

User's Manual 701936 Deskew Correction Signal Source

Thank you for purchasing the Deskew Correction Signal Source (Model 701936). To use the full capabilities of the 701936, please read this manual thoroughly before beginning operation and use the 701936 correctly.

Contact information of Yokogawa offices worldwide is provided on the following sheet.
 • PIM113-01Z2 List of worldwide contacts

The contents of this manual are subject to change without prior notice as a result of continuing improvements to the instrument's performance and functions.

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IM 701936-01EN
 4th Edition

Safety Precautions

The following safety precautions must be observed during all phases of operation. YOKOGAWA assumes no liability for the customer's failure to comply with these requirements. Read the user's manual of the measurement instrument and have a thorough understanding of the specifications and handling of the instrument before using the 701936.

The following symbols are used on this instrument.

Warning: 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.

Make sure to comply with the following safety precautions in order to prevent accidents such as an electric shock which impose serious health risks to the user and damage to the instrument.

WARNING

- Ground the Measurement Instrument**
Be sure to employ protective earth ground on the measurement instrument.
- Do Not Use in Locations of High Humidity**
To prevent electric shock, do not use the 701936 in locations of high humidity.
- Do Not Operate in an Explosive Atmosphere**
To prevent injury and fire, do not use the 701936 in locations where explosion or fire is possible in the presence of flammable liquids, vapors, and dust.

CAUTION

- Do Not Short or Apply Voltage to the Output Terminal**
Do not short or apply external voltage to the output terminal. Doing so can cause damage to the 701936.
- Use the Correct Power Supply for the 701936**
Use the USB connector provided by the YOKOGAWA DL Series Digital Oscilloscope (DL Series Oscilloscope).
- Ground the 701936**
The electric potential of the GND terminal of the voltage output terminal is the same as that of the grounding terminal of the DL Series Oscilloscope to which it is connected.
- When Wiping off Dirt**
To wipe off dirt, use a dry, soft, clean cloth. Do not use volatile chemicals such as benzene or thinner for cleaning.
- Other Handling Precautions**
 - Do not touch the voltage outputs or surface-mounted components of the 701936 directly.
 - Do not apply shock to the 701936 such as by dropping it or hitting it against another object.
 - Do not use the 701936 with the name plate panel facing down.
 - Since the 701936 is compact and light, it is easy to tilt the 701936 when voltage and current probes are connected (attached). Place the 701936 and probes on a flat even surface and be sure that the 701936 does not tilt.

Operating environment limitations

See below for operating environment limitations.

CAUTION

This product is a Class A (for industrial environments) product. Operation of this product in a residential area may cause radio interference in which case the user will be required to correct the interference.

Waste Electrical and Electronic Equipment



Waste Electrical and Electronic Equipment (WEEE), Directive

(This directive is valid only in the EU.)
 This product complies with the WEEE directive marking requirement. This marking indicates that you must not discard this electrical/electronic product in domestic household waste.

Product Category

With reference to the equipment types in the WEEE directive, this product is classified as a "Monitoring and control instruments" product.

When disposing products in the EU, contact your local Yokogawa Europe B.V. office. Do not dispose in domestic household waste.

Authorized Representative in the EEA

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.

The Following Symbols are 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 attentions to actions or conditions that could cause light injury to the user or damage to the instrument or the 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.

