ANYLOAD

AN404

Sensor Comprehensive Parameter





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TECHNICAL MANUAL

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1	March 27, 2026	First public release version.
1.1	September 28, 2026	Added AN404 portable (carry-case) configuration: integrated sensor interface, insulation setup, and wiring subsections.

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1 Introduction of Main Features

The AN404 Sensor Comprehensive Parameter Measuring Instrument is a highly accurate and reliable device for measuring sensor parameters. It can measure input resistance, output resistance, the resistance of the four bridge arms, sensor insulation resistance, and the sensitivity of a strain bridge. It also includes a dedicated resistance measurement range and can be used as a multimeter for resistance measurements.

1.1 Main Features

- The maximum resistance measurement range is 4000 Ω, with a measurement accuracy of ±0.5 Ω (below 2000 Ω) and ±1 Ω (above 2000 Ω).
- The measurement resolution is 0.1 Ω.
- The sensitivity range is ±4.8 mV/V, with a measurement resolution of 0.00001 mV/V and a measurement accuracy of 0.01% FS.
- 7-inch industrial touch screen and touch pad for convenient data input
- Supports calibration of each channel's input resistance and sensitivity. Parameters are retained in the event of a power failure
- Synchronous digital ratio technology uses an internal standard voltage source to perform simultaneous analog to digital conversion of the bridge voltage and output signal, reducing instrument drift
    - Optional Accessory: It can be equipped with serial printing interface or RS232 interface
- The insulation test voltage is 100 ± 5 V, the insulation resistance test range is 500 to 10,000 MΩ, and the measurement accuracy is ±5%

1.2 Portable (carry-case) configuration

The AN404 is also available in a portable configuration: the same measurement electronics and firmware as the benchtop unit, installed in a rugged carry case. The 7-inch touch display is mounted in the case lid; excitation, sense, signal, and shield connections are wired to an integrated panel in the case base with colour-coded spring clips (and optional binding posts). Measurement, calibration, quality judgement, and Modbus RTU behaviour are the same on both form factors unless a subsection is labelled "Benchtop only" or "Portable only".

Figure P1: AN404 portable configuration (integrated display and sensor panel).



2 Technical Parameters

Item	Data Specification
Instrument model	Instrument model AN404
Resistance Measurement Range	4000 Ω
Resistance Measurement Accuracy	R ≤ 2000 Ω: ±0.5 Ω R > 2000 Ω: ±1 Ω
Sensitivity Measurement Range	±4.8 mV/V
Sensitivity Measurement Resolution	0.00001 mV/V
Sensitivity Measurement Accuracy	0.01%FS
Insulation Resistance Measurement Range	500~10000 MΩ
Insulation Resistance Measurement Accuracy	±5%
Communication Interface	RS232
Communication Protocol	Modbus Protocol

Table 1: Technical Parameters

Form factor: Electrical specifications are identical for benchtop and portable units. Portable units add an integrated sensor interface and carry case; mass and outer dimensions depend on the case option—see your order packing list.

3 Safety Information

- Prior to connecting power supply, ensure power supply used is within the range of 100V to 240V
- AN404 Power plug must be connected to a three-prong grounded power socket
- Do not open the chassis without authorization
- Do not short-circuit the probes in any mode other than the resistance mode, as this may damage the instrument

