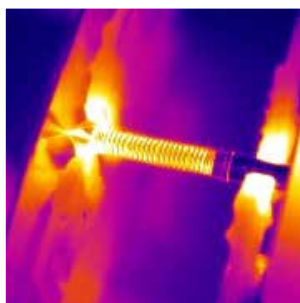


CONTACT PROBES

FOR HIGH CURRENTS
FOR LOW HEIGHTS
AND FOR DIRECT SOLDERING



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BASICS

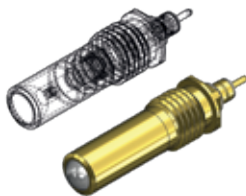
Competence

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



Broad Competence In-house

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



Innovative Capacity

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

International Customer Service

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



Quality

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

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



Environment and Health Protection

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

Traceability of Contact Probes

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

Customer Focus

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

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Note:

This catalogue includes short-travel probes and battery contacts in small sizes up to high current solutions suitable for loads up to 600A continuous current.

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.

BASICS

Overview of Tip Styles for High Current and Coaxial Probes

01 Conical 90°	02 Conical 90° stepped	03 Conical 60°	04 Conical 60° stepped	05 Concave stepped	06 Serrated stepped
07 Hexagonal 90° stepped	08 Hexagonal 60° stepped	09 6-point crown 120° stepped	11 Spherical	12 Spherical stepped	14 4-point crown stepped (self cleaning)
15 Triangular 45° stepped	16 Flat	17 Flat stepped	18 Conical 30°	27 Conical 120°	39 Conical flat 30°
				NEW	
41 6-point crown stepped (self cleaning)	46 W-profile	52 Concave with annular spring	55 Concave (self cleaning)		

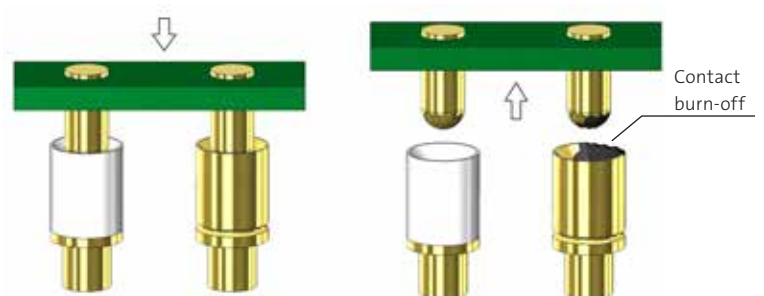
Special Versions

05 (IK) IK = Insulating cap	05 (A) Concave stepped	12 (A) Spherical stepped	12 (SP) SP = Step Probe	17 (A) Flat stepped

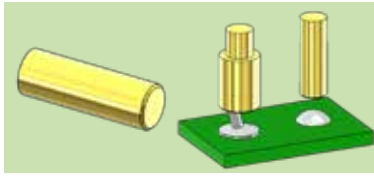
Special Head Made of Silver Alloy

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.



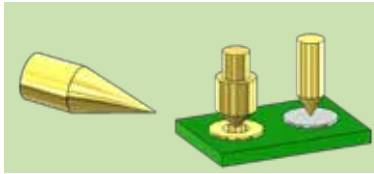
Typical Tip Styles and Applications



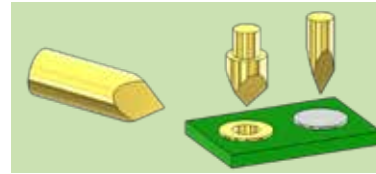
**Flat
(16,17)**
Suitable for solder pads and contact pins.



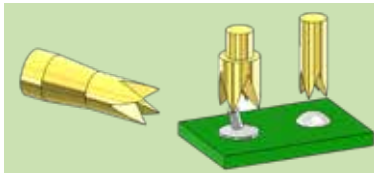
**Spherical
(11,12)**
For testing clean contact surfaces, does not leave marks or scratches.



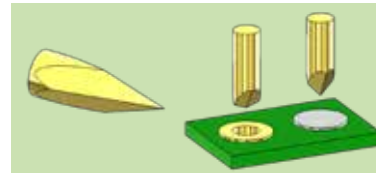
**Conical
(01,02,03,10,18,32,34,35)**
Universal tip style with different angles of 10°, 15°, 30°, 60°, 90° or 120° for contacting solder pads and vias.



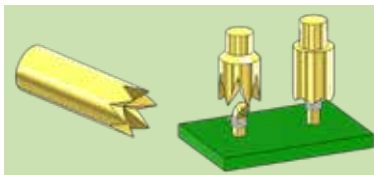
**Triangular
(15,30,62)**
For via holes and solder pads. The sharp edges penetrate flux residues and oxide layers.



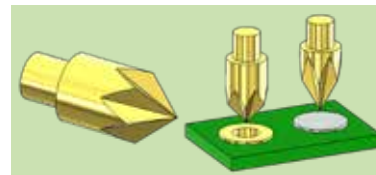
**4-point crown
(14,20,21,28,29,37)**
For pad surfaces and soldered pins. The sharp edges penetrate flux residues and oxide layers.



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



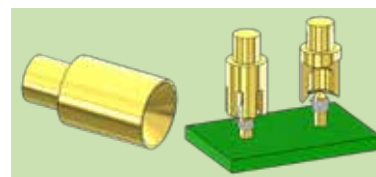
**Crown
(09,35,40,41,42,60,63)**
For wire wrap posts, even if the contacts are bent or twisted.



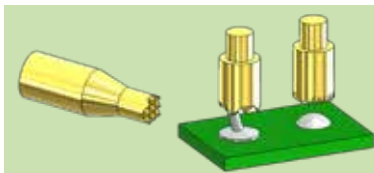
**Hexagonal
(07,08)**
For testing plated vias and pads. The sharp edges penetrate contamination and oxide layers.



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



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



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



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



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

Life Cycle Test of Contact Probes

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

High lateral forces, high current load and contamination may lead to a significantly reduced lifetime of the probes. For us as manufacturer of these probes, it is vital to permanently control and review the quality parameters and to analyze the lifetime performance of our products. In our own laboratory we have various test and measurement setups for quality control and for the determination of technical parameters during research and development. One important subject is the life cycle test, conducted with seven

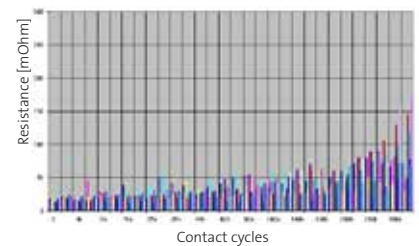
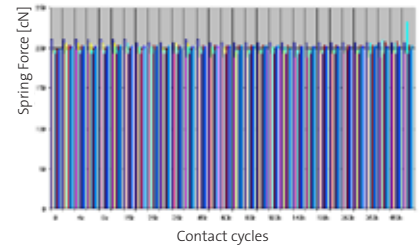
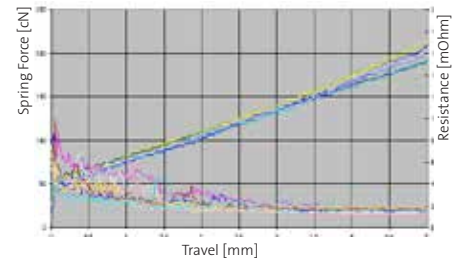


autonomous stress stages. The test conditions provide an internal standard reference that allows competent statements regarding the life cycles of our probes.

Life cycle tests are performed under the following conditions:

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

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



Pointing Accuracy and Radial Tolerance

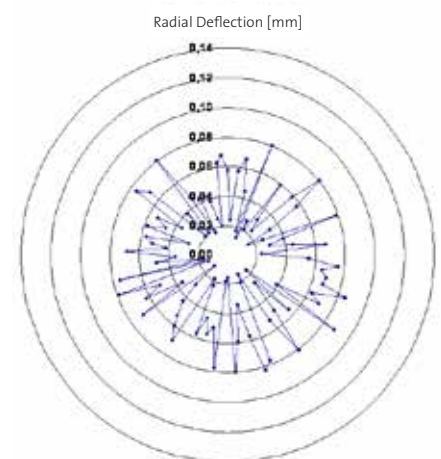


The pointing accuracy of a spring contact probe is determined by many factors, for example by manufacturing tolerances, by the length of the plungers and by the type of plunger guiding. Further factors that are independent of the contact probe have to be considered, for example the receptacles and the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

To optimize the pointing accuracy especially in applications with small centers additional guiding plates in the fixture can be used. There is always a radial tolerance between plunger and barrel of a spring contact probe.

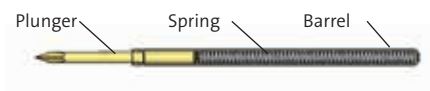
This leads to a certain deflection of the plunger tip. The guide clearance is necessary and if ideally designed, it guarantees a low abrasion and a reduction of lateral forces. The know-how to produce a good functioning and still long living spring contact probe lies in the definition of the optimum tolerances of plunger and barrel.

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



Design of Spring Contact Probes

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



Plunger

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

Barrel

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

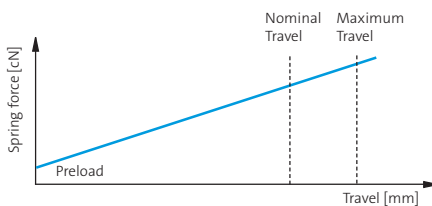
Spring

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

Spring Force

The selection of the spring force mainly depends on the application. On the one hand the spring force needs to ensure the quality of the electrical contact and the penetration of contaminations or oxide layers. On the other hand it should not lead to any damages on the contacting

surface or on the board. It also needs to be taken into consideration that the penetration of the contacted surface highly depends on the chosen tip style. In test fixtures (especially vacuum fixtures) the sum of all spring forces has to be observed in order to close the fixture and to contact without problems. Due to manufacturing processes and material variances all spring forces have a tolerance of $\pm 20\%$.



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.

Electrical Specifications

In a contact probe the primary current flow typically leads through the plunger, the barrel and the receptacle.

A secondary current flow leads through the plunger, the spring and the barrel. The transition points cause certain transfer resistances that are influenced by the following factors:

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

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

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

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

Materials

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

Basic Materials

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

Beryllium-Copper

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

Steel

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

Palladium Alloy

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

Nickel Silver

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

Bronze

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

Brass

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

Nickel

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

Plating Materials

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

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

Galvanic Nickel

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

Chemical Nickel

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

Rhodium

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

Silver

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

Gold

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

Hard Gold

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

FM Longtime Gold

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

Progressive Coating

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

Multiplex

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



Different Types of Spring Contact Probes

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

ICT/FCT Probes for Test Fixtures

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

Fine Pitch Probes

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

Battery Contacts

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

Interface Probes

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

Threaded Probes

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

High Current Probes

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

Switch Probes

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

Switch Probes with Ball Head

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

Pneumatic Switch Probes

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

Push Back Probes

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

Kelvin Probes

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

Radio Frequency Probes

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



Receptacles for Spring Contact Probes

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

Mounting

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

Connection of Receptacles

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

Types of Receptacles

At ICT/FCT test fixtures mainly plug-in probes are used. However, in some applications, particularly at modules for wire harness and connector tests, threaded probes are used, which are

screwed into the receptacles. Threaded probes guarantee a secure seat because they do not move out of the receptacle even under difficult conditions. Knurled receptacles ensure a firm seat of the receptacle in the drill hole. For switch probes and coaxial probes, FEINMETALL has developed special receptacles called "combi-receptacles", which enable a solder free exchange of these probes. Further receptacles with integrated switch function are available, that are frequently used in combination with twist proof probes.

Drilling Recommendations

Mounting the receptacle into the mounting plate demands special precision. Various parameters like rotating speed, feed, helical groove length, material and plate thickness are influencing the drilling results. The drilling recommendations in the technical specifications of the probes are guideline values only as a basis for your own drilling trials.

Therefore it is very important to make drilling tests in order to ensure that receptacles have a proper seat in the mounting plate.

Spacers

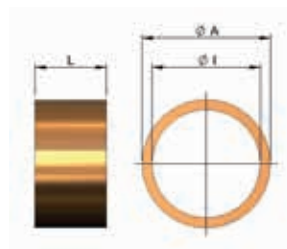
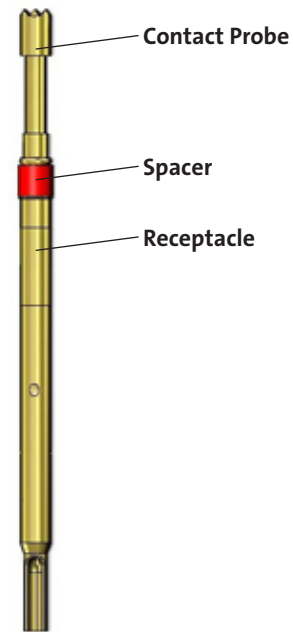
For height adjustment and balancing of tolerances.

Spacers H772DS/xx for 100mil Probes

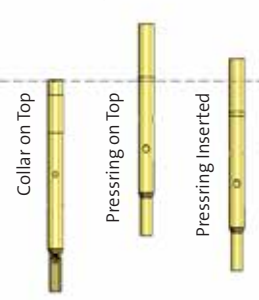
Order Code	Outer-Ø	Inner-Ø	Length
H772DS/10	2,20	1,70	1,00
H772DS/20	2,20	1,70	2,00
H772DS/30	2,20	1,70	3,00
H772DS/50	2,20	1,70	5,00

Spacers H773DS/xx for 138 mil Probes

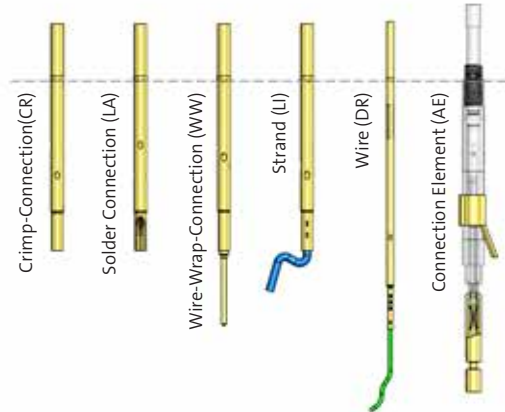
Order Code	Outer-Ø	Inner-Ø	Length
H773DS/01	3,20	2,70	0,10
H773DS/05	3,20	2,70	0,50
H773DS/10	3,20	2,70	1,00
H773DS/20	3,20	2,70	2,00
H773DS/30	3,20	2,70	3,00
H773DS/50	3,20	2,70	5,00



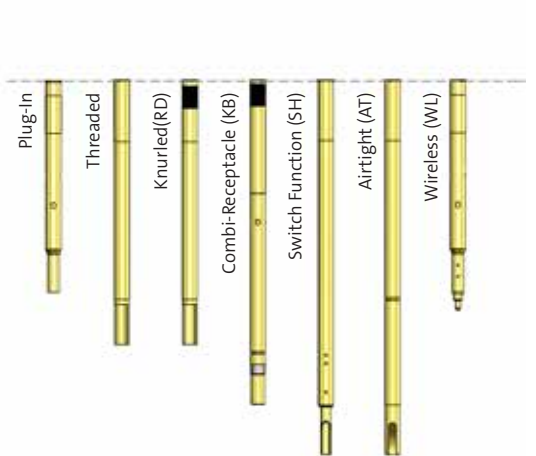
Mounting



Types of Connections



Types of Receptacles





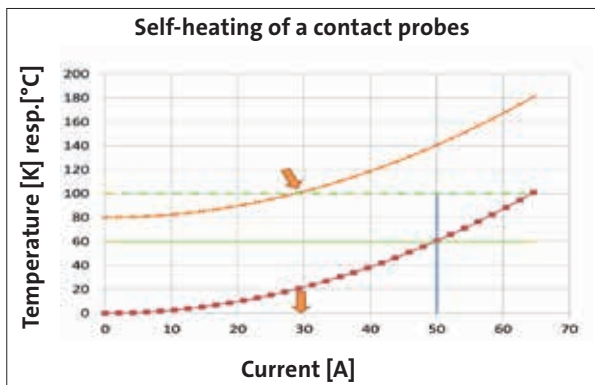
High Current Probes

For high current applications spring contact probes need to be designed in a special way with very low internal resistances. Especially too high temperatures of the probes or of single components of the probes need to be avoided and the electrical contact to the DUT needs to be optimized. The application range for high current probes is very large. These probes are used in test fixtures, wire harness test modules or in special test setups like e.g. in the field of charging and discharging processes in battery production.

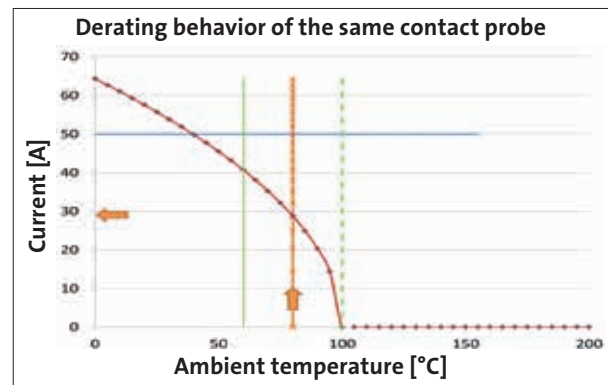
Requirements

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.



— 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.

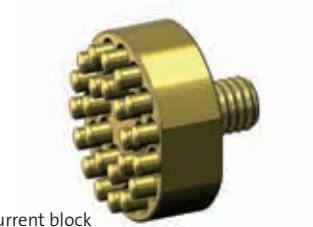
HIGH CURRENT PROBES

Overview

Types of High Current Probes

High current blocks

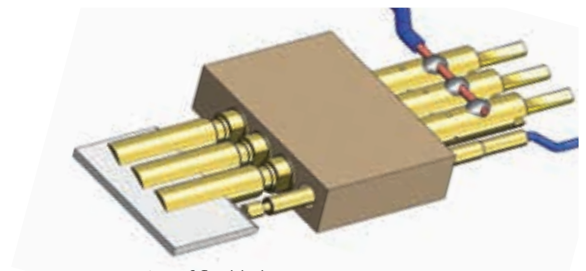
By integrated spring loaded contact elements this block allows contacting uneven or inclined surfaces with a very low contact resistance. The block should be mounted directly into conductive material to make use of the whole contact surface.



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

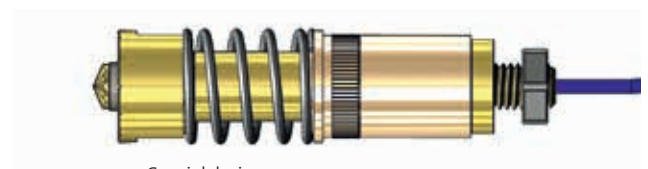
have the lowest internal resistance and therefore allow the highest currents. If the connection is made at the end of the plunger, this connection is moving synchronously with the plunger. Therefore such a connection wire needs to be flexible to avoid damages of the wire.



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

HIGH CURRENT PROBES

F310

High Current Probe 75 mil with Continuous Plunger up to 10 A, Plug-in

Centers (mm/mil)	1,90 / 75
Current	10,0 A
R typ	<25 mOhm
Temperature	-40°C...+200°C (H)

Spring Force (cN ±20%)

Version	Preload	Nominal
Standard	40	90

Travel (mm)

Version	Nominal	Maximum
Standard	2,4	3,0
Pointing Accuracy		±0,10 mm

Materials and Plating

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

Accessories

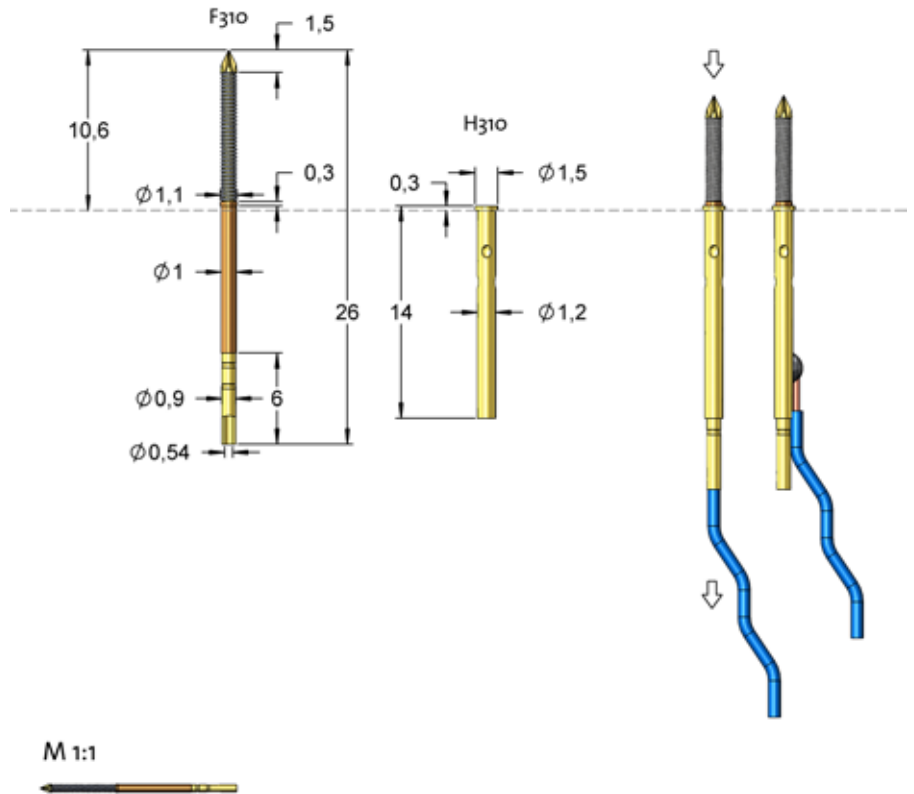
Insertion tool receptacle	FEWZ-075E0
Insertion tool probe	FDWZ-075

Drill Size (mm)

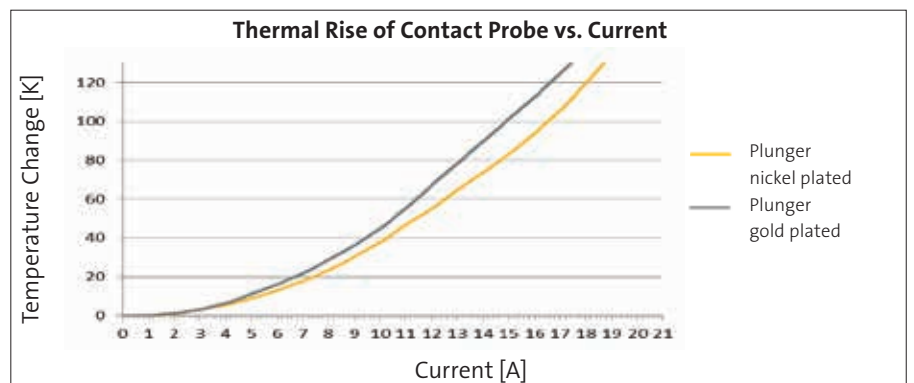
F310	0,96 - 0,99
H310	1,19 - 1,20

Projection Height (mm)

H310 mit F310	10,6
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The continuous plunger guarantees a low internal resistance and allows applications with high currents. The connection of the plunger should be realized by a flexible wire with sufficient space for the movement. The wire can also be soldered directly to the receptacle. However, this leads to a lower electrical performance.



Series	Tip-Ø	Spring Force (cN)
F310	04	S 110 L 090 -
Tip Style	Material	Plating

Material: S = Stahl
Tip-Ø: 110 = 1,10 mm (z.B.)
Plating: L = Langzeit Gold, N = Nickel
Version: -
Receptacle: Order code according drawing

Tip Style	Number	Material	Ø in mm	Plating	Version
	04	S	1,10	N	-
	05	S	1,10	N	-
	08	S	1,10	L	-
	09	S	1,10	L	-
	09	S	1,10	N	-
	14	S	1,10	L	-

HIGH CURRENT PROBES

F320

High Current Probe 100 mil with Continuous Plunger up to 12 A, Plug-in

Centers (mm/mil)	2,54 / 100
Current	12,0 A
R typ	<20 mOhm
Temperature	-40°C...+200°C (H)

Spring Force (cN ±20%)

Version	Preload	Nominal
Standard	50	130

Travel (mm)

Version	Nominal	Maximum
Standard	3,2	4,0
Pointing Accuracy		±0,10 mm

Materials and Plating

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

Accessories

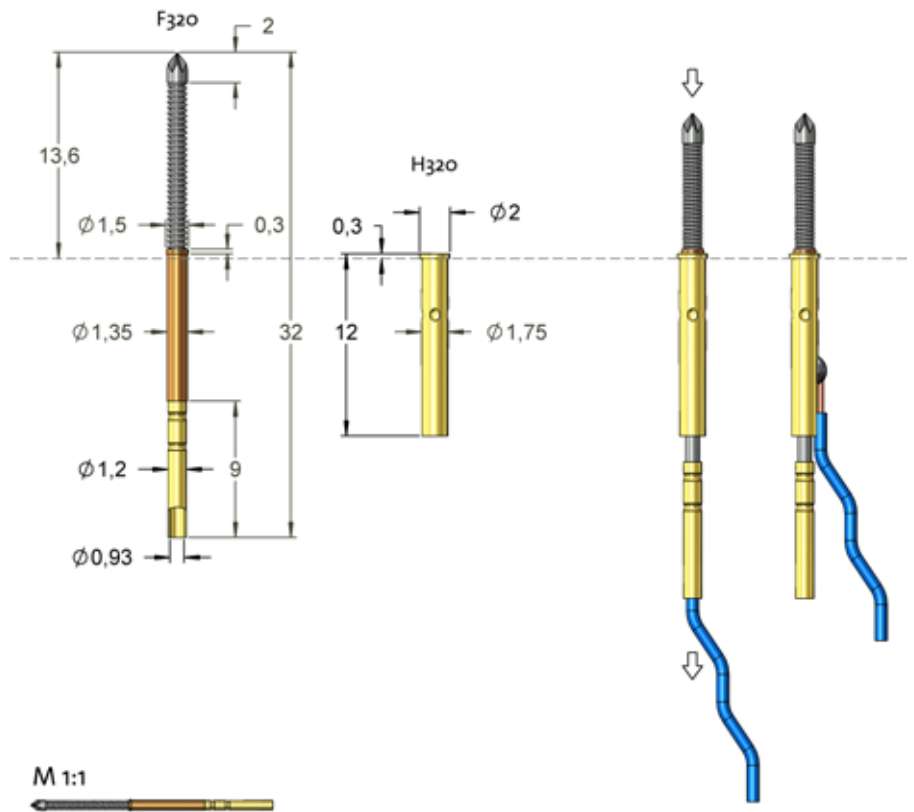
Insertion tool receptacle	FEWZ-100E0
Insertion tool probe	FDWZ-100

Drill Size (mm)

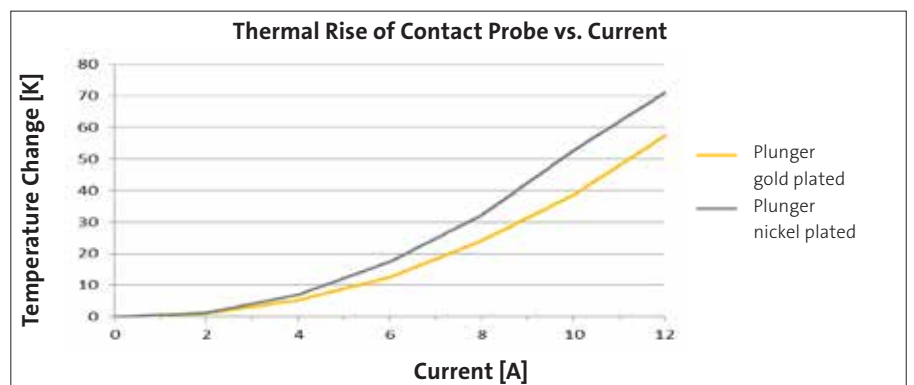
F320	1,32 - 1,35
H320	1,74 - 1,75

Projection Height (mm)

H320 mit F320	13,6
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The continuous plunger guarantees a low internal resistance and allows applications with high currents. The connection of the plunger should be realized by a flexible wire with sufficient space for the movement. The wire can also be soldered directly to the receptacle. However, this leads to a lower electrical performance.



Series	Tip-Ø	Spring Force (cN)
F320	04	S 135 N 130 -
	Tip Style	Material Plating Version

Material: S = Steel
Tip-Ø: 135 = 1,35 mm (e.g.)
Plating: L = Longtime gold plated, N = Nickel plated
Version: -
Receptacle: Order code according drawing

Tip Style	Number	Material	Ø in mm	Plating	Version
	04	S	1,35	N	-
	05	S	1,35	N	-
	07	S	1,35	N	-
	09	S	1,35	L	-
	09	S	1,35	N	-
	12	S	1,35	L	-
	14	S	1,35	L	-

HIGH CURRENT PROBES

F330

High Current Probe 118 mil with Continuous Plunger up to 14 A, Plug-in

Centers (mm/mil)	1,90 / 75
Current	14,0 A
R typ	<25 mOhm
Temperature	-40°C...+200°C (H)

Spring Force (cN ±20%)

Version	Preload	Nominal
Standard	60	210
Standard	180	415

Travel (mm)

Version	Nominal	Maximum
Standard	5,6	7,0
Pointing Accuracy		±0,10 mm

Materials and Plating

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

Accessories

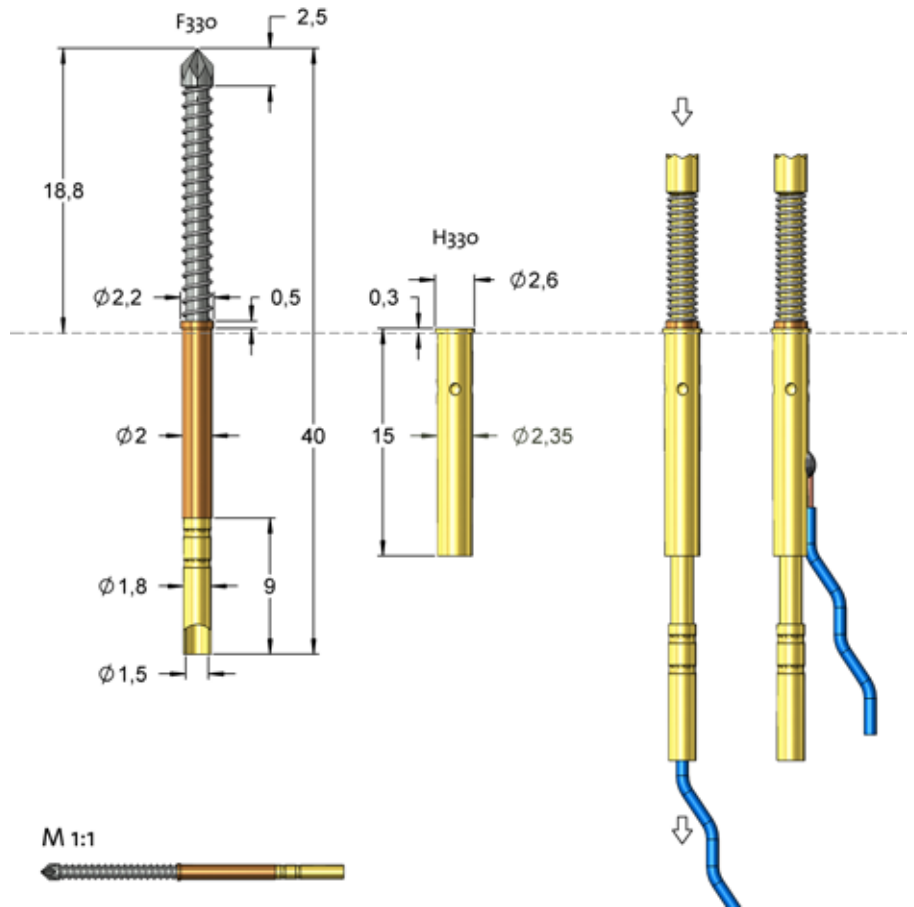
Insertion tool receptacle	FEWZ-330E0
Insertion tool probe	FDWZ-100

Drill Size (mm)

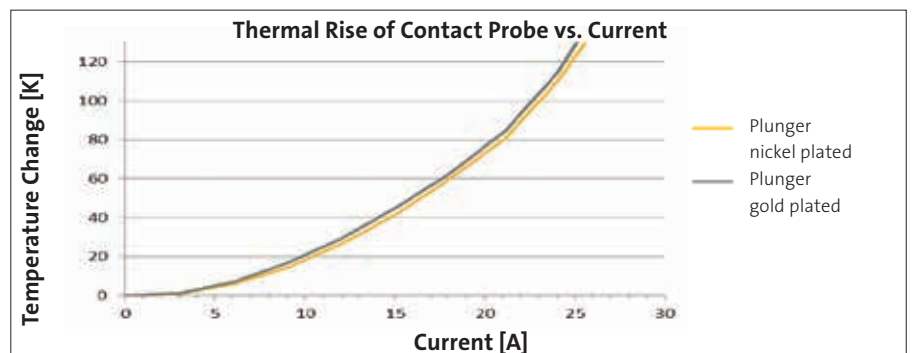
F330	1,97 - 2,00
H330	2,33 - 2,34

Projection Height (mm)

H330 mit F330	18,8
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The continuous plunger guarantees a low internal resistance and allows applications with high currents. The connection of the plunger should be realized by a flexible wire with sufficient space for the movement. The wire can also be soldered directly to the receptacle. However, this leads to a lower electrical performance.



Series	Tip-Ø	Spring Force (cN)
F330	05	S 210
		L 210
		-
	Tip Style	Material
		Plating
		Version

Material: S = Stahl
Tip-Ø: 210 = 2,10 mm (e.g.)
Plating: L = Longtime gold plated, N = Nickel plated
Version: -
Receptacle: Order code according drawing

Tip Style	Number	Material	Ø in mm	Plating	Version
	05	S	2,10	L	-
	05	S	2,10	N	-
	07	S	2,10	L	-
	07	S	2,10	N	-
	08	S	2,10	N	-
	09	S	2,10	L	-
	14	S	2,10	L	-

HIGH CURRENT PROBES

F340

High Current Probe 157 mil with Continuous Plunger up to 16 A, Plug-in

Centers (mm/mil)	4,00 / 157
Current	16,0 A
R typ	<10 mOhm
Temperature	-40°C...+200°C (H)

Spring Force (cN ±20%)

Version	Preload	Nominal
Standard	80	260
Standard	150	400
Standard	300	540

Travel (mm)

Version	Nominal	Maximum
Standard	6,4	8,0
Pointing Accuracy		±0,10 mm

Materials and Plating

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

Accessories

Insertion tool receptacle	FEWZ-340E0
Insertion tool probe	FDWZ-100

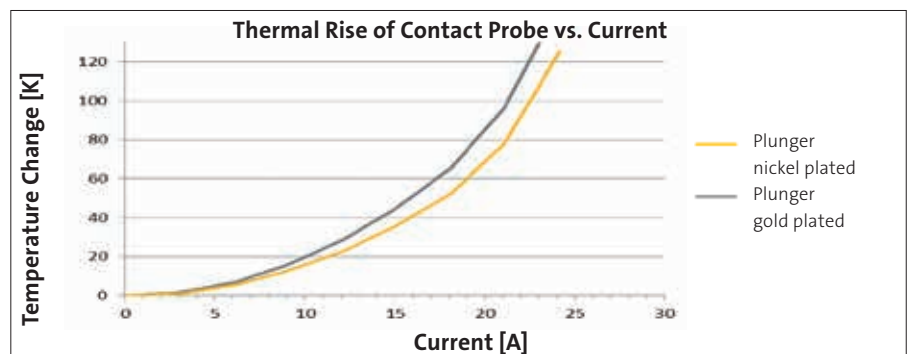
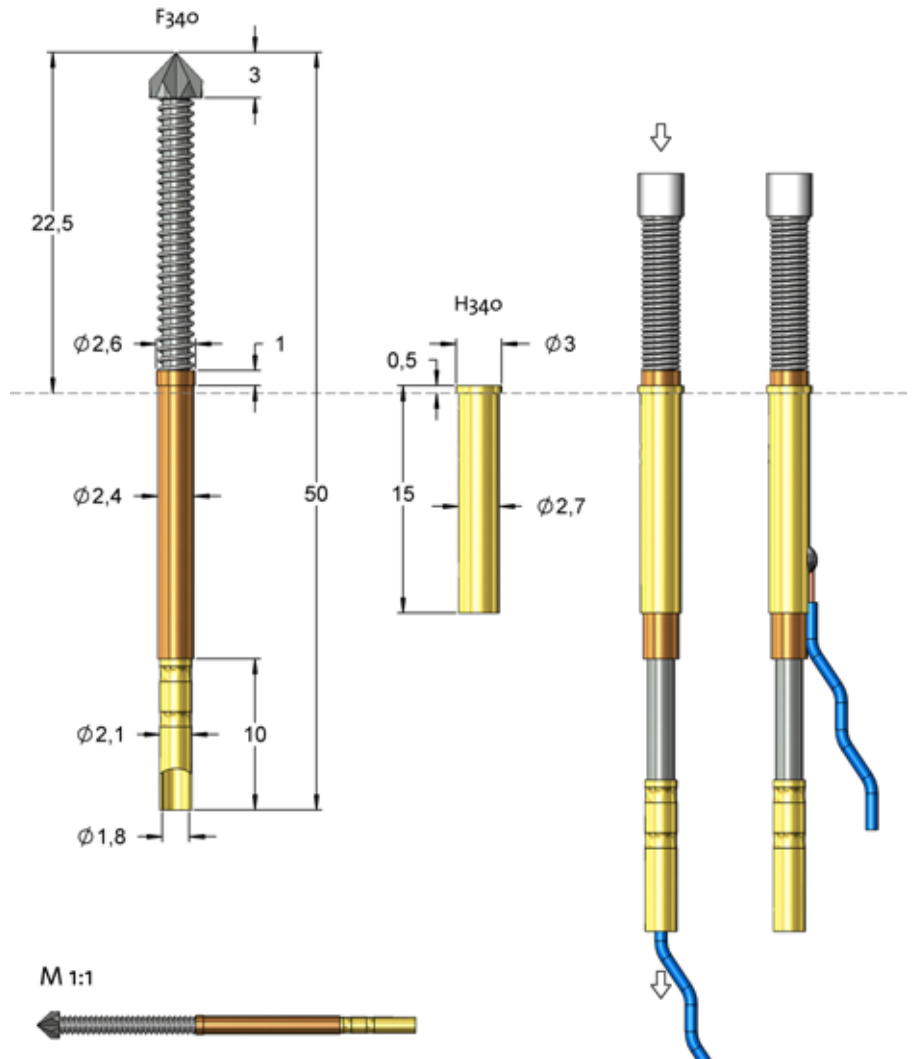
Drill Size (mm)

F340	2,37 - 2,40
H340	2,68 - 2,69

Projection Height (mm)

H340 mit F340	22,5
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The continuous plunger guarantees a low internal resistance and allows applications with high currents. The connection of the plunger should be realized by a flexible wire with sufficient space for the movement. The wire can also be soldered directly to the receptacle. However, this leads to a lower electrical performance.



