HITACHI
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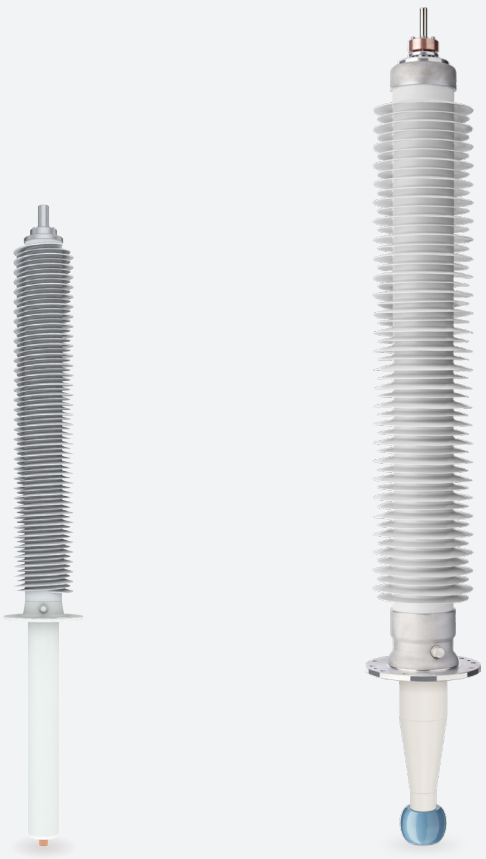


Transformer Components

EasyDry® Transformer bushings Technical guide

1ZBF600000-AAA EN, REV. A

Hitachi Energy

Resin Impregnated Synthetics (RIS) is a term used for dry bushings in which the main insulation consists of a core wound from synthetic non-woven material, which is then impregnated with a curable resin. Hitachi Energy's RIS bushings are characterized by outstanding technical performance: the mositure resistant and lightweight design facilitates easy transportation, storage and installation, while the oil-free construction requires no maintenance, is leakage-free and thus exceptionally safe and environmentally friendly.

EasyDry® bushings are combining the best practice from pioneering bushing technologies for more than 100 year with increasing flexibility in product design.

Table of contents

Global leader in bushing technologies

We are your partner of choice with a 100+ years expertise in bushing manufacturing and six decades of global leadership with dry bushing technology.

Easy to select & purchase

Acceleration of the entire value creation process
Simple to select the right bushing solution with our online configurator COMPAS

Comprehensive product documentation at your fingertips, online RFQ at any time

Seamless upgrades and replacements
Direct replacements of dry bushing and easy adaption for OIP bushings. Solutions for many bushing brands

Easy to store & handle

Superior handling, transportation and long-term storage
No dedicated long-term packing required. Possible to energize directly after storage (no need for pre-conditioning).

Optimal spare part choice

Convert into pluggable bushings with QuickConnect for bushings ≥ 245kV
Fast & convenient installation/replacement and commissioning without draining transformer oil

Easy to operate & upgrade

Maintenance free in most severe service conditions
Paperless bushing – no moisture sensitivity of internal insulation, temperatures of -55°C for 52-245 kV and -50°C for 245-550 kV, highest corrosion protection (optional)
Extended service lifetime
More homogeneous electric field stresses
Highest operational safety certified by independent test institutes
PD-free, vandalism resistant, highest seismic resistance, no porcelain shattering, no combustible fluids, no leakage risks
Complete service support throughout the entire transformer lifecycle
24/7/365 high quality support by the world largest transformer service network present in more than 30 countries.

Resin Impregnated Synthetics (RIS) Technology

Through continuous investments in Research & Development, Hitachi Energy became the inventor of the paperless, Resin Impregnated Synthetics (RIS) bushing technology. In our flagship RIS line EasyDry®, we have substituted the traditional paper insulation by a homogeneous synthetic material, resulting in superior product properties and lifetime.
Hitachi Energy's paperless RIS bushings are made of a synthetic non-woven material that is wound around a conductor with aluminum foil inserts for electrical stress control. The core is afterwards vacuum impregnated with epoxy resin and cured, giving a partial discharge free dry bushing.

This paperless bushing technology has an advanced insulation performance due to its non-hygroscopic insulation that is not sensitive to moisture ingress and absorption. In addition, RIS bushings will have a superior effect on the power factor (dielectric losses), and the intrinsic aging behavior leading to an extended product lifetime.

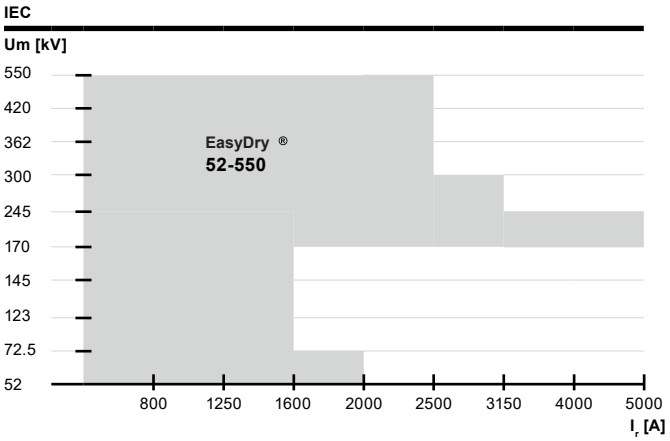
Based upon Hitachi Energy long experience of designing and manufacturing transformer bushing, our paperless EasyDry® portfolio sets the new industry benchmark for transformer components in terms of reliability and resilience.

Design

EasyDry® is our latest bushing platform of dry resin impregnated synthetic (RIS) bushing for oil-air transformer application, covering almost every customer design specifications with just one product family.
Whenever you need a product with outstanding technical performance, shortest delivery time, the highest flexibility in design in standard and specific configurations, EasyDry® is your solution.

The products are divided into two different production methods. For lower voltage levels up to and including 245 kV, a directly molded silicone insulator is used and for voltage levels of 245 kV and higher the composite or porcelain insulator design is used. Therefore 245 kV bushing are available in both designs.

Dry - Resin Impregnated Synthetic (RIS)



Common specifications for EasyDry® 52–245 kV

Application	Transformers and reactors
Classification	Resin impregnated synthetics, capacitance graded, outdoor immersed bushing
Ambient temperature	-55 °C to +40 °C.
Altitude of site	up to 1000 m a.s.l, higher altitude available on request
Pollution level	Very heavy according to standard IEC 60815
Angle of mounting	From vertical to horizontal
Test tap	2 kV
Conductor types	Solid removable rod (RR), split removable rod (RR), draw lead (DL)
Standards	IEC 60137, IEEE C57.19.00, IEEE C57.19.01 (not compatible with dimensions)
Markings	Conforming to IEC/ IEEE and CE standard
Seismic certification	IEEE 693-2018 (high performance level)

Common specifications for EasyDry® 245–550 kV

Application	Transformers and reactors
Classification	Resin inpregnated synthetics, capacitance graded, outdoor immersed bushing
Ambient temperature	-50 °C up to +40 °C
Altitude of site	up to 1000 m a.s.l., higher altitude available on request
Pollution level	Very heavy according to standard IEC 60815
Angle of mounting	From vertical to 30° from vertical
Test tap	2 kV
Conductor types	Quick^{Connect} draw rod (DR), solid removable rod (RR), split removable rod (RR), Fixed bottom contact (FBC) aluminum, fixed bottom contact (FBC) copper, draw lead (DL)
Standards	IEC 60137, IEEE C57.19.00, IEEE C57.19.01 (not compatible with dimensions)
Markings	Conforming to IEC/ IEEE and CE
Seismic certification	IEEE 693-2018 (high performance level)

NOTE: For conditions exceeding the standard specification, please consult the supplier.

Testing

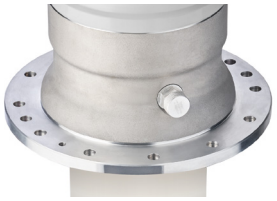
Testing standards
EasyDry® bushings are designed and tested according to IEC 60137, IEEE C57.19.00, IEEE C57.19.01 (dielectric).

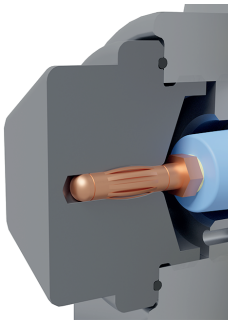
Routine testing
Each EasyDry® bushing is routine tested according to applicable standards. The tests include measurement of partial discharge quantity, tan δ, capacitance, and dry power frequency voltage withstand test. The flange is separately tightness tested with helium. A visual inspection is performed, and an individual routine test report is issued with each bushing.

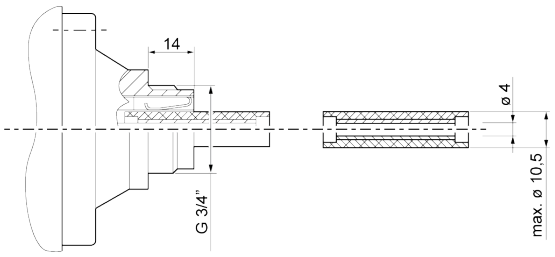
Type tests
Complete type tests have been performed and reports are available on request. Type tests are performed at accredited indpendent laboratory or third party controller. Type test summary certificate is available in Compas product selector tool.

Seismic qualification
EasyDry® bushings have been qualified in shake table tests for High Performance Level IEEE 693-2018. Executed tests also satisfies seismic requirements for AG5 (0.5g) of IEC TS 61463 (2017). For other specific seismic requirements (including other standards) please contact us.

Test tap
The outer conducting layer of the condenser core is connected to the insulated test tap. During operation the protective cap must be fitted to ground the outer conducting layer to the flange. The maximum test voltage is 2 kV, 50 Hz for 1 minute. The maximum service voltage is 600 V. Voltage tap, Ur = 6 kV, available as customized option.







EasyDry® 52–245 kV

EasyDry® 52–245 kV is a Resin Impregnated Synthetic (RIS) bushing with silicone rubber insulator. The condenser core is bonded directly to the silicone rubber insulator to give a compact and lightweight bushing, containing no gas, oil or other liquids.

The bushings are produced by winding a synthetics web onto a mandrel, with aluminum foil inserts for electrical stress control. The core is impregnated and cured under vacuum, giving a partial discharge free bushing with low tan δ (dissipation factor) <0.5 % far below global standard values. After curing, the core is machined and the flange is fitted. High thermal endurance (class E, 120).

The bushing can be configured with one of two connection types: the draw lead system for greater ease of assembly, when the required current capacity is lower, or the removable rod conductor system for maximum current capacity.

The inner terminal is fixed to the top piece with a divided ring (patented by Hitachi Energy) and can be connected to leads by brazing. For maximum current rating, a solid copper rod is used.

- **Draw lead (DL)** system for greater ease of assembly, when the required current capacity is at a relative lower rate. The draw lead is the current path through the bushing.

- **Removable rod (RR)** conductor system for medium current capacity and easy installation, with the possibility to pre-install the lower part of the removable rod directly in the transformer turret. The removable rod is the current path through the bushing.

Air terminals are available in a number of standard configurations in aluminum and copper, but can also be modified to suit any connection need.

As an option the air terminal can be equipped with a terminal plate for connection to the line conductor and the bushing can also be equipted with arcing horns for protection during flashover.

The flange and the top piece are protected from corrosion. The standard colour of the mounting flange and of the insulator is ANSI 70, light grey. Flange painting withstands corrosivity category C5 (very high) of ISO-EN 12944-1 to -9.

An external barrier (painting) is not needed.

Electrical data

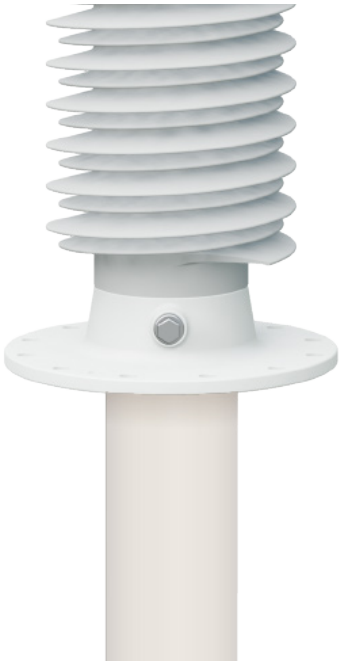
Ratings	52	72.5	100	123	145	170	245
Rated highest voltage for equipment IEC (kV)	52	72.5	100	123	145	170	245
Rated phase-to-earth voltage IEC (kV)	30	42	58	71	84	98	146
Insulation class IEEE (kV)	46	69	-	115	138	161	230
Rated line-to-ground voltage IEEE (kV)	29	44	-	88	88	102	146
Lightning impulse withstand voltage (BIL) (kV)	250	350	450	550	650	750	1050
Rated current (A)	2000	2000	1600	1600	1600	1600	1600
Draw lead current (A)	1250	1250	1250	1250	1250	1250	1250
Rated frequency (Hz)	50/60	50/60	50/60	50/60	50/60	50/60	50/60
Temporary over voltage (kV)	52	73	100	170	170	170	196
Wet power-frequency withstand voltage (kV)	95	140	185	230	275	325	460
Dry power-frequency withstand voltage (kV) (Routine test 1 minute)	120	160	205	260	310	365	506
Dry switching impulse withstand voltage (kV)	N/A	N/A	N/A	N/A	N/A	N/A	850
Wet switching impulse withstand voltage	N/A	N/A	N/A	N/A	N/A	N/A	750

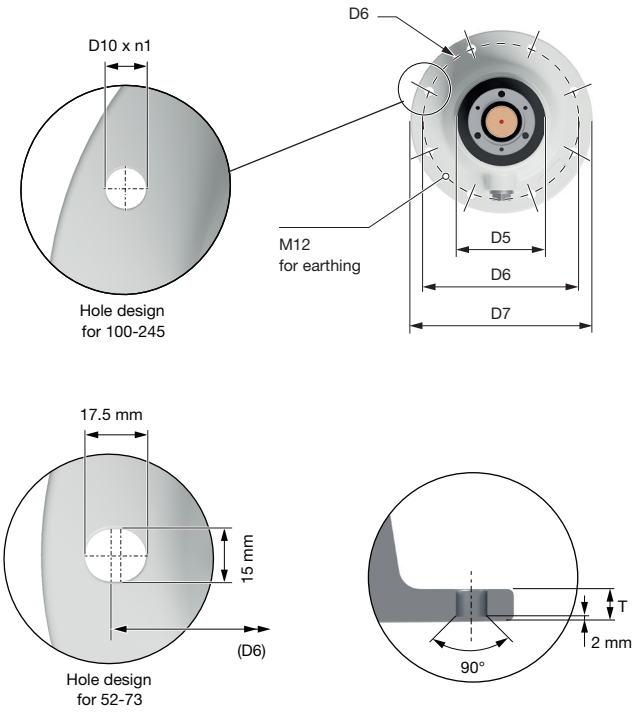
Dimensions and connection types

Flange

The flange design varies in size and mounting holes depending on the model. In some models, the flange can be ordered with a breathing valve. The flange is protected from corrosion. The standard color of the mounting flange is ANSI 70, light grey.

