

INSTRUMENT TRANSFORMERS



**INSTRUMENT
TRANSFORMERS**

MEDIUM VOLTAGE INSTRUMENT TRANSFORMERS

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OPERATION CONDITIONS FOR CURRENT TRANSFORMERS

1. When the secondary terminals are connected to the measuring or protection devices, one of the terminals should be earthed for safety as seen in **FIGURE CT-1**
2. The secondary circuit of a current transformer must not be operated open-circuited
3. The secondary winding of a current transformer which will not be used must always be short-circuited and earthed as seen in **FIGURE CT-2**
4. For the transformer with reconnectable and/or tapped secondaries, unused terminals must be left open as seen in **FIGURE CT-3**
5. The current transformers which have capacitive divider tap (Ck) must be connected to the indicator. If the tap will not be used then it must be earthed as seen in **FIGURE CT-4**

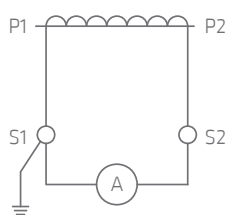


FIGURE CT-1

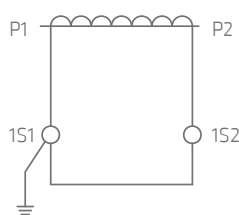


FIGURE CT-2

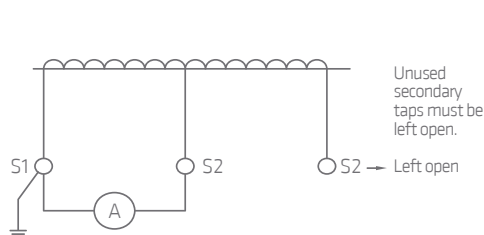


FIGURE CT-3

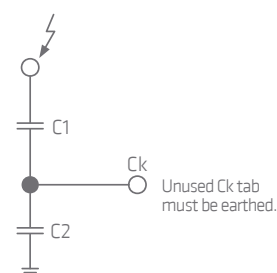


FIGURE CT-4

Test Voltages

Highest voltage for equipment U_m (r.m.s.)	Rated power-frequency withstand voltage (r.m.s.)	Rated lightning impulse withstand voltage (peak)
[kV]	[kV]	[kV]
12	28	75
17,5	38	95
24	50	125
36	70	170

