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**User's  
Manual**

**Model 701913  
PBA2500 Active Probe**

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## Foreword

Thank you for purchasing the PBA2500 Active Probe (Model 701913). This user's manual contains useful information about the functions and operating procedures of the PBA2500 Active Probe and lists the handling precautions of the instrument. To ensure correct use, please read this manual thoroughly before beginning operation. After reading this manual, keep it in a convenient location for quick reference in the event a question arises during operation.

## Revisions

1st Edition: June 2005  
2nd Edition: July 2005

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**The following safety markings 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 injury or death 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 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.

## Checking the Contents of the Package

If any of the contents are incorrect, missing, or appear to be abnormal, please contact your Yokogawa dealer or representative.

PBA2500 Active Probe: 1

Various kinds of attachments (see page 1-2)

- Straight and angle pins: 8 each
- Spring type straight and angle pins: 8 each
- Microclips (red and black): 1 each
- Lead wires (red and black): 1 each
- L-pins: 2

User's manual (this manual): 1

Carrying case: 1

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## **Safety Symbols and Precautions**

To ensure safe and correct operation of the instrument, you must take the safety precautions given on the next page. The instrument may not function if used in a manner not described in this manual. Yokogawa bears no responsibility for, nor implies any warranty against damages occurring as a result of failure to take these precautions.

### **The following safety symbols and words are used in this manual.**



Warning: Handle with care. Refer to the user's 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.)

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## Safety Precautions

For safe use of the instrument, and for best results, please heed the following warnings and cautions.



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### WARNING

- Take care to avoid electric shock when connecting the probe to the item under test.
- Never disconnect the probe from the measuring instrument while the probe is connected to the circuit under test.
- Never use the probe with wet hands, or when the probe itself is wet. Electric shock can result.
- Before connecting the probe input terminal to the item under test, check that the measuring instrument is properly grounded, and that the probe output connector is connected to the input connector of the oscilloscope.
- Ground the measuring instrument.  
Always connect the main instrument's protective grounding.
- Connect the probe's earth lead.  
Connect the earth lead (ground potential) to ground.
- Maintain nondestructive input voltages.  
Do not apply a voltage exceeding [PM]25 V (DC+ACpeak) between input and ground.
- Do not use the probe in humid locations  
To avoid electric shock, never use the probe in areas of high humidity.
- Do not use the probe near flammable gases.  
To avoid injury and fire, do not use the probe near flammable or explosive gasses or vapors.
- Avoid exposed circuits.  
To prevent injury, remove all jewelry such as rings and wristwatches. When the power is ON, do not touch any exposed contact points or components.



