LEOPARD FAMILY

FL-B101D40H Version 2

Leopard Bargraph Temperature Meter 101 Segment, 4 Digit 0.32" LEDs in a 9/64 DIN CASE

Smart Tricolor or mono-color digital bargraph with four fully programmable set points for J, K, R, and T type thermocouples and RTD inputs.

General Features

- Thermocouple (J, K, R and T types) or RTD (Pt-100. 385 and 392 curves. 3 wire/4wire). Digitally Linearized.
- Optional isolated 16 bit analog output. User or factory scalable to 4 to 20 mA, 0 to 20 mA or 0 to 10 V across any desired digital span from ± one count to the full scale range of – 1999 to 9999 (12000 counts).
- A Programmable Tricolor (Red-Green-Orange) or mono color (red or green), 101 segment high brightness bargraph. Vertical or optional horizontal format.
- Red 4-digit LED display with a range of -1999 to 9999 (12000 counts). Optional green digital display.
- Front panel LED annunciators provide indication of setpoint status.
- Two 10 Amp Form C, and two 5 Amp Form A relays available
- Auto-sensing AC/DC power supply. For voltages between **85-265 V AC / 95-370 V DC (PS1)** or 18-48 V AC / 10-72 V DC (PS2).
- 24 V DC excitation is available to power external 4/20mA transmitters and 5 or 10 V DC excitation is available for resistance bridge type sensors.
- Provision to connect an external programming lockout switch.
- Provision for external DIM switch to reduce the brightest display setting by 50%.
- Optional NEMA-4 front cover.
- Automatic intelligent averaging, smooths noisy signals while providing a fast display response to real level changes.

Software Features

- The bargraph can display, full scale, any desired portion of the digital reading.
- Bargraph center zero function.
- Four programmable setpoints.
- Setpoint 1 has delay-on-make and delay-on-break plus a special "pump on pump off" mode that creates a Hysteresis Band between SP1 and SP2.
- Relay activation can be selected to occur above (hi) or below (Lo) each setpoint.
- Digital display blanking.
- Decimal point setting.
- Four-level brightness control of the bargraph and digital display.

Input Module Compatibility

There are 3 different Plug-in Modular Input Signal Conditioners for this specialized temperature only member of the Leopard Family. IT10 is for J, K, T and R thermocouples. IT11 is for 3 wire/4 wire Pt-100 RTD inputs. IT15 is for 3 wire/4 wire Pt-1000 RTD inputs.

LEOPARD

Specifications

Input Specs: .....Depends on Input signal conditioner
A/D Converter:.....14 bit single slope
Accuracy:.....±(0.05% of reading + 2 counts)
Temp. Coeff.: .....100 ppm/°C (Typical)
Warm up time:.....2 minutes
Conversion Rate: .....10 conversions per second (Typical)
Digital Display:.....**4 digit 0.31" LED red (std)**, green (optn)
Range –1999 to 9999 counts.
Bargraph Display:.....**101 segment 4" red vertical (std)**,
green or tricolor (optn), horizontal (optn)
Polarity:.....Assumed positive. Displays – negative
Decimal Selection:....Front panel button selectable, X•X•X•X•
Positive Overrange:..Bargraph and top segments of digital display flash.
Negative Overrange:.First segment of bargraph and bottom segments of digital display flash.
Relay Output: .....Two 5 Amp Form A relays and Two 10 Amp Form C relays.
Analog Output:.....Isolated 16 bit user scalable mA or V
OIC (mA out).....4-20 mA @ 0 to 500Ω max loop resistance
OIV (volts out)..... 0-10 V DC @ 500 Ω or higher resistance
Power Supply: .....AC/DC Auto sensing wide range supply
PS1 (std) .....**85-265 VAC / 95-370 VDC @ 2.5W max 4.2W**
PS2 .....18-48 VAC / 10-72 VDC @ 2.5W max 4.2W
Operating Temp.:.....0 to 60°C
Storage Temp: .....–20°C to 70°C
Relative Humidity: ....95% (non condensing)
Case Dimensions:.....9/64 DIN (Bezel 36Wx144Hmm)
Depth behind bezel (5.83") 148mm
Plus (0.7") 18mm for connectors
Weight:.....9.5 oz., 12 oz when packed

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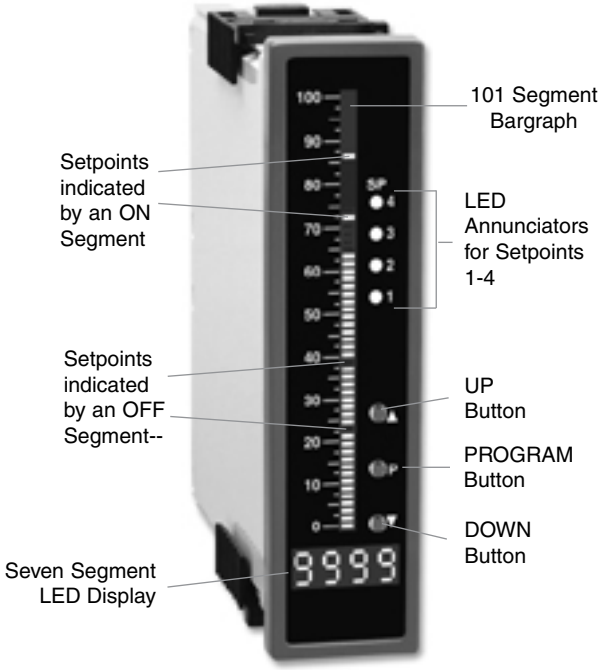
Controls and Indicators



Front Panel Buttons

Program Button

The [P] button is used to move from one program step to the next. When pressed at the same time as the [▲] button, it initiates the **calibration mode**. When pressed at the same time as the [▼] button, it initiates the **setpoint setting mode**.

Up Button

When in the operational display, pressing the [▲] button allows you to view the setting of the saved **Peak and Valley Values**.

When setting a displayed parameter during programming, the [▲] button is used to increase the value of the displayed parameter.

Down Button

When in the operational display, pressing the [▼] button allows you to change the **Brightness Level** as well as to view the setting of the setpoints **SP1, SP2, SP3 & SP4**.

When setting a displayed parameter during programming, the [▼] button is used to decrease the value of the displayed parameter.

Front Panel LED Display

Annunciator LEDs

The annunciator LEDs indicate the alarm status. They are labeled from bottom to top: SP1, SP2, SP3, SP4.

Digital LED Displays

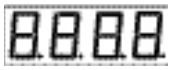
The digital LED displays are used to display the meter input signal readings. They also display the programming settings during programming.

Setpoint Indication

The position of setpoints on the bargraph display are indicated by an ON or OFF segment dependent on the bargraph display being above or below the setpoint.

Programming Conventions

To explain software programming procedures, logic diagrams are used to visually assist in following the programming steps. The following symbols are used throughout the logic diagrams to represent the buttons and indicators on the meter:

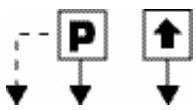


This symbol represents the OPERATIONAL DISPLAY.

This is the PROGRAM button.

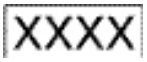
This is the UP button.

This is the DOWN button.

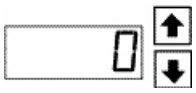


When a button is shown, press and release it to go onto the next step in the direction indicated by the arrow. When an alternative dotted line is shown, this indicates that an alternative logic branch will be followed when a particular option is present.

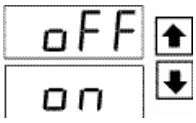
When two buttons are shown side by side and enclosed by a dotted line, they must be pressed at the same time then released to go onto the next programming step.



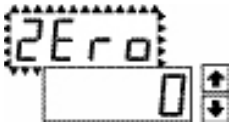
If an X appears through a digit, it means that any number displayed in that digit is not relevant to the function being explained.



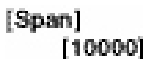
When the [▲] and [▼] buttons are shown together, the display value can be increased by pressing and releasing the [▲] button or decreased by pressing and releasing the [▼] button.



When the [▲] and [▼] buttons are shown with two displays, either display can be selected by pressing and releasing the [▲] or [▼] buttons.

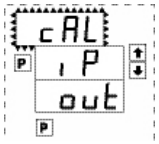


When two displays are shown together with bursts, this indicates that the display is toggling (flashing) between the name of the function and the value.



Text or numbers shown between square brackets in a procedure indicate the programming code name of the function or the value displayed on the meter display.

When there are more than two display selections they are shown in brackets below the first display and are also selectable by pressing and releasing the [▲] or [▼] buttons.



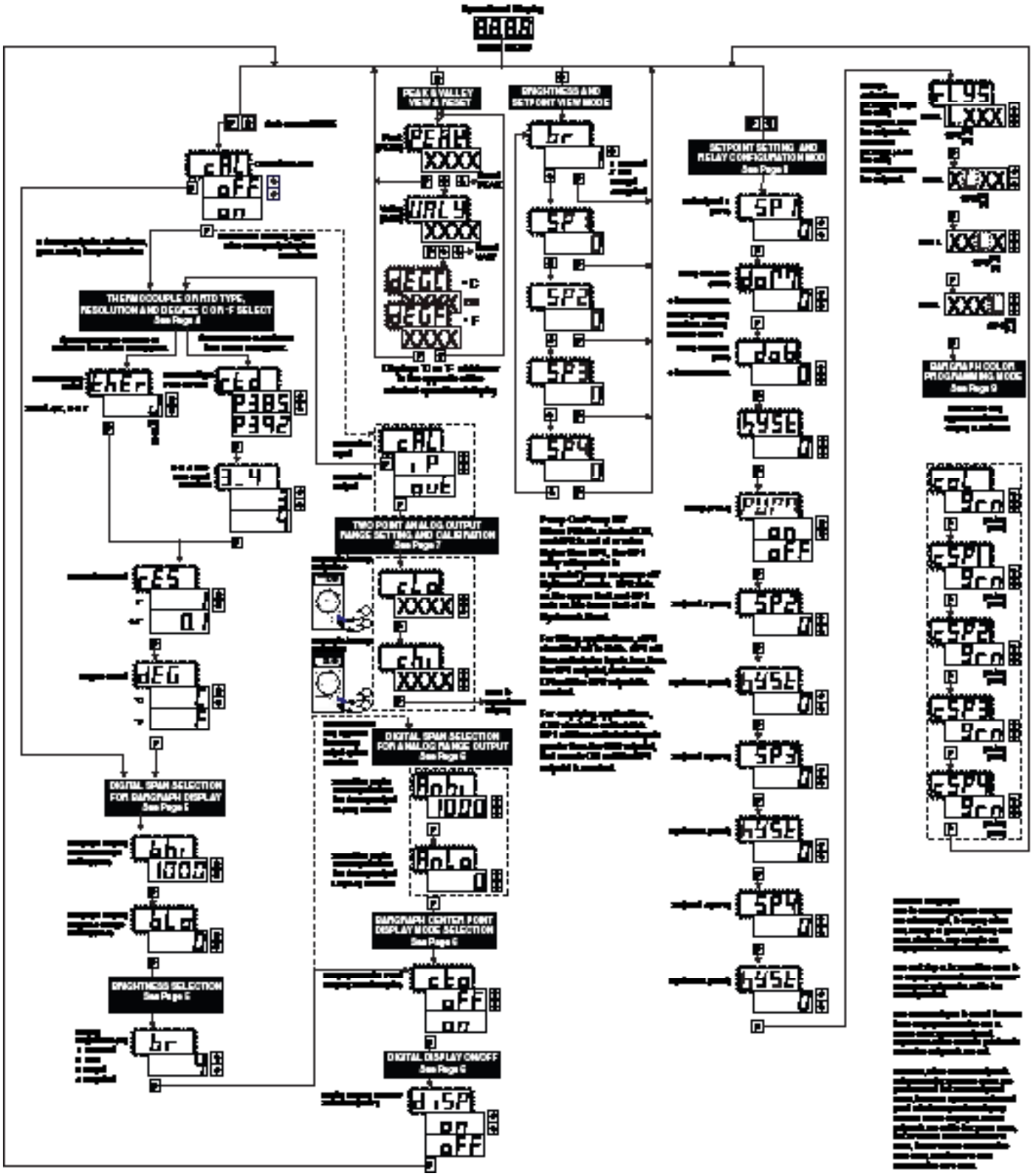
A dotted line enclosing an entire logic diagram indicates that programming branch will appear only when a particular option is present.

