Calibration
measurement

CALYS 1500

Documenting signal calibrator
High precision table model

Process calibration procedures

Description

CALYS 1500 is a field documenting multifunction calibrator within CALYS range. CALYS 1500 does not only work as a simulator (IN / OUT) but also as a dual channel thermometer (IN / IN) to perform comparison calibration. It calibrates HART transmitters (HART communicator integrated into ACL500 modem) and thermistors.

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…) and audit trails, CALYS 1500 complies with both 21 CFR Part 11 and NADCAP Heat Treatment standards and makes advanced data exploitation and full data traceability easier.

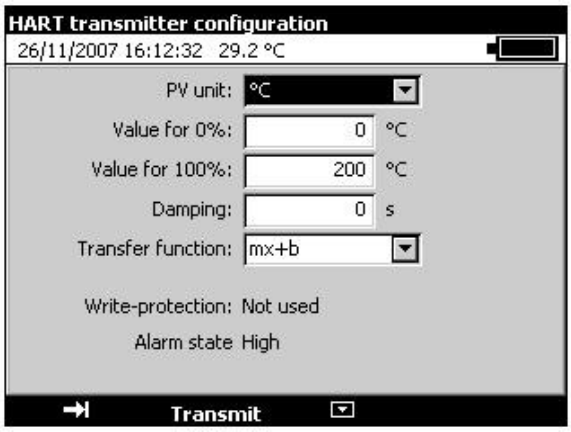
The instrument simultaneously measures and simulates:

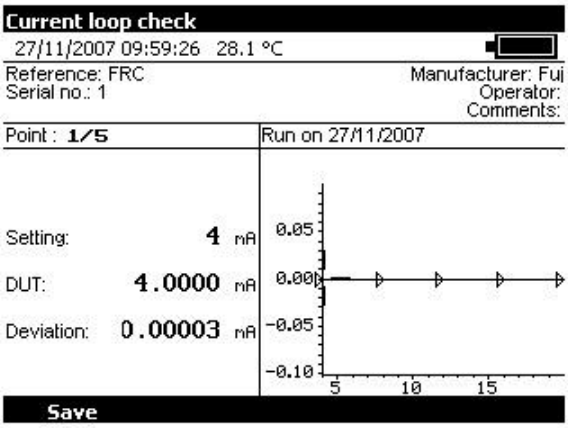
- Temperature: Up to 0.005 % RDG
- Pressure: with an external pressure module (comparison calibration with a pressure pump).
- Resistance Up to 0.006 % RDG and 50 KΩ range
- Current: Up to 0.007 % RDG and 100 mA range + Loop Supply 24 V
- Voltage: Up to 0.005 % RDG and 50 V range
- Frequency: Up to 0.01 % RDG and 100 KHz range

HART protocol

CALYS 1500 works with HART instruments:

- Connection of 1 to 15 analogue sensors with 24 V power supply
- Compatibility with « HART 5 » and « HART 6 » protocols. Setting and configuration of these sensors through the CALYS 1500
- Loop supply with insertion of 250 Ω internal resistance.
- "Verify" HART menu option: Verification of the current loop (manually or automatically) and of the detector. Every information is stored into the Verification report.
- Loop current and detector can be adjusted from CALYS 1500.
- HART Instrument status: Some information about the behaviour of the instrument under test can be displayed: overload loop, out of limit variable…





Sensor calibration

Calibration operations are efficiently and easily performed:

- Calibration coefficient can be implemented in order to correct sensors. CALYS 1500 is able to issue calibration reports.
- Electronic devices calibration: Calibration can be performed by comparison (2 probes connected to 2 input channels and temperature generator driven) or using signal generation. Two methods are available: manual or automatic, with uncertainty taken into account. Calibration setpoints are entered by user.
- Transmitter mode: The measured value is emitted as 4-20 mA or voltage.
- Drives dry-blocks and baths…

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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 900 g 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 1500 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 1500 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.

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

Uncertainty is given in % of reading + fixed value.