INDOOR CURRENT TRANSFORMERS

SUPPORT TYPE CURRENT TRANSFORMERS



12 - 24 kV

Block Type Design

Standard: IEC 60044-1/6, VDE, ANSI, GOST

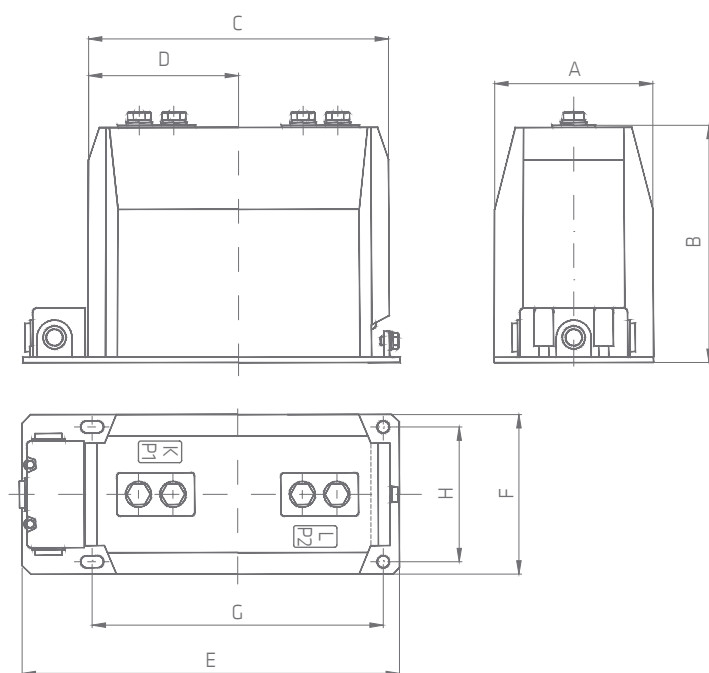
On request with capacitive layer

On request with barrier

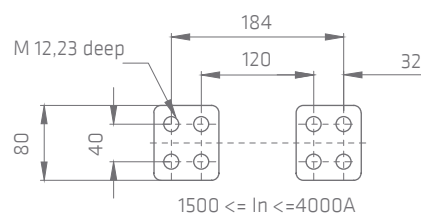
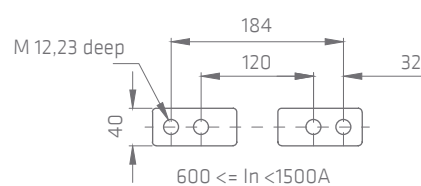
TECHNICAL DATA

Type		AB12	AB12-3	AB24	AB24-3
Rated data					
Operating voltage (maximum)	[kV]	12 - 17,5		24	
Test voltages	[kV]	28/75 - 38/95		50/125	
Rated frequency	[Hz]	50 or 60			
Maximum rated primary current	[A]	2500		4000 [$I_{cont} \times I_n$]	
Secondary rated current	[A]	1 or 5			
Rated short-time thermal current I_{th} [1s]	[kA]	max. 60 [$1000 \times I_n$]			
Rated dynamic current I_{dyn}	[kA]	max. 120 [$2,5 \times I_{th}$]			
Weight [approx.]	[kg]	22	35	33	48

DIMENSIONS



PRIMARY CONNECTION TERMINALS



Type	AB12	AB12-3	AB24	AB24-3
Dimensions (mm)				
A	148	148	178	178
B	220	220	280	280
C	280	380	290	400
D	140	140	140	140
E	350	467	355	482
F	148	148	178	178
G	270	370	280	390
H	125	125	150	150