Series	Tip-Ø	Spring Force (cN)
F340	04	S
		350
		N
		260
		-
	Tip Style	Material
		Plating
		Version

Material: S = Stahl
Tip-Ø: 350 = 3,50 mm (e.g.)
Plating: L = Longtime gold plated, N = Nickel plated
Version: -
Receptacle: Order code according drawing

Tip Style	Number	Material	Ø in mm	Plating	Version
	04	S	3,50	N	-
	05	A	3,00	U	-
	05	S	3,50	L	-
	05	S	3,50	N	-
	07	S	3,50	L	-
	09	S	3,50	L	-
	17	A	3,00	U	-

HIGH CURRENT PROBES

F772C

High Current Probe 100 mil
up to 20 A, Plug-in

Centers (mm/mil)	2,54 / 100
Current	20,0 A
R typ	<10 mOhm
Temperature	-40°C...+200°C (H)

Spring Force (cN ±20%)

Version	Preload	Nominal
C	50	150
C	50	300

Travel (mm)

Version	Nominal	Maximum
Standard	4,0	5,0
Pointing Accuracy		±0,08 mm

Materials and Plating

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

Accessories

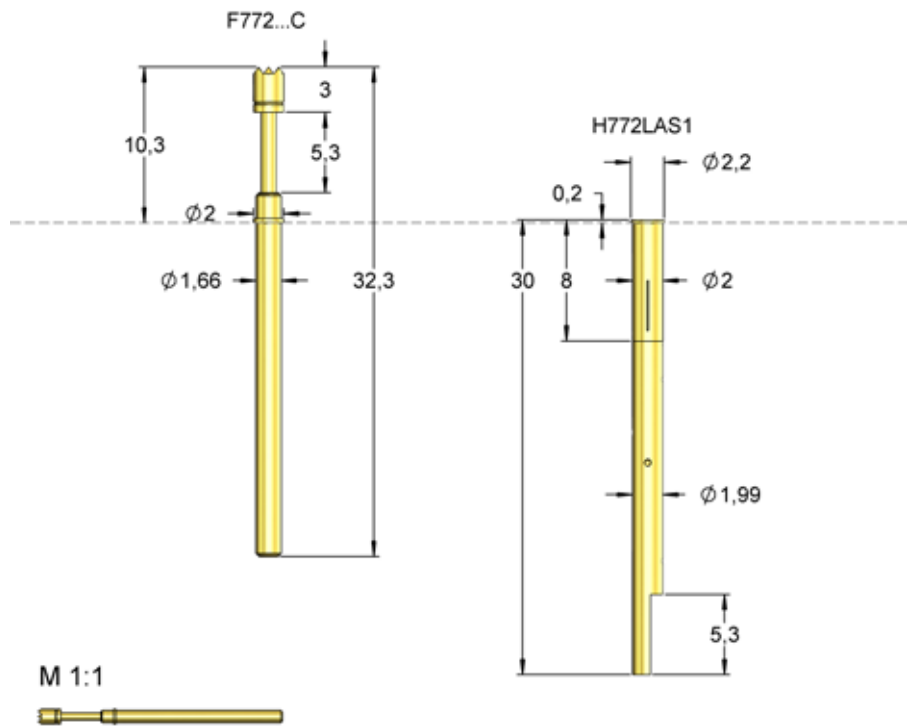
Insertion tool receptacle	FEWZ-772E0
Insertion tool probe	FDWZ-100

Drill Size (mm)

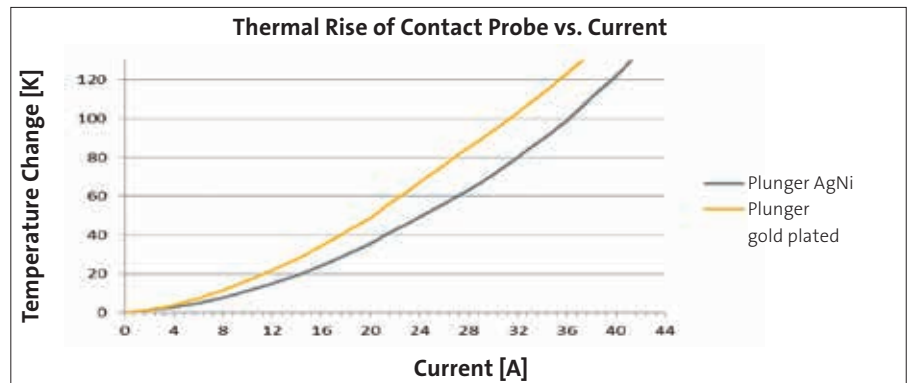
H772LAS1	1,99 - 2,00
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Projection Height (mm)

H772LAS1 with F772...C	10,5
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This probe is suitable for applications in burn-in / run-in tests and for functional tests with higher currents.



Tip Style	Number	Material	Ø in mm	Plating	Version
	05	A	2,00	U	C
	05	B	2,00	G	C
	06	B	2,00	G	C
	07	B	2,00	G	C
	11	B	1,00	G	C
	14	B	2,00	G	C
	16	B	1,00	G	C
	46	B	2,00	G	C
	55	B	2,00	G	C

Series	Tip-Ø	Spring Force (cN)
F772	06	200
	B	G
		300
		C

Material: B = BeCu, A = AgNi (Silver alloy)
Tip-Ø: 200 = 2,00 mm (e.g.)
Plating: G = Gold plated, U = Unplated
Version: C = High Current Version
Receptacle: Order code according drawing

HIGH CURRENT PROBES

F713C

High Current Probe 138 mil Short Version, up to 25 A, Plug-in

Centers (mm/mil)	3,50 / 138
Current	25,0 A
R typ	<8 mOhm
Temperature	-40°C...+200°C (H)

Spring Force (cN ±20%)

Version	Preload	Nominal
C	60	150

Travel (mm)

Version	Nominal	Maximum
C	2,8	3,5

Pointing Accuracy ±0,10 mm

Materials and Plating

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

Accessories

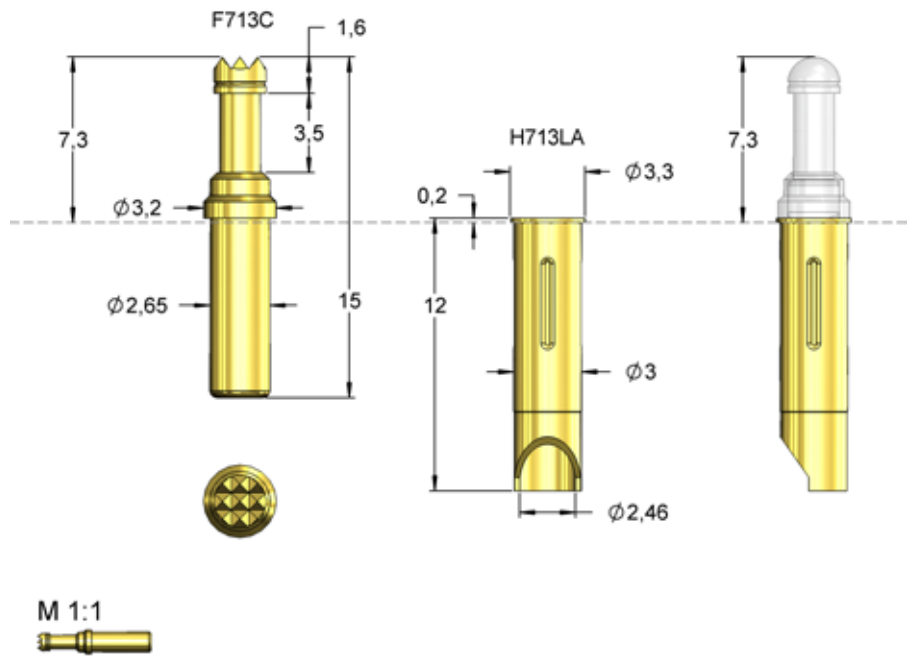
Insertion tool receptacle	FEWZ-772E0
Insertion tool probe	FDWZ-100

Drill Size (mm)

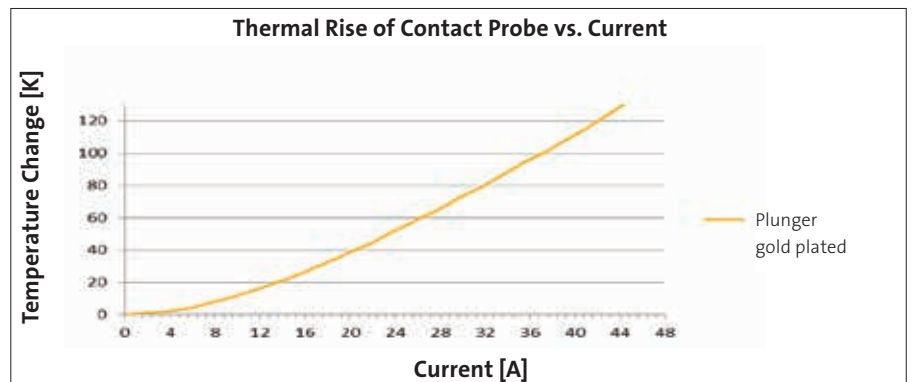
H713LA	2,98 - 2,99
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Projection Height (mm)

H713LA mit F713...C	7,3
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For high current applications at limited space.



Series	Tip-Ø	Spring Force (cN)
F713 06 B 230 G 150 C		
Tip Style	Material	Plating
Version		

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

Tip Style	Number	Material	Ø in mm	Plating	Version
	06	B	2,30	G	C
	12	B	2,30	G	C
	14	B	2,30	G	C

F773C

**High Current Probe 138 mil
Robust Version,
up to 25 A, Plug-in**

Centers (mm/mil)	3,50 / 138
Current	25,0 A
R typ	<8 mOhm
Temperature	-40°C...+200°C (H)

Spring Force (cN ±20%)

Version	Preload	Nominal
C	60	150
C	60	300
C	170	600

Travel (mm)

Version	Nominal	Maximum
Standard	4,0	5,0
Pointing Accuracy		±0,10 mm

Materials and Plating

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

Accessories

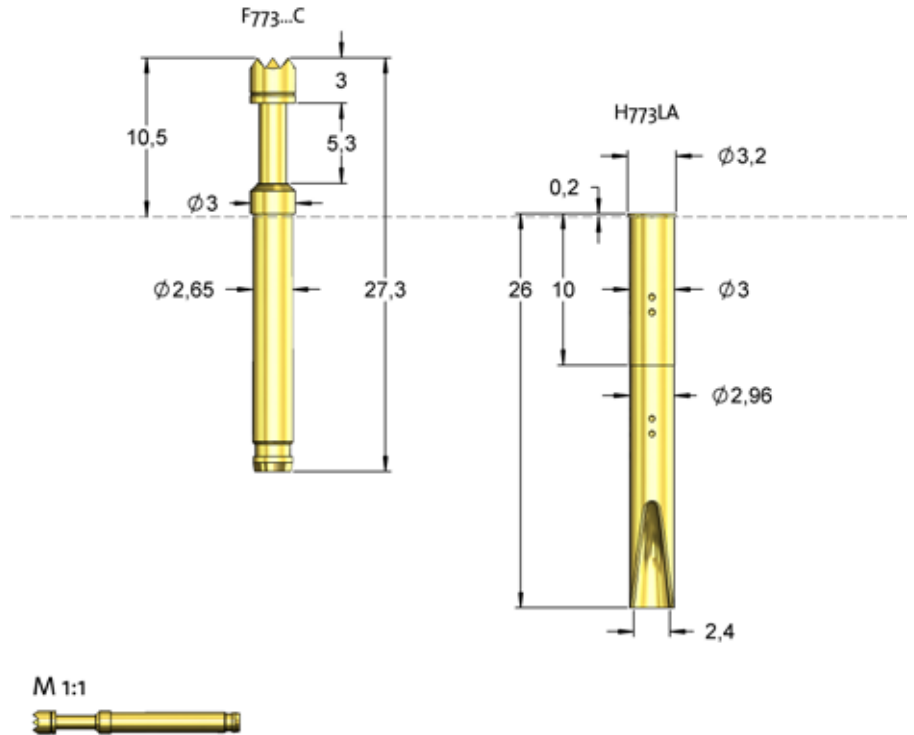
Insertion tool receptacle	FEWZ-774E0
Insertion tool probe	FDWZ-100

Drill Size (mm)

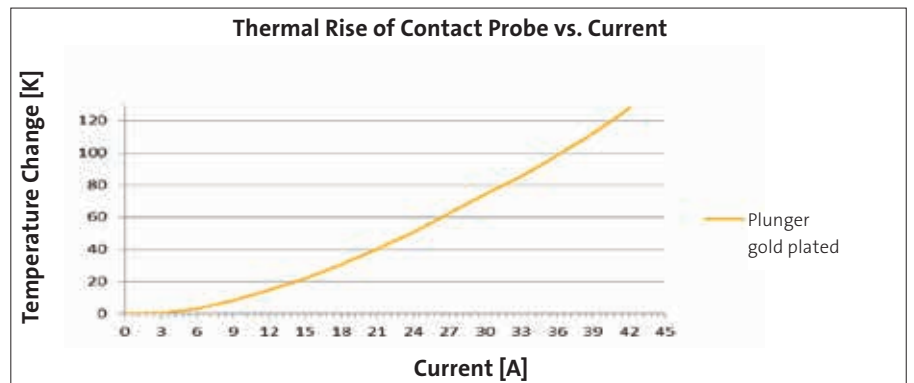
H773LA	2,98 - 2,99
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Projection Height (mm)

H773LA mit F773...C	10,5
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This probe is suitable for applications in burn-in / run-in tests and for functional tests with higher currents.



Tip Style	Number	Material	Ø in mm	Plating	Version
	05	A	3,00	U	C
	06	B	2,30	G	C
	06	B	3,00	G	C
	06	B	4,00 *	G	C
	07	B	3,00	G	C
	11	B	1,40	G	C
	11	B	1,80	G	C
	12	B	2,30	G	C
	14	B	2,30	G	C
	17	B	4,00 *	G	C
	55	B	3,00	G	C

Series	Tip-Ø	Spring Force (cN)
F773	06	300
	B	G
	230	C

Material: B = BeCu, A = AgNi (Silver alloy)
Tip-Ø: 230 = 2,30 mm (e.g.)
Plating: G = Gold plated, U = Unplated
Version: C = High Current Version
Receptacle: Order code according drawing

HIGH CURRENT PROBES

F566C

**High Current Probe 177 mil
Robust Version,
up to 35 A, Plug-in**

Centers (mm/mil)	4,50 / 177
Current	35,0 A
R typ	<15 mOhm
Temperature	-20°C...+150°C

Spring Force (cN ±20%)

Version	Preload	Nominal
C	300	500
E12C	300	500

Travel (mm)

Version	Nominal	Maximum
C	4,3	6,4
E12C	4,3	6,4
Pointing Accuracy		±0,10 mm

Materials and Plating

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

Accessories

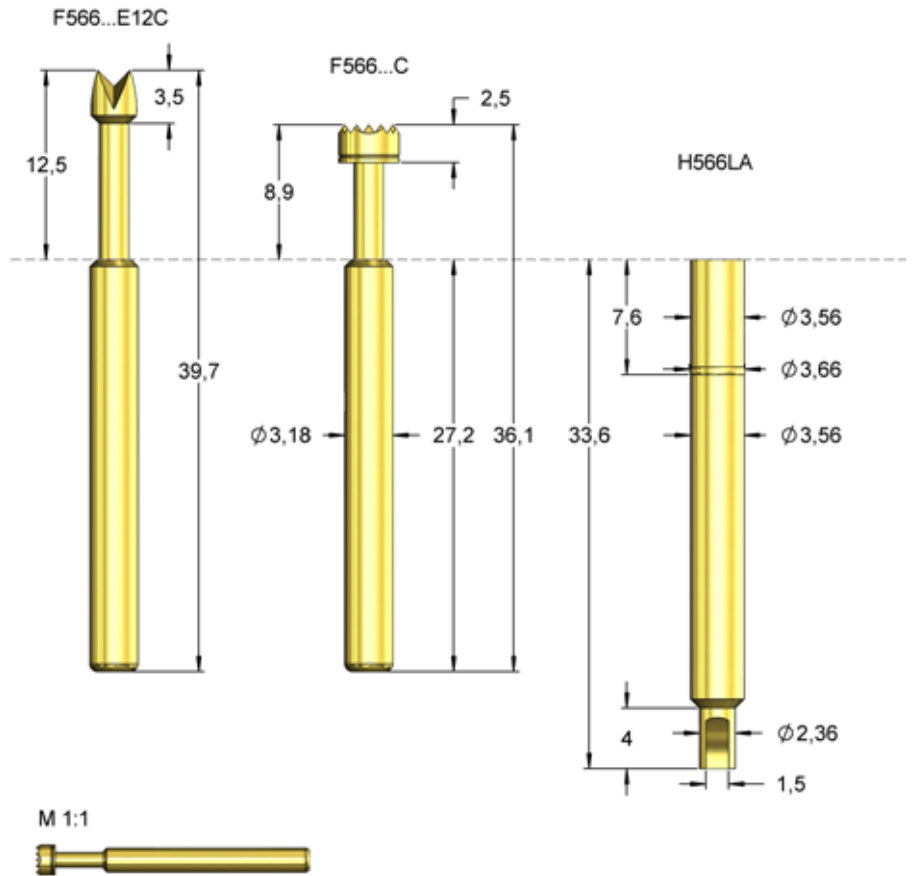
Insertion tool receptacle	FEWZ-774E0
Insertion tool probe	FDWZ-100

Drill Size (mm)

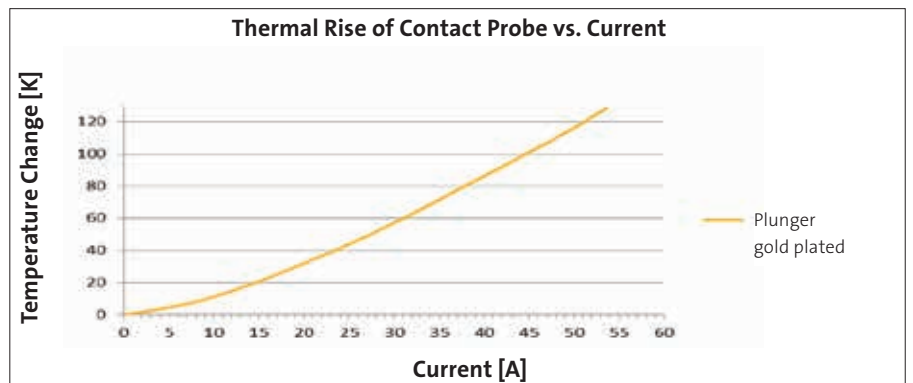
Press ring as stop	3,54 - 3,55
Press ring inserted	3,58 - 3,63

Projection Height (mm)

H566LA with F566...C	8,9 - 16,5
H566LA with F566...E12C	12,5 - 20,2



This probe is suitable for applications in burn-in / run-in tests and for functional tests with higher currents.



Series	Tip-Ø	Spring Force (cN)
F566 06 B 400 G 500 C		
Tip Style	Material	Plating
		Version

Material: B = BeCu
Tip-Ø: 400 = 4,0 mm (e.g.)
Plating: G = Gold plated
Version: C = High Current Version;
 E12 = Projection Height 12,5mm
Receptacle: Order code according drawing

Tip Style	Number	Material	Ø in mm	Plating	Version
	06	B	4,00	G	C
	12	B	4,00	G	C
	14	B	3,00	G	C
	14	B	3,00	G	E12C

HIGH CURRENT PROBES

F775C

**High Current Probe 197 mil
Robust Version,
up to 50 A, Plug-in**

Centers (mm/mil)	5,00 / 197
Current	50,0 A
R typ	<5 mOhm
Temperature	-40°C...+200°C (H)

Spring Force (cN ±20%)

Version	Preload	Nominal
C	150	300
C	150	500
C	500	1000

Travel (mm)

Version	Nominal	Maximum
C	4,4	5,5

Pointing Accuracy ±0,10 mm

Materials and Plating

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

Accessories

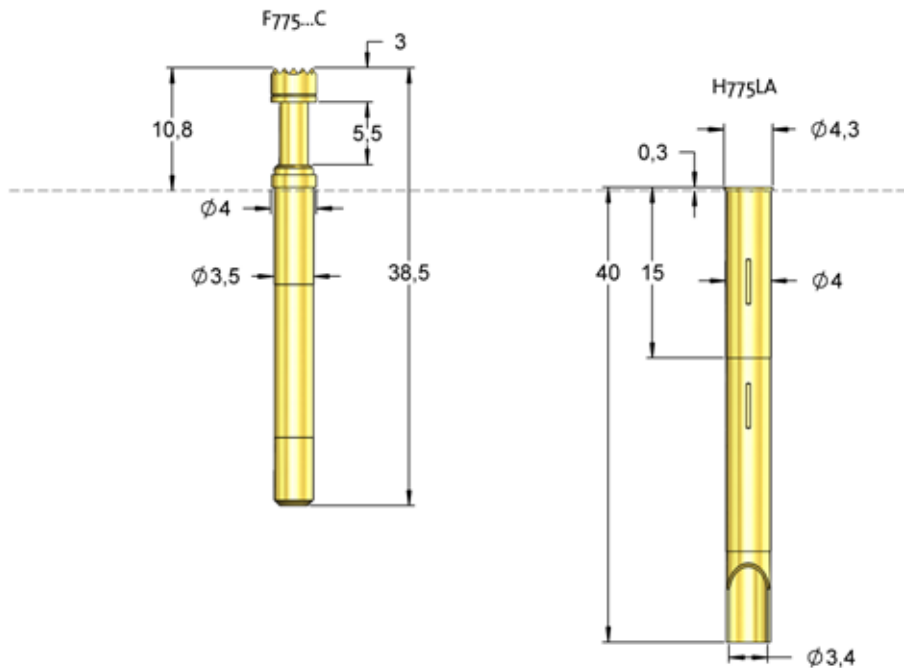
Insertion tool receptacle	FEWZ-735E0
Insertion tool probe	FDWZ-100

Drill Size (mm)

H775LA	3,98 - 3,99
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Projection Height (mm)

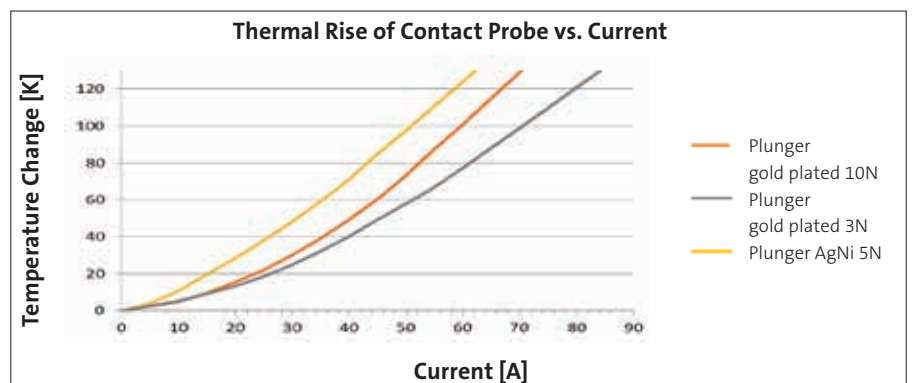
H775LA with F775...C	10,8
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M 1:1



This probe is suitable for applications in burn-in / run-in tests and for functional tests with higher currents.



Series	Tip-Ø	Spring Force (cN)
F775	05	400
	B	G
		300
		C

Tip Style: 05, Material: B, Plating: G, Version: C

Material: B = BeCu, A = AgNi (Silver alloy)
Tip-Ø: 400= 4,00 mm (e.g.)
Plating: G = Gold plated, U = Unplated
Version: C = High Current Version
Receptacle: Order code according drawing

Tip Style	Number	Material	Ø in mm	Plating	Version
	04	B	3,00	G	C
	05	B	4,00	G	C
	06	B	4,00	G	C
	07	B	3,00	G	C
	12	A	4,00	U	C
	17	B	4,00	G	C
	55	B	4,00	G	C

HIGH CURRENT PROBES

1860C010

NEW

**High Current Probe 256 mil
Solder Tight, Robust Version
up to 50 A, Plug-in**

Centers (mm/mil)	6,50 / 256
Current	50,0 A
R typ	<6 mOhm
Temperature	-40°C...+200°C (H)

Spring Force (cN ±20%)

Version	Preload	Nominal
Standard	120	400

Travel (mm)

Version	Nominal	Maximum
Standard	4,8	7,0
Pointing Accuracy		±0,08 mm

Materials and Plating

Plunger	Brass, gold plated
Barrel	Brass, gold plated
Spring	Stainless steel, unplated
Receptacle	Brass, gold plated

Accessories

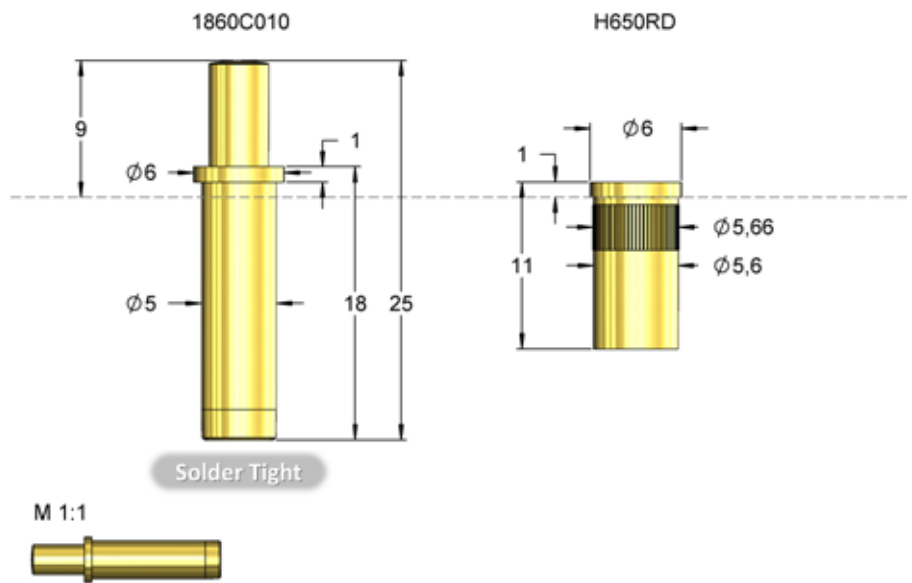
Insertion tool probe	FDWZ-650
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Drill Size (mm)

1860C010	4,98 - 5,01
H650RD	5,61 - 5,63


Projection Height (mm)

1860C010 in H650RD	9,0
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Design with standard plunger



Order Code	Tip Style	Number	Material	Ø in mm	Plating	Version
1860C010		11	M	4,00	G	G

HIGH CURRENT PROBES

F732C

High Current Probe 100 mil up to 20 A, Threaded

Centers (mm/mil)	2,54 / 100
Current	20,0 A
R typ	<10 mOhm
Temperature	-40°C...+200°C (H)

Spring Force (cN ±20%)

Version	Preload	Nominal
C	50	150
C	50	300

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

Accessories

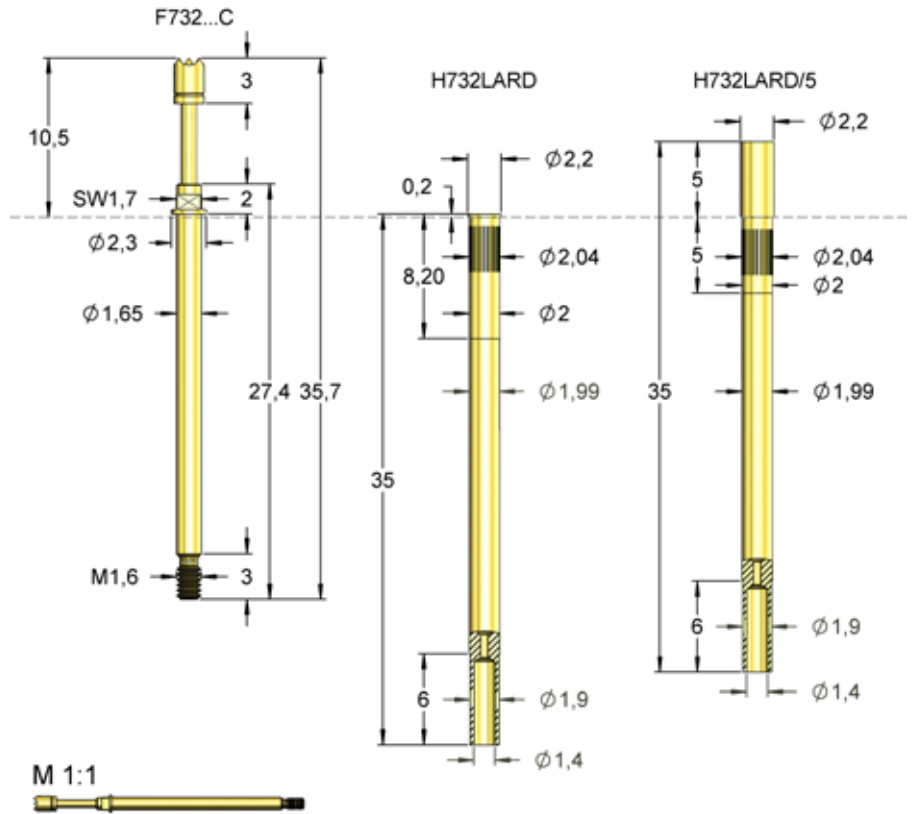
Insertion tool receptacle	FEWZ-772E0
Screw-in tool probe	FWZ732 (T)

Drill Size (mm)

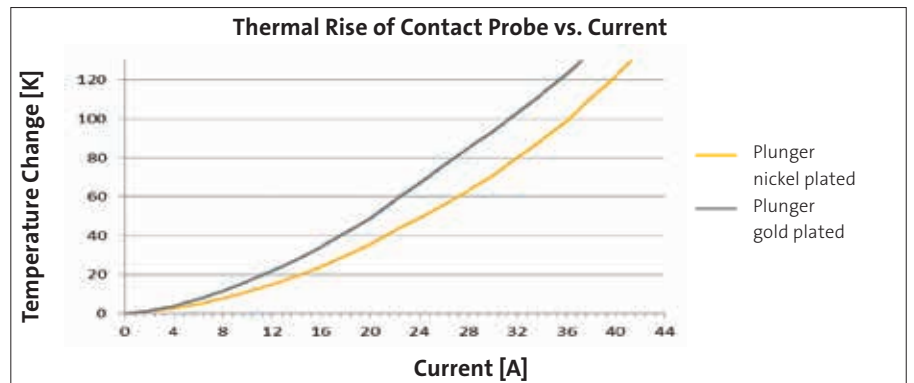
Receptacle without knurl	1,99 - 2,00
Receptacle with knurl	2,00 - 2,02

Projection Height (mm)

H732... with F732...C	10,5
H732.../5 with F732...C	15,3
H732.../10 with F732...C	20,3



This probe is suitable for applications in burn-in / run-in tests and for functional tests with higher currents.



Tip Style	Number	Material	Ø in mm	Plating	Version
	05	A	2,00	U	C
	05	B	2,00	G	C
	06	B	1,80	G	C
	06	B	2,00	G	C
	07	B	1,75	G	C
	11	B	0,65	G	C
	11	B	0,80	G	C
	11	B	1,00	G	C
	16	B	1,00	G	C
	29	B	1,00	G	C
	55	B	2,00	G	C

Series	Tip-Ø	Spring Force (cN)
F732	06	200
	B	G
		300
		C

Material: B = BeCu, A = AgNi (Silver alloy)
Tip-Ø: 200 = 2,00 mm (e.g.)
Plating: G = Gold plated, U = Unplated
Version: C = High Current Version
Receptacle: Order code according drawing

HIGH CURRENT PROBES

F360C

High Current Probe 138 mil
up to 15 A, Threaded

Centers (mm/mil)	3,50 / 138
Current	15,0 A
R typ	<15 mOhm
Temperature	-40°C...+200°C (H)

Spring Force (cN ±20%)

Version	Preload	Nominal
C	50	80

Travel (mm)

Version	Nominal	Maximum
C	0,8	1,2
Thread (M)		2,5
Wrench Size		2,2
Pointing Accuracy		±0,10 mm

Materials and Plating

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

Accessories

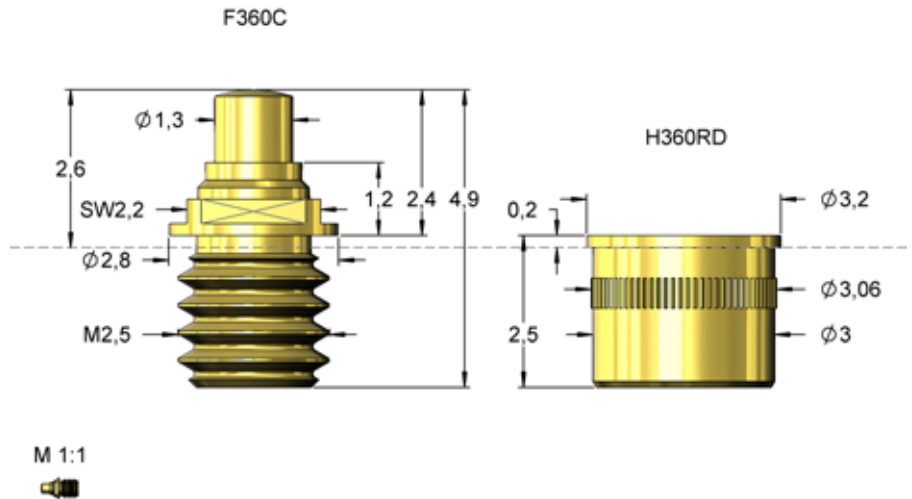
Insertion tool receptacle	FEWZ-563E0
Screw-in tool probe	FWZVF3S2

Drill Size (mm)

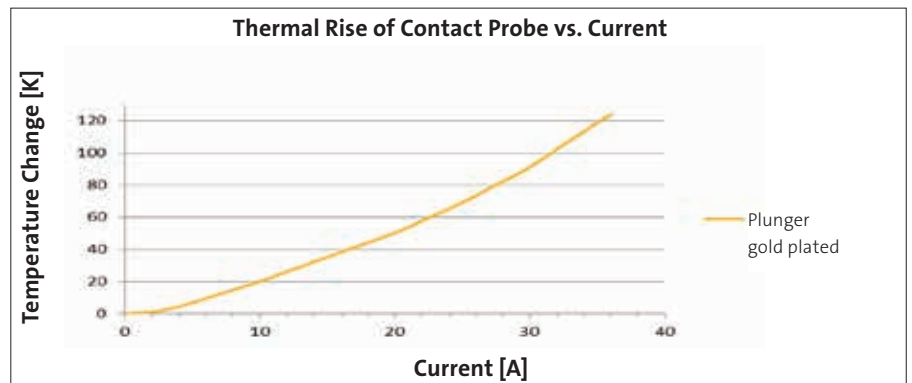
Receptacle with knurl	3,00 - 3,02
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Projection Height (mm)

H360RD with F360...C	2,6
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The high current construction ensures a low resistance despite the compact design of the probe. At larger contact surfaces several probes F360C can be mounted next to each other to realize higher currents (e.g. 1860C001).



Series	Tip-Ø	Spring Force (cN)
F360	11	B 130 G 080 C
Tip Style	Material	Plating

Material: B = BeCu
Tip-Ø: 130 = 1,30 mm (e.g.)
Plating: G = Gold plated
Version: C = High Current Version
Receptacle: Order code according drawing

Tip Style	Number	Material	Ø in mm	Plating	Version
	11	B	1,30	G	C

HIGH CURRENT PROBES

F723C

**High Current Probe 157 mil
Robust Version,
up to 25 A, Threaded**

Centers (mm/mil)	4,00 / 157
Current	25,0 (18,0*) A
R typ	<8 mOhm
Temperature	-40°C...+200°C (H)

Spring Force (cN ±20%)

Version	Preload	Nominal
C	40	80
C	70	150

Travel (mm)

Version	Nominal	Maximum
C	2,8	3,5
Thread (M)		2,0
Wrench Size		3,0
Pointing Accuracy		±0,08 mm

Materials and Plating

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

Accessories

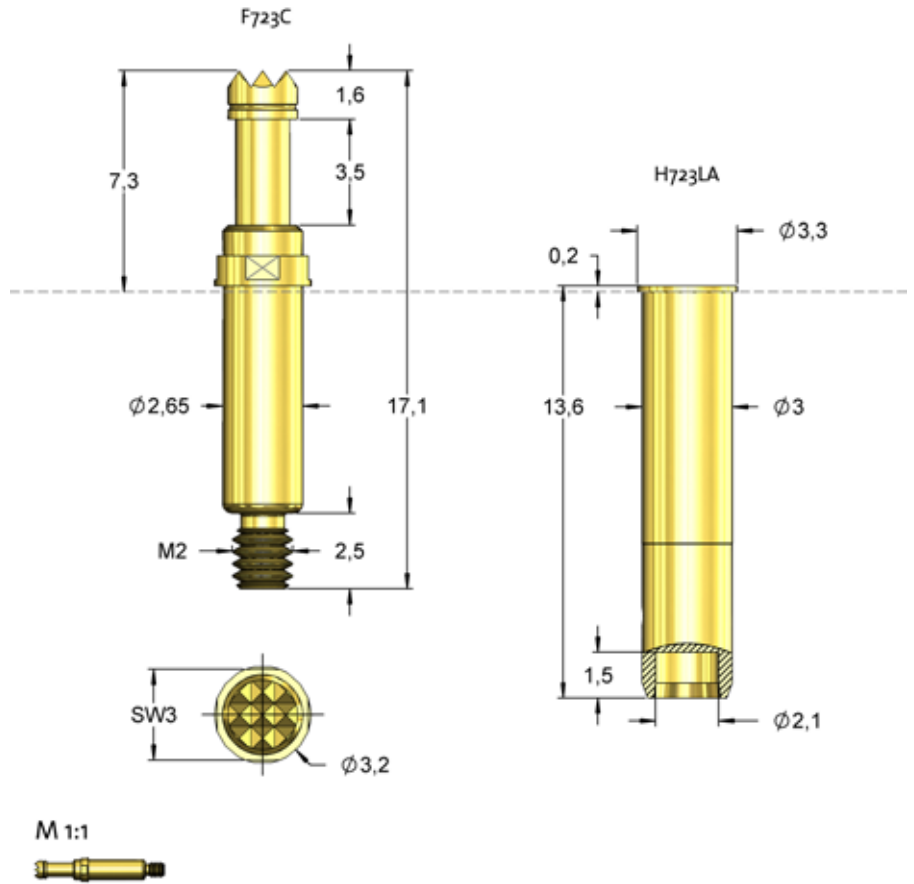
Insertion tool receptacle	FEWZ-713E0
Screw-in tool probe	FWZ733S1 (T)

Drill Size (mm)

H723LA	2,98 - 2,99
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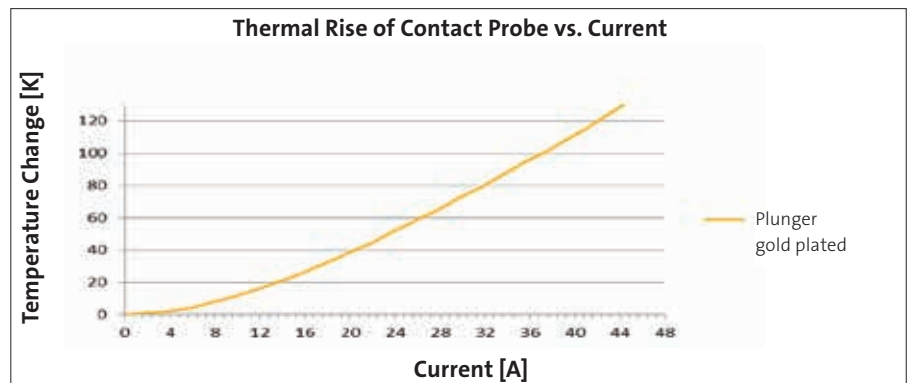
Projection Height (mm)

H723LA mit F723...C	7,3
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For high current applications with limited available space.

*The 80 cN version only allows 18,0 A because of the low contact force.



