

Section II.2



Calibration Components

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INTRODUCTION: Testing the interfaces of connectors and adapters upon incoming inspection is not only highly recommended, it is definitely a necessity. Interfaces not meeting specification will not only lead to degraded specification of the components, furthermore, these out of specification interfaces may damage the connectors of mating components or ruin the connectors of test equipment.

CHECKING THE INTERFACE: Spectrum Elektrotechnik GmbH manufactures a comprehensive line of connector gauges for measuring the critical interface dimensions of coaxial connectors. These connector gauges consist of an especially adapted dial indicator with appropriate bushings and pins that are designed to mate with the specific connector under test. The indicator of each gauge is zero set by a specific master gauge. When engaged to a connector, it measures the specific interface dimension from a specific reference plane. For every dimension of interest, a special gauge will be offered. This gives the most accurate results, allows easy calibration, fast testing and helps to avoid mistakes.

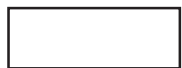
RESOLUTION: A number of gauges are available. The models are shown to the right. The main difference between these four types of gauges is the different resolution as well as the units of measurement: inches or metric. Only the digital gauges can be switched from metric to inch and vice versa.

“HAND-HELD” VERSUS “THREAD-ON”: Most Gauges shown are available as “Hand-Held” or “Thread-On”. The faster testing is possible by using the “Hand-Held” gauges, the more accurate readings will be achieved from the “Thread-On” gauges, as threading on the gauges will perfectly align them with the connector. Hand-Held means aligning gauge and connector freely, which may allow for mistakes.

INTERFACE DIMENSIONS: Complete interface dimensions are shown in section VII.4. of this Handbook. The important measurements are marked clearly for every connector series:



Dimensions, highlighted in an oval shape, are recommended for verification as a minimum. The connector gauges measuring these dimensions are included in the Expanded Calibration Kit and the Professional Kit as well.



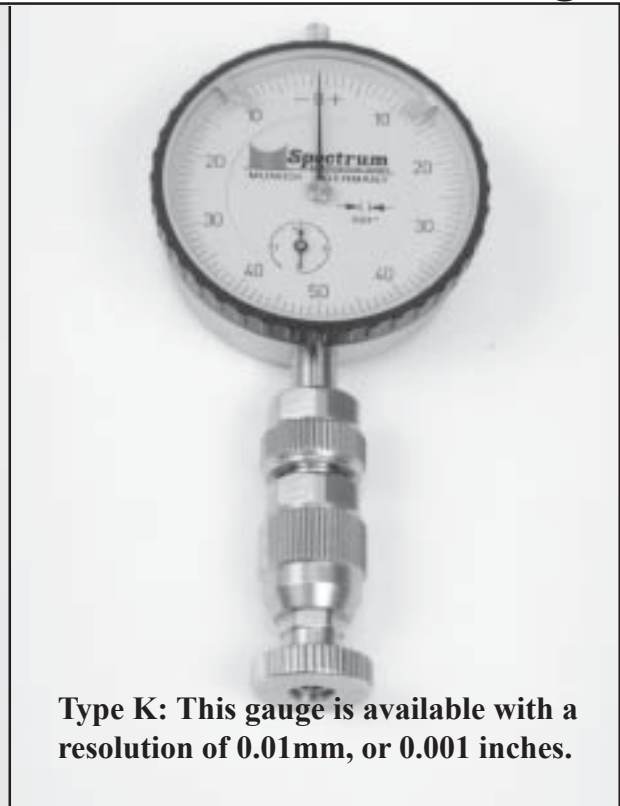
Dimensions, highlighted in a rectangular block are recommended for verification in addition to the dimensions highlighted in an oval shape. Checking all these dimensions will guarantee optimum performance of the connectors. The necessary connector gauges to measure all those dimensions are included in the Professional Calibration Kit only.

