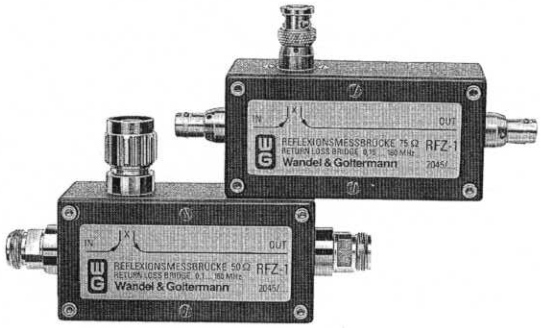
Bridges for measuring return loss and signal balance

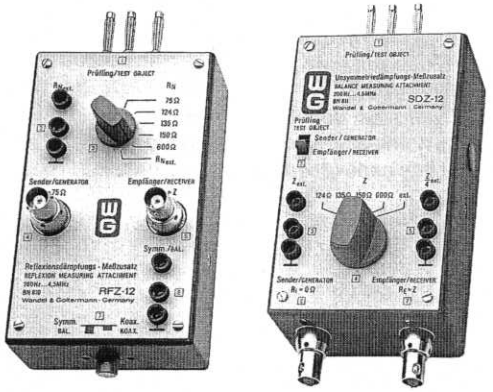
These bridges and accessoires make it easy to make precise measurements of return loss and signal balance ratio in conjunktion with level measuring setups or spectrum and network analyzers.

The RFZ Return Loss Bridges provide very high directivity and low measurement error. The spectrum and network analyzers have a normalization function to eliminate the residual attenuation and frequency response error of the test setup.



The RFZ-1 Bridge allows return loss measurements in the frequency range from approximately 50 kHz up to 180 MHz. It is available with 75 Ω or 50 Ω characteristic impedance.

RFZ-12 Return Loss Bridge
SDZ-12 Signal Balance Ratio Bridge When used with a level measuring setup, the RFZ-12 enables measurements of return losses of balanced and unbalanced items-under-test simply and easily. The RFZ-12 can be used up to 4.5 MHz. The SDZ-12 is used to perform signal balance ratio measurements to ITU-T O.121 on generators and receivers. From 200 Hz to 4.5 MHz it is possible to carry out both wideband and selective measurements.
If a swept level measuring setup with display screen is used, return loss measurements can be made in sweep mode, with saves much time and effort.
The RFZ-12 and the SDZ-12 both contain bridge circuits; the RFZ-12 has built-in switchable reference impedances and the SDZ-12 built-in switchable terminating impedances. This ensures simple operation and high accuracy.



Both the SDZ-12 and the RFZ-12 have a connector for external standard impedances which can differ from the characteristic impedances normally used. The RN-120 standard impedance can be used to allow return loss measurements on the balanced 120 Ω connections to digital multiplexers.

RFZ-1 Return Loss Bridge

Impedance and frequency

Characteristic impedance, Z_0	Nominal frequency range
75 Ω	75 kHz to 190 MHz
50 Ω	50 kHz to 190 MHz

Data overview

for all versions and connectors; with input and output terminated, calibrated with short- and open circuit at each test frequency.

Temperature	18 to 28 °C	5 to 40 °C	5 to 40 °C
Directivity	≥45 dB	≥45 dB	≥42 dB
Test port X return loss	≥23 dB	≥28 dB	≥26 dB
Error limits, reflection coefficient magnitude, r	±(0.006 + 0.07 r^2)	±(0.006 + 0.04 r^2)	±(0.008 + 0.05 r^2)
Error limits, reflection coefficient phase	±(arcsin 0.006/r +5°)	±(arcsin 0.006/r +4°)	±(arcsin 0.008/r +5°)

Z_0 = 75 Ω:	75 kHz	150 kHz	180 MHz	190 MHz
Z_0 = 50 Ω:	50 kHz	100 kHz	180 MHz	190 MHz

Port return loss

(other ports terminated)
IN port (from generator) ..... approx. 30 dB
OUT port (to receiver) ..... approx. 20 dB
Test port X (to UUT) ..... see data overview above

Insertion loss

From IN to X (OUT terminated) ..... 6 dB
From IN to OUT (X open- or short circuit)
at 3 MHz ..... 12 dB
variation with frequency, referred to 3 MHz .. −1.5 to +0.1 dB

Load (all ports)

within nominal frequency range ..... ≤+20 dBm
below nominal frequency range reducing by .. 20 dB/decade
but in any case (down to 0 Hz) at least ..... 5 mA

General specifications

Ambient temperature
Nominal range, use ..... +5 to +40 °C
Storage and transport ..... −40 to +70 °C
Humidity, nominal ranges of use
Relative ..... 20 to 80 %
Absolute ..... ≤20 g/m³
Condensation .. only permissible during storage and transport
RFI/EMI suppression to DBP 1046/1984