Series	Tip-Ø	Spring Force (cN)
F722	06	B
	200	G
	300	C
	Tip Style	Material
		Plating
		Version

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

Tip Style	Number	Material	Ø in mm	Plating	Version
	06	B	2,30	G	C
	12	B	2,30	G	C
	14	B	2,30	G	C

HIGH CURRENT PROBES

F733C

**High Current Probe 157 mil
Robust Version,
up to 25 A, Threaded**

Centers (mm/mil)	4,00 / 157
Current	25,0 A
R typ	<8 mOhm
Temperature	-40°C...+200°C (H)

Spring Force (cN ±20%)

Version	Preload	Nominal
C	60	150
C	60	300
C	170	600

Travel (mm)

Version	Nominal	Maximum
C	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
Receptacle	Brass, gold plated

Accessories

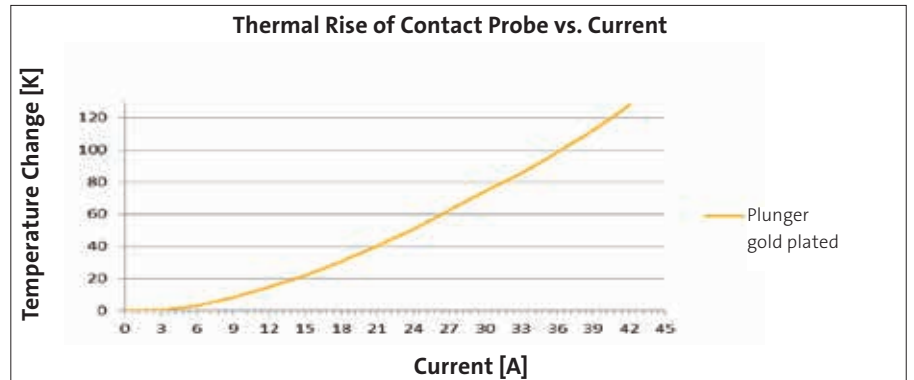
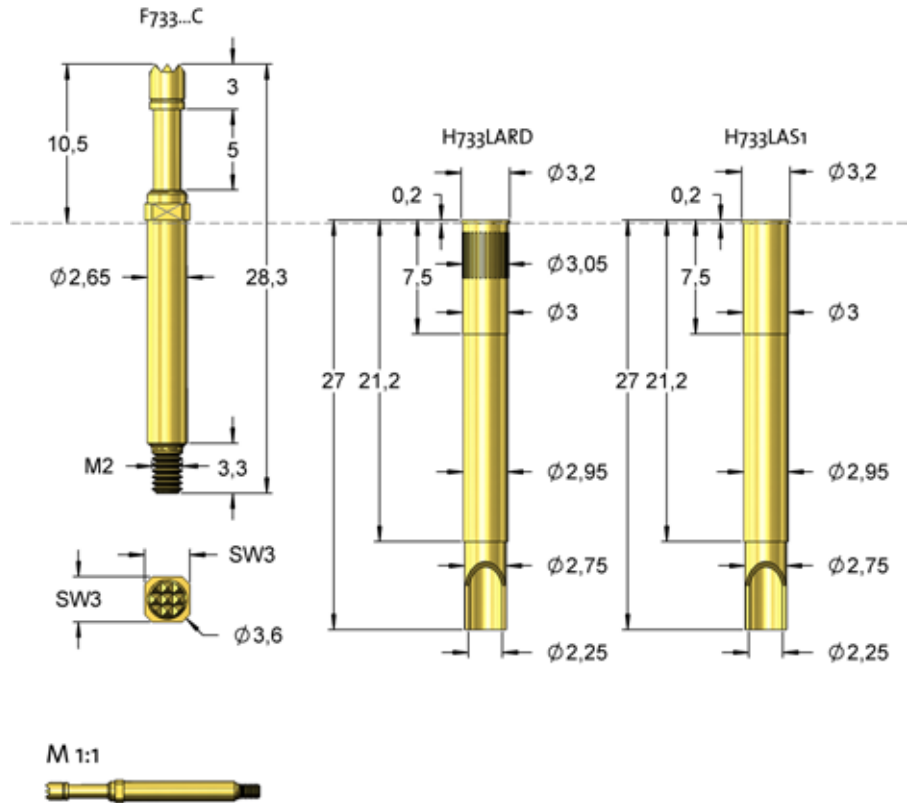
Insertion tool receptacle	FEWZ-774E0
Screw-in tool probe	FWZ733 (T)

Drill Size (mm)

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

Projection Height (mm)

H733.... with F733C	10,5
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Series	Tip-Ø	Spring Force (cN)
F733	06	230
	B	G
		300
		C
	Tip Style	Material
		Plating
		Version

Material: B = BeCu, A = AgNi (Silver alloy)
Tip-Ø: 230 = 2,30 mm (e.g.)
Plating: G = Gold plated, U = Unplated
Version: C = High Current Version
Receptacle: Order code according drawing

Tip Style	Number	Material	Ø in mm	Plating	Version
	05	A	3,00	U	C
	06	B	1,80	G	C
	06	B	2,30	G	C
	06	B	3,00	G	C
	06	B	4,00	G	C
	07	B	3,00	G	C
	11	B	1,40	G	C
	11	B	1,80	G	C
	12	A	3,00	U	C
	12	B	2,30	G	C
	14	B	2,30	G	C
	16	B	1,00	G	C
	18	B	2,30	G	C
	21	B	1,80	G	C

HIGH CURRENT PROBES

F762C

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

Centers (mm/mil)	4,00 / 157
Current	40,0 A
R typ	<5 mOhm
Temperature	-40°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

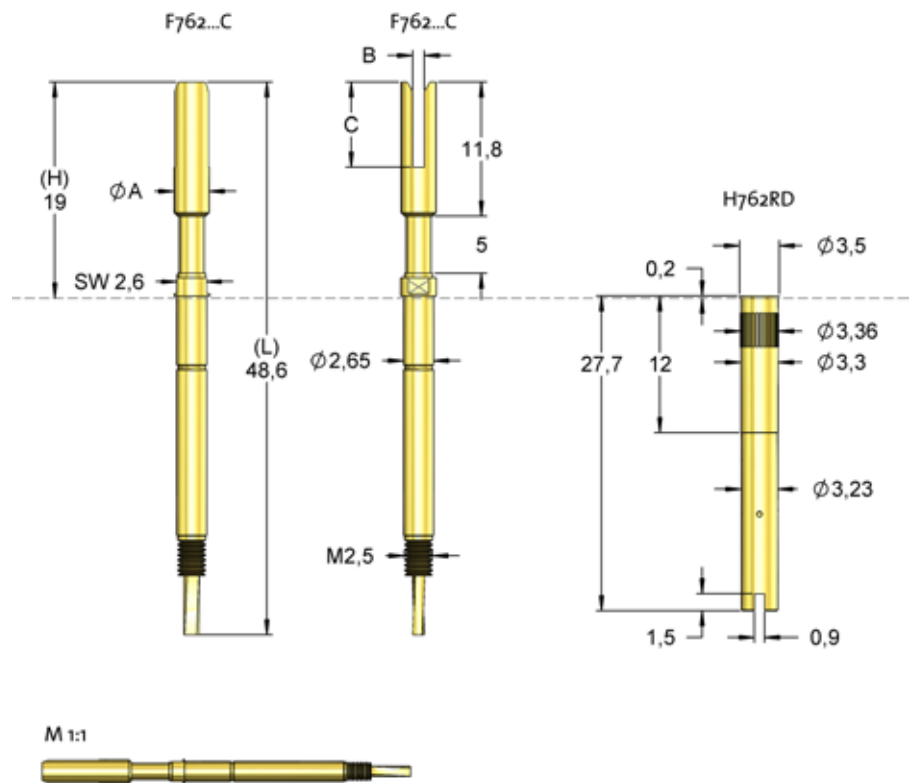
Alignment tool receptacle	FAWZ761
Screw-in tool probe	FWZ885S1 FWZ885T1

Drill Size (mm)

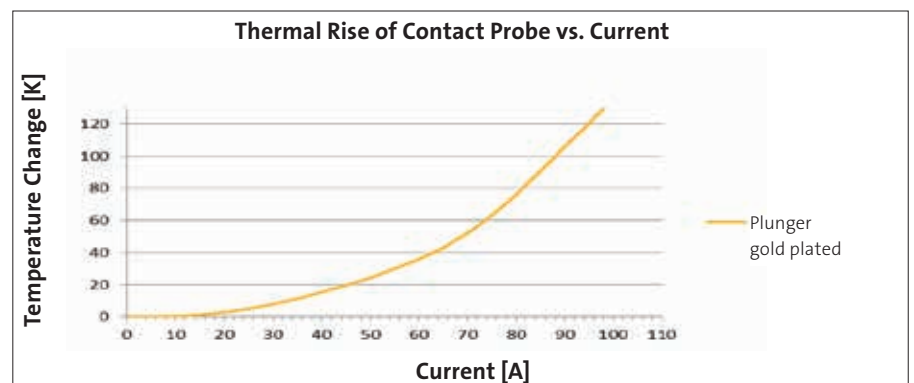
H762RD	3,30 - 3,35
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Projection Height (mm)

H723LA mit F723...C	7,3
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For connecting the probe a flexible wire with sufficient space for movement should be used.

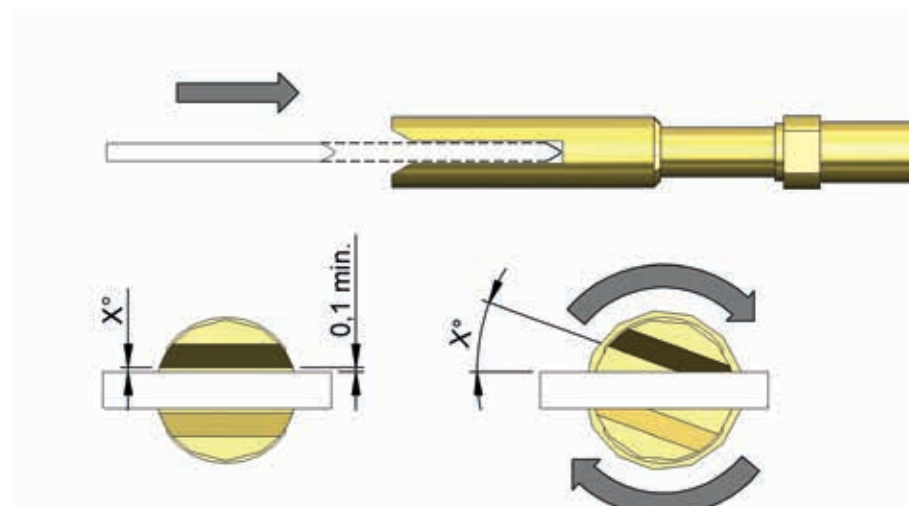


Functional principle

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.



HIGH CURRENT PROBES

F762C

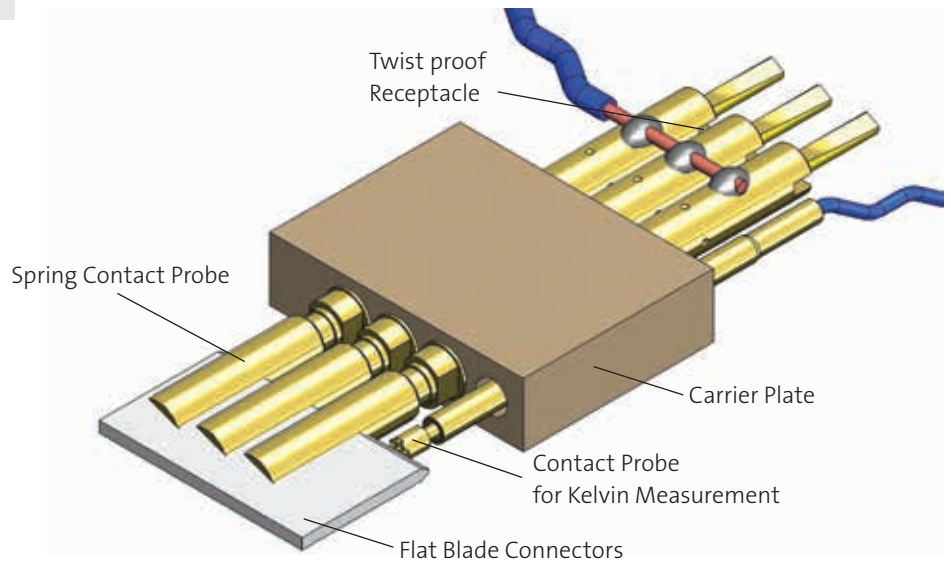
High Current Probe 157 mil for Contacting Flat Blade Connectors up to 40 A, Threaded

Centers (mm/mil)	4,00 / 157
Current	40,0 A
R typ	<5 mOhm
Temperature	-40°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).

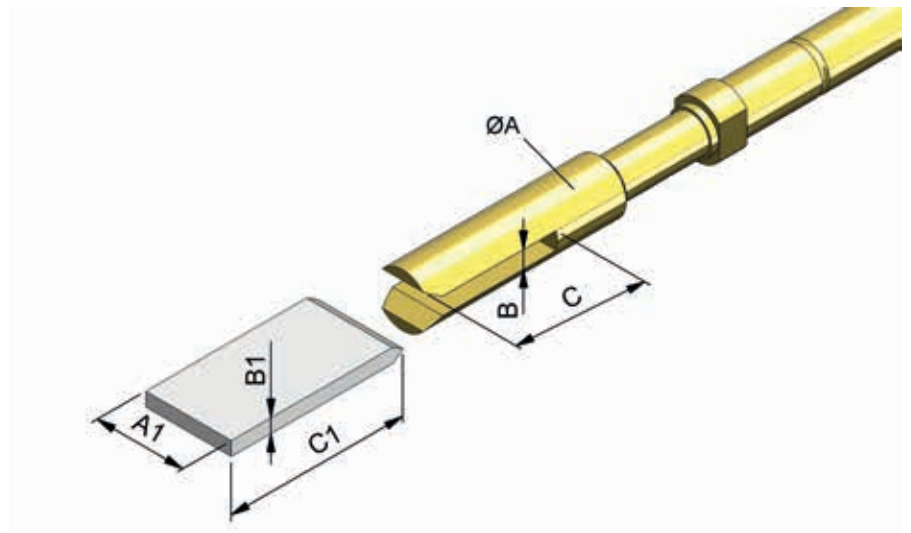
Further connection options for large cable cross-sections > e.g. integration in block with connection thread >M5



Series	Number	Spring Force (cN)
F762	89 B 0001 G 300 C	
Tip Style	Material	Plating
		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; FWZ885T1
min. 3,2	1,0 - 1,3	min. 8,0	F76289B0002G300C	3,1	1,5	7,5	FWZ885S1; FWZ885T1
min. 3,2	1,0 - 1,3	min. 4,5	F76289B0003G300C	3,1	1,5	4,0	FWZ885S1; FWZ885T1
min. 4,2	1,5 - 1,8	min. 8,0	F76289B0004G300C	4,0	2,0	7,5	FWZ760S1; FWZ760T1
min. 3,2	0,5 - 0,8	min. 3,0	F76289B0005G300C	3,1	1,0	2,5	FWZ885S1; FWZ885T1
min. 3,2	0,5 - 0,8	min. 6,7	F76289B0006G300C	3,1	1,0	6,2	FWZ885S1; FWZ885T1
min. 3,2	0,3 - 0,6	min. 6,2	F76289B0007G300C	2,2	0,8	5,7	FWZ885S1; FWZ885T1

HIGH CURRENT PROBES

F725C

**High Current Probe 197 mil
Robust Version,
up to 50 A, Threaded**

Centers (mm/mil)	5,00 / 197
Current	50,0 A
R typ	<5 mOhm
Temperature	-40°C...+200°C (H)

Spring Force (cN ±20%)

Version	Preload	Nominal
C	100	250

Travel (mm)

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

Materials and Plating

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

Accessories

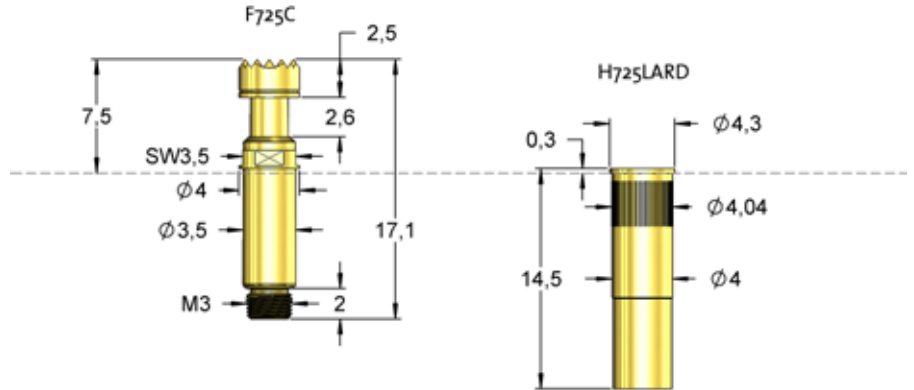
Insertion tool receptacle	FEWZ-735E0
Screw-in tool probe	FWZ735 (T)

Drill Size (mm)

H725...	3,98 - 3,99
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Projection Height (mm)

H725... with F725C	7,5
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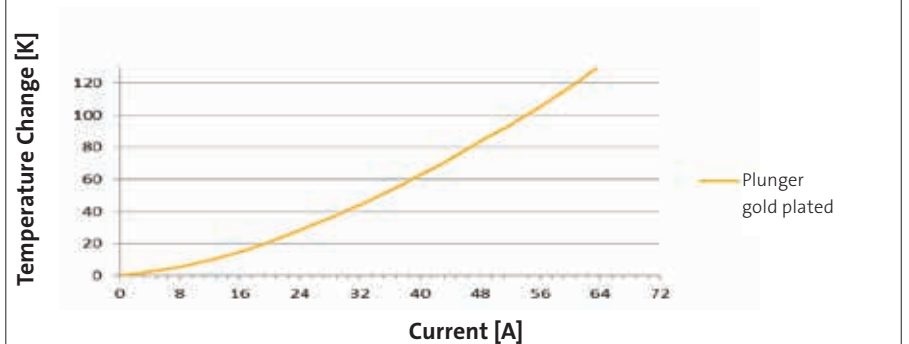


M 1:1



For high current applications with limited space.

Thermal Rise of Contact Probe vs. Current



Series	Tip-Ø	Spring Force (cN)
F725 06 B 400 G 250 C		
Tip Style	Material	Plating
Version		

Material: B = BeCu
Tip-Ø: 400 = 4,00 mm (e.g.)
Plating: G = Gold plated
Version: C = High Current Version
Receptacle: Order code according drawing

Tip Style	Number	Material	Ø in mm	Plating	Version
	06	B	G	4,00	C
	12	B	G	4,00	C
	14	B	G	4,00	C

HIGH CURRENT PROBES

F735C

**High Current Probe 197 mil
Robust Version,
up to 50 A, Threaded**

Centers (mm/mil)	5,00 / 197
Current	50,0 A
R typ	<5 mOhm
Temperature	-40°C...+200°C (H)

Spring Force (cN ±20%)

Version	Preload	Nominal
C	150	300
C	150	500

Travel (mm)

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

Materials and Plating

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

Accessories

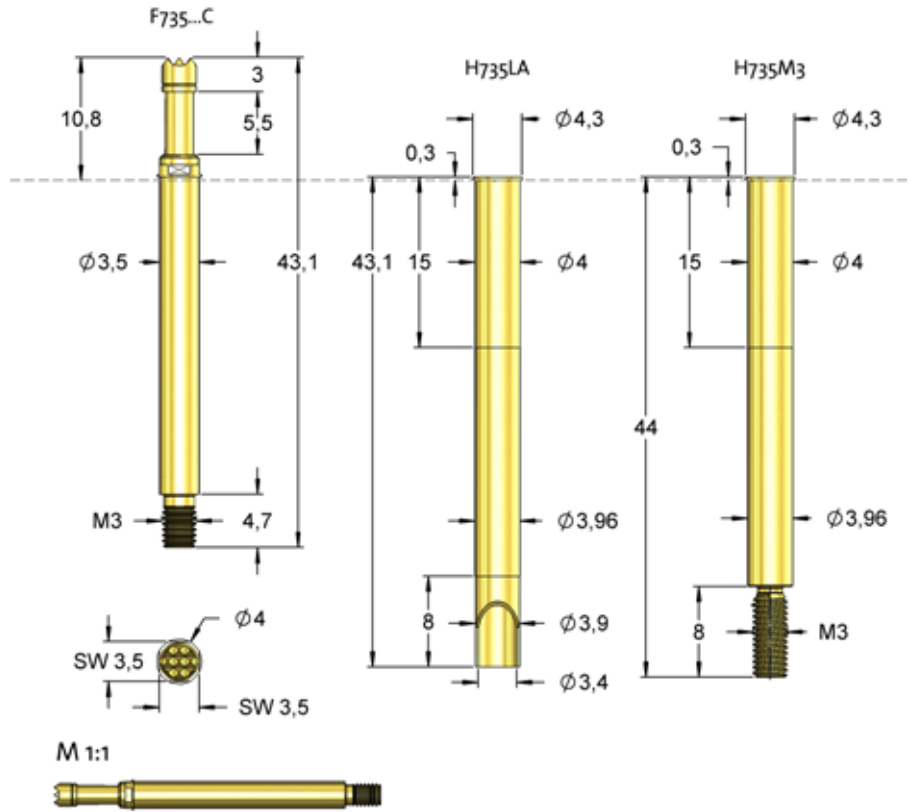
Insertion tool receptacle	FEWZ-735E0
Screw-in tool probe	FWZ735 (T)

Drill Size (mm)

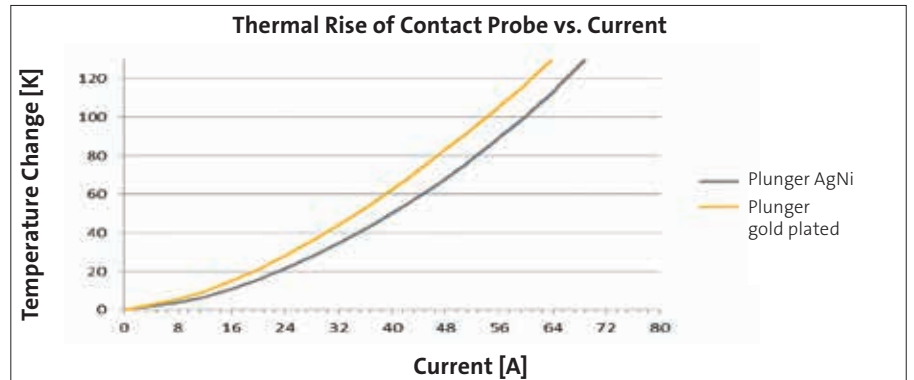
H735...	3,98 - 3,99
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Projection Height (mm)

H735... with F735C	10,8
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Robust designed high current probe. The M3 thread of H735M3 can be mounted with a counternut to a cable eye.



Series	Tip-Ø	Spring Force (cN)
F735	06	400
	B	G
		300
		C

Material: B = BeCu, A = AgNi (Silver alloy)
Tip-Ø: 400 = 4,00 mm (e.g.)
Plating: G = Gold plated, U = Unplated
Version: C = High Current Version
Receptacle: Order code according drawing

Tip Style	Number	Material	Ø in mm	Plating	Version
	06	B	3,00	G	C
	06	B	4,00	G	C
	07	B	3,00	G	C
	12	A	4,00	U	C
	17	B	4,00	G	C
	55	B	4,00	G	C

HIGH CURRENT PROBES

F348C

**High Current Probe 300 mil
Robust Version,
up to 100 A, Threaded**

Centers (mm/mil)	7,60 / 300
Current	100,0 A
R typ	<4 mOhm
Temperature	-40°C...+200°C (H)

Spring Force (cN ±20%)

Version	Preload	Nominal
C	500	1400

Travel (mm)

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

Materials and Plating

Plunger	BeCu, gold plated
Barrel	Brass, gold plated
Spring	Stainless steel, gold plated
Receptacle	Brass, silver plated

Accessories

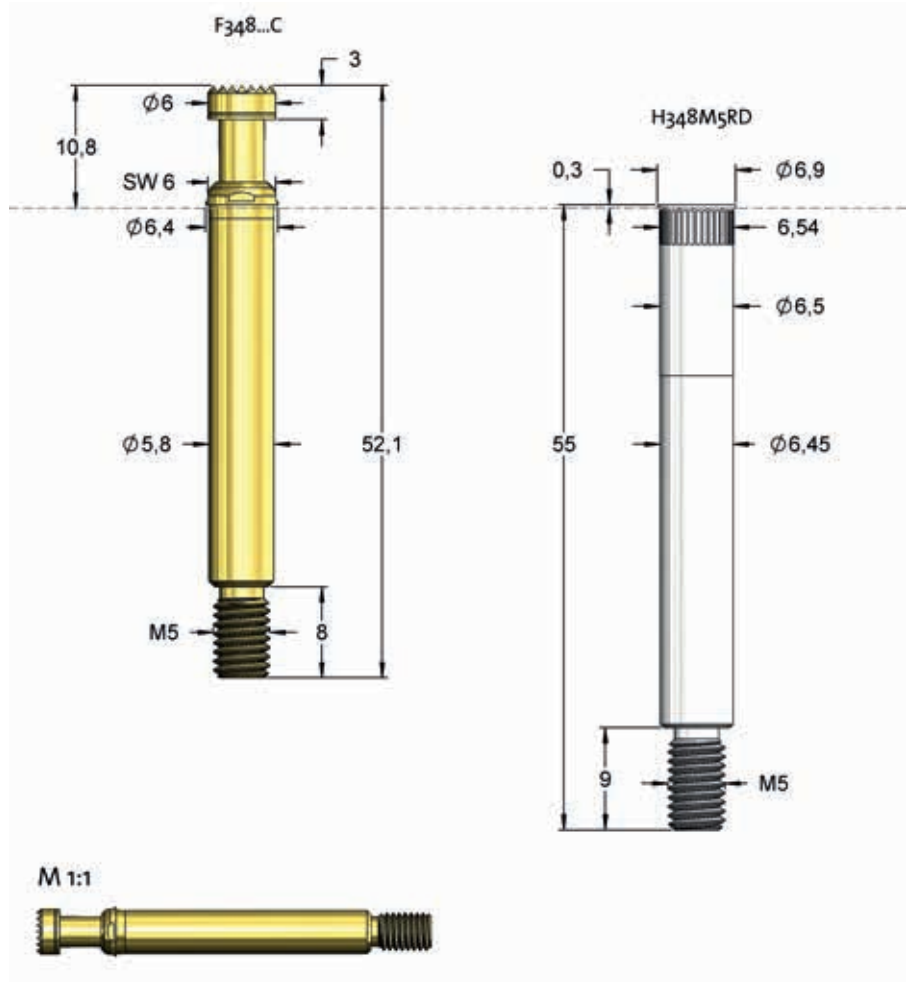
Insertion tool receptacle	FEWZ-348E0
Screw-in tool probe	FWZ348 (T)

Drill Size (mm)

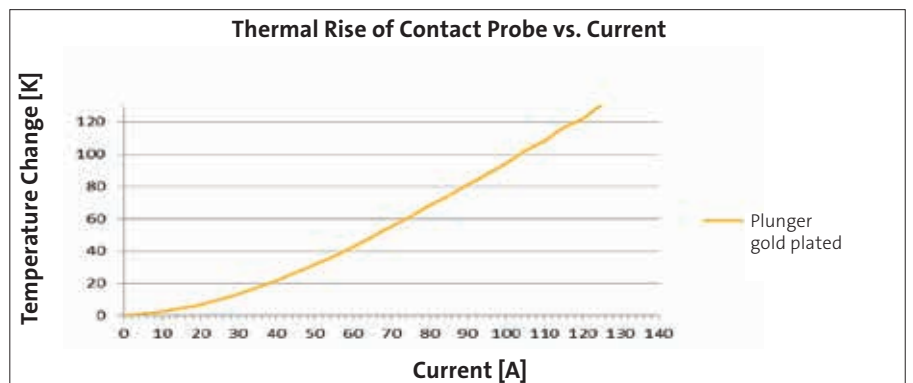
H348M5RD	6,51 - 6,53
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Projection Height (mm)

H348... with F348C	10,8
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For testing smaller power components in centers of 300 mil. The M5 thread of H348M5RD can be mounted with a counternut to a cable eye. A coaxial version of this probe is also available (see F349C).



Series	Tip-Ø	Spring Force (cN)
F348 06 B 600 G 14 C		
Tip Style	Material	Plating

Material: B = BeCu
Tip-Ø: 600 = 6,00 mm (e.g.)
Plating: G = Gold plated
Version: C = High Current Version
Receptacle: Order code according drawing

Tip Style	Number	Material	Ø in mm	Plating	Version
	06	B	6,00	G	C

HIGH CURRENT PROBES

1860C005

**High Current Probe 433 mil
Robust Version,
up to 50 A, Threaded**

Centers (mm/mil)	11,0 / 433
Current	50,0 A
R typ	<6 mOhm
Temperature	-40°C...+200°C (H)

Spring Force (cN ±20%)

Version	Preload	Nominal
C	200	530

Travel (mm)

Version	Nominal	Maximum
C	5,0	7,0
Thread (M)	8x1 / 3,0	
Wrench Size	9,0 / 5,5	
Pointing Accuracy	±0,08 mm	

Materials and Plating

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

Accessories

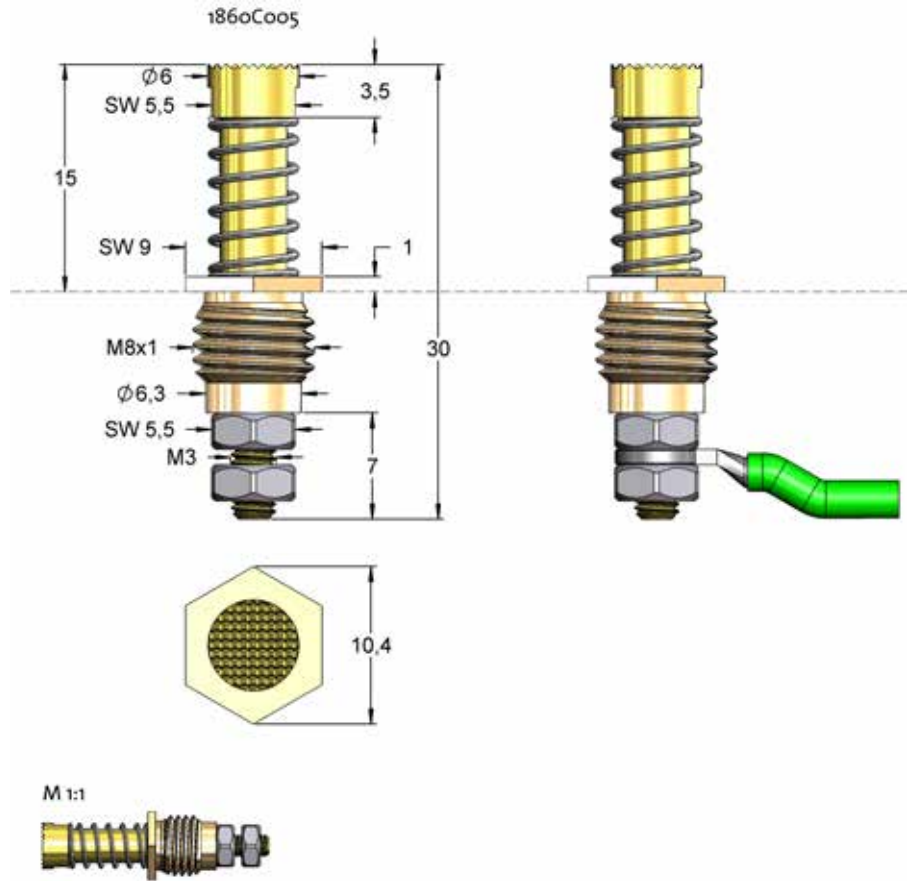
Insertion tool receptacle	FEWZ-348E0
Screw-in tool probe	FWZ348 (T)

Drill Size (mm)

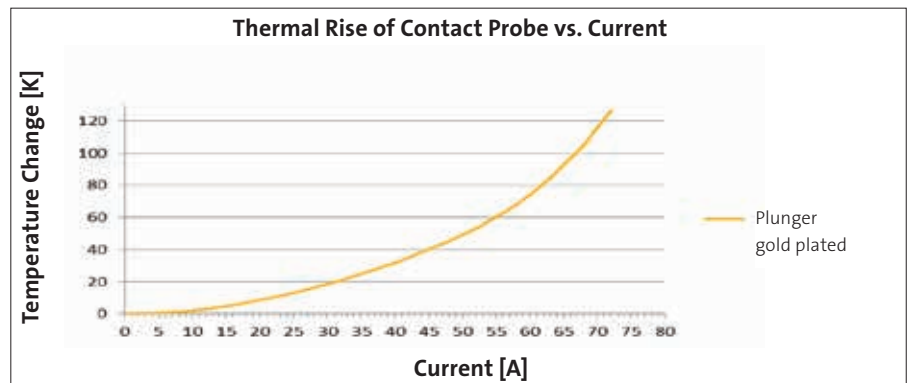
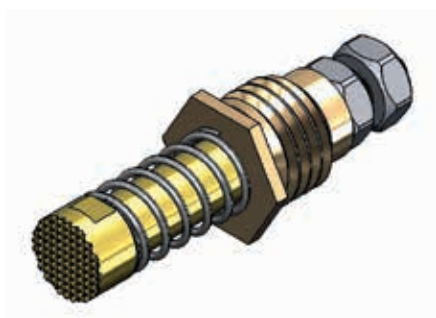
Barrel with knurl	10,95 - 10,99
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Projection Height (mm)

1860C005	15,0
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Robust high current probe with continuous plunger. The M3 thread can be mounted with a counter nut to a cable eye.



Order Code	Tip Style	Number	Material	Ø in mm	Plating	Version	Screw-in Tool
1860C005		06	B	6,00	G	C	-

HIGH CURRENT PROBES



HC09

High current probe up to 60 A for Ø4mm round pins with finger protection

Centers (mm/mil)	8,0 / 314
Current	60 A
R typ	<2 mOhm
Temperature	-40°C...+200°C (H)

Spring Force (cN ±20%)

Version	Preload	Nominal
Standard	1400	2400

Travel (mm)

Version	Nominal	Maximum
Standard	4,0	5,0
Thread (M)		10x1
Wrench Size		10
Pointing Accuracy		±0,10 mm

Materials and Plating

Plunger head	Brass, gold plated
Plunger	Brass, gold plated
Barrel	Brass, unplated
Spring	Stainless steel, unplated

Accessories

Insertion tool probe	open-end wrench SW 6,0
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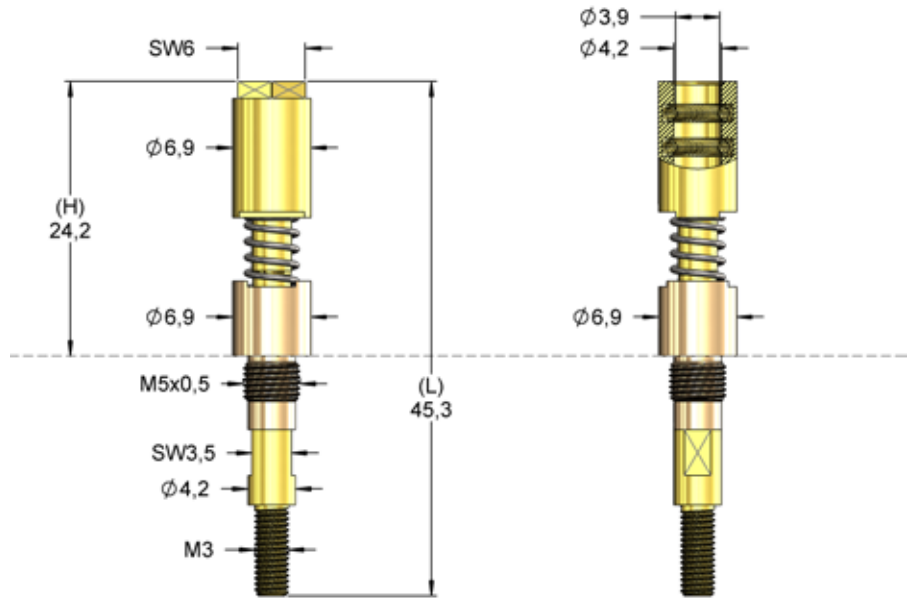
Drill Size (mm)

HC09	M5x0,5
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Projection Height (mm)

HC09	24,2
------	------

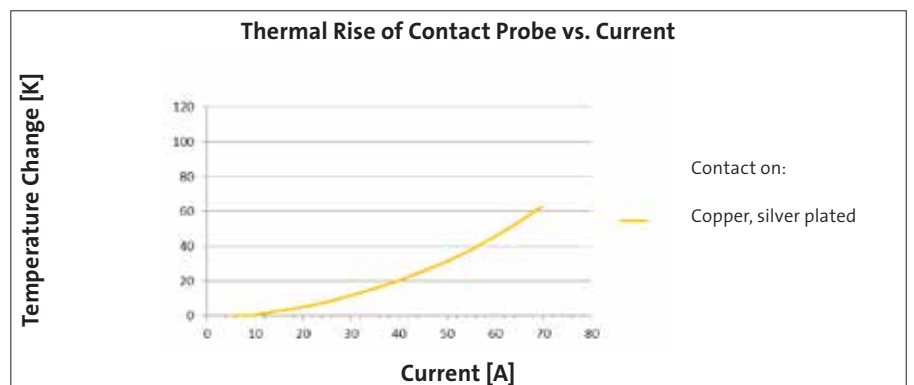
HC09A52B100G08040



M1:1



The challenge in the field of e-mobility is a scratch-free contacting of a round pin with finger protection on the end face. The HC09 is the perfect solution for use with pin Ø4.0 mm.
Recommended cable cross-section: 16 mm².



Order Code	Tip Style	Number	Material	Ø in mm	Plating	Mounting with
HC09A52B100G08040		52	M	6,90	G	M3

HIGH CURRENT PROBES



HC10

High current probe up to 100 A for Ø6mm round pins with finger protection

Centers (mm/mil)	12,0 / 472
Current	100 A
R typ	<1 mOhm
Temperature	-40°C...+200°C (H)

Spring Force (cN ±20%)

Version	Preload	Nominal
Standard	1400	2400

Travel (mm)

Version	Nominal	Maximum
Standard	4,0	5,0
Thread (M)	M10x1	
Wrench Size	10	
Pointing Accuracy	±0,10 mm	

Materials and Plating

Plunger head	BeCu, gold plated
Plunger	Brass, silver plated
Barrel	Brass, unplated
Spring	Stainless steel, unplated

Accessories

Insertion tool probe	FWZHC10(T)
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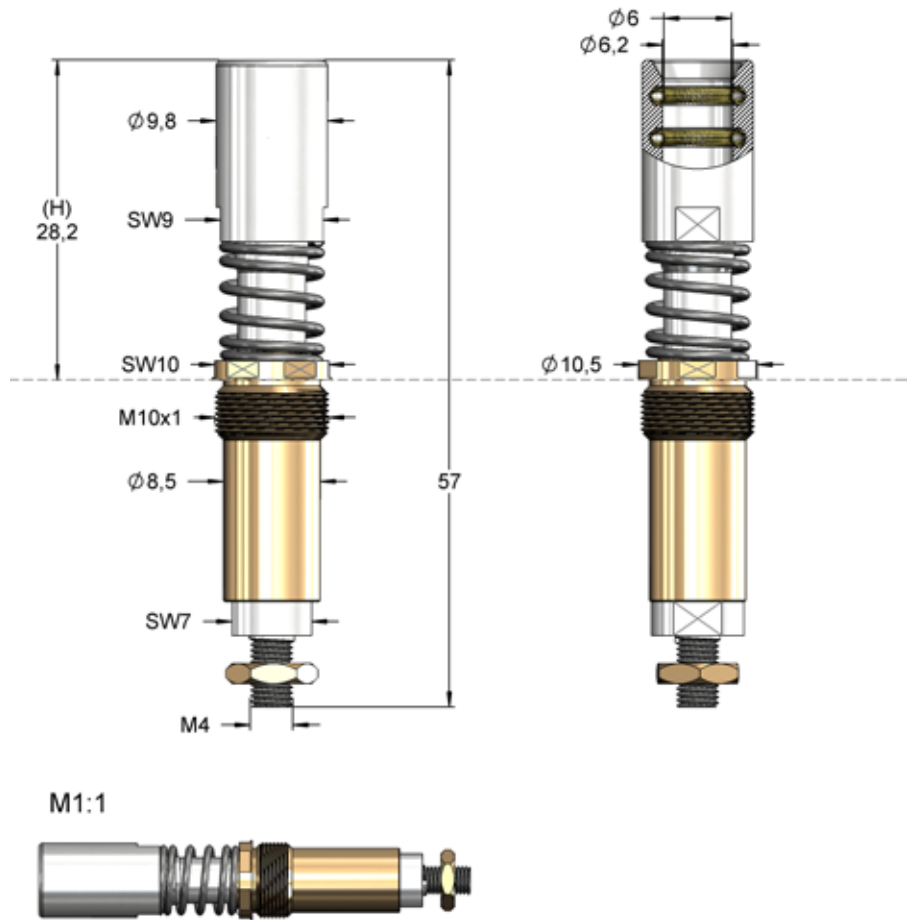
Drill Size (mm)

HC10	M10x1
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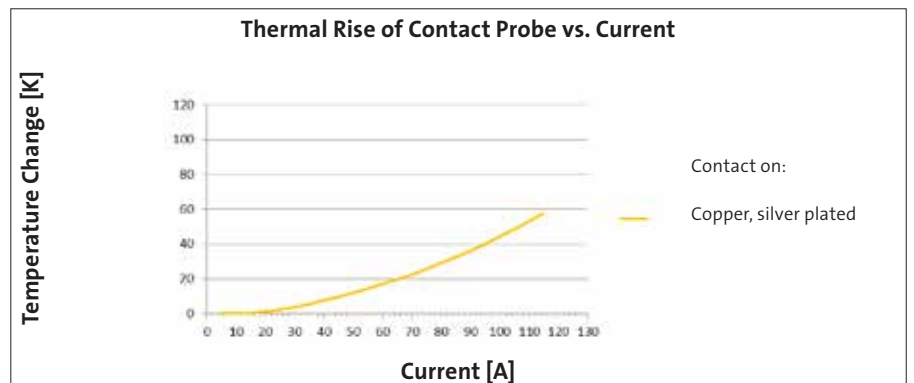
Projection Height (mm)

HC10	28,2
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HC10A52B240G13060



The challenge in the field of e-mobility is a scratch-free contacting of a round pin with finger protection on the end face. The HC10 is the perfect solution for use with pin Ø6.0 mm.
Recommended cable cross-section: 16 mm².



