

PAO

Condenser Bushings 25-765 kV

OIL-TO-AIR - Oil-Impregnated Paper

ANSI STANDARDS IEEE C57.19.01-2000 AND IEEE C57.19.01-1991

PASSONI & VILLA
AN ALSTOM COMPANY

PAO bushings are capacitance-graded bushings with an oil-impregnated paper core. They meet ANSI/IEEE C57.19.01-2000 and C57.19.01-1991, standard performance characteristics and dimensions for outdoor apparatus bushings.

They are designed for use in power transformers and can be installed up to a 45° maximum inclination (up to and including 138 kV) or 30° (161 to 765 kV) off vertical. Design, components and manufacturing technology promote an average lifetime in excess of 30 years under normal operation conditions.

The bushing is designated as follows:
PAO.138.650.800

PAO	ANSI type Condenser Bushings, Oil-impregnated paper (OIP)
138	Insulation class in kV
650	BIL in kV
800	Rated current in A
I-11657-33-DL	Catalogue number
I-11657-33	Drawing number
DL (BC)	Draw Lead (Bottom Connection) installed

Customer Benefits

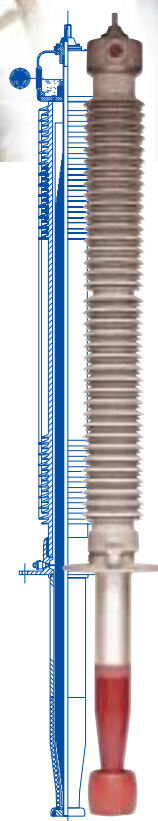
- Bushings with longer lifetime and higher reliability
- Possibility to use bushings under extreme weather condition (lower pour-point value)
- No oxidation phenomena typical with mineral oil
- No performance reduction with age



Manufacturing of capacitance-graded bushings

The main electrical component is the condenser body, manufactured using a continuous sheet of pure kraft paper, wound around a central conductor tube. During the winding process a series of aluminum foils are coaxially inserted between the paper layers, to achieve the best possible distribution of the radial and longitudinal electrical gradients between the central tube and the flange, which is grounded. The winding is made by computer-controlled machines, with subsequent machining to achieve the final shape. After winding, each bushing is individually assembled and placed into an oven and processed under vacuum for the appropriate period of time. Each bushing

is then impregnated with oil, which has been degassed and processed so that it has a maximum water content of 3 ppm. Each bushing is placed under pressure to insure thorough impregnation and to test that it is properly sealed. After impregnation, the bushing head is filled with a nitrogen cushion. This process is automatic and computer-controlled.



Main Features

PAO: ANSI/IEEE Standards condenser bushings

- Range from 25 to 765 kV
- Oil-impregnated paper
- Air side: porcelain or composite insulator
- Oil side: epoxy resin insulator (25 to 345 kV) or porcelain insulator (500 to 765 kV)
- Partial discharge: max. 5 pC at 1.5 Un
- Synthetic impregnating oil DDB (completely miscible with transformer oil)
- Provided with power factor tap (25 to 69 kV) or voltage tap (115 to 765 kV)
- Draw lead for 400-800 A, 25 to 765 kV
- Draw split rod for bottom connection for 1200 A, 25 to 69 kV
- Bottom connection for ≥ 1200 A application, 115 kV and above
- Head made of special UV filter prismatic glass with oil level indicator (25 to 230 kV) or fitted with metal oil reservoir and level gauge (345 to 765 kV)
- Flange made of cast aluminum alloy
- Standard installation angle, max. of 45° off vertical (up to and included 138 kV) or max. 30° off vertical (161 to 765 kV) other installation angles available on request
- Transformer-Breaker Interchangeable (TBI)

