

TOOLS

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INTRODUCTION: To manufacture superior products, well educated and trained personnel, state-of-the-art machines and proper and well engineered tooling are necessities. This ensures quality products and competitive pricing. Therefore most of the products are built in companies, specializing in the different product categories.

Cable assemblies are necessary for signal routing between components within a system. Not all of these cable assemblies can be manufactured and then installed in the systems. In some applications the connector is too big in diameter to fit through the slots, the cable has to be pulled through. In those cases the cable has to be terminated with the connector after the cable is put in place. Other examples are laboratories where certain cable assemblies are to be replaced or repaired immediately, etc. For those applications Spectrum Elektrotechnik GmbH is offering a number of tools. But it cannot be expected that these manually used tools are as good as the machines used for the manufacturing of superior cable assemblies at the Cable Assembly Division of Spectrum Elektrotechnik GmbH.

Besides the adequate manufacturing tools, also a number of important test tools are needed, to ensure proper manufacturing and repeatable testing.

CABLE TRIMMING TOOLS: They are used to cut interfaces at semi rigid cables. Others are engineered to cut interfaces at the flexible cable assemblies.

CRIMPING TOOLS: Instead of soldering, center contacts and outer conductors can be crimped. The pliers for crimping the center contacts and the pliers used for the outer conductors are different, as much higher pressure is needed for the outer conductors. A variety of inserts can be supplied, as needed for the different cables.

CONNECTOR INTERFACE GAUGES: Connector gauges are needed 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 is offered. This gives the most accurate results, allows easy calibration, fast and comfortable testing and it helps to avoid mistakes.

TORQUE WRENCHES: For proper test results and long life of the connectors the rules need to be obeyed. For each individual connector series a torque has been specified, a torque that ensures proper mating conditions, repeatable electrical performance and guarantees mechanically a long life of the connectors. Using a Torque Wrench guarantees that the connection is not too loose, it also ensures that the connection is not too tight, preventing possible connector damage and impaired electrical performance. Using the Torque Wrench also assures that all connections are equally tight, each time.

THREAD LIMIT GAUGES: It is almost a necessity to check the thread of connectors and adapters. Out of limits thread can create serious problems and may damage the connectors of mating components or ruin the connectors at test equipment. Spectrum Elektrotechnik GmbH offers a comprehensive line of thread limit gauges to check the thread on a "GO" / "NO GO" basis.



Torque Wrenches

INTRODUCTION: Connectors have to be mated and need to be tightened. Some people do it by hand, some use a regular wrench, some use a Torque Wrench.

TIGHTENING BY HAND: People who are using nothing but their fingers for tightening, usually undertorque. The electrical performance will vary from tightening to tightening, depending how tired the fingers are. In addition: If the same component is tested several times and by different people using only their fingers for tightening, the electrical performance will even vary more, as different torque will be applied, equivalent to the strength of the individual. But strength does not only depend on the physical ability of the individual, but also one's perception of what constitutes proper torque. Tightening connectors by hand will result from very loose fits to almost correct fits, but usually always incorrect fits. Tightening connectors by hand is obviously inadequate and not recommendable.

USING A REGULAR WRENCH: The ones who are using a regular wrench, usually overtorque. Short wrenches may lead to torsional forces that are only a little high, the use of longer wrenches however usually results into applying very high torsion. Overtorquing of up to three times has been seen. This will deform the interface of the connectors, proper test results from then on cannot be obtained anymore.

USING THE TORQUE WRENCH: For proper test results and long life of the connectors the rules need to be obeyed. For each individual connector series a torque has been specified, a torque that ensures proper mating conditions, repeatable electrical performance and guarantees mechanically a long life of the connectors. Using the Torque Wrench guarantees that the connection is not too loose, it also ensures that the connection is not too tight, preventing possible connector damage and impaired electrical performance. Using the Torque Wrench also assures that all connections are equally tight, each time.