Resistive probes: Measurement and simulation

Probe type	Range	Resolution	Measurement Accuracy / 1 year	Emission Accuracy / 1 year
Pt 50 (α = 3851)	-220°C to +1200°C	0.01°C	0.006% RDG + 0.04°C	0.006% RDG + 0.04°C
Pt 100 (α = 3851)	-220°C to +850°C	0.01°C	0.006% RDG + 0.03°C	0.006% RDG + 0.03°C
Pt 100 (α = 3916)	-200°C to +510°C	0.01°C	0.006% RDG + 0.03°C	0.006% RDG + 0.03°C
Pt 100 (α = 3926)	-210°C to +850°C	0.01°C	0.006% RDG + 0.03°C	0.006% RDG + 0.03°C
Pt 200 (α = 3851)	-220°C to +1200°C	0.01°C	0.006% RDG + 0.04°C	0.006% RDG + 0.04°C
Pt 500 (α = 3851)	-220°C to +1200°C	0.01°C	0.006% RDG + 0.03°C	0.006% RDG + 0.03°C
Pt 1000 (α = 3851)	-220°C to +850°C	0.01°C	0.006% RDG + 0.03°C	0.006% RDG + 0.03°C
Ni 100 (α = 618)	-60°C to +180°C	0.01°C	0.006% RDG + 0.05°C	0.006% RDG + 0.05°C
Ni 120 (α = 672)	-40°C to +205°C	0.01°C	0.006% RDG + 0.05°C	0.006% RDG + 0.05°C
Ni 1000 (α = 618)	-60°C to +180°C	0.01°C	0.006% RDG + 0.05°C	0.006% RDG + 0.05°C
Cu 10 (α = 427)	-70°C to +150°C	0.10°C	0.006% RDG + 0.18°C	0.006% RDG + 0.18°C
Cu 50 (α = 428)	-50°C to +150°C	0.01°C	0.006% RDG + 0.05°C	0.006% RDG + 0.05°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
Measuring current: from 0.01 mA to 4 mA (Measurement), 1 mA (Emission Pt50 / 100, Ni100 / 120, Cu10 / 50) or 0.1 mA (Emission Pt200 / 500 / 1000, Ni1000)
Settling time: < 1 ms (Simulation on quick transmitters)
Temperature coefficient: < 10% of accuracy /°C

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

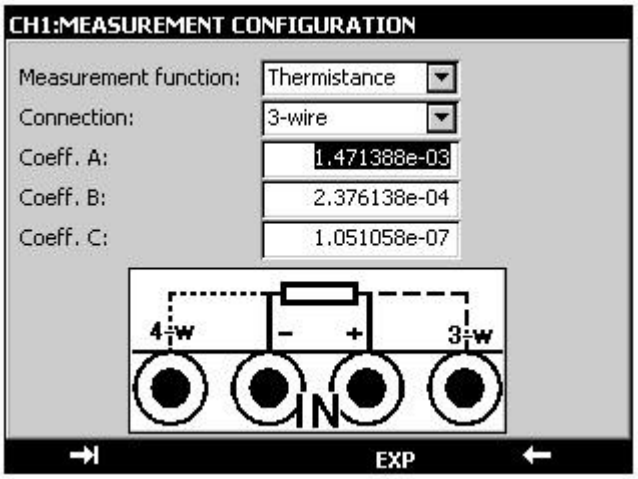
Uncertainty is given in % of reading + fixed value.

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 and from 40 to 80°C.
ACL433 digital pressure module 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.

Thermistors: Measurement (Channel 1)



With 50 kOhm range and Steinhart – Hart equation integrated, thermistors can be entered into CALYS 1500 and tested.

Steinhart-hart equation is as follows:

$$\frac{1}{T} = A + B(\ln(R)) + C(\ln(R))^3$$

Where: A, B and C are usually calculated according to temperature at 0°C, 25°C and 70°C.

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Uncertainty is given in % of reading + fixed value.

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 +1372°C	0.10°C 0.05°C 0.01°C	0.50°C 0.15°C 0.005% R + 0.08°C	-250 to -50°C -50 to +120°C +120 to +1020°C +1020 to +1370°C	0.01°C 0.01°C 0.01°C 0.01°C	0.15% R 0.06°C 0.005% R + 0.05°C 0.007% R + 0.05°C
T	-250 to -200°C -200 to -100°C -100 to +80°C +80 to +400°C	0.1°C 0.01°C 0.01°C 0.01°C	0.50°C 0.05% R + 0.06°C 0.015% R + 0.07°C 0.06°C	-250 to -100°C -100 to +0°C +0 to +400°C	0.01°C 0.01°C 0.01°C	0.1% R + 0.05°C 0.02% R + 0.06°C 0.055°C
J	-210 to -120°C -120 to +60°C +60 to +1200°C	0.01°C 0.01°C 0.01°C	0.15°C 0.005% R + 0.07°C 0.0025% R + 0.06°C	-210 to +0°C +0 to +50°C +50 to +1200°C	0.01°C 0.01°C 0.01°C	0.03% R + 0.08°C 0.05% R + 0.07°C 0.005% R + 0.04°C
E	-250 to -200°C -200 to +100°C +100 to +1000°C	0.05°C 0.01°C 0.01°C	+ 0.30°C + 0.06°C 0.005% R + 0.05°C	-250 to +40°C +40 to +550°C +550 to +1000°C	0.01°C 0.01°C 0.01°C	0.15°C 0.005% R + 0.12°C 0.005% R + 0.13°C
R	-50 to +150°C +150 to +550°C +550 to 1768°C	0.20°C 0.10°C 0.01°C	0.60°C 0.30°C 0.30°C	-50 to +0°C +0 to +350°C +350 to +1768°C	0.01°C 0.01°C 0.01°C	0.35%R + 0.4°C 0.4°C 0.25°C
S	-50 to +150°C +150 to +550°C +550 to +1450°C +1450 to +1768°C	0.20°C 0.10°C 0.05°C 0.05°C	0.80°C 0.30°C 0.30°C 0.35°C	-50 to +0°C +0 to +350°C +350 to +1768°C	0.01°C 0.01°C 0.01°C	0.25% R + 0.4°C 0.30°C 0.25°C
B	+400 to +900°C +900 to +1820°C	0.10°C 0.05°C	0.005% R + 0.4°C 0.005% R + 0.2°C	+400 to +900°C +900 to +1820°C	0.01°C 0.01°C	0.005% R + 0.4°C 0.005% R+ 0.2°C
U	-200 to -100°C -100 to +660°C	0.01°C 0.01°C	0.13°C 0.09°C	-200 to +400°C +400 to +600°C	0.05°C 0.05°C	0.09°C 0.11°C
L	-200 to +900°C	0.01°C	+ 0.10°C	-200 to +900°C	0.05°C	+0.15°C
C	-20 to +900°C +900 to +1730°C +1730 to +2310°C	0.05°C 0.05°C 0.05°C	0.15°C 0.008% R+ 0.12°C 0.015% R+ 0.12°C	-20 to +1540°C +1540 to +2310°C	0.10°C 0.10°C	+0.25°C 0.012% R+ 0.1°C
N	-240 to -190°C -190 to -110°C -110 to +0°C +0 to +400°C +400 to +1300°C	0.10°C 0.05°C 0.01°C 0.01°C 0.01°C	0.25% R 0.10% R 0.04% R + 0.06°C 0.08°C 0.005% R + 0.06°C	-240 to -200°C -200 to +10°C +10 to +250°C +250 to +1300°	0.01°C 0.01°C 0.01°C 0.01°C	0.15 % R +0.10°C +0.08°C 0.008% R + 0.05°C
Pt	-100 to +100°C +100 to +1400°C	0.01°C 0.01°C	0.15°C 0.005% R + 0.06°C	-100 to +1400°C	0.05°C	+0.10°C
Mo	+0 to +1375°C	0.01°C	0.005% R + 0.06°C	+0 to +1375°C	0.05°C	0.005% R + 0.06°C
NiMo/ NiCo	-50 to +1410°C	0.01°C	0.005% R + 0.30°C	-50 to +1410°C	0.05°C	0.005% 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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Performances & technical specifications @23°C ±5°C

Uncertainty is given in % of reading + fixed value.
Temperature coefficient: < 7 ppm/°C beyond reference domain

DC current: Measurement

Range	Full range	Resolution	Accuracy / 1 year	Notes
0-20 mA	0 to +24 mA	1 µA	0.007% RDG + 0.8 µA	Rin: < 30 Ω With or without loop supply (24 V)
4-20 mA	3 to +24 mA	1 µA	0.007% RDG + 0.8 µA	
100 mA	0 to +100 mA	1 µA	0.009% RDG + 2 µA	

Loop supply: 24 V ±10%
HART® compatibility: Input impedance Rin = 280 Ω
Linear or square law display scale

DC current: Emission

Range	Resolution	Accuracy / 1 year	Note
24 mA	1 µA	0.007% RDG + 0.8 µA	With or without loop supply (24 V)
4-20 mA	1 µA	0.007% RDG + 0.8 µA	
0-20 mA	1 µA	0.007% RDG + 0.8 µA	

Specifications given for CALYS 1500 configurations in:
- Active mode (+24 V ON) ←→ Meter in passive mode (+24 V OFF)
- Passive mode (+24 V OFF) ←→ Meter in active mode (+24 V ON)

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	Full range	Resolution	Accuracy / 1 year	Notes
±100 mV	-10 mV to +100 mV	1 µV	0.005% RDG + 2 µV	Rin: > 10 MΩ
±1 V	-100 mV to +1 V	10 µV	0.005% RDG + 8 µV	Rin: > 10 MΩ
±10 V	-1 V to +10 V	100 µV	0.007% RDG + 80 µV	Rin: > 1 MΩ
±50 V	-5 V to +50 V	1 mV	0.007% RDG + 0.5 mV	Rin: > 1 MΩ

Rin: input resistance

Direct voltage: Emission

Range	Full range	Resolution	Accuracy / 1 year	Min Load
100 mV	-5 mV to +100 mV	1 µV	0.005% RDG + 2 µV	1 kΩ
1 V	-5 mV to +1 V	10 µV	0.005% RDG + 8 µV	2 kΩ
10 V	-100 mV to +10 V	100 µV	0.007% RDG + 80 µV	4 kΩ
50 V	-100 mV to +50 V	1 mV	0.007% RDG + 0.5 mV	4 kΩ

Settling time: < 5 ms

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

Uncertainty is given in % of reading + fixed value.
Temperature coefficient: < 5 ppm/°C beyond reference domain

Resistance: Measurement

Range	Full range	Resolution	Accuracy / 1 year
400 Ω	0 to 400 Ω	1 mΩ	0.006% RDG + 8 mΩ
4000 Ω	0 to 3600 Ω	10 mΩ	0.006% RDG + 50 mΩ
50 kΩ (1)	0 to 50 kΩ	100 mΩ	0.006% RDG + 1 Ω

(1) Only on channel 1
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
Continuity test: Open circuit for R > 1000 Ω and closed circuit for R < 1000 Ω

Resistance: Emission

Range	Full range	Resolution	Accuracy / 1 year	Notes
400 Ω	1 to 400 Ω	10 mΩ	0.006% RDG + 20 mΩ	Iext: 0.1 / 4 mA
3600 Ω	10 to 3600 Ω	100 mΩ	0.006% RDG + 100 mΩ	Iext: 0.1 / 4 mA

Emission with pulsed current available: refer to instruction manual for specifications
Current settling time: < 1 ms
Compatibility with smart transmitters
Iext: Current received by the calibrator

Frequency and counting: Measurement

Range	Resolution	Accuracy / 1year
10 kHz	< 0.01 Hz	0.01% RDG
100 kHz	0.1 Hz	0.01% RDG

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	0.01% RDG
10 kHz	1 Hz	0.01%RDG

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 1500 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 1500 enables users to draw a generation curve.
Transmitter function	CALYS 1500 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 1500 High precision documenting multifunction calibrator

Delivered in standard with:

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

Accessories

ACL433	External digital pressure sensor, various ranges available 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
ACL9311	Set of 6 measuring cables with removable crocodile clips
ER 49504-000	USB cable
ACL500	HART modem for CALYS 1500
ACL600	Cable to drive temperature dry blocks and baths for CALYS 1500

Please ask before for compliance with your bath/dry block

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

Vertrieb durch:

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