Switchboard Style Bargraph MicroPLC

- *General Monitoring and Control Applications*
- *Great Visualization of Key Process Measurements*
- *Independent 6 Digit Display & 101 Segment Bargraph*
- *Linear and Center Zero (+/-) Bargraph Capability*
- *Standard ANSI AB40 Rugged Polycarbonate Case*
- *Optional RS-232, RS-485 or Ethernet (ASCII or Modbus RTU)*
- *Multiple Alarms with Digital and Relay Output Options*
- *Wide Power Supply Range (AC or DC)*
- *Optional Single or Dual Analog Output (4-20mA/DCV)*
- *Datalogging and 2 Channels of PID Control*
- *Custom Applications & User Interfaces with TexBASIC*

RoHS COMPLIANT

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CE

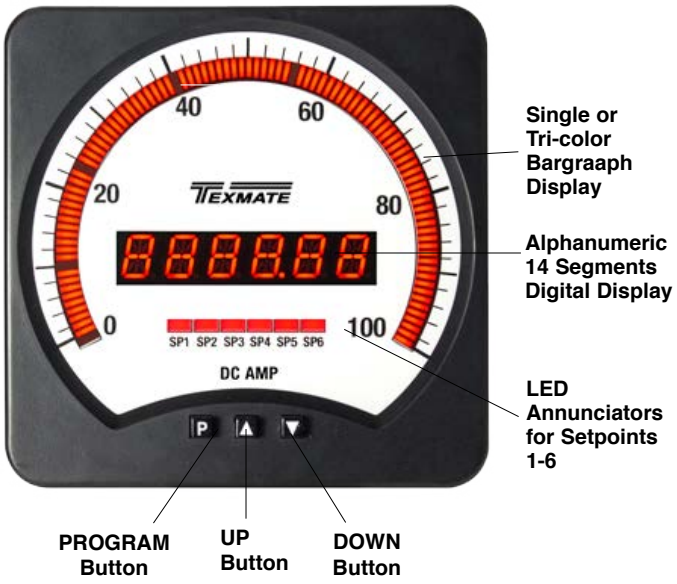
Model: CI-B101D60AT

General Features

- 101 segment Circular Bargraph in Red, Green or Tri-color.
- Six digit Green, or Red 14-segment, 0.43" high digital LEDs with full support for alphanumeric text.
- Rugged ANSI Switchboard Case.
- Brightness control of LED display from front panel buttons.
- Modular construction with more than 140 input signal conditioners.
- Up to 4 input channels with cross channel math for multi-channel processing.
- For applications where sensor excitation is required, modules are provided with 5V, 10V or 24 V DC voltage outputs.
- On demand tare, calibration and compensation can be initiated by the front panel program button.
- Autozero maintenance for super stable zero reading is provided for use in weighing applications.
- Programmable input averaging and smart digital filtering for quick response to input signal changes.
- Display text editing. Scrolling display text messaging on meters with macros.
- Auto-sensing high voltage or low voltage AC / DC power supply.
- Serial output options include RS-232, RS-485,Ethernet,Modbus, ASCII or direct meter-to-meter communications.
- Single or dual 16-bit Isolated Analog Outputs. Programmable 0~4 to 20mA or 0 to 10V for retransmission, 4-20mA loops to drive valve actuators, remote controllers & displays, multi-loop feedback and PID output. Scalable from 1 count to full scale.
- Dual independent totalizers to integrate input signals.
- 6 super smart, independently programmable setpoints with 8 selectable functions, including latching, deviation, hysteresis, register resetting, tracking and dual PID. Plus 7 programmable timer modes on all 6 setpoints.
- Setpoint tracking, setpoint latching and manual relay reset.
- Setpoints activated from any input, any register in the meter or from any digital input.
- Output modules include electromechanical or solid state relays, logic outputs or open collector outputs.
- Internal program safety lockout switch to prevent tampering.
- Peak & valley (max & min) with front panel recall and reset.
- Real time clock with 15 year Lithium battery backup (optional).
- Data logging within the meter (up to 4000 samples with date/time stamp using optional OR91 module).
- An easy to use PC based Configuration Utility Program, which can be downloaded FREE from the web, and programming from front panel buttons.
- UL Certified.

Table of Contents

Front Panel Controls and Indicators



Display with Faceplate and Bezel

Program Button

While programming, pressing the Red Program [P] button saves the current programming settings and moves to the next programming step.

You can move through the programming codes using the program button. The codes you pass are not affected, unless you stop and make changes using the [▲] or [▼] buttons.

Pressing the [P] and [▲] button at the same time initiates the **main programming mode**. To save a new configuration setting and return to the operational display, press the [P] button once and then press the [P] and [▲] button at the same time.

Pressing the [P] and [▼] button at the same time initiates the **setpoint programming mode**. To save a new configuration setting and return to the operational display, press the [P] button once and then press the [P] and [▼] button at the same time.

Up Button

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

When in the operational display, pressing the [▲] button initiates a viewing mode that allows you to view the readings on **channels 1 and 3, setpoints 1, 3, and 5, peak, and total 1**. Once into the viewing routine, pressing the [▲] button moves through each displayed parameter.

Down Button

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

When in the operational display, pressing the [▼] button initiates a viewing mode that allows you to view the readings on **channels 2 and 4, setpoints 2, 4, and 6, valley, and total 2**. Once into the viewing routine, pressing the [▼] button moves through each displayed parameter.

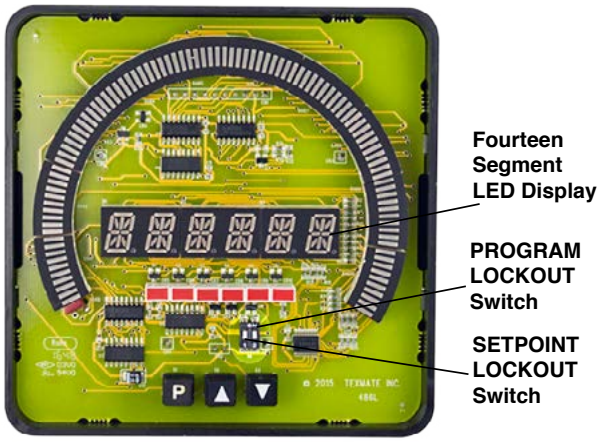
Annunciator LEDs

The annunciator LEDs can be programmed to indicate the alarm status.

Setpoint 1 can be configured to indicate the **rising** signal trend. Setpoint 2 can be configured to indicate the **falling** signal trend. They are labeled from left to right: SP1, SP2, SP3, SP4, SP5, SP6.

LED Display

The CI-B101D60A meter has a 6-digit, 14-segment, 0.43”(10.9 mm) green or red LED display. The LEDs display the meter input signal readings. They also display the programming codes and settings during meter programming.



Display PCB without Faceplate

Display Text Editing with 14 Segment Full Alphanumeric Display Characters

Display text, such as setpoints, can be easily edited to suit your application, by connecting the meter to a PC running the free downloadable Configuration Utility program.

For Example:

Instead of [SP_1]

could be used for TANK LOW

OR

Instead of [SP_2]

could be used for BRAKE OFF

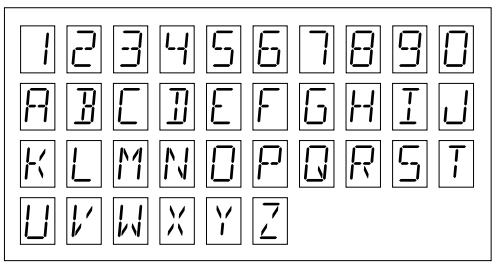
Scrolling Display Text Messaging

Scrolling display text messaging can be configured to run with a simple macro.

Display Text Characters

The following text characters are used with the 14-segment full alphanumeric display.

14-SEGMENT DISPLAY CHARACTERS



Program Lockout Switch

When the PROGRAM LOCKOUT switch is set to position 2, all programmable meter functions can be changed.

When set to the ON position, the PROGRAM LOCKOUT switch prevents any programming changes being made to the meter. If programming is attempted, the meter displays [LOCKED]. The ON position allows programming parameters to be viewed but not changed.

See Display PCB without Faceplate and Bezel diagram.

Setpoint Lockout Switch

When the SETPOINT LOCKOUT switch is set to position 1, the setpoints can be programmed. Once the setpoint values have been entered and the SETPOINT LOCKOUT switch set to the ON position, the setpoints can be viewed but not changed.

See Display PCB without Faceplate and Bezel diagram.

Error Message [ERROR]

Error messages usually occur during calibration procedures. The three most likely causes of an error message are:

Display Showing [ERROR] Message

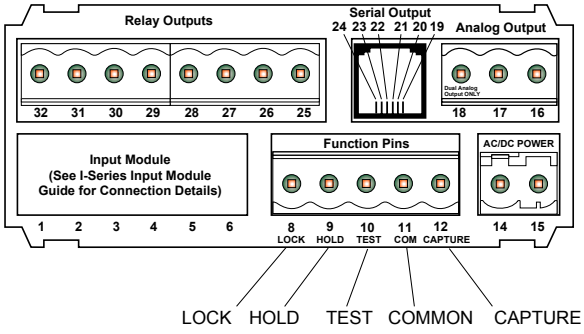
1) The full scale and zero signals were too similar.

   Note, the high input (full scale) signal must be at least 1000 counts greater than the low input (zero) signal (positive and negative values are allowed).

2) The scaling requirement exceeded the capability of the meter (–199999 to +999999).

3) No input signal present, or incorrect connections.

Rear Panel Function Pins



Lock Pin

By configuring Code 9 to [XX0], connecting the LOCK pin (pin 8 on the main PCB) to the COMMON pin (pin 11 on the main PCB), locks out the main and setpoint programming modes. All meter programming codes and setpoints can be viewed but not changed.

Display Showing [LOCKED] Message

The main programming mode can be entered, but only the brightness setting adjusted. After adjusting the brightness setting, pressing the P button displays [LOCK].

The LOCK pin can also be configured in Code 9 to carry out the following functions (see *Meter Programming Codes* on page 27):

- Reset channel 1 [XX1].
- Reset channel 2 [XX2].
- Reset channel 3 [XX3].
- Reset channel 4 [XX4].
- Reset tare [XX5].
- Reset total 1 [XX6].
- Unlatch (de-energize) all setpoints [XX7].

Hold Pin

Configure Code 9 to [X0X]. When the HOLD pin (pin 9) is connected to the COMMON pin (pin 11) the displayed reading is frozen. However, A/D conversions and all control functions continue and as soon as pin 9 is disconnected from pin 11 by the switch, the updated reading is instantly displayed.

The HOLD pin can also be configured in Code 9 to carry out the following functions (see Meter Programming Codes on page 27):

- Reset channel 1 [X1X].
- Reset total 1 and total 2 [X2X].
- Reset total 2 [X3X].
- Reset peak and valley [X4X].
- Reset tare [X5X].
- Set tare [X6X].
- Unlatch (de-energize) all setpoints [X7X].

Test Pin

Configure Code 9 to [0XX]. When the TEST pin (pin 10) is connected briefly to the COMMON pin (pin 11) all segments of the display and setpoint annunciators light up. The microprocessor is also reset during this time, losing all RAM settings such as peak and valley, and any digital input pin settings set up in Code 9.

The TEST pin can also be configured in Code 9 to carry out the following (see Meter Programming Codes on page 27):

- Reset counter channel 1 and total 2 at power-up [1XX].
- Reset counters, CH1, CH2, CH3, CH4, TOTAL 1, and TOTAL 2 at power-up [2XX].
- Reset total 1 and total 2 at power-up [3XX].

Capture Pin

When the CAPTURE pin (pin 12) is connected to the COMMON pin (pin 11), the CAPTURE pin can be programmed for setpoint/relay activation or macro control applications in the setpoint control settings mode of the setpoint programming mode [SPC_X] [X2X] .

COMMON Pin

To activate the LOCK, HOLD, TEST and CAPTURE pins from the rear of the meter, the respective pins have to be connected to the COMMON pin (pin 11).

The meter uses a set of intuitive software codes to allow maximum user flexibility while maintaining an easy programming process. To configure the meter's programming codes, the meter uses the three right-hand side display digits. These are known as the 1st, 2nd, and 3rd digits and can be seen in the diagram opposite. To explain software programming procedures, diagrams are used to visually describe the programming steps.

Operational Display

The following conventions are used throughout the CI-B101D60A meter document diagrams, representing the buttons and indicators on the meter, and the actions involved in programming the meter:

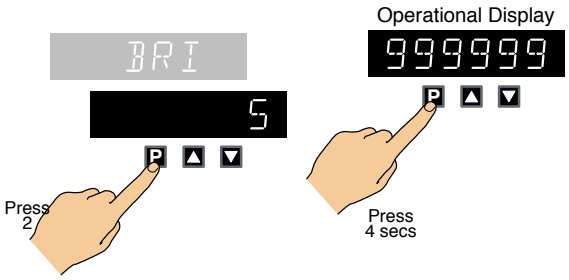
Symbol **Explanation**

The display showing 999999 represents the **OPERATIONAL DISPLAY**. After the meter has been powered up, the display settles and indicates the calibrated input signal. This is known as the operational mode and is generally referred to as the operational display throughout the documentation.

All programming modes are entered from this level.

P

This symbol represents the Red **PROGRAM** button. In a procedure, pressing the program button is always indicated by a **left hand**. A number indicates how many times it must be pressed and released, or for how long it must be pressed before releasing.



This symbol represents the **UP** button.

Shown in a diagram, pressing the UP button is always indicated by a **right hand**.

This symbol represents the **DOWN** button.

Shown in a diagram, pressing the DOWN button is always indicated by a right hand.

Where right hand is shown with two arrows and the word OR between them, this indicates that both the ⬆ and ⬇ buttons can be used to adjust the display: UP for increase, DOWN for decrease.

In the example procedures, a flashing display is indicated by a display with a gray background above a display with a black background.

[Span] **[10000]** Text or numbers shown between square brackets in a description or procedure indicate the programming code name of the function or the value displayed on the meter display.

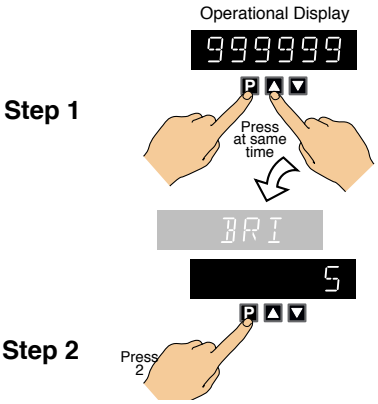
Programming procedures are graphic based with little descriptive text.

Each procedure shows a number of meter panel displays running in procedural steps from the top to the bottom of the page.

If need be, the procedure may run into two columns with the left column running down the page and continuing at the top of the right-hand column. Each action performed by the user is shown as a numbered step.

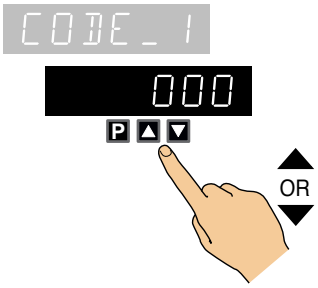
Each procedural step shows the meter display as it looks before an action is performed (Gray Display). The hand or hands in the procedural step indicate the action to be performed and also how many times, or for how long, the button is to be pressed.

For example, the diagram below shows the meter in the operational display. With a left hand pressing the P button and a right hand pressing the ⬆ button, the user is entering the **main programming mode**. This is indicated by the next diagram displaying [BRI] and [5]. This is the display brightness mode and is the first sub-menu of the main programming mode.



Where a left and right hand are shown on separate buttons on the same diagram, this indicates that the buttons must be pressed at the same time.

The only exception to this rule is when carrying out the *Model and Software Code Version Check*.



When two displays are shown together as black on grey, this indicates that the display is toggling (flashing) between the name of the function and the value or configuration setting.

Where a number is not definable, the default setting [000] is shown.

If an X appears in the description of a 3-digit programming code or in a configuration procedure, this means that any number displayed in that digit is not relevant to the function being explained, or more than one choice can be made.

The meter's programming codes are divided into two modes: the **main programming mode**, and the **setpoint programming mode** (*See diagram below*).

Each mode is accessible from the operational display.

Programming Tip

The easiest and fastest way to configure the meter is to use a PC with the free downloadable configuration utility program. See page 43

Main Programming Mode

The main programming mode provides access to program all meter functions, except setpoints.

To enter or exit the Main Programming Mode, press P and ↑ at the sam time

Main Programming Mode

- **[BRI]** Display Brightness
- P
- **[CAL]** Calibration Modes for Input and Output
- P
- **[CODE_1]** Code 1 – Display Configuration
- P
- **[CODE_2]** Code 2 – CH1 Measurement Task & Sampling Rate
- P
- **[CODE_3]** Code 3 – CH1 Post Processing & Serial Mode Functions
- P
- **[CODE_4]** Code 4 – CH2 Measurement Task & Sampling Rate
- P
- **[CODE_5]** Code 5 – CH3 Functions
- P
- **[CODE_6]** Code 6 – CH4 Functions
- P
- **[CODE_7]** Code 7 – Result Processing
- P
- **[CODE_8]** Code 8 – Data Logging & Print Mode
- P
- **[CODE_9]** Code 9 – Functions for Digital Input Pins
- P
- **[CODE10]** Code 10 – Bargraph Setup
- P

Programming Tip

Save Code Settings & Exit

To save a new main programming mode configuration setting and return to the operational display at any point, press the P button once.

Then press the P and ↑ button at the same time to exit.

Setpoint Programming Mode

The setpoint programming mode provides access to program all setpoint and relay functions.

To enter or exit the Setpoint Programming Mode, press P and ▼ at the same time

Setpoint Programming Mode

Setpoint Activation Values Mode

Enter these menus to adjust SP activation values

- **[SP_1]** Setpoint 1
- P
- **[SP_2]** Setpoint 2
- P
- **[SP_3]** Setpoint 3
- P
- **[SP_4]** Setpoint 4
- P
- **[SP_5]** Setpoint 5
- P
- **[SP_6]** Setpoint 6

Programming Tip

Save SP Settings & Exit

To save a new setpoint configuration setting and return to the operational display at any point, press the P button once.

