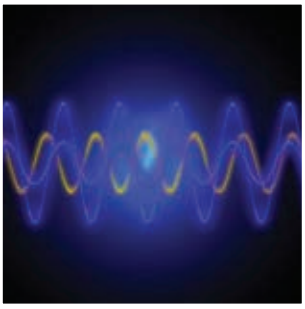
KELVIN PROBES
RADIO FREQUENCY PROBES
FINE PITCH PROBES

CONTACT PROBES

FOR RADIO FREQUENCY AND KELVIN - MEASUREMENT AND FINE PITCH APPLICATIONS





Version 1.0

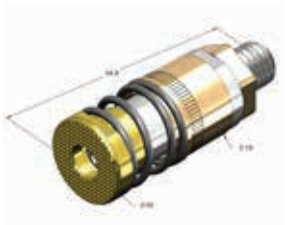
FEINMETALL
Contact Technologies

CONTENTS

Competence

FEINMETALL is your partner for the reliable contacting of electronic components. The wide range of applications for spring contact probes includes board tests with fine centers up to high current est with individual and intelligent solutions.

Broad Competence In-house
The development and manufacturing of spring contact probes, special contact solutions and wafer probe cards in one company are a wide basis for our competence in precision technology and micro-mechanics. This combination is unique at the market and represents “German Technology” at its best.



Innovative Capacity
For many years FEINMETALL represents a high level of innovation. Many patent-registered solutions have been milestones in the world of test engineering.

International Customer Service
We are acting in the international high-tech industry and our processes are aligned accordingly. With seven subsidiaries worldwide and a strong network of well trained partners we are always connected to the markets and to our customers, wherever they are. Local stocks and special customs certificates provide a high delivery performance.

Quality

Quality controls all process steps at FEINMETALL. From product development and construction up to manufacturing and delivery all operation steps are perfectly aligned.

FEINMETALL is certified according to DIN ISO 9001. Additionally a wide range of measures like e.g. risk analysis by FMEA during the whole product development process ensure a maximum of technical as well as delivery reliability.

Environment and Health Protection
FEINMETALL is committed to the goals of the up-to-date legislation regarding environment as well as health protection and to conformance to all necessary measures. The current statements regarding the various European environment and health regulations are available on our homepage.

Traceability of Contact Probes
FEINMETALL contact probes with a sufficient diameter are marked by laser. This enables the traceability of each single contact probe and the correlation to the exact production lot. Additionally the laser marking guarantees the use of “the original”.

Customer Focus
Our engineers and technicians work closely together with our customers and have a deep knowledge of the practical applications. Our know-how is your advantage!

Contents

Note:
This catalogue contains a wide range of coaxial probes, especially radio frequency probes. Also a variety of fine pitch probes and test connectors show good solutions for testing or transmitting signals.

For other applications you will find suitable contact pins in our additional catalogues.

The whole contact probe portfolio as well as corresponding step-files for the integration in your CAD-system can be downloaded from our homepage at **www.feinmetall.com**.

OVERVIEW OF TIP STYLES

01	02	03	04	05	06
Conical 90°	Conical 90° stepped	Conical 60°	Conical 60° stepped	Concave stepped	Serrated stepped

07	08	09	11	12	14
Hexagonal 90° stepped	Hexagonal 60° stepped	6-point crown 120° stepped	Spherical	Spherical stepped	4-point crown stepped (self cleaning

15	16	17	18	27	29
Triangular 45° stepped	Flat	Flat stepped	Conical 30°	Conical 120°	4-Point Crown Shaft

30	34	39	41	46	55
Triangular Shaft 45°	Rigid Needle Head 15°	Conical flat 30°	6-point crown stepped (self cleaning)	W-profile	Concave (self cleaning)

71	72	05 (IK)	12 (SP)
Half Moon	Half Crown	IK = Insulating cap	SP = Step Probe

Examples of PCB Layouts for Coaxial Contacting

Coax-closed

Coax-open

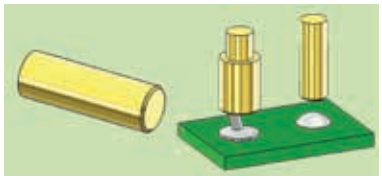
Coax-kidney-shaped

Coax G-S-G

Coax G-S-G

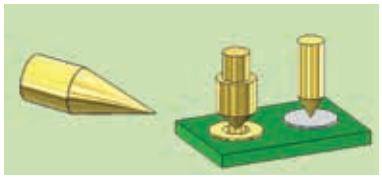
Coax G-G-S-G-G

TYPICAL TIP STYLES AND APPLICATIONS



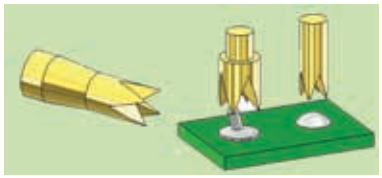
Flat
(16,17)
Suitable for solder pads and contact pins.

Spherical
(11,12)
For testing clean contact surfaces, does not leave marks or scratches.

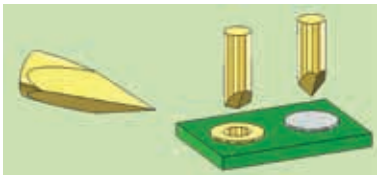


Conical
(01,02,03,10,18,32,34,35)
Universal tip style with different angles of 10°, 15°, 30°, 60°, 90° or 120° for contacting solder pads and vias.

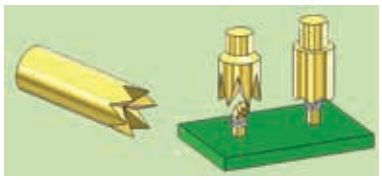
Triangular
(15,30,62)
For via holes and solder pads. The sharp edges penetrate flux residues and oxide layers.



4-point crown
(14,20,21,28,29,37)
For pad surfaces and soldered pins. The sharp edges penetrate flux residues and oxide layers.

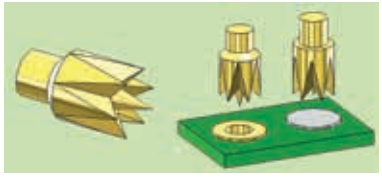


Square lance
(33,38,43)
For via holes and solder pads. The sharp edges penetrate flux residues and oxide layers.

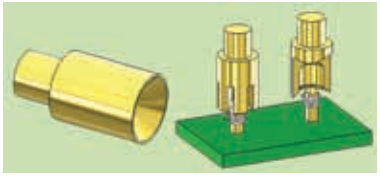


Crown
(09,35,40,41,42,60,63)
For wire wrap posts, even if the contacts are bent or twisted.

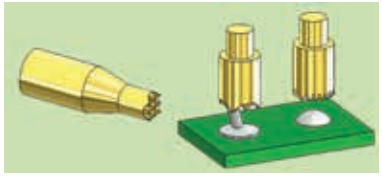
Hexagonal
(07,08)
For testing plated vias and pads. The sharp edges penetrate contamination and oxide layers.



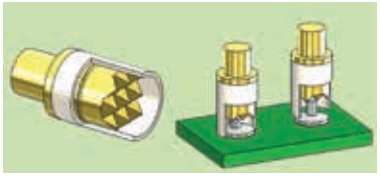
Crown with inner pin
(36,68)
Used for reliable contacting of plated or filled vias.



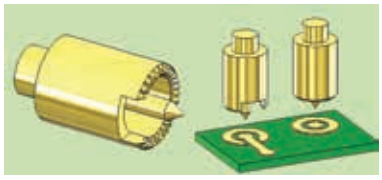
Concave
(05,50,55)
For a smooth contact of pins and wire wrap posts. The risk of contamination can be minimized by using a self cleaning version.



Serrated, W-profile
(06,46,64,66)
Universal tip style for contacting wires, pins and wire wrap posts, even suitable for bent contacts.



Insulation cap (IK)
(05,06,17,41)
For detecting the correct length and straightness of pins.

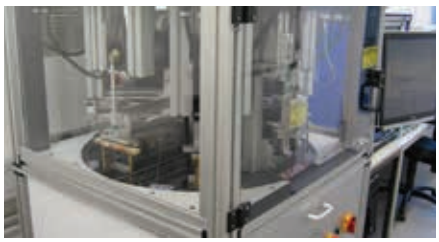


Coaxial design
Tip styles of coaxial probes are used for contacting standard connectors or for contacting PCB test points, SMD mini coax and switch connectors, see below.

Life Cycle Test of Contact Probes

The life cycle of spring contact probes is depending on the design of the probes as well as on the operating conditions in the field.

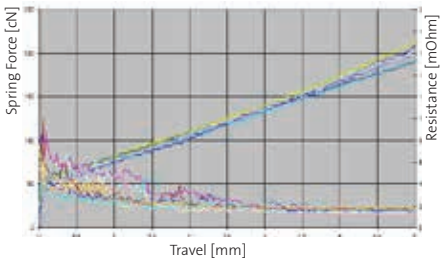
High lateral forces, high current load and contamination may lead to a significantly reduced lifetime of the probes. For us as manufacturer of these probes, it is vital to permanently control and review the quality parameters and to analyze the lifetime performance of our products. In our own laboratory we have various test and measurement setups for quality control and for the determination of technical parameters during research and development. One important subject is the life cycle test, conducted with seven autonomous stress stages. The test conditions provide an internal standard reference that allows competent statements regarding the life cycles of our probes.

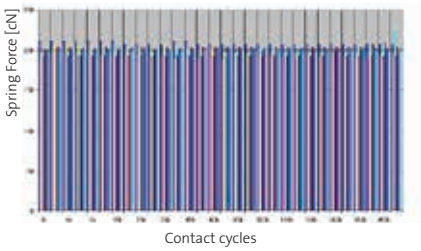


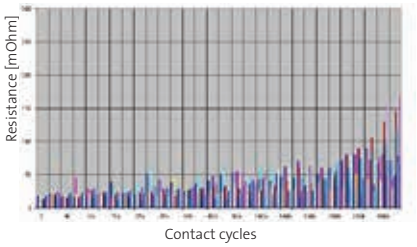
Life cycle tests are performed under the following conditions:

→ Ambient temperature: +20°C to +30°C
→ Relative humidity: 40 to 60%
→ Dust free environment

For the life cycle test up to 10 sample probes are mounted in a stress stage and then pressed with a stroke frequency of 5 to 6 strokes per second. In predetermined steps (e.g. after 2000 strokes) the probes are analyzed in a separate test station and the spring force and the contact resistance of each probe are measured as a function of the spring travel (see picture right on the top). Later the test results are combined in a diagram, showing the whole life cycle of the probe (up to more than a million strokes). The diagrams show typical life cycle test results of spring force and resistance.





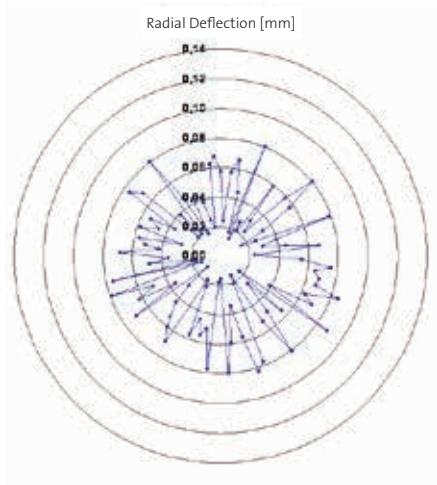


Pointing Accuracy and Radial Tolerance

The pointing accuracy of a spring contact probe is determined by many factors, for example by manufacturing tolerances, by the length of the plungers and by the type of plunger guiding. Further factors that are independent of the contact probe have to be considered, for example the receptacles and the mounting of the test fixture or module.

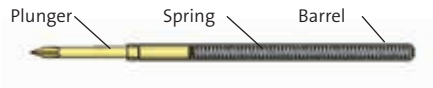
To optimize the pointing accuracy especially in applications with small centers additional guiding plates in the fixture can be used. There is always a radial tolerance between plunger and barrel of a spring contact probe. This leads to a certain deflection of the plunger tip. The guide clearance is necessary and if ideally designed, it guarantees a low abrasion and a reduction of lateral forces. The know-how to produce a good functioning and still long living spring contact probe lies in the definition of the optimum tolerances of plunger and barrel.

The most important factor for the pointing accuracy is the radial deflection of the tip compared to the central axis of the probe at the moment of contacting. The specific pointing accuracy in the technical specifications of the probes is approximately corresponding with the maximum radial deflection. The radial deflection can be shown in a diagram.



Design of Spring Contact Probes

Spring contact probes are typically composed of a plunger, a barrel and a spring.



Plunger

FEINMETALL manufactures plungers with many different tip styles, suitable for a large variety of applications. Plungers are generally made from beryllium copper (BeCu) or steel. Optimized turning and plating processes are resulting in an outstanding straightness and exactness of the plunger surface, the base for a long lifetime. Aggressive tip styles are made by a special grinding process for ultra sharp edges.

Barrel

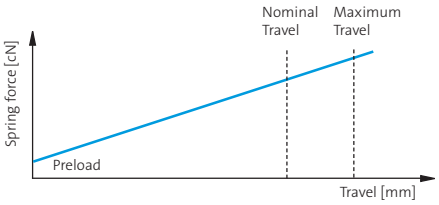
FEINMETALL barrels are usually made of nickel silver, bronze or brass. Nickel silver barrels are deep-drawn whereas barrels made of bronze are turned or deep-drawn and barrels of brass are turned. All barrels are usually silver or gold plated. A small hole in the bottom permits the barrels to be thoroughly cleaned during manufacturing and ensures continuous wetting in the plating process.

Spring

During the early years FEINMETALL developed long-life springs for the clock industry and subsequently made use of this knowledge in the manufacturing of spring contact probes. Compression springs are normally made of silver plated music wire or stainless steel, for some special applications also of non-magnetic beryllium copper. Springs made of music wire have a working temperature up to a Maximum of 80°C (176°F) while made of stainless steel or BeCu can be operated up to 200°C (392°F).

Spring Force

The selection of the spring force mainly depends on the application. On the one hand the spring force needs to ensure the quality of the electrical contact and the penetration of contaminations or oxide layers. On the other hand it should not lead to any damages on the contacting surface or on the board. It also needs to be taken into consideration that the penetration of the contacted surface highly depends on the chosen tip style. In test fixtures (especially vacuum fixtures) the sum of all spring forces has to be observed in order to close the fixture and to contact without problems. Due to manufacturing processes and material variances all spring forces have a tolerance of ±20%.



Spring Travel

The spring force increases proportional to the spring travel. This linear function is shown in the force-travel-diagram. During the assembly of the probe the spring is already compressed by a certain travel. The resulting spring force is called preload. The preload makes sure that there is a certain force right from the beginning of the contacting process. Also it makes sure that the plunger is completely pushed back after the contacting. The nominal spring force is the spring force at the recommended working travel. The recommended working travel should not be exceeded significantly, because otherwise the life time of the probe could be considerably reduced.

Electrical Specifications

In a contact probe the primary current flow typically leads through the plunger, the barrel and the receptacle.
A secondary current flow leads through the plunger, the spring and the barrel. The transition points cause certain transfer resistances that are influenced by the following factors:

- → Conductivity of the base material
- → Conductivity of the plating material
- → Condition of the surface of the probe
- → Size of the contact surface
- → Contact forces at the transition points

FEINMETALL is taking measures to guarantee a constant low contact resistance during the whole lifetime of the probes. The maximum continuous currents and the typical resistances of each specific probe are shown in the data sheets.

Important note for all products with electrically insulated functions
like switch probes, switch receptacles, combi receptacles, coaxial probes, insulation caps etc.: **For safety reasons according to DIN VDE 0100, part 410, over electrically insulated parts only low-voltages of maximum 25 V (AC) or 60 V (DC) are allowed.** These values are effective values including voltage pulses due to over-voltages etc.

	Basic Materials	Plating
Barrel	Nickel Silver (deep-drawn) Bronze (turned or deep-drawn) Brass (drilled) Nickel	Silver Gold
Plunger	Beryllium-Copper - BeCu (B) Steel (S) Synthetic Material (K) Palladium Alloy (P) Brass (M)	Chemical Nickel Gold FM-Longtime Gold Rhodium Progressive Coating Multiplex
Spring	Music Wire (max. 80°C) Stainless Steel (max. 200°C) BeCu (non-magnetic, max. 200°C)	Silver Gold
Receptacle	Nickel Silver Bronze Brass	Gold

Materials

The optimum performance of spring contact probes significantly depends on the selection and combination of materials and platings. Developing, testing and qualifying materials for the various applications is an important aspect of our research and development efforts.

Basic Materials

For choosing the optimum basic material for barrel, plunger, spring and receptacle of spring contact probes different aspects need to be considered. Besides the technical applicability also machining and economical factors are relevant for this decision.

Beryllium-Copper
combines outstanding mechanical properties with a high electrical conductivity. It is used for plungers or contact elements in a great variety of products, especially in the field of standard- and high current probes. Also springs can be made of BeCu.

Steel
is significantly harder than BeCu and is used for plungers with aggressive tip styles or the requirement of extremely long durability.

Palladium Alloy
is used as basic material for plungers. Because of the high hardness it is very robust, an additional plating is not necessary.

Nickel Silver
is very resistant to corrosion and is well suitable for machining. Barrels and receptacles made of nickel silver can also be deep drawn economically.

Bronze
is characterized by a combination of good wear resistance, cold formability and high electrical conductivity. It is used for barrels and receptacles.

Brass
is an extremely high quality material with a high electrical conductivity, a good wear resistance and the suitability for different ways of machining.
It is used for barrels, receptacles and for special shapes.

Nickel
Barrels in very small diameters can be manufactured by electro-forming. In this case nickel is separated and combined with precious metal. This results in pipes with very thin pipe wall of nickel, that can already be gold plated on the inner surface. These barrels are highly precise, however, the thickness of the pipe wall cannot be varied within one part.

Plating Materials

Typically the surfaces of all elements of contact probes are galvanically plated in order to protect the basic material against corrosion. At the assembled contact probe the plating also reduces friction and thereby leads to low abrasion and low contact resistances.

FEINMETALL plating materials are basically galvanic nickel, chemical nickel, gold, hard gold, longtime gold, rhodium, silver or progressive coating. To achieve the maximum performance the ideal selection and combination of coating materials, coating thicknesses, coating alloys as well as various boundary processes have to be made.

Galvanic Nickel
has a good chemical durability and a hardness of 300 to 500 HV. It has a good ductility and adheres well to the base material. Nickel also prevents the base material from migrating into the precious metal surface and contaminating it and leads to a high temperature stability and life time.

Chemical Nickel
has a very good chemical durability and is not brittle. It has a hardness of 400 to 600 HV. Chemical nickel is most appropriate for aggressive tip styles, because it has a good contouring capability and wear resistance.

Rhodium
is extremely resistant to wear and abrasion. Due to its hardness of 800 to 900 HV it is plated on plungers which are used in very rough applications.

Silver
is used as a bearing surface and as corrosion protection for barrels and springs. The hardness of the silver layer is 80 to 100 HV only, but it adheres very well to the base material even at small diameters. Silver improves the electrical conductivity.

Gold
guarantees the best chemical durability with a hardness of 150 to 200 HV.
Gold considerably improves the electrical conductivity. Standard gold is mainly used for plungers made of beryllium-copper or brass.

Hard Gold
is the hardest galvanic gold layer with up to 400 HV. Hard gold differs from the other gold types by its slightly lighter color.

FM Longtime Gold
is a special gold plating layer system for steel plungers developed by FEINMETALL. The combination of steel and FM-Longtime gold results in a high performance and a long lifetime, even at heavy load applications.

Progressive Coating
is a special coating for contacting lead-free soldering pads and other contaminated or oxidized surfaces. This coating is characterized by a high hardness of 550 to 600 HV and a very low contamination of the tips, which leads to a long lifetime of the probes.

Multiplex
is a multi-layer coating system with a very high corrosion resistance. It has been developed for gold plating of steel plungers, that are used in conditions with high humidity.

Different Types of Spring Contact Probes

Spring Contact Probes are available for various applications. Below you find a brief overview of the most important types.

ICT/FCT Probes for Test Fixtures
Test fixtures for in-circuit test (ICT) and functional test (FCT) are mainly equipped with standard probes for the centers 50 mil, 75 mil and 100 mil.

Fine Pitch Probes
Contact probes for centers smaller than 1,27 mm / 50 mil are fine pitch probes. In these centers a direct soldering or the use of receptacles is not possible. Therefore most fine pitch probes are designed as double plunger probes to be mounted into sandwich blocks.

Battery Contacts
Battery contacts are compact probes, often with a limited travel. They are well suitable as charging contact, but they can also be integrated in end user products whenever low-wear electrical contacts are required.

Interface Probes
Interface probes are used for transmitting the signals from the test fixture into the test system. Contact probes for this application are specifically standardized for each test system.

Threaded Probes
Contact probes with thread are mainly used in modules for testing connectors and wire harnesses. The advantage is that even under difficult conditions the probes do not move out of the receptacle and a secure seat is guaranteed.

High Current Probes
For high current applications spring contact probes need to be designed with a very small probe resistance. High current probes are available in different versions and designs.

Switch Probes
Special probes with integrated switch element are mainly used for presence tests. Switch probes close or open an electric circuit after a defined travel of the plunger (switch travel). For non-conductive contacting, switch probes are available with various insulated tips.

Switch Probes with Ball Head
For side contacts with laterally moved test items, FEINMETALL has developed a special switch probe series with a rolling ball as contact element. These probes are less sensitive to lateral forces and have a remarkably higher durability compared to standard probes with only round tip styles.

Pneumatic Switch Probes
For selective contacting of test points or for areas that are difficult to access, it can be helpful to use pneumatic contact probes, operated by compressed air.

Push Back Probes
During push back tests of connectors the tight seat of the connector elements is verified. For this application contact probes with very high spring forces are used.

Kelvin Probes
Very low resistances of components are measured by the 4-wire measurement (Kelvin-method). For this application contacts for the current source and the voltmeter need to be implemented very close to the component. These connections can be realized by special coaxial probes (Kelvin probes), using the outer conductor for the constant current and the inner conductor for measuring the voltage. Therefore measuring errors caused by the connection wires are eliminated.

Radio Frequency Probes
In many applications, like e.g. testing antenna connectors, radio frequency signals need to be transmitted. To carry these signals, special coaxial contact probes are used. RF-probes have an inner conductor for the transmission of the signal and an outer conductor for the electromagnetic shielding.

Receptacles for Spring Contact Probes

For simple replacement spring contact probes are typically mounted into receptacles. The probes are either plugged-in or screwed into receptacles, depending on the type of contact probe.
Receptacles are available with different types of electrical connections.

Mounting

Receptacles with collar on top have a fixed projection height and guarantee the tightest seat with very low tolerances. Receptacles with press ring can be used in two ways. Either the press ring is used as dead stop or it is inserted into the mounting plate, which results in a variable projection height. For receptacle insertion into the mounting plate, a special insertion tool is necessary.

Connection of Receptacles

Almost all receptacles are available with solder or crimp connection. Wire wrap connections are frequently used for test fixture manufacturing because they can be wired automatically. Some receptacles (especially those with very small diameters) are available with pre-assembled wires. Additionally, to connect coaxial probes, special connecting elements can be used

Types of Receptacles

At ICT/FCT test fixtures mainly plug-in probes are used. However, in some applications, particularly at modules for wire harness and connector tests, threaded probes are used, which are screwed into the receptacles. Threaded probes guarantee a secure seat because they do not move out of the receptacle even under difficult conditions. Knurled receptacles ensure a firm seat of the receptacle in the drill hole. For switch probes and coaxial probes, FEINMETALL has developed special receptacles called “combi-receptacles“, which enable a solder free exchange of these probes. Further receptacles with integrated switch function are available, that are frequently used in combination with twist proof probes.

Drilling Recommendations

Mounting the receptacle into the mounting plate demands special precision. Various parameters like rotating speed, feed, helical groove length, material and plate thickness are influencing the drilling results. The drilling recommendations in the technical specifications of the probes are guideline values only as a basis for your own drilling trials.
Therefore it is very important to make drilling tests in order to ensure that receptacles have a proper seat in the mounting plate.

Spacers

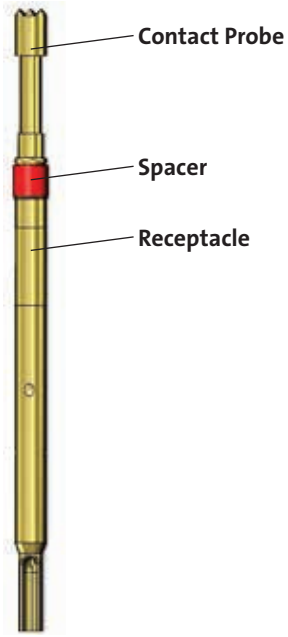
For height adjustment and balancing of tolerances.

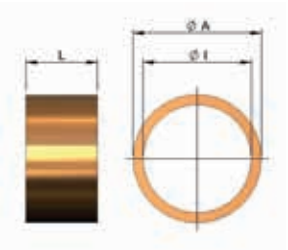
Spacers H772DS/xx for 100mil Probes

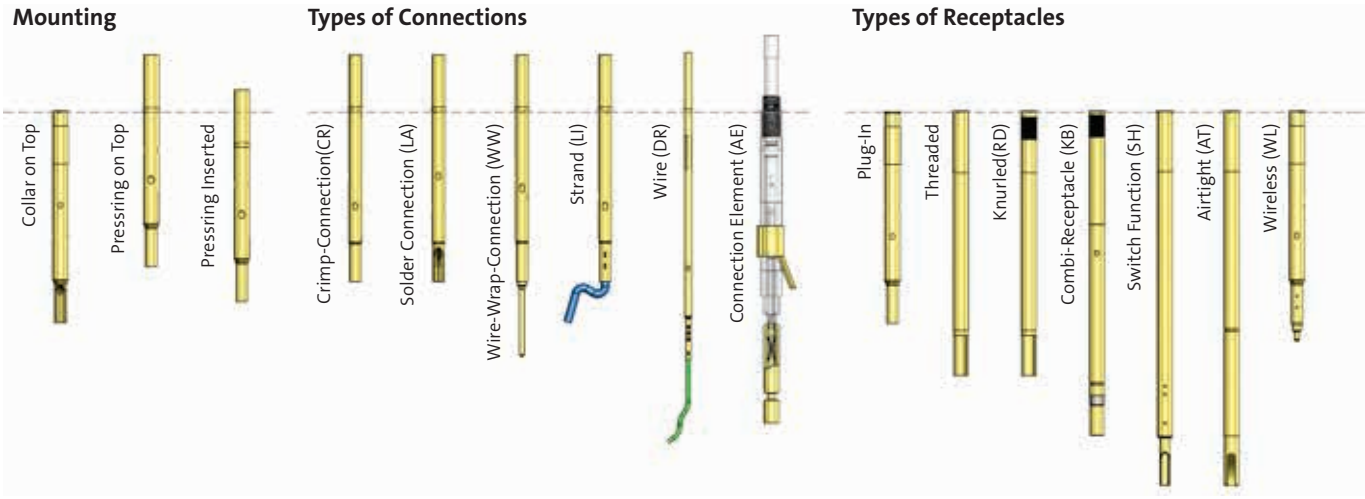
Order Code	Outer-Ø	Inner-Ø	Length
H772DS/10	2,20	1,70	1,00
H772DS/20	2,20	1,70	2,00
H772DS/30	2,20	1,70	3,00
H772DS/50	2,20	1,70	5,00

Spacers H773DS/xx for 138 mil Probes

Order Code	Outer-Ø	Inner-Ø	Length
H773DS/01	3,20	2,70	0,10
H773DS/05	3,20	2,70	0,50
H773DS/10	3,20	2,70	1,00
H773DS/20	3,20	2,70	2,00
H773DS/30	3,20	2,70	3,00
H773DS/50	3,20	2,70	5,00







Coaxial Probes for 4-Wire Measurement (Kelvin Method)

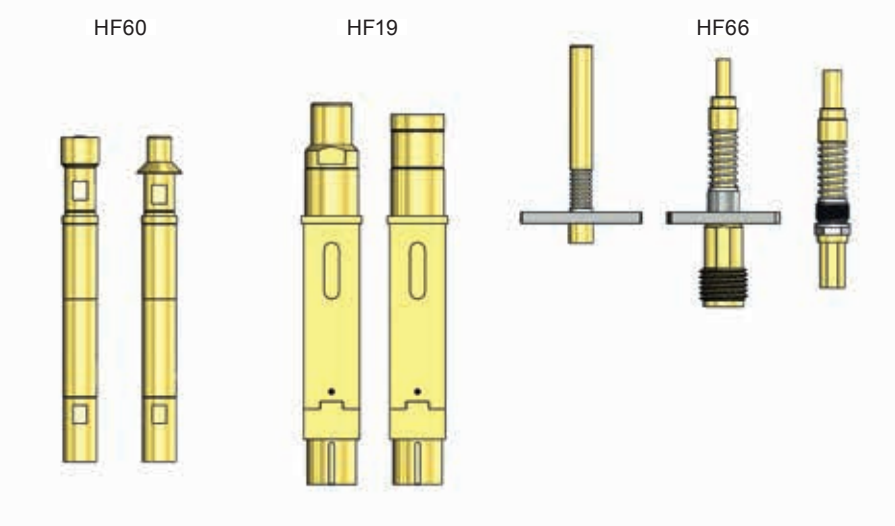
Coaxially designed contact probes can be used for the measurement of very low resistances according to the Kelvin-method (4-wire measurement), especially at limited space. In this application the outer conductor is used for the constant current and the inner conductor is used for measuring the voltage.

Overview

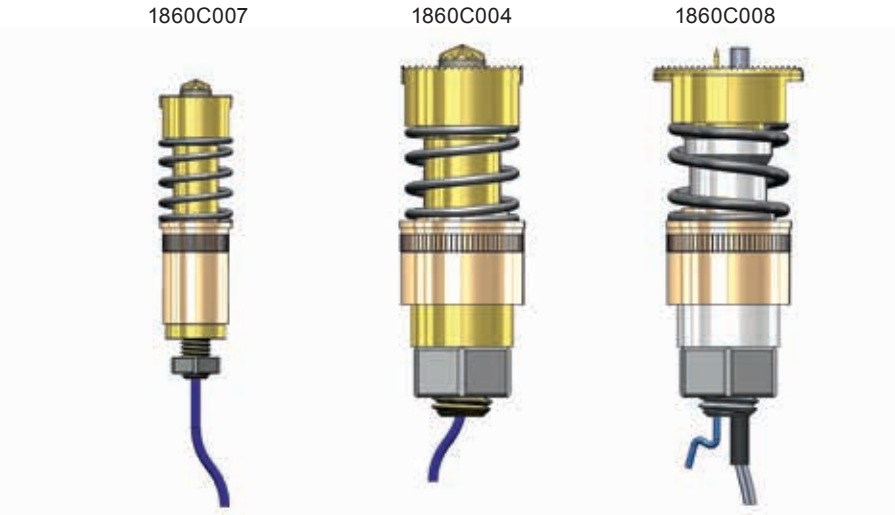
Types of Coaxial Probes

For Kelvin measurement
For measuring very low resistances by the Kelvin method (4-wire measurement) coaxially build contact probes can be used by feeding the current by the outer conductor and measuring the voltage by the inner conductor. The figure shows different series of available Kelvin probes.

For RF applications
In many test applications like contacting RF sockets, signals with high frequencies need to be transmitted. For this contact coaxially designed RF probes can be used. In this case the inner conductor carries the signal and the outer conductor is used as shielding (same principle as coaxial cables). This leads to low electro-magnetic radiation and interference.



For high current applications
These coaxially designed high current probes have been developed for measuring the inner resistance of applications with very high currents, e.g. for charging and discharging of accumulator cells and batteries.



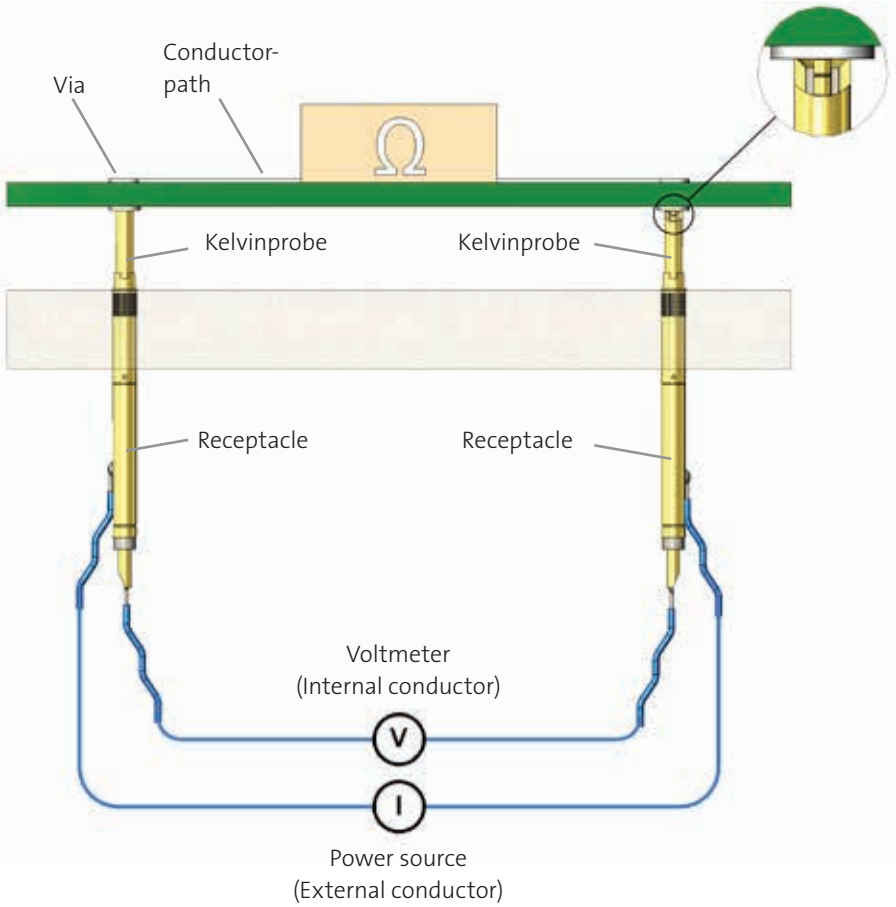
Coaxial Probes

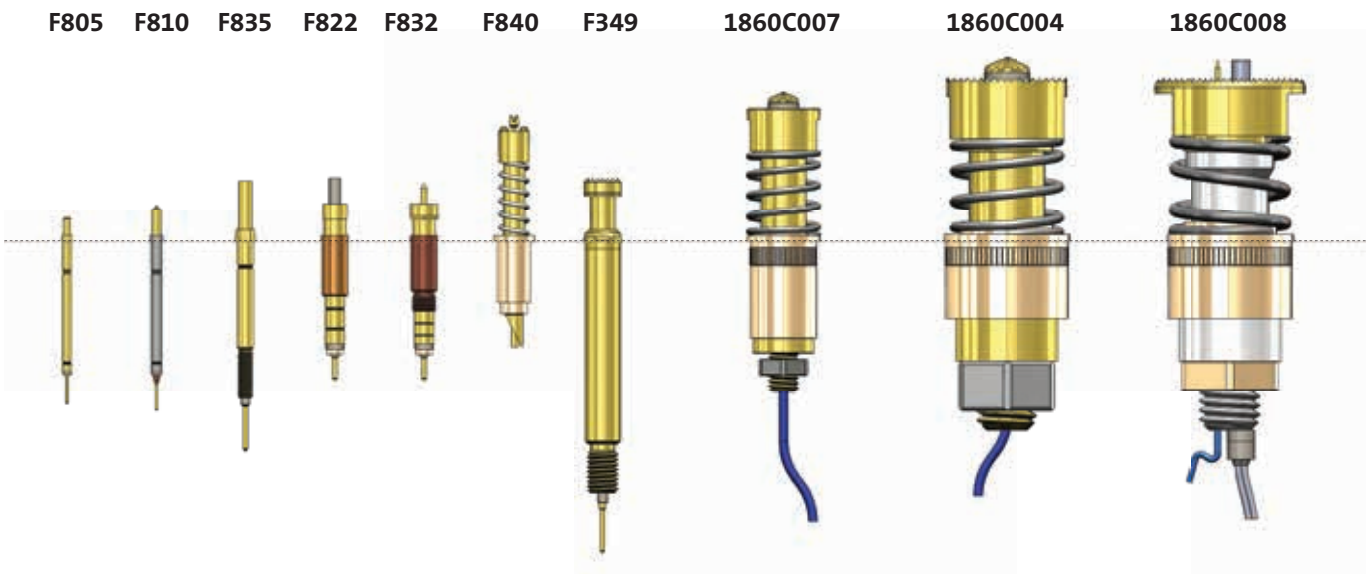
for Kelvin Measurement (4-Wire Measurement)

A Kelvin probe is a coaxial contact probe with two electrically insulated measuring circuits. The typical 4-wire measurement is based on a constant current, flowing through the test resistance and the measurement of the resulting drop in voltage, which is directly proportional to the resistance value. According "I=constant" and because of the very high internal resistance of the voltmeter, the cable and contact resistances are not influencing the measuring result.

This leads to high accuracy of this measuring method. The contacting for current source and voltmeter is realized by two Kelvin probes, ideally located very close to the device under test.

The constant current usually is carried by the outer conductor (force signal), while the voltage drop is detected by the inner conductor (sense signal). The inner and outer conductors of FEINMETALL coaxial probes are independently spring loaded in order to balance mechanical tolerances and heights.





F800

NEW

Kelvin Probe 75 mil
Threaded, double plunger

Centers (mm/mil)	1,90 / 75
Current (Circular)	2,0 A
Current (Internal)	1,0 A
Temperature	-20°C...+80°C

Spring Force (cN ±20%)

	Preload	Nominal
Internal Cont.	10	50
Circular Cont.	-	Starr

Travel (mm)

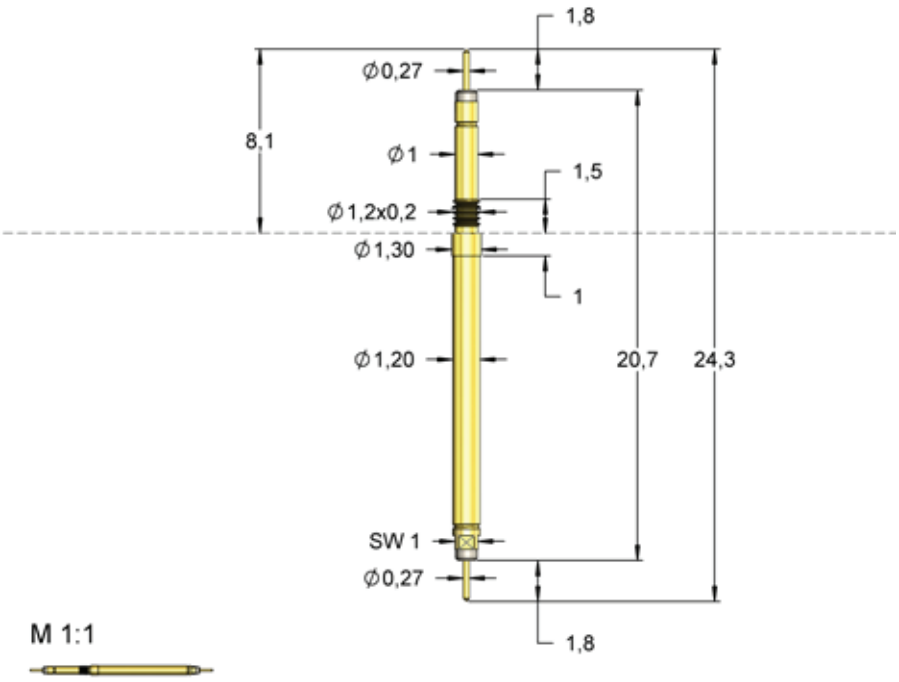
	Nominal	Maximum
Internal Cont.	2,0	2,5
Thread		1,2x0,2
Wrench size		1,0

Materials and Plating

Internal Cont.	BeCu, Longtime gold plated
Internal Barrel	Bronze, gold plated
Circular Cont.	Bronze, gold plated
Spring Internal Cont.	Stainless steel, unplated

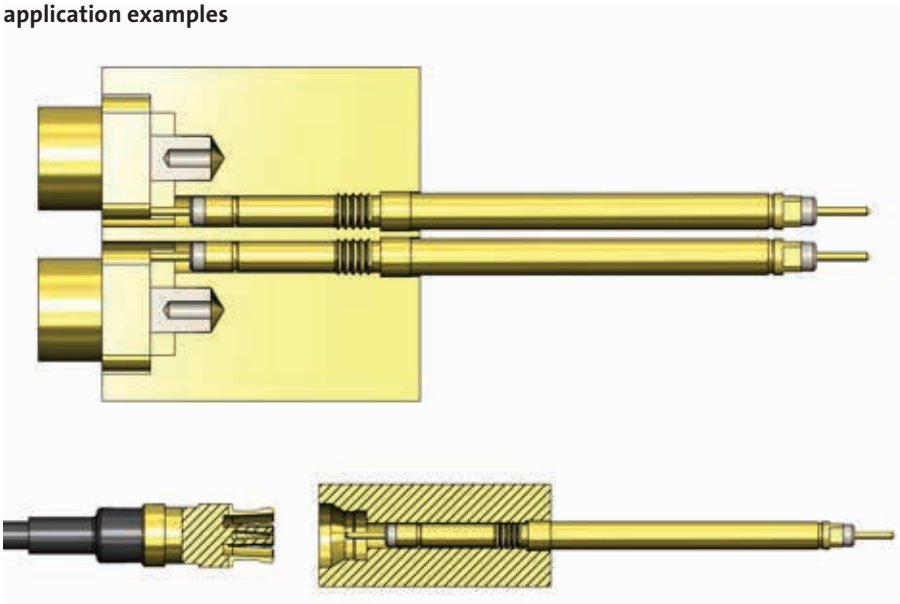
Accessories

Screw-in tool	FWZ730S1. FWZ730S1T



Currently the smallest threaded double plunger Kelvin probe worldwide. This solution is outstanding on the market, as common Kelvin probes usually require centers of at least 138 mil / 3,50 mm.
Often the probe with the rigid ring contact is mounted through a ground plate and then contacted with the signal pin on PCB pads.

application examples



Order Code	Sense Pin	Tip Style	Internal-Ø	Ring-Ø	C	H	L	Version	Tool
F80001B0001G050M		01	0,27	1,00	1,80	8,10	24,30	-	FWZ730S1 (T)

F805

Kelvin Probe 87 mil
Plug-in

Centers (mm/mil)	2,20 / 87
Current (Circular)	2,5 A
Current (Internal)	0,5 A
Temperature	-40°C...+200°C

Spring Force (cN ±20%)

	Preload	Nominal
Total	-	250
Internal Cont.	10	50
Circular Cont.	80	200

Travel (mm)

	Nominal	Maximum
Internal Cont.	2,0	2,5
Circular Cont.	2,0	2,5

Materials and Plating

Internal Cont.	BeCu, gold plated
Circular Cont.	BeCu, gold plated
Barrel	Bronze, gold plated
Spring Internal Cont.	Stainless steel, gold plated
Spring Circular Cont.	Stainless steel, gold plated
Receptacle	Bronze, gold plated

Accessories

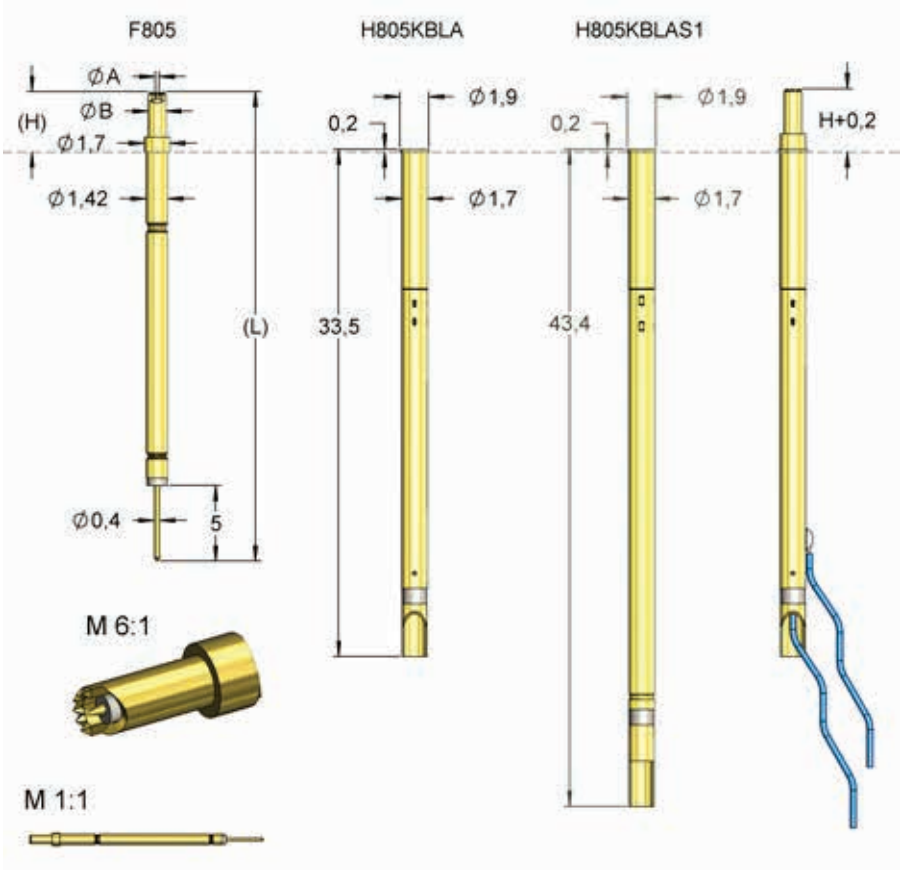
Insertion tool probe	FDWZ-805
Insertion tool receptacle	FEWZ-100E0

Drill Size (mm)

H805KBLA	1,68 - 1,70

Projection Height (mm)

H805... with F805	H+0,2



Currently the smallest Kelvin probe worldwide. This solution is outstanding on the market, as common Kelvin probes usually require centers of at least 100 mil / 2,54 mm.

Order Code	Sense Pin	Tip Style	Ø A	Ø B	C	H	L	Version
F80518B0001G250		18	0,27	1,18	0,00	4,00	31,00	-
F80518B0002G250		18	0,27	1,18	0,00	6,00	33,00	-

F810

Kelvin Probe 100 mil Plug-in

Centers (mm/mil)	2,54 / 100
Current (Circular)	3,0 A
Current (Internal)	0,8 A
Temperature	-20°C...+80°C

Spring Force (cN ±20%)

	Preload	Nominal
Total		170
Total		230
Internal Cont.	10	70
Internal Cont.	25	90
Circular Cont.	40	100
Circular Cont.	40	140

Travel (mm)

	Nominal	Maximum
Internal Cont.	2,8	4,0
Circular Cont.	2,3	3,5

Materials and Plating

Internal Cont.	Steel, longtime gold plated
Circular Cont.	BeCu, gold plated
Barrel	Bronze, silver plated
Spring Internal Cont.	Music Wire, silver plated
Spring Circular Cont.	Music Wire, silver plated
Receptacle	Bronze, gold plated

Accessories

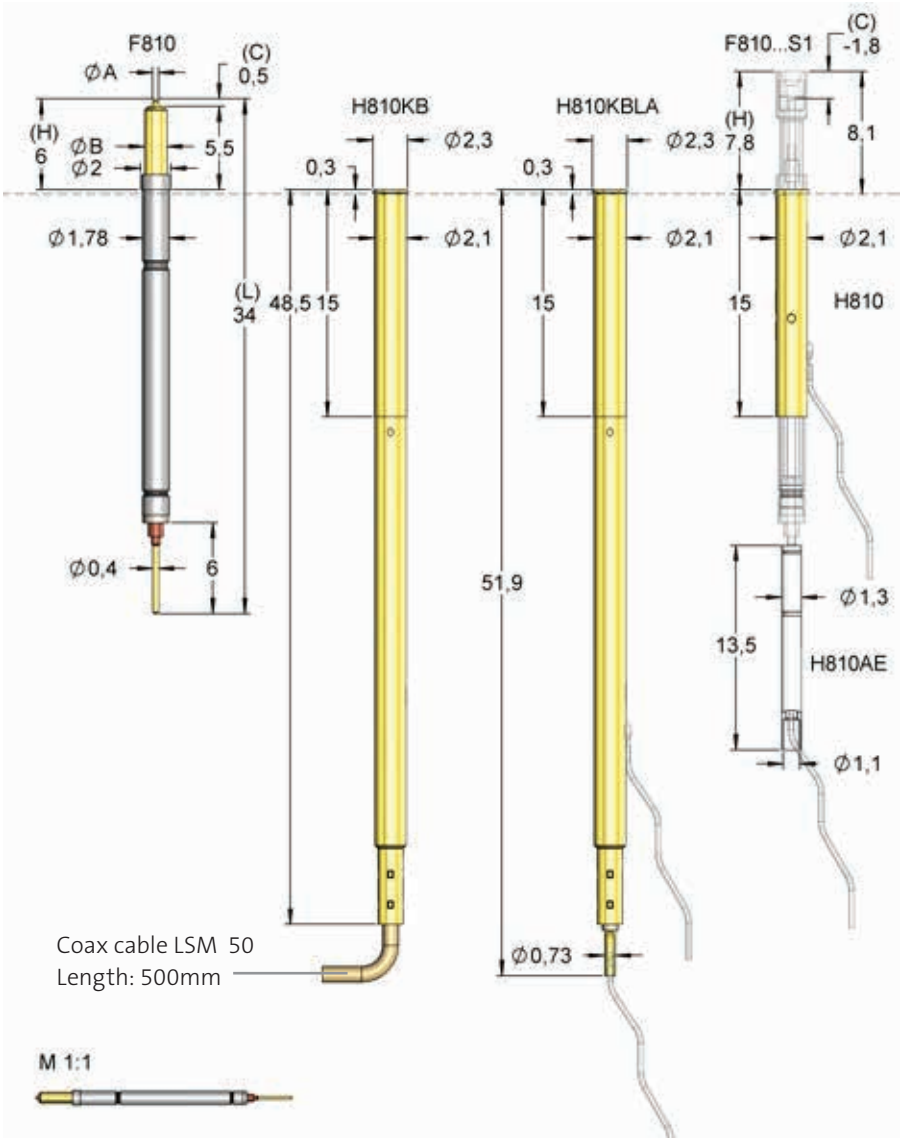
Insertion tool receptacle	FEWZ-772E0

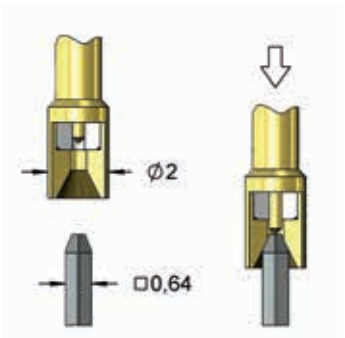
Drill Size (mm)

H810...	2,08 - 2,09

Projection Height (mm)

H810... with F810	H + 0,3





Special version for contacting wire wrap posts: Order code F81001S040L230S1

Order Code	Sense Pin	Tip Style	Ø A	Ø B	C	H	L	Version
F81001S040L170		01	0,40	1,50	0,50	6,00	34,00	-
F81001S040L230S1		01	0,40	2,00	-1,20	7,80	35,80	S1
F81006B080G230S1		06	0,80	2,00	-1,20	7,80	35,80	S1
F81016S040L170		16	0,40	1,50	0,50	6,00	34,00	-
F81016S040L230S1		16	0,40	2,00	-1,80	7,80	35,80	S1

F835

Kelvin Probe 138 mil Threaded

Centers (mm/mil)	3,50 / 138
Current (Circular)	10,0 A
Current (Internal)	2,0 A
Frequency	2 GHz
Temperature	-20°C...+80°C

Spring Force (cN ±20%)

	Preload	Nominal
Total	-	180
Internal Cont.	30	70
Circular Cont.	50	110
Total	-	410
Internal Cont.	50	110
Circular Cont.	80	300

Travel (mm)

	Nominal	Maximum
Internal Cont.	4,0	5,0
Circular Cont.	4,0	5,0
Wrench Size		2,6
Thread		2,5

Materials and Plating

Internal Cont.	BeCu, gold plated
Circular Cont.	BeCu, gold plated
Barrel	Brass, gold plated
Spring Internal Cont.	Music Wire, silver plated Stainless Steel, silver plated
Spring Circular Cont.	Music Wire, silver plated
Receptacle	Brass, gold plated

Accessories

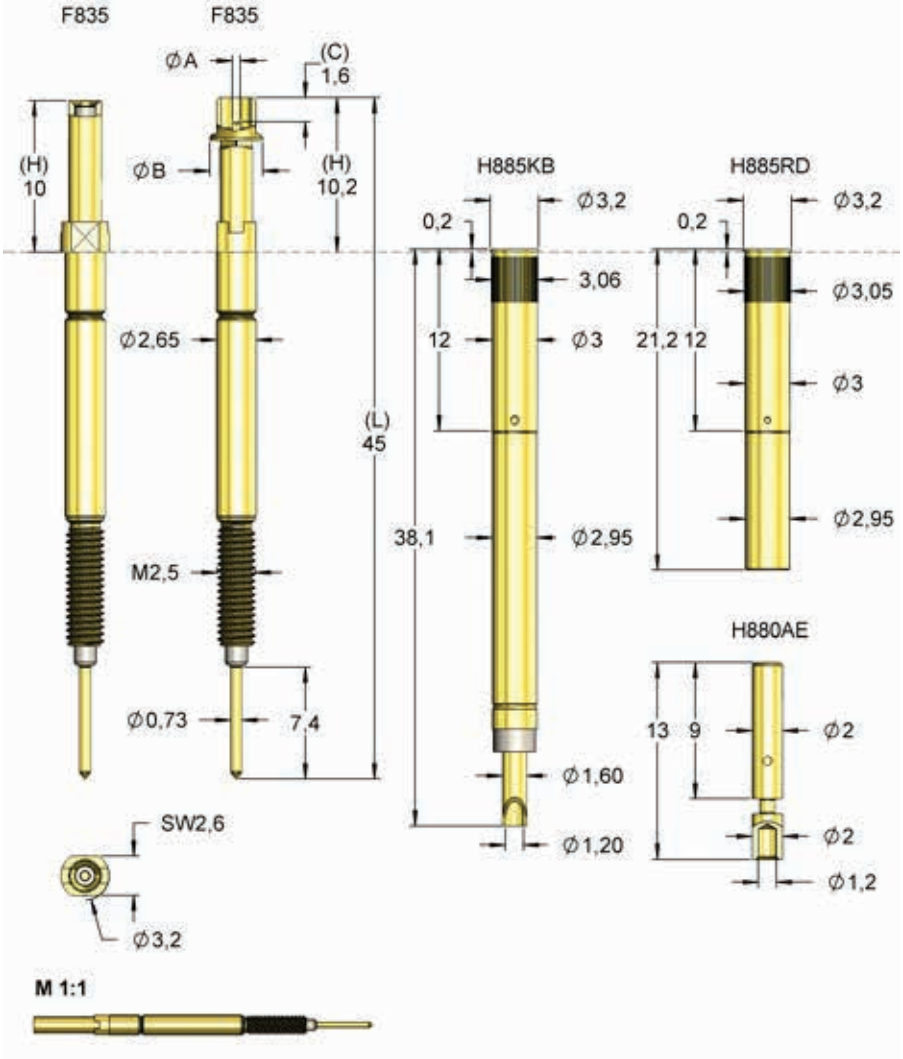
Insertion tool receptacle	FEWZ-774E0
Screw-in tool probe	FWZ885 (T) FWZ885L (T)

Drill Size (mm)

Receptacle without knurl	2,98 - 2,99
Receptacle with knurl	3,00 - 3,02

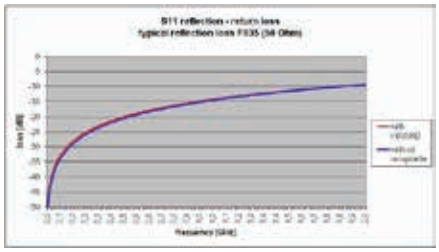
Herausraghöhe (mm)

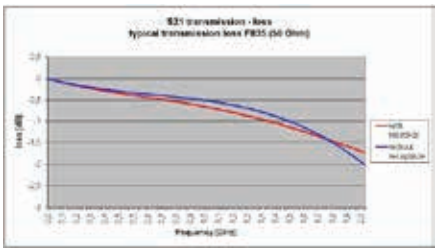
H885... mit F835	H + 0,2



The version F83527B0002G410 is for Kelvin measurement at hybrid connector ECTA.

F83512B0004G120 - HFM-Koax, female; F83505B0005G120 - HFM-Koax, male
F83505B0006G120 - MATE-AX, male; F83511B0003G120 - MATE-AX, female





Order Code	Sense Pin	Tip Style	Ø A	Ø B	C	H	L	Version	Screw-in Tool
F83505B0005G120		05	0,52	2,65	-1,60	10,20	45,00	-	FWZ885S1 (T)
F83505B0006G120		05	0,52	3,20	-1,90	10,50	45,30	-	FWZ760S1 (T)
F83509B0001G180		09	0,64	2,17	0,00	10,00	44,80	-	FWZ885 (T)
F83511B0003G120		11	0,45	2,66	-0,90	9,00	43,80	-	FWZ885S1 (T)
F83512B0004G120		12	0,60	3,20	-0,20	9,00	43,80	-	FWZ760S1 (T)
F83516B0001G410		16	0,64	2,17	0,00	10,00	44,80	-	FWZ885 (T)

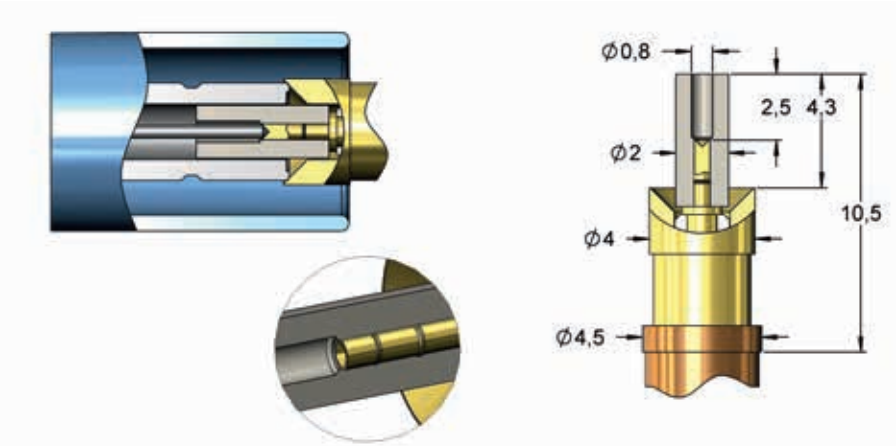
Fakra-Male

F822 Special Versions

Fakra Connector Contacting

Position- and Straightness Test with Insulation Cap

This probe has a leading insulating cap at the inner contact for testing position and straightness of the connector pin. Bended pins or pins with wrong position do not enter the insulating cap and are not able to contact the inner probe plunger. Inner and outer conductor of the Kelvin probe are spring loaded. Receptacles and probe dimensions please see F822.

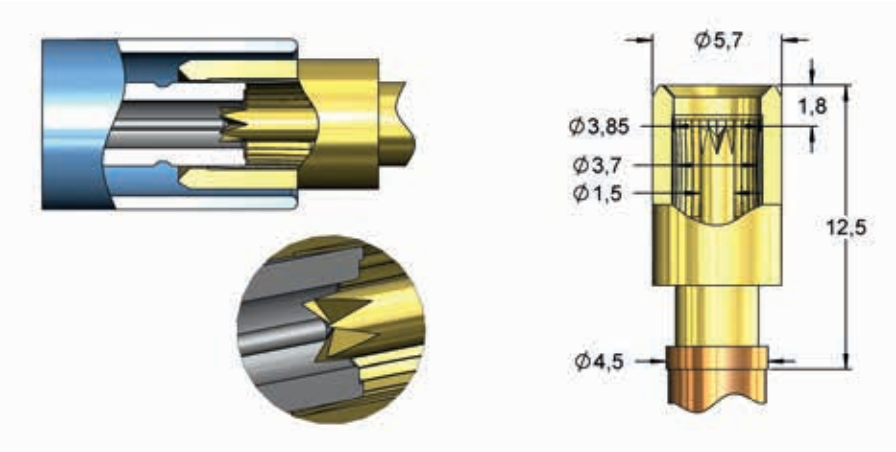


Order code: F82205S0007L650IK25

Fakra Connector Contacting

Lamella Socket for Optimal Ground Contacting

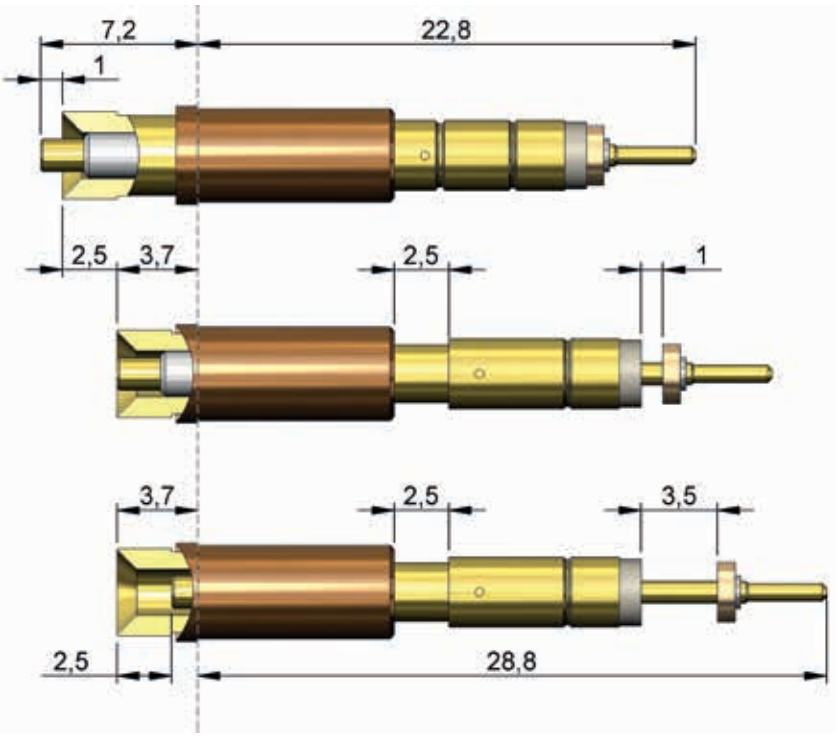
This probe is provided with a bezel at the inner and outer contact to center the connector. The connector ground contacting is securely made by a specific lamella socket, which tolerates deviations of position and angle. Inner and outer conductor of the Kelvin probe are spring loaded. Receptacles and probe dimensions please see F822.



Order code: F82241S0008L650S1

Application Note F822

Depending on the shape of the DUT the travel of inner contact and circular contact might be different. As soon as the circular contact is pushed in, the inner contact is carried along. This might lead to other travels and spring forces than the nominal values.



F822

Kelvin Probe 217 mil
Plug-in

Centers (mm/mil)	5,50 /217
Current (Circular)	6,0 A
Current (Internal)	1,6 A
Frequency	1,2 GHz
Temperature	-40°C...+200°C

Spring Force (cN ±20%)

	Preload	Nominal
Total	-	650
Internal Cont.	100	200
Circular Cont.	250	450

Travel (mm)

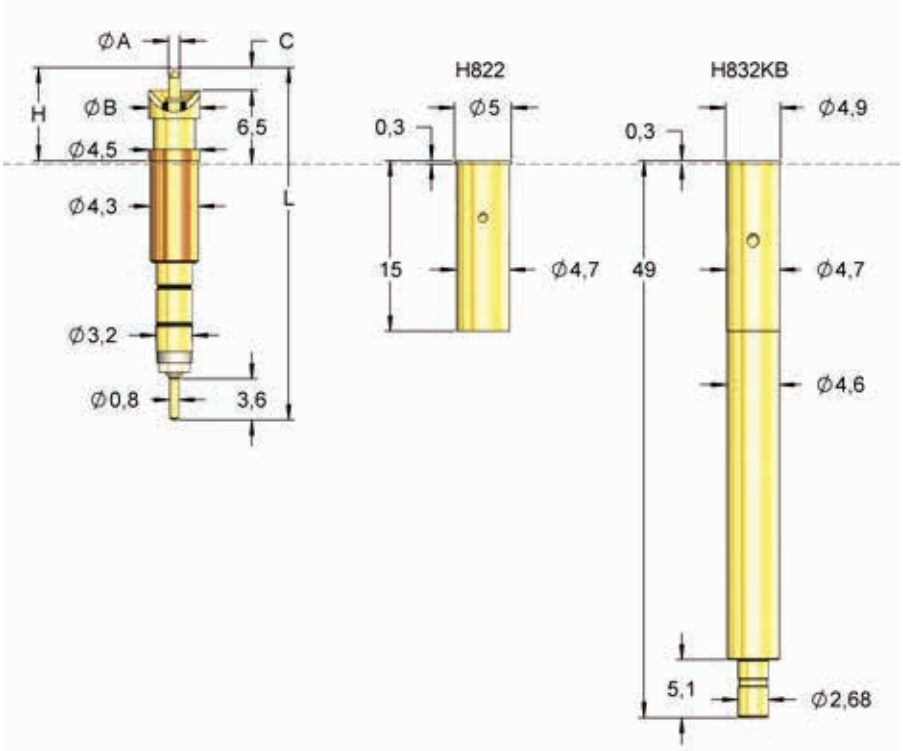
	Nominal	Maximum
Internal Cont.	3,0	3,5
Circular Cont.	2,0	2,6

Materials and Plating

Internal Cont.	Steel, longtime gold plated
Circular Cont.	BeCu, gold plated
Barrel	Bronze, unplated
Spring Internal Cont.	Stainless steel, unplated
Spring Circular Cont.	Stainless steel, unplated
Receptacle	Brass, gold plated

Accessories

Insertion tool receptacle	FEWZ-822E0



Drill Size (mm)

Receptacle without knurl	4,68 - 4,69
Insulating receptacle	5,56 - 5,57

Projection Height (mm)

H8x2... with F822	H + 0,3

Order Code	Sense Pin	Tip Style	Ø A	Ø B	C	H	L	Version
F82201S0018L650		01	0,80	3,20	0,00	8,60	31,40	-
F82202S0016L650		02	1,50	4,00	1,00	7,20	30,00	-
F82203S0011L650		03	0,50	4,00	2,00	8,20	31,00	-
F82203S0001L650		03	1,00	4,00	2,00	8,20	31,00	-
F82203S0014L650		03	1,00	4,00	3,50	9,70	32,50	-
F82203S0003L650		03	1,00	4,50	2,00	8,20	31,00	-
F82203S0015L650		03	1,00	4,50	3,50	9,70	32,50	-
F82205S0007L650IK25		05	0,60	4,00	-2,50	10,50	33,30	IK25
F82205S0001L650		05	1,00	4,00	2,00	8,20	31,00	-
F82205S0003L650		05	1,00	4,50	2,00	8,20	31,00	-
F82205S0005L650		05	1,50	4,00	4,50	10,70	33,50	-
F82209S0016L650		09	1,50	4,00	1,00	7,20	30,00	-
F82211S0012L650		11	0,64	4,50	3,50	9,70	32,50	-
F82217S0006L650		17	0,64	4,00	2,00	8,20	31,00	-
F82217S0016L650		17	1,50	4,00	1,00	7,20	30,00	-
F82239S0001L650		39	1,00	4,00	2,00	8,20	31,00	-
F82241S0008L650S1		41	1,50	5,70	-1,80	12,50	35,30	S1

Accessories for Coaxial Probes F822 / F832

Mounting option 1

Order code: H822
Plug-in receptacle
for soldering
suitable for F822

Order code: H832
Threaded receptacle
for soldering
suitable for F832

Order code: H832RD
Threaded receptacle
with knurl for soldering
suitable for F832

Order code: H822AE
Connection element plug-in
for soldering
suitable for F822/F832

Mounting option 2

Order code: H832KB
Threaded coax combi receptacle
with SSMB Mini connector
suitable for F822/F832

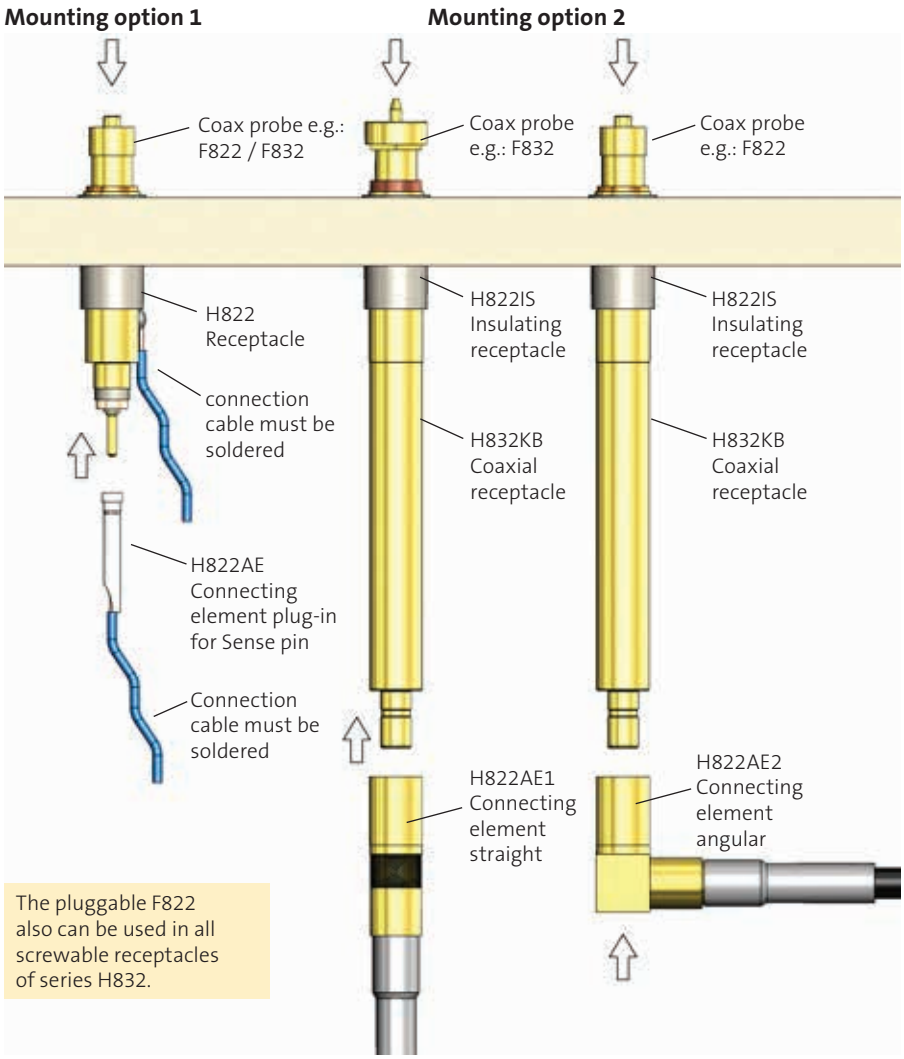
Order code: H822AE1
Connection element with pre-assembled
coaxial cable RG 174 and **straight**
SSMB Mini connector
Impedance: 50 Ohm
Standard length: **600 mm**

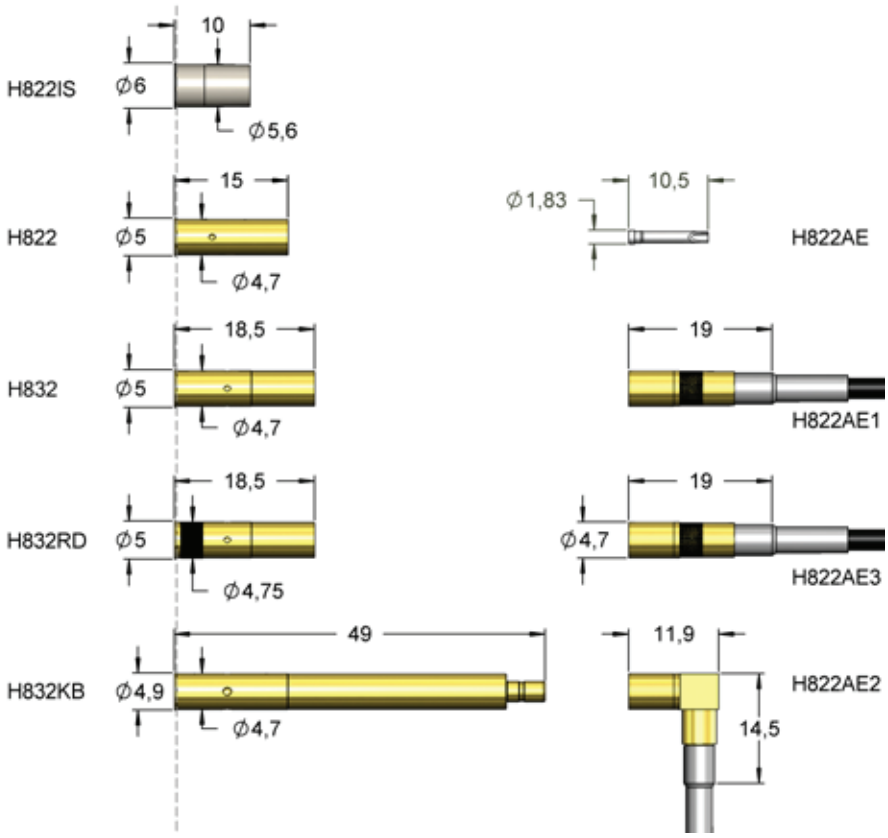
Order code: H822AE2
Connection element with pre-assembled
coaxial cable RG 174 and **angled**
SSMB Mini connector
Impedance: 50 Ohm
Standard length: **600 mm**

Order code: H822AE3
Connection element with pre-assembled
coaxial cable RG 174 and **straight**
SSMB Mini connector
Impedance: 50 Ohm
Standard length: **2000 mm**

Additional option

Order code: H822IS
Plug-in insulating receptacle for insulated
mounting into conductive material
suitable for H822...
for drill holes Ø 5,55 mm

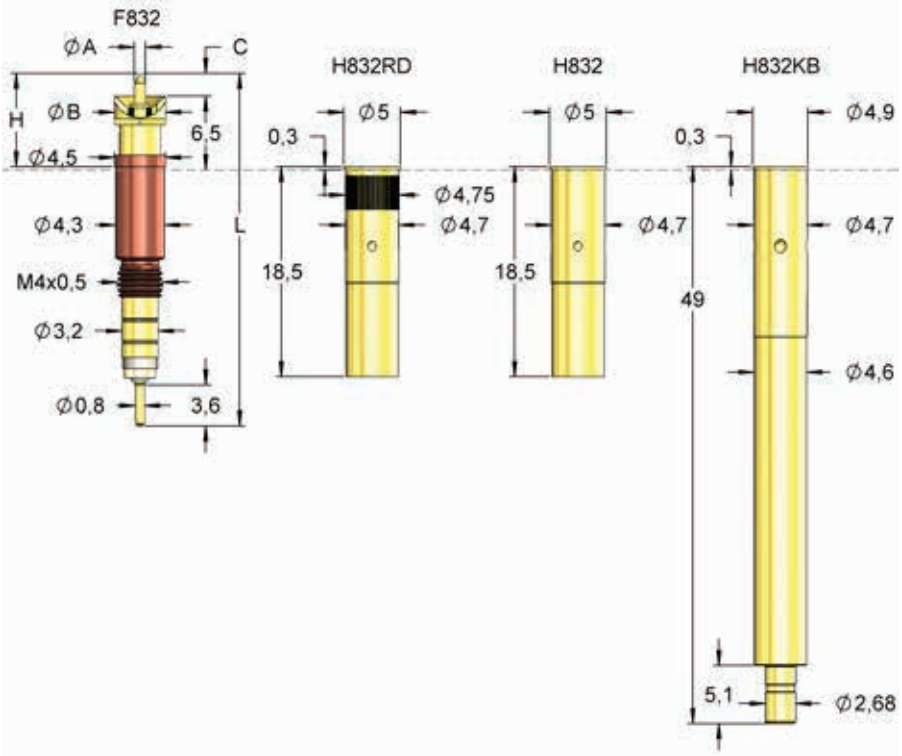




F832

Kelvin Probe 217 mil Threaded

Centers (mm/mil)	5,50 /217
Current (Circular)	6,0 A
Current (Internal)	1,6 A
Frequency	1,2 GHz
Temperature	-40°C...+200°C



Spring Force (cN ±20%)

	Preload	Nominal
Total	-	650
Internal Cont.	100	200
Circular Cont.	250	450

Travel (mm)

	Nominal	Maximum
Internal Cont.	3,0	3,5
Circular Cont.	2,0	2,5
Wrench Size		-
Thread		4,0x0,5

Materials and Plating

Internal Cont.	Steel, longtime gold plated
Circular Cont.	BeCu, gold plated
Barrel	BeCu, unplated
Spring Internal Cont.	Stainless steel, unplated
Spring Circular Cont.	Stainless steel, unplated
Receptacle	Brass, gold plated

Accessories

Insertion tool receptacle	FEWZ-822E0
Screw-in tool probe	FWZ832 (T)

Drill Size (mm)

Receptacle without knurl	4,68 - 4,69
Receptacle with knurl	4,70 - 4,72
Insulating receptacle	5,56 - 5,57

Projection Height (mm)

H832... with F832	H + 0,3

* Center deviating from standard, depending on diameter.

