

MARC 53 Series Connectors

General Information

The MARC 53 Series Connector family represents a major advancement in the design of high density (.080 [2.03] contact centers), sub-miniature, power and coaxial contact connectors. The MARC 53 Series Connectors consists of two connector styles — the Military approved MD53 featuring shoulder entrapped contacts, and the new RMD53 utilizing rear insertable/removable contacts.

MARC 53 Series Connectors combine positive lock — the rugged, push-pull, lock-coupling mechanism — with the unique positive seal multiple sealing system.

Positive lock is our new finger-tip, push-pull coupling with the safety lock feature, and is the only connector made with positive "blind mating" indication. When the plug is fully engaged, the coupling ring can be rotated 45° to the safety lock position; if the plug is not

completely engaged, the coupling ring cannot be turned to the safety lock position. Consequently, under "blindmating" conditions, it is always possible to determine if the plug is properly engaged without visual reference, damage, or accidental disengagement.

The environmental integrity is guaranteed by multiple seal construction using silicone rubber "O" rings and a floating, voidless insert construction. The floating insert design allows the inserts to move within the connector housing to control interfacial sealing pressure in spite of tolerance accumulation, and a compression interfacial seal with minimum engaging force. Both the primary "O" ring system and the continuous dielectric construction withstand the MIL-C-38300A altitude breathing test. The sealing system meets the air leakage requirements of not more than 1 cubic inch

of air per hour at a 30 P.S.I. pressure differential. This redundant sealing method is indicative of the inherent reliability built into our connectors.

MARC 53 Series Connector power contacts are manufactured from high grade copper alloys, and are designed to be crimped with standard M22520 tooling using subminiature contact locators.

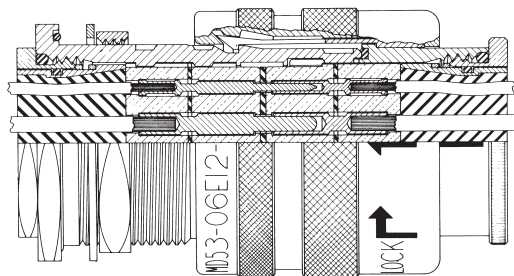
MARC 53 Series Connectors incorporate hard insulators in both the plug and receptacle inserts for exceptional contact stability. Shoulder entrapment positively retains the front insertable MD53 contacts between the front and rear insulators. The new RMD53 contacts are rear insertable and removable and are retained within the connector insulators by clips which can be visually inspected. No insertion or extraction tools are

required for either the MD53 or RMD53 contacts using nominal size wire.

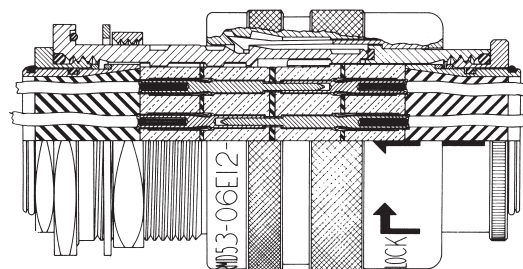
MARC 53 Series Connectors are truly field serviceable... no special tools are required for maintainability. In addition, connector subcomponents damaged through handling or misuse can be procured separately generally without the need to scrap entire connector units.

Weight reductions as high as 67% are achieved without loss of performance.

MARC 53 Series Connectors are available in both environmental and hermetic styles. In addition to the positive lock plug, a threaded coupling plug is also available. Part numbers for configurations offering various finishes and accessories plus other design variations to satisfy special requirements are also available.



MD53
shoulder entrapped contacts



RMD53
rear insertable contacts

Materials and Finishes

Housings and quick disconnect couplings are machined from bar stock aluminum to combine maximum strength with minimum weight. Threaded couplings are machined from non-magnetic, stainless steel bar stock for durability of the coupling threads. Contacts are manufactured from high conductivity copper alloys which have been selected

for low contact resistance over the operating range of the connectors. Inserts are molded from flame-resistant, glass-filled diallyl phthalate, meeting ASTM D5948 requirements. All resilient parts are made of high-temperature, silicone elastomers. Fuel resistant compounds are used where swelling affects the performance of the

connector. All materials are selected for their non-magnetic properties.

The standard finish is hard black, non-conductive, anodized finish on connector housings and quick disconnect couplings; stainless steel threaded coupling is passivated with black oxide finish. Conductive finish modifications include gold

finish and electroless nickel finish. Multi-finish modifications for connector plugs include black anodized disconnect coupling with conductive finish on shell grounding members. Contacts are gold plated per MIL-G-45204 requirements. See Page 73 for modification information.

