



## Technical Feature

### 4-pole-measurement of low resistances by Kelvin-probes

The product family “Kelvin Probes” is a significant part of the FEINMETALL product range, including many years of experience in these applications. Kelvin probes have been developed for the measurement of low-impedance resistances.

#### Principle of the Kelvin measurement

A Kelvin probe is a coaxial contact probe with two electrically isolated measuring channels. The typical 4-pole-measurement is based on an impressed current flowing through the resistance and the measurement of the resulting voltage drop. Ideally, the contacting of current source and voltage meter is realised by two Kelvin probes, which are located very close to the device under test. The constant current usually flows through the outer conductor (force signal), while the voltage drop is measured by the internal conductor (sense signal). Using this measurement principle, transition and output resistances are compensated and therefore do not lead to false results (fig. 1).

The inner and outer conductors of FEINMETALL coaxial probes are spring loaded independently from each other in order to balance different mechanical tolerances.

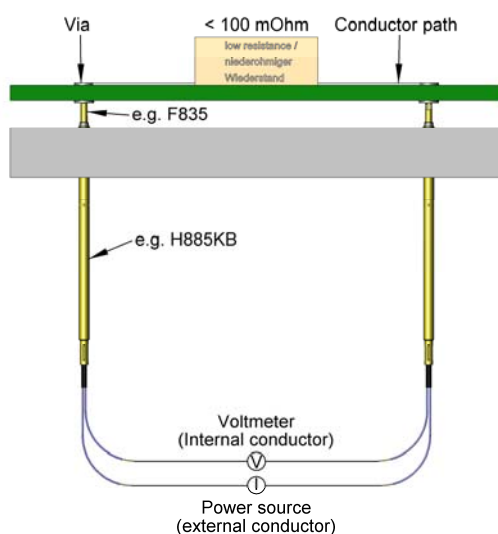


Fig. 1: Kelvin-measurement of a low resistance

### FEINMETALL Kelvin probes

As a leading manufacturer of spring contact probes for automotive and electronic tests FEINMETALL offers innovative solutions for new applications and connector types. The first offered Kelvin probes have been plug-in versions that were mounted into plug-in receptacles. In order to prevent ejection of the probes out of the receptacles, new screwable versions of Kelvin probes have been realised (e.g. for FAKRA applications or antenna connections).

### New generation of Kelvin probes – now to be exchanged solderless

With the new series F835 FEINMETALL offers a new generation of threaded Kelvin probes. The most important advantages are the solderless exchange of the probes and the ability to be used in applications with very small centers.

### Solderless exchange of the probes

The solderless exchange of the probes is realized by the use of the “combi-receptacle”. The outer and inner conductor are electrically connected to the receptacle just by screwing the probe in (fig.2). The further electrical connections are made either by direct soldering to the receptacle or by using adequate connecting elements. Combi-receptacles save time and efforts for exchanging the probes and therefore reduce the cost of maintenance and assembly.

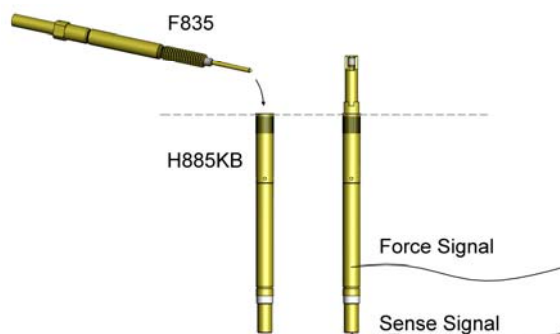


Fig. 2: Principle of the combi-receptacle

### Simple implementation of small centers

A clever design of head and barrel of the probe results in a slim screw-in-tool that needs only very few space during the assembly. Small centers almost down to the probe diameter can thus be realised (fig. 3).

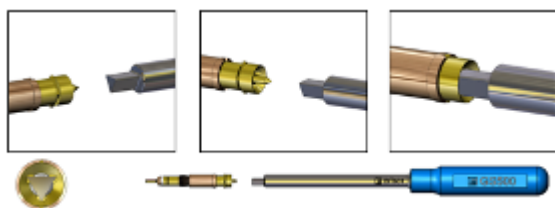


Fig. 3: New tool engagement for small centers

### Outstanding frequency response

Generally, all FEINMETALL Kelvin probes are optimized for higher frequencies, as far as the boundary conditions allow so. It should be mentioned that the good frequency response of the F835 is not degraded by using the combi-receptacle (fig. 4 and 5). The cut-off frequency (-3dB) of the combination of probe and receptacle is higher than 2 GHz.