4 User Instructions and Calibration

4.1 Main Interface

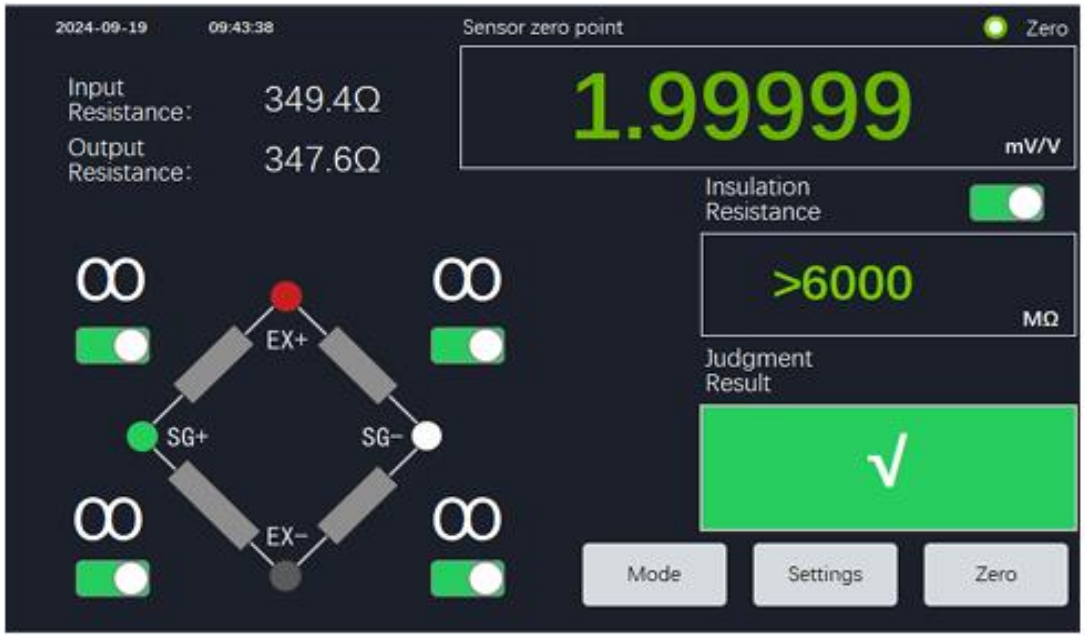


Figure 1: Main Interface of AN404

Mode	Press the Mode button to enter the sensitivity measurement interface. See Sections 4.3 and 4.4
Settings	Press the Settings button to access the settings interface. See section 4.5
Zeros	Press the ***Zero*** button to toggle the sensitivity display between absolute and relative values. When relative mode is active, the ***Zero*** indicator in the upper-right corner of the display will light up

4.2 Pre-Testing and Set Up

4.2.1 Strain Gauge Resistance Measurement

1. Connect the sensor to the junction box. The instrument defaults to the sensitivity measurement channel.
2. The display shows sensitivity values in absolute mode by default. Press the **Zero** button to switch between absolute and relative display modes. In relative mode, the "Zero" indicator lights up.
3. To measure a specific resistance, click the button next to the desired item. Each channel will automatically complete one measurement cycle and then return to sensitivity measurement.
4. Sensitivity range: ±4.8 mV/V. The display can be set to show 4 or 5 decimal places for higher accuracy.

4.2.2 Strain Gauge Insulation Measurement

Sensor insulation resistance measurement checks the insulation between the sensor's power and signal leads and the housing (ground).

1. Connect the sensor to the junction box.
2. Place a metal sheet under the sensor. See Figure 2.
3. Connect a wire from the metal sheet to the lower terminal of the junction box. See Figure 2.
4. Perform the insulation resistance measurement.



Figure 2: Insulation Measurement Set Up

4.2.3 Portable only – insulation setup

For the carry-case configuration, connect the sensor to the integrated spring clips (section 5.6). Place the load cell on the conductive reference plate on the base panel (or a metal sheet in contact with that plate). Jumper the metal sheet or plate to the shield (SHD) terminal on the integrated panel, then run the insulation test as in section 4.2.2. Do not force the lid closed on loose clip leads during the test.

4.2.4 Result Interpretation

If a threshold is set, the test result is judged as follows:

Sensitivity	If the absolute value of the measurement exceeds the sensitivity threshold.
Insulation resistance	If the measured value is below the insulation resistance threshold.
Resistance detection	If the difference between the 'power positive signal' and 'power negative signal' exceeds the resistance threshold.

Results that fail any of these checks are displayed as **"×"** and the corresponding items flash red. Passing results are displayed as **"√"**

4.3 Sensitivity Measurement Interface

- When the **Zero** button appears grey, the display shows **absolute values**.
- Press the **Zero** button (turns blue) to switch the display to **relative values**.
- Click the **Resistance Measurement** button to enter the resistance measurement interface.
- Press **Return** to go back to the main interface.

