

Thank you for purchasing the Model 702906, 10:1 Passive Probe (Wide operating temperature range, for non-isolated BNC input). This user's manual explains usage, specifications, and the handling precautions of the 702906. To ensure correct use, please read this manual thoroughly before beginning operation. After reading this manual, keep it in a safe place.

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IM 702906-01EN
8th Edition

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.

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 cause 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, the general safety precautions described herein must be observed during all phases of operation. YOKOGAWA assumes no liability for the customer's failure to comply with these requirements.

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. In addition, before using the probe, read the manuals of the oscilloscope to thoroughly familiarize yourself with its specifications and operations.

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.

Observe the maximum input voltage

Do not apply a voltage exceeding the maximum input voltage to the probe.

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 watches, rings or other metal jewelry. 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.

Be careful of burns and frostbite

When the probe is connected to a device under measurement that is hot or cold, do not touch the probe directly. In such situations, the probe will also be hot or cold, and touching it may cause burns or frostbite. Also, be careful of burns and frostbite when you connect the probe to such device under measurement.

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 cable

Stop using the probe if the probe cable is torn and the inner metal is exposed or if a color different from the outer sheath appears.

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.

Respectez la tension d'entrée maximale

N'appliquez pas une tension supérieure à la tension d'entrée maximale sur la sonde.

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 les chocs électriques, retirez les montres, bagues ou autres bijoux en métal. 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.

Attention aux brûlures et aux engelures

Lorsque la sonde est connectée à un appareil en cours de mesure qui est chaud ou froid, ne touchez pas directement la sonde. Dans de telles situations, la sonde sera également chaude ou froide et son contact peut provoquer des brûlures ou engelures. Faites également attention aux brûlures et aux engelures lorsque vous connectez la sonde à un tel appareil en cours de mesure.

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 or 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.

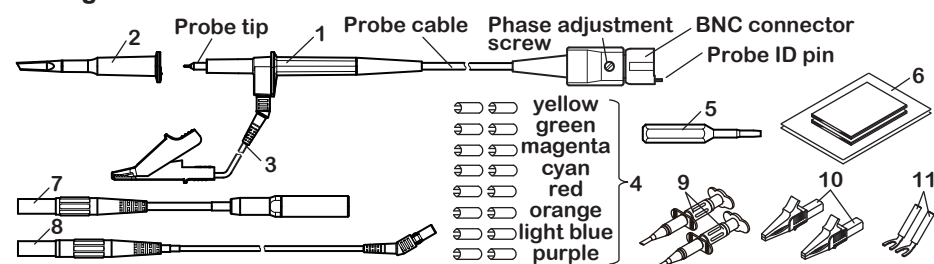
Disposal

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

1. Overview

Model 702906 is a passive probe with attenuation ratio of 10:1 for non-isolated BNC input. It can be used for oscilloscopes with input impedances of 1 MΩ. The probe operates over a wide range of temperature from -40 °C to +85 °C.

2. Configuration and Part Names



No. Standard Parts	Part No.	No. Optional Accessories (Sold separately)	Part No.
1. Probe main unit	-	7. 4Φ conversion adapter (pincher tip end)	B8099NL
2. Pincher tip	B8099MR	8. 4Φ conversion adapter (ground lead end)	B8099NM
3. Safety ground lead	B8099NK	9. Pincher tip	B9852MN (red) B9852MM (black)
4. Marker tip (8 colors x 2)	-	10. Alligator clip adapter (red/black)	758929
5. Adjustment screwdriver	-	11. Fork terminal adapter (red/black)	758921
6. Manuals (see the table below)	-		

Manual Title	Manual No.	Description
Model 702906 10:1 Passive Probe (Wide operating temperature range, for non-isolated BNC input) User's Manual	IM 702906-01EN	This manual. Explains usage, specifications, and the handling precautions of the 702906.
Model 702906 10:1 Passive Probe (Wide operating temperature range, for non-isolated BNC input)	IM 702906-92Z1	Document for China
Safety Instruction Manual	IM 00C01C01-01Z1	Safety manual (European languages)
Inquiries	PIM 113-01Z2	List of worldwide contacts

The "EN", "Z1", and "Z2" in the manual number are the language codes.

