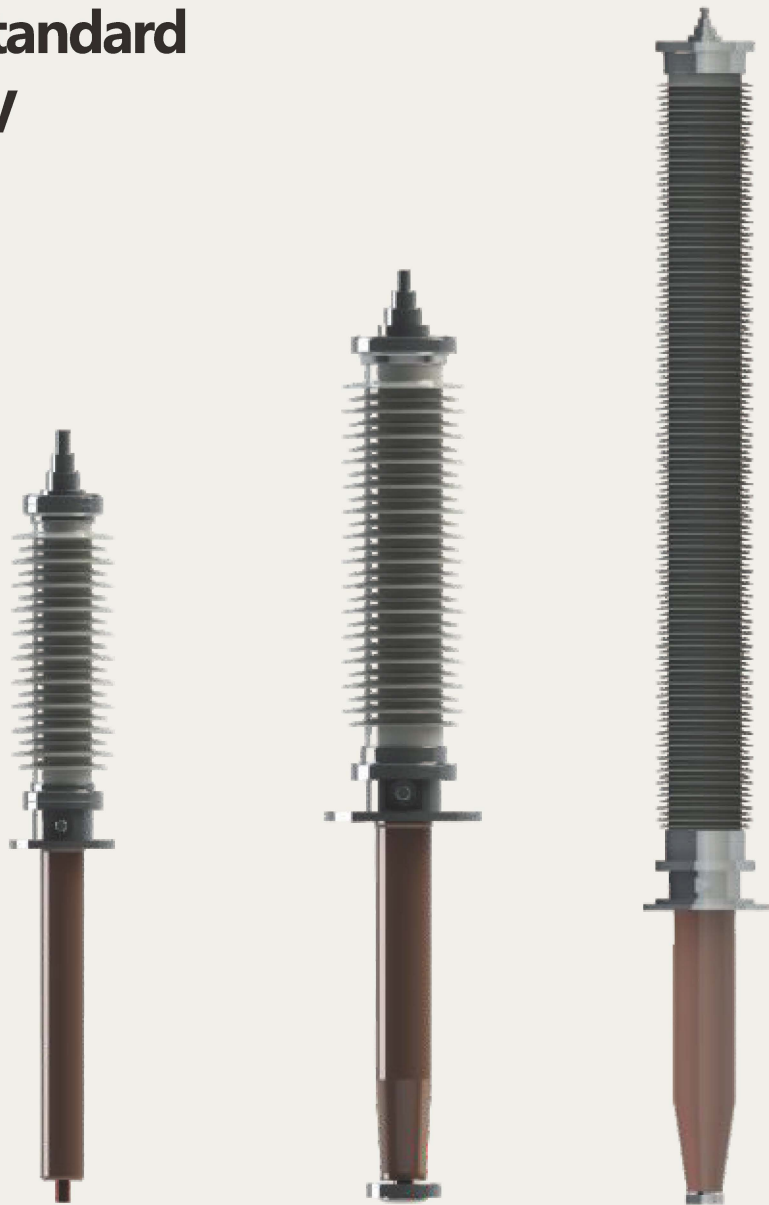




ZDTRIP

- RIP Transformer Bushings
- ANSI/IEEE Standard
- 25kV-765 kV



(Appendix: IEC standard RIP Bushings Up to 800kV)

JIANGSU ZHIDA HIGH VOLTAGE ELECTRIC CO., LTD



Jiangsu Zhida High Voltage Electrical Co., Ltd, doing business as (D/B/A) ZDVolt, specializes in advanced high-voltage solutions, including transformer bushings, GIS and breaker bushings, substation post insulators, and bushing/instrument current transformers. Its products are engineered for exceptional reliability and high performance.

Founded in 2003, ZDVolt is a privately held company with hundreds of patents. Its high-voltage bushing product line supports ratings up to 1000 kV and complies with IEC and ANSI/IEEE/CSA standards. ZDVolt's transformer bushings are available in OIP, RIP, RIS, SEC™, and P&O™ series. The company maintains an annual manufacturing capacity of approximately 30,000 bushings and bushing-type current transformers, with average 1-5 months lead times.

By the end of 2025, ZDVolt has installed more than 200,000 high-voltage bushings worldwide (including over 80,000 OIP bushings), including China, the United States, and Europe. Its patented "Porcelain & Oil" (P&O™) technology is the only field-proven, commercially available thermosiphon bushing solution in the industry, with over 10,000 installations.

ZDVolt operates fully integrated manufacturing facilities supported by a dozen in-house testing laboratories. These capabilities enable the production of key components such as porcelain using enhanced isostatic cold pressing, composite insulators, windings, metal parts, and fiberglass. ZDVolt also manufactures its patented BambuX™ composite insulators.

ZDVolt holds valid ISO 9001 (Quality), ISO 14001 (Environment), ISO 45001 (Occupational Health & Safety), GOST, UL, and ISO/IEC 17025 laboratory accreditations.

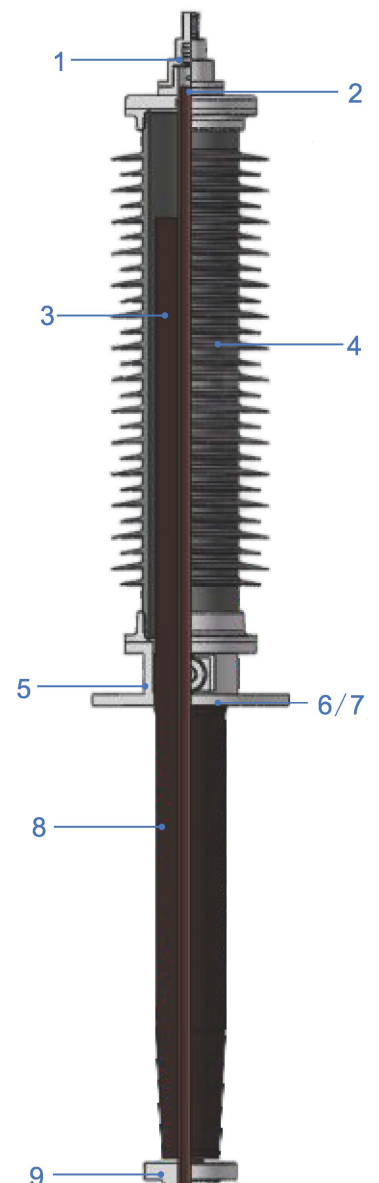


ZDTRIP -- RIP bushings designed for IEEE standard bushings

ZDTRIP is a series of RIP bushings developed by ZDVolt, with dimensions and electrical performance strictly in accordance with IEEE Std. C57.19.01-2017 and IEEE Std. C57.19.00-2023. Voltage and current fully cover the standard rated levels. The characteristic of RIP bushing is oil-free and has no risk of explosion. The main insulation of this bushing is an epoxy resin-impregnated paper capacitor core, which is made by wrapping aluminum foil with crepe paper to form a coaxial series capacitor. After vacuum drying, casting and curving, the core needs to be machined into the specified shape. Usually, the external insulator is made of gray silicone rubber. Sometimes porcelain material is also as an option according to customer's requirement. Between the insulator and the capacitor core, there is the insulation gel in it.

Bushing structure

1. **Top terminal:** Connected to the outer terminal, silver plated brass or copper.
2. **Inner terminal:** Connected to the transformer cable, draw lead type.
3. **Capacitor core:** Main insulation, epoxy resin-impregnated crepe paper.
4. **External insulator:** Silicone rubber covered on the fiber glass tube. Standard creepage distance of 54mm/kV (extra heavy).
5. **Mounting flange:** Aluminum alloy.
6. **Test tap (up to 69kV bushings) :** 25kV to 69kV bushings are equipped with a power factor test tap. The tap is connected to the last layer of the capacitor core and must be grounded when in service.
7. **Voltage tap (115kV bushings and above):** Bushings rated at 115kV and above are equipped with a voltage tap. The tap can be used for testing. It can be connected to the online monitor device or be grounded directly when in service. The tap is ANSI/IEEE standard type A, normally grounded.
8. **CT pocket:** The oil end is epoxy resin core exposed. CT length refers to the drawing.
9. **Bottom terminal:** Tinned copper.



Bushing electric performance

All the bushings are tested in accordance with IEEE Std. C57.19.00-2023.

Design test

- Leak test
- Draw-lead bushing cap pressure
- Cantilever strength
- Capacitance measurement
- Power factor
- Tap withstand voltage
- Full-wave lightning-impulse withstand voltage
- Chopped-wave lightning-impulse withstand voltage
- Rated frequency wet withstand voltage (900-kV BIL and below)
- Switching-impulse withstand voltage
- Rated frequency dry withstand test with partial discharge measurement
- Temperature rise
- Verification of nameplate markings

Routine test

- Leak test
- Capacitance measurement
- Power factor
- Tap withstand voltage
- Rated frequency dry withstand with partial discharge measurement
- Capacitance measurement
- Power factor
- Verification of nameplate markings

Electric performances exceed ANSI/IEEE standard requirements.

Higher electric performances	PD at 1.5 times L-G voltage	C1 Power factor
IEEE Std. C57.19.01-2017	10pC	0.85%
ZDVolt level	5pC	0.4%

Note:

Partial discharge of ZDVolt RIP bushings shall not exceed 10 pC at 1.5 Um.

ZDTRIP Bushing characteristics

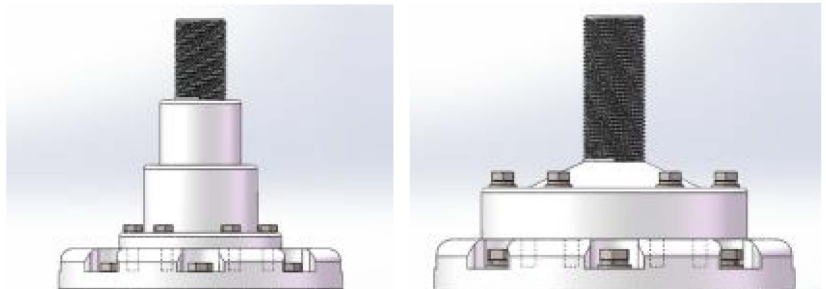
Dimensions and ratings

ZDTRIP bushings cover all voltage class (25 to 765kV) & all current ratings (400 to 5000A). Dimensions and electric performances are strictly in accordance with ANSI/IEEE Std. C57.19.01-2017 & C57.19.00-2023.

