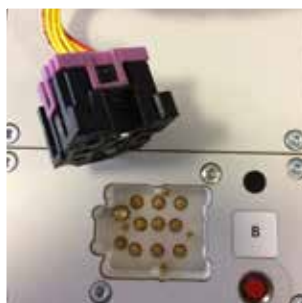


CONTACT PROBES FOR WIRE HARNESS TEST



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 wire harness and connector tests 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.



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!



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.(e.g. AEO - Authorised Economic Operator).



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.



Note:

This catalogue contains contact probes for wire harness and connector test.

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.

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GENERAL BASICS

Overview of Tip Styles




















						
01	02	03	04	05	06	07
Conical 90°	Conical 90° stepped	Conical 60°	Conical 60° stepped	Concave stepped	Serrated stepped	Hexagonal 90° stepped
						
08	09	10	11	12	14	15
Hexagonal 60° stepped	6-point crown 120° stepped	Flexible Needle	Spherical	Spherical stepped	4-point crown stepped (self cleaning)	Triangular 45° stepped
						
16	17	18	20	21	22	27
Flat	Flat stepped	Conical 30°	4-point crown stepped (self cleaning)	4-point crown (self cleaning)	Special version for contacting into connector housings	Conical 120°
						
28	29	30	32	33	34	35
4-point crown stepped	4-point crown	Triangular 45°	Rigid needle 10°	Square lance 38°	Rigid needle 15° stepped	3-point crown stepped (self cleaning)
						
36	37	38	39	40	41	42
6-point crown with middle pin stepped	4-point crown stepped	Square lance 140°	Conical flat 30°	6-point crown	6-point crown stepped (self cleaning)	5-point crown stepped
						
43	45	46	NEW 47	50	NEW 53	55
Square lance 90°	Conical 120° with eccentric cut	W-profile	Square 70°	Concave with drill hole stepped	Square lance 55°	Concave (self cleaning)
						
60	62	63	64	65	66	68
3-point crown stepped	Triangular 30°	8-point crown stepped (self cleaning)	Mini-serrated stepped	Conical 45°	Serrated stepped (self cleaning)	6-point crown stepped with middle pin

GENERAL BASICS

Overview of Tip Styles

						
80 Spade spadeØ < plungerØ	81 Reduced spade spadeØ < plungerØ	82 Spade spadeØ = plungerØ	83 Spade spadeØ > plungerØ	84 Reduced spade spadeØ > plungerØ	85 Square spade	86 Square spade not centric
						
89 Special version for spade tips	90 Rolling ball					

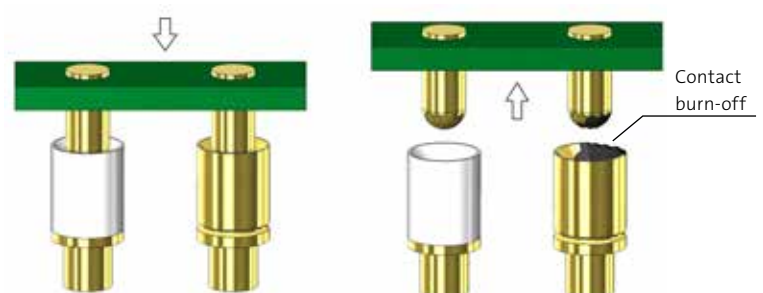
Special Versions

						
05 (A) Concave stepped	05 (C) C = High current (marked by groove)	05 (IK) IK = Insulating cap	06 (IK) IK = Insulating cap	06 (SP) SP = Step probe	11 (SP) SP = Step probe	12 (SP) SP = Step probe
						
16 (SP) SP = Step probe	16 (SP) SP = Step probe	16 (SP) SP = Step probe	12 (A) Spherical stepped	16 (IP) IP = Insulating pin	17 (A) Flat stepped	(17) IK IK = Insulating cap
						
(17) K K = Synthetic head	(17) H H = Synthetic head with ring	(17) T T = Insulated BeCu head	17 (PT) PT = Position test	(41) IK IK = Insulating cap		

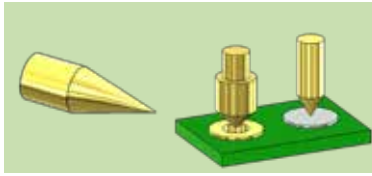
Special Head Made of Silver Alloy

In high current applications ideally no voltage should apply and accordingly no current should flow during closing or releasing the contact. Otherwise, an electric spark may occur, which may damage the surface of the contact area.

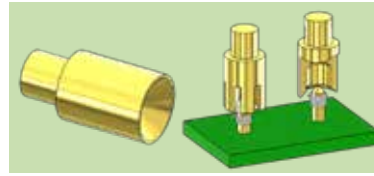
To avoid or at least minimize such a contact burn-off, FEINMETALL offers tips made of a special silver alloy to minimize the contact burn-off, reducing the transition resistance and lead to a longer life time of the probes.



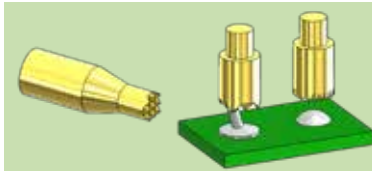
Typical Tip Styles and Applications



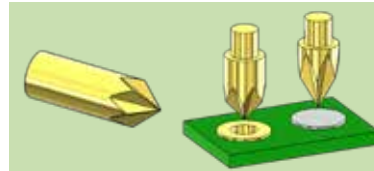
Conical
(01,02,03,10,18,32,34,35)
Universal tip style with different angles of 10°, 15°, 30°, 60°, 90° or 120° for contacting solder pads and vias.



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.



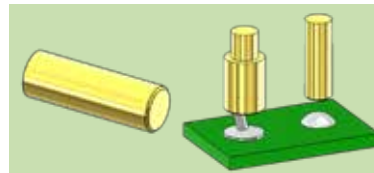
Serrated, W-profile
(06,46,64,66)
Universal tip style for contacting wires, pins and wire wrap posts, even suitable for bent contacts.



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



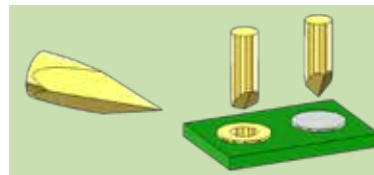
Spherical
(11,12)
For testing clean contact surfaces, does not leave marks or scratches.



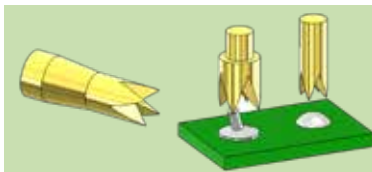
Flat
(16,17)
Suitable for solder pads and contact pins.



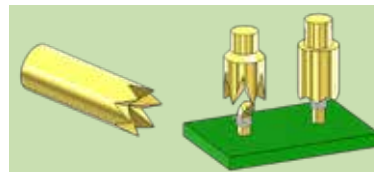
Triangular stepped
(15,30,62)
For via holes and solder pads. The sharp edges penetrate flux residues and oxide layers.



Square lance
(33,38,43,47,53)
For via holes and solder pads. The sharp edges penetrate flux residues and oxide layers.



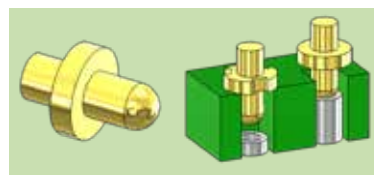
4-point crown
(14,20,21,28,29,37)
For pad surfaces and soldered pins. The sharp edges penetrate flux residues and oxide layers.



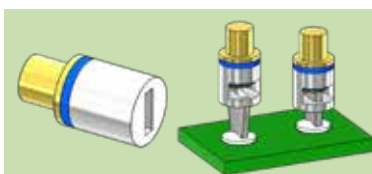
Crown
(09,35,40,41,42,47,53,60,63)
For wire wrap posts, even if the contacts are bent or twisted.



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



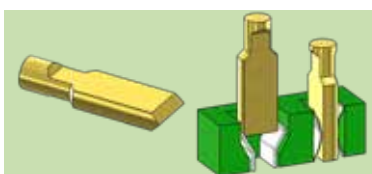
Step probe
(06,11,12,16,89)
For position and presence tests of connectors.



Slotted insulation cap for position test (PT)
(06,17)
For detecting the correct length and straightness of flat pins.



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



Spade
(80,81,82,83,84,85,86,89)
For twist proof contacting of connector elements.



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

GENERAL BASICS

Design of Spring Contact Probes

Plunger

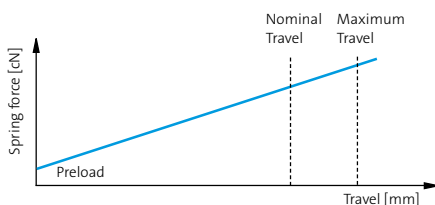
FEINMETALL manufactures plungers with many different tip styles, suitable for a large variety of applications. Plungers are generally made from beryllium copper (BeCu) or steel. Optimized turning and plating processes are resulting in an outstanding straightness and exactness of the plunger surface,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

Barrel

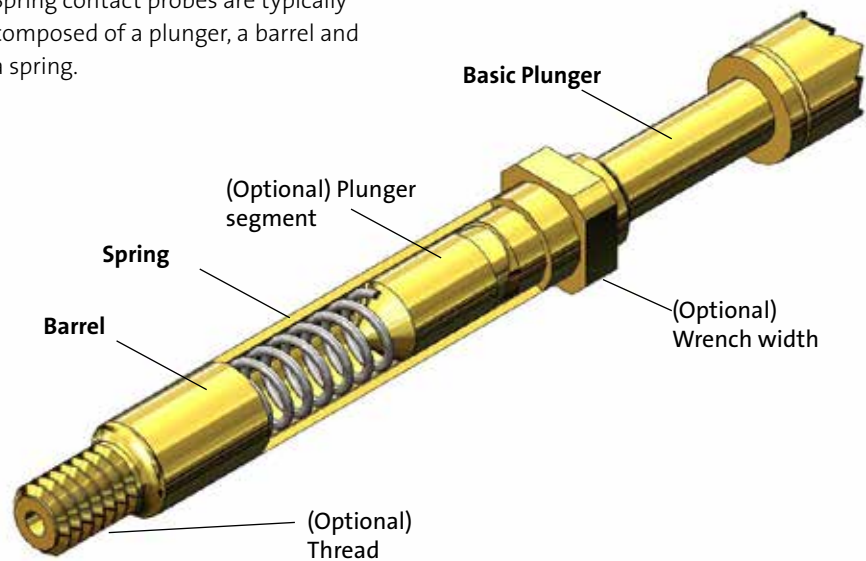
FEINMETALL barrels are usually made of nickel silver, bronze or brass. Nickel silver barrels are deep-drawn whereas barrels made of bronze are turned or deep-drawn and barrels of brass are turned. All barrels are usually silver or gold plated. A small hole in the bottom permits the barrels to be thoroughly 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 100°C (212°F) while made of stainless steel or BeCu can be operated up to 200°C (392°F).



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



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 $\pm 20\%$.

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.

	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. 100°C/212°F) Stainless Steel (max. 200°C/392°F) BeCu (non-magnetic, max. 200°C/392°F)	Silver Gold
Receptacle	Nickel Silver Bronze Brass	Gold

GENERAL BASICS

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.

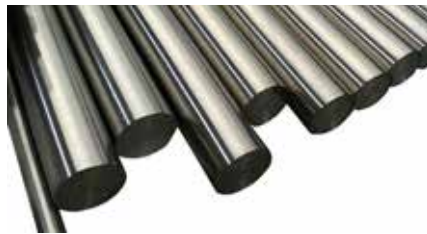
Beryllium-Copper

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.



GENERAL BASICS

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.



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

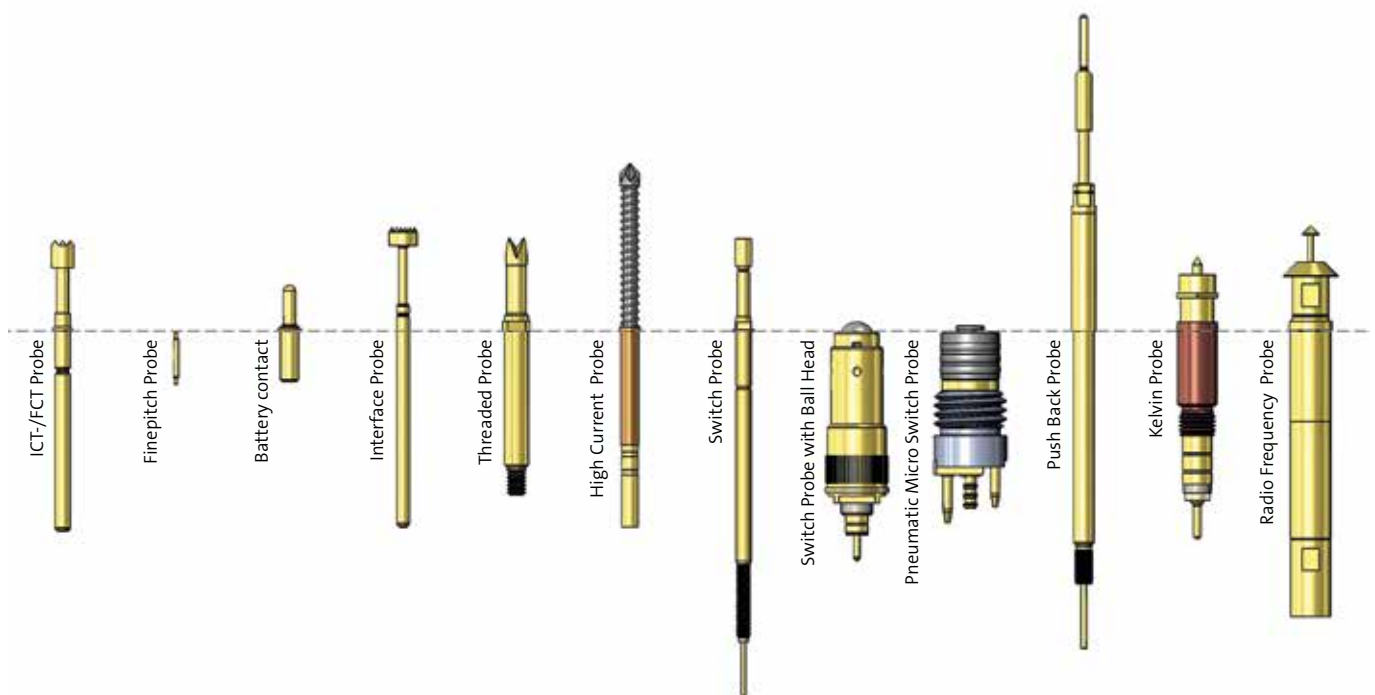
During push back tests of connectors the tight seat of the connector elements is verified. For this application contact probes with very high spring forces are used.

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.



GENERAL BASICS

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.

Wear of the plunger!

Mechanical wear and tear reduces the life of the probes. The deeper the penetration depth into the test specimen and the higher the spring force, the higher the wear. Lateral forces and deflection favour the wear of the plating layers and thus reduce the good performance (contact resistance) and thus the life of the Test Probes as well.

Excessive current load and contamination can also considerably reduce the life of the probes.

Therefore, the prerequisite for a good life of the Test Probes is the compliance with the mechanical and electrical data as well as the temperature application ranges!

Only then can the spring loaded Test Probes guarantee reliable contacting and long life.

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 several autonomous stress stages.

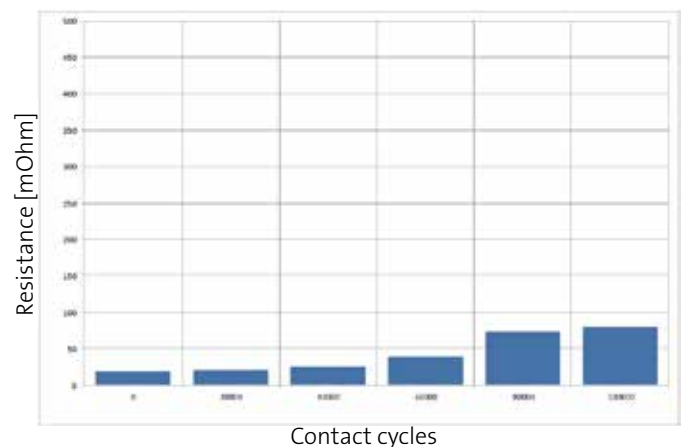
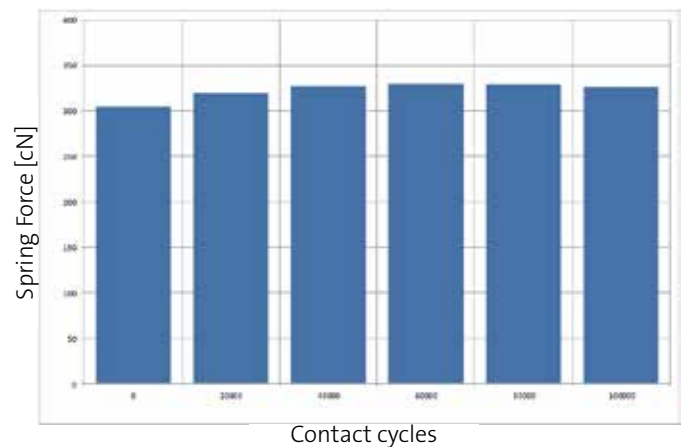
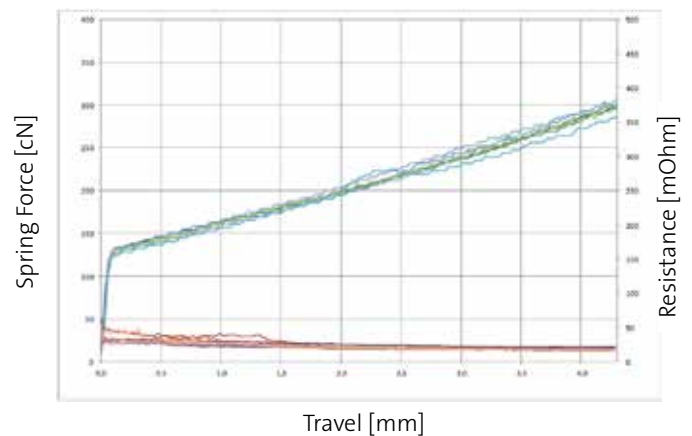
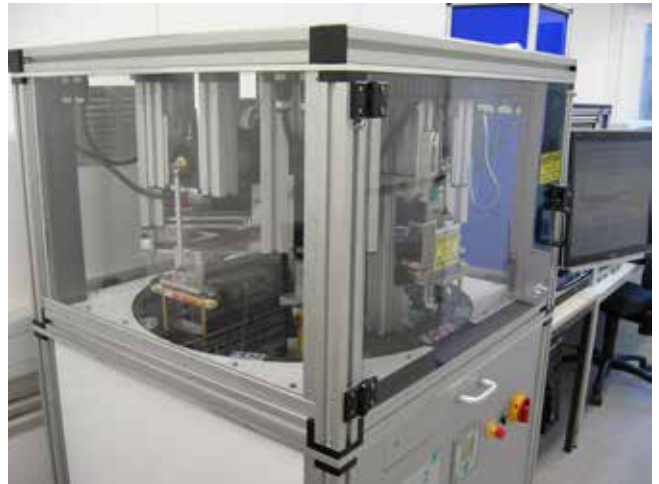
The test conditions provide an internal standard reference that allows competent statements regarding the life cycles of our probes. Life cycle tests are performed under the following conditions:

- 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).

As an example the evaluation of a typical lifetime test follows.



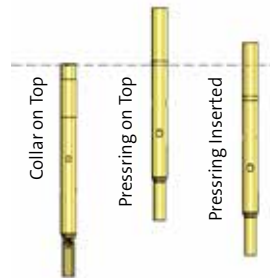
Receptacles for Spring Contact Probes

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.

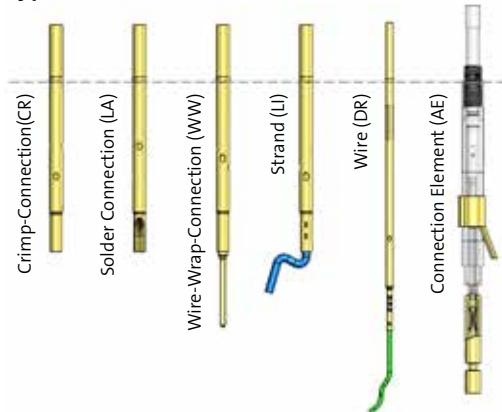
Mounting



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

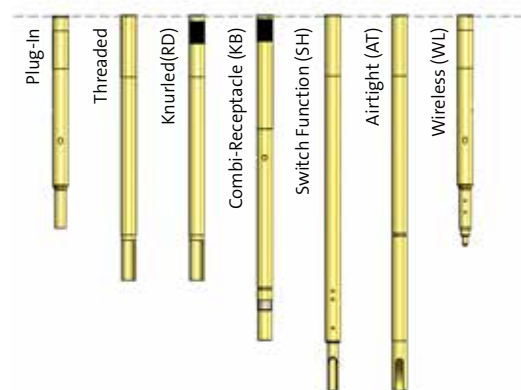
Types of Connections



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. Airtight receptacles are also used in adaptations where vacuum or negative pressure is used.

Types of Receptacles



Airtightness for receptacles

If the air tightness class is specified for FM receptacles, it is defined as follows:

Airtightness I corresponds to a leakage rate $< 0.7 \text{ cm}^3/\text{min}$.

Airtight I

Airtightness II corresponds to a leakage rate $0.7 - 7 \text{ cm}^3/\text{min}$.

Airtight II

GENERAL BASICS

Spacers

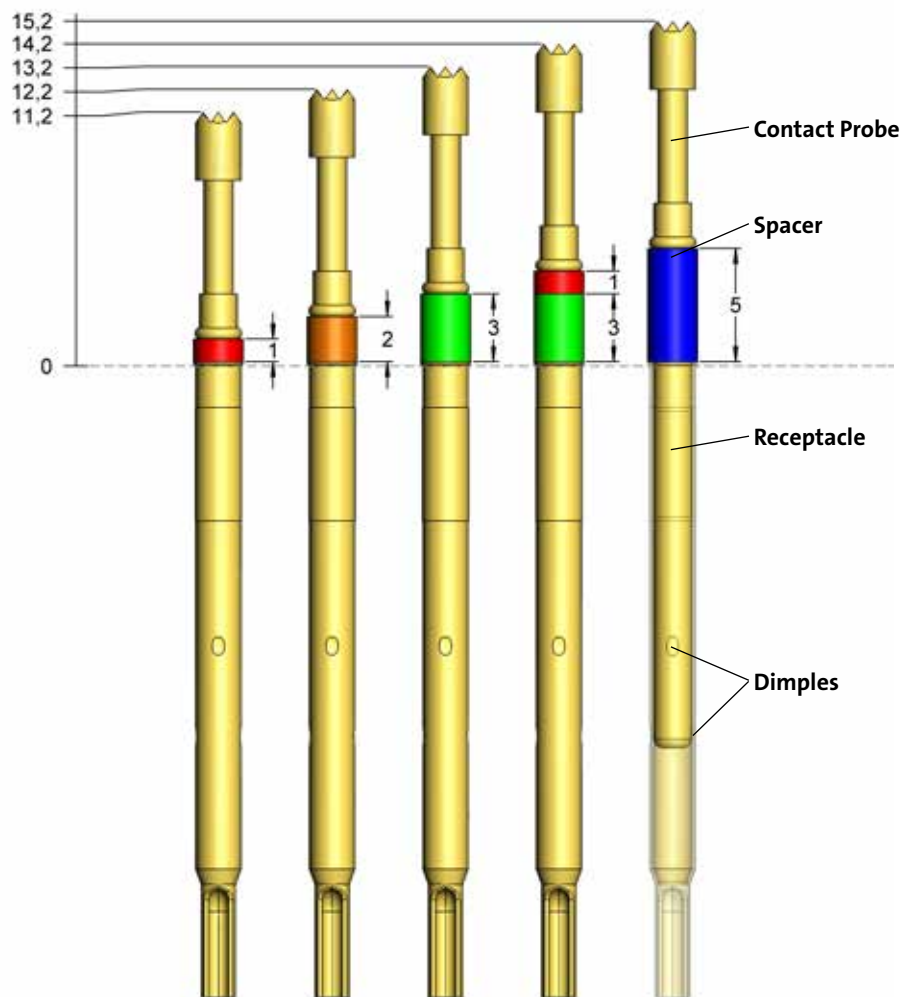
By using spacers, different projection heights can be achieved without the need for new probes or receptacles. They can also be used for tolerance compensation. They are usually made of uncoated brass, as they have only a mechanical function and no electrical function.

Spacer sleeves are inserted between the receptacle and the pluggable contact probe mounted.

It is also possible to use several spacer sleeves in combination to reach other projection heights.

Always make sure that the dimples of the mounting receptacle still hold the contact probe. Therefore a maximum distance of 5.0mm is possible.

Even with screwed versions, always ensure that the thread grips sufficiently.

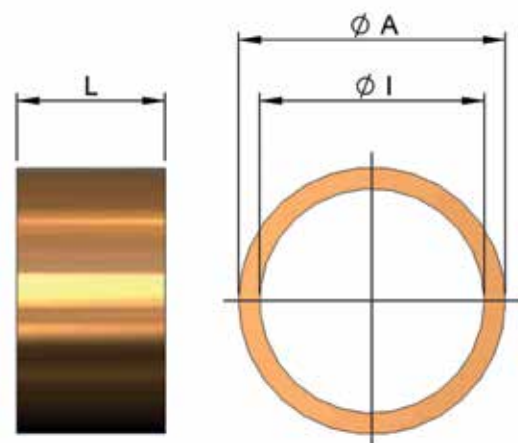


Spacers H772DS/xx for 100mil Probes

Order Code	Outer- \varnothing	Inner- \varnothing	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

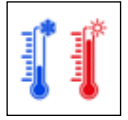
Spacers H773DS/xx for 138mil Probes

Order Code	Outer- \varnothing	Inner- \varnothing	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



Temperature operating range

The typical operating temperature of Feinmetall contacts (**-45°C...100°C**) is essentially, but not exclusively, limited by the component spring. The specification given applies to typical mechanical loads. Exposure to additional loads such as high humidity, rapid and extreme temperature changes (thermal shock) and extreme loads (e.g. far above nominal travel) can lead to a shortened lifetime. Within a product family, probes with high spring forces react more sensitively to these factors than probes with lower spring forces. Note that the temperature at the product is not determined only by the environment and mounting situation. Depending on the electrical load, self-heating occurs as a result of power loss. The permissible environmental temperature decreases accordingly (derating).



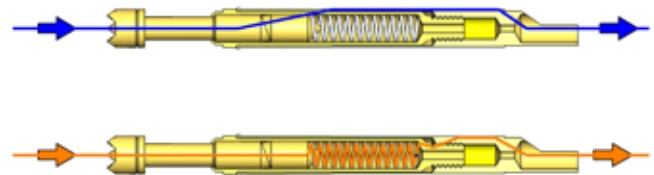
For **applications up to +200°**, variants are also available which can be identified by the additional designation „H“ and „C“ and are characterized by special spring materials. For example, stainless steel springs are used, but they could have a negative effect on the contact resistance.

On the other side, FEINMETALL products are not necessarily unsuitable for operation outside the thermal specification. This has to be checked on a case-by-case basis. We will be happy to advise you and with our large selection of materials and various designs we can offer **customized solutions** for you.

Electrical conductivity

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

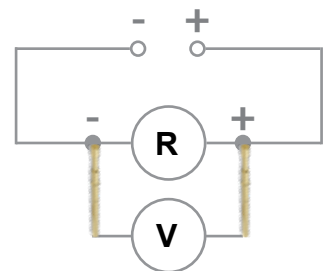


FEINMETALL is taking measures to guarantee a constant low contact resistance during the whole lifetime of the probes. The maximum continuous currents (referred to the Feinmetall standard high current test) and the typical resistances of each probe are shown in the data sheets. A pulse current can be higher depending on pulse and rest time, cooling and various other influences.

Max. Operating voltage

Voltmeters must always be connected in parallel with the electrical device or component on which the voltage is to be measured. This is necessary in order to measure the voltage applied to this component, because for the parallel connection the voltage in both branches is the same.

If the user operates our probes with a higher voltage than defined by DIN VDE 0100, part 410 as low voltage not dangerous to touch, **FEINMETALL does not assume any liability. Furthermore, the user himself is obliged to determine and implement the legally required protective measures for people and equipment.**



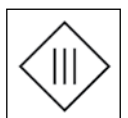
Dielectric strength / electric strength of bipolar probes

The dielectric strength (usually stated in kV/mm) of an insulator is the maximum electric field strength that may prevail in the material (including air) without a voltage breakdown (arc or spark) occurring. The creepage distances must be much longer, especially when exposed to dirt and moisture. The dielectric strength depends on the geometry of the probe, the material (dielectric), the ambient conditions and the degree of contamination. This comes into play in all our products with electrically insulating functions, e.g. switching probes, switching receptacles, combination receptacles, coaxial probes and insulating caps.



Electrical protection class

According to VDE0100 part 410, our probes are only to be operated with low voltage that is not dangerous to touch (25 V rms AC, 60 V DC). These values include all occurring surge voltages, e.g. due to overvoltage, switching peaks, etc.



If the user operates our probes with a higher voltage than defined by DIN VDE 0100, part 410 as low voltage not dangerous to touch, **FEINMETALL does not assume any liability. Furthermore, the user himself is obliged to determine and implement the legally required protective measures for people and equipment.**

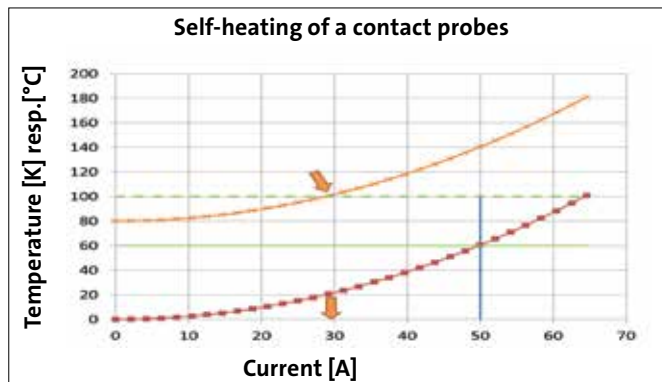
Electrical interaction between electrical parameters

Relevant for the temperature rise of a high current probe is power loss. This power loss needs to be as low as possible. This is why a high current probe needs a special design to minimize the internal and contact resistance of the probe. The internal resistance is directly depending on the design and the materials of the probe. FEINMETALL springs for high current probes are suitable for up to 200°C without any risk of damages or reduced life cycles. Independently from the probe design, the contact resistance can be minimized by using high contact forces or by choosing tips made of silver alloy.

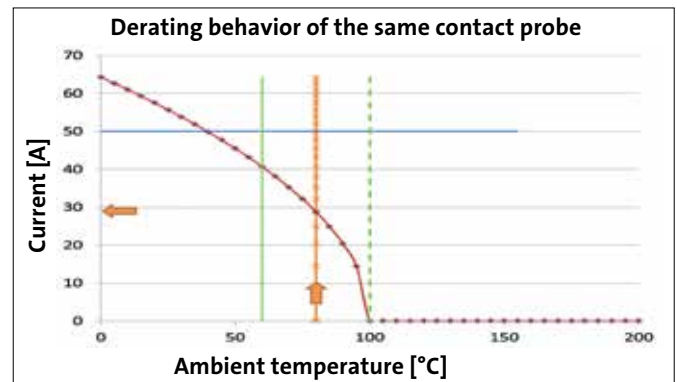
The maximum current values in the specifications refer to a maximum continuous current (DC). It is mainly limited by the maximum allowed temperature rise of the contact probe. The maximum alternating current is defined as the root mean square of the current.

$$P_v = R \cdot I^2$$

$$P_v = \frac{U^2}{R}$$



— Nominal current — Probe temperature incl. ambient temp.
 — Temp. rise ΔT — Allowed temp., — Nominal ΔT



— Nominal current — Tempering
 — Derating — Allowed temp. — Nominal ΔT

FEINMETALL standard high current test for creating the measurement curve and for defining the maximum current:

The self-heating caused by the power loss in a contact probe is measured in an own laboratory by increasing the current step by step and measuring the respective temperatures at the contact probe plating after reaching a stable state. As the ambient temperature may vary during the measurement, its value is also detected and subtracted from the measured temperature value. This results in the chart showing only the temperature rise ΔT in Kelvin versus the current, starting at zero.

On the basis of these measurement results the nominal current of a spring contact probe is defined by a certain degree of heating. This value (nominal ΔT) is not a fix value and varies depending on the probe series and functionality between 30 K and 70 K. In the example (diagram on the left) this value was 60 K, leading to a nominal current of 50 A.

At ideal operating conditions as in the laboratory (ambient temperature, heat dissipation by DUT and cables, sufficient thermal convection etc.), the contact probe can generally be used securely with the nominal current. It has to be considered, that in the application many factors differ from the ideal conditions (e.g. close-by current-carrying contact probes, contaminations, higher ambient temperatures). Especially the higher ambient temperature is visualized in the derating behavior (diagram on the right). A safety factor of minimum 20% is recommended.

Derating behavior and connection with self heating of a spring contact probe:

The derating describes the necessary reduction of the operating current at increasing temperatures of the contact probe and its ambience. The derating curve shows the same behavior of the contact probe just in another diagram format. The analogies to the diagram on the left show this connection. The basis of a correct derating curve is the definition of a maximum allowed temperature of the contact probe. This value needs to be lower than the maximum temperature of the probe specifications (in most cases 200°C) and is often limited by application related factors such as fixture materials.

In the shown example the temperature limit is 100°C. That means at an ambient temperature of 100°C no further current flow is allowed, because this would lead to additional heating beyond the limit. At the nominal current of 50 A the self heating would result in 60°C and so an ambient temperature of 40°C would be allowed until the limit of 100°C is reached.

A different scenario is the assumption that the ambient temperature is e.g. 80°C. The heating curve is shifted of this value (diagram on the left). The intersection with the limit of 100°C results in an allowed current flow of only 30 A. The same current value can be identified in the diagram on the right as intersection of temperature and derating curve. So, the derating behavior is also determined by the self-heating diagrams shown in the catalog specifications.

GENERAL BASICS

General information about drilling

The drill should of course be adapted to the type of material and the thickness of the board. It may even be necessary to drill a stepped hole to ensure a perfect fit and centering of the mounting sleeve.

Applications

In the case of fibrous materials such as glass fiber boards (HGW2372.1 / FR4), a slightly larger hole must be drilled than for other materials, as the fibers are set up in the hole.

Mounting methods

It must also be taken into account whether a receptacle is to be mounted via the guide diameter or the press ring diameter.

influences

The assembly of receptacle always requires special care. Various parameters such as speed, feed, spiral groove length, material type and panel thickness influence the drilling behaviour.

IMPORTANT

On our homepage you will find an overview of all common mounting receptacle, with drill hole recommendations **as a guide** for the material types FR3 and FR4.

However, it is always advisable to carry out your own drilling tests in order to achieve a secure fit of the contact part in your own application.

FR3 (epoxy resin + hard paper)



FR4 (epoxy resin + glass fiber fabric)



Pointing Accuracy and Radial Tolerance



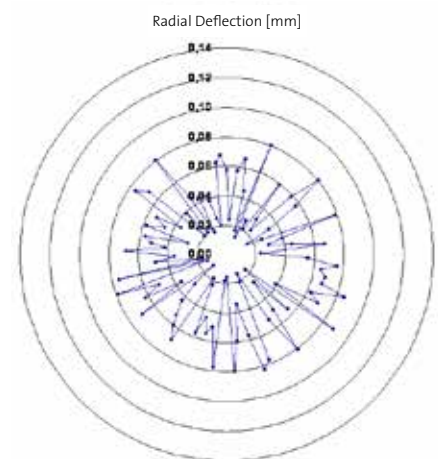
The pointing accuracy of a spring contact probe is determined by many factors, for example by manufacturing tolerances, by the length of the plungers and by the type of plunger guiding. Further factors that are independent of the contact probe have to be considered, for example the receptacles and the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

The radial deflection can be shown in a diagram.





Contact Probes for wire harness test

Based on many years of experience and great proximity to our customers, FEINMETALL today offers a perfect product portfolio of test probes for the wire harness and connector test. The high quality standard and the excellent availability of our products are inspiring our customers. FEINMETALL is setting standards in cost optimized solutions, for always new and challenging requirements from the market, by specifically and well designed products. Innovation is the key to our success.

These include for example:

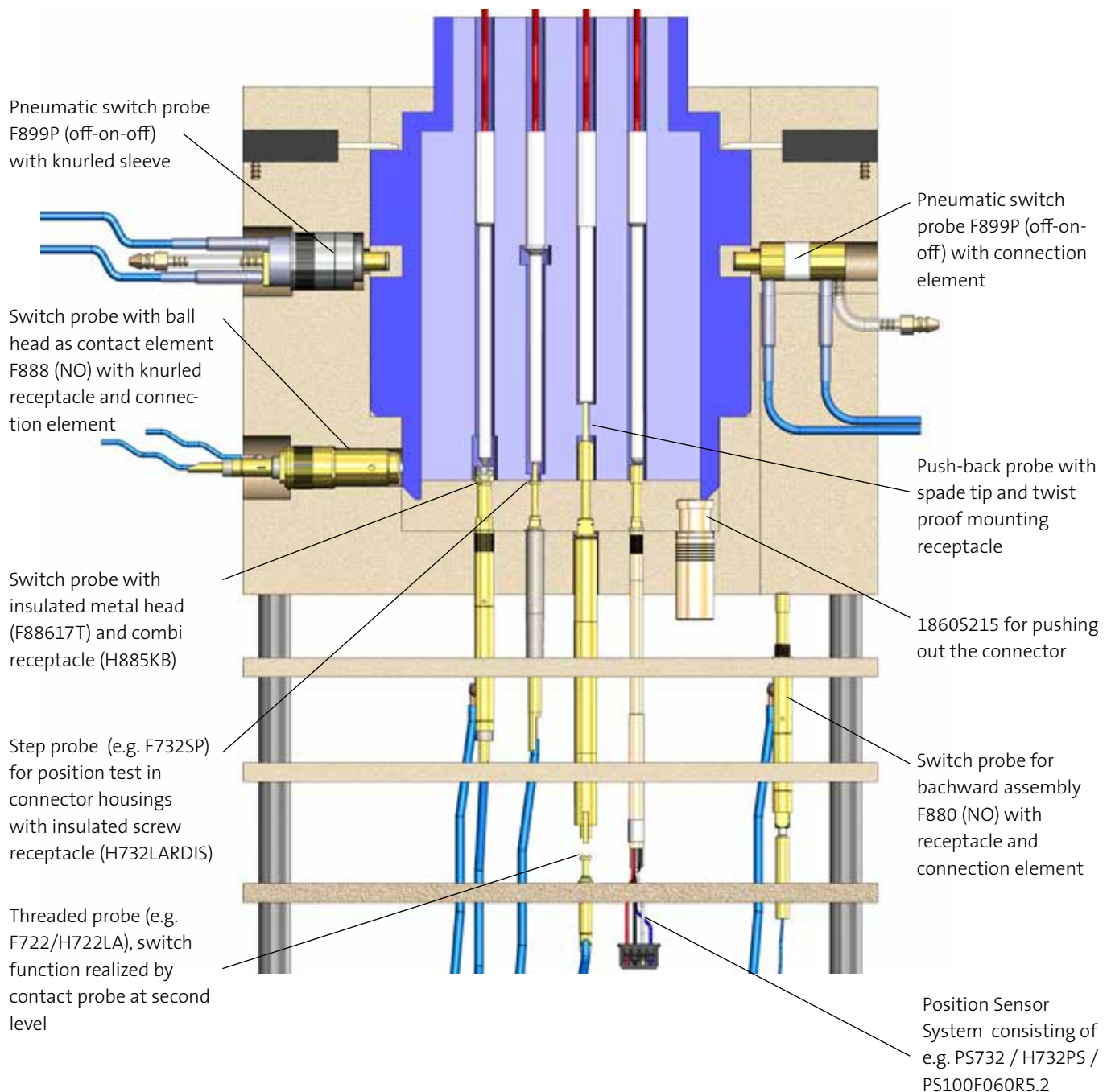
- Contact probes for presence and position test
- Step probes
- Switch probes
- Threaded probes
- Twist proof probes
- Push back probes
- High current probes
- Kelvin probes for 4-wire measurements
- Radio frequency probes

WIRE HARNESS TEST

Contact Probes for Wire Harness and Connector Test

As market leader FEINMETALL offers a wide range of special contact probes and accessories for the design of test modules. With innovative and cost-effective solutions FEINMETALL satisfies the demand in this market and is a real driving force in the wire harness testing technology.

The picture shows the schematic design of a connector test module with various contact probes.



Smart Solutions for Test Module Functions by FEINMETALL Products

Variable adjustment of the switch travel for push-back probes

The usage of push-back probes in combination with threaded probes on a second level allows a variable adjustment of the switch point (closing of the electric circuit) by height adjustability of the second level. To guarantee a reduced depth of the module we recommend the usage of the short-travel probe F722 together with the push-back probes VF4, VF3 or VF100.

Push-back probes with fix switch travel

As push back probes are commonly designed with continuous plunger, a switch function can be realized in different ways.

One option is to use a switch receptacle. In this receptacle the continuous plunger of the probe closes a switch circuit after a defined travel. If required, switch receptacles are also available in airtight version ("AT" = airtight).

Alternatively, push back probes with an integrated switch function can be used (V03 and V04). These probes do not require a separate receptacle. However, they are not twist proof.

Push-back probes with same projection height

The threaded push-back probes VF3, VF4 and VF100 have identical projection heights and thus can be combined without any additional procedures for height adjustment.

Design of vacuum-tight modules

FEINMETALL offers a wide range of probes and receptacles for the design of vacuum-tight modules. The airtight version can be identified by the ending "AT" in the order code. No additional cost-intensive procedures for tightening are necessary at contact probes and receptacles. The permissible leakage rate for creating an airtight Class I version is a maximum of 0.7 cm³/min.

Lateral presence test of connectors

The lateral presence test of connectors generally is a problem for conventional contact probes due to the lateral

movement of the DUT. With Series F888 FEINMETALL offers an excellent and innovative solution for this application, providing lots of advantages.

- Rolling ball as contact element is tolerant against lateral forces, which leads to a remarkably higher durability compared to contact probes with fix plunger head of similar shape
- Airtight version for vacuum-tight modules
- Galvanically isolated switch available
- Very short length for a low installation depth
- Variable height adjustment of the probe in combination with the corresponding receptacle
- Adjustment of switching point without wiring by special tool FWZ888SA

Position test of contact elements with insulated probe tips

For an insulated position test FEINMETALL offers a great selection of insulated tip styles for the switch probe series F886. Especially the version with tip style 17T (insulated metal cap) is extremely rugged and durable. Its construction avoids any electrical connection to the barrel of the probe also at maximum travel. A silver plating helps to distinguish the insulated tip style 17T from the conducting gold plated BeCu heads.

Switch probes for backward assembly

Switch probes usually are assembled and exchanged from the top. If this is not possible or wanted, the switch probe F880 can be applied. This probe is for mounting from the bottom, and its switch point can be adjusted with the special tool FWZ888SA before fixing the wiring.

Short-circuit-proof modules by voltage-free switch probes

Short-circuit-proof modules and fixtures can be designed with the switch probes F881 and F888 with electrically isolated switch circuit. This is an important matter given by the fact that test tables in the market may be equipped with

modules of different manufacturers. Due to different switching concepts and voltage levels at these different modules, the activation of the probe switch may lead to short-circuits with destructive consequences when using switch probes without electrical isolation. Isolated switch probes can avoid this problem. As the series F881 has the same installation dimensions as the standard switch probes F885/F886 no change of the design in the module is necessary for replacement. For the series F881 a special combi-receptacle (H881KB) for solderless replacement is available.

Note for the usage of voltage-free switch probes:

According to DIN VDE 0100 (part 410) a maximum of 25V AC (rms) or 60V DC is permitted which includes any potential over-voltages.

Contact probe for pushing out the connector

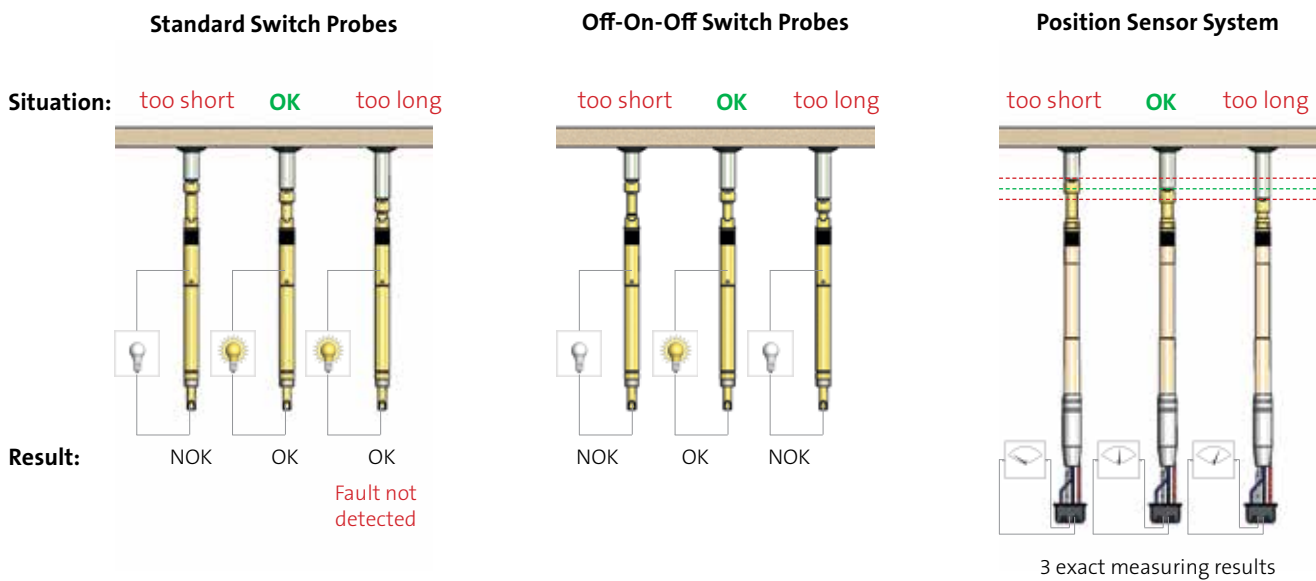
To ease taking the connector out of the test module after the test process, FEINMETALL offers a special push-out probe (e.g. 1860S215). Its high spring force just pushes the connector out of the module when the locking is opened.

Detail view of test module



Different Solutions for Presence and Position Tests

The pictures below show different categories of FEINMETALL solutions with increasing accuracy. Simple solutions like using standard switch probes or step probes only allow a statement of OK or NOT OK. With the off-on-off switch probe with two switch points the result is more precise. With the position sensor system the exact position of a DUT can be measured and documented. The following pages include detailed information about corresponding probes and applications.



Standard Switch Probes

Switch probes with one switch point open or close a switch circuit after a defined switch travel.

NO – „normally open“ = closer
NC – „normally closed“ = opener

Off-On-Off Switch Probes

Switch probes with off-on-off function have two switch points. After a defined travel the switch circuit is closed and after a further travel (e.g. 1,0 mm) the switch circuit is opened again.

Off-On-Off - 2 switch points

Position Sensor System

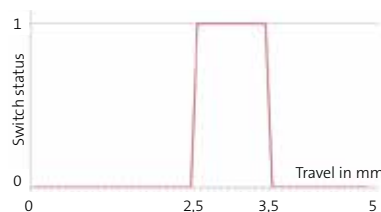
The position sensor system has a sensor element with integrated potentiometer, that allows an exact measurement of the travel.

Travel measurement

Switch Characteristic



Switch Characteristic



Measurement





LED Probe / Position Sensor System

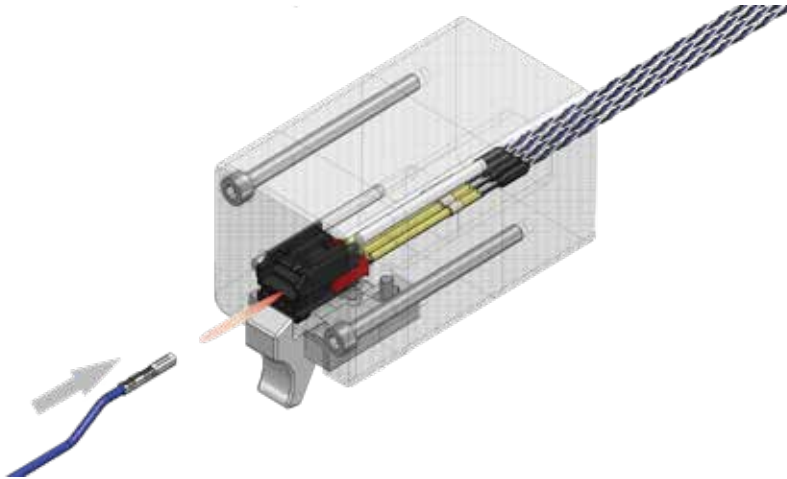
The LED probe can be used to indicate the correct cavity during connector assembly and electrical testing at the same time. This combines two functions in one component.

The position sensor system is a modular designed contact probe with a small integrated potentiometer. In addition to realizing an electrical contact to the DUT it allows an exact measurement of the travel of the plunger. This can be useful whenever exact, quantitative and documentable measuring results are required, e.g. for testing connectors or housings in the automotive industry, for the evaluation of injection molded parts or for testing the bending of PCBs.

LED Contact probe for Guided Terminal Insertion



Contact Probes For
MARKET LEADER
Wire Harness Test



Contact Probe with LED Indicator for Guided Terminal Insertion

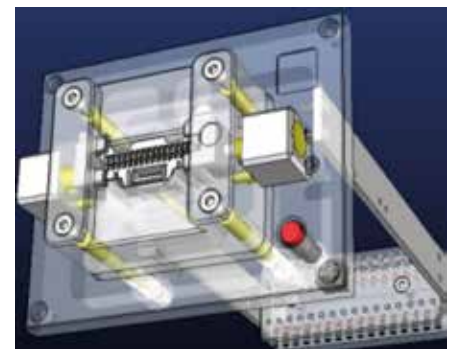
The new LED probe system provides a complete solution for guiding the operator into the process of assembling wires in a connector. This process includes:

- Guided insertion with indication of the correct cavity by light (LED)
- Electrical test, i.e. continuity check of the wire to assure the correct position

Existing solutions use either optical fiber indication of the cavity, which does not allow electrical contacting, or LED indication next to the cavities, which is much less effective for guiding the operator and might cause more wrong assemblies.

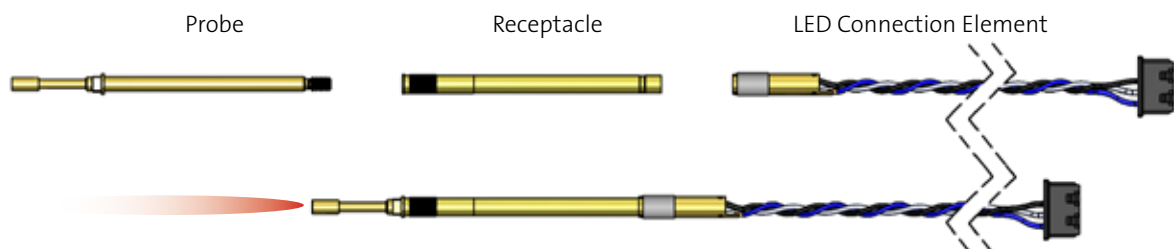
Advantage of LED Contact Probe

Both functions (LED-indicator and contact probe) are combined in one device. This ensures correct terminal insertion and at the same time allows electrical tests.



Modul for wire assembly

Modular Design



The LED contact probe is a modular system consisting of a spring contact probe with hollow plunger, a holding receptacle and a connected LED-element. The electrical connection is realized by a connector compatible to Molex PicoBlade™ Series. One wire is used to connect to the probe head (test point) and the other two wires are used to provide the control voltage for the LED (5V DC).

Market Leader in Contact Probes for Wire Harness Test

With this solution FEINMETALL provides real added value to wire harness production and test and strengthens the position as market leader in the field of contacting wire harnesses and connectors.

PROBES FOR SPECIAL APPLICATIONS

LP732

NEW

Light Contact Probe for Guided Terminal Insertion



Centers (mm/mil)	2,54 / 100
Contin. current	5,0 A* / (1,0 A sensor)
R typ	< 50 mOhm (Gesamt)
Temperature	-20°C...+80°C

Spring Force Probe+Sensor (cN ±20%)

Version	Preload	Nominal
Standard	30	80

Travel (mm)

Version	Nominal	Maximum
Standard	4,0	5,0
Thread (M)		1,6
Wrench Size		1,7
Pointing Accuracy		±0,08 mm

Materials and Plating

Plunger	BeCu, gold plated
Barrel	Brass, gold plated
Spring	Stainless steel, unplated
Receptacles	Brass, gold plated

Accessories

Insertion tool receptacle	FEWZ-772E0
Screw-in tool probe	FWZ732 (T)
Extension cable for Molex-connector (250mm)	2112221

Drill Size (mm)

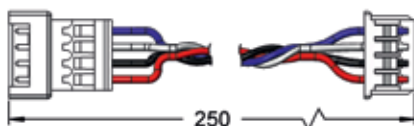
H732LPRD	2,02 - 2,05
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Projection Height (mm)

H732LPRD mit LP732	10,5
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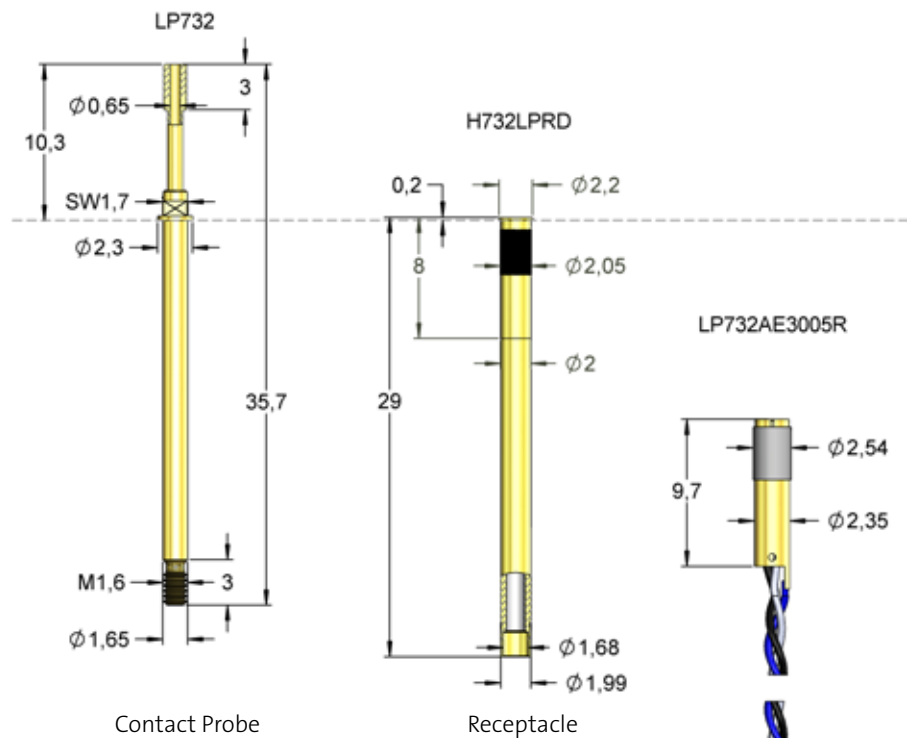
2112221:

Extension cable 250 mm for Molex-connector



Series	Tip-Ø	Spring Force (cN)
LP732 11 B 064 G 080		
Tip Style	Material	Plating
		Version

Material: B = BeCu
Tip-Ø: 064 = 0,64 mm (e.g.)
Plating: G = Gold plated
Note: Additional receptacle and position sensor required, order code according to drawing



Light element with Molex-connector
51021-0400 and 3x 250 mm flexible wire

The new Light probe system provides a complete solution for guiding the operator into the process of assembling wires (terminals) in a connector.

* The values for current and resistance are only valid for a soldered connection at the receptacle. The blue wire of the Molex connector only allows a maximum current of 1,0 A and R_{typ} 500 mOhm.

For mounting the probe, first mount the receptacle as usual, screw in the probe and afterwards plug on the Light element.

If the length of the connection cable at the light element is not sufficient, an additional extension cable can be used.

LP73217B150G080

H732LPRD

LP732AE3005R



Tip Style	Number	Material	Plating	Ø in mm	Version
	11	B	G	0,64	-
	17	B	G	1,50	-

PROBES FOR SPECIAL APPLICATIONS

Position Sensor System

Contact Probe with Integrated Potentiometer

The position sensor system has been developed to enable an exact measurement of the travel of the plunger additionally to contacting the test item.

The system has a modular design and consists of a contact probe, a receptacle and a sensor element with integrated potentiometer. The potentiometer is galvanically isolated from the probe.

After applying an operating voltage, the sensor supplies a measurement voltage that is linear to the travel of the plunger (potentiometric operation). Alternatively, with restrictions regarding accuracy and life cycle, also the resulting resistance can be used as measurement value (resistive operation). FEINMETALL recommends the potentiometric operation for all position sensor systems. The measurement results can be analyzed by the available tester environment, commonly.

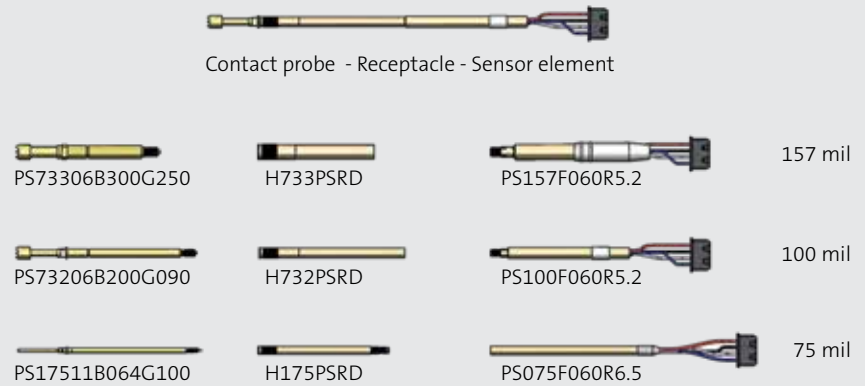
Variants

The position sensor system is available for different centers of 75 mil, 100 mil and 157 mil. For 100 mil centers a twist proof version is available (PS756). The system for 157 mil is suitable for airtight modules or fixtures (i.e. leakage rate < 0,5 cm³ / min at 0,7 bar).