Order Code	Sense Pin	Tip Style	Ø A	Ø B	C	H	L	Version	Screw-in Tool
F83203S0001L650		03	1,00	4,00	2,00	8,50	31,00	-	FWZ832; FWZ832T
F83203S0003L650		03	1,00	4,50	2,00	8,50	31,00	-	FWZ832; FWZ832T
F83203S0005L650		03	1,00	4,50	3,50	10,00	32,50	-	FWZ832; FWZ832T
F83205S0008L650IK10		05	0,60	4,00	2,80	9,30	31,80	IK	FWZ832; FWZ832T
F83205S0007L650IK25		05	0,60	4,00	4,30	10,50	33,30	IK	FWZ832; FWZ832T
F83205S0001L650		05	1,00	4,00	2,00	8,50	31,00	-	FWZ832; FWZ832T
F83205S0003L650		05	1,00	4,50	2,00	8,50	31,00	-	FWZ832; FWZ832T
F832110017L650		11	0,65	* 6,00	1,50	8,00	30,50	-	FWZ832; FWZ832T
F83239S0001L650		39	1,00	5,00	2,00	8,50	31,00	-	FWZ832; FWZ832T

F840

Kelvin Probe 275 mil Plug-in

Centers (mm/mil)	7,00 / 275
Current (Circular)	30,0 A
Current (Internal)	5,0 A
Frequency	-
Temperature	-20°C...+80°C

Spring Force (cN ±20%)

	Preload	Nominal
Total		1780
Internal Cont.	200	280
Circular Cont.	100	1500

Travel (mm)

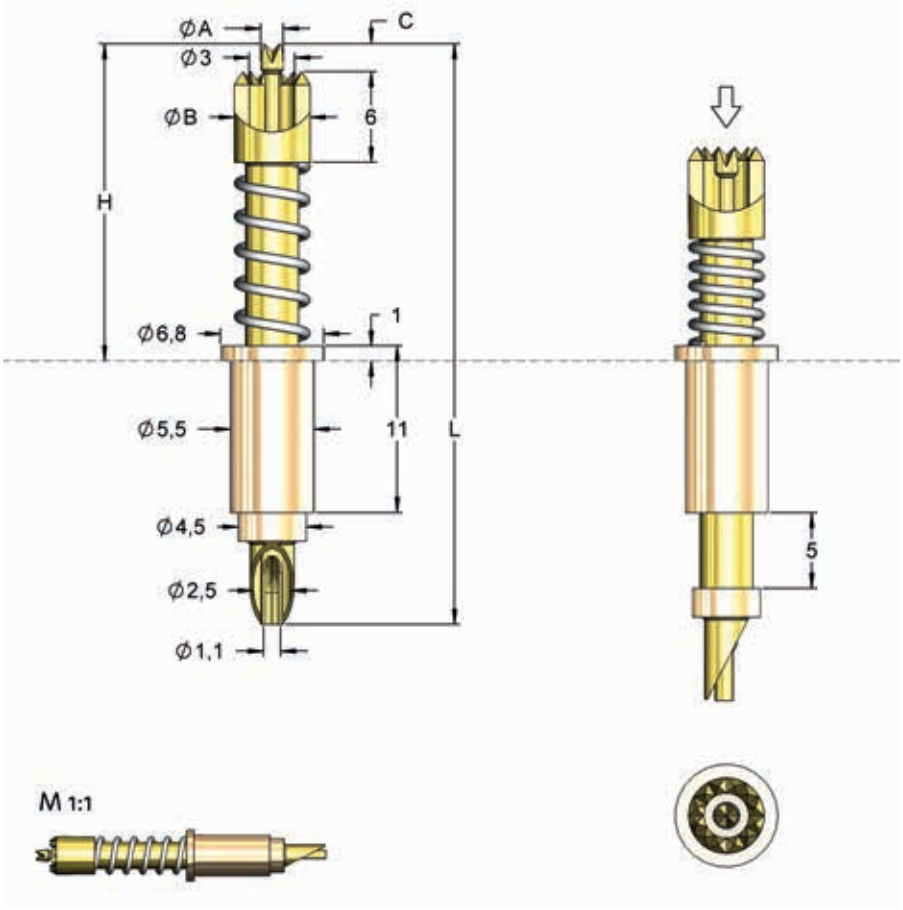
	Nominal	Maximum
Internal Cont.	1,9	6,4
Circular Cont.	5,0	5,5

Materials and Plating

Internal Cont.	Stahl, longtime gold plated
Circular Cont.	Stahl, longtime gold plated
Barrel	Brass, unplated
Spring Internal Cont.	Music Wire, silver plated
Spring Circular Cont.	Music Wire, silver plated

Drill Size (mm)

Barrel-Ø	5,49 -5,51



Order Code	Sense Pin	Tip Style	Ø A	Ø B	C	H	L	Version
F84014S150L1780		14	1,50	5,00	1,85	21,00	38,85	-

F819

For electrical contacting of HSD female

Centers (mm/mil)	12,0 / 472
Current (Circular)	10,0 A
Current (Internal)	3,0 A
Temperature	-20°C...+80°C

Spring Force (cN ±20%)

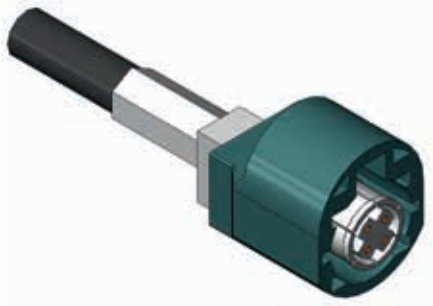
	Preload	Nominal
Total	-	2020
Internal Cont.	75	130
Circular Cont.	900	1500

Travel (mm)

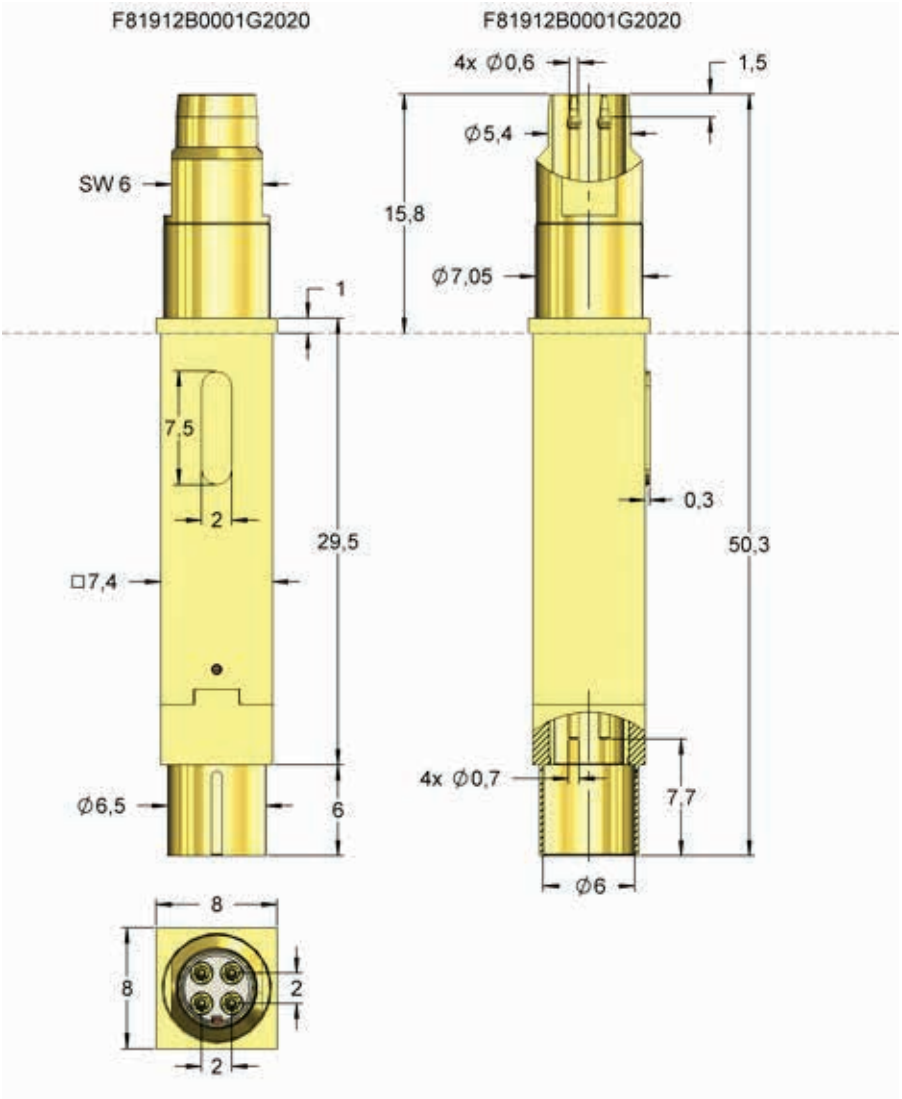
	Nominal	Maximum
Internal Cont.	3,0	5,8
Circular Cont.	5,0	6,0
Wrench Size		6,0

Materials and Plating

Internal Cont.	BeCu, gold plated
Circular Cont.	BeCu, gold plated
Barrel	Brass, gold plated
Spring Internal Cont.	Music Wire, silver plated
Spring Circular Cont.	Stainless steel, unplated



HSD-Female (H819AE1)



The F819 combines several advantages: Conical inlet of the external as well as internal contact for better contacting and compensation of tolerances. In addition, the screwed internal contacts (F17512B0023G150SPS1) prevent the contact from being pulled out of the receptacle. The probe is used for purely electrical contacting of HSD females.

By combining the connection elements H819AE2 and H819AE1 a **defined and reproducible measuring** setup with fix parameters can be realized.

HF819 H819AE2 H819AE1

Connection units selectable

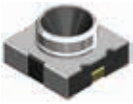
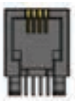
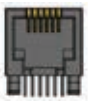
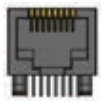
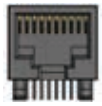
HF819 H819AE3 for direct soldering

* deviating from standard, depending on diameter.

Order Code	Sense Pin	Tip Style	Ø A	Ø B	C	H	L	Version
F81912B0001G2020		12 *	max. 0,60	max. 5,40	- 1,50	15,80	50,30	-

RADIO FREQUENCY PROBES

OVERVIEW OF CONNECTORS

GSC-Male	HSC-Male	JSC-Male	KSC-Switch	LSC-Male
				
MHF-Male	MHF5-Male	SWD-Switch	SWF-Switch	SWG-Switch
				
SWH-Switch	SWJ-Switch	U.FL-Male		
				
BMA-Male	BNC-Female	DIN 1,0/2,3-Female	FME-Male	FAKRA-Male
				
FAKRA-Female	GT16 Male	HSD-Male	HSD-Female	HFM-Male
				
MATE-AX-Male	MMBX-Female	MMCX-Female	mSMP-Male	N-Type-Female
				
QMA-Female	RF-Male	R-TNC-Female	R-SMA-Female	SMA-Female
				
SMB-Female	SMB-Male	SMC-Male		
				
PCB GSG	PCB-coax-closed	PCB-coax-open	PCB-coax-kidney	PCB GSG
				
PCB GGSGG		F-Type	HDMI 1.4	HDMI 2.0
				
RCA	RJ-9	RJ-11	RJ-45	RJ-50
				
Mikro-USB	Mini-USB	USB 2.0 A	USB 3.0 A	USB 3.1 C
				

Coaxial Probes for RF-Applications

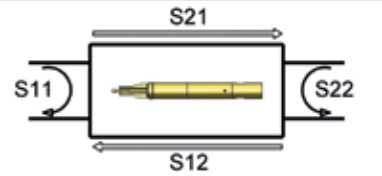
For transmitting RF signals with coaxial probes the inner conductor carries the signal whereas the outer conductor serves as a shielding.

Typical applications are contacting various standard RF connectors or sockets like e.g. Fakra, HSD, SMA, SMB, SMC connectors or even very small SMD assembled switch connectors or direct test points on a PCB.

Radio Frequency Probes

Design of RF-Probes
Spring contact probes for RF-applications are coaxial probes. The inner and outer conductors are designed and dimensioned according the RF specific requirements. That means the signals within a wide frequency band are transmitted with a minimum loss. For evaluation of RF-probes various definitions and parameters are relevant.

Two-Port Network
The common two-port network describes the characteristics of possible transmission paths. These can be wires, radio transmissions or RF-contact probes.



S-Parameters
In radio frequency technology the transmission characteristics of two-port networks are described by S-parameters (scattering parameters). The S-parameters are typically specified as attenuation given in decibel [dB].

S11: Reflection loss head-sided
S21: Insertion loss
Contact head for terminal element
S12: Insertion loss connection-side
S22: Reflection loss output side

Matching
The matching always refers to the impedance of the DUT and its RF related environment. The more constant the impedance on the transmission path, the better is the reflection and transmission behavior. For RF testing always the complete transmission path of DUT, RF-probe and connecting element has to be considered. A major part of the signal loss is caused by mismatching between RF probe and DUT.

The diagrams given in the specifications partly contain two characteristic curves. These are the performance of the HF860 with and without test specimen in the form of an HF connector and connection element including cable. The type and length of the cable also influence the transmitted signal quality and can reduce the bandwidth. If only one characteristic curve is specified for the S-parameters, the interfaces to the DUT and connection element are included.

Insertion Loss
The insertion loss describes the transmission behavior of a two-port network and is represented by the value S21. Very often the 3dB cutoff frequency is used as characteristic value. This is the frequency with an attenuation of -3dB. At this frequency the power has reduced by 50% and the voltage by 30%.

Frequency
The values for frequency stored in the catalogue correspond to the maximum operating frequency recommended by FEINMETALL. Depending on the application and the permissible transmission quality, the radio-frequency probes can also be used beyond this. On request, diagrams with the frequency characteristics are available.

New Codes for RF-Probes

RF-Series	DUT	Mounting version	Center
z.B. HF60-0001	SMA-F	8 P	MCX -

Number	Cutoff frequency *	Connection

Order code:

Is composed of RF-Series and number

DUT (e.g.):

SMA-F (Female)
SMB-M (Male)
GSG (Ground-Signal-Ground)

Mounting options:

F (flange)
P (plug-in)
S (threaded)

Center:

Center specifies only distance ground to signal, otherwise the field is left blank

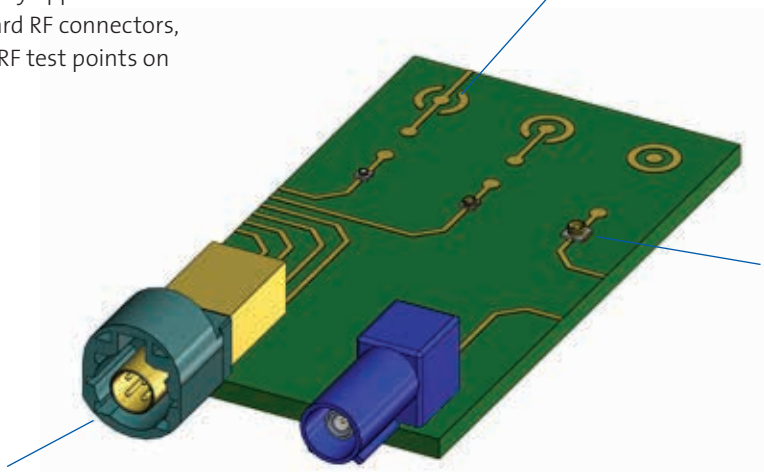
* the specified value is the recommended maximum operating frequency.

Coaxial Probes

for Radio Frequency Tests and Transmission of Radio Frequency Signals

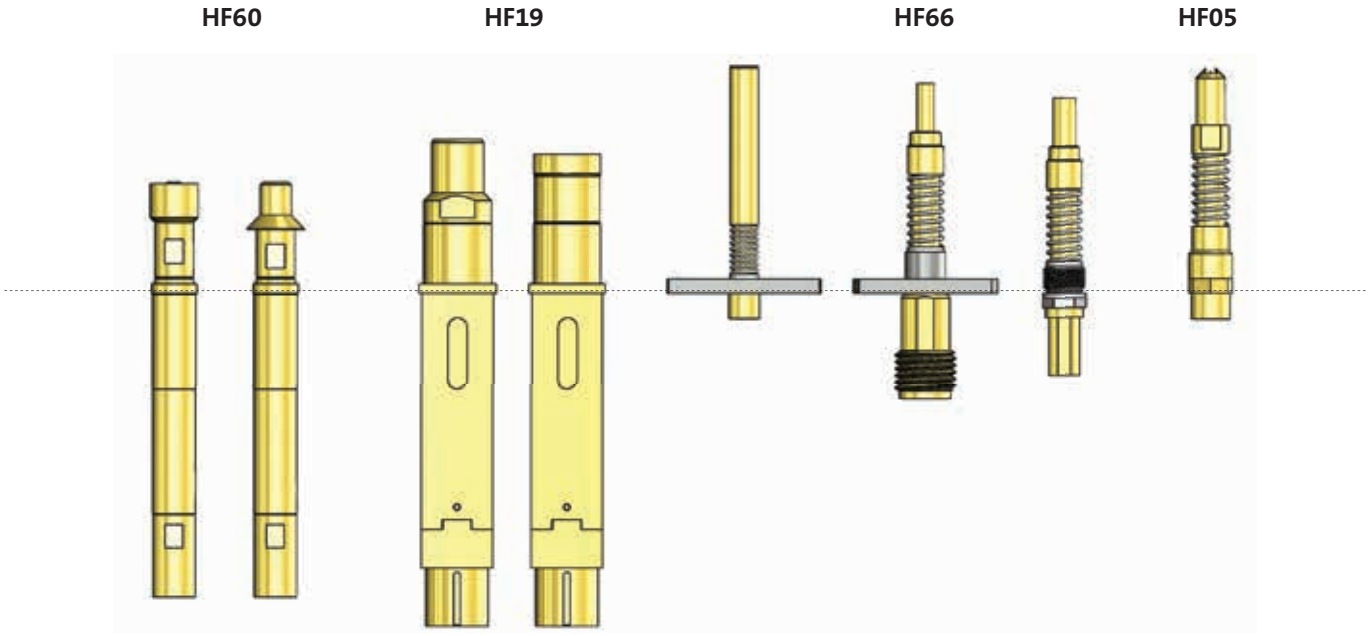
FEINMETALL offers sophisticated contact solutions for various industries and applications. Coaxial probes cover a wide range of radio frequency applications like contacting standard RF connectors, switch connectors or RF test points on the PCB.

PCB Test Points
For RF contacts directly on the PCB special RF probes are available. The probe design of these probes (e.g. HF05, HF60) is adapted to the typical requirements of the test points.



SMD mini coax and SMD switch connectors
are used on PCBs as RF interfaces. To contact these FEINMETALL provides different types of RF probes (e.g. HF66).

Connectors
In various telecommunications, consumer electronics and automotive applications different standard connectors like SMA, SMB, SMC, HSD are used. FEINMETALL offers different probe series for contacting these connectors (e.g. HF60, HF19, HF66).



DUT	Order number	Description	Freq. [GHz]	Internal Contact	Tool	cable connection
1,0-2,3-F	HF86002B0021G530	HF60-0021 1,0-2,3-F 4 P MCX	4	F08602B080G130	FZWZ-004 / FDWZ-050	MCX
BMA-M	HF86005B0011G530	HF60-0011 BMA-M 4 P MCX	4	F08605B150G130	FZWZ-005 / FDWZ-050	MCX
BNC-F	HF86002B0016G550	HF60-0016 BNC-F 4 P MCX	4	-	-	MCX
FAKRA-F	HF86002B0012G930	HF60-0012 FAKRA-F 6 P MCX	6	F08602B080G130S1	FZWZ-004 / FDWZ-050	MCX
FAKRA-M	HF86005B0006G470	HF60-0006 FAKRA-M 6 P MCX	6	F08605B150G130	FZWZ-005 / FDWZ-050	MCX
FAKRA-M	HF86005B0026G550	HF60-0026 FAKRA-M 6 P MCX	6	F08605B150G130	FZWZ-005 / FDWZ-050	MCX
FAKRA-M	HF66-0017	HF66-0017 FAKRA-M 6 F MCX	6	-	-	MCX
FME-M	HF86005B0022G790	HF60-0022 FME-M 2 P MCX	2	F08605B150G190	FZWZ-005 / FDWZ-050	MCX
GT16-M	HF86005B0023G530	HF60-0023 GT16-M 4 P MCX	4	F08605B090G130	FZWZ-004 / FDWZ-050	MCX
HFM-M	HF77-0001BG01-1	HF77-0001 HFM-M F MSMP BG01-1	12	-	-	mSMP-F
HFM-M (4-fach)	HF77-0001BG04-1	HF77-0001 HFM-M S MSMP BG04-1	12	-	-	mSMP-F
HSC	HF66-0006	HF66-0006 HSC 6 S M-SMP	6	-	-	mSMP-F
HSC	HF66-0008	HF66-0008 HSC 6 F SMA	6	-	-	SMA-M
HSD-M	HF81905B0001G1270	HF19-0001 HSD-M 2 P H819AE2-3	2	F08605B090G130	FZWZ-004 / FDWZ-050	H819AE2 + H819AE1 / H819AE3
HSD-F	HF81912B0002G2020	HF19-0002 HSD-F 2 P H819AE2-3	2	F08612B0003G130SP	FZWZ-004 / FDWZ-050	H819AE2 + H819AE1 / H819AE3
HSD-M	HF81914S0004L1270	HF19-0004 HSD-M 2 P H819AE4	2	F08614S090L130	FZWZ-004 / FDWZ-050	H819AE4
HSD-M	HF81955B1005G2000	HF19-0005 HSD-M 3 P HSD	3	F08655B090G130	FZWZ-004 / FDWZ-050	H819AE1
HSD-M	HF81955B1006G2020	HF19-0006 HSD-M 3 P HSD	3	F08655B120G130	FZWZ-005 / FDWZ-050	H819AE1
JSC	HF66-0002	HF66-0002 JSC 6 S M-SMP	6	-	-	mSMP-F
JSC	HF66-0010	HF66-0010 JSC 6 S M-SMP	6	-	-	mSMP-F
JSC	HF66-0012	HF66-0012 JSC 6 F SMA	6	-	-	SMA-M
KSC	HF66-0003	HF66-0003 KSC 6 F SMA	6	-	-	SMA-M
KSC	HF66-0005	HF66-0005 KSC 6 F M-SMP	6	-	-	mSMP-F
KSC	HF66-0016	HF66-0016 MHF5-KSC 6 F M-SMP	6	-	-	mSMP-F
LSC	HF66-0004	HF66-0004 LSC 6 F M-SMP	6	-	-	mSMP-F
LSC	HF66-0011	HF66-0011 LSC 6 F SMA	6	-	-	SMA-M
MATE AX-M	HF77-0002BG01-1	HF77-0002 MATE AX-M F MSMP BG01-1	12	-	-	mSMP-F
MATE AX-M (4-fach)	HF77-0002BG04-1	HF77-0002 MATE AX-M S MSMP BG04-1	12	-	-	mSMP-F
MHF	HF66-0014	HF66-0014 MHF-U.FL 6 F M-SMP	6	-	-	mSMP-F
MHF5	HF66-0016	HF66-0016 MHF5-KSC 6 F M-SMP	6	-	-	mSMP-F
MMBX-F	HF86002B0024G530	HF60-0024 MMBX-F 4 P MCX	4	F08602B110G130	FZWZ-005 / FDWZ-050	MCX
MMCX-F	HF86002B0014G530	HF60-0014 MMCX-F 6 P MCX	6	-	-	MCX
MSMP-M	HF86005B0013G530	HF60-0013 MSMP-M 6 P MCX	6	-	-	MCX
N-F	HF86002B0027G430	HF60-0027 N-F 6 P MCX	6	F08602B300G130S1	-	MCX

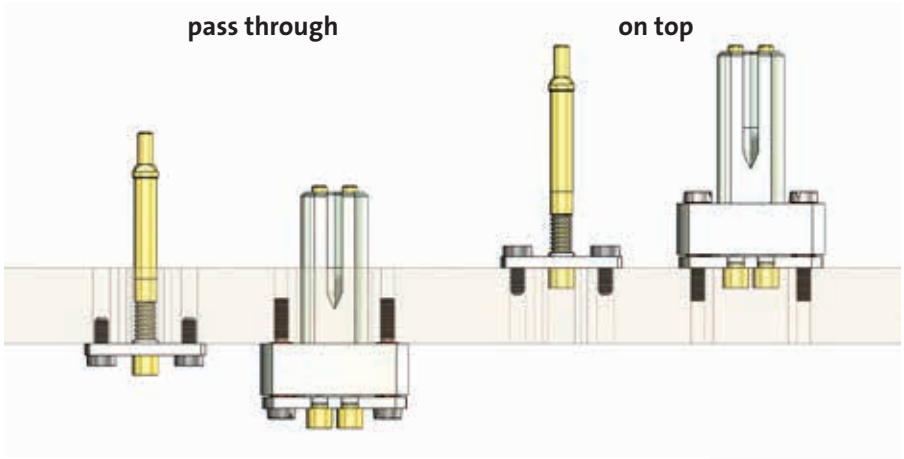
DUT	Order number	Description	Freq. [GHz]	Internal Contact	Tool	cable connection
PCB-coax-closed	HF86018B0019G530	HF60-0019 PCB-coax-closed 4 P MCX	4	-	-	MCX
PCB-coax-kidney	HF86018B0020G530	HF60-0020 PCB-coax-kidney 4 P MCX	4	-	-	MCX
PCB-coax-open	HF86002B0008G530	HF60-0008 PCB-coax-open 6 P MCX	6	-	-	MCX
PCB-coax-open	HF86018B0010G530	HF60-0010 PCB-coax-open 6 P MCX	6	-	-	MCX
PCB-GGS-GG	HF86002B0025G960	HF60-0025 GGSGG 4 P MCX 135	4	-	-	MCX
PCB-GSG	HF86002B0009G960	HF60-0009 GSG 6 P MCX 135	6	-	-	MCX
PSB-GSG	HF05-0001	HF05-0001 GSG 6 F M-SMP 050	6	-	-	mSMP-F
PSB-GSG	HF05-0002	HF05-0002 GSG 6 F M-SMP 050	6	-	-	mSMP-F
QMA-F	HF86002B0017G730	HF60-0017 QMA-F 6 P MCX	6	-		MCX
RF-M	HF86005B0007G530	HF60-0007 RF-M 6 P MCX	6	F08605B090G130	FZWZ-004 / FDWZ-050	MCX
R-SMA-F	HF86005B0018G530	HF60-0018 R-SMA-F 6 P MCX	6	F08605B150G130	FZWZ-005 / FDWZ-050	MCX
R-TNC-F	HF86005B0015G450	HF60-0015 R-TNC-F 2 P MCX	2	F08605B150G130	FZWZ-005 / FDWZ-050	MCX
SMA-F	HF86002B0001G530	HF60-0001 SMA-F 8 P MCX	8	F08602B180G130	FZWZ-006 / FDWZ-050	MCX
SMB-F	HF86002B0005G530	HF60-0005 SMB-F 6 P MCX	6	F08602B080G130	FZWZ-004 / FDWZ-050	MCX
SMB-M	HF86005B0004G530	HF60-0004 SMB-M 5 P MCX	5	F08605B150G130	FZWZ-005 / FDWZ-050	MCX
SMC-M	HF86005B0003G530	HF60-0003 SMC-M 5 P MCX	5	F08605B150G130	FZWZ-005 / FDWZ-050	MCX
SWD	HF66-0013	HF66-0013 SW-D-F-G 6 F SMA	6	-	-	SMA-M
SWF	HF66-0013	HF66-0013 SW-D-F-G 6 F SMA	6	-	-	SMA-M
SWF	HF66-0015	HF66-0015 SWF 6 F SMA	6	-	-	SMA-M
SWG	HF66-0007	HF66-0007 SWG 6 F SMA	6	-	-	SMA-M
SWG	HF66-0013	HF66-0013 SW-D-F-G 6 F SMA	6	-	-	SMA-M
SWH	HF66-0009	HF66-0009 SWH 6 S M-SMP	6	-	-	mSMP-F
SWJ	HF66-0001	HF66-0001 SWJ 6 F M-SMP	6	-	-	mSMP-F
U.FL-M	HF86005B0002G530	HF60-0002 U.FL-M 5 P MCX	5	-	FZWZ-004 / FDWZ-050	MCX
U.FL-M	HF66-0014	HF66-0014 MHF-U.FL 6 F M-SMP	6	-	-	mSMP-F
				-	-	

HF77

NEW

Assembly of the RF-probe

The probe variants of the HF77 can be mounted on or through a mounting plate.



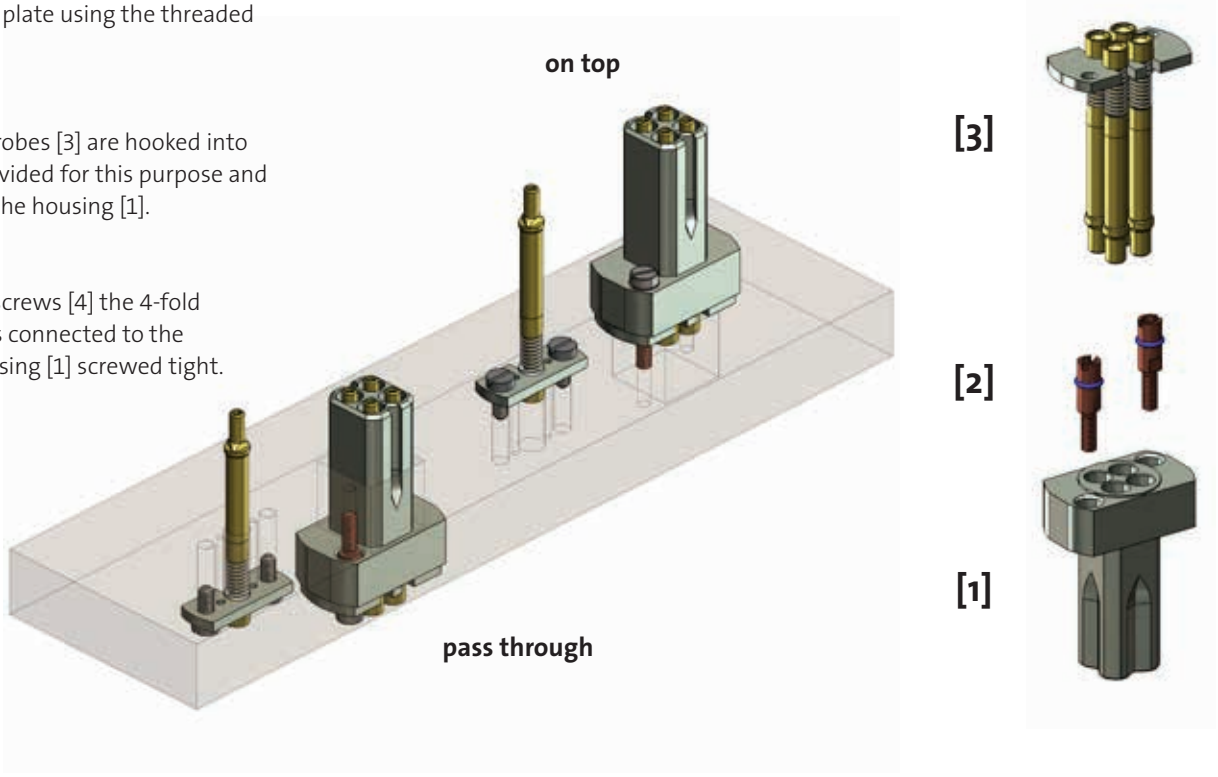
Variant: Single plug
Here the probe can simply be screwed to the mounting plate by means of a flange.

Variant: 4-fold plug

Step 1
The module housing [1] is screwed onto the mounting plate using the threaded pins [2].

Step 2
The four HF probes [3] are hooked into the flange provided for this purpose and inserted into the housing [1].

Step 3
With the M2 screws [4] the 4-fold assembly [3] is connected to the assembly-housing [1] screwed tight.

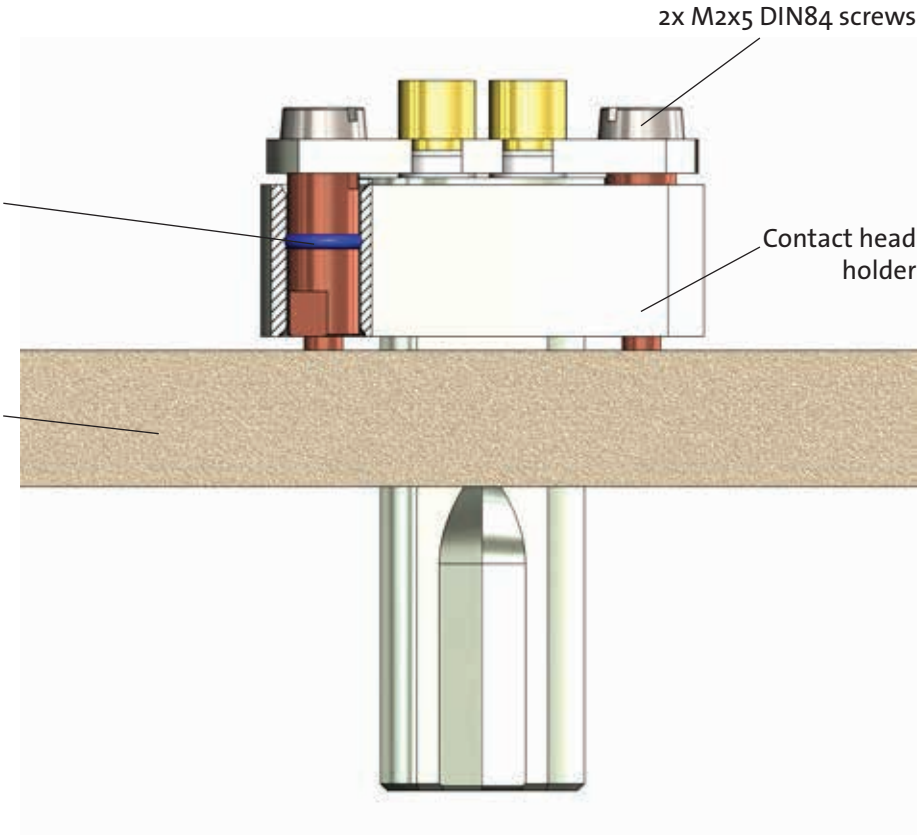


Change of RF-probe

With the release tool FUWZ-001 the pin can be released from the flange. The chamfered tip of the tool is inserted between the flange and the synthetic stop of the spring. Then the spring can be pressed in with the tool and the probe can be pulled out of the groove of the flange. In the same way, the Mini SMP cable connection can be simply pulled off without pulling on the cable.

Floating bearing of the radio frequency block HF77

Description Structure

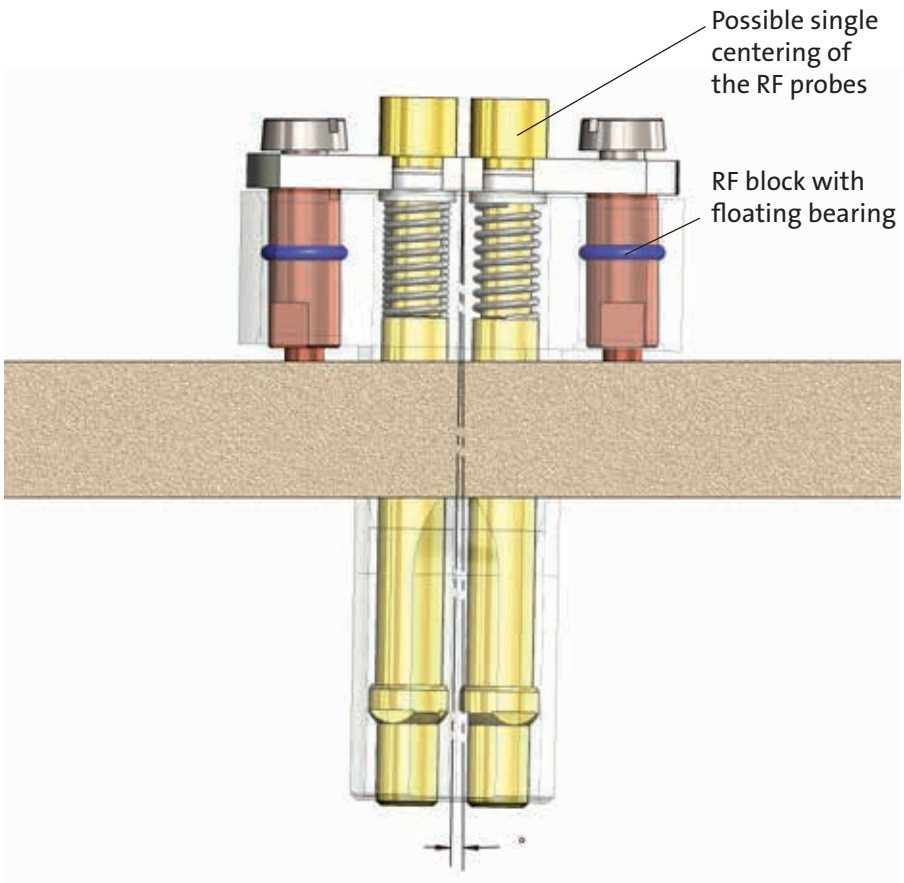


functional principle

The collar length of the special screws is slight longer than the collar of the Contact head holder.

Because of the fixed O-ring at the special screw, the Contact head holder is floating and can compensate positional tolerances that may occur.

In addition, each RF-probe is able to float separately inside the Contact head holder.



HF77-0001 HFM-M F MSMP BG01-1

Contacting HFM-Male

NEW

Centers (mm/mil)	4,00 / 157
Current (Circular)	0,5 A
Current (Internal)	0,1 A
Impedance [Z]	50 Ohm
Frequency	12 GHz
Temperature	-20°C...+80°C

Spring Force (cN ±20%)

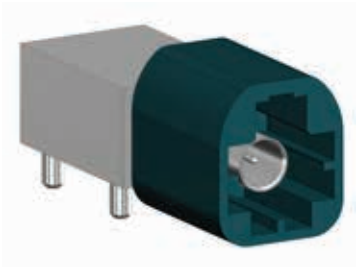
	Preload	Nominal
Internal Cont.	95	120
Circular Cont.	230	420

Travel (mm)

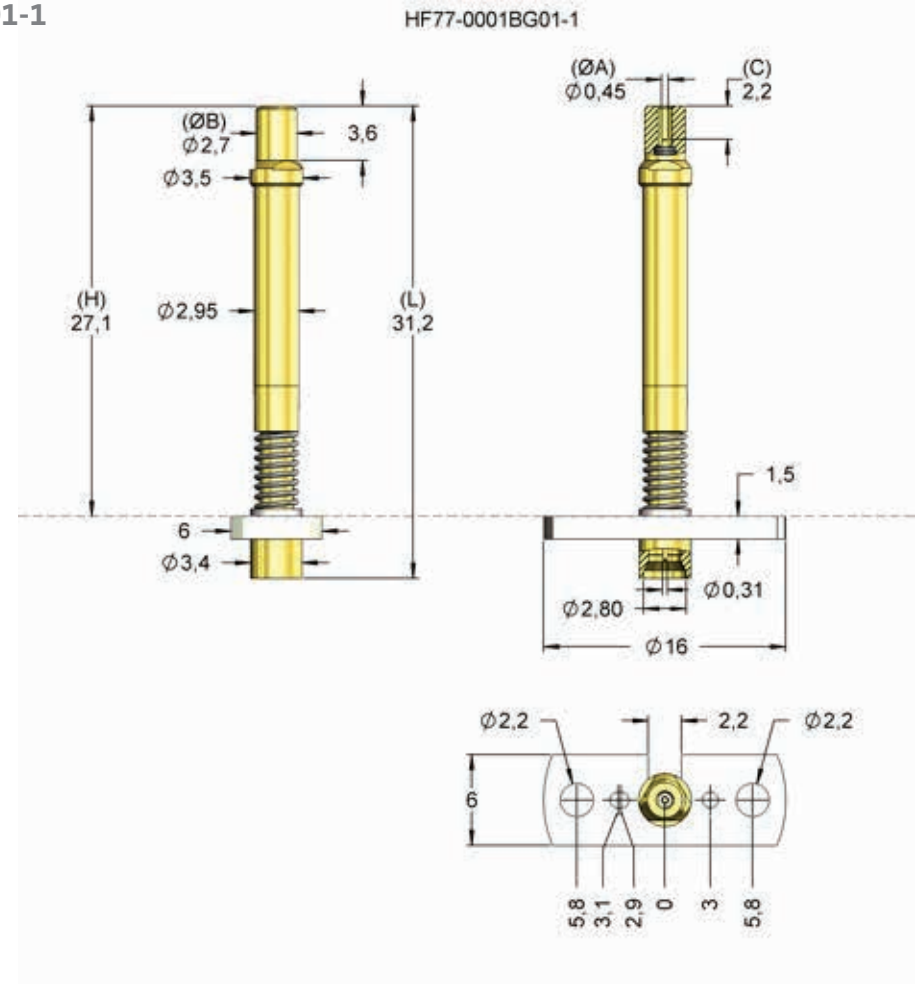
	Nominal	Maximum
Internal Cont.	0,5	1,8
Circular Cont.	2,0	2,8
Wrench Size		-

Materials and Plating

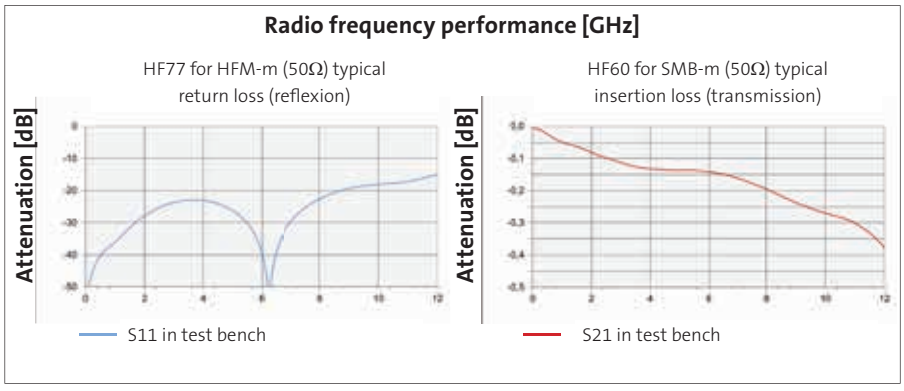
Internal Cont.	BeCu, gold plated
Circular Cont.	BeCu, gold plated
Barrel	Brass, gold plated
Spring Internal Cont.	Music Wire, gold plated
Spring Circular Cont.	Stainless steel, unplated



HFM-Male



The probe can be mounted using the flange. Cable connection with standard connector Mini SMP female. In the HF77-0001BG01-1 the HF7716B0001G530 with flange was installed.



Order Code	Description	Sensepin	Tip Style	Ø A	Ø B	C	H	L	Version
HF77-0001BG01-1	HF77-0001 HFM-M F MSMP BG01-1		16	0,45	2,70	-2,20	27,10	31,20	-

HF77-0001 HFM-M S MSMP BG04-1

Contacting 4-pole HFM-Male

NEW

Centers (mm/mil)	4,00 / 157
Current (Circular)	0,5 A
Current (Internal)	0,1 A
Impedance [Z]	50 Ohm
Frequency	12 GHz
Temperature	-20°C...+80°C

Spring Force (cN ±20%)

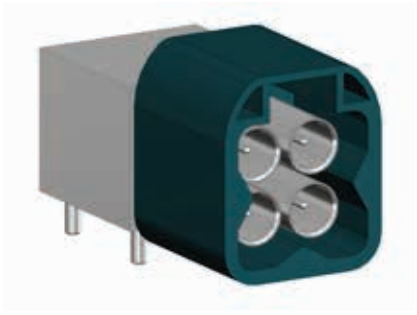
	Preload	Nominal
Internal Cont.	95	120
Circular Cont.	230	420

Travel (mm)

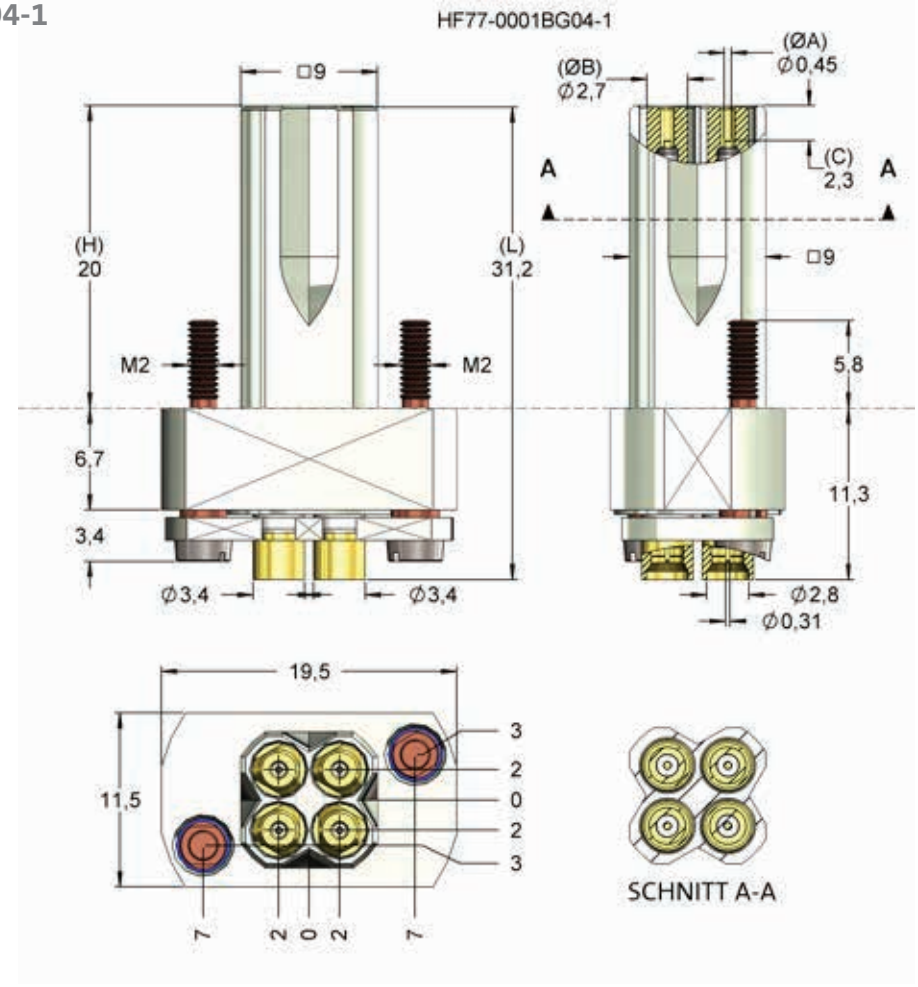
	Nominal	Maximum
Internal Cont.	0,5	1,8
Circular Cont.	2,0	2,8
Wrench Size		-

Materials and Plating

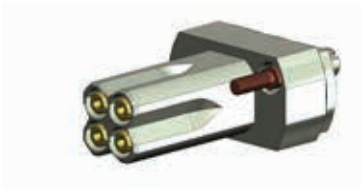
Internal Cont.	BeCu, gold plated
Circular Cont.	BeCu, gold plated
Barrel	Brass, gold plated
Spring Internal Cont.	Music Wire, gold plated
Spring Circular Cont.	Stainless steel, unplated

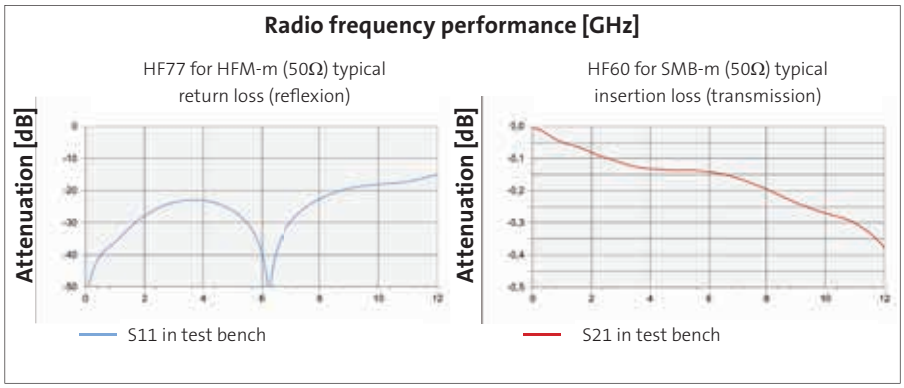


HFM-Male (4-pole)



The block can be mounted using the flange. Cable connection with standard connector Mini SMP female. In the HF77-0001BG04-1 the HF7716B0001G530 was installed four times.





Order Code	Description	Sensepin	Tip Style	Ø A	Ø B	C	H	L	Version
HF77-0001BG04-1	HF77-0001 HFM-M S MSMP BG04-1		16	0,45	2,70	-2,30	20,00	31,20	-

HF77-0002 MATE AX-M F MSMP BG01-1

Contacting MATE AX-Male

NEW

Centers (mm/mil)	4,00 / 157
Current (Circular)	0,5 A
Current (Internal)	0,1 A
Impedance [Z]	50 Ohm
Frequency	12 GHz
Temperature	-20°C...+80°C

Spring Force (cN ±20%)

	Preload	Nominal
Internal Cont.	95	120
Circular Cont.	230	420

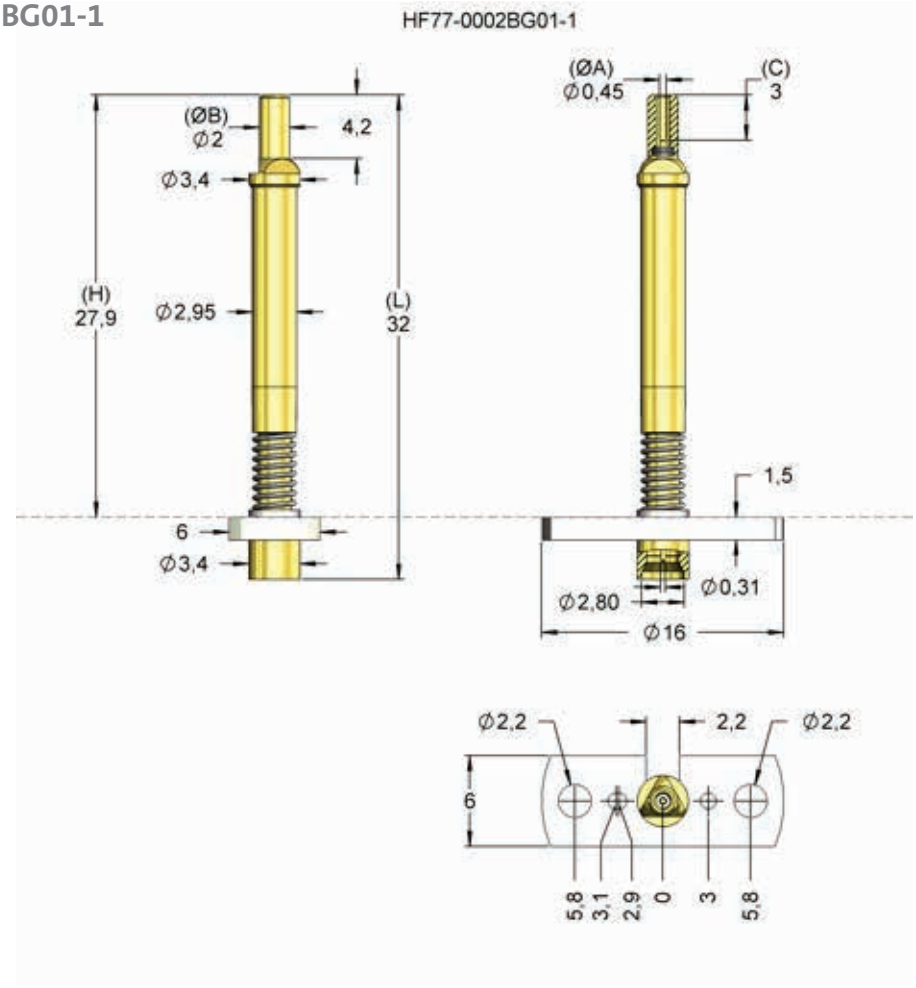
Travel (mm)

	Nominal	Maximum
Internal Cont.	0,5	1,8
Circular Cont.	2,0	2,8
Wrench Size		-

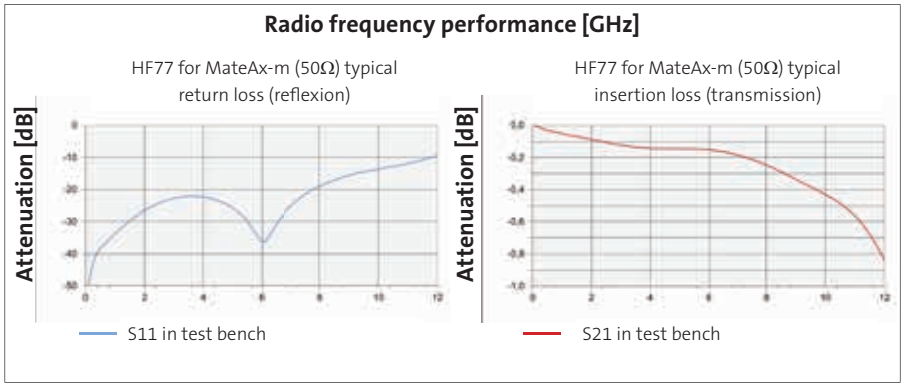
Materials and Plating

Internal Cont.	BeCu, gold plated
Circular Cont.	BeCu, gold plated
Barrel	Brass, gold plated
Spring Internal Cont.	Music Wire, gold plated
Spring Circular Cont.	Stainless steel, unplated

MATE AX-Male



The probe can be mounted using the flange. Cable connection with standard connector Mini SMP female. In the HF77-0002BG01-1 the HF7716B0002G530 with flange was installed.



Order Code	Description	Sensepin	Tip Style	Ø A	Ø B	C	H	L	Version
HF77-0002BG01-1	HF77-0002 MATE AX-M F MSMP BG01-1		16	0,45	2,00	-3,00	27,90	32,00	-

HF77-0002 MATE AX-M S MSMP BG04-1

Contacting 4-pole MATE AX-Male

NEW

Centers (mm/mil)	4,00 / 157
Current (Circular)	0,5 A
Current (Internal)	0,1 A
Impedance [Z]	50 Ohm
Frequency	12 GHz
Temperature	-20°C...+80°C

Spring Force (cN ±20%)

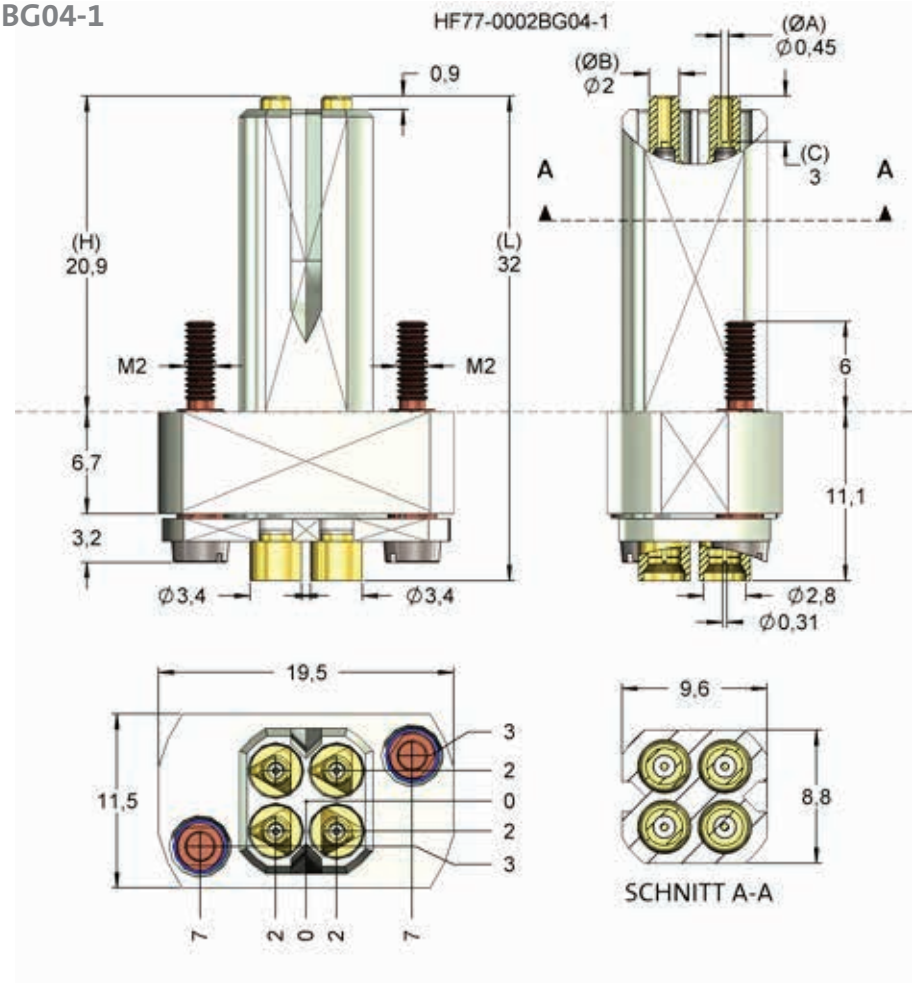
	Preload	Nominal
Internal Cont.	95	120
Circular Cont.	230	420

Travel (mm)

	Nominal	Maximum
Internal Cont.	0,5	1,8
Circular Cont.	2,0	2,8
Wrench Size		-

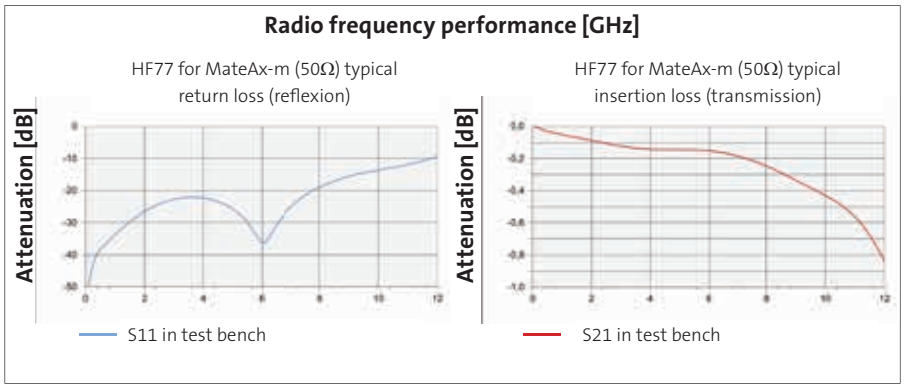
Materials and Plating

Internal Cont.	BeCu, gold plated
Circular Cont.	BeCu, gold plated
Barrel	Brass, gold plated
Spring Internal Cont.	Music Wire, gold plated
Spring Circular Cont.	Stainless steel, unplated



The block can be mounted using the flange. Cable connection with standard connector Mini SMP female. In the HF77-0002BG04-1 the HF7716B0002G530 was installed four times..

MATE AX-Male (4-pole)



Order Code	Description	Sensepin	Tip Style	Ø A	Ø B	C	H	L	Version
HF77-0002BG04-1	HF77-0002 MATE AX-M F MSMP BG01-1		16	0,45	2,00	-3,00	20,90	32,00	-

SMA-Female

HF60-0001 SMA-F 8 P MCX

Contacting SMA-Female

Centers (mm/mil)	6,50 / 256
Current (Circular)	10,0 A
Current (Internal)	3,0 A
Impedance [Z]	50 Ohm
Frequency	8 GHz
Temperature	-20°C...+80°C

Spring Force (cN ±20%)

	Preload	Nominal
Total	-	530
	-	990
Internal Cont.	75	130
	115	190
Circular Cont.	90	400
	450	800

Travel (mm)

	Nominal	Maximum
Internal Cont.	2,0	3,7
Circular Cont.	4,0	5,0
Thread (M)		M5x0,5
Wrench Size		3,5 / 4,0 / 5,0

Materials and Plating

Internal Cont.	BeCu, gold plated
Circular Cont.	BeCu, gold plated
Barrel	Brass, gold plated
Spring Internal Cont.	Music Wire, gold plated
Spring Circular Cont.	Stainless steel, unplated
Receptacle	Brass, gold plated

Drill Size (mm)

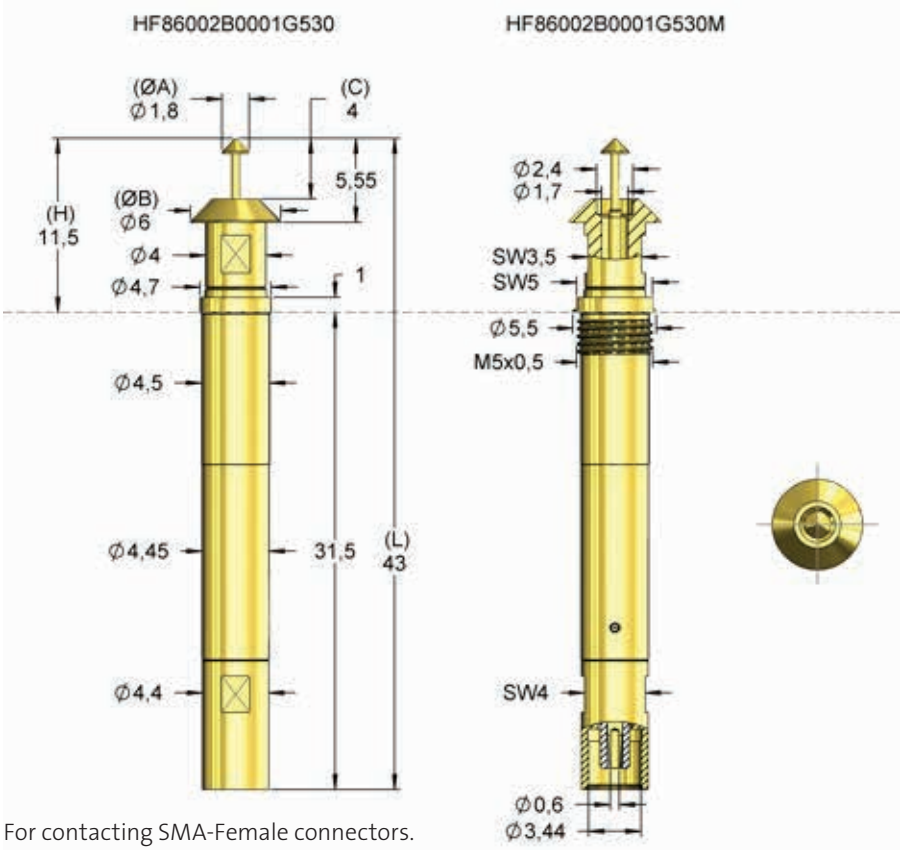
H860	4,99 - 5,00
H860RD	5,51 - 5,53
H860FL	7,99 - 8,01

Projection Height (mm)

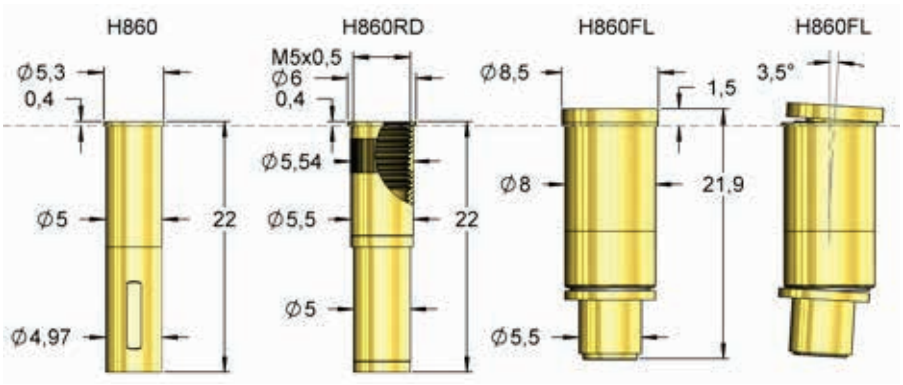
H860(RD) with HF60-0001	11,9
H860FL with HF60-0001	13,0

Accessories

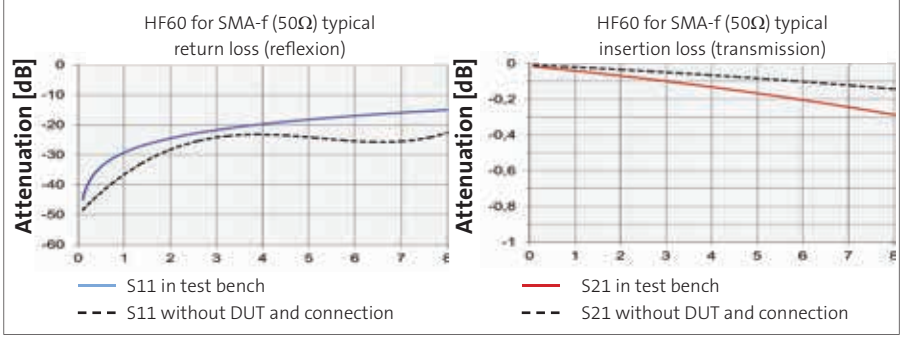
Internal pin	F08602B180G130
Tool for changing internal pin	FZWZ-006 / FDWZ-050
Insertion tool receptacle	FEWZ-822E0
Screw-in tool probe	FWZ860HF50
Cables see overview	page 62



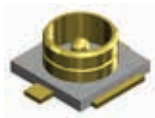
For contacting SMA-Female connectors.