Other specifications available on request

SUPPORT TYPE
CURRENT TRANSFORMERS

36 kV

Block Type Design

Standard: IEC 60044-1/6, VDE, ANSI, GOST

On request with capacitive layer

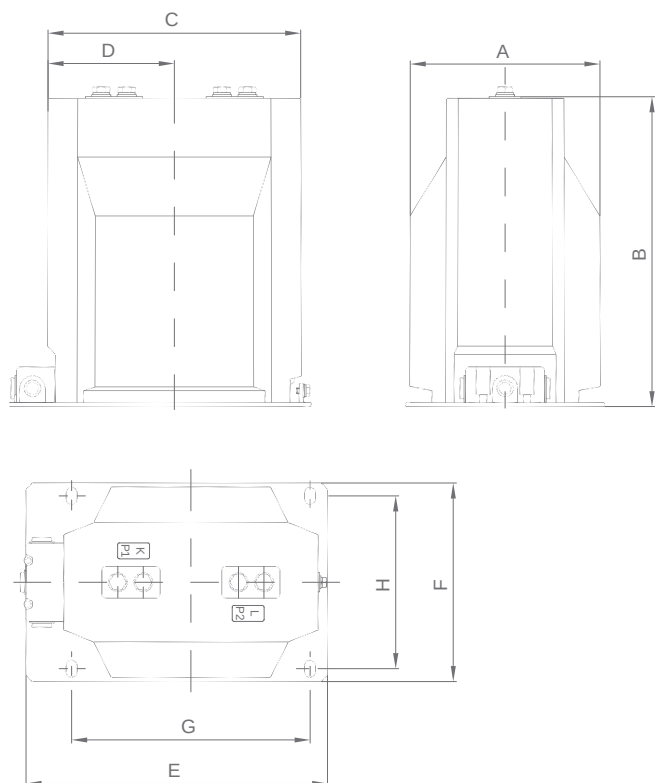
On request with barrier

TECHNICAL DATA

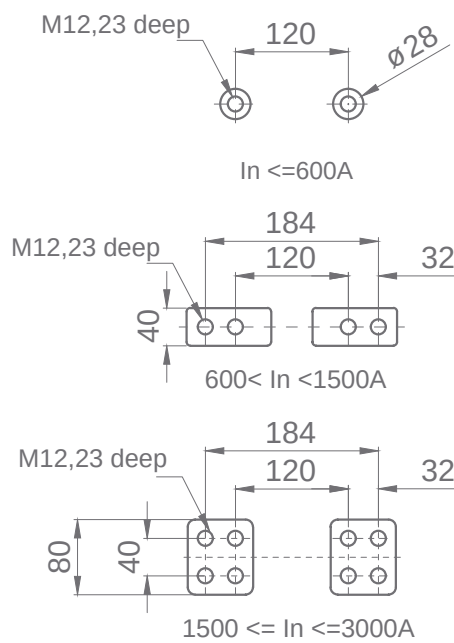
Type		AB36-1	AB36-3	AB36-T1	AB36-T3
Rated data					
Operating voltage (maximum)	[kV]	36			
Test voltages	[kV]	70/170			
Rated frequency	[Hz]	50 or 60			
Maximum rated primary current	[A]	3000			
Secondary rated current	[A]	1 or 5			
Rated short-time thermal current I_{th} [1s]	[kA]	max. 60 [max. 1000 x I_n]			
Rated dynamic current I_{dyn}	[kA]	max. 120 [2,5 x I_{th}]			
Weight [approx.]	[kg]	42	52	46	56

Other specifications available on request

DIMENSIONS



PRIMARY CONNECTION TERMINALS



Type	AB36-1	AB36-3	AB36-T1	AB36-T3
Dimensions (mm)				
A	220	240	220	240
B	360	360	390	390
C	260	320	260	320
D	130	160	130	160
E	355	380	355	380
F	250	250	250	250
G	300	300	300	300
H	217,5	217,5	217,5	217,5

Other specifications available on request

INDOOR CURRENT TRANSFORMERS

SUPPORT TYPE

CURRENT TRANSFORMERS



24 - 36 kV

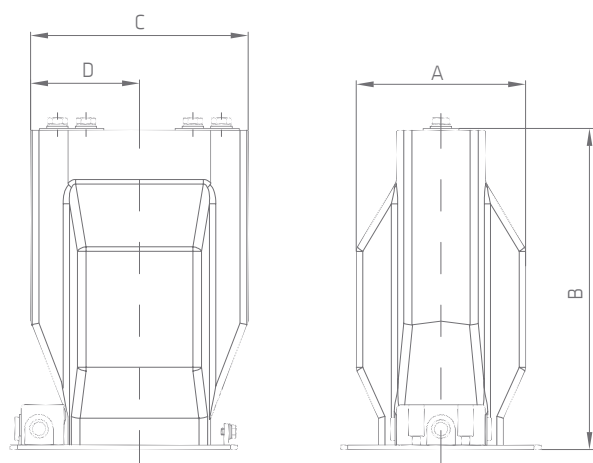
Standard: IEC 60044-1/6, VDE, ANSI, GOST

TECHNICAL DATA

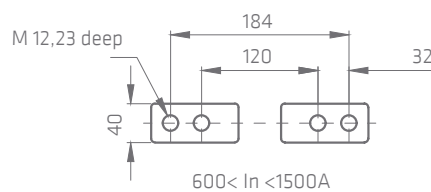
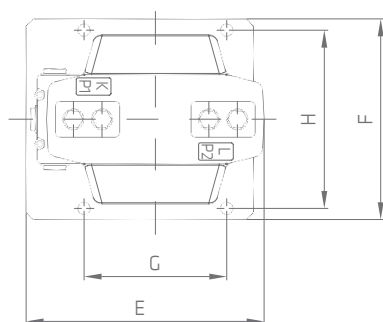
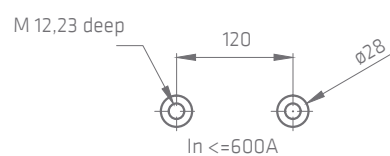
Type		AK24	AK36
Rated data			
Operating voltage (maximum)	[kV]	24	36
Test voltages	[kV]	50/125	70/170
Rated frequency	[Hz]	50 or 60	
Maximum rated primary current	[A]	1500	
Secondary rated current	[A]	1 or 5	
Rated short-time thermal current I_{th} [1s]	[kA]	max. 60 [max. 1000 x I_n]	
Rated dynamic current I_{dyn}	[kA]	max. 120 [2,5 x I_{th}]	
Weight [approx.]	[kg]	20	30