Service and Performance Data

MARC 53 Series Connectors (Continued)

I. Electrical — Electrical Ratings

Contact Size	Current Rating (Amperes, Max., 81°F [+27°C])	Dielectric Withstanding Voltage (RMS)	Working Voltage		Contact Resistance (Millivolts, Max.)
			Sea Level	110,000 ¹ Ft. Alt.	
22 AWG	5	1000	750	300	15
16 AWG	20	1000	750	300	20

¹ 10,000 ft equals 33,528 m altitude.

Wire Sizes Accommodated

Contact Size	Cond. Dia. (Stranded) ¹	Jacket Size ²
22 AWG	.019-.032 [.483-.813]	.039-.054 [.991-1.37]
16 AWG	.038-.061 [.965-1.55]	.065-.081 [1.65-2.05]

¹ Tolerance of conductor diameters required for a reliable crimp. Smaller sizes readily accommodated — consult Tyco Electronics.

² Smaller jacketed cable can be accommodated but environmental seal may be impaired. Smooth extruded jacket should be used for consistent wire sealing.

Insulation Resistance: 5000 megohms, minimum, at room ambient conditions.

II. Mechanical — Durability: 500 Cycles Mate/Unmate.
Coupling/Uncoupling Forces and Tightening Torques:

Shell Size	Coupling/ Uncoupling Force (In-Lbs.) Max.	Tightening Torque (In-Lbs.)	
		Retaining Nut	Mounting Nut
9	18 [80.07 N]	20 [2.26 Nm], Max.	30-45 [3.39 – 5.08 Nm]
12	22 [97.86 N]	20 [2.26 Nm], Max.	40-55 [4.52 – 6.21 Nm]
15	27 [120.10 N]	20 [2.26 Nm], Max.	55-70 [6.21 – 7.91 Nm]
18	32 [142.34 N]	20 [2.26 Nm], Max.	70-85 [7.91 – 9.60 Nm]

Operating Temperature: -67°F to 257°F [-55°C to +125°C]
Connector Mated Length: MD Plug (06) mated to MD Receptacles (00) (01) (02) (12): 2.031 [51.58], max. RMD Plug (06) mated to RMD Receptacles: 2.217 [56.31], max.

MARC 53 Series Connectors (Continued)

Test Data

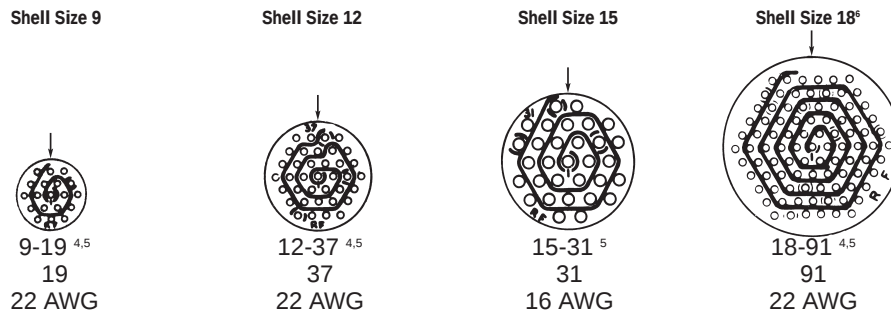
MARC 53 Series Connectors exceed the requirements of specification MIL-C-38300A (USAF) as detailed in the applicable M38300A (USAF) military specification sheets.

MARC 53 Series Connectors meet the following selected test parameters as specified below:

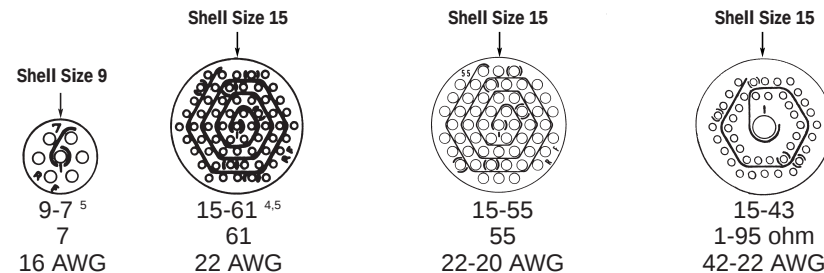
DESCRIPTION MIL-C-38300 Test Para	TEST REQUIREMENTS
Contact Retention Para. 4.10.3	MD Contacts shall withstand 15 lbs [66.72 N] axial load and RMD contacts 10 lbs [44.48 N] axial load without axial displacement in excess of 0.012 [.305] or damage to contacts or inserts when the axial load is applied to the mating end of the contacts in unmated plugs and receptacles at a rate of approximately 1 lb/sec. [4.45 N].
Contact Resistance Para. 4.10.8	The potential drop across normally mated contacts shall not exceed 25 mv under room ambient and high temperature service conditions when measured as specified in MIL-C-26636, Fig. 2, with maximum rated current.
Dielectric Withstanding Voltage, Altitude and Sea Level Para. 4.10.10	No evidence of dielectric breakdown or flashover when mated and unmated plugs are subjected to 645 and 180 volts RMS, respectively, at altitudes up to 110,000 feet [33,528 m] and 1000 volts RMS at sea level.
Insulation Resistance, Room and High Temp. Para. 4.10.13 and 4.10.13.1	Insulation resistance of mated plugs and receptacles shall be 5000 megohms, minimum, at room temperature and 1000 megohms, minimum, at 257°F [+125°C] when measured per MIL-STD-202, Method 302, Test Condition B.
Coupling and Uncoupling Para. 4.11.3	Plugs and receptacles shall withstand up to 500 cycles of engagement and separation (locking mechanism actuated with each cycle) without detrimental damage to plugs or receptacles or not satisfying subsequent tests of MIL-C-38300.
Fluid Immersion Para. 4.11.5	Mating and unmating forces shall not exceed 27 lbs, [120.10 N] maximum, (15 shell size) after fully wired plugs and receptacles are immersed for 20 hours, each, in hydraulic fluid (MIL-H-5606) and high temperature lubricating oil (MIL-L-9236) followed by a one-hour dry.
Sweep Vibration, Mated Para. 4.11.6	Mated connectors shall show no circuit interruptions greater than one microsecond during 12 hours vibration to include six sweeps in each axis at extreme temperatures of -85°F [-65°C] and 257°F [+125°C] per MIL-STD-202, Method 204, Test Condition D. Post inspection shall show no detrimental cracking, breaking, or loosening of parts.
Moisture Resistance Para. 4.11.8	The insulation resistance of mated connectors shall exceed 1000 megohms after subjection to moisture resistance testing per MIL-STD-202, Method 106, as amended by MIL-C-38300.
Altitude Breathing Para. 4.11.12	The insulation resistance of wired and mated connectors shall be 5000 megohms, minimum, and there shall be no flashover or breakdown at a test voltage of 1000 volts RMS after the third cycle and while immersed in 5% salt water solution at 68°F [20°C] and room ambient pressure pressure at 68°F [20°C].
Salt Spray Para. 4.11.13	Unmated plugs and receptacles shall show no excessive corrosion which would detrimentally affect the electrical and mechanical performance of the connectors after subjection to 24 hours exposure to salt spray atmosphere per MIL-STD-202, Method 101.

MARC 53 Series Connectors (Continued)

Contact Arrangements ^{1,2}



Insert Arrangement ³
Number of Contacts
Contact Size



Insert Arrangement³
Number of Contacts
Contact Size

¹ Views shown are front face view of receptacles. Front face view of plugs is mirror image of that shown.

² In addition to the above inserts shown, MARC 43 Series Connector inserts may be utilized in MARC 53 Series Connector housings. See page 63, MARC 43 Series Connector modifications.

³ Arrow (↓) indicates insert top or vertical position in relation to top or vertical position of connector housings.

⁴ Arrangement also available in RMD style.

⁵ Arrangement also available in hermetic seal receptacles.

⁶ Arrangement available in 06, 00, 01.

Part Number and Ordering Information

MARC 53 Series Connector part numbers indicate size, shape, insert layout, type of seal, style of contact and polarization.