Radio frequency performance [GHz]



Order Code	Description	Sensepin	Tip Style	Ø A	Ø B	C	H	L	Version
HF86002B0001G530	HF60-0001 SMA-F 8 P MCX		02	1,80	6,00	4,00	11,50	43,00	-
HF86002B0001G530M	HF60-0001 SMA-F 8 S MCX		02	1,80	6,00	4,00	11,50	43,00	M
HF86002B0001G990	HF60-0001 SMA-F 8 P MCX		02	1,80	6,00	4,00	11,50	43,00	-
HF86002B0001G990M	HF60-0001 SMA-F 8 S MCX		02	1,80	6,00	4,00	11,50	43,00	M



HF60-0002 U.FL-M 5 P MCX

Contacting U.FL-Male

Centers (mm/mil)	6,00 / 236
Current (Circular)	10,0 A
Current (Internal)	3,0 A
Impedance [Z]	50 Ohm
Frequency	5 GHz
Temperature	-20°C...+80°C

Spring Force (cN ±20%)

	Preload	Nominal
Total	-	530
Internal Cont.	75	130
Circular Cont.	90	400

Travel (mm)

	Nominal	Maximum
Internal Cont.	2,0	3,7
Circular Cont.	4,0	5,0
Thread (M)		M5x0,5
Wrench Size		3,5 / 4,0 / 5,0

Materials and Plating

Internal Cont.	BeCu, gold plated
Circular Cont.	BeCu, gold plated
Barrel	Brass, gold plated
Spring Internal Cont.	Music Wire, gold plated
Spring Circular Cont.	Stainless steel, unplated
Receptacle	Brass, gold plated

Drill Size (mm)

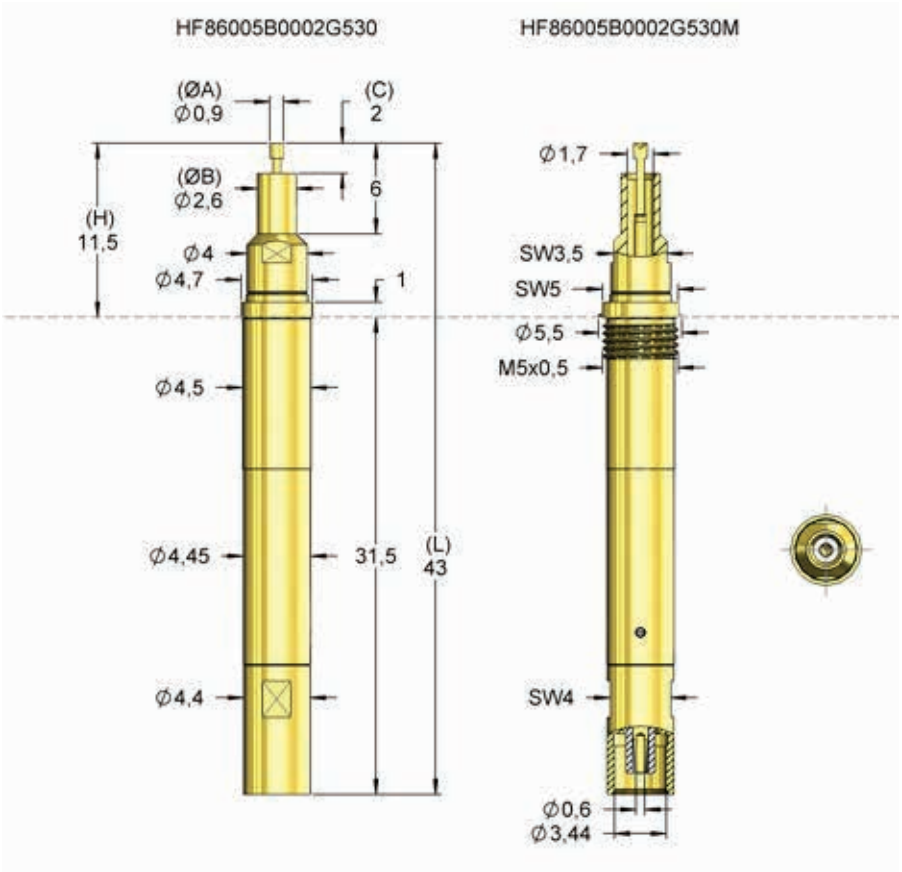
H860	4,99 - 5,00
H860RD	5,51 - 5,53
H860FL	7,99 - 8,01

Projection Height (mm)

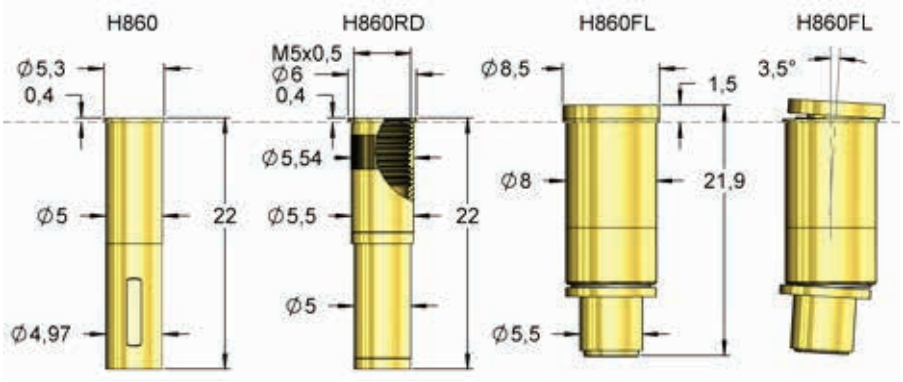
H860(RD) with HF60-0002	11,9
H860FL with HF60-0002	13,0

Accessories

Internal pin	F08605B090G130
Tool for changing internal pin	FZWZ-004 / FDWZ-050
Insertion tool receptacle	FEWZ-822E0
Screw-in tool probe	FWZ860HF50
Cables see overview	page 62

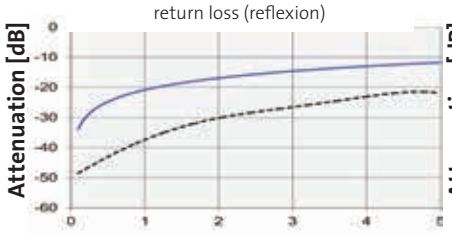


For contacting U.FL-Male connectors.

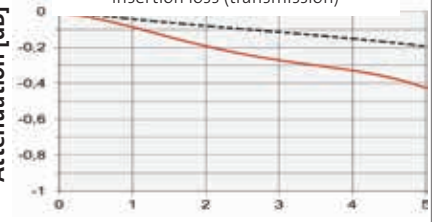


Radio frequency performance [GHz]

HF60 for U.FL-m (50Ω) typical return loss (reflexion)



HF60 for U.FL-m (50Ω) typical insertion loss (transmission)



S11 in test bench
S11 without DUT and connection
S21 in test bench
S21 without DUT and connection

Order Code	Description	Sensepin	Tip Style	Ø A	Ø B	C	H	L	Version
HF86005B0002G530	HF60-0002 U.FL-M 5 P MCX		05	0,90	2,60	2,00	11,50	43,00	-
HF86005B0002G530M	HF60-0002 U.FL-M 5 S MCX		05	0,90	2,60	2,00	11,50	43,00	M

HF60-0003 SMC-M 5 P MCX

Contacting SMC-Male

Centers (mm/mil)	6,00 / 236
Current (Circular)	10,0 A
Current (Internal)	3,0 A
Impedance [Z]	50 Ohm
Frequency	5 GHz
Temperature	-20°C...+80°C

Spring Force (cN ±20%)

	Preload	Nominal
Total	-	530
Internal Cont.	75	130
Circular Cont.	90	400

Travel (mm)

	Nominal	Maximum
Internal Cont.	2,0	3,7
Circular Cont.	4,0	5,0
Thread (M)		M5x0,5
Wrench Size		3,5 / 4,0 / 5,0

Materials and Plating

Internal Cont.	BeCu, gold plated
Circular Cont.	BeCu, gold plated
Barrel	Brass, gold plated
Spring Internal Cont.	Music Wire, gold plated
Spring Circular Cont.	Stainless steel, unplated
Receptacle	Brass, gold plated

Drill Size (mm)

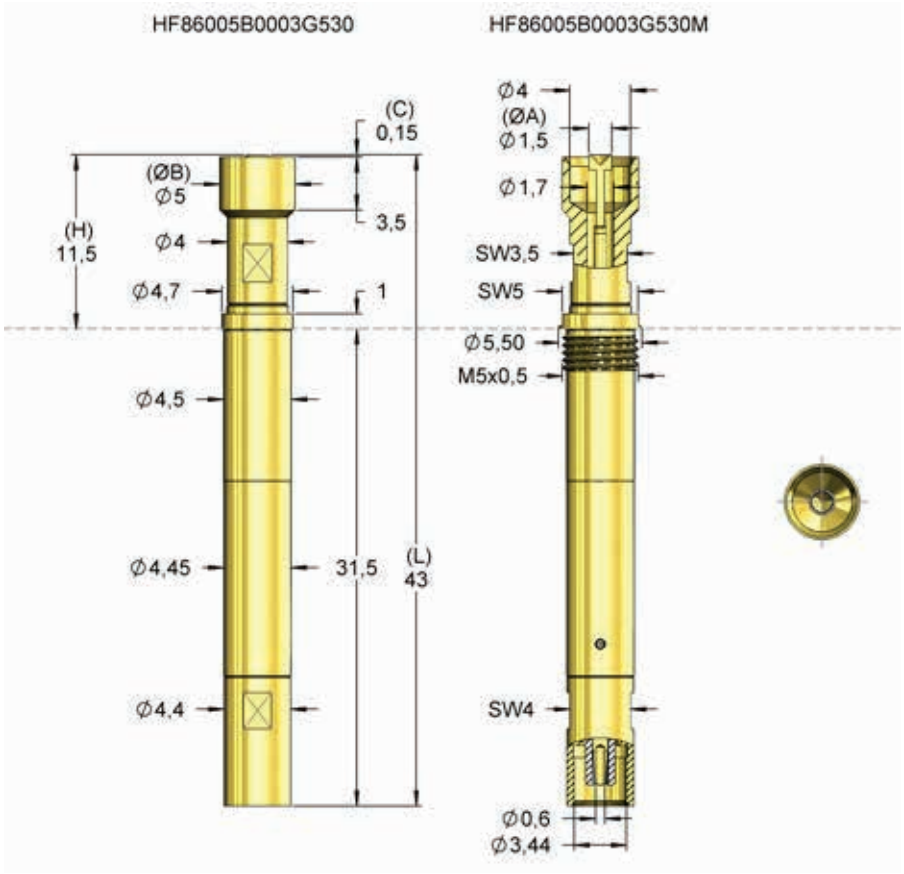
H860	4,99 - 5,00
H860RD	5,51 - 5,53
H860FL	7,99 - 8,01

Projection Height (mm)

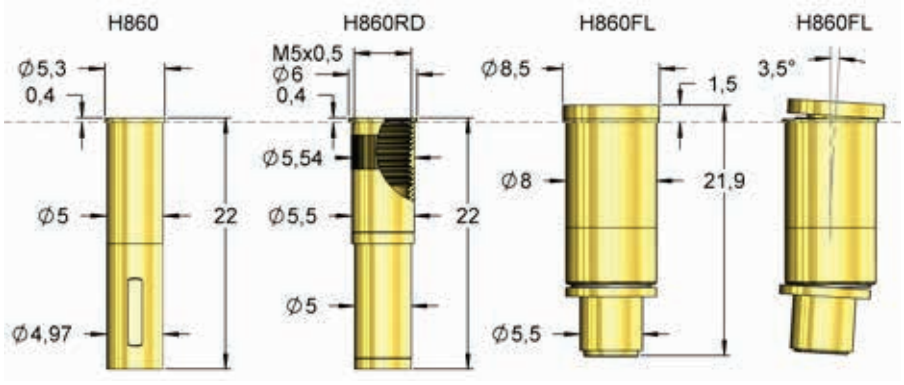
H860(RD) with HF60-0003	11,9
H860FL with HF60-0003	13,0

Accessories

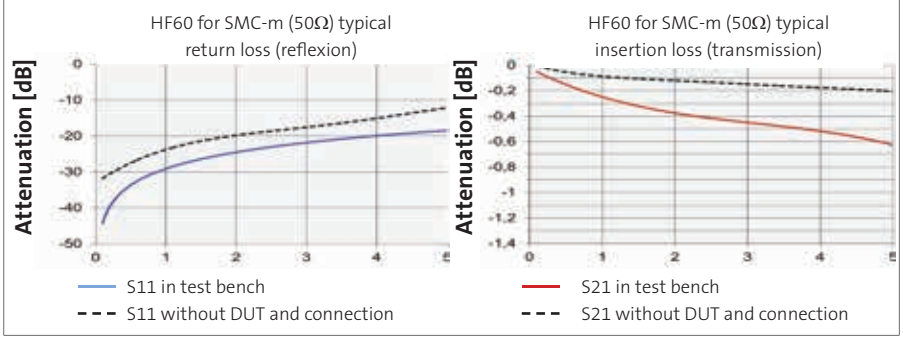
Internal pin	F08605B150G130
Tool for changing internal pin	FZWZ-005 / FDWZ-050
Insertion tool receptacle	FEWZ-822E0
Screw-in tool probe	FWZ860HF50
Cables see overview	page 62



For contacting SMC-Male connectors.



Radio frequency performance [GHz]



Order Code	Description	Sensepin	Tip Style	Ø A	Ø B	C	H	L	Version
HF86005B0003G530	HF60-0003 SMC-M 5 P MCX		05	1,50	5,00	0,15	11,50	43,00	-
HF86005B0003G530M	HF60-0003 SMC-M 5 S MCX		05	1,50	5,00	0,15	11,50	43,00	M

SMB-Male

HF60-0004 SMB-M 5 P MCX

Contacting
SMB-Male

Centers (mm/mil)	6,00 / 236
Current (Circular)	10,0 A
Current (Internal)	3,0 A
Impedance [Z]	50 Ohm
Frequency	5 GHz
Temperature	-20°C...+80°C

Spring Force (cN ±20%)

	Preload	Nominal
Total	-	530
Internal Cont.	75	130
Circular Cont.	90	400

Travel (mm)

	Nominal	Maximum
Internal Cont.	2,0	3,7
Circular Cont.	4,0	5,0
Thread (M)		M5x0,5
Wrench Size		3,5 / 4,0 / 5,0

Materials and Plating

Internal Cont.	BeCu, gold plated
Circular Cont.	BeCu, gold plated
Barrel	Brass, gold plated
Spring Internal Cont.	Music Wire, gold plated
Spring Circular Cont.	Stainless steel, unplated
Receptacle	Brass, gold plated

Drill Size (mm)

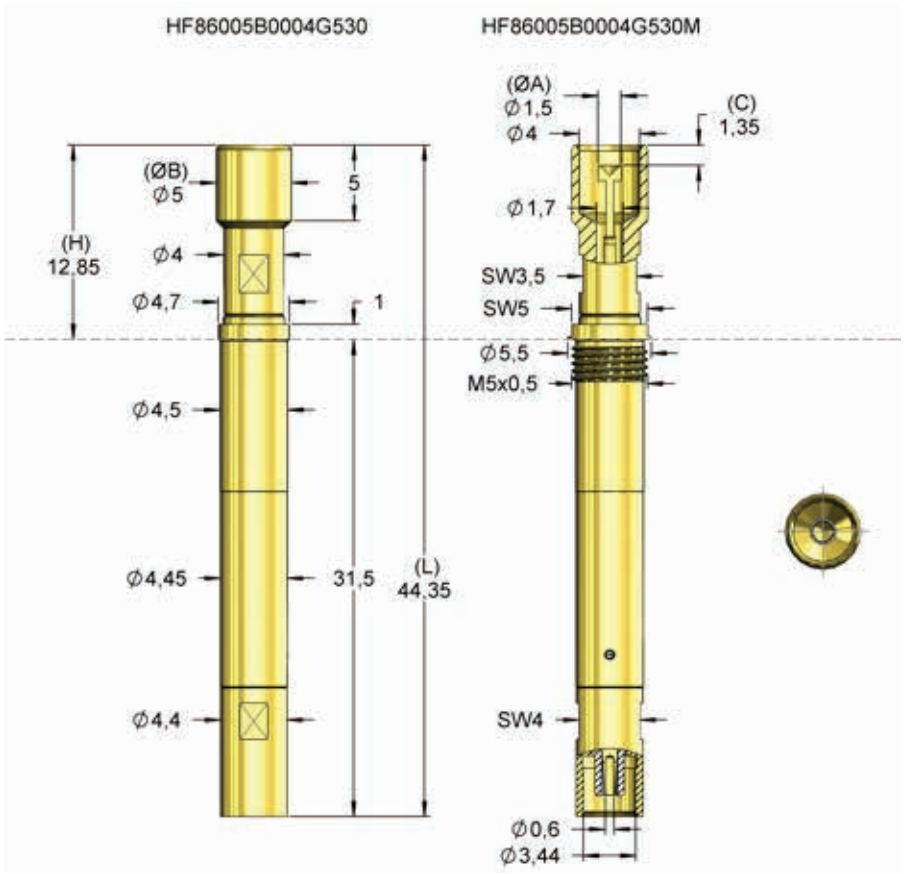
H860	4,99 - 5,00
H860RD	5,51 - 5,53
H860FL	7,99 - 8,01

Projection Height (mm)

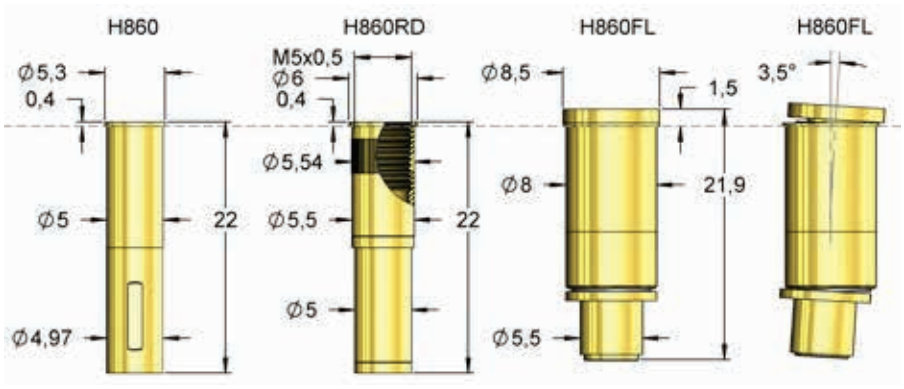
H860(RD) with HF60-0004	13,25
H860FL with HF60-0004	14,35

Accessories

Internal pin	F08605B150G130
Tool for changing internal pin	FZWZ-005 / FDWZ-050
Insertion tool receptacle	FEWZ-822E0
Screw-in tool probe	FWZ860HF50
Cables see overview	page 62

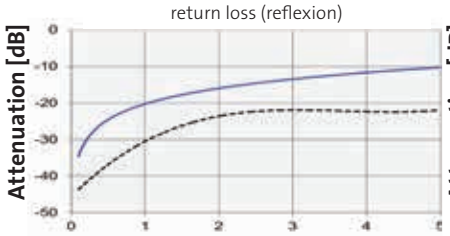


For contacting SMB-Male connectors.

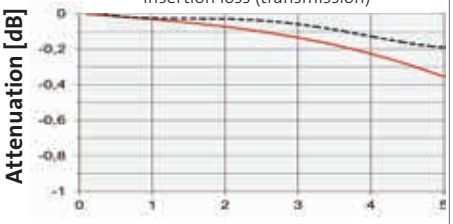


Radio frequency performance [GHz]

HF60 for SMB-m (50Ω) typical return loss (reflexion)



HF60 for SMB-m (50Ω) typical insertion loss (transmission)



S11 in test bench
S11 without DUT and connection
S21 in test bench
S21 without DUT and connection

Order Code	Description	Sensepin	Tip Style	Ø A	Ø B	C	H	L	Version
HF86005B0004G530	HF60-0004 SMB-M 5 P MCX		05	1,50	5,00	-1,35	12,85	44,35	-
HF86005B0004G530M	HF60-0004 SMB-M 5 S MCX		05	1,50	5,00	-1,35	12,85	44,35	M

SMB-Female

HF60-0005 SMB-F 6 P MCX

Contacting
SMB-Female

Centers (mm/mil)	6,50 / 256
Current (Circular)	10,0 A
Current (Internal)	3,0 A
Impedance [Z]	50 Ohm
Frequency	6 GHz
Temperature	-20°C...+80°C

Spring Force (cN ±20%)

	Preload	Nominal
Total	-	530
Internal Cont.	75	130
Circular Cont.	90	400

Travel (mm)

	Nominal	Maximum
Internal Cont.	2,0	3,7
Circular Cont.	4,0	5,0
Thread (M)		M5x0,5
Wrench Size		3,5 / 4,0 / 5,0

Materials and Plating

Internal Cont.	BeCu, gold plated
Circular Cont.	BeCu, gold plated
Barrel	Brass, gold plated
Spring Internal Cont.	Music Wire, gold plated
Spring Circular Cont.	Stainless steel, unplated
Receptacle	Brass, gold plated

Drill Size (mm)

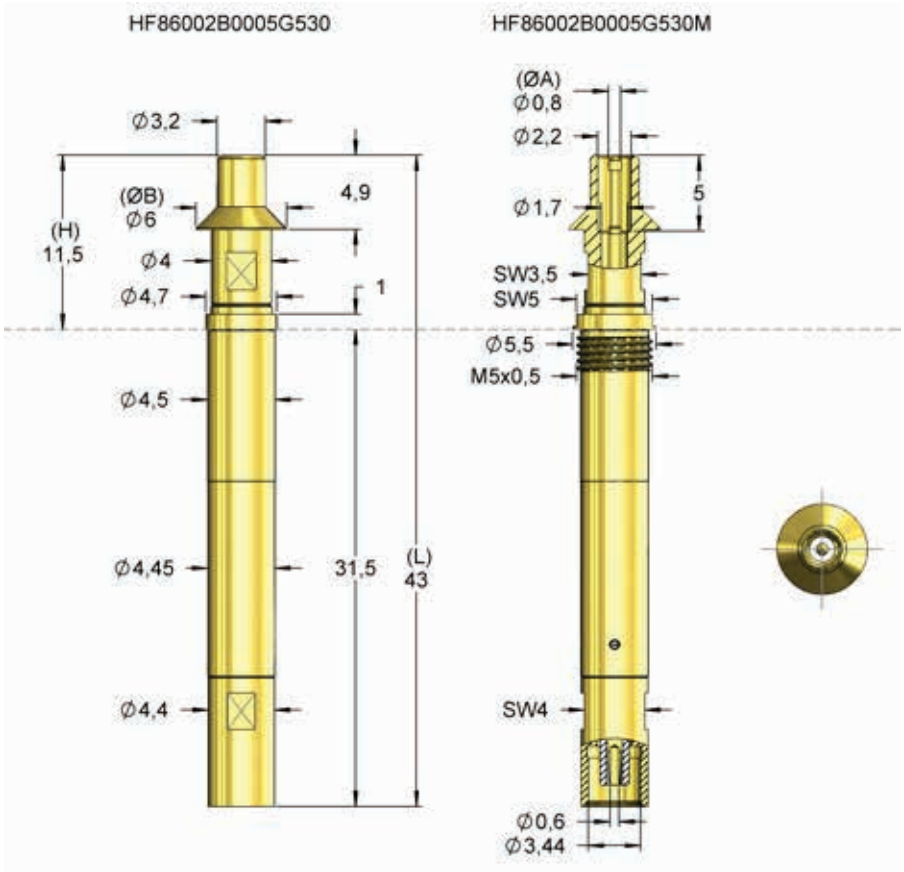
H860	4,99 - 5,00
H860RD	5,51 - 5,53
H860FL	7,99 - 8,01

Projection Height (mm)

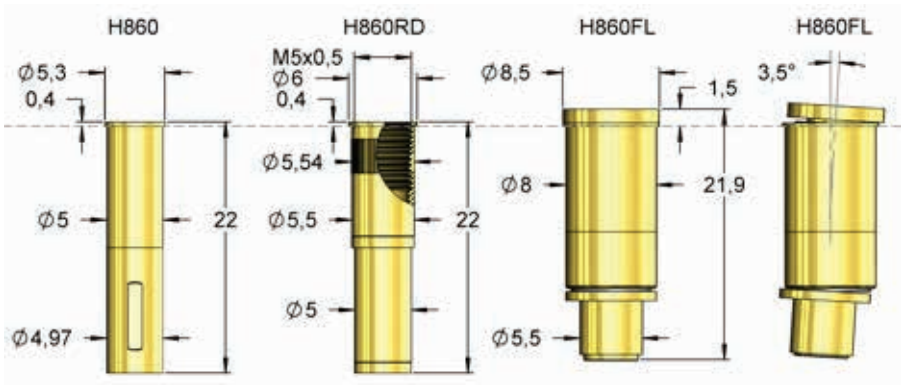
H860(RD) with HF60-0002	11,9
H860FL with HF60-0002	13,0

Accessories

Internal pin	F08602B080G130
Tool for changing internal pin	FZWZ-004 / FDWZ-050
Insertion tool receptacle	FEWZ-822E0
Screw-in tool probe	FWZ860HF50
Cables see overview	page 62



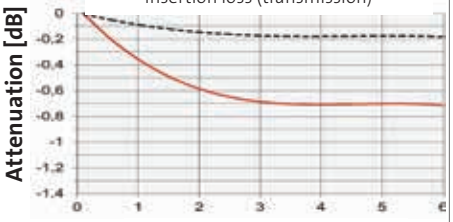
For contacting SMB-Female connectors.



Radio frequency performance [GHz]

HF60 for SMB-f (50Ω) typical return loss (reflexion)

HF60 for SMB-f (50Ω) typical insertion loss (transmission)



S11 in test bench
S11 without DUT and connection
S21 in test bench
S21 without DUT and connection

Order Code	Description	Sensepin	Tip Style	Ø A	Ø B	C	H	L	Version
HF86002B0005G530	HF60-0005 SMB-F 6 P MCX		02	0,80	6,00	0,00	11,50	43,00	-
HF86002B0005G530M	HF60-0005 SMB-F 6 S MCX		02	0,80	6,00	0,00	11,50	43,00	M

HF60-0007 RF-M 6 P MCX

Contacting
Micro RF-Male

Centers (mm/mil)	6,00 / 236
Current (Circular)	10,0 A
Current (Internal)	3,0 A
Impedance [Z]	50 Ohm
Frequency	6 GHz
Temperature	-20°C...+80°C

Spring Force (cN ±20%)

	Preload	Nominal
Total	-	530
Internal Cont.	75	130
Circular Cont.	90	400

Travel (mm)

	Nominal	Maximum
Internal Cont.	2,0	2,5
Circular Cont.	4,0	5,0
Thread (M)		M5x0,5
Wrench Size		3,5 / 4,0 / 5,0

Materials and Plating

Internal Cont.	BeCu, gold plated
Circular Cont.	BeCu, gold plated
Barrel	Brass, gold plated
Spring Internal Cont.	Music Wire, gold plated
Spring Circular Cont.	Stainless steel, unplated
Receptacle	Brass, gold plated

Drill Size (mm)

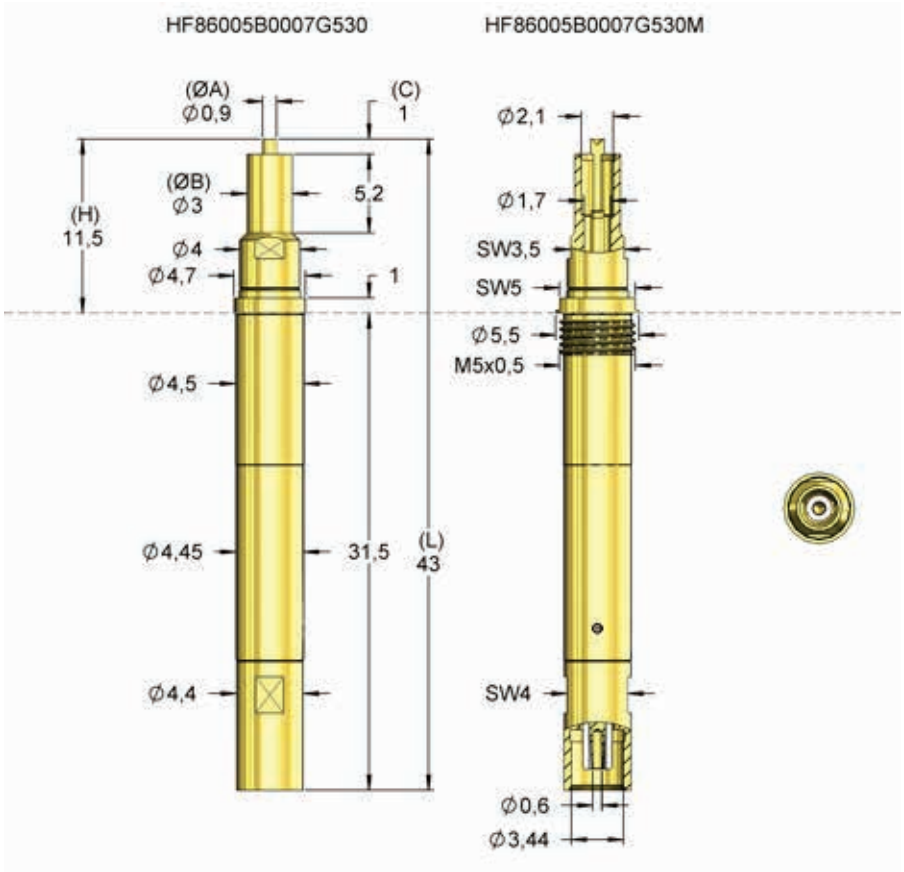
H860	4,99 - 5,00
H860RD	5,51 - 5,53
H860FL	7,99 - 8,01

Projection Height (mm)

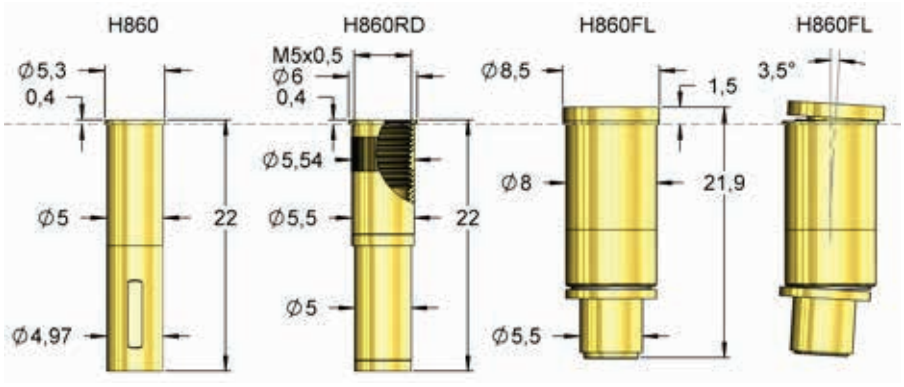
H860(RD) with HF60-0007	11,9
H860FL with HF60-0007	13,0

Accessories

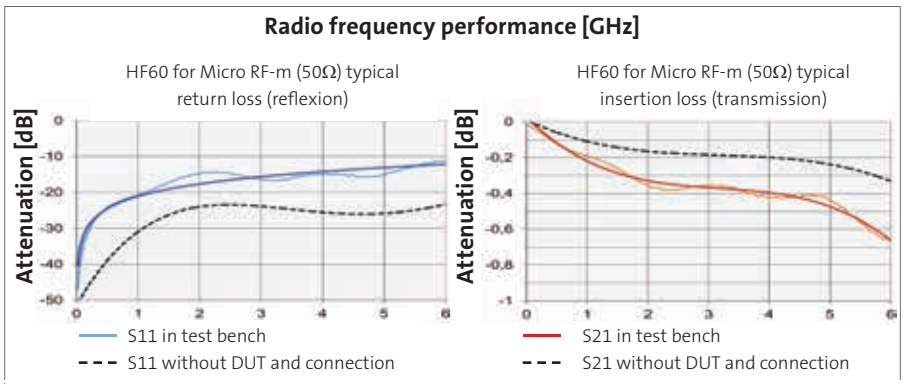
Internal pin	F08605B090G130
Tool for changing internal pin	FZWZ-004 / FDWZ-050
Insertion tool receptacle	FEWZ-822E0
Screw-in tool probe	FWZ860HF50
Cables see overview	page 62



For contacting Micro RF-Male connectors.



Radio frequency performance [GHz]



Order Code	Description	Sensepin	Tip Style	Ø A	Ø B	C	H	L	Version
HF86005B0007G530	HF60-0007 RF-M 6 P MCX		05	0,90	3,00	1,00	11,50	43,00	-
HF86005B0007G530M	HF60-0007 RF-M 6 S MCX		05	0,90	3,00	1,00	11,50	43,00	M

HF60-0008 PCB-coax-open 6 P MCX

Contacting PCB-coax-open

NEW

Centers (mm/mil)	6,00 / 236
Current (Circular)	10,0 A
Current (Internal)	3,0 A
Impedance [Z]	50 Ohm
Frequency	6 GHz
Temperature	-20°C...+80°C

Spring Force (cN ±20%)

	Preload	Nominal
Total	-	530
Internal Cont.	75	130
Circular Cont.	90	400

Travel (mm)

	Nominal	Maximum
Internal Cont.	2,0	2,5
Circular Cont.	4,0	5,0
Thread (M)		M5x0,5
Wrench Size		3,5 / 4,0 / 5,0

Materials and Plating

Internal Cont.	BeCu, gold plated
Circular Cont.	BeCu, gold plated
Barrel	Brass, gold plated
Spring Internal Cont.	Music Wire, gold plated
Spring Circular Cont.	Stainless steel, unplated
Receptacle	Brass, gold plated

Drill Size (mm)

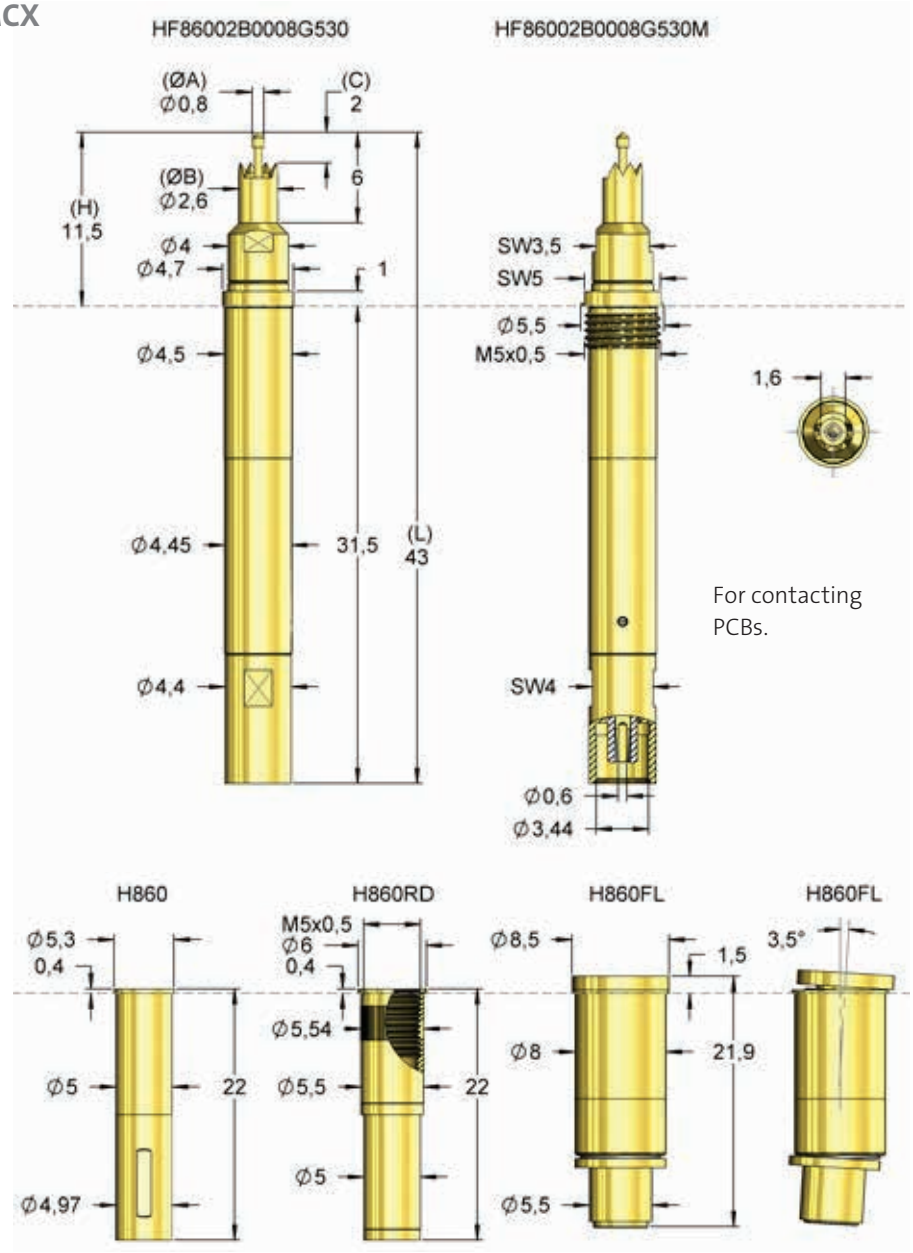
H860	4,99 - 5,00
H860RD	5,51 - 5,53
H860FL	7,99 - 8,01

Projection Height (mm)

H860(RD) with HF60-0008	11,9
H860FL with HF60-0008	13,0

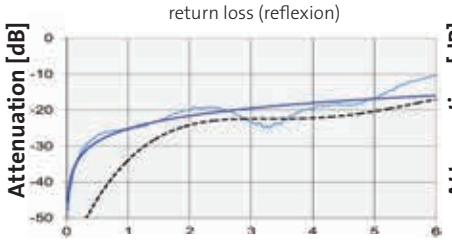
Accessories

Internal pin	-
Tool for changing internal pin	-
Insertion tool receptacle	FEWZ-822E0
Screw-in tool probe	FWZ860HF50
Cables see overview	page 62



Radio frequency performance [GHz]

HF60 for PCB-coax-open (50Ω) typical return loss (reflexion)



S11 in test bench

S11 without DUT and connection

HF60 for PCB-coax-open (50Ω) typical insertion loss (transmission)

S21 in test bench

S21 without DUT and connection

Order Code	Description	Sensepin	Tip Style	Ø A	Ø B	C	H	L	Version
HF86002B0008G530	HF60-0008 PCB-coax-open 6 P MCX		02	0,80	2,60	2,00	11,50	43,00	-
HF86002B0008G530M	HF60-0008 PCB-coax-open 6 S MCX		02	0,80	2,60	2,00	11,50	43,00	M

PCB-GSG

HF60-0009 GSG 6 P MCX 135

Contacting PCB-GSG

NEW

Centers (mm/mil)	6,00 / 236
Current (Circular)	10,0 A
Current (Internal)	3,0 A
Impedance [Z]	50 Ohm
Frequency	6 GHz
Temperature	-20°C...+80°C

Spring Force (cN ±20%)

	Preload	Nominal
Total	-	960
Internal Cont.	0	0
Pins Circular Cont.	2x40	2x80
Core Circular Cont.	450	800

Travel (mm)

	Nominal	Maximum
Internal Cont.		
Pins Circular Cont.	1,0	1,5
Core Circular Cont.	4,0	5,0
Thread (M)		M5x0,5
Wrench Size		3,5 / 4,0 / 5,0

Materials and Plating

Internal Cont.	BeCu, gold plated
Circular Cont.	BeCu, gold plated
Barrel	Brass, gold plated
Spring Internal Cont.	Music Wire, gold plated
Spring Circular Cont.	Stainless steel, unplated
Receptacle	Brass, gold plated

Drill Size (mm)

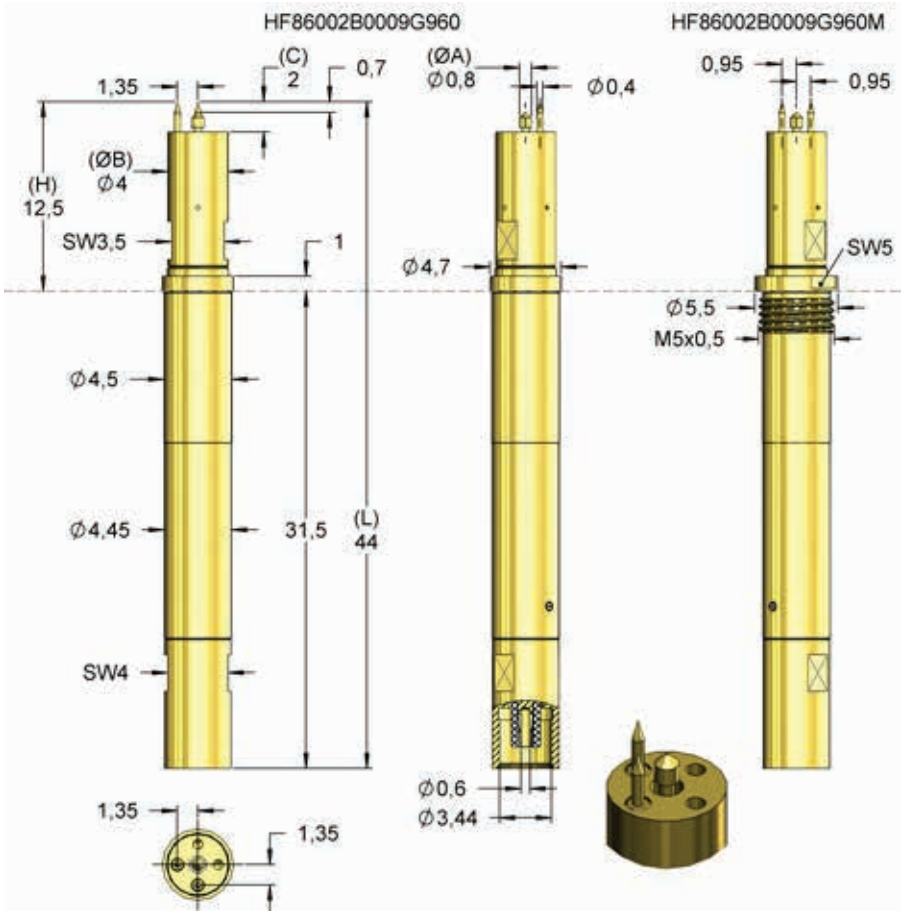
H860	4,99 - 5,00
H860RD	5,51 - 5,53
H860FL	7,99 - 8,01

Projection Height (mm)

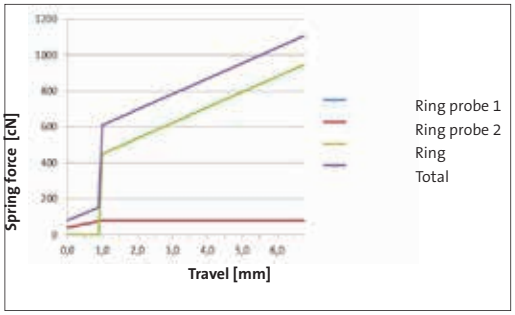
H860(RD) with HF60-0002	12,9
H860FL with HF60-0002	14,0

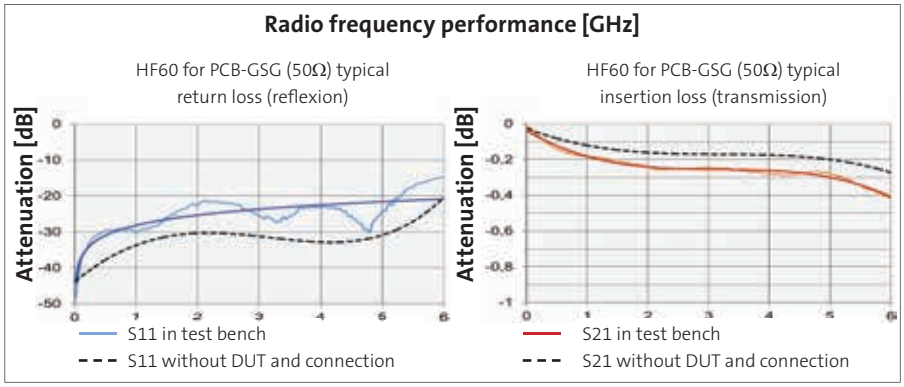
Accessories

Internal pin	-
Tool for changing internal pin	-
Insertion tool receptacle	FEWZ-822E0
Cables see overview	page 62



For contacting PCBs. The signal pin is not spring loaded. The ground pins have a spring force of 80 cN. Suitable mounting receptacles see H860 or H860FL.





Order Code	Description	Sensepin	Tip Style	Ø A	Ø B	C	H	L	Version
HF86002B0009G960	HF60-0009 GSG 6 P MCX 135		02	0,80	4,00	-0,70	12,50	44,00	-
HF86002B0009G960M	HF60-0009 GSG 6 S MCX 135		02	0,80	4,00	-0,70	12,50	44,00	M

HF60-0010 PCB-coax-open 6 P MCX

Contacting PCB-coax-open

NEW

Centers (mm/mil)	6,00 / 236
Current (Circular)	10,0 A
Current (Internal)	3,0 A
Impedance [Z]	50 Ohm
Frequency	6 GHz
Temperature	-20°C...+80°C

Spring Force (cN ±20%)

	Preload	Nominal
Total	-	930
		530
Internal Cont.	75	130
Circular Cont.	50	800
	90	400

Travel (mm)

	Nominal	Maximum
Internal Cont.	2,0	2,5
Circular Cont.	4,0	5,0
Thread (M)		M5x0,5
Wrench Size		3,5 / 4,0 / 5,0

Materials and Plating

Internal Cont.	BeCu, gold plated
Circular Cont.	BeCu, gold plated
Barrel	Brass, gold plated
Spring Internal Cont.	Music Wire, gold plated
Spring Circular Cont.	Stainless steel, unplated
Receptacle	Brass, gold plated

Drill Size (mm)

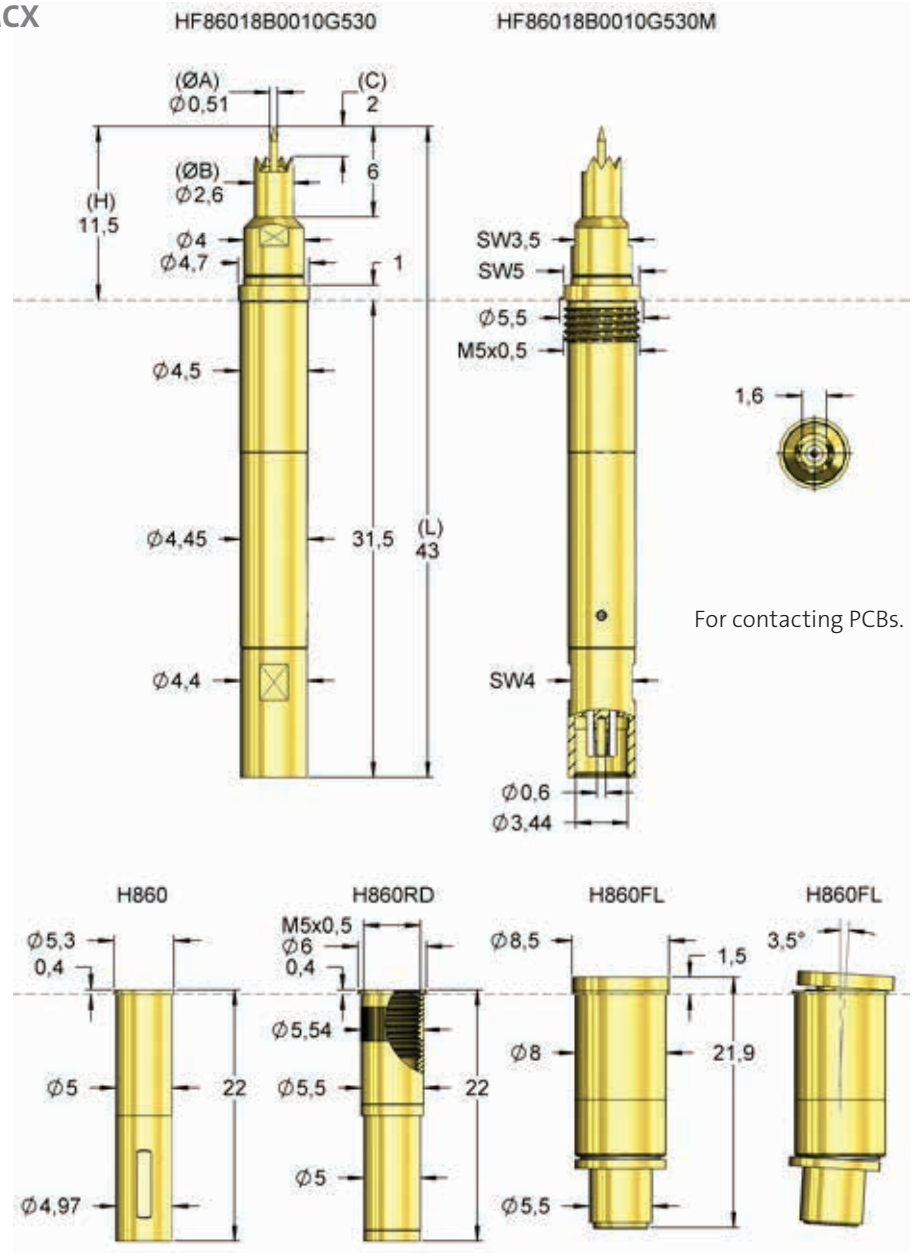
H860	4,99 - 5,00
H860RD	5,51 - 5,53
H860FL	7,99 - 8,01

Projection Height (mm)

H860(RD) with HF60-0010	11,9
H860FL with HF60-0010	13,0

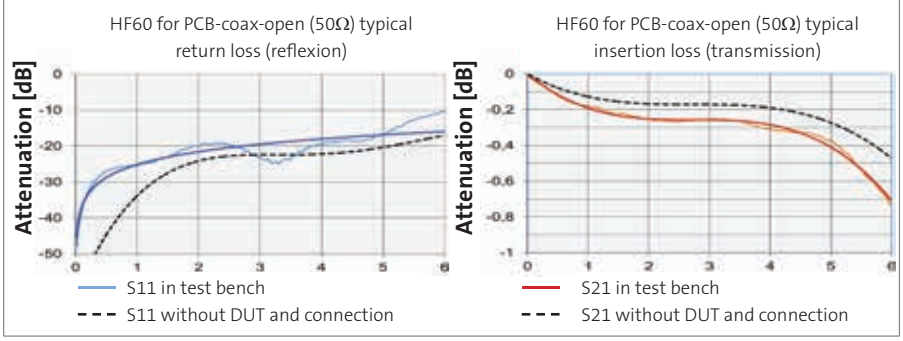
Accessories

Internal pin	F08618B051G130
Tool for changing internal pin	FZWZ-004 / FDWZ-050
Insertion tool receptacle	FEWZ-822E0
Screw-in tool probe	FWZ860HF50
Cables see overview	page 62



For contacting PCBs.

Radio frequency performance [GHz]



Order Code	Description	Sensepin	Tip Style	Ø A	Ø B	C	H	L	Version
HF86018B0010G530	HF60-0010 PCB-coax-open 6 P MCX		18	0,51	2,60	2,00	11,50	43,00	-
HF86018B0010G530M	HF60-0010 PCB-coax-open 6 S MCX		18	0,51	2,60	2,00	11,50	43,00	M
HF86018B0010G930	HF60-0010 PCB-coax-open 6 P MCX		18	0,51	2,60	2,00	11,50	43,00	-
HF86018B0010G930M	HF60-0010 PCB-coax-open 6 S MCX		18	0,51	2,60	2,00	11,50	43,00	M

HF60-0011 BMA-M 4 P MCX

Contacting BMA-Male

NEW

Centers (mm/mil)	6,00 / 236
Current (Circular)	10,0 A
Current (Internal)	3,0 A
Impedance [Z]	50 Ohm
Frequency	4 GHz
Temperature	-20°C...+80°C

Spring Force (cN ±20%)

	Preload	Nominal
Total	-	530
Internal Cont.	75	130
Circular Cont.	90	400

Travel (mm)

	Nominal	Maximum
Internal Cont.	2,0	3,7
Circular Cont.	4,0	5,0
Thread (M)		M5x0,5
Wrench Size		3,5 / 4,0 / 5,0

Materials and Plating

Internal Cont.	BeCu, gold plated
Circular Cont.	BeCu, gold plated
Barrel	Brass, gold plated
Spring Internal Cont.	Music Wire, gold plated
Spring Circular Cont.	Stainless steel, unplated
Receptacle	Brass, gold plated

Drill Size (mm)

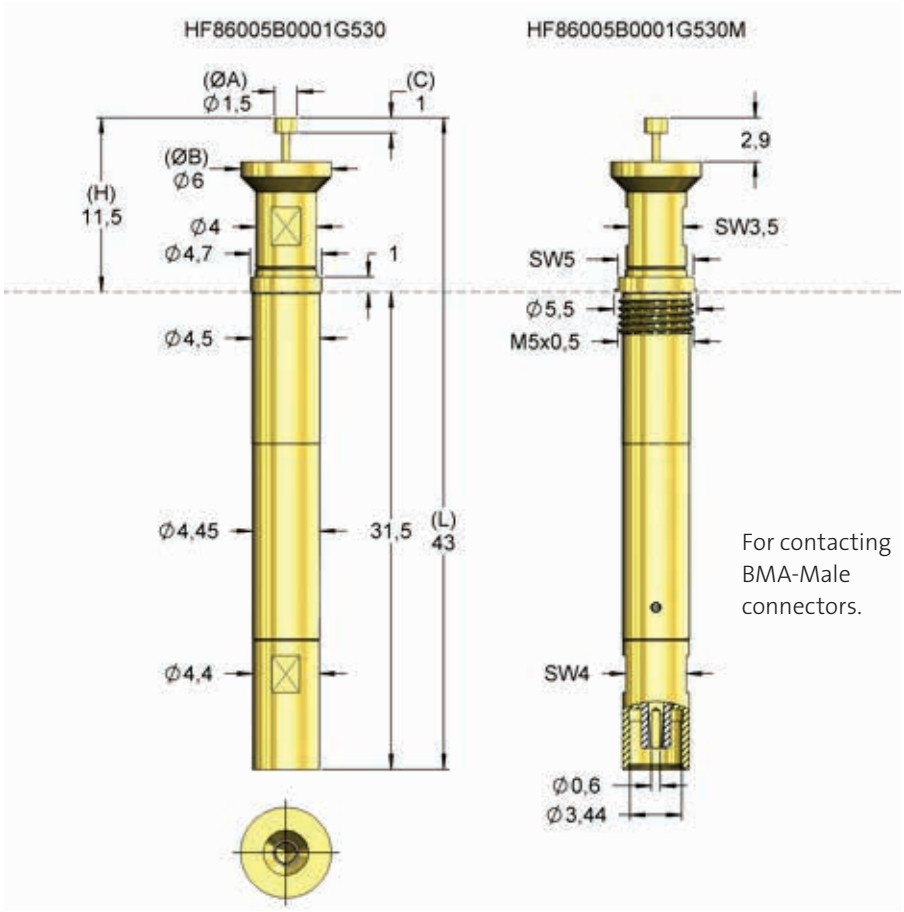
H860	4,99 - 5,00
H860RD	5,51 - 5,53
H860FL	7,99 - 8,01

Projection Height (mm)

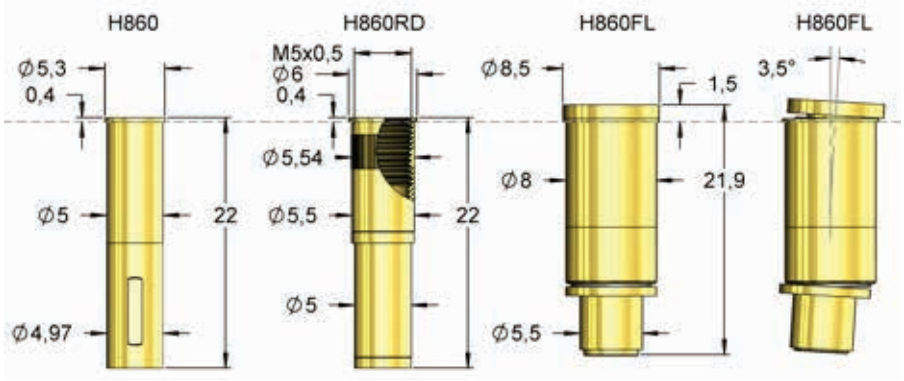
H860(RD) with HF60-0011	11,9
H860FL with HF60-0011	13,0

Accessories

Internal pin	F08605B150G130
Tool for changing internal pin	FZWZ-005 / FDWZ-050
Insertion tool receptacle	FEWZ-822E0
Screw-in tool probe	FWZ860HF50
Cables see overview	page 62

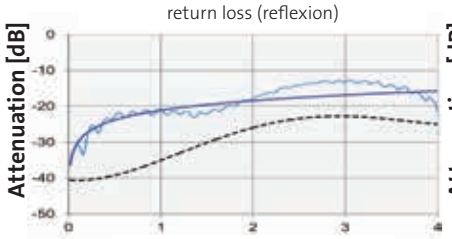


For contacting BMA-Male connectors.



Radio frequency performance [GHz]

HF60 for BMA-m (50Ω) typical return loss (reflexion)



S11 in test bench

S11 without DUT and connection

HF60 for BMA-m (50Ω) typical insertion loss (transmission)

S21 in test bench

S21 without DUT and connection

Order Code	Description	Sensepin	Tip Style	Ø A	Ø B	C	H	L	Version
HF86005B0011G530	HF60-0011 BMA-M 4 P MCX		05	1,50	6,00	2,90	11,50	43,00	-
HF86005B0011G530M	HF60-0011 BMA-M 4 S MCX		05	1,50	6,00	2,90	11,50	43,00	M

HF60-0012 FAKRA-F 5 P MCX

Contacting Fakra-Female

NEW

Centers (mm/mil)	6,50 / 256
Current (Circular)	10,0 A
Current (Internal)	3,0 A
Impedance [Z]	50 Ohm
Frequency	6 GHz
Temperature	-20°C...+80°C

Spring Force (cN ±20%)

	Preload	Nominal
Total	-	930
Internal Cont.	100	130
Circular Cont.	450	800

Travel (mm)

	Nominal	Maximum
Internal Cont.	1,0	2,7
Circular Cont.	4,0	5,0
Thread (M)		M5x0,5
Wrench Size		3,5 / 4,0 / 5,0

Materials and Plating

Internal Cont.	BeCu, gold plated
Circular Cont.	BeCu, gold plated
Barrel	Brass, gold plated
Spring Internal Cont.	Music Wire, gold plated
Spring Circular Cont.	Stainless steel, unplated
Receptacle	Brass, gold plated

Drill Size (mm)

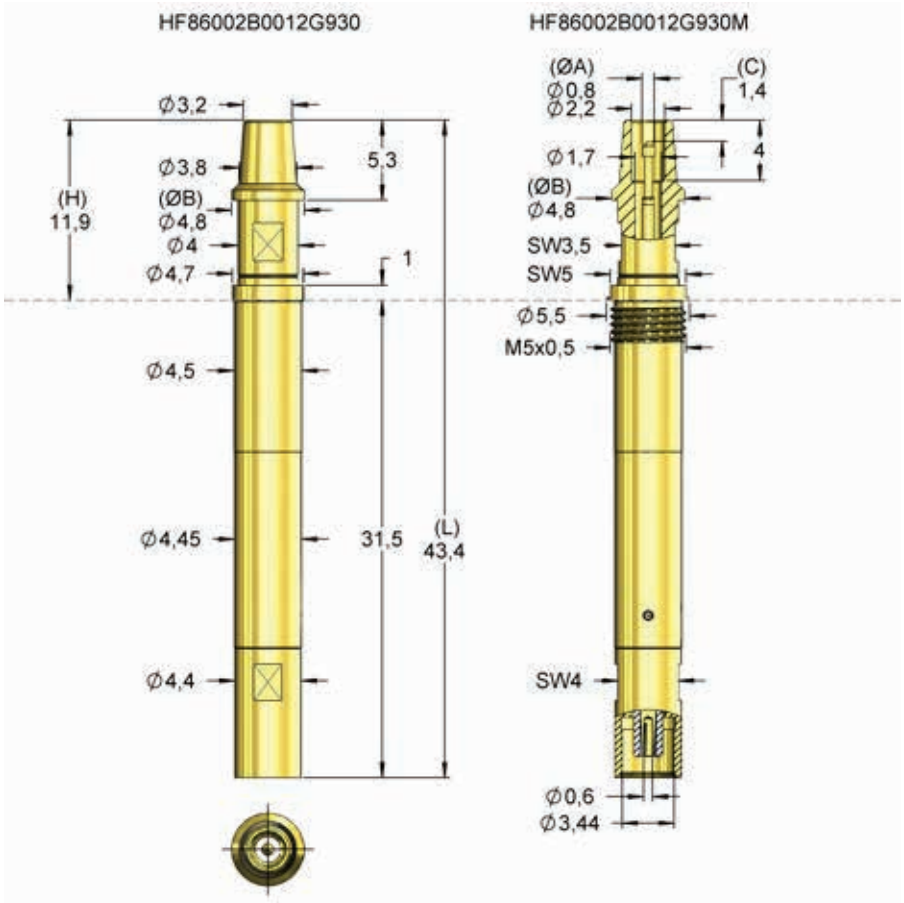
H860	4,99 - 5,00
H860RD	5,51 - 5,53
H860FL	7,99 - 8,01

Projection Height (mm)

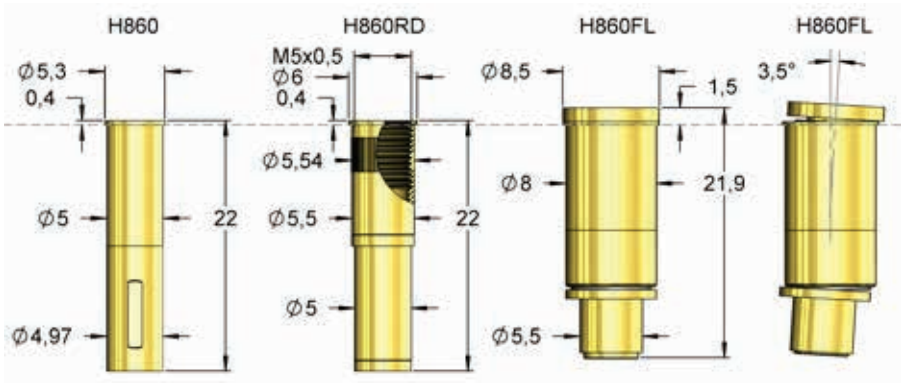
H860(RD) with HF60-0012	12,3
H860FL with HF60-0012	13,4

Accessories

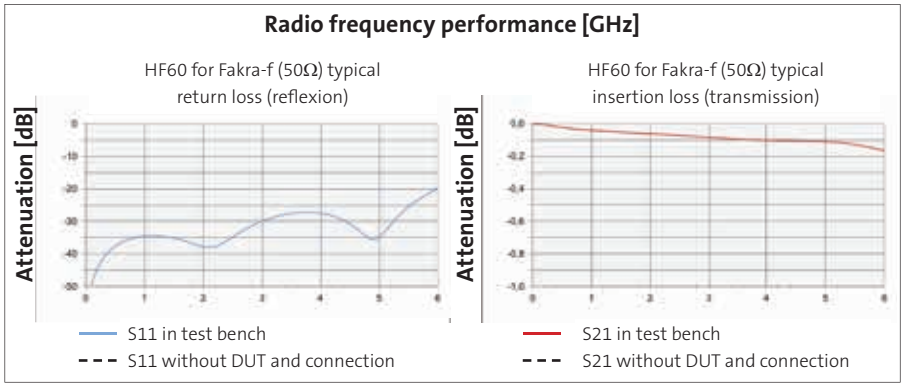
Internal pin	F08602B080G130S1
Tool for changing internal pin	FZWZ-004 / FDWZ-050
Insertion tool receptacle	FEWZ-822E0
Screw-in tool probe	FWZ860HF50
Cables see overview	page 62



For contacting Fakra-Female connectors.



Radio frequency performance [GHz]



Order Code	Description	Sensepin	Tip Style	Ø A	Ø B	C	H	L	Version
HF86002B0012G930	HF60-0012 FAKRA-F 6 P MCX		02	0,80	4,80	-1,40	11,90	43,40	-
HF86002B0012G930M	HF60-0012 FAKRA-F 6 S MCX		02	0,80	4,80	-1,40	11,90	43,40	M

HF60-0013 M-SMP-M 6 P MCX

Contacting Mini SMP-Male

NEW

Centers (mm/mil)	5,00 / 200
Current (Circular)	10,0 A
Current (Internal)	3,0 A
Impedance [Z]	50 Ohm
Frequency	6 GHz
Temperature	-20°C...+80°C

Spring Force (cN ±20%)

	Preload	Nominal
Total	-	530
Internal Cont.	100	130
Circular Cont.	90	400

Travel (mm)

	Nominal	Maximum
Internal Cont.	1,0	1,7
Circular Cont.	4,0	5,0
Thread (M)		M5x0,5
Wrench Size		3,5 / 4,0 / 5,0

Materials and Plating

Internal Cont.	BeCu, gold plated
Circular Cont.	BeCu, gold plated
Barrel	Brass, gold plated
Spring Internal Cont.	Music Wire, gold plated
Spring Circular Cont.	Stainless steel, unplated
Receptacle	Brass, gold plated

Drill Size (mm)

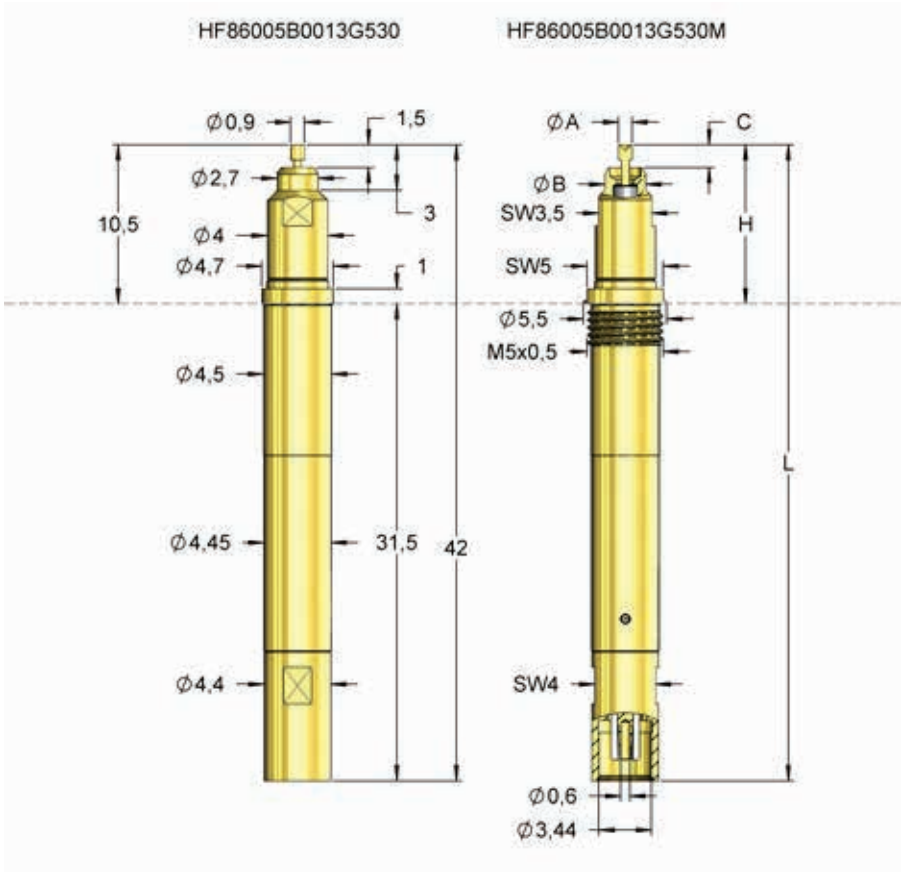
H860	4,99 - 5,00
H860RD	5,51 - 5,53
H860FL	7,99 - 8,01

Projection Height (mm)

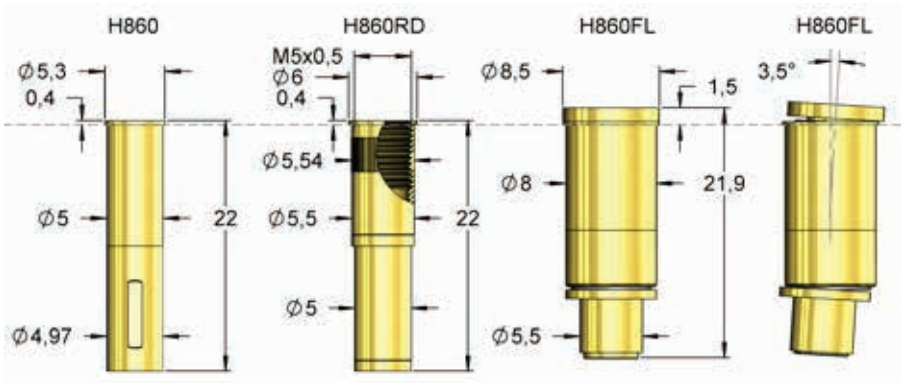
H860(RD) with HF60-0013	10,9
H860FL with HF60-0013	12,0

Accessories

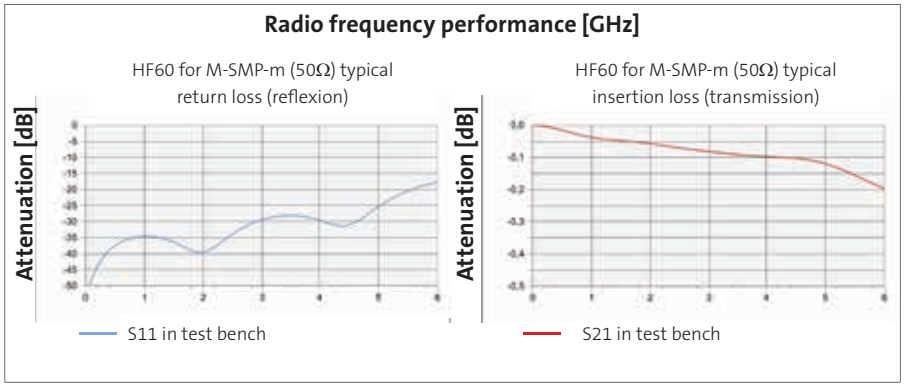
Internal pin	-
Tool for changing internal pin	-
Insertion tool receptacle	FEWZ-822E0
Screw-in tool probe	FWZ860HF50
Cables see overview	page 62



For contacting mini SMP-Female connectors.