Order Code	Tip Style	Number	Material	Ø in mm	Plating	Mounting with
HC10A52B240G13060		52	B	9,80	A	M4

HIGH CURRENT PROBES

1860C001

High Current Test Head
up to 50 A for
Contacting Uneven Surfaces

Centers (mm/mil)	12,0 / 472
Current	50,0 A
R typ	<4 mOhm
Temperature	-40°C...+200°C (H)

Spring Force (cN ±20%)

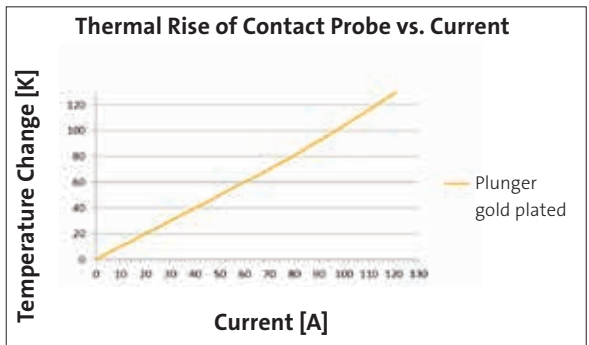
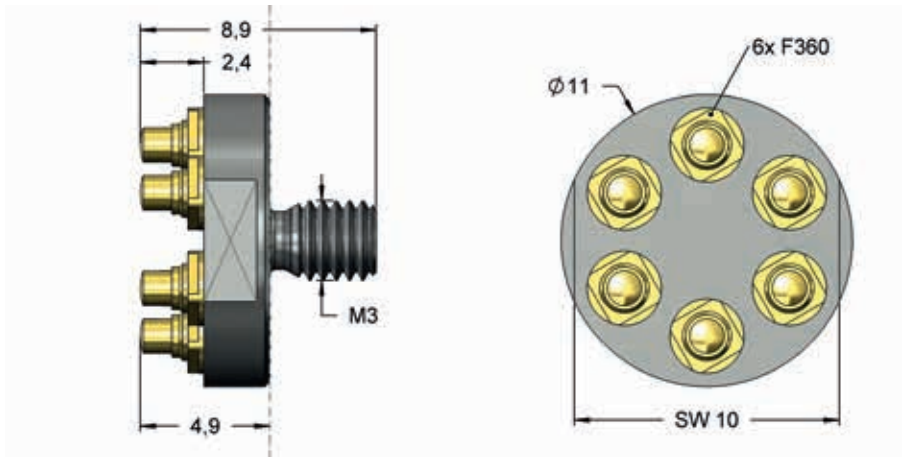
Version	Preload	Nominal
C	300	480

Travel (mm)

Version	Nominal	Maximum
C	1,0	1,2
Thread (M)		3,0
Wrench Size		10,0

Materials and Plating

Plunger	BeCu, gold plated
Barrel	Copper, gold plated
Spring	Stainless steel, unplated



1860C006

High Current Test Head
up to 50 A for
Contacting Uneven Surfaces

Centers (mm/mil)	12,0 / 472
Current	100,0 A
R typ	<2 mOhm
Temperature	-40°C...+200°C (H)

Spring Force (cN ±20%)

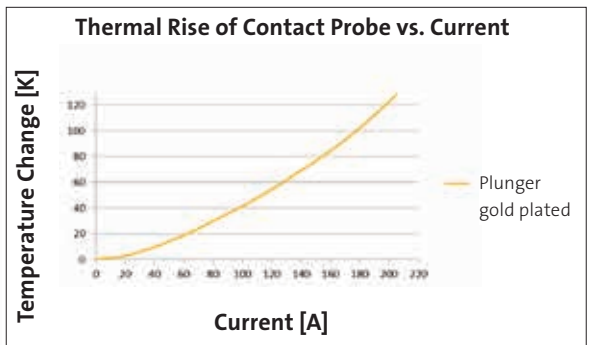
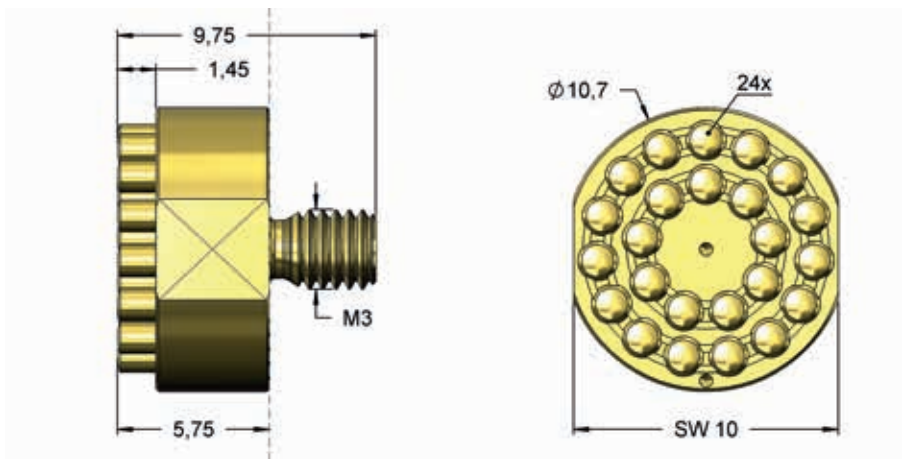
Version	Preload	Nominal
C	960	1920

Travel (mm)

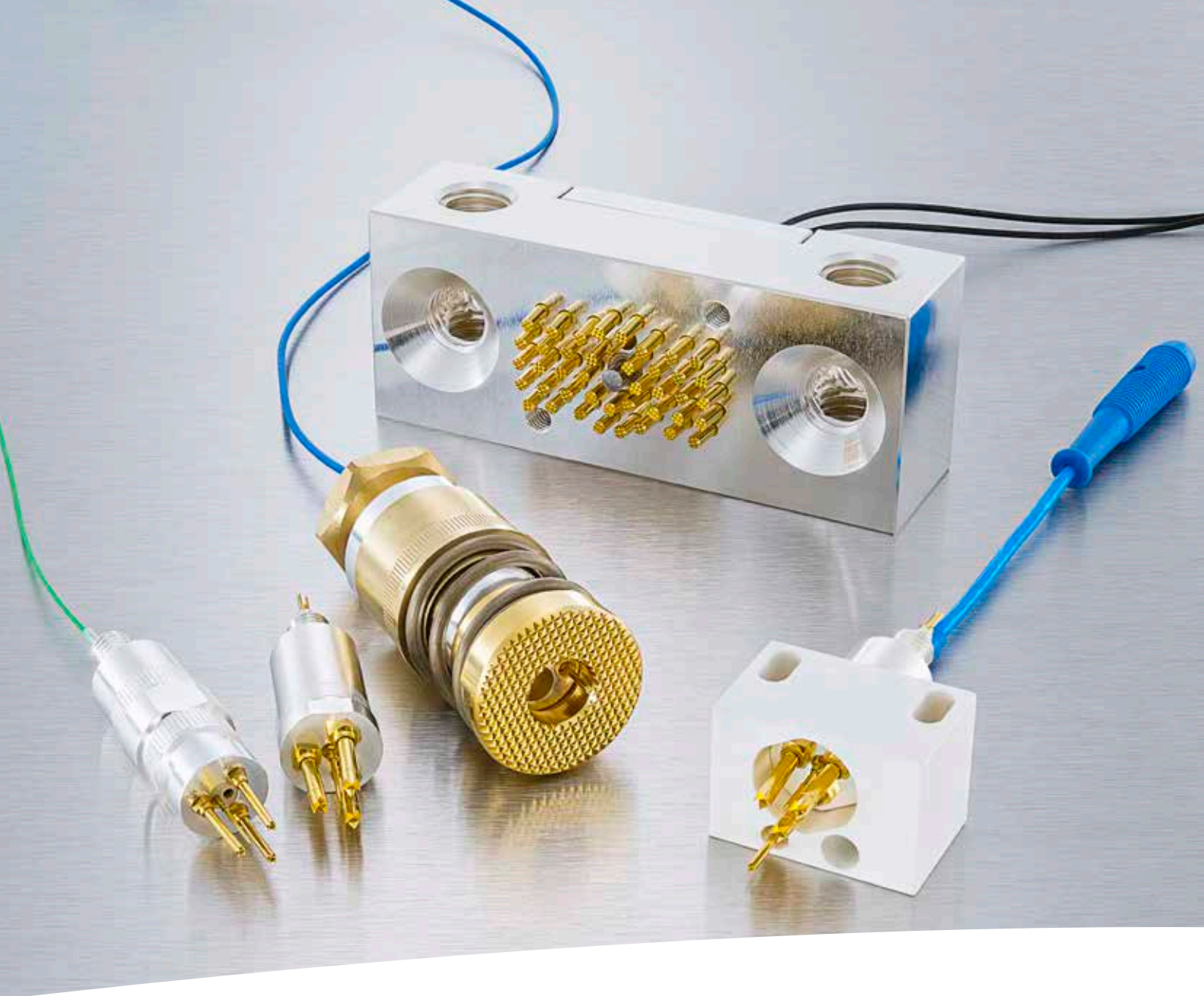
Version	Nominal	Maximum
C	0,9	1,2
Thread (M)		3,0
Wrench Size		10,0

Materials and Plating

Plunger	Brass, gold plated
Barrel	Copper, gold plated
Spring	Stainless steel, unplated



These contact blocks are screwed directly into conductive material. It is essential that not only the thread, but also the whole surface of the block has an electrical contact. The electrical connection can be realized also directly with the conductive material. The maximum current depends on the allowed temperature rise.



Coaxial solutions for High Current Applications

Coaxially designed high current probes are used for the measurement of very low resistances according to the Kelvin-method (4-wire measurement). We also offer application-specific blocks as a solution. 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). One important application field of these probes is charging and discharging of batteries and accumulator cells in large volume production.

HIGH CURRENT PROBES



For production and testing of batteries and battery cells

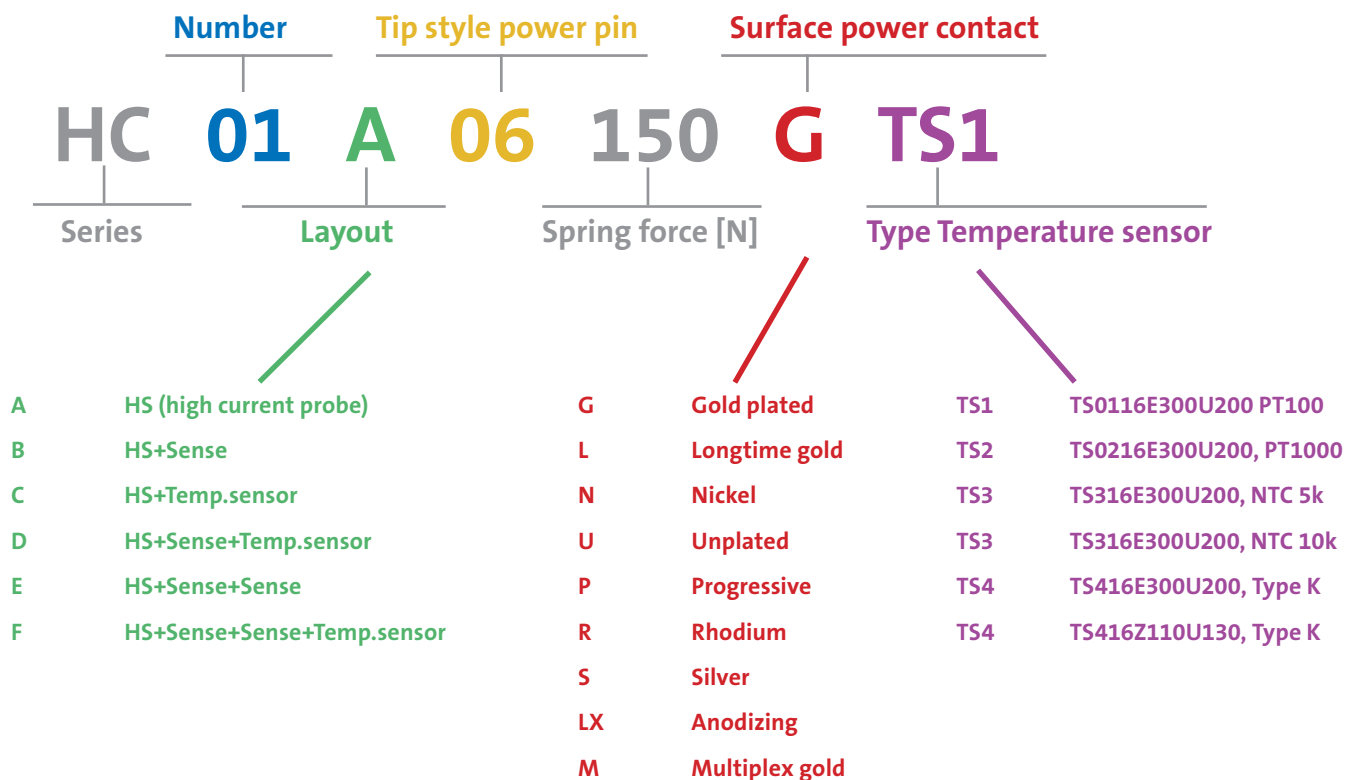
- for formation and testing of Li-Ion cells
- for quality control of batteries and energy storages
- for battery-charging and discharging processes

With reliable contact elements and fixtures for manufacturing of lithium ion cells and for battery production FEINMETALL has established as a strong partner in this industry segment.

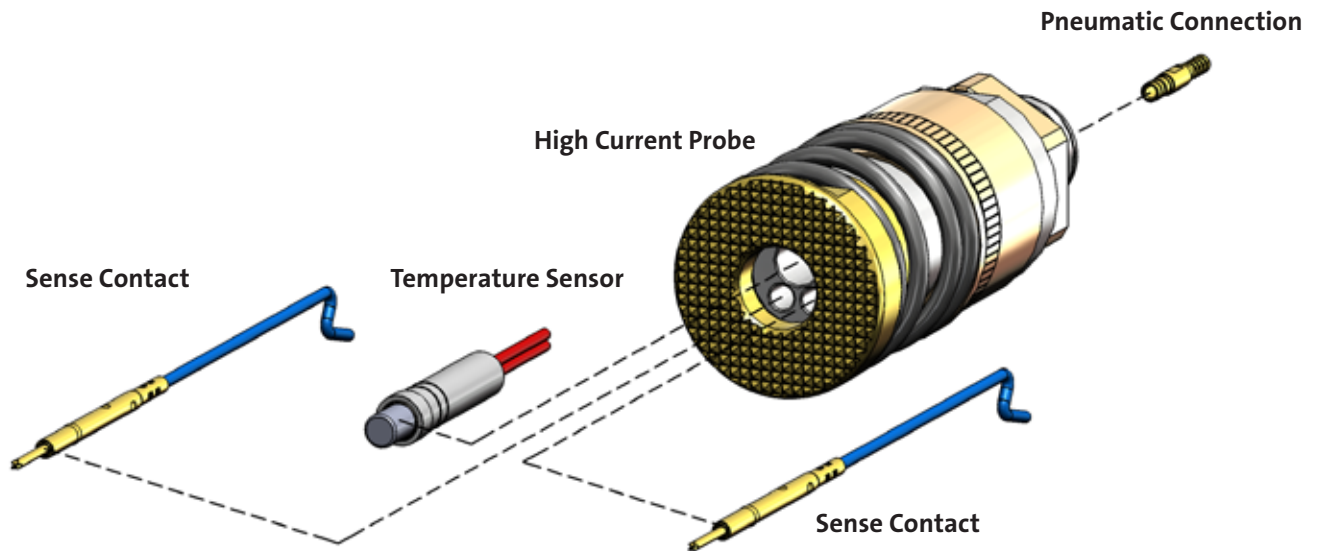
Many years of cooperation with customers and partners result in the development and realization of reliable and practical products as well as in a high level of expertise in secure adaption and contacting of cells and batteries.



Detail picture of a contacting device for large cylindrical lithium cells



HIGH CURRENT PROBES



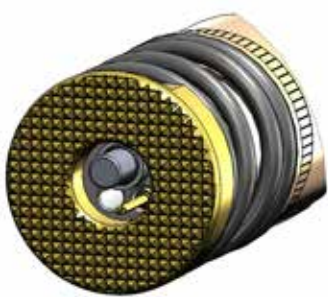
Modular High Current Probes

The new high-current probes can be designed individually according to the application and test setup, e.g.:

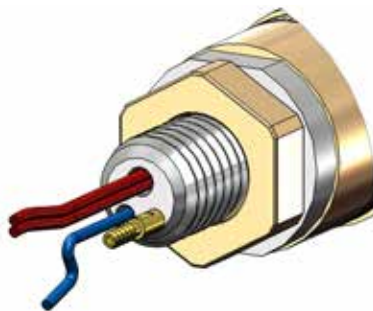
- Basic assembly high current probe
- Basic module high current probe + pneumatic connection
- Coaxial probe + sense contact
- Coaxial probe + sense contact + pneumatic connection
- Coaxial probe + sense contact + temperature sensor
- Coaxial probe + sense contact + temperature sensor + pneumatic connection
- Coaxial probe + sense contact + temperature sensor + second sense contact (pneumatic connection not required)

If a temperature sensor is required, the PT100, PT1000, TypeK and the NTC sensor are usually available for selection. The third hole can be used either for a second sense contact or for active cooling with compressed air. See figure below.

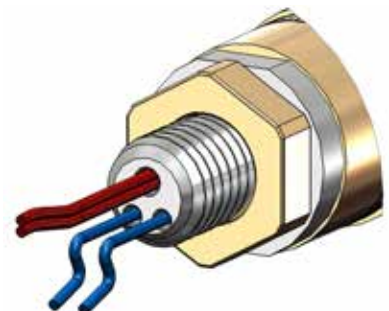
Examples:



High current probe front side
+ Sense contact
+ Temperature Sensor
+ Cooling channel



High current probe back side
+ Sense contact
+ Temperature Sensor
+ Pneumatic connection



High current probe back side
+ Sense contact
+ Temperature Sensor
+ Second sense contact

HIGH CURRENT PROBES

HC01



High current block up to 600 A for contacting prismatic or pouch cells

Centers (mm/mil)	35,0 / 1378
Current (Power)	600 A
Current (Sense)	15,0 A
R typ (circular/internal)	<0,5 mOhm
Temperature	-40°C...+200°C (H)

Spring Force (cN ±20%)

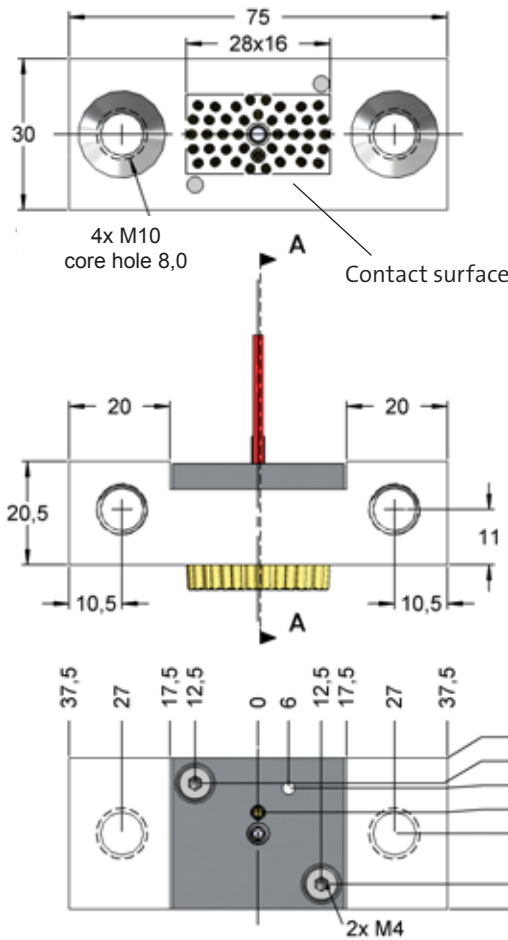
Version	Preload	Nominal
Sensor	70	200
Sense	50	300
Power	70	245

Travel (mm)

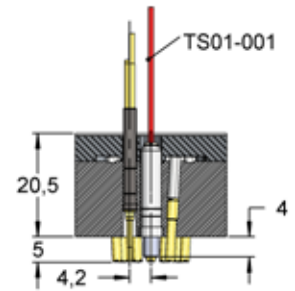
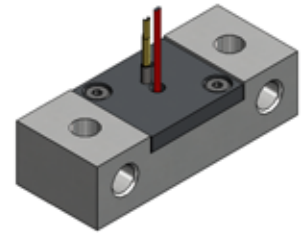
Version	Nominal	Maximum
Sensor	3,0	4,0
Sense	4,4	5,5
Power	4,0	5,0
Gewinde (M)		10,0

Materials and Plating

Plunger	BeCu, gold plated
Spring	Stainless steel, gold plated
Holder	Aluminum, silver plated



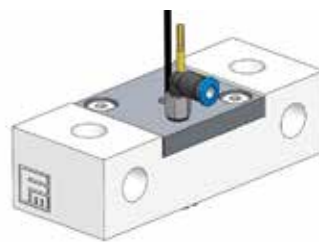
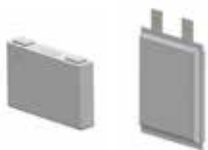
HC01D06245GTS1



Section A-A

The high current block can be fixed with an M8 and lock nut or screwed directly to M10 in the thread. The additional M5 hole can always be used for cooling, regardless of the design. A pneumatic connection piece 2102959 is provided for this purpose (not included in the scope of delivery).
Connection recommendation Cable diameter 120 mm² + 50 mm².

Suitable for:



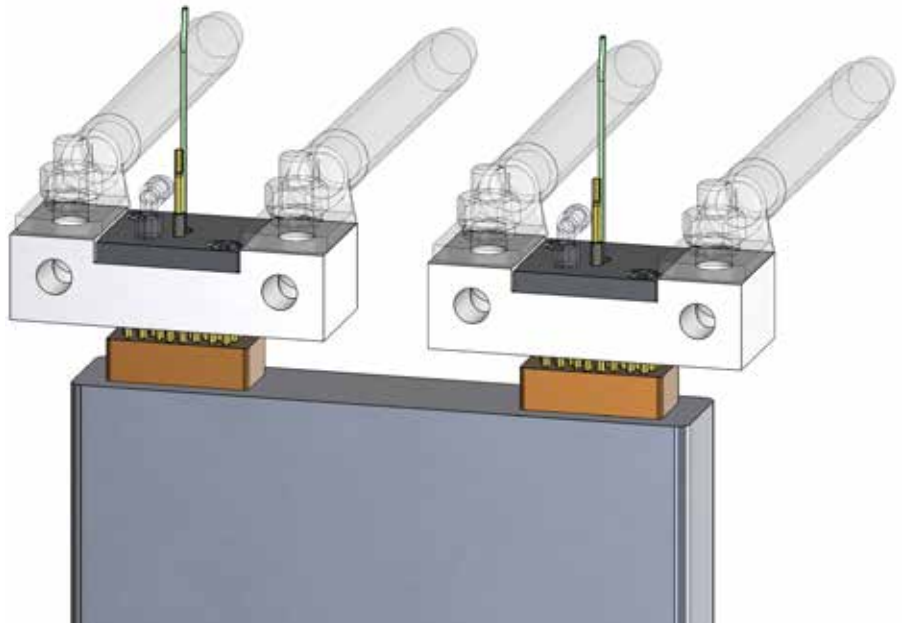
Order Code	Tip Style	Cooling	Sense	Temperature Sensor	Mounting with
HC01A06245G		x	-	-	M8 / M10
HC01B06245G		x	F732 KF07	-	M8 / M10
HC01C06245GTS1		x	-	PT100	M8 / M10
HC01C06245GTS2		x	-	PT1000	M8 / M10
HC01C06245GTS3		x	-	NTC	M8 / M10
HC01C06245GTS4		x	-	Typ-K	M8 / M10
HC01D06245GTS1		x	F732 KF07	PT100	M8 / M10
HC01D06245GTS2		x	F732 KF07	PT1000	M8 / M10
HC01D06245GTS3		x	F732 KF07	NTC	M8 / M10
HC01D06245GTS4		x	F732 KF07	Typ-K	M8 / M10

HIGH CURRENT PROBES

HC01

High current block up to 600 A
for contacting prismatic
or pouch cells

Centers (mm/mil)	35,0 / 1378
Current (Power)	600 A
Current (Sense)	15,0 A
R typ (circular/internal)	<0,5 mOhm
Temperature	-40°C...+200°C (H)

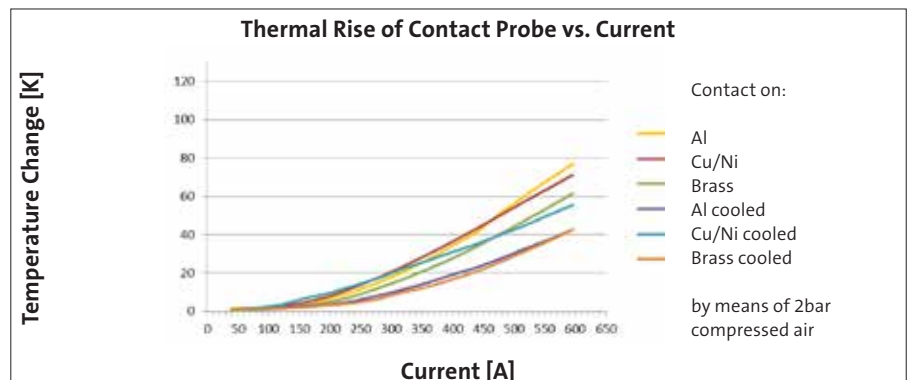


Function:

Typical application of the contact block is the contacting of prismatic or pouch cells, but also various other high current applications.

Advantages:

- Continuous current carrying capacity up to 600 A
- Individually spring-loaded plungers with proven scratch contact for current path for optimum contact on typical cell arresters of LIB cells
- Equipped with spring-loaded sense contact probe for voltage path of four-pole measurement
- Additional sense contact probe can be retrofitted via contact insert with encoder interface
- Integrated spring-loaded temperature sensor (4 types) directly at the contact point
- Low heating of less than 50K at full load
- Connection for additional cooling possibility of contact point integrated
- Universal design of electrical connections and mechanical mounting (M8/M10 vertical and horizontal)



HIGH CURRENT PROBES

THE PRINCIPLE OF SCRATCH CONTACTING

Function:

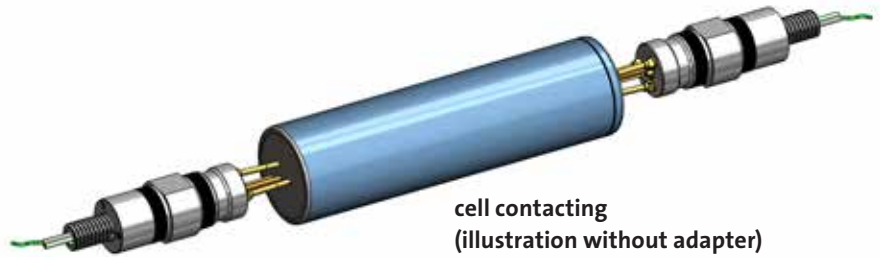
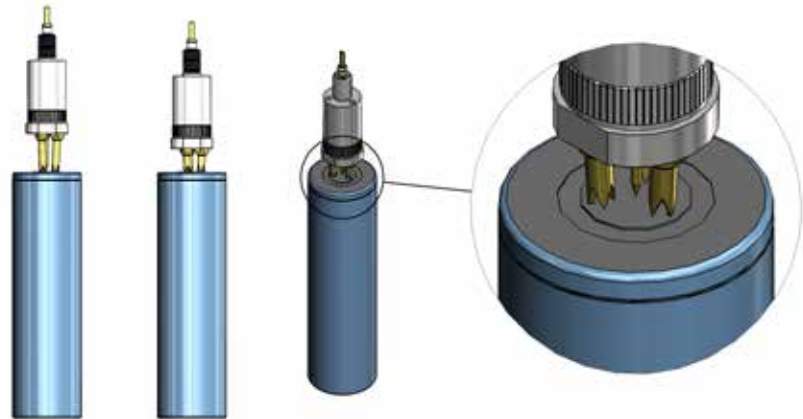
A typical application of the coaxial probe is the contacting of cylindrical or Pouch cells in battery production and test applications, but also various other high current applications.

The scratch contact is ideally suited for reliable contacting under difficult conditions. It not only contacts axially, but also generates a lateral movement due to the axially symmetrical inclination of the contact probes. This scratch movement on the surface significantly increases the contact aggressiveness compared to standard high-current probes.

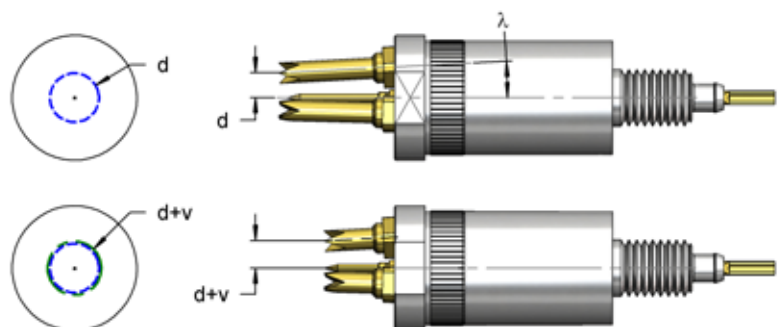


Advantages:

- Continuous current carrying capacity up to 100 A on cell pole < 6 mm
- Individually spring-loaded plungers with established scratch contact for current path for optimum contact on the typical cell conductors of LIB cells, also for uneven, passivated or contaminated contact surfaces
- Equipped with spring-loaded sense pin for the voltage path of the four-pole measuring and temperature sensor (TypeK)
- Low heating of less than 50K at full load
- Configurable variants from the modular system available
- Electrical connections via M5 thread
- Mounting by pressing into Ø10 mounting hole in contact direction universally possible (can also be laterally fixed)
- More effective penetration of passivation layers or contaminants.
- Deeper penetration into the surface.
- Simultaneous compensation of unevenness.
- Improved current carrying capacity
- Permanently lower contact resistance
- Significant increase in contact safety with critical surfaces such as aluminum or nickel.



The probe tips are contacting at spring travel 0 mm in a distance d to the central axis. During the travel the probe tips move outwards by the offset v .



HIGH CURRENT PROBES

VERIFICATION PROJECT AT THE ISEA INSTITUTE AT RWTH AACHEN

Target: The testing and comparison of various designs of FEINMETALL high-current blocks under application-oriented conditions in cell production, in particular during the formation process.

Test setup: Contacting of 2 blocks (PLUS and MINUS) to mating an uncoated copper contact

Diagram above: Typical temperature curve over 1h continuous current. Heating due to power loss at various measuring points on the high-current block HC01 as well as on its terminals and on the mating contact.

Diagram below: Voltage drop via contacting PLUS- and MINUS-pole.



Result in direct comparison with scratch principle to without:

- Lower contact resistance
- More constant contact resistance over the current stages.
- More constant contact resistance over time.
- Lower temperature increase
- Smoother heating - no wetting current effect
- More stable, lower impedance contact behaviour.

Diagram 1 - temperature progression

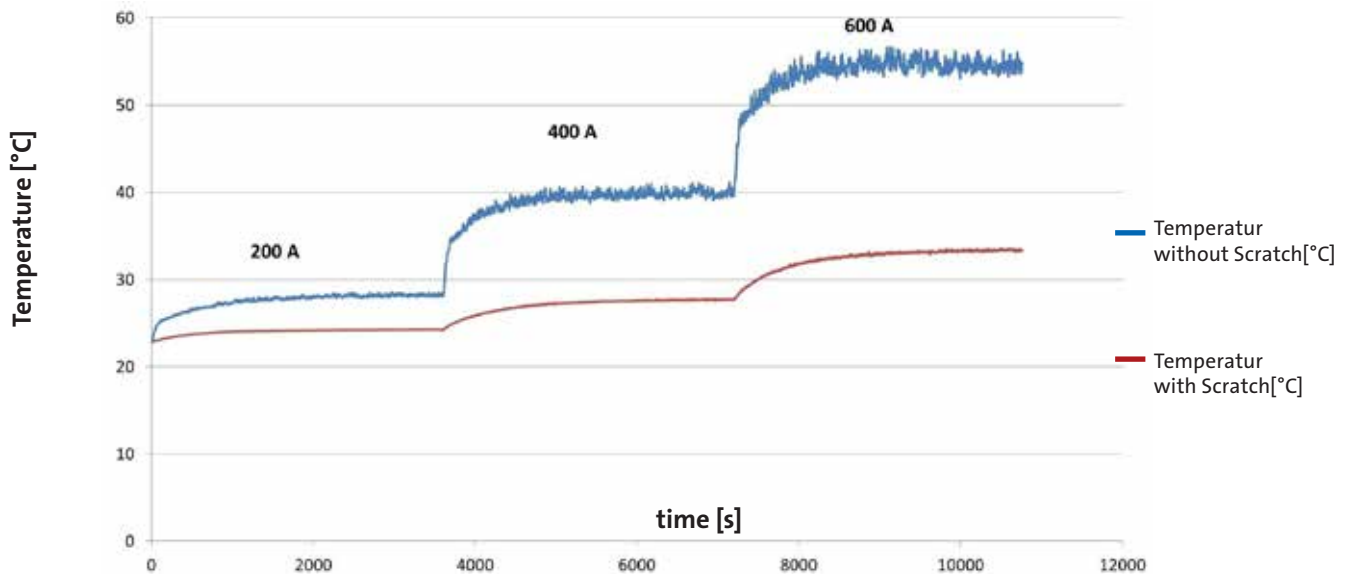
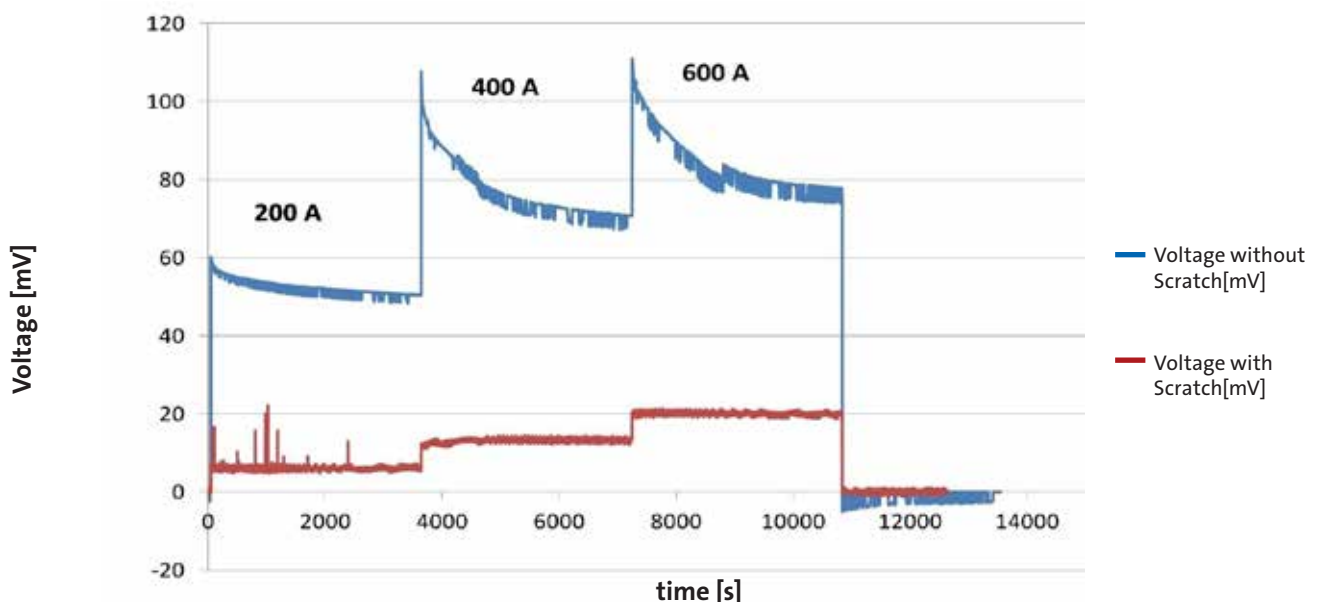


Diagram 2 - power dissipation



HIGH CURRENT PROBES



HC06

High current block up to 50 A
for Scratch contacting of
contaminated surfaces

Centers (mm/mil)	12,0 / 472
Current (Power)	50 A
Current (Sense)	0,5 A
R typ	<3 mOhm
Temperature	-40°C...+200°C (H)

Spring Force (cN ±20%)

Version	Preload	Nominal
Sense pin	40	80
Circular cont.	3x 50	3x 300

Travel (mm)

Version	Nominal	Maximum
Sense pin	4,3	6,4
Circular cont.	4,0	5,0
Thread (M)		5,0
Wrench size		1,7 / 10,0

Materials and Plating

Plunger	BeCu, gold plated
Barrel	Brass, gold plated
Spring	Stainless steel, gold plated
Holder	Brass, silver plated

Accessories

Insertion tool holder	FDWZ-860C009
Insertion tool Sense pin	FDWZ-050
Screw-in tool probe circular cont.	FWZ732 (T)

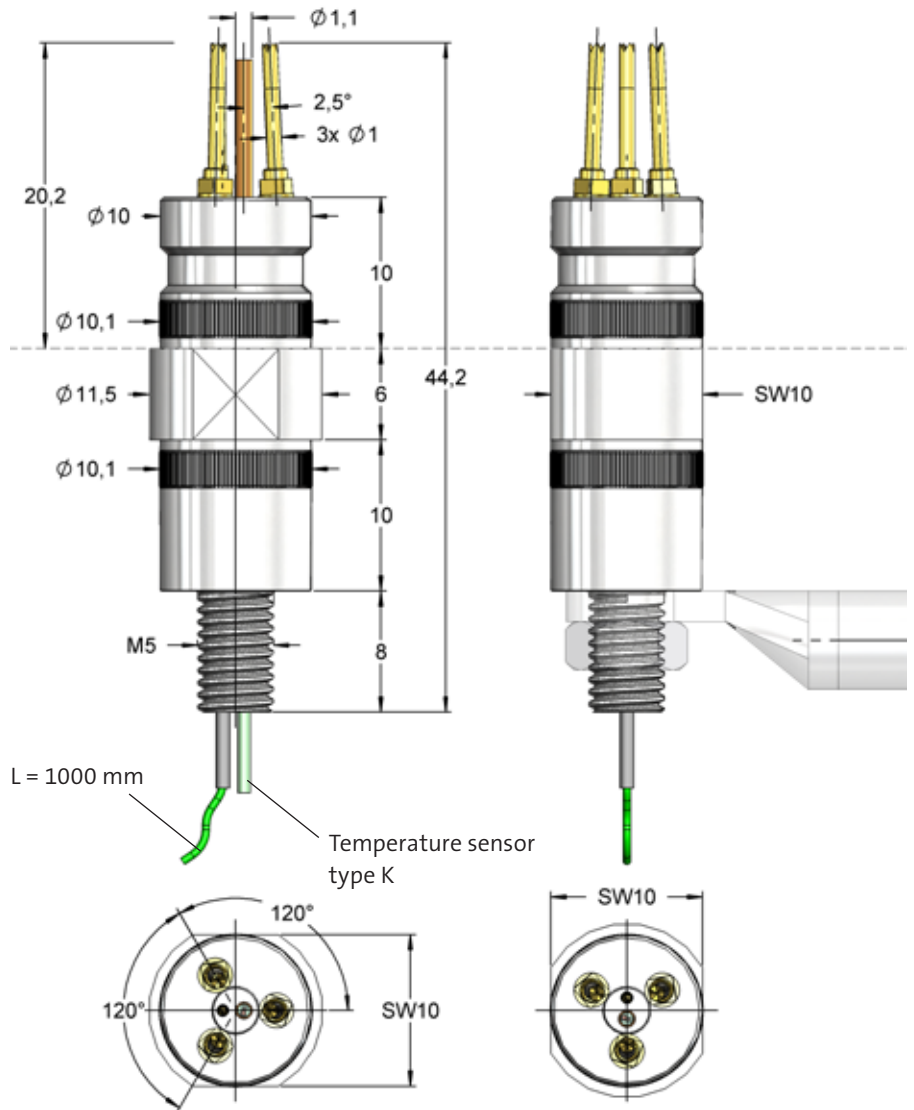
Drill Size (mm)

Receptacle with knurl	10,00 - 10,05
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Projection Height (mm)

HC06	12,8
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Suitable for:



A ring eye or a cable lug can be fixed to the M5 thread by a lock nut. The built-in threaded probes F732 can be changed with the screw-in tool FWZ732T. The high-current block can also be equipped with a temperature sensor type K. The high-current block can be mounted as a pure scratch contact, with sense pin and/or with temperature sensor type K. Technical specifications for temperature sensor type K (see next page). Connection recommendation Cable diameter 16 mm².



Order Code	Tip Style	Bezeichnung	Sense	Sensor	Mounting with	Screw-in Tool
HC06A29009G		3x F732 KF29	-	-	M5	FWZ732 (T)
HC06B29010G		3x F732 KF29	F040 KF18	-	M5	FWZ732 (T)
HC06D29011GTS4		3x F732 KF29	F040 KF18	Typ K	M5	FWZ732 (T)

HIGH CURRENT PROBES

HC06

High current block up to 50 A
for Scratch contacting of
contaminated surfaces

Centers (mm/mil)	12,0 / 472
Current (Power)	50 A
Current (Sense)	0,5 A
R typ	<3 mOhm
Temperature	-40°C...+200°C (H)

Specifications

Temperature Sensor Typ K

Measuring principle	thermocouple
Accuracy / grade	+/-2 °C
Response time t63 related to medium water	ca. 0,2-0,3 sec.
Response time t63 related to metal contact in air	ca. 1-2 sec.
Switching type	2-wire
Receptacle potential-free / galvanically isolated	yes
Cable diameter	ca. 0,9 mm
Cable length	1,2 m (not extendable)
Cable insulation	Teflon
Cable end	unassembled

Cell contact (representation without adapter)

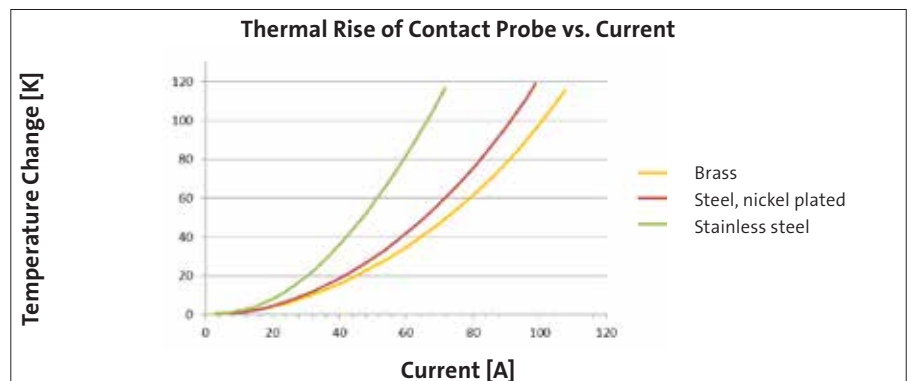


Function:

- A typical application of the coaxial probe is the contacting of cylindrical or Pouch cells in battery production and test applications, but also various other high current applications.