Then press the P and ▼ button at the same time to exit.

Setpoint & Relay Control Settings Mode

Enter these menus to configure SP control values

- **[SPC_1]** Setpoint 1 →
- P
- Setpoint 2 →
- P
- **[SPC_3]** Setpoint 3 →
- P
- **[SPC_4]** Setpoint 4 →
- P
- **[SPC_5]** Setpoint 5 →
- P
- **[SPC_6]** Setpoint 6 →
- P

The Setpoint and Relay Control Settings diagram on page 39 shows the three digit configuration settings that are applied individually to each setpoint.

See page 38 for an example procedure to configure a setpoint for simple relay functions.

See page 35

Operational Display

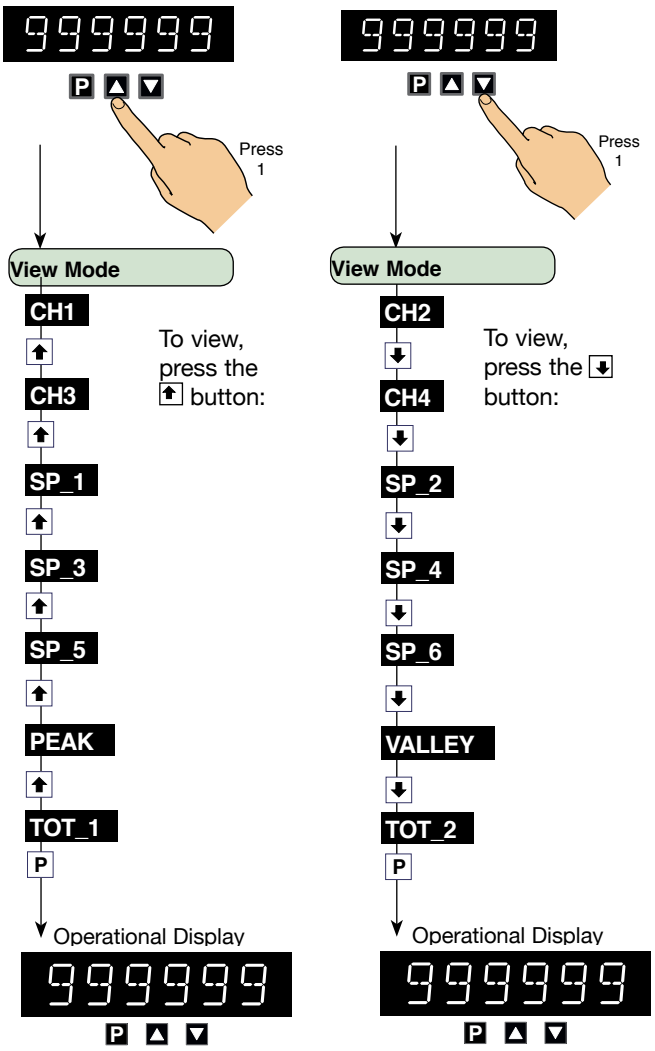
View Modes

While in the operational display, pressing the ⬆ button allows you to view but not change the following parameters:

- Channel 1.
- Channel 3.
- Setpoint 1.
- Setpoint 3.
- Setpoint 5.
- Peak (of CH1).
- Total 1 (total of CH1).

While in the operational display, pressing the ⬇ button allows you to view but not change the following parameters:

- Channel 2.
- Channel 4.
- Setpoint 2.
- Setpoint 4.
- Setpoint 6.
- Valley (of CH1).
- Total 2 (total of CH2).

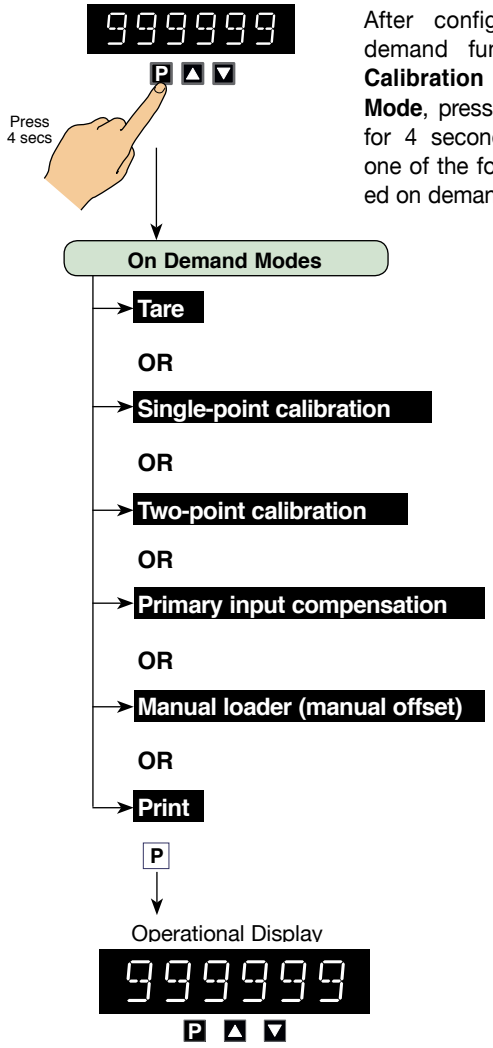


On Demand Modes

The meter can be programmed to activate the following functions on demand by pressing the P button for 4 seconds:

- Tare.
- Single-point calibration.
- Two-point calibration.
- Primary input compensation.
- Manual loader (manual offset).
- Print.

The on demand function is selected in the calibration mode.



After configuring an on demand function in the **Calibration On Demand Mode**, press the P button for 4 seconds to activate one of the following selected on demand modes.

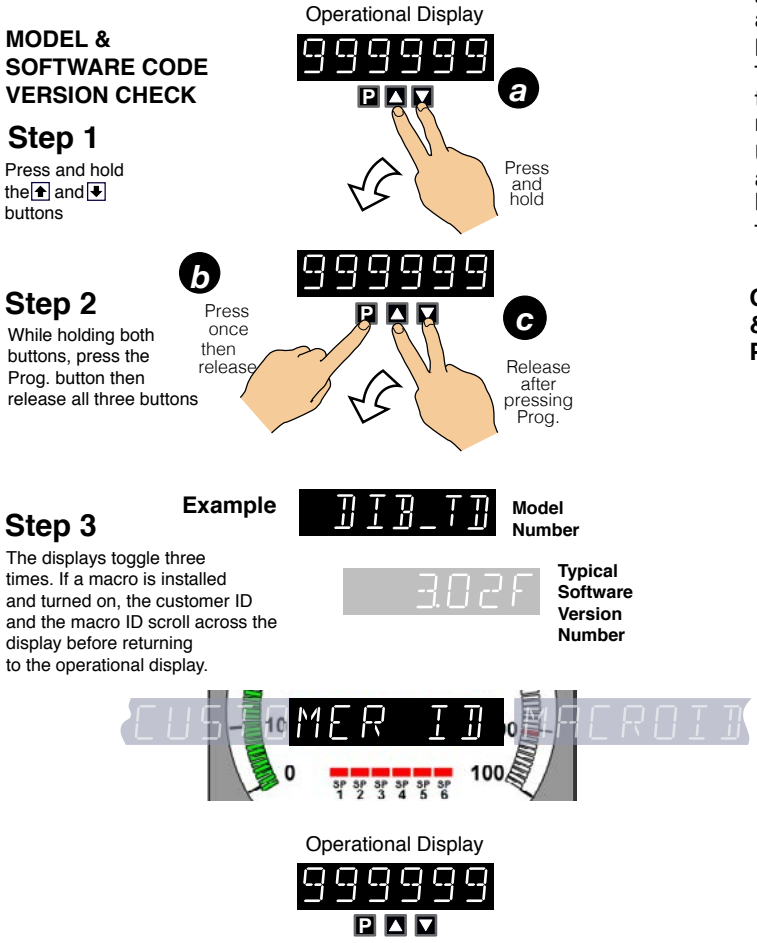
Before configuring the meter, carry out the following meter configuration checks:

- Model and software code version check.
- Code blanking and macro check.

After powering-up the meter, check the model and software code version number and note this in your user manual.

Model and Software Code Version Check

The meter model and software code version number can be checked at any time while in the operational display using the following procedure.



Model No:	.....
Software Version No:	.....
Customer ID:	.....
Macro ID:	.....

Programming Tip

The *Model and Software Code Version* checking procedure can be performed at any time without interfering with other configuration settings.

Code Blanking and Macro Check

The CI-B101D60A meters have the ability to hide (blank out) all or some programming codes, making them tamper-proof. This can only be done using the Meter Configuration program.

With code blanking turned ON, all main and setpoint codes that have been blanked out during factory programming are hidden, preventing them from being reprogrammed. Any codes that have not been blanked out are still visible and can be reprogrammed.

Turning code blanking OFF means all meter programming codes are visible when you enter the programming modes and can be reprogrammed.

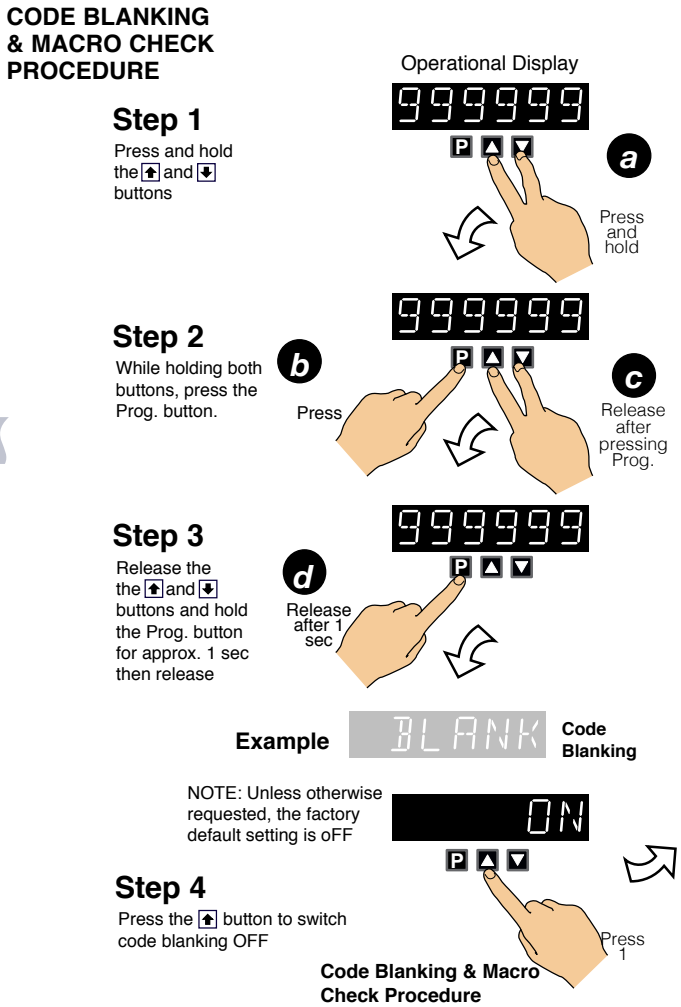
A macro is a set of commands that run automatically when the meter is powered up. We have a growing library of macros to suit a wide range of standard customer applications.

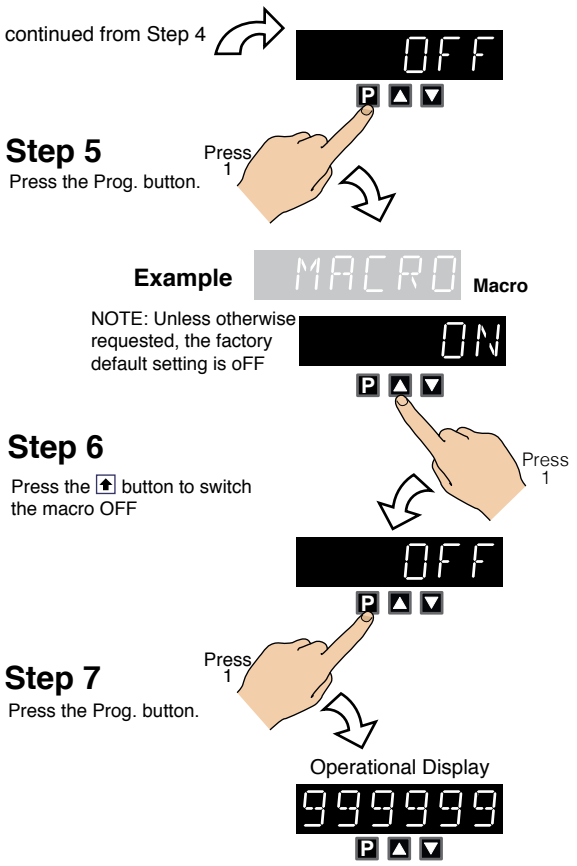
Macros can be installed in the meter at the factory during initial programming or by the customer at some later date. Macros are written and compiled using the BASIC Compiler program, and loaded into the meter using either the BASIC Compiler program or the Meter Configuration program.

Turning the macro OFF means that the meter will not perform the automatic commands pre-programmed to run with the macro.

Unless requested to blank out all or some programming codes and/or run a macro, we will program the meter in the code blanking OFF and macro OFF (default) setting.

To turn the code blanking and macro settings from ON to OFF:





Programming Tip

Code Blanking and Macro ON/OFF settings revert to the meter's original configuration settings when the meter is powered off and on.

Display Configuration

Once you have read the user manual and related supplements, and installed and powered-up the meter, configure the display to suit its designated application.

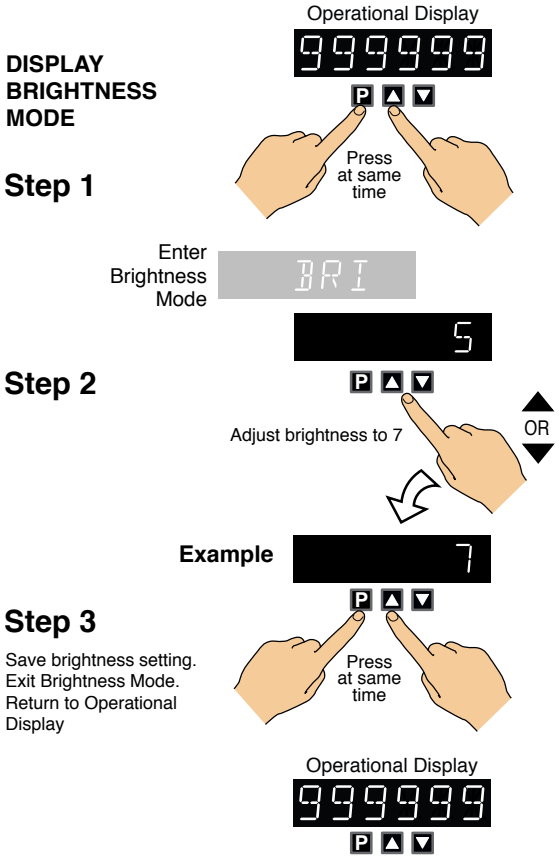
Display Brightness Mode

The **display brightness mode** is accessed when entering the main programming mode. It allows you to adjust the brightness of the display LEDs and setpoint annunciators without interfering with other configuration settings. It is always available, even with the PROGRAM LOCK switch set to ON, or the external LOCK pin connected to the COMMON pin, locking out the programming modes.

The display brightness can be set between 0 and 7, with 0 being dull and 7 being bright. The default setting is 5.

Example Procedure:

Configure the display brightness setting to 7 (bright).



Programming Tip

The *Display Brightness* setting procedure can be performed at any time without interfering with other configuration settings by entering the main programming mode.

The CI-B101D60A meter has an extremely powerful set of input and output calibration modes. See diagram below.

ON DEMAND Functions

In this mode the meter can be programmed to activate one of the following on demand functions by pressing the [P] button while in the operational display:

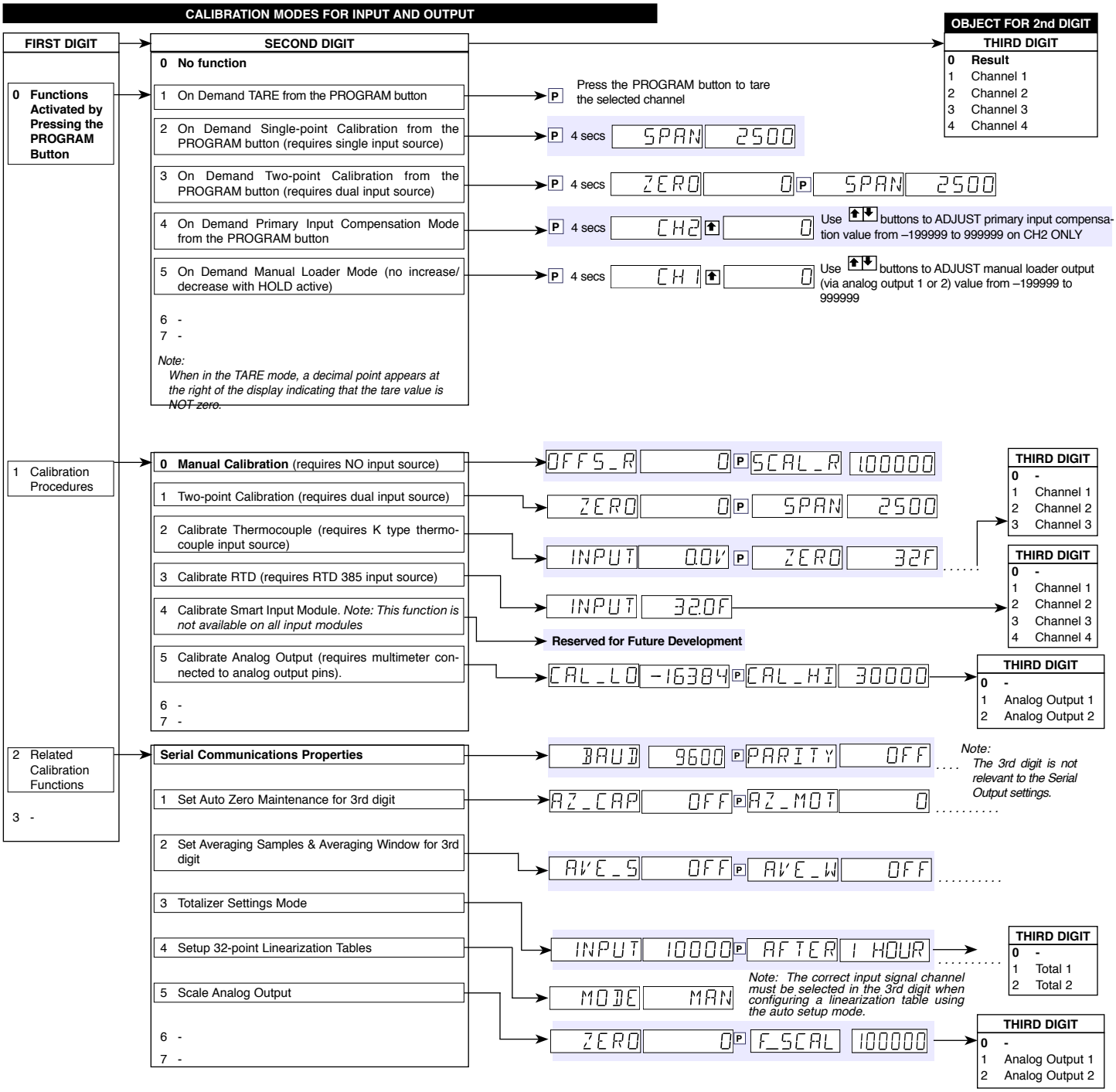
- On Demand TARE.
- On Demand Single-point Calibration (requires single input source).
- On Demand Two-point Calibration (requires dual input source).
- On Demand Primary Input Compensation Mode.
- On Demand Manual Loader Mode.