USING CONNECTOR GAUGES: Select the correct gauge for the connector under test. Inspect the gauge and the appropriate calibration block (master) and make sure that both are in good condition and clean. (Dirt on the gauge or the master will lead to inaccurate measurements and can transfer dirt to the connectors and damage them during gauging). Attach the calibration block carefully to the gauge. Zero the gauge by moving the dial until the gauge pointer reads zero. To verify that the setting is correct and repeatable, remove the calibration block and then attach it a second time.

When testing the connectors, make sure that they are not damaged and clean. When using the “Thread-On” gauges, tighten the connection with the appropriate Torque Wrench only.



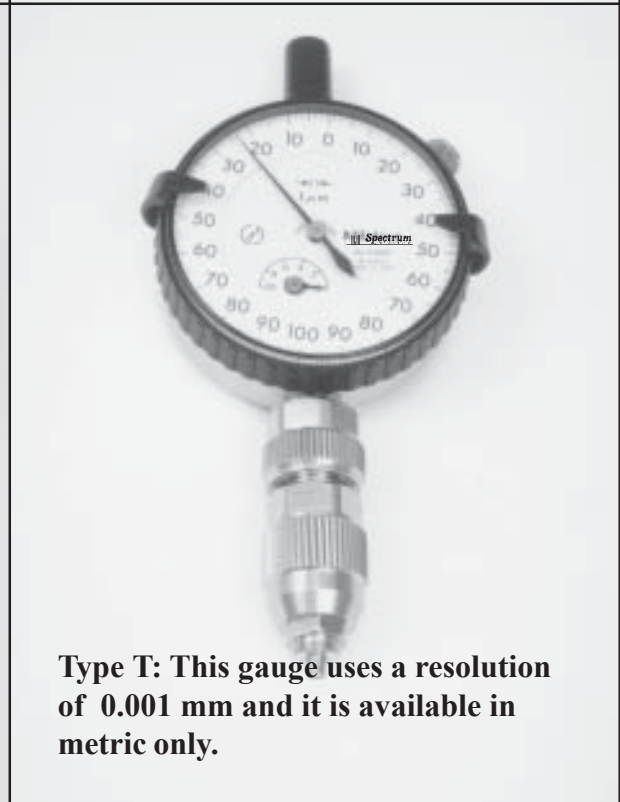
Type H: This gauge is available with a resolution of 0.005mm, or 0.0001 inches.



Type K: This gauge is available with a resolution of 0.01mm, or 0.001 inches.

