

Digital display for strain transducers



GENERAL DESCRIPTION

The Analog Panel Meters offer many features and performance capabilities to suit a wide range of industrial applications. Available in two different models (**E1930**, **E1931**) to handle various analogue inputs, including DC Voltage/Current, Process, and strain gauge inputs. The optional plug-in output cards allow the opportunity to configure the meter for present applications, while providing easy upgrades for future needs.

The meters employ a bright 0.56" LED display. The unit is available with a red sunlight readable or a standard green LED. The intensity of display can be adjusted from dark room applications up to sunlight readable, making it ideal for viewing in bright light applications.

The meters provide a MAX and MIN reading memory with programmable capture time. The capture time is used to prevent detection of false max or min readings which may occur during start-up or unusual process events.

The signal totalizer (integrator) can be used to compute a time-input product. This can be used to provide readout of totalized flow, calculate service intervals of motors or pumps, etc. The totalizer can also accumulate batch weighing operations.

The meters have four setpoint outputs, implemented on Plug-in option cards. The Plug-in cards provide dual FORM-C relays (5A), quad FORM-A (3A), or either quad sinking or quad sourcing open collector logic outputs. The setpoint alarms can be configured to suit a variety of control and alarm requirements.

Once the meters have been initially configured, the parameter list may be locked out from further modification in its entirety or only the setpoint values can be made accessible.

The meters have been specifically designed for harsh industrial environments.

With NEMA 4X/IP65 sealed bezel and extensive testing of noise effects to CE requirements, the meter provides a tough yet reliable application solution.

Communication and Bus Capabilities are also available as option cards. These include RS232, RS485 and Profibus-DP. Readout values and setpoint alarm values can be controlled through the bus. Additionally, the meters have a feature that allows a remote computer to directly control the outputs of the meter. With an RS232 or RS485 card installed, it is possible to configure the meter using a Windows® based program. The configuration data can be saved to a file for later recall.

A linear DC output signal is available as an optional Plug-in card. The card provides either 20 mA or 10 V signals. The output can be scaled independent of the input range and can track the input, totalizer, max or min readings.

FEATURES

- PROCESS; VOLTAGE; CURRENT AND STRAIN GAGE INPUTS
- 5-DIGIT 0.56" RED SUNLIGHT READABLE DISPLAY
- VARIABLE INTENSITY DISPLAY
- 16 POINT SCALING FOR NON-LINEAR PROCESSES
- PROGRAMMABLE FUNCTION KEYS/USER INPUTS
- 9 DIGIT TOTALIZER (INTEGRATOR) WITH BATCHING
- OPTIONAL CUSTOM UNITS OVERLAY W/BACKLIGHT
- FOUR SETPOINT ALARM OUTPUTS (W/OPTION CARD)
- COMMUNICATION AND BUS CAPABILITIES (W/OPTION CARD)
- RETRANSMITTED ANALOG OUTPUT (W/OPTION CARD)
- PC SOFTWARE AVAILABLE FOR METER CONFIGURATION
- NEMA 4X/IP65 SEALED FRONT BEZEL
- CABLE BREAK RECOGNITION IN CONNECTION WITH LIMIT VALUE SWITCH

SAFETY SUMMARY

All safety related regulations, local codes and instructions that appear in this literature or on equipment must be observed to ensure personal safety and to prevent damage to either the instrument or equipment connected to it. If equipment is used in a manner not specified by the manufacturer, the protection provided by the equipment may be impaired.

Do not use this unit to directly command motors, valves, or other actuators not equipped with safeguards. To do so can be potentially harmful to persons or equipment in the event of a fault to the unit.



Model no.: E1930/E1931

1. Technical data

1. DISPLAY:

5 digit, 0.56" (14.2 mm) red sunlight readable or standard green, LEDs, (-19999 to 99999)

2. POWER:

AC Versions: AC Power: 85 to 250 VAC, 50/60 Hz, 15 VA
Isolation: 2300 Vrms for 1 min. to all inputs and outputs.

DC Versions

DC Power: 11 to 36 VDC, 11 W
(derate operating temperature to 40° C if operating <15 VDC and three plug-in option cards are installed)

AC Power: 24 VAC, ± 10%, 50/60 Hz, 15 VA

Isolation: 500 Vrms for 1 min. to all inputs and outputs (50 V working).

3. ANNUNCIATORS:

MAX - maximum readout selected
MIN - minimum readout selected
TOT - totalizer readout selected, flashes when total overflows
SP1 - setpoint alarm 1 is active
SP2 - setpoint alarm 2 is active
SP3 - setpoint alarm 3 is active
SP4 - setpoint alarm 4 is active
Units Label - optional units label backlight

4. KEYPAD:

3 programmable function keys, 5 keys total

5. A/D CONVERTER:

16 bit resolution

6. UPDATE RATES:

A/D conversion rate: 20 readings/sec.
Step response: 200 msec. max. to within 99% of final readout value (digital filter and internal zero correction disabled)
700 msec. max. (digital filter disabled, internal zero correction enabled)
Display update rate: 1 to 20 updates/sec.
Setpoint output on/off delay time: 0 to 3275 sec.
Analog output update rate: 0 to 10 sec
Max./Min. capture delay time: 0 to 3275 sec.