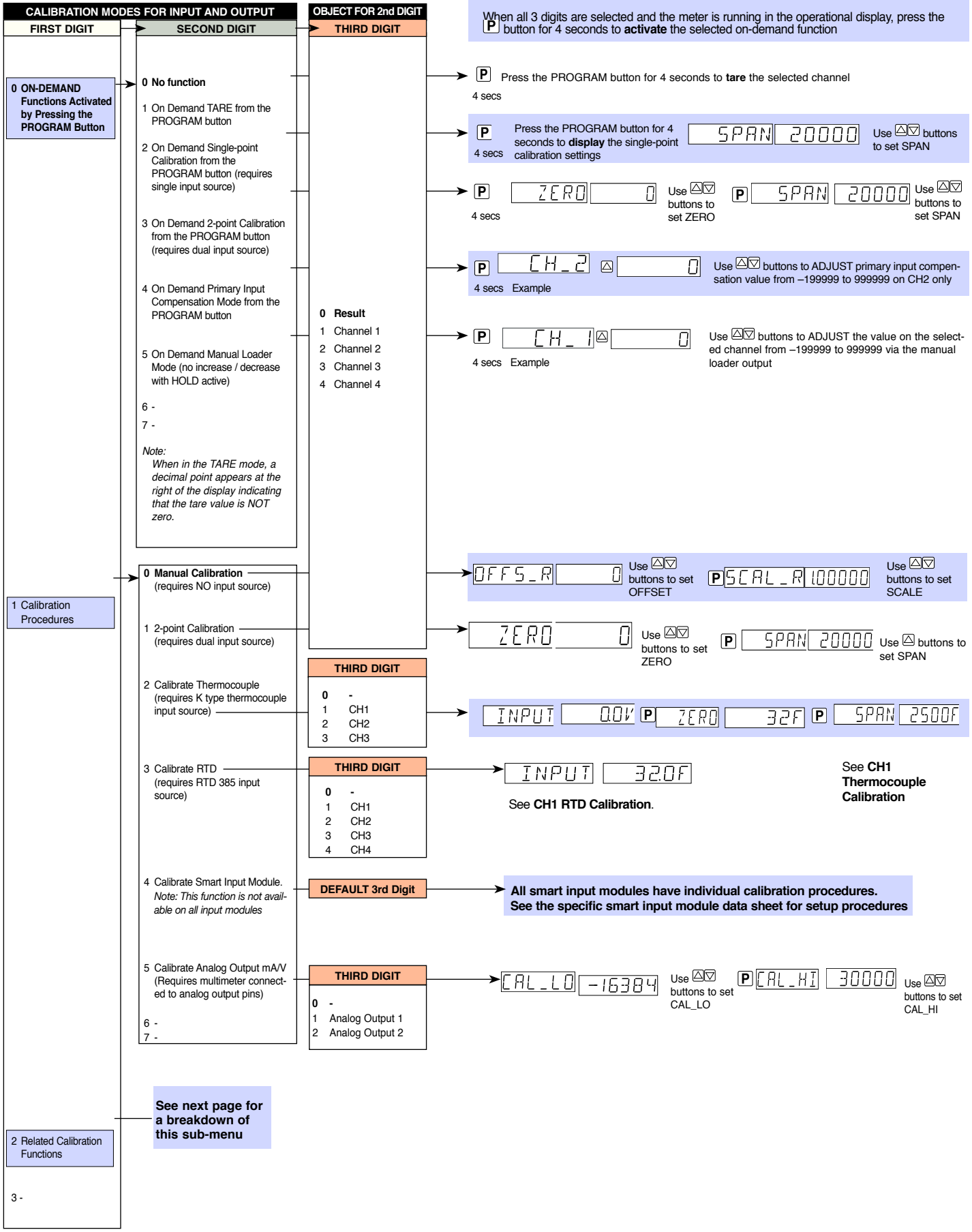
The following calibration modes are available:

- Manual Calibration (requires NO input source).
- **Two-point Calibration (requires dual input source).**

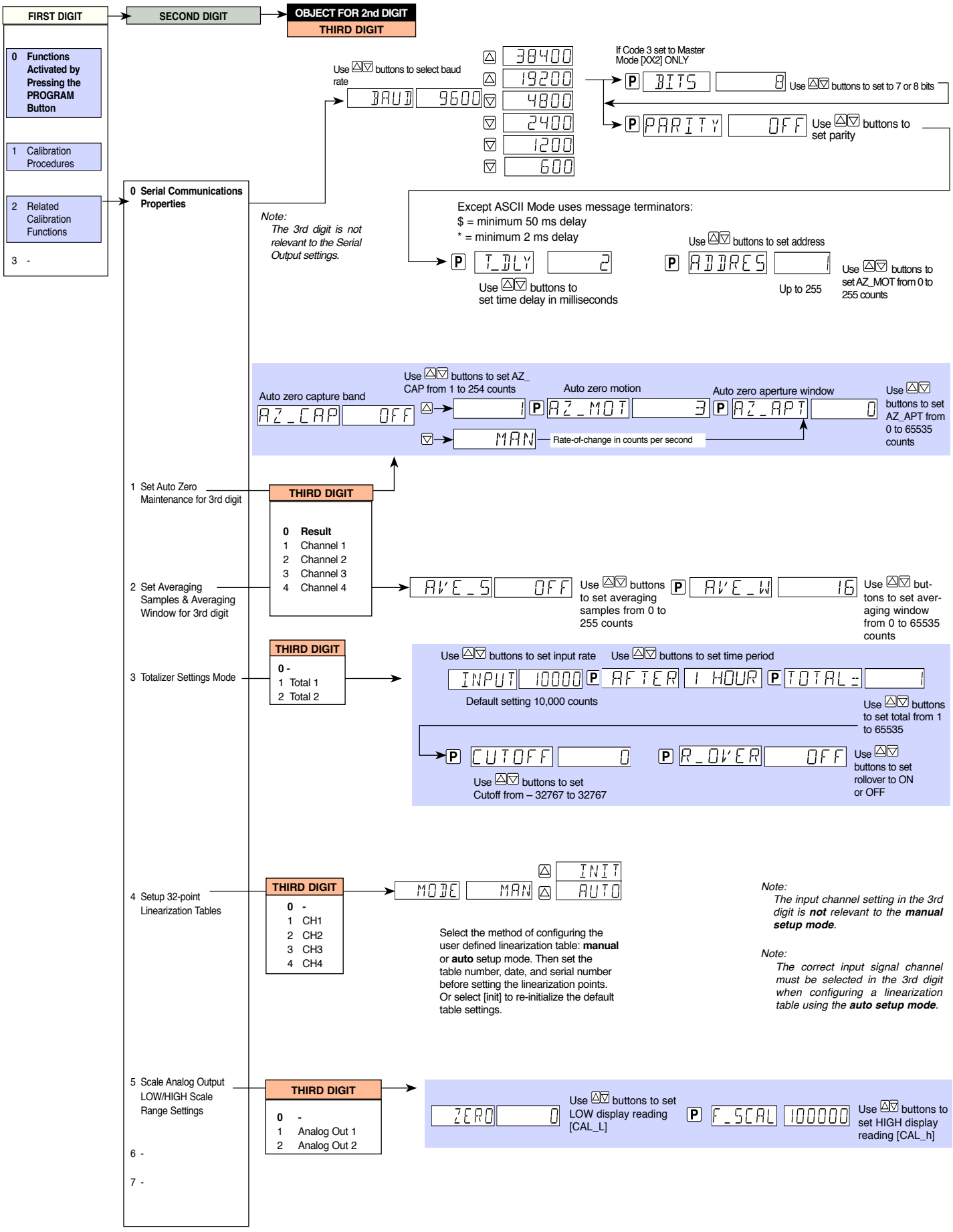
  This is the calibration mode generally used to calibrate the meter for most applications. An example procedure has been included.
- Calibrate Thermocouple (requires K type thermocouple input source).
- Calibrate RTD (requires RTD 385 input source).
- Calibrate Smart Input Module (not available on all input modules).
- Calibrate Analog Output (requires multimeter connected to analog output pins).

Calibration Modes




CALIBRATION MODES FOR INPUT AND OUTPUT
FIRST DIGIT
SECOND DIGIT
OBJECT FOR 2nd DIGIT
THIRD DIGIT
When all 3 digits are selected and the meter is running in the operational display, press the P button for 4 seconds to activate the selected on-demand function
0 ON-DEMAND Functions Activated by Pressing the PROGRAM Button
0 No function
1 On Demand TARE from the PROGRAM button
2 On Demand Single-point Calibration from the PROGRAM button (requires single input source)
3 On Demand 2-point Calibration from the PROGRAM button (requires dual input source)
4 On Demand Primary Input Compensation Mode from the PROGRAM button
5 On Demand Manual Loader Mode (no increase / decrease with HOLD active)
6 -
7 -
Note:
When in the TARE mode, a decimal point appears at the right of the display indicating that the tare value is NOT zero.
P Press the PROGRAM button for 4 seconds to tare the selected channel
4 secs
P 4 secs Press the PROGRAM button for 4 seconds to display the single-point calibration settings
SPAN 20000
Use buttons to set SPAN
P 4 secs
ZERO 0
Use buttons to set ZERO
P SPAN 20000
Use buttons to set SPAN
P CH_2 0
4 secs Example
Use buttons to ADJUST primary input compensation value from –199999 to 999999 on CH2 only
0 Result
1 Channel 1
2 Channel 2
3 Channel 3
4 Channel 4
P CH_1 0
4 secs Example
Use buttons to ADJUST the value on the selected channel from –199999 to 999999 via the manual loader output
1 Calibration Procedures
0 Manual Calibration (requires NO input source)
OFFS_R 0
Use buttons to set OFFSET
P SCAL_R 100000
Use buttons to set SCALE
1 2-point Calibration (requires dual input source)
ZERO 0
Use buttons to set ZERO
P SPAN 20000
Use buttons to set SPAN
2 Calibrate Thermocouple (requires K type thermocouple input source)
THIRD DIGIT
0 -
1 CH1
2 CH2
3 CH3
INPUT 0.0V P ZERO 32F P SPAN 2500F
3 Calibrate RTD (requires RTD 385 input source)
THIRD DIGIT
0 -
1 CH1
2 CH2
3 CH3
4 CH4
INPUT 32.0F
See CH1 RTD Calibration.
See CH1 Thermocouple Calibration
4 Calibrate Smart Input Module.
Note: This function is not available on all input modules
DEFAULT 3rd Digit
All smart input modules have individual calibration procedures.
See the specific smart input module data sheet for setup procedures
5 Calibrate Analog Output mA/V (Requires multimeter connected to analog output pins)
6 -
7 -
THIRD DIGIT
0 -
1 Analog Output 1
2 Analog Output 2
CAL_LO -16384
Use buttons to set CAL_LO
P CAL_HI 30000
Use buttons to set CAL_HI
See next page for a breakdown of this sub-menu
2 Related Calibration Functions
3 -

[CAL] - Calibration Modes for Input and Output continued



Related Calibration Functions

The following functions are also configured in the calibration mode.

Serial Communications Properties

Selecting [CAL][20X] enters the Serial Communications Properties Mode.

This mode allows you to configure the serial communications output module baud rate, parity, time delay, and address settings.

*See the **calibration modes** diagram on page 9 showing a breakdown of 1st, 2nd, and 3rd digits.*

Also see the Serial Communications Module Supplement for further details on the serial communications module.

Set Auto Zero Maintenance

Selecting [CAL][21X] enters the Set Auto Zero Maintenance Mode.

This mode allows you to configure auto zero maintenance settings for weighing applications applied to the channel selected in the 3rd digit.

*See the **calibration modes** diagram on page 9 showing a breakdown of 1st, 2nd, and 3rd digits.*

Set Averaging Samples & Averaging Window

Selecting [CAL][22X] enters the Set Averaging Samples and Averaging Windows Mode.

This mode allows you to configure the number of input signal samples to average over, and the size of the averaging window in display counts applied to the channel selected in the 3rd digit.

Selecting [CAL][22X] enters the Set Averaging Samples and Averaging Windows Mode. When in this mode, the [AV_S] menu allows you to select the number of input signal samples to average over. After setting the number of samples, moving to the [AV_W] menu allows you to configure the size of the averaging window in displayed counts.

The meter averages the input samples over the selected number of input samples (selected in the [AV_S] menu). This carries on in a continual process provided the input signal stays within the averaging window (set in the [AV_W] menu). If the sample moves out of the averaging window, the meter responds quickly to the change by displaying the non-averaged signal value. When the signal stabilizes, a new averaging window is established and averaging resumes.

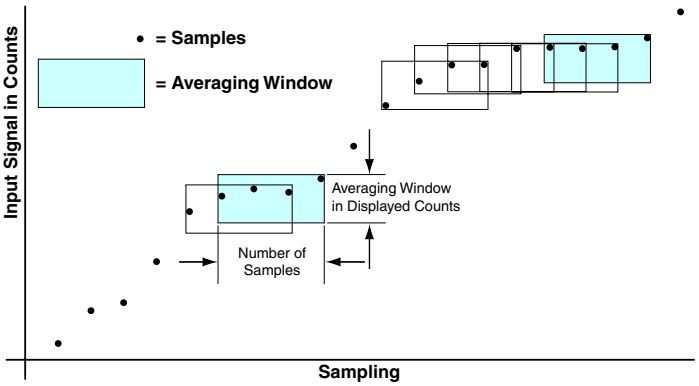
You can program the number of samples you want to average the input signal over from 1 to 255 samples. The averaging window can be set to between 1 and 65535 counts.

*See the **calibration modes** diagram on page 9 showing a breakdown of 1st, 2nd, and 3rd digits.*

See Input Signal Sampling Showing Averaging Window diagram opposite.

Example Procedure

The example procedure on page 14 shows how to configure channel 1 (CH1) with an averaging sample rate of 10 counts and an averaging window of 1000 counts.



Input Signal Sampling Showing Averaging Window

Totalizer Settings

Selecting [CAL][23X] enters the Totalizer Settings Mode.

This mode allows you to configure the settings for the totalizer selected in the 3rd digit. An input value of 10000 counts is applied to a selectable time period to produce the required total value.

The cutoff is a programmable limit below which the input is not totalized.

*See the **calibration modes** diagram on page 9 showing a breakdown of 1st, 2nd, and 3rd digits.*

Also see the Totalizing and Batching Supplement for further details on K factor and totalizer cutoff parameters.

Setup 32-point Linearization Tables

Selecting [CAL][24X] enters the Setup 32-point Linearization Tables Mode.

This mode allows you to set up the linearization table or tables using the manual or auto setup modes. The table or tables can then be selected to linearize the signals on channels 1 to 4.

*See **Linearization Table Notes** on page 26 for a description of memory related issues with linearization.*

*See the **calibration modes** diagram on page 9 showing a breakdown of 1st, 2nd, and 3rd digits.*

Scale Analog Output

Selecting [CAL][25X] enters the Scale Analog Output Mode.

This mode allows you to calibrate and scale the analog output signal. Before calibrating the analog output in the calibration mode, the data source for the analog output must be configured in Code 1.

*See the **calibration modes** diagram on page 9 showing a breakdown of 1st, 2nd, and 3rd digits.*

Also see the Analog Output Module Supplement for further details on the analog output module.

Also see Configure Data Source Procedure on page 17 for an example of setting the analog output data source.

Two-point Calibration

Two-point calibration is the most commonly used method of calibrating The CI-B101D60A meters when a low and high input source is available.

Example Calibration Procedure

Calibrate channel 1 (CH1) using the two-point calibration method. Set the calibration mode display to **[111]**.

The low input source is applied to the meter when setting the zero value.

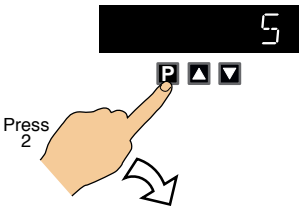
The high input source is applied to the meter when setting the span value.

