

A close-up photograph of a gold-colored INGUN E-TYPE FUSION probe. The probe has a textured, ribbed upper section and a smooth lower section. It is positioned vertically, with its tip touching a circular pad on a dark grey printed circuit board (PCB). The PCB features intricate white circuit traces. A bright blue light emanates from the point of contact between the probe tip and the pad. In the background, the word 'ingun' is faintly visible on the PCB traces. The overall lighting is soft, with a blue glow around the probe's tip.

ingun®

INGUN E-TYPE®

FUSION

*Designed for challenging
test conditions*

INGUN E-TYPE® FUSION

Designed for the most challenging test conditions

INGUN has designed a new test probe series specifically for challenging contacting of tough OSP coatings, lead-free soldering, or contaminated printed circuit boards (PCBs). Despite harsh conditions, these probes achieve outstanding test results, and boast the following features:

- Aggressive tip styles
- Robust plating
- Increased spring pre-load

INFINITE BENEFITS

Saving time and costs in the testing process

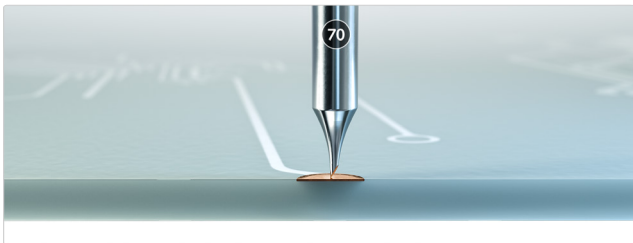
- Increase of the first pass yield thanks to the optimal combination of the tip style geometry, the plating, and the contact dynamics
- Optimal utilisation of the product capacity thanks to reduction of test cycles needed
- Long lifespan thanks to the extremely hard-wearing plating
- Reliable test results thanks to improved electrical contact
- Fewer damaged PCBs due to as little impact as possible from the spring forces resulting in low-stress contacting
- Effective self-cleaning effect of the plating results in fewer process interruptions caused by contamination and residues

SUITABLE SOLUTIONS

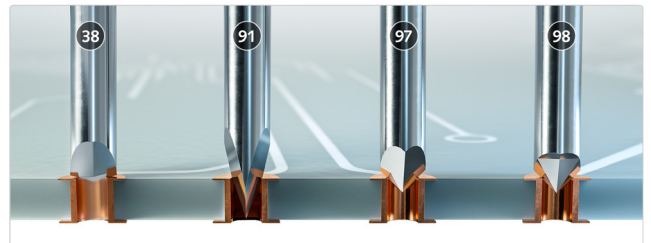
For varied test requirements

INGUN provides tailor-made tip styles for various requirements to achieve optimal test results. With the newly-developed tip style 70, INGUN offers a solution to contact OSP-coated bare boards as well as oxidised pads. All of the tips styles in the INGUN E-TYPE® FUSION series are characterised by particularly aggressive edges and also have a self-cleaning effect due to their specialised palladium-nickel plating.

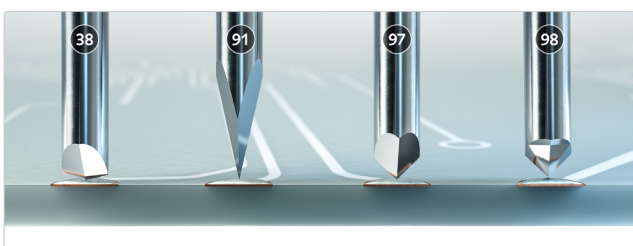
The choice of the optimum tip style depends on the customer-specific test requirements. You will find a detailed overview of the tip styles available at www.ingun.com/fusion. We are also happy to advise you personally.



