 40 kA

MH30	transformer dimension
0,5	accuracy class of the measuring secondary winding
FS10	instrument security factor of the measuring secondary winding
10P	accuracy class of the protective secondary winding
10	rated accuracy limit factor of the protective winding
10	rated secondary burden of the measuring secondary winding
15	rated secondary burden of the protective secondary winding
1000	rated primary current
5	rated secobdary current
NF	climatic modification
1	placement category
a	insulation level
40 kA	short-time (one second) thermal current

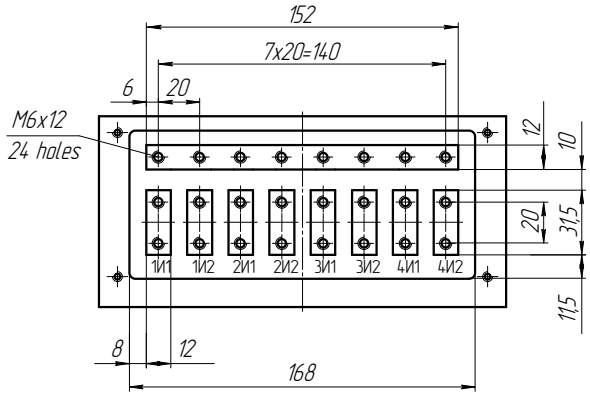
Technical parameters and characteristics

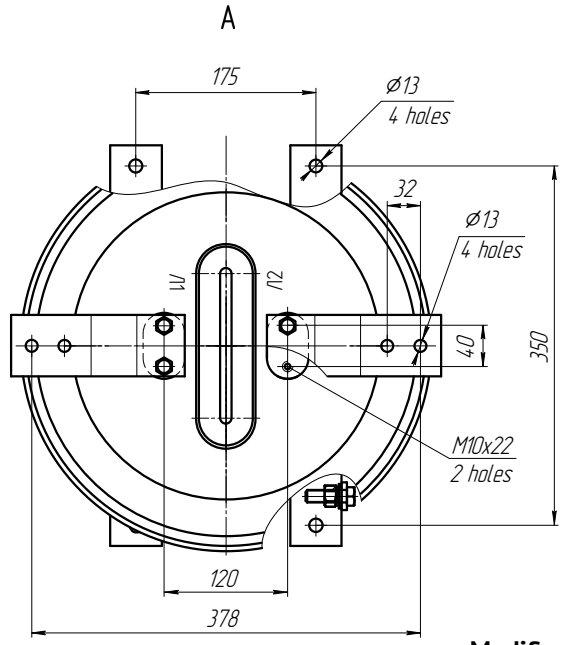
Parameters	Values for parameters
Rated voltage, kV	10
Maximum operating voltage, kV	12
Rated primary current, A	5; 7,5; 10; 11; 12; 13; 14; 16; 15; 18; 20; 22; 25; 27,5; 30; 32,5; 35; 37,5; 40; 50; 55; 60; 65; 70; 75; 80; 90; 100; 150; 200; 250; 300; 350; 400; 500; 550; 600; 650; 700; 750; 800; 900; 1000; 1050; 1100; 1150; 1200; 1250; 1300; 1400; 1500
Rated secondary current, A	1; 5
Rated frequency, Hz	50; 60
Number of secondary windings	up to 3
Rated secondary burdens with cosφ=0,8: measuring windings, V·A protective winding, V·A	 from 1 up to 50 from 1 up to 50
Rated accuracy class, according to GOST 7746: measuring windings protective windings	 0,2S; 0,2; 0,5S; 0,5; 1; 3 5P or 10P
Accuracy limit factor K_{rated} of secondary protective winding:	from 2 up to 30
Rated instrument security factor FS_{rated} of secondary measuring winding:	from 3 up to 30
Short-time (one second) thermal current kA, at rated primary current	
5-20 A	2,5; 5
30-50 A	5; 10; 20
75-100 A	10; 20; 31,5; 40
150 A	15; 20; 31,5; 40
200 A	20; 31,5; 40-60
300 A	31,5; 40-100
400-1500 A	40-100
Dynamic current kA, at rated primary current:	
5-20 A	6,25; 12,8
30-50 A	12,8; 26; 52
75-100 A	26; 52; 81; 100
150 A	39; 52; 81; 100
200 A	52; 81; 100-150
300 A	81; 100-250
400-1500 A	100-250
Weight, kg, not more	90
Overall dimensions (LxWxH), mm	400x400x426

Overall dimensions, fitting and connecting dimensions

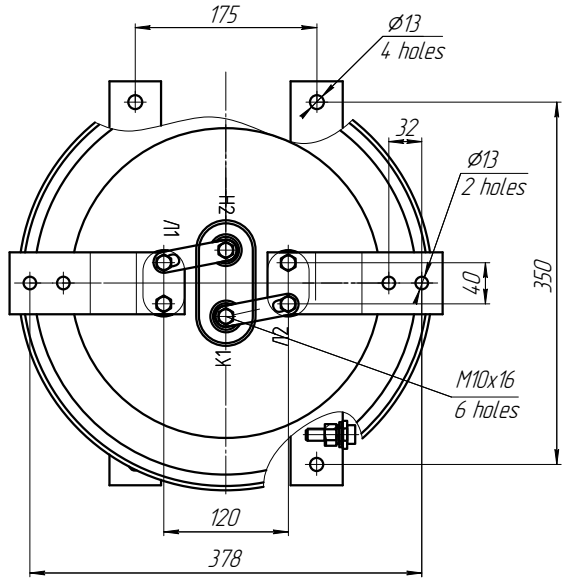


Location of secondary terminals





Modification F
with switching over on the primary winding
for transformers with rated current up to 600 A



1.1.13. CAST SUPPORT-TYPE CURRENT TRANSFORMERS TLO-10

Outdoor current transformers TLO-10 MH31 NF1

Modification	Description
F	with switching over on the primary winding

An example of identification of TLO-10 current transformer in MH31 dimension:

TLO-10 MH31-0,5FS10/10P10-10/15-1000/5 NF1 a 40 kA

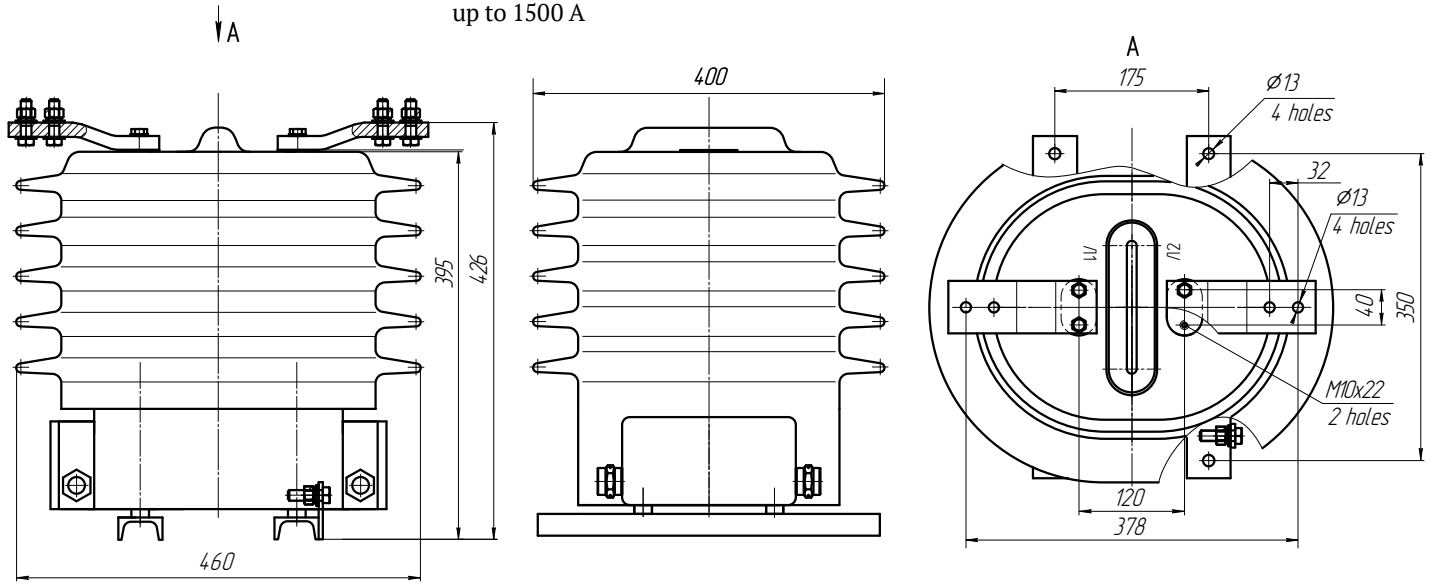
MH31	transformer dimension
0,5	accuracy class of the measuring secondary winding
FS10	instrument security factor of the measuring secondary winding
10P	accuracy class of the protective secondary winding
10	rated accuracy limit factor of the protective winding
10	rated secondary burden of the measuring secondary winding
15	rated secondary burden of the protective secondary winding
1000	rated primary current
5	rated secobdary current
NF	climatic modification
1	placement category
a	insulation level
40 kA	short-time (one second) thermal current

Technical parameters and characteristics

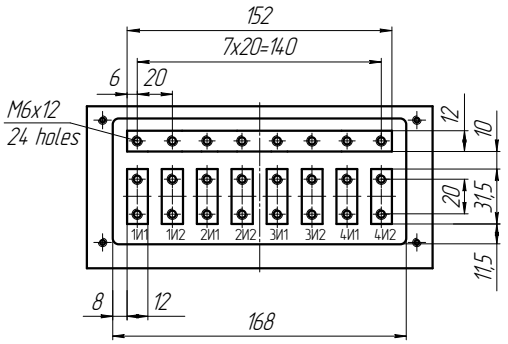
Parameters	Values for parameters
Rated voltage, kV	10
Maximum operating voltage, kV	12
Rated primary current, A	5; 7,5; 10; 11; 12; 13; 14; 16; 15; 18; 20; 22; 25; 27,5; 30; 32,5; 35; 37,5; 40; 50; 55; 60; 65; 70; 75; 80; 90; 100; 150; 200; 250; 300; 350; 400; 500; 550; 600; 650; 700; 750; 800; 900; 1000; 1050; 1100; 1150; 1200; 1250; 1300; 1400; 1500; 1550; 1600; 1650; 1700; 1750; 1800; 1900; 2000; 2100; 2200; 2250; 2300; 2500; 2550; 2600; 2650; 2700; 2750; 2800; 2900; 3000
Rated secondary current, A	1; 5
Rated frequency, Hz	50; 60
Number of secondary windings	up to 5
Rated secondary burdens with cosφ=0,8: measuring windings, V·A protective winding, V·A	 from 1 up to 50 from 1 up to 50
Rated accuracy class, according to GOST 7746: measuring windings protective windings	 0,2S; 0,2; 0,5S; 0,5; 1; 3 5P or 10P
Accuracy limit factor K_{rated} of secondary protective winding:	from 2 up to 30
Rated instrument security factor FS_{rated} of secondary measuring winding:	from 3 up to 30
Short-time (one second) thermal current kA, at rated primary current	
5-20 A	2,5; 5
30-50 A	5; 10; 20
75-100 A	10; 20; 31,5; 40
150 A	15; 20; 31,5; 40
200 A	20; 31,5; 40-60
300 A	31,5; 40-100
400-3000 A	40-100
Dynamic current kA, at rated primary current:	
5-20 A	6,25; 12,8
30-50 A	12,8; 26; 52
75-100 A	26; 52; 81; 100
150 A	39; 52; 81; 100
200 A	52; 81; 100-150
300 A	81; 100-250
400-3000 A	100-250
Weight, kg, not more	90
Overall dimensions (LxWxH), mm	460x400x426

Overall dimensions, fitting and connecting dimensions

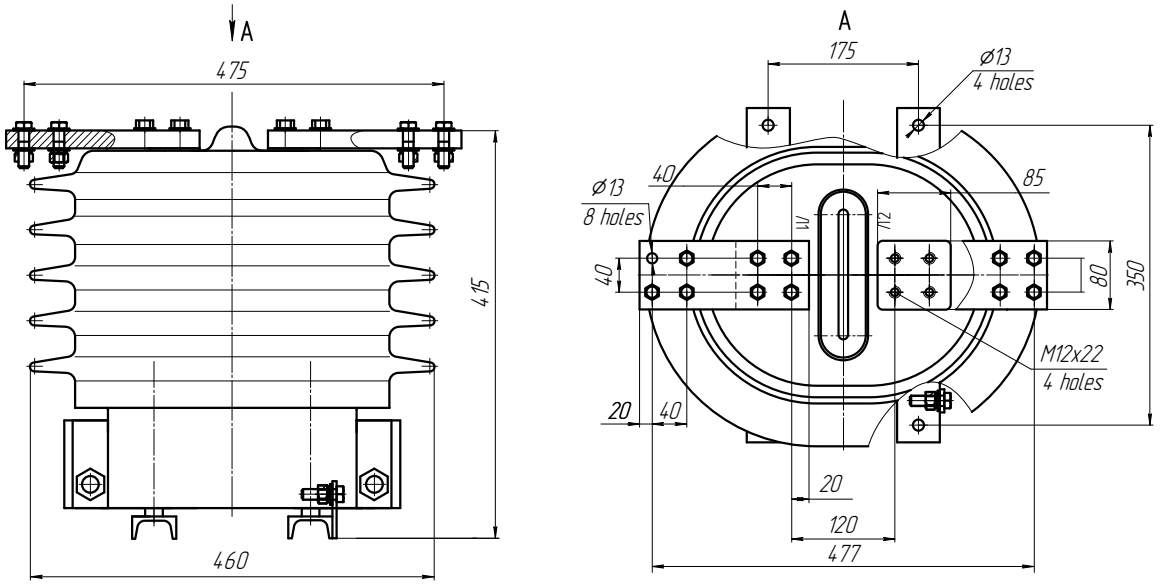
up to 1500 A



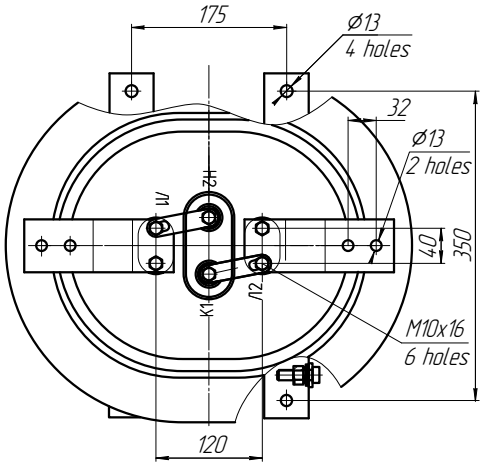
Location of secondary terminals



from 1500 A



Modification F
with switching over on the primary winding
for transformers with rated current up to 600 A



IMPLEMENTED PROJECTS

TLO | **TLP** | **TZLK(R)-0,66** | **TSH-EK-0,66** | **ZNOL(P)-EK**

HEAT POWER ENGINEERING

CHP - combined heat and power (plant)

Mosenergo CHP-4, -12, -16, -17, -21, -25, -26, -27
Abakan CHP
Aleksin CHP
Balkhash CHP
Vladimir CHP
Vladivostok CHP-2
Dankov CHP
Zhodino CHP
Izhevsk CHP and CHP-1
Kazan CHP-3
Kamchatka CHP
Kirov CHP-4
Klintsy CHP
Kuznetsk CHP
Likhachov Plant (ZIL) CHP
Lipetsk CHP-2
Nizhnekamsk CHP
Novgorod CHP
Novogorkovsk CHP
Novokondrovsk CHP
Novo-Ryazanskaya CHP
Obninsk CHP
Okhtinskaya CHP
Penza CHP
Sarov CHP
Severnaya CHP
Central CHP
South-Western CHP
Huadian-Tenin CHP
Yuzhno-Sakhalinsk CHP

HYDROELECTRIC POWER

HPP - hydro power plant

Volga HPP
Boguchany HPP
Gizeldon HPP
Gotsatlinskaya HPP
Zhigulevsk HPP
Irkutsks HPP
Kabardino-Balkaria HPP
Kama HPP
Cascade of Paz HPP

NUCLEAR POWER ENGINEERING

NPP nuclear power plant

Balakovo NPP
Beloyarskaya NPP
Beloyarskaya NPP-2
Kalininskaya NPP

CAST SUPPORT-TYPE CURRENT TRANSFORMERS TLO-24

Description

TLO-24 current transformer for 6-10 kV is designed for installation in indoor and outdoor switchgears and in single-end service assembled chambers.

The current transformer ensures transmitting of the measuring information signal to the measuring instruments and protection and control devices to insulate secondary wiring from high voltage in alternating current electrical units for up to 24 kV voltage class.
Climatic modification N (temperate climate), T (tropical climate) or NF (temperate an cold climate), placement category 1, 2 or 3.

Production on the basis of the specification: TU 3414-024-52889537-07.

Guaranteed service life – 5 years.

Technical parameters and characteristics

Parameters	Possible values for parameters	Standard parameters
Rated voltage, kV	20, 24	
Maximum operating voltage, kV	26, 5	
Rated primary current, A	5-3000	-
Rated secondary current, A	1, 5	-
Rated frequency, Hz	50, 60	
Number of secondary windings	up to 5	
Rated secondary burdens with cosφ=0,8: measuring windings, V·A protective winding, V·A	 1-50 1-50	 10 15
Rated accuracy class: measuring windings protective windings	0,2; 0,2S; 0,5; 0,5S; 1; 3 5P or 10P	
Accuracy limit factor K_{rated} of secondary protective winding	from 2 up to 30	10
Rated instrument security factor FS_{rated} of secondary measuring winding	from 3 up to 30	-
Short-time (one second) thermal current kA, at rated primary current		
5-20 A	2,5; 5	
30 - 50 A	5; 10; 20	
75 -100 A	10; 20; 31,5; 40	
150 A	15; 20; 31,5; 40	
200 A	20; 31,5; 40-60	
300 A	31,5; 40-100	
400-3000 A	40-100	
Dynamic current kA, at rated primary current		
5-20 A	6,25; 12,8	
30 - 50 A	12,8; 26; 52	
75 - 100 A	26; 52; 81; 100	
150 A	39; 52; 81; 100	
200 A	52; 81; 100-150	
300 A	81; 100-250	
400-3000 A	100-250	
Weight, kg, not more	150	

1.2.1. CAST SUPPORT-TYPE CURRENT TRANSFORMERS TLO-24

TLO-24 M1 and M2 current transformers can be made in modifications as follows:

Modification	Description
A	secondary terminals from the transformer end surface
B	secondary terminals on the transformer bottom
C	seal cover availability
D	with flexible secondary terminals
E	with switching over on the secondary winding
F	with switching over on the primary winding

An example of identification of TLO-24 current transformer in M1 dimension:

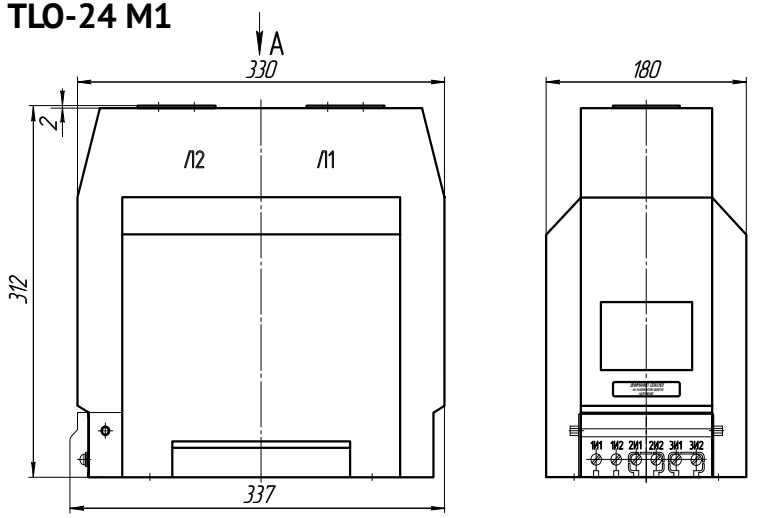
TLO-24 M1AC-0,5FS10/10P10-10/15-100/5 N3 a 10 kA

M1	transformer dimension
A	secondary terminals on the transformer body are located at the end surface
C	availability of a cover to protect and seal the measuring winding
0,5	accuracy class of the measuring secondary winding
FS10	instrument security factor of the measuring secondary winding
10P	accuracy class of the protective secondary winding
10	rated accuracy limit factor of the protective winding
10	rated secondary burden of the measuring secondary winding
15	rated secondary burden of the protective secondary winding
100	rated primary current
5	rated secondary current
N	climatic modification
3	placement category
a	insulation level
10 kA	short-time (one-second) thermal current

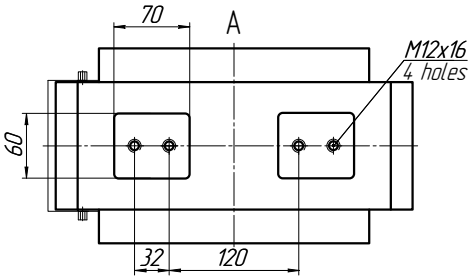
Technical parameters and characteristics

Parameters	Values for parameters
Rated voltage, kV	20; 24
Maximum operating voltage, kV	26,5
Rated primary current, A	5; 7,5; 10; 11; 12; 13; 14; 16; 15; 18; 20; 22; 25; 27,5; 30; 32,5; 35; 37,5; 40; 50; 55; 60; 65; 70; 75; 80; 90; 100; 150; 200; 250; 300; 350; 400; 500; 550; 600; 650; 700; 750; 800; 900; 1000; 1050; 1100; 1150; 1200; 1250; 1300; 1400; 1500; 1550; 1600; 1650; 1700; 1750; 1800; 1900; 2000; 2100; 2200; 2250; 2300; 2500; 2550; 2600; 2650; 2700; 2750; 2800; 2900; 3000
Rated secondary current, A	1; 5
Rated frequency, Hz	50; 60
Number of secondary windings	up to 5
Rated secondary burdens with cosφ=0,8: measuring windings, V·A protective winding, V·A	 from 1 up to 30 from 1 up to 30
Rated accuracy class, according to GOST 7746: measuring windings protective windings	 0,2S; 0,2; 0,5S; 0,5; 1; 3 5P or 10P
Accuracy limit factor K_{rated} of secondary protective winding:	from 2 up to 30
Rated instrument security factor FS_{rated} of secondary measuring winding:	from 3 up to 30
Short-time (one second) thermal current kA, at rated primary current	
5-20 A	2,5; 5
30-50 A	5; 10; 20
75-100 A	10; 20; 31,5; 40
150 A	15; 20; 31,5; 40
200 A	20; 31,5; 40-60
300 A	31,5; 40-100
400-3000 A	40-100
Dynamic current kA, at rated primary current:	
5-20 A	6,25; 12,8
30-50 A	12,8; 26; 52
75-100 A	26; 52; 81; 100
150 A	39; 52; 81; 100
200 A	52; 81; 100-150
300 A	81; 100-250
400-3000 A	100-250
Weight, kg, not more	50
Overall dimensions (LxWxH), mm	330x180x312/330x180x355

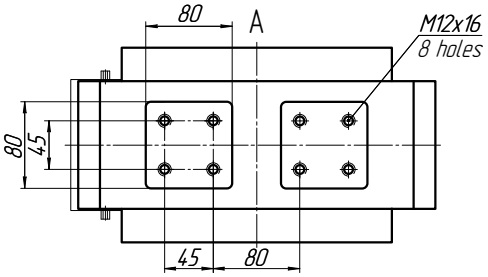
Overall dimensions, fitting and connecting dimensions TLO-24 M1



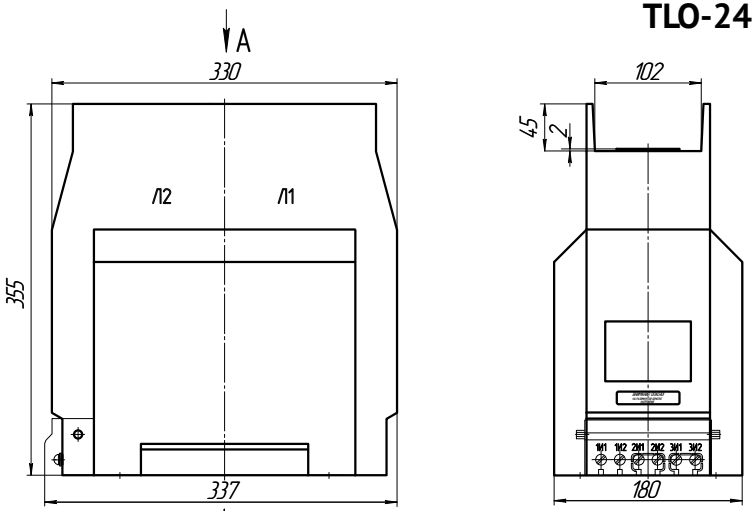
up to 1500 A



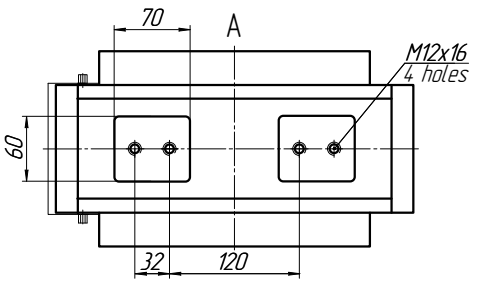
from 1500 A



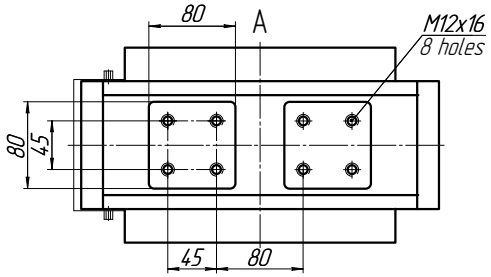
Overall dimensions, fitting and connecting dimensions TLO-24 M2



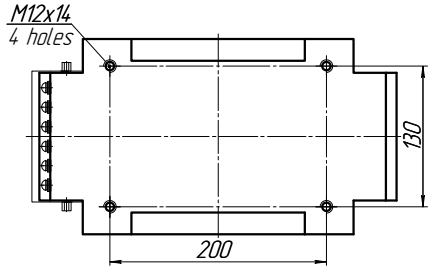
up to 1500 A



from 1500 A

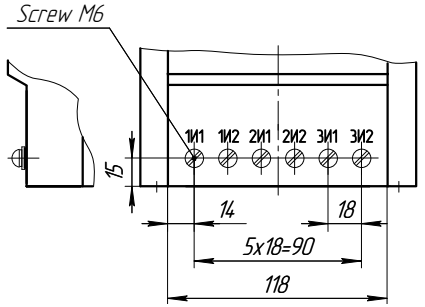


Fitting dimensions for TLO-24 M1 and M2

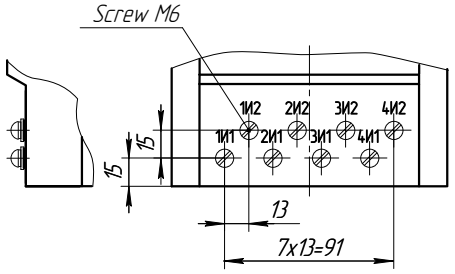


Different modifications

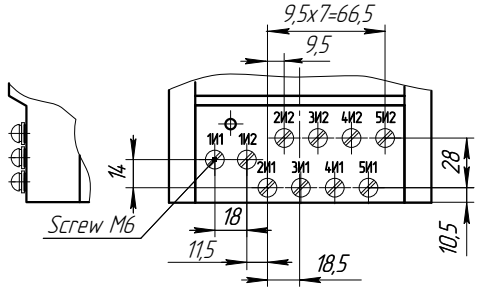
Modification A
secondary terminals from the transformer end surface



Transformers with secondary windings, from one up to three

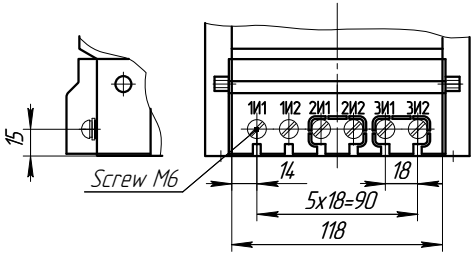


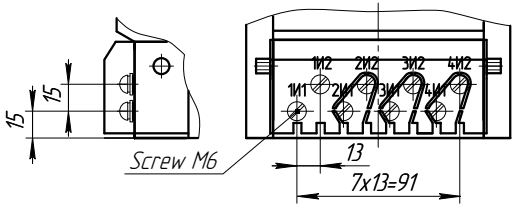
Transformers with secondary windings, from one up to four

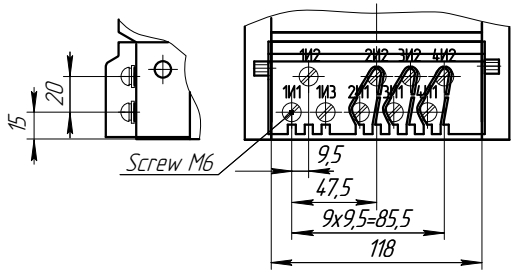


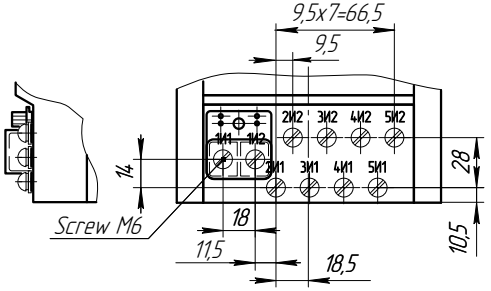
Transformers with secondary windings, from one up to five

Modification AC
secondary terminals from the transformer end surface, seal cover

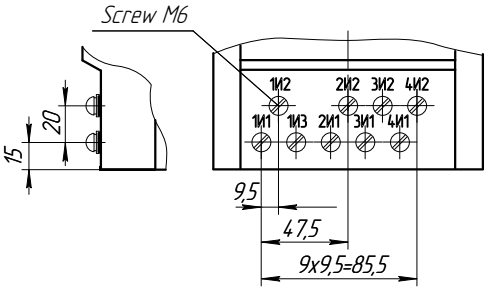




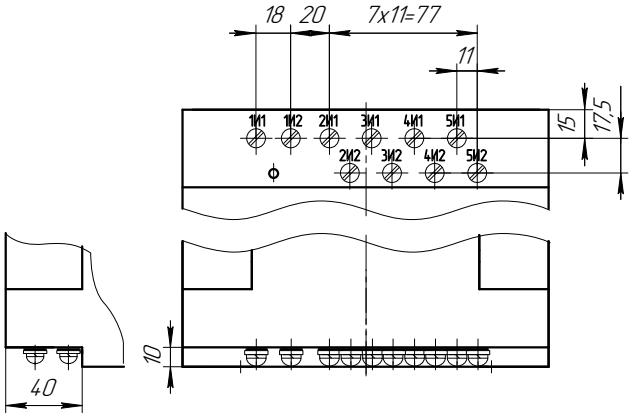




Modification AE
with switching over on the secondary winding located at the end surface

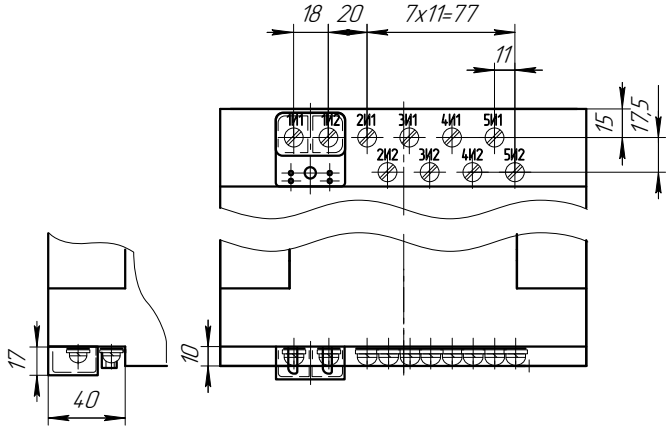


Modification B
secondary terminals on the transformer bottom

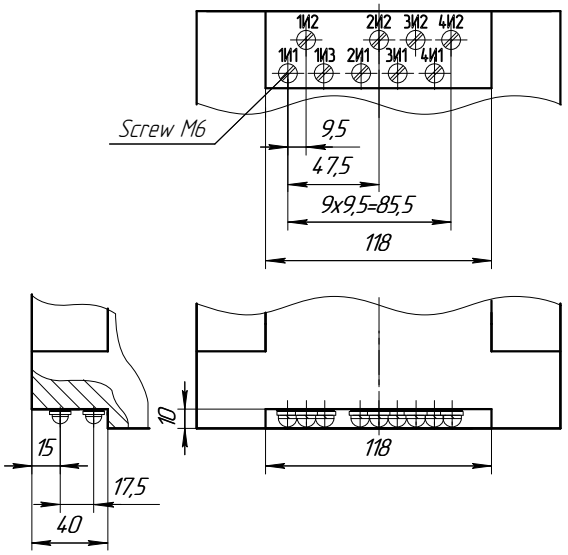


Transformers with secondary windings,
from one up to five

Modification BC
secondary terminals on the transformer bottom,
seal cover

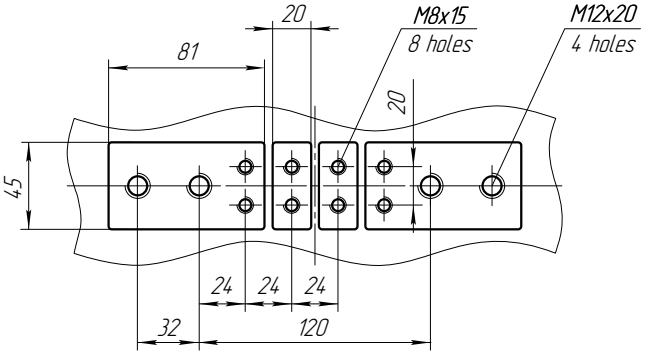


Modification BE
with switching over on the secondary winding
located on the bottom



Modification D
with flexible secondary terminals

Modification F
with switching over on the primary winding
(an example of identification of transformation ratio for
a transformer with 2 windings:100(200)/5)



1.2.2. CAST SUPPORT-TYPE CURRENT TRANSFORMERS TLO-24

TLO-24 M3 and M4 current transformers can be made in modifications as follows:

Modification	Description
A	secondary terminals from the transformer end surface
B	secondary terminals on the transformer bottom
C	seal cover availability
D	with flexible secondary terminals
E	with switching over on the secondary winding
F	with switching over on the primary winding

An example of identification of TLO-24 current transformer in M3 dimension:

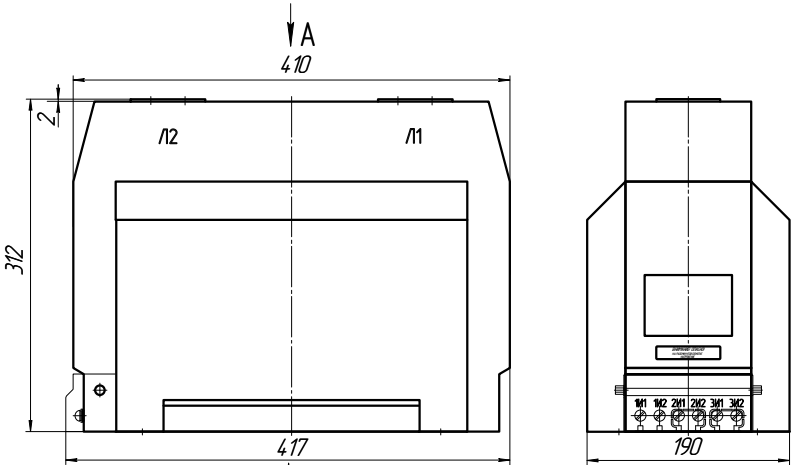
TLO-24 M3AC-0,5FS10/10P10-10/15-100/5 N3 a 10 kA

M3	transformer dimension
A	secondary terminals on the transformer body are located at the end surface
C	availability of a cover to protect and seal the measuring winding
0,5	accuracy class of the measuring secondary winding
FS10	instrument security factor of the measuring secondary winding
10P	accuracy class of the protective secondary winding
10	rated accuracy limit factor of the protective winding
10	rated secondary burden of the measuring secondary winding
15	rated secondary burden of the protective secondary winding
100	rated primary current
5	rated secondary current
N	climatic modification
3	placement category
a	insulation level
10 kA	short-time (one-second) thermal current

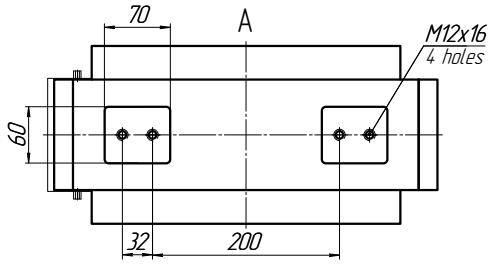
Technical parameters and characteristics

Parameters	Values for parameters
Rated voltage, kV	20; 24
Maximum operating voltage, kV	26,5
Rated primary current, A	5; 7,5; 10; 11; 12; 13; 14; 16; 15; 18; 20; 22; 25; 27,5; 30; 32,5; 35; 37,5; 40; 50; 55; 60; 65; 70; 75; 80; 90; 100; 150; 200; 250; 300; 350; 400; 500; 550; 600; 650; 700; 750; 800; 900; 1000; 1050; 1100; 1150; 1200; 1250; 1300; 1400; 1500; 1550; 1600; 1650; 1700; 1750; 1800; 1900; 2000; 2100; 2200; 2250; 2300; 2500; 2550; 2600; 2650; 2700; 2750; 2800; 2900; 3000
Rated secondary current, A	1; 5
Rated frequency, Hz	50; 60
Number of secondary windings	up to 5
Rated secondary burdens with cosφ=0,8: measuring windings, V·A protective winding, V·A	 from 1 up to 50 from 1 up to 50
Rated accuracy class, according to GOST 7746: measuring windings protective windings	 0,2S; 0,2; 0,5S; 0,5; 1; 3 5P or 10P
Accuracy limit factor K_{rated} of secondary protective winding:	from 2 up to 30
Rated instrument security factor FS_{rated} of secondary measuring winding:	from 3 up to 30
Short-time (one second) thermal current kA, at rated primary current	
5-20 A	2,5; 5
30-50 A	5; 10; 20
75-100 A	10; 20; 31,5; 40
150 A	15; 20; 31,5; 40
200 A	20; 31,5; 40-60
300 A	31,5; 40-100
400-3000 A	40-100
Dynamic current kA, at rated primary current:	
5-20 A	6,25; 12,8
30-50 A	12,8; 26; 52
75-100 A	26; 52; 81; 100
150 A	39; 52; 81; 100
200 A	52; 81; 100-150
300 A	81; 100-250
400-3000 A	100-250
Weight, kg, not more	55
Overall dimensions (LxWxH), mm	410x190x312/410x190x355

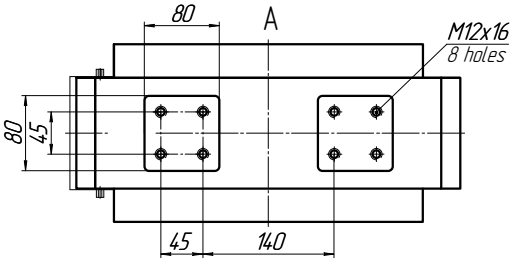
Overall dimensions, fitting and connecting dimensions TLO-24 M3



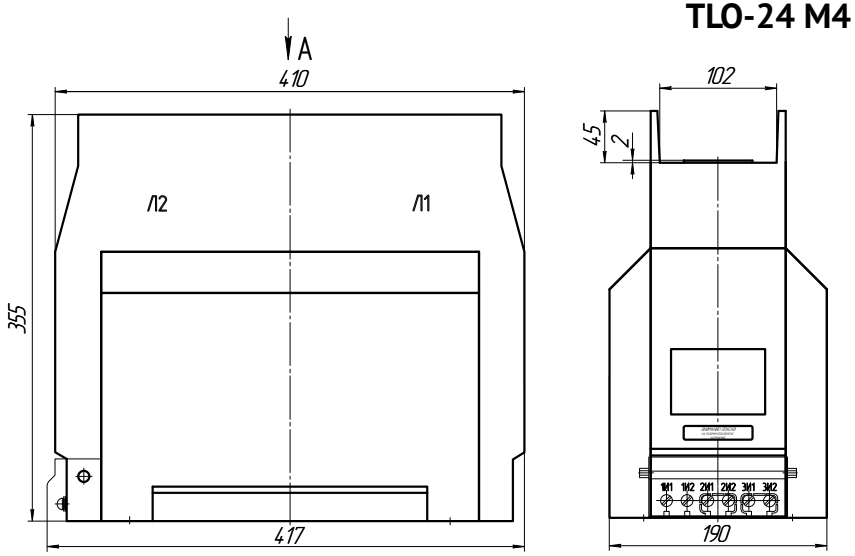
up to 1500 A



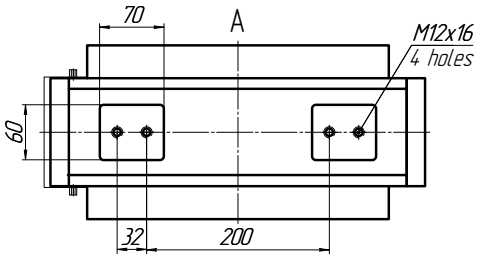
from 1500 A



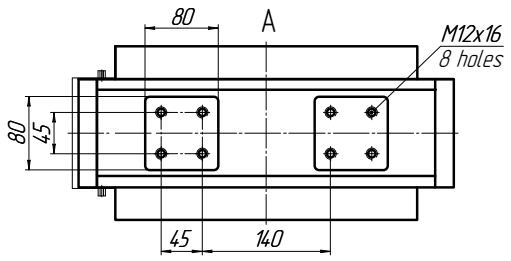
Overall dimensions, fitting and connecting dimensions TLO-24 M4



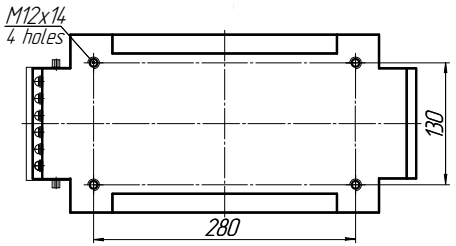
up to 1500 A



from 1500 A

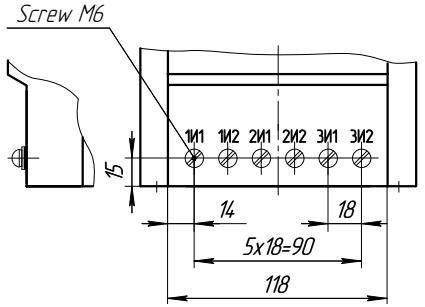


Fitting dimensions for TLO-24 M3 and M4

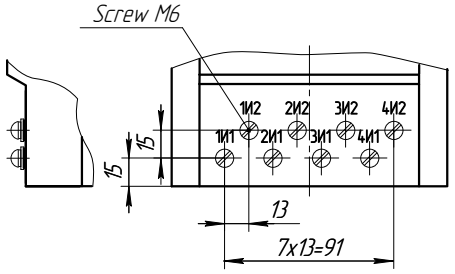


Different modifications

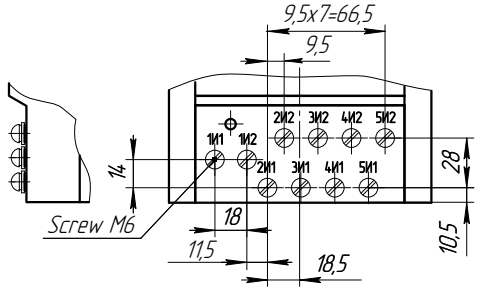
Modification A
secondary terminals from the transformer end surface



Transformers with secondary windings, from one up to three

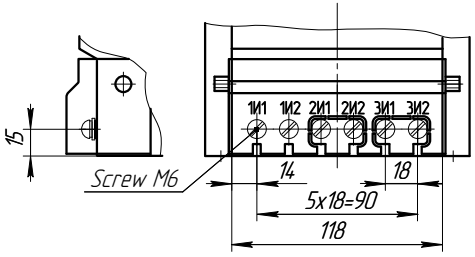


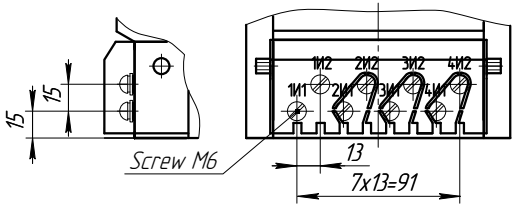
Transformers with secondary windings, from one up to four

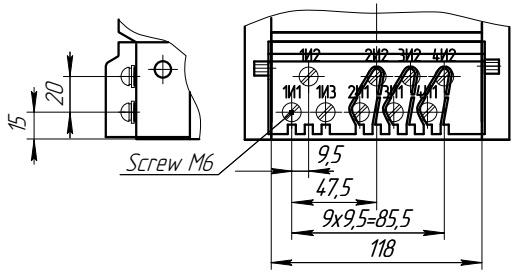


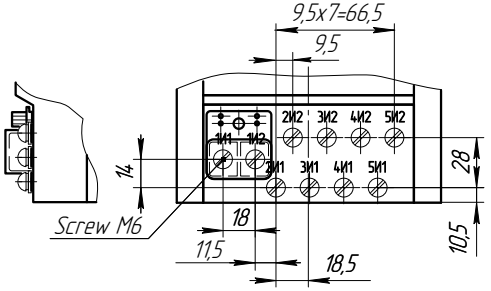
Transformers with secondary windings, from one up to five

Modification AC
secondary terminals from the transformer end surface, seal cover

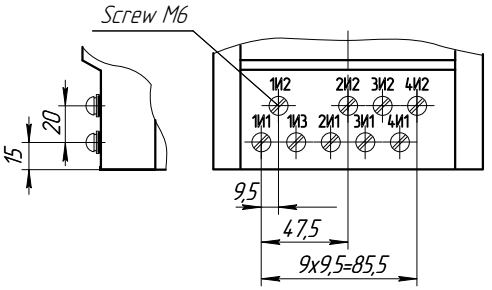




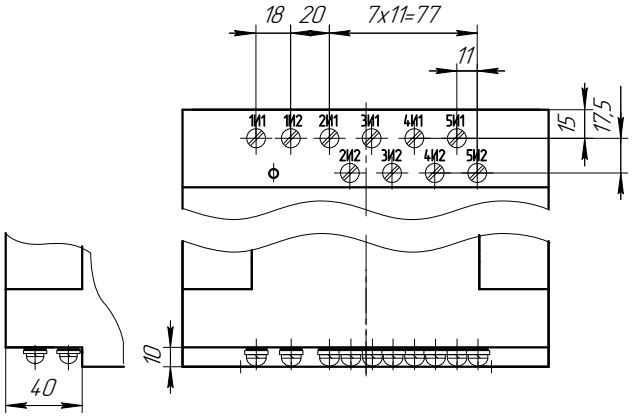




Modification AE
with switching over on the secondary winding located at the end surface

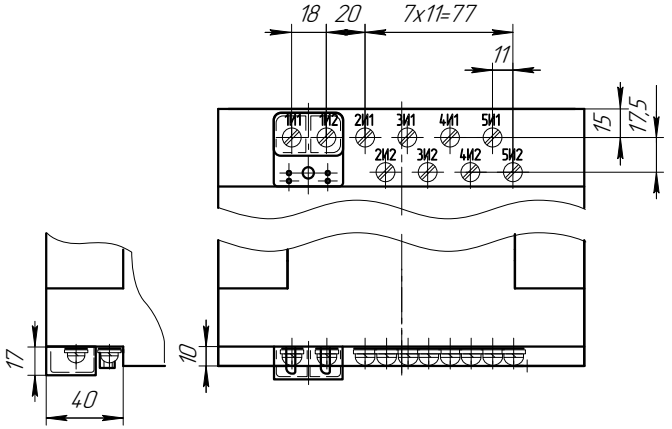


Modification B
secondary terminals on the transformer bottom

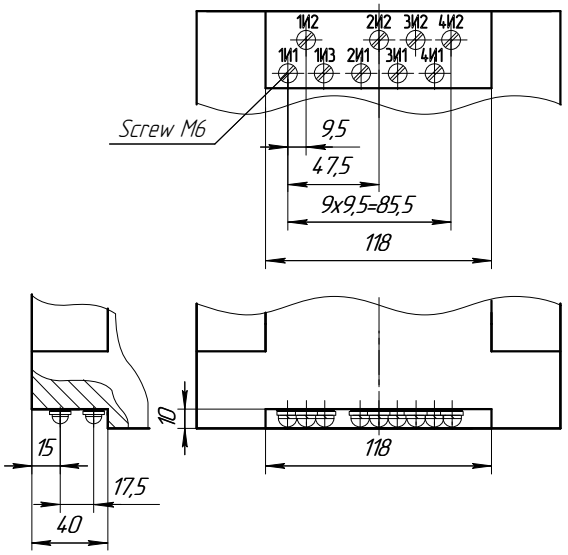


Transformers with secondary windings,
from one up to five

Modification BC
secondary terminals on the transformer bottom,
seal cover



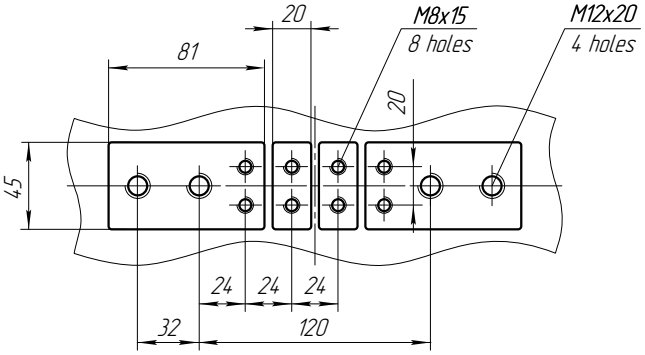
Modification BE
with switching over on the secondary winding
located on the bottom



Transformers with secondary windings,
from one up to five with a cover to protect and seal
the measuring winding

Modification D
with flexible secondary terminals

Modification F
with switching over on the primary winding
(an example of identification of transformation ratio for
a transformer with 2 windings:100(200)/5)



1.2.3. CAST SUPPORT-TYPE CURRENT TRANSFORMERS TLO-24

TLO-24 M5 and M6 current transformers can be made in modifications as follows:

Modification	Description
A	secondary terminals from the transformer end surface
C	seal cover availability
D	with flexible secondary terminals
E	with switching over on the secondary winding
F	with switching over on the primary winding

An example of identification of TLO-24 current transformer in M5 dimension:

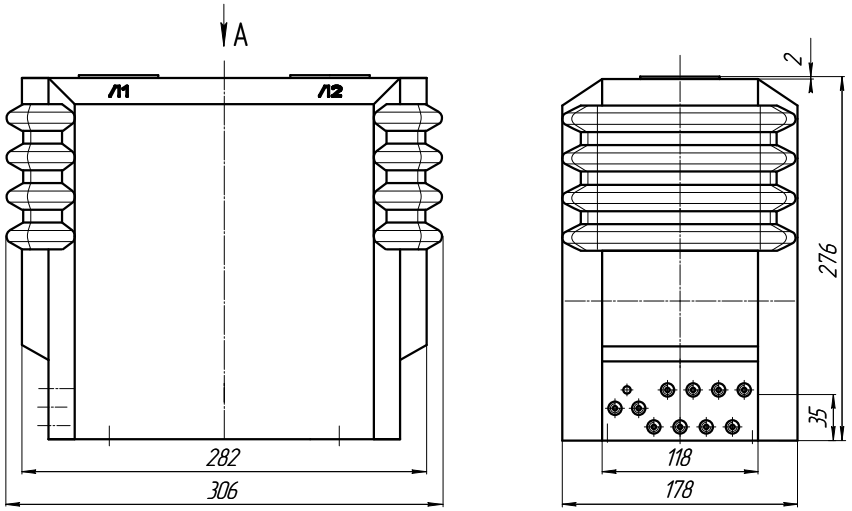
TLO-24 M5AC-0,5FS10/10P10-10/15-2500/5 N3 a 60 kA

M5	transformer dimension
A	secondary terminals on the transformer body are located at the end surface
C	availability of a cover to protect and seal the measuring winding
0,5	accuracy class of the measuring secondary winding
FS10	instrument security factor of the measuring secondary winding
10P	accuracy class of the protective secondary winding
10	rated accuracy limit factor of the protective winding
10	rated secondary burden of the measuring secondary winding
15	rated secondary burden of the protective secondary winding
2500	rated primary current
5	rated secondary current
N	climatic modification
3	placement category
a	insulation level
60 kA	short-time (one-second) thermal current

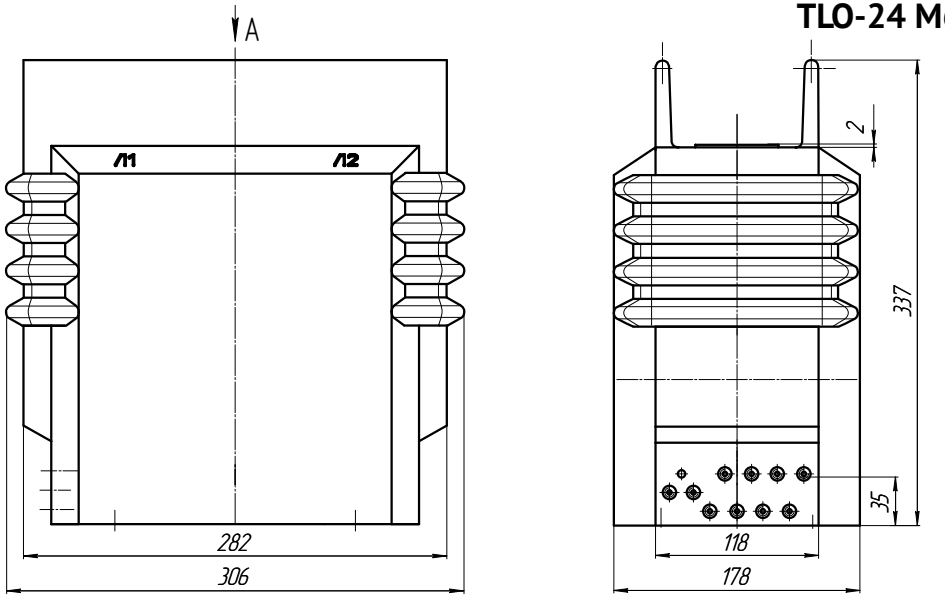
Technical parameters and characteristics

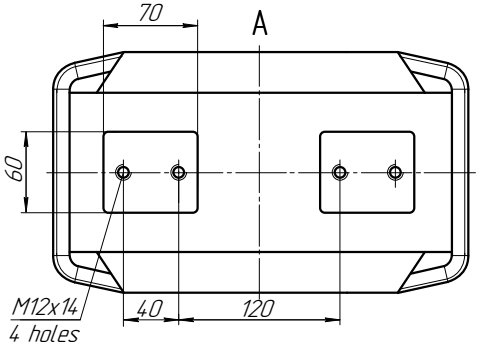
Parameters	Values for parameters
Rated voltage, kV	20; 24
Maximum operating voltage, kV	26,5
Rated primary current, A	5; 7,5; 10; 11; 12; 13; 14; 16; 15; 18; 20; 22; 25; 27,5; 30; 32,5; 35; 37,5; 40; 50; 55; 60; 65; 70; 75; 80; 90; 100; 150; 200; 250; 300; 350; 400; 500; 550; 600; 650; 700; 750; 800; 900; 1000; 1050; 1100; 1150; 1200; 1250; 1300; 1400; 1500; 1550; 1600; 1650; 1700; 1750; 1800; 1900; 2000; 2100; 2200; 2250; 2300; 2500
Rated secondary current, A	1; 5
Rated frequency, Hz	50; 60
Number of secondary windings	up to 4
Rated secondary burdens with cosφ=0,8: measuring windings, V·A protective winding, V·A	 from 1 up to 30 from 1 up to 30
Rated accuracy class, according to GOST 7746: measuring windings protective windings	 0,2S; 0,2; 0,5S; 0,5; 1; 3 5P or 10P
Accuracy limit factor K_{rated} of secondary protective winding:	from 2 up to 30
Rated instrument security factor FS_{rated} of secondary measuring winding:	from 3 up to 30
Short-time (one second) thermal current kA, at rated primary current	
5-20 A	2,5; 5
30-50 A	5; 10; 20
75-100 A	10; 20; 31,5; 40
150 A	15; 20; 31,5; 40
200 A	20; 31,5; 40-60
300 A	31,5; 40-100
400-2500 A	40-100
Dynamic current kA, at rated primary current:	
5-20 A	6,25; 12,8
30-50 A	12,8; 26; 52
75-100 A	26; 52; 81; 100
150 A	39; 52; 81; 100
200 A	52; 81; 100-150
300 A	81; 100-250
400-2500 A	100-250
Weight, kg, not more	45
Overall dimensions (LxWxH), mm	306x178x276/306x178x337

