

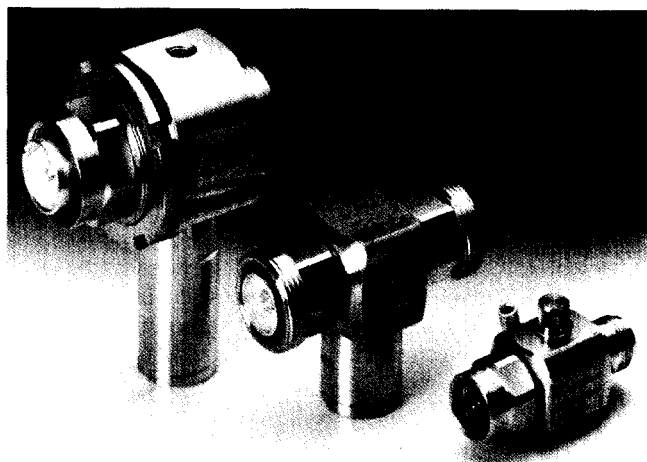


Surge Suppressors

To protect against EMP caused by lightning strikes in the direct vicinity of base stations, Telegärtner has developed a range of surge suppressors with 7/16- and N-Series interfaces.

There are two different designs:

- Surge suppressors with Gas Discharge Tube
- Quarter Wavelength Shorting Stub



Surge Suppressors with Gas Discharge Tube

The method of operation of this device can be likened in principle to an electrical switch which, when a certain voltage (d.c. sparkover voltage) is reached, switches the inner conductor to ground. The design of this device consists of a Gas Discharge Tube installed directly between the inner and outer conductors of a coaxial line. When a higher voltage than the impulse sparkover voltage (= overvoltage) appears on the line, the Gas Discharge Tube will fire and, depending on the prevalent energy, a glow discharge of between 75-90V (current in milliamperes range) or ionisation with an arc voltage of 10-20V (currents ranging from amps to kiloamps) takes place. When the energy subsides (= is converted to heat), the discharge extinguishes itself automatically. After a cooling-down period of 30 secs., the Gas Discharge Tube is fully operational again. After several very high discharge currents occurring within a few seconds of each other, the functionality of the device may be impaired. It is recommended, therefore, that the gas capsules are replaced at certain intervals.

Characteristics

- Broad-band applications (to around 2.5 GHz)
- Transmission of DC voltages possible, e.g. remote feeding of antenna amplifiers over the coaxial cable
- Maximum impulse Discharge current up to 40 KA
- Different variants available from 75 to 1200 volts

Areas of Application

The main usage of the surge suppressor with gas discharge tube is between the antenna and the base station. It should be installed in a waterproof unit. For high power signal transmission lines, $\lambda/4$ surge arrestors are recommended, as the non-linear characteristics of the gas cartridge can produce intermodulation products.

Product Overview Gas Discharge Tube Types

	Nominal DC spark-over voltage									Fig.
	75 V	90 V	145 V	230 V	350 V	470 V	600 V	900 V	1200 V	
	Order-N°.									
7/16 Jack-Jack f-f	EW940021-20									8
7/16 Plug-Jack m-f	EW940021-00			J01125A0004			EW940021-00			9
7/16 Bulkhead f-f	EW940021-10									10
7/16 Bulkhead m-f	EW960042-00									11
7/16 Angle plug	EW950072-20									15
7/16 Angle plug	EW950072-00									16
N Jack-Jack f-f	J01028A0004	J01028A0000	J01028A0006	J01028A0002	EW930092-00	J01028A0010	J01028A0011	J01028A0012	J01028A0013	12
N Plug-Jack m-f	J01028A0005	J01028A0001	J01028A0007	J01028A0003	EW930092-20		J01028A0014	EW930092-20		13
N Bulkhead f-f	J01028A0023		J01028A0024							14

Packing: Individually packed with assembly instructions in PE foil. Mating thread of the 7/16 socket protected by a PE cover.