Software Logic Tree

The FL-B101D40H is an intelligent bargraph meter with a hierarchical software structure designed for easy programming and operation, as shown below in the software logic tree.

Software Version is Displayed on Power-up

When power is applied, all segments of the bargraph and digital display light up for 3 seconds. The version number of the installed software is then displayed for 2 seconds, after which,



15 Second Program Timeout

Except for ZERO and SPAN settings in the Two Point Digital Calibration Mode and the Analog Output Range Setting and Calibration Mode (cLo and chi), the meter has a 15 second program timeout. If no buttons are pressed for 15 seconds in any of the other programming sequences, the meter will exit the programming mode and return to the operational display. Any program changes that were made prior to pressing the P button in the preceding step will not be saved.

Calibration Procedure

STEP A Enter the Calibration Mode

1) Press the P and ↑ buttons at the same time. Display toggles between [CAL] and [oFF].
2) Press the ↑ or ↓ button. Display changes from [oFF] to [on].
3) Press the P button.

STEP B If the Display toggles between [CAL] and [out] the optional Analog Output hardware is installed. In which case select [CAL] [out]. Display toggles between [thEr] or [rtd] depending on whether a IT10 Thermocouple Input Module or a IT11 RTD Input Module are detected by the soft ware. If no optional output hardware is installed the menu will skip directly to STEP C.

Thermocouple type or RTD type selection mode

STEP C Sensor Type Selection

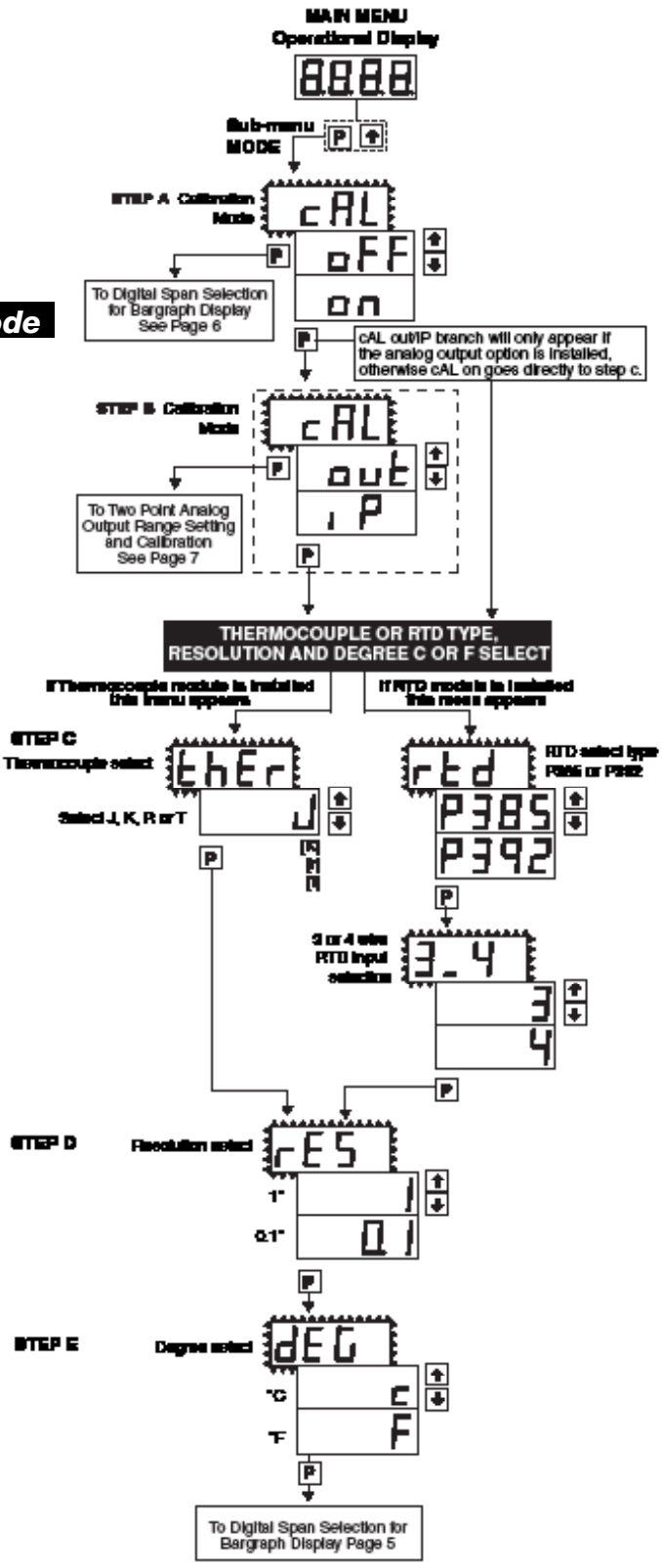
1) Using the ↑ and ↓ buttons, adjust the display to the desired sensor type.
2) Press the P button. Display toggles between [rES] resolution select and previous [rES] setting.

STEP D Set the Resolution

1) Using the ↑ and ↓ buttons, adjust the display to the desired resolution [rES] value.
2) Press the P button. Display toggles between [dEG] and previous [dEG] selection.

STEP E Selection of Degree C or Degree F

1) Using the ↑ and ↓ buttons, adjust the display to either ˚C or ˚F.
2) Press the P button.



Sensor Range Table

Input Sensor	Resolution	°C Range	°F Range
J T/C	1°	-[illegible] to 760°C	-[illegible] to 1400°F
	0.1°	-120.0 to 999.9°C	-[illegible] to 999.9°F
K T/C	1°	-120 to 1370°C	-200 to 2500°F
	0.1°	-[illegible] to 999.9°C	-[illegible] to 999.9°F
R T/C	1°	0 to 1760°C	32 to 3200°F
	0.1°	0 to 999.9°C	32.0 to 999.9°F
T T/C	1°	-[illegible] to 400°C	-200 to 750°F
	0.1°	-[illegible] to 400.0°C	-[illegible] to 750.0°F
100Ω RTD (P385 curve)	1°	-200 to 600°C	-200 to 1400°F
	0.1°	-[illegible] to 600.0°C	-[illegible] to 999.9°F
100Ω RTD (P392 curve)	1°	-200 to 600°C	-200 to 1400°F
	0.1°	-[illegible] to 600.0°C	-[illegible] to 999.9°F

Input Module Calibration Procedure

See page 12 for the Calibration instructions of each Input Module type.

Digital Span Selection For Bargraph Display

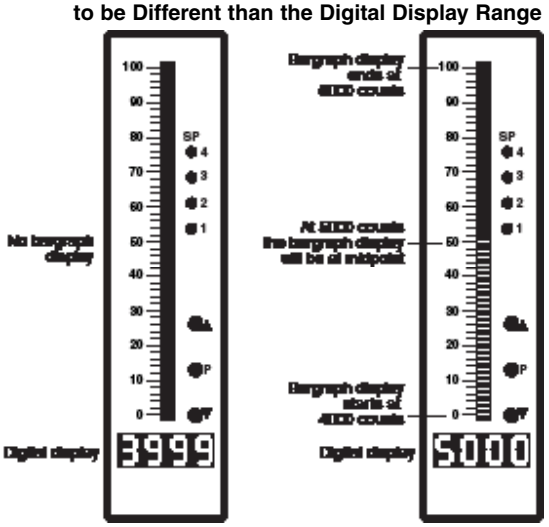
The bargraph can be set to display full scale (0-101 bars) any portion of the digital reading from a minimum of 100 counts to a maximum of 12,000 counts. This provides higher resolution bargraph indication for those applications where the normal operating input signal range is less than the desired full scale display range of the digital display.

For Example:

If the full scale range of the meter has been set from -1999 to 9999 (0-12,000 counts), but the normal operating range of the input signal is between 4000 & 6000. The bargraph high parameter [bhi] can be set to 6000 and the bargraph low parameter [bLo] can be set to 4000.

This means that although the meter could digitally display a signal from -1999 to 9999 (0-12,000 counts), the bargraph display only begins to function at a reading of 4000, and reaches full scale indication at a reading of 6000. Although the digital display will continue reading up to 9999 before indicating overrange, the bargraph display will indicate its overrange by flashing for readings above 6000.

