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**Probing Solutions.  
Made in Germany.**



# PHV **X**<sup>(kV)</sup> – Series

**High Voltage Probes  
with Universal BNC Interface**

4000 V, >600 MHz

PRELIMINARY

Datasheet



## About PHVX Series Probes

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The state-of-the-art high voltage probe series PHVX establishes itself with its first 4kV model PHVX4kV as the best-in-class solution for the growing demands of power electronics design, e.g. low side VDS measurements in double pulse testing of high-speed high-voltage switching devices of SiC technology, and IGBTs, thyristors, fast-switching HV diodes, and more.

All PHVX series models are engineered to deliver precise and consistent results, allowing designers to optimize the efficiency and performance of their power electronic systems with confidence.

With <3pF low input capacitance and a bandwidth exceeding 600MHz, the PHVX series ensures accurate and reliable measurements for fast-switching devices and power electronics, making it an essential tool for engineers working on advanced designs having a protected test environment.

The PHVX series probes have a universal BNC output connector and are compatible with any oscilloscope in the lab with 1 M $\Omega$  input impedance.

PMK's PHVX series probes are not for handheld use and for integration into full-automated or manual test stations for high-voltage safety reasons. All PHVX probes are therefore used as a voltage-measuring component (permanently attached device) of a test system.

The probe series impresses with its innovative and compact form factor. Individual contacting with high signal fidelity in different applications is ensured with the replaceable spring tip and a variety of contacting accessories for high voltages. Particularly the unique ground ring, which can be rotated through 360° and thus enables direct contacting to 5.08 mm pitch square pin headers without adding any additional capacitive loading to the DUT for highest signal fidelity. In addition, there is a wide range of soldering adapters, BNC adapters, and other accessories for easy and save connectivity for this non-handheld probe.

Each voltage model is available in different cable lengths and configurations, w/o intelligent read-out function, and w/o additional Silicon insulation (S) for high power measurements. The optional read-out (RO) features intelligent communication with automatic scaling on the oscilloscope display. The fully equipped model with intelligent read-out and extra Silicon insulation end with nomenclature -S-RO.

Please review the ordering information for the full list of available accessories and options.

## Specifications

Do not exceed the specifications. Allow the probe to warm up for 20 minutes. This probe comes with 1 year warranty. Each specification is determined at +23 °C ambient temperature. This probe series is not for hand-held use, and not rated for CAT II, III or IV.

## Electrical Specifications

Electrical Specifications<sup>1</sup> that are not marked with (\*) as guaranteed are typical.

Models <sup>2</sup>	PHVX4kV models
Attenuation* ( $\leq \pm 1$ % guaranteed)	100:1
Maximum Rated Input Voltages <sup>1</sup>	
No Measurement Category	4000 V rms / 4000 V pk / 4000 V DC
CAT Rating	not applicable
Pollution Degree	2
DC Gain Accuracy <sup>3</sup>	$\pm 0.5$ % (preliminary)
Input Impedance	50 M $\Omega$    < 3 pF
Compensation Range	10 pF – 25 pF
Input Coupling of the Measuring Instrument	1 M $\Omega$



The electrical specifications are valid for use in a controlled environment, like a semiconductor tester or test setup with protective cover.

Models	PHV4kV		
Article numbers <sup>2</sup>	PHVX4kV-2-0 PHVX4kV-2-0-RO PHVX4kV-2-S PHVX4kV-2-S-RO	PHVX4kV-3-0 PHVX4kV-3-0-RO PHVX4kV-3-S PHVX4kV-3-S-RO	PHVX4kV-5-0 PHVX4kV-5-0-RO PHVX4kV-5-S PHVX4kV-5-S-RO
Cable Length	2m	3m	5m
Bandwidth* (-3 dB) Small Signal (guaranteed)	> 600 MHz	TBD	TBD
Rise time (10 % - 90 %) Large Signal	< 800 ps	TBD	TBD

## Mechanical Specifications

Parameter	Specification
Weight (Probe only)	TBD
Length <sup>4</sup>	Model dependent
Probe Input	Square pin wholes, 5.08mm pitch
Output Connector <sup>5</sup>	BNC (Male)

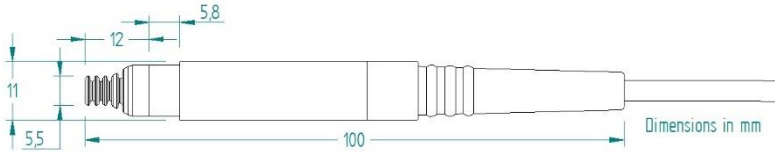
Notes:

- <sup>1</sup> The rating is based on basic insulation in a controlled environment in accordance with IEC 61010-1. Also observe the definitions in the probe series' instruction manual.
- <sup>2</sup> Each model is available with different cable lengths, w/o read-out, and w/o extra silicon cable insulation for measurements in high power applications. See "Ordering Information".
- <sup>3</sup> Input voltage >25%
- <sup>4</sup> Depending on model, available in different length
- <sup>5</sup> Depending on model, available with or without read-out

## Environmental Specifications

Parameter		Specification
Temperature Range	Operating	-40 °C to +60 °C
	Non-Operating	-40 °C to +71 °C
Maximum Relative Humidity	Operating	80 % relative humidity for temperatures up to +31 °C, decreasing linearly to 40 % at +45 °C, non-condensing humidity
	Non-Operating	95 % relative humidity for temperatures up to +40 °C
Altitude	Operating	up to 2000 m
	Non-Operating	up to 15000 m

## Dimensions



## Scope of Delivery

See chapter “Ordering Information” to review the selection of accessories.

