



FEINMETALL

Contact Technologies

FINE PITCH & INTERFACE SOLUTIONS

Pushing the edge of what is possible

> FEINMETALL.COM



ULTIMATE RELIABILITY & PRECISION

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FINE PITCH PROBES

FINE PITCH PROBES

APPLICATIONS

Fine Pitch Probes for precise and reliable testing

When it comes to the contacting of test points in very small dimensions, Fine Pitch Probes are needed. Fine Pitch Probes are essential parts in the electronics industry, ensuring accurate and reliable testing and measurement of electronic components and circuits.

These probes are mainly used in applications like Semiconductor Final Testing, WLCSP solutions, MEMS sensor tests or the testing of micro PCBs. Due to the small pitches in these applications, a deep expertise and precision in production is required, to guarantee the best possible contacting.

FEINMETALL offers highly precise engineered Fine Pitch Probes that ensure a high lifetime, excellent quality and repeatability with the goal to advance the customers yield. We are able to offer Fine Pitch Probes down to a pitch of 110µm to provide the solution of your needs.

Semiconductor Final Testing

Through rigorous final testing, manufacturers ensure that only high-quality, fully functional semiconductors reach the market, guaranteeing the reliability of electronic devices. Fine Pitch Probes are essential for these tests. FEINMETALL Fine Pitch Probes offer precise contact with various chip package types such as BGA, QFN, LGA, and QFP, ensuring high quality and repeatability. Our diverse portfolio has a suitable probe for all your applications.



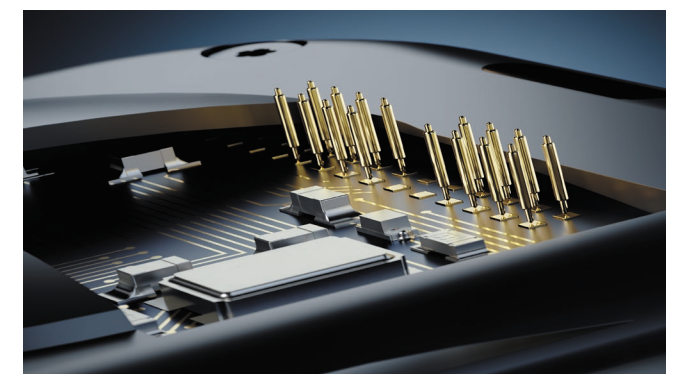
MEMS Sensor Testing

Testing MEMS sensors means checking if they work well and are accurate. Fine Pitch Probes allow engineers to access specific points on the sensor, enabling full testing and analysis. The high level of precision provided by FEINMETALL Fine Pitch Probes is essential for evaluating the performance parameters of MEMS sensors. We provide a wide range of options of these probes with excellent quality standards to secure your best testing results.



Micro PCB Testing

Testing micro PCBs is essential for ensuring the functionality of compact electronic devices like smartphones and wearables. PCB Testing means making safe electrical connections with these tiny boards. These processes guarantee the reliability and functionality of modern electronic gadgets. FEINMETALL Fine Pitch Probes are designed by our engineers, to provide you the best possible solution with a long lifetime.

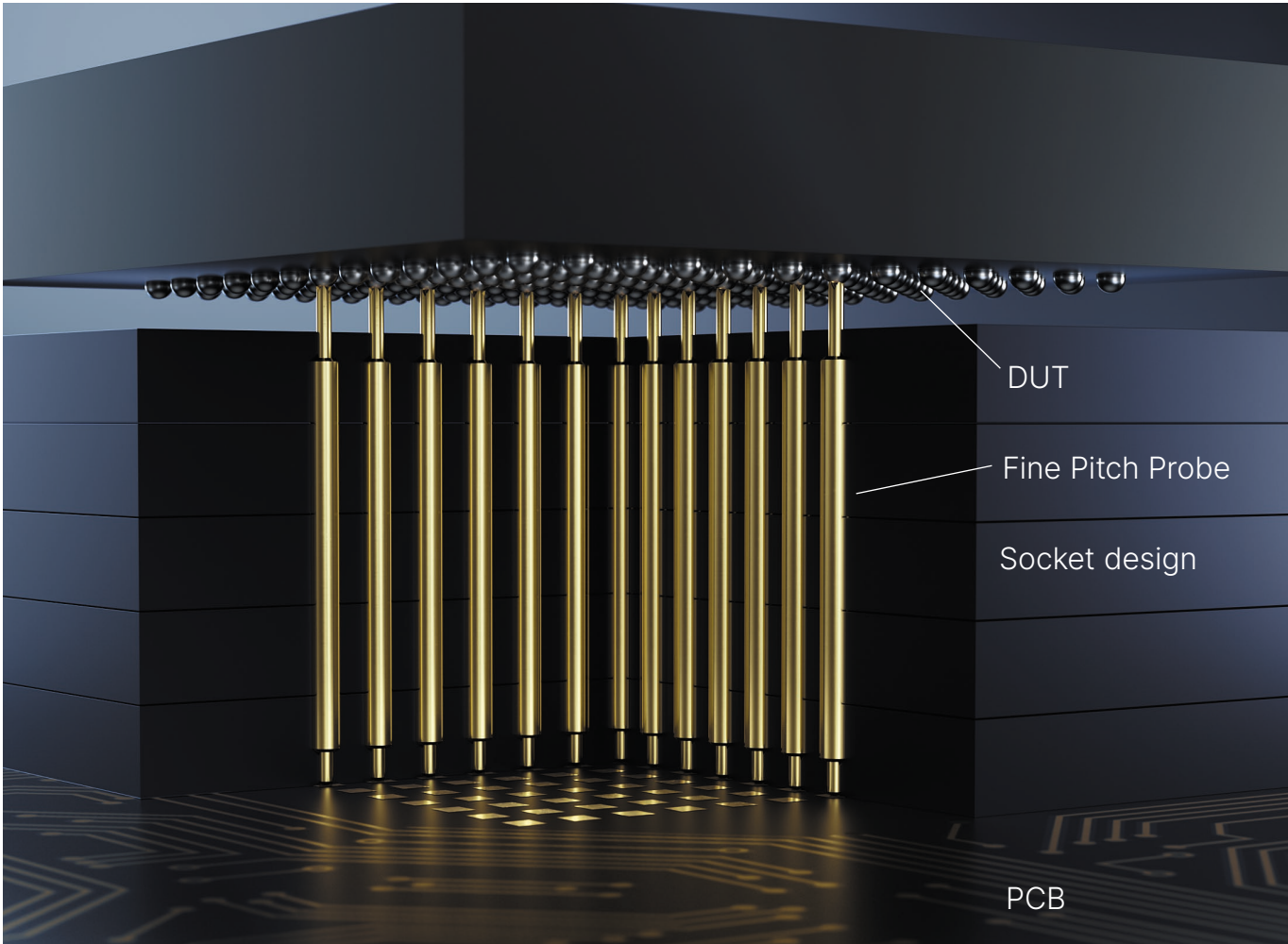


MAIN APPLICATION

Functional structure and application of Fine Pitch Probes

Fine Pitch Probes are extremely thin contact probes for the use in pitches of 0.11 mm to 1.0 mm. In most cases Fine Pitch Probes are not mounted in separate receptacles, but they are mounted in sandwich design blocks connecting a DUT with a PCB.