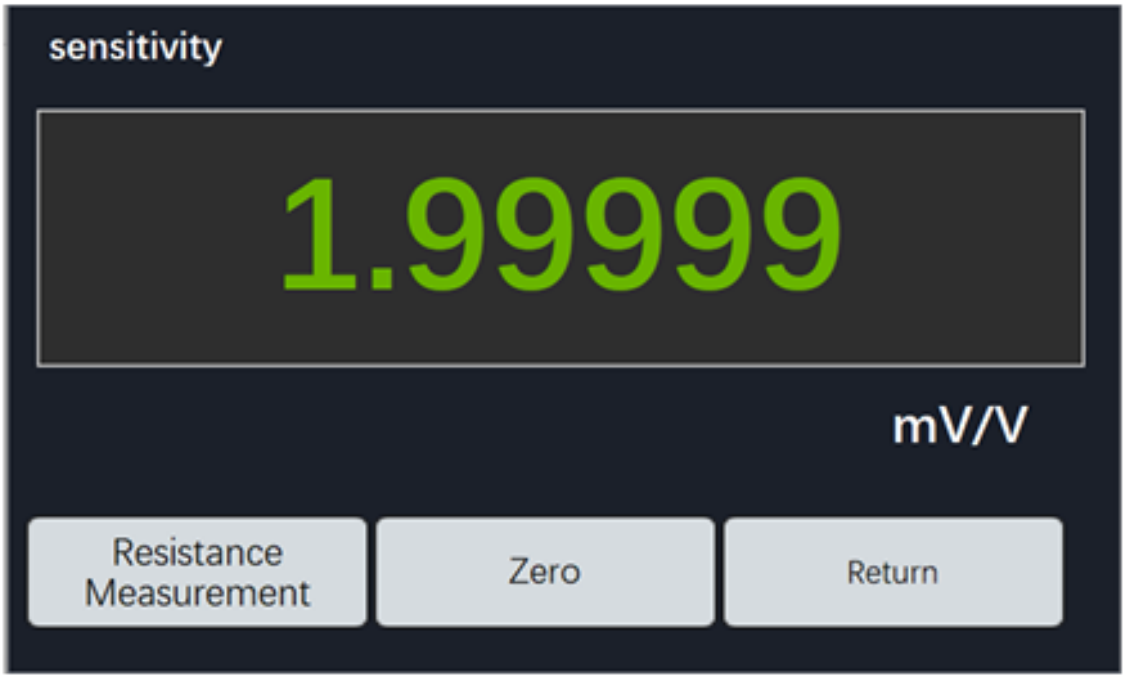


Figure 3: Sensitivity Measurement Interface

4.4 Resistance Measurement Interface

- Measures resistance in real time, with a maximum range of 4000 Ω.
- **IMPORTANT:** Unplug the sensor wires before measuring to avoid errors. Do not short-circuit the probes.
- Press **Return** to go back to the main interface.
- Press **Sensitivity Measurement** to switch to the sensitivity measurement interface.

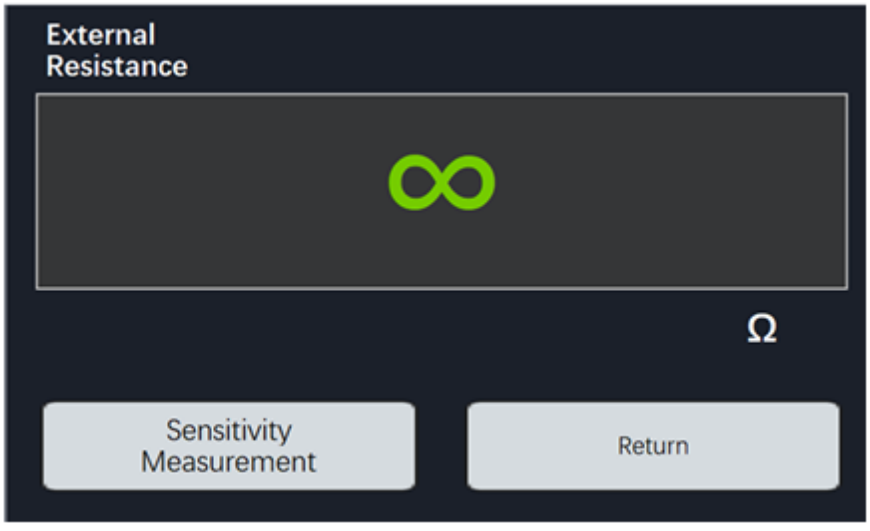


Figure 4: Resistance Measurement Interface

4.5 Settings Interface

- Press the **Settings** button on the *Main Interface* (Figure 1) to access the settings interface, which includes multiple configuration options.
- Press **Return** to return to the Main Interface.

