

## Strain Indicator and Recorder

### FEATURES

- Four input channels
- Direct reading LCD display
- On-board data storage
- 0 to 2.5 VDC analog output
- Quarter, half, and full bridge circuits
- Built-in bridge completion and shunt calibration
- 120, 350, and 1000  $\Omega$  dummy gages
- Automatic zero-balancing
- Intuitive, menu-driven operations
- USB data link
- Operation from keypad or PC
- Portable, lightweight, and rugged
- Battery, USB, or line-voltage power



### DESCRIPTION

The P3 Strain Indicator and Recorder is a portable, battery-operated instrument capable of simultaneously accepting four inputs from quarter, half, and full bridge strain-gage circuits, including strain-gage-based transducers. Water-resistant grommets in the hinged cover allow the lid to be closed with leadwires attached. Designed for use in a wide variety of physical test and measurement applications, the P3 functions as bridge amplifier, static strain indicator, and digital data logger.

The P3, utilizing an LCD display for readout of setup information and acquired data, incorporates many unique operating features that make it the most advanced instrument of its kind. An extensive, easy-to-use menu-driven user interface operates through a front-panel keypad to readily configure the P3 to meet your particular measurement requirements. Selections include active input and output channels, bridge configuration, measurement units, bridge balance, calibration method, and recording options, among others.

Standard sensor input connection is via eccentric-lever-release terminal blocks. They enable fast connection and disconnection as well as easy reconfiguration for fault finding.

Data, recorded at a user-selectable rate of up to 1 reading per channel per second, is stored on a removable flash card and is transferred by USB to a host computer for subsequent storage, reduction and presentation with the supplied software.

The P3 can also be configured and operated directly from your PC with a separate software application included with each instrument. Additionally, a full set of ActiveX components is provided for creating custom applications in any language supporting ActiveX.

A highly stable measurement circuit, regulated bridge excitation supply, and precisely settable gage factor enable measurements of  $\pm 0.1\%$  accuracy and 1 microstrain resolution. Bridge completion resistors of 120, 350 and 1000  $\Omega$  are built in for quarter bridge operation. Also, input connections and switches are provided for remote shunt calibration of transducers and full bridge circuits.

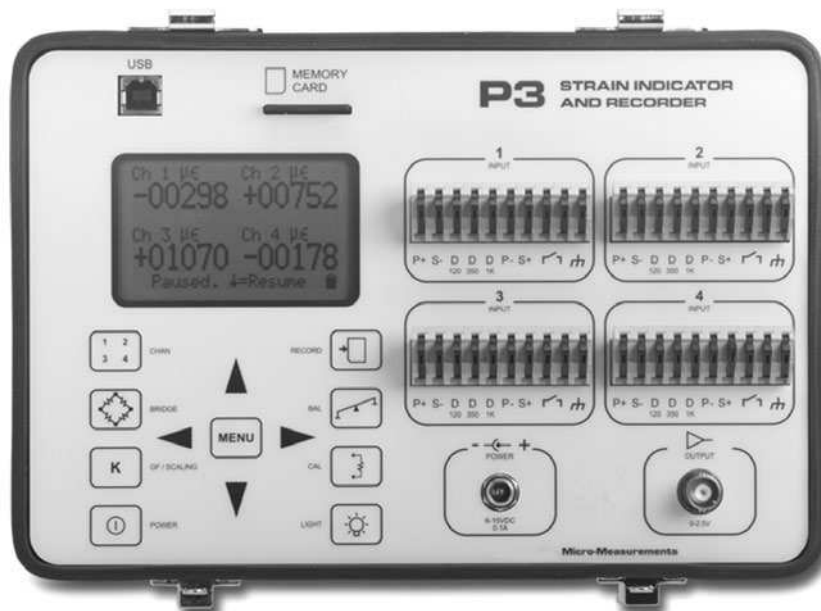
The P3 operates from two readily available D cells. Battery life depends upon mode of operation but ranges up to 600 hours of continuous use for a single channel. It can also be powered by connection to an external battery or power supply, a USB port on a PC or with an optional external line-voltage adapter, the P3-A105.