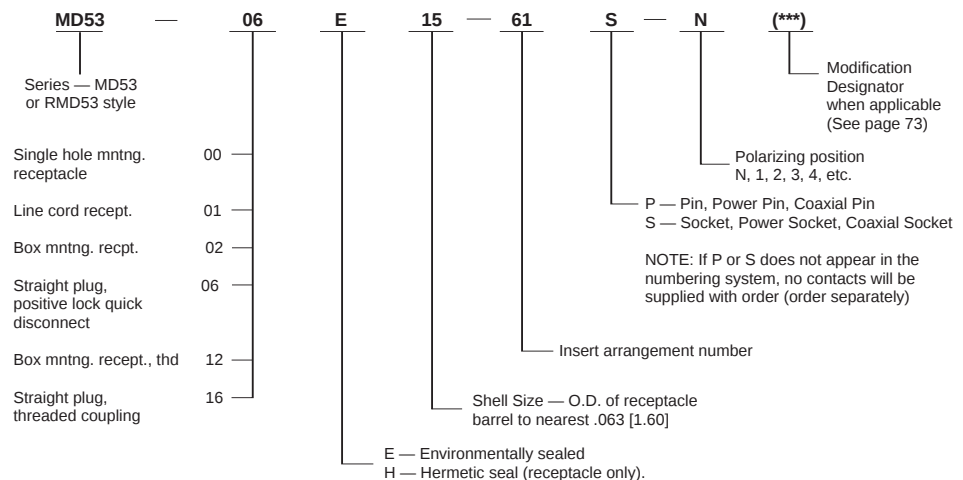
Note: Pin or socket (power or coaxial) contacts may be used in either plugs or receptacles. However, it is recommended that pins be placed in the receptacles when possible to take advantage of our “scoop-proof” design.

Alternate Keying — Standard alternate polarizing key positions are shown below. Additional polarizing keyways are available upon request.

Supplemental Accessory Hardware — We also manu-

facture supplemental accessory hardware (protective covers, shield adapters, etc.) to adapt these connectors to almost any application. For modifications to fit your requirements, contact Tyco Electronics.

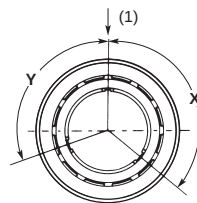
Typical Part Number



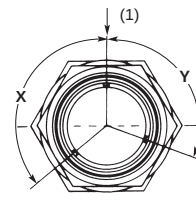
MARC 53 Series Connectors (Continued)

Polarizing Key Positions

All of our multi-pin plugs and receptacles are available in alternate polarizing positions as listed below:



Plug
(Shell sizes 9, 12, 15 only)

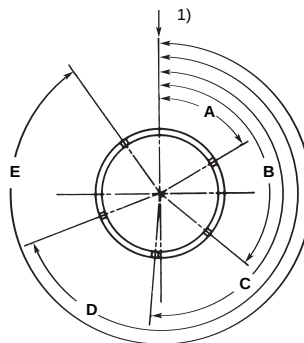


Receptacle
(Shell sizes 9, 12, 15 only)

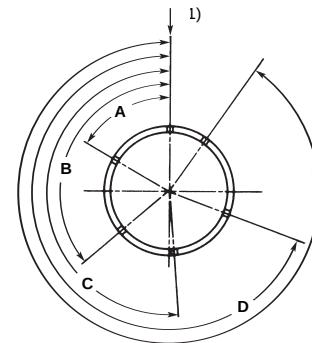
Shell Size 9			
Part No.	X°	Y°	
(R) MD53-***9-***-N	130	110	
(R) MD53-***9-***-1	130	150	
(R) MD53-***9-***-2	90	110	
(R) MD53-***9-***-3	210	110	
(R) MD53-***9-***-4	130	35	
(R) MD53-***9-***-5	90	230	

Shell Size 12			
Part No.	X°	Y°	
(R) MD53-***12-***-N	130	110	
(R) MD53-***12-***-1	130	90	
(R) MD53-***12-***-2	130	145	
(R) MD53-***12-***-3	105	110	
(R) MD53-***12-***-4	155	110	
(R) MD53-***12-***-5	80	110	
(R) MD53-***12-***-6	190	110	
(R) MD53-***12-***-7	130	170	
(R) MD53-***12-***-8	215	110	
(R) MD53-***12-***-9	80	230	
(R) MD53-***12-***-10	130	30	

Shell Size 15			
Part No.	X°	Y°	
(R) MD53-***15-***-N	130	110	
(R) MD53-***15-***-1	130	90	
(R) MD53-***15-***-2	130	150	
(R) MD53-***15-***-3	130	170	
(R) MD53-***15-***-4	190	110	
(R) MD53-***15-***-5	150	110	
(R) MD53-***15-***-6	90	110	
(R) MD53-***15-***-7	70	110	
(R) MD53-***15-***-8	70	230	
(R) MD53-***15-***-9	90	230	
(R) MD53-***15-***-10	210	110	
(R) MD53-***15-***-11	30	110	
(R) MD53-***15-***-12	250	30	
(R) MD53-***15-***-13	130	30	
(R) MD53-***15-***-14	30	230	