Other specifications available on request

DIMENSIONS



PRIMARY CONNECTION TERMINALS



Type	AK24	AK36
Dimensions (mm)		
A	178	190
B	280	360
C	244	244
D	122	122
E	287	255
F	178	225
G	200	160
H	150	200

INFORMATION ABOUT THE SAFE OPERATION OF VOLTAGE TRANSFORMERS

OPERATION CONDITIONS FOR POTENTIAL TRANSFORMERS

1. When the secondary terminals are connected to the measuring or protection devices, one of the terminals should be earthed for safety as seen in **FIGURE VT-1**
2. The base plate must be earthed.
3. The secondary circuits must not be short-circuited during operation. Otherwise the voltage transformers will be thermally destroyed.
4. If any of the secondary windings of a voltage transformer, used for the purpose of measuring, will not be used then it must be left open with one terminal connected to earth as seen in **FIGURE VT-2**. However, even if the open-delta windings are not to be used for detection of earth faults, they must be connected in an open delta circuit and an appropriate resistor (depending on the voltage and thermal power rating of the secondary) must be connected and open-delta circuit must be earthed only at one point as seen on **FIGURE VT-4**. Please refer to the technical recommendations below.
5. For single phase transformers, the neutral terminal of the primary “ N ” must be earthed in the earthed (neutral) systems as seen in **FIGURE VT-3**

Other important points and notes

When using single pole insulated inductive voltage transformers, it is very important to be aware that, if a circuit is being closed or during the decaying period of an earth fault, ferroresonance may occur.

Ferroresonance can lead to the overheating and thermal destruction of the voltage transformer or high levels of voltages may be induced. In general, ferroresonance can be eliminated by the use of an appropriate resistor. The resistor is placed as a burden in open-delta circuit formed by three voltage transformers delta windings. The open-delta circuit must always be earthed only at one point as seen in **FIGURE VT-4**. The open-delta connection can also be used for earth-fault monitoring with appropriate devices.

As the number of cable systems is increasing in the energy distribution systems, the protection of voltage transformers have become very important for the uninterrupted operation of the system without any failure and/or down time. For that reason, ALCE is always recommending the use of open-delta windings in single phase inductive voltage transformers.

The use of open-delta windings may not be sufficient for the protection of voltage transformers by itself in some cases. An energy systems design engineer shall always use proper surge arresters, avalanche diodes, limiters and/or their combinations for the survivability of the distribution system after a fault or disturbance.

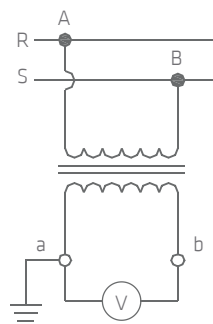
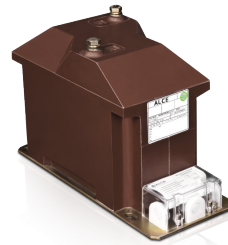


FIGURE VT-1

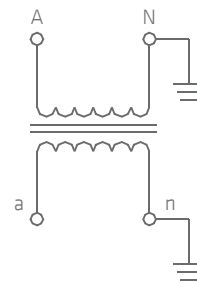


FIGURE VT-3

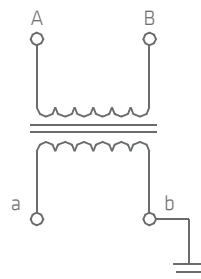


FIGURE VT-2

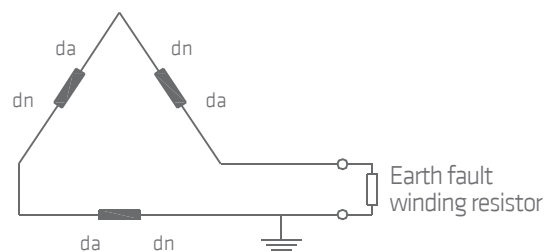


FIGURE VT-4

Test Voltages

Highest voltage for equipment U_m (r.m.s.)	Rated power-frequency withstand voltage (r.m.s.)	Rated lightning impulse withstand voltage (peak)
[kV]	[kV]	[kV]
12	28	75
17,5	38	95
24	50	125
36	70	170

