User's Manual

Model 701926
High Voltage Differential Probe for the DL Series

Thank you for purchasing the High Voltage Differential Probe (701926) for the DL Series. To ensure correct use, please read this manual thoroughly before beginning operation.
After reading this manual, keep it in a safe place.

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

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YOKOGAWA ◆

IM 701926-01E
7th Edition

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 attention 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.

French

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.

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

Safety Precautions

This product is designed to be used by a person with specialized knowledge.
Make sure to comply with the safety precautions mentioned hereafter when handling the probe.
YOKOGAWA assumes no responsibility for any consequences resulting from failure to comply with these safety precautions. Also, read the User's Manual of the measuring instrument thoroughly so that you are fully aware of its specifications and handling, before starting to use the probe.
This manual is part of the product and contains important information. Store this manualin a safe place close to the instrument so that you can refer to it immediately. Keep this manual until you dispose of the instrument.

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.

Risk of electric shock

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.

Risque de choc électrique

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 measuring instrument
Make sure to connect the protective grounding terminal of the measuring instrument to ground.

Connecting the object of measurement
Make sure to avoid an electric shock when connecting the probe to the object of measurement. Do not remove the probe from the measuring instrument after the object of measurement is connected.

Do not operated with suspected failures
If you suspect that there is damage to this probe, contact your nearest YOKOGAWA dealer or sales representative.

Observe the maximum input voltage
Do not apply voltage exceeding 7000 Vpeak between an input lead and ground or between two input leads. The maximum input voltage is 7000 Vpeak regardless of whether 1000:1 or 100:1 attenuation is used.

Ground the probe
Ground the probe by connecting the grounding conductor of the measuring instrument's power cable or another appropriate grounding conductor to the BNC shell and an auxiliary grounding terminal.
Before connecting the probe input terminal to the circuit under measurement, ensure that the measuring instrument is grounded properly, that the probe output connector is attached to the BNC connector of the measuring instrument, and that the auxiliary grounding terminal is connected to a proper ground.

Do not remove the alligator clip's cover
To prevent electric shock or fire, do not remove the alligator clip's insulation cover.

Do not operate in wet/damp conditions
To avoid electric shock, do not operate this probe in wet or damp conditions.

Do not use in an explosive atmosphere
To prevent fire and injury, do not use the probe in a flammable or explosive atmosphere or near steam.

Do not touch exposed circuitry
To prevent injury, remove metallic objects and jewelry such as rings and watches. Do not touch exposed live connections or components.

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

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 immediately.

CAUTION

Use the correct power supply
Power the probe by using four AA dry cells, by using a 6 VDC/200 mA or 9 VDC/150 mA external power supply, or by connecting a probe power cable to the DL Series probe power supply terminal, the 700938, or the 701934. Operating the probe while using a power supply exceeding the specified voltage may cause damage to the instrument.

Connecting the external power supply to the probe
Always turn OFF the probe's power switch when connecting or disconnecting the external power supply. Also, do not install the dry cells when using an external power supply.

Conditions of use
This product has not been designed or manufactured for applications in which high reliability is required over a long time period.

Operating environment limitations
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.

French

AVERTISSEMENT

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

Connexion de l'objet de la mesure
S'assurer d'éviter un choc électrique lors de la connexion de la sonde à l'objet de la mesure. Ne pas retirer la sonde de l'instrument de mesure après avoir connecté l'objet de la mesure.

Ne pas utiliser en cas de défaillances suspectées
Si vous suspectez que la sonde est endommagée, contactez votre revendeur ou représentant commercial YOKOGAWA.

Respecter la tension d'entrée maximum
Ne pas appliquer une tension dépassant 7000 V (c.c. + crête c.a.) entre un fil d'entrée et la terre ou entre deux fils d'entrée. La tension d'entrée maximum est de 7000 V (c.c. + crête c.a.) sans tenir compte de l'atténuation utilisée, 1000:1 ou 100:1.

Mise à terre de la sonde
Mettre à la terre la sonde en connectant le conducteur de terre du câble d'alimentation de l'instrument de mesure ou un autre conducteur de terre approprié au connecteur BNC et à une borne de terre auxiliaire.
Avant de connecter la borne d'entrée de la sonde au circuit de mesure, vérifiez que l'instrument de mesure est correctement mis à la terre, que le connecteur de sortie de la sonde est connecté au connecteur BNC de l'instrument de mesure et que la borne de terre auxiliaire est connectée à un raccordement à la terre.