Plug
(Shell size 18 only)



Receptacle
(Shell size 18 only)

Shell Size 18					
Part No.	A°	B°	C°	D°	E°
(R) MD53-***18-***-N	60	130	185	250	325
(R) MD53-***18-***-1	70	130	205	270	320
(R) MD53-***18-***-2	55	130	210	250	310
(R) MD53-***18-***-3	50	130	190	235	305
(R) MD53-***18-***-4	75	125	190	250	320
(R) MD53-***18-***-5	80	150	205	250	300
(R) MD53-***18-***-6	50	90	175	250	315
(R) MD53-***18-***-7	70	120	175	250	295
(R) MD53-***18-***-8	70	130	205	260	325
(R) MD53-***18-***-9	35	90	130	215	285
(R) MD53-***18-***-10	75	140	210	250	310

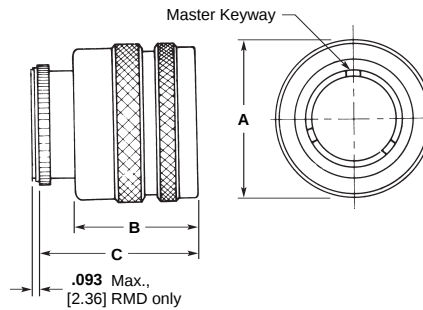
⁽¹⁾ Arrow (↑) indicates top or vertical position (master key/keyway) and coincides with top or vertical position of insert shown on page 59. This relationship remains constant with alternate polarizing key positions.
(R) Rear insertable and removable.

MARC 53 Series Connectors (Continued)

Configurations

MD53-06E/RMD53-06E

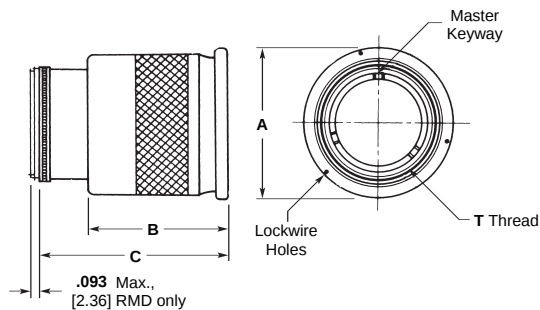
Straight Plug, positive lock
Coupling, Environmental
(Mates with Receptacles,
All Types)



Shell Size	Dimensions		
	A	B (Max.)	C (Max.)
9	.890 22.60	1.000 25.4	1.281 32.54
12	1.078 27.38	1.000 25.4	1.281 32.54
15	1.262 32.05	1.000 25.4	1.281 32.54
18	1.577 40.06	1.000 25.4	1.281 32.54

MD53-16E/RMD53-16E

Straight Plug, Threaded
Coupling, Environmental
(Mates with Receptacles,
Types 00 and 12; Not avail-
able in 18 Shell Size)



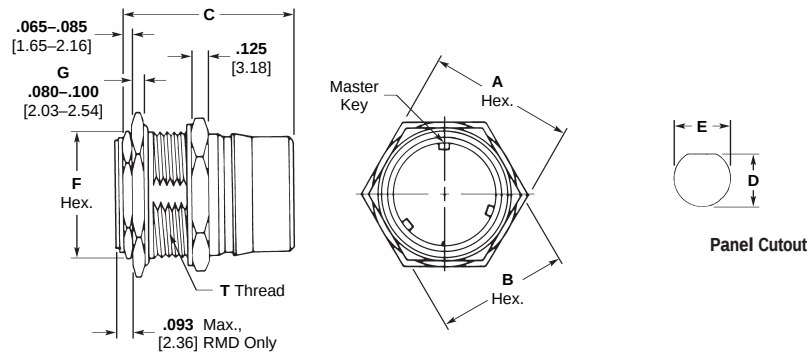
Shell Size	Dimensions			
	A	B (Max.)	C (Max.)	T (Class 2B)
9	.812 20.62	1.125 28.57	1.500 38.1	5/8-32UN
12	1.000 25.4	1.125 28.57	1.500 38.1	13/16-28UN
15	1.187 30.15	1.125 28.57	1.500 38.1	1-28UN
18	1.437 36.50	1.125 28.57	1.437 36.50	1-1/4-28UN