INDOOR VOLTAGE TRANSFORMERS

SINGLE POLE VOLTAGE TRANSFORMERS



12 - 24 - 36 kV

Single Pole Insulated

Block Type Design

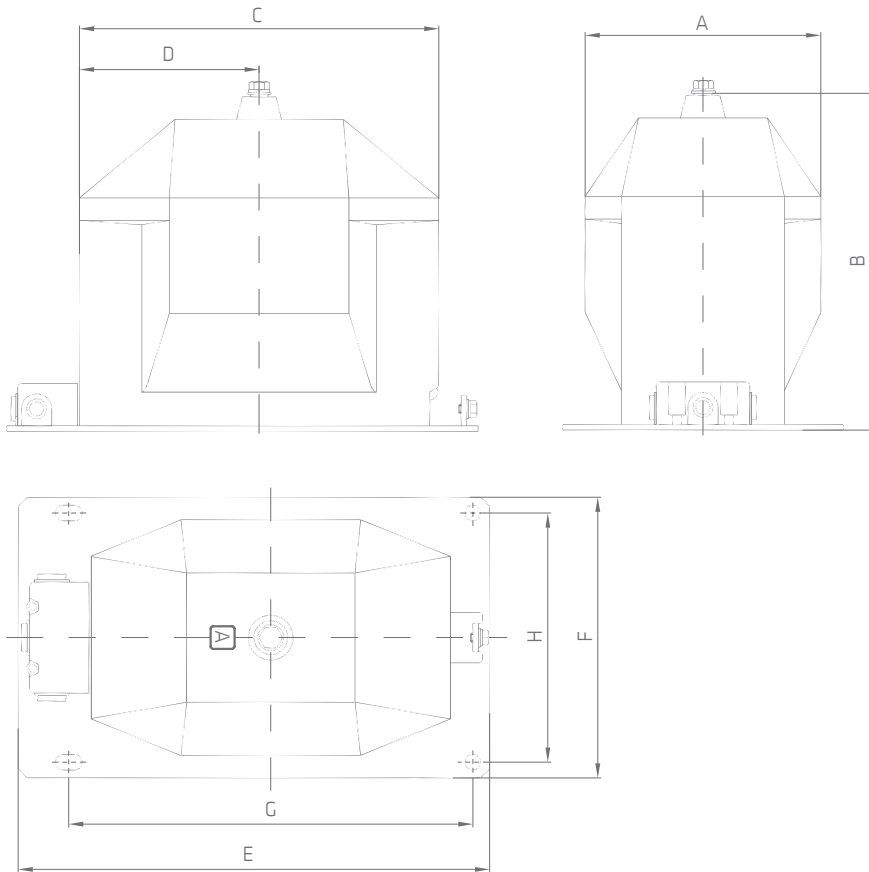
Standard: IEC 60044-2, IEC 61869, VDE, ANSI, GOST

TECHNICAL DATA

Type		VB12	VB24	VB36
Rated data				
Highest voltage for equipment, U_m [r.m.s.]	[kV]	12 - 17,5	24	36
Test voltages	[kV]	28/75 - 38/95	50/125	70/170
Rated frequency	[Hz]	50 or 60		
Rated primary voltage, U_n [max.]	[kV]	12/ $\sqrt{3}$ - 15/ $\sqrt{3}$	24/ $\sqrt{3}$	36/ $\sqrt{3}$
Secondary voltage	[V]	100 / $\sqrt{3}$ or 110 / $\sqrt{3}$ or 120 / $\sqrt{3}$		
Rated burden in class 0.2-0.5-1.0	[VA]	5-10-15-20-30-40...		
Maximum rated burden for protection purpose in class 3P/6P	[VA]	100		
Thermal limiting current for earth fault detection winding	[A]	6		
Rated voltage factor [8h]		1,9 U_n		
Weight [approx.]	[kg]	25	34	42

