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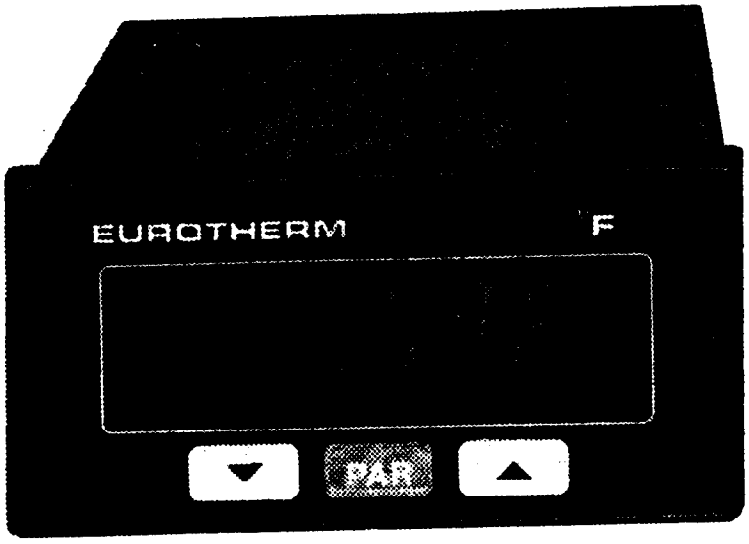
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EUROTHERM
MODEL 842
PROCESS MONITOR/INDICATOR

OPERATION AND INSTALLATION MANUAL



EUROTHERM CORPORATION
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CAUTION: Before installing, operating, or servicing the Model 842 Process Monitor/Indicator, please read the following instructions for its SAFE USE.

OVERCURRENT PROTECTION

AC power supplies to the Model 842 should be protected by fuses or automatic circuit breakers rated at not more than 2 amperes. The Model 842 has an internal 1A power fuse.

VOLTAGE RATINGS

Do not exceed maximum voltage ratings for the Model 842. Unless otherwise stated in the specifications for a particular function, the maximum voltage which may be applied between any two isolated circuits, or between any isolated circuit and ground, is limited to the highest of the rated supply or input voltages for that instrument.

ENCLOSURE OF "HOT" PARTS

Some of the rear terminals of the Model 842 can become electrically "hot" under some conditions of normal operation. Care should be taken during mounting and wiring to prevent the "hot" terminals from being accessible to the hands of personnel and their metal tools.

WIRING

Before wiring to the Model 842 the installer should familiarize himself with the installation data provided in the Instruction Manual. Unlabelled terminals must not be used as "tie points" for other wires (unless the installation instructions permit it), as the terminals may be internally connected. The installer must make sure that correct polarity is maintained. Wiring should conform to the standards of good practice and local codes. Conductors should be commensurate with voltage and current ratings of the units. Questions concerning correct wiring practice should be directed to the nearest Eurotherm Corporation service facility.

(continued inside back cover)

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1.1 RECEIVING AND UNPACKING YOUR INSTRUMENT

The Process Monitor/Indicator is a precision electronic instrument, designed for applications in industrial control rooms, research labs, etc. Its shipping container is designed to withstand reasonable shocks. Unpack it carefully, noting that the package should contain the instrument, mounting hardware, and a copy of this instruction manual. Inspect the instrument carefully for damage, and keep the original packing materials if re-shipment is required.

If there is evidence of shipping damage, please notify the carrier within 72 hours. The packaging should be retained for inspection by the manufacturer's representative and/or carrier.

1.2 CAUTION

Before you remove or replace any circuit board contained in the instrument, or remove any internal electrical connector, make certain the power is OFF, or disconnected.

The Monitor/Indicator circuit boards contain static sensitive components. Before you remove any board make certain that you, the area in which you place it, or work on it, and the board are properly electrostatically grounded.

Do not exceed the maximum voltage ratings for the instrument.

FAILURE TO OBSERVE THE PRECAUTIONS LISTED ABOVE COULD LEAD TO FAILURE OF THE INSTRUMENT'S CIRCUITRY. FAILURES SO CAUSED ARE OUTSIDE THE MANUFACTURER'S WARRANTY.

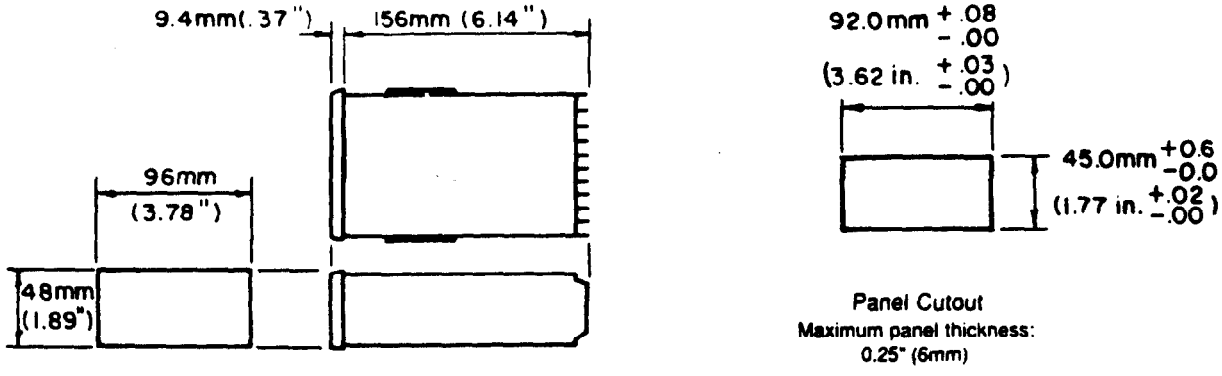


Figure 1. Dimension Drawing, Including Cut-Out Dimensions

1.3 DESCRIPTION

The Process Monitor/Indicator is a general purpose instrument that accepts mV, dc Volts, Thermocouple, RTD, or Strain Gauge inputs. A unit especially designed for the measurement of AC volts is also available. The visual display on the front panel presents to the operator a maximum of 5 Vacuum Fluorescent characters, or digits. The instrument is 1/8 DIN size, and is designed for either panel or bench-top mounting. Hardware for panel mounting is furnished as standard, while the bench-mounting hardware kit must be ordered separately.

The operator controls are mounted on the front of the instrument and consist of three membrane switches, one for decrementing a numerical display, one labeled "PAR" for calling up Parameter displays in sequence, and a third for incrementing a numerical display. The operator can configure all necessary instrument func-

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tions using these three controls. In addition, there is a single, two-position "Run/Configure" switch (SW1) mounted within the instrument case on the lower circuit board. The function of all these controls is fully described in the "Operations Instructions" section of this manual.

1.4 SHIPPING CONFIGURATION

The Process Monitor/Indicator is shipped fully assembled and ready for installation, including any of the following options selected when ordered:

1. Up to 2 alarm relay outputs, for process "HI/LO", deviation "HI/LO" alarm outputs.
2. Serial communications, using an RS422 port, for applications requiring linking to a remote intelligent device (e.g. supervisory computer).
3. Isolated retransmission of the measured variable to a remote device.
4. Transducer power supply, for applications where a remote transmitter or transducer requires separate power.
5. Input shunt or voltage divider.

A specially designed Monitor/Indicator exclusively for AC voltage measurement applications is also available. This AC unit can also be configured with the first 4 options described above.

NOTE TO USER: Options 2 (Serial Communications) and 3 (Retransmission) are mutually exclusive; that is, either 2 or 3 may be ordered, but not both.

2.0 INSTALLATION

2.1 GENERAL MOUNTING REQUIREMENTS

Although the Monitor/Indicator will operate in any position, it is recommended that the front face be vertical (or slightly inclined, as in console-mounting applications), to help keep the display window clean.

Back-of-panel space around the instrument should allow adequate ventilation to help keep ambient temperatures within the maximum specified. Adequate wiring space should be provided.

2.2 MOUNTING INSTRUCTIONS

The Monitor/Indicator case fits a 1/8 DIN panel cutout dimensioned in Figure 1. It is secured from the back-of-panel with 2 mounting jacks shipped with the instrument.

After cutout is made, slide instrument case in from the front. Behind the panel, insert the four tabs of each mounting jack into the side slots provided. Tighten the mounting jack shafts clockwise with a screwdriver as illustrated in Figure 2.