Measuring ranges

PS175: 0...6,4 mm (75 mil)
 PS756: 0...4,4 mm (100 mil)
 PS732: 0...5,0 mm (100 mil)
 PS733: 0...5,0 mm (157 mil)

Modular Design of the Position Sensor System



Specification sensor element

Measuring principle: potentiometric
 Accuracy: ≤ 2%
 Reproducibility: typ. ≤ ±0,05 mm
 Therm. resist. coeff. 5x10⁻⁵/K
 Nominal spring force: 60 cN
 Preload: 40 cN
 Nominal: 4,0 mm

Connections

Red: Operating voltage U_0
Black: Measuring signal U_m or R_m
White: Mass
Blue: Test point of contact probe tip (maximum current 1 A)

Calibration

Due to test principle with a certain initial and final resistance and due to electrical and mechanical tolerances the exact plunger position in millimeter requires a calibration of the position sensor system after assembly.

Measurement of relative values

By calculating the difference between two measurement values of one probe deviations related to a required position can be determined in positive or negative travel direction.

The reference can either be a certain reference point of the test item or a special "golden device".

Zero balance

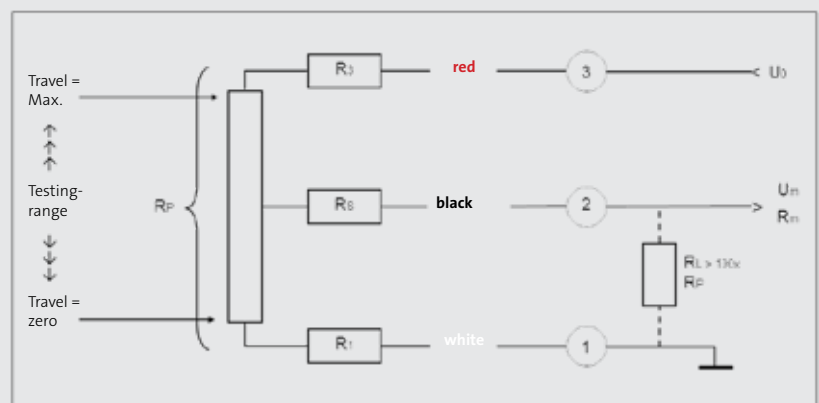
Depending on the hard- and software of the test system the measurement signal can be zeroed at user-defined positions. This method allows positive or negative deviations without calculating any differences.

FEINMETALL recommends periodic calibration and zeroing of the system.

Reference measurement

By calculating the difference between two measurement values of different probes deviations related to a reference position can be determined.

- U_0 Operating voltage (maximum 10 VDC)
- U_m Measuring voltage (potentiometric op.)
($U_1 < U_m < U_p - U_3$)
- R_m Measuring resistance (resistive op.)
($R_1 < R_m < R_p - R_3$)
- R_1 Initial resistance
- U_1 Initial voltage ($U_1 = I \cdot R_1$)
- R_3 Final resistance
- U_3 Final voltage ($U_3 = I \cdot R_3$)
- R_p Potentiometric resistance
(4,5 kOhm ± 20%) ($R_p = R_1 + R + R_3$)
- R_s Slider resistance
- R_L Load resistor (optional to protect against over-current at the slider)



PROBES FOR SPECIAL APPLICATIONS

PS175

Position Sensor System 75 mil



Centers (mm/mil)	1,90 / 75
Contin. current	5,0 A* / (1,0 A sensor)
R typ	20 mOhm *
Temperature	-20°C...+80°C

Spring Force Probe+Sensor (cN ±20%)

Version	Preload	Nominal
Sensor	40	60
Standard	50	100

Travel (mm)

Version	Nominal	Maximum
Standard	4,3	6,4
Thread (M)		1,0
Wrench Size		1,0
Pointing Accuracy		±0,08 mm

Materials and Plating

Plunger	BeCu, gold plated
Barrel	Brass, gold plated
Spring	Music wire, silver plated
Receptacles	Brass, unplated

Accessories

Insertion tool receptacle	FEWZ-075E0
Screw-in tool probe	FWZ730S1 (T)
Screw-in tool sensor element	FWZPS075

Extension cable for Molex-connector (250mm)	2112221
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Drill Size (mm)

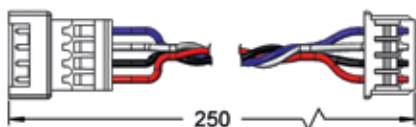
H175PSRD	1,59 - 1,60
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Projection Height (mm)

H175PSRD with PS175	10,5
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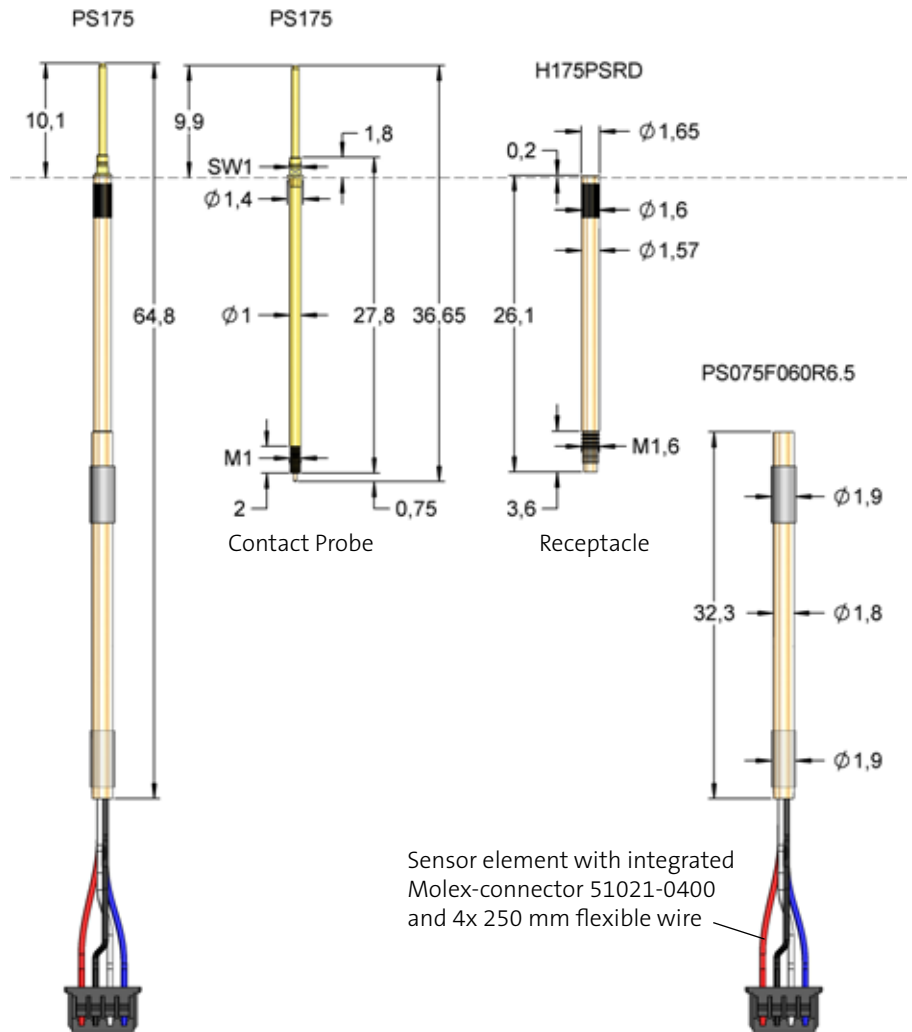
2112221:

Extension cable 250 mm for Molex-connector



Series	Tip-Ø	Spring Force (cN)
PS175 11 B 064 G 100		
Tip Style	Material	Plating
		Version

Material: B = BeCu
Tip-Ø: 100 = 1,00 mm (e.g.)
Plating: G = Gold plated
Note: Additional receptacle and position sensor required, order code according to drawing



The position sensor system consists of a special spring contact probe PS175..., a receptacle H175PSRD and a sensor element PS075.... These three elements are mounted into a fixture plate. The position sensor is screwed at the receptacle from backwards after the receptacle is mounted.

* The values for current and resistance are only valid for a soldered connection at the receptacle. The blue wire of the Molex connector only allows a maximum current of 1,0 A and R_{typ} 500 mOhm.

Tip Style	Number	Material	Ø in mm	Plating	Version
	06	B	1,20	G	-
	11	B	0,64	G	-
	12	B	1,00	G	-
	17	B	1,20	G	-

PROBES FOR SPECIAL APPLICATIONS

PS732

Position Sensor System 100 mil



Centers (mm/mil)	2,54 / 100
Contin. current	5,0 A* / (1,0 A sensor)
R typ	20 mOhm *
Temperature	-20°C...+80°C

Spring Force Probe+Sensor (cN ±20%)

Version	Preload	Nominal
Sensor	40	60
Standard	30	90

Travel (mm)

Version	Nominal	Maximum
Standard	4,0	5,0
Thread (M)		1,6
Wrench Size		1,7
Pointing Accuracy		±0,08 mm

Materials and Plating

Plunger	BeCu, gold plated
Barrel	Brass, gold plated
Spring	Music wire, silver plated
Receptacles	Brass, unplated

Accessories

Insertion tool receptacle	FEWZ-772E0
Screw-in tool probe	FWZ732 (T) FWZ732S1 (T)
Screw-in tool sensor	FWZPS100
Extension cable for Molex-connector (250 mm)	2112221

Drill Size (mm)

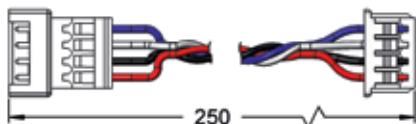
H732PS without knurl	1,99 - 2,00
H732PSRD with knurl	2,02 - 2,04

Projection Height (mm)

H732PSRD with PS732	10,5
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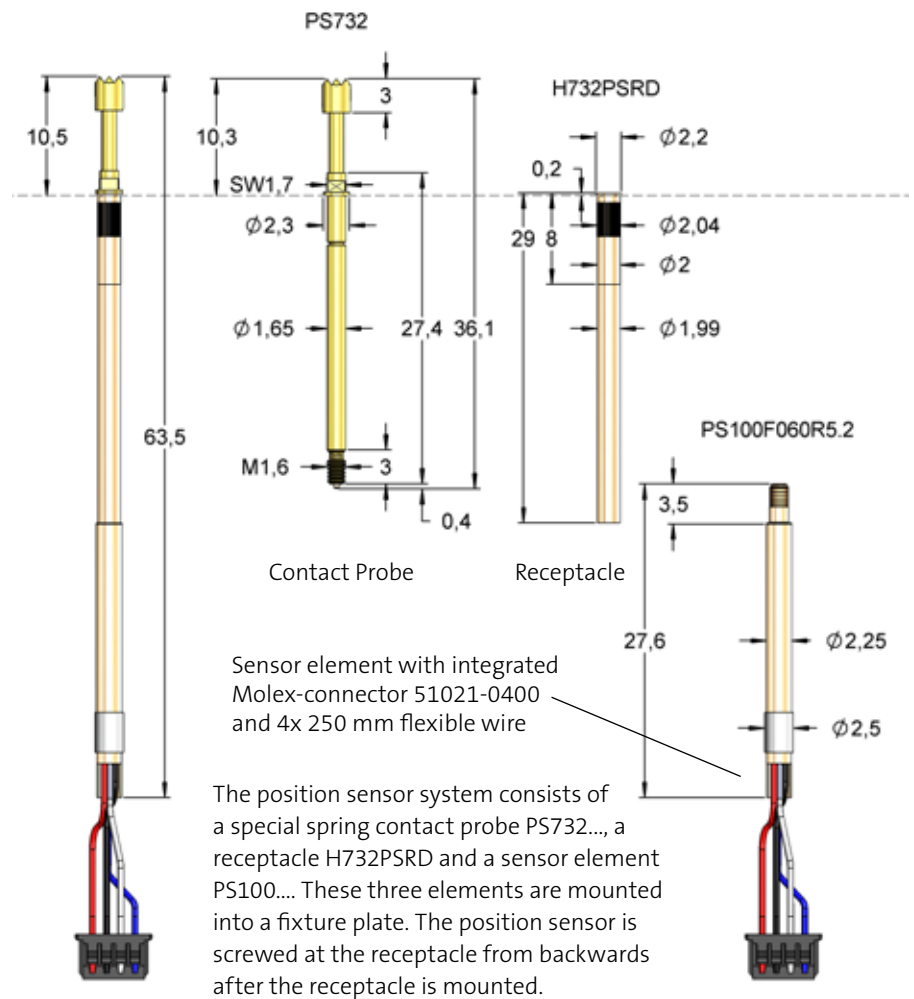
2112221:

Extension cable 250 mm for Molex-connector



Series	Tip-Ø	Spring Force (cN)
PS732 05 B 180 G 090		
Tip Style	Material	Plating
		Version

Material: B = BeCu
Tip-Ø: 180 = 1,80 mm (e.g.)
Plating: G = Gold plated
Note: Additional receptacle and position sensor required, order code according to drawing



Sensor element with integrated Molex-connector 51021-0400 and 4x 250 mm flexible wire

The position sensor system consists of a special spring contact probe PS732..., a receptacle H732PSRD and a sensor element PS100.... These three elements are mounted into a fixture plate. The position sensor is screwed at the receptacle from backwards after the receptacle is mounted.

* The values for current and resistance are only valid for a soldered connection at the receptacle. The blue wire of the Molex connector only allows a maximum current of 1,0 A and R_{typ} 500 mOhm.
 ** Center differing from standard.

Tip Style	Number	Material	Ø in mm	Plating	Version
	05	B	1,80	G	-
	06	B	1,50	G	-
	06	B	1,80	G	-
	06	B	2,00	G	-
	06	B	2,50 **	G	-
	11	B	0,64	G	-
	11	B	0,80	G	-
	11	B	1,00	G	-
	12	B	1,40	G	-
	16	B	0,80	G	-
	16	B	1,00	G	-
	16	B	1,20	G	-
	17	B	1,40	G	-
	17	B	2,00	G	-
	17	B	3,00 **	G	-

PROBES FOR SPECIAL APPLICATIONS

PS756

Position Sensor System 100 mil, Twist Proof



Centers (mm/mil)	2,54 / 100
Contin. current	5,0 A* / (1,0 A sensor)
R typ	20 mOhm *
Temperature	-20°C...+80°C

Spring Force Probe+Sensor (cN ±20%)

Version	Preload	Nominal
Sensor	40	60
Standard	60	150
Standard	100	300

Travel (mm)

Version	Nominal	Maximum
Standard	4,0	4,4
Thread (M)		1,6
Wrench Size		1,7
Pointing Accuracy		±0,08 mm

Materials and Plating

Plunger	BeCu, gold plated
Barrel	Brass, gold plated
Spring	Music wire, silver plated
Receptacles	Brass, unplated

Accessories

Insertion tool receptacle	FAWZ756
Screw-in tool probe	FWZ732 (T) FWZ732S1 (T)
Screw-in tool sensor	FWZPS100
Extension cable for Molex-connector (250 mm)	2112221

Drill Size (mm)

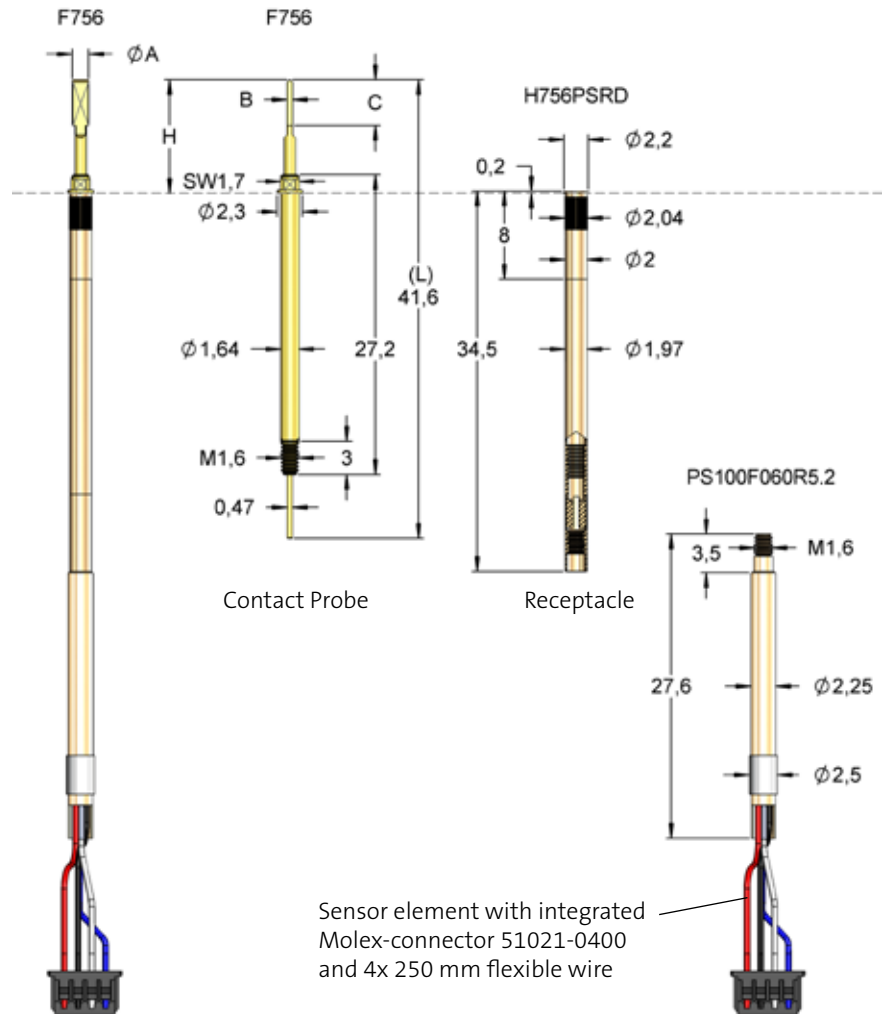
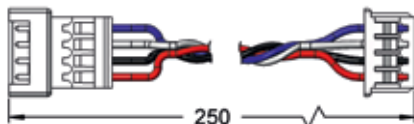
H756PSRD with knurl	2,02 - 2,04
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Projection Height (mm)

H756PS with F756	10,5
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2112221:

Extension cable 250 mm for Molex-connector



The position sensor system consists of a twist proof threaded probe F756..., a receptacle H756... and a sensor element PS100.... These three elements are mounted into a fixture plate. The position sensor is screwed at the receptacle from backwards after the receptacle is mounted.

* The values for current and resistance are only valid for a soldered connection at the receptacle. The blue wire of the Molex connector only allows a maximum current of 1,0 A and R_{typ} 500 mOhm.

Order code	Tip Style	Ø A	B	C	H	L	Version	Screw-in Tool
F75684B0001G150	84	1,50	0,50	4,15	10,30	41,60	-	FWZ732 (T)
F75684B0004G150	84	1,50	1,00	4,15	10,30	41,60	-	FWZ732 (T)
F75684B0003G150	84	2,00	0,80	4,15	10,30	41,60	-	FWZ732 (T)

Further variants see F756

PROBES FOR SPECIAL APPLICATIONS

PS733

Position Sensor System 157 mil, Airtight



Centers (mm/mil)	4,00 / 157
Contin. current	5,0 A* / (1,0 A sensor)
R typ	20 mOhm *
Temperature	-20°C...+80°C

Spring Force Probe+Sensor (cN ±20%)

Version	Preload	Nominal
Sensor	40	60
Standard	50	250

Travel (mm)

Version	Nominal	Maximum
Standard	4,0	5,0
Thread (M)		2,0
Wrench Size		3,0
Pointing Accuracy		±0,10 mm

Materials and Plating

Plunger	see Tip Style
Barrel	Brass, gold plated
Spring	Stainless steel, unplated
Receptacles	Brass, unplated

Accessories

Insertion tool receptacle	FEWZ-774E0
Screw-in tool probe	FWZ733 (T)
Extension cable for Molex-Connector (250 mm)	2112221

Drill Size (mm)

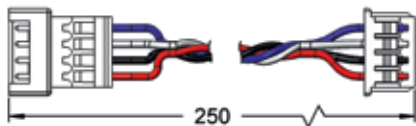
H733PSRD	3,01 - 3,05
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Projection Height (mm)

H733PSRD with PS733	10,5
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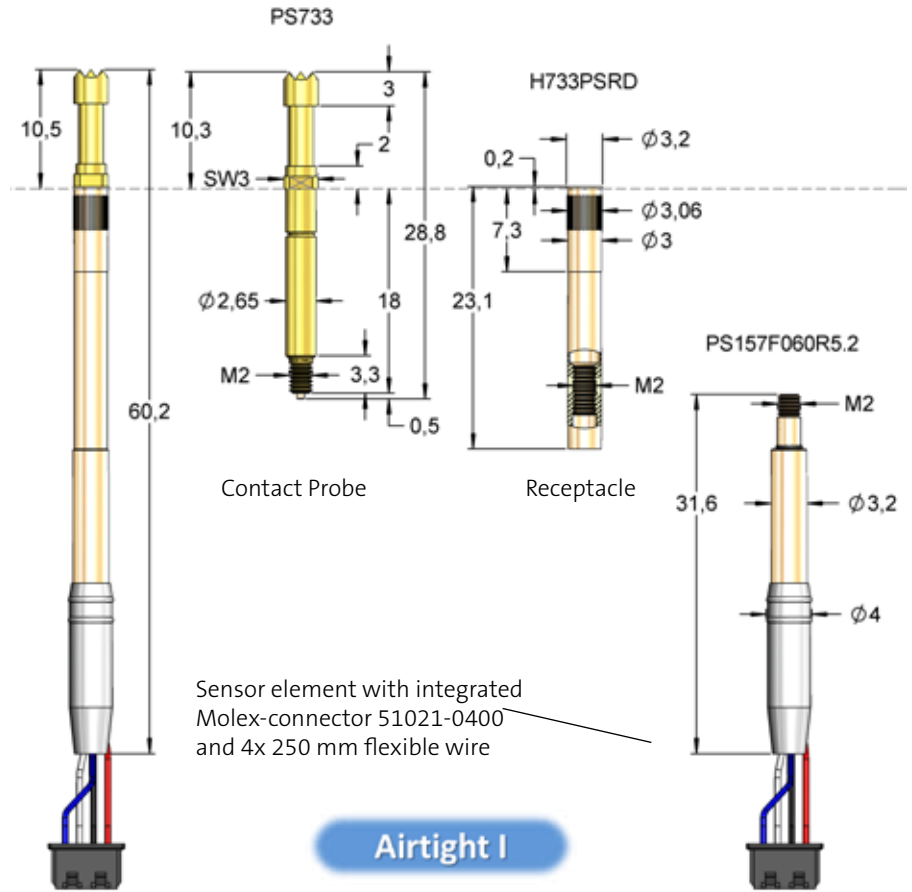
2112221:

Extension cable 250 mm for Molex-connector



Series	Tip-Ø	Spring Force (cN)
PS733 06 B 100 G 250		
Tip Style	Material	Plating
		Version

Material: B = BeCu
Tip-Ø: 100 = 1,00 mm (e.g.)
Plating: G = Gold plated
Note: Additional Receptacle and position sensor required, order code according to drawing



The position sensor system PS733 can be used in vacuum fixtures or modules (max. leakage rate <0,5 cm³/min at 0,7bar). It consists of a special spring contact probe PS733..., a receptacle H733PSRD and a sensor element PS157... These three elements are mounted into a fixture plate. The position sensor is screwed at the receptacle from backwards after the receptacle is mounted.

* The values for current and resistance are only valid for a soldered connection at the receptacle. The blue wire of the Molex connector only allows a maximum current of 1,0 A and R_{typ} 500 mOhm.

Tip Style	Number	Material	Plating	Ø in mm	Version
	06	B	G	1,00	-
	06	B	G	2,00	-
	06	B	G	3,00	-
	17	B	G	2,30	-



Switch Probes

Switch probes are commonly used for presence and position tests of connectors or components. After reaching a defined travel switch probes open or close an integrated switch circuit.

The switch probes are sorted in this order:

- Switch probes with off-on-off characteristic
- Switch probes with ball head (NO)
- Standard switch probes (NO/NC)

SWITCH PROBE TYPES



Standard Switch Probe

Standard switch probes are available in plug-in and threaded versions. The switch function can work as an opener or as a closer. Standard switch probes are available in various diameters and lengths.



Switch Probes for Backward Assembly

Switch probes for backward assembly have been designed for applications with difficult access of the probes from the front.



Potential-free Switch Probes

Potential-free switch probes have a galvanically isolated switch circuit. This allows building short-circuit-proof fixtures or modules with separate electrical circuits for logic and test currents.



Switch Probes with Ball Head

Switch probes with ball head have a rolling ball as contact element which makes them tolerant against lateral forces and avoids scratches at the contact surface. The most common application is the lateral presence test of connector housings in test modules.



Switch Probes with Off-On-Off Function

The special switch probes with off-on-off function allow realizing more precise position tests of components or connector elements with little effort. While common switch probes only have one switch point after a specific travel, the special switch probes have two integrated switch points in a certain distance.

SWITCH PROBES APPLICATIONS

Presence Test with Switch Probes

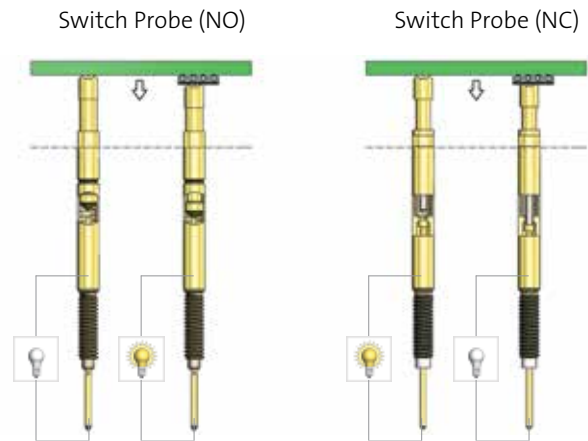
Switch probes are contact elements which open or close an electric circuit after a defined switch travel. This condition persists beyond the switching point. FEINMETALL offers special combi-receptacles for the solderless exchange of switch probes (see below).

Typical applications:

- Presence test of components or connectors
- Voltage-free detection with synthetic heads
- Short-circuit-proof modules by electrically isolated switch elements (voltage-free system)
- Installation of intrinsically safe circuits (only with NC-versions, e.g. F873, F883)

Versions of switch probes:

- Openers (NC - normally closed), closers (NO - normally open)
- Different switch travels
- Probes for a gentle lateral contacting by ball head (F888)
- Short and long versions to realize different projection heights
- Long travel versions for depth determination (F375 and F385)

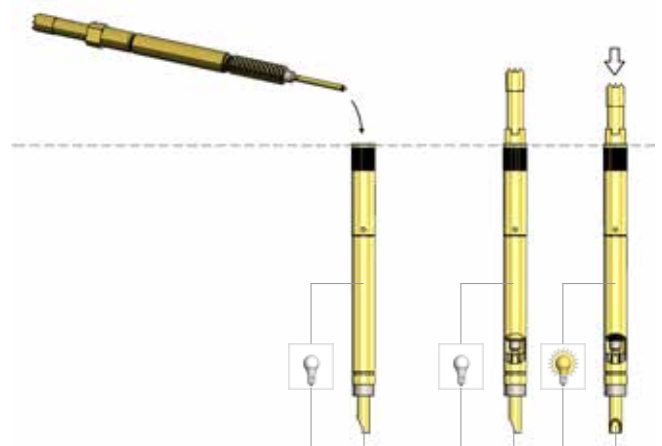


Solderless Replacement of Switch Probes and Kelvin Probes

Combi-receptacles allow a quick and solderless replacement of switch probes or kelvin probes (plug-in and threaded versions) without disassembly of the module or fixture. Secure connections of both signal circuits (inner and outer conductor) are realized by contact elements within the receptacle.

Advantages of the combi-receptacle

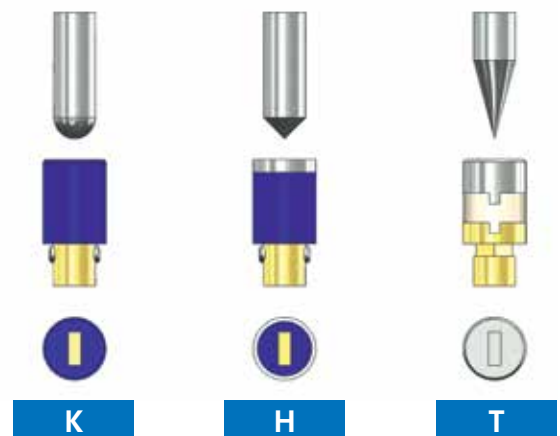
- Solderless replacement of switch probes and kelvin probes
- Prevention of incorrect wirings in case of maintenance
- Saving of time and expenses in case of maintenance
- Height adaptability of switch probes by the probe thread and pressure marks in the receptacle
- High frequency capabilities in combination with coaxial kelvin probes



Insulated Tips for Switch Probes

There are three different versions of insulated switch probe tips:

- Version K is made of synthetic material, it is the standard tip style for insulated contacting
- Version H is reinforced additionally by a brass ring, which allows higher stress on the synthetic head.
- Version T has a metal head, which is insulated against the plunger and therefore is suitable for applications with higher mechanical exposure. The special design avoids any electrical contact between tip and barrel, even at maximum travel. The tip of this version is silver-colored for better identification of the assembled probe.



F487

Switch Probe 157mil
Threaded, Off-On-Off



Centers (mm/mil)	4,00 / 157
Contin. current	10,0 A
Current (Switch)	1,0 A
R typ	20 mOhm
Temperature	-45°C...+100°C

Spring Force (cN ±20%)

Version	Preload	Nominal
E12	40	100
Standard	120	300

Travel (mm)

Version	Nominal	Maximum
E12	4,0	5,0
Standard	4,0	5,0
Switch point 1 (mm)		2,5
Switch point 2 (mm)		3,5
Thread (M)		3,0x0,35
Wrench Size		2,5
Pointing Accuracy		±0,10 mm

Materials and Plating

Plunger	see Tip Style
Barrel	Brass, gold plated
Spring	Music wire, silver plated
Receptacles	Brass, gold plated

Accessories

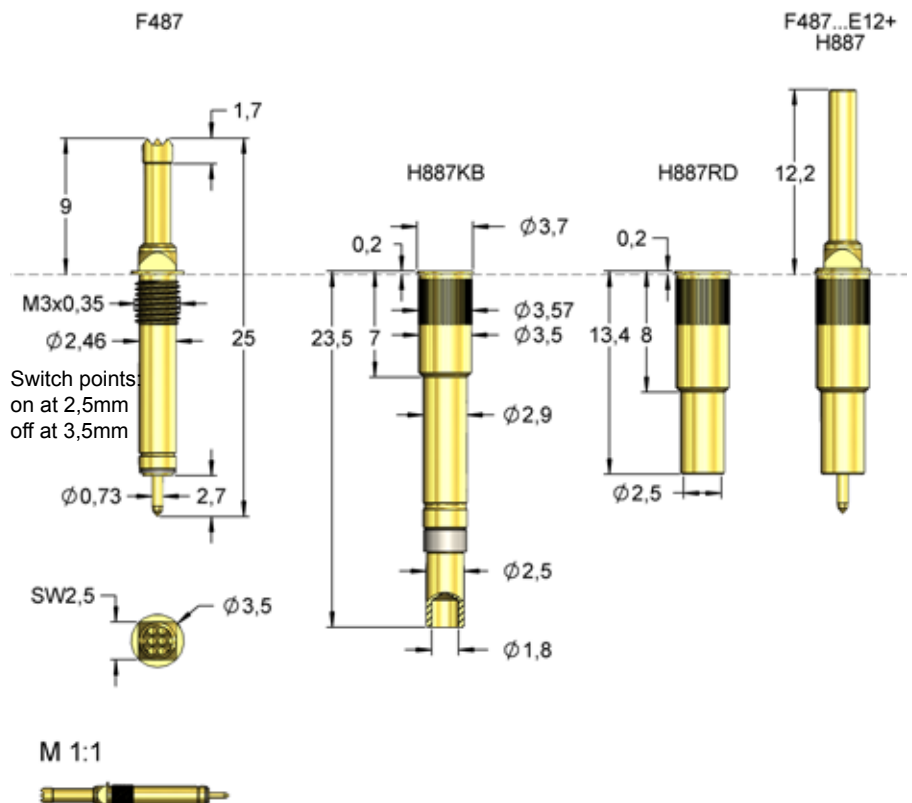
Insertion tool receptacle	FEWZ-340E0
Screw-in tool probe	FWZVF4 (T)

Drill Size (mm)

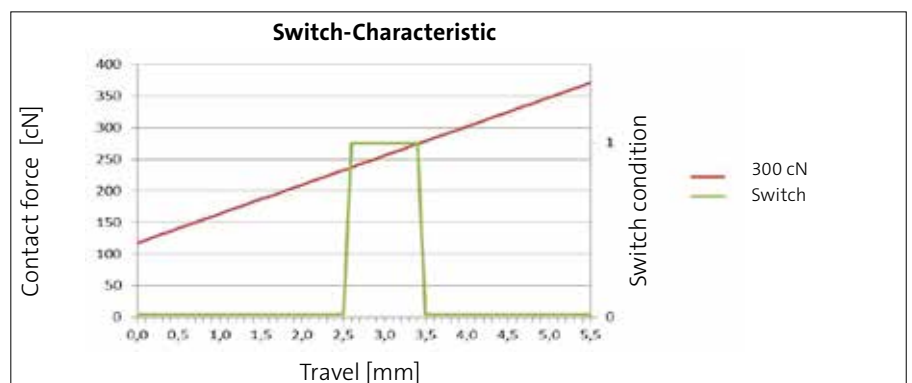
Receptacle with knurl	3,50 - 3,52
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Projection Height (mm)

H887... with F487	9,2 - 11,2
H887... with F487...E12	11,2 - 13,2



The probe F487 allows an exact determination of depths and lengths with low efforts. It was specifically developed for position tests at limited space. Due to the off-on-off function of the probe, the correct position of the DUT, a correct pin length or hole depth can be verified. The probe can be used with the standard receptacle H887RD or H887KB which allows a solderless exchange of the probes.



Series	Tip-Ø	Spring Force (cN)
F487	16	B 180 G 100 E12
	Tip Style	Material Plating Version

Material:	B = BeCu
Tip-Ø:	200 = 2,00 mm (e.g.)
Plating:	G = Gold plated
Special version:	E12 = Projection height 12mm
Receptacle:	Order code according drawing

Tip Style	Number	Material	Ø in mm	Plating	Version
	06	B	2,00	G	-
	16	B	1,80	G	E12
	17	B	3,00	G	-

SWITCH PROBES

F485/F486

Switch Probe 157mil
Threaded, Off-On-Off



Centers (mm/mil)	min. 3,50 / 138
Contin. current	10,0 A
Current (Switch)	1,0 A
R typ	20 mOhm
Temperature	-45°C...+100°C

Spring Force (cN ±20%)

Version	Preload	Nominal
Standard	80	300

Travel (mm)

Version	Nominal	Maximum
Standard	4,0	5,0
Switch point 1 (mm)		2,5
Switch point 2 (mm)		3,5
Thread (M)		2,5
Wrench Size		2,5
Pointing Accuracy		±0,08 mm

Materials and Plating

Plunger	see Tip Style
Barrel	Brass, gold plated
Spring	Music wire, silver plated
Receptacles	Brass, gold plated

Accessories

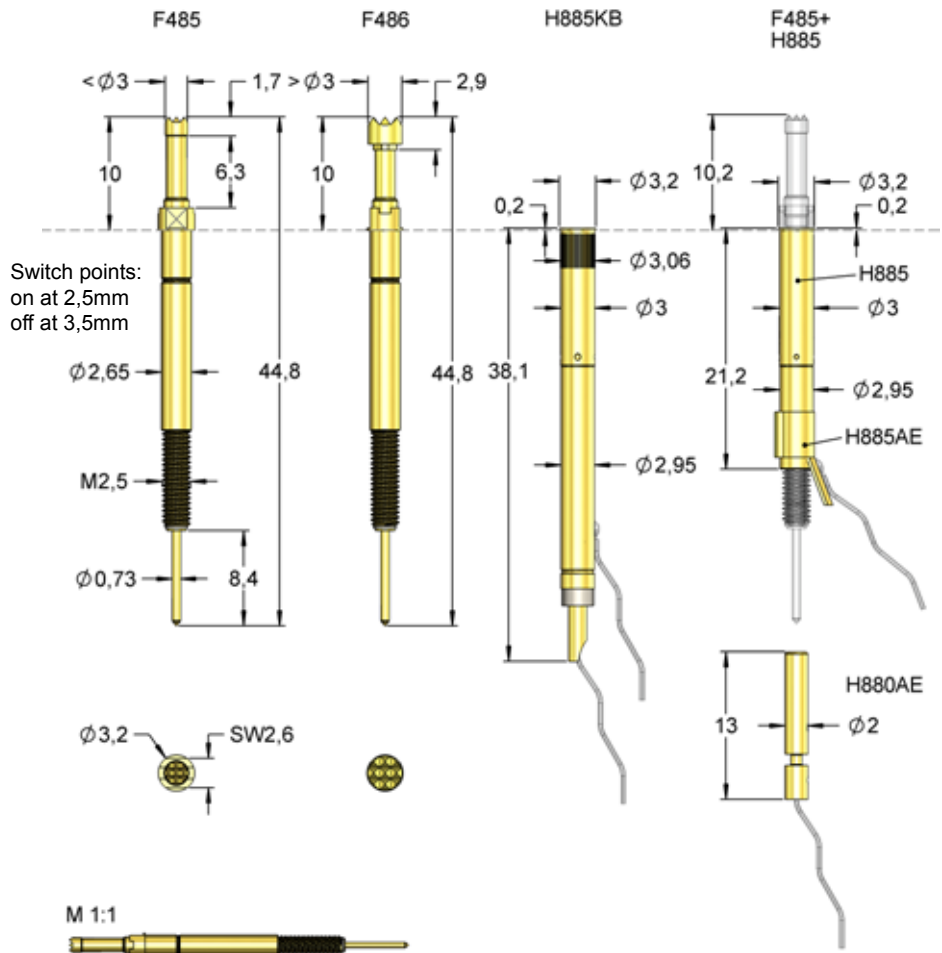
Insertion tool receptacle	FEWZ-774E0
Screw-in tool probe	FWZ886S1/ FWZ886S2

Drill Size (mm)

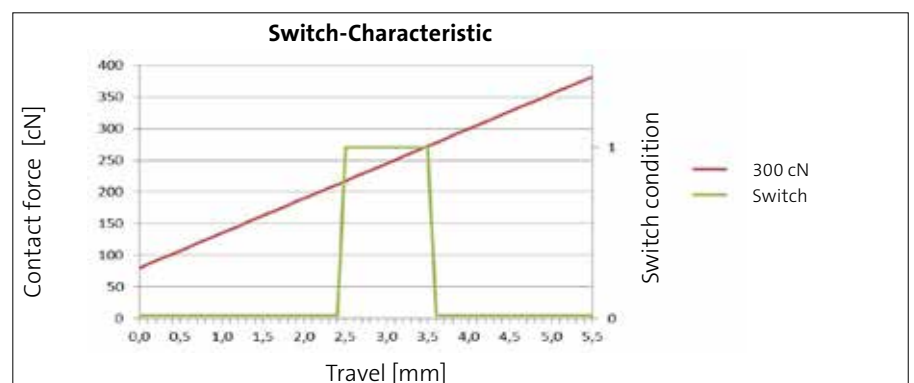
Receptacle without knurl	2,98 - 2,99
Receptacle with knurl	3,00 - 3,02

Projection Height (mm)

H885... with F485/F486	10,2 - 15,2
H885.../5 with F485/F486	15,0 - 20,0



The probes F485/F486 allow an exact determination of depths and lengths with low efforts. They were specifically developed for position tests at limited space. Due to the off-on-off function of the probes, the correct position of a DUT, a correct pin length or hole depth can be verified. The probes can be used with the standard receptacles H885 or H885KB which allows a solderless exchange of the probes.



Tip Style F485

Tip Style	Number	Material	Ø in mm	Plating	Version
	06	B	2,00	G	-

Tip Style F486

Tip Style	Number	Material	Ø in mm	Plating	Version
	06	B	3,00	G	-

Series	Tip-Ø	Spring Force (cN)
F48x 06 B 200 G 300		
Tip Style	Material	Plating
Version		

Material: B = BeCu
Tip-Ø: 200 = 2,00 mm (e.g.)
Plating: G = Gold plated
Receptacle: Order code according drawing

SWITCH PROBES

F899P0001 / F899P0002

**Switch Probe 394mil,
Pneumatic,
Off-On-Off**



Centers (mm/mil)	10,00 / 394
Contin. current	3,0 A
Current (Switch)	1,0 A
R typ	100 mOhm
Temperature	-45°C...+100°C

Technical Specifications

Operating pressure	5-7 bar
	Change 75 cN / bar
Operating medium	Compressed air (dried & filtered)
Allowed leakage rate	5 cm³/min.
Thread (M)	8,0x1,0

F899P0001	Working travel [mm]	Contact force at 6 bar [cN]
Switch point 1	2,0 ±0,2	
Nominal	3,8	350 ±20%*
Switch point 2	4,0 ±0,2	
Maximum	5,3	

F899P0002	Working travel [mm]	Contact force at 6 bar [cN]
Switch point 1	3,0 ±0,2	
Nominal	3,8	350 ±20%
Switch point 2	4,0 ±0,2	
Maximum	5,3	

Materials and Plating

Plunger tip	Synthetic, unplated
Barrel	Brass, gold plated Synthetic, unplated
Spring	Music wire, silver plated
Receptacle	Brass, nickel plated

Included in Delivery

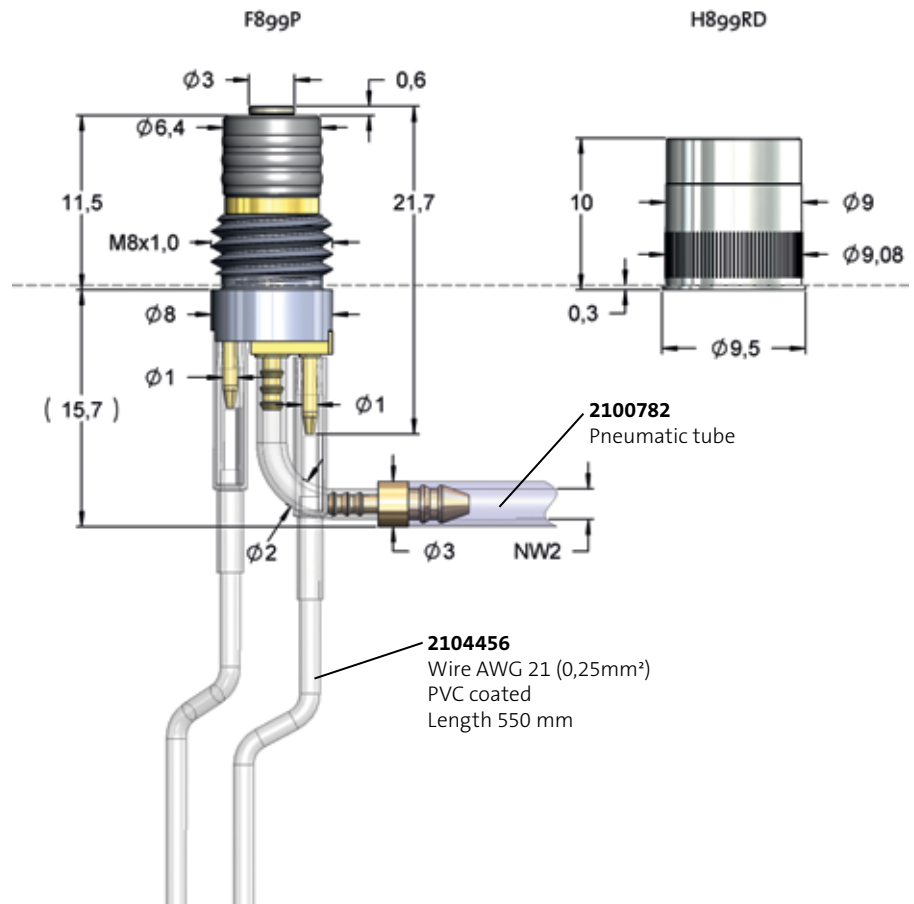
1x F899P000x Pneumatic switch probe
2x 2104456 Connection wire (AWG21)

Accessories

Pneumatic tube	2100782 (NW2)
Receptacle with knurl	H899RD
Screw-in tool probe	FWZ899

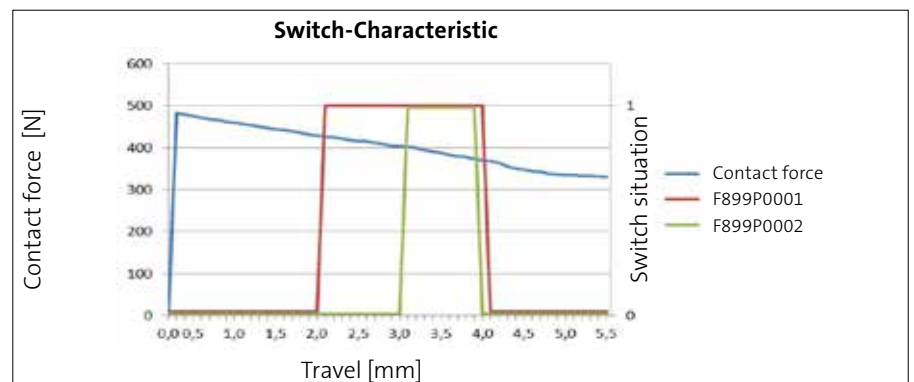
Drill Size (mm)

Receptacle with knurl	9,02 - 9,06
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Special solution for pneumatic position tests at limited space.

The pneumatic micro switch probe F899P with two switch points (off-on-off) allows an exact determination of the DUT position.



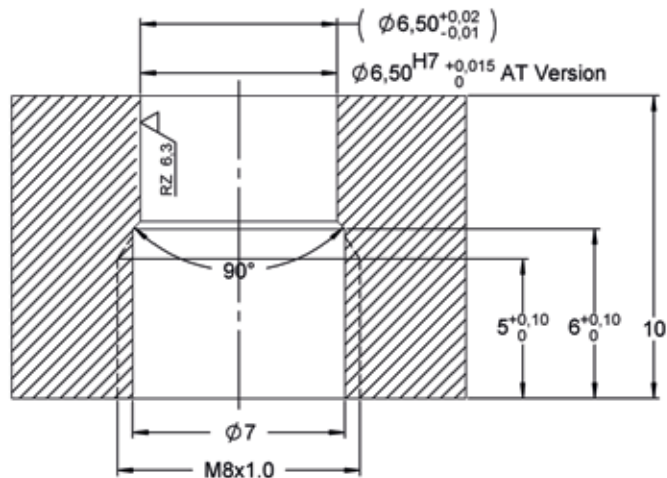
For a proper operation see the following mounting and operation instructions.

Mounting and Operation Instructions F899P

Drilling Recommendations for the Use without Receptacle

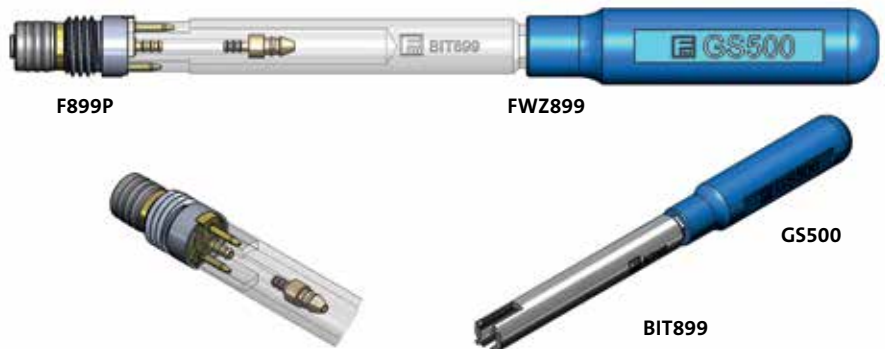
For mounting the probe F899P without receptacle a precise drilling is mandatory to hold the probe in its position. It is essential to consider if the module with the mounted probe needs to be airtight or not. An airtight module needs extremely precise drilling dimensions. As the ideal drilling diameters depend on the material, the recommendations here are only a guideline for your own drilling tests.

The permissible leakage rate for the construction of an airtight version is 5 cm³ / min.



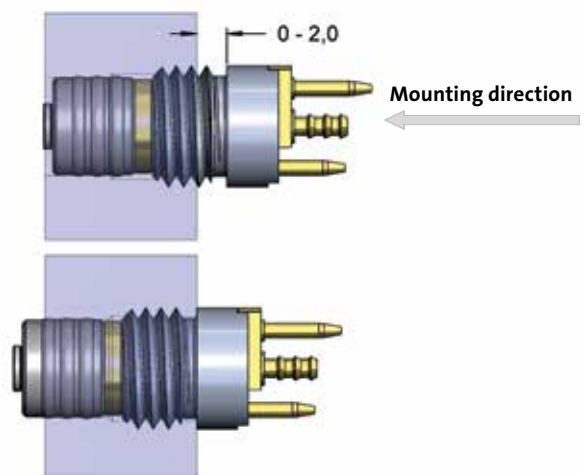
Mounting Tool FWZ899

The mounting tool fits into the corresponding notch of the probe and allows to screw in and position the probe securely from backwards.



Longitudinal Adjustment

The probe F899P can be mounted either on stop or it can be adjusted for up to 2,0 mm in longitudinal direction. This is realized by the thread of the probe. One full turn of the probe leads to 1,0 mm adjustment.



SWITCH PROBES

Switch Probe with Ball Head for Lateral Contacting

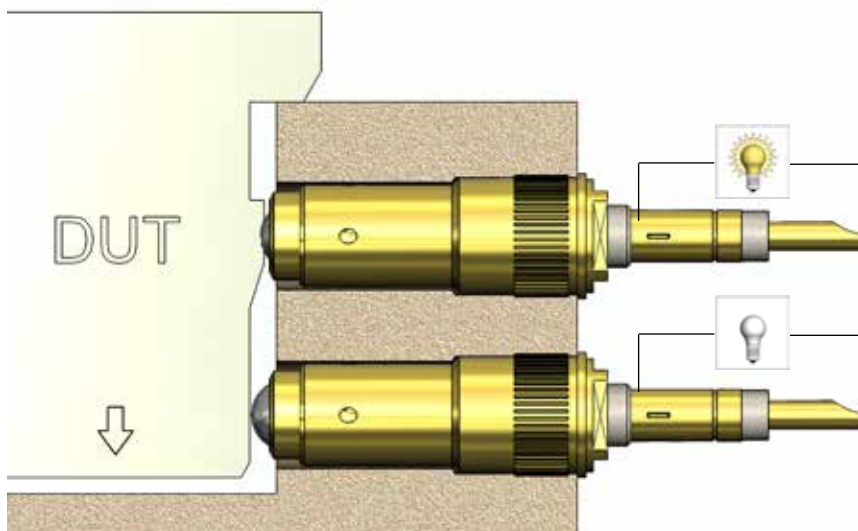
This series allows contacting applications with laterally moved DUT.

Function:

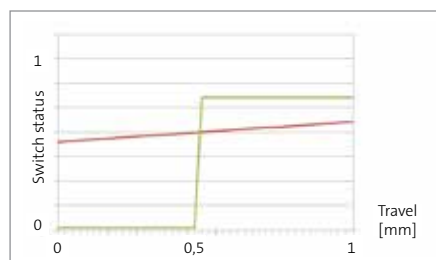
A rolling ball as contact element is insensitive against lateral forces, which leads to a remarkably higher durability compared to contact probes with fix plunger head of similar shape. This probe does not leave any scratching or damaging of the DUT.

Typical applications:

Lateral presence test of components or connectors, drill holes, screws etc.



Switch Characteristic



Series	Number		Spring Force (cN)	
F888	90	S	1101	200
	Tip Style	Material	Plating	Version
Material:	S = Steel			
Number:				
1. Digit	0 = Switch not galvanically isolated 1 = Switch galvanically isolated 2 = Without switch			
2. Digit	0 = Without thread 1 = With thread			
3.+4. Digit	Running number			
Plating:	U = Unplated			
Version:	S05 = 0,5mm Switch travel (e.g.)			

F88890S1101U200S05

F88890S1103U200S05

F88890S1102U100S07

F88890S0003U100S08

F88890S0003U100S05

F88890S1003U100S05



With thread,
switch 0,5mm,
galvanically isolated



With thread,
switch 0,5mm,
galvanically isolated



With thread,
switch 0,7mm,
galvanically isolated



Without thread,
switch 0,8mm, not
galvanically isolated



Without thread,
switch 0,5mm, not
galvanically isolated



Without thread,
switch 0,5mm,
galvanically isolated

SWITCH PROBES

F88890Sx003U100Sxx (NO)

Switch Probe with Ball Head, Plug-In



Centers (mm/mil)	6,50 / 256
Contin. current	5,0 A
Current (Switch)	1,0 A
R typ	25 mOhm
Temperature	-45°C...+100°C

Spring Force (cN ±20%)

Version	Preload	Nominal
S05	70	100
S08	70	100

Travel (mm)

Version	Nominal	Maximum
S05	1,4	1,4
S08	1,4	1,4

Switch Travel (mm)

S05	0,5
S08	0,8

Materials and Plating

Ball	Steel, unplated
Barrel	Brass, gold plated
Spring	Stainless steel, unplated

Accessories

Connection element	H888AE
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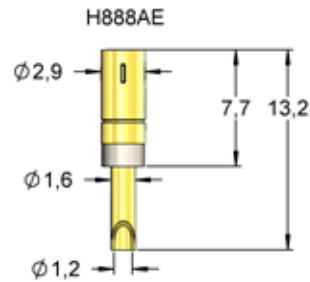
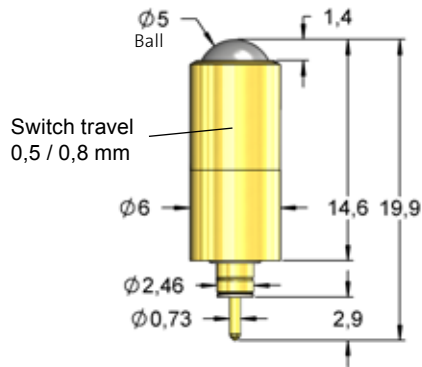
Drill Size (mm)

F88890Sx003U100Sxx	6,00
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Projection Height (mm)

F88890Sx003U100Sxx	max. 1,40
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F88890S0003U100S05/S08



M 1:1



Due to a rolling ball as contact element probes of the series F888 are insensitive against lateral forces. A common application is the lateral presence test of connector housings in test modules. With the **F88890S0003U100S05**, the switching circuit of this probe is **not galvanically isolated** against the barrel.

With the **F88890S1003U100S05**, on the other hand, the switching circuit is **galvanically isolated** from the barrel and the ball head, meaning that it can be used potential-free.

Series	Number	Spring Force (cN)
F888	90	S
		0003
		U
		100
		S08

Material:

S = Steel

Number:

1. Digit
0 = Switch not galvanically isolated
1 = Switch galvanically isolated
2 = Without switch
2. Digit
0 = Without thread
1 = With thread
- 3.+4. Digit
Running number

Plating:

U = Unplated

Version:

S08 = 0,8mm Switch travel (e.g.)

Receptacle:

Order code according drawing

Order code	Tip Style	Number	Material	Ø in mm	Plating	Version
F88890S0003U100S05		90	S	5,00	U	S05
F88890S0003U100S08		90	S	5,00	U	S08
F88890S1003U100S05 (galvanically isolated)		90	S	5,00	U	S05

SWITCH PROBES

F88890S1101U200S05 (NO)

Switch Probe with Ball Head, Threaded



Centers (mm/mil)	7,00 / 275
Contin. current	5,0 A
Current (Switch)	1,0 A
R typ	25 mOhm
Temperature	-45°C...+100°C

Spring Force (cN ±20%)

Version	Preload	Nominal
Standard	100	200

Travel (mm)

Version	Nominal	Maximum
Standard	1,0	1,0
Switch Travel (mm)		0,5
Thread (M)		6,0x0,75
Wrench Size		5,0

Materials and Plating

Ball	Steel, unplated
Barrel	Brass, gold plated
Spring	Music wire, gold plated
Receptacles	Brass, gold plated

Accessories

Insertion tool receptacle	FEWZ-888
Screw-in tool	FWZ888
Screw-in tool w. light indicator	FWZ888SA
Connection element	H888AE

Drill Size (mm)

F88890S1101U200S05	M6x0,75
H888RD	6,55 - 6,70
H888S1	6,50

Projection Height (mm)

	max.
F88890S1101U200S05	1,00

Series	Number	Spring Force (cN)
F888	90	S
1101	U	200
S05		
Tip Style	Material	Plating

Material: S = Steel

Number:

1. Digit 0 = Switch not galvanically isolated

1 = Switch galvanically isolated

2 = Without switch

0 = Without thread

1 = With thread

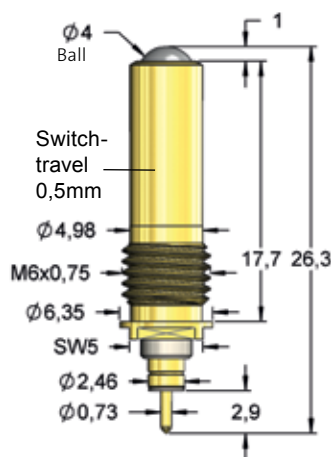
3.+4. Digit Running number

Plating: U = Unplated

Version: S05 = 0,5mm Switch travel (e.g.)