1. Overview

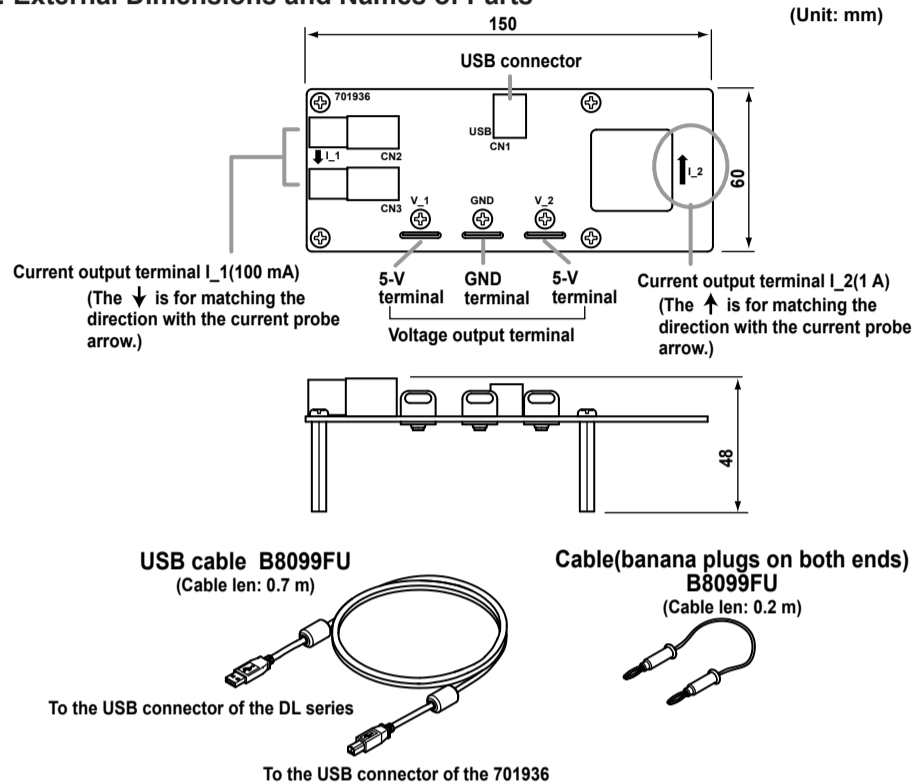
The 701936 is a signal source used to correct the difference in the signal transfer time (skew, delay) between voltage and current probes. If using a following Yokogawa oscilloscope equipped with the Auto Deskew function, the skew can be adjusted automatically.

DLM2000 (firmware version 1.60 or later)
 DL6000/DLM6000 (firmware version 1.22 or later)

Note

- When correcting the skew, use the falling edge of the waveform of the voltage and current signals that the 701936 outputs.
- When connecting the current probe, match the direction of the arrows indicating the current direction of the 701936 and the current probe.
- Securely connect the ground terminal (negative input on a differential probe, usually black) of the probe to the GND terminal of the voltage output terminal of the 701936.
- Accurate correction may not be possible near objects generating strong magnetic fields such as a circuit with large current flowing or a transformer or near object generating strong electric fields such as a radio.