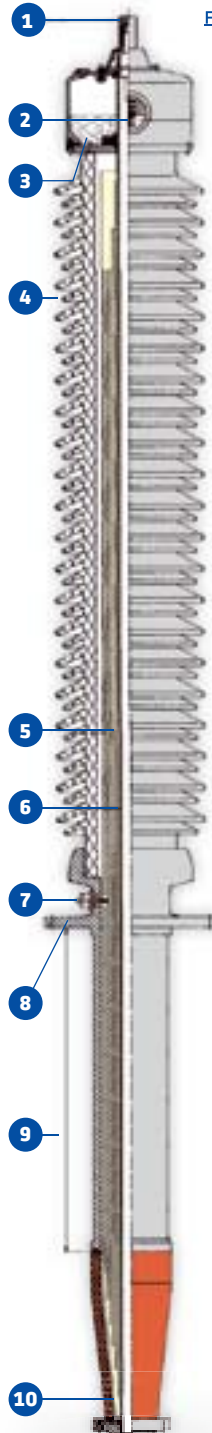


Fig. 1: Bushings 345 to 765 kV

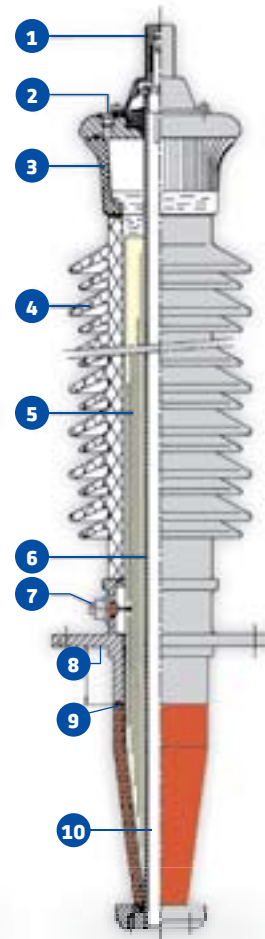


Fig. 2: Bushings 25 to 230 kV

1. HV Terminal
2. Metal oil reservoir
3. Oil level indicator
4. Porcelain
5. OIP Condenser
6. Winding tube
7. Voltage tap
8. Flange
9. CT space
10. Epoxy resin or Porcelain envelope

1. HV Terminal
2. Filling plug
3. UHV filter glass
4. Porcelain
5. OIP Condenser
6. Winding tube
7. Voltage tap
8. Flange
9. CT space
10. Epoxy resin or Porcelain envelope

Air side

The air side insulator is made of porcelain, light grey MUNSELL 5B4 7.0/0.4 (ASA 70). It can be provided with a resin fiberglass envelope covered by silicone sheds upon request. The typical creepage distance is suitable for very highly polluted atmospheres. The shed configuration is an alternating type (short-long shed). This is the most effective solution, proven by salt spray tests. The shed profile complies with IEC 815-1986 recommendations. A one-piece porcelain or multiple-piece porcelain, in order to meet standard or special requirements, is used for bushings. Multiple pieces are glued using epoxy resin, without use gaskets. The final porcelain is considered as a single piece (it passes tests IEC 233, clause 6).

Oil side

The oil side envelope is made of a molded epoxy resin for bushings up to 345 kV and porcelain for higher voltage ratings. This resin is a two-part compound consisting of a resin base and a hardener; the filler material is quartz sand. The epoxy resin envelope permits shapes, thickness and dimensional tolerances not possible with porcelain. As an added advantage, the epoxy resin easily accepts metal attachments, as required, to meet design requirements. The under flange sleeve length for the CT pocket is provided in accordance with ANSI/IEEE Standards.

Top terminal

The top terminal is made of silver plated copper. Bushings rated 400/800/1200 A have a removable HV terminal (fig. 24-7 and 25-8). This terminal is connected to the copper inner terminal lug by means of multiblade contacts and is secured to the bushing head by screws.

Current ratings

There are three connection alternatives for the conductor:

- Draw lead connection for 400 and 800 A (fig. 13-3 and 14-4)
- Draw split rod for bottom rod connection for 1200 A, 25 to 69 kV
- Bottom connection using a rigid conductor for 1200 A and above (fig. 15-5)

Using suitable accessories, any bushing rated 400 or 800 A (draw through lead installed) can be converted to 1200 A (bottom connected) and vice versa.

[Fig. 3:
400 A draw lead
terminal](#)



[Fig. 4:
800 A draw lead
terminal](#)



[Fig. 5:
1200 A inner lug](#)



[Fig. 6:
1200 A draw split
rod for bottom connection](#)



Draw through lead interchangeability

Current ANSI Standards address the dimensions, mounting holes and connections at and below the bushing flange. Bushings, for the same class, may vary slightly in external height creating few problems due to differences between various manufacturer's draw lead cable lengths and inner terminal lug connectors. This issue has been addressed by means of a "split-lug" draw lead connector (see fig. 13-3 and 14-4) that provides universal interchangeability to most bushing.

This eliminates the need to use an exact replacement bushing or to remove and replace the existing lug from the draw lead to mate with the bushing cap of the replacement bushing.

Draw rod installation

The draw rod connection (split-conductor) allows an easier and quicker bushing installation and removal as well. By simply connecting and pulling the split-conductor through the bushing, it is possible to install a 1200 A rated bushing (commonly bottom connected) in the same manner of a draw-lead type bushing, saving time and money in commissioning and maintenance activities (need to drop down the oil in the transformer tank).

Head and oil level indication

Bushings up to and including 230 kV have a cylindrical oil head reservoir, prismatic in shape, made of borosilicate glass, and containing a UV filter (fig. 24-7). This head design allows easy oil level checks, even from a distance and at any angle of sight. Bushings at 345 kV through 765 kV have a metal head reservoir and are provided with a prismatic glass oil level indicator to verify proper oil levels (fig. 25-8). The metal components of the head are made of cast aluminum alloy.

