

# User's Manual

## Model 701947 100:1 Probe (Safety Probe Supporting Isolated Input)

Thank you for purchasing the 100:1 Probe (Model 701947). To ensure correct use, please read this manual thoroughly before beginning operation. After reading the manual, keep it in a convenient location for quick reference whenever a question arises during operation.



**YOKOGAWA** ◆

IM 701947-01E  
6th 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 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 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 user's manual of the measuring instrument 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 a measuring instrument to observe and measure electrical signals. Do not use for any other purpose.

##### Grounding of the measuring instrument

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

##### Observe maximum input voltage

Do not apply any voltages 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 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 instrument de mesure pour observer et mesurer des signaux électriques. Ne l'utilisez pas à d'autres fins.

##### Mise à la terre de l'instrument de mesure

S'assurer de connecter la mise à la terre protectrice de l'instrument de mesure.

##### Respecter la tension d'entrée maximum

Ne pas appliquer à la sonde de tension dépassant la tension d'entrée maximum.

##### 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

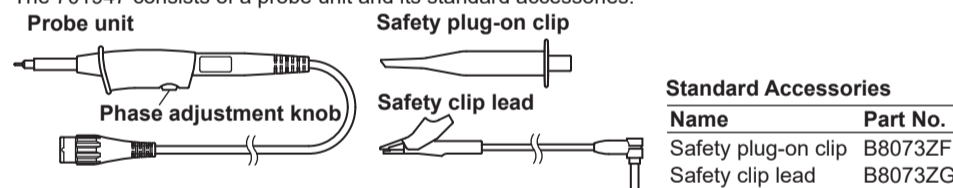
When disposing of YOKOGAWA products, follow the laws and ordinances of the country or region where the product will be disposed of.

### 1 Overview

Model 701947 is a dedicated 100:1 safety probe supporting isolated input that enables safer, high-voltage measurement when used in combination with an isolated input measuring instrument. The probe body and the BNC connector, except for the probe tip, are isolated so that dangerous voltages cannot be accidentally exposed. Make sure that you also fully understand the conditions for using the measurement instrument when using the probe.

### 2 Configuration

The 701947 consists of a probe unit and its standard accessories.



#### Standard Accessories

Name	Part No.
Safety plug-on clip	B8073ZF
Safety clip lead	B8073ZG

Manual Title	Manual No.	Description
Model 701947 100:1 Probe (Safety Probe Supporting Isolated Input) User's Manual	IM 701947-01E	This manual. Explains usage, specifications, and the handling precautions of the 701947
Model 701947 100:1 Probe Safety Instruction Manual	IM 701947-92	Document for China
	IM 00C01C01-01Z1	Safety manual (European languages)
Inquiries	PIM 113-01Z2	List of worldwide contacts

The "E", "Z1", and "Z2" in the manual numbers are the language codes.

#### Note

When storing the probe in the case, remove the safety plug-on clip and the safety clip lead from the probe unit, and attach the included protection cover to the probe tip.

### 3 How to Use



#### WARNING

- Use this probe only with YOKOGAWA's isolated input measuring instruments. Even with YOKOGAWA's measuring instruments, this probe can be used only when specified as an accessory.
- Do not apply a voltage exceeding the maximum input voltage or the derating voltage by frequency 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 measuring instrument. Failure to follow this precaution may cause accidents, such as electric shock or damage to the measuring instruments.
- The actual maximum input voltage is limited to the lower of the maximum input voltage of the probe or the maximum input voltage of the measuring instrument. For the maximum input voltage of the measuring instrument, see the specifications of the measuring instrument. Convert the attenuation ratio of the probe and make sure not to apply an excessive input voltage to the measuring instrument.
- When the input coupling of the measuring instrument is AC, a DC voltage is applied to the measuring instrument's input at the same electric potential as the probe's input. Make sure not to exceed the maximum input voltage of the measuring instrument.
- Be careful of electric shock when connecting the probe to the device under measurement. After use, turn off the power to the device under measurement, disconnect the probe from the device, and then disconnect the probe from the measuring instrument.

### CAUTION

- Avoid shock to the probe body. Do not bend or pull the cables excessively. Doing so may damage or disconnect the probe.
- Use a soft cloth to clean 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 instruments de mesure d'entrée isolés de YOKOGAWA. Même avec les instruments de mesure de YOKOGAWA, la sonde ne peut être utilisée que si spécifiée comme accessoire.
- Ne pas appliquer une tension qui dépasse la tension d'entrée maximale ou la tension de déclassement par fréquence à 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'instrument de mesure. Si cette précaution n'est pas prise, des accidents tels qu'un choc électrique ou un dégât matériel peuvent se produire.
- La tension d'entrée maximale réelle est limitée à la plus basse de la tension d'entrée maximale de la sonde ou de la tension d'entrée maximale de l'instrument de mesure. Pour la tension d'entrée maximale de l'instrument de mesure, voir les spécifications de l'instrument de mesure. Convertissez le rapport d'atténuation de la sonde et assurez-vous de ne pas appliquer une tension d'entrée excessive à l'instrument de mesure.
- Lorsque le couplage d'entrée de l'instrument de mesure est AC, une tension DC est appliquée à l'entrée de l'instrument de mesure au même potentiel électrique que l'entrée de la sonde. Assurez-vous de ne pas dépasser la tension d'entrée maximale de l'instrument de mesure.
- Faites attention aux chocs électriques lors de la connexion de la sonde à l'appareil sous mesure. Après utilisation, coupez l'alimentation de l'appareil en cours de mesure, déconnectez la sonde de l'appareil, puis déconnectez la sonde de l'instrument de mesure.