7. DISPLAY MESSAGES:

"LOL" - Appears when measurement exceeds + signal range.
"ULUL" - Appears when measurement exceeds - signal range
"... ." - Appears when display values exceed + display range.
"... ." - Appears when display values exceed - display range.

8. INPUT CAPABILITIES:

See specific product specifications

9. EXCITATION POWER:

See specific product specifications

10. LOW FREQUENCY NOISE REJECTION:

Normal Mode: > 60 dB @ 50 or 60 Hz ±1%, digital filter off
Common Mode: >100 dB, DC to 120 Hz

11. USER INPUTS:

Three programmable user inputs
Max. Continuous Input: 30 VDC
Isolation To Sensor Input Common: Not isolated.
Response Time: 50 msec. max.
Logic State: Jumper selectable for sink/source logic

| INPUT STATE | SINKING INPUTS 22 Ωpull-up to +5 V | SINKING INPUTS 22 Ωpull-down |
|-------------|---------------------------------------|---------------------------------|
| Active | VIN < 0.9 VDC | VIN > 3.6 VDC |
| Inactive | VIN > 3.6 VDC | VIN < 0.9 VDC |

12. TOTALIZER:

Function:
Time Base: second, minute, hour, or day
Batch: Can accumulate (gate) input display from a user input
Time Accuracy: 0.01% typical
Decimal Point: 0 to 0.0000

Scale Factor: 0.001 to 65.000

Low Signal Cut-out: -19,999 to 99,999

Total: 9 digits, display alternates between high order and low order readouts

13. CUSTOM LINEARIZATION:

Data Point Pairs: Selectable from 2 to 16
Display Range: -19,999 to 99,999
Decimal Point: 0 to 0.0000

14. MEMORY:

Nonvolatile E²PROM retains all programmable parameters and display values.

15. ENVIRONMENTAL CONDITIONS:

Operating Temperature Range: 0 to 50°C (0 to 45°C with all three plug-in cards installed)

Storage Temperature Range: -40 to 60°C

Operating and Storage Humidity: 0 to 85% max. RH non-condensing

Altitude: Up to 2000 meters

16. CERTIFICATIONS AND COMPLIANCES:

SAFETY

IEC 1010-1, EN 61010-1: Safety requirements for electrical equipment for measurement, control, and laboratory use, Part I
IP65 Enclosure rating (Face only), IEC 529
IP20 Enclosure rating (Rear of unit), IEC 529

ELECTROMAGNETIC COMPATIBILITY

Immunity to EN 50082-2

Electrostatic discharge Level 2; 4 Kv contact EN 61000-4-2
Level 3; 8 Kv air

Electromagnetic RF fields Level 3; 10 V/m 1 EN 61000-4-3
80 MHz - 1 GHz

Fast transients (burst) Level 4; 2 Kv I/O EN 61000-4-4
Level 3; 2 Kv power

RF conducted interference Level 3; 10 V/rms EN 61000-4-6
150 KHz - 80 MHz

Simulation of cordless telephones Level 3; 10 V/m ENV 50204
900 MHz • ½ MHz
200 Hz, 50% duty cycle

Emissions to EN 50081-2

RF interference EN 55011 Enclosure class A
Power mains class A

Notes:

1. Self-recoverable loss of performance during EMI disturbance at 10 V/m: Measurement input and/or analog output signal may deviate during EMI disturbance.

For operation without loss of performance:

Unit is mounted in a metal enclosure (Buckeye SM7013-0 or equivalent) I/O and power cables are routed in metal conduit connected to earth ground.

Refer to EMC Installation Guidelines section of the bulletin for additional information.

17. CONNECTIONS:

High compression cage-clamp terminal block

Wire Strip Length: 0.3" (7.5 mm)

Wire Gauge: 30-14 AWG copper wire

Torque: 4.5 inch-lbs (0.51 N-m) max.