TWO-POINT CALIBRATION

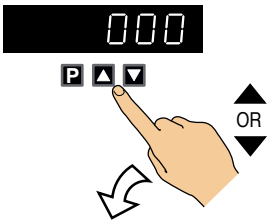
Operational Display

Step 1
Enter Brightness Mode

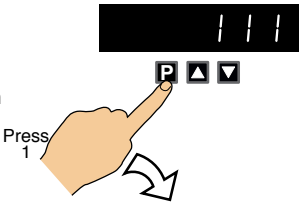
Step 2
Pass Brightness Mode and enter Calibration Mode



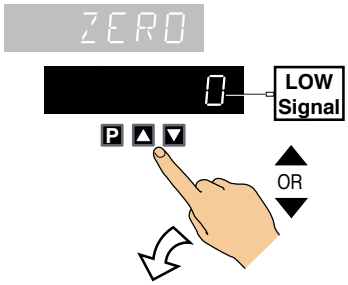
Step 3
Set Calibration Mode to [111]:
1st Digit = 1
Selects calibration procedures
2nd Digit = 1
Selects 2-point calibration
3rd Digit = 1
Selects CH1 for calibration



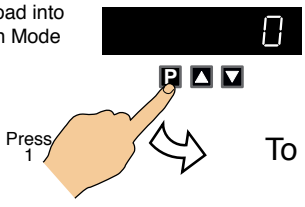
Step 4
Enter Cal Mode [111]
For 2-point calibration of CH1



Step 5
5.1. Adjust display to desired reading for zero input
5.2. Apply the LOW input signal



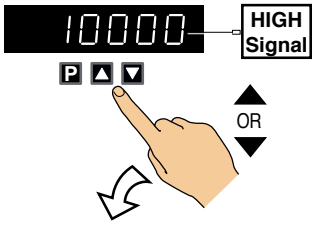
Step 6
Set reading for zero load into meter and enter Span Mode



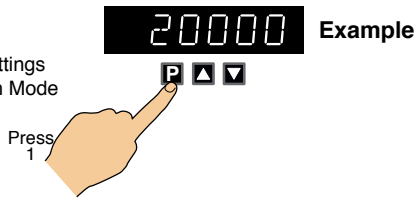
To Step 7

From Step 6

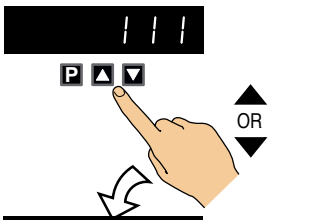
Step 7
7.1. Adjust display to desired reading for span input
7.2. Apply the HIGH input signal

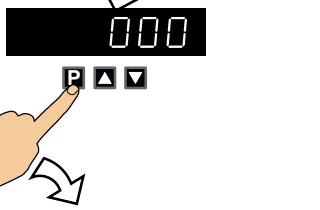


Step 8
Save zero and span settings and re-enter Calibration Mode

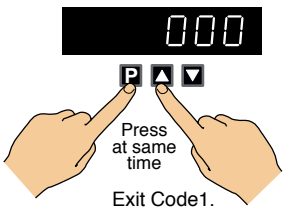


Step 9
Select the No Function Calibration Mode [000]





Step 10
Save Calibration Mode [000] setting and enter Code 1



Step 11
Exit Code1. Return to Operational Display

Operational Display

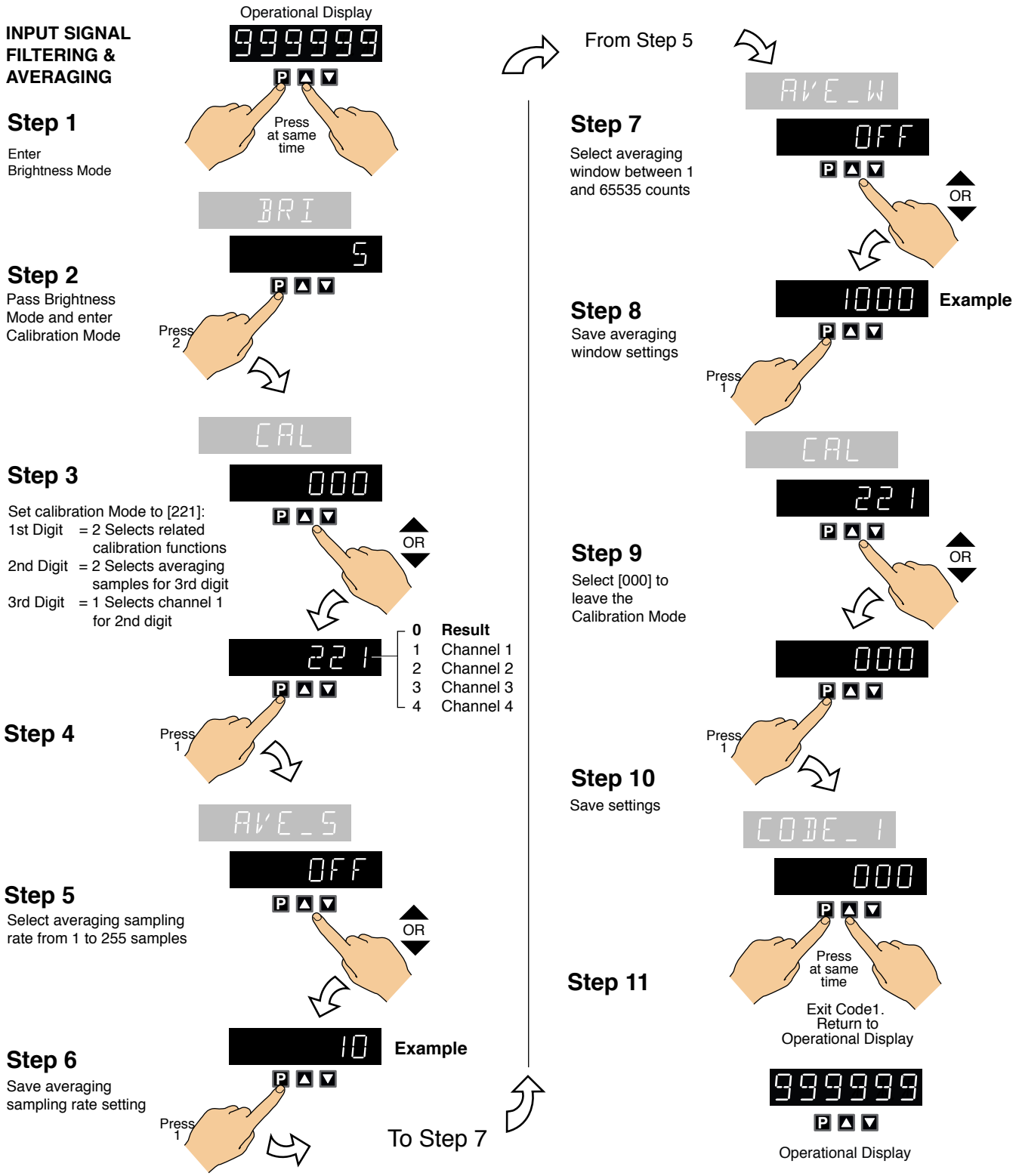
Input Signal Filtering and Averaging

Input signal filtering and averaging is configured in the calibration mode. Programmable averaging allows you to program the number of samples you want to average the input signal over (from 1 to 255 samples).

A programmable averaging window provides a quick response time to large input signal changes. The averaging window can be set to between 1 and 65535 counts.

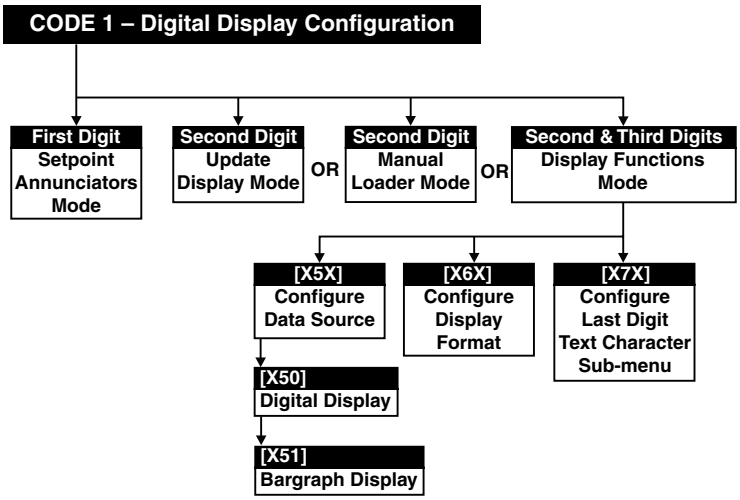
Example Procedure:

Select an averaging sampling rate of 10 samples and an averaging window of 1000 counts for Channel 1 by setting [CAL] to [**221**].



CODE 1 – Display Configuration Modes

All meter display modes, except the display brightness mode, are configured in Code 1 (See diagram below).



Setpoint Annunciators Mode

The setpoint annunciators mode is configured by changing the first digit in Code 1. The setpoint annunciators can be configured to operate as follows:

- On when the setpoint activates.
- All annunciators are permanently on and each one only goes off when its setpoint activates.
- All annunciators are always off (See Note 1 on Code 1 diagram on page 16).
- Setpoint **1** annunciator comes **on** indicating a **rising signal**. Setpoint **2** annunciator comes **on** indicating a **falling signal**.

The example procedure on page 20 shows how to select the setpoint annunciators to come ON when the setpoints are OFF (not active).

Update Display at Selected Sample Rate

The meter's default display update rate is 0.5 seconds and is set in the 2nd digit of Code 1 as [X0X].

The display can be configured to update at the analog sample rate selected in Code 2.

The example procedure on page 20 shows how to configure the display to update at 50 samples per second by setting Code 1 to [X2X].

For these settings to take effect, the analog sample rate must be set at [2XX] in Code 2.

See Code 2 – Channel 1 Measurement Task and Sampling Rate on page 21 for an example.

Manual Loader Mode

The meter can be configured to function exclusively as a manual loader by setting Code 1 to [X1X].

See Analog Output Module Supplement for full details on manual loader mode functions.

Display Functions Mode

The display functions mode is configured by changing the 2nd and 3rd digits in Code 1:

- Selecting [X5X] enters the **Data Source** sub-menu.
- Selecting [X6X] enters the **Display Format** sub-menu.
- Selecting [X7X] enters the **Last Digit Text Character** sub-menu.

Data Source – 2nd Digit [X5X]

The data source for the primary display is configured by selecting **5** in the 2nd digit and **0** in the 3rd digit.

Note:
[XX1] Second Display is the bargraph display .

The 2nd digit in Code 1 can also be used to configure the data source for the remaining functions in the 3rd digit:

- [X53] = Peak and Valley.
- [X54] = Analog Output 1.
- [X55] = Analog Output 2.
- [X56] = Totalizer 1.
- [X57] = Totalizer 2.

Selecting **5** in the 2nd digit enters a sub-menu and allows you to select the data from one of a number of meter registers as the data source for the displays or functions selected in the third digit.

The example procedure on page 17 shows how to select the data source for the **primary** display. The three digits are set to [**X50**].

Display Format – 2nd Digit [X6X]

Selecting **6** in the 2nd digit enters the Display Format sub-menu where the following display format settings can all be configured:

- Last digit rounding.
- Display units (Decimal, octal, or optional 12 or 24-hour clock).
- Decimal point placement.

The example procedure on page 18 shows how to configure the three display format modes for the 3rd digit selection.

Text Character – 2nd Digit [X7X]

Selecting **7** in the 2nd digit allows you to select one of 54 characters and apply it to the last digit when the meter is in the operational display.

For example, if the meter was measuring a temperature, the display could be configured to display the reading with a C or an F in the last digit for °C or °F.

The example procedure on page 19 shows how to configure the last digit text character as "C" for centigrade (°C) for the 3rd digit selection.

Note:
After setting any or all the above three modes [X5X], [X6X], [X7X], the Code 1 display must set back to [X0X] to leave Code 1 and carry on programming.

FIRST DIGIT | **SECOND DIGIT** | **THIRD DIGIT**

CODE 1 – DISPLAY CONFIGURATION

FRONT PANEL ANNUNCIATORS

- **0 ON when Setpoints are ON (relay energized)**
- 1 ON when Setpoints are OFF (relay de-energized)
- 2 Always OFF. *See Note 1*
- 3 LED SP1 ON indicates RISING signal trend.
  LED SP2 ON indicates FALLING signal trend.

DISPLAY FUNCTIONS

- **0 Normal Display Mode (i.e. operational display shows selected register) updates every 0.5 seconds**
- 1 Manual Loader Mode (Direct Display). *See Note**
- 2 Update at sample rate selected in Code 2
- 3 -
- 4 -
- 5 Select data source as per 3rd digit. *See Note 4*
- 6 Select display format as per 3rd digit. *See Note 4*
- 7 Select text character as per 3rd digit. *See Note 4*

SELECT DATA SOURCE FOR

- **0 Primary Display see Note 2**
- 1 Secondary Display. see Note 2
- 2 –
- 3 Peak/Valley
- 4 Analog Output 1
- 5 Analog Output 2
- 6 Totalizer 1
- 7 Totalizer 2

Select Data Source

P SOURCE OFF

[1] ← → [DISP]

[10] [100] [200] [244] [TARE] [VALLEY] [PEAK] [TOT_2] [TOT_1] [CH4] [CH3] [CH2] [CH1] [RESULT]

Use the ↑ ↓ buttons to cycle through the Registers Menu and Registers (1 to 244) to select data source for displays, peak and valley, totalizers and analog output (41 for Register numbers that can be used and Register numbers that should not be used.)

SELECT DISPLAY FORMAT FOR

- **0 Result**
- 1 Channel 1
- 2 Channel 2
- 3 Channel 3
- 4 Channel 4
- 5 Default Display
- 6 Total 1
- 7 Total 2

Note:*

For the Manual Loader Mode (Direct Display) to work, with Code 1 set to [X54] the data source for the analog output (1 or 2) must be set to [diSP].

Operating range upper and lower limits can be set for the manual loader mode.

The setpoint activation values for setpoint 5 becomes the upper limit and setpoint 6 becomes the lower limit.

When either the direct display or on demand manual loader mode is programmed into the meter, the values for setpoint 5 and setpoint 6 are activated as upper and lower limits.

See Analog Output Supplement for further details.

Note 1:

LED annunciators are always off, except when the meter is in single channel VOLTAGE or CURRENT mode and Code 3 = [X6X], or Code 7 = [X6X] in which case the LEDs indicate which 32-point table has been selected from the rear pins (SP1 = Table 1, SP2 = Table 2, SP3 = Table 3, SP4 = Table 4).

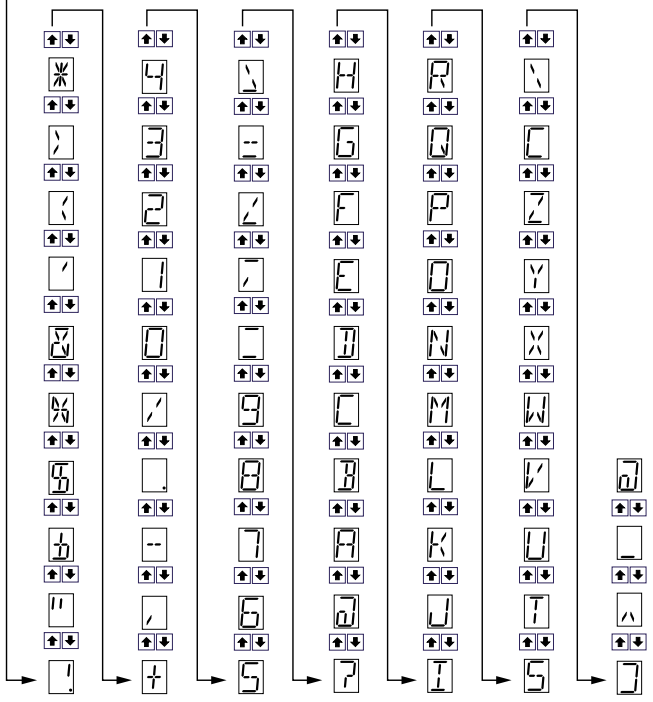
SELECT TEXT CHARACTER FOR

- **0 Result**
- 1 Channel 1
- 2 Channel 2
- 3 Channel 3
- 4 Channel 4
- 5 Default Display
- 6 Total 1
- 7 Total 2

Select Last Digit Text Character

TEXT OFF

Use the ↑ button to cycle through the menu, and the ↓ button to cycle back.



Display Format Mode

P DISP 000

Program the three digits to the required display function mode

FIRST DIGIT – LAST DIGIT ROUNDING
0 No rounding
1 Rounding by 2's
2 Rounding by 5's
3 Rounding by 10's

SECOND DIGIT – DISPLAY UNITS
0 Decimal
1 24-hour clock mode Hours: Minutes: Seconds (6-digit version only)
2 12-hour clock mode (12:30 am is displayed as 12:30A. 12:30 pm is displayed as 12:30P)
3 24-hour clock mode Days: Hours:Minutes (6-digit version only)
4 -
5 -
6 -
7 Octal

Note:

Selecting 1, 2, or 3 in the 2nd digit of this mode configures the display of the selected channel as a clock.

THIRD DIGIT – DECIMAL POINT PLACEMENT
0 No decimal point
1 XX.XX.XX
2 X.XXXXX
3 X.XXXX
4 X.XXX
5 X.XX
6 X.X
7 Decimal Point set from the rear (X.XXXX to XXXXX) *See Note 3. Also See Note 4.*

Note 2:
With bargraph meters the PRIMARY display is the digital display, and the SECONDARY display is the bargraph display.

Note 3:
These function are only available on selected input module.

Note 4:
If Code 1's display modes have been entered (second digit set to 5,6, or 7), the display will cycle between Code 1 and the display fumctions mode each time the PROGRAM button is pressed. To leave the cycle, the Code 1 digits must be reset to any relevant fuction between [X00] to [X20]. This takes you into Code 2.

Configure Data Source Procedure

The following example procedure describes how to select the source of the data to be displayed for the third digit selection.

Example Procedure:

Configure the Primary Display with the display [DISP] as the data source by setting Code 1 to [**X50**]. See diagram at the bottom of the page for data source selection options.

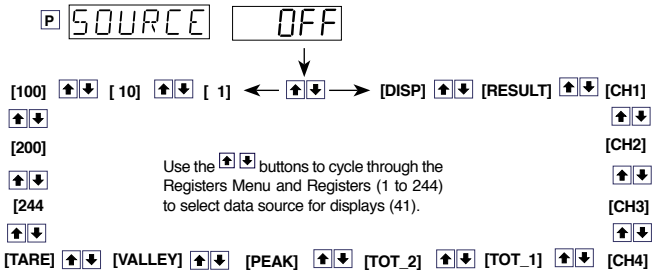
Non-symmetrical Zero Bargraph

Programming Tip

To enter the Main Programming Mode press the P and ⇧ buttons at the same time. To exit and return to the operational display, press the P and ⇧ buttons again at the same time.