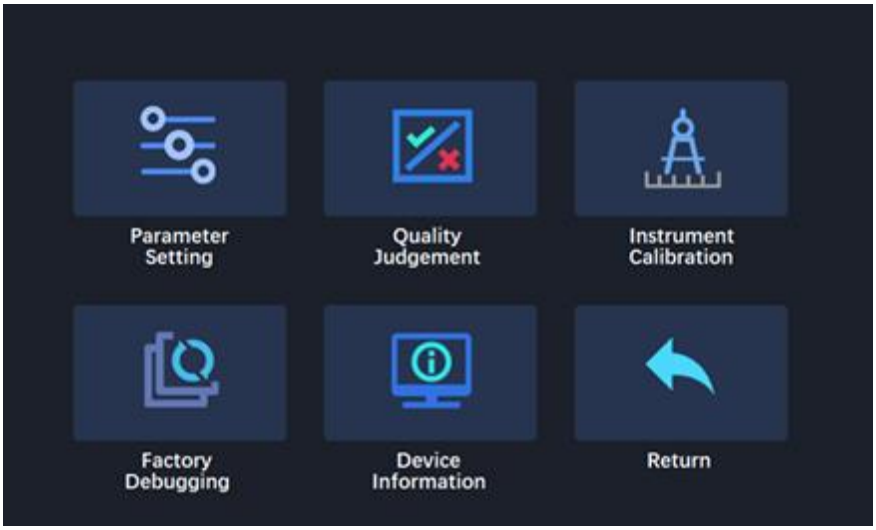
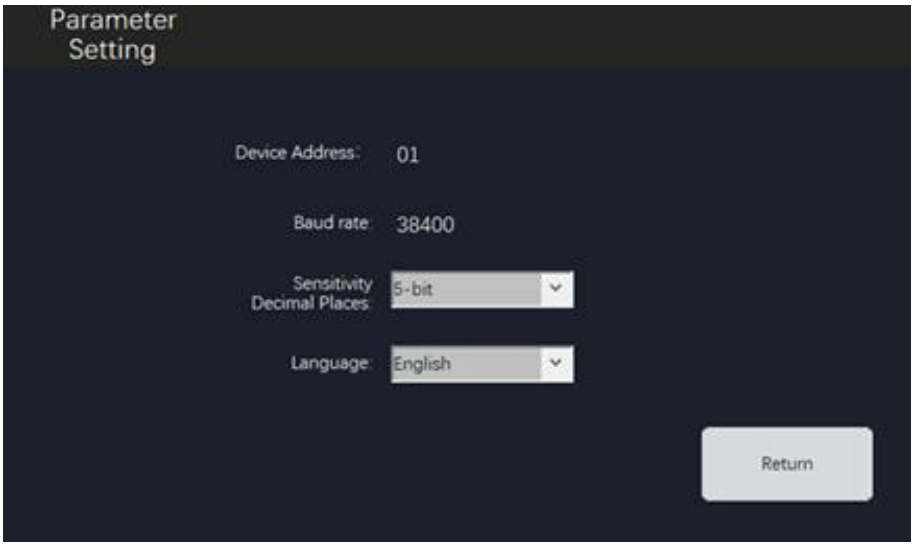


Figure 5: Settings Interface

Instrument Calibration	Primarily used for internal instrument calibration by manufacturers and metrology departments.
Device Information	Provides details on device's software and hardware versions.
Factory Debugging	For debugging and troubleshooting purposes.

4.5.1 Parameter Setting

This setting allows you to change and set various parameters that are best suited to the environment the indicator is operating in.