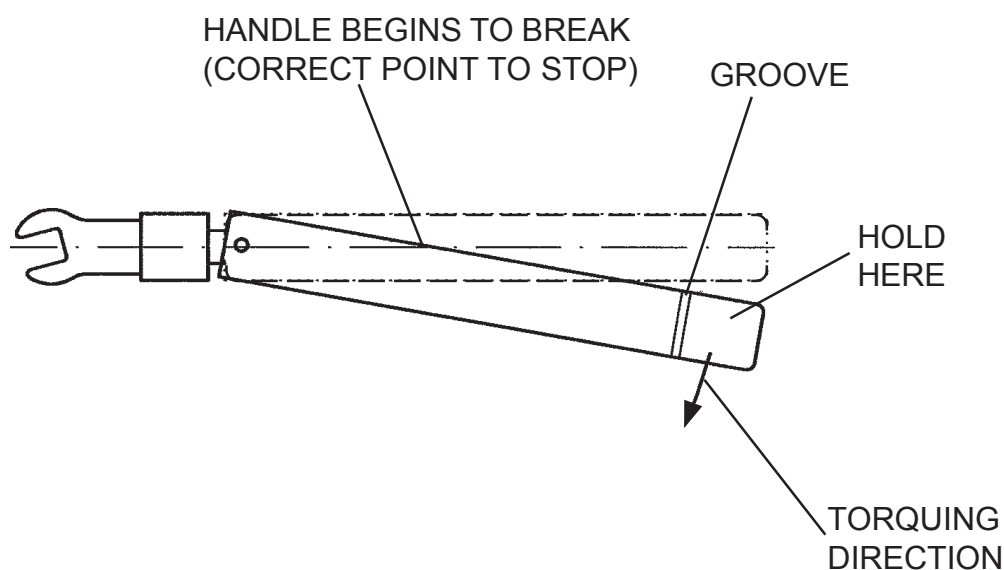
OPERATING THE TORQUE WRENCH: Hold the Torque Wrench always at the same point near the end of the handle. Apply force perpendicular to the Wrench, in a plane parallel to the outer conductor mating planes of the connectors. Rotate the connector nut only when tightening the connector. Use an open-end wrench to keep the body of the mating connector from turning, if it is not a fixed test port connector. Position the wrenches within 90° of each other before applying force.

Avoid pivoting the Wrench on your thumb or other fingers, and do not twist the Wrench relative to the outer conductors mating plane of the connectors. This would result into applying an additional and unknown amount of torque to the connection.

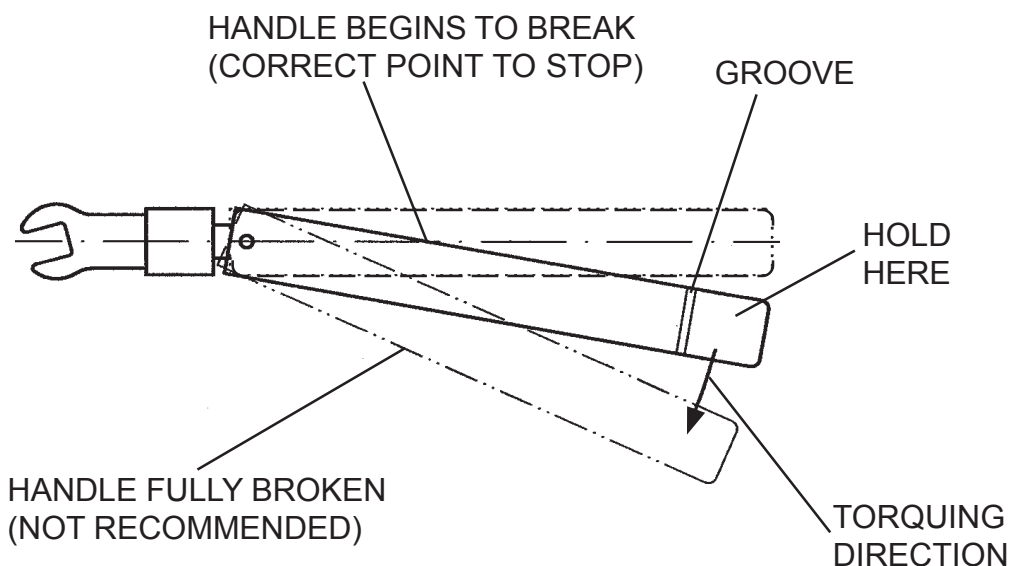
DIFFERENT TORQUE WRENCHES: Spectrum Elektrotechnik GmbH manufactures two different types of Torque Wrenches for most of the connector series:

The Wrench with only the Break Point: The Wrench is employing a "Break Point", when the specific torque has been reached. But having heard and felt the Break, a further torquing would be possible. This Wrench has been designed for people that are sensitive and very conscientious (Torque Wrenches are Series: WE-D.....).