18. CONSTRUCTION:

This unit is rated for NEMA 4X/IP65 indoor use. IP20

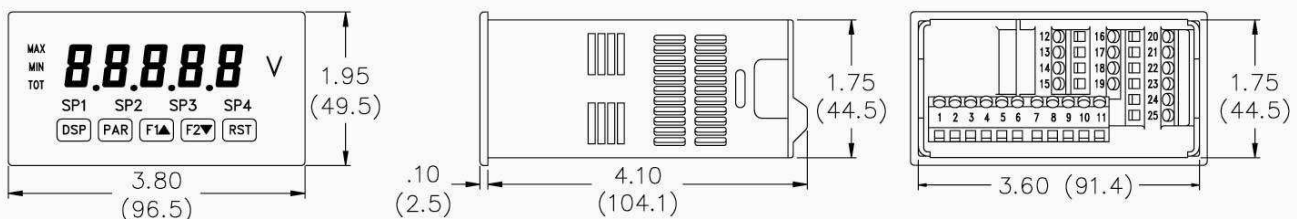
Touch safe. Installation Category II, Pollution Degree 2. One piece bezel/case. Flame resistant. Synthetic rubber keypad. Panel gasket and mounting clip included.

19. WEIGHT:

10.4 oz. (295 g)

DIMENSIONS In inches (mm)

Note: Recommended minimum clearance (behind the panel) for mounting clip installation is 2.1" (53.4) H x 5.0" (127) W.



2. Installing the meter

Installation

The **E1930, E1931** meets NEMA 4X/IP65 requirements for indoor use when properly installed. The unit is intended to be mounted into an enclosed panel. Prepare the panel cutout to the dimensions shown. Remove the panel latch from the unit. Slide the panel gasket over the rear of the unit to the back of the bezel.

The unit should be installed fully assembled. Insert the unit into the panel cutout.

While holding the unit in place, push the panel latch over the rear of the unit so that the tabs of the panel latch engage in the slots on the case. The panel latch should be engaged in the farthest forward slot possible. To achieve a proper seal, tighten the latch screws evenly until the unit is snug in the panel (Torque to approximately 7 in-lbs [79N-cm]). Do not over-tighten the screws.

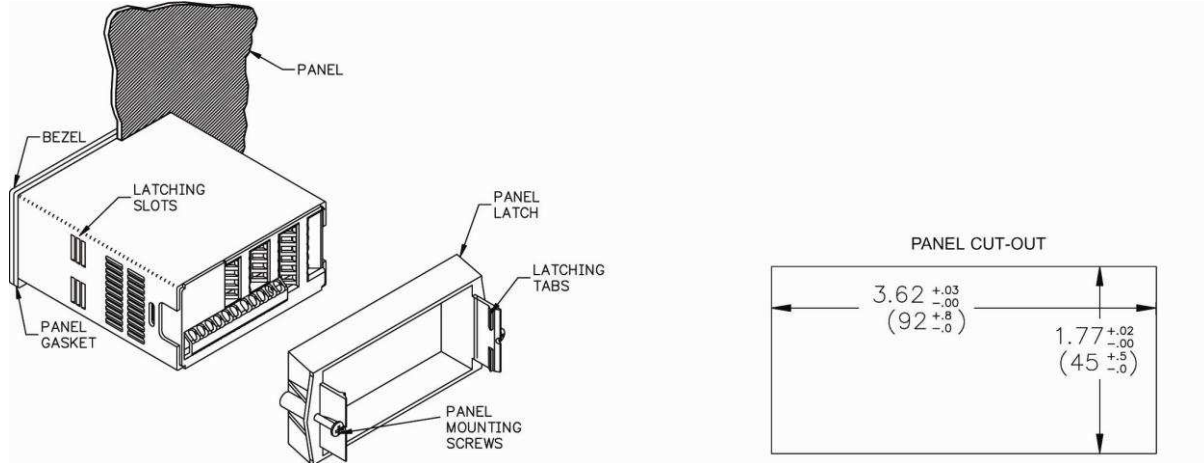
Installation Environment

The unit should be installed in a location that does not exceed the maximum operating temperature and provides good air circulation. Placing the unit near devices that generate excessive heat should be avoided.

The bezel should be cleaned only with a soft cloth and neutral soap product.

Do NOT use solvents. Continuous exposure to direct sunlight may accelerate the aging process of the bezel.

Do not use tools of any kind (screwdrivers, pens, pencils, etc.) to operate the keypad of the unit.



3. Reviewing the front buttons and display

Display Readout Legends*

Optional Custom Units Overlay

Setpoint Alarm Annunciators

| KEY | DISPLAY MODE OPERATION | PROGRAMMING MODE OPERATION |
|-----|--|--|
| DSP | Index display through max/min/total/input readouts | Quit programming and return to display mode |
| PAR | Access parameter list | Store selected parameter and index to next parameter |
| F1? | Function key 1; hold for 3 seconds for Second Function 1** | Increment selected parameter value |
| F2? | Function key 2; hold for 3 seconds for Second Function 2** | Decrement selected parameter value |
| RST | Reset (Function key)** | Hold with F1?, F2? to scroll value by x1000 |

* Display Readout Legends may be locked out in Factory Settings.
 ** Factory setting for the F1, F2, and RST keys is NO mode.

