Calibration
measurement

CALYS 1000

Table documenting multifunction calibrator

Description

CALYS 1000 is a field documenting multifunction calibrator within CALYS range. It is the perfect tool for advanced process maintenance and use on test bench in all industries.
Suitable for all field and lab measurements, it can simultaneously measure, generate and record over two isolated channels various signals of temperature, pressure, resistance, process and frequency in one single instrument.

Providing extended functionalities (temperature simulation, scaling, steps, synthesizer, statistical functions, user-programmable configurations…), CALYS 1000 makes advanced data exploitation and full data traceability easier, as well as quick access to functions by menus.

The instrument simultaneously measures and simulates:

- Temperature: Up to 0,014% RDG
- Resistance: Up to 0,012% RDG, 4 kΩ range
- Current: Up to 0,0175% RDG, 50 mA range + 24 V loop supply
- Voltage: Up to 0,013% RDG, 50 V range
- Frequency: Up to 0,005% RDG, 20 kHz range (10 kHz in simulation)
- Pressure: with an external pressure module (ref. ACL433) (comparison calibration with a pressure pump).

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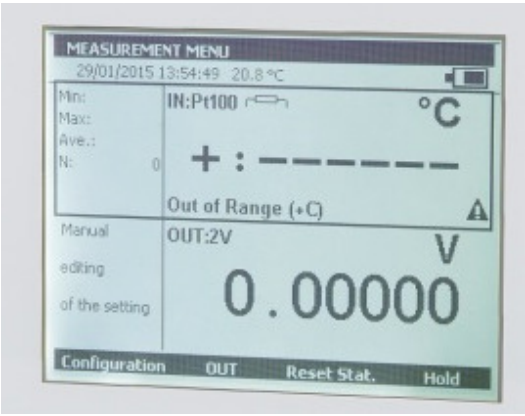
Calibration procedures and DATACAL software

Using this user-friendly instrument, calibration tasks can be quickly carried out over the whole process chain. Take the documenting process calibrator to the field with you during the whole week with 10 calibration procedures stored in the device.
Run the procedure after connecting the probes to the instrument and save the results for onsite easy and quick calibration. Back to the office, you can then upload the data on a computer in order to issue customized calibration certificates with dedicated calibration software DATACAL.

Innovative and ergonomic design

Metal housing for enhanced robustness
Capacitive touch panel
USB communication
Carrying handle
Battery and main powered

Graphic screen and display resolution



CALYS 1000 allows the digit number after the dot to be selected: This function is justified by the needs of users who want or not to display the best resolution for calibration or on the contrary limit it for simple verifications.

CALYS 1000 dual display indicates permanently the measurement value, and also the emitted value, the gauge and the used functions.
On the top date, time and also external temperature are also indicated.
During measuring average, maximum, minimum and the number of measurements are displayed on the left. While for emission this part of screen displays all details of ramps, steps and constant value emission functions.
Drop-down menus are used with the navigator, and an on-line help is available to make easier connections of probes and wires.

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Performances & technical specifications @23°C ±5°C

Uncertainty is given in % of reading + fixed value.

Resistive probes: Measurement and simulation

Probe type	Range	Measurement		Emission	
		Resolution	Accuracy / 1 year	Resolution	Accuracy / 1 year
Pt 50 (α = 3851)	-220°C to +1200°C	0.01°C	0.012 % R + 0.06°C	0.03°C	0.014 % R + 0.18°C
Pt 100 (α = 3851)	-220°C to +850°C	0.01°C	0.012 % R + 0.05°C	0.02°C	0.014 % R + 0.12°C
Pt 100 (α = 3916)	-200°C to +510°C	0.01°C	0.012 % R + 0.05°C	0.02°C	0.014 % R + 0.12°C
Pt 100 (α = 3926)	-210°C to +850°C	0.01°C	0.012 % R + 0.05°C	0.02°C	0.014 % R + 0.12°C
Pt 200 (α = 3851)	-220°C to +1200°C	0.01°C	0.012 % R + 0.12°C	0.10°C	0.014 % R + 0.33°C
Pt 500 (α = 3851)	-220°C to +1200°C	0.01°C	0.012 % R + 0.07°C	0.03°C	0.014 % R + 0.18°C
Pt 1000 (α = 3851)	-220°C to +850°C	0.01°C	0.012 % R + 0.05°C	0.02°C	0.014 % R + 0.08°C
Ni 100 (α = 618)	-60°C to +180°C	0.01°C	0.012 % R + 0.03°C	0.01°C	0.014 % R + 0.08°C
Ni 120 (α = 672)	-40°C to +205°C	0.01°C	0.012 % R + 0.03°C	0.01°C	0.014 % R + 0.08°C
Ni 1000 (α = 618)	-60°C to +180°C	0.01°C	0.012 % R + 0.03°C	0.01°C	0.014 % R + 0.08°C
Cu 10 (α = 427)	-70°C to +150°C	0.10°C	0.012 % R + 0.18°C	0.01°C	0.014 % R + 0.10°C
Cu 50 (α = 428)	-50°C to +150°C	0.01°C	0.012 % R + 0.06°C	0.03°C	0.014 % R + 0.15°C

