
**User's
Manual**

**Model 701949
Miniature Passive Probe**

User Registration

YOKOGAWA provides registered users with useful information and services. Please allow us to serve you best by completing the user registration form accessible from our website.

<https://tmi.yokogawa.com/support/>



Contact Us

If you want to resolve a technical support issue or need to contact YOKOGAWA, please fill out the inquiry form on our website.

<https://tmi.yokogawa.com/contact/>



Thank you for purchasing the Model 701949 Miniature Passive Probe. This user's manual explains usage, specifications, and the handling precautions of the 701949. To ensure correct use, please read this manual thoroughly before beginning operation. After reading this manual, keep it in a safe place.

List of Manuals

The following manuals are provided for the 701949, including this manual.

Manual Title	Manual Number	Description
Model 701949 Miniature Passive Probe User's Manual	IM 701949-01EN	This manual. Explains usage, specifications, and the handling precautions of the 701949.
701949 Miniature Passive Probe	IM 701949-92Z1	Document for China
Safety Instruction Manual	IM 00C01C01-01Z1	Safety manual (European languages)

The "EN" and "Z1" in the manual numbers are the language codes.

Contact information of YOKOGAWA offices worldwide is provided on the following sheet.

Document Number	Description
PIM 113-01Z2	List of worldwide contacts

Notes

- The contents of this manual are subject to change without prior notice as a result of continuing improvements to the product's performance and functionality. The figures given in this manual may differ from those that actually appear on your product.
- Every effort has been made in the preparation of this manual to ensure the accuracy of its contents. However, should you have any questions or find any errors, please contact your nearest YOKOGAWA dealer.
- Copying or reproducing all or any part of the contents of this manual without the permission of YOKOGAWA is strictly prohibited.

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Revisions

- 1st Edition: January 2020
- 2nd Edition: June 2021
- 3rd Edition: May 2022

Conventions Used in This Manual



Improper handling or use can lead to injury to the user or damage to the instrument. This symbol appears on the instrument to indicate that the user must refer to the user's manual for special instructions. The same symbol appears in the corresponding place in the user's manual to identify those instructions. In the manual, the symbol is used in conjunction with the word "WARNING" or "CAUTION."

WARNING

Calls attention to actions or conditions that could cause serious or fatal injury to the user, and precautions that can be taken to prevent such occurrences.

CAUTION

Calls attention to actions or conditions that could cause light injury to the user or damage to the instrument or user's data, and precautions that can be taken to prevent such occurrences.

Note

Calls attention to information that is important for the proper operation of the instrument.

French



Une manipulation ou une utilisation incorrectes risquent de blesser l'utilisateur ou d'endommager l'instrument. Ce symbole apparaît sur l'instrument pour indiquer à l'utilisateur qu'il doit se reporter au manuel de l'utilisateur afin d'y lire les instructions spécifiques correspondantes. Ce même symbole apparaît à la section correspondante du manuel de l'utilisateur pour signaler lesdites instructions. Dans le manuel de l'utilisateur, ce symbole est accompagné des termes AVERTISSEMENT et ATTENTION.

AVERTISSEMENT

Attire l'attention sur des gestes ou des conditions susceptibles de provoquer des blessures graves (voire mortelles), et sur les précautions de sécurité pouvant prévenir de tels accidents.

ATTENTION

Attire l'attention sur des gestes ou des conditions susceptibles de provoquer des blessures légères ou d'endommager l'instrument ou les données de l'utilisateur, et sur les précautions de sécurité susceptibles de prévenir de tels accidents.

Safety Precautions

This product is designed to be used by a person with specialized knowledge. To use this product correctly and safely, make sure to observe the following safety precautions when handling the product. YOKOGAWA assumes no liability for the customer's failure to comply with these safety precautions.

This manual is part of the product and contains important information. Keep this manual in a safe place so that you can refer to it immediately when using the product until you dispose of the product. Also, before starting to use the probe, read the oscilloscope manual to thoroughly familiarize yourself with its specifications and handling.

The following symbols are used on this instrument.



