SERIES BMA
SUBMINIATURE BLIND MATE CONNECTORS

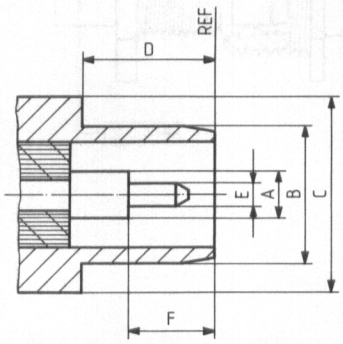
Description

SUHNER BMA blind mate connectors open up new dimensions in microwave applications up to 22 GHz. SUHNER offers a range of connectors for fixed as well as "floating" configurations with any axial or radial misalignment taken out by the outer contact of the jacks.

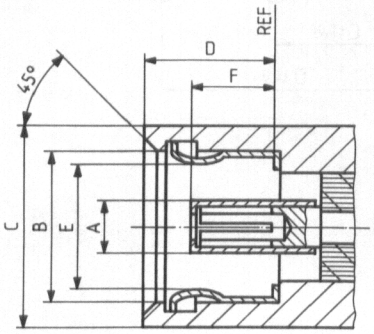
The BMA series presents an outstanding range of products featuring high reliability and ease of assembly.

Interface Dimension

Plug



Jack



Contents

	page
Application Notes	96
Technical Data	99
Connectors for Semi-Rigid Cables	101
Connectors for Flexible Cables	104
Receptacles with Solder End	106
Connectors with Hermetic Seal	108
PCB Connectors	109
Terminations	110

Further Information

Adaptors	234
Accessories	261

Standards

Interface dimensions conform to
MIL–STD–348A

Compatibility

The SUHNER range of BMA connectors is completely compatible with the OSP connector series. The connector dimensions are subject to a licence with M/A-COM Omni-Spectra, Inc.

Interface Dimensions in mm

	Plug	Jack
Ø A	1.78	1.78
Ø B	5.33	5.73 min.
Ø C	7.60	7.60
D	5.05 min.	5.00 *
Ø E	0.91	5.08 max.
F	3.25 min.	3.23 max. *

* contact spring pressed flat

BMA Connector Applications

Quick and reliable engagement and disengagement of multiple microwave transmission lines, high packaging density of flexible and rigid coaxial lines and cable free connection of modules to motherboard are some needs of modern microwave systems.

SUHNER BMA connectors offer an economical solution for the most demanding interconnector applications found today in civil and military microwave circuits.
To help ensure a problem free, reliable long term operation the following guidelines should be used.

Assembly hints

Rigid mounting

Maximum misalignment

axial	:	0.38 mm [1]
radial	:	0.2 mm

1) For applications with reduced specifications 0.76 mm is allowable.

Hole dimensions

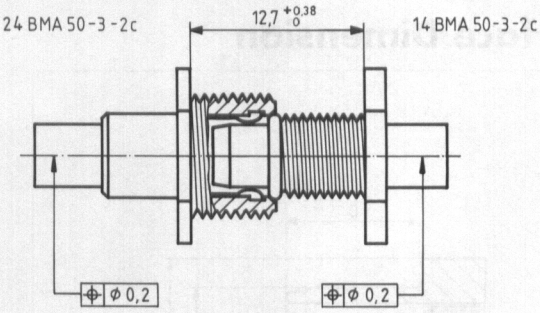
To avoid tolerance build up all mounting holes must be toleranced from a single datum point.

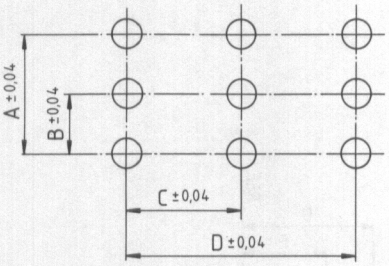
It is also important that both of the mounting plates are properly affixed and correctly positioned.

Radial and axial misalignments can be accommodated with the sprung outer contacts of the SUHNER BMA connector.

These misalignments are due to the build up of tolerances with the major contributions coming from:
Axial direction: mounting plate distances and plate distortions.
Radial direction: mounting hole positions and concentricity, plate distortion and misalignment.

For recommended mounting hole sizes see page 273.