Advantages:

- Continuous current carrying capacity up to 50 A on cell pole < 6 mm
- Individually spring-loaded plungers with established scratch contact for current path for optimum contact on the typical cell conductors of LIB cells, also for uneven, passivated or contaminated contact surfaces
- Equipped with spring-loaded sense pin for the voltage path of the four-pole measuring and temperature sensor (TypeK)
- Low heating of less than 50K at full load
- Configurable variants from the modular system available
- Electrical connections via M5 thread
- Mounting by pressing into Ø10 mounting hole in contact direction universally possible (can also be laterally fixed)



HIGH CURRENT PROBES



HC02

High current block
up to 100 A
for Scratch contacting

Centers (mm/mil)	12,0 / 472
Current (Power)	100 A
Current (Sense)	1,0 A
R typ	<2 mOhm
Temperature	-40°C...+200°C (H)

Spring Force (cN ±20%)		
Version	Preload	Nominal
Sense pin	70	150
Circular cont.	3x 170	3x 600

Travel (mm)		
Version	Nominal	Maximum
Sense pin	4,3	6,4
Circular cont.	4,0	5,0
Thread (M)		4,0
Wrench size		3,0/10,0

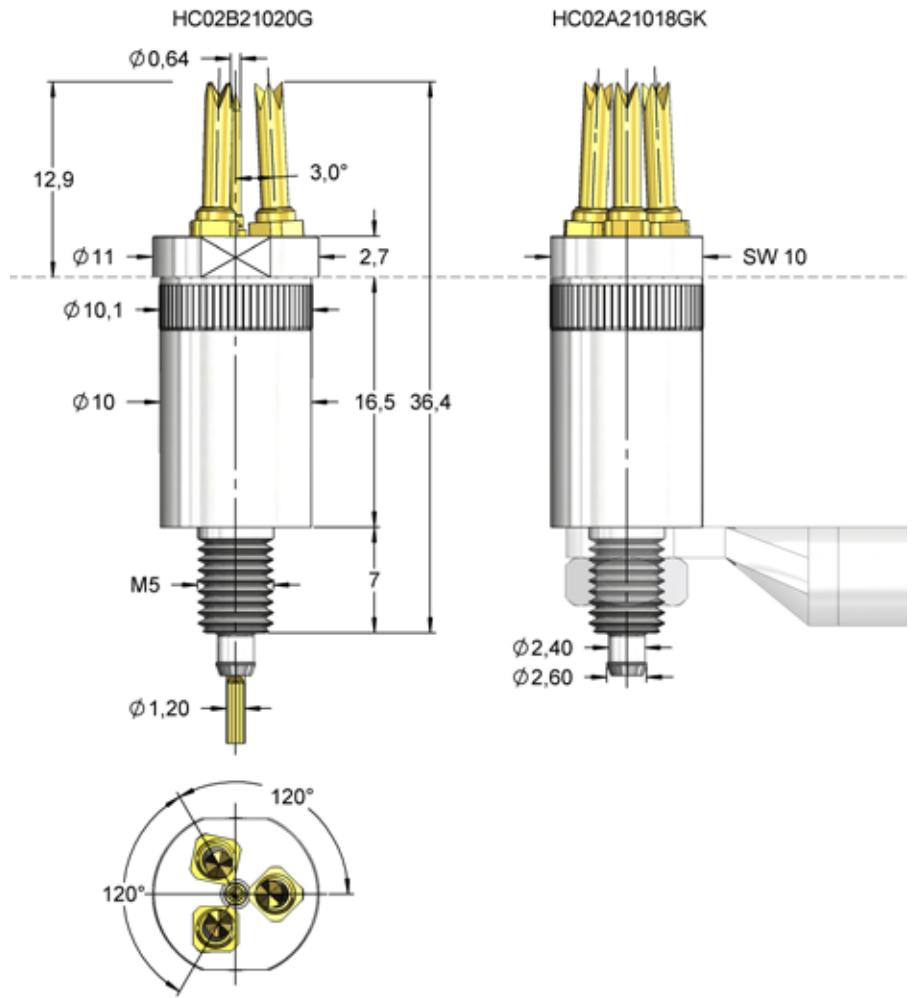
Materials and Plating	
Plunger	BeCu, gold plated
Barrel	Brass, gold plated
Spring holder	Stainless steel, gold plated
holder	Brass, silver plated

Accessories	
Insertion tool holder	FDWZ-860C009
Screw-in tool sense pin	FWZ730S1 (T)
Screw-in tool probe	FWZ733S2 (T)

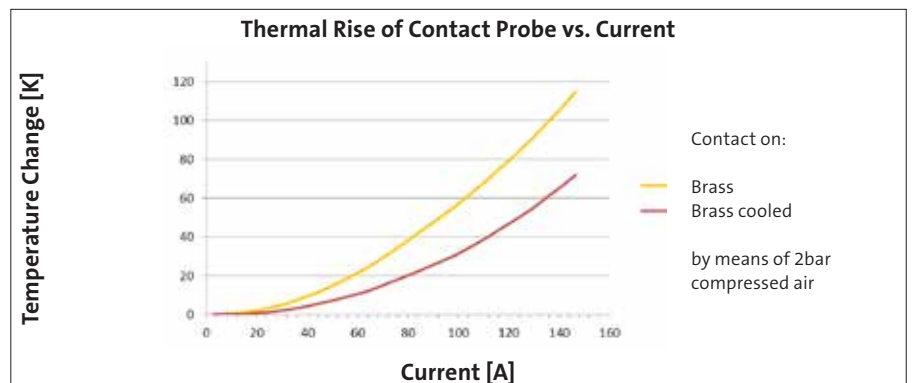
Drill Size (mm)	
Receptacle with knurl	10,00 - 10,05

Projection Height (mm)	
HC02	12,8

Suitable for:



A ring eye or a cable lug can be fixed to the M5 thread by a lock nut. The built-in threaded probes F733 can be changed with the screw-in tool FWZ733S2T. The high current block is available either as a pure scratch contact or with sense pin. Connection recommendation Cable diameter 25 mm².



Order Code	Tip Style	Bezeichnung	Sense	Sensor	Mounting with	Screw-in Tool
HC02A21018GK		3x F733 KF21	x	-	M5	FWZ733S2 (T)
HC02B21020G		3x F733 KF21	-	F175 KF18	M5	FWZ733S2 (T)

HIGH CURRENT PROBES

F349C

High Current Probe 300 mil up to 100 A Coaxial Design

Centers (mm/mil)	7,60 / 300
Current (Circular)	100,0 A
Current (Internal)	4,0 A
R typ (circular/internal)	<4/20 mOhm
Temperature	-40°C...+200°C (H)

Spring Force (cN ±20%)

	Preload	Nominal
Total	-	1560
Internal Cont.	60	160
Circular Cont.	500	1400

Travel (mm)

Version	Nominal	Maximum
Internal Cont.	4,3	6,4
Circular Cont.	4,4	5,5
Thread (M)		5,0
Wrench Size		6,0
Pointing Accuracy		-

Materials and Plating

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

Accessories

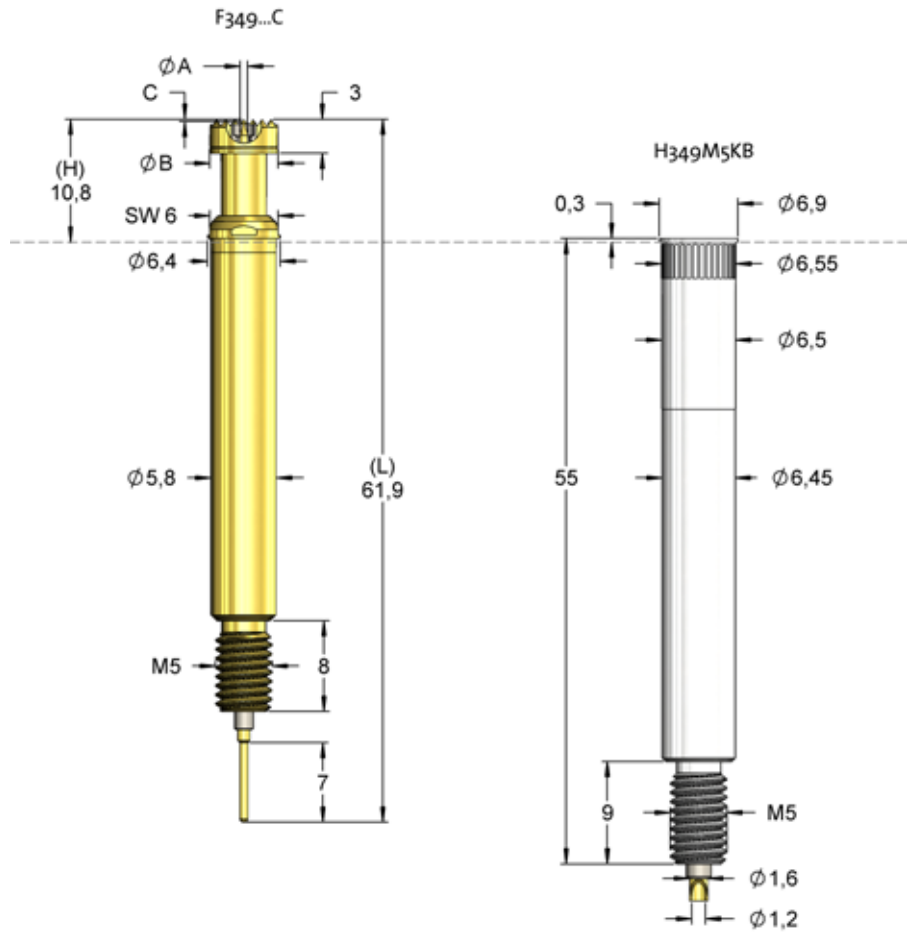
Insertion tool receptacle	FEWZ-348E0
Screw-in tool probe	FWZ348 (T)

Drill Size (mm)

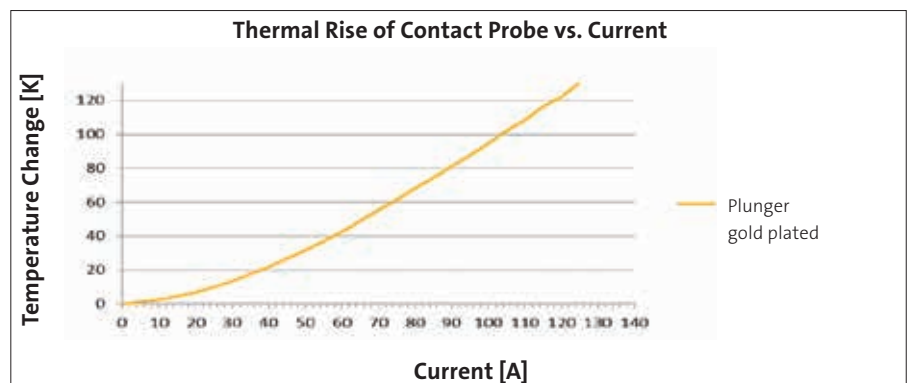
Receptacle with knurl	6,51 - 6,53
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Projection Height (mm)

H349... with F349C	10,8
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The new high current Kelvin probe F349C allows 4-wire measurements with currents up to 100 A even at smaller power components with centers down to 300 mil. The robust design allows applications even at rough production conditions. The F349C is mounted into the receptacle H349M5KB. The circular contact is connected by the M5 thread of the receptacle. It can be mounted with a counternut to a cable eye. The internal contact at the receptacle needs to be soldered.



Order Code	Sense Pin	Tip Style	Ø A	Ø B	C	H	L	Version	Screw-in Tool
F34918B0001G15C		18	0,64	6,00	-0,20	10,5	61,90	C	FWZ348 (T)
F34918B0002G15C		18	0,64	5,00	-0,20	24,0	75,35	C	FWZ348 (T)

HIGH CURRENT PROBES

1860C007

High Current Probe 551 mil
up to 75 A
Coaxial Design

Centers (mm/mil)	14,0 / 551
Current (Circular)	75,0 A
Current (Internal)	5,0 A
R typ (circular/internal)	<3/20 mOhm
Temperature	-40°C...+200°C (H)

Spring Force (cN ±20%)

	Preload	Nominal
Total	-	3035
Internal Cont.	160	235
Circular Cont.	1900	2800

Travel (mm)

Version	Nominal	Maximum
Internal Cont.	1,5	3,0
Circular Cont.	5,0	8,0
Thread (M)		5,0
Wrench Size		11,0
Pointing Accuracy		<1,5°

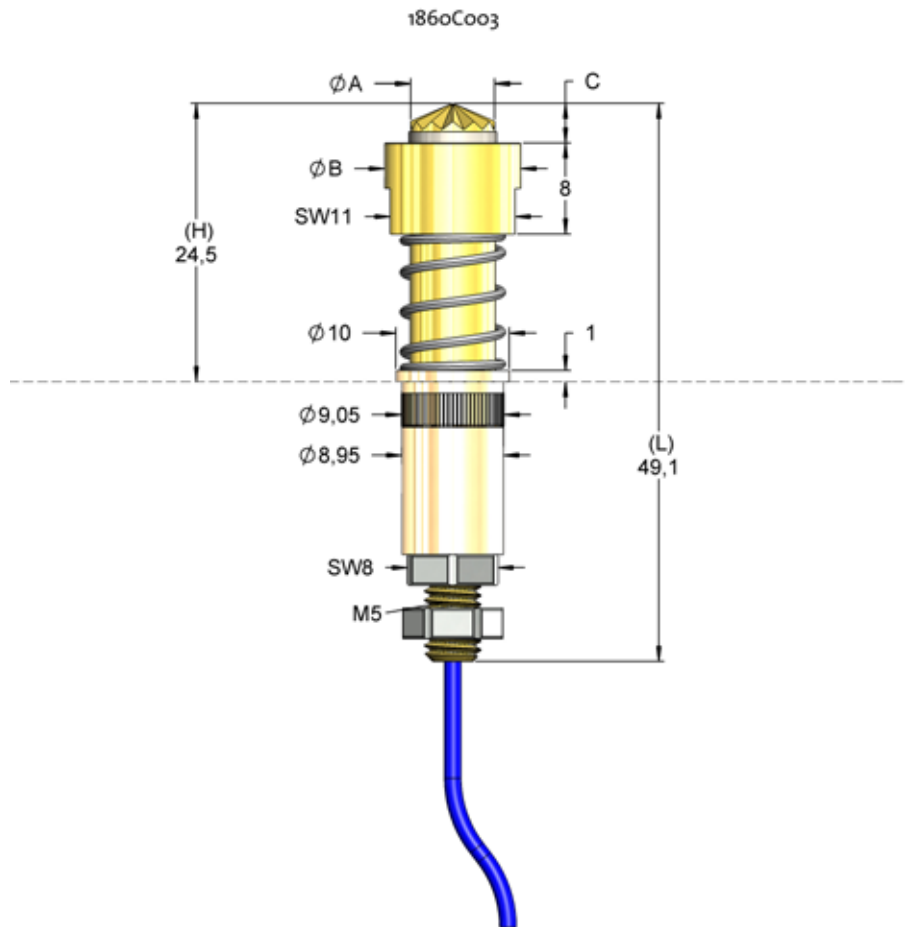
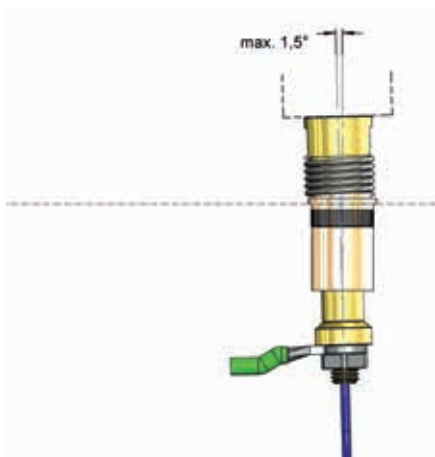
Materials and Plating

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

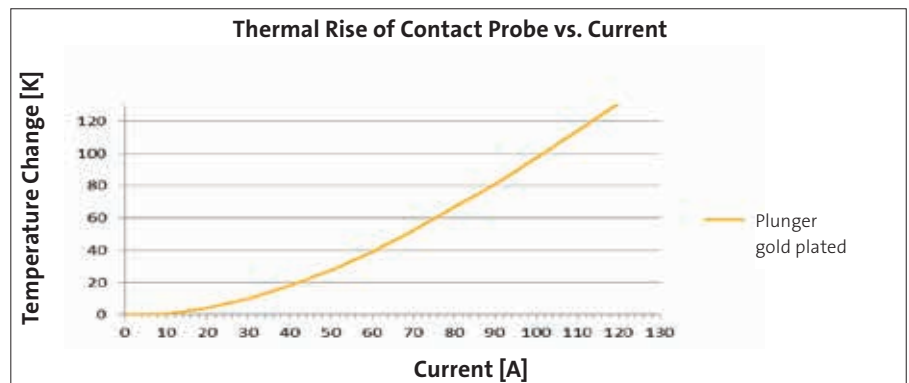
Drill Size (mm)

Barrel with knurl	10,95 - 10,99
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Contacting an inclined surface



Der 1860C007 adapts to an up to 1,5 degree inclined surface.
The M5 thread can be mounted with a counternut to a cable eye.



M 1:1



Order Code	Sense Pin	Tip Style	Ø A	Ø B	C	H	L	Version	Screw-in Tool
1860C007		07	4,80	12,00	2,70	24,70	49,70	C	-

HIGH CURRENT PROBES

1860C004

High Current Probe 984 mil up to 250 A Coaxial Design

Centers (mm/mil)	25,0 / 984
Current (Circular)	250,0 A
Current (Internal)	5,0 A
R typ (circular/internal)	<1/20 mOhm
Temperature	-40°C...+200°C (H)

Spring Force (cN ±20%)

	Preload	Nominal
Total	-	3150
Internal Cont.	130	300
Circular Cont.	1000	2850

Travel (mm)

Version	Nominal	Maximum
Internal Cont.	2,8	3,5
Circular Cont.	5,6	7,0
Thread (M)		10,0
Wrench Size		19,0
Pointing Accuracy		< 2°

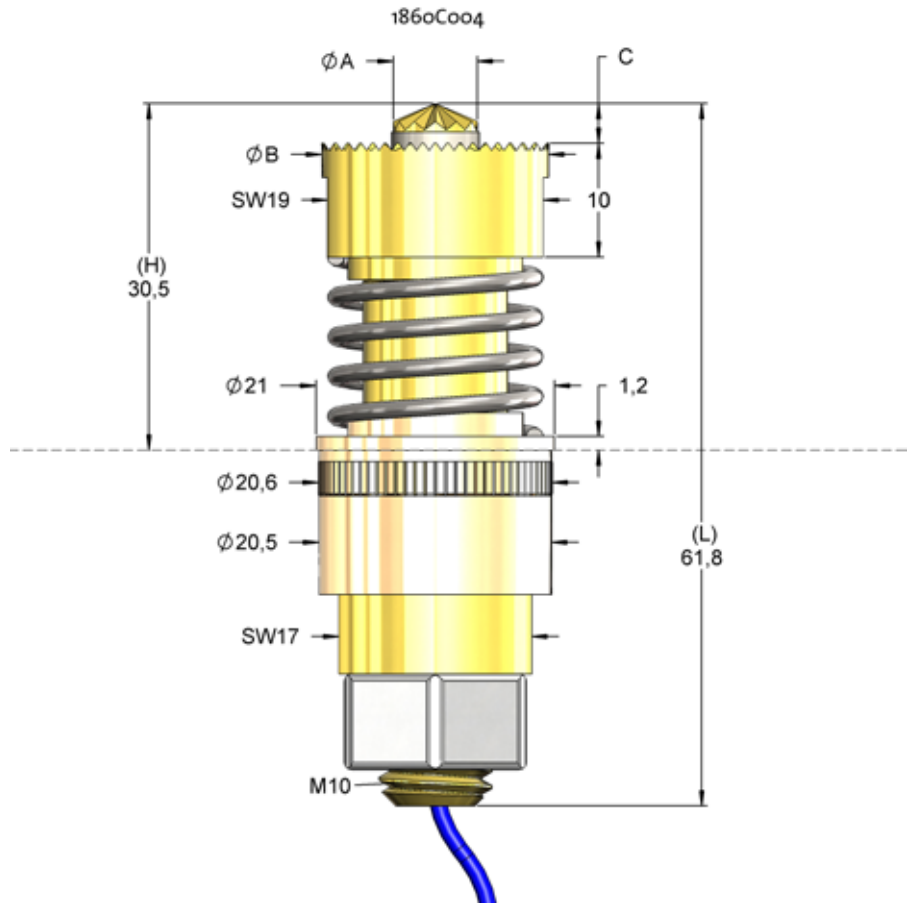
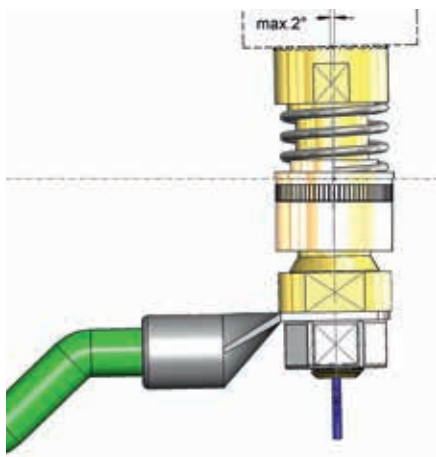
Materials and Plating

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

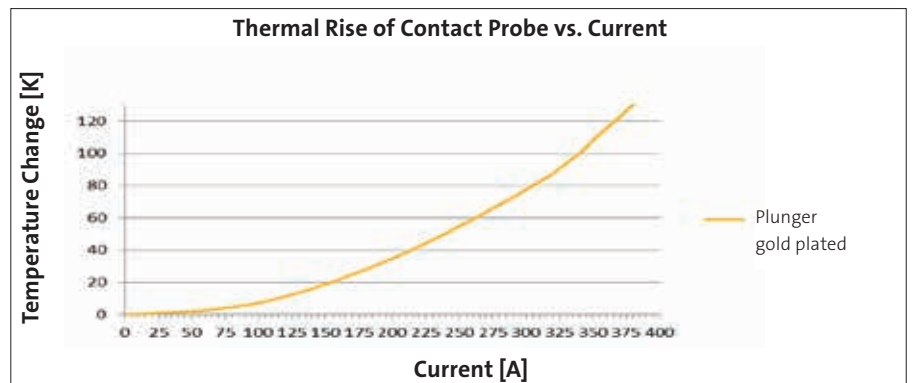
Drill Size (mm)

Barrel with knurl	20,55 - 20,60
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Contacting an inclined surface



Der 1860C007 adapts to an up to 1,5 degree inclined surface. The M5 thread can be mounted with a counternut to a cable eye.



Order Code	Sense Pin	Tip Style	Ø A	Ø B	C	H	L	Version	Screw-in Tool
1860C004		07	7,40	20,00	3,50	30,50	61,80	C	-

HIGH CURRENT PROBES

HC04

High current probe up to 300 A with coaxial design and temperature sensor

Centers (mm/mil)	25,0 / 984
Current (Circular)	300 A
Current (Internal)	2,0 A
R typ (circular/internal)	<1 mOhm
Temperature	-40°C...+200°C (H)

Spring Force (cN ±20%)

	Preload	Nominal
Sensor	60	150
Internal cont.	70	200
Circular cont.	1000	7000

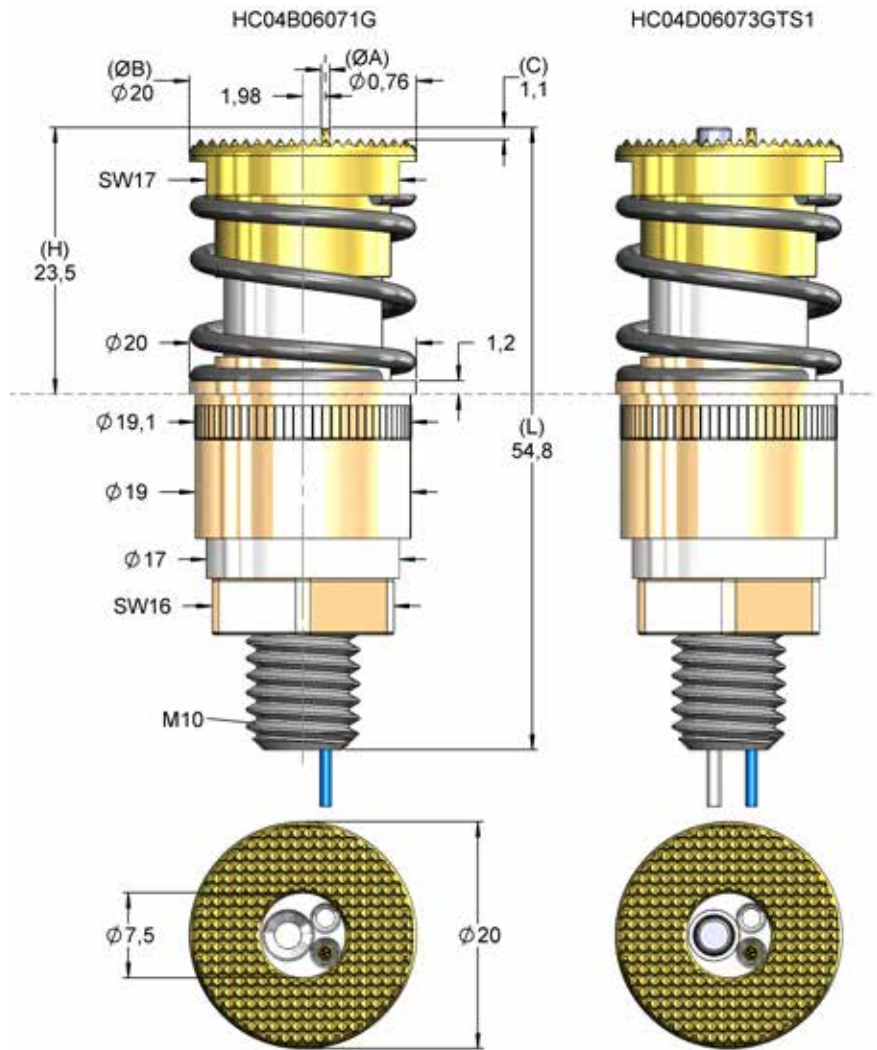
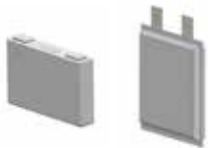
Travel (mm)

Version	Nominal	Maximum
Internal cont.	4,0	5,0
Circular cont.	5,6	7,0
Thread (M)		10,0
Wrench size		17,0 / 16,0
Pointing accuracy		< 1°

Materials and Plating

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

Suitable for:



Function:

The HC04 adapts to an inclination of the Contact surface of up to 1 degree. A ring eye or cable lug can be fixed to the M10 thread by a lock nut (max. torque 15 Ncm). Higher spring forces on request. Connection recommendation Cable diameter 120 mm².

Order Code	Tip Style	Cooling	Sense	Sense	Temperature Sensor	Mounting with
HC04A06070G		-	-	-	-	M10
HC04B06071G		-	F562 KF21	-	-	M10
HC04B06071GK		x	F562 KF21	-	-	M10
HC04C06072GTS1		-	-	-	PT100	M10
HC04C06072GTS2		-	-	-	PT1000	M10
HC04C06072GTS3		-	-	-	NTC	M10
HC04C06072GTS4		-	-	-	Typ-K	M10
HC04D06073GTS1		-	F562 KF21	-	PT100	M10
HC04D06073GTS2		-	F562 KF21	-	PT1000	M10
HC04D06073GTS3		-	F562 KF21	-	NTC	M10
HC04D06073GTS4		-	F562 KF21	-	Typ-K	M10
HC04E06073G		-	F562 KF21	F562 KF21	-	M10

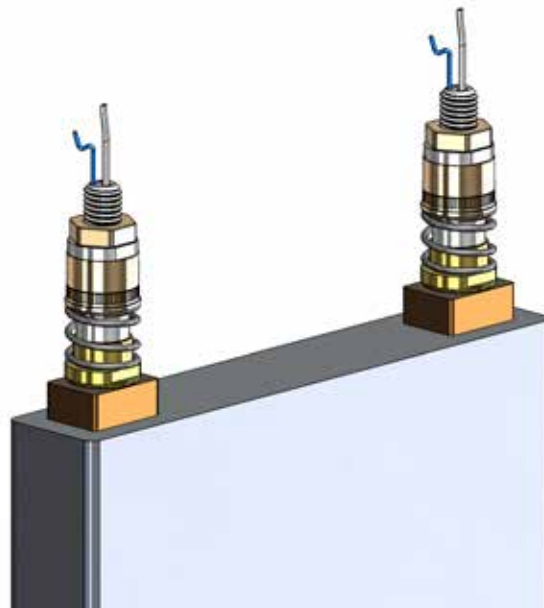
HIGH CURRENT PROBES

HC04

High current probe up to 300 A with coaxial design and temperature sensor

Centers (mm/mil)	25,0 / 984
Current (Circular)	300 A
Current (Internal)	2,0 A
R typ (circular/internal)	<1 mOhm
Temperature	-40°C...+200°C (H)

Example of contacting prismatic cell:

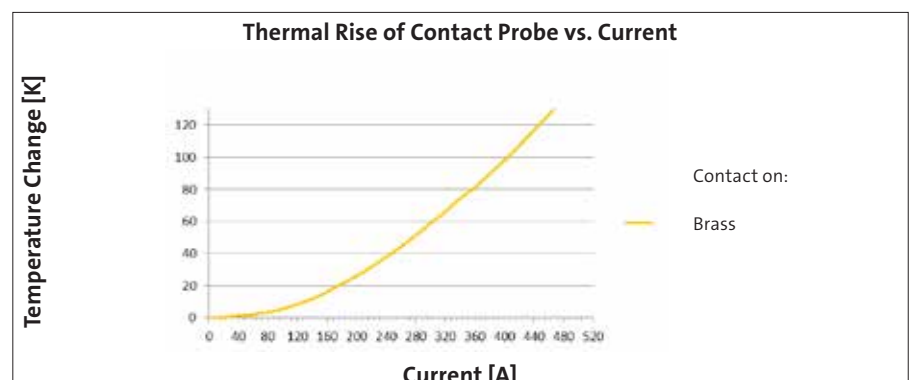


Function:

Typical application of the coaxial probes is the contacting of prismatic or pouch cells in battery production and test applications, but also various other high current applications.

Advantages:

- Continuous current carrying capacity up to 300 A in 25 mm pitch
- Aggressive and wobbly contact plunger for current path ensures optimum contact on typical LIB cell arresters
- Equipped with spring-loaded sense contact probe for the voltage path of the four-pole measurement
- Second additional sense contact probe (e.g. EIS measurement = Electrochemical-Impedance-Spectroscopy) configurable
- Integrated spring-loaded temperature sensor (4 possible types available) directly at the point of contact
- Low heating of less than 60K at full load
- Connection can be configured for additional cooling option for contacting and contact point in case of a sense
- Electrical connections via M10 thread
- Mechanical fastening via press sleeve



TS0x-001

Spring-loaded temperature sensor

Centers (mm/mil)	5,00 / 197
Temperature	-40 °C ... + 200 °C

Spring Force (cN ±20%)

Version	Preload	Nominal
Standard	70	200

Travel (mm)

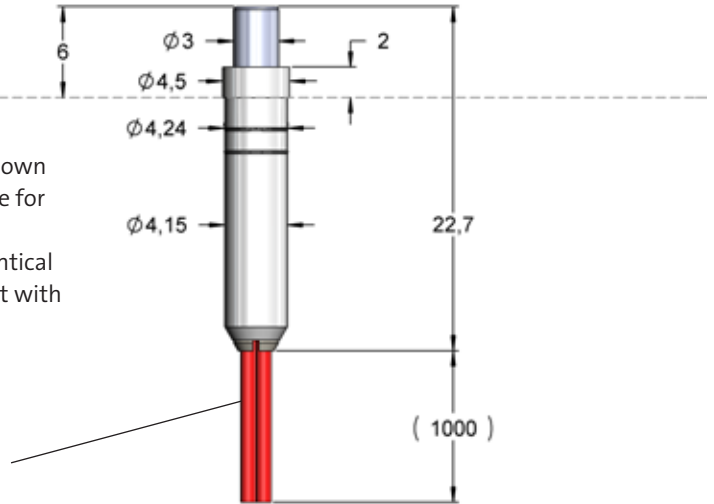
Version	Nominal	Maximum
Standard	3,0	4,0

Materials and Plating

Sensor head	Stainless steel, unplated
Barrel	Syntetic, unplated
Spring	Stainless steel, unplated

The TS01-001 is shown here as an example for all sensors. All sensors are identical in construction but with different sensors:

- PT100 = Red
- PT1000 = White
- NTC = Black
- Type K = Green



Spezifikationen	TS01-001	TS02-001	TS03-001	TS04-001
Description	TS0116E300U200PT100	TS0216E300U200PT1000	TS0316E300U200NTC5k	TS0416E300U200TYPK
Sensor Type	PT100	PT1000	NTC	Type K
Measuring principle	resistance	resistance	thermistor	thermocouple
Accuracy / grade	B	A	B	2
Response time t63 related to medium water	ca. 2 sec.	ca. 2 sec.	ca. 2 sec.	ca. 2 sec.
Response time t63 related to metal contact in air	ca. 30 sec.	ca. 30 sec.	ca. 30 sec.	ca. 30 sec.
Switching type	2-wire	2-wire	2-wire	2-wire
Receptacle potential-free / galvanically isolated	yes	yes	yes	yes
Cable diameter	ca. 2,0 mm	ca. 2,0 mm	ca. 2,0 mm	ca. 1,0 mm
Cable length	1,0 m (extendable)	1,0 m (extendable)	1,0 m (extendable)	1,2 m (not extendable)
Cable insulation	Teflon	Teflon	Teflon	Teflon
Cable end	stripped	stripped	stripped	unassembled
Protection class	watertight IP67	watertight IP67	watertight IP67	watertight IP67
Sensor cable colour	red	white	black	green
Drill size [mm]	4,2 H7	4,2 H7	4,2 H7	4,2 H7
Application	Platinum measuring resistors are designated according to their material and their nominal resistance R ₀ at a temperature of 0 °C (PT100 = R ₀ = 100 Ω). The PT100 is a fast-response, waterproof miniature temperature sensor suitable for universal temperature measurement even in small of spaces.	Platinum measuring resistors are designated according to their material and their nominal resistance R ₀ at a temperature of 0 °C (PT1000 = R ₀ = 1000 Ω). The PT1000 is a fast-response, waterproof miniature temperature sensor and suitable for universal temperature measurement even in small of spaces.	The NTC sensor (NTC = Negative Temperature Coefficient) is a temperature-dependent component. If the temperature rises, the resistance of the NTC sensor decreases. Its characteristic curve is non-linear.	Thermocouple type K is the most common thermocouple type with a large measuring range. Thermocouple connector not included in scope of delivery.

HIGH CURRENT PROBES

TS04-003

Spring-loaded temperature sensor

Centers (mm/mil)	16,0 / 406
Sensor Type	Typ K (NiCr/Ni)
Temperature range	-20°C...+80°C

Spring Force (cN ±20%)

	Preload	Nominal
Sensor	-	200

Travel (mm)

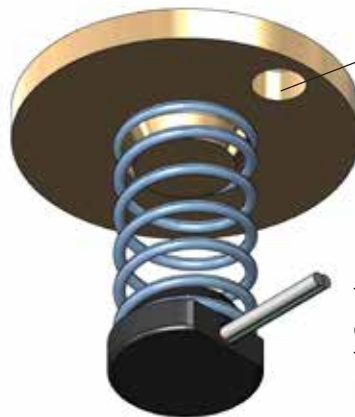
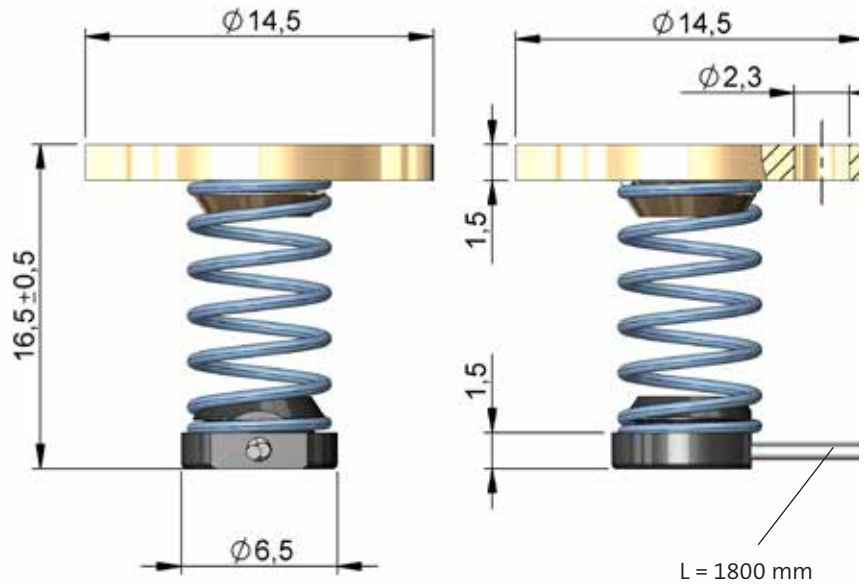
Version	Nominal	Maximum
Sensor	3,0	6,0

Materials and Plating

Sensor head	Aluminum, anodised
Spring	Stainless steel, unplated
Sensor plate	Brass, unplated

Specifications

Measuring principle	thermocouple
Accuracy / grade	2
Response time t63 related to medium water	ca. 2 sec.
Response time t63 related to metal contact in air	ca. 30 sec.
Switching type	2-wire
Receptacle potential-free / galvanically isolated	yes
Cable diameter	ca. 1,0 mm
Cable length	1,8 m (not extendable)
Cable insulation	Teflon
Cable end	Thermo-plug yellow



Mounting hole for fixing screw M2 available.

Thermocouple type K (NiCr/Ni), electrically insulated to the sensor head
 Thermocable teflon insulated, length 1800mm
 Miniature TE plug type K at free end

HIGH CURRENT PROBES

FTS

Coaxial, spring-loaded temperature sensor, for voltage measurement

Centers (mm/mil)	8,50 / 335
Current	5,0 A
R typ (power)	<6 mOhm
Temperature	-40°C...+200°C

Spring Force (cN ±20%)

	Preload	Nominal
Total	-	700
Sensor	70	200
Circular cont.	400	500

Travel (mm)

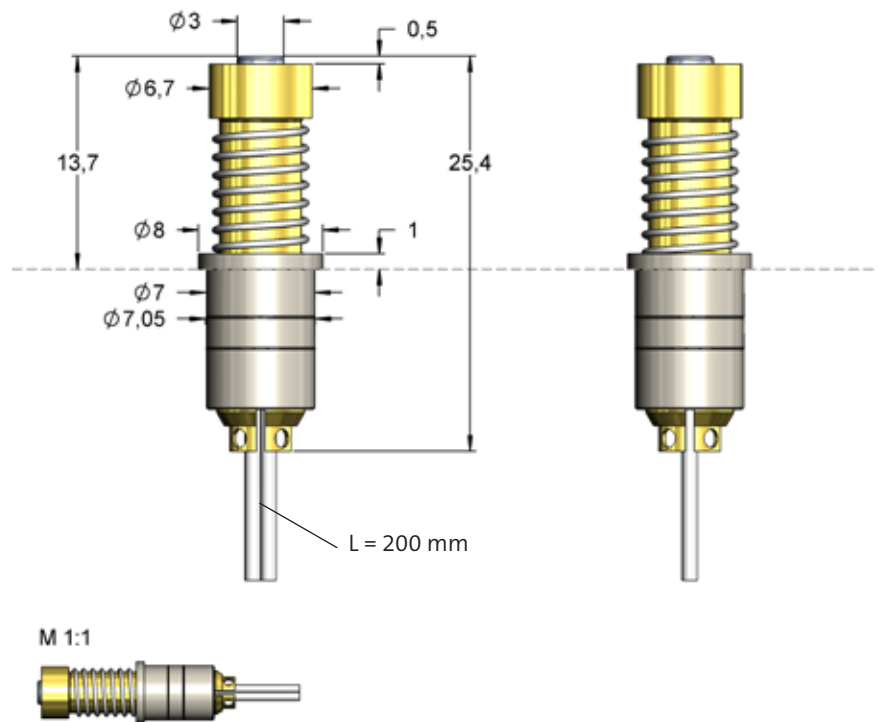
Version	Nominal	Maximum
Sensor	0,5	4,0
Circular cont.	4,0	5,0

Materials and Plating

Sensor	Stainless steel, unplated
Circular cont.	BeCu, gold plated
Barrel	Syntetic, unplated
Spring	Stainless steel, unplated
Circular cont.	Stainless steel, unplated

Drill Size (mm)

Barrel with knurl	7,00 -7,03
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The contact probe enables the simultaneous electrical contacting and temperature measurement at the contact point in compact design.

