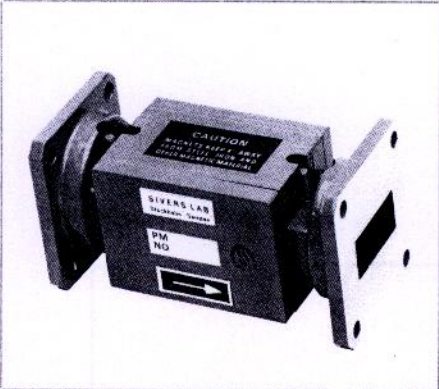


Ferrite isolator

Standing wave detector



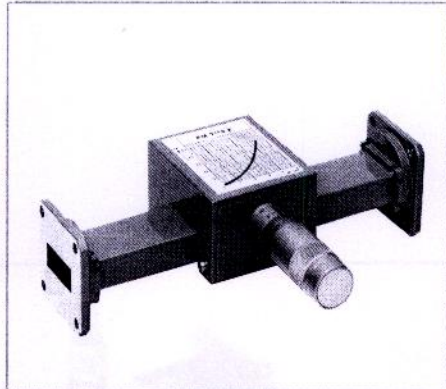
PM 7045X is a low power field displacement isolator. It is used in connection with oscillators to reduce load mismatches. The waveguide contains a magnetized ferrite bar to which a resistive plate is attached. Microwave energy travelling in the forward direction is very little attenuated. In the reverse direction the energy is absorbed in the resistive plate. This effect arises from the non-reciprocal distortion of the RF field caused by the magnetized ferrite.

Specifications

- PM 7045X
- Frequency range: 8.5-9.6 GHz
- Insertion loss: 0.5 dB
- Isolation: 30 dB
- VSWR: 1.10
- Power average*: 1 W
- Power peak*: 1 kW
- Waveguide: R100 (WR90, WG16)
- Flange: mates UBR 100
- Length: 85 mm
- Material: nickel-plated brass, grey enamel
- Weight: 700 g

* terminated with VSWR = 2

Variable attenuator



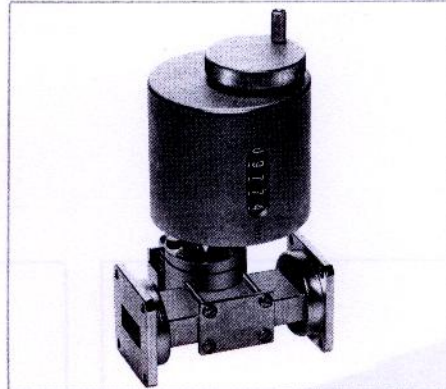
The attenuation is achieved by moving a resistive vane, in the waveguide. The E-field increases towards the centre and thus the attenuation increases when the vane is moved towards this position. The attenuation as a function of the micrometer reading is given on the calibration chart attached to the instrument.

Specifications

- PM 7110X
- Frequency range: 8.2-12.4 GHz
- Attenuation range: 0-35 dB
- Accuracy: <10%
- Insertion loss: 0.2 dB
- VSWR: 1.10
- Waveguide: R100 (WR90, WG16)
- Flange: mates UBR 100
- Material: nickel plated brass, grey enamel
- Weight: 600 g
- Length: 164 mm

Frequency meter

Movable short



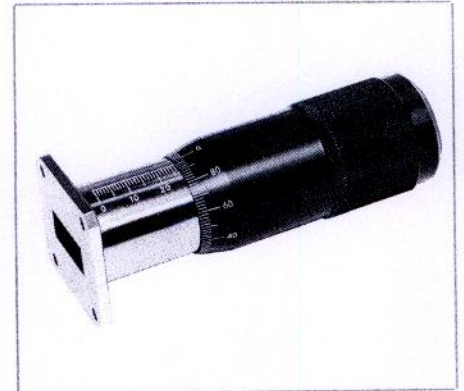
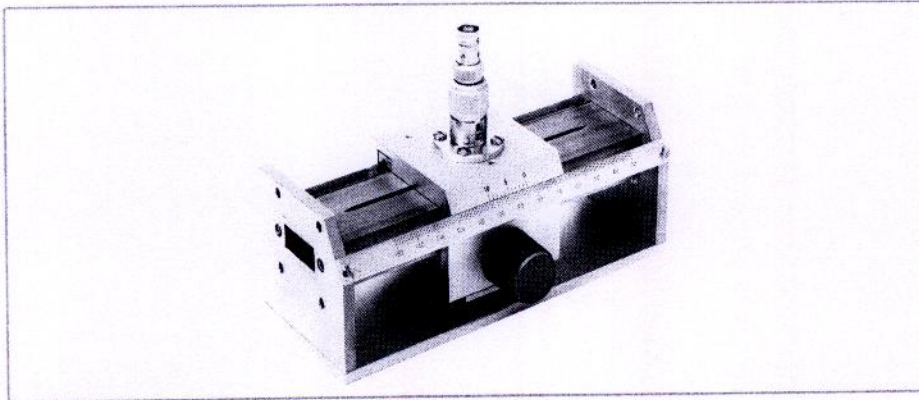
The frequency meter consists of a coaxial cavity with a tuning plunger and a digital readout in MHz. The cavity is coupled to a passing waveguide via a hole in the narrow wall of the waveguide. When the frequency of the signal in the passing waveguide is the same as the resonant frequency of the cavity, an amount of power will be removed from the waveguide. This means an additional transmission loss at the resonant frequency (a "dip" in transmitted power), which can be observed on a detecting instrument connected to the passing waveguide. Alternatively the cavity can be connected to a waveguide crystal detector which will give maximum current at the resonant frequency.