The flange can be delivered unpainted or in any color of choice. Flange painting withstands corrosivity category C5 (very high) of ISO-EN 12944-1 to -9.





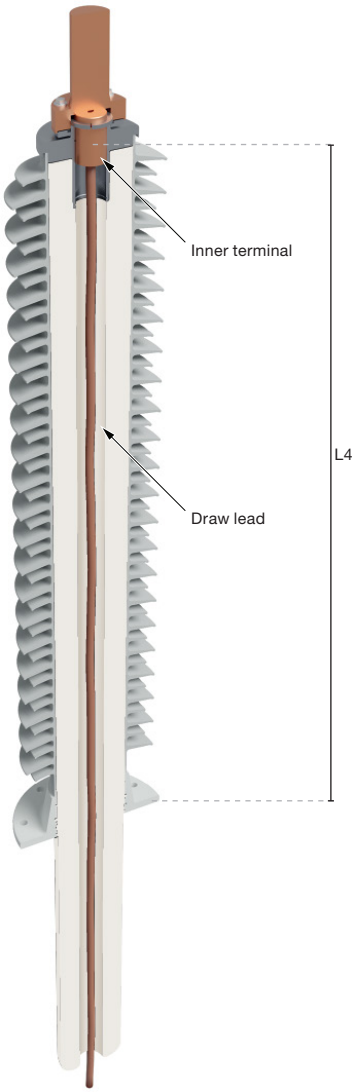
Flange dimensions

Rated highest voltage for equipment (U_m)	Dimensions in mm						
	Flange height	Min. gasket surface (inner)	Hole circle	Flange	Hole dimension	Number of holes	Flange thickness
		D5	D6	D7	D10	n1	T
52	101	120	185	225	15x17.5	6	15
73	101	120	185	225	15x17.5	6	15
100	101	136	185	225	16	6	15
123	101	160	250	290	16	8	15
145	101	160	250	290	16	8	15
170	101	160	250	290	16	8	15
245	105	206	400	450	23	12	20

Draw lead (DL)

Low currents with cable conductor
The current is led through a multi-strand flexible conductor, joined to the inner terminal of the winding. The lead is drawn up through the central tube of the bushing and connected to the top terminal that is fastened to the fastening ring connected to the winding tube. The top terminal is available in different materials, copper or aluminum and contact surfaces can be bare or silvered, other terminal sizes can be selected. Additional possibilities are available upon request.

Inner terminal for draw lead connection
Transformer manufacturers need to provide the conductor cable with a thin insulation in order to keep transient voltages to the central bushing tube. Brazing hole of the inner terminal depends on the cable diameter selected by the transformer designer. The inner terminal is provided with a pilot hole that can be drilled to the correct size.



Inner terminal

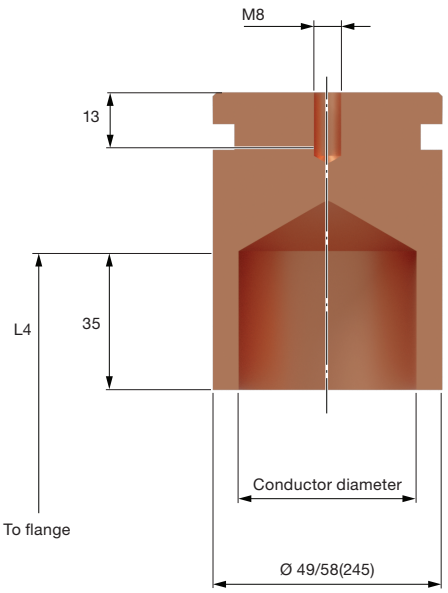
The inner terminal is made of copper for the brazing of a draw lead.

52-170 Inner terminal

Material	Conductor diameter (mm)	Ordering number	Mass (kg)
Copper	5 (pilot hole)	1ZBF551001-AAA	1
	11	1ZBF551001-AAB	1
	13	1ZBF551001-AAC	1
	15	1ZBF551001-AAD	1
	17	1ZBF551001-AAE	1
	18	1ZBF551001-AAF	1
	30	1ZBF551001-AAG	1
	42	1ZBF551001-AAH	1
	45	1ZBF551001-AAJ	1

245 Inner terminal

Material	Conductor diameter (mm)	Ordering number	Mass (kg)
Copper	5 (pilot hole)	1ZBF551001-CAA	1
	30	1ZBF551001-CAB	1
	45	1ZBF551001-CAC	1

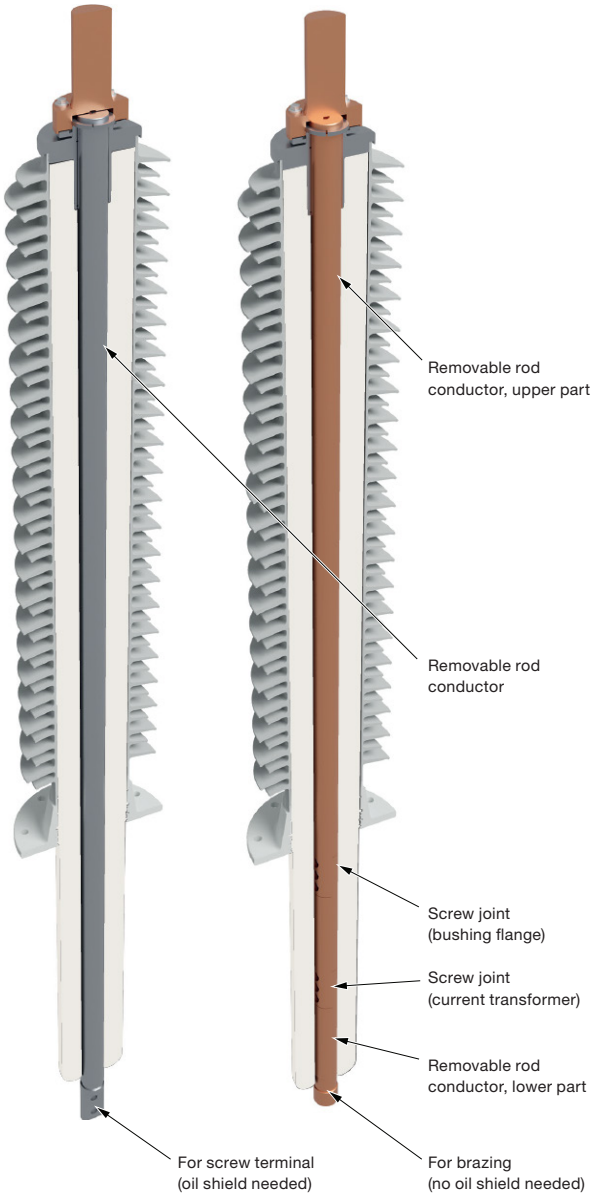


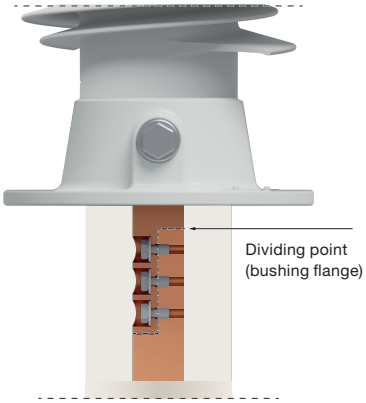
Removable rod (RR)

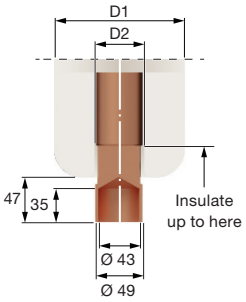
There are three alternative designs for removable rod conductors. Available are two alternatives with a dividing point and the third option with a removable rod conductor without a dividing point. Depending on preference the dividing point is either 20 mm below the bushing flange or 20 mm below the current transformer.

Design features
The rod is produced from electrolytic copper or aluminum. The divided point is joined with a screw joint with undroppable screws. The lower part of the rod conductor is designed for connection by brazing.

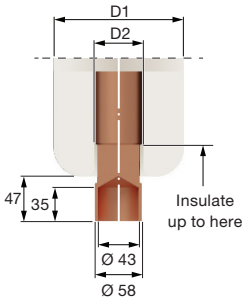
The 245 kV variant is available with a terminal for brazing or screw terminal. The removable rod with screw terminal is also available in aluminum without a dividing point.







52–170



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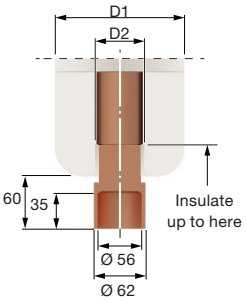
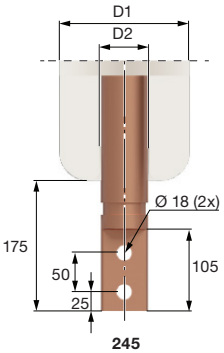
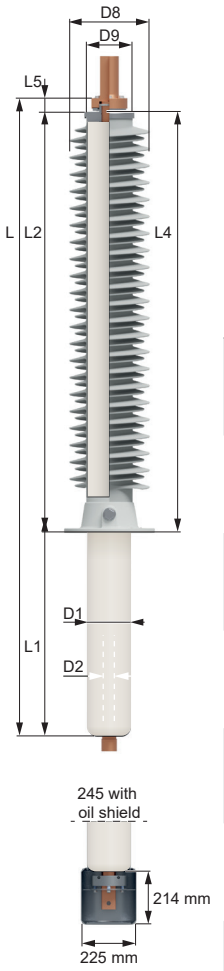


52–73



245

Dimension of the bushings EasyDry® 52–245 kV



Rated highest voltage for equipment (U_m)	Bushing Ordering number	Dimensions in mm													Creepage distance		Capacitance C_1
		Total length	Oil side length	Air side length	Top part	Cond. core (outer)	Center hole	Min. gasket surface (inner)	Hole circle	Insulator sheds	Top piece	Current transformer extension	Net mass	Number of holes	minimum	protected, at 90°	
		L	L1	L2	L5	D1	D2	D5	D6	D8	D9	(mm)	(kg)	n1	(mm)	(mm)	(pF)
52	1ZBF690052-010	734	145	589	56	96	51	110	185	218	120	0	13	6	1642	700	215
	1ZBF690052-013	1034	445									300	16				417
	1ZBF690052-015	1234	645									500	17				543
73	1ZBF690073-010	1029	260	769	56	96	51	110	185	218	120	0	18	6	2323	1000	325
	1ZBF690073-013	1329	560									300	20				512
	1ZBF690073-015	1529	760									500	21				636
100	1ZBF690100-010	1334	345	989	56	112	51	136	185	238	137	0	24	6	3150	2600	294
	1ZBF690100-013	1574	585									300	25				397
	1ZBF690100-015	1774	785									500	26				488
123	1ZBF690123-010	1444	255	1189	56	136	51	150	250	258	160	0	45	8	3913	1700	216
	1ZBF690123-013	1744	555									300	50				319
	1ZBF690123-015	1944	755									500	53				369
145	1ZBF690145-010	1731	362	1369	56	136	51	150	250	258	160	0	52	8	4595	2000	233
	1ZBF690145-013	2031	662									300	57				326
	1ZBF690145-015	2231	862									500	60				386
170	1ZBF690170-010	2019	410	1609	56	136	51	150	250	258	160	0	61	8	5504	2400	311
	1ZBF690170-013	2319	710									300	66				404
	1ZBF690170-015	2519	910									500	69				467
245	1ZBF690245-013	3055	920	2135	52	177	60	200	400	339	220	300	180	12	9214	4396	459
	1ZBF690245-016	3355	1220	2135	52	177	60	200	400	339	220	600	191	12	9214	4396	536