The Torque Wrench that breaks completely: For the smaller connector series that can suffer most from overtorquing, this Wrench has been designed that "Fully Breaks". After the Break Point has been reached, it almost moves freely in an angle of 90° (Series WE-B.....).



**Torque Wrenches, Model Nos. WE-D.....
employing only the “Break Point”.**



**Torque Wrenches, Model Nos. WE-B.....
These Wrenches break completely.**

Torque Wrenches



Connector Type	Remarks	Torque Wrench "Break Point" Model No.	Torque Wrench "Fully Breaks" Model No.	Wrench Size (inches)	Wrench Size (mm)	Preset Torque (in./lbs.)	Preset Torque (Ncm)
2.4mm		WE - D108	WE - B108	5/16"	7.94	9.0	100
2.4mm	Maxi Nut	WE - D117	WE - B117	9/16"	14.29	9.0	100
3.5mm		WE - D100	WE - B100	5/16"	7.94	8.0	90
3.5mm	Maxi Nut	WE - D103	WE - B103	9/16"	14.29	8.0	90
7mm		WE - D107	WE - B107	3/4"	19.05	16.0	180
HN		WE - D116	WE - B116	7/8"	22.2	16.0	180
K* (2.9mm)		WE - D100	WE - B100	5/16"	7.94	8.0	90
K* (2.9mm)	Maxi Nut	WE - D103	WE - B103	9/16"	14.29	8.0	90
N		WE - D101	WE - B101	11/16"	17.46	13.0	150
N		WE - D105	WE - B105	3/4"	19.05	13.0	150
NMD 2.4		WE - D115	WE - B115	3/4"	19.05	9.0	100
NMD 2.9		WE - D114	WE - B114	3/4"	19.05	8.0	90
NMD 3.5		WE - D114	WE - B114	3/4"	19.05	8.0	90
SC		WE - D111	WE - B111	13/16"	20.60	13.0	150
SMA		WE - D100	WE - B100	5/16"	7.94	8.0	90
SMA	Maxi Nut	WE - D103	WE - B103	9/16"	14.29	8.0	90
SSMA		WE - D106	WE - B106	1/4"	6.35	5.0	55
SMP	Calibration Components	WE - D109	WE - B109	.354"	9.0	6.2	70
SPM		WE - D113	WE - B113	5/16"	7.94	8.0	90
TNC		WE - D102	WE - B102	9/16"	14.29	13.0	150
TNX		WE - D112	WE - B112	9/16"	14.29	23.0	260
Spectrum's Interchangeable Connector		WE - DE01	WE - BE01	9/16"	14.29	35.4	400



Connector Interface Gauges

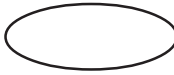
INTRODUCTION: Testing the interfaces of connectors and adapters upon incoming inspection is not only highly recommended, it is definitely a necessity. Interfaces not meeting specification will not only lead to degraded specification of the components, furthermore, these out of specification interfaces 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 the " '98 Handbook Test Necessities & Accessories ". 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.

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.

FOR MORE INFORMATION: Please refer to the " '99 Handbook Test Necessities & Accessories ".

GB		CDEF				H		JKL																		
<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 2920 = K* MIL-C-39012 N000 = N TNC8 = TNC per N750 = N 75Ω MIL-C-87104/2 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																								
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SMP "Bullet" Removal/Installation Tool