Radio frequency performance [GHz]



Order Code	Description	Sensepin	Tip Style	Ø A	Ø B	C	H	L	Version
HF86005B0013G530	HF60-0013 MSMP-M 6 P MCX		05	0,90	2,70	1,50	10,50	42,00	-
HF86005B0013G530M	HF60-0013 MSMP-M 6 S MCX		05	0,90	2,70	1,50	10,50	42,00	M

MMCX-Female

HF60-0014 MMCX-F 6 P MCX

Contacting MMCX-Female

NEW

Centers (mm/mil)	5,00 / 200
Current (Circular)	10,0 A
Current (Internal)	3,0 A
Impedance [Z]	50 Ohm
Frequency	6 GHz
Temperature	-20°C...+80°C

Spring Force (cN ±20%)

	Preload	Nominal
Total	-	530
Internal Cont.	100	130
Circular Cont.	90	400

Travel (mm)

	Nominal	Maximum
Internal Cont.	1,0	1,7
Circular Cont.	4,0	5,0
Thread (M)		M5x0,5
Wrench Size		3,5 / 4,0 / 5,0

Materials and Plating

Internal Cont.	BeCu, gold plated
Circular Cont.	BeCu, gold plated
Barrel	Brass, gold plated
Spring Internal Cont.	Music Wire, gold plated
Spring Circular Cont.	Stainless steel, unplated
Receptacle	Brass, gold plated

Drill Size (mm)

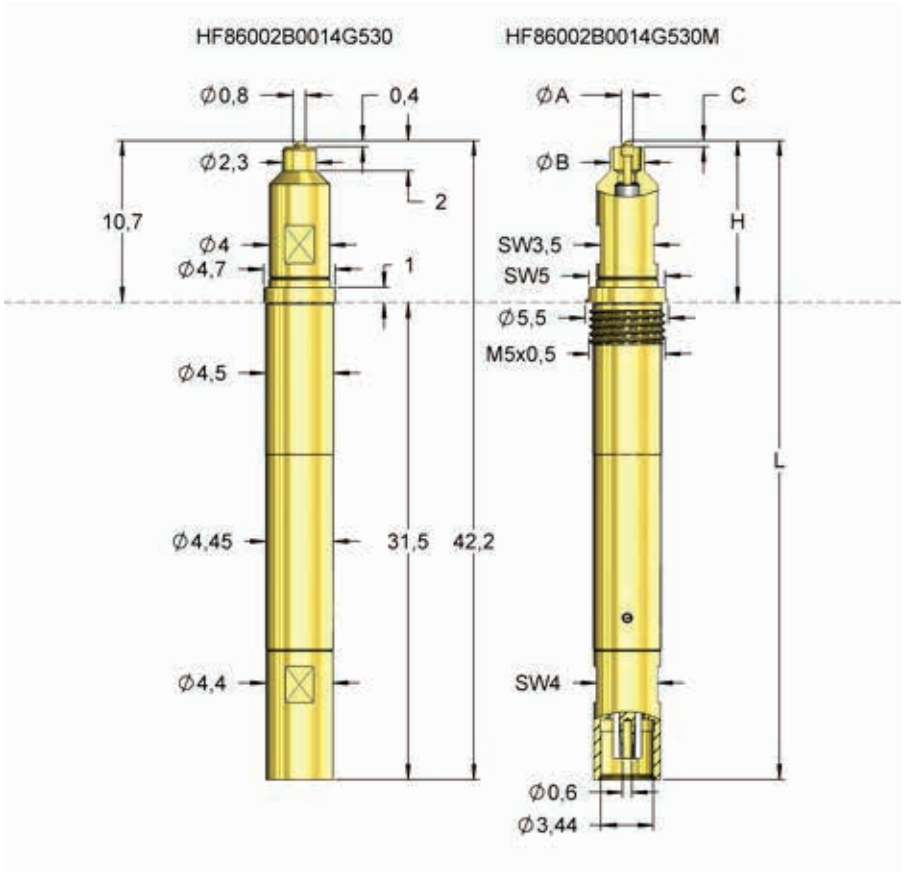
H860	4,99 - 5,00
H860RD	5,51 - 5,53
H860FL	7,99 - 8,01

Projection Height (mm)

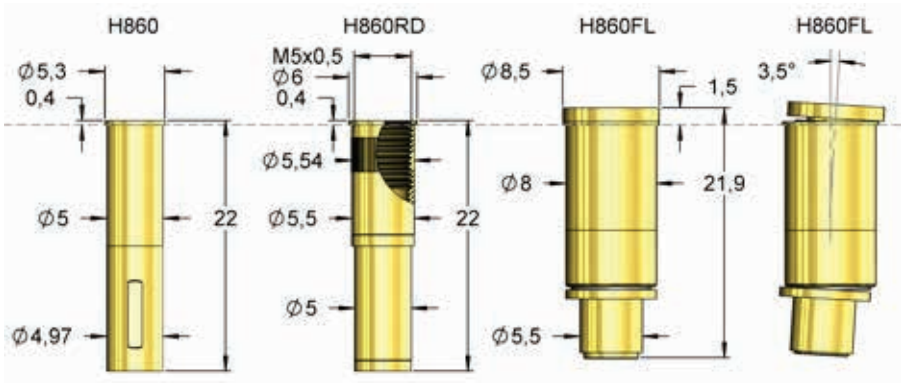
H860(RD) with HF60-0014	11,1
H860FL with HF60-0014	12,2

Accessories

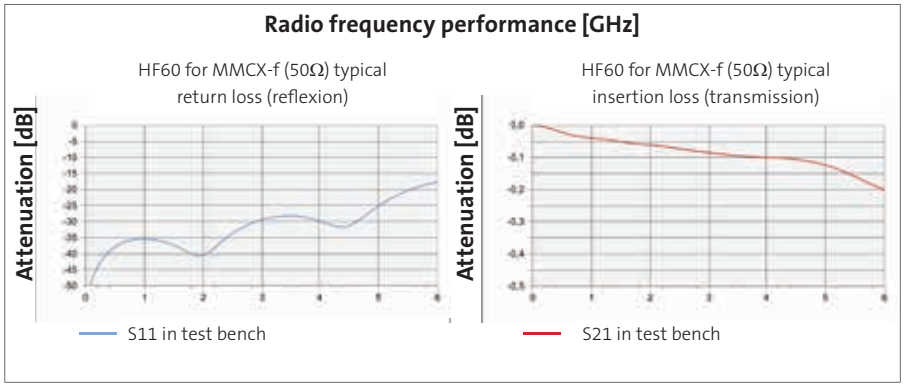
Internal pin	-
Tool for changing internal pin	-
Insertion tool receptacle	FEWZ-822E0
Screw-in tool probe	FWZ860HF50
Cables see overview	page 62



For contacting MMCX-Female connectors.



Radio frequency performance [GHz]



Order Code	Description	Sensepin	Tip Style	Ø A	Ø B	C	H	L	Version
HF86002B0014G530	HF60-0014 MMCX-F 6 P MCX		02	0,80	2,30	0,40	10,70	42,20	-
HF86002B0014G530M	HF60-0014 MMCX-F 6 S MCX		02	0,80	2,30	0,40	10,70	42,20	M

R-TNC-Female

HF60-0015 R-TNC-F 2 P MCX

Contacting R-TNC-Female

NEW

Centers (mm/mil)	14,00 / 550
Current (Circular)	10,0 A
Current (Internal)	3,0 A
Impedance [Z]	50 Ohm
Frequency	2 GHz
Temperature	-20°C...+80°C

Spring Force (cN ±20%)

	Preload	Nominal
Total	-	450
Internal Cont.	75	130
Circular Cont.	90	320

Travel (mm)

	Nominal	Maximum
Internal Cont.	2,0	3,7
Circular Cont.	3,0	4,0
Thread (M)		M5x0,5
Wrench Size		3,5 / 4,0 / 5,0

Materials and Plating

Internal Cont.	BeCu, gold plated
Circular Cont.	BeCu, gold plated
Barrel	Brass, gold plated
Spring Internal Cont.	Stainless steel, unplated
Spring Circular Cont.	Stainless steel, unplated
Receptacle	Brass, gold plated

Drill Size (mm)

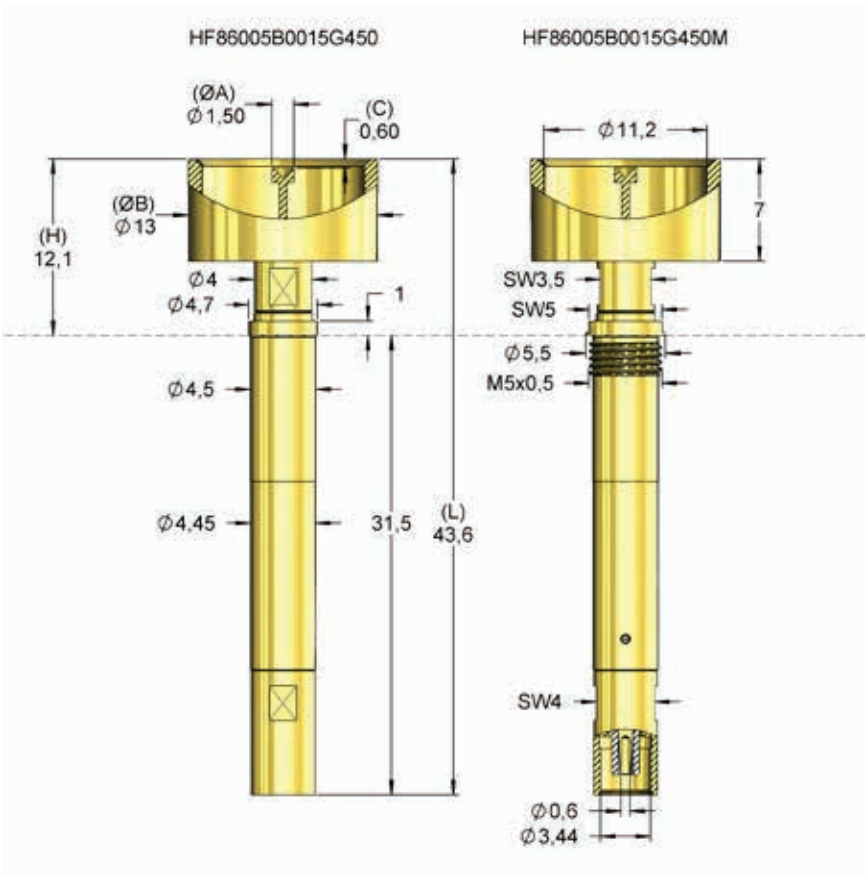
H860	4,99 - 5,00
H860RD	5,51 - 5,53
H860FL	7,99 - 8,01

Projection Height (mm)

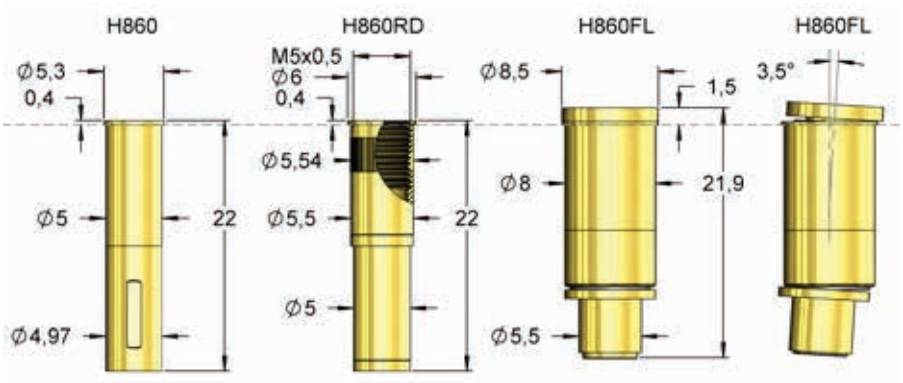
H860(RD) with HF60-0015	12,5
H860FL with HF60-0015	13,6

Accessories

Internal pin	F08605B150G130
Tool for changing internal pin	FZWZ-005 / FDWZ-050
Insertion tool receptacle	FEWZ-822E0
Screw-in tool probe	Gabelschlüssel SW5
Cables see overview	page 62

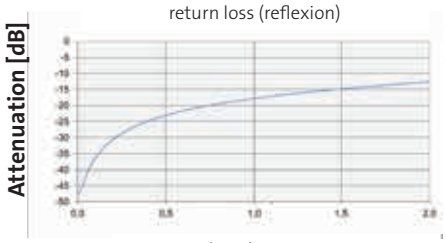


For contacting Reverse TNC-Female connectors.



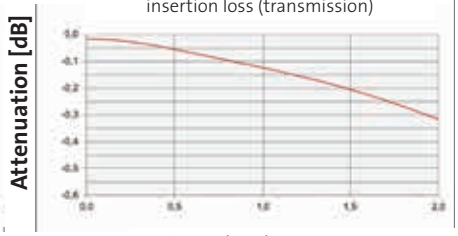
Radio frequency performance [GHz]

HF60 for R-TNC-f (50Ω) typical return loss (reflexion)



S11 in test bench

HF60 for R-TNC-f (50Ω) typical insertion loss (transmission)



S21 in test bench

Order Code	Description	Sensepin	Tip Style	Ø A	Ø B	C	H	L	Version
HF86005B0015G450	HF60-0015 R-TNC-F 2 P MCX		05	1,50	13,00	-0,60	12,10	43,60	-
HF86005B0015G450M	HF60-0015 R-TNC-F 2 S MCX		05	1,50	13,00	-0,60	12,10	43,60	M

BNC-Female

HF60-0016 BNC-F 4 P MCX

Contacting BNC-Female

NEW

Centers (mm/mil)	8,50 / 335
Current (Circular)	10,0 A
Current (Internal)	3,0 A
Impedance [Z]	50 Ohm
Frequency	4 GHz
Temperature	-20°C...+80°C

Spring Force (cN ±20%)

	Preload	Nominal
Total	-	550
Internal Cont.	75	150
Circular Cont.	90	400

Travel (mm)

	Nominal	Maximum
Internal Cont.	2,0	2,7
Circular Cont.	4,0	4,6
Thread (M)		M5x0,5
Wrench Size		3,5 / 4,0 / 5,0

Materials and Plating

Internal Cont.	BeCu, gold plated
Circular Cont.	BeCu, gold plated
Barrel	Brass, gold plated
Spring Internal Cont.	Music Wire, gold plated
Spring Circular Cont.	Stainless steel, unplated
Receptacle	Brass, gold plated

Drill Size (mm)

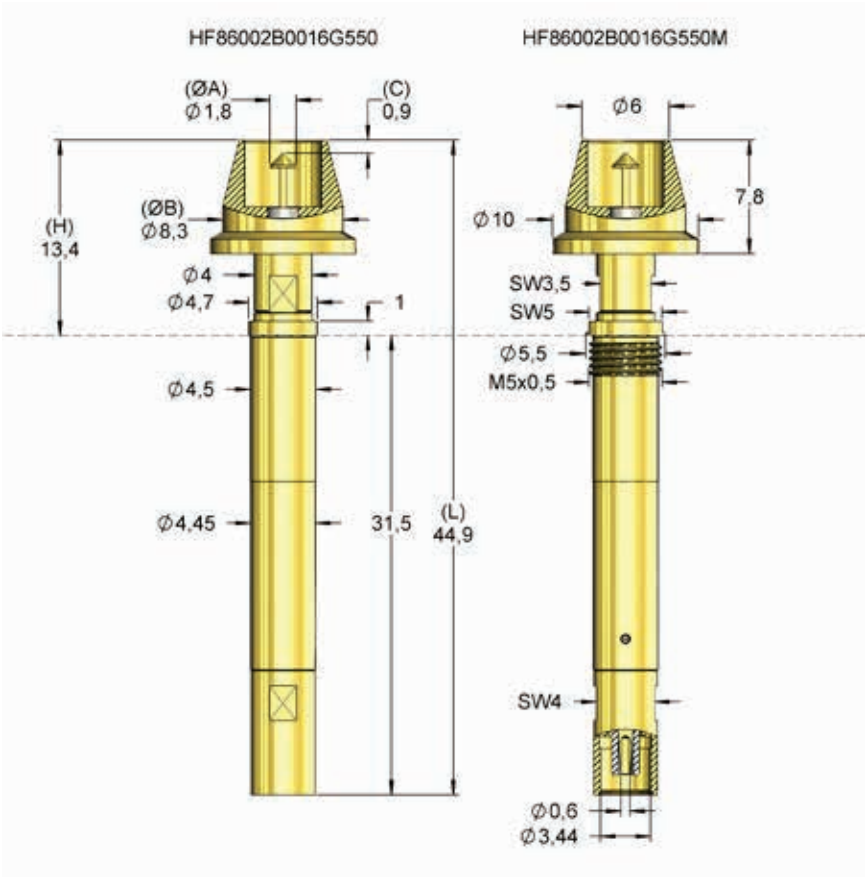
H860	4,99 - 5,00
H860RD	5,51 - 5,53
H860FL	7,99 - 8,01

Projection Height (mm)

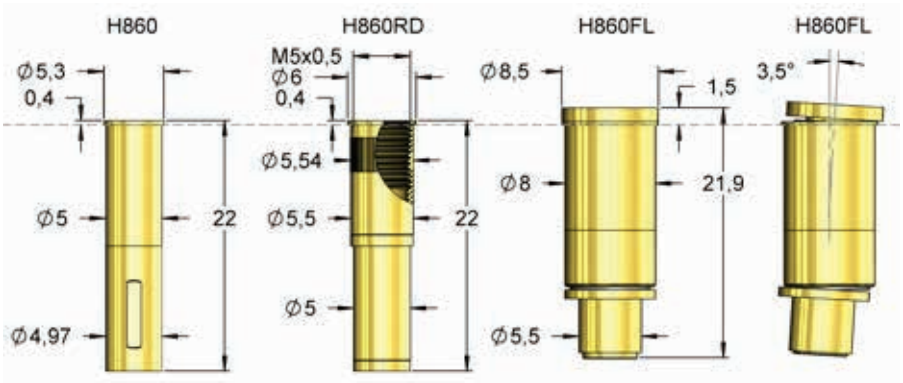
H860(RD) with HF60-0016	13,8
H860FL with HF60-0016	14,9

Accessories

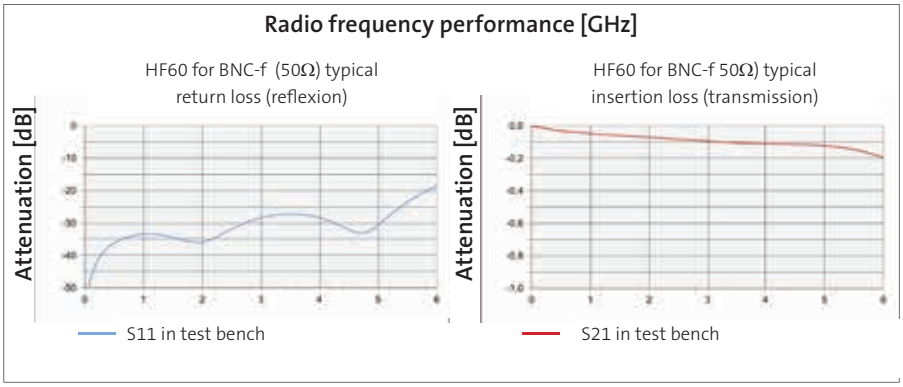
Internal pin	-
Tool for changing internal pin	-
Insertion tool receptacle	FEWZ-822E0
Screw-in tool probe	Gabelschlüssel SW5
Cables see overview	page 62



For contacting BNC-Female connectors.



Radio frequency performance [GHz]



Order Code	Description	Sensepin	Tip Style	Ø A	Ø B	C	H	L	Version
HF86002B0016G550	HF60-0016 BNC-F 4 P MCX		02	1,80	8,30	-0,90	13,40	44,90	-
HF86002B0016G550M	HF60-0016 BNC-F 4 S MCX		02	1,80	8,30	-0,90	13,40	44,90	M

HF60-0017 QMA-F 6 P MCX

Contacting QMA-Female

NEW

Centers (mm/mil)	8,50 / 335
Current (Circular)	10,0 A
Current (Internal)	3,0 A
Impedance [Z]	50 Ohm
Frequency	6 GHz
Temperature	-20°C...+80°C

Spring Force (cN ±20%)

	Preload	Nominal
Total	-	730
Internal Cont.	75	130
Circular Cont.	400	600

Travel (mm)

	Nominal	Maximum
Internal Cont.	2,0	2,5
Circular Cont.	4,0	5,0
Thread (M)		M5x0,5
Wrench Size		3,5 / 4,0 / 5,0

Materials and Plating

Internal Cont.	BeCu, gold plated
Circular Cont.	BeCu, gold plated
Barrel	Brass, gold plated
Spring Internal Cont.	Music Wire, gold plated
Spring Circular Cont.	Stainless steel, unplated
Receptacle	Brass, gold plated

Drill Size (mm)

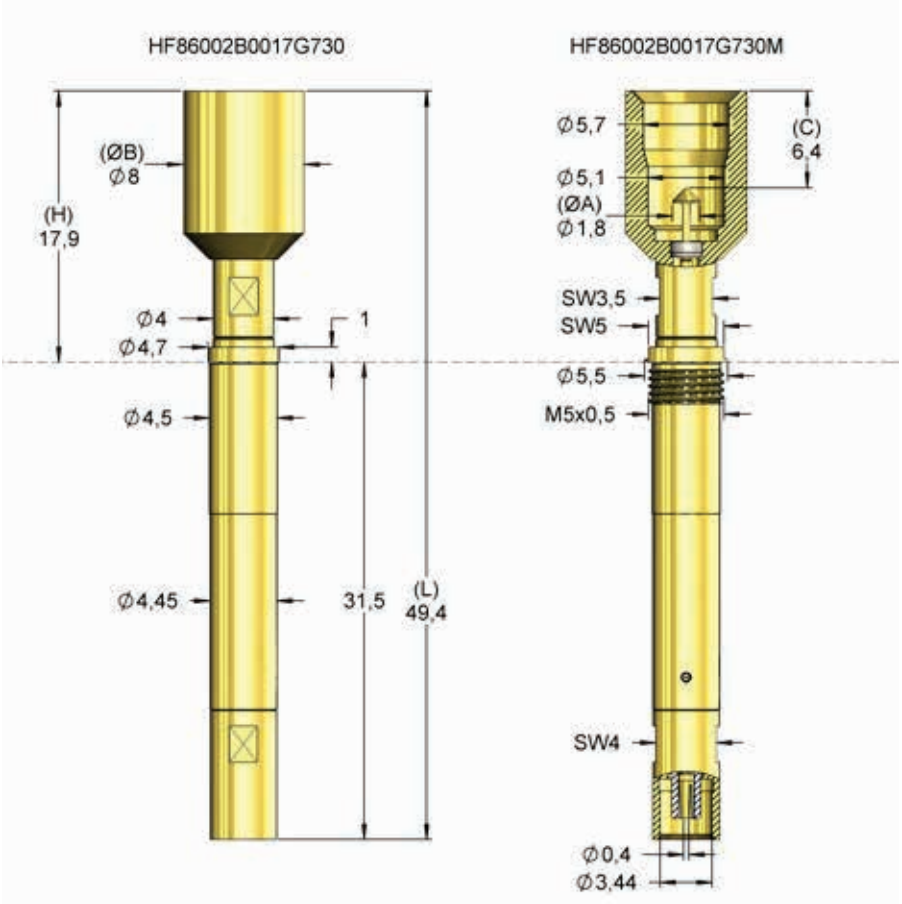
H860	4,99 - 5,00
H860RD	5,51 - 5,53
H860FL	7,99 - 8,01

Projection Height (mm)

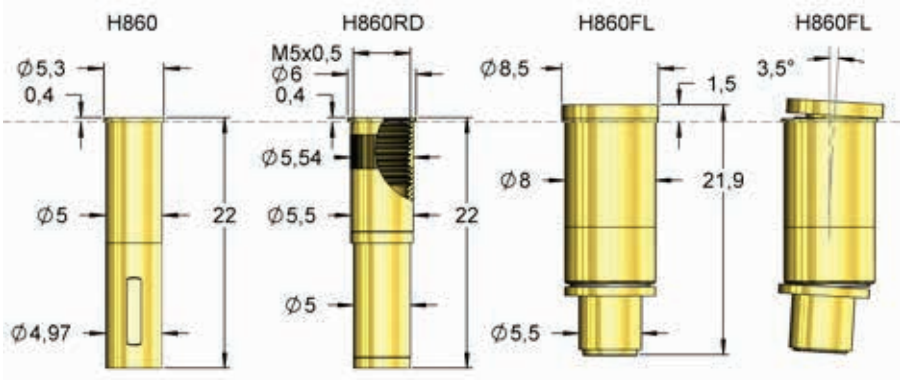
H860(RD) with HF60-0017	18,3
H860FL with HF60-0017	19,4

Accessories

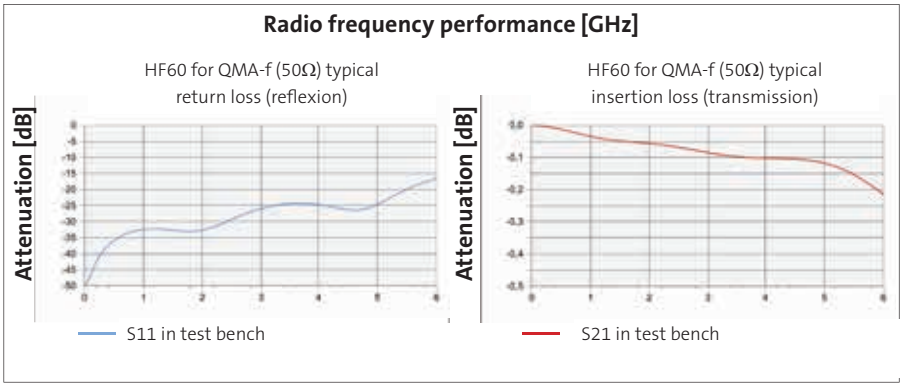
Internal pin	-
Tool for changing internal pin	-
Insertion tool receptacle	FEWZ-822E0
Screw-in tool probe	FWZ860HF50
Cables see overview	page 62



For contacting QMA-Female connectors.



Radio frequency performance [GHz]



Order Code	Description	Sensepin	Tip Style	Ø A	Ø B	C	H	L	Version
HF86002B0017G730	HF60-0017 QMA-F 6 P MCX		02	1,80	8,00	-6,40	17,90	49,40	-
HF86002B0017G730M	HF60-0017 QMA-F 6 S MCX		02	1,80	8,00	-6,40	17,90	49,40	M

R-SMA-Female

HF60-0018 R-SMA-F 6 P MCX

Contacting R-SMA-Female

NEW

Centers (mm/mil)	8,50 / 335
Current (Circular)	10,0 A
Current (Internal)	3,0 A
Impedance [Z]	50 Ohm
Frequency	6 GHz
Temperature	-20°C...+80°C

Spring Force (cN ±20%)

	Preload	Nominal
Total	-	530
Internal Cont.	75	130
Circular Cont.	90	400

Travel (mm)

	Nominal	Maximum
Internal Cont.	2,0	3,7
Circular Cont.	4,0	5,0
Thread (M)		M5x0,5
Wrench Size		3,5 / 4,0 / 5,0

Materials and Plating

Internal Cont.	BeCu, gold plated
Circular Cont.	BeCu, gold plated
Barrel	Brass, gold plated
Spring Internal Cont.	Music Wire, gold plated
Spring Circular Cont.	Stainless steel, unplated
Receptacle	Brass, gold plated

Drill Size (mm)

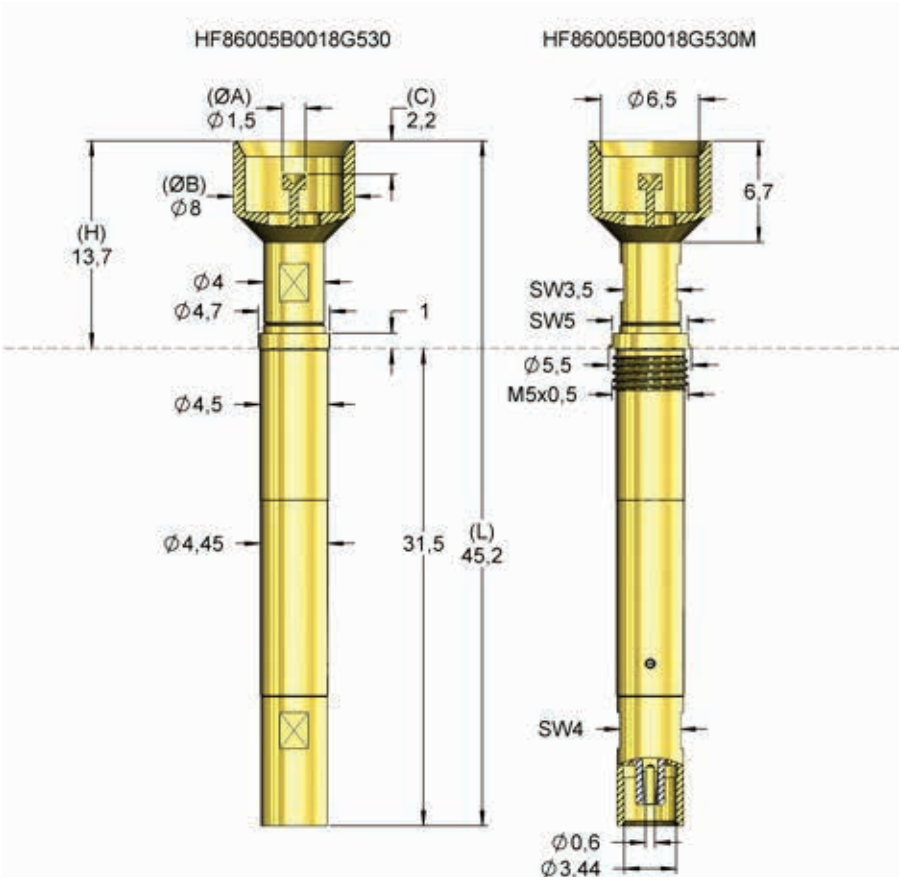
H860	4,99 - 5,00
H860RD	5,51 - 5,53
H860FL	7,99 - 8,01

Projection Height (mm)

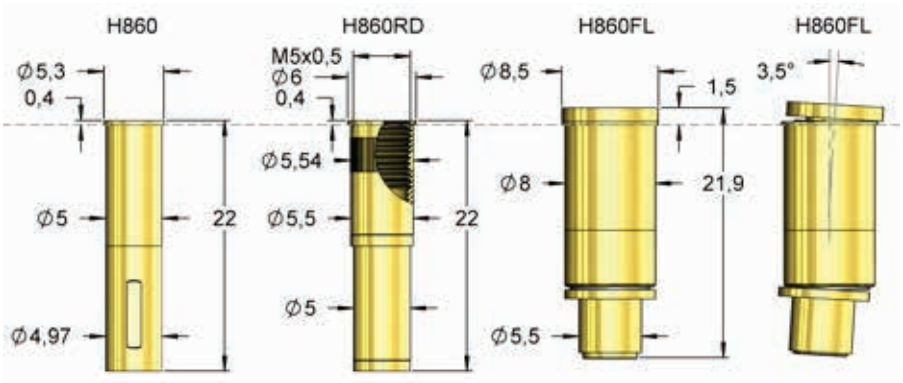
H860(RD) with HF60-0018	14,1
H860FL with HF60-0018	15,2

Accessories

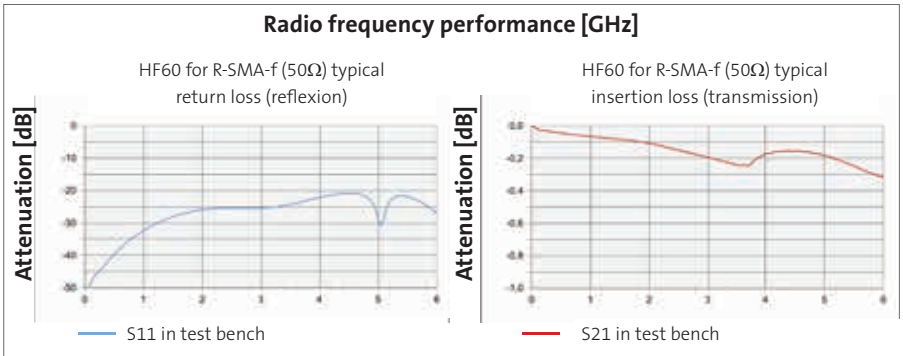
Internal pin	F08605B150G130
Tool for changing internal pin	FZWZ-005 / FDWZ-050
Insertion tool receptacle	FEWZ-822E0
Screw-in tool probe	FWZ860HF50
Cables see overview	page 62



For contacting Reverse SMA-Female connectors.



Radio frequency performance [GHz]



Order Code	Description	Sensepin	Tip Style	Ø A	Ø B	C	H	L	Version
HF86005B0018G530	HF60-0018 R-SMA-F 6 P MCX		05	1,50	8,00	-2,20	13,70	45,20	-
HF86005B0018G530M	HF60-0018 R-SMA-F 6 S MCX		05	1,50	8,00	-2,20	13,70	45,20	M

HF60-0019 PCB-coax-closed 4 P MCX

Contacting PCB-coax-closed

NEW

Centers (mm/mil)	6,00 / 236
Current (Circular)	10,0 A
Current (Internal)	3,0 A
Impedance [Z]	50 Ohm
Frequency	4 GHz
Temperature	-20°C...+80°C

Spring Force (cN ±20%)

	Preload	Nominal
Total	-	530
Internal Cont.	75	130
Circular Cont.	90	400

Travel (mm)

	Nominal	Maximum
Internal Cont.	2,0	2,5
Circular Cont.	4,0	5,0
Thread (M)		M5x0,5
Wrench Size		3,5 / 4,0 / 5,0

Materials and Plating

Internal Cont.	BeCu, gold plated
Circular Cont.	BeCu, gold plated
Barrel	Brass, gold plated
Spring Internal Cont.	Music Wire, gold plated
Spring Circular Cont.	Stainless steel, unplated
Receptacle	Brass, gold plated

Drill Size (mm)

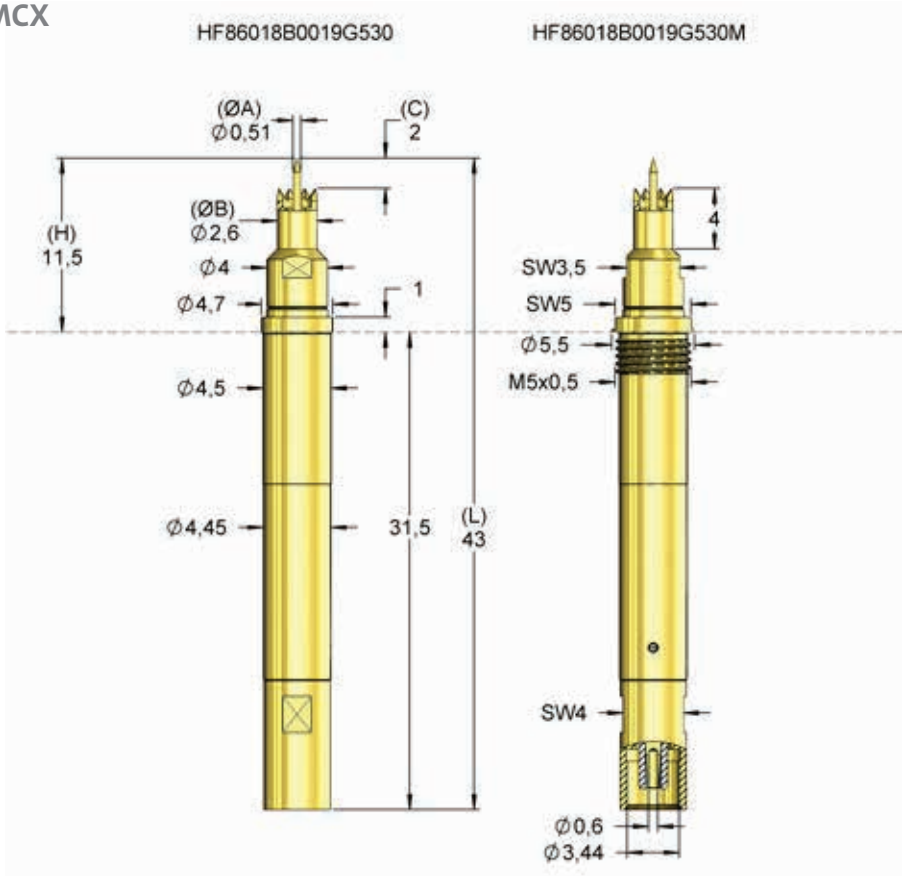
H860	4,99 - 5,00
H860RD	5,51 - 5,53
H860FL	7,99 - 8,01

Projection Height (mm)

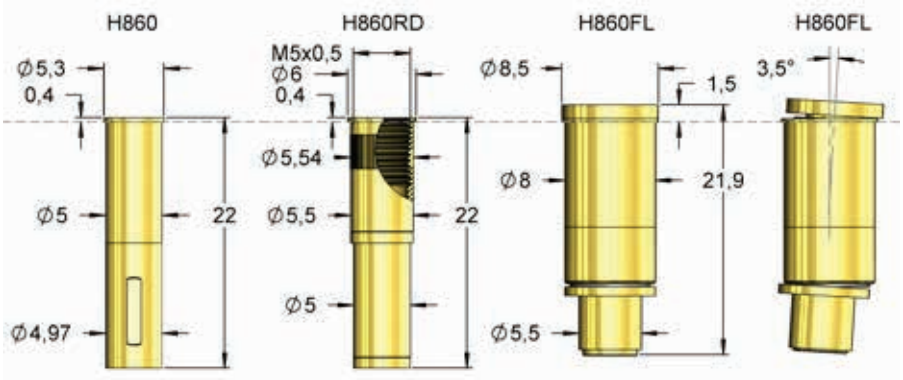
H860(RD) with HF60-0019	11,9
H860FL with HF60-0019	13,0

Accessories

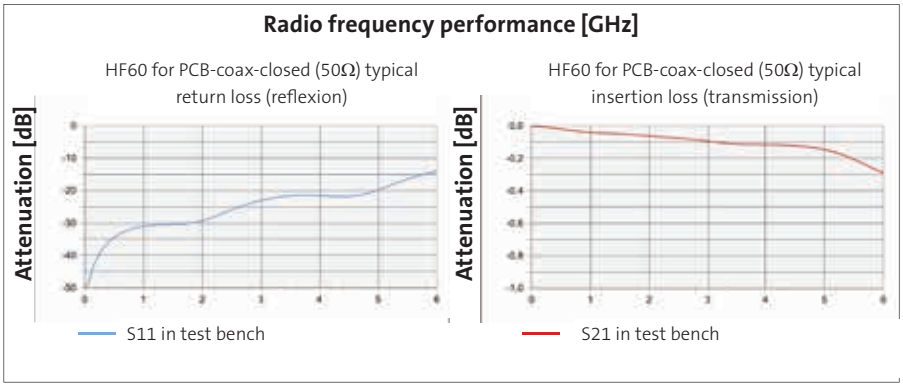
Internal pin	F08618B051G130
Tool for changing internal pin	FZWZ-004 / FDWZ-050
Insertion tool receptacle	FEWZ-822E0
Screw-in tool probe	FWZ860HF50
Cables see overview	page 62



For contacting PCBs coaxial closed.



Radio frequency performance [GHz]



Order Code	Description	Sensepin	Tip Style	Ø A	Ø B	C	H	L	Version
HF86018B0019G530	HF60-0019 PCB-coax-closed 4 P MCX		18	0,51	2,60	2,00	11,50	43,00	-
HF86018B0019G530M	HF60-0019 PCB-coax-closed 4 S MCX		18	0,51	2,60	2,00	11,50	43,00	M

HF60-0020 PCB-coax-kidney 4 P MCX

Contacting PCB-coax-kidney

NEW

Centers (mm/mil)	8,50 / 335
Current (Circular)	10,0 A
Current (Internal)	3,0 A
Impedance [Z]	50 Ohm
Frequency	6 GHz
Temperature	-20°C...+80°C

Spring Force (cN ±20%)

	Preload	Nominal
Total	-	730
Internal Cont.	75	130
Circular Cont.	400	600

Travel (mm)

	Nominal	Maximum
Internal Cont.	2,0	2,5
Circular Cont.	4,0	5,0
Thread (M)		M5x0,5
Wrench Size		3,5 / 4,0 / 5,0

Materials and Plating

Internal Cont.	BeCu, gold plated
Circular Cont.	BeCu, gold plated
Barrel	Brass, gold plated
Spring Internal Cont.	Music Wire, gold plated
Spring Circular Cont.	Stainless steel, unplated
Receptacle	Brass, gold plated

Drill Size (mm)

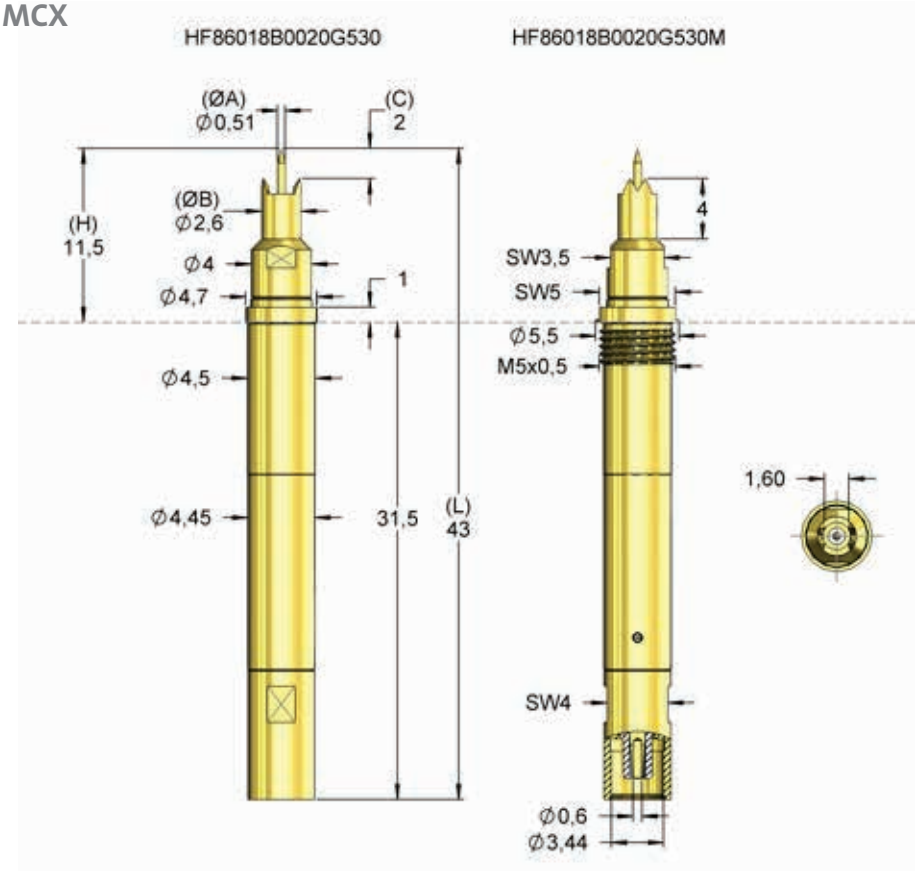
H860	4,99 - 5,00
H860RD	5,51 - 5,53
H860FL	7,99 - 8,01

Projection Height (mm)

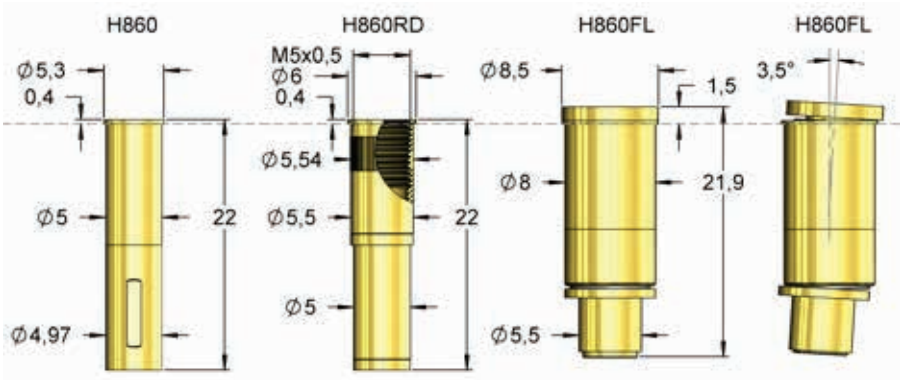
H860(RD) with HF60-0020	11,9
H860FL with HF60-0020	13,0

Accessories

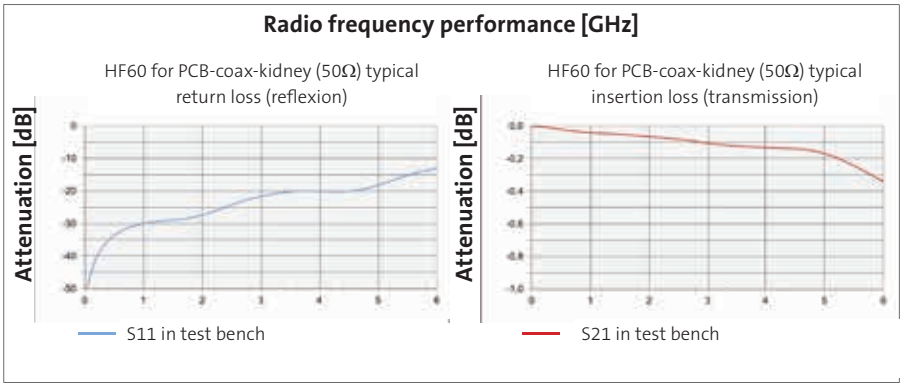
Internal pin	F08618B051G130
Tool for changing internal pin	FZWZ-004 / FDWZ-050
Insertion tool receptacle	FEWZ-822E0
Screw-in tool probe	FWZ860HF50
Cables see overview	page 62



For contacting PCB-coax-kidney.



Radio frequency performance [GHz]



Order Code	Description	Sensepin	Tip Style	Ø A	Ø B	C	H	L	Version
HF86018B0020G530	HF60-0020 PCB-coax-kidney 4 P MCX		18	0,51	2,50	2,00	11,50	43,00	-
HF86018B0020G530M	HF60-0020 PCB-coax-kidney 4 S MCX		18	0,51	2,50	2,00	11,50	43,00	M

HF60-0021 1,0/2,3-F 4 P MCX

Contacting DIN 1,0/2,3-Female

NEW

Centers (mm/mil)	6,50 / 256
Current (Circular)	10,0 A
Current (Internal)	3,0 A
Impedance [Z]	50 Ohm
Frequency	4 GHz
Temperature	-20°C...+80°C

Spring Force (cN ±20%)

	Preload	Nominal
Total	-	530
Internal Cont.	75	130
Circular Cont.	90	400

Travel (mm)

	Nominal	Maximum
Internal Cont.	2,0	3,7
Circular Cont.	4,0	5,0
Thread (M)		M5x0,5
Wrench Size		3,5 / 4,0 / 5,0

Materials and Plating

Internal Cont.	BeCu, gold plated
Circular Cont.	BeCu, gold plated
Barrel	Brass, gold plated
Spring Internal Cont.	Music Wire, gold plated
Spring Circular Cont.	Stainless steel, unplated
Receptacle	Brass, gold plated

Drill Size (mm)

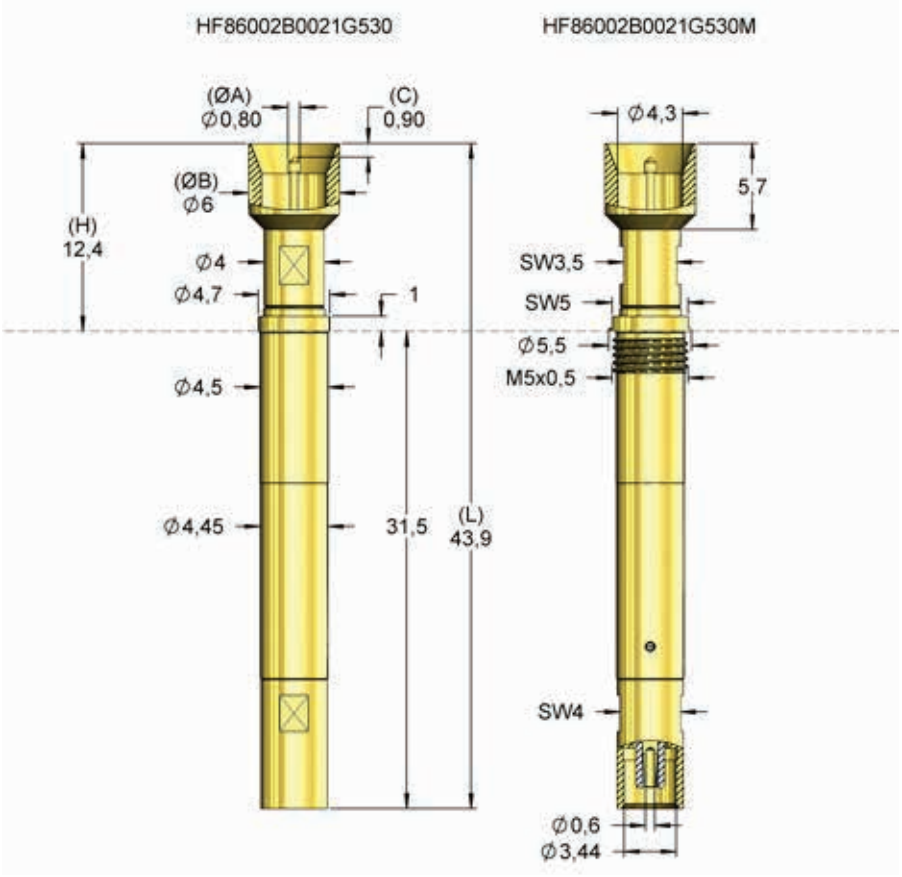
H860	4,99 - 5,00
H860RD	5,51 - 5,53
H860FL	7,99 - 8,01

Projection Height (mm)

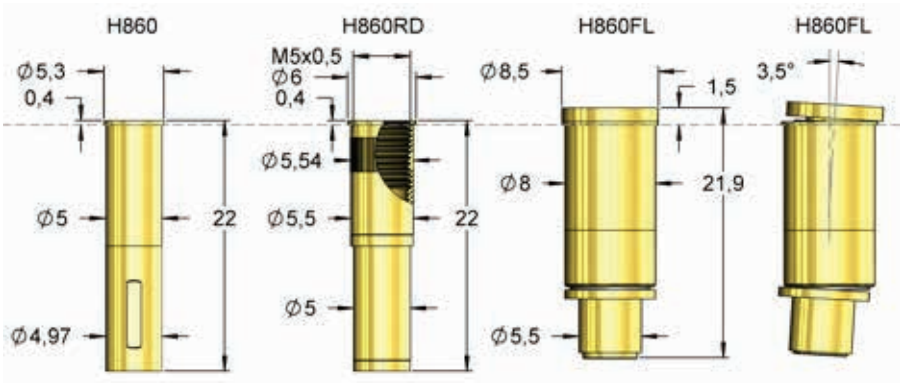
H860(RD) with HF60-0021	12,8
H860FL with HF60-0021	13,9

Accessories

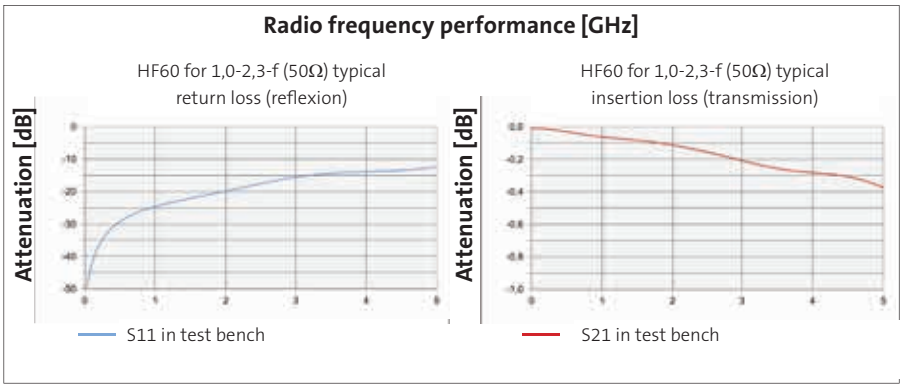
Internal pin	F08602B080G130
Tool for changing internal pin	FZWZ-004 / FDWZ-050
Insertion tool receptacle	FEWZ-822E0
Screw-in tool probe	FWZ860HF50
Cables see overview	page 62



For contacting DIN 1,0/2,3-Female connectors.



Radio frequency performance [GHz]



Order Code	Description	Sensepin	Tip Style	Ø A	Ø B	C	H	L	Version
HF86002B0021G530	HF60-0021 1,0-2,3-F 4 P MCX		02	0,80	6,00	-0,90	12,40	43,90	-
HF86002B0021G530M	HF60-0021 1,0-2,3-F 4 S MCX		02	0,80	6,00	-0,90	12,40	43,90	M

HF60-0022 FME-M 2 P MCX

Contacting FME-Male

NEW

Centers (mm/mil)	8,50 / 335
Current (Circular)	10,0 A
Current (Internal)	3,0 A
Impedance [Z]	50 Ohm
Frequency	2 GHz
Temperature	-20°C...+80°C

Spring Force (cN ±20%)

	Preload	Nominal
Total	-	790
Internal Cont.	115	190
Circular Cont.	400	600

Travel (mm)

	Nominal	Maximum
Internal Cont.	2,0	3,7
Circular Cont.	4,0	5,0
Thread (M)		M5x0,5
Wrench Size		3,5 / 4,0 / 5,0

Materials and Plating

Internal Cont.	BeCu, gold plated
Circular Cont.	BeCu, gold plated
Barrel	Brass, gold plated
Spring Internal Cont.	Stainless steel, unplated
Spring Circular Cont.	Stainless steel, unplated
Receptacle	Brass, gold plated

Drill Size (mm)

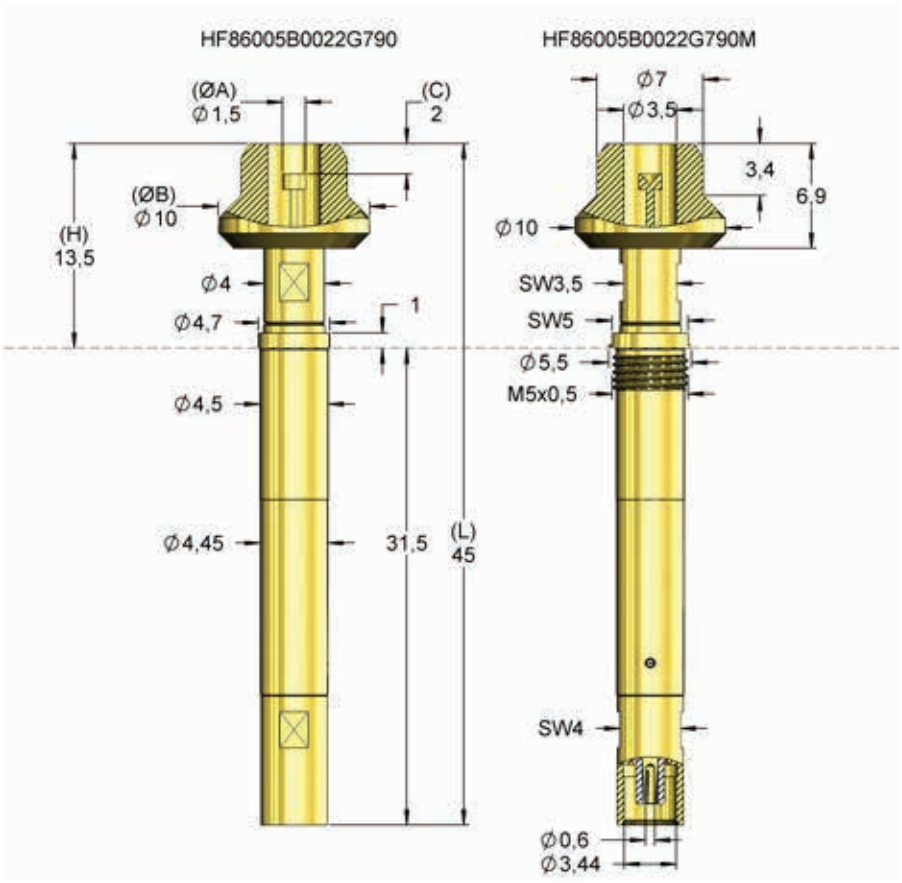
H860	4,99 - 5,00
H860RD	5,51 - 5,53
H860FL	7,99 - 8,01

Projection Height (mm)

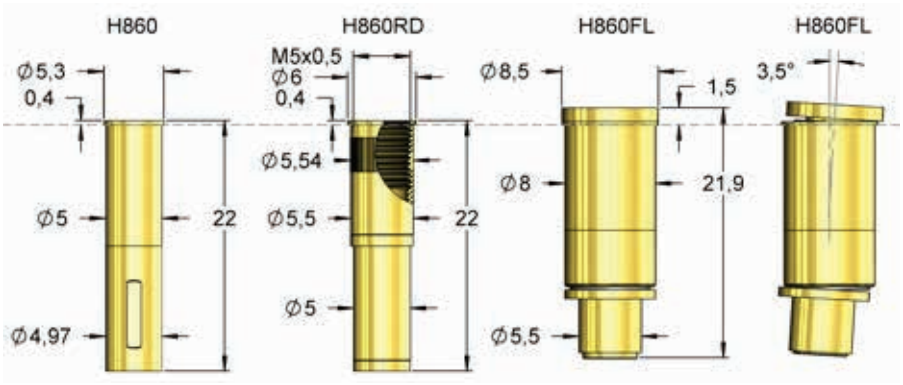
H860(RD) with HF60-0022	13,9
H860FL with HF60-0022	15,0

Accessories

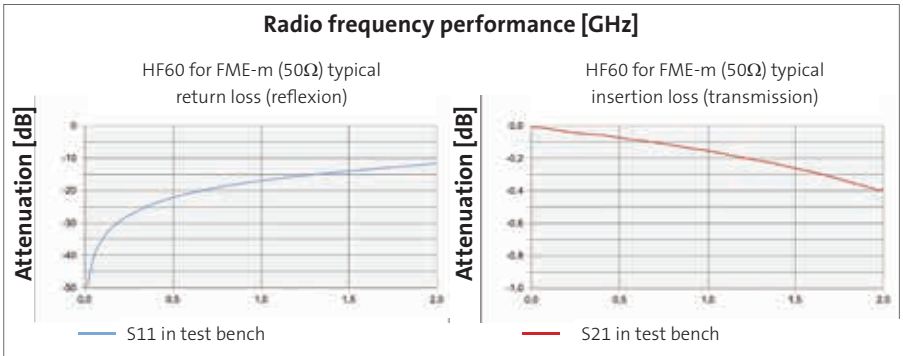
Internal pin	F08605B150G190
Tool for changing internal pin	FZWZ-005 / FDWZ-050
Insertion tool receptacle	FEWZ-822E0
Screw-in tool probe	Open-end wrench SW5
Cables see overview	page 62



For contacting FME-Male connectors.



Radio frequency performance [GHz]



Order Code	Description	Sensepin	Tip Style	Ø A	Ø B	C	H	L	Version
HF86005B0022G790	HF60-0022 FME-M 2 P MCX		05	1,50	10,00	-2,00	13,50	45,00	-
HF86005B0022G790M	HF60-0022 FME-M 2 S MCX		05	1,50	10,00	-2,00	13,50	45,00	M

HF60-0023 GT16-M 4 P MCX

Contacting GT16-Male

NEW

Centers (mm/mil)	6,50 / 256
Current (Circular)	10,0 A
Current (Internal)	3,0 A
Impedance [Z]	50 Ohm
Frequency	4 GHz
Temperature	-20°C...+80°C

Spring Force (cN ±20%)

	Preload	Nominal
Total	-	530
Internal Cont.	75	130
Circular Cont.	90	400

Travel (mm)

	Nominal	Maximum
Internal Cont.	2,0	3,7
Circular Cont.	4,0	5,0
Thread (M)		M5x0,5
Wrench Size		3,5 / 4,0 / 5,0

Materials and Plating

Internal Cont.	BeCu, gold plated
Circular Cont.	BeCu, gold plated
Barrel	Brass, gold plated
Spring Internal Cont.	Music Wire, gold plated
Spring Circular Cont.	Stainless steel, unplated
Receptacle	Brass, gold plated

Drill Size (mm)

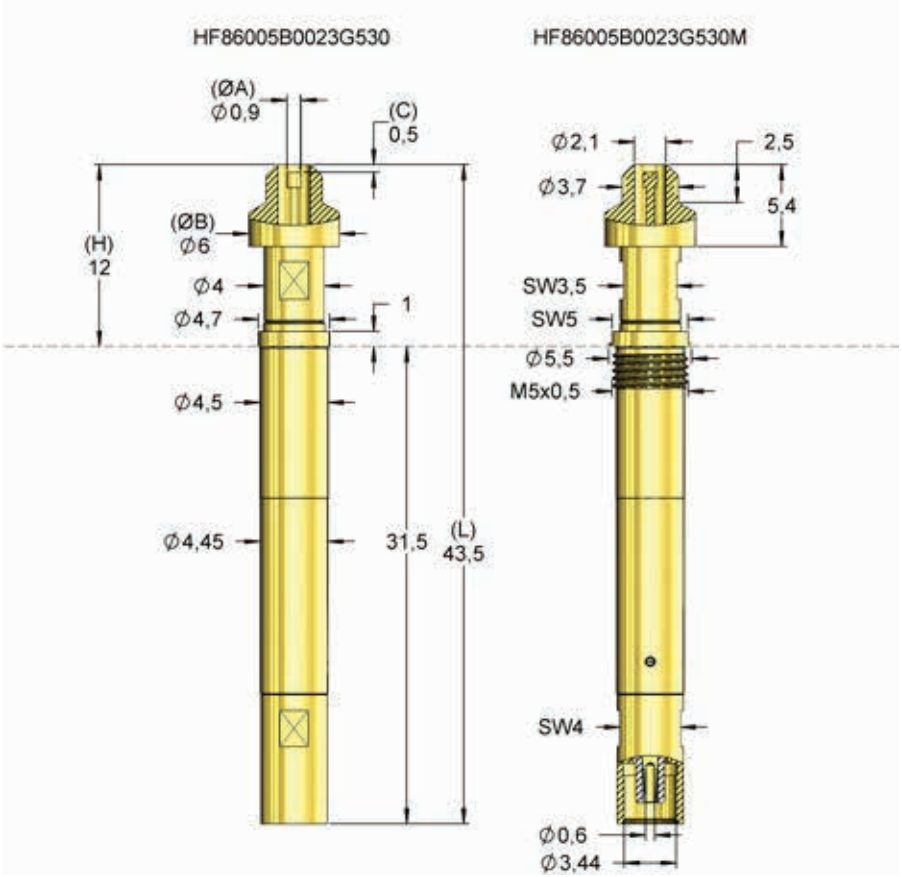
H860	4,99 - 5,00
H860RD	5,51 - 5,53
H860FL	7,99 - 8,01

Projection Height (mm)

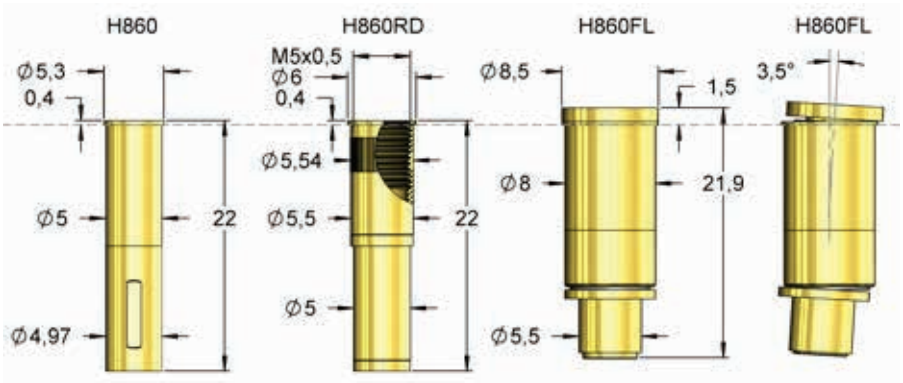
H860(RD) with HF60-0023	12,4
H860FL with HF60-0023	13,5

Accessories

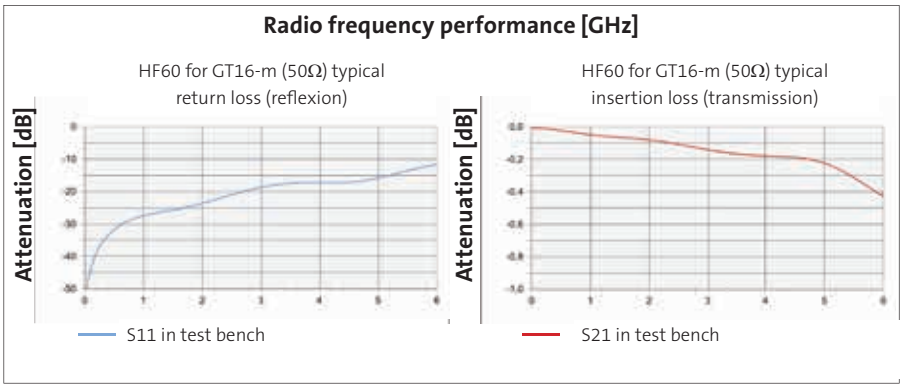
Internal pin	F08605B090G130
Tool for changing internal pin	FZWZ-004 / FDWZ-050
Insertion tool receptacle	FEWZ-822E0
Cables see overview	page 62



For contacting GT16-Male connectors.



Radio frequency performance [GHz]



Order Code	Description	Sensepin	Tip Style	Ø A	Ø B	C	H	L	Version
HF86005B0023G530	HF60-0023 GT16-M 4 P MCX		05	0,90	6,00	-0,50	12,00	43,50	-
HF86005B0023G530M	HF60-0023 GT16-M 4 S MCX		05	0,90	6,00	-0,50	12,00	43,50	M

MMBX-Female

HF60-0024 MMBX-F 4 P MCX

Contacting MMBX-Female

NEW

Centers (mm/mil)	8,50 / 335
Current (Circular)	10,0 A
Current (Internal)	3,0 A
Impedance [Z]	50 Ohm
Frequency	6 GHz
Temperature	-20°C...+80°C

Spring Force (cN ±20%)

	Preload	Nominal
Total	-	530
Internal Cont.	75	130
Circular Cont.	90	400

Travel (mm)

	Nominal	Maximum
Internal Cont.	2,0	3,7
Circular Cont.	4,0	5,0
Thread (M)		M5x0,5
Wrench Size		3,5 / 4,0 / 5,0

Materials and Plating

Internal Cont.	BeCu, gold plated
Circular Cont.	BeCu, gold plated
Barrel	Brass, gold plated
Spring Internal Cont.	Music Wire, gold plated
Spring Circular Cont.	Stainless steel, unplated
Receptacle	Brass, gold plated

Drill Size (mm)

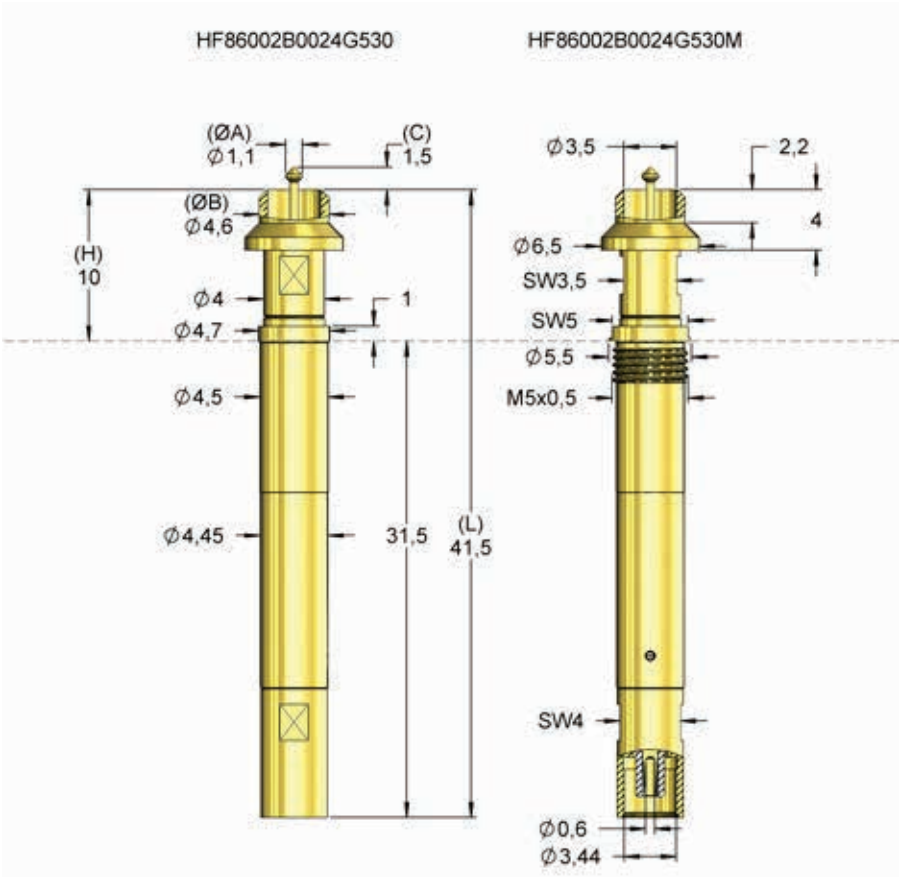
H860	4,99 - 5,00
H860RD	5,51 - 5,53
H860FL	7,99 - 8,01

Projection Height (mm)

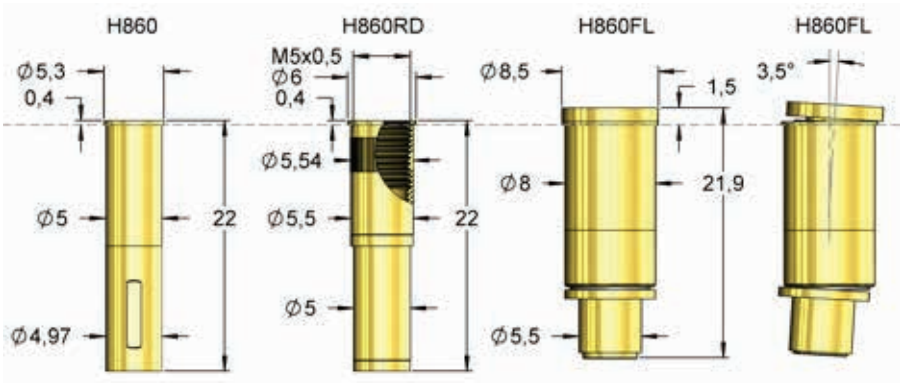
H860(RD) with HF60-0024	10,4
H860FL with HF60-0024	11,5

Accessories

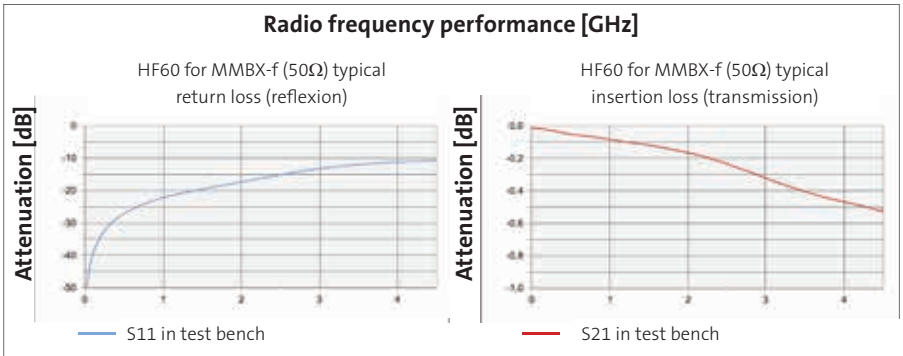
Internal pin	F08602B110G130
Tool for changing internal pin	FZWZ-005 / FDWZ-050
Insertion tool receptacle	FEWZ-822E0
Screw-in tool probe	FWZ860HF50
Cables see overview	page 62



For contacting MMBX-Female connectors.