Removable rod (RR) for EasyDry® 52–245 kV

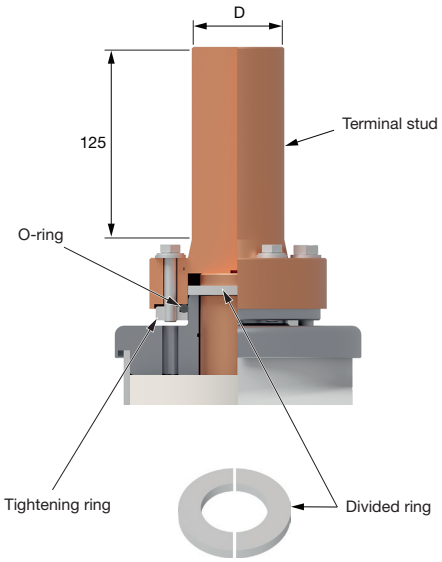
Bushing Ordering number	Division at flange				Division at current transformer				Mass (kg)			
	Upper part 1ZBF553001	1600 A Lower part 1ZBF554001	2000 A Lower part 1ZBF554002	(screw term.) Lower part 1ZBF554003	Upper part 1ZBF553001	1600 A Lower part 1ZBF554001	2000 A Lower part 1ZBF554002	No division (Al) 1ZBF555014	1600 A	2000 A	screw term.	
1ZBF690052-010	-AAB	-AAD	-AAC	-	-	-	-	-	13	13.5	-	-
1ZBF690052-013	-AAB	-ABG	-AAH	-	-AAE	-AAD	-AAC	-	18	18.5	-	-
1ZBF690052-015	-AAB	-ABT	-AAN	-	-AAH	-AAD	-AAC	-	21.5	22	-	-
1ZBF690073-010	-AAC	-AAP	-AAG	-	-	-	-	-	18	18.5	-	-
1ZBF690073-013	-AAC	-ABQ	-AAL	-	-AAG	-AAP	-AAG	-	23	23.5	-	-
1ZBF690073-015	-AAC	-ACD	-AAP	-	-AAL	-AAP	-AAG	-	26	26.5	-	-
1ZBF690100-010	-AAF	-AAU	-	-	-	-	-	-	23	-	-	-
1ZBF690100-013	-AAF	-ABS	-	-	-	-	-	-	27	-	-	-
1ZBF690100-015	-AAF	-ACG	-	-	-	-	-	-	31	-	-	-
1ZBF690123-010	-AAJ	-AAL	-	-	-	-	-	-	25	-	-	-
1ZBF690123-013	-AAJ	-ABM	-	-	-AAN	-AAL	-	-	30	-	-	-
1ZBF690123-015	-AAJ	-ACB	-	-	-AAS	-AAL	-	-	33	-	-	-
1ZBF690145-010	-AAM	-AAX	-	-	-	-	-	-	29.5	-	-	-
1ZBF690145-013	-AAM	-ABV	-	-	-AAR	-AAX	-	-	33.7	-	-	-
1ZBF690145-015	-AAM	-ACH	-	-	-AAU	-AAX	-	-	37.1	-	-	-
1ZBF690170-010	-AAQ	-ABC	-	-	-	-	-	-	34.5	-	-	-
1ZBF690170-013	-AAQ	-ABY	-	-	-AAV	-ABC	-	-	39.5	-	-	-
1ZBF690170-015	-AAQ	-ACK	-	-	-AAW	-ABC	-	-	42.5	-	-	-
1ZBF690245-013	-AAY	-BAA	-	-BAA	-	-	-	-BAA	-	-	74	23
1ZBF690245-016	-AAY	-BAC	-	-BAB	-	-	-	-BAB	-	-	81	25

Accessories

Air terminal

The air terminal needs to be specified in each case. The air terminal is then used together with either a removable rod, for maximum current capacity, or a draw lead for greater ease of assembly, when the required current capacity is lower.

The air terminal is available in a number of standard configurations. Other configurations can be supplied on request.

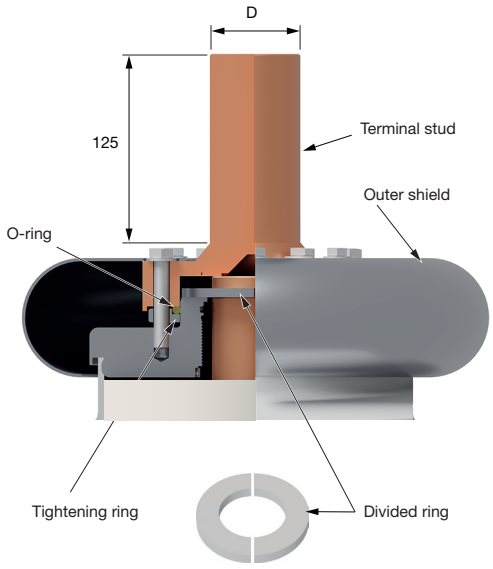


Air terminal

Rated highest voltage for equipment (U_m)	Material	Plating	D (mm)	Ordering number	Max. current (A)	Mass (kg)
52–170	Copper	-	60	1ZBF550000-AAA	2000	6
	Copper	-	30	1ZBF550000-AAB	1600	4
	Copper	-	60	1ZBF550000-BAA	2000	6
	Copper	Tin	30	1ZBF550000-BAB	1600	4
	Copper	Silver	60	1ZBF550000-BAC	2000	6
	Copper	Silver	30	1ZBF550000-BAD	1600	4
	Aluminium	-	60	1ZBF550000-CAA	2000	2
	Aluminium	-	30	1ZBF550000-CAB	1250	2
245	Copper	-	60	1ZBF550001-AAA	1600	8
	Copper	-	30	1ZBF550001-AAB	1600	5
	Aluminum	-	60	1ZBF550001-CAA	1600	3
	Aluminum	-	30	1ZBF550001-CAB	1250	2

Outer shield

If extra shielding of the connected power line is required, an outer shield can be supplied on request for the 245.



Outer shield

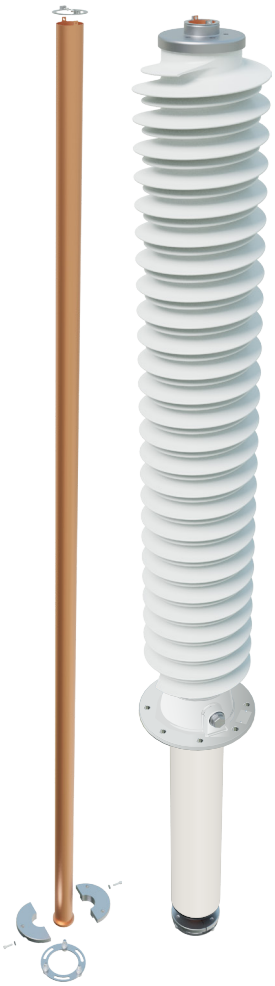
Material	D (mm)	Ordering number	Mass (kg)
Aluminum	310	1ZSC028970-AAA	1

Oil shield

The end shield is required for the GSA 245 if a solid rod conductor with a screw terminal will be used. The shield is made of aluminum and insulated with epoxy paint.

Oil shield

Rated highest voltage for equipment (U_m)	Material	Ordering number
245	Aluminum with epoxy coating	LF170046-BL



Optional accessories

Long term storage tank

With the technology of RIS there are no need for long term storage tank but can be ordered on request.

Lifting tools

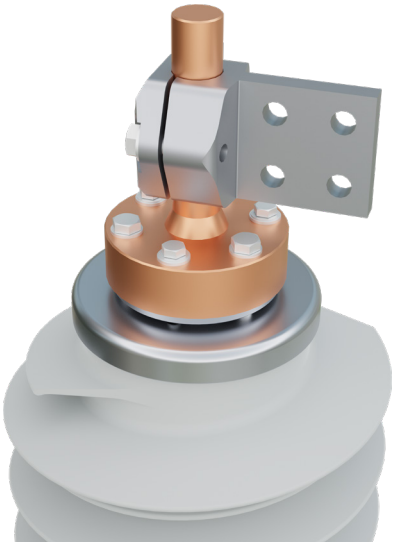
A special tool for safe lifting and handling operations of EasyDry® bushings is available as optional accessory. The lifting tool prevents stressing to the insulator and avoids damages of sheds or other parts of the bushing. Safe and fast handling of our bushings is a value.

Lifting tools for 52–245

Rated highest voltage for equipment (U_m)	Ordering number	Max load
52–170	2183 789-2	125 kg
245	2183 789-3	490 kg

Separate screw terminal plate with bolts

The separate terminal plate is available for studs with ø 30 mm and used for connecting the bushing to the line conductor.



Terminal plate

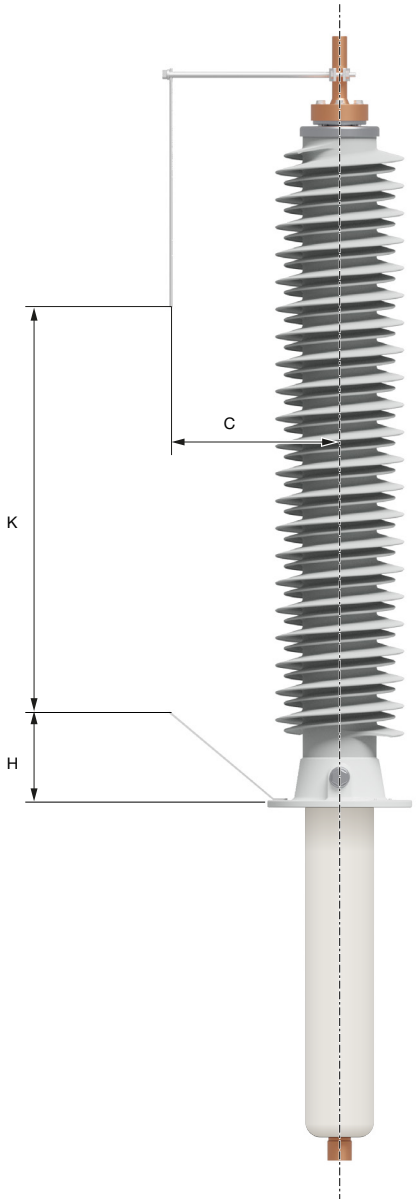
Material	Ordering number
Aluminum	LF 170 014-A
Nickel plated copper	LF 170 021-A

Arcing horns

Arcing horns made of galvanized steel can be mounted on the bushing. The arcing horns are available for studs with ø 30 mm.

The lower rod is fastened onto the flange with one of the fixing screws and the upper rod by means of a bracket on the air terminal.

The gap distances for standard arcing horns are shown in the table. Other gap distances on request.

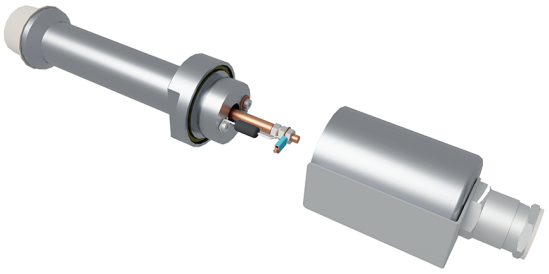


Arcing horns

Rated highest voltage for equipment (U_m)	Ordering number	Arcing distance L7 (mm)	K (mm)	C (mm)	H (mm)
52	LF 170 004-A	467	230–440	315	112
73	LF 170 004-A	647	400–620	315	112
100	LF 170 004-G	867	400–780	315	112
123	LF 170 004-G	1067	620–960	315	114
145	LF 170 005-A	1247	700–1080	380	224
170	LF 170 005-B	1487	820–1290	380	224
245	LF 170 005-N	2005	915-1695	410	390

Test tap adapter

For permanent connection of the test tap to measuring circuits, a test tap adapter is sometimes required.



Test tap adapters

Rated highest voltage for equipment (U_m)	Ordering number	K (mm)	C (mm)	H (mm)
52–245	1ZSC003881-AAC	230–440	315	112

Mechanical loading guide

The cantilever operational and test loads are given in the table below. The force is applied at the center of the air terminal of the bushing. Contact us for any specific requirements which include earthquakes, extreme environmental conditions and heavy equipment. The tests are performed in accordance with IEC 60137 and IEEE C57.19.01-2000.

Rated highest voltage for equipment (U_m) **[kV]**	**Lightning impulse withstand voltage (BIL)** **[kV]**	**Cantilever test load, 1 min.** **[N]**	**Cantilever operating load** **[N]**	**Installation** **Degree**
52	250	4000 [1]	2000 [1]	Horizontal to vertical
73	350	4000 [1]	2000 [1]	Horizontal to vertical
100	450	4000 [1]	2000 [1]	Horizontal to vertical
123	550	4000 [2]	2000 [2]	Horizontal to vertical
145	650	4000 [2]	2000 [2]	Horizontal to vertical
170	750	4000 [2]	2000 [2]	Horizontal to vertical
245	1050	5000 [1]	2500 [1]	Horizontal to vertical

1) Exceeding IEC 60137 Cantilever load Level II.
2) Conforming to IEC 60137 Cantilever load Level II.

Conductor loading

The bushings fulfil the temperature rise test requirements according to IEC and IEEE for the currents in the table Conductors tested.

Conductors tested

Rated highest voltage for equipment (U_m)	Conductor	Permissible current	
		IEC (A)	IEEE (A)
52-73 kV	Removable rod	2000	2000
100-245 kV	Removable rod	1600	1600
All ratings	**Draw lead**		
	185 mm²	400	400
	740 mm²	1250	1250

Calculation of values for the maximal permissible current at 20 °C in a draw lead, see the table Calculated permissible current.