Top terminal

Top terminal is an integral cast structure with an advanced sealing design, eliminating the risk of water ingress.

NEMA top terminal pad can be offered as an optional accessory.



Draw lead

Inner terminal and top terminal are connected through multi-contact blades, with excellent current carrying performance and easy installation. ZDVolt can provide different types of inner terminal for customers to choose from, like welding type, forging type, board contact type and unprocessed type (processed by customer)



Welding type

Forging type

Board contact type

Unprocessed type

Note:

For 400 & 800A draw lead bushings, we can change the inner terminal and bottom terminal to convert to 1200A bottom connected bushings. There is no bottom shield for RIP bushings rated up to 69kV, so the length of draw lead type may be shorter than the bottom connected type. More details please contact ZDVolt.



Draw lead (400A/800A) + draw rod ➡ Bottom connected (1200A)

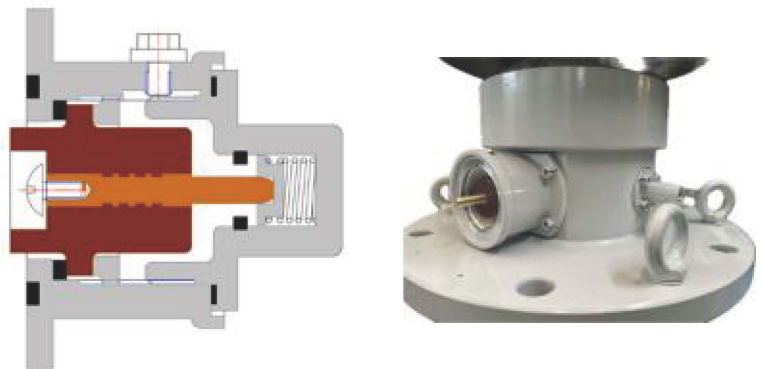
Test tap

Bushings up to 69kV are equipped with a test tap for testing. The tap must be earthed when in service. A standard 4mm test pin needs to be inserted into the tap hole when testing.



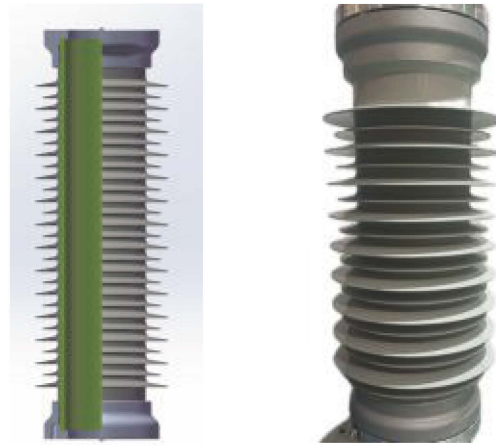
Voltage tap

Bushings rated at 115kV and above are equipped with a voltage tap for testing and can also be used for connecting online monitoring device. The tap is ANSI standard type A. According to ANSI standard, the withstand voltage from tap to earth can reach 20kV at least. The tap must be earthed when in service except connecting monitoring device.



Insulator structure

External insulator consists of an epoxy-impregnated, seamless, void-free fiberglass tube with silicone rubber sheath and weather sheds and metal fittings flange. The composite insulator has much higher bending strength than porcelain. The seismic level can reach 1g.



Bushing service condition

Ambient temperature

Normally -40~ +40°C. Minimum ambient temperature affects the selection of the sealing gasket material.

Option (after Catalog No.)	Min. ambient temperature	Sealing gasket material
Default	Above -30°C	Nitrile rubber
L	-30°C to -45°C	Low temperature-resistant nitrile rubber
LL	Below -45°C	Fluorosilicone rubber

Note: 1, Special temperature must be emphasized in the order document.

2, If the max. temperature exceeds 40°C, it is best to choose the higher current grade.

Mounting angle

Normally 0-90 degrees. For bushings rated at 500kV and above, it is recommended to install them at an angle not exceeding 60 degrees.

High anti-corrosion area

Most of the bushing metal parts are made of aluminum alloy material, which have high corrosion resistance. For areas below C5 level, no special treatment is required, while for areas at C5 and above, special painting treatment is required.

High pollution area

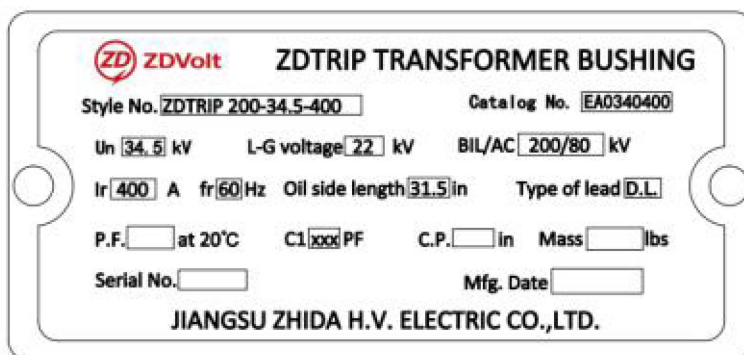
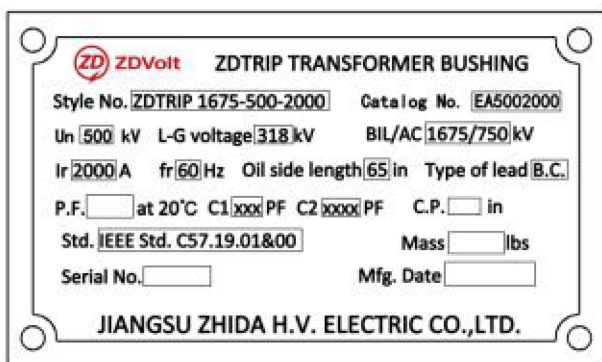
ZDTRIP bushings' porcelains are designed in accordance with the extra heavy pollution level (USCD:54mm/kV), So it can satisfy high pollution area. If the customer needs higher pollution level, ZDVolt can also specially design for it. Add "H" after catalog No. if necessary.

High altitude area

At high altitudes, it is necessary to improve the external insulation level of the bushing, that is, to increase the arcing distance of the bushing. Each voltage level of bushings has a maximum applicable altitude. If the altitude exceeds it, the bushing needs to be specially designed. If the altitude is high enough, it is recommended to increase the voltage level for use. Add "H" after catalog No. if necessary.

Nameplate sample

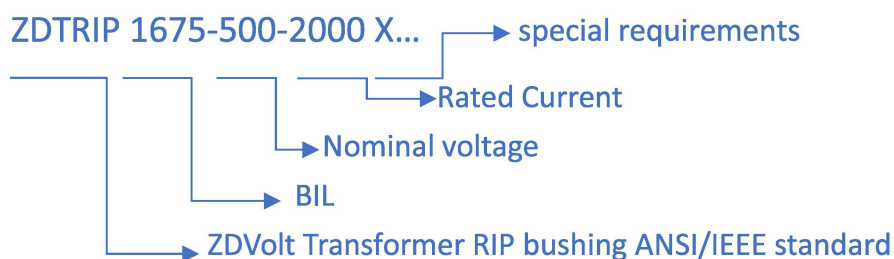
Every bushing is provided with a nameplate made of stainless steel. It contains all the electric data, serial No. and all the information in accordance with ANSI standard.



Style No. and catalog No.

Bushing is defined by the style No. and the catalog No. together. The style No. determines the bushing's type, BIL, voltage and current. The catalog No. determines the unique of the bushing including the dimension and structure. Usually, for special requirements that affect the dimension and structure of the bushing, some letters will be added after the Catalog No. to indicate specific meanings. IEEE std. bushing is strictly unique, we add the letters after the style No. as well for special requirements.

Style No. example:

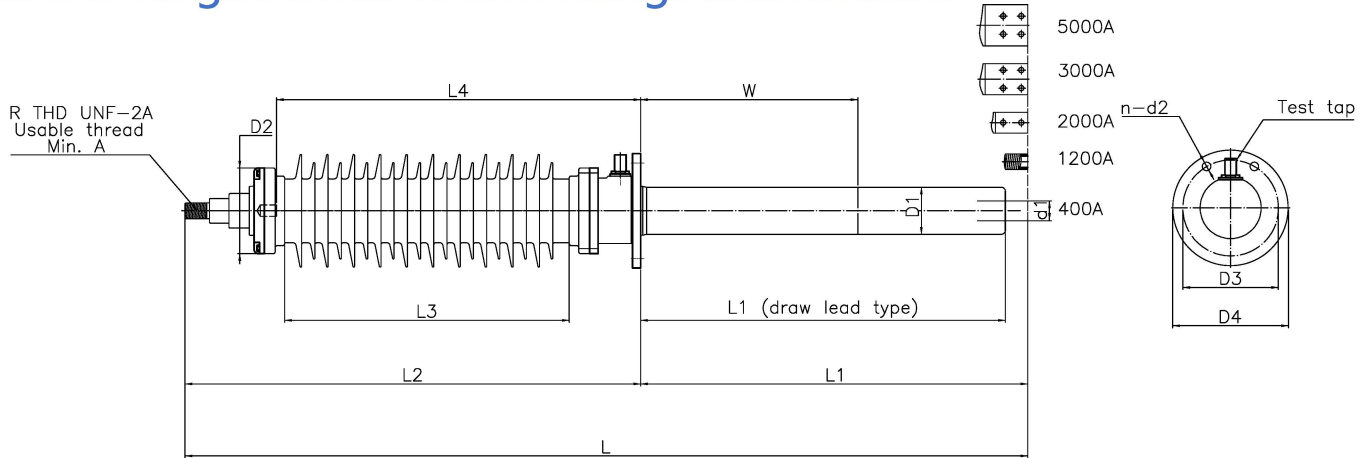


Special requirements		Style No.	Catalog No.
Standard name		ZDTRIP 1675-500-2000	EA5002000
High altitude/high pollution area		ZDTRIP 1675-500-2000 H	EA5002000H
Low temperature	-30°C~-45°C	ZDTRIP 1675-500-2000 L	EA5002000L
	Below -45°C	ZDTRIP 1675-500-2000 LL	EA5002000LL
Special type of lead	Draw lead	ZDTRIP 1675-500-1200 C	EA50001200C
	Bottom connected	ZDTRIP 1675-500-800 G	EA5000800G
Special BIL		ZDTRIP 1800-500-2000	EA5002000A
Other special requirements		ZDTRIP 1675-500-2000 S1...	EA5002000S1....
Porcelain insulator		ZDTRIP 1675-500-2000 C	CEA5002000

ZDVolt solution

- ZDVolt can provide all related accessories of bushings, including top& bottom terminals and shields.
- ZDVolt has sufficient replacement experience, replacing various types of bushings in the industry, not limited to IEEE Std.
- Short delivery time and high compatibility. Except for insulation paper and oil, all parts ZDVolt can be internally supplied to shorten the delivery time.
- To prevent moisture in the oil end, we have equipped all RIP bushings with protective covers.

