



DURESCA®



DTOX(S) Condenser bushings 72.5 – 550kV

Transformer to SF6
with Dry-Type insulation RIP and RIS
IEC standard 60137:2017 & IEC62271-211:2014



MOSER GLASER

Current and voltage – our passion

Swiss quality combined with global experience



Features

Dry-type RIP Insulation

Moser Glaser researched a way to increase the dielectric characteristics of its High Voltage equipment. As a result Moser Glaser invented the Epoxy Resin Impregnated Paper (RIP) technology in 1958.

With more than 50 years of experience in development of the ERIP technology, Moser Glaser offers transformer bushings DURESCA® DTOX(S) from 72.5 to 550kV.

The insulation lays directly on the conductor or tube and consists of crepe paper dried under vacuum and impregnated with epoxy resin. Conductive grading layers are embedded during the winding of the insulation for the best field control. This guarantees the highest operational and human safety.

- A strong moisture barrier prevents any contamination or moisture ingress.
- Moser Glaser design does not use any oil; DTOX(S) are completely dry and free of partial discharge.
- DTOX(S) bushings can be applied at any position from 0° to 90° from vertical and allow for safe horizontal transport and storage.



Replacement bushings

- In addition to the standard range, our design, combined with our production process, allows a wide flexibility and adaptability to provide tailor-made solutions.

Moser Glaser can interchange a wide variety of bushings designs. This allows the customer to replace existing OIP bushings with the RIP technology. The supply chain is simplified as the silicone molding operation is done in-house, Moser Glaser can offer short lead-times for its standard range of product.



DTOX bushings are also available with RIS (Resin Impregnated Synthetic) insulation.

The main performance and life expectancy restraint in RIP condenser bushings was found to be the paper itself. Paper is an organic material with inconsistent material parameters, namely the moisture content. Too much moisture will cause high loss values, degrade the insulation system of the bushing, and possibly cause a premature failure. In order to compensate this, modern RIP bushings utilize drying systems during the manufacturing process.

For shipment and storage, plastic bags with a dessicate bag or oil containers are used to protect the bushing. Finding an alternative material to paper was not an easy task, though, due to the fact that paper provides good insulation characteristics and has been used in bushing and transformer manufacturing processes for many years with continual optimization.

Several experimentations were needed to find optimal successor.

Moser Glaser undertook this task by performing tests on many materials in order to find a successor to the paper. After research, Moser Glaser found a special polyester structural material which is an excellent alternative to paper. Moser Glaser performed a sequence of tests to qualify this solution:



Routine and type tests according to IEC 60137:2017 and IEC62271-211:2014 Specifications for the type tests were beyond the requirements of the standard.

In addition several special tests have been developed to challenge this solution.

- Adhesion test of direct moulded silicone on the RIS insulation
- Special humidity test
- Dynamic cantilever load tests
- Temperature cycle test
- Accelerated ageing test under high voltage

The new Resin Impregnated Synthetic RIS is now developed and part of Moser Glaser products portfolio.

An all-inclusive solution!

The result of this development is an ideal association of existing epoxy resin technology and its appreciated characteristics:

- Partial discharge free
- Installation at any angle

enhanced with new features:

- Shorter production cycle
- Easier handling for long transportation and storage
- Reduced power factor and capacitance
- Not affected by humidity

For outdoor application Moser Glaser standardized a direct-moulded silicone insulator to provide an even more safer solution.

Moser Glaser could maintain its strength by providing a high level of customization.

Therefore RIS technology can be applied to the standard range and also can interchange all existing designs. There are no limitation as for the diameter and length.

What you get today with RIP technology can be offered with RIS.

With this important new milestone, Moser Glaser is ready to offer the bushing of the future.