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### CAUTION

- The probe head has undergone a precision assembly process. Take sufficient care when handling the probe as sudden changes in ambient temperature and physical shocks can damage it.
  - Do not inadvertently twist or pull the cable. The wires inside the cable can break, causing malfunction.
  - Avoid vibration, shock, and static electricity during shipping and handling. Take extra care not to drop the probe.
  - Avoid storing or using the probe in direct sunlight, or in areas with high temperature, humidity, or condensation. Deformation and deterioration of insulation can occur resulting in failure to retain product specifications.
  - Inspect the probe before use to ensure that damage has not occurred during shipping and storing. If damage is found, contact your nearest Yokogawa dealer or sales representative.
  - This probe is not water or dust resistant. Do not use the probe in areas with a lot of dust, or near water.
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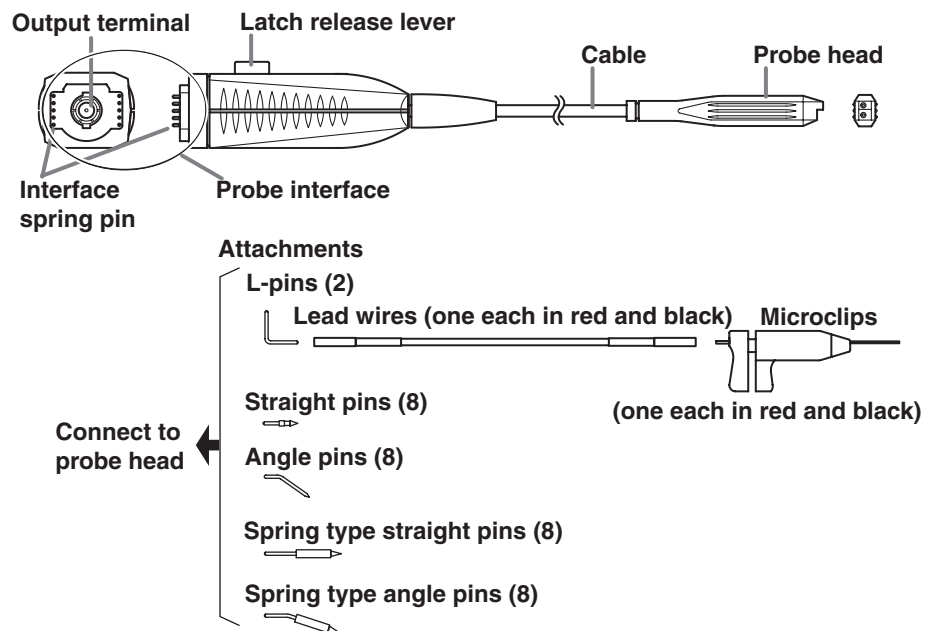
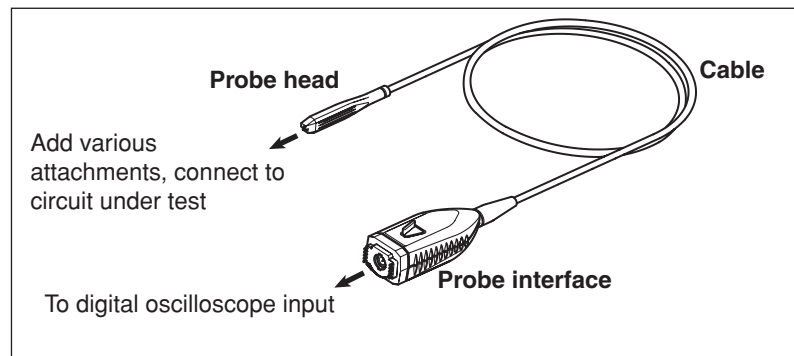
## Product Overview

The PBA2500 Active Probe is a 2.5-GHz bandwidth single-end active probe that can be used in combination with DL9000 series digital oscilloscopes. The probe is simply connected to the BNC input terminal on the DL9000 series instrument. By touching the probe tip to the circuit under test, you can view voltage waveforms.

## Features

- Wide frequency bandwidth (DC-2.5 GHz)
- Power can be supplied to the probe from the DL9000 series instrument.
- The probe is automatically recognized by the DL9000 series instrument.
- The attachment that touches the circuit under test can be changed
- Compact and lightweight

## Names of Parts



The quantity in parentheses ( ) is the number of the various attachments that belong to a single probe.

### Probe interface

The point of connection to the input of the digital oscilloscope.

### Interface spring pin

When the probe output terminal is connected, it touches the pad on the interface board of the oscilloscope. The probe's power is supplied through this interface component. The interface also supplies the offset voltage, and allows automatic recognition of the probe.

### Cable

Links the probe interface and probe head.

### Probe head

Contacts the circuit under test through various attachments.

### Latch release lever

A lever that releases the lock connecting the probe output terminal to the oscilloscope input.

### Attachments

The probe's input terminals. An attachment is selected according to the circuit to be tested, and attached to the probe head.

### Output terminal

The output terminal is a BNC connector. It connects to the input of the oscilloscope (BNC connector).



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## Usage Precautions

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### CAUTION

Use a soft cloth to wipe away dirt, and be careful not to damage the probe. Also, never dip the instrument in liquid, nor use any detergents or abrasives. Do not use any volatile solvents such as benzine.

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Do not bring the probe near transformers, circuits with large currents, wireless devices, or other objects emitting large electric and/or magnetic fields. Inaccurate measurement may result.

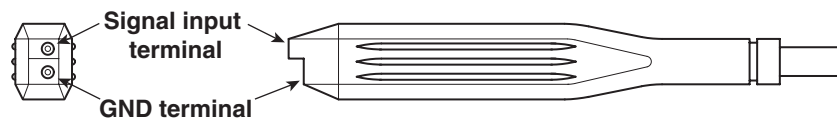
## Operating Procedures

### Preparing for Measurement

1. Set up the probe and DL9000 series digital oscilloscope.
2. Before measurement, insert the probe interface completely into the input of the oscilloscope and confirm that the BNC connector and interface pin are securely fastened. When inserting the interface, you will hear a click as the latch closes, indicating that the connection has been made.