Example of Setting the Digital Span of the Bargraph Display to be Different than the Digital Display Range



Bargraph does not light up for Input Signals up to 3999 counts

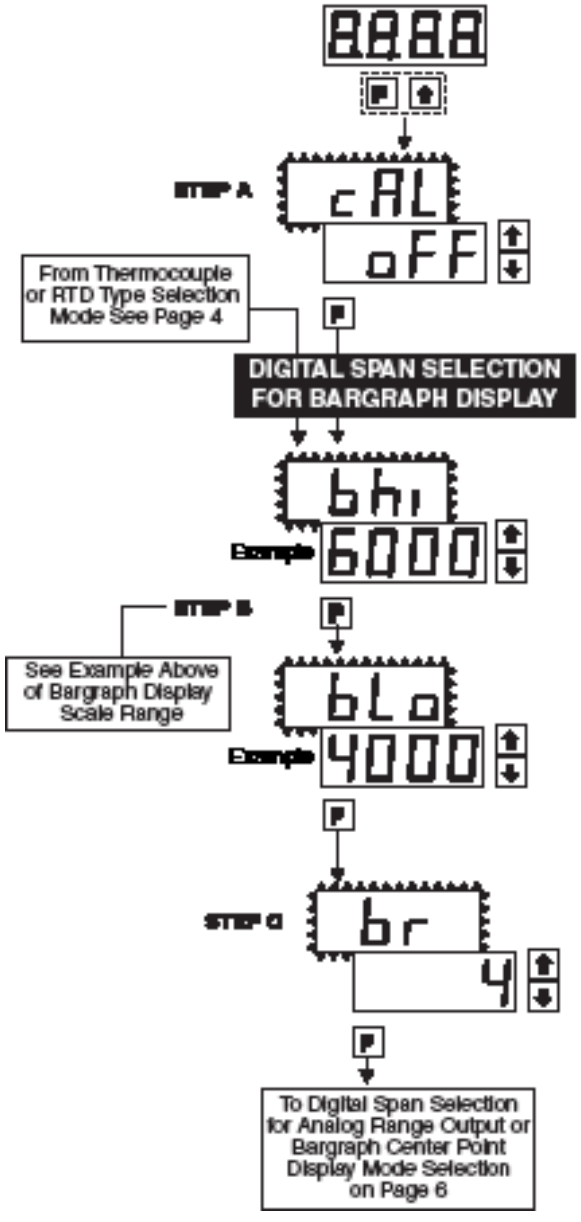
Bargraph lights up for Input Signals above 4000 counts

STEP A Enter the Calibration Sub Menu Mode

1) Press the P and ⬆ buttons at the same time. Display toggles between [CAL] and [oFF].
2) Press the P button. Display toggles between [bhi] and the previous setting.

STEP B Set the Digital Span of the Bargraph Display (See example above)

1) Using the ⬆ and ⬇ buttons, adjust the display to the desired high parameter reading, e.g. 6000 counts.
2) Press the P button. Display toggles between [bLo] and the previous setting.
3) Using the ⬆ and ⬇ buttons, adjust the display to the desired low parameter reading, e.g. 4000 counts.
4) Press the P button. Display changes from [4000] to [dP].



Brightness Selection

STEP C Press the P button. Display toggles between [br] and the previous brightness setting.

Set the Bargraph and Digital Display Brightness

1) Using the ⬆ and ⬇ buttons, adjust the display to the desired brightness setting (4 is the brightest setting).
2) Press the P button. Display toggles between [Anhi] and the previous [Anhi] setting.

Note: If at this point, the display skips directly to STEP G and toggles between [Cto] and [oFF], the software is detecting that the optional analog output hardware is NOT installed.

Digital Span Selection for Analog Range Output

STEP D Selecting the [Anhi] Digital Value for Analog High Output

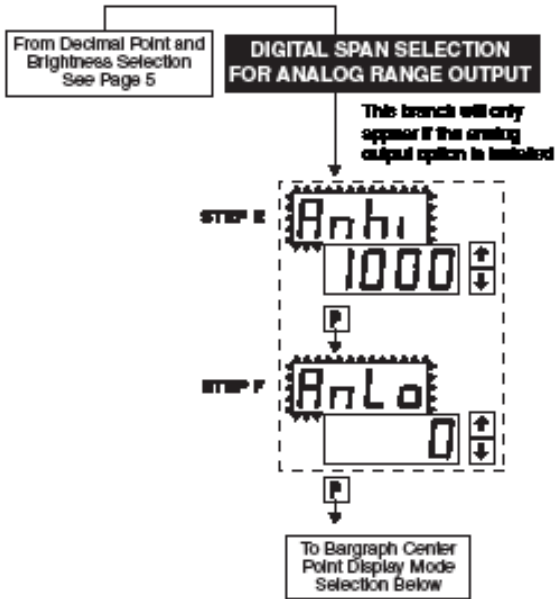
1) Using the ⬆ and ⬇ buttons, adjust the display to the desired digital value at which the [chi] Calibrated Analog High output will occur. For digital readings outside the digital span selected, the analog output will linearly rise above the value set for chi, up to the maximum analog output capability. However, the analog output will not go lower than the calibrated value set for cLo (see below).
2) Press the P button. Display toggles between [AnLo] and previous [AnLo] setting.

STEP E Selecting the [AnLo] Digital Value for Analog Low Output

1) Using the ⬆ and ⬇ buttons, adjust the display to the desired digital value at which the [cLo] Calibrated Analog Low output will occur. For Digital readings outside the Digital Span selected, the analog output will not go lower than the calibrated value set for cLo.
2) Press the P button. The display toggles between [cto] and [oFF].

Note: Any two digital span points from –1999 to 9999 can be selected. The digital values for [Anhi] analog high and [AnLo] analog low can be reversed to provide a 20 to 4mA output. The digital span selected can be as small as two counts, when using the analog output to function as a Control or Alarm Driver. Small digital spans will cause the high resolution 16 bit D to A to increment digitally in stair case steps.

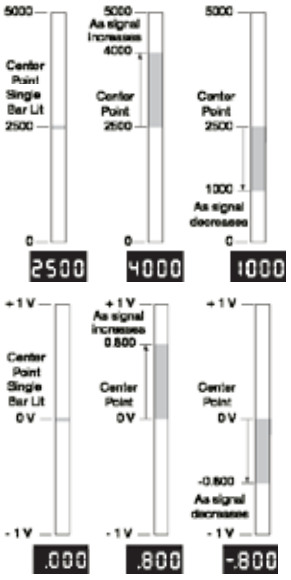
See Two Point Analog Output Range Setting and Calibration at the top of the next page.



Bargraph Center Point Display Mode Selection

Example of Using the Center Point Bargraph Display Mode with a Unipolar Input

If the meter's full scale range is set to 5000 counts, the midpoint would be 2500 counts. If a signal of 2500 counts is applied only one segment at the 2500 count mark will light up. If a signal of 4000 counts is applied the segments between the center segment (2500 counts) and the 4000 count mark light up.
If a signal of 1000 counts is applied, the segments between the center segment (2500 counts) and the 1000 count mark will light up.



Example of Using the Center Point Bargraph Display Mode with Bipolar Signal Inputs

The meter may also be calibrated to display symmetrical bipolar signals such as ± 1 V or ± 10 V. When the center point display mode is selected, it will then function as a center zero meter. When positive signals are applied, the bar will go up from the center point, and when negative signals are applied, the bar will go down from the center point.

STEP F Bargraph Center Point Mode Selection (See example above)

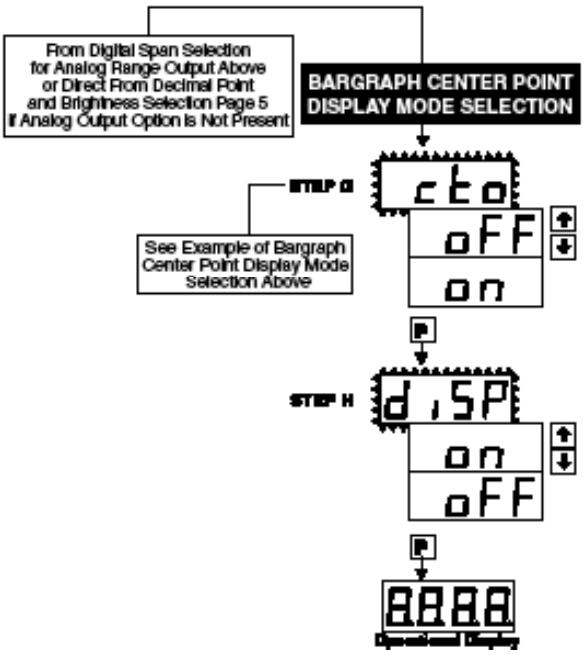
1) To select bargraph center point mode, press the ⬆ or ⬇ button. Display changes from [oFF] to [on].
2) Press the P button. Display toggles between [diSP] and [on] or [oFF].

STEP G Digital Display ON/OFF Selection

1) To set the display to [oFF], press the ⬆ or ⬇ button. Display toggles between [diSP] and [oFF].
2) Press the P button. The display exits the calibration mode and returns to the operational display. Only the bargraph display is on and the digital display is off.

If the digital display is selected to be off, pressing any button to make programming changes or to view setpoints activates the digital display. When the procedure is complete, the digital display will then automatically switch off.

The Display/Bargraph settings are now complete.



Two Point Analog Output Range Setting and Calibration

Determine if the Analog Output Selection Header is in the 4 to 20mA (0-20mA) position or the 0 to 10VDC position. If necessary, the module may have to be removed and the header position changed (see Component Layout below).

Note: Always disconnect power from the meter before removing the analog output module to adjust the mA or Volts output selection header and reinstalling it. When power is reconnected, the meter's software will automatically detect the presence or absence of the analog output module.

STEP A Enter the Calibration Mode

1) Press the P and ⬆ buttons at the same time. Display toggles between [cAL] and [oFF].
2) Press the ⬆ or ⬇ button. Display changes from [oFF] to [on].
3) Press the P button. Display toggles between [cAL] and [out] input calibration.

Note: If at this point the display skips directly to toggle between Zero and the previous Zero setting, the software is detecting that the optional analog output hardware is NOT installed.

STEP B Enter the Two Point Analog [ouT] Output Range Setting and Calibration Mode

1) Press the P button. Display toggles between [cLo] and an internal scale factor.