Calculated permissible current

Rated highest voltage for equipment (U_m)	Draw lead (mm²)	Permissible current (A)
All ratings	90	200
	150	310
	240	480
	300	570
	400	700
	500	820
	630	1000

Overloading of bushings
If the conductor for the bushing is selected with 120 % of the rated current of the transformer, the bushing is considered to be able to withstand the overload conditions stated in IEC 60076-7 without further clarifications or tests, according to IEC 60137.

Conductor insulation
Draw leads and removable rods must be insulated with vacuum oil-impregnated insulating paper or equivalent, to give sufficient insulation integrity. The paper insulation must be min. 2 mm.

Draw lead: The paper insulation must be brought min. 50 mm inside the bushing centre hole.

Removable rod: The paper must fill the recess and cover the whole removable rod end downwards.

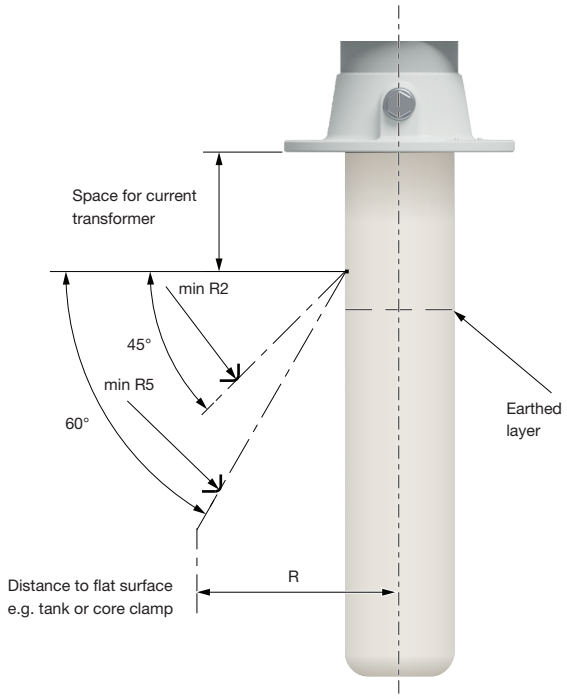
Short-time current
The rated thermal short-time current (Ith) is calculated according to IEC 60137. See the table Short-time current.

Short-time current

Rated highest voltage for equipment (Um)	Conductor	Rated current (A)	Area (mm²)	Short-time current (I_{th}) kA, rms		Dynamic current (I_d) kA, peak
				1 s	2 s	
52-170 kV	Removable rod Ø 49 mm Cu	2000-1600	1886	100	96	240
52, 73, 245 kV	Removable rod Ø 58 mm Cu	1600	2642	100	100	315
245 kV	Removable rod Ø 58 mm Al	1600	2642	100	90	225
All ratings	Draw lead	1250	740	61	43	107

Recommendation for positioning

Clearance distance for transformers
The maximum stresses in the oil at the surface of the conductor insulation must be limited to those values normal for insulated conductors and similar components in the same transformer. The adjacent recommendations are intended as guidelines when complete calculations are not carried out.



Clearance distance

Rated highest voltage for equipment (U_m)	Internal insulation level of transformer (kV)	Distance to earthed parts R (mm)
52 kV	250-95	75
73 kV	350-140	90
100 kV	450-185	140
123 kV	550-230	145
145 kV	650-275	165
170 kV	750-325	190
245 kV	1050-460	265

EasyDry® 52–245 kV overview

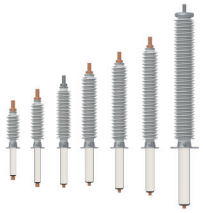
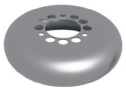
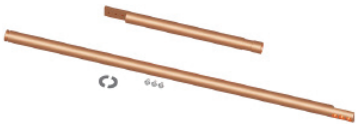
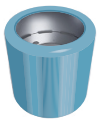
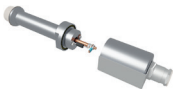
Rated highest voltage for equipment	**Rated current**		**Current transformer extension**	**Dimension drawing**	**Ordering number**
U_m	Draw lead	Removable rod	CT	Silicone	Silicone
[kV]	[A]	[A]	[mm]		
52	1250	1600 / 2000	0	1ZBF680020	1ZBF690052-010
			300	1ZBF680023	1ZBF690052-013
			500	1ZBF680025	1ZBF690052-015
73	1250	1600 / 2000	0	1ZBF680030	1ZBF690073-010
			300	1ZBF680033	1ZBF690073-013
			500	1ZBF680035	1ZBF690073-015
100	1250	1600	0	1ZBF680040	1ZBF690100-010
			300	1ZBF680043	1ZBF690100-013
			500	1ZBF680045	1ZBF690100-015
123	1250	1600	0	1ZBF680050	1ZBF690123-010
			300	1ZBF680053	1ZBF690123-013
			500	1ZBF680055	1ZBF690123-015
145	1250	1600	0	1ZBF680060	1ZBF690145-010
			300	1ZBF680063	1ZBF690145-013
			500	1ZBF680065	1ZBF690145-015
170	1250	1600	0	1ZBF680070	1ZBF690170-010
			300	1ZBF680073	1ZBF690170-013
			500	1ZBF680075	1ZBF690170-015
245	1250	1600	300	1ZBF680083	1ZBF690245-013
			600	1ZBF680085	1ZBF690245-016

Inquiring details

When ordering, please state:

- Type and ordering number for bushing.
- Drawing number for inner terminal or conductor, lower and upper part.
- Drawing number for air terminal.
- Additional accessories or modifications.
- Test required, in addition to the normal routine tests.

Bushing ordering

Ordering part	Ordering number	
Bushing	See "Dimension of the bushings EasyDry® 52–245 kV" on page 12.	
Air terminal	See "Air terminal" on page 13.	
Outer shield for 245	See "Outer shield" on page 13.	
Inner terminal for draw lead	See "52-170 Inner terminal" on page 10 or "245 Inner terminal" on page 10.	
Removable rod conductor	See "Removable rod (RR) forEasyDry® 52–245 kV" on page 12.	
Terminal plate	See "Terminal plate" on page 16.	
Oil shield	See "Oil shield" on page 14.	
Arcing horns	See "Arcing horns" on page 17.	
Additional accessories or modifications	For example see "Test tap adapters" on page 17.	

Tools ordering

Ordering tool	**Ordering number**	
Lifting tool	2183 789-2	For 52-170. Max load 125 kg.
	2183 789-3	For 245. Max load 490 kg.
Pull-through cord	9760 669-A, -D	For assembly and disassembly of the draw lead/conductor rod.

Spare parts ordering

Ordering spare part	**Ordering number**
Test tap cover	2126 774-34
Test tap O-ring	1ZSC001606-AAW

EasyDry® 245–550 kV

The bushing is configured with one of four connection types, depending on the current rating and preferred design of the transformer manufacturer. EasyDry® modular bushing platform enables separate selection of air terminal and oil terminal.

- **Quick^{Connect} draw rod (DR)** is a unique patented connection system developed by Hitachi Energy. It combines the benefits from maximum current rating capability and a rapid assembly/ disassembly system that reduce risk for humans and transformers during transformers life time.
- **Draw lead (DL)** system for greater ease of assembly, when the required current capacity is at a relative lower rate. The draw lead is the current path through the bushing.
- **Removable rod (RR)** conductor system for medium current capacity and easy installation, with the possibility to pre-install the lower part of the removable rod directly in the transformer turret. The removable rod is the current path through the bushing.
- **Fixed bottom contact (FBC)** for higher current capability and higher mechanical performance. The current is lead through a central casted conductor, in copper or aluminum.

Connection types and dimensions

Quick[Connect] draw rod

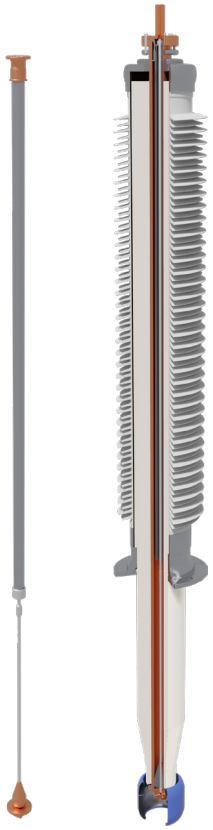
Quick[Connect] draw rod (DR) is used in combination with an air terminal and an oil terminal and offers the simplest way of installing bushing on site from all other bottom contact conductor systems. The current is transposed via a conductor tube connected to the oil and air terminal and not the draw rod.

If required, for example to meet specific transport conditions, an additional joint can be positioned at any desired level below the flange. This must be stated in the order. The lower part with contact can be secured to the transport cover during transport and storage of the transformer.

Advantages compared to other methods used for high current:

- No manholes required in the transformer tank
- The bushing tube is used as a conductor
- No special support required in the transformer, as is the case with plug contacts
- Perfect guiding of the bushing into the transformer
- The draw rod consists of compensating device, rods, joints, washer and nut

Bottom contacts with 4 threaded holes for cable lugs are available. The bottom contacts are made of copper in one piece with prism shape.

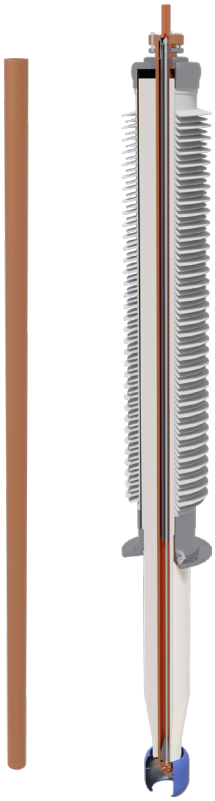


Fixed bottom contact (FBC)

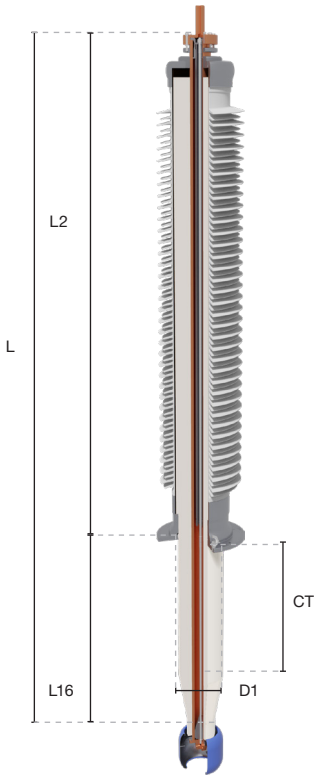
For improved current utilization, the current is led through a central casted conductor, in copper or aluminum depending on the requested current rate. This solution ensures high thermal and mechanical performance.

As in other variants of connections, the terminals can be selected among different possible options.

Bottom contacts with 4 or 6 threaded holes for cable lugs are available. The bottom contacts are made of copper in one piece with prism and flag shape.



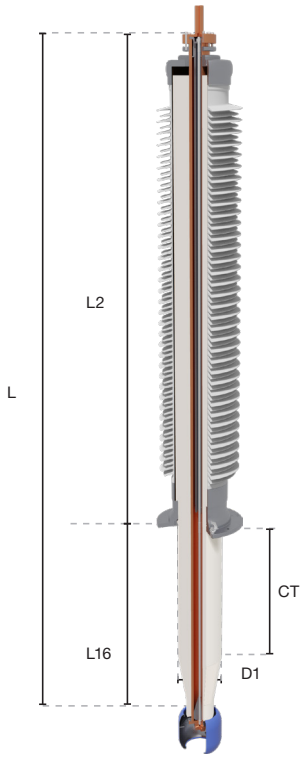
Dimension of the bushings with fixed bottom contact (FBC) and Quick^{Connect} draw rod (DR) in aluminum version



Electrical data				Dimensions							Drawings	
Rated highest voltage for equipment (U_m)	Lightning impulse withstand voltage (BIL)	Switching impulse withstand voltage (SIL) dry/ wet	Rated current (Ir) alluminum conductor	Minimum creepage distance	Minimum arcing distance	Air side length from flange to the beginning of the terminal on the top	Current transformer extension	Oil side core length	Core diameter	Total length, without air terminal and oil shield	Silicone composite insulator	Porcelain composite insulator
						L2	CT	L16	D1	L	Drawing number	
[kV]	[kV]	[kV]	[A]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]		
245	1050	850 750	1600	7595	2005	2461	0	540	185	3001	1ZBF186008	1ZBF186240
							300	840		3301	1ZBF186011	1ZBF186243
							600	1140		3601	1ZBF186014	1ZBF186246
245	1050	850 750	2500	7595	2005	2481	0	540	234	3021	1ZBF186029	1ZBF186261
							300	840		3321	1ZBF186032	1ZBF186264
							600	1140		3621	1ZBF186035	1ZBF186267
300	1175	850	1250	9301	2300	2766	0	590	234	3356	1ZBF186057	1ZBF186289
							300	890		3656	1ZBF186060	1ZBF186292
							600	1190		3956	1ZBF186063	1ZBF186295
300	1175	850	2500	9301	2300	2776	100	690	234	3466	1ZBF186077	1ZBF186309
							300	890		3666	1ZBF186079	1ZBF186311
							600	1190		3966	1ZBF186082	1ZBF186314
362	1300	950	1250	11223	2700	3168	100	760	234	3928	1ZBF186095	1ZBF186327
							300	960		4128	1ZBF186097	1ZBF186329
							600	1260		4428	1ZBF186100	1ZBF186332
362	1300	950	2000	11223	2700	3229	100	760	264	3989	1ZBF186113	1ZBF186345
							300	960		4189	1ZBF186115	1ZBF186347
							600	1260		4489	1ZBF186118	1ZBF186350
420	1550	1050	1250	13021	3100	3627	0	730	264	4357	1ZBF186132	1ZBF186364
							300	1030		4657	1ZBF186135	1ZBF186367
							600	1330		4957	1ZBF186138	1ZBF186370
420	1550	1050	2000	13021	3100	3677	0	730	285	4407	1ZBF186153	1ZBF186385
						3687	300	1030		4717	1ZBF186156	1ZBF186388
						3687	600	1330		5017	1ZBF186159	1ZBF186391
420	1675	1175	1250	13021	3600	4127	0	790	264	4917	1ZBF186174	1ZBF186406
							300	1090		5217	1ZBF186177	1ZBF186409
							600	1390		5517	1ZBF186180	1ZBF186412
420	1675	1175	2000	13021	3600	4177	0	790	285	4967	1ZBF186195	1ZBF186427
						4187	300	1090		5277	1ZBF186198	1ZBF186430
						4187	600	1390		5577	1ZBF186201	1ZBF186433
550	1675	1175	1600	17052	4155	4782	100	1055	338	5837	1ZBF186471	1ZBF186495
						4792	300	1255		6047	1ZBF186473	1ZBF186497
						4792	600	1555		6347	1ZBF186476	1ZBF186500
550	1800	1300	1600	17052	4155	4782	100	1055	338	5837	1ZBF186215	1ZBF186447
						4792	300	1255		6047	1ZBF186217	1ZBF186449
						4792	600	1555		6347	1ZBF186220	1ZBF186452

NOTE: For more details please check the individual drawings. Dimensions are subject to modification without notice.