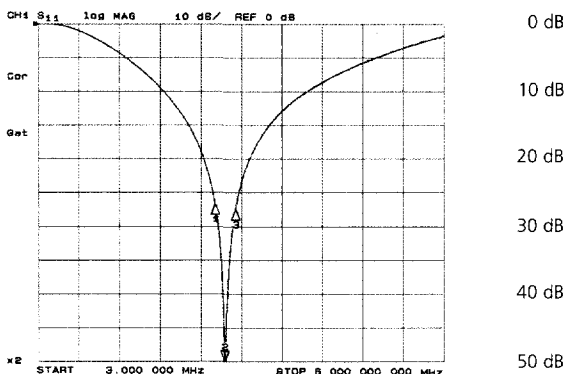
Quarter-Wavelength Shorting Stub

These surge suppressors act like narrow bandpass filters. Only a narrow bandwidth is allowed to pass; other frequencies are shorted and discharged to ground. The design of these surge suppressors involves a direct and solid short-circuit between the centre and outer conductor of the coaxial device. This short-circuit path, in the form of a coaxial line and of a precisely defined length, is designed to have an electrical length equivalent to one quarter wavelength ($\lambda/4$) of the signal frequency to be transmitted.

As an alternating voltage of the correct frequency passes along the quarter-wavelength shorting stub it experiences a 90° phase angle rotation, is then reflected totally at the short (180° phase angle rotation) and finally travels back along the quarter wavelength stub (= a further phase angle rotation of 90°). This represents a total phase angle rotation of 360°. The reflected signal and the incident signal are in phase and the operating signal does not see the short. It is, therefore, not affected by it. However, if an alternating voltage of a different frequency is present, then these special factors are not given and the energy is short-circuited (= discharged to ground).

Fig.1 shows the return loss in relationship to frequency.

Fig. 1: Return loss J01125A0001 (typical)



Marker 1:	870 MHz	-27dB
Marker 2:	920 MHz	-50dB
Marker 3:	970 MHz	-27dB

Return loss of $\lambda/4$ shorting stubs

Product Overview $\lambda/4$ Shorting Stubs

	Frequency range (MHz)						Fig.
	870-970	800-900	1700-1900	1850-2000	1700-2300	2250-2450	
	Order-N°.						
7/16 Jack-Jack f-f	J01125A0000 ¹⁾	J01125A0007 ¹⁾	J01125A0002 ⁴⁾	J01125A0009 ⁴⁾			1
7/16 Plug-Jack m-f	J01125A0001 ¹⁾	J01125A0008 ¹⁾	J01125A0003 ⁴⁾	J01125A0010 ⁴⁾	J01125A0017 ⁴⁾	J01125A0016 ⁷⁾	2
7/16 Bulkhead f-f	EW940108-00 ²⁾	J01125A0011 ²⁾	EW940108-10 ⁶⁾	J01125A0013 ⁶⁾			3
7/16 Bulkhead m-f	J01125A0006 ³⁾	J01125A0012 ³⁾	J01125A0015 ⁵⁾	J01125A0014 ⁵⁾			4
N Jack-Jack f-f	EW950200-00 ⁸⁾	J01028A0015 ⁴⁾	EW50200-30 ⁴⁾	J01028A0017 ⁴⁾	J01028A0020 ⁴⁾	J01028A0019 ⁷⁾	5
N Plug-Jack m-f	J01028A0008 ¹⁾	J01028A0016 ¹⁾	J01028A0009 ⁴⁾	J01028A0018 ⁴⁾	J01028A0021 ⁴⁾	J01028A0022 ⁷⁾	6

Dimensions (see drawings following pages): 1) Dim. a = 97 mm 2) Dim. a = 98 mm 3) Dim. a = 102 mm 4) Dim. a = 64 mm 5) Dim. a = 69 mm
6) Dim. a = 65 mm 7) Dim. a = 59 mm 8) Dim. a = 92 mm

Advantages

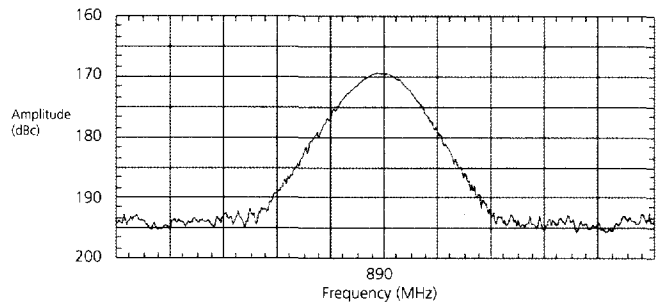
- Very high discharge currents are possible
- Very good transmission and intermodulation characteristics
- Complete discharge of the excess voltage
- Matching of the frequency range up to a range of over 10 GHz possible.
- Maintenance free and waterproof
- Since only the desired frequency range is allowed to pass, there is an additional, useful filter effect (excluding odd multiples of the quarter wavelength frequency)

Areas of Application

$\lambda/4$ shorting stubs are used particularly in the transmission paths between base station and antenna - or alternatively where transmit and receive paths use a common cable - where high power is required. In principle, their use in the receive path is also recommendable with the restriction that these devices do not permit transmission of d.c. current to feed pre-amplifiers.