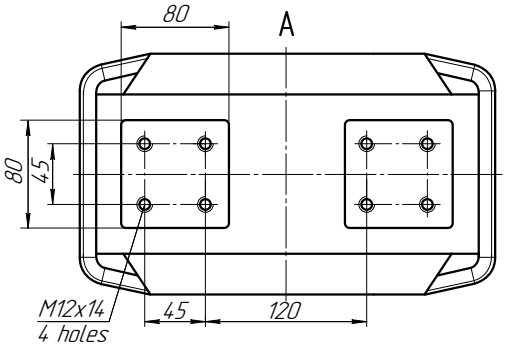
Overall dimensions, fitting and connecting dimensions TLO-24 M5



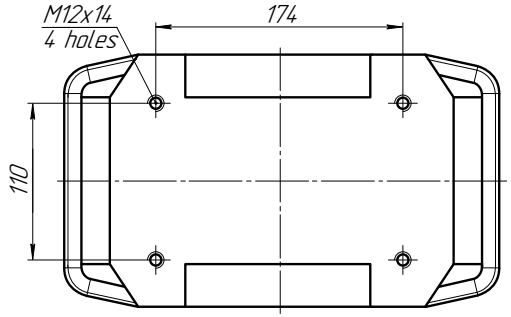
Overall dimensions, fitting and connecting dimensions TLO-24 M6

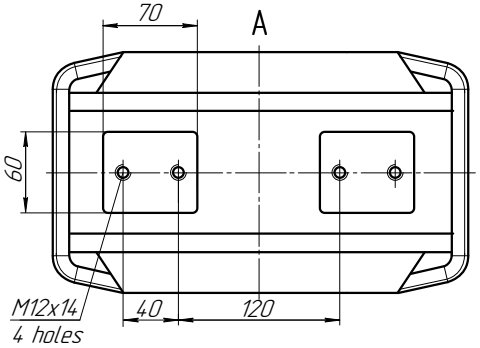


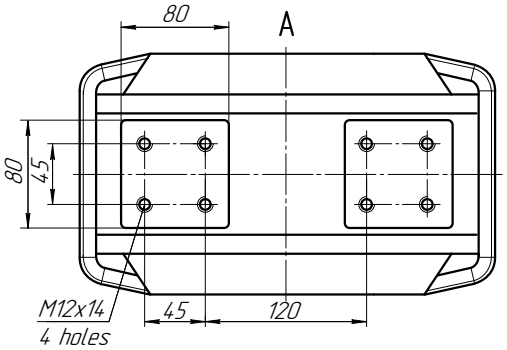




Fitting dimensions for TLO-24 M5 and M6

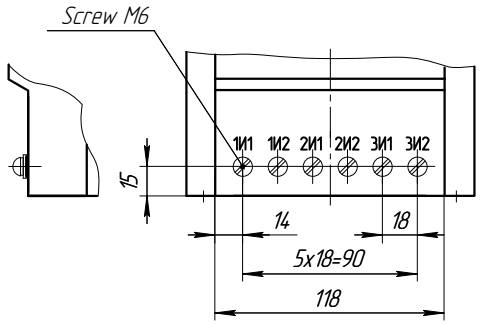






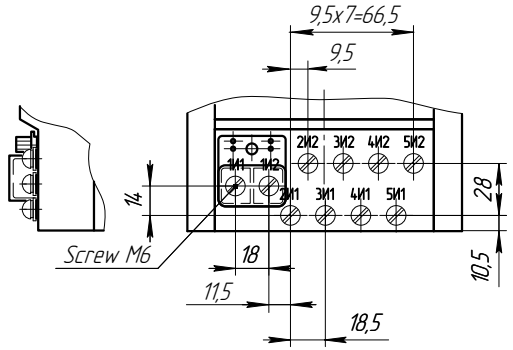
Different modifications

Modification A
secondary terminals from the transformer end surface

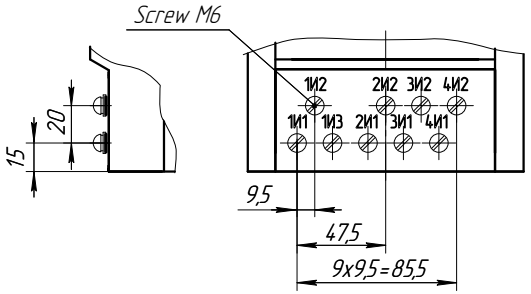


Transformers with secondary windings, from one up to three

Modification AC
secondary terminals from the transformer end surface, seal cover

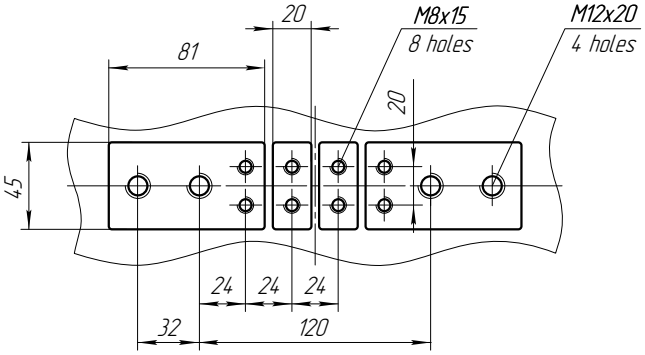


Modification AE
with switching over on the secondary winding located at the end surface



Modification D
with flexible secondary terminals

Modification F
with switching over on the primary winding
(an example of identification of transformation ratio for a transformer with 2 windings:100(200)/5)



Technical parameters and characteristics

Parameters	Values for parameters
Rated voltage, kV	20; 24
Maximum operating voltage, kV	26,5
Rated primary current, A	5; 7,5; 10; 11; 12; 13; 14; 16; 15; 18; 20; 22; 25; 27,5; 30; 32,5; 35; 37,5; 40; 50; 55; 60; 65; 70; 75; 80; 90; 100; 150; 200; 250; 300; 350; 400; 500; 550; 600; 650; 700; 750; 800; 900; 1000; 1050; 1100; 1150; 1200; 1250; 1300; 1400; 1500; 1550; 1600; 1650; 1700; 1750; 1800; 1900; 2000; 2100; 2200; 2250; 2300; 2500
Rated secondary current, A	1; 5
Rated frequency, Hz	50; 60
Number of secondary windings	up to 5
Rated secondary burdens with cosφ=0,8: measuring windings, V·A protective winding, V·A	 from 1 up to 50 from 1 up to 50
Rated accuracy class, according to GOST 7746: measuring windings protective windings	 0,2S; 0,2; 0,5S; 0,5; 1; 3 5P or 10P
Accuracy limit factor K_{rated} of secondary protective winding:	from 2 up to 30
Rated instrument security factor FS_{rated} of secondary measuring winding:	from 3 up to 30
Short-time (one second) thermal current kA, at rated primary current	
5-20 A	2,5; 5
30-50 A	5; 10; 20
75-100 A	10; 20; 31,5; 40
150 A	15; 20; 31,5; 40
200 A	20; 31,5; 40-60
300 A	31,5; 40-100
400-2500 A	40-100
Dynamic current kA, at rated primary current:	
5-20 A	6,25; 12,8
30-50 A	12,8; 26; 52
75-100 A	26; 52; 81; 100
150 A	39; 52; 81; 100
200 A	52; 81; 100-150
300 A	81; 100-250
400-2500 A	100-250
Weight, kg, not more	55
Overall dimensions (LxWxH), mm	371x178x276/371x178x337

Modification	Description
A	secondary terminals from the transformer end surface
C	seal cover availability
D	with flexible secondary terminals
E	with switching over on the secondary winding
F	with switching over on the primary winding

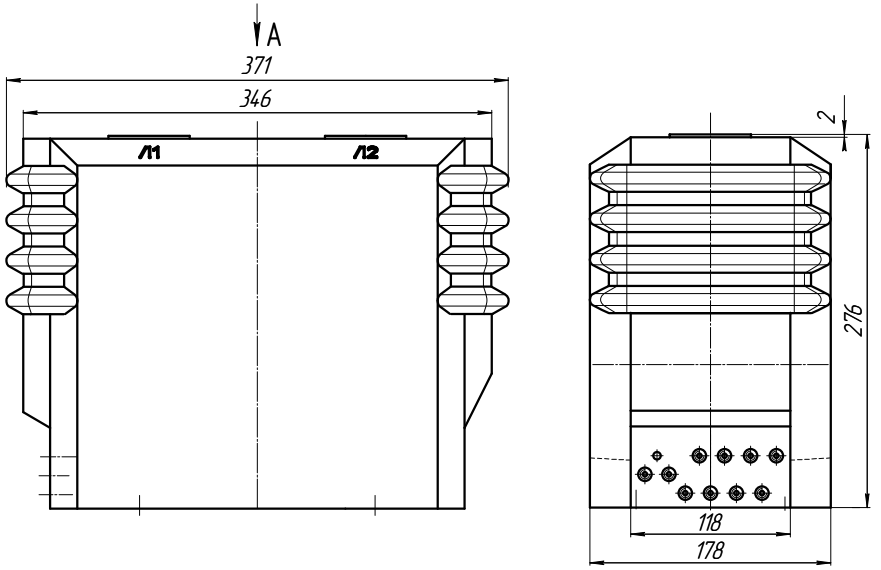
TLO-24 M7 and M8 current transformers can be made in modifications as follows:

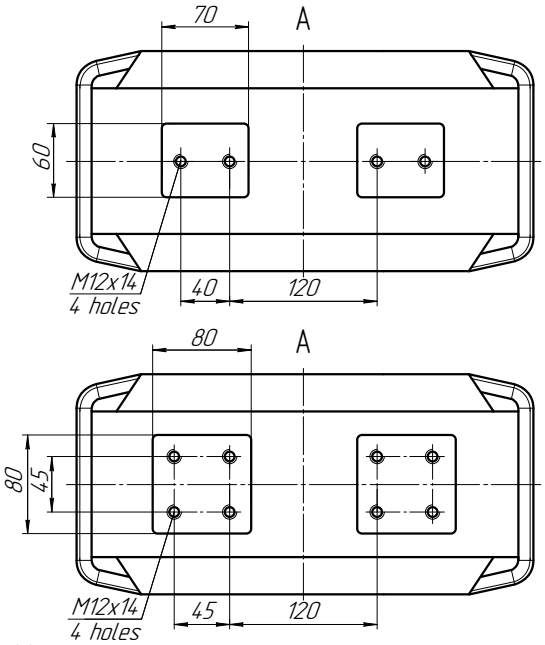
TLO-24 M7AC-0,5FS10/10P10-10/15-800/5 N3 a 40 kA

M7	transformer dimension
A	secondary terminals on the transformer body are located at the end surface
C	availability of a cover to protect and seal the measuring winding
0,5	accuracy class of the measuring secondary winding
FS10	instrument security factor of the measuring secondary winding
10P	accuracy class of the protective secondary winding
10	rated accuracy limit factor of the protective winding
10	rated secondary burden of the measuring secondary winding
15	rated secondary burden of the protective secondary winding
800	rated primary current
5	rated secondary current
N	climatic modification
3	placement category
a	insulation level
40 kA	short-time (one-second) thermal current

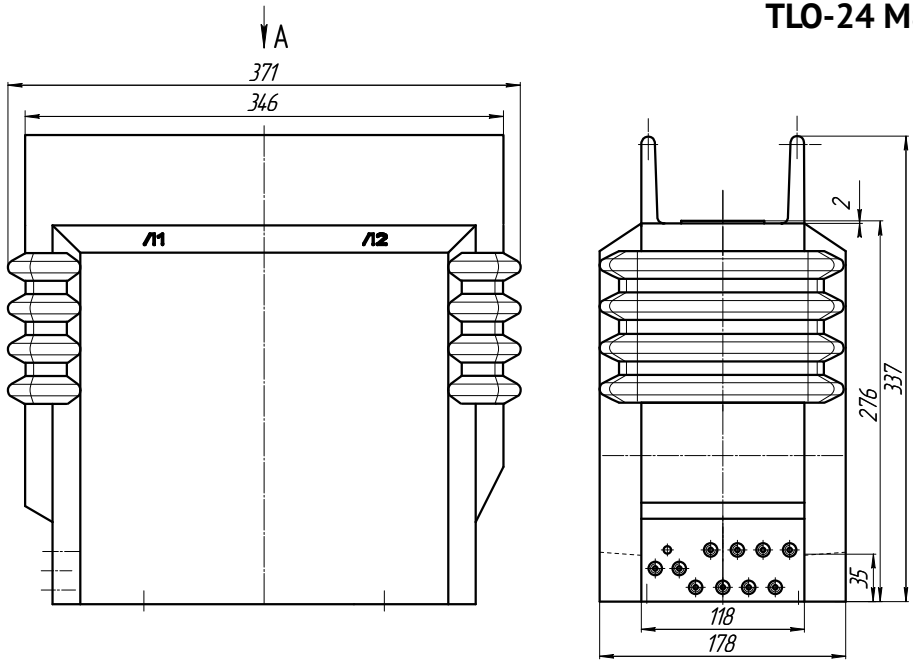
An example of identification of TLO-24 current transformer in M7 dimension:

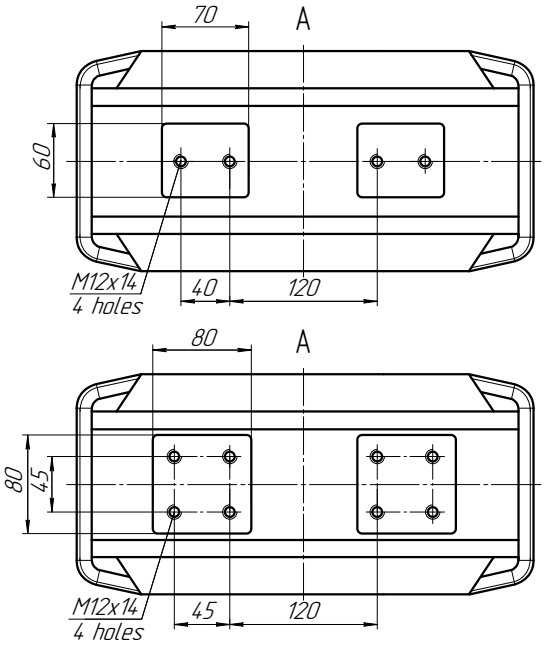
Overall dimensions, fitting and connecting dimensions TLO-24 M7



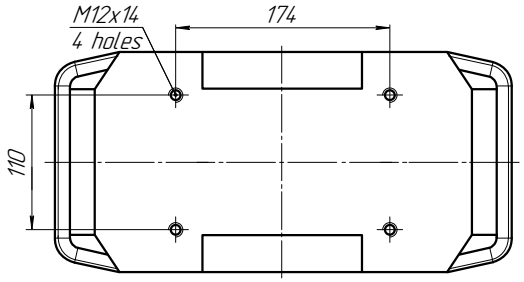


Overall dimensions, fitting and connecting dimensions TLO-24 M8



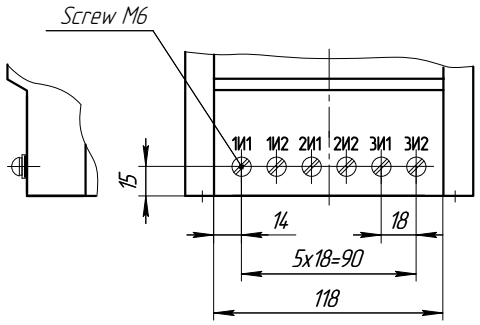


Fitting dimensions for TLO-24 M7 and M8



Different modifications

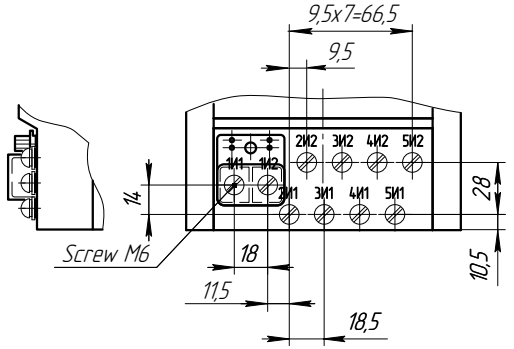
Modification A
secondary terminals from the transformer end surface



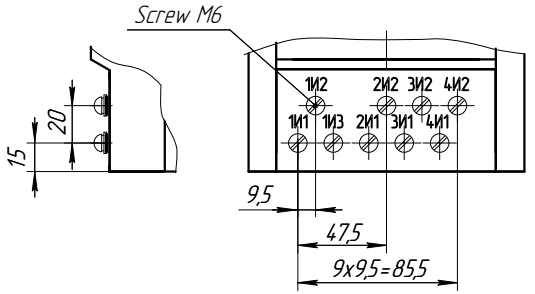
Transformers with secondary windings, from one up to three

Modification D
with flexible secondary terminals

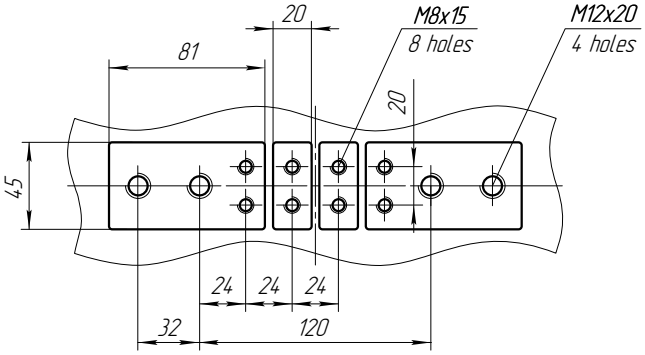
Modification AC
secondary terminals from the transformer end surface, seal cover



Modification AE
with switching over on the secondary winding located at the end surface



Modification F
with switching over on the primary winding (an example of identification of transformation ratio for a transformer with 2 windings:100(200)/5)



1.2.5. CAST SUPPORT-TYPE CURRENT TRANSFORMERS TLO-24

Outdoor current transformers TLO-24 MH30 NF1 can be made in modifications as follows:

Modification	Description
F	with switching over on the primary winding

An example of identification of TLO-24 current transformer in MH30 dimension:

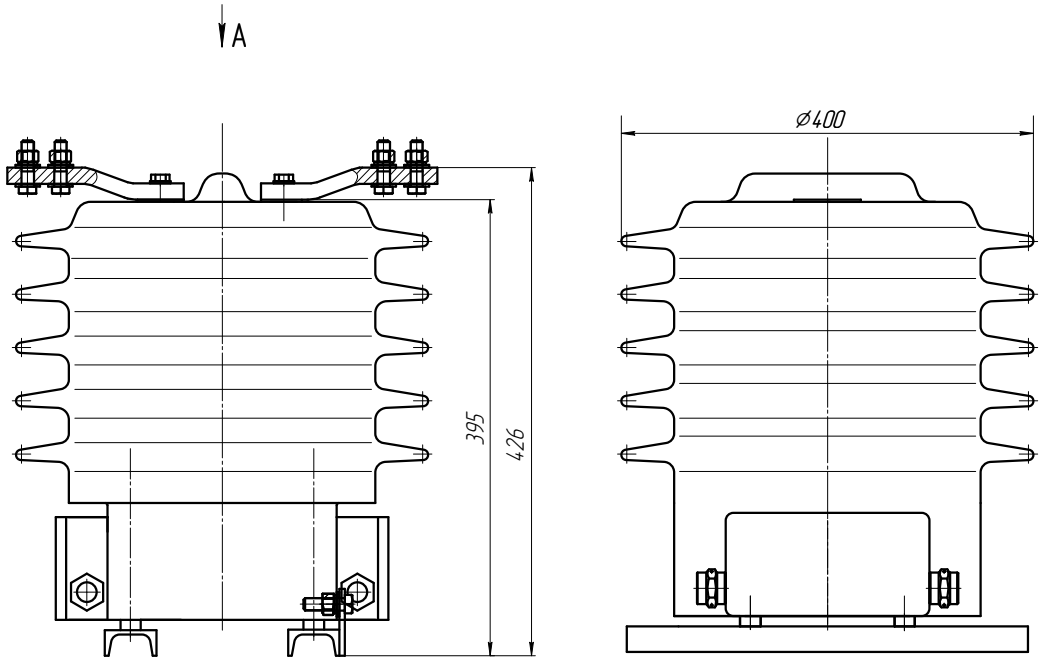
TLO-24 MH30-0,5FS10/10P10-10/15-1000/5 NF1 a 40 kA

MH30	transformer dimension
0,5	accuracy class of the measuring secondary winding
FS10	instrument security factor of the measuring secondary winding
10P	accuracy class of the protective secondary winding
10	rated accuracy limit factor of the protective winding
10	rated secondary burden of the measuring secondary winding
15	rated secondary burden of the protective secondary winding
1000	rated primary current
5	rated secobdary current
NF	climatic modification
1	placement category
a	insulation level
40 kA	short-time (one second) thermal current

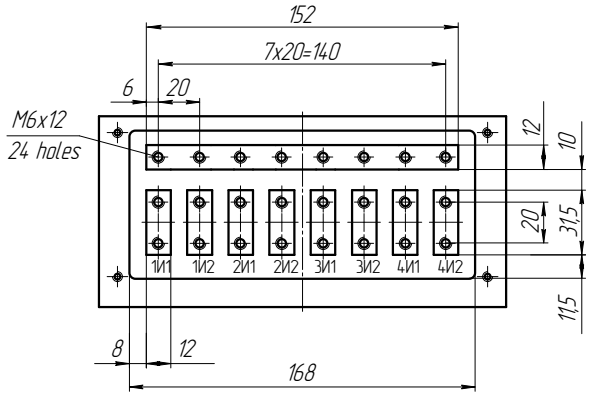
Technical parameters and characteristics

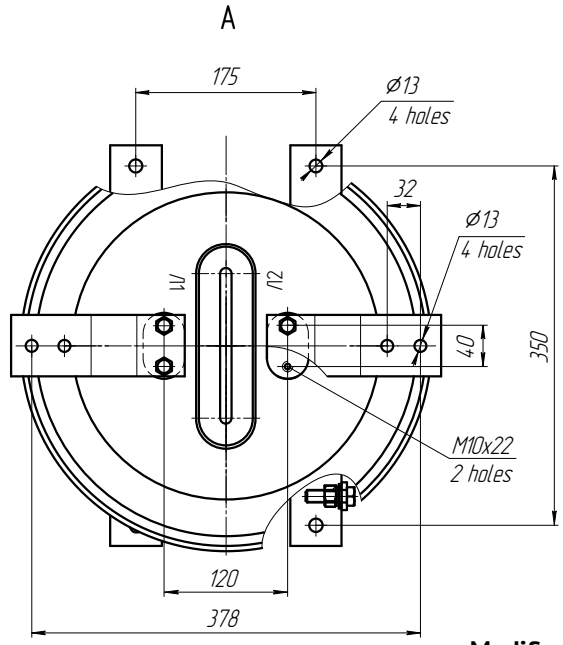
Parameters	Values for parameters
Rated voltage, kV	20; 24
Maximum operating voltage, kV	26,5
Rated primary current, A	5; 7,5; 10; 11; 12; 13; 14; 16; 15; 18; 20; 22; 25; 27,5; 30; 32,5; 35; 37,5; 40; 50; 55; 60; 65; 70; 75; 80; 90; 100; 150; 200; 250; 300; 350; 400; 500; 550; 600; 650; 700; 750; 800; 900; 1000; 1050; 1100; 1150; 1200; 1250; 1300; 1400; 1500
Rated secondary current, A	1; 5
Rated frequency, Hz	50; 60
Number of secondary windings	up to 3
Rated secondary burdens with cosφ=0,8: measuring windings, V·A protective winding, V·A	 from 1 up to 50 from 1 up to 50
Rated accuracy class, according to GOST 7746: measuring windings protective windings	 0,2S; 0,2; 0,5S; 0,5; 1; 3 5P or 10P
Accuracy limit factor K_{rated} of secondary protective winding:	from 2 up to 30
Rated instrument security factor FS_{rated} of secondary measuring winding:	from 3 up to 30
Short-time (one second) thermal current kA, at rated primary current	
5-20 A	2,5; 5
30-50 A	5; 10; 20
75-100 A	10; 20; 31,5; 40
150 A	15; 20; 31,5; 40
200 A	20; 31,5; 40-60
300 A	31,5; 40-100
400-1500 A	40-100
Dynamic current kA, at rated primary current:	
5-20 A	6,25; 12,8
30-50 A	12,8; 26; 52
75-100 A	26; 52; 81; 100
150 A	39; 52; 81; 100
200 A	52; 81; 100-150
300 A	81; 100-250
400-1500 A	100-250
Weight, kg, not more	90
Overall dimensions (LxWxH), mm	400x400x426

Overall dimensions, fitting and connecting dimensions

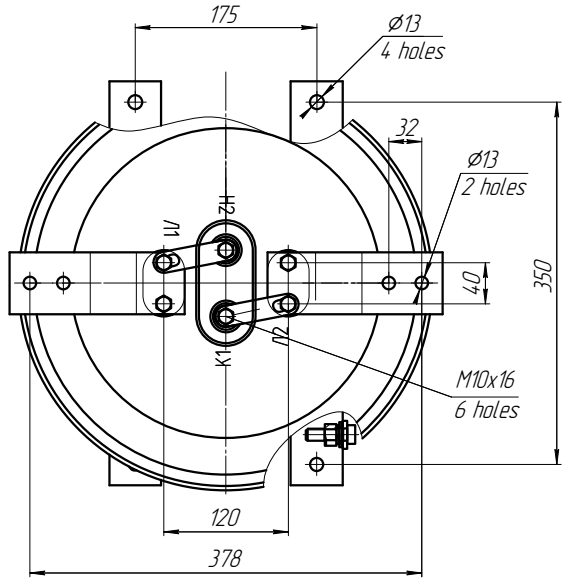


Location of secondary terminals





Modification F
with switching over on the primary winding
for transformers with rated current up to 600 A



1.2.6. CAST SUPPORT-TYPE CURRENT TRANSFORMERS TLO-24

Outdoor current transformers TLO-24 MH31 NF1

Modification	Description
F	with switching over on the primary winding

An example of identification of TLO-24 current transformer in MH31 dimension:

TLO-24 MH31-0,5FS10/10P10-10/15-1000/5 NF1 a 40 kA

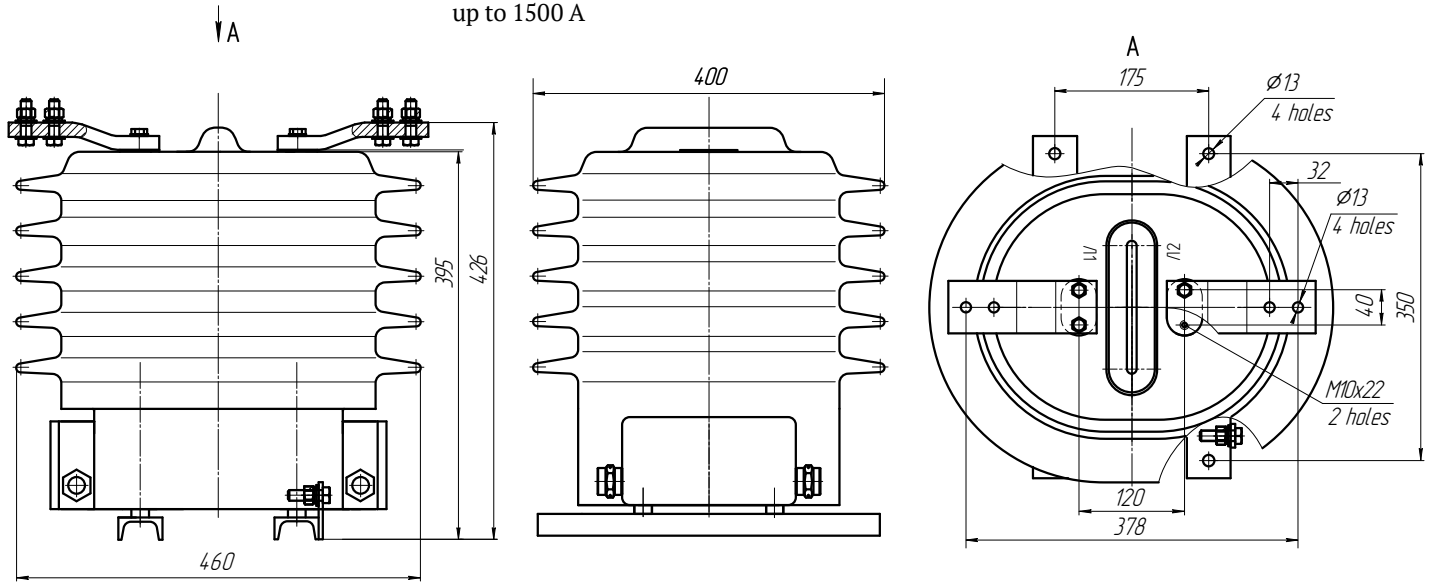
MH31	transformer dimension
0,5	accuracy class of the measuring secondary winding
FS10	instrument security factor of the measuring secondary winding
10P	accuracy class of the protective secondary winding
10	rated accuracy limit factor of the protective winding
10	rated secondary burden of the measuring secondary winding
15	rated secondary burden of the protective secondary winding
1000	rated primary current
5	rated secobdary current
NF	climatic modification
1	placement category
a	insulation level
40 kA	short-time (one second) thermal current

Technical parameters and characteristics

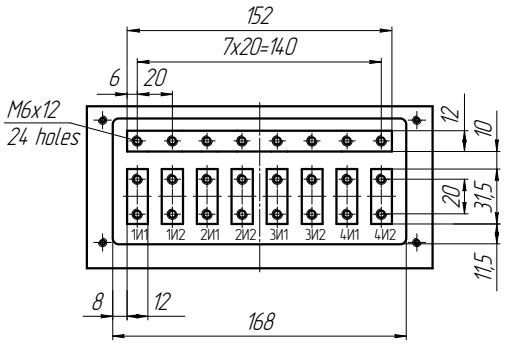
Parameters	Values for parameters
Rated voltage, kV	20; 24
Maximum operating voltage, kV	26,5
Rated primary current, A	5; 7,5; 10; 11; 12; 13; 14; 16; 15; 18; 20; 22; 25; 27,5; 30; 32,5; 35; 37,5; 40; 50; 55; 60; 65; 70; 75; 80; 90; 100; 150; 200; 250; 300; 350; 400; 500; 550; 600; 650; 700; 750; 800; 900; 1000; 1050; 1100; 1150; 1200; 1250; 1300; 1400; 1500; 1550; 1600; 1650; 1700; 1750; 1800; 1900; 2000; 2100; 2200; 2250; 2300; 2500; 2550; 2600; 2650; 2700; 2750; 2800; 2900; 3000
Rated secondary current, A	1; 5
Rated frequency, Hz	50; 60
Number of secondary windings	up to 5
Rated secondary burdens with cosφ=0,8: measuring windings, V·A protective winding, V·A	 from 1 up to 50 from 1 up to 50
Rated accuracy class, according to GOST 7746: measuring windings protective windings	 0,2S; 0,2; 0,5S; 0,5; 1; 3 5P or 10P
Accuracy limit factor K_{rated} of secondary protective winding:	from 2 up to 30
Rated instrument security factor FS_{rated} of secondary measuring winding:	from 3 up to 30
Short-time (one second) thermal current kA, at rated primary current	
5-20 A	2,5; 5
30-50 A	5; 10; 20
75-100 A	10; 20; 31,5; 40
150 A	15; 20; 31,5; 40
200 A	20; 31,5; 40-60
300 A	31,5; 40-100
400-3000 A	40-100
Short-time (one second) thermal current kA, at rated primary current	
5-20 A	6,25; 12,8
30-50 A	12,8; 26; 52
75-100 A	26; 52; 81; 100
150 A	39; 52; 81; 100
200 A	52; 81; 100-150
300 A	81; 100-250
400-3000 A	100-250
Weight, kg, not more	90
Overall dimensions (LxWxH), mm	460x400x426

Overall dimensions, fitting and connecting dimensions

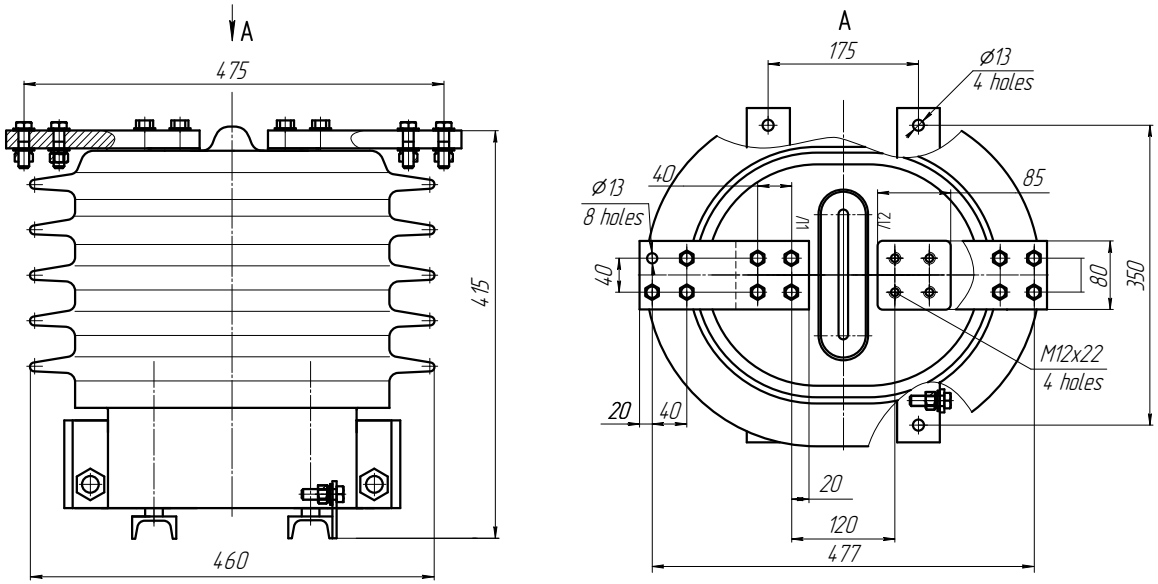
up to 1500 A



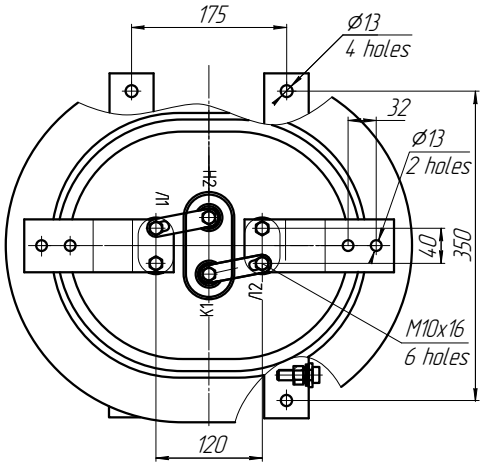
Location of secondary terminals



from 1500 A



Modification F
with switching over on the primary winding
for transformers with rated current up to 600 A



IMPLEMENTED PROJECTS

TLO | **TLP** | **TZLK(R)-0,66** | **TSH-EK-0,66** | **ZNOL(P)-EK**

HEAT POWER ENGINEERING

TPS thermal power station

Dzhubga TPS
Sisak TPS
Sochi TPS
Nizhny Novgorod TPS
Novosibirsk TPS
Ukhta TPS

HYDROELECTRIC POWER

HPP - hydro power plant

Miatlinskaya HPP
Matkozhnenskaya HPP
Nizhne-Bureiskaya HPP
Novosibirsk HPP
Palagorskaya HPP
Rybinsk HPP

NUCLEAR POWER ENGINEERING

NPP nuclear power plant

Kolskaya NPP
Kursk NPP
Leningradskaya NPP
Smolensks NPP

CAST SUPPORT-TYPE CURRENT TRANSFORMERS TLO-35

Description

TLO-35 current transformer is designed for installation in indoor and outdoor switchgears and in singleend service assembled chambers.

The current transformer ensures transmitting of the measuring information signal to the measuring instruments and protection and control devices to insulate secondary wiring from high voltage in alternating current electrical units for up to 35 kV voltage class.
Climatic modification N (temperate climate), T (tropical climate) or NF (temperate and cold climate), placement category 1, 2 or 3.

Production on the basis of the specification: TU 3414-035-52889537-07.

Guaranteed service life – 5 years.

Technical parameters and characteristics

Parameters	Possible values for parameters	Standard parameters
Rated voltage, kV	35	
Maximum operating voltage, kV	40,5	
Rated primary current, A	5-3000	-
Rated secondary current, A	1, 5	-
Rated frequency, Hz	50, 60	
Rated primary current, A	5-3000	
Rated secondary burdens with cosφ=0,8: measuring windings, V·A protective winding, V·A	 1-50 1-50	 10 15
Rated accuracy class: measuring windings protective windings	 0,2; 0,2S; 0,5; 0,5S; 1; 3 5P or 10P	
Accuracy limit factor K_{rated} of secondary protective winding	from 2 up to 30	10
Rated instrument security factor FS_{rated} of secondary measuring winding	from 3 up to 30	-
Number of secondary windings	up to 5	
Short-time (one second) thermal current kA, at rated primary current		
5-20 A	2,5; 5	
30 - 50 A	5; 10; 20	
75 -100A	10; 20; 31,5; 40	
150 A	15; 20; 31,5; 40	
200 A	20; 31,5; 40-60	
300 A	31,5; 40-100	
400-3000 A	40-100	
Dynamic current kA, at rated primary current		
5-20 A	6,25; 12,8	
30-50 A	12,8; 26; 52	
75-100 A	26; 52; 81; 100	
150 A	39; 52; 81; 100	
200 A	52; 81; 100-150	
300 A	81; 100-250	
400-3000 A	100-250	
Weight, kg, not more	from 45 up to 90	

1.3.1. CAST SUPPORT-TYPE CURRENT TRANSFORMERS TLO-35

TLO-35 M2 current transformers can be made in modifications as follows:

Modification	Description
A	secondary terminals from the transformer end surface
C	seal cover availability
D	with flexible secondary terminals
E	with switching over on the secondary winding
F	with switching over on the primary winding

An example of identification of TLO-35 current transformer in M2 dimension:

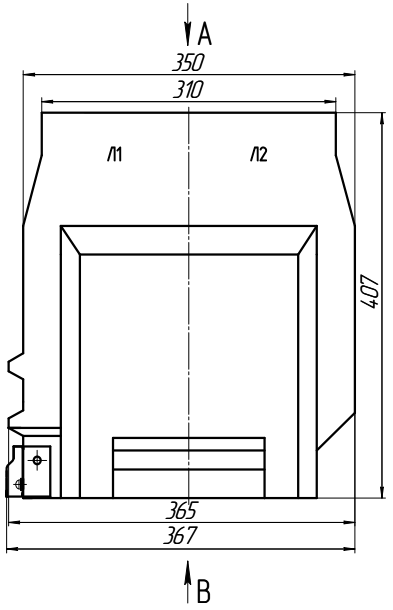
TLO-35 M2AC-0,5FS10/10P10-10/15-100/5 N3 a 10 kA

M2	transformer dimension
A	secondary terminals on the transformer body are located at the end surface
C	availability of a cover to protect and seal the measuring winding
0,5	accuracy class of the measuring secondary winding
FS10	instrument security factor of the measuring secondary winding
10P	accuracy class of the protective secondary winding
10	rated accuracy limit factor of the protective winding
10	rated secondary burden of the measuring secondary winding
15	rated secondary burden of the protective secondary winding
100	rated primary current
5	rated secondary current
N	climatic modification
3	placement category
a	insulation level
10 kA	short-time (one-second) thermal current

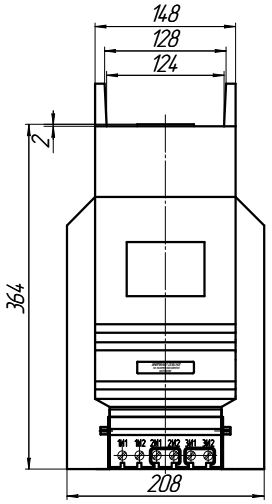
Technical parameters and characteristics

Parameters	Values for parameters
Rated voltage, kV	35
Maximum operating voltage, kV	40,5
Rated primary current, A	5; 7,5; 10; 11; 12; 13; 14; 16; 15; 18; 20; 22; 25; 27,5; 30; 32,5; 35; 37,5; 40; 50; 55; 60; 65; 70; 75; 80; 90; 100; 150; 200; 250; 300; 350; 400; 500; 550; 600; 650; 700; 750; 800; 900; 1000; 1050; 1100; 1150; 1200; 1250; 1300; 1400; 1500; 1550; 1600; 1650; 1700; 1750; 1800; 1900; 2000; 2100; 2200; 2250; 2300; 2500; 2550; 2600; 2650; 2700; 2750; 2800; 2900; 3000
Rated secondary current, A	1; 5
Rated frequency, Hz	50; 60
Number of secondary windings	up to 5
Rated secondary burdens with cosφ=0,8: measuring windings, V·A protective winding, V·A	 from 1 up to 30 from 1 up to 30
Rated accuracy class, according to GOST 7746: measuring windings protective windings	 0,2S; 0,2; 0,5S; 0,5; 1; 3 5P or 10P
Accuracy limit factor K_{rated} of secondary protective winding:	from 2 up to 30
Rated instrument security factor FS_{rated} of secondary measuring winding:	from 3 up to 30
Short-time (one second) thermal current kA, at rated primary current	
5-20 A	2,5; 5
30-50 A	5; 10; 20
75-100 A	10; 20; 31,5; 40
150 A	15; 20; 31,5; 40
200 A	20; 31,5; 40-60
300 A	31,5; 40-100
400-3000 A	40-100
Dynamic current kA, at rated primary current:	
5-20 A	6,25; 12,8
30-50 A	12,8; 26; 52
75-100 A	26; 52; 81; 100
150 A	39; 52; 81; 100
200 A	52; 81; 100-150
300 A	81; 100-250
400-3000 A	100-250
Weight, kg, not more	50
Overall dimensions (LxWxH), mm	365×208×407

Overall dimensions, fitting and connecting dimensions



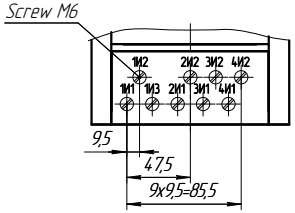
up to 1500 A



from 1500 A

Different modifications

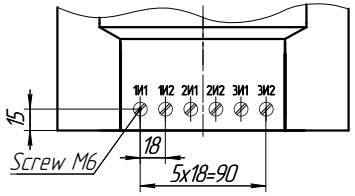
Modification AE
with switching over on the secondary winding located at the end surface



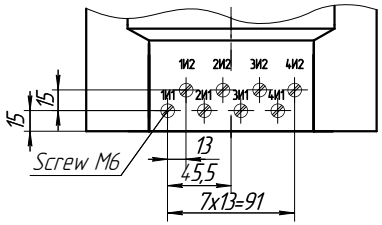
Modification D
with flexible secondary terminals

Different modifications

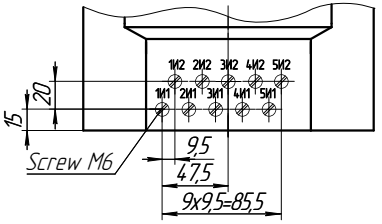
Modification
A secondary terminals from the transformer end surface



Transformers with secondary windings, from one up to three

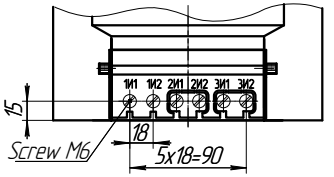


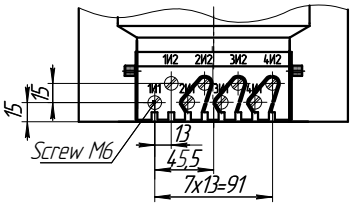
Transformers with secondary windings, from one up to four

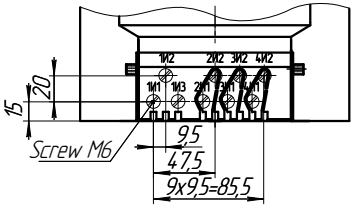


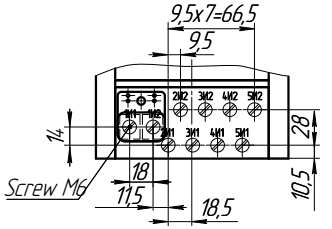
Transformers with secondary windings, from one up to five

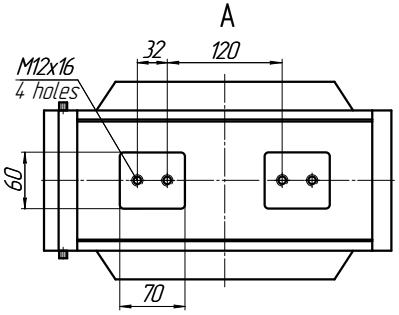
Modification AC
secondary terminals from the transformer end surface, seal cover

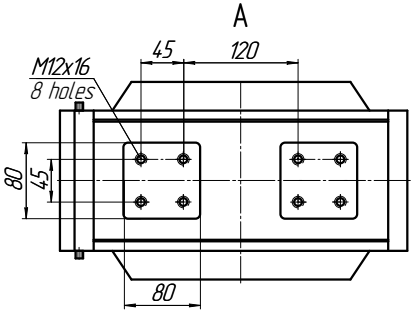


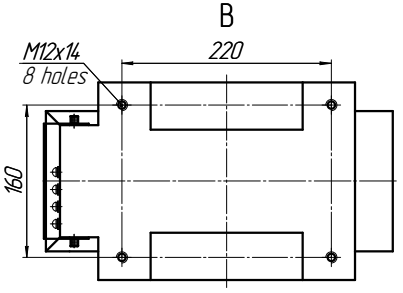




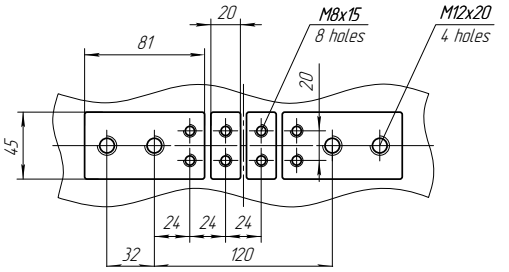




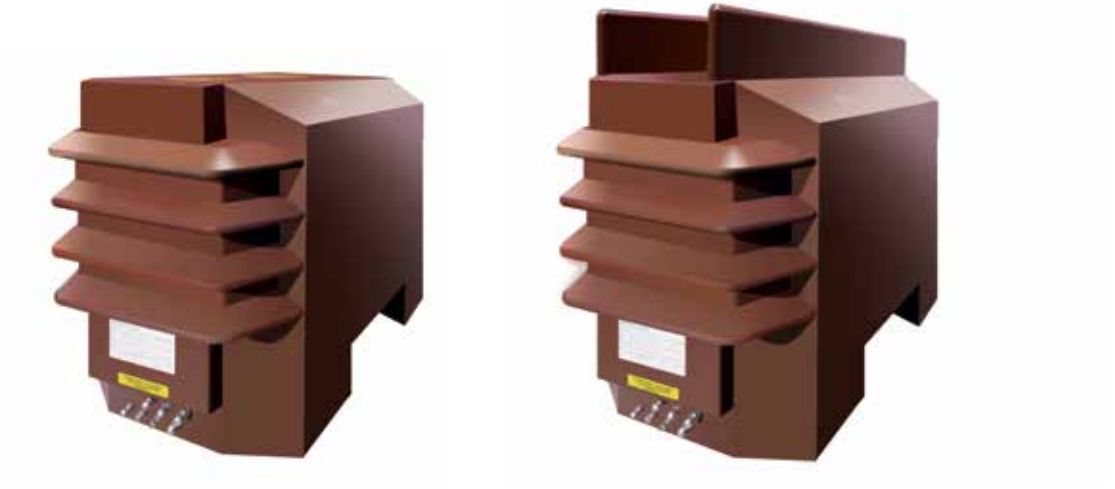




Modification F
with switching over on the primary winding (an example of identification of transformation ratio for a transformer with 2 windings: 100(200)/5)



1.3.2. CAST SUPPORT-TYPE CURRENT TRANSFORMERS TLO-35



TLO-35 M3 and M4 current transformers can be made in modifications as follows:

Modification	Description
A	secondary terminals from the transformer end surface
C	seal cover availability
D	with flexible secondary terminals
E	with switching over on the secondary winding
F	with switching over on the primary winding

An example of identification of TLO-35 current transformer in M3 dimension:

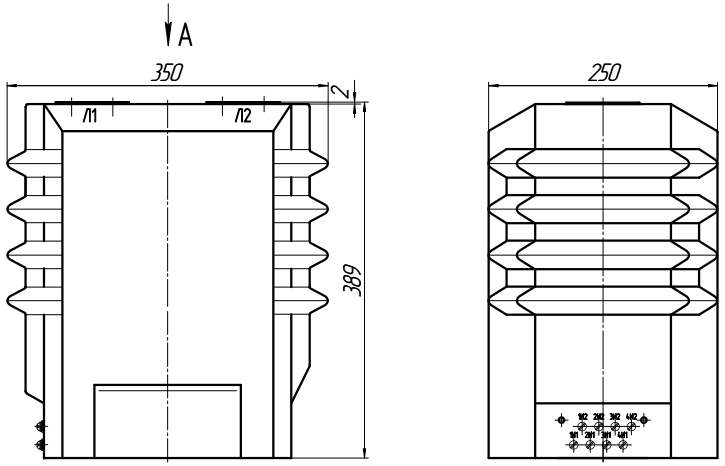
TLO-35 M3AC-0,5FS10/10P10-10/15-100/5 N3 a 10 kA

M3	transformer dimension
A	secondary terminals on the transformer body are located at the end surface
C	availability of a cover to protect and seal the measuring winding
0,5	accuracy class of the measuring secondary winding
FS10	instrument security factor of the measuring secondary winding
10P	accuracy class of the protective secondary winding
10	rated accuracy limit factor of the protective winding
10	rated secondary burden of the measuring secondary winding
15	rated secondary burden of the protective secondary winding
100	rated primary current
5	rated secondary current
N	climatic modification
3	placement category
a	insulation level
10 kA	short-time (one-second) thermal current

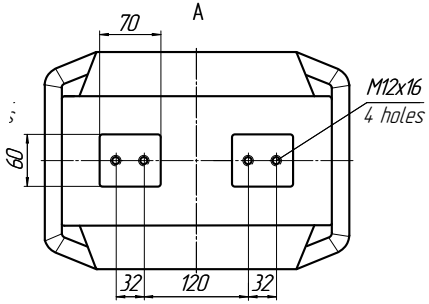
Technical parameters and characteristics

Parameters	Values for parameters
Rated voltage, kV	35
Maximum operating voltage, kV	40,5
Rated primary current, A	5; 7,5; 10; 11; 12; 13; 14; 16; 15; 18; 20; 22; 25; 27,5; 30; 32,5; 35; 37,5; 40; 50; 55; 60; 65; 70; 75; 80; 90; 100; 150; 200; 250; 300; 350; 400; 500; 550; 600; 650; 700; 750; 800; 900; 1000; 1050; 1100; 1150; 1200; 1250; 1300; 1400; 1500; 1550; 1600; 1650; 1700; 1750; 1800; 1900; 2000; 2100; 2200; 2250; 2300; 2500; 2550; 2600; 2650; 2700; 2750; 2800; 2900; 3000
Rated secondary current, A	1; 5
Rated frequency, Hz	50; 60
Number of secondary windings	up to 5
Rated secondary burdens with cosφ=0,8: measuring windings, V·A protective winding, V·A	 from 1 up to 20 from 1 up to 20
Rated accuracy class, according to GOST 7746: measuring windings protective windings	 0,2S; 0,2; 0,5S; 0,5; 1; 3 5P or 10P
Accuracy limit factor K_{rated} of secondary protective winding:	from 2 up to 20
Rated instrument security factor FS_{rated} of secondary measuring winding:	from 3 up to 30
Short-time (one second) thermal current kA, at rated primary current	
5-20 A	2,5; 5
30-50 A	5; 10; 20
75-100 A	10; 20; 31,5; 40
150 A	15; 20; 31,5; 40
200 A	20; 31,5; 40-60
300 A	31,5; 40-100
400-3000 A	40-100
Dynamic current kA, at rated primary current:	
5-20 A	6,25; 12,8
30-50 A	12,8; 26; 52
75-100 A	26; 52; 81; 100
150 A	39; 52; 81; 100
200 A	52; 81; 100-150
300 A	81; 100-250
400-3000 A	100-250
Weight, kg, not more	60
Overall dimensions (LxWxH), mm	350×250×389/350×250×434

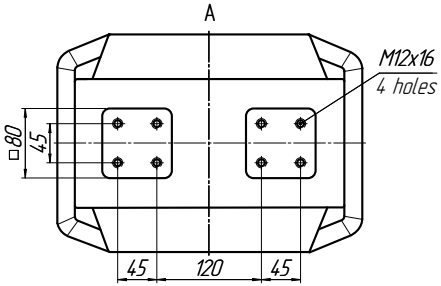
Overall dimensions, fitting and connecting dimensions TLO-35 M3