Dimension of the bushings with fixed bottom contact (FBC) and Quick[Connect] draw rod (DR) or copper version



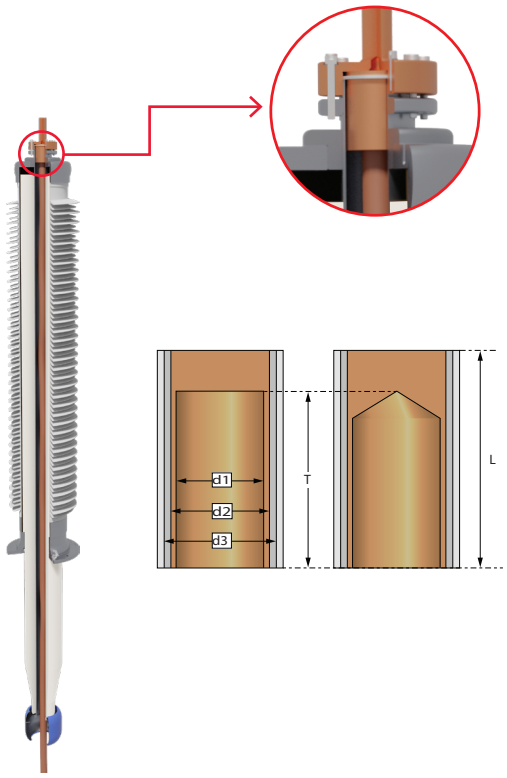
Electrical data				Dimensions							Drawings	
Rated highest voltage for equipment (U_m)	Lightning impulse withstand voltage (BIL)	Switching impulse withstand voltage (SIL) dry/ wet	Rated current (Ir) copper conductor	Minimum creepage distance	Minimum arcing distance	Air side length from flange to the beginning of the terminal on the top	Current transformer extension	Oil side core length	Core diameter	Total length, without air terminal and oil shield	Silicone composite insulator	Porcelain composite insulator
						L2	CT	L16	D1	L	Drawing number	
[kV]	[kV]	[kV]	[A]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]		
245	1050	850 750	2000	7595	2005	2461	0	540	185	3001	1ZBF186015	1ZBF186247
							300	840		3301	1ZBF186018	1ZBF186250
							600	1140		3601	1ZBF186021	1ZBF186253
245	1050	850 750	3150	7595	2005	2481	0	540	234	3021	1ZBF186036	1ZBF186268
							300	840		3321	1ZBF186039	1ZBF186271
							600	1140		3621	1ZBF186042	1ZBF186274
245	1050	850 750	5000	7595	2005	2603	0	540	285	3143	1ZBF186043	1ZBF186275
							300	840		3343	1ZBF186046	1ZBF186278
							600	1140		3664	1ZBF186049	1ZBF186281
300	1175	850	2000	9301	2300	2766	0	590	234	3356	1ZBF186064	1ZBF186296
							300	890		3656	1ZBF186067	1ZBF186299
							600	1190		3956	1ZBF186070	1ZBF186302
300	1175	850	3150	9301	2300	2776	100	690	234	3466	1ZBF186083	1ZBF186315
							300	890		3666	1ZBF186085	1ZBF186317
							600	1190		3966	1ZBF186088	1ZBF186320
362	1300	950	2000	11223	2700	3168	100	760	234	3928	1ZBF186101	1ZBF186333
							300	960		4128	1ZBF186103	1ZBF186335
							600	1260		4428	1ZBF186106	1ZBF186338
362	1300	950	2500	11223	2700	3229	100	760	264	3989	1ZBF186119	1ZBF186351
							300	960		4189	1ZBF186121	1ZBF186353
							600	1260		4489	1ZBF186124	1ZBF186356
420	1550	1075	2000	13021	3100	3627	0	730	264	4357	1ZBF186139	1ZBF186371
							300	1030		4657	1ZBF186142	1ZBF186374
							600	1330		4957	1ZBF186145	1ZBF186377
420	1550	1075	2500	13021	3100	3677	0	730	285	4407	1ZBF186160	1ZBF186392
						3687	300	1030		4717	1ZBF186163	1ZBF186395
						3687	600	1330		5017	1ZBF186166	1ZBF186398
420	1675	1175	2000	13021	3600	4127	0	790	264	4917	1ZBF186181	1ZBF186413
							300	1090		5217	1ZBF186184	1ZBF186416
							600	1390		5517	1ZBF186187	1ZBF186419
420	1675	1175	2500	13021	3600	4177	0	790	285	4967	1ZBF186202	1ZBF186434
						4187	300	1090		5277	1ZBF186205	1ZBF186437
						4187	600	1390		5577	1ZBF186208	1ZBF186440
550	1675	1175	2000	17052	4155	4782	100	1055	338	5837	1ZBF186477	1ZBF186501
			2500			4792	300	1255		6047	1ZBF186479	1ZBF186503
			2500			4792	600	1555		6347	1ZBF186482	1ZBF186506
550	1675	1175	3000	17052	4155	4792	100	1055	374	5847	1ZBF186483	1ZBF186507
							300	1255		6047	1ZBF186485	1ZBF186509
							600	1555		6347	1ZBF186488	1ZBF186512
550	1800	1300	2000	17052	4155	4782	100	1055	338	5837	1ZBF186221	1ZBF186453
			2500			4792	300	1255		6047	1ZBF186223	1ZBF186455
			2500			4792	600	1555		6347	1ZBF186226	1ZBF186458
550	1800	1300	3000	17052	4155	4792	100	1055	374	5847	1ZBF186227	1ZBF186459
							300	1255		6047	1ZBF186229	1ZBF186461
							600	1555		6347	1ZBF186232	1ZBF186464

NOTE: For more details please check the individual drawings. Dimensions are subject to modification without notice.

Draw lead (DL)

Low currents with cable conductor
The current is led through a multi-strand flexible conductor, joined to the inner terminal of the winding. The lead is drawn up through the central tube of the bushing and connected to the top terminal that is fastened to the fastening ring connected to the winding tube. The top terminal is available in different materials, copper or aluminum and contact surfaces can be bare or silvered, other terminal sizes can be selected. Additional possibilities are available upon request.

Inner terminal for draw lead connection
Transformer manufacturers need to provide the conductor cable with a thin insulation in order to keep transient voltages to the central bushing tube. Brazing hole of the inner terminal depends on the cable diameter selected by the transformer designer. The inner terminal is provided with a pilot hole that can be drilled to the correct size.



Maximum allowable drilling depth and hole diameter of standard cable bolt*

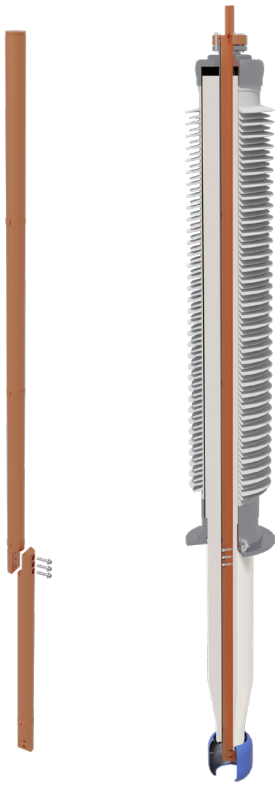
Inner tube diameter [d3]	Inner terminal diameter [d2]	Maximum hole diameter [d1]	Maximum height [T]
50 mm	48 mm	45 mm	L-20 mm
65 mm	60 mm	55 mm	L-20 mm
80 mm	75 mm	70 mm	L-20 mm
90 mm	85 mm	80 mm	L-20 mm

*Item number for all accessories available in the drawings

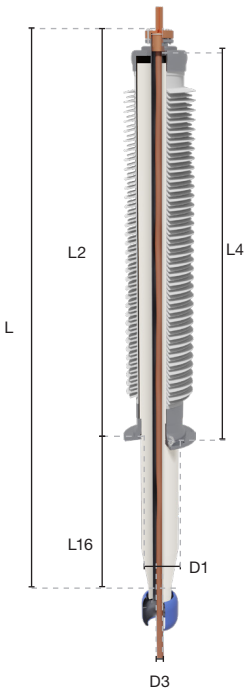
Removable rod (RR)

For higher current ratings, the bushing with central tube is equipped with a removable copper conductor rod.

The rod conductor fitted with a joint, near the flange. The conductor is centered by insulator rings which help to avoid any contact of the rod with the winding tube during operation.



Dimension of the bushings with draw lead (DL) and removable rod (RR)



Electrical data			Current draw lead		Current removable rod		Dimensions									Drawings	
Rated highest voltage for equipment (U_m)	Lightning impulse withstand voltage (BIL)	Switching impulse withstand voltage (SIL) dry/ wet	Rated current (Ir) draw lead	with copper cable section S	Rated current (Ir) removable rod	Removable rod diameter	Minimum creepage distance	Minimum arcing distance	Air side length from flange plate to terminal plate	Inner terminal: distance from the flange plate for daw lead	Current transformer extension	Oil side core length	Core diameter	Inside tube ø	Total length, without air terminal and oil shield	Silicone composite insulator	Porcelain composite insulator
									L2	L4	CT	L16	D1	D3	L	Drawing number	
[kV]	[kV]	[kV]	[A]	[mm²]	[A]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]		[mm]		
245	1050	850 750	1250	840	1250	45	7595	2005	2461	2370	0	540	185	50	3001	1ZBF186001	1ZBF186233
											300	840			3301	1ZBF186004	1ZBF186236
											600	1140			3601	1ZBF186007	1ZBF186239
245	1050	850 750	2000	2100	2000	85	7595	2005	2471	2355	0	540	234	90	3011	1ZBF186022	1ZBF186254
											300	840			3311	1ZBF186025	1ZBF186257
											600	1140			3611	1ZBF186028	1ZBF186260
300	1175	850	1250	840	1250	45	9301	2300	2766	2675	0	590	234	50	3356	1ZBF186050	1ZBF186282
											300	890			3656	1ZBF186053	1ZBF186285
											600	1190			3956	1ZBF186056	1ZBF186288
300	1175	850	2000	2100	2000	75	9301	2300	2766	2650	100	690	234	80	3456	1ZBF186071	1ZBF186303
						85					300	890		90	3656	1ZBF186073	1ZBF186305
						85					600	1190		90	3956	1ZBF186076	1ZBF186308
362	1300	950	1000	840	1000	45		2700	3168	3077	100	760	234	50	3928	1ZBF186089	1ZBF186321
											300	960			4128	1ZBF186091	1ZBF186323
											600	1160			4428	1ZBF186094	1ZBF186326
362	1300	950	1600	1680	1600	75		2700	3219	3103	100	760	264	80	3979	1ZBF186107	1ZBF186339
											300	960			4179	1ZBF186109	1ZBF186341
											600	1160			4379	1ZBF186111	1ZBF186344
420	1550	1075	800	840	800	45		3100	3627	3536	0	730	264	50	4357	1ZBF186125	1ZBF186357
											300	1030			4657	1ZBF186128	1ZBF186360
											600	1330			4957	1ZBF186131	1ZBF186363
420	1550	1075	1600	1200	1600	60		3100	3677	3586	0	730	285	65	4407	1ZBF186146	1ZBF186378
				1680		75				3561	300	1030		80	4707	1ZBF186149	1ZBF186381
				1680		75				3561	600	1330		80	5007	1ZBF186152	1ZBF186384
420	1675	1175	800	840	800	45		3600	4127	4036	0	790	264	50	4917	1ZBF186167	1ZBF186399
											300	1090			5217	1ZBF186170	1ZBF186402
											600	1390			5517	1ZBF186173	1ZBF186405
420	1675	1175	1600	1200	1600	60		3600	4177	4086	0	790	285	65	4967	1ZBF186188	1ZBF186420
				1680		75				4061	300	1090		80	5267	1ZBF186191	1ZBF186423
				1680		75				4061	600	1390		80	5567	1ZBF186194	1ZBF186426
550	1675	1175	1250	1200	1250	60		4155	4782	4691	100	1055	338	65	5837	1ZBF186465	1ZBF186489
				1680		75				4666	300	1255		80	6037	1ZBF186467	1ZBF186491
				1680		75				4666	600	1555		80	6337	1ZBF186470	1ZBF186494
550	1800	1300	1250	1200	1250	60		4155	4782	4691	100	1055	338	65	5837	1ZBF186209	1ZBF186441
				1680		75				4666	300	1255		80	6037	1ZBF186211	1ZBF186443
				1680		75				4666	600	1555		80	6337	1ZBF186214	1ZBF186446

NOTE: For more details please check the individual drawings. Dimensions are subject to modification without notice.