At the end of any procedure (Step 8 in this procedure) the P must be pressed before the P and ⇧ buttons are pressed,otherwise the meter returns to the operational display without saving the new settings.

Select Data Source

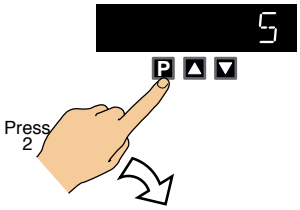


Operational Display

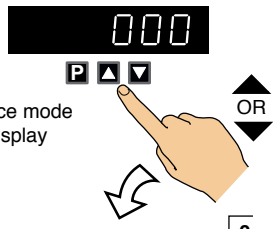
CONFIGURE DATA SOURCE

Step 1
Enter Brightness Mode

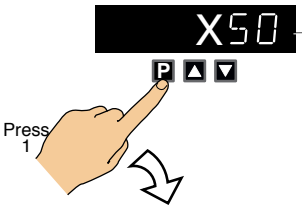
Step 2
Pass Brightness and Calibration Modes and enter Code 1



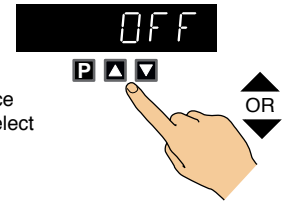
Step 3
Set Code 1 to [X50]:
1st Digit = X Note relevant
2nd Digit = 5 Selects data source mode
3rd Digit = 0 Selects primary display



Step 4



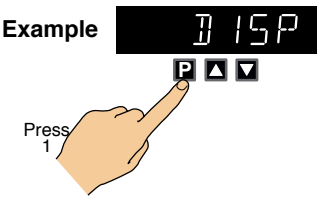
Step 5
Select [diSP] as the Data Source from the options listed in the Select Data Source diagram below.



0	**Primary Display**
1	Second Display (See Note)
2	Third Display (See Note)
3	Peak/Valley
4	Analog Output 1
5	Analog Output 2
6	Totalizer 1
7	Totalizer 2

From Step 5

Example

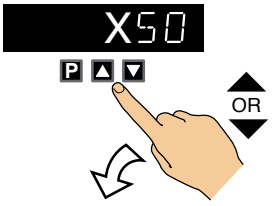


Step 6

Programming Tip

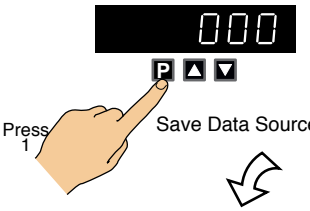
Pressing the ⇩ button reaches [000] faster.

Step 7
Select [000] to leave Code 1



Programming Tip

Pressing the ⇧ and ⇩ buttons at the same time increases the displayed parameter in increments of 100 counts.



Step 8
Save Data Source setting

Step 9
Exit Code 2. Return to Operational Display

Operational Display

Note:
With bargraph meters the PRIMARY display is the digital display, and the SECONDARY display is the bargraph display.

Configure Display Format Mode Procedure

The following example procedure describes how to configure the display format mode for the 3rd digit selection and covers:

- Last Digit Rounding.
- Display Units.
- Decimal Point Placement.

Example Procedure:

Configure the display format mode for channel 1 with rounding by 2's, decimal display units, and the decimal point placed between display digits 4 and 5 by setting Code 1 to [**X61**] to enter the Display Format Mode.

Display Format Mode

P DISP 000 Program the three digits to the required display format mode

FIRST DIGIT LAST DIGIT ROUNDING
0 No rounding
1 Rounding by 2's
2 Rounding by 5's
3 Rounding by 10's

SECOND DIGIT DISPLAY UNITS
0 Decimal
1 24-hour clock mode Hours: Minutes: Seconds (6-digit version only)
2 12-hour clock mode (12:30 am is displayed as 12:30A. 12:30 pm is displayed as 12:30P)
3 24-hour clock mode Days: Hours:Minutes (6-digit version only)
4 -
5 -
6 -
7 Octal

THIRD DIGIT DECIMAL POINT PLACEMENT	
0	**No decimal point**
1	XX.XX.XX
2	X.XXXXX
3	X.XXXX
4	X.XXX
5	X.XX
6	X.X
7	Decimal Point set from the rear (X.XXXX to XXXXX) *See Note 3.* *Also See Note 4.*

Note:
Selecting 1, 2, or 3 in the 2nd digit of this mode configures the display of the selected channel (see Step 4) as a clock.

Note 3:
These functions are only available on selected input modules.

Note 4:
If Code 1's display modes have been entered (second digit set to 5, 6, or 7), the display will cycle between Code 1 and the display functions mode each time the PROGRAM button is pressed. To leave the cycle, the Code 1 digits must be reset to any relevant function between [X00] to [X20]. This takes you into Code 2.

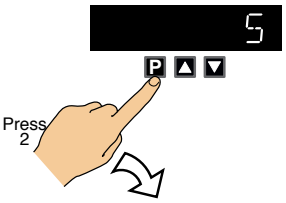
CONFIGURE DISPLAY FORMAT

Operational Display

Step 1
Enter Brightness Mode

BRI

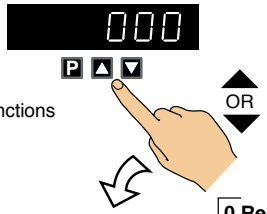
Step 2
Pass Brightness and Calibration Modes and enter Code 1



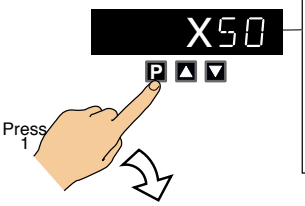
CODE_1

Step 3

Set Code 1 to [X61]:
1st Digit = X Note relevant
2nd Digit = 6 Selects display functions
3rd Digit = 1 Selects Channel 1



Step 4



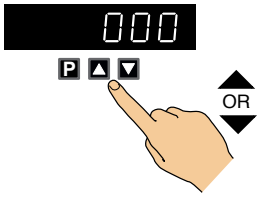
0 Result
1 Channel 1
2 Channel 2
3 Channel 3
4 Channel 4
5 Default Display
6 Total 1
7 Total 2

Step 5

DISP

Set the Display Format Mode to [106]:

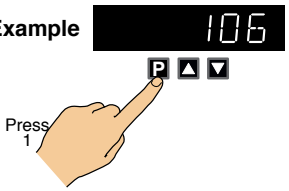
1st Digit = 1 Rounding by 2's
2nd Digit = 0 Decimal display
3rd Digit = 6 Decimal point



From Step 5

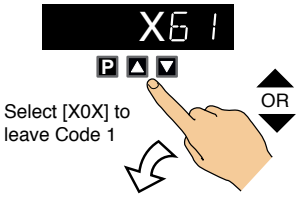
Step 6

Example

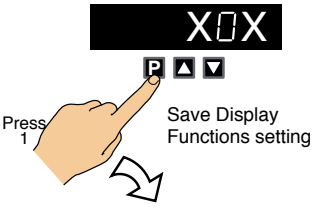


CODE_1

Step 7

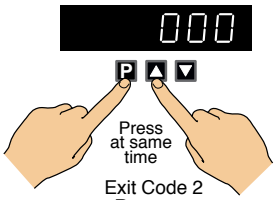


Step 8



CODE_2

Step 9



Exit Code 2
Return to Operational Display

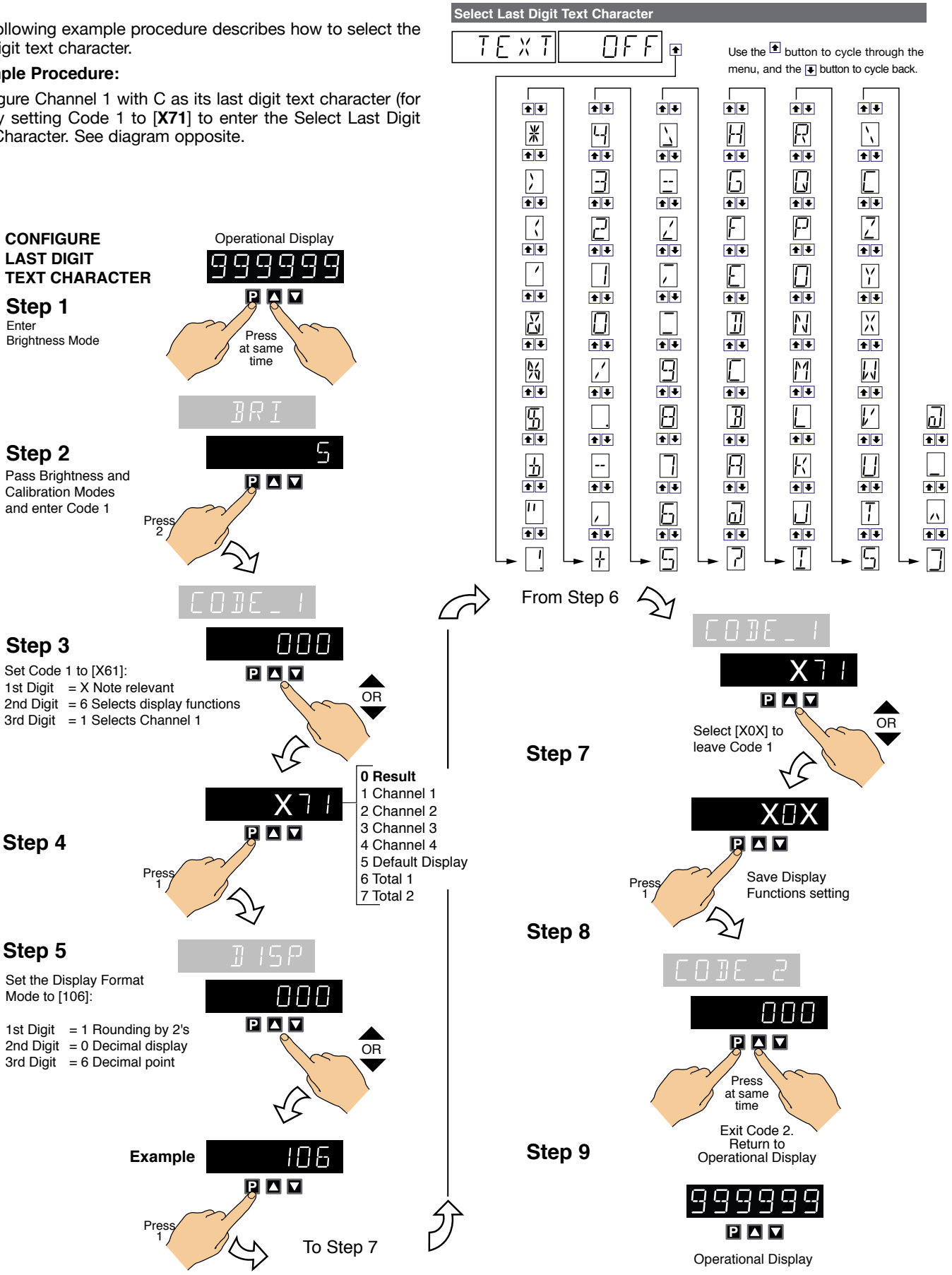
Operational Display

Configure Last Digit Text Character Procedure

The following example procedure describes how to select the last digit text character.

Example Procedure:

Configure Channel 1 with C as its last digit text character (for °C) by setting Code 1 to [**X71**] to enter the Select Last Digit Text Character. See diagram opposite.

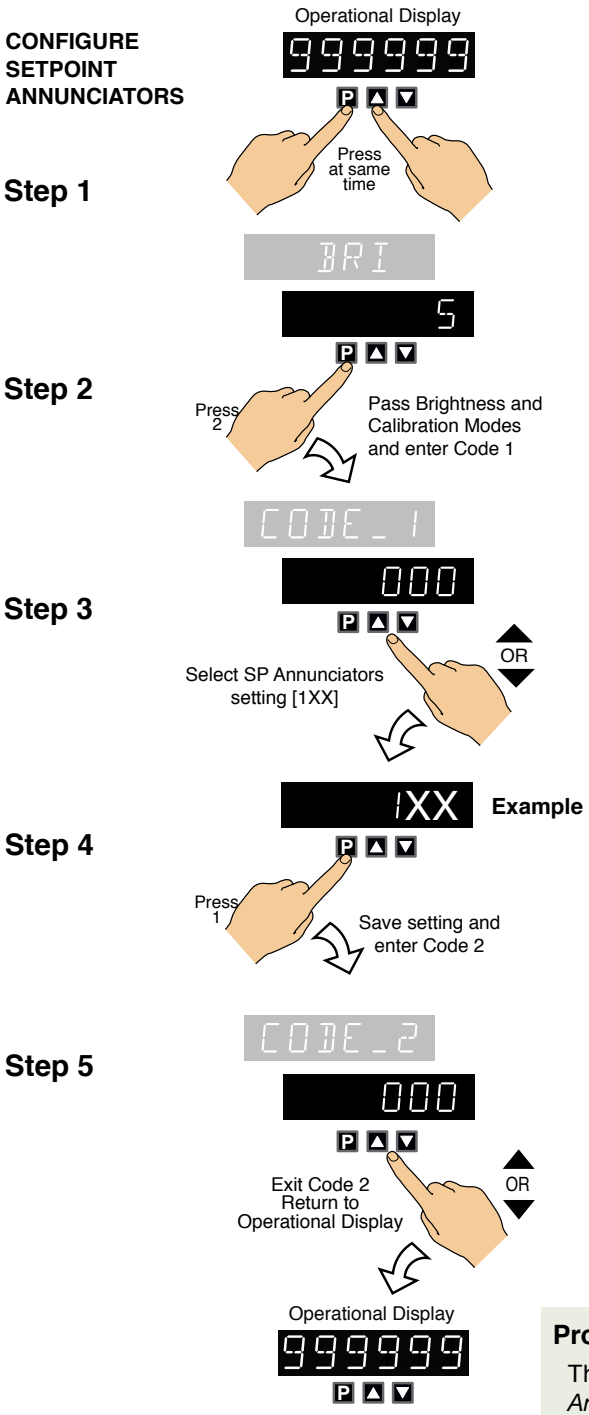


Configure Setpoint Annunciators Procedure

The following example procedure describes how to configure setpoint annunciators.

Example Procedure:

Configure the setpoint annunciators to come ON when the setpoints are OFF (not active) by setting Code 1 to [**1XX**].

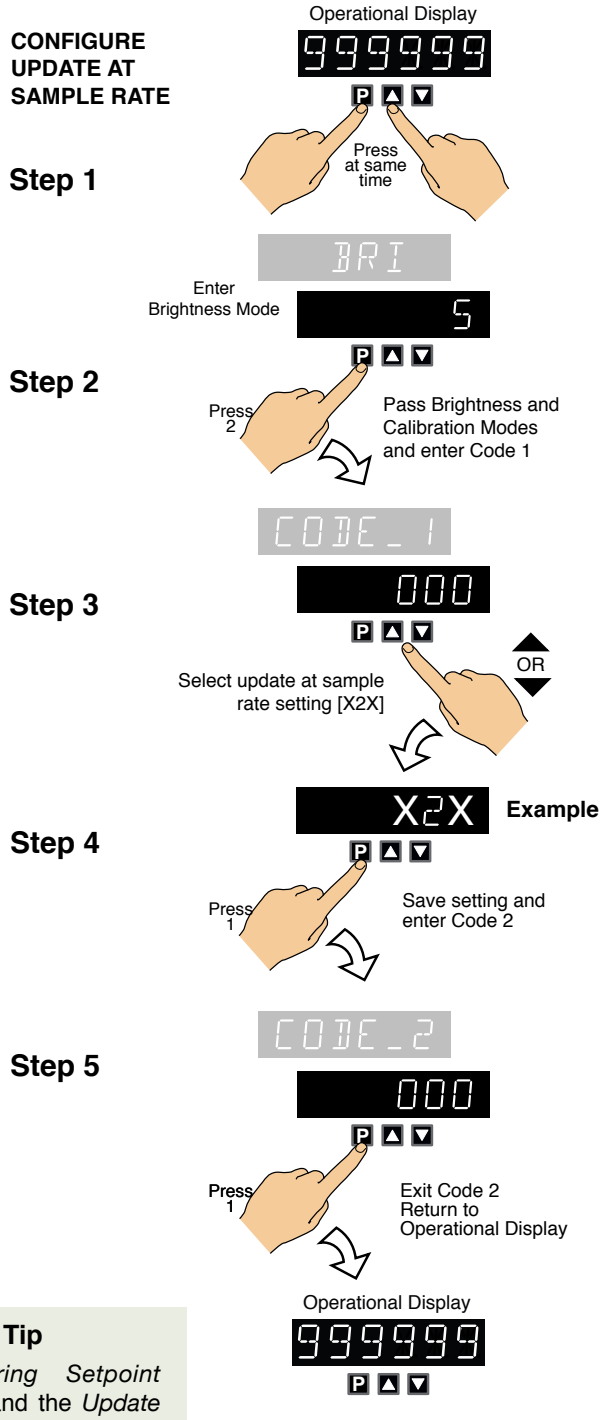


Configure Update at Sample Rate Procedure

The following example procedure describes how to configure the display to update at the sample rate selected in Code 2.

Example Procedure:

Update the display at the sample rate selected in Code 2 by setting Code 1 to [**X2X**].



Programming Tip

The *Configuring Setpoint Annunciators* and the *Update at Sample Rate* procedures can be combined so that Code 1 could be set to [12X] (for the above examples) in a single procedure.

[CODE 2] - Channel 1 Measurement Task & Sampling Rate

The CI-B101D60A meter can be configured to measure almost any input signal. The measurement task and sampling rate for Channel 1 (CH1) is configured in the three digits of Code 2. The diagram below lists the available configuration selections in Code 2.

Example Procedure:

Configure CH1 for a voltage input with 10 samples/second (60 Hz rejection) sampling rate and output rate of 0.1 seconds by setting Code 2 to [**000**].