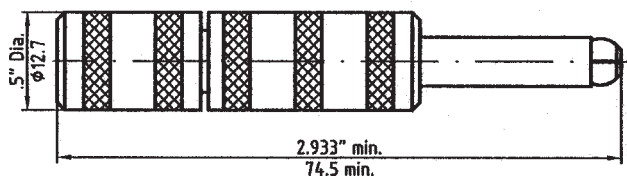
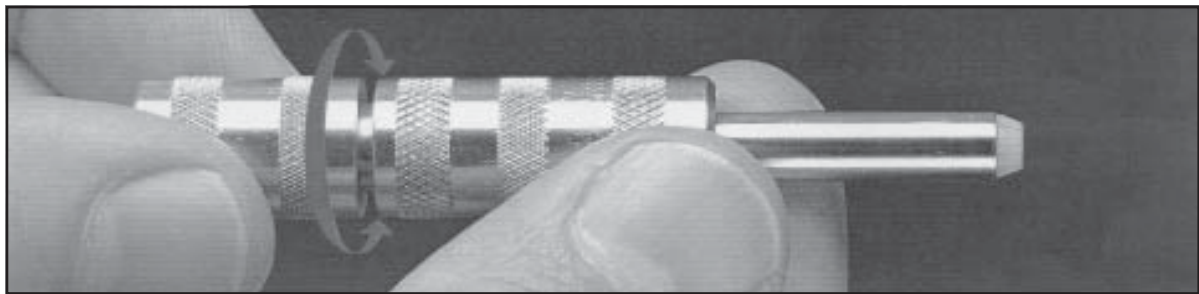
Spectrum Elektrotechnik GmbH has introduced the WE - 6313, an all new tool for removing or installing the "bullets" used in its subminiature push-on SMP series of connectors.



Because of their small size, SMP bullets can be particularly difficult to remove once they are mated with other SMP family components.

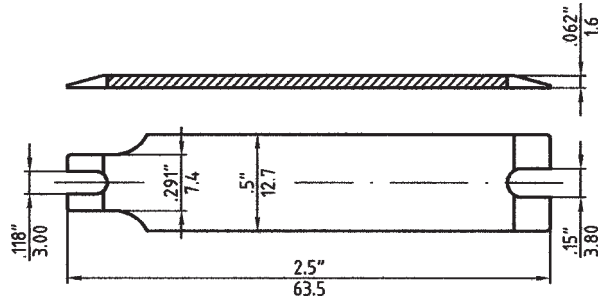


However, the WE - 6313 can grasp the part securely in its slotted Delrin jaws so it can be removed without damage.

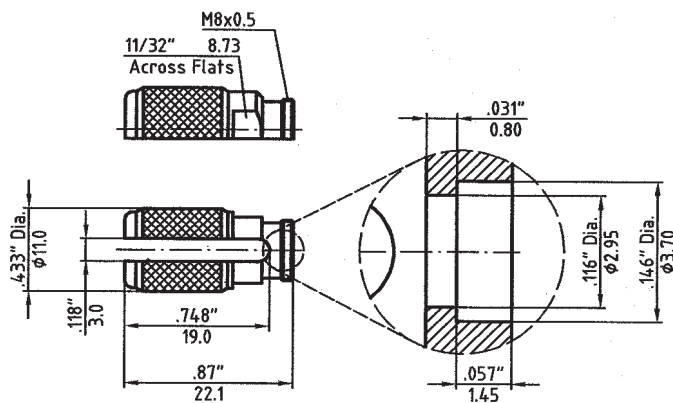


By rotating the stainless steel tool's handle clockwise its jaws can be opened to accept or release the part. Rotate the handle counterclockwise and jaws close to grasp the bullet.

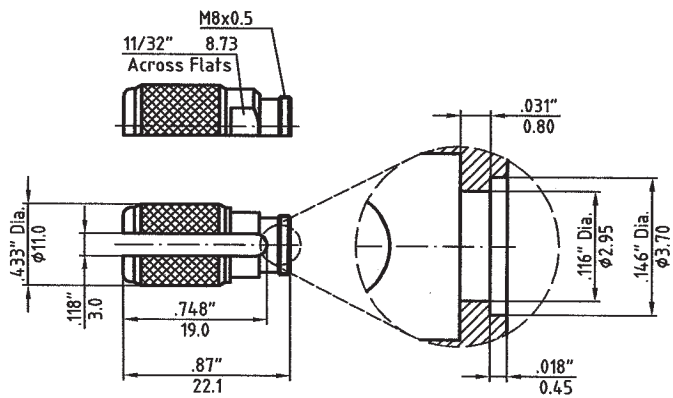
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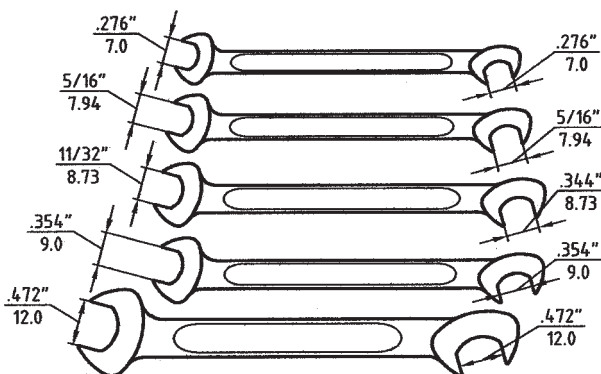
**SMP Withdrawal Tool
for female connectors,
Part Number: T - 6298**



