PJ 6301

High precision multifunction benchtop calibrator with documenting capabilities

PJ 6301 multifunction benchtop calibrator is a high precision instrument which can simultaneously measure and simulate of physical and electrical values: DC voltage and current, resistance and temperature from thermocouples and RTDs.

Description

PJ 6301 multifunction benchtop calibrator is a high precision instrument which can simultaneously measure and simulate of physical and electrical values: DC voltage and current, resistance and temperature from thermocouples and RTDs.

Its graphical dual display enables INPUT and OUTPUT values 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.

Extended functionalities: data processing, customized signal linearization, transmitter function, ramp and step function, relative measurements...

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. PJ 6301 is also available with a battery in option.

PJ 6301 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:

Due to its outstanding performances and quality, PJ 6301 meets the requirements of a wide range of applications:

- Accurate measurement for calibration of signal generators such as sensors, voltage and current sources, resistance, and for the verification of general process control instruments
- Temperature simulation, voltage and current sourcing, resistance simulation for calibration of measuring equipment such as chart recorders, logical controllers, PLC analogue inputs...
- Test of signal conditioners or transmitters, using PJ 6301 simultaneous sensor simulation and output signal measurement capability.

Specifications

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

Uncertainty is given in % of reading (PJ 6301 display) + fixed value.

Resistive probes: Measurement and simulation

Sensor	Measurement range	Resolution	Accuracy / 1 year in measurement	Simulation range	Resolution	Accuracy / 1 year in simulation
Pt100	-220°C to 0°C 0 to +630°C +630°C to +1200°C	0.01°C 0.005°C 0.01°C	0.04°C 0.015% RDG + 0.04°C 0.2°C	-220°C to 0°C 0 to +1200°C	0.01°C 0.01°C	0.06°C 0.015% RDG + 0.06°C
Pt200	-220°C to 0°C 0 to +630°C +630 to +798°C	0.01°C 0.005°C 0.01°C	0.04°C 0.015% RDG + 0.04°C 0.15°C	-220°C to 0°C 0 to +590°C	0.01°C 0.01°C	0.04°C 0.015% RDG + 0.04°C
Pt500	-220°C to 0°C 0 to +1200°C	0.01°C 0.01°C	0.06°C 0.015% RDG + 0.06°C	-220°C to 0°C 0 to +1200°C	0.01°C 0.01°C	0.1°C 0.015% RDG + 0.1°C
Pt1000	-220°C to 0°C 0 to +630°C +630°C to +1200°C	0.01°C 0.005°C 0.01°C	0.05°C 0.015% DG + 0.05°C 0.3°C	-220°C to 0°C 0 to +1200°C	0.01°C 0.01°C	0.06°C 0.015% RDG + 0.06°C
Ni100	-60°C to +180°C	0.05°C	0.15°C	-60°C to +180°C	0.01°C	0.4°C

Accuracies are given for 4-wire mounted probes
Measuring current: 1 mA for Pt100, Pt200, Ni100 and 0.1 mA for Pt500 and Pt1000
Take into account additional uncertainty of 0.02 to 0.05°C in 3-wire measurement and 0.02 to 0.2°C in 2-wire measurement according to the type of sensor.
In simulation mode, accuracy is given for external current between 0.5 mA and 2.5 mA for Pt 100, Pt 200 and Ni 100 simulation and 1 mA for Pt 500 and Pt 1000 simulation
Temperature coefficient: < 10% of accuracy /°C
Display unit: °C, °F and K.

Thermocouples: Measurement and simulation

Type	Input range	Resolution	Accuracy / 1 year (Measurement)	Output range	Resolution	Accuracy / 1 year (Simulation

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K	-250 to -200°C -200 to -120°C -120 to 0°C 0 to +1372°C	0.2°C 0.1°C 0.05°C 0.05°C	1.5°C 0.5°C 0.3°C 0.015% RDG + 0.2°C	-240 to -200°C -200 to 0°C +0 to +1372°C	0.01°C 0.01°C 0.01°C	1.5°C 0.5°C 0.015% RDG + 0.2°C
T	-250 to -200°C -200 to -0°C +0 to +400°C	0.2°C 0.05°C 0.05°C	1.5°C 0.5°C 0.2°C	-240 to -200°C -200 to +0°C +0 to +400°C	0.01°C 0.01°C 0.01°C	1.5°C 0.5°C 0.2°C
J	-210 to -100°C -100 to +1200°C	0.05°C 0.05°C	0.4°C 0.2°C	-210 to -100°C -100 to +1200°C	0.01°C 0.01°C	0.5°C 0.015% RDG + 0.2°C
E	-250 to -200°C -200 to -100°C -100 to 980°C	0.1°C 0.05°C 0.05°C	1°C 0.3°C 0.2°C	-240 to -200°C -200 to -100°C -100 to +1000°C	0.01°C 0.01°C 0.01°C	1°C 0.3°C 0.2°C
R	-50 to +150°C +150 to +550°C +550 to 1768°C	0.5°C 0.2°C 0.1°C	2.0°C 1.0°C 1.0°C	-50 to +120°C +120 to +1768°C	0.01°C 0.01°C	2.0°C 1.0°C
S	-50 to +150°C +150 to +550°C +550 to +1768°C	0.5°C 0.2°C 0.1°C	1.5°C 1.0°C 1.0°C	-50 to +120°C +120 to +1768°C	0.01°C 0.01°C	2.0°C 1.0°C
B	+400 to +900°C +900 to +1820°C	0.2°C 0.1°C	1.5°C 1.0°C	+0 to +400°C +400 to 900°C +900 to +1820°C	0.01°C 0.01°C 0.01°C	- 1.5°C 1.0°C
U	-200 to 0°C 0 to +600°C	0.05°C 0.05°C	0.5°C 0.3°C	-200 to -10°C -100 to +900°C	0.01°C 0.01°C	0.4°C 0.2°C
L	-200 to -100°C -100 to +900°C	0.05°C 0.05°C	0.3°C 0.2°C	-200 to +900°C	0.01°C	0.3°C 0.2°C