Handle with care. Refer to the user's manual or service manual. This symbol appears on dangerous locations on the instrument which require special instructions for proper handling or use. The same symbol appears in the corresponding place in the manual to identify those instructions.

French



À manipuler délicatement. Toujours se reporter aux manuels d'utilisation et d'entretien. Ce symbole a été apposé aux endroits dangereux de l'instrument pour lesquels des consignes spéciales d'utilisation ou de manipulation ont été émises. Le même symbole apparaît à l'endroit correspondant du manuel pour identifier les consignes qui s'y rapportent.

Notes about Usage



WARNING

Purpose of the product

The product is used in combination with an oscilloscope to observe and measure electrical signals. Do not use for any other purpose.

Grounding of the measuring instrument

The protective grounding terminal of the oscilloscope must be connected to ground.

Grounding of the probe

Make sure to connect the ground lead or the equivalent accessory of the probe to the grounding potential.

Be careful of electric shock

Never use the probe with wet hands or when the probe itself is wet. Doing so may cause electric shock. Be careful of electric shock when you connect the probe to the device under measurement.

Do not operate in wet or damp conditions

To prevent electric shock, do not operate the probe in wet or damp conditions.

Avoid exposed circuitry

To prevent electric shock, remove metal and jewelry such as watches and rings. Do not touch exposed connections or components when power is present on the device.

Do not operate in explosive atmosphere

To prevent injury or fire hazard, do not operate the probe in an atmosphere of flammable or explosive gases or vapors.

Do not operate with suspected failures

Stop using the probe if you suspect that the probe is damaged. Consult your nearest YOKOGAWA dealer.

Do not operate with a damaged signal cable

If the signal cable is torn and the inner metal is exposed or if a color different from the outer sheath appears, stop using the cable.

Do not disassemble or modify

Do not disassemble or modify the product. YOKOGAWA assumes no liability if you disassemble or modify the product.

French



AVERTISSEMENT

But du produit

Le produit est utilisé en association avec un oscilloscope pour observer et mesurer des signaux électriques. Ne l'utilisez pas à d'autres fins.

Mise à la terre de l'instrument de mesure

La borne de terre de protection de l'oscilloscope doit être connectée à la terre.

Mise à la terre de la sonde

Assurez-vous de connecter le fil de terre ou l'accessoire équivalent de la sonde au potentiel de mise à la terre.

Faites attention au choc électrique

N'utilisez jamais la sonde les mains mouillées ou lorsque la sonde elle-même est mouillée. Cela pourrait provoquer un choc électrique. Faites attention au choc électrique lorsque vous connectez la sonde à l'appareil à mesurer.

N'opérez pas dans des conditions mouillées ou humides

Pour éviter un choc électrique, ne faites pas fonctionner la sonde dans des conditions mouillées ou humides.

Évitez les circuits exposés

Pour éviter un choc électrique, retirez le métal et les bijoux tels que les montres et les bagues. Ne touchez pas les connexions ou composants exposés en présence de courant sur l'appareil.

N'opérez pas dans une atmosphère explosive

Pour éviter les blessures et les risques d'incendie, n'utilisez pas la sonde dans une atmosphère de gaz ou des vapeurs inflammables ou explosifs.

N'opérez pas en cas de défaillances suspectées

Arrêtez d'utiliser la sonde si vous pensez qu'elle est endommagée. Consultez votre revendeur YOKOGAWA le plus proche.

N'opérez pas avec le câble de signal endommagé

Si le câble de signal est coupé et que le métal interne est exposé ou si une couleur différente de la gaine extérieure apparaît, arrêtez d'utiliser le câble.

Ne démontez ou modifiez pas

Ne démontez ou modifiez pas le produit. YOKOGAWA n'assume aucune responsabilité si vous démontez ou modifiez le produit.

Regulations and Sales in Various Countries and Regions

Waste Electrical and Electronic Equipment (WEEE)



(EU WEEE Directive valid only in the EEA* and UK WEEE Regulation in the UK)



This product complies with the WEEE marking requirement. This marking indicates that you must not discard this electrical/electronic product in domestic household waste. When disposing of products in the EEA or UK, contact your local Yokogawa office in the EEA or UK respectively.