Ne retirez pas le couvercle de la pince crocodile
Pour éviter les risques d'électrocution ou d'incendie, ne retirez pas le couvercle d'isolation de la pince crocodile.

Ne pas utiliser dans des conditions humides
Afin d'éviter un choc électrique, ne pas utiliser cette sonde dans des conditions humides."

Ne pas utiliser dans une atmosphère explosive
Afin d'éviter des risques de blessures ou d'incendie, ne pas utiliser cette sonde dans une atmosphère explosive.

Éviter les circuits exposés
Afin d'éviter des blessures, retirer les bijoux comme les bagues, montres et autres objets métalliques. Ne pas toucher les connexions et les composants exposés après mise sous tension.

Ne pas démonter ou modifier
Ne pas démonter ou modifier le produit. YOKOGAWA se dégage de toute responsabilité si vous démontez ou modifiez le produit.

Câble de signal endommagé
Si le câble de signal est déchiré et que le métal intérieur est exposé ou si une couleur différente de la gaine externe est visible, arrêter immédiatement d'utiliser ce câble.

ATTENTION

Utilisation adéquate de l'alimentation
Alimenter la sonde avec 4 piles sèches AA, avec une alimentation externe 6 VDC/200 mA ou 9 VDC/150 mA, ou en connectant le câble d'alimentation de la sonde à une borne d'alimentation sur un instrument de mesure série DL ou au 700938 ou 701934.L'utilisation de la sonde sous une alimentation supérieure à la tension spécifiée ci-dessus peut endommager l'instrument.

Connexion de l'alimentation externe à la sonde
Toujours éteindre l'interrupteur d'alimentation de la sonde lors de la connexion ou de la déconnexion de l'alimentation externe.En outre, n'installez pas les piles sèches lorsque vous utilisez une alimentation externe.

Conditions d'utilisation
Ce produit n'est pas conçu ou fabriqué pour des applications nécessitant une fiabilité élevée sur une longue période.

Limitations relatives à l'environnement opérationnel
Ce produit est un produit de classe A (pour environnements industriels). L'utilisation de ce produit dans un zone résidentielle peut entraîner une interférence radio que l'utilisateur sera tenu de rectifier.

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

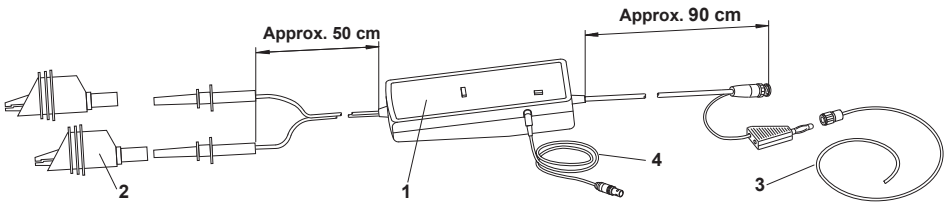
Yokogawa Europe B.V. is the authorized representative of Yokogawa Test & Measurement Corporation for this product in the EEA. To contact Yokogawa Europe B.V., see the separate list of worldwide contacts, PIM 113-01Z2.

1. Description

This probe provides differential inputs to be used with oscilloscopes with single-ended inputs.

2. Configuration

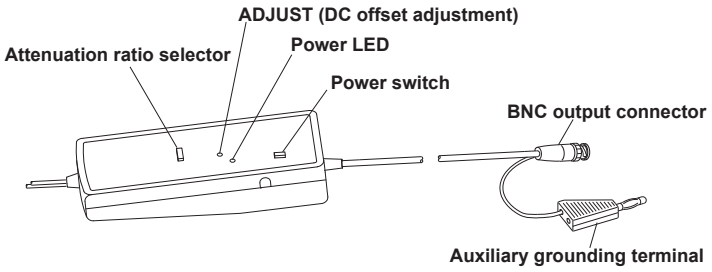
The differential probe consists of the following parts and accessories.



Standard parts	Parts No
1. Probe	-
2. High voltage alligator clip (Two in a set)	Black: B8099RC Red: B8099RD
3. Ground extension lead (length: approx. 100 cm)	-
4. Power cable* (length: approx. 150 cm)	B9852MJ

* Power can be supplied from a YOKOGAWA measuring instrument, 700938, or 701934.

3. Probe Part Names



4. Installing or Replacing Batteries

Slide the lid on the back side of the probe, and install or replace the four AA dry cells.
The probe is shipped from the factory without the batteries installed.