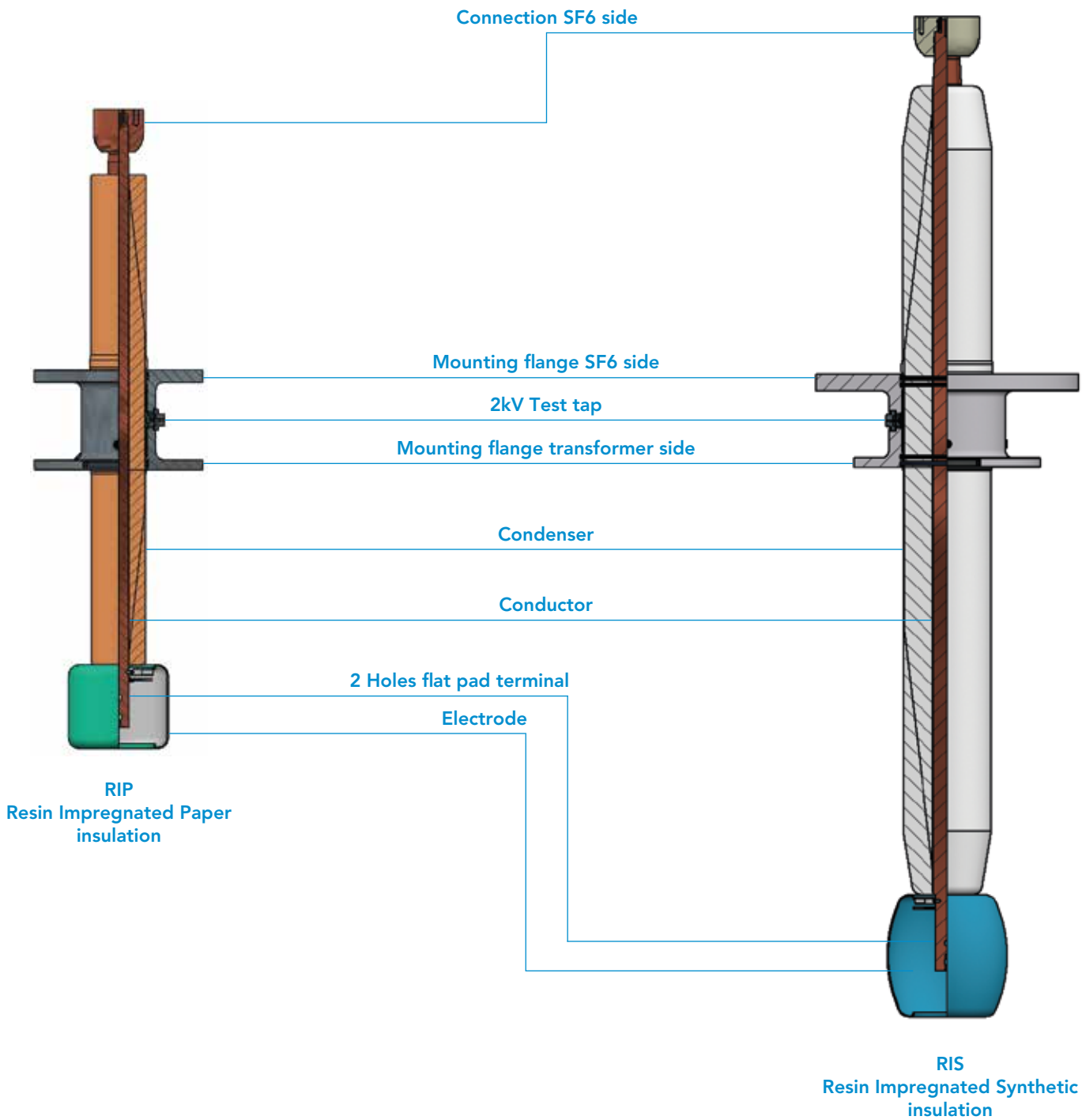


Cut from a RIS active part



Cut from an RIP active part

Design



All technical data (electrical and dimensions) from this catalogue are applicable for RIP as well as RIS insulation.