2. External Dimensions and Names of Parts



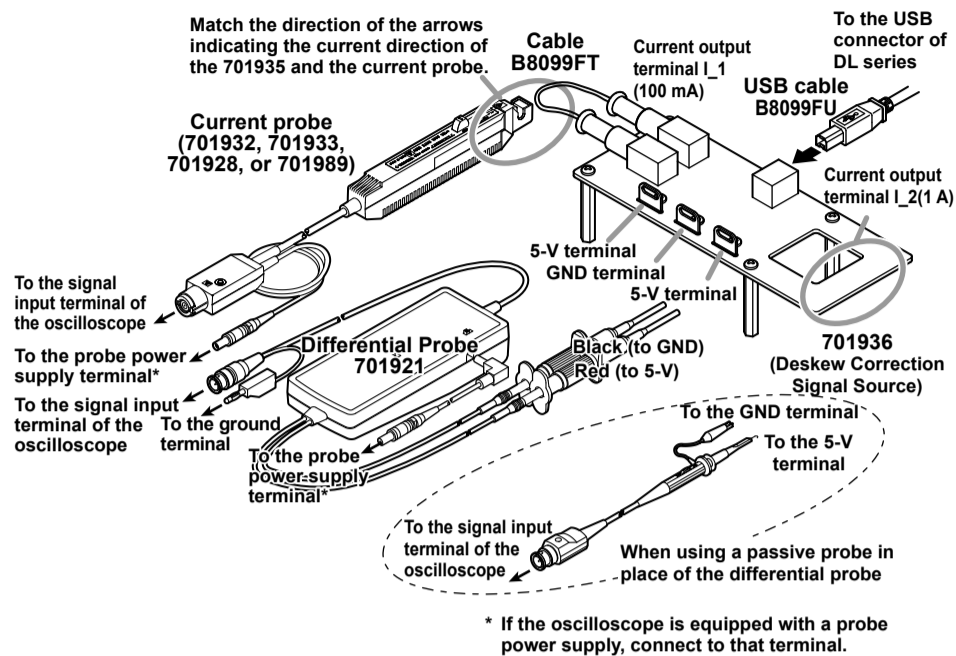
3. Specifications

Output voltage/current (rectangular wave)	Output voltage Approx. 5 V (V ₁ , V ₂)	Output current Approx. 100 mA (I ₁) Approx. 1 A (I ₂)
Output frequency	Approx. 15 kHz	
Fall time	Approx. 25 ns, 250 ns	
Unique value*	Small current terminal (I ₁): -2.3 ns ± 0.5 ns Large current terminal (I ₂): 14.5 ns ± 1 ns	
Operating temperature range	5 to 40°C	
Operation humidity range	20 to 80% RH (no condensation)	
Storage temperature range	-20 to 60°C	
Storage humidity range	20 to 80% RH (no condensation)	
Power supply	Using the USB cable, supplied from the USB connector provided by the DL Series Oscilloscope.	
Average power supply current	100 mA	
External dimensions	150 mm (W) × 48 mm (H) × 60 mm (D)	
Weight	Approx. 100 g	
Standard accessories	USB cable	1 piece
	Cable (banana plugs on both ends)	1 piece
	User's Manual	1 piece (this manual)
Emission	Complying standard	• EN61326-1 Class A • EN55011 Class A, Group 1 • EMC standards of Australia and New Zealand EN55011 Class A, Group 1
		This product is a Class A (for commercial environment) product. Operation of this product in a residential area may cause radio interference in which case the user is required to correct the interference.
Immunity	Complying standard	EN61326-1 Table 2 (for use in industrial locations)

* There is a unique interval between the voltage and current output waveforms of the 701936. This interval is a result of the electrical length and impedance of the signal output section. This interval is the time difference of the current waveform from the voltage waveform. The unique value for the small current terminal (I₁) is for when the B8099FT cable (2 m) is used. If you use a cable of a different length, the unique value shifts by approximately 3.3 ps/mm. The unique value increases as the cable length increases.

4. Operating Procedure

1. Connect the USB cable to the 701936 USB connector.
2. Connect the other end of the USB cable to the USB connector of the DL Series Oscilloscope.
3. Connect the tip of the voltage probe (passive probe or differential probe) to the voltage output terminal of the 701936.
4. Connect the BNC connector end of the voltage probe (passive probe or differential probe) to the signal input terminal of the DL Series Oscilloscope.
5. Connect (Clamp) the current probe to the current output terminal of the 701936.
6. Connect the BNC connector end of the current probe to the signal input terminal of the DL Series Oscilloscope. Set the probe of the signal input terminal of the oscilloscope to the current probe setting (setting in which current-to-voltage conversion is possible).



Performing Skew Correction Manually

7. On the DL Series Oscilloscope, observe the falling edges of the waveforms of voltage and current signals that the 701936 outputs. For the setup procedure of the oscilloscope, see the manual that came with the oscilloscope.
8. Using the deskew function of the DL Series Oscilloscope, correct the signals so that the starting sections of the falling edges of the waveforms match.
9. After setting the deskew value so that the falling edges of the voltage and current waveforms match, adjust the deskew value by the amount of the unique value.

Performing Skew Correction Using the DL Series Auto Deskew Feature

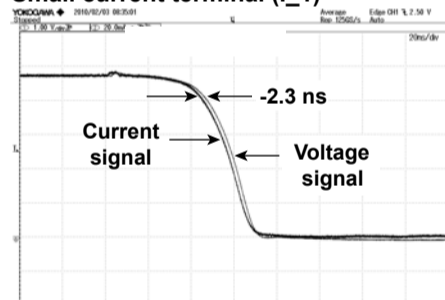
Perform auto deskew, following the appropriate procedure for the YOKOGAWA DL series instrument.

Because in auto deskew the unique value is calibrated automatically, after auto deskew is performed, the voltage and current waveform values are off by the amount of the unique value (see the figure below).

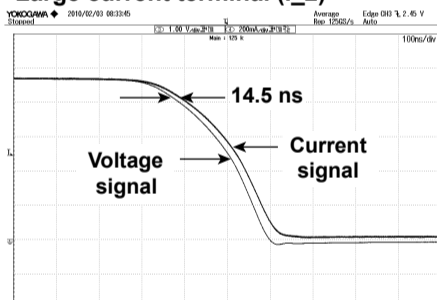
Auto deskew feature is available for the following DL series
 DLM2000 (with firmware version 1.60 or later)
 DL6000/DLM6000 (with firmware version 1.22 or later).

Example of Skew Correction When the Waveform Acquisition Mode Is Set to Averaging on the DL Series Oscilloscope

Small current terminal (I_1)



Large current terminal (I_2)



Note

Auto deskew feature can correct skews up to ± 80 ns for the small current terminal (I_1) and up to ± 400 ns for the large current terminal (I_2).