Other specifications available on request

DIMENSIONS



Type	VB12	VB24	VB36
Dimensions (mm)			
A	148	178	210
B	220	280	300
C	280	290	320
D	140	145	160
E	350	360	405
F	148	178	248
G	270	280	300
H	125	150	225

INDOOR VOLTAGE TRANSFORMERS

SINGLE POLE VOLTAGE TRANSFORMERS



36 kV

Single Pole Insulated

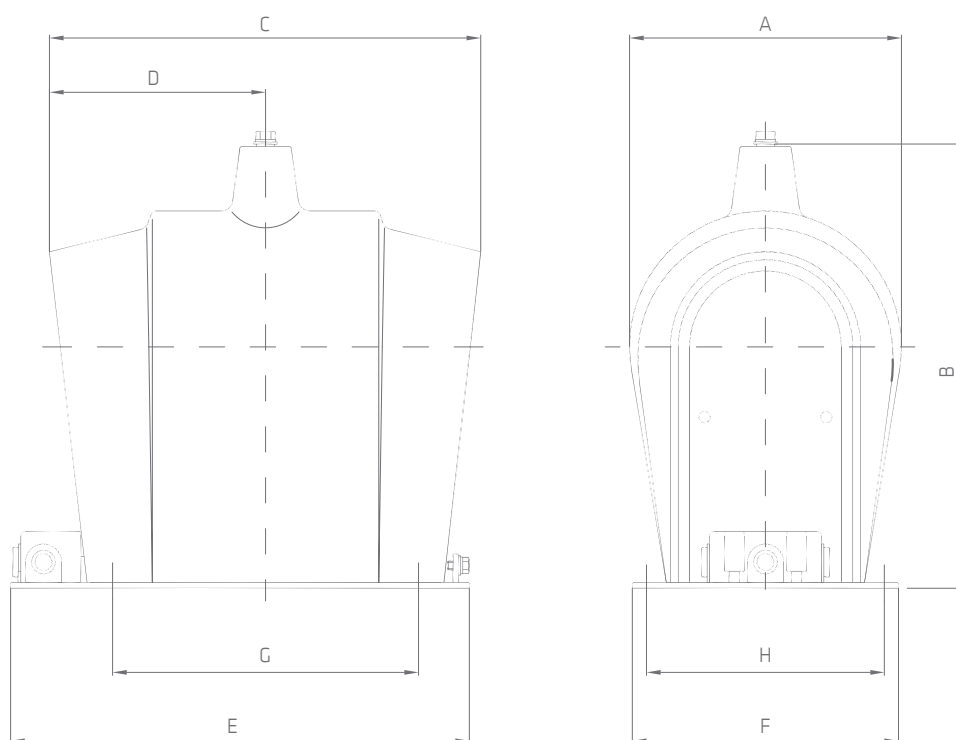
Standard: IEC 60044-2, IEC 61869-3, VDE, ANSI, GOST

TECHNICAL DATA

Type	VK36	
Rated data		
Highest voltage for equipment, Um [r.m.s.]	[kV]	36
Test voltages	[kV]	70/170
Rated frequency	[Hz]	50 or 60
Rated primary voltage, Un [max.]	[kV]	36/√3
Secondary voltage	[V]	100 / √3 or 110 / √3 or 120 / √3
Rated burden in class 0.2-0.5-1.0	[VA]	5-10-15-20-30-40...
Maximum rated burden for protection purpose in class 3P/6P	[VA]	100
Thermal limiting current for earth fault detection winding	[A]	6
Rated voltage factor [8h]		1.9 Un
Weight [approx.]	[kg]	55