Outdoor insulators

There are 2 different outdoor insulator options:
- Composite insulator with helical sheds (recommended solution)
- Composite insulator with concentric sheds

Please consult corresponding weights as well as head and shed diameters for each bushing type in the respective drawings.

Composite insulator with silicone sheds

Composite insulators with silicone sheds are made of an outer layer of silicone sheds with a reinforced glass fiber tube inside the bushing. The silicone rubber (SiR) insulator ensures and outstanding durability, reliable hydrophobicity recovery, and an excellent tracking and erosion resistance.

The helical shed is the result of intensive development efforts at Hitachi Energy. Outstanding results in tough long-term pollution tests have proved their superior quality.

Insulators with conventional concentric sheds complement our product range.

Advantages
- Excellent self-cleaning behavior in harsh environment due to hydrophobic surface properties
- Low leakage currents
- Improved safety for personnel and equipment
- Lower weight

Helical sheds

Concentric sheds

Porcelain insulator

Porcelain insulators are made of high-quality electrical porcelain with a glaze finish.

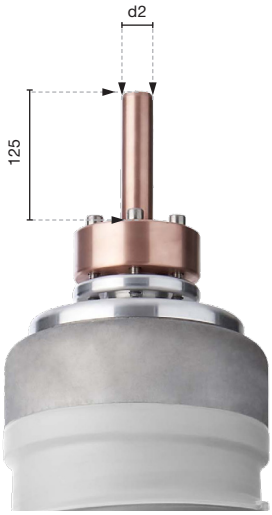
Advantages
- High arc resistance
- Well proven over decades
- High erosion durability

Porcelain sheds

Accessories

Air terminal

The air terminal is used together with either a draw lead (DL), removable rod (RR), fixed bottom contact (FBC) or QuickConnect draw rod connection types. The air terminal needs to be specified in every case.

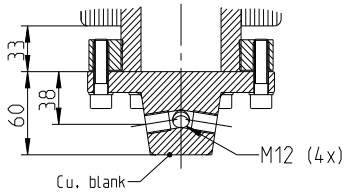


Terminal diameter (d2)	30, 40, 50 and 60 mm
Terminal length	125 mm
Terminal material	Copper
	Aluminium
Surface treatment	Blank
	Silver plated
	Nickel plated
	Tin plated

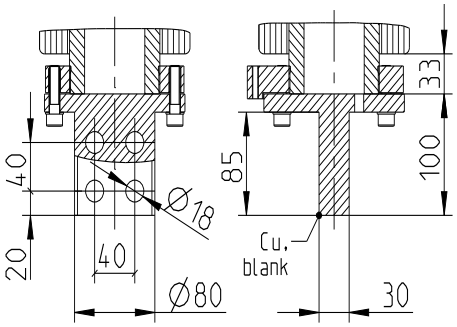
Oil terminal for fixed bottom contact (FBC)

The center tube of the bushing is used as conductor. The transformer leads are fitted with cable lugs, bolted to the oil terminal. This contact is tightened to the lower end of the bushing tube.

Two different shape variants are available for FBC; in the prism variant 4 or 6 threaded holes for cable lugs are disposed at the same height; in the flag variant 4 or 2 holes are at different positions on the flat surface of the oil terminal.



Oil terminal (prism)



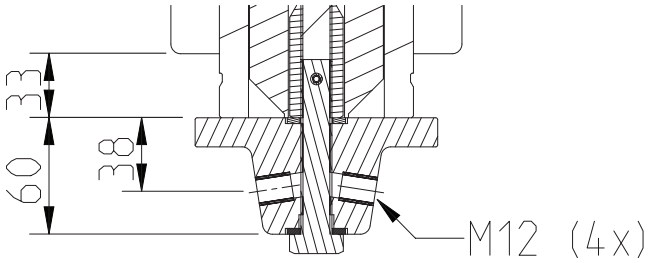
Oil terminal (flag)

Electrical characteristics		**Current**	**Bushing size**	**Oil terminal**				
Rated highest voltage for equipment (U_m)	Lightning impulse withstand voltage (BIL)	Current range	Core diameter	Oil terminal shape	Number of holes	Hole ø	Width of flag	Height of flag
[kV]	[kV]	[A]	D1 [mm]	Shape		[mm] or type	[mm]	[mm]
245	1050	1250 - 2000	185	Flag	2	18 mm	52	85
				Prism	4	M10	46	45
245	1050	2000 - 3150	234	Flag	4	18 mm	80	85
				Prism	4	M12	46	45
245	1050	5000	285	Flag	4	18 mm	100	85
				Prism	6	M12	46	45
300	1175	1250 - 2000	234	Flag	2	18 mm	52	85
				Prism	4	M10	46	45
300	1175	2000 - 3150	234	Flag	4	18 mm	80	85
				Prism	4	M12	46	45
362	1300	1250 - 2000	234	Flag	2	18 mm	52	85
				Prism	4	M10	46	45
362	1300	1600 - 2500	264	Flag	4	18 mm	80	85
				Prism	4	M12	46	45
420	1550/1675	1250 - 2500	264/285	Flag	4	18 mm	80	85
				Prism	4	M12	46	45
550	1675/1800	1250 - 3150	338/394	Flag	4	18 mm	80	85
				Prism	4	M12	46	45

Oil terminal for Quick^{Connect} draw rod (DR)

The center tube of the bushing is used as conductor. The transformer leads are fitted with cable lugs, bolted to the oil terminal. This contact is tightened to the lower end of the draw rod system.

Only prism shape variant is available for Quick^{Connect} draw rod (DR); 4 or 6 threaded holes for cable lugs are disposed at the same height.



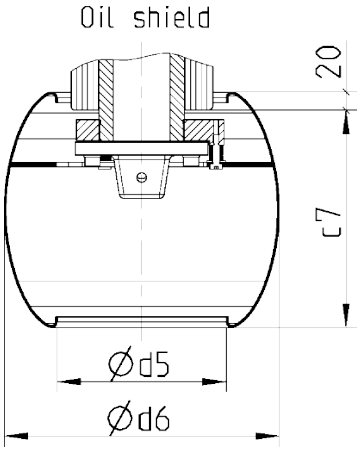
Oil terminal (prism)

Electrical characteristics	**Current**	**Bushing size**	**Oil terminal**					
Rated highest voltage for equipment (U_m)	Lightning impulse withstand voltage (BIL)	Current range	Core diameter	Oil terminal shape	Number of holes	Hole ø	Width of flag	Height of flag
[kV]	[kV]	[A]	D1 [mm]	Shape			[mm]	[mm]
245	1050	2000 - 3150	234	Prism	4	M12	46	45
245	1050	5000	285	Prism	6	M12	46	45
300	1175	2000 - 3150	234	Prism	4	M12	46	45
362	1300	1600 - 2500	264	Prism	4	M12	46	45
420	1550	1250 - 2500	264	Prism	4	M12	46	45
420	1675	1600 - 2500	285	Prism	4	M12	46	45
550	1675	2500 - 3000	338	Prism	4	M12	46	45
550	1800	2500 - 3000	394	Prism	4	M12	46	45

Oil shield

Oil shield is available in different diameters; the installation is bayonet type and is fully removable for easier installation.

All our standard shields are epoxy coated, other variants are available upon request.

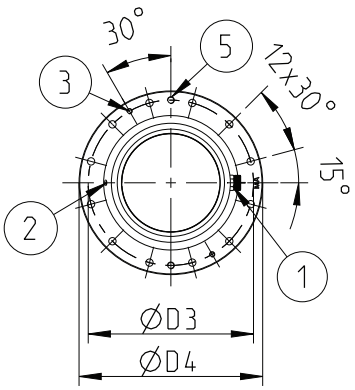


Electrical characteristics	**Current**	**Bushing size**	**Oil shield***		
Highest voltage for equipment (U) and lightning impulse (BIL)	Current range	Core diameter	Opening bottom	Shield	Shield length below core body
		D1	D5	D6	C7
[kV]	[A]	[mm]	[mm]	[mm]	[mm]
245 - 1050	1250 - 2000	185	140	200	200
245 - 1050	2000 - 3150	234	154 140	240 260	230 247
245 - 1050	5000	285	216	302	230
300 - 1175	1250 - 2000	234	132	230	200
300 - 1175	2000 - 3150	234	154 140	240 260	230 247
362 - 1300	1250 - 2000	234	132	230	200
362 - 1300	1600 - 2500	264	140 176	260 292	247 230
420 - 1550 and 420 - 1160	800 - 1600	264	140 176	260 292	247 230
420 - 1550 and 420 - 1165	1600 - 2500	285	140 176	260 292	247 230
550 - 1675 and 550 - 1800	1250 - 3000	338 - 374	140 176	260 292	247 230

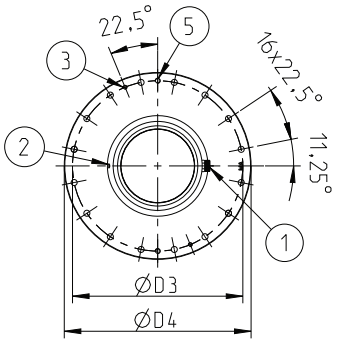
*Item number for all accessories available in the drawing

Flange

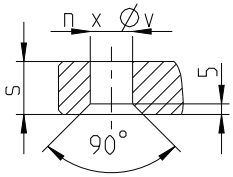
Different sizes of the flange are available to meet all transformer designs, included CENELEC 50458: 2006 recommendations.



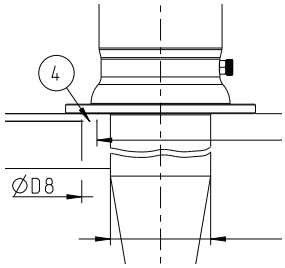
Flange variant 1



Flange variant 2



Flange holes



1. Test tap
2. Deaeration screw
3. Earthing screws
4. Sealing area
5. Lifting screws

Electrical characteristics		**Current**	**Flange**							
Rated highest voltage for equipment (U_m)	Lightning impulse withstand voltage (BIL)	Current range	Core diameter	Pitch circle ø	Outer diameter ø	Sealing area: max. ø	Number of holes	Hole ø	Flange plate thicknes	Flange variant
			D1	D3	D4	D8		v	s	
[kV]	[kV]	[A]	[mm]	[mm]	[mm]	[mm]	n	[mm]	[mm]	
245	1050	1250 - 2000	185	400	450	365	12	20	22	1
				350	400	315	12	20	22	1
245	1050	2000 - 3150	234	400	450	365	12	20	22	1
				450	500	415	12	20	25	1
245	1050	5000	285	450	500	415	12	20	25	1
				620	680	580	16	22	25	2
300	1175	1250 - 3150	234	400	450	365	12	20	22	1
				450	500	415	12	20	25	1
362	1300	1000 - 2000	234	400	450	365	12	20	22	1
				450	500	415	12	20	25	1
362	1300	1600 - 2500	264	450	500	415	12	20	25	1
				620	680	580	16	22	25	2
420	1550 and 1675	800 - 2000	264	450	500	415	12	20	25	1
				620	680	580	16	22	25	2
420	1550 and 1675	1600 - 2500	285	450	500	415	12	20	25	1
				620	680	580	16	22	25	2
550	1675 and 1800	1250 - 2500	338	620	680	580	16	22	25	2
				550	500	380	12	23	25	1
550	1675 and 1800	3000	374	620	680	580	12	22	25	2
				580	530	380	12	23	25	1

Optional accessories

Corrosion protection (CX)

If EasyDry® bushings are intended for usage in severe environments, for example in offshore applications, all bushings can be provided with special painted flange and bushing head, and a plated air terminal.

Long term storage tank

With the technology of RIS there are no need for long term storage tank but can be ordered on request.

Long term storage tank

Lifting tool

A special tool for safe lifting and handling operations of EasyDry® bushings is available as optional accessory. The lifting tool prevents stressing the composite, or porcelain insulator and avoids damages of sheds or other parts of the bushing. Safe and fast handling of our bushings is a value. Our lifting tool is optimized to facilitate the installation of cable in draw lead applications and enhancing the way to install our Quick^{Connect} (DR) system.