Order Code	Tip Style	Number	Material	Ø in mm	Plating	Temperature Sensor
FTS0116E0001U700		16	E	3,00	U	PT100
FTS0216E0001U700		16	E	3,00	U	PT1000
FTS0316E0001U700		16	E	3,00	U	NTC
FTS0416E0001U700		16	E	3,00	U	Typ K

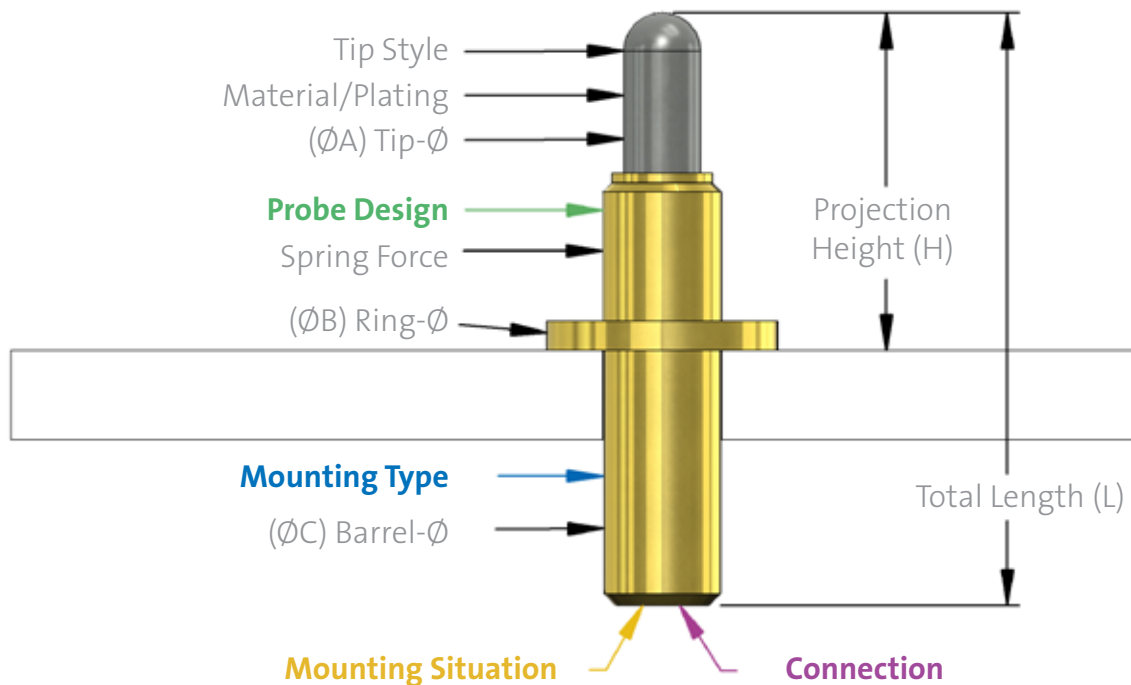
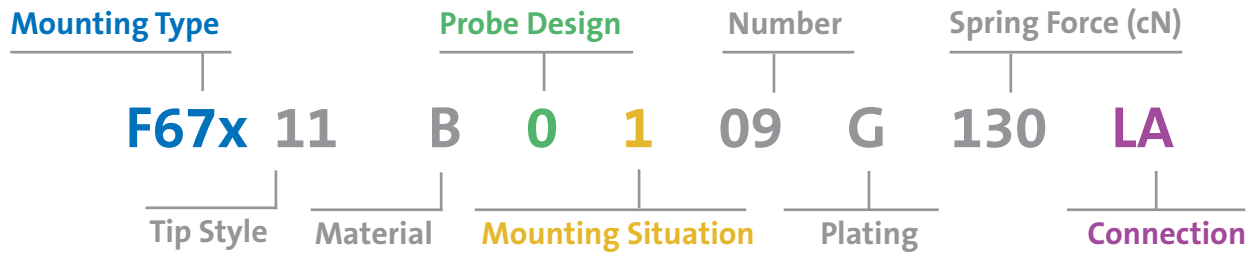


Battery and Charging Contacts

Battery and charging contacts are compact and direct solderable contact probes. Their application range is extremely versatile and reaches far beyond pure test applications. Wherever detachable electrical connections are required, they can be a smart solution. Typical applications are charging accumulator cells or cordless devices, contacts for signal transmission between pluggable parts or switch contacts. These probes are also frequently used in the medical industry or in general products e.g. in the furniture and lighting industry.

BATTERY CONTACTS

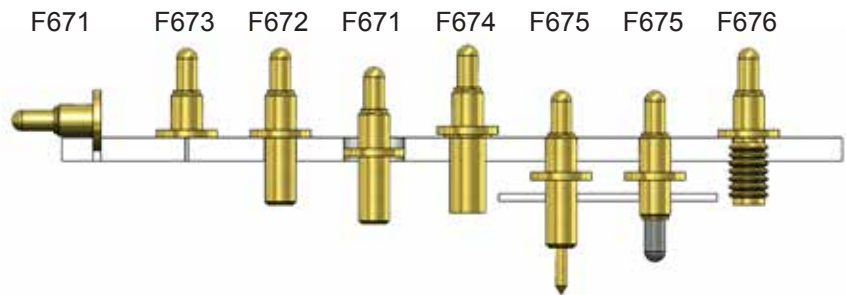
F67x Order codes for battery contacts of this series



BATTERY CONTACTS

Mounting Type:

- (F671) pressed-in
- (F672) soldered in
- (F673) soldered on
- (F674) in receptacle mounted
- (F675) floating mounted
- (F676) screwed-in



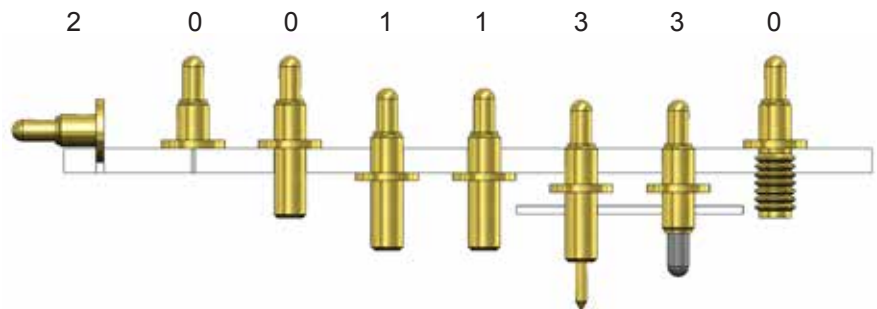
Probe Design:

- (0) drill hole plunger
- (1) standard plunger
- (2) bias design
- (3) bias-ball design
- (4) split plunger design



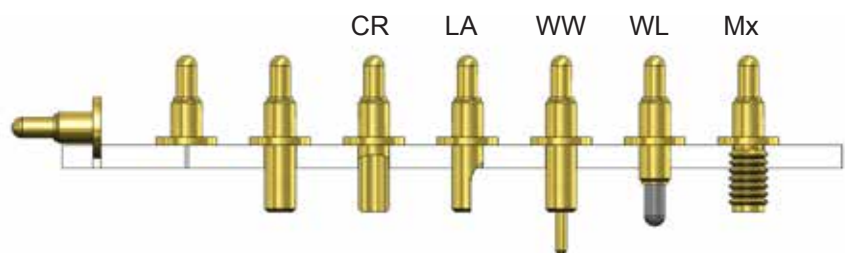
Mounting Situation:

- (0) mounted from top
- (1) mounted from bottom
- (2) mounted in horizontal direction
- (3) floating mounted



Connection:

- (LA) with solder connection
- (CR) with crimp connection
- (WL) with round pin
- (WW) with wire-wrap connection
- (WL) wireless connection
- (Mx) with thread
- without pin



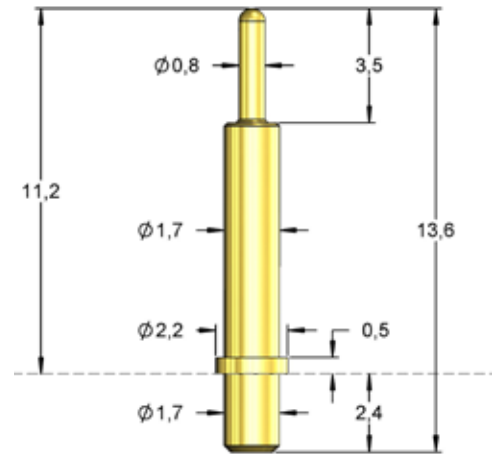
BATTERY CONTACTS

F67111B1004G230

Battery Contact for Pressing-in

Centers (mm/mil)	2,70 / 106
Current	5,0 A
R typ	<30 mOhm
Temperature	-20°C...+80°C

Design with standard plunger



Spring Force (cN ±20%)

Version	Preload	Nominal
Standard	60	230

Travel (mm)

Version	Nominal	Maximum
Standard	2,0	3,5

Materials and Plating

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

Drill Size (mm)

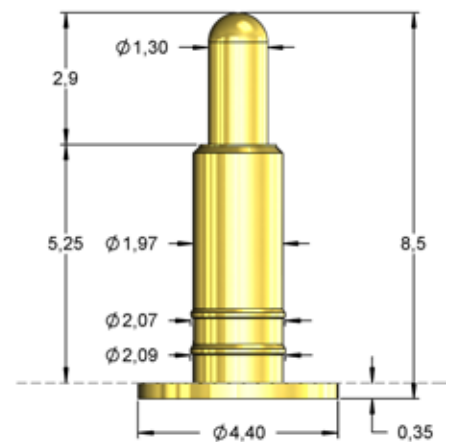
F67111B1004G230	1,68 - 1,70
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F67111B0109G130

Battery Contact for Pressing-in

Centers (mm/mil)	5,00 / 197
Current	8,0 A
R typ	<100 mOhm
Temperature	-40°C...+200°C (H)

Design with drill hole plunger



Spring Force (cN ±20%)

Version	Preload	Nominal
Standard	40	130

Travel (mm)

Version	Nominal	Maximum
Standard	1,5	2,2

Materials and Plating

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

Drill Size (mm)

F67111B0109G130	2,00 - 2,05
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Also well suitable for direct soldering
on a PCB.

BATTERY CONTACTS

F67111M1007G200

**Battery Contact 106 mil
for Pressing-in
with Continuous Plunger**

Centers (mm/mil)	5,50 / 216
Current	5,0 A
R typ	<20 mOhm
Temperature	-40°C...+200°C (H)

Spring Force (cN ±20%)

Version	Preload	Nominal
Standard	150	200

Travel (mm)

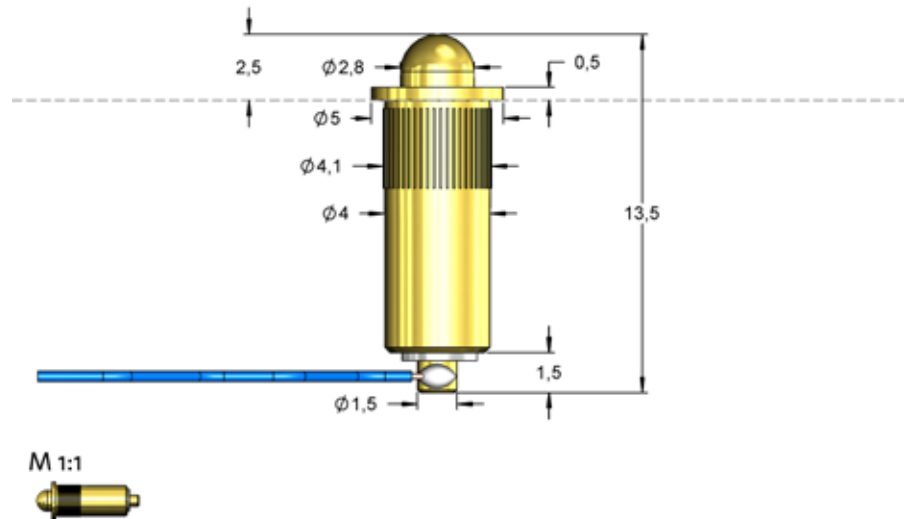
Version	Nominal	Maximum
Standard	1,5	2,0

Materials and Plating

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

Drill Size (mm)

F67111M1007G200	4,01 - 4,08
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F67111M1007U150

**Battery Contact 106 mil
for Pressing-in
with Continuous Plunger**

Centers (mm/mil)	5,50 / 216
Current	5,0 A
R typ	100 mOhm
Temperature	-40°C...+200°C (H)

Spring Force (cN ±20%)

Version	Preload	Nominal
Standard	100	150

Travel (mm)

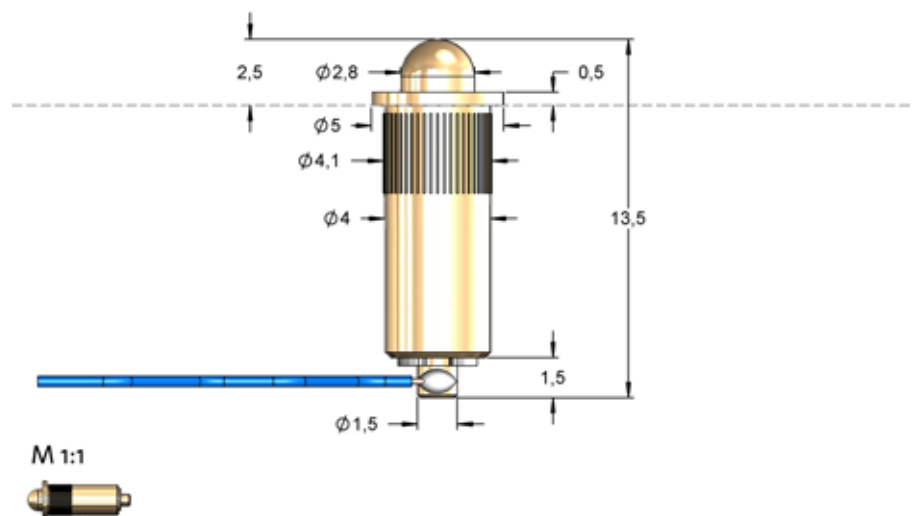
Version	Nominal	Maximum
Standard	1,5	2,0

Materials and Plating

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

Drill Size (mm)

F67111M1007U150	4,01 - 4,08
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BATTERY CONTACTS

F67211B2008G020

Battery Contact for Direct Soldering on PCBs

Centers (mm/mil)	3,00 / 118
Current	5,0 A
R typ	<30 mOhm
Temperature	-40°C...+200°C (H)

With Bias Design



Spring Force (cN ±20%)

Version	Preload	Nominal
Standard	10	20

Travel (mm)

Version	Nominal	Maximum
Standard	0,6	1,0

Materials and Plating

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

Drill Size (mm)

Equal barrel-Ø	1,96 - 1,97
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F67211B0004G020 / F67211B0004G150

Battery Contact for Direct Soldering on PCBs with 20cN or 150cN

Centers (mm/mil)	3,18 / 125
Current	5,0 A
R typ	<30 mOhm
Temperature	-40°C...+200°C (H)

Design with drill hole plunger



Spring Force (cN ±20%)

Version	Preload	Nominal
Standard	10	20
Standard	70	150

Travel (mm)

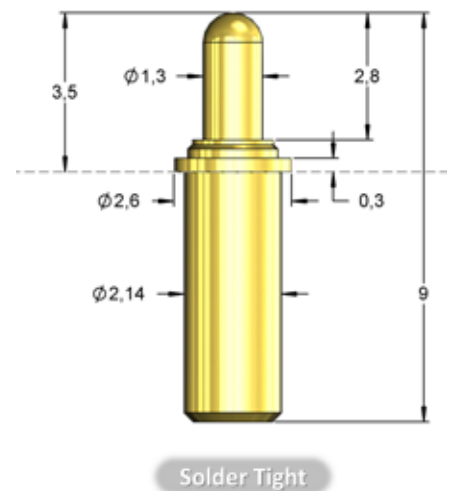
Version	Nominal	Maximum
Standard	1,0	2,8

Materials and Plating

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

Drill Size (mm)

Equal barrel-Ø	2,14 - 2,15
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BATTERY CONTACTS

F67211B1005G040

Battery Contact
pressed-in

NEW

Centers (mm/mil)	3,18 / 125
Current	9,0 A
R typ	<100 mOhm
Temperature	-40°C...+200°C (H)

Spring Force (cN ±20%)

Version	Preload	Nominal
Standard	25	40

Federwege (mm)

Version	Nominal	Maximum
Standard	0,4	1,0

Materials and Plating

Plunger	see tip style
Barrel	Brass, gold plated
Spring	Stainless steel, gold plated

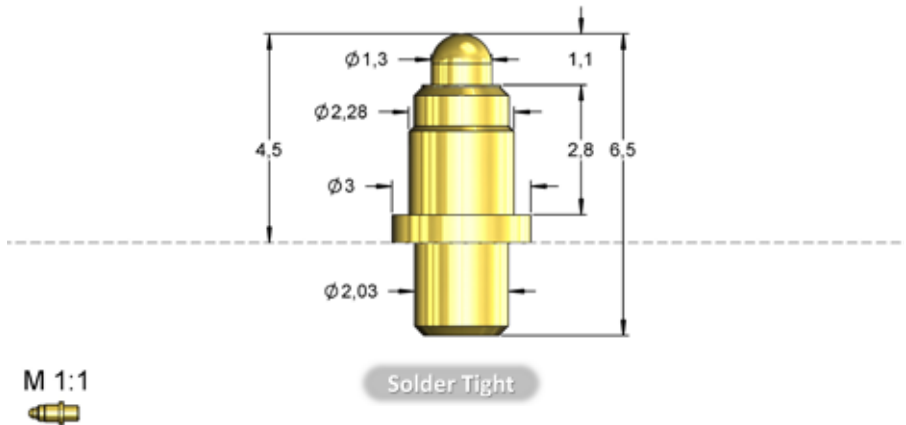
Drill Size (mm)


F67211B1005G040	2,02 - 2,03
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Projection Height (mm)

F67211B1005G040	4,5
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Design with standard plunger



Order Code	Tip Style	Number	Material	Ø in mm	Plating	Version
F67211B1005G040		11	B	1,30	G	-

BATTERY CONTACTS

F67211M2009G250

Battery Contact
pressed-in

NEW

Centers (mm/mil)	4,00 / 157
Current	10,0 A
R typ	<30 mOhm
Temperature	-40°C...+200°C (H)

Spring Force (cN ±20%)

Version	Preload	Nominal
Standard	150	250

Federwege (mm)

Version	Nominal	Maximum
Standard	0,65	0,90

Materials and Plating

Plunger	Brass, gold plated
Barrel	Brass, gold plated
Spring	Stainless steel, gold plated

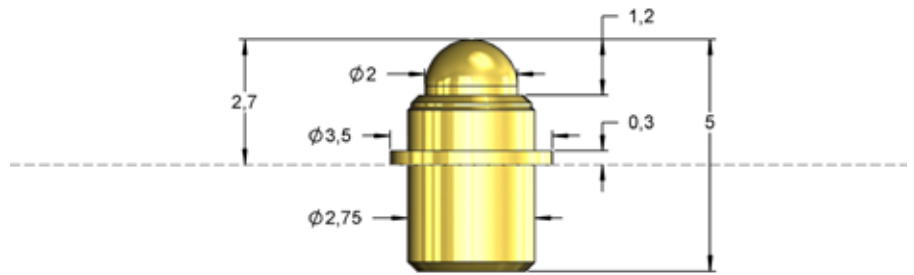
Drill Size (mm)

Barrel-Ø	2,72 - 2,75
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Projection Height (mm)

F67211M2009G250	2,7
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With Bias Design



M 1:1



Solder Tight

Order Code	Tip Style	Number	Material	Ø in mm	Plating	Version
F67211M2009G250		11	B	200	G	-

BATTERY CONTACTS

F67211B0001G170

Battery Contact for Direct Soldering on PCBs

Centers (mm/mil)	4,50 / 177
Current	9,0 A
R typ	<30 mOhm
Temperature	-40°C...+200°C (H)

Design with drill hole plunger



Spring Force (cN ±20%)

Version	Preload	Nominal
Standard	80	170

Travel (mm)

Version	Nominal	Maximum
Standard	1,7	2,5

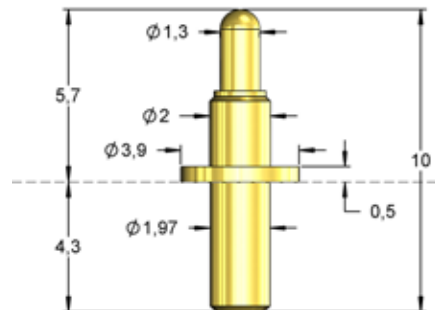
Materials and Plating

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

Drill Size (mm)

Equal barrel-Ø	1,96 - 1,97
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F67211B0001G170



Solder Tight

F67211B0003G040

Battery Contact for Direct Soldering on PCBs

Centers (mm/mil)	4,50 / 177
Current	9,0 A
R typ	<30 mOhm
Temperature	-40°C...+200°C (H)

Design with drill hole plunger



Spring Force (cN ±20%)

Version	Preload	Nominal
Standard	20	40

Travel (mm)

Version	Nominal	Maximum
Standard	1,7	2,5

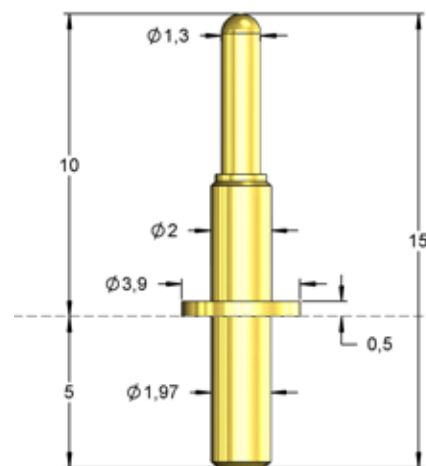
Materials and Plating

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

Drill Size (mm)

Equal barrel-Ø	1,96 - 1,97
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F67211B0003G040



Solder Tight

BATTERY CONTACTS

F67311M0002G030

Battery Contact for Direct Soldering on PCBs

Centers (mm/mil)	1,90 / 75
Current	4,0 A
R typ	<30 mOhm
Temperature	-40°C...+200°C (H)

This probe can also be mounted through a bore. The collar serves as a stop.

Design with drill hole plunger



Spring Force (cN ±20%)

Version	Preload	Nominal
Standard	25	30

Travel (mm)

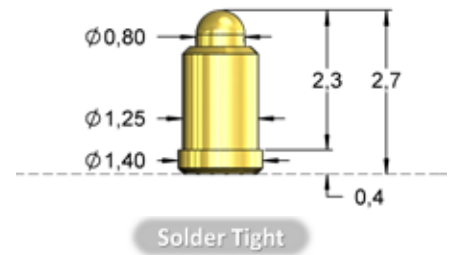
Version	Nominal	Maximum
Standard	0,15	0,60

Materials and Plating

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

Drill Size (mm)

Equal barrel-Ø 1,25	1,23 - 1,25
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F67311B2003G065WR

Battery Contact for Direct Soldering on PCBs NEW

Centers (mm/mil)	2,54 / 100
Current	5,0 A
R typ	<100 mOhm
Temperature	-40°C...+200°C (H)

Spring Force (cN ±20%)

Version	Preload	Nominal
WR	10	65

Federwege (mm)

Version	Nominal	Maximum
WR	1,2	1,5

Materials and Plating

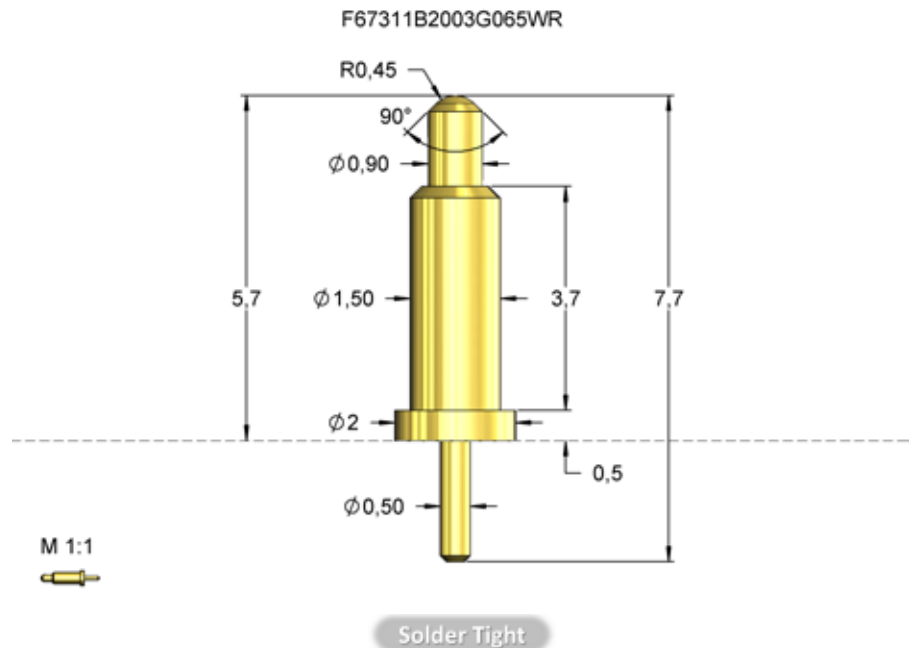
Plunger	see tip style
Barrel	Brass, gold plated
Spring	Stainless steel, unplated

Drill Size (mm)

F67311B2003G065WR	0,51 - 0,55
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Projection Height (mm)

F67311B2003G065WR	5,7
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With Bias Design



Order Code	Tip Style	Number	Material	Ø in mm	Plating	Version
F67311B2003G065WR		11	B	0,90	G	WR

BATTERY CONTACTS

F67311B2001G065

Battery Contact for Direct Soldering on PCBs

Centers (mm/mil)	3,50 / 138
Current	5,0 A
R typ	<20 mOhm
Temperature	-40°C...+200°C (H)

This probe can also be mounted through a bore. The collar serves as a stop.

With Bias Design



Spring Force (cN ±20%)

Version	Preload	Nominal
Standard	10	65

Travel (mm)

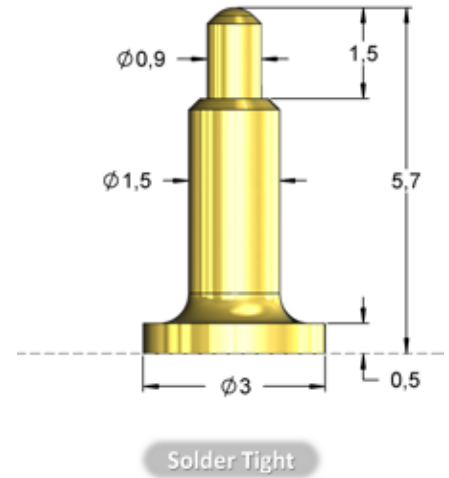
Version	Nominal	Maximum
Standard	1,0	1,5

Materials and Plating

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

Drill Size (mm)

Equal barrel- \varnothing 1,5	1,51 - 1,53
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F67603S0001R200M3

Short travel probe with wobbling plunger

NEW

Centers (mm/mil)	5,50 / 217
Current	20,0 A
R typ	<30 mOhm
Temperature	-40°C...+200°C (H)

Spring Force (cN ±20%)

Version	Preload	Nominal
M3	100	200

Federwege (mm)

Version	Nominal	Maximum
M3	2,0	2,2

Materials and Plating

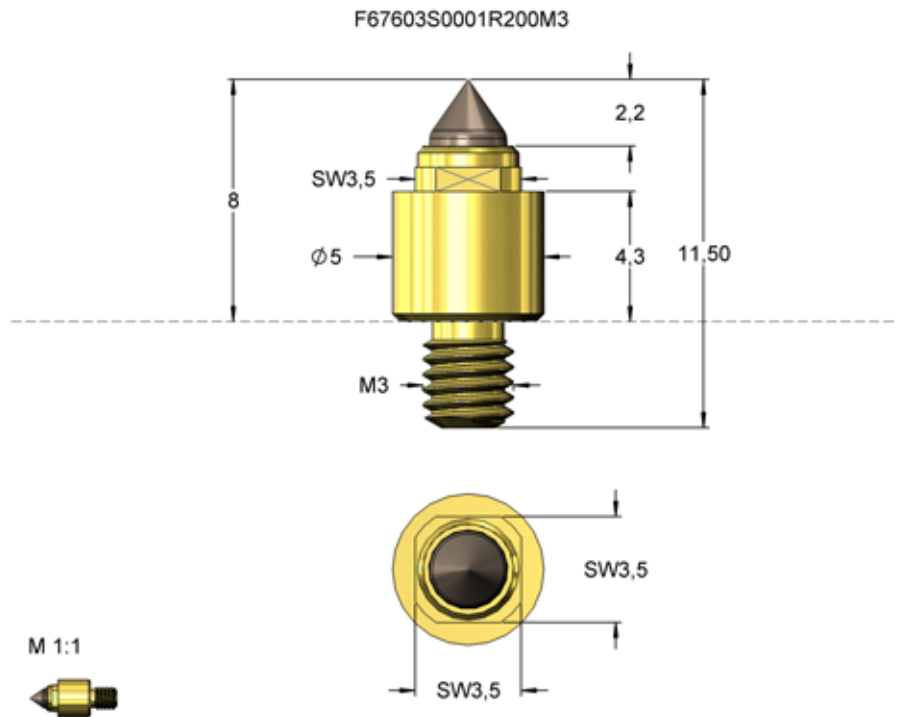
Plunger	Steel, rhodanized
Barrel	Bronze, gold plated
Spring	Stainless steel, unplated

Drill Size (mm)

Thread	M3
--------	----

Projection Height (mm)

F67603S0001R200M3	8,0
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The probe can be used in automated production. The materials and a defined wobble function of up to ± 0.2 mm make the probe robust and wear-resistant.

Order Code	Tip Style	Number	Material	\varnothing in mm	Plating	Version
F67603S0001R200M3		03	S	2,60	R	M3

BATTERY CONTACTS

F697

Battery Contact 50 mil Solder Tight

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

Spring Force (cN ±20%)

Version	Preload	Nominal
Standard	10	30

Travel (mm)

Version	Nominal	Maximum
Standard	1,0	1,3
Pointing Accuracy		±0,08 mm

Materials and Plating

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

Accessories

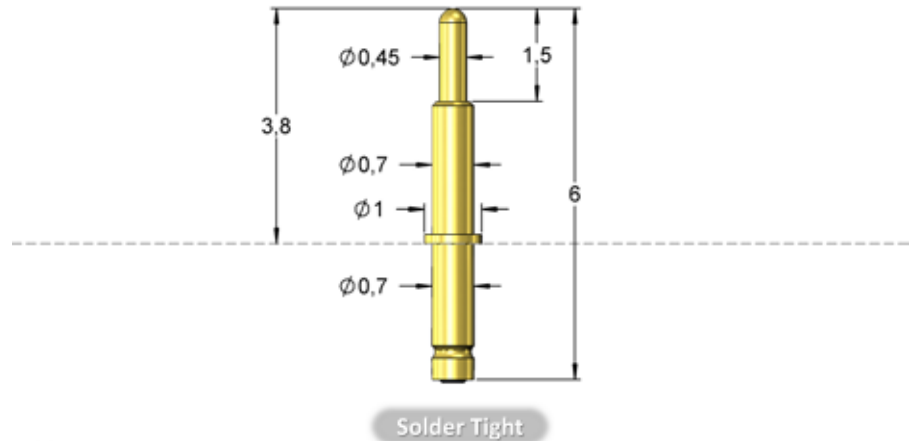
Insertion tool probe	FDWZ-050
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Drill Size (mm)

F697	0,68 - 0,70
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Projection Height (mm)

F697	3,8
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M 1:1



The F69711B045G030 can also be ordered for automatic assembly as taped components, with the order code 1860S235.

Design with standard plunger



Series	Tip-Ø	Spring Force (cN)
F697	11	045
	B	G
		030

Material: B = BeCu
Tip-Ø: 045 = 0,45 mm (e.g.)
Plating: G = Gold plated

Tip Style	Number	Material	Ø in mm	Plating	Version
	11	B	0,45	G	-

BATTERY CONTACTS

F709

Battery Contact 67 mil

Centers (mm/mil)	1,70 / 67
Current	5,0 A
R typ	<100 mOhm
Temperature	-20°C...+80°C, -40°C...+200°C (H)

Spring Force (cN ±20%)

Version	Preload	Nominal
Standard	10	40
H	10	20
ST	10	20

Travel (mm)

Version	Nominal	Maximum
Standard	1,0	1,2
H	1,0	1,2
ST	1,0	1,2
Pointing Accuracy		±0,08 mm

Materials and Plating

Plunger	BeCu, gold plated
Barrel	Brass, gold plated
Spring	Music wire, silver plated, Stainless steel, unplated
Receptacle	Bronze, gold plated

Accessories

Spacer 0,5 mm	H709DS/05
Insertion tool probe	FDWZ-050

Drill Size (mm)

F709	0,89 - 0,91
H709	1,12 - 1,14

Projection Height (mm)

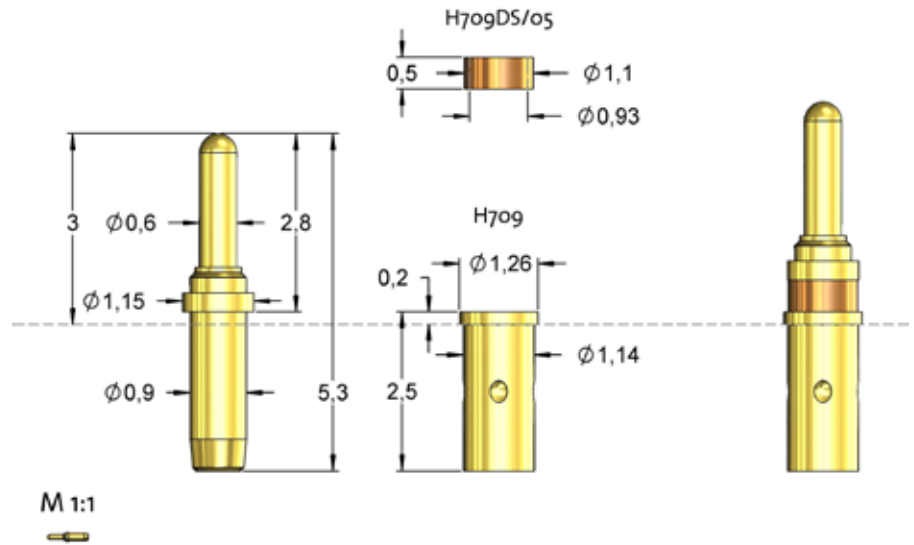
F709 in H709	3,0
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Design with drill hole plunger



Series	Tip-Ø	Spring Force (cN)
F709	11	B 060 G 040 ST
Tip Style	Material	Plating
		Version

Material:	B = BeCu
Tip-Ø:	060 = 0,60 mm (e.g.)
Plating:	G = Gold plated
Version:	H = High temperature, ST = Solder tight high temperature version
Receptacle:	Order code according drawing



The soldered version (ST) can also be used for automatic assembly.

Tip Style	Number	Material	Ø in mm	Plating	Version
	11	B	0,60	G	-
	11	B	0,60	G	H
	11	B	0,60	G	ST

F708

Battery Contact 87 mil Solder Tight

Centers (mm/mil)	2,20 / 87
Current	8,0 A
R typ	<100 mOhm
Temperature	-40°C...+200°C (H)

Spring Force (cN ±20%)

Version	Preload	Nominal
Standard	22	50
Standard	20	80
Standard	40	100

Travel (mm)

Version	Nominal	Maximum
Standard	1,0	1,2
Pointing Accuracy		±0,08 mm

Materials and Plating

Plunger	BeCu, gold plated
Barrel	Brass, gold plated
Spring	Stainless steel, unplated
Receptacle	Bronze, gold plated

Accessories

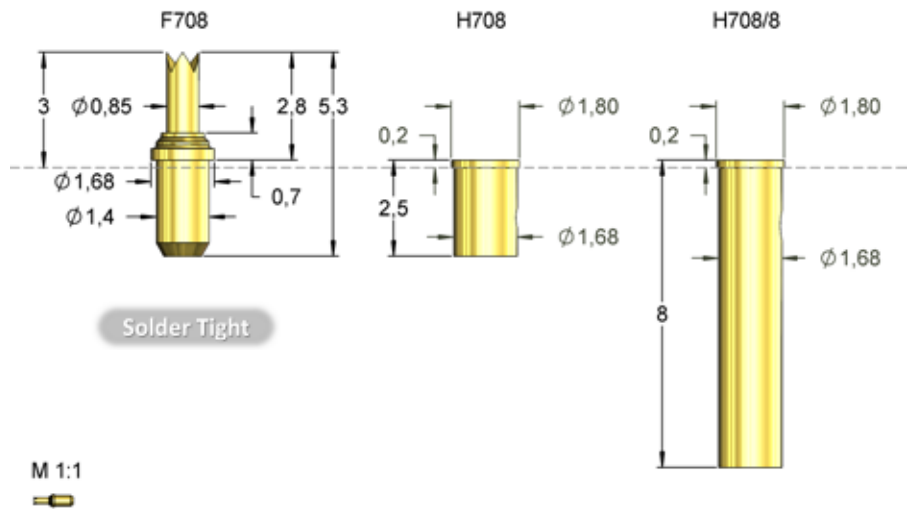
Insertion tool probe	FDWZ-075
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Drill Size (mm)

F708	1,38 - 1,40
H708...	1,66 - 1,68

Projection Height (mm)

F708 in H708...	3,0
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Can also be used for automatic assembly.

Design with drill hole plunger



Series	Tip-Ø	Spring Force (cN)
F708	11	B 085 G 080
Tip Style	Material	Plating
Version		

Material:	B = BeCu, S = Steel
Tip-Ø:	085 = 0,85 mm (e.g.)
Plating:	G = Gold plated, L = Longtime gold plated
Receptacle:	Order code according drawing

Tip Style	Number	Material	Ø in mm	Plating	Version
	11	B	0,85	G	-
	29	B	0,85	G	-

BATTERY CONTACTS

F704

Battery Contact 87 mil Solder Tight

Centers (mm/mil)	2,20 / 87
Current	8,0 A
R typ	<100 mOhm
Temperature	-40°C...+200°C (H)

Spring Force (cN ±20%)

Version	Preload	Nominal
Standard	20	60

Travel (mm)

Version	Nominal	Maximum
Standard	1,5	2,2
Pointing Accuracy		±0,08 mm

Materials and Plating

Plunger	BeCu, gold plated
Barrel	Brass, gold plated
Spring	Stainless steel, unplated
Receptacle	Bronze, gold plated

Accessories

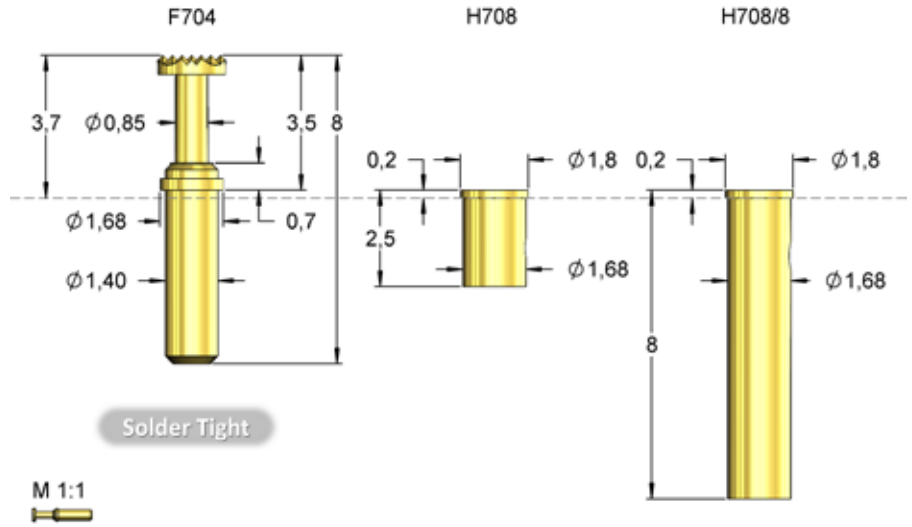
Insertion tool probe	FDWZ-075
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Drill Size (mm)

F704	1,39 - 1,41
H708...	1,66 - 1,68

Projection Height (mm)

F704 in H708...	3,7
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Can also be used for automatic assembly.