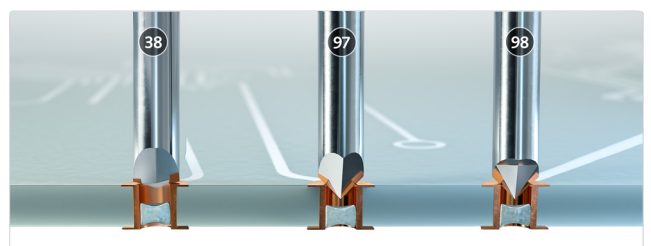
Pad without solder



Open via



Pad with solder



Closed via

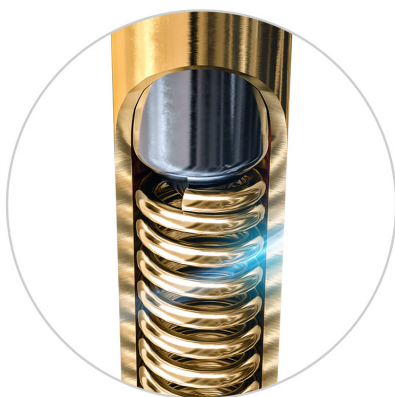
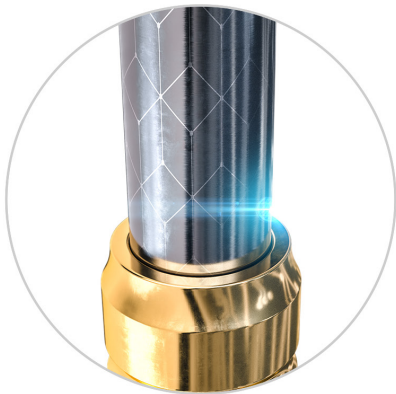
INGUN E-TYPE® FUSION

FEATURES

The high-performance solution for the most demanding test requirements

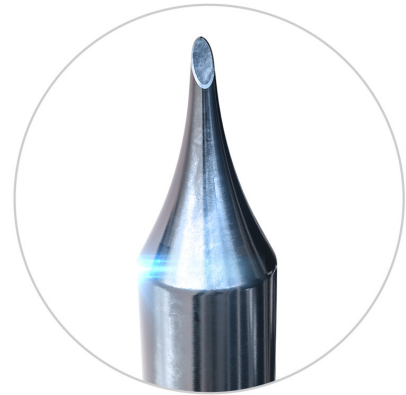
ROBUST PLATING

The palladium-nickel plating developed by INGUN guarantees the hardness required to reliably penetrate tough coatings and contamination. The plunger tips in particular withstand contamination well, and are extremely durable and resistant to wear.



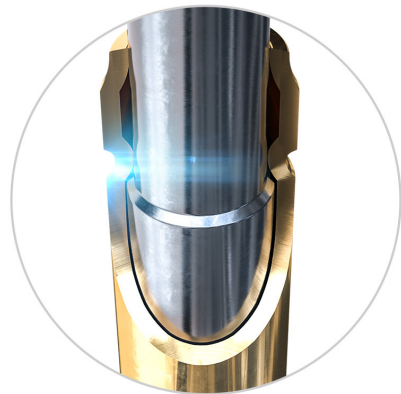
INCREASED SPRING PRE-LOAD

The increased spring pre-load ensures deeper penetration of the tip style in the PCB, which improves the contact reliability. Stress on delicate PCBs can be minimised by using the INGUN E-TYPE® FUSION series because lower nominal spring forces can be used to achieve the same contact reliability.



AGGRESSIVE TIP STYLES

The tip styles selected for the INGUN E-TYPE® FUSION series are characterised by aggressive edges and excellent edge-retention properties. Especially the newly-developed tip style 70 guarantees reliable contacting of OSP-coated test points without solder thanks to a particularly sharp-edged cutting geometry.



PRECISE DOUBLE BEADING

The tried-and-tested double beading guarantees optimum hitting accuracy due to precision-guidance of plungers. In addition, this ensures reliable signal transmission.

VARIED SOLUTIONS

For your testing challenges

Lead-free solder or contamination resulting from the solder process frequently leads to contacting problems, and the pseudo errors associated with them during the process of contacting surfaces with OSP coating. In addition OSP and flux residues tend to accumulate on the plunger tip. In order to keep the contamination on plunger tips to a minimum, and to reliably penetrate the top layer on the soldered points, aggressive tip styles with a specialised palladium-nickel plating developed by INGUN is used.

