



## CALYS 100

Field precision documenting  
multifunction calibrator

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## Description

CALYS 100 is a field precision 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 and generate over two isolated channels various signals of temperature, resistance, process, pressure and frequency in one single instrument.

Providing **extended functionalities** (temperature simulation, scaling, steps, synthesizer, statistical functions...), CALYS 100 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 0,012% RDG
- Resistance: Up to 0,010% RDG, 4 K $\Omega$  range
- Current: Up to 0,012% RDG, 50 mA range + 24 V loop supply
- Voltage: Up to 0,010% RDG, 50 V range
- Frequency: Up to 0,005% RDG, 20 KHz range (10 KHz in simulation)
- Pressure: When used with an external pressure module (ref. ACL433), CALYS 100 can measure and simulate pressure (comparison calibration with a pressure pump).



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 (Easy connect system®) 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.

IP 54, fully protected by an antichoc rubber holster, CALYS 100 integrates "easyconnect" terminals and a wide backlite display that makes it easy to use in any severe or dark conditions.

## Easy connection system®



Connect your probes by simply pushing on the terminal top and insert wires of up to 3 mm or 10 AWG diameter and compensated thermocouple connectors.

Wires are held tight between two brass plates ensuring thermal stability and a very good cold junction compensation for thermocouples. This system also enables 4 mm banana plugs and security connectors to be connected on the terminal top.

## CALYS series, 4 models from basic use to advanced performances

| Specifications                |                              | CALYS 50                          | CALYS 75   | CALYS 100                    | CALYS 150                      |
|-------------------------------|------------------------------|-----------------------------------|--|------------------------------|--------------------------------|
| Top accuracy                  |                              | 200 ppm                           |  | 130 ppm                      | 50 ppm                         |
| Temperature accuracy          | Thermocouples (14) RTDs (12) | 0.013% RDG for Tc K 0.012% RDG    |  | 0.01% RDG for Tc K 0.01% RDG | 0.005% RDG for Tc K 0.006% RDG |
| DC current + Loop supply 24 V | Range Accuracy               | 50 mA 0.0175% RDG                 |  |                              | 100 mA 0.007% RDG              |
| DC voltage                    | Range Accuracy               | 50 V IN / 20 V OUT 0.013% RDG     | 50 V 0.013% RDG  | 50 V 0.010% RDG              | 50 V 0.005% RDG                |
| Frequency                     | Range Accuracy               | 20 KHz IN / 10 KHz OUT 0.005% RDG |  |                              | 100 KHz 0.01% RDG              |
| Resistance                    | Range Accuracy               | 4000 $\Omega$ 0.012% RDG          |  | 4000 $\Omega$ 0.010% RDG     | 50 K $\Omega$ 0.006% RDG       |
| Pressure                      | Range Accuracy               |                                   | Relative pressure: 30 bar / Absolute pressure: 1,000 bar 0.05% RDG |                              |                                |
| Compliance to standards       |                              |                                   |  |                              | 21 CFR Part 11                 |

|                      |  |  |  |   |
|----------------------|--|--|--|---|
|                      |  |  |  | NADCAP Heat treatment AMS 2750  |
| Additional functions | Advanced data exploitation: Scaling, relative measurement, simulation of ramps and steps, synthetizer, square root, statistical functions Transmitter function |  |  |   |
| Additional functions |  | Switch test Calibration of transmitters                            |  |   |
| Additional functions |  |  |  | Comparison calibration<br>HART: Digital calibration and data transfer<br>Calibration of thermistors |
| Software             |  | DATACAL calibration software for configuration and data management |  |   |
| Memory               |  | 10,000 data stored and recalled on screen as curve or list         |  |   |

# Specifications

## Specifications and performances in temperature @23°C ±5°C

Uncertainty is given in % of reading (CALYS 100 display) + fixed value.

### Resistive probes: Measurement and simulation

| Sensor                     | Input / Output range | Resolution | Accuracy / 1 year in measurement | Accuracy / 1 year in simulation |
|----------------------------|----------------------|------------|----------------------------------|---------------------------------|
| Pt50 ( $\alpha = 3851$ )   | -220°C to +850°C     | 0.01°C     | 0.010% RDG + 0.06°C              | 0.012% RDG + 0.18°C             |
| Pt100 ( $\alpha = 3851$ )  | -220°C to + 850°C    | 0.01°C     | 0.010% RDG + 0.05°C              | 0.012% RDG + 0.12°C             |
| Pt100 ( $\alpha = 3916$ )  | -200°C to +510°C     | 0.01°C     | 0.010% RDG + 0.05°C              | 0.012% RDG + 0.12°C             |
| Pt100 ( $\alpha = 3926$ )  | -210°C to +850°C     | 0.01°C     | 0.010% RDG + 0.05°C              | 0.012% RDG + 0.12°C             |
| Pt200 ( $\alpha = 3851$ )  | -220°C to + 850°C    | 0.01°C     | 0.010% RDG + 0.12°C              | 0.012% RDG + 0.33°C             |
| Pt500 ( $\alpha = 3851$ )  | -220°C to + 850°C    | 0.01°C     | 0.010% RDG + 0.07°C              | 0.012% RDG + 0.18°C             |
| Pt1000 ( $\alpha = 3851$ ) | -220°C to +850°C     | 0.01°C     | 0.010% RDG + 0.05°C              | 0.012% RDG + 0.08°C             |
| Ni100 ( $\alpha = 618$ )   | -60°C to +180°C      | 0.01°C     | 0.010% RDG + 0.03°C              | 0.012% RDG + 0.08°C             |
| Ni120 ( $\alpha = 672$ )   | -40°C to +205°C      | 0.01°C     | 0.010% RDG + 0.03°C              | 0.012% RDG + 0.08°C             |
| Ni1000 ( $\alpha = 618$ )  | -60°C to +180°C      | 0.01°C     | 0.010% RDG + 0.03°C              | 0.012% RDG + 0.08°C             |
| Cu10 ( $\alpha = 427$ )    | -70°C to +150°C      | 0.01°C     | 0.010% RDG + 0.18°C              | 0.012% RDG + 0.1°C              |
| Cu50 ( $\alpha = 428$ )    | -50°C to +150°C      | 0.01°C     | 0.010% RDG + 0.06°C              | 0.012% RDG + 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)

Current settling time: < 5 ms

### Thermocouples: Measurement and simulation

| Type | Input range   | Resolution                          | Accuracy /<br>1 year in m<br>easuremen<br>t               | Output<br>range   | Resolution                | Accuracy /<br>1 year in<br>simulation                 |
|------|---|-------------------------------------|---|---|---------------------------|---|
| K    | -250 to<br>-200°C<br>-200 to<br>-120°C<br>-120 to 0°C<br>0 to<br>+1372°C        | 0.2°C<br>0.1°C<br>0.05°C<br>0.05°C  | 0.70°C<br>0.20°C<br>0.1°C<br>0.010% RDG<br>+ 0.08°C       | -240 to<br>-50°C<br>-50 to 0°C<br>+0 to<br>+1372°C          | 0.2°C<br>0.1°C<br>0.05°C  | 0.50°C<br>0.09°C<br>0.013% L +<br>0.07°C              |
| T    | -250 to<br>-200°C<br>-200 to<br>-120°C<br>-120 to<br>-50°C<br>-500 to<br>+400°C | 0.2°C<br>0.05°C<br>0.05°C<br>0.05°C | 0.60°C<br>0.20°C<br>0.10°C<br>0.010% RDG<br>+ 0.08°C      | -240 to<br>-100°C<br>-100 to +0°C<br>+0 to<br>+400°C        | 0.2°C<br>0.05°C<br>0.05°C | 0.35°C<br>0.09°C<br>0.010% L +<br>0.08°C              |
| J    | -210 to<br>-120°C<br>-120 to 0°C<br>+0 to<br>+1200°C                            | 0.05°C<br>0.05°C<br>0.05°C          | 0.2°C<br>0.09°C<br>0.010% RDG<br>+ 0.07°C                 | -210 to -0°C<br>+0 to<br>+1200°C                            | 0.05°C<br>0.05°C          | 0.18°C<br>0.010% L +<br>0.07°C                        |
| E    | -250 to<br>-200°C<br>-200 to<br>-100°C<br>-100 to +0°C<br>+0 to<br>1000°C       | 0.1°C<br>0.05°C<br>0.05°C<br>0.05°C | 0.4°C<br>0.13°C<br>0.07°C<br>0.010% RDG<br>+ 0.05°C       | -240 to<br>-100°C<br>-100 to<br>+40°C<br>+40 to<br>+1000°C  | 0.1°C<br>0.1°C<br>0.05°C  | 0.2°C<br>0.09°C<br>0.010% L +<br>0.05°C               |
| R    | -50 to<br>+150°C<br>+150 to<br>+550°C<br>+550 to<br>1768°C                      | 0.5°C<br>0.20°C<br>0.10°C           | 0.7°C<br>0.010% RDG<br>+ 0.3°C<br>0.010% RDG<br>+ 0.2°C   | -50 to<br>+350°C<br>+350 to<br>+900°C<br>+900 to<br>1768°C  | 0.5°C<br>0.2°C<br>0.1°C   | 0.45°C<br>0.010% L +<br>0.35°C<br>0.010% L +<br>0.2°C |
| S    | -50 to<br>+150°C<br>+150 to<br>+550°C<br>+550 to<br>+1768°C                     | 0.50°C<br>0.20°C<br>0.1°C           | 0.7°C<br>0.010% RDG<br>+ 0.35°C<br>0.010% RDG<br>+ 0.25°C | -50 to<br>+120°C<br>+120 to<br>+450°C<br>+450 to<br>+1768°C | 0.5°C<br>0.2°C<br>0.1°C   | 0.7°C<br>0.010% L +<br>0.35°C<br>0.010% L +<br>0.25°C |
| B    | +400 to<br>+900°C<br>+900 to<br>+1820°C   | 0.2°C<br>0.1°C                      | 0.010% RDG<br>+ 0.4°C<br>0.010% RDG<br>+ 0.2°C            | +400 to<br>+850°C<br>+850 to<br>+1820°C                     | 0.2°C<br>0.1°C            | 0.010% L +<br>0.4°C<br>0.010% L +<br>0.2°C            |
| U    | -200 to<br>+660°C   | 0.051°C                             | 0.15°C  | -200 to<br>+660°C   | 0.05°C                    | 0.13°C  |

|           |   |                                     |  |   |                                     |   |
|-----------|---|-------------------------------------|--|---|-------------------------------------|---|
| L         | -200 to +900°C  | 0.05°C                              | 0.2°C  | -200 to +900°C  | 0.05°C                              | 0.17°C  |
| C         | -20 to +900°C<br>+900 to 2310°C                                   | 0.1°C<br>0.1°C                      | 0.2°C<br>0.010% RDG + 0.15°C                     | -20 to +900°C<br>+900 to 2310°C                                   | 0.1°C<br>0.1°C                      | 0.23°C<br>0.010% L + 0.15°C                     |
| N         | -240 to -190°C<br>-190 to -110°C<br>-110 to +0°C<br>+0 to +1300°C | 0.20°C<br>0.1°C<br>0.05°C<br>0.05°C | 0.4°C<br>0.10°C<br>0.08°C<br>0.010% RDG + 0.15°C | -240 to -190°C<br>-190 to -110°C<br>-110 to +0°C<br>+0 to +1300°C | 0.20°C<br>0.1°C<br>0.05°C<br>0.05°C | 0.25°C<br>0.13°C<br>0.08°C<br>0.010% L + 0.06°C |
| Platine   | -100 to +1400°C   | 0.05°C                              | 0.25°C   | -100 to +1400°C   | 0.05°C                              | 0.25°C  |
| Mo        | +0 to +1375°C   | 0.05°C                              | 0.010% RDG + 0.06°C                              | +0 to +1375°C   | 0.05°C                              | 0.010% L + 0.06°C                               |
| NiMo/NiCo | -50 to +1410°C  | 0.05°C                              | 0.010% RDG + 0.30°C                              | -50 to +1410°C  | 0.05°C                              | 0.010% L + 0.3°C                                |

Accuracy is given for reference @ 0°C.

When using the internal reference junction (except couple B) add an additional uncertainty of 0.2 °C at 0 °C.

It is possible (thermocouple B excepted) 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

Thermocouples: D and G, for specifications, refer to instruction manual

## Specifications and performances in pressure @23°C ±5°C>

### Pressure: Measurement by external digital sensor



| Ranges   | 0-1 bar | 0-3 bar | 0-10 bar | 0-30 bar | 0-100 bar | 0-300 bar | 0-1000 bar |
|----------|---------|---------|----------|----------|-----------|-----------|------------|
| Absolute | X       | X       | X        | X        | X         | X         | X          |
| Relative | X       | X       | X        | X        |           |           |            |

Available in relative, absolute and differential pressure.

Connector: ¼ gas

Resolution: 0.02% FS

Accuracy:

- 0.05% FS from 10 to 40°C

- 0.1% FS from -10 to +10°C and from 40 to 80°C

This digital pressure module ACL433 is connected to CALYS 100 through RS485 serial cable to the digital input connector. All data are digital. Measurements are compensated in temperature by a polynomial correction implemented into the firmware at factory.

## Specifications and performances in process @23°C ±5°C

### DC current: Measurement

With or without loop supply

| Range   | Resolution | Accuracy / 1 year | Nota Rin |
|---------|------------|-------------------|----------|
| 0-20 mA | 1 µA       | 0.012% RDG + 2 µA | < 25 Ω   |
| 4-20 mA | 1 µA       | 0.012% RDG + 2 µA | < 25 Ω   |
| ±50 mA  | 1 µA       | 0.012% RDG + 2 µA | < 25 Ω   |

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

Loop supply: 24 V ±10%

HART® compatibility: Input impedance Rin = 280 Ω

Display with linear or quadratic scaling

### DC current: Emission

With or without loop supply

| Range   | Resolution | Accuracy / 1 year |
|---------|------------|-------------------|
| 24 mA   | 1 µA       | 0.012% RDG + 2 µA |
| 4-20 mA | 1 µA       | 0.012% RDG + 2 µA |
| 0-20 mA | 1 µA       | 0.012% RDG + 2 µA |

Temperature Coefficient < 10 ppm/°C beyond reference domain

Settling time: < 5 ms

Specifications given for CALYS configurations in:

- Active mode (+24V ON) 1 Meter in passive mode (+24 V OFF)

- Passive mode (+24 V OFF) 1 Meter in active mode (+24 V ON)

Pre-programmed 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

### DC voltage: Measurement

| Range    | Resolution  | Accuracy / 1 year        | Nota Rin        |
|----------|-------------|--------------------------|-----------------|
| +100 mV  | 1 $\mu$ V   | 0.010% RDG + 3 $\mu$ V   | > 10 M $\Omega$ |
| +1 V (1) | 10 $\mu$ V  | 0.010% RDG + 20 $\mu$ V  | > 10 M $\Omega$ |
| +10 V    | 100 $\mu$ V | 0.010% RDG + 200 $\mu$ V | = 1 M $\Omega$  |
| +50 V    | 1 mV        | 0.010% RDG + 2 mV        | = 1 M $\Omega$  |

(1) Range specified: -0.8 V to +1 V

Temperature coefficient: &lt; 7 ppm/°C beyond reference domain

### DC voltage: Emission

| Range    | Resolution  | Accuracy / 1 year            | Minimum load |
|----------|-------------|------------------------------|--------------|
| +100 m V | 1 $\mu$ V   | 0.010% RDG + 3 $\mu$ V       | 1 k $\Omega$ |
| +2 V     | 10 $\mu$ V  | 0.010% RDG + 20 $\mu$ V      | 2 k $\Omega$ |
| +20 V    | 100 $\mu$ V | 0.012% RDG + 200 $\mu$ V (1) | 4 k $\Omega$ |
| +50 V    | 1 mV        | 0.012% RDG + 2 mV            | 4 k $\Omega$ |

(1) Noise: 3 ppm (for 0.1 Hz to 10 Hz) and 5 ppm (for 10 Hz to 100 Hz)

Temperature coefficient: &lt; 7 ppm/°C beyond reference domain

Settling time: &lt; 5 ms

### Frequency and counting: Measurement

| Range  | Resolution | Accuracy / 1 year |
|--------|------------|-------------------|
| 20 kHz | 0.01 Hz    | 0.005% 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.

Temperature coefficient: &lt; 5 ppm/°C beyond reference domain

### Frequency and counting: Emission

| Range   | Resolution | Accuracy / 1 year |
|---------|------------|-------------------|
| 1000 Hz | 0.01 Hz    | 0.005% RDG        |
| 100 kHz | 0.1 Hz     | 0.005% RDG        |

Scale unit: Pulse / min and Hz

Emission of pulses and dry contacts

Signal maximum amplitude: 20 V (user selectable)

Temperature coefficient: &lt; 5 ppm/°C beyond reference domain

## Resistance: Measurement

| Range         | Resolution    | Accuracy / 1 year           |
|---------------|---------------|-----------------------------|
| 400 $\Omega$  | 1 m $\Omega$  | 0.010% RDG + 10 m $\Omega$  |
| 4000 $\Omega$ | 10 m $\Omega$ | 0.010% RDG + 100 m $\Omega$ |

Resistance measurement 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

Open circuit terminal voltage: < 10 V

Continuity test: Open circuit for  $R > 1000 \Omega$  and closed circuit for  $R < 1000 \Omega$

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

Measurement current: 0.25 mA

## Resistance: Emission

| Range         | Resolution     | Accuracy / 1 year  | Nota<br>text                        |
|---------------|----------------|--|-------------------------------------|
| 40 $\Omega$   | 1 m $\Omega$   | 0.012% RDG + 3 m $\Omega$<br>0.012% RDG + 10 m $\Omega$  | text: 10 mA<br>text: 1 mA           |
| 400 $\Omega$  | 10 m $\Omega$  | 0.012% RDG + 20 m $\Omega$<br>0.012% RDG + 30 m $\Omega$ | text: 1 / 10 mA<br>text: 0.1 / 1 mA |
| 4000 $\Omega$ | 100 m $\Omega$ | 0.012% RDG + 300 m $\Omega$                              | text: 0.1 / 1 mA                    |

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

Current settling time: < 1 ms

text : Current received by the calibrator

## Further features

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

## Models and accessories

### Instrument:

CALYS100            On-site 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 for CALYS 75 / 100 / 150 (Absolute or relative pressure)

Different ranges available from 0 to 1,000 bar

Range from -1 -> 1; 3; 10; 30 (Absolute or relative pressure)

Range from -1 -> 100; 300; 1,000 (Absolute pressure only))

Standard accuracy: 0.05% FS

AN6050            Transport case for CALYS series

ACL9311           Set of 6 measuring cables with removable crocodile clips

ER 49504-000    USB cable

### Software:

DATA CAL           Calibration software for CALYS 75 / 100 / 150

Supplied with USB cable

### Certification:

QMA11EN           COFRAC certificate of calibration

With all relevant data points where the device has been tested

### Packing information:

Size            210 x 110 x 50 mm

Weight           900 g