Radio frequency performance [GHz]



Order Code	Description	Sensepin	Tip Style	Ø A	Ø B	C	H	L	Version
HF86002B0024G530	HF60-0024 MMBX-F 4 P MCX		02	1,10	4,60	1,50	10,00	41,50	-
HF86002B0024G530M	HF60-0024 MMBX-F 4 S MCX		02	1,10	4,60	1,50	10,00	41,50	M

PCB-GGSGG

HF60-0025 GGSGG 4 P MCX 135

Contacting PCB-GGSGG

NEW

Centers (mm/mil)	6,00 / 236
Current (Circular)	5,0 A
Current (Internal)	3,0 A
Impedance [Z]	50 Ohm
Frequency	4 GHz
Temperature	-20°C...+80°C

Spring Force (cN ±20%)

	Preload	Nominal
Total	-	-
Internal Cont.	4x40	4x80
Circular Cont.	450	800

Travel (mm)

	Nominal	Maximum
Internal Cont.	-	-
Circular Cont.	4,0	5,0
Thread (M)		M5x0,5
Wrench Size		3,5 / 4,0 / 5,0

Materials and Plating

Internal Cont.	BeCu, gold plated
Circular Cont.	BeCu, gold plated
Barrel	Brass, gold plated
Spring Internal Cont.	Music Wire, gold plated
Spring Circular Cont.	Stainless steel, unplated
Receptacle	Brass, gold plated

Drill Size (mm)

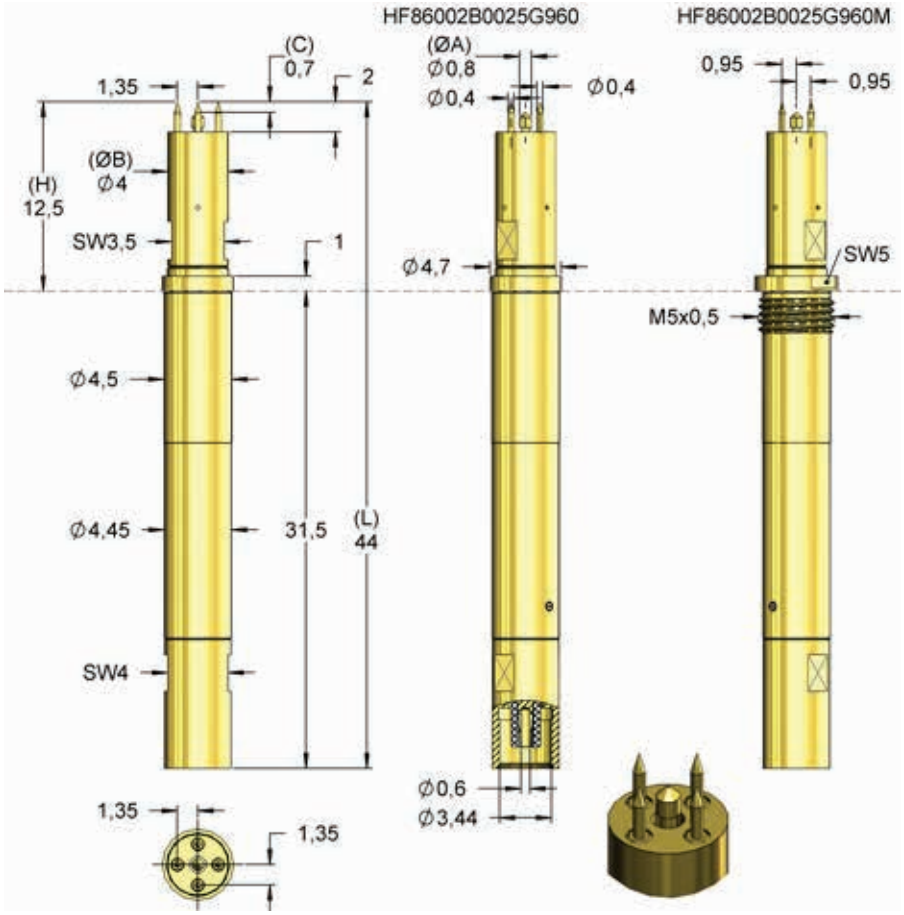
H860	4,99 - 5,00
H860RD	5,51 - 5,53
H860FL	7,99 - 8,01

Projection Height (mm)

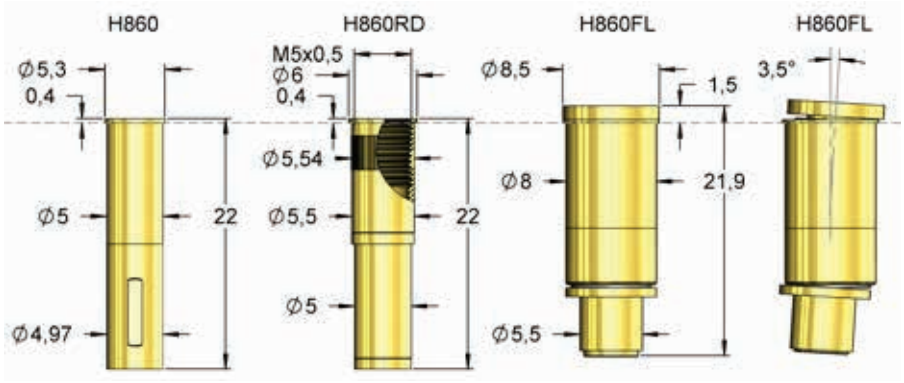
H860(RD) with HF60-0025	12,9
H860FL with HF60-0025	14,0

Accessories

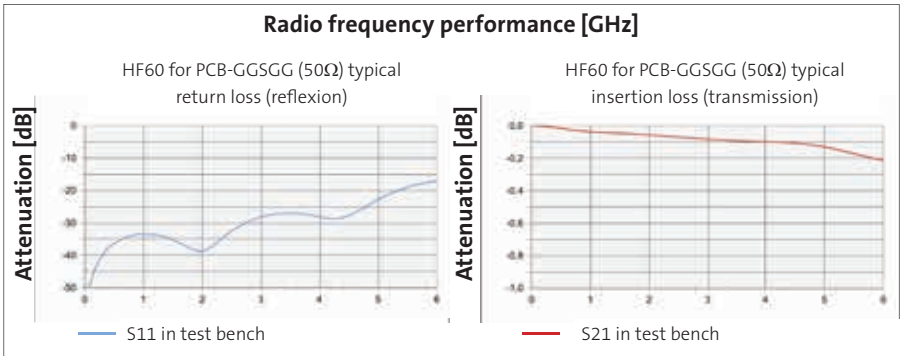
Internal pin	-
Tool for changing internal pin	-
Insertion tool receptacle	FEWZ-822E0
Screw-in tool probe	FWZ860HF50
Cables see overview	page 62



For contacting PCB-GGSGG.



Radio frequency performance [GHz]



Order Code	Description	Sensepin	Tip Style	Ø A	Ø B	C	H	L	Version
HF86002B0025G960	HF60-0025 GGSGG 4 P MCX 135		02	0,80	4,00	0,70	12,50	44,00	-
HF86002B0025G960M	HF60-0025 GGSGG 4 S MCX 135		02	0,80	4,00	0,70	12,50	44,00	M

Fakra-Male

HF60-0026 FAKRA-M 6 P MCX

Contacting Fakra-Male

NEW

Centers (mm/mil)	6,50 / 256
Current (Circular)	10,0 A
Current (Internal)	3,0 A
Impedance [Z]	50 Ohm
Frequency	6 GHz
Temperature	-20°C...+80°C

Spring Force (cN ±20%)

	Preload	Nominal
Total	-	550
Total	-	950
Internal Cont.	75	150
Circular Cont.	90	400
Circular Cont.	450	800

Travel (mm)

	Nominal	Maximum
Internal Cont.	2,5	3,7
Circular Cont.	4,0	5,0
Thread (M)		M5x0,5
Wrench Size		3,5 / 4,0 / 5,0

Materials and Plating

Internal Cont.	BeCu, gold plated
Circular Cont.	BeCu, gold plated
Barrel	Brass, gold plated
Spring Internal Cont.	Music Wire, gold plated
Spring Circular Cont.	Stainless steel, unplated
Receptacle	Brass, gold plated

Drill Size (mm)

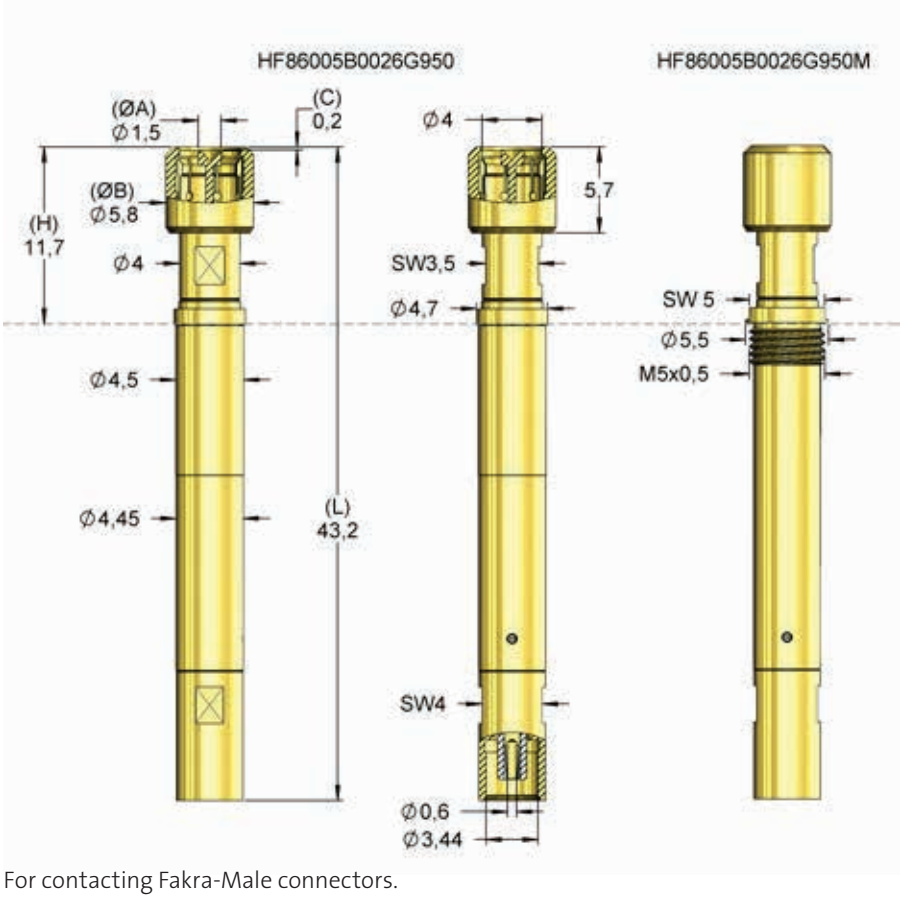
H860	4,99 - 5,00
H860RD	5,51 - 5,53
H860FL	7,99 - 8,01

Projection Height (mm)

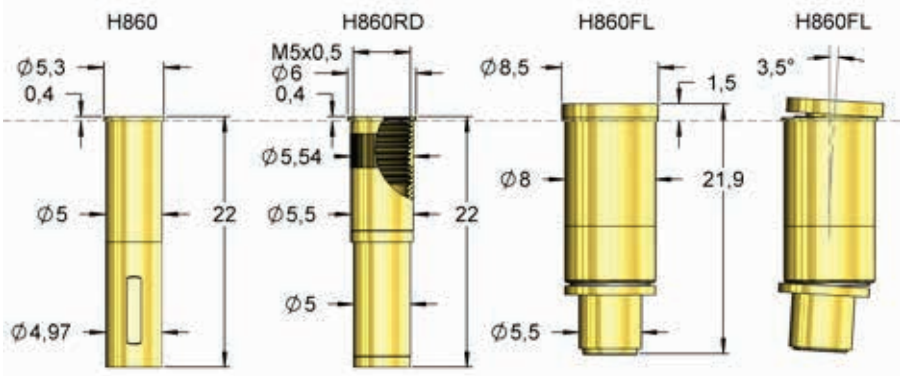
H860(RD) with HF60-0026	12,1
H860FL with HF60-0026	13,2

Accessories

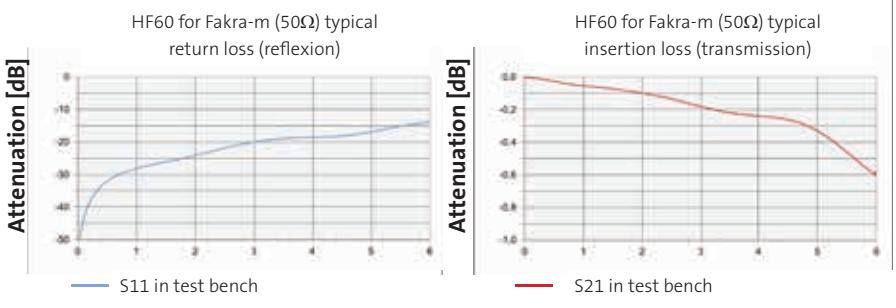
Internal pin	F08605B150G130
Tool for changing internal pin	FZWZ-005 / FDWZ-050
Insertion tool receptacle	FEWZ-822E0
Screw-in tool probe	FWZ860HF50
Cables see overview	page 62



For contacting Fakra-Male connectors.



Radio frequency performance [GHz]



Order Code	Description	Sensepin	Tip Style	Ø A	Ø B	C	H	L	Version
HF86005B0026G550	HF60-0026 FAKRA-M 6 P MCX		05	1,50	5,80	-0,20	11,70	43,20	-
HF86005B0026G950	HF60-0026 FAKRA-M 6 P MCX		05	1,50	5,80	-0,20	11,70	43,20	-
HF86005B0026G950M	HF60-0026 FAKRA-M 6 S MCX		05	1,50	5,80	-0,20	11,70	43,20	M

N-Female

HF60-0027 N-F 6 P MCX

Contacting N-Female

NEW

Centers (mm/mil)	12,5 / 492
Current (Circular)	10,0 A
Current (Internal)	3,0 A
Impedance [Z]	50 Ohm
Frequency	6 GHz
Temperature	-20°C...+80°C

Spring Force (cN ±20%)

	Preload	Nominal
Total	-	430
Internal Cont.	75	130
Circular Cont.	90	300

Travel (mm)

	Nominal	Maximum
Internal Cont.	2,0	2,7
Circular Cont.	2,7	3,3
Thread (M)		M5x0,5
Wrench Size		3,5 / 4,0 / 5,0

Materials and Plating

Internal Cont.	BeCu, gold plated
Circular Cont.	BeCu, gold plated
Barrel	Brass, gold plated
Spring Internal Cont.	Stainless steel, unplated
Spring Circular Cont.	Stainless steel, unplated
Receptacle	Brass, gold plated

Drill Size (mm)

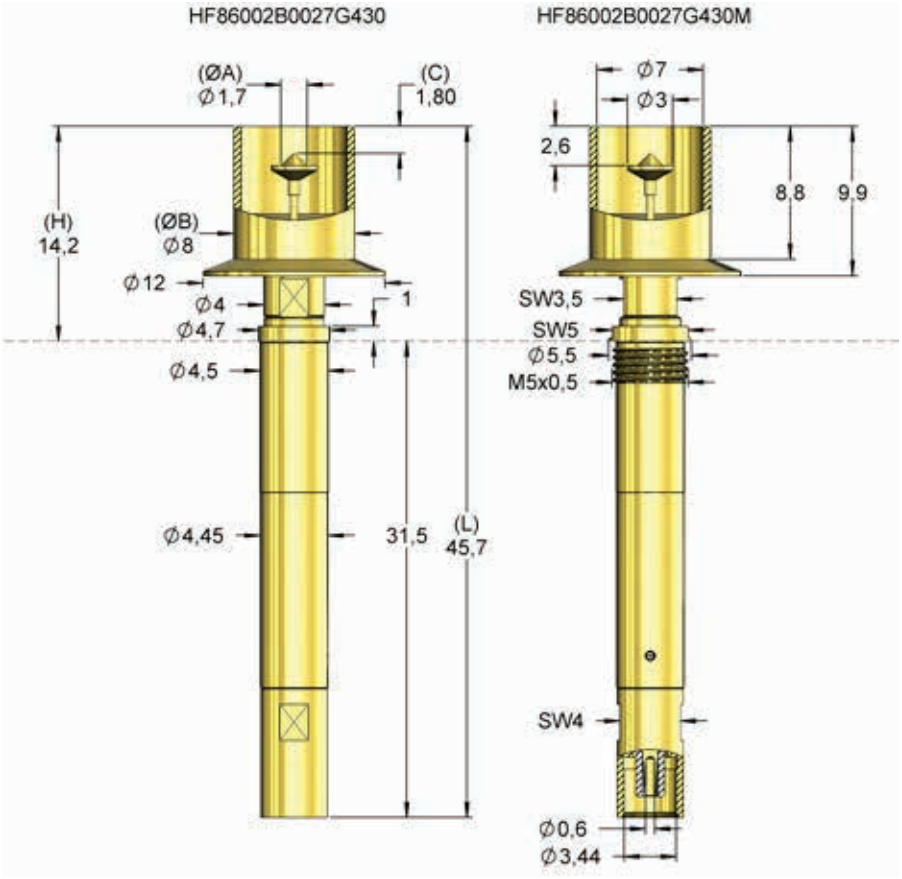
H860	4,99 - 5,00
H860RD	5,51 - 5,53
H860FL	7,99 - 8,01

Projection Height (mm)

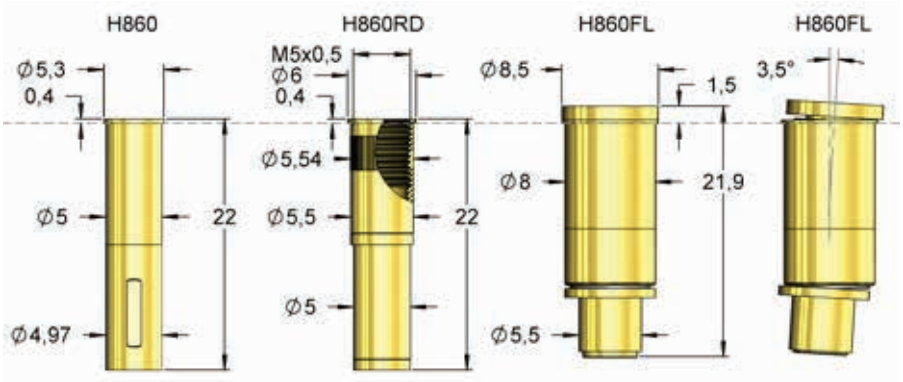
H860(RD) with HF60-0027	14,6
H860FL with HF60-0027	15,7

Accessories

Internal pin	F08602B300G130S1
Tool for changing internal pin	-
Insertion tool receptacle	FEWZ-822E0
Screw-in tool probe	Open-end wrench SW5
Cables see overview	page 62

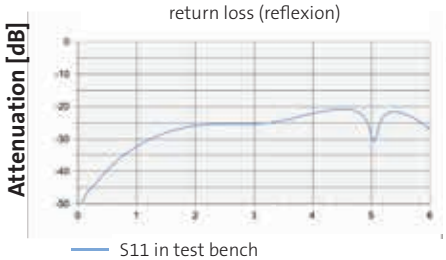


For contacting N-Female connectors.

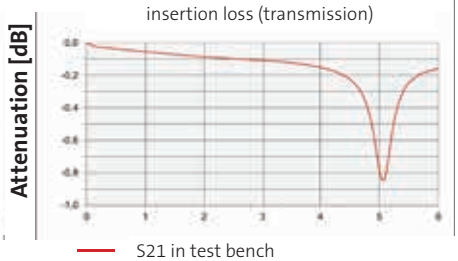


Radio frequency performance [GHz]

HF60 for N-f (50Ω) typical return loss (reflexion)



HF60 for N-f (50Ω) typical insertion loss (transmission)



Order Code	Description	Sensepin	Tip Style	Ø A	Ø B	C	H	L	Version
HF86002B0027G430	HF60-0027 N-F 6 P MCX		02	1,70	8,00	-1,80	14,20	45,70	-
HF86002B0027G430M	HF60-0027 N-F 6 S MCX		02	1,70	8,00	-1,80	14,20	45,70	M

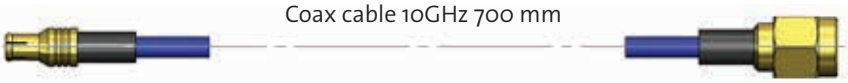
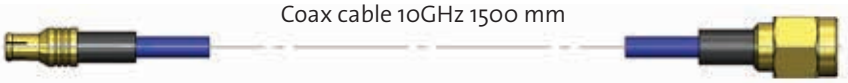
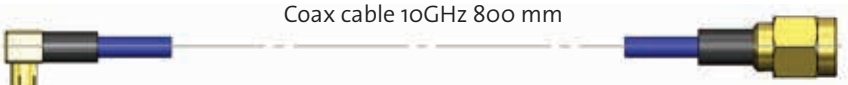
CONNECTION CABLES

for Types HF860/HF66

Connection Cables for HF860

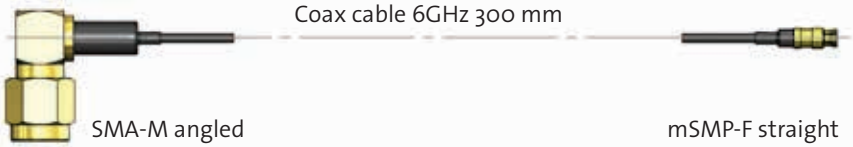
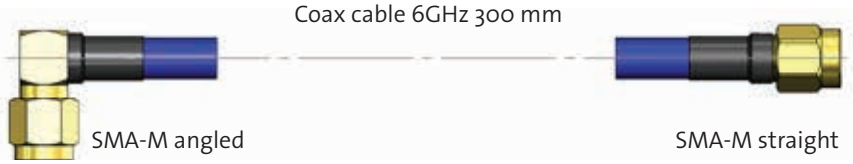
Connection element with pre-assembled coaxial cable RG 316.
Impedance: 50 Ohm
Cutoff frequency:
recommended up to **3 GHz**

Connector with pre-assembled coaxial cable Multiflex 86.
Impedance: 50 Ohm
Cutoff frequency:
recommended up to **10 GHz**

H860AE1		Coax cable 3GHz 700 mm	unassembled
H860AE3		Coax cable 3GHz 700 mm	SMA-M straight
H860AE4		Coax cable 3GHz 700 mm	BNC--M straight
H860AE2		Coax cable 10GHz 700 mm	SMA-M straight
H860AE5		Coax cable 10GHz 1500 mm	SMA-M straight
H860AE6		Coax cable 10GHz 800 mm	SMA-M gerade

Connection Cables for HF66

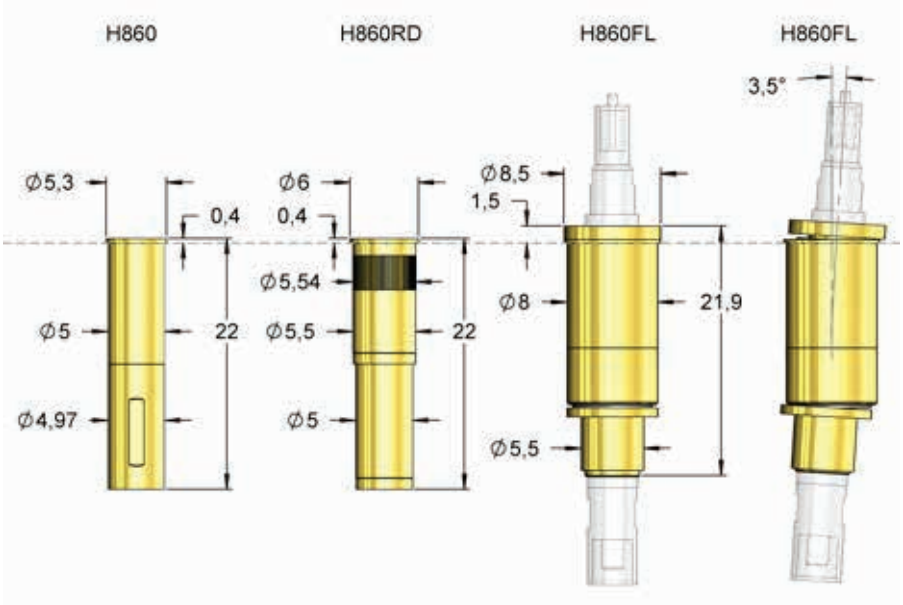
Connector with pre-assembled highly flexible coaxial cable.
Impedance: 50 Ohm
Cutoff frequency:
recommended up to **6 GHz**

H66AE1		Coax cable 6GHz 300 mm	mSMP-F straight
H66AE2		Coax cable 6GHz 500 mm	mSMP-F straight
H66AE3		Coax cable 6GHz 300 mm	SMA-M straight

Receptacles

for HF860

The new receptacle H860FL allows a flexible (floating) mounting of the high frequency probe HF60. It permits a wobbling by 360 degrees in case of a small offset to the DUT. Such a possible offset is compensated without damaging the DUT. In released mode the HF probe is returned to its zero point position. The screwable receptacle with knurl (H860RD) is available for the screwable versions of the HF860.



Tools

for HF860

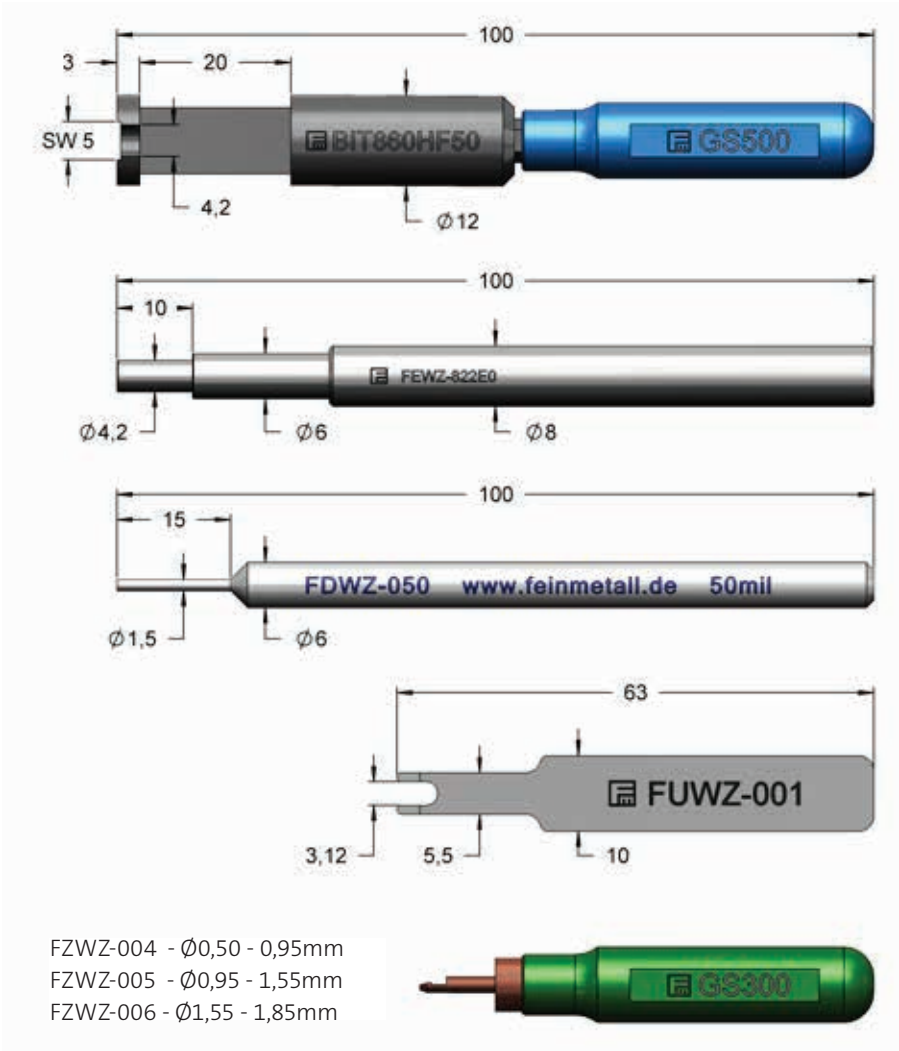
FWZ860HF50
The FWZ860HF50 is used to screw the probes HF860...M into the screwable receptacle H860RD.

FEWZ-822E0
The FEWZ-822E0 is used to insert the receptacles H860... into the mounting plate.

FDWZ-050
The FDWZ-050 is used to insert the signal pin of the HF860 and HF819 if it is possible to replace the signal pin without damaging it.

FUWZ-001
With the release tool FUWZ-001 the pin can be released from the flange. The Mini SMP cable connection can also be easily removed without pulling on the cable.

FZWZ-004 / FZWZ-005 / FZWZ-006
With the removal tool, the signal pin of the HF860 or HF819 can be disconnected and replaced.



F086

Internal Contact for RF Probes HF819 and HF860

Centers (mm/mil)	1,27 / 50
Current	3,0 A
R typ	10 mOhm
Temperature	-20°C...+80°C

Spring Force (cN ±20%)

Version	Preload	Nominal
Standard	75	130
SP	75	130

Travel (mm)

Version	Nominal	Maximum
Standard	2,0	3,7
SP	2,0	3,7
Pointing Accuracy		±0,05 mm

Materials and Plating

Plunger	see Tip Style
Barrel	Bronze, gold plated
Spring	Music Wire, gold plated
Receptacle	Nickel silver, gold plated

Accessories

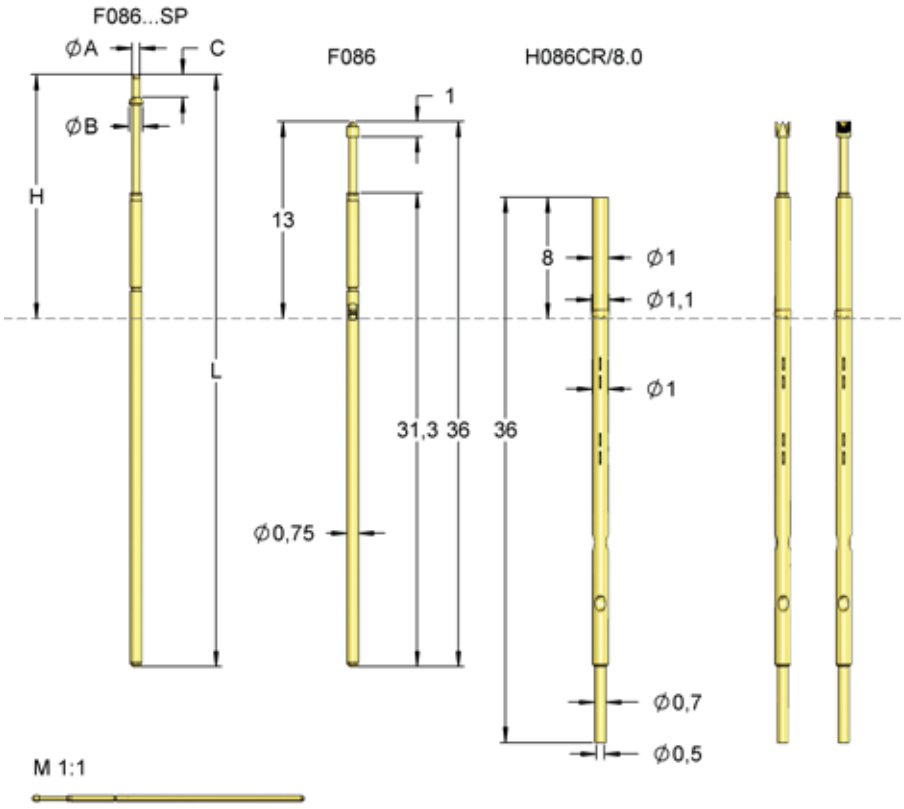
Insertion tool receptacle	FEWZ-050EV
Insertion tool receptacle	FEWZ-050E0
Insertion tool probe	FDWZ-050

Drill Size (mm)

Receptacle press ring as stop	0,99 - 1,00
Receptacle press ring inserted	1,05 -1,07

Projection Height (mm)

H086CR/8.0 with F086	5,0 - 13,0
H086CR/8.0 with F086...SP	8,1 - 16,1



The F086 is mounted in the RF probes HF860 and HF819 as inernal contact for signal transmission.

Series			Tip-Ø		Spring Force (cN)
F086	14	S	090	L	130
	Tip Style	Material		Plating	Version

Material: B = BeCu, S = Steel
Tip-Ø: 090 = 0,90 mm (e.g.)
Plating: G = Gold plated , L = Longtime gold plated
Version: SP = Step Probe (see table)
Receptacle: Order Code according drawing

* deviating from standard, depending on diameter.

Tip Style	Number	Material	Plating	Ø in mm	Version
	02	B	G	0,80	-
	02	B	3,00	G	S1
	02	B	G	1,80	-
	05	B	G	0,90	-
	05	B	G	1,50	-
	11	B	G	0,51	-
	14	B	L	0,90	-
	18	B	G	0,51	-
	55	B	G	0,90	-

Order Code	Tip Style	Ø A	Ø B	C	H	L	Version
F08612B0002G130SP *	12	0,51	0,90	1,50	8,10	39,10	SP
F08612B0004G130SP *	12	0,60	0,90	1,50	8,10	39,10	SP
F08612B0003G130SP *	12	max. 0,60	0,90	1,50	8,10	39,10	SP

F175...SPS1

Internal Contact for RF Probes HF819

Centers (mm/mil)	1,90 / 75
Current	4,0 A
R_{typ}	20 mOhm
Temperature	-20°C...+80°C

Spring Force (cN ±20%)

Version	Preload	Nominal
SPS1	70	150

Travel (mm)

Version	Nominal	Maximum
SPS1	4,3	5,8
Pointing Accuracy		±0,08 mm

Materials and Plating

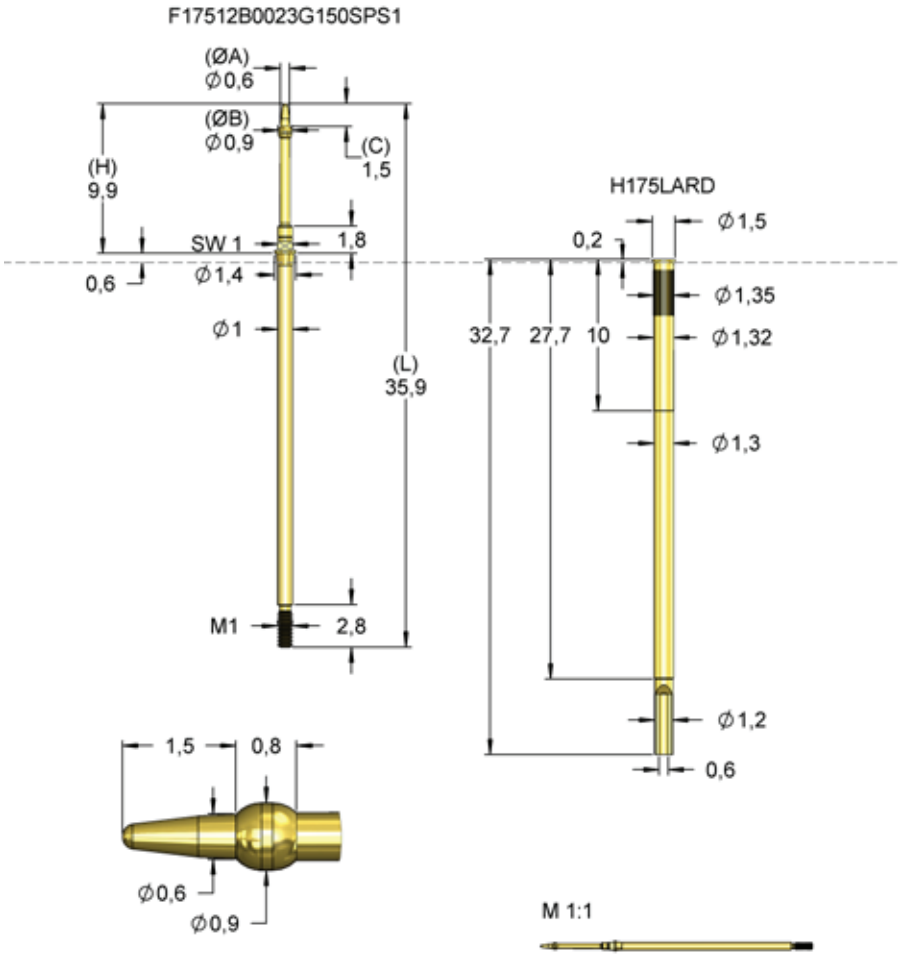
Plunger	BeCu, gold plated
Barrel	Brass, gold plated
Spring	Music Wire, silver plated
Receptacle	Brass, gold plated

Accessories

Insertion tool receptacle	FEWZ-075E0
Screw-in tool probe	FWZ730

Drill Size (mm)

H175LARD	1,32 - 1,34



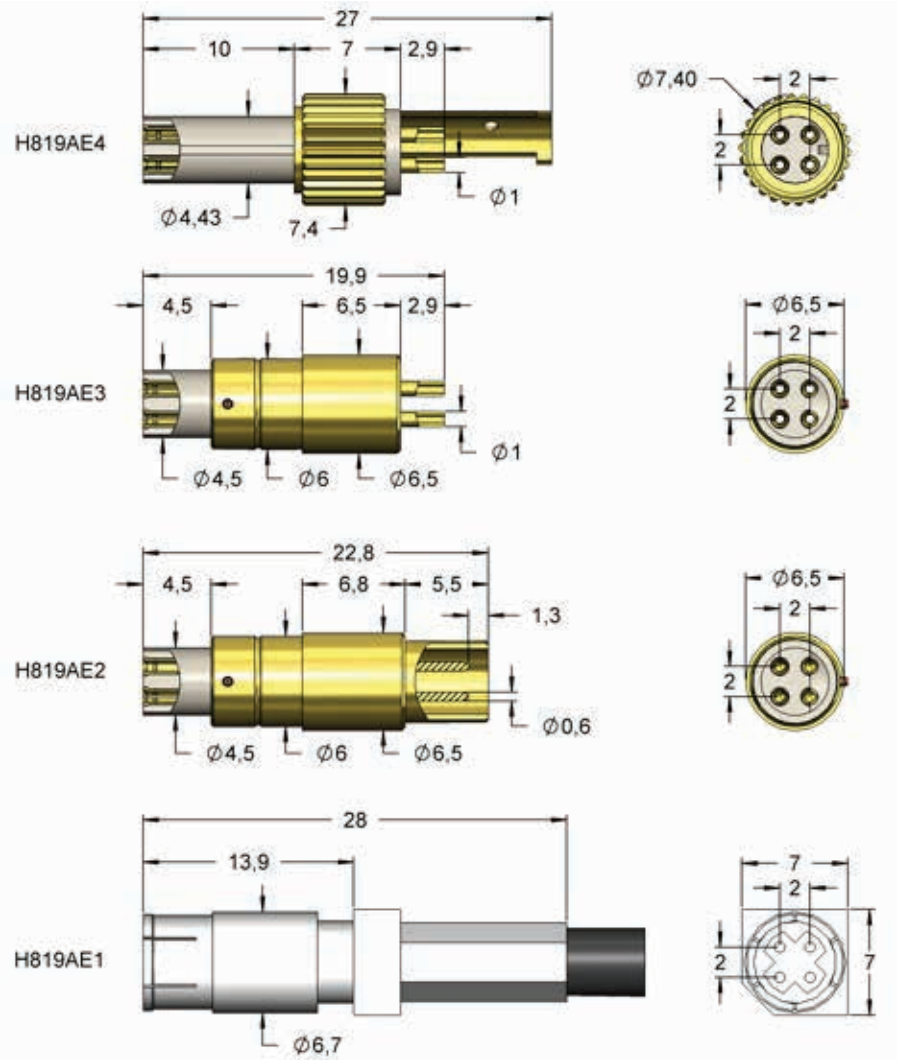
The F175...SPS1 is mounted in the RF probes HF819 as inernal contact for signal transmission.

* deviating from standard, depending on diameter.

Order Code	Tip Style	Ø A	Ø B	C	H	L	Version
F17512B0023G150SPS1 *	12	0,60	0,90	1,50	9,90	35,90	SPS1

H819AEx

Connecting Elements for HF819



Connection on both sides:
D4K- Dacar 535,
socket 4-pole, straight
Length: 500 mm (± 10 mm)

By combining the connection elements H819AE2 and H819AE1 a defined and reproducible measuring setup with fix parameters can be realized.

HF819 H819AE2 H819AE1 (HSD-Female)

Connection units selectable

for direct soldering

HF819 H819AE3

Screw connection provided for direct soldering

HF819...M H819AE4

HF19-0002 HSD-F 2 P H819AE2-3

Contacting
HSD-Female

Centers (mm/mil)	12,0 / 472
Current (Circular)	10,0 A
Current (Internal)	4,0 A
Impedance [Z]	100 Ohm
Frequency	2 GHz
Temperature	-20°C...+80°C

Spring Force (cN ±20%)

	Preload	Nominal
Total	-	2020
Internal Cont.	75	130
Circular Cont.	900	1500

Travel (mm)

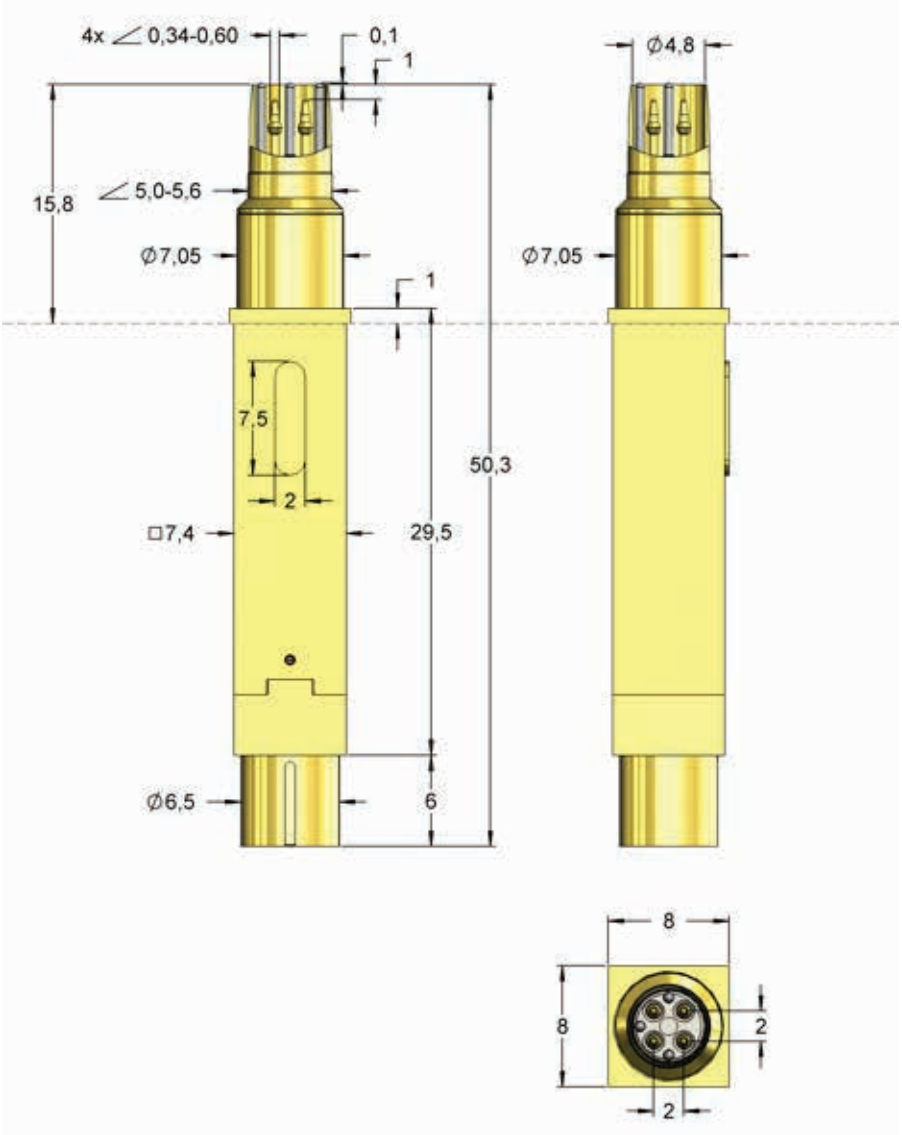
	Nominal	Maximum
Internal Cont.	2,0	3,7
Circular Cont.	5,0	6,0
Wrench Size		6,0

Materials and Plating

Internal Cont.	BeCu, gold plated
Circular Cont.	BeCu, gold plated
Barrel	Brass, gold plated
Spring Internal Cont.	Music Wire, gold plated
Spring Circular Cont.	Stainless steel, unplated

Accessories

Internal pin	F08612B0003G130SP
Tool for changing internal pin	FZWZ-004 / FDWZ-050



This version of probe HF819 has several advantages: conical shape for better contacting, a special step shape for better disconnection of HSD-F with head inlay, protruding alignment pins in the tip for better guidance during the mounting and for avoiding any damages of the screwable internal pins (F17512B0023G150SPS1).

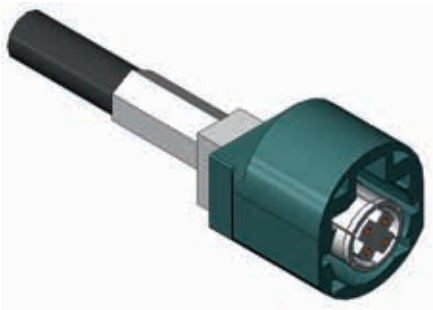
By combining the connection elements H819AE2 and H819AE1 a **defined and reproducible measuring** setup with fix parameters can be realized.

HF819 H819AE2 H819AE1 (HSD-Female)

Connection units selectable

for direct soldering

HF819 H819AE3



HSD-Female (H819AE1)

Order Code	Description	Sensepin	Tip Style	Ø A	Ø B	C	H	L	Version
HF81912B0002G2020	HF19-0002 HSD-F 2 P H819AE2-3		12 *	max. 0,60	max. 5,60	-1,00	15,80	50,30	-

HF19-0001 HSD-M 2 P H819AE2-3

Contacting HSD-Male

Centers (mm/mil)	12,0 / 472
Current (Circular)	10,0 A
Current (Internal)	3,0 A
Impedance [Z]	100 Ohm
Frequency	1-2 GHz
Temperature	-20°C...+80°C

Spring Force (cN ±20%)

	Preload	Nominal
Total	-	1270
Internal Cont.	75	130
Circular Cont.	300	750

Travel (mm)

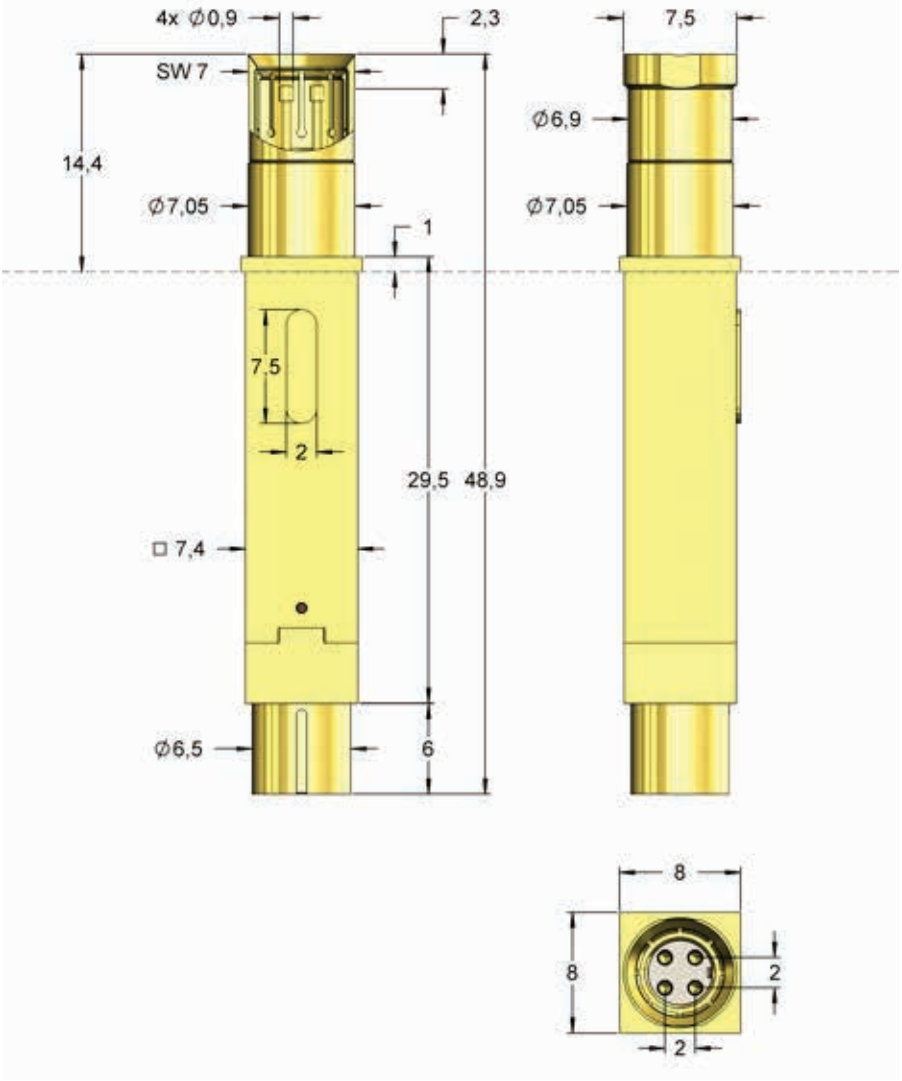
	Nominal	Maximum
Internal Cont.	2,0	3,7
Circular Cont.	5,0	6,0
Wrench Size		6,0 / 7,0

Materials and Plating

Internal Cont.	BeCu, gold plated
Circular Cont.	BeCu, gold plated
Barrel	Brass, gold plated
Spring Internal Cont.	Music Wire, gold plated
Spring Circular Cont.	Stainless steel, unplated

Accessories

Internal pin	F08605B090G130
Tool for changing internal pin	FZWZ-004 / FDWZ-050

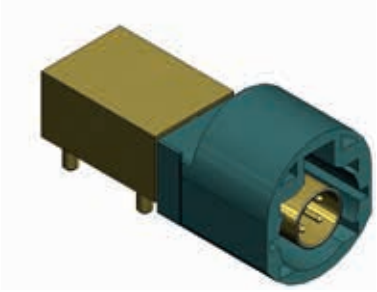


By combining the connection elements H819AE2 and H819AE1 a defined and reproducible measuring setup with fix parameters can be realized.

HF819 H819AE2 H819AE1 (HSD-Female)

Connection units selectable

HF819 H819AE3 for direct soldering



HSD-Male (D4S20A-40MLS-Z)

Order Code	Description	Sensepin	Tip Style	Ø A	Ø B	C	H	L	Version
HF81905B0001G1270	HF19-0001 HSD-M 2 P H819AE2-3		05	0,90	7,50	-2,30	14,40	48,90	-

HF19-0004 HSD-M 2 P H819AE4

Contacting HSD-Male, with threaded conecting element

NEW

Centers (mm/mil)	12,0 / 472
Current (Circular)	10,0 A
Current (Internal)	3,0 A
Impedance [Z]	100 Ohm
Frequency	2 GHz
Temperature	-20°C...+80°C

Spring Force (cN ±20%)

	Preload	Nominal
Total	-	2000
Internal Cont.	75	130
Circular Cont.	900	1500

Travel (mm)

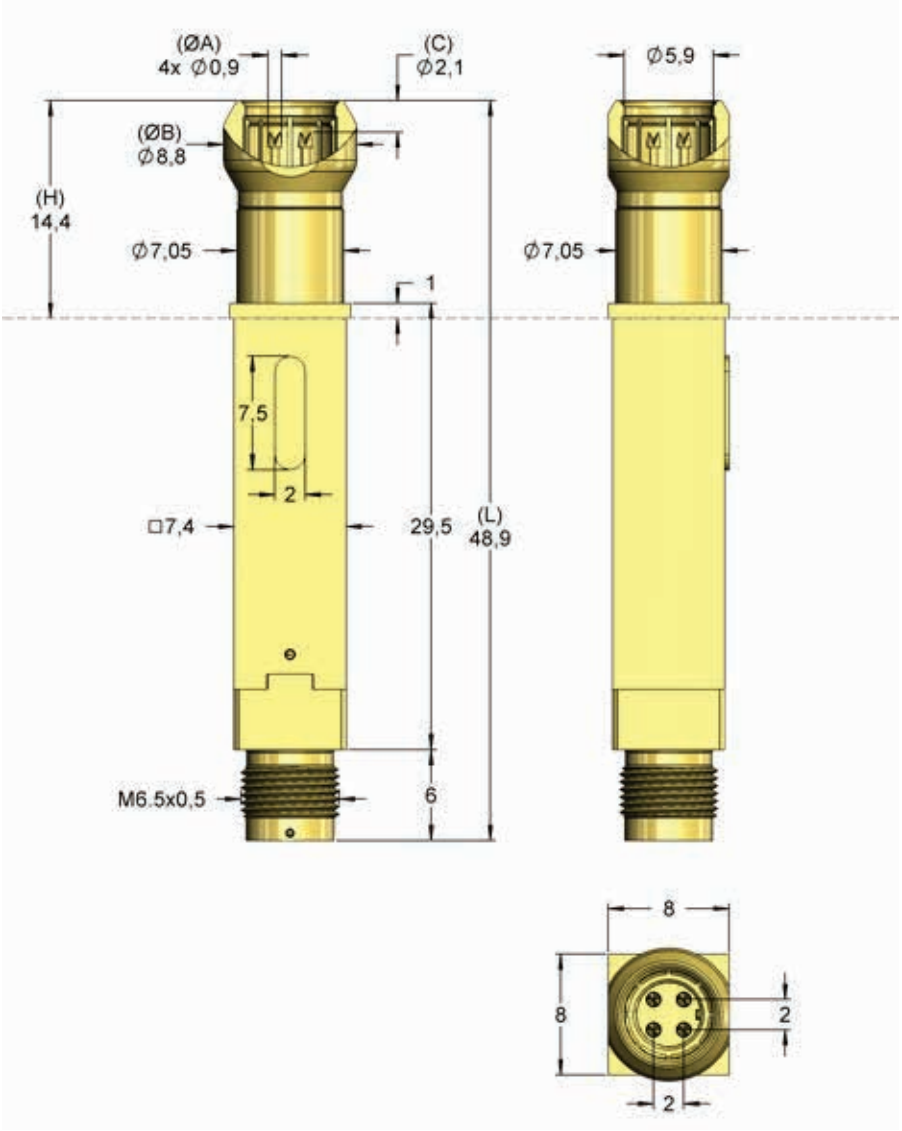
	Nominal	Maximum
Internal Cont.	2,0	3,7
Circular Cont.	5,0	6,0
Wrench Size		8,0

Materials and Plating

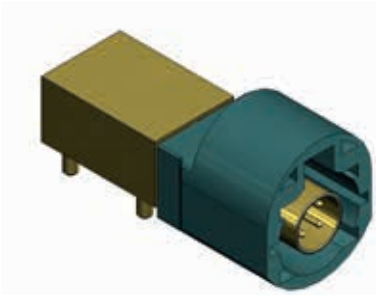
Internal Cont.	Steel, longtime gold plated
Circular Cont.	Brass, gold plated
Barrel	Brass, gold plated
Spring Internal Cont.	Music Wire, gold plated
Spring Circular Cont.	Stainless steel, unplated

Accessories

Internal pin	F08614S090L130
Tool for changing internal pin	FZWZ-004 / FDWZ-050



With its spherical ring contact, the HF probe can better center itself in the HSD connector. The H819AE4 connection element can be screwed on using the thread at the end of the probe. This prevents the connection element from being pulled off.



HSD-Male (D4S20A-40MLS-Z)

HF819 H819AE4

Order Code	Description	Sensepin	Tip Style	Ø A	Ø B	C	H	L	Version
HF81914S0004L1270	HF19-0004 HSD-M 2 P H819AE4		14	0,90	8,80	-2,10	14,40	48,90	-

HF19-0005 HSD-M 3 P HSD

Contacting HSD-Male

NEW

Centers (mm/mil)	12,0 / 472
Current (Circular)	10,0 A
Current (Internal)	3,0 A
Impedance [Z]	100 Ohm
Frequency	3 GHz
Temperature	-20°C...+80°C

Spring Force (cN ±20%)

	Preload	Nominal
Total	-	2000
Internal Cont.	75	130
Circular Cont.	900	1500

Travel (mm)

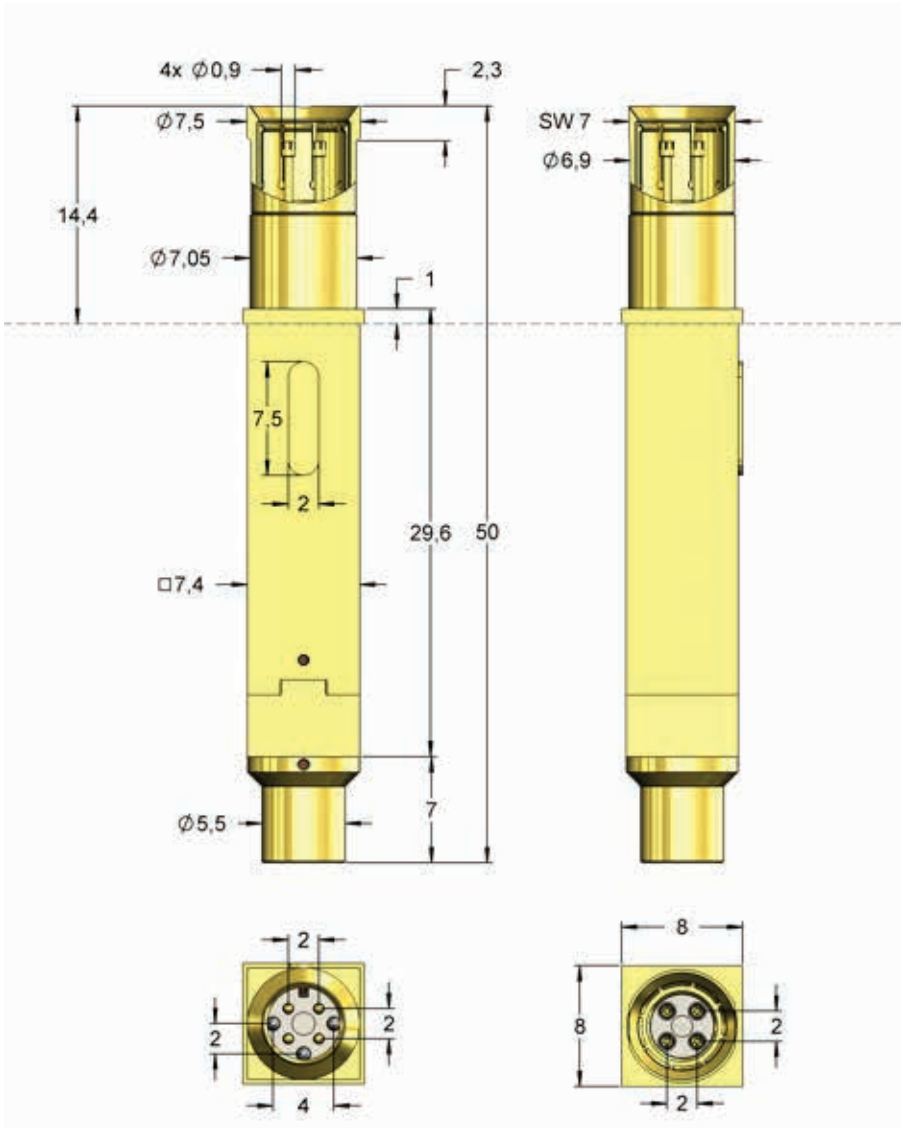
	Nominal	Maximum
Internal Cont.	2,0	3,7
Circular Cont.	5,0	6,0
Wrench Size		6,0 / 7,0

Materials and Plating

Internal Cont.	BeCu, gold plated
Circular Cont.	BeCu, gold plated
Barrel	Brass, gold plated
Spring Internal Cont.	Music Wire, gold plated
Spring Circular Cont.	Stainless steel, unplated

Accessories

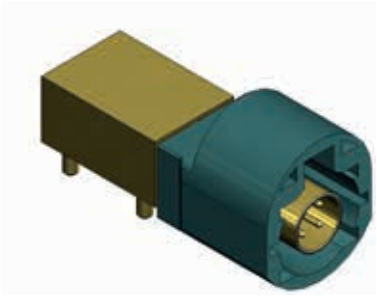
Internal pin	F08655B090G130
Tool for changing internal pin	FZWZ-004 / FDWZ-050



Back view **Front view**

With its larger diameters of the internal pins and the self-cleaning tip style this version is well suitable for contacting contaminated DUTs. The reduced connection area allows a direct connection to connection element H819AE1. The three protruding alignment pins - due to their better guidance when connecting the connection cable - serve to avoid of damage.

HF819 H819AE1 (HSD-Female)



HSD-Male (D4S20A-40MLS-Z)

Order Code	Description	Sensepin	Tip Style	Ø A	Ø B	C	H	L	Version
HF81955B1005G2000	HF19-0005 HSD-M 3 P HSD		55	0,90	7,50	-2,30	14,40	50,00	-

HF19-0006 HSD-M 3 P HSD

Contacting HSD-Male

NEW

Centers (mm/mil)	12,0 / 472
Current (Circular)	10,0 A
Current (Internal)	3,0 A
Impedance [Z]	100 Ohm
Frequency	3 GHz
Temperature	-20°C...+80°C

Spring Force (cN ±20%)

	Preload	Nominal
Total	-	2020
Internal Cont.	75	130
Circular Cont.	900	1500

Travel (mm)

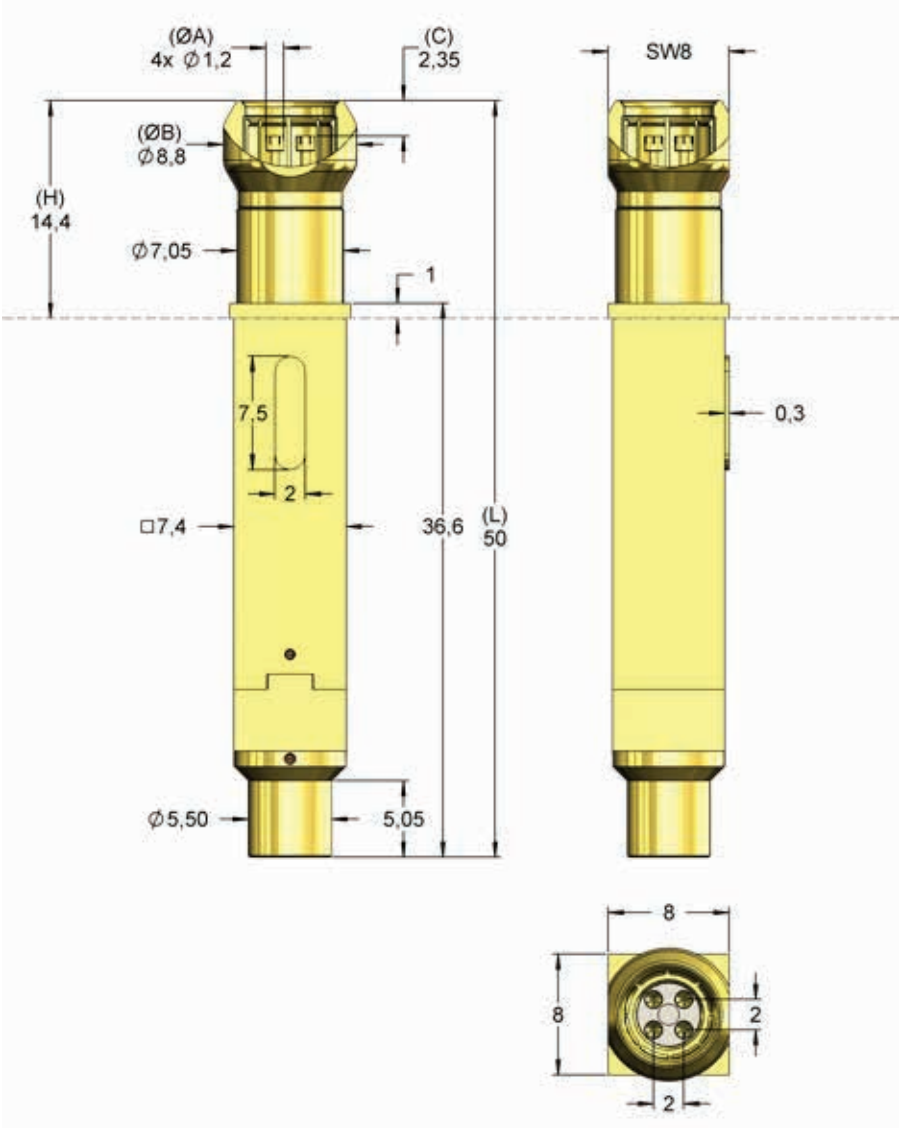
	Nominal	Maximum
Internal Cont.	2,0	3,7
Circular Cont.	5,0	6,0
Wrench Size		6,0 / 7,0

Materials and Plating

Internal Cont.	BeCu, gold plated
Circular Cont.	BeCu, gold plated
Barrel	Brass, gold plated
Spring Internal Cont.	Music Wire, gold plated
Spring Circular Cont.	Stainless steel, unplated

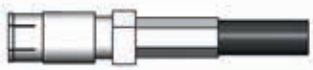
Accessories

Internal pin	F08655B120G130
Tool for changing internal pin	FZWZ-004 / FDWZ-050

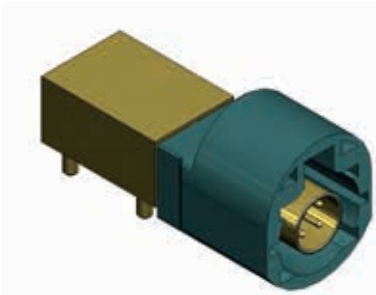


With its spherical ring contact, the HF probe can better center itself in the HSD connector. With its larger diameters of the internal pins and the self-cleaning tip style this version is well suitable for contacting contaminated DUTs. The reduced connection area allows a direct connection to connection element H819AE1.

HF819



H819AE1 (HSD-Female)



HSD-Male (D4S20A-40MLS-Z)

Order Code	Description	Sensepin	Tip Style	Ø A	Ø B	C	H	L	Version
HF81955B1006G2020	HF19-0006 HSD-M 3 P HSD		55	1,20	8,80	-2,35	14,40	50,00	-

Mounting of the new RF series

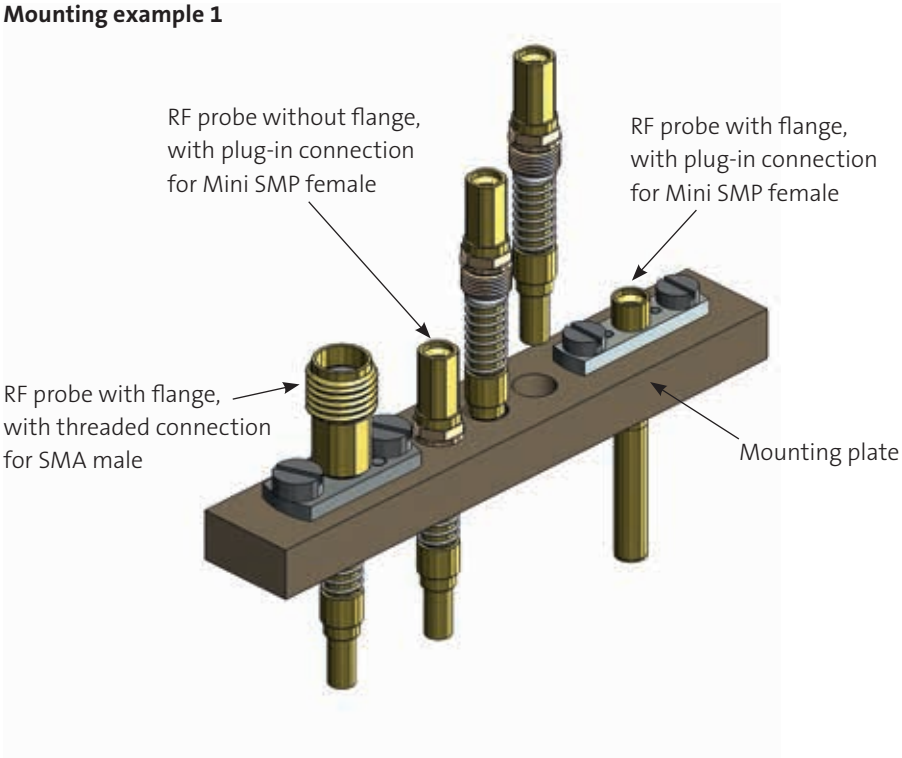
Mounting Options

For the new RF probe series HF66 and HF05 different mounting options are possible.

Some probes can be threaded directly into the mounting plate.

Some versions have a flange that is screwed to the mounting plate, this version allows a simple adjusting and contacting of the DUT. The drill hole for mounting needs to have a sufficient diameter to allow a movement of the probe.

Mounting example 1



Mounting with Flange

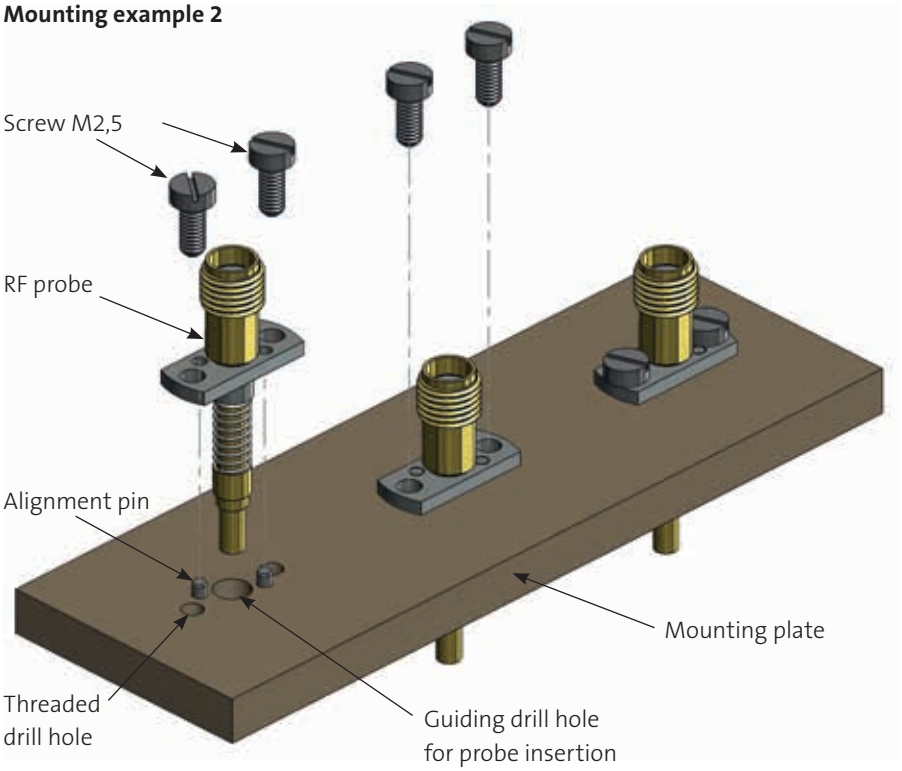
For mounting RF probes with flange drill holes for the centering pins, threaded holes for the fixing screws as well as guiding holes for the probe are needed. These need to correspond with the pattern of the flange.

At first, the RF probe is inserted into the guiding hole and brought into the correct position with the alignment pins.

Afterwards the RF probe can be fixed with the screws.

The last step is the connection of the probe with a suitable connection cable. We recommend coaxial cables with low attenuation and low stiffness, because the cables move with the end of the probe when the probe is compressed and they need to allow a certain movement of the probes.

Mounting example 2



HF66-0001 SWJ 6 F M-SMP

Contacting SWJ-Female

NEW

Centers (mm/mil)	4,50/ 177
Current (Circular)	0,5 A
Current (Internal)	0,1 A
Impedance [Z]	50 Ohm
Frequency	6 GHz
Temperature	-20°C...+80°C

Spring Force (cN ±20%)

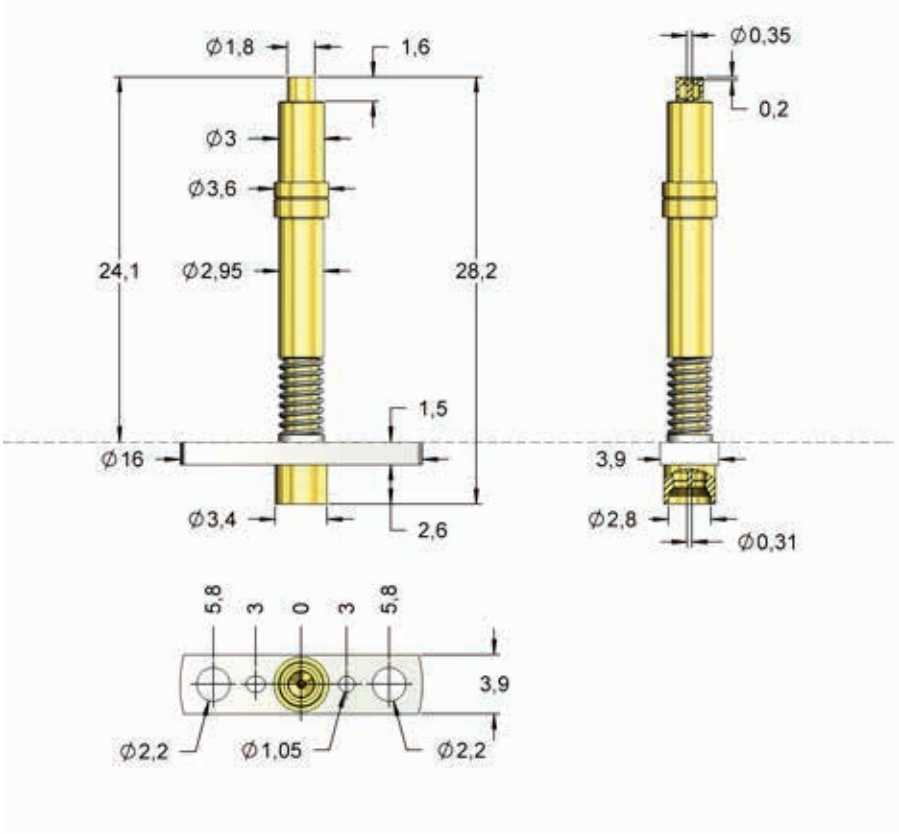
	Preload	Nominal
Total	-	540
Internal Cont.	95	120
Circular Cont.	150	420

Travel (mm)

	Nominal	Maximum
Internal Cont.	0,5	0,8
Circular Cont.	2,0	3,0
Thread		-
Wrench Size		-

Materials and Plating

Internal Cont.	BeCu, gold plated
Circular Cont.	Brass, gold plated
Barrel	Brass, gold plated
Spring Internal Cont.	Music Wire, gold plated
Spring Circular Cont.	Stainless steel, unplated



The probe can be mounted using the flange.
Cable connection with standard connector Mini SMP female.