CODE 2 – CHANNEL 1 MEASUREMENT TASK AND SAMPLING RATE

FIRST DIGIT – ANALOG SAMPLE RATE

- **0 Sample Rate: Typically 10 samples/second (60 Hz rejection) Output Rate: 0.1 seconds See Example**
- 1 Sample Rate: Typically 10 samples/second (50 Hz rejection) Output Rate: 0.1 seconds See Example
- 2 Sample Rate: Typically 10 samples/second (60 Hz rejection) Output Rate: 10 millisecs See Example
- 3 Sample Rate: Typically 10 samples/second (50 Hz rejection) Output Rate: 10 millisecs See Example

Note: Output Rate refers to setpoint and macro outputs, and input rates from smart input modules.

Note: All above sample rates are quoted for single channel operation. Where more than one channel is available, sample rates are divided by the number of active channels. See Example.

Example: 10 Samples/Second

1 Channel = 10 samples/second
2 Channels = 5 samples/second
3 Channels = 3.33 samples/second
4 Channels = 2.5 samples/second

SECOND DIGIT – MEASUREMENT TASK

- **0 Voltage, Current**
- 1 TC (3rd digit selects type of TC)
- 2 RTD 3-wire (3rd digit selects type of RTD)
- 3 RTD 2- or 4-wire (3rd digit selects type of RTD)
- 4 Frequency
- 5 Period
- 6 Counter
- 7 Smart Input Module

THIRD DIGIT

FOR VOLTAGE
- **0 No function**
- 1 Peak detector
- 2 Pressure with Auto-cal

FOR THERMOCOUPLE
- **0 Type J**
- 1 Type K
- 2 Type R
- 3 Type S
- 4 Type T
- 5 Type B
- 6 Type N
- 7 Select a User Defined Lin Table set-up in CAL [24X]

FOR RTD TYPE (2-, 3-, 4- WIRE)
- **0 Resistance**
- 1 RTD 385
- 2 RTD 392
- 3 RTD 120
- 4 Cn 10

FREQUENCY RANGE
- **0 99.999 Hz range from 0.010 Hz**
- 1 99.999 Hz range from 2.000 Hz
- 2 999.99 Hz range from 0.01 Hz
- 3 999.99 Hz range from 2.00 Hz
- 4 9999.9 Hz range from 0.1 Hz
- 5 9999.9 kHz range from 2.0 Hz
- 6 99 kHz range from 1 Hz (1 s gate)
- 7 655.35 kHz range from 10 Hz (0.1 s gate)

PERIOD MEASUREMENT
- **0 99.999 s**
- 1 9.9999 s
- 2 999.99 ms
- 3 99.999 ms

COUNTER/RESIDENT TIMER/CLOCK
- **0 Counter input with 16 bit Pre-scaler**
- 1 Setting of 16-bit Pre-scaler
- 2 Debounced Counter with Pre-scaler
- 3 Up/Down Counter with Pre-scaler
- 4 0.1 sec Timer with Pre-scaler
- 5 –
- 6 External 24-hour clock
- 7 Internal 24-hour clock

SMART INPUT MODULE
- **0 Output Register 1**
- 1 Output Register 2
- 2 Output Register 3
- 3 Output Register 4
- 4 Output Register 5
- 5 Output Register 6
- 6 Output Register 7
- 7 Smart Input Module Setup.

Press P SMART 000

Use the ▲▼ buttons to set the required smart input module code (0 to 377).

***Note: For the 1 hour setting, the scale factor for CH1 must be set to 0.1 in the calibration mode setting [111].

PRE_S 1

X61 Sets Prescaler

1 =	0.1 second
10 =	1 second
600 =	1 minute
36000 =	1 Hour***

Use ▲▼ buttons to set prescale values

CONFIGURE CH1 MEASUREMENT TASK & SAMPLING RATE

Operational Display: 999999

Step 1
Enter Brightness Mode

Press P ▲ ▼ at same time

BRI

Step 2
Pass Brightness Mode, Calibration Mode, Code 1, and enter Code 2

5

Press P ▲ ▼ 3

CODE_2

Step 3
Set Code 2 to [000]:
1st Digit = 0 Selects 10 samples/sec (60 Hz)
2nd Digit = 0 Selects voltage, current
3rd Digit = 0 Selects no function

000

Press P ▲ ▼ OR

000 **Example**

Step 4
Save setting and enter Code 3

Press P ▲ ▼ 1

To Step 5

Step 5

CODE_3

000

Press P ▲ ▼ at same time

Exit Code 3. Return to Operational Display

999999

Operational Display

Post processing functions refer to functions that occur to the input after it has been configured and scaled.

Post processing for Channel 1 (CH1) is configured in the first digit of Code 3. The diagram below lists the available post processing configuration selections in Code 3 (1st digit only).

Example Procedure:

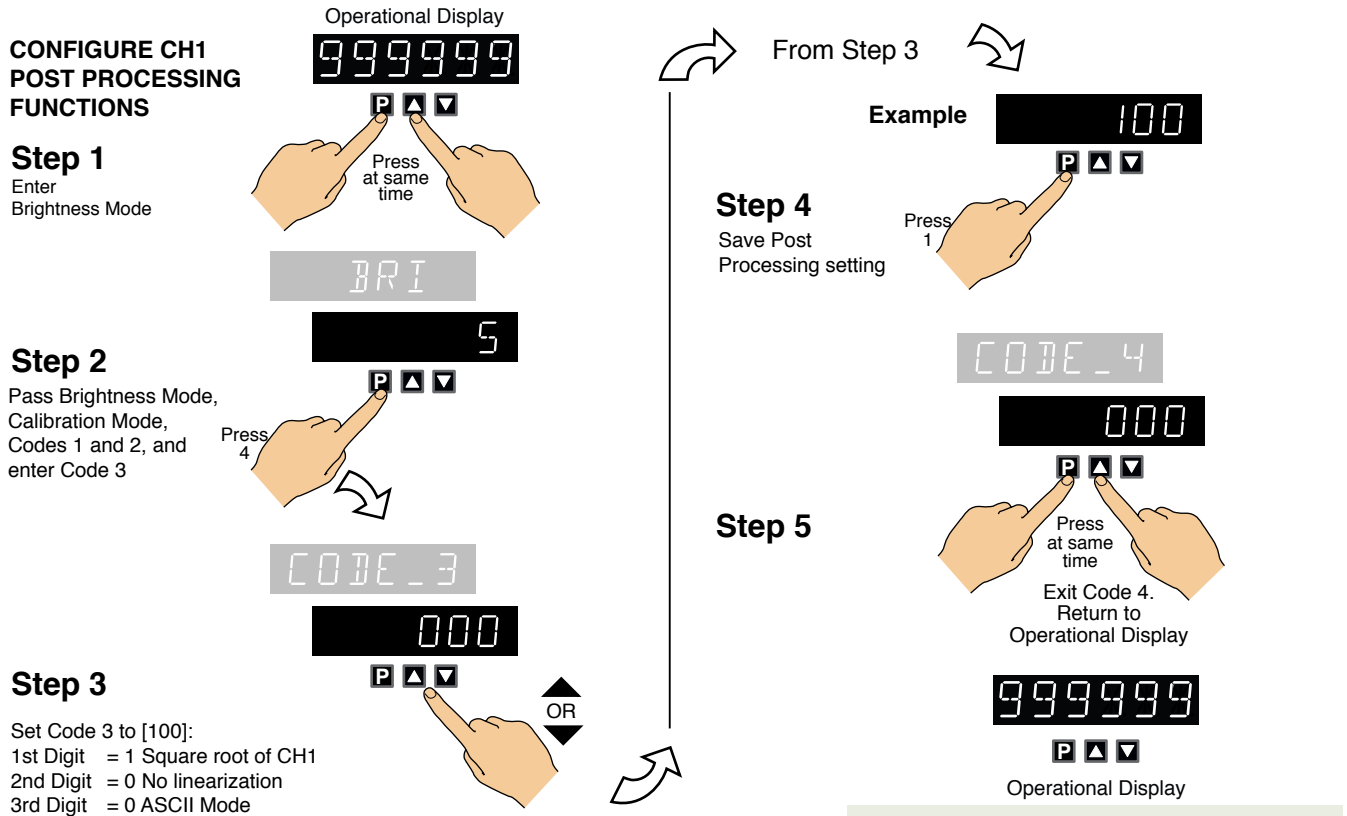
Configure the meter to apply square root to the CH1 signal by setting Code 3 to [**100**].

CODE 3 – CHANNEL 1 FUNCTIONS (POST PROCESSING & SERIAL MODE)

FIRST DIGIT CH1 POST PROCESSING	SECOND DIGIT 32-POINT LINEARIZATION FOR CHANNEL 1	THIRD DIGIT SERIAL MODE
0 Direct Display of Input (no processing)	**0 No Linearization on CH1**	**0 ASCII Mode**
1 Square Root of Channel 1	1 32-point Linearization on CH1 using Table 1	1 Modbus Mode
2 Inverse of Channel 1	2 32-point Linearization on CH1 using Table 2. *See Note 5*	2 Master mode (used to customize print mode protocols via macro)
3 –	3 32-point Linearization on CH1 using Table 3. *See Note 5*	3 Print Mode
	4 32-point Linearization on CH1 using Table 4. *See Note 5*	4 Ethernet Mode. *See Note 6*
	5 125-point Linearization on CH1 (Tables 1 to 4 cascaded). *See Note 5*	
	6 32-point Linearization on CH1 (Tables 1 to 4 selected from the rear pins of selected input modules). The selected table is not available if CH2, CH3, or CH4 is operating in the analog output mode. CH1 must be set to Voltage, Current in Code 2 [X0X]. *See Note 5*	
	7 -	
	Note: All linearization tables are set up in the Calibration Mode [24X].	

Note 5:
If only 4 kB memory installed, functions 2 to 6 are not available in:
- *Code 3 second digit.*
- *Code 4 third digit.*
- *Code 7 second digit.*

Note 6:
These functions are not available on all models and in some cases require additional hardware.



Programming tip

For full details on the Serial Mode, see *Serial Communications Output Module* supplement.

Print Mode – Data Printing Direct to Serial Printer

Print mode data logging is a simple method of capturing data using the meter's print mode. The data can be printed directly to a serial printer from the meter.

The print mode uses the meter's serial communications port to connect to a remote serial printer. The data can be printed with or without a Day: Month: Year or Hours: Minutes: Seconds time stamp.

Time stamp settings are configured in Code 8.

Print Mode – Data Printing Direct to PC

The print mode can also be used to print data to a PC where it is logged in a Windows Terminal program.

The print mode uses the meter's serial communications port to connect to the PC. The data can be logged with or without a Day: Month: Year or Hours: Minutes: Seconds time stamp.

Time stamp settings are configured in Code 8.

[CODE 4] - Channel 2 Measurement Task & Sampling Rate

Code 4 is a single code that combines all the configuration and post processing functions available for Channel 2.

When a **dual input** signal conditioner is installed, the second input signal is processed and displayed on CH2.

Measurement task and 32-point linearization for CH2 is configured in the 1st and 2nd digits of Code 4. The diagram opposite lists the available configuration selections in Code 4.

Example Procedure:

Configure CH2 for a direct voltage input with no linearization by setting Code 4 to [**010**].

CODE 4 – CHANNEL 2 MEASUREMENT TASK AND 32-POINT LINEARIZATION

FIRST DIGIT – MEASUREMENT TASK

0	Voltage, Current
1	TC (type as per 2nd digit)
2	RTD (type as per 2nd digit)
3	Second Digital Input Channel (type as per 2nd digit)

SECOND DIGIT – FOR VOLTAGE & CURRENT

0	**Channel 2 Disabled**
1	Direct (no post processing)
2	Square Root of Channel 2
3	Inverse of Channel 2
4	Output Register 1 (smart module)
5	Output Register 2 (smart module)
6	Output Register 3 (smart module)
7	Output Register 4 (smart module)

SECOND DIGIT – FOR THERMOCOUPLE

0	**Type J**
1	Type K
2	Type R
3	Type S
4	Type T
5	Type B
6	Type N
7	Select user defined table set up in CAL [24X]

SECOND DIGIT – FOR RTD TYPE (3-WIRE)

0	**Resistance**
1	RTD 385
2	RTD 392
3	RTD 120
4	Cn10

SECOND DIGIT – DIGITAL INPUT

0	**Frequency - 99.999 Hz range from 0.01 Hz**
1	Frequency - 999.99 Hz range from 0.01 Hz
2	Frequency - 99.999 kHz range from 1 Hz (1 s gate)
3	Frequency - 500 kHz range from 10 Hz (0.1 s gate)
4	Period - 9.9999 s (100 µs resolution)
5	Period - 999.99 ms (10 µs resolution)
6	Up/Down Counter with Prescaler
7	Set Prescaler

PRE_SC 1

Use ↑ ↓ buttons to set prescale values from 1 to 65535 counts

THIRD DIGIT – 32-POINT LINEARIZATION FOR CH2

0	**No user defined Linearization on CH2**
1	32-point Linearization on CH2 using Table 1
2	32-point Linearization on CH2 using Table 2. *See Note 5*
3	32-point Linearization on CH2 using Table 3. *See Note 5*
4	32-point Linearization on CH2 using Table 4. *See Note 5*
5	125-point Linearization on CH2 (Tables 1 to 4 cascaded). *See Note 5*
6	–
7	–

Note 5:
If only 4 kB memory installed, functions 2 to 6 are not available in:

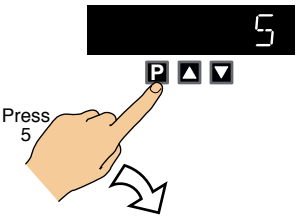
- *Code 3 second digit.*
- *Code 4 third digit.*
- *Code 7 second digit.*

CONFIGURE CH2 MEASUREMENT TASK

Operational Display

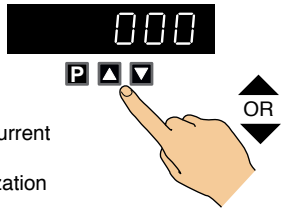
Step 1
Enter Brightness Mode

BRI



Step 2
Pass Brightness Mode, Calibration Mode, and Codes 1 to 3, and enter Code 4

CODE_4

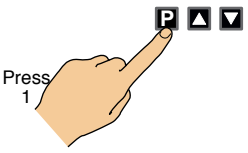


Step 3
Set Code 4 to [030]:
1st Digit = 0 Selects voltage, current
2nd Digit = 1 Selects direct
3rd Digit = 0 Selects no linearization

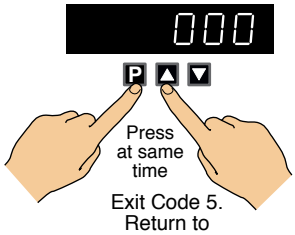
From Step 3

Example

Step 4
Save CH 2 Measurement Task setting



CODE_5



Step 5
Exit Code 5. Return to Operational Display

Operational Display

Code 5 is a single code that combines all the configuration and post processing functions available for Channel 3.

When a **triple input** signal conditioner is installed, the 3rd input signal is processed and displayed on CH3.

Post processing and measurement task functions for CH3 are configured in the 1st, 2nd, and 3rd digits of Code 5. The diagram opposite lists the available configuration selections in Code 5.

CODE 5 – CHANNEL 3 FUNCTIONS

FIRST DIGIT

CH3 POST PROCESSING

- **0 Direct Display of Input (no processing)**
- 1 Square Root of Channel 3
- 2 Inverse of Channel 3
- 3 **4 kB Meters** 32-point Linearization of CH3 using Table 1
  32 kB Meters 32-point Linearization of CH3 using Table 3

Note: All linearization tables are set up in the Calibration Mode [24X].

SECOND DIGIT

MEASUREMENT TASK

- **0 No Function**
- 1 Voltage / current
- 2 TC (3rd digit selects type of TC)
- 3 RTD (3rd digit selects type of RTD)
- 4 Real Time Clock & Timer (3rd digit selects type)
- 5 -
- 6 -
- 7 Smart Input Module (3rd digit selects register)

THIRD DIGIT

FOR THERMOCOUPLE

- **0 Type J**
- 1 Type K
- 2 Type R
- 3 Type S
- 4 Type T
- 5 Type B
- 6 Type N
- 7 Select user defined linearization table (Table 1) set up in CAL [24X]

FOR RTD TYPE (2-, 3-, 4- WIRE)

- **0 Resistance**
- 1 RTD 385
- 2 RTD 392
- 3 RTD 120
- 4 Cn 10

FOR REAL-TIME CLOCK & TIMER

- **0 HRS:MIN:SEC**
- 1 HRS:MIN
- 2 -
- 3 -
- 4 1 2nd Count UP Timer
- 5 1 2nd Count DOWN Timer
- 6 -
- 7 -

FOR SMART INPUT MODULE

- **0 Output Register 1**
- 1 Output Register 2
- 2 Output Register 3
- 3 Output Register 4
- 4 Output Register 5
- 5 Output Register 6
- 6 Output Register 7
- 7 Smart Input Module Register 2 Code Setup

Press P SMART 000 Use the ↑↓ buttons to set the required smart input module code (0 to 377).

Example Procedure:

Configure CH3 to display the square root of a voltage input by setting Code 5 to [**11X**].

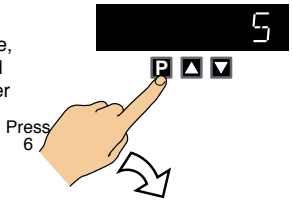
CONFIGURE CH3 FUNCTIONS

Operational Display

Step 1
Enter Brightness Mode

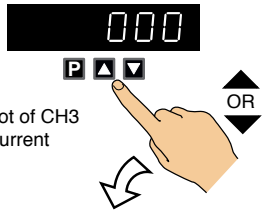
BRI

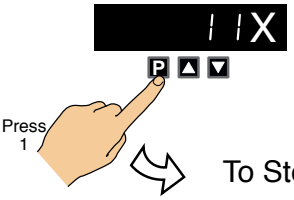
Step 2
Pass Brightness Mode, Calibration Mode, and Codes 1 to 4 and enter Code 5



CODE_5

Step 3
Set Code 5 to [11X]:
1st Digit = 1 Selects square root of CH3
2nd Digit = 1 Selects voltage, current
3rd Digit = X Not relevant





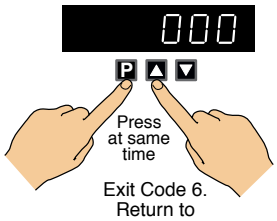
Step 4
Save CH3 setting

To Step 5

From Step 4

CODE_6

Step 5



Exit Code 6. Return to Operational Display

Operational Display

Code 6 is a single code that combines all the configuration and post processing functions available for Channel 4.

