



# INSULATORS





<b>INDOOR INSULATORS</b>	
<b>Type</b>	<b>Page</b>
INDOOR INSULATORS	02 - 03
CAPACITIVE DIVIDER INSULATORS	04 - 05
WALL BUSHINGS	06 - 07
BOLT BUSHINGS	08 - 09
INSULATORS CUSTOM DESIGNS	10 - 12

**Rated insulation levels for post insulators**

<b>Um (kV)</b>	<b>Dry power frequency withstand voltage acc. to IEC 60273 (kV)</b>	<b>Lightning impulse withstand voltage acc. to IEC 60273 (kV)</b>
3,6	10	40
7,2	28	60
12	38	75
17,5	50	95
24	50	125
36	70	170

**Tightening torques**

The table below applies when the length of the screw within the threaded insert is at least 1,4 x screw diameter.

<b>Screw</b>	<b>Max. torque (Nm)</b>	<b>Max. hole diameter in busbar (Nm)</b>
M6	7	8
M8	12	10
M10	28	12
M12	45	15
M16	110	19
M20	150	24
M24	250	28

**Um:** Highest voltage for equipment

Specifications and product designs are subject to change without prior notice in view of continuous improvements.

# INDOOR POST INSULATORS



## APPLICATION

Epoxy cast resin indoor post insulators can be used for all indoor applications. For tropical conditions same types (with special fixing parts) are available. They are suitable for temperatures from  $-25^{\circ}\text{C}$  up to  $+90^{\circ}\text{C}$ .

## CONSTRUCTION

Epoxy cast resin indoor post insulators are cylindrical solid insulators, with proper creepage and number of ripples. The main dimensions are in accordance with IEC 60273 -1990. Auxiliary inserts are connected with main insert electrically.

## TESTS

The following tests, according to IEC 60660 - 1999 are performed:

### ROUTINE TESTS

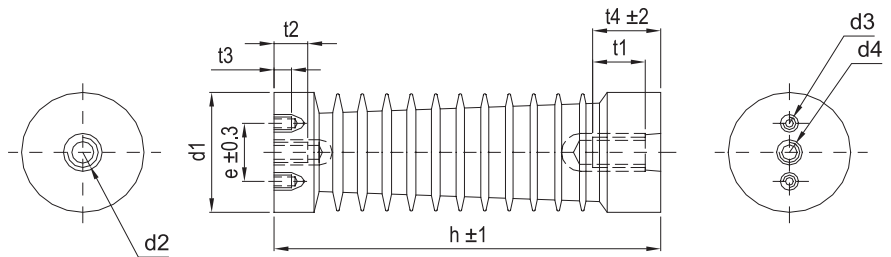
- Visual inspection
- Testing of conductive connection of fixing inserts for post insulators type B (IEC 60660 -1999)
- Power-frequency withstand voltage (dry)
- Partial discharge measurement

### SAMPLE TESTS

- Testing of minimum failing load for bending

### ADDITIONAL TESTS

- Lightning impulse withstand voltage test (on request)
- Testing of minimum failing loads (nominal loads) for bending