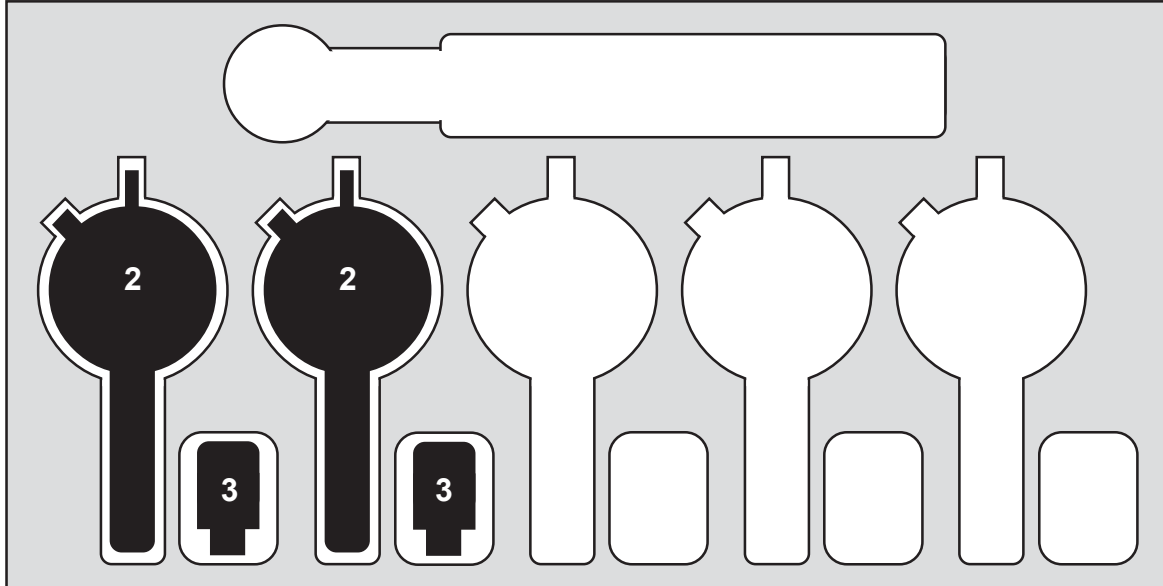


Type D: This gauge employs a digital readout and can be switched from a resolution of 0.01mm to 0.0005 inches.



Type T: This gauge uses a resolution of 0.001 mm and it is available in metric only.

Standard Gauge Kit



The actual layout and/or filling of the Instrument Case may differ from the schematic above. It depends on the size of the connector series, the number of gauges that are advisable for that connector series, and whether it is a Standard, or a Professional Kit. The layout of the Instrument Case itself for the Standard and the Professional Kits are identical. This is very advantageous, as someone can start with the Standard Kit, and fill the empty spots at a later stage to expand to the Professional Kit. Each instrument Case contains a space where the appropriate Torque Wrench can be fitted.

Description of Equipment Provided

Standard Gauge Kit

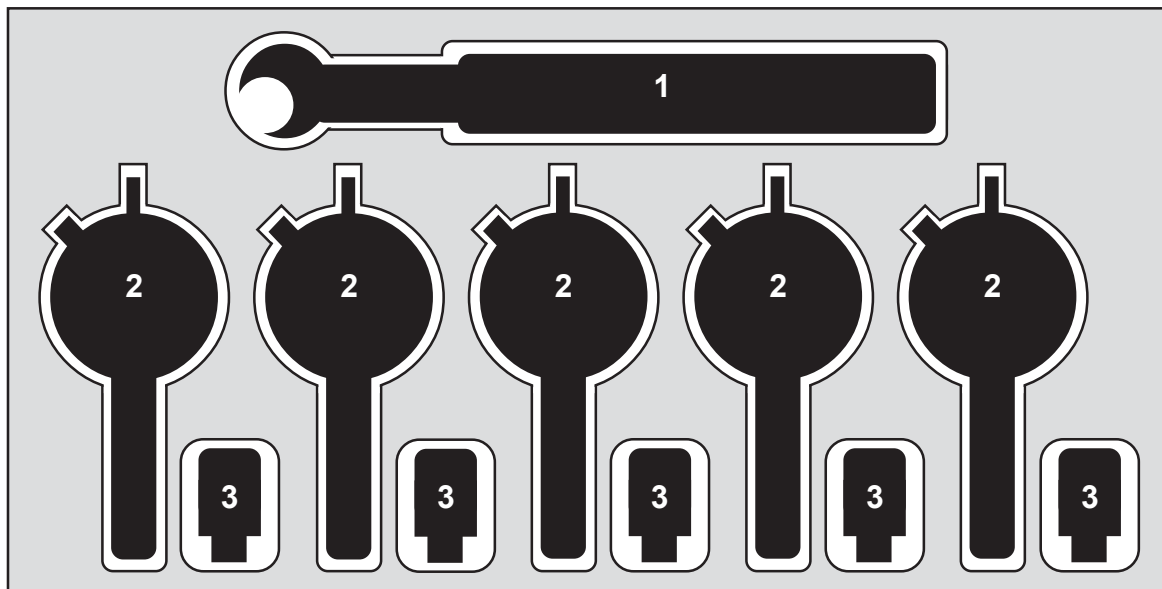
2:
3:

Set of Connector Interface Gauges

Set of Gauge Calibration Blocks

Instrument case
Operating instructions

Professional Gauge Kit



The actual layout and/or filling of the Instrument Case may differ from the schematic above. It depends on the size of the connector series, the number of gauges that are advisable for that connector series, and whether it is a Standard, or a Professional Kit. The layout of the Instrument Case itself for the Standard and the Professional Kits are identical. This is very advantageous, as someone can start with the Standard Kit, and fill the empty spots at a later stage to expand to the Professional Kit. Each Professional Kit contains already the appropriate Torque Wrench.