* EEA: European Economic Area

UKCA Marking



This product complies with the UKCA (UK Conformity Assessed) marking.

Authorized Representative in the EEA (AR)

Yokogawa Europe B. V. is the authorized representative of Yokogawa Test & Measurement Corporation for this product in the EEA. To contact Yokogawa Europe B. V., see the separate list of worldwide contacts, PIM 113-01Z2.

Disposal

When disposing of YOKOGAWA products, follow the laws and ordinances of the country or region where the product will be disposed of.

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1. Overview

Overview of 701949

Model 701949 is a miniature passive probe with attenuation ratio of 10:1, used in combination with oscilloscopes with input impedances of 1 M Ω . The probe is designed for user safety and ease of use, suitable for measuring high density mounting boards. By adopting a spring structure for the contact tip, the stress applied on the device under measurement is minimized. In addition, by using various accessories such as IC caps, you can easily contact the pins of fine pitch ICs.

2. Configuration and Dimensions

List of Standard Accessories

The 701949 consist of all the standard accessories listed below. The number corresponds to the combination on the next page. There are no optional accessories.

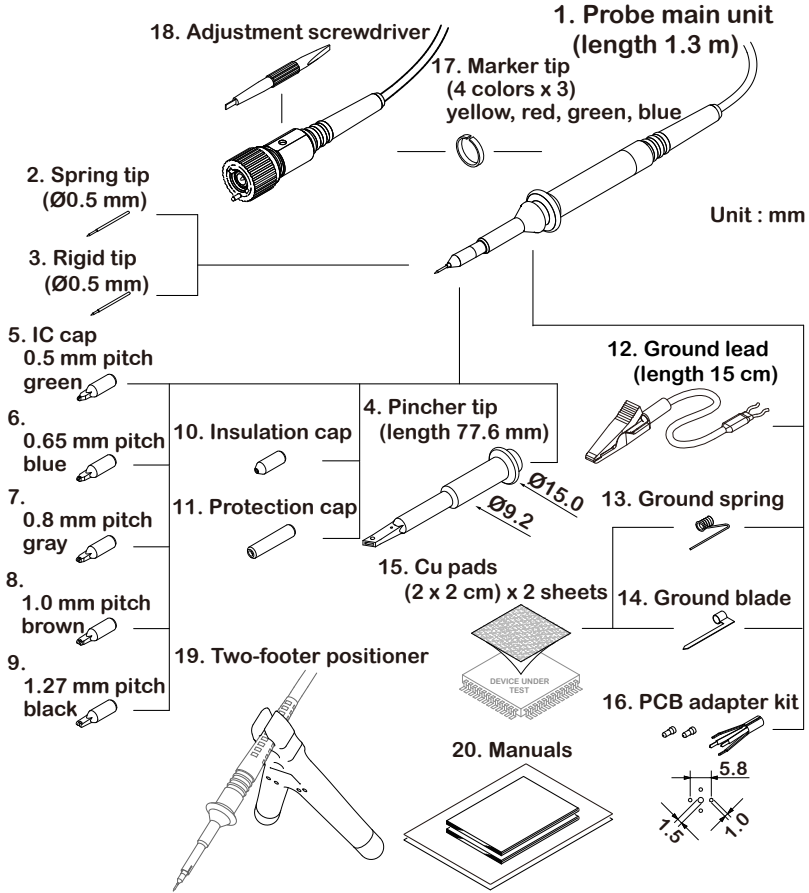
No. Standard Accessories	No. Standard Accessories
1. Probe main unit	11. Protection cap ¹
2. Spring tip (Ø 0.5 mm) ¹	12. Ground lead
3. Rigid tip (Ø 0.5 mm)	13. Ground spring
4. Pincher tip	14. Ground blade
5. IC cap 0.5 mm pitch (green)	15. Cu sheets (2 x 2 cm) x 2 sheets
6. IC cap 0.65 mm pitch (blue)	16. PCB adapter kit
7. IC cap 0.8 mm pitch (gray)	17. Marker tips (4 colors x 3)
8. IC cap 1.0 mm pitch (brown)	18. Adjustment screwdriver
9. IC cap 1.27 mm pitch (black)	19. Two-footer probe positioner
10. Insulation cap	20. Manuals ²