### Acc.to VDE 0674 -(1993), VDE 0111 - (1980)

TYPE	Um (kV)	Min. creepage (mm)	Ripples	Min. Bendign (N)	Tensile Strength (N)	h	e	d1	Dimension (mm)						Weight (kg)	Pcs/ Box	
									d2	d3	d4	t1	t2	t3			t4
A10S-500	7,2	130	2	5000	17500	95	36	58	M16	M6	M10	26	15	9	38	0,39	16
B10S-1000	7,2	128	2	10000	30000	95	46	71	M16	M10	M16	26	30	12	36	0,65	9
A10N-500	12	182	5	5000	20000	130	36	60	M16	M6	M10	33	20	10	41	0,52	16
B10N-1000	12	187	5	10000	30000	130	46	77	M20	M10	M16	35	30	12	47	1,00	9
C10N-1600	12	191	5	16000	40000	130	66	90	M20	M10	M16	40	33	16	55	1,35	9
A20S-500	17,5	259	6	5000	20000	175	36	70	M16	M6	M10	33	20	10	51	1,00	16
B20S-1000	17,5	237	6	10000	30000	175	46	80	M20	M10	M16	35	30	15	50	1,50	9
A20N-500	24	318	8	5000	20000	210	36	70	M16	M6	M10	35	20	10	55	1,10	16
B20N-1000	24	313	8	10000	30000	210	46	86	M20	M10	M16	35	30	15	52	1,90	9
A30N-500	36	465	11	5000	20000	300	36	74	M16	M6	M10	35	20	10	47	2,10	9
B30N-1000	36	495	11	10000	30000	300	46	95	M24	M10	M16	45	30	15	60	3,00	6
C30N-1600	36	453	11	16000	40000	300	66	115	M30	M10	M16	45	26	12	68	4,80	6

Um: Highest voltage for equipment

### Acc.to IEC 60273 -(1990), IEC 60660 - (1999)

TYPE	Um (kV)	Min. creepage (mm)	Ripples	Min. Bendign (N)	Tensile Strength (N)	h	e	d1	Dimension (mm)						Weight (kg)	Pcs/ Box	
									d2	d3	d4	t1	t2	t3			t4
J06-60	7,2	130	2	6000	17500	95	36	58	M16	M6	M12	26	20	10	38	0,38	16
J010-60	7,2	128	2	10000	30000	95	46	71	M16	M10	M16	26	26	12	35	0,65	9
J06-75	12	182	4	6000	20000	130	36	56	M16	M6	M12	33	20	10	41	0,49	16
J010-75	12	184	5	10000	30000	130	46	77	M20	M10	M16	35	30	12	45	1,00	9
J06-95	17,5	242	6	6000	20000	175	36	70	M16	M6	M12	33	20	10	51	1,00	16
J010-95	17,5	237	6	10000	30000	175	46	83	M20	M10	M16	35	30	12	50	1,40	9
J06-125	24	303	6	6000	20000	210	36	70	M16	M6	M12	35	20	10	55	1,10	16
J010-125	24	300	8	10000	30000	210	46	85	M20	M10	M16	35	30	15	52	1,82	9
J06-170	36	520	11	6000	20000	300	36	74	M16	M6	M12	35	20	10	47	2,10	9
J010-170	36	488	11	10000	30000	300	46	95	M24	M10	M16	36	30	15	60	3,00	6
J016-170	36	453	11	10000	40000	300	66	115	M24	M10	M16	45	30	12	68	4,80	6

Um: Highest voltage for equipment

# CAPACITIVE DIVIDER INSULATORS

## NECESSARY INFORMATION FOR ORDERING:

- 1- Voltage detecting system: HR or LRM system.
- 2- Nominal voltage,  $U_n$  (if different from  $U_m$ ).
- 3- Length of the coaxial cable for connection.
- 4- If the capacitance of the indicator is different from IEC 61243-5, please inform us about the capacitance of the indicator.

## APPLICATION

Indoor voltage divider insulators are used for the detection of the presence of voltage on phase lines. The basic operation principle is on the capacitive division of phase voltage. The voltage divider insulators are used with capacitance coupled voltage indicating system. They are suitable for temperatures from  $-25^{\circ}\text{C}$  up to  $+90^{\circ}\text{C}$ .

## CONSTRUCTION

Indoor voltage divider insulators are epoxy cast resin. The main dimensions and mechanical requirements are in accordance with DIN 48136.