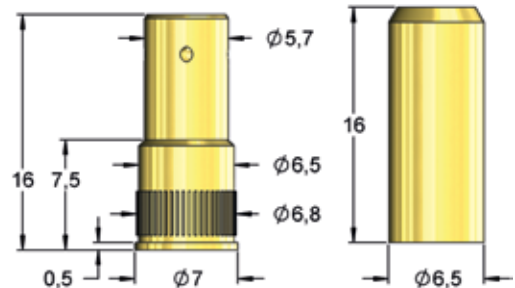
Receptacle: Order code according drawing

F88890S1101U200S05

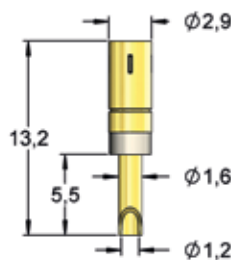


H888RD

H888S1



H888AE

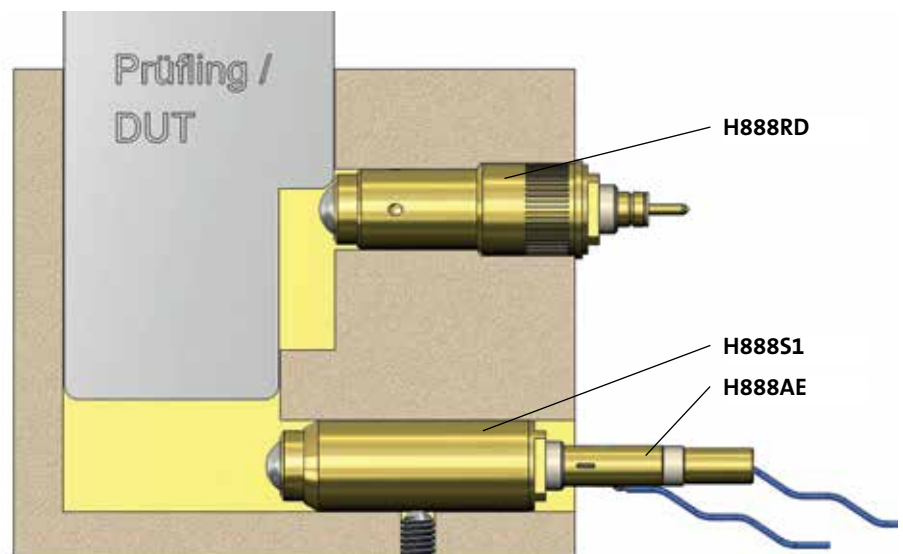


M 1:2



Due to a rolling ball as contact element probes of the series F888 are insensitive against lateral forces. A common application is the lateral presence test of connector housings in test modules. The switch circuit of this probe is galvanically isolated against the barrel.

The same probe just with a larger collar of 8,4 mm instead of 6,35 mm is available by order code **F88890S1103U200S05**.



Order code

Order code	Tip Style	Number	Material	Ø in mm	Plating	Version
F88890S1101U200S05		90	S	4,00	U	S05

SWITCH PROBES

F88890S1102U100S07 (NO)

Switch Probe with Ball Head, Threaded



Centers (mm/mil)	9,00 / 354
Contin. current	5,0 A
Current (Switch)	1,0 A
R typ	25 mOhm
Temperature	-45°C...+100°C

Spring Force (cN ±20%)

Version	Preload	Nominal
Standard	70	100

Travel (mm)

Version	Nominal	Maximum
Standard	1,5	1,5
Switch Travel (mm)		0,7
Thread (M)		8,0x0,5
Wrench Size		5,0

Materials and Plating

Ball	Steel, unplated
Barrel	Brass, gold plated
Spring	Stainless steel, unplated
Receptacles	Brass, gold plated

Accessories

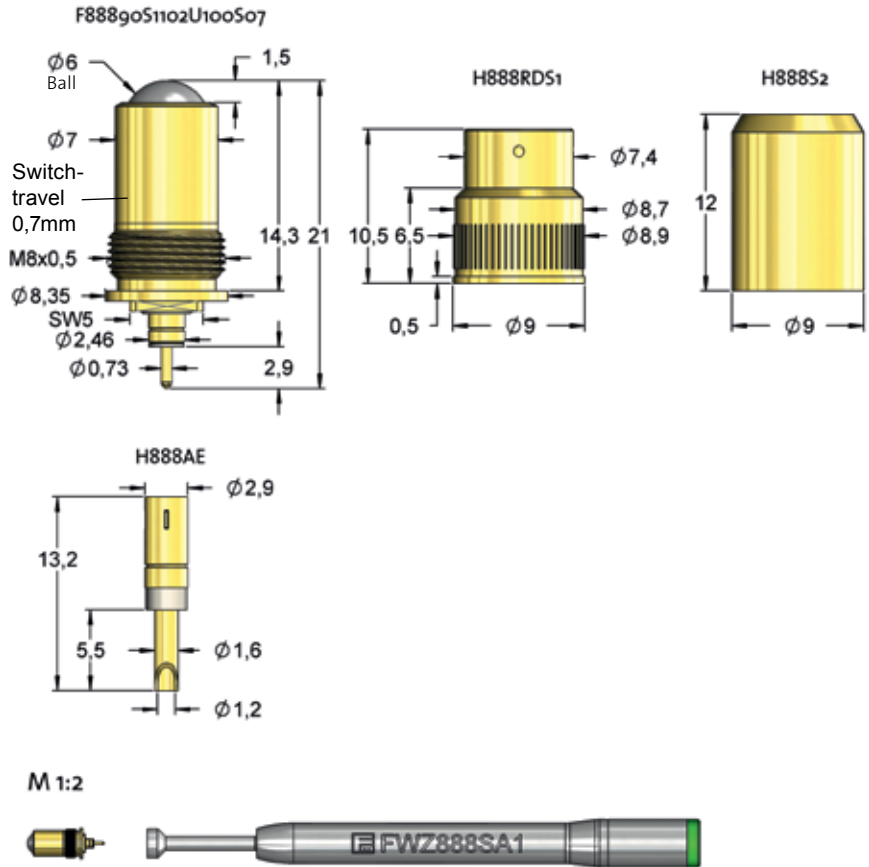
Insertion tool receptacle	FEWZ-888S1
Screw-in tool	FWZ888
Screw-in tool w. light indicator	FWZ888SA1
Connection element	H888AE

Drill Size (mm)

F88890S1102U100S07	M8x0,5
H888RDS1	8,75 - 8,85
H888S2	9,00

Projection Height (mm) max.

F88890S1102U100S07	1,5
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Due to a rolling ball as contact element probes of the series F888 are insensitive against lateral forces. A common application is the lateral presence test of connector housings in test modules. The switch circuit of this probe is galvanically isolated against the barrel.

Series	Number	Spring Force (cN)
F888	90 S 1102 U 100 S07	
Tip Style	Material	Plating

Material: S = Steel

Number:

1. Digit 0 = Switch not galvanically isolated

1 = Switch galvanically isolated

2 = Without switch

2. Digit 0 = Without thread

1 = With thread

3.+4. Digit Running number

Plating: U = Unplated

Version: S07 = 0,7mm Switch travel (e.g.)

Receptacle: Order code according drawing

Order code	Tip Style	Number	Material	Ø in mm	Plating	Version
F88890S1102U100S07		90	S	6,00	U	S07

SWITCH PROBES

F863 (NO)

Switch Probe 75 mil Threaded

Centers (mm/mil)	1,90 / 75
Contin. current	2,0 A
Current (Switch)	1,0 A
R typ	65 mOhm
Temperature	-45°C...+100°C

Spring Force (cN ±20%)

Version	Preload	Nominal
Standard	20	80
Standard	50	150
L	50	150

Travel (mm)

Version	Nominal	Maximum
Standard	4,0	5,0
L	4,0	5,0
Switch Travel (mm)		3,5
Thread (M)		1,0
Wrench Size		1,00

Materials and Plating

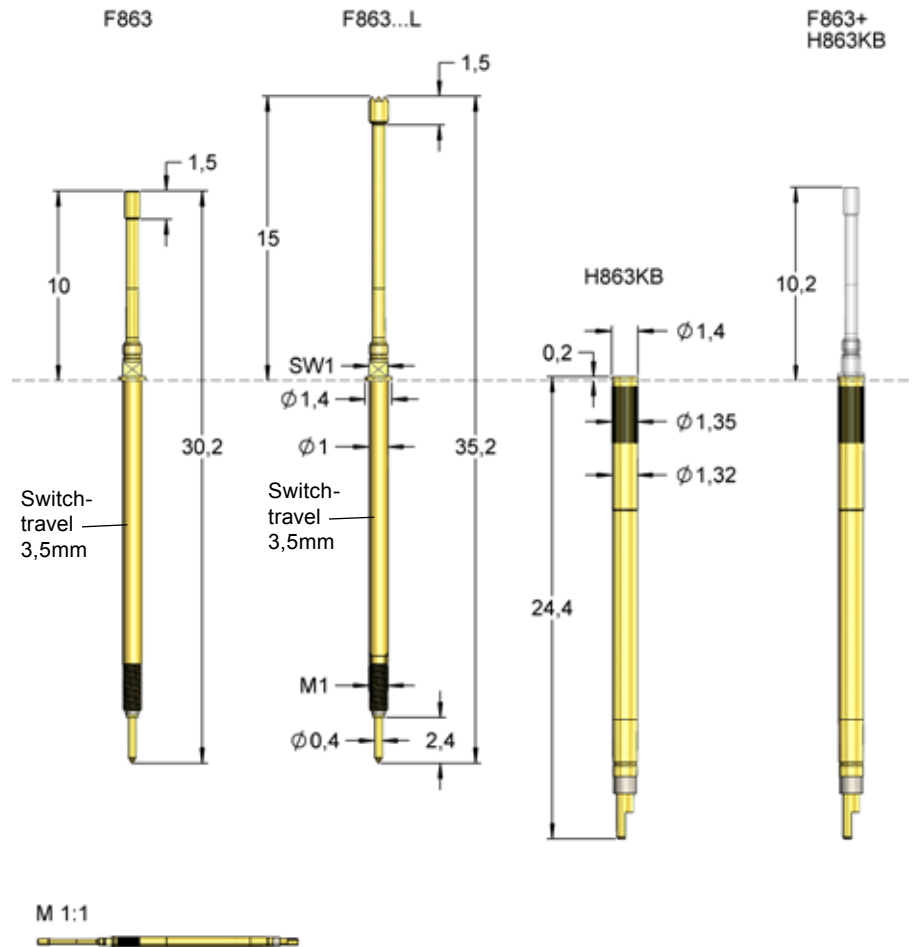
Plunger	see Tip Style
Barrel	Brass, gold plated
Spring	Music wire, silver plated
Receptacles	Brass, gold plated

Accessories

Insertion tool receptacle	FEWZ-100E0
Screw-in tool probe	FWZ730 (T) max. <Ø0,9 mm
Screw-in tool probe	FWZ730S1 (T) max. <Ø1,5 mm

Drill Size (mm)

H863KB	1,32 - 1,34
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The F863 is the smallest threaded switch probe. It is the ideal solution for modules with centers down to 1,90 mm / 75 mil. It can be used with a combi-receptacle for solderless exchange of the probe.



The F86311B050G080 with its small plunger diameter can also be used to test the Nano MQS connector.

Series	Tip-Ø	Spring Force (cN)
F863	06	B
		100
		G
		150
		L

Material:	B = BeCu
Tip-Ø:	100 = 1,00 mm (e.g.)
Plating:	G = Gold plated
Version:	L = Long version
Receptacle:	Order code according drawing

Tip Style	Number	Material	Ø in mm	Plating	Version
	06	B	1,00	G	L
	11	B	0,50	G	-
	11	B	0,64	G	L
	12	B	0,70	G	-
	12	B	0,75	G	L
	17	B	0,80	G	-
	17	T	0,80	N	-

F879 (NO)

Switch Probe 100 mil Short Version, Threaded

Centers (mm/mil)	2,54 / 100
Contin. current	3,0 A
Current (Switch)	1,0 A
R typ	65 mOhm
Temperature	-45°C...+100°C

Spring Force (cN ±20%)

Version	Preload	Nominal
Standard	50	200

Travel (mm)

Version	Nominal	Maximum
Standard	4,0	5,0
Switch Travel (mm)		2,6
Thread (M)		2,0x0,25
Wrench Size		1,7

Materials and Plating

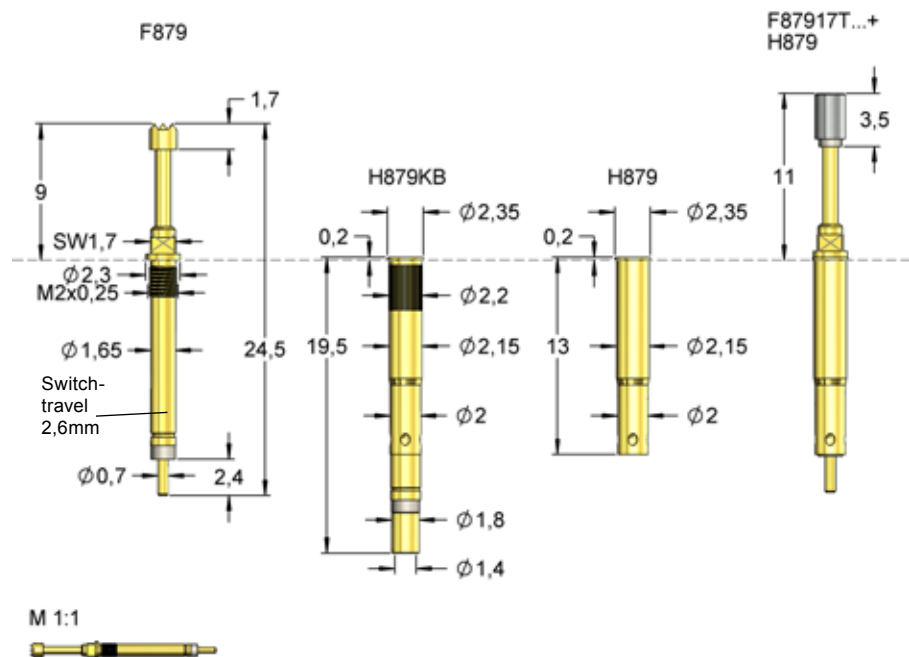
Plunger	see Tip Style
Barrel	Brass, gold plated
Spring	Music wire, silver plated
Receptacles	Brass, gold plated

Accessories

Insertion tool receptacle	FEWZ-772E0
Screw-in tool probe	FWZ732 (T)

Drill Size (mm)

Receptacle with knurl	2,17 - 2,20
Receptacle without knurl	2,14 - 2,16



Version F87917T200N200 is 1,8 mm longer than standard (projection height with receptacle = 11,0 mm).

* deviation from standard see drawing

Series	Tip-Ø	Spring Force (cN)
F879	06	B 180 G 200
Tip Style	Material	Plating
Material:	B = BeCu, K = Synthetic	
Tip-Ø:	180 = 1,80 mm (e.g.)	
Plating:	G = Gold plated, N = Nickel plated, U = Unplated	
Receptacle:	Order code according drawing	

Tip Style	Number	Material	Ø in mm	Plating	Version
	06	B	1,80	G	-
	11	B	1,00	G	-
	16	B	1,00	G	-
	17	B	1,80	G	-
	17	K	1,80	U	-
	17	T *	2,00	N	-

F878 (NO)

Switch Probe 100 mil Plug-In

Centers (mm/mil)	2,54 / 100
Contin. current	3,0 A
Current (Switch)	1,0 A
R typ	20 mOhm
Temperature	-45°C...+100°C

Spring Force (cN ±20%)

Version	Preload	Nominal
S26	20	80
S26	40	150
S26	110	300

Travel (mm)

Version	Nominal	Maximum
S26	4,0	5,3
Switch Travel (mm)		2,6

Materials and Plating

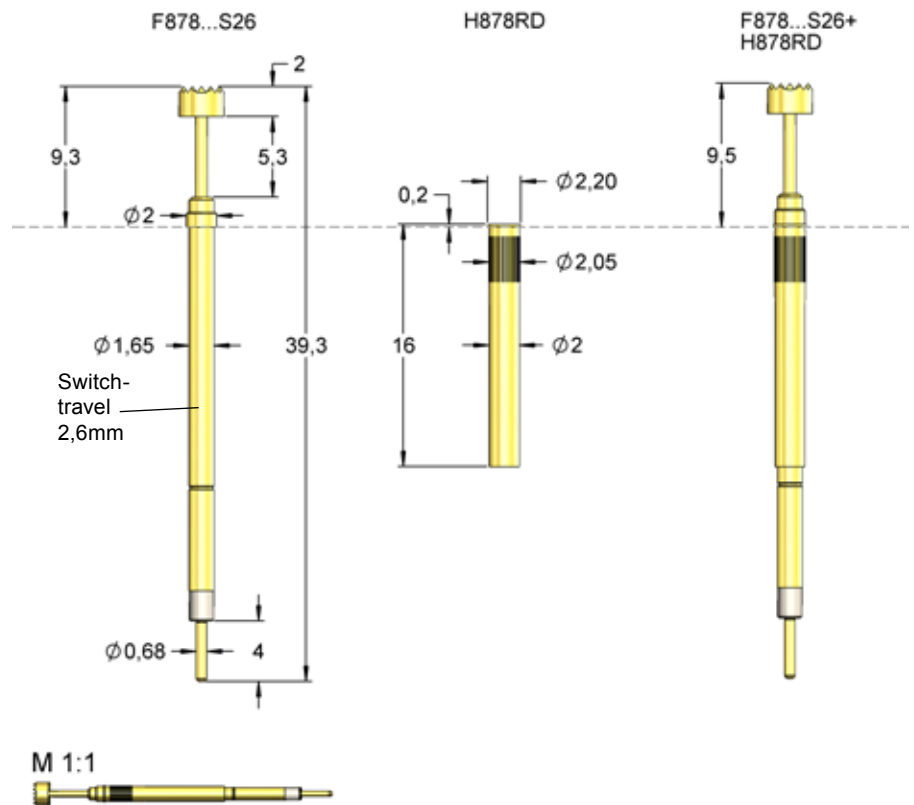
Plunger	see Tip Style
Barrel	Brass, gold plated
Spring	Music wire, silver plated
Receptacles	Brass, gold plated

Accessories

Insertion tool receptacle	FEWZ-772E0
Screw-in tool probe	FDWZ-100

Drill Size (mm)

Receptacle with knurl	2,01 - 2,04
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* Center differing from standard.

Series	Tip-Ø	Spring Force (cN)
F878 06 B 150 G 150 S26		
Tip Style	Material	Plating
		Version

Material:	B = BeCu
Tip-Ø:	150 = 1,50 mm (e.g.)
Plating:	G = Gold plated
Version:	S26 = Switch travel 2,6 mm
Receptacle:	Order code according drawing

Tip Style	Number	Material	Ø in mm	Plating	Version
	06	B	1,50	G	S26
	06	B	3,00 *	G	S26
	16	B	0,80	G	S26
	17	B	1,00	G	S26

F876 (NO)

Switch Probe 100 mil Threaded

Centers (mm/mil)	2,54 / 100
Contin. current	3,0 A
Current (Switch)	1,0 A
R typ	20 mOhm
Temperature	-45°C...+100°C

Spring Force (cN ±20%)

Version	Preload	Nominal
S26	40	150
S26	110	300
S40	40	150
S40	110	300

Travel (mm)

Version	Nominal	Maximum
S26	4,0	5,3
S40	4,0	5,3

Switch Travel (mm)

S26	2,6
S40	4,0
Thread (M)	2,0x0,25
Wrench Size	1,7

Materials and Plating

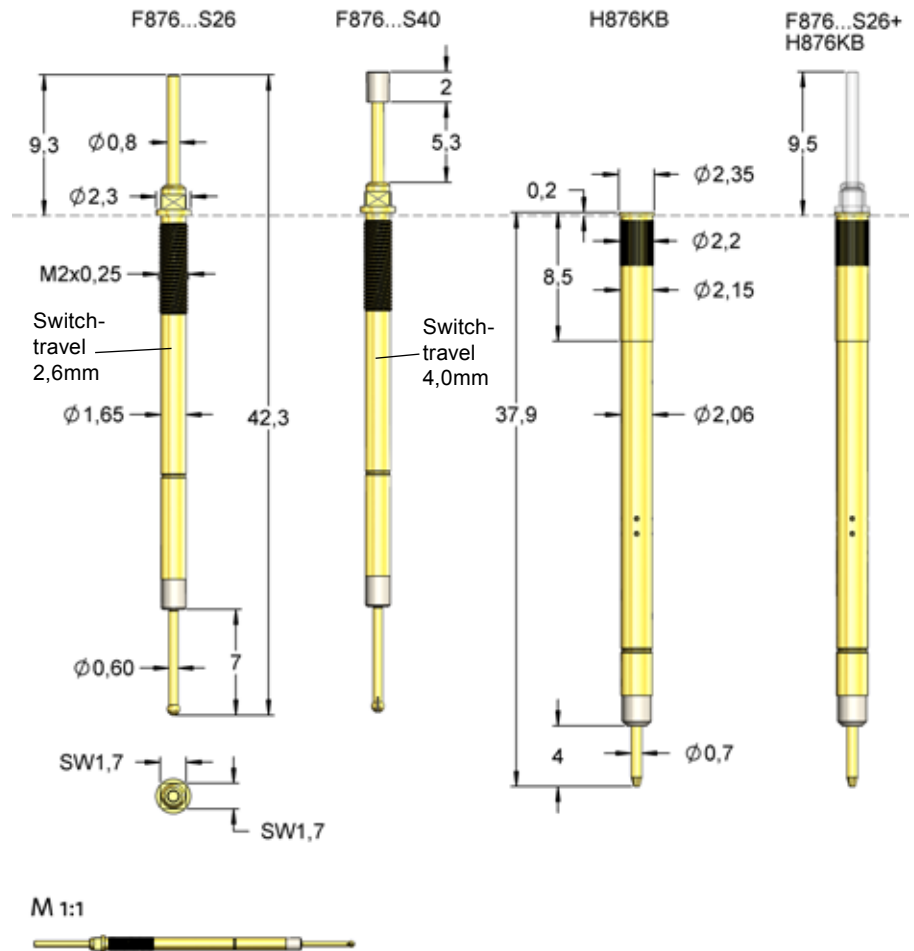
Plunger	see Tip Style
Barrel	Brass, gold plated
Spring	Music wire, silver plated
Receptacles	Brass, gold plated

Accessories

Insertion tool receptacle	FEWZ-772E0
Screw-in tool probe	FWZ732 (T) max. Ø2,0 mm
Screw-in tool probe	FWZ732S1 (T) max. Ø2,7 mm

Drill Size (mm)

Receptacle with knurl	2,16 - 2,19
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Series	Tip-Ø	Spring Force (cN)
F876	06	B 150 G 150 S26
	Tip Style	Material Plating Version

Material:	B = BeCu, K = Synthetic
Tip-Ø:	150 = 1,50 mm (e.g.)
Plating:	G = Gold plated, U = Unplated
Version:	S26 = Switch travel 2,6 mm (e.g.)
Receptacle:	Order code according drawing

Tip Style	Number	Material	Ø in mm	Plating	Version
	06	B	1,50	G	S26
	16	B	0,80	G	S26
	17	B	1,50	G	S26
	17	K	1,50	U	S26
	06	B	1,50	G	S40
	16	B	0,80	G	S40
	17	B	1,50	G	S40
	17	K	1,50	U	S40

F873 (NC)

Switch Probe 100 mil Opener, Threaded

Centers (mm/mil)	2,54 / 100
Contin. current	5,0 A
Current (Switch)	1,0 A
R typ	65 mOhm
Temperature	-45°C...+100°C

Spring Force (cN ±20%)

Version	Preload	Nominal
Standard	50	250

Travel (mm)

Version	Nominal	Maximum
Standard	4,0	5,0
Switch Travel (mm)		1,5
Thread (M)		1,6
Wrench Size		1,7

Materials and Plating

Plunger	see Tip Style
Barrel	Brass, gold plated
Spring	Music wire, silver plated
Receptacles	Brass, gold plated

Accessories

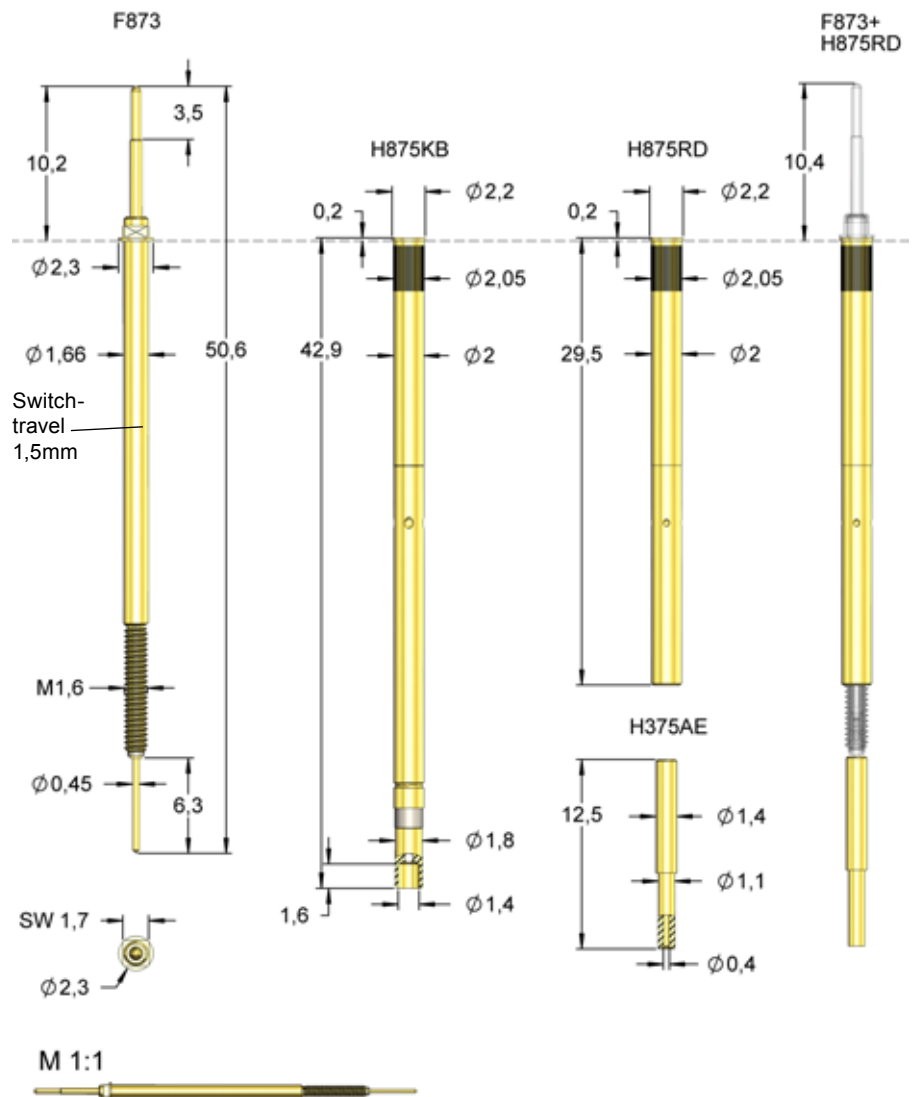
Insertion tool receptacle	FEWZ-772E0
Screw-in tool probe	FWZ732 (T) max. Ø 2,0 mm
Screw-in tool probe	FWZ732S1 (T) max. Ø 2,7 mm

Drill Size (mm)

Receptacle without knurl	1,99 - 2,00
Receptacle with knurl	2,02 - 2,03

Projection Height (mm)

F873 and receptacle with collar height 0,2mm	10,4 - 15,4
F873 and receptacle with collar height 5,0mm	15,2 - 20,2



The probe F873 can be height adjusted by 5,0 mm independently from the used receptacle. It is held in its position by pressure marks. For further receptacles see datasheet H875.

Series	Tip-Ø	Spring Force (cN)
F873	16	B 100 G 250
Tip Style	Material	Plating

Material: B = BeCu
Tip-Ø: 100 = 1,00 mm (e.g.)
Plating: G = Gold plated
Receptacle: Order code according drawing












Tip Style	Number	Material	Ø in mm	Plating	Version
	11	B	0,64	G	-
	16	B	1,00	G	-

F875 (NO)

Switch Probe 100 mil Threaded

Projection Height (mm)

F875 and receptacle with collar height 0,2mm	10,4 - 15,4
F875 and receptacle with collar height 5,0mm	15,2 - 20,2
F875...L and receptacle with collar height 0,2mm	16,9 - 21,9
F875...L and receptacle with collar height 5,0mm	21,7 - 26,7

Tip Style	Number	Material	Ø in mm	Plating	Version
	16	B	0,60	G	S1
	16	B	0,64	G	-
	16	B	0,70	G	-
	16	B	0,80	G	-
	16	B	0,80	G	L
	16	B	1,00	G	-
	16	B	1,00	G	L
	17	B	1,80	G	-
	17	K	1,80	U	-
	17	K	2,30	U	-
	17	T	1,80	N	-

H875

Receptacles for Switch Probe Series F875, F873 and F375

Receptacle H875RD

This receptacle has the same dimensions as H875, but it has a knurl for a secure seat in the drill hole.
Projection heights.

Material: Brass, gold plated

Receptacle H875KB for solderless exchange of probes

In combination with this receptacle switch probes can be exchanged solderless.

Solder temperature max. 300 °C.

Material: Brass, gold plated

Receptacle H875KB/5 for solderless exchange of probes

This receptacle is the same as H875KB, just with a collar of 5,0 mm for larger projection heights.

Solder temperature max. 300 °C.

Material: Brass, gold plated

Receptacle H875/5

This receptacle has a collar of 5,0 mm for larger projection heights.

Material: Brass, gold plated

Receptacle H875

Material: Brass, gold plated

Insulating sleeve H875IS

In combination with insulating sleeves it is possible to mount all H875 receptacles insulated into conductive material, e.g. steel. Because of the collar the projection height is increased by 0,2 mm.

The insulating sleeve can be used up to 260 °C.

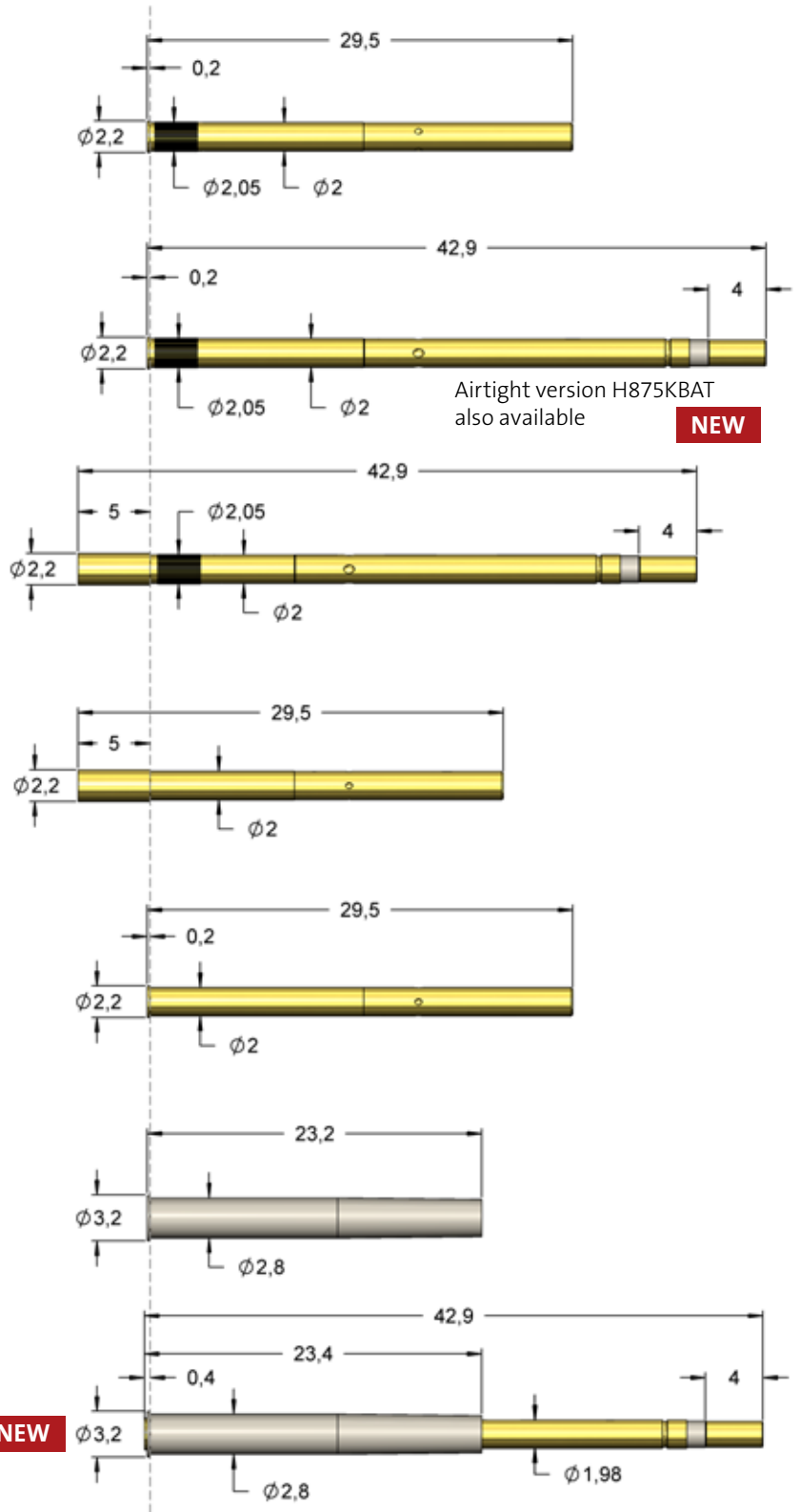
Material: Polyetheretherketone, PEEK

Insulating sleeve H875KBIS for solderless exchange of probes

In combination with insulating sleeves it is possible to mount all H875 receptacles insulated into conductive material, e.g. steel.

The insulating sleeve can be used up to 260 °C.

Material: Polyetheretherketone, PEEK



Drill Size (mm)

Receptacle without knurl	1,99 - 2,00
Receptacle with knurl	2,00 - 2,02
Insulating sleeve	2,78 - 2,79

For inserting the receptacles the tool
FEWZ-772E0 can be used.

F375 (NO)

Switch Probe 100 mil Long Version, Threaded

Centers (mm/mil)	2,54 / 100
Contin. current	5,0 A
Current (Switch)	1,0 A
R typ	50 mOhm
Temperature	-45°C...+100°C

Spring Force (cN ±20%)

Version	Preload	Nominal
Standard	30	200

Travel (mm)

Version	Nominal	Maximum
Standard	8,0	9,5
Switch Travel (mm)		1,5
Thread (M)		1,6
Wrench Size		1,7

Materials and Plating

Plunger	see Tip Style
Barrel	Brass, gold plated
Spring	Music wire, gold plated
Receptacles	Brass, gold plated

Accessories

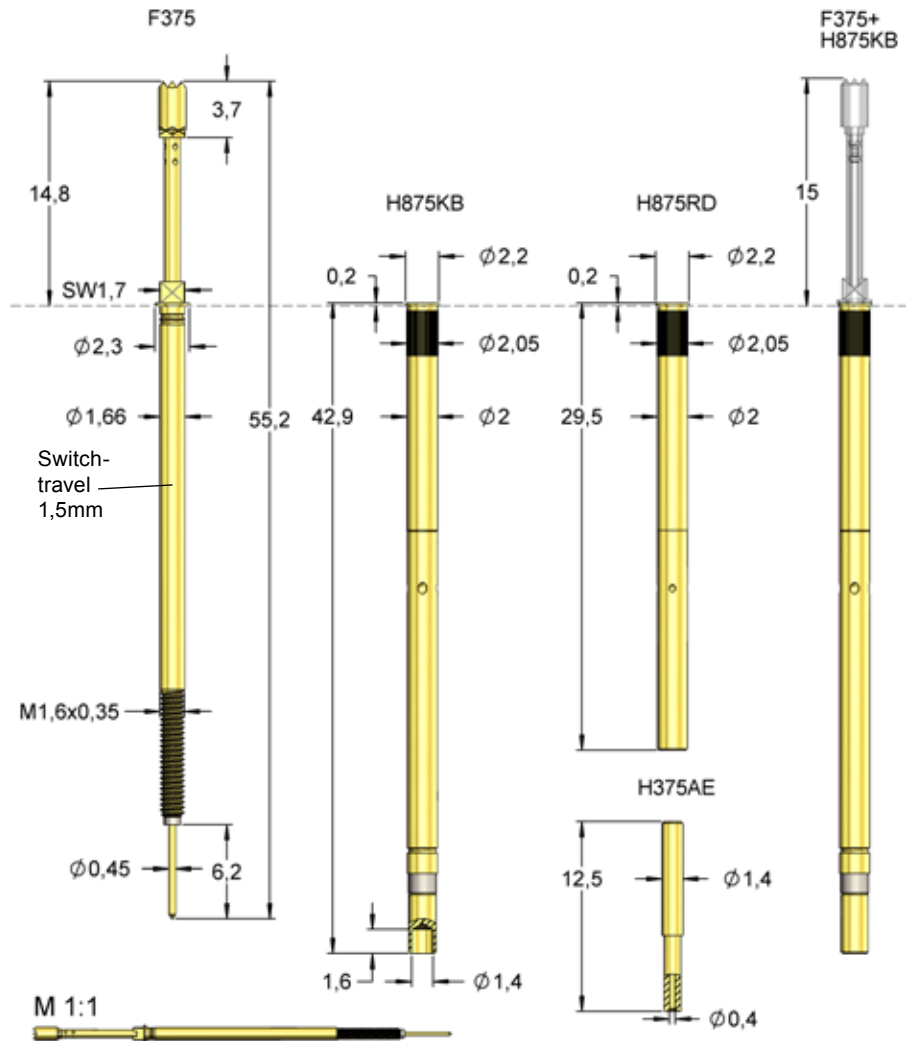
Insertion tool receptacle	FEWZ-772E0
Screw-in tool probe	FWZ732 (T) max. Ø 2,0 mm
Screw-in tool probe	FWZ732S1 (T) max. Ø 2,7 mm

Drill Size (mm)

Receptacle without knurl	1,99 - 2,00
Receptacle with knurl	2,02 - 2,03

Projection Height (mm)

F375 and receptacle with collar height 0,2mm	15,0 - 20,0
F375 and receptacle with collar height 5,0mm	19,8 - 24,8



The probe F375 can be height adjusted by 5,0 mm, independently from the used receptacle. It is held in its position by pressure marks. For further receptacles see datasheet H875.

Series	Tip-Ø	Spring Force (cN)
F375	06	B 180 G 200
Tip Style	Material	Plating

Material: B = BeCu
Tip-Ø: 180 = 1,80 mm (e.g.)
Plating: G = Gold plated
Receptacle: Order code according drawing

Tip Style	Number	Material	Ø in mm	Plating	Version
	06	B	1,80	G	-
	17	B	1,80	G	-

SWITCH PROBES

F884 (NO)

Switch Probe 138 mil Plug-In

Centers (mm/mil)	3,50 / 138
Contin. current	10,0 A
Current (Switch)	1,0 A
R typ	50 mOhm
Temperature	-45°C...+100°C

Spring Force (cN ±20%)

Version	Preload	Nominal
LM	50	200
LM	80	350
SM	50	200
SM	80	350
SM	220	900

Travel (mm)

Version	Nominal	Maximum
LM	4,0	5,0
SM	4,0	5,0
Switch Travel (mm)		1,7

Materials and Plating

Plunger	see Tip Style
Barrel	Brass, gold plated
Spring	Music wire, silver plated
Receptacles	Brass, gold plated

Accessories

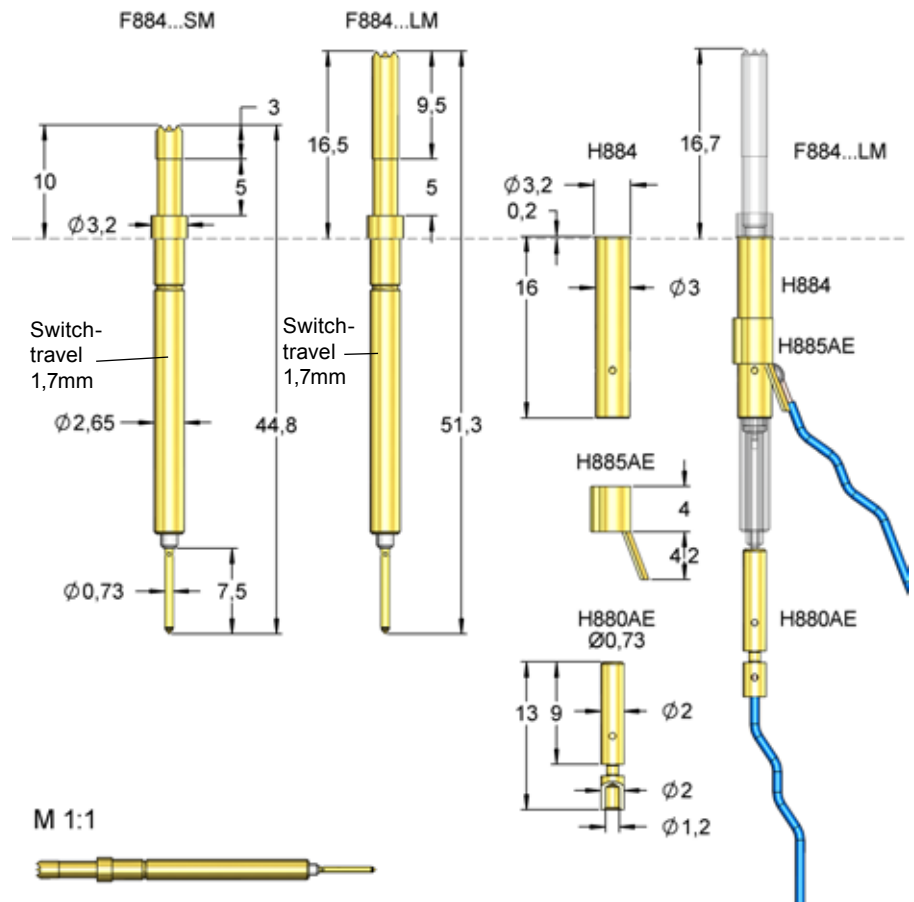
Insertion tool receptacle	FEWZ-774E0
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Drill Size (mm)

Receptacle without knurl	2,98 - 2,99
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Projection Height (mm)

H884 / H884/23 with F884...SM	10,2
H884 / H884/23 with F884...LM	16,7



Series	Tip-Ø	Spring Force (cN)
F884	06	B 100 G 350 SM
Tip Style	Material	Plating

Material:	B = BeCu, K = Synthetic
Tip-Ø:	100 = 1,00 mm (e.g.)
Plating:	G = Gold plated, U = Unplated
Version:	SM = Short version, LM = Long version
Receptacle:	Order code according drawing

Tip Style	Number	Material	Ø in mm	Plating	Version
	06	B	1,00	G	LM
	06	B	1,00	G	SM
	06	B	2,30	G	LM
	06	B	2,30	G	SM
	17	B	2,30	G	SM
	17	B	3,00	G	SM
	17	K	3,00	U	SM

SWITCH PROBES

F880 (NO)

Switch Probe for Backward Assembly, Threaded



Centers (mm/mil)	3,50 / 138
Contin. current	10,0 A
Current (Switch)	1,0 A
R typ	50 mOhm
Temperature	-45°C...+100°C

Spring Force (cN ±20%)

Version	Preload	Nominal
Standard	80	350
L	50	150
L	80	350

Travel (mm)

Version	Nominal	Maximum
Standard	4,0	5,0
L	4,0	5,0
Switch Travel (mm)		1,7
Thread (M)		2,5x0,35
Wrench Size		2,2

Materials and Plating

Plunger	see Tip Style
Barrel	Brass, gold plated
Spring	Music wire, silver plated
Receptacles	Brass, gold plated

Accessories

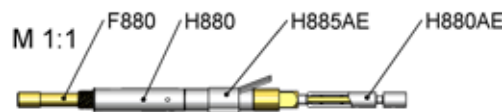
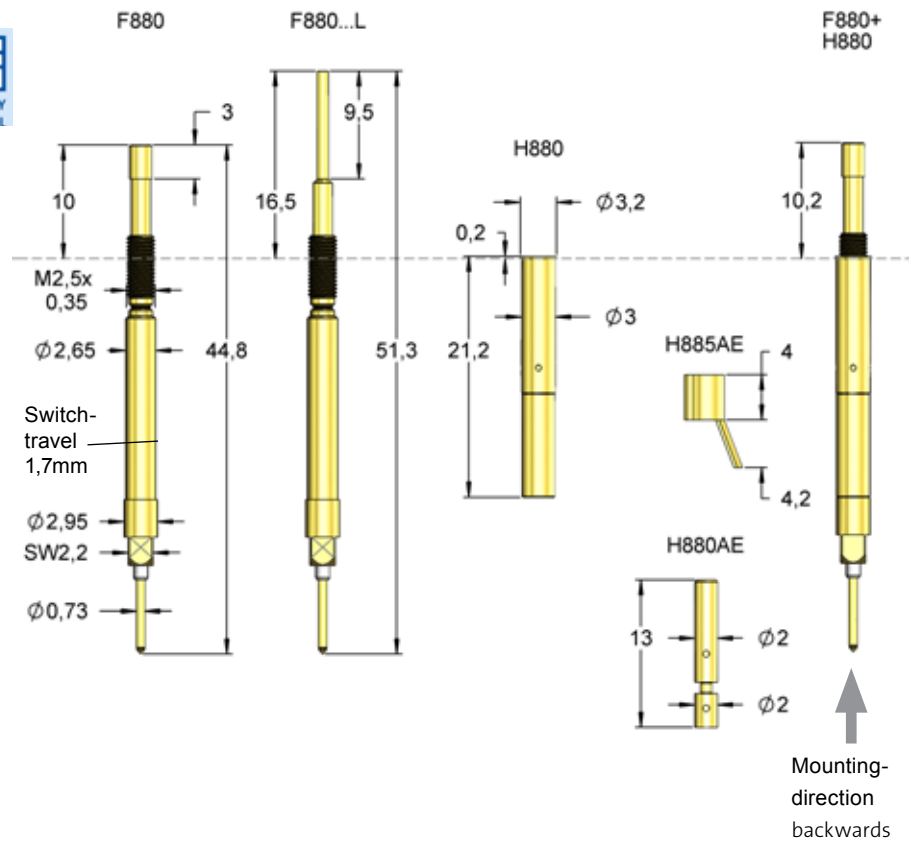
Insertion tool receptacle	FEWZ-774E0
Screw-in tool probe	FWZVF3 (T)
Screw-in tool with LED	FWZ880SA

Drill Size (mm)

H880	2,98-2,99
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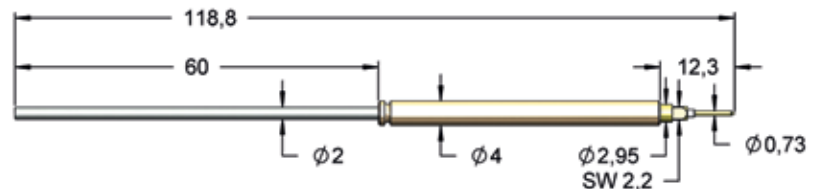
Projection Height (mm)

H880 with F880	6,2 - 10,2
H880 with F880...L	12,7 - 16,7



The probe F880 can be mounted and exchanged from backwards, which can be useful for modules that are difficult to access, e.g. a second level of a test module. The projection height is adjustable with the thread about 4,0mm.

Special version 1860S206



For the special version 1860S206 the probe F88016B100G150L was built up with an extension in a brass receptacle. Datasheet available on request.

Series	Tip-Ø	Spring Force (cN)
F880 16 B 100 G 150 L		
Tip Style	Material	Plating
		Version

Material: B = BeCu
Tip-Ø: 100 = 1,00 mm (e.g.)
Plating: G = Gold plated
Version: L = Long version
Receptacle: Order code according drawing

Tip Style	Number	Material	Ø in mm	Plating	Version
	16	B	1,00	G	L
	17	B	2,00	G	-

F881 (NO)

Electrically Isolated
Switch Probe, Threaded



Centers (mm/mil)	3,50 / 138
Contin. current	10,0 A
Current (Switch)	1,0 A
R typ	25 mOhm
Temperature	-45°C...+100°C

Spring Force (cN ±20%)

Version	Preload	Nominal
Standard	80	380

Travel (mm)

Version	Nominal	Maximum
Standard	4,0	5,0
Switch Travel (mm)		1,7
Thread (M)		2,5
Wrench Size		2,6

Materials and Plating

Plunger	see Tip Style
Barrel	Brass, gold plated
Spring	Music wire, silver plated
Receptacles	Brass, gold plated

Accessories

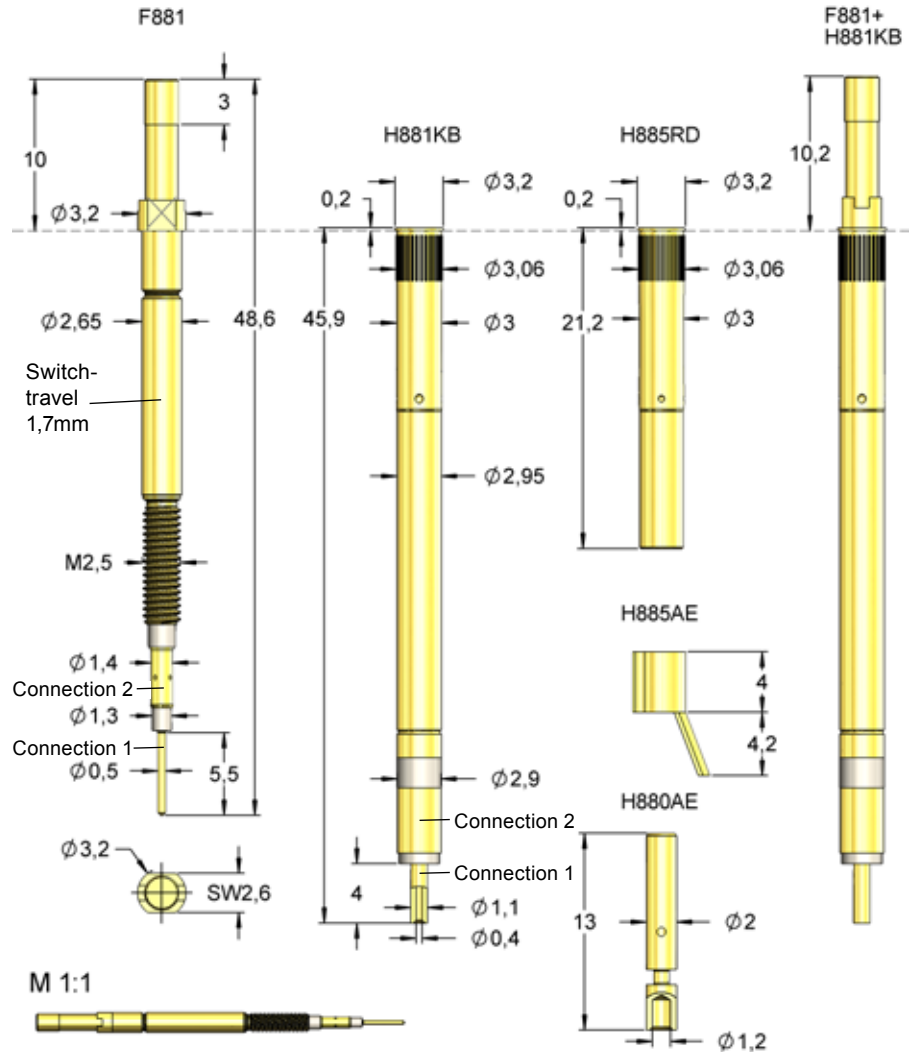
Insertion tool receptacle	FEWZ-774E0
	FWZ885 (T)
Screw-in tool probe	FWZ885L (T)
	max. Ø2,5 mm
Screw-in tool probe	FWZ885S1 (T)
	max. Ø3,1 mm

Drill Size (mm)

Receptacle with knurl	3,00 - 3,02
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Projection Height (mm)

H881KB with F881	10,2 - 12,2
H885 / H885RD with F881	10,2 - 15,2
H885/5 with F881	15,0 - 20,0



The probe F881 can be height adjusted by 5,0 mm, independently from the used receptacle. It is held in its position by pressure marks. For further receptacles see datasheet H885.

Series	Tip-Ø	Spring Force (cN)
F881	05	B 230 G 380
	Tip Style	Material Plating Version

Material: B = BeCu
Tip-Ø: 230 = 2,30 mm (e.g.)
Plating: G = Gold plated
Receptacle: Order code according drawing

Tip Style	Number	Material	Ø in mm	Plating	Version
	05	B	2,30	G	-
	05	B	3,00	G	-
	06	B	2,30	G	-
	06	B	3,00	G	-
	17	B	2,30	G	-
	17	B	3,00	G	-

SWITCH PROBES

F883 (NC)

Switch Probe 138 mil Opener, Threaded

Centers (mm/mil)	3,50 / 138
Contin. current	10,0 A
Current (Switch)	1,0 A
R typ	50 mOhm
Temperature	-45°C...+100°C

Spring Force (cN ±20%)

Version	Preload	Nominal
LM	40	230
SM	40	230

Travel (mm)

Version	Nominal	Maximum
LM	4,0	5,0
SM	4,0	5,0
Switch Travel (mm)		1,7
Thread (M)		2,5
Wrench Size		2,6

Materials and Plating

Plunger	see Tip Style
Barrel	Brass, gold plated
Spring	Music wire, silver plated
Receptacles	Brass, gold plated

Accessories

Insertion tool receptacle	FEWZ-774E0
Screw-in tool probe	FWZ885 (T) FWZ885L (T) max. Ø2,5 mm
Screw-in tool probe	FWZ885S1 (T) max. Ø3,1 mm

Drill Size (mm)

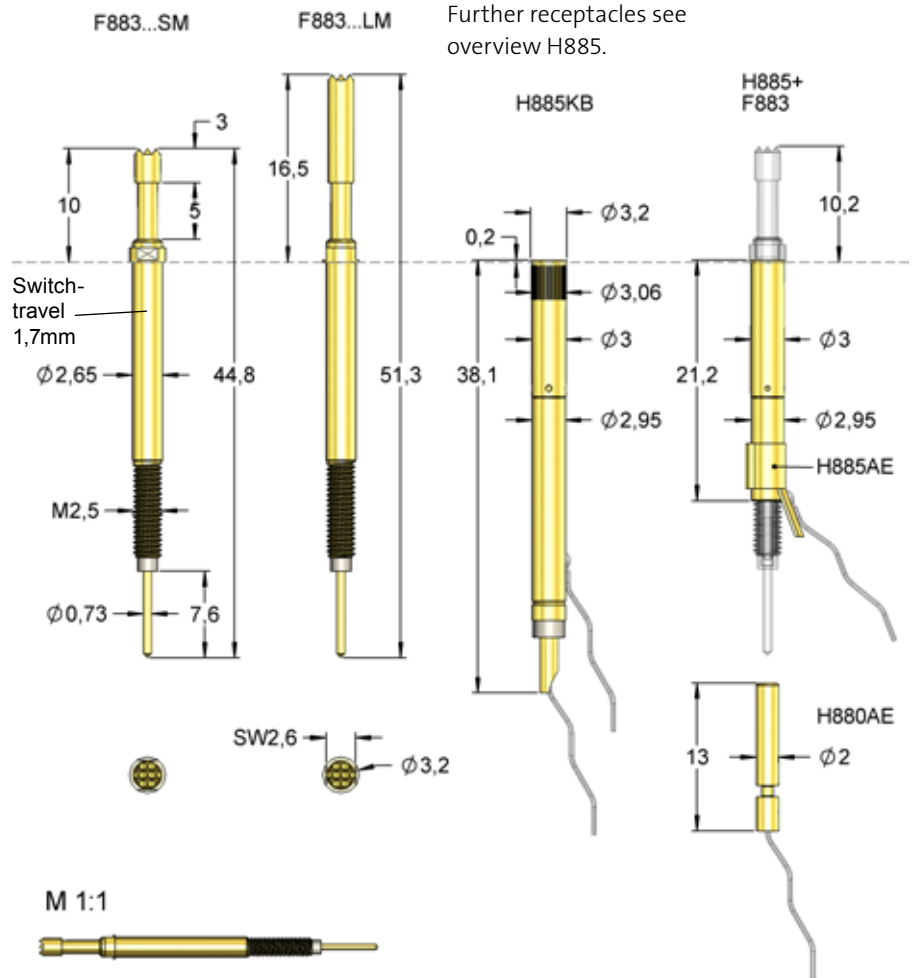
Receptacle without knurl	2,98 - 2,99
Receptacle with knurl	3,00 - 3,02

Projection Height (mm)

F883...SM and receptacle with collar height 0,2mm	10,2 - 15,2
F883...SM and receptacle with collar height 5,0mm	15,0 - 20,0
F883...LM and receptacle with collar height 0,2mm	16,7 - 21,7
F883...LM and receptacle with collar height 5,0mm	21,5 - 26,5

Series	Tip-Ø	Spring Force (cN)
F883	05	B
		230
		G
		230
		SM

Material:	B = BeCu, K = Synthetic
Tip-Ø:	230 = 2,30 mm (e.g.)
Plating:	G = Gold plated, U = Unplated
Version:	SM = Short version, LM = Long version
Receptacle:	Order code according drawing



Further receptacles see overview H885.

The probe F883 can be height adjusted by 5,0 mm, independently from the used receptacle. It is held in its position by pressure marks. Versions with switch travel 0,5 mm available on request.