Fig. 7: Head of bushings
25 to 230 kV

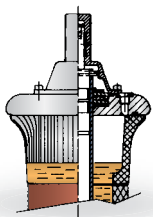
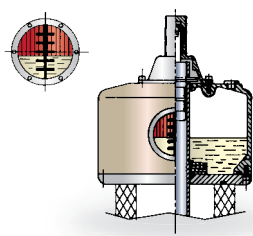


Fig. 8: Head of bushings
345 to 765 kV



Flange

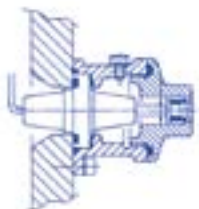
The flange is made of cast aluminum, equipped with the following accessories:

- **Lifting holes**
- **Power factor tap**, for bushings 25 to 69 kV (fig. 22-9)
- **Voltage tap**, for bushings 115 to 765 kV (fig. 23-10)

Fig. 9: Power Factor Tap



Fig. 10: Voltage Tap

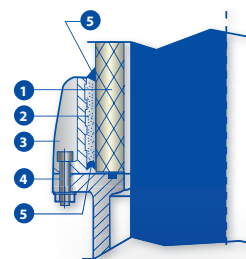


Gaskets

Made of Viton® (a fluoroelastomer which has better properties than nitrile, i.e. resistance to higher temperature and excellent resistance to oils, aggressive fuels and chemicals), O-ring type. They are compatible with both the fluid inside the bushing (DDB) and transformer mineral oil. The air side gaskets are sealed to carefully protect against polluting weather elements.

Fig. 11: Cemented porcelain

1. Porcelain
2. Cement
3. Metal cemented ring
4. Flange
5. Silicone sealing

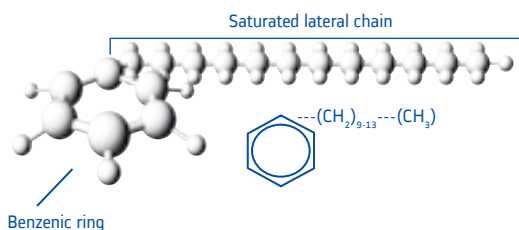


Assembly

The coupling between porcelain and metallic parts is made of Belleville spring washers placed into the bushing head. Bushings of 138 to 765 kV are always assembled using cemented porcelains.

The cement used is a quick setting monocalcic-aluminized type. All cemented surfaces, potentially in contact with the external environment, are silicone sealed.

Fig. 12: DDB – Dodecylbenzene synthetic oil



Insulating fluid

We have over 20 years of field-proven experience with oil-impregnated paper bushings using DDB synthetic oil (DODECYLBENZENE). This oil has superior dielectric and insulating characteristics than mineral oil:

- Superior and constant dielectric qualities (non-aging)
- High capability of gas absorption under electrical field stress and high temperature
- Negligible toxicity
- Excellent biodegradability
- Full miscibility with transformer mineral oil
- A very low pour point and higher flash point

Tests

All bushings have electrical characteristics and are tested in compliance with ANSI/IEEE C57.19.00-2000 and C57.19.00-1991 standard general requirements and test procedure for outdoor power apparatus bushings.

Design tests

Dielectric Withstand Voltage Tests

- Low-Frequency Wet Withstand Voltage Test
- Full-Wave Lightning Impulse Withstand Voltage Test
- Chopped-Wave Lightning Impulse Withstand Voltage Test
- Wet Switching Impulse Withstand Voltage (≥ 345 kV)
- Low-Frequency Dry Withstand Voltage Test with PD measurement.

Mechanical Tests

- Draw-Lead Bushing Cap Pressure Test
- Cantilever Strength Test

Thermal Tests

Routine tests

- Capacitance and Power Factor Measurement
- Low-Frequency Dry Withstand Test with PD Measurement
- Tap Withstand Voltage
- Mechanical Tests

Packing - transportation

Thanks to a special device to prevent the diffusion of the nitrogen cushion out of the head into the lower end of the bushing, each bushing can be packed and shipped secured in the horizontal position. This insures minimal crate dimensions and reduced transportation costs.