## TESTS

In addition to the tests applied to the standard insulators according to VOE 0441 part 3 (1984)

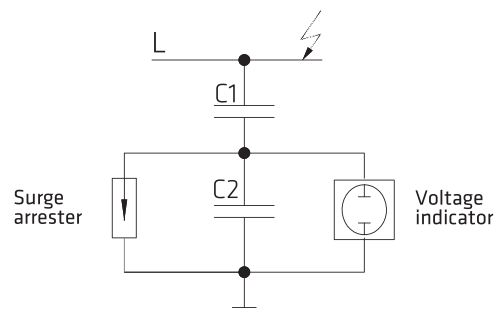
## IEC 60660-1999 FOLLOWING ROUTINE TESTS ARE PERFORMED:

- Power-frequency withstand voltage test [dry]
- Partial discharge measurement
- Capacitance test

## CAPACITIVE VOLTAGE INDICATING SYSTEM FOR MEDIUM VOLTAGE

### Capacitance-coupled voltage indication system

The voltage indication system consists essentially of a capacitive voltage divider between a conductor L and earth. Moreover, the system includes an indicator for the detection of voltage and a surge arrester for protection purposes.



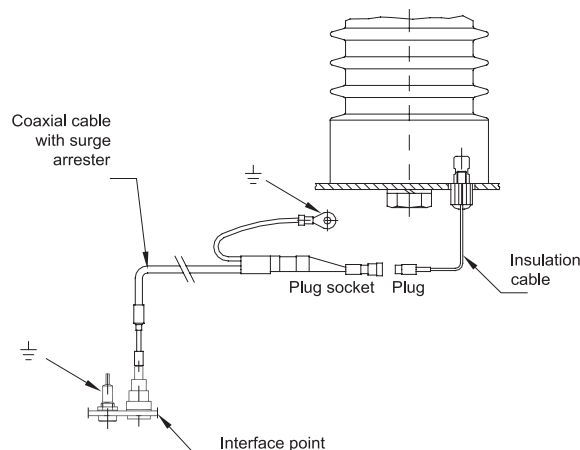
### Function

Voltage division occurs due to the capacitive values of  $C_1$  and  $C_2$ . According to IEC 61243-5 the indication should start in between 10 % of the rated voltage of the system. For that reason, the capacitance values are adjusted in accordance within this range so that the indication starts. Up to 10% of the rated voltage, there shall be no indication. Under any circumstance above 45% of the rated voltage the indication shall be "ON".

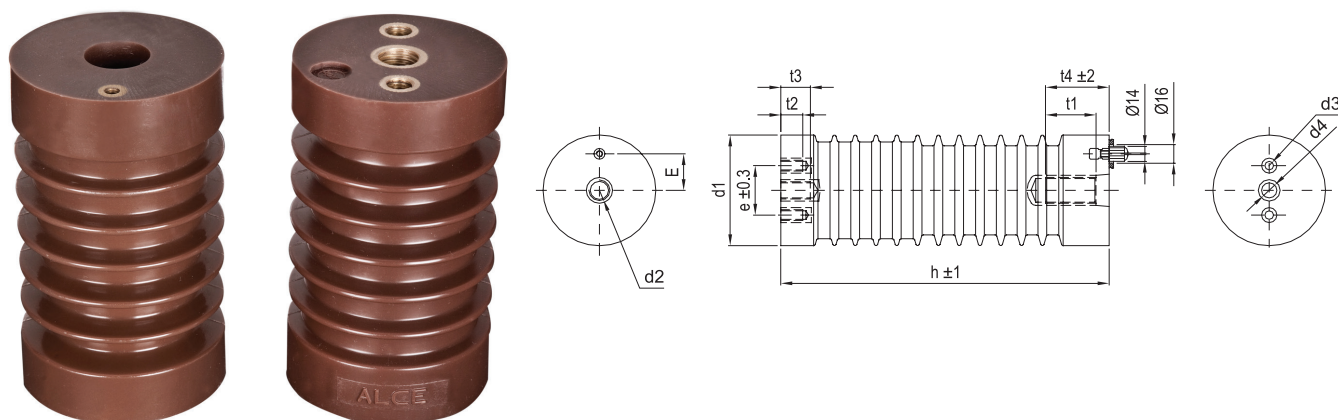
The presence of voltage is indicated separately and independently for each phase conductor. The system operates without a battery or auxiliary supply. The energy required for the system is being drawn from the high voltage system (OVI system may require auxiliary power for some additional functions depending on the application).