Dimensions (w × h × d) in mm
Casing only ..... 99 × 40 × 50
BN 2045/10 with BNC connectors ..... 140 × 40 × 72
BN 2045/30 with N connectors ..... 141 × 40 × 76

Weight excluding accessories
BN 2045/10 with BNC connectors ..... 0.27 kg
BN 2045/30 with N connectors ..... 0.33 kg

RFZ-12 Return Loss Bridge

Frequency range ..... 200 Hz to 4.5 MHz

Impedance standards, integral, switchable
balanced ..... 124, 135, 150, 600 Ω
unbalanced ..... 75, 124, 135, 150, 600 Ω

Attenuation at r = 1
for balanced items-under-test ..... 40 dB
for unbalanced items-under-test ..... 46 dB
Connector for external impedance standard

Max. error in reflection coefficient r

in balanced mode		
in frequency range	for Z =	max. error
200 Hz to 620 kHz	124 Ω to 150 Ω	±0.001 ±0.1 r
200 Hz to 2 MHz	125 Ω to 150 Ω	±0.003 ±0.1 r
200 Hz to 4.5 MHz	124 Ω	±0.006 ±0.2 r
200 Hz to 620 kHz	600 Ω	±0.003 ±0.1 r
in unbalanced mode		
200 Hz to 620 kHz	75 Ω to 150 Ω	±0.001 ±0.1 r
200 Hz to 2 MHz	75 Ω to 150 Ω	±0.002 ±0.1 r
200 Hz to 4.5 MHz and $\lvert r \rvert \leq 0.1$	75 Ω to 150 Ω	±0.003 ±0.2 r
200 Hz to 620 kHz	600 Ω	±0.003 ±0.15 r

Accessory

RN-120 standard impedance, BN 810/00.08
Max. error in measured reflection coefficient (r)
from 200 Hz to 2 MHz ..... ±0.003 ±0.1 r
from 200 Hz to 4.5 MHz ..... ±0.01 ±0.1 r

General specifications

Dimensions (w × h × d) in imm without plug .... 75 × 56 × 133

SDZ-12 Signal Balance Ratio Bridge

Frequency range ..... 200 Hz to 4.5 MHz

Terminating and Z/4 impedances

integral, switchable ..... 124, 135, 150, 600 Ω
Connector for external impedance standard

Intrinsic bridge inbalance

in frequency range	for Z =	Intrinsic inbal.
200 Hz to 620 kHz	124 Ω to 150 Ω	≥60 dB
200 Hz to 2 MHz	124 Ω to 150 Ω	≥54 dB
200 Hz to 4.5 MHz	124 Ω to 150 Ω	≥50 dB
200 Hz to 620 kHz	600 Ω	≥60 dB

General Specifications

Dimensions (w × h × d) in mm without plug ..... 75 × 62 × 125

Ordering information

RFZ-1 return loss bridge, 75 Ω **BN 2045/10**
with one of the following options:

X port	IN and OUT ports	Order number
BNC (male)	BNC (female)[1]	BN 2045/00.10
BNC (female)		BN 2045/00.11
1.6/5.6 (male)	1.6/5.6 (female)[1]	BN 2045/00.12
1.6/5.6 (female)		BN 2045/00.13

RFZ-1 return loss bridge, 50 Ω **BN 2045/30**
with one of the following options:

X port	IN and OUT ports	Order number
N connector (male)	N connector (female)[2]	BN 2045/00.30
N connector (female)		BN 2045/00.31
BNC (male)	BNC (female)[3]	BN 2045/00.32
BNC (female)		BN 2045/00.33

Accessories (included with bridge)
Storage and transport box BN 2045/00.01
Standard short circuit to match version chosen

Accessories (charged extra)
BNC-N connecting cable, $Z_0 = 50\ \Omega$, length 1 m. Order no. K 679

1) Fitted with the basic 75 Ω Versacon 9 connectors and the adapters listed above as standard. Other adapters can be fitted ex-works or by user as long as the chosen type is suitable for the frequency range; see Versacon 9 specification sheet for details of available types.
2) or BNC (female) on request.
3) or N (female) on request.

RFZ-12 Return Loss Bridge[4] **BN 810/01**

SDZ-12 Signal Balance Ratio Bridge[4] **BN 811/01**

Accessories (charged extra)
for RFZ-12:
RN-120 standard impedance BN 810/00.08
120 Ω, balanced, with 3 pole CF plug
Coaxial connector for item-under-test:
Versacon 9 adapter[5] BN 810/00.06

for RFZ-12, SDZ-12:
Carrying case for both RFZ-12 and SDZ-12 BN 626/08

4) Generator and receiver connections are fitted with basic 75 Ω Versacon 9 connectors with BNC adapters as standard. Alternative adapters are available; refer the Versacon 9 specification sheet for details and specify typ of adapter required when ordering.
5) Inserts required must be ordered separately; see Versacon 9 specification sheet for details.