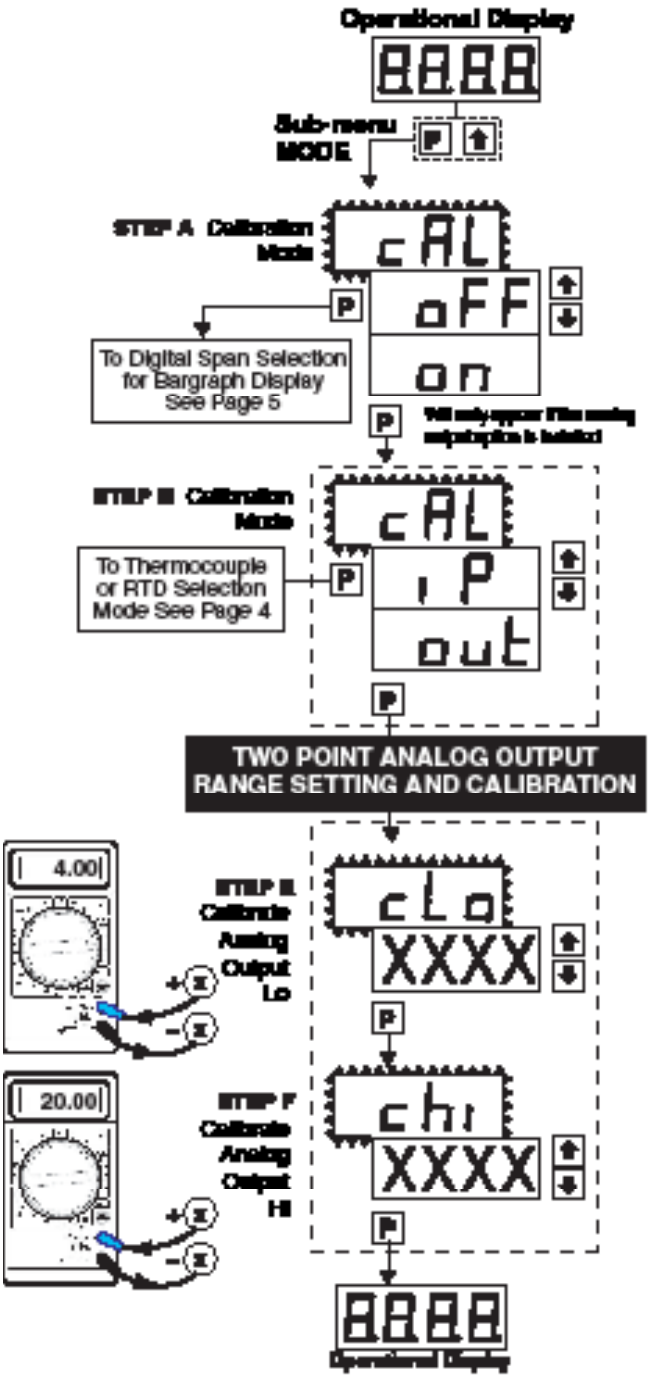
STEP E Set or Calibrate [cLo] the Low Analog Value of the Analog Output Range

1) Connect a multimeter to analog output pins 17 and 18 (see Rear Panel Pinouts on page 10). Using the ⬆ and ⬇ buttons, adjust the analog output to the desired low value as measured on the multimeter. cLo may be adjusted to any value from –0.3 mA to 18 mA (mA output selected) or from –0.6 V to 8 V (volt output selected). However, the output of cLo must always be less than the value selected for chi. If a reversed analog output is desired, the values selected to establish the Digital Span can be reversed (see top of page 6). For digital readings outside the Digital Span selected, the analog output will not go any lower than the calibrated value set for cLo. However, the analog output will linearly rise above the value set for chi, up to the the maximum analog output capability (see chi below).
2) Press the P button. Display toggles between [chi] and an internal scale factor.

STEP F Set or Calibrate [chi] the High Analog Value of the Analog Output Range

1) Using the ⬆ and ⬇ buttons, adjust the analog output to the desired high value as measured on the multimeter display. chi may be adjusted to any value from 18 mA to 24 mA (mA output) or from 8 V to 10.3 V (volt output). However, the value must be higher than the value selected for cLo. For digital readings outside the Digital Span selected, the analog output will linearly rise above the value set for chi, up to the maximum analog output capability.
2) Press the P button. The meter exits the calibration mode and returns to the operational display.

Note: The analog output range established by the values selected for cLo and chi will occur, automatically scaled, between the two digital values selected for AnHi and AnLo. However, the analog output can linearly rise above the chi value set for digital readings outside the digital span selected. See Digital Span Selection on page 6.



Setpoint Setting and Relay Configuration Mode

The following programming steps are required to enter the setpoint values and configure the relay functions in a meter with four relays using four setpoints. Generally if less than four relays are installed, the setpoints without relays are operational in software for tri-color control or display only purposes. To remove unwanted setpoint indications, set them to 9999 or -1999 depending on the relay activation mode selected.

STEP A Enter the Setpoint Mode
1) Press the P and ⬇ buttons at the same time. Display toggles between [SP1] and the previous SP1 setting.

STEP B Set Setpoint 1 [SP1]
1) Using the ⬆ and ⬇ buttons, adjust the display to the desired SP1 value.
2) Press the P button. Display toggles between [doM] and the previous [doM] setting.

STEP C Set the SP1 Delay-on-Make [doM] Delay Time Setting
1) Using the ⬆ and ⬇ buttons, adjust the display to the desired [doM] value (0 to 9999 seconds). The reading must continuously remain in an alarm condition until this delay time has elapsed before the relay will make contact (energize).
2) Press the P button. Display toggles between [dob] and the previous [dob] setting.

STEP D Set the SP1 Delay-on-Break [dob] Delay Time Setting
1) Using the ⬆ and ⬇ buttons, adjust the display to the desired [dob] value (0 to 9999 seconds). The reading must continuously remain in a non-alarm condition until this delay time has elapsed before the relay will break contact (de-energize).
2) Press the P button. Display toggles between [hYSt] and the previous [hYSt] setting.

STEP E Select the Hysteresis [hYSt]
1) Using the ⬆ and ⬇ buttons, select the Hysteresis to be ON or OFF.
2) Press the P button. Display toggles between PUM and (on) or (oFF).

STEP F Select Pump [PUM] (on) or (oFF)
1) Using the ⬆ and ⬇ buttons, select the Pump to be ON or OFF. When PUM is selected ON, and SP2 is set at a value higher than SP1, the SP1 relay will operate in a special "pump on pump off" mode. SP2 acts as the upper limit and SP1 acts as the lower limit of the Hysteresis Band on the SP1 relay.

For filling applications:
[rLYS] should be set to [LhXX] (see step M). The SP1 relay and SP1 LED Annunciator will then activate for inputs less than the SP1 setpoint, and remain ON until the SP2 setpoint is reached.

For emptying applications:
[rLYS] should be set to [hhXX] (see step M). The SP1 relay and SP1 LED Annunciator will then activate for inputs greater than the SP2 setpoint, and remain ON until the SP1 setpoint is reached.

2) Press the P button. Display toggles between [SP2] and the previous SP2 setting.

STEP G Set Setpoint 2 (SP2)
1) Using the ⬆ and ⬇ buttons, adjust the display to the desired SP2 value.
2) Press the P button. Display toggles between [hySt] and the previous [hySt] setting.

STEP H Select the Hysteresis [hYSt]
1) Using the ⬆ and ⬇ buttons, select the Hysteresis to be ON or OFF.
2) Press the P button. Display toggles between [SP3] and the previous [SP3] setting.

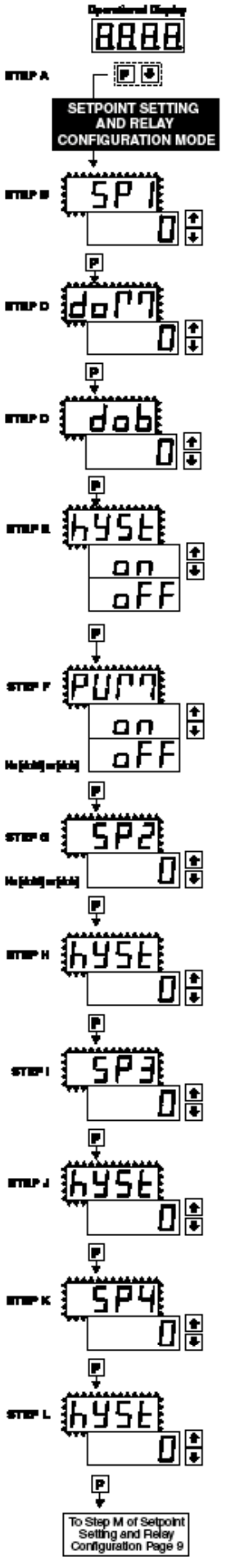
STEP I Set Setpoint 3 (SP3) (No [doM] or [dob])
1) Using the ⬆ and ⬇ buttons, adjust the display to the desired SP3 value.
2) Press the P button. Display toggles between [hySt] and the previous [hySt] setting.

STEP J Select the Hysteresis [hYSt]
1) Using the ⬆ and ⬇ buttons, select the Hysteresis to be ON or OFF.
2) Press the P button. Display toggles between [SP4] and the previous [SP4] setting.

STEP K Set Setpoint 4 (SP4) (No [doM] or [dob])
1) Using the ⬆ and ⬇ buttons, adjust the display to the desired SP4 value.
2) Press the P button. Display toggles between [hySt] and the previous [hySt] setting.

STEP L Select the Hysteresis [hYSt]
1) Using the ⬆ and ⬇ buttons, select the Hysteresis to be ON or OFF.
2) Press the P button. Display toggles between [rLYS] and the previous relay setting.

Please Continue On Next Page.



Setpoint Setting and Relay Configuration Mode Continued

STEP M **Set Relay Activation mode [rLYS] for SP1**
(H) High the relay energizes when the setpoint is exceeded. (L) Low the relay energizes below the setpoint. The setpoint is indicated from left to right SP1, SP2, SP3, SP4.
1) Using the ⬆ and ⬇ buttons, select (L) or (H) for the first digit, which corresponds to SP1.
2) Press the P button. The SP2 Relay Activation digit begins to flash, and its decimal point is lit.

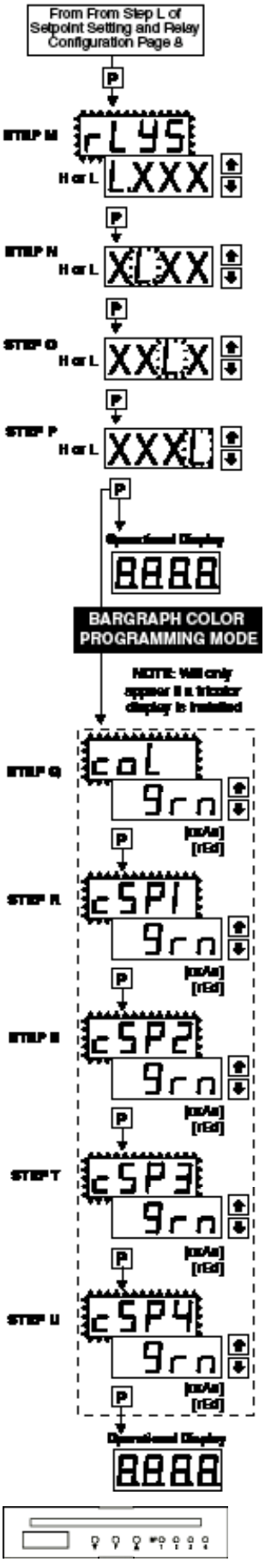
STEP N **Set High (H) or Low (L) for SP2**
1) Using the ⬆ and ⬇ buttons, select (L) or (H) for the second digit, which corresponds to SP2.
2) Press the P button. The SP3 Relay Activation digit begins to flash, and its decimal point is lit.

