

Dead-tank circuit-breaker VTB-110



Intended purpose

Circuit breakers VTB-110 are intended for making switching operations (closings and openings) under specified conditions in normal and emergency modes in three-phase alternating current circuits with earthed neutral (earth fault factor is not more than 1,4) under 110kV rated voltage 50Hz frequency. The circuit-breaker is equipped with integral current transformers. Integral current transformers are designed for the transfer of measuring data to measuring devices and safety and control devices.

Operation conditions

Circuit breakers are manufactured in U and UKHL climatic version, 1 arrangement category as per GOST 15150 and GOST 15543 here with:

- Ambient temperature operating range:
 - upper value is plus 40°C;
 - lower value is minus 45°C;
- Maximum altitude is no more than 1000m;
- Environment does not contain reactive and explosive impurities (atmosphere of II type as per GOST 15150);
- Circuit breakers maintain their working capacity at wind speed:
 - without icing-no more 40m/s;
 - at icing with ice thickness up to 20mm-no more 15m/s;
- Duration of ambient temperature and wind speed combination is per GOST 16350;
- Intensity of seismic load is no more 9 points as per MSK-64.

⚡ Circuit breakers are not intended for switching shunting reactor.

⚡ Circuit breakers conform to requirements of GOST R 52565.

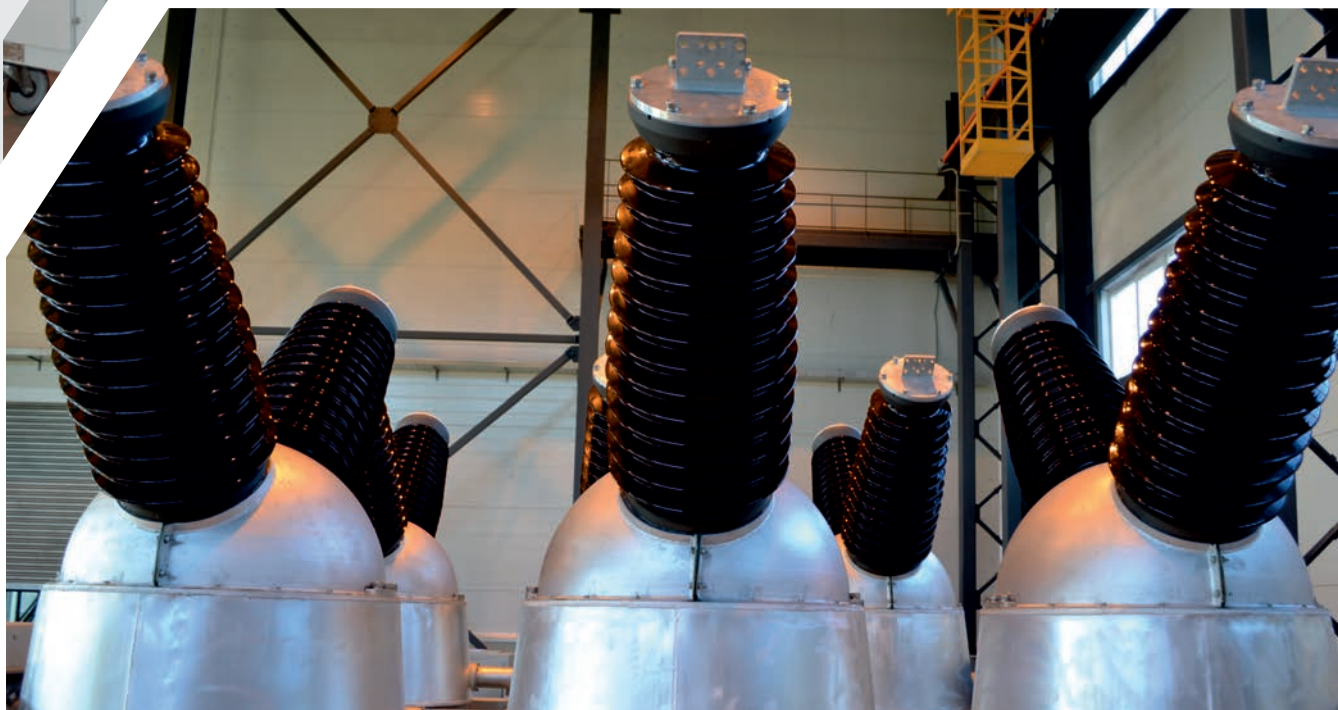
Symbolic designation

VTB - 110III-40/XX₁ 1

V	- Circuit-breaker;	40	- Rated breaking current, kA;
T	- Of three-pole type;	X	- Rated current, A;
B	- Dead-tank;	X ₁	- Climatic version U, UKHL as per GOST 15150;
110	- Rated voltage, kV;	1	- Placement category as per GOST 15150.
III	- Pollution degree as per GOST 9920;		