### Shock hazard protection

Voltage indication system does not present any risk during normal or disturbed operation. During normal operation, the voltage divider capacitance  $C_1$  limits the currents to less than  $100\mu\text{A}$ .



# CAPACITIVE DIVIDER INSULATORS (FOR INDICATION AND STATIC LOADS)



TYPE	Um (kV)	Min. creepage (mm)	Ripples	Capacitance (LRC meter) (pF)	Bending streight (N)	Tensile streight (N)	h	E	e	d1	Dimension (mm)						Weight (kg)	Pcs/ Box	
											d2	d3	d4	t1	t2	t3			t4
DKA-10N	7,2	187	5	21±20%	5000	10000	130	30	36	77	M16	M6	M10	25	20	10	35	0,90	9
DKB-10N	7,2	187	5	21±20%	10000	20000	130	30	46	77	M20	M10	M16	24	20	15	34	1,10	9
DKA-10N	12	187	5	21±20%	5000	10000	130	30	36	77	M16	M6	M10	25	20	10	35	0,90	9
DKB-10N	12	187	5	21±20%	10000	20000	130	30	46	77	M20	M10	M16	24	20	15	34	1,10	9
DKA-20S	17,5	237	6	21±20%	5000	10000	175	30	36	80	M16	M6	M10	35	20	10	50	1,30	9
DKB-20S	17,5	237	6	21±20%	10000	20000	175	30	46	80	M20	M10	M16	35	30	15	50	1,40	9
DKA-20N	24	313	8	16±20%	5000	10000	210	30	36	85	M16	M6	M10	35	20	10	52	1,80	9
DKB-20N	24	313	8	16±20%	10000	20000	210	30	46	85	M20	M10	M16	35	30	15	52	1,90	9
DKA-30N	36	495	11	7,5±20%	5000	10000	300	34	46	95	M16	M6	M10	35	20	10	59	3,00	6
DKB-30N	36	488	11	7,5±20%	10000	20000	300	34	46	95	M24	M10	M16	46	30	12	57	3,20	6
DKB-30N	36	488	11	16±20%	10000	20000	300	34	46	95	M24	M10	M16	45	30	12	57	3,20	6

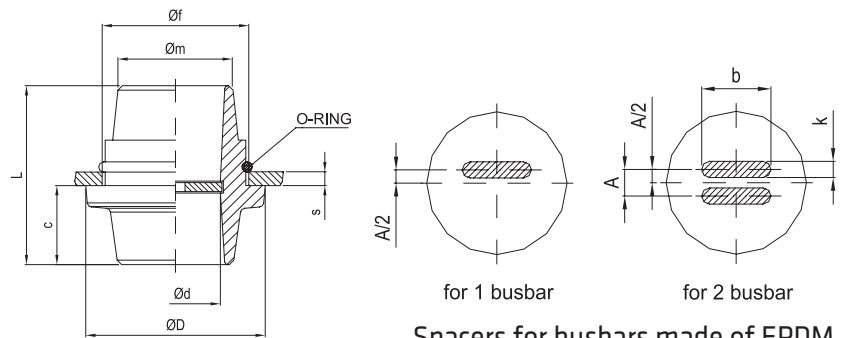
Um: Highest voltage for equipment

TYPE	Um (kV)	Min. creepage (mm)	Ripples	Capacitance (LRC meter) (pF)	Bending streight (N)	Tensile streight (N)	h	E	e	d1	Dimension (mm)						Weight (kg)	Pcs/ Box	
											d2	d3	d4	t1	t2	t3			t4
KB-20S	17,5	237	6	100±20%	10000	10000	175	30	46	83	M20	M10	M16	35	30	15	50	1,40	9
EK-30N-400	36	520	11	15±20%	4000	10000	300	30	36	80	M12	M6	M10	23	20	10	33	2,15	9
KA-30N	36	488	11	50±20%	5000	10000	300	34	36	95	M16	M6	M10	33	20	10	45	3,00	6
DKB-30N/E	36	488	11	50±20%	10000	20000	300	34	46	95	M24	M10	M16	48	30	12	60	3,20	6

## ATTENTION!

The insulators should be used for indication purposes and should not be exposed to excessive dynamic loads. Highvoltage connection for indication shall be flexible cable.

