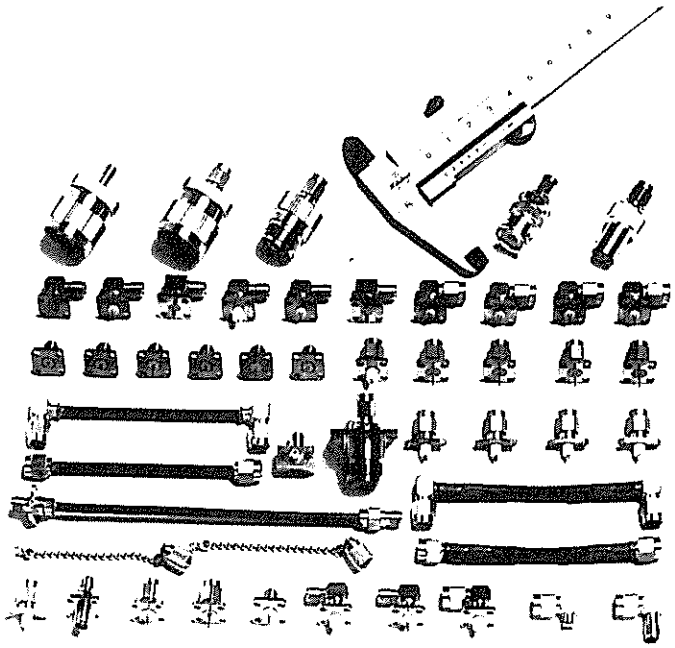
HRM SERIES RF CO-AXIAL CONNECTORS

INFORMATION

The HRM (Hirose Radio Miniature) series are connectors of the SMA (Sub-Miniature Type A) type, prescribed in MIL-C-39012. We developed them in 1967, for the first time in Japan, thanks to our company's outstanding technology. Since then, their high reliability has been recognized, and we have a sales record of more than 6 million thus far.

Uses

The HRM series is suitable for in-unit wiring in wired and wireless communications equipment, broadcasting equipment, radar equipment and electronic measuring instruments, for connections between units, and for input/output terminals of equipment components. They display their effects especially in set designs subject to severe requirements, such as those which operate in a frequency band above the L band and which also have transmission.



Characteristic features

1. Outstanding performance characteristics.
The matters which most require consideration in matching the impedance of coaxial connectors are these: How are we to reduce the discontinuous capacitance caused by dimensional discontinuities on the transmission channel (the differences in level provided for supporting the center contacts or the dielectric materials), and how are we to correct the discontinuous capacitance which does occur? In this respect, the high-frequency performance characteristics of the HRM series are good because there are small differences in level in the transmission channel, and the discontinuous capacitance which does occur because of the differences in level is corrected by a unique technique.
Moreover, the series also has mechanically stable performance characteristics because the center contacts and dielectric materials have secure fastening structure.

2. They are compact in size, lightweight and sturdy.
The receptacle flanges are square in shape, measuring 12.7mm on each side. Their area being about one-half that of the BNC series and about one-fourth that of the S series, they are most suitable for high-density mounting. Moreover, their weights are greatly reduced (a standard receptacle weighs only about 3 grams). Even though they are compact and lightweight, their durability is no lower than that of other types, because they use stainless-steel shells.

3. They have high quality and reliability.
The HRM series is manufactured under a system of thorough quality control from the raw materials to the shipped product. In addition to the highest manufacturing quality, they also have high reliability, and not a single faulty unit has ever occurred at the end-user stage with a service record exceeding 6 million units.

4. There are many varieties.
An extensive expansion of the varieties has been carried out recently, including providing the S type for all varieties and adding airtight connectors and connectors for .085-inch semi-rigid cables. As a result, clients can now select products more freely than was possible before.

Standard cables

The following are the standard cables of the HRM series:

Flexible cables ——— RG-142B/U, RG-55/U

Semi-rigid cables —
- .141-inch semi-rigid cables (UT-141, UT-141A, UT-141AA etc.)
- .085-inch semi-rigid cables (UT-85, UT-85C etc.)

The standard cable dimensions are listed on P.110.

Types

1. Classification by function

Functionally, the cables are classified into six types. The following is the configuration of their names.

HRM – XXX – XXX
- HRM: Name of type
- XXX: 100 ~ 199 (Connectors for semi-rigid cables); 200 ~ 299 (Connectors for Flexible cables); 300 ~ 399 (Receptacles); 400 ~ 499 (Plug receptacles); 500 ~ 599 (Adapters); 600 ~ 699 (Accessories)
- XXX: Additional number (A number of 1 ~ 3 digits is used. Numbers are assigned to some products and not to others.)