Nameplate

Each bushing is provided with a nameplate, containing complete electrical data and the serial number, in accordance with the requirements of ANSI Standards. The nameplate, made of stainless steel, is secured to the flange with rivets and includes:

Fig. 12b: Nameplate

1. Identification number
2. Bushing code
3. Insulation class
4. Rated maximum line to ground voltage
5. Rated impulse withstand voltage
6. Rated continuous current for draw lead type
7. Rated continuous current for fixed conductor, bottom connection type
8. Serial number
9. Month and year of final tests
10. Standard references
11. Length below mounting surface
12. Weight
13. Capacitance C1
14. Capacitance C2
15. Power factor value at 20 °C

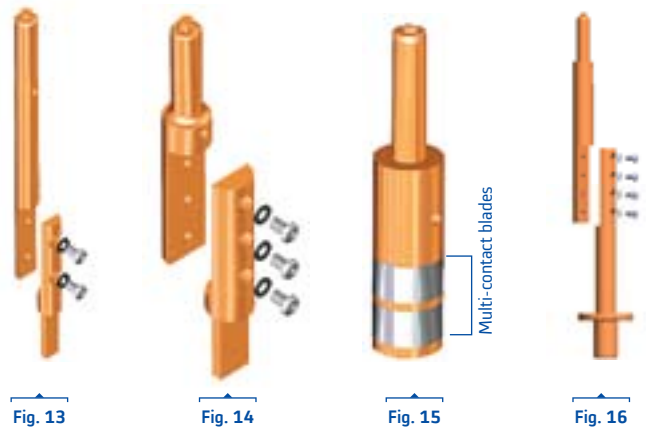


Fig. 13: Split draw lead terminal 400 A (25 to 69 kV)

Fig. 14: Split draw lead terminal 800 A (25 to 765 kV)

Fig. 15: Bottom connection 1200 A and above (115 to 765 kV)

Fig. 16: Bottom connection 1200 A and above (25 to 69 kV)

PAO

Range 25-765 kV

Dimensions	Catalogue Number	Figure	IEEE C57.19.01-	Nominal System Voltage	BIL	Rated continuous current	Arcing distance	Creepage distance	Weight	Maximum altitude	K (CT pocket)	L	L2	L3	L4	L1	D1
Type				kV	kV	A	Inches	Inches	Lbs	Feet	Inches	Inches	Inches	Inches	Inches	Inches	Inches
25.150.400	I-11883-00-DL	27	1991	25	150	400	17.12	37.1	90	9900	21	52.68	25.98	6.50	12.91	26.70	3.54
25.150.1200	I-11883-01-BC	27	1991	25	150	1200	17.12	37.1	110	9900	21	55.48	25.98	6.50	...	29.50	3.54
34.5.200.400	I-11885-00-DL	27	2000	34.5	200	400	17.12	37.1	92	9900	21	54.68	25.98	6.50	12.91	28.70	3.54
34.5.200.1200	I-11885-01-BC	27	2000	34.5	200	1200	17.12	37.1	112	9900	21	57.48	25.98	6.50	...	31.50	3.54
34.5.200.2000	I-11885-02-BC	27	2000	34.5	200	2000	17.12	37.1	132	9900	21	59.48	25.98	6.50	...	33.50	3.54
34.5.200.3000	I-11653-23-BC	27	2000	34.5	2000	3000	17.12	37.1	143	9900	21	61.65	28.15	8.27	...	33.50	3.94
46.250.400	I-11899-00-DL	27	1991	46	250	400	24.02	67.8	103	9900	21	63.98	33.27	6.50	20.20	30.71	3.94
46.250.1200	I-11899-01-BC	27	1991	46	250	1200	24.02	67.8	128	9900	21	66.77	33.27	6.50	...	33.50	3.94
69.350.400	I-11901-00-DL	27	2000	69	350	400	29.94	92.87	117	9900	21	73.91	39.19	6.50	26.10	34.72	3.94
69.350.1200	I-11901-01-BC	27	2000	69	350	1200	29.94	92.87	145	9900	21	76.69	39.19	6.50	...	37.51	3.94
69.350.2000	I-11655-33-BC	27	2000	69	350	2000	34.45	98.0	220	9900	21	84.78	45.28	6.50	...	39.50	5.12
69.350.3000	I-11655-34-BC	27	2000	69	350	3000	34.45	98.0	254	9900	21	86.55	47.05	8.27	...	39.50	5.12
115.550.800	I-11675-27-DL	28	1991	115	550	800	45.47	156.0	308	6600	23	99.49	56.49	6.69	47.24	43	5.125