Tip Style	Number	Material	Ø in mm	Plating	Version
	05	B	2,30	G	SM
	06	B	2,30	G	LM
	06	B	2,30	G	SM
	16	B	1,80	G	SM
	17	B	2,30	G	SM
	17	K	2,30	U	SM

F885 (NO)

Switch Probe 138 mil Threaded

Centers (mm/mil)	3,50 / 138
Contin. current	10,0 A
Current (Switch)	1,0 A
R typ	50 mOhm
Temperature	-45°C...+100°C

Spring Force (cN ±20%)

Version	Preload	Nominal
LM	50	200
LM	80	350
LM	240	550
LM	220	900
LM	300	1250
SM	30	70
SM	50	200
SM	80	350
SM	240	550
SM	220	900
SM	300	1250
S2	80	350

Travel (mm)

Version	Nominal	Maximum
Standard	4,0	5,0
Switch Travel (mm)		1,7
Thread (M)		2,5
Wrench Size		2,6

Materials and Plating

Plunger	see Tip Style
Barrel	Brass, gold plated
Spring	Music wire, silver plated
Receptacles	Brass, gold plated

Accessories

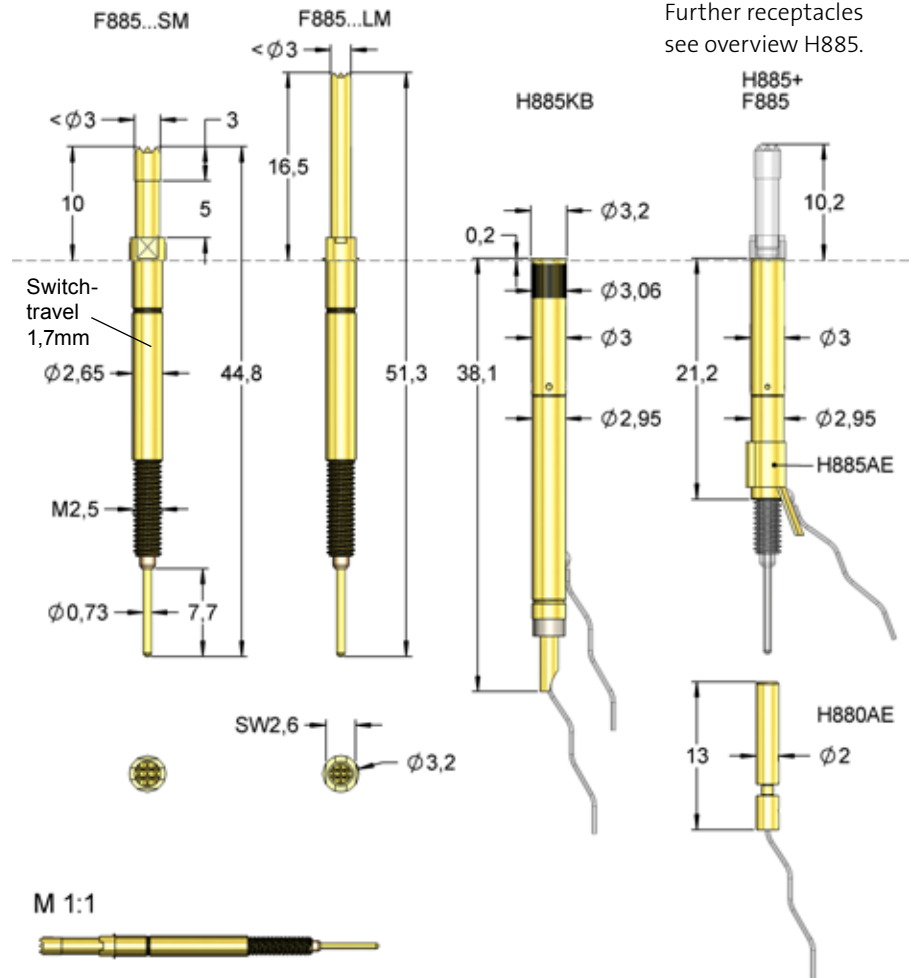
Insertion tool receptacle	FEWZ-774E0 FWZ885 (T)
Screw-in tool probe	FWZ885L (T) max. Ø2,5 mm
Screw-in tool probe	FWZ885S1 (T) max. Ø3,1 mm

Drill Size (mm)

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

Series	Tip-Ø	Spring Force (cN)
F885	03	B
		080
		G
		135
		SM
	Tip Style	Material
		Plating
		Version

Material: B = BeCu, K = Synthetic
Tip-Ø: 080 = 0,80 mm (e.g.)
Plating: G = Gold plated, U = Unplated
Version: SM = Short version, LM = Long version
Receptacle: Order code according drawing



Further receptacles
see overview H885.

The probe F885 can be height adjusted by 5,0 mm independently from the used receptacle. It is held in its position by pressure marks. Versions with switch travel 3,5 mm available on request.
 The version with spring force 1250 cN has a reduced maximum travel of 4,2 mm.

Tip Style	Number	Material	Ø in mm	Plating	Version
	03	B	0,80	G	SM
	05	B	2,30	G	LM
	05	B	2,30	G	SM
	05	B	3,00	G	LM
	05	B	3,00	G	SM
	06	B	0,70	G	SM
	06	B	1,00	G	LM
	06	B	1,00	G	SM
	06	B	1,30	G	SM
	06	B	1,30	G	S2
	06	B	1,40	G	LM














SWITCH PROBES

F885 (NO)

Switch Probe 138 mil Threaded

Projection Height (mm)

F885...SM and receptacle with collar height 0,2mm	10,2 - 15,2
F885...SM and receptacle with collar height 5,0mm	15,0 - 20,0
F885...LM and receptacle with collar height 0,2mm	16,7 - 21,7
F885...LM and receptacle with collar height 5,0mm	21,5 - 26,5

Tip Style	Number	Material	Ø in mm	Plating	Version
	06	B	1,80	G	LM
	06	B	1,80	G	SM
	06	B	2,30	G	LM
	06	B	2,30	G	SM
	16	B	1,00	G	LM
	16	B	1,00	G	SM
	16	B	1,20	G	LM
	16	B	1,40	G	SM
	16	B	1,80	G	SM
	17	B	2,30	G	SM
	17	K	2,30	U	LM
	17	K	2,30	U	SM
	55	B	2,30	G	LM

F886 (NO)

Switch Probe 138 mil Threaded

Further receptacles
see overview H885.

Centers (mm/mil)	> 3,50 / 138
Contin. current	10,0 A
Current (Switch)	1,0 A
R typ	50 mOhm
Temperature	-45°C...+100°C

Spring Force (cN ±20%)

Version	Preload	Nominal
LM	30	70
LM	30	120
LM	50	200
LM	80	350
LM	220	900
SM	30	70
SM	30	120
SM	50	200
SM	80	350
SM	240	550
SM	220	900
SM	300	1250

Travel (mm)

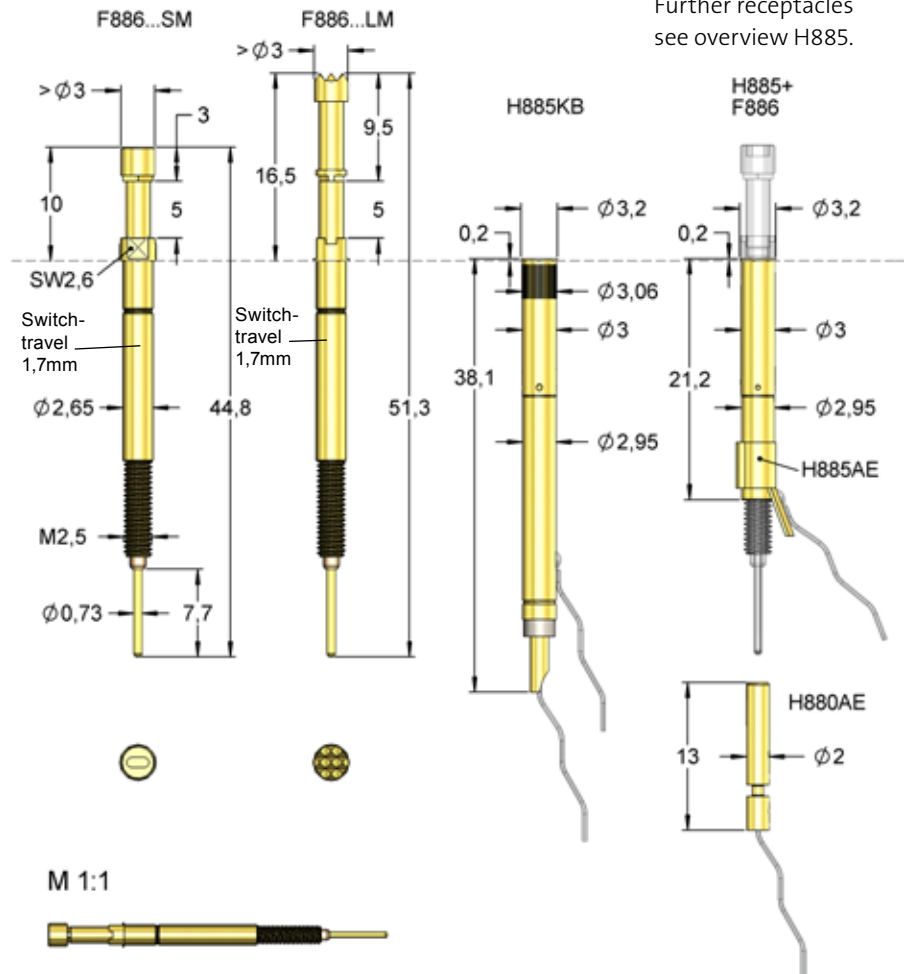
Version	Nominal	Maximum
Standard	4,0	5,0
Switch Travel (mm)		1,7
Thread (M)		2,5
Wrench Size		2,6

Materials and Plating

Plunger	see Tip Style
Barrel	Brass, gold plated
Spring	Music wire, silver plated
Receptacles	Brass, gold plated

Accessories

Insertion tool receptacle	FEWZ-774E0
Screw-in tool probe	FWZ885S1 max. Ø3,1 mm
Screw-in tool probe	FWZ760S1 max. Ø4,0 mm
Screw driver	FWZ886S2



The probe F886 can be height adjusted by 5,0 mm, independently from the used receptacle. It is held in its position by pressure marks. For higher order volumes also versions with 3,5 mm switch travel are possible on request (e.g. F88617B300G-900SM35).

* Center differing from standard.

Tip Style	Number	Material	Ø in mm	Plating	Version
	06	B	3,00	G	LM
	06	B	3,00	G	SM
	06	B	4,00 *	G	SM
	17	B	3,00	G	LM
	17	B	3,00	G	SM
	17	B	3,50 *	G	LM
	17	B	3,50 *	G	SM
	17	B	4,00 *	G	LM
	17	B	4,00 *	G	SM
	17	B	4,50 *	G	LM
	17	B	4,50 *	G	SM

Series	Tip-Ø	Spring Force (cN)
F886	17	T
		350
		N
		350
		SM

Material:	B = BeCu, K = Synthetic, H = Synthetic head with ring, T = BeCu head isolated, Gold plated
Tip-Ø:	350 = 3,50 mm (e.g.)
Plating:	G = Gold plated, N = Nickel plated, U = Unplated
Version:	SM = Short version, LM = Long version
Receptacle:	Order code according drawing

F886 (NO)

Switch Probe 138 mil Threaded

Drill Size (mm)

Receptacle without knurl 2,98 - 2,99

Receptacle with knurl 3,00 - 3,02





























Projection Height (mm)

F886...SM and receptacle
with collar height 0,2mm 10,2 - 15,2

F886...SM and receptacle
with collar height 5,0mm 15,0 - 20,0

F886...LM and receptacle
with collar height 0,2mm 16,7 - 21,7

F886...LM and receptacle
with collar height 5,0mm 21,5 - 26,5

Tip Style	Number	Material	Ø in mm	Plating	Version
	17	B	5,00 *	G	SM
	17	B	5,50 *	G	SM
	17	B	5,90 *	G	LM
	17	B	5,90 *	G	SM
	17	H	3,00	U	LM
	17	H	3,00	U	SM
	17	H	3,50 *	U	LM
	17	H	3,50 *	U	SM
	17	H	4,00 *	U	LM
	17	H	4,00 *	U	SM
	17	H	4,50 *	U	LM
	17	H	4,50 *	U	SM
	17	H	5,00 *	U	LM
	17	H	5,00 *	U	SM
	17	H	5,50 *	U	SM
	17	H	6,00 *	U	SM
	17	K	3,00	U	LM
	17	K	3,00	U	SM
	17	K	3,50 *	U	LM
	17	K	3,50 *	U	SM
	17	K	4,00 *	U	SM
	17	K	4,50 *	U	SM
	17	K	5,00 *	U	SM
	17	K	5,50 *	U	SM
	17	K	5,90 *	U	SM
	17	T	3,00	N	SM
	17	T	3,50 *	N	SM
	17	T	5,00 *	N	SM

H885

Receptacles for Switch Probe Series F883, F885, F886, F485, F486 and F385

Receptacle H885RD

This receptacle has the same dimensions as H885, but it has a knurl for a secure seat in the drill hole.
Projection heights.

Material: Brass, gold plated

Receptacle H885KB for solderless exchange of probes

In combination with this receptacle switch probes can be exchanged solderless.
Solder temperature max. 300 °C.

Material: Brass, gold plated

Receptacle H885KB/5 for solderless exchange of probes

This receptacle is the same as H885KB, just with a collar of 5,0 mm for larger projection heights.
Solder temperature max. 300 °C.

Material: Brass, gold plated

Receptacle H885/5

This receptacle has a collar of 5,0 mm for larger projection heights.

Material: Brass, gold plated

Receptacle H885

Material: Brass, gold plated

Insulating sleeve H885IS

In combination with insulating sleeves it is possible to mount all H885 receptacles insulated into conductive material, e.g. steel. Because of the collar the projection height is increased by 0,2 mm.

The insulating sleeve can be used up to 260 °C.

Material: Polyetheretherketone, PEEK

Insulating sleeve H885KBIS for solderless exchange of probes

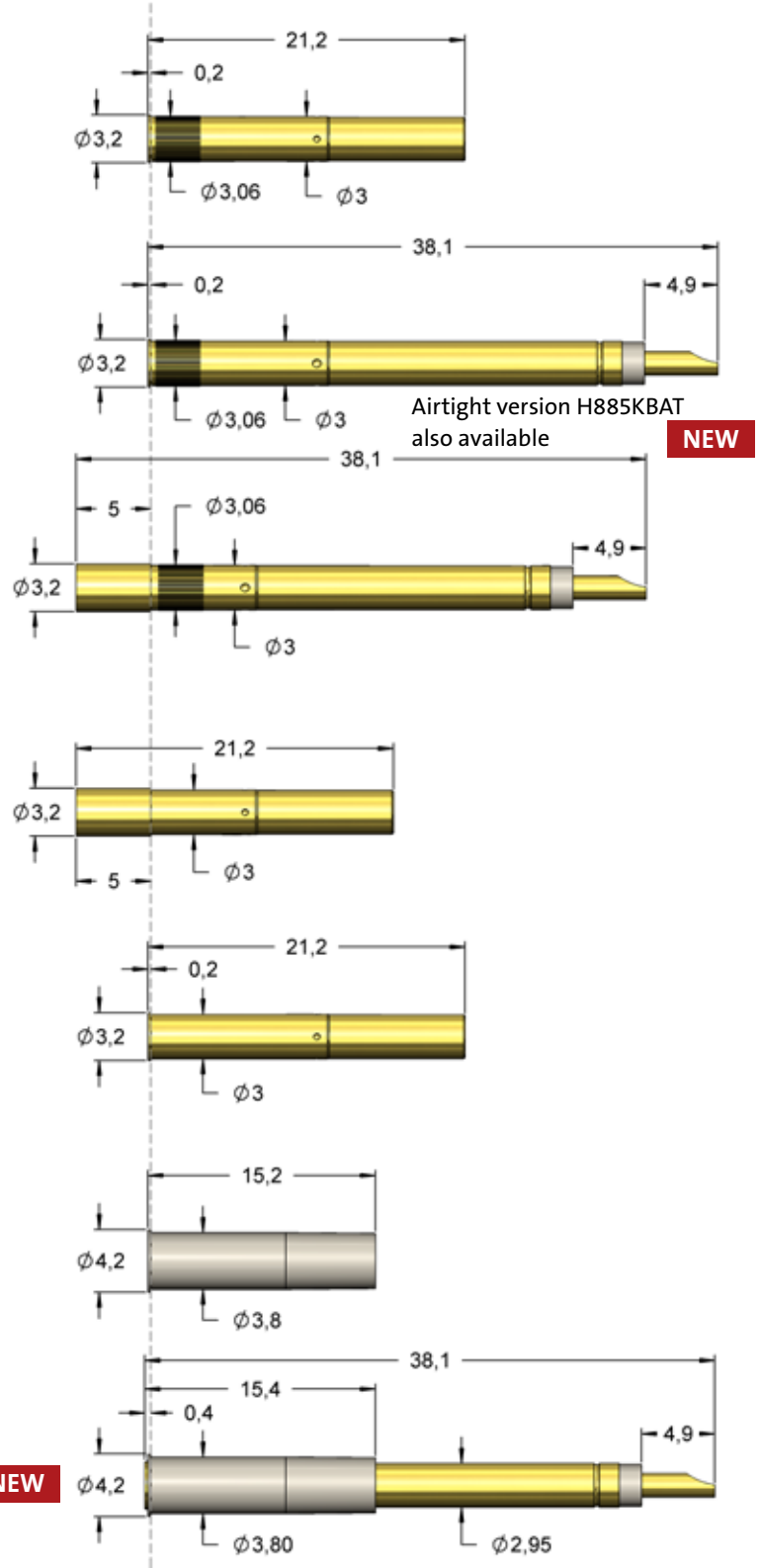
In combination with insulating sleeves it is possible to mount all H885 receptacles insulated into conductive material, e.g. steel.

The insulating sleeve can be used up to 260 °C.

Material: Polyetheretherketone, PEEK

Drill Size (mm)

Receptacle without knurl	2,98 - 2,99
Receptacle with knurl	3,00 - 3,02
Insulating sleeve	3,78 - 3,79



For inserting the receptacles the tool
FEWZ-774E0 can be used.

SWITCH PROBES

F385 (NO)

Switch Probe 157 mil Long Version, Threaded

Centers (mm/mil)	4,00 / 157
Contin. current	10,0 A
Current (Switch)	1,0 A
R typ	50 mOhm
Temperature	-45°C...+100°C

Spring Force (cN ±20%)

Version	Preload	Nominal
Standard	40	200

Travel (mm)

Version	Nominal	Maximum
Standard	9,0	11,0
Switch Travel (mm)		1,7
Thread (M)		2,5
Wrench Size		2,6

Materials and Plating

Plunger	see Tip Style
Barrel	Brass, gold plated
Spring	Music wire, silver plated
Receptacles	Brass, gold plated

Accessories

Insertion tool receptacle	FEWZ-774E0
Screw-in tool probe	FWZ760S1

Drill Size (mm)

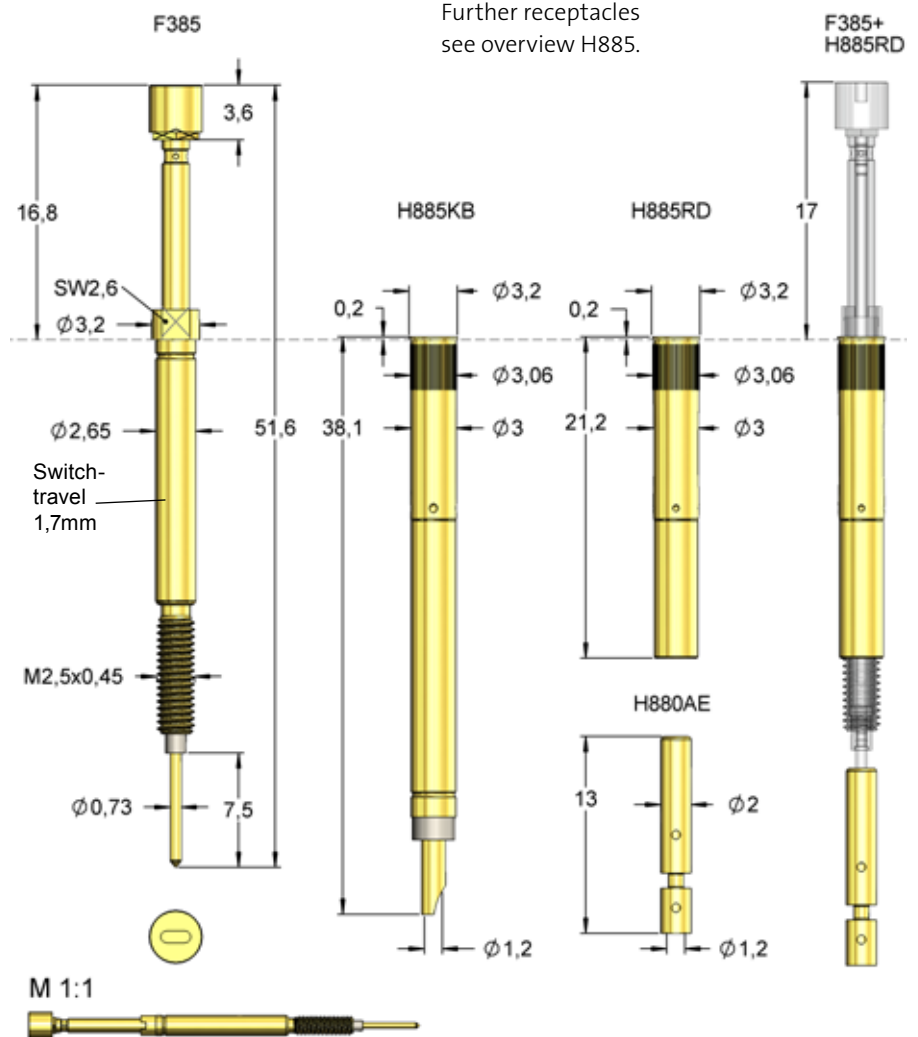
Receptacle without knurl	2,98 - 2,99
Receptacle with knurl	3,00 - 3,02

Projection Height (mm)

F385 and receptacle with collar height 0,2mm	17,0 - 22,0
F385 and receptacle with collar height 5,0mm	21,8 - 26,8

Series	Tip-Ø	Spring Force (cN)
F385 06 B 350 G 200		
Tip Style	Material	Plating
		Version

Material: B = BeCu
Tip-Ø: 350 = 3,50 mm (e.g.)
Plating: G = Gold plated
Receptacle: Order code according drawing



Further receptacles
see overview H885.

The probe F385 can be height adjusted by 5,0 mm independently from the used receptacle. It is held in its position by pressure marks.

Tip Style	Number	Material	Ø in mm	Plating	Version
	06	B	3,50	G	-
	17	B	3,50	G	-

F887 (NO)

Switch Probe 157 mil Short Version, Threaded

Centers (mm/mil)	4,00 / 157
Contin. current	10,0 A
Current (Switch)	1,0 A
R typ	40 mOhm
Temperature	-45°C...+100°C

Spring Force (cN ±20%)

Version	Preload	Nominal
Standard	60	150
Standard	60	200
Standard	140	300

Travel (mm)

Version	Nominal	Maximum
Standard	4,0	5,0
Switch Travel (mm)		1,7
Thread (M)		3,0x0,35
Wrench Size		2,5

Materials and Plating

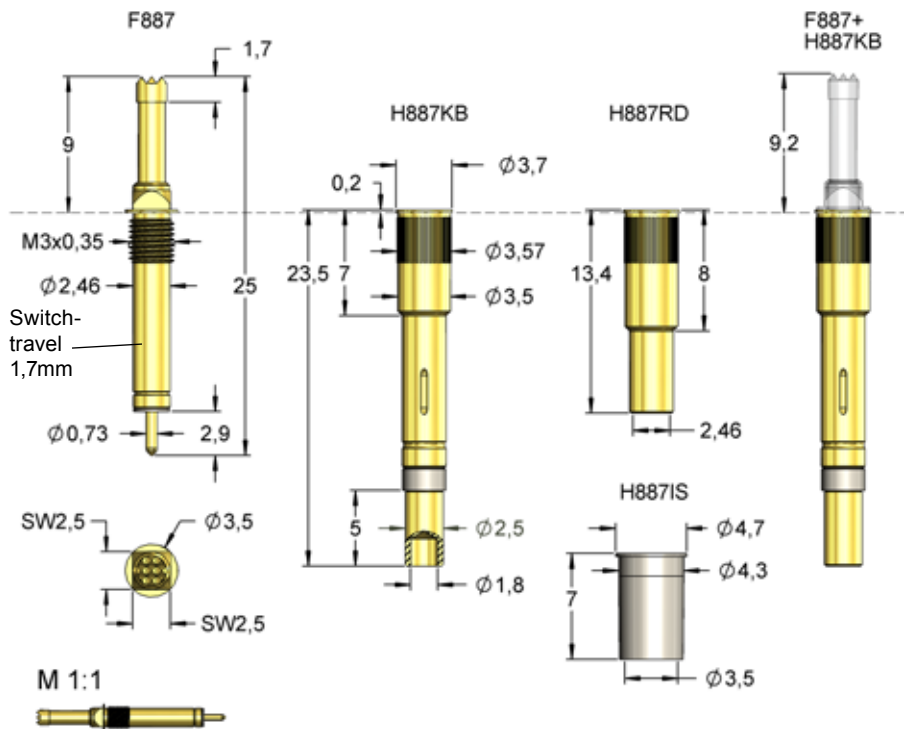
Plunger	see Tip Style
Barrel	Brass, gold plated
Spring	Music wire, silver plated
Receptacles	Brass, gold plated

Accessories

Insertion tool receptacle	FEWZ-340E0
Screw-in tool probe	FWZVF4 (T)

Drill Size (mm)

Receptacle with knurl	3,50 - 3,52
Insulating sleeve	4,28 - 4,29



The probe F887 can be height adjusted by 2,0 mm. The probe is held in its position by pressure marks. The H887IS insulating receptacle can additionally be pressed onto the H887... mounting receptacles. This also allows mounting in electrically conductive material.

Series	Tip-Ø	Spring Force (cN)
F887	06	B 200 G 150
	Tip Style	Material Plating Version

Material: B = BeCu, K = Synthetic
Tip-Ø: 200 = 2,00 mm (e.g.)
Plating: G = Gold plated, U = Unplated
Receptacle: Order code according drawing

Tip Style	Number	Material	Ø in mm	Plating	Version
	06	B	1,00	G	-
	06	B	2,00	G	-
	06	B	3,00	G	-
	16	B	1,00	G	-
	17	B	2,00	G	-
	17	B	3,00	G	-
	17	K	2,00	U	-

F419 (NO)

Switch Probe 256 mil Long Travel, Threaded

Centers (mm/mil)	6,50 / 256
Contin. current	10,0 A
Current (Switch)	1,0 A
R typ	20 mOhm
Temperature	-45°C...+100°C

Spring Force (cN ±20%)

Version	Preload	Nominal
Standard	200	400

Travel (mm)

Version	Nominal	Maximum
Standard	11,0	16,0
Switch travel (mm)		2,0
Thread (M)		4,0x0,5
Wrench Size		5,0

Materials and Plating

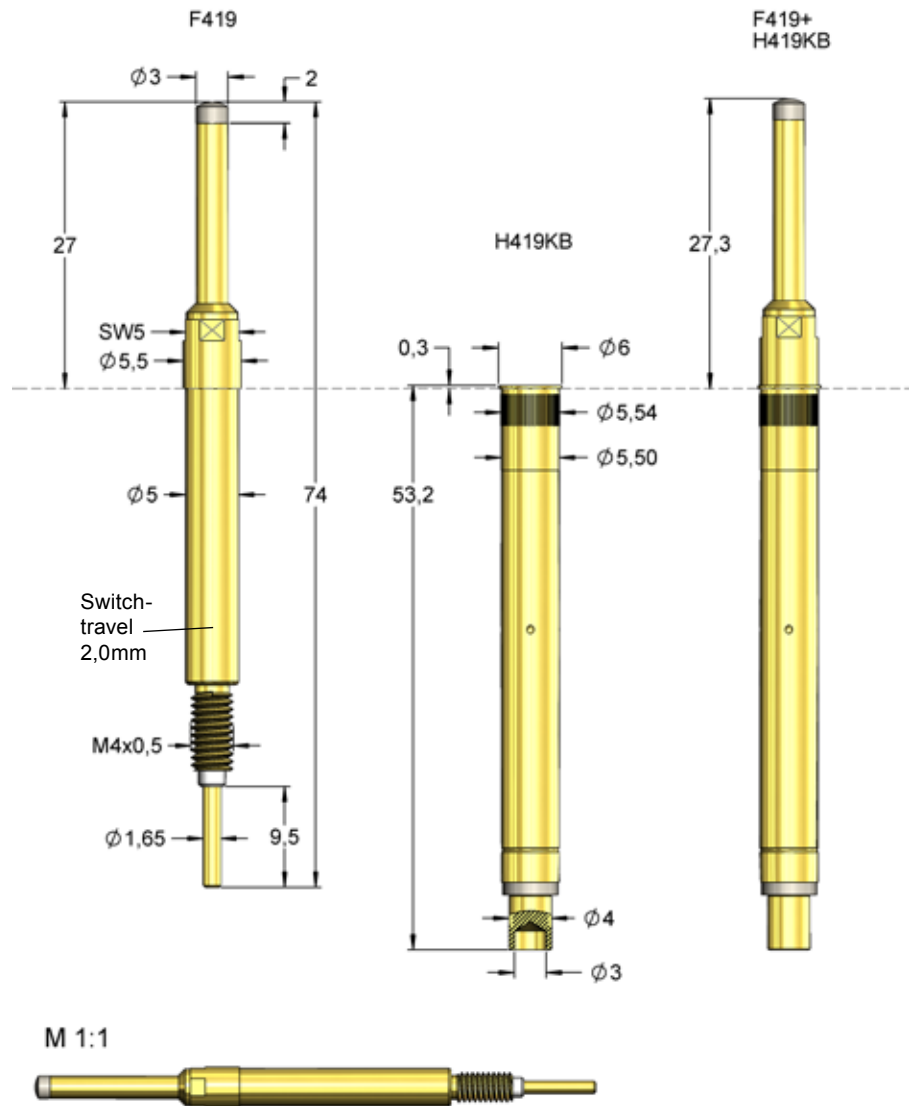
Plunger	see tip style
Barrel	Brass, gold plated
Spring	Music wire, silver plated
Receptacle	Brass, gold plated

Accessories

Insertion tool receptacle	FEWZ-340E0
Screw-in tool probe	FWZ888 (T)

Drill size (mm)

Receptacle with knurl	5,50 - 5,54
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This probe is often used for detecting if a DUT is inserted in test fixtures. The switch function of the probe is activated when the lid of the fixture closes and pushes down the DUT (switch travel of 2,0 mm). The high maximum travel of 16 mm still allows to cover the whole fixture travel of further 10 to 14 mm.

Series	Tip-Ø	Spring Force (cN)
F419	11	K 300 U 400
Tip Style	Material	Plating
		Version

Material: K = Synthetic
Tip-Ø: 300 = 3,00 mm (e.g.)
Plating: U = Unplated
Receptacle: Order Code according drawing

Tip Style	Number	Material	Ø in mm	Plating	Version
	11	K	3,00	U	-

1860S215

Push-out Probe 256 mil for Pressing-in

Centers (mm/mil)	6,50 / 256
Temperature	-45°C...+200°C (H)

Spring Force (cN ±20%)

Version	Preload	Nominal
Standard	200	400

Travel (mm)

Version	Nominal	Maximum
Standard	6,0	7,5

Materials and Plating

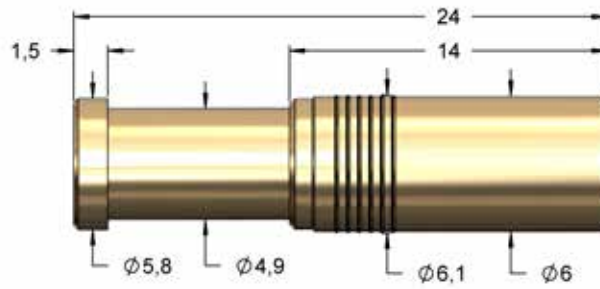
Plunger	Brass, unplated
Barrel	Brass, unplated
Spring	Stainless steel, unplated

Accessories

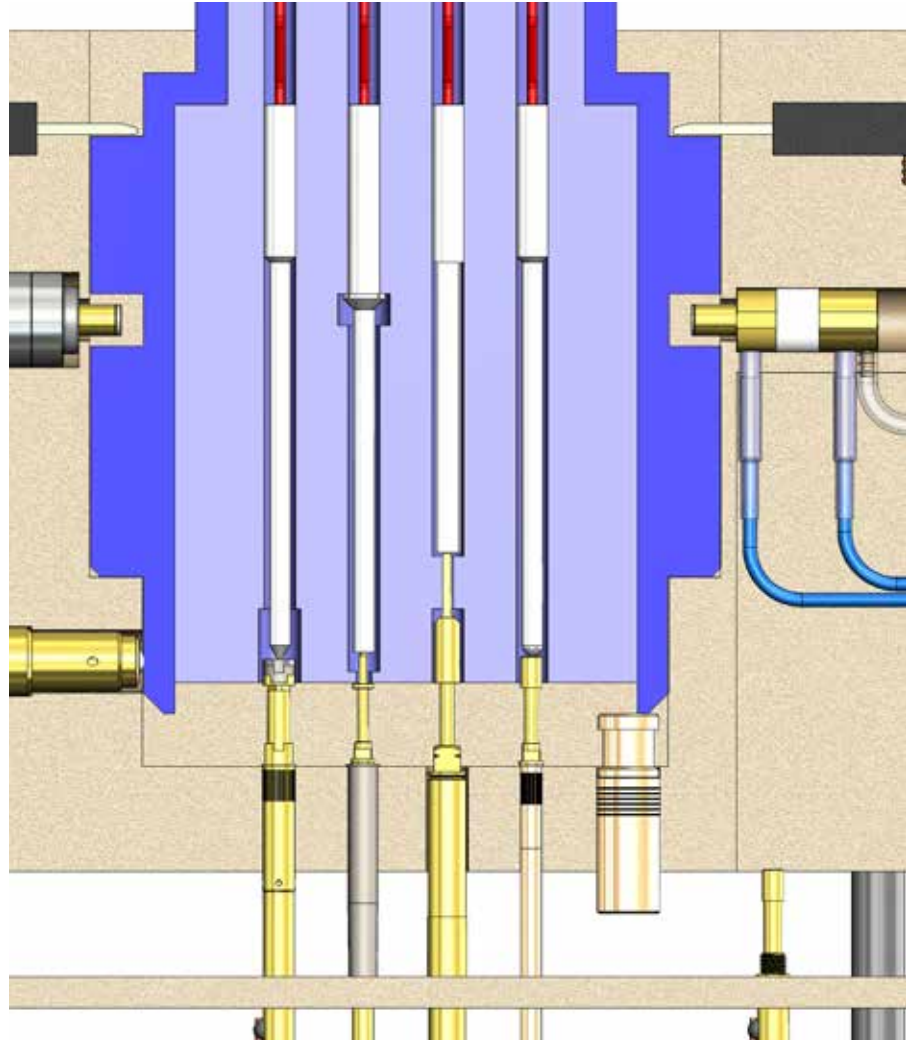
Insertion tool probe	FDWZ-650
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Drill Size (mm)

Receptacle with knurl	6,08 - 6,10
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The 1860S215 is an unplated and cost effective probe for mechanical applications, e.g. for pushing the connector out of the module after the locking is opened (see picture below).



Order code	Tip Style	Number	Material	Plating	Ø in mm	Version
1860S215		17	M	U	5,80	-



Step Probes

Step probes can be used whenever a tested contact is located in a housing or a cavity. The test principle is based on the fact that the plate comes to rest on the DUT (e.g. connector housing) after a certain penetration of the pin. If the connector element is not present or too short, no electrical contact is made.


The connector test with a step probe is very simple, but it requires the availability of certain dimensions of step probes. So a large variety of dimensions is essential.

POSITION TEST

With Standard Step Probe


Step probes allow testing the correct position of a contact element in a connector housing. If the position of the contact element is correct, the pin of the step probe creates an electrical contact to the contact element. If the contact element is too short, the plate is stopped at the connector housing and the pin does not connect to the contact element.

PLATE STANDARD



Series	Number			Spring force		
e.g. F732	16	B	0xxx	G	150	SP
	Tip Style	Material	Plating		Version	
0 =	without slot, plate-Ø smaller than wrench size					

PLATE OVERSIZED




Series	Number			Spring force		
e.g. F732	16	B	1xxx	G	150	SP
	Tip Style	Material	Plating		Version	
1 =	with slot, plate-Ø larger than wrench size					

Position Test with Partially Insulated Step Probe


Step probes with partially insulated pins allow testing coaxial or multi-pole connectors or connectors that need to be contacted in a certain depth of the connector housing only from the front side.

PLATE STANDARD, INSULATED PIN



Series	Number			Spring force		
e.g. F732	16	B	2xxx	G	150	SP
	Tip Style	Material	Plating		Version	
2 =	without slot, plate-Ø smaller than wrench size					

PLATE OVERSIZED, INSULATED PIN




Series	Number			Spring force		
e.g. F732	16	B	3xxx	G	150	SP
	Tip Style	Material	Plating		Version	
3 =	with slot, plate-Ø larger than wrench size					

Position Test with Fully Insulated Step Probe


Step probes with fully insulated pins allow testing and contacting the ring contact of connector sleeves. Only if the connector sleeve has the correct length and is not damaged or bent, the plate of the step probe creates an electrical contact.

PLATE STANDARD, FULLY INSULATED PIN



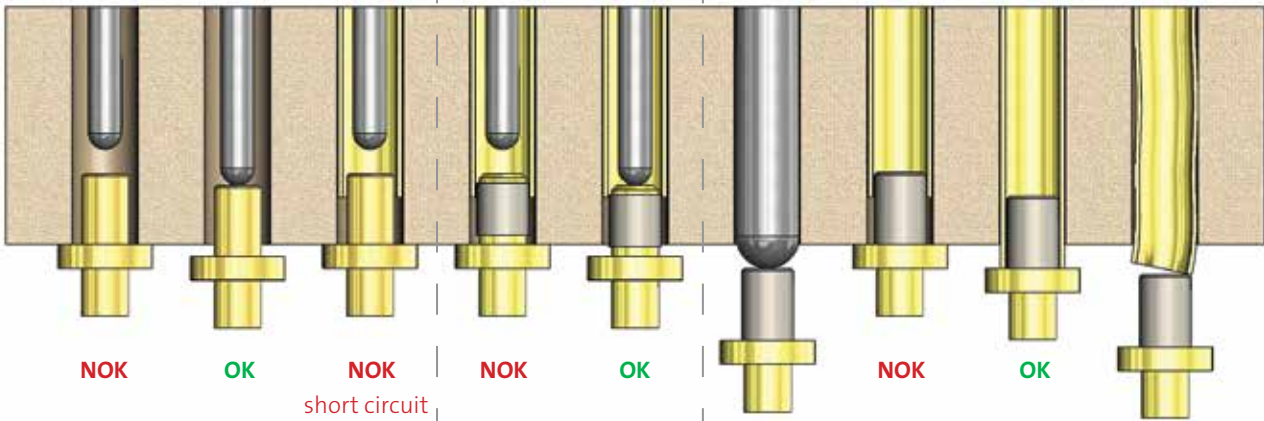
Series	Number			Spring force		
e.g. F732	16	B	4xxx	G	150	SP
	Tip Style	Material	Plating		Version	
4 =	without slot, plate-Ø smaller than wrench size					

PLATE OVERSIZED, FULLY INSULATED PIN



Series	Number			Spring force		
e.g. F732	16	B	5xxx	G	150	SP
	Tip Style	Material	Plating		Version	
5 =	with slot, plate-Ø larger than wrench size					

	standard			partially insulated			fully insulated		
Situation:	too short	OK	too short	too short	OK	wrong pin	too short	OK	bent pin
Result	NOK	OK	NOK	NOK	OK	NOK	NOK	OK	NOK
			short circuit possible						

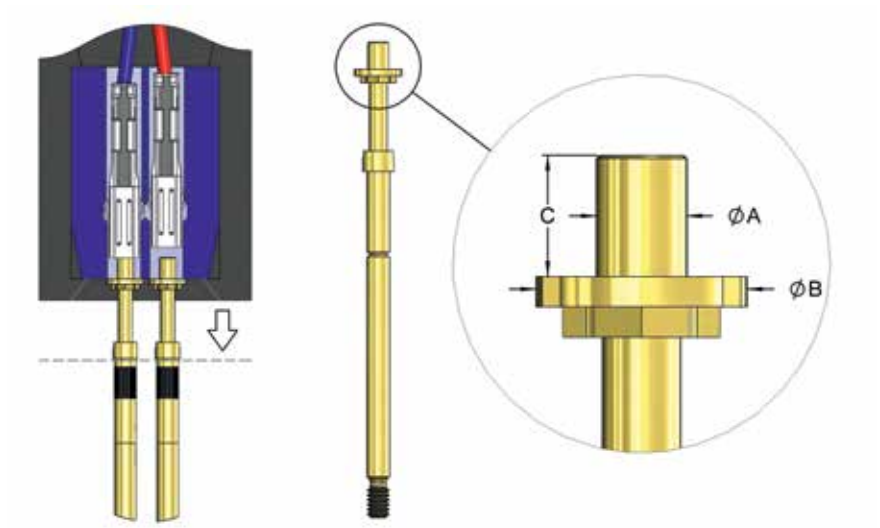


POSITION TEST

Position Test with Step Probes

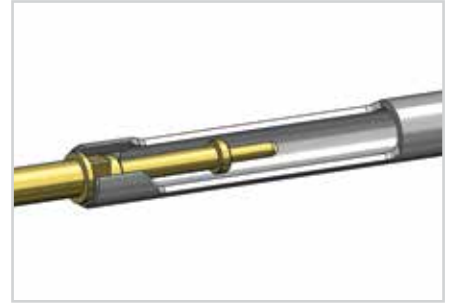
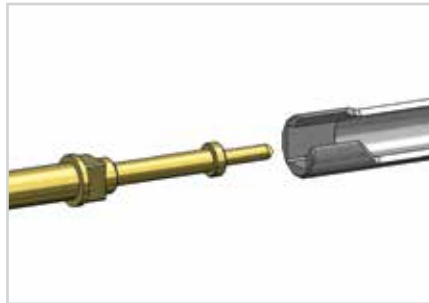
The test principle of a step probe is based on the fact that the plate comes to rest on the DUT (e.g. connector housing) and thereby a defined penetration of the pin in the connector housing is given. The pin of the step probe identifies the presence and/or the correct position of the contact element by contacting.

FEINMETALL offers a great variety of step probes with different diameters and pin lengths.



Standard Screw-in Tool 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.



Innovative 3-Point Screw-in Tool

For step probes with oversized plates (plate- ϕ larger than probe- ϕ or wrench size), FEINMETALL has developed a 3-point-tool that allows mounting the probes even at very small centers. But also in other applications with limited space this tool can be a good alternative to the standard tool.



F720SP

Step Probe 50 mil
with continuous plunger

NEW

Centers (mm/mil)	1,27 / 50
Contin. current	3,0 A
R typ	<50 mOhm
Temperature	-45°C...+100°C

Spring Force (cN ±20%)

Version	Preload	Nominal
SP	50	110

Federwege (mm)

Version	Nominal	Maximum
SP	4,0	4,8
Thread (M)	0,9x0,175	
Wrench Size	1,0	

Materials and Plating

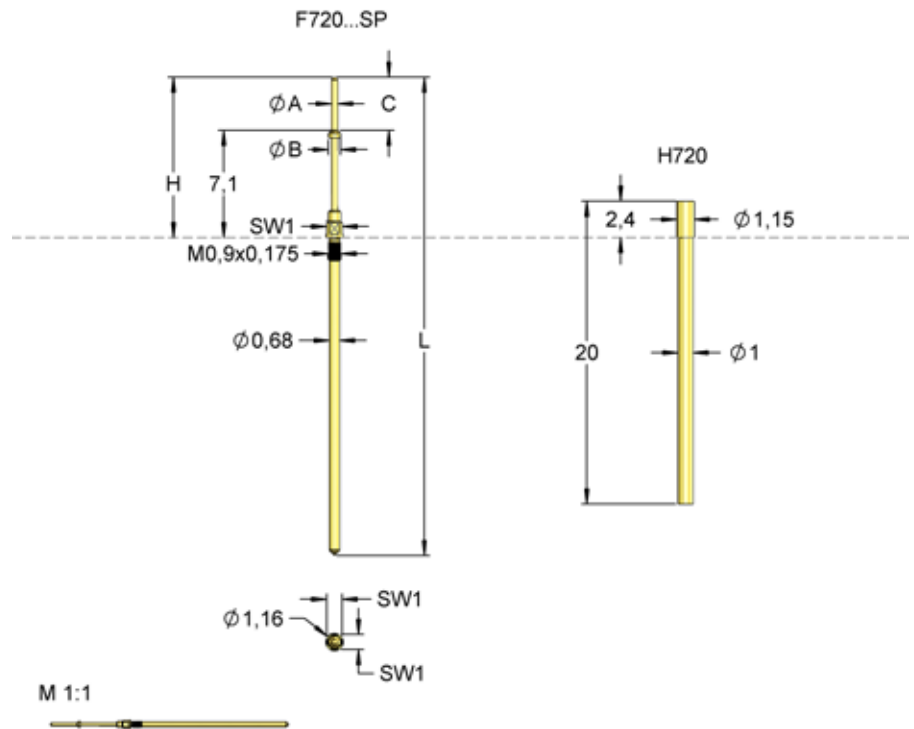
Plunger	BeCu, gold plated
Barrel	Bronze, gold plated
Spring	Music wire, gold plated
Receptacle	Bronze, gold plated

Accessories

Insertion tool receptacle	FEWZ-040E0
Screw-in tool probe max. Tip-Ø 0,9	FWZ730 (T)
Screw-in tool probe max. Tip-Ø 1,5	FWZ730S1 (T)

Drill Size (mm)

H720	0,99 - 1,00
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The step probe F72012B0001G110SP can also be used to test the **Nano MQS connector**. By means of a continuous plunger of the F720 and a second contact probe in the 2nd level, a switching function can be realized.



Order Code	Ø A	Tip Style	C	Ø B	H	L	Version	Screw-in tool
F72012B0001G110SP	0,40	12	3,5	0,8	13,0	31,4	SP	FWZ730 (T)

Further variants see our homepage

F730SP

Step Probe 50 mil

Centers (mm/mil)	1,27 / 50
Contin. current	3,0 A
R typ	50 mOhm
Temperature	-45°C...+100°C

Spring Force (cN ±20%)

Version	Preload	Nominal
SP	50	110

Travel (mm)

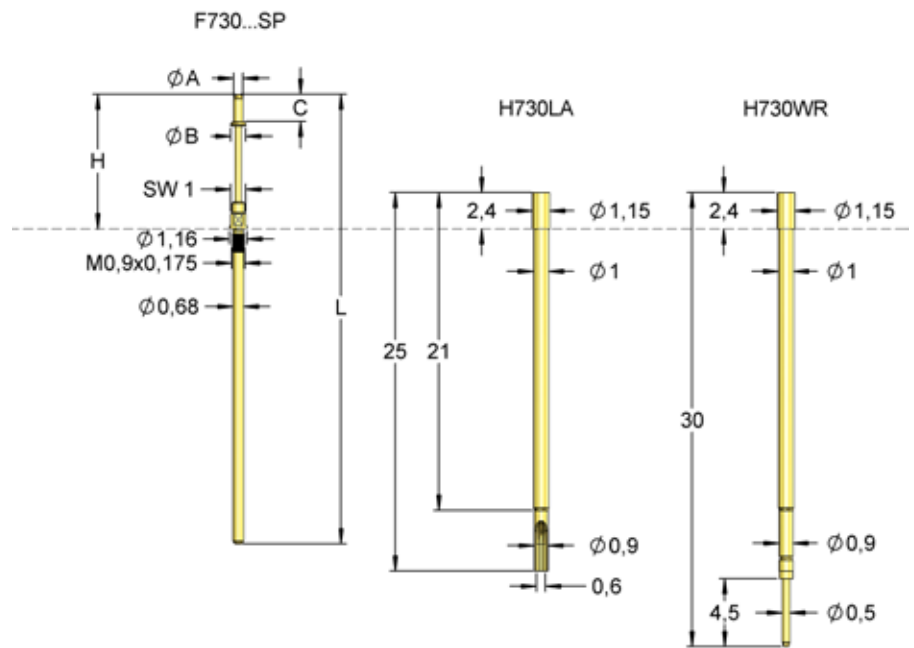
Version	Nominal	Maximum
SP	4,0	5,0
Thread (M)		0,9x0,175
Wrench Size		1,0

Materials and Plating

Plunger	BeCu, gold plated
Barrel	Bronze, gold plated
Spring	Music wire, gold plated
Receptacles	Brass, gold plated

Accessories

Insertion tool receptacle	FEWZ-040EO
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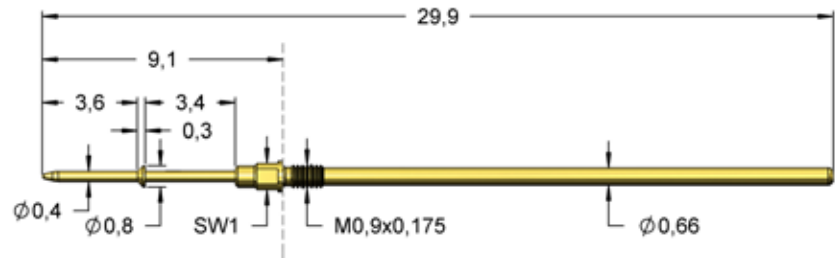
M 1:1



The special versions F73012B0006G110SPS1 / F73012B0015G095SPS1 have other technical values, e.g. a reduced spring travel. These variants can also be used for position sensing of the Nano MQS connector.

F73012B0015G095SPS1

* Differing from standard.



Order Code	Ø A	Tip Style	C	Ø B	H	L	Version	Screw-in tool
F73011B0016G110SP	0,40	11	5,1	1,4	12,2	37,2	SP	FWZ730S1 (T)
F73012B0006G110SPS1	0,40	12	3,5	0,8	10,7	35,7	SPS1	FWZ730 (T)
F73012B0015G095SPS1	0,40	12	3,6	0,8	9,1	34,1	SPS1*	FWZ730 (T)
F73011B0006G110SP	0,50	11	3,6	1,0	10,7	35,7	SP	FWZ730 (T)
F73011B0014G110SP	0,50	11	4,0	1,0	11,1	36,1	SP	FWZ730 (T)
F73012B0011G110SP	0,50	12	0,8	0,9	7,9	32,9	SP	FWZ730 (T)
F73012B0005G110SP	0,50	12	1,0	0,9	8,1	33,1	SP	FWZ730 (T)
F73012B0004G110SP	0,50	12	1,1	0,9	8,2	33,2	SP	FWZ730 (T)
F73012B0003G110SP	0,50	12	1,4	0,9	8,5	33,5	SP	FWZ730 (T)
F73012B0008G110SP	0,50	12	2,0	0,9	9,1	34,1	SP	FWZ730 (T)
F73012B0010G110SP	0,50	12	3,5	0,9	10,6	35,6	SP	FWZ730 (T)
F73012B0017G110SP	0,50	12	4,2	0,9	11,3	36,3	SP	FWZ730 (T)
F73016B0007G110SP	0,50	16	0,6	1,0	7,7	32,7	SP	FWZ730 (T)
F73012B0001G110SP	0,60	12	1,8	1,0	8,9	33,9	SP	FWZ730 (T)
F73012B0002G110SP	0,60	12	2,6	1,0	9,7	34,7	SP	FWZ730S1 (T)
F73017B0013G065SPS1	0,60	17	1,1	0,9	5,0	30,0	SPS1*	FWZ730 (T)
F73012B0009G110SP	0,80	12	2,6	1,3	9,7	34,7	SP	FWZ730S1 (T)

Further variants see our homepage.

F175SP

Step Probe 75 mil

Centers (mm/mil)	1,90 / 75
Contin. current	4,0 A
R typ	20 mOhm
Temperature	-45°C...+100°C

Spring Force (cN ±20%)

Version	Preload	Nominal
SP	50	100
SP	70	150

Travel (mm)

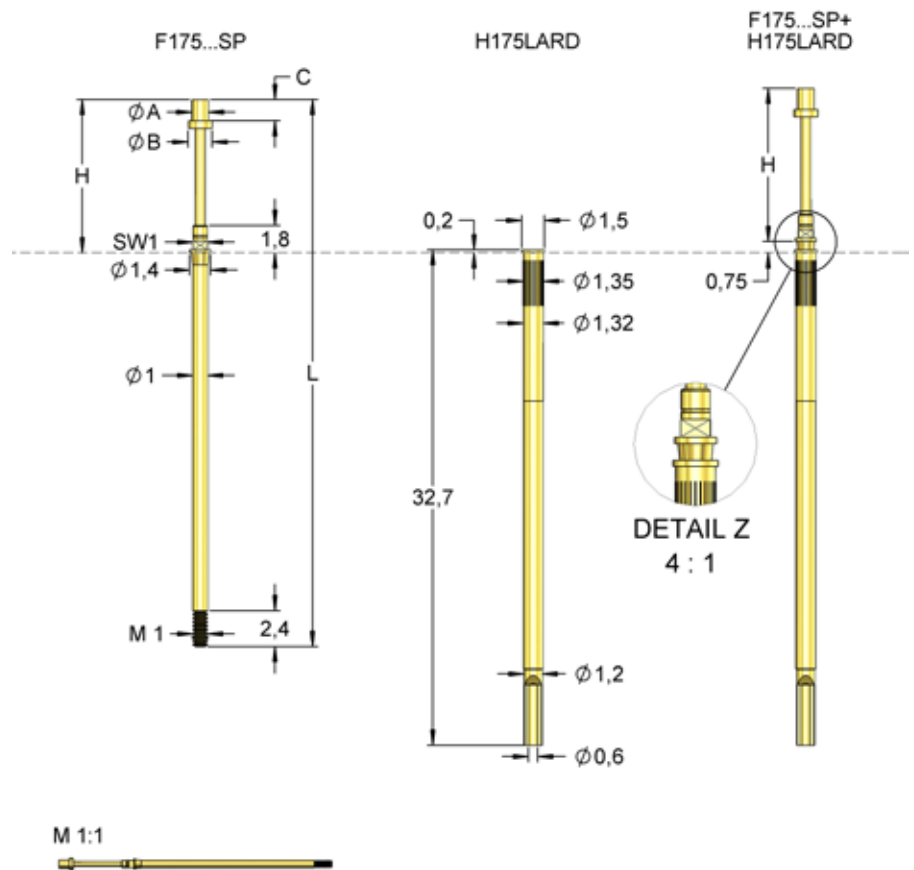
Version	Nominal	Maximum
SP	4,3	6,4
Thread (M)		1,0
Wrench Size		1,0

Materials and Plating

Plunger	BeCu, gold plated
Barrel	Brass, gold plated
Spring	Music wire, silver plated
Receptacles	Brass, gold plated

Accessories

Insertion tool receptacle	FEWZ-075E0
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Due to the cone below the probe collar, the probe including receptacle looks 0.75mm more out of the mounting plate than just the probe.

As a shorter solution to the F175SP we offer the F176SP on our homepage.

* Differing from standard.

Order Code	Ø A	Tip Style	C	Ø B	H	L	Version	Screw-in tool
F17511B0017G060SP	0,40	11	3,5	1,0	12,6	38,6	SP	FWZ730S1 (T)
F17511B0019G060SP	0,40	11	4,5	1,0	13,6	39,6	SP	FWZ730S1 (T)
F17511B0020G060SP	0,40	11	5,0	1,0	14,1	40,1	SP	FWZ730S1 (T)
F17511B0013G100SP	0,43	11	2,5	1,5	11,6	37,6	SP	FWZ730S1 (T)
F17511B0011G100SP	0,50	11	1,5	1,0	10,6	36,6	SP	FWZ730S1 (T)
F17511B0012G150SP	0,60	11	2,0	1,2	11,1	37,1	SP	FWZ730S1 (T)
F17511B0002G100SP	0,60	11	2,0	1,5	11,1	37,1	SP	FWZ730S1 (T)
F17511B0003G100SP	0,60	11	2,5	1,5	11,6	37,6	SP	FWZ730S1 (T)
F17511B0004G100SP	0,60	11	3,0	1,5	12,1	38,1	SP	FWZ730S1 (T)
F17511B0005G100SP	0,60	11	3,6	1,5	12,7	38,7	SP	FWZ730S1 (T)
F17511B0006G100SP	0,60	11	4,1	1,5	13,2	39,2	SP	FWZ730S1 (T)
F17511B0007G100SP	0,60	11	4,6	1,5	13,7	39,7	SP	FWZ730S1 (T)
F17511B0008G100SP	0,60	11	5,1	1,5	14,2	40,2	SP	FWZ730S1 (T)
F17512B0023G150SPS1	0,60	12	1,5	0,9	9,9	35,9	SPS1	FWZ730S1 (T)
F17516B0010G150SP	0,60	16	0,6	1,4	9,3	35,3	SP	FWZ730S1 (T)
F17516B0009G150SP	0,80	16	1,0	1,5	9,7	35,7	SP	FWZ730S1 (T)
F17516B0001G150SP	1,10	16	1,4	1,6	10,1	36,1	SP	FWZ730S1 (T)

Further variants see our homepage.