STEP O **Set High (H) or Low (L) for SP3**
1) Using the ⬆ and ⬇ buttons, select (L) or (H) for the third digit, which corresponds to SP3.
2) Press the P button. The SP4 Relay Activation digit begins to flash, and its decimal point is lit.

STEP P **Set High (H) or Low (L) for SP4**
1) Using the ⬆ and ⬇ buttons, select (L) or (H) for the fourth digit, which corresponds to SP4.
2) Press the P button.

If a mono-color red or green display is installed then the Setpoint Relay Programming Mode is now complete and the meter returns to the operational display.

If a tricolor bargraph display is installed then the Bargraph Color Programming Mode will be entered and display toggles between [CoL] and the previous setting. Color selection menu will be displayed.



Bargraph Color Programming Mode

To comply with the latest safety requirements, the tri-color bargraph is designed like a traffic light, to display either red, orange or green, but only one color at a time. When the bar reaches a selected color change point, the entire bar will change to the color designated for that zone. This eliminates any ambiguity as to the signal status, especially just after transitioning to a new zone.

First (Step Q) is to select the color to be displayed, when the bar is "below*", whichever set point is set to the lowest position.

Second (Steps R, S, T, and U) is to select the color to be displayed when the bar is above each specific set point, regardless of the order or position to which the set points are set.

However, if two or more setpoints with differently specified colors are positioned at the same set point value, the color specified for the set point with the highest identifying number will be displayed. When set points are set to the same value, the SP4 color overrides the SP3 color, the SP3 color overrides the SP2 color, and the SP2 color overrides the SP1 color.

STEP Q **Select Bargraph Color when the bar is BELOW* the Setpoint that is set to the lowest position**
1) Using the ⬆ and ⬇ buttons, select the desired bargraph color [grn], [oran] or [red]
2) Press the P button. Display toggles between [CSP1] and the previous color setting.

STEP R **Select Bargraph Color when the bar is ABOVE* SP1 Setpoint**
1) Using the ⬆ and ⬇ buttons, select the desired bargraph color [grn], [oran] or [red]
2) Press the P button. Display toggles between [CSP2] and the previous color setting.

STEP S **Select Bargraph Color when the bar is ABOVE* SP2 Setpoint**
1) Using the ⬆ and ⬇ buttons, select the desired bargraph color [grn], [oran] or [red]
2) Press the P button. Display toggles between [CSP3] and the previous color setting.

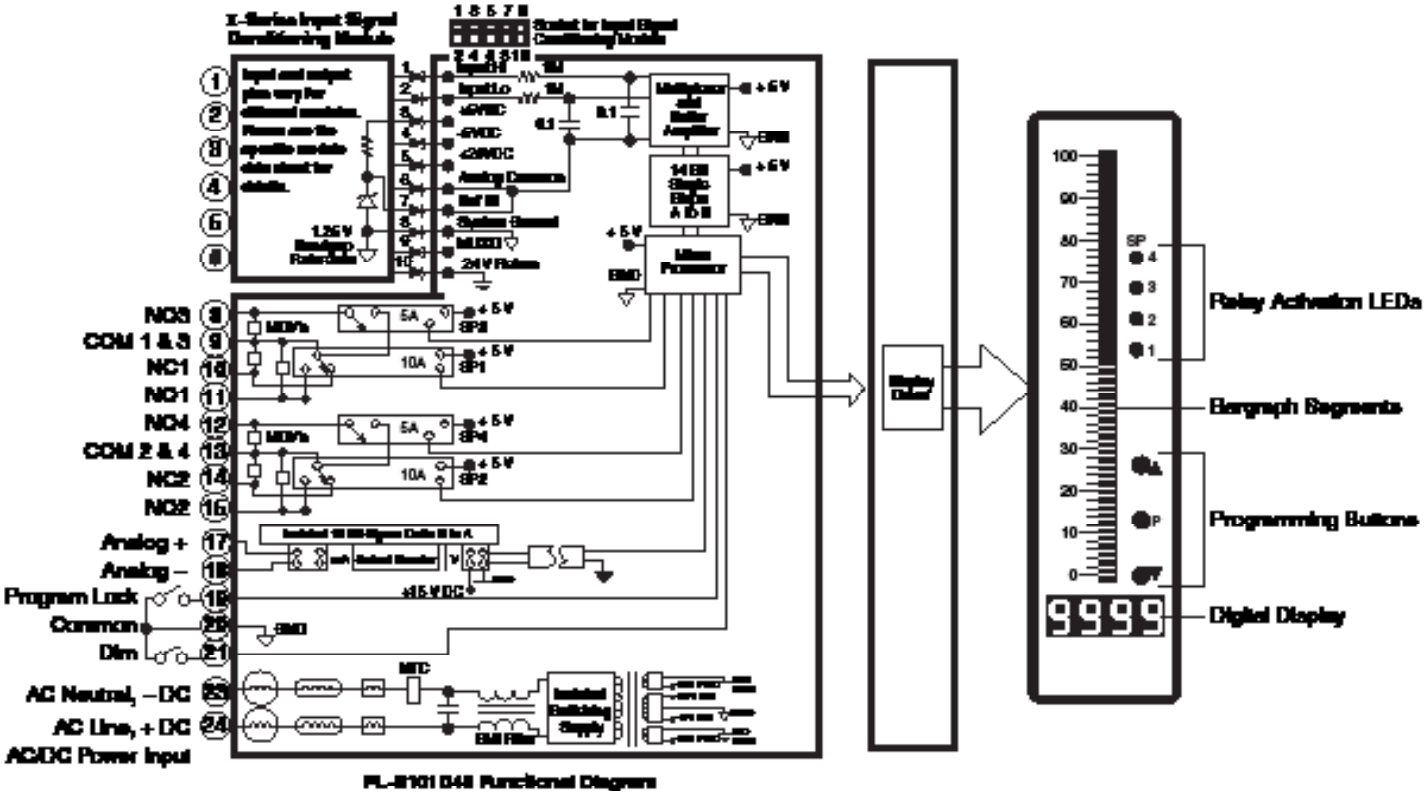
STEP T **Select Bargraph Color when the bar is ABOVE* SP3 Setpoint**
1) Using the ⬆ and ⬇ buttons, select the desired bargraph color [grn], [oran] or [red]
2) Press the P button. Display toggles between [CSP4] and the previous color setting.

STEP U **Select Bargraph Color when the bar is ABOVE* SP4 Setpoint**
1) Using the ⬆ and ⬇ buttons, select the desired bargraph color [grn], [oran] or [red]
2) Press the P button. The meter exits the setpoint mode and returns to the operational display.

The Bargraph Color programming mode is now complete.

***Note:** For horizontal display formats BELOW* should be read as, "to the left" and ABOVE* should be read as, "to the right".

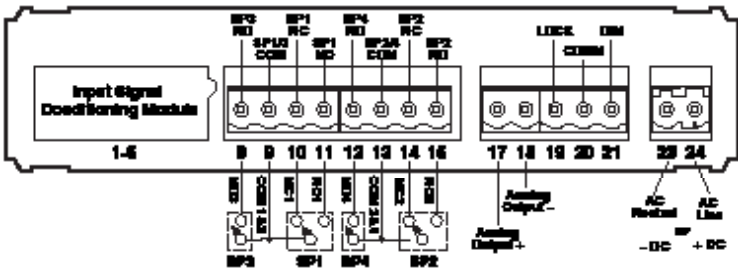
Functional Diagram



Connector Pinouts

This meter uses plug-in type screw terminal connectors for all input and output connections. The power supply connections (pins 23 and 24) have a unique plug and socket outline to prevent cross connection. The main board uses standard right-angled connectors.

Replacement 2-, 3-, and 4-pin plug connectors are available (see Accessories on page 16).



WARNING: AC and DC input signals and power su voltages can be hazardous. Do Not connect live wire screw terminal plugs, and do not insert, remove or handle screw terminal plugs with live wires connected.

Note: The sequence of setpoint outputs on meters shipped prior to 2002 was 1-2-3-4. The sequence is now 3-1-4-2, enabling delay on make (dom) and delay on break (dob) to be used with both Form "C" relays.

Pin Descriptions

Input Signal – Pins 1 to 6

Pins 1 to 6 are reserved for the input signal conditioner. See the data sheet for the selected input signal conditioner.

Pins 8 to 15 – Relay Output Pins

Pin 8 **SP3 NO.** Normally Open 5 Amp Form A.
Pin 9 **SP1/3 COM.** Common for SP1 and SP3.
Pin 10 **SP1 NC.** Normally Closed 10 Amp Form C.
Pin 11 **SP1 NO.** Normally Open 10 Amp Form C.
Pin 12 **SP4 NO.** Normally Open 5 Amp Form A.
Pin 13 **SP2/4 COM.** Common for SP2 and SP4.
Pin 14 **SP2 NC.** Normally Closed 10 Amp Form C.
Pin 15 **SP2 NO.** Normally Open 10 Amp Form C.