Typical applications are contacting PCBs with very small structures and building up test sockets. In these pitches direct soldering of probes as well as using receptacles with larger diameters is not possible any more. Therefore, most Fine Pitch Probes are used in floating movement that connect a DUT to a printed circuit board.



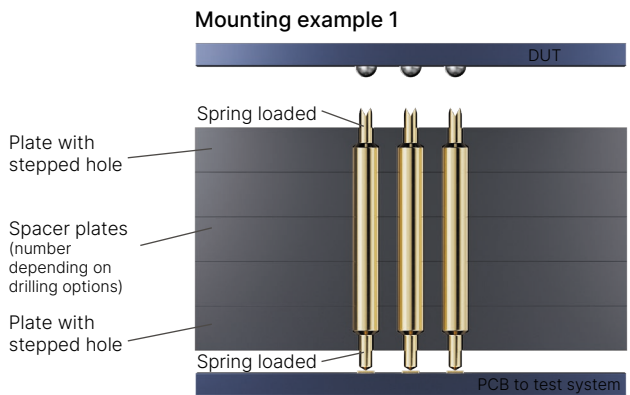
DESIGN TYPES

Design types of Fine Pitch Probes

Fine pitch probes are available in various design types to meet the demands of precise and reliable testing in dense electronic environments. They are engineered to ensure optimal performance even in space-constrained and high-density applications. This versatility makes them suitable for a wide range of testing applications.

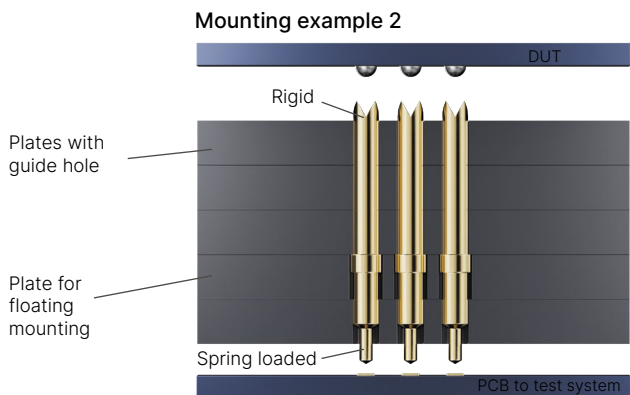
Double ended - Double acting

Double-acting contact probes are commonly used to compensate for uneven contact surfaces, ensuring best possible electrical connections. Their versatile design allows for a wide range of applications across various testing environments.



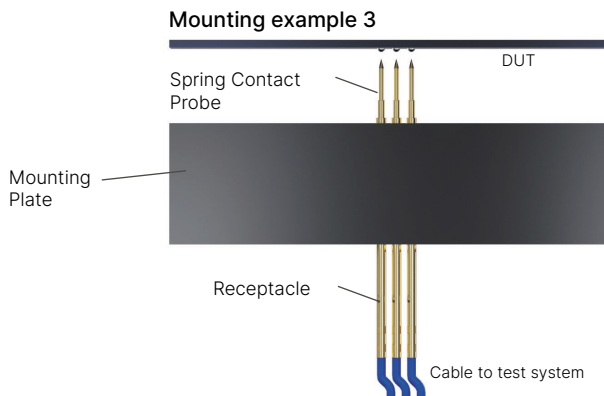
Double ended - Single acting

These contact probes are frequently used to achieve excellent plunger planarity, ensuring consistent and precise contact. They are also integrated into our fine-pitch probe cards, where they contribute to the high precision and reliability required in wafer testing applications.



Single ended - Single acting

Single-ended single-acting probes are typically used in combination with receptacles, offering a compact and efficient testing solution. They are ideal for small ICT/FCT applications, such as testing miniature PCBs where space and precision are critical.



FINE PITCH PROBES FOR BACK-END-TEST

High performance probes for all applications

Fine pitch contact probes are designed to meet the specific demands of various advanced test applications. They deliver reliable performance under challenging conditions, including high frequencies, thermal stress, and complex signal requirements. This adaptability makes them a key component in ensuring accurate and consistent test results across different use cases.

Functional test

Standard Design with focus on low resistance and high life cycles.



Burn-in test

We use different materials for various test demands. For example, the spring is made of stainless steel for high currents and temperatures.



RF-test

Due to their short design and the resulting low signal losses, fine pitch probes are ideally suited for RF-applications.



RF DIAGRAM IN GENERAL

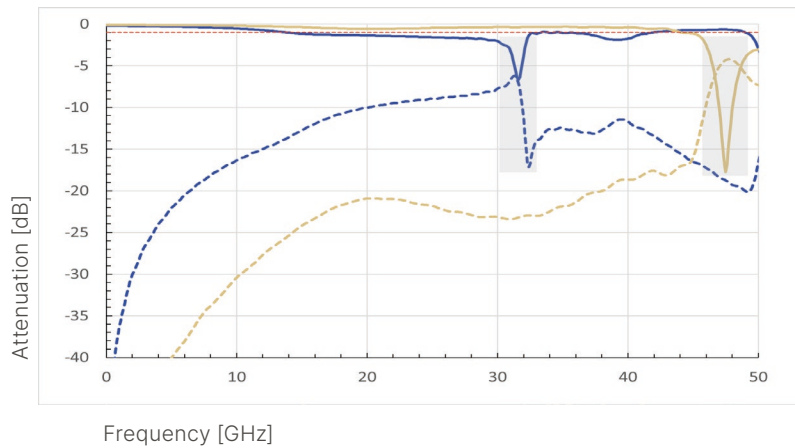
Comments on RF properties

The high-frequency properties of the contact probes are determined using 3D fem simulation in a GND-SGN-GND arrangement, in the respective pitch and at nominal stroke. For the purpose of standardization, assumptions are made that may deviate from real operating conditions.

A test socket made of PEEK (see Fig. Socket design) is assumed as standard. In addition, S-parameters are shown for a typical FEINMETALL test head (FeinProbe® see Fig. Probe Card Head). Due to its patented design and materials, this probe almost always provides better RF performance than the socket design. With additional optimization, using special FEINMETALL RF designs, test cards can be adapted very well to individual requirements.

FEINMETALL has the know-how and technologies to design and manufacture the optimum test product for high frequency applications up to 100 GHz.