115.550.1200	I-11675-27-BC	28	1991	115	550	1200	45.47	156.0	308	6600	23	99.49	56.49	6.69	...	43	5.125
138.650.800	I-11657-33-DL	28	2000	138	650	800	52.16	175.6	349	3300	23	113.08	66.33	6.69	57.09	46.75	5.75
138.650.1200	I-11657-33-BC	28	2000	138	650	1200	52.16	175.6	349	3300	23	113.08	66.33	6.69	...	46.75	5.75
138.650.2000	I-11657-22-BC	28	2000	138	650	2000	52.16	175.6	482	3300	23	113.08	66.33	6.69	...	46.75	5.75
138.650.3000	I-11657-38-BC	28	2000	138	650	3000	50.00	176.5	660	3300	23	116.23	69.48	11.02	...	46.75	6.89
161.750.800	I-11887-00-DL	28	1991	161	750	800	59.06	200.79	494	3300	23	126.43	76.18	8.66	66.93	50.25	6.89
161.750.1200	I-11887-00-BC	28	1991	161	750	1200	59.06	200.79	494	3300	23	126.43	76.18	8.66	...	50.25	6.89
196.900.800	I-11889-00-DL	28	1991	196	900	800	67.32	233.46	573	3300	26.75	143.94	84.45	8.66	75.20	59.50	6.89
196.900.1200	I-11889-00-BC	28	1991	196	900	1200	67.32	233.46	595	3300	26.75	143.94	84.45	8.66	...	59.50	6.89
230.1050.800	I-11891-00-DL	28	2000	230	1050	800	90.95	323.78	646	3300	23	158.32	90.95	8.66	98.82	50.25	6.89
230.1050.1200	I-11891-00-BC	28	2000	230	1050	1200	90.95	323.78	646	3300	23	158.32	90.95	8.66	...	50.25	6.89
230.1050.2000	I-11891-01-BC	28	2000	230	1050	2000	90.95	323.78	651	3300	23	161.08	110.83	11.42	...	50.25	6.89
230.1050.3000	I-11891-02-BC	28	2000	230	1050	3000	82.28	308.5	1390	3300	23	160.87	110.62	19.29	...	50.25	8.66
345.1175.800	I-11893-00-DL	29	2000	345	1175	800	106.5	399.7	1236	9900	23	185.25	134.25	18.7	124.80	51	8.66
345.1175.1200	I-11893-00-BC	29	2000	345	1175	1200	106.5	399.7	1236	9900	23	185.25	134.25	18.7	...	51	8.66
345.1175.2000	I-11893-01-BC	29	2000	345	1175	2000	106.5	399.7	1245	9900	23	188.01	137.01	21.46	...	51	8.66
345.1175.3000	I-11893-02-BC	29	2000	345	1175	3000	106.5	399.7	1518	9900	23	185.84	134.84	19.29	...	51	8.66
500.1675.800	I-11663-20-DL	29	2000	500	1675	800	141.34	540.63	2812	3300	23	245.32	180.3	29.14	169.1	65	15.75
500.1675.1200	I-11663-21-BC	29	2000	500	1675	1200	141.34	540.63	2812	3300	23	245.32	180.3	29.14	...	65	15.75
500.1675.2000	I-11663-22-BC	29	2000	500	1675	2000	141.34	540.63	2812	3300	23	245.32	180.3	29.14	...	65	15.75
500.1675.3000	I-11663-23-BC	29	2000	500	1675	3000	141.34	540.63	2862	3300	23	245.32	180.3	29.14	...	65	15.75
765.2050.800	I-11665-20-DL	29	2000	765	2050	800	202.36	767.7	6504	3300	23	327.7	242.62	28.35	230.32	85	21.26
765.2050.1200	I-11665-21-BC	29	2000	765	2050	1200	202.36	767.7	6504	3300	23	327.7	242.62	28.35	...	85	21.26
765.2050.2000	I-11665-22-BC	29	2000	765	2050	2000	202.36	767.7	6504	3300	23	327.7	242.62	28.35	...	85	21.26