2.3 BENCH MOUNTING

The bench-stand kit provides the Monitor/Indicator with a tilt-stand, line cord, and terminal board safety cover for lab-bench mounting applications, as shown in Figure 3. All other operating characteristics are the same as for panel-mounted units.

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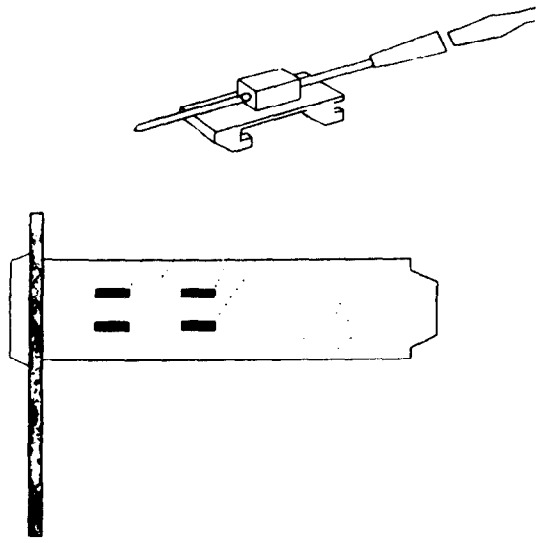
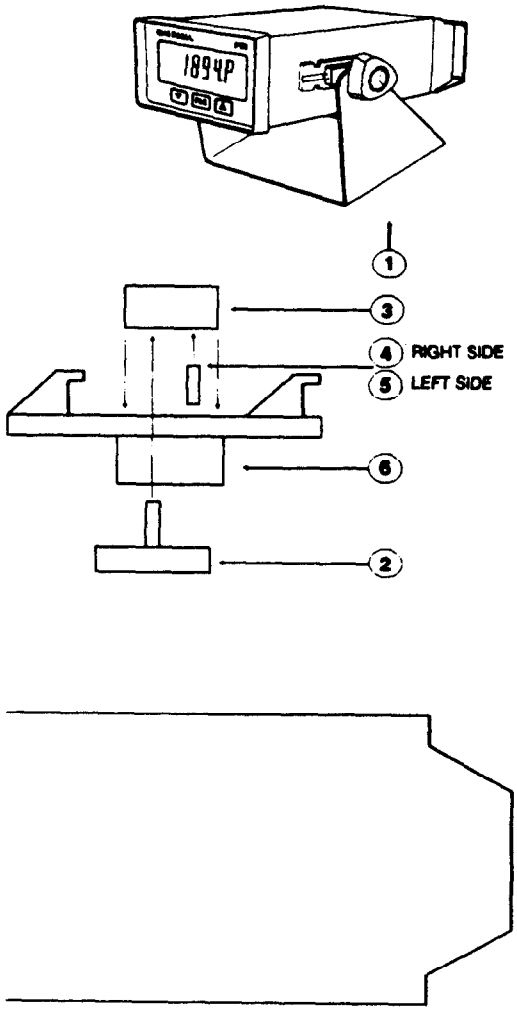


Figure 2. Side View of Panel Mounting



LA203706 BENCH KIT

1.	1 - LA203079	STAND
2.	2 - DI203713	KNOBS
3.	2 - BE203710	BLOCKS
4.	1 - FB203715	8-32X1/2 SET SCREW
5.	1 - FB203716	8-32X5/16 SET SCREW
6.	2 - BE203707	MOUNTING JACKS
7.	1 - LA203711	COVER ASSY. (Incl Line Cord)
8.	2 - BE203708	STUDS
9.	2 - FB203717	SCREWS

Figure 3. Drawing of Bench Mounting Option

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2.4 ELECTRICAL WIRING

Before wiring to the Monitor/Indicator, first check the nameplate for correct model number and options. Remember that power is always applied to the internal circuits when the instrument is connected to the AC power supply (terminals 1, 2, and 3, as shown in Figures 4 and 5).