Description of Equipment Provided

Professional Gauge Kit

1: Torque Wrench

2: Set of Connector Interface Gauges

3: Set of Gauge Calibration Blocks

Instrument case

Operating instructions

INFORMATION ON HOW TO ORDER CONNECTOR GAUGES: Spectrum Elektrotechnik GmbH has set up an easy to use part number system. The customer can compose his part number, describing completely the Connector Interface Gauge Kit, he is ordering. The table below explains the system and describes the possible alternatives.

THE MEASUREMENT: The Letter **B** identifies the units of the dial readings, which either can be in millimeters or inches.

THE CONNECTOR SERIES: The four letters **CDEF** are used to recognize the connector series, the Kit is needed for. Please replace these four letters by the code used for identifying the connector series, as listed below.

THE KIT: The letter **H** is to be replaced by the letter **S** when a Standard Kit is ordered, and by the letter **P**, when the Professional Kit is specified.

THE TYPE OF GAUGES: The Gauges are usually available as "Hand Held" or "Thread On". The faster testing is possible by using the "Hand Held" gauges, the more accurate readings will be achieved from the "Thread On" gauges, as threading on the gauges will perfectly align them with the connector. Hand Held means aligning gauge and connector freely, which may allow for mistakes. The letters **JK** are to be replaced by **HH**, when Hand Held Gauges are specified, and with **MG**, when Thread On Gauges are needed.

THE RESOLUTION: The letter **L** has to be replaced by the code that is used to identify the resolution. Resolutions of 0.01mm to 0.001mm, and 0.001 inches to 0.0001 inches are available. For the appropriate letter coding please refer to the table below.

G	B	-	C	D	E	F	-	H	J	K	L																	
<p>B: to be replaced with the letter I or M according to the units of measurement of the gauge required.</p> <p>I = Inch M = Metric</p>			<p>CDEF: to be replaced with one of the following digit number/letter Code, describing Connectors as listed below.</p> <p>2400 = 2.4mm SBY0 = SBY 3500 = 3.5mm SC00 = SC 7000 = 7mm SMA0 = SMA 7160 = 7/16 SSMA = SSMA BMA0 = BMA SMP0 = SMP BNC0 = BNC SMPT = SMP Test Connector C000 = C SPM0 = SPM HN00 = HN TNC3 = TNC per MIL-C-39012 2920 = K* TNC8 = TNC per MIL-C-87104/2 N000 = N N750 = N 75Ω SBX0 = SBX TNX0 = TNX</p>				<p>H: to be replaced with one of the following letters for the option required.</p> <p>S = Standard Kit P = Professional Kit</p>			<p>JK: to be replaced with the letters HH or MG according to the type of gauge required.</p> <p>HH = Hand Held MG = "Thread-On"</p>		<p>L = Resolution</p> <table border="1"> <thead> <tr> <th></th> <th>mm</th> <th>inches</th> </tr> </thead> <tbody> <tr> <td>H =</td> <td>0.005</td> <td>0.0001</td> </tr> <tr> <td>K =</td> <td>0.01</td> <td>0.001</td> </tr> <tr> <td>T =</td> <td>0.001</td> <td>-</td> </tr> <tr> <td>D =</td> <td colspan="2">Digital Gauge 0.01mm/ 0.0005"</td> </tr> </tbody> </table>			mm	inches	H =	0.005	0.0001	K =	0.01	0.001	T =	0.001	-	D =	Digital Gauge 0.01mm/ 0.0005"	
	mm	inches																										
H =	0.005	0.0001																										
K =	0.01	0.001																										
T =	0.001	-																										
D =	Digital Gauge 0.01mm/ 0.0005"																											