1 Attached to the probe main unit.

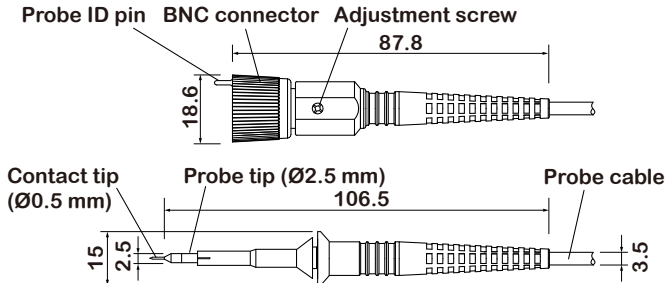
2 See the table below.

Manual Title	Manual No.	Description
Model 701949 Miniature Passive Probe User's Manual	IM 701949-01EN	This manual
701949 Miniature Passive Probe	IM 701949-92Z1	Document for China
Safety Instruction Manual	IM 00C01C01-01Z1	Safety manual (European languages)
Inquiries	PIM 113-01Z2	List of worldwide contacts

Combinations and Dimensions of Accessories



1. Dimensions of probe main unit



3. How to use

How to Connect to Oscilloscopes



WARNING

- Use this probe only with YOKOGAWA's oscilloscopes. Even with YOKOGAWA's oscilloscopes, this probe can be used only when specified as an accessory. Do not use accessories other than the standard accessories of this probe.
 - Do not apply a voltage exceeding the maximum input voltage to the probe. EN 61010-031 is a compliant safety standard that is applied to the probe alone. For the actual safety standards and operating conditions, comply with the conditions of the oscilloscope. Failure to follow this precaution may cause accidents, such as electric shock or damage to the instruments.
 - When the oscilloscope's input coupling is AC, a DC voltage is applied to the oscilloscope's input at the same electric potential as the probe's input. Make sure not to exceed the oscilloscope's maximum input voltage.
 - This probe cannot be used to measure the voltage between two points floating from the ground potential. Consider using a differential probe.
 - When disconnecting the probe, turn off the power to the device under measurement, disconnect the probe from the device, and then disconnect the probe from the oscilloscope.
-

CAUTION

- Since the contact tips are very thin and sharp, handle them with care. Attach the protection cap when not in use.
 - Avoid shock to the probe body. Do not bend or pull the cables excessively. Doing so may damage or disconnect the probe.
-

French



AVERTISSEMENT

- Utilisez la sonde uniquement avec les oscilloscopes de YOKOGAWA. Même avec les oscilloscopes de YOKOGAWA, la sonde ne peut être utilisée que si spécifiée comme accessoire. N'utilisez pas d'autres accessoires que les accessoires standards de la sonde.
- N'appliquez pas une tension supérieure à la tension d'entrée maximale sur la sonde. EN 61010-031 est une norme de sécurité conforme qui s'applique à la sonde seule. Pour les normes de sécurité et les conditions d'utilisation actuelles, suivez les conditions de l'oscilloscope. Si cette précaution n'est pas prise, des accidents tels qu'un choc électrique ou un dégât matériel peuvent se produire.
- Lorsque le couplage d'entrée de l'oscilloscope est AC, une tension DC est appliquée à l'entrée de l'oscilloscope au même potentiel électrique que l'entrée de la sonde. Assurez-vous de ne pas dépasser la tension d'entrée maximale de l'oscilloscope.
- La sonde ne peut être utilisée pour mesurer la tension entre deux points flottant du potentiel de terre. Pensez à utiliser une sonde différentielle.
- Lors de la déconnexion de la sonde, mettez hors tension le périphérique en cours de mesure, déconnectez la sonde du périphérique, puis déconnectez la sonde de l'oscilloscope.