5. Procedure

1. Connect the provided high voltage alligator clips to the probe input leads.
2. Supply power to the probe by one of the following methods.
   - Install four AA cells.
     The power LED blinks if the battery level goes low. If this message appears, replace the dry cells.
   - Connect the appropriate power cable to an external power supply.
   - Connect the probe power cable to a probe power supply terminal on the DL Series, the 700938, or the 701934.
3. Connect the BNC output connector to the oscilloscope input terminal, and properly ground the auxiliary grounding terminal. If necessary, use the auxiliary ground extension lead.
4. Turn the power switch ON, and warm up the probe for at least 30 minutes.
5. Select the appropriate attenuation using the attenuation ratio selector.
   - For higher resolution and less noise when measuring signals less than or equal to 700 V, switch the attenuation to 1/100.
   - When measuring signals greater than 700 V, set the attenuation to 1/1000.
6. If the offset voltage is large, short the alligator clips, and turn the ADJUST variable resistor (DC voltage adjustment) using an appropriate flat-head screwdriver to adjust the offset voltage.
7. Connect the two probe input leads to the two points of measurement (differential measurement). The performance declines if you only connect a probe input lead to a single point. Make sure to connect both leads.

WARNING

- To protect against electric shock the ground side of the output cable (the shielded side of the BNC connector) must be grounded.
- Turn OFF the power to the circuit under measurement when connecting or disconnecting the probe from the circuit under measurement. Connecting or removing the probe while the power is ON is dangerous. Do not touch the probe after turning ON the power to the circuit under measurement. Do not remove the probe from the measuring instrument while the probe is connected to the circuit under measurement.
- When disconnecting the probe BNC output connector, first turn OFF the power to the circuit under measurement. Then, disconnect the probe from the high voltage parts of the circuit under measurement.
- When replacing batteries or connecting an external power supply, first turn OFF the power to the circuit under measurement. Then, remove the input lead from the circuit under measurement.

CAUTION

- This probe is designed to measure the voltage difference between two points on the circuit under measurement. It does not electrically isolate the circuit under measurement from the measuring instrument.
- Use a soft cloth to clean the probe. Be careful not to break the probe. Do not immerse the probe in liquid or use abrasive cleaners on the probe. Do not use benzene or other solvents on the probe.
- Always turn OFF the probe's power switch when connecting or disconnecting the external power supply. Also, do not install the dry cells when using an external power supply.

French

AVERTISSEMENT

- Pour éviter les chocs électriques, la mise à la terre du câble de sortie (côté blindé du connecteur BNC) doit être effectuée.
- Mettre hors tension le circuit faisant l'objet de la mesure lorsque vous connectez ou déconnectez la sonde du circuit. Connecter ou retirer la sonde après la mise sous tension est dangereux. Ne pas toucher la sonde après la mise sous tension du circuit faisant l'objet de la mesure.Ne pas déconnecter la sonde de l'instrument de mesure lorsque la sonde est connectée au circuit faisant l'objet de la mesure.
- Lors de la déconnexion du connecteur de sortie BNC de la sonde, mettre d'abord HORS tension le circuit faisant l'objet de la mesure. Puis déconnecter la sonde des parties à haute tension du circuit faisant l'objet de la mesure.
- Lors du remplacement des piles ou de la connexion d'une alimentation externe, coupez d'abord l'alimentation du circuit sous tension. Ensuite, retirez le câble d'entrée du circuit à mesurer.

ATTENTION

- Lors du remplacement des piles ou de la connexion d'une alimentation externe, coupez d'abord l'alimentation du circuit sous tension. Ensuite, retirez le câble d'entrée du circuit à mesurer.
- Utiliser un chiffon doux pour nettoyer la sonde. Faire attention de ne pas casser la sonde. Ne pas immerger la sonde dans un liquide ni utiliser de nettoyants abrasifs sur la sonde. Ne pas utiliser de benzène ni d'autres solvants sur la sonde.
- Toujours éteindre l'interrupteur d'alimentation de la sonde lors de la connexion ou de la déconnexion de l'alimentation externe. En outre, n'installez pas les piles sèches lorsque vous utilisez une alimentation externe.