- Bushings with RIP insulation are denominated as DTOX
- Bushings with RIS insulation as DTOXS

Common characteristics

Top terminal

DTOX(S) bushings are delivered with specific top terminal designed as per the IEC62271-211:2014. Material is in copper and silver plated.

Conductor

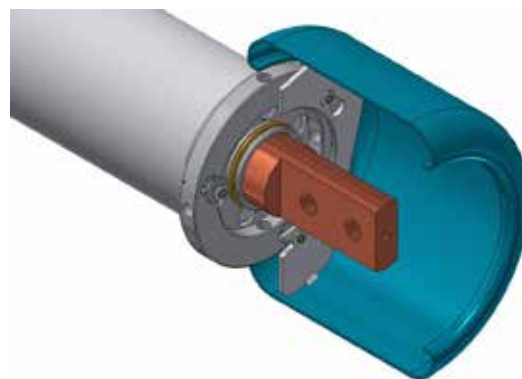
All DTOX(S) bushings are designed with a fix-conductor.

Short-time current level

The bushings withstand a short-time current of 25x rated continuous current for a maximum of 2 seconds. For draw-lead the short-time current is defined according to the cable cross section S in mm^2 : $I_{th\ 2sec} \text{ (kA)} = 0.06 \times S$. Others values are possible after validation by Moser Glaser.

Current

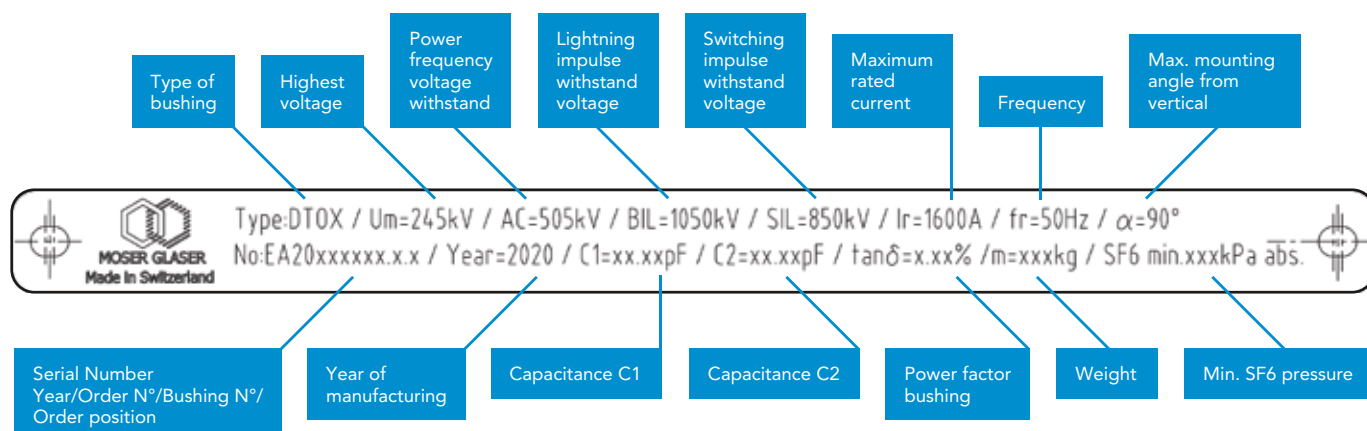
The current rating gives the maximum continuous rating with no effect on the bushing life time. Bushing rating as well as cable size has to be chosen at least 20% above transformer rating.



Corona shield

The bushings are all equipped with a removable corona shield at the transformer side. A manhole on the transformer is required to access the connection.