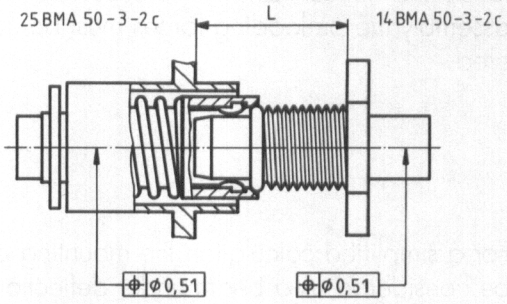




Floating assembly:

The increased tolerance correction of the connector is achieved by using an extra spring system.

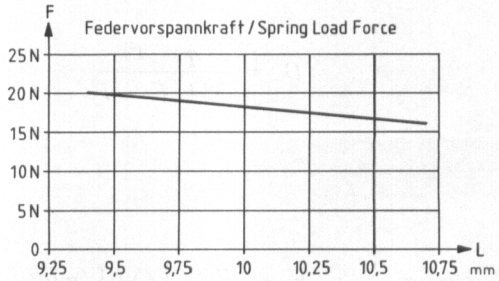
This allows the centre assembly of the connector to move freely within the flange body.



Recommended maximum tolerances

axial	:	1.52 mm
radial	:	0.51 mm

The adjacent diagram shows the relationship between the connector preloading force and the separation distance "L" between the mounting reference planes for a typical connector pair (25 BMA 50–3–2c+14 BMA 50–3–2c).



To ensure optimum contact under extreme radial misalignment the following points must be considered:

a) The maximum misalignment tolerances must not be exceeded. Any possible bending of the mounting plate due to the spring preloading of the individual connectors must be taken into account.
If distortion occurs the following steps should be taken to minimize the effect:

- re-dimensioning
- bracing of the mounting plate
- reduction of maximum connector preloading force which will result in the limitation of length L.

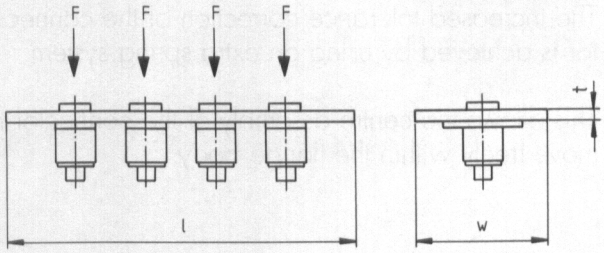
b) A minimum preloading force of 16 N must be ensured for each connector pair so that the maximum engaging force will be exceeded. This represents the upper limit of separation. For the example above this is a length L of maximum 10.65 mm.

Data on other connector combinations available on request.

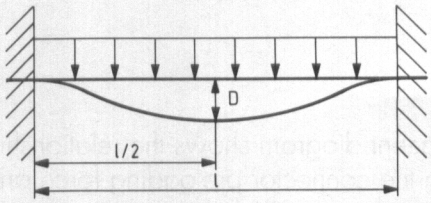
For the dimensioning of the holes the same points must be considered as for the rigid assembly.

Mounting plate bending

For an array of BMA connectors to be mounted on a chassis, the forces on the connectors must be taken into account and in the case of a floating assembly the preloading forces must be considered.



For a simplified calculation the mounting plate can be considered as a beam under deflection, thus the bending is:



$$D = \frac{q \cdot l^4}{384\ E \cdot I}$$

aluminium : E = 70'000 N/mm^2
steel : E = 210'000 N/mm^2

q: resultant force per unit length

For example:

4 connectors of type 25 BMA 50–3–2c each with a preloading force F of 20 N.

$$I = \frac{w \cdot t^3}{12}$$

$$q = \frac{Fn}{l} = \frac{4 \cdot 20}{l}$$

$$D = \frac{4 \cdot 20 \cdot l^3}{384\ E \cdot I}$$

Using the resulting bending value it can be seen if the maximum tolerances will be exceeded.

Technical Data

Electrical Data

Cable type	Requirements RG 402/U	RG 405/U
Impedance	50 Ω	
Frequency range	DC ... 22 GHz	
VSWR (mated connector pair) – DC ... 18 GHz – 18 ... 22 GHz	 ≤ 1.02 + 0.005 f (GHz) ≤ 1.02 + 0.008 f (GHz)	 ≤ 1.05 + 0.005 f (GHz) ≤ 1.05 + 0.009 f (GHz)
RF-leakage	≥ 90 dB – f (GHz) dB[1]	
Dielectric withstanding voltage (at sea level)	1.5 kV rms, 50 Hz	1.0 kV rms, 50 Hz
RF-testing voltage (at sea level)	1.0 kV rms, 5 MHz	670 V rms, 5 MHz
Insulation resistance	≥ $5 \cdot 10^3$ MΩ	
Contact resistance – inner conductor – outer conductor	 ≤ 2 mΩ ≤ 2 mΩ	
Admissible power (at sea level and room temperature)	≤ 300 W at 3 GHz	