Design with drill hole plunger



Series	Tip-Ø	Spring Force (cN)
F704	06	B 180 G 060
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	Ø in mm	Plating	Version
	06	B	1,80	G	-

F706

Battery Contact 118 mil Solder Tight

Centers (mm/mil)	3,00 / 118
Current	9,0 A
R typ	<100 mOhm
Temperature	-40°C...+200°C (H)

Spring Force (cN ±20%)

Version	Preload	Nominal
Standard	20	100
Standard	70	150
Standard	80	200

Travel (mm)

Version	Nominal	Maximum
Standard	1,0	1,2
Pointing Accuracy		±0,08 mm

Materials and Plating

Plunger	BeCu, gold plated
Barrel	Brass, gold plated
Spring	Stainless steel, unplated
Receptacle	Bronze, gold plated

Accessories

Insertion tool receptacle	FEWZ-702E0
Insertion tool probe	FDWZ-100

Drill Size (mm)

F706	1,97 - 2,00
H702...	2,28 - 2,29

Projection Height (mm)

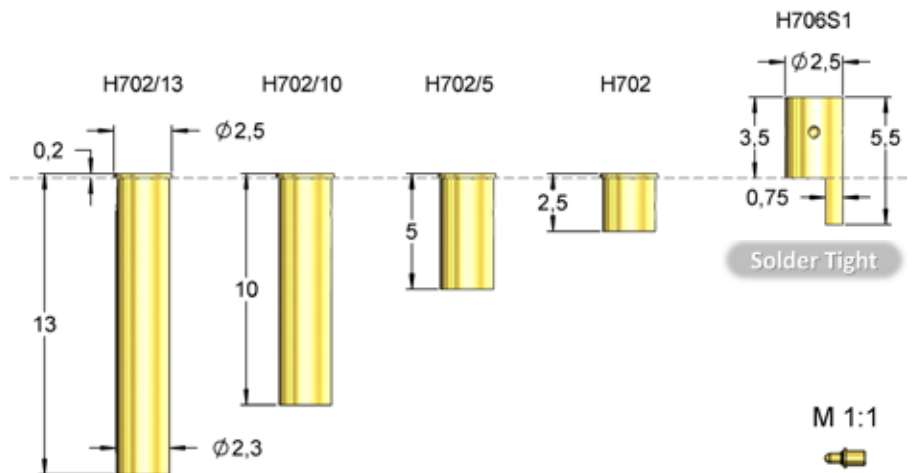
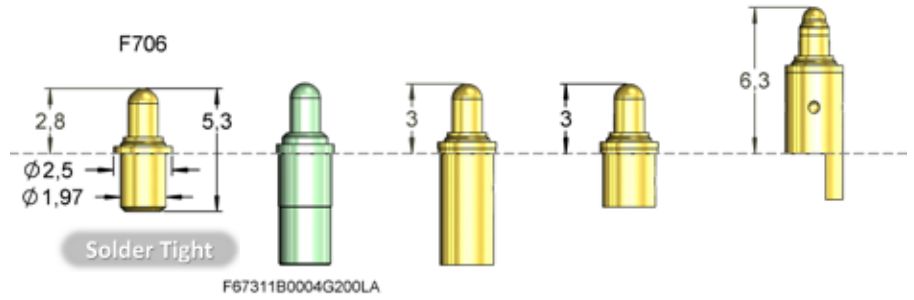
F706 in H702...	3,0
F706 in H706S1	6,3

Design with drill hole plunger

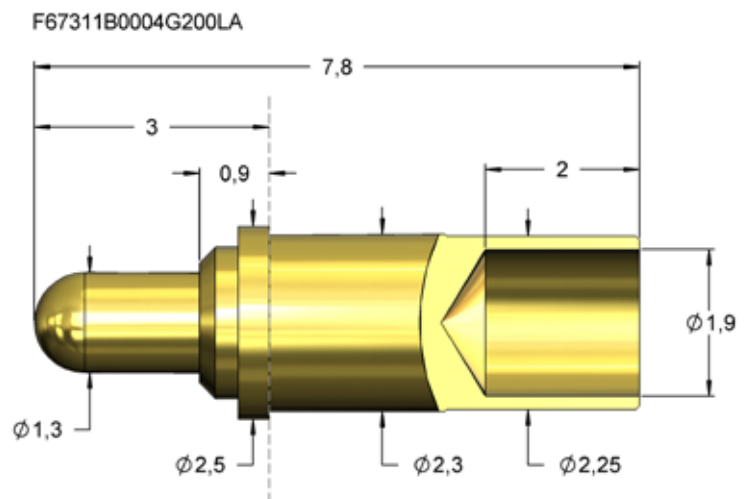


Series	Tip-Ø	Spring Force (cN)
F706	11	B 100 G 200
Tip Style	Material	Plating
Version		

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



Can also be used for automatic assembly.



With the F67311B0004G200LA, the mounting receptacle was integrated directly in the contact probe as a combination. This reduces the installation effort. However, this only makes sense if the contact probe does not have to be changed frequently.

Tip Style	Number	Material	Ø in mm	Plating	Version
	11	B	1,00	G	-
	11	B	1,30	G	-

BATTERY CONTACTS

F702

Battery Contact 118 mil Solder Tight

Centers (mm/mil)	3,00 / 118
Current	9,0 A
R typ	<100 mOhm
Temperature	-40°C...+200°C (H)

Spring Force (cN ±20%)

Version	Preload	Nominal
Standard	10	15
Standard	40	130

Travel (mm)

Version	Nominal	Maximum
Standard	1,5	2,2
Pointing Accuracy		±0,08 mm

Materials and Plating

Plunger	BeCu, gold plated
Barrel	Brass, gold plated
Spring	Stainless steel, unplated
Receptacle	Bronze, gold plated

Accessories

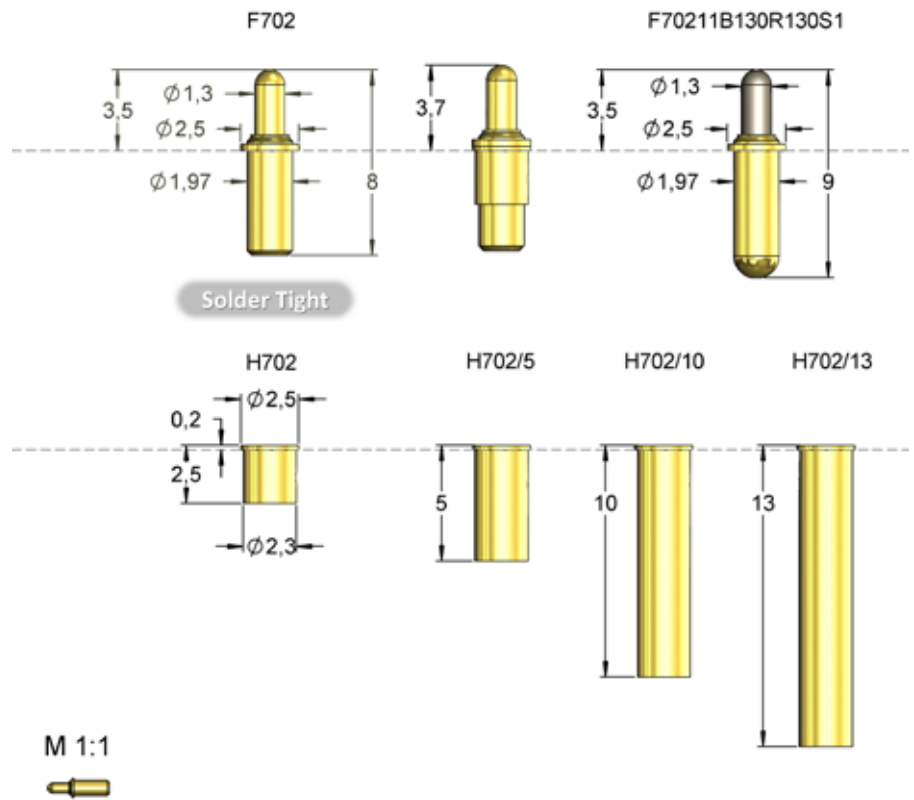
Insertion tool receptacle	FEWZ-702E0
Insertion tool probe	FDWZ-100

Drill Size (mm)

F706	1,96 - 1,98
H702...	2,28 - 2,29

Projection Height (mm)

F706 in H702...	3,7
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Can also be used for automatic assembly.

Design with drill hole plunger



Series	Tip-Ø	Spring Force (cN)
F702	11	B 130 G 130
Tip Style	Material	Plating
		Version

Material:	B = BeCu, S = Steel
Tip-Ø:	130 = 1,30 mm (e.g.)
Plating:	G = Gold plated, L = Longtime gold plated
Version:	S1 = Special version
Receptacle:	Order code according drawing

Tip Style	Number	Material	Ø in mm	Plating	Version
	11	B	1,30	G	-
	11	B	1,30	G	S1

BATTERY CONTACTS

F705

Battery Contact 118 mil Solder Tight

Centers (mm/mil)	3,00 / 118
Current	9,0 A
R typ	<100 mOhm
Temperature	-40°C...+200°C (H)

Spring Force (cN ±20%)

Version	Preload	Nominal
Standard	30	50
Standard	80	130
Standard	75	200
LA	80	130
LA	75	200

Travel (mm)

Version	Nominal	Maximum
Standard	1,5	3,0
Pointing Accuracy		±0,08 mm

Materials and Plating

Plunger	BeCu, gold plated
Barrel	Brass, gold plated
Spring	Stainless steel, unplated
Receptacle	Bronze, gold plated

Accessories

Insertion tool receptacle	FEWZ-702E0
Insertion tool probe	FDWZ-100

Drill Size (mm)

F705	1,96 - 1,98
H702...	2,28 - 2,29

Projection Height (mm)

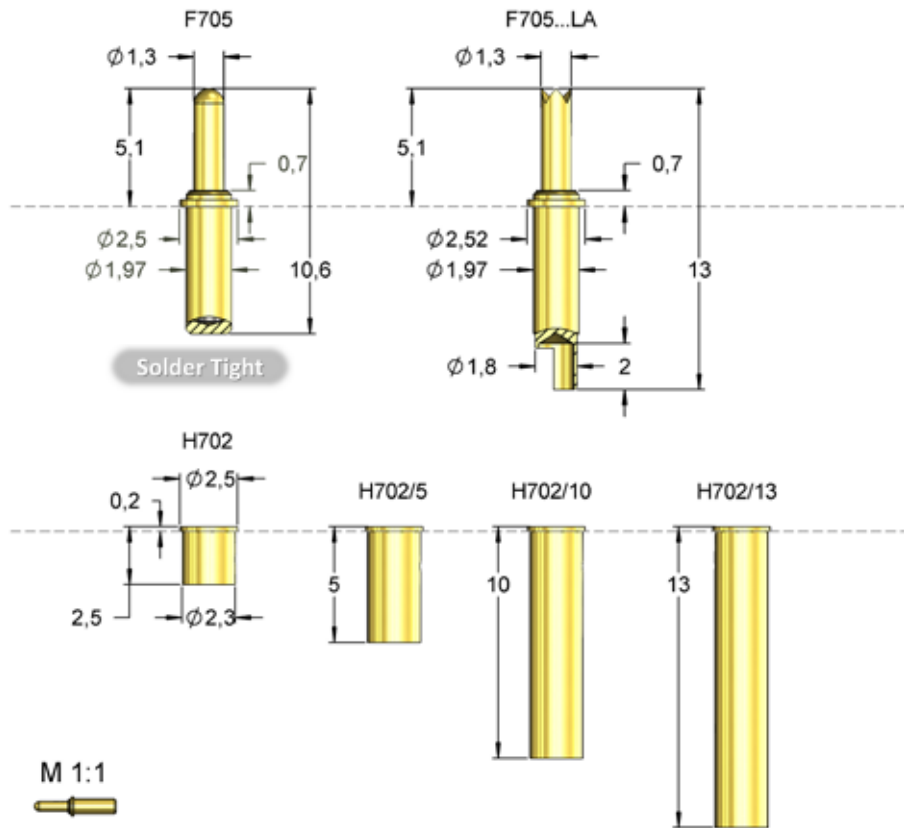
F705 in H702...	5,3
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Design with drill hole plunger



Series	Tip-Ø	Spring Force (cN)
F705	11	B
	130	G
		130
		CR
	Tip Style	Material
		Plating
		Version

Material:	B = BeCu
Tip-Ø:	130 = 1,30 mm (e.g.)
Plating:	G = Gold plated
Version:	CR = Crimp Version, LA = Solder Version, LI = with Strand
Receptacle:	Order code according drawing



The version F705...LI with 550mm blue flexible wire (AWG18) is available.
Conductor cross-section: 0,90mm².

Tip Style	Number	Material	Ø in mm	Plating	Version
	11	B	1,30	G	-
	29	B	1,30	G	-
	11	B	1,30	G	LA
	29	B	1,30	G	LA

BATTERY CONTACTS

F713

Battery Contact 157 mil Solder Tight

Centers (mm/mil)	4,00 / 157
Current	10,0 A
R typ	<100 mOhm
Temperature	-40°C...+200°C (H)

Spring Force (cN ±20%)

Version	Preload	Nominal
Standard	70	150

Travel (mm)

Version	Nominal	Maximum
Standard	2,8	3,5
Pointing Accuracy		±0,10 mm

Materials and Plating

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

Accessories

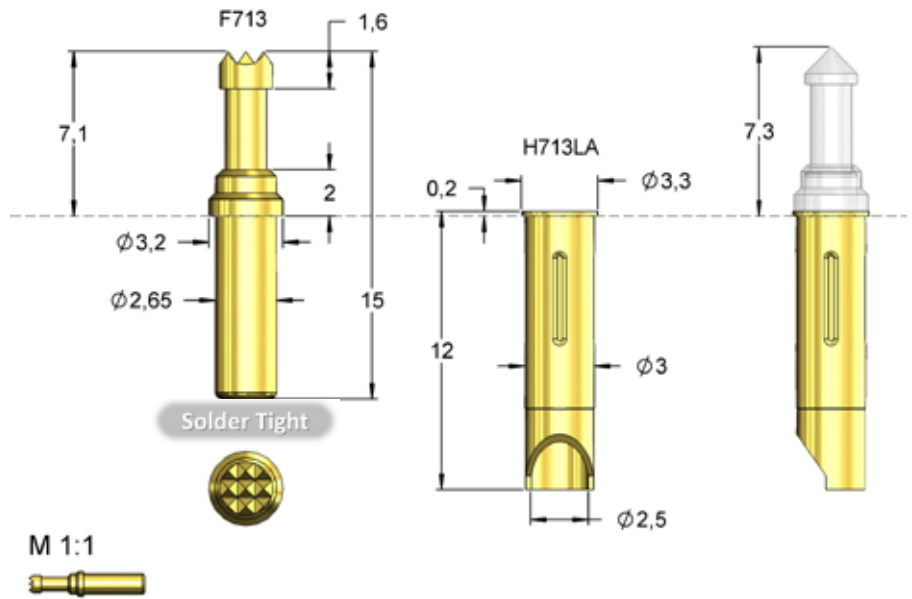
Insertion tool receptacle	FEWZ-713E0
Insertion tool probe	FDWZ-100

Drill Size (mm)

H713LA	2,98 - 2,99
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Projection Height (mm)

F713 in H713LA	7,3
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The F71312E230U150 with plunger made of stainless steel has different electrical values. Information for a suitable threaded version is available, see F723.

Design with standard plunger



Series	Tip-Ø	Spring Force (cN)
F713 06 B 230 G 150		
Tip Style	Material	Plating
		Version

Material: B = BeCu, E = Stainless steel
Tip-Ø: 230 = 2,30 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	2,30	G	-
	12	E	2,30	U	-

F650

Battery Contact 256 mil Solder Tight, Robust Version

Centers (mm/mil)	6,50 / 256
Current	10,0 A
R typ	<30 mOhm
Temperature	-40°C...+200°C (H)

Spring Force (cN ±20%)

Version	Preload	Nominal
Standard	50	150

Travel (mm)

Version	Nominal	Maximum
Standard	3,2	5,0
Pointing Accuracy		±0,08 mm

Materials and Plating

Plunger	Brass, gold plated
Barrel	Brass, gold plated
Spring	Stainless steel, unplated
Receptacle	Brass, gold plated

Accessories

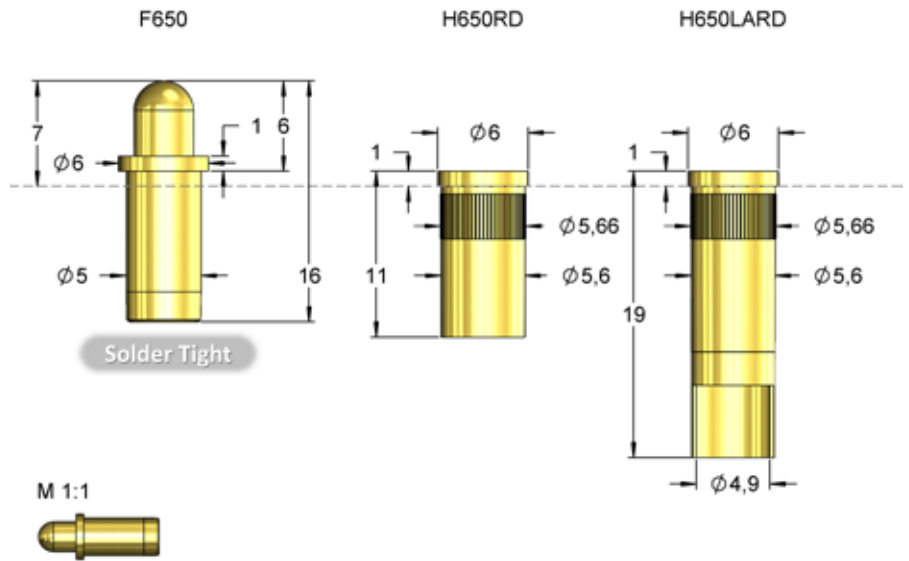
Insertion tool probe	FDWZ-650
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Drill Size (mm)

F650	4,98 - 5,01
H650...	5,62 - 5,65

Projection Height (mm)

F650 in H650...	7,0
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Design with standard plunger



Series	Tip-Ø	Spring Force (cN)
F650	11	M 400 G 150
Tip Style	Material	Plating
		Version

Material:	M= Brass
Tip-Ø:	400 = 4,00 mm (e.g.)
Plating:	G = Gold plated
Receptacle:	Order code according drawing

Tip Style	Number	Material	Ø in mm	Plating	Version
	11	M	4,00	G	-

BATTERY CONTACTS

F652

NEW

Battery Contact 256 mil Solder Tight, Robust Version

Centers (mm/mil)	6,50 / 256
Current	30,0 A
R typ	<30 mOhm
Temperature	-40°C...+200°C (H)

Spring Force (cN ±20%)

Version	Preload	Nominal
Standard	60	150
Standard	100	300
Standard	120	400
Standard	150	500

Travel (mm)

Version	Nominal	Maximum
Standard	4,8	7,0
Pointing Accuracy		±0,08 mm

Materials and Plating

Plunger	Brass, gold plated
Barrel	Brass, gold plated
Spring	Stainless steel, unplated
Receptacle	Brass, gold plated

Accessories

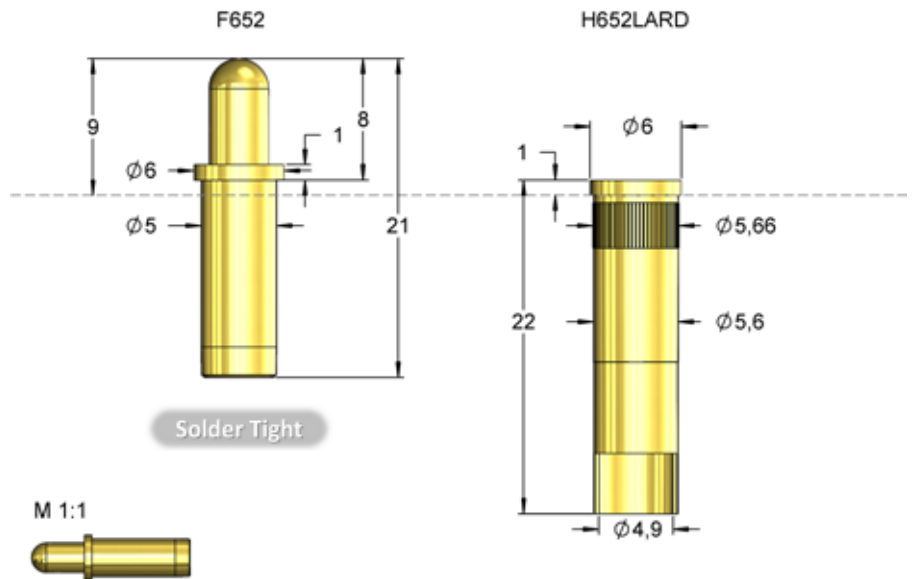
Insertion tool probe	FDWZ-650
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Drill Size (mm)

F652	4,98 - 5,01
H652...	5,62 - 5,65

Projection Height (mm)

F651 in H652...	9,0
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Design with standard plunger



Series	Tip-Ø	Spring Force (cN)
F652	11	400
	M	G
		150

Material:	M= Brass
Tip-Ø:	400 = 4,00 mm (e.g.)
Plating:	G = Gold plated
Receptacle:	Order code according drawing

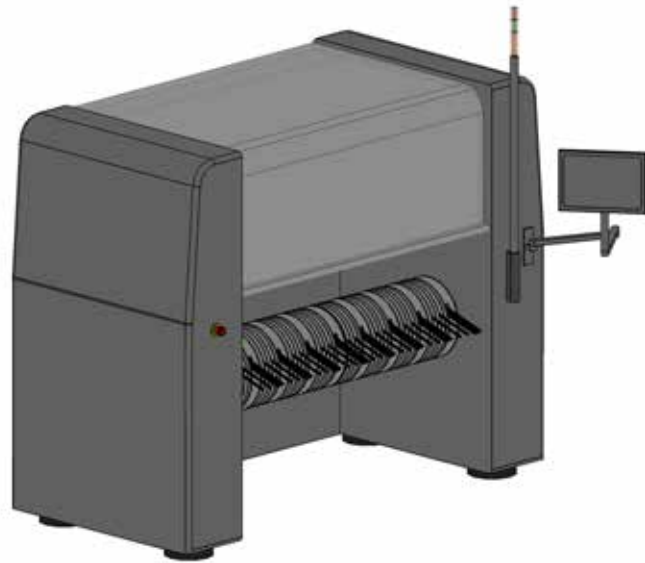
Tip Style	Number	Material	Ø in mm	Plating	Version
	11	M	4,00	G	-

BATTERY CONTACTS

Automated Assembly

For an automated assembly in large quantities, charge contacts or short travel probes can also be delivered in block units or taped on request.

Typical applications are the automated assembly of printed circuit boards or other electronic production processes.



Contact Pins in Block Units

This solution allows cost effective and time saving assembly without the need to interrupt the production process by manual operations. Using block units also simplifies the centering and positioning of the probes.



Taped Contact Probes

This solution allows cost effective and time saving assembly without the need to interrupt the production process by manual operations.



BATTERY CONTACTS

Carrier Tape

The pockets in the carrier tape are produced by thermoforming.

Most commonly used materials:

Polystyrene PS, polycarbonate PC, polypropylene PP, polyethylene terphthalate PET as an antistatic or conductive version (important for electronic components).

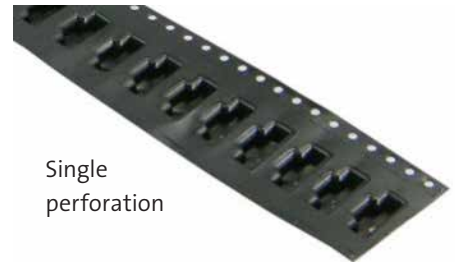
Common tape widths:

8 mm; 12 mm; 16 mm; 24 mm; 32 mm; 44 mm; 56 mm; 72 mm; 80 mm up to 200 mm

Common tape thicknesses:

0,20 mm; 0,25 mm; 0,30 mm; 0,35 mm; 0,40 mm; 0,50 mm

With a minimum tape width of 32 mm double perforations for the feeding process are possible.



Single perforation



Double perforation

Accessories

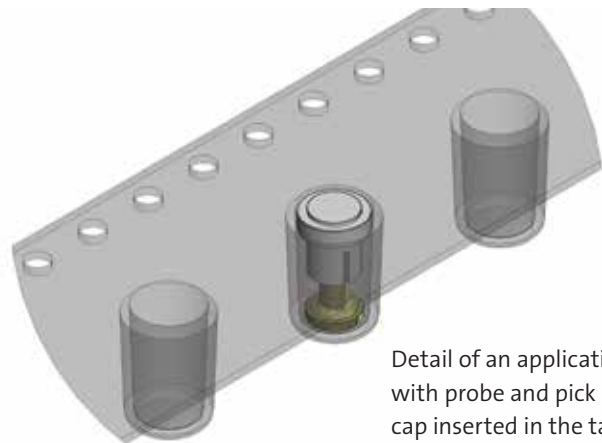
To remove components more easily from the tape pick & place caps or clips can be used. This is especially important for probes with a complex shape.



Probe with pick & place cap



Application of pick & place cap

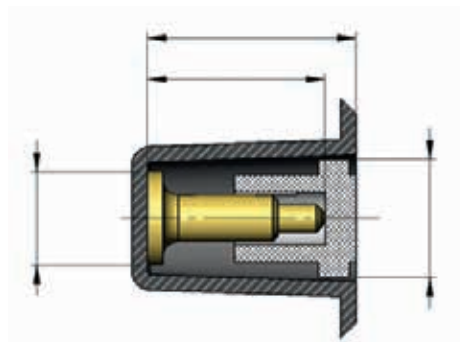


Detail of an application with probe and pick & place cap inserted in the tape

Taping Information

If a component is to be taped, the following information is necessary:

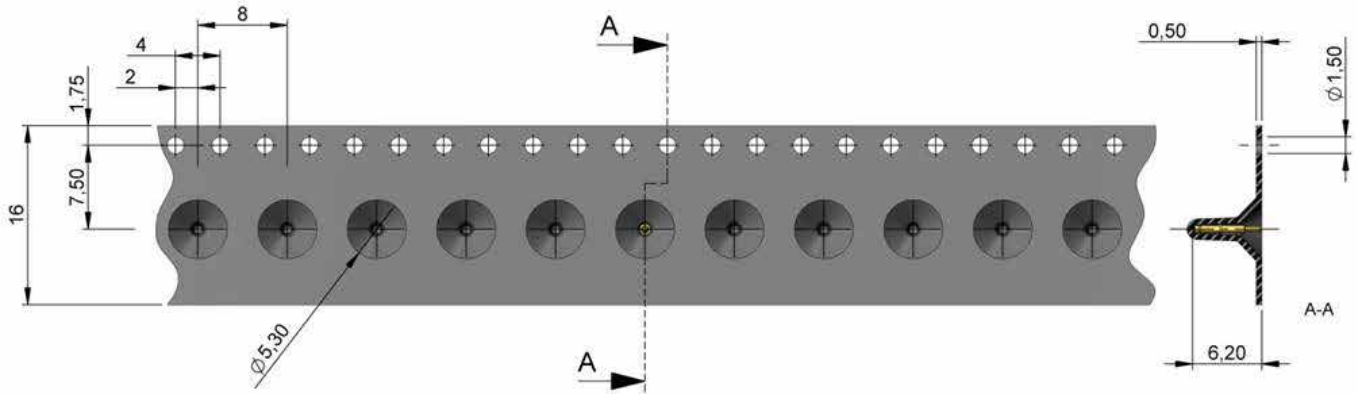
Component dimensions L/W/H, number of required probes, number of required rolls, required delivery date, packaging wishes, carrier tape material, tape width.



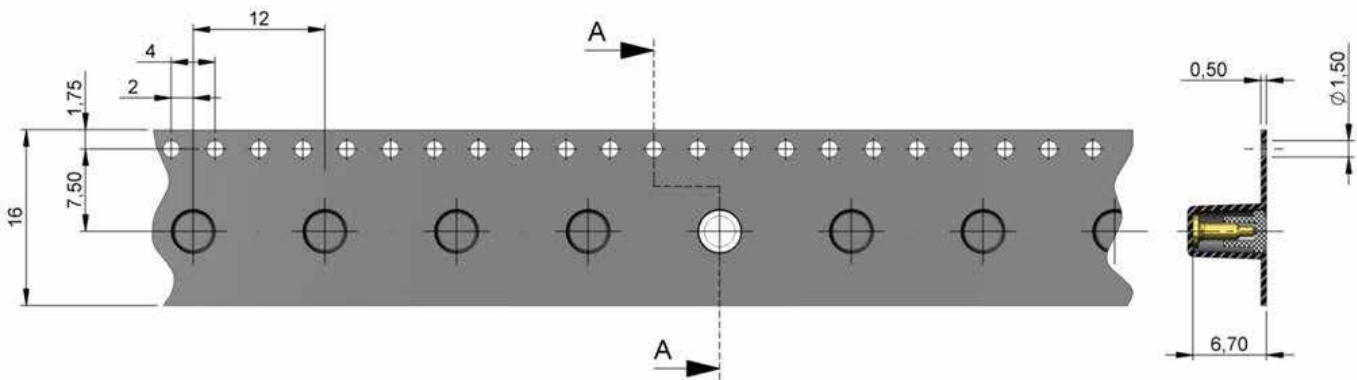
BATTERY CONTACTS

Probes for automated assembly The Following Tapes are Defined as a Standard

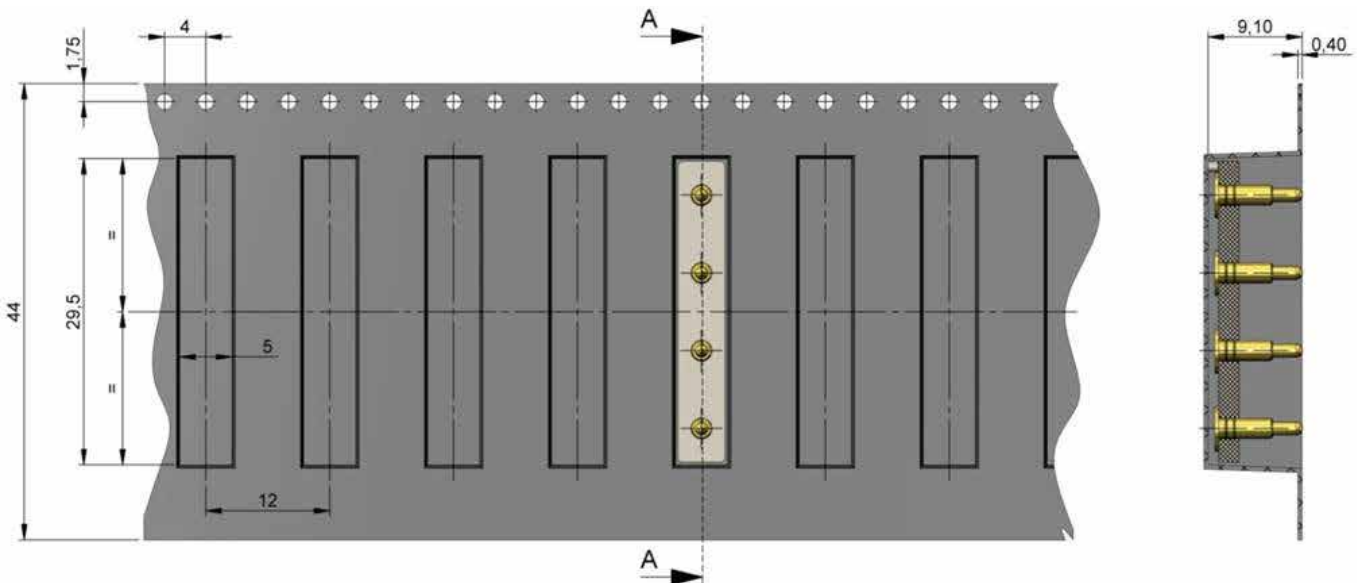
Order code tape: 1860S235
One tape includes 500 pieces of the battery contact F69711B045G030



Order code tape: 1860S265
One tape includes 800 pieces of the battery contact F67311B2001G065



Other tapes on request





Short Travel Probes

Short travel probes are spring contact probes with a nominal travel of 3.0 mm and less. The spring and also the total length of the probe can be shorter compared to standard probes. Typical applications are test fixtures with limited space or single contact points with a limited projection height.

SHORT TRAVEL PROBES

F691

Short Travel Probe
for Pressing-in

NEW

Centers (mm/mil)	1,80 / 71
Current	5,0 A
R typ	<50 mOhm
Temperature	-20°C...+80°C

Spring Force (cN ±20%)

Version	Preload	Nominal
S1	40	80
Standard	40	80

Federwege (mm)

Version	Nominal	Maximum
S1	3,0	3,5
Standard	3,0	3,5

Materials and Plating

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

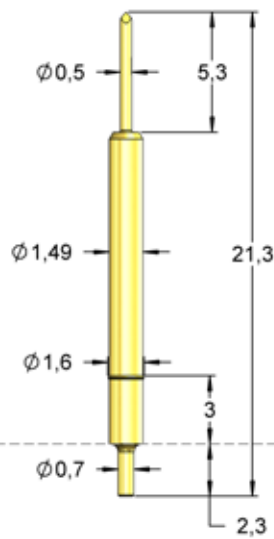
Drill Size (mm)

F691	1,52 - 1,56
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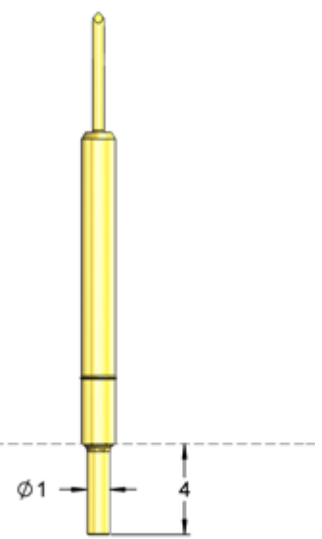
Projection Height (mm)

F691	21,3
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F69130B050G080



F69130B050G080S1





M 1:1



Type	Tip-Ø	Spring Force (cN)
F 691 30 B 050 G 080 S1		
Tip Style	Material	Finish Special Version

Material: B = BeCu
Tip-Ø: o50= 0,50 mm (e.g.)
Finish: G = Gold plated
Version: S1 = different Length of Contact end

Tip Styles	Number	Material	Ø in mm	Plating	Version
	30	B	0,50	G	S1
	30	B	0,50	G	-

SHORT TRAVEL PROBES

F620

Short Travel Probe 100 mil

Centers (mm/mil)	2,54 / 100
Current	8,0 A
R typ	<30 mOhm
Temperature	-40°C...+200°C (H)

Spring Force (cN ±20%)

Version	Preload	Nominal
Standard	40	75
Standard	50	130

Travel (mm)

Version	Nominal	Maximum
Standard	1,3	1,6
Pointing Accuracy		±0,08 mm

Materials and Plating

Plunger	see Tip Style
Barrel	Bronze, gold plated
Spring	Stainless steel, silver plated

Drill Size (mm)

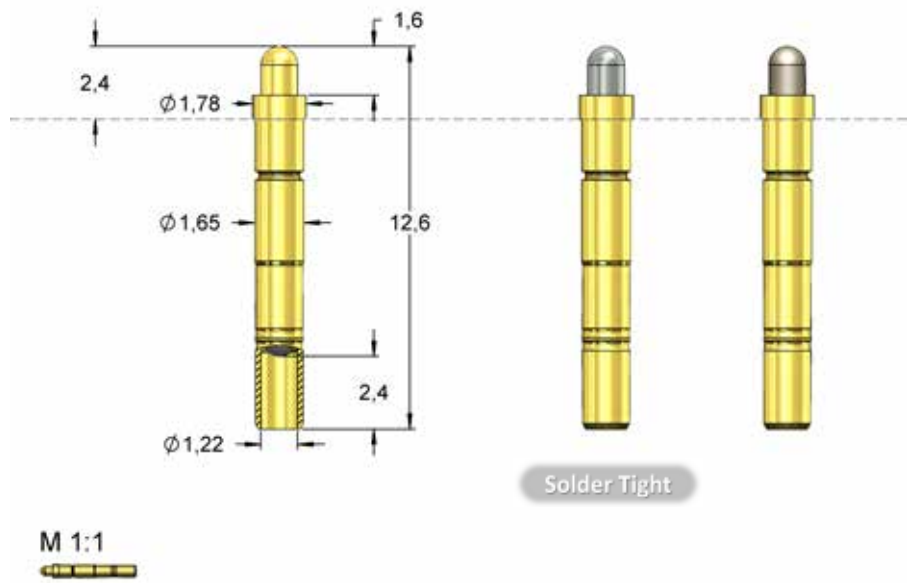
F620...	1,63 - 1,65
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Projection Height (mm)

F620...	2,4
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Series	Tip-Ø	Spring Force (cN)
F620	11 S 120 L 130	
Tip Style	Material	Plating
		Version

Material: S = Steel
Tip-Ø: 120 = 1,20 mm (e.g.)
Plating: L = Longtime gold plated, N = Nickel, R = Rhodanized
Receptacle: Order code according drawing



Tip Style	Number	Material	Ø in mm	Plating	Version
	01	S	1,20	L	-
	11	S	1,20	L	-
	11	S	1,20	N	-
	11	S	1,20	R	-

F69911S120L130

Short Travel Probe 100 mil

Centers (mm/mil)	2,54 / 100
Current	8,0 A
R typ	<30 mOhm
Temperature	-40°C...+200°C (H)

Spring Force (cN ±20%)

Version	Preload	Nominal
Standard	50	130

Travel (mm)

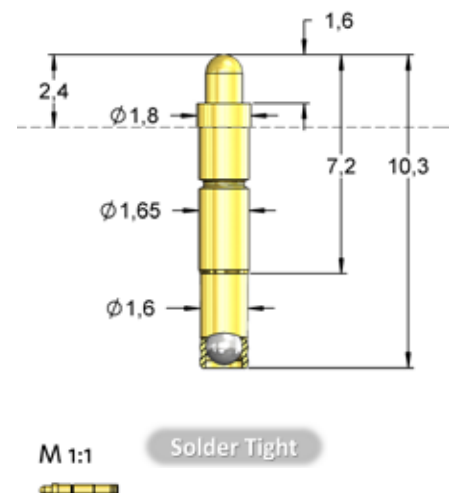
Version	Nominal	Maximum
Standard	1,3	1,6
Pointing Accuracy		±0,08 mm

Materials and Plating

Plunger	Steel, gold plated
Barrel	Bronze, gold plated
Spring	Stainless steel, unplated

Drill Size (mm)

F699...	1,63 - 1,65
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SHORT TRAVEL PROBES

F665...S1

Short Travel Probe 50 mil for Interfaces

Centers (mm/mil)	1,27 / 50
Current	4,0 A
R typ	<20 mOhm
Temperature	-20°C...+80°C

Spring Force (cN ±20%)

Version	Preload	Nominal
S1	34	60

Travel (mm)

Version	Nominal	Maximum
S1	0,6	1,1
Pointing Accuracy		±0,08 mm

Materials and Plating

Plunger	BeCu, gold plated
Barrel	Bronze, gold plated
Spring	Stainless steel, gold plated
Receptacle	Bronze, gold plated

Accessories

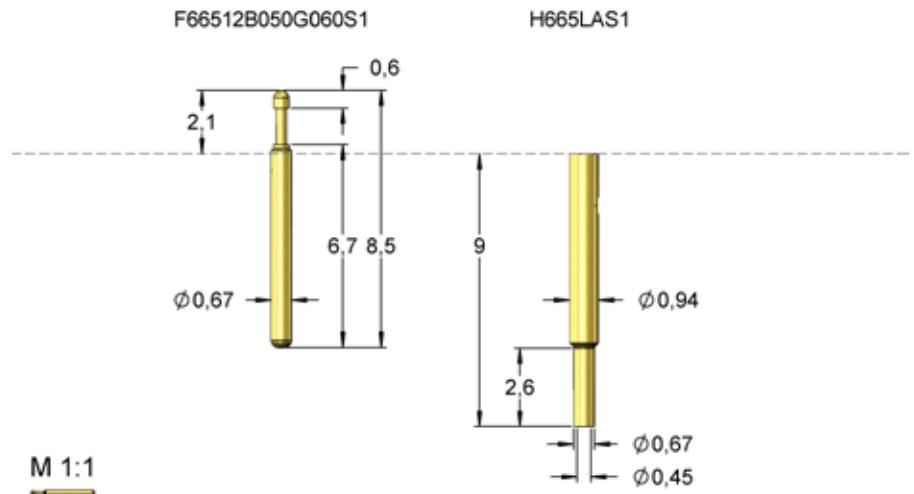
Insertion tool receptacle	FEWZ-511E0
Insertion tool probe	FDWZ-050

Drill Size (mm)

H605WW	0,93 - 0,94
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Projection Height (mm)


F665...S1 in H665LAS1	2,1
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Suitable for a reliable signal transmission in interfaces. The probe is designed with a bias ball.