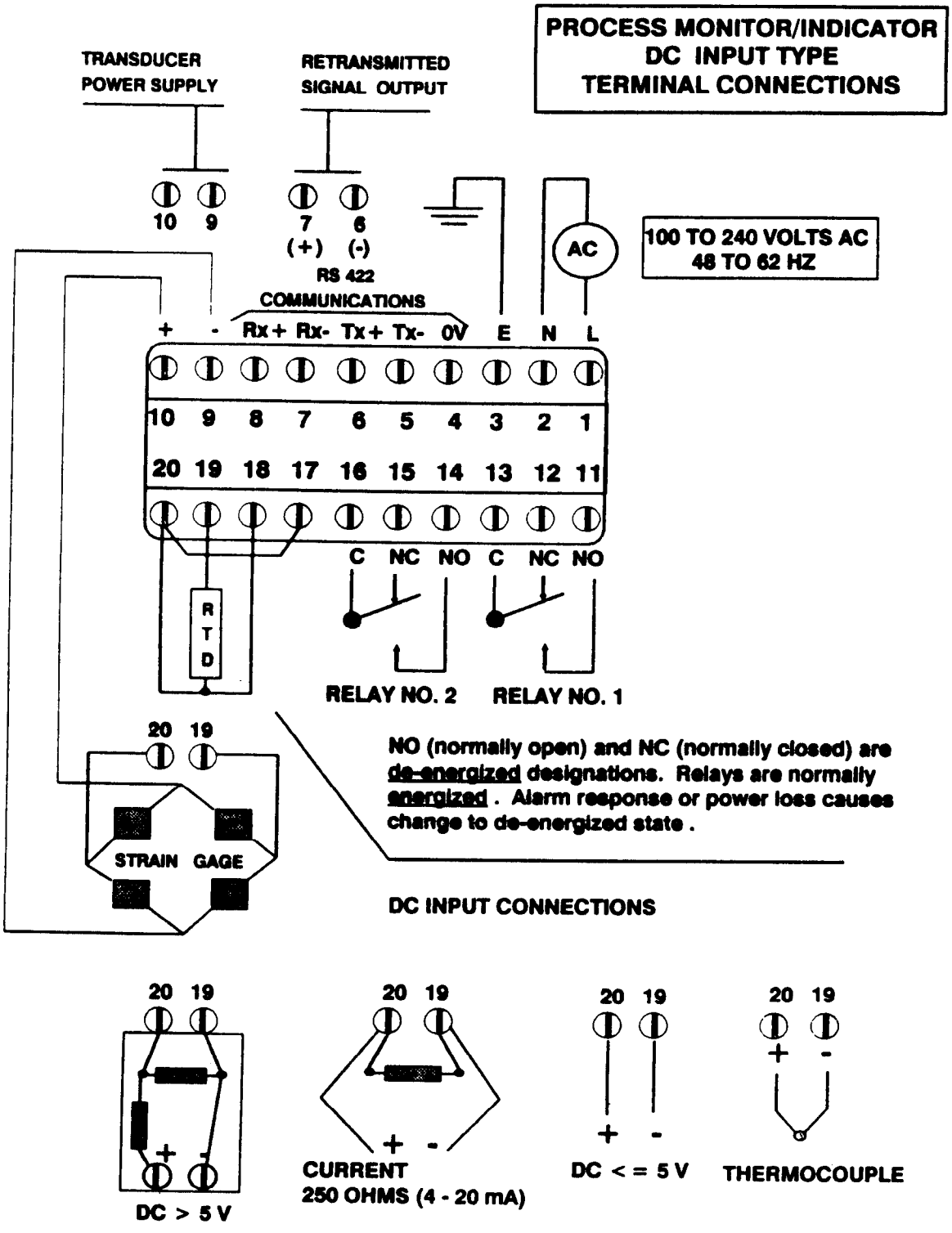


Figure 4. DC Input Terminal Board Connection Diagram

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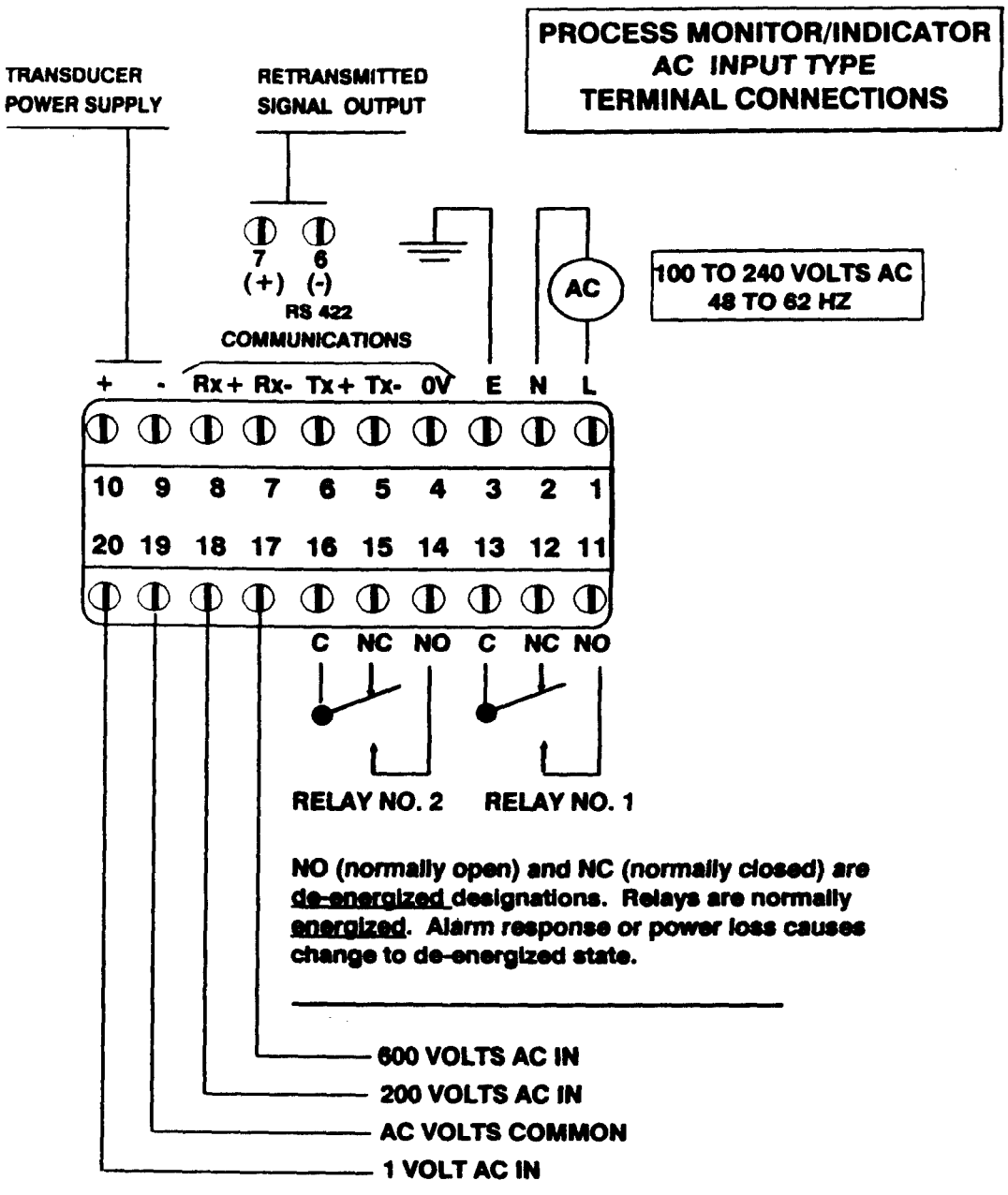


Figure 5. AC Input Terminal Board Connection Diagram

CAUTION: MAKE ALL INPUT AND OUTPUT TERMINATIONS TO THE INSTRUMENT WITH THE POWER "OFF". DAMAGE CAN RESULT FROM HIGH VOLTAGES APPLIED TO THE SIGNAL INPUT TERMINALS, OR TO IMPROPER SUPPLY VOLTAGE. VERIFY ALL CONNECTIONS BEFORE APPLYING POWER. REFER TO FIGURE 5.

2.5 POWER AND GROUND CONNECTIONS

The Monitor/Indicator can be powered from any 50 to 60 Hz, 100 to 240 Vac source. Connect Neutral to Terminal 2, Hot line to Terminal 1, and ground to Terminal 3. NOTE – Terminal 3 MUST be connected to a good earth ground.

The wire size should not be smaller than #18/AWG. Wire size and insulation should conform to local codes. Spade or ring lugs up to 5/16" wide are recommended.

Keep power and signal wiring separated.

Overcurrent protection is afforded by a 1-Amp fuse mounted on the circuit card just behind Terminals 1, 2, and 3.

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2.6 GROUNDING

No ground connection to the case is required for the Monitor/Indicator.

3.0 TECHNICAL SPECIFICATIONS

3.1 INPUTS

Thermocouples:	B,C,D,E,G2,J,K (CA),L,N/N,PL2,R,S, and T
RTD:	PT100, ANSI & DIN Ni 120, Ni 100, Cu 10
DC Volts:	-4.0 to 20.0 mV -20.0 to 100.0 mV -0.20 to 1.0V -1.0 to 5.0V
AC Volts: (on AC Type Only)	0 to 1.0 Vac 0 to 200.0 Vac 0 to 600.0 Vac
Sample Rate:	3/Sec. Min.
Resolution:	0.001% of Full Scale (DC Volts) or 1 μV, whichever is greater 0.1 F/C (Thermocouple or RTD)
Accuracy:	0.1% of Full Scale (TC or Volts) 0.1% of Full Scale or 0.8 deg C, whichever is greater (RTD)
Conversion Method:	Modified Dual Slope
Input Impedance:	1 MegOhm Min.
Normal Mode Rejection:	40 db Min. at 50/60 Hz
Common Mode Rejection:	120 db Min. at 50/60 Hz
Linearity Conformity Error:	<0.2°C Thermocouple <0.1°C RTD
Cold Junction Compensation:	Better than +/- 1.5 deg C (0-50 deg C)
Ambient Temperature:	0-50 deg C
Humidity:	0-95% non-condensing
Zero Shift:	<= 0.5 uV/deg C

3.2 DISPLAY

Type:	5 Digit, 7 Segment Vacuum Fluorescent with 8-segment bar indicator for negative (-), alarms and programming functions
Display Update Rate:	2/Sec.
Decimal Pt. Position:	Programmable for 0-4 decimal places (0-1 decimal places on temperature inputs)

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Table 3.1
THERMOCOUPLE AND RTD TEMPERATURE RANGES

Thermocouples:	deg C		deg F	
B	300	1820	542	3308
C	0	2315	32	4169
D	0	2495	32	4493
E	-250	1000	-418	1832
G2	20	2315	68	4199
J	-130	1000	-202	1832
K (CA)	-250	1200	-418	2192
L	-100	900	-148	1652
N/N	-20	1300	-4	2372
PL2	-10	1200	14	2192
R	-35	1600	-31	2912
S	-35	1600	-31	2912
T	-260	400	-436	752
RTD:				
PT100 (DIN)	-220	850	-364	1562
PT100 (ANSI)	-220	850	-364	1562
Ni 120	-70	320	-94	608
Ni 100	-40	200	-40	392
Cu 10	-73	149	-99	300

3.3 THE MICROPROCESSOR

The Monitor/Indicator contains an 80C154-series microprocessor with a 16K masked ROM, which controls all instrument functions:

- Input scaling and linearization.
  Linearization tables (using polynomial curve-fitted segments per thermocouple type) permanently reside in memory for processing of the digitally filtered transducer signals.
- A/D conversion.
  A unique dual-slope and zero-referencing technique virtually eliminates drift and provides high series- and common-mode noise rejection and measurement stability.
- Display range, offset, and update rate.
  The display, as well as the retransmitted signal, is updated approximately 2 times per second. The display range and offset are firmware generated.

3.4 POWER SUPPLY

Supply Voltage: 100 to 240 Vac RMS (+/- 10%)

Supply Frequency: 48 to 62 Hz

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3.5 OPTIONS

3.5.1 Alarm Relays

Up to 2 Alarm Relay Outputs. These relay outputs will respond to the chosen relay actions. Relays are normally energized (NC contacts "open") and de-energized in the "alarm" state. NOTE: In an instrument ordered without the Relay Option, alarms can still be set, and they will indicate alarms using the left-hand display bars:

High Alarm — top bar
Deviation Alarm — 3rd & 6th bar
Low Alarm — 8th (bottom) bar

See 4.2.4 through 4.2.19 for configuration.