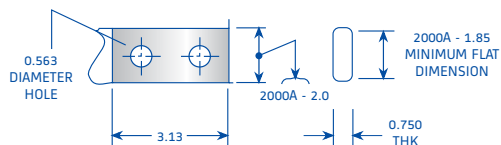


Fig. 17: Bottom terminal type 1

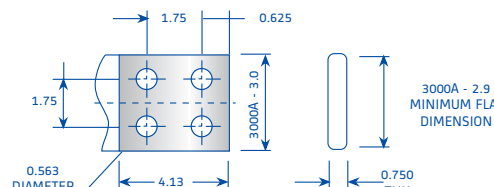


Fig. 18: Bottom terminal type 2

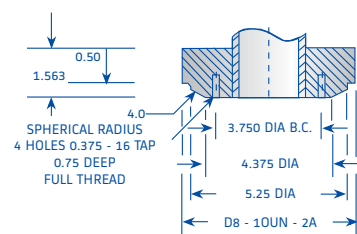


Fig. 19: Bottom terminal type 3

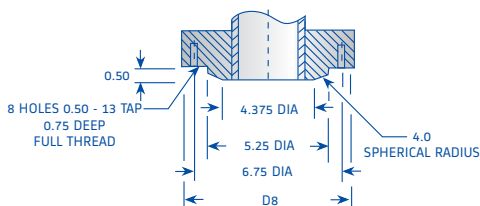


Fig. 20: Bottom terminal type 4

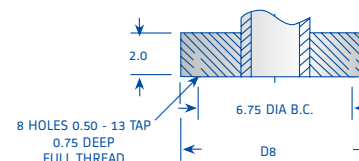
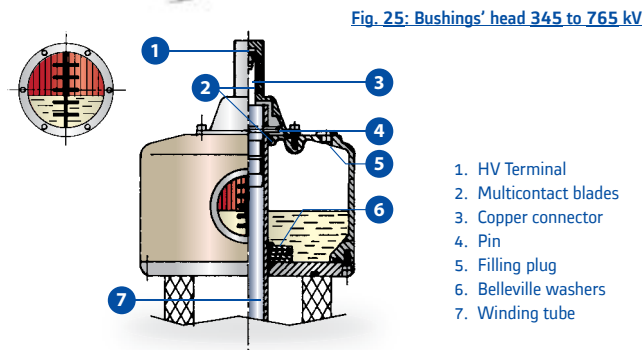
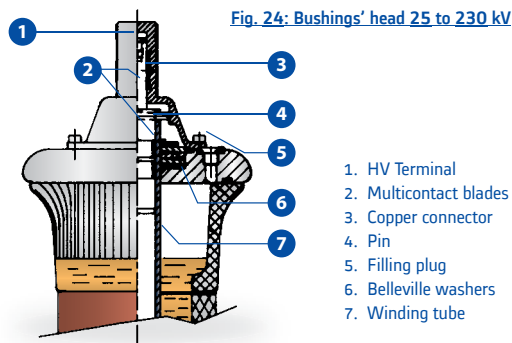
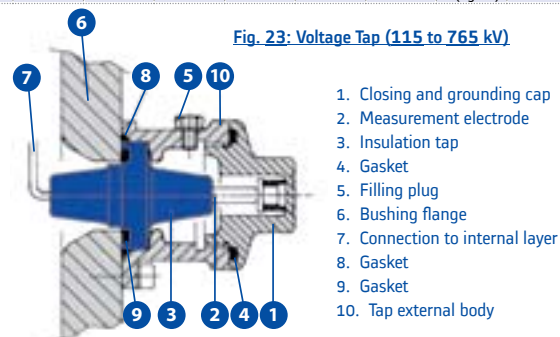
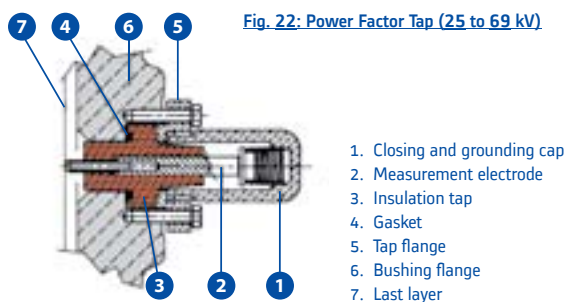