Series	Tip-Ø	Spring Force (cN)
F665	12	B 050 G 060 S1
Tip Style	Material	Plating
		Version

Material:	B = BeCu
Tip-Ø:	050 = 0,50 mm (e.g.)
Plating:	G = Gold plated
Version:	S1 = Special version (see drawing)
Receptacle:	Order code according drawing

Tip Style	Number	Material	Ø in mm	Plating	Version
	12	B	0,50	G	S1

SHORT TRAVEL PROBES

F665

Short Travel Probe 50 mil

Centers (mm/mil)	1,27 / 50
Current	4,0 A
R typ	<70 mOhm
Temperature	-20°C...+80°C

Spring Force (cN ±20%)

Version	Preload	Nominal
Standard	30	75

Travel (mm)

Version	Nominal	Maximum
Standard	0,8	1,2
Pointing Accuracy		±0,08 mm

Materials and Plating

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

Accessories

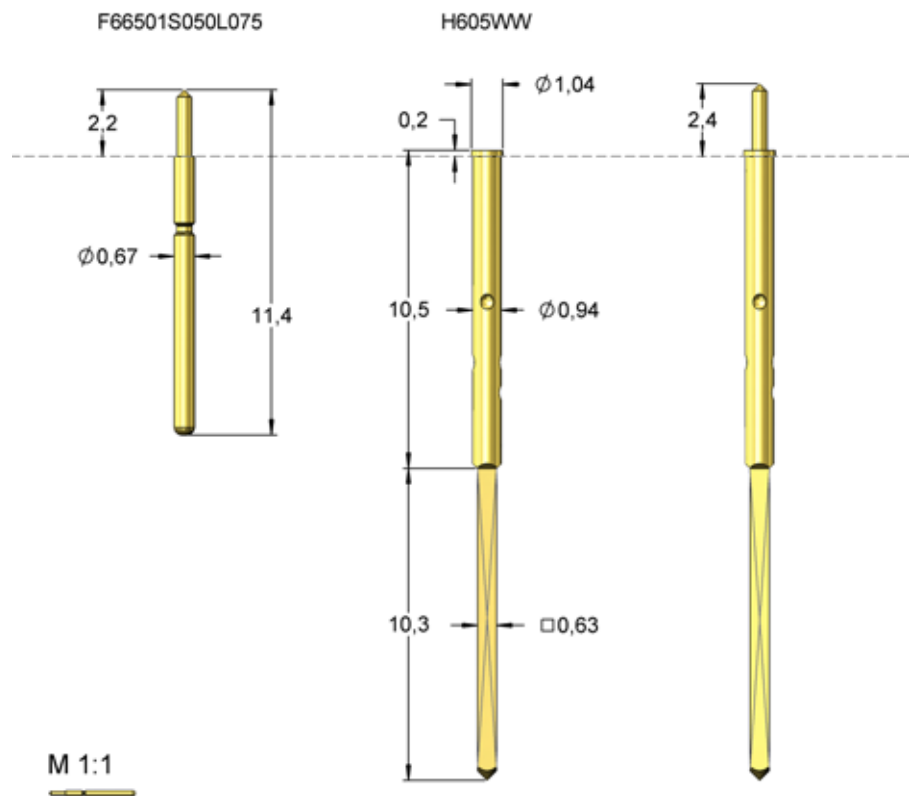
Insertion tool receptacle	FEWZ-511E0
Insertion tool probe	FDWZ-050

Drill Size (mm)

H605WW	0,92 - 0,94
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Projection Height (mm)


F665 in H605WW	2,4
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See also alternative / additional series F111 (16.5 mm) and F511 (24.7 mm) with the same center but different length.

Series	Tip-Ø	Spring Force (cN)
F665 01 S 050 L 075		
Tip Style	Material	Plating
		Version

Material:	S = Steel
Tip-Ø:	050 = 0,50 mm (e.g.)
Plating:	L = Longtime gold plated
Receptacle:	Order code according drawing

Tip Style	Number	Material	Ø in mm	Plating	Version
	01	S	0,50	L	-

SHORT TRAVEL PROBES

F605

Short Travel Probe 50 mil

Centers (mm/mil)	1,27 / 50
Current	4,0 A
R typ	<70 mOhm
Temperature	-20°C...+80°C

Spring Force (cN ±20%)

Version	Preload	Nominal
Standard	15	50
Standard	30	75

Travel (mm)

Version	Nominal	Maximum
Standard	0,8	1,2
Pointing Accuracy		±0,08 mm

Materials and Plating

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

Accessories

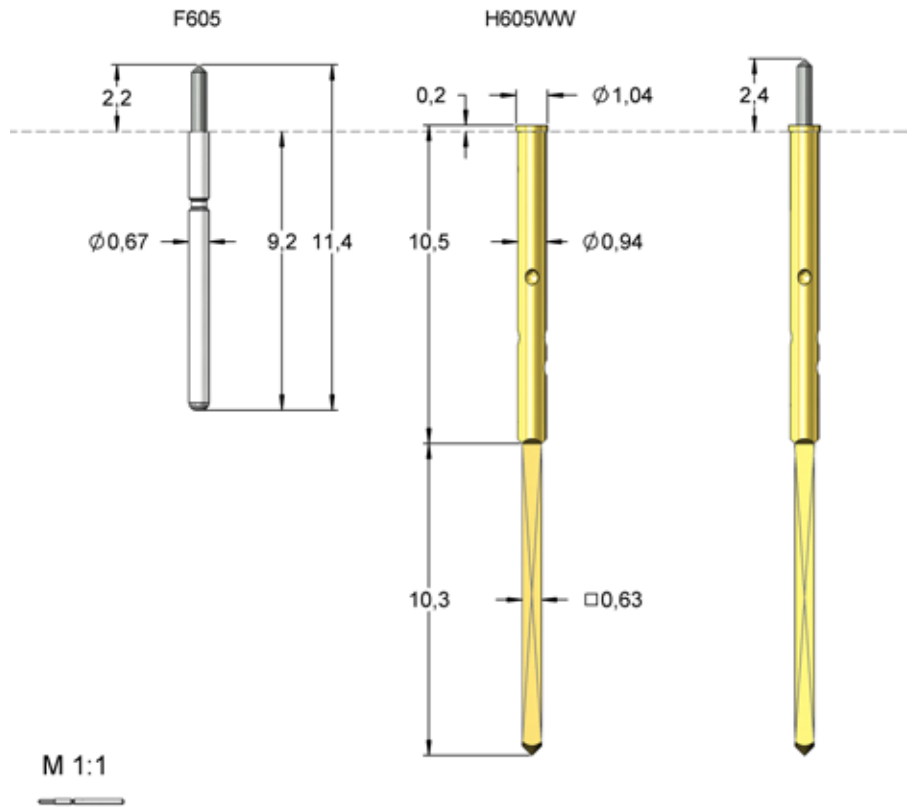
Insertion tool receptacle	FEWZ-511E0
Insertion tool probe	FDWZ-050

Drill Size (mm)

H605WW	0,94 - 0,96
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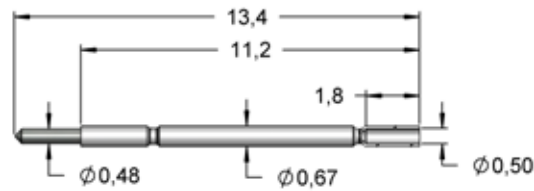
Projection Height (mm)

F605 in H605WW	2,4
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See also alternative / additional series F111 (16.5 mm) and F511 (24.7 mm) with the same center but different length.

F60501S050N075S1



Series	Tip-Ø	Spring Force (cN)
F605	01	S 050 L 075
Tip Style	Material	Plating
		Version

Material: S = Steel
Tip-Ø: 050 = 0,50 mm (e.g.)
Plating: L = Longtime gold plated, N = Nickel
Receptacle: Order code according drawing

Tip Style	Number	Material	Ø in mm	Plating	Version
	01	S	0,50	L	-
	01	S	0,50	N	S1
	07	S	1,00	L	-
	11	S	0,50	L	-
	11	S	0,50	N	-

SHORT TRAVEL PROBES

F670

Short Travel Probe 100 mil

Centers (mm/mil)	2,54 / 100
Current	8,0 A
R typ	<20 mOhm
Temperature	-20°C...+80°C

Spring Force (cN ±20%)

Version	Preload	Nominal
Standard	40	85
Standard	95	185

Travel (mm)

Version	Nominal	Maximum
Standard	0,8	1,2
Pointing Accuracy		±0,08 mm

Materials and Plating

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

Accessories

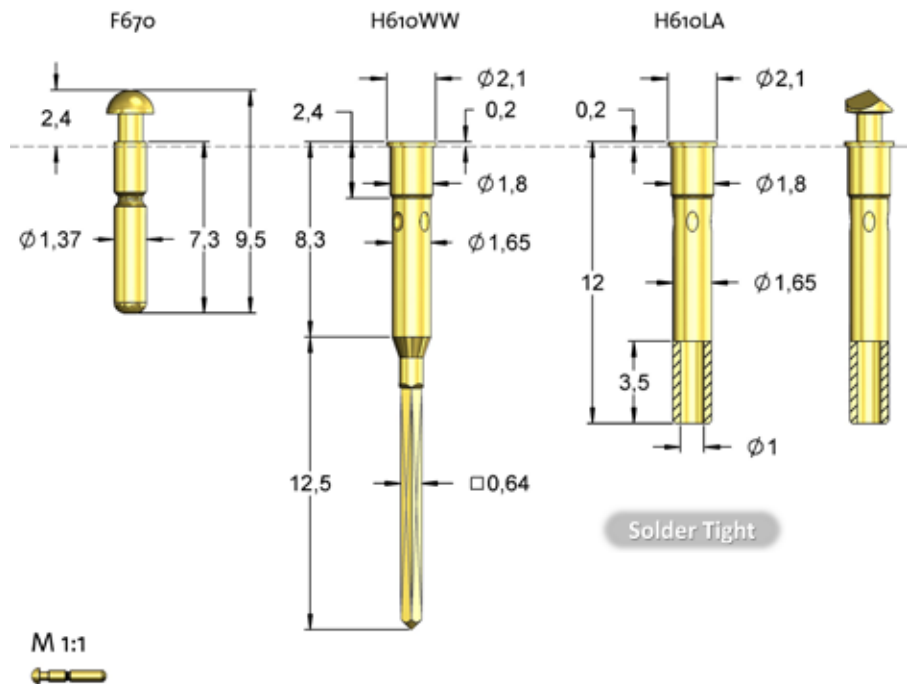
Insertion tool receptacle	FEWZ-100E0
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Drill Size (mm)

H610...	1,78 - 1,79
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Series	Tip-Ø	Spring Force (cN)
F670	11	B 105
		G 085
	Tip Style	Material
		Plating
		Version

Material: B = BeCu
Tip-Ø: 105 = 1,05mm (z.B.)
Plating: G = Gold plated
Receptacle: Order Code according drawing



Projection Height (mm)

F670 in H610...	2,4
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Tip Style	Number	Material	Ø in mm	Plating	Version
	06	B	2,00	G	-
	11	B	1,05	G	-
	12	B	2,00	G	-
	15	B	2,00	G	-

F69311B105R085

Short Travel Probe 75 mil

Centers (mm/mil)	1,90 / 75
Current	8,0 A
R typ	<30 mOhm
Temperature	-20°C...+80°C

Spring Force (cN ±20%)

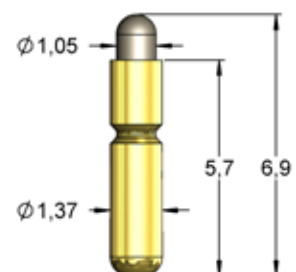
Version	Preload	Nominal
Standard	40	85

Travel (mm)

Version	Nominal	Maximum
Standard	0,8	1,2
Pointing Accuracy		±0,08 mm

Materials and Plating

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



SHORT TRAVEL PROBES

F63011S120L070

Short Travel Probe 100 mil

Centers (mm/mil)	2,54 / 100
Current	8,0 A
R typ	<30 mOhm
Temperature	-20°C...+80°C

Spring Force (cN ±20%)

Version	Preload	Nominal
Standard	40	70

Travel (mm)

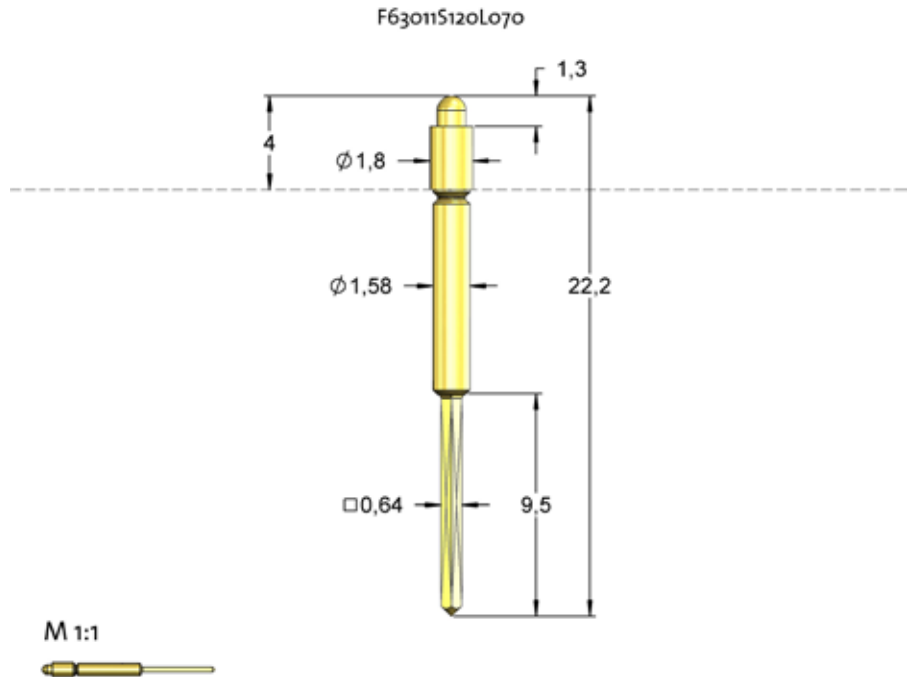
Version	Nominal	Maximum
Standard	0,9	1,3
Pointing Accuracy		±0,08 mm

Materials and Plating

Plunger	Steel, gold plated
Barrel	Brass, gold plated
Spring	Music wire, silver plated

Drill Size (mm)

F630...	1,56 - 1,58
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F69211M140G250

Short Travel Probe 100 mil

Centers (mm/mil)	2,54 / 100
Current	8,0 A
R typ	<30 mOhm
Temperature	-40°C...+200°C (H)

Spring Force (cN ±20%)

Version	Preload	Nominal
Standard	100	250

Travel (mm)

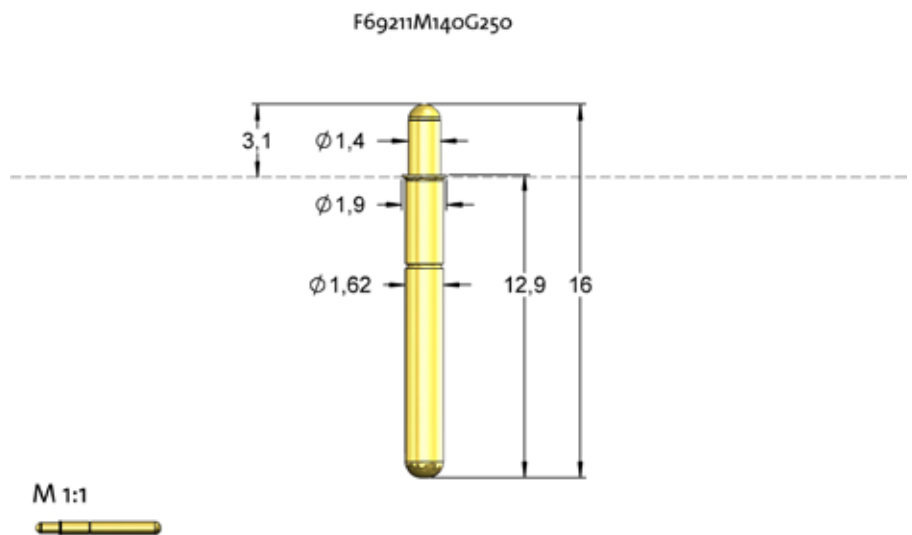
Version	Nominal	Maximum
Standard	2,8	3,0
Pointing Accuracy		±0,08 mm

Materials and Plating

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

Drill Size (mm)

F692...	1,60 - 1,62
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Tools and Accessories

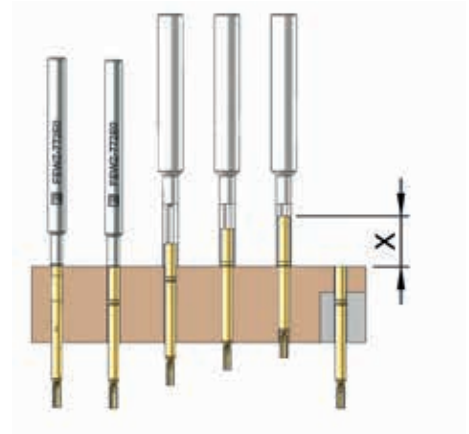
For installation and maintenance of contact probes and receptacles FEINMETALL offers a great variety of tools. For the mounting of standard probes practical insertion- and screw-in tools are useful. For a simple and effective mounting of switch probes tools with integrated functions are ideal, for example 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.

FEWZ

Insertion tools for receptacles

Insertion tool (FEWZ) for receptacles with fixed stop (collar or press ring on top)

Order Code	Insertion height [mm]	Pin-Ø [mm]	Receptacle
FEWZ-050E0	0,0	0,8	H050, H787, H051
FEWZ-075E0	0,0	0,9	H075, H175, H176, H310, H701
FEWZ-100E0	0,0	1,3	H100, H320, H502, H708, H731, H805, H863, H865
FEWZ-109E0	0,0	0,5	H109
FEWZ-330E0	0,0		H330
FEWZ-340E0	0,0		H340, H419, H887
FEWZ-348E0	0,0		H348, H349
FEWZ-511E0	0,0	0,6	H111, H511, H730
FEWZ-563E0	0,0	2,0	H563
FEWZ-735E0	0,0	3,5	H735, H725, H775
FEWZ-772E0	0,0	1,6	H772, H727, H732, H752, H875, H876, H877, H878, H879
FEWZ-774E0	0,0	2,6	H774, H566, H713, H723, H733, H735, H737, H773, H810, H866, H867, H880, H881, H884, H885,
FEWZ-822E0	0,0	4,2	H822, H832, H860



All receptacles with dead stop (collar) can be inserted with tool FEWZ-...E0. Press ring at receptacles can be used also as dead stop. The guiding pin of the tool helps to stabilize and properly mount the receptacle.

Insertion tool for receptacles with press ring (inserted)

Order Code	Insertion height X required [mm]	I-Ø [mm]	Receptacle
FEWZ-050Exx	xx	1,10	H050, H787
FEWZ-075Exx	xx	1,50	H075
FEWZ-100Exx	xx	1,83	H100



All receptacles with press ring can be inserted with tool FEWZ-...Ex. In this case the x is the fix height level (see picture). This value is required for ordering the correct tool. For often changing projection heights the variable tool below is recommended.

Variable insertion tool for receptacles

Order Code	Insertion height X [mm]	PIN-Ø / I-Ø [mm]	Receptacle
FEWZ-050EV	0 - 10	0,79 / 1,20	H050, H787
FEWZ-075EV	0 - 12	1,00 / 1,50	H075
FEWZ-100EV	0 - 12	1,38 / 1,90	H100
FEWZ-772EV	0 - 10	1,65 / 2,20	H772

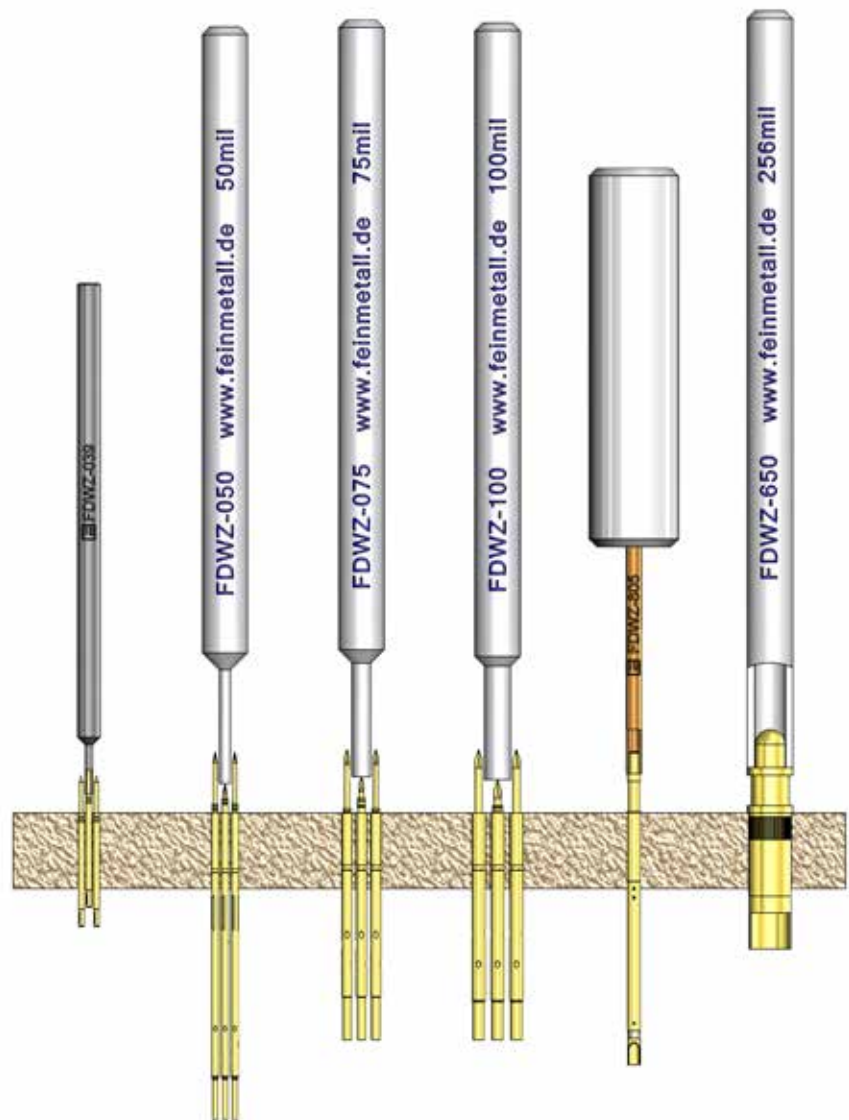


For different height levels of the receptacles with inserted press ring, the tool FEWZ-...EV is recommended. The required height level can be adjusted at the tool..

FDWZ

Insertion tools for plug-in contact probes in receptacles

For inserting the probe into the receptacle tool FDWZ is helpful. After the probe is pushed into the receptacle and stopped by the pressure marks, the probe is driven into the receptacle with the FDWZ tool. The tool is made of a synthetic material to avoid any damaging of the plunger tips. Depending on the design of the contact probe, the tool can also sit on the collar of the probe.



Order Code	Shank- ϕ [mm]	Handle- ϕ [mm]	Length [mm]	e.g. for probe Types
FDWZ-039	A- ϕ =1,00; I- ϕ =0,55	3,00	67,50	F039
FDWZ-050	1,50	6,00	100,0	F050, F051, F086, F588, F768, F787, F788, F111, F112, F605, F665
FDWZ-075	2,50	6,00	100,0	F561, F701, F075, F703, F793, F310, F320, F502, F504, F538, F562, F566, F771, F100, F585, F588, F772, F786, F797, F563, F713, F773, F796, F785, F330, F340
FDWZ-100	3,50	6,00	100,0	
FDWZ-805	A- ϕ =2,00; I- ϕ =1,32	12,00	80,00	F805
FDWZ-650	A- ϕ =6,00; I- ϕ =4,10	6,00	100,0	F650, F652

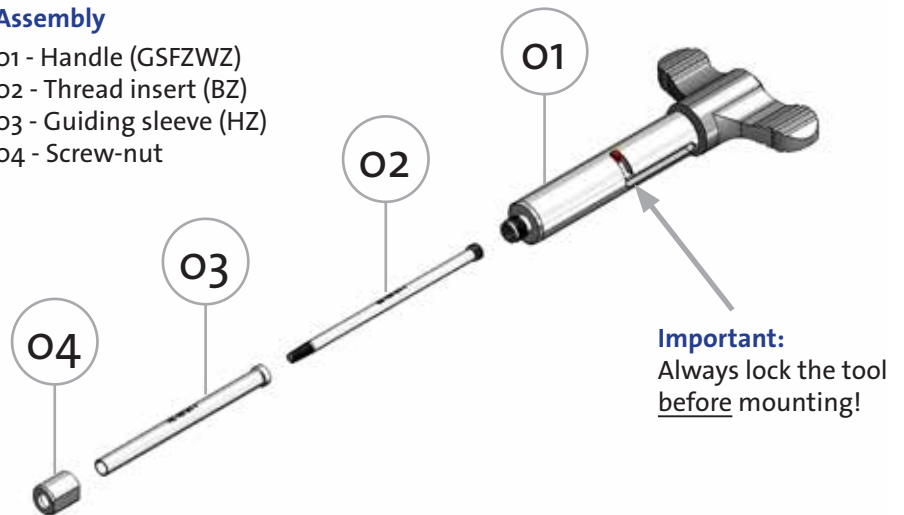
FZWZ-SET-001

Mounting tool for twist proof receptacles

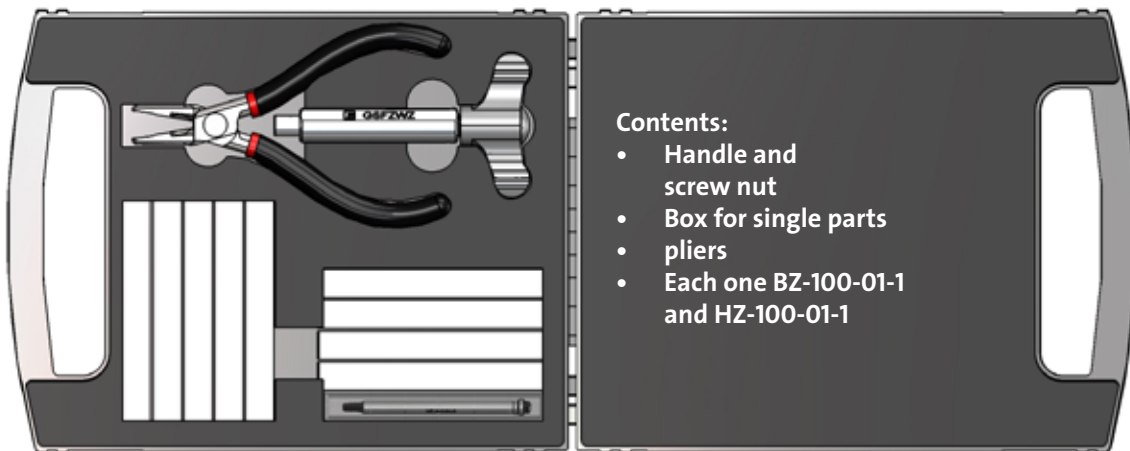
Receptacles for twist proof probes need to be mounted well aligned into the fixture or module. This can be done with the alignment tool FAWZ. This tool can be chucked into a lever press. In this case the alignment only needs to be done once.

Assembly

- 01 - Handle (GSFZWZ)
- 02 - Thread insert (BZ)
- 03 - Guiding sleeve (HZ)
- 04 - Screw-nut



Basic Kit FZWZ-SET-001



Contents:

- Handle and screw nut
- Box for single parts
- pliers
- Each one BZ-100-01-1 and HZ-100-01-1

Available guiding sleeves (HZ) and thread inserts (BZ):

Combination:

- 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:

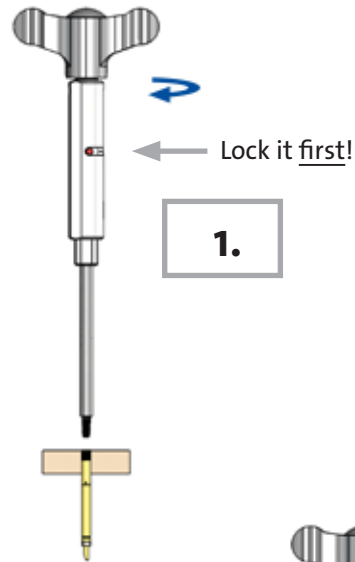
- H121; H075; H175; H176; H310; H561; H701; H863
- H722; H727; H732; H752; H756; H757; H772; H875; H878
- H320; H610; H865
- H100; H502; H708; H731; H751; H805
- H762; H866; H867; H887
- H723; H733; H737; H760; H761; H773; H774; H880; H881; H884; H885

Further variants are updated on the homepage under [PRODUCT FINDER/ACCESSORIES-CP/FZWZ](#).

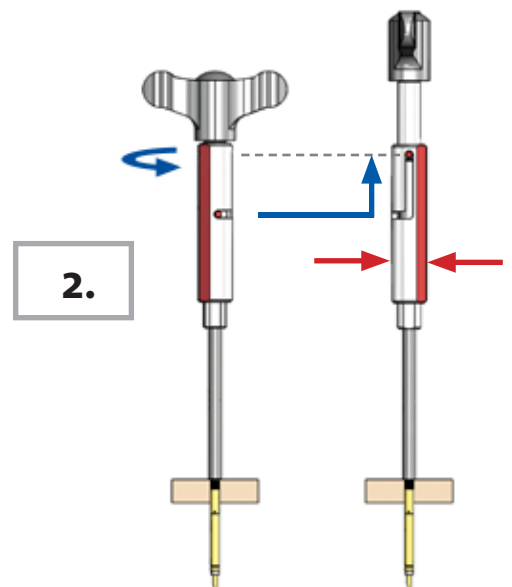
Below you will find step-by-step instructions for handling the tool.

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.

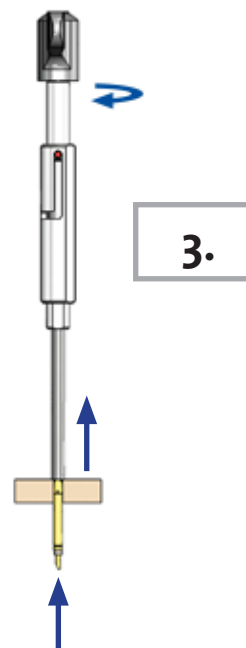


2. Release the lock: Turn the entire tool back slightly counterclockwise so that the lock can be released more easily. Then hold the flattened surfaces (marked red) and turn the handle counterclockwise.



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°.

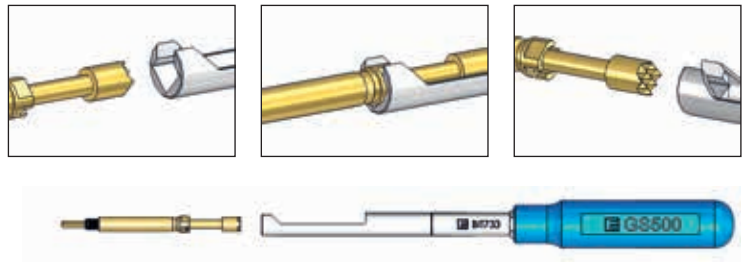


5. For reuse, the thread insert must be screwed all the way down so that the lock can be set.

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



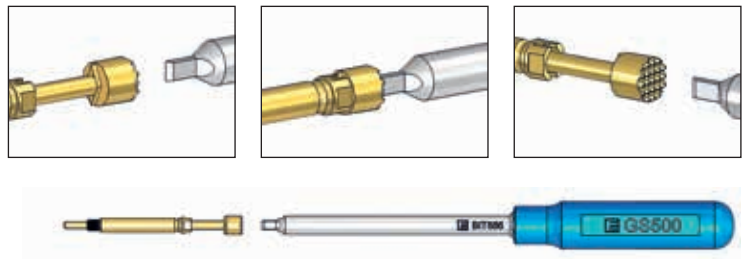
The socket wrench can be used for square wrench sizes if the head diameter is smaller than the wrench size. The tool helps to assemble probes within small centers.



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.



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	1,7	Socket wrench	FWZ730	GS300	BIT730	FWZ730T	GS300T	F730
1,0	1,5	2,0	Hook wrench	FWZ730S1		BIT730S1	FWZ730S1T		F175, F176, F730
1,4	1,3	2,4	Socket wrench	FWZ731S1	GS400	BIT731S1	FWZ731S1T	GS400T	F731
1,4	2,0	2,8	Hook wrench	FWZ731		BIT731	FWZ731T		F731
1,4	2,0	2,8	Hook wrench	FWZ731L		BIT731L	FWZ731LT		F731
1,7	1,6	2,7	Socket wrench	FWZ732S2		BIT732S2	FWZ732S2T		F732 (C)
1,7	2,0	2,8	Hook wrench	FWZ732		BIT732	FWZ732T		F722, F732 (C), F727, F756, F873, F875
1,7	2,0	2,8	Hook wrench	FWZ732L		BIT732L	FWZ732LT		F722, F732 (C), F727, F756, F873, F875
1,7	2,7	3,5	Hook wrench	FWZ732S1	GS500	BIT732S1	FWZ732S1T	GS500T	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	GS500	BIT885	FWZ885T	GS500T	F835, F881, F883, F885
2,6	2,5	3,8	Socket wrench	FWZ885L		BIT885L	FWZ885LT		F835, F881, F883, F885
2,6	3,1	4,0	Hook wrench	FWZ885S1		BIT885S1	FWZ885S1T		F835, F881, F883, F885, F886
2,6	4,0	5,0	Hook wrench	FWZ760S1		BIT760S1	FWZ760S1T		F760, F835, F881, F883, F885, F886
2,6	4,9	6,5	Hook wrench	FWZ760S2		BIT760S2	FWZ760S2T		F760, F835, F881, F883, F885, F886
3,0	3,0	5,0	Socket wrench	FWZ733S1		BIT733S1	FWZ733S1T		F723 (C), F733 (C), F737, F755
3,0	4,0	5,0	Hook wrench	FWZ733	BIT733	FWZ733T	F723 (C), F733 (C), F737, F755		
3,0	4,0	5,0	Hook wrench	FWZ733L	BIT733L	FWZ733LT	F723 (C), F733 (C), F737, F755		
3,5	4,4	5,5	Hook wrench	FWZ735	BIT735	FWZ735T	F735 (C), F725 (C)		
5,0	-	8,0	Hook wrench	FWZ888	BIT888	FWZ888T	F888		
6,0	5,9	8,0	Socket wrench	FWZ348	BIT348	FWZ348T	F348, F349		
-	-	4,0	3-point tool	FWZ832	BIT832	FWZ832T	F832		
-	-	4,0	Screw driver	FWZ886	BIT886	FWZ886T	F88617...		

FK50

Toolbox with Spring Force Gauge

Contents:

- 1x Spring force gauge with receptacle for measuring sleeves
- 1x Measuring sleeve $\varnothing 5,0$ 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:

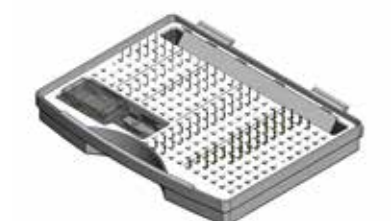
- 1x Cordless screwdriver
(shape changeable from pistol to straight shape)
- 1x Power connector for 230V
- 3x Magnetic holder with different ratchets
- 1x Bit box with 15 empty slots for bits
- 2x Empty boxes for probes and accessories



FM-SAMPLEBOX-07

Step Probe Box

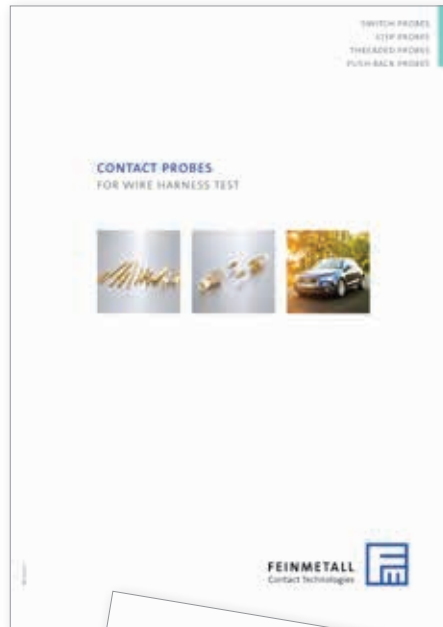
Sample box with a large variety of step probes

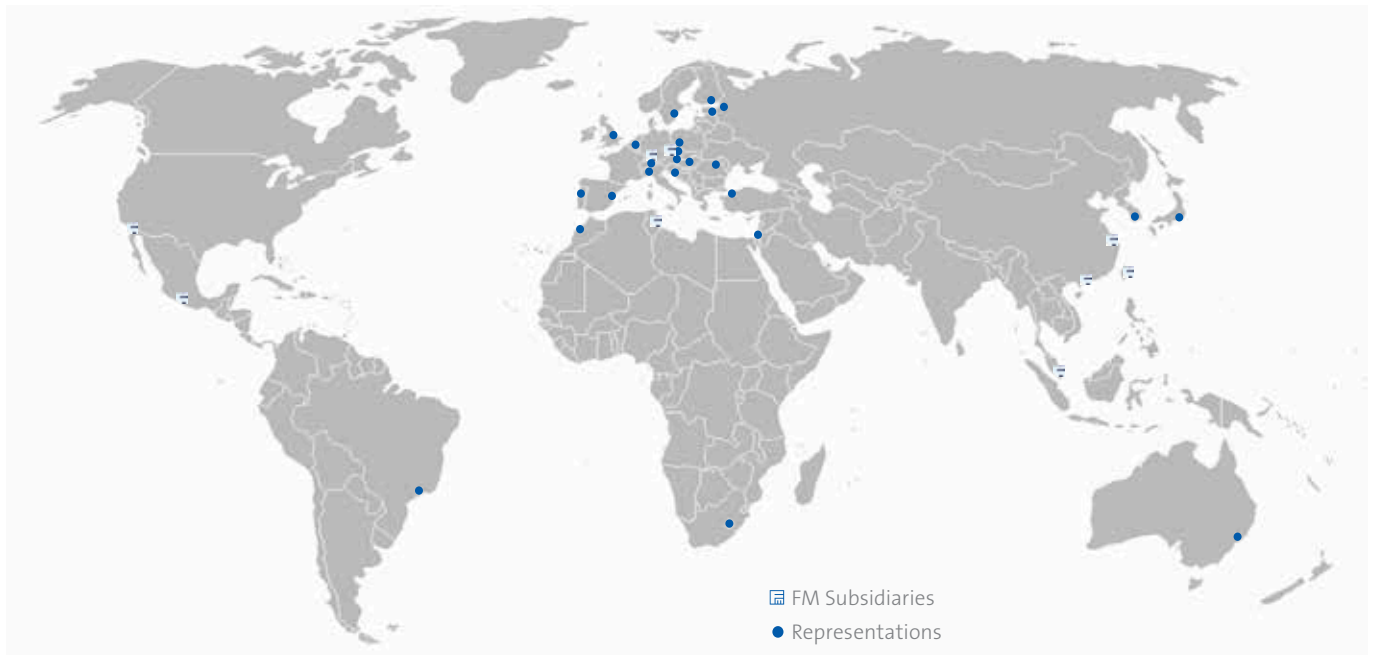


THE RIGHT CATALOGUE FOR EACH APPLICATION

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.





FM Subsidiaries:



FEINMETALL GMBH | HERRENBERG, GERMANY
(+49) 7032 2001-0 | info@feinmetall.com



FEINMETALL DE MEXICO | MEXICO
(+52) 55 2591 0629 | info.mexico@feinmetall.com



FEINMETALL SINGAPORE PTE LTD | SINGAPORE
(+65) 3152 9103 | info@sg.feinmetall.com



FEINMETALL TUNISIE | TUNISIA
(+216) 29 175697 | info@tn.feinmetall.com



FEINMETALL CZ | CZECH REPUBLIC
(+42) 0491 470-511 | info@cz.feinmetall.com



FEINMETALL USA LLC | SAN JOSE, USA
(+1) 408 432 7500 | info.us@feinmetall.com



FEINMETALL SHANGHAI | CHINA
(+86) 21 2898 6848 | info@cn.feinmetall.com

FEINMETALL-OCT | HSINCHU COUNTY, TAIWAN
(+886) 3 560 15 66 | info@tw.feinmetall.com

You can find all representations worldwide on our homepage www.feinmetall.com

Our sales offices are perfectly connected to the markets and work in close cooperation with our customers. Most important for us is a high quality - regarding our products as well as regarding our customer support.

Our strengths

- Native-speaking contacts in many countries enable ideal communication
- Application engineers take care of customer projects
- Active key account management provides customer specific know-how
- Teamwork of product managers and local sales engineers facilitate innovative and customized solutions
- Periodic technical trainings make sure that sales teams have a high level of competence
- Technical key customer trainings enhances know-how transfer to end users

These strengths have already resulted in many successful and innovative projects. FEINMETALL is already rated as preferred supplier for many notable companies. Our strong customer support is your advantage.