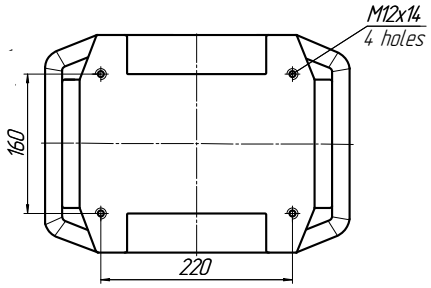
up to 1500 A



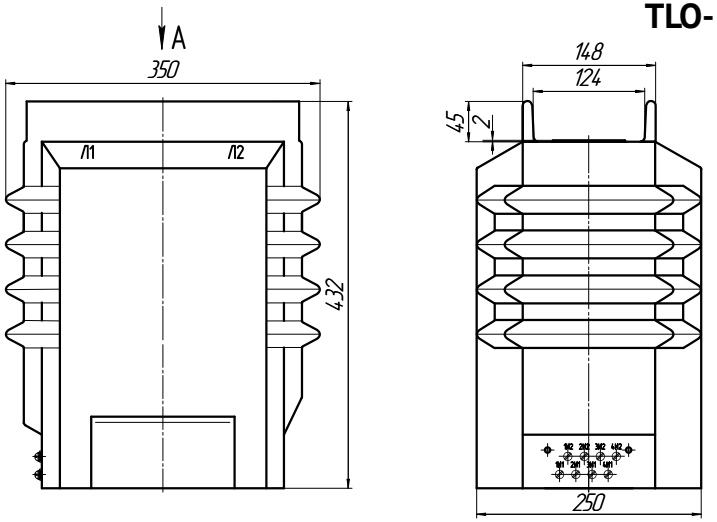
from 1500 A



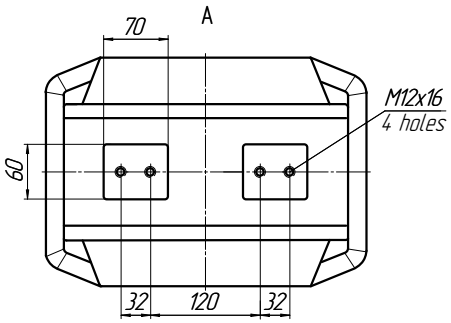
Fitting dimensions for TLO-35 M3 and M4



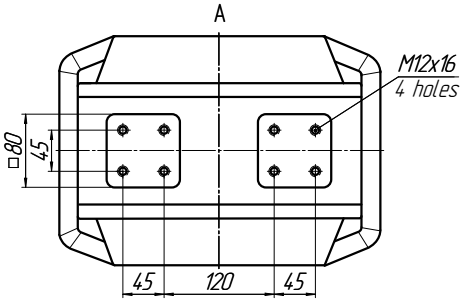
Overall dimensions, fitting and connecting dimensions TLO-35 M4



up to 1500 A

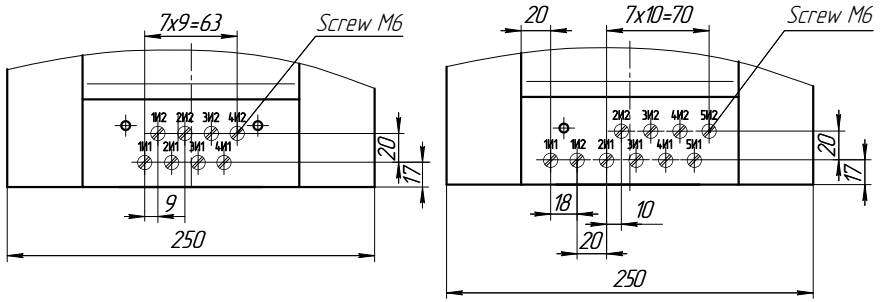


from 1500 A



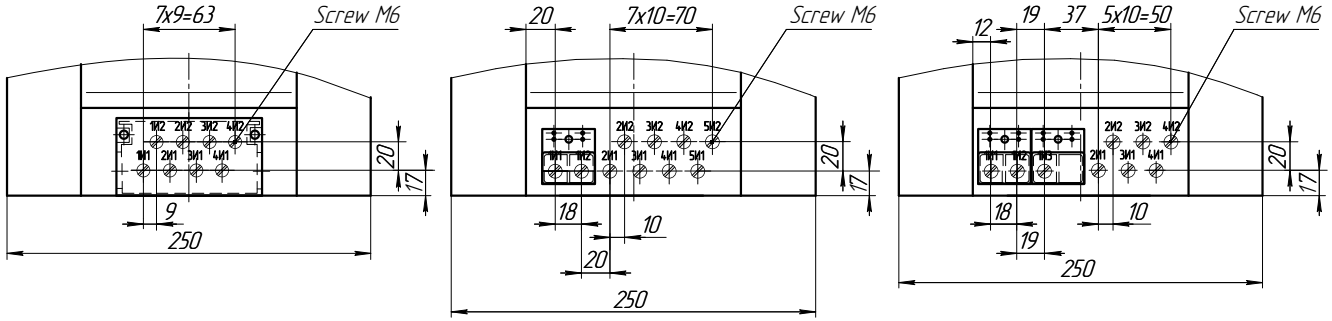
Different modifications

Modification A
secondary terminals from the transformer end surface

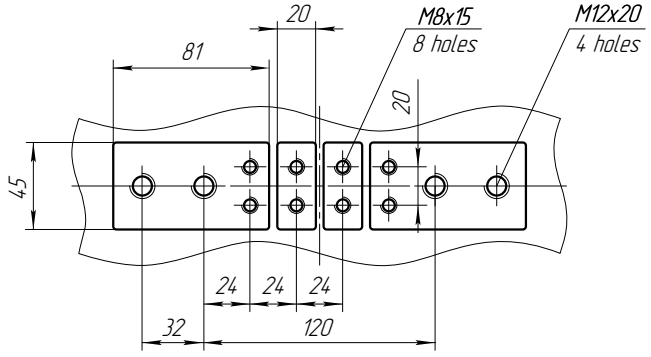


Modification D
with flexible secondary terminals

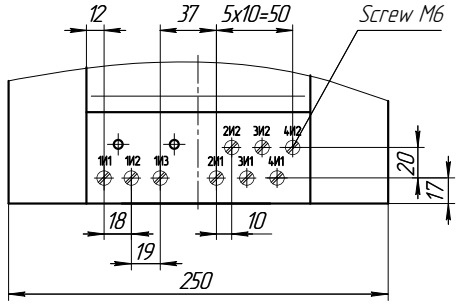
Modification AC
secondary terminals from the transformer end surface seal cover



Modification F
with switching over on the primary winding
(an example of identification of transformation ratio for a transformer with 2 windings: 100(200)/5)



Modification AE
with switching over on the secondary winding located at the end surface



Technical parameters and characteristics

Parameters	Values for parameters
Rated voltage, kV	35
Maximum operating voltage, kV	40,5
Rated primary current, A	5; 7,5; 10; 11; 12; 13; 14; 16; 15; 18; 20; 22; 25; 27,5; 30; 32,5; 35; 37,5; 40; 50; 55; 60; 65; 70; 75; 80; 90; 100; 150; 200; 250; 300; 350; 400; 500; 550; 600; 650; 700; 750; 800; 900; 1000; 1050; 1100; 1150; 1200; 1250; 1300; 1400; 1500; 1550; 1600; 1650; 1700; 1750; 1800; 1900; 2000; 2100; 2200; 2250; 2300; 2500; 2550; 2600; 2650; 2700; 2750; 2800; 2900; 3000
Rated secondary current, A	1; 5
Rated frequency, Hz	50; 60
Number of secondary windings	up to 5
Rated secondary burdens with cosφ=0,8: measuring windings, V·A protective winding, V·A	 from 1 up to 50 from 1 up to 50
Rated accuracy class, according to GOST 7746: measuring windings protective windings	 0,2S; 0,2; 0,5S; 0,5; 1; 3 5P or 10P
Accuracy limit factor K_{rated} of secondary protective winding:	from 2 up to 20
Rated instrument security factor FS_{rated} of secondary measuring winding:	from 3 up to30
Short-time (one second) thermal current kA, at rated primary current	
5-20 A	2,5; 5
30-50 A	5; 10; 20
75-100 A	10; 20; 31,5; 40
150 A	15; 20; 31,5; 40
200 A	20; 31,5; 40-60
300 A	31,5; 40-100
400-3000 A	40-100
Dynamic current kA, at rated primary current:	
5-20 A	6,25; 12,8
30-50 A	12,8; 26; 52
75-100 A	26; 52; 81; 100
150 A	39; 52; 81; 100
200 A	52; 81; 100-150
300 A	81; 100-250
400-3000 A	100-250
Weight, kg, not more	75
Overall dimensions (LxWxH), mm	438×250×389/438×250×432

Modification	Description
A	secondary terminals from the transformer end surface
C	seal cover availability
D	with flexible secondary terminals
E	with switching over on the secondary winding
F	with switching over on the primary winding

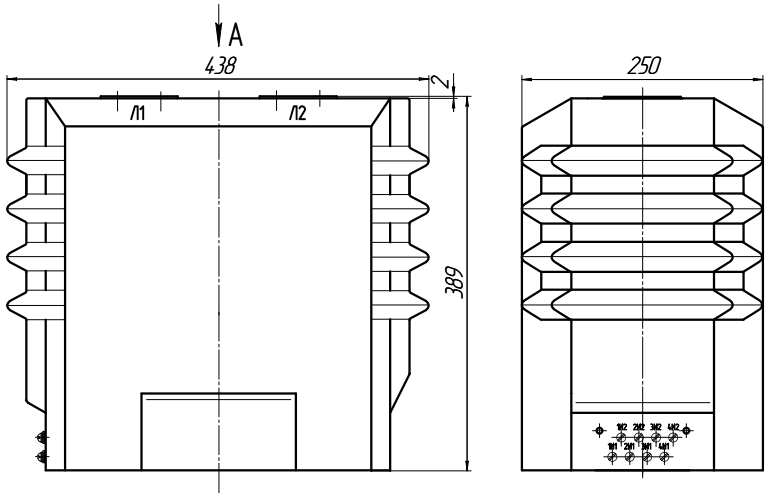
TLO-35 M5 and M6 current transformers can be made in modifications as follows:

TLO-35 M5AC-0,5FS10/10P10-10/15-100/5 N3 a 10 kA

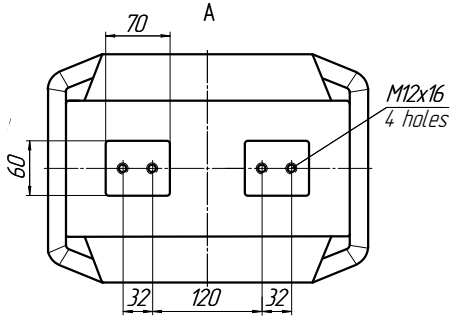
M5	transformer dimension
A	secondary terminals on the transformer body are located at the end surface
C	availability of a cover to protect and seal the measuring winding
0,5	accuracy class of the measuring secondary winding
FS10	instrument security factor of the measuring secondary winding
10P	accuracy class of the protective secondary winding
10	rated accuracy limit factor of the protective winding
10	rated secondary burden of the measuring secondary winding
15	rated secondary burden of the protective secondary winding
100	rated primary current
5	rated secondary current
N	climatic modification
3	placement category
a	insulation level
10 kA	short-time (one-second) thermal current

An example of identification of TLO-35 current transformer in M5 dimension:

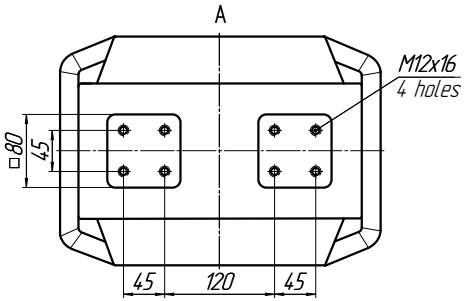
Overall dimensions, fitting and connecting dimensions TLO-35 M5



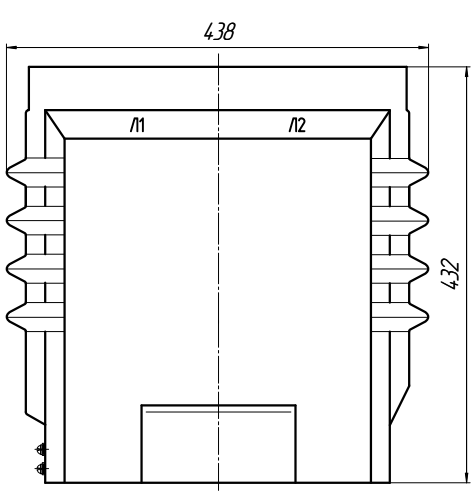
up to 1500 A

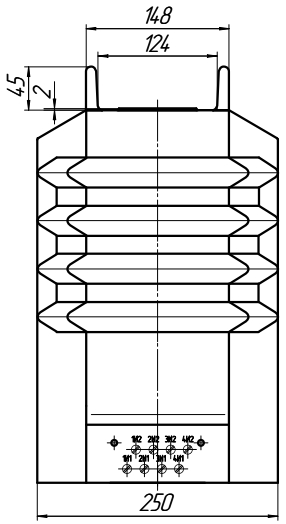


from 1500 A

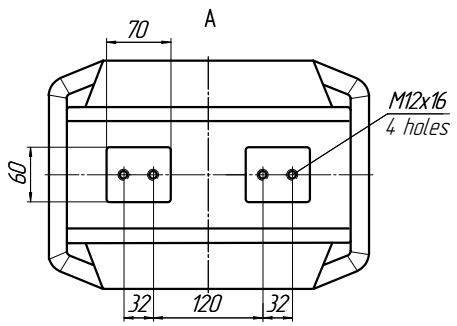


Overall dimensions, fitting and connecting dimensions TLO-35 M6

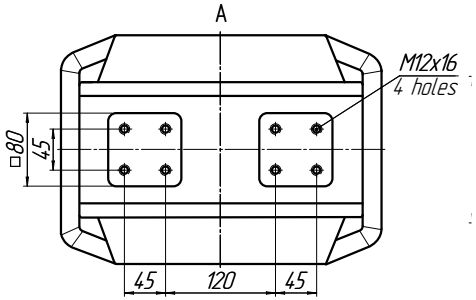




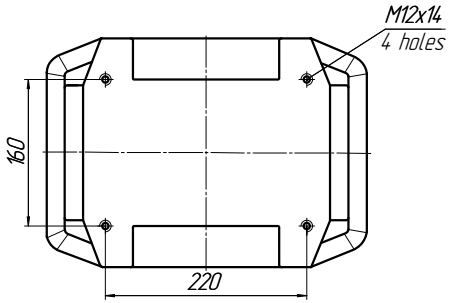
up to 1500 A



from 1500 A

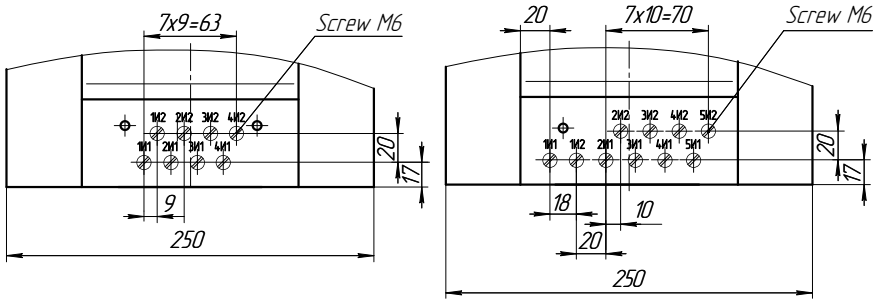


Fitting dimensions for TLO-35 M5 and M6



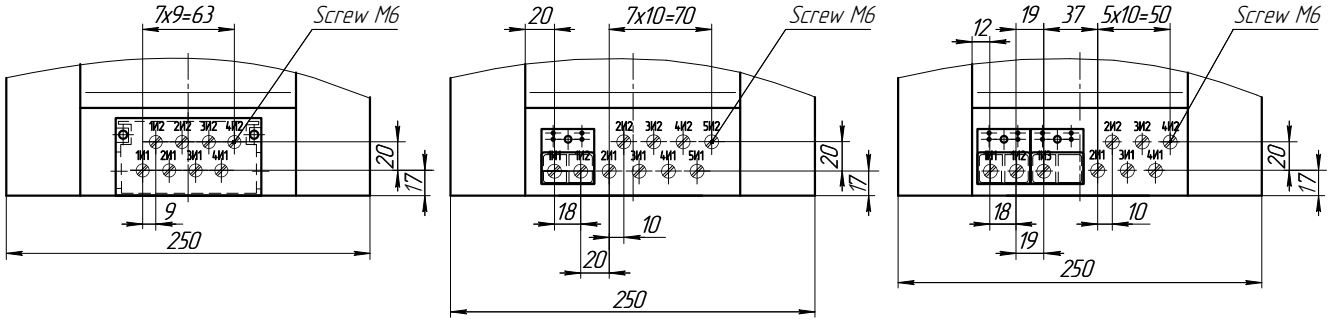
Different modifications

Modification A
secondary terminals from the transformer end surface



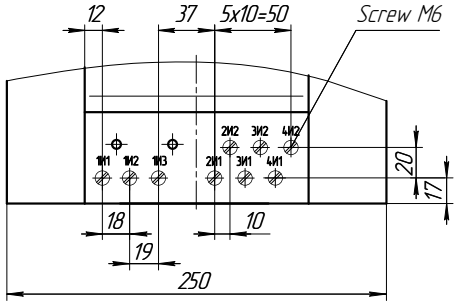
Modification D
with flexible secondary terminals

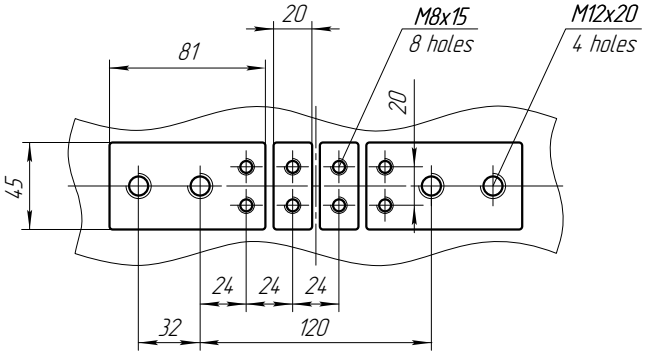
Modification AC
secondary terminals from the transformer end surface seal cover



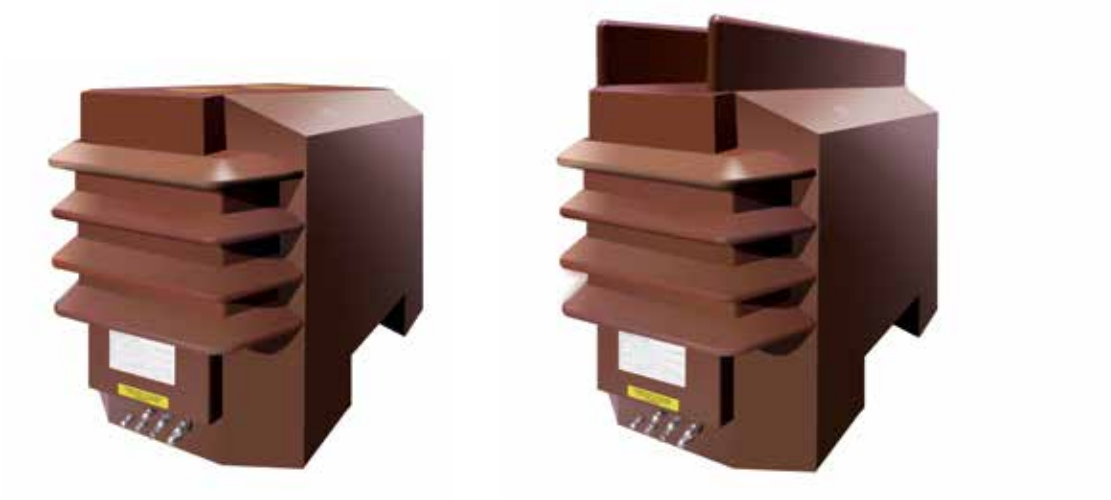
Modification F
with switching over on the primary winding
(an example of identification of transformation ratio for a transformer with 2 windings: 100(200)/5)

Modification AE
with switching over on the secondary winding located at the end surface





1.3.4. CAST SUPPORT-TYPE CURRENT TRANSFORMERS TLO-35



TLO-35 M7 and M8 current transformers can be made in modifications as follows:

Modification	Description
A	secondary terminals from the transformer end surface
C	seal cover availability
D	with flexible secondary terminals
E	with switching over on the secondary winding
F	with switching over on the primary winding

An example of identification of TLO-35 current transformer in M7 dimension:

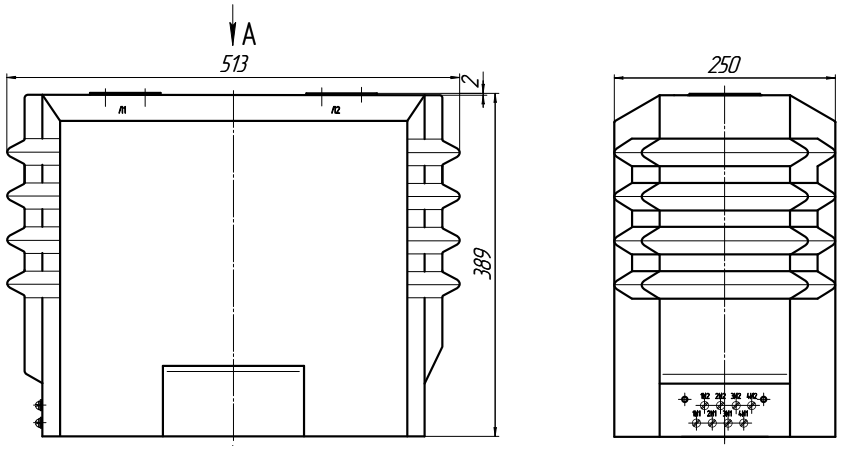
TLO-35 M7AC-0,5FS10/10P10-10/15-100/5 N3 a 10 kA

M7	transformer dimension
A	secondary terminals on the transformer body are located at the end surface
C	availability of a cover to protect and seal the measuring winding
0,5	accuracy class of the measuring secondary winding
FS10	instrument security factor of the measuring secondary winding
10P	accuracy class of the protective secondary winding
10	rated accuracy limit factor of the protective winding
10	rated secondary burden of the measuring secondary winding
15	rated secondary burden of the protective secondary winding
100	rated primary current
5	rated secondary current
N	climatic modification
3	placement category
a	insulation level
10 kA	short-time (one-second) thermal current

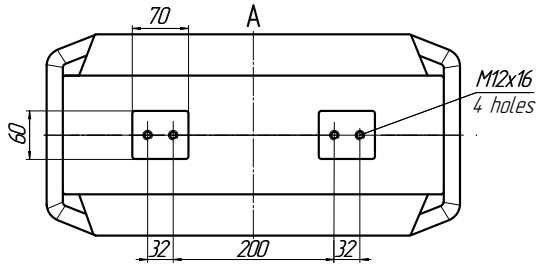
Technical parameters and characteristics

Parameters	Values for parameters
Rated voltage, kV	35
Maximum operating voltage, kV	40,5
Rated primary current, A	5; 7,5; 10; 11; 12; 13; 14; 16; 15; 18; 20; 22; 25; 27,5; 30; 32,5; 35; 37,5; 40; 50; 55; 60; 65; 70; 75; 80; 90; 100; 150; 200; 250; 300; 350; 400; 500; 550; 600; 650; 700; 750; 800; 900; 1000; 1050; 1100; 1150; 1200; 1250; 1300; 1400; 1500; 1550; 1600; 1650; 1700; 1750; 1800; 1900; 2000; 2100; 2200; 2250; 2300; 2500; 2550; 2600; 2650; 2700; 2750; 2800; 2900; 3000
Rated secondary current, A	1; 5
Rated frequency, Hz	50; 60
Number of secondary windings	up to 5
Rated secondary burdens with cosφ=0,8: measuring windings, V·A protective winding, V·A	 from 1 up to 50 from 1 up to 50
Rated accuracy class, according to GOST 7746: measuring windings protective windings	 0,2S; 0,2; 0,5S; 0,5; 1; 3 5P or 10P
Accuracy limit factor K_{rated} of secondary protective winding:	from 2 up to 20
Rated instrument security factor FS_{rated} of secondary measuring winding:	from 3 up to 30
Short-time (one second) thermal current kA, at rated primary current	
5-20 A	2,5; 5
30-50 A	5; 10; 20
75-100 A	10; 20; 31,5; 40
150 A	15; 20; 31,5; 40
200 A	20; 31,5; 40-60
300 A	31,5; 40-100
400-3000 A	40-100
Dynamic current kA, at rated primary current:	
5-20 A	6,25; 12,8
30-50 A	12,8; 26; 52
75-100 A	26; 52; 81; 100
150 A	39; 52; 81; 100
200 A	52; 81; 100-150
300 A	81; 100-250
400-3000 A	100-250
Weight, kg, not more	90
Overall dimensions (LxWxH), mm	513×250×389/513×250×432

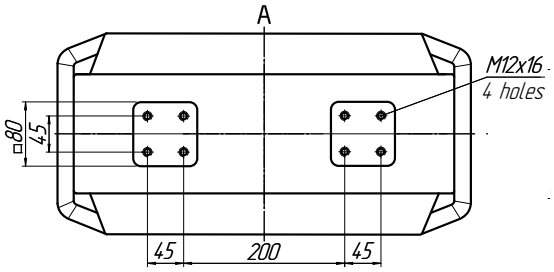
Overall dimensions, fitting and connecting dimensions TLO-35 M7



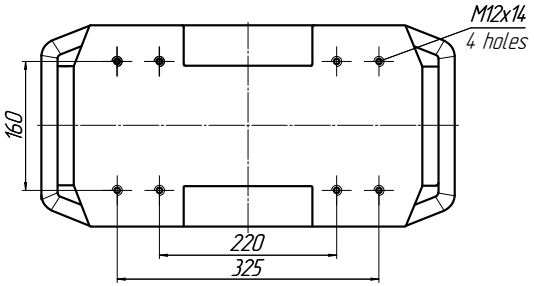
up to 1500 A



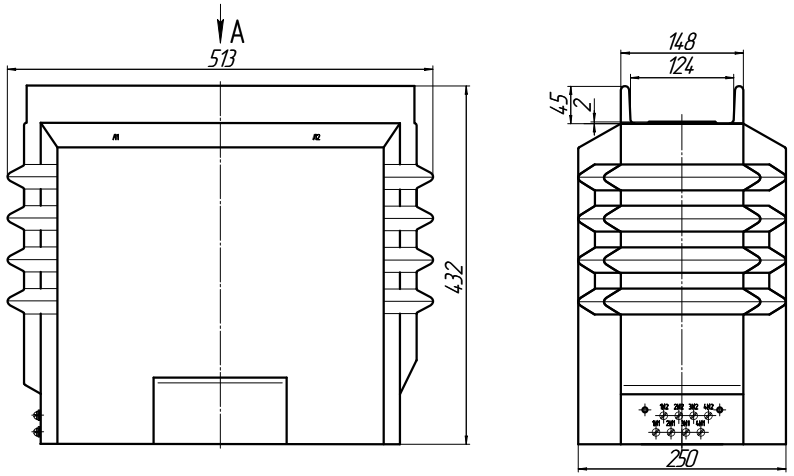
from 1500 A



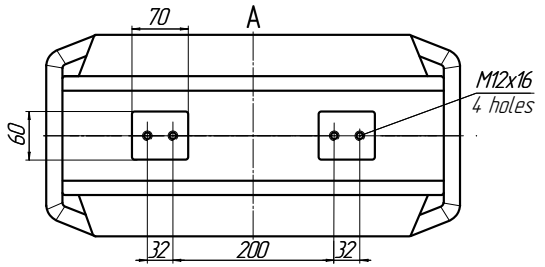
Fitting dimensions for TLO-35 M7 and M8



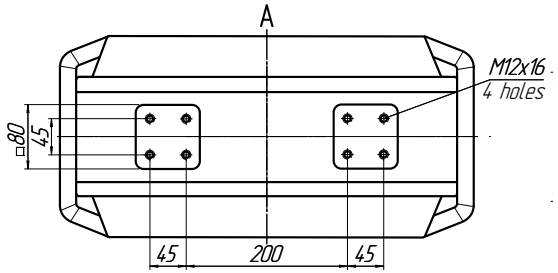
Overall dimensions, fitting and connecting dimensions TLO-35 M8



up to 1500 A

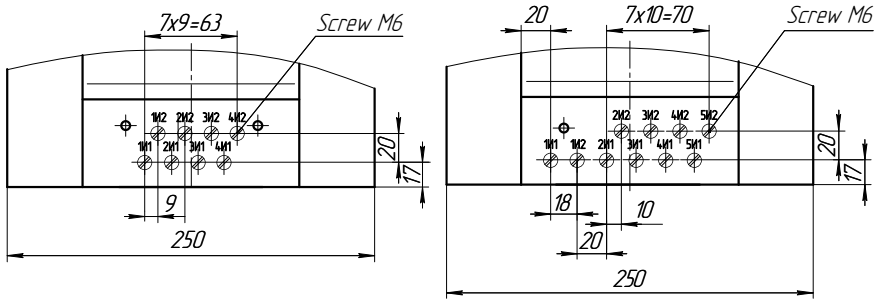


from 1500 A



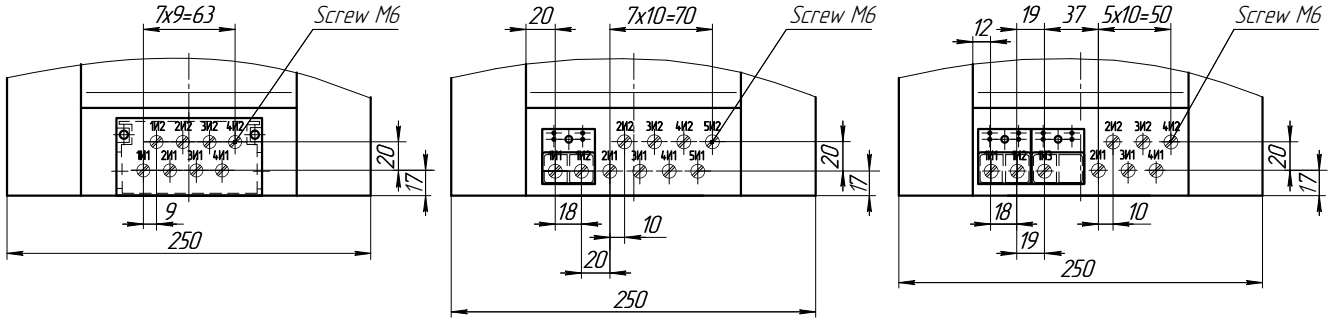
Different modifications

Modification A
secondary terminals from the transformer end surface

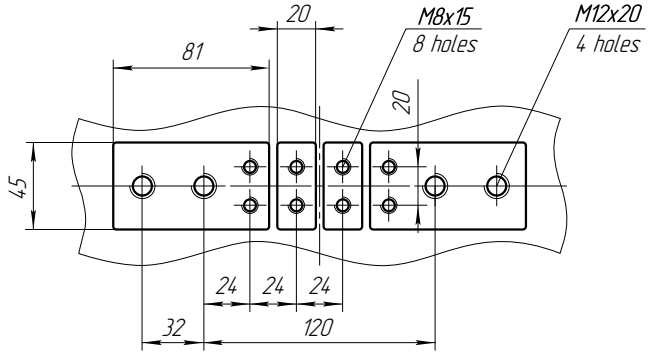


Modification D
with flexible secondary terminals

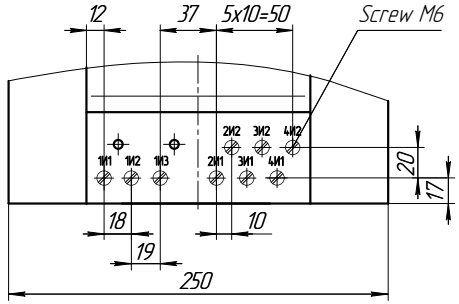
Modification AC
secondary terminals from the transformer end surface seal cover



Modification F
with switching over on the primary winding
(an example of identification of transformation ratio for a transformer with 2 windings: 100(200)/5)



Modification AE
with switching over on the secondary winding located at the end surface



SUPPORT-TYPE INSTRUMENT CURRENT TRANSFORMERS TL-EK-35

Description

TL-EK current transformer is designed to transmit measurement information signal to measuring, protection, automatic, signal and control devices, to be used for the purposes of electric power fiscal metering in alternate current electric circuits with 50 or 60 Hz frequency for voltage classes of up to 35 kV.

Climatic modifications NF (temperate an cold climate) and T (tropical climate), placement category 1. The transformer is designed for use in the following environments:

- the upper temperature value of ambient air for the climatic modification NF is plus 50˚C, for the climatic modification T - plus 65˚C;
- the lower temperature value of ambient air is minus 60˚C for the climatic modification NF and minus 10˚C for the climatic modification T;
- the environment is non-explosive, containing no current-conducting dust, reactive gases and vapors in concentrations destroying metals, environment of type II;
- air pollutants (AP) concentration 4S3 for transformers of the IVth creeping distance category;
- the transformer is designed for an aggregate mechanical wind load of 40m/s, a glaze ice load with a glaze of 20 mm thick and a wire tension load of not more than 500 N (50 kgf)
- the transformer conforms to the group M1 of operating conditions.

Production on the basis of the specification TU 3414-006-52889537-15.

Service life – at least 30 years.
Guaranteed service life – 5,5 years.

Technical parameters and characteristics

Parameters	Possible values for parameters	Standard parameters
Rated voltage, kV	35	
Maximum operating voltage, kV	40,5	
Rated primary current, A	5-3000	-
Rated secondary current, A	1, 5	-
Rated frequency, Hz	50, 60	
Rated secondary burdens with cosφ=0,8: measuring windings, V·A protective winding, V·A	 1-50 1-50	 10 15
Rated accuracy class: measuring windings protective windings	0,2; 0,2S; 0,5; 0,5S; 1; 3 5P or 10P	
Accuracy limit factor K_{rated} of secondary protective winding	from 2 up to 30	10
Rated instrument security factor FS_{rated} of secondary measuring winding	from 3 up to 30	-
Number of secondary windings	from 5	
Rated short-time (one second) thermal current kA, at rated primary current		
5-20 A	2,5; 5	
30 - 50 A	5; 10; 20	
75 -100 A	10; 20; 31,5; 40	
150 A	15; 20; 31,5; 40	
200 A	20; 31,5; 40-60	
300 A	31,5; 40-100	
400-3000 A	40-100	
Dynamic current kA, at rated primary current:		
5-20 A	6,25; 12,8	
30 - 50 A	12,8; 26; 52	
75 - 100 A	26; 52; 81; 100	
150 A	39; 52; 81; 100	
200 A	52; 81; 100-150	
300 A	81; 100-250	
400-3000 A	100-250	
Weight, kg, not more	250	

1.4.1. SUPPORT-TYPE INSTRUMENT CURRENT TRANSFORMERS TL-EK-35

Outdoor current transformers TL-EK-35 M1 NF1 can be made in modifications as follows:

Modification	Description
F	with switching over on the primary winding

An example of identification of TL-EK-35 current transformer in M1 dimension:

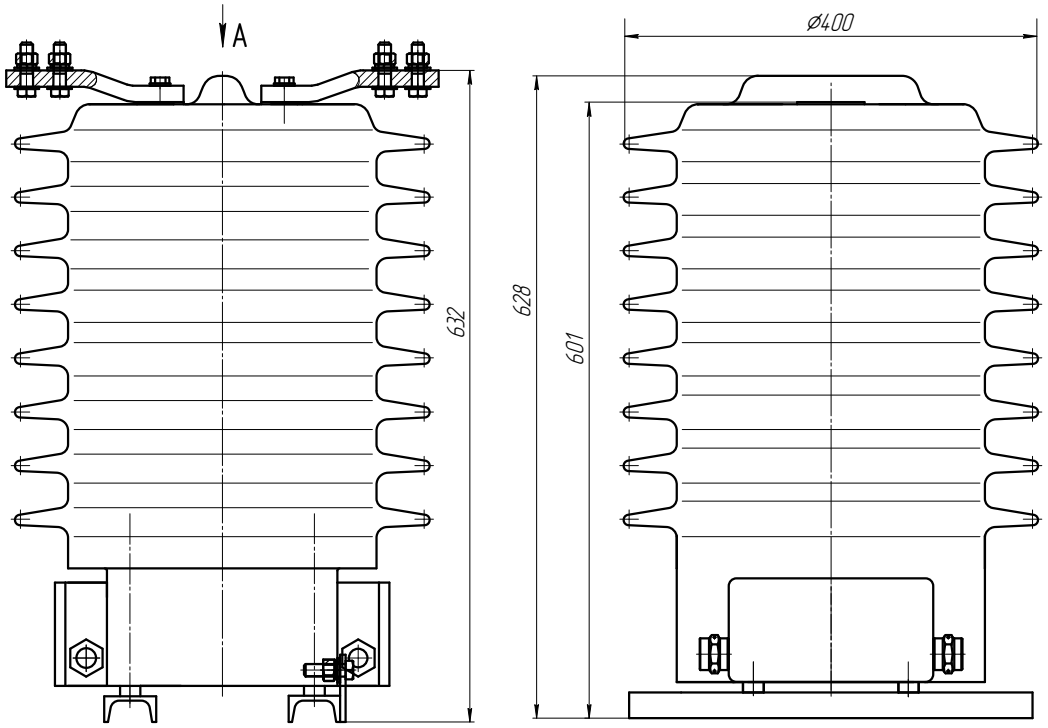
TL-EK-35 M1-0,5FS10/10P10-10/15-100/5 NF1 a 10 kA

M1	transformer dimension
0,5	accuracy class of the measuring secondary winding
FS10	instrument security factor of the measuring secondary winding
10P	accuracy class of the protective secondary winding
10	rated accuracy limit factor of the protective winding
10	rated secondary burden of the measuring secondary winding
15	rated secondary burden of the protective secondary winding
100	rated primary current
5	rated secobdary current
NF	climatic modification
1	placement category
a	insulation level
10 kA	short-time (one second) thermal current

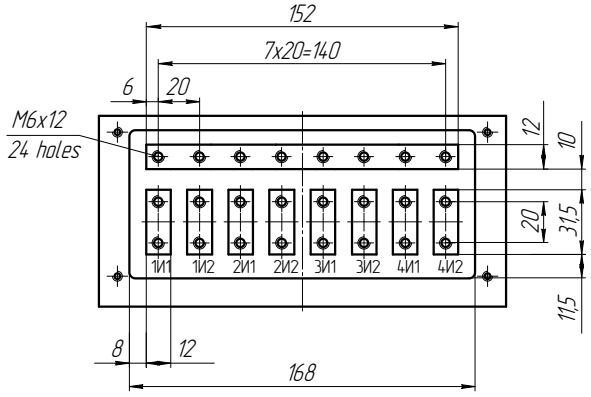
Technical parameters and characteristics

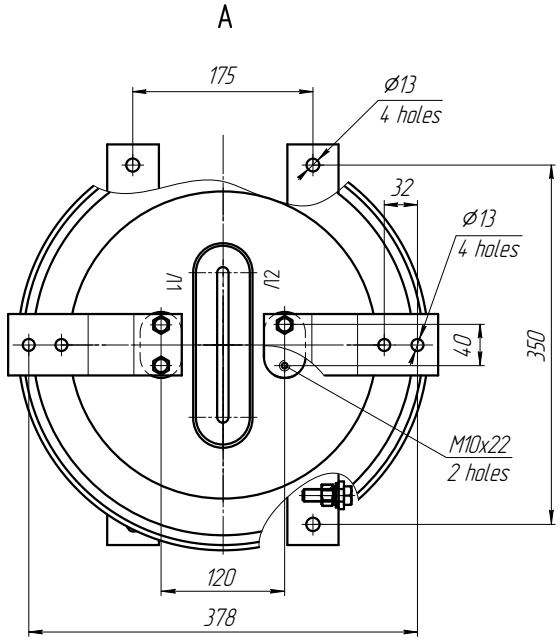
Parameters	Values for parameters
Rated voltage, kV	35
Maximum operating voltage, kV	40,5
Rated primary current, A	5; 7,5; 10; 11; 12; 13; 14; 16; 15; 18; 20; 22; 25; 27,5; 30; 32,5; 35; 37,5; 40; 50; 55; 60; 65; 70; 75; 80; 90; 100; 150; 200; 250; 300; 350; 400; 500; 550; 600; 650; 700; 750; 800; 900; 1000; 1050; 1100; 1150; 1200; 1250; 1300; 1400; 1500
Rated secondary current, A	1; 5
Rated frequency, Hz	50; 60
Number of secondary windings	up to 3
Rated secondary burdens with cosφ=0,8: measuring windings, V·A protective winding, V·A	 from 1 up to 50 from 1 up to 50
Rated accuracy class, according to GOST 7746: measuring windings protective windings	 0,2S; 0,2; 0,5S; 0,5; 1; 3 5P or 10P
Accuracy limit factor K_{rated} of secondary protective winding:	from 2 up to 30
Rated instrument security factor FS_{rated} of secondary measuring winding:	from 3 up to 30
Short-time (one second) thermal current kA, at rated primary current	
5-20 A	2,5; 5
30-50 A	5; 10; 20
75-100 A	10; 20; 31,5; 40
150 A	15; 20; 31,5; 40
200 A	20; 31,5; 40-60
300 A	31,5; 40-100
400-1500 A	40-100
Dynamic current kA, at rated primary current:	
5-20 A	6,25; 12,8
30-50 A	12,8; 26; 52
75-100 A	26; 52; 81; 100
150 A	39; 52; 81; 100
200 A	52; 81; 100-150
300 A	81; 100-250
400-1500 A	100-250
Weight, kg, not more	from 200 up to 215
Overall dimensions (LxWxH), mm	400×400×667

Overall dimensions, fitting and connecting dimensions

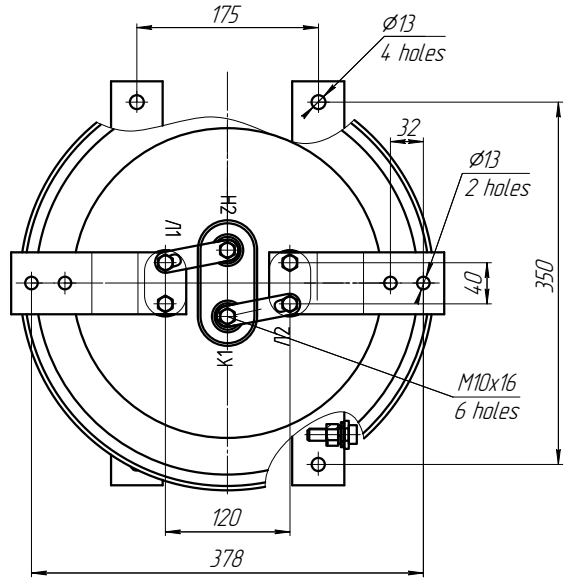


Location of secondary terminals





Modification F
with switching over on the primary winding
for transformers with rated current up to 600 A



1.4.2. SUPPORT-TYPE INSTRUMENT CURRENT TRANSFORMERS TL-EK-35

Outdoor current transformers TL-EK-35 M2 NF1 can be made in modifications as follows:

Modification	Description
F	with switching over on the primary winding

An example of identification of TL-EK-35 current transformer in M2 dimension:

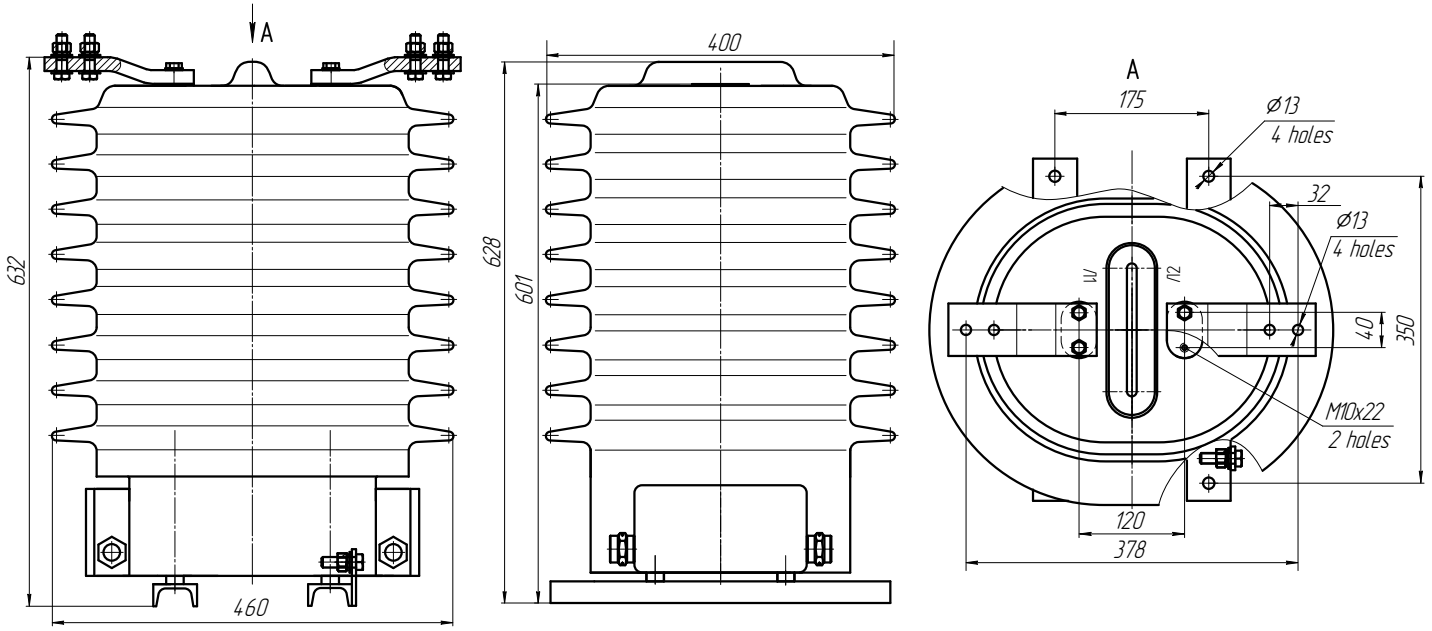
TL-EK-35 M2-0,5FS10/10P10-10/15-100/5 NF1 a 10 kA

M2	transformer dimension
0,5	accuracy class of the measuring secondary winding
FS10	instrument security factor of the measuring secondary winding
10P	accuracy class of the protective secondary winding
10	rated accuracy limit factor of the protective winding
10	rated secondary burden of the measuring secondary winding
15	rated secondary burden of the protective secondary winding
100	rated primary current
5	rated secobdary current
NF	climatic modification
1	placement category
a	insulation level
10 kA	short-time (one second) thermal current

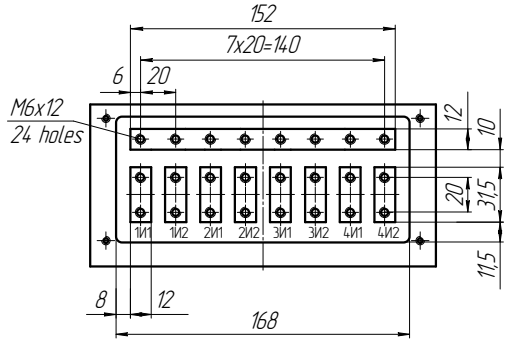
Technical parameters and characteristics

Parameters	Values for parameters
Rated voltage, kV	35
Maximum operating voltage, kV	40,5
Rated primary current, A	5; 7,5; 10; 11; 12; 13; 14; 16; 15; 18; 20; 22; 25; 27,5; 30; 32,5; 35; 37,5; 40; 50; 55; 60; 65; 70; 75; 80; 90; 100; 150; 200; 250; 300; 350; 400; 500; 550; 600; 650; 700; 750; 800; 900; 1000; 1050; 1100; 1150; 1200; 1250; 1300; 1400; 1500; 1550; 1600; 1650; 1700; 1750; 1800; 1900; 2000; 2100; 2200; 2250; 2300; 2500; 2550; 2600; 2650; 2700; 2750; 2800; 2900; 3000
Rated secondary current, A	1; 5
Rated frequency, Hz	50; 60
Number of secondary windings	up to 5
Rated secondary burdens with cosφ=0,8: measuring windings, V·A protective winding, V·A	 from 1 up to 50 from 1 up to 50
Rated accuracy class, according to GOST 7746: measuring windings protective windings	 0,2S; 0,2; 0,5S; 0,5; 1; 3 5P or 10P
Accuracy limit factor K_{rated} of secondary protective winding:	from 2 up to 30
Rated instrument security factor FS_{rated} of secondary measuring winding:	from 3 up to 30
Short-time (one second) thermal current kA, at rated primary current	
5-20 A	2,5; 5
30-50 A	5; 10; 20
75-100 A	10; 20; 31,5; 40
150 A	15; 20; 31,5; 40
200 A	20; 31,5; 40-60
300 A	31,5; 40-100
400-3000 A	40-100
Dynamic current kA, at rated primary current:	
5-20 A	6,25; 12,8
30-50 A	12,8; 26; 52
75-100 A	26; 52; 81; 100
150 A	39; 52; 81; 100
200 A	52; 81; 100-150
300 A	81; 100-250
400-3000 A	100-250
Weight, kg, not more	from 200 up to 215
Overall dimensions (LxWxH), mm	460×400×667

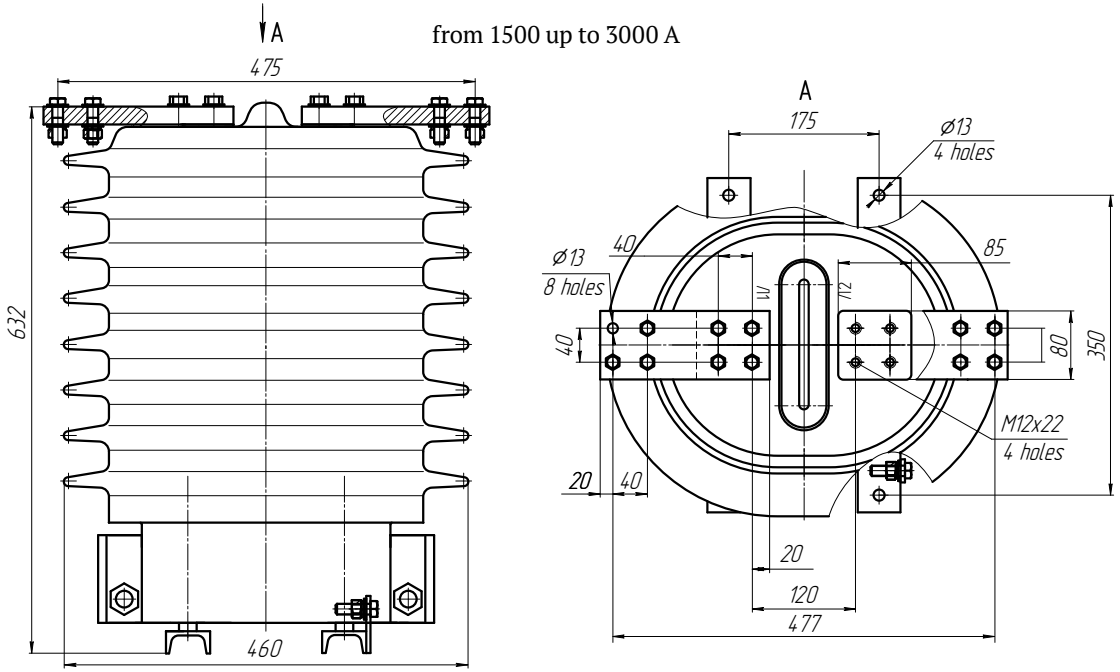
Overall dimensions, fitting and connecting dimensions



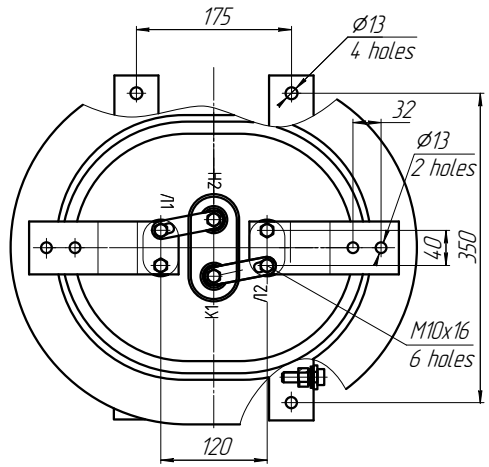
Location of secondary terminals



from 1500 up to 3000 A



Modification F
with switching over on the primary winding
for transformers with rated current up to 600 A



IMPLEMENTED PROJECTS

TLO	TLP	TZLK(R)-0,66	TSH-EK-0,66	ZNOL(P)-EK

HEAT POWER ENGINEERING

SDPP state district power plant

Astrakhan SDPP
Belov SDPP
Ekibastuz SDPP
Verkhnetagilskaya SDPP
Kirishi SDPP
Kostroma SDPP
Krasnoyarsk SDPP and SDPP-2
Nizhneturinskaya SDPP
Novocherkassk SDPP
Novy Urengoy SDPP
Partizansk SDPP
Perm SDPP
Reftinskaya SDPP
Sakhalin SDPP
Serov SDPP
Chelyabinsk SDPP
Shatura SDPP
Yaiva SDPP

HYDROELECTRIC POWER

HPP - hydro power plant

Saratov HPP
Sayano-Shushenskaya HPP
Tolmacheva HPP
Chiriyuritskaya HPP
Chirikeiskaya HPP
Zelenchug HPP

NUCLEAR POWER ENGINEERING

NPP nuclear power plant

Novovoronezhskaya NPP
Novovoronezhskaya NPP-2
Smolensks NPP

BUSHING-TYPE INSTRUMENT CURRENT TRANSFORMERS TLP-10

Description

TLP-10 current transformer is designed for installation in indoor and outdoor switchgears and in singleend service assembled chambers.

The current transformer ensures transmitting of the measuring information signal to the measuring instruments and protection and control devices to insulate secondary wiring from high voltage in alternating current electrical units for up to 10 kV voltage class.
Climatic modification N (temperate climate), T (tropical climate) or NF (temperate and cold climate), placement categories 2 or 3 .

Production on the basis of the specification TU 3414-003-52889537-05.

Guaranteed service life – 5 years.