Design features

- ⚡ Circuit breakers consist of three poles installed on common frame and controlled by one spring drive of PprM series, herewith integral current transformers are positioned on one side in the insulating hollow, and the arc extinguish device is positioned on the opposite side of the second insulating hollow.
- ⚡ Circuit-breakers of standard version have no support metal structures. Circuit breakers can be supplied as per the order with factory support pillars and maintenance platform.
- ⚡ Explosion-proof design.
- ⚡ Low leakage level-no more 0,5% per year.
- ⚡ Circuit breaker's steel parts and support metal structures have corrosion-resistant coatings.
- ⚡ Maintaining of circuit breaker's insulation strength at 84kV voltage in case if gas overpressure is lost in circuit breake. Capacitive currents' switching-off without restrikes, low overvoltages.
- ⚡ Automatic control in drive with two heating stages (anti-condensing and main) of drive's cubicle and control of their running order.
- ⚡ Components (devices), including high-quality housings, are purchased from well-reputed leading domestic and foreign manufacturers.
- ⚡ Circuit breaker's design allows supplying the products to the Customer in suitable containers of minimal volumes at minimal transport expenses and providing convenient and operative mounting and commissioning.
- ⚡ Mounting and commissioning are made under the guidance of engineering supervisor.



Technical characteristics

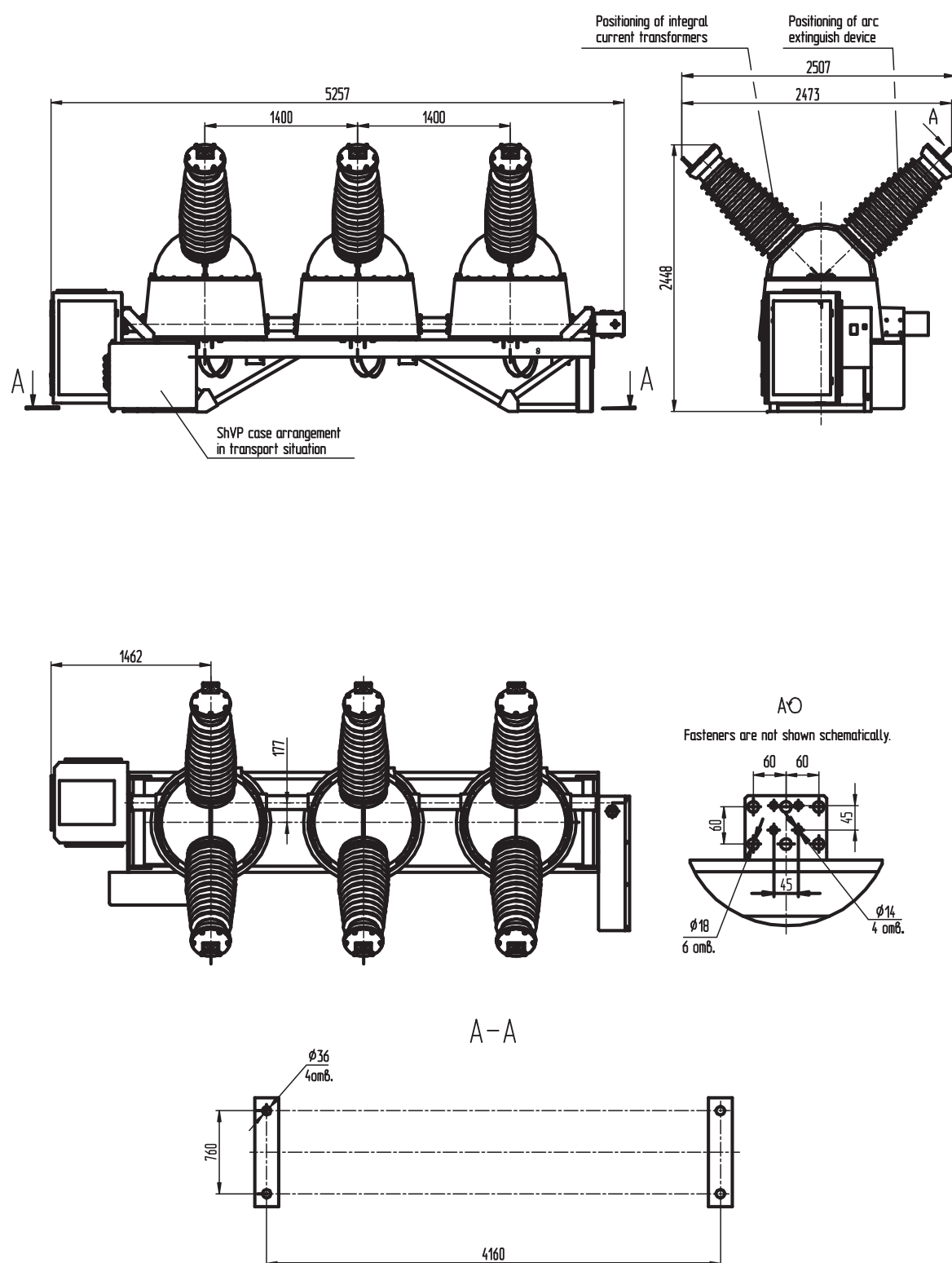
Parameter	Value
Rated voltage, U_{rat} , kV	110
Maximum operating voltage, $U_{max. oper.}$ kV	126
Rated breaking current, $I_{break. norm.}$ A	40
Rated current, A	2000, 3150
Normed percentage of periodic component, $\beta_H\%$, no more	45
Normed parameters of making current, kA, no more	
• maximum peak	102
• initial acting value of periodic component	40
Normed parameters of short-circuit through current, kA	
• maximum peak (peak withstand current)	102
• rms current value for current duration (short-time withstand current)	40
• duration of short-circuit current, s	3
Insulation level:	
Test power frequency voltage 50Hz, kV:	
• between phases	230
• relative to ground and between phases	230
Test voltage of full lightning impulse, kV	
• relative to ground and between poles, kV	450
• between open contacts	520
Specific creepage distance of external insulation, sq.cm	2,5
Rated parameters of transient recovery voltage	GOST R 52565 п.6.6.3
Rated switching cycles as per GOST R52565:	
• cycle 1	O-0,3c-BO-180c-BO
• cycle 1a	O-0,3c-BO-20c-BO
• cycle 2	O-180c-BO-180c-BO
Normed dead time under HS automatic reclosing, s	0,3
Own opening time, s	0,32±0,005
Full opening time, ms	0,06 ^{+0,055}
Time difference of making & breaking contacts of poles not more than, s	
• when closing	0,0018
• when opening	0,0015
Own closing time, t_c , s, no more	0,08
Normed breaking current of unloaded overhead line, A	31,5
Rated voltage d. c. of control electromagnet power, V	220/110
Operating voltage range of control electromagnets, %, of U_{rated} :	
• of closing one	from 85 up to 105
• of opening one	from 70 up to 110
Rated voltage for spring-driven motor power, V:	
• three-phase alternative current	400/230
• one-phase alternative current	230
• direct current	220
Consumption current of closing electromagnet and opening electromagnet:	
• underrated power voltage 220V, A, not more than	3,0
• underrated power voltage 110V, A, not more than	5,0