RADIO FREQUENCY PERFORMANCE

Typical insertion loss	**DC up to 3 GHz**	**3 GHz up to 6 GHz**
Maximum	0,4 dB	0,6 dB
Typical return loss	**DC up to 3 GHz**	**3 GHz up to 6 GHz**
Minimum	22 dB	16 dB

This table shows the reference values in the middle and at the end of the recommended frequency.

Order Code	Description	Sensepin	Tip Style	Ø A	Ø B	C	H	L	Version
HF66-0001	HF66-0001 SWJ 6 F M-SMP		11	0,35	1,80	-0,20	25,60	28,20	-

JSC (Male)

HF66-0002 JSC 6 S M-SMP

Contacting JSC-Male

NEW

Centers (mm/mil)	4,50/ 177
Current (Circular)	0,5 A
Current (Internal)	0,1 A
Impedance [Z]	50 Ohm
Frequency	6 GHz
Temperature	-20°C...+80°C

Spring Force (cN ±20%)

	Preload	Nominal
Total	-	535
Internal Cont.	95	120
Circular Cont.	280	415

Travel (mm)

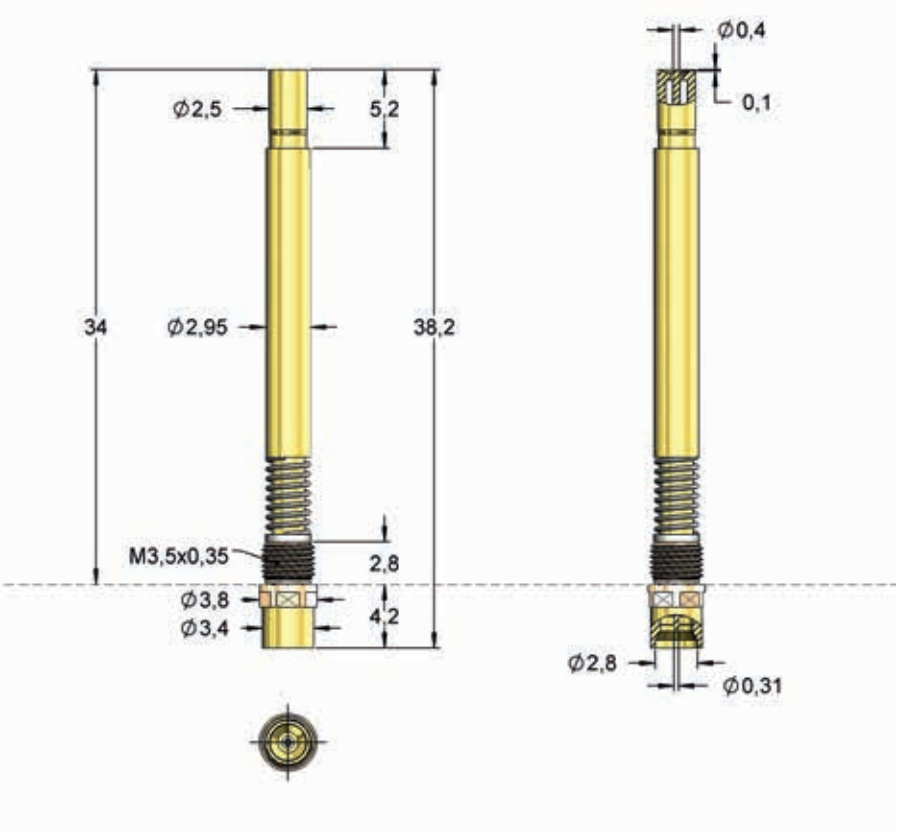
	Nominal	Maximum
Internal Cont.	0,5	0,8
Circular Cont.	1,4	2,2
Thread		M3,5x0,35
Wrench Size		3,5

Materials and Plating

Internal Cont.	BeCu, gold plated
Circular Cont.	Brass, gold plated
Barrel	Brass, gold plated
Spring Internal Cont.	Music Wire, gold plated
Spring Circular Cont.	Stainless steel, unplated

Drill Size (mm)

Thread	M3,5x0,35



Cable connection with standard connector Mini SMP female.

RADIO FREQUENCY PERFORMANCE

Typical insertion loss	DC up to 3 GHz	3 GHz up to 6 GHz
Maximum	0,5 dB	0,7 dB
Typical return loss	**DC up to 3 GHz**	**3 GHz up to 6 GHz**
Minimum	18 dB	13 dB

This table shows the reference values in the middle and at the end of the recommended frequency.

Order Code	Description	Sensepin	Tip Style	Ø A	Ø B	C	H	L	Version
HF66-0002	HF66-0002 JSC 6 S M-SMP		16	0,40	2,50	-0,10	34,00	38,20	-

HF66-0003 KSC 6 F SMA

Contacting KSC-Male

NEW

Centers (mm/mil)	10,0 / 394
Current (Circular)	0,5 A
Current (Internal)	0,1 A
Impedance [Z]	50 Ohm
Frequency	6 GHz
Temperature	-20°C...+80°C

Spring Force (cN ±20%)

	Preload	Nominal
Total	-	480
Internal Cont.	95	120
Circular Cont.	240	360

Travel (mm)

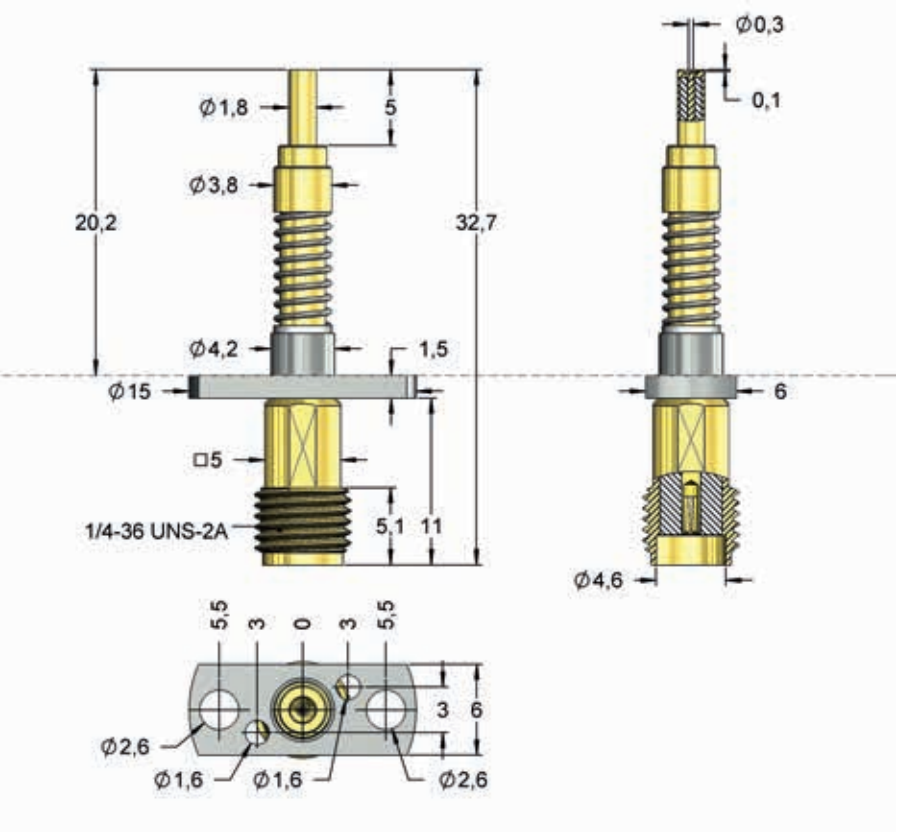
	Nominal	Maximum
Internal Cont.	0,5	0,8
Circular Cont.	2,0	3,0
Thread		1/4“
Wrench Size		5,0

Materials and Plating

Internal Cont.	BeCu, gold plated
Circular Cont.	Brass, gold plated
Barrel	Brass, gold plated
Spring Internal Cont.	Music Wire, gold plated
Spring Circular Cont.	Stainless steel, unplated

Accessories

Connection element up to 6 GHz	H66AE1



The probe can be mounted using the flange.
Cable connection with standard connector SMA-Male.

RADIO FREQUENCY PERFORMANCE

Typical insertion loss	DC up to 3 GHz	3 GHz up to 6 GHz
Maximum	0,4 dB	0,6 dB
Typical return loss	**DC up to 3 GHz**	**3 GHz up to 6 GHz**
Minimum	18 dB	15 dB

This table shows the reference values in the middle and at the end of the recommended frequency.

Order Code	Description	Sensepin	Tip Style	Ø A	Ø B	C	H	L	Version
HF66-0003	HF66-0003 KSC 6 F SMA		16	0,30	1,80	-0,10	21,70	32,70	-

LSC (Male)

HF66-0004 LSC 6 F M-SMP

Contacting LSC-Male

NEW

Centers (mm/mil)	4,50/ 177
Current (Circular)	0,5 A
Current (Internal)	0,1 A
Impedance [Z]	50 Ohm
Frequency	6 GHz
Temperature	-20°C...+80°C

Spring Force (cN ±20%)

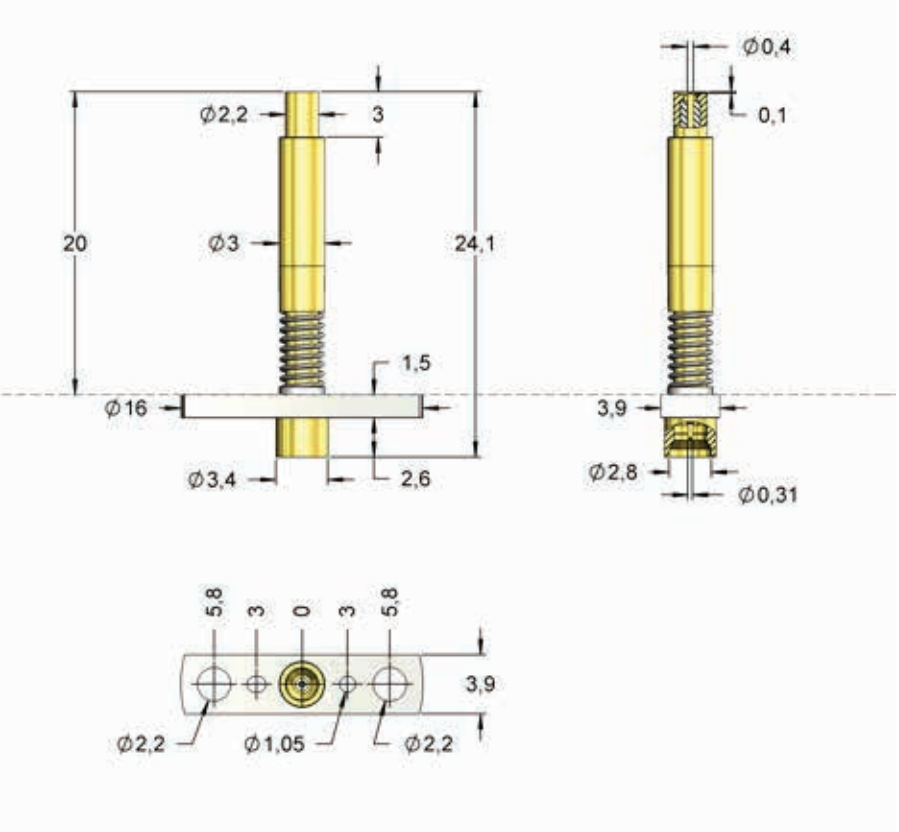
	Preload	Nominal
Total	-	540
Internal Cont.	95	120
Circular Cont.	280	420

Travel (mm)

	Nominal	Maximum
Internal Cont.	0,5	0,8
Circular Cont.	1,4	2,2
Thread		-
Wrench Size		-

Materials and Plating

Internal Cont.	BeCu, gold plated
Circular Cont.	Brass, gold plated
Barrel	Brass, gold plated
Spring Internal Cont.	Music Wire, gold plated
Spring Circular Cont.	Stainless steel, unplated



The probe can be mounted using the flange.
Cable connection with standard connector Mini SMP female.

RADIO FREQUENCY PERFORMANCE

Typical insertion loss	DC up to 3 GHz	3 GHz up to 6 GHz
Maximum	0,5 dB	0,8 dB
Typical return loss	**DC up to 3 GHz**	**3 GHz up to 6 GHz**
Minimum	20 dB	14 dB

This table shows the reference values in the middle and at the end of the recommended frequency.

Order Code	Description	Sensepin	Tip Style	Ø A	Ø B	C	H	L	Version
HF66-0004	HF66-0004 LSC 6 F M-SMP		16	0,40	2,20	-0,10	21,50	24,10	-

HF66-0005 KSC 6 F M-SMP

Contacting KSC-Male

NEW

Centers (mm/mil)	4,50/ 177
Current (Circular)	0,5 A
Current (Internal)	0,1 A
Impedance [Z]	50 Ohm
Frequency	6 GHz
Temperature	-20°C...+80°C

Spring Force (cN ±20%)

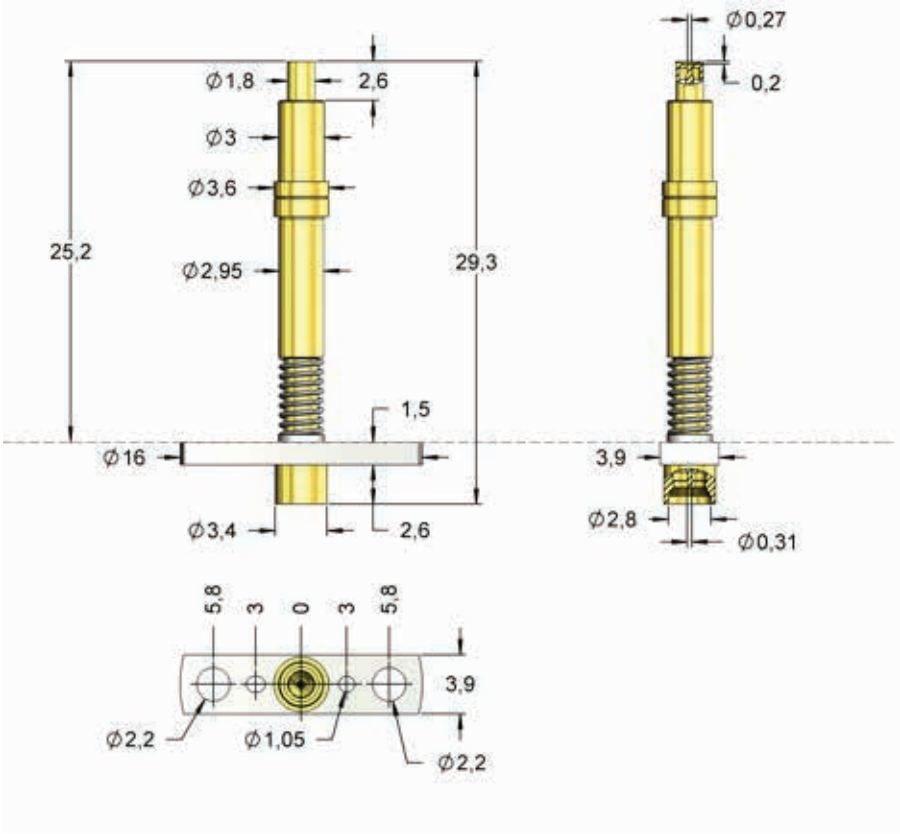
	Preload	Nominal
Total	-	540
Internal Cont.	95	120
Circular Cont.	150	420

Travel (mm)

	Nominal	Maximum
Internal Cont.	0,5	0,8
Circular Cont.	2,0	3,0
Thread		-
Wrench Size		-

Materials and Plating

Internal Cont.	BeCu, gold plated
Circular Cont.	Brass, gold plated
Barrel	Brass, gold plated
Spring Internal Cont.	Music Wire, gold plated
Spring Circular Cont.	Stainless steel, unplated



The probe can be mounted using the flange.
Cable connection with standard connector Mini SMP female.

RADIO FREQUENCY PERFORMANCE

Typical insertion loss	DC up to 3 GHz	3 GHz up to 6 GHz
Maximum	0,4 dB	0,6 dB
Typical return loss	**DC up to 3 GHz**	**3 GHz up to 6 GHz**
Minimum	22 dB	16 dB

This table shows the reference values in the middle and at the end of the recommended frequency.

Order Code	Description	Sensepin	Tip Style	Ø A	Ø B	C	H	L	Version
HF66-0005	HF66-0005 KSC 6 F M-SMP		16	0,27	1,80	-0,20	26,70	29,30	-

HF66-0006 HSC 6 S M-SMP

Contacting HSC (Male)

NEW

Centers (mm/mil)	4,50/ 177
Current (Circular)	0,5 A
Current (Internal)	0,1 A
Impedance [Z]	50 Ohm
Frequency	6 GHz
Temperature	-20°C...+80°C

Spring Force (cN ±20%)

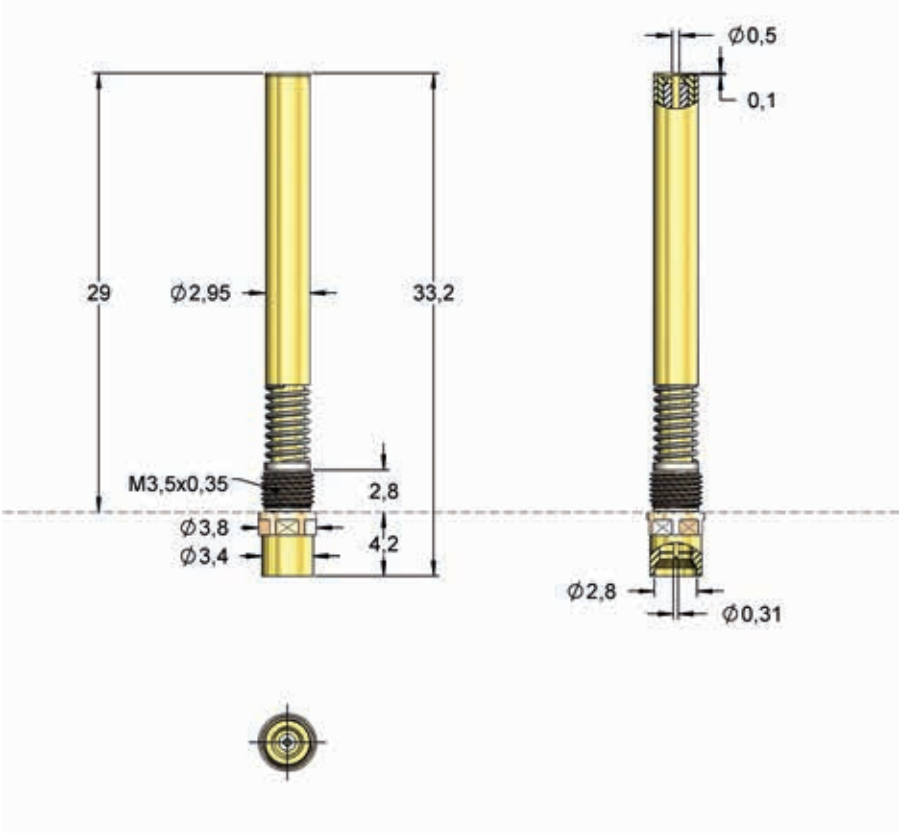
	Preload	Nominal
Total	-	535
Internal Cont.	95	120
Circular Cont.	280	415

Travel (mm)

	Nominal	Maximum
Internal Cont.	0,5	0,8
Circular Cont.	1,4	2,2
Thread		M3,5x0,35
Wrench Size		3,5

Materials and Plating

Internal Cont.	BeCu, gold plated
Circular Cont.	Brass, gold plated
Barrel	Brass, gold plated
Spring Internal Cont.	Music Wire, gold plated
Spring Circular Cont.	Stainless steel, unplated



Cable connection with standard connector Mini SMP female.

RADIO FREQUENCY PERFORMANCE

Typical insertion loss	DC up to 3 GHz	3 GHz up to 6 GHz
Maximum	0,4 dB	0,7 dB
Typical return loss	**DC up to 3 GHz**	**3 GHz up to 6 GHz**
Minimum	20 dB	14 dB

This table shows the reference values in the middle and at the end of the recommended frequency.

Order Code	Description	Sensepin	Tip Style	Ø A	Ø B	C	H	L	Version
HF66-0006	HF66-0006 HSC 6 S M-SMP		16	0,50	2,95	-0,10	29,00	33,20	-

HF66-0007 SWG 6 F SMA

Contacting SWG-Female

NEW

Centers (mm/mil)	10,0 / 394
Current (Circular)	0,5 A
Current (Internal)	0,1 A
Impedance [Z]	50 Ohm
Frequency	6 GHz
Temperature	-20°C...+80°C

Spring Force (cN ±20%)

	Preload	Nominal
Total	-	340
Internal Cont.	95	120
Circular Cont.	140	220

Travel (mm)

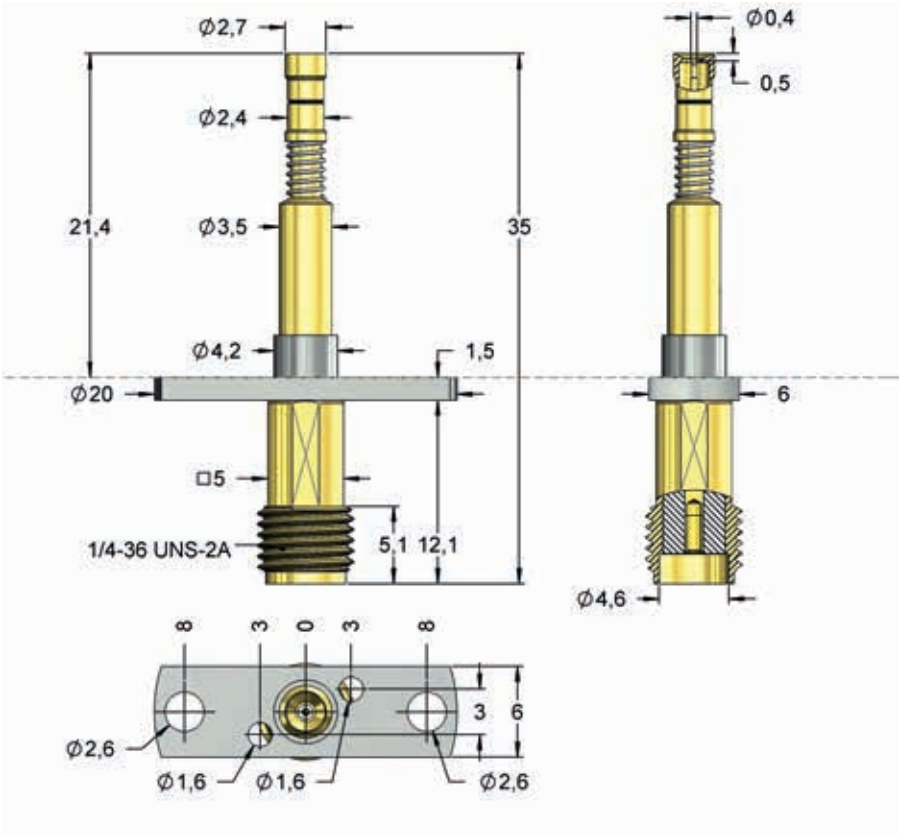
	Nominal	Maximum
Internal Cont.	0,5	1,5
Circular Cont.	1,5	1,8
Thread		1/4“
Wrench Size		5,0

Materials and Plating

Internal Cont.	BeCu, gold plated
Circular Cont.	Brass, gold plated
Barrel	Brass, gold plated
Spring Internal Cont.	Music Wire, gold plated
Spring Circular Cont.	Stainless steel, unplated

Accessories

Connection element up to 6 GHz	H66AE1



The probe can be mounted using the flange.
Cable connection with standard connector SMA male.

RADIO FREQUENCY PERFORMANCE

Typical insertion loss	DC up to 3 GHz	3 GHz up to 6 GHz
Maximum	0,6 dB	0,8 dB
Typical return loss	**DC up to 3 GHz**	**3 GHz up to 6 GHz**
Minimum	18 dB	14 dB

This table shows the reference values in the middle and at the end of the recommended frequency.

Order Code	Description	Sensepin	Tip Style	Ø A	Ø B	C	H	L	Version
HF66-0007	HF66-0007 SWG 6 F SMA		39	0,40	2,70	-0,50	22,90	35,00	-

HF66-0008 HSC 6 F SMA

Contacting HSC (Male)

NEW

Centers (mm/mil)	10,0 / 394
Current (Circular)	0,5 A
Current (Internal)	0,1 A
Impedance [Z]	50 Ohm
Frequency	6 GHz
Temperature	-20°C...+80°C

Spring Force (cN ±20%)

	Preload	Nominal
Total	-	480
Internal Cont.	95	120
Circular Cont.	240	360

Travel (mm)

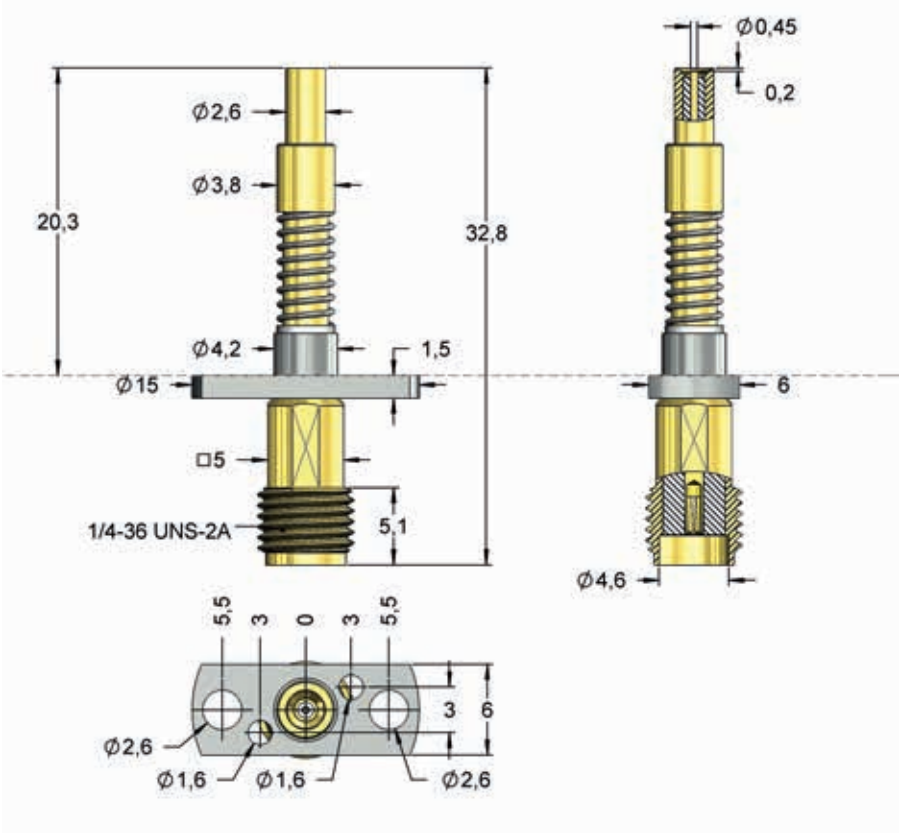
	Nominal	Maximum
Internal Cont.	0,5	0,8
Circular Cont.	1,5	1,8
Thread		1/4“
Wrench Size		5,0

Materials and Plating

Internal Cont.	BeCu, gold plated
Circular Cont.	Brass, gold plated
Barrel	Brass, gold plated
Spring Internal Cont.	Music Wire, gold plated
Spring Circular Cont.	Stainless steel, unplated

Accessories

Connection element up to 6 GHz	H66AE1



The probe can be mounted with a flange.
Cable connection with standard connector SMA male.

RADIO FREQUENCY PERFORMANCE

Typical insertion loss	DC up to 3 GHz	3 GHz up to 6 GHz
Maximum	0,4 dB	0,6 dB
Typical return loss	**DC up to 3 GHz**	**3 GHz up to 6 GHz**
Minimum	19 dB	16 dB

This table shows the reference values in the middle and at the end of the recommended frequency.

Order Code	Description	Sensepin	Tip Style	Ø A	Ø B	C	H	L	Version
HF66-0008	HF66-0008 HSC 6 F SMA		16	0,45	2,60	-0,20	21,80	32,80	-

HF66-0009 SWH 6 S M-SMP

Contacting SWH-Female

NEW

Centers (mm/mil)	5,00 / 197
Current (Circular)	0,5 A
Current (Internal)	0,1 A
Impedance [Z]	50 Ohm
Frequency	6 GHz
Temperature	-20°C...+80°C

Spring Force (cN ±20%)

	Preload	Nominal
Total	-	480
Internal Cont.	95	120
Circular Cont.	240	360

Travel (mm)

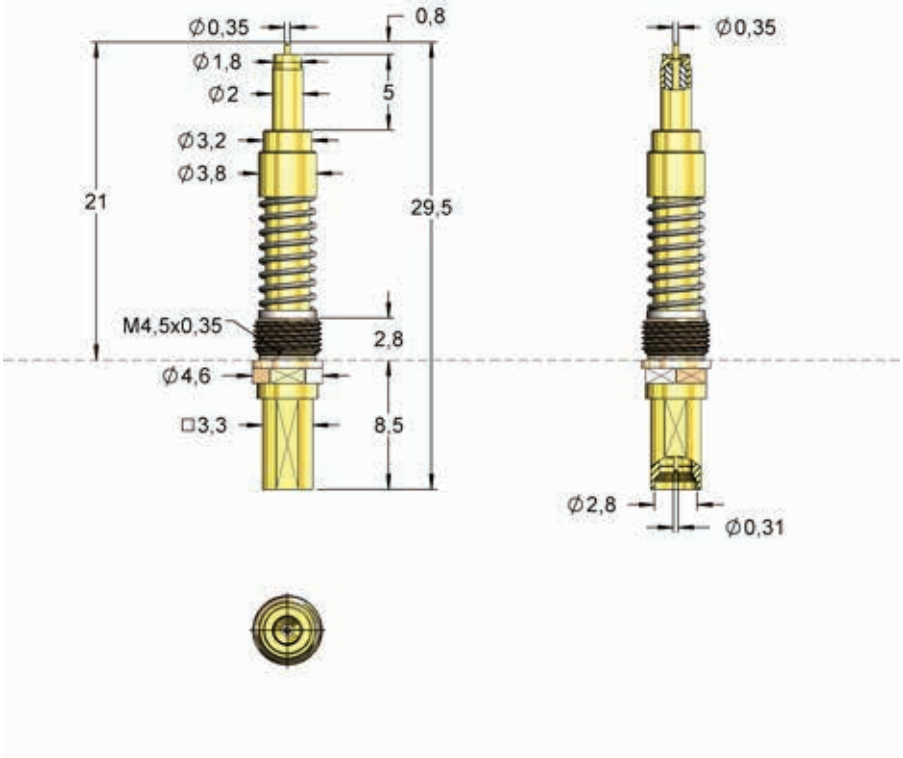
	Nominal	Maximum
Internal Cont.	0,5	0,8
Circular Cont.	2,0	3,0
Thread		M4,5x0,35
Wrench Size		3,3 / 4,0

Materials and Plating

Internal Cont.	BeCu, gold plated
Circular Cont.	Brass, gold plated
Barrel	Brass, gold plated
Spring Internal Cont.	Music Wire, gold plated
Spring Circular Cont.	Stainless steel, unplated

Drill Size (mm)

Thread	M3,5x0,35



Connection with Mini SMP female.

RADIO FREQUENCY PERFORMANCE

Typical insertion loss	**DC up to 3 GHz**	**3 GHz up to 6 GHz**
Maximum	0,4 dB	0,7 dB
Typical return loss	**DC up to 3 GHz**	**3 GHz up to 6 GHz**
Minimum	20 dB	14 dB

This table shows the reference values in the middle and at the end of the recommended frequency.

Order Code	Description	Sensepin	Tip Style	Ø A	Ø B	C	H	L	Version
HF66-0009	HF66-0009 SWH 6 S M-SMP		11	0,35	1,80	0,80	21,00	29,50	-

JSC (Male)

HF66-0010 JSC 6 S M-SMP

Contacting JSC-Male

NEW

Centers (mm/mil)	5,00 / 197
Current (Circular)	0,5 A
Current (Internal)	0,1 A
Impedance [Z]	50 Ohm
Frequency	6 GHz
Temperature	-20°C...+80°C

Spring Force (cN ±20%)

	Preload	Nominal
Total	-	480
Internal Cont.	95	120
Circular Cont.	240	360

Travel (mm)

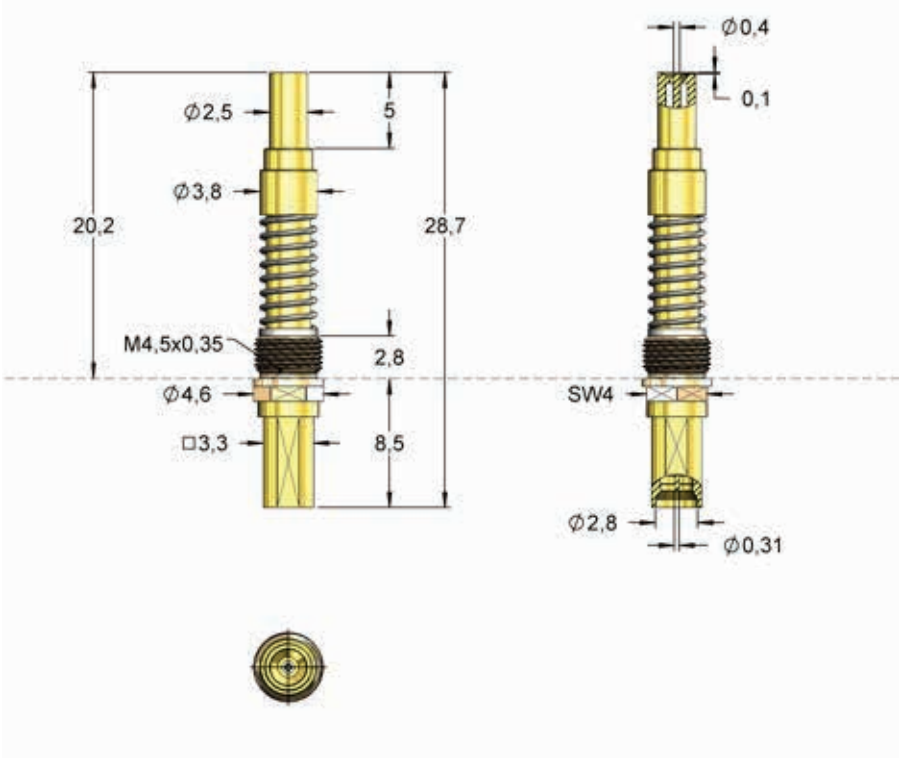
	Nominal	Maximum
Internal Cont.	0,5	0,8
Circular Cont.	2,0	3,0
Thread		M4,5x0,35
Wrench Size		3,3 / 4,0

Materials and Plating

Internal Cont.	BeCu, gold plated
Circular Cont.	Brass, gold plated
Barrel	Brass, gold plated
Spring Internal Cont.	Music Wire, gold plated
Spring Circular Cont.	Stainless steel, unplated

Drill Size (mm)

Thread	M3,5x0,35



Cable connection with standard connector Mini SMP female.

RADIO FREQUENCY PERFORMANCE

Typical insertion loss	DC up to 3 GHz	3 GHz up to 6 GHz
Maximum	0,4 dB	0,7 dB
Typical return loss	**DC up to 3 GHz**	**3 GHz up to 6 GHz**
Minimum	20 dB	14 dB

This table shows the reference values in the middle and at the end of the recommended frequency.

Order Code	Description	Sensepin	Tip Style	Ø A	Ø B	C	H	L	Version
HF66-0010	HF66-0010 JSC 6 S M-SMP		16	0,40	2,50	-0,10	20,20	28,70	-

LSC (Male)

HF66-0011 LSC 6 F SMA

Contacting LSC-Male

NEW

Centers (mm/mil)	10,0 / 394
Current (Circular)	0,5 A
Current (Internal)	0,1 A
Impedance [Z]	50 Ohm
Frequency	6 GHz
Temperature	-20°C...+80°C

Spring Force (cN ±20%)

	Preload	Nominal
Total	-	480
Internal Cont.	95	120
Circular Cont.	240	360

Travel (mm)

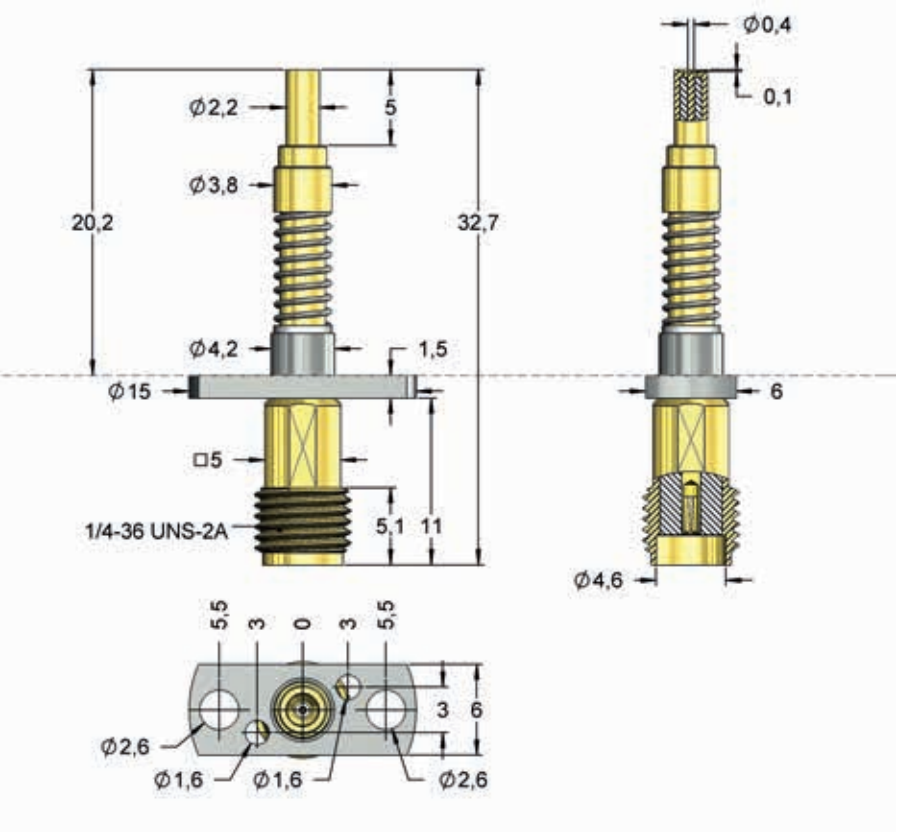
	Nominal	Maximum
Internal Cont.	0,5	0,8
Circular Cont.	2,0	3,0
Thread		1/4“
Wrench Size		5,0

Materials and Plating

Internal Cont.	BeCu, gold plated
Circular Cont.	Brass, gold plated
Barrel	Brass, gold plated
Spring Internal Cont.	Music Wire, gold plated
Spring Circular Cont.	Stainless steel, unplated

Accessories

Connection element up to 6 GHz	H66AE1



The probe can be mounted using the flange.
Cable connection with standard connector SMA male.

RADIO FREQUENCY PERFORMANCE

Typical insertion loss	DC up to 3 GHz	3 GHz up to 6 GHz
Maximum	0,4 dB	0,6 dB
Typical return loss	**DC up to 3 GHz**	**3 GHz up to 6 GHz**
Minimum	19 dB	16 dB

This table shows the reference values in the middle and at the end of the recommended frequency.

Order Code	Description	Sensepin	Tip Style	Ø A	Ø B	C	H	L	Version
HF66-0011	HF66-0011 LSC 6 F SMA		16	0,40	2,20	-0,10	21,70	32,70	-

JSC (Male)

HF66-0012 JSC 6 F SMA

Contacting JSC-Male

NEW

Centers (mm/mil)	10,0 / 394
Current (Circular)	0,5 A
Current (Internal)	0,1 A
Impedance [Z]	50 Ohm
Frequency	6 GHz
Temperature	-20°C...+80°C

Spring Force (cN ±20%)

	Preload	Nominal
Total	-	480
Internal Cont.	95	120
Circular Cont.	240	360

Travel (mm)

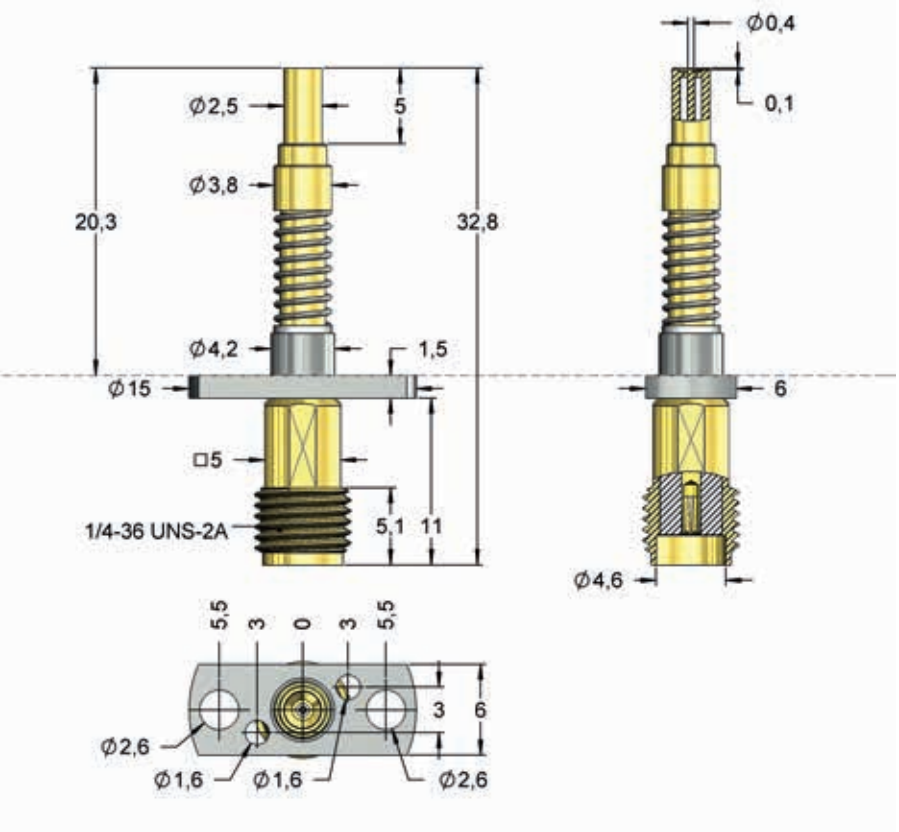
	Nominal	Maximum
Internal Cont.	0,5	0,8
Circular Cont.	2,0	3,0
Thread		1/4“
Wrench Size		5,0

Materials and Plating

Internal Cont.	BeCu, gold plated
Circular Cont.	Brass, gold plated
Barrel	Brass, gold plated
Spring Internal Cont.	Music Wire, gold plated
Spring Circular Cont.	Stainless steel, unplated

Accessories

Connection element up to 6 GHz	H66AE1



The probe can be mounted using the flange.
Cable connection with standard connector SMA male.

RADIO FREQUENCY PERFORMANCE

Typical insertion loss	DC up to 3 GHz	3 GHz up to 6 GHz
Maximum	0,4 dB	0,6 dB
Typical return loss	**DC up to 3 GHz**	**3 GHz up to 6 GHz**
Minimum	19 dB	16 dB

This table shows the reference values in the middle and at the end of the recommended frequency.

Order Code	Description	Sensepin	Tip Style	Ø A	Ø B	C	H	L	Version
HF66-0012	HF66-0012 JSC 6 F SMA		16	0,40	2,50	-0,10	21,80	32,80	-

HF66-0013 SW-D/F/G 6 F SMA

Contacting SWD/SWF/SWG-Female

NEW

Centers (mm/mil)	10,00 / 394
Current (Circular)	0,5 A
Current (Internal)	0,1 A
Impedance [Z]	50 Ohm
Frequency	6 GHz
Temperature	-20°C...+80°C

Spring Force (cN ±20%)

	Preload	Nominal
Total	-	660
Internal Cont.	120	210
Circular Cont.	240	450

Travel (mm)

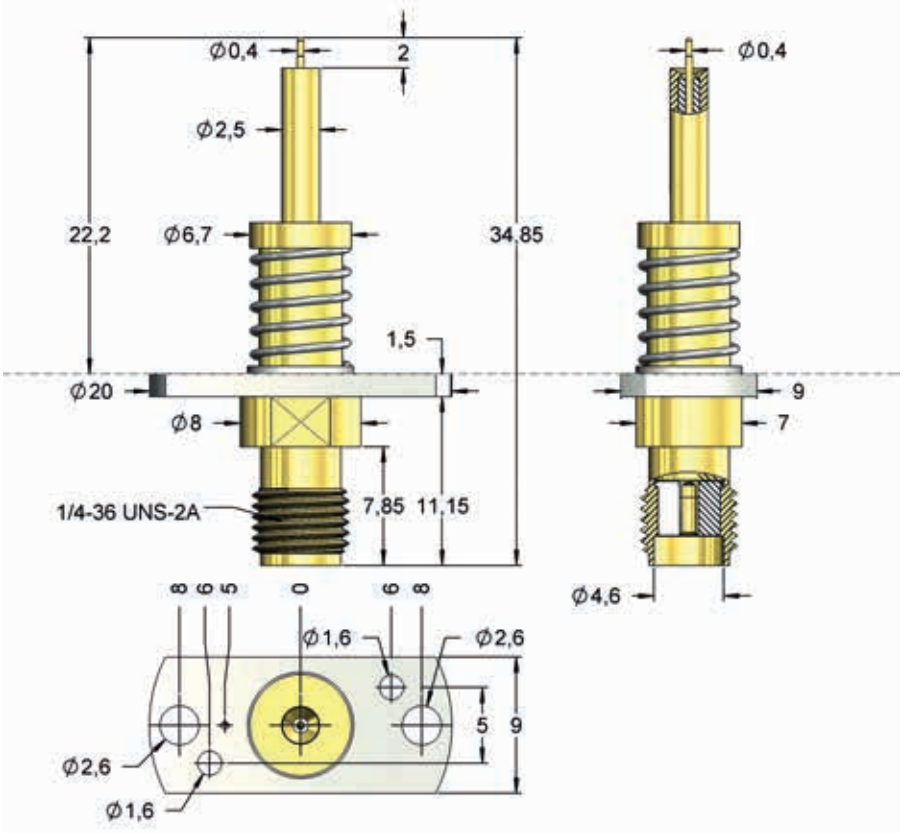
	Nominal	Maximum
Internal Cont.	2,0	3,0
Circular Cont.	2,0	4,5
Thread		1/4“
Wrench Size		7,0

Materials and Plating

Internal Cont.	BeCu, gold plated
Circular Cont.	Brass, gold plated
Barrel	Brass, gold plated
Spring Internal Cont.	Music Wire, gold plated
Spring Circular Cont.	Stainless steel, unplated

Accessories

Connection element up to 6 GHz	H66AE1



The probe can be mounted using the flange.
Cable connection with standard connector SMA male.

RADIO FREQUENCY PERFORMANCE

Typical insertion loss	DC up to 3 GHz	3 GHz up to 6 GHz
Maximum	0,4 dB	0,6 dB
Typical return loss	**DC up to 3 GHz**	**3 GHz up to 6 GHz**
Minimum	21 dB	13 dB

This table shows the reference values in the middle and at the end of the recommended frequency.

Order Code	Description	Sensepin	Tip Style	Ø A	Ø B	C	H	L	Version
HF66-0013	HF66-0013 SW-D-F-G 6 F SMA		11	0,40	2,50	2,00	23,70	34,85	-

MHF/U.FL (Male)

HF66-0014 MHF/U.FL 6 F M-SMP

Contacting MHF/U.FL-Male

NEW

Centers (mm/mil)	4,50 / 177
Current (Circular)	0,5 A
Current (Internal)	0,1 A
Impedance [Z]	50 Ohm
Frequency	6 GHz
Temperature	-20°C...+80°C

Spring Force (cN ±20%)

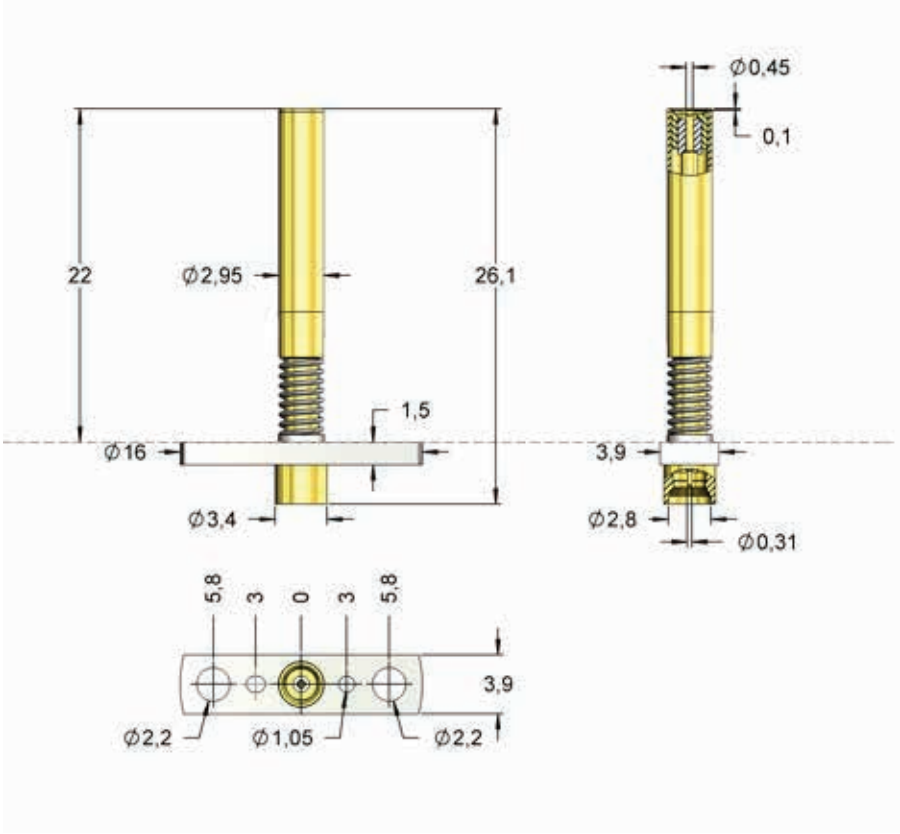
	Preload	Nominal
Total	-	535
Internal Cont.	95	120
Circular Cont.	280	415

Travel (mm)

	Nominal	Maximum
Internal Cont.	0,5	0,8
Circular Cont.	1,4	2,2
Thread		-
Wrench Size		-

Materials and Plating

Internal Cont.	BeCu, gold plated
Circular Cont.	Brass, gold plated
Barrel	Brass, gold plated
Spring Internal Cont.	Music Wire, gold plated
Spring Circular Cont.	Stainless steel, unplated



Cable connection with standard connector Mini SMP female.

RADIO FREQUENCY PERFORMANCE

Typical insertion loss	DC up to 3 GHz	3 GHz up to 6 GHz
Maximum	0,4 dB	0,7 dB
Typical return loss	**DC up to 3 GHz**	**3 GHz up to 6 GHz**
Minimum	20 dB	14 dB

This table shows the reference values in the middle and at the end of the recommended frequency.

Order Code	Description	Sensepin	Tip Style	Ø A	Ø B	C	H	L	Version
HF66-0014	HF66-0014 MHF-U.FL 6 F M-SMP		16	0,45	2,95	-0,10	23,50	26,10	-

HF66-0015 SWF 6 F SMA

Contacting SWF-Female

NEW

Centers (mm/mil)	9,00 / 354
Current (Circular)	0,5 A
Current (Internal)	0,1 A
Impedance [Z]	50 Ohm
Frequency	6 GHz
Temperature	-20°C...+80°C

Spring Force (cN ±20%)

	Preload	Nominal
Total	-	420
Internal Cont.	110	180
Circular Cont.	120	240

Travel (mm)

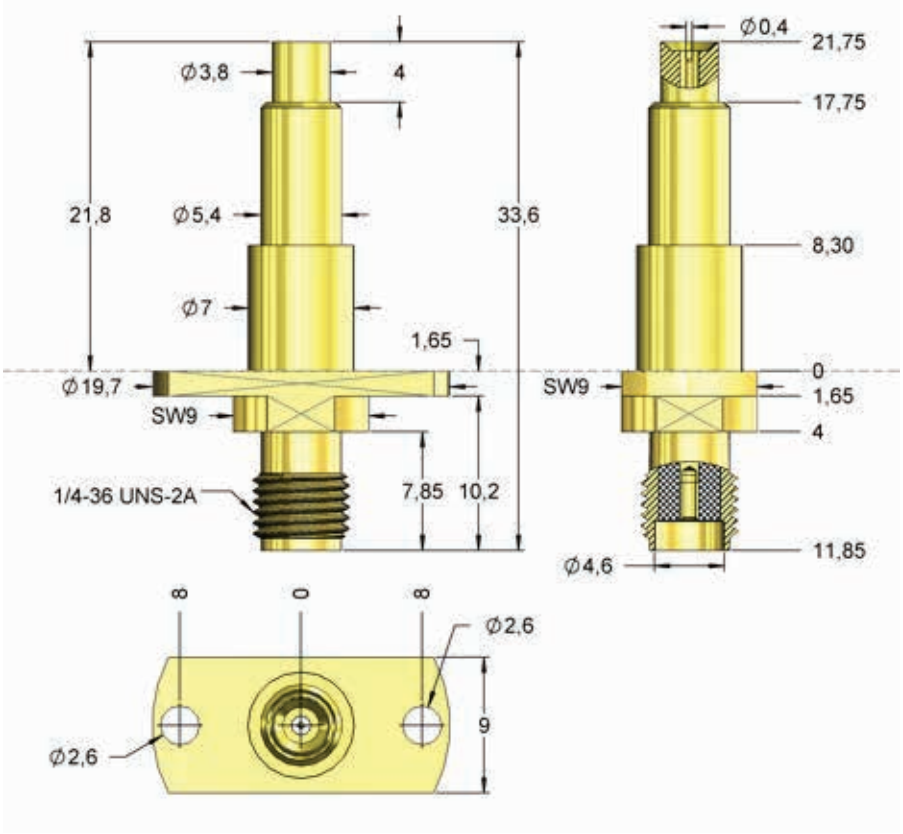
	Nominal	Maximum
Internal Cont.	0,8	3,3
Circular Cont.	2,2	4,0
Thread		1/4“
Wrench Size		9,0

Materials and Plating

Internal Cont.	BeCu, gold plated
Circular Cont.	Brass, gold plated
Barrel	Brass, gold plated
Spring Internal Cont.	Music Wire, gold plated
Spring Circular Cont.	Music Wire, gold plated

Accessories

Connection element up to 6 GHz	H66AE1



The probe can be mounted using the flange.
Cable connection with standard connector SMA male.

RADIO FREQUENCY PERFORMANCE

Typical insertion loss	**DC up to 3 GHz**	**3 GHz up to 6 GHz**
Maximum	0,5 dB	0,7 dB
Typical return loss	**DC up to 3 GHz**	**3 GHz up to 6 GHz**
Minimum	12 dB	10 dB

This table shows the reference values in the middle and at the end of the recommended frequency.

Order Code	Description	Sensepin	Tip Style	Ø A	Ø B	C	H	L	Version
HF66-0015	HF66-0015 SWF 6 F SMA		11	0,40	3,80	-1,10	21,80	33,60	-

SWJ (Switch)

HF66-0016 MHF5/KSC 6 F M-SMP

Contacting MHF5/KSC

NEW

Centers (mm/mil)	4,00 / 157
Current (Circular)	0,5 A
Current (Internal)	0,1 A
Impedance [Z]	50 Ohm
Frequency	6 GHz
Temperature	-20°C...+80°C

Spring Force (cN ±20%)

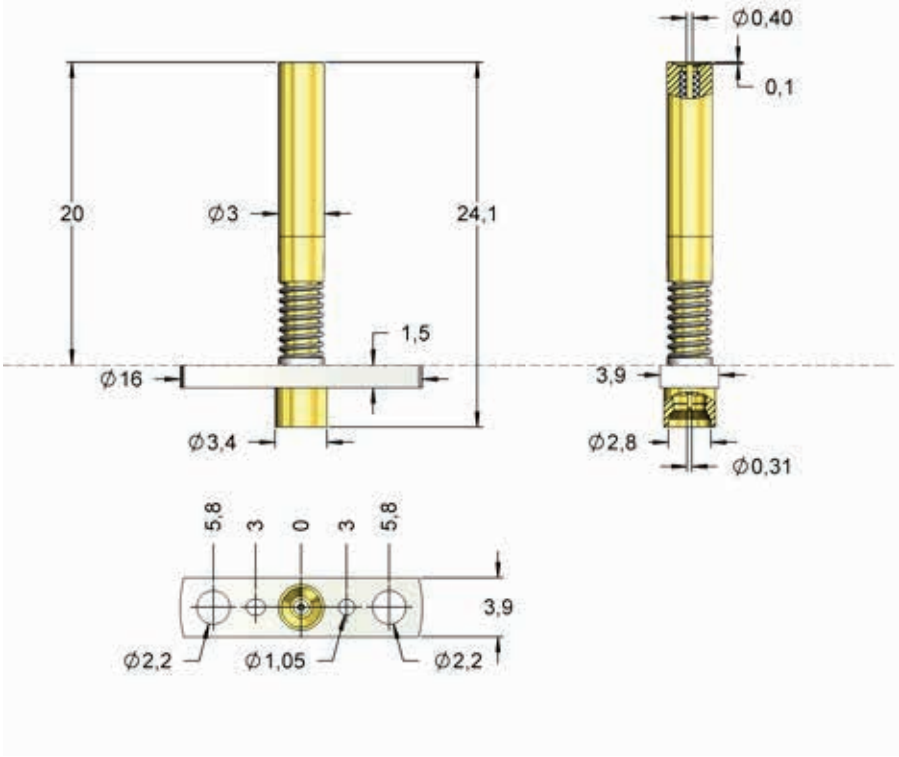
	Preload	Nominal
Internal Cont.	95	120
Circular Cont.	280	420

Travel (mm)

	Nominal	Maximum
Internal Cont.	0,5	0,8
Circular Cont.	1,5	2,2
Thread		-
Wrench Size		-

Materials and Plating

Internal Cont.	BeCu, gold plated
Circular Cont.	Brass, gold plated
Barrel	Brass, gold plated
Spring Internal Cont.	Music Wire, gold plated
Spring Circular Cont.	Stainless steel, unplated



The probe can be mounted using the flange.
Cable connection with standard connector Mini SMP female.

RADIO FREQUENCY PERFORMANCE

Typical insertion loss	DC up to 3 GHz	3 GHz up to 6 GHz
Maximum	0,2 dB	0,3 dB
Typical return loss	**DC up to 3 GHz**	**3 GHz up to 6 GHz**
Minimum	25 dB	20 dB

This table shows the reference values in the middle and at the end of the recommended frequency.

Order Code	Description	Sensepin	Tip Style	Ø A	Ø B	C	H	L	Version
HF66-0016	HF66-0016 MHF5-KSC 6 F M-SMP		16	0,40	3,00	-0,10	20,00	24,10	-

HF66-0017 FAKRA-M 6 F MCX

Contacting Fakra-Male

NEW

Centers (mm/mil)	6,60 / 260
Current (Circular)	0,5 A
Current (Internal)	0,1 A
Impedance [Z]	50 Ohm
Frequency	6 GHz
Temperature	-20°C...+80°C

Spring Force (cN ±20%)

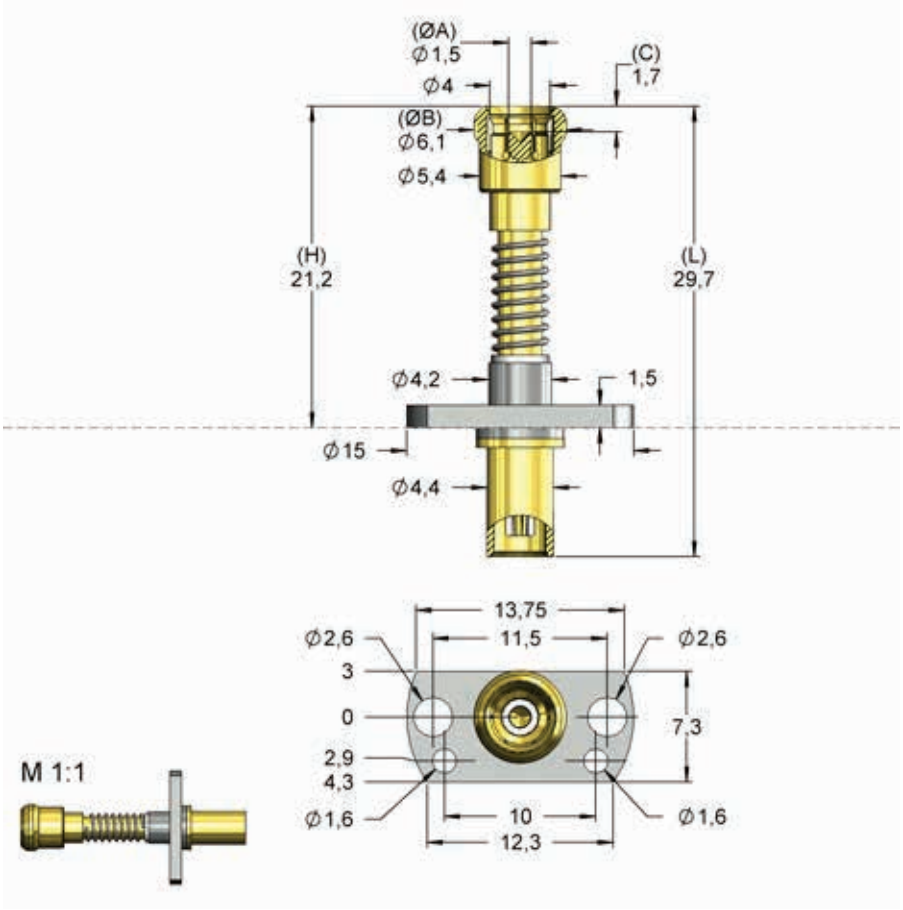
	Preload	Nominal
Internal Cont.	110	150
Circular Cont.	500	665

Travel (mm)

	Nominal	Maximum
Internal Cont.	110	150
Circular Cont.	500	665
Thread		-
Wrench Size		-

Materials and Plating

Internal Cont.	BeCu, gold plated
Circular Cont.	Brass, gold plated
Barrel	Brass, gold plated
Spring Internal Cont.	Music Wire, gold plated
Spring Circular Cont.	Stainless steel, unplated



The probe can be mounted using the flange.
Cable connection with standard connector MCX-male.

RADIO FREQUENCY PERFORMANCE

Typical insertion loss	**DC up to 3 GHz**	**3 GHz up to 6 GHz**
Maximum	0,4 dB	0,6 dB
Typical return loss	**DC up to 3 GHz**	**3 GHz up to 6 GHz**
Minimum	17 dB	12 dB

This table shows the reference values in the middle and at the end of the recommended frequency.

Order Code	Description	Sensepin	Tip Style	Ø A	Ø B	C	H	L	Version
HF66-0017	HF66-0017 FAKRA-M 6 F MCX		05	1,5	6,10	-1,70	21,20	29,70	-

HF05-0001 GSG 6 F M-SMP 050

Contacting PCBs GSG

NEW

Centers (mm/mil)	5,00 / 197
Current (Circular)	0,5 A
Current (Internal)	0,1 A
Impedance [Z]	50 Ohm
Frequency	6 GHz
Temperature	-20°C...+80°C

Spring Force (cN ±20%)

	Preload	Nominal
Total	-	430
Internal Cont.	-	-
Pins Circular Cont.	65	80
Core Circular Cont.	240	270

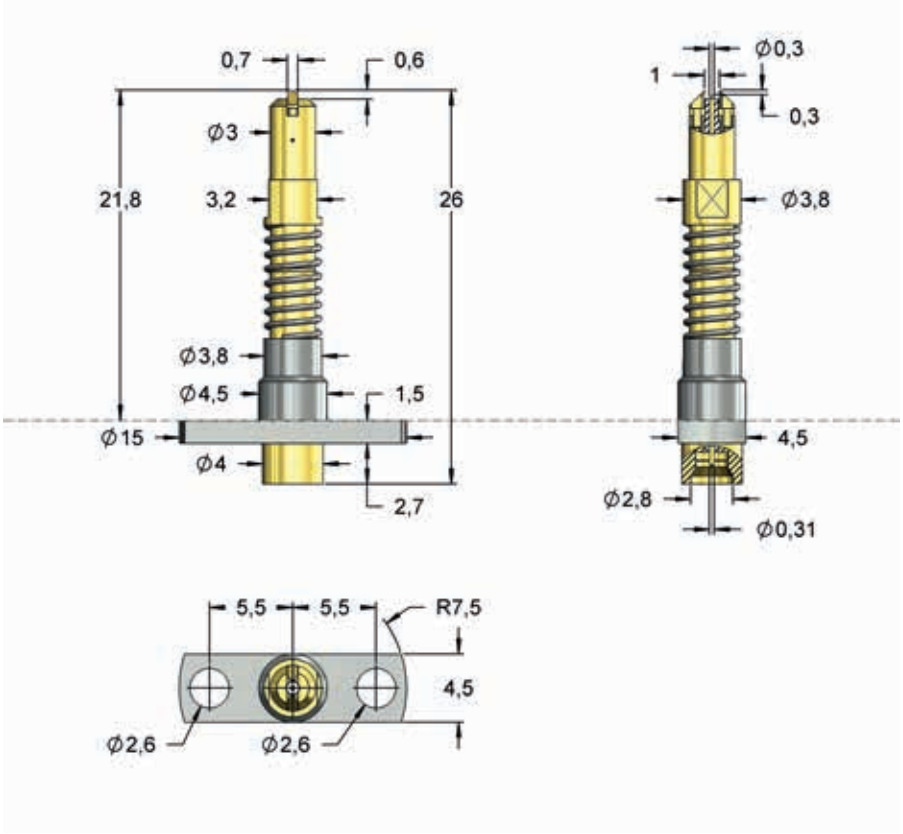
Travel (mm)

	Nominal	Maximum
Circular Cont. Tips	0,5	0,8
Circular Cont. Body	0,5	3,0
Thread		-
Wrench Size		3,2

Materials and Plating

Internal Cont.	BeCu, gold plated
Circular Cont.	BeCu, gold plated
Barrel	Brass, gold plated
Spring Tip Circular Cont.	Stainless steel, gold plated
Spring Circular Cont.	Stainless steel, unplated

PCB-GSG in Center 0,5 mm



The probe can be mounted using the flange. For ensuring a correct alignment the probe is twist proof mounted in the flange. This probe design does not allow a wobble function of the probe. Cable connection with standard connector Mini SMP female.

RADIO FREQUENCY PERFORMANCE

Typical insertion loss	**DC up to 3 GHz**	**3 GHz up to 6 GHz**
Maximum	0,6 dB	1,0 dB
Typical return loss	**DC up to 3 GHz**	**3 GHz up to 6 GHz**
Minimum	14 dB	14 dB

This table shows the reference values in the middle and at the end of the recommended frequency.

Order Code	Description	Sensepin	Tip Style	Ø A	Ø B	C	H	L	Version
HF05-0001	HF05-0001 GSG 6 F M-SMP 050		03	0,30	3,00	-0,30	23,30	28,00	-

HF05-0002 GSG 6 F M-SMP 050

Contacting PCBs GSG

NEW

Centers (mm/mil)	5,00 / 197
Current (Circular)	0,5 A
Current (Internal)	0,1 A
Impedance [Z]	50 Ohm
Frequency	6 GHz
Temperature	-20°C...+80°C

Spring Force (cN ±20%)

	Preload	Nominal
Total	-	430
Internal Cont.	-	-
Pins Circular Cont.	65	80
Core Circular Cont.	240	270

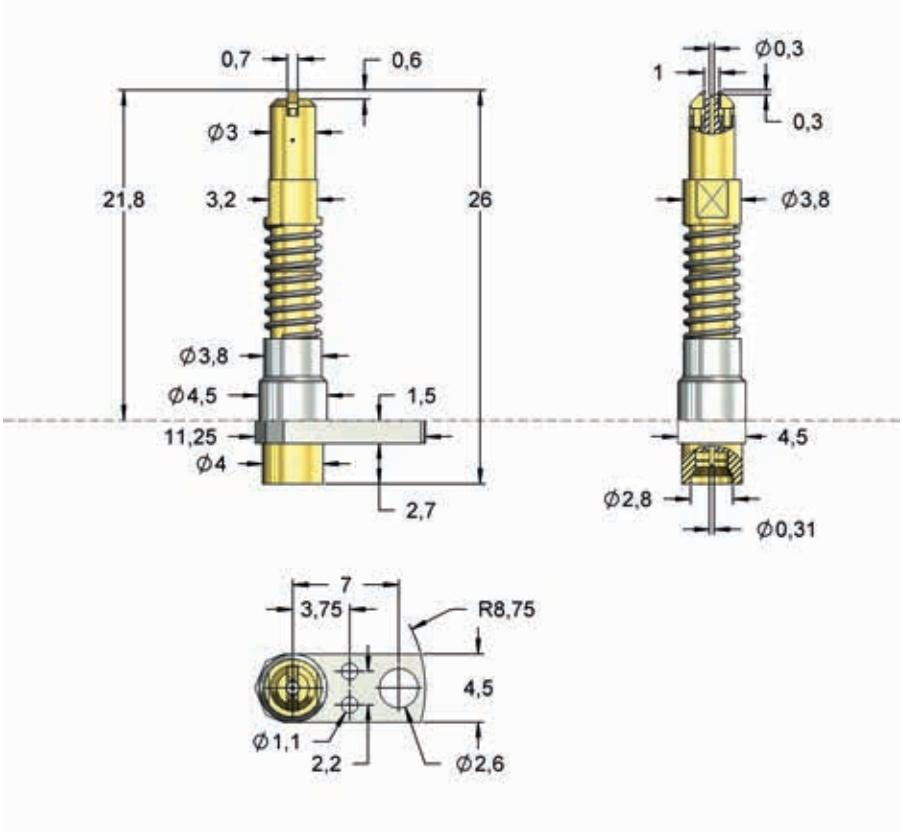
Travel (mm)

	Nominal	Maximum
Circular Cont. Tips	0,5	0,8
Circular Cont. Body	0,5	3,0
Thread		-
Wrench Size		3,2

Materials and Plating

Internal Cont.	BeCu, gold plated
Circular Cont.	BeCu, gold plated
Barrel	Brass, gold plated
Spring Tip Circular Cont.	Stainless steel, gold plated
Spring Circular Cont.	Stainless steel, unplated

PCB-GSG in Center 0,5 mm



This probe has in the ring contact two separately spring-loaded plungers integrated. The asymmetric flange allows mounting of close neighboring probes with different alignment of the ground pins. For ensuring a correct alignment the probe is twist proof mounted in the flange. This probe design does not allow a wobble function of the probe. Cable connection with standard connector Mini SMP female.

RADIO FREQUENCY PERFORMANCE

Typical insertion loss	**DC up to 3 GHz**	**3 GHz up to 6 GHz**
Maximum	0,6 dB	1,0 dB
Typical return loss	**DC up to 3 GHz**	**3 GHz up to 6 GHz**
Minimum	14 dB	14 dB

This table shows the reference values in the middle and at the end of the recommended frequency.

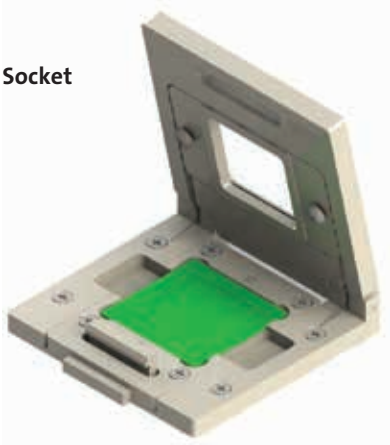
Order Code	Description	Sensepin	Tip Style	Ø A	Ø B	C	H	L	Version
HF05-0002	HF05-0002 GSG 6 F M-SMP 050		11	0,30	3,00	-0,30	23,30	28,00	-

Application Range for Fine Pitch Probes

Fine pitch probes are mainly used for different applications within semi-conductor component tests, like e.g. front-end and back-end tests including burn-in test which is an electrical and thermic stress test for semiconductor components.