F731SP

Step Probe 94 mil

Centers (mm/mil)	2,40 / 94
Contin. current	5,0 A
R typ	30 mOhm
Temperature	-45°C...+100°C

Spring Force (cN ±20%)

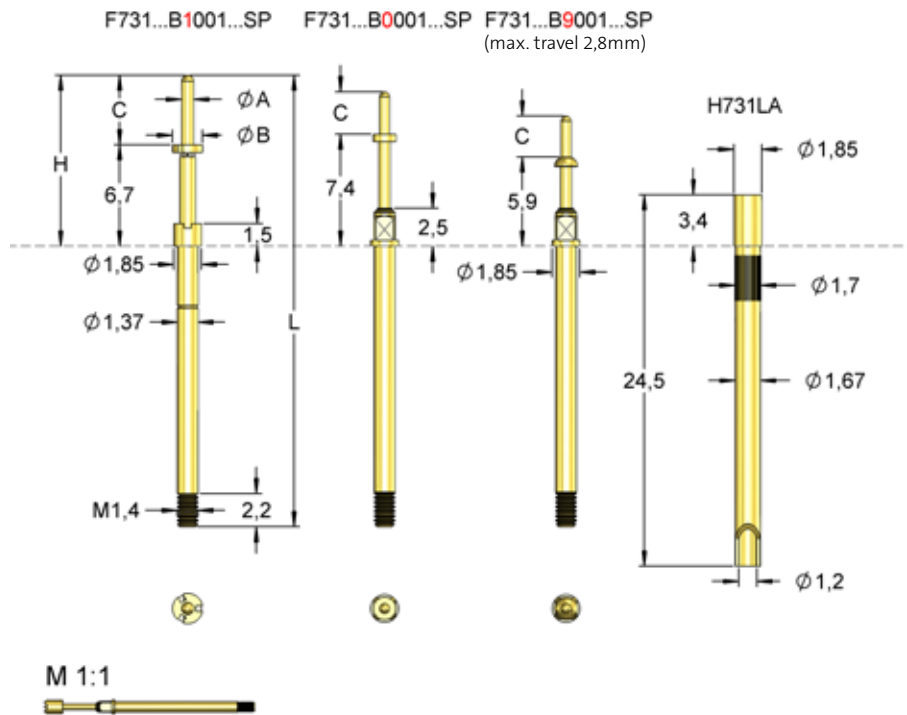
Version	Preload	Nominal
SP	50	110
SP	50	150
SP	50	300

Travel (mm)

Version	Nominal	Maximum
F731...B90...SP	2,0	2,8
SP	3,5	4,4
Thread (M)		1,4
Wrench Size		1,4

Materials and Plating

Plunger	BeCu, gold plated
Barrel	Brass, gold plated
Spring	Music wire, gold plated
Receptacles	Brass, gold plated



Accessories

Insertion tool receptacle	FEWZ-100Eo
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Order Code	Ø A	Tip Style	C	Ø B	H	L	Version	Screw-in tool
F73111B0014G300SP	0,65	11	1,5	1,5	8,9	27,4	SP	FWZ731S1 (T)
F73111B0006G300SP	0,65	11	2,1	1,5	9,5	28,0	SP	FWZ731S1 (T)
F73111B0012G300SP	0,65	11	2,5	1,5	9,9	28,4	SP	FWZ731S1 (T)
F73111B0002G150SP	0,65	11	2,8	1,5	10,3	28,8	SP	FWZ731S1 (T)
F73111B0002G300SP	0,65	11	2,8	1,5	10,2	28,7	SP	FWZ731S1 (T)
F73111B0017G300SP	0,65	11	3,0	1,5	10,4	28,9	SP	FWZ731S1 (T)
F73111B0007G150SP	0,65	11	3,4	1,5	10,8	29,3	SP	FWZ731S1 (T)
F73111B0007G300SP	0,65	11	3,4	1,5	10,8	29,3	SP	FWZ731S1 (T)
F73111B0001G150SP	0,65	11	4,0	1,5	11,5	30,0	SP	FWZ731S1 (T)
F73111B0001G300SP	0,65	11	4,0	1,5	11,5	30,0	SP	FWZ731S1 (T)
F73111B0015G150SP	0,65	11	4,5	1,5	11,9	30,4	SP	FWZ731S1 (T)
F73111B0015G300SP	0,65	11	4,5	1,5	11,9	30,4	SP	FWZ731S1 (T)
F73111B0016G300SP	0,65	11	5,0	1,5	12,4	30,9	SP	FWZ731S1 (T)
F73111B0004G150SP	0,65	11	5,5	1,4	12,9	31,4	SP	FWZ731S1 (T)
F73112B9008G110SP	0,65	12	2,7	1,5	8,6	27,1	SP	FWZ731S1 (T)
F73112B9007G110SP	0,65	12	3,4	1,5	9,3	27,8	SP	FWZ731S1 (T)
F73116B0006G150SP	0,65	16	2,1	1,5	9,5	28,0	SP	FWZ731S1 (T)
F73111B0010G150SP	0,70	11	3,5	1,5	10,9	29,4	SP	FWZ731S1 (T)
F73111B0003G150SP	0,70	11	4,0	1,5	11,4	29,9	SP	FWZ731S1 (T)
F73111B1009G150SP	0,80	11	4,6	2,0	11,3	29,8	SP	FWZ731SP(T)

Further variants see our homepage.

F732SP

Step Probe 100 mil

Centers (mm/mil)	2,54 / 100
Contin. current	5,0 A
R typ	20 mOhm
Temperature	-45°C...+100°C

Spring Force (cN ±20%)

Version	Preload	Nominal
SP	30	80
SP	50	100
SP (1)	60	150
SP (1)	60	300

Travel (mm)

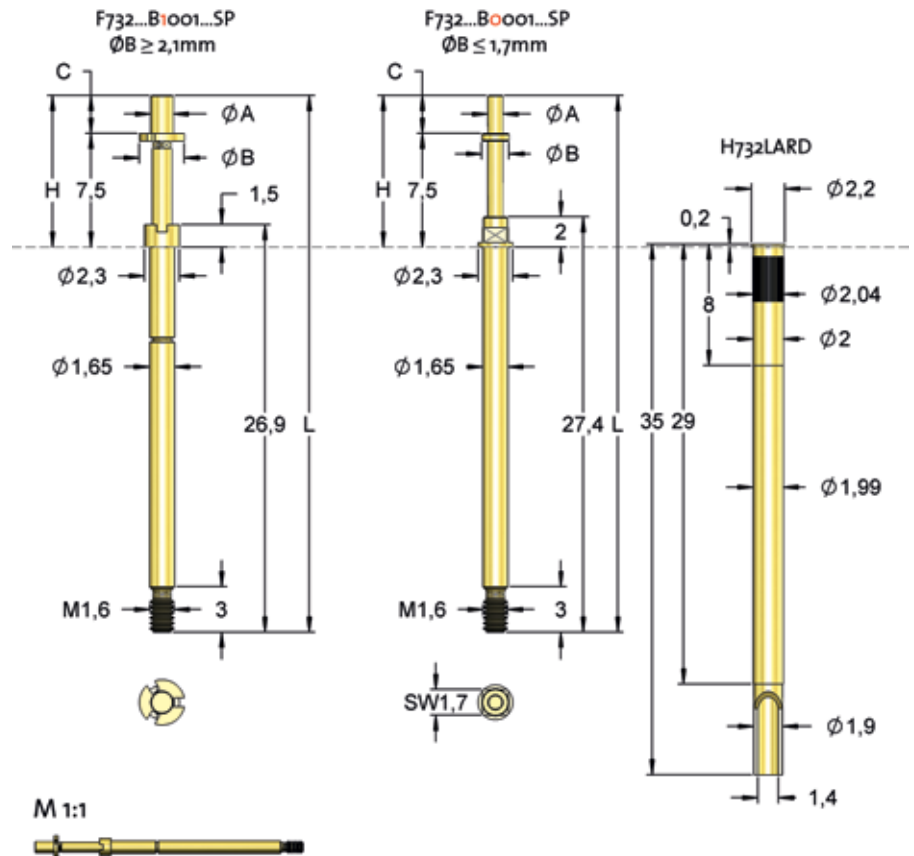
Version	Nominal	Maximum
SP (1)	4,0	5,0
Thread (M)		1,6
Wrench Size		1,7

Materials and Plating

Plunger	BeCu, gold plated
Barrel	Brass, gold plated
Spring	Music wire, silver plated
Receptacles	Brass, gold plated

Accessories

Insertion tool receptacle	FEWZ-772Eo
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Order Code	Ø A	Tip Style	C	Ø B	H	L	Version	Screw-in tool
F73211B0045G150SP	0,64	11	3,0	1,5	10,5	35,9	SP	FWZ732 (T)
F73211B1041G150SP	0,65	11	2,5	2,1	10,0	35,4	SP	FWZ732SP (T)
F73211B0029G150SP	0,65	11	2,7	1,5	10,2	35,6	SP	FWZ732 (T)
F73211B0048G150SP	0,65	11	3,0	1,0	10,5	35,9	SP	FWZ732 (T)
F73211B1054G150SP	0,65	11	3,0	2,1	10,5	35,9	SP	FWZ732SP (T)
F73211B1051G150SP	0,65	11	3,4	2,1	10,9	36,3	SP	FWZ732SP (T)
F73211B0053G150SP	0,65	11	3,6	1,7	11,1	36,5	SP	FWZ732 (T)
F73211B1042G150SP	0,65	11	3,6	2,1	11,1	36,5	SP	FWZ732SP (T)
F73211B0073G150SP	0,65	11	4,0	1,5	11,5	36,9	SP	FWZ732 (T)
F73211B0024G150SP	0,65	11	4,3	1,5	11,8	37,2	SP	FWZ732 (T)
F73211B0052G150SP	0,65	11	4,7	1,7	12,2	37,6	SP	FWZ732 (T)
F73211B0084G300SP	0,80	11	3,5	1,8	11,0	36,4	SP	FWZ732 (T)
F73211B0036G300SP	0,80	11	4,0	1,8	11,5	36,9	SP	FWZ732 (T)
F73211B1036G150SP	0,80	11	4,0	2,1	11,5	36,9	SP	FWZ732SP (T)
F73211B1006G150SP	0,80	11	4,0	2,5	11,5	36,9	SP	FWZ732SP (T)
F73211B0086G300SP	0,80	11	5,0	1,8	12,5	37,9	SP	FWZ732 (T)
F73216B1038G150SP	1,00	16	2,0	2,1	9,5	34,9	SP	FWZ732SP (T)
F73216B1046G150SP	1,00	16	2,5	2,1	10,0	35,4	SP	FWZ732SP (T)
F73216B1015G150SP	1,50	16	2,0	3,5	9,5	34,9	SP	FWZ732SP (T)
F73216B1014G150SP	1,50	16	2,5	3,0	10,0	35,4	SP	FWZ732SP (T)

Further variants see our homepage.

F756SP

Step Probe 100 mil
Twist proof with
continuous plunger

Centers (mm/mil)	2,54 / 100
Contin. current	5,0 A
R typ	25 mOhm
Temperature	-45°C...+100°C

Spring Force (cN ±20%)

Version	Preload	Nominal
SP	60	150

Travel (mm)

Version	Nominal	Maximum
SP	4,0	4,4
Thread (M)		1,6
Wrench Size		1,7

Materials and Plating

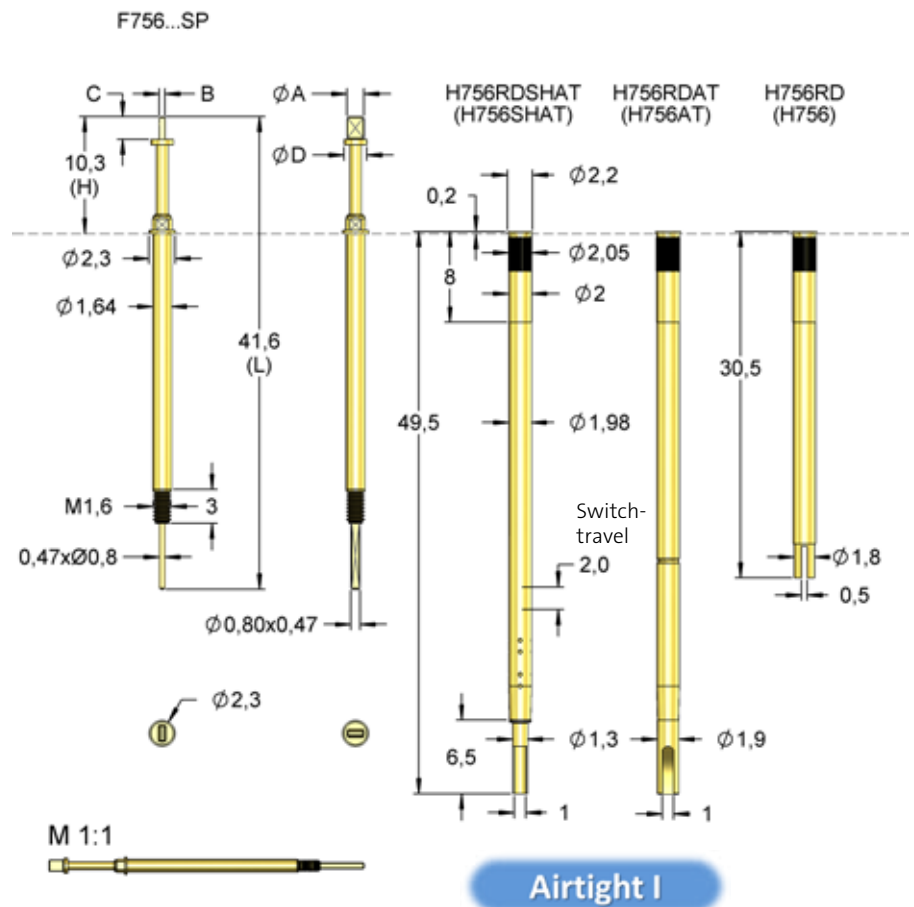
Plunger	BeCu, gold plated
Barrel	Brass, gold plated
Spring	Stainless steel, unplated
Receptacles	Brass, gold plated

Drill Size (mm)

Receptacle without knurl	1,99 - 2,00
Receptacle with knurl	2,02 - 2,04

Accessories

Alignment tool receptacle	FAWZ756
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Order Code	Ø A	Kopfform	B	C	Ø D	H	L	Version	Screw-in tool
F75689B0002G150SP	1,00	89	0,5	1,5	2,7	10,3	41,6	SP	FWZ732S1 (T)
F75689B0007G150SP	1,00	89	0,5	2,5	1,8	10,3	41,6	SP	FWZ732S1 (T)
F75689B0008G150SP	1,50	89	0,3	2,0	2,0	10,3	41,6	SP	FWZ732S1 (T)
F75689B0006G150SP	1,50	89	0,5	1,2	2,0	10,3	41,6	SP	FWZ732S1 (T)
F75689B0006G150SP	1,50	89	0,5	1,4	2,0	10,3	41,6	SP	FWZ732S1 (T)
F75689B0004G150SP	1,50	89	0,5	1,5	2,0	10,3	41,6	SP	FWZ732S1 (T)
F75689B0001G150SP	1,50	89	0,5	1,5	2,7	10,3	41,6	SP	FWZ732S1 (T)
F75689B0003G150SP	1,50	89	0,5	2,0	2,0	10,3	41,6	SP	FWZ732S1 (T)
F75689B0005G150SP	1,50	89	0,5	2,5	2,0	10,3	41,6	SP	FWZ732S1 (T)

Weitere Varianten sind auf der Homepage zu finden.

F733SP

Step Probe 157 mil

Centers (mm/mil)	4,00 / 157
Contin. current	10,0 A
R typ	25 mOhm
Temperature	-45°C...+100°C

Spring Force (cN ±20%)

Version	Preload	Nominal
SP (1)	50	150
SP (1)	50	300

Travel (mm)

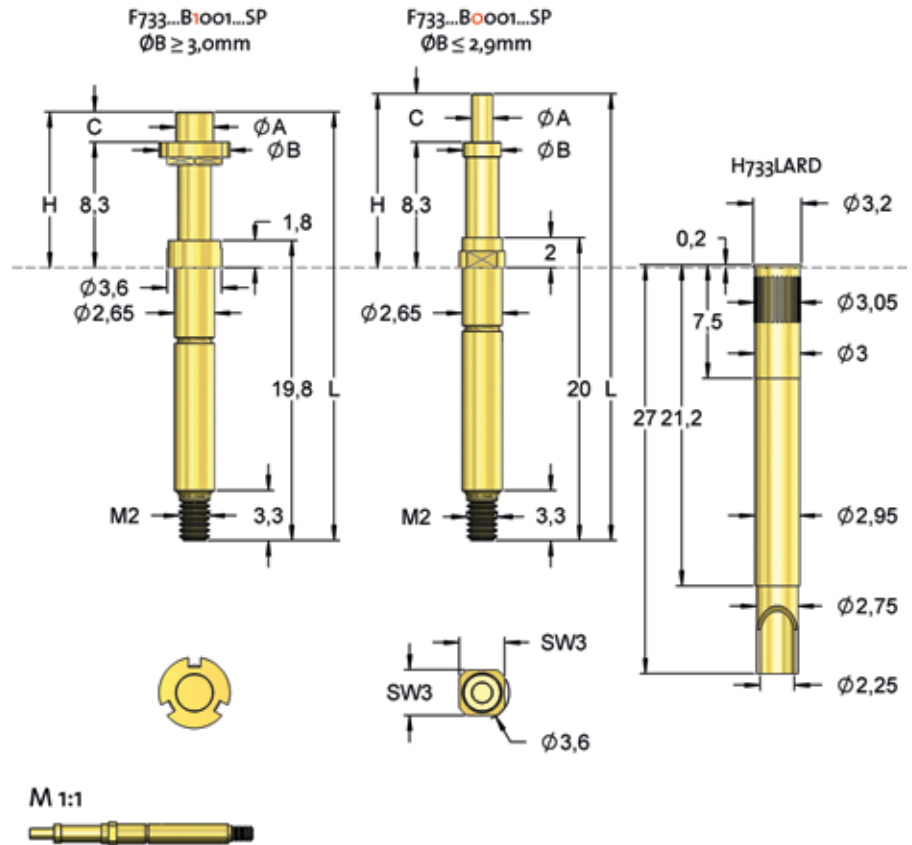
Version	Nominal	Maximum
SP (1)	4,0	5,0
Thread (M)		2,0
Wrench Size		3,0

Materials and Plating

Plunger	BeCu, gold plated
Barrel	Brass, gold plated
Spring	Music wire, silver plated
Receptacles	Brass, gold plated

Accessories

Insertion tool receptacle	FEWZ-774E0
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As a long travel solution we offer the F737SP on our homepage.

Order Code	Ø A	Tip Style	C	Ø B	H	L	Version	Screw-in tool
F73316B1005G150SP	1,30	16	2,7	4,7	11,0	29,0	SP	FWZ733SP (T)
F73316B1002G150SP	1,30	16	5,3	4,7	13,6	31,6	SP	FWZ733SP (T)
F73311B1027G150SP1	1,40	11	2,4	3,5	10,7	28,7	SP1	FWZ732SP1 (T)
F73311B1035G150SP1	1,40	11	2,7	3,5	11,0	29,0	SP1	FWZ732SP1 (T)
F73316B1031G150SP1	1,40	16	1,7	3,5	10,0	28,0	SP1	FWZ732SP1 (T)
F73316B1016G150SP1	1,40	16	2,0	3,5	10,3	28,3	SP1	FWZ732SP1 (T)
F73316B1027G150SP1	1,40	16	2,4	3,5	10,7	28,7	SP1	FWZ732SP1 (T)
F73316B1032G150SP1	1,40	16	3,0	3,5	11,3	29,3	SP1	FWZ732SP1 (T)
F73316B0060G300SP	1,50	16	1,5	3,0	9,8	27,8	SP	FWZ733S1 (T)
F73316B0061G300SP	1,50	16	2,0	3,0	10,3	28,3	SP	FWZ733S1 (T)
F73316B0062G300SP	1,50	16	2,5	3,0	10,8	28,8	SP	FWZ733S1 (T)
F73316B0063G300SP	1,50	16	3,0	3,0	11,3	29,3	SP	FWZ733S1 (T)
F73316B0064G300SP	1,50	16	3,5	3,0	11,8	29,8	SP	FWZ733S1 (T)
F73316B0066G300SP	1,50	16	4,5	3,0	12,8	30,8	SP	FWZ733S1 (T)
F73316B1036G150SP1	1,80	16	1,6	3,5	9,9	27,9	SP1	FWZ732SP1 (T)
F73316B1015G150SP1	1,80	16	2,2	3,5	10,5	28,5	SP1	FWZ732SP1 (T)
F73316B1009G150SP	1,80	16	4,2	4,7	12,5	30,5	SP	FWZ733SP (T)
F73316B1075G300SP1	2,00	16	2,0	4,0	10,3	28,3	SP1	FWZ732SP1 (T)
F73316B1077G300SP1	2,00	16	3,0	4,0	11,3	29,3	SP1	FWZ732SP1 (T)
F73316B1043G150SP1	2,20	16	2,0	3,5	10,3	28,3	SP1	FWZ732SP1 (T)

Further variants see our homepage.



Threaded Probes

Threaded probes and step probes are mainly used in modules for the test of wire harnesses and connectors. They can be screwed in with a corresponding screw-in tool. The advantage is that even under difficult conditions a secure seat of the probes is guaranteed.

F720

NEW

Threaded Probe 50 mil With Continuous Plunger

Centers (mm/mil)	1,27 / 50
Contin. current	3,0 A
R typ	50 mOhm
Temperature	-45°C...+100°C

Spring Force (cN ±20%)

Version	Preload	Nominal
Standard	50	110

Travel (mm)

Version	Nominal	Maximum
Standard	4,0	4,8
Thread (M)	0,9x0,175	
Wrench Size	1,0	

Materials and Plating

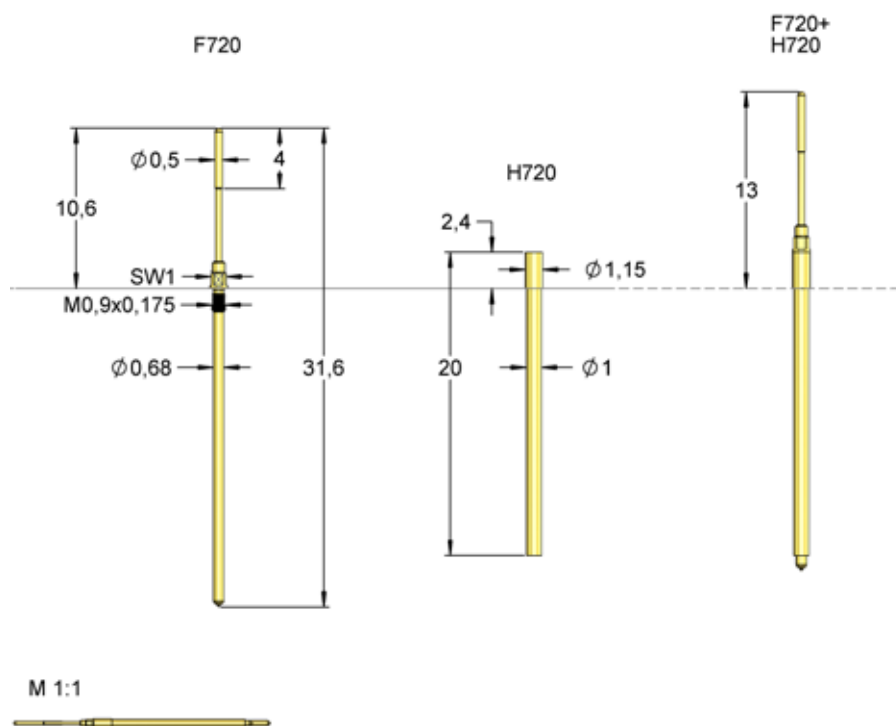
Plunger	see Tip Style
Barrel	Bronze, gold plated
Spring	Music wire, gold plated
Receptacles	Brass, gold plated

Accessories

Insertion tool receptacle	FEWZ-040E0
Screw-in tool probe max. Tip-Ø 0,9 mm	FWZ730 (T)

Drill Size (mm)


H720	0,96 - 0,99
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The F720 is well suited for contacting small connectors with centers down to 50mil. The continuous plunger allows realizing a switch function by using a second level of contact probes.

Series	Tip-Ø	Spring Force (cN)
F720	11	M 050 G 110
Tip Style	Material	Plating
		Version

Material: M = Brass
Tip-Ø: 050 = 0,50 mm (e.g.)
Plating: G = Gold plated
Receptacle: Order code according drawing

Tip Style	Number	Material	Plating	Ø in mm	Version
	11	M	G	0,50	-

THREADED PROBES

F730

Threaded Probe 50 mil Standard

Centers (mm/mil)	1,27 / 50
Contin. current	3,0 A
R typ	50 mOhm
Temperature	-45°C...+100°C

Spring Force (cN ±20%)

Version	Preload	Nominal
Standard	30	50
Standard	50	110

Travel (mm)

Version	Nominal	Maximum
Standard	4,0	5,0
Thread (M)	0,9x0,175	
Wrench Size		1,0

Materials and Plating

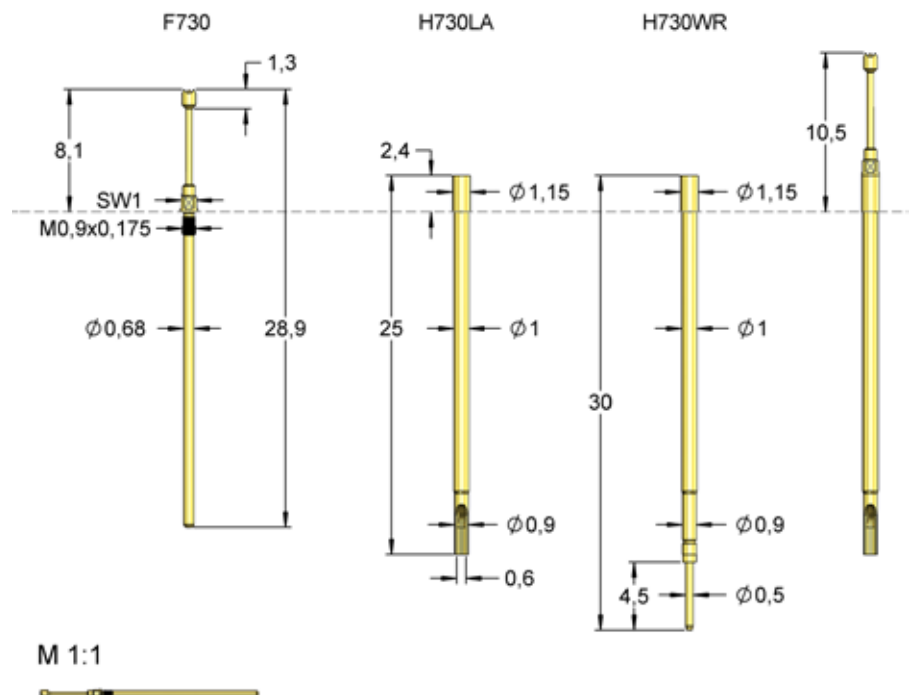
Plunger	see Tip Style
Barrel	Bronze, gold plated
Spring	Music wire, gold plated
Receptacles	Brass, gold plated

Accessories

Insertion tool receptacle	FEWZ-040E0
Screw-in tool probe max. Tip-Ø 0,9 mm	FWZ730 (T)

Drill Size (mm)

H730...	0,96 - 0,99
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Series	Tip-Ø	Spring Force (cN)
F730	06	B 090 G 110
Tip Style	Material	Plating

Material: B = BeCu
Tip-Ø: 090 = 0,90 mm (e.g.)
Plating: G = Gold plated
Receptacle: Order code according drawing

Tip Style	Number	Material	Plating	Ø in mm	Version
	06	B	G	0,90	-
	12	B	G	0,64	-
	16	B	G	0,40	-
	17	B	G	0,64	-
	18	B	G	0,40	-

F176

Threaded Probe 75 mil Short travel Version

Centers (mm/mil)	1,90 / 75
Contin. current	4,0 A
R typ	20 mOhm
Temperature	-45°C...+100°C

Spring Force (cN ±20%)

Version	Preload	Nominal
Standard	30	80
Standard	85	150

Travel (mm)

Version	Nominal	Maximum
Standard	2,4	3,0
Thread (M)		1,0
Wrench Size		1,0

Materials and Plating

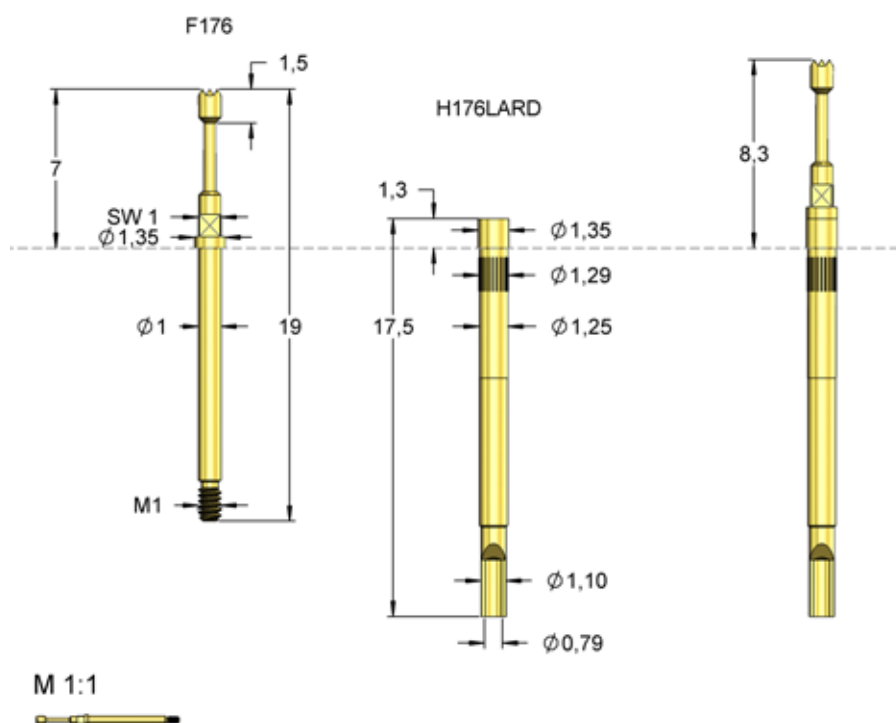
Plunger	see Tip Style
Barrel	Brass, gold plated
Spring	Music wire, silver plated
Receptacles	Brass, gold plated

Accessories

Insertion tool receptacle	FEWZ-075E0
Screw-in tool probe max. Tip-Ø 1,5 mm	FWZ730S1 (T)

Drill Size (mm)

H176LARD	1,25 - 1,27
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Series	Tip-Ø	Spring Force (cN)
F176	06	B 100 G 080
Tip Style	Material	Plating

Material:	B = BeCu
Tip-Ø:	100 = 1,00 mm (e.g.)
Plating:	G = Gold plated
Receptacle:	Order code according drawing

Tip Style	Number	Material	Plating	Ø in mm	Version
	06	B	G	1,00	-
	11	B	G	0,40	-
	11	B	G	0,50	-
	12	B	G	0,65	-
	17	B	G	1,00	-
	18	B	G	0,45	-

THREADED PROBES

F175

Threaded Probe 75 mil Standard

Centers (mm/mil)	1,90 / 75
Contin. current	4,0 A
R typ	20 mOhm
Temperature	-45°C...+100°C

Spring Force (cN ±20%)

Version	Preload	Nominal
Standard	50	100
Standard	70	150
Standard	100	280

Travel (mm)

Version	Nominal	Maximum
Standard	4,3	6,4
Thread (M)		1,0
Wrench Size		1,0

Materials and Plating

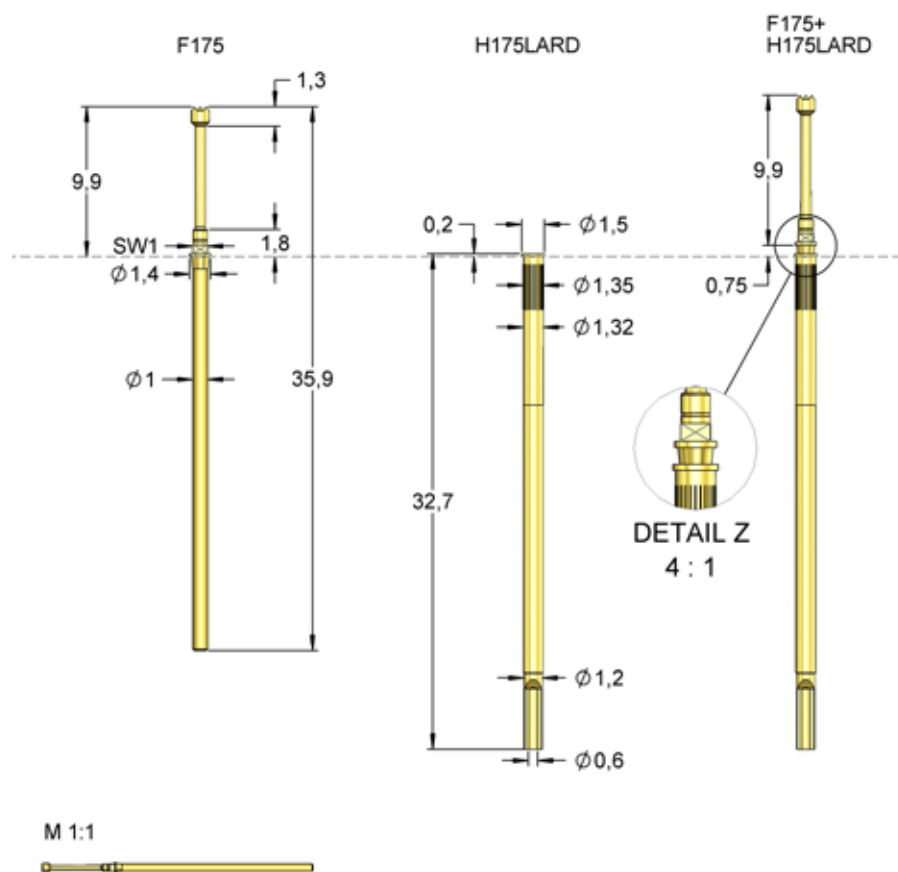
Plunger	see Tip Style
Barrel	Brass, gold plated
Spring	Music wire, silver plated
Receptacles	Brass, gold plated

Accessories

Insertion tool receptacle	FEWZ-075E0
Screw-in tool probe max. Tip-Ø 1,5 mm	FWZ730S1 (T)

Drill Size (mm)

H175LARD	1,32 - 1,34
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Due to the cone below the probe collar, the probe including receptacle looks 0.75mm more out of the mounting plate than just the probe.

As a shorter solution to the F175 we offer the F176 on our homepage.

Series	Tip-Ø	Spring Force (cN)
F175	05	B 120 G 150
	Tip Style	Material Plating Version

Material:	B = BeCu, S = Steel
Tip-Ø:	120 = 1,20 mm (e.g.)
Plating:	G = Gold plated, L = Longtime gold plated
Receptacle:	Order code according drawing

Tip Style	Number	Material	Plating	Ø in mm	Version
	05	B	G	1,20	-
	06	B	G	1,20	-
	11	B	G	0,50	-
	11	B	G	0,64	-
	12	B	G	0,78	-
	17	B	G	1,20	-
	18	B	G	0,64	-
	18	B	G	0,78	-
	21	S	L	0,64	-
	30	S	L	0,64	-

F731

Threaded Probe 94 mil Standard

Centers (mm/mil)	2,40 / 94
Contin. current	5,0 A
R typ	30 mOhm
Temperature	-45°C...+100°C

Spring Force (cN ±20%)

Version	Preload	Nominal
L	50	300
Standard	20	60
Standard	50	100
Standard	50	150
Standard	50	250
Standard	50	300

Travel (mm)

Version	Nominal	Maximum
L	3,5	4,4
Standard	3,5	4,4
Thread (M)		1,4
Wrench Size		1,4

Materials and Plating

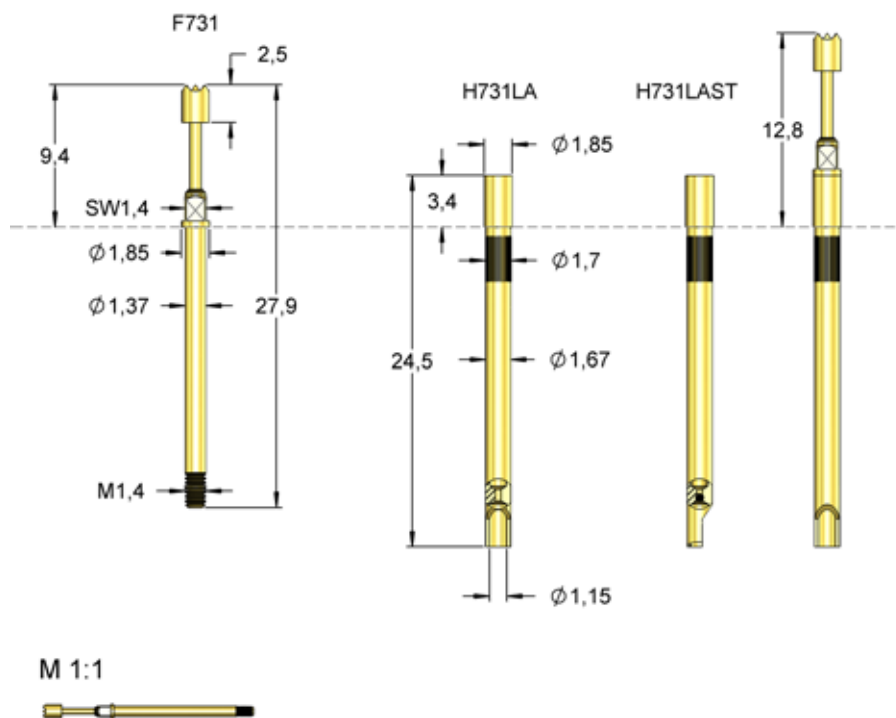
Plunger	see Tip Style
Barrel	Brass, gold plated
Spring	Music wire, gold plated
Receptacles	Brass, gold plated

Accessories

Insertion tool receptacle	FEWZ-100E0
Screw-in tool probe max. Tip-Ø 2,0 mm	FWZ731 (T)
Screw-in tool probe max. Tip-Ø 1,3 mm	FWZ731S1 (T)

Drill Size (mm)

Receptacle with knurl	1,67 - 1,68
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A solder tight receptacle is available (H731LAST).

Series	Tip-Ø	Spring Force (cN)
F731	11	B 075 G 300 L
	Tip Style	Material

Material:	B = BeCu
Tip-Ø:	075 = 0,75 mm (e.g.)
Plating:	G = Gold plated
Version:	L = Long version
Receptacle:	Order code according drawing

Tip Style	Number	Material	Plating	Ø in mm	Version
	05	B	G	1,80	-
	06	B	G	1,00	-
	06	B	G	1,30	-
	06	B	G	1,80	-
	11	B	G	0,50	-
	11	B	G	0,60	-
	11	B	G	0,65	-
	11	B	G	0,75	-
	11	B	G	0,75	L
	12	B	G	1,80	-
	16	B	G	0,75	-
	17	B	G	1,50	-
	18	B	G	0,75	-

THREADED PROBES

F722

Threaded Probe 100 mil Short travel Version

Centers (mm/mil)	2,54 / 100
Contin. current	5,0 A
R typ	25 mOhm
Temperature	-45°C...+100°C

Spring Force (cN ±20%)

Version	Preload	Nominal
Standard	40	100

Travel (mm)

Version	Nominal	Maximum
Standard	1,5	2,2
Thread (M)		1,6x0,2
Wrench Size		1,7

Materials and Plating

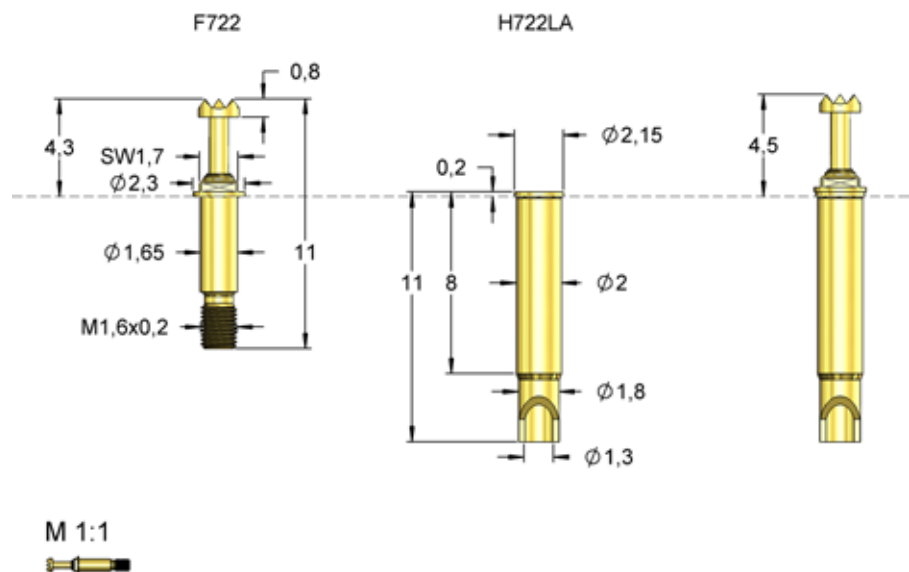
Plunger	see Tip Style
Barrel	BeCu, gold plated
Spring	Music wire, silver plated
Receptacles	Brass, gold plated

Accessories

Insertion tool receptacle	FEWZ-100EV
Screw-in tool probe max. Tip-Ø 2,0 mm	FWZ732 (T)

Drill Size (mm)

H722LA	1,99 - 2,00
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With its very short total length, the F722 can be used in limited spaces.

Series	Tip-Ø	Spring Force (cN)
F722	05	B 180 G 100
Tip Style	Material	Plating

Material:	B = BeCu
Tip-Ø:	180 = 1,80 mm (e.g.)
Plating:	G = Gold plated
Receptacle:	Order code according drawing

Tip Style	Number	Material	Plating	Ø in mm	Version
	05	B	G	1,80	-
	06	B	G	1,80	-
	11	B	G	0,64	-
	11	B	G	0,85	-
	17	B	G	1,80	-

F732

Threaded Probe 100 mil Standard

Centers (mm/mil)	2,54 / 100
Contin. current	5,0 A
R typ	25 mOhm
Temperature	-45°C...+100°C, -45°C...+200°C (H)

Spring Force (cN ±20%)

Version	Preload	Nominal
Standard	30	80
Standard	50	100
Standard	60	150
Standard	60	200
Standard	60	300
E14	60	150
H	60	150
H	100	300
IK	60	150
IK	60	300
RP	60	150
RP	60	300

Travel (mm)

Version	Nominal	Maximum
Standard	4,0	5,0
Thread (M)		1,6
Wrench Size		1,7

Materials and Plating

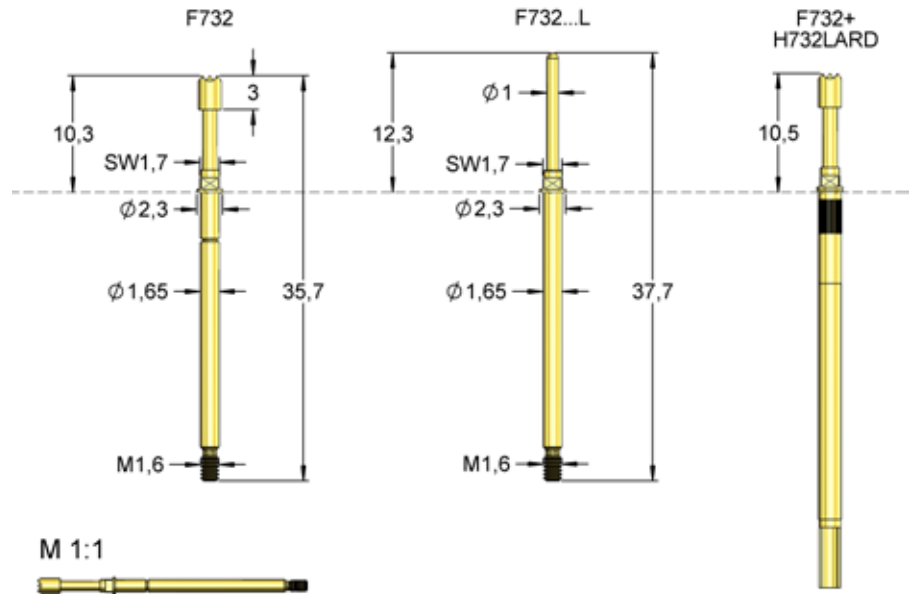
Plunger	see Tip Style
Barrel	Brass, gold plated
Spring	Stainless steel, unplated
Receptacles	Brass, gold plated

Accessories

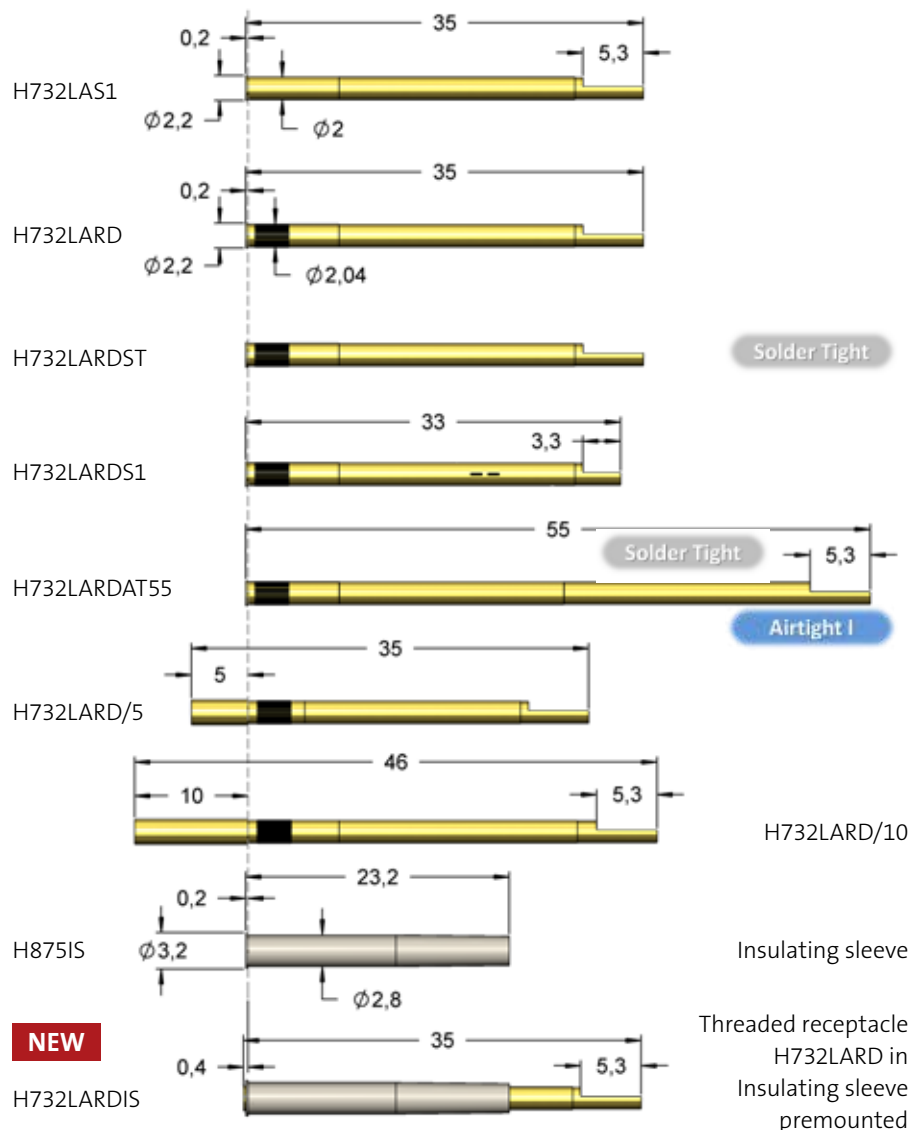
Insertion tool receptacle	FEWZ-772E0
Screw-in tool probe	FWZ732 (T)
max. Tip-Ø 2,0 mm	
Screw-in tool probe	FWZ732S1 (T)
max. Tip-Ø 2,7 mm	

Series	Tip-Ø	Spring Force (cN)
F732 06 B 120 G 150 IK05		
Tip Style	Material	Plating

Material:	B = BeCu, S = Steel
Tip-Ø:	120 = 1,20 mm (e.g.)
Plating:	G = Gold plated, L = Longtime gold plated, N = Nickel plated, R = Rhodanized
Version:	L = Long travel, H = High temperature, IK = Insulating cap, RP = „Wobbling Plunger“, E14 = Projection height 14mm
Receptacle:	Order code according drawing



A solder tight version with a closed receptacle with knurl is available (H732LARDS1), which also has further press marks for a better hold of the probe even at conditions with stronger vibrations.



THREADED PROBES

F732







































Threaded Probe 100 mil Standard

Drill Size (mm)

Receptacle without knurl	1,99 - 2,00
Receptacle with knurl	2,00 - 2,02

Projection Height (mm)

H732... with F732	10,5
H732.../5 with F732	15,3
H732.../10 with F732	20,3
H732... with F732...L	12,5
H732.../5 with F732...L	17,3
H732.../10 with F732...L	22,3

Tip Style	Number	Material	Plating	Ø in mm	Version
	05	B	G	1,80	-
	05	B	G	2,00	-
	06	B	G	1,20	IK
	06	B	G	1,30	-
	06	B	G	1,40	-
	06	B	G	1,50	-
	06	B	G	1,80	-
	06	B	G	1,80	IK
	06	B	G	2,00	-
	06	B	G	2,00	H
	06	B	G	2,50	-
	07	S	L	1,75	-
	07	S	L	1,75	H
	11	B	G	0,64	-
	11	B	G	0,64	E14
	11	B	G	0,64	H
	11	B	G	0,64	RP
	11	B	G	0,80	-
	11	B	G	1,00	-
	11	B	G	1,00	L
	11	B	G	1,30	-
	12	B	G	1,40	-
	12	B	G	1,60	-
	12	B	G	1,80	-
	12	B	G	2,00	-
	14	S	L	2,00	-
	15	B	R	1,70	-
	16	B	G	0,64	-
	16	B	G	0,80	-
	16	B	G	1,00	-
	17	B	G	1,40	-
	17	B	G	1,50	-
	17	B	G	2,00	-
	18	B	G	1,30	-
	18	B	G	1,30	H
	21	S	L	1,30	-
	30	B	G	1,30	-
	41	B	G	2,00	-

THREADED PROBES

F727

Threaded Probe 100 mil Long Travel Version

Centers (mm/mil)	2,54 / 100
Contin. current	5,0 A
R typ	25 mOhm
Temperature	-45°C...+100°C

Spring Force (cN ±20%)

Version	Preload	Nominal
Standard	110	300

Travel (mm)

Version	Nominal	Maximum
Standard	12,0	14,5
Thread (M)		1,6
Wrench Size		1,7

Materials and Plating

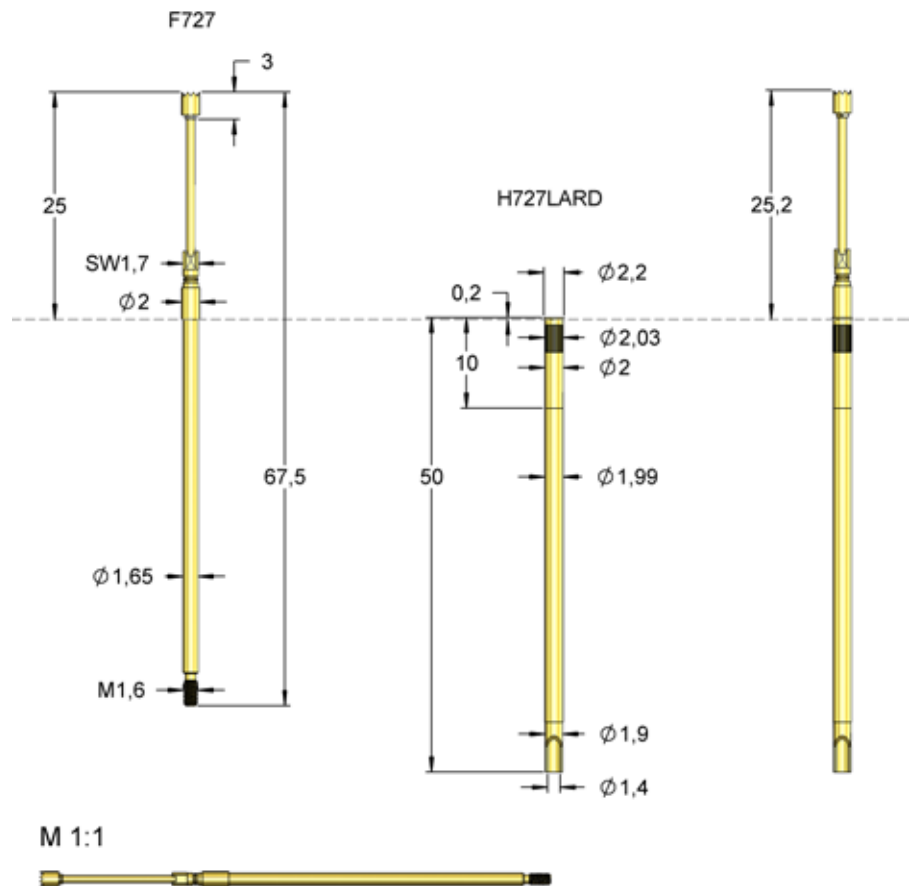
Plunger	see Tip Style
Barrel	Brass, gold plated
Spring	Music wire, silver plated
Receptacles	Brass, gold plated

Accessories

Insertion tool receptacle	FEWZ-772E0
Screw-in tool probe max. Tip-Ø 2,0 mm	FWZ732 (T)

Drill Size (mm)

H727LARD	2,00 - 2,02
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Series	Tip-Ø	Spring Force (cN)
F727 06 B 200 G 300		
Tip Style	Material	Plating
Material:	B = BeCu	
Tip-Ø:	200 = 2,00 mm (e.g.)	
Plating:	G = Gold plated	
Receptacle:	Order code according drawing	

Tip Style	Number	Material	Plating	Ø in mm	Version
	06	B	G	2,00	-
	15	B	G	2,00	-

F723

Threaded Probe 157 mil Short Version

Centers (mm/mil)	4,00 / 157
Contin. current	10,0 A
R typ	15 mOhm
Temperature	-45°C...+200°C (H)

Spring Force (cN ±20%)

Version	Preload	Nominal
Standard	40	80
Standard	70	150

Travel (mm)

Version	Nominal	Maximum
Standard	2,8	3,5
Thread (M)		2,0
Wrench Size		3,0

Materials and Plating

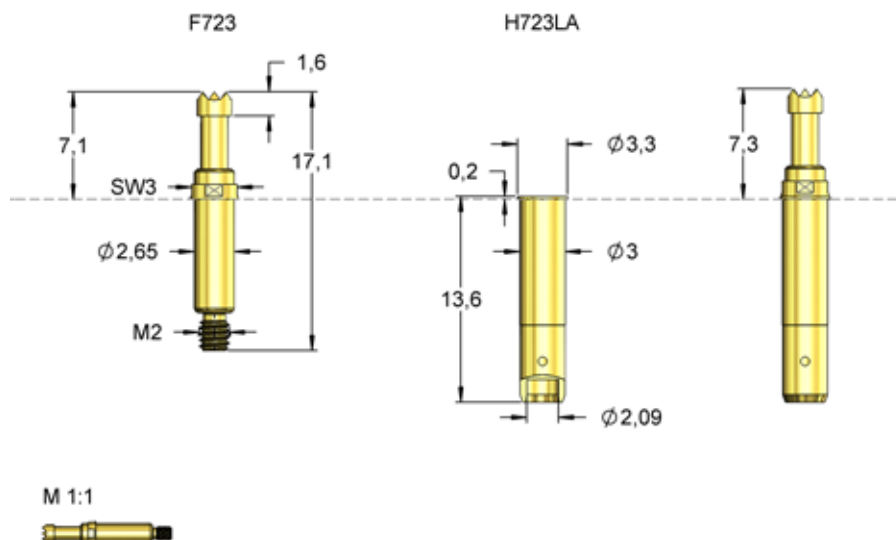
Plunger	see Tip Style
Barrel	Brass, gold plated
Spring	Stainless steel, unplated
Receptacles	Brass, gold plated

Accessories

Screw-in tool probe max. Tip-Ø 3,0 mm	FWZ733S1 (T)
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Drill Size (mm)

H723LA	2,98 - 2,99
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Corresponding plug-in version see F713, which is included in the catalogue for fine pitches, low heights and for direct soldering or on our homepage..

Series	Tip-Ø	Spring Force (cN)
F723	02	B 230 G 150
Tip Style	Material	Plating
		Version

Material:	B = BeCu
Tip-Ø:	230 = 2,30 mm (e.g.)
Plating:	G = Gold plated
Receptacle:	Order code according drawing

Tip Style	Number	Material	Plating	Ø in mm	Version
	02	B	G	2,30	-
	06	B	G	2,30	-
	12	B	G	2,30	-
	17	B	G	2,30	-

F733

Threaded Probe 157 mil Standard

Centers (mm/mil)	4,00 / 157
Contin. current	10,0 A
R typ	8 mOhm
Temperature	-45°C...+100°C

Spring Force (cN ±20%)

Version	Preload	Nominal
Standard	50	150
Standard	80	300
Standard	30	400
Standard	70	600

Travel (mm)

Version	Nominal	Maximum
Standard	4,0	5,0
Thread (M)		2,0
Wrench Size		3,0

Materials and Plating

Plunger	see Tip Style
Barrel	Brass, gold plated
Spring	Music wire, silver plated
Receptacles	Brass, gold plated

Accessories

Insertion tool receptacle	FEWZ-774E0
Screw-in tool probe max. Tip-Ø 3,0 mm	FWZ733S1 (T)
Screw-in tool probe max. Tip-Ø 4,0 mm	FWZ733 (T)
Plug lock	H733VS

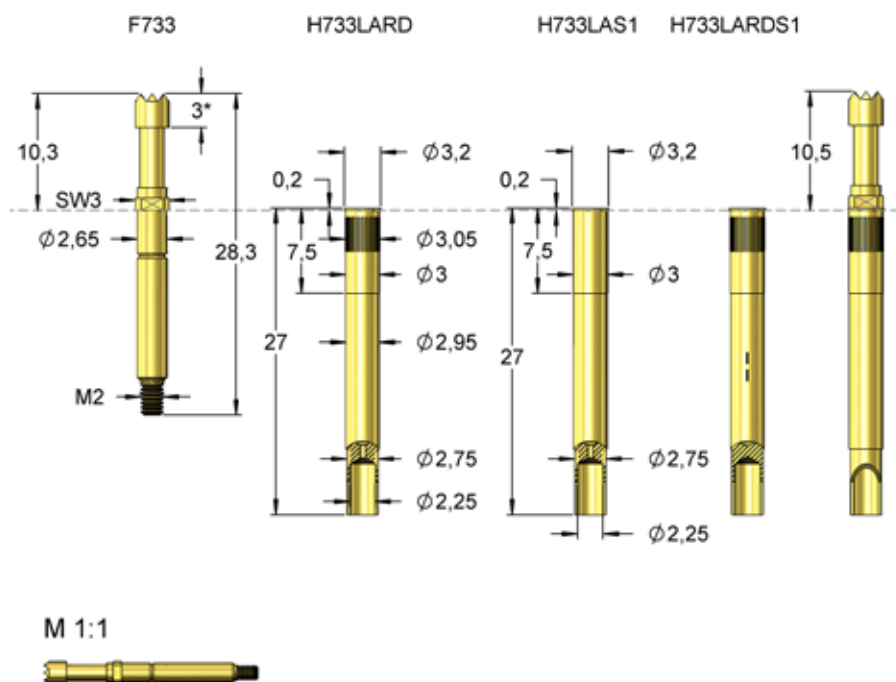
Drill Size (mm)

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

Series	Tip-Ø	Spring Force (cN)
F733	04	B 230 G 150 -
	Tip Style	Material Plating Version

Material:	B = BeCu, S = Steel
Tip-Ø:	230 = 2,30 mm (e.g.)
Plating:	G = Gold plated, L = Longtime gold plated
Receptacle:	Order code according drawing

* 5,0 mm tip length for Ø <1,8 mm
























A solder tight version with a closed receptacle with knurl is available (H733LARDS1) which also has further press marks for a better hold of the probe even at conditions with stronger vibrations. Available high temperature versions see homepage.