3.5.1.1 Relays

Alarm Relays:	1 or 2 Optional
Contact Ratings:	115 Vac at 1 Amp (resistive load) 240 Vac at 0.5 Amp (resistive load)
Contact Form:	Form C (SPDT) (NOTE: Normally Open/Close designation is "shelf" — not "energize" condition)
Relay Action:	Normally energized with power ON Selectable for "Latch", "Non-latch", or "OFF" (NOTE: "OFF" means "Alarm Off", "Latch" means relay action continues after alarm conditions until manually reset, "Non-latch" means relay action ceases with alarm condition.)

3.5.1.2 Assignment

Each Alarm Channel (1 and 2) has the following independent parameter settings:

— High Alarm Setpoint
— Low Alarm Setpoint
— Deviation Alarm Setpoint
— Deviation Band Setting
— Alarm Hysteresis Setting

3.5.1.3 Relay Action

There are Alarm Relay Actions for "High", "Low", and "Deviation" on each Alarm Channel. Any one, two, or all three actions may be selected for "Latched", "Non-latched", or "OFF". IF "OFF" IS SELECTED, THERE WILL BE NO ALARM INDICATION OR RELAY ACTION. If more than one relay action (except OFF) is chosen, the indicator bar and relay (if present) will respond to all chosen actions (e.g. both High Alarm and Deviation Alarm will operate the same relay output).

3.5.2 Shunt/Divider

Input Shunt is:	250Ω
Voltage Dividers are:	5–25V (25:1, 250K)
	25–100V (100:1, 1 Meg)

3.5.3 Transmitter Power Supply

Transmitter or strain gauge power supply, for applications where a remote transmitter or transducer requires separate power.

The transducer power supply is capable of operation as either a constant voltage supply or a constant current supply.

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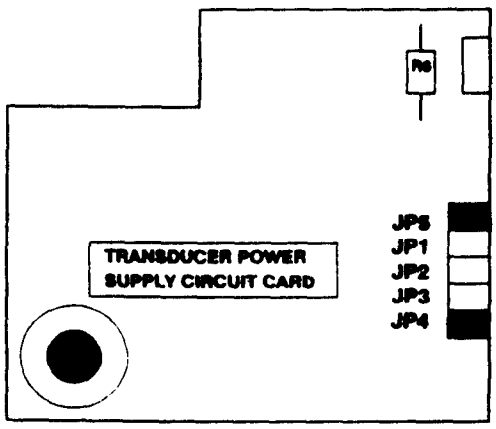
Voltage: Selectable on the board for 5, 7.5, 10, or 20 Volts up to 20 mA. Selected voltages are within +/- 20% of the nominal value and are stable to +/- 0.1%. When set for 5V, minimum load is 250Ω.

Current: Programmable via fixed resistor (R6) 0-20 mA with Max. compliance voltage of 15V.

Selected currents are within +/- 20% of the desired value if the resistor used is within +/- 10% of its calculated value, and are stable to +/- 0.1% if R6 has a temperature coefficient of +/- 50 ppm or better.

$$\text{R6 value: } R = \frac{2450 \text{ mV}}{\text{mA required}}$$

Selection of constant voltage or current value is made by proper jumper or precision resistor choice on the transmitter power supply circuit board as shown in Figure 6 below:



SELECTION OF CONSTANT VOLTAGE OR CURRENT VALUE IS MADE BY PROPER JUMPER OR PRECISION RESISTOR CHOICE ON THE TRANSDUCER POWER SUPPLY CIRCUIT BOARD.

	R6	JP 1	JP 2	JP 3	JP 4	JP 5
5V		X				X
7.5V			X			X
10V				X		X
20V					X	X
CURRENT	X					

HG203771U001

Figure 6. Transmitter Power Supply Configuration

NOTE TO USER: Option 3.5.5 (Serial Communications), and Option 3.5.4 (Retransmission) are mutually exclusive. Either can be ordered, but not both.

3.5.4 ANALOG RETRANSMISSION

See 4.2.34 through 4.2.37 for configuration.

Isolation: Optically isolated from input signal, signal ground, and power supply ground.

Isolation Voltage: 750V

Output Signal: 0-20 or 4-20 mA

Compliance Voltage: 12V Min.

Linearity: 0.5%

3.5.5 SERIAL COMMUNICATIONS

See 4.2.38 through 4.2.41 for configuration.

The Serial Communications Port will operate in one of two modes:

Data Logging Mode: In the Data Logging Mode the unit will output the measured value at a user-settable period of 1 to 86,400 sec. (1 sec. to 24 hours).

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EI Mode:	The unit will support the bidirectional multidrop EI Bisync Communications Protocol
Electrical Interface:	RS-422

NOTE TO USER: All parameters, EXCEPT those defining communications, may be set through the Serial Communications Port. More detailed communications information is shipped with the Monitor/Indicator when the option is installed.

3.6 PHYSICAL CHARACTERISTICS

Case Bezel Size:	1/8 DIN [48 mm (1.9 in) × 96 mm (3.8 in) × 9.4 mm (.37 in) in front of panel]
Case Size:	45 mm (1.77 in) × 92 mm (3.62 in) × 156 mm (6.14 in) behind face of panel
Shipping Weight:	1.25 lb (.567 kg)
Connections:	Screw Terminals (Maximum 12-gauge wire)

4.0 OPERATING INSTRUCTIONS

4.1 INTRODUCTION

4.1.1 Controls

The Monitor/Indicator is completely user-configurable. All controls, save the "Run/Configure" selector switch SW1, are located on the front bezel area. Procedures for configuring the instrument are described in this section of the manual.

4.1.2 Power "ON"

If required, a separate power switch should be installed. Immediately after power is applied, the display will reset. After approximately 4 seconds the display readout will change to its default condition, which is the display of the instantaneous value of the Measured Variable. This could be a process temperature, or some other numerical value, depending upon the input to the instrument.

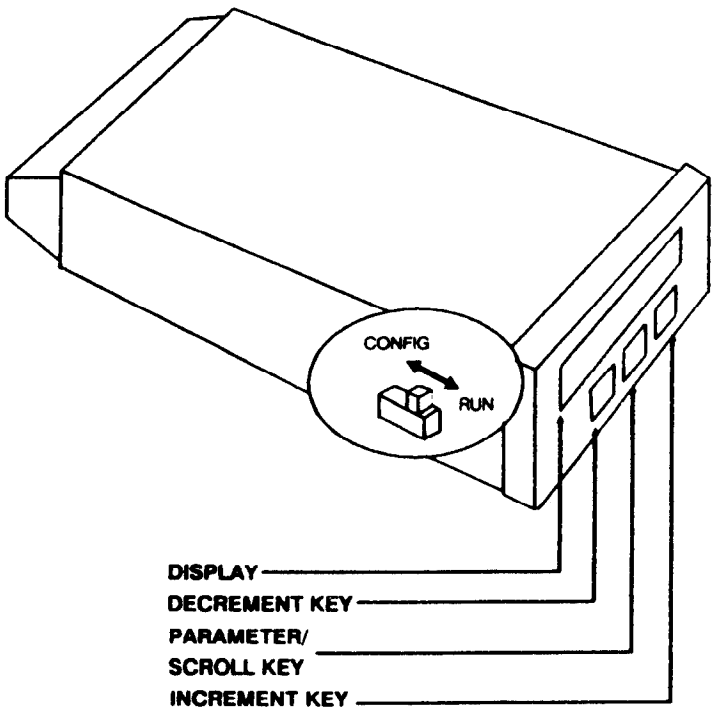


Figure 7. Process Monitor/Indicator Controls and Display

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4.1.3 Description of Controls

The user can configure the Monitor/Indicator via three front panel keys, which operate as follows:

4.1.3.1 PAR

This key is used to scroll through the configuration parameter menu in a fixed serial sequence. Pressing the key advances the scroll to the next Parameter Descriptor. About one second after the release of the key the display is updated with the instantaneous value of the selected parameter. If no more keys are pressed for the next 40 seconds, the display will change to its default display of the Measured Variable, and will continue to display that variable until PAR is again pressed.

4.1.3.2 Up-Arrow

This push-and-hold key is used to increment a parameter value setting. The increment rate increases when the key is held down.

The Up-Arrow key can also acknowledge alarms, clear the "HI/LO HOLD" display, select parameters for Access, and momentarily display actual electrical input values.

4.1.3.3 Down-Arrow

This push-and-hold key is used to decrement a parameter value setting. The decrement rate increases when the key is held down.

The Down-Arrow key is also used to clear the "HI/LO HOLD" display, change the Access type, momentarily display actual electrical input values.