Other specifications available on request

DIMENSIONS



Type	VK36
Dimensions (mm)	
A	240
B	390
C	400
D	200
E	405
F	235
G	270
H	210

INDOOR VOLTAGE TRANSFORMERS

DOUBLE POLE VOLTAGE TRANSFORMERS



12 - 24 kV

Double Pole Insulated

Block Type Design

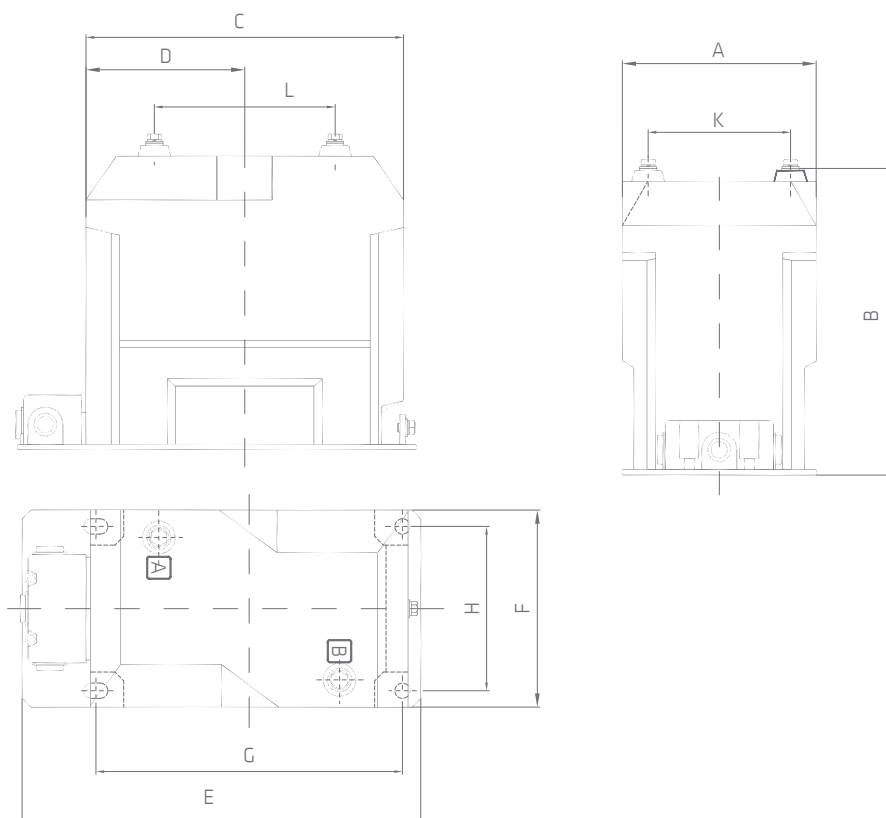
Standard: IEC 60044-2, IEC 61869-3, VDE, ANSI, GOST

TECHNICAL DATA

Type		2VB12	2VB24
Rated data			
Highest voltage for equipment, U_m [r.m.s.]	[kV]	12	24
Test voltages	[kV]	28/75	50/125
Rated frequency	[Hz]	50 or 60	
Rated primary voltage, U_n [max.]	[kV]	12	24
Secondary voltage	[V]	100 or 110 or 120	
Rated burden in class 0.2-0.5-1.0	[VA]	5-10-15-20-30-40...	
Maximum rated burden for protection purpose in class 3P/6P	[VA]	100	
Rated voltage factor [8h]		1,2 U_n	
Weight [approx.]	[kg]	24	36

Other specifications available on request

DIMENSIONS



Type	2VB12	2VB24
Dimensions (mm)		
A	148	178
B	220	280
C	280	290
D	140	145
E	350	360
F	148	178
S	270	280
H	125	150
K	110	130
L	100	165