1) measured at interface with reference planes being in true alignment

Mechanical Data

	Requirements
Engagement force	≤ 13.5 N
Disengagement force	≥ 2 N
Contact captivation	≥ 27 N
Cable retention force [2] – flexible cables cable group U2 cable groups U9,U10,U11 – semi-rigid cables cable group Y3 cable group Y5	 ≥ 50 N ≥ 250 N ≥ 155 N ≥ 300 N
Durability (matings)	≥ 1000

2) value considers maximum load of the cables without irreversible variations of specifications.

Environmental Data

	Requirements/tests
Temperature range	– 65° C ... + 125° C
Thermal shock	MIL–STD–202, Method 107, Condition B
Moisture resistance	MIL–STD–202, Method 106
Corrosion	Saltspray test acc. to MIL–STD–202, Method 101, Condition B
Vibration	MIL–STD–202, Method 204, Condition D
Shock	MIL–STD–202, Method 213, Condition I
Hermetic seal	see type specifications

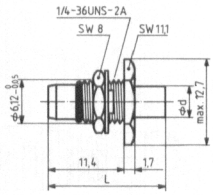
Materials

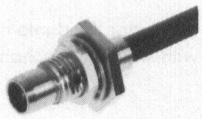
Connector part	Standards	Material	Surface/plating
Bodies	QQ–C–530/MIL-H-7199 CuBe 2 QQ–S–763, Class 303, A	beryllium-copper, hardened, stainless steel, non-magnetic	gold plated passivated
Inner conductor contacts	QQ–C–530/MIL-H-7199, CuBe 2	beryllium-copper, hardened	gold plated MIL-G-45204 Type II, class I
Spring basket	QQ–C–530/MIL-H-7199, CuBe 2	beryllium-copper	gold plated
Springs (floating connectors)		stainless steel	passivated
Insulators	ASTM–D–1457, BS 4271 Grade B	PTFE	
Gaskets		EPDM, 40 shore A	

Some connectors may have a specification that differs from above mentioned data.

Connectors for Semi-Rigid Cables

straight plugs



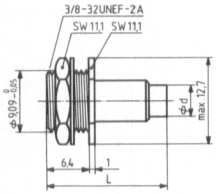


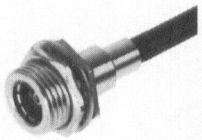
cable entry soldered
bulkhead mounted, rigid

SUHNER TYPE	Ident. no.	DESC Drawing	Cable group (example)	Weight	AI	Mounting hole	L mm	Ø d mm	Material
14 BMA-50-2-2c	645600		Y3, Y11 (EZ 86) (RG 405/U)	3.5 g	9171	ML 56	17.5	3.4	CuBe, gold plated
14 BMA-50-2-20c	645657	85072 ZSGB	Y3, Y11 (EZ 86) (RG 405/U)	3.5 g	9171	ML 56	17.5	3.4	CuBe, gold plated
14 BMA-50-3-2c	645601		Y5, Y12 (EZ 141) (RG 402/U)	3.5 g	9171	ML 56	17.5	4.8	CuBe, gold plated
14 BMA-50-3-20c	645658	85072 ZSGA	Y5, Y12 (EZ 141) (RG 402/U)	3.5 g	9171	ML 56	17.5	4.8	CuBe, gold plated

panel thickness 3.2 mm max.

straight jacks

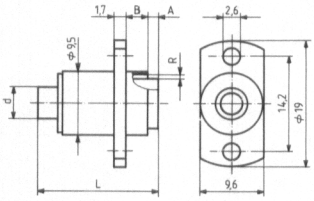


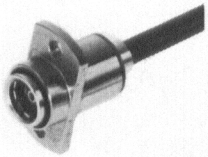


cable entry soldered
bulkhead mounted, rigid

SUHNER TYPE	Ident. no.	DESC Drawing	Cable group (example)	Weight	AI	Mounting hole	L mm	Ø d mm	Material
24 BMA-50-2-2c	645602		Y3, Y11 (EZ 86) (RG 405/U)	5.7 g	9171	ML 57	18.0	3.4	CuBe, gold plated
24 BMA-50-3-2c	645603		Y5, Y12 (EZ 141) (RG 402/U)	5.7 g	9171	ML 57	18.0	4.8	CuBe, gold plated

panel thickness 3.2 mm max.