4.1.3.4 Run/Configure Selector Switch

The Run/Configure Selector Switch (SW1) is mounted within the instrument case on the lower circuit board. It is accessed by turning the screw on the right side of the front panel counterclockwise until it releases from the case. The chassis can then be withdrawn from the case.

When SW1 is pushed toward the back of the case, the instrument is in "Configure" status, with all parameter functions available for configuration and display. When the switch is pushed toward the front, the instrument is in "Run" status, with selected functions displayed and configurable.

The interaction between SW1 and the configuration procedures is described more fully under the "ACCES" display description in Section 4.2.33 following.

4.2 CONFIGURATION

There are three basic areas of Configuration in the menu sequence:

1. Alarms
2. Input Selection and Scaling
3. Options (Retransmission and Communications)

In order to permit the fastest checking and change of set points, alarms appear first in the configuration menu sequence. However, initial Configuration should begin with the selection of "Input" in the second area. Alarms should be set and options defined *after* the input range has been established.

Refer to the Configuration Flow Diagram on p. 16. If a TC or RTD Input is chosen, the sequence follows down the left side of the diagram. If a voltage or millivoltage (including Custom TC) Input is chosen, the sequence follows down one of the paths on the right side of the diagram.

a. When initially configuring a TC or RTD input, the OFFSET is normally set at 0.0, the CJC is normally INTERNAL and FILTER should be set to 0.

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b. When initially configuring a V, mV or Custom TC input, be sure to consider the Decimal Point (4.2.21) and Units (4.2.22) choices carefully, since these choices affect all measured value displays. Again, FILTER should be set to 0.

The PROC choice (4.2.27) determines whether the displayed value will be directly in measured VOLTS, or will be LINEAR or NONLINEAR scaled to display values other than the direct input.

If NONLINEAR is chosen, the operation of the 5th order polynomial curve fit equation requires that *all 10 points* be configured using *equally spaced* input voltage values. LINEAR requires only the upper and lower values. **All "Vins" are actual calculated input voltage values. All "Vouts" are the *displayed values* for the same number "Vin."** *Before* configuring LINEAR or NONLINEAR, make sure that the DISPLAY HIGH (4.2.31) and DISPLAY LOW (4.2.32) are set properly to include *all* the values to be displayed including over and under range, if required.

Each configurable parameter is identified by a Display Descriptor. The configurable parameters, with their Display Descriptors (printed approximately as they are seen on the display) are listed below:

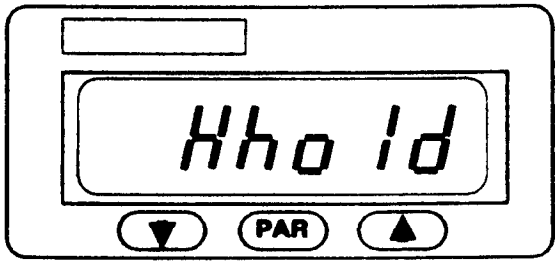


Figure 8. Typical Configuration Display

4.2.1 Alarm Acknowledge

Confirms the unit of measure (F, C, or other) and shows flashing "H", "L" or "d" when in alarm status. Pressing the Up-Arrow while on this display will cause a LATCHed alarm, that has cleared, to reset.

HIGH AND LOW PEAK HOLD

4.2.2 Hhold

Displays the high peak value of the Measured Variable since the last time this parameter was cleared. Both this parameter, and the Lhold, are important to the process engineer who is using the instrument to monitor a process variable which is not being recorded. The stored value can be cleared by depressing either the Up- or Down-Arrow, which will cause "Clr" to appear; and depressing PAR, which will clear the value.

4.2.3 Lhold

Displays the low peak value of the Measured Variable since the last time this parameter was cleared. The stored value can be cleared in the same manner as with Hhold above.

ALARM CHANNEL 1

4.2.4 H AL1

Displays the High Alarm Setpoint for ALARM CHANNEL 1. The value may be set and modified using the Up- and Down-Arrow keys. The alarm is NOT active unless "Hi r1" (below) is set to "LATCH" or "NON-LATCH".

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4.2.5 L AL1

Displays the Low Alarm Setpoint for ALARM CHANNEL 1. The value may be set and modified using the Up- and Down-Arrown keys. The alarm is NOT active unless "Lo r1" (below) is set to "LATCH" or "NON-LATCH".

4.2.6 SP 1

Displays the Deviation Setpoint for ALARM CHANNEL 1. The value may be set and modified using the Up- and Down-Arrow keys. Deviation alarm is NOT active unless "d r1" is set to "LATCH" or "NON-LATCH".

4.2.7 d AL1

Displays the Deviation Band for ALARM CHANNEL 1. The value may be modified by using the Up- and Down-Arrow keys. This value is the amount *above or below* the setpoint that will cause an alarm, utilizing only one of the instrument's relays. Alarm is NOT active unless "d r1" is set to "LATCH" or "NON-LATCH".

4.2.8 HyS 1

Displays the Hysteresis Setting for ALARM CHANNEL 1 in displayed value units (e.g. degrees F or C). The value may be modified using the Up- and Down-Arrow keys. Hysteresis is used to prevent too frequent "On-Off" alarm action when the input stays close to the alarm setpoint.

For example, on a high alarm point of 200 degrees, setting a hysteresis value of 4 degrees will result in the alarm not clearing until the input has decreased from 200 to 196 degrees.

4.2.9 Hi r1

Selects the Relay Actuation desired in response to the detection of a High Alarm on ALARM CHANNEL 1. The selections are:

OFF - no alarm action.
nLAtCH - non-latched relay action (momentary contact).
LAtCH - latched relay action (reset from Alarm Ack display, see 4.2.1).

4.2.10 Lo r1

Selects the Relay Actuation desired in response to the detection of a Low Alarm on ALARM CHANNEL 1. The selections are:

OFF - no alarm action.
nLAtCH - non-latched relay action.
LAtCH - latched relay action (reset from Alarm Ack display, see 4.2.1).

4.2.11 d r1

Selects the Relay Actuation desired in response to the detection of a Deviation Alarm on ALARM CHANNEL 1. The selections are:

OFF - no alarm action.
nLAtCH - non-latched relay action.
LAtCH - latched relay action (reset from Alarm Ack display, see 4.2.1).

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ALARM CHANNEL 2

This display, and all the following displays which relate to Alarm Channel 2, have their values set and modified, and actuations selected, in the same manner as the above descriptions for Alarm Channel 1.

4.2.12 H AL 2

4.2.13 L AL 2

4.2.14 SP 2

4.2.15 D AL2

4.2.16 HyS 2

4.2.17 Hi r2

4.2.18 Lo r2

4.2.19 d r2

INPUT RANGE AND LINEARIZATION

4.2.20 InPUt

Selects the desired input type and its appropriate linearization function. The selections are:

Thermocouples:	b,c,d,E,G2,J,L,CA(k),n/n,PL2,r,S,t.
RTDs:	rtdPA (PT100ANSI), rtdPD (PT100DIN), rtdn2 (Ni120), rtdn1 (Ni100), rtdcu (Cu10).
DC Volts:	0.02 dc, 0.1 dc, 1 dc, 5 dc.
AC Volts:	1 AC, 200 AC, 600 AC (Although appearing in the Vdc/TC/RTD menu, AC Volt ranges should be selected and used ONLY with instruments specified for AC inputs).

The following types are used to define the input range when Custom Thermocouple (.e.g not listed above) Linearization is required. The selections are:

Ctc20 - selects the 20 mV range with custom CJC (Cold Junction Compensation) active.

Ctc100 - selects the 100 mV range with custom CJC active.

NOTE: Both of the above choices require entry of a 10 point curve (see 4.2.28 and 4.2.29).

DECIMAL POINT POSITION

4.2.21 dP

Selects the decimal point position in the measured value display. Also chosen is the inclusion of the "F", "C" or an alpha character from UNITS (4.2.22) in the far right position. Decimal position choice is made by using the up and down arrows.

There are three choices for volts, millivolts and Custom TC's:

a. Up to four decimal positions without an alpha unit.

b. Up to three decimal positions with an alpha unit.

c. Single zero with no decimal point showing (same as choice a.)