Technical characteristics

Parameter	Value
Number of control electromagnets:	
• of closing ones	1
• of opening ones	2
Number of switching contacts for auxiliary circuits:	
• of making circuits	12
• of breaking circuits	12
A.c. rated voltage of power of drive electric heating poles of circuit-breakers, V	230
Power of anti-condensation (uninterruptible) heater of the circuit-breaker for pole, Watt, (only for UKHL 1 version)	50
Integral current transformers:	
• quantity for pole	up to 9
• secondary load, VA	from 2 to 50
• nominal primary current, A	from 200 to 3000
• nominal secondary current, A	1; 5
• accuracy class for measurement & accounting	0,2S; 0,2; 0,5S; 0,5
• accuracy class for safety	5P, 10P
• accuracy limit factor	up to 35
• safety factor	5, 10, 15
Total power (for three poles) of the main heating device of circuit-breaker heating, Watt, not more than (only for UKHL1 version)	6600
Temperature of automatic switching on/off of heating devices of poles and pressure alarms (only for UKHL1 version)	-40±3°C
Capacity of anti-condensation (non-interruptible) heating device of drive, Watt, not more than	1600
Temperature of automatic switching on/off of drive heating devices,	5±2°C
Sf6 pressure adjusted to 20°C, MPa, excess:	
• nominal (filling)	0,4
• warning alarm actuation	0,35
• control interlocking (or automatic switch-off with interlocking of switching-on)	0,32
Admissible level of Sf6 leakage, % ,not more than	0,5
Life time of switching stability till mid-life repair	
a) under current I o.rat. and I c.	
• number of O operations, not less than	20
• number of C operations, not less than	10
b) under current 0.6 I o.rat. and 0.6 I c.	
• number of O operations, not less than	34
• number of C operations, not less than	17
c) under load currents close to I o.rat	
• number of O operations, not less than	5000
• number of C operations, not less than	5000
Circuit breaker's life time of mechanical stability, number of cycles (C-tn-O)	10000
Life time till mid-life repair, years	20
Life time, years,	40
Admissible wires' stress, N	
• in horizontal direction along pole axis	1250
• in horizontal direction across pole axis	750
• vertical	1000

