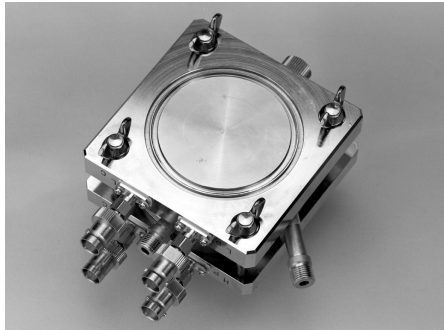


## Up to 120 MHz (4-Terminal Pair): Material *continued*

### 16452A Liquid dielectric test fixture



**Terminal connector:** 4-Terminal Pair, SMA

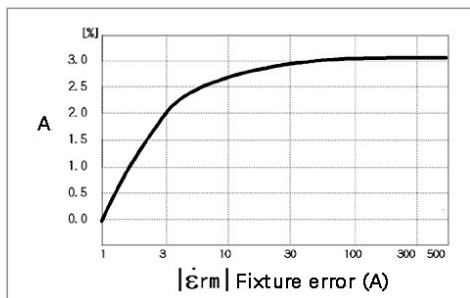
**Dimensions (approx.):** 8

5 (H) x 85 (W) x 37 (D) [mm]

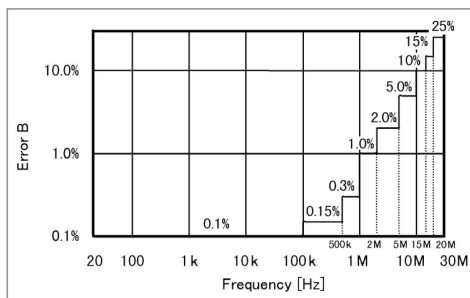
**Weight (approx.):** 1400 g

**Measurement accuracy:** A + B + C [%]

Error A [%]



Error B [%]



Error C [%] = Measurement Error of Instrument



LCR meter with 16452A

**Description:** This test fixture provides accurate dielectric constant and impedance measurements of liquid materials. The 16452A employs the parallel plate method, which sandwiches the liquid material between two electrodes to form a capacitor. A LCR meter or an impedance analyzer is then used to measure the capacitance created from the fixture.

**Applicable instruments:** E4980A/AL, E4990A

**Frequency:** 20 Hz to 30 MHz

**Operating temperature:** -20 to 125°C

**Maximum voltage:** 30 Vrms

**Material capacity:** Required sample liquid capacity depends on the gap of the electrodes.

Gap of electrodes	0.3 mm	0.5 mm	1 mm	2 mm
Air capacitance	34.9 pF ±25%	21.2 pF ±15%	10.9 pF ±10%	5.5 pF ±10%
Sample liquid capacity	3.4 ml	3.8 ml	4.8 ml	6.8 ml
Applicable frequency	20 Hz - 30 MHz			



**Furnished accessories:**

Description	P/N	Qty.	
Shorting plate	16092-08010	1	E
O-ring for liquid outlet	0905-1277	1	D
Spacer (1.3 mm thickness)	16452-00601	1	F
Spacer (1.5 mm thickness)	16452-00602	1	F
Spacer (2.0 mm thickness)	16452-00603	1	F
Spacer (3.0 mm thickness)	16452-00604	1	F
Lid of liquid outlet	16452-24002	1	G
SMA-BNC adapter	1250-1200	4	H
Waterproof cap for BNC connector	1252-5821	4	I
Carrying case	16452-60111	1	-
Operation and service manual	16452-90020	1	-
Angle iron of stand body for fixture stand	16452-01201	2	-
Screw of stand body or fixture stand	0515-0914	4	C
Screw for fixture stand	0515-0914	4	-
Stand foot	16452-00611	1	-
Electrode (high and low)	NA	2	A,B

Requires the following interface cables to connect to a measurement instrument. Select accordingly to the required temperature conditions.

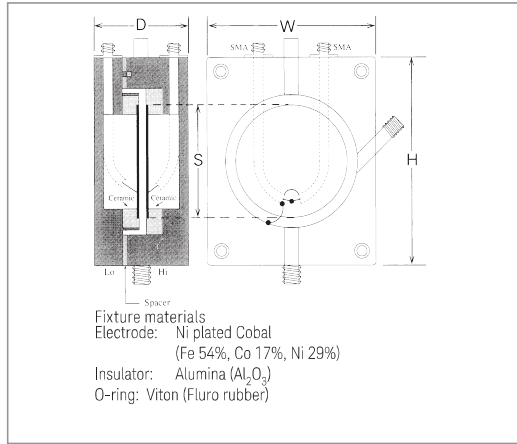
Temperature	Model# or P/N	Cable length (approx.)
0 to 55°C	16048A	0.94 m
-20 to 150°C	16048G* for E4990A only	1 m
-20 to 150°C	16048H* for E4990A only	2 m

\* Four BNC(m) to BNC(m) adapters (P/N 1250-0216) are needed to connect the 16048G/H and 16452A.