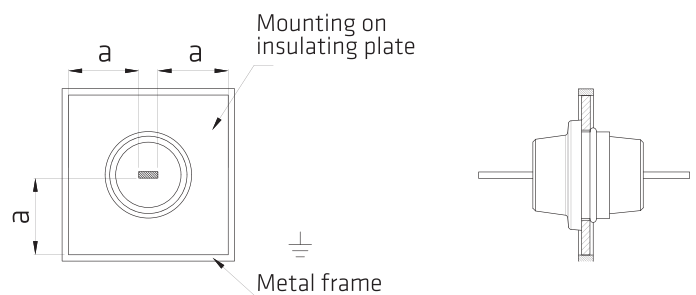
# WALL BUSHING TYPE GKR SPOUT TYPE SCB



Spacers for busbars made of EPDM

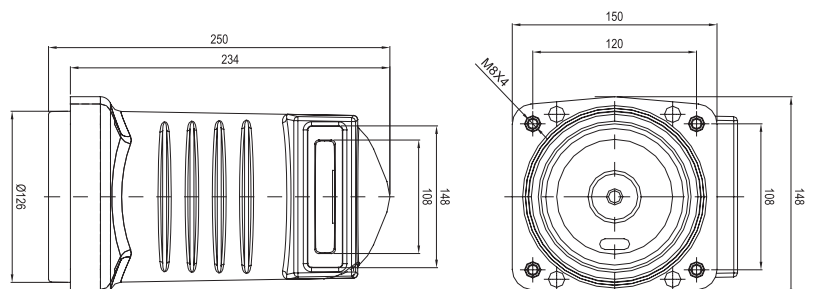
TYPE	Rated voltage (kV)	Dimension (mm)							Bar dimension (mm)	A	b x k (mm)	Weight	Pcs/Box
		L	C	ØD	Ød	Øm	Øf	S					
GKR 6/60	12 kV insulating plate; 7,2 kV in sheet of metal	120	55	120	62	77	96	10	1x(50x10)	-	1x(50x10)	1,0	10
GKR 12/75	12 kV insulating plate; 7,2 kV in sheet of metal	120	53	130	75	98	115	6	1x(60x10) 2x(60x10)	20	1x(65x14) 2x(65x14)	1,2	10
GKR 24/75	24-36 kV insulating plate; 12 kV in sheet of metal	150	65	140	75	114	125	6	1x(60x10) 2x(60x10)	20	1x(65x14) 2x(65x14)	1,6	10

Um (kV)	Lightning impulse Voltage (kV)	Min Distance "a" at impulse voltage (mm)	Dry power frequency withstand voltage at distance "a" (kV)
12	75	60	42
24	125	178	75
36	170	260	95