C	-20 to +900°C +900 to 2310°C	0.1°C 0.1°C	1.0°C 0.05% RDG + 0.2°C	-20 to +900°C +900 to 2310°C	0.01°C	0.5°C 0.05% RDG + 0.2°C
N	-240 to -190°C -190 to -110°C -110 to +1300°C	0.20°C 0.1°C 0.05°C	1.5°C 1.0°C 0.3°C	-240 to -100°C -100 to +1300°C	0.01°C 0.01°C	1.5°C 0.4°C
Platine	-100 to +1400°C	0.05°C	0.4°C	-100 to +1395°C	0.01°C	0.4°C
Mo	+0 to +1375°C	0.05°C	0.2°C	+0 to +1375°C	0.01°C	0.3°C

Accuracy is given for reference @ 0°C.
Accuracy when using the internal reference junction: front terminal board: ≤ 0.2°C and rear terminal board: ≤ 0.4°C
Normal rejection for 10 mV, 50 / 60 Hz: < 0.1°C over R and S thermocouples and < 0.03°C over the others
Common mode rejectin for 10 V, 50 / 60 Hz: < 0.03°C over R and S thermocouples and < 0.01°C over the others
Temperature coefficient: <10% of accuracy /°C

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

DC current: Measurement

With or without loop supply

Range	Res.	Accuracy / 1 year
±60 mA	0.1 µA	0.020% RDG + 0.6 µA

Temperature coefficient: < 10 ppm/°C beyond reference domain
Loop supply: 24 V ±10% at 25 mA max
Max voltage drop: 1.2 V
Normal mode rejection: 80 dB

DC voltage: Measurement

Range	Res.	Accuracy / 1 year
+60 mV	0.1 µV	0.010% RDG + 6 µV
+600 mV	1 µV	0.010% RDG + 6 µV
+6 V	10 µV	0.010% RDG + 30 µV
+60 V	100 µV	0.010% RDG + 300 µV

Temperature coefficient: < 10 ppm/°C beyond reference domain
Input resistance: over 60 mV / 600 mV / 6 V ranges: > 1000 MΩ, input current: < 200 pA and

over 60 V range: 10 MΩ
Max permissible voltage on all ranges: 100 V or AC peak
Max permissible common mode voltage: 250 V AC or 350 V peak
Normal mode rejection (60 mV range): > 80 dB
Common mode rejection (60 mV range): > 150 dB

Resistance: Measurement

Range	Measurement range	Res.	Connection	Accuracy / 1an
0 to 600 Ω	1 mA	1 mΩ	4 wires 3 wires 2 wires	0.010% RDG + 6 mΩ 0.010% RDG + 20 mΩ 0.010% RDG + 50 mΩ
0 to 6000 Ω	0.1 mA	10 mΩ	4 wires 3 wires 2 wires	0.010% RDG + 40 mΩ 0.010% RDG + 80 mΩ 0.010% RDG + 100 mΩ

4 wires: permissible line resistance over wires Ω3 or Ω4: < 10 kΩ per wire, over wires + or -: < 350 Ω per wire
3 wires: add error: < 50 Ω
2 wires: add error due to resistance of connection wires (+ and -). Measurement line resistance and unit internal residual can be taken into account: < 20 mΩ
Max voltage in open circuit: 10 V
Max applicable voltage: 100 V DC or AC peak

DC current: Emission

With or without loop supply

Range	Resolution	Accuracy / 1 year
0-60 mA	0.1 µA	0.020% RDG + 0.8 µA

Temperature Coefficient < 10 ppm/°C beyond reference domain
Max output voltage: 30 V
Possible external supply: ≤ 30 V
Source resistance: > 100 MW
Protection against external voltage : between -20 and 100 V

DC voltage: Emission

Range	Emission range	Res.	Accuracy / 1an
+600 mV	-100 mV to +600 mV	1 µV	0.015% RDG + 6 µV
+6 V	- 1V to +6 V	10 µV	0.015% RDG + 30 µV
+60 V	-10 V to +60 V	100 µV	0.015% RDG + 300 µV

+600 mV	-100 mV to +600 mV	1 µV	0.015% RDG + 6 µV

Max current for positive output: 60 mA (except: 60 V range: 30 mA)
Max current for negative output: -5 mA
Internal resistance: < 0.5 mW at front terminals and < 2 mW at rear terminals.
Max permissible overvoltage on output terminals: from -18 V to 100 V DC or AC peak.