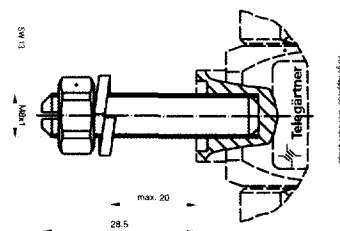
Intermodulation (J01125A0001 typical)

Test Band: EGSM Tx1: 925 MHz Tx2: 960 MHz
IMP 3rd Order at 890 MHz -126 dBm -169.1 dBc



Accessory for $\lambda/4$ Shorting Stubs

Order N°.	Description
H06000A0024	Mounting kit for $\lambda/4$ shorting stubs





Technical Data

Mechanical Characteristics

Materials	Spring contact	CuBe2
	Other metal parts	CuZn39Pb3
	Insulators	PTFE
	Gaskets	Silicon
Finish	Spring contact	Cu2Ag5
	Other metal parts	CuSnZn3
Coupling torque series N		4-6 Nm
Coupling torque series 7/16		25-35 Nm
Durability (mating cycles)		≥ 500

Thermal and Climatic Characteristics

Category to DIN IEC 68 Teil 1	
Serie N	40/155/21
Serie 7/16	55/155/56
Protection level to DIN 40050/IEC 529	IP 67
	(only λ/4-shorting stubs types)

Electrical Characteristics

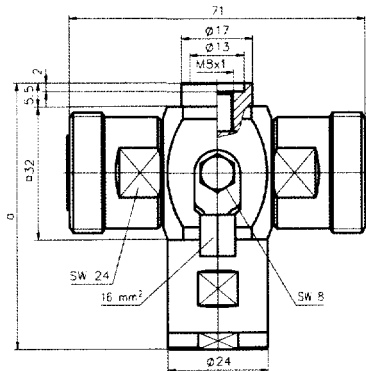
- Quarter wave shorting stub types

Frequency range	800-900 /1850-2000MHz*
VSWR	870-970 /1700-1900MHz ≤ 1.15
Insertion loss	≤ 0.1 dB
Intermodulation	
Intermodulation product 3rd Order (typical)	
2 unmodulated test-signals at 43dBm (20W)	
at 800-1000 MHz	-160 dBc
at 1600-2000 MHz	-155 dBc
 - Gas discharge types

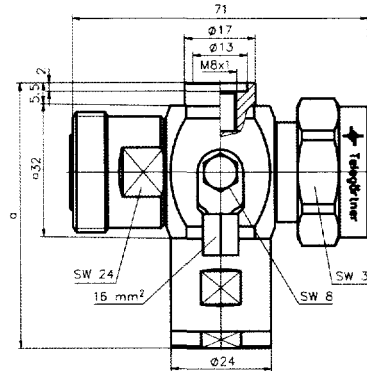
Nominal DC spark-over voltage	75V / 90V / 145V / 230V / 350V / 470V / 600V / 900V / 1200V
Impulse Discharge Current	2500x10A (10/1000µs) 1000x500A (10/1000µs) 5x20000A (8/20µs) 1x40000A (8/20µs)
VSWR	≤ 1.06/1.5 GHz
Insertion loss	≤ 0.1 dB/1.5 GHz
- * other frequency ranges on request