Specifications:

- Type PM 7072X
- Frequency range 8.5-9.6 GHz
- Waveguide R100 (WR90, WG16)
- Accuracy ±0.1%
- Length 80 mm
- Weight 750 g

Standing wave detector

Movable short



The standing wave detector PM 7142X consists of a straight waveguide section with a slot along the centreline of the broadside wall, a probe carriage, a probe (antenna) inserted through the slot and a detector diode. The probe can be moved along the waveguide and the position is indicated on a mm-scale. The probe depth is adjustable. The microwave signal is coupled to the diode via the probe and the rectified signal behind the diode is fed to the BNC jack output on top of the detector mount.

Specifications

PM 7142X	
Frequency range:	8.2-12.4 GHz
Residual VSWR:	1.03
Probe displacement:	95 mm
Probe resolution:	0.1 mm
Probe penetration:	0-3 mm
Diode:	PM 7729
Waveguide:	R100 (WR90, WG16)
Flange:	mates UBR 100
Video output:	BNC jack
Length:	167 mm
Material:	aluminium
Weight:	950 g

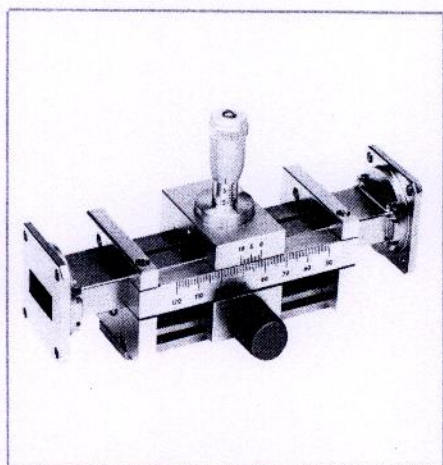
The movable short PM 7216X is a precision choke type short-circuit giving a VSWR exceeding 100 at the flange.

The micrometer reading permits adjustment or resetting of the short-circuit plane position with a displacement accuracy of 0.02 mm. This short-circuit is specially recommended for accurate phase measurements and for determining the di-electric constant of solid materials. The short is made of nickel-plated brass.

Specifications

PM 7216X	
Frequency range:	8.2-12.4 GHz
VSWR:	
(at the flange)	>100
Travel length:	35 mm
Accuracy of displacement:	0.02 mm
Waveguide:	R100 (WR90, WG16)
Flange:	mates UBR 100
Weight:	530 g

Slide screw tuner



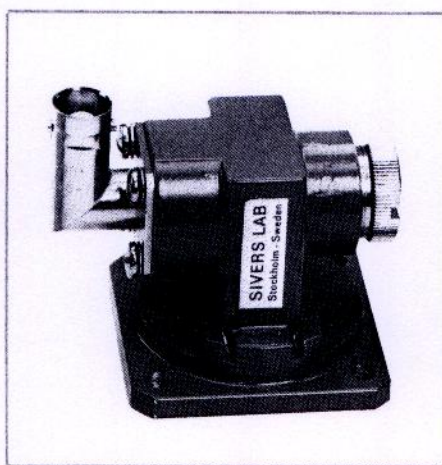
Slide screw tuner PM 7151X is used to match out unwanted reflections in a waveguide or to introduce a desired reflection. The tuner consists of a slotted waveguide section and a movable probe penetrating through the slot in the broad wall of the waveguide. Probe displacement is very accurate due to the use of sturdy steel guiding rods. The penetration and the position of the probe can be located accurately by means of a micrometer and a mm scale.