### Handling the Attachments

You can change attachments according to the circuit to be tested. As in the figure below, there is a hole for attaching the attachments to the tip of the probe head.



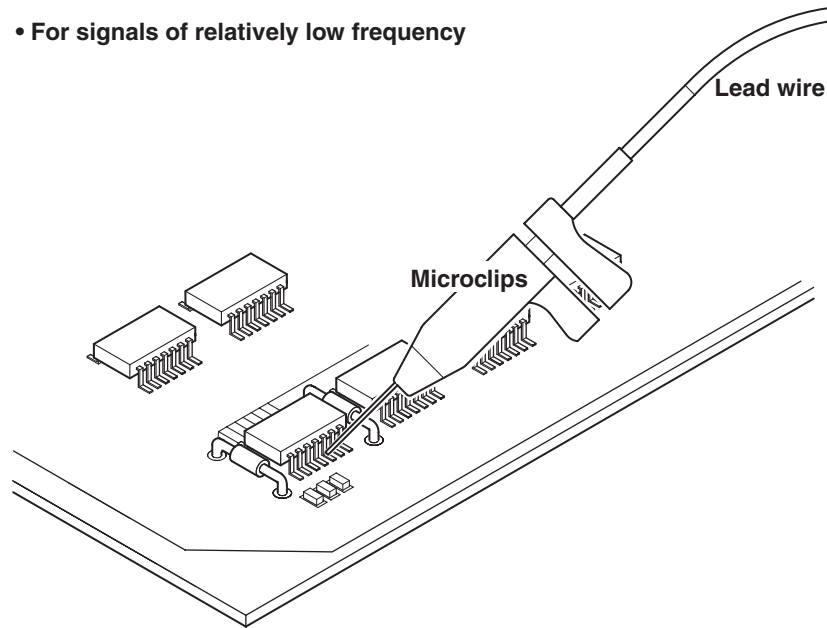
There are straight and angle pins. Select an attachment according to the circuit to be tested.

Since the impedance of the probe input is high, the inductance from the probe head to the circuit under test has a large effect on measured results of high frequency signal components. When measuring signals including frequencies of 100 MHz and higher in particular, we recommend that you use as short of an attachment as possible to connect the circuit under test to the probe head (both signal input terminal and ground terminal).

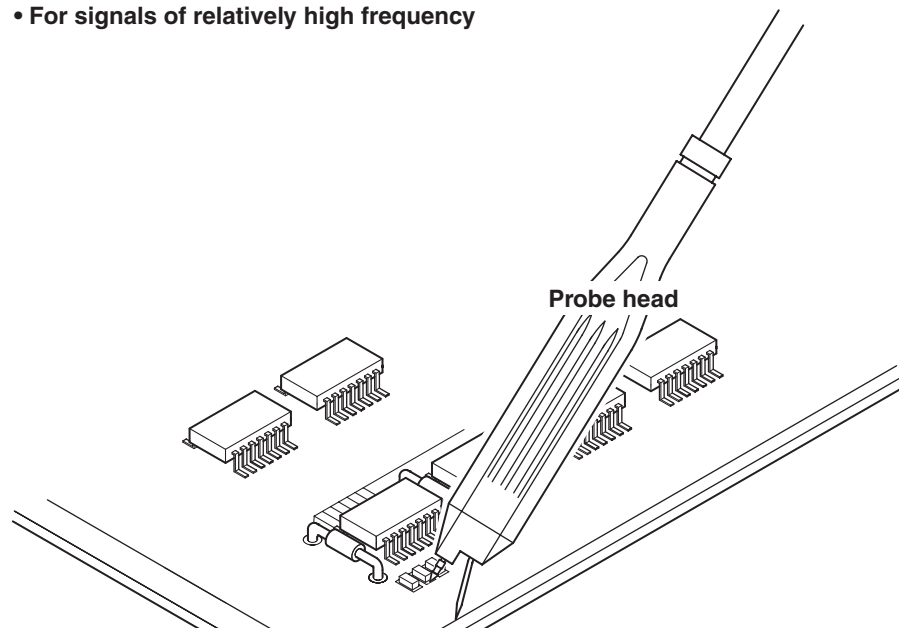
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## Example

- For signals of relatively low frequency



- For signals of relatively high frequency



Select an attachment according to the circuit to be tested (straight pin, angle pin, spring type straight pin, spring type angle pin).