Resistive probes measurements in 2, 3 or 4 wires: automatic recognition of number of connected wires, with indication on screen
Accuracies are given for 4-wire mounted probes
Take into account particular error of temperature sensor used and implementation conditions
Temperature coefficient: < 10% of accuracy /°C
Measuring current: 0.25 mA (Measurement) or from 0.1 to 1 mA (Emission)
Settling time: < 1 ms (Simulation on quick transmitters)

Pressure: Measurement by external digital sensor

Range	Resolution	0-1 bar	0-3 bar	0-10 bar	0-30 bar	0-100 bar	0-300 bar	0-1000 bar
Absolute	0.02 % FS	X	X	X	X	X	X	X
Relative	0.02 % FS	X	X	X	X			

Available in relative, absolute and differential pressure
Connector: ¼ gas
Accuracy: 0.05 % FS from 10 to 40°C, 0.1 % FS from -10 to +10°C & from 40 to 80°C
ACL433 digital pressure module is connected to CALYS through RS485 serial cable to the digital input connector. All data are digital. Measurements are temperature compensated by a polynomial correction implemented into the firmware at factory.

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Thermocouples: Measurement and simulation

Type	Measurement			Simulation		
	Range	Res	Accuracy / 1 year	Range	Res	Accuracy / 1 year
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	0.80°C 0.25°C 0.1°C 0.013 % R + 0.08°C	-240 to -50°C -50 to -0°C +0 to +1372°C	0.2°C 0.1°C 0.05°C	0.60°C 0.10°C 0.013 % R + 0.08°C
T	-250 to -200°C -200 to -120°C -120 to -50°C -50 to +400°C	0.2°C 0.05°C 0.05°C 0.05°C	0.70°C 0.25°C 0.10°C 0.013 % R + 0.08°C	-240 to -100°C -100 to -0°C +0 to +400°C	0.2°C 0.05°C 0.05°C	0.40°C 0.10°C 0.013 % R + 0.08°C
J	-210 to -120°C -120 to -0°C +0 to +1200°C	0.05°C 0.05°C 0.05°C	0.25°C 0.09°C 0.013 % R + 0.07°C	-210 to -0°C +0 to +1200°C	0.05°C 0.05°C	0.20°C 0.013 % R + 0.07°C
E	-250 to -200°C -200 to -100°C -100 to -0°C +0 to +1000°C	0.1°C 0.05°C 0.05°C 0.05°C	0.45°C 0.15°C 0.07°C 0.013 % R + 0.05°C	-240 to -100°C -100 to +40°C +40 to +1000°C	0.1°C 0.1°C 0.05°C	0.25°C 0.10°C 0.013 % R + 0.05°C
R	-50 to +150°C +150 to +550°C +550 to +1768°C	0.5°C 0.2°C 0.1°C	0.8°C 0.013 % R + 0.35°C 0.013 % R + 0.2°C	-50 to +350°C +350 to +900°C +900 to +1768°C	0.5°C 0.2°C 0.1°C	0.5°C 0.013 % R + 0.35°C 0.013 % R + 0.2°C
S	-50 to +150°C +150 to +550°C +550 to +1768°C	0.5°C 0.2°C 0.1°C	0.80°C 0.013 % R + 0.35°C 0.013 % R + 0.25°C	-50 to +120°C +120 to +450°C +450 to +1768°C	0.5°C 0.2°C 0.1°C	0.8°C 0.013 % R + 0.35°C 0.013 % R + 0.25°C
B	+400 to +900°C +900 to +1820°C	0.2°C 0.1°C	0.013 % R + 0.4°C 0.013 % R + 0.2°C	+400 to +850°C +850 to +1820°C	0.2°C 0.1°C	0.013 % R + 0.4°C 0.013 % R + 0.2°C
U	-200 to + 60°C	0.05°C	0.15°C	-200 to +600°C	0.05°C	0.15°C
L	-200 to +00°C	0.05°C	0.2°C	-200 to +900°C	0.05°C	0.20°C
C	-20 to + 900°C +900 to +2310°C	0.1°C 0.1°C	0.25°C 0.013 % R + 0.15°C	-20 to +900°C +900 to +2310°C	0.1°C 0.1°C	0.25°C 0.013 % R + 0.15°C
N	-240 to -190°C -190 to -110°C -110 to -0°C +0 to +1300°C	0.2°C 0.1°C 0.05°C 0.05°C	0.5°C 0.15°C 0.08°C 0.013 % R + 0.06°C	-240 to -190°C -190 to -110°C -110 to -0°C +0 to +1300°C	0.2°C 0.1°C 0.05°C 0.05°C	0.3°C 0.15°C 0.08°C 0.013 % R + 0.06°C
Pt	-100 to +1400°C	0.05°C	0.3°C	-100 to +1400°C	0.05°C	0.3°C
Mo	+0 to +1375°C	0.05°C	0.013 % R + 0.06°C	+0 to +1375°C	0.05°C	0.013 % R + 0.06°C
NiMo/ NiCo	-50 to +1410°C	0.05°C	0.013 % R + 0.30°C	-50 to +1410°C	0.05°C	0.013 % R + 0.30°C