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There are also three choices for TC's and RTD's:

a. Zero or one decimal with "F" or "C" at the right end.

b. Zero or one decimal without the "F" or "C" showing.

c. Single zero with no decimal point showing — this choice is not recommended since it will result in display of the temperature number *without recognizing any decimal position.*

4.2.22 unitS (appears only with V, mV or Custom TC inputs)

Allows the user to display any one of the following letters in the least significant display position:

A,b,C,d,E,F,G,H,i,j,L,P,o,r,t,u,blank

(The choice for "F" and "C" automatically appears when TC or RTD inputs are selected)

INPUT OFFSET

4.2.23 OFSEt (appears only with TC or RTD inputs)

Allows the user to enter a fixed offset value (in measured value units) to the display. The need for this can occur when two or more instruments (Monitor/ Indicators, recorders, etc) are monitoring the same Measured Variable but each instrument displays a value that is within accuracy but slighly different from the readings of the other instruments. The "Offset" parameter can be used to "match" another reading.

DEGREE C OR F SELECTION

4.2.24 C-F (appears only with TC or RTD inputs)

Selects either degrees C or F for the Measured Value display.

COLD (OR REFERENCE) JUNCTION COMPENSATION

4.2.25 CJC (appears only with TC or RTD inputs)

Selects the method of Cold Junction Compensation to be used. The selections are:

int - internal Cold Junction Compensation.
0 C - external 0° C referenced compensation.
45 C - external 45° C referenced compensation.
50 C - external 50° C referenced compensation.

INPUT SIGNAL FILTER

4.2.26 Filtr

Enables the operator to set a 1 to 80 second time constant for input value changes. It can be used to "damp" or stabilize noisy flow signals or high resolution temperature changes, etc.

CAUTION: If entering a high filter value (e.g. above 10), first set a low filter value (e.g. 1), return to the Measured Value display, then return to "Filtr" to increase the filter value. This procedure will avoid a possible extended period of Measured Value upset and "dampout" that may result if a high value is entered from a "0" value.

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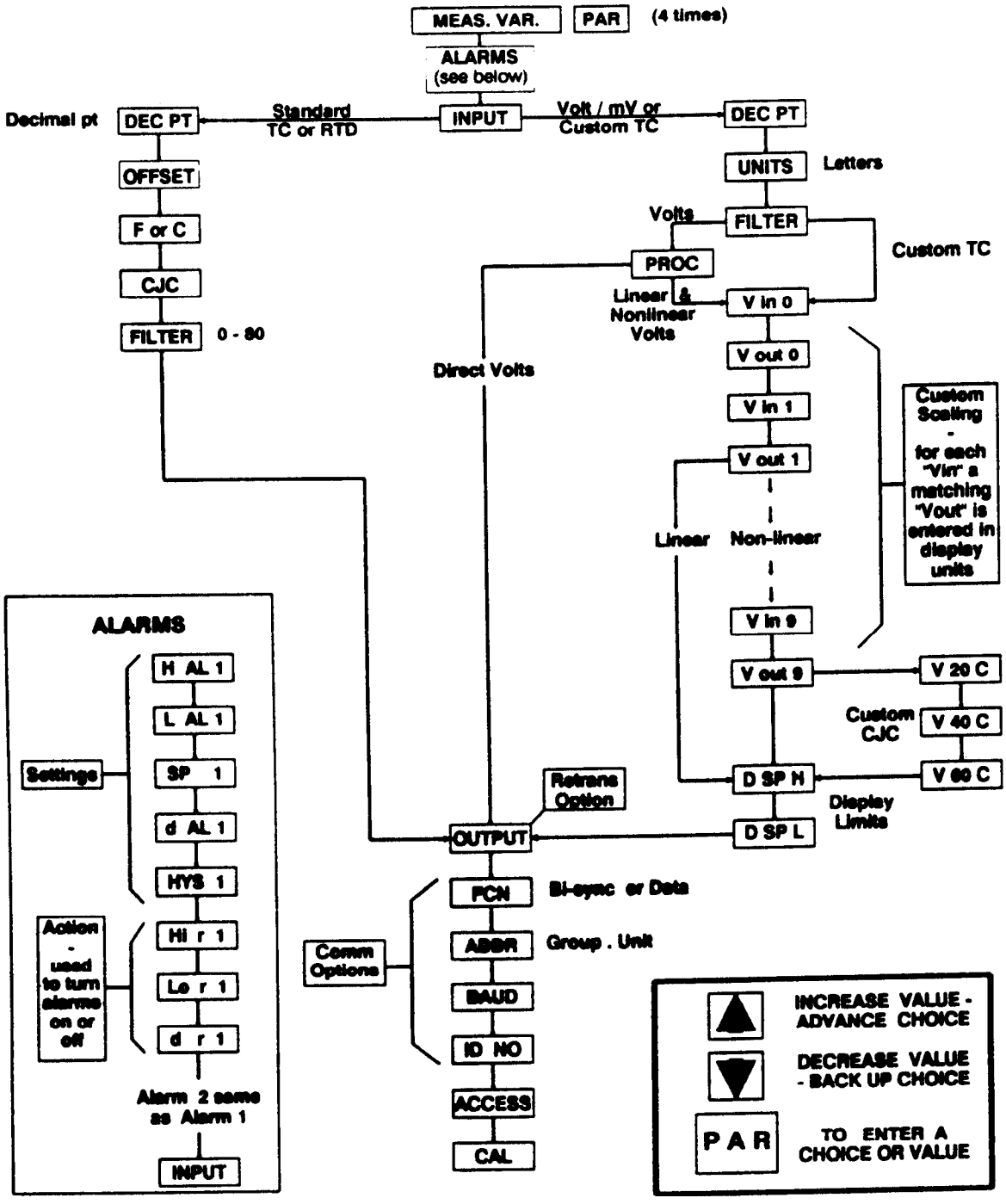


Figure 9. Configuration Flow Diagram

VOLTAGE INPUTS

The following five displays appear only when (V, mV or Custom TC Inputs have been selected:

4.2.27 Proc

Selects linear or non-linear operation when Voltage Input Ranges have been specified. Selections are:

vOLt – measured value is displayed in Direct Voltage Units.

LinE – linearly scales the Measured Value into Engineering Units.

nLinE – provides a 10-point non-linear Custom Linearization using a 5th order polynomial curve fit. *All 10 points must be entered.*

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4.2.28 Vin 0-9

These entries are the volt or millivolt values that will be seen at the input. Ten (10) *equally spaced* values are required if Nonlinear Scaling is selected. Only Vin 0 and Vin 1 are required to specify the endpoints if Linear Scaling is selected.

4.2.29 Vout 0-9

These 10 entries are the Engineering Units equivalents of the volt or millivolt values entered for vin 0-9. Vout 0 and Vout 1 also specify the endpoints of the Linear Scaling.

4.2.30 v20C, v40C, v60C (appears only with Custom TCs)

These values are the millivolt equivalents of 20, 40, and 60 C for use by the cold junction compensation. These entries are only required when using a non-standard thermocouple, and only appear when Ctc 20 or Ctc .1 (4.2.20) are chosen.

4.2.31 dSP H

Numeric value that determines the maximum display value when in the linear or non-linear mode.

4.2.32 dSP L

Numeric value that determines the minimum display value when in the linear or non-linear mode.

DISPLAY VISIBILITY SELECTION

4.2.33 ACCES

This parameter display denotes a very important functional area of the Monitor/Indicator. It allows the user to select which parameters he chooses to make accessible for "Change," "Recall-but-no change" or "Unaccessible". For example, Input Type and Calibration could be hidden from view while Alarm Setpoints could be viewable but not changeable.

NOTE: The "Run/Configure" selector switch SW1 within the instrument must be in the BACK, or "Configure" position to activate the "ACCES" display.

4.2.33.1 How to Render a Parameter Invisible, or Visible but Unchangeable to an Unauthorized Person:

- Place SW1 in the "Configure" position.
- Scroll to the "ACCES" display by depressing the "PAR" key.
- Press the "Up-Arrow" key once. You are now in the "ACCES" menu, and you scroll thru it by using the Up-Arrow key instead of the PAR key.
- As you scroll with the Up-Arrow key, you may note a "ladder" of horizontal dashes to the left of the descriptor displays. By using the "Down-Arrow", you can blank out these dashes altogether (hidden), or you can build a ladder of either 4 rungs (visible but not changeable), or 8 rungs (visible and changeable).