Specifications

PM 7151X

Frequency range: 8.2-12.4 GHz
Waveguide: R100 (WG16, WR90)
Flange: mates UBR 100
Probe displacement: 50 mm
Probe penetration: 0-10 mm
Length: 165 mm
Material: nickel plated brass
Weight: 650 g

Detector



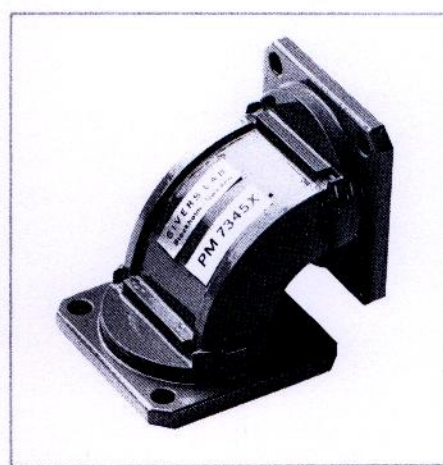
This waveguide detector is designed for low level detection. Diode is mounted in the centre of the waveguide in front of a fixed short circuit. Two field symmetrical irises between the flange and the diode flatten the response and reduce the VSWR. The rugged design meets military requirements and the material is chromated aluminium, painted grey enamel on external non-mating parts.

Specifications

PM 7195X

Frequency range: 8-11 GHz
VSWR type: 3-5 unbiased, 1 k Ω video load
Diode: PM 7721 (1N23B)
Video output: BNC jack
Waveguide input: R100 (WG16, WR90)
Flange: mates UBR 100
Weight: 85 g

Waveguide E-bend



The E-plane bend is made of aluminium. It is chromated and externally painted in grey enamel.

Specifications

PM 7345X

Frequency range: 8.2-12.4 GHz
VSWR max.: 1.05
Waveguide: R100 (WR90, WG16)
Flanges: mates UBR 100
Radius: 30 mm
Angle: 90°
Weight: 70 g

Rotary joint

Horn antenna

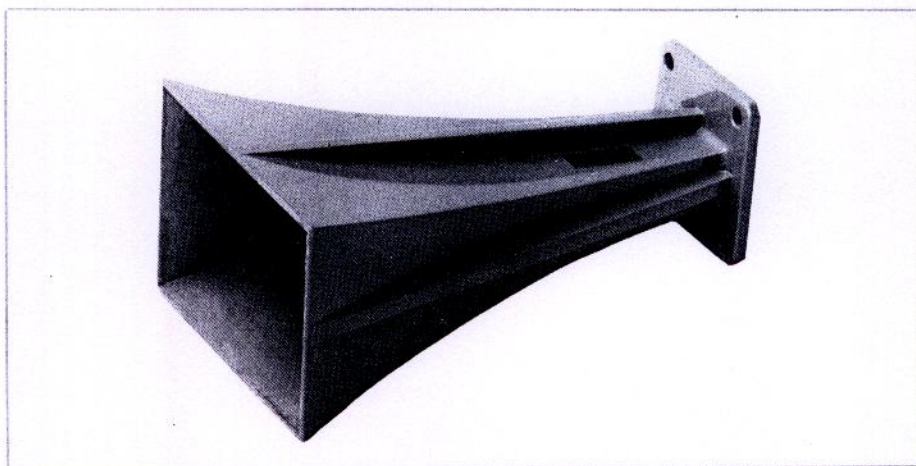


The rotary joint PM 7888X is used to link the rotating part to the stationary part of a microwave system. It is ideal for antenna measurement e.g. radiation pattern, being equipped with an angular scale 0-180°. It is made in brass with non-mating external surfaces, painted in grey enamel.

Specifications

PM 7888X

Frequency range: 9.0-9.5 GHz
VSWR: 1.10
Insertion loss: 0.2 dB
Power capacity: 75 kW peak,
0.5 kW average
Starting torque: 0.2 Nm
Waveguide: R100 (WR90, WG16)
Flange: mates UBR 100
Weight: 600 g



The horn antenna PM 7320X/01 has exponentially flared guide walls to give a proper matching between the waveguide and free space. The antenna is a precision cast in zinc alloy, iridite treated and external non-mating surfaces painted in grey enamel.