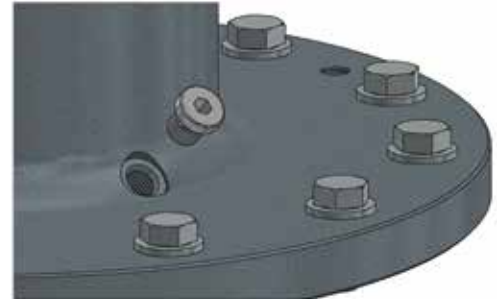
Example of Nameplate marking



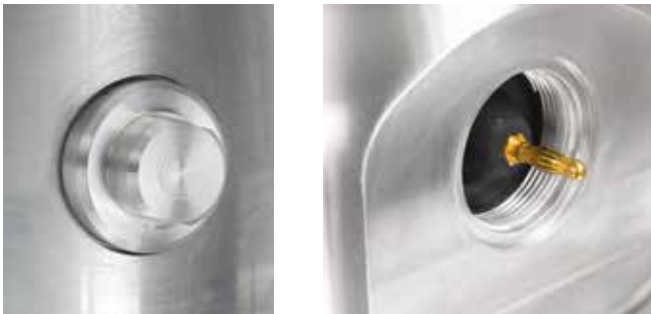
Mounting flange

Made of corrosion free aluminium, equipped with:

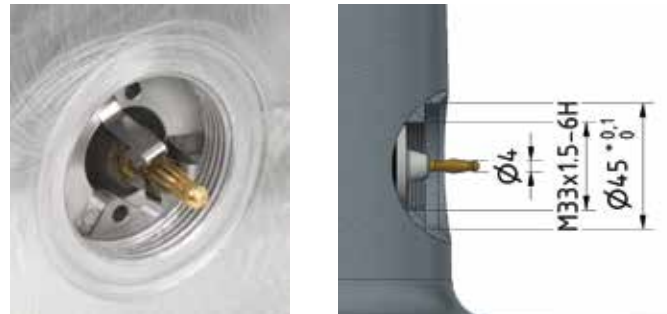
- Test tap (all ratings), the grounding is done through the cap.
- Test voltage is 2kV / 60sec for 50Hz network or 72sec for 60Hz network.
- Self-earthed test tap available on request.
- Air vent screw at flange.



Standard 2kV test tap



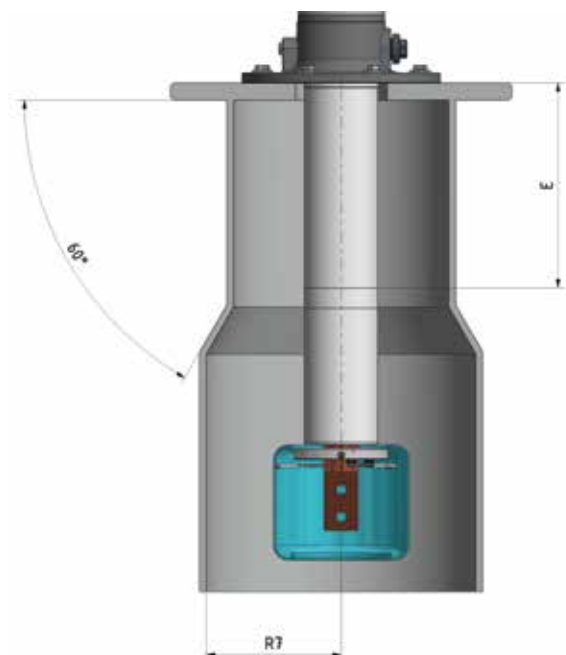
Self-earthed test tap available as accessory



Minimum distance to earthed parts

The distance to the earthed parts is depending of voltage, transformer tank design as well as oil condition and quality. This distance is according to the recommendation of the standard CLC / TS 50458, lower distance can be covered after approval from Moser Glaser.

R7 distance is given in the dimensions table.



Accessories

Long term storage RIP bushings

Protective tank is used to protect parts of RIP bushing which are used under service in transformer oil against damages or humidity.

They are used for long term storage as well as for protection during long transports.