Radio frequency performance [GHz]



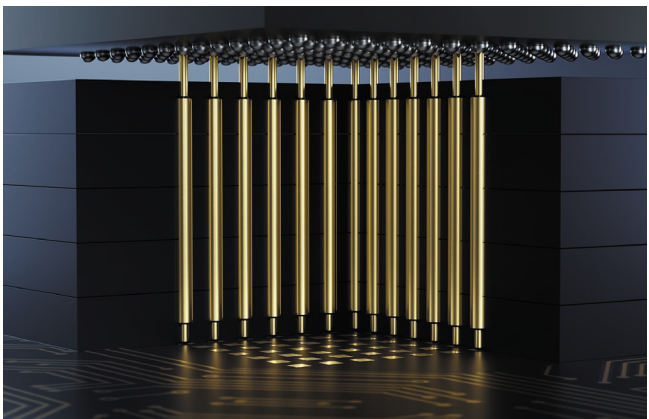
Caption legend:

- Limit -1dB
- Socket S21 (Insertion loss1)
- - - Socket S11 (Return loss1)
- Probe Card Head S21 (Insertion loss2)
- - - Probe Card Head S11 (Return loss2)

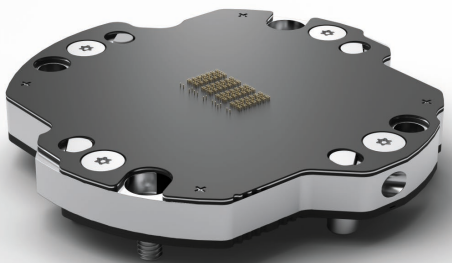
Notes on presentation

Such pronounced peaks and jumps in the S-parameters originate from simulation artefacts that arise due to ideally plane-parallel, smooth reflection surfaces in the model. In practice, these will not occur or will be very attenuated.

Socket design



Probe Card Head



DEFENSIVE COATING

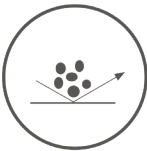
For high contamination

There is a common problem in the industry. ‘Solder migration’ while pads and bumps are being tested. Pieces of the solder material are deposited in the tip of a probe, which can also form chemical compounds with the coating of the tip due to the use of high temperatures. For this reason, Feinmetall has developed a solution for the industry that solves this problem, increases the service life and thus the yield. It also reduces the resistance and generally contributes to better values in the test.

This is a special solution from Feinmetall which has already led to major improvements in the test performance of our customers.

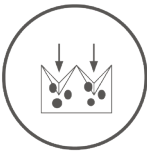
Functional coating

Normally, solder migration problems can be recognised by the fact that the solder material is very firmly fused to the tip. Our defensive coating has the advantage that the solder material can no longer form a chemical bond with the coating of the tip and simply flakes off. This is particularly important as it makes it very difficult to clean the tip.



Self cleaning tip style

In addition to the repellent coating of the ‘tip’, Feinmetall has also developed a special tipstyle. This ensures that the contamination cannot get stuck in the crown and simply fall out on one of the sides.



Proven solution

We have already had several projects with different customers where we were able to solve their problems of solder migration with this solution. The test results were much more stable and the contamination could be reduced to a minimum.



PLUNGER DESIGNS



	Basic plunger	Drill hole plunger	Bias design	Bias Ball design
Contact safety	+	+	++	+++
Continuous current	+	+	++	+++
Mechanical life	+++	+++	++	++
Manufacturing costs	++++	++	++	+
Spring force	+++	++	+++	+
Travel	++++	++++	+++	++

Basic plunger

The standard plunger has a conical end on which the spring can center itself. This also prevents the spring end from getting stuck between the plunger and the barrel or scratching the coating.

The maximum possible spring diameter allows for high spring forces. In addition, the good plunger guide ensures good plunger centering.

Drill hole

The drill hole in the plunger allows better adaptation to different insertion and tolerance conditions due to the longer spring travel. Increased spring force can be achieved by using a longer spring. A higher spring force can provide a stronger electrical connection and improve contact stability.

The hollow plunger allows better flexibility and adaptability to different surfaces or application environments. It can better compensate for vibration, shock and unevenness, increasing the reliability of the contact.

Bias design

The bias design features an offset force that ensures directional contact and improves alignment on angled or uneven surfaces. This design provides stable, reliable connections and consistent

electrical performance across a wide range of applications. Ideal for situations where precise contact is needed without compromising durability.

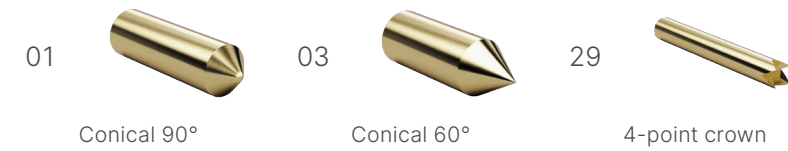
Bias ball design

The bias ball design can provide improved electrical performance, especially in applications with higher currents or demanding environments. The ball provides a more reliable and stable electrical connection. By using a ball in the bias design, Pogo

Connectors can be better protected against vibration and shock, which increases the reliability of the connection. The bias ball design can help minimize contact wear and extend the life of the Pogo Connector.

POSSIBLE TIP STYLES

Main versions



Further versions



Spade versions



TYPICAL TIP STYLES AND APPLICATIONS



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



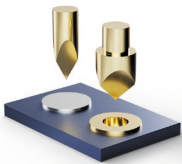
Spherical (11,12)
For testing clean contact surfaces, does not leave marks or scratches.



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



Crown (21,29,37,40)
For solder bumps and pads.