Device Address	This device address is used for *Modbus RTU* communication and cannot be modified.
Baud Rate	Speed at which information travels through communication channels Default is 38,400 Bd and cannot be modified.
Sensitivity Decimal Places	Controls how much detail seen when viewing the sensor's sensitivity. Choose to show 4 or 5 decimal places
Language	Switch between languages of preference

Figure 6: Parameter Setting

4.5.2 Quality Judgement Setup

This setting allows users to set the pass/fail limits for the user's defined hardware testing. If any measurement exceeds set thresholds, the system will mark the unit as unqualified.

- To disable any of these functions, simply set the value to 0



Sensitivity Threshold
- This monitors the sensor's output accuracy and ensures the sensor is operating within the intended range.
- If the absolute measured sensitivity is higher than the set limit, the test will fail.

Insulation Resistance (IR) Threshold
- Ensures electrical safety and wiring integrity by detecting short circuits, preventing electric shocks, or moisture ingress.
- Test fails if IR drops below the set value.

Resistance Detection Threshold
- Compares the difference between "Power Positive" and "Power Negative" signal channels.
- Ensures the electrical bridges are balanced and wiring is symmetrical in the system
- Test fails if the difference is larger than set value

Figure 7: Quality Judgement Setup

5 Instrumentation Wiring

5.1 Form factor overview

Two mechanical configurations share the same AN404 electronics: (A) Benchtop standard — rear panel, DB9 sensor cable, external junction box, RS232, foot switch, and probe sockets (Figure 8). (B) Portable carry-case — integrated lid display and base-panel sensor interface; RS232 and foot switch remain available inside the case (see internal label). Sections 5.1–5.5 are benchtop; section 5.6 is portable.

This section outlines the physical setup and electrical connections for the AN404 Measuring Instrument. It covers everything from basic power requirements to specialized sensors and communication interfaces.

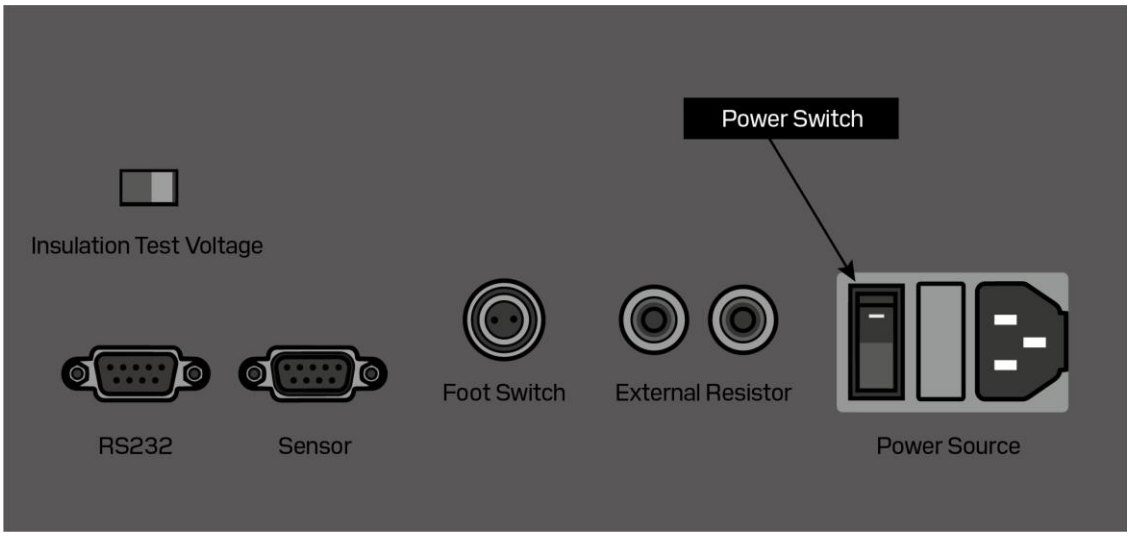


Figure 8: Rear Panel

RS232	Enables data exchange between the instrument and a computer using the industrial-standard Modbus RTU protocol. See Section 5.3 for more details.
Sensor	This interface connects sensors to measure strain signals and is compatible with both 4-wire and 6-wire systems. See sections 5.1 and 5.2 for more details.
Foot Switch	Attach manual foot switch to control desired parameter. Foot switch not provided by ANYLOAD. See Section [] for wiring instructions.
External Resistor	Attach additional resistors to these channels. User's discretion for additional resistance. See section 5.4 for more details.
Power Source	Provides power to the device. Ensure power source is 100V to 240V and connected to three core power sockets with grounding wire.
Power Switch	Turns the indicator on and off.