ZDTRIP range from 25 to 69kV ratings & dimensions



Style No.	Catalog No.	Nominal voltage	BIL	Rated current	Creepage distance Min.		Arcing distance Min. (L3)		Max. altitude		Overall length (L)		Length above flange (L2)		Length below flange (L1)		Min. oil level and CT length (W)	
		kV	kV	A	mm	in	mm	in	m	ft	mm	in	mm	in	mm	in	mm	in
ZDTRIP 150-25-400	EA0250400	25	150	400	780	30.71	300	11.81	2700	8856	1404	55.28	715	28.15	689	27.13	534	21
ZDTRIP 150-25-1200	EA0251200	25	150	1200	780	30.71	300	11.81	2700	8856	1464	57.64	715	28.15	749	29.49	534	21
ZDTRIP 150-25-2000	EA0252000	25	150	2000	780	30.71	300	11.81	2700	8856	1460	57.48	660	25.98	800	31.50	534	21
ZDTRIP 150-25-3000	EA0253000	25	150	3000	780	30.71	300	11.81	2700	8856	1470	57.87	670	26.38	800	31.50	534	21
ZDTRIP 150-25-5000	EA0255000	25	150	5000	780	30.71	300	11.81	2700	8856	1568	61.73	730	28.74	838	32.99	534	21
ZDTRIP 200-34.5-400	EA0340400	34.5	200	400	1076	42.36	400	15.75	2700	8856	1555	61.22	815	32.09	740	29.13	534	21
ZDTRIP 200-34.5-1200	EA0341200	34.5	200	1200	1076	42.36	400	15.75	2700	8856	1615	63.58	815	32.09	800	31.50	534	21
ZDTRIP 200-34.5-2000	EA0342000	34.5	200	2000	1076	42.36	400	15.75	2700	8856	1611	63.43	760	29.92	851	33.50	534	21
ZDTRIP 200-34.5-3000	EA0343000	34.5	200	3000	1076	42.36	400	15.75	2700	8856	1621	63.82	770	30.31	851	33.50	534	21
ZDTRIP 200-34.5-5000	EA0345000	34.5	200	5000	1076	42.36	400	15.75	2700	8856	1681	66.18	830	32.68	851	33.50	534	21
ZDTRIP 250-46-400	EA0460400	46	250	400	1435	56.50	485	19.09	2700	8856	1691	66.57	900	35.43	791	31.14	534	21
ZDTRIP 250-46-1200	EA0461200	46	250	1200	1435	56.50	485	19.09	2700	8856	1751	68.9	900	35.43	851	33.50	534	21
ZDTRIP 250-46-2000	EA0462000	46	250	2000	1435	56.50	485	19.09	2700	8856	1747	68.78	845	33.27	902	35.51	534	21
ZDTRIP 250-46-3000	EA0463000	46	250	3000	1435	56.50	485	19.09	2700	8856	1757	69.17	855	33.66	902	35.51	534	21
ZDTRIP 250-46-5000	EA0465000	46	250	5000	1435	56.50	485	19.09	2700	8856	1855	73.03	915	36.02	940	37.01	534	21
ZDTRIP 350-69-400	EA0690400	69	350	400	2155	84.84	700	27.56	2700	8856	2017	79.41	1125	44.29	892	35.12	534	21
ZDTRIP 350-69-1200	EA0691200	69	350	1200	2155	84.84	700	27.56	2700	8856	2077	81.77	1125	44.27	952	37.50	534	21
ZDTRIP 350-69-2000	EA0692000	69	350	2000	2155	84.84	700	27.56	2700	8856	2068	81.42	1065	41.92	1003	39.50	534	21
ZDTRIP 350-69-3000	EA0693000	69	350	3000	2155	84.84	700	27.56	2700	8856	2078	81.81	1075	42.31	1003	39.50	534	21
ZDTRIP 350-69-5000	EA0695000	69	350	5000	2155	84.84	700	27.56	2700	8856	2158	84.96	1155	45.46	1003	39.50	534	21

*a: DL means draw lead, BC means Bottom connected.

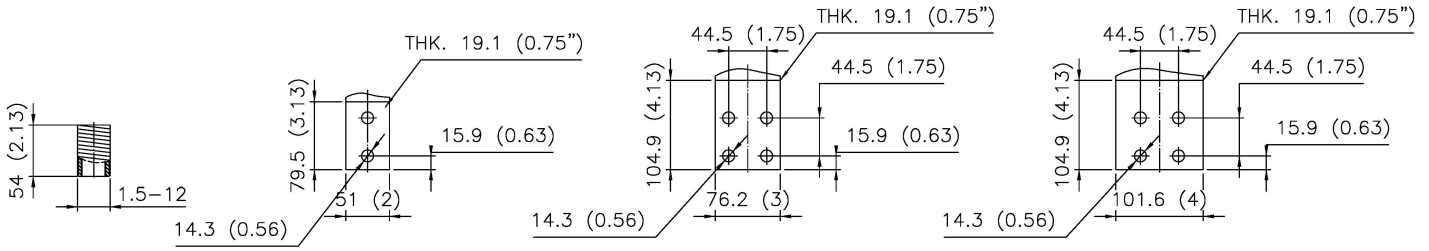


Fig. 1.1

Fig. 1.2

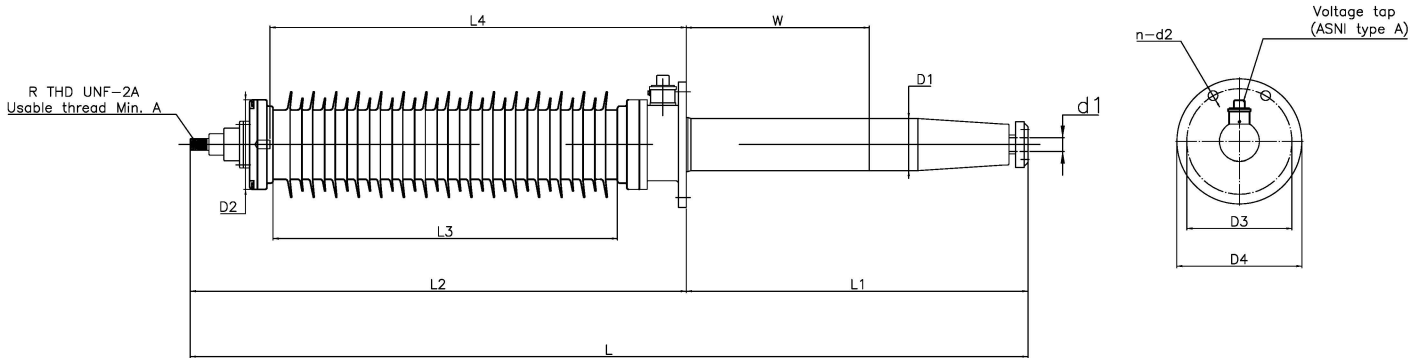
Fig. 1.3

Fig. 1.4

Oil end diameter Max. (D1)		Type of lead	Inner tube diameter (d1)		Draw lead length (air side)		Bottom terminal		Top terminal		Head metal part diameter (D2)		Flange gasket space				Flange					
							Fig.	N	R	A			Inside diameter Max.	Outside diameter Min.	Holes No.	Hole size	B.C.					
mm	in		mm	in	mm	in		mm	in	mm	in	mm	in	mm	in	mm	in	No.	mm	in	mm	in
79	3.11	DL	35	1.38	465	18.31	-	-	1.5-12	54	2.13	185	7.28	102	4	159	6.25	4	22	0.88	184	7.25
79	3.11	BC	-	-	-	-	1.1	-	1.5-12	54	2.13	185	7.28	102	4	159	6.25	4	22	0.88	184	7.25
92	3.62	BC	-	-	-	-	1.2	-	1.5-12	64	2.5	185	7.28	102	4	159	6.25	4	22	0.88	184	7.25
114	4.49	BC	-	-	-	-	1.3	-	2.0-12	76	3	210	8.27	140	5.5	184	7.25	4	22	0.88	210	8.25
140	5.51	BC	-	-	-	-	1.4	-	4.0-12	102	4	230	9.06	191	7.5	235	9.25	6	22	0.88	260	10.25
79	3.11	DL	35	1.38	565	22.24	-	-	1.5-12	54	2.13	185	7.28	102	4	159	6.25	4	22	0.88	184	7.25
79	3.11	BC	-	-	-	-	1.1	-	1.5-12	54	2.13	185	7.28	102	4	159	6.25	4	22	0.88	184	7.25
92	3.62	BC	-	-	-	-	1.2	-	1.5-12	64	2.5	185	7.28	102	4	159	6.25	4	22	0.88	184	7.25
114	4.49	BC	-	-	-	-	1.3	-	2.0-12	76	3	210	8.27	140	5.5	184	7.25	6	22	0.88	235	9.25
140	5.51	BC	-	-	-	-	1.4	-	4.0-12	102	4	230	9.06	191	7.5	235	9.25	6	22	0.88	260	10.25
79	3.11	DL	35	1.38	650	25.59	-	-	1.5-12	54	2.13	185	7.28	102	4	159	6.25	4	22	0.88	210	8.25
79	3.11	BC	-	-	-	-	1.1	-	1.5-12	54	2.13	185	7.28	102	4	159	6.25	4	22	0.88	210	8.25
92	3.62	BC	-	-	-	-	1.2	-	1.5-12	64	2.5	185	7.28	102	4	159	6.25	4	22	0.88	210	8.25
114	4.49	BC	-	-	-	-	1.3	-	2.0-12	76	3	210	8.27	140	5.5	184	7.25	6	22	0.88	235	9.25
140	5.51	BC	-	-	-	-	1.4	-	4.0-12	102	4	230	9.06	191	7.5	235	9.25	6	22	0.88	260	10.25
115	4.53	DL	48	1.89	875	34.45	-	-	1.5-12	54	2.13	210	8.27	152	6	210	8.25	6	22	0.88	235	9.25
115	4.53	BC	-	-	-	-	1.1	-	1.5-12	54	2.13	210	8.27	152	6	210	8.25	6	22	0.88	235	9.25
126	4.96	BC	-	-	-	-	1.2	-	1.5-12	64	2.5	230	9.06	152	6	210	8.25	6	22	0.88	235	9.25
126	4.96	BC	-	-	-	-	1.3	-	2.0-12	76	3	230	9.06	178	7	235	9.25	6	22	0.88	260	10.25
158	6.22	BC	-	-	-	-	1.4	-	4.0-12	102	4	285	11.22	254	10	324	12.75	6	32	1.25	362	14.25

Note: Dimensions listed in this table are for reference and may be changed. For specific dimensions refer to the outline drawing.