2. Classification by surface treatment

Products having the same structure, shape and dimensions may have different surface treatments of their armor (shell). There are gold-plated products (gold-plated type) and passivated products (S type).

Those of the S type have the letter S attached at the end of their part number.

Example 1 HRM–301 (Gold-plated type) HRM–301S (S type)

Exampel 2 HRM–400–12 (Gold-plated type) HRM–400–12S (S type)

Technical explanations of the S-type products and of passivation are given on p. 90.

3. Airtight type

Airtight products with hermetic seals are also available.

All airtight products are of the gold-plated type. Air tight types are not available in the S type. Products of the airtight type have the letter H attached at the end of their part number.

Example HRM–300–2H

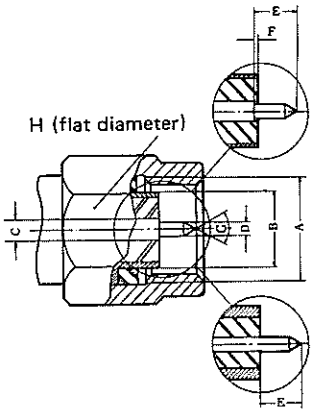
Main materials used

Parts	Materials		Finish			
	Materials	Applicable standards	Type		Plating	Plating thickness
Shell	Stainless steel	JIS G 4303	Gold-plated type		Gold plating	0.5 ~ 1 micron*
			S type	Straight type	Passivation	
				L-bent type	Nickel plating	3 microns
Coupling	Stainless steel	JIS G 4303	Gold-plated type		Gold plating	0.5 ~ 1 micron*
			S type		Passivation	
Female contact	Beryllium copper	JIS H 3270			Gold plating	2 ~ 3 micron
Male contact	Brass	JIS H 3250			Gold plating	2 ~ 3 microns
Solderless sleeve (ferrule)	Annealed copper	JIS H 3250			Nickel plating	3 microns
Insulation	Tetrafluoride resin					
Rubber packings	Silicone rubber					
Cord coverings	Fluoreresin					

*VA types with a plating thickness of 0.3 micron (min.) are also available.

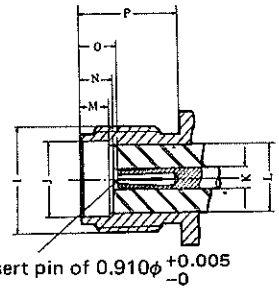
Dimensions of coupling parts

Male coupling parts



Symbols	Dimension values
A	¼–36UNS–2B
B	4.56ϕ $^{\pm 0.02}$
C	1.27ϕ $^{\pm 0.02}$
D	0.92ϕ $^{+0.01}_{-0.015}$
E	2.3
F	0 $^{+0.15}_{-0}$
G	60°
H	8

Female coupling parts



Insert pin of 0.910ϕ $^{+0.005}_{-0}$

Grasping force 150 grams or more

Symbols	Dimension values
I	¼–36UNS–2A
J	4.62ϕ $^{\pm 0.02}$
K	1.27ϕ $^{\pm 0.02}$
L	4.11ϕ
M	1.93 $^{\pm 0.02}$
N	1.93 $^{+0.05}_{-0.1}$
O	1.95 $^{+0.38}_{-0}$
P	5.8 or more