## Strain Indicator and Recorder

### SPECIFICATIONS

All specifications are nominal or typical at +73°F (+23°C) unless noted.

| PARAMETER                    | SPECIFICATIONS                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>INPUT CONNECTORS</b>      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| P3                           | Eccentric-lever-release terminal blocks accept up to four independent bridge inputs. Accommodates 16–28 AWG (1.3 to 0.35 mm diameter) wire. The Transducer Input Option (Model P3-TIO) includes four 10-pin bayonet locking circular connectors mounted on the side of the case and wired in parallel to the lever-release terminal blocks. The supplied mating connector has a 0.046 inch (1.17 mm) diameter solder well.                                                                                                                     |
| P3-TIO                       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| <b>BRIDGE CONFIGURATIONS</b> | Quarter, half, and full bridge circuits. Internal bridge completion provided for 120, 350 and 1000 $\Omega$ quarter bridges, 60 to 2000 $\Omega$ half or full bridges.                                                                                                                                                                                                                                                                                                                                                                         |
| Bridge Excitation            | 1.5 VDC nominal. Readings are fully ratiometric, and not degraded by variation in excitation voltage.                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| Bridge Types                 | <ul style="list-style-type: none"> <li>• Quarter bridge</li> <li>• Half bridge, adjacent arms, equal and opposite strains</li> <li>• Half bridge opposite arms equal strains</li> <li>• Shear bridge, 2 active arms</li> <li>• Poisson half bridge</li> <li>• Full bridge 4 fully active arms</li> <li>• Shear bridge, 4 active arms</li> <li>• Full bridge, Poisson gages in opposite arms</li> <li>• Full bridge, Poisson gages in adjacent arms</li> <li>• Undefined full bridge</li> <li>• Undefined half bridge/quarter bridge</li> </ul> |



