



## PHP 601

High accurate dual input reference thermometer for RTDs and thermocouples

PHP 601 is a high accurate dual input reference thermometer for resistive probes and thermocouples.

## Description

PHP 601 is a high accurate dual input reference thermometer for resistive probes and thermocouples.

It is able to store sensor characteristics and coefficients and can scan up to 12 sensors using SHP 101 scanner, without any loss of signal integrity or performance.

Used together with VISULOG data management software to drive PHP thermometer, SHP 601 scanner and a thermal device such as temperature bath, dry block calibrator or oven, a complete calibration procedure can be performed, reports generated and certificates printed for individual sensors.

Its graphical dual display enables measured values from channel 1 and 2 to be simultaneously displayed and leads to keyboard simplification. On-line help messages are available at any time in case additional information on displayed options is needed.

It is fully programmable via RS 232 and IEEE 488 (option) interfaces, which makes it the perfect instrument for test benches and automatic test equipment applications. PHP 601 is also available with a battery in option.

PHP 601 is offered into a compact benchtop housing for on-site use as well as benchtop or panel mounted use. It is widely used in metrological departments, quality-control departments, research and development laboratories and also by maintenance and approval companies.

## Applications:

- Temperature measurements using RTDs and/or thermocouples
- Absolute or differential measurements over two channels
- Differential thermal analysis
- Checking the temperature stability of furnaces or baths
- Monitoring (alarm) and temperature recording

# Specifications

## Specifications and performances in temperature @23°C ±1°C

Uncertainty is given in % of reading (PHP 601 display) + fixed value.

### Resistive probes: Measurement

Sensor	Measurement range	Range	Resolution	Accuracy / 1 year in measurement
Pt100 ( $\alpha = 3851$ )	-210 to +45°C -210 to +365°C -210 to +1100°C	100 $\Omega$ 200 $\Omega$ 400 $\Omega$	0.0001°C 0.0002°C 0.0005°C	0.004% RDG + 0.009°C 0.004% RDG + 0.010°C 0.004% RDG + 0.015°C
Pt100 ( $\alpha = 3916$ )	-200 to +44°C -200 to +358°C -200 to +510°C	100 $\Omega$ 200 $\Omega$ 400 $\Omega$	0.0001°C 0.0002°C 0.0005°C	0.004% RDG + 0.009°C 0.004% RDG + 0.010°C 0.004% RDG + 0.015
Pt100 ( $\alpha = 3926$ )	-210 to +45°C -210 to +365°C -210 to + 1100°C	100 $\Omega$ 200 $\Omega$ 400 $\Omega$	0.0001°C 0.0002°C 0.0005°C	0.004% RDG + 0.009°C 0.004% RDG + 0.010°C 0.004% RDG + 0.015
Pt200 ( $\alpha = 3851$ )	-210 to +45°C -210 to +365°C -210 to + 1100°C	200 $\Omega$ 400 $\Omega$ 800 $\Omega$	0.0001°C 0.0002°C 0.0005°C	0.004% RDG + 0.009°C 0.004% RDG + 0.010°C 0.004% RDG + 0.015
Pt500 ( $\alpha = 3851$ )	-210 to +233°C -210 to +800°C -210 to +1200°C	800 $\Omega$ 1600 $\Omega$ 3200 $\Omega$	0.0001°C 0.0005°C 0.001°C	0.004% RDG + 0.008°C 0.004% RDG + 0.010°C 0.004% RDG + 0.015
Pt1000 ( $\alpha = 3851$ )	-210 to +230°C -210 to +800°C	1600 $\Omega$ 3200 $\Omega$	0.0002°C 0.0005°C	0.004% RDG + 0.008°C 0.004% RDG + 0.010°C
Ni100 ( $\alpha = 618$ )	-60 to +30°C -60 to +180°C	100 $\Omega$ 200 $\Omega$	0.0001°C 0.0001°C	0.007°C 0.009°C
Ni120 ( $\alpha = 672$ )	-40 to +136°C	200 $\Omega$	0.0001°C	0.008°C

	-40 to +205°C	400 Ω	0.0002°C	0.010°C
Cu10 ( $\alpha = 427$ )	-200 to +260°C	25 Ω	0.0002°C	0.004% RDG + 0.010°C

Accuracies are given for 4-wire mounted probes

Choice between 6 measuring currents: 0.125 to 4 mA

Choice between three current waveforms: continuous, pulse or alternated

Measurement with  $I/\sqrt{2}$  function to define self-heating measurement.

Display unit: °C, °F and K.