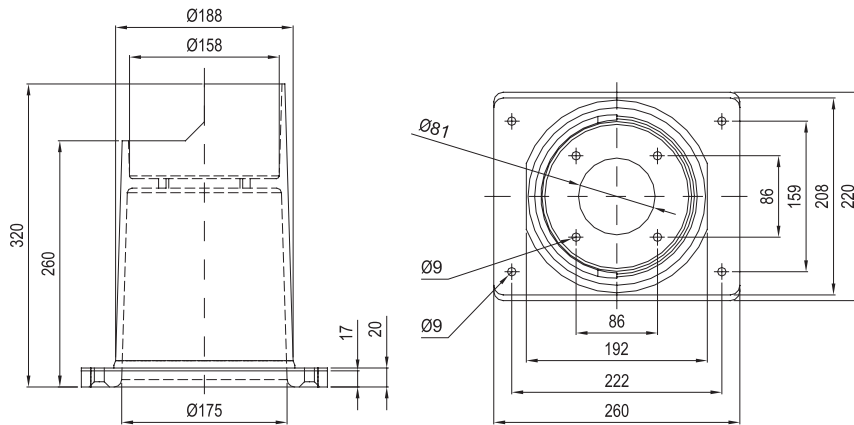
Um: Highest voltage for equipment

TYPE	Rated Current (A)	Rated Voltage (kV)	Insulation Voltage (kV)	Lightning Voltage (kV)	Weight (kg)	Pcs/Box
SCB-12	<1250A	12	38	75	2,7	6



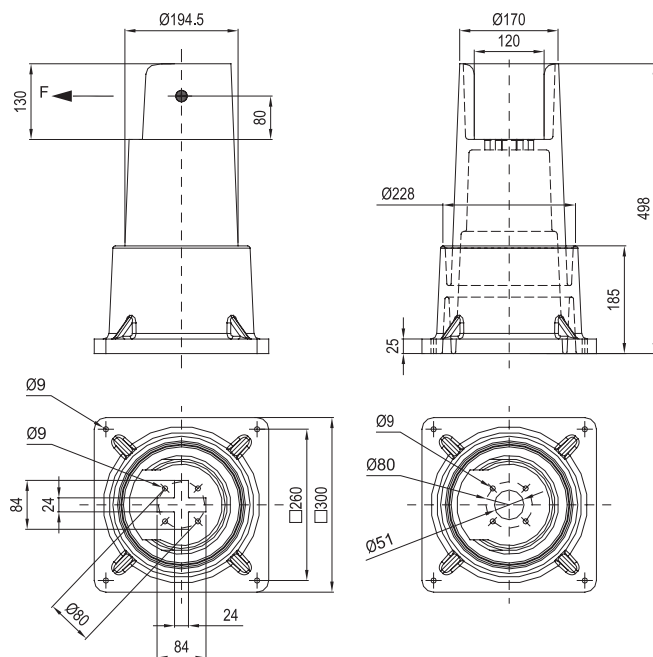


## GKB-12



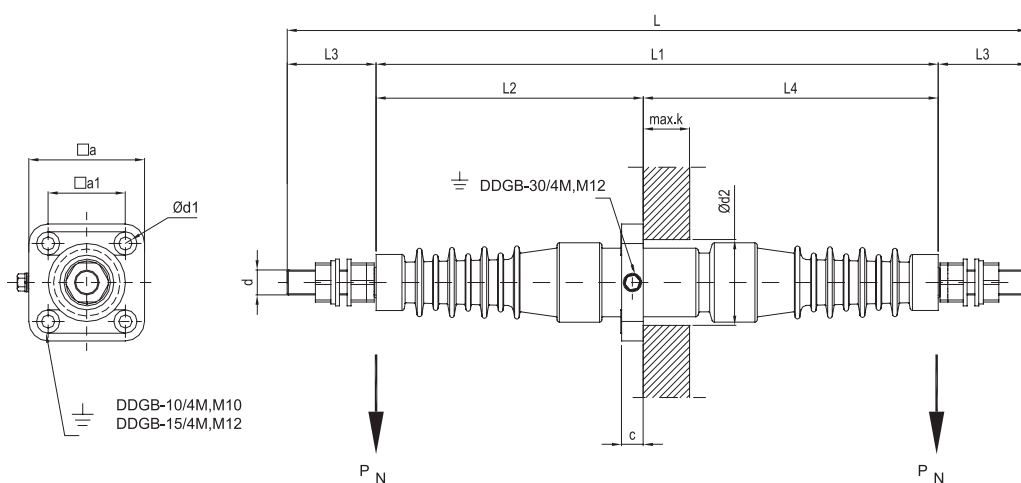
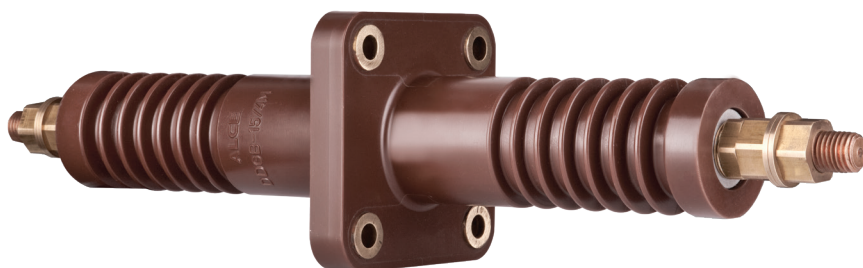
## GKB-36