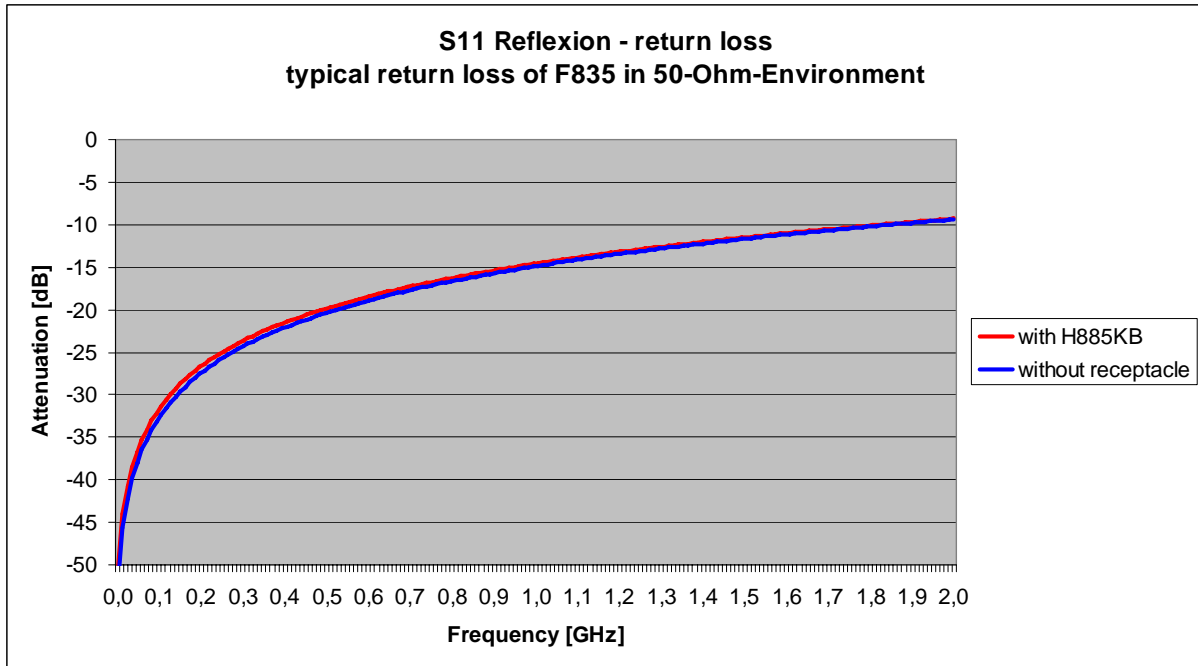


Fig. 4: Return loss of the F835 with and without combi-receptacle

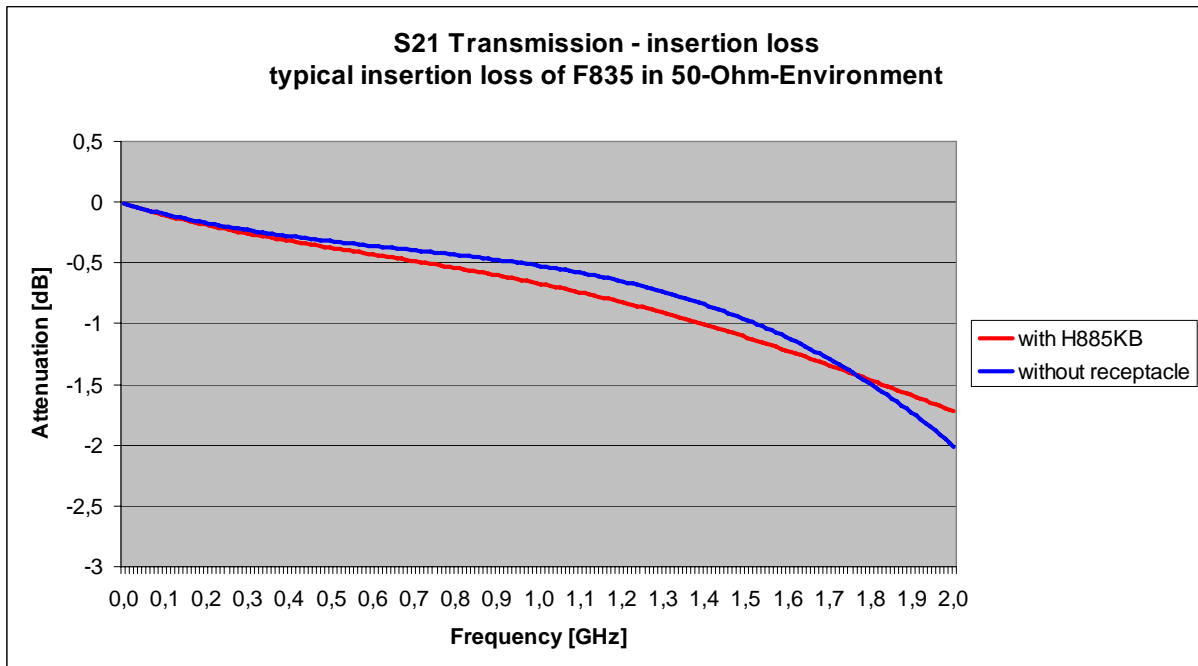


Fig. 5: Insertion loss of the F835 with and without combi-receptacle

## Selection of combi-receptacles

Combi-receptacles are offered for all FEINMETALL Kelvin probes. They can be used for threaded as well as for plug-in probes (H831KB).

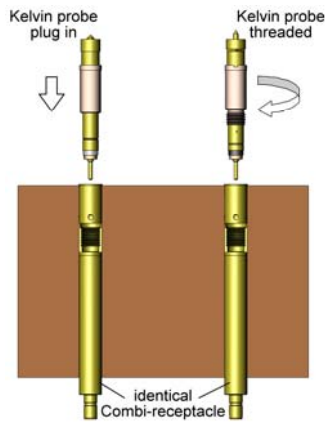


Fig. 6: Combi-receptacle for threaded and plug-in probes

Connecting elements with ready-prepared cables as well as appropriate screw-in-tools are offered for all Kelvin probes and combi-receptacles. For correlation of probes and combi-receptacles please see table below.

Type	F810	F820	F821	F822	F831	F832	F835
	plug in				threaded		
<b>H810KB</b>	x						
<b>H831KB</b>		x	x	x	x	x	
<b>H885KB</b>							x

Table 1: Correlation of Kelvin probes and combi-receptacles

For further information visit our homepage: [www.feinmetall.com](http://www.feinmetall.com) .

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