Selecting the optimum tip style is based on the surface texture of the test point and customer-specific test requirements:

- Pad without solder
- Pad with solder
- Open via
- Closed via

The reliable contacting of test points without solder poses the biggest challenge.

The tip style 70, which is characterised by its asymmetrical, sharp-edged cutting geometry, was developed specifically for pads. Moreover, the tip of the plunger is significantly smaller in comparison to other tip styles, which leads to deeper penetration of the tip into the PCB at the same spring force due to higher contact pressure. This interplay enables the reliable penetration of tough top layers.

Image 1 shows how the edge of tip style 70 penetrated into the surface of the pad. A clear depression and displacement of material can be seen. This results in reliable contacting.

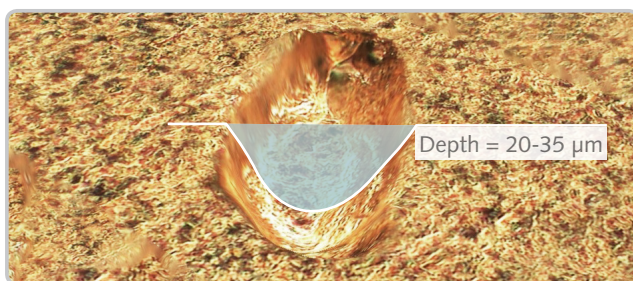


Image 1: Displacement of material after penetration using tip style 70
PAD-Oberfläche

We recommend tips styles 38, 91, 97, and 98 for pads with solder and open vias. Tip styles 38, 97, and 98 from the INGUN E-TYPE® FUSION range are available for closed vias.

INCREASED FIRST PASS YIELD

For reliable contacting

When contacting test points, first of all it is important to achieve reliable contact. Furthermore, consistent resistance, kept as low as possible, is required to perform measurements which are both precise and repeatable.

The following chart shows results from measurements performed on OSP-coated PCBs. The measurements were conducted up to 50,000 test cycles in the INGUN testing laboratory. During the test, the behaviour of tips style 70 on pads without solder, tip style 98 on open vias, as well as tip style 38 on pads with solder was examined.

Image 2 shows the tip styles selected for the test all achieved reliable contact with the test point. The first pass yield, contact achieved during the first test cycle, is over 99 % in each case. This leads to significant cost and time savings in the test field.

First pass yield - test points with OSP coating

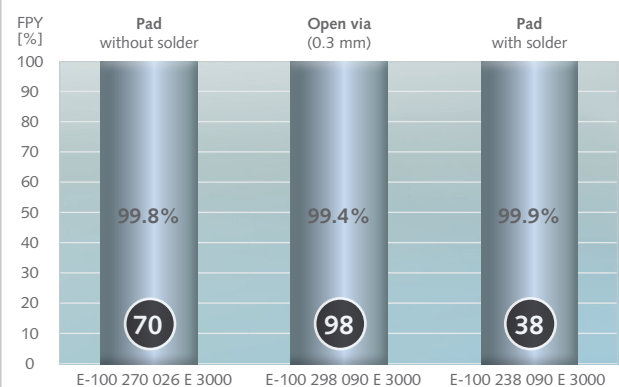


Image 2: Test results of the first pass yield on OSP-coated PCBs

The signal quality chart (see image 3) shows the measurement accuracy achieved on each test point with OSP coating.

The resistance values are considerably lower than 50 mΩ, which enables precise measurement. Furthermore, measurements at these low resistance values exhibit only slight fluctuations.

The test probes in the INGUN E-TYPE® FUSION series achieve an ideal compromise between signal quality and reliable contact thanks to their features, which enable reliable contacting of tough surfaces.