Dimensions and shape of the hole in the center (will be used for the assembly of fixed part) can change according to customer requirements.



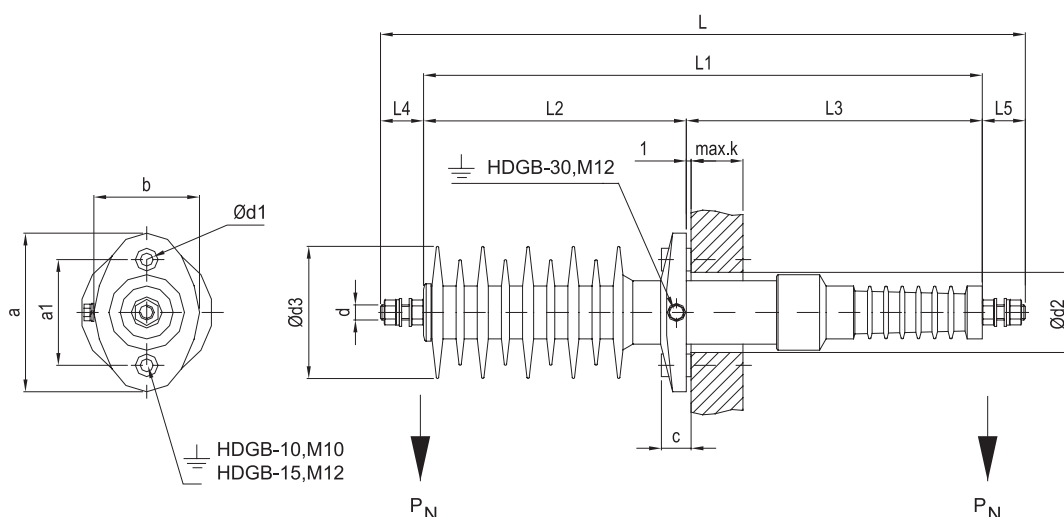
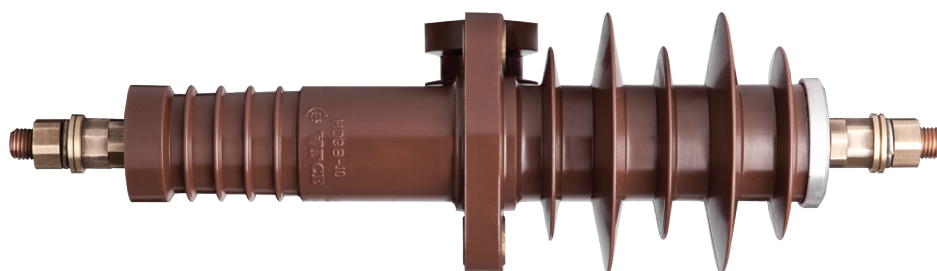
TYPE	Rated Voltage (kV)	Insulation Voltage (kV)	Lightning Impulse (kV)	Min. Bending (N)	Busbar (mm)	Weight (kg)	Pcs/Box
GKB-12	12	28	75	4000	Ø80	3,45	1
GKB-36	36	70	170	3750	1x(80x24)	12	1
GKB-36	36	70	170	3750	Ø50	12	1

# INDOOR TO INDOOR BOLT BUSHING TYPE DDGB



- Test load shall be applied to each end of the bushing separately.
- Assembly should be done according to the assembly instructions that are given with the product.