## Up to 120 MHz (4-Terminal Pair): Material *continued*

### 16452A Liquid dielectric test fixture *continued*



Test fixture overview

**Compensation and measurement:** Short compensation is recommended in combination with the cable length compensation before measurement. First, set the instrument's cable length compensation function to 1 m. Then, short compensation is performed by using the furnished shorting plate. Open compensation is not performed, but its values are used in the dielectric constant equation as shown below:

$$\epsilon_r = \alpha \left( \frac{C_p}{C_o} - j \frac{1}{\omega C_o R_p} \right)$$

$\alpha$  : Correction coefficient

$\epsilon_r$  : Relative dielectric constant

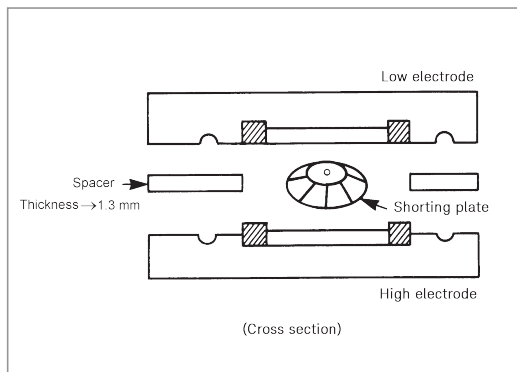
$C_p$  : Liquid capacitance (measurement data)

$C_o$  : Air capacitance (measurement data) or open compensation data

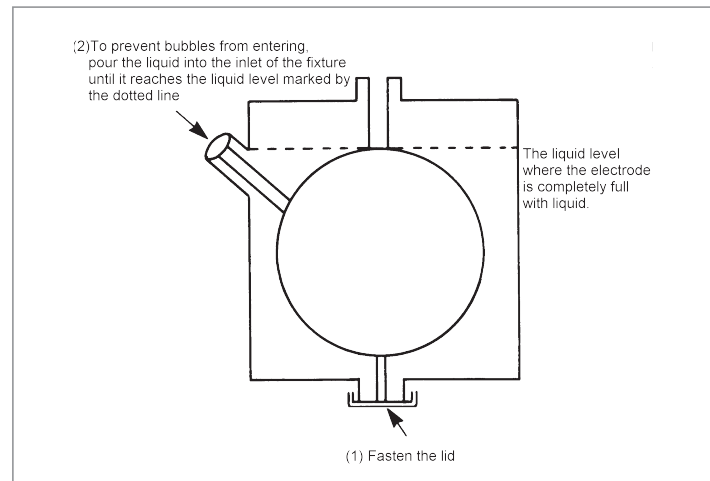
$R_p$  : Equivalent parallel resistance (measurement data)

$\omega$  : Angular frequency ( $\omega = 2\pi f$ )

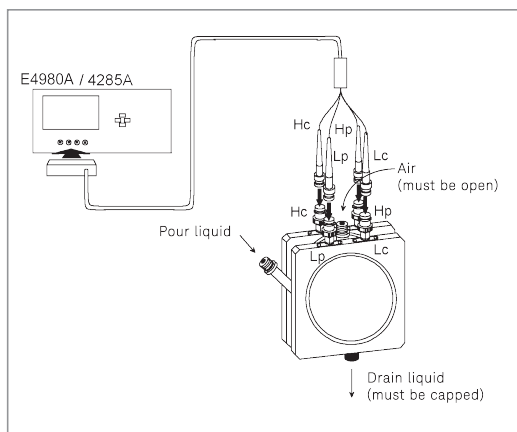
The following figures below show how compensation and measurement is performed.



Short compensation



Pouring the liquid into the fixture



Method of connection

**Note:** The 16452A is not capable of measuring salt or ionic solutions or other liquids with bulk conductivity due to the electrode polarization phenomenon.

Keysight is not responsible for any damage (e.g., corrosion, smear) to the 16452A caused by the reaction between the liquid under test and the 16452A.