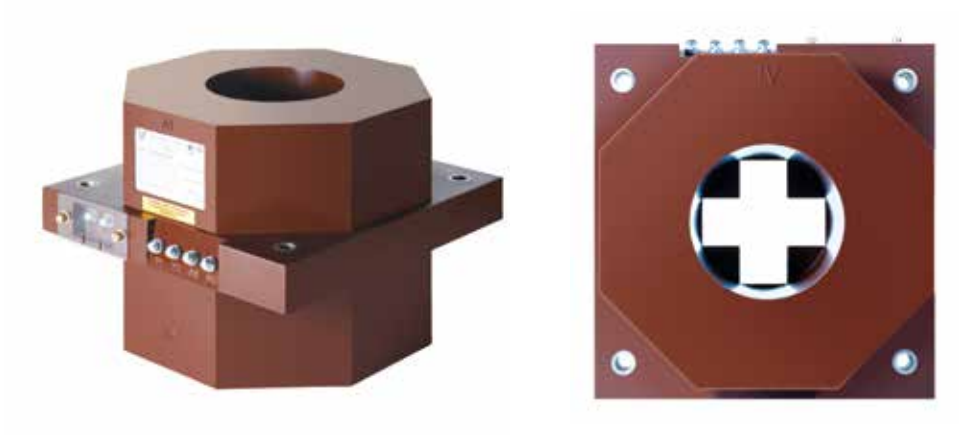




Technical parameters and characteristics

Parameters	Possible values for parameters	Standard parameters
Rated voltage, kV	10	
Maximum operating voltage, kV	12	
Rated primary current, A	5-5000	
Rated secondary current, A	1, 5	
Rated frequency, Hz	50, 60	
Rated secondary burdens with cosφ=0,8: measuring windings, V·A protective winding, V·A	 1-50 1-50	 10 15
Rated accuracy class: measuring windings protective windings	0,2; 0,2S; 0,5; 0,5S; 1; 3 5P or 10P	
Accuracy limit factor K_{rated} of secondary protective winding	from 2 up to 30	10
Rated instrument security factor FS_{rated} of secondary measuring winding	from 3 up to 30	-
Number of secondary windings	up to 5	
Short-time (one second) thermal current kA, at rated primary current		
5-20 A	2,5; 5	
30-50 A	5; 10; 20	
75-100 A	10; 20; 31,5; 40	
150 A	15; 20; 31,5; 40	
200 A	20; 31,5; 40-60	
300 A	31,5; 40-100	
400-5000 A	40-100	
Dynamic current kA, at rated primary current		
5-20A	6,25; 12,8	
30-50 A	12,8; 26; 52	
75-100 A	26; 52; 81; 100	
150 A	39; 52; 81; 100	
200 A	52; 81; 100-150	
300 A	81; 100-250	
400-5000 A	100-250	
Weight, kg, not more	from 21 up to 40	

1.5.1.1. CAST BUSHING-TYPE CURRENT TRANSFORMERS TLP-10



TLP-10-1 M1, M2, M3 current transformers can be made in modifications as follows:

Modification	Description
C	seal cover availability
D	with flexible secondary terminals
E	with switching over on the secondary winding (an example of identification of transformation ratio for a transformer with 2 windings: 1000(2000)-2000/5)
X	with an x-shape opening
Y	with a round opening

An example of identification of TLP-10 current transformer in M1 dimension:

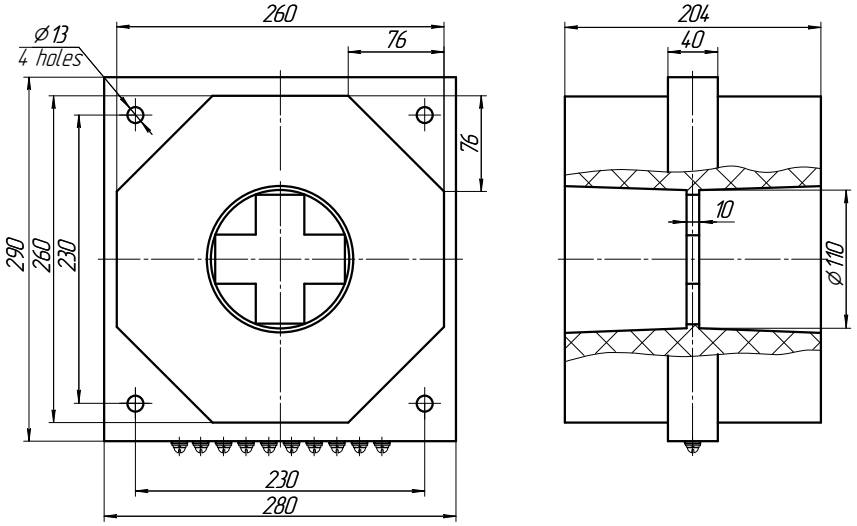
TLP-10-1 M1CX-0,5 FS10/10P10-10/15-1000/5 N3 b 40 kA

M1	transformer dimension
C	availability of a cover to protect and seal the measuring winding
X	opening type
0,5	accuracy class of the measuring secondary winding
FS10	instrument security factor of the measuring secondary winding
10P	accuracy class of the protective secondary winding
10	rated accuracy limit factor of the protective winding
10	rated secondary burden of the measuring secondary winding
15	rated secondary burden of the protective secondary winding
1000	rated primary current
5	rated secondary current
N	climatic modification
3	placement category
b	insulation level
40 kA	short-time (one second) thermal current

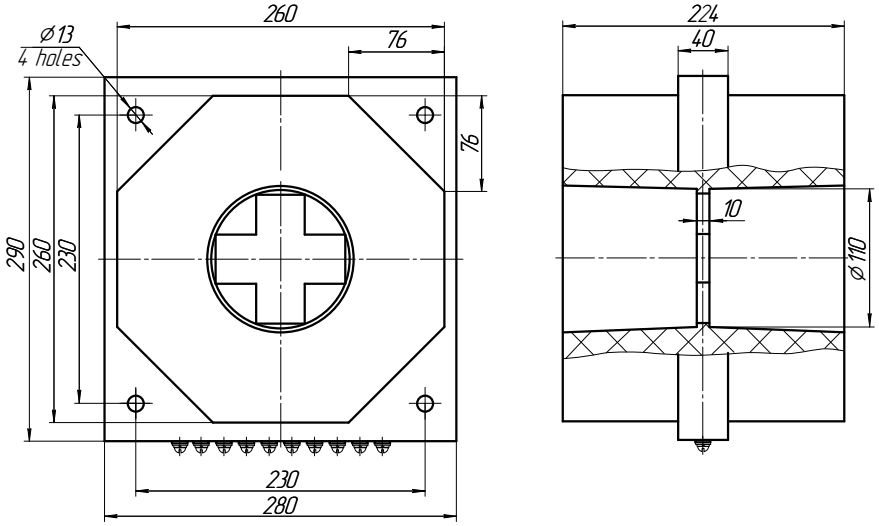
Technical parameters and characteristics

Parameters	Values for parameters
Rated voltage, kV	10
Maximum operating voltage, kV	12
Rated primary current, A	500; 550; 600; 650; 700; 750; 800; 900; 1000; 1050; 1100; 1150; 1200; 1250; 1300; 1400; 1500; 1550; 1600; 1650; 1700; 1750; 1800; 1900; 2000; 2100; 2200; 2250; 2300; 2500; 2550; 2600; 2650; 2700; 2750; 2800; 2900; 3000
Rated secondary current, A	1; 5
Rated frequency, Hz	50; 60
Number of secondary windings	up to 5
Rated secondary burdens with cosφ=0,8: measuring windings, V·A protective winding, V·A	 from 1 up to 50 from 1 up to 50
Rated accuracy class, according to GOST 7746: measuring windings protective windings	 0,2S; 0,2; 0,5S; 0,5; 1; 3 5P or 10P
Accuracy limit factor K_{rated} of secondary protective winding	from 2 up to 30
Rated instrument security factor FS_{rated} of measuring winding	from 3 up to 30
Rated short-time (one second) thermal current kA, at rated primary current	
500-3000 A	40-100
Dynamic current kA, at rated primary current:	
500-3000 A	100-250
Weight, kg, not more	from 30 up to 40
Overall dimensions (LxWxH), mm	290×280×204/290×280×224/ 330×320×210

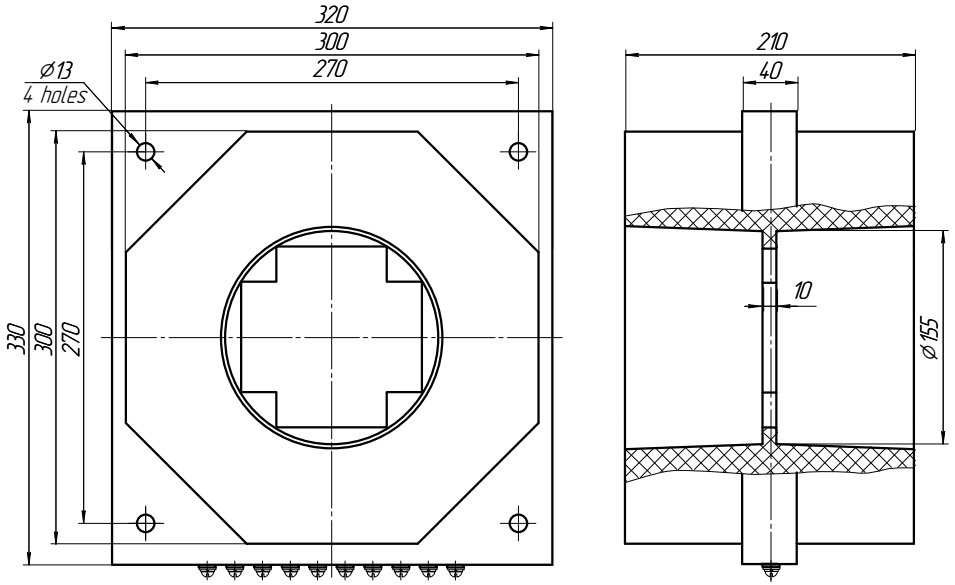
Overall dimensions, fitting and connecting dimensions TLP-10-1 M1



Overall dimensions, fitting and connecting dimensions TLP-10-1 M2



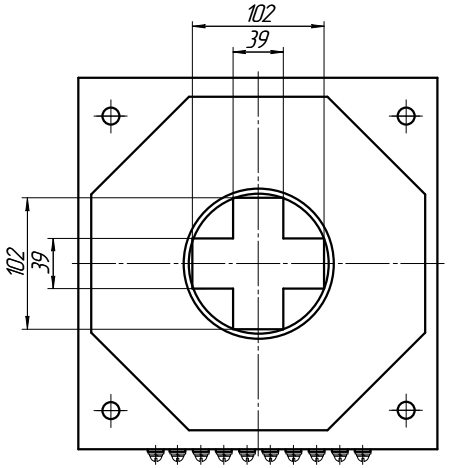
Overall dimensions, fitting and connecting dimensions TLP-10-1 M3



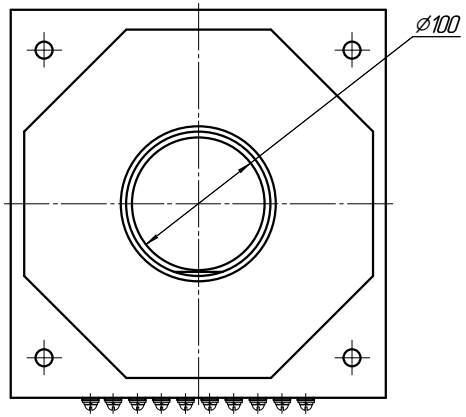
Different modifications

Different modifications openings for TLP-10-1 M1 and M2

Modification X

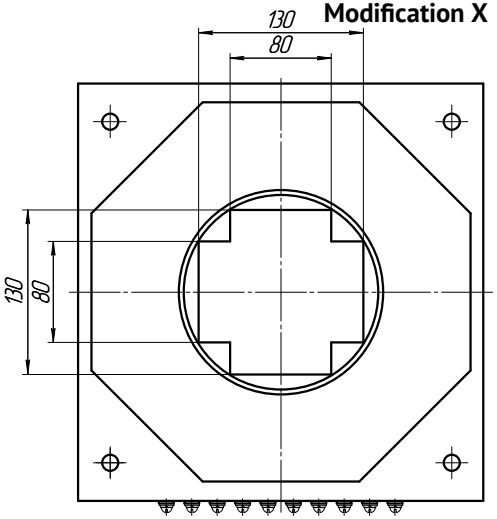


Modification Y

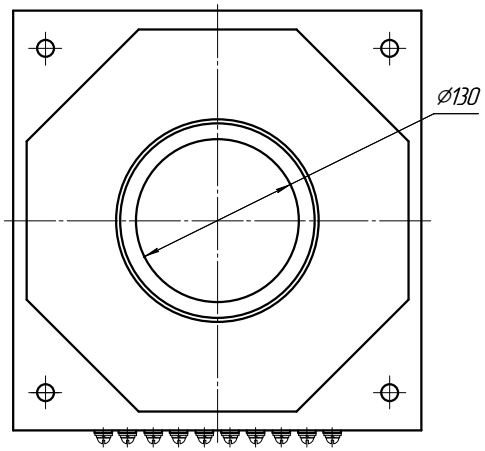


Different modifications openings for TLP-10-1 M3

Modification X



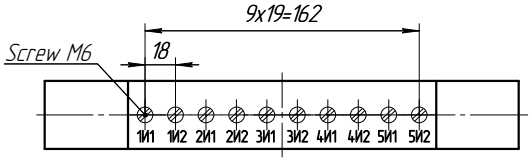
Modification Y



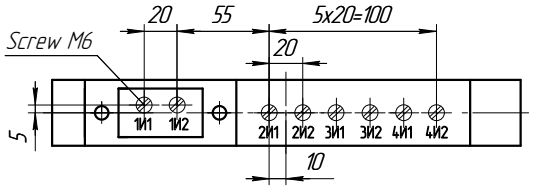
Location of secondary terminals

Modification C

secondary terminals from the transformer end surface seal cover

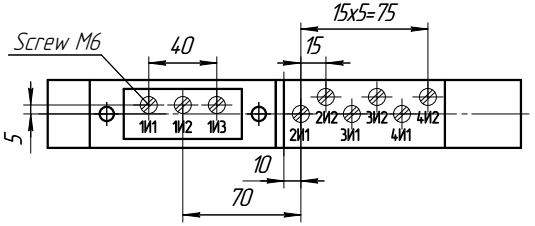


Transformers with secondary windings, from one up to five

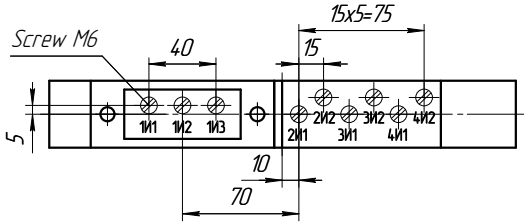


Transformers with secondary windings, from one up to four, with a cover to protect and seal the measuring winding

Modification E



Transformers with secondary windings, from one up to four, with switching over on the secondary winding



Transformers with secondary windings, from one up to four, with switching over on the secondary winding and with a cover to protect and seal the measuring winding

Technical parameters and characteristics

Parameters	Values for parameters
Rated voltage, kV	10
Maximum operating voltage, kV	12
Rated primary current, A	10; 11; 12; 13; 14; 16; 15; 18; 20; 22; 25; 27,5; 30; 32,5; 35; 37,5; 40; 50; 55; 60; 65; 70; 75; 80; 90; 100; 150; 200; 250; 300; 350; 400; 500; 550; 600; 650; 700; 750; 800; 900; 1000; 1050; 1100; 1150; 1200; 1250; 1300; 1400; 1500
Rated secondary current, A	1; 5
Rated frequency, Hz	50; 60
Number of secondary windings	up to 5
Rated secondary burdens with cosφ=0,8: measuring windings, V·A protective winding, V·A	 from 1 up to 50 from 1 up to 50
Rated accuracy class, according to GOST 7746: measuring windings protective windings	 0,2S; 0,2; 0,5S; 0,5; 1; 3 5P or 10P
Accuracy limit factor K_{rated} of secondary protective winding	from 2 up to 30
Rated instrument security factor FS_{rated} of measuring winding	from 3 up to 30
Rated short-time (one second) thermal current kA, at rated primary current	
10-20 A	2,5; 5
30-50 A	5; 10; 20
75-100 A	10; 20; 31,5; 40
150 A	15; 20; 31,5; 40
200 A	20; 31,5; 40-60
300 A	31,5; 40-100
400-1500 A	40-100
Dynamic current kA, at rated primary current:	
10-20 A	6,25; 12,8
30-50 A	12,8; 26; 52
75-100 A	26; 52; 81; 100
150 A	39; 52; 81; 100
200 A	52; 81; 100-150
300 A	81; 100-250
400-1500 A	100-250
Weight, kg, not more	25
Overall dimensions (LxWxH), mm	250×222×344/250×222×513

Modification	Description
A	with a flat-type primary contact
B	with primary bus connectors
C	seal cover availability
D	with flexible secondary terminals
E	with switching over on the secondary winding (an example of identification of transformation ratio for a transformer with 2 windings: 100(200)-200/5)

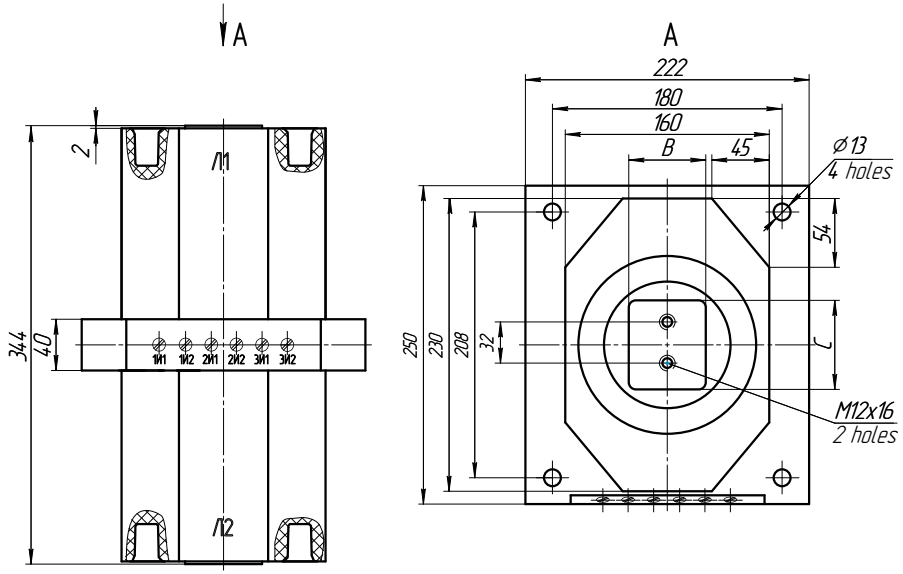
TLP-10-2 M1A and M1B current transformers can be made in modifications as follows:

TLP-10-2 M1AC-0,5 FS10/10P10-10/15-600/5 N3 b 40 kA

M1	transformer dimension
A	with a flat-type primary contact
C	availability of a cover to protect and seal the measuring winding
0,5	accuracy class of the measuring secondary winding
FS10	instrument security factor of the measuring secondary winding
10P	accuracy class of the protective secondary winding
10	rated accuracy limit factor of the protective winding
10	rated secondary burden of the measuring secondary winding
15	rated secondary burden of the protective secondary winding
600	rated primary current
5	rated secondary current
N	climatic modification
3	placement category
b	insulation level
40 kA	short-time (one second) thermal current

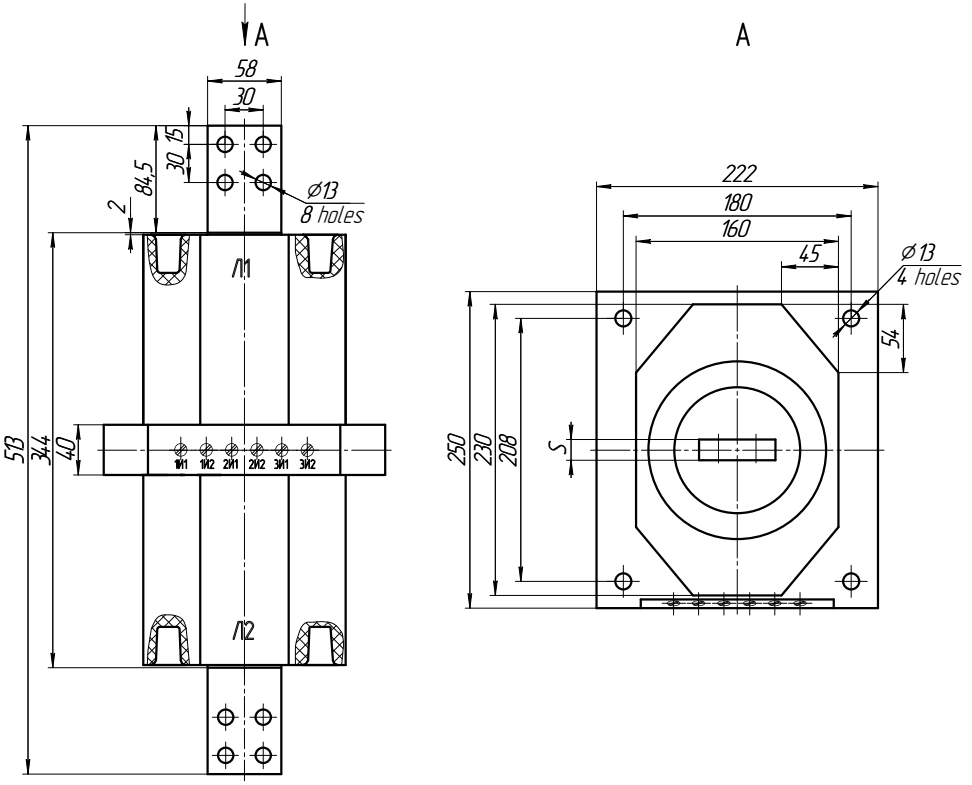
An example of identification of TLP-10-2 current transformer in M1A dimension:

Overall dimensions, fitting and connecting dimensions TLP-10-2 M1A



Rated primary current, A	Dimensions of terminals for primary winding, mm
	B x C
10...1000	60 x 70
10...1500	60 x 80

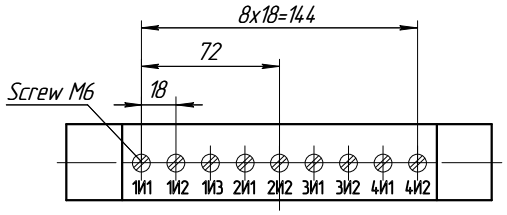
Overall dimensions, fitting and connecting dimensions TLP-10-2 M1B



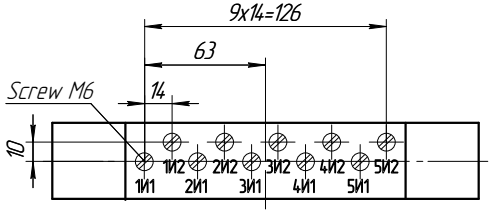
Rated primary current, A	S, мм
10...600	7
60...1000	10
1000...1500	20

Different modifications

Location of secondary terminals

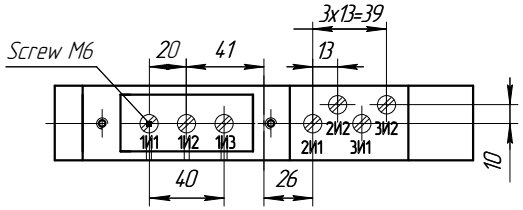


Transformers with secondary windings, from one up to four

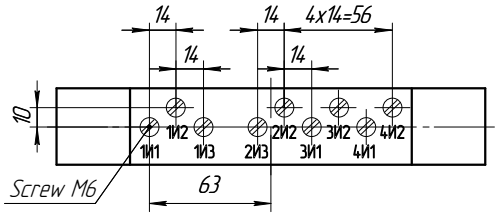


Transformers with secondary windings, from one up to five

Modification E



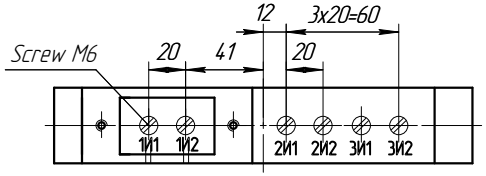
Transformers with secondary windings, from one up to three, and with switching over on the secondary winding



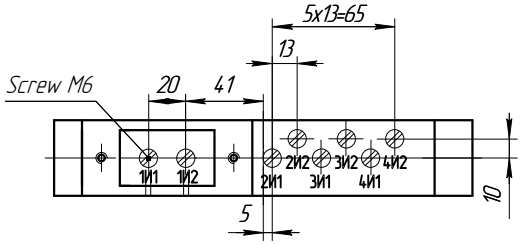
Transformers with secondary windings, from one up to four, with switching over on the secondary winding

Modification C

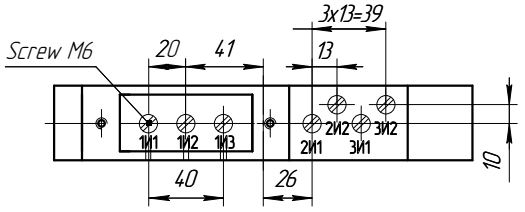
Secondary terminals with a seal cover



Transformers with secondary windings, from one up to three, with a cover to protect and seal the measuring winding

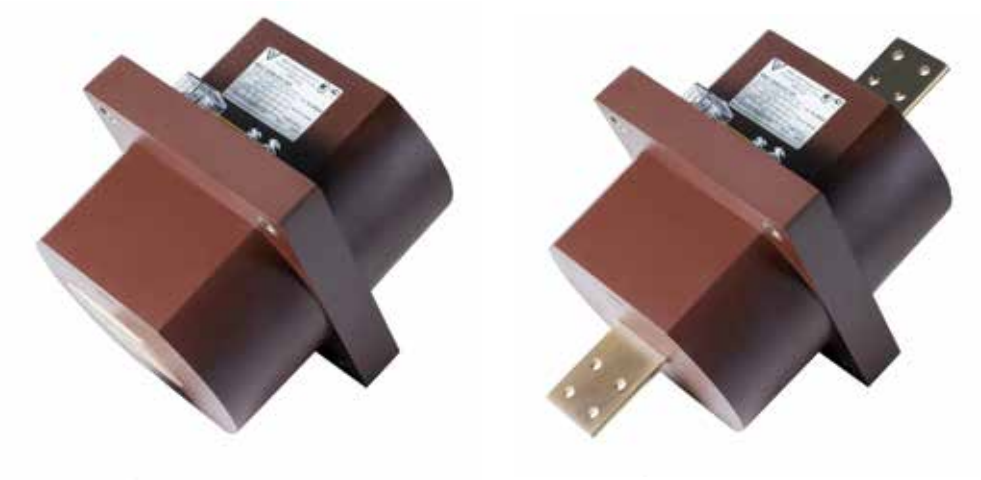


Transformers with secondary windings, from one up to four, with a cover to protect and seal the measuring winding



Transformers with secondary windings, from one up to three, with switching over on the secondary winding and a cover to protect and seal the measuring winding

1.5.2.2. CAST BUSHING-TYPE CURRENT TRANSFORMERS TLP-10



TLP-10-2 M2A and M2B current transformers can be made in modifications as follows:

Modification	Description
A	with a flat-type primary contact
B	with primary bus connectors
C	seal cover availability
D	with flexible secondary terminals

An example of identification of TLP-10-2 current transformer in M2A dimension:

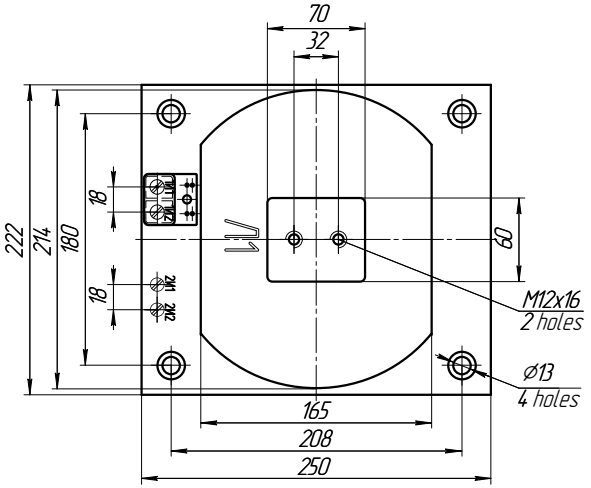
TLP-10-2 M2AC-0,5 FS10/10P10-10/15-600/5 N3 b 40 kA

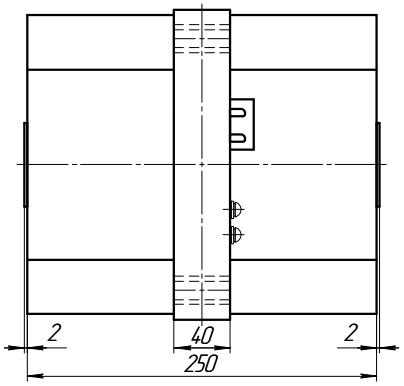
M2	transformer dimension
A	with a flat-type primary contact
C	availability of a cover to protect and seal the measuring winding
0,5	accuracy class of the measuring secondary winding
FS10	instrument security factor of the measuring secondary winding
10P	accuracy class of the protective secondary winding
10	rated accuracy limit factor of the protective winding
10	rated secondary burden of the measuring secondary winding
15	rated secondary burden of the protective secondary winding
600	rated primary current
5	rated secondary current
N	climatic modification
3	placement category
b	insulation level
40 kA	short-time (one second) thermal current

Technical parameters and characteristics

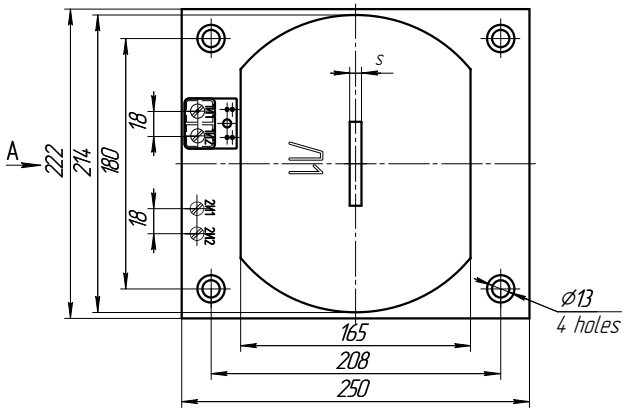
Parameters	Values for parameters
Rated voltage, kV	10
Maximum operating voltage, kV	12
Rated primary current, A	10; 11; 12; 13; 14; 16; 15; 18; 20; 22; 25; 27,5; 30; 32,5; 35; 37,5; 40; 50; 55; 60; 65; 70; 75; 80; 90; 100; 150; 200; 250; 300; 350; 400; 500; 550; 600; 650; 700; 750; 800; 900; 1000; 1050; 1100; 1150; 1200; 1250; 1300; 1400; 1500
Rated secondary current, A	1; 5
Rated frequency, Hz	50; 60
Number of secondary windings	up to 2
Rated secondary burdens with cosφ=0,8: measuring windings, V·A protective winding, V·A	 from 1 up to 10 from 1 up to 15
Rated accuracy class, according to GOST 7746: measuring windings protective windings	 0,2S; 0,2; 0,5S; 0,5; 1; 3 5P or 10P
Accuracy limit factor K_{rated} of secondary protective winding	from 2 up to 15
Rated instrument security factor FS_{rated} of measuring winding	from 3 up to 30
Rated short-time (one second) thermal current kA, at rated primary current	
10-20 A	2,5; 5
30-50 A	5; 10; 20
75-100 A	10; 20; 31,5; 40
150 A	15; 20; 31,5; 40
200 A	20; 31,5; 40-60
300 A	31,5; 40-100
400-1500 A	40-100
Dynamic current kA, at rated primary current:	
10-20 A	6,25; 12,8
30-50 A	12,8; 26; 52
75-100 A	26; 52; 81; 100
150 A	39; 52; 81; 100
200 A	52; 81; 100-150
300 A	81; 100-250
400-1500 A	100-250
Weight, kg, not more	25
Overall dimensions (LxWxH), mm	250×222×250/250×222×414

Overall dimensions, fitting and connecting dimensions TLP-10-2 M2A



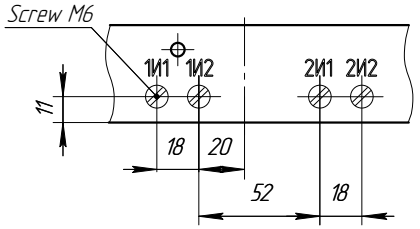


Overall dimensions, fitting and connecting dimensions TLP-10-2 M2B

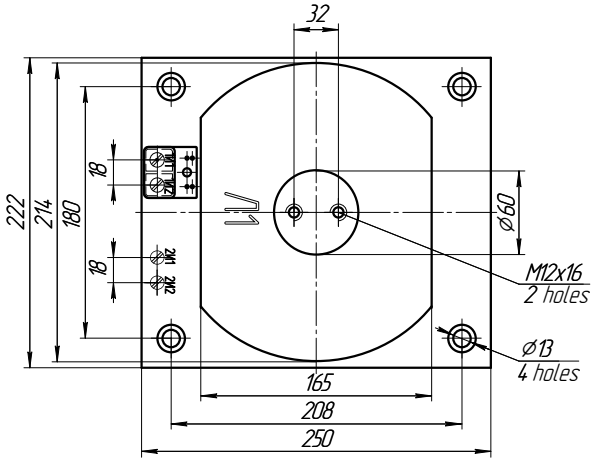


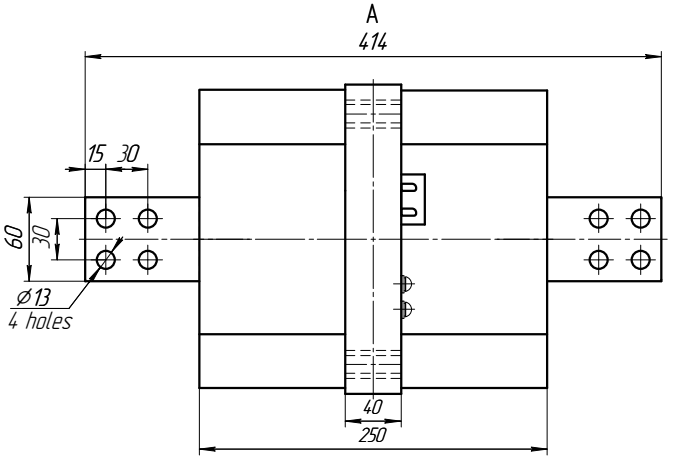
Different modifications

Location of secondary terminals



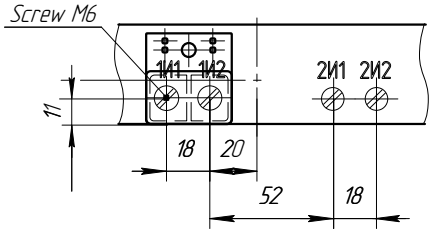
Transformers with secondary windings, one or two





Modification C

Secondary terminals with a seal cover



Transformers with secondary windings, one or two, with a cover to protect and with a seal the measuring winding

Rated primary current, A	Dimensions of terminals for primary winding, mm	
	ø D	B x C
10..400	60	–
10..1500	–	60 x 70

Rated primary current, A	S, mm
10..600	7
600..1000	10
1000..1500	20

1.5.3.1. CAST BUSHING-TYPE CURRENT TRANSFORMERS TLP-10

TLP-10-3 M1A and M1B current transformers can be made in modifications as follows:

Modification	Description
A	with a flat-type primary contact
B	with primary bus connectors
C	seal cover availability
D	with flexible secondary terminals
E	with switching over on the secondary winding (an example of identification of transformation ratio for a transformer with 2 windings: 100(200)-200/5)

An example of identification of TLP-10-3 current transformer in M1A dimension:

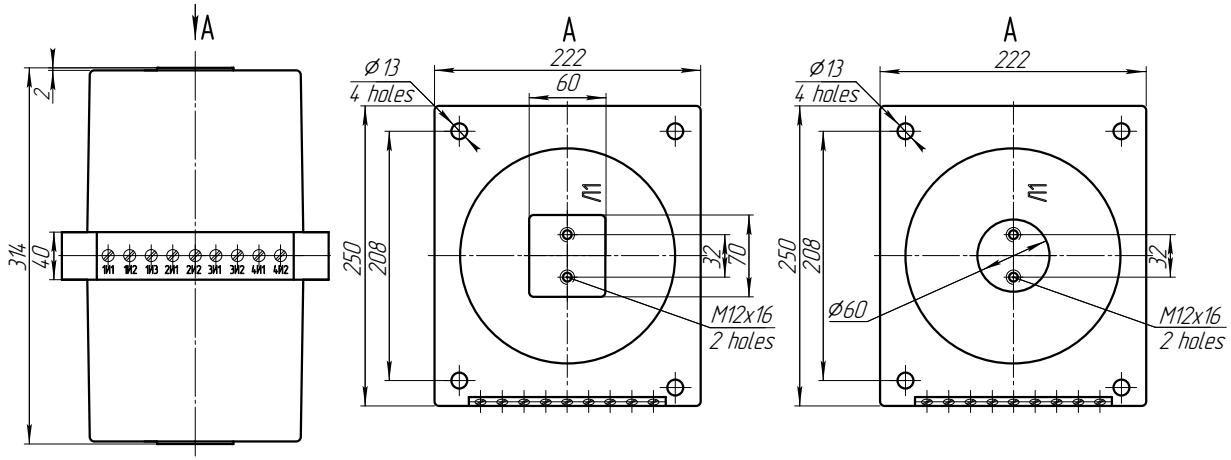
TLP-10-3 M1AC-0,5 FS10/10P10-10/15-600/5 N3 b 40 kA

M1	transformer dimension
A	with a flat-type primary contact
C	availability of a cover to protect and seal the measuring winding
0,5	accuracy class of the measuring secondary winding
FS10	instrument security factor of the measuring secondary winding
10P	accuracy class of the protective secondary winding
10	rated accuracy limit factor of the protective winding
10	rated secondary burden of the measuring secondary winding
15	rated secondary burden of the protective secondary winding
600	rated primary current
5	rated secondary current
N	climatic modification
3	placement category
b	insulation level
40 kA	short-time (one second) thermal current

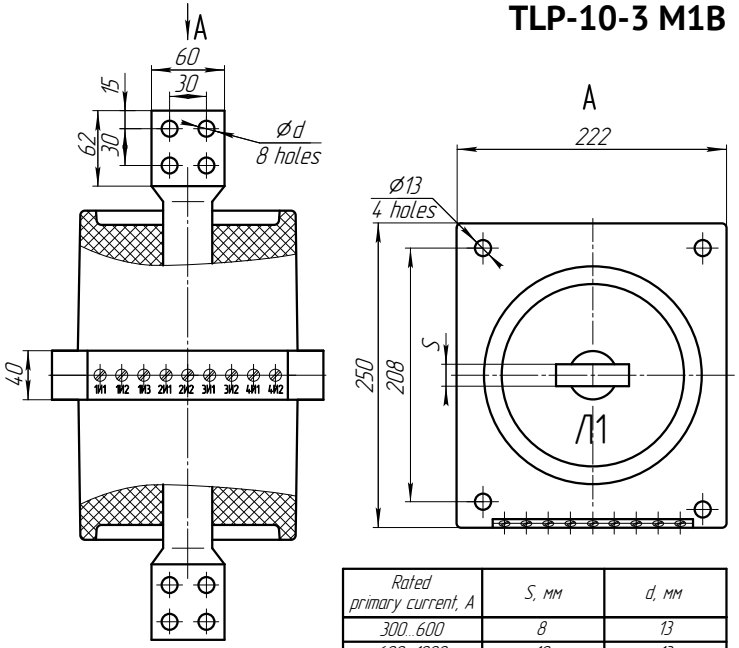
Technical parameters and characteristics

Parameters	Values for parameters
Rated voltage, kV	10
Maximum operating voltage, kV	12
Rated primary current, A	300; 350; 400; 500; 550; 600; 650; 700; 750; 800; 900; 1000; 1050; 1100; 1150; 1200; 1250; 1300; 1400; 1500; 1550; 1600; 1650; 1700; 1750; 1800; 1900; 2000
Rated secondary current, A	1; 5
Rated frequency, Hz	50; 60
Number of secondary windings	up to 5
Rated secondary burdens with cosφ=0,8: measuring windings, V·A protective winding, V·A	 from 1 up to 50 from 1 up to 50
Rated accuracy class, according to GOST 7746: measuring windings protective windings	 0,2S; 0,2; 0,5S; 0,5; 1; 3 5P or 10P
Accuracy limit factor K_{rated} of secondary protective winding	from 2 up to 30
Rated instrument security factor FS_{rated} of measuring winding	from 3 up to 30
Rated short-time (one second) thermal current kA, at rated primary current	
300 A	31,5; 40-100
400-2000 A	40-100
Dynamic current kA, at rated primary current:	
300 A	81; 100-250
400-2000 A	100-250
Weight, kg, not more	from 21 up to 40
Overall dimensions (LxWxH), mm	250×222×314/250×222×453

Overall dimensions, fitting and connecting dimensions TLP-10-3 M1A



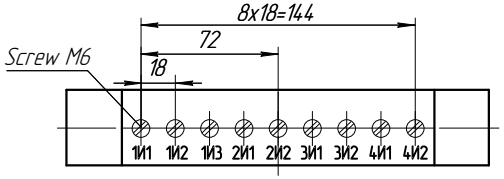
Overall dimensions, fitting and connecting dimensions TLP-10-3 M1B



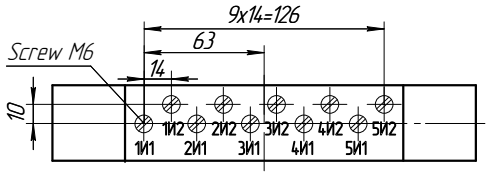
Rated primary current, A	S, mm	d, mm
300...600	8	13
600...1000	10	13
1000...2000	20	13

Different modifications

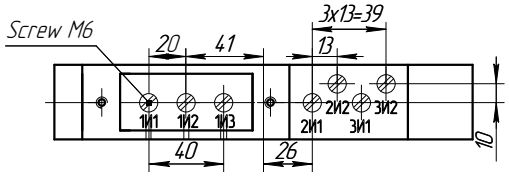
Location of secondary terminals



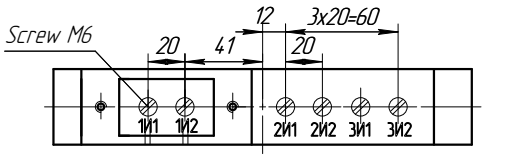
Transformers with secondary windings, from one up to four



Transformers with secondary windings, from one up to five

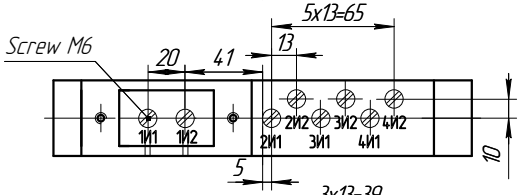


Modification E
Transformers with secondary windings, from one up to three, with switching over on the secondary winding

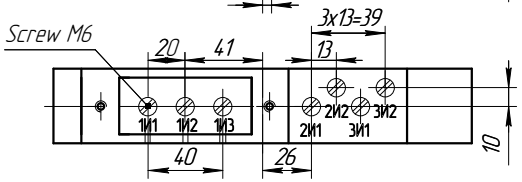


Modification C
Secondary terminals with a seal cover

Transformers with secondary windings, from one up to three, with a cover to protect and seal the measuring winding



Transformers with secondary windings, from one up to four, with a cover to protect and seal the measuring winding



Transformers with secondary windings, from one up to three, with switching over on the secondary winding and with a cover to protect and seal the measuring winding

1.5.3.2. CAST BUSHING-TYPE CURRENT TRANSFORMERS TLP-10

TLP-10-3 M2A and M2B current transformers can be made in modifications as follows:

Modification	Description
A	with a flat-type primary contact
B	with primary bus connectors
C	seal cover availability
D	with flexible secondary terminals
E	with switching over on the secondary winding (an example of identification of transformation ratio for a transformer with 2 windings: 100(200)-200/5)

An example of identification of TLP-10-3 current transformer in M2A dimension:

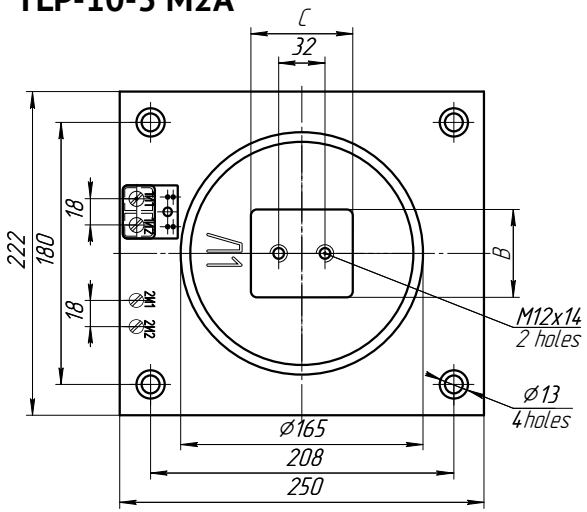
TLP-10-3 M2AC-0,5 FS10/10P10-10/15-600/5 N3 b 40 kA

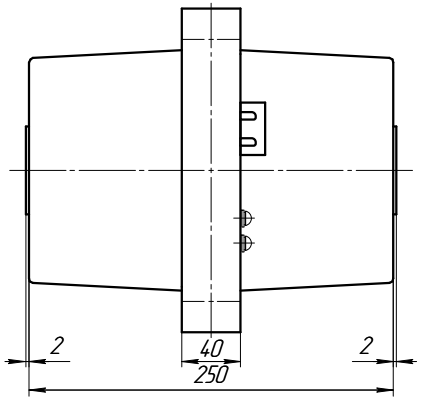
M2	transformer dimension
A	with a flat-type primary contact
C	availability of a cover to protect and seal the measuring winding
0,5	accuracy class of the measuring secondary winding
FS10	instrument security factor of the measuring secondary winding
10P	accuracy class of the protective secondary winding
10	rated accuracy limit factor of the protective winding
10	rated secondary burden of the measuring secondary winding
15	rated secondary burden of the protective secondary winding
600	rated primary current
5	rated secondary current
N	climatic modification
3	placement category
b	insulation level
40 kA	short-time (one second) thermal current

Technical parameters and characteristics

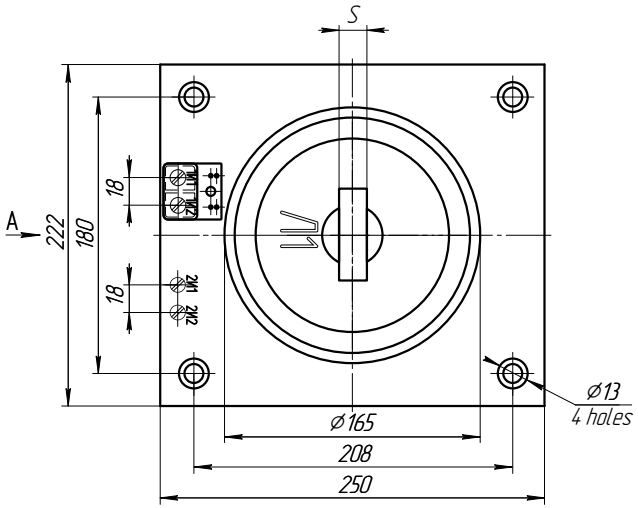
Parameters	Values for parameters
Rated voltage, kV	10
Maximum operating voltage, kV	12
Rated primary current, A	300; 350; 400; 500; 550; 600; 650; 700; 750; 800; 900; 1000; 1050; 1100; 1150; 1200; 1250; 1300; 1400; 1500; 1550; 1600; 1650; 1700; 1750; 1800; 1900; 2000
Rated secondary current, A	1; 5
Rated frequency, Hz	50; 60
Number of secondary windings	up to 2
Rated secondary burdens with cosφ=0,8: measuring windings, V·A protective winding, V·A	 from 1 up to 10 from 1 up to 15
Rated accuracy class, according to GOST 7746: measuring windings protective windings	 0,2S; 0,2; 0,5S; 0,5; 1; 3 5P or 10P
Accuracy limit factor K_{rated} of secondary protective winding	from 2 up to 15
Rated instrument security factor FS_{rated} of measuring winding	from 3 up to 30
Rated short-time (one second) thermal current kA, at rated primary current	
300 A	31,5; 40-100
400-2000 A	40-100
Dynamic current kA, at rated primary current:	
300 A	81; 100-250
400 -2000 A	100-250
Weight, kg, not more	25
Overall dimensions (LxWxH), mm	250×222×250/250×222×414

Overall dimensions, fitting and connecting dimensions TLP-10-3 M2A

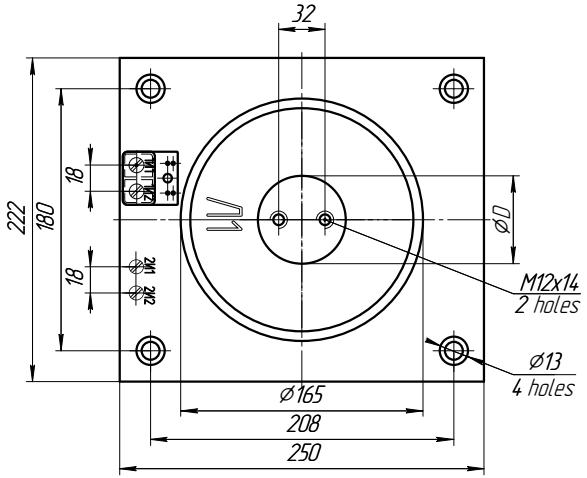




Overall dimensions, fitting and connecting dimensions TLP-10-3 M2B

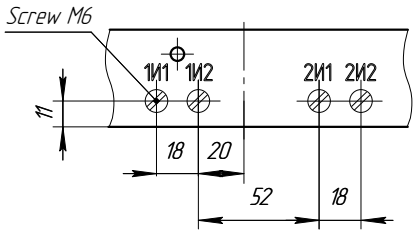


Different modifications

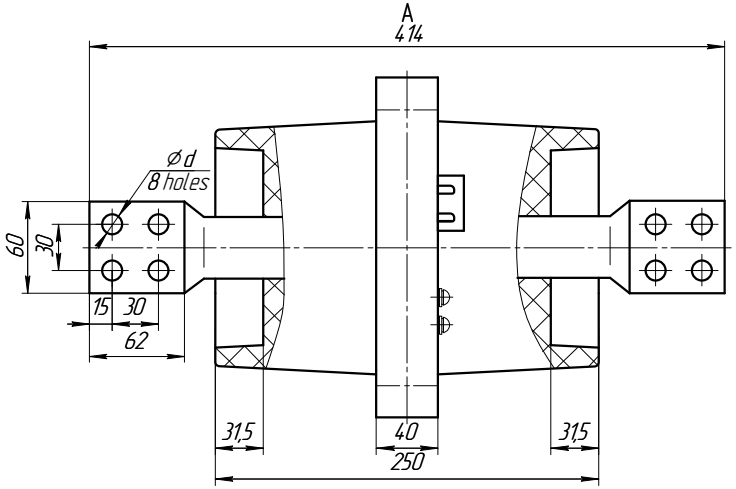


Rated primary current, A	Dimensions of terminals for primary winding, mm	
	ØD	B x C
10..400	60	–
10..2000	–	60 x 70

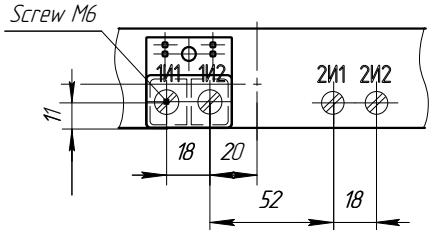
Location of secondary terminals



Transformers with secondary windings, one or two



Modification C
Secondary terminals with a seal cover



Transformers with secondary windings. one or two, a cover to protect and seal the measuring winding

Rated primary current, A	S, мм	d, мм
50..200	6	9
200..600	10	13
600..2000	18	13

1.5.4.1. CAST BUSHING-TYPE CURRENT TRANSFORMERS TLP-10

TLP-10-4 M1 current transformers can be made in modifications as follows:

Modification	Description
A	with a flat-type primary contact
B	with primary bus connectors
D	with flexible secondary terminals

An example of identification of TLP-10-4 current transformer in M1 dimension:

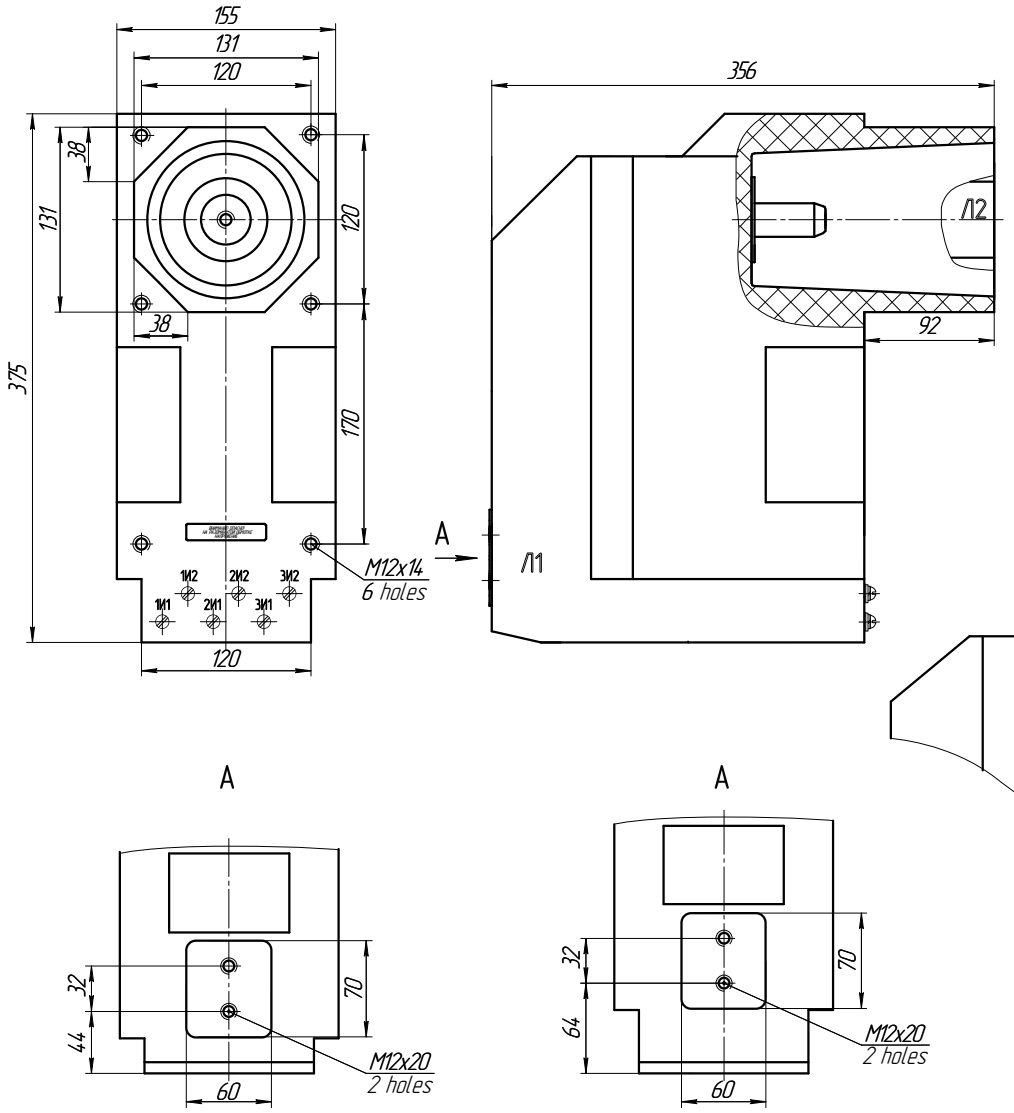
TLP-10-4 M1A-0,5 FS10/10P10-10/15-600/5 N3 b 40 kA

M1	transformer dimension
A	with a flat-type primary contact
0,5	accuracy class of the measuring secondary winding
FS10	instrument security factor of the measuring secondary winding
10P	accuracy class of the protective secondary winding
10	rated accuracy limit factor of the protective winding
10	rated secondary burden of the measuring secondary winding
15	rated secondary burden of the protective secondary winding
600	rated primary current
5	rated secondary current
N	climatic modification
3	placement category
b	insulation level
40 kA	short-time (one second) thermal current

Technical parameters and characteristics

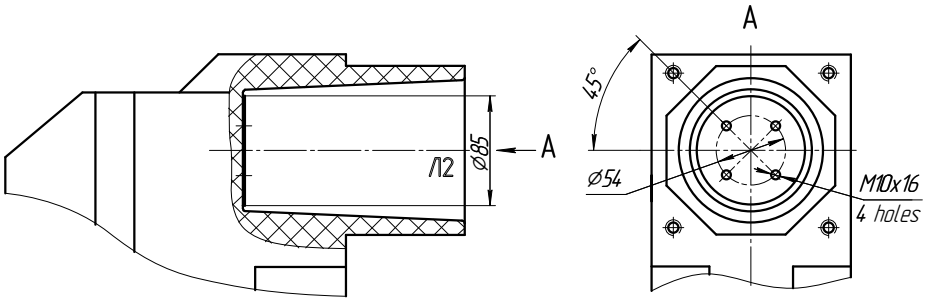
Parameters	Values for parameters
Rated voltage, kV	10
Maximum operating voltage, kV	12
Rated primary current, A	5; 7,5; 10; 11; 12; 13; 14; 16; 15; 18; 20; 22; 25; 27,5; 30; 32,5; 35; 37,5; 40; 50; 55; 60; 65; 70; 75; 80; 90; 100; 150; 200; 250; 300; 350; 400; 500; 550; 600; 650; 700; 750; 800; 900; 1000; 1050; 1100; 1150; 1200; 1250; 1300; 1400; 1500 ; 1550; 1600; 1650; 1700; 1750; 1800; 1900; 2000
Rated secondary current, A	1; 5
Rated frequency, Hz	50; 60
Number of secondary windings	up to 4
Rated secondary burdens with cosφ=0,8: measuring windings, V·A protective winding, V·A	 from 1 up to 50 from 1 up to 50
Rated accuracy class, according to GOST 7746: measuring windings protective windings	 0,2S; 0,2; 0,5S; 0,5; 1; 3 5P or 10P
Accuracy limit factor K_{rated} of secondary protective winding	from 2 up to 30
Rated instrument security factor FS_{rated} of measuring winding	from 3 up to 30
Rated short-time (one second) thermal current kA, at rated primary current	
5-20 A	2,5; 5
30-50 A	5; 10; 20
75-100 A	10; 20; 31,5; 40
150 A	15; 20; 31,5; 40
200 A	20; 31,5; 40-60
300 A	31,5; 40-100
400-2000 A	40-100
Dynamic current kA, at rated primary current:	
5-20 A	6,25; 12,8
30-50 A	12,8; 26; 52
75-100 A	26; 52; 81; 100
150 A	39; 52; 81; 100
200 A	52; 81; 100-150
300 A	81; 100-250
400-2000 A	100-250
Weight, kg, not more	30
Overall dimensions (LxWxH), mm	375×155×356

Overall dimensions, fitting and connecting dimensions

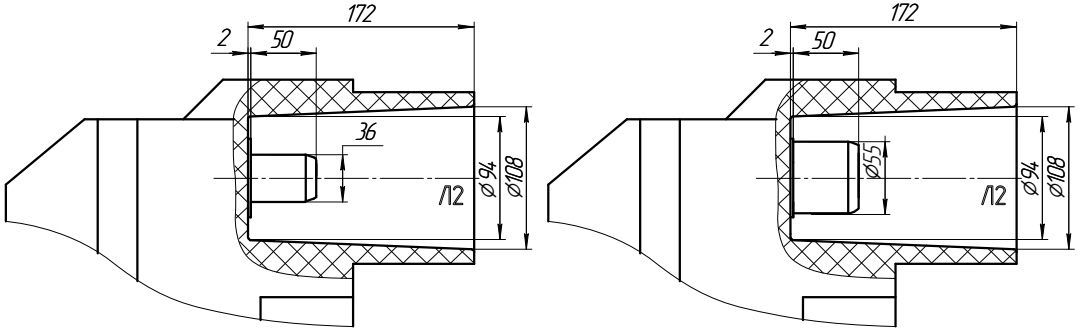


Different modifications

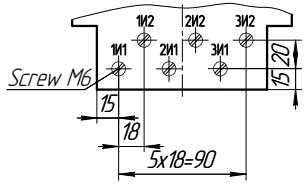
Modification A
with a flat-type primary contact