MARC 53 Series Connectors (Continued)

Configurations (Continued)

MD53-00E/RMD53-00E

Receptacle, Single Hole
Mounting, Environmental
(Mates with Plugs, Type 06
and 16)

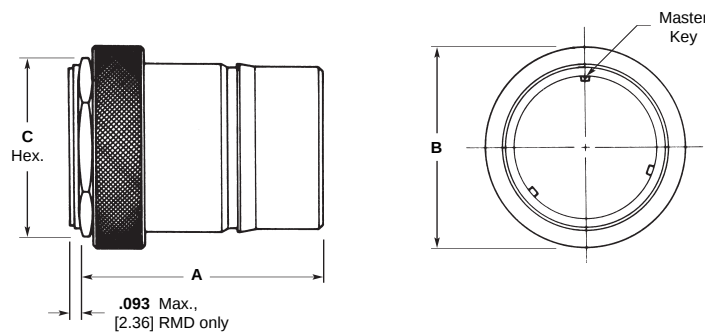


Shell Size	Dimensions							
	A	B	C	D	E	F	G	T (Class 2A)
9	.75 19.05	.687 17.45	1.360 34.54	.607-.611 15.42-15.52	.625-.629 15.87-15.97	.563 14.30	.090 2.29	5/8-32NS
12	.937 23.80	.875 22.23	1.360 34.54	.794-.798 20.17-20.27	.812-.816 20.62-20.73	.75 19.05	.090 2.29	13/16-28NS
15	1.125 28.58	1.062 26.97	1.360 34.54	.975-.979 24.76-24.86	.999-1.003 25.37-25.48	.875 22.23	.090 2.29	1-28UNS
18	1.625 41.28	1.375 34.93	1.360 34.54	1.214-1.218 30.83-30.94	1.251-1.255 31.77-31.87	1.125 28.58	.125 3.18	1-1/4-28UN

Note: .313 [7.95] Maximum Panel Thickness when mated with a positive lock 06 Plug.
.109 [2.77] Maximum Panel Thickness when mated with threaded 16 Plug.

MD53-01E/RMD53-01E

Receptacle, Line Cord,
Environmental (Mates with
Plug, Type 06)



Shell Size	Dimensions		
	A (Max.)	B (Max.)	C
9	1.360 34.54	.766 19.46	.562 14.27
12	1.360 34.54	.953 24.21	.75 19.05
15	1.360 34.54	1.141 28.98	.875 22.23
18	1.360 34.54	1.578 40.08	1.125 28.58

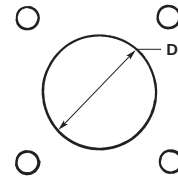
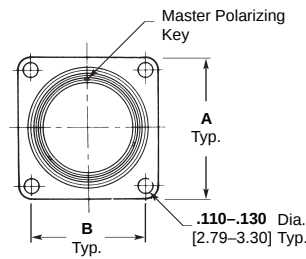
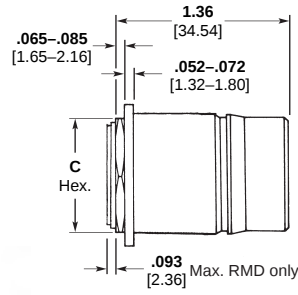
Note: Unless otherwise shown, tolerances are: decimals $\pm .015$ [$\pm .381$]; fractions $\pm \frac{1}{32}$.

MARC 53 Series Connectors (Continued)

Configurations (Continued)

MD53-02E/RMD53-02E

Receptacle, Box Mounting,
Environmental (Mates with
Plug, Type 06)



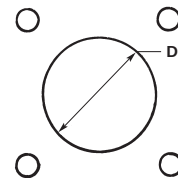
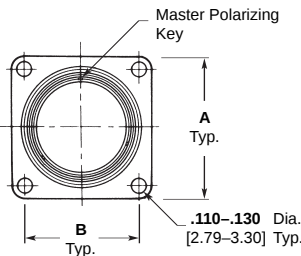
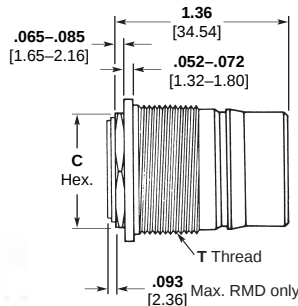
Panel Cutout

.375 [9.53] Max. Panel Thickness for
rear-mount applications.