Accuracy is given for reference @ 0°C.
When using the internal reference junction (except for couple B) add an additional uncertainty of 0.2 °C at 0 °C.
It is possible (except for thermocouple B) to choose by programming the cold junction localization: External at 0°C, internal (temperature compensation of instrument's terminals) or manually entered.
Temperature coefficient: <10% of accuracy /°C
Display unit: °C and F

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DC current: Measurement

Range	Resolution	Accuracy / 1 year	Notes
0-20 mA	1 µA	0.0175% RDG + 2 µA	Rin: < 25 Ω With or without loop supply (24 V)
4-20 mA	1 µA	0.0175% RDG + 2 µA	
±50 mA	1 µA	0.0175% RDG + 2 µA	

For measurements of transmitter outputs, special ranges give a dual display using mA and % of full scale.
CALYS 1000 also allows linear or quadratic signals to be linearized.
Temperature coefficient: < 10 ppm/°C beyond reference domain
Loop supply: 24 V ±10%
HART® compatibility: Input impedance Rin = 280 Ω

DC current: Emission

Range	Resolution	Accuracy / 1 year	Note
24 mA	1 µA	0.0175% RDG + 2 µA	With or without loop supply (24 V)
4-20 mA	1 µA	0.0175% RDG + 2 µA	
0-20 mA	1 µA	0.0175% RDG + 2 µA	

Temperature coefficient < 10 ppm/°C beyond reference domain
Settling time: < 5 ms

Preprogrammed steps

	0%	25%	50%	75%	100%
4-20 mA linear	4	8	12	16	20
0-20 mA linear	0	5	10	15	20
4-20 mA quad	4	5	8	13	20
0-20 mA quad	0	1.25	5	11.25	20
4-20 mA valves	3.8-4 -4.2		12		19,20,21

Direct voltage: Measurement

Range	Resolution	Accuracy / 1 year	Notes
±100 mV	1 µV	0.013% RDG + 3 µV	Rin: > 10 MΩ
±1 V (1)	10 µV	0.013% RDG + 20 µV	Rin: > 10 MΩ (1): -0.8 V to +1 V
±10 V	100 µV	0.015% RDG + 200 µV	Rin: > 1 MΩ
±50 V	1 mV	0.015% RDG + 2 mV	Rin: > 1 MΩ

Rin: input resistance
Temperature coefficient: < 7 ppm/°C beyond reference domain

Direct voltage: Emission

Range	Resolution	Accuracy / 1yr	Min Load	Notes
100 mV	1 µV	0.013% RDG + 3 µV	1 kΩ	Iout max: 5 mA
2 V	10 µV	0.013% RDG + 20 µV	2 kΩ	Iout max: 5 mA
20 V	100 µV	0.015% RDG + 200 µV	4 kΩ	Iout max: 25 mA
50 V	1 mV	0.015% RDG + 2 mV	4 kΩ	

Iout: output current from transmitter
Temperature coefficient: < 7 ppm/°C beyond reference domain
Settling time: < 5 ms

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Resistance: Measurement

Range	Resolution	Accuracy / 1 year	Notes
400 Ω	1 mΩ	0,012% RDG + 10 mΩ	Meas current: 0.25 mA
4000 Ω	10 mΩ	0,012% RDG+ 100 mΩ	Meas current: 0.25 mA

2, 3 or 4 wires resistance measurement: automatic recognition of number of connected wires, with indication on screen
Accuracies are given for 4-wire mounted probes
Temperature coefficient: < 7 ppm/°C beyond reference domain
Open circuit terminal voltage: < 10 V
Continuity test: Open circuit for R > 1000 Ω and closed circuit for R < 1000 Ω