Specifications

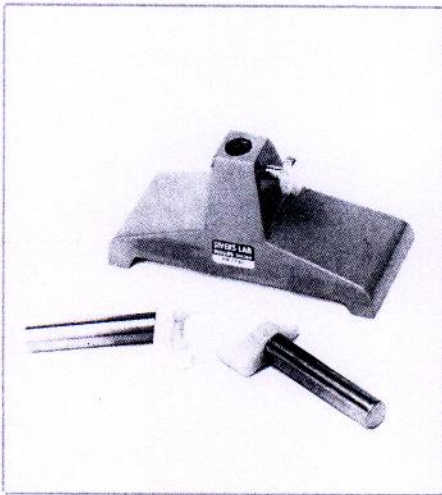
PM 7320X/01

Frequency range: 8.2-12.4 GHz
Midband gain: 16 dB
VSWR: 1.25
Waveguide: R100 (WR90, WG16)
Flange: mates UBR 100
Weight: 300 g

Waveguide support

Termination

Straight waveguide section



The support of the set-ups in the different experiments is achieved by the use of waveguide supports (PM 7700). These fit to the X-band components with clamps, either waveguide mounted (PM 7701X) or flange mounted (PM 7702X).



The low reflection termination PM 7220X has a very low VSWR and is designed for precision measurements. It is made of nickel-plated brass and finish is grey enamel.

Specifications

PM 7220X

Frequency range: 8.5-9.6 GHz
VSWR max.: 1.02
Max.power: 2 W average
Waveguide: R100 (WR90, WG16)
Flange: mates UBR 100
Length: 160 mm
Weight: 250 g

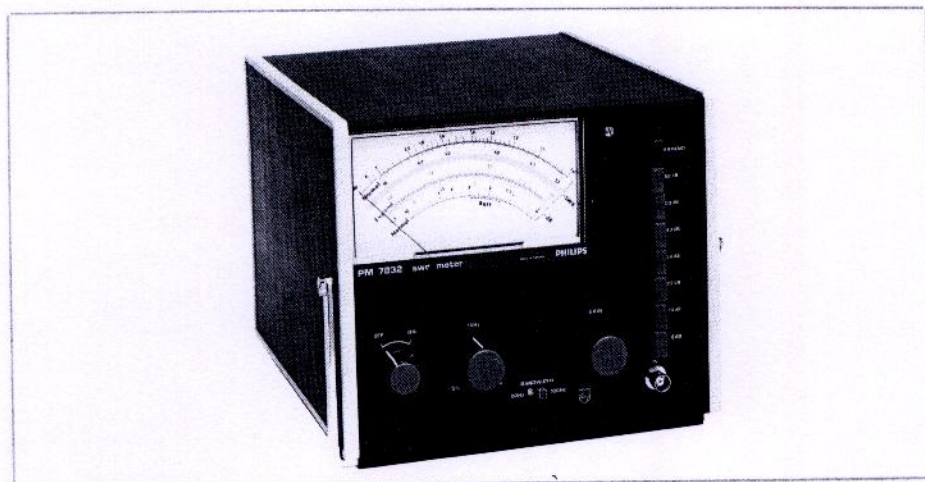


PM 7366X

This is a 20 cm long piece of waveguide R100 made of nickel-plated brass, externally grey in colour. Flanges mate UBR 100.

Weight: 300 g

SWR-meter



The SWR meter type PM 7833 is a low-noise 1000 Hz tuned amplifier/volmeter. To avoid hum caused by ground loop currents the measuring circuit is completely isolated from the mains ground.

Specifications

PM 7832

Input

frequency: 1000 Hz, adjustable approx. $\pm 5\%$

Bandwidth: 100 Hz

Sensitivity: $1 \mu\text{V}$ rms for full-scale deflection at max. bandwidth at least 6 dB below fullscale at max. bandwidth and with input terminated in 5000 ohm (measured at rated sensitivity)

Noise:

Input: unbiased, optimized for high impedance crystals with a source impedance 2-10 kohm

Input

connector: BNC female

Range: 70 dB in 6 steps of 10 dB and 10 dB variable by gain control

Adjustable gain:

at least 10 dB coarse control approx. 0.8 dB by fine control

Accuracy: ± 0.1 dB/10 dB step, max. cumulative error between any two 10 dB steps ± 0.2 dB $+0.05$ dB when switching NORMAL-EXPAND

Meter scales: calibrated for square-law detectors
 SWR 1-4/3.2-10 (NORMAL)
 1-1.3 (EXPAND)
 dB 0-10 (NORMAL)
 dB 0-2.5 (EXPAND)