Shell Size	Dimensions			
	A	B	C	D
9	.875 22.23	.594 15.09	.563 14.30	.595 15.11
12	1.000 25.40	.786 19.96	.75 19.05	.783 19.89
15	1.125 28.58	.906 23.01	.875 22.23	.960 24.38
18	1.344 34.14	1.062 26.97	1.125 28.58	1.212 30.78

**MD53-12E/RMD53-12E
Threaded Coupling**

Receptacle, Box Mounting,
Environmental (Mates with
Plugs, Type 06 and 16; not
available in 18 Shell Size)



Panel Cutout

.125 [3.18] Max. Panel Thickness
when mated with threaded 16 Plug
for rear mount applications.

Shell Size	Dimensions				
	A	B	C	T (Class 2A)	D
9	.875 22.23	.594 15.09	.563 14.30	5/8-32UN	.645 16.38
12	1.000 25.40	.786 19.96	.75 19.05	13/16-28UN	.832 21.13
15	1.125 28.58	.906 23.01	.875 22.23	1-28UN	1.020 25.91

Note: Unless otherwise shown, tolerances are: decimals $\pm .015$ [$\pm .381$]; fractions $\pm \frac{1}{32}$.

MARC 53 Series Connectors (Continued)

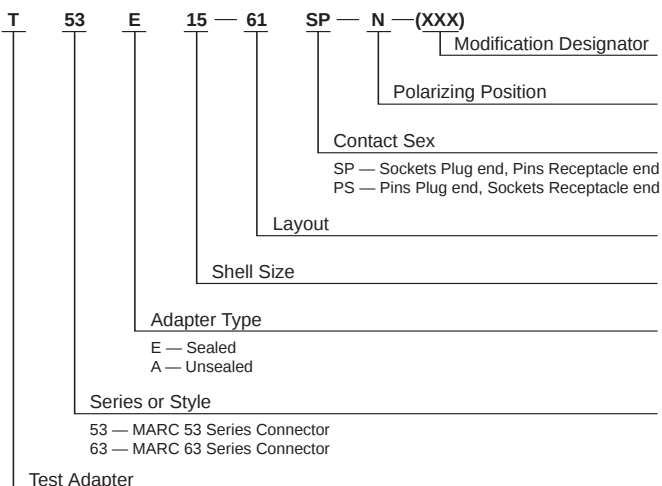
Accessories

Test Adapter

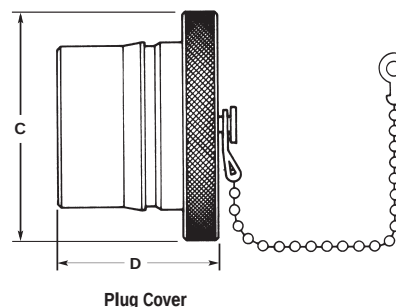
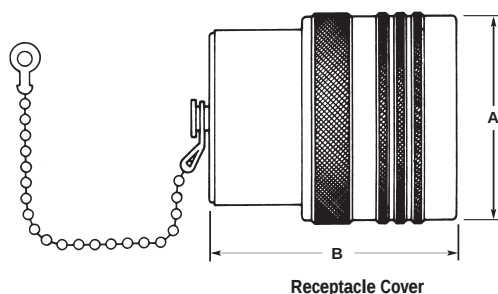
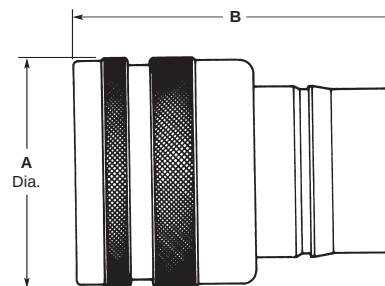
The test adapter accessory is utilized primarily as a connector simulator to preserve the end-use connector where this connector would be subjected to extensive testing, matings, or probings. The test adapter, when mated, provides the exact mating interface as that of the end-use connector and is completely field serviceable.