The protection tank is delivered mounted on the bushing and filled with dry insulating oil.

After the sealing an air cushion remains in the protection tank which is necessary for compensation purposes due to temperature-sensitive volume variations.



Shock indicator

On request, a shock indicator label can be fixed on the crate to check if it has experienced a mechanical shock.

Offshore application (C5-M)

Moser Glaser has made investigations and performed tests according to ISO 12944 and ISO 20340 to find the most efficient combination of products for heavy corrosive environment.

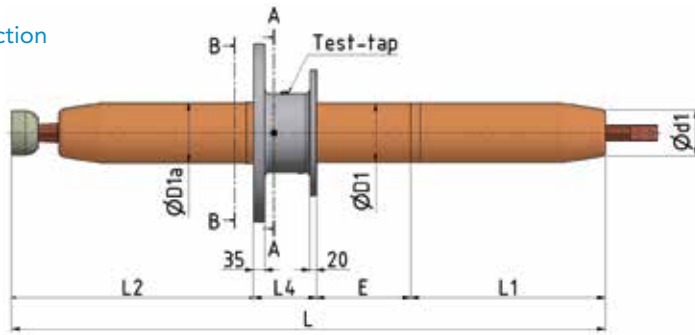
If you ordered a bushing for offshore application, the flange and the head of the bushing will be anodized, and the top terminal will be tin-plated.

Additional mounting advices are given in our online instruction manual www.mgc.ch.

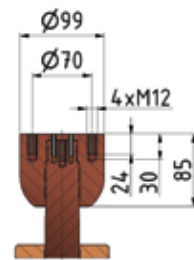


Dimensions and technical characteristics

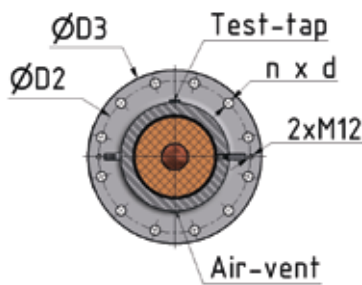
SF6 connection



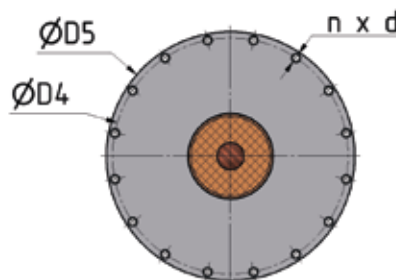
Type 1



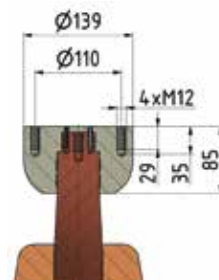
Flange A-A (transformer side)



Flange B-B (SF6 side)