- 1x PHVX series probe
- 1x **890-440-005** PHVX-GND ring for 5.08mm pitch and >360° angle of rotation
- 1x Instruction manual
- 1x Factory calibration certificate
- 1x Set cable coding rings



## Ordering Information

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### Step 1: Select Base Probe

Each voltage model is available in different lengths and options. The readout (-RO) lets the oscilloscope detect the probe's dividing factor automatically. Extra Silicon insulation (-S) of the BNC cable is recommended for measurements with high power devices.

<b>PHVX4kV-2-0</b>	PHVX4kV, passive HV probe, >600MHz, 4000V D C / 4000V pk, 2.0m, 100:1
<b>PHVX4kV-2-0-RO</b>	PHVX4kV, passive HV probe, >600MHz, 4000V DC / 4000V pk, 2.0m, 100:1, with readout
<b>PHVX4kV-2-S</b>	PHVX4kV, passive HV probe, >600MHz, 4000V DC / 4000V pk, 2.0m, 100:1, additional Silicon insulation for high current applications, without readout
<b>PHVX4kV-2-S-RO</b>	PHVX4kV, passive HV probe, >600MHz, 4000V DC / 4000V pk, 2.0m, 100:1, additional Silicon insulation for high current applications, with readout
<b>PHVX4kV-3-0</b>	PHVX4kV, passive HV probe, TBD MHz, 4000V DC / 4000V pk, 3.0m, 100:1, without readout
<b>PHVX4kV-3-0-RO</b>	PHVX4kV, passive HV probe, TBD MHz, 4000V DC / 4000V pk, 3.0m, 100:1, with readout
<b>PHVX4kV-3-S</b>	PHVX4kV, passive HV probe, TBD MHz, 4000V DC / 4000V pk, 3.0m, 100:1, additional Silicon insulation for high current applications, without readout
<b>PHVX4kV-3-S-RO</b>	PHVX4kV, passive HV probe, TBD MHz, 4000V DC / 4000V pk, 3.0m, 100:1, additional Silicon insulation for high current applications, with readout
<b>PHVX4kV-5-0</b>	PHVX4kV, passive HV probe, TBD MHz, 4000V DC / 4000V pk, 5.0m, 100:1, without readout
<b>PHVX4kV-5-0-RO</b>	PHVX4kV, passive HV probe, TBD MHz, 4000V DC / 4000V pk, 5.0m, 100:1, with readout
<b>PHVX4kV-5-S</b>	PHVX4kV, passive HV probe, TBD MHz, 4000V DC / 4000V pk, 5.0m, 100:1, additional Silicon insulation for high current applications, without readout
<b>PHVX4kV-5-S-RO</b>	PHVX4kV, passive HV probe, TBD MHz, 4000V DC / 4000V pk, 5.0m, 100:1, additional Silicon insulation for high current applications, with readout

## Step 2: Select Additional Accessories

More PHVX-series connectivity options are in planning. If no fitting solution is shown below, please reach out to sales@pmk.de with your specific needs and application information.  
*Accessory ratings will be shown in the manual.*

**890-440-001** PHVX-PCB Adapter, same footprint as PMK's high voltage PCB-Adapter 5.0-L (890-700-006) for PHV1000/2000 series (shown with strip line), max 4kV



**890-440-002** PHVX-BNC Adapter, max V TBD



**890-440-003** PHVX-Dual adapter to 2mm banana, max V TBD



**890-440-004** PHVX-Sprung Hook (red), max V TBD



**890-440-005** PHVX-GND ring for 5.08mm pitch, >360° rotational angle



**890-440-007** PHVX-GND ring with GND lead to 2mm banana, without clamp



**890-440-008** PHVX-GND ring with GND lead to 2mm banana, with clamp



**890-440-009** PHVX-Dual adapter to 2mm banana, with pair of clamps (red/black), max V TBD



**890-440-010** Set 2 clamps, for use with 2mm banana plugs (red/black), max V TBD



**890-800-001** Spring tips, gold-plated, 5x



**890-800-000** Solid tips, gold-plated, 5x



The accessories for this probe series have been safety tested. Do not use any other accessories than recommended.



Observe the accessory ratings. Do not exceed the accessory ratings.

## Step 3: Select Accredited Calibration

TBD

ISO 17025 (re-)calibration



The logo for dataTec, featuring the word "dataTec" in a white, italicized, sans-serif font. The "a" has a horizontal bar through it. The logo is centered within a solid red rectangular background.

*dataTec*

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