**Insert/Holding/Withdrawal Tool
for straight SMP female connectors,
Part Number: WE - SMPL**



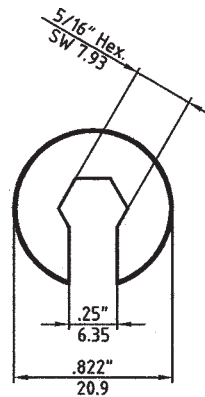
**Insert/Holding/Withdrawal Tool
for straight SMP female connectors,
Part Number: WE - SMPS**



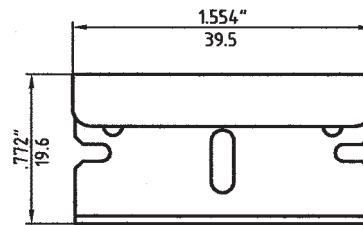
**Set of Double ended wrenches,
Part Number: WE - WSET**

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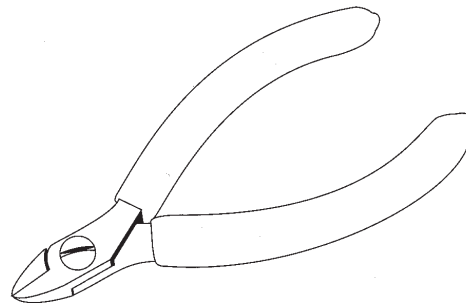
The "fingersaver" is an effective gadget for tightening and loosening SMA male connectors.
Part Number: WE - F100



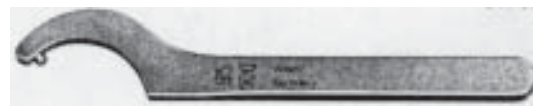
Single edged razor blades.
 (5 pieces)
Part Number: WE - K005



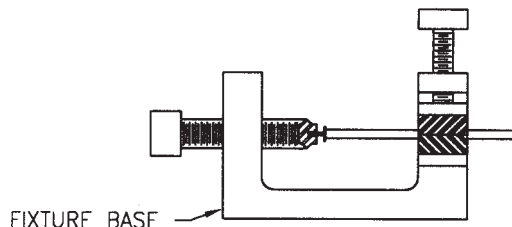
Side cutting pliers.
Part Number: WE - A140



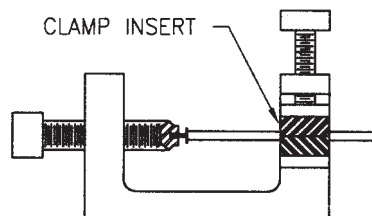
Pin wrench.
Part Number:
 WE - P019
 WE - P026
 WE - P040



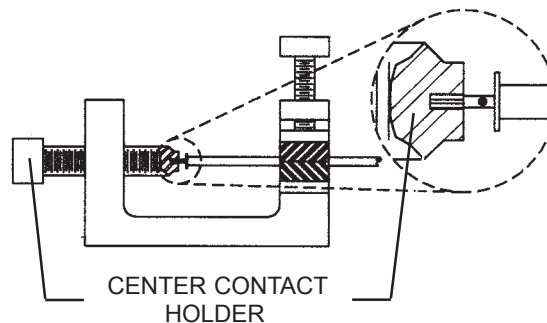
Fixture base.
Part Number: WE - 6053



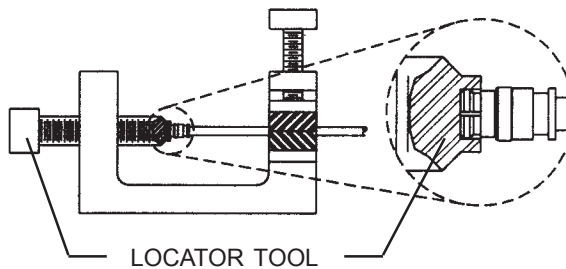
Clamp insert.
Part Number:
WE - 6055-2 for S/R .085"
WE - 6055-3 for S/R .047"