Type 2



					SF6 connection	SF6 side dimensions		Flange SF6 side			Flange transformer side			Oil side dimensions without terminal				
Highest voltage	Dry power frequency withstand voltage	Lightning impulse withstand voltage	Rated current Fix-conductor	Cantilever test load (min) Class II IEC 60137	Diameter x Length	Active part diameter	Length above flange	No. of bolts x diameter	Bolt circle diameter	Outside diameter	Height	No. of bolts x diameter	Bolt circle diameter	Outside diameter	Overall length	Oil end length	Overall length	Oil end length
(Um)	(Up)	(UBIL)	(Ir)	N		(D1a)	(L2)	nxd	(D4)	(D5)	(L4)	nxd	(D2)	(D3)	(L)	(L1)	(L)	(L1)
kV	kV	kV	A	N		mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm
72.5	160	350	1250-2500	3150	Type 1 (99x30)	115	330	8x16	285	315	200	8x15	250	290	705	175	1005	475
100			2000	3150	Type 1 (99x30)	145	330	8x16	285	315	200	8x15	290	335	760	230	1060	530
			2500	3150		145	330	8x16	285	315	200	8x15	290	335	760	230	1060	530
						145	330	8x16	285	315	200	8x15	290	335	760	230	1060	530
123	260	550	1250-1600	3150	Type 1 (99x30)	112	520	8x16	305	335	200	8x15	290	335	1060	340	1360	640
			2000	4000		145	520	8x16	305	335	200	8x15	290	335	1060	340	1360	640
			2500	4000		145	520	8x16	305	335	200	8x15	290	335	1060	340	1360	640
145	310	650	1250-2000	4000	Type 1 (99x30)	145	520	8x16	305	335	200	8x15	290	335	1080	360	1380	660
			2500	4000		195	520	8x16	305	335	200	8x15	290	335	1080	360	1380	660
						145	520	8x16	305	335	200	8x15	290	335	1080	360	1380	660
170	365	750	1250-1600	4000	Type 1 (99x30)	145	520	8x16	305	335	200	8x15	290	335	1220	500	1470	750
			2000	5000		195	520	8x16	305	335	200	8x15	290	335	1170	450	1470	750
			2500	5000		195	520	8x16	305	335	200	8x15	290	335	1170	450	1470	750
300	505	1050	1250-2000	5000	Type 2 (139x30)	195	770	16x16	535	565	200	12x23	400	450	1590	620	1890	920
			2500	5000		250	770	16x16	535	565	200	12x23	400	450	1590	620	1890	920
						250	770	16x16	535	565	200	12x23	400	450	1590	620	1890	920
362	950	1175	1250-2000	5000	Type 2 (139x30)	252	1050	16x20	640	690	200	12x23	400	450	1935	685	2235	985
			2500	5000		252	1050	16x20	640	690	200	12x23	400	450	1935	685	2235	985
						252	1050	16x20	640	690	200	12x23	400	450	1935	685	2235	985
420	1175	1550	1250-1600	4000	Type 2 (139x30)	286	1050	16x20	640	690	200	12x23	450	500	2040	790	2340	1090
			2000	5000		286	1050	16x20	640	690	200	12x23	450	500	2140	890	2340	1090
			2500	5000		286	1050	16x20	640	690	200	12x23	450	500			2340	1090
550	1175	1675	1250-1600	4000	Type 2 (139x30)	286	1050	16x20	640	690	200	16x23	550	600			2440	1190
			2000	5000		286	1050	16x20	640	690	200	16x23	550	600			2440	1190
			2500	5000		286	1050	16x20	640	690	200	16x23	550	600			2440	1190