When a **quad input** signal conditioner is installed, the 4th input signal is processed and displayed on CH4.

Post processing and measurement task functions for CH4 are configured in the 1st, 2nd, and 3rd digits of Code 6. The diagram opposite lists the available configuration selections in Code 6.

CODE 6 – CHANNEL 4 FUNCTIONS

FIRST DIGIT

CH4 POST PROCESSING

- **0 Direct Display of Input (no processing)**
- 1 Square Root of Channel 4
- 2 Inverse of Channel 4
- 3 **4 kB Meters** 32-point Linearization of CH4 using Table 1
  32 kB Meters 32-point Linearization of CH4 using Table 4

Note: All linearization tables are set up in the Calibration Mode [24X].

SECOND DIGIT

MEASUREMENT TASK

- 0 No Function
- 1 Voltage / Current
- 2 TC (3rd digit selects type of TC). *See Note 7*
- 3 RTD (3rd digit selects type of RTD). *See Note 7*
- 4 Real Time Clock and Timer (3rd digit selects type)
- 5 -
- 6 -
- 7 Smart Input Module (3rd digit selects register)

Note 7: For future development.

THIRD DIGIT

FOR THERMOCOUPLE

- 0 Type J
- 1 Type K
- 2 Type R
- 3 Type S
- 4 Type T
- 5 Type B
- 6 Type N
- 7 Select user defined linearization table (Table 1) set up in CAL [24X]

FOR RTD TYPE (2-, 3-, 4- WIRE)

- 0 Resistance
- 1 RTD 385
- 2 RTD 392
- 3 RTD 120
- 4 Cn 10

FOR REAL-TIME CLOCK & TIMER

- **0 HRS:MIN:SEC**
- 1 HRS:MIN
- 2 -
- 3 -
- 4 1 2nd Count UP Timer
- 5 1 2nd Count DOWN Timer
- 6 -
- 7 -

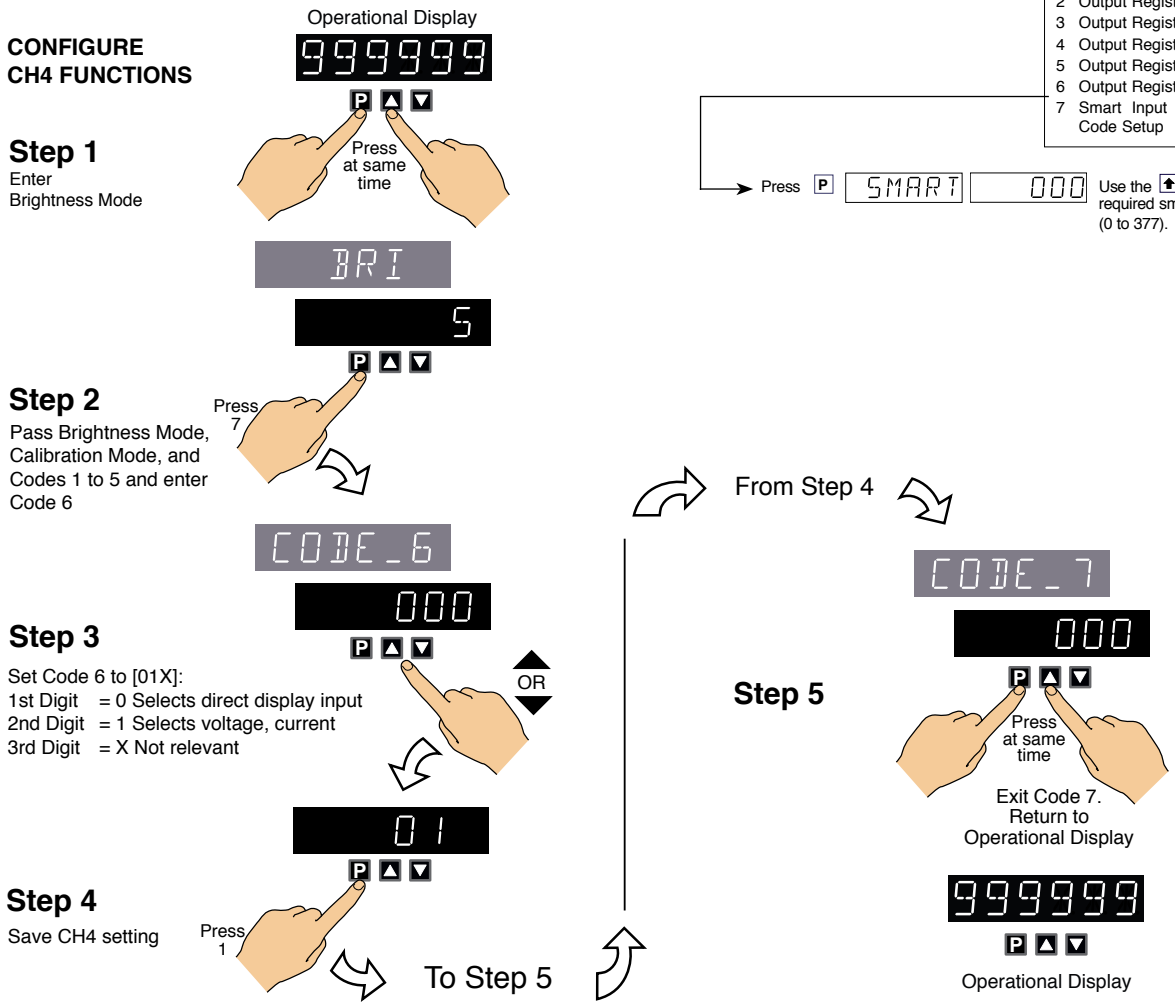
FOR SMART INPUT MODULE

- 0 Output Register 1
- 1 Output Register 2
- 2 Output Register 3
- 3 Output Register 4
- 4 Output Register 5
- 5 Output Register 6
- 6 Output Register 7
- 7 Smart Input Module Register 3 Code Setup

Press P → SMART 000 — Use the ▲▼ buttons to set the required smart input module code (0 to 377).

Example Procedure:

Configure CH4 as direct display of voltage input by setting Code 6 to [**01X**].



The 3rd digit of Code 7 performs various math functions between channel 1 and channel 2 and stores this data in the result register.

The data in the result register can then be further processed by the selections made in the 1st and 2nd digits.

FIRST DIGIT	
RESULT PROCESSING	
0	**Direct Display of Result as per processing performed in 2nd or 3rd digit**
1	Square Root of Result
2	Inverse of Result
3	-

SECOND DIGIT	
CODE 7 – RESULT PROCESSING	
32-POINT LINEARIZATION FOR RESULT	
0	**No Linearization on Result**
1	32-point Linearization on Result using Table 1
2	32-point Linearization on Result using Table 2. *See Note 5*
3	32-point Linearization on Result using Table 3. *See Note 5*
4	32-point Linearization on Result using Table 4. *See Note 5*
5	125-point Linearization on Result (Tables 1 to 4 cascaded). *See Note 5*
6	32-point Linearization on Result (Tables 1 to 4 selected from the rear of the meter). The selected table is not available if CH2, CH3, or CH4 is operating in the analog mode. CH1 must be set to Voltage, Current in Code 2 [X0X]. *See Note 5*
7	–

THIRD DIGIT	
MATHS FUNCTIONS FOR RESULT	
0	**Result Register not Updated**
1	pH Meter (CH1 = Tbuff, CH2 = pH)
2	Result = CH1, Setpoint 2 = CH2
3	Result = CH1 + CH2
4	Result = CH1 - CH2
5	Result = (CH1 x 20 000)/CH2
6	Result = CH1 x CH2/10 000
7	Result = CH1

Example Procedure:

Configure Code 7 to add the input of CH1 and CH2 and directly display the result by setting Code 7 to [**003**].

Note 5:
If only 4 kB memory installed, functions 2 to 6 are not available in:

- *Code 3 second digit.*
- *Code 4 third digit.*
- *Code 7 second digit.*

Linearization Table Notes

A base meter with 4 kB memory installed has a single 32-point programmable linearization table available.

For four 32-point programmable linearization tables to be available, the meter requires at least 32 kB of memory to be installed.

Meters with 4 kB Memory

In base meters with 4 kB memory, set up Table 1 in the Calibration Mode to [24X]. This means that Table 1 is available to be applied to:

- CH1 – Selected in Code 3.
- CH2 – Selected in Code 4.
- CH3 – Selected in Code 5.
- CH4 – Selected in Code 6.

Meters with 32 kB Memory

In base meters with 32 kB or more memory, each of the four tables (Tables 1 to 4) are set up in [24X] of the Calibration Mode by selecting the appropriate table number. This means that the four tables are available for the four channels as follows:

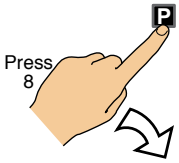
- CH1 – All four tables selected in Code 3.
- CH2 – All four tables selected in Code 4.
- CH3 – Table 3 selected in Code 5.
- CH4 – Table 4 selected in Code 6.

CONFIGURE RESULT PROCESSING

Operational Display

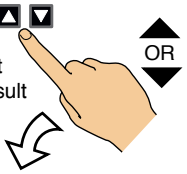
Step 1
Enter Brightness Mode

Step 2
Pass Brightness Mode, Calibration Mode, and Codes 1 to 6 and enter Code 7

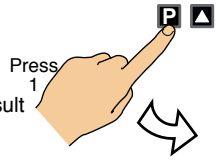


Step 3

Set Code 7 to [003]:
1st Digit = 0 Selects direct display of result
2nd Digit = 0 Selects no linearization on result
3rd Digit = 3 Selects result = CH1+CH2



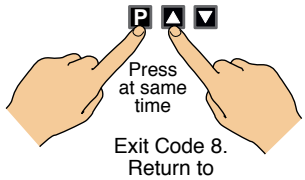
Step 4
Save CH1 & CH 2 Result Processing setting



To Step 5

From Step 4

Step 5



Exit Code 8.
Return to Operational Display

Operational Display

[CODE 8] - Data Logging & Print Mode

Up to 4000 samples can be logged within the meter in the cyclic or linear FIFO mode and saved for later downloading to a PC, using a terminal emulation program, or printing directly to a serial printer.

Data logging can be triggered (activated) from a setpoint, the program button, or from an external switch. See the 3rd digit in the diagram below.

Data from up to four selectable registers can be logged with one of the following printer or spreadsheet style time and date stamps. All time and date stamps are generated from an optional real-time clock (see the 2nd digit in the diagram below):

- No time stamp.
- Month - Day - Year. Hours:Minutes:Seconds.
- Day - Month - Year. Hours:Minutes:Seconds.
- Hours:Minutes:Seconds.

Printer style time and date stamps have a carriage return and line feed. Spreadsheet style time and date stamps are continuous on a single line.

See *Serial Communications Module Supplement* for full details on the Data Logging and Print Mode Options.

CODE 8 – DATA LOGGING AND PRINT MODE OPTIONS

FIRST DIGIT – DATA LOG BUFFER TYPE

- **0 No Data Logging**
- 1 Cyclic Buffer
- 2 Linear FIFO Buffer.
- 3 Reset Buffer Number to 0.

Note:
Setting Code 8 to [3XX] resets the data log buffer to 0. Once reset, Code 8 must be set back to the required data log buffer setting.

SECOND DIGIT – DATE &TIME STAMP OPTIONS

- **0 Printer Format – No time stamp with print/log**
- 1 Printer Format – Time stamp format 1 [Mth-Day-Yr Hrs:Min:Sec] (with <CR><LF>)
- 2 Printer Format – Time stamp format 2 [Day-Mth-Yr Hrs:Min:Sec] (with <CR><LF>)
- 3 Printer Format – Time stamp format 3 [Hrs:Min:Sec] (with <CR><LF>)
- 4 Spreadsheet Format – No time stamp with print/log
- 5 Spreadsheet Format – Time stamp format 1 [Mth-Day-Yr Hrs:Min:Sec]
- 6 Spreadsheet Format – Time stamp format 2 [Day-Mth-Yr Hrs:Min:Sec]
- 7 Spreadsheet Format – Time stamp format 3 [Hrs:Min:Sec]

ALL ABOVE ARE REAL-TIME CLOCK OPTIONS

THIRD DIGIT – LOG OR PRINT TRIGGER

- **0 No trigger**
- 1 Trigger on Demand from PROGRAM Button
- 2 Trigger on Demand from F1 Button
- 3 Trigger on Demand from F2 Button
- 4 Trigger on Demand from HOLD Pin
- 5 Trigger on Demand from LOCK Pin
- 6 -
- 7 -

Note:
Log and/or print will only trigger if enabled.

[CodE 9] - Functions for Digital Input Pins

The TEST, HOLD, and LOCK pins are located at the rear of the meter to accommodate external switched digital inputs. When switched to the COMMON pin, they can be programmed in Code 9 to perform remote resetting functions to add to the functionality of the meter.

Note:
CAPTURE, HOLD, and LOCK pins can be a setpoint activation source. See Setpoint Programming mode.

CODE 9 – FUNCTIONS FOR DIGITAL INPUT PINS

FIRST DIGIT – DISPLAY TEST PIN

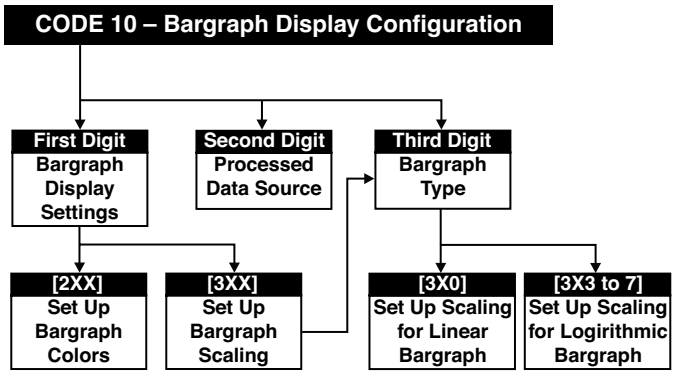
- **0 Display test only**
- 1 Reset Counter Channel 1 and Sub-total at Power-up
- 2 Reset Counters Channel 1, 2, 3, 4, Total 1, and Total 2 at Power-up
- 3 Reset Total 1, and Total 2 at Power -up

SECOND DIGIT – HOLD PIN

- **0 Display Hold**
- 1 Reset Channel 1
- 2 Reset Total 1 and Total 2
- 3 Reset Total 2
- 4 Reset Peak, Valley
- 5 Reset Tare
- 6 Set Tare
- 7 Unlatch (de-energize) all Setpoints

THIRD DIGIT – LOCK PIN

- **0 Key Lock**
- 1 Reset Channel 1
- 2 Reset Channel 2
- 3 Reset Channel 3
- 4 Reset Channel 4
- 5 Reset Tare
- 6 Reset Total
- 7 Unlatch (de-energize) all Setpoints



CODE 10 – Bargraph Display Configuration

Set Up Bargraph Colors

This mode is where the colors of the bargraph relative to the setpoints are set. Tri-color bargraphs use the following three colors:

- Green.
- Orange.
- Red.

The bargraph colors are not applied to specific setpoints. They are applied to whichever setpoint is configured at the lowest setting, and then to each next highest setpoint in turn.

Only one color is displayed on the bargraph at any time. As the signal changes, the color selected for the most recently activated setpoint displays

Only setpoints with the same source data as the bargraph are displayed.

If all six setpoints are used the colors are set as follows:

- **Color 1. Color BELOW lowest setpoint.**

  This is the bargraph color before it reaches a setpoint.
- **Color 2. Color ABOVE lowest setpoint and BELOW the next highest.**
- **Color 3. Color ABOVE the 2nd lowest setpoint and BELOW the next highest.**
- **Color 4. Color ABOVE the 3rd lowest setpoint and BELOW the next highest.**
- **Color 5. Color ABOVE the 4th lowest setpoint and BELOW the next highest.**
- **Color 6. Color ABOVE the 5th lowest setpoint and BELOW the next highest.**
- **Color 7. Color ABOVE the highest setpoint.**

Any one of the colors (green, orange, red, or OFF – meaning no color) can be applied to each color setting (See Example: Bargraph Colors diagram above). Selecting **2** in the 1st digit enters the Set Up Bargraph Colors mode. Selections for the 2nd and 3rd digits are not relevant at this point.

Example Procedure. The example procedure on page 34 shows how to configure the bargraph colors.

Set Up Bargraph Scaling

This mode is where the span range of the bargraph is scaled. The span range of the bargraph can be set between –199999 to 999999 counts. There are three methods of scaling the bargraph:

- Linear.
- Via Linearization Table 1.
- Logarithmic.

Selecting 3 in the 1st digit enters the Set Up Bargraph Scaling mode.

Linear Bargraph Scaling

The most common method of scaling the bargraph is through the Linear Bargraph Scaling sub-menu. In this menu the bar low, bar high, and bar nominal settings are set.

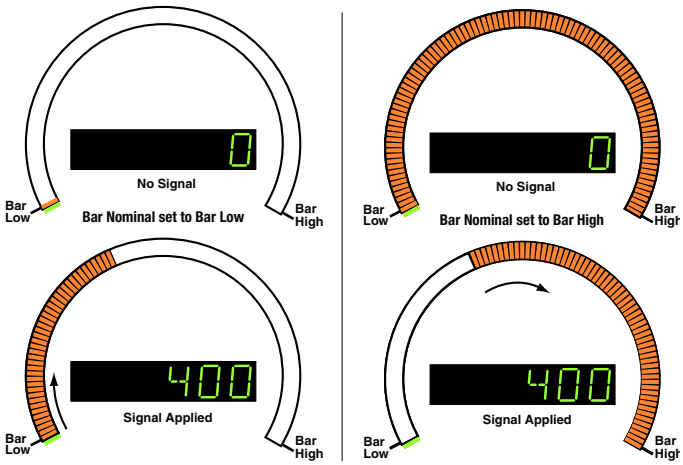
Bar Low [BAR_LO] is the setting in counts required at the bottom of the bargraph.