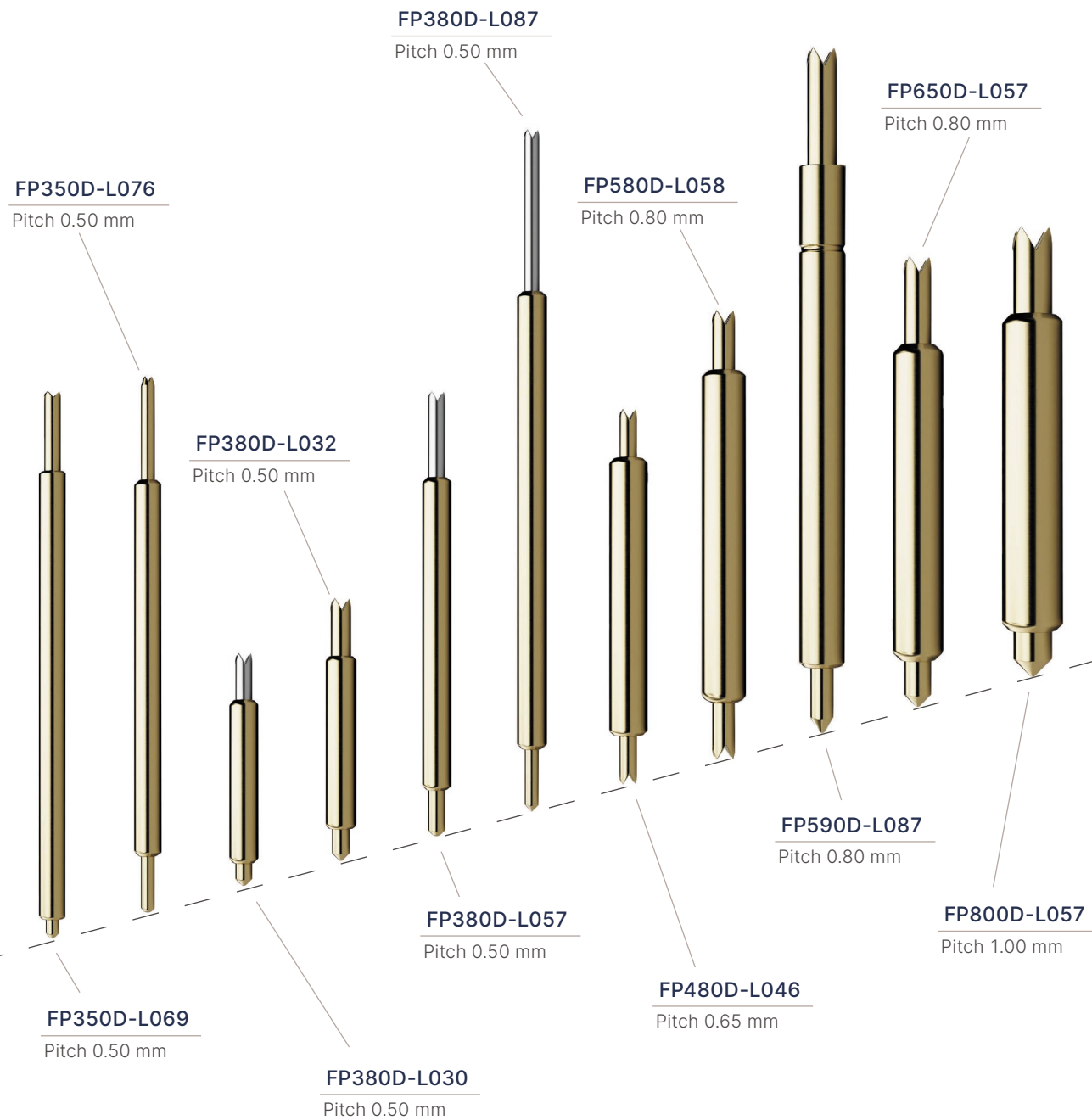
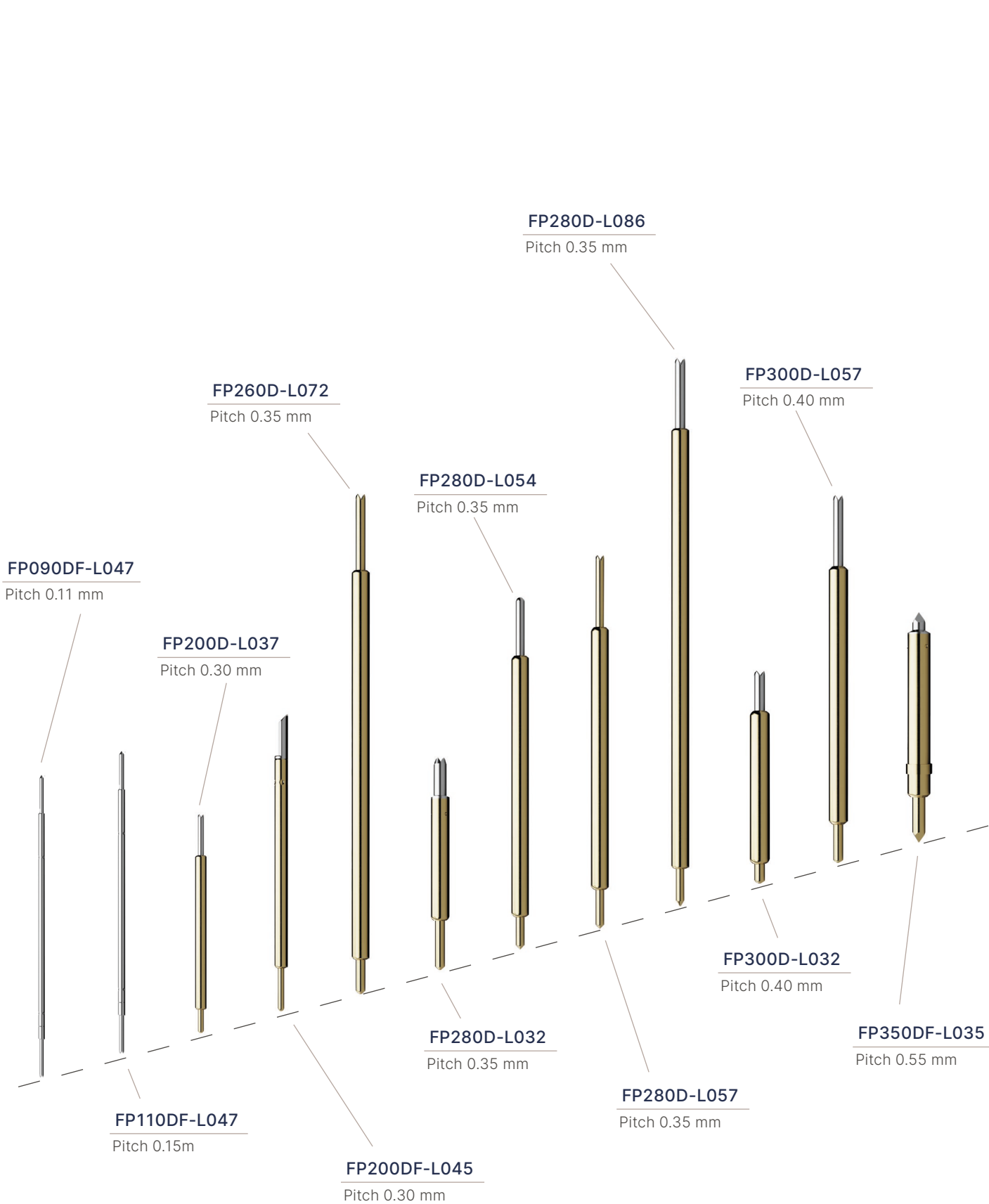


Triangular stepped (15,30,62)
For via holes and solder pads. The sharp edges penetrate flux residues and oxide layers.



Spade non centric for fine pitch kelvin test (71,72)
The probes can be used in the smallest pitches for Kelvin measurement. With a corresponding hole pattern in the drill plate, this type of mounting also provides an anti-rotation feature.

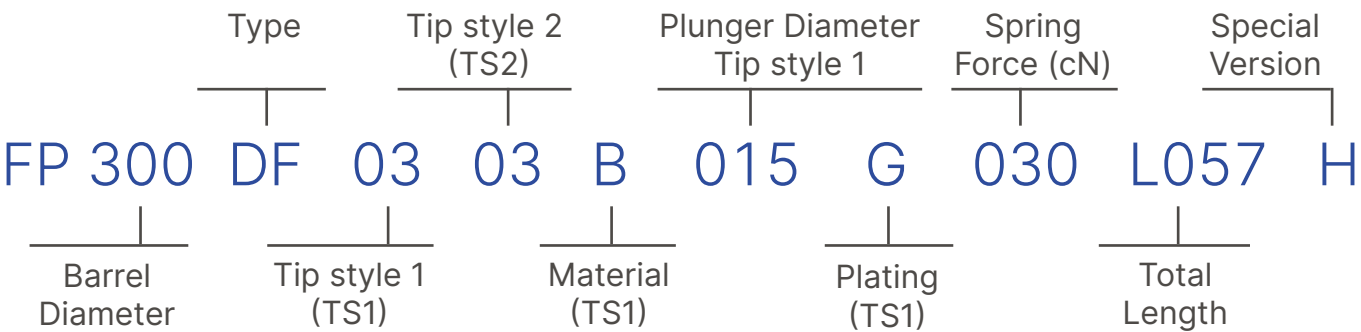
AT A GLANCE



PRODUCT NAME

Number code system

In order to improve the clarity of the material designations, the self-explanatory number code has been further developed. Therefore, all fine pitch probes have been redefined according to the order code shown below.