Signal quality - test points with OSP coating

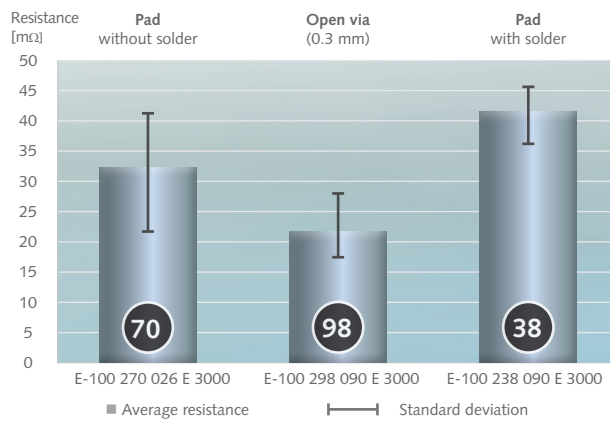


Image. 3: Signal quality on test points on OSP-coated PCBs

With regard to the mechanical wear on the test probe, the probes were in good condition and fully functional after 50,000 test cycles, see images 4 and 5.

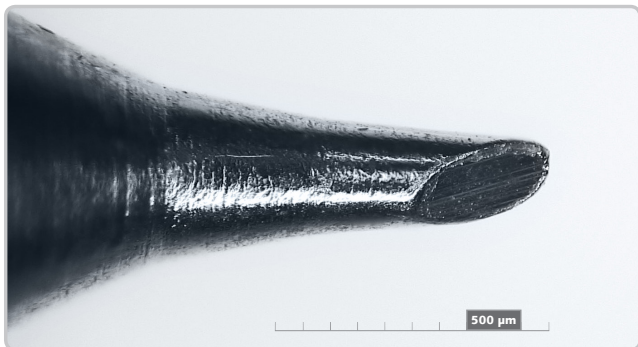


Image 4: Tip style 70, unused

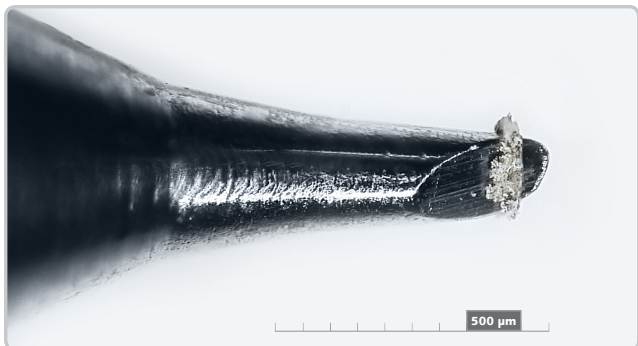


Image 5: Tip style 70 after 50,000 test cycles

Minimal deposits can be seen on the edge of tip style 70. However, these are not in the area of the contact zone, which means good signal quality is still guaranteed.

SPECIALISED PLATING

For the best edge-retention properties

The palladium-nickel plating, which was specifically developed for the test probes in the INGUN E-TYPE® FUSION series, are characterised by a surface hardness value three times higher than standard gold plating. With these characteristics solid layers of contamination and top layers, such as OSP can be penetrated without the tip style losing its edge-retention properties, and ultimately its aggressiveness.

Another positive effect of the plating is that it repels contamination, which reinforces the self-cleaning effect of each tip style – for unimpaired contact.

INCREASED CONTACT FORCE

For reliable penetration of the test surface

The INGUN E-TYPE® FUSION test probes based on the established INGUN E-TYPE® technology and enables the highest contact reliability on the PCB without subjecting it to excessive stress. This provides a 100 % higher contact force when impacting the test surface, which is achieved by the increased spring pre-load. The FUSION test probes, however, have the same spring force at working stroke as a standard test probe (GKS), see image 6.

The additional contact force initially gained ensures reliable penetration of insulated top layers and a contact surface between probe and PCB which is up to 25 % larger due to the penetration depth.