Connector Type	Dial Resol. (inches)	Dial Resol. (mm)	Instrument Case Model No.	Type of Gauge	No. of Gauges	Measuring			For Interface Mating Dimensions please refer to page:	
						Fem. & Male Contact Interface Locations	Additional Dim. on Female Connector	Additional Dim. on Male Connector		
2.4mm	yes		GI-2400-SHHK	Hand-held	2	yes			209	
			GI-2400-PHHK		4		.1201" (3.05mm)	.536" (1.36mm)		
		yes		GM-2400-SHHK	Hand-held	2	yes			209
				GM-2400-PHHK		4		.1201" (3.05mm)	.536" (1.36mm)	
	yes			GI-2400-SMGK	"Thread-On"	2	yes			209
				GI-2400-PMGK		4		.1201" (3.05mm)	.536" (1.36mm)	
		yes		GM-2400-SMGK	"Thread-On"	2	yes			209
				GM-2400-PMGK		4		.1201" (3.05mm)	.536" (1.36mm)	
3.5mm	yes		GI-3500-SHHK	Hand-held	2	yes			210	
			GI-3500-PHHK		4		.076" (1.93mm)	Center Pin .1" (2.54mm)		
		yes		GM-3500-SHHK	Hand-held	2	yes			210
				GM-3500-PHHK		4		.076" (1.93mm)	Center Pin .1" (2.54mm)	
	yes			GI-3500-SMGK	"Thread-On"	2	yes			210
				GI-3500-PMGK		4		.076" (1.93mm)	Center Pin .1" (2.54mm)	
		yes		GM-3500-SMGK	"Thread-On"	2	yes			210
				GM-3500-PMGK		4		.076" (1.93mm)	Center Pin .1" (2.54mm)	
7mm	yes		GI-7000-SHHK	Hand-held	1	Planar contact location			211	
		yes	GM-7000-SHHK	Hand-held	1	Planar contact location			211	
	yes		GI-7000-SMGK	"Thread-On"	1	Planar contact location			211	
		yes	GM-7000-SMGK	"Thread-On"	1	Planar contact location			211	
As per IEC 457-2										

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Connector Interface Gauges



Connector Type	Dial Resol. (inches)	Dial Resol. (mm)	Instrument Case Model No.	Type of Gauge	No. of Gauges	Measuring			For Interface Mating Dimensions please refer to page:	
						Fem. & Male Contact Interface Locations	Additional Dim. on Female Connector	Additional Dim. on Male Connector		
7/16 As per DIN 47223	yes		GI-7160-SHHK	Hand-held	2	yes			212	
			GI-7160-PHHK		5		.255" (6.47mm)	.247" (6.27mm) .315" (8.0mm)		
		yes		GM-7160-SHHK	Hand-held	2	yes			212
				GM-7160-PHHK		5		.255" (6.47mm)	.247" (6.27mm) .315" (8.0mm)	
	yes			GI-7160-SMGK	"Thread-On"	2	yes			212
				GI-7160-PMGK		5		.255" (6.47mm)	.247" (6.27mm) .315" (8.0mm)	
		yes		GM-7160-SMGK	"Thread-On"	2	yes			212
				GM-7160-PMGK		5		.255" (6.47mm)	.247" (6.27mm) .315" (8.0mm)	
BMA	yes		GI-BMA0-SHHK	Hand-held	2	yes			213	
		yes	GM-BMA0-SHHK	Hand-held	2	yes			213	
BNC As per MIL-C-39012 (IEC 169-2)	yes		GI-BNC0-SHHK	Hand-held	2	yes			214	
			GI-BNC0-PHHK		5		.198" (5.03mm) .006" (.15mm)	.22" (5.59mm)		
		yes		GM-BNC0-SHHK	Hand-held	2	yes			214
				GM-BNC0-PHHK		5		.198" (5.03mm) .006" (.15mm)	.22" (5.59mm)	
C As per MIL-C-39012 (IEC 169-7)	yes		GI-C000-SHHK	Hand-held	2	yes			215	
			GI-C000-PHHK		5		.007" (.18mm) .309" (7.85mm)	.309" (7.85mm)		
		yes		GM-C000-SHHK	Hand-held	2	yes			215
				GM-C000-PHHK		5		.007" (.18mm) .309" (7.85mm)	.309" (7.85mm)	