** Center differing from standard.

Tip Style	Number	Material	Plating	Ø in mm	Version
	04	B	G	2,30	-
	05	B	G	2,00	-
	05	B	G	2,30	-
	05	B	G	3,00	-
	06	B	G	1,60	-
	06	B	G	2,30	-
	06	B	G	2,50	-
	06	B	G	3,00	-
	06	B	G	3,50	-
	06	B	G	4,00 **	-
	06	S	L	2,30	-
	07	S	L	1,80	-
	07	S	L	2,30	-
	07	S	L	3,00	-
	09	S	L	2,30	-

F733

Threaded Probe 157 mil Standard

Tip Style	Number	Material	Plating	Ø in mm	Version
	11	B	G	0,64	-
	11	B	G	0,80	-
	11	B	G	1,00	-
	11	B	G	1,40	-
	11	B	G	1,80	-
	12	B	G	2,30	-
	12	B	G	3,00	-
	14	S	L	2,30	-
	15	B	G	2,30	-
	15	B	G	3,00	-
	16	B	G	0,80	-
	16	B	G	1,00	-
	16	B	G	1,40	-
	16	B	G	1,80	-
	17	B	G	2,30	-
	17	B	G	3,00	-
	18	B	G	1,80	-
	21	S	L	1,80	-
	28	B	G	2,30	-
	29	B	G	1,80	-
	39	B	G	1,80	-

THREADED PROBES

F734

Threaded Probe 157 mil Long Travel Version

Centers (mm/mil)	4,00 / 157
Contin. current	10,0 A
R typ	8 mOhm
Temperature	-45°C...+100°C

Spring Force (cN ±20%)

Version	Preload	Nominal
Standard	60	150
Standard	120	300

Travel (mm)

Version	Nominal	Maximum
Standard	5,6	7,0
Thread (M)		2,0
Wrench Size		3,0

Materials and Plating

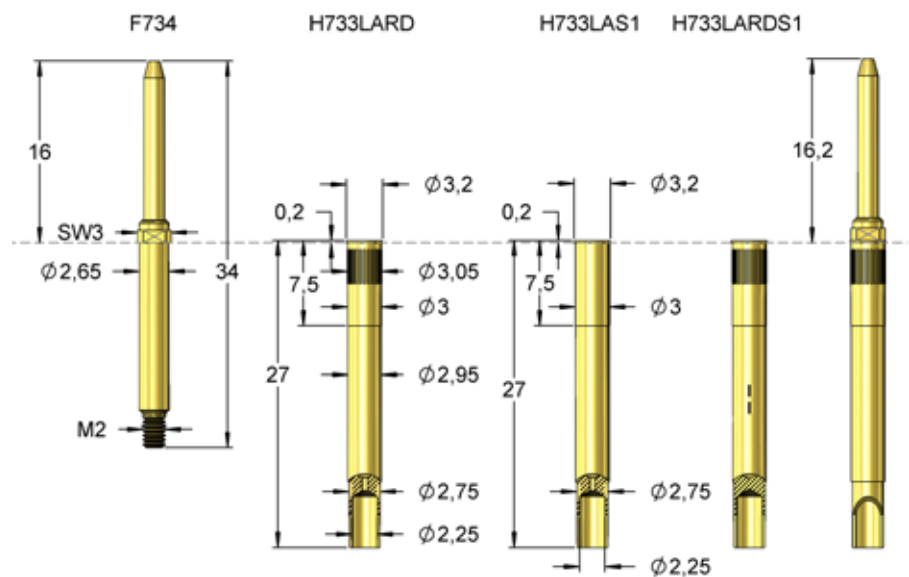
Plunger	see Tip Style
Barrel	Brass, gold plated
Spring	Music wire, silver plated
Receptacles	Brass, gold plated

Accessories

Insertion tool receptacle	FEWZ-774E0
Screw-in tool probe max. Tip-Ø 3,0 mm	FWZ733S1 (T)
Screw-in tool probe max. Tip-Ø 4,0 mm	FWZ733 (T)
Plug lock	H733VS

Drill Size (mm)

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



M 1:1



A solder tight version with a closed receptacle with knurl is available (H733LARDS1), which also has further press marks for a better hold of the probe even at conditions with stronger vibrations.

Series	Tip-Ø	Spring Force (cN)
F734	16	B 180 G 150
Tip Style	Material	Plating
Material:	B = BeCu, S = Steel	
Tip-Ø:	180 = 1,80 mm (e.g.)	
Plating:	G = Gold plated, L = Longtime gold plated	
Receptacle:	Order code according drawing	

Tip Style	Number	Material	Plating	Ø in mm	Version
	16	B	G	1,80	-
	18	S	L	1,80	-
	39	B	G	1,80	-

THREADED PROBES

F737

Threaded Probe 157 mil Long Travel Version

Centers (mm/mil)	4,00 / 157
Contin. current	10,0 A
R typ	8 mOhm
Temperature	-45°C...+100°C

Spring Force (cN ±20%)

Version	Preload	Nominal
Standard	60	150
Standard	80	300

Travel (mm)

Version	Nominal	Maximum
Standard	12,0	14,3
Thread (M)		2,0
Wrench Size		3,0

Materials and Plating

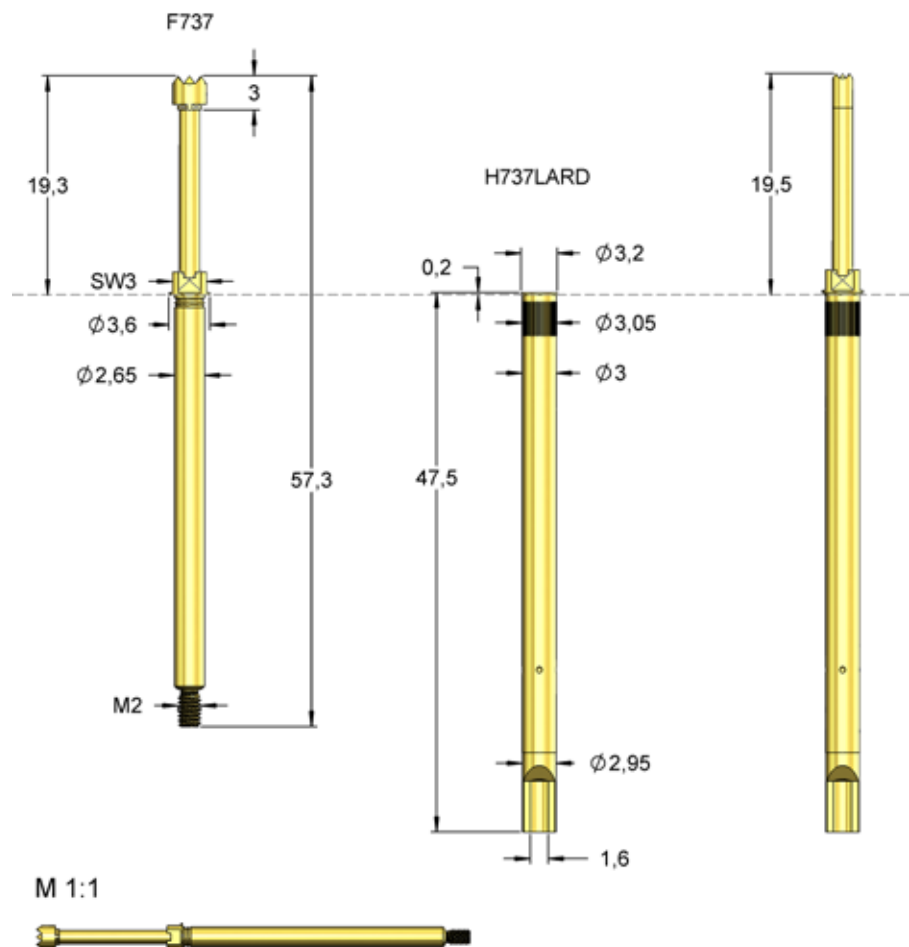
Plunger	see Tip Style
Barrel	Brass, gold plated
Spring	Music wire, silver plated
Receptacles	Brass, gold plated

Accessories

Insertion tool receptacle	FEWZ-774E0
Screw-in tool probe max. Tip-Ø 3,0 mm	FWZ733S1 (T)
Screw-in tool probe max. Tip-Ø 4,0 mm	FWZ733 (T)
Plug lock	H733VS

Drill Size (mm)

H737LARD	3,00 - 3,02
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Series	Tip-Ø	Spring Force (cN)
F737 06 B 180 G 300		
Tip Style	Material	Plating
		Version

Material:	B = BeCu
Tip-Ø:	180 = 1,80 mm (e.g.)
Plating:	G = Gold plated
Receptacle:	Order code according drawing

Tip Style	Number	Material	Plating	Ø in mm	Version
	06	B	G	1,80	-
	06	B	G	3,00	-
	06	B	G	4,00	-
	16	B	G	1,80	-

THREADED PROBES

F88890M2104G150

Threaded Probe with Ball Head

Centers (mm/mil)	6,00 / 236
Contin. current	10,0 A
R typ	25 mOhm
Temperature	-45°C...+200°C (H)

Spring Force (cN ±20%)

Version	Preload	Nominal
Standard	100	150

Travel (mm)

Version	Nominal	Maximum
Standard	0,8	0,8
Thread (M)		5,0

Materials and Plating

Kugel	Brass, gold plated
Barrel	Brass, gold plated
Spring	Stainless steel, unplated
Receptacles	Brass, gold plated

Accessories

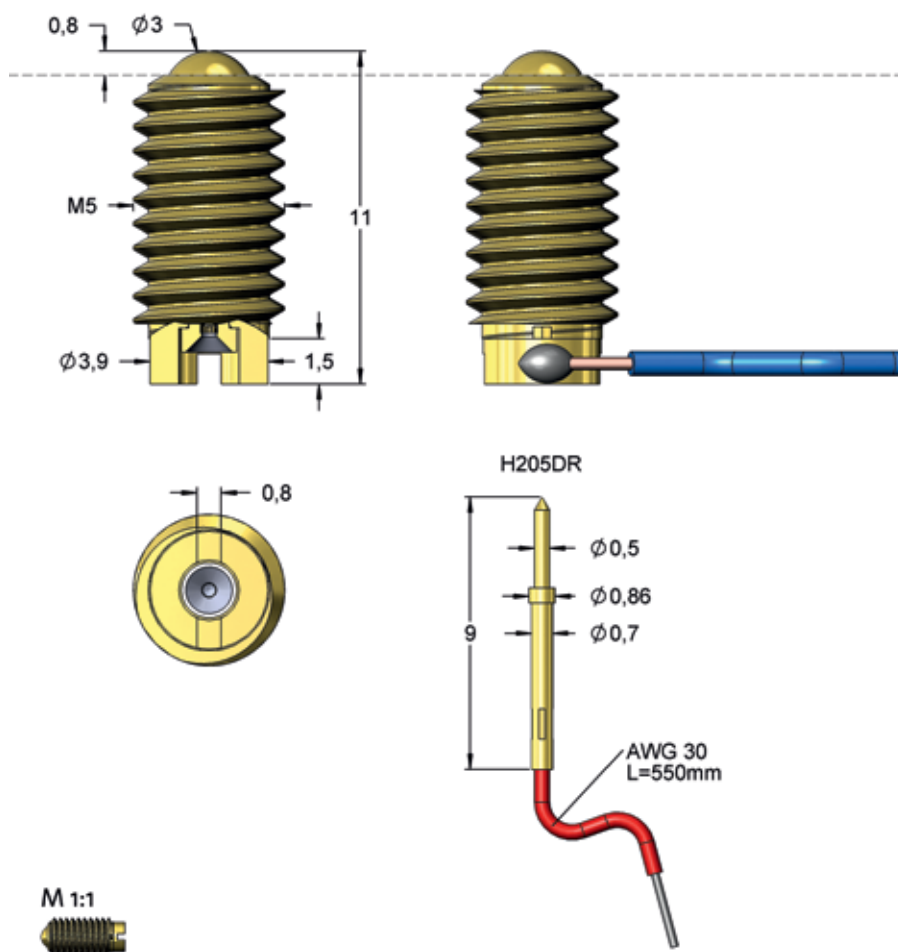
Screw driver	FWZ888S2
Insertion tool for Connection element	FWZ888S1
Connection element	H205DR

Drill Size (mm)

F88890M2104G150	M5
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Projection Height (mm) **max.**


F88890M2104G150	0,8
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Due to a rolling ball as contact element probes of the series F888 are insensitive against lateral forces. **This special version does not have a switch function.** It can be used like a normal contact probe.

Series	Tip-Ø	Spring Force (cN)
F888 90 M 2104 G 150		
Tip Style	Material	Plating
Version		

Material:	M = Messing
Number:	
1. Digit	0 = Switch not galvanically isolated 1 = Switch galvanically isolated 2 = Without switch
2. Digit	0 = Without thread 1 = With thread
3.+4. Digit	Running number
Plating:	G = Gold plated
Receptacle:	Order code according drawing

Tip Style	Number	Material	Plating	Ø in mm	Version
	90	M	G	3,00	-



Twist Proof Probes

Twist proof probes are used for testing aligned connectors and contact blades. In these applications rectangular shaped probes are needed, that move into the connector housing well aligned. The twist proof design is realized either within the probe or by mounting into a receptacle.

TWIST PROOF PROBES

Functional Principle

Twist proof probes are mainly used for testing connectors in rectangular cavities in which contact probes need to be inserted, or for testing contact blades. In these applications the alignment of the probe needs to have a certain direction. This alignment is realized by a twist proof design of the probe, either directly in the probe or in combination with a receptacle.

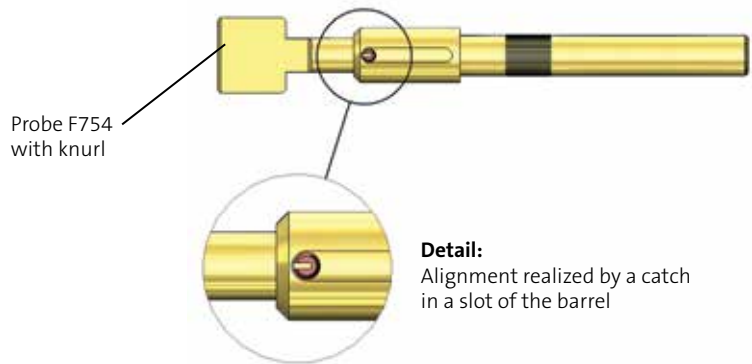
Twist proof design within a probe

When mounting a twist proof plug-in probe the correct alignment needs to be considered. If a receptacle is used, it can be mounted without alignment tool.

Advantage:

Probe can be mounted without receptacle.

Example for a twist proof plug-in probe



Twist proof design by guiding slot in the receptacle:

In this application the correct alignment needs to be considered already when mounting the slotted receptacle. The threaded probes have a rectangular continuous plunger that is guided in a slot of the receptacle and makes sure that the probe is also aligned.

Advantage:

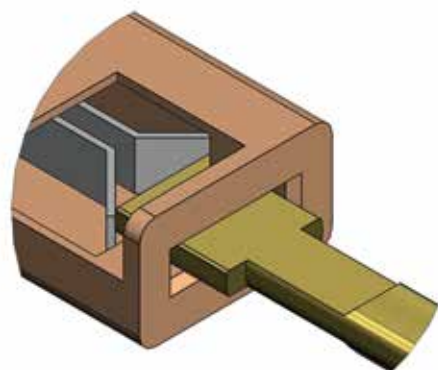
The correct alignment is already done after mounting the receptacle, there's no risk of alignment mistakes when probes are exchanged.

Example of a twist proof design with receptacle



Application Example

The twist proof spade tip moves through the hole in the plastic housing and contacts the inner connector inlay.



TWIST PROOF PROBES

Twist Proof Insulation Caps

For testing the correct position and alignment of flat contact elements FEINMETALL has developed a simple and effective solution. With a slotted tip style in combination with a twist proof probe, flat contact elements can be tested regarding the correct length. Additionally deformed, twisted or too thick false contacts can be detected.

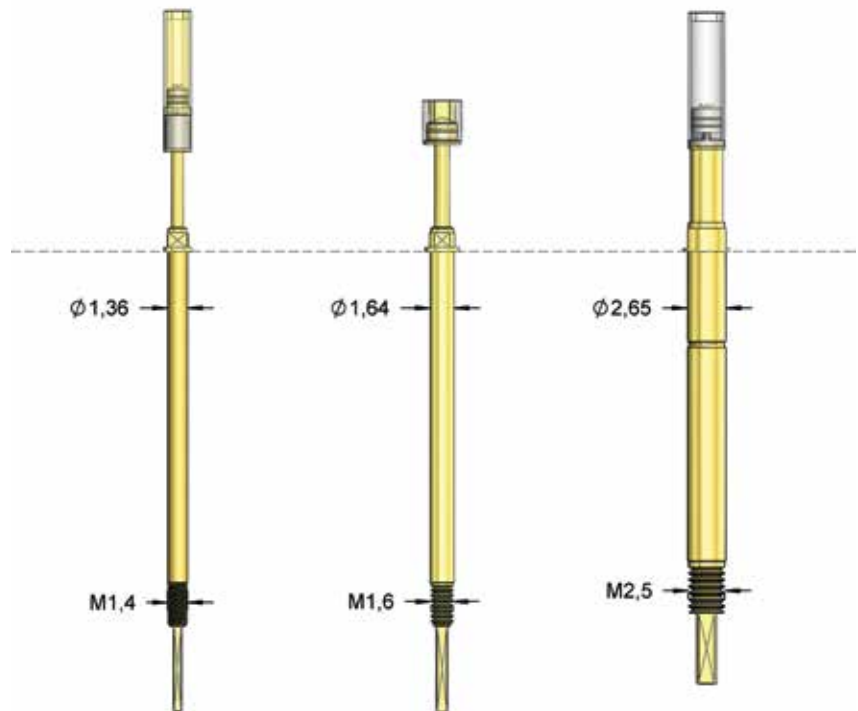
Slotted insulating caps are available for the twist proof probes F751, F756 and F760. They can be identified by the ending PT (Position Test) in the order code, e.g. PT50 = 5,0 mm overlap.



F75106B0001G150PT50

F76006B0001G300PT62

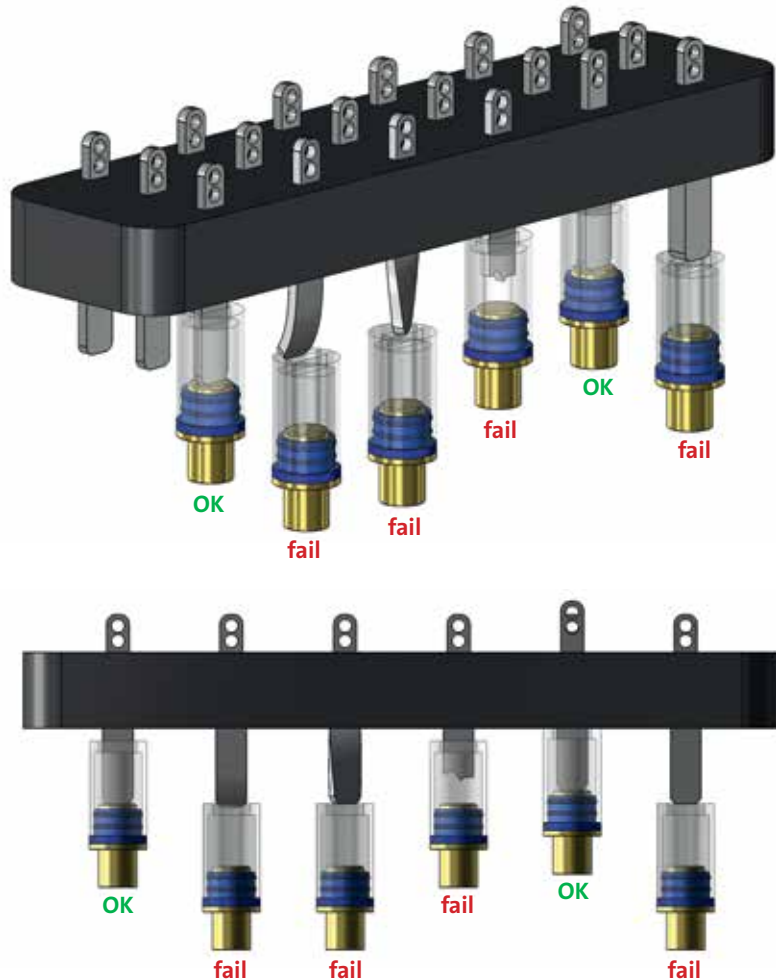
F75684B0007G080PT



Functional Principle and Application Examples

With the new slotted insulating cap in combination with a twist proof probe the correct length as well as the correct alignment of a contact element can be tested. If flat contact elements are deformed, twisted or too thick, the insulating cap goes solid and does not establish an electrical connection. Only if length, alignment and shape of the contact is OK, the insulating cap can be moved over the contact element and an electrical contact to the test item is established.

This method allows to detect a great variety of failures reliably and in a very simple way.



F752

Probe 100 mil Twist Proof, Plug-In

Centers (mm/mil)	2,54 / 100
Contin. current	3,0 A
R typ	30 mOhm
Temperature	-45°C...+100°C

Spring Force (cN ±20%)

Version	Preload	Nominal
L	50	150
L	50	300
S	50	150

Travel (mm)

Version	Nominal	Maximum
L	4,0	5,0
S	4,0	5,0

Materials and Plating

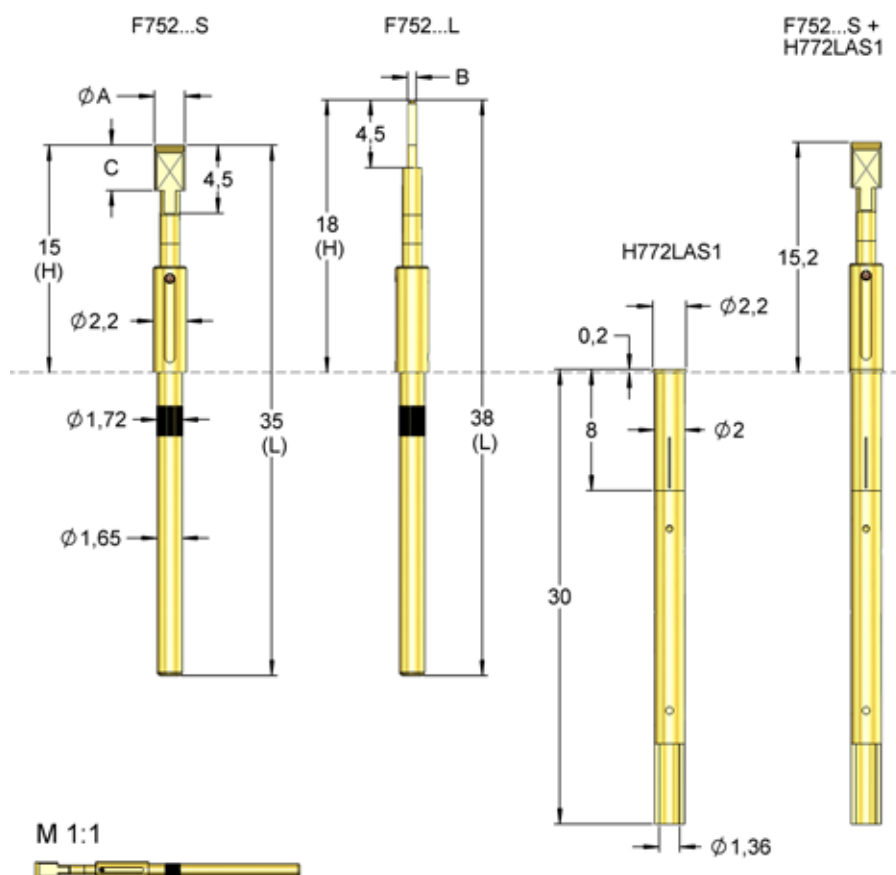
Plunger	Steel, Longtime gold plated
Barrel	Brass, gold plated
Spring	Music wire, gold plated
Receptacles	Nickel silver, gold plated

Accessories

Insertion tool receptacle	FEWZ-772E0
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Drill Size (mm)

F752 without receptacle	1,66 - 1,70
H772LAS1	1,99 - 2,00



Order code	Number	Ø A	B	C	H	L	Version
F75284S0005L150L	84	1,50	0,50	6,00	18,00	38,00	L
F75284S0004L150L	84	2,00	0,50	6,00	18,00	38,00	L
F75284S0004L300L	84	2,00	0,50	6,00	18,00	38,00	L
F75284S0003L150S	84	2,00	1,00	3,00	15,00	35,00	S
F75284S0007L150S	84	3,00	0,58	3,00	15,00	35,00	S

F756

Threaded Probe 100 mil Spade Tip Styles, Twist Proof with Continuous Plunger

Centers (mm/mil)	2,54 / 100
Contin. current	5,0 A
R typ	30 mOhm
Temperature	-45°C...+200°C (H)

Spring Force (cN ±20%)

Version	Preload	Nominal
Standard	60	150
Standard	100	300

Travel (mm)

Version	Nominal	Maximum
Standard	4,0	4,4
Thread (M)		1,6
Wrench Size		1,7

Materials and Plating

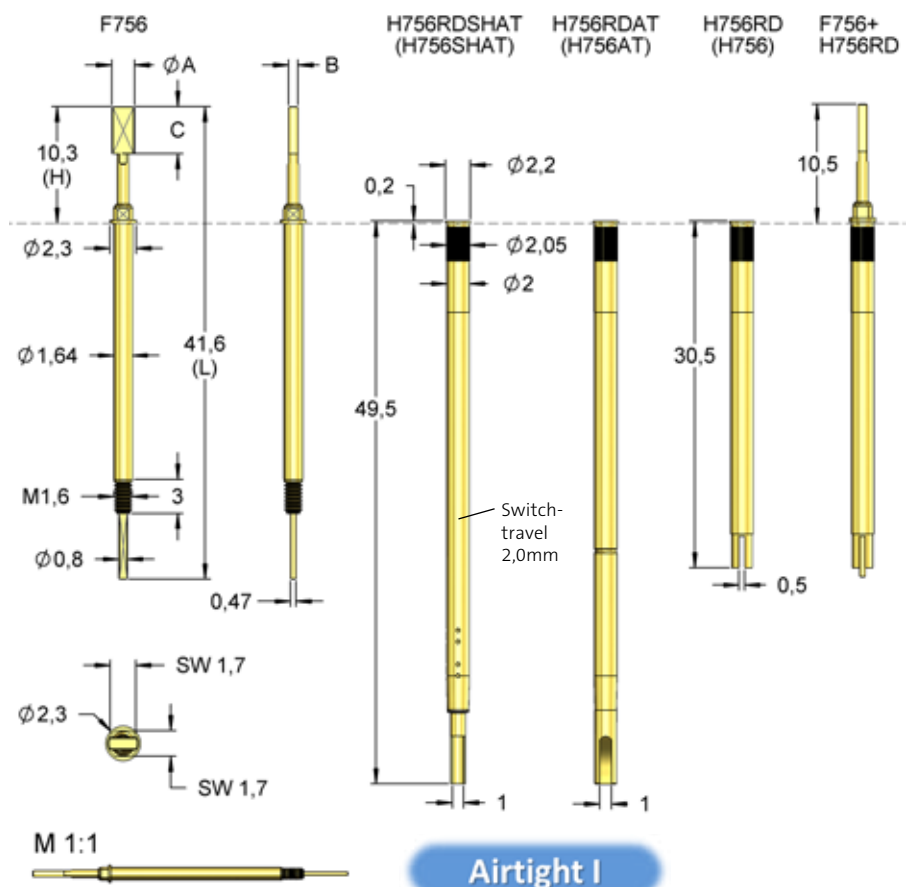
Plunger	BeCu, gold plated
Barrel	Brass, gold plated
Spring	Stainless steel, unplated
Receptacles	Brass, gold plated

Accessories

Alignment tool receptacle	FAWZ756
Screw-in tool probe	FWZ732 (T)

Drill Size (mm)

H756...	1,99 - 2,00
H756RD...	2,02 - 2,05



Information on variants with round tip styles on our homepage.
For the permissible leakage rate see information in the technical introduction on page 12.

Order code	Number	Ø A	B	C	H	L	Version	Screw-in tool
F75682B0001G150	82	1,10	0,45	5,00	10,30	41,60	-	FWZ732 (T)
F75684B0001G150	84	1,50	0,50	4,15	10,30	41,60	-	FWZ732 (T)
F75684B0001G300	84	1,50	0,50	4,15	10,30	41,60	-	FWZ732 (T)
F75684B0004G150	84	1,50	1,00	4,15	10,30	41,60	-	FWZ732 (T)
F75684B0004G300	84	1,50	1,00	4,15	10,30	41,60	-	FWZ732 (T)
F75684B0003G150	84	2,00	0,80	4,15	10,30	41,60	-	FWZ732 (T)
F75684B0003G300	84	2,00	0,80	4,15	10,30	41,60	-	FWZ732 (T)
F75684B0006G300	84	2,00	0,80	4,15	10,30	41,60	-	FWZ732 (T)

Threaded Probe 138 mil Spade Tip Styles, Twist Proof with Continuous Plunger

Spring Force (cN $\pm 20\%$)

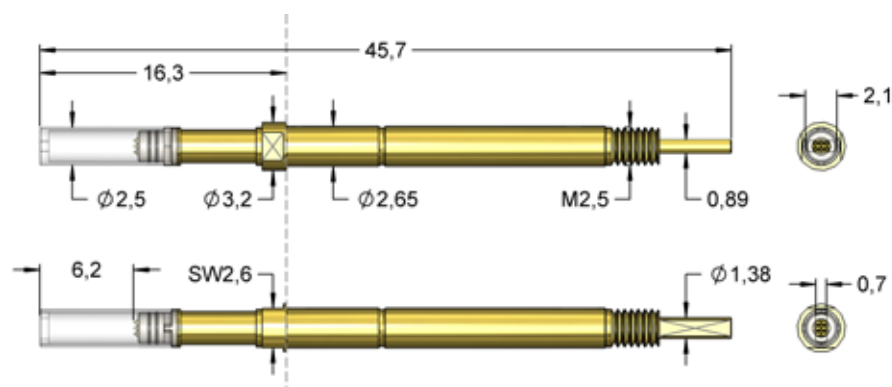
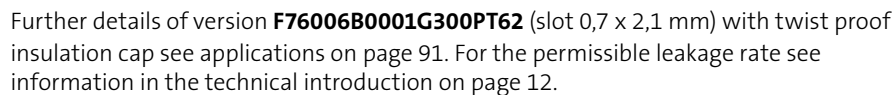
Travel (mm)

Materials and Plating

Accessories

Drill Size (mm)

H760...	2,98 - 2,99
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F755

Threaded Probe 177 mil Spade Tip Styles, Twist Proof with Continuous Plunger

Centers (mm/mil)	4,50 / 177
Contin. current	10,0 A
R typ	30 mOhm
Temperature	-45°C...+200°C (H)

Spring Force (cN ±20%)

Version	Preload	Nominal
E13	70	150
E15	90	300

Travel (mm)

Version	Nominal	Maximum
E13	5,6	7,0
Thread (M)		2,5
Wrench Size		3,0

Materials and Plating

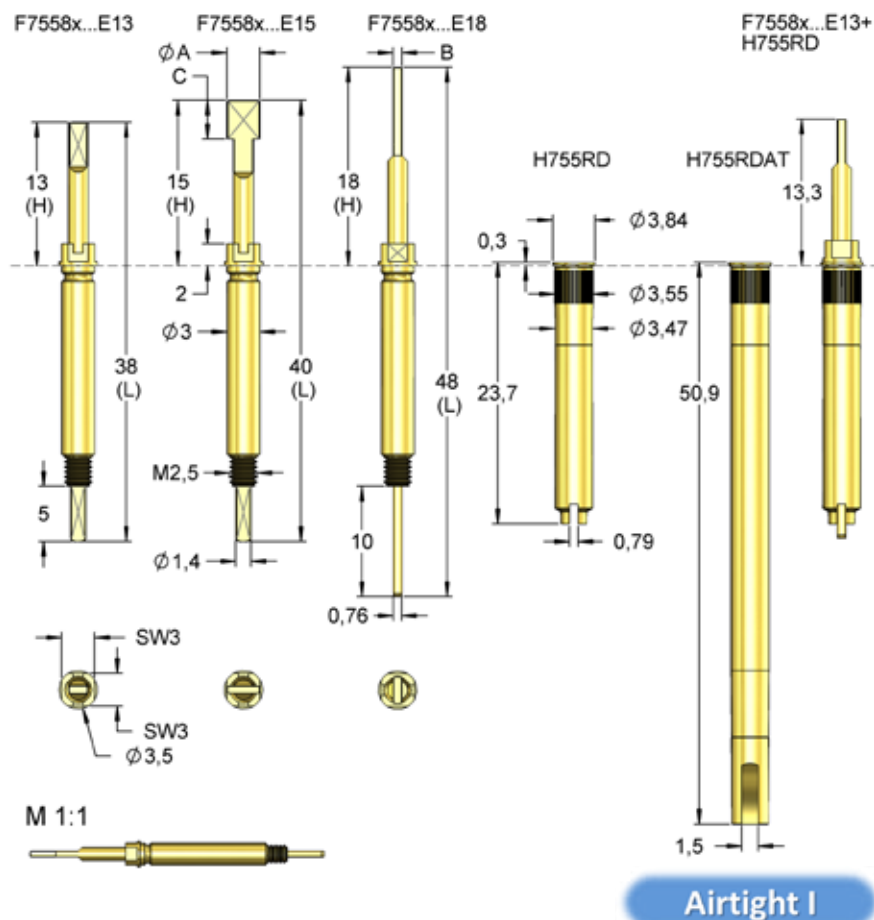
Plunger	BeCu, gold plated
Barrel	Brass, gold plated
Spring	Stainless steel, unplated
Receptacles	Brass, gold plated

Accessories

Alignment tool receptacle	FAWZ755
Screw-in tool probe max. Tip-Ø 4,0 mm	FWZ733 (T)

Drill Size (mm)

H755RD	3,48 - 3,52
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For the permissible leakage rate see information in the technical introduction on page 12.

Order code	Number	Ø A	B	C	H	L	Version	Screw-in tool
F75582B0002G150E13	82	1,80	0,50	4,00	13,00	38,00	E13	FWZ733 (T)
F75582B0001G150E13	82	1,80	0,80	4,00	13,00	38,00	E13	FWZ733 (T)
F75582B0001G300E13	82	1,80	0,80	4,00	13,00	38,00	E13	FWZ733 (T)
F75583B0001G150E18	83	2,50	0,80	8,00	18,00	48,00	E18	FWZ733 (T)
F75583B0001G300E18	83	2,50	0,80	8,00	18,00	48,00	E18	FWZ733 (T)
F75584B0002G300E15	84	2,80	0,40	6,00	15,00	40,00	E15	FWZ733 (T)
F75584B0001G150E15	84	3,00	0,70	3,50	15,00	40,00	E15	FWZ733 (T)
F75584B0001G300E15	84	3,00	0,70	3,50	15,00	40,00	E15	FWZ733 (T)

F755

Threaded Probe 177 mil Round Tip Styles, with Continuous Plunger

Centers (mm/mil)	4,50 / 177
Contin. current	10,0 A
R typ	30 mOhm
Temperature	-45°C...+200°C (H)

Spring Force (cN ±20%)

Version	Preload	Nominal
Exx	70	150
Exx	90	300
Exx	120	500

Travel (mm)

Version	Nominal	Maximum
Exx	5,6	7,0
Thread (M)		2,5
Wrench Size		3,0

Materials and Plating

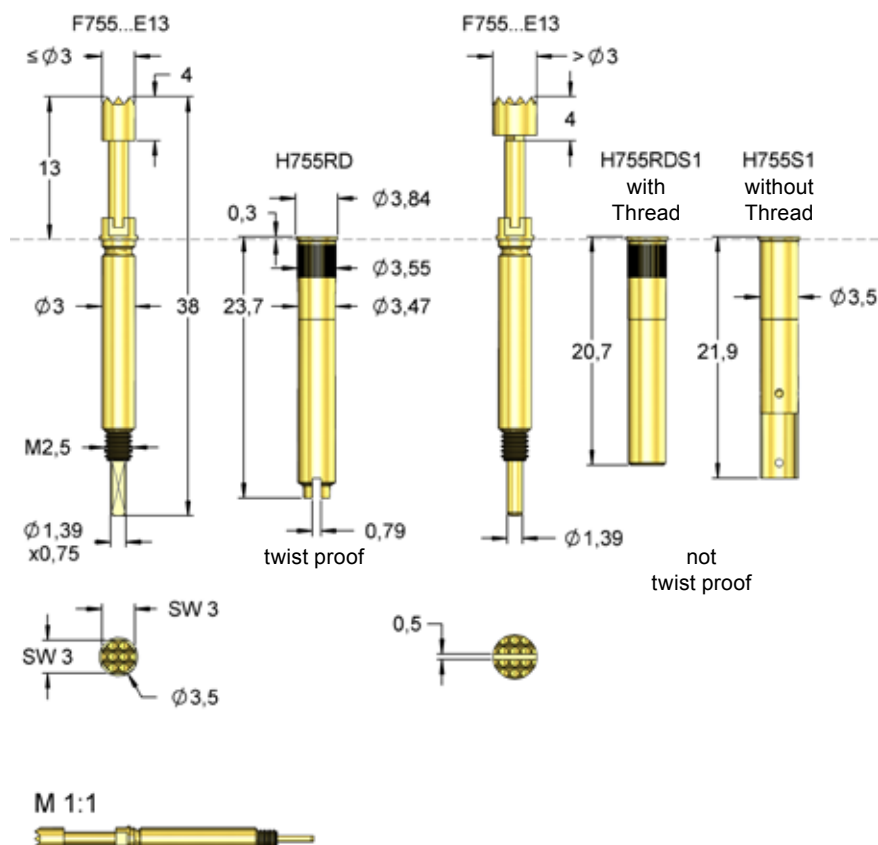
Plunger	see Tip Style
Barrel	Brass, gold plated
Spring	Stainless steel, unplated
Receptacles	Brass, gold plated

Accessories

Insertion tool receptacle (not twist proof)	FEWZ-755E0
Alignment tool receptacle	FAWZ755
Screw-in tool probe max. Tip-Ø 3,0 mm	FWZ733S1 (T)
Screw-in tool probe > Ø3,1 mm with slot	FWZ886S1

Drill Size (mm)

H755S1	3,48 - 3,49
H755RD	3,48 - 3,52



Tip styles with a diameter up to 3,0 mm are twist proof. With larger tip diameters, the twist proof function at the plunger cannot be realized. Twist proof receptacles (e.g. H755RD) cannot be used here either.

* Not twist proof.

Series	Tip-Ø	Spring Force (cN)
F755	06	B
		300
		G
		300
		E13
	Tip Style	Material
		Plating
		Version
Material:	B = BeCu	
Tip-Ø:	300 = 3,00 mm (e.g.)	
Plating:	G = Gold plated	
Version:	E13 = Projection Height 13mm, S1 = special version	
Receptacle:	Order code according drawing	

Tip Style	Number	Material	Plating	Ø in mm	Version
	06	B	G	3,00	E13
	06	B	G	4,00	E13 *
	14	B	G	3,00	E13
	18	B	G	1,80	E13S1 *

F754

Probe 177 mil Twist Proof, Plug-In

Centers (mm/mil)	4,50 / 177
Contin. current	10,0 A
R typ	20 mOhm
Temperature	-45°C...+100°C

Spring Force (cN ±20%)

Version	Preload	Nominal
L	30	150
L	80	300
S	30	150
S	80	300

Travel (mm)

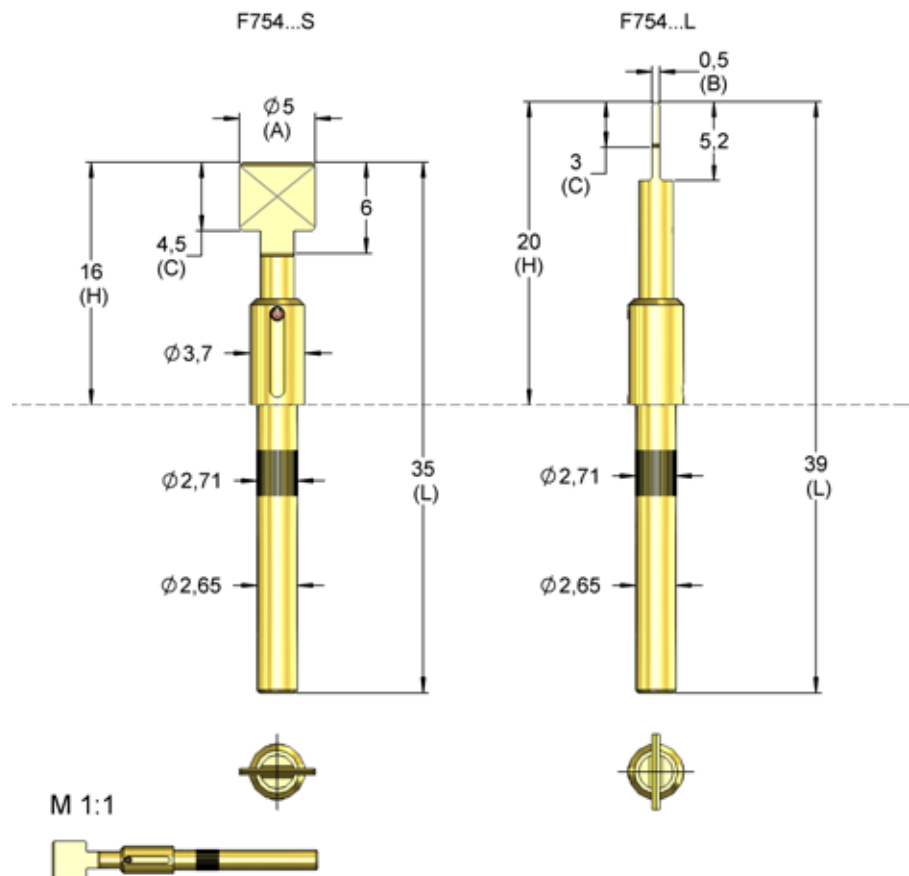
Version	Nominal	Maximum
L	4,0	4,5
S	4,0	4,5

Materials and Plating

Plunger	BeCu, gold plated
Barrel	Brass, gold plated
Spring	Music wire, gold plated

Drill Size (mm)

F754 without Receptacle	2,66 - 2,70
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Order code	Number	Ø A	B	C	H	L	Version
F75484B0004G150L	84	4,00	0,65	3,00	20,00	39,00	L
F75484B0003G150L	84	5,00	0,50	3,00	20,00	39,00	L
F75484B0003G300L	84	5,00	0,50	3,00	20,00	39,00	L
F75484B0002G150S	84	4,00	1,00	3,00	16,00	35,00	S
F75484B0002G300S	84	4,00	1,00	3,00	16,00	35,00	S
F75484B0005G300S	84	5,00	0,40	4,50	16,00	35,00	S
F75484B0001G150S	84	5,00	1,00	3,00	16,00	35,00	S
F75484B0001G300S	84	5,00	1,00	3,00	16,00	35,00	S
F75484B0006G300S	84	5,00	1,00	4,50	16,00	35,00	S



Push Back Probes

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

PUSH BACK PROBES

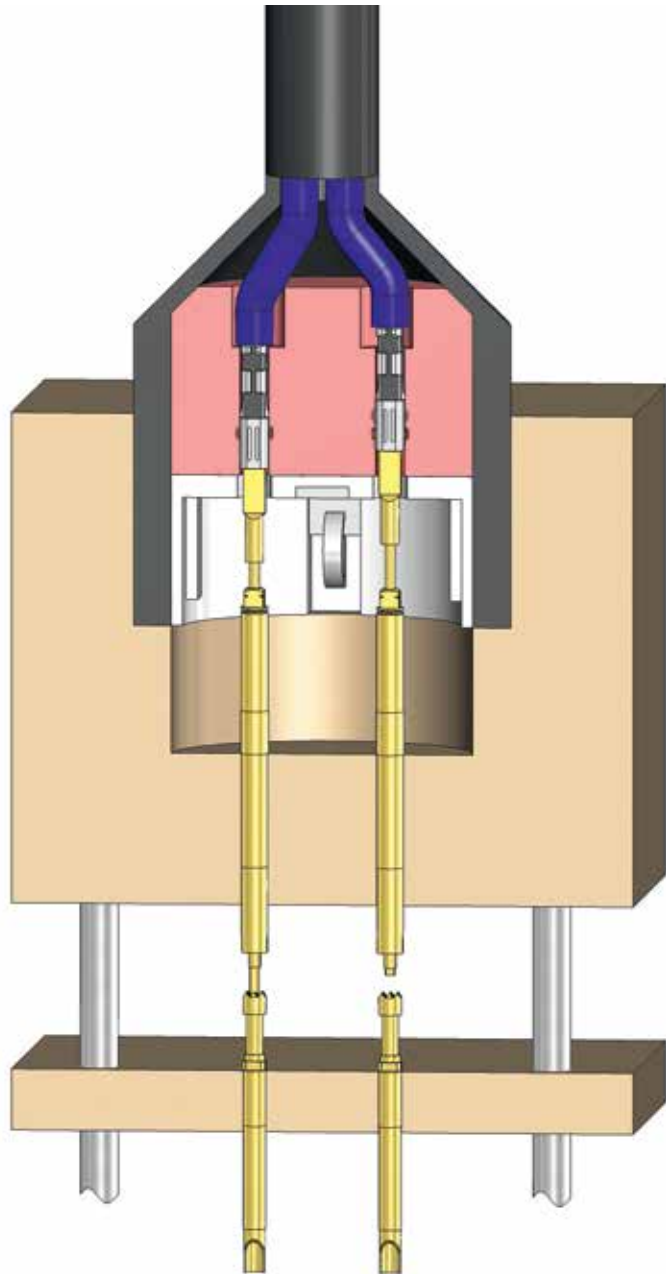
Push Back Test of Connectors

Push back probes are used to verify and qualify the correct mounting and locking of terminals in connectors and to make sure that they cannot be pushed out of their housings.

For these applications contact probes with very high spring forces and pre-defined projection heights are used. Depending on the centers the spring forces have values between 5 N and 25 N.

Very commonly push back tests require twist proof probes with spade tip styles (series VF100, VF3, VF4).

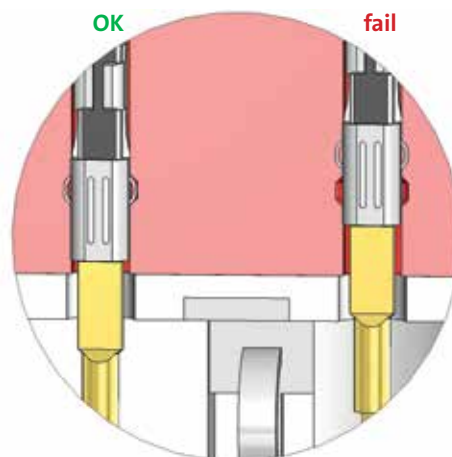
Push back probes are also available with round tip styles without twist proof design (series V03, V04).



Details of Contacting Procedure

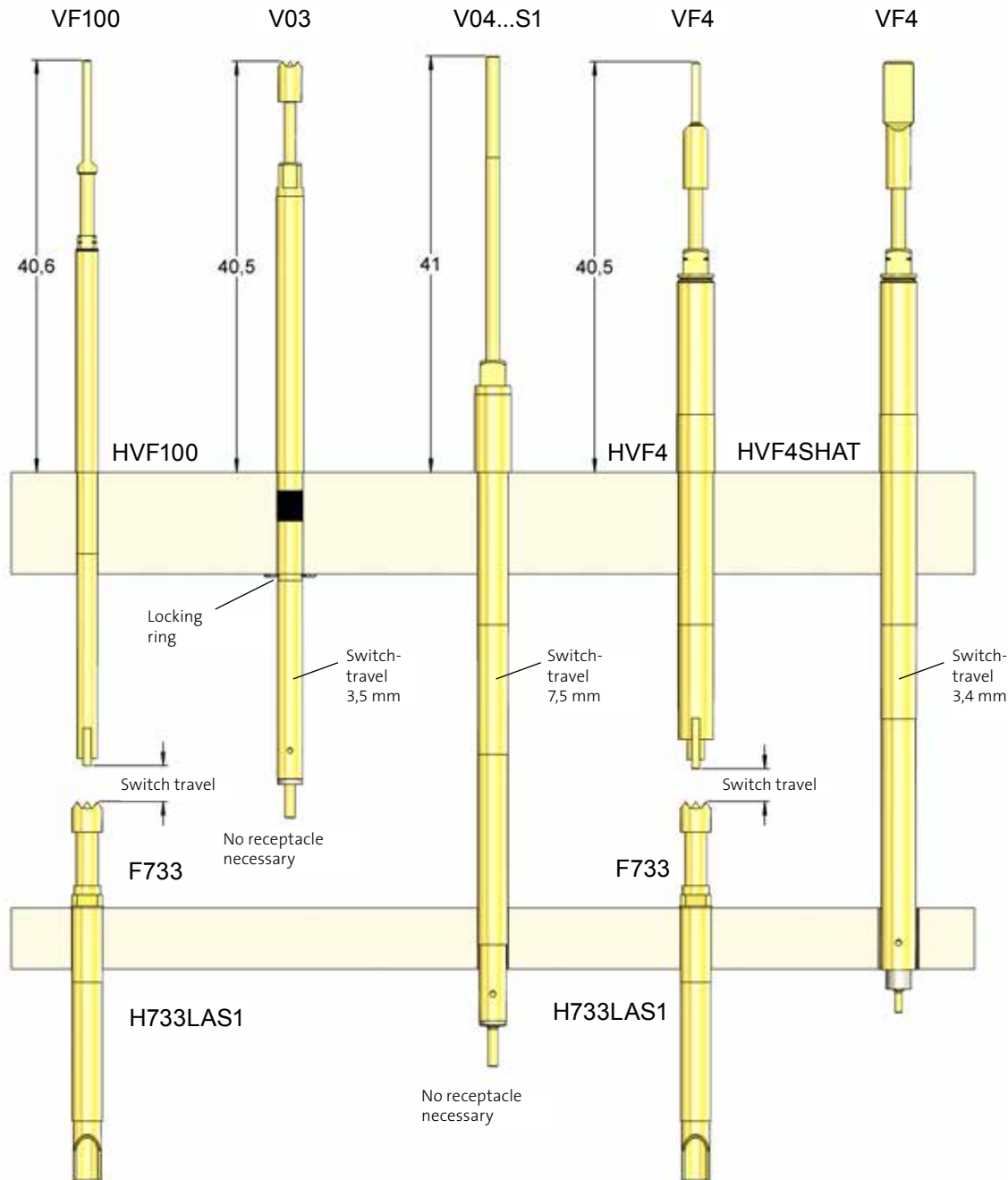
During the test procedure not only the electrical continuity is tested, but also the correct mounting of the connector. Without a push back test the result could be OK even if the connector is not locked properly.

The detection of the correct mounting of the connector is based on a switch function of the push back probe. This switch function can be realized either by using a switch receptacle or by using an additional probe in a second level.



PUSH BACK PROBES

Typical Combinations of Push Back Probes



Threaded Probes for Push Back Tests of Connectors

Push back probes are used for testing wire harnesses and connectors. FEINMETALL offers a great variety of tip styles and spring forces as well as further features, for example receptacles for building up airtight modules as well as push back probes that can be mounted without receptacle. .

Selection of Variable and Fix Switch Points

The modular design of FEINMETALL push back probes enables a separate exchange of switch elements and push back probes. This is a great economical advantage. The illustration shows different combinations of probes at different levels.

Note

In case of connecting several probes in series the resulting spring force is the sum of the single spring forces.

PUSH BACK PROBES

VF100

Push Back Probe 100 mil Round Tip Styles

Centers (mm/mil)	2,54 / 100
Contin. current	5,0 A
Current (Switch Receptacle)	1,0 A
R typ	30 mOhm
Temperature	-45°C...+100°C

Spring Force (cN ±20%)

Version	Preload	Nominal
Standard	80	500
Standard	80	1000
Standard	120	1500

Travel (mm)

Version	Nominal	Maximum
Standard	5,0	5,5
Thread (M)		2,0x0,25
Wrench Size		1,8

Materials and Plating

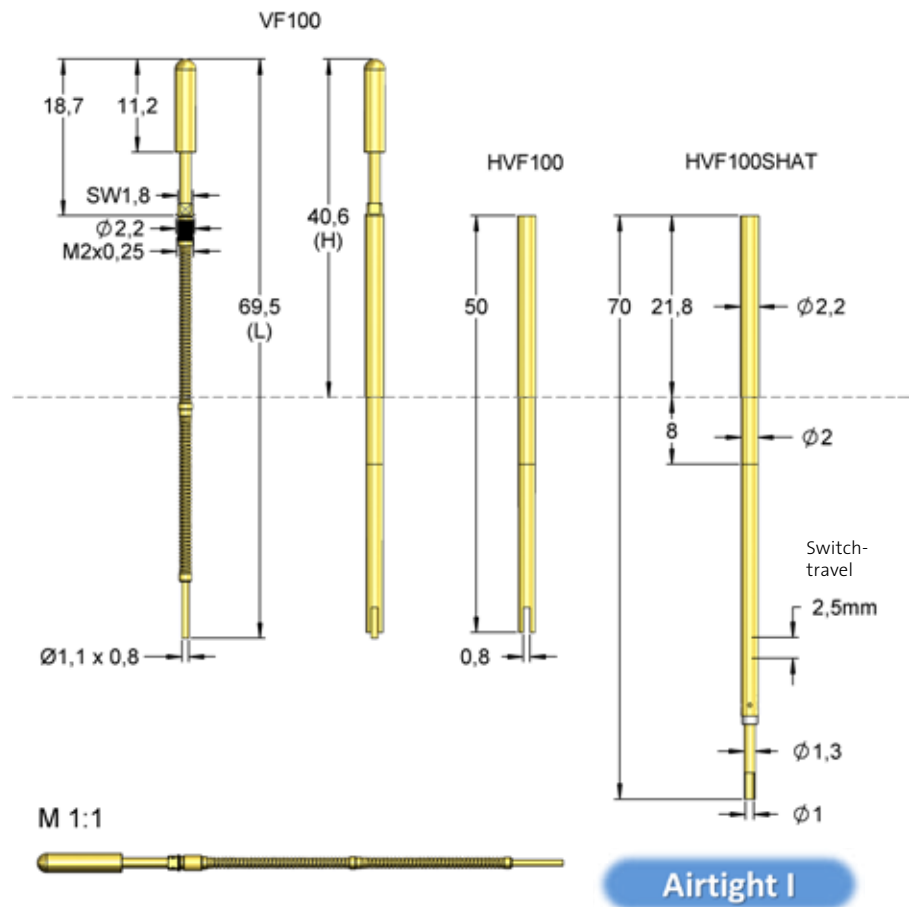
Plunger	see Tip Style
Barrel	Brass, gold plated
Spring	Music wire, gold plated
Receptacles	Brass, gold plated

Accessories

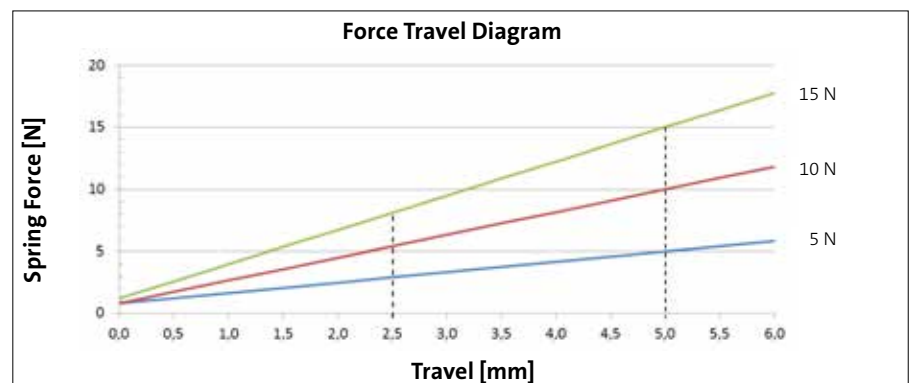
Alignment tool receptacle	FAWZVF100
Screw-in tool probe max. Tip-Ø 2,0 mm	FWZVF100 (T)
Screw-in tool probe max. Tip-Ø 2,7 mm	FWZVF100S1 (T)

Drill Size (mm)

HVF100...	1,99 - 2,00
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For the permissible leakage rate see information in the technical introduction on page 12.