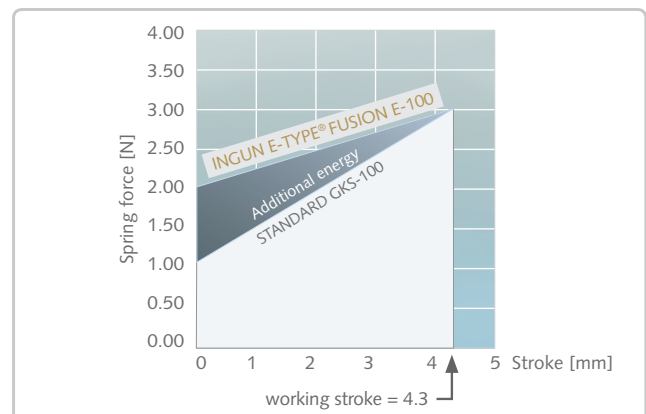


Image 6: Spring force-stroke chart for E-100 with 3N

E-050

INGUN E-TYPE® FUSION

Grid:

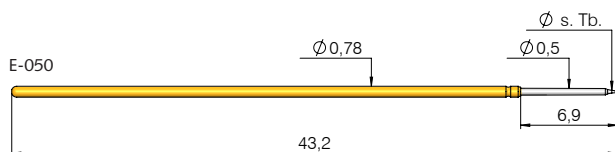
≥ 1.27 mm

≥ 50 Mil

Installation height with KS: 16.0 / 18.0 mm / variable

Recommended stroke: 4.3 mm

Mounting and functional dimensions



Mechanical data

Working stroke:	4.3 mm
Maximum stroke:	6.35 mm
Spring force at working stroke:	2.0 N
Spring pre-load:	1.2 N

Materials

Plunger:	steel, palladium-nickel
Barrel:	bronze, gold-plated
Spring:	steel, gold-plated
Receptacle:	BeCu, gold-plated

Available tip styles

Material	Tip style	Plating	Other versions	
			Ø	Plating
2 38	 Ø 0.50	E		
2 70	 Ø 0.26	E		
2 91	 Ø 0.50	E		
2 97	 Ø 0.50	E		

E-075

INGUN E-TYPE® FUSION

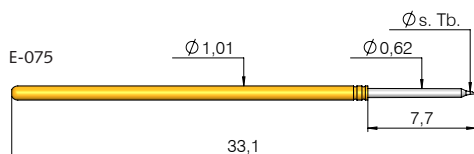
Grid:

≥ 1.91 mm

≥ 75 Mil

Installation height with KS: 10.5 - 23.0 mm / variable

Recommended stroke: 4.3 mm



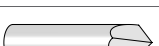
Mechanical data

Working stroke:	4.3 mm
Maximum stroke:	6.35 mm
Spring force at working stroke:	2.0 N
alternative:	2.8 N
Spring pre-load:	1.2 N; alternative 1.6 N

Materials

Plunger:	steel, palladium-nickel
Barrel:	bronze, gold-plated
Spring:	steel, gold-plated
Receptacle:	BeCu, gold-plated

Available tip styles

Material	Tip style	Plating	Other versions	
			Ø	Plating
2 38	 Ø 0.64	E		
2 70	 Ø 0.26	E		
2 91	 Ø 0.64	E		
2 97	 Ø 0.64	E		
2 98	 Ø 0.64	E		

E-100

INGUN E-TYPE® FUSION

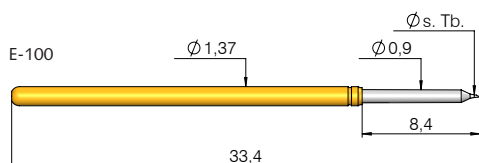
Grid:

≥ 2.54 mm

≥ 100 Mil

Installation height with KS: 10.5 - 25.5 mm / variable

Recommended stroke: 4.3 mm



Mechanical data

Working stroke:	4.3 mm
Maximum stroke:	6.35 mm
Spring force at working stroke:	2.0 N
alternative:	3.0 N
Spring pre-load:	1.3 N; alternative 2.0 N