Type

- S = Single Plunger single acting
- D = Double Plunger double acting
- DF = Double Plunger single acting

Material Plunger

- B = BeCu (Beryllium Copper)
- P = Palladium alloy
- S = Steel

Plating Plunger

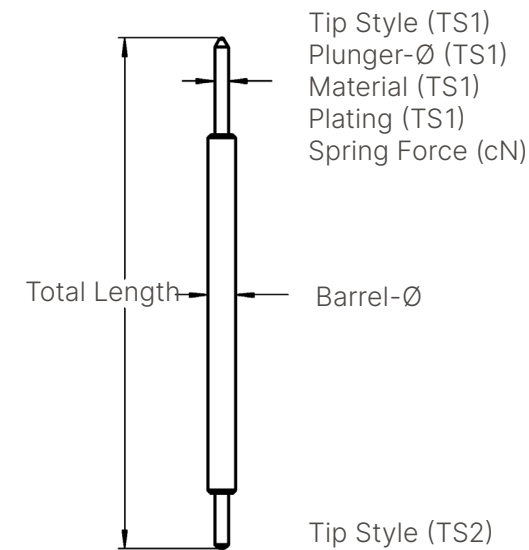
- G = Gold plate
- P = Palladium alloy
- S = Silver plated
- U = Unplated

Special Version

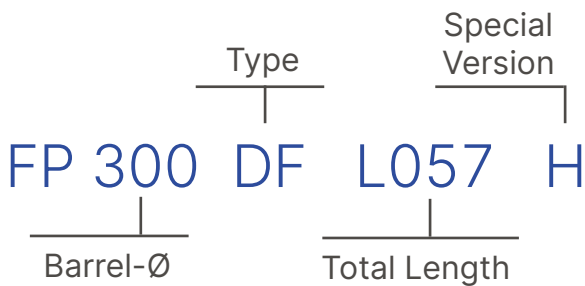
- H = High temperature version
- B = Banana version
- NM = Non magnetic version

Type Description

To simplify matters in many contexts, only the product type designation is given rather than the complete individual article number. This consists of the barrel diameter, the function type, the total length and, if applicable, a special function.



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



FM Choice

What is FM Choice?

FM Choice is our specially curated selection of the most reliable and frequently used probes in the market. Based on our expertise and experience, we have pre-selected the top-performing probes, so you don't have to choose from hundreds of options. With FM Choice, we make your decision easier by offering the most trusted solutions that meet your needs.

One of the greatest advantages of FM Choice is high availability and fast delivery, as we can often ship directly from our stock. This enables us to meet your demands whenever you need them. Plus, FM Choice offers competitive pricing, even for smaller quantities, making it an attractive solution for all kinds of projects.

Our portfolio includes over 700 contact probes for pitches between 6 and 100 mil, covering a wide range of applications and ensuring we meet most technical requirements quickly and efficiently.

Benefits at a glance



Most trusted solutions



Competitive prices



Fast delivery & high availability

Discover FM Choice products online

With our new Product Finder, we offer you a complete overview of all FM Choice products that you can easily search through. This high-performance tool allows you to search for specific products and compare them based on their technical features.

In addition to the FM Choice products, we invite you to explore the other categories to discover our complete product portfolio. Start your selection now and experience the variety and quality of our products.

> [FEINMETALL.COM/product-finder](https://feinmetall.com/product-finder)



FINE PITCH STANDARDPORTFOLIO

FM Choice

Order code	Product name	Pitch [mm]	Barrel - Ø [mm]	Length [mm]	Tip Style / Materials
1030191	FP200D2901P012U014L037	0.30	0.20	3.70	Crown (PD)
1023129	FP200D2901B010G017L037				Crown (CuBe)
1023002	FP200D0301B010G017L037				Pointed (CuBe)
1023128	FP260D2901B014G025L072	0.35	0.26	7.20	Crown (CuBe)
1023003	FP260D0301B014G025L072				Pointed (CuBe)
1031135	FP280D0301B013G025L057		0.28	3.70	Pointed (CuBe)
1024431	FP300D2901P016U017L032	0.40	0.30	3.20	Crown (PD)
1023004	FP300D2901B016G019L032				Crown (CuBe)
1023111	FP300D0301B016G019L032				Pointed (CuBe)
1024430	FP300D2901P015U025L057			5.70	Crown (PD)
1023005	FP300D2901B015G030L057				Crown (CuBe)
1023125	FP300D0301B015G030L057				Pointed (CuBe)
1114002	FP350D2901B021G020L076	0.50	0.35	7.60	Crown (CuBe)
1023006	FP380D2901P022U025L030			3.00	Crown (PD)
1127921	FP380D2901P025U023L032		3.20	Crown (PD)	
1127922	FP380D2901B025G023L032			Crown (CuBe)	
1127923	FP380D0301B025G023L032			Pointed (CuBe)	
1127686	FP380D2903P022U024L057		5.70	Crown (PD)	
1127689	FP380D2903B022G024L057			Crown (CuBe)	
1127691	FP380D0103B022G024L057			Pointed (CuBe)	
1128176	FP570D2901B030G030L057	0.80	0.57	5.70	Crown (CuBe)
1128177	FP570D0301B030G030L057				Pointed (CuBe)
1131051	FP650D2901B035G030L057		0.65		Crown (CuBe)
1131068	FP650D0301B035G030L057				Pointed (CuBe)
1130428	FP800D2901B050G025L057	1.00	0.80	5.70	Crown (CuBe)
1130443	FP800D0301B050G025L057				Pointed (CuBe)

Top plunger (TS1)
for device side



Bottom plunger
(TS2) for PCB side

FP

300

DF

03

03

B

015

G

030

L057

H

Barrel Diameter

Tip style 1 (TS1)

Material (TS1)

Plating (TS1)

Total Length

Type

Tip style 2 (TS2)

Plunger Diameter (TS1)

Spring Force (cN)

Special Version



FP090DF-L047

0.11 mm Pitch | Single acting

Electrical specifications

Current [A]	0.25	
R _{TYP} [mOhm]	<600	
Self Inductance [nH]	1.89	
	Socket [Pitch 0.15]	Probe Card [Pitch 0.11]
Frequency at -1dB [GHz]	33	43

Mechanical specifications

Temperature [°C]	-45°...+120°	
Preload [cN]	0.8	
Spring force at nt [cN ±20%]	4.5	
Nominal travel [mm]	0.40	
Maximum travel [mm]	0.50	