## Strain Indicator and Recorder

| PARAMETER           | SPECIFICATIONS                                                                                                                                                                                                                                                                                                                                                                                            |     |      |     |    |      |     |   |     |     |    |   |     |     |    |   |    |     |    |   |    |     |    |   |      |    |     |   |     |
|---------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|------|-----|----|------|-----|---|-----|-----|----|---|-----|-----|----|---|----|-----|----|---|----|-----|----|---|------|----|-----|---|-----|
| Bridge Balance      | Single key operation to initiate automatic software balance <ul style="list-style-type: none"><li>• Automatic</li><li>• Manual offset adjust</li><li>• Disabled (Raw offset)</li></ul>                                                                                                                                                                                                                    |     |      |     |    |      |     |   |     |     |    |   |     |     |    |   |    |     |    |   |    |     |    |   |      |    |     |   |     |
| DATA CONVERSION     | High-resolution 24-bit sigma-delta converter. 50 or 60 Hz noise rejection. User selectable.                                                                                                                                                                                                                                                                                                               |     |      |     |    |      |     |   |     |     |    |   |     |     |    |   |    |     |    |   |    |     |    |   |      |    |     |   |     |
| DYNAMIC RANGE       | ±31,000 µε (±1 µε resolution) at Gage Factor = 2.000                                                                                                                                                                                                                                                                                                                                                      |     |      |     |    |      |     |   |     |     |    |   |     |     |    |   |    |     |    |   |    |     |    |   |      |    |     |   |     |
| ACCURACY            | ±0.1% of reading ±3 counts. (Normal mode operation at Gage Factor = 2.000.)                                                                                                                                                                                                                                                                                                                               |     |      |     |    |      |     |   |     |     |    |   |     |     |    |   |    |     |    |   |    |     |    |   |      |    |     |   |     |
| GAGE FACTOR RANGE   | 0.500 to 9.900                                                                                                                                                                                                                                                                                                                                                                                            |     |      |     |    |      |     |   |     |     |    |   |     |     |    |   |    |     |    |   |    |     |    |   |      |    |     |   |     |
| SHUNT CALIBRATION   | Shunt calibration across each dummy resistor to simulate 5000 µε (±0.1%). Remote calibration supported via accessible switch contacts at input terminal block.                                                                                                                                                                                                                                            |     |      |     |    |      |     |   |     |     |    |   |     |     |    |   |    |     |    |   |    |     |    |   |      |    |     |   |     |
| SCALING             | Automatic scaling for microstrain, based upon gage factor, with nonlinearity correction based upon bridge type.<br>Automatic calculation of mV/V<br>Linear scaling for other engineering units                                                                                                                                                                                                            |     |      |     |    |      |     |   |     |     |    |   |     |     |    |   |    |     |    |   |    |     |    |   |      |    |     |   |     |
| UNITS               | <table><tr><td>µε</td><td>g</td><td>rpm</td><td>hp</td></tr><tr><td>mV/V</td><td>lbf</td><td>m</td><td>deg</td></tr><tr><td>psi</td><td>lb</td><td>s</td><td>rad</td></tr><tr><td>ksi</td><td>kg</td><td>A</td><td>oz</td></tr><tr><td>GPa</td><td>in</td><td>N</td><td>mV</td></tr><tr><td>MPa</td><td>mm</td><td>V</td><td>m/s2</td></tr><tr><td>Pa</td><td>mil</td><td>Ω</td><td>ton</td></tr></table> | µε  | g    | rpm | hp | mV/V | lbf | m | deg | psi | lb | s | rad | ksi | kg | A | oz | GPa | in | N | mV | MPa | mm | V | m/s2 | Pa | mil | Ω | ton |
| µε                  | g                                                                                                                                                                                                                                                                                                                                                                                                         | rpm | hp   |     |    |      |     |   |     |     |    |   |     |     |    |   |    |     |    |   |    |     |    |   |      |    |     |   |     |
| mV/V                | lbf                                                                                                                                                                                                                                                                                                                                                                                                       | m   | deg  |     |    |      |     |   |     |     |    |   |     |     |    |   |    |     |    |   |    |     |    |   |      |    |     |   |     |
| psi                 | lb                                                                                                                                                                                                                                                                                                                                                                                                        | s   | rad  |     |    |      |     |   |     |     |    |   |     |     |    |   |    |     |    |   |    |     |    |   |      |    |     |   |     |
| ksi                 | kg                                                                                                                                                                                                                                                                                                                                                                                                        | A   | oz   |     |    |      |     |   |     |     |    |   |     |     |    |   |    |     |    |   |    |     |    |   |      |    |     |   |     |
| GPa                 | in                                                                                                                                                                                                                                                                                                                                                                                                        | N   | mV   |     |    |      |     |   |     |     |    |   |     |     |    |   |    |     |    |   |    |     |    |   |      |    |     |   |     |
| MPa                 | mm                                                                                                                                                                                                                                                                                                                                                                                                        | V   | m/s2 |     |    |      |     |   |     |     |    |   |     |     |    |   |    |     |    |   |    |     |    |   |      |    |     |   |     |
| Pa                  | mil                                                                                                                                                                                                                                                                                                                                                                                                       | Ω   | ton  |     |    |      |     |   |     |     |    |   |     |     |    |   |    |     |    |   |    |     |    |   |      |    |     |   |     |
| ANALOG OUTPUT       | BNC connector. 0 to 2.5 V. Device impedance of 2000 Ω or greater. 480 updates/second output rate. 16-bit resolution                                                                                                                                                                                                                                                                                       |     |      |     |    |      |     |   |     |     |    |   |     |     |    |   |    |     |    |   |    |     |    |   |      |    |     |   |     |
| RECORDING           | <ul style="list-style-type: none"><li>• Up to 64 data files</li><li>• Automatic recording</li><li>• 1 reading every 1 to 3600 seconds</li><li>• Individually selectable per channel</li><li>• Manual recording</li><li>• Automatic date/time stamping</li></ul>                                                                                                                                           |     |      |     |    |      |     |   |     |     |    |   |     |     |    |   |    |     |    |   |    |     |    |   |      |    |     |   |     |
| DATA STORAGE        |                                                                                                                                                                                                                                                                                                                                                                                                           |     |      |     |    |      |     |   |     |     |    |   |     |     |    |   |    |     |    |   |    |     |    |   |      |    |     |   |     |
| Media               | Removable SD or Multimedia Card (32GB max).                                                                                                                                                                                                                                                                                                                                                               |     |      |     |    |      |     |   |     |     |    |   |     |     |    |   |    |     |    |   |    |     |    |   |      |    |     |   |     |
| Data Recording Rate | 1 reading per second maximum.                                                                                                                                                                                                                                                                                                                                                                             |     |      |     |    |      |     |   |     |     |    |   |     |     |    |   |    |     |    |   |    |     |    |   |      |    |     |   |     |
| DISPLAY             | Full dot-matrix structure, 128 dots x 64 dots FSTN positive, grey transfective LCD with backlight. Display update rate is twice a second.                                                                                                                                                                                                                                                                 |     |      |     |    |      |     |   |     |     |    |   |     |     |    |   |    |     |    |   |    |     |    |   |      |    |     |   |     |
| Backlight Control   | Programmable on time while in run mode: 5, 15 or 60 sec. Manual off/on. If illuminated, backlight will remain illuminated while operating menus.                                                                                                                                                                                                                                                          |     |      |     |    |      |     |   |     |     |    |   |     |     |    |   |    |     |    |   |    |     |    |   |      |    |     |   |     |
| Contrast            | Software Adjustable                                                                                                                                                                                                                                                                                                                                                                                       |     |      |     |    |      |     |   |     |     |    |   |     |     |    |   |    |     |    |   |    |     |    |   |      |    |     |   |     |
| OPERATING MODES     | <ul style="list-style-type: none"><li>• Normal mode</li><li>• Analog output (any one of four channels)</li></ul>                                                                                                                                                                                                                                                                                          |     |      |     |    |      |     |   |     |     |    |   |     |     |    |   |    |     |    |   |    |     |    |   |      |    |     |   |     |
| COMMUNICATION       | USB 1.1 with type B connector. Used for device control, transferring stored data, and firmware updates.                                                                                                                                                                                                                                                                                                   |     |      |     |    |      |     |   |     |     |    |   |     |     |    |   |    |     |    |   |    |     |    |   |      |    |     |   |     |