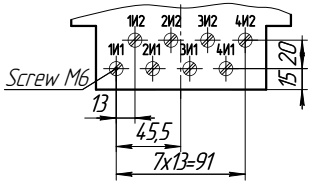
Modification B
with cinch primary contact



Location of secondary terminals



Transformers with secondary windings, from one up to three



Transformers with secondary windings, from one up to four

1.5.5.1. CAST BUSHING-TYPE CURRENT TRANSFORMERS TLP-10

TLP-10-5 M1 current transformers can be made in modifications as follows:

Modification	Description
C	seal cover availability
D	with flexible secondary terminals
E	with switching over on the secondary winding (an example of identification of transformation ratio for a transformer with 2 windings: 100(200)-200/5)

An example of identification of TLP-10-5 current transformer in M1 dimension:

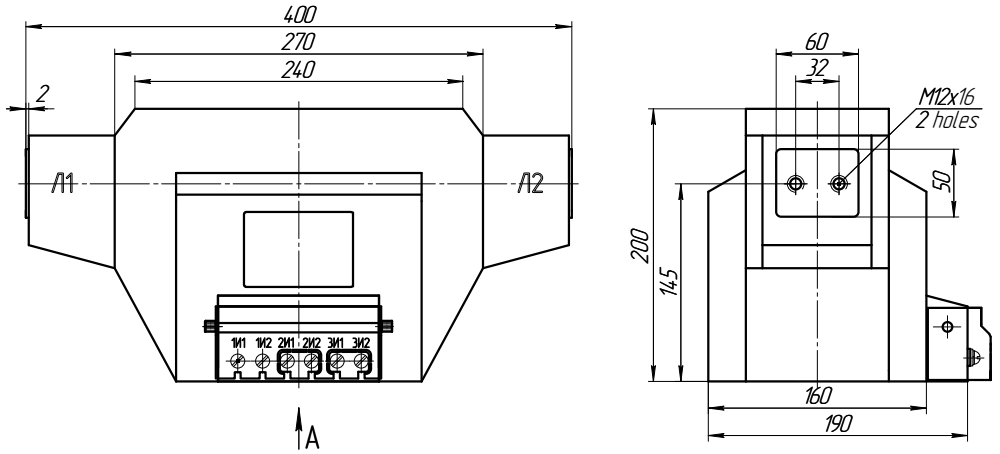
TLP-10-5 M1C-0,5 FS10/10P10-10/15-600/5 N3 b 40 kA

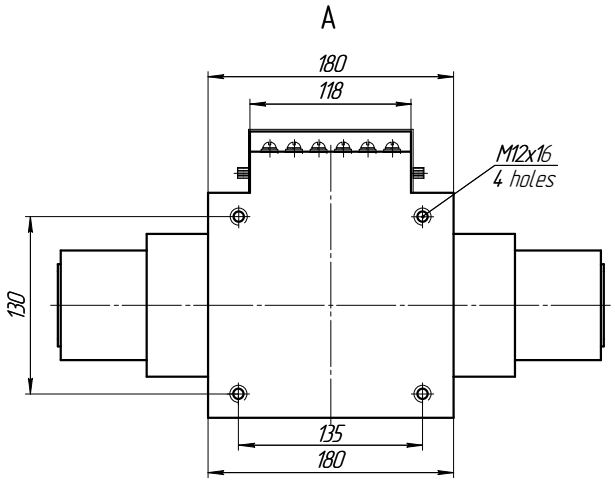
M1	transformer dimension
C	availability of a cover to protect and seal the measuring winding
0,5	accuracy class of the measuring secondary winding
FS10	instrument security factor of the measuring secondary winding
10P	accuracy class of the protective secondary winding
10	rated accuracy limit factor of the protective winding
10	rated secondary burden of the measuring secondary winding
15	rated secondary burden of the protective secondary winding
600	rated primary current
5	rated secondary current
N	climatic modification
3	placement category
b	insulation level
40 kA	short-time (one second) thermal current

Technical parameters and characteristics

Parameters	Values for parameters
Rated voltage, kV	10
Maximum operating voltage, kV	12
Rated primary current, A	5; 7,5; 10; 11; 12; 13; 14; 16; 15; 18; 20; 22; 25; 27,5; 30; 32,5; 35; 37,5; 40; 50; 55; 60; 65; 70; 75; 80; 90; 100; 150; 200; 250; 300; 350; 400; 500; 550; 600; 650; 700; 750; 800
Rated secondary current, A	1; 5
Rated frequency, Hz	50; 60
Number of secondary windings	up to 4
Rated secondary burdens with cosφ=0,8: measuring windings, V·A protective winding, V·A	 from 1 up to 50 from 1 up to 50
Rated accuracy class, according to GOST 7746: measuring windings protective windings	 0,2S; 0,2; 0,5S; 0,5; 1; 3 5P or 10P
Accuracy limit factor K_{rated} of secondary protective winding	from 2 up to 30
Rated instrument security factor FS_{rated} of measuring winding	from 3 up to 30
Rated short-time (one second) thermal current kA, at rated primary current	
5-20 A	2,5; 5
30-50 A	5; 10; 20
75-100 A	10; 20; 31,5; 40
150 A	15; 20; 31,5; 40
200 A	20; 31,5; 40-60
300 A	31,5; 40-100
400-800 A	40-100
Dynamic current kA, at rated primary current:	
5-20 A	6,25; 12,8
30-50 A	12,8; 26; 52
75-100 A	26; 52; 81; 100
150 A	39; 52; 81; 100
200 A	52; 81; 100-150
300 A	81; 100-250
400-800 A	100-250
Weight, kg, not more	up to 35
Overall dimensions (LxWxH), mm	400×190×200

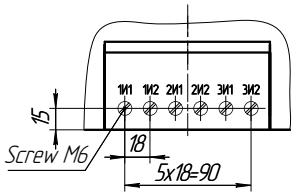
Overall dimensions, fitting and connecting dimensions



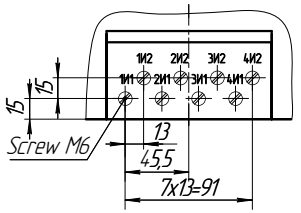


Different modifications

Location of secondary terminals

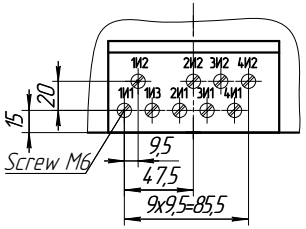


Transformers with secondary windings, from one up to three



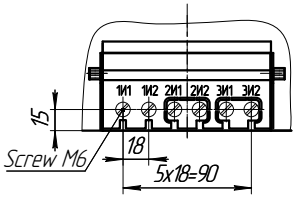
Transformers with secondary windings, from one up to four

Modification E

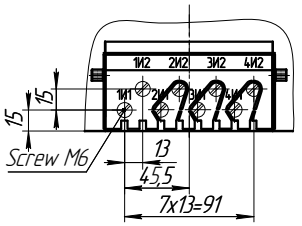


Transformers with secondary windings, from one up to four with switching over on the secondary winding

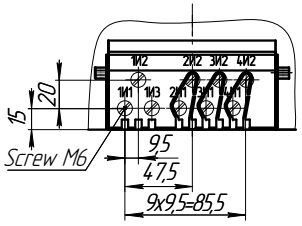
Modification C



Transformers with secondary windings from one up to three with a cover to protect and seal the measuring winding



Transformers with secondary windings, from one up to four, with a cover to protect and seal the measuring winding



Transformers with secondary windings, from one up to four, with switching over on the secondary winding and with a cover to protect and seal the measuring winding

1.5.5.2. CAST BUSHING-TYPE CURRENT TRANSFORMERS TLP-10

Technical parameters and characteristics

Parameters	Values for parameters
Rated voltage, kV	10
Maximum operating voltage, kV	12
Rated primary current, A	50; 55; 60; 65; 70; 75; 80; 90; 100; 150; 200; 250; 300; 350; 400; 500; 550; 600; 650; 700; 750; 800; 900; 1000; 1050; 1100; 1150; 1200; 1250; 1300; 1400; 1500; 1550; 1600; 1650; 1700; 1750; 1800; 1900; 2000
Rated secondary current, A	1; 5
Rated frequency, Hz	50; 60
Number of secondary windings	до 5
Rated secondary burdens with cosφ=0,8: measuring windings, V·A protective winding, V·A	 from 1 up to 50 from 1 up to 50
Rated accuracy class, according to GOST 7746: measuring windings protective windings	 0,2S; 0,2; 0,5S; 0,5; 1; 3 5P or 10P
Accuracy limit factor K_{rated} of secondary protective winding	from 2 up to 30
Rated instrument security factor FS_{rated} of measuring winding	from 3 up to 30
Rated short-time (one second) thermal current kA, at rated primary current	
50 A	5; 10; 20
75-100 A	10; 20; 31,5; 40
150 A	15; 20; 31,5; 40
200 A	20; 31,5; 40-60
300 A	31,5; 40-100
400-2000 A	40-100
Dynamic current kA, at rated primary current:	
50 A	12,8; 26; 52
75-100 A	26; 52; 81; 100
150 A	39; 52; 81; 100
200 A	52; 81; 100-150
300 A	81; 100-250
400-2000 A	100-250
Weight, kg, not more	30
Overall dimensions (LxWxH), mm	400×180×240

TLP-10-5 M2 current transformers can be made in modifications as follows:

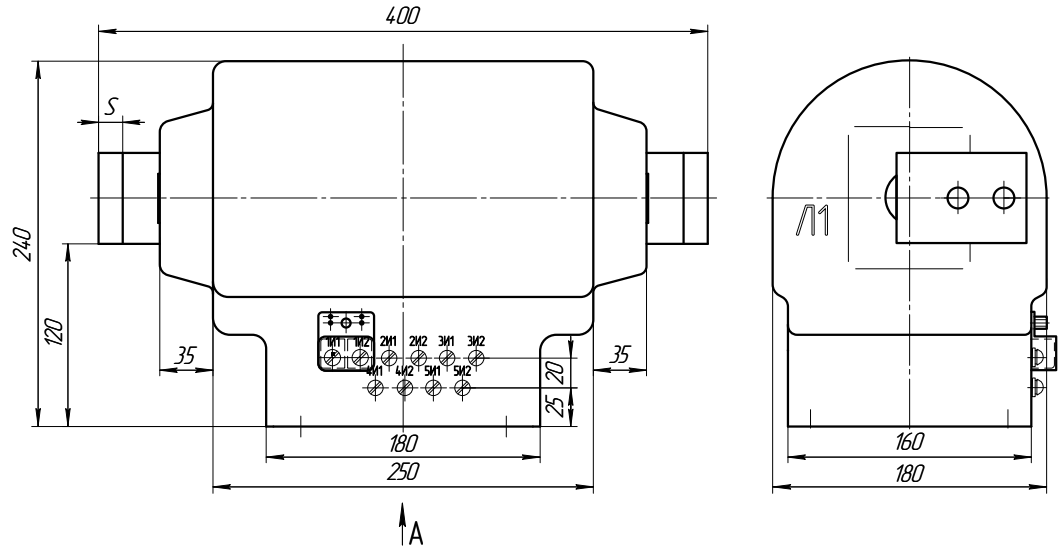
Modification	Description
C	seal cover availability
D	with flexible secondary terminals
E	with switching over on the secondary winding (an example of identification of transformation ratio for a transformer with 2 windings: 100(200)-200/5)

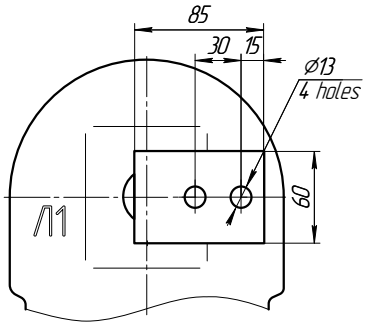
An example of identification of TLP-10-5 current transformer in M2 dimension:

TLP-10-5 M2C-0,5 FS10/10P10-10/15-600/5 N3 b 40 kA

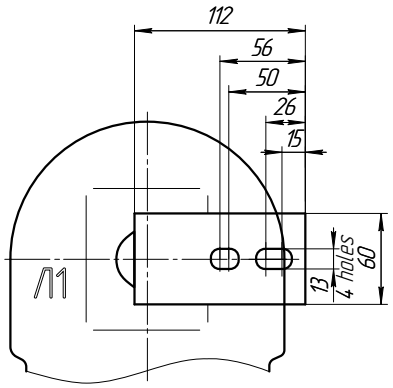
M2	transformer dimension
C	availability of a cover to protect and seal the measuring winding
0,5	accuracy class of the measuring secondary winding
FS10	instrument security factor of the measuring secondary winding
10P	accuracy class of the protective secondary winding
10	rated accuracy limit factor of the protective winding
10	rated secondary burden of the measuring secondary winding
15	rated secondary burden of the protective secondary winding
600	rated primary current
5	rated secondary current
N	climatic modification
3	placement category
b	insulation level
40 kA	short-time (one second) thermal current

Overall dimensions, fitting and connecting dimensions

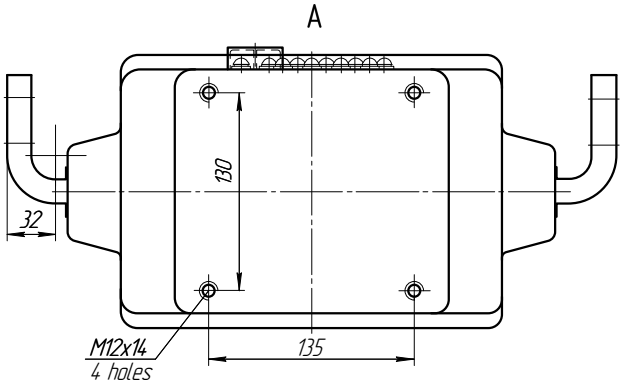




up to 1500 A



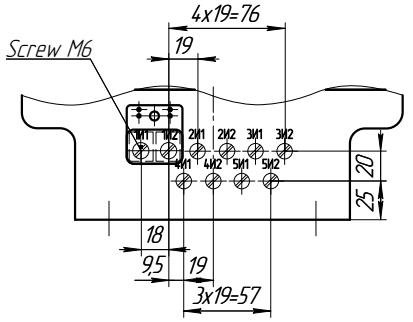
from 1500 up to 2000 A



Rated primary current, A	Dimensions of terminals for primary winding, mm
	S
up to 1500	12,5
1500–2000	16

Different modifications

Modification C



Transformers with secondary windings, from one up to five, with a cover to protect and seal the measuring winding

1.5.6.1. CAST BUSHING-TYPE CURRENT TRANSFORMERS TLP-10

Technical parameters and characteristics

Parameters	Values for parameters
Rated voltage, kV	10
Maximum operating voltage, kV	12
Rated primary current, A	5; 7,5; 10; 11; 12; 13; 14; 16; 15; 18; 20; 22; 25; 27,5; 30; 32,5; 35; 37,5; 40; 50; 55; 60; 65; 70; 75; 80; 90; 100; 150; 200; 250; 300; 350; 400; 500; 550; 600; 650; 700; 750; 800; 900; 1000; 1050; 1100; 1150; 1200; 1250; 1300; 1400; 1500; 1550; 1600; 1650; 1700; 1750; 1800; 1900; 2000
Rated secondary current, A	1; 5
Rated frequency, Hz	50; 60
Number of secondary windings	up to 4
Rated secondary burdens with cosφ=0,8: measuring windings, V·A protective winding, V·A	 from 1 up to 50 from 1 up to 50
Rated accuracy class, according to GOST 7746: measuring windings protective windings	 0,2S; 0,2; 0,5S; 0,5; 1; 3 5P or 10P
Accuracy limit factor K_{rated} of secondary protective winding	from 2 up to 30
Rated instrument security factor FS_{rated} of measuring winding	from 3 up to 30
Rated short-time (one second) thermal current kA, at rated primary current	
5-20 A	2,5; 5
30-50 A	5; 10; 20
75-100 A	10; 20; 31,5; 40
150 A	15; 20; 31,5; 40
200 A	20; 31,5; 40-60
300 A	31,5; 40-100
400-2000 A	40-100
Dynamic current kA, at rated primary current:	
5-20 A	6,25; 12,8
30-50 A	12,8; 26; 52
75-100 A	26; 52; 81; 100
150 A	39; 52; 81; 100
200 A	52; 81; 100-150
300 A	81; 100-250
400-2000 A	100-250
Weight, kg, not more	30
Overall dimensions (LxWxH), mm	495×148×222

TLP-10-6 M1 current transformers can be made in modifications as follows:

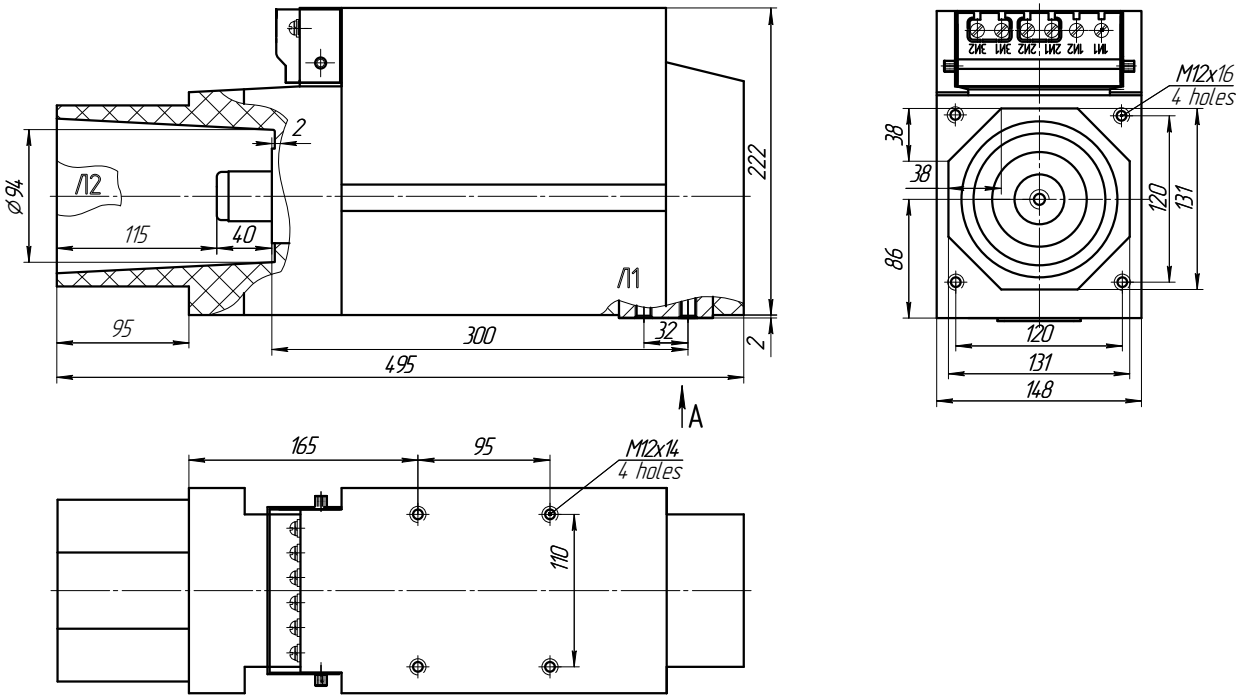
Modification	Description
C	seal cover availability
D	with flexible secondary terminals

An example of identification of TLP-10-6 current transformer in M1 dimension:

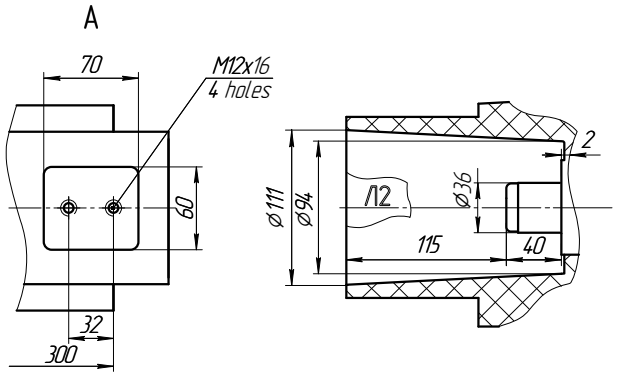
TLP-10-6 M1C-0,5 FS10/10P10-10/15-600/5 N3 b 40 kA

M1	transformer dimension
C	availability of a cover to protect and seal the measuring winding
0,5	accuracy class of the measuring secondary winding
FS10	instrument security factor of the measuring secondary winding
10P	accuracy class of the protective secondary winding
10	rated accuracy limit factor of the protective winding
10	rated secondary burden of the measuring secondary winding
15	rated secondary burden of the protective secondary winding
600	rated primary current
5	rated secondary current
N	climatic modification
3	placement category
b	insulation level
40 kA	short-time (one second) thermal current

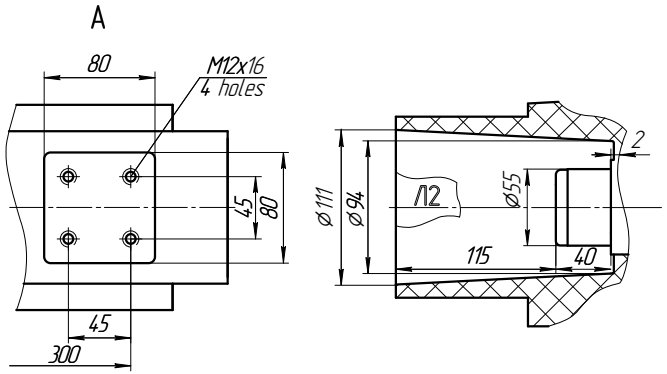
Overall dimensions, fitting and connecting dimensions



For rated primary currents from 5 up to 1500 A

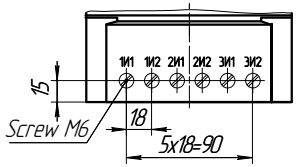


For rated primary current 2000 A

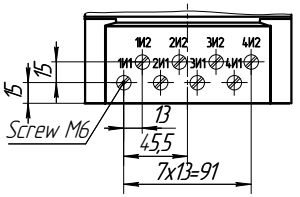


Different modifications

Location of secondary terminals

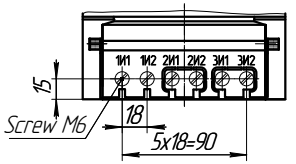


Transformers with secondary windings from one up to three

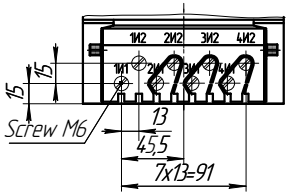


Transformers with secondary windings, from one up to three

Modification C



Transformers with secondary windings from one up to three with a cover to protect and seal the measuring winding



Transformers with secondary windings, from one up to four, with a cover to protect and seal the measuring winding

CURRENT TRANSFORMERS TV-EK

Description

TV-EK current transformers are designed to transmit measuring information signal to measuring instruments and protection and control devices in alternating current units. The transformers are designed to operate in transformer oil inside the circuit breaker or power transformer tank, on highvoltage bushings, current bus lines and in air.

Transformer operation principle involves transforming of alternating industrial frequency current into alternating current for measurement with the help of standard measuring instruments, and ensuring galvanic isolation of the measuring instruments from the high-voltage circuit.

The transformers are of built-in type, have from one to five secondary windings for metering, measuring and protection, and also one or several transformation ratios produced through changing the number of secondary turns.

Climatic modifications N (temperate climate), T (tropical climate) or NF (temperate and cold climate), placement categories 1, 2 or 3.

Production on the basis of the specification TU 3414-009-52889537-08.

Service life – at least 45 years.
Guaranteed service life – 6 years.

Technical parameters and characteristics

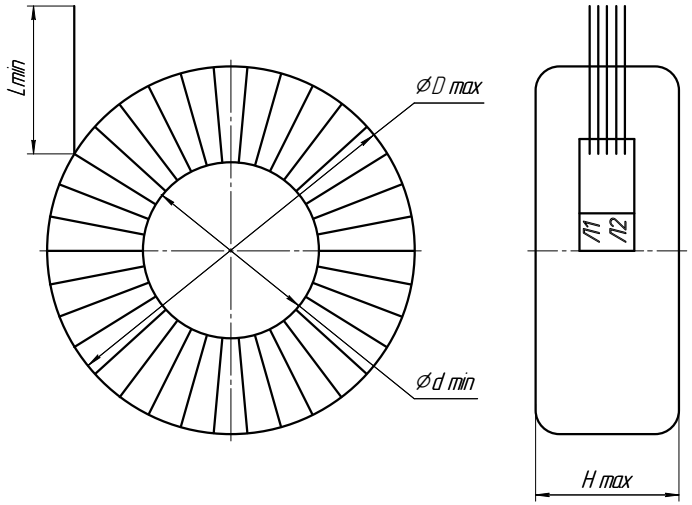
Parameters	Values for parameters
Rated voltage, kV	0,66; 3; 6; 10; 15; 20; 24; 27; 35; 110; 150; 220; 330; 500; 750
Maximum operating voltage, kV	0,72; 3,6; 7,2; 12; 17,5; 24; 26,5; 30; 40; 126; 172; 252; 363; 525; 787
Rated primary current, A	50; 75; 100; 150; 200; 250; 300; 400; 500; 600; 750; 800; 1000; 1200; 1250; 1500; 1600; 2000; 2500; 3000; 3500; 4000; 5000; 6000; 8000; 9000; 10000; 12000; 15000; 18000; 20000; 21000; 22000; 23000; 24000; 25000; 26000; 28000; 30000; 31000; 32000
Rated secondary current, A	1; 5
Rated frequency, Hz	50; 60
Number of secondary windings	up to 5
Rated secondary burdens with cosφ=0,8: measuring windings, V·A protective winding, V·A	 from 1 up to 100 from 1 up to 100
Rated accuracy class, according to GOST 7746: measuring windings protective windings	 0,2S; 0,2; 0,5S; 0,5; 1; 3 5P or 10P
Accuracy limit factor K_{rated} of secondary protective winding	from 2 up to 50
Rated instrument security factor FS_{rated} of secondary measuring winding	from 3 up to 50
Rated short-time (one second) thermal current kA, at rated primary current	
$I_{1th}(min) = 100 \times I_{pr}$	
Dynamic current kA, at rated primary current:	
$I_{dyn} = 1,8\sqrt{2} \times I_{1th}$	
Weight, kg, not more	according to the order
Overall dimensions (D outer x d inner x H) max.	according to the order

Notice: when ordering a built-in current transformer, please specify:
a) transformer modification;
b) maximum overall and fitting dimensions (D max, d min, H max);
c) rated primary current (if more than one primary current, specify each);
d) rated secondary current;
e) rated accuracy class for the transformer (if more than one primary current, specify the accuracy class for each tap);
f) rated secondary burden of the transformer (if more than one primary current, specify the secondary burden for each tap);
g) rated accuracy limit factor of the protective winding (if more than one primary current, specify the accuracy limit factor of the protective winding for each tap);
h) rated instrument security factor (if more than one primary current, specify the instrument security factor or each tap).

Technical parameters and characteristics

Parameters	Values for parameters
Rated voltage, kV	0,66; 3; 6; 10; 15; 20; 24; 27; 35; 110; 150; 220; 330; 500; 750
Maximum operating voltage, kV	0,72; 3,6; 7,2; 12; 17,5; 24; 26,5; 30; 40; 126; 172; 252; 363; 525; 787
Rated primary current, A	50; 75; 100; 150; 200; 250; 300; 400; 500; 600; 750; 800; 1000; 1200; 1250; 1500; 1600; 2000; 2500; 3000; 3500; 4000; 5000; 6000; 8000; 9000; 10000; 12000; 15000; 18000; 20000; 21000; 22000; 23000; 24000; 25000; 26000; 28000; 30000; 31000; 32000
Rated secondary current, A	1; 5
Rated frequency, Hz	50; 60
Number of secondary windings	up to 5
Rated secondary burdens with cosφ=0,8: measuring windings, V·A protective winding, V·A	 from 1 up to 100 from 1 up to 100
Rated accuracy class, according to GOST 7746: measuring windings protective windings	 0,2S; 0,2; 0,5S; 0,5; 1; 3 5P or 10P
Accuracy limit factor K_{rated} of secondary protective winding	from 2 up to 50
Rated instrument security factor FS_{rated} of secondary measuring winding	from 3 up to 50
Rated short-time (one second) thermal current kA, at rated primary current	
$I_{1терм.}$ (min) = 100 x $I_{ном}$	
Dynamic current kA, at rated primary current:	
$I_{дин.}$ = 1,8 √2 x $I_{1терм.}$	
Weight, kg, not more	according to the order
Overall dimensions (D outer x d inner x H) max.	according to the order

Overall dimensions, fitting and connecting dimensions



TV-EK transformers of M1 version are used as component parts of power transformers and vacuum switches and are installed inside a power transformer tank or a switch cover. The power transformer and vacuum switch bushing serves as primary winding for these transformers. Utilities are air or oil. The transformer insulation is the insulation available for the primary winding of the end product. Secondary terminals are represented by flexible wires in accordance with engineering specifics of the end product.

An example of identification of TV-EK current transformer in M1 dimension:

ТУ-ЭК 10 М1-0,5S/0,2/0,2S-20/20/15-1000-2000-6000/5 N3 (630x470x100)

10	rated input voltage
M1	version of the transformer
D outer	outer diameter 630 mm
d inner	inner diameter 470 mm
H	height 100 mm
6000	rated primary current
5	rated secondary current
0,2S	accuracy class
15	rated burden
Auxiliary taps	
1000	current
0,5S	accuracy class
20	burden
2000	current
0,2	accuracy class
20	burden
NF	climatic modification
3	placement category

1.6.2. BUILT-IN CURRENT TRANSFORMERS TV-EK

TV-EK transformers of M2 version are used to be installed into current-conducting wires and bus lines. The transformer is fixed inside the cover of the current-conducting wire. The current-conducting bus is the primary winding of this transformer. The insulation is represented by the transformer body made of compound and by insulation of the end product primary winding. Secondary terminals are located on the transformer body in accordance with engineering specifics of the end product.

An example of identification of TV-EK current transformer in M2 dimension:

ТV-ЭК 35 M2-0,2S/10P-15/20-3000/5 N3 (540x290x150)

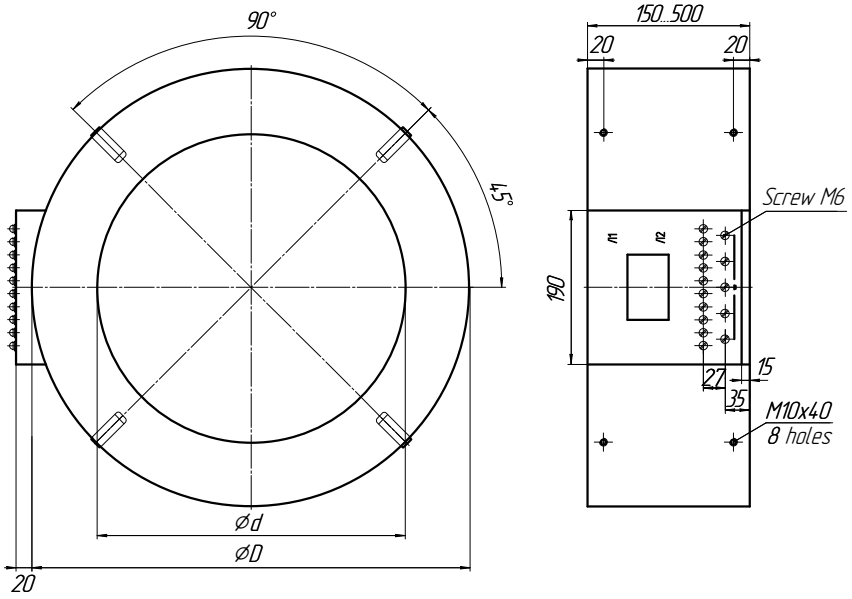
35	rated input voltage
M2	version of the transformer
D outer	outer diameter 540 mm
d inner	inner diameter 290 mm
H	height 150 mm
3000	rated primary current
5	rated secondary current
0,2S	accuracy class of the secondary winding
10P	accuracy class of the protective secondary winding
15	rated secondary burden of the measuring secondary winding
20	rated secondary burden of the protective secondary winding
N	climatic modification
3	placement category

Technical parameters and characteristics

Parameters	Values for parameters
Rated voltage, kV	0,66; 3; 6; 10; 15; 20; 24; 27; 35; 110; 150; 220; 330; 500; 750
Maximum operating voltage, kV	0,72; 3,6; 7,2; 12; 17,5; 24; 26,5; 30; 40; 126; 172; 252; 363; 525; 787
Rated primary current, A	50; 75; 100; 150; 200; 250; 300; 400; 500; 600; 750; 800; 1000; 1200; 1250; 1500; 1600; 2000; 2500; 3000; 3500; 4000; 5000; 6000; 8000; 9000; 10000; 12000; 15000; 18000; 20000; 21000; 22000; 23000; 24000; 25000; 26000; 28000; 30000; 31000; 32000
Rated secondary current, A	1; 5
Rated frequency, Hz	50; 60
Number of secondary windings	up to 5
Rated secondary burdens with cosφ=0,8: measuring windings, V·A protective winding, V·A	 from 1 up to 100 from 1 up to 100
Rated accuracy class, according to GOST 7746: measuring windings protective windings	 0,2S; 0,2; 0,5S; 0,5; 1; 3 5P or 10P
Accuracy limit factor K_{rated} of secondary protective winding	from 2 up to 50
Rated instrument security factor FS_{rated} of secondary measuring winding	from 3 up to 50
Rated short-time (one second) thermal current kA, at rated primary current	
I_{1th} (min) = 100 x I_{pr}	
Dynamic current kA, at rated primary current:	
I_{dyn} = 1,8 √2 x I_{1th}	
Weight, kg, not more	according to the order
Overall dimensions (D outer x d inner x H) max.	1400x1200x500

Overall dimensions, fitting and connecting dimensions

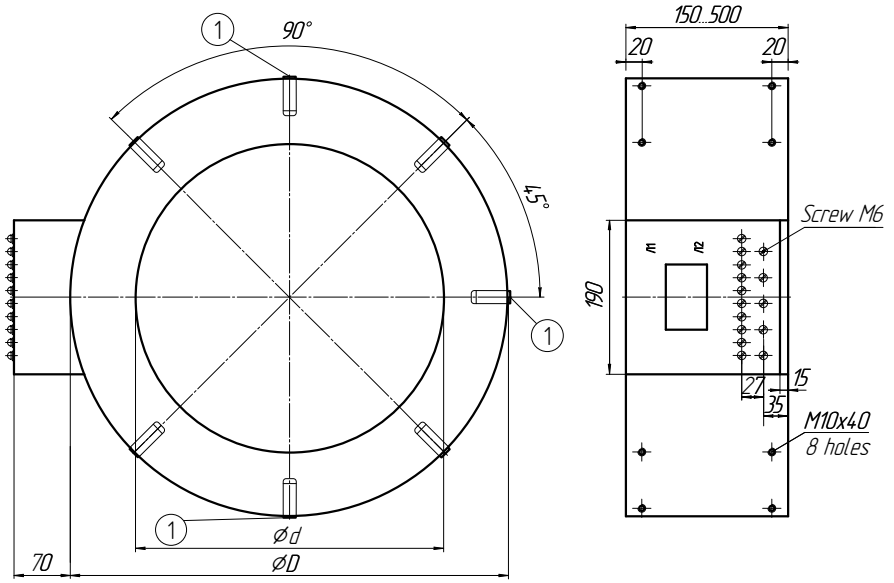
TV-EK transformer of M2 version without additional mounting bushings



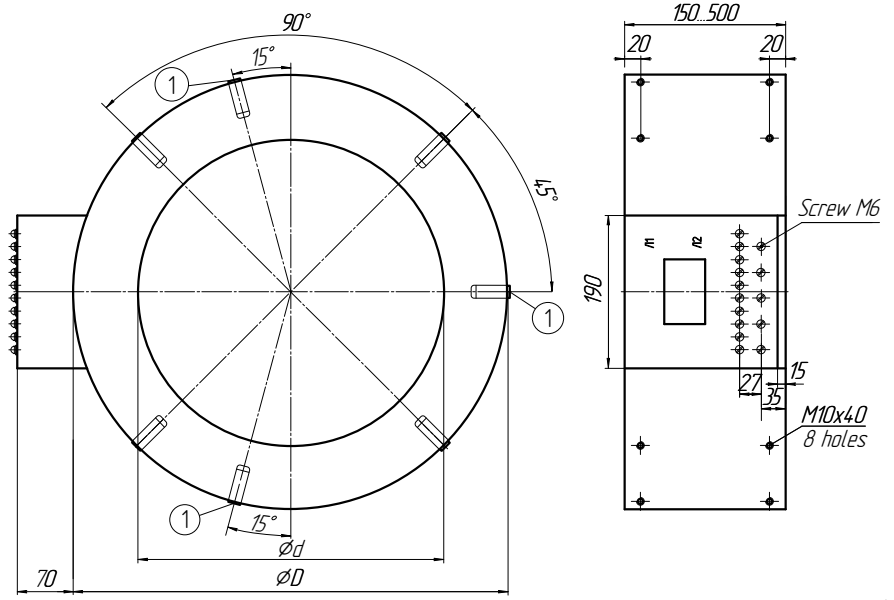
Possible height H	mm
A	150
B	200
C	250
D	300
E	350
F	400
G	450
H	500

D, mm	380	450		540		630		720		1080		1150		1400	
d, mm	240	240	290	290	380	380	470	470	560	720	840	840	920	920	1200

TV-EK transformer of M2 version with additional mounting bushings, marking: ①
for transformers with diameters D 1400 mm



for transformers with diameters D 1080 and D 1150 mm



Outdoor current transformers TV-EK M3 NF1 version are designed to equip power transformers and deadtank circuit breakers already being in operation. The primary winding of these transformers is represented by the current-conducting rod of the power transformer and circuit breaker high-voltage bushing. The secondary terminals are terminated to the junction box located at the transformer end surface. TV-EK transformer of M3 version shall be installed in the lower part, on the high-voltage bushing flange, and does not come in contact with its porcelain or polymeric insulation, providing for galvanic isolation of the measuring circuits from the high voltage.

An example of identification of TV-EK current transformer in M3 dimension:

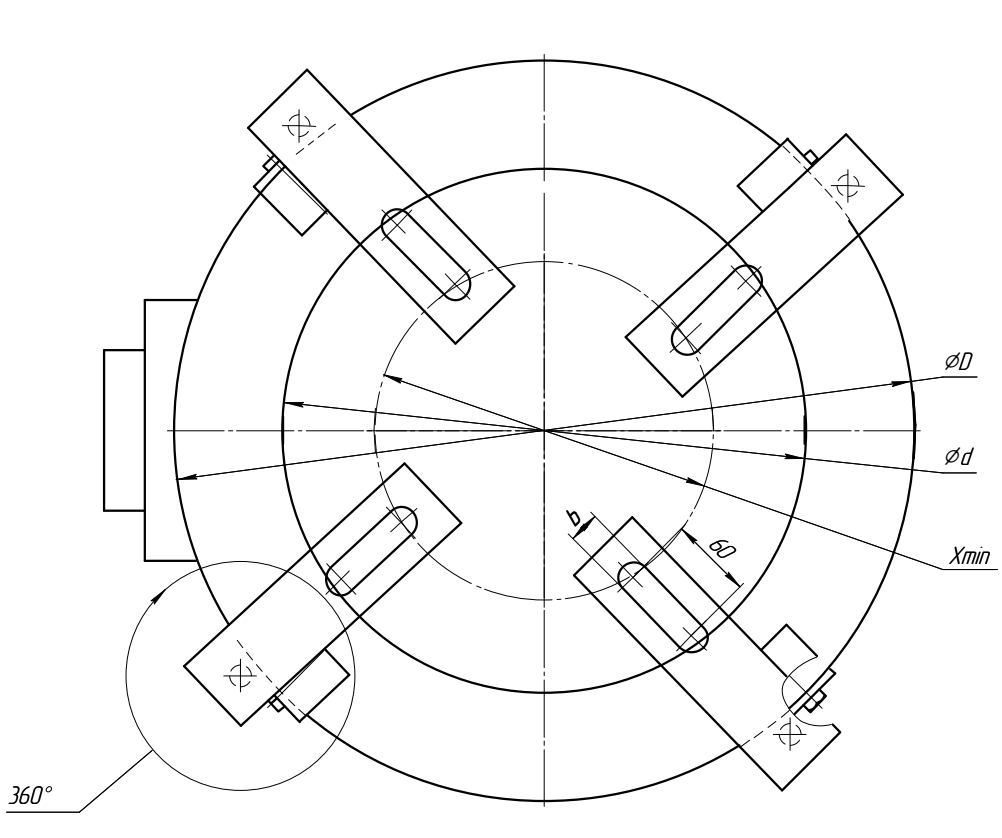
TV-EK 220 M3-0,2S/10P-15/20-3000/5 NF1 (540x290x150)

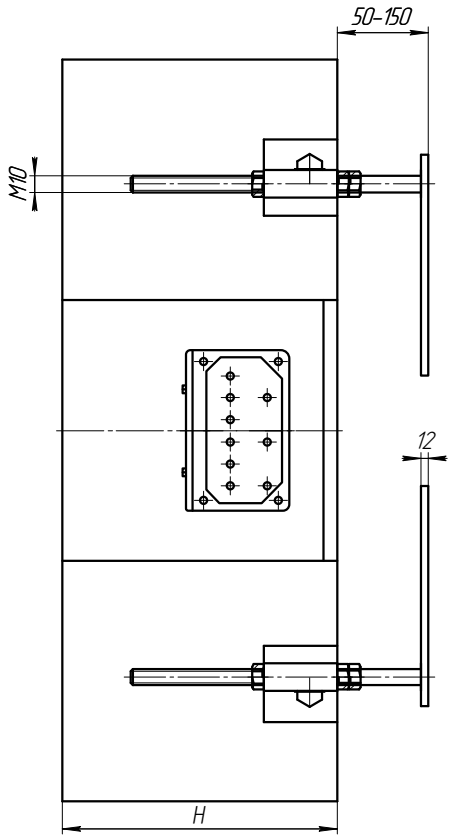
220	rated input voltage
M3	version of the transformer
D outer	outer diameter 540 mm
d inner	inner diameter 290 mm
H	height 150 mm
3000	rated primary current
5	rated secondary current
0,2S	accuracy class of the secondary winding
10P	accuracy class of the protective secondary winding
15	rated secondary burden of the measuring secondary winding
20	rated secondary burden of the protective secondary winding
NF	climatic modification
1	placement category

Technical parameters and characteristics

Parameters	Values for parameters
Rated voltage, kV	0,66; 3; 6; 10; 15; 20; 24; 27; 35; 110; 150; 220; 330; 500; 750
Maximum operating voltage, kV	0,72; 3,6; 7,2; 12; 17,5; 24; 26,5; 30; 40; 126; 172; 252; 363; 525; 787
Rated primary current, A	50; 75; 100; 150; 200; 250; 300; 400; 500; 600; 750; 800; 1000; 1200; 1250; 1500; 1600; 2000; 2500; 3000; 3500; 4000; 5000; 6000; 8000; 9000; 10000; 12000; 15000; 18000; 20000; 21000; 22000; 23000; 24000; 25000; 26000; 28000; 30000; 31000; 32000
Rated secondary current, A	1; 5
Rated frequency, Hz	50; 60
Number of secondary windings	up to 5
Rated secondary burdens with cosφ=0,8: measuring windings, V·A protective winding, V·A	 from 1 up to 100 from 1 up to 100
Rated accuracy class, according to GOST 7746: measuring windings protective windings	 0,2S; 0,2; 0,5S; 0,5; 1; 3 5P or 10P
Accuracy limit factor K_{rated} of secondary protective winding	from 2 up to 50
Rated instrument security factor FS_{rated} of secondary measuring winding	from 3 up to 50
Rated short-time (one second) thermal current kA, at rated primary current	
I_{1th} (min) = 100 x I_{pr}	
Dynamic current kA, at rated primary current:	
I_{dyn} = 1,8 √2 x I_{1th}	
Weight, kg, not more	according to the order
Overall dimensions (D outer x d inner x H) max.	1400x1200x500

Overall dimensions, fitting and connecting dimensions





Rated operating voltage	b, mm
up to 35 kV	22
110 kV and more	32

Possible height, H	mm
A	150
B	200
C	250
D	300
E	350
F	400
G	450
H	500

D, mm	380	450		540		630		720		1080		1150		1400	
d, mm	240	240	290	290	380	380	470	470	560	720	840	840	920	920	1200
Xmin	83	153		243		330		423		783		853		1103	

BUS-TYPE CURRENT TRANSFORMERS TSH-EK-0,66

Description

TSH-EK-0,66 current transformers are designed to transmit measuring information signal to measuring instruments and protection and control devices in alternating current units in various economic entities.

The transformers have a bus-type conception, with secondary windings for measurement and protection, with one or several transformation ratios produced through changing the number of the secondary turns by switching over to respective taps. The primary winding is represented by the current-conducting cable or current-conducting bus. High-voltage insulation is ensured by the cable insulation and an air gap.

The transformers can be installed on the busbar bushings with a voltage of 0.66 kV provided that the specified installation sizes are ensured. The transformers can be used on high-voltage cable or bus lines with a voltage of 3-24 kV, provided that the principal insulation between the current-conducting cable cores (buses) and the transformer secondary winding is ensured by means of the cable (bus) insulation.

Production on the basis of the specification TU 3414-016-52889537-13.

Technical parameters and characteristics

Parameters	Values for parameters
Rated voltage, kV	0,66
Maximum operating voltage, kV	0,72
Rated primary current, A	50; 75; 100; 125; 150; 175; 200; 225; 250; 275; 300; 375; 400; 450; 500; 550; 600; 650; 700; 750; 800; 900; 1000; 1050; 1100; 1150; 1200; 1250; 1300; 1400; 1500; 1550; 1600; 1650; 1700; 1750; 1800; 1900; 2000; 2500; 2550; 2600; 2650; 2700; 2750; 2800; 2900; 3000
Rated secondary current, A	1; 5
Rated frequency, Hz	50; 60
Number of secondary windings	up to 3
Rated secondary burdens with cosφ=0,8: measuring windings, V·A protective winding, V·A	 from 1 up to 30 from 1 up to 30
Rated accuracy class, according to GOST 7746: measuring windings protective windings	 0,2S; 0,2; 0,5S; 0,5; 1; 3; 5; 10 5P or 10P
Accuracy limit factor K_{rated} of secondary protective winding	from 2 up to 30
Rated instrument security factor FS_{rated} of secondary measuring winding	from 3 up to 50
Weight, kg, not more	according to the order
Overall dimensions, (LxWxH)	according to the order

Production on the basis of the specification TU 3414-016-52889537-13.

Registered in the Measuring Instrument State Registers of the Russian Federation, Republic of Belarus, Ukraine, Republic of Kazakhstan.

Reverification interval – 8 years.
Service life – at least 30 years.
Guaranteed service life – 4 years.

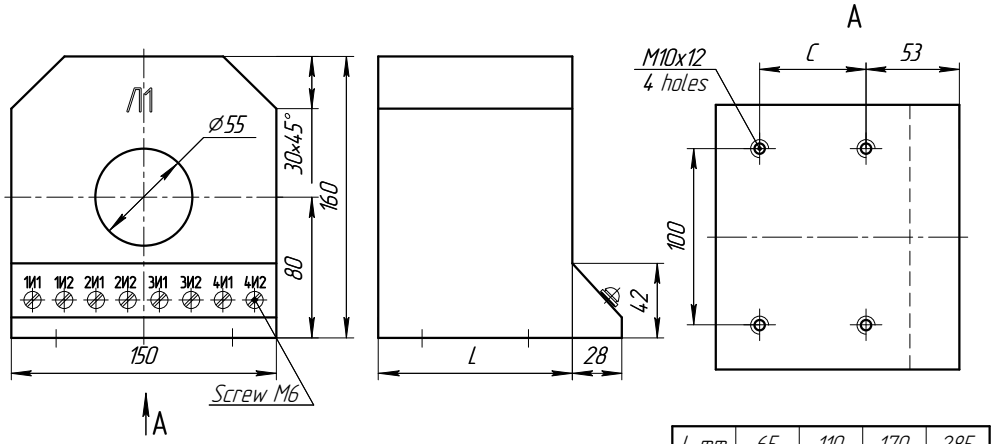
Technical parameters and characteristics

Parameters	Values for parameters
Rated voltage, kV	0,66
Maximum operating voltage, kV	0,72
Rated primary current, A	50; 75; 100; 125; 150; 175; 200; 225; 250; 275; 300; 375; 400; 450; 500; 550; 600; 650; 700; 750; 800; 900; 1000; 1050; 1100; 1150; 1200; 1250; 1300; 1400; 1500; 1550; 1600; 1650; 1700; 1750; 1800; 1900; 2000; 2500; 2550; 2600; 2650; 2700; 2750; 2800; 2900; 3000
Rated secondary current, A	1; 5
Rated frequency, Hz	50; 60
Number of secondary windings	up to 4
Rated secondary burdens with cosφ=0,8: measuring windings, V·A protective winding, V·A	 from 1 up to 30 from 1 up to 30
Rated accuracy class, according to GOST 7746: measuring windings protective windings	 0,2S; 0,2; 0,5S; 0,5; 1; 3; 5; 10 5P or 10P
Accuracy limit factor K_{rated} of secondary protective winding	from 2 up to 30
Rated instrument security factor FS_{rated} of secondary measuring winding	from 3 up to 50
Weight, kg, not more	according to the order
Overall dimensions (LxWxH), max, mm	313x150x160

Modification	Description
A	secondary terminals are made of M6 screw bushings
B	secondary terminals are made of flexible wires with a cross-section of not less than 2.5 mm²
C	seal cover availability

Versions of secondary terminals

Overall dimensions, fitting and connecting dimensions



L, mm	65	110	170	285
C, mm	-	60	120	235

TSH-EK-0,66 M1B110-0,2/10P-10/15-600/5 N3

M1	transformer dimension
B	with flexible secondary terminals
110	length of secondary terminals
0,2	accuracy class of the measuring secondary winding
10P	accuracy class of the protective secondary winding
10	rated secondary burden of the measuring secondary winding
15	rated secondary burden of the protective secondary winding
600	rated primary current
5	rated secondary current
N	climatic modification
3	placement category

An example of identification of TSH-EK-0,66 current transformer in M1 dimension:

1.7.2. BUS-TYPE INSTRUMENT CURRENT TRANSFORMERS TSH-EK-0,66

Technical parameters and characteristics

Parameters	Values for parameters
Rated voltage, kV	0,66
Maximum operating voltage, kV	0,72
Rated primary current, A	50; 75; 100; 125; 150; 175; 200; 225; 250; 275; 300; 375; 400; 450; 500; 550; 600; 650; 700; 750; 800; 900; 1000
Rated secondary current, A	1; 5
Rated frequency, Hz	50; 60
Number of secondary windings	up to 3
Rated secondary burdens with cosφ=0,8: measuring windings, V·A protective winding, V·A	 from 1 up to 30 from 1 up to 30
Rated accuracy class, according to GOST 7746: measuring windings protective windings	 0,2S; 0,2; 0,5S; 0,5; 1; 3; 5; 10 5P or 10P
Accuracy limit factor K_{rated} of secondary protective winding	from 2 up to 30
Rated instrument security factor FS_{rated} of secondary measuring winding	from 3 up to 50
Weight, kg, not more	according to the order
Overall dimensions (LxWxH), max, mm	483x230x150

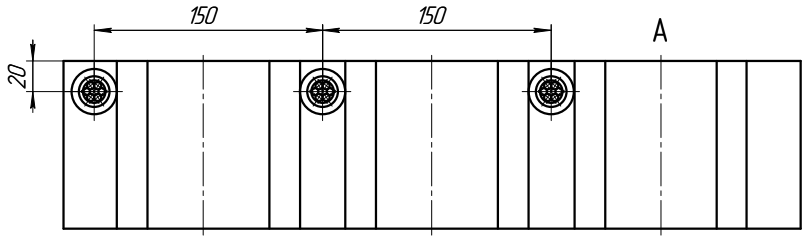
Versions of secondary terminals

Modification	Description
B	secondary terminals are made of flexible wires with a cross-section of not less than 2.5 mm²

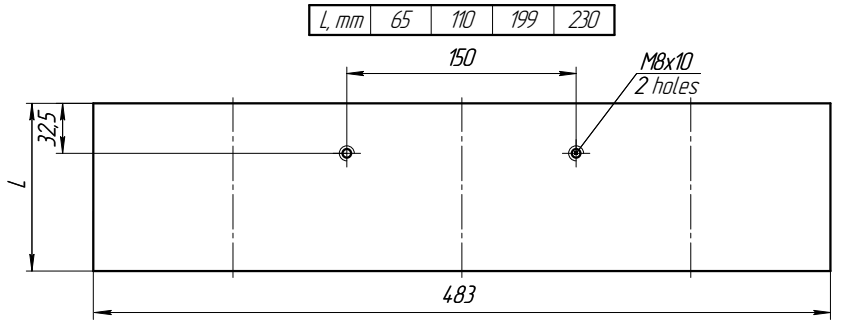
An example of identification of TSH-EK-0,66 current transformer in M2 dimension:

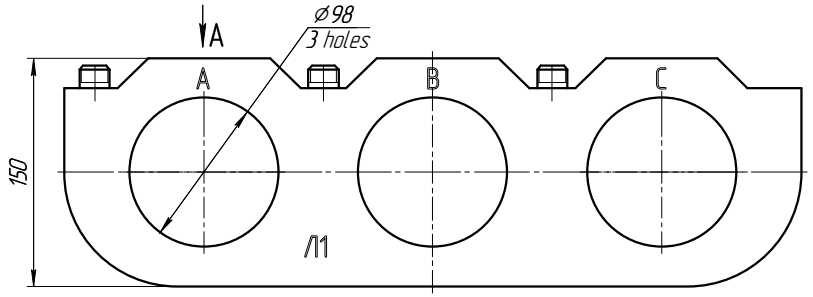
TSH-EK-0,66 M2B110-0,2/10P-10/15-600/5 N3

M2	transformer dimension
B	with flexible secondary terminals
110	length of secondary terminals
0,2	accuracy class of the measuring secondary winding
10P	accuracy class of the protective secondary winding
10	rated secondary burden of the measuring secondary winding
15	rated secondary burden of the protective secondary winding
600	rated primary current
5	rated secondary current
N	climatic modification
3	placement category



Overall dimensions, fitting and connecting dimensions





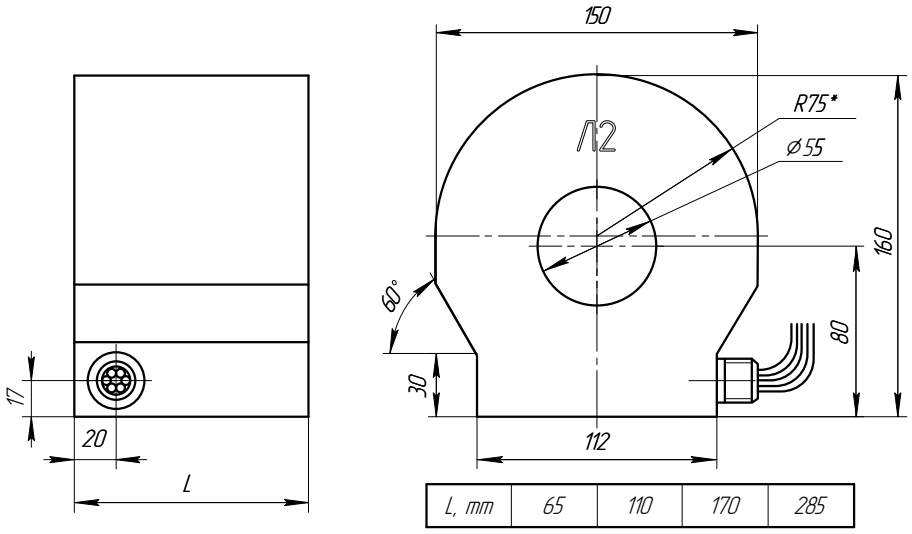
Technical parameters and characteristics