Different component tests:
BGA (Ball Grid Array)
LGA (Land Grid Array)
QFP (Quad Flat Package)
QFN (Quad Flat No Leads Package)
WLCSP (Wafer Level Chip Scale Package)

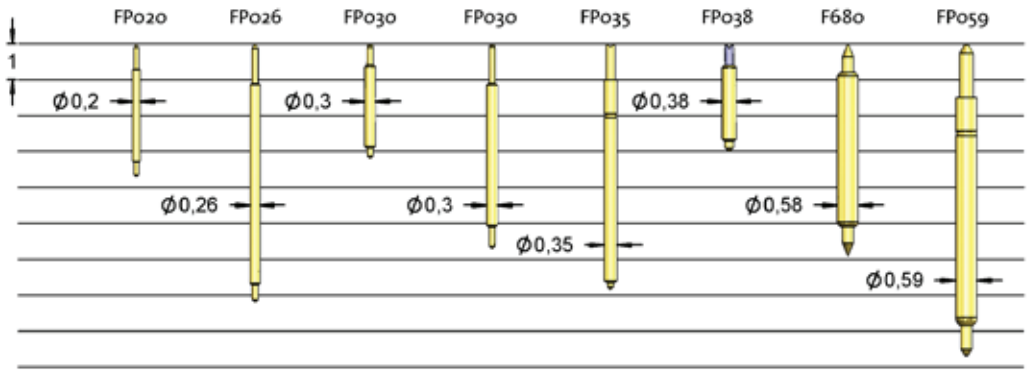
Socket

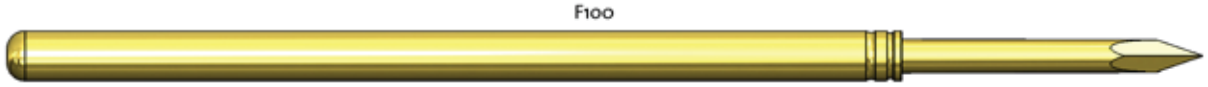


Chip (WLCSP)

For testing components, fine pitch probes are commonly used for test heads and test sockets. They serve as interface between DUT and test set-up.

Size comparison between F100 vs. fine pitch probes





Fine Pitch Probes

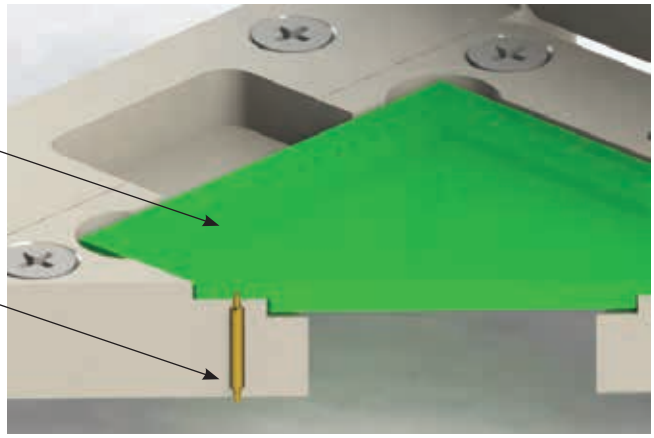
Fine pitch probes are extremely thin spring contact probes for the use in centers of 0,3 mm to 1 mm. In most cases fine pitch probes are not mounted in separate receptacles, but they are mounted in sandwich design blocks connecting a DUT with a PCB. Typical applications are contacting PCBs with very small structures and building up test sockets.

Mounting of Fine Pitch Probes

Double plunger probes can be used for interfaces without soldering. For this purpose the probes are inserted directly into corresponding bores in the guiding plates. In such a setup the different guiding plates have different drill hole diameters to hold the probe in its position but still allow a movement within the guiding material.

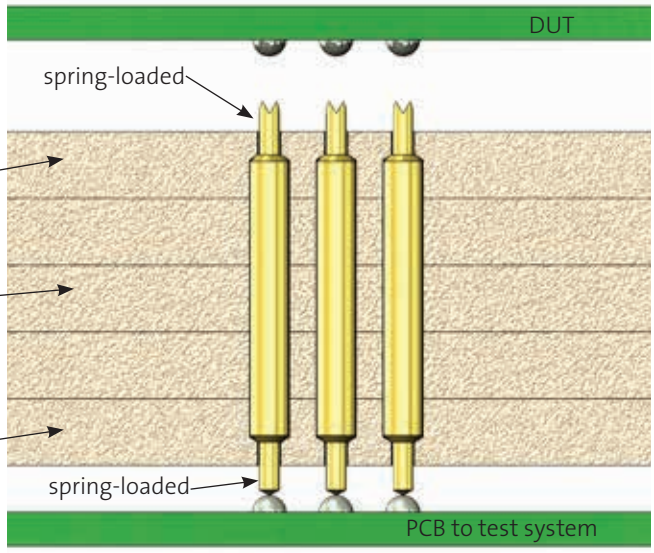
Fine pitch probes are spring contact probes in centers < 1.27 mm / 50 mil.

Application socket



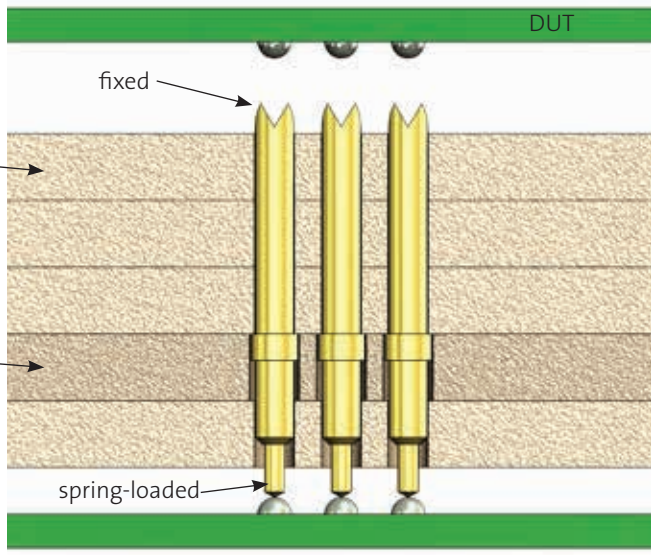
In these centers direct soldering of probes as well as using receptacles with larger diameters is not possible any more. Therefore most fine pitch probes are used in sandwich design blocks connecting a DUT with a PCB.

Mounting example FP01



Even if only one side is spring loaded the floating movement of the probe within the guiding material allows a travel of the probe tips on both sides.

Mounting example FP02



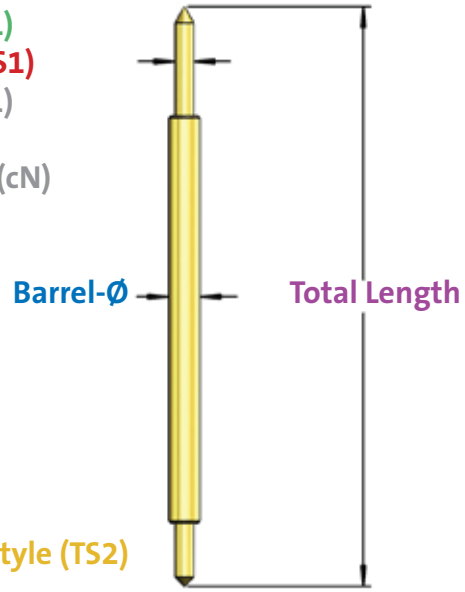
FPXX For the order numbers there is a description for new series in the product range Fine Pitch probes

		Barrel-Ø	Tip Style (TS2)		Plunger-Ø (TS1)		Spring Force (cN)	
FP01	030	03	03	B	015	G	030	L057
Series		Tip Style (TS1)		Material (TS1)		Plating (TS1)		Total Length

Depending on the mounting type the probes have either two spring loaded plungers or only one at the DUT side (see picture below).

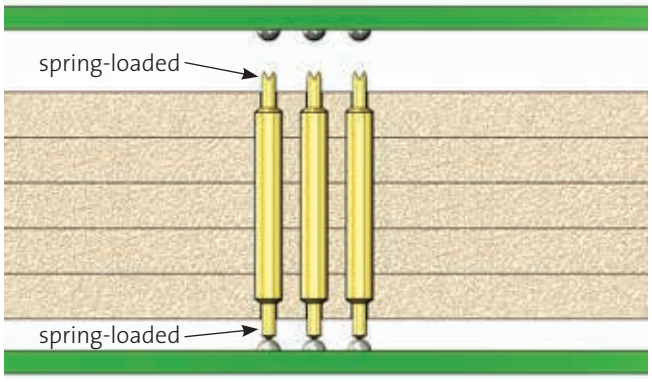
FP01: Both probe sides are spring-loaded

FP02: Each one side fixed and spring-loaded

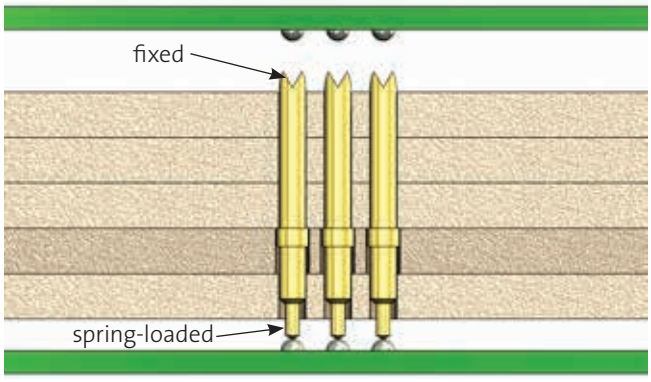


The material and plating of „Tip Style TS2“ is standard and always the same for all versions within a probe series.

Mounting example FP01



Mounting example FP02



FP02 Ø0,20mm

Fine Pitch Probe for 4-wire measurement Double Plunger Probe

NEW

Centers (mm/mil)	0,30 / 12
Current	0,7 A
R typ	<500 mOhm
Self Inductance	1,27 nH
Frequency at -1dB	<30 GHz
Temperature	-40°C...+120°C

Spring Force (cN ±20%)

Version	Preload	Nominal
Standard	10	15

Travel (mm)

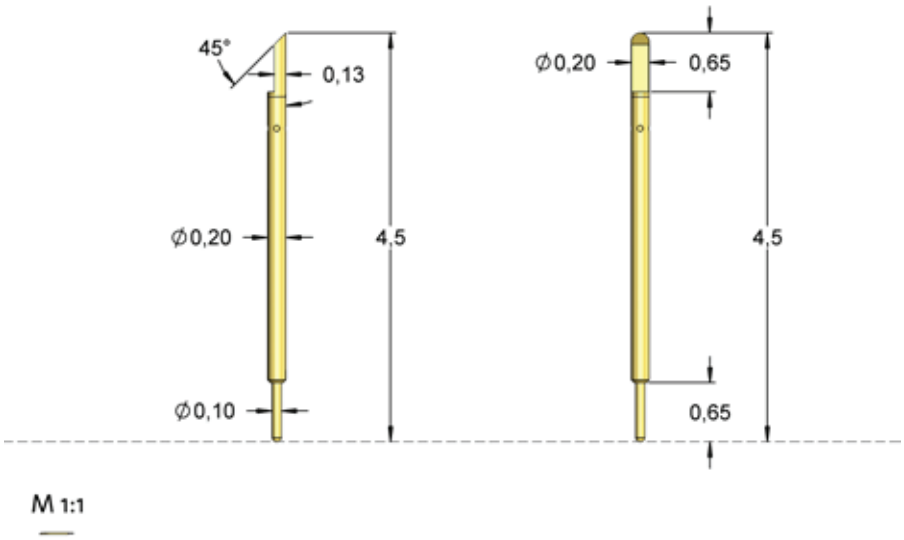
Version	Nominal	Maximum
Standard	0,30	0,45

Materials and Plating

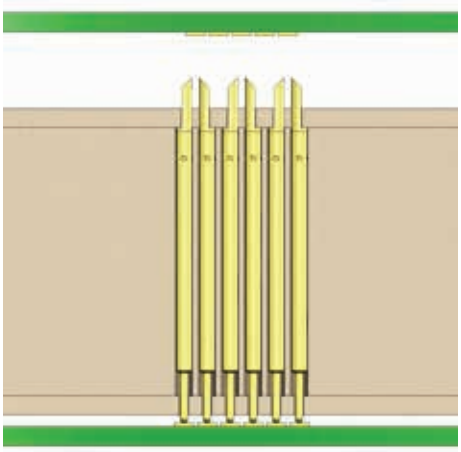
Plunger 1	BeCu, gold plated
Plunger 2	BeCu, gold plated (standard)
Barrel	Nickel, gold plated
Spring	Music wire, gold plated

Drill Size (mm)

FP02-020-L045	0,21 - 0,23



For applications like BGA, LGA, SOP, QFP, QFN-testing.
Suitable for mounting in sockets and test fixtures.



With a corresponding hole pattern in the drill plate, the probes can be used in the smallest grids for Kelvin measurement. This type of mounting also provides an anti-rotation feature.

Order Code	Description	Sensepin	KF1 / KF2	Material	Ø in mm	Plating	Spring force	Length	Version
FP02-0001	FP02 020 7111 B 012 G 015 L045		71 11	B	0,12	G	15	4,50	-
FP02-0002	FP02 020 7211 B 012 G 015 L045		72 11	B	0,12	G	15	4,50	-
FP02-0003	FP02 020 7211 P 012 U 015 L045		72 11	P	0,12	U	15	4,50	-

FP01 Ø0,20mm

Fine Pitch Probe
Double Plunger Probe

NEW

Centers (mm/mil)	0,30 / 12
Current	0,8 A
R typ	<100 mOhm
Self Inductance	1,27 nH
Frequency at -1dB	<30 GHz
Temperature	-40°C...+120°C

Spring Force (cN ±20%)

Version	Preload	Nominal
Standard	7	17

Travel (mm)

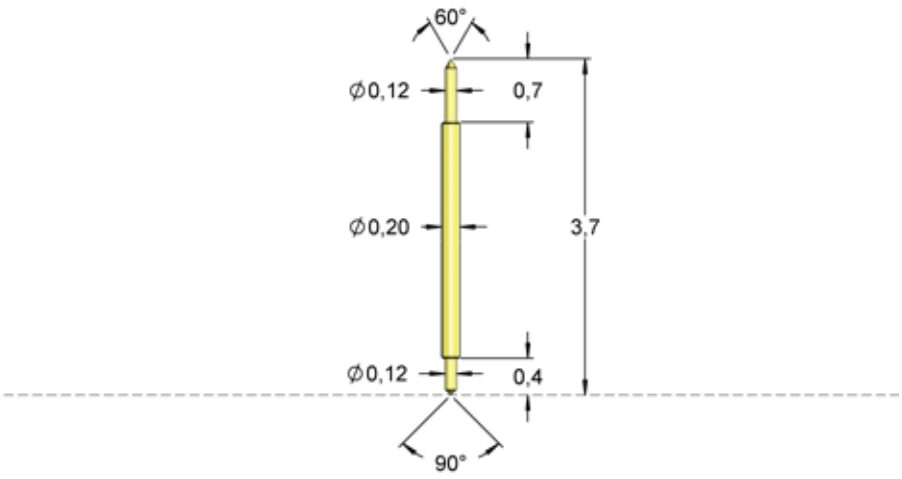
Version	Nominal	Maximum
Standard	0,40	0,55

Materials and Plating

Plunger 1	BeCu, gold plated
Plunger 2	BeCu, gold plated (standard)
Barrel	Nickel, gold plated
Spring	Music wire, gold plated

Drill Size (mm)

FP01- 020-L037	0,21 - 0,23



M 1:1

For applications like BGA, LGA, SOP, QFP, QFN-testing.
Suitable for mounting in sockets and test fixtures.

Order Code	Description	Sensepin	KF1 / KF2	Material	Ø in mm	Plating	Spring force	Length	Version
FP01-0001	FP010200301B012G017L037		03 01	B	0,12	G	17	3,70	
FP01-0011	FP010202901B012G017L037		29 01	B	0,12	G	17	3,70	-
FP01-0027	FP010202901P012U017L037		29 01	P	0,12	U	17	3,70	-

FP01 Ø0,20mm

Fine Pitch Probe
Double Plunger Probe

NEW

Centers (mm/mil)	0,30 / 12
Current	0,7 A
R typ	<100 mOhm
Self Inductance	1,33 nH
Frequency at -1dB	<35 GHz
Temperature	-50°C...+150°C (H)

Spring Force (cN ±20%)

Version	Preload	Nominal
H	7	17

Travel (mm)

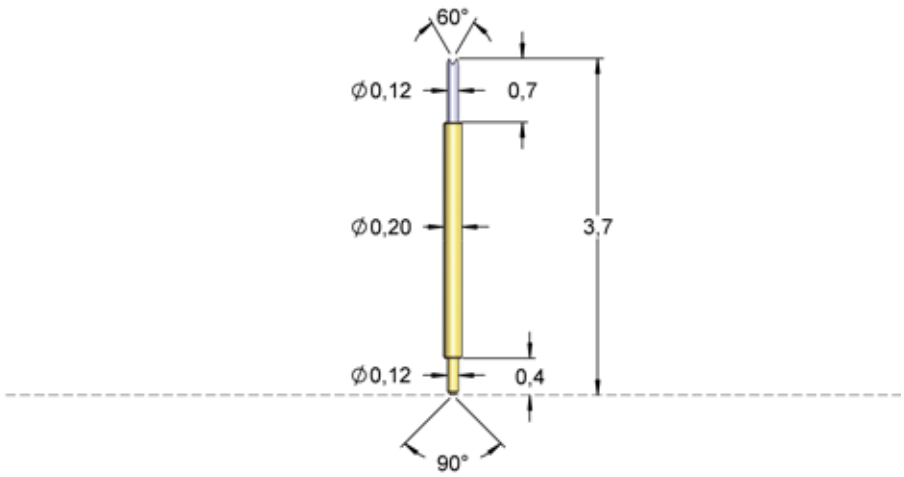
Version	Nominal	Maximum
H	0,25	0,38

Materials and Plating

Plunger 1	Palladium alloy, unplated
Plunger 2	BeCu, gold plated (standard)
Barrel	Nickel, gold plated
Spring	Stainless steel, gold plated

Drill Size (mm)

FP01- 020-L037	0,21 - 0,23



M 1:1

For applications like BGA, LGA, SOP, QFP, QFN-testing.
Suitable for mounting in sockets and test fixtures.

Order Code	Description	Sensepin	KF1 / KF2	Material	Ø in mm	Plating	Spring force	Length	Version
FP01-0026	FP010202901P012U017L037H		29 01	P	0,12	U	17	3,70	H

FP01 Ø0,21mm

Fine Pitch Probe
Double Plunger Probe

NEW

Centers (mm/mil)	0,30 / 12
Current	0,5 A(14cN) 0,8 A (16cN)
R typ	<150 mOhm
Self Inductance	1,90 nH
Frequency at -1dB	<4,1 GHz
Temperature	-40°C...+120°C

Spring Force (cN ±20%)

Version	Preload	Nominal
Standard	6	12
Standard	6	16

Travel (mm)

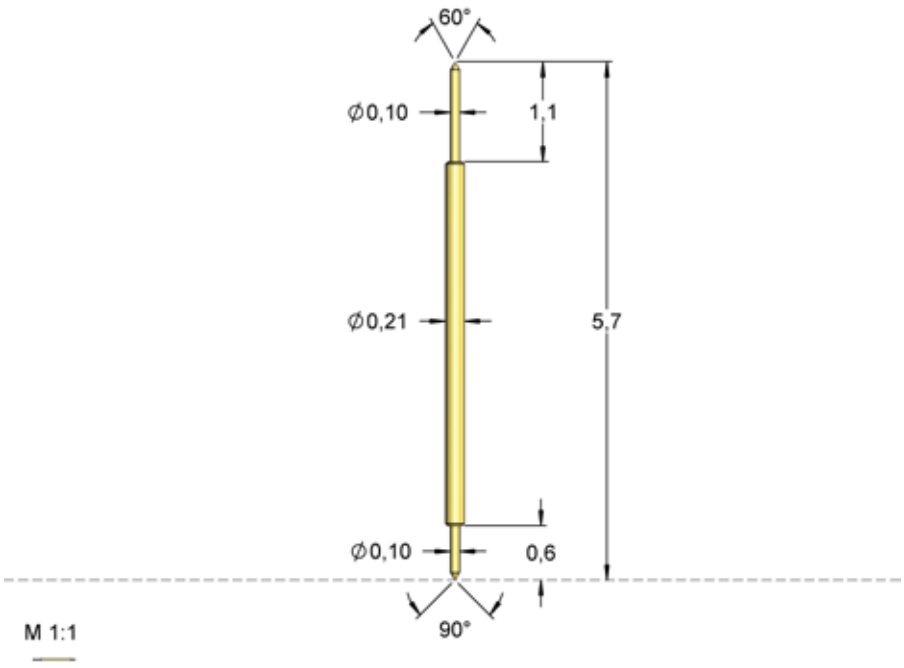
Version	Nominal	Maximum
12 cN	0,60	1,00
16 cN	0,50	0,60

Materials and Plating

Plunger 1	Steel, gold plated
Plunger 2	Steel, gold plated (standard)
Barrel	Nickel, gold plated
Spring	Music wire, gold plated

Drill Size (mm)

FP01-021	0,22 - 0,24



For applications like BGA, LGA, SOP, QFP, QFN-testing.
Suitable for mounting in sockets and test fixtures.

Order Code	Description	Sensepin	KF1 / KF2	Material	Ø in mm	Plating	Spring force	Length	Version
FP01-0036	FP010210303S010G016L057		03 03	S	0,10	G	16	5,70	-
FP01-0020	FP010212903S010G012L057		29 03	S	0,10	G	12	5,70	-

FP01 Ø0,26mm

Fine Pitch Probe
Double Plunger Probe

NEW

Centers (mm/mil)	0,35 / 14
Current	1,5 A
R typ	<100 mOhm
Self Inductance	2,07 nH
Frequency at -1dB	<7 GHz
Temperature	-40°C...+140°C

Spring Force (cN ±20%)

Version	Preload	Nominal
H	5	25

Travel (mm)

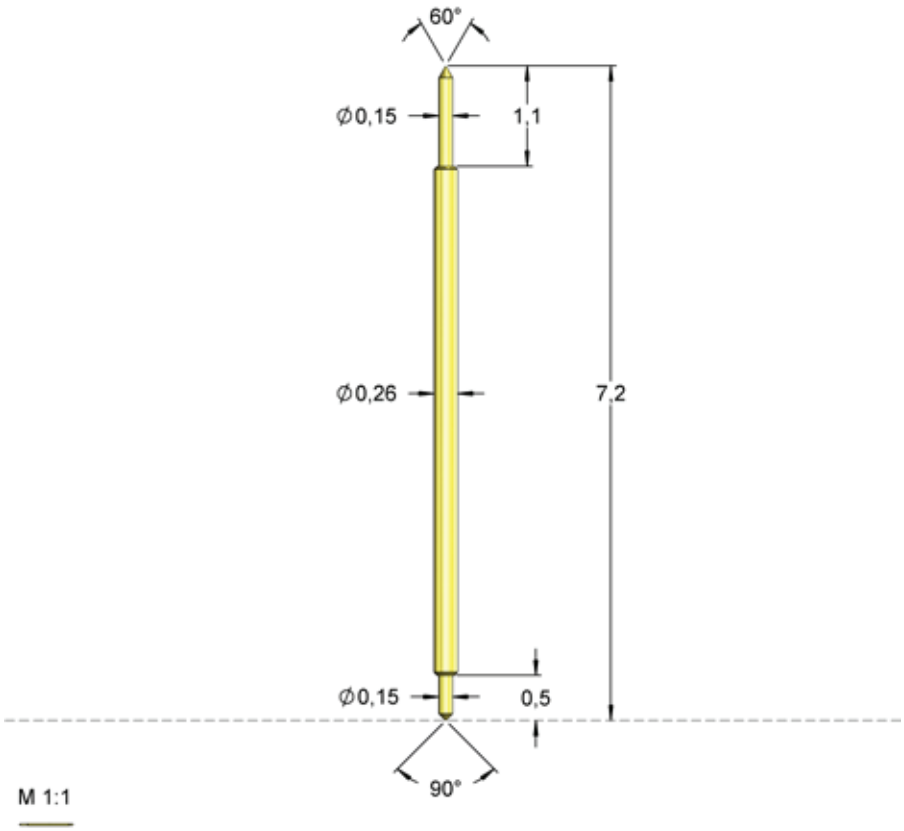
Version	Nominal	Maximum
H	0,80	1,00

Materials and Plating

Plunger 1	BeCu, gold plated
Plunger 2	BeCu, gold plated (standard)
Barrel	Nickel, gold plated
Spring	Stainless steel, gold plated

Drill Size (mm)

FP01-026-L072	0,25 - 0,27



For applications like BGA, LGA, SOP, QFP, QFN-testing.
Suitable for mounting in sockets and test fixtures.

Order Code	Description	Sensepin	KF1 / KF2	Material	Ø in mm	Plating	Spring force	Length	Version
FP01-0002	FP010260301B015G025L072H		03 01	B	0,15	G	25	7,20	H
FP01-0010	FP010262901B015G025L072H		29 01	B	0,15	G	25	3,70	H

FP01 Ø0,28mm

Fine Pitch Probe
Double Plunger Probe

NEW

Centers (mm/mil)	0,35 / 14
Current	1,6 A 1,4 A (H)
R typ	<75 mOhm <100 mOhm (H)
Self Inductance	1,90 nH
Frequency at -1dB	<7,3 GHz
Temperature	-40°C...+120°C -50°C...+150°C (H)

Spring Force (cN ±20%)

Version	Preload	Nominal
Standard	6	15
Standard	6	25
Standard	6	30
H	6	15

Travel (mm)

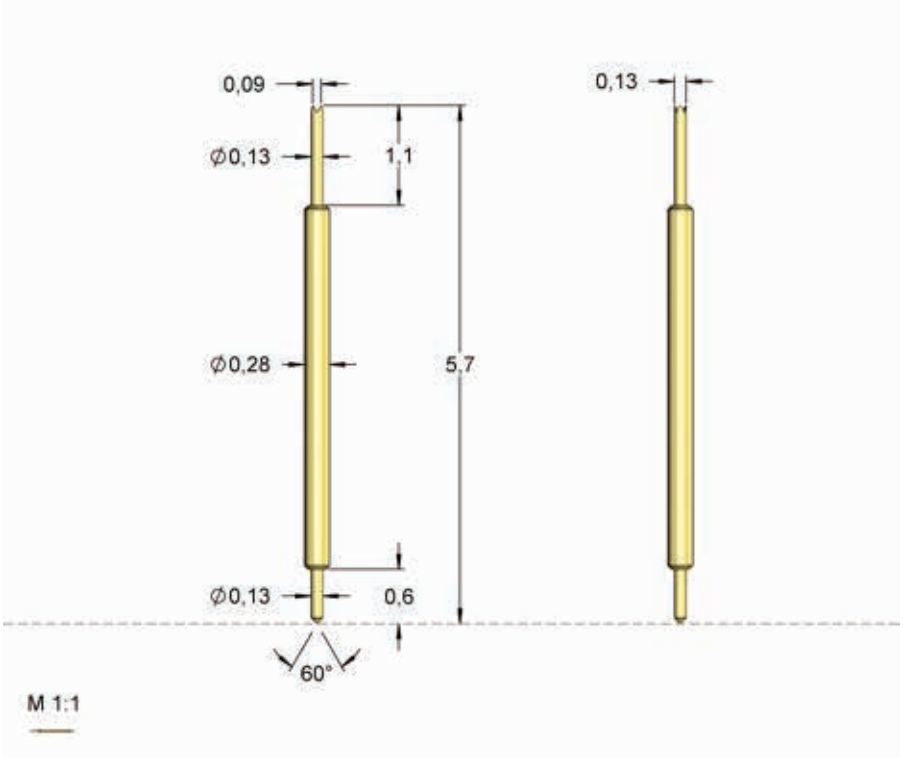
Version	Nominal	Maximum
Standard	0,50	0,80
H	0,50	0,80

Materials and Plating

Plunger 1	see table
Plunger 2	BeCu, gold plated (standard)
Barrel	Bronze, gold plated
Spring	Music wire, gold plated, Stainless steel, gold plated

Drill Size (mm)

FP01-028	0,29 - 0,31



For applications like BGA, LGA, SOP, QFP, QFN-testing.
Suitable for mounting in sockets and test fixtures.

Order Code	Description	Sensepin	KF1 / KF2	Material	Ø in mm	Plating	Spring force	Length	Version
FP01-0033	FP010280301B013G025L057		03 01	B	0,13	G	25	5,70	-
FP01-0029	FP010280301P013U030L057		03 01	P	0,13	U	30	5,70	-
FP01-0021	FP010282901B013G015L057		29 01	B	0,13	G	15	5,70	-
FP01-0031	FP010282901B013G025L057		29 01	B	0,13	G	25	5,70	-
FP01-0038	FP010280101B013G015L057H		01 01	B	0,13	G	15	5,70	H
FP01-0034	FP010280301B013G015L057H		03 01	B	0,13	G	15	5,70	H
FP01-0030	FP010280301P013U015L057H		03 01	P	0,13	U	15	5,70	H
FP01-0032	FP010282901B013G015L057H		29 01	B	0,13	G	15	5,70	H
FP01-0023	FP010282903P016U020L057H		29 03	P	0,16	U	20	5,70	H

FP01 Ø0,28mm

Fine Pitch Probe
Double Plunger Probe

NEW

Centers (mm/mil)	0,35 / 14
Current	1,1 A
R typ	<180 mOhm
Self Inductance	2,79 nH
Frequency at -1dB	<7,4 GHz
Temperature	-50°C...+150°C (H)

Spring Force (cN ±20%)

Version	Preload	Nominal
Standard	4	20

Travel (mm)

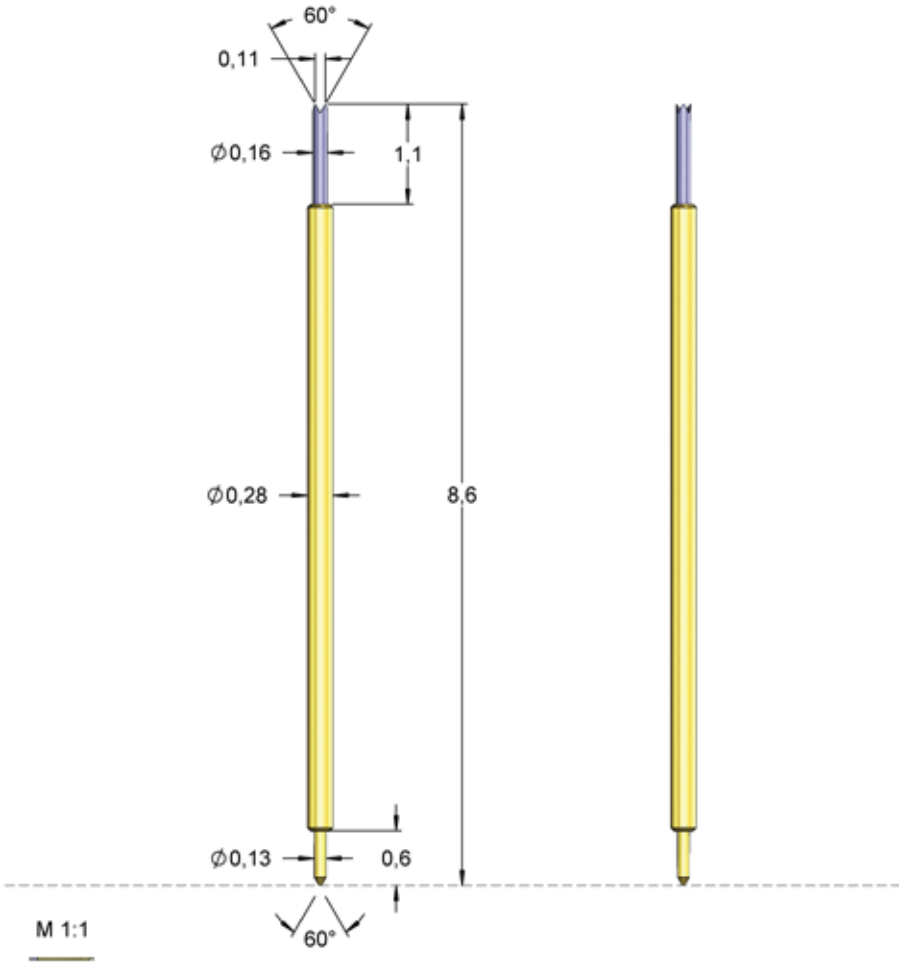
Version	Nominal	Maximum
Standard	0,80	1,00

Materials and Plating

Plunger 1	Palladium alloy, unplated
Plunger 2	Steel, gold plated (standard)
Barrel	Bronze, gold plated
Spring	Music wire, gold plated

Drill Size (mm)

FP01-028-L086H	0,29 - 0,31



For applications like BGA, LGA, SOP, QFP, QFN-testing.
Suitable for mounting in sockets and test fixtures.

Order Code	Description	Sensepin	KF1 / KF2	Material	Ø in mm	Plating	Spring force	Length	Version
FP01-0028	FP010282903P016U020L086H		29 03	P	0,16	U	20	8,60	H

FP01 Ø0,30mm

Fine Pitch Probe
Double Plunger Probe

NEW

Centers (mm/mil)	0,40 / 16
Current	1,4 A
R typ	<100 mOhm
Self Inductance	0,87 nH
Frequency at -1dB	<20 GHz
Temperature	-40°C...+120°C -50°C...+150°C (H)

Spring Force (cN ±20%)

Version	Preload	Nominal
Standard	6	22
H	6	22

Travel (mm)

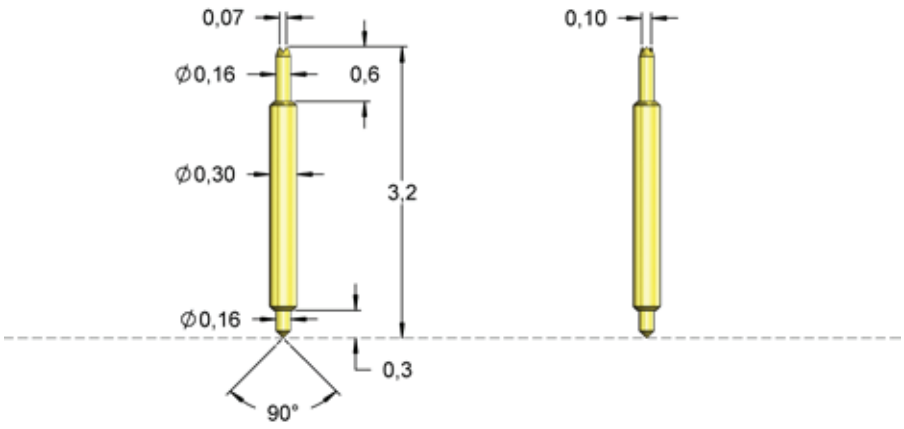
Version	Nominal	Maximum
Standard	0,45	0,60
H	0,45	0,60

Materials and Plating

Plunger 1	see table
Plunger 2	BeCu, gold plated (standard)
Barrel	Nickel, gold plated
Spring	Music wire, gold plated

Drill Size (mm)

FP01-030-L032	0,31 - 0,33



M 1:1

For applications like BGA, LGA, SOP, QFP, QFN-testing.
Suitable for mounting in sockets and test fixtures.

Order Code	Description	Sensepin	KF1 / KF2	Material	Ø in mm	Plating	Spring force	Length	Version
FP01-0008	FP010300301B016G022L032		03 01	B	0,16	G	22	3,20	-
FP01-0003	FP010302901B016G022L032		29 01	B	0,16	G	22	3,20	-
FP01-0006	FP010302901P016U022L032		29 01	P	0,16	U	22	3,20	-

FP01 Ø0,30mm

Fine Pitch Probe
Double Plunger Probe

NEW

Centers (mm/mil)	0,40 / 16
Current	1,4 A
R typ	<100 mOhm
Self Inductance	0,87 nH
Frequency at -1dB	<20 GHz
Temperature	-50°C...+150°C (H)

Spring Force (cN ±20%)

Version	Preload	Nominal
H	6	22

Travel (mm)

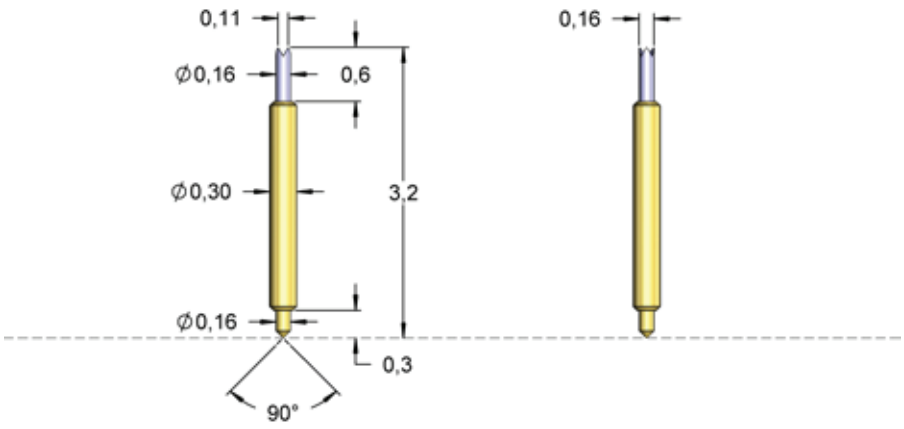
Version	Nominal	Maximum
H	0,45	0,60

Materials and Plating

Plunger 1	Palladium alloy, unplated
Plunger 2	BeCu, gold plated (standard)
Barrel	Nickel, gold plated
Spring	Music wire, gold plated

Drill Size (mm)

FP01-030-L032H	0,31 - 0,33



M 1:1

For applications like BGA, LGA, SOP, QFP, QFN-testing.
Suitable for mounting in sockets and test fixtures.

Order Code	Description	Sensepin	KF1 / KF2	Material	Ø in mm	Plating	Spring force	Length	Version
FP01-0018	FP010302901P016U018L032H		29 01	P	0,16	U	22	3,20	H

FP01 Ø0,30mm

Fine Pitch Probe
Double Plunger Probe

NEW

Centers (mm/mil)	0,40 / 16
Current	1,4 A
R typ	<100 mOhm
Self Inductance	1,61 nH
Frequency at -1dB	<13 GHz
Temperature	-40°C...+120°C -50°C...+150°C (H)

Spring Force (cN ±20%)

Version	Preload	Nominal
Standard	8	30

Travel (mm)

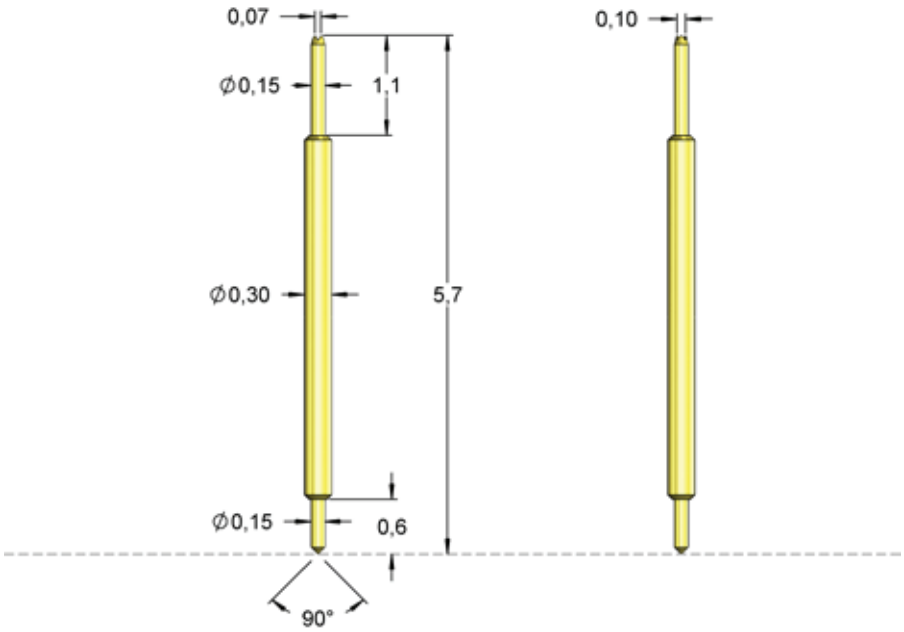
Version	Nominal	Maximum
Standard	0,65	0,80

Materials and Plating

Plunger 1	BeCu, gold plated; Palladium alloy, unplated
Plunger 2	BeCu, gold plated (standard)
Barrel	Nickel, gold plated
Spring	Music wire, gold plated

Drill Size (mm)

FP01-030-L057	0,31 - 0,33



M 1:1

For applications like BGA, LGA, SOP, QFP, QFN-testing.
Suitable for mounting in sockets and test fixtures.

Order Code	Description	Sensepin	KF1 / KF2	Material	Ø in mm	Plating	Spring force	Length	Version
FP01-0009	FP010300301B015G030L057		03 01	B	0,15	G	30	5,70	-
FP01-0004	FP010302901B015G030L057		29 01	B	0,15	G	30	5,70	-
FP01-0007	FP010302901P015U030L057		29 01	P	0,15	U	30	5,70	-

FP01 Ø0,30mm

Fine Pitch Probe
Double Plunger Probe

NEW

Centers (mm/mil)	0,40 / 16
Current	1,4 A
R typ	<100 mOhm
Self Inductance	1,61 nH
Frequency at -1dB	<13 GHz
Temperature	-50°C...+150°C (H)

Spring Force (cN ±20%)

Version	Preload	Nominal
H	8	30

Travel (mm)

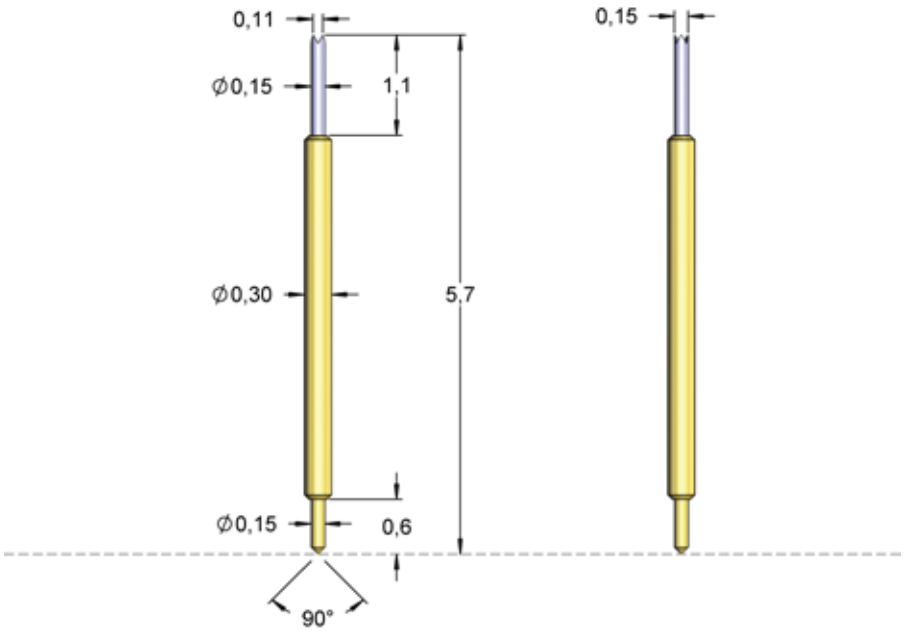
Version	Nominal	Maximum
H	0,65	0,80

Materials and Plating

Plunger 1	Palladium alloy, unplated
Plunger 2	BeCu, gold plated (standard)
Barrel	Nickel, gold plated
Spring	Music wire, gold plated

Drill Size (mm)

FP01-030-L057	0,31 - 0,33



M 1:1

For applications like BGA, LGA, SOP, QFP, QFN-testing.
Suitable for mounting in sockets and test fixtures.

Order Code	Description	Sensepin	KF1 / KF2	Material	Ø in mm	Plating	Spring force	Length	Version
FP01-0007	FP010302901P015U030L057		29 01	P	0,15	U	30	5,70	-

FP01 Ø0,35mm

Fine Pitch Probe
Double Plunger Probe

NEW

Centers (mm/mil)	0,50 / 20
Current	2,0 A
R typ	<60 mOhm
Temperature	-42°C...+135°C

Spring Force (cN ±20%)

Version	Preload	Nominal
Standard	8	20
H	8	20

Travel (mm)

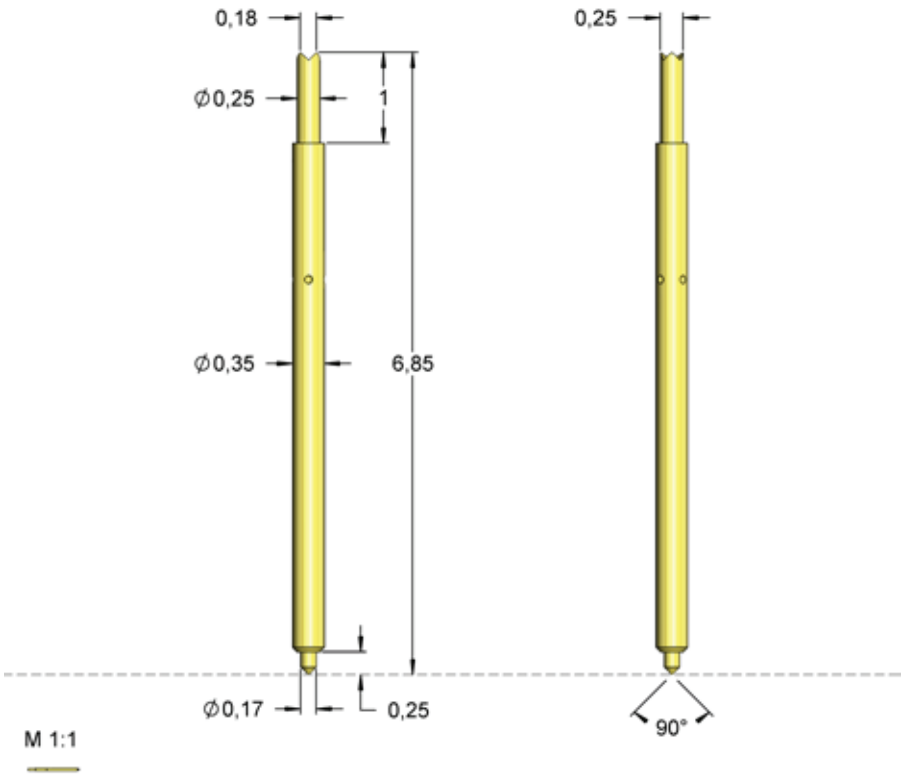
Version	Nominal	Maximum
Standard	0,65	0,75
H	0,65	0,75

Materials and Plating

Plunger 1	BeCu, gold plated
Plunger 2	BeCu, gold plated (standard)
Barrel	Nickel, gold plated
Spring	Music wire, gold plated

Drill Size (mm)

FP01-035-L069H	0,36 - 0,38



For applications like BGA, LGA, SOP, QFP, QFN-testing.
Suitable for mounting in sockets and test fixtures.

Order Code	Description	Sensepin	KF1 / KF2	Material	Ø in mm	Plating	Spring force	Length	Version
FP01-0014	FP010350301B025G020L069H		03 01	B	0,25	G	20	6,90	H
FP01-0037	FP010351111B025G020L069H		11 11	B	0,25	G	20	6,90	H
FP01-0022	FP010351601B025G020L069H		16 01	B	0,25	G	20	6,90	H
FP01-0013	FP010352901B025G020L069H		29 01	B	0,25	G	20	6,90	H

FP01 Ø0,38mm

Fine Pitch Probe
Double Plunger Probe

NEW

Centers (mm/mil)	0,50 / 20
Current	1,1 A
R typ	<100 mOhm
Self Inductance	0,81 nH
Frequency at -1dB	<20 GHz
Temperature	-40°C...+120°C

Spring Force (cN ±20%)

Version	Preload	Nominal
Standard	15	25

Travel (mm)

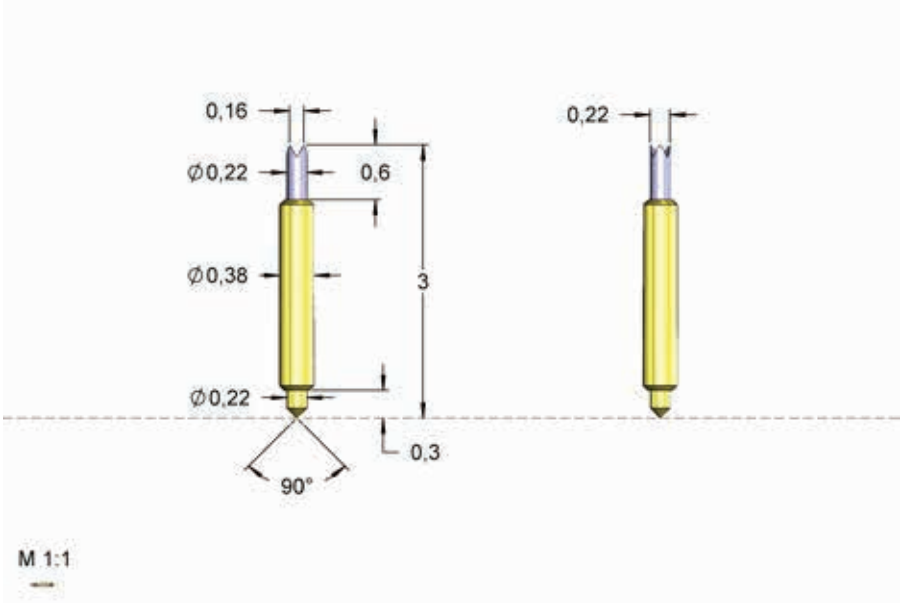
Version	Nominal	Maximum
Standard	0,40	0,55

Materials and Plating

Plunger 1	Palladium alloy, unplated
Plunger 2	BeCu, gold plated (standard)
Barrel	Nickel, gold plated
Spring	Music wire, gold plated

Drill Size (mm)

FP01-038-L030	0,39 - 0,41



For applications like BGA, LGA, SOP, QFP, QFN-testing.
Suitable for mounting in sockets and test fixtures.

Order Code	Description	Sensepin	KF1 / KF2	Material	Ø in mm	Plating	Spring force	Length	Version
FP01-0005	FP010382901P022U025L030		29 01	P	0,22	U	25	3,00	-

FP01 Ø0,38mm

Fine Pitch Probe
Double Plunger Probe

NEW

Centers (mm/mil)	0,50 / 20
Current	2,1 A
R typ	<70 mOhm
Self Inductance	2,37 nH
Frequency at -1dB	<6,1 GHz
Temperature	-50°C...+150°C

Spring Force (cN ±20%)

Version	Preload	Nominal
Standard	13	30

Travel (mm)

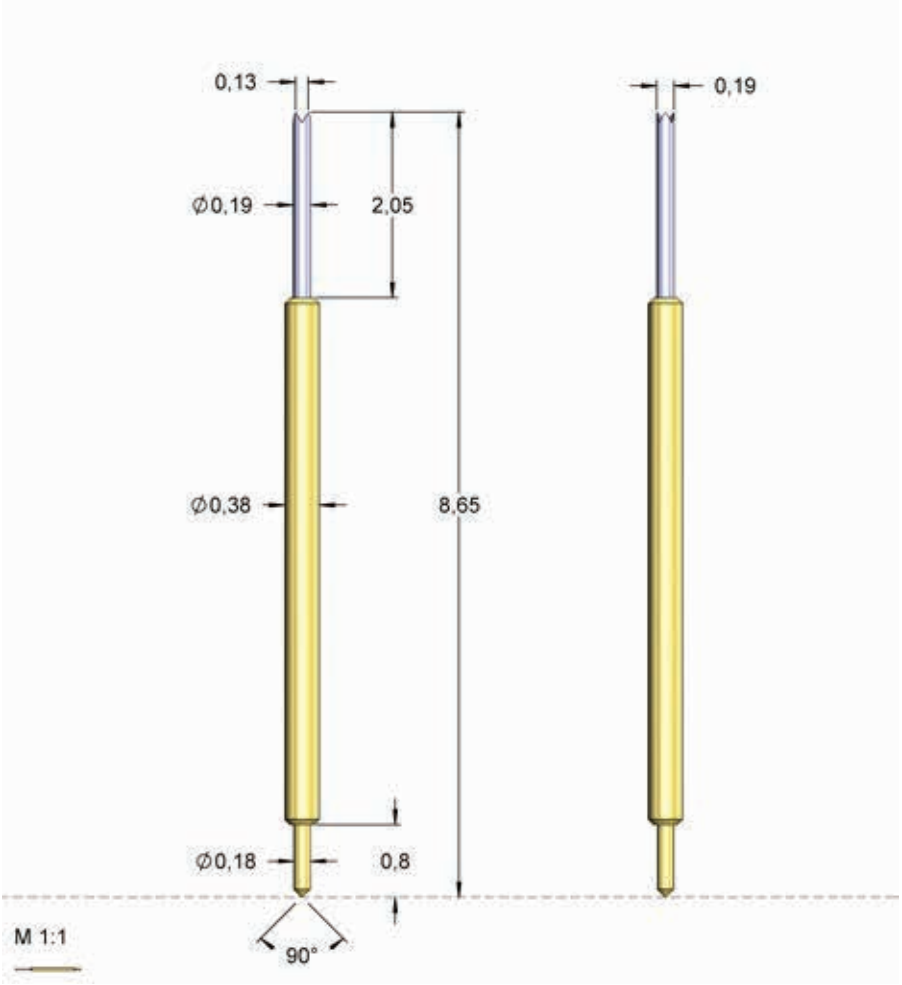
Version	Nominal	Maximum
Standard	1,00	1,20

Materials and Plating

Plunger 1	Palladium alloy, unplated
Plunger 2	BeCu, gold plated (standard)
Barrel	Nickel, gold plated
Spring	Stainless steel, gold plated

Drill Size (mm)

FP01-038-L086H	0,39 - 0,41



For applications like BGA, LGA, SOP, QFP, QFN-testing.
Suitable for mounting in sockets and test fixtures.

Order Code	Description	Sensepin	KF1 / KF2	Material	Ø in mm	Plating	Spring force	Length	Version
FP01-0019	FP010382901P019U030L086H		29 01	P	0,19	U	30	8,60	H

FP01 Ø0,48mm

Fine Pitch Probe Double Plunger Probe, nonmagnetic

NEW

Centers (mm/mil)	0,50 / 20
Current	2,1 A
R typ	<70 mOhm
Self Inductance	2,37 nH
Frequency at -1dB	<6,1 GHz
Temperature	-50°C...+150°C

Spring Force (cN ±20%)

Version	Preload	Nominal
HNM	6	46

Travel (mm)

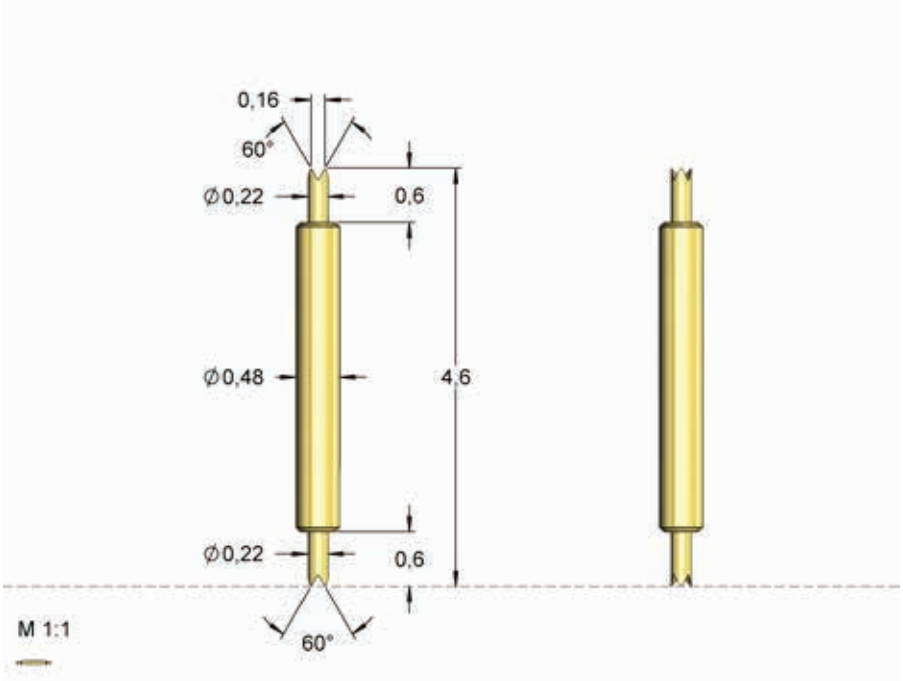
Version	Nominal	Maximum
HNM	0,40	0,60

Materials and Plating

Plunger 1	BeCu, gold plated
Plunger 2	BeCu, gold plated (standard)
Barrel	Bronze, gold plated
Spring	Stainless steel, gold plated

Drill Size (mm)

FP01-048-L046	0,49 - 0,51



The probe is constructed exclusively with **non-magnetic materials**.
For applications like BGA, LGA, SOP, QFP, QFN-testing.
Suitable for mounting in sockets and test fixtures.

Order Code	Description	Sensepin	KF1 / KF2	Material	Ø in mm	Plating	Spring force	Length	Version
FP01-0035	FP010482929B022G046L046HNM		29 29	B	0,22	G	46	4,60	HNM

FP01 Ø0,58mm

Fine Pitch Probe
Double Plunger Probe

NEW

Centers (mm/mil)	0,75 / 30
Current	0,5 A
R typ	<50 mOhm
Temperature	-50°C...+150°C

Spring Force (cN ±20%)

Version	Preload	Nominal
H	30	60

Travel (mm)

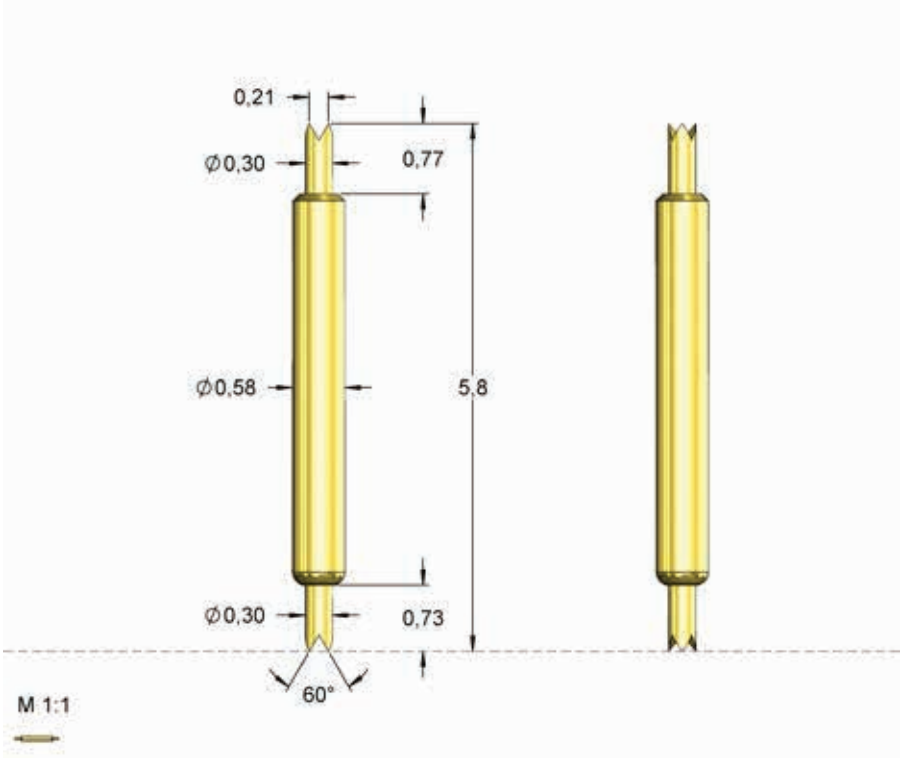
Version	Nominal	Maximum
H	0,50	0,60

Materials and Plating

Plunger 1	BeCu, gold plated
Plunger 2	BeCu, gold plated (standard)
Barrel	Bronze, gold plated
Spring	Stainless steel, gold plated

Drill Size (mm)

FP01-058-L058H	0,59 - 0,62



For applications like BGA, LGA, SOP, QFP, QFN-testing.
Suitable for mounting in sockets and test fixtures.

Order Code	Description	Sensepin	KF1 / KF2	Material	Ø in mm	Plating	Spring force	Length	Version
FP01-0024	FP010582929B030G060L058H		29 29	B	0,30	G	60	5,80	H

FP01 Ø0,59mm

Fine Pitch Probe
Double Plunger Probe

NEW

Centers (mm/mil)	0,75 / 30
Current	0,5 A
R typ	<50 mOhm
Temperature	-50°C...+150°C

Spring Force (cN ±20%)

Version	Preload	Nominal
H	10	35

Travel (mm)

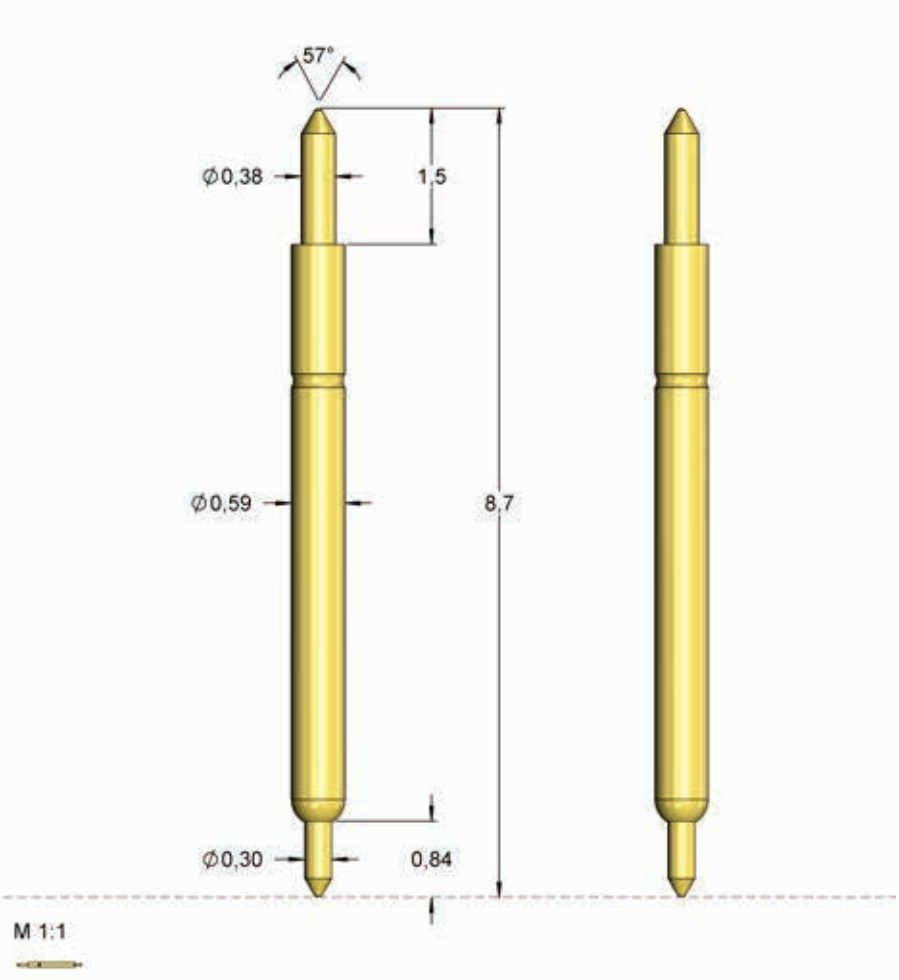
Version	Nominal	Maximum
H	0,75	1,0

Materials and Plating

Plunger 1	Steel, longtime gold plated
Plunger 2	BeCu, gold plated (standard)
Barrel	Bronze, gold plated
Spring	Stainless steel, gold plated

Drill Size (mm)

FP01-059-L087H	0,60 - 0,63



For applications like BGA, LGA, SOP, QFP, QFN-testing.
Suitable for mounting in sockets and test fixtures.

Order Code	Description	Sensepin	KF1 / KF2	Material	Ø in mm	Plating	Spring force	Length	Version
FP01-0015	FP010590303S038L035L087H		03 03	S	0,38	L	35	8,70	H
FP01-0016	FP010592903S038L035L087H		29 29	S	0,38	L	35	8,70	H

F238

Fine Pitch Probe
Double Plunger Probe

Centers (mm/mil)	0,50 / 20
Current	1,0 A
R typ	<350 mOhm
Temperature	-20°C...+80°C

Spring Force (cN ±20%)

Version	Preload	Nominal
Standard	10	50

Travel (mm)

Version	Nominal	Maximum
Standard	2,0	2,5

Materials and Plating

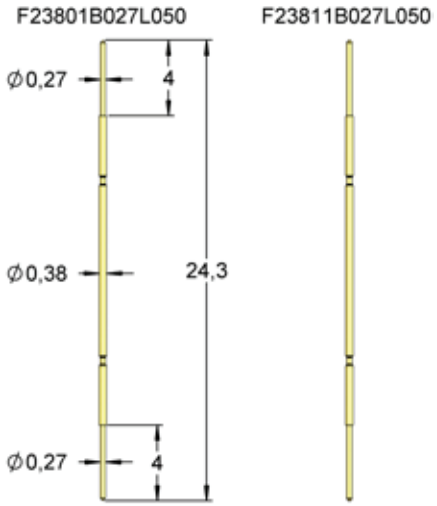
Plunger	BeCu, longtime gold plated
Barrel	Bronze, gold plated
Spring	Stainless steel, unplated

Drill Size (mm)

F238	0,38 - 0,40

Series			Tip-Ø TS1		Spring Force (cN)
F238	**01**	**B**	**027**	**L**	**050**
	TS1	Material		Plating	Total Length

Material: B = BeCu
Tip-Ø: 027 = 0,27 mm (e.g.)
Plating: L = Longtime gold plated



For applications like BGA, LGA, SOP, QFP, QFN-testing.
Suitable for mounting in sockets and test fixtures.

Tip Styles	TS1 / TS2	Material	Ø in mm	Plating	Version
	01 01	B	0,27	L	-
	11 11	B	0,27	L	-
	30 30	B	0,27	L	-

F239

Fine Pitch Probe
with Connecting Element

Centers (mm/mil)	0,50 / 20
Current	1,0 A
R typ	<350 mOhm
Temperature	-20°C...+80°C

Spring Force (cN ±20%)

Version	Preload	Nominal
Standard	10	50

Travel (mm)

Version	Nominal	Maximum
Standard	2,0	2,5

Materials and Plating

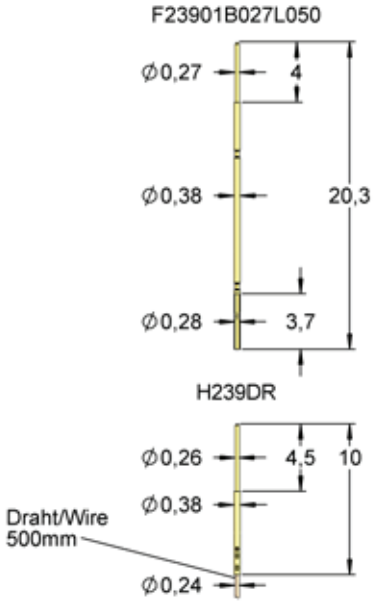
Plunger	BeCu, longtime gold plated
Barrel	Bronze, gold plated
Spring	Stainless steel, unplated
Connecting element	BeCu, gold plated

Drill Size (mm)

F238	0,38 - 0,40

Series			Tip-Ø TS1		Spring Force (cN)
F239	**01**	**B**	**027**	**L**	**050**
	TS1	Material		Plating	Total Length

Material: B = BeCu
Tip-Ø: 027 = 0,27 mm (e.g.)
Plating: L = Longtime gold plated



For applications like BGA, LGA, SOP, QFP, QFN-testing.
Suitable for mounting in sockets and test fixtures.

Tip Styles	TS1 / TS2	Material	Ø in mm	Plating	Version
	01	B	0,27	L	-

F209

Fine Pitch Probe
Double Plunger Probe

Centers (mm/mil)	0,70 / 28
Current	1,0 A
R typ	<70 mOhm
Temperature	-20°C...+80°C

Spring Force (cN ±20%)

Version	Preload	Nominal
Standard	10	50

Travel (mm)

Version	Nominal	Maximum
Standard	2,0	2,5

Materials and Plating

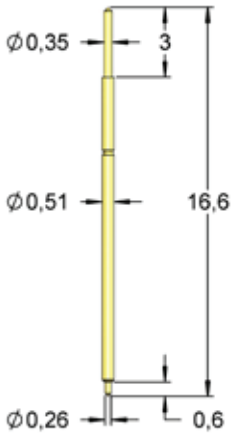
Plunger	BeCu, gold plated
Barrel	Bronze, gold plated
Spring	Music wire, silver plated

Drill Size (mm)

F209	0,51 - 0,53

Series			Tip-Ø TS1		Spring Force (cN)
F209	**01**	**B**	**035**	**G**	**050**
TS1		Material		Plating	Total Length

Material: B = BeCu
Tip-Ø: 035 = 0,35 mm (e.g.)
Plating: G = Gold plated



For applications like BGA, LGA, SOP, QFP, QFN-testing.
Suitable for mounting in sockets and test fixtures.

Tip Styles	TS1 / TS2	Material	Ø in mm	Plating	Version
	01 01	B	0,35	G	-

F206

Fine Pitch Probe
Double Plunger Probe

Centers (mm/mil)	0,70 / 28
Current	1,0 A
R typ	<70 mOhm
Temperature	-20°C...+80°C

Spring Force (cN ±20%)

Version	Preload	Nominal
Standard	10	50

Travel (mm)

Version	Nominal	Maximum
Standard	2,0	2,5

Materials and Plating

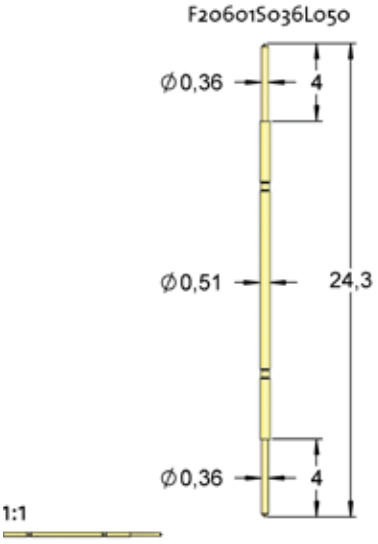
Plunger	BeCu, gold plated
Barrel	Bronze, gold plated
Spring	Music wire, silver plated

Drill Size (mm)

F209	0,51 - 0,53

Series			Tip-Ø TS1		Spring Force (cN)
F206	**01**	**S**	**036**	**L**	**050**
TS1		Material		Plating	Total Length

Material: S = Steel
Tip-Ø: 036 = 0,36 mm (e.g.)
Plating: L = Longtime gold plated



For applications like BGA, LGA, SOP, QFP, QFN-testing.
Suitable for mounting in sockets and test fixtures.