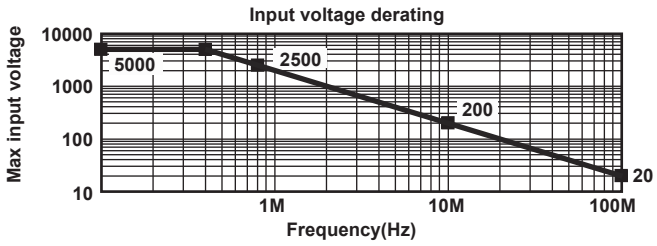
Note

- Accurate measurements may not be possible near objects with strong electromagnetic fields such as transformers, large current circuits, and wireless equipment.
- Before use, flip the attenuation switch back and forth several times. The switch's electrical contacts can weaken if not used for long periods of time.
- To take accurate measurements, we recommend that you calibrate the probe once a year.

6. Specifications

Item		Specifications
Frequency bandwidth[1, 2]		DC to 50 MHz (–3 dB)
Input type		Balanced differential input
Attenuation		1000:1 or 100:1, switchable
Output offset voltage[2, 3]		±5 mV or less (after adjusting the ADJUST resistor)
Input resistance/capacitance (typical)[4]		50 MΩ/17 pF (parallel with respect to ground)
Allowable differential voltage (between + and – terminals)		5000 V rms or less and 7000 Vpeak or less at 1000:1 attenuation 500 V rms or less and 700 Vpeak or less at 100:1 attenuation
Allowable common mode voltage		5000 Vrms or less and 7000 Vpeak or less
Maximum input voltage (to ground)[5]		1000 Vrms CAT III 5000 Vrms or 7000 Vpeak CAT I
CMRR (typical)[1, 4]		–80 dB or less at 60 Hz, –60 dB or less at 20 kHz
Output voltage[1, 2]		±7 V (DC+ACpeak) Value when the probe is used in combination with a measuring instrument whose input resistance is 50 kΩ or higher
Output impedance		Used on a 1 MΩ input oscilloscope
Gain accuracy[1, 2, 3]		±2%
Operating conditions		5 to 40°C, 25 to 85%RH (no condensation)
Storage conditions		–30 to 70°C, 25 to 85%RH (no condensation)
Operating altitude		2000 m or less
Storage altitude		3000 m or less
Power requirements[6]		• Internal battery: Four AA dry cells • External power supply: 6 VDC/200 mA or higher or 9 VDC/150 mA or higher, with a positive center pin. • Power is supplied through the dedicated cable B9852MJ from a YOKOGAWA measuring instrument's probe power supply terminal or from a 700938 or 701934 probe power supply.
Battery life		Approx. 7 hours under continuous use (when using alkaline dry cells)
Warm-up time		At least 30 minutes
Recommended calibration period		1 year
External dimensions		202 mm × 83 mm × 38 mm (excluding connector and cable)
Weight		Approx. 500 g (excluding batteries)
Safety standards	Complying standards	Probe (excluding the alligator clip) EN61010-031 Measurement category III[7] 1000 Vrms Measurement category I[8] 5000 Vrms, 7000 Vpeak Pollution degree 2[9] Alligator clip (B8099RC/8099RD) EN61010-031 Measurement category I[8] 5000 Vrms, 7000 Vpeak Pollution degree 2[9] Probe and alligator clip[10] EN61010-031 Measurement category I[8] 5000 Vrms, 7000 Vpeak Pollution degree 2[9]
Emission	Complying standards	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 industrial 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 standards	EN61326-1 Table 1

1 When the supply voltage from the dry cells is 5 V or higher or when using an external power supply.
2 At an ambient temperature 23±5°C, humidity 55% ± 10% RH, 30 minutes after the power is turned on.
3 The accuracy is the total of the gain accuracy and offset voltage.
4 Typical values are typical or mean values. They are not strictly guaranteed.
5 Frequency derating (load reduction) applies.



6 The power LED blinks if the battery level goes low. If this message appears, replace the dry cells.
When using an external power supply, do not install dry cells.
7 This equipment is for measurement category III (CAT III). Do not use it with measurement category IV (CAT IV). CAT III applies to measurement of the distribution level, that is, building wiring, fixed installations. CAT IV applies to measurement of the primary supply level, that is, overhead lines, cable systems, and so on.
8 Measurement category (CAT I) applies to measurement of circuits that are not directly connected to a main power source. Forexample, this category applies to measurement of secondary electric circuits in equipment across a transformer. The estimatedtransient overvoltage for the 701926 is 0 V.
9 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 (with only non-conductive pollution).
10 When using devices with different measurement categories, the lower measurement category applies.
For this probe, because the measurement category of the alligator clip is lower, when the probe and the alligator clip are used together, measurement category I (CAT I) applies.
To use the probe under measurement category III conditions, use it with the 701954 alligator clip (1000 Vrms, CAT III, sold separately).