INDOOR VOLTAGE TRANSFORMERS

SINGLE POLE VOLTAGE TRANSFORMERS



12 - 24 - 36 kV

With Fuse

Single Pole Insulated

Block Type Design

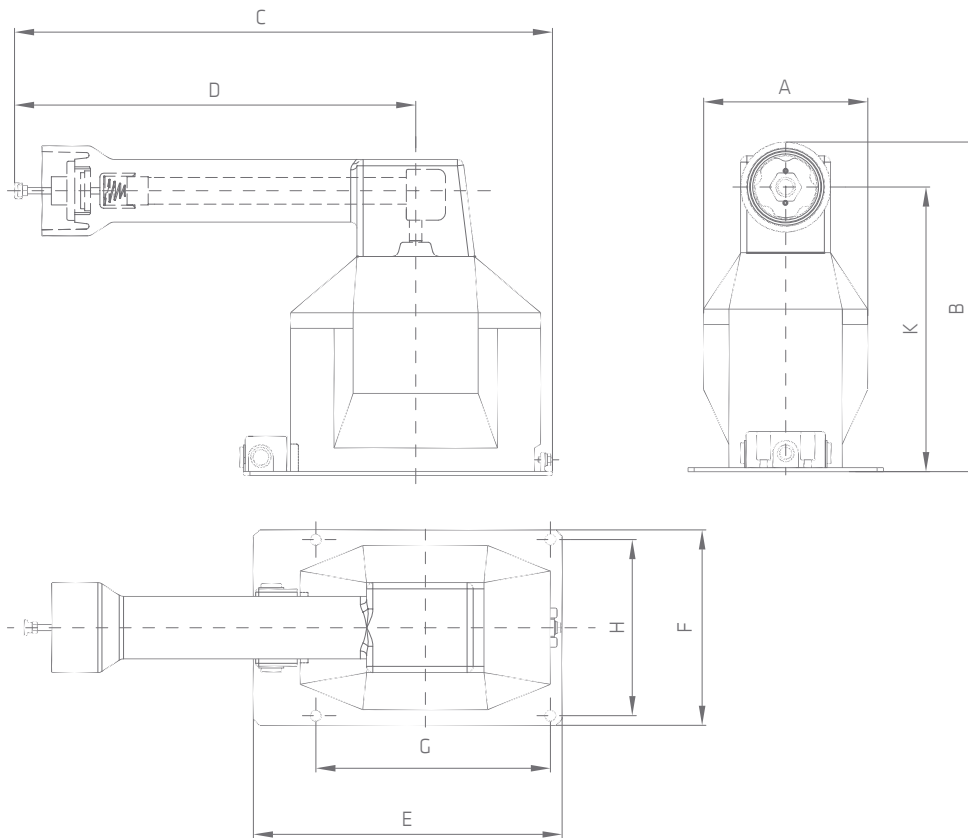
Standard: IEC 60044-2, IEC 61869-3, VDE, ANSI, GOST

TECHNICAL DATA

Type		VPF12	VPF24	VPF36
Rated data				
Highest voltage for equipment, U_m [r.m.s.]	[kV]	12 - 17,5	24	36
Test voltages	[kV]	28/75 - 38/95	50/125	70/170
Rated frequency	[Hz]	50 or 60		
Rated primary voltage, U_n [max.]	[kV]	12/ $\sqrt{3}$ - 15/ $\sqrt{3}$	24/ $\sqrt{3}$	36/ $\sqrt{3}$
Secondary voltage	[V]	100 / $\sqrt{3}$ or 110 / $\sqrt{3}$ or 120 / $\sqrt{3}$		
Rated burden in class 0.2-0.5-1.0	[VA]	5-10-15-20-30-40...		
Maximum rated burden for protection purpose in class 3P/6P	[VA]	100		
Thermal limiting current for earth fault detection winding	[A]	6		
Rated voltage factor [8h]		1,9 U_n		
Weight [approx.]	[kg]	26	35	48

Other specifications available on request

DIMENSIONS



Type	VBF12-FS	VBF24-FS	VBF36-FS
Dimensions (mm)			
A	148	178	210
B	300	360	422
C	487	575	688
D	337	420	523
E	350	360	395
F	148	178	250
G	270	280	300
H	125	150	225
K	260	320	364

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