Materials and plating

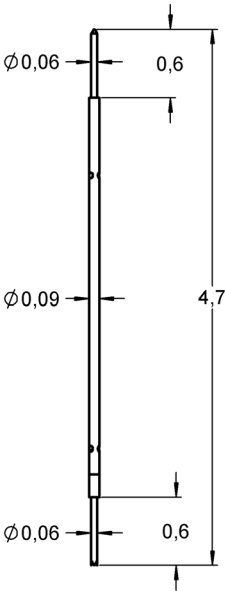
Top Plunger	Palladium alloy	unplated
Bottom Plunger (rigid)	Palladium alloy	unplated
Barrel	Nickel	gold plated (inside)
Spring	Spring steel	gold plated

Drill size recommendation [mm]

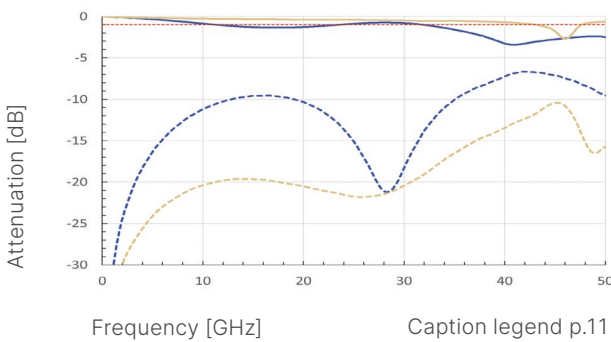
Equal barrel diameter	0.10 - 0.12
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Series drawing

All measurements are in mm.



Radio frequency performance [GHz]



Order code	Product name	Top plunger	Bottom plunger	Ø in mm	FM Choice
1135965	FP090DF0329P006U005L047	03	29	0.06	-

INTERFACE SOLUTIONS

INTERFACE SOLUTIONS

IN GENERAL

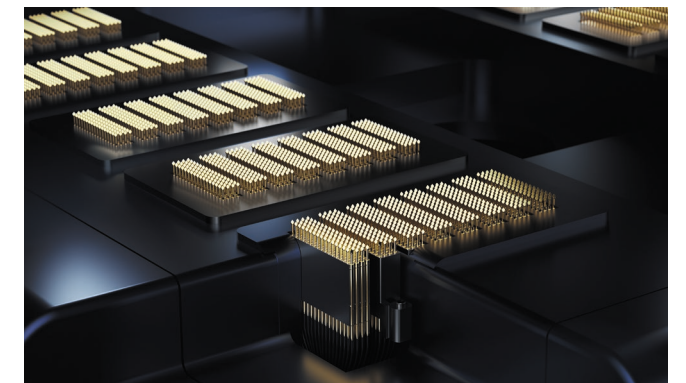
Interface Solutions with Spring Contact Probes

Spring Contact Probes as an interface offer many advantages in the field of signal transmission, power transfer and data exchange between different devices or circuits.

FEINMETALL's Interface Probes provide a reliable electrical connection with a stable low resistance. This stability contributes to the overall integrity of data transmission. FEINMETALL uses its advanced expertise in Interface Probes to offer various Interface Solutions.

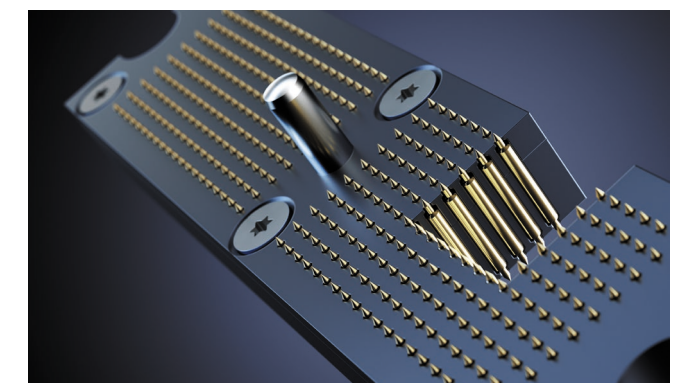
Interface Blocks

FEINMETALL Interface Blocks are used for the reliable transmission of signals between test instrument and test system / test fixture in internal, external and customer-specific interfaces. An electrical interface via spring-loaded interface blocks ensures consistently high contact quality and reliable signal transmission with consistently low contact resistance. Various designs of signal, high-current, high-frequency and special blocks are available for a wide range of applications.



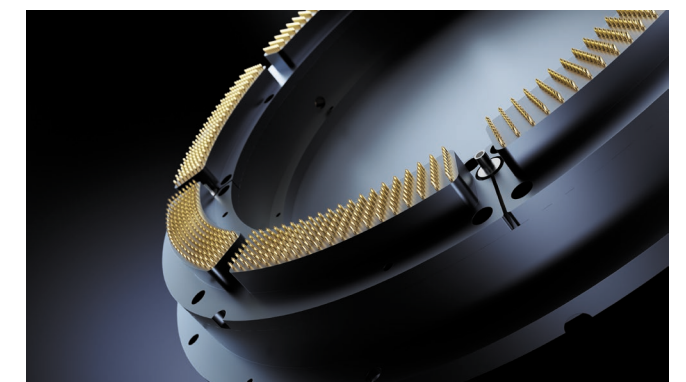
Interposer

Interposers are used in the semiconductor industry to establish connection between two boards. FEINMETALL Interposer provide a robust solution for board-to-board connections ensuring seamless electrical contact in Semiconductor Testing. They are designed for low resistance and high durability.