Materials

Plunger:	steel, palladium-nickel
Barrel:	bronze, gold-plated
Spring:	steel, gold-plated
Receptacle:	BeCu, gold-plated

Available tip styles

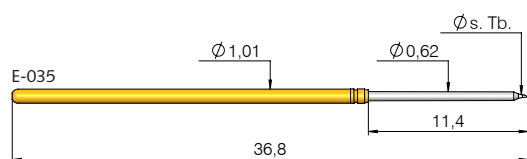
Material	Tip style	Plating	Other versions	
			Ø	Plating
2 38	 Ø 0.90	E		
2 70	 Ø 0.26	E		
2 91	 Ø 0.90	E		
2 97	 Ø 0.90	E		
2 98	 Ø 0.90	E		

E-035

Grid:
≥ 1.91 mm
≥ 75 Mil

Installation height with KS: 14.2 - 23.7 mm / variable
Recommended stroke: 8.0 mm

Mounting and functional dimensions



Mechanical data

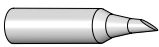
Working stroke: 8.0 mm
Maximum stroke: 10.0 mm
Spring force at working stroke: 1.2 N
Spring pre-load: 0.57 N

Materials

Plunger: steel, palladium-nickel
Barrel: bronze, gold-plated
Spring: steel, gold-plated
Receptacle: BeCu, gold-plated

Long stroke INGUN E-TYPE® FUSION for dual-stage test fixtures

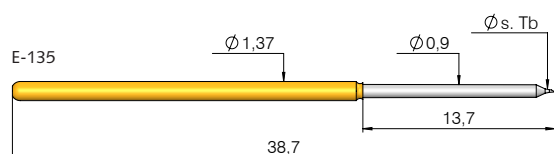
Available tip styles

Material	Tip style	Plating	Other versions	
			Ø	Plating
2 70	 Ø 0.26	E		
2 91	 Ø 0.64	E		

E-135

Grid:
≥ 2.54 mm
≥ 100 Mil

Installation height with KS: 15.8 - 21.3 mm / variable
Recommended stroke: 9.3 mm



Mechanical data

Working stroke: 9.3 mm
Maximum stroke: 11.5 mm
Spring force at working stroke: 2.8 N
Spring pre-load: 1.1 N

Materials

Plunger: steel, palladium-nickel
Barrel: bronze, gold-plated
Spring: steel, gold-plated
Receptacle: BeCu, gold-plated

Long stroke INGUN E-TYPE® FUSION for dual-stage test fixtures

Available tip styles

Material	Tip style	Plating	Other versions	
			Ø	Plating
2 70	 Ø 0.26	E		
2 91	 Ø 0.90	E		
2 97	 Ø 0.90	E		

INGUN E-TYPE® FUSION versions	Series	Grid (≥ mm)	Working stroke (mm)	Max Hub (mm)	Current rating (A)	Spring forces (N)		Installation height with KS (mm) v = variable		
						min	max	min	max	v
Standard stroke	E-050	1.27	4.3	6.35	2 – 3	2	-	16	18	v
	E-075	1.91	4.3	6.35	3 – 4	2	2.8	10.5	23	v
	E-100	2.54	4.3	6.35	5 – 8	2	3	10.5	25.5	v
Long stroke	E-035	1.91	8	10	3 – 4	1.2	-	14.2	23.7	v
	E-135	2.54	9.3	11.5	5 – 8	2.8	-	15.8	21.3	v

Note:

You will find a comprehensive overview of the available receptacles and possible installation heights, electrical data, operating temperature range, and mounting hole sizes on our website, as well as in the current test probe catalogue in the compatible test probe series GKS-050, GKS-075, GKS-100 as well as GKS-035 and GKS-135.

Ordering example

Series	Tip style material 2 = steel	Tip style	Tip diameter (1/100 mm)	Plating E = palladium-nickel	Spring force (dN)	Collar height (mm)
E	1	00	270	026	E	3000

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