Parameters	Values for parameters
Rated voltage, kV	0,66
Maximum operating voltage, kV	0,72
Rated primary current, A	50; 75; 100; 125; 150; 175; 200; 225; 250; 275; 300; 375; 400; 450; 500; 550; 600; 650; 700; 750; 800; 900; 1000; 1050; 1100; 1150; 1200; 1250; 1300; 1400; 1500; 1550; 1600; 1650; 1700; 1750; 1800; 1900; 2000; 2500; 2550; 2600; 2650; 2700; 2750; 2800; 2900; 3000
Rated secondary current, A	1; 5
Rated frequency, Hz	50; 60
Number of secondary windings	up to 3
Rated secondary burdens with cosφ=0,8: measuring windings, V·A protective winding, V·A	 from 1 up to 30 from 1 up to 30
Rated accuracy class, according to GOST 7746: measuring windings protective windings	 0,2S; 0,2; 0,5S; 0,5; 1; 3; 5; 10 5P or 10P
Accuracy limit factor K_{rated} of secondary protective winding	from 2 up to 30
Rated instrument security factor FS_{rated} of secondary measuring winding	from 3 up to 50
Weight, kg, not more	according to the order
Overall dimensions (LxWxH), max, mm	285x150x160

Modification	Description
B	secondary terminals are made of flexible wires with a cross-section of not less than 2.5 mm²

Versions of secondary terminals

Overall dimensions, fitting and connecting dimensions



L, mm	65	110	170	285

TSH-EK-0,66 M3B110-0,2/10P-10/15-600/5 N3

M3	transformer dimension
B	with flexible secondary terminals
110	length of secondary terminals
0,2	accuracy class of the measuring secondary winding
10P	accuracy class of the protective secondary winding
10	rated secondary burden of the measuring secondary winding
15	rated secondary burden of the protective secondary winding
600	rated primary current
5	rated secondary current
N	climatic modification
3	placement category

An example of identification of TSH-EK-0,66 current transformer in M3 dimension:

1.7.4. BUS-TYPE INSTRUMENT CURRENT TRANSFORMERS TSH-EK-0,66

Versions of secondary terminals

Modification	Description
A	secondary terminals are made of M6 screw bushings
B	secondary terminals are made of flexible wires with a cross-section of not less than 2.5 mm²
C	seal cover availability

Technical parameters and characteristics

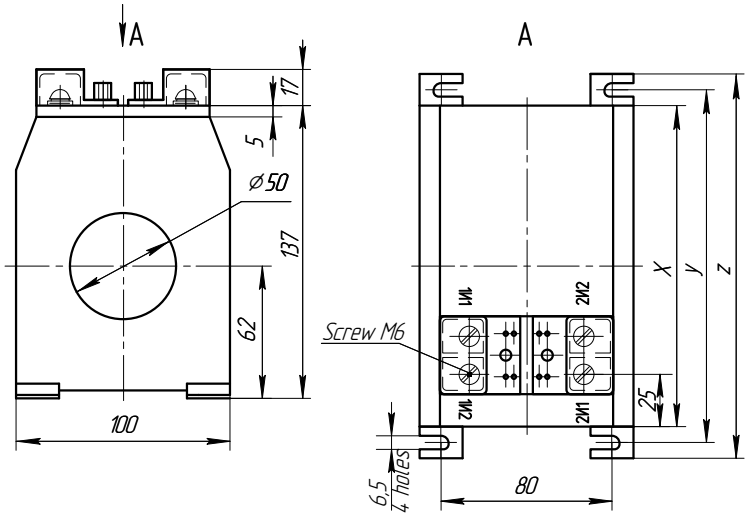
Parameters	Values for parameters
Rated voltage, kV	0,66
Maximum operating voltage, kV	0,72
Rated primary current, A	50; 75; 100; 125; 150; 175; 200; 225; 250; 275; 300; 375; 400; 450; 500; 550; 600; 650; 700; 750; 800; 900; 1000
Rated secondary current, A	1; 5
Rated frequency, Hz	50; 60
Number of secondary windings	up to 2
Rated secondary burdens with cosφ=0,8: measuring windings, V·A protective winding, V·A	 from 1 up to 30 from 1 up to 30
Rated accuracy class, according to GOST 7746: measuring windings protective windings	 0,2S; 0,2; 0,5S; 0,5; 1; 3; 5; 10 5P or 10P
Accuracy limit factor K_{rated} of secondary protective winding	from 2 up to 30
Rated instrument security factor FS_{rated} of secondary measuring winding	from 3 up to 50
Weight, kg, not more	according to the order
Overall dimensions (LxWxH), max, mm	180x100x154

An example of identification of TSH-EK-0,66 current transformer in M4 dimension:

TSH-EK-0,66 M4B110-0,2/10P-10/15-600/5 N3

M4	transformer dimension
B	with flexible secondary terminals
110	length of secondary terminals
0,2	accuracy class of the measuring secondary winding
10P	accuracy class of the protective secondary winding
10	rated secondary burden of the measuring secondary winding
15	rated secondary burden of the protective secondary winding
600	rated primary current
5	rated secondary current
N	climatic modification
3	placement category

Overall dimensions, fitting and connecting dimensions



Dimensions	X	y	z
A	60	75	90
B	90	105	120
C	120	135	150
D	150	165	180

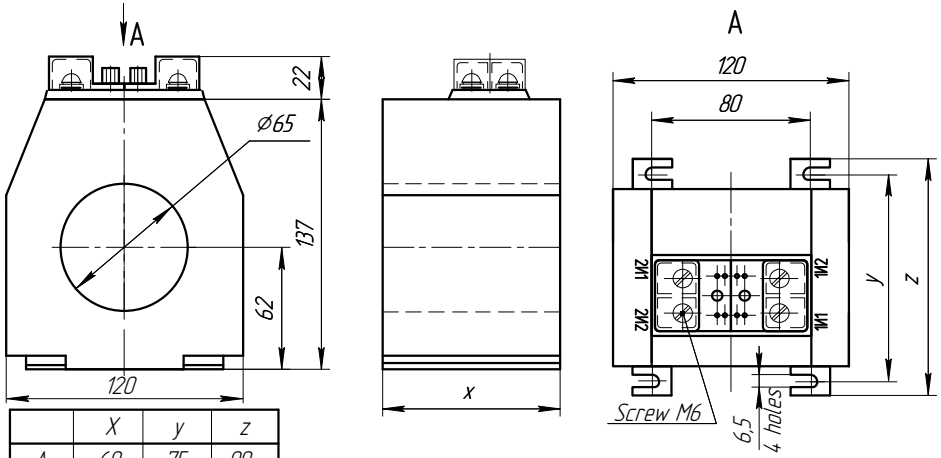
Technical parameters and characteristics

Parameters	Values for parameters
Rated voltage, kV	0,66
Maximum operating voltage, kV	0,72
Rated primary current, A	50; 75; 100; 125; 150; 175; 200; 225; 250; 275; 300; 375; 400; 450; 500; 550; 600; 650; 700; 750; 800; 900; 1000; 1050; 1100; 1150; 1200; 1250; 1300; 1400; 1500; 1550; 1600; 1650; 1700; 1750; 1800; 1900; 2000; 2500; 2550; 2600; 2650; 2700; 2750; 2800; 2900; 3000
Rated secondary current, A	1; 5
Rated frequency, Hz	50; 60
Number of secondary windings	up to 2
Rated secondary burdens with cosφ=0,8: measuring windings, V·A protective winding, V·A	 from 1 up to 30 from 1 up to 30
Rated accuracy class, according to GOST 7746: measuring windings protective windings	 0,2S; 0,2; 0,5S; 0,5; 1; 3; 5; 10 5P or 10P
Accuracy limit factor K_{rated} of secondary protective winding	from 2 up to 30
Rated instrument security factor FS_{rated} of secondary measuring winding	from 3 up to 50
Weight, kg, not more	according to the order
Overall dimensions (LxWxH), max, mm	180x120x137

Modification	Description
A	secondary terminals are made of M6 screw bushings
B	secondary terminals are made of flexible wires with a cross-section of not less than 2.5 mm²
C	seal cover availability

Versions of secondary terminals

Overall dimensions, fitting and connecting dimensions



	X	y	z
A	60	75	90
B	90	105	120
C	120	135	150
D	150	165	180

TSH-EK-0,66 M5A110-0,2/10P-10/15-600/5 N3

M5	transformer dimension
A	secondary terminals are made of M6 screw bushings
0,2	accuracy class of the measuring secondary winding
10P	accuracy class of the protective secondary winding
10	rated secondary burden of the measuring secondary winding
15	rated secondary burden of the protective secondary winding
600	rated primary current
5	rated secondary current
N	climatic modification
3	placement category

An example of identification of TSH-EK-0,66 current transformer in M5 dimension:

1.7.6. BUS-TYPE INSTRUMENT CURRENT TRANSFORMERS TSH-EK-0,66

Technical parameters and characteristics

Parameters	Values for parameters
Rated voltage, kV	0,66
Maximum operating voltage, kV	0,72
Rated primary current, A	50; 75; 100; 125; 150; 175; 200; 225; 250; 275; 300; 375; 400; 450; 500; 550; 600; 650; 700; 750; 800; 900; 1000; 1050; 1100; 1150; 1200; 1250; 1300; 1400; 1500; 1550; 1600; 1650; 1700; 1750; 1800; 1900; 2000; 2500; 2550; 2600; 2650; 2700; 2750; 2800; 2900; 3000
Rated secondary current, A	1; 5
Rated frequency, Hz	50; 60
Number of secondary windings	up to 3
Rated secondary burdens with cosφ=0,8: measuring windings, V·A protective winding, V·A	 from 1 up to 30 from 1 up to 30
Rated accuracy class, according to GOST 7746: measuring windings protective windings	 0,2S; 0,2; 0,5S; 0,5; 1; 3; 5; 10 5P or 10P
Accuracy limit factor K_{rated} of secondary protective winding	from 2 up to 30
Rated instrument security factor FS_{rated} of secondary measuring winding	from 3 up to 50
Weight, kg, not more	according to the order
Overall dimensions (LxWxH), max, mm	214x190x190

Versions of secondary terminals

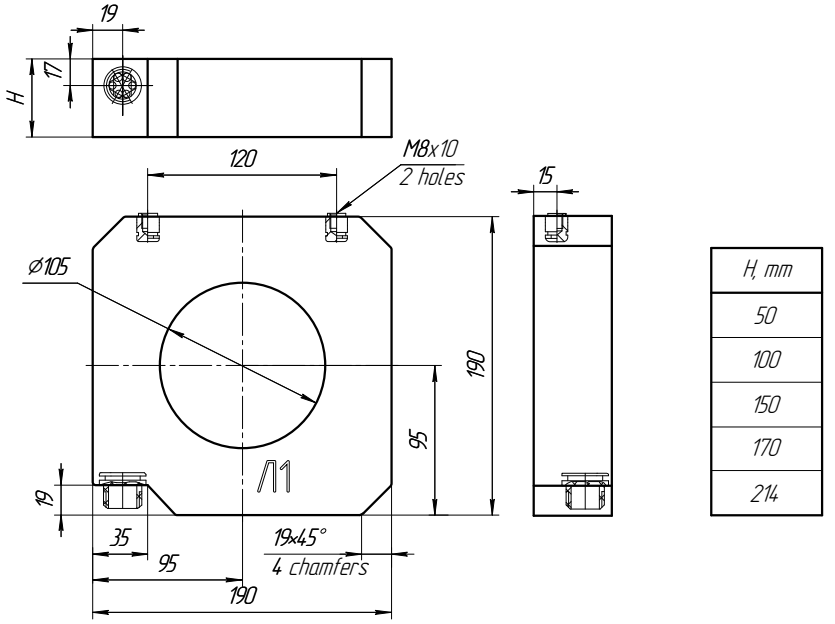
Modification	Description
B	secondary terminals are made of flexible wires with a cross-section of not less than 2.5 mm²

An example of identification of TSH-EK-0,66 current transformer in M6 dimension:

TSH-EK-0,66 M6B-0,2/10P-10/15-600/5 N3

M6	transformer dimension
B	with flexible secondary terminals
110	length of secondary terminals
0,2	accuracy class of the measuring secondary winding
10P	accuracy class of the protective secondary winding
10	rated secondary burden of the measuring secondary winding
15	rated secondary burden of the protective secondary winding
600	rated primary current
5	rated secondary current
N	climatic modification
3	placement category

Overall dimensions, fitting and connecting dimensions

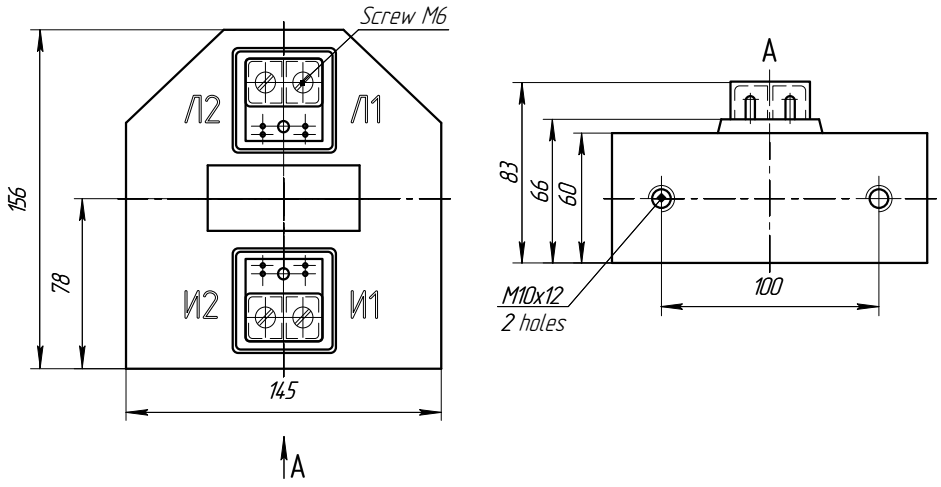


H, mm
50
100
150
170
214

Technical parameters and characteristics

Parameters	Values for parameters
Rated voltage, kV	0,66
Maximum operating voltage, kV	0,72
Rated primary current, A	5
Rated secondary current, A	1; 5
Rated frequency, Hz	50
Rated secondary burdens with cosφ=0,8: measuring windings, V·A protective winding, V·A	 from 1 up to 50 from 1 up to 50
Rated accuracy class, according to GOST 7746: measuring windings	 0,5; 1; 3
Rated instrument security factor FS_{rated} of measuring winding	from 5 up to 30
Weight, kg, not more	according to the order
Overall dimensions (LxWxH), max, mm	145x66x156

Overall dimensions, fitting and connecting dimensions



TPL-EK-0,66 current transformers are designed to supply and isolate technical metering circuits and measuring circuits from the protection current circuits connected to one measuring winding with 0.5 accuracy class, of a stand-alone or built-in current transformer. TPL-EK-0,66 current transformers are manufactured with one and the same dimensions and one or two windings.

Production on the basis of the specification TU 3414-015-52889537-13.
Service life – at least 30 years.
Guaranteed service life – 3 years.

TPL-EK-0,66 1-0,5-40-5/5 N3

1	transformer dimension
5	rated primary current
5	rated secondary current
0,5	accuracy class of the measuring secondary winding
40	rated secondary burden
N	climatic modification
3	placement category

An example of identification of TPL-EK-0,66 current transformer

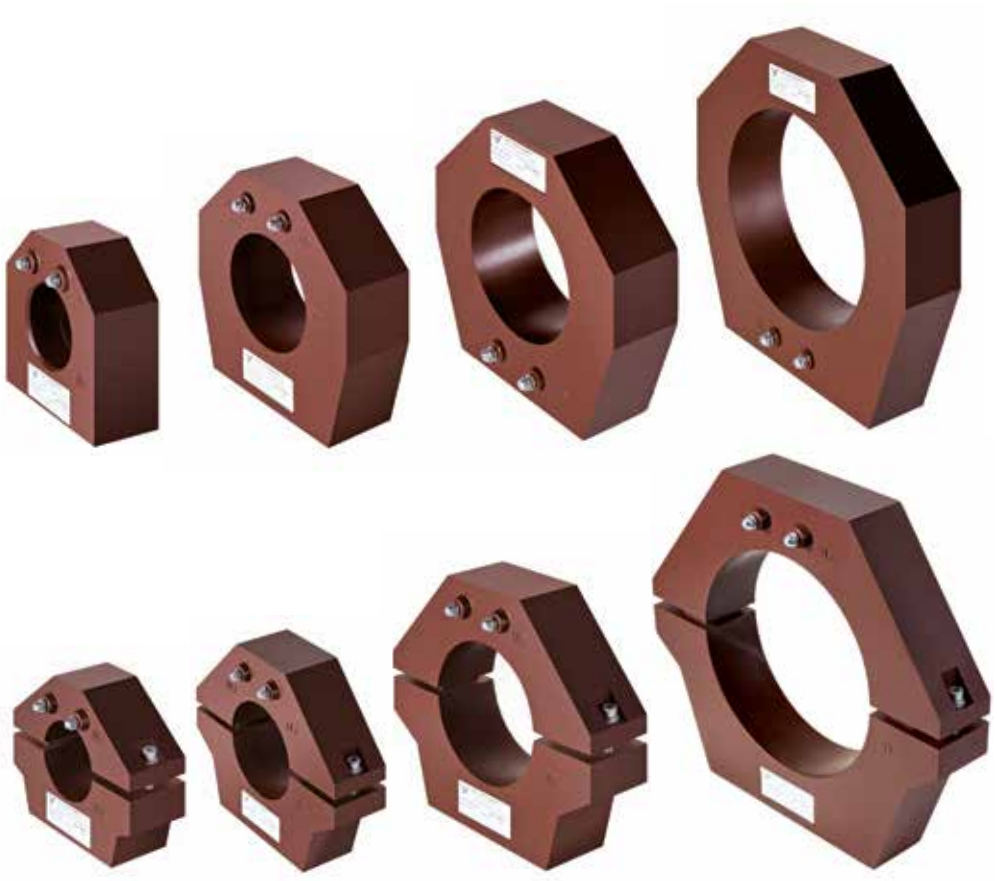
ZERO-PHASE SEQUENCE CURRENT TRANSFORMERS TZLK-0,66 and TZLKR-0,66, SPLIT-CORE TYPE

Description

TZLK-0,66 and TZLKR-0,66 current transformers are designed to supply relay schemes for protection against fault to earth in triple cable cores by means of transforming zerophase currents.

The transformers are to be installed on a cable of 200 mm diameter.
Climatic modifications N (temperate climate) and T (tropical climate), placement categories 2 and 3.

Production on the basis of the specification TU 3414-004-52889537-03.



Technical parameters and characteristics

Parameters	Values for parameters
Rated voltage, kV	0,66
Rated frequency, Hz	50 or 60
Short-time (one second) thermal current for the secondary winding, A	140
Test short-time (one minute) power frequency withstand voltage, kV	3

Protection sensitivity peak

Relay type	Trans-former type	Applied relay scale, A	Actuating current default value, A	Protection sensitivity (primary current, A), not more*		
				when operated at one transformer	when two transformers are series-connected	when two transformers are parallel-connected
PT-40/0,2 PT-140/0,2 SIPROTEC	TZLK	0,1...0,2	0,1	8,5	10,2	12,5
	TZLKR			25	30	36,8
PT3-51 SIPROTEC	TZLK	0,02...0,1	0,03	2,8	3,2	4,8
	TZLKR			3,0	3,4	5,1

Secondary resistance to direct current

Transformer type	Transformation ratio	number of secondary winding turns	Secondary resistance to direct current, mOhm
TZLK-0,66-70 TZLKR-0,66-70	30/1	30	50 ±20%
TZLK-0,66-100 TZLKR-0,66-100			60 ±20%
TZLK-0,66-125 TZLKR-0,66-125			55 ±20%
TZLK-0,66-200 TZLKR-0,66-200	60/1	60	120 ±20%

Note: * sensitivity values are given for parallel-connected relay windings and connecting wire resistance of not more than 1 Ohm.

Technical parameters and characteristics

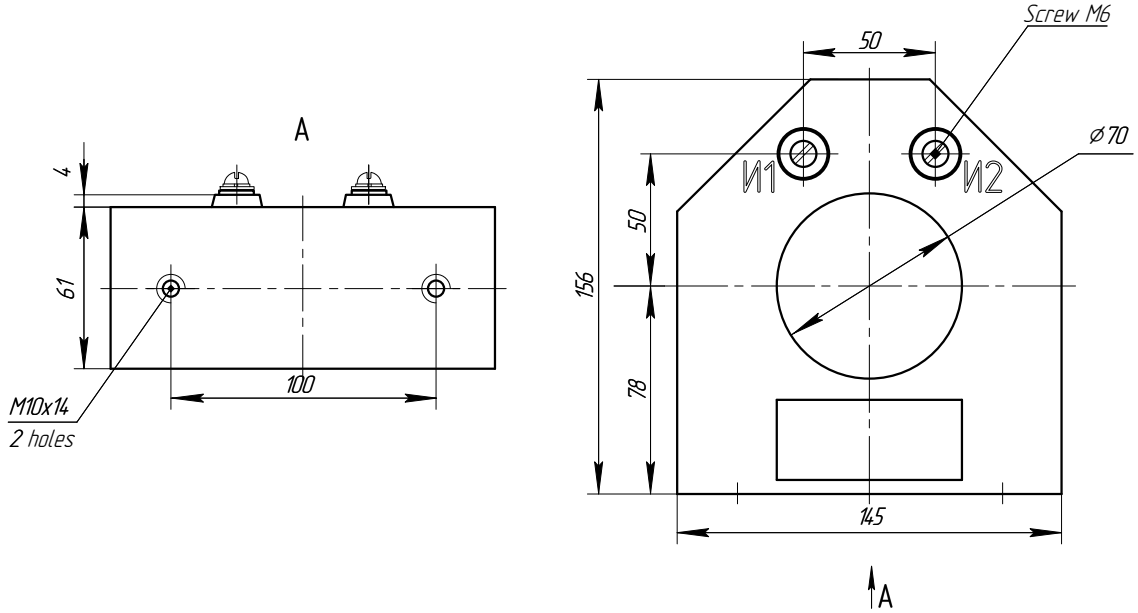
Parameters	Values for parameters	
Rated voltage, kV	0,66	
Maximum operating voltage, kV	0,72	
Transformation ratio	30/1	
Number of secondary winding turns	30	
Rated frequency, Hz	50*	
Short-time (one second) thermal current, A	140	
Secondary resistance to direct current, mOhm	50±20%	
Relay type and connection circuit:	Number of transformers**	Protection sensitivity peak (primary current, A), not more***
PT3-51	1	1,5
PT3-51 by the parallel connection of secondary windings of transformers	2	2
	3	2,5
	4	3
PT-40/0,2	1	7,5
PT-140/0,2	1	7,5
Weight, kg, not more	3	
Overall dimensions (LxWxH), max, mm	65x145x156	

*if transformers are intended for export deliveries, the rated frequency is 60 Hz.

** The number of transformers is stated for mounting onto a bunch of cables to connect one consumer. In this case the unbalance current of the cables in the bunch should not exceed 20 % of the protection actuating current.

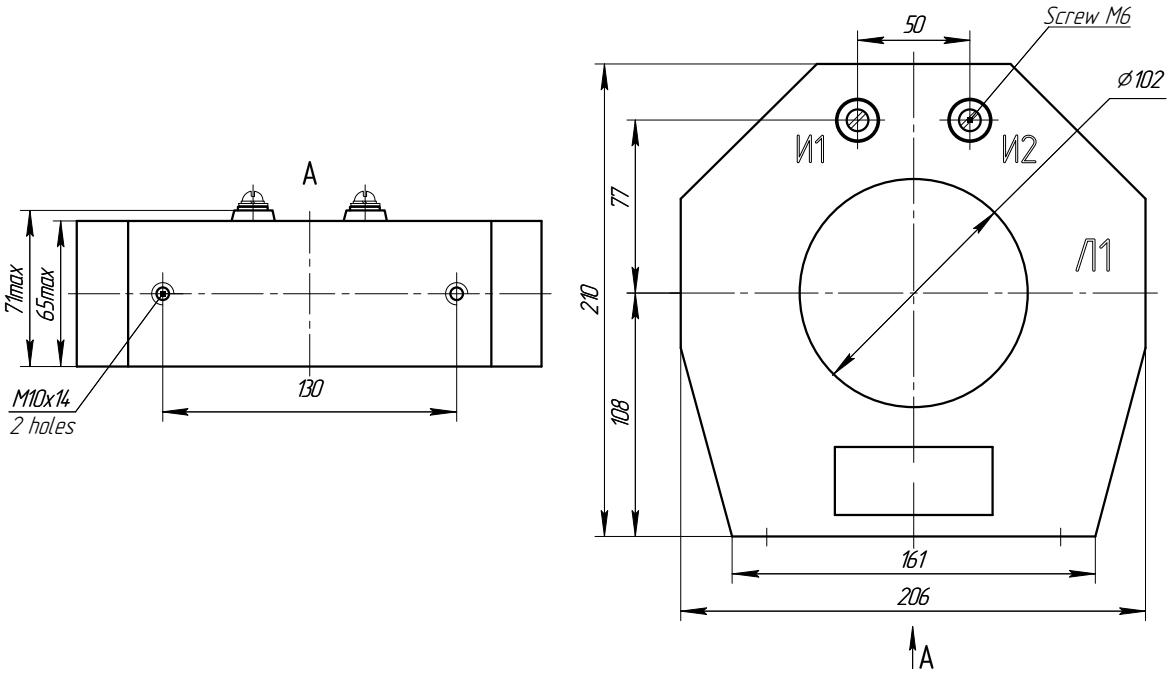
*** The sensivity values are given for PT-40/0,2 PT-140/0,2 for parallelconnected relay windings and the actuating current default value by 0.1 A, for PT3-51 and similar electronic relays with the actuating current default value by 0.03 A; and the resistance of connecting wires not more than 0.5 Ohm.

Overall dimensions, fitting and connecting dimensions



1.9.2. ZERO-PHASE SEQUENCE CURRENT TRANSFORMERS TZLK-0,66 and TZLKR-0,66

Overall dimensions, fitting and connecting dimensions



Technical parameters and characteristics

Parameters	Values for parameters	
Rated voltage, kV	0,66	
Maximum operating voltage, kV	0,72	
Transformation ratio	30/1	
Number of secondary winding turns	30	
Rated frequency, Hz	50*	
Short-time (one second) thermal current, A	140	
Secondary resistance to direct current, mOhm	60±20%	
Relay type and connection circuit:	Number of transformers**	Protection sensitivity peak (primary current, A), not more***
PT3-51	1	2
PT3-51 by the parallel connection of secondary windings of transformers	2	2,5
	3	3
	4	3,5
PT-40/0,2	1	8
PT-140/0,2	1	8
Weight, kg, not more	7	
Overall dimensions (LxWxH), max, mm	71x206x210	

*if transformers are intended for export deliveries, the rated frequency is 60 Hz.

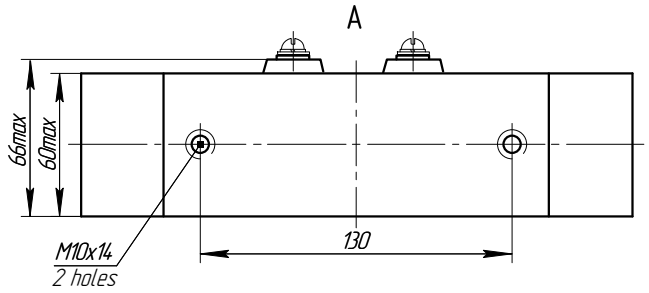
** The number of transformers is stated for mounting onto a bunch of cables to connect one consumer. In this case the unbalance current of the cables in the bunch should not exceed 20 % of the protection actuating current.

*** The sensivity values are given for PT-40/0,2 PT-140/0,2 for parallelconnected relay windings and the actuating current default value by 0.1 A, for PT3-51 and similar electronic relays with the actuating current default value by 0.03 A; and the resistance of connecting wires not more than 0.5 Ohm.

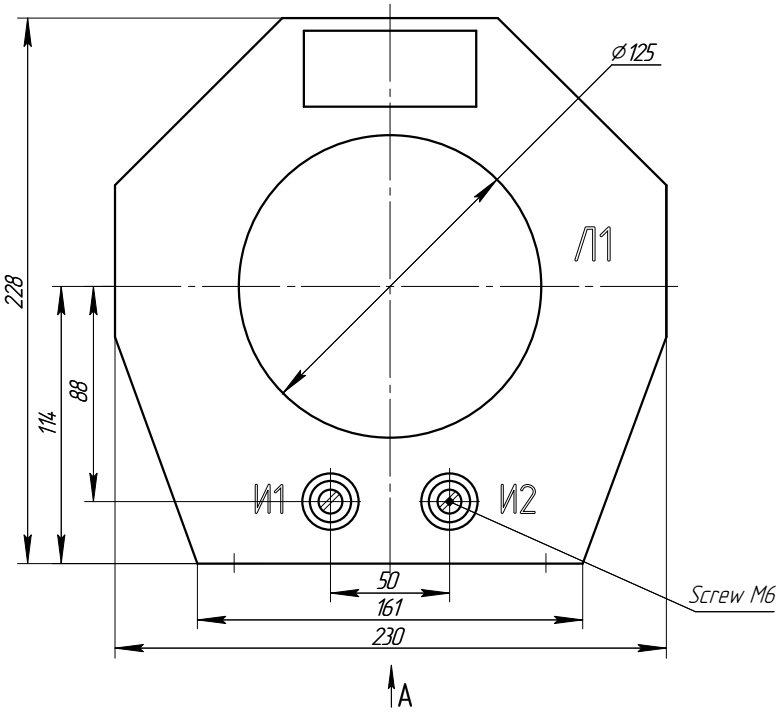
Technical parameters and characteristics

Parameters	Values for parameters	
Rated voltage, kV	0,66	
Maximum operating voltage, kV	0,72	
Transformation ratio	30/1	
Number of secondary winding turns	30	
Rated frequency, Hz	50*	
Short-time (one second) thermal current, A	140	
Secondary resistance to direct current, mOhm	55±20%	
Relay type and connection circuit:	Number of transformers**	Protection sensitivity peak (primary current, A), not more***
PT3-51	1	2
PT3-51 by the parallel connection of secondary windings of transformers	2	2,5
	3	3
	4	3,5
PT-40/0,2	1	8
PT-140/0,2	1	8
Weight, kg, not more	7	
Overall dimensions (LxWxH), max, mm	66x230x228	

*if transformers are intended for export deliveries, the rated frequency is 60 Hz.
** The number of transformers is stated for mounting onto a bunch of cables to connect one consumer. In this case the unbalance current of the cables in the bunch should not exceed 20 % of the protection actuating current.
*** The sensivity values are given for PT-40/0,2 PT-140/0,2 for parallelconnected relay windings and the actuating current default value by 0.1 A, for PT3-51 and similar electronic relays with the actuating current default value by 0.03 A; and the resistance of connecting wires not more than 0.5 Ohm.

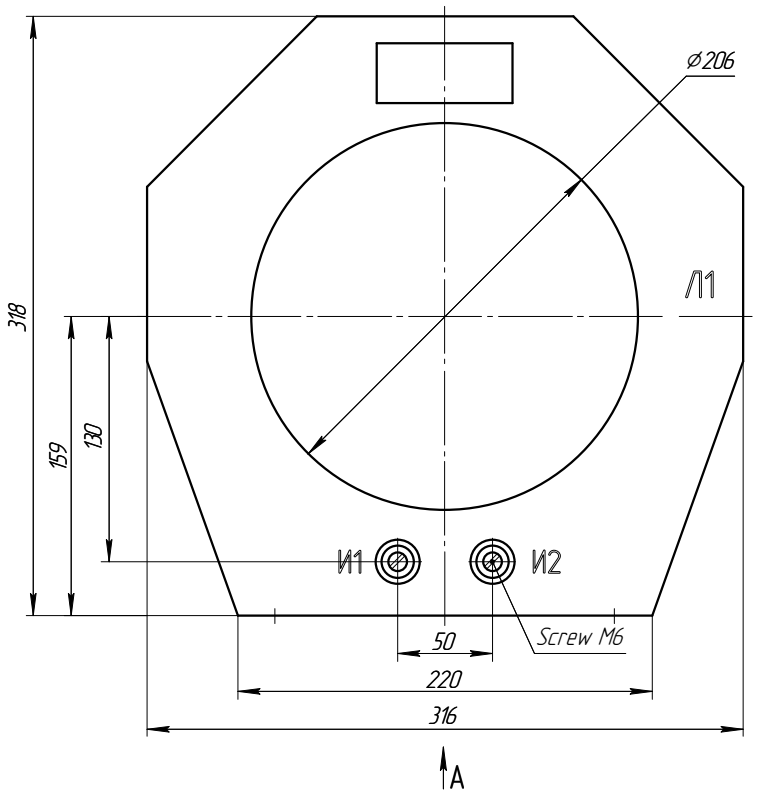


Overall dimensions, fitting and connecting dimensions



1.9.4. ZERO-PHASE SEQUENCE CURRENT TRANSFORMERS TZLK-0,66 and TZLKR-0,66

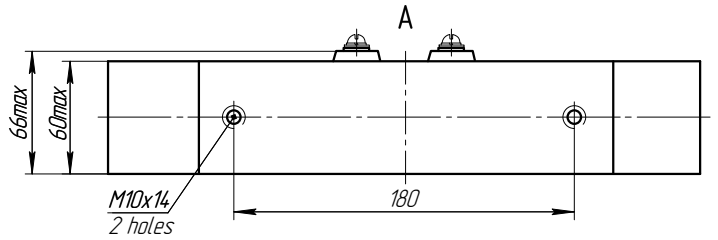
Overall dimensions, fitting and connecting dimensions



Technical parameters and characteristics

Parameters	Values for parameters	
Rated voltage, kV	0,66	
Maximum operating voltage, kV	0,72	
Transformation ratio	60/1	
Number of secondary winding turns	60	
Rated frequency, Hz	50*	
Short-time (one second) thermal current, A	140	
Secondary resistance to direct current, mOhm	120±20%	
Relay type and connection circuit:	Number of transformers**	Protection sensitivity peak (primary current, A), not more***
PT3-51	1	2,5
PT3-51 by the parallel connection of secondary windings of transformers	2	3
	3	3,5
	4	4
PT-40/0,2	1	8,5
PT-140/0,2	1	8,5
Weight, kg, not more	12	
Overall dimensions (LxWxH), max, mm	66x316x318	

*if transformers are intended for export deliveries, the rated frequency is 60 Hz.
** The number of transformers is stated for mounting onto a bunch of cables to connect one consumer. In this case the unbalance current of the cables in the bunch should not exceed 20 % of the protection actuating current.
*** The sensivity values are given for PT-40/0,2 PT-140/0,2 for parallelconnected relay windings and the actuating current default value by 0.1 A, for PT3-51 and similar electronic relays with the actuating current default value by 0.03 A; and the resistance of connecting wires not more than 0.5 Ohm.



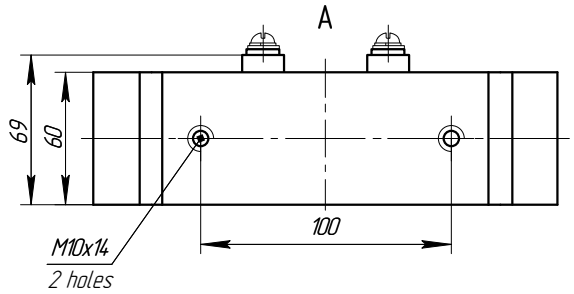
Technical parameters and characteristics

Parameters	Values for parameters	
Rated voltage, kV	0,66	
Maximum operating voltage, kV	0,72	
Transformation ratio	30/1	
Number of secondary winding turns	30	
Rated frequency, Hz	50*	
Short-time (one second) thermal current, A	140	
Secondary resistance to direct current, mOhm	50±20%	
Relay type and connection circuit:	Number of transformers**	Protection sensitivity peak (primary current, A), not more***
PT3-51	1	2,5
PT3-51 by the parallel connection of secondary windings of transformers	2	3
	3	3,5
	4	4
PT-40/0,2	1	20
PT-140/0,2	1	20
Weight, kg, not more	3	
Overall dimensions (LxWxH), max, mm	69x185x156	

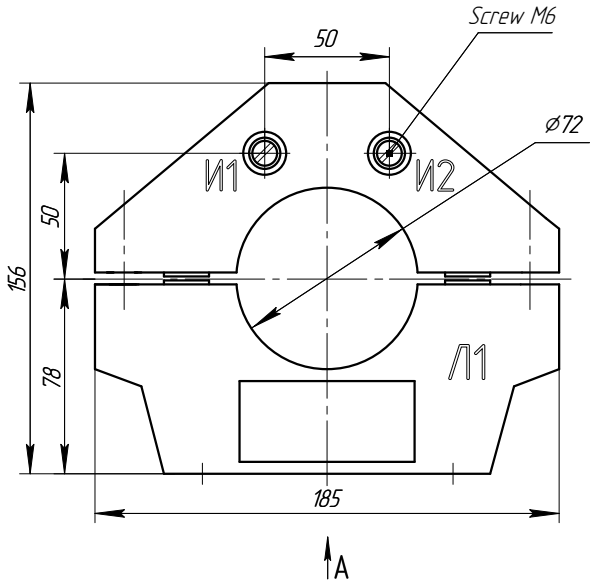
*if transformers are intended for export deliveries, the rated frequency is 60 Hz. frequency is 60 Hz.

** The number of transformers is stated for mounting onto a bunch of cables to connect one consumer. In this case the unbalance current of the cables in the bunch should not exceed 20 % of the protection actuating current.

*** The sensivity values are given for PT-40/0,2 PT-140/0,2 for parallel-connected relay windings and the actuating current default value by 0.1 A, for PT3-51 and similar electronic relays with the actuating current default value by 0.03 A; and the resistance of connecting wires not more than 0.5 Ohm.

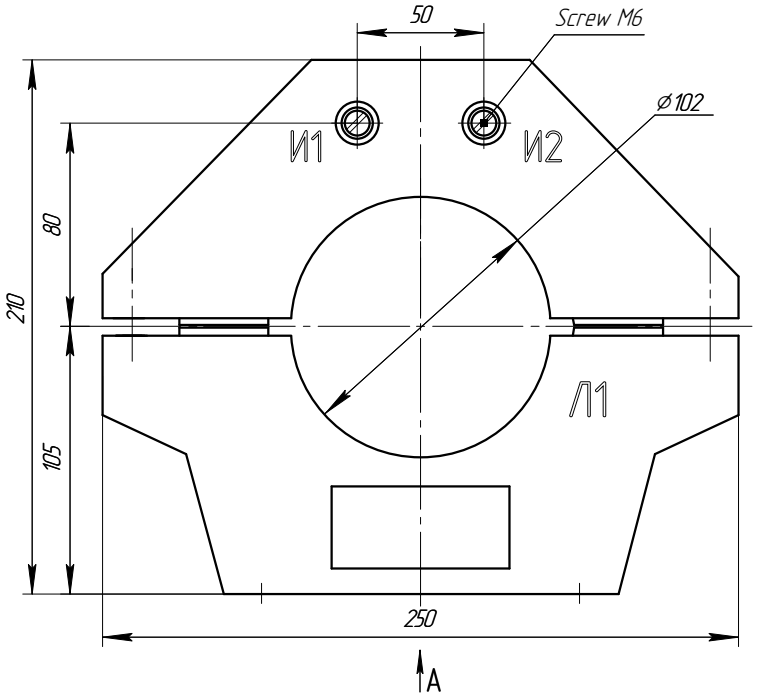


Overall dimensions, fitting and connecting dimensions



1.9.6. ZERO-PHASE SEQUENCE CURRENT TRANSFORMERS TZLK-0,66 and TZLKR-0,66

Overall dimensions, fitting and connecting dimensions



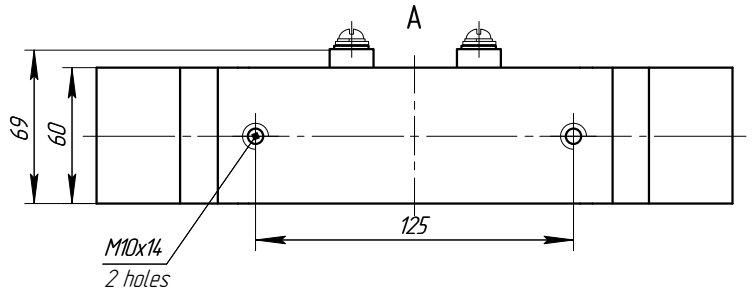
Technical parameters and characteristics

Parameters	Values for parameters	
Rated voltage, kV	0,66	
Maximum operating voltage, kV	0,72	
Transformation ratio	30/1	
Number of secondary winding turns	30	
Rated frequency, Hz	50*	
Short-time (one second) thermal current, A	140	
Secondary resistance to direct current, mOhm	60±20%	
Relay type and connection circuit:	Number of transformers**	Protection sensitivity peak (primary current, A), not more***
PT3-51	1	3
PT3-51 by the parallel connection of secondary windings of transformers	2	3,5
	3	4
	4	4,5
PT-40/0,2	1	23
PT-140/0,2	1	23
Weight, kg, not more	7	
Overall dimensions (LxWxH), max, mm	69x250x210	

*if transformers are intended for export deliveries, the rated frequency is 60 Hz. frequency is 60 Hz.

** The number of transformers is stated for mounting onto a bunch of cables to connect one consumer. In this case the unbalance current of the cables in the bunch should not exceed 20 % of the protection actuating current.

*** The sensivity values are given for PT-40/0,2 PT-140/0,2 for parallel-connected relay windings and the actuating current default value by 0.1 A, for PT3-51 and similar electronic relays with the actuating current default value by 0.03 A; and the resistance of connecting wires not more than 0.5 Ohm.



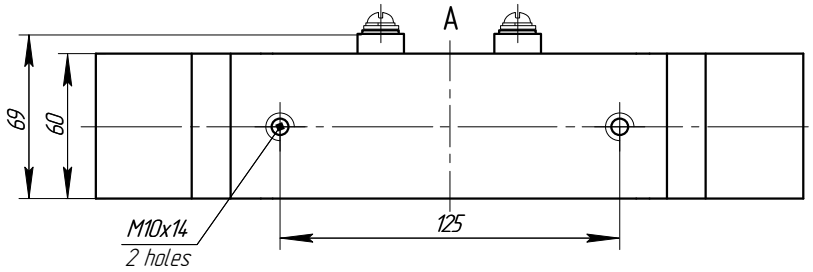
Technical parameters and characteristics

Parameters	Values for parameters	
Rated voltage, kV	0,66	
Maximum operating voltage, kV	0,72	
Transformation ratio	30/1	
Number of secondary winding turns	30	
Rated frequency, Hz	50*	
Short-time (one second) thermal current, A	140	
Secondary resistance to direct current, mOhm	50±20%	
Relay type and connection circuit:	Number of transformers**	Protection sensitivity peak (primary current, A), not more***
PT3-51	1	3
PT3-51 by the parallel connection of secondary windings of transformers	2	3,5
	3	4
	4	4,5
PT-40/0,2	1	23
PT-140/0,2	1	23
Weight, kg, not more	7	
Overall dimensions (LxWxH), max, mm	69x260x228	

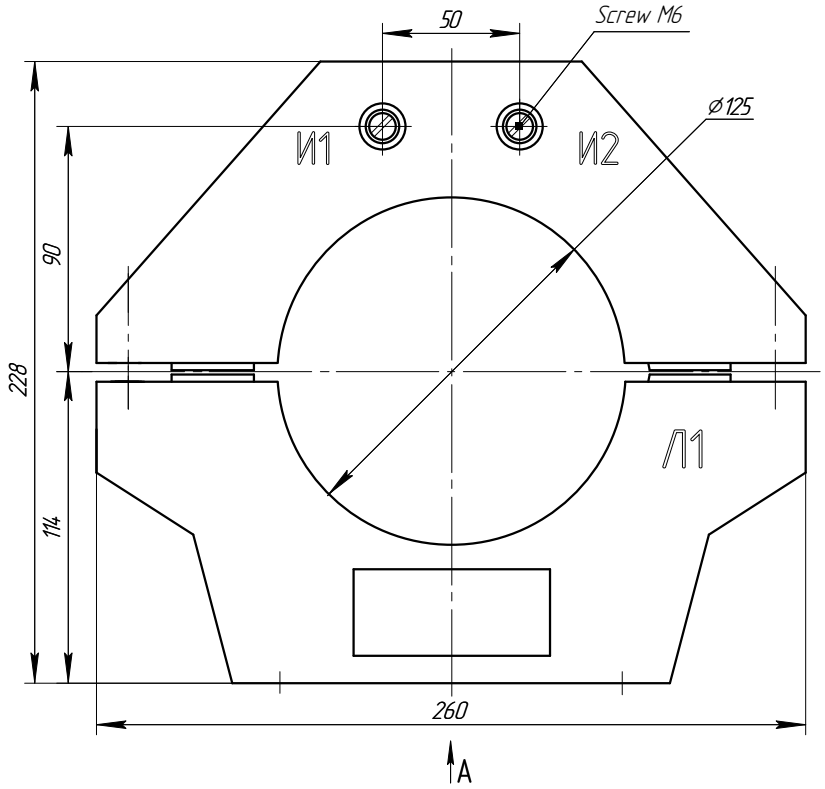
*if transformers are intended for export deliveries, the rated frequency is 60 Hz. frequency is 60 Hz.

** The number of transformers is stated for mounting onto a bunch of cables to connect one consumer. In this case the unbalance current of the cables in the bunch should not exceed 20 % of the protection actuating current.

*** The sensivity values are given for PT-40/0,2 PT-140/0,2 for parallel-connected relay windings and the actuating current default value by 0.1 A, for PT3-51 and similar electronic relays with the actuating current default value by 0.03 A; and the resistance of connecting wires not more than 0.5 Ohm.

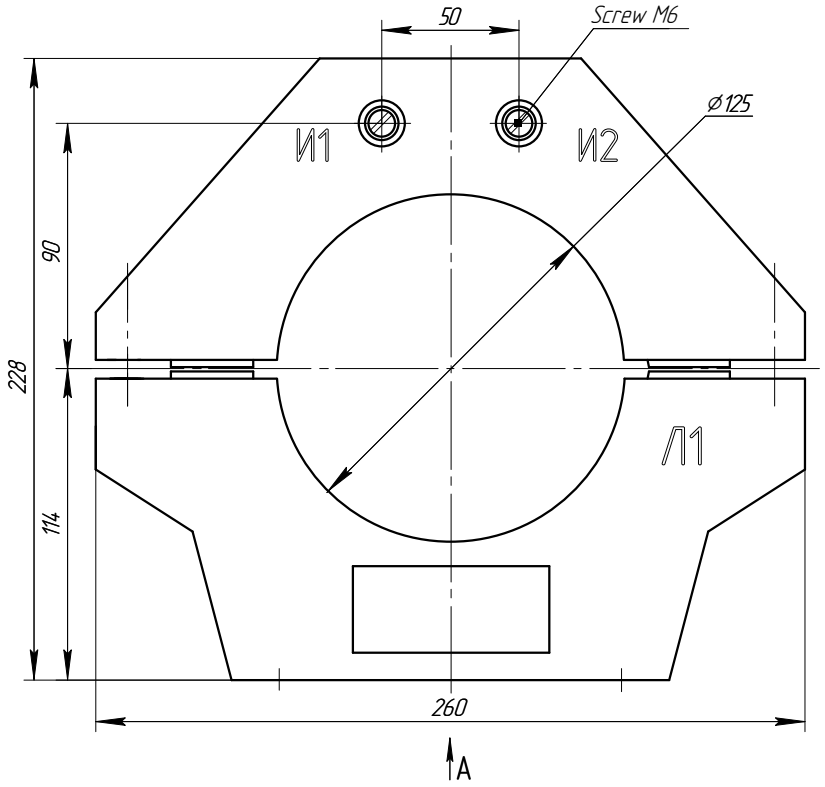


Overall dimensions, fitting and connecting dimensions



1.9.8. ZERO-PHASE SEQUENCE CURRENT TRANSFORMERS TZLK-0,66 and TZLKR-0,66

Overall dimensions, fitting and connecting dimensions



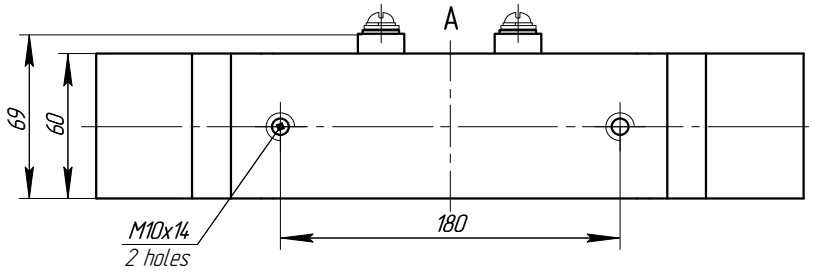
Technical parameters and characteristics

Parameters	Values for parameters	
Rated voltage, kV	0,66	
Maximum operating voltage, kV	0,72	
Transformation ratio	60/1	
Number of secondary winding turns	60	
Rated frequency, Hz	50*	
Short-time (one second) thermal current, A	140	
Secondary resistance to direct current, mOhm	120±20%	
Relay type and connection circuit:	Number of transformers**	Protection sensitivity peak (primary current, A), not more***
PT3-51	1	3,5
PT3-51 by the parallel connection of secondary windings of transformers	2	4
	3	4,5
	4	5
PT-40/0,2	1	25
PT-140/0,2	1	25
Weight, kg, not more	12	
Overall dimensions (LxWxH), max, mm	69x360x318	

*if transformers are intended for export deliveries, the rated frequency is 60 Hz. frequency is 60 Hz.

** The number of transformers is stated for mounting onto a bunch of cables to connect one consumer. In this case the unbalance current of the cables in the bunch should not exceed 20 % of the protection actuating current.

*** The sensivity values are given for PT-40/0,2 PT-140/0,2 for parallel-connected relay windings and the actuating current default value by 0.1 A, for PT3-51 and similar electronic relays with the actuating current default value by 0.03 A; and the resistance of connecting wires not more than 0.5 Ohm.



EARTHED VOLTAGE TRANSFORMERS ZNOL-EK AND ZNOLP-EK

Description

Earthed single-phase voltage transformers ZNOL-EK and ZNOLP-EK with cast insulation are designed for operation in electric power supply systems with insulated neutral and also with a neutral earthed through an arc suppression coil or a resistor, in measuring, protection, automatic, control, signal alternating current circuits of 50 and 60 Hz frequency, rated voltage from 3 to 35 kV at electric power plants of all kinds, including nuclear power plants, power grid substations, industrial and agricultural facilities, and also for export supplies.

The voltage transformers are tailored for a wide range of use in indoor and outdoor switchgears, singleend service chambers, current-conducting wires of generator voltage and auxiliary voltage of electric power plants and substations.

Production on the basis of the spec. TU 3414-010-52889537-08.

Registered in the Measuring Instrument State Registers
of the Russian Federation,
Republic of Belarus,
Ukraine,
Republic of Kazakhstan.

Certified by Rosseti (PAO)
Service life – at least 30 years.
Guaranteed service life – 5 years.

EARTHED VOLTAGE TRANSFORMERS ZNOL-EK AND ZNOLP-EK

Description

Earthed voltage transformers are manufactured with or without a protection device (ZNOLP-EK or ZNOL-EK respectively).
The protection devices in the transformers of M1, M2 and M6 versions for voltage classes 3, 6, 10 kV are equipped with a fuse link SIBA 187000.
Use of other fuse links with similar characteristics is acceptable.

At customer's option, ZNOLP transformers of M1, M2 and M3 versions for voltage classes 3, 6, 10 kV can be equipped with a protection device with a resistor C2-33H-0,25.

The protection device in the transformer of M7 version for voltage classes 15, 20, 24 kV is equipped with a fuse link SIBA HHZ3044111.0,6.
Use of other fuse types is acceptable, if their characteristics provide the desired protection for the transformer winding.

Earthed voltage transformers ZNOL-EK and ZNOLP-EK can be supplied assembled in various variants of three-phase groups (3xZNOL-EK or 3xZNOLP-EK).
The groups are assembled of 3-10 kV voltage transformers.
The groups are designed for installation in switchgear cabinets, single-end service assembled chambers and other indoor switchgears.