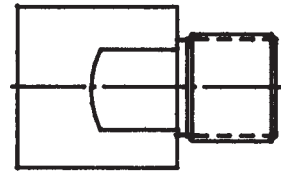
Center contact holder.
Part Number:
WE - 6057
WE - 6307



Locator tool
Part Number:
WE - 6292
WE - 6295
WE - 6296-1
WE - 6296-2
WE - 6296-3
WE - 6308

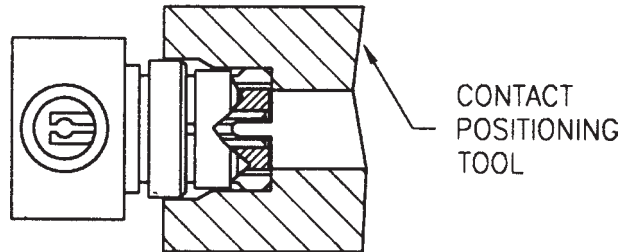


Clamping Tool.
Part Number: WE - 3000

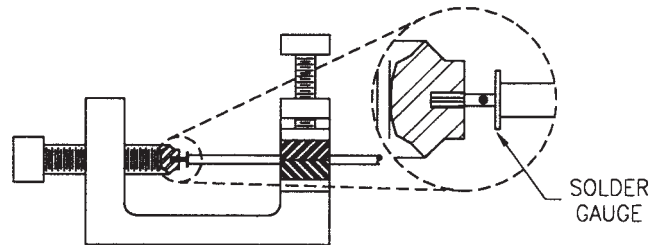


WE-3000

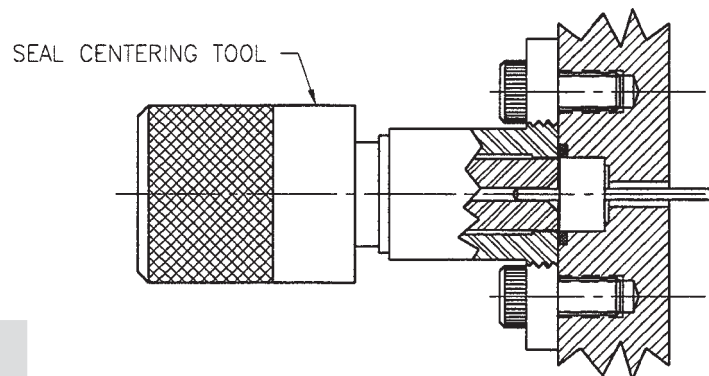
Contact positioning tool.
Part Number: WE - 6290



Soldering gauge.
Part Number: WE - 6294



Seal centering tool.
Part Number: WE - 6304



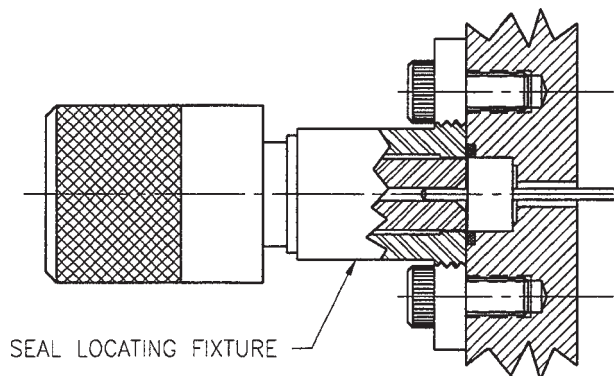
Seal locating fixture.

Part Number:

WE - 6305-1

WE - 6305-2

WE - 6305-3



Shroud installation tool.