2-hole mounted, floating

SUHNER TYPE	Ident. no.	DESC Drawing	Cable group (example) 2)	Weight	AI	Assembly hole	L mm	Ø d mm	Material
25 BMA-50-2-2c	645604		Y3, Y11 (EZ 86) (RG 405/U)	6.5 g	9171	ML 58	18.0	3.4	1)
25 BMA-50-2-20c	645659	85071 ZSGB	Y3, Y11 (EZ 86) (RG 405/U)	6.5 g	9171	ML 58	18.0	3.4	1)
25 BMA-50-3-2c	645605		Y5, Y12 (EZ 141) (RG 402/U)	6.5 g	9171	ML 58	18.0	4.8	1)
25 BMA-50-3-20c	645660	85071 ZSGA	Y5, Y12 (EZ 141) (RG 402/U)	6.5 g	9171	ML 58	18.0	4.8	1)

A min. 2.1 mm axial range of spring
B max. 3.2 mm panel thickness
R min. 0.5 mm radial misalignment

1) Outer connector body and flange of stainless steel, inner floating part of gold plated CuBe.
2) It is recommended to use a service loop to facilitate the float features of the connector.

AI = assembly instruction
cable groups see page 17

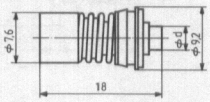
mounting holes see page 269
assembly tools see page 251

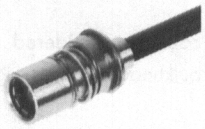
straight jacks

bulkhead mounted, floating

connector fixed into mounting panel
with snap-on mechanism

recommended removal tool
74 Z-0-0-213





SUHNER TYPE	Ident. no.	DESC Drawing	Cable group (example) 2)	Weight	AI	Mounting hole	Ø d mm	Material
24 BMA-50-2-4c	645606		Y3, Y11 (EZ 86) (RG 405/U)	3.0 g	9171	ML 66	3.4	CuBe, gold plated
24 BMA-50-3-4c	645607		Y5, Y12 (EZ 141) (RG 402/U)	3.0 g	9171	ML 66	4.8	CuBe, gold plated

panel thickness 12.7 mm max.

2) It is recommended to use a service loop to facilitate the float features of the connector.

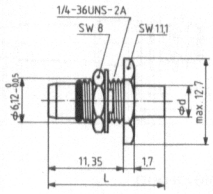
AI = assembly instruction
cable groups see page 17

mounting holes see page 269
assembly tools see page 251

Crimp connectors for semi-rigid cables

straight plugs

cable entry crimped
bulkhead mounted, rigid

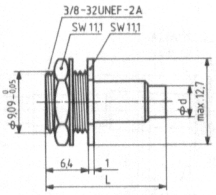


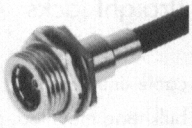
SUHNER TYPE	Ident. no.	Cable group (example)	Wt.	AI	Crimp inserts: Cable captivation	Crimp inserts: Connector positioning	M-hole	L 1) mm	Ø d mm	Material
14 BMA-50-2-6c	645608	Y3 (EZ 86) (RG405/U)	4 g	9174	76Z-0-0-68	76Z-0-0-73	ML 56	17.1	5.6	stainless steel
14 BMA-50-3-6c	645609	Y5 (EZ 141) (RG402/U)	4 g	9174	76Z-0-0-67	76Z-0-0-73	ML 56	17.1	5.6	stainless steel

panel thickness 3.2 mm max.

straight jacks

cable entry crimped
bulkhead mounted, rigid

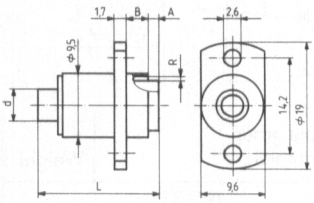


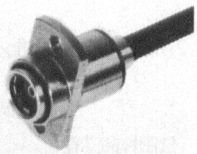


SUHNER TYPE	Ident. no.	Cable group (example)	Wt.	AI	Crimp inserts: Cable captivation	Crimp inserts: Connector positioning	M-hole	L 1) mm	Ø d mm	Material
24 BMA-50-2-6c	645610	Y3 (EZ 86) (RG405/U)	6 g	9174	76Z-0-0-68	76Z-0-0-74	ML 57	18.2	5.6	stainless steel
24 BMA-50-3-6c	645611	Y5 (EZ 141) (RG402/U)	6 g	9174	76Z-0-0-67	76Z-0-0-74	ML 57	18.2	5.6	stainless steel

panel thickness 3.2 mm max.