Lifting tool

Lifting tools for 245–550

Rating	Current	Core diameter (D1)	Ordering number
245	1250–2000	185	1ZBF220024
300	1250–2000	234	
362	1000–2000	234	
420	800–2000	264	
245	2000–3150	234	1ZBF220020
300	2000–2500	234	
362	1600–2500	264	
420	1600–2500	264–285	
550	1250-3000	338–374	

Terminal plates

The separate terminal plate is available and used for connecting the bushing to the line conductor. Different sizes, materials and surface treatment are available. One example is displayed in the image.

Terminal plates

Terminal plate

Material	Cat. No.
Aluminum	LF 170 014-A
Nickel plated copper	LF 170 021-A

Arcing horns

Optional arcing horns are available as optional accessories for all voltage levels. Contact our sales to have an offer.

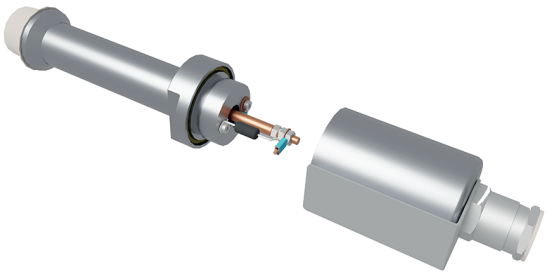
Arcing horns

Rating	Cat. No.	Arcing distance L7 (mm)	K (mm)	C (mm)	H (mm)
245	On request				
300-550	On request				

Arcing horns

Test tap adapter

For permanent connection of the test tap to measuring circuits, a test tap adapter is sometimes required. Available on request.



Mechanical loading guide

The cantilever operational and test loads are given in the table below. The force is applied at the center of the air terminal of the bushing. Contact us for any specific requirements which include earthquakes, extreme environmental conditions and heavy equipment. The tests are performed in accordance with IEC 60137 and IEEE C57.19.01-2017.

Rated highest voltage for equipment (U_m) [kV]	Lightning impulse withstand voltage (BIL) [kV]	Cantilever test load, 1 min. [N]	Cantilever operating load [N]	Installation (v=vertical; 30° from vertical) Degree
245	1050	5000	2500	v-30°
300	1175	5000	2500	v-30°
362	1300	5000	2500	v-30°
420	1550	5000	2500	v-30°
420	1675	5000	2500	v-30°
550	1675	5000	2500	v-30°
550	1800	5000	2500	v-30°

Conductor loading guide

The rated current is the starting point for choosing the type of conductor. However, current levels of conductor types partially overlap and can be selected according to individual preferences.

The EasyDry® bushing fulfill the temperature rise test requirements according to IEC for the currents in the table below. The short-time current is also calculated according to IEC 60137 and listed in the table below.

Conductor type	**Max. rated current**	**Cable nominal cross section/ removable rod diameter**	**Rated thermal short-time current**	**Rated dynamic current**
	[A]	[mm^2]	[kA, rms, 2s]	[kA, peak]
Draw lead (DL)	1250	840	48	120
Draw lead (DL)	2000	1200 1600 2100	63	158
Removable rod (RR)	1250 - 2500	45 60 75 85	63	158
Fixed bottom contact (FBC) Quick^{Connect} draw rod (DR)	1600 - 5000	-	100	250

Overloading of bushing
If the conductor for the bushing is selected with 120% of the rated current of the transformer, the bushing is considered to be able to withstand the overload conditions stated in IEC 60076-7 when following the directions: for long time and short time emergency loading the oil temperature must be 115°C max. and the daily mean oil temperature must be 90°C max. For overload conditions other than above mentioned IEC overload, contact us for permissible currents and temperatures.

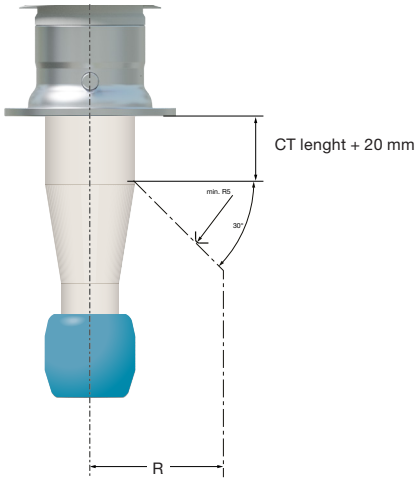
Rated thermal short-time current
The rated thermal short-time current is calculated according to IEC 60137.

Recommendation for positioning

Recommended clearance distance from the transformer wall

The bushings are developed and tested for mineral oil applications. The field strengths in oil in the lower part of the bushing depend on the form of the surrounding parts as well as on the transformer oil.

The corresponding gaps (R) to the earthed structures under standard conditions are listed as a guideline in the following table. This concerns the oil-side ends of the bushings according to the data of the dimension sheet for the bushing.
Due to framework conditions, additional insulation measures and/ or greater distances can be necessary. If necessary, the distance can also be reduced.



Minimum distances R [mm] to earthed parts

Highest voltage for equipment (U) and lightning impulse (BIL)	**Uac transformer**	**Oil sheild outer diameter**					
[kV]	[kV]	ø 200 mm	ø 230 mm	ø 240 mm	ø 260 mm	ø 292 mm	ø 302 mm
245 - 1050	460	300	–	300	300	–	300
300 - 1175	510	_	330	330	330	_	_
362 - 1300	510	_	410	_	410	410	_
420 - 1550	630	_	_	_	450	450	_
420 - 1675	680	_	_	_	500	500	_
550 - 1675	750	_	_	_	600	550	_
550 - 1800	790	_	_	_	600	600	_

EasyDry® 245–550 kV overview

Description	**Rated current**		**Grounding extension**	**Dimension drawing**		**Rated current**	**Grounding extension**	**Dimension drawing**
Um-Li	Draw lead	Removable rod	CT	Silicone	Porcelain	FBC AI	CT	Silicone
[kV]	[A]	[A]	[mm]			[A]	[mm]	
245-1050	1250	1250	0	1ZBF186001	1ZBF186233	1600	0	1ZBF186008
			100	1ZBF186002	1ZBF186234		100	1ZBF186009
			200	1ZBF186003	1ZBF186235		200	1ZBF186010
			300	1ZBF186004	1ZBF186236		300	1ZBF186011
			400	1ZBF186005	1ZBF186237		400	1ZBF186012
			500	1ZBF186006	1ZBF186238		500	1ZBF186013
			600	1ZBF186007	1ZBF186239		600	1ZBF186014
	2000	2000	0	1ZBF186022	1ZBF186254	2500	0	1ZBF186029
			100	1ZBF186023	1ZBF186255		100	1ZBF186030
			200	1ZBF186024	1ZBF186256		200	1ZBF186031
			300	1ZBF186025	1ZBF186257		300	1ZBF186032
			400	1ZBF186026	1ZBF186258		400	1ZBF186033
			500	1ZBF186027	1ZBF186259		500	1ZBF186034
			600	1ZBF186028	1ZBF186260		600	1ZBF186035
300-1175	1250	1250	0	1ZBF186050	1ZBF186282	1250	0	1ZBF186057
			100	1ZBF186051	1ZBF186283		100	1ZBF186058
			200	1ZBF186052	1ZBF186284		200	1ZBF186059
			300	1ZBF186053	1ZBF186285		300	1ZBF186060
			400	1ZBF186054	1ZBF186286		400	1ZBF186061
			500	1ZBF186055	1ZBF186287		500	1ZBF186062
			600	1ZBF186056	1ZBF186288		600	1ZBF186063
	2000	2000	100	1ZBF186071	1ZBF186303	2500	100	1ZBF186077
			200	1ZBF186072	1ZBF186304		200	1ZBF186078
			300	1ZBF186073	1ZBF186305		300	1ZBF186079
			400	1ZBF186074	1ZBF186306		400	1ZBF186080
			500	1ZBF186075	1ZBF186307		500	1ZBF186081
			600	1ZBF186076	1ZBF186308		600	1ZBF186082
362-1300	1250	1000	100	1ZBF186089	1ZBF186321	1250	100	1ZBF186095
			200	1ZBF186090	1ZBF186322		200	1ZBF186096
			300	1ZBF186091	1ZBF186323		300	1ZBF186097
			400	1ZBF186092	1ZBF186324		400	1ZBF186098
			500	1ZBF186093	1ZBF186325		500	1ZBF186099
			600	1ZBF186094	1ZBF186326		600	1ZBF186100
	1600	1600	100	1ZBF186107	1ZBF186339	2000	100	1ZBF186113
			200	1ZBF186108	1ZBF186340		200	1ZBF186114
			300	1ZBF186109	1ZBF186341		300	1ZBF186115
			400	1ZBF186110	1ZBF186342		400	1ZBF186116
			500	1ZBF186111	1ZBF186343		500	1ZBF186117
			600	1ZBF186112	1ZBF186344		600	1ZBF186118

Dimension drawing	**Rated current**	**Grounding extension**	**Dimension drawing**		**Rated current**	**Grounding extension**	**Dimension drawing**	
Porcelain	FBC Cu	CT	Silicone	Porcelain	FBC Cu	CT	Silicone	Porcelain
	[A]	[mm]			[A]	[mm]		
1ZBF186240	2000	0	1ZBF186015	1ZBF186247				
1ZBF186241		100	1ZBF186016	1ZBF186248				
1ZBF186242		200	1ZBF186017	1ZBF186249				
1ZBF186243		300	1ZBF186018	1ZBF186250				
1ZBF186244		400	1ZBF186019	1ZBF186251				
1ZBF186245		500	1ZBF186020	1ZBF186252				
1ZBF186246		600	1ZBF186021	1ZBF186253				
1ZBF186261	3150	0	1ZBF186036	1ZBF186268	5000	0	1ZBF186043	1ZBF186275
1ZBF186262		100	1ZBF186037	1ZBF186269		100	1ZBF186044	1ZBF186276
1ZBF186263		200	1ZBF186038	1ZBF186270		200	1ZBF186045	1ZBF186277
1ZBF186264		300	1ZBF186039	1ZBF186271		300	1ZBF186046	1ZBF186278
1ZBF186265		400	1ZBF186040	1ZBF186272		400	1ZBF186047	1ZBF186279
1ZBF186266		500	1ZBF186041	1ZBF186273		500	1ZBF186048	1ZBF186280
1ZBF186267		600	1ZBF186042	1ZBF186274		600	1ZBF186049	1ZBF186281
1ZBF186289	2000	0	1ZBF186064	1ZBF186296				
1ZBF186290		100	1ZBF186065	1ZBF186297				
1ZBF186291		200	1ZBF186066	1ZBF186298				
1ZBF186292		300	1ZBF186067	1ZBF186299				
1ZBF186293		400	1ZBF186068	1ZBF186300				
1ZBF186294		500	1ZBF186069	1ZBF186301				
1ZBF186295		600	1ZBF186070	1ZBF186302				
1ZBF186309	3150	100	1ZBF186083	1ZBF186315				
1ZBF186310		200	1ZBF186084	1ZBF186316				
1ZBF186311		300	1ZBF186085	1ZBF186317				
1ZBF186312		400	1ZBF186086	1ZBF186318				
1ZBF186313		500	1ZBF186087	1ZBF186319				
1ZBF186314		600	1ZBF186088	1ZBF186320				
1ZBF186327	2000	100	1ZBF186101	1ZBF186333				
1ZBF186328		200	1ZBF186102	1ZBF186334				
1ZBF186329		300	1ZBF186103	1ZBF186335				
1ZBF186330		400	1ZBF186104	1ZBF186336				
1ZBF186331		500	1ZBF186105	1ZBF186337				
1ZBF186332		600	1ZBF186106	1ZBF186338				
1ZBF186345	2500	100	1ZBF186119	1ZBF186351				
1ZBF186346		200	1ZBF186120	1ZBF186352				
1ZBF186347		300	1ZBF186121	1ZBF186353				
1ZBF186348		400	1ZBF186122	1ZBF186354				
1ZBF186349		500	1ZBF186123	1ZBF186355				
1ZBF186350		600	1ZBF186124	1ZBF186356				