## Strain Indicator and Recorder

| PARAMETER                         | SPECIFICATIONS                                                                                                                                                                                                                                   |
|-----------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| PC APPLICATION SUPPORT            | Windows-based software provided for control and data storage. No device driver required (treated as an HID device).                                                                                                                              |
| FIRMWARE UPGRADEABLE              |                                                                                                                                                                                                                                                  |
| REAL-TIME CLOCK                   |                                                                                                                                                                                                                                                  |
| SYSTEM CALIBRATION / VERIFICATION | Requires 1550B Strain Indicator Calibrator or other compatible calibrator. Calibration date stored in flash memory.                                                                                                                              |
| POWER                             | <ul style="list-style-type: none"> <li>Internal battery pack using two “D” cells. Battery life up to 600 hours (single channel, normal mode)</li> <li>USB power</li> <li>External 6 to 15 VDC</li> <li>AC adapter (optional, P3-A105)</li> </ul> |
| ENVIRONMENTAL                     |                                                                                                                                                                                                                                                  |
| Temperature                       | +32 to +122°F (0 to +50°C)                                                                                                                                                                                                                       |
| Humidity                          | Up to 90%, non-condensing                                                                                                                                                                                                                        |
| SIZE                              | 9 x 6 x 6 in (228 x 152 x 152 mm)                                                                                                                                                                                                                |
| WEIGHT                            | 4.4 lb (2.0 kg), including batteries                                                                                                                                                                                                             |

View Showing  
Optional Transducer  
Input Connectors



## Disclaimer

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