Tip Styles	TS1 / TS2	Material	Ø in mm	Plating	Version
	01 01	S	0,36	L	-

F680

Fine Pitch Probe
Double Plunger Probe

Centers (mm/mil)	0,75 / 30
Current	0,5 A
R typ	<50 mOhm
Temperature	-20°C...+80°C -40°C...+200°C

Spring Force (cN ±20%)

Version	Preload	Nominal
Standard	10	20
Standard	20	40
NM	10	50
HS1	10	20
HS1	45	60

Travel (mm)

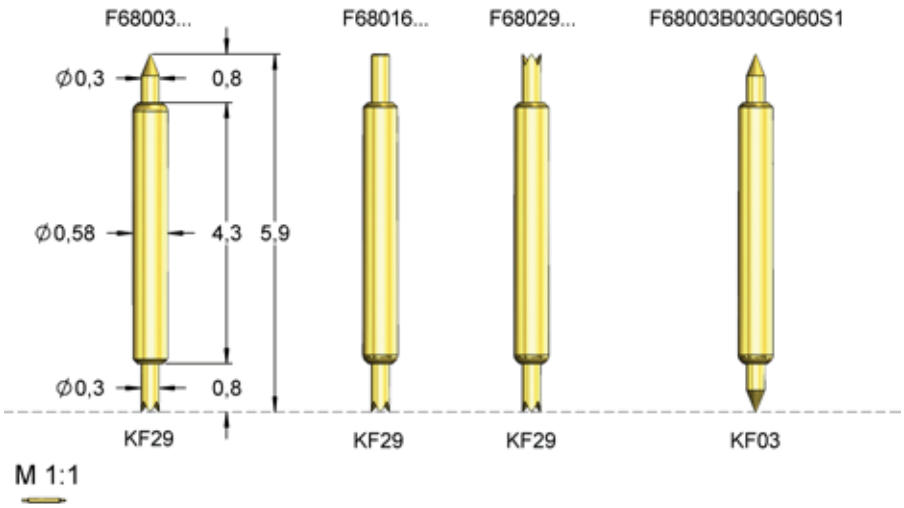
Version	Nominal	Maximum
Standard	0,5	1,0
NM	0,5	0,7
S1	0,5	0,6

Materials and Plating

Plunger	BeCu, gold plated; BeCu, rhodanized
Barrel	Bronze, gold plated Bronze, rhodanized (NM)
Spring	BeCu, unplated (NM) Music wire, silver plated Stainless steel, silver plated (H)

Drill Size (mm)

F680	0,59 - 0,62



For applications like BGA, LGA, SOP, QFP, QFN-testing.
Suitable for mounting in sockets and test fixtures.

Version **F68029B030R050NM** is made exclusively of **non-magnetic** materials.

Series			Tip-Ø TS1		Spring Force (cN)	
F680	**03**	**B**	**030**	**G**	**060**	**S1**
	TS1	Material		Plating		Version

Material: B = BeCu
Tip-Ø: 030 = 0,30 mm (e.g.)
Plating: G = Gold plated, R = Rhodanized
Version: NM = non magnetic,
S1 = Special version,
H = High temperature

Tip Style	Number	Material	Ø in mm	Plating	Version
	03 03	B	0,30	G	HS1
	03 03	B	0,30	G	S1
	03 29	B	0,30	G	-
	16 29	B	0,30	G	-
	29 03	B	0,30	G	HS1
	29 29	B	0,30	G	-
	29 29	B	0,30	R	NM

F252

Fine Pitch Probe
Double Plunger Probe

Centers (mm/mil)	1,00 / 39
Current	1,5 A
R typ	<75 mOhm
Temperature	-20°C...+80°C

Spring Force (cN ±20%)

Version	Preload	Nominal
Standard	30	85

Travel (mm)

Version	Nominal	Maximum
Standard	2,0	2,5

Materials and Plating

Plunger	see Tip Style
Barrel	Bronze, silver plated
Spring	Music wire, silver plated

Accessories

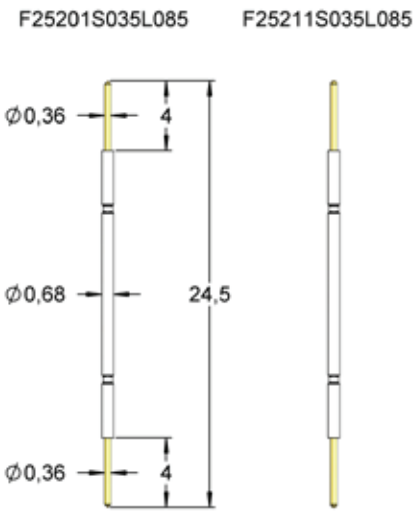
Insertion tool receptacle	FEWZ-109E0
Insertion tool probe	FDWZ-050

Drill Size (mm)

F252	0,69 - 0,71

Projection Height (mm)

F109 with receptacle H109...	4,0



For fine pitch component test or board test with very small centers.

Series		Tip-Ø TS1		Spring Force (cN)	
F252	**01**	**S**	**036**	**L**	**085**
	TS1	Material		Plating	Version

Material: S = Steel
Tip-Ø: 036 = 0,36 mm (e.g.)
Plating: L = Longtime gold plated

Tip Styles	TS1 / TS2	Material	Ø in mm	Plating	Version
	01 01	S	0,36	L	-
	11 11	S	0,36	L	-
	18 18	S	0,36	L	-

F109

Fine Pitch Probe with Receptacle

Centers (mm/mil)	1,00 / 39
Current	1,0 A
R typ	<65 mOhm
Temperature	-20°C...+80°C -40°C...+200°C

Spring Force (cN ±20%)

Version	Preload	Nominal
Standard	10	50
H	17	50

Travel (mm)

Version	Nominal	Maximum
Standard	2,0	2,3
H	2,0	2,3
Pointing Accuracy		±0,05 mm

Materials and Plating

Plunger	see Tip Style
Barrel	Nickel silver, gold plated
Spring	Music wire, silver plated Stainless steel, gold plated (H)
Receptacle	Bronze, gold plated

Accessories

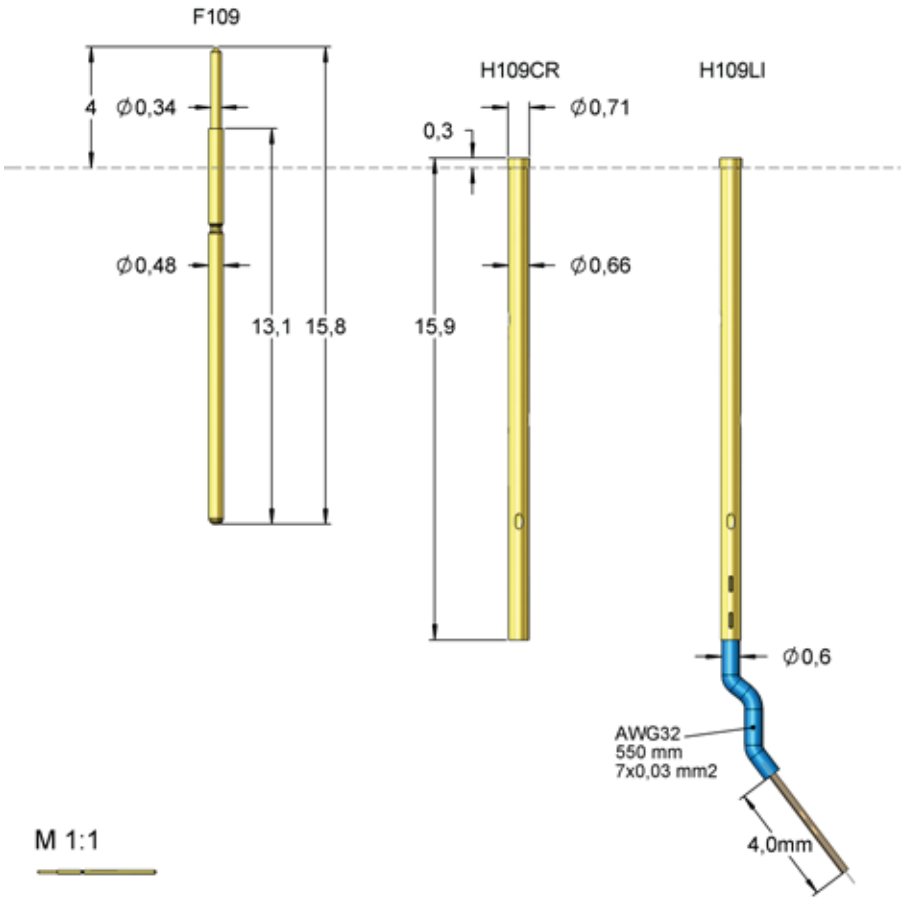
Insertion tool receptacle	FEWZ-109E0
Insertion tool probe	FDWZ-050

Drill Size (mm)

F109 with receptacle H109...	0,66 - 0,68
F109 without receptacle	0,49 - 0,51

Projection Height (mm)

F109 with receptacle H109...	4,0



For fine pitch component test or board test with very small centers.

Series			Tip-Ø TS1		Spring Force (cN)	
F109	**01**	**B**	**034**	**G**	**050**	**H**
	TS1	Material		Plating		Version

Material: B = BeCu
Tip-Ø: 034 = 0,34 mm (e.g.)
Plating: G = Gold plated
Version: H = High temperature
Receptacle: Order Code according drawing

Tip Style	Number	Material	Ø in mm	Plating	Version
	01	B	0,34	G	-
	01	B	0,34	G	H
	18	B	0,34	G	-

F025

NEW

Probe 30 mil Standard

Centers (mm/mil)	0,60 / 25
Current	1,5 A
R typ	150 mOhm
Temperature	-20°C...+80°C

Spring Force (cN ±20%)

Version	Preload	Nominal
Standard	10	40

Travel (mm)

Version	Nominal	Maximum
Standard	2,0	3,0
Pointing Accuracy		±0,05 mm

Materials and Plating

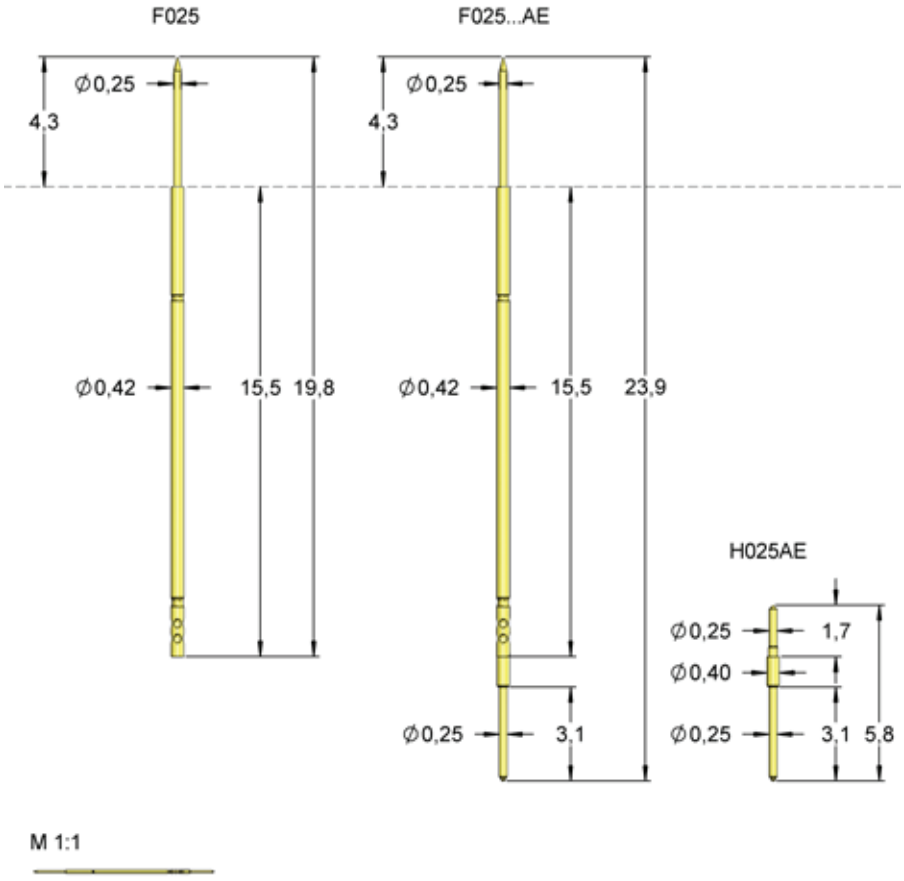
Plunger	see tip style
Barrel	Bronze, gold plated
Spring	Music wire, gold plated

Accessories

Connecting element	H025AE

Drill size (mm)

Barrel-Ø	0,41 - 0,43



The AE variant is the combination of F025 and H025AE.

Series			Tip-Ø		Spring Force (cN)	
F025	18	B	025	G	040	AE
	Tip Style	Material	Plating		Version	

Material: B = BeCu
Tip-Ø: 025 = 0,25 mm (e.g.)
Plating: G = Gold plated
Receptacle: Order Code according drawing

Tip Style	Number	Material	Ø in mm	Plating	Version
	18	B	0,25	G	-
	18	B	0,25	G	AE

F030

NEW

Probe 30 mil Standard

Centers (mm/mil)	0,76 / 30
Current	1,5 A
R typ	150 mOhm
Temperature	-20°C...+80°C

Spring Force (cN ±20%)

Version	Preload	Nominal
Standard	35	80

Travel (mm)

Version	Nominal	Maximum
Standard	2,0	3,5
Pointing Accuracy		±0,05 mm

Materials and Plating

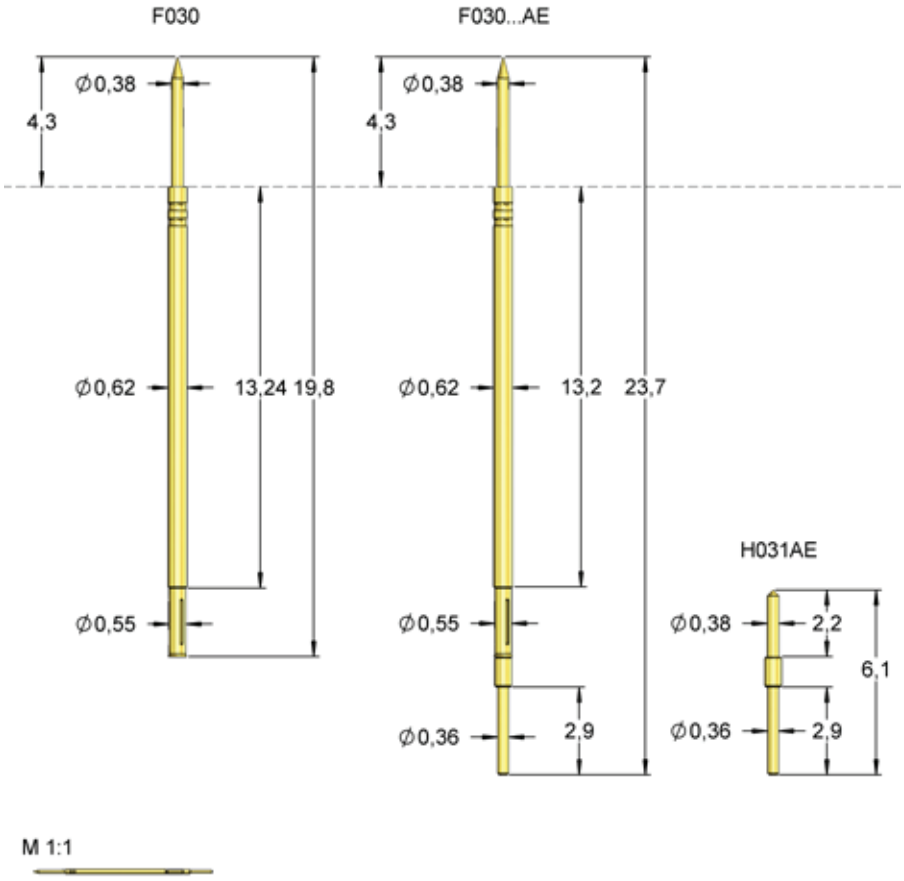
Plunger	see tip style
Barrel	Bronze, gold plated
Spring	Music wire, silver plated

Accessories

Connecting element	H031AE

Drill size (mm)

Barrel-Ø	0,61 - 0,63



The AE variant is the combination of F030 and H031AE.

Series			Tip-Ø		Spring Force (cN)	
F030	18	E	038	M	080	AE
	Tip Style	Material	Plating		Version	

Material: E = Stainless steel
Tip-Ø: 038 = 0,38 mm (e.g.)
Plating: M = Multiplex coating
Receptacle: Order Code according drawing

Tip Style	Number	Material	Ø in mm	Plating	Version
	18	E	0,38	M	-
	18	E	0,38	M	AE

F031

NEW

Probe 31 mil
Standard

Centers (mm/mil)	0,80 / 31
Current	1,5 A
R typ	150 mOhm
Temperature	-20°C...+80°C

Spring Force (cN ±20%)

Version	Preload	Nominal
Standard	35	80

Travel (mm)

Version	Nominal	Maximum
Standard	2,0	3,5
Pointing Accuracy		±0,05 mm

Materials and Plating

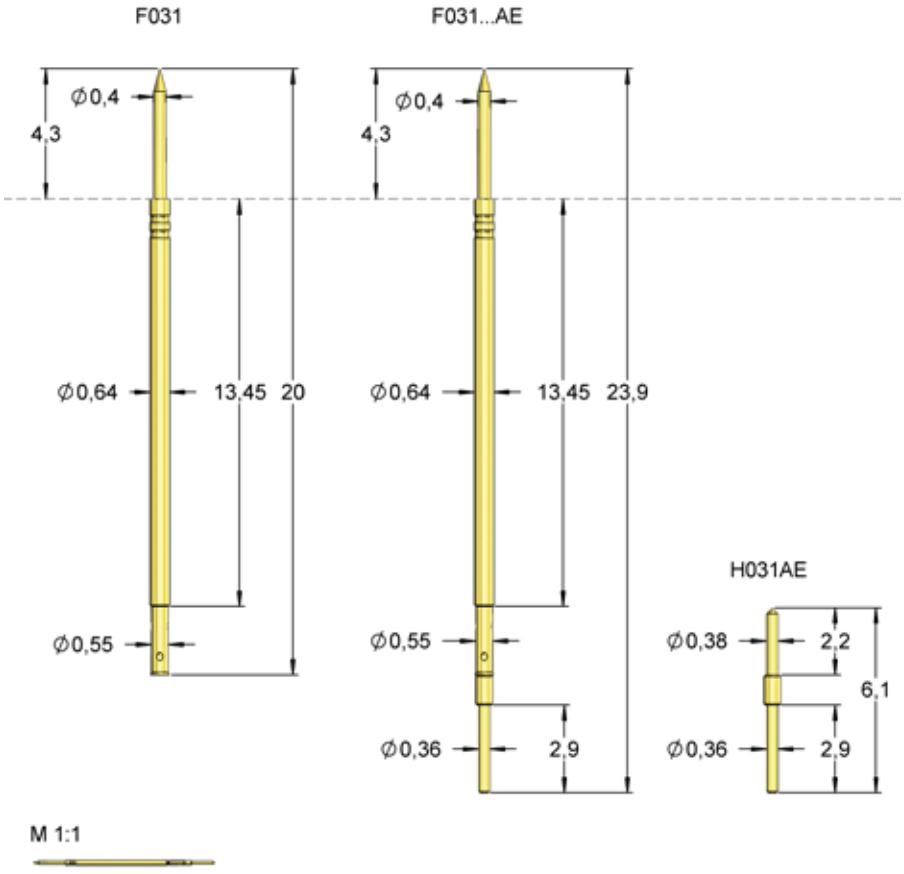
Plunger	see tip style
Barrel	Bronze, gold plated
Spring	Music wire, silver plated
Connecting element	BeCu, gold plated

Accessories

Connecting element	H031AE

Drill size (mm)

Barrel-Ø	0,63 - 0,65



The AE variant is the combination of F031 and H031AE.

Series			Tip-Ø		Spring Force (cN)	
F031	18	S	040	M	080	AE
	Tip Style	Material		Plating		Version

Material: S = Steel; E = Stainless steel
Tip-Ø: 040= 0,40 mm (e.g.)
Plating: M = Multiplex coatig
Receptacle: Order Code according drawing

Tip Style	Number	Material	Ø in mm	Plating	Version
	18	E	0,40	M	-
	18	E	0,40	M	AE

F039

NEW

Probe 39 mil Standard

Centers (mm/mil)	1,00 / 39
Current	2,0 A
R typ	150 mOhm
Temperature	-20°C...+80°C

Spring Force (cN ±20%)

Version	Preload	Nominal
Standard	10	30
Standard	60	130

Travel (mm)

Version	Nominal	Maximum
Standard	2,0	3,7
Pointing Accuracy		±0,05 mm

Materials and Plating

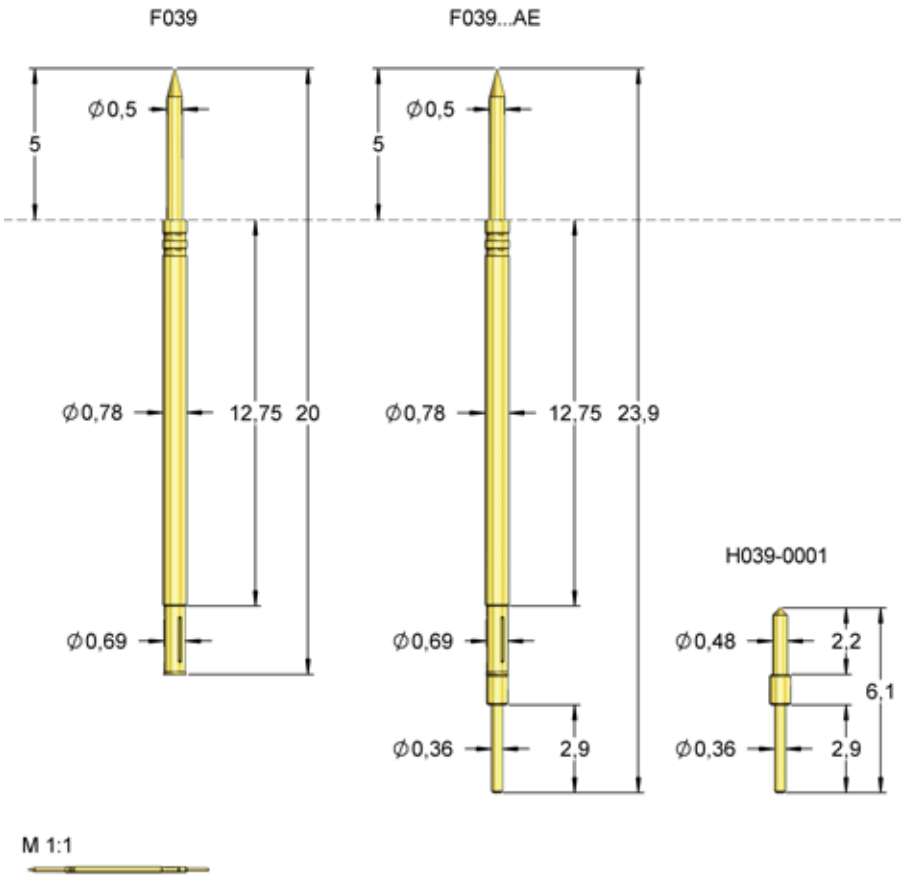
Plunger	see tip style
Barrel	Bronze, gold plated
Spring	Music wire, silver plated Stainless steel, gold plated

Accessories

Connecting element	H039AE
Insertion tool probe	FDWZ-039

Drill size (mm)

Barrel-Ø	0,77 - 0,79



The AE variant is the combined variant of F039 and H039AE.

Series			Tip-Ø		Spring Force (cN)	
F039	18	E	050	M	130	AE
	Tip Style	Material		Plating		Version

Material: S = Steel; E = Stainless steel
Tip-Ø: 050= 0,50 mm (e.g.)
Plating: G = Longtime gold plated; M = Multiplex coating
Receptacle: Order Code according drawing

Tip Style	Number	Material	Ø in mm	Plating	Version
	18	S	0,50	L	-
	18	E	0,50	M	-
	18	E	0,50	M	AE

FK50

Spring Force Gauge

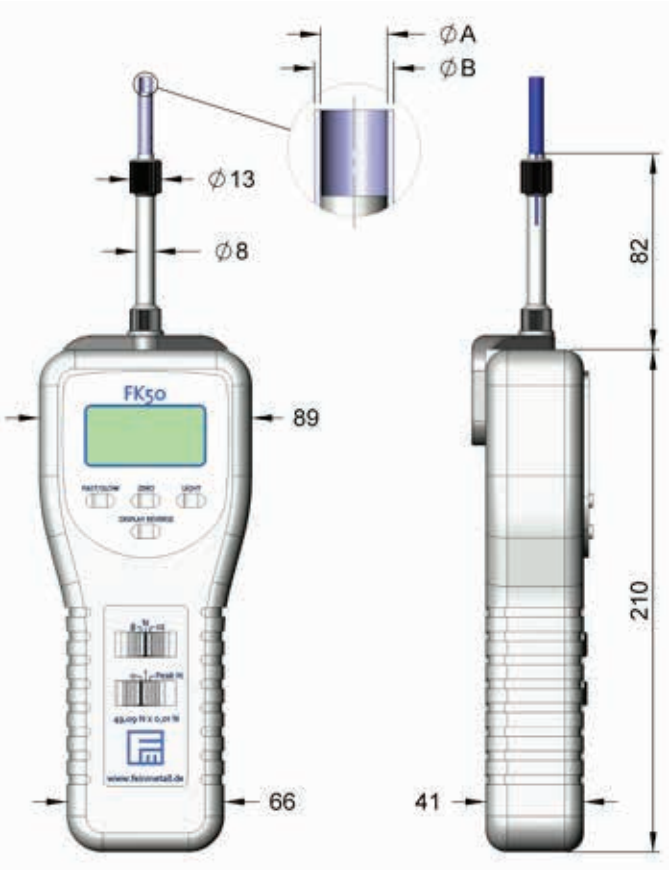
The Spring Force Gauge allows force measurement at all types of spring contact probes up to 50 N. This instrument allows in a very simple way to verify, if a probe is still intact and to determine the spring force of the probe. The measuring results are displayed at the instrument and the display can be electrically turned by 180° if needed, e.g. for overhead applications. For the measurement just put the measuring sleeve over the probe and push it to the mounting plate. The sleeves depth can be adjusted according to the projection height of the probe. Adjustable measuring sleeves are available with three different diameters.

Technical Specifications

Minimum force:	3g / 0,10oz / 0,03N
Resolution:	1g / 0,03oz / 0,01N
Measuring accuracy:	+/- 0,5% at 25°C
Data output:	via RS 232 (order code 2111810)
Power supply:	6 x 1,5V AA (UM-3 batteries)
	(Batteries non included in delivery)

Included in Delivery:

- → Spring Force Gauge with receptacle for measuring sleeve
- → Measuring sleeve Ø 5,0mm
- → Calibration certificate
- → Carrying case



Operating manual available on the homepage.

Dimensions of adjustable measuring sleeves			
Measuring sleeve	Inner-Ø A [mm]	Outer-Ø B [mm]	Height adjustable from/to [mm]
MS30	3,00	4,00	0 - 40,50
MS40	4,00	5,00	0 - 40,50
MS50	5,00	6,00	0 - 40,50

Example for height adjustment at measuring sleeve		
	Projection height of probe, e.g. F732: Nominal: Projection height - nominal: Value of height to fix:	= 10,50 mm = 4,00 mm = 10,50 - 4,00 mm = 6,50 mm

Description	Order code
Spring force gauge FK50	FK50
Measuring sleeve Ø 3,0 mm	MS30
Measuring sleeve Ø 4,0 mm	MS40
Measuring sleeve Ø 5,0 mm	MS50
Data cable RS232	2111810

Rigid measuring sleeves with fixed stop

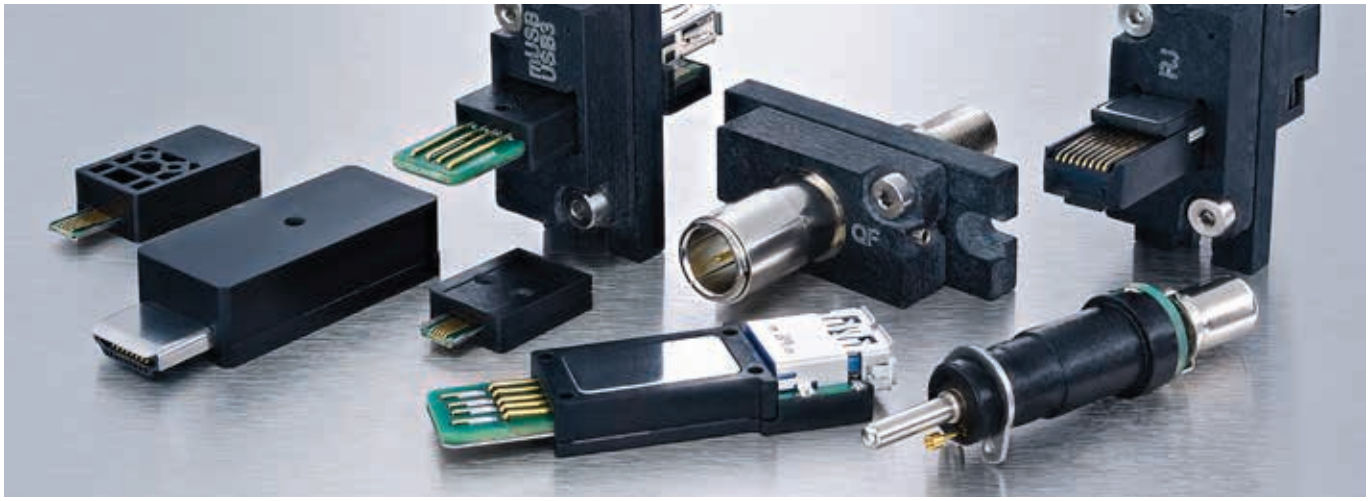
Rigid measuring sleeves for repeating measurements at probes with fixed projection height are available with different diameters.

Measuring sleeve	Order code	for series	Inner-Ø A [mm]	Outer-Ø B [mm]	Projection Height [mm]	Nominal travel [mm]
Measuring sleeve F732	MS230E065	F732	2,30	2,70	10,50	4,00
Measuring sleeve F733	MS360E065	F733	3,60	4,00	10,50	4,00
Measuring sleeve VF3	MS270E355	VF3	2,70	3,20	40,50	5,00
Measuring sleeve VF4	MS370E355	VF4	3,70	4,20	40,50	5,00
Measuring sleeve VF5	MS460E315	VF5	4,60	5,00	36,50	4,80

Tools and Test Connectors

For installation and maintenance of contact probes and receptacles FEINMETALL offers a great variety of tools. For the mounting of standard probes practical insertion- and screw-in tools are useful. For a simple and effective mounting of switch probes tools with integrated functions are ideal, for example to adjust the correct position of the switch point. A spring force gauge additionally enables the measurement of spring forces, for example to identify inserted contact probes in existing modules or fixtures.

CONTACTS FOR COMMON CONNECTOR TYPES



Long-life test connectors for in-circuit, functional and wire harness testing

The need for contacting common USB, RJ or HDMI connector types is not only increasing in the **in-circuit and functional test** of printed circuit boards, but is also becoming more and more important in the **wire harness test**.

Advantages when using FEINMETALL test connectors

- Very high contact cycles; up to 200,000 (depending on test specimen)
- Test connectors do not snap into the DUT compared to normal plugs
- Unnecessary loading or damage to the contact springs in the test piece is avoided
- fixture-side connection of the test connector is very simple and solder-free, using a standard connector (plug and play). In case of maintenance, it is very easy to replace the test connector.

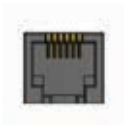
The test connectors can be easily and effectively integrated into test fixtures and test modules. The contacting of the test specimen can be done either by the travel of the fixture or module . Alternatively, it can be integrated into a pneumatically controlled contacting unit (assembly instructions available).

With these new test connectors, FEINMETALL completes its portfolio of contact probes for test engineering and can now offer you even more comprehensive contacting solutions from a single source.

RJ 09

TC-P 201 004 RJ 09
Order code: 2112151
Max. data rate: 1 Gbit/s
Contact cyles: 200.000
Current: 1,5 A at 25°C
Number Poles: 4

RJ 11



TC-P 201 006 RJ 11
Order code: 2112152
Max. data rate: 1 Gbit/s
Contact cyles: 200.000
Current: 1,5 A at 25°C
Number Poles: 6

RJ 45

TC-P 201 008 RJ 45
Order code: 2112142
Max. data rate: 1 Gbit/s
Contact cyles: 200.000
Current: 1,5 A at 25°C
Number Poles: 8

RJ 50

TC-P 201 010 RJ 50
Order code: 2112153
Max. data rate: 1 Gbit/s
Contact cyles: 200.000
Current: 1,5 A at 25°C
Number Poles: 10

CONTACTS FOR COMMON CONNECTOR TYPES

Micro-USB

TC-P 195 005 USB 2.0 B micro
Order code: 2112145
Max. data rate: 480 Mbit/s
Contact cyles: 200.000
Current: 1,5 A at 25°C
Number Poles: 5

Mini-USB

TC-P 198 005 USB 2.0 B mini
Order code: 2112757
Max. data rate: 480 Mbit/s
Contact cyles: 200.000
Current: 1,0 A at 25°C
Number Poles: 5

USB Type A

TC-P 198 004 USB 2.0 A
Order code: 2112143
Max. data rate: 480 Mbit/s
Contact cyles: 200.000
Current: 1,5 A at 25°C
Number Poles: 4

USB Type A

TC-P 198 009 USB 3.0 A
Order code: 2112159
Max. data rate: 4 Gbit/s
Contact cyles: 50.000
Current: 1,5 A at 25°C
Number Poles: 9

USB Type C

TC-P 756 024 USB 3.1 C
Order code: 2112219
Max. data rate: 5 Gbit/s
Contact cyles: 50.000
Current: 5,0 A at 25°C
Number Poles: 24

HDMI 1.4

TC-P 197 019 HDMI 1.4
Order code: 2112148
Max. data rate: 8,16 Gbit/s
Contact cyles: 50.000
Current: 0,5 A at 25°C
Number Poles: 19

HDMI 2.0

TC-P 226 019 HDMI 2.0
Order code: 211218
Max. data rate: 14,4 Gbit/s
Contact cyles: 50.000
Current: 0,5 A at 25°C
Number Poles: 19

F-Type

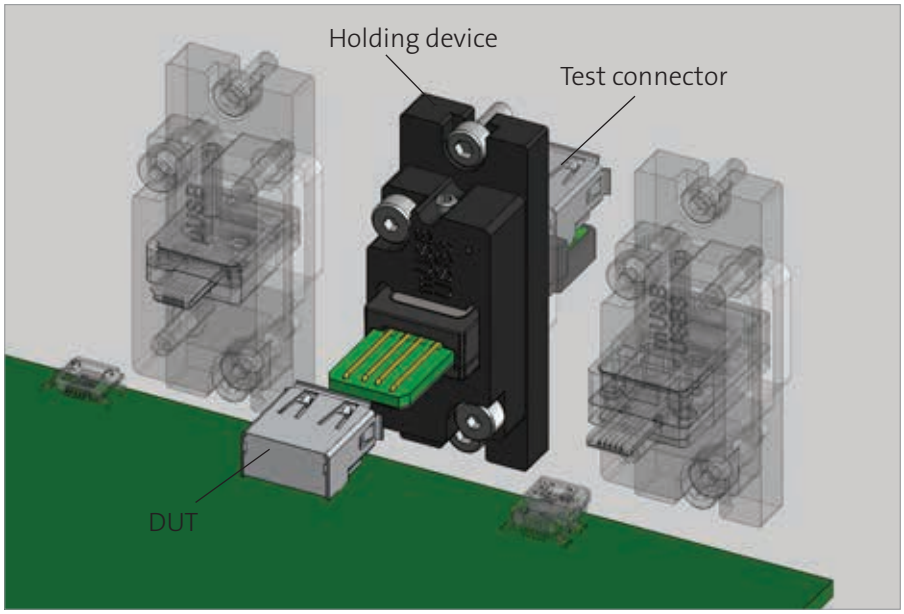
TC-P 196 001 F QF
Order code: 2112149
Max. data rate: 300 khz - 3 Ghz
Contact cyles: 50.000
Current: 1,5 A at 25°C
Number Poles: (Coaxial)

RCA (Chinch)

TC-P 200 002 RCA
Order code: 2112150
Max. data rate: 500 khz
Contact cyles: 200.000
Current: 1,5 A at 25°C
Number Poles: (Coaxial)

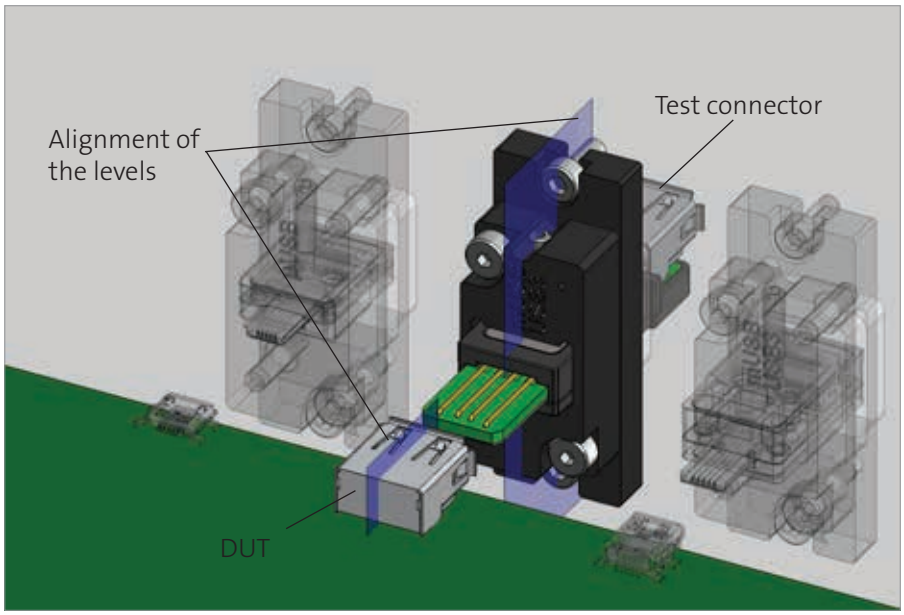
MOUNTING OF TEST CONNECTORS

Choose the test connector and holding device according to your needs.
In this example: USB

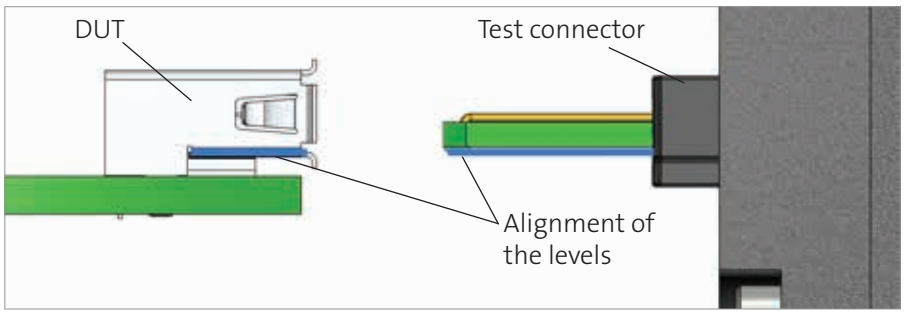


Please note the following guidelines for building up a test fixture

Align the median level of the connector to be tested (DUT) and of the test connector.

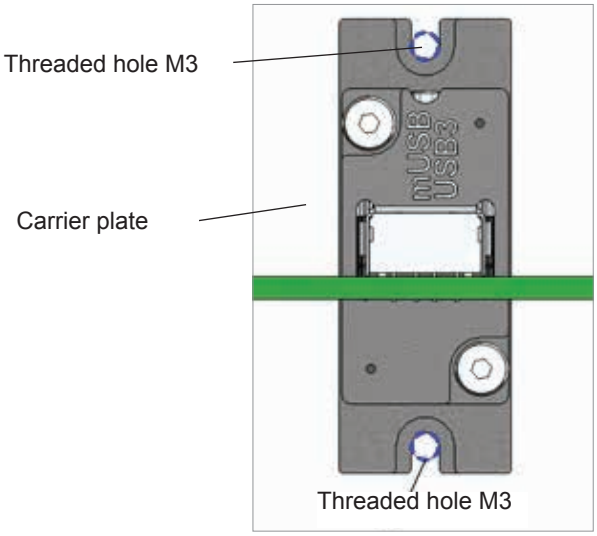


Align the lower level of the test connector on the lower internal level of the connector to test (DUT)

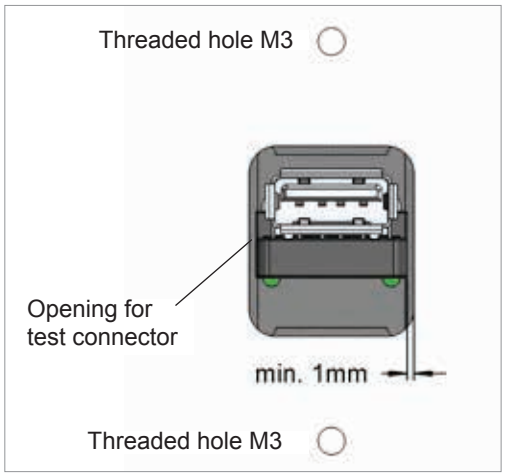


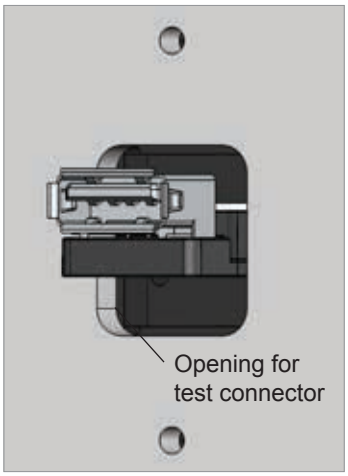
MOUNTING OF TEST CONNECTORS

Place two opposite threaded holes M3 onto the carrier plate. For fixing of the holding device, two screws M3x8 (ISO4768) are required - **not included in delivery!**



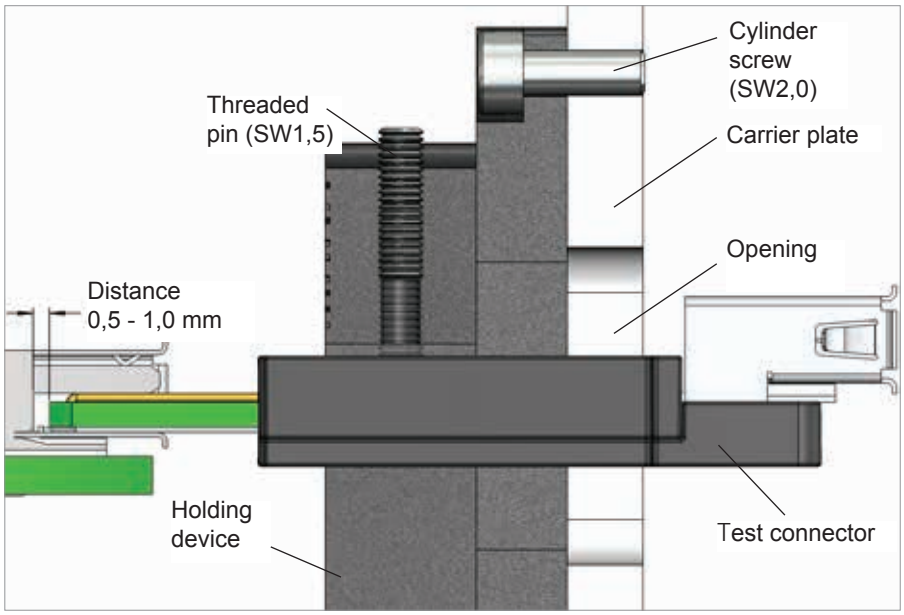
Cut a sufficient opening into the carrier plate to have enough space for later insertion of the test connector from the back. Leave at least 1 mm space between opening and test connector.





Loosen the retaining screw of the test connector.
Insert the test connector into the DUT until it comes to rest. Retract the test connector for 0.5 to 1 mm in order to prevent damages of the DUT.

Now the test connector can be fixed by using the threaded pin.

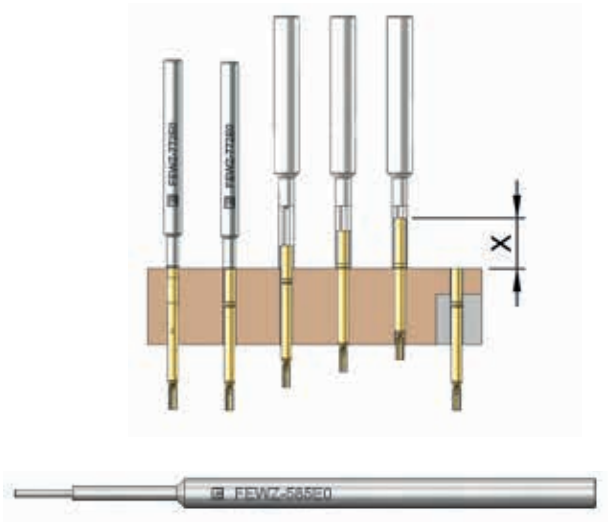


FEWZ

Insertion tools for receptacles

Insertion tool (FEWZ) for receptacles with fixed stop (collar or press ring on top)

Order Code	Insertion height [mm]	Pin-Ø [mm]	Receptacle
FEWZ-050E0	0,0	0,8	H050, H787, H051
FEWZ-075E0	0,0	0,9	H075, H175, H176, H310, H701
FEWZ-100E0	0,0	1,3	H100, H320, H502, H708, H731, H805, H863, H865
FEWZ-109E0	0,0	0,5	H109
FEWZ-330E0	0,0		H330
FEWZ-340E0	0,0		H340, H419, H887
FEWZ-348E0	0,0		H348, H349
FEWZ-511E0	0,0	0,6	H111, H511, H730
FEWZ-563E0	0,0	2,0	H563
FEWZ-735E0	0,0	3,5	H735, H725, H775
FEWZ-772E0	0,0	1,6	H772, H727, H732, H752, H875, H876, H877, H878, H879
FEWZ-774E0	0,0	2,6	H774, H566, H713, H723, H733, H735, H737, H773, H810, H866, H867, H880, H881, H884, H885,
FEWZ-822E0	0,0	4,2	H822, H832, H860



All receptacles with dead stop (collar) can be inserted with tool FEWZ-...E0. Press ring at receptacles can be used also as dead stop. The guiding pin of the tool helps to stabilize and properly mount the receptacle.

Insertion tool for receptacles with press ring (inserted)

Order Code	Insertion height X required [mm]	I-Ø [mm]	Receptacle
FEWZ-050Exx	xx	1,10	H050, H787
FEWZ-075Exx	xx	1,50	H075
FEWZ-100Exx	xx	1,83	H100

All receptacles with press ring can be inserted with tool FEWZ-...Ex. In this case the x is the fix height level (see picture).
This value is required for ordering the correct tool. For often changing projection heights the variable tool below is recommended.

Variable insertion tool for receptacles

Order Code	Insertion height X [mm]	PIN-Ø / I-Ø [mm]	Receptacle
FEWZ-050EV	0 - 10	0,79 / 1,20	H050, H787
FEWZ-075EV	0 - 12	1,00 / 1,50	H075
FEWZ-100EV	0 - 12	1,38 / 1,90	H100
FEWZ-772EV	0 - 10	1,65 / 2,20	H772

For different height levels of the receptacles with inserted press ring, the tool FEWZ-...EV is recommended.
The required height level can be adjusted at the tool..

FDWZ

Insertion tools for plug-in contact probes in receptacles

For inserting the probe into the receptacle tool FDWZ is helpful. After the probe is pushed into the receptacle and stopped by the pressure marks, the probe is driven into the receptacle with the FDWZ tool. The tool is made of a synthetic material to avoid any damaging of the plunger tips. Depending on the design of the contact probe, the tool can also sit on the collar of the probe.

Order Code	**Shank-ø** [mm]	Handle-Ø [mm]	**Length** [mm]	e.g. for probe Types
FDWZ-039	A-Ø=1,00; I-Ø=0,55	3,00	67,50	F039
FDWZ-050	1,50	6,00	100,0	F050, F051, F086, F588, F768, F787, F788, F111, F112, F605, F665
FDWZ-075	2,50	6,00	100,0	F561, F701, F075, F703, F793, F310, F320,
FDWZ-100	3,50	6,00	100,0	F502, F504, F538, F562, F566, F771, F100, F585, F588, F772, F786, F797, F563, F713, F773, F796, F785, F330, F340
FDWZ-805	A-Ø=2,00; I-Ø=1,32	12,00	80,00	F805
FDWZ-650	A-Ø=6,00; I-Ø=4,10	6,00	100,0	F650, F652

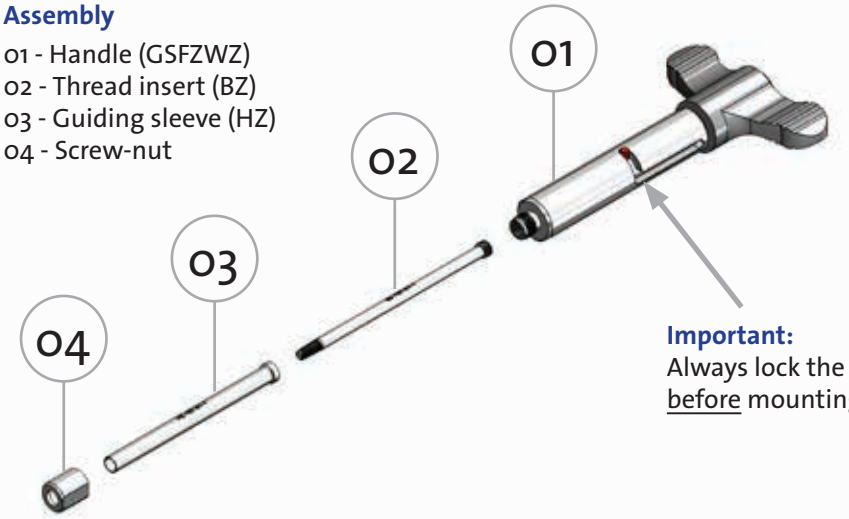
FZWZ-SET-001

Mounting tool for twist proof receptacles

With the removal tool, receptacles can be removed from a bore without damaging it. This is also possible with broken receptacles or if you do not have the possibility to knock the receptacles out from the back.

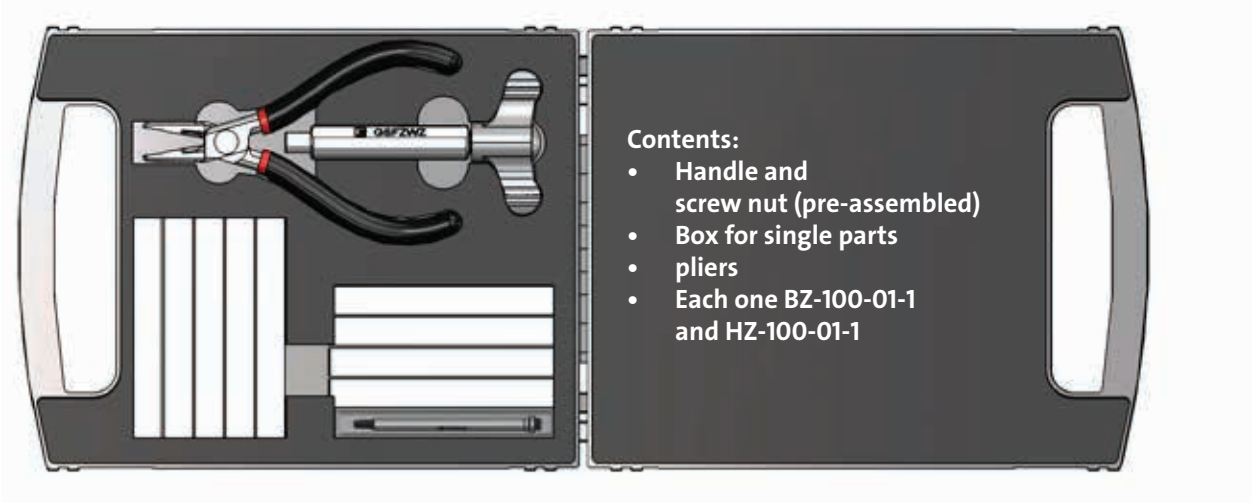
Assembly

01 - Handle (GSFZWZ)
02 - Thread insert (BZ)
03 - Guiding sleeve (HZ)
04 - Screw-nut



Important:
Always lock the tool before mounting!

Basic Kit FZWZ-SET-001



Contents:
- **Handle and screw nut (pre-assembled)**
- **Box for single parts**
- **pliers**
- **Each one BZ-100-01-1 and HZ-100-01-1**

Available guiding sleeves (HZ) and thread inserts (BZ):

Combination:	Receptacles:
• BZ-075-01-1 & HZ-075-01-1	H121; H075; H175; H176; H310; H561; H701; H863
• BZ-100-01-1 & HZ-100-01-1	H722; H727; H732; H752; H756; H757; H772; H875; H878
• BZ-100-02-1 &HZ-100-01-1	H320; H610; H865
• BZ-100-02-1 & HZ-100-02-1	H100; H502; H708; H731; H751; H805
• BZ-157-01-1 & HZ-157-01-1	H762; H866; H867; H887
• BZ-157-01-1 & HZ-157-01-2	H723; H733; H737; H760; H761; H773; H774; H880; H881; H884; H885

Further variants are updated on the homepage under **PRODUCT FINDER/ACCESSORIES-CP/FZWZ**.

Below you will find step-by-step instructions for handling the tool.

Step-by-step-Instruction

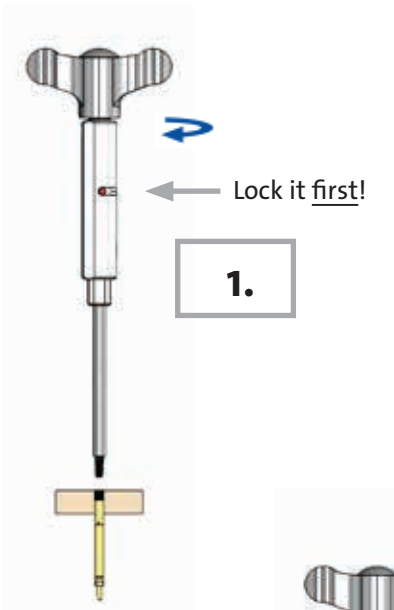
1. Make sure that the handle is locked!
   Screw the tool clockwise into the mounted receptacle until a few turns are cut. This is the case when the screwing in becomes stiffer or the guiding sleeve (03) touches the module.

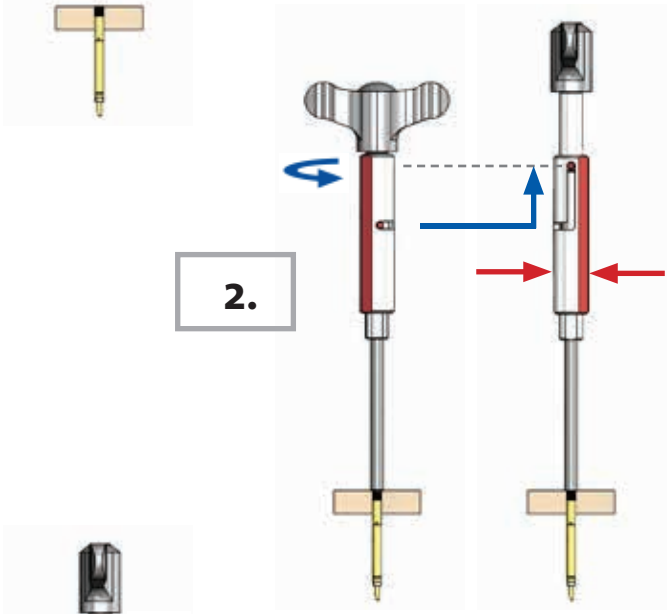
2. Release the lock: Turn the entire tool back slightly counterclockwise so that the lock can be released more easily. Then hold the flattened surfaces (marked red) and turn the handle counterclockwise.

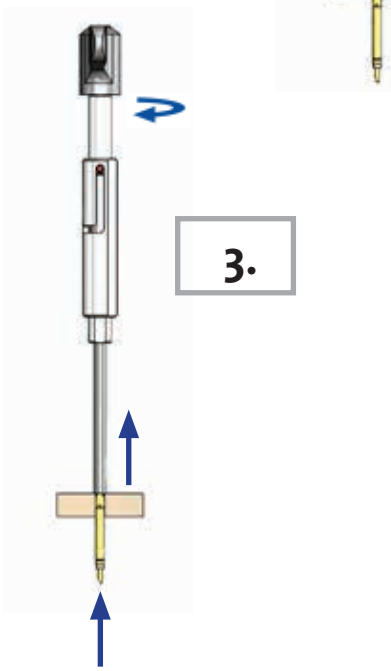
3. Continue turning the tool clockwise. The receptacle pulls upwards from the mounting plate, into the guiding sleeve and can be removed.

4. Remove the receptacle from the tool with the nipper by screwing it counterclockwise from the tool. The sleeve can be bent by 30°- 90°.

5. For reuse, the thread insert must be screwed all the way down so that the lock can be set.

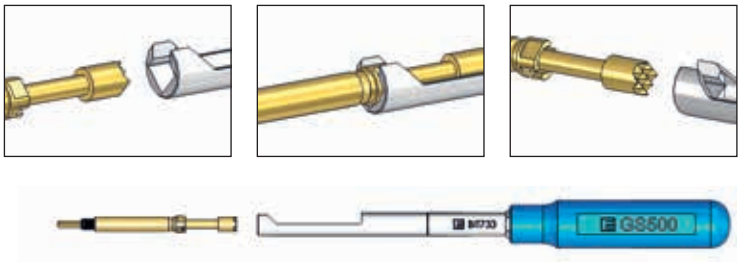






Hook Wrench

The hook wrench is the standard tool for all probes with square wrench sizes even if the head diameter is larger than the wrench size.

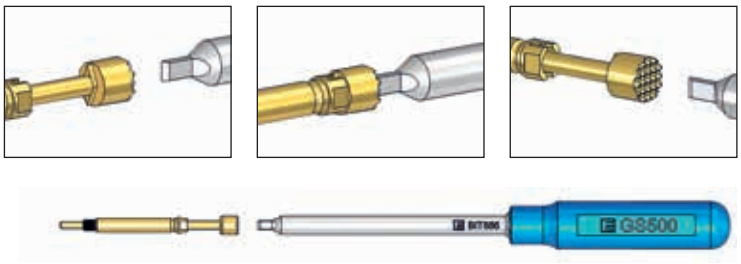


Socket Wrench

The socket wrench can be used for square wrench sizes if the head diameter is smaller than the wrench size. The tool helps to assemble probes within small centers.

Screw driver

Screw drivers can be used if the contact area has any support (e.g. serrated honeycomb or slit) and the head has an integrated locking system.

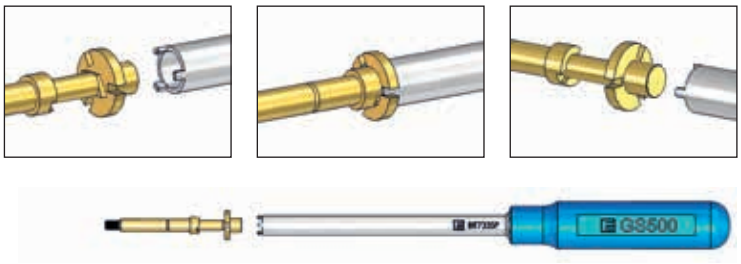


Tool for Coaxial Probes

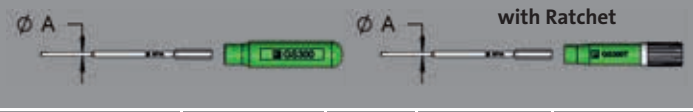
For the mounting of large outer conductors FEINMETALL has developed a special tool that enables applications with limited space between the probes.

Tool for Step Probes

For assembly of oversized step probes FEINMETALL has developed a special tool for applications with very limited space between the probes.



Screw-in Tools



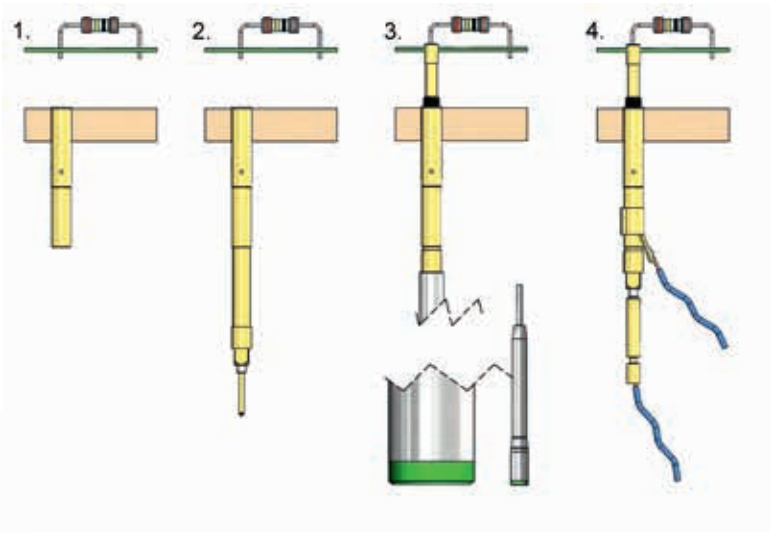
SW	max. Tip-Ø	Shank-ØA	Bit type	FWZ	Handle	BIT	FWZ...T	Handle	Used for (e.g.)
1,0	0,9	1,7	Socket wrench	FWZ730	GS300	BIT730	FWZ730T	GS300T	F730
1,0	1,5	2,0	Hook wrench	FWZ730S1		BIT730S1	FWZ730S1T		F175, F176, F730
1,4	1,3	2,4	Socket wrench	FWZ731S1	GS400	BIT731S1	FWZ731S1T	GS400T	F731
1,4	2,0	2,8	Hook wrench	FWZ731		BIT731	FWZ731T		F731
1,4	2,0	2,8	Hook wrench	FWZ731L		BIT731L	FWZ731LT		F731
1,7	1,6	2,7	Socket wrench	FWZ732S2		BIT732S2	FWZ732S2T		F732 (C)
1,7	2,0	2,8	Hook wrench	FWZ732		BIT732	FWZ732T		F722, F732 (C), F727, F756, F873, F875
1,7	2,0	2,8	Hook wrench	FWZ732L		BIT732L	FWZ732LT		F722, F732 (C), F727, F756, F873, F875
1,7	2,7	3,5	Hook wrench	FWZ732S1		BIT732S1	FWZ732S1T		F722, F732 (C), F727, F756, F873, F875
1,8	1,9	2,8	Socket wrench	FWZVF100		BITVF100	FWZVF100T		VF100
1,8	2,7	3,5	Hook wrench	FWZVF100S1		BITVF100S1	FWZVF100S1T		VF100
2,2	2,3	3,5	Socket wrench	FWZVF3S4	GS500	BITVF3S4	FWZVF3S4T	GS500T	VF3
2,2	2,7	3,5	Hook wrench	FWZVF3		BITVF3	FWZVF3T		VF3
2,2	3,1	4,0	Hook wrench	FWZVF3S1		BITVF3S1	FWZVF3S1T		VF3
2,2	2,3	3,5	Socket wrench	FWZVF3S2		BITVF3S2	FWZVF3S2T		VF3, F880
2,2	4,0	5,0	Hook wrench	FWZVF3S3		BITVF3S3	FWZVF3S3T		VF3
2,5	3,1	4,0	Hook wrench	FWZVF4S1		BITVF4S1	FWZVF4S1T		VF4, F887
2,5	4,0	5,0	Hook wrench	FWZVF4		BITVF4	FWZVF4T		VF4, F887
2,6	2,5	3,8	Socket wrench	FWZ885		BIT885	FWZ885T		F835, F881, F883, F885
2,6	2,5	3,8	Socket wrench	FWZ885L		BIT885L	FWZ885LT		F835, F881, F883, F885
2,6	3,1	4,0	Hook wrench	FWZ885S1		BIT885S1	FWZ885S1T		F835, F881, F883, F885, F886
2,6	4,0	5,0	Hook wrench	FWZ760S1		BIT760S1	FWZ760S1T		F760, F835, F881, F883, F885, F886
2,6	4,9	6,5	Hook wrench	FWZ760S2		BIT760S2	FWZ760S2T		F760, F835, F881, F883, F885, F886
3,0	3,0	5,0	Socket wrench	FWZ733S1		BIT733S1	FWZ733S1T		F723 (C), F733 (C), F737, F755
3,0	4,0	5,0	Hook wrench	FWZ733		BIT733	FWZ733T		F723 (C), F733 (C), F737, F755
3,0	4,0	5,0	Hook wrench	FWZ733L		BIT733L	FWZ733LT		F723 (C), F733 (C), F737, F755
3,5	4,4	5,5	Hook wrench	FWZ735		BIT735	FWZ735T		F735 (C), F725 (C)
5,0	-	8,0	Hook wrench	FWZ888		BIT888	FWZ888T		F888
5,0	8,0	12,0	Hakenschlüssel	FWZ860HF50		BIT860HF50	FWZ860HF50T		HF860
6,0	5,9	8,0	Socket wrench	FWZ348		BIT348	FWZ348T		F348, F349
-	-	4,0	3-point tool	FWZ832		BIT832	FWZ832T		F832
-	-	4,0	Screw driver	FWZ886		BIT886	FWZ886T		F88617...

Screw-in Tools with Signal Indicator for Switch Probes

Contact Probe	SW	Shank-ØA	FWZ	Batteries	Socket wrench
F880...	2,2	3,7	FWZ880SA	2x AAAA 1,5 V	X
F88890S1101U200S05	5,0	8,0	FWZ888SA	2x AAAA 1,5 V	X
F88890S1102U100S07	5,0	8,0	FWZ888SA1	2x AAAA 1,5 V	X

Batteries not included in delivery

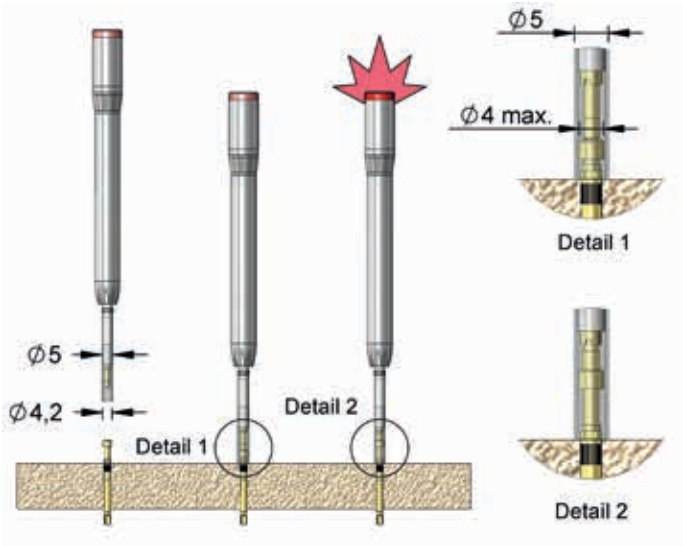
The tool FWZ...SA enables the mounting and correct positioning of switch probes before the final electrical connections are made. The exact switching position can be adjusted by help of the integrated light signal which is illuminated as soon as the switch circuit is closed.



Tool for detection of blocked or tight plungers

With this tool the correct function of contact probes built in at test modules or fixtures can be tested very quickly (max. spring force 600 cN). Thereby a potential damage of connector elements can be avoided.

- → Simple tool with integrated switch probe (F885) and light signal
- → Test height (nominal travel) adjustable by threaded sleeve
- → Spring force adjustment possible by exchange of the integrated switch probe



Order code:
32001 (max. Tip-Ø 4,1 mm)
32002 (max. Tip-Ø 2,2 mm)
32003 Blocking Tester Set composed of:
32001 + adaption for 32002

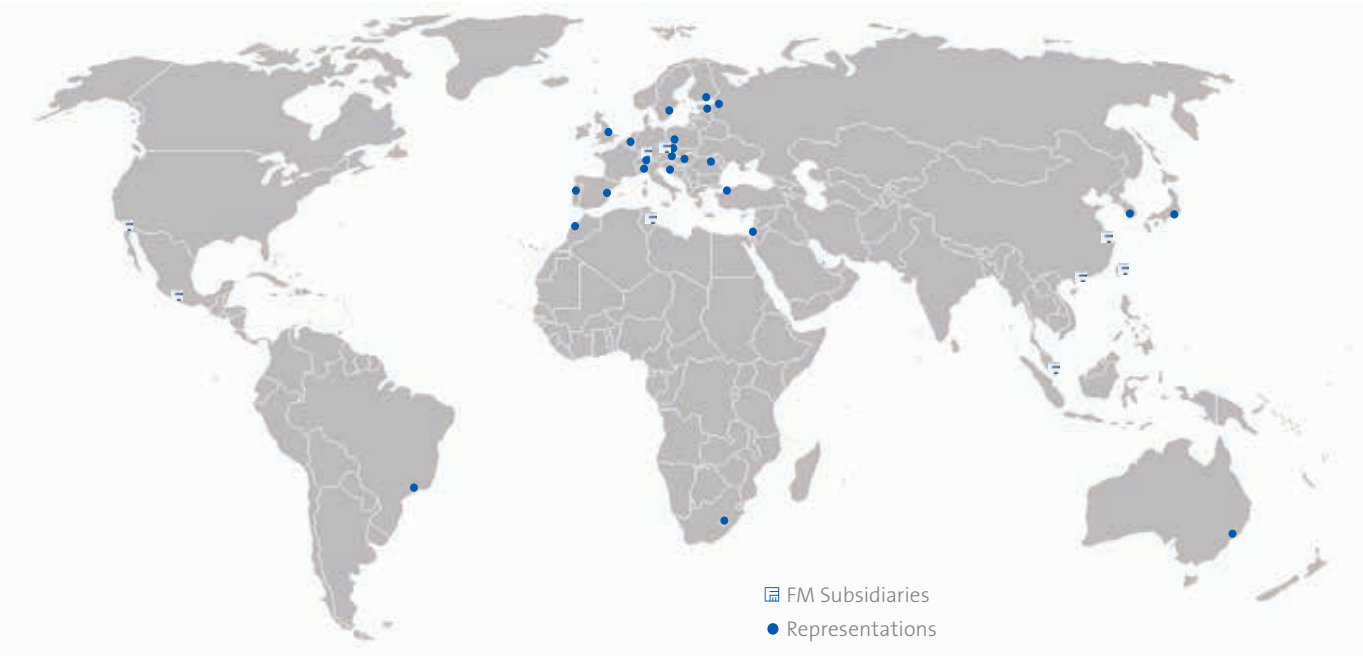
THE RIGHT CATALOGUE FOR EACH APPLICATION

Application Specific Catalogs

In order to find the right contact probe for your application quickly and at a glance, we have now created four application specific catalogs with appropriate contact probes, including many technical details and application notes.

All catalogs and brochures are available on our homepage
http://www.feinmetall.com/downloads/catalogues-and-flyers/

WORLDWIDE PRESENT FOR YOU



FM Subsidiaries:

FEINMETALL GMBH | HERRENBERG, GERMANY
(+49) 7032 2001-0 | info@feinmetall.com

FEINMETALL DE MEXICO | MEXICO
(+52) 55 2591 0629 | info.mexico@feinmetall.com

FEINMETALL SHANGHAI | CHINA
(+86) 21 2898 6848 | info@cn.feinmetall.com

FEINMETALL-OCT | HSINCHU COUNTY, TAIWAN
(+886) 3 560 15 66 | info@tw.feinmetall.com

FEINMETALL CZ | CZECH REPUBLIC
(+42) 0491 470-511 | info@cz.feinmetall.com

FEINMETALL USA LLC | SAN JOSE, USA
(+1) 408 432 7500 | info.us@feinmetall.com

FEINMETALL SINGAPORE PTE LTD | SINGAPORE
(+65) 3152 9103 | info@sg.feinmetall.com

You can find all representations worldwide on our homepage www.feinmetall.com
Our sales offices are perfectly connected to the markets and work in close cooperation with our customers. Most important for us is a high quality - regarding our products as well as regarding our customer support.

Our strengths

- Native-speaking contacts in many countries enable ideal communication
- Application engineers take care of customer projects
- Active key account management provides customer specific know-how
- Teamwork of product managers and local sales engineers facilitate innovative and customized solutions
- Periodic technical trainings make sure that sales teams have a high level of competence
- Technical key customer trainings enhances know-how transfer to end users

These strengths have already resulted in many successful and innovative projects. FEINMETALL is already rated as preferred supplier for many notable companies. Our strong customer support is your advantage.

MARKETING098 / Version 1.0

FEINMETALL
Contact Technologies

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