Connector Type	Dial Resol. (inches)	Dial Resol. (mm)	Instrument Case Model No.	Type of Gauge	No. of Gauges	Measuring			For Interface Mating Dimensions please refer to page:	
						Fem. & Male Contact Interface Locations	Additional Dim. on Female Connector	Additional Dim. on Male Connector		
HN	yes		GI-HN00-SHHK	Hand-held	2	yes			216	
			GI-HN00-PHHK		3					
		yes		GM-HN00-SHHK	Hand-held	2	yes			216
				GM-HN00-PHHK		3				
	yes			GI-HN00-SMGK	"Thread-On"	2	yes			216
				GI-HN00-PMGK		3				
		yes		GM-HN00-SMGK	"Thread-On"	2	yes			216
				GM-HN00-PMGK		3				
As per MIL-C-3643										
K* (2.9mm)	yes		GI-2920-SHHK	Hand-held	2	yes			217	
			GI-2920-PHHK		4					
		yes		GM-2920-SHHK	Hand-held	2	yes			217
				GM-2920-PHHK		4				
	yes			GI-2920-SMGK	"Thread-On"	2	yes			217
				GI-2920-PMGK		4				
		yes		GM-2920-SMGK	"Thread-On"	2	yes			217
				GM-2920-PMGK		4				

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Connector Interface Gauges



Connector Type	Dial Resol. (inches)	Dial Resol. (mm)	Instrument Case Model No.	Type of Gauge	No. of Gauges	Measuring			For Interface Mating Dimensions please refer to page:		
						Fem. & Male Contact Interface Locations	Additional Dim. on Female Connector	Additional Dim. on Male Connector			
N	yes		GI-N000-SHHK	Hand-held	2	yes			218		
			GI-N000-PHHK		4		.359" (9.12mm)	.003" (.08mm)			
		yes		GM-N000-SHHK	Hand-held	2	yes			218	
				GM-N000-PHHK		4		.359" (9.12mm)	.003" (.08mm)		
	yes			GI-N000-SMGK	"Thread-On"	2	yes			218	
				GI-N000-PMGK		4		.359" (9.12mm)	.003" (.08mm)		
	As per MIL-C-39012	yes		GM-N000-SMGK	"Thread-On"	2	yes			218	
				GM-N000-PMGK		4		.359" (9.12mm)	.003" (.08mm)		
	N 75 Ohms	yes		GI-N750-SHHK	Hand-held	2	yes			219	
				GI-N750-PHHK		4		.359" (9.12mm)	.059" (1.50mm)		
			yes		GM-N750-SHHK	Hand-held	2	yes			219
					GM-N750-PHHK		4		.359" (9.12mm)	.059" (1.50mm)	
yes				GI-N750-SMGK	"Thread-On"	2	yes			219	
				GI-N750-PMGK		4		.359" (9.12mm)	.059" (1.50mm)		
		yes		GM-N750-SMGK	"Thread-On"	2	yes			219	
				GM-N750-PMGK		4		.359" (9.12mm)	.059" (1.50mm)		
SBX	yes		GI-SBX0-SHHK	Hand-held	2	yes			220		
			GI-SBX0-PHHK		4		.248" (6.3mm)	.244" (6.2mm)			
		yes		GM-SBX0-SHHK	Hand-held	2	yes			220	
				GM-SBX0-PHHK		4		.248" (6.3mm)	.244" (6.2mm)		