Pins 17 to 21 – Rear Panel Switches

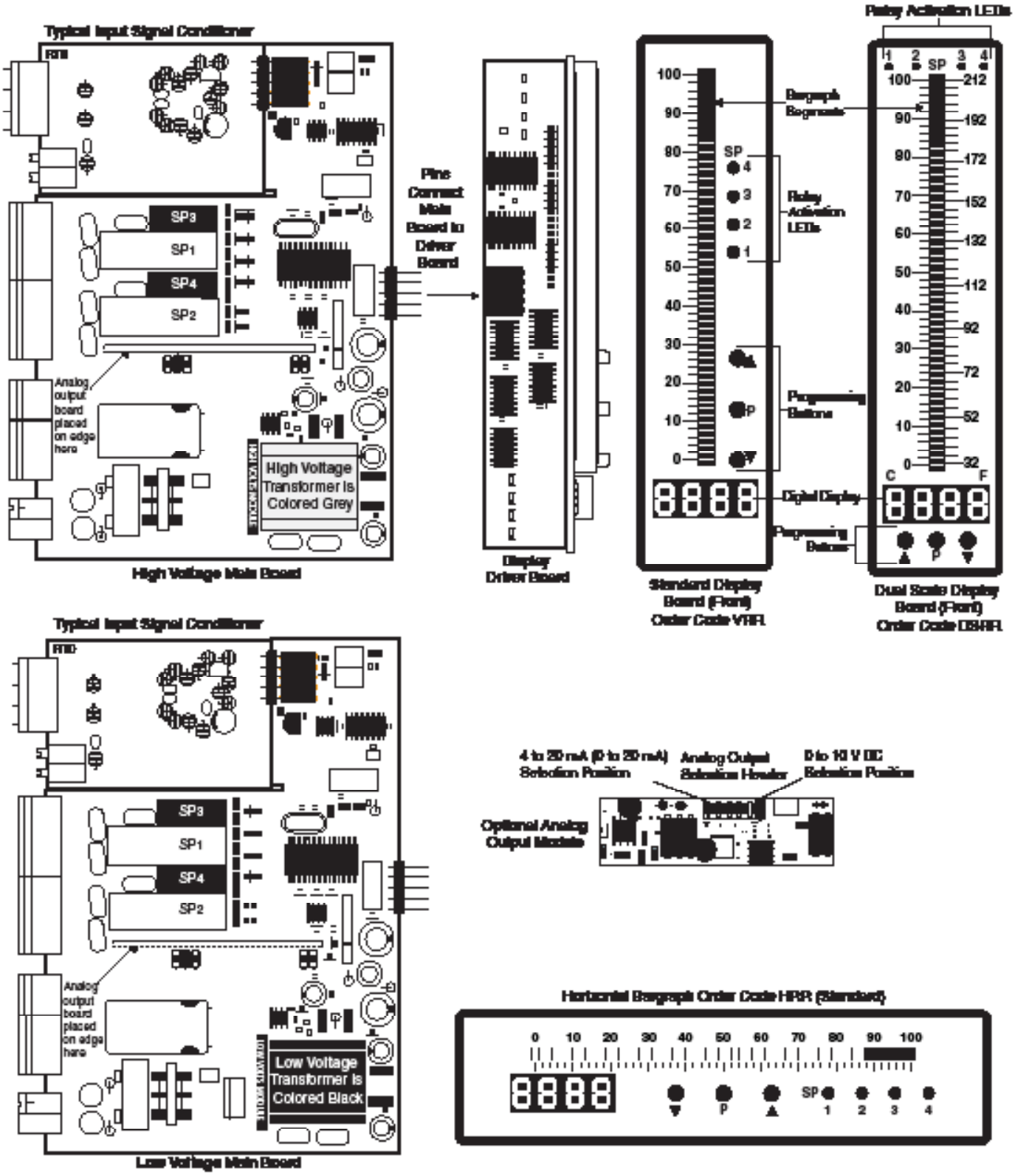
Pin 17 **ANALOG OUTPUT (+).** mA (0 to 20 mA/4 to 20 mA) or V (0 to 10 V) output is header selectable.
Pin 18 **ANALOG OUTPUT (–).** mA (0 to 20 mA/4 to 20 mA) or V (0 to 10 V) output is header selectable.
Pin 19 **Programming LOCK.** By connecting the LOCK pin to the COMMON pin, the meter's programmed parameters can be viewed but not changed.
Pin 20 **COMMON.** To activate the LOCK or DIM functions from the rear of the meter, the respective pins have to be connected to the COMMON pin. This pin is connected to the internal power supply ground.
Pin 21 **DIM.** By connecting the display dim (DIM) pin to the COMMON pin, the display brightness setting is halved.

Pins 23 and 24 – AC/DC Power Input

Auto-sensing AC/DC power supply. For voltages between 85-265 V AC / 95-370 V DC (PS1) or 18-48 V AC / 10-72 V DC (PS2).

Pin 23 **AC Neutral / –DC.** Neutral power supply line.
Pin 24 **AC line / +DC.** Live power supply line.

Component Layout

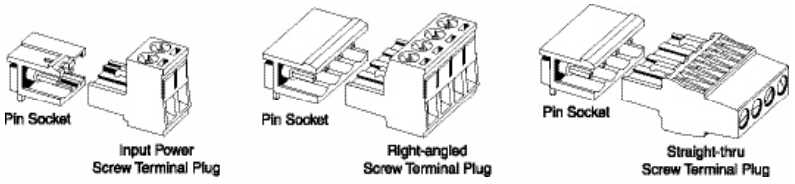


Connectors

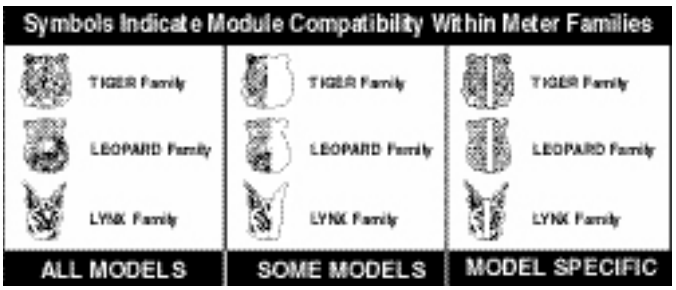
WARNING

AC and DC input signals and power supply voltages can be hazardous. Do Not connect live wires to terminal blocks, and do not insert, remove or handle terminal blocks with live wires connected.

Standard plug-in screw terminal blocks provided by Texmate:



I-Series Input Signal Conditioning Modules



WARNING: **AC and DC input signals and power supply voltages can be hazardous. Do Not insert, remove or handle modules with live wires connected to any terminal plugs.**

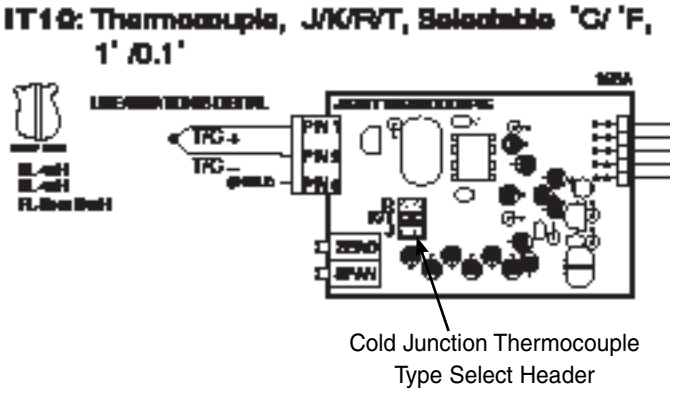
Pre-calibrated **I-Series** input modules, that have span or zero potentiometers, can be interchanged between any **I-Series** compatible meter, without recalibration, because all of the analog scaling and reference circuitry is self-contained within the module.

Unless otherwise specified Texmate will ship all modules pre-calibrated with factory preselected ranges and/or scalings as shown in **BOLD** type. Other pre-calibrated standard ranges or custom ranges may be ordered. Factory installed custom scaling and other custom options are also available (see Ordering Information, Special Options on last page).

Input Module Calibration Procedure

IT10 Thermocouple Input Signal Conditioner installed.

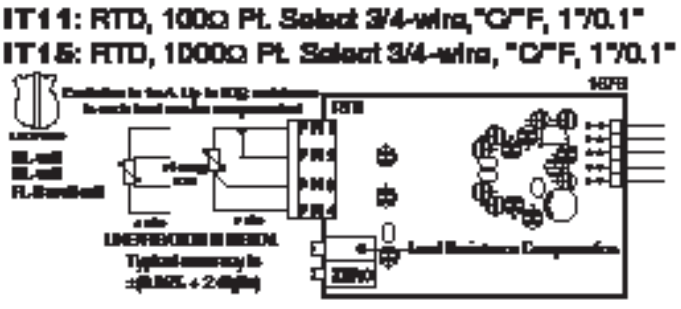
1. The cold junction select header must be installed in the correct position for the thermocouple type to be used. Thermocouple types J, K, R and T are supported. If you wish to use a different thermocouple from the default setting of K/T it is necessary to remove the module and move the cold junction select header to the appropriate position.
2. Unplug the connector plugs from the meter. Remove the case back panel and slide the module out of the case.
3. After selecting the appropriate header position, insert the module back into the case. Snap the back panel back into the case. Apply power to the meter.
4. Enter the program mode and select the type of thermocouple (J, K, R, T), the resolution (0.1° or 1°) and the display units ·°C or °F). See Page 4 of the data sheet for details.
5. Connect a thermocouple simulator to the meter inputs. Apply an input corresponding to 0° and adjust the ZERO Potentiometer to make the display read 0.
6. Apply an input corresponding to the maximum reading of the thermocouple and adjust the SPAN Potentiometer to make the display read correctly.
7. The meter is now calibrated and ready for use. Calibration will have to be performed again if the thermocouple type is changed.



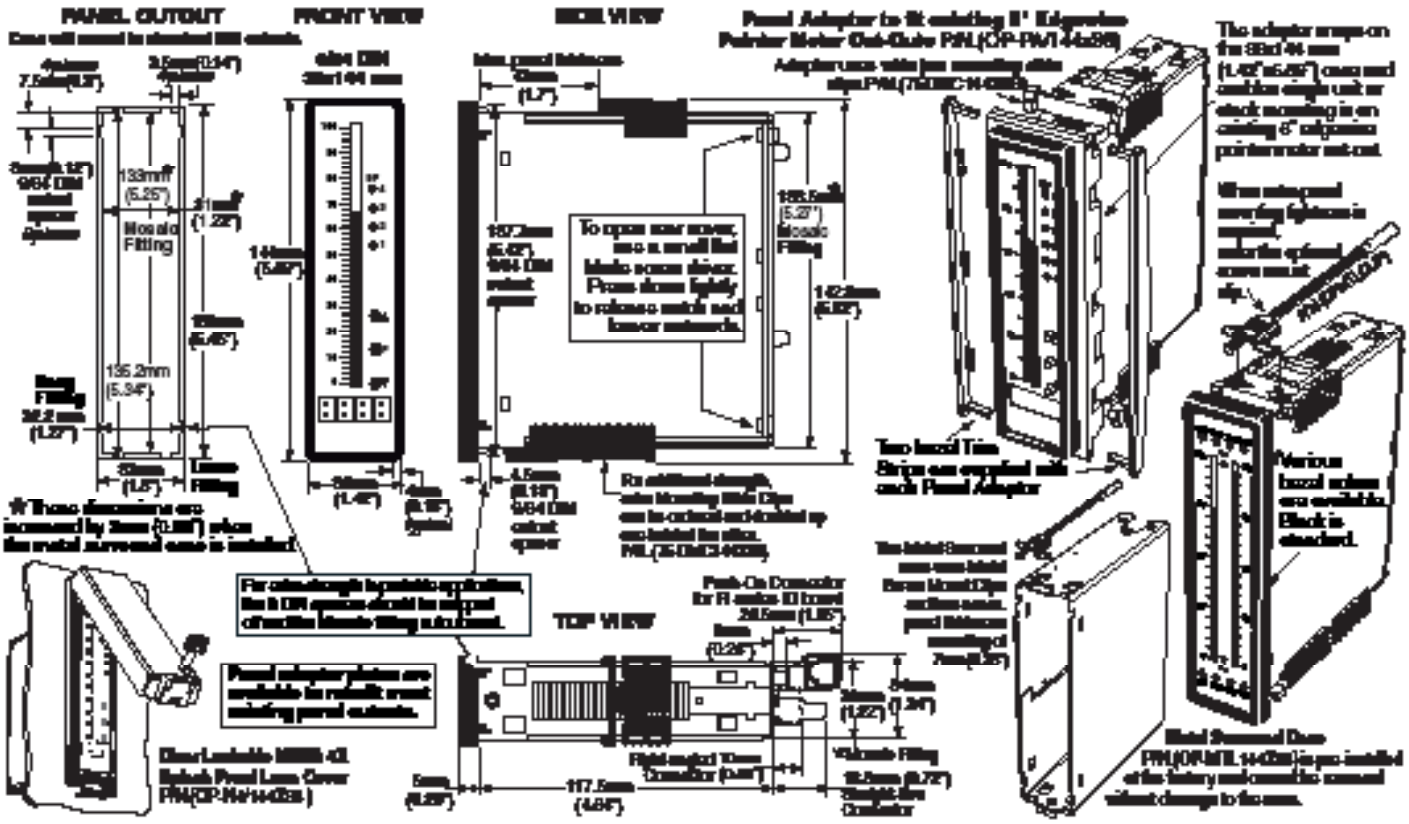
Cold Junction Thermocouple Type Select Header

IT11 or IT15 RTD Input Signal Conditioner installed.