Series	Tip-Ø	Spring Force (N)
VF100 05 B 190 G 15		
Tip Style	Material	Plating
		Version

Material: B = BeCu
Tip-Ø: 190 = 1,90 mm (e.g.)
Plating: G = Gold plated
Receptacle: Order code according drawing

Tip Style	Number	Material	Plating	Ø in mm	Version
	05	B	G	1,90	-
	05	B	G	2,20	-
	11	B	G	1,20	-
	12	B	G	2,50	-
	17	B	G	1,50	-
	17	B	G	1,80	-

PUSH BACK PROBES

VF100

Push Back Probe 100 mil Spade Tip Styles

Centers (mm/mil)	2,54 / 100
Contin. current	5,0 A
Current (Switch Receptacle)	1,0 A
R typ	30 mOhm
Temperature	-45°C...+100°C

Spring Force (cN ±20%)

Version	Preload	Nominal
Standard	80	500
Standard	80	1000
Standard	120	1500

Travel (mm)

Version	Nominal	Maximum
Standard	5,0	5,5
Thread (M)		2,0x0,25
Wrench Size		1,8

Materials and Plating

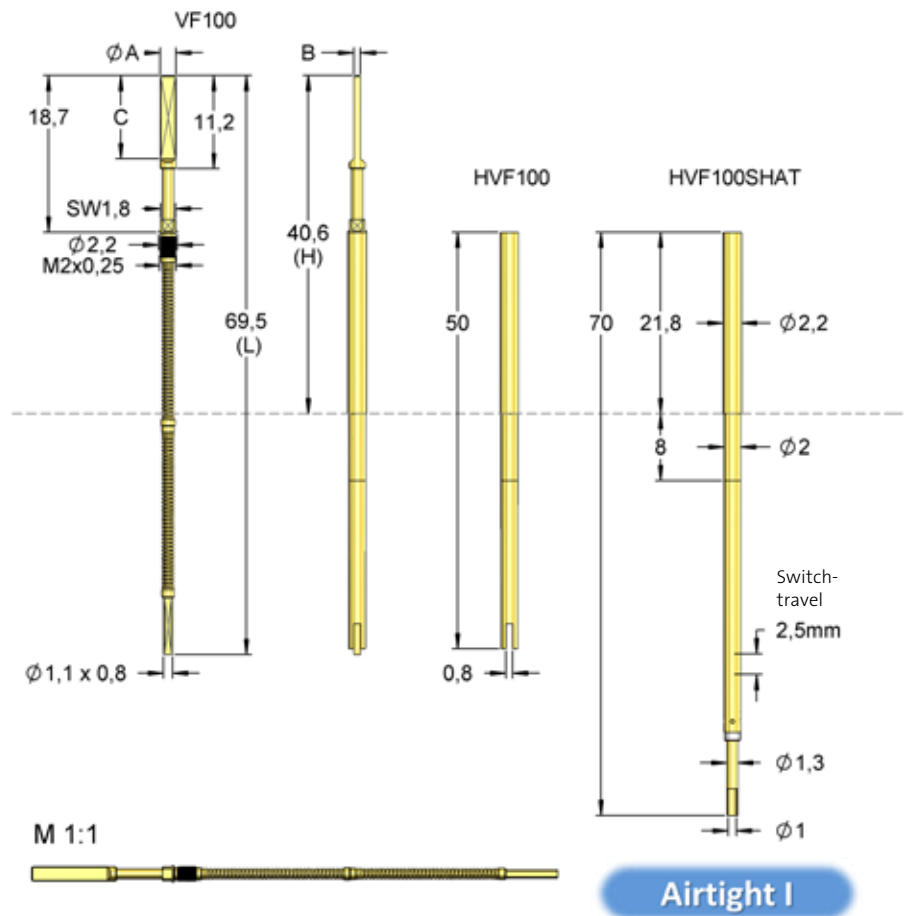
Plunger	see Tip Style
Barrel	Brass, gold plated
Spring	Music wire, gold plated
Receptacles	Brass, gold plated

Accessories

Alignment tool receptacle	FAWZVF100
Screw-in tool probe max. Tip-Ø 2,0 mm	FWZVF100 (T)
Screw-in tool probe max. Tip-Ø 2,7 mm	FWZVF100S1 (T)

Drill Size (mm)

HVF100...	1,99 - 2,00
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For the permissible leakage rate see information in the technical introduction on page 12.

Order Code	Number	Ø A	B	C	H	L	Version	Screw-in tool
VF10080B0001Gxx	80	1,60	0,50	10,00	40,50	69,50	-	FWZVF100 (T)
VF10082B0003Gxx	82	1,90	0,50	10,00	40,50	69,50	-	FWZVF100 (T)
VF10082B0004Gxx	82	1,90	0,80	10,00	40,50	69,50	-	FWZVF100 (T)
VF10082S0001Lxx	82	1,90	0,30	10,00	40,50	69,50	-	FWZVF100 (T)
VF10082S0002Lxx	82	1,90	0,36	10,00	40,50	69,50	-	FWZVF100 (T)
VF10084B0001Gxx	84	2,50	0,80	3,00	40,50	69,50	-	FWZVF100S1 (T)

PUSH BACK PROBES

VF3

Push Back Probe 118 mil Round Tip Styles

Centers (mm/mil)	3,00 / 118
Contin. current	8,0 A
Current (Switch Receptacle)	1,0 A
R typ	30 mOhm
Temperature	-45°C...+100°C

Spring Force (cN ±20%)

Version	Preload	Nominal
Standard	100	500
Standard	200	1000
Standard	300	1500
S1	1090	1500

Travel (mm)

Version	Nominal	Maximum
Standard	5,0	5,5
S1	1,5	3,5
Thread (M)	2,0x0,2	
Wrench Size	2,2	

Materials and Plating

Plunger	see Tip Style
Barrel	Brass, gold plated
Spring	Music wire, gold plated
Receptacles	Brass, gold plated

Accessories

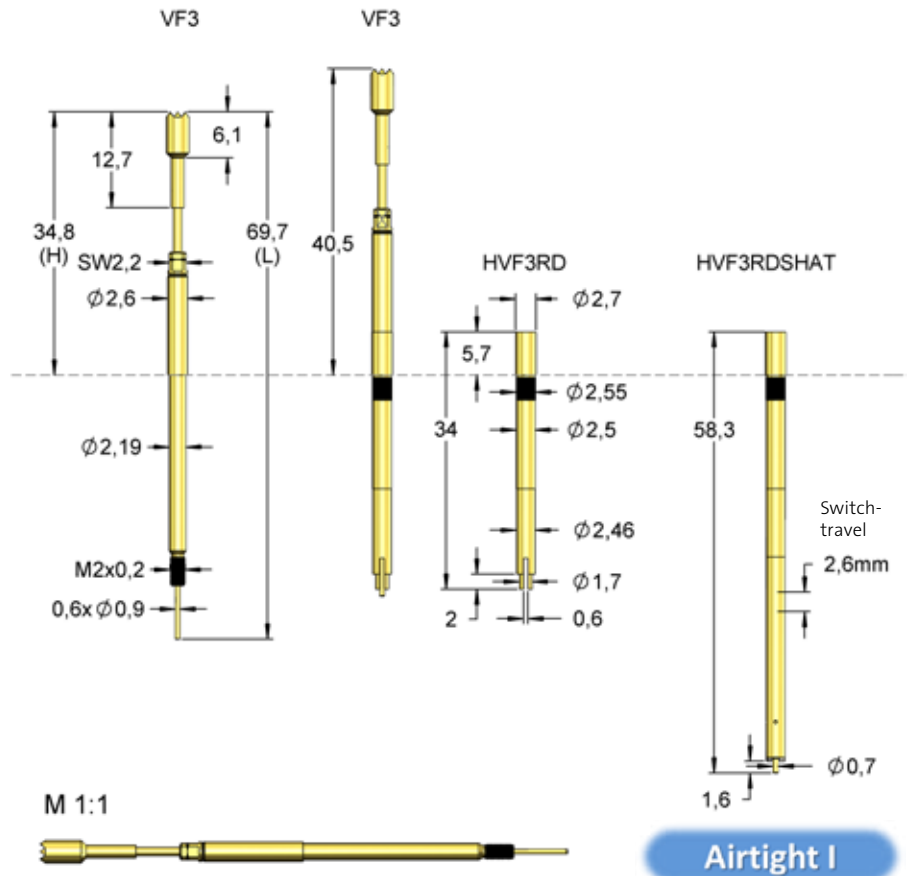
Alignment tool receptacle	FAWZVF3
Screw-in tool probe max. Tip-Ø 2,3 mm	FWZVF3S4 (T)
Screw-in tool probe max. Tip-Ø 2,7 mm	FWZVF3 (T)
Screw-in tool probe max. Tip-Ø 4,0 mm	FWZVF3S3 (T)

Drill Size (mm)

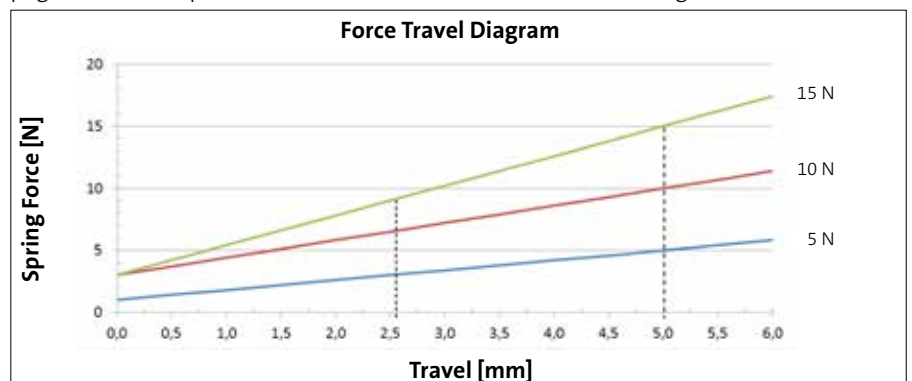
Receptacle without knurl	2,48 - 2,49
Receptacle with knurl	2,52 - 2,55

Series	Tip-Ø	Spring Force (N)
VF3	05	B 190 G 15
	Tip Style	Material Plating Version

Material: B = BeCu
Tip-Ø: 190 = 1,90 mm (e.g.)
Plating: G = Gold plated
Version: L = Long version, S1 = Special version
Receptacle: Order code according drawing



For the permissible leakage rate see information in the technical introduction on page 12. The receptacle HVF3SHATS1 is available with a switching travel of 4.5 mm.



Tip Style	Number	Material	Plating	Ø in mm	Version
	05	B	G	1,90	-
	05	B	G	2,20	-
	05	B	G	3,00	-
	06	B	G	2,00	S1
	06	B	G	2,70	-
	06	B	G	3,00	-
	12	B	G	2,30	-
	17	B	G	1,50	-
	17	B	G	1,80	-
	17	B	G	2,30	-
	17	B	G	3,00	-

PUSH BACK PROBES

VF3

Push Back Probe 118 mil Spade Tip Styles

Centers (mm/mil)	3,00 / 118
Contin. current	8,0 A
Current (Switch Receptacle)	1,0 A
R typ	30 mOhm
Temperature	-45°C...+100°C

Spring Force (cN ±20%)

Version	Preload	Nominal
Standard	100	500
Standard	200	1000
Standard	300	1500

Travel (mm)

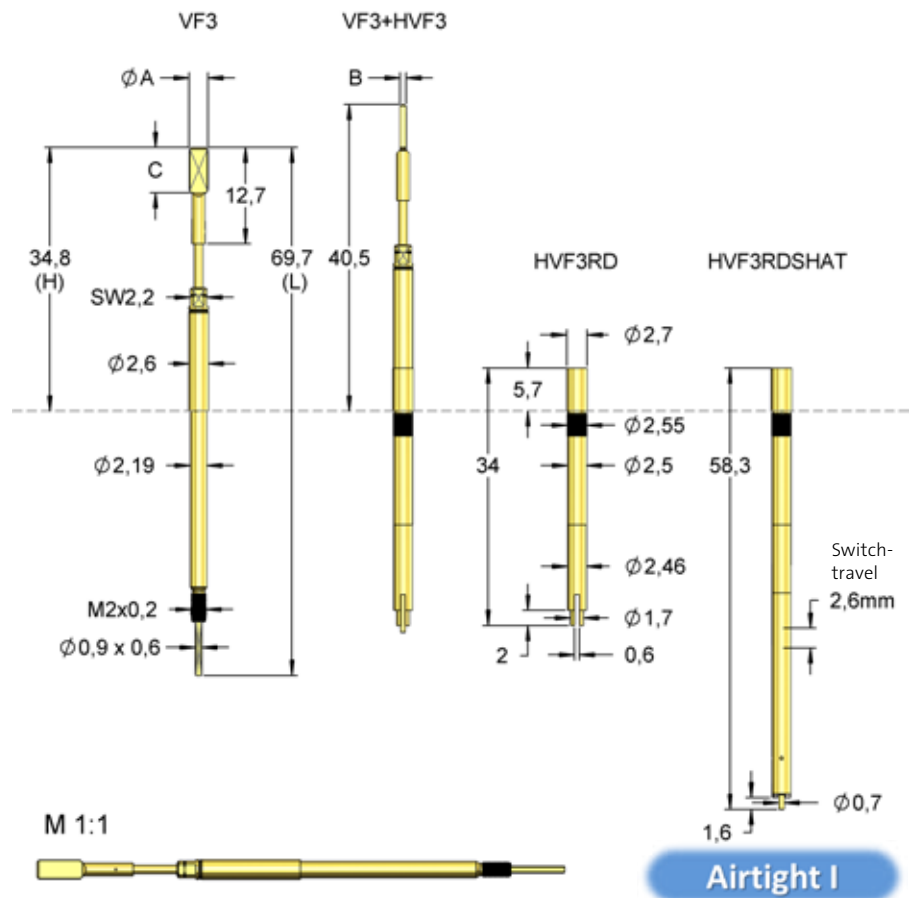
Version	Nominal	Maximum
Standard	5,0	5,5
Thread (M)		2,0x0,2
Wrench Size		2,2

Materials and Plating

Plunger	see Tip Style
Barrel	Brass, gold plated
Spring	Music wire, gold plated
Receptacles	Brass, gold plated

Drill Size (mm)

Receptacle without knurl	2,48 - 2,49
Receptacle with knurl	2,52 - 2,55



For the permissible leakage rate see information in the technical introduction on page 12. The receptacle HVF3SHATS1 is available with a switching travel of 4.5 mm. All receptacles also available without knurl (RD).

Order Code	Number	Ø A	B	C	H	L	Version	Screw-in tool
VF380B0002Gxx	80	1,40	0,50	6,00	34,80	69,70	-	FWZVF3 (T)
VF380B0001Gxx	80	1,60	0,50	6,00	34,80	69,70	-	FWZVF3 (T)
VF383B0004Gxx	83	1,90	0,50	6,00	34,80	69,70	-	FWZVF3 (T)
VF383B0004G15L	83	1,90	0,50	12,00	40,80	75,70	L	FWZVF3 (T)
VF383B0005Gxx	83	1,90	0,80	6,00	34,80	69,70	-	FWZVF3 (T)
VF383B0009G15L	83	2,10	0,70	12,00	40,80	75,70	L	FWZVF3 (T)
VF383B0007G15	83	2,20	1,20	6,00	34,80	69,70	-	FWZVF3 (T)
VF383B0002G15	83	2,50	0,50	6,00	34,80	69,70	-	FWZVF3 (T)
VF383B0001Gxx	83	2,50	0,80	6,00	34,80	69,70	-	FWZVF3 (T)
VF383B0003Gxx	83	2,50	1,50	6,00	34,80	69,70	-	FWZVF3 (T)
VF383B0008Gxx	83	2,70	0,80	6,00	34,80	69,70	-	FWZVF3 (T)
VF383B0010G15	83	2,70	0,80	10,00	38,80	73,70	S1	FWZVF3 (T)
VF383B0006G15	83	4,00	0,60	10,00	38,80	73,70	S1	FWZVF3S3 (T)

V03

Push Back Probe 118 mil Plug-In with Switch Function

Centers (mm/mil)	3,00 / 118
Contin. current	8,0 A
Current (switch)	1,0 A
R typ	30 mOhm
Temperature	-45°C...+100°C

Spring Force (cN $\pm 20\%$)

Version	Preload	Nominal
Standard	300	1500

Travel (mm)

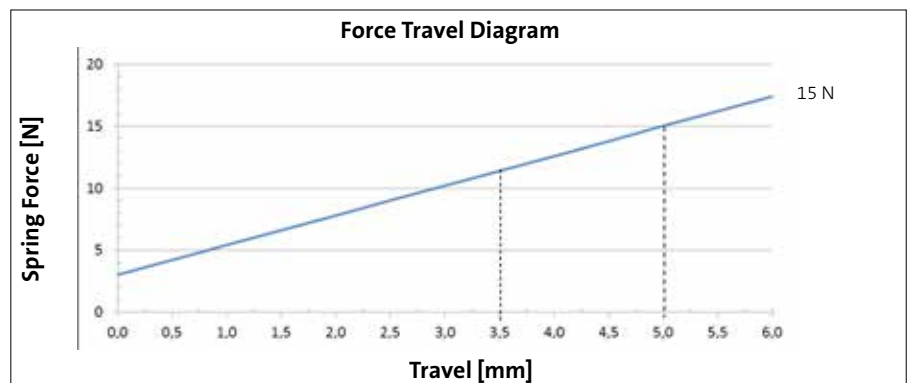
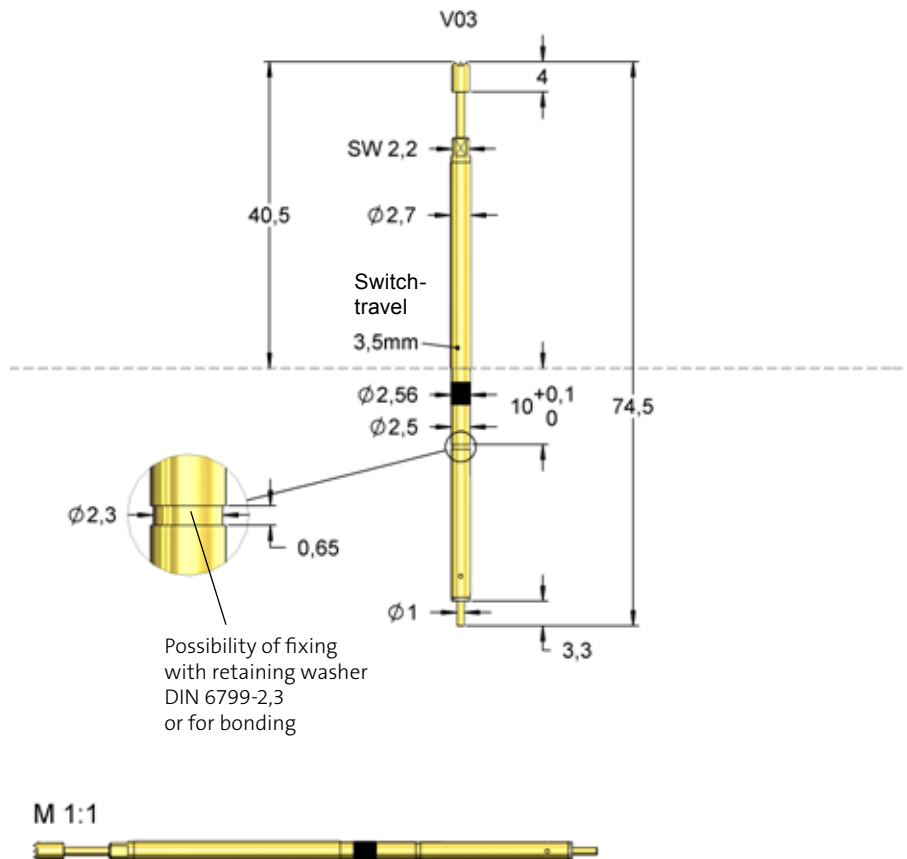
Version	Nominal	Maximum
Standard	5,0	6,0
Switch Travel (mm)		3,5
Wrench Size		2,2

Materials and Plating



Plunger	see Tip Style
Barrel	Brass, gold plated
Spring	Music wire, gold plated
Receptacles	-

Drill Size (mm)

V03	2,50 - 2,52
-----	-------------



Series	Tip-Ø	Spring Force (N)
V03	230	15
Tip Style	Material	Plating
		Version
Material:	B = BeCu	
Tip-Ø:	230 = 2,3 mm (e.g.)	
Plating:	G = Gold plated	

Tip Style	Number	Material	Plating	Ø in mm	Version
	06	B	G	2,30	-
	17	B	G	2,30	-

PUSH BACK PROBES

V04

Push Back Probe 157 mil Plug-In with Switch Function

Centers (mm/mil)	4,00 / 157
Contin. current	8,0 A
Current (Switch)	1,0 A
R typ	30 mOhm
Temperature	-45°C...+100°C

Spring Force (cN ±20%)

Version	Preload	Nominal
Standard	150	600
Standard	200	900
Standard	400	1500
E33	400	1500
S1	600	1500

Travel (mm)

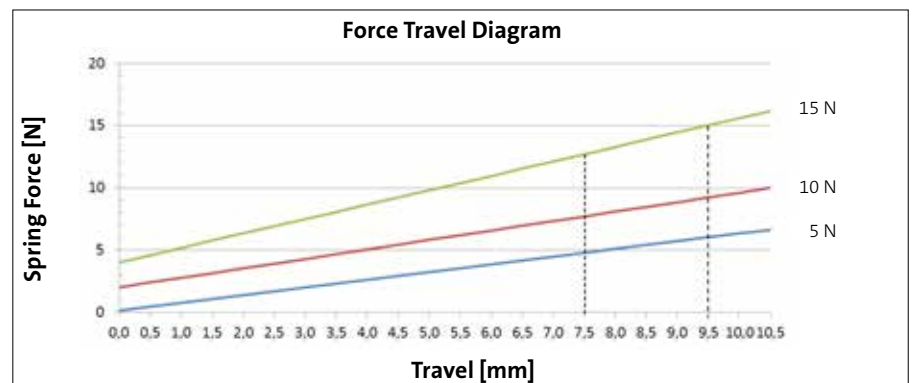
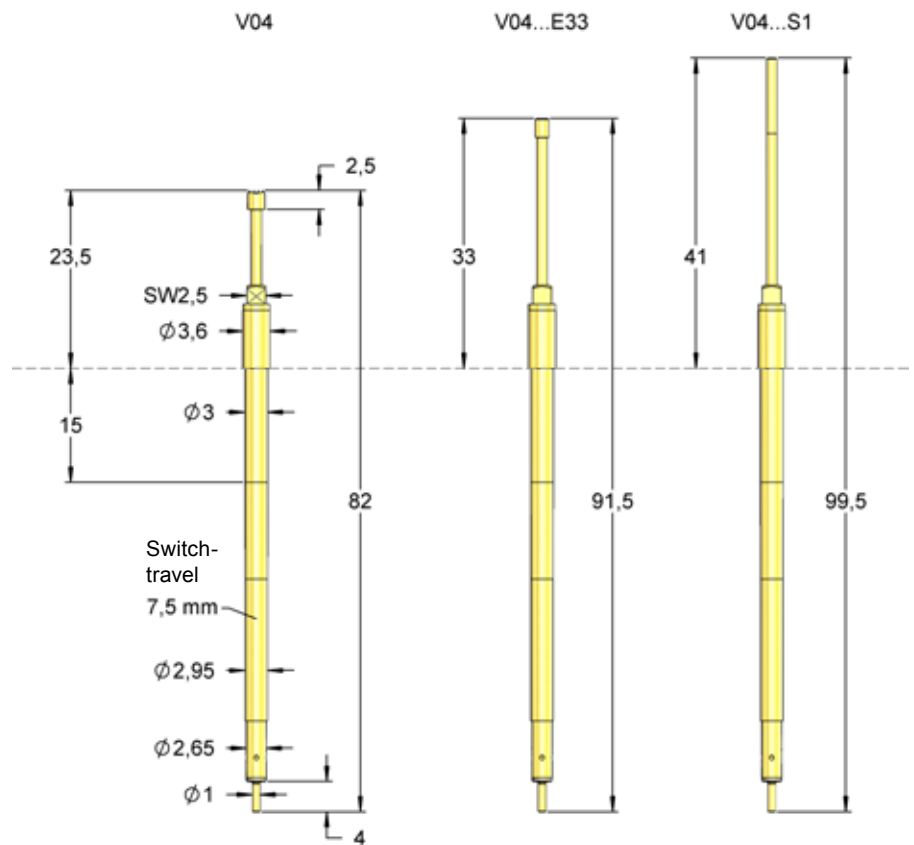
Version	Nominal	Maximum
Standard	9,5	10,0
E33	9,5	10,0
S1	9,5	10,0
Switch Travel (mm)		7,5
Switch Travel (mm)		3,0 (S1)
Wrench Size		2,5

Materials and Plating

Plunger	see Tip Style
Barrel	Brass, gold plated
Spring	Music wire, silver plated
Receptacles	-

Drill Size (mm)

V04	2,98 - 2,99
-----	-------------



Series	Tip-Ø	Spring Force (N)
V04	06	B
		230
		G
		15

Material:	B = BeCu
Tip-Ø:	230 = 2,3 mm (e.g.)
Plating:	G = Gold plated
Version:	Exx = deviating projection height S1 = Special version

Tip Style	Number	Material	Plating	Ø in mm	Version
	06	B	G	2,30	-
	06	B	G	3,00	-
	16	B	G	1,30	S1
	17	B	G	1,40	-
	17	B	G	1,80	E33

PUSH BACK PROBES

VF4

Push Back Probe 157 mil Round Tip Styles

Centers (mm/mil)	4,00 / 157
Contin. current	10,0 A
Current (Switch Receptacle)	1,0 A
R typ	30 mOhm
Temperature	-45°C...+100°C

Spring Force (cN ±20%)

Version	Preload	Nominal
Standard	80	300
Standard	100	500
Standard	300	1000
Standard	300	1500
Standard	300	2000
Standard	300	2500

Travel (mm)

Version	Nominal	Maximum
Standard	5,0	5,5
Thread (M)		2,5x0,35
Wrench Size		2,5

Materials and Plating

Plunger	see Tip Style
Barrel	Brass, gold plated
Spring	Music wire, gold plated
Receptacles	Brass, gold plated

Accessories

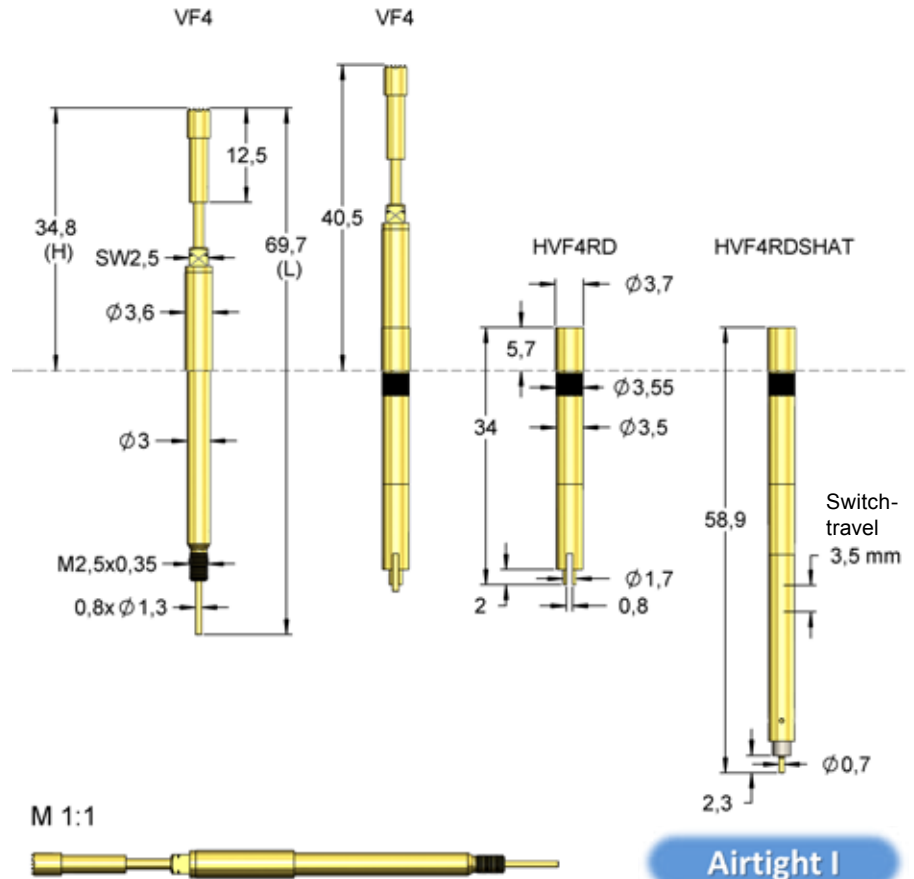
Alignment tool receptacle	FAWZVF4
Screw-in tool probe	FWZVF4S1 (T) max. Ø3,1 mm
Screw-in tool probe	FWZVF4 (T) max. Ø4,0 mm

Drill Size (mm)

Receptacle without knurl	3,48 - 3,49
Receptacle with knurl	3,52 - 3,55

Series	Tip-Ø	Spring Force (N)
VF4	05	B
		230
		G
		15
	Tip Style	Material
		Plating
		Version

Material: B = BeCu,
Tip-Ø: 230 = 2,30 mm (e.g.)
Plating: G = Gold plated,
Receptacle: Order code according drawing



For the permissible leakage rate see information in the technical introduction on page 12. The receptacle HVF4SHATS1 is available with a switching travel of 4.5 mm. All receptacles also available without knurl (RD).

Tip Style	Number	Material	Plating	Ø in mm	Version
	05	B	G	2,30	-
	06	B	G	3,00	-
	06	B	G	4,00	-
	06	B	G	2,40	-
	06	B	G	3,00	-
	06	B	G	4,00	-
	06	B	G	4,80	-
	11	B	G	1,80	-
	11	B	G	2,00	-
	11	B	G	2,30	-
	11	B	G	3,00	-
	11	B	G	3,70	-
	16	B	G	1,00	-
	16	B	G	1,40	-
	16	B	G	1,80	-
	16	B	G	2,00	-
	16	B	G	2,30	-
	17	B	G	3,00	-
	17	B	G	4,00	-

PUSH BACK PROBES

VF4

Push Back Probe 157 mil, Elastic Tip Style

Centers (mm/mil)	4,00 / 157
Contin. current	10,0 A
Current (Switch Receptacle)	1,0 A
R typ	30 mOhm
Temperature	-45°C...+100°C

Spring Force (cN ±20%)

Version	Preload	Nominal
Standard	300	1500

Travel (mm)

Version	Nominal	Maximum
Standard	5,0	5,5
Thread (M)	2,5x0,35	
Wrench Size	2,5	

Materials and Plating

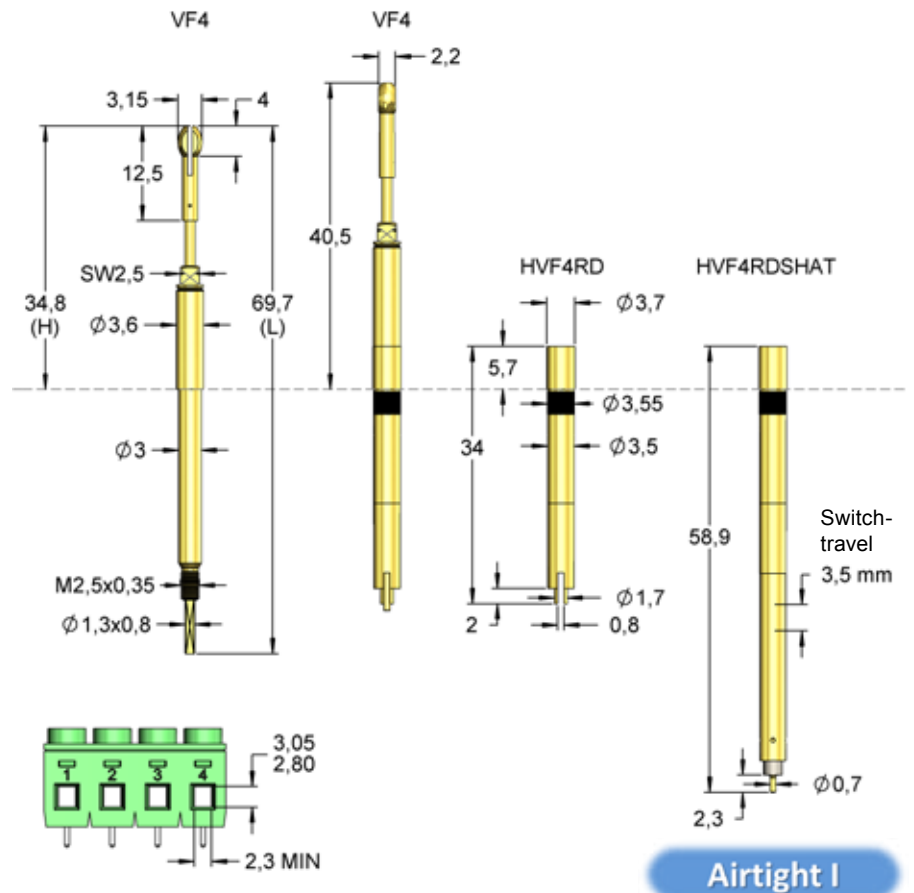
Plunger	see Tip Style
Barrel	Brass, gold plated
Spring	Music wire, gold plated
Receptacles	Brass, gold plated

Accessories

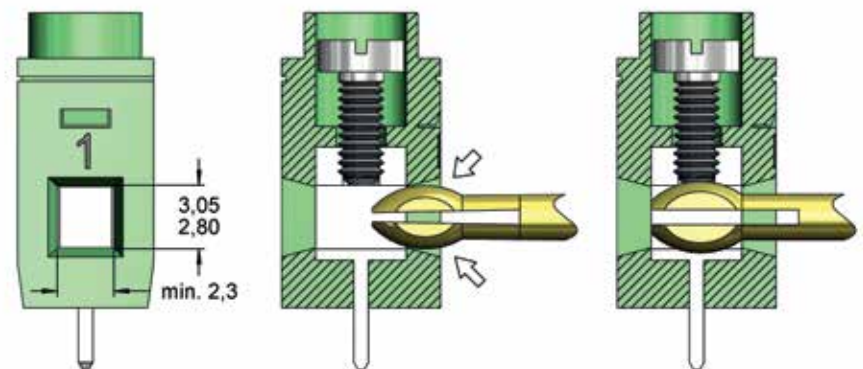
Alignment tool receptacle	FAWZVF4
Screw-in tool probe	FWZVF4 (T) max. Ø4,0 mm

Drill Size (mm)

Receptacle without knurl	3,48 - 3,49
Receptacle with knurl	3,52 - 3,55



The elastic twist proof tip style 22 has been developed for contacting PCB-connectors. This tip styles makes sure that the contact elements within the connector cavity are contacted reliably. This tip style is currently available for connector MSTB 2,5/2-ST-5,08. The receptacle HVF4SHATS1 is available with a switching travel of 4.5 mm. All receptacles also available without knurl (RD).



Order Code	Number	Ø A	B	C	H	L	Version	Screw-in tool
VF422B0001G15	22	3,15	2,20	4,00	34,80	69,70	-	FWZVF4; FWZVF4T



Connector contacting in the range E-Mobility and high current

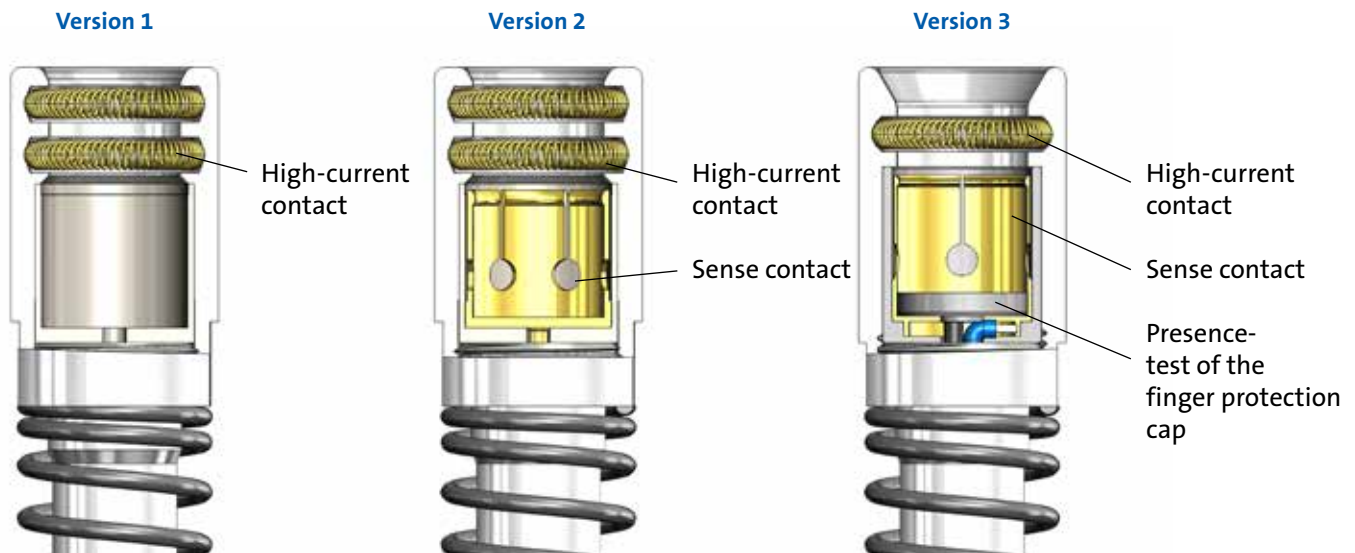
More and more, the field of e-mobility is gaining ground in the different markets in Europe, USA and Asia. Therefore, there is an increasing demand for solutions for testing and checking charging plugs and charging sockets.

For this purpose, we offer you a variety of solutions for current transmission, voltage measurement and the position test of the finger protection on the test object.
















HIGH-CURRENT CONNECTORS FOR E-MOBILITY

Three variants for contacting round pins - the right solution for every test requirement

- Due to the canted coil springs in the plunger head a safe and constant electrical contact of a round pin can be achieved.
- In addition to contacting a round pin for current transfer (Force), a voltage measurement can be performed by the optionally integrated cup spring.
- By a short-circuit test between the sense contact and the bottom of the round pin the presence of the finger protection cap on the round pin can be checked.

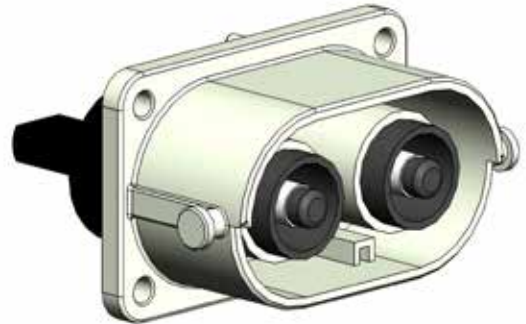














Round pins or round sockets are built into all new charging plugs for electric mobility all over the world. Therefore we offer solutions for common diameters ($\varnothing 4$ / $\varnothing 6$ / $\varnothing 8$ / $\varnothing 10$ mm). Other sizes are available on request.

Region			 							
Current	AC	AC	DC - AC	DC - AC	AC	AC	DC - AC	DC - AC	DC	DC
Version	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female
Type	Typ 2	Typ 2	Typ 2 CCS Combo 2	Typ 2 CCS Combo 2	Typ 1	Typ 1	Typ 1 Combo 1	Typ 1 Combo 1	GB/T	GB/T
										

HIGH-CURRENT CONNECTORS FOR E-MOBILITY

NEW with sense-contact and Finger protection check















Contact	Connector	Contact probe	Current	Variant	Order number
Pin Ø 4.0 mm e.g. Hirschmann HPS 40-2					
			60 A	High current probe	HC09A52B100G08040
			60 A	High current probe with sense contact	HC09B52B100G08040
			60 A	High current probe with sense contact, Finger protection check	HC09G52B100G07040
Socket Ø 4.0 mm e.g. Hirschmann HPS40-2					
			100 A	High current probe with sense contact	HC08B11M100G09040
Pin Ø 6.0 mm e.g. Amphenol HVSL-6000					
			100 A	High current probe	HC10A52B240G12060
			100 A	High current probe with sense contact	HC10B52B240G12060
			100 A	High current probe with sense contact, Finger protection check	HC10G52B240G11060
Socket Ø 6.0 mm e.g. Amphenol HVSL-6000					
			100 A	High current probe with sense contact	HC11B11M240S13060

HIGH-CURRENT CONNECTORS FOR E-MOBILITY

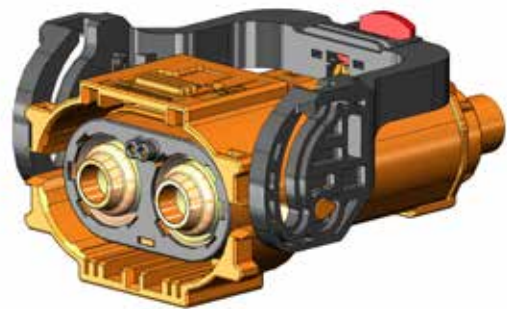
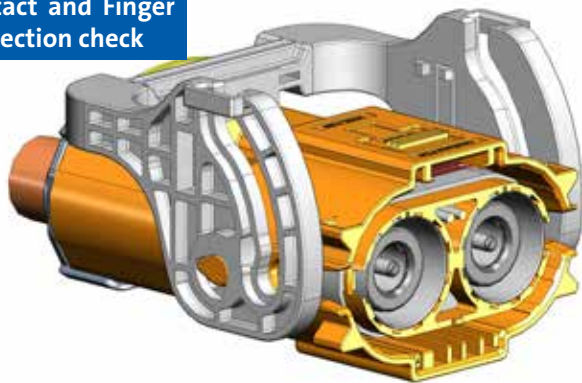
NEW with sense-contact and Finger protection check









Contact	Connector	Contact probe	Current	Variant	Order number
Pin Ø 8.0 mm e.g. Amphenol HVSL-8000					
			200 A	High current probe	HC10A52B280S20080
			200 A	High current probe with sense contact	HC10B52B280S20080
			200 A	High current probe with sense contact, Finger protection check	HC10G52B280S19080
Socket Ø 8.0 mm e.g. Amphenol HVSL-8000					
			200 A	High current probe with sense contact	HC11B11M280S18080
Pin Ø 8.0 mm e.g. CCS Typ 2					
			200 A	High current probe	HC10A52B280S26080
			200 A	High current probe with sense contact	HC10B52B280S26080
			200 A	High current probe with sense contact, Finger protection check	HC10G52B280S25080
Socket Ø 8.0 mm e.g. CCS Typ 2					
			200 A	High current probe with sense contact	HC11B11M280S18080

HIGH-CURRENT CONNECTORS FOR E-MOBILITY

NEW with sense-
contact and Finger
protection check



Contact	Connector	Contact probe	Current	Variant	Order number
Pin Ø 10.0 mm e.g. Amphenol HVSL-10000					
			250 A	High current probe	HC10A52B350S19100
			250 A	High current probe with sense contact	HC10B52B350S19100
			250 A	High current probe with sense contact, Finger protection check	HC10G52B350S18100
Socket Ø 10.0 mm e.g. Amphenol HVSL-10000					
			250 A	High current probe with sense contact	HC11B11M350S18100

FURTHER INFORMATION

Our product portfolio is constantly being expanded to meet the needs of a rapidly developing market. Other sizes and solutions are available on request.

You will find a constantly updated overview on our homepage or via the attached QR code.



F762C

**High Current Probe 157 mil
for Contacting
Flat Blade Connectors
up to 40 A, Threaded**

Centers (mm/mil)	4,00 / 157
Contin. current	40,0 A
R typ	<5 mOhm
Temperature	-45°C...+200°C (H)

Spring Force (cN ±20%)

Version	Preload	Nominal
C	70	300

Travel (mm)

Version	Nominal	Maximum
C	4,0	5,0
Thread (M)		2,5
Wrench Size		2,6
Pointing Accuracy		±0,05 mm

Materials and Plating

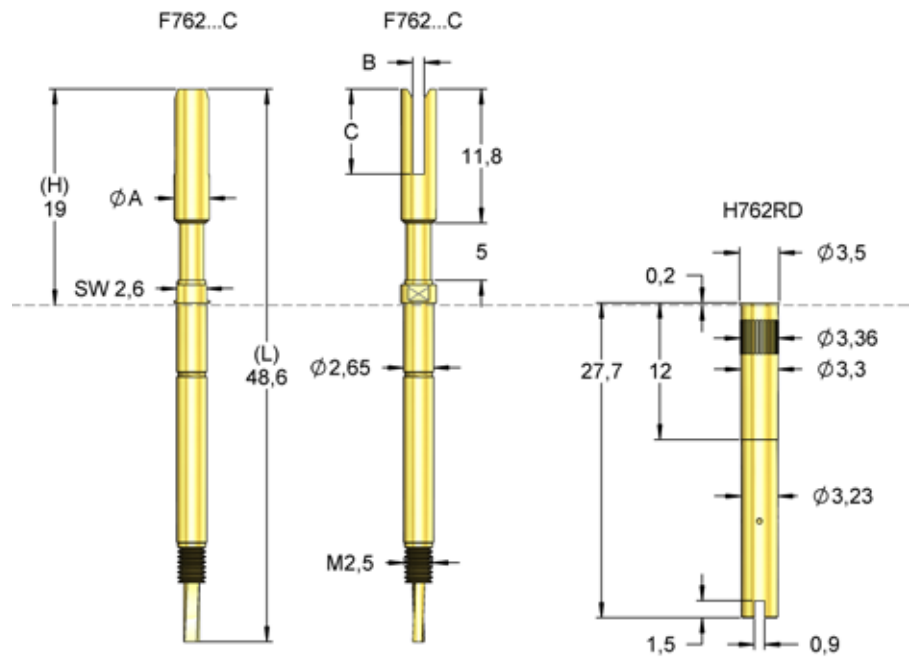
Plunger	see Tip Style
Barrel	Brass, gold plated
Spring	Stainless steel, unplated
Receptacle	BeCu, gold plated

Accessories

Alignment tool receptacle	FAWZ761
Screw-in tool probe	FWZ885S1 (T)

Drill Size (mm)

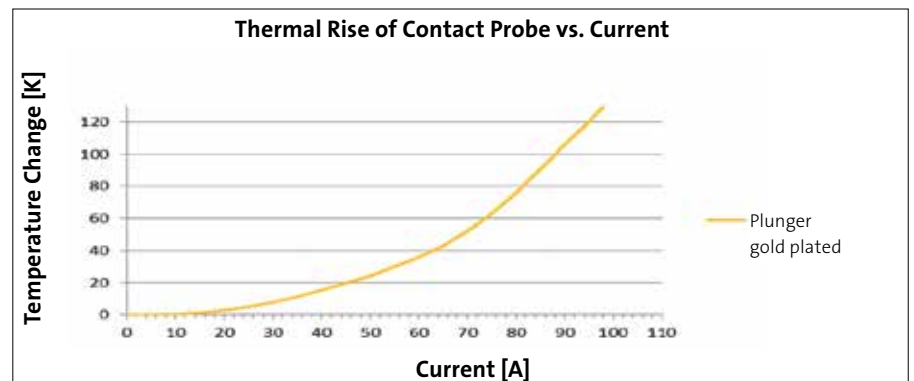
H762RD	3,30 - 3,35
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M 1:1



For connecting the probe a flexible wire with sufficient space for movement should be used.

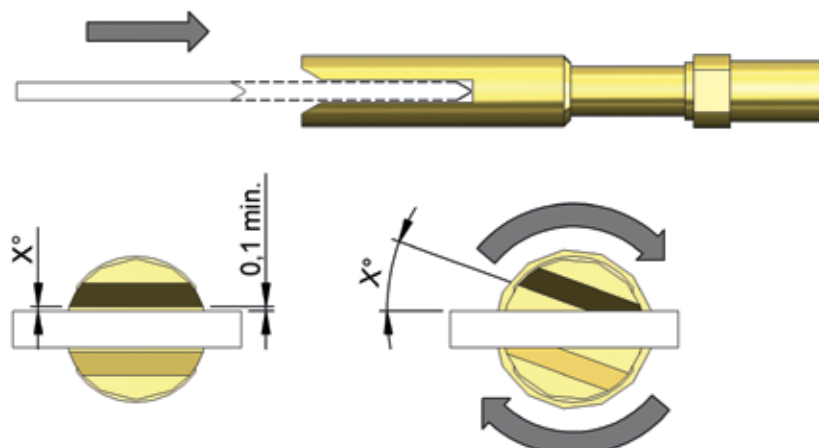


Functional principle

Due to the twist proof design the plunger is always brought to the test item well aligned. Once the plunger is compressed by contacting the blade connector, it is twisted up to a maximum of 20°. This results in a good electrical contact without damaging or scratching the tested item.

Important:

The probe needs to be moved axially to the blade connector. A chamfer at the contact probe enables an optimum guiding.



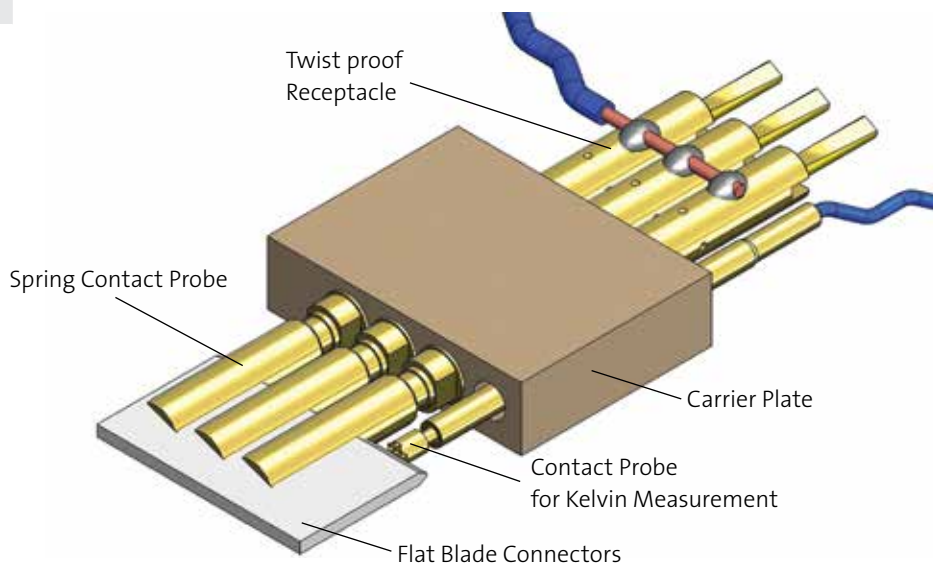
F762C

**High Current Probe 157 mil
for Contacting
Flat Blade Connectors
up to 40 A, Threaded**

Centers (mm/mil)	4,00 / 157
Contin. current	40,0 A
R typ	<5 mOhm
Temperature	-45°C...+200°C (H)

Application note

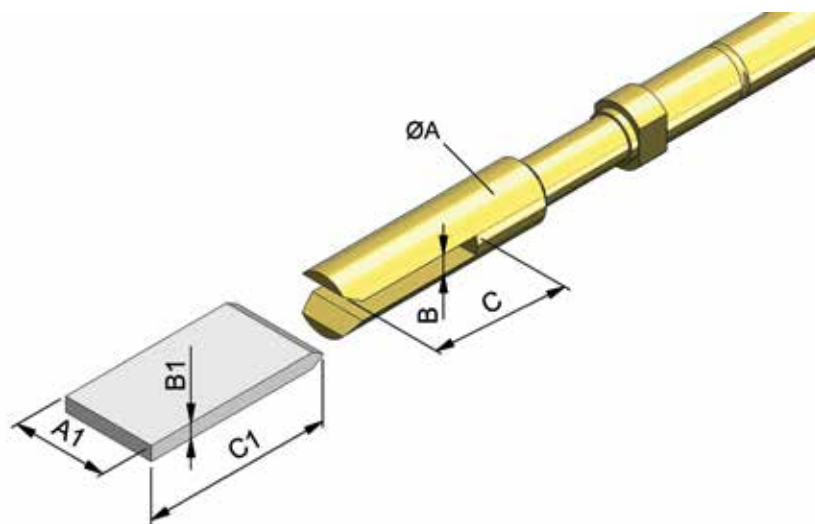
Higher currents can be realized by using several probes in parallel, e.g. 120 A in this example. In applications with Kelvin tests a normal spring contact probe can be used for the voltage (sense signal).



Series	Number	Spring Force (cN)
F762	89	B
Tip Style	Material	Plating
Version	Order Code	Version

Material: B = BeCu
Number: see table
Plating: G = Gold plated
Version: C = High Current Version
Receptacle: Order Code according drawing

At the Order Code of coaxial versions you will find a number instead of the coded tip-Ø. This number shows in the table the belonging spade dimensions.



Suitable for blades			Spring Contact Probe				
A1 [mm]	B1 [mm]	C1 [mm]	Order Code	ØA [mm]	B [mm]	C [mm]	Screw-in Tool
min. 3,2	0,5 - 0,8	min. 8,0	F76289B0001G300C	3,1	1,0	7,5	FWZ885S1 (T)
min. 3,2	1,0 - 1,3	min. 8,0	F76289B0002G300C	3,1	1,5	7,5	FWZ885S1 (T)
min. 3,2	1,0 - 1,3	min. 4,5	F76289B0003G300C	3,1	1,5	4,0	FWZ885S1 (T)
min. 4,2	1,5 - 1,8	min. 8,0	F76289B0004G300C	4,0	2,0	7,5	FWZ760S1 (T)
min. 3,2	0,5 - 0,8	min. 3,0	F76289B0005G300C	3,1	1,0	2,5	FWZ885S1 (T)
min. 3,2	0,5 - 0,8	min. 6,7	F76289B0006G300C	3,1	1,0	6,2	FWZ885S1 (T)
min. 3,2	0,3 - 0,6	min. 6,2	F76289B0007G300C	2,2	0,8	5,7	FWZ885S1 (T)

Overview

Types of High Current Probes

High current blocks

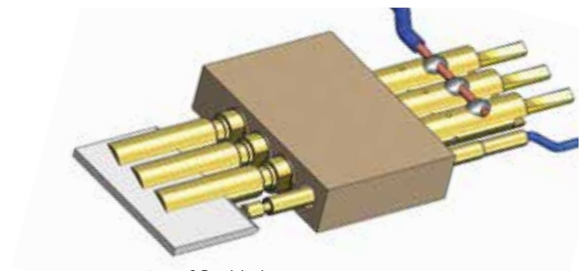
By integrated spring loaded contact elements this block allows contacting uneven or inclined surfaces with a very low contact resistance. The block should be mounted directly into conductive material to make use of the whole contact surface.



High current block

High current probes for contacting flat blade connectors

Due to the twist proof design the plunger can be moved to the test item well aligned. As soon as the plunger meets the blade and is pushed in, it makes a twist movement of up to 20°. Therefore it adapts to the surface and creates a line contact without causing any scratching or damaging of the DUT.



Contacting of flat blades

High current probes with bias ball design

are designed to optimize the electrical contact between plunger and barrel by an integrated ball between spring and inclined plunger. As soon as the plunger is compressed, the mechanical force leads to an optimal contact to the barrel.



Bias ball design

High current probes with split plunger design

are designed to optimize the contact between plunger and barrel as soon as they are pushed in. The result is an optimized current flow through the barrel, with a minimized current flow through the spring.



Split Plunger Design



Special tip with silver alloy

High current probes with continuous plunger

have the lowest internal resistance and therefore allow the highest currents. If the connection is made at the end of the plunger, this connection is moving synchronously with the plunger. Therefore such a connection wire needs to be flexible to avoid damages of the wire.



Continuous plunger

High current probes with coaxial design

For charging and discharging of accumulator and battery cells with simultaneous measuring of the voltage special coaxial high current probes have been developed.



Coaxial design



Connector contacting in the area Automotive electronics and high current

Areas such as security, navigation, object recognition, camera systems and infotainment systems require good contact security. In order to carry out a continuity test for required components and connectors in a cost-effective way, we offer a variety of suitable contact probes.

CONNECTOR CONTACTING



Overview of coax probes for continuity testing of automotive connectors

Connector		Probe	Mounting	Order number	Data sheet
1-fold HFM® Male			screwable	F83505B0005G120	
1-fold HFM® Female			screwable	F83512B0004G120	
1-fold MATE-AX® Male			screwable	F83505B0006G120	
1-fold MATE-AX® Female			screwable	F83511B0003G120	
FAKRA Male			pluggable	F82241S0008L650S1	
FAKRA Male			pluggable	F82205S0007L650IK25	
FAKRA Male			screwable	F83205S0007L650IK25	
HSD Female			pluggable	F81912B0001G2020	

CONNECTOR CONTACTING

Micro-USB



TC-P 195 005 USB 2.0 B micro

Order code: 2112145

Max. data rate: 480 Mbit/s
Contact cycles: 200.000
Contin. current: 1,5 A at 25°C
Number Poles: 5

Mini-USB

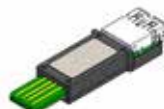


TC-P 198 005 USB 2.0 B mini

Order code: 2112757

Max. data rate: 480 Mbit/s
Contact cycles: 200.000
Contin. 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 cycles: 200.000
Contin. 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 cycles: 50.000
Contin. current: 1,5 A at 25°C
Number Poles: 9

USB Type C



TC-P 756 024 USB 3.1 C

Order code: 211219

Max. data rate: 5 Gbit/s
Contact cycles: 50.000
Contin. 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 cycles: 50.000
Contin. 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 cycles: 50.000
Contin. 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 cycles: 50.000
Contin. 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 cycles: 200.000
Contin. current: 1,5 A at 25°C
Number Poles: (Coaxial)

CONNECTOR CONTACTING

**MATenet®-
Male**



Test connector for MATenet® Male

Order code: TC77 MATenet-M 01 LA S
Contin. current: 1,5 A bei 25°C
Number Poles: 4

**H-MTD®-
Male**



Test connector for H-MTD® Male

Order code: TC77 H-MTD-M 01 DR S
Contin. current: 1,5 A bei 25°C
Number Poles: 4

**H-MTD®-
Female**



Test connector for H-MTD® Female

Order code: TC77 H-MTD-F 01 DR S
Contin. current: 1,5 A bei 25°C
Number Poles: 4

Radio Frequency Probes in general

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

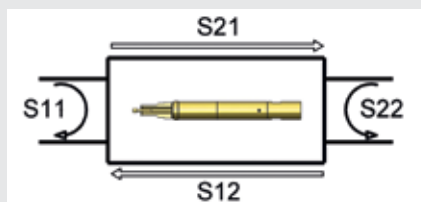
In radio frequency technology the transmission characteristics of two-port networks are described by S-parameters (scattering parameters). The S-parameters are typically specified as attenuation given in decibel [dB].