ZDTRIP range from 115 to 765kV ratings & dimensions



Style No.	Catalog No.	Nominal voltage	BIL	Rated current	Creepage distance Min.		Arcing distance Min. (L3)		Max. altitude		Overall length (L)		Length above flange (L2)		Length below flange (L1)		Min. oil level and CT length (W)	
		kV	kV	A	mm	in	mm	in	m	ft	mm	in	mm	in	mm	in	mm	in
ZDTRIP 550-115-800	EA1150800	115	550	800	3585	141.14	1100	43.31	2400	7874	2657	104.61	1565	61.61	1092	43	584	23
ZDTRIP 550-115-1200	EA1151200	115	550	1200	3585	141.14	1100	43.31	2400	7874	2657	104.61	1565	61.61	1092	43	584	23
ZDTRIP 550-115-2000	EA1152000	115	550	2000	3585	141.14	1100	43.31	2400	7874	2597	102.24	1505	59.24	1092	43	584	23
ZDTRIP 550-115-3000	EA1153000	115	550	3000	3585	141.14	1100	43.31	2400	7874	2607	102.64	1515	59.64	1092	43	584	23
ZDTRIP 550-115-5000	EA1155000	115	550	5000	3585	141.14	1100	43.31	2400	7874	2732	107.56	1640	64.56	1092	43	584	23
ZDTRIP 650-138-800	EA1380800	138	650	800	4310	169.69	1250	49.21	2100	6888	2913	114.69	1725	67.94	1188	46.75	584	23
ZDTRIP 650-138-1200	EA1381200	138	650	1200	4310	169.69	1250	49.21	2100	6888	2913	114.69	1725	67.94	1188	46.75	584	23
ZDTRIP 650-138-2000	EA1382000	138	650	2000	4310	169.69	1250	49.21	2100	6888	2853	112.32	1665	65.57	1188	46.75	584	23
ZDTRIP 650-138-3000	EA1383000	138	650	3000	4310	169.69	1250	49.21	2100	6888	2863	112.72	1675	65.97	1188	46.75	584	23
ZDTRIP 650-138-5000	EA1385000	138	650	5000	4310	169.69	1250	49.21	2100	6888	2978	117.24	1790	70.49	1188	46.75	584	23
ZDTRIP 750-161-800	EA1610800	161	750	800	5020	197.64	1475	58.07	2100	6888	3216	126.61	1940	76.36	1276	50.25	584	23
ZDTRIP 750-161-1200	EA1611200	161	750	1200	5020	197.64	1475	58.07	2100	6888	3216	126.61	1940	76.36	1276	50.25	584	23
ZDTRIP 750-161-2000	EA1612000	161	750	2000	5020	197.64	1475	58.07	2100	6888	3166	124.65	1890	74.40	1276	50.25	584	23
ZDTRIP 750-161-3000	EA1613000	161	750	3000	5020	197.64	1475	58.07	2100	6888	3176	125.04	1900	74.79	1276	50.25	584	23
ZDTRIP 750-161-5000	EA1615000	161	750	5000	5020	197.64	1475	58.07	2100	6888	3291	129.57	2015	79.32	1276	50.25	584	23
ZDTRIP 900-230-800	EA2300800	230	900	800	7170	282.28	2050	80.71	3000	9840	3946	155.35	2670	105.10	1276	50.25	584	23
ZDTRIP 900-230-1200	EA2301200	230	900	1200	7170	282.28	2050	80.71	3000	9840	3946	155.35	2670	105.10	1276	50.25	584	23
ZDTRIP 900-230-2000	EA2302000	230	900	2000	7170	282.28	2050	80.71	3000	9840	3886	152.99	2610	102.74	1276	50.25	584	23
ZDTRIP 900-230-3000	EA2303000	230	900	3000	7170	282.28	2050	80.71	3000	9840	3896	153.39	2620	103.14	1276	50.25	584	23
ZDTRIP 900-230-5000	EA2305000	230	900	5000	7170	282.28	2050	80.71	3000	9840	4006	157.72	2730	107.47	1276	50.25	584	23
ZDTRIP 1175-345-800	EA3450800	345	1175	800	10760	423.62	2900	114.17	2100	6888	4920	193.70	3625	142.70	1295	51	584	23
ZDTRIP 1175-345-1200	EA3451200	345	1175	1200	10760	423.62	2900	114.17	2100	6888	4920	193.70	3625	142.70	1295	51	584	23
ZDTRIP 1175-345-2000	EA3452000	345	1175	2000	10760	423.62	2900	114.17	2100	6888	4835	190.35	3540	139.35	1295	51	584	23
ZDTRIP 1175-345-3000	EA3453000	345	1175	3000	10760	423.62	2900	114.17	2100	6888	4845	190.75	3550	139.75	1295	51	584	23
ZDTRIP 1675-500-800	EA5000800	500	1675	800	15600	614.17	4250	167.32	1000	3280	6726	264.80	5075	199.80	1651	65	584	23
ZDTRIP 1675-500-1200	EA5001200	500	1675	1200	15600	614.17	4250	167.32	1000	3280	6726	264.80	5075	199.80	1651	65	584	23
ZDTRIP 1675-500-2000	EA5002000	500	1675	2000	15600	614.17	4250	167.32	1000	3280	6641	261.46	4990	196.46	1651	65	584	23
ZDTRIP 1675-500-3000	EA5003000	500	1675	3000	15600	614.17	4250	167.32	1000	3280	6651	261.85	5000	196.85	1651	65	584	23
ZDTRIP 2050-765-800	EA7650800	765	2050	800	23850	938.98	6600	259.84	2100	6888	9634	379.29	7475	294.29	2159	85	584	23
ZDTRIP 2050-765-1200	EA7651200	765	2050	1200	23850	938.98	6600	259.84	2100	6888	9634	379.29	7475	294.29	2159	85	584	23
ZDTRIP 2050-765-2000	EA7652000	765	2050	2000	23850	938.98	6600	259.84	2100	6888	9549	375.94	7390	290.94	2159	85	584	23
ZDTRIP 2050-765-2500	EA7652500	765	2050	2500	23850	938.98	6600	259.84	2100	6888	9589	377.52	7430	292.52	2159	85	600	24

*a: DL means draw lead, BC means Bottom connected.