Temperature

range: 0 . . . $+45^\circ\text{C}$ ambient

Power: 100-130/200-260 V
 50-60 Hz

Weight: 3.8 kg

Dimensions: $212 \times 270 \times 195$ mm

Component description

Microstrip antenna

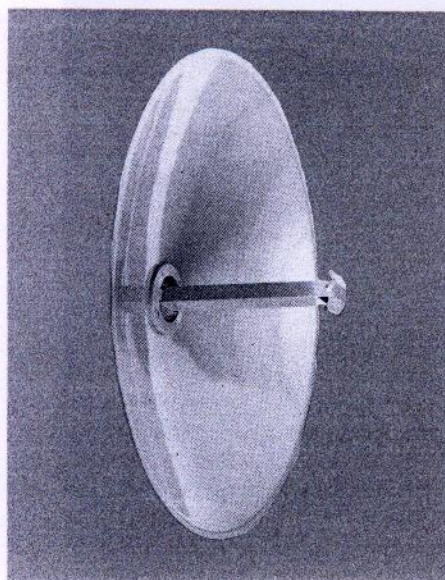
Parabolic antenna

Metal plane

Slot antenna

Antenna stand

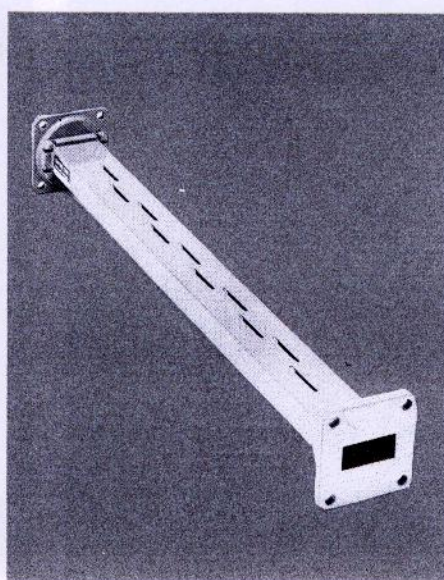
Helix antenna



The parabolic antenna SL 19700 consists of a parabolic dish and a waveguide rear feed, both made of chromated aluminium and external painted in grey enamel. The feed is fastened to the dish by inserting the feed through a hole from the rear side of the dish and then fixing it with four screws. Incident power in the feed is divided into two parts and then reflected towards the dish.

SPECIFICATIONS SL 19700

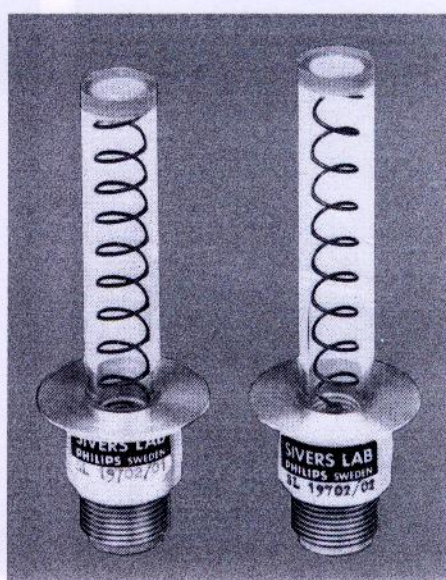
Frequency range: 8.2—12.4 GHz
 Gain, at 9.5 GHz typically 25 dB
 Dish diameter: 36 cm
 f/D: 0.42
 Waveguide: R100 (WR90, WG16)
 Flange: mates UBR 100
 Material: aluminium
 Weight: 900 g



The slot antenna SL 19701 consists of a rectangular aluminium waveguide, painted external in grey enamel, with slots in the broad side. The slots are spaced a guide half-wavelength apart and on the opposite sides of the symmetry axis. The slot antenna should be tuned with a movable short, PM 7216X.

SPECIFICATIONS SL 19701

Resonant frequency: 9.5 GHz
 Number of slots: 10
 Gain, at 9.5 GHz typically 16 dB
 Waveguide: R100 (WR90, WG16)
 Flange: mates UBR 100
 Material: aluminium
 Weight: 380 g



There are two versions of the helix antenna: right-hand wound SL 19702/01 and left-hand wound SL 19702/02. Except for the winding they are identical. The antenna spiral is protected by a transparent tube of plexiglass.