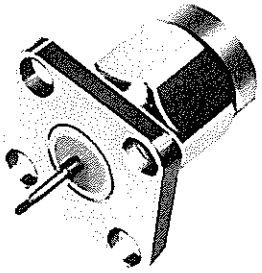
Performance characteristics

	Item	Performance characteristics
Structural dimensions	Structure	Refer to individual drawings.
	Dimensions	Refer to P.89 for the coupling part dimensions. Refer to P.91~107 for the external dimensions.
Electrical characteristics	Insulation resistance	500MΩ or more measured at 500V DC
	Withstand voltage	Test voltage 1000V AC (rms) (at normal pressure)
	Contact resistance	Each 4mΩ or less at center contact and at out contact
	Characteristic impedance	50Ω
	Frequency range	DC ~ 12.4GHz (Those with a range up to 18GHz are also available. They are marked in the catalog with (18 next to the name.)
	Voltage standing wave ratio (V.S.W.R.)	HRM-100 ~ 199: Products of the straight type which have no center contacts (Example HRM-101) 1.05 + 0.01f Products of the straight type which have center contacts (Example HRM-102) 1.05 + 0.015f (Note) L-bent type 1.10 + 0.02f (Note) Note: These values are limited to cases where .141-inch semi-rigid cables are used. HRM-200 ~ 299: Straight type (Example HRM-202) 1.10 + 0.02f L-bent type (Example HRM-208) 1.10 + 0.025f HRM-300 ~ 399: Straight type (Example HRM-301) 1.05 + 0.01f L-bent type (Example HRM-305) 1.05 + 0.025f HRM-400 ~ 499: Straight type (Example HRM-401) 1.05 + 0.01f L-bent type (Example HRM-405) 1.05 + 0.025f HRM-500 ~ 599: Straight type (Example HRM-513) 1.05 + 0.01f L-bent type (Example HRM-503) 1.05 + 0.025f Conversion adapter: For type N, type S (Example HRM-506) 1.05 + 0.01f For type BNC (Example HRM-517) 1.2 or less HRM-600 ~ 699 Standard terminal device (HRM-601, 602) 1.05 + 0.015f Airtight products DC to 6GHz, .1.15 or less 6 ~ 12.4GHz, 1.2 or less f = frequency in GHz
Mechanical characteristics	Coupling tightening torque	0.6~1.0Nm
	Coupling fastening strength	490N or more
	Center-contact holding power	1.5N or more
	Center-contact fastening torque	16.7mN · m or more
	Contact life	Contact resistance of 6 mΩ or less after 1000 insertions and withdrawals
Environmental characteristics	Vibration resistance	*There must be no abnormalities when tested by MIL-STD-202 Method 204, test condition D.
	Impact resistance	*There must be no abnormalities when tested by MIL-STD-202 Method 202 at an acceleration of 200G.
	Temperature-resistance cycles	*There must be no abnormalities when tested by MIL-STD-202 Method 202, test condition C.
	Corrosion resistance	*There must be no abnormalities when tested by MIL-STD-202 Method 101, test condition B.
	Humidity resistance	*There must be no abnormalities when tested by MIL-STD-202 Method 106, test condition C.
	Airtightness	1×10^{-7} cc/sec or less
	Radiation resistance	There must be no abnormalities when exposed to radiation of 3×10^{13} neutrons.

*The coupling tightening torque is 10 kg-cm.

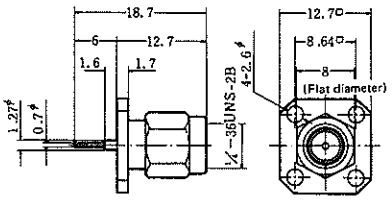
Plug receptacles HRM-400~499

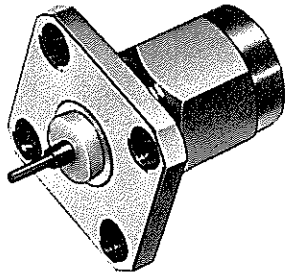
The mounting parts of the plug receptacles are available in types for mounting strip lines (microstrips, triplates, suspender types), for mounting waveguides, etc.
There are two mounting systems: fastening with machine screws (M2.3) at four or two places.



	HRS No.	Part No.	
	CL323-0021-9-40	HRM-401(40)	⑱
	CL323-0070-4-40	HRM-401S(40)	⑱

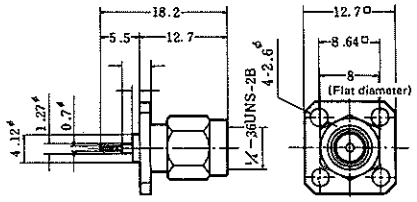
Fastened with machine screws at four places
Round-bar terminals
Straight plug receptacles

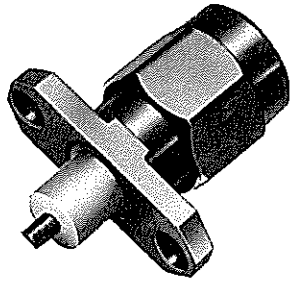




	HRS No.	Part No.	
	CL323-0022-1-40	HRM-402(40)	⑱
*	CL323-0071-7-40	HRM-402S(40)	⑱

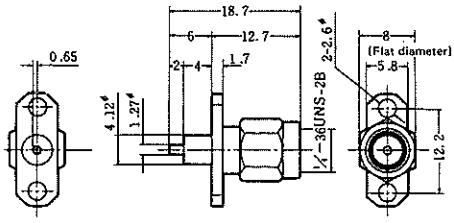
Fastened with machine screws at four places
Round-bar terminals
L-type plug receptacles