Fig. 21: Bottom terminal type 5

Dimensions	Catalogue Number											D7 Top terminal thread size	L7 Top terminal min. thread	Terminal lug: figure d.r.	Bottom terminal thread size	Bottom terminal min. thread	Bottom terminal type (fig.)	Installation d.l. = bot-draw lead b.c. = bot-tom connected
		D3	D4	D5	D6	d3	D8	s	n	F								
Type		Inches	Inches	Inches	Inches	Inches	Inches	Inches	N.	Inches		Inches	Inches		Inches	Inches		
25.150.400	I-11883-00-DL	7.25	8.875	6.70	3.54	1.38	...	0.625	4	0.875	1.5-12	2.125	fig.4-14	...	...	...	...	d.l.
25.150.1200	I-11883-01-BC	7.25	8.875	6.70	3.54	...	...	0.625	4	0.875	1.5-12	2.125	fig.7-17	1.5-12	2.125	...	...	b.c.
34.5.200.400	I-11885-00-DL	7.25	8.875	6.70	3.54	1.38	...	0.625	4	0.875	1.5-12	2.125	fig.4-14	...	...	...	...	d.l.
34.5.200.1200	I-11885-01-BC	7.25	8.875	6.70	3.54	...	...	0.625	4	0.875	1.5-12	2.125	fig.7-17	1.5-12	2.125	...	...	b.c.
34.5.200.2000	I-11885-02-BC	7.25	8.875	6.70	3.54	...	...	0.625	4	0.875	1.5-12	2.5	...	...	...	1 (fig.18)	...	b.c.
34.5.200.3000	I-11653-23-BC	9.25	11.437	6.70	4.53	...	...	0.625	6	0.875	2.0-12	3	...	...	...	2 (fig.19)	...	b.c.
46.250.400	I-11899-00-DL	8.25	11.437	6.70	4.53	1.38	...	0.625	4	0.875	1.5-12	2.125	fig.4-14	...	...	...	...	d.l.
46.250.1200	I-11899-01-BC	8.25	11.437	6.70	4.53	...	...	0.625	4	0.875	1.5-12	2.125	fig.7-17	1.5-12	2.125	...	...	b.c.
69.350.400	I-11901-00-DL	9.25	11.437	6.70	4.53	1.38	...	0.625	6	0.875	1.5-12	2.125	fig.4-14	...	...	...	...	d.l.
69.350.1200	I-11901-01-BC	9.25	11.437	6.70	4.53	...	...	0.625	6	0.875	1.5-12	2.125	fig.7-17	1.5-12	2.125	...	...	b.c.
69.350.2000	I-11655-33-BC	9.25	11.437	9.06	5.9	...	...	0.625	6	0.875	1.5-12	2.5	...	...	...	1 (fig.18)	...	b.c.
69.350.3000	I-11655-34-BC	10.25	12.00	9.06	5.9	...	...	0.625	6	0.875	2.0-12	3	...	...	...	2 (fig.19)	...	b.c.
115.550.800	I-11675-27-DL	13.25	15.75	9.06	5.91	1.625	...	0.867	6	1.25	1.5-12	2	fig.5-15	...	...	...	...	d.l.
115.550.1200	I-11675-27-BC	13.25	15.75	9.06	5.91	...	5.75	0.867	6	1.25	1.5-12	2	fig.6-16	...	...	3 (fig.20)	...	b.c.
138.650.800	I-11657-33-DL	14.25	16.75	9.06	6.7	1.625	...	0.867	6	1.25	1.5-12	2	fig.5-15	...	...	...	...	d.l.
138.650.1200	I-11657-33-BC	14.25	16.75	9.06	6.7	...	5.75	0.867	6	1.25	1.5-12	2	fig.6-16	...	...	3 (fig.20)	...	b.c.
138.650.2000	I-11657-22-BC	14.25	16.75	9.06	6.7	...	8.25	0.867	6	1.25	1.5-12	2.5	...	...	...	4 (fig.21)	...	b.c.
138.650.3000	I-11657-38-BC	14.25	18.312	10.63	7.68	...	8.25	0.867	6	1.25	2.0-12	3	...	...	...	4 (fig.21)	...	b.c.
161.750.800	I-11887-00-DL	15.75	18.312	10.63	7.68	2	...	0.867	8	1.25	1.5-12	2	fig.5-15	...	...	...	...	d.l.
161.750.1200	I-11887-00-BC	15.75	18.312	10.63	7.68	...	5.75	0.867	8	1.25	1.5-12	2	fig.6-16	...	...	3 (fig.20)	...	b.c.
196.900.800	I-11889-00-DL	21.00	23.75	10.63	7.68	2	...	1	12	1.25	1.5-12	2	fig.5-15	...	...	...	...	d.l.
196.900.1200	I-11889-00-BC	21.00	23.75	10.63	7.68	...	8.25	1	12	1.25	1.5-12	2	fig.6-16	...	...	4 (fig.21)	...	b.c.
230.1050.800	I-11891-00-DL	21.00	23.75	10.63	7.68	2	...	1	12	1.25	1.5-12	2	fig.5-15	...	...	...	...	d.l.
230.1050.1200	I-11891-00-BC	21.00	23.75	10.63	7.68	...	8.25	1	12	1.25	1.5-12	2	fig.6-16	...	...	4 (fig.21)	...	b.c.
230.1050.2000	I-11891-01-BC	21.00	23.75	10.63	7.68	...	8.25	1	12	1.25	1.5-12	2.5	...	...	...	4 (fig.21)	...	b.c.
230.1050.3000	I-11891-02-BC	21.00	23.75	14.96	9.84	...	8.25	0.867	12	1.25	2.0-12	3	...	...	...	4 (fig.21)	...	b.c.
345.1175.800	I-11893-00-DL	21.00	23.75	14.96	9.84	2	...	0.867	12	1.25	1.5-12	2	fig.5-15	...	...	...	...	d.l.
345.1175.1200	I-11893-00-BC	21.00	23.75	14.96	9.84	...	8.25	0.867	12	1.25	1.5-12	2	fig.6-16	...	...	5 (fig.22)	...	b.c.
345.1175.2000	I-11893-01-BC	21.00	23.75	14.96	9.84	...	8.25	0.867	12	1.25	1.5-12	2.5	...	...	...	5 (fig.22)	...	b.c.
345.1175.3000	I-11893-02-BC	21.00	23.75	14.96	9.84	...	8.25	0.867	12	1.25	2.0-12	3	...	...	...	5 (fig.22)	...	b.c.
500.1675.800	I-11663-20-DL	25.00	28.35	19.7	15.75	2.75	...	1	12	1.25	1.5-12	2	fig.5-15	...	...	...	...	d.l.
500.1675.1200	I-11663-21-BC	25.00	28.35	19.7	15.75	...	8.25	1	12	1.25	1.5-12	2	fig.6-16	...	...	5 (fig.22)	...	b.c.
500.1675.2000	I-11663-22-BC	25.00	28.35	19.7	15.75	...	8.25	1	12	1.25	1.5-12	2.5	...	...	...	5 (fig.22)	...	b.c.
500.1675.3000	I-11663-23-BC	25.00	28.35	19.7	15.75	...	8.25	1	12	1.25	2.0-12	3	...	...	...	5 (fig.22)	...	b.c.
765.2050.800	I-11665-20-DL	35.00	37.79	27.56	21.26	2.75	...	1.18	16	1.25	1.5-12	2	fig.5-15	...	...	...	...	d.l.
765.2050.1200	I-11665-21-BC	35.00	37.79	27.56	21.26	...	9	1.18	16	1.25	1.5-12	2	fig.6-16	...	...	5 (fig.22)	...	b.c.
765.2050.2000	I-11665-22-BC	35.00	37.79	27.56	21.26	...	9	1.18	16	1.25	1.5-12	2.5	...	...	...	5 (fig.22)	...	b.c.