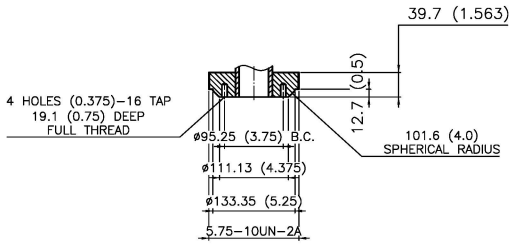


Fig. 2.1

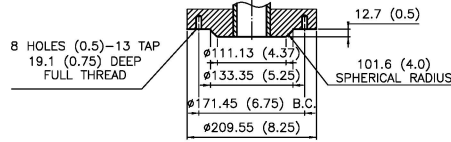


Fig. 2.2

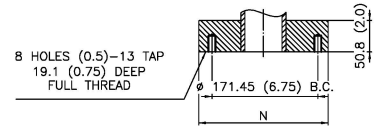


Fig. 2.3

Oil end diameter Max. (D1)		Type of lead	Inner tube diameter Min. (d1)		Draw lead length (air side)		Bottom terminal			Top terminal		Head metal part diameter (D2)		Flange gasket space				Flange						
mm	in		mm	in	mm	in	Fig.	N	R	A	mm	in	mm	in	mm	in	mm	in	Holes No.	Hole size	B.C.	mm	in	mm
140	5.51	DL	42	1.65	1320	51.97	-	-	-	1.5-12	51	2	230	9.06	251	9.88	302	11.88	6	32	1.25	337	13.25	
140	5.51	BC	-	-	-	-	2.1	-	-	1.5-12	51	2	230	9.06	251	9.88	302	11.88	6	32	1.25	337	13.25	
145	5.71	BC	-	-	-	-	2.2	-	-	1.5-12	64	2.5	230	9.06	251	9.88	302	11.88	6	32	1.25	337	13.25	
145	5.71	BC	-	-	-	-	2.2	-	-	2.0-12	76	3	230	9.06	251	9.88	302	11.88	6	32	1.25	337	13.25	
190	7.48	BC	-	-	-	-	2.2	-	-	4.0-12	102	4	285	11.22	251	9.88	302	11.88	6	32	1.25	337	13.25	
140	5.51	DL	42	1.65	1480	58.27	-	-	-	1.5-12	51	2	230	9.06	276	10.88	327	12.88	6	32	1.25	362	14.25	
140	5.51	BC	-	-	-	-	2.1	-	-	1.5-12	51	2	230	9.06	276	10.88	327	12.88	6	32	1.25	362	14.25	
145	5.71	BC	-	-	-	-	2.2	-	-	1.5-12	64	2.5	230	9.06	276	10.88	327	12.88	6	32	1.25	362	14.25	
145	5.71	BC	-	-	-	-	2.2	-	-	2.0-12	76	3	230	9.06	276	10.88	327	12.88	6	32	1.25	362	14.25	
190	7.48	BC	-	-	-	-	2.2	-	-	4.0-12	102	4	285	11.22	276	10.88	327	12.88	6	32	1.25	362	14.25	
140	5.51	DL	42	1.65	1695	66.73	-	-	-	1.5-12	51	2	230	9.06	314	12.38	365	14.38	8	32	1.25	400	15.75	
140	5.51	BC	-	-	-	-	2.1	-	-	1.5-12	51	2	230	9.06	314	12.38	365	14.38	8	32	1.25	400	15.75	
158	6.22	BC	-	-	-	-	2.2	-	-	1.5-12	64	2.5	285	11.22	314	12.38	365	14.38	8	32	1.25	400	15.75	
158	6.22	BC	-	-	-	-	2.2	-	-	2.0-12	76	3	285	11.22	314	12.38	365	14.38	8	32	1.25	400	15.75	
210	8.27	BC	-	-	-	-	2.2	-	-	4.0-12	102	4	350	13.78	314	12.38	365	14.38	8	32	1.25	400	15.75	
210	8.27	DL	42	1.65	2425	95.47	-	-	-	1.5-12	51	2	350	13.78	435	17.13	495	19.5	12	32	1.25	533	21	
210	8.27	BC	-	-	-	-	2.2	-	-	1.5-12	51	2	350	13.78	435	17.13	495	19.5	12	32	1.25	533	21	
210	8.27	BC	-	-	-	-	2.2	-	-	1.5-12	64	2.5	350	13.78	435	17.13	495	19.5	12	32	1.25	533	21	
210	8.27	BC	-	-	-	-	2.2	-	-	2.0-12	76	3	350	13.78	435	17.13	495	19.5	12	32	1.25	533	21	
295	11.61	BC	-	-	-	-	2.2	-	-	4.0-12	102	4	480	18.90	435	17.13	495	19.5	12	32	1.25	533	21	
295	11.61	DL	60	2.36	3375	132.87	-	-	-	1.5-12	51	2	480	18.90	435	17.13	495	19.5	12	32	1.25	533	21	
295	11.61	BC	-	-	-	-	2.3	210	8.25	1.5-12	51	2	480	18.90	435	17.13	495	19.5	12	32	1.25	533	21	
295	11.61	BC	-	-	-	-	2.3	210	8.25	1.5-12	64	2.5	480	18.90	435	17.13	495	19.5	12	32	1.25	533	21	
295	11.61	BC	-	-	-	-	2.3	210	8.25	2.0-12	76	3	480	18.90	435	17.13	495	19.5	12	32	1.25	533	21	
340	13.39	DL	60	2.36	4825	189.96	-	-	-	1.5-12	51	2	550	21.65	533	21	584	23	12	32	1.25	635	25	
340	13.39	BC	-	-	-	-	2.3	210	8.25	1.5-12	51	2	550	21.65	533	21	584	23	12	32	1.25	635	25	
340	13.39	BC	-	-	-	-	2.3	210	8.25	1.5-12	64	2.5	550	21.65	533	21	584	23	12	32	1.25	635	25	
340	13.39	BC	-	-	-	-	2.3	210	8.25	2.0-12	76	3	550	21.65	533	21	584	23	12	32	1.25	635	25	
435	17.13	DL	70	2.76	7225	284.45	-	260	10.24	1.5-12	51	2	680	26.77	749	29.5	854	33.63	16	32	1.25	889	35	
435	17.13	BC	-	-	-	-	2.3	260	10.24	1.5-12	51	2	680	26.77	749	29.5	854	33.63	16	32	1.25	889	35	
435	17.13	BC	-	-	-	-	2.3	260	10.24	1.5-12	64	2.5	680	26.77	749	29.5	854	33.63	16	32	1.25	889	35	
435	17.13	BC	-	-	-	-	2.3	260	10.24	2.5-12	102	4	680	26.77	749	29.5	854	33.63	16	32	1.25	889	35	

Note: Dimensions listed in this table are for reference and may be changed. For specific dimensions refer to the outline drawing.

Appendix

RIS BUSHINGS

RIS bushing is a new technology in the dry type bushing area. This type bushing uses the synthetic material instead of crepe paper when wrapping the condenser core. The condenser core needs to cast in the vacuum model. All the manufacturing processes are similar to the RIP bushings. The outer envelope is silicone rubber that is directly spliced to the core. The most advantages of RIS bushings are water-proofing and better strength ability. ZDVolt has developed RIS bushings rated up to 138kV now.

All the dimensions of RIS bushings are similar to RIP bushings. For detailed information, please contact ZDVolt for outline drawings.



IEC60137 standard bushings

Bushing type specification

RIP bushings are applicable in various environment, we define different types for them.

No.	Letter or numbers	Meaning	Option or example
1	E	Epoxy resin impregnated paper bushing	All RIP bushings
2	TA	Transformer-Air	ETA-145/630-4F
	TO	Transformer-Oil	ETO-145/630
	TG	Transformer-Gas	ETG-145/630
	TGA	Transformer (gas)-Air	ETGA-145/630-4F
	TW	Wall bushing	ETW-145/630
3	145	Maximum voltage of bushing	
4	630	Rated current	
5	4	Pollution level	3 represents USCD 43.7mm/kV, 4 represents USCD 53.7mm/kV.
6	F	External insulator material : Polymer.	Cancel "F" with the porcelain insulator.

Note: Only outdoor bushings need to consider the pollution level, so ETG and ETO bushings don't need the last number and letter (No.5&6 in the table).

Electric performance

No.	Um	BIL (kV)	AC (dry, kV)	Ac (wet, kV)	SIL (kV)
1	36(40.5)	170(200)	77(95)	70(80)	---
2	52	250	105	95	---
3	72.5	325	155	140	---
4	123 (126)	550	255	230	---
5	145	650	305	275	---
6	170	750	355	325	---
7	245 (252)	1050	505	460	850
8	300	1050	505	---	850
9	362 (363)	1175	625	535	950
10	420	1425	695	---	1050
11	550	1675	750	---	1175
12	800	2100	970	---	1425
13	1100	2400	1200	---	1950
Tanδ (corrected at 20°C)		< 0.4% at Um			
Partial discharge		< 5PC at Um			
		< 10PC at 1.5Um			

RIP bushings dimension (oil-air, composite insulator)

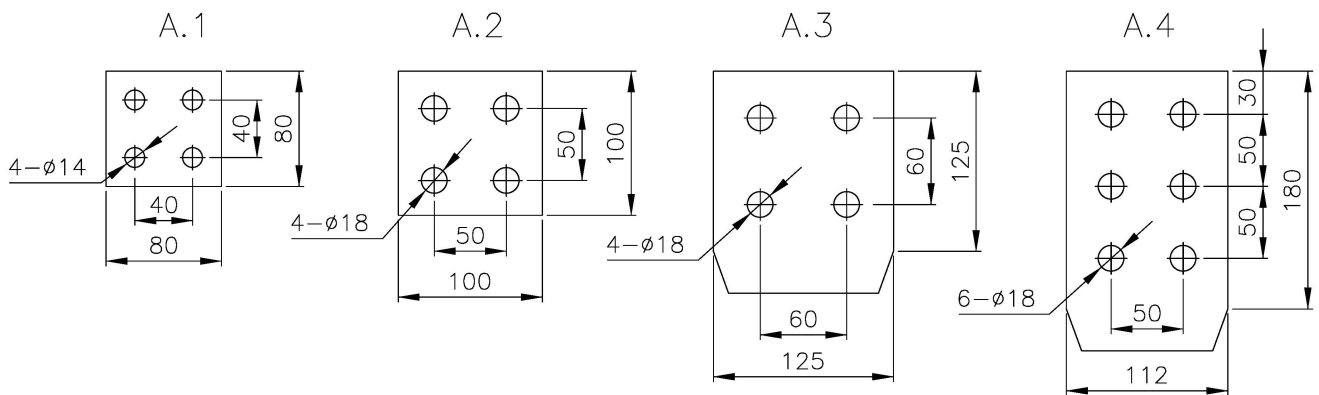
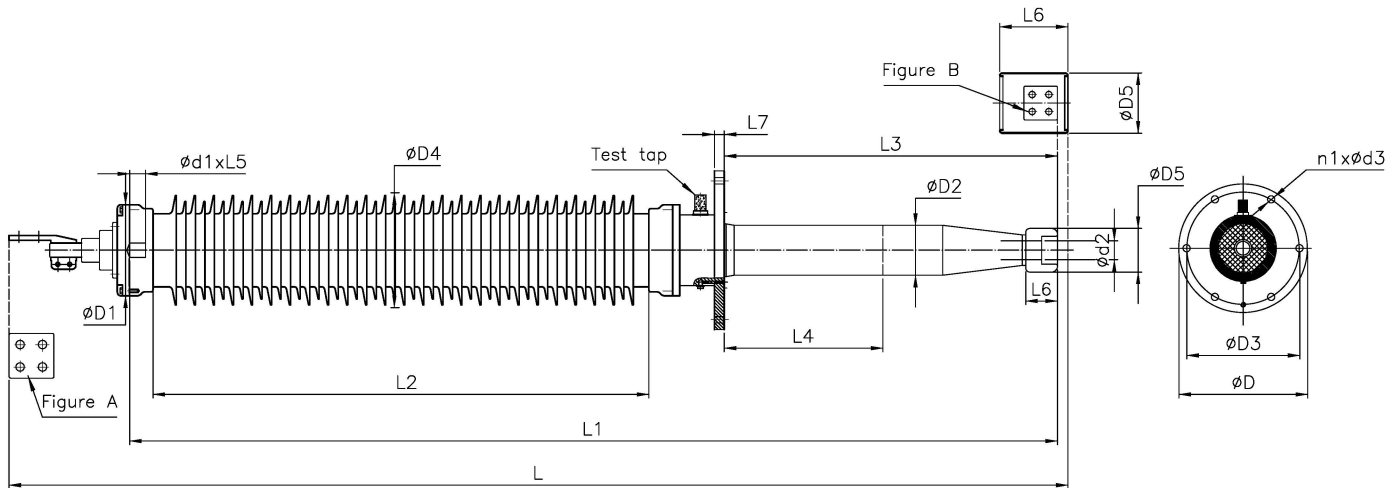