Recommended resistor types for earthing of primary terminals, which are marked as "X", and their resistance and capacity values

Parameters	Values for parameters for ZNOL-EK and ZNOLP-EK	
	Voltage class 3-6 kV	Voltage class 10 kV
Resistor type*	C5-35B 3 kOhm 100 W ±5%	C5-35B 2,4 kOhm 100 W ±5%
Resistor rated total capacity, W	300	300
Total resistance, Ohm	1000	800

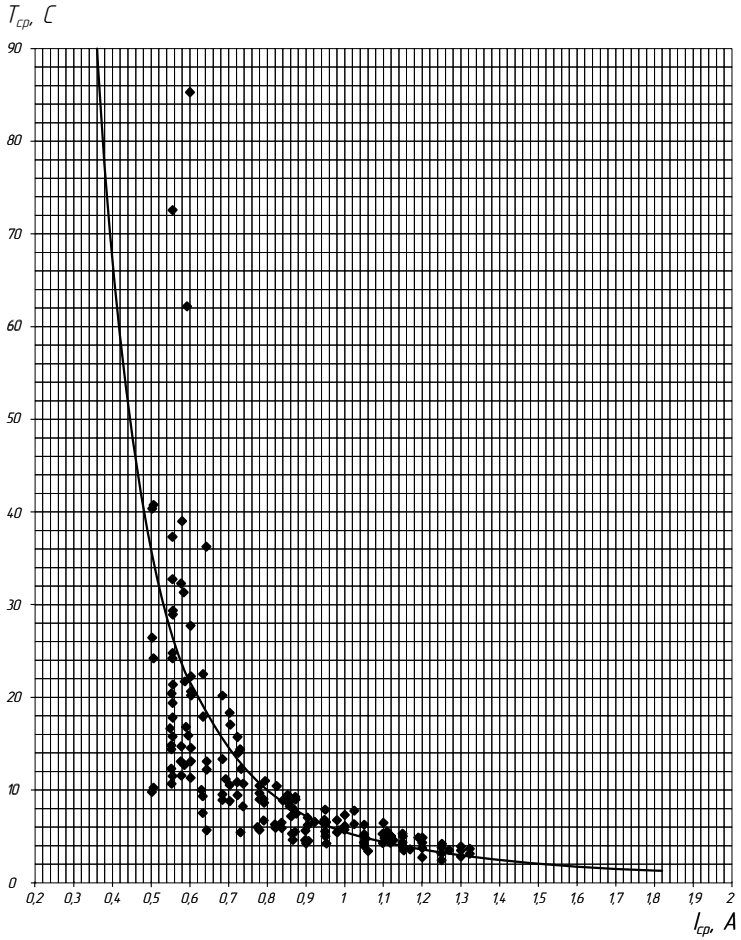
*C5-35B resistors must meet requirements of OZhO 467.173 TU, other resistor types with similar parameters are acceptable

Technical parameters and characteristics

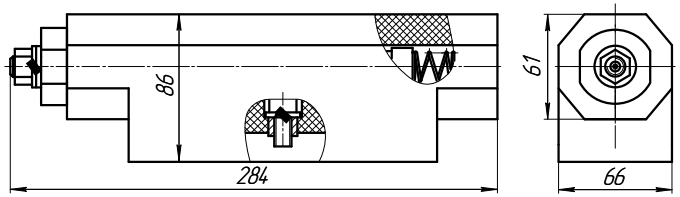
Parameters	Values for parameters**							
Voltage class, kV	3	6	10	15	20	24	27	35
Maximum operating voltage, kV	3,6	7,2	12	17,5	24	26,5	30	40,5
Rated primary voltage, V	3000/√3 3300/√3	6000/√3 6300/√3 6600/√3 6900/√3	10000/√3 10500/√3 11000/√3	13800/√3 15000/√3 15750/√3 16000/√3	18000/√3 20000/√3 22000/√3	24000/√3	27000/√3 27500/√3	35000/√3
Accuracy class: for measuring and metering for protection	0,2; 0,5; 1,0; 3,0 3P or 6P							
Rated voltage for the main secondary, V	100; 110; 100/√3; 110/√3							
Rated voltage for the auxiliary secondary, V	100/3; 100/√3; 100; 110/√3; 110/3; 110							
Rated output for the main secondary, V·A in the accuracy class: 0,2 0,5 1 3	1,25-15 1,25-30 1,25-50 1,25-150	1,25-30 1,25-50 1,25-75 1,25-200	1,25-50 1,25-75 1,25-150 1,25-300					
Rated output for the main secondary, in the accuracy class 3, V·A	10-300							
Maximum output outside the accuracy class, V·A	160; 250; 400; 630							
Winding connection scheme and the group:	1/1/1-0-0							
Rated frequency, Hz	50 or 60							

**At customer's option, supplied transformers can have technical parameters other than stated.

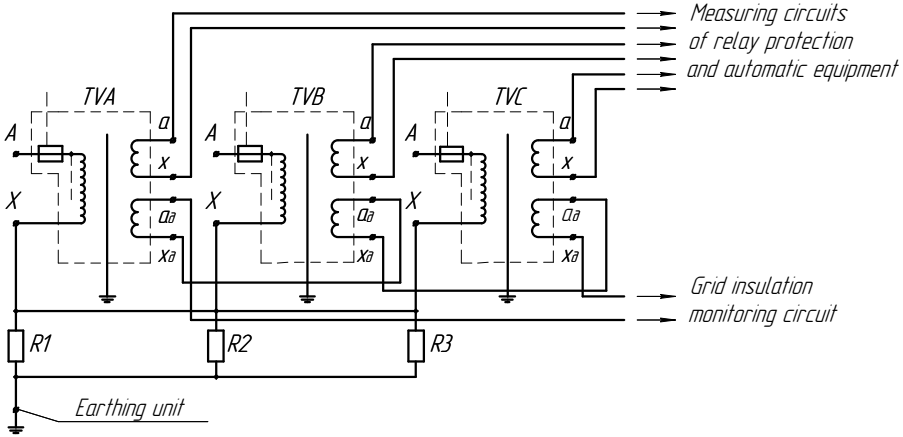
Time-current characteristic of the embedded protection device



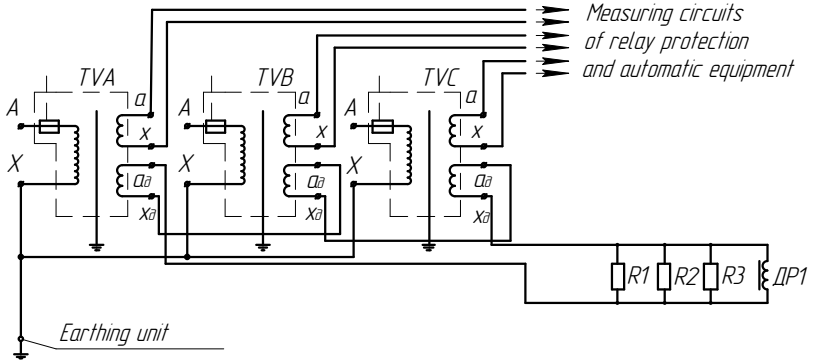
Overall and fitting dimensions
of the embedded protection device



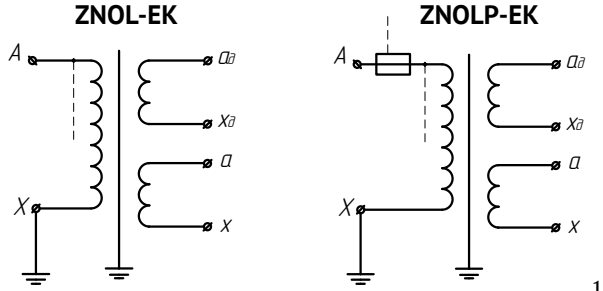
Schematic circuit diagram of the three-phase group 3xZNOLP-EK



Schematic circuit diagram of the antiresonant three-phase group 3xZNOLP-EK



Schematic circuit diagram of the earthed voltage transformers



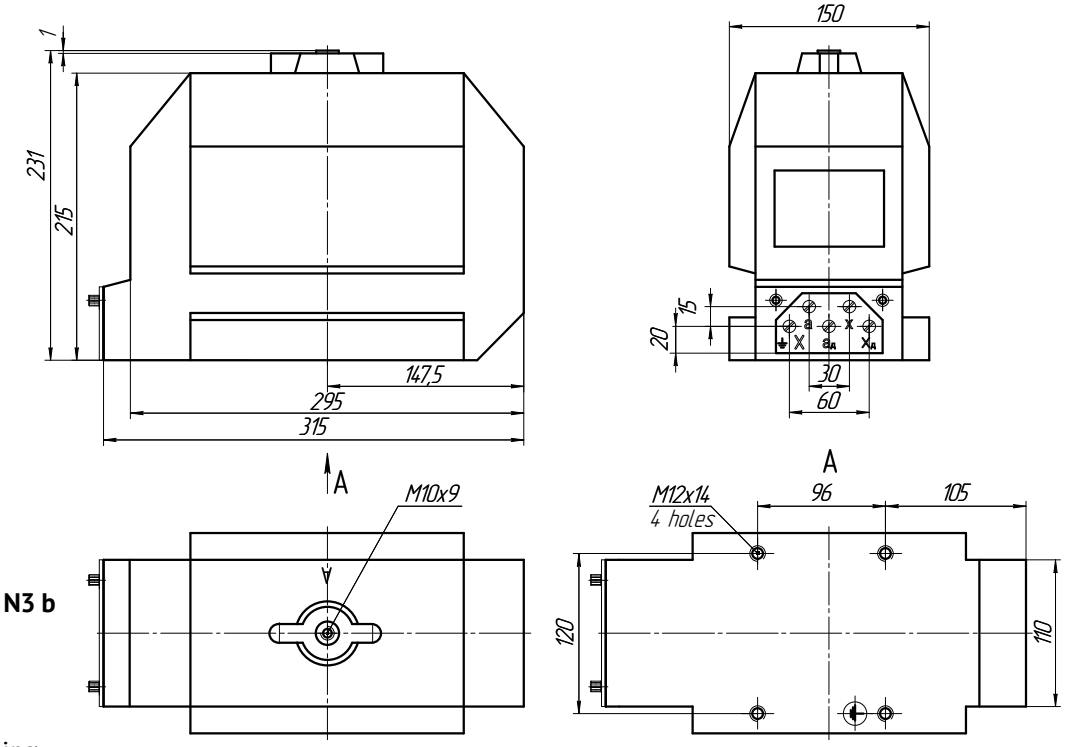
An example of identification of an earthed voltage transformer ZNOL-EK M1, voltage class 6 kV

ZNOL-EK-6 M1-6000/√3-100/√3-100/3-0,2/3,0-30/200 N3 b

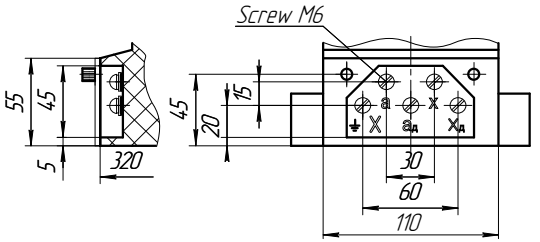
M1	transformer dimension
6000/√3	rated primary voltage
100/√3	rated voltage for the main secondary
100/3	rated voltage for the auxiliary secondary
0,2	accuracy class of the measuring secondary winding
3,0	accuracy class of the protective secondary winding
30	rated secondary burden of the measuring secondary winding
200	rated secondary burden of the protective secondary winding
N	climatic modification
3	placement category
b	insulation level

Overall dimensions, fitting and connecting dimensions

ZNOL-EK M1 voltage transformers in the voltage classes 3; 6; 10 kV



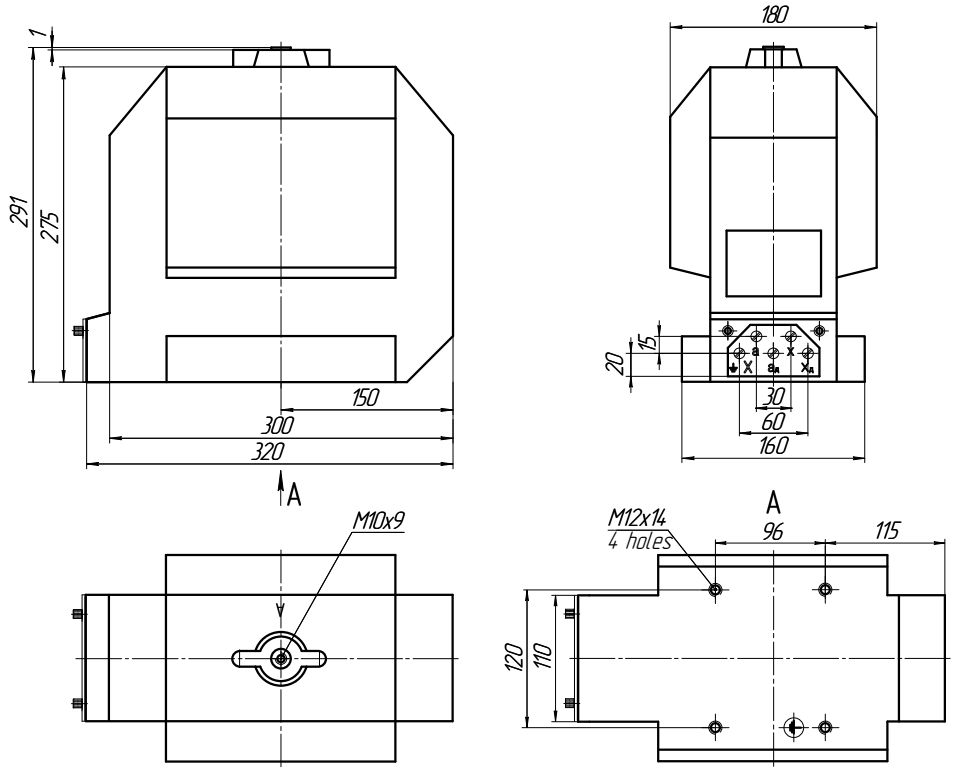
Location of the terminals and the protective seal cover



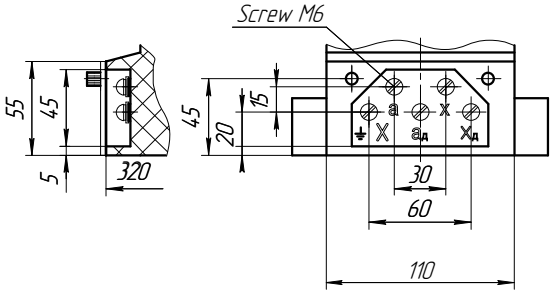
For transformers with two windings

Overall dimensions, fitting and connecting dimensions

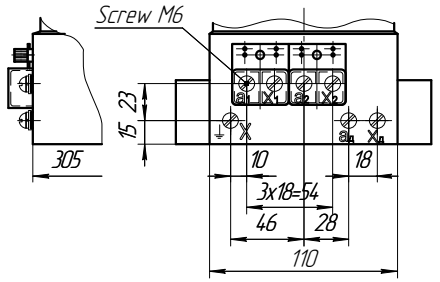
ZNOL-EK M2 voltage transformers in the voltage classes 3; 6; 10, 15 kV



Location of the terminals and the protective seal cover



For transformers with two windings



For transformers with three windings

ZNOL-EK-10 M2-10000/√3-100/√3-100/3-0,2/3,0-30/200 N3 b

M2	transformer dimension
10000/√3	rated primary voltage
100/√3	rated voltage for the main secondary
100/3	rated voltage for the auxiliary secondary
0,2	accuracy class of the measuring secondary winding
3,0	accuracy class of the protective secondary winding
30	rated secondary burden of the measuring secondary winding
200	rated secondary burden of the protective secondary winding
N	climatic modification
3	placement category
b	insulation level

An example of identification of an earthed voltage transformer ZNOL-EK M2, voltage class 10 kV

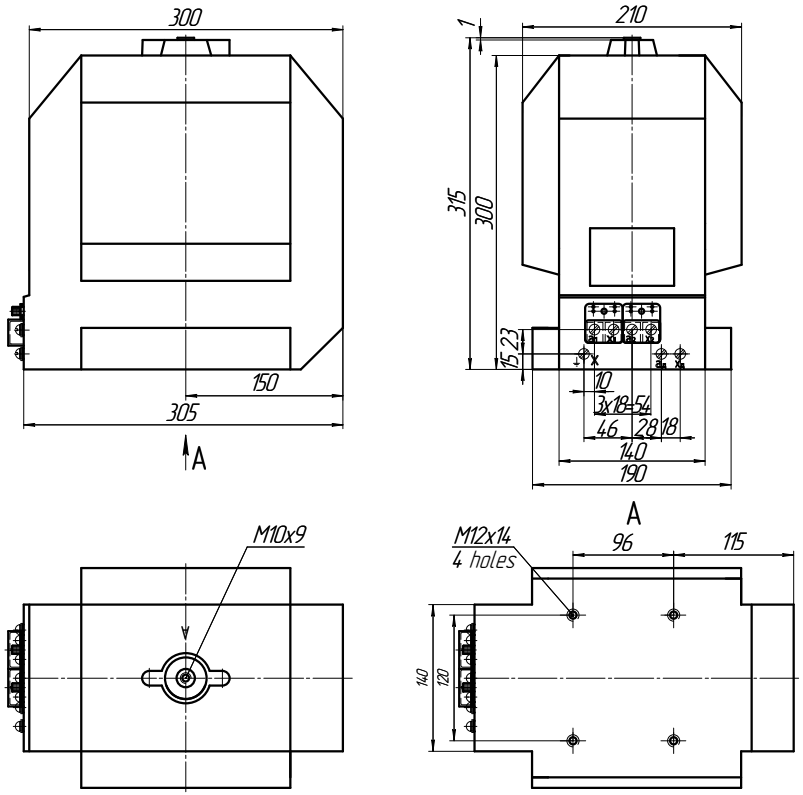
An example of identification of an earthed voltage transformer ZNOL-EK M3, voltage class 15 kV

ZNOL-EK-15 M3-15750/√3-100/√3-100/3-0,2/3,0-30/300 N3 b

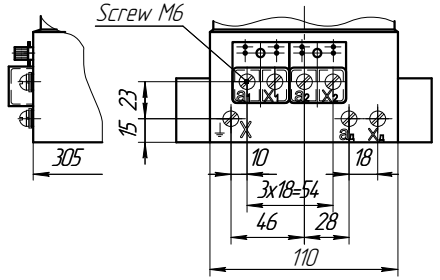
M3	transformer dimension
15750/√3	rated primary voltage
100/√3	rated voltage for the main secondary
100/3	rated voltage for the auxiliary secondary
0,2	accuracy class of the measuring secondary winding
3,0	accuracy class of the protective secondary winding
30	rated secondary burden of the measuring secondary winding
300	rated secondary burden of the protective secondary winding
N	climatic modification
3	placement category
b	insulation level

Overall dimensions, fitting and connecting dimensions

ZNOL-EK M3 voltage transformers in the voltage classes 3; 6; 10; 15; 20; 24 kV



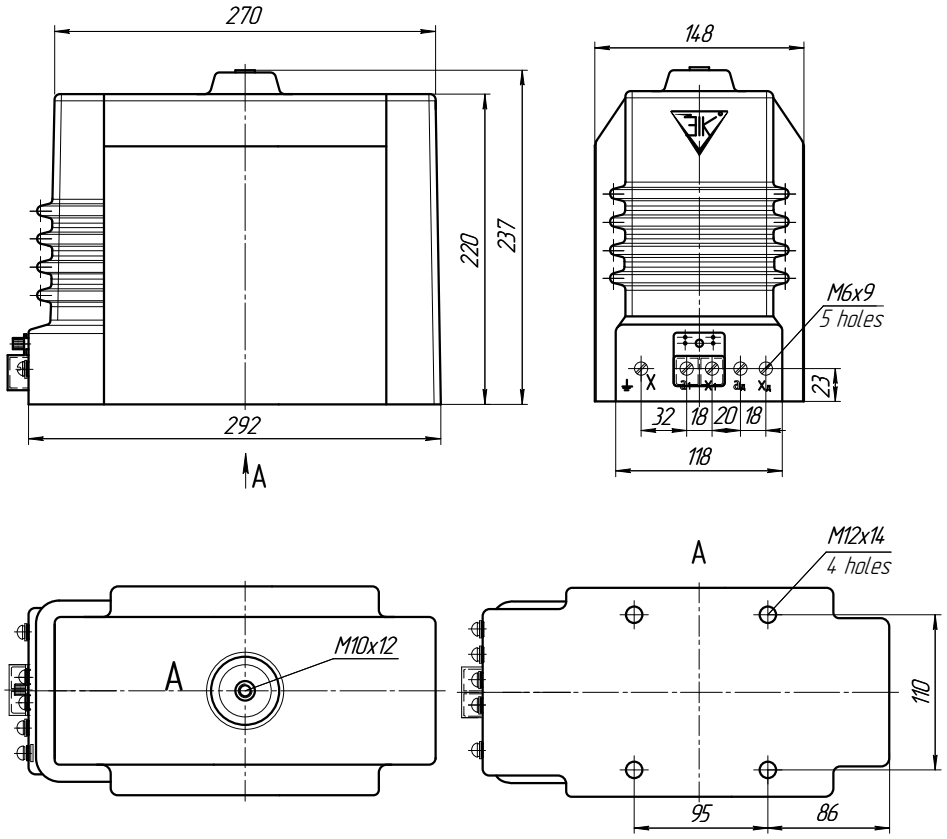
Location of the terminals and the protective seal cover



For transformers with windings up to three

Overall dimensions, fitting and connecting dimensions

ZNOL-EK M4 voltage transformers in the voltage classes 3; 6; 10 kV



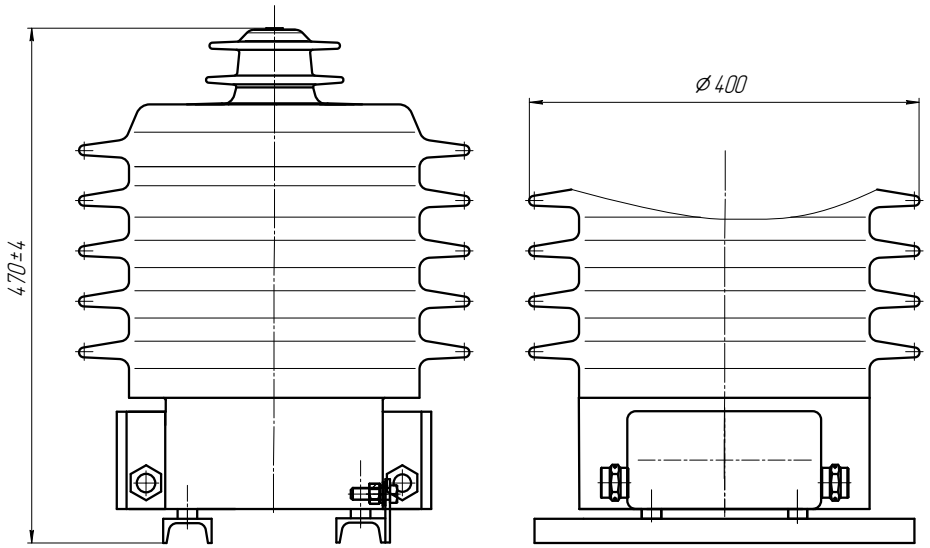
ZNOL-EK-10 M4-10000/√3-100/√3-100/3-0,2/3,0-30/200 N3 a

M4	transformer dimension
10000/√3	rated primary voltage
100/√3	rated voltage for the main secondary
100/3	rated voltage for the auxiliary secondary
0,2	accuracy class of the measuring secondary winding
3,0	accuracy class of the protective secondary winding
30	rated secondary burden of the measuring secondary winding
200	rated secondary burden of the protective secondary winding
N	climatic modification
3	placement category
a	insulation level

An example of identification of an earthed voltage transformer ZNOL-EK M4, voltage class 10 kV

Overall dimensions, fitting and connecting dimensions

ZNOL-EK MH30 outdoor voltage transformers in the voltage classes up to 24 kV

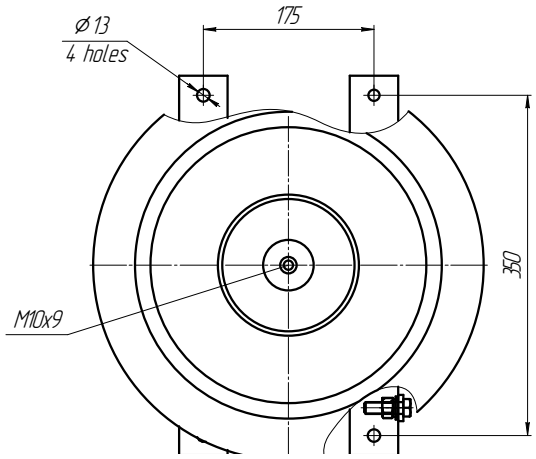


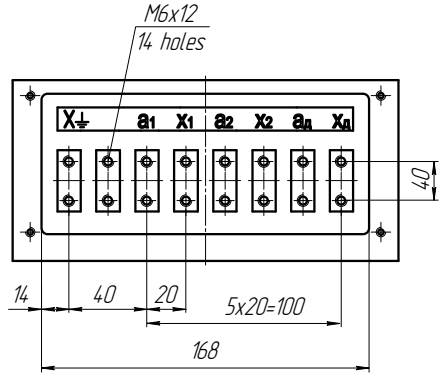
An example of identification of an earthed outdoor voltage transformer ZNOL-EK MH30 NF1, voltage class 10 kV

ZNOL-EK-10 MH30-10000/√3-100/√3-100/3-0,2/3,0-30/300 NF1 a

MH30	transformer dimension
10000/√3	rated primary voltage
100/√3	rated voltage for the main secondary
100/3	rated voltage for the auxiliary secondary
0,2	accuracy class of the measuring secondary winding
3,0	accuracy class of the protective secondary winding
30	rated secondary burden of the measuring secondary winding
300	rated secondary burden of the protective secondary winding
NF	climatic modification
1	placement category
a	insulation level

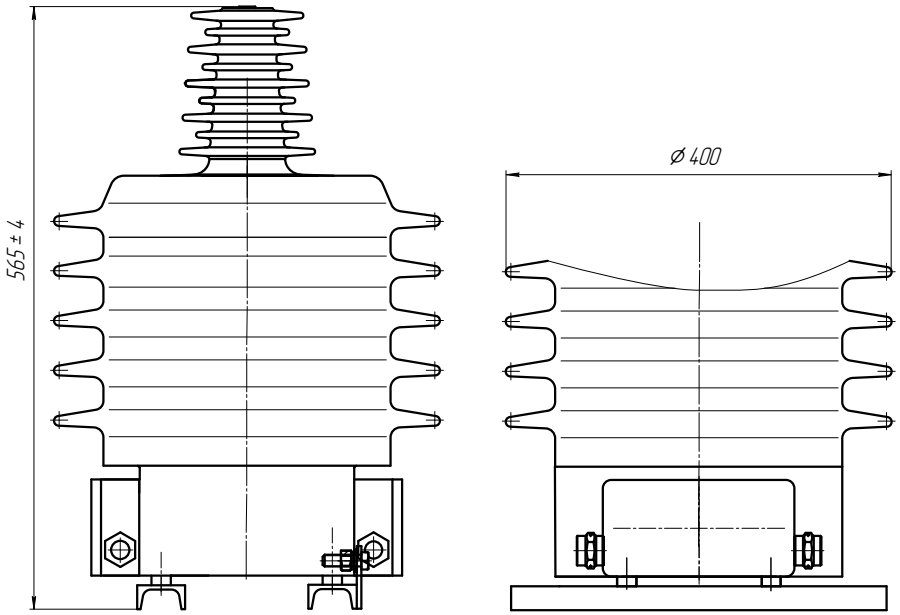
Location of secondary terminals



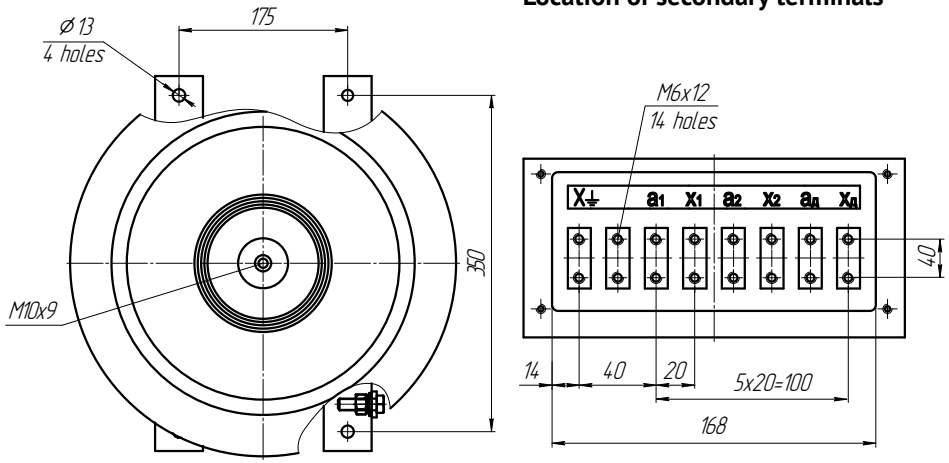


Overall dimensions, fitting and connecting dimensions

ZNOL-EK MH31 outdoor voltage transformers in the voltage classes up to 35 kV



Location of secondary terminals



ZNOL-EK-35 MH31-35000/√3-100/√3-100/3-0,2/3,0-30/300 NF1 a

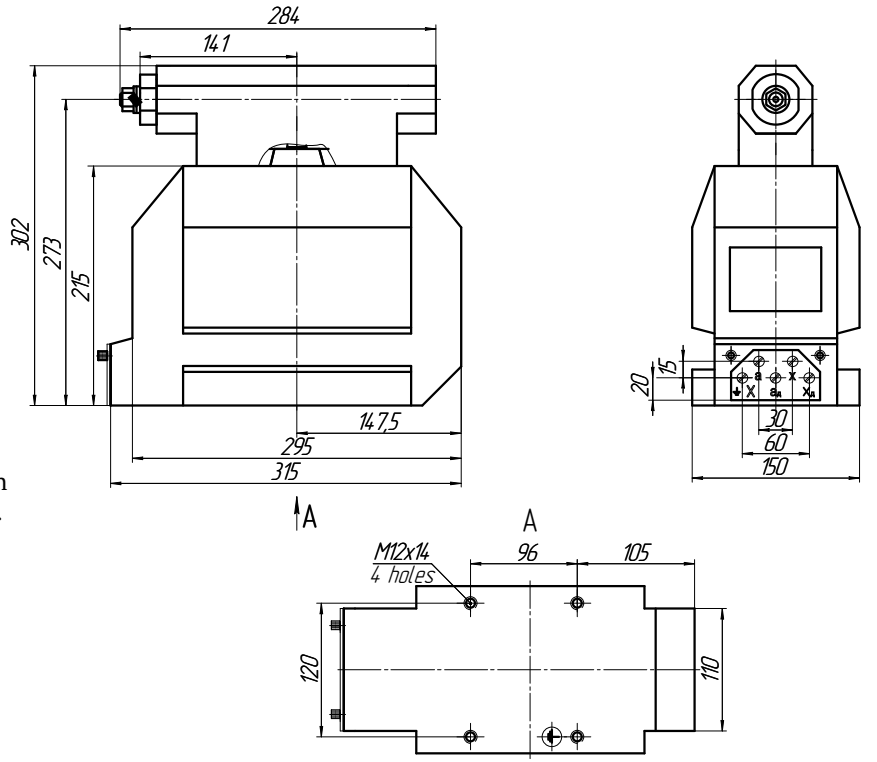
MH31	transformer dimension
35000/√3	rated primary voltage
100/√3	rated voltage for the main secondary
100/3	rated voltage for the auxiliary secondary
0,2	accuracy class of the measuring secondary winding
3,0	accuracy class of the protective secondary winding
30	rated secondary burden of the measuring secondary winding
300	rated secondary burden of the protective secondary winding
NF	climatic modification
1	placement category
a	insulation level

An example of identification of an earthed outdoor voltage transformer ZNOL-EK MH31 NF1, voltage class 35 kV

This transformer is designed with a removable protection device which can be mounted on the transformer body in any of the two opposite directions.

Overall dimensions, fitting and connecting dimensions

ZNOLP-EK M1 voltage transformers with a protection device, in the voltage classes 3; 6; 10 kV

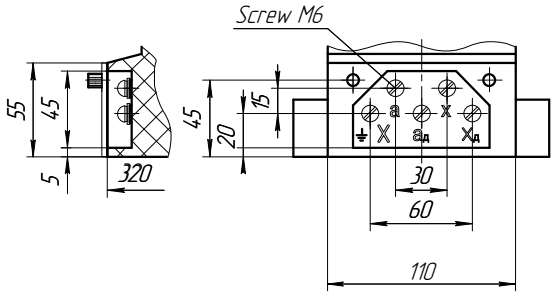


An example of identification of an earthed voltage transformer ZNOLP-EK M1, voltage class 3 kV

ZNOLP-EK-3 M1-3300/√3-100/√3-100/3-0,2/3,0-30/200 N3 b

M1	transformer dimension
3300/√3	rated primary voltage
100/√3	rated voltage for the main secondary
100/3	rated voltage for the auxiliary secondary
0,2	accuracy class of the measuring secondary winding
3,0	accuracy class of the protective secondary winding
30	rated secondary burden of the measuring secondary winding
200	rated secondary burden of the protective secondary winding
N	climatic modification
3	placement category
b	insulation level

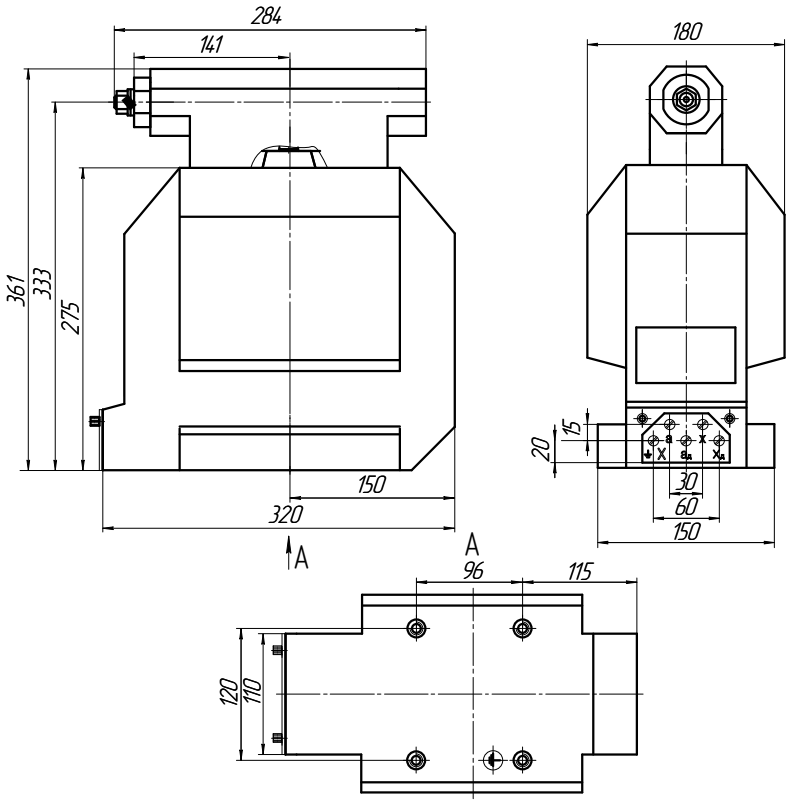
Location of the terminals and the protective seal cover



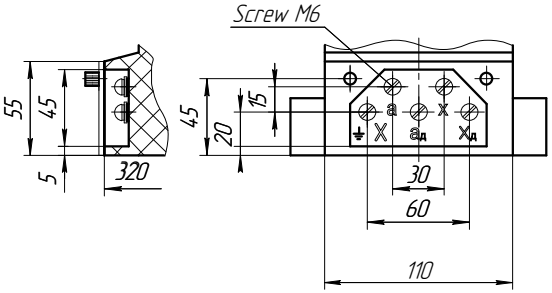
For transformers with two windings

Overall dimensions, fitting and connecting dimensions

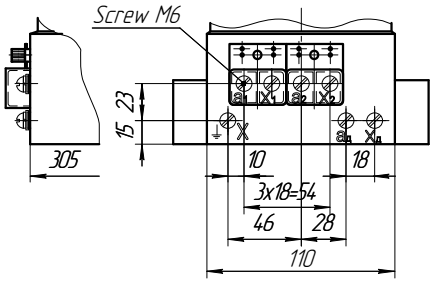
ZNOLP-EK M2 voltage transformers with a protection device, in the voltage classes 3; 6; 10 kV



Location of the terminals and the protective seal cover



For transformers with two windings



For transformers with three windings

This transformer is designed with a removable protection device which can be mounted on the transformer body in any of the two opposite directions.

ZNOLP-EK-6 M2-6300/√3-100/√3-100/3-0,2/3,0-30/200 N3 a

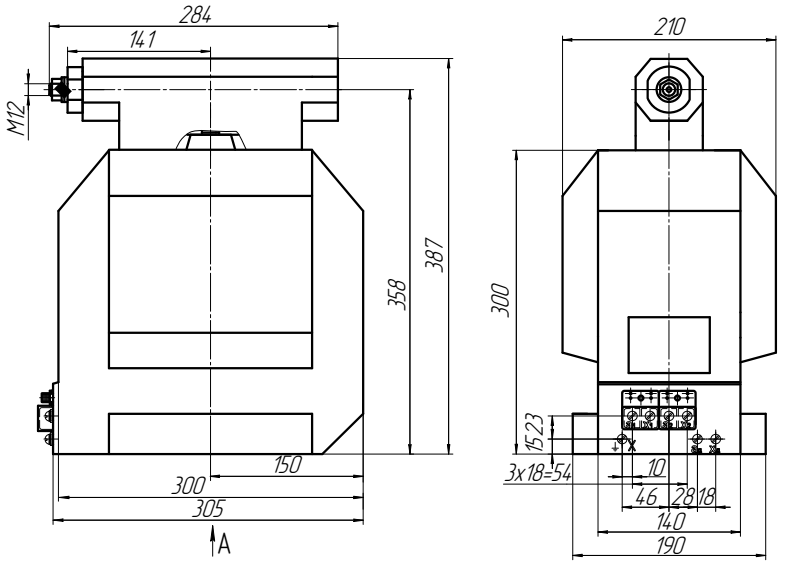
M2	transformer dimension
6300/√3	rated primary voltage
100/√3	rated voltage for the main secondary
100/3	rated voltage for the auxiliary secondary
0,2	accuracy class of the measuring secondary winding
3,0	accuracy class of the protective secondary winding
30	rated secondary burden of the measuring secondary winding
200	rated secondary burden of the protective secondary winding
N	climatic modification
3	placement category
a	insulation level

An example of identification of an earthed voltage transformer ZNOLP-EK M2, voltage class 6 kV

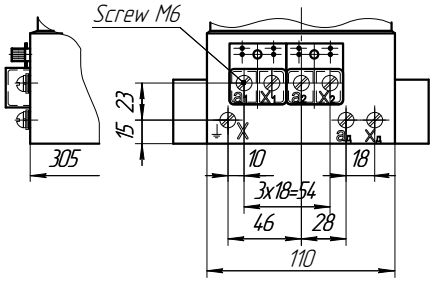
This transformer is designed with a removable protection device which can be mounted on the transformer body in any of the two opposite directions.

Overall dimensions, fitting and connecting dimensions

ZNOLP-EK M3 voltage transformers with a protection device, in the voltage classes 3; 6; 10 kV



Location of the terminals and the protective seal cover



For transformers with windings up to three

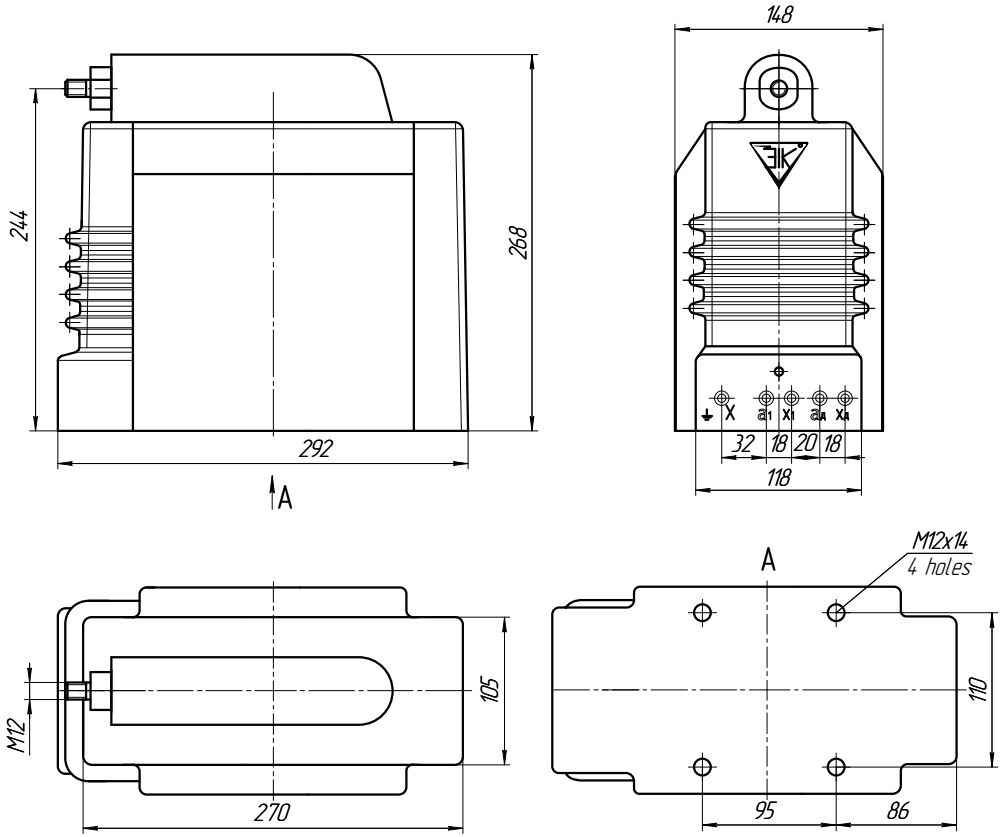
An example of identification of an earthed voltage transformer ZNOLP-EK M3, voltage class 6 kV

ZNOLP-EK-6 M3-6300/√3-100/√3-100/3-0,2/3,0-30/200 N3 a

M3	transformer dimension
6300/√3	rated primary voltage
100/√3	rated voltage for the main secondary
100/3	rated voltage for the auxiliary secondary
0,2	accuracy class of the measuring secondary winding
3,0	accuracy class of the protective secondary winding
30	rated secondary burden of the measuring secondary winding
200	rated secondary burden of the protective secondary winding
N	climatic modification
3	placement category
a	insulation level

Overall dimensions, fitting and connecting dimensions

ZNOLP-EK M6 voltage transformers in the voltage classes 3; 6; 10 kV



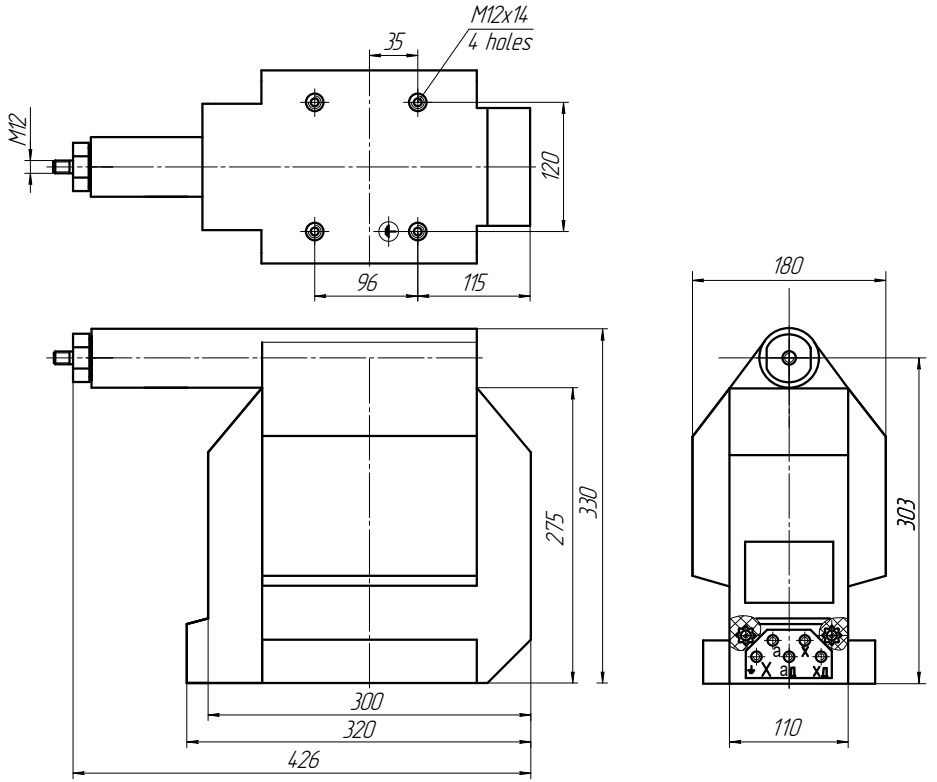
ZNOLP-EK-10 M6-10000/√3-100/√3-100/3-0,2/3,0-30/200 N3 a

M6	transformer dimension
10000/√3	rated primary voltage
100/√3	rated voltage for the main secondary
100/3	rated voltage for the auxiliary secondary
0,2	accuracy class of the measuring secondary winding
3,0	accuracy class of the protective secondary winding
30	rated secondary burden of the measuring secondary winding
200	rated secondary burden of the protective secondary winding
N	climatic modification
3	placement category
a	insulation level

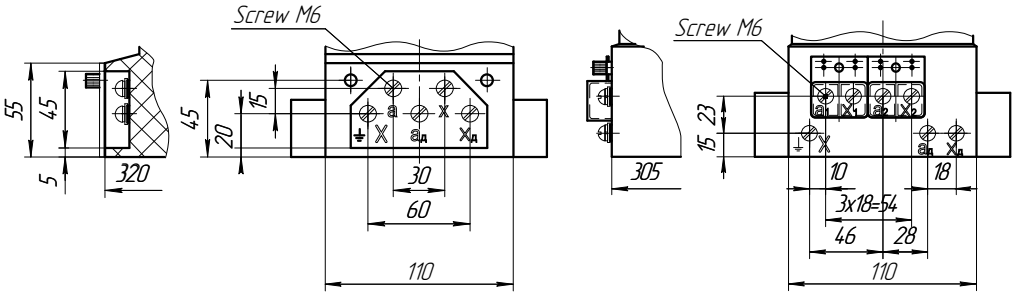
An example of identification of an earthed voltage transformer ZNOLP-EK M6, voltage class 10 kV

Overall dimensions, fitting and connecting dimensions

ZNOLP-EK M7 voltage transformers in the voltage classes 15; 20; 24 kV



Location of the terminals and the protective seal cover



For transformers with two windings

For transformers with three windings

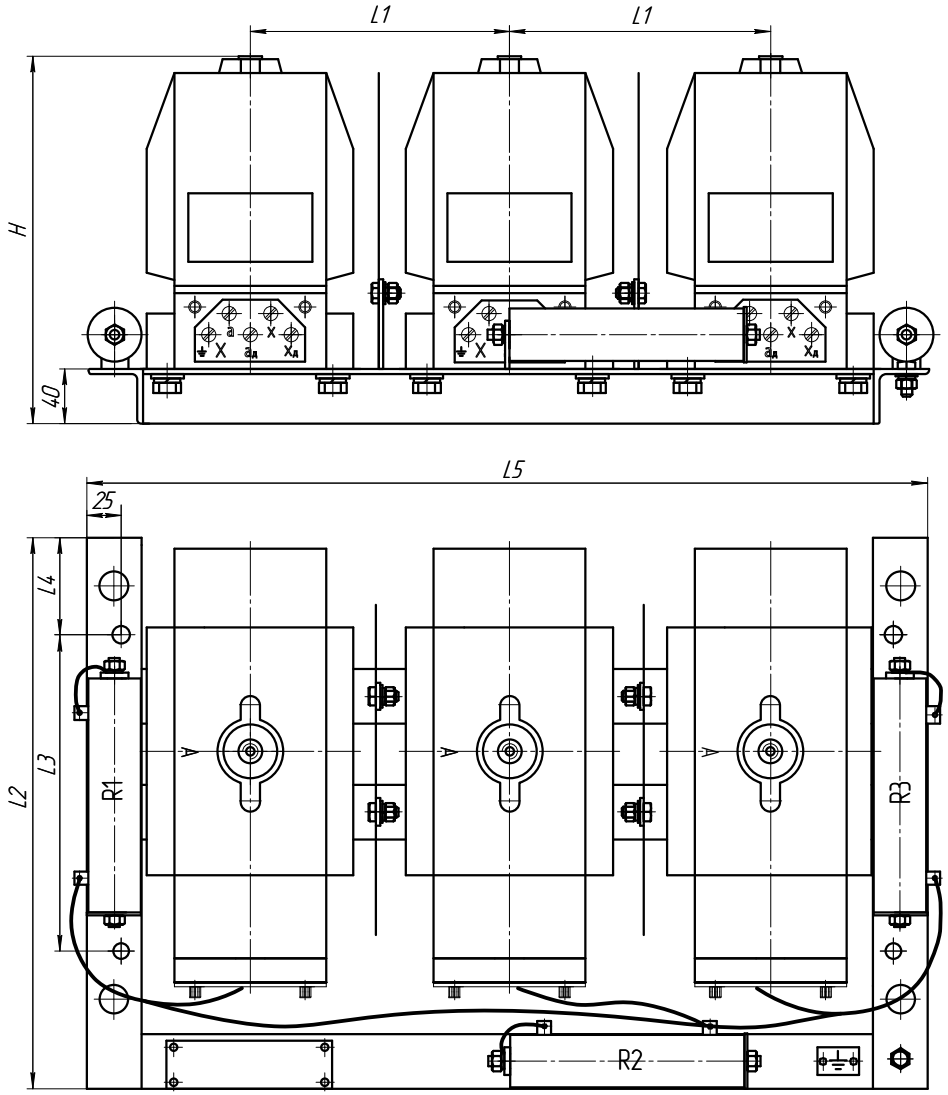
An example of identification of an earthed voltage transformer ZNOLP-EK M7

ZNOLP-EK-24 M7-24000/√3-100/√3-100/3-0,2/3,0-30/300 N3 a

M7	transformer dimension
24000/√3	rated primary voltage
100/√3	rated voltage for the main secondary
100/3	rated voltage for the auxiliary secondary
0,2	accuracy class of the measuring secondary winding
3,0	accuracy class of the protective secondary winding
30	rated secondary burden of the measuring secondary winding
300	rated secondary burden of the protective secondary winding
N	climatic modification
3	placement category
a	insulation level

Overall dimensions, fitting and connecting dimensions

Three-phase group, consisting of voltage transformers 3xZNOL-EK T, 3xZNOLP-EK T, voltage transformers in the voltage classes 3; 6; 10 kV



Three-phase groups 3xZNOL-EK T, 3xZNOLP-EK T, consisting of three voltage transformers ZNOL-EK, ZNOLP-EK. Primary terminals are earthed through the resistors.

Recommended resistor types and resistance values and their total capacity

Parameters	Values for parameters for ZNOL-EK and ZNOLP-EK	
	voltage class 3 – 6 kV	voltage class 10 kV
Resistor type*	C5-35B 3 kOhm 100 W ±5%	C5-35B 2,4 kOhm 100 W ±5%
Resistor rated total capacity, W	300	300
Resistor total resistance, Ohm	1000	800
One resistor value, Ohm	3000	2400

* C5-35B resistors must meet requirements of OZhO 467.173 TU
* other resistor types with similar parameters are acceptable

Group	L1	L2	L3	L4	L5	H	Weight, kg, max
3xZNOL-EK M1T	165	400	230±2	70±2	565	271	78
3xZNOL-EK M2T	185	400	230±2	70±2	610	331	104
3xZNOL-EK M4T	165	400	230±2	70±2	565	277	78
3xZNOLP-EK M1T	165	400	230±2	70±2	565	342	85
3xZNOLP-EK M2T	185	400	230±2	70±2	610	401	115
3xZNOLP-EK M6T	165	400	230±2	70±2	565	308	85

A transformer group has a designation similar to the one of single-phase voltage transformers with addition of the group and “3x” symbols to the designation beginning, for example: 3xZNOLPEK-6 M2T-6300/√3-100/√3-100/3-0,2/3,0-30/200 N3 a

Three-phase antiresonance groups 3xZNOL-EK TA, 3xZNOLP-EK TA, consisting of three voltage transformers ZNOL-EK, ZNOLP-EK. Primary terminals are earthed through the resistors.

Recommended resistor types and resistance values and their total capacity.

Parameters	Values for parameters for ZNOL-EK and ZNOLP-EK	
	Voltage of the auxiliary secondary, V	
	100/3	100
Resistor type*	C5-35B 300 Ohm 125 W ±5%	C5-35B 4500 Ohm 150 W ±5%
Resistor rated total capacity, W	375	450
Resistor total resistance, Ohm	100	1500
Output, auxiliary secondary (V·A)	Inductance coil design variant	
150	№1	№1a
200	№2	№2a
300	№3	№3a

*C5-35B resistors must meet requirements of OZhO 467.173 TU, other resistor types with similar parameters are acceptable, or with other, provided that the total capacity and resistance have the same values.

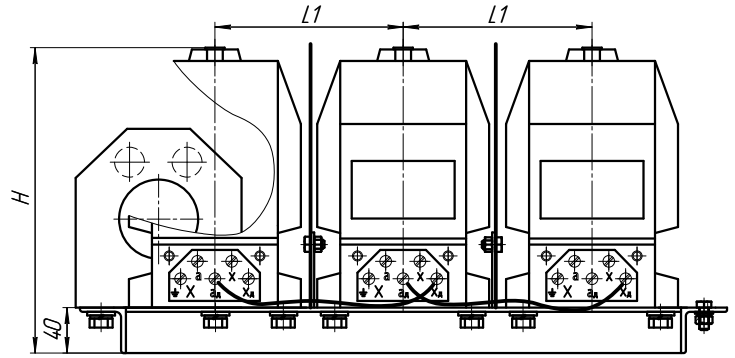
Group	L1	L2	L3	L4	L5	H	Weight, kg, max
3xZNOL-EK M1TA	165	490	230±2	160±2	565	271	82
3xZNOL-EK M2TA	185	490	230±2	160±2	610	331	110
3xZNOL-EK M4TA	165	490	230±2	160±2	565	277	82
3xZNOLP-EK M1TA	165	490	230±2	160±2	565	342	88
3xZNOLP-EK M2TA	185	490	230±2	160±2	610	401	116
3xZNOLP-EK M6TA	165	490	230±2	160±2	565	308	88

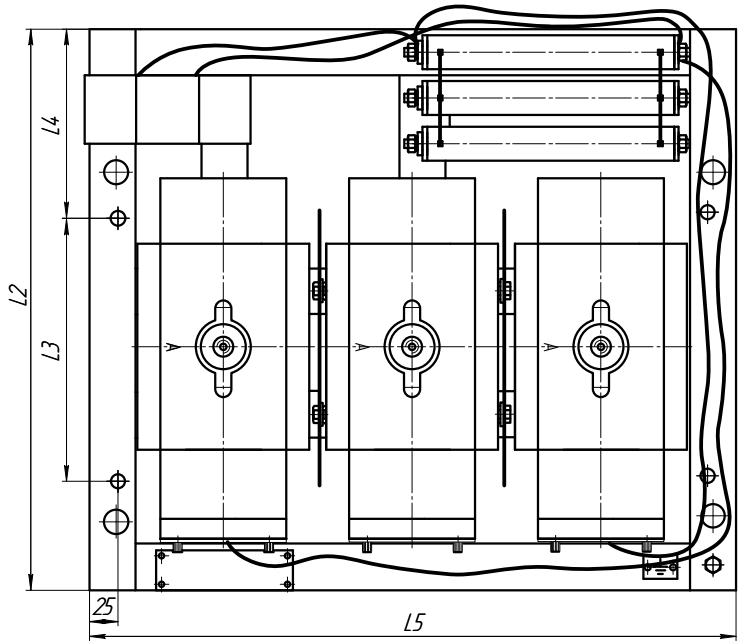
A transformer group has a designation similar to the one of single-phase voltage transformers with addition of the group and “3x” symbols to the designation beginning, for example: 3xZNOLP-EK-6 M2TA-6300/√3-100/√3-100/3-0,2/3,0-30/200 N3 a.

Operation and efficiency of the method for blowing-out ferroresonant effects applied in the three-phase antiresonance groups 3xZNOL-EK TA, 3xZNOLP-EK TA was test proven in the Končar Electrical Engineering Institute (Croatia).

Overall dimensions, fitting and connecting dimensions

Three-phase antiresonance group, consisting of voltage transformers 3xZNOL-EK TA, 3xZNOLP-EK TA for voltage transformers in the voltage classes 3; 6; 10 kV





UNERARTHED VOLTAGE TRANSFORMERS NOL-EK and NOLP-EK

Description

Unearthed voltage transformers are designed to be used in electrical circuits of alternating current of 50 Hz frequency with rated voltage of up to 10 kV inclusive with a neutral isolated or earthed through an arc-suppression coil.

The principal transformer function is to transmit the measuring information signal to metering, control, protection and automatic devices at electric power facilities, including nuclear power plants.
Transformer operation outside the guaranteed accuracy class is acceptable, provided that the load does not exceed the maximum capacity. The voltage transformers are designed for a wide range of use in fiscal metering facilities and indoor and outdoor switchgears at power plants and substations.
Climatic modifications N (temperate climate), T (tropical climate) or NF (temperate and cold climate), placement categories 1, 2 or 3.

Production on the basis of the specification TU 3414-007-52889537-16.

Service life – at least 30 years.
Guaranteed service life – 5 years.

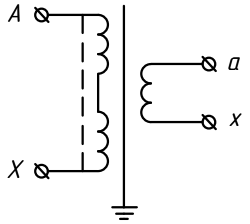
Technical parameters and characteristics

Parameters	Values for parameters***						
Voltage class, kV	3	6	10	15	20	24	35
Maximum operating voltage, kV	3,6	7,2	12	17,5	24	26,5	40,5
Rated primary voltage, V	3000 3300 3000/√3 3300/√3	6000 6300 6600 6000/√3 6300/√3 6600/√3 6900/√3	10000 10500 11000 10000/√3 10500/√3 11000/√3	13800 15000 15750 13800/√3 15000/√3 15750/√3 16000/√3	18000 20000 22000 18000/√3 20000/√3 22000/√3	24000 24000/√3	35000 35000/√3 36000/√3
Accuracy class:	0,2; 0,5; 1,0; 3,0; 3P; 6P						
Rated secondary voltage, V	100/3; 100/√3; 100; 110/3; 110/√3; 110						
Rated output for the main secondary, V·A* in the accuracy class: 0,2 0,5 1 3	 10 - 50 20 - 75 50 - 200 150 - 300			 10 - 50 20 - 150 50 - 200 150 - 300			
Maximum output outside of the accuracy class, V·A	160; 250; 400; 630						
Winding connection scheme and group	1 / 1 - 0						
Rated frequency, Hz	50 or 60**						

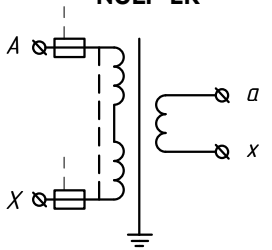
* At customer's option, supplied voltage transformers can be equipped with two secondary windings.
**In voltage transformers for export supplies.
***At customer's option, supplied transformers can have technical parameters other than stated. Voltage transformers are manufactured with a protection device (NOLP-EK) or without it (NOL-EK).