ATTENTION

- Les pointes de contact étant très fines et pointues, manipulez-les avec précaution. Placez le capuchon de protection lorsque vous ne l'utilisez pas.
- Évitez les chocs sur le corps de la sonde. Ne pliez pas et ne tirez pas les câbles de manière excessive. Cela pourrait endommager ou déconnecter la sonde.

1. Connect the BNC connector of the probe to the input of the oscilloscope with the input impedance of 1 M Ω . Set the input impedance of the oscilloscope to 1 M Ω .
2. The probe ID pin is automatically detected, and the oscilloscope attenuation ratio is automatically set to 10:1. If it is not set automatically, set it manually.
3. Using the appropriate accessories, connect the probe to the device under measurement.
4. Adjust the probe phase before use.

Note

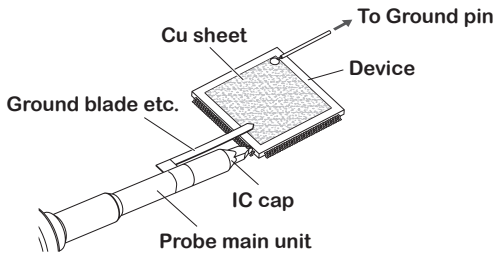
Accurate measurements may not be possible near objects with strong electromagnetic fields such as transformers, large current circuits, or wireless equipment.

Contact Tips and IC Caps

Contact tips are available as a spring tip (spring structure, already attached to the probe body) and a rigid tip (solid structure). In addition, five types of IC caps that allow easy contact with fine-pitch IC pins are available ranging from 0.5 mm to 1.27 mm pitches.

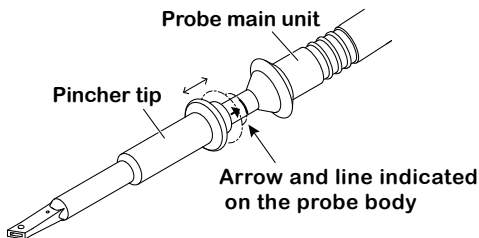
Connecting to Ground

When measuring signals that contain high frequency components, to reduce the ringing caused by the ground lead inductance, it is important to reduce the length of the ground connection. Affix the included Cu sheet after adjusting its size to match the size of the device under measurement. Then connect it to the ground (ground potential) by soldering or by other means. Good ground connection can be made using the included ground blade or ground spring.



Installing the Pincher Tip

To use the pincher tip, first install it on the probe so that the pincher tip comes to the line indicated by the arrow when pulled.



How to Adjust the Probe Phase

CAUTION

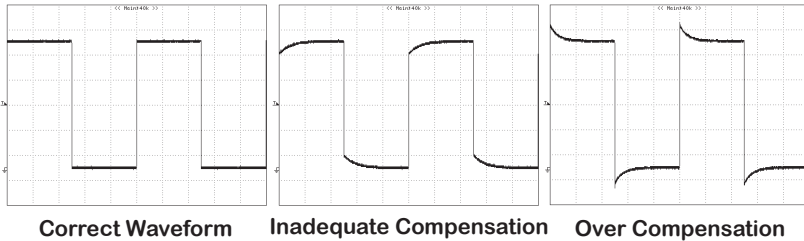
Do not apply excessive force to the phase adjustment screw. Doing so may damage the internal variable capacitor.

French

ATTENTION

N'appliquez pas une force excessive sur la vis de réglage de phase. Cela pourrait endommager le condensateur variable interne.

1. Connect the BNC connector of the probe to the input of the oscilloscope, and connect the probe input to the oscilloscope signal output terminal for probe compensation adjustment (CAL or COMP terminal).
2. Operate the vertical and time scales on the oscilloscope, and turn the phase adjustment screw with the included adjustment screwdriver to adjust the observed waveform to the correct waveform (square wave). Adjust the probe capacitance to match the input capacitance of the oscilloscope with the variable capacitor inside the probe.