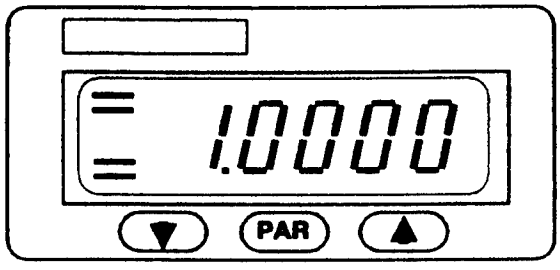


Figure 10. Diagram of "4-Rung" Display

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- For example, suppose you wanted to render the action of the high alarm and low alarm on relay 1 invisible. Using the Up-Arrow, scroll to "Hi r1". If a ladder appears, blank it out, using the Down-Arrow key. Do the same for "Lo r1".
- Move the "Run/Configure" switch to the back, or "Run" position. Now, when you scroll with the PAR key, you will be unable to find "Hi r1", or "Lo r1" displays. The alarms are STILL ACTIVE, with the "latched" or "not-latched" choice as originally set, but these actions are invisible from unauthorized view.
- Now, suppose you wanted to make the alarm setpoint values visible, but unchangeable. Simply place S1 in the "Configure," or back position, enter the ACCES menu, and instead of blanking out the ladders, make 4-rung ladders for high and low alarms on relay 1.
- Now, when you move S1 to the "Run", or forward position, you will find that the alarm setpoint values are visible, but you cannot change them by using the Up-or Down-Arrows.
- By entering the ACCES menu and making 8-rung ladders to the left of any descriptors, you will find that they are both visible and changeable in "Run" mode.

ANALOG RETRANSMISSION

The following four displays appear only when the Retransmission option is supplied:

4.2.34 OUTpu

Enables selection of either 0–20 mA or 4–20 mA outputs for Retransmission.

4.2.35 An 0

Sets the engineering units value that corresponds to a value of 0 mA at the Retransmitted Analog Output. (Will only appear if 0–20 is selected.)

4.2.36 An 4

Sets the engineering units value that corresponds to 4 mA at the Retransmitted Analog Output. (Will only appear if 4–20 is selected.)

4.2.37 An 20

Sets the engineering units value that corresponds to 20 mA at the Retransmitted Analog Output.

SERIAL COMMUNICATIONS

A separate Communication's Manual is supplied with the Communication's Option.

The following four displays are functional only when the Serial Communication's Option is supplied:

4.2.38 Fcn

Selects the mode of operation desired for the serial communications port OPTION. The selections are:

EI — EI bi-directional protocol.

OFF — disables the port.

1 thru 86,400 — selects the Data Logging Mode, which causes a periodic output of the Measured Value at equally spaced time intervals — 1–86,400 seconds. (86,400 seconds equals 24 hours.)

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4.2.39 Addr

Sets the instrument Group and Unit Address per the following format:

G.U, where G is the Group Address (0-9) and U is the Unit Address (0-9). For exampie, Group 1, Unit 2 = 1.2

4.2.40 bAud

Sets the communications port baud rate. Selections are: 300, 600, 1200, 2400, 4800, 9600, 19200.

4.2.41 id no

Allows the user to enter a computer readable five digit identification number, between 0 and 99999.

CALIBRATION

4.2.42 CAL

The Monitor/Indicator is precisely calibrated at manufacture and does not need periodic recalibration under normal conditions. If for any reason calibration must be done, the following procedure should be followed.

NOTE: The "F__ CAL" selection in the "CAL" menu is intended for *factory use only.* Improper use of this selection can result in the need to recalibrate and reconfigure the Monitor/Indicator.

For all calibrations, a precision reference standard *must be connected* to the Monitor/Indicator *before* the final calibration step is initiated.

1. CJC — Connect either a *Type J* thermocouple in an ice bath or use a Type J thermocouple calibrator connected with Type J wire and set for 0°C (32°F).

NOTE: The 0.02, 0.1 and 1.0 volt DC calibrations should be verified prior to calibrating the Cold Junction Compensation as they are used for thermocouple calibration and measurement.

2. RTD — Connect a precision 10, 20, 100 or 400 Ohm resistance (as required) between terminals 19 and 20, and jumper terminals 17, 18 and 20 together.

3. Vdc — connect a precision 0.02, 0.1, 1.0 or 5.0 volt DC source (as required) between terminals 19 and 20.

4. Vac — Connect a precision ac source between terminal 19 and: terminal 20 for 1.0 Vac, terminal 18 for 200 Vac or terminal 17 for 600 Vac.

5. Nonlinear "v in 0" through "v in 9" — The values for an entered nonlinear custom curve can be calibrated against actual input values.

6. Analog Output — With a 250 Ohm precision resistor across terminals 19 and 20, connect terminal 7 to 20 and 6 to 19. This calibration is *necessary* if a Retransmission Option is added after shipment from the factory.

The calibration sequence for each of the preceding inputs is essentially the same:

a. Use the PAR key to scroll through the menu to "CAL" and wait until this changes to ----- (five dashes).
b. Use the Up and Down arrows to select the input to be calibrated, then use "PAR" to choose that input for calibration.
c. Wait until the display changes to "no" and use the Up arrow to change it to "Yes".
d. *With a precision reference properly connected,* press "PAR" to begin calibration.

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e. The input being calibrated will be displayed while calculations are taking place. After the prompt "CAL" reappears and changes to -----, select another input or use "PAR" to exit the calibration mode.

4.3 APPLICATION EXAMPLE OF CONFIGURATION PROCEDURES

The application involves the use of a Process Monitor/Indicator to monitor the temperature inside a cooking kettle in a food processing plant. Assume that you have just installed the Monitor/Indicator in the control room. You are using a Type "T" thermocouple, which is installed through the side of the kettle. You want to set both a high and low alarm point for the process, because it is vital for product quality not to cook it either below or above certain temperatures. You also want the kettle operator to observe the temperature, and you have instructed him in how to read the alarm temperatures. But you don't want him to be able to change the alarm points. How would you configure the instrument for this application?

1. Turn power "On" and observe if the display area lights up.

2. Loosen the front panel screw and slide the chassis part way out of the case. Move the "Run/Configure" switch SW1 back to the "Confgure" position. Re-insert the chassis and tighten the screw.

3. Next, consider how you want the alarms set up. You have two relays, and you could set a high and low alarm on one relay. But if an alarm sounded it would be difficult to establish whether it was high or low. So, set the high alarm on one relay, and the low alarm on the other.

4. Then scroll to "H AL 1" and set a High Alarm Point. You do not want a Low or Deviation alarm on Relay 1, so it is not necessary to make entries for "Lo Al 1", "SP 1", and "d AL 1". Relay actuation should be "Latch" set on "Hi r1". Set relay actuation at "OFF" on "Lo r1" and "d r1".

5. Scroll to "L AL 2" and set a Low Alarm Point. On "d r2" and "Hi r2" set "OFF" for relay actuation, and "Latch" on "Lo r2".

6. You might also instruct the kettle operator how to scroll to the "Hhold" and Lhold" displays, so he can observe Peak and Low Temperatures achieved during a cooking period, and report them for possible future adjustment of the alarm points.

7. Scroll the PAR key to "InPUt". Using the Up-Arrow key, set the thermocouple type to "t". Scroll PAR to "CJC" and set "int" with the Up-Arrow key. Scroll PAR to "C—F" and set "F" for degrees Fahrenheit with the Up-Arrow.

8. Next, scroll to the "ACCES" menu and establish 4-rung ladders for "H AL 1" and "L AL 2". This will allow viewing but no change of the alarm setpoints.

9. Withdraw the chassis and move the "Run/Configure" switch to the rear, or "Run" position.

10. The Monitor/Indicator is now configured for kettle temperature monitoring with high and low alarms, with the alarm values visible to the operator, but unchangeable from the front of the instrument.

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5.0 OPTIONS AND ACCESSORIES

5.1 EIGHT CHANNEL INPUT SELECTOR STATION

The Selector Station permits the selection of any one of eight, two-wire inputs. Gold switch contacts are used, making it suitable for thermocouple inputs. It is housed in the same size case as the Monitor/Indicator and is mounted with the same type mounting jacks.