3. How to Use



WARNING

- Use this probe only with YOKOGAWA's oscilloscopes. Even with YOKOGAWA's oscilloscopes, this probe can be used only when specified as a connectable accessory. Also, use this probe only with standard accessories or optional accessories sold separately.
- When connecting the probe to the object under measurement, be careful of electric shock, burns, and frostbite.
- Do not apply a voltage exceeding the maximum input voltage to the probe. EN 61010-031 is a safety standard that applies to the probe alone. For the actual compliant safety standards and operating conditions, observe the conditions for the oscilloscope. Failure to observe them may cause accidents, such as electric shock and damage to the instrument.
- 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.
- After use, turn off the power to the device under measurement, disconnect the probe from the device under measurement, and then disconnect the probe from the oscilloscope.

CAUTION

- When using optional tip accessories (such as alligator clip adapters) sold separately, make sure to use the 4Φ conversion adapters sold separately in between. Optional tip accessories are unavailable without the 4Φ conversion adapters.
- When connecting the probe tip directly to the device under measurement without using the attached pincher tip or optional accessories, use 40 V or less.
- The product is not dust proof or water resistant. Do not use the product in areas with a lot of dust or where water may be spilled.
- Avoid using or storing the product in an environment that does not meet the specifications such as under direct sunlight, high temperature, high humidity, or where condensation may form. Deformation and insulation deterioration can occur to cause the probe to no longer meet the specifications.
- Avoid vibration, shock, and static electricity when handling the probe. Do not bend or pull the cables excessively. Doing so may damage or disconnect the probe.
- When cleaning the probe, wipe with a piece of soft cloth to prevent damaging the probe. Do not immerse the probe body in liquid. Do not use abrasive cleaners or volatile solvents such as benzene on 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 connectable. Et utilisez la sonde uniquement avec des accessoires standard ou des accessoires en option vendus séparément.
- Lors de la connexion de la sonde à l'objet faisant l'objet de la mesure, faire attention au choc électrique, aux brûlures et aux gelures.
- N'appliquez pas une tension supérieure à la tension d'entrée maximale sur la sonde. EN61010-031 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.
- Après utilisation, coupez l'alimentation de l'appareil en cours de mesure, déconnectez la sonde de l'appareil en cours de mesure, puis déconnectez la sonde de l'oscilloscope.

ATTENTION

- Lorsque vous utilisez des accessoires de pointe en option (tels que des adaptateurs de pince crocodile) vendus séparément, assurez-vous d'utiliser les adaptateurs de conversion 4Φ vendus séparément entre les deux. Les accessoires de pointe en option ne sont pas disponibles sans les adaptateurs de conversion 4Φ.
- Lorsque vous connectez la pointe de la sonde directement à l'appareil sous mesure sans utiliser la pointe de pince attachée ou les accessoires en option, utilisez 40 V ou moins.
- Le produit n'est pas étanche à la poussière ni à l'eau. N'utilisez pas le produit dans des zones très poussiéreuses ou dans lesquelles de l'eau pourrait être renversée.
- Évitez d'utiliser ou de stocker le produit dans un environnement qui ne répond pas aux spécifications, par exemple sous la lumière directe du soleil, à des températures élevées, à une humidité élevée ou là où de la condensation peut se former. Une déformation et une détérioration de l'isolation peuvent survenir, faisant que la sonde ne répond plus aux spécifications.
- Évitez les vibrations, les chocs et l'électricité statique lors de la manipulation du produit. Ne pliez pas et ne tirez pas les câbles de manière excessive. Cela pourrait endommager ou déconnecter la sonde.
- Lors du nettoyage de la sonde, essuyez avec un morceau de chiffon doux pour éviter d'endommager la sonde. Ne plongez pas le corps de la sonde dans un liquide. N'utilisez pas de nettoyants abrasifs ni de solvants volatils tels que la benzène sur la sonde.

How to Connect

- Connect the BNC connector of the probe to the input of the oscilloscope with the input impedances of 1 MΩ. Set the input impedance of the oscilloscope to 1 MΩ.
- 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.
- Depending on the object under measurement or the situations, connect the attached pincher tip and safety ground lead to the tips of the probe, or connect the optional accessories by putting the optional 4Φ conversion adapters (signal end / ground) in between. See Connecting the Optional Accessories for details.
- Adjust the phase of the probe using the screwdriver. See Phase Adjustment for details.

Connecting the Optional Accessories

If you use the optional 4Φ conversion adapters (signal end B8099NL / ground B8099NM, 1000 Vpeak CAT II) instead of the attached pincher tip (B8099MR) and safety ground lead (B8099NK), you can connect to the following optional tip accessories. We offer a variety of combinations. Contact your nearest YOKOGAWA dealer for details.