1. Enter the program mode and select the type of RTD (385 or 392 curve and 3-wire/ 4-wire), the resolution (0.1° or 1°) and the display units ·°C or °F). See Page 4 of the data sheet for details.
2. Connect an RTD simulator to the meter inputs. Apply an input corresponding to 0° and adjust the ZERO Potentiometer to make the display read 0.
3. Introduce a lead resistance of 10Ω in each lead. Adjust the Lead Resistance Compensation potentiometer to make the display again read 0.
4. The meter is now calibrated and ready for use. Calibration will have to be performed again if the RTD type is changed.



Case Dimensions



Hinged Clear Lockable Polycarbonate NEMA 4X Splash Proof Cover

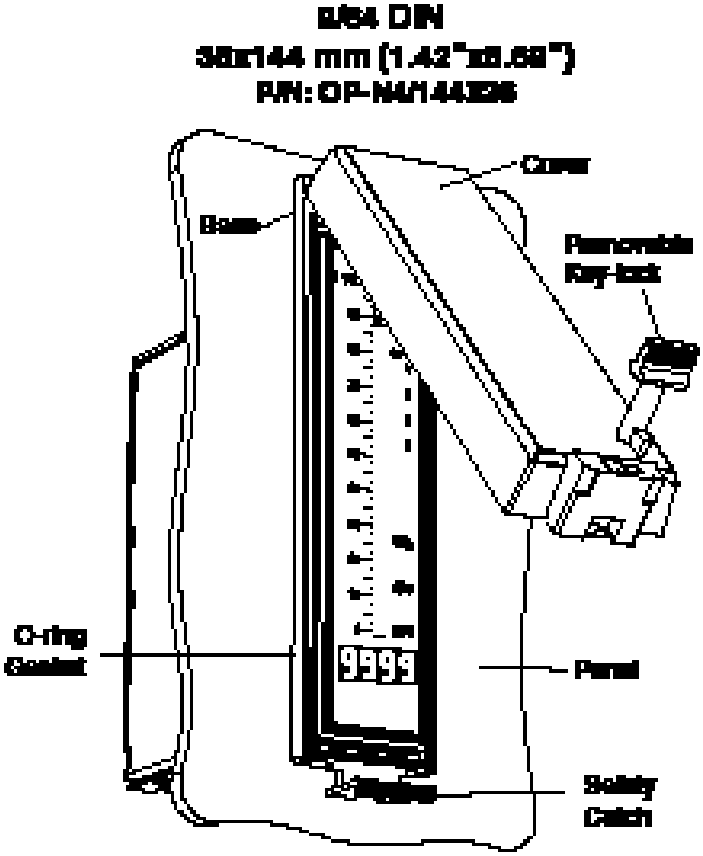
This rugged, impact resistant, clear lens cover is designed to be dust and water proof to NEMA 4 and IP65 standards. The lens cover consists of a base and cover with a cam hinge and key-lock locking device.

An O-ring, or neoprene gasket forms a seal between the base and the panel. When opened, a cam hinge prevents the cover from closing until pushed closed.

The cover has a tapered recess that, when closed, forms a capillary seal with a tapered ridge on the base. A capillary seal is created when capillary action causes a small amount of water to be drawn in between the two surfaces producing a water tight film around the sealing area.

For those applications, such as food processing, where fluid residues are unacceptable, apply a light coating of clear silicone grease, or other approved sealant to the mating grove to prevent any ingress of liquid and enable the cover to withstand steam cleaning.

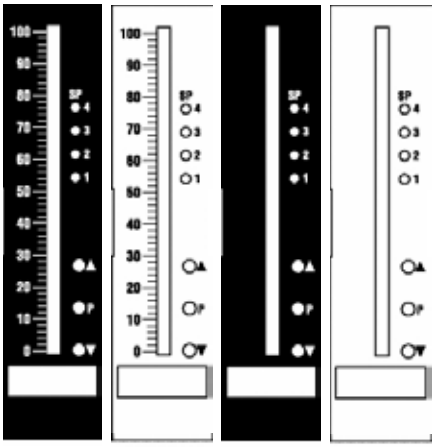
Turning the key-lock tightens the cover to the base, ensuring seal integrity. A safety catch keeps the cover closed even when the key is turned to the open position and removed. The keyhole can also be used to attach a safety seal clip, preventing unauthorized opening.



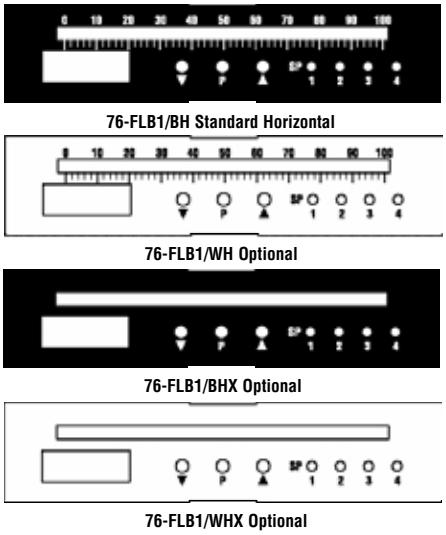
Standard Face Plates and Scales

Unless otherwise specified, a standard 0-100 scaled face plate with white letters on a black background is provided with each meter. In those cases where a temperature module is ordered, a 0 – 200°F (white on black) face plate will be provided as standard.

Alternatively a face plate with black letters on a white background or a blank, white or black face plate, may be ordered as a no charge substitute. For temperature applications there are also several different optional face plates that may be ordered as a no charge substitute. (See below). Customized face plates with special scaling can also be ordered (see following page).



76-FLB1/BV Standard | 76-FLB1/WV Optional | 76-FLB1/BVX Optional | 76-FLB1/WVX Optional



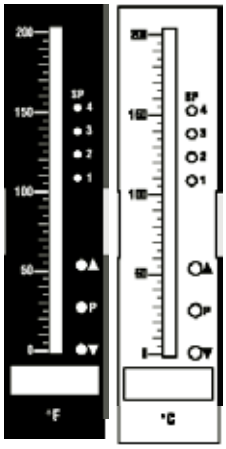
76-FLB1/BH Standard Horizontal

76-FLB1/WH Optional

76-FLB1/BHX Optional

76-FLB1/WHX Optional

Face plates supplied with temperature modules.



76-FLB1/BV2 Standard Temperature | 76-FLB1/WV1 Optional

Other optional face plates for temperature are also available in the following ranges:

0 to 200

0 to 1000

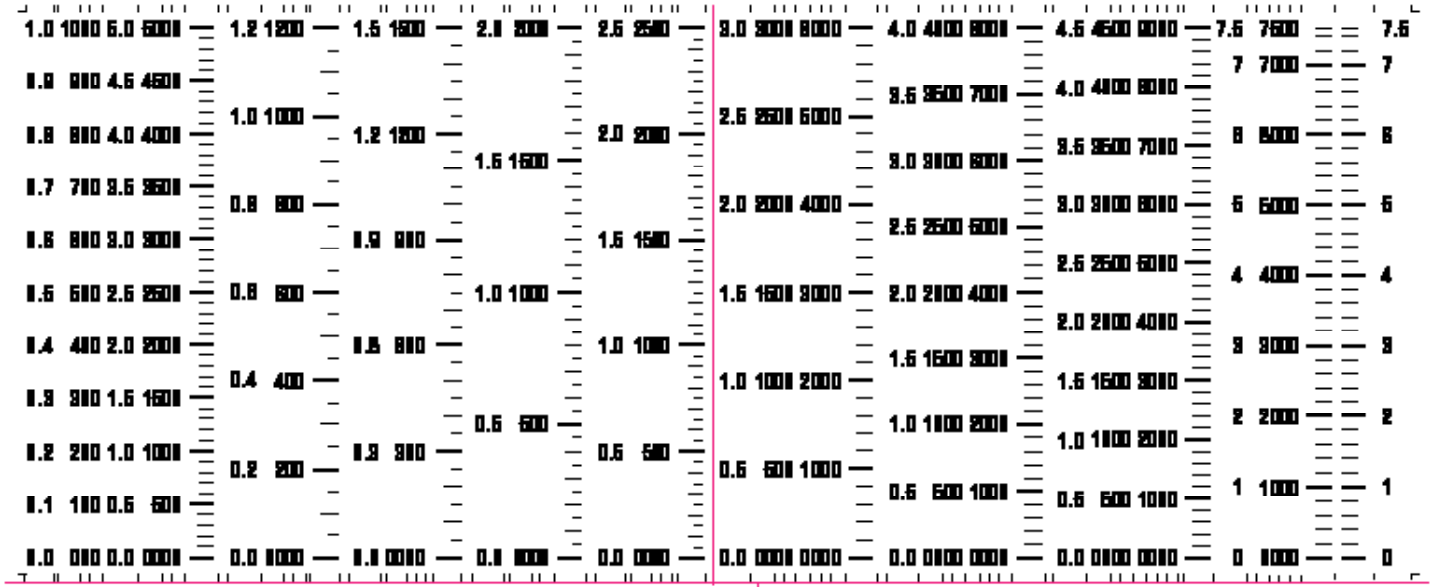
-200 to +200

(Zero Center Mode)

When ordering, specify white letters on a black background or black letters on a white background. Horizontal or vertical format and °F or °C caption.

Standard Scales and Caption Sheets *(white or black lettering for do-it-yourself customizing)*

Clear self-adhesive caption sheets with white or black lettering are provided for each meter shipped with a standard or optional faceplate.