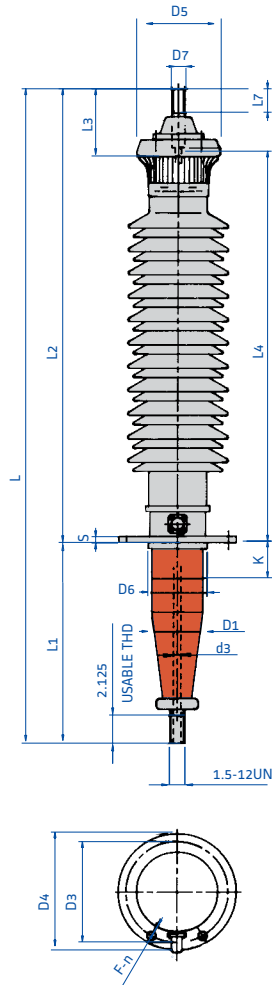


Fig. 26: PAO bushings 25 to 69 kV

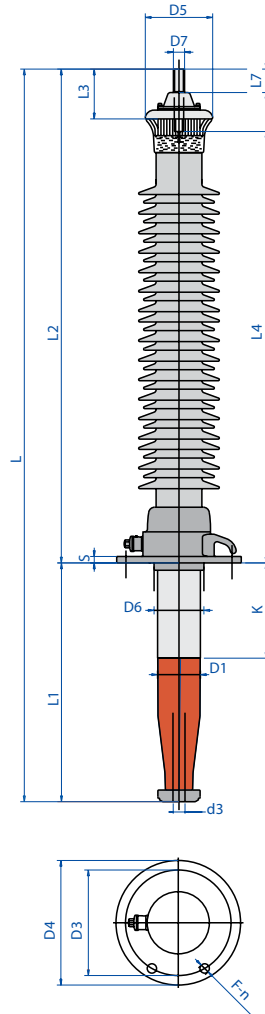


Fig. 27: PAO bushings 115 to 230 kV

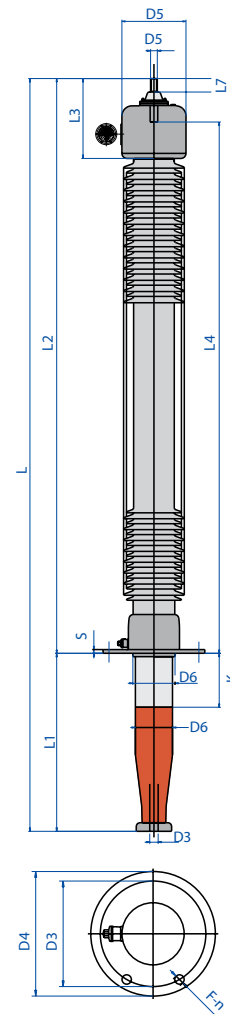


Fig. 28: PAO bushings 345 to 765 kV

PASSONI & VILLA
AN ALSTOM COMPANY

Following the acquisition of PASSONI & VILLA, Alstom Grid now offers a large portfolio of condenser bushings for AC or DC operation. If you require any further information, please address your queries to

rpv@alstom.com

Alstom Grid Worldwide Contact Centre
www.grid.alstom.com/contactcentre
Tel.: +44 (0) 1785 250 070
www.grid.alstom.com

To contact the manufacturer
Viale Suzzani, 229 20162 MILANO (Italy)
Tel.: +39 02 661 221
Fax: +39 02 647 09 06
Email: rpv@alstom.com

GRID

ALSTOM