Connector Type	Dial Resol. (inches)	Dial Resol. (mm)	Instrument Case Model No.	Type of Gauge	No. of Gauges	Measuring			For Interface Mating Dimensions please refer to page:	
						Fem. & Male Contact Interface Locations	Additional Dim. on Female Connector	Additional Dim. on Male Connector		
SBY	yes		GI-SBY0-SHHK	Hand-held	2	yes	.089" (2.25mm) .085" (2.15mm)		221	
			GI-SBY0-PHHK		4					
		yes		GM-SBY0-SHHK	Hand-held	2	yes	.089" (2.25mm) .085" (2.15mm)		221
				GM-SBY0-PHHK		4				
SC	yes		GI-SC00-SHHK	Hand-held	2	yes	.007" (.18mm) .309" (7.85mm) .309" (7.85mm) .040" (1.015mm)		222	
			GI-SC00-PHHK		6					
		yes		GM-SC00-SHHK	Hand-held	2	yes	.007" (.18mm) .309" (7.85mm) .309" (7.85mm) .040" (1.015mm)		222
				GM-SC00-PHHK		6				
	yes			GI-SC00-SMGK	"Thread-On"	2	yes	.007" (.18mm) .309" (7.85mm) .309" (7.85mm) .040" (1.015mm)		222
				GI-SC00-PMGK		6				
	As per MIL-C-39012		yes	GM-SC00-SMGK	"Thread-On"	2	yes	.007" (.18mm) .309" (7.85mm) .309" (7.85mm) .040" (1.015mm)		222
				GM-SC00-PMGK		6				
SMA	yes		GI-SMA0-SHHK	Hand-held	4	yes	Dielectric Location .076" (1.93mm) .10" (2.54mm)		223	
			GI-SMA0-PHHK		6					
		yes		GM-SMA0-SHHK	Hand-held	4	yes	Dielectric Location .076" (1.93mm) .10" (2.54mm)		223
				GM-SMA0-PHHK		6				
	yes			GI-SMA0-SMGK	"Thread-On"	4	yes	Dielectric Location .076" (1.93mm) .10" (2.54mm)		223
				GI-SMA0-PMGK		6				
	As per MIL-C-39012		yes	GM-SMA0-SMGK	"Thread-On"	4	yes	Dielectric Location .076" (1.93mm) .10" (2.54mm)		223
				GM-SMA0-PMGK		6				

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Connector Interface Gauges



Connector Type	Dial Resol. (inches)	Dial Resol. (mm)	Instrument Case Model No.	Type of Gauge	No. of Gauges	Measuring			For Interface Mating Dimensions please refer to page:	
						Fem. & Male Contact Interface Locations	Additional Dim. on Female Connector	Additional Dim. on Male Connector		
SSMA	yes		GI-SSMA-SHHK	Hand-held	4	yes	Dielectric Location		224	
		yes	GM-SSMA-SHHK	Hand-held	4	yes	Dielectric Location		224	
	yes		GI-SSMA-SMGK	"Thread-On"	4	yes	Dielectric Location		224	
		yes	GM-SSMA-SMGK	"Thread-On"	4	yes	Dielectric Location		224	
SMP As per DESC94007 and DESC94008	yes		GI-SMP0-SHHK	Hand-held	3	yes	Dielectric Location		225	
		yes	GM-SMP0-SHHK	Hand-held	3	yes	Dielectric Location		225	
SMP Test Connector	yes		GI-SMPT-SHHK	Hand-held	4	yes	Dielectric Location		226	
		yes	GM-SMPT-SHHK	Hand-held	4	yes	Dielectric Location		226	
	yes		GI-SMPT-SMGK	"Thread-On"	4	yes	Dielectric Location		226	
		yes	GM-SMPT-SMGK	"Thread-On"	4	yes	Dielectric Location		226	
SPM	yes		GI-SPM0-SHHK	Hand-held	4	yes	Dielectric Location		227	
			GI-SPM0-PHHK		6		.072" (1.83mm)	.01" (0.25mm)		
		yes		GM-SPM0-SHHK	Hand-held	4	yes	Dielectric Location		227
				GM-SPM0-PHHK		6		.072" (1.83mm)	.01" (0.25mm)	
	yes			GI-SPM0-SMGK	"Thread-On"	4	yes	Dielectric Location		227
				GI-SPM0-PMGK		6		.072" (1.83mm)	.01" (0.25mm)	
		yes		GM-SPM0-SMGK	"Thread-On"	4	yes	Dielectric Location		227
				GM-SPM0-PMGK		6		.072" (1.83mm)	.01" (0.25mm)	