Schematic circuit diagram

NOL-EK

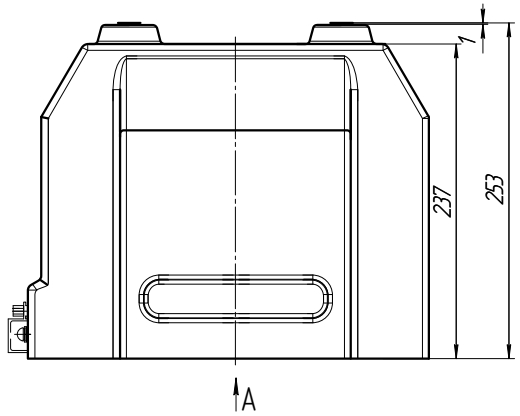


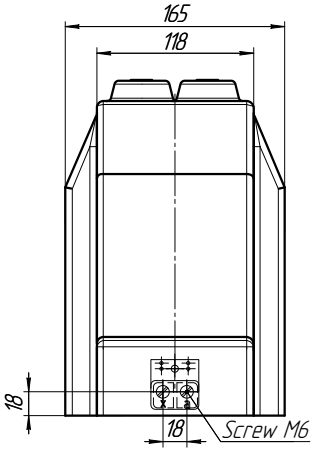
NOLP-EK

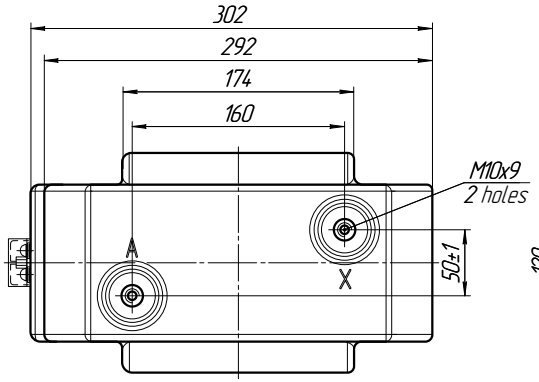


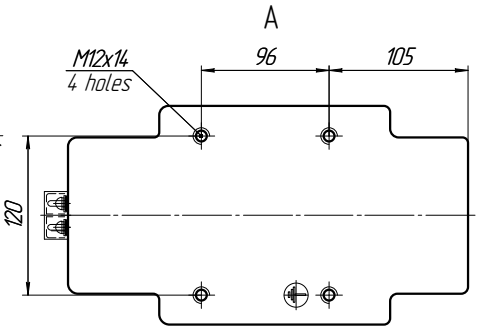
Overall dimensions, fitting and connecting dimensions

NOL-EK M1 for voltage transformers in the voltage classes 3; 6; 10 kV









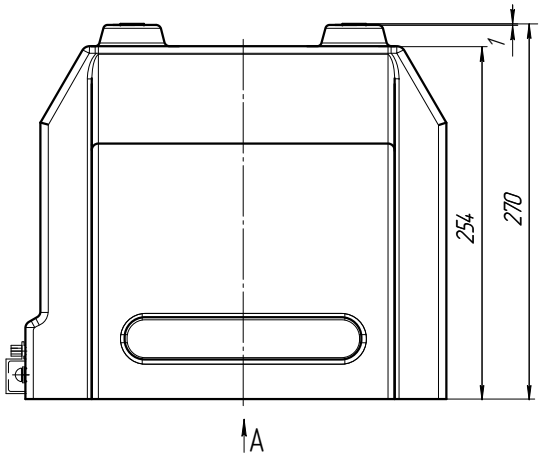
An example of identification of an unearthed voltage transformer NOL-EK M1, voltage class 6 kV

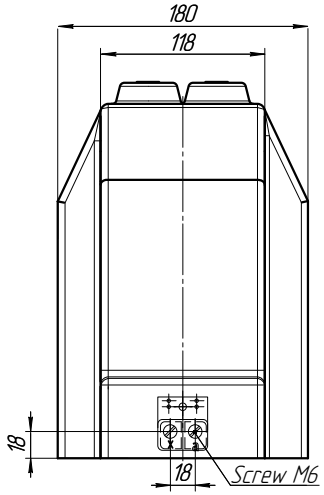
NOL-EK-6 M1-6000/100-0,2-30 N3 b

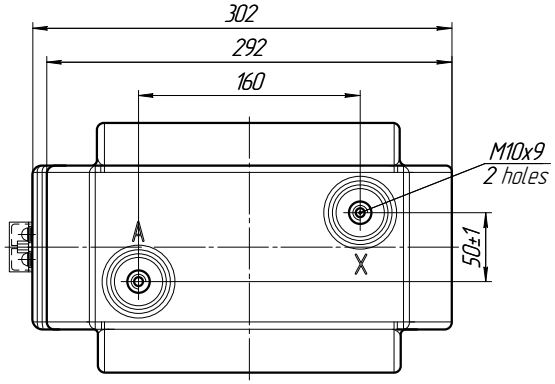
M1	transformer dimension
6	voltage class
6000	rated primary voltage
100	rated secondary voltage
0,2	accuracy class of the secondary winding
30	rated secondary burden
N	climatic modification
3	placement category
b	insulation level

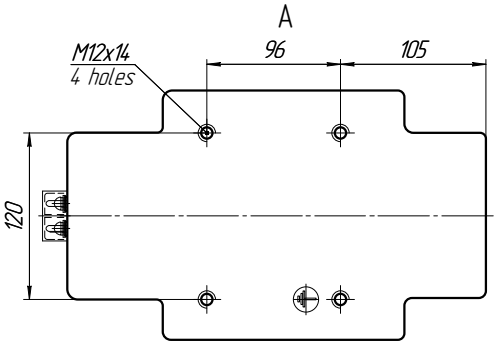
Overall dimensions, fitting and connecting dimensions

NOL-EK M2 for voltage transformers in the voltage classes 3; 6; 10 kV









NOL-EK-6 M2-6000/100-0,2-30 N3 b

M2	transformer dimension
6	voltage class
6000	rated primary voltage
100	rated secondary voltage
0,2	accuracy class of the secondary winding
30	rated secondary burden
N	climatic modification
3	placement category
b	insulation level

An example of identification of an unearthed voltage transformer NOL-EK M2, voltage class 6 kV

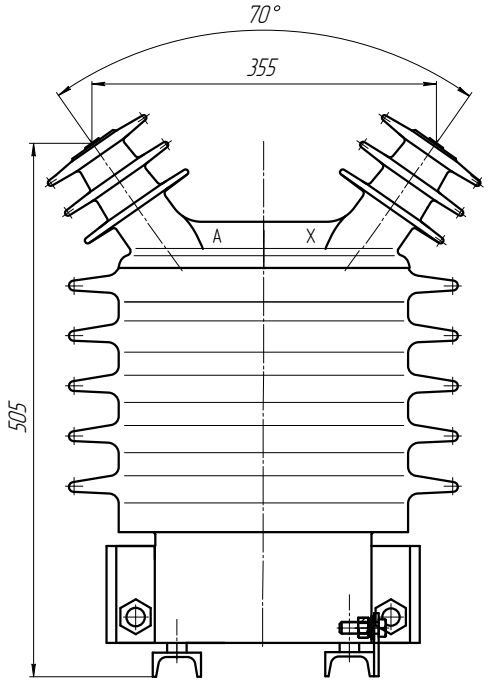
An example of identification of an earthed outdoor voltage transformer NOL-EK MH30 NF1, voltage class 6 kV

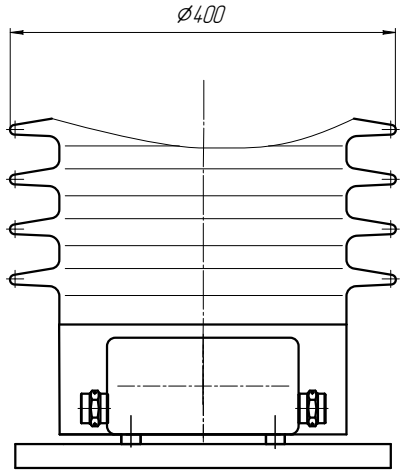
NOL-EK-6 MH30-6000/100-0,2-30 NF1 b

MH30	transformer dimension
6	voltage class
6000	rated primary voltage
100	rated secondary voltage
0,2	accuracy class of the secondary winding
30	rated secondary burden
NF	climatic modification
1	placement category
b	insulation level

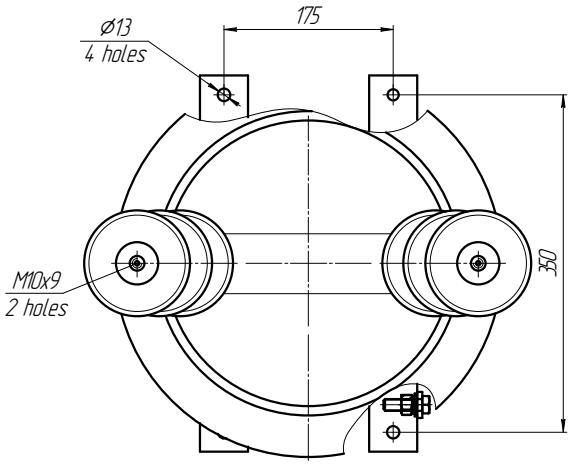
Overall dimensions, fitting and connecting dimensions

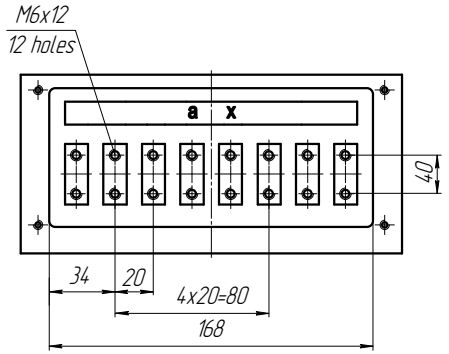
NOL-EK MH30 for outdoor voltage transformers in the voltage classes up to 24 kV





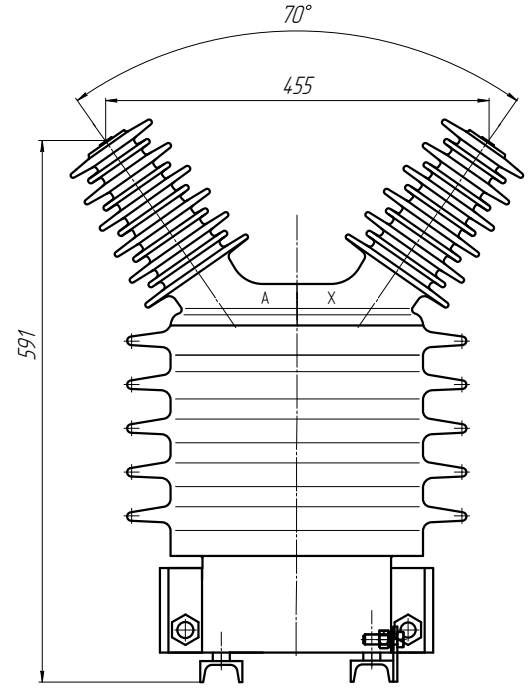
Location of secondary terminals

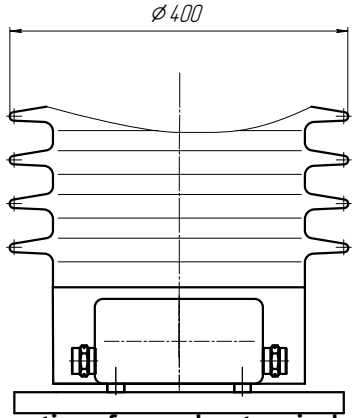




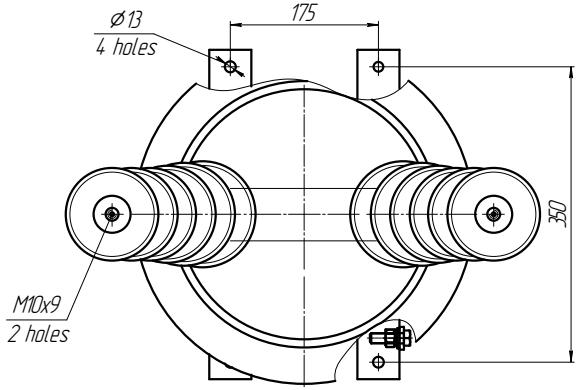
Overall dimensions, fitting and connecting dimensions

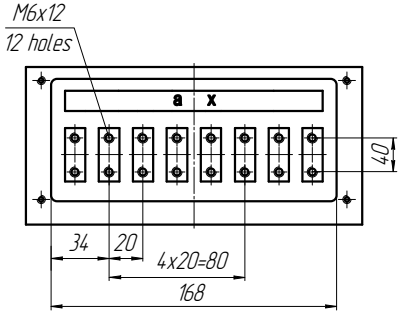
NOL-EK MH31 for outdoor voltage transformers in the voltage classes up to 35 kV





Location of secondary terminals





NOL-EK-35 MH31-35000/100-0,2-30 NF1 b

MH31	transformer dimension
35	voltage class
35000	rated primary voltage
100	rated secondary voltage
0,2	accuracy class of the secondary winding
30	rated secondary burden
NF	climatic modification
1	placement category
b	insulation level

An example of identification of an earthed outdoor voltage transformer NOL-EK MH31 NF1, voltage class 35 kV

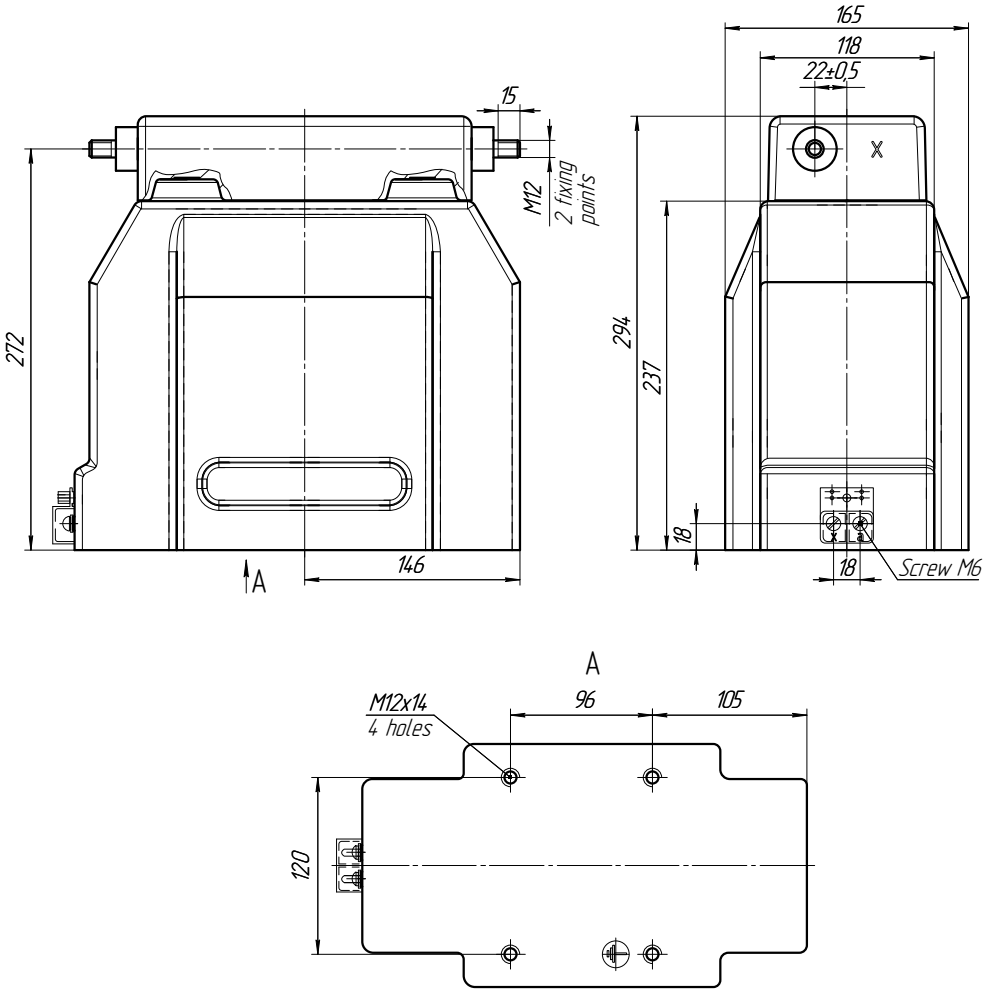
An example of identification of an unearthed voltage transformer NOLP-EK M1, voltage class 6 kV

NOLP-EK-6 M1-6000/100-0,2-30 N3 b

M1	transformer dimension
6	voltage class
6000	rated primary voltage
100	rated secondary voltage
0,2	accuracy class of the secondary winding
30	rated secondary burden
N	climatic modification
3	placement category
b	insulation level

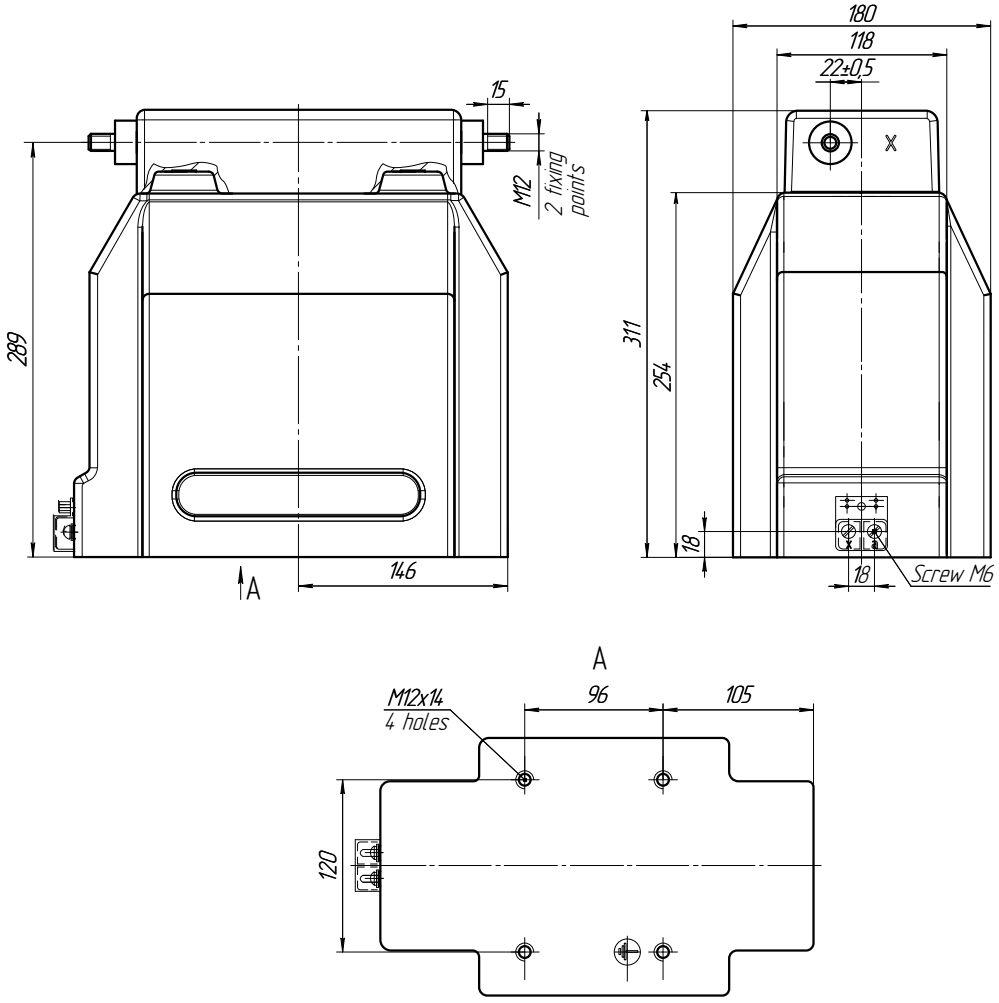
Overall dimensions, fitting and connecting dimensions

NOLP-EK M1 for voltage transformers in the voltage classes 3; 6; 10 kV



Overall dimensions, fitting and connecting dimensions

NOLP-EK M2 for voltage transformers in the voltage classes 3; 6; 10 kV



NOLP-EK-6 M2-6000/100-0,2-30 N3 b

M2	transformer dimension
6	voltage class
6000	rated primary voltage
100	rated secondary voltage
0,2	accuracy class of the secondary winding
30	rated secondary burden
N	climatic modification
3	placement category
b	insulation level

An example of identification of an unearthed voltage transformer NOLP-EK M2, voltage class 6 kV

VOLTAGE TRANSFORMERS OLS-EK and OLSP-EK

Description

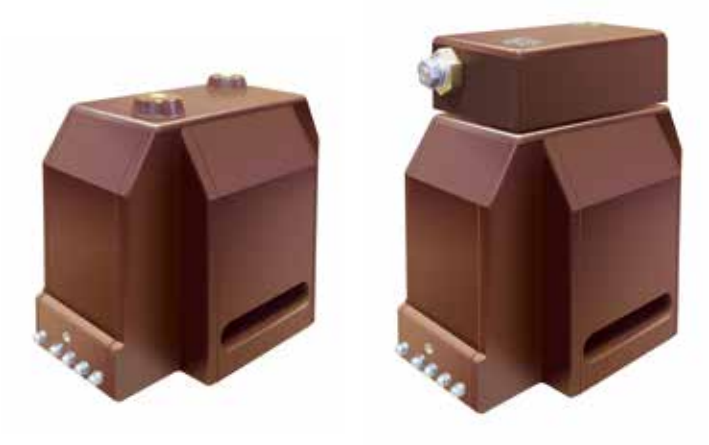
The single-phase power transformers OLS-EK and OLSP-EK with cast insulation are not measuring instruments and are designed to supply auxiliary circuits of sectionalization facilities and power grid automatic transfer switch (ATS) facilities of 6-10 kV.

The transformer is designed for installation in indoor and outdoor switchgears and in single-end service assembled chambers as a component part.
Climatic modifications N (temperate climate), T (tropical climate) or NF (temperate and cold climate), placement categories 2 or 3 under GOST 15150-69 and GOST 15543.1-89.

The voltage transformers are manufactured with or without a protection device (OLSP-EK and OLS-EK respectively).

Production on the basis of the specification TU 3411-005-52889537-14.

Service life – at least 30 years.
Guaranteed service life – 5 years.



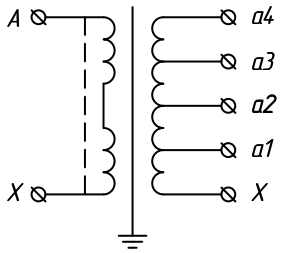
Technical parameters and characteristics

Parameters	OLS(P)-EK M1-0,63/6	OLS(P)-EK M1-0,63/10	OLS(P)-EK M2-1,25/6	OLS(P)-EK M2-1,25/10
Voltage class, kV	6	10	6	10
Maximum operating voltage, kV	7,2	12	7,2	12
Rated primary voltage, kV	6; 6,3; 6,6	10; 10,5; 11	6; 6,3; 6,6	10; 10,5; 11
Rated primary current, A	0,11; 0,11; 0,1	0,07; 0,065; 0,06	0,22; 0,2; 0,2	0,13; 0,125; 0,12
Rated secondary voltage, V:*				
x-a1	100			
x-a2	209			
x-a3	220			
x-a4	231			
Rated secondary current, A:*				
x-a1	6,3		12,5	
x-a2	3,01		5,98	
x-a3	2,86		5,68	
x-a4	2,72		5,41	
Rated output , kV·A	0,63		1,25	
Current overload tolerance, %	10			
Idle current, A, not more	0,99		1,98	
Idling losses, W, not more	50			
Short-circuit voltage, %	5,5			
Short-circuit losses, W, not more	55			
Basic characte: ristics tolerances for				
idle current	+30%			
Idling losses	+15%			
short-circuit losses	+10%			
shortcircuit voltage	+10%			
Rated frequency, Hz	50 or 60			
Winding connection scheme and group	1/1-0			
Temperature class of insulation	«B»			

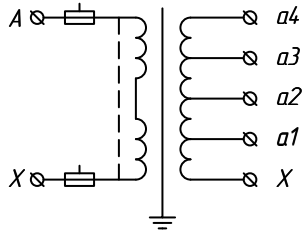
* - maximum deviation of the transformation ratio on the tap 100V is ±3%, on the other taps is ±1%.

Schematic circuit diagram

OLS-EK

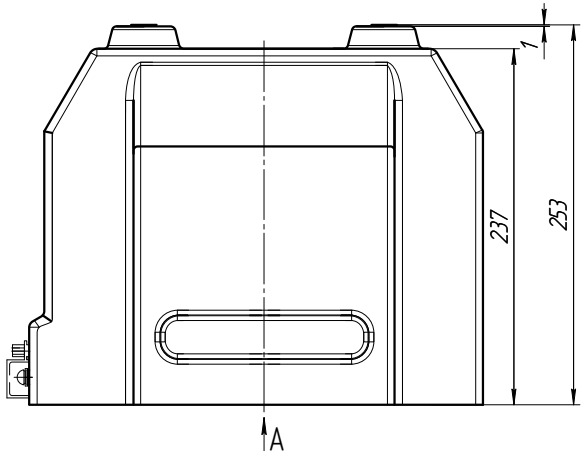


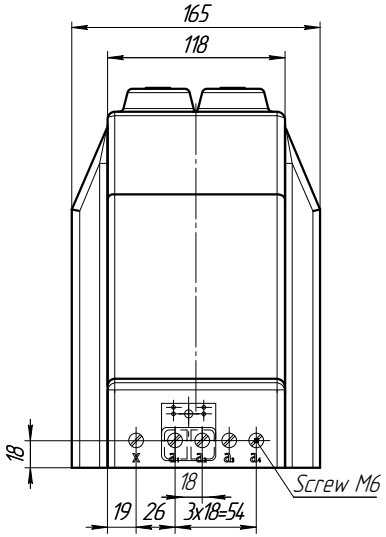
OLSP-EK

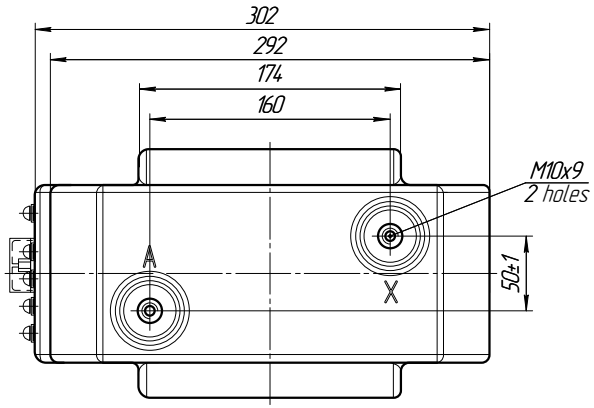


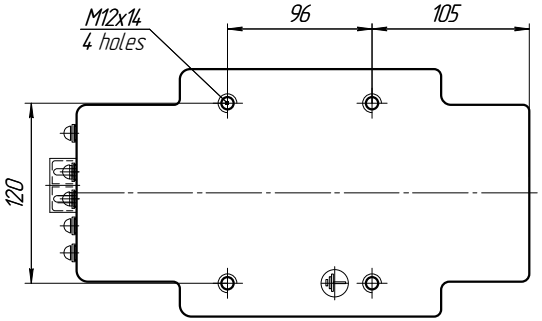
Overall dimensions, fitting and connecting dimensions

OLS-EK M1 for voltage transformers in the voltage classes 6; 10 kV and rated output for taps 0,63 and 1,25 kV·A









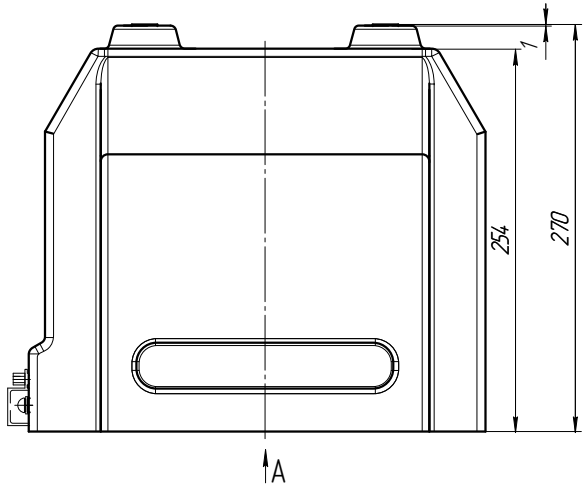
OLS-EK-6 M1-0,63/6 N3 (6,3 kV) b

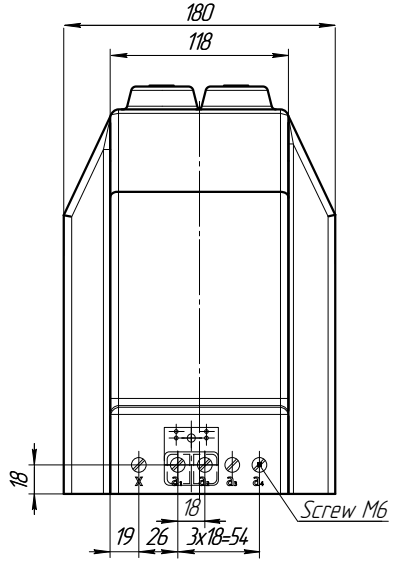
M1	transformer dimension
0,63	rated output for taps 100 and 220 V
6	voltage class
N	climatic modification
3	placement category
6300	rated output for the primary winding
b	insulation level

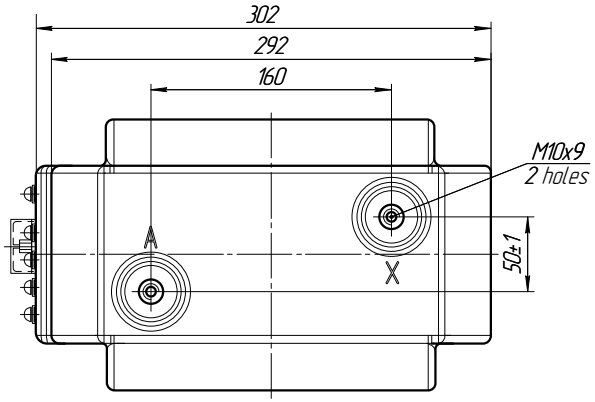
An example of identification of a voltage transformer OLS-EK M1, voltage class 6 kV and rated output for taps 0,63 kV·A

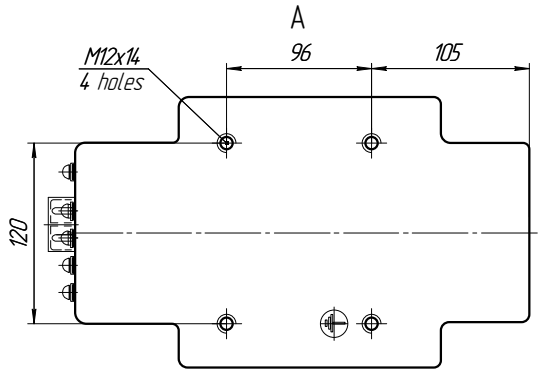
Overall dimensions, fitting and connecting dimensions

OLS-EK M2 for voltage transformers in the voltage classes 6; 10 kV and rated output for taps 0,63 and 1,25 kV·A









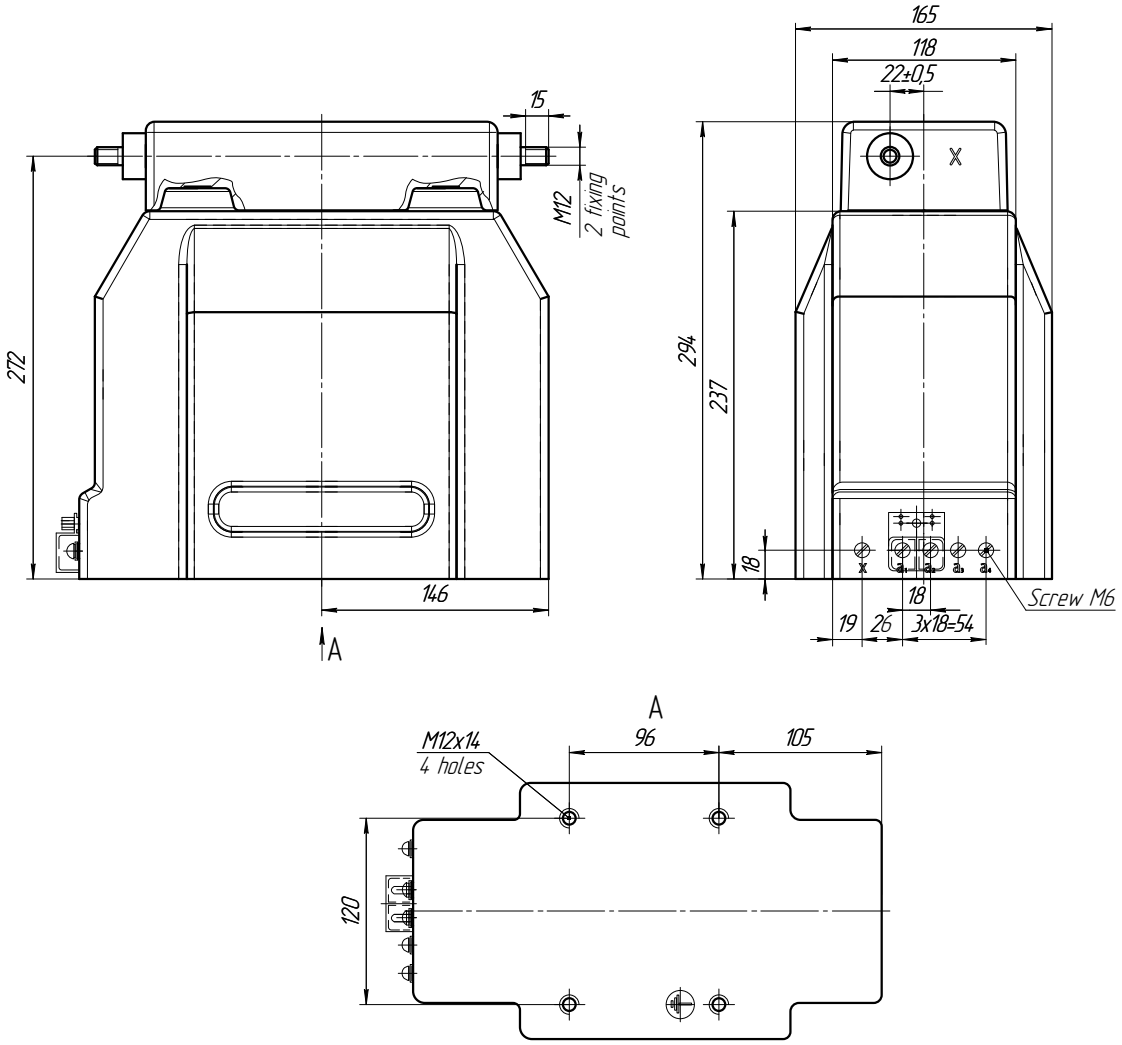
An example of identification of a voltage transformer OLS-EK M2, voltage class 6 kV and rated output for taps 1,25 kV·A

OLS-EK-6 M2-1,25/6 N3 (6,3 kV) b

M2	transformer dimension
1,25	rated output for taps 100 and 220 V
6	voltage class
N	climatic modification
3	placement category
6300	rated output for the primary winding
b	insulation level

Overall dimensions, fitting and connecting dimensions

OLSP-EK M1 for voltage transformers in the voltage classes 6; 10 kV and rated output for taps 0,63 и 1,25 kV·A



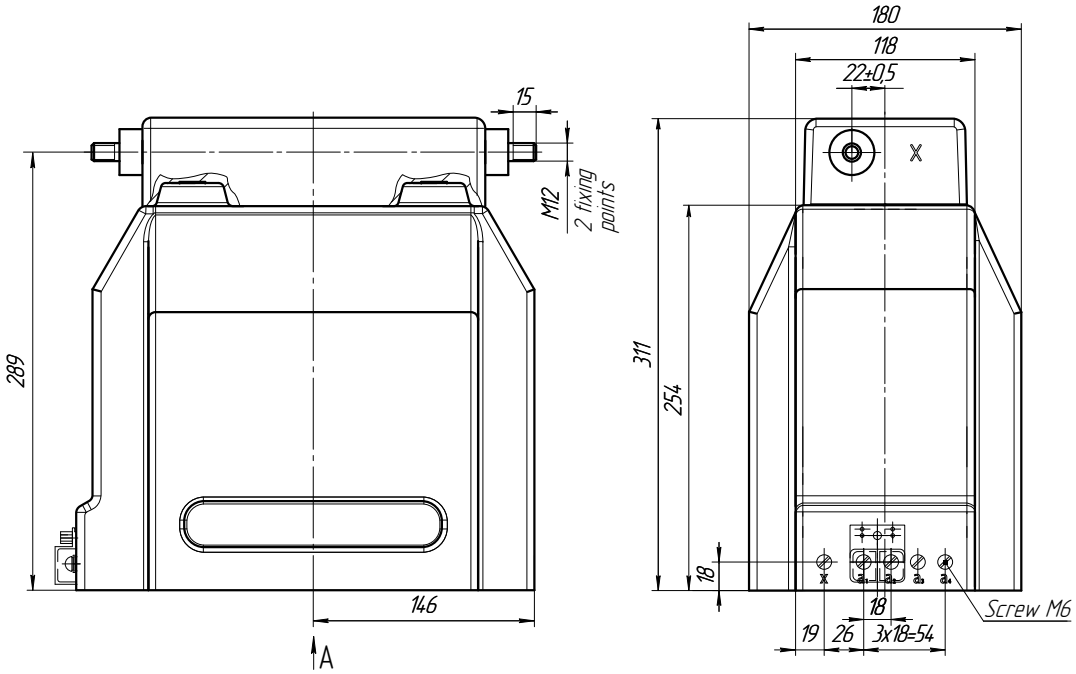
OLSP-EK-10 M1-0,63/10 N3 (10 kV) b

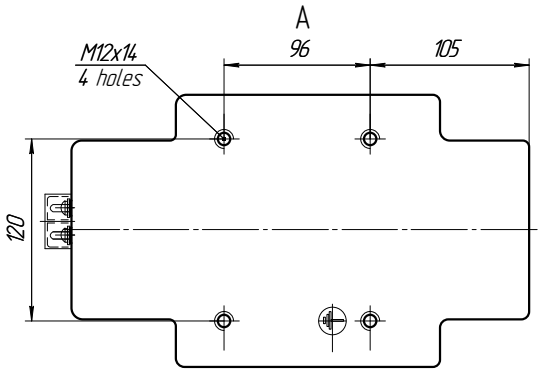
M1	transformer dimension
0,63	rated output for taps 100 and 220 V
10	voltage class
N	climatic modification
3	placement category
6300	rated output for the primary winding
b	insulation level

An example of identification of a voltage transformer OLSP-EK M1, voltage class 10 kV and rated output for taps 0,63 kV·A

Overall dimensions, fitting and connecting dimensions

OLSP-EK M2 for voltage transformers in the voltage classes 6; 10 kV and rated output for taps 0,63 and 1,25 kV·A





An example of identification of a voltage transformer OLSP-EK M2 voltage class 10 kV and rated output for taps 1,25 kV·A

OLSP-EK-10 M2-1,25/10 N3 (10 kV) b

M2	transformer dimension
1,25	rated outputfor taps 100 and 220 V
10	voltage class
N	climatic modification
3	placement category
10000	rated output for the primary winding
b	insulation level

SUPPORT POLYMERIC INSULATORS IOL-4/10

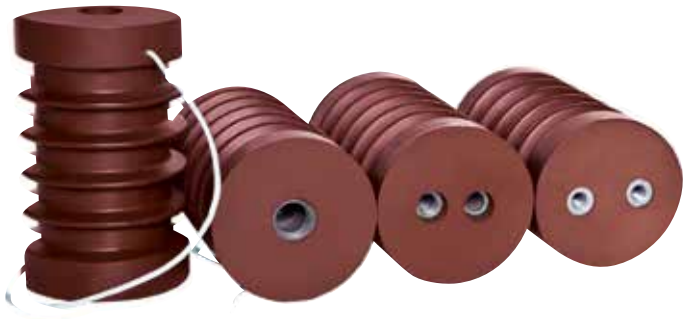
Description

Support polymer insulators IOL-4/10 are designed to insulate and fix current-conducting parts in electrical appliances and switchgears in power plants and three-phase alternating voltage substations up to 10 kV, climatic modifications NF and T, placement categories 2 and 3.

IOL-4/10 insulators are component parts and are made of polyurethane resin, which has a high tracking resistance and good electrical insulating characteristics. Guaranteed service life – 5 years.

Production on the basis of the specification TU 3493-001-52889537-01.

Service life – at least 30 years.
Guaranteed service life – 4 years.



Technical parameters and characteristics

Parameters	Values for parameters
Rated voltage, kV	10
Testing lightning impulse voltage, kV	75
Testing power-frequency voltage in dry state, kV	42
Testing power-frequency voltage under dewfall, KV	28
Breakdown power-frequency voltage in insulating agent, kV	170
Partial discharge damping voltage, kV	8
Minimum bending breakdown force, kN	4
Working temperature range, °C	from -60 up to +45
Weight, kg, not more	0,91

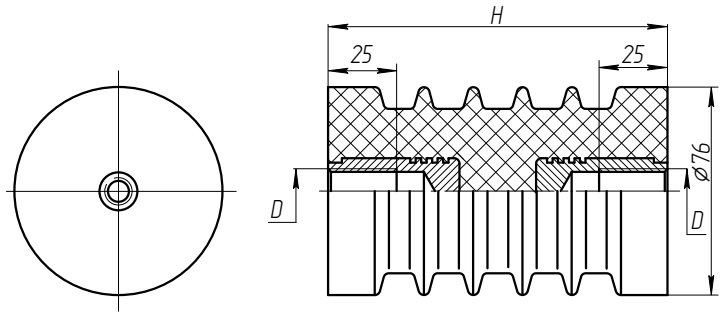
An example of identification of a support polymeric insulator

Insulator IOL – 4/10 IIIA NF 2

4	Minimum bending breakdown force, kN
10	rated voltage, kV
IIIA	version
NF	climatic modification
2	placement category

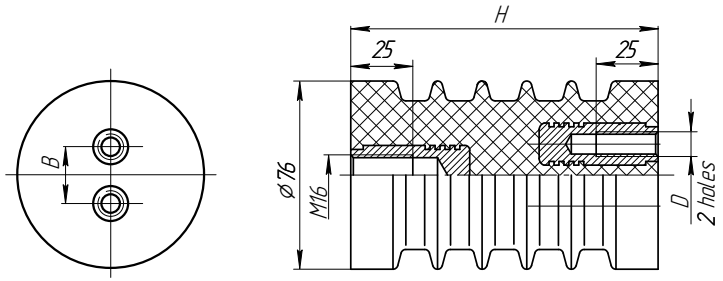
Overall dimensions, fitting and connecting dimensions

IOL-4/10 IA
IOL-4/10 IA (IWN) with flexible terminals
IOL-4/10 IB



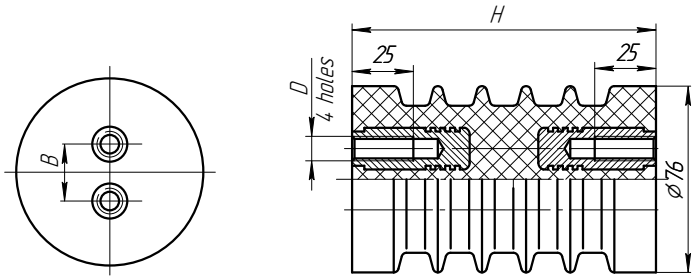
Modification	Dimensions, mm	
	H	D
IA	124	M16
IA(ИВН)	124	M16
IБ	120	M16

IOL-4/10 IIA
IOL-4/10 IIB



Modification	Dimensions, mm		
	H	B	D
IIA	124	23	M10
IIБ	120	30	M8

IOL-4/10 IIIA
IOL-4/10 IIIB



Modification	Dimensions, mm		
	H	B	D
IIIA	124	23	M10
IIIБ	120	30	M8

BUSHING POLYMERIC INSULATORS IPL-10/8

Description

Bushing polymeric insulators IPL-10/8 are designed to insulate and fix current-conducting parts in electrical appliances and switchgears in power plants and three-phase alternating voltage substations up to 10 kV, frequency 50 Hz, climatic modifications NF and T, placement categories 2 and 3.

IPL-10/8 insulators are component parts and are made of polyurethane resin, which has a high tracking resistance and good electrical insulating characteristics.

Production on the basis of the specification TU 3493-002-52889537-01.

Service life – at least 30 years.
Guaranteed service life – 4 years.

Technical parameters and characteristics

Parameters	Values for parameters
Rated voltage, kV	10
Rated current, A	1250; 1600; 2000
Short-time (one second) thermal current , kA	40
Testing lightning impulse voltage, kV	75
Testing power-frequency voltage in dry state, kV	42
Testing power-frequency voltage under dewfall, KV	28
Breakdown power-frequency voltage in insulating agent, kV	67
Minimum bending breakdown force, kN	8
Working temperature range, °C	from -60 up to +45

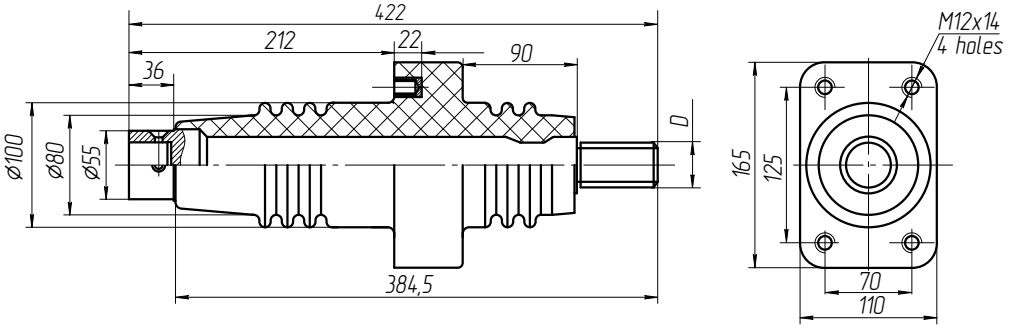
Insulator IPL – 10/8 III NF 2

10	rated voltage, kV
8	minimum bending breakdown force, kN
III	insulator version
NF	climatic modification
2	placement category

An example of identification of a bushing polymeric insulator

Overall dimensions, fitting and connecting dimensions

for insulators IPL-10/8 I and IPL-10/8 II with a bar

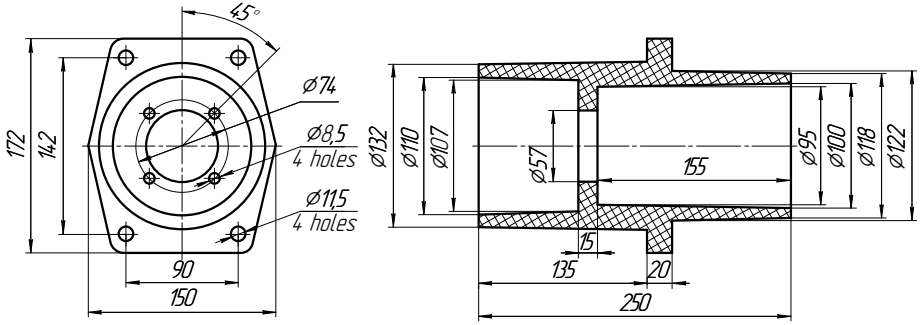


Insulator version	D, mm	Rated current, A	Weight, kg, not more
IPL-10/8 I	M22-8g M36-8g M42-8g	1250 1600 2000	7
IPL-10/8 I I	ø22 ø36 ø42	1250 1600 2000	

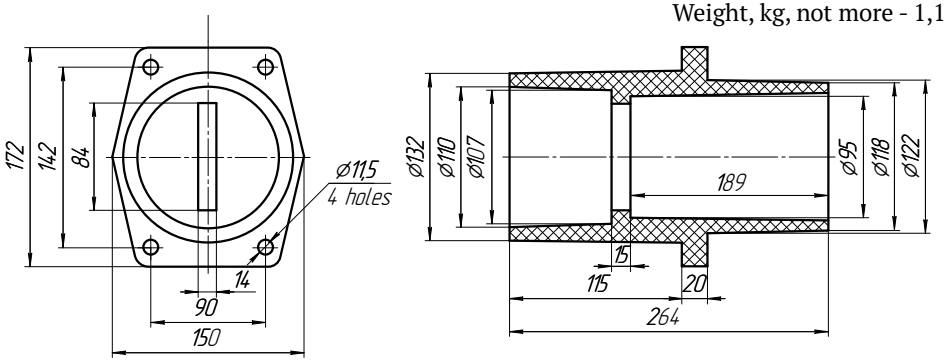
Overall dimensions, fitting and connecting dimensions

for insulators IPL-10/8

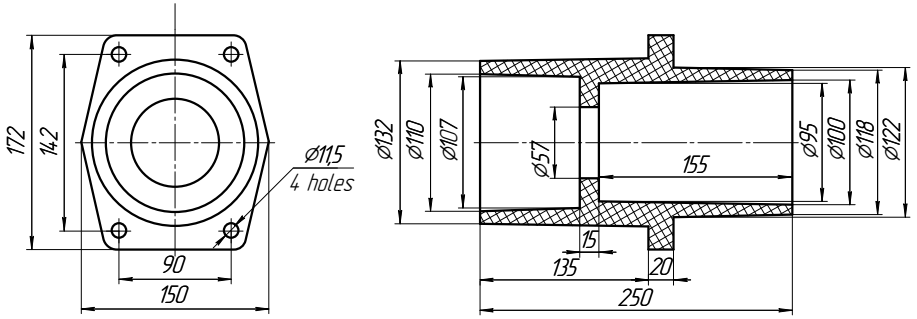
IPL-10/8 III
Weight, kg, not more - 1,1



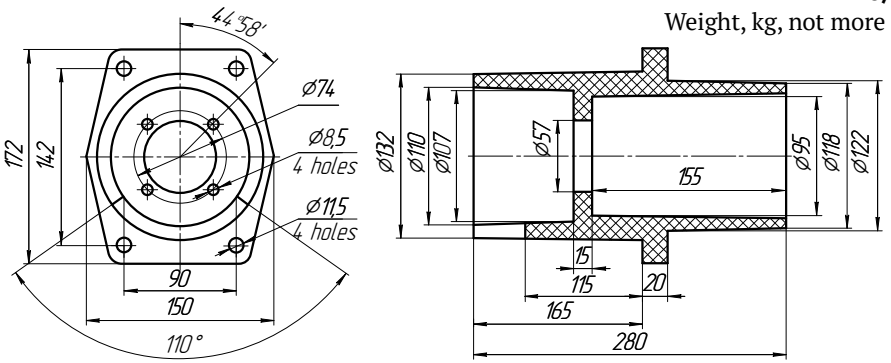
IPL-10/8 V
Weight, kg, not more - 1,1



IPL-10/8 IV
Weight, kg, not more - 1,1



IPL-10/8 VI
Weight, kg, not more - 1,1



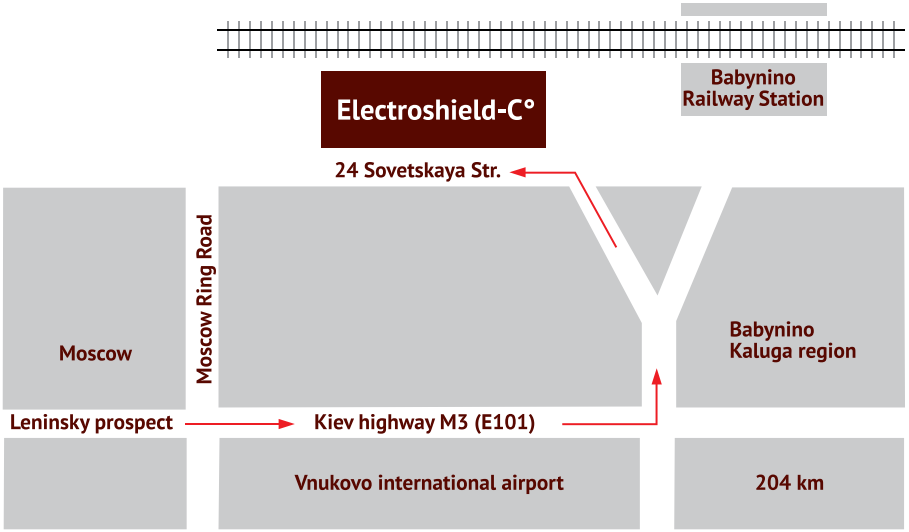
ELECTROSHIELD-CO OFFERS DEVELOPMENT OF TECHNICAL DOCUMENTATION, FORMS AND MANUFACTURE OF ANY CUSTOM-TAILORED SPECIAL-PURPOSE CASTED ELECTRICAL PRODUCT

TRANSFORMER INTERCHANGEABILITY TABLE

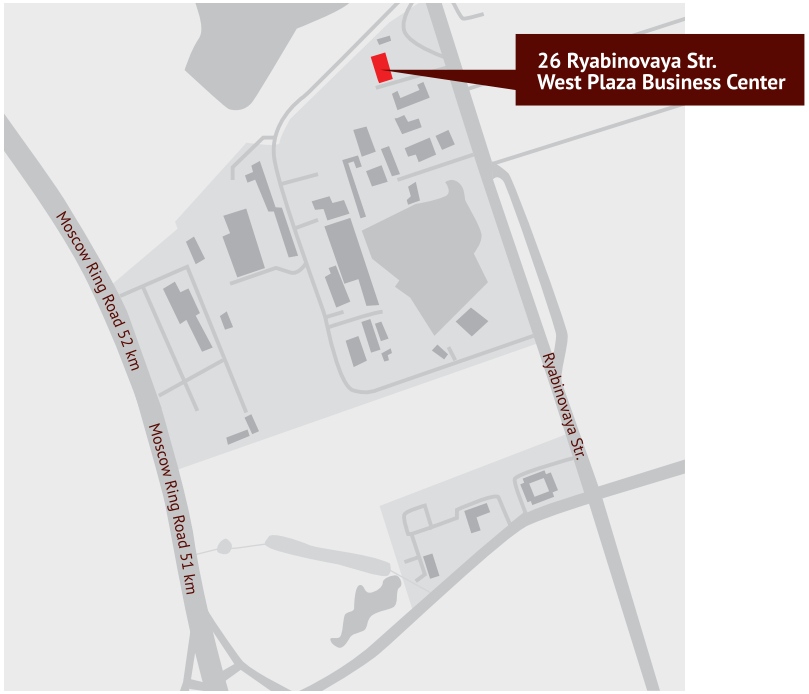
Type	Analogue
Current transformers	
TLO-10	ТОЛ-10; ТЛМ-10; ТЛК-10; ТВК-10; ТВЛМ-10; ТВЛ-10; АВК-10; IMZ-10; TPU 40.13
TLO-24	ТОЛ-20; ТЛК-20; GI-24; GIS-24; CTW6; CTWH6; TP 6; TPU 6; AD21,22,23; ARJD; ARJM; ARJP: ARJH
TLO-35	ТЛК-35; ТОЛ-35; GI-36; CTW6; CTWH7; TPU 7; ARM
TL-EK-35	ТОЛ; GIF
TLP-10-1	ТШЛП-10; ТШЛПК-10; ТШЛ-10; ТШЛК- 10; ТЛШ-10; ТЛК-10; ТПШЛ-10; GK2D; CTO; CTOR; ISZ; KOKS
TLP-10-2;-3	ТПОЛ-10; ТПЛ-10; ТЛК-10; ТПК-10; ТПФМ, ТПФ; ТПОФД; ТПОФ; GDS-12; TTR 4; TSR; IPZ
TLP-10-4	ТЛ-10; ТПЛК-10
TLP-10-5	ТПЛ-10; ТЛК-10; ТПЛМ-10; ТПЛУ-10; CTWH5
TLP-10-6	ТЛ-10; ТЛК-10; ТПЛ-10; ТОЛ-10
TV-EK	ТВ; ТШЛГ; ТШЛ; GSR; SB 0,8;
TSH-EK-0,66	ТШЛ-0,66; ТНШЛ-0,66 ; ТШЛМ
TZLK-0,66	ТЗЛМ; ТЗЛЭ; ТЗЛ; ТДЗЛК; ТДЛ-0,66; ТЗЛК; KOLA; KEKA
TZLKR-0,66	ТЗРЛ; ТДЗРЛ; ТЗЛКР; ТДЗРЛ-0,66; KOLA

Type	Analogue
Voltage transformers	
ZNOL(P)-EK	ЗНОЛ; ЗНИОЛ; ЗНОЛП; ЗНОЛПМ; JVM; TJC; VDF; VRQ; GE; UGE
3xZNOL(P)-EK	3х3НОЛ; 3х3НОЛП; 3хНИОЛ
NOL(P)-EK	НОЛ; НОЛП; НОМ; НОС; GZ; TDC; VDC; VRFR; VRC; GZF; TDO; VOL; VRL
OLS(P)-EK	ОЛС(П); ОЛ; ТСЛ; ОМ

How to reach us



Moscow office How to reach us



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