Part Number:

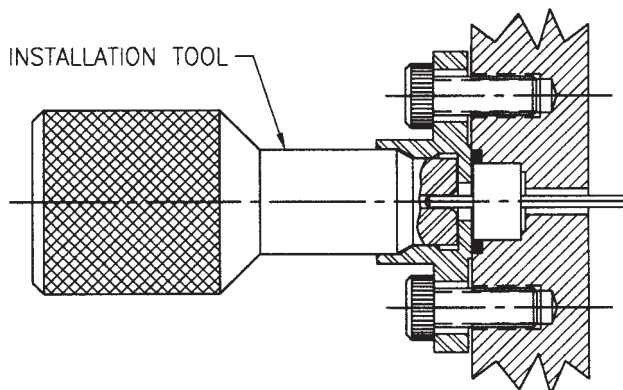
WE - 6301-1

WE - 6301-2

WE - 6301-3

WE - 6301-4

SHROUD INSTALLATION TOOL





Calibration Kits are designed and manufactured to the highest standards. A Calibration Kit should not only include the standards needed for the calibration. It is furthermore very helpful to have handy the necessary adapters, gauges and wrenches as well. Every Calibration Kit is supplied with a parts list, identifying the individual components and their part numbers. A certificate guarantees that the calibration Kit meets the appropriate standards and requirements.



18.0 GHz SMP Calibration Kit

MODEL NO.: CSMP-WILT-18

Parts List S/N: 011

MODEL NO.: CSMP-WILT-18

Precision 18.0 GHz Calibration Kit supplied for Wiltron 360, using K*connectors. The Calibration Kit consists of the following:

1 pce Precision Standard SMP Short female	1130-2101-02 S/N
1 pce Precision Standard SMP Short male	1130-1101-02 S/N
1 pce Precision Standard SMP Open female	1140-2102-02 S/N
1 pce Precision Standard SMP Open male	1140-1102-02 S/N
2 pcs Prec. Stand. Terminations SMP female	TE-0018-MP01
2 pcs Prec. Stand. Terminations SMP male	TE-0018-MJ01
1 pce Throughline SMP female/SMP female	8002-MPMP-02
1 pce Throughline SMP female/SMP male	8001-MJMP-02
1 pce Throughline SMP male/SMP male	8001-MJMJ-02
1 pce Interface Gauge SMP female, CC	IG-SMPF-CC01 S/N
1 pce Interface Gauge SMP female, Diel.	IG-SMPF-D001 S/N
1 pce Interface Gauge SMP male, CC	IG-SMPM-CC01 S/N
1 pce Interface Gauge SMP male, Diel.	IG-SMPM-D001 S/N
1 pce Master female	IG-SMPF-M001 S/N
1 pce Master male	IG-SMPM-M001 S/N
1 pce Torque Wrench, 0.6 Nm for SMP	WE-D109
5 pcs Regular Wrenches	7mm, 9mm, 12mm, 5/16", 11/32"
1 pce SMP Withdrawal Tool	T-6298
2 pcs I.H.W. Tool for straight connectors	2x WE-SMPL
2 pcs I.H.W. Tool for straight connectors	2x WE-SMPS
1 pce Prec. Adapter/B.M. SMPm. to K*male	8009-KMMJ-02
1 pce Prec. Adapter/B.M. SMPm. to K*fem.	8005-KFMJ-02
1 pce Comm. Adapter/B.M. SMPm. to K*m.	8010-KMMJ-02
1 pce Comm. Adapter/B.M. SMPm. to K*fem.	8010-KFMJ-02
1 pce Precision Adapter SMP fem. to K*male	8003-KMMP-02
1 pce Precision Adapter SMP fem. to K*fem.	8003-KFMP-02
1 pce Disc containing Calibration Properties	

ABBREVIATIONS:

B.M.: Bayonet Mount, used to hold in place during testing the SMP right angle.
 CC: Center Contact
 Diel.: Dielectric
 I.H.W.: Insertion/Holding/Withdrawal

* K* Connector is a trademark of Wiltron Company.

Spectrum Elektrotechnik GmbH P.O. Box 45 05 33, 80905 Munich, Germany Tel. (89) 354 804-0, Fax (89) 354 804-90 (Country Code: 49)