4. Maintenance

Cleaning

CAUTION

Do not immerse the probe body in liquid. Do not use abrasive cleaners or volatile solvents such as benzine on the probe.

French

ATTENTION

Ne plongez pas le corps de la sonde dans un liquide. N'utilisez pas de nettoyeurs abrasifs ni de solvants volatils tels que la benzine sur la sonde.

Use a soft cloth to clean the probe.

Changing the Contact Tips

CAUTION

When changing contact tips, do not grip the housing or the white plastic insulator of the probe tip. Doing so may damage the probe tip.

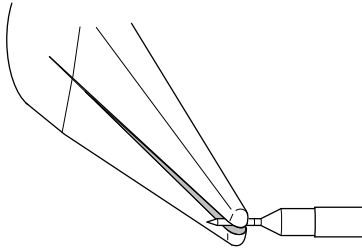
French

ATTENTION

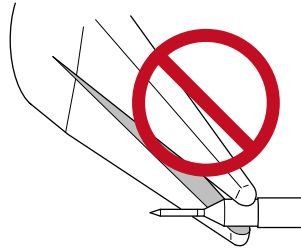
Lors du changement des pointes de contact, ne saisissez pas le boîtier ni l'isolant en plastique blanc de la pointe de la sonde. Cela pourrait endommager la pointe de la sonde.

4. Maintenance

When replacing the contact tip at the front of the probe tip, grasp the contact tip firmly with a pair of pliers or the like, and insert or remove it straight along the probe shaft.



Grip the contact tip with pliers.



Do not grip the housing or the white plastic insulator with pliers.

5. Specifications

Specifications

Item	Specifications	
Probe length	1.3 m (excluding the pincher tip)	
Weight	48 g (probe only)	
Connector type	BNC (with probe ID pin)	
Attenuation ratio	10 : 1 \pm 2 % (DC input) ¹	
Frequency band	500 MHz (–3 dB)	
Rise time	700 ps (typical) ²	
Propagation delay time	5.7 ns (typical) ²	
Maximum input voltage	\pm 400 Vrms (EN 61010-031) ³	
Input resistance	10 M Ω \pm 1 % ^{1,4}	
Input capacitance	9.5 pF (typical) ²	
Matching input capacitance	10 pF to 25 pF (typical) ²	
Operating environment	Temperature/ Humidity	0 °C to +50 °C ⁵ (no condensation)
	Altitude	2000 m or less
	Storage environment	Temperature/ Humidity
Compliant standards	Altitude	15000 m or less
	Safety standards	EN 61010-031 Measurement category "O" ⁶ 400 Vrms, 1250 V transient over-voltage Measurement category II ⁶ 300 Vrms Pollution degree 2 ⁷
		Environmental standards ⁸

- 1 In combination with an oscilloscope with an input impedance of 1 M Ω \pm 1%. Input voltage 100V or less. If 100 V exceeded, add a voltage coefficient of 0.0025%/V.
- 2 "Typical" values are typical or average values and are not strictly guaranteed.
- 3 Refer to "Compliant standards (Safety standards)". See the figure below for input voltage derating by frequency.
- 4 See the figure below for input impedance derating.
- 5 See the figure below for temperature vs. humidity derating.

5. Specifications

6 The product is for measurement category II (CAT II). Do not use it with measurement category III (CAT III), nor measurement category IV (CAT IV). When using devices or accessories with different measurement categories, the lower measurement category applies. See below for definitions of measurement categories.

Measurement Category	Definition
Measurement category "O" (Other)	It applies to measurement of a circuit that is not connected directly to the main power source.
Measurement category II (CAT II)	It applies to measurement of electrical equipment that is powered through a fixed installation such as a wall outlet wired to a distribution board and measurement on such wiring.
Measurement category III (CAT III)	It applies to measurement at the distribution level, that is, building wiring, fixed installations.
Measurement category IV (CAT IV)	It applies to measurement at the primary supply level, that is, overhead lines, cable systems.