Test Adapter Product Part Number System

How to Specify



Shell Size	Dimension	
	A (Max.)	B (Max.)
9	.906 23.01	2.670 67.82
12	1.094 27.79	2.670 67.82
15	1.281 32.54	2.670 67.82
18	1.594 40.49	2.670 67.82



Protective Covers

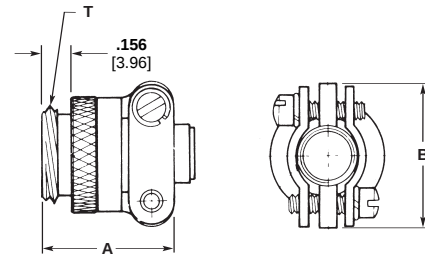
Shell Size	Receptacle Cover Part No. ¹		Plug Cover Part No. ¹		Dimensions (Max.)			
	With Chain	Without Chain	With Chain	Without Chain	A	B	C	D
9	086-0049-00AL	086-0073-00W3	086-0052-00L6	086-0076-00P2	.766 19.46	.950 24.13	.969 24.61	.913 23.19
12	086-0050-00AL	086-0074-00W3	086-0053-00L6	086-0077-00P2	.953 24.21	.950 24.13	1.156 29.36	.913 23.19
15	086-0051-00AL	086-0075-00W3	086-0054-00L6	086-0078-00P2	1.141 28.98	.950 24.13	1.344 34.14	.913 23.19
18	086-0146-00AL	086-0139-00W3	086-0147-00L6	086-0140-00P2	1.578 40.08	1.000 25.4	1.781 45.24	.913 23.19

¹ For threaded plug (PT) cover, consult Tyco Electronics. Wire rope/lanyard attachments and plastic protective caps also available, consult Tyco Electronics.

Accessories (Continued)

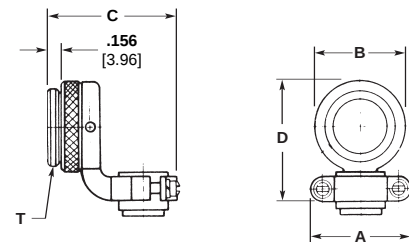
Cable Clamps

Shell Size	Clamp Part No.		A	B	T Thd. 2A
	MD	RMD			
9	086-0099-00F5	086-0175-00F3	.704 17.88	.750 19.05	1/2-20 UNF
12	086-0100-00F5	086-0176-00F3	.773 19.63	.932 23.67	11/16-24 UNEF
15	086-0101-00F5	086-0177-00F3	.829 21.06	1.078 27.38	13/16-24 UNEF
18	086-0142-00F5	086-0178-00F3	.890 22.61	1.250 31.75	1-28 UN



Straight

Shell Size	Clamp Part No.		A	B (Max.)	C (Max.)	D	T Thd. 2A
	MD	RMD					
9	086-0103-00F5	086-0179-00F3	.737 18.72	.600 15.24	1.100 27.94	.879 22.32	1/2-20 UNF
12	086-0104-00F5	086-0180-00F3	.913 23.19	.775 19.68	1.250 31.75	1.067 27.10	11/16-24 UNEF
15	086-0105-00F5	086-0181-00F3	1.048 26.62	.962 24.43	1.469 37.31	1.233 31.32	13/16-20 UNEF
18	086-0143-00F5	086-0182-00F3	1.225 31.12	1.185 30.01	1.550 39.37	1.550 39.37	1-28 UN



Right-Angle

Contacts (see pages 78 and 79)

Contact Size	Pin Part No.		Socket Part No.	
	MD	RMD	MD	RMD
22 AWG	083-0009-00R4	083-1200-00R4	082-0464-00Y9	082-0462-00Y9
16 AWG	083-0158-00R4	—	082-0113-00T1	—

Note: Standard packaging includes same quantity of contacts as contact cavities in insert.

Contact Cavity Sealing Plugs (see page 80)

Contact Size	Standard Length Part No.		Short Length Part No.	
	MD	RMD	MD	RMD
22 AWG	086-0055-0000	086-0148-0000	082-0009-0000	086-0009-0000
16 AWG	086-0056-0000	—	082-0010-0000	—

Note: Standard length plug occupies contact cavity and wire sealing grommet. Short length plug occupies wire sealing grommet only (to be used behind non-wired contacts and in plugs which mate to hermetic receptacles).

Modifications

We offer a unique modification identification system which provides alteration of standard MARC 53 Series Connectors to include special finishes, accessories, MARC 43 Series Connector contact arrangements, and custom quality assurance provisions — processing, testing, serialization, traceability. Consult Tyco Electronics for additional modification information.

Standard modifications include:

- (503): MARC 53 Series Connector including cable clamp, straight type
- (504): MARC 53 Series Connector including cable clamp, right-angle type
- (506): MARC 53 Series Connector, gold finish

- (507): MARC 53 Series Connector, electroless nickel finish
- (508): MARC 53 Series Connector, black anodized coupling ring, gold over electroless nickel housings, retaining nuts and hardware.