cable entry crimped
2-hole mounted, floating





SUHNER TYPE	Ident. no.	Cable group (example) 2)	Wt.	AI	Crimp inserts: Cable captivation	Crimp inserts: Connector positioning	M-hole	L 1) mm	Ø d mm	Material
25 BMA-50-2-6c	645612	Y3 (EZ 86) (RG405/U)	7 g	9174	76Z-0-0-68	76Z-0-0-75	ML 58	19.81	5.6	stainless steel
25 BMA-50-3-6c	645613	Y5 (EZ 141) (RG402/U)	7 g	9174	76Z-0-0-67	76Z-0-0-75	ML 58	19.81	5.6	stainless steel

A min. 2.1 mm axial range of spring
B max. 3.2 mm panel thickness
R min. 0.5 mm radial misalignment

1) after crimping
2) It is recommended to use a service loop to facilitate the float features of the connector.

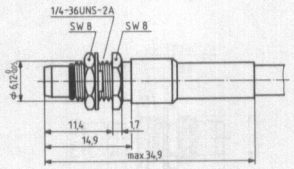
AI = assembly instruction
cable groups see page 17

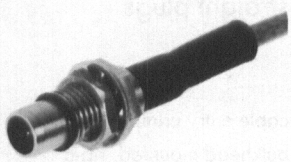
mounting holes see page 269
assembly tools see page 251

Connectors for Flexible Cables

straight plugs

cable entry crimped
bulkhead mounted, rigid



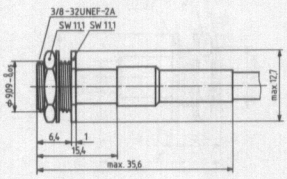


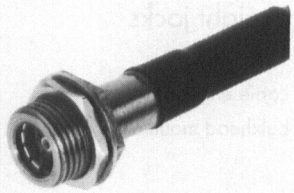
SUHNER TYPE	Ident. no.	DESC drawing	Cable group (example)	Weight	AI	Mounting hole	Crimp insert	Material
14 BMA-50-2-3c	645614		U2 (RG 316/U, RG 188A/U, RG 174/U)	3.5 g	9172	ML 56	A 1)	stainless steel
14 BMA-50-2-30c	645661	85074 ZSGA	U2 (RG 316/U, RG 188A/U, RG 174/U)	3.5 g	9172	ML 56	A 1)	stainless steel
14 BMA-50-3-3c	645615		U9/11 (RG 223/U, RG 142 B/U, RG 400/U)	3.5 g	9173	ML 56	B 2)	stainless steel
14 BMA-50-3-30c	645662	85074 ZSGB	U9/11 (RG 223/U, RG 142 B/U, RG 400/U)	3.5 g	9173	ML 56	B 2)	stainless steel

panel thickness 3.2 mm max.

straight jacks

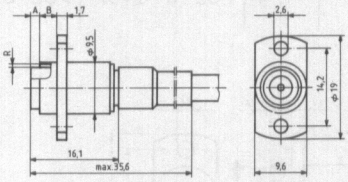
cable entry crimped
bulkhead mounted, rigid

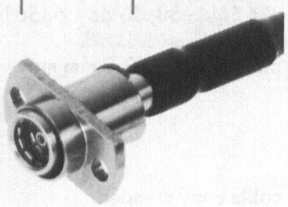




SUHNER TYPE	Ident. no.	DESC drawing	Cable group (example)	Weight	AI	Mounting hole	Crimp insert	Material
24 BMA-50-2-3c	645616		U2 (RG 316/U, RG 188 A/U, RG 174/U)	6.5 g	9172	ML 57	A 1)	stainless steel
24 BMA-50-3-3c	645617		U9/11 (RG 223/U, RG 142 B/U, RG 400/U)	6.5 g	9173	ML 57	B 2)	stainless steel

panel thickness 3.2 mm max.