Figure A: Outer terminal

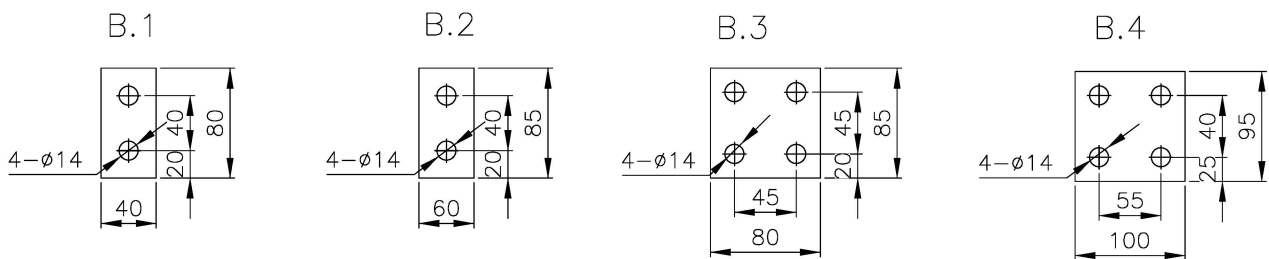


Figure B: Bottom terminal

Code	Type	Um	Ir	L	L1	Outdoor insulator			Flange					Oil end dimension			Shield ball		Outer terminal	Bottom terminal	Inner terminal		Head	Tube
						c.p.	L2	D4	D	D3	n1	d3	L7	L4	L3	D2	L6	D5	Fig.	Fig.	d1	L5	D1	d2
FEA3140	ETA-40.5/630-4F	40.5	630	1170	890	1260	485	280	255	225	8	14	20	0	180	115	*	*	A.1	*	28	40	210	60
FEA3143	ETA 40.5/630 4F	40.5	630	1435	1155	1260	485	280	255	225	8	14	20	300	445	115			A.2		28	40	210	60
FEA3240	ETA-40.5/1250-4F	40.5	1250	1195	890	1260	485	280	255	225	8	14	20	0	180	115	*	*	A.2	*	36	40	210	60
FEA3243	ETA-40.5/1250-4F	40.5	1250	1460	1155	1260	485	280	255	225	8	14	20	300	445	115	*	*	A.2	*	36	40	210	60
FEA3340	ETA-40.5/2000-4F	40.5	2000	1350	*	1260	485	280	255	225	8	14	20	0	295	115	*	*	A.3	B.2	*	*	210	*
FEA3343A	ETA-40.5/1600-4F	40.5	1600	1615	*	1260	485	280	255	225	8	14	20	300	560	115	*	*	A.3	B.2	*	*	210	*
FEA3343	ETA-40.5/2000-4F	40.5	2000	1615	*	1260	485	280	255	225	8	14	20	300	560	115	*	*	A.3	B.2	*	*	210	*
FEA3343B	ETA-40.5/2500-4F	40.5	2500	1615	*	1260	485	280	255	225	8	14	20	300	560	115	*	*	A.3	B.2	*	*	210	*
FEA3440	ETA-40.5/3150-4F	40.5	3150	1385	*	1260	485	280	255	225	8	14	20	0	295	115	*	*	A.4	B.3	*	*	210	*
FEA3443	ETA-40.5/3150-4F	40.5	3150	1650	*	1260	485	280	255	225	8	14	20	300	560	115	*	*	A.4	B.3	*	*	210	*
FEA3543	ETA-40.5/4000-4F	40.5	4000	1710	*	1260	485	280	400	350	6	24	25	300	580	140	*	*	A.4	B.4	*	*	230	*
FEA3153	ETA-52/630-4F	52	630	1435	1155	1612	485	280	255	225	8	14	20	300	445	115	*	*	A.1	*	28	40	210	60
FEA3253	ETA 52/1250 4F	52	1250	1460	1155	1612	485	280	255	225	8	14	20	300	445	115	*	*	A.2	*	36	40	210	60
FEA3353A	ETA 52/1600 4F	52	1600	1615	*	1612	485	280	255	225	8	14	20	300	560	115	*	*	A.3	B.2	*	*	210	*
FEA3353	ETA-52/2000-4F	52	1600	1615	*	1612	485	280	255	225	8	14	20	300	560	115	*	*	A.3	B.2	*	*	210	*
FEA3353B	ETA-52/2500-4F	52	1600	1615	*	1612	485	280	255	225	8	14	20	300	560	115	*	*	A.3	B.2	*	*	210	*
FEA3453	ETA-52/3150-4F	52	3150	1650	*	1612	485	280	255	225	8	14	20	300	560	115	*	*	A.4	B.3	*	*	210	*
FEA3553	ETA-52/4000-4F	52	4000	1710	*	1612	485	280	400	350	6	24	25	300	580	140	*	*	A.4	B.4	*	*	230	*
FEA4144	ETA-72.5/630-4F	72.5	630	1925	1625	2250	755	280	320	280	6	18	20	400	670	95	50	100	A.1		28	35	210	35
FEA4244	ETA-72.5/1250-4F	72.5	1250	1980	1680	2250	755	280	320	280	6	18	20	400	700	115	80	110	A.2	*	36	40	210	48
FEA4344A	ETA-72.5/1600-4F	72.5	1600	2140	*	2250	755	280	400	350	6	24	20	400	755	115	200	180	A.3	B.2	*	*	210	*
FEA4344	ETA-72.5/2000-4F	72.5	2000	2140	*	2250	755	280	400	350	6	24	20	400	755	115	200	180	A.3	B.2	*	*	210	*
FEA4344B	ETA-72.5/2500-4F	72.5	2500	2140	*	2250	755	280	400	350	6	24	20	400	755	115	200	180	A.3	B.2	*	*	210	*
FEA5144	ETA-126/630-4F	126	630	2565	2265	3906	1250	280	400	350	6	24	25	400	810	115	50	100	A.1	*	28	35	210	35
FEA5244	ETA-126/1250-4F	126	1250	2640	2340	3906	1250	280	400	350	6	24	25	400	840	126	80	110	A.2	*	36	40	230	48
FEA5344A	ETA-126/1600-4F	126	1600	2815	*	3906	1250	280	400	350	6	24	25	400	915	140	200	180	A.3	B.2	*	*	230	*
FEA5344	ETA-126/2000-4F	126	2000	2815	*	3906	1250	280	400	350	6	24	25	400	915	140	200	180	A.3	B.2	*	*	230	*
FEA5344B	ETA-126/2500-4F	126	2500	2815	*	3906	1250	280	400	350	6	24	25	400	915	140	200	180	A.3	B.2	*	*	230	*
FEA5154K	ETA-145/630-4F	145	630	2645	2345	4495	1300	280	400	350	6	24	25	400	840	115	50	100	A.1	*	28	35	210	35
FEA5254K	ETA 145/1250 4F	145	1250	2720	2420	4495	1300	280	400	350	6	24	25	400	870	126	80	110	A.2		36	40	230	48
EA5163FR	ETA-170/630-4F	170	630	3070	2790	5300	1640	350	450	400	8	24	25	300	890	158	90	150	A.1		28	40	300	60
EA5263FR	ETA-170/1250-4F	170	1250	3090	2790	5300	1640	350	450	400	8	24	25	300	890	158	90	150	A.2	*	36	40	300	60
FEA5363A	ETA-170/1600-4F	170	1600	3240	*	5300	1640	350	450	400	8	24	25	300	935	158	200	180	A.3	B.2	*	*	300	*
FEA6146	ETA-252/630-4F	252	630	4430	4150	8600	2330	390	550	500	12	24	30	600	1380	210	150	200	A.1	*	28	40	350	48
FEA6246	ETA-252/1250-4F	252	1250	4455	4150	8600	2330	390	550	500	12	24	30	600	1380	210	150	200	A.2	*	36	40	350	48
FEA6346	ETA-252/2000-4F	252	2000	4660	*	8600	2330	390	550	500	12	24	30	600	1450	210	265	265	A.3	B.2	*	*	350	*
FEA6156	ETA-300/630-4F	300	630	4780	4500	10230	2680	390	550	500	12	24	30	600	1380	210	150	200	A.1	*	28	40	350	48
FEA6256	ETA-300/1250-4F	300	1250	4800	4500	10230	2680	390	550	500	12	24	30	600	1380	210	150	200	A.2	*	36	40	350	48
FEA6356	ETA-300/2000-4F	300	2000	5010	*	10230	2680	390	550	500	12	24	30	600	1450	210	265	265	A.3	B.2	*	*	350	*
EA7146FR	ETA-363/630-4F	363	630	5880	5475	12380	3350	500	710	660	12	24	30	600	1600	295	200	280	A.2	*	46	60	480	70
EA7246KFR	ETA-363/1250-4F	363	1250	5880	5475	12380	3350	500	710	660	12	24	30	600	1600	295	200	280	A.2	*	46	60	480	70
EA7166FR.1	ETA-420/630-4F	420	630	7370	6800	14325	4250	540	710	660	12	24	30	600	1990	340	280	320	A.2	*	46	60	550	70
EA7266FR	ETA-420/1250-4F	420	1250	7370	6800	14325	4250	540	710	660	12	24	30	600	1990	340	280	320	A.2	*	46	60	550	70
FEA8144	ETA-550/630-4F	550	630	7420	6850	18755	4500	560	720	660	12	24	30	400	1790	340	280	320	2*A.3	*	46	60	550	70
FEA8244	ETA-550/1250-4F	550	1250	7420	6850	18755	4500	560	720	660	12	24	30	400	1790	340	280	320	2*A.3	*	46	60	550	70
EA9336BFR	ETA-800/2500-3F	800	2500	9780	*	26000	6600	800	800	711	12	32	40	600	2190	435	420	350	2*A3	B.3	*	*	680	*