7 Pollution degree refers to the degree of adhesion of a solid, liquid, or gas which deteriorates withstand voltage or surface resistivity. Pollution Degree 2 applies to normal indoor atmospheres (normally with only non-conductive pollution).

8 For conformity to environmental regulations and/or standards other than EU, contact your nearest Yokogawa office (PIM 113-01Z2).

Input Voltage Derating by Frequency



WARNING

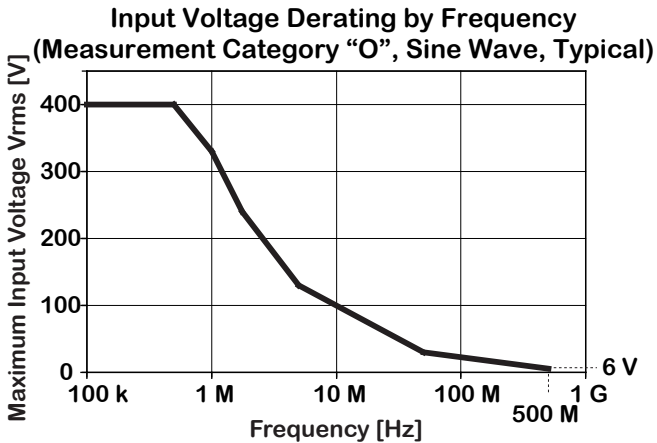
As the frequency of the input signal increases, the maximum input voltage of the probe decreases.

French



AVERTISSEMENT

Lorsque la fréquence du signal d'entrée augmente, la tension d'entrée maximale de la sonde diminue.



Input Impedance Derating

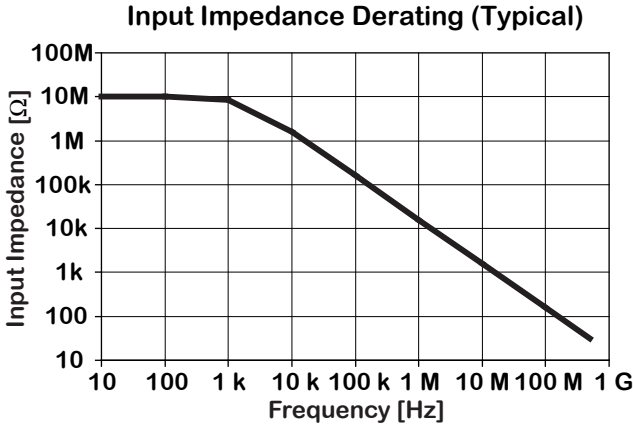
CAUTION

As the frequency of the input signal increases, the input impedance of the probe decreases.

French

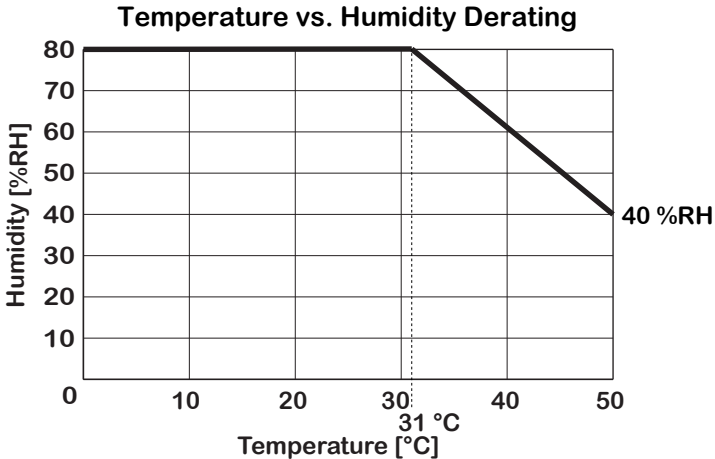
ATTENTION

Lorsque la fréquence du signal d'entrée augmente, l'impédance d'entrée de la sonde diminue.



Temperature vs. Humidity Derating

Derating by temperature vs. humidity is applied.



Aufgrund laufender Weiterentwicklungen sind Änderungen der Spezifikationen vorbehalten. Alle Angaben vorbehaltlich Satz- und Druckfehler.