4. E1930 – Strain gauge input

- LOAD CELL, PRESSURE AND TORQUE BRIDGE INPUTS
- DUAL RANGE INPUT: ± 24 mV OR ± 240 mV
- SELECTABLE 5 VDC OR 10 VDC BRIDGE EXCITATION
- PROGRAMMABLE AUTO-ZERO TRACKING

SENSOR INPUTS:

| INPUT RANGE | ACCURACY* (18 to 28°C) | ACCURACY* (0 to 50°C) | IMPEDANCE | MAX CONTINUOUS OVERLOAD | RESOLUTION |
|----------------|---------------------------------|---------------------------------|-----------|-------------------------------|------------|
| ± 24 mVDC | 0.02% of reading +3 μ V | 0.07% of reading +4 μ V | 100 Mohm | 30 V | 1 μ V |
| ± 240 mVDC | 0.02% of reading +30 μ V | 0.07% of reading +40 μ V | 100 Mohm | 30 V | 10 μ V |

* After 20 minute warm-up. Accuracy is specified in two ways: Accuracy over an 18 to 28°C and 10 to 75% RH environment; and accuracy over a 0 to 50°C and 0 to 85% RH (non-condensing environment). Accuracy over the 0 to 50°C range includes the temperature coefficient effect of the meter.

CONNECTION TYPE: 4-wire bridge (differential)
2-wire (single-ended)
COMMON MODE RANGE (w.r.t. input common): 0 to +5 VDC
Rejection: 80 dB (DC to 120 Hz)
BRIDGE EXCITATION :
Jumper Selectable: 5 VDC @ 65 mA max., $\pm 2\%$
10 VDC @ 125 mA max., $\pm 2\%$
Temperature coefficient (ratio metric): 20 ppm/°C max.

5. E1931 – Process input

- DUAL RANGE INPUT (20 mA or 10 VDC)
- 24 VDC TRANSMITTER POWER

SENSOR INPUTS:

| INPUT (RANGE) | ACCURACY* (18 to 28°C) | ACCURACY* (0 to 50°C) | IMPEDANCE/ COMPLIANCE | MAX CONTINUOUS OVERLOAD | DISPLAY RESOLUTION |
|--------------------------|--------------------------------|--------------------------------|--------------------------|-------------------------------|-----------------------|
| 20 mA (-2 to 26 mA) | 0.03% of reading +2 μ A | 0.12% of reading +3 μ A | 20 ohm | 150 mA | 1 μ A |
| 10 VDC (-1 to 13 VDC) | 0.03% of reading +2 mV | 0.12% of reading +3 mV | 500 Kohm | 300 V | 1 mV |

* After 20 minute warm-up. Accuracy is specified in two ways: Accuracy over an 18 to 28°C and 10 to 75% RH environment; and accuracy over a 0 to 50°C and 0 to 85%RH (non-condensing environment). Accuracy over the 0 to 50°C range includes the temperature coefficient effect of the meter.

EXCITATION POWER:

Transmitter Power: 24 VDC, $\pm 5\%$, regulated, 100 mA max.

6. Accessories

UNITS LABEL KIT

Each meter has units indicator with backlighting that can be customized using the Units Label Kit. The backlight is controlled in the programming.

7. Optional plug-in output cards

The E1930 and E1931 series meters can be fitted with up to three optional plug-in cards. Only one card from each function type can be installed at one time. The function types include setpoint alarms, communications and analog output. The plug-in cards can be installed initially or at a later time.

Isolation specification for all option cards
Isolation to sensor commons: 1400 Vrms for 1 min. working voltage: 125 V
Isolation to user input commons: 500 Vrms for 1 min. working voltage: 50 V

SERIAL COMMUNICATIONS CARD

Type: RS485 or RS232
Isolation To Sensor & User Input Commons: 500 Vrms for 1 min.
Working Voltage: 50 V. Not Isolated from all other commons.
Data: 7/8 bits
Baud: 300 to 19,200
Parity: no, odd or even
Bus Address: Selectable 0 to 99, Max. 32 meters per line (RS485)
Transmit Delay: Selectable for 2 to 50 msec or 50 to 100 msec (RS485)

PROFIBUS-DP CARD

Fieldbus Type: Profibus-DP as per EN 50170, implemented with Siemens SPC3 ASIC
Conformance: PNO Certified Profibus-DP Slave Device
Baud Rates: Automatic baud rate detection in the range 9.6 Kbaud to 12 Mbaud
Station Address: 0 to 126, set by the master over the network. Address stored in non-volatile memory.
Connection: 9-pin Female D-Sub connector
Network Isolation: 500 Vrms for 1 minute (50 V working) between Profibus network and sensor and user input commons. Not isolated from all other commons.