TYPE	Rated Voltage (kV)	Insulation Voltage (kV)	Lightning Impulse Voltage (kV)	Rated Current (A)	Min. Bending (N)	Dimension (mm)											Weight (kg)	Pcs/Box	
						L	L1	L2	L3	L4	a	a1	c	d	Ød1	Ød2			k
DDGB-10/4M	12	28	75	630	3750	425	287	131	70	156	135	100	21	M20	11	80	50	3,18	1
				1250		115			M32x1,5					5,98					
DDGB-15/4M	17,5	38	95	630	3750	575	439	217	70	222	140	100	20	M20	13	80	55	4,71	1
				1250		115			M32x1,5					8,16					
DDGB-30/4M	36	70	170	630	3750	865	725	343.5	70	381.5	150	100	28	M20	17	110	60	9,20	1
				1250		115			M32x1,5					14,85					



- Test load shall be applied to each end of the bushing separately.
- Assembly should be done according to the assembly instructions that are given with the product.

TYPE	Rated Voltage (kV)	Insulation Voltage (kV)	Lightning Impulse Voltage (kV)	Rated Current (A)	Min. Bending (N)	Dimension (mm)													Weight (kg)	Pcs/Box
						L	L1	L2	L3	L4	a	a1	b	c	d	Ød1	Ød2	k		
HDGB-10/4M	12	28	75	630	3750	490	345	180	165	75	135	100	80	21	M20	11	75	50	4,32	1
				1250		120				M32x1,5					8,07					
HDGB-15/4M	17,5	38	95	630	3750	600	455	245	210	75	160	120	90	27	M20	13	90	55	5,58	1
				1250		120				M32x1,5					9,80					
HDGB-30/4M	36	70	170	630	3750	885	740	348	392	75	210	140	140	33	M20	17	110	60	11,35	1
				1250		120				M32x1,5					16,74					

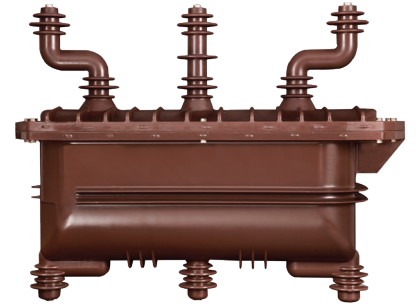
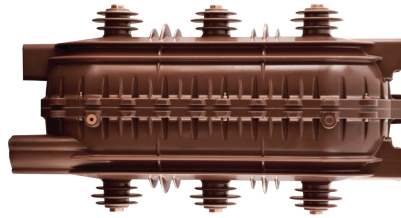
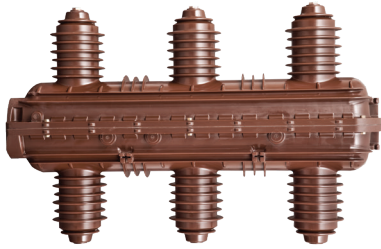
Um: Highest voltage for equipment





# CUSTOM DESIGNS

## LOAD BREAKERS



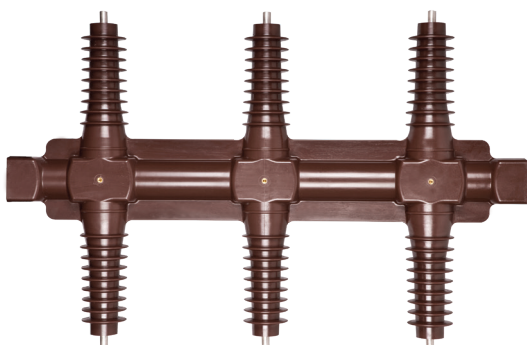
## SF6 / VACUUM BREAKERS



## CT BUSHINGS



## ROTARY DISCONNECTORS







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