### **Note**

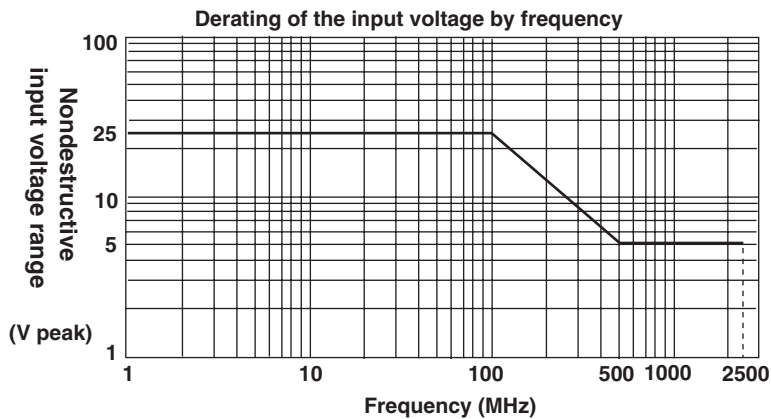
- After connecting the probe, heat emitted from the probe itself causes the offset voltage to drift. The probe should nearly stabilize about thirty minutes after applying power.
  - The offset voltage drifts as a result of the ambient temperature. During continuous use, make sure the ambient temperature is stable.
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## Product Specifications

### Electrical Specifications

(The electrical specifications are based on a standard operating conditions after a thirty-minute warm-up).

Frequency Bandwidth	DC to 2.5 GHz (–3 dB or more)
Attenuation ratio and DC voltage accuracy <sup>*1</sup>	10:1, within ±2% (including oscilloscope error at a 50 Ω load)
Input capacitance	Approximately 0.9 pF (relative to ground, typical value <sup>*4</sup> )
Input resistance:	Within ±2% of 100 kΩ
Output impedance	Approximately 50 Ω (typical value <sup>*4</sup> )
Input dynamic range	7 V
Offset voltage setting range	±10 V (set on the DL9000 series digital oscilloscope)
Operating input voltage range	±15 V (measurable voltage range when the offset voltage is applied)
Maximum rated voltage <sup>*2</sup>	±25 V (DC+ACpeak)
Rise time	140 ps or less (not including characteristics of the oscilloscope, typical value <sup>*4</sup> )
Residual noise	300 μVrms or less (in probe output, typical value <sup>*4</sup> )
Residual offset <sup>*3</sup>	Within ±2 m



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## General Specifications

Power range	Standard power supply voltage of $\pm 5$ V, within $\pm 5\%$	
Interface	(The probe is supplied power from a dedicated terminal. Connect the probe to a DL series instrument having a matching dedicated terminal.)	
Storage altitude	3,000 m or less	
Operating altitude	2,000 m or less	
Standard operating environment	Temperature range	$23^{\circ}\text{C} \pm 5^{\circ}\text{C}$
	Humidity range <sup>*5</sup>	$55\% \pm 10\% \text{RH}$
Operating environment	Temperature range	$5^{\circ}\text{C}$ to $40^{\circ}\text{C}$
	Humidity range <sup>*5</sup>	20 to 80%RH
Storage environment	Temperature range	$-20$ to $60^{\circ}\text{C}$
	Humidity range <sup>*5</sup>	20 to 80%RH
Calibration cycle	1 year	
Warm-up time	30 minutes or more	
Total length	Approximately 1.2 m.	
Weight	Approximately 80 g.	

## Standards Conformance

EMC Emission	Conforms to EN61326 Class A
Immunity	Conforms to EN61326 standards
	Effect of Immunity Environment
	$ \text{noise increase}  \leq 2 \text{ V}^{*6}$

\*1 Excluding residual offset voltage

\*2 Nondestructive maximum input voltage

\*3 When tip is shorted or when inputting 0 V

\*4 Typical value represents a typical or average value. It is not strictly guaranteed.

\*5 No condensation

\*6 Test conditions

Frequency bandwidth limit of 20 MHz, using a DL9000 series digital oscilloscope set for an input impedance of 50  $\Omega$ , and probe tip terminated at 50  $\Omega$ .