- Pincher tip (B9852MN/B9852MM, rated 1000 Vrms CAT III)
- Alligator clip adapter (758929, rated 1000 Vrms CAT II)
- Fork terminal adapter (758921, rated 1000 Vrms CAT II)

Connection example with accessories



Phase Adjustment

CAUTION

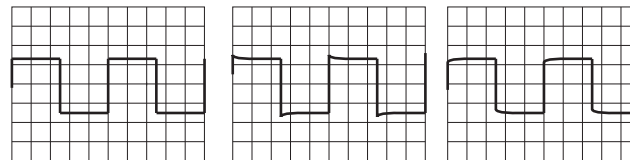
Do not apply excessive force to the phase adjustment screw. Doing so may damage the internal variable capacitor.

French

ATTENTION

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

- 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).
- 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.



Correct Waveform Over Compensation Inadequate Compensation

Note

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

4. Specifications

Item	Specifications
Probe length	2500 mm ±50 mm (including the pincher tip)
Connector type	BNC (with the probe ID pin)
Attenuation ratio	10:1 ±2 % (+5 °C to +40 °C) ¹ 10:1 ±3 % (-40 °C to +5 °C, +40 °C to +85 °C) ¹
Frequency band	DC to 200 MHz (-3 dB) ²
Rise time	1.8 ns (typical) ^{2,3}
Propagation delay time	12.0 ns (typical) ³
Maximum input voltage	±1000 V (DC + ACpeak) ⁴
Input resistance	10 MΩ ±2 % ¹
Input capacitance	16.0 pF (typical) ³
Matching input capacitance	15 pF to 25 pF
Operating environment	Temperature/Humidity -40 °C to +85 °C (no condensation) ⁵ However, up to +40 °C on the phase adjustment unit Altitude 3000 m or less
Storage environment	Temperature/Humidity -40 °C to +85 °C (no condensation) ⁵ Altitude 4600 m or less
Compliant standards	Safety standard EN 61010-031 Measurement category II ⁶ 1000 V (DC + ACpeak) Pollution degree 2 ⁷ Environmental standards ⁸ EU RoHS Directive compliant

- In combination with an oscilloscope with an input impedance of 1 MΩ ±1%.
- Varies depending on the oscilloscope combined.
- "Typical" values are typical or average values and are not strictly guaranteed.
- Complies with safety standard EN 61010-031 (see "Safety standards"). And input voltage derating by frequency applies (see the figure below).
- Temperature/humidity derating applies. See the figure below for humidity.
- 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)"	Measurement category O (Other) applies to measurement of a circuit that is not connected directly to the main power source.
Measurement category II (CAT II)	CAT II 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)	CAT III applies to measurement at the distribution level, that is, building wiring, fixed installations.
Measurement category IV (CAT IV)	CAT IV applies to measurement at the primary supply level, that is, overhead lines, cable systems.

- Pollution degree applies 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 (usually with only non-conductive pollution).
- For conformity to environmental regulations and/or standards other than EU, contact your nearest Yokogawa office (PIM 113-0122).

Input Voltage Derating by Frequency and Temperature/humidity Derating



WARNING

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

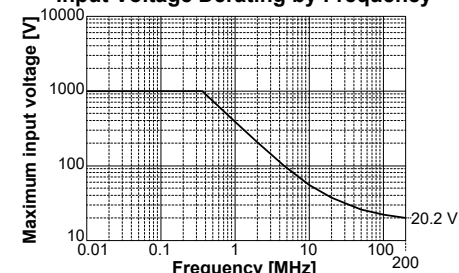
French



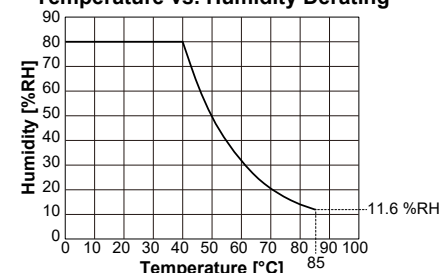
AVERTISSEMENT

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

Input Voltage Derating by Frequency

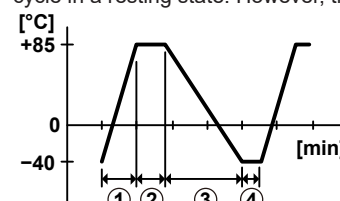


Temperature vs. Humidity Derating



Temperature Cycle Reference Values

It has been verified that the probe can withstand at least 500 repetitions of the following temperature cycle in a resting state. However, these are reference values and are not strictly guaranteed.



- One cycle duration
- 40°C to +85°C: 40 min to 50 min
 - +85°C: > 30 min
 - +85°C to -40°C: 80 min to 90 min
 - 40°C: > 5 min