RIP bushings dimension (oil-air, porcelain insulator)

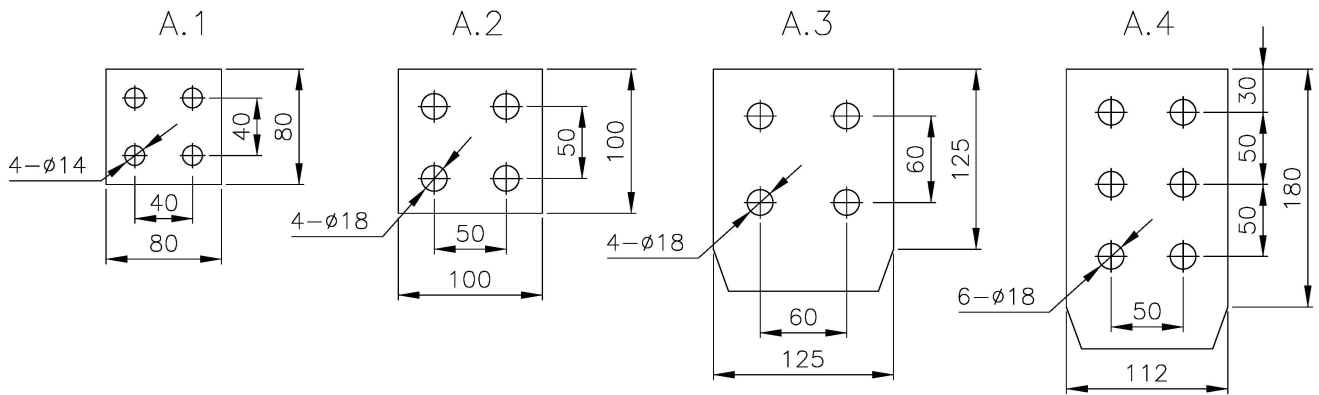
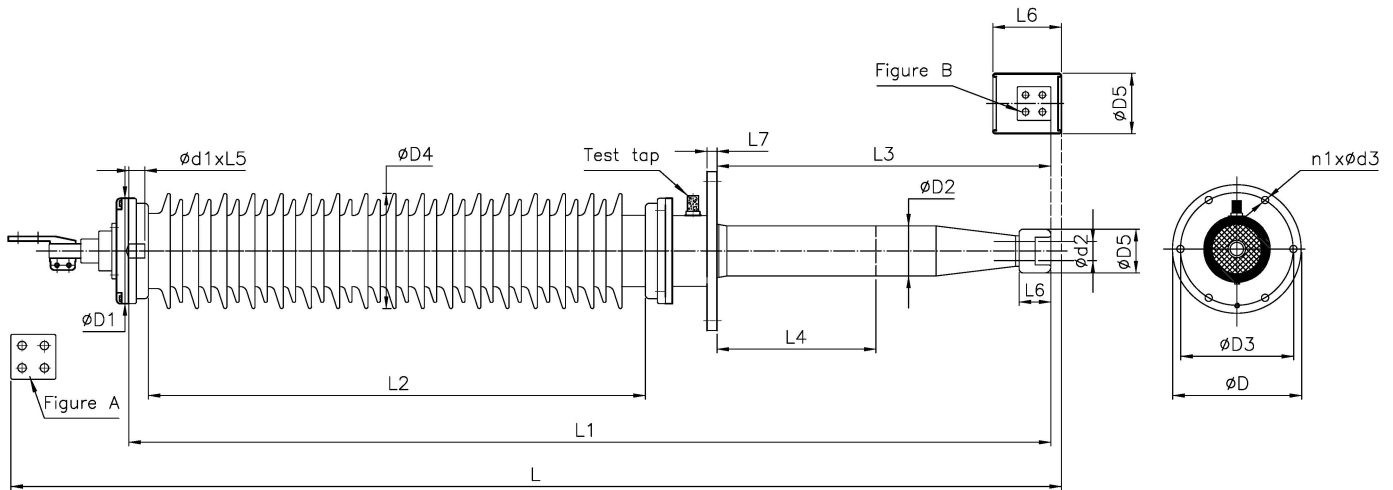


Figure A: Outer terminal

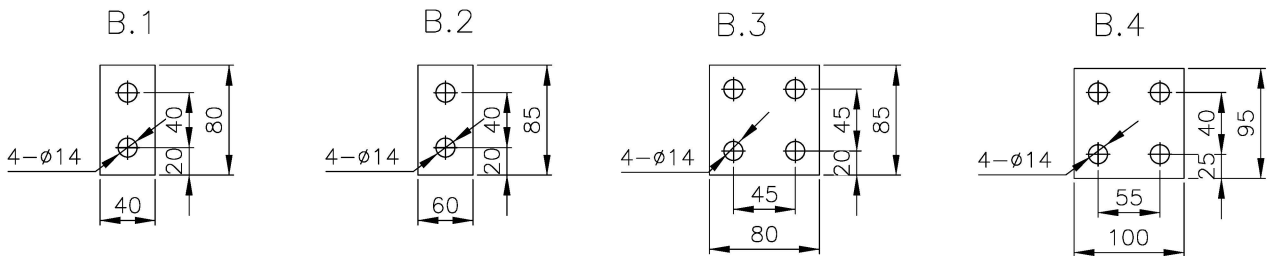
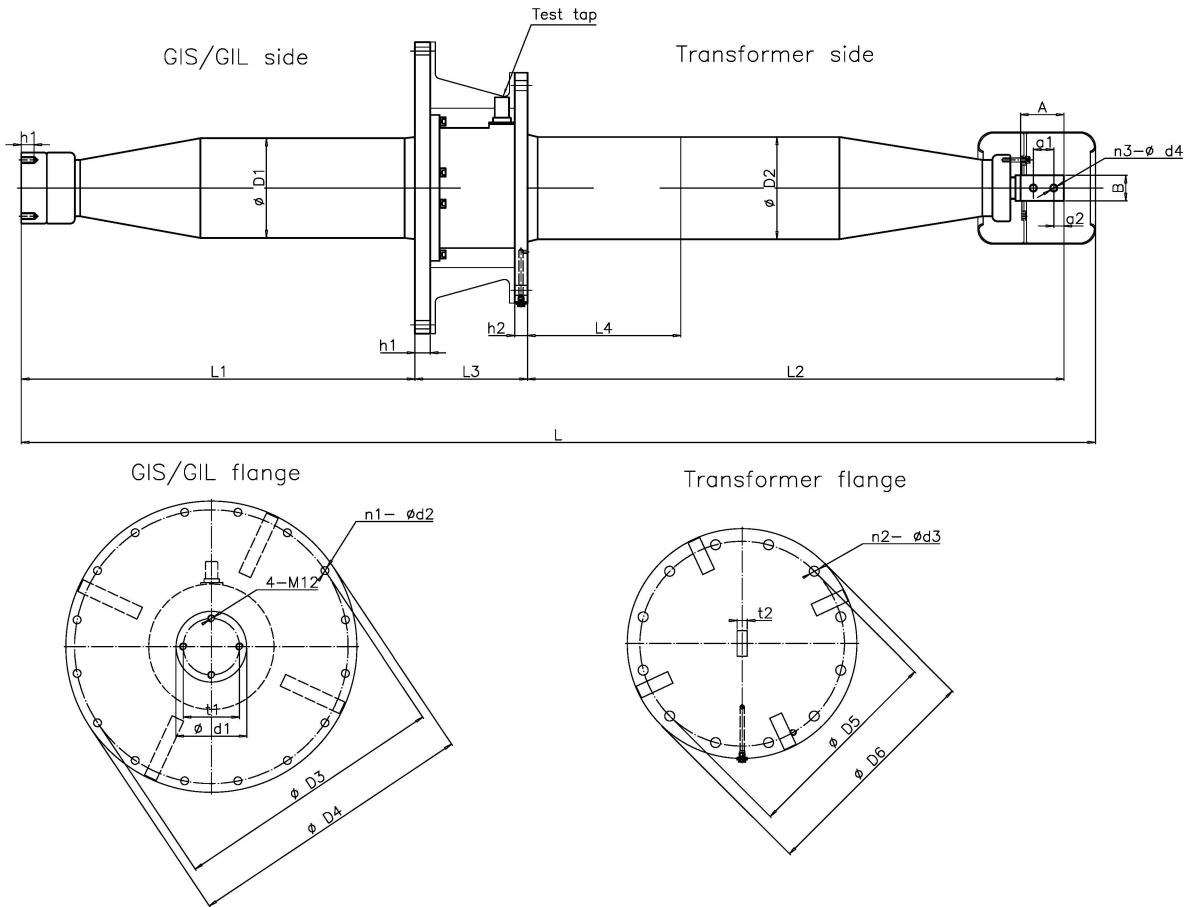


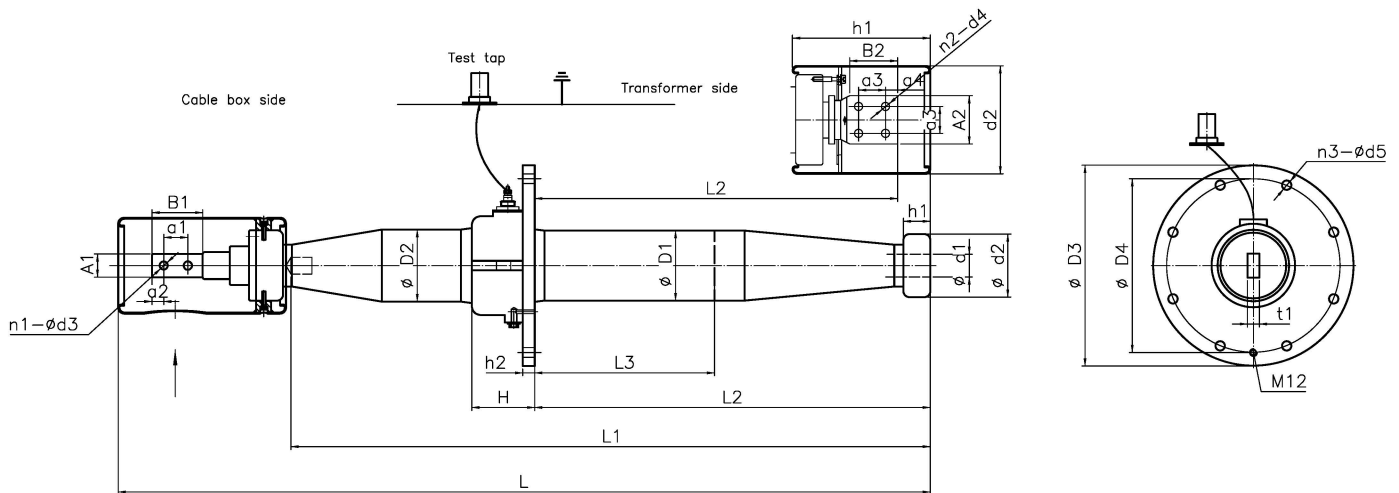
Figure B: Bottom terminal

RIP bushings dimension (oil-gas)