### ATTENTION

- Évitez les chocs sur le corps de la sonde. Ne pliez pas et ne tirez pas excessivement sur les câbles. Cela pourrait endommager ou déconnecter la sonde.
- Utilisez un chiffon doux pour nettoyer la sonde. Ne plongez pas le corps de la sonde dans un liquide. N'utilisez pas de nettoyants abrasifs ou de solvants volatils tels que la benzène sur la sonde.

1. Connect the BNC connector of the probe to the input of the isolated input measuring instrument with the input impedance of 1 MΩ.
2. Set the attenuation ratio of the measuring instrument to 100:1.
3. Adjust the probe phase.
4. Using standard accessories or the 701948 Plug-on Clips (sold separately) depending on the condition, connect the probe to the device under measurement.

#### Note

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

#### How to Adjust the Probe Phase

### CAUTION

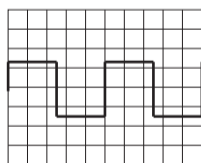
Do not apply excessive force to the phase adjustment screw. Doing so may damage the internal variable capacitor.

#### French

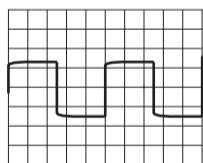
### ATTENTION

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

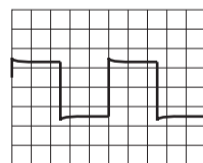
1. Connect the BNC connector of the probe to the input of the isolated input measuring instrument, and connect the probe input to the signal output terminal (CAL or COMP terminal) on the measuring instrument for probe compensation adjustment.
2. Operate the vertical and time scales on the measuring instrument,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



Correct Waveform



Inadequate Compensation



Over Compensation

## 4 Specifications

Item	Specifications
Cable length	1.5 m
Connector type	Isolated BNC
Attenuation ratio	100:1 ± 2%
Frequency band	DC to 200 MHz (-3 dB)
Rise time	1.2 ns
Maximum input voltage <sup>1</sup>	Between safety plug-on clip and safety clip lead Measurement category II 1000 Vrms Measurement category "O" 3540 Vrms Between safety clip lead and ground Measurement category II 1000 Vrms Measurement category "O" 1000 Vrms
Input impedance	100 MΩ ± 2% <sup>2</sup>
Input capacitance	7 pF (typical) <sup>3</sup>
Matching input capacitance	15 to 45 pF (typical) <sup>3</sup>
Operating environment	5 to 40 °C, 20 to 80% (no condensation), altitude 2000 m or less
Storage environment	-10 to 70 °C, 20 to 80% (no condensation)
Compliant standards	Safety standard EN 61010-031 Measurement category "O"(Other) 3540 Vrms, measurement category II <sup>4</sup> 1000 Vrms Pollution degree 2 <sup>5</sup>
Environmental standards <sup>6</sup>	EU RoHS Directive compliant

1 When the input signal is AC, the voltage derating by the frequency is applied. See the figure below for details.

2 In combination with a measuring instrument with an input impedance of 1 MΩ ± 1 %.

3 "Typical" values are typical or average values and are not strictly guaranteed.

- 4 This product is for measurement category "O" (Other) and measurement category II (CAT II). Do not use it with measurement category III (CAT III), nor measurement category IV (CAT IV). See the table below for the definition of measurement categories.

Measurement Category	Definition
Measurement category "O" (Other)	CAT "O" 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.

- 5 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).

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

#### Voltage Derating by Frequency



### WARNING

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

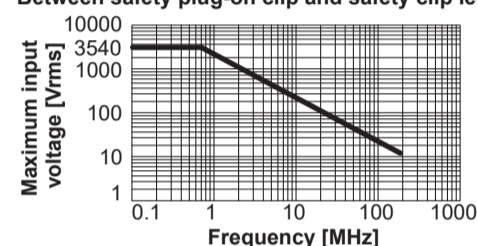
#### French



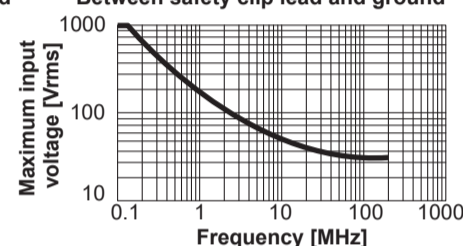
### AVERTISSEMENT

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

Between safety plug-on clip and safety clip lead



Between safety clip lead and ground



Frequency [MHz]

Frequency [MHz]

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