The following drawing shows the input connections for the Selector Station:

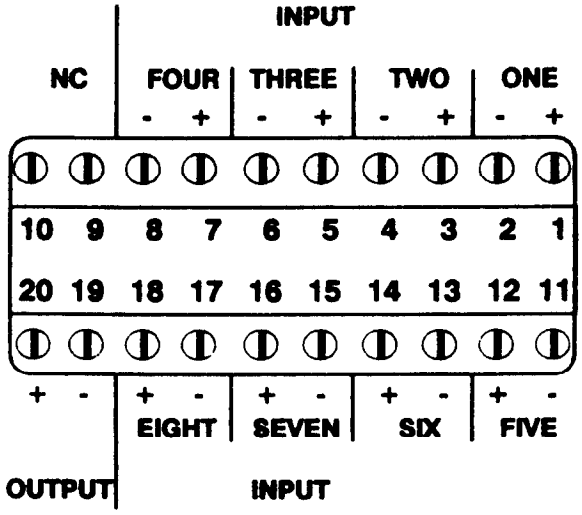


Figure 11. Selector Station Connection Diagram

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5.2 ADDITION OF OPTION CARDS

Alarm relays, Transducer Power Supply, Retransmitted Signal and Digital Communications can be added to any Monitor/Indicator by the addition of separate circuit cards.

The following procedure should be used when adding option cards to the Monitor/Indicator:

INSTRUCTIONS FOR ADDING OPTION CARDS TO THE PROCESS MONITOR/INDICATOR

1. Caution - This instrument contains *electrostatic sensitive* components. Use proper precautions when handling circuit cards.
2. Turn front panel screw fully counterclockwise and pull circuit card assembly from case.
3. Carefully remove the upper circuit card from its front panel retaining latches and place cards side-by-side on a properly grounded surface.
4. Insert two option card spacers into holes at position "A", "B" or "C" (as required) on the upper or lower circuit card (with locking ends into upper or lower card).
5. Insert the option card by aligning the connectors on the option card with the pins on the upper or lower card and carefully pressing the two cards together until the spacers seat in the option card.
6. Re-assemble the upper and lower cards with the front panel, making sure that the card interconnect ribbon is folded between the two cards.
7. Re-insert card assembly into case. Apply pressure on the left side of the front panel while tightening the screw to assure proper seating of the cards into the rear connector assembly.

OPTION CARD LOCATIONS

ALARM RELAY	POSITION	"A"
ANALOG RETRANSMISSION	POSITION	"B" (SEE MANUAL FOR REQUIRED CALIBRATION).
OR		
COMMUNICATIONS	POSITION	"B"
TRANSDUCER POWER SUPPLY	POSITION	"C" (SEE MANUAL FOR POSITION OF VOLTAGE LINKS AND VALUE FOR CURRENT SETTING RESISTOR).

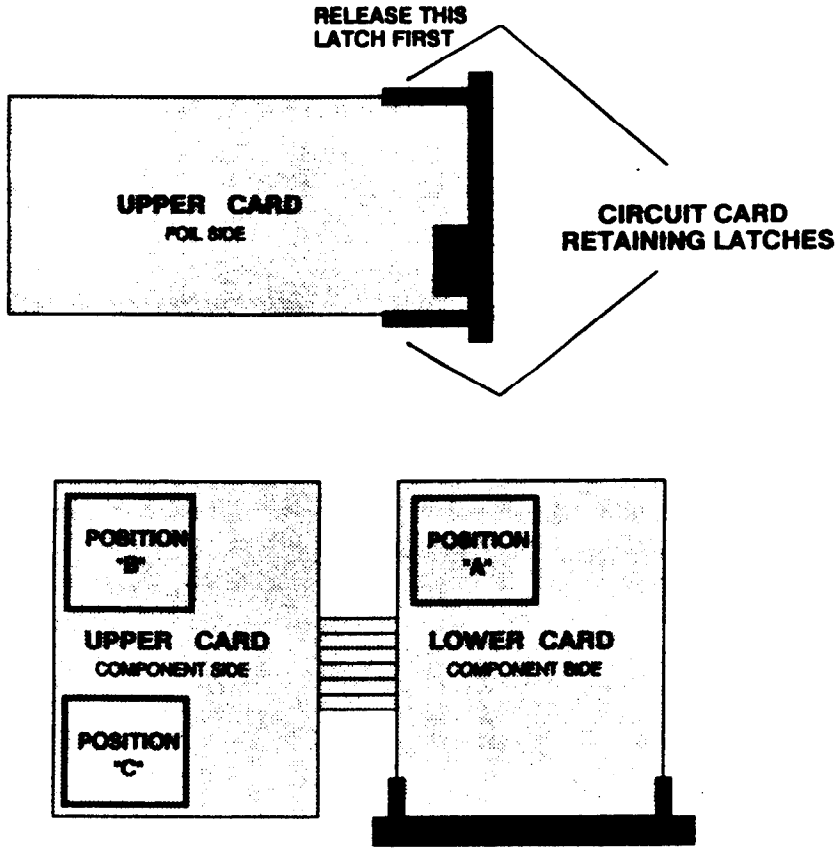


Figure 12. Option Card Installation

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6.0 SERVICE AND MAINTENANCE

6.1 FACTORY WARRANTY

This product is warranted against defects in material and workmanship for 12 months from the date of shipment. During the warranty period the manufacturer will, at its option, either repair or replace products which prove to be defective.

Within areas designated for service travel by the manufacturer or its representatives, warranty service will be provided at the buyer's facility at no charge. Outside the service areas, warranty service at the buyer's facility can be provided only upon prior agreement by the manufacturer or its representatives, and the buyer may be required to pay round trip travel expenses.

In all cases the buyer has the option of returning the product for warranty service to a facility designated by the manufacturer or its representatives. They buyer shall prepay shipping charges for products returned to a service facility, and the manufacturer or its representatives shall pay for return of the product to the buyer.

Limitations on Above Warranty Statement

The foregoing warranty shall not apply to defects arising from:

- Improper or inadequate maintenance.
- Improper or inadequate site preparation.
- Unauthorized modification or misuse.
- Operation of the product in unfavorable environments, especially high temperatures, high humidity, corrosive, or other damaging atmospheres.

No other warranty is expressed or implied.

6.2 MAINTENANCE

Keep the instrument case and front window clean with an anti-static cleaner and soft cloth. Prevent excessive dust build-up around the vent slots on the case sides.

No user adjustments (other than those decribed in this manual) or are required.

6.3 TROUBLESHOOTING

Before returning an apparently faulty instrument to factory or branch service departments, first check the following:

- Is power (of the proper supply) reaching the instrument?
- Are circuit board plug-ins firmly seated?
- Fuse blown?
- If one of the plug-in OPTIONS is not operating, option and replacement may be all that is required. For other problems, the instrument should be returned to the manufacturer for repair.

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GROUNDING

All "ground" terminals must be securely connected to an earth ground by conductors appropriate to the current ratings of the circuits involved. The Model 842 has internal circuits which are isolated or "floating", in order to prevent occurrence of a ground loop in signal circuits. To avoid possible shock hazards in the event of an internal fault causing breakdown of insulation, it is recommended that all connected equipment be enclosed in a grounded metal enclosure. Sheaths of thermocouples (or other sensor wires) should be properly grounded by a separate conductor, instead of being dependent upon grounding via the equipment framework.

SUPPLY ISOLATORS

Every electrical system should be provided with means for isolating the system from the AC supply so as to allow safe working conditions during repair and maintenance. SCRs and TRIACS are not adequate to isolate the supply, and should always be backed by a suitable mechanical disconnect switch.

TEMPERATURE SENSOR FAILURE

In the event of sensor failure (thermocouple break or open circuit), the instrument might display erroneous readings before indicating the input fault condition. For example, upon thermocouple break, the display reading changes rapidly before an indication occurs.

HAZARDOUS ATMOSPHERES

The Model 842 is not designed for use in areas subject to hazardous atmospheres. It should not be connected to a circuit which passes into or through a hazardous area unless appropriate precautions are taken, even though the instrument itself may be located in a safe area. Such an installation should conform to Factory Mutual and Underwriters' Laboratory requirements.

TROUBLESHOOTING

Before beginning any troubleshooting, make certain all electrical supply to the Model 842 is shut off and isolated. Instruments suspected of being faulty should be disconnected and removed to a properly equipped repair area for testing. Any attempt to troubleshoot a device that is still installed could be hazardous to personnel and equipment.

CALL FOR HELP! If you have any questions regarding any aspect of installation, operation, or service on your Eurotherm Corporation equipment, please contact EUROTHERM at the location listed on the back cover of this manual.

Installation and Operation Manual
Eurotherm Model 842 Process Monitor/Indicator

Printed in USA

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MODEL 842 PROCESS MONITOR/INDICATOR
OPERATION AND INSTALLATION MANUAL

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