Connector Type	Dial Resol. (inches)	Dial Resol. (mm)	Instrument Case Model No.	Type of Gauge	No. of Gauges	Measuring			For Interface Mating Dimensions please refer to page:	
						Fem. & Male Contact Interface Locations	Additional Dim. on Female Connector	Additional Dim. on Male Connector		
TNC	yes		GI-TNC3-SHHK	Hand-held	2	yes			228	
			GI-TNC3-PHHK		6		.006" (.15mm) .198 (5.03mm)	.2155" (5.474mm) .006" (.15mm)		
		yes		GM-TNC3-SHHK	Hand-held	2	yes			228
				GM-TNC3-PHHK		6		.006" (.15mm) .198 (5.03mm)	.2155" (5.474mm) .006" (.15mm)	
		yes		GI-TNC3-SMGK	"Thread-On"	2	yes			228
				GI-TNC3-PMGK		6		.006" (.15mm) .198 (5.03mm)	.2155" (5.474mm) .006" (.15mm)	
	As per MIL-C-39012		yes	GM-TNC3-SMGK	"Thread-On"	2	yes			228
				GM-TNC3-PMGK		6		.006" (.15mm) .198 (5.03mm)	.2155" (5.474mm) .006" (.15mm)	
TNC	yes		GI-TNC8-SHHK	Hand-held	2	yes			229	
			GI-TNC8-PHHK		6		.0045" (.115mm) .2065 (5.245mm)	.0075" (.19mm) .2105" (5.347mm)		
		yes		GM-TNC8-SHHK	Hand-held	2	yes			229
				GM-TNC8-PHHK		6		.0045" (.115mm) .2065 (5.245mm)	.0075" (.19mm) .2105" (5.347mm)	
		yes		GI-TNC8-SMGK	"Thread-On"	2	yes			229
				GI-TNC8-PMGK		6		.0045" (.115mm) .2065 (5.245mm)	.0075" (.19mm) .2105" (5.347mm)	
	As per MIL-C-87104/2		yes	GM-TNC8-SMGK	"Thread-On"	2	yes			229
				GM-TNC8-PMGK		6		.0045" (.115mm) .2065 (5.245mm)	.0075" (.19mm) .2105" (5.347mm)	

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Connector Interface Gauges

Connector Type	Dial Resol. (inches)	Dial Resol. (mm)	Instrument Case Model No.	Type of Gauge	No. of Gauges	Measuring			For Interface Mating Dimensions please refer to page:	
						Fem. & Male Contact Interface Locations	Additional Dim. on Female Connector	Additional Dim. on Male Connector		
TNX	yes		GI-TNX0-SHHK	Hand-held	2	yes			230	
			GI-TNX0-PHHK		5					.23" (5.84mm)
		yes		GM-TNX0-SHHK	Hand-held	2	yes			230
				GM-TNX0-PHHK		5				
	yes			GI-TNX0-SMGK	"Thread-On"	2	yes			230
				GI-TNX0-PMGK		5				
		yes		GM-TNX0-SMGK	"Thread-On"	2	yes			230
				GM-TNX0-PMGK		5				