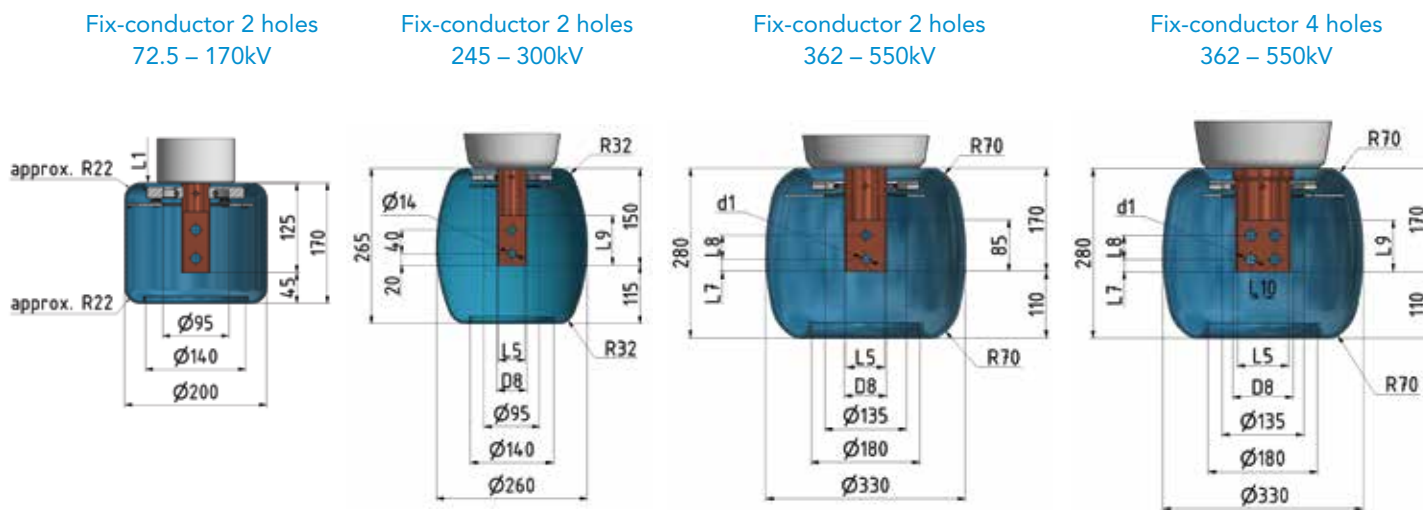


Fig. 2

Fig. 2a

Fig. 2b

Fig. 2c

Oil side dimensions without terminal			Bottom terminal													
Overall length	Oil end length	Active part diameter	Type of connection	Diametre	Usable width	Usable Length	Thickness	Hole size	Distance between holes	Distance between holes	Distance bottom to the first hole	Distance HV to earth	Bushing type	Drawings references for RIP version On request for RIS		
(L)	(L1)	(D1)		(D8)	(L5)	(L9)	(t)	(d1)	(L8)	(L10)	(L7)	(R7)		CT extension (E) 0mm	CT extension (E) 300mm	CT extension (E) 500mm
mm	mm	mm		mm	mm	mm	mm	mm	mm	mm	mm	mm				
1205	675	111	2	60	56.7	85	20	18	40		20	130	DTOX 72.5kV 1250-2500A	600.20.0009	600.20.0010	600.20.0011
1260	730	111	2	45	37	85	20	18	40		20	145	DTOX 100kV 1250-1600A	600.20.0012	600.20.0013	600.20.0014
1260	730	141	2	60	56.7	85	20	18	40		20	145	DTOX 100kV 2000A	600.20.0015	600.20.0016	600.20.0017
1260	730	141	2	60	56.7	85	20	18	40		20	145	DTOX 100kV 2500A	600.20.0018	600.20.0019	600.20.0020
1560	840	111	2	45	37	85	20	18	40		20	160	DTOX 123kV 1250-1600A	600.20.0021	600.20.0022	600.20.0023
1560	840	141	2	60	56.7	85	20	18	40		20	160	DTOX 123kV 2000A	600.20.0024	600.20.0025	600.20.0026
1560	840	141	2	60	56.7	85	20	18	40		20	160	DTOX 123kV 2500A	600.20.0027	600.20.0028	600.20.0029
1580	860	141	2	60	56.7	85	20	18	40		20	190	DTOX 145kV 1250-2000A	600.20.0030	600.20.0031	600.20.0032
1580	860	190	2	60	56.7	85	20	18	40		20	190	DTOX 145kV 2500A	600.20.0034	600.20.0035	600.20.0036
1670	950	141	2	50	40.3	85	20	18	40		20	230	DTOX 170kV 1250-1600A	600.20.0037	600.20.0038	600.20.0039
1670	950	190	2	60	56.7	85	20	18	40		20	230	DTOX 170kV 2000A	600.20.0040	600.20.0041	600.20.0042
1670	950	190	2	60	56.7	85	20	18	40		20	230	DTOX 170kV 2500A	600.20.0043	600.20.0044	600.20.0045
2090	1120	190	2a	60	56.7	85	20	18	40		20	325	DTOX 300kV 1250-2000A	600.20.0046	600.20.0047	600.20.0048
2090	1120	246	2a	60	56.7	85	20	18	40		20	325	DTOX 300kV 2500A	600.20.0049	600.20.0050	600.20.0051
2235	1185	246	2b	70	67.1	85	20	18	40		20	370	DTOX 362kV 1250-2000A	600.20.0067	600.20.0068	600.20.0069
2235	1185	246	2c	80	77.5	85	20	18	40	40	20	370	DTOX 362kV 2500A	600.20.0070	600.20.0071	600.20.0072
2540	1290	278	2b	60	56.6	85	20	18	40		20	510	DTOX 420kV 1250-1600A	600.20.0073	600.20.0060	600.20.0074
2540	1290	278	2b	70	67.1	85	20	18	40		20	510	DTOX 420kV 2000A	600.20.0075	600.20.0060	600.20.0074
2540	1290	278	2c	90	87.7	85	20	18	40	50	20	510	DTOX 420kV 2500A		600.20.0076	600.20.0077
2640	1390	328	2b	60	56.6	85	20	18	40		20	510	DTOX 550kV 1250-1600A		600.20.0078	600.20.0079
2640	1390	328	2b	80	77.5	85	20	18	40		20	510	DTOX 550kV 2000A		600.20.0080	600.20.0081
2640	1390	328	2c	90	87.7	85	20	18	40	50	20	510	DTOX 550kV 2500A		600.20.0082	600.20.0083