5.2 Connecting Sensor to Indicator

Benchtop only – rear-panel DB9 cable, crocodile clips, and external junction box.

Connect the sensor to the instrument using the DB9 interface. The DB9 cable splits into crocodile clips, which will attach directly to the sensor's signal and power lines for testing. See Table 2 below for more details.

Table 2: Sensor Interface Connection Guide

Number	Symbol	Description	DB9 Connection	Crocodile Clip Connection
1	EX-	Supplies bridge output voltage (-)	Connect the bridge input of the sensor	Black
2	SEN-	Bridge induction input (-)		
3	SEN+	Bridge induction input (+)	Connects the bridge input of the sensor (+)	Red
4	EX+	Supplies bridge voltage output (+)		
5	SIG-	Sensor signal input (-)	Connect the signal output of the sensor (-)	White
6	SHD	Shielding Wire	Connect the shielding end of the sensor	
8	SHD	Shielding Wire		
9	SIG+	Sensor signal input (+)	Signal output from sensor (+)	Green

5.3 Junction Box Connection Guide

Benchtop only – portable units use section 5.6 (integrated clips); no separate junction box.

Sensor	Description	Crocodile Clip Connection
SIG-	Sensor signal input (－)	White
SIG+	Sensor signal input (+)	Green
EX-	Supply bridge voltage output (－)	Black
EX+	Supply bridge voltage output (＋)	Red
SHD	Shielding Wire	Terminal



5.4 Communication Interface Connection

This indicator uses a **9-pin D-type socket** interface.

Needle	Symbol	Description
2	232RXD	Serial port data input (RS232 level)
3	232TXD	Serial port data output (RS232 level)
5	GND	Ground (digital ground)

5.5 External Resistor Measurement

The instrument includes measurement probes. To use them, insert the probes into the designated panel sockets and switch the device to **Resistance Mode**. You can then measure resistance in real time, with a maximum detection range of 4000Ω.

5.6 Foot Switch Connection

The foot switch connects to the instrument panel using a secure XS12 aviation plug, allowing users to trigger hands-free measurements by simply stepping on the pedal. Connect the foot switch via the port on the rear panel. See Figure 8.

This feature is a key benefit for sensor manufacturers, as it significantly increases production efficiency by removing the need to manually press the "*Start*" button. By keeping hands free to handle sensors and wiring, the foot switch streamlines high-volume testing and reduces the risk of errors during repetitive tasks.