Resistance: Emission

Range	Emission range	Res.	Accuracy / 1 year	Nota Iext
600 Ω	0 to 600 Ω	1 mΩ	0.010% RDG + 10 mΩ	0.5 mA / 2.5 mA
6000 Ω	0 to 6000 Ω	10 mΩ	0.010% RDG + 100 mΩ	0.05 mA / 0.25 mA

Temperature coefficient: < 10 ppm/°C beyond reference domain
Max permissible current and voltage:
600 Ω range: 100 mA or 60 V DC or peak
6000 Ω range: 10 mA or 60 V DC or peak
Iext : Current received by the calibrator

Further features

Analogue output	0 to 2.55 V with load > 2.5 kΩ Resolution: 10 mV Accuracy: ±10 mV
Establishing time	< 25 ms over every function
Alarm thresholds	2 alarms with sound signal and relay output (1 A, 220 V~, 60 VA max)
Scaling in measurement and simulation modes	Linear scaling (X = aY + b) or programmable segments to create a response curve (9 segments)
Relative measurement	The features allows the following : • Programming a reference value different from the one of the instrument (NUL function). • Subtracting of constant value by measuring or programming it from a measured value (TARE function).
Digital filter	A programmable digital filter enables the PJ 6301 to display a smoothed value taking into account previous measurements.
Square root	In current measurement and simulation, this function allows taking into account a quadratic signal coming from transmitter of type ΔP.
Trigger function	Acquisition on request can be replaced by

	triggered acquisition, one by one or with an acquisition procedure where number of measurements and time interval between measurements can be programmed. Measurements of a burst are stored and can be processed off-line in the various ways described in the following paragraph.
Statistical functions	Continuous display of average, minimum and maximum value of the signal under monitoring, as well as number of measurements.
Ramps generation	Starting, ending and length time values of simple or cyclic ramps can be set to do simulation. Number of ramps can also be adjusted in case of cyclic ramps for any signals.
Steps simulation	Emitted value can vary by steps, whose amplitude, direction, and number of iterations are user programmable.
Synthesizer	With 100 values manually set, CALYS 150 enables users to draw a generation curve.
Transmitter function	PJ 6301 is able to be used as a transmitter. Measurement input is copied on the output with scaling.

General specifications

Size	225 x 88 x 310
Weight	2 to 3 kg according to the configuration
Display	Graphical back-lit LCD display, 600,000 counts
Power supply	115 / 230 V ±10%, 50/400 Hz
Battery (option)	Type: 12 V Battery life: 2 to 3.5 hours Charging time: 12 to 14 hours
Communication ports	RS 232 IEEE488 in option
Storage capacity	Up to 5 full configurations 1,000 measurements in one burst or up to 128 bursts of one measurement. Bursts are tagged with an item number and can be identified with a label. 100 different emission values can be stored, values are entered by keyboard or via RS 232

Environmental specifications

Reference range	23°C ±1°C (RH: 45 to 75% w/o condensing)
Operating reference range	0 to 50°C (RH: 20 to 75% w/o condensing)

Limit operating range	-10°C to +55°C (RH: 10 to 80% w/o condensing)
Storage temperature limits	-30°C to +55°C (-15 to +50°C for model with battery charged)
IP protection	IP40 according to EN60529

Safety specifications

Class	In accordance with EN 61010-1 Category III, pollution 2
Rated voltage	60 V
Chocks and vibrations	EN 61010-1
EMC conformity	Immunity: • EN 61000-4-2 • EN 61000-4-3 • EN 61000-4-5 • EN 61000-4-6 • EN 61000-4-11 EN 61000-4-4 Conducted and radiated emissions: • EN 55022, class B • EN 61000-3-2 • EN 61000-3-3

Models and accessories

Instrument:

PJ 6301-1 High accurate benchtop multifunction calibrator

Delivered in standard with:

- Carrying case
- Factory test report
- RS 232 interface

PJ 6301-2 High accurate benchtop multifunction calibrator

Delivered in standard with:

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

PJ6301-3 High accurate benchtop multifunction calibrator

Delivered in standard with:

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

PJ6301-4 High accurate benchtop multifunction calibrator

Delivered in standard with:

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

Accessories:

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)
LCL301-OFA	PC software in English
	Available for free download from our web site

Certification:

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

Packing information:

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