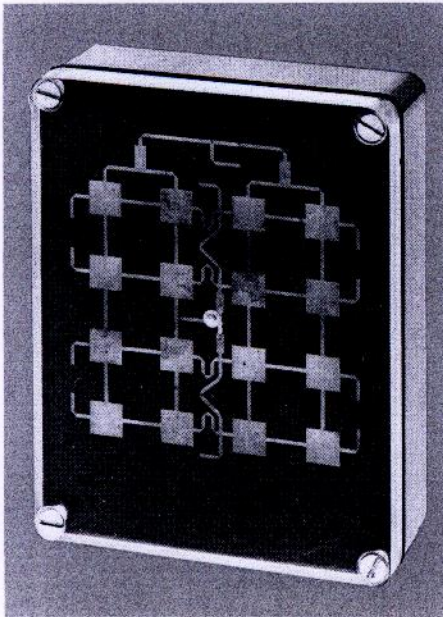
SPECIFICATIONS SL 19702/01—02

Frequency range: 6.8—11.2 GHz
 Gain, at 9.0 GHz typically 16 dB
 Coaxial connector: N-type jack
 Weight: 50 g

Microstrip antenna

Metal plane

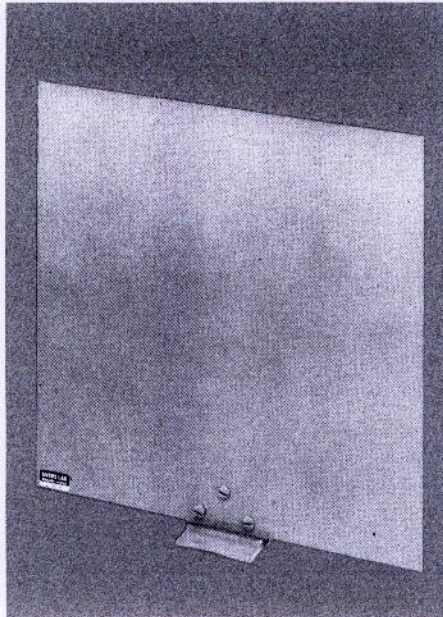
Antenna stand



The microstrip antenna SL 19703 consists of a double-sided printed circuit board. One side forms the antenna pattern and the other a ground plane. The pattern is protected by a 10 mm thick layer of plexiglass. The pattern, consisting of an array of 16 patches, is symmetrically excited. The antenna is fastened to an aluminium box which also serves as a support for the N-type coaxial contact.

SPECIFICATIONS SL 19703

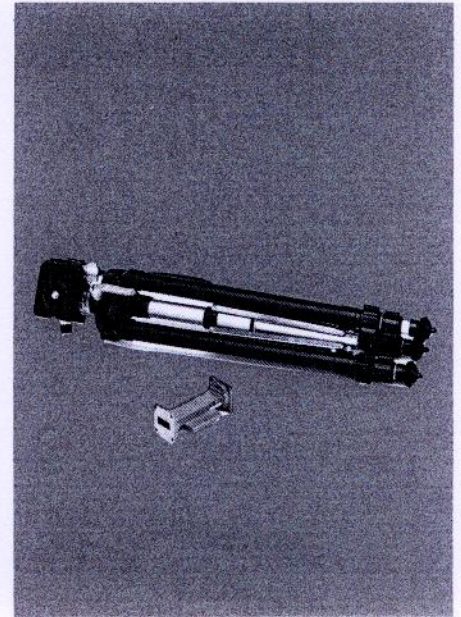
Resonant frequency:	9.1 GHz
ϵ_r :	2.62
W:	8.9 mm
h:	1.6 mm
Coaxial contact:	N-type jack
Dimensions:	120×95 mm
Weight:	350 g



The metal plane SL 19704 is made of a square of chromated aluminium painted in grey enamel. It is fastened to a 5 cm long T-shaped stand of the same material.

SPECIFICATIONS SL 19704

Dimensions:	25×25 cm
Material:	aluminium
Weight:	300 g



The antenna stand SL 19705 consists of a tripod stand and a stand adaptor. The tripod stand has 3-section tubular legs and a panorama head adjustable in three directions. This permits a quick and easy alignment of an antenna system.

The stand adaptor is a 10 cm long rectangular waveguide with a fixed adaptor for the stand.

SPECIFICATIONS SL 19705

Tripod:	
Maximum operating height:	147 cm
Weight:	2.2 kg
Stand adaptor:	
Frequency range:	8.2—12.4 GHz
VSWR:	< 1.05
Length:	10 cm
Waveguide:	R100 (WR90, WG16)
Flange:	mates UBR 100
Material:	brass, grey enameled
Weight:	300 g