Resistance: Emission

Range	Resolution	Accuracy / 1 year	Notes
40 Ω	1 mΩ	0.014% RDG + 3 mΩ 0.014% RDG + 10 mΩ	Iext: 10 mA Iext: 1 mA
400 Ω	10 mΩ	0.014% RDG + 20 mΩ 0.014% RDG + 30 mΩ	Iext: 1 / 10 mA Iext: 0.1 / 1 mA
4000 Ω	100 mΩ	0.014% RDG + 300 mΩ	Iext: 0.1 / 1 mA

Temperature coefficient: < 5 ppm/°C beyond reference domain
Current settling time: < 1 ms
Iext: Current received by the calibrator

Frequency and counting: Measurement

Range	Resolution	Accuracy / 1yr
20 kHz	< 0.01 Hz	0.005% RDG

Temperature coefficient: < 5 ppm/°C beyond reference domain
Scale unit: Pulse / min and Hz
Trigger level: 1 V
Measurement on frequency signals or dry contacts
Counting will be performed on defined time or infinite time

Frequency and pulses: Emission

Range	Resolution	Accuracy / 1 year
1000 Hz	0.01 Hz	0.005% RDG
10 kHz	10 Hz	0.005%RDG

Temperature coefficient: < 5 ppm/°C beyond reference domain
Scale unit: Pulse / min and Hz
Pulse emission and dry contact simulation
Max amplitude: 20 V selectable by user

Further functionalities

File Menu	Users can save up to 10 full configurations of the instruments and recall them. Configurations include all programming done on instrument.
Scaling in measurement and simulation modes	Scaling allows process signals to be displayed in % of FS or in all other units. This function also allows sensors to be corrected after a calibration.
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).
Simulation menu	Simulation value is set by entering value on keypad or by changing the specific digit with the cursor.
Square root	In current measurement and simulation, this function allows taking into account a quadratic signal coming from transmitter of type ΔP.
Statistical functions	Continuous display of average, minimum and maximum value of the signal under monitoring, as well as number of measurements.
Transmitters tests	Transmitters can be verified using user procedures. 20 procedures can be stored as well as test results. Deviation curves are displayed. Edition of comprehensive test reports.
Switch test	In temperature or pressure mode, CALYS 1000 can control electronic thermostat and pressostat trigger levels.
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	2 modes are available: ▪ Program mode: Starting value, number of steps and the length time have to be set ▪ Manual mode: User has about a hundred preset values In current simulation, user will have some additional preset values in function of range and according to 0%, 25%, 50%, 75% and 100% from selected gauge. Choice is done between gauges: 0-20 mA: linear or quadratic 4-20 mA: linear or quadratic
Synthesizer	With 100 values manually set, CALYS 1000 enables users to draw a generation curve.
Transmitter function	CALYS 1000 is able to be used as a transmitter. Measurement input is copied on the output with scaling.
Memory capacity	Up to 10 full configurations (Input / output type, range…) 10,000 data into one or several measurement campaigns, i.e. more than one week work with configurations, measurements, calibration procedures and reports

General specifications

Size	340 x 245 x 130 mm (L x W x h)
Weight	4 kg
Display	240 x 320 pixel liquid crystal graphical display with backlite & contrast control Display of result as table of values or trend curve
Power supply	230 V ±10 %, 50/60 Hz
Battery	Type: Lithium-Ion Charging time: 3 hours Lifetime: 8 hours
Communication ports	USB

Environmental specifications

Reference range	23°C ±5°C (RH: 45 to 75 % w/o condensing)
Operating reference range	-10 to 50°C (RH: 20 to 80 % w/o condensing)
Limit operating range	-15°C to +55°C (RH: 10 to 80 % w/o condensing) (70 % at 55°C)
Storage temperature limits	-30°C to +60°C
Maximum height	0 to 2000 m
IP protection	IP54 according to EN 60529

Safety specifications

Protections	Electronic protection up to 250 V for 'voltage' wires Fuse protection for 'current' wires Protection against 'current' circuit breaking during inductive resistance measurements	
Class	In accordance with EN 61010-1 Category II, 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

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Model and accessories

Instrument

CALYS 1000 Documenting multifunction calibrator

Delivered in standard with:

- User manual
- Battery charger
- Set of 6 testing leads
- Carrying strap
- Factory test report

Accessories

ACL433	External digital pressure sensor, range to be specified at the order: Absolute or relative pressure: Range from -1 -> 1; 3; 10; 30 bar Absolute pressure: Range from -1 -> 100; 300; 1000 bar
AN6050	Transport case for CALYS series
ACL9311	Set of 6 measuring cables with removable crocodile clips
ER 49504-000	USB cable

Software

DATACAL	Calibration software, supplied with USB cable

Certification

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

Delivery

Size	340 x 245 x 130 mm
Weight	4 kg
Standard delivery	6 weeks