### Thermocouples: Measurement

Type	Input range	Resolution	Accuracy / 1 year
K	-250 to -220°C	0.05°C	0.5°C
	-220 to -100°C	0.02°C	0.1°C
	-100 to +1350°C	0.01°C	0.01% RDG + 0.02°C
T	-250 to -220°C	0.05°C	0.3°C
	-220 to -90°C	0.02°C	0.1°C
	-90 to +400°C	0.01°C	0.04°C
J	-210 to -100°C	0.02°C	0.1°C
	-100 to +1200°C	0.01°C	0.04°C
E	-250 to -180°C	0.05°C	0.3°C
	-180 to -100°C	0.02°C	0.06°C
	-100 to 980°C	0.01°C	0.008% RDG + 0.02°C
N	-240 to -175°C	0.05°C	0.5°C
	-175 to -100°C	0.02°C	0.1°C
	-100 to +1300°C	0.01°C	0.008% RDG + 0.03°C
S	-50 to +400°C	0.05°C	0.02°C
	+400 to +1768°C	0.02°C	0.01% RDG + 0.1°C
R	-50 to +400°C	0.05°C	0.2°C
	+400 to +1768°C	0.02°C	0.008% RDG + 0.08°C
B	+100 to +400°C	0.2°C	1.0°C
	+400 to +1820°C	0.05°C	0.2°C
U	-200 to -70°C	0.02°C	0.08°C
	-70 to +600°C	0.01°C	0.008% RDG + 0.02°C
L	-200 to -70°C	0.02°C	0.08°C
	-70 to +900°C	0.01°C	0.008% RDG + 0.02°C
C	-20 to +2310°C	0.02°C	0.015% RDG + 0.07°C
Platine	-100 to +1400°C	0.02°C	0.01% RDG + 0.03°C
Mo	+0 to +1375°C	0.05°C	0.1°C

Accuracy is given for reference @ 0°C.

Uncertainty due to the internal reference junction:  $\pm 0.15^\circ\text{C}$ .

Temperature coefficient of the internal reference junction:  $\pm 0.015^\circ\text{C}/^\circ\text{C}$ .

## Specifications and performances in process @23°C ±1°C

### DC voltage: Measurement With or without loop supply

Range	Etendue de mesure	Res.	Accuracy / 1 year
100 mV	-50 to 117.5 mV	0.2 µV	0.008% RDG + 0.8 µV

Temperature coefficient: < 10 ppm/°C beyond reference domain

### Resistance: Measurement

Range	Res.	Connection	Accuracy / 1an
25 to 3200 Ω	1 mΩ	4 wires 3 wires 2 wires	0.003% RDG + 0.0005% range

4-wire measurement: All measuring currents.

3-wire measurement: add 1 mΩ

### Further features

Analogue output	0 to 2.55 V with load > 2.5 kΩ Resolution: 10 mV Accuracy: ± 10 mV
Alarm thresholds	2 alarms with sound signal and relay output (1 A, 220 V~, 60 VA max)
Scaling in measurement	Linear scaling ( $X = aY + b$ ) or programmable segments to create a response curve (9 segments)
Relative measurement	

## Models and accessories

### Instrument:

PHP601-1 Reference table thermometer for RTDs and thermocouples with 2 measurement channels

Delivered in standard with:

- Carrying case
- Factory test report
- RS 232 interface

PHP601-2 High accurate table multifunction calibrator

Delivered in standard with:

- Carrying case
- Factory test report
- RS 232 interface
- Battery + charger

PHP601-3 High accurate table multifunction calibrator

Delivered in standard with:

- Carrying case
- Factory test report
- RS 232 and IEEE 488 interface

PHP601-4 High accurate table multifunction calibrator

Delivered in standard with:

- Carrying case
- Factory test report
- RS 232 and IEEE 488 interface
- Battery + charger

### Scanner and accessories:

SHP101-1 Accurate scanning system

ACL4601 1m cable with 2 Lemo plugs for connection PHP/SHP or CJC reference

ACL4603-000A Cable 2 m, 1 LEMO connector and 1 connection for bare wires

PEM40317-000 Low emf cable

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### Further accessories:

ACL4604-000A	Adaptor LEMO
ER 48379-000	LEMO connector
PEM40316-000	Adaptor DIN/LEMO
AN6901	Soft case for benchtop instruments
AN5836	IEEE 488 cable Length: 2 m
AN5875	RS232 9p F cable
AN5883	Bracket mounting for panel installation (T2 box type)
AN5884	Rack mounting kit for rack installation (T2 box type)

### Reference sensors:

AN5847-30000A	Pt100 working standard sensor, -180 to 450°C L = 500 mm, dia 5 mm, stability 0.025°C, LEMO output, with certification
AN5847-30001A	Pt100 working standard sensor, -180 to 450°C L = 500 mm, dia 5 mm, stability 0.025°C, LEMO output, without certification
AN5848-30000	Pt100 working standard sensor, -180 to 450°C L = 400 mm, dia 6 mm, stability 0.050°C, LEMO output, with certification
AN5848-30001	Pt100 working standard sensor, -180 to 450°C L = 400 mm, dia 6 mm, stability 0.050°C, LEMO output, without certification

### Software:

VISULOG	Monitoring software 32 bits full version
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### Certification:

QMA11EN	COFRAC certificate of calibration With all relevant data points where the device has been tested
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### Packing information:

Size	255 x 88 x 310 mm
Weight (gross)	2 to 3 kg according to the configuration chosen