S11: Reflection loss input side

S21: Insertion loss forward

S12: Insertion loss backward

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 frequency response charts in the specification sheets of the probes HF60 include the probe as well as an RF-connector (representing the DUT) and a connecting element with connected cable. The type and length of the cable is also influencing the transmission of the signal and may lead to a reduced bandwidth. For reference, the values S21 and S11 for the HF60 without DUT and connecting element are shown as well.

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%.



High-frequency connector contacting in the area of Automotive electronics, e-mobility

The requirements of the automotive industry are high: For example, areas such as security, navigation, object recognition, camera systems and infotainment systems require good contact reliability and precise data transmission in large quantities (lidar, radar, infrared). We offer a variety of high frequency probes to test the components required for these applications.

RADIO FREQUENCY PROBES

Connectors

A wide variety of connectors for signal transmission are used in the most diverse applications like in telecommunications, consumer electronics and the automotive industry. FEINMETALL offers various high frequency probe series for contacting these connectors. In the following you will find an overview of connectors to which FEINMETALL offers solutions. Further information on our homepage.

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
				
H-MTD[®]-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	SMP-Male
				
F-Type	HDMI 1.4	HDMI 2.0	RCA	
				
RJ-9	RJ-11	RJ-45	RJ-50	MATenet[®]
				
Mikro-USB	Mini-USB	USB 2.0 A	USB 3.0 A	USB 3.1 C
				

RADIO FREQUENCY PROBES



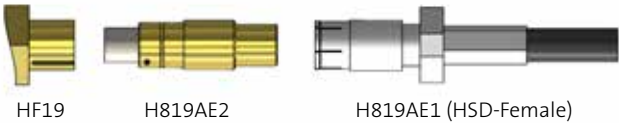
Contacting HSD-Male/Female

NEW

Connector		Probe	Frequency	Mounting	Connection	Order number	Data sheet
HSD-Male			2 GHz	pluggable	H819AE2/3	HF81905B0001G1270	
HSD-Male			3 GHz	pluggable	HSD	HF81955B1005G2000	
HSD-Male			3 GHz	pluggable	HSD	HF81955B1006G2020	
HSD-Male			2 GHz	screwable	H819AE4	HF81914S0004L1270	
HSD-Female			2 GHz	pluggable	H819AE2/3	HF81912B0002G2020	

Connection Cables for HF19

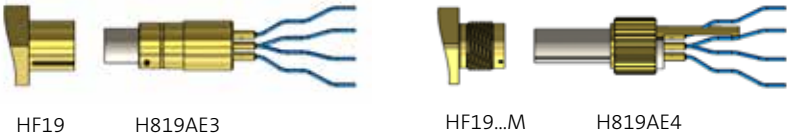
By combining the connection elements H819AE2 and H819AE1 a **defined and reproducible measuring** setup with fix parameters can be realized.



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

Connection units selectable

for direct soldering











RADIO FREQUENCY PROBES



Contacting FAKRA-Male/Female

NEW

Connector	Probe	Frequency	Mounting	Connection	Order number	Data sheet
Fakra-Male		6 GHz	pluggable	MCX	HF86005B0006G470	
		6 GHz	screwable	MCX	HF86005B0006G470M	
Fakra-Male		6 GHz	pluggable	MCX	HF86005B0026G550	
		6 GHz	screwable	MCX	HF86005B0026G550M	
Fakra-Male		6 GHz	with flange	MCX	HF66-0017	
Fakra-Female		5 GHz	pluggable	MCX	HF86002B0012G930	
		5 GHz	screwable	MCX	HF86002B0012G930M	

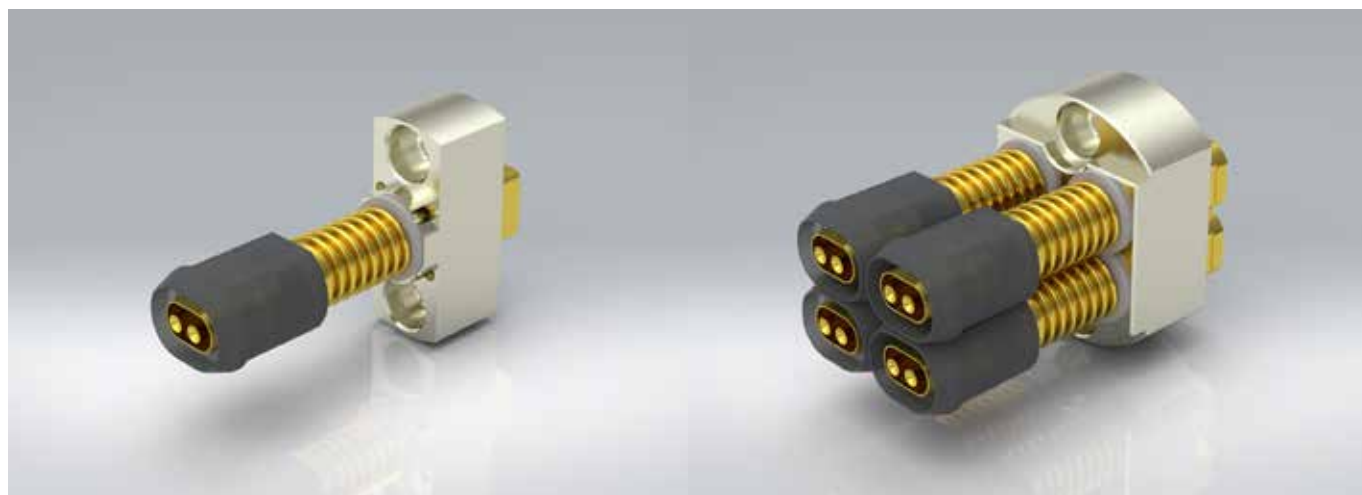
RADIO FREQUENCY PROBES



Contacting **NEW** HFM® / Mate-AX®-Male

Connector	Probe	Frequency	Mounting	Connection	Order number	Data sheet	
4-fold HFM® Male			12 GHz	pluggable	M-SMP	HF77-0001BG04-1	
1-fold HFM® Male			12 GHz	with flange	M-SMP	HF77-0001BG01-1	
1-fold HFM® Male			12 GHz	pluggable	M-SMP	HF7716B0001G530	
4-fold- MATE- AX® Male			12 GHz	pluggable	M-SMP	HF77-0002BG04-1	
1-fold- MATE- AX® Male			12 GHz	with flange	M-SMP	HF77-0002BG01-1	
1-fold- MATE- AX® Male			12 GHz	pluggable	M-SMP	HF7716B0002G530	

RADIO FREQUENCY PROBES



Contacting H-MTD®-Male

NEW

Connector	Probe	Frequency	Mounting	Connection	Order number	Data sheet
-----------	-------	-----------	----------	------------	--------------	------------

H-MTD®
Male



14 GHz

with flange

HMTD®-F

HF77-0003BG01-1



Centers (mm/mil)	-
Impedance [Z]	100 Ohm
Frequency	14 GHz
Temperature	-20°C...+80°C

Contacting of oval H-MTD® connector. Cable connection with standard H-MTD®-female connector. For the 2-fold and 4-fold connectors a modular design is possible at any time. The RF-Contact Probes can be mounted on top of each other or side by side using a flange.

Female

Male

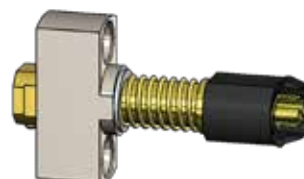


1-fold

H77AE1

HF77-0003BG01-1

HMTD®-Male



Female

Male



2-fold

Female

Male



4-fold



Coaxial Probes

A typical application for coaxially designed contact probes is the measurement of very low resistances according to the Kelvin-method (4-wire measurement). In this application the outer conductor is used for the constant current and the inner conductor is used for measuring the voltage drop (Kelvin probes).

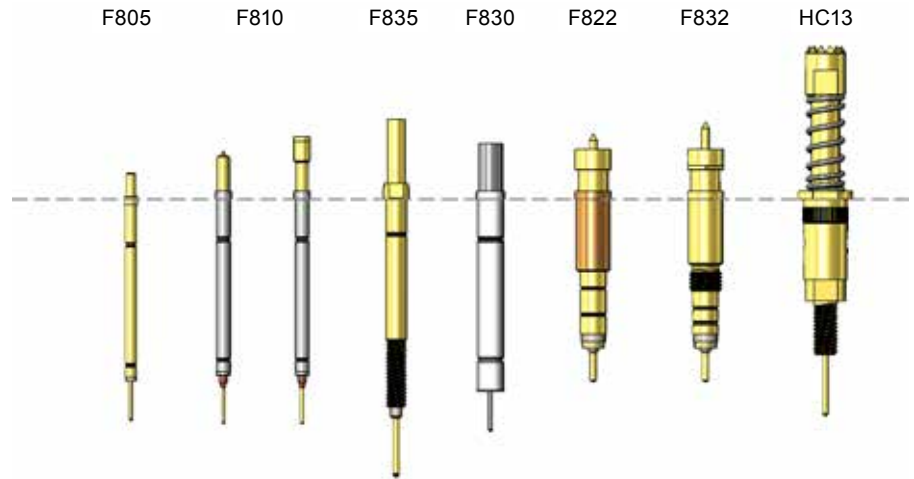
Another application for specially designed coaxial probes is contacting of RF connectors or sockets. In this case the inner conductor carries the signal whereas the outer conductor serves as a shielding (RF probes).

Overview

Types of Coaxial Probes

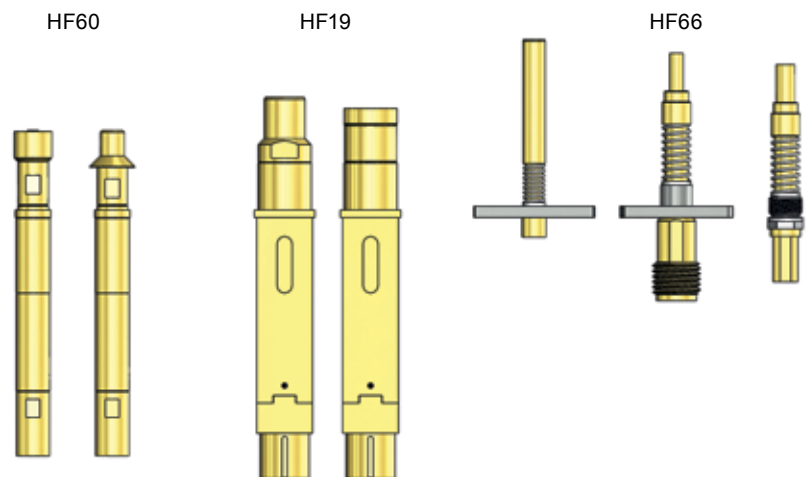
For Kelvin measurement

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.



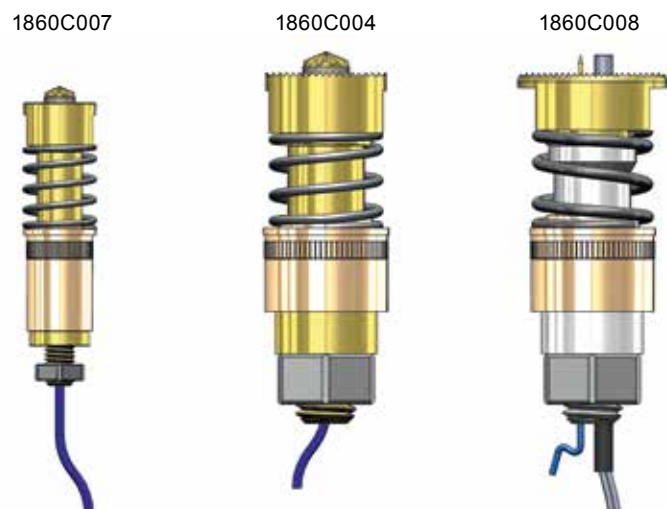
For RF applications

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 electromagnetic 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

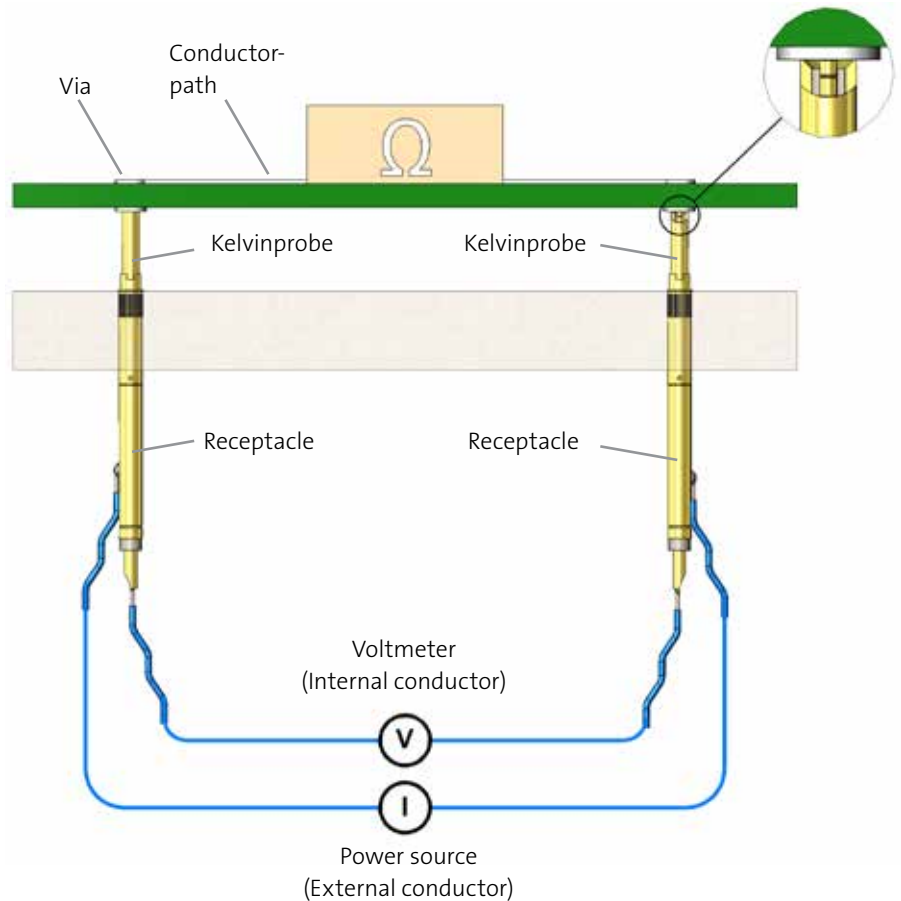
Coaxial Probes

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.

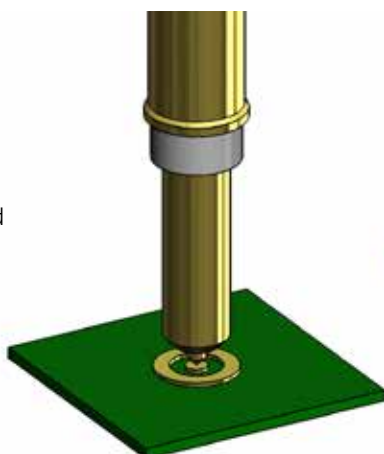
This leads to high accuracy of this measuring method. The contacting for current source and voltmeter is realized by two Kelvin probes or four base probes, ideally located very close to the device under test.

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.



1x coax probe
center 100mil
with power and
sense contact

i.O.



2x base probe
center 100mil
for power and
sense contact

n.i.O.



Examples of PCB Layouts for Coaxial Contacting

Coax-closed



Coax-open



Coax-kidney-shaped



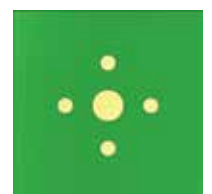
Coax G-S-G



Coax G-S-G



Coax G-G-S-G-G



F810

Kelvin Probe 100 mil Plug-in

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

Spring Force (cN ±20%)

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

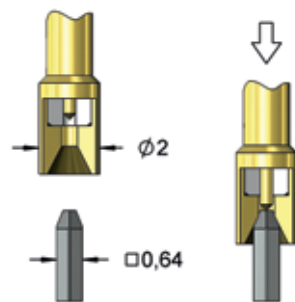
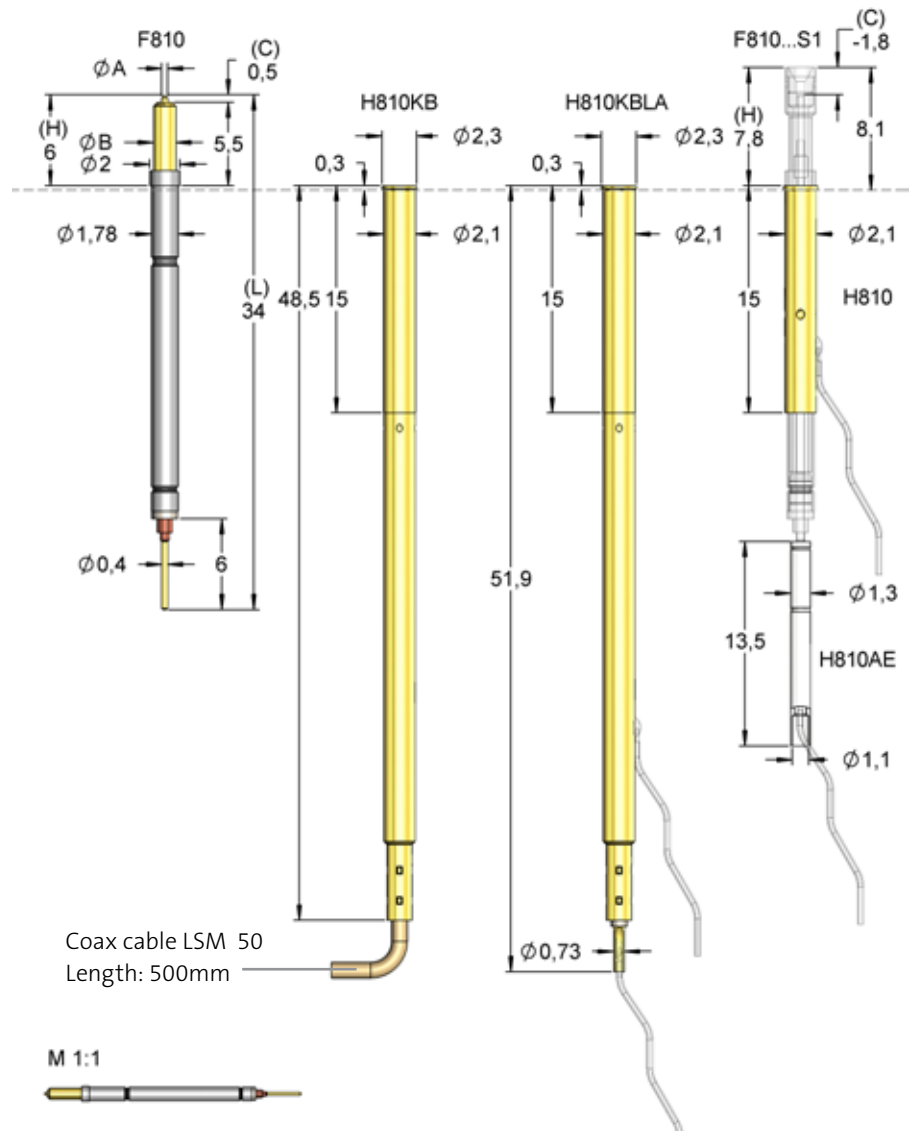
Insertion tool receptacle	FEWZ-772E0
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Drill Size (mm)

H810...	2,08 - 2,09
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Projection Height (mm)

H810... with F810	H + 0,3
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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
Continous current (Circular)	10,0 A
Continous current (Internal)	2,0 A
Frequency	2 GHz
Temperature	-20°C...+80°C

Spring Force (cN $\pm 20\%$)

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

Accessories

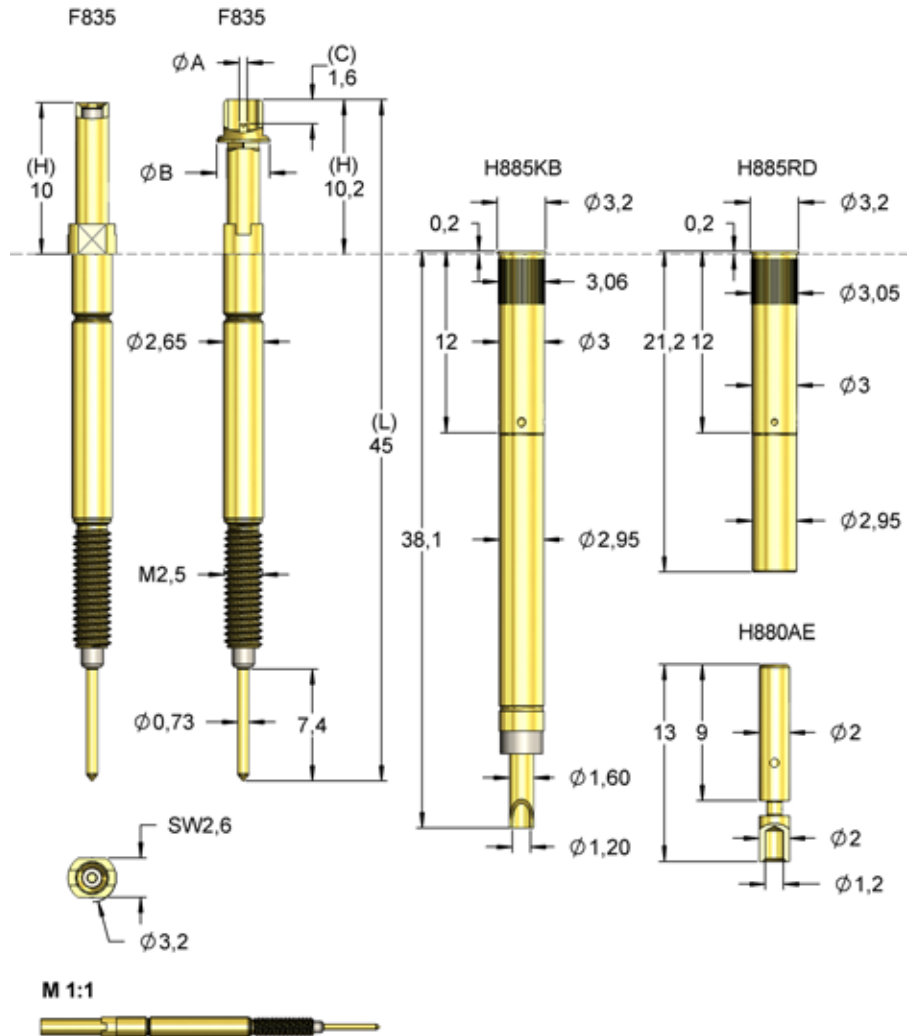
Insertion tool receptacle	FEWZ-774E0
Screw-in tool probe	FWZ885 (T) FWZ885L (T)

Drill Size (mm)

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

Projection Height (mm)

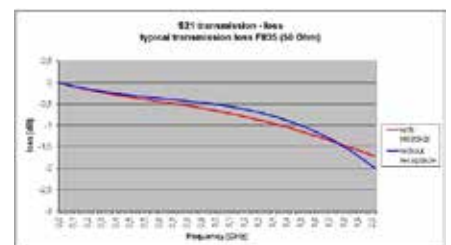
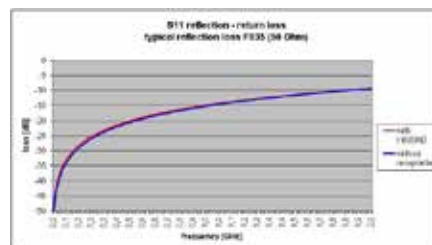
H885... mit F835








 $H + 0,2$ 

The version F83527B0002G410 is suitable for Kelvin measurement of the hybrid connector type ECTA.

* For contacting HFM[®] connectors

** For contacting MATE-AX[®] connectors



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	-	FWZ885S1 (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	-	FWZ885S1 (T)
F83516B0001G410		16	0,64	2,17	0,00	10,00	44,80	-	FWZ885 (T)
F83527B0002G410		27	0,64	3,30	9,00	19,00	53,80	-	FWZ760S1(T1)

F822

Kelvin Probe 217 mil Plug-in

Centers (mm/mil)	5,50 /217
Continuous current (Circular)	6,0 A
Continuous current (Internal)	1,6 A
Frequency	1,2 GHz
Temperature	-20°C...+80°C

Spring Force (cN ±20%)

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

Travel (mm)

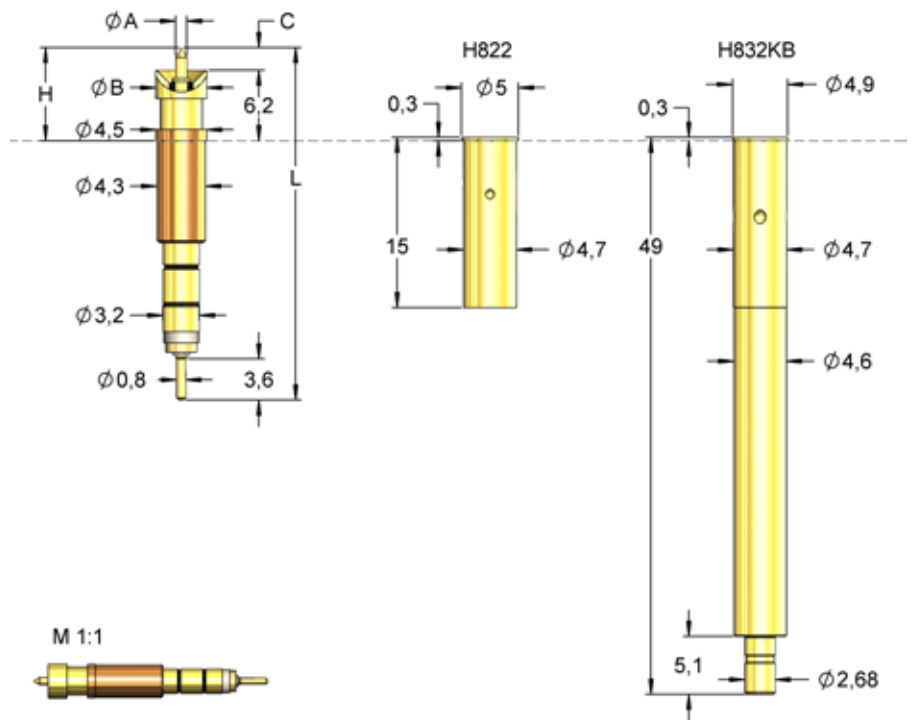
	Nominal	Maximum
Internal Cont.	3,0	3,5
Circular Cont.	2,0	2,6

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

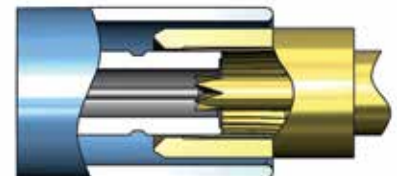
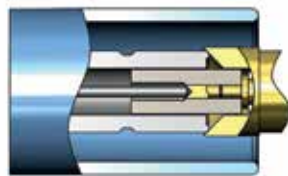
Accessories

Insertion tool receptacle	FEWZ-822E0
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The special version **F82205S0007L650IK25** has a leading insulating cap at the inner contact for testing position and straightness of the Fakra connector pin.

In the **F82241S0008L650S1**, the Fakra connector ground (outer conductor) is contacted via the lamella-shaped contact cage, which ensures a secure contact.



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

COAXIAL PROBES

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/F822

Order code: H832RD

Threaded receptacle
with knurl for soldering
suitable for F832/F822

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

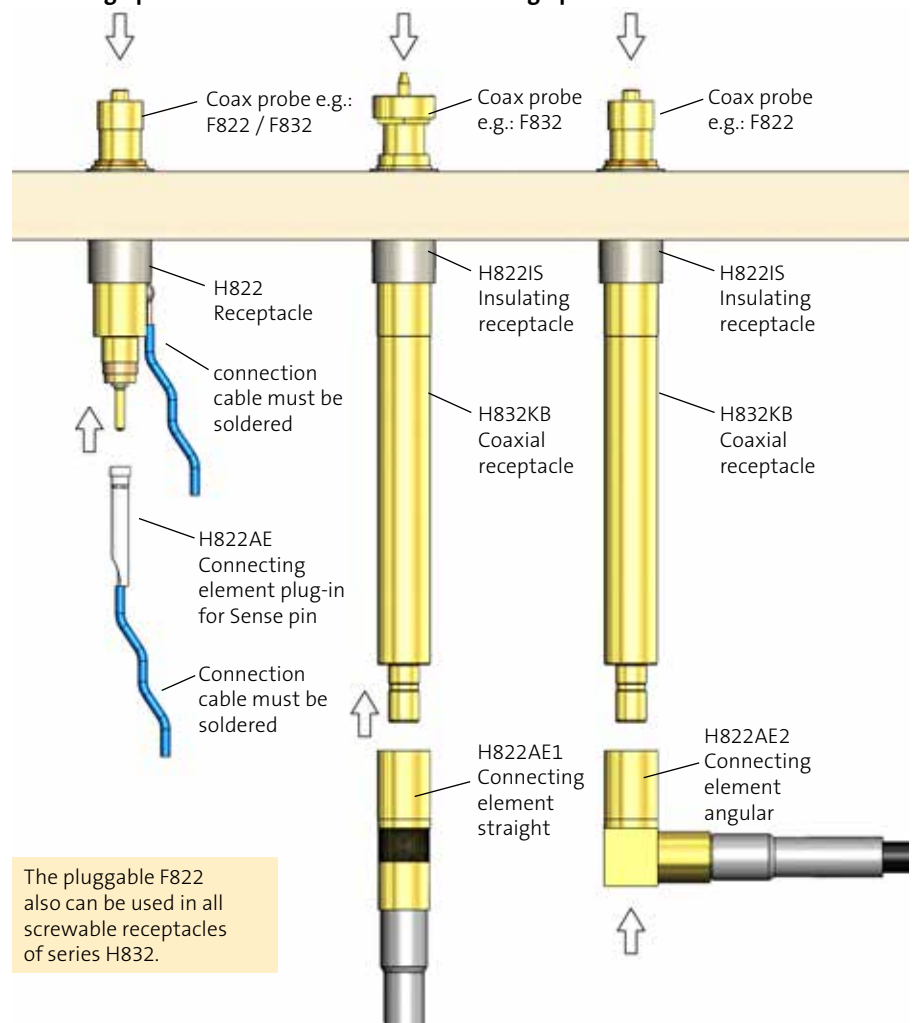
Connection element with pre-assembled
coaxial cable RG 174 and **straight**
SSMB Mini connector
Impedance: 50 Ohm
Standard length: **2000 mm**

Additional option

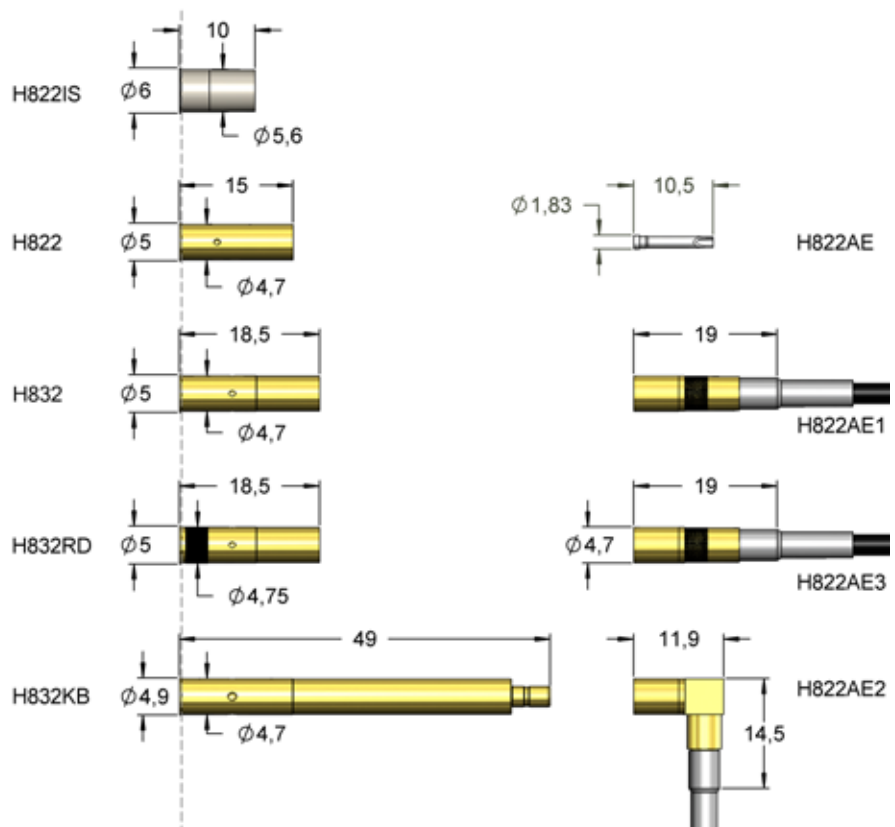
Order code: H822IS

Pluggable synthetic receptacle
(electrically insulated) fits over
mounting receptacle H822... in
electrically conductive material for
bores $\varnothing 5.55$ mm

Mounting option 1



The pluggable F822
also can be used in all
screwable receptacles
of series H832.



F832

Kelvin Probe 217 mil Threaded

Centers (mm/mil)	5,50 /217
Continuous current (Circular)	6,0 A
Continuous current (Internal)	1,6 A
Frequency	1,2 GHz
Temperature	-20°C...+80°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
Wrench Size	-	-
Thread	-	4,0x0,5

Materials and Plating

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

Accessories

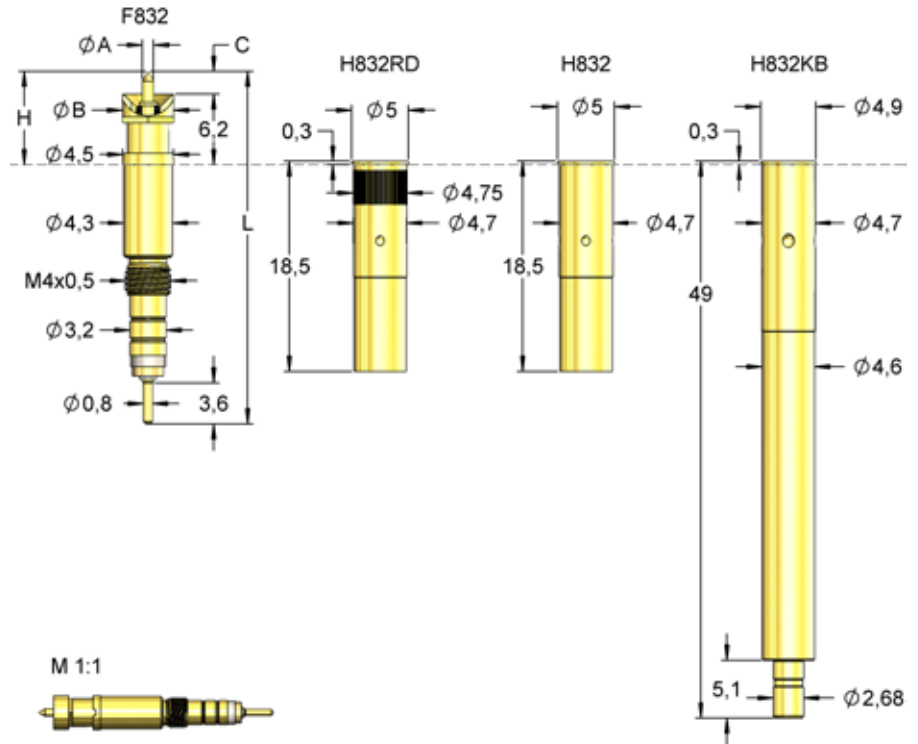
Insertion tool receptacle	FEWZ-822E0
Screw-in tool probe	FWZ832 (T)

Drill Size (mm)

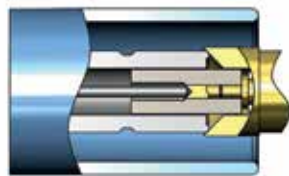
Receptacle without knurl	4,68 - 4,69
Receptacle with knurl	4,70 - 4,72
Insulating receptacle	5,56 - 5,57

Projection Height (mm)

H832... with F832	H + 0,3
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The special version **F83205S0007L650IK25** has a leading insulating cap at the inner contact for testing position and straightness of the Fakra connector pin.



* 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



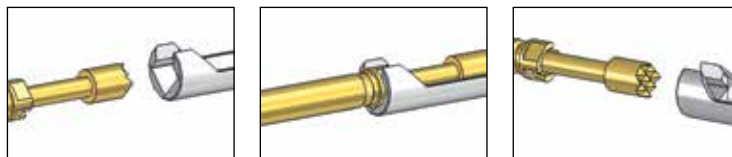
Tools and Accessories

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.

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



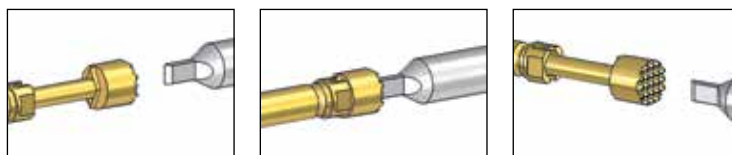
The socket wrench can be used for square wrench sizes if the head diameter is smaller than the wrench size. The tool helps to assemble probes within small centers.



Screw driver



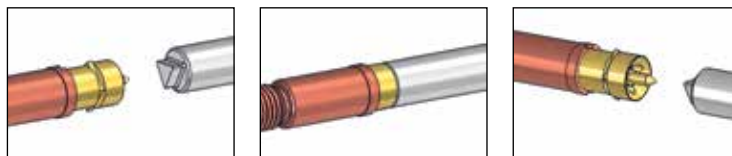
Screw drivers can be used if the contact area has any support (e.g. serrated honeycomb or slit) and the head has an integrated locking system.



Tool for Coaxial Probes



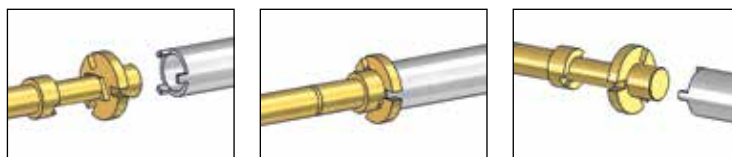
For the mounting of large outer conductors FEINMETALL has developed a special tool that enables applications with limited space between the probes.



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.



Combination Options of Screw-in Tools

Bits and handles can be ordered separately. The handles are color marked due to the wrench size (SW). For each bit a standard handle as well as a handle with ratchet and a bit holder for usage in the cordless screwdriver are available. Each handle can be used with the same bits that are available for all contact probes.

BIT



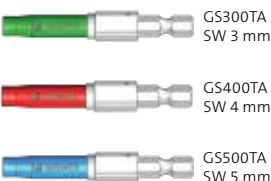
Handle



Handle with ratchet

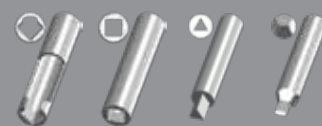


Bit holder for cordless screwdriver



TOOLS / ACCESSORIES

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	1,4	Socket wrench	FWZ730	GS300	BIT730	FWZ730T	GS300T	F730
1,0	1,5	2,0	Hook wrench	FWZ730S1		BIT730S1	FWZ730S1T		F175, F176, F730, PS175
1,4	1,3	2,4	Socket wrench	FWZ731S1	GS400	BIT731S1	FWZ731S1T	GS400T	F731
1,4	1,3	2,4	Socket wrench	FWZ731S1L		BIT731S1L	FWZ731S1LT		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	GS500	BIT732	FWZ732T	GS500T	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	GS500	BIT760S1	FWZ760S1T	GS500T	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
6,0	5,9	8,0	Socket wrench	FWZ348		BIT348	FWZ348T		F348, F349
-	-	4,0	3-point tool	FWZ832		BIT832	FWZ832T		F832
-	-	3,0	Screw driver	FWZ886		BIT886	FWZ886T		F88617...

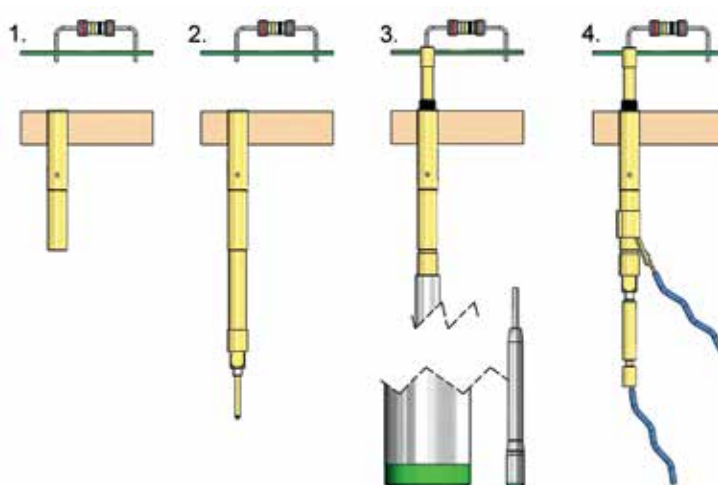
The tools for Step Probes are listed on the page for the relevant product family.

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.



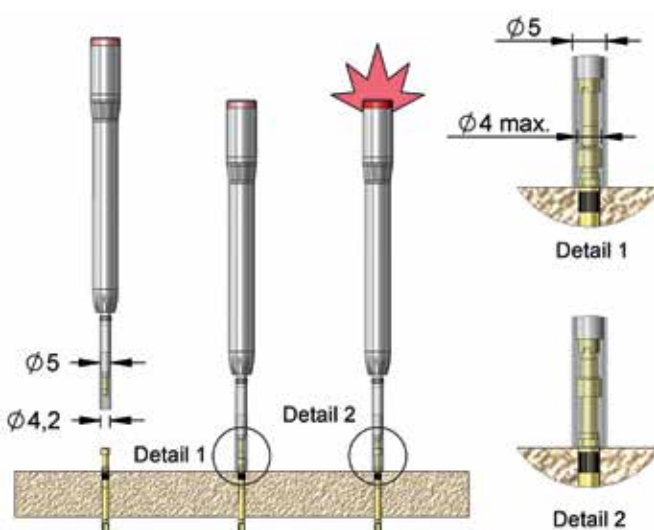
Tool for detection of blocked or tight plungers

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



FK50

Spring Force Gauge

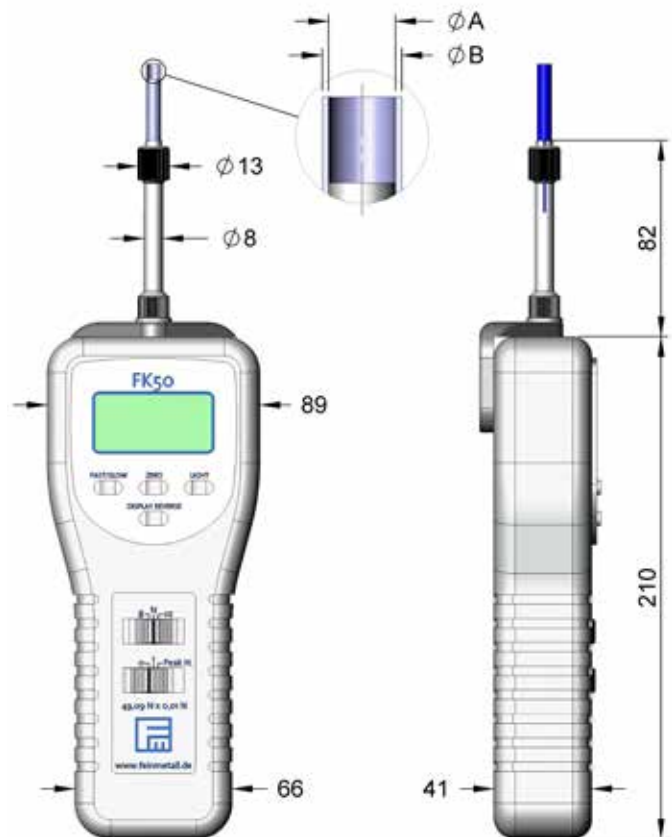
The Spring Force Gauge allows force measurement at all types of spring contact probes up to 50 N. This instrument allows in a very simple way to verify, if a probe is still intact and to determine the spring force of the probe. The measuring results are displayed at the instrument and the display can 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



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

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

Operating manual available on the homepage.



Example for height adjustment at measuring sleeve

	Projection height of probe, e.g. F732: = 10,50 mm Nominal: = 4,00 mm Projection height - nominal: = 10,50 - 4,00 mm Value of height to fix: = <u>6,50 mm</u>
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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

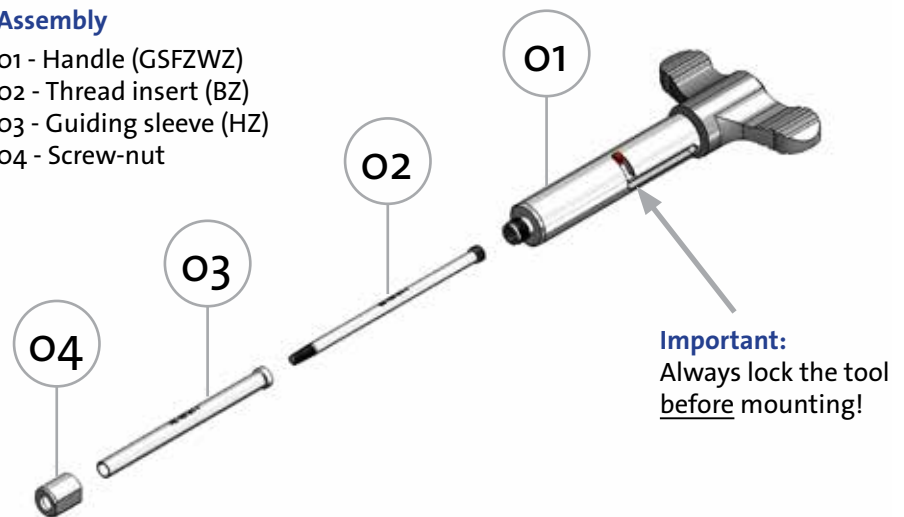
FZWZ-SET-001 NEW

Mounting tool for twist proof receptacles

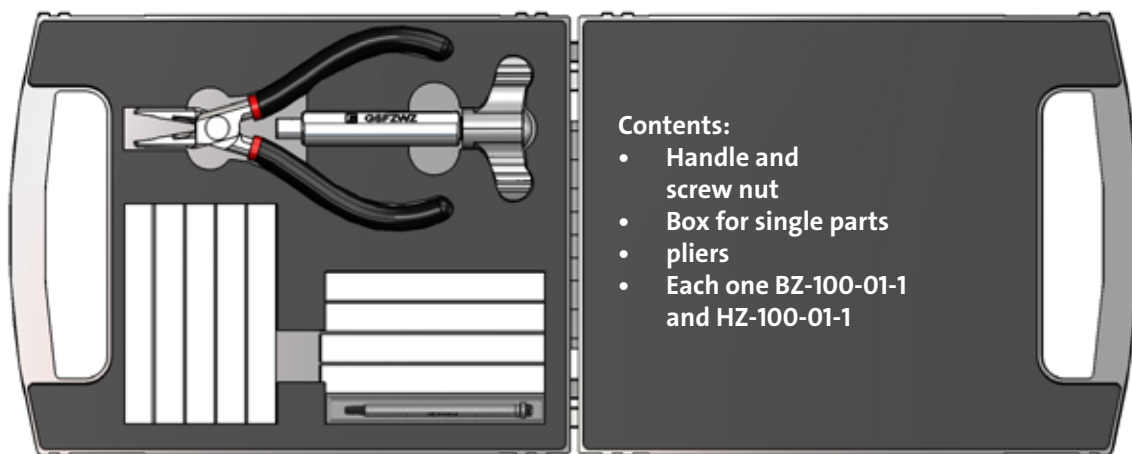
With the removal tool, receptacles can be removed from a drilling without damaging it. This is also possible with broken receptacles or if you do not have the possibility to knock the receptacles out from the back.

Assembly

- 01 - Handle (GSFZWZ)
- 02 - Thread insert (BZ)
- 03 - Guiding sleeve (HZ)
- 04 - Screw-nut



Basic Kit FZWZ-SET-001



Available guiding sleeves (HZ) and thread inserts (BZ):

Combination:

- BZ-075-01-1 & HZ-075-01-1
- BZ-100-01-1 & HZ-100-01-1
- BZ-100-02-1 & HZ-100-01-1
- BZ-100-02-1 & HZ-100-02-1
- BZ-157-01-1 & HZ-157-01-1
- BZ-157-01-1 & HZ-157-01-2

Receptacles:

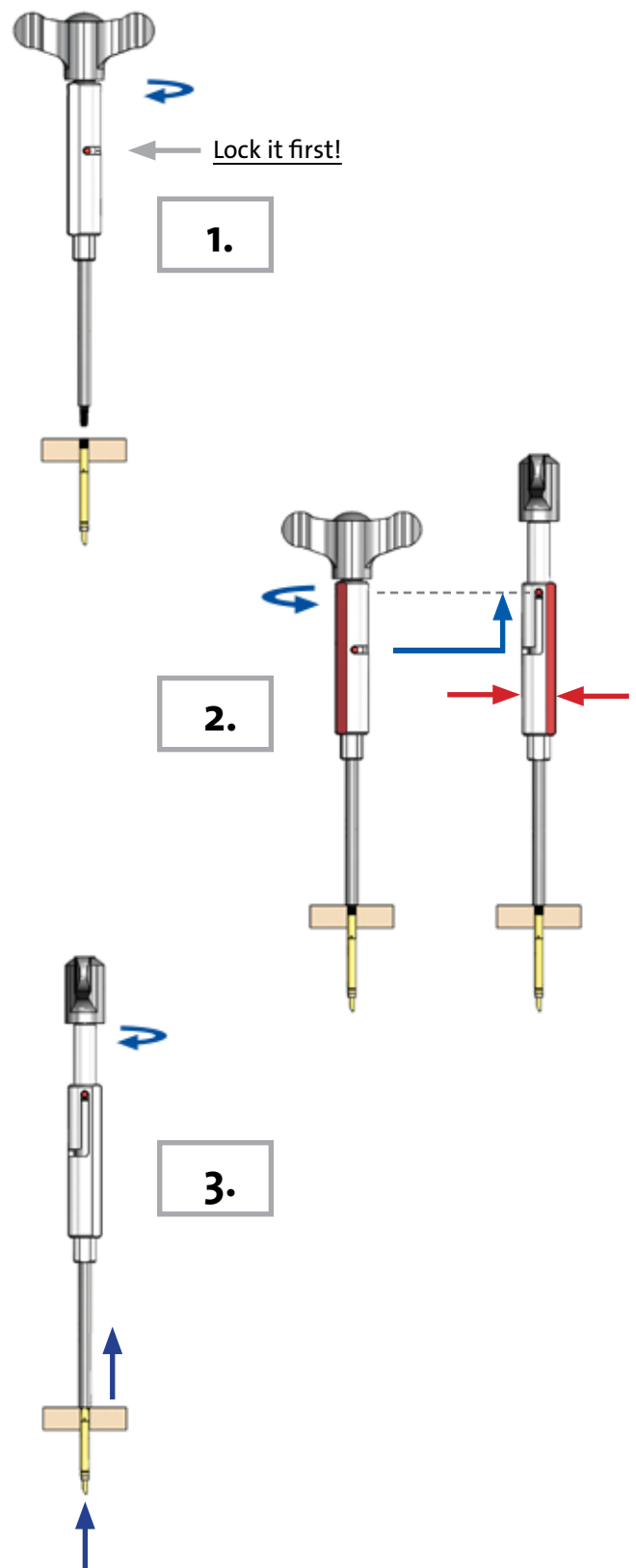
H121; H075; H175; H176; H310; H561; H701; H863
 H722; H727; H732; H752; H756; H757; H772; H875; H878
 H320; H610; H865
 H100; H502; H708; H731; H751; H805
 H762; H866; H867; H887
 H723; H733; H737; H760; H761; H773; H774; H880; H881; H884; H885

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.

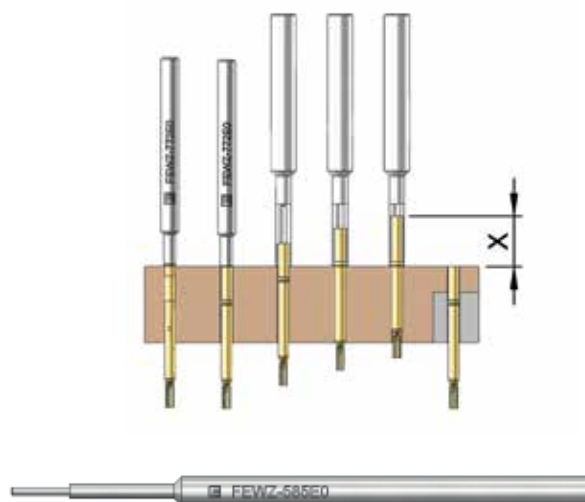


FEWZ

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-040E0	0,0	0,63	H040, H111, H112, H511, H605, H665, H730
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-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
FEWZ-888	0,0	5,2	H888RD
FEWZ-888S1	0,0	6,4	H888RDS1



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

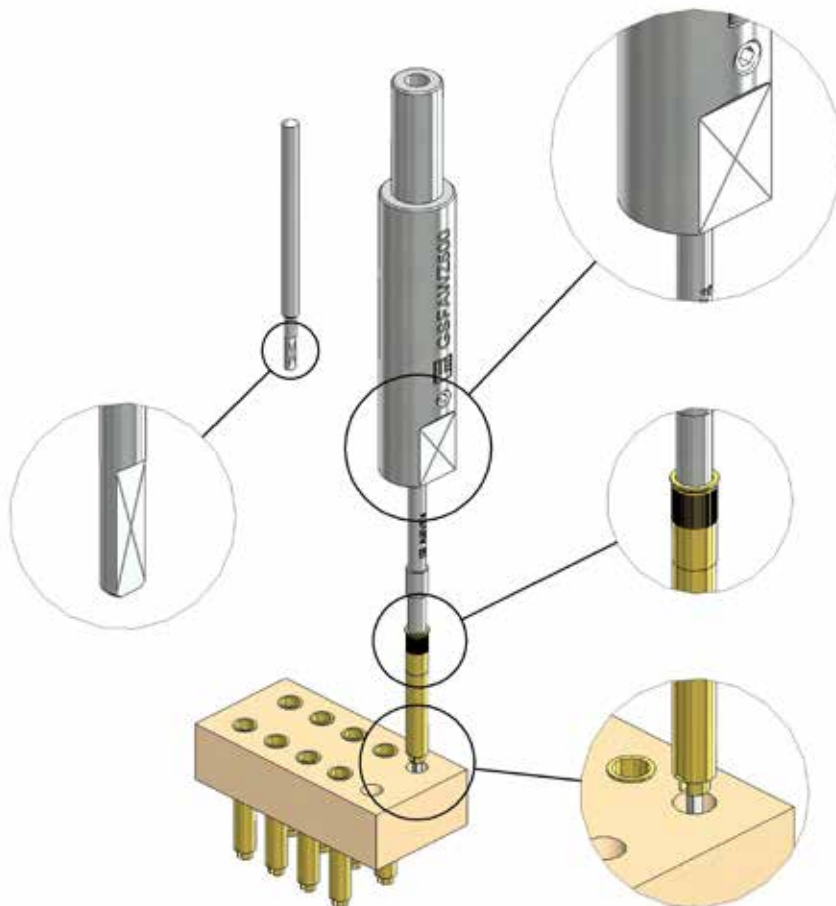


For different height levels of the receptacles with inserted press ring, the tool FEWZ...EV is recommended. The required height level can be adjusted at the tool..

FAWZ

Mounting tool for twist proof receptacles

In order to ensure that the anti-twist protection of the probes is really effective, the receptacle must be loaded into the test fixture already aligned during assembly. This can be done with an alignment tool of FEINMETALL (FAWZ...). The alignment tool can also be clamped in a hand lever press. Advantage: One-time alignment of the Alignment tool in the fixture.



Order Code (BIT + Handle)	BIT	Handle	Length [mm]	e.g. for receptacles
FAWZ751	AS751	GSFAWZ500	118,0	H751
FAWZ755	AS755	GSFAWZ500	118,0	H755
FAWZ756	AS756	GSFAWZ500	118,0	H756
FAWZ761	AS761	GSFAWZ500	118,0	H760, H762
FAWZVF3	ASVF3	GSFAWZ500	139,6	HVF3
FAWZVF4	ASVF4	GSFAWZ500	124,0	HVF4
FAWZVF100	ASVF100	GSFAWZ500	129,0	HVF100

FK50

Toolbox with Spring Force Gauge

Contents:

- 1x Spring force gauge with receptacle for measuring sleeves
- 1x Measuring sleeve Ø5,0 mm
- 1x Calibration certificate
- 1x Empty box for probes and accessories



FM-TOOLBOX

Toolbox for Mounting Tools (empty)

Contents:

- Empty case with corresponding inlay for bits, handles and other accessories
- 1x Bit box with 15 empty slots for bits
- 3x Empty boxes for probes and accessories



FM-TOOLBOX-SET-001

Toolbox with Predefined Mounting Tools (filled)

Contents:

- 22x Bits
- 3x Handles (standard)
- 3x Handles (with ratchet)
- 2x Alignment tools, 1x handle
- 2x Screw driver
- 1x Bit box with 15 empty slots for bits
- 3x Empty boxes for probes and accessories



FM-TOOLBOX-SET-002

Cordless Screwdriver Set

Contents:

- 1x Cordless screwdriver (shape changeable from pistol to straight shape)
- 1x Power connector for 230V
- 3x Magnetic holder with different ratchets
- 1x Bit box with 15 empty slots for bits
- 2x Empty boxes for probes and accessories



FM-SAMPLEBOX-07

Step Probe Box

Sample box with a large variety of step probes

3D-models of our step probes on request on USB data carrier available.



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/>



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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.