5.7 Portable configuration – integrated sensor interface

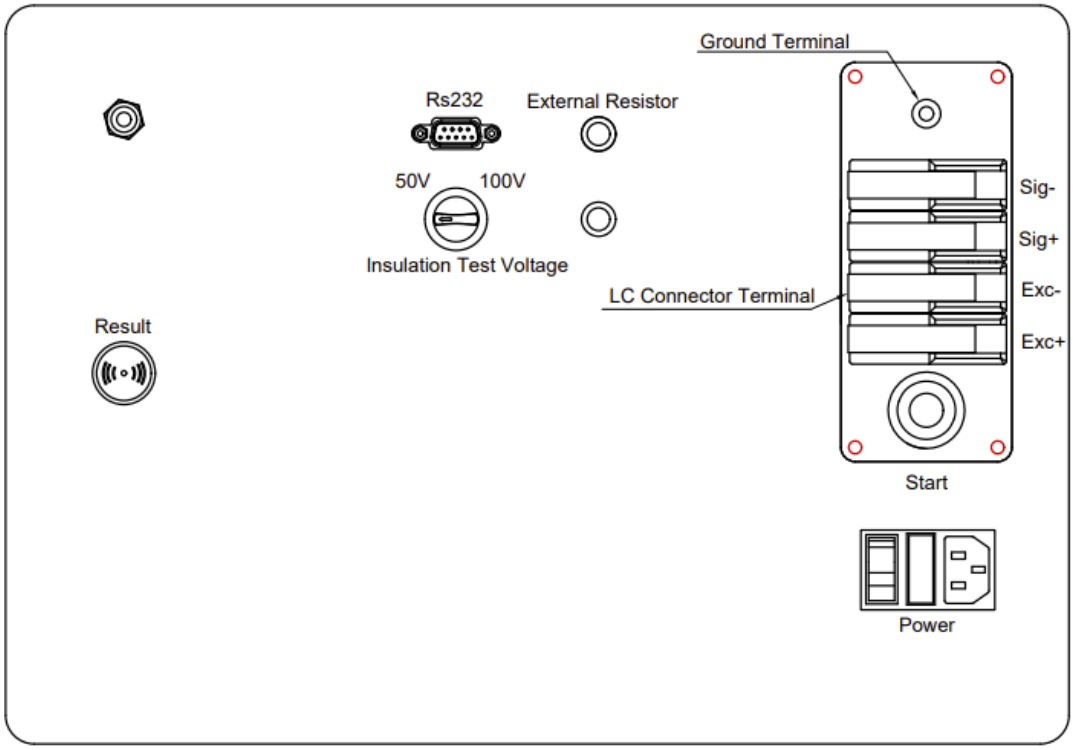


Figure 9: AN404-P Series Configuration Layout

Electrical assignments match Table 2. Spring clip colours on the base panel match the benchtop crocodile leads:

Black – EX– (bridge excitation negative / power negative)

Red – EX+ and sense (+) on 6-wire sensors

White – SIG– (signal negative)

Green – SIG+ (signal positive)

Shield terminal – SHD (cable shield; use for insulation reference)

Setup: Open the case; connect the load cell to the clips without swapping EX and SIG pairs. Use

the touch UI (sections 4.1–4.5) as on the benchtop unit. Red/black binding posts on the base plate (when fitted) are auxiliary—follow the label inside your case or the packing list.

RS232 Modbus RTU (section 5.3) is unchanged; the 9-pin connector may be on an internal bracket or case bulkhead. For probe resistance mode (section 5.4), unplug sensor clips before using probes.

Before transport: power off, disconnect clips, dress the lid cable, and latch the case.

6 Other Information

6.1 Safety and Hazardous Environments

- **Non-Intrinsic Safety:** This instrument is **not** rated for use in flammable or explosive environments.
- **Safety Barriers:** To measure sensors located in hazardous areas, user must connect them through a **safety barrier** to isolate the instrument from the hazard.

6.2 Cleaning and Maintenance

- Use only a soft cotton cloth with a neutral detergent (like water) to clean the surface.
- **Do not** use industrial solvents on the buttons, display window, or casing, as it can cause permanent damage.

Portable: clean the case shell and lid with a soft cloth and mild detergent; do not use solvents on seals, latches, or foam; avoid strain on the lid coiled cable.

- **Warranty Exclusions:** Cosmetic parts (casings, buttons, windows) and power components (cords, plugs) are **not covered** under the product warranty.

6.3 Circuit Integrity and Warranty

- **No User-Serviceable Parts:** There are no adjustable switches or components inside the circuit.
- **Anti-Tamper Protection:** Internal logic is protected by programmable encryption. Any attempt to disassemble, modify, or copy the circuitry will cause **permanent damage** and void all warranties.

6.4 Custom and High-Vibration Orders

If your application involves **strong vibrations** or other specialized requirements, these must be specified at the time of purchase to ensure the hardware is properly configured.

6.5 Accuracy, Metrology, and Service

- Accuracy is measured as "Full-Scale," which includes both **linearity** and **repeatability**.
- The manufacturer does not provide a written guarantee for mV/V accuracy. For official mV/V certification, the unit must be sent to a **national metrology institution**.
- Costs for external calibration, testing, or metrology department services are the responsibility of the purchaser and are not included in the product price.

Please **Contact Our Authorized Dealer** for Technical Assistance:

Notes:

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