2-hole mounted, floating

SUHNER TYPE	Ident. no.	DESC drawing	Cable group (example)	Weight	AI	Mounting hole	Crimp insert	Material
25 BMA-50-2-3c	645618		U2 (RG 316/U, RG 188 A/U, RG 174/U)	7.0 g	9172	ML 58	A 1)	stainless steel
25 BMA-50-2-30c	645663	85073 ZSGA	U2 (RG 316/U, RG 188 A/U, RG 174/U)	7.0 g	9172	ML 58	A 1)	stainless steel
25 BMA-50-3-3c	645619		U9/11 (RG 223/U, RG 142 B/U, RG 400/U)	7.0 g	9173	ML 58	B 2)	stainless steel
25 BMA-50-3-30c	645664	85073 ZSGB	U9/11 (RG 223/U, RG 142 B/U, RG 400/U)	7.0 g	9173	ML 58	B 2)	stainless steel

A min. 2.1 mm axial range of spring B panel thickness 3.2 mm max. R min. 0.5 mm radial misalignment

1) MIL insert M22520/5-03A can also be used

2) MIL insert M22520/5-05A can also be used

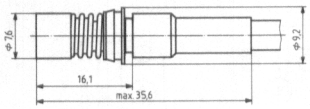
AI = assembly instruction
cable groups see page 17

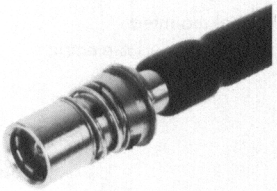
mounting holes see page 269
assembly tools see page 251

straight jacks

bulkhead mounted, floating

connector fixed into mounting panel
with snap-on mechanism





recommended removal tool
74 Z–0–0–213

SUHNER TYPE	Ident. no.	DESC drawing	Cable group (example)	Weight	AI	Mounting hole	Crimp insert	Material
24 BMA–50–2–5c	645620		U2 (RG 316/U, RG 188 A/U, RG 174/U)	3.5 g	9172	ML 66	A 1)	stainless steel
24 BMA–50–3–5c	645621		U9/11 (RG 223/U, RG 142 B/U, RG 400/U)	3.5 g	9173	ML 66	B 2)	stainless steel

panel thickness 12.7 mm max.

1) MIL insert M22520/5–03A
can also be used

2) MIL insert M22520/5–05A
can also be used

BMA

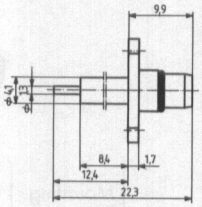
AI = assembly instruction
cable groups see page 17

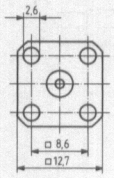
mounting holes see page 269
assembly tools see page 251

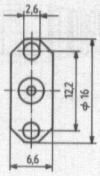
Receptacles with Solder End

receptacles, male

panel mounted
with extended dielectric







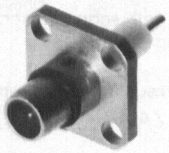
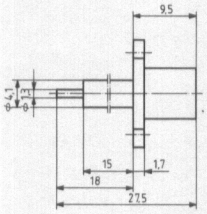


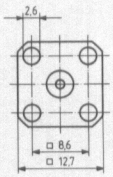
fig. 1 fig. 2

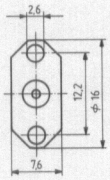
SUHNER TYPE	Ident. no.	Flange type	Weight	Fig.	Notes
13 BMA-50-0-1	645622	square	4.2 g	1	body stainless steel
13 BMA-50-0-2	645623	2-hole	3.5 g	2	body stainless steel

receptacles, female

panel mounted
with extended dielectric







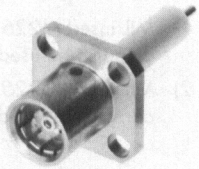
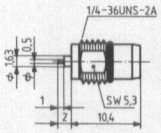


fig. 1 fig. 2

SUHNER TYPE	Ident. no.	Flange type	Weight	Fig.	Notes
23 BMA-50-0-1	645624	square	4.9 g	1	body stainless steel
23 BMA-50-0-2	645625	2-hole	4.4 g	2	body stainless steel

receptacle, male

bulkhead mounted
threaded installation

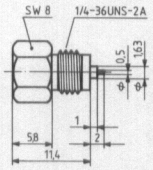


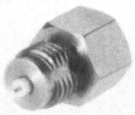
SUHNER TYPE	Ident. no.		Weight		Mounting hole	Notes
12 BMA-50-0-2	645626		2.5 g		ML 63	body stainless steel

recommended assembly tools are
74 Z-0-0-215 and 8 mm spanner

receptacle, female

bulkhead mounted
threaded installation





SUHNER TYPE	Ident. no.		Weight		Mounting hole	Notes
22 BMA-50-0-2	645627		3.3 g		ML 63	body stainless steel