A	AC	E_b	Btu	bars	CFH	BHP	Low	inch/	CosØ	AMPS	BBL/HR
J	Ah	kJ	bar	cal_{15}	CFM	IPS	High	Kcal	FEET	GALS	BBL/MIN
K	cal	kV	cal	cm^{-1}	CFS	IPH	MGD	kg/hr	Hold	INHg	DEG/MIN
l	dB	kW	cm	cm^2	COS	Kg/h	Mid	kVAR	Km^3/h	m/min	FT H_2O
m	DC	ml	FT^3	cm^3	CPH	KPH	MPH	kW/s	MWH	m/sec	In.H_2O
V	FT	NL	lbs	dm^3	CPM	KPM	MPS	RPM	mWs	Nm^3/h	Kg/cm^2
α	HP	Pa	IN^2	H_2O	CPS	KPS	N/m^2	MPM	mbar	Ohms	KNOTS
β	Hz	PF	kg/	kPa	DCA	kWH	ORP	M^3/hr	ml/m^2	PSIA	kg/sec
ϕ	Kg	pH	mA	l/s	FPH	lb/ft	PPH	Upm	mm/s	PSID	Mvars
Ω	kA	sin	mS	l/h	FPM	lb/in	PPM	VAC	Peak	PSIG	mmH_2O
Δ	L^3	t/h	mV	l/m	FPS	LPH	PPS	Vars	PORT	PSIR	mmHg
μ	m^3	yd^3	Nm	lb/h	GAL	LPM	RPH	VDC	STRB	SCFM	VOLTS
ϑ	W	μA	oz	MW	GMP	LPS	RPS	w/m^2	TARE	TORR	%LOAD
γ	°C	μS	RH	min	GPH	m^3/h	phi	YPM	TONS	U/min	%OPEN
%	°F	μV	1/h	mm	GPM	m^3/m	psi	YPS	X100	x10kN	⟶
∠	°K	μΩ	μm	Sm^3	GPS	m^3/S	X10	μPa	%KW	X1000	⟵

AHEAD	AC Volts	AC Amperes	AC Kilowatts	AIR PRESSURE	AC Millamperes
ALARM	AC Volts	AC Kilovars	AC Millivolts	AC Kiloamperes	Battery Voltage
BOILER	AC Watts	AC Kilovolts	RPM X 1000	AC Megavars	Backup Voltage
Cycles	BEARING	AIR FLOW	CFM x 1000	AC Megawatts	Displacement
Depth	COOLANT	BILLS/HOUR	DC Amperes	AC Volts/Vars	DC Amps to Ground
HEATER	DC Volts	RPM AMPS	DC Kilovolts	CENTIMETERS	DC Microamperes
Height	DC Watts	BHP x 100	DC Kilovolts	DC Kiloamperes	DC Milliamperes
Hertz	Degrees	BLOWER	DC Millivolts	FD FAN AMPS	GALLONS / MINUTE
Hours	ERRINE	DC Current	FPM X 100	IN. H_2O PRESS	GENERATOR AMPS
INCHES	ECHAUST	Dew Point	FPM X 1000	LBS/MINUTE	LESS PER GALLON
Input	Humidity	Degrees C	GPM X 1000	LEVEL INCHES	LOAD LIMIT PERCENT
PORT	METERS	Degrees F	HORSEPOWER	LEVEL GALLONS	MANIFOLD PRESSURE
PUMP	Output	Degrees K	INCHES WC	LEVEL PERCENT	MILL LOAD AMPS
Preset	Percent	Degrees R	INCHES H_2O	MILLIMETERS	MOTOR LOAD AMPS
Reset	Program	FPM X 10	KILOWATTS	Percent Current	Percent Horsepower
SHAFT	Psi/atm	Frequency	LBS X 1000	Percent Load	OXYGEN PERCENT
SPEED	Pulses	FUEL FLOW	MEGAWATTS	PERCENT OPEN	TEMPERATURE °C
Setup	RUDDER	GALLONS	Power Factor	RATE of TURN	TEMPERATURE °F
TABLE	SPINDLE	IN. WATER	Phase Angle	STEAM TEMP °F	Meter Load Percent
Total	SQ ROOT	LEVEL FT.	RPM X 100	TONS / HOUR	LEFT RIGHT
VALVE	Set Point	LBS X 100	STANDARD	OIL PRESSURE	FRONT REAR
Voltage	THRUST	POSITION	TARE LEVEL	WATER LEVEL	FORWARD REVERSE
WATTS	TURBINE	TONS X 10	VAC MM HG	1000 LBS/HOUR	TOP BOTTOM 0-110

Ordering Information

BASIC MODEL #	DISPLAY	POWER SUPPLY	INPUT MODULES	ANALOG OUTPUT	RELAY OUTPUT	OPTIONS / ACCESSORIES
FL-B101D40H	–	–	–	–	–	– OA____

Add to the basic model number the order code suffix for each standard option required. The last suffix is to indicate how many different special options and or accessories that you may require to be included with this product.

Ordering Example: FL-B101D40H-VRR-PS1-IA01-OIC-R11-OA2 plus CR-CHANGE and an OP-N4/144X36

BASIC MODEL NUMBER

FL-B101D40H . . 144x36mm, 101 Segment Bargraph, 4 Digit, Temperature

Standard Options for this Model Number

Order Code Suffix *Description*

DISPLAY

VRR . . Red LED Bargraph w/4 Digit Red DPM, Vertical
VGG . . . .Green LED Bargraph w/4 Digit Green DPM, Vertical
VGR . . . .Green LED Bargraph w/4 Digit Red DPM, Vertical
VRG . . . .Red LED Bargraph w/4 Digit Green DPM, Vertical
VTG . . . .Tri-Color Bargraph w/4 Digit Green DPM, Vertical
VTR . . . .Tri-Color Bargraph w/4 Digit Red DPM, Vertical

HRR . . . .Red LED Bargraph w/4 Digit Red DPM, Horizontal
HGG . . . .Green LED Bargraph w/4 Digit Green DPM, Horizontal
HGR . . . .Green LED Bargraph w/4 Digit Red DPM, Horizontal
HRG . . . .Red LED Bargraph w/4 Digit Green DPM, Horizontal
HTG . . . .Tri-Color Bargraph w/4 Digit Green DPM, Horizontal
HTR . . . .Tri-Color Bargraph w/4 Digit Red DPM, Horizontal

DSGG . . .Dual Scale Green LED Vertical Bargraph w/4 Digit Green DPM
DSGR . . .Dual Scale Green LED Vertical Bargraph w/4 Digit Red DPM
DSRG . . .Dual Scale Red LED Vertical Bargraph w/4 Digit Green DPM
DSRR . . .Dual Scale Red LED Vertical Bargraph w/4 Digit Red DPM
DSTG . . .Dual Scale Tri-Color Vertical Bargraph w/4 Digit Green DPM
DSTR . . .Dual Scale Tri-Color Vertical Bargraph w/4 Digit Red DPM

POWER SUPPLY

PS1 . . 85-265VAC/95-370VDC
PS2 . . . .15-48VAC/10-72VDC

INPUT MODULES (Partial List. See www.texmate.com)

Unless otherwise specified Texmate will ship all modules precalibrated with factory preselected ranges and/or scalings as shown in **BOLD** type.
IT10 . . .Thermocouple, J/**K**/R/T, Selectable °C/**°F**, **1°**/0.1°
IT11 . . .RTD, 100Ω Pt. Selectable **3**/4-wire,°C/**°F**, **1°**/0.1°, 385/392
IT15 . . .RTD, 1000Ω Pt. Selectable **3**/4-wire,°C/**°F**, **1°**/0.1°, 385/392

ANALOG OUTPUT

OIC . . . Isolated 16 Bit Current Output, 4-20mA
OIV . . . Isolated 16 Bit Voltage Output, 0-10VDC

RELAY OUTPUT

R11 . . . Single 10A Form C Relay
R12 . . . Dual 10A Form C Relays
R13 . . . Dual 10A Form C & One 5A Form A Relays
R14 . . . Dual 10A Form C & Dual 5A Form A Relays
R15 . . . Single 10A Form C & Dual 5A Form A Relays
R16 . . . Single 10A Form C & Single 5A Form A Relays

Special Options and Accessories

Part Number *Description*

SPECIAL OPTIONS (Specify Inputs or Outputs & Req. Reading)

CR-CHANGE . . . . . Calibrated Range Change to another Standard Range
CS-L/BAR. . . . . Custom Scaling within any Stnd. or Custom Selectable Range
CSR-L/BAR. . . . . Custom Selectable Range Installation or Modification
CSS-L/BAR. . . . . Custom Special Scaling beyond the Standard Range
COA-L/SINGLE . . . . Custom Output - Special Scaling of Analog Output
COR-L/RELAY . . . . . Custom Output - Relays Installed in Non-Standard Locations
CCP-L/SETUP. . . . . NRC to Set-up Custom Configuration - Functions, Codes
CCP-L/INSTL . . . . . Factory Installation - Custom Configuration

ACCESSORIES (Specify Serial # for Custom Artwork Installation)

75-DMC14436B . . . . Side Slide Brackets-Wide opening (2 pc)
75-DMC144X36 . . . . Side Slide Brackets-stand. (2 pc) - extra set
93-PLUG2P-DP. . . . . Extra Screw Terminal Conn., 2 Pin Power Plug
93-PLUG2P-DR. . . . . Extra Screw Terminal Conn., 2 Pin Plug
93-PLUG3P-DR. . . . . Extra Screw Terminal Conn., 3 Pin Plug
93-PLUG4P-DR. . . . . Extra Screw Terminal Conn., 4 Pin Plug
93-PLUG5P-DR. . . . . Extra Screw Terminal Conn., 5 Pin Plug
OP-MTL144x36. . . . . Metal Surround Case, includes screw mounting clips
OP-MTLCLIP . . . . . Screw Mounting Clips (2 pc) - to screw tighten slide brackets
OP-N4/144X36 . . . . . 144x36mm clear lockable front cover-NEMA 4X, splash proof
OP-PA/144X36 . . . . . Panel Adapter for 144x36mm from 6 inch cutout

For Custom Face Plates and Scales see page 15.

Many other options and accessories are available. See full price list for more details.
Prices subject to change without notice.

WARRANTY

Texmate warrants that its products are free from defects in material and workmanship under normal use and service for a period of one year from date of shipment. Texmate's obligations under this warranty are limited to replacement or repair, at its option, at its factory, of any of the products which shall, within the applicable period after shipment, be returned to Texmate's facility, transportation charges pre-paid, and which are, after examination, disclosed to the satisfaction of Texmate to be thus defective. The warranty shall not apply to any equipment which shall have been repaired or altered, except by Texmate, or which shall have been subjected to misuse, negligence, or accident. In no case shall Texmate's liability exceed the original purchase price. The aforementioned provisions do not extend the original warranty period of any product which has been either repaired or replaced by Texmate.

USER'S RESPONSIBILITY

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