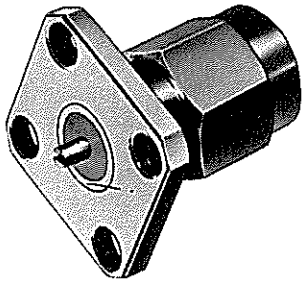




	HRS No.	Part No.	
*	CL323-0023-4-40	HRM-403(40)	⑱
	CL323-0072-0-40	HRM-403S(40)	⑱

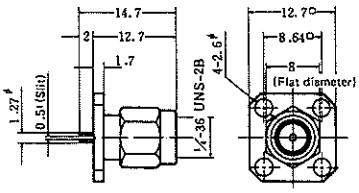
Fastened with machine screws at two places
Half-cutter terminals
Straight plug receptacles





	HRS No.	Part No.	
	CL323-0024-7-40	HRM-404(40)	⑱
*	CL323-0073-2-40	HRM-404S(40)	⑱

Fastened with machine screws at four places
Slot terminals
Straight plug receptacles



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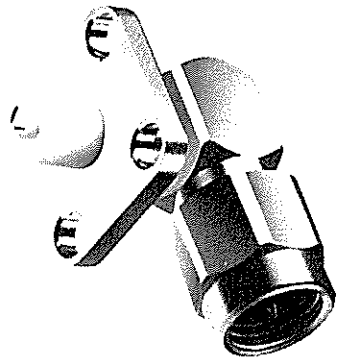
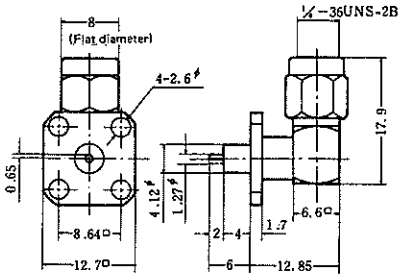
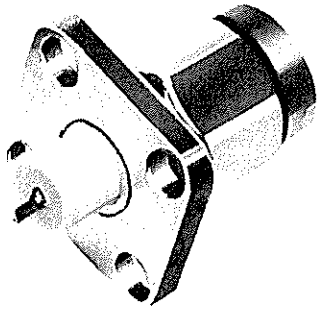


HRS No.	Part No.
CL323-0025-0-40	HRM-405(40)
CL323-0074-5-40	HRM-405S(40)

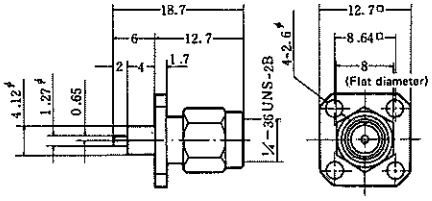
Fastened with machine screws at four places
Half-cutter terminals
L-type plug receptacles

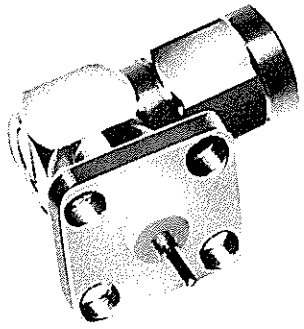




HRS No.	Part No.
CL323-0026-2-40	HRM-406(40)
CL323-0075-8-40	HRM-406S(40)

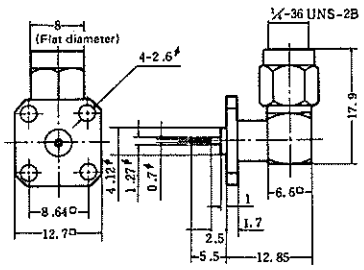
Fastened with machine screws at four places
Half-cutter terminals
Straight plug receptacles

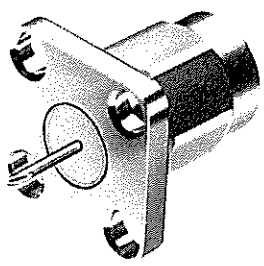




HRS No.	Part No.
CL323-0027-5-40	HRM-407(40)
CL323-0076-0-40	HRM-407S(40)

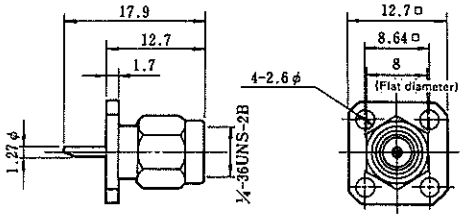
Fastened with machine screws at four places
Round-bar terminals
L-type plug receptacles





HRS No.	Part No.
CL323-0175-2	HRM-400-36S1

Fastened with machine screws at four places
Solder terminals
Straight plug receptacles



* Standard product