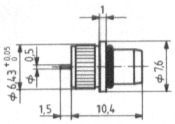
for assembly, 8 mm spanner is required

AI = assembly instruction
cable groups see page 17

mounting holes see page 269
assembly tools see page 251

receptacle, male

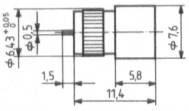
bulkhead mounted
press-fit installation



SUHNER TYPE	Ident. no.	Weight	Mounting hole			Notes
12 BMA-50-0-1	645628	2.6 g	ML 62			body stainless steel

receptacle, female

bulkhead mounted
press-fit installation

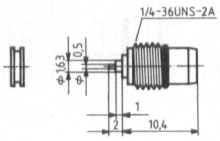


SUHNER TYPE	Ident. no.	Weight	Mounting hole			Notes
22 BMA-50-0-1	645629	3.1 g	ML 59, 67			body stainless steel

receptacle, male, hermetic seal

"Spark plug"
metal seal

installation thermal limit 250°C max.



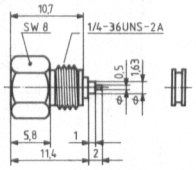
SUHNER TYPE	Ident. no.	Weight	Mounting hole	VSWR max. [1]	Leak. rate max.	Notes
12 BMA-50-0-4	645634	1.9 g	ML 60	1.04+0.009 f	10^{-8} Torr l/sec	body stainless steel

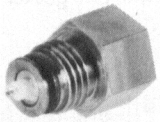
use tool 74 Z-0-0-215 and torque wrench
74 Z-0-0-214, torque 200 Ncm, for assembly

receptacle, female, hermetic seal

"Sparkplug"
metal seal

installation thermal limit 250°C max.





SUHNER TYPE	Ident. no.	Weight	Mounting hole	VSWR max. [1]	Leak. rate max.	Notes
22 BMA-50-0-4	645635	2.8 g	ML 60	1.04+0.009 f	10^{-8} Torr l/sec	body stainless steel

use tool 74 Z-0-0-215 and torque wrench
74 Z-0-0-214, torque 200 Ncm, for assembly

1) f in GHz

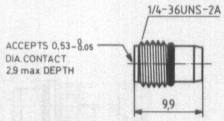
AI = assembly instruction
cable groups see page 17

mounting holes see page 269
assembly tools see page 251

Connectors with Solder-In Hermetic Seal

receptacle, male

bulkhead mounted
threaded installation

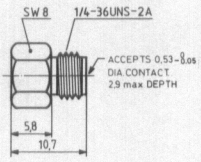


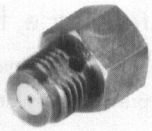
SUHNER TYPE	Ident. no.	Weight	Mounting hole	Suitable [1] glass bead	VSWR max. [2]	Notes
12 BMA-50-0-3	645636	2.5 g	ML 61	73 Z-0-0-198	1.04+0.006 f	body stainless steel

use tool 74 Z-0-0-215 with torque wrench 74 Z-0-0-214 for mounting. For fixturing hermetic seal while soldering, fixture 74 Z-0-0-211 is recommended.

receptacle, female

bulkhead mounted
threaded installation



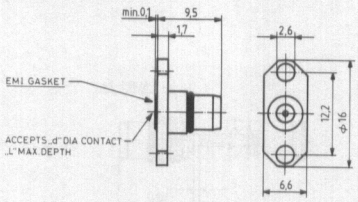


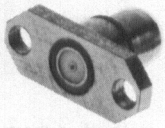
SUHNER TYPE	Ident. no.	Weight	Mounting hole	Suitable [1] glass bead	VSWR max. [2]	Notes
22 BMA-50-0-3	645637	3.2 g	ML 61	73 Z-0-0-198	1.04+0.006 f	body stainless steel

use tool 74 Z-0-0-215 with torque wrench 74 Z-0-0-214 for mounting. For fixturing hermetic seal while soldering, fixture 74 Z-0-0-211 is recommended.