Dimensional drawing

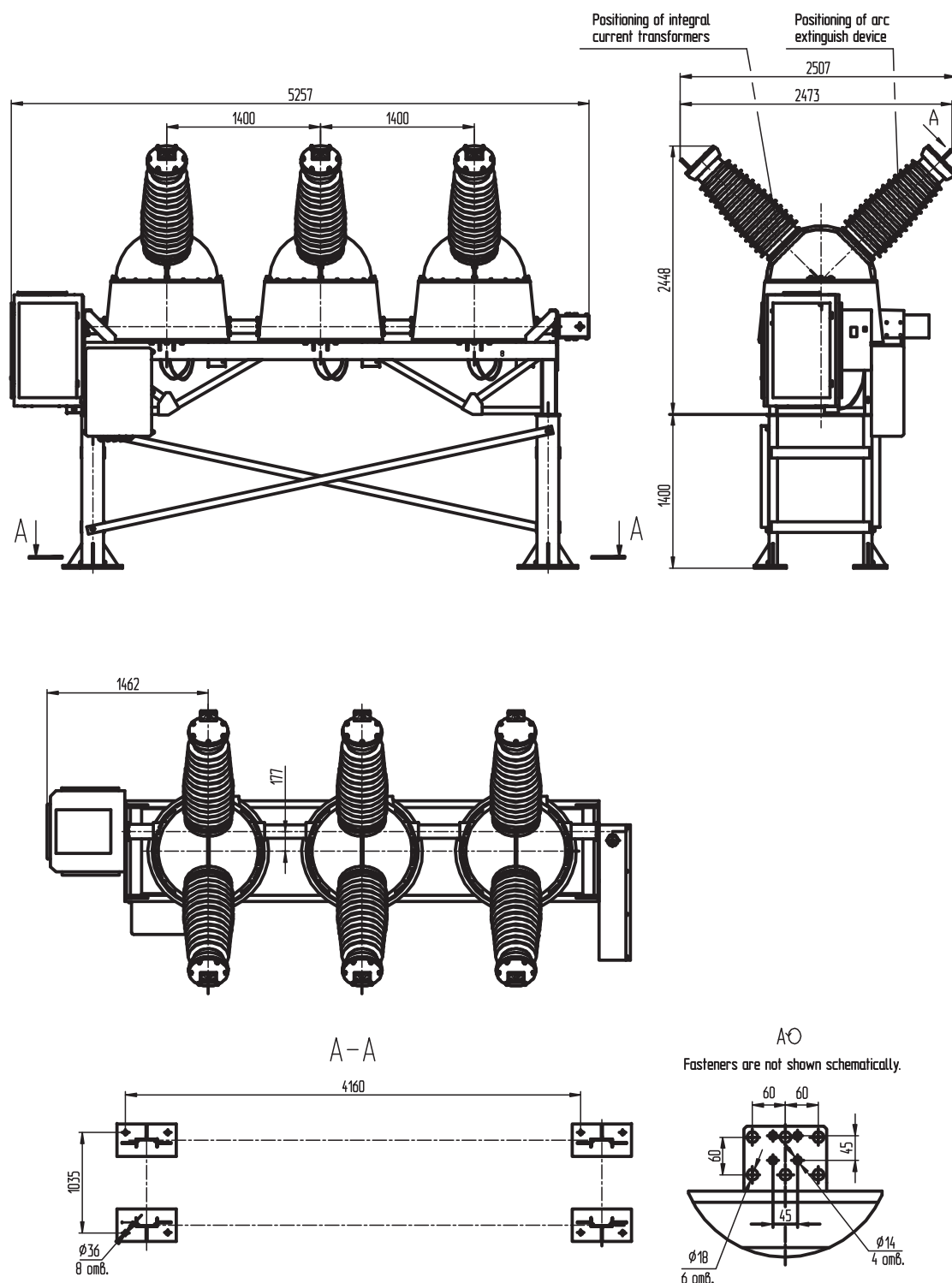
Overall and coupling dimensions



Drawing 1.

Dimensional drawing

**Overall and coupling dimensions of VTB-110 circuit-breaker
on standard pillars H=1400 mm.**



Drawing 2.

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