Production facility

Winding



Impregnation



Machining



Production facility

Silicone insulator molding



Routine / type tests



Packaging



Range of transformer bushings

DTOI(S)H / DTOIA(S)H

- Oil to air bushings
- IEC or IEEE standard
- From 52 to 550kV
- With hollow core insulator



DTOIA(S)

- Oil to air bushings
- IEEE standard
- From 25 to 500kV



DTO(S)

- Oil to oil bushings
- IEC standard
- From 72.5 to 550kV



DTOI(S)

- Oil to Air bushings
- IEC standard
- From 25 to 362kV
- With direct molded silicone insulator



DTOP RIP or RIS Transformer and Switchgear bushings in porcelain housing - up to 252kV

ООО МОЗЕР ГЛАЗЕР

In 2018, Moser Glaser decided to firmly consolidate its position on the high-voltage bushings market in Russia, and the CIS countries, by establishing the company ООО Moser Glaser with its head office, assembly site and testing laboratory, in the city of Kaluga.

ООО Moser Glaser is developing dynamically and continues to strengthen its reputation in the energy sector, while competing with international players and local manufacturers.

For more information: www.mgc-ru.ch

Email: info@mgc-ru.ch



Range of transformer bushings

OIP Condenser Bushing

Voltage rating: up to 145kV

Current rating: up to 3150A

Standards: IEC / IEEE

Connection: Draw-lead / Draw Rod / Stem type

Housing: Porcelain / Polymer

- Hermetically sealed and self contained
- Low dielectric loss and partial discharge free
- Exact interchangeability with global reputed makes
- Short lead time
- Excellent lead time
- Excellent mechanical strength
- Good seismic and short circuit withstand
- Easy clean alternate sheds
- Explosion proof lower end insulator

High Current Bushing

Rated voltage: 24kV – 36kV

Types: Oil filled / Communicating OIP Condenser

Standard: IEC-60137:2017

- Single solid aluminium / copper conductor
- No welding or brazing below mounting flange
- Integral flat bottom terminal, directly milled on solid conductor
- High thermal stability / Short-circuit withstand capability
- High strength Porcelain
- Corrosion resistant metal parts
- Exact interchangeability with global reputed makes
- Shortest lead time

For more information: www.yashhv.com

Email: sales@yashhv.com



DURESCA®
Busbar system



TIRESCA®
Busbar system



GASLINK®
SF₆ insulated busbar system



DURESCA®
Wall bushings



DURESCA®
Transformer bushings



MOSER GLASER

Current and voltage – our passion

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Member of PFIFFNER Group

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Represented by: