

Integrated calibration system for electronic and pneumatic instrumentation model CBS-SC2000

scandura

WIKA data sheet CT 92.32

Applications

- Calibration and testing of pneumatic and electronic industrial instrumentation against pressure primary standards traceable to national standards

Special features

- Pressure generation and measurement available from vacuum to 1,200 bar
- Electrical section to generate and measure the electrical parameters normally used in the field of industrial instrumentation (mA/mV/V/ Ω) and the most common AC/DC supplies
- Robust self-standing steel construction with a working surface that gives room up to three people working at the same time
- Mimic panels suitably oriented and incorporating most of adjustments/connections
- Lower part of bench giving free space for spares or other items

Description

General information

System CBS-SC2000 is the heart of a well-organised central instrument workshop.

Instruments checked with system CBS-SC2000 typically are: Electronic and pneumatic pressure, differential pressure and vacuum transmitters

- Signal converters, including T/C or RTD
- Temperature sensors
- Indicators, recorders, controllers, either pneumatic or electronic type
- Pressure/temperature switches
- Pressure gauges and others

Top accuracy and performance specifications make this unit especially suitable to check other calibration equipment:

- Table routine calibrators
- Portable calibrators for field operation
- Test gauges, etc.

Other versions without electric section, with high-pressure section and with mercury-free pressure gauges are available on request.



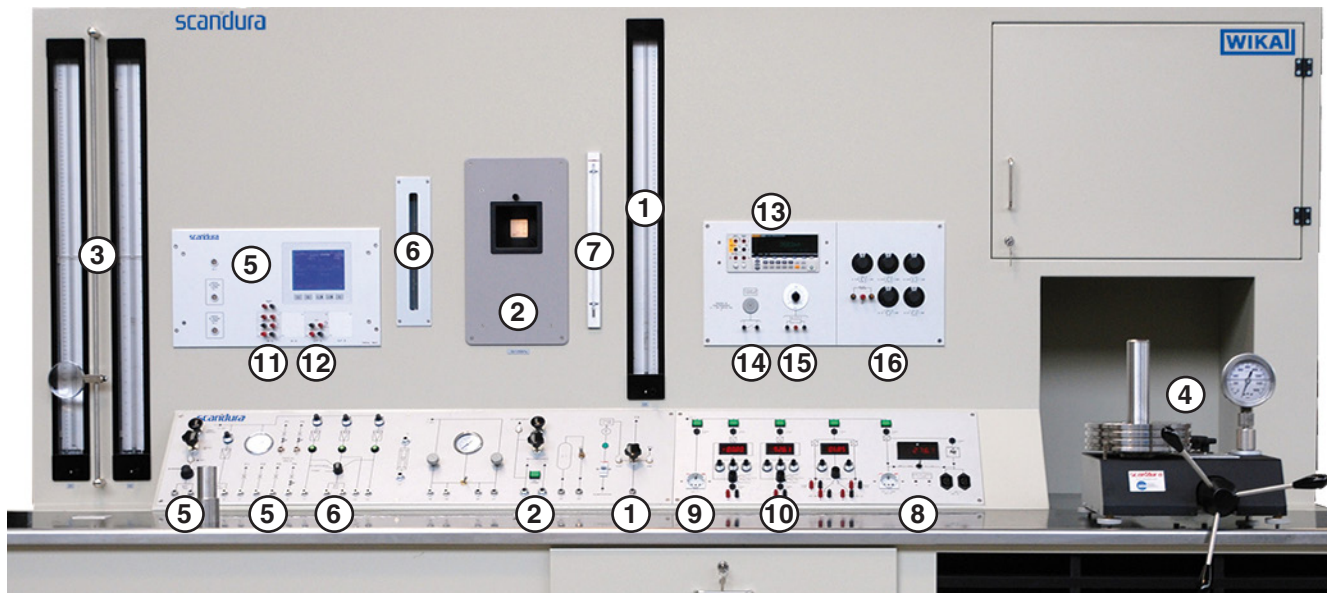
Calibration bench, model CBS-SC2000

The systems CBS-SC2000 can be used for a wide range of applications. Using the quick fit connectors and external connections the operator can set up a large variety of pneumatic and electrical circuits.

The main advantages of system CBS-SC2000 are:

- Each item of test apparatus is permanently mounted in the best position for observation. The mimic panels enable the controls to be easily identified and correctly operated.
- The basic supply connections, electrical and pneumatic, are available for immediate use on the equipment under test.
- Accuracy and reliability of the test instruments is kept by the automatically controlled supplies, in-built overload safeguards and the panel layouts.
- Different tests can be set up and selected by the pneumatic and electrical switches. Time is saved performing repeated tests.

Specifications



Pressure measurement / generation section

1) Vacuum

Generation	Electric pump suitable to get 20 mbar as residual pressure (5 mbar on request)
Adjustment	Manual, fitted on mimic panel having + 0.1 mbar sensitivity
Measurement	Primary standard precision glass tube mercury column reference gauge having accuracy $\pm 0.2\%$ of reading ± 0.5 mm depending on the meniscus conditions (mercury not supplied). Scale graduated 0 ... 760 mmHg

2) Very low pressure

Generation	Hand-operated pump (on mimic)
Adjustment	Fine volume variator (on mimic), + 1 mmH ₂ O sensitivity
Measurement	Primary standard high-accuracy reflection type reference micromanometer, accuracy $\pm 0.04\%$ FS, scale -50 ... 2500 N/m ² (Pa) accuracy 0.04 % FS

3) Low pressure

Generation	From external air supply
Adjustment	Precise pressure regulators
Measurement	Two primary standard precision glass tube column manometers, one filled with water, one with mercury (not included), scales: - 0 ... 900 mmH ₂ O (division 1 mmH ₂ O) - 0 ... 17 psi / 0 ... 12 mH ₂ O (division 0.05 psi / 1 cmH ₂ O), accuracy 0.2 % of rdg ± 0.5 mm

4) High pressure

Dead-weight tester	Hydraulically operated dead-weight tester, dual piston range 1 ... 60 bar and 20 ... 1,200 bar, accuracy 0.015 % of rdg (other hydraulic and/or pneumatic ranges on request)
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5) Pressure or differential pressure

Generation	From external air supply, manual regulator and/or hand-operated pump	
Adjustment	Precise pressure regulators	
Measurement	Ranges: -60 ... +60 mbar -1 ... + 1,5 bar 600 ... 1,300 mbar abs. 0 ... 7 bar	internal sensor, uncertainty 0.025 % FS, resolution 0.01 mbar internal sensor, uncertainty 0.025 % FS, resolution 0.01 mbar internal sensor, uncertainty 0.025 % FS, resolution 0.01 mbar internal sensor, uncertainty 0.025 % FS, resolution 0.01 mbar

6) Pneumatic instruments

Receivers instruments calibration	Three different points with selector, max. 2 bar.
Cascade controllers calibration	Simultaneous use of pressure indicators and/or a mercury column gauge. Various calibration circuits can be obtained with the equipment specified against above functions.
Air flow on pneumatic instruments	Variable area flowmeter, range 4 ... 40 Nlitres/min., to check air flow on pneumatic components, relays, etc.

Pressure measurement / generation section specifications

7) Ambient temperature measurement

Range	-5 ... +50°C for compensating readout of precision pressure instruments when differing from 20 °C
Measurement	Precision glass thermometer, with special red liquid filling, mounted on aluminum scale

Electrical section specifications - inclined panel

8) AC Stabilised/variable power supply sources

Stabilised socket	One DIN/VDE standard output socket
Output	AC 230 V
Accuracy	±1.5 % at AC 230 V
Power	800 VA
Maximum harmonic distortion	0.2 %
Variable socket	Two European standard output sockets
Output	AC 0 ... 260 V
Power	800 VA
Maximum total power	The variable auto-transformer is supplied through the stabilised AC source at AC 230 V. Therefore the maximum total power available at the three sockets is 800 VA

Electrical section specifications - inclined panel

9) AC unstabilised power supply source

Socket	One DIN/VDE standard output socket
Output	AC 230 V unstabilised
Current	16 A

10) Two DC stabilised power supply source

Output voltage	DC 0 ... 30 V CH1 / CH2
Output current	DC 0 ... 3 A CH1 / CH2
Tracking series voltage	DC 0 ... 60 V
Tracking series current	DC 0 ... 6 A
Display	3-digit, 0.5" LE display, accuracy ± 0.5 % of rdg + 2 digits
Switch check	Continuity circuit, including buzzer and terminals, for checking operation of pressure switches and other equipment with NO/NC contacts

Electrical section specifications - inclined panel

11) Electrical / temperature input signal

Electrical signal	Measuring range	Full scale	Precision % of rdg ±% FS	Accuracy % of rdg ±% FS	Max. resolution
Voltage DC 1) 2)	±100 mV 3)	100 mV	0.008 % ±0.002 % FS	0.01 % ±0.003 % FS	0.0001 mV
	±2 V 3)	2 V	0.008 % ±0.002 % FS	0.01 % ±0.003 % FS	0.000001 V
	±80 V 4)	80 V	0.008 % ±0.002 % FS	0.01 % ±0.003 % FS	0.00001 V
Current DC 1) 5)	±100 mA	100 mA	0.008 % ±0.003 % FS	0.01 % ±0.003 % FS	0.0001 mA
Resistance 1) 6)	0 ... 400 Ω	400 Ω	0.008 % ±0.002 % FS	0.01 % ±0.003 % FS	0.001 Ω
	0 ... 10,000 Ω	10,000 Ω	0.008 % ±0.002 % FS	0.01 % ±0.003 % FS	0.01 Ω
Frequency 7)	0.5 ... 10,000 Hz 8)	50,000 Hz	0.01 Hz	0.01 Hz	0.001 Hz
	10,000 ... 20,000 Hz 8)	50,000 Hz	0.1 Hz	0.1 Hz	0.001 Hz
	20,000 ... 30,000 Hz 9)	50,000 Hz	1 Hz	1 Hz	0.001 Hz
	30,000 ... 50,000 Hz 9)	50,000 Hz	20 Hz	20 Hz	0.001 Hz
Pulses 10)	1 ... 999,999	999,999	N/A	N/A	1

1) One year specifications with temperature effect: 0.001 % of reading * $t - t_c$ for $t : -10 \text{ °C} \leq t \leq 19 \text{ °C}$ and $23 \text{ °C} \leq t \leq 50 \text{ °C}$ and $t_c = 20 \text{ °C}$

2) Maximum input voltage: DC ±100 V

3) Input impedance: > 100 MΩ

4) Input impedance: 0.5 MΩ

5) Maximum input current: ±120 mA
Input impedance: < 20 Ω

6) Measure current: < 200 μA

7) Maximum input voltage: ±100 V input impedance: > 100 MΩ

Minimum amplitude of square wave: 1.5 V p-p @ 50 kHz, 0.7 V p-p @ 5 Hz

Configurable duty cycle from 10 % up to 90 % with minimum amplitude of 5 V p-p

8) For both frequency inputs simultaneously (IN A + IN B)

9) For only one frequency input (IN A or IN B) at the same time

10) Amplitude: 1 ... 80 V, frequency: 0.5 ... 20 Hz

Electrical section specifications - vertical panel

Temperature	Input type	Precision up to	Accuracy up to	Resolution up to	
RTD	Pt100	$\alpha = 0.00385 \text{ } ^\circ\text{C}^{-1}$	0.05 °C	0.06 °C	0.01 °C
	Pt100	$\alpha = 0.003916 \text{ } ^\circ\text{C}^{-1}$	0.05 °C	0.06 °C	0.01 °C
	Pt100 JIS	$\alpha = 0.003916 \text{ } ^\circ\text{C}^{-1}$	0.05 °C	0.06 °C	0.01 °C
	Pt100	$\alpha = 0.003902 \text{ } ^\circ\text{C}^{-1}$	0.05 °C	0.06 °C	0.01 °C
	Pt100	$\alpha = 0.003926 \text{ } ^\circ\text{C}^{-1}$	0.05 °C	0.06 °C	0.01 °C
	Pt100	$\alpha = 0.003923 \text{ } ^\circ\text{C}^{-1}$	0.05 °C	0.06 °C	0.01 °C
	Pt200	$\alpha = 0.00385 \text{ } ^\circ\text{C}^{-1}$	0.05 °C	0.06 °C	0.01 °C
	Pt500	$\alpha = 0.00385 \text{ } ^\circ\text{C}^{-1}$	0.05 °C	0.06 °C	0.01 °C
	Pt1000	$\alpha = 0.00385 \text{ } ^\circ\text{C}^{-1}$	0.05 °C	0.06 °C	0.01 °C
	Pt1000	$\alpha = 0.003916 \text{ } ^\circ\text{C}^{-1}$	0.05 °C	0.06 °C	0.01 °C
	Cu10	$\alpha = 0.0042 \text{ } ^\circ\text{C}^{-1}$	0.23 °C	0.28 °C	0.1 °C
	Cu100	$\alpha = 0.0042 \text{ } ^\circ\text{C}^{-1}$	0.06 °C	0.07 °C	0.01 °C
	Ni100	$\alpha = 0.00617 \text{ } ^\circ\text{C}^{-1}$	0.04 °C	0.05 °C	0.01 °C
	Ni120	$\alpha = 0.00672 \text{ } ^\circ\text{C}^{-1}$	0.04 °C	0.05 °C	0.01 °C

Temperature	Input type	Precision % of rdg \pm % FS	Accuracy % of rdg \pm % FS	Linear error up to	Resolution up to
TC	Type J ¹⁾ , K ¹⁾ , T ¹⁾ , F ¹⁾ , R, S, B ¹⁾ , U ¹⁾ , L ¹⁾ , N, E, M, C ¹⁾	0.008 % \pm 0.002 % FS	0.01 % \pm 0.003 % FS	0.03 °C	0.01 °C

- 1) Precision and accuracy of the e.m.f. values
 For measurements with internal cold junction compensation: cold junction error = 0.15 °C
 Maximum input voltage: DC \pm 100 V
 Input impedance: > 100 M Ω
 Temperature effect: 0.001 % of reading * $l_t - t_{cl}$ for t : -10 °C \leq $t \leq$ 19 °C and 23 °C \leq $t \leq$ 50 °C and $t_c = 20$ °C
 One year specifications

12) Electrical / temperature output signal

Electrical signal	Measuring range	Full scale	Precision % of rdg \pm % FS	Accuracy % of rdg \pm % FS	Max. resolution
Voltage DC ¹⁾	0 ... 100 mV ²⁾	100 mV	0.01 % \pm 0.003 % FS	0.015 % \pm 0.003 % FS	0.0001 mV
	0 ... 2 V ³⁾	2 V	0.01 % \pm 0.003 % FS	0.015 % \pm 0.003 % FS	0.000001 V
	0 ... 20 V ³⁾	20 V	0.015 % \pm 0.003 % FS	0.02 % \pm 0.003 % FS	0.00001 V
Current DC ⁴⁾	0 ... 20 mA ⁵⁾	100 mA	0.02 % \pm 0.003 % FS	0.025 % \pm 0.003 % FS	0.0001 mA
Resistance ⁴⁾	0 ... 400 Ω	400 Ω	0.008 % \pm 0.003 % FS	0.01 % \pm 0.002 % FS	0.001 Ω
	0 ... 10,000 Ω	10,000 Ω	0.008 % \pm 0.002 % FS	0.01 % \pm 0.001 % FS	0.01 Ω
Frequency	0.5 ... 50,000 Hz	50,000 Hz	0.1 Hz	0.1 Hz	0.001 Hz
Pulses ⁶⁾	1 ... 999,999	999,999	N/A	N/A	1

- 1) One year specifications with temperature effect: 0.001 % output * $l_t - t_{cl}$ for t : -10 °C \leq $t \leq$ 19 °C and 23 °C \leq $t \leq$ 50 °C and $t_c = 20$ °C
 2) Output impedance = 10 Ω - $R_{lmin} > 1$ k Ω
 3) Output impedance < 30 m Ω - $R_{lmin} > 1$ k Ω
 4) One year specifications with temperature effect: 0.002 % output * $l_t - t_{cl}$ for t : -10 °C \leq $t \leq$ 19 °C and 23 °C \leq $t \leq$ 50 °C and $t_c = 20$ °C
 5) Output impedance > 100 M Ω - $R_{lmax} < 750$ Ω
 6) Amplitude: 0.1 ... 15 Vrms, frequency: 0.5 ... 200 Hz

Temperature	Input type	Precision up to	Accuracy up to	Resolution up to	
RTD	Pt100	$\alpha = 0.00385 \text{ } ^\circ\text{C}^{-1}$	0.05 °C	0.06 °C	0.01 °C
	Pt100	$\alpha = 0.003916 \text{ } ^\circ\text{C}^{-1}$	0.05 °C	0.06 °C	0.01 °C
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Electrical section specifications - vertical panel

Temperature	Input type	Precision % of rdg ±% FS	Accuracy % of rdg ±% FS	Linear error up to	Resolution up to
TC	Type J ¹⁾ , K ¹⁾ , T ¹⁾ , F ¹⁾ , R, S, B ¹⁾ , U ¹⁾ , L ¹⁾ , N, E, M, C ¹⁾	0.008 % ±0.002 % FS	0.01 % ±0.003 % FS	0.03 °C	0.01 °C

1) Precision and accuracy of the e.m.f. values
 For measurements with internal cold junction compensation: cold junction error = 0.15 °C
 Maximum input voltage: DC ±100 V
 Input impedance: > 100 MΩ
 Temperature effect: 0.001 % of reading * It - tcl for t: -10 °C ≤ t ≤ 19 °C and 23 °C ≤ t ≤ 50 °C and tc = 20 °C
 One year specifications

13) Digital multimeter 6.5 digits

Specification On request, refer to manufacturer data sheet

14) Continuity circuit

Switch test facility Including buzzer and terminals, for checking operation of pressure switches and other equipment operating with NC/NO contacts

15) Load simulation

Rotating potentiometer From 0 ... 1 kΩ

16) Decade resistance

Five decade resistances x 0.01, x 0.1, x 1, x 10, x 100 Ω

Range 0 ... 1,111.1 Ω

Accuracy 0.02%

17) Environmental parameters module

Parameter	Measuring range	Precision	Accuracy	Max. resolution
Temperature	-10 ... +50 °C	1.5 °C	1.8 °C	0.1 °C
Barometric pressure	650 ... 1,150 mbar	4 % FS	5 % FS	1 mbar
Relative humidity	10 ... 90 % r. h.	4 %	5 %	1 %

Mechanical

The system CBS-SC2000 cabinet is a robust self-standing mild steel frame, 2 mm thickness, painted in light grey color to specification RAL 7032. Four rollers are provided on the base, to provide easy movement during installation and maintenance. During use, the system is maintained in fixed position by two front adjustable feet. The working surface is covered by heavy-duty rubber, finished with stainless steel edges and corners. The mimic panel is specially hand engraved and colored on aluminum alloy plate, brushed and anodised. Below the working surface, one drawer and shelves to store tools, electronic components, fittings, etc. the system CBS-SC2000 includes the fitting of all embedded instrumentation and wiring for electrical components.

Dimensions

- Front 3,000 mm approx
- Depth 1,200 mm approx
- Height 2,080 mm approx
- Working surface height 945 mm approx

Power requirement

- Main supply: 230 V ±10 %, 50/60 Hz, 1,500 VA
- Operating Environment:
specified for 0 °C ... 50 °C
specified to 80 % r.h. at 35 °C not condensing
- Storage environment: -40° ... 70°C

Electrical safety

The system CBS-SC2000 is featured for the electrical safety, it includes:

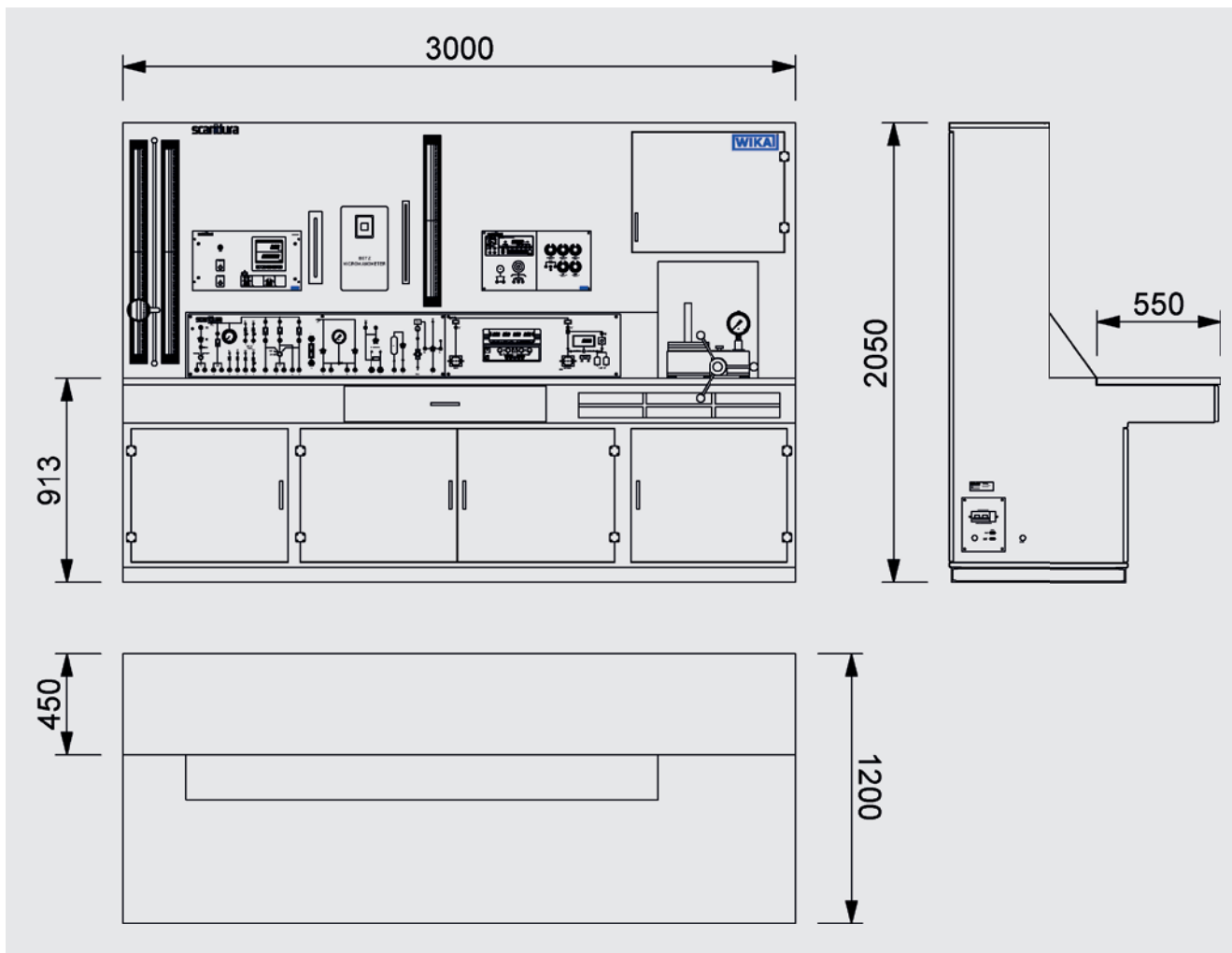
- Approved main switch
- Earth leakage circuit breaker to standard IEC-1010-1 for personnel and fire protection by detecting an earth leakage fault current in excess of 30 mA and disconnecting the main supply within 200 ms
- 'Double isolation' protection in connecting the external main supply to the system main switch, by completely enclosing live connections in an insulating case
- Protective transparent covers over live connections inside the equipment

Air

External "instrument air" (clean, dry and oil free) supply is required, at 7 bar pressure.

An internal air filter with automatic drain is fitted. If air is according to the "instrument air" specification, the amount of condensation is irrelevant.

Dimensions in mm



Supply connections

- Mains Cable gland with 16 mm I.D., located at the bottom on the left-hand side of the system.
- Actual cable connection in a terminal junction box inside the system.
- Recommended cable: 3-wire, 2½ mm² cross section
- Air ½" BSP female, located at the bottom on the left-hand side of the system.

Standard certification

- Certificate of conformity
- Calibration reports

Certification on request

- Certificate of calibration, against reference masters, traceable to national and international standards (E.A.).
- Official certificates issued by accredited laboratories of the Italian National Service (ACCREDIA) membership of the E.A. (European Accreditation Laboratory).

Standard supply

- 30 meters flexible tubing, size ¼"
- 3 meters flexible tubing, size ⅜"
- 5 barbed connectors ⅛" NPT
- 5 barbed connectors ¼" NPT
- 2 barbed connectors ½" NPT
- 5 Tee connections for external circuits
- 5 cross connections for external circuits
- 5 linear connections for external circuits
- Kit of fuses
- Flying leads, silicone insulated, for electrical signals
- One plug for each electrical socket
- One male quick fit connector for each female pneumatic output fitted on the panel
- Set of device under test holders series GZ, from GZ-1 to GZ-6

Technical documentation

Two sets of the installation, operating and maintenance manual.