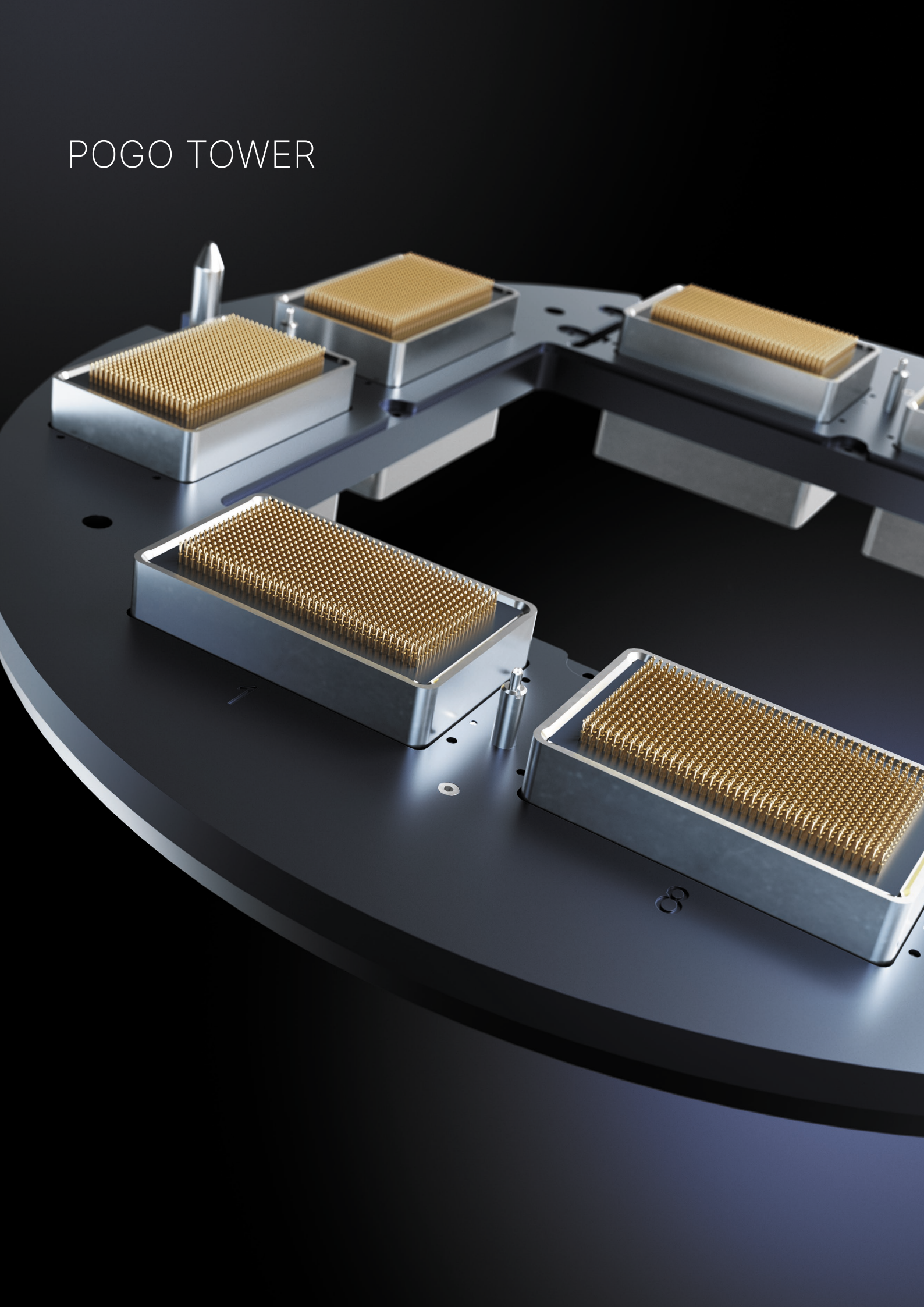


Pogo Tower

In Semiconductor Testing, a Pogo Tower is a crucial interface component that ensures a reliable electrical connection between the tester and the probe card. FEINMETALL's Pogo Tower solutions are engineered to ensure optimal contact safety, superior signal integrity, and outstanding performance.



POGO TOWER



POGO TOWER

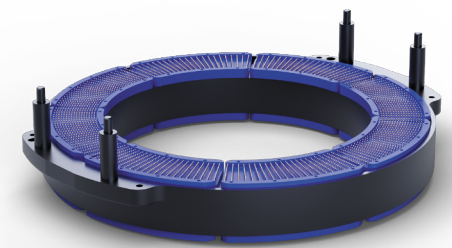
EXAMPLES OF AVAILABLE POGO TOWERS

Applications for Pogo Tower

Pogo Towers are the interface that connects the probecard with the test-system. They consist out of several Pogo Blocks equipped with our probes. The experience of FEINMETALL in manufacturing spring contact probes ensure stable and long lasting contacts with the best precision. The Pogo Towers are designed for different testsystems of the companies Teradyne and Advantest.

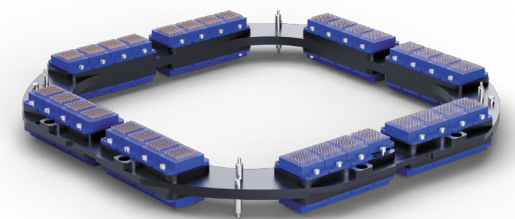
Pogo Tower J750

Teradyne Testsystem J750
Configurations up to 2.992 pins



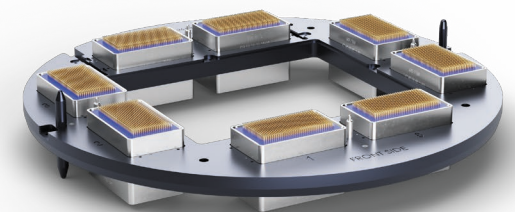
Flex 440UF Pogo Tower

Teradyne Testsystem UltraFLEX
Configurations up to 6400 pins



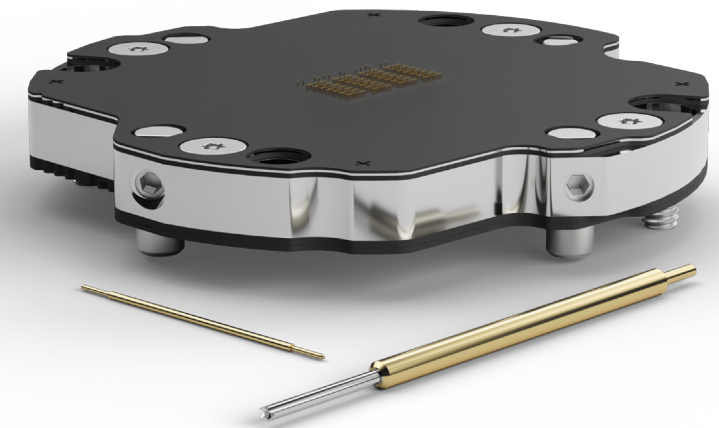
Pogo Tower T2000

Advantest Testsystem T2000
Configurations up to 4864 pins



WLCSP SOLUTIONS X FEINPROBE®

WLCSP SOLUTIONS X FEINPROBE®



FEINPROBE®

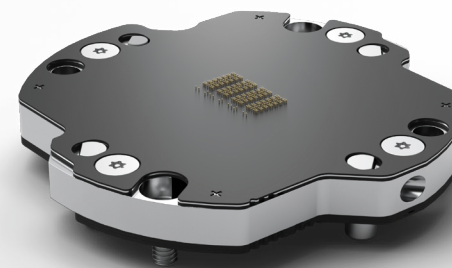
The Spring Probe Solution

The FEINMETALL FeinProbe® uses contact probes as contact elements for contacting bumped wafers for WLCSP, SiP and Flip Chip Applications.

By using FEINMETALL contact probes, the probe solution has several advantages because of the independent spring loaded pins and the crown tip of the contact element. This ensures a stable contact without a stressful impact on the bumps. Even more, signal transmission can be guaranteed when applying specific design rules.

Advantages

- Stable contact performance in terms of low contact resistance and force
- Self-aligning plunger and crown tip reduces stress to the bump
- Spring probes are able to withstand higher currents
- Signal transmission of up to 80 GHz (when following specific layout rules)
- Combined know-how from FM spring probe department, special adaptations and wafer probe cards
- Fast delivery time due to automatic spring probe assembly
- High quality due to accurate ceramic design
- Easy maintenance
- 5G proven wafer testing technology



WELCOME TO OUR DIGITAL WORLD

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Step into FEINMETALL's digital world and explore our products, technologies and industry expertise across our website, social media channels and newsletter. Stay connected with the latest innovations, insights and updates from FEINMETALL – all in one digital space.