receptacles, male

2-hole mounted
with EMI gasket



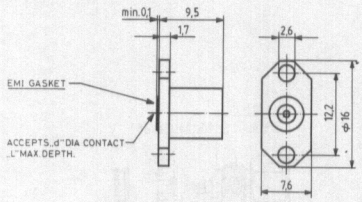


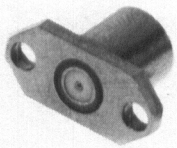
SUHNER TYPE	Ident. no.	Weight	Mounting hole	Suitable [1] glass bead	VSWR max. [2]	Dimensions mm Ø d	Dimensions mm L	Notes
13 BMA-50-0-3	645638	3.0 g	ML 64	73 Z-0-0-196	1.04+0.006 f	0.28 – 0.41	2.8	body stainless steel
13 BMA-50-0-4	645639	3.0 g	ML 65	73 Z-0-0-197	1.04+0.006 f	0.42 – 0.53	2.8	body stainless steel

for fixturing hermetic seal while soldering, fixture 74 Z-0-0-212 is recommended

receptacles, female

2-hole mounted
with EMI gasket





SUHNER TYPE	Ident. no.	Weight	Mounting hole	Suitable [1] glass bead	VSWR max. [2]	Dimensions mm Ø d	Dimensions mm L	Notes
23 BMA-50-0-3	645640	4.0 g	ML 64	73 Z-0-0-196	1.04+0.006 f	0.28 – 0.41	2.8	body stainless steel
23 BMA-50-0-4	645641	4.0 g	ML 65	73 Z-0-0-197	1.04+0.006 f	0.42 – 0.53	2.8	body stainless steel

for fixturing hermetic seal while soldering, fixture 74 Z-0-0-212 is recommended

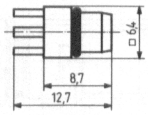
1) see page 267
2) f in GHz; valid for connectors without glass bead

AI = assembly instruction
cable groups see page 17

mounting holes see page 269
assembly tools see page 251

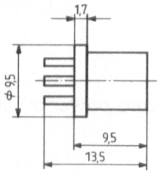
PCB Connectors

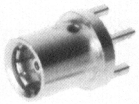
straight PCB plug



SUHNER TYPE	Ident. no.	Weight	Mounting hole	Notes
81 BMA-50-0-1	645630	2.6 g	ML 41	body CuBe, gold plated

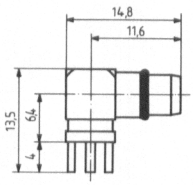
straight PCB jack

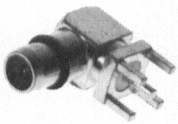




SUHNER TYPE	Ident. no.	Weight	Mounting hole	Notes
82 BMA-50-0-1	645631	3.7 g	ML 41	body CuBe, gold plated

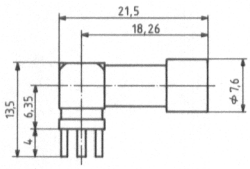
right angle PCB plug

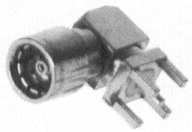




SUHNER TYPE	Ident. no.	Weight	Mounting hole	Notes
84 BMA-50-0-1	645632	4.5 g	ML 41	body CuBe, gold plated

right angle PCB jack





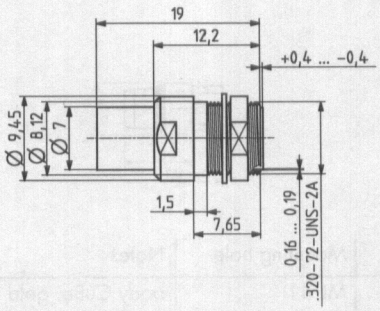
SUHNER TYPE	Ident. no.	Weight	Mounting hole	Notes
85 BMA-50-0-1	645633	5.0 g	ML 41	body CuBe, gold plated

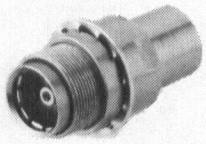
AI = assembly instruction
cable groups see page 17

mounting holes see page 269
assembly tools see page 251

Termination

impedance 50Ω





SUHNER TYPE	Ident. no.	Connector	Weight	Power [1]	VSWR 4 GHz	10 GHz	16 GHz	18 GHz
65 BMA-50-0-1	648527	jack	5.0 g	1.0 Watt	≤ 1.10	≤ 1.20	≤ 1.35	≤ 1.45 1.35 typ.

1) at max. 30° ambient temperature, derated linearly to zero power at 130°C

AI = assembly instruction
cable groups see page 17
mounting holes see page 269
assembly tools see page 251