Code	Type	Um	Ir	L	Gas side										Transformer side										Flange	
					L1	D1	d1	t1	h1	D4	D3	n1-d2	h1	L2	D2	L4	BxA	a1	a2	n3-d4	t2	D6	D5	n2-d3		h2
EF513X	ETG-126/630	126	630	1500	520	136	99	70	25	335	305	8-16	30	765	128	300	40x85	45	20	2-14	20	335	290	8-16	20	155
EF513BX	ETG-126/800	126	800	1500	520	136	99	70	25	335	305	8-16	30	765	128	300	40x85	45	20	2-14	20	335	290	8-16	20	155
EF523XT	ETG-126/1250	126	1250	1500	520	136	99	70	25	335	305	8-16	30	765	128	300	40x85	45	20	2-14	20	335	290	8-16	20	155
EF513KX	ETG-145/630	145	630	1585	520	145	99	70	25	335	305	8-16	30	855	140	300	40x85	45	20	2-14	20	335	290	8-16	20	155
EF523KT	ETG-145/1250	145	1250	1585	520	145	99	70	25	335	305	8-16	30	855	140	300	40x85	45	20	2-14	20	335	290	8-16	20	155
EF613X.1	ETG-252/630	252	630	2105	770	195	139	110	25	570	535	16-16	30	1050	200	300	50x85	40	20	2-14	20	450	400	12-20	25	220
EF613X	ETG-252/800	252	800	2105	770	195	139	110	25	570	535	16-16	30	1050	200	300	50x85	40	20	2-14	20	450	400	12-20	25	220
EF615X	ETG-252/630	252	630	2305	770	195	139	110	25	570	535	16-16	30	1250	200	500	50x85	40	20	2-14	20	450	400	12-20	25	220
EF623X	ETG-252/1250	252	1250	2105	770	195	139	110	25	570	535	16-16	30	1050	200	300	50x85	40	20	2-14	20	450	400	12-20	25	220
EF643	ETG-252/3150	252	3150	2100	770	195	139	110	25	570	535	16-16	30	1060	200	300	80x80	45x45	20	4-14	20	450	400	12-20	25	220
EF712LK	ETG-363/630	363	630	2765	1050	295	139	110	25	690	640	16-20	35	1295	295	250	40x85	40	20	2-14	20	660	600	12-24	30	285
EF825E	ETG-420/1250	420	1250	3065	1050	340	139	110	25	690	640	16-20	35	1630	340	500	80x80	40x40	20	4-14	20	660	600	12-24	30	285
EF825	ETG-550/1250	550	1250	3065	1050	340	139	110	25	690	640	16-20	35	1630	340	500	80x80	40x40	20	4-14	20	660	600	12-24	30	285
EF835B	ETG-550/2500	550	2500	3065	1050	340	139	110	25	690	640	16-20	35	1630	340	500	80x80	40x40	20	4-14	20	660	600	12-24	30	285

RIP bushings dimension (oil-oil)



Code	Type	Um	Ir	L	Cable box side								Transformer side										Flange					Type of lead	
					L1	D2	A1	B1	a1	a2	t1	n1-d3	L2	D1	L3	d1	d2	h1	A2	B2	a3	a4	n2-d4	D3	D4	n3-d5	H		h2
EO410C	ETO-72.5/630	72.5	630	940	650	120	40	85	40	20	20	2-14	300	117	0	35	110	45	*	*	*	*	*	300	250	8-16	105	20	Draw lead
EO413C	ETO-72.5/630	72.5	630	1240	955	120	40	85	40	20	20	2-14	600	117	300	35	110	45	*	*	*	*	*	300	250	8-16	105	20	Draw lead
EO413C.1	ETO-72.5/800	72.5	800	1240	955	120	40	85	40	20	20	2-14	600	117	300	35	110	45	*	*	*	*	*	300	250	8-16	105	20	Draw lead
EO414G	ETO-72.5/630	72.5	630	1480	*	120	40	85	40	20	20	2-14	800	117	400	*	160	200	40	80	40	20	2-14	300	250	8-16	105	20	Solid stem
EO423C	ETO-72.5/1250	72.5	1250	1240	975	120	40	85	40	20	20	2-14	600	117	300	48	110	45	*	*	*	*	*	300	250	8-16	105	20	Draw lead
EO425C	ETO 72.5/1250	72.5	1250	1440	1175	120	40	85	40	20	20	2-14	800	117	500	48	110	45	*	*	*	*	*	300	250	8-16	105	20	Draw lead
EO442T	ETO-72.5/3150	72.5	3150	1320	*	150	80	85	45	20	20	4-14	615	150	200	*	180	230	80	80	45	20	4-14	400	350	6-24	110	25	Solid stem
EO452T	ETO-72.5/4000	72.5	4000	1320	*	150	80	85	45	20	20	4-14	615	150	200	*	180	230	80	80	45	20	4-14	400	350	6-24	110	25	Solid stem
EO510C	ETO-126/630	126	630	1145	860	120	40	85	40	20	20	2-14	450	117	0	35	110	45	*	*	*	*	*	335	290	8-16	105	20	Draw lead
EO513C	ETO-126/630	126	630	1355	1065	120	40	85	40	20	20	2-14	660	117	300	35	110	45	*	*	*	*	*	335	290	8-16	105	20	Draw lead
EO514C	ETO-126/630	126	630	1455	1165	120	40	85	40	20	20	2-14	760	117	400	35	110	45	*	*	*	*	*	335	290	8-16	105	20	Draw lead
EO523C	ETO-126/1250	126	1250	1375	1110	136	40	85	40	20	20	2-14	675	128	300	48	140	60	*	*	*	*	*	335	290	8-16	105	20	Draw lead
EO513C.2	ETO-145/630	145	630	1610	1325	136	40	85	40	20	20	2-14	785	128	300	35	110	45	*	*	*	*	*	335	290	8-16	105	20	Draw lead
EO523KC	ETO-145/1250	145	1250	1585	1320	160	40	85	40	20	20	2-14	800	150	300	48	140	60	*	*	*	*	*	335	290	8-18	110	25	Draw lead
EO533BK	ETO 145/2500	145	2500	1730	*	155	65	85	40	20	20	2-14	885	150	300	*	180	230	65	85	40	20	2-14	400	350	6-24	110	25	Solid stem
EO513EC	ETO-170/630	170	630	1780	1520	160	40	85	40	20	20	2-14	890	150	300	48	140	90	*	*	*	*	*	400	350	6-24	110	25	Draw lead
EO523EC	ETO-170/1250	170	1250	1780	1520	160	40	85	40	20	20	2-14	890	150	300	48	140	90	*	*	*	*	*	400	350	6-24	110	25	Draw lead
EO533E	ETO-170/2000	170	2000	1785	*	180	65	85	45	20	20	2-14	920	170	300	*	180	230	65	85	45	20	2-14	400	350	6-24	110	25	Solid stem
EO613C	ETO-252/630	252	630	2150	1890	210	40	85	40	20	20	2-14	1070	210	300	48	240	150	*	*	*	*	*	550	500	12-24	180	30	Draw lead
EO623C.2	ETO-252/1250	252	1250	2150	1890	210	40	85	40	20	20	2-14	1070	210	300	48	240	150	*	*	*	*	*	550	500	12-24	180	30	Draw lead
EO836E	ETO-420 2000	420	2000	3135	*	340	65	85	45	20	20	2-14	1680	340	600	*	320	280	65	85	45	20	2-14	660	600	12-24	260	30	Solid stem
EO836	ETO-550/2000	550	2000	3135	*	340	65	85	45	20	20	2-14	1680	340	600	*	320	280	65	85	45	20	2-14	660	600	12-24	260	30	Solid stem

Note:

All the bushings in the tables are for reference, we can provide various types and dimensions as customer required.



72.5-252kV OIP Bushings



550kV OIP Bushings



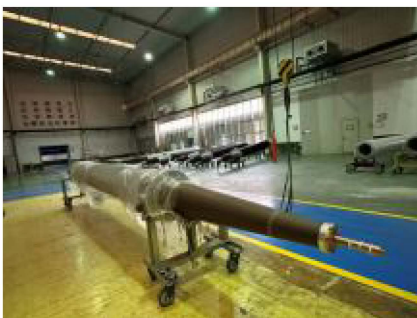
145kV RIP Bushings



550kV RIP Bushings



±800kV SF₆ HVDC Bushing



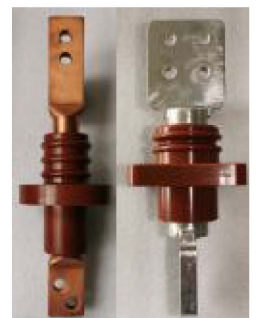
±400kV RIP DC Bushing



Type P&O I



Type P&O II



SEC bushings



Oil-Oil/Gas RIP bushings



GIS/GCB SF₆ Outlet Bushings



Turret with BCTs



CNAS Accreditation



±2400kV DC system



1650kV Power frequency system



4000kV Lightning impulse system



Contact:

Contact ZDVolt

Email: info@ZDVolt.com

Web: <http://www.ZDvolt.com>

Headquarter:

285 Longchang Road

Jurong city, Jiangsu Province, China 212400

Tel: +86-25-68518886

North America:

3790 El Camino Real, Unit #788

Palo Alto, CA 94306, USA

Tel: +1-408-520-7880