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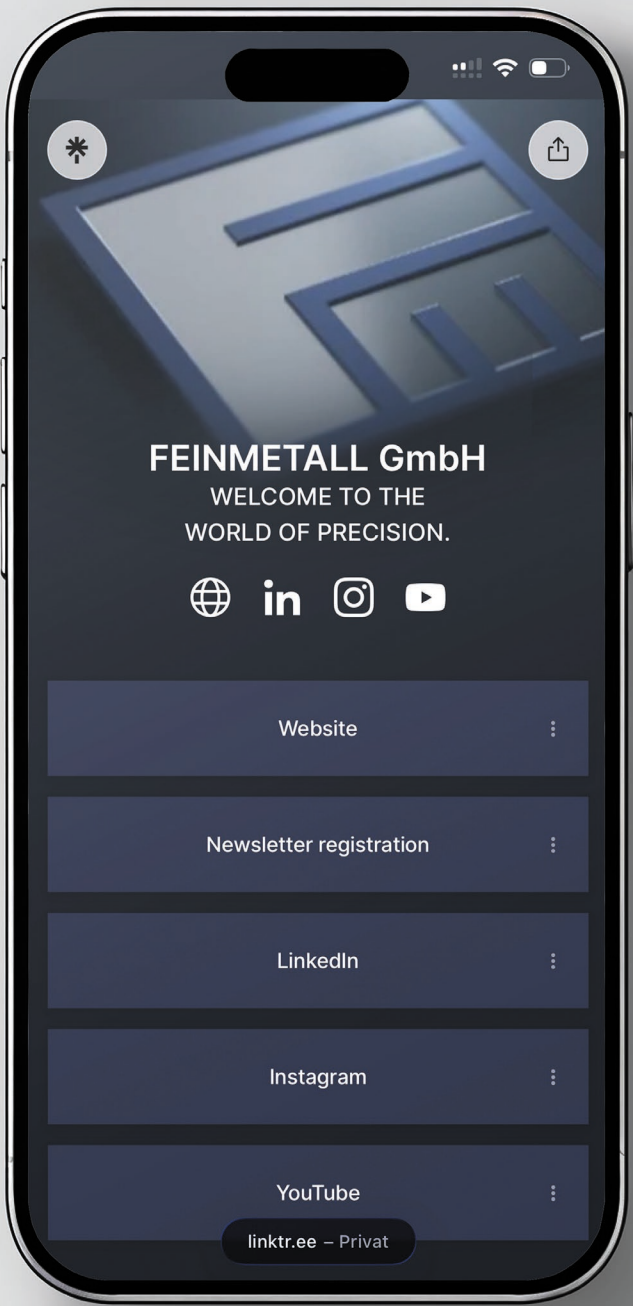


Instagram: Insights & Impressions



YouTube: Watch & Experience

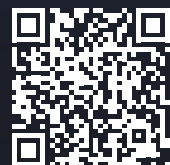
Checkt it out now:



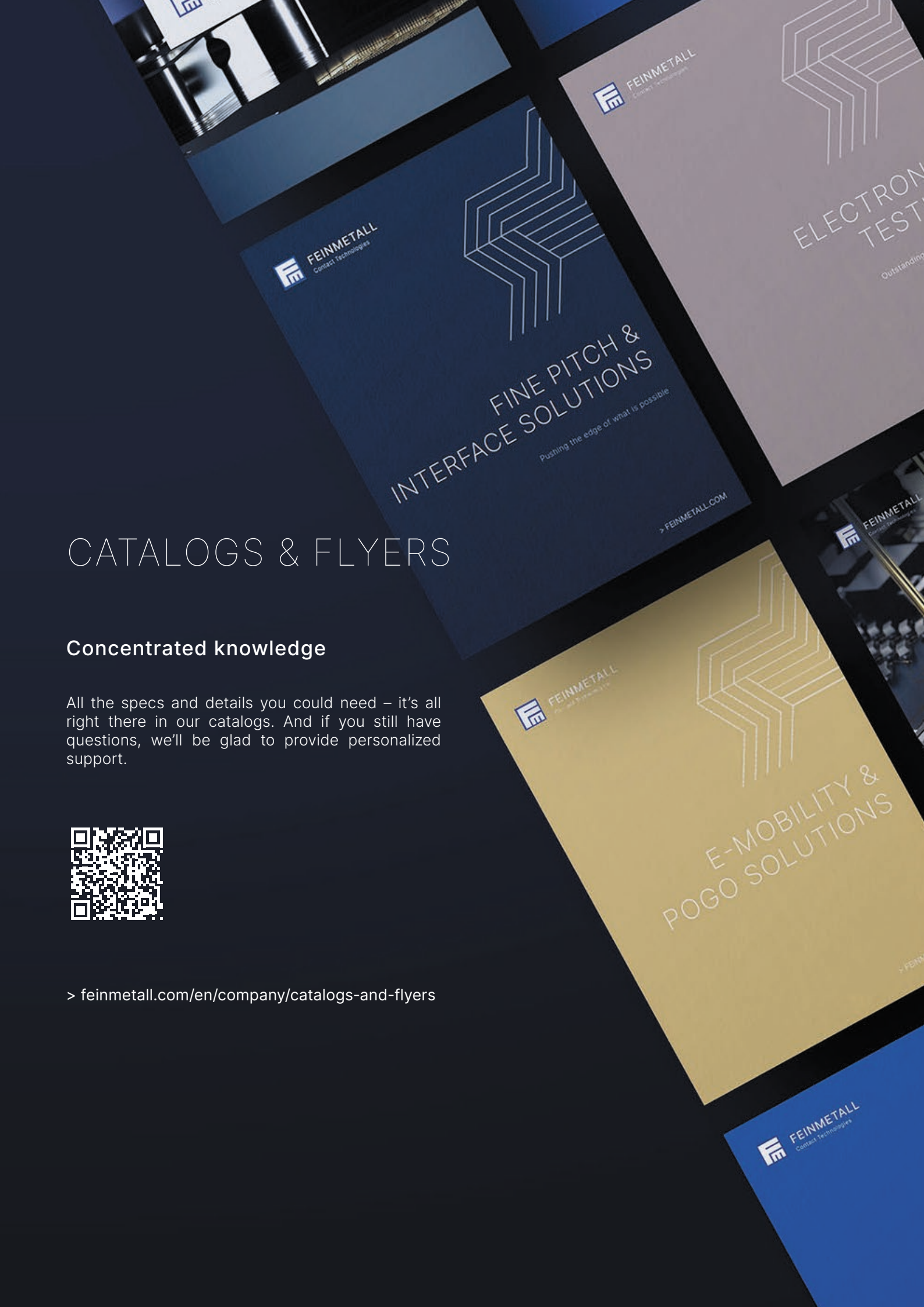
CATALOGS & FLYERS

Concentrated knowledge

All the specs and details you could need – it's all right there in our catalogs. And if you still have questions, we'll be glad to provide personalized support.



> feinmetall.com/en/company/catalogs-and-flyers



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