EasyDry® 245–550 kV overview

Description	**Rated current**		**Grounding extension**	**Dimension drawing**		**Rated current**	**Grounding extension**	**Dimension drawing**
Um-Li	Draw lead	Removable rod	CT	Silicone	Porcelain	FBC AI	CT	Silicone
[kV]	[A]	[A]	[mm]			[A]	[mm]	
420-1550	800	800	0	1ZBF186125	1ZBF186357	1250	0	1ZBF186132
			100	1ZBF186126	1ZBF186358		100	1ZBF186133
			200	1ZBF186127	1ZBF186359		200	1ZBF186134
			300	1ZBF186128	1ZBF186360		300	1ZBF186135
			400	1ZBF186129	1ZBF186361		400	1ZBF186136
			500	1ZBF186130	1ZBF186362		500	1ZBF186137
			600	1ZBF186131	1ZBF186363		600	1ZBF186138
	1600	1600	0	1ZBF186146	1ZBF186378	2000	0	1ZBF186153
			100	1ZBF186147	1ZBF186379		100	1ZBF186154
			200	1ZBF186148	1ZBF186380		200	1ZBF186155
			300	1ZBF186149	1ZBF186381		300	1ZBF186156
			400	1ZBF186150	1ZBF186382		400	1ZBF186157
			500	1ZBF186151	1ZBF186383		500	1ZBF186158
			600	1ZBF186152	1ZBF186384		600	1ZBF186159
420-1675	800	800	0	1ZBF186167	1ZBF186399	1250	0	1ZBF186174
			100	1ZBF186168	1ZBF186400		100	1ZBF186175
			200	1ZBF186169	1ZBF186401		200	1ZBF186176
			300	1ZBF186170	1ZBF186402		300	1ZBF186177
			400	1ZBF186171	1ZBF186403		400	1ZBF186178
			500	1ZBF186172	1ZBF186404		500	1ZBF186179
			600	1ZBF186173	1ZBF186405		600	1ZBF186180
550-1675	1600	1600	0	1ZBF186188	1ZBF186420	2000	0	1ZBF186195
			100	1ZBF186189	1ZBF186421		100	1ZBF186196
			200	1ZBF186190	1ZBF186422		200	1ZBF186197
			300	1ZBF186191	1ZBF186423		300	1ZBF186198
			400	1ZBF186192	1ZBF186424		400	1ZBF186199
			500	1ZBF186193	1ZBF186425		500	1ZBF186200
			600	1ZBF186194	1ZBF186426		600	1ZBF186201
550-1800	1250	1250	100	1ZBF186465	1ZBF186489	1600	100	1ZBF186471
			200	1ZBF186466	1ZBF186490		200	1ZBF186472
			300	1ZBF186467	1ZBF186491		300	1ZBF186473
			400	1ZBF186468	1ZBF186492		400	1ZBF186474
			500	1ZBF186469	1ZBF186493		500	1ZBF186475
			600	1ZBF186470	1ZBF186494		600	1ZBF186476
	1250	1250	100	1ZBF186209	1ZBF186441	1600	100	1ZBF186215
			200	1ZBF186210	1ZBF186442		200	1ZBF186216
			300	1ZBF186211	1ZBF186443		300	1ZBF186217
			400	1ZBF186212	1ZBF186444		400	1ZBF186218
			500	1ZBF186213	1ZBF186445		500	1ZBF186219
			600	1ZBF186214	1ZBF186446		600	1ZBF186220

Dimension drawing	**Rated current**	**Grounding extension**	**Dimension drawing**		**Rated current**	**Grounding extension**	**Dimension drawing**	
Porcelain	FBC Cu	CT	Silicone	Porcelain	FBC Cu	CT	Silicone	Porcelain
	[A]	[mm]			[A]	[mm]		
1ZBF186364		0	1ZBF186139	1ZBF186371				
1ZBF186365		100	1ZBF186140	1ZBF186372				
1ZBF186366		200	1ZBF186141	1ZBF186373				
1ZBF186367	2000	300	1ZBF186142	1ZBF186374				
1ZBF186368		400	1ZBF186143	1ZBF186375				
1ZBF186369		500	1ZBF186144	1ZBF186376				
1ZBF186370		600	1ZBF186145	1ZBF186377				
1ZBF186385		0	1ZBF186160	1ZBF186392				
1ZBF186386		100	1ZBF186161	1ZBF186393				
1ZBF186387		200	1ZBF186162	1ZBF186394				
1ZBF186388	2500	300	1ZBF186163	1ZBF186395				
1ZBF186389		400	1ZBF186164	1ZBF186396				
1ZBF186390		500	1ZBF186165	1ZBF186397				
1ZBF186391		600	1ZBF186166	1ZBF186398				
1ZBF186406		0	1ZBF186181	1ZBF186413				
1ZBF186407		100	1ZBF186182	1ZBF186414				
1ZBF186408		200	1ZBF186183	1ZBF186415				
1ZBF186409	2000	300	1ZBF186184	1ZBF186416				
1ZBF186410		400	1ZBF186185	1ZBF186417				
1ZBF186411		500	1ZBF186186	1ZBF186418				
1ZBF186412		600	1ZBF186187	1ZBF186419				
1ZBF186427		0	1ZBF186202	1ZBF186434				
1ZBF186428		100	1ZBF186203	1ZBF186435				
1ZBF186429	2500	200	1ZBF186204	1ZBF186436				
1ZBF186430		300	1ZBF186205	1ZBF186437				
1ZBF186431		400	1ZBF186206	1ZBF186438				
1ZBF186432		500	1ZBF186207	1ZBF186439				
1ZBF186433		600	1ZBF186208	1ZBF186440				
1ZBF186495		100	1ZBF186477	1ZBF186501		100	1ZBF186483	1ZBF186507
1ZBF186496		200	1ZBF186478	1ZBF186502		200	1ZBF186484	1ZBF186508
1ZBF186497	2500	300	1ZBF186479	1ZBF186503	3000	300	1ZBF186485	1ZBF186509
1ZBF186498		400	1ZBF186480	1ZBF186504		400	1ZBF186486	1ZBF186510
1ZBF186499		500	1ZBF186481	1ZBF186505		500	1ZBF186487	1ZBF186511
1ZBF186500		600	1ZBF186482	1ZBF186506		600	1ZBF186488	1ZBF186512
1ZBF186447		100	1ZBF186221	1ZBF186453		100	1ZBF186227	1ZBF186459
1ZBF186448		200	1ZBF186222	1ZBF186454		200	1ZBF186228	1ZBF186460
1ZBF186449	2500	300	1ZBF186223	1ZBF186455	3150	300	1ZBF186229	1ZBF186461
1ZBF186450		400	1ZBF186224	1ZBF186456		400	1ZBF186230	1ZBF186462
1ZBF186451		500	1ZBF186225	1ZBF186457		500	1ZBF186231	1ZBF186463
1ZBF186452		600	1ZBF186226	1ZBF186458		600	1ZBF186232	1ZBF186464

Inquiring details

1. Use our web based product selector tool >> **COMPAS** Or
2. Use our technical guide and choose your bushing in the electrical data table from page 42-45 and open the respective clickable drawing number
3. Do your selection on the respective drawings by highlighting the single items of your interest

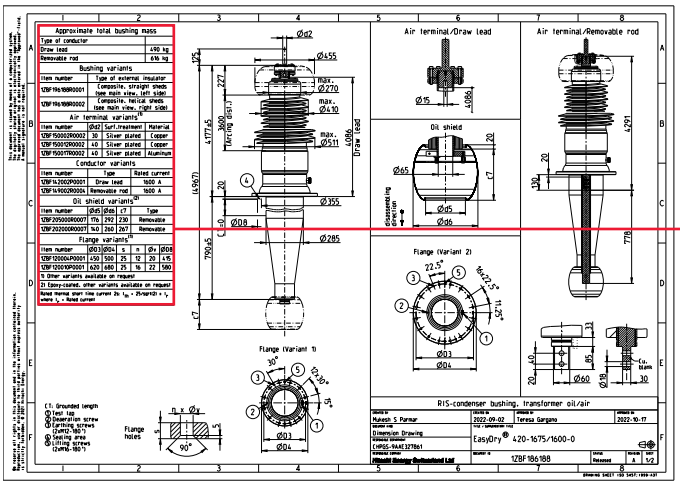
How to use the drawing? See two examples below:

Example 1:
You are looking for a quote for a dry bushing 420 kV, 1600 A, no CT pocket, silicone insulator, removable rod.

- Open the electrical data table on page 44
- Follow the specification you are looking for and get guided to a clickable drawing number
- In this case, you will be guided to a drawing number 1ZBF186188

Description			**Title**	**Dimension drawing 1ZBF180**	
Um-LI	Cable	Removable rod	CT	Silicone	Porcelain
			0	1ZBF186188	1ZBF186420
			100	1ZBF186189	1ZBF186421
			200	1ZBF186190	1ZBF186422
420-1675	1600	1600	300	1ZBF186191	1ZBF186423
			400	1ZBF186192	1ZBF186424
			500	1ZBF186193	1ZBF186425
			600	1ZBF186194	1ZBF186426

- Open the drawings by clicking on the link and choose the variants you are looking for in the below categories:
  - External insulator
  - Air terminal
  - Conductor
  - Oil shield
  - Flange
- Now you can share the pdf drawing with the highlighted variants with our sales representative
- Do not hesitate to contact us for support



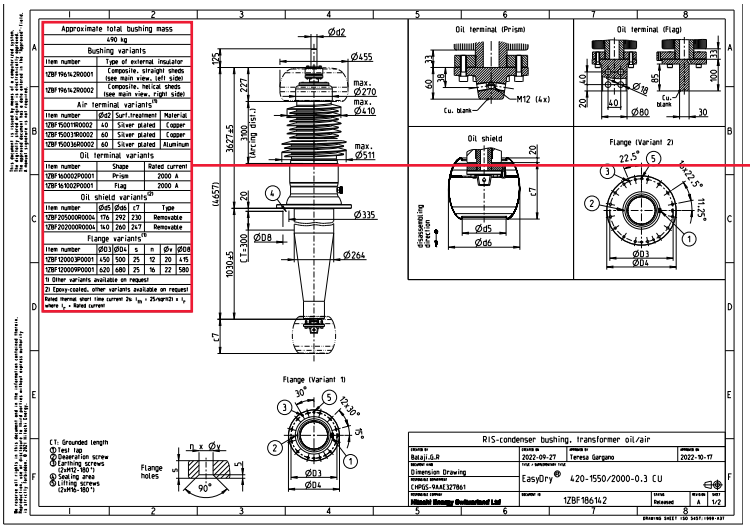
Approximate total bushing mass						
Type of conductor						
Draw lead						490 kg
Removable rod						616 kg
Bushing variants						
Item number	Type of external insulator					
1ZBF196188R0001	Composite, straight sheds (see main view, left side)					
1ZBF196188R0002	Composite, helical sheds (see main view, right side)					
Air terminal variants[1]						
Item number	Ød2	Surf.treatment				Material
1ZBF150002R0002	30	Silver plated				Copper
1ZBF150012R0002	40	Silver plated				Copper
1ZBF150017R0002	40	Silver plated				Aluminum
Conductor variants						
Item number	Type					Rated current
1ZBF142002P0001	Draw lead					1600 A
1ZBF149002R0004	Removable rod					1600 A
Oil shield variants[2]						
Item number	Ød5	Ød6	c7			Type
1ZBF205000R0007	176	292	230			Removable
1ZBF202000R0007	140	260	267			Removable
Flange variants[1]						
Item number	ØD3	ØD4	s	n	Øv	ØD8
1ZBF120004P0001	450	500	25	12	20	415
1ZBF120010P0001	620	680	25	16	22	580
1) Other variants available on request						
2) Epoxy-coated, other variants available on request						
Rated thermal short time current 2s: I_{th} = 25/sqrt(2) x I_r where I_r = Rated current						

Example 2:
Dry Bushing 420kV, 2000A with extruded insulator, CT pocket = 300mm; silicone insulator, Fixed bottom contact Copper

- Open the electrical data table on page 44
- Follow the specification you are looking for and get guided to a clickable drawing number. For the bushing from Example 2 you will be guided to drawing number 1ZBF186142

Description			**Title**			**Dimension drawing 1ZBF186**	**Rated current**			**Dimension drawing 1ZBF180**	**Rated current**	**Dimension drawing 1ZBF186**
Um-LI	Cable	Removable rod	CT	Silicone	Porcelain	Fixed BC Al	CT	Silicone	Porcelain	Fixed BC Cu	CT	Silicone
			0	1ZBF186125	1ZBF186357		0	1ZBF186132	1ZBF186364		0	1ZBF186139
			100	1ZBF186126	1ZBF186358		100	1ZBF186133	1ZBF186365		100	1ZBF186140
			200	1ZBF186127	1ZBF186359		200	1ZBF186134	1ZBF186366		200	1ZBF186141
420-1550	800	1250	300	1ZBF186128	1ZBF186360	1600	300	1ZBF186135	1ZBF186367	2000	300	1ZBF186142
			400	1ZBF186129	1ZBF186361		400	1ZBF186136	1ZBF186368		400	1ZBF186143
			500	1ZBF186130	1ZBF186362		500	1ZBF186137	1ZBF186369		500	1ZBF186144
			600	1ZBF186131	1ZBF186363		600	1ZBF186138	1ZBF186370		600	1ZBF186145

- Open the drawings by clicking on the link and choose the variants you are looking for in the below categories:
  - External insulator
  - Air terminal
  - Conductor
  - Oil shield
  - Flange



Approximate total bushing mass						
490 kg						
Bushing variants						
Item number	Type of external insulator					
1ZBF196142R0001	Composite, straight sheds (see main view, left side)					
1ZBF196142R0002	Composite, helical sheds (see main view, right side)					
Air terminal variants[1]						
Item number	Ød2	Surf.treatment	Material			
1ZBF150011R0002	40	Silver plated	Copper			
1ZBF150031R0002	60	Silver plated	Copper			
1ZBF150036R0002	60	Silver plated	Aluminum			
Oil terminal variants						
Item number	Shape	Rated current				
1ZBF160002P0001	Prism	2000 A				
1ZBF161002P0001	Flag	2000 A				
Oil shield variants[2]						
Item number	Ød5	Ød6	c7	Type		
1ZBF205000R0004	176	292	230	Removable		
1ZBF202000R0004	140	260	247	Removable		
Flange variants[1]						
Item number	ØD3	ØD4	s	n	Øv	ØD8
1ZBF120003P0001	450	500	25	12	20	415
1ZBF120009P0001	620	680	25	16	22	580
1) Other variants available on request						
2) Epoxy-coated, other variants available on request						
Rated thermal short time current 2s: I_{th} = 25/sqrt(2) x I_r where I_r = Rated current						

4. Now you can share the pdf drawing with the highlighted variants with our sales representative
   - Do not hesitate to contact us for support.

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