λ/4 shorting stub types

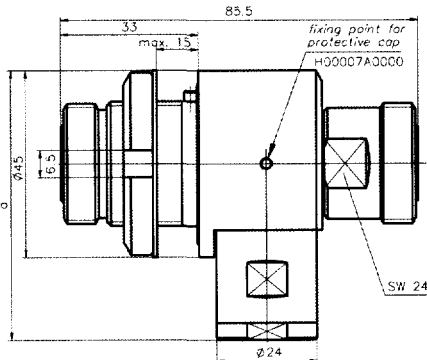
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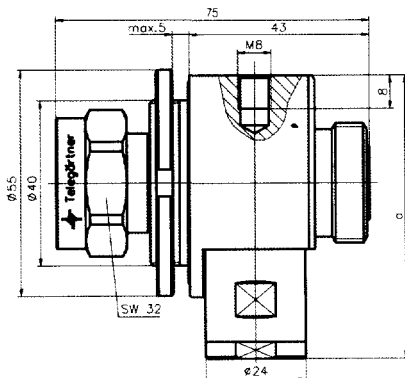
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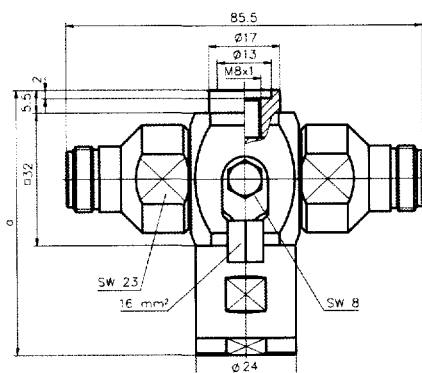
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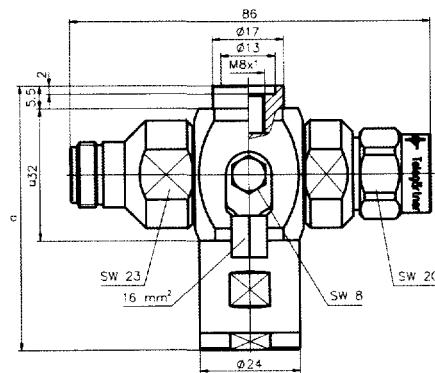
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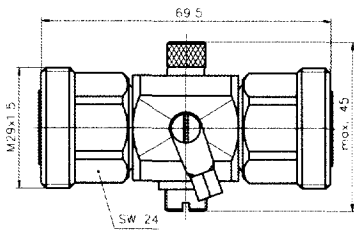
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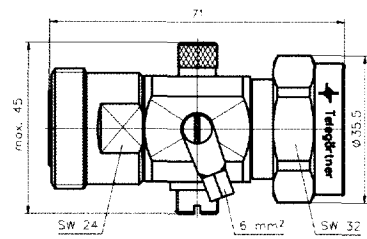


Gas discharge tube types

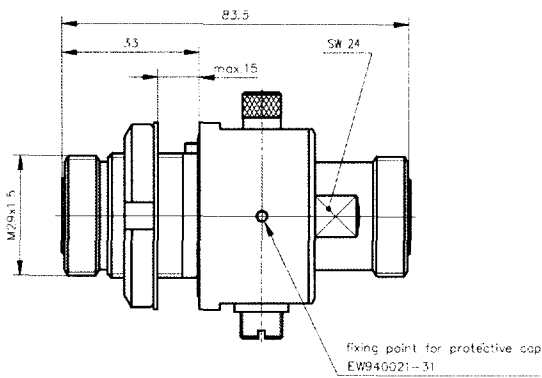
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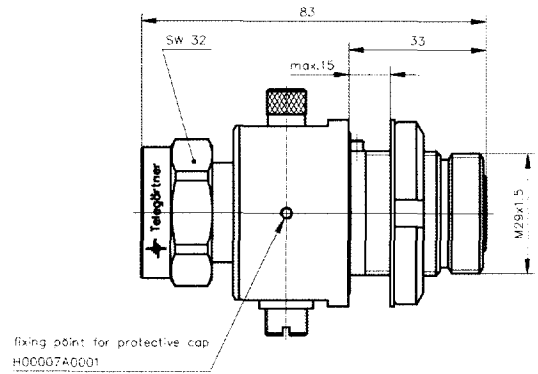
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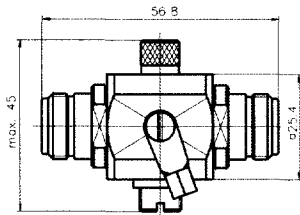
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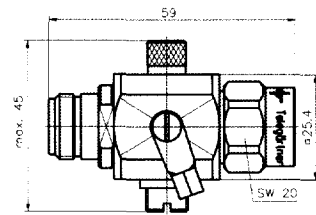
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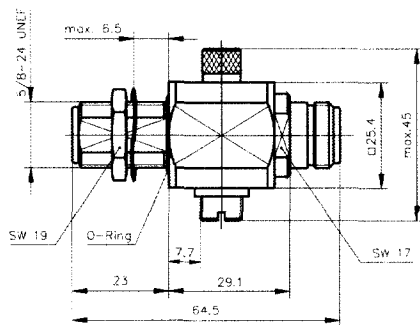
12



13



14



Replacement Gas Discharge Tubes available on request!