Bar High [BAR_HI] is the setting in counts required at the top of the bargraph.

Bar Nominal sets the point on the bargraph at which the bar begins to light up. This can be any position between and including the bar low and bar high settings.

If bar nominal is set to the **bar low** setting, the bargraph behaves like a typical bargraph making the segments light up from the **bottom** of the bar and grow towards the top.

If bar nominal is set to the **bar high** setting, this makes all segments from the displayed signal to the **top** of the bar light up. As the signal increases, the number of lit segments between the signal and the bar high setting becomes steadily less. When the signal reaches the bar high setting no segments are lit.

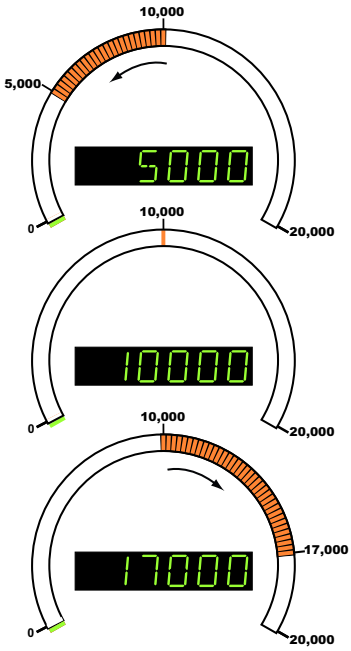


Bargraph Nominal Set Low or High

Setting bar nominal to the midpoint between bar low and bar high makes the bargraph behave like a typical center zero bargraph. This means the bargraph lights up at the center of the bar and moves either up or down the bar depending on the displayed signal.

For example, if the meter's full scale range is 20,000 counts, the midpoint is 10,000 counts. If a signal of 10,000 counts is applied, only one segment at the 10,000 count mark lights up. If a signal of 17,000 counts is applied, the segments between the center segment (10,000 counts) and the 17,000 count mark light up.

If a signal of 5000 counts is applied, the segments between the center segment (10,000 counts) and the 5000 count mark light up.

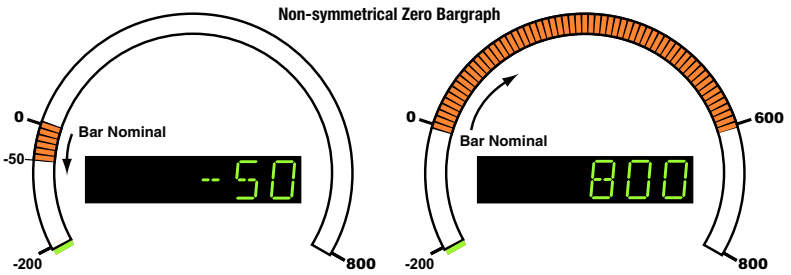


Typical Center Zero Bargraph

An added feature of this bargraph is that it can also be non-symmetrical. This means that the bar nominal setting does not need to be set at the mid-point between bar low and bar high. For example, if the bargraph is configured to display –200 to 800 °C, bar low is set to –200 counts and bar high is set to 800 counts.

Bar nominal is set to 0 counts. If a signal of –50 °C is applied, the bar lights from 0 down to –50. If a signal of 600 °C is applied, the bar lights from 0 up to 600.

Example Procedure. The example procedure on page 33 shows how to scale the bargraph using linear scaling.



Bargraph Scaling using Linearization Table 1

When set in this mode, the register selected to be displayed on the bargraph display (Code 1 set to [XX1]) is first processed through a 32-point flexible linearization table (Table 1) before being displayed.

This can be used, for example, if channel 1 is the required digital display while the bargraph display is the square root of channel 1.

See Linearization Supplement for full details to set up linearization Table 1.

Selecting **3** in the 1st digit and **1** in the 3rd digit selects Bargraph scaling via Linearization Table 1.

Example Procedure. To scale the bargraph using Linearization Table 1, follow the *Scale Bargraph using Linear Scaling Procedure* on page 33. Ensure the secondary (bargraph) display has been set up in Code 1 and Linearization Table 1 has been formatted and selected for the required application.

Logarithmic Bargraph Scaling

Logarithmic scales are used in a wide variety of measurements. Probably the most well known logarithmic scale is the Richter scale for measuring earthquakes. Other log scales used include sound level (dB), radio frequency signals, power levels (dBm), and numerous radiation signals.

In all logarithmic scales a reference level is required that is the level at 0 dB. For example, in an RF measurement 0 dBm is at a reference of 1 mW.

The scale is calculated from: $$10 \log_{10} \frac{\text{counts (input)}}{\text{reference}}$$

If the meter is scaled so that:
1 mW = 100 countsand 1 W = 100,000 counts
Then the reference for 0 dBm would be set to 100 counts:

$$10 \log_{10} \frac{\text{(input)}}{100} = 0 \text{ dBm}$$

Decade (Counts)	dBm
1	–20
10	–10
100	0
1000	10
10,000	20
100,000	30
1,000,000	40

Now every 10 dBm represents a decade, the bargraph can be scaled to a different amount of bars per decade (as set in the 3rd digit).

Example of Bars per Decade

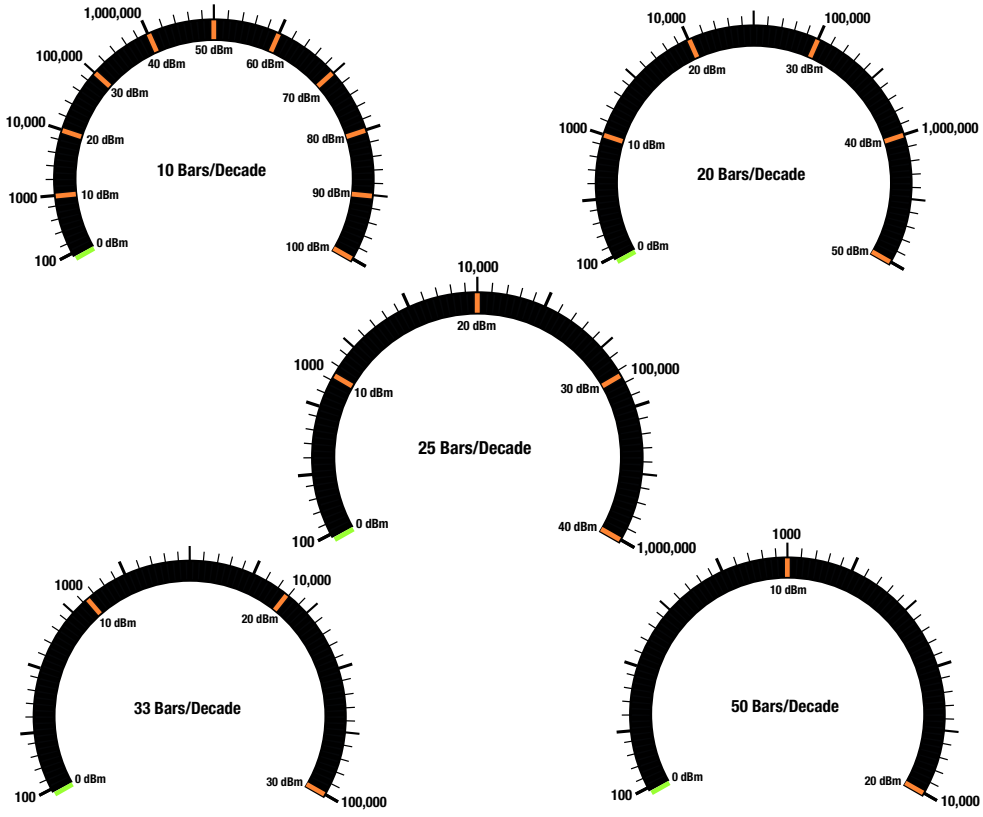
Reference. This is the number of counts displayed for a 0 dB reference. Range: 1 to 999999 counts.

Bar Nominal. See Bar Nominal description under heading: *Linear Bargraph Scaling.*

Selecting **3** in the 1st digit and **3, 4, 5, 6, or 7** in the 3rd digit enters the Set Up Scaling for Logarithmic Bargraph sub-menu:

- Selecting **3** in the 3rd digit sets the log to 10 Bar/Decade.
- Selecting **4** in the 3rd digit sets the log to 20 Bar/Decade.
- Selecting **5** in the 3rd digit sets the log to 25 Bar/Decade.
- Selecting **6** in the 3rd digit sets the log to 33 Bar/Decade.
- Selecting **7** in the 3rd digit sets the log to 50 Bar/Decade.

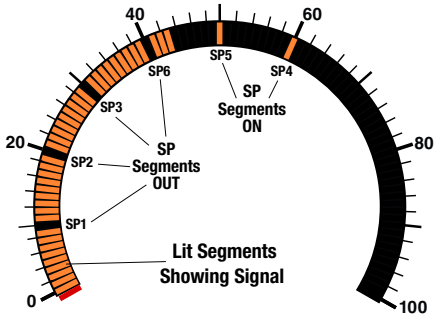
Example Procedure. The example procedure on page 34 shows how to scale the bargraph using example logarithmic settings.



Bargraph Display Format

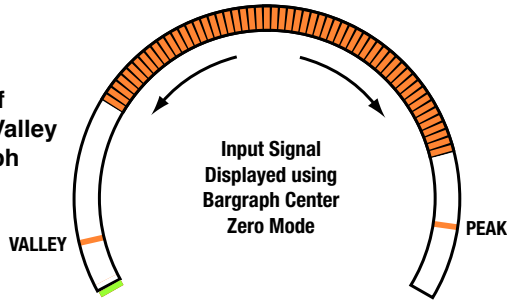
After the bargraph colors have been set and the bargraph scaled, the display format can be set. This is normally the final setting. The 2nd digit selects the format of the bargraph display. There are four display format settings available:

Example of Setpoints on Bargraph



- **Setpoints on Bar**. Selecting [X0X] means that the setpoints are displayed on the bar as lit segments in the current display color. When the display color changes, the setpoint segments change to that color. When the bargraph lights up on or beyond a setpoint, the setpoint segment goes out.

Example of Peak and Valley on Bargraph

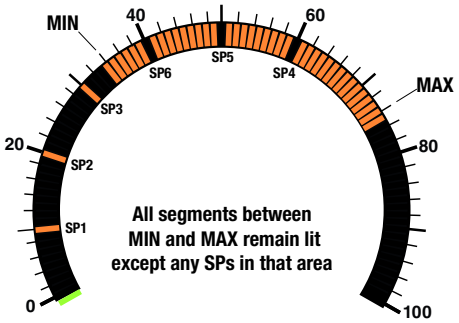


- **Peak and Valley on Bar**. Selecting [X1X] means that peak and valley are displayed as lit segments and are updated as they change. The setpoints are not displayed.
- **Min/Max with Setpoints**. Selecting [X4X] means that the segments of the bar remain lit over the minimum and maximum signal variations. The setpoints are displayed as lit segments. This is a useful mode for seeing process variations at a glance.

Note:

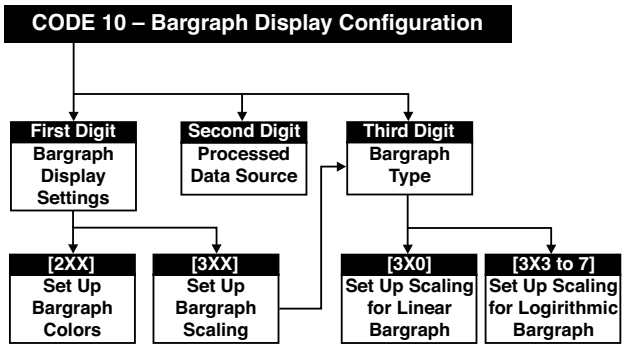
*When moving from another display format to the **Min/Max with Setpoints** mode, the peak and valley settings must be set to the current settings by entering the Peak View mode or Valley View mode and pressing the UP and DOWN buttons at the same time.*

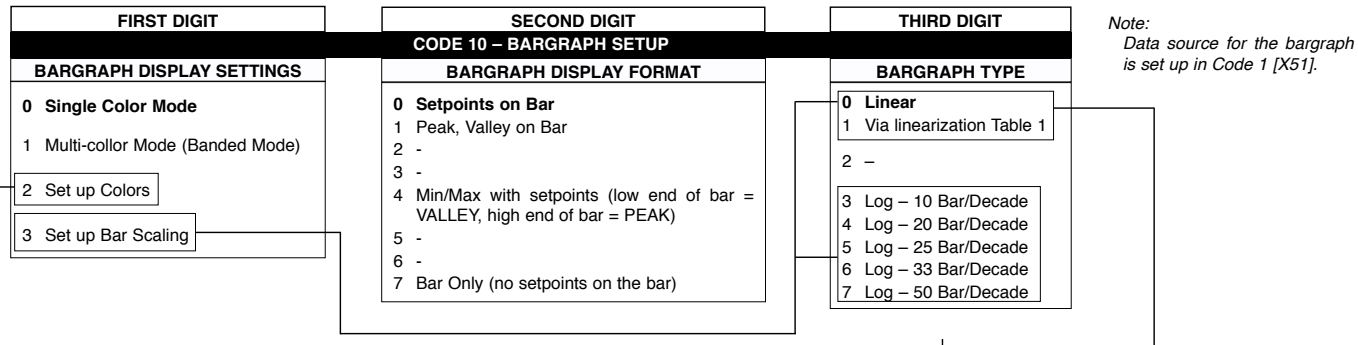
Example of MIN and MAX on Bargraph



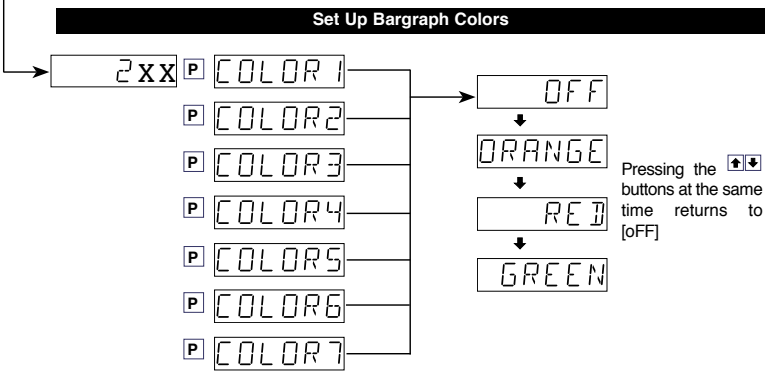
*When moving from **Min/Max with Setpoints** mode to another display format, the bar nominal [BAR_N] setting must be reset to its original settings in Code 10 [3XX].*

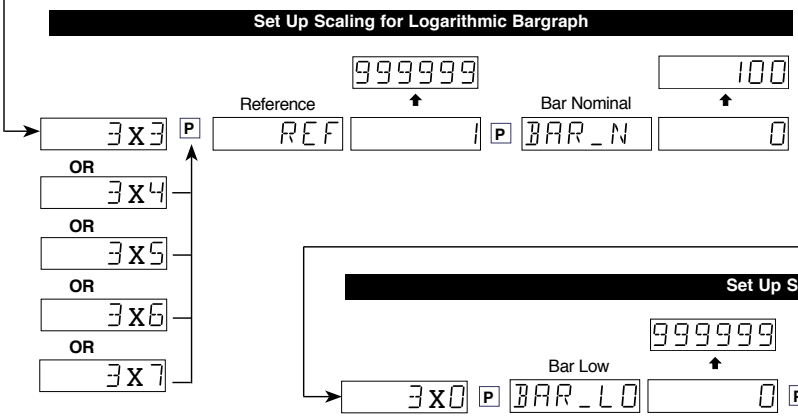
- **Bar Only**. Selecting [X7X] means that only the bargraph display signal is displayed on the bar. Setpoints and peak and valley are not displayed.

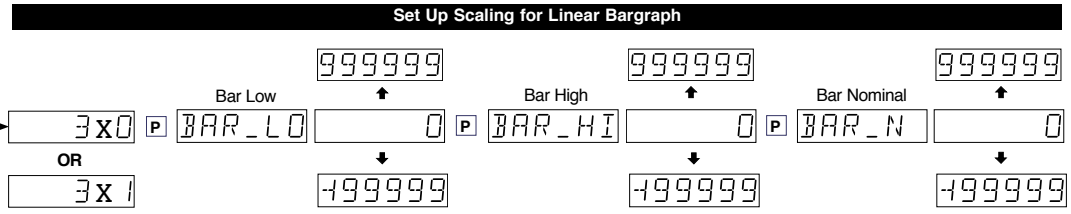




Note:
Data source for the bargraph is set up in Code 1 [X51].



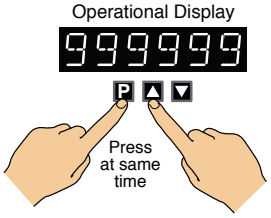




Configure Bargraph Colors Procedure

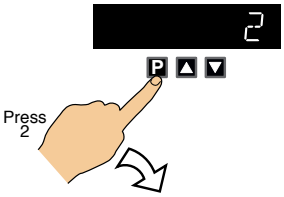
CONFIGURE BARGRAPH COLORS

Operational Display

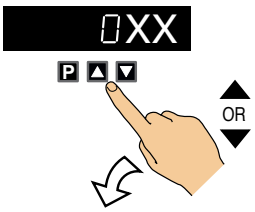


Step 1
Enter Brightness Mode

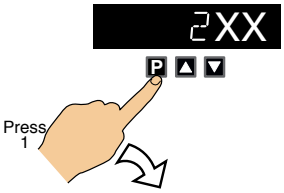
Step 2
Pass Brightness and Calibration Modes and enter Code 10



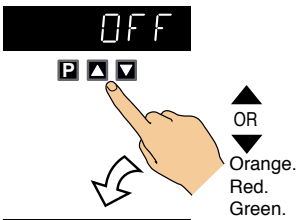
Step 3
Set Code 10 to [2XX]:
1st Digit = 2 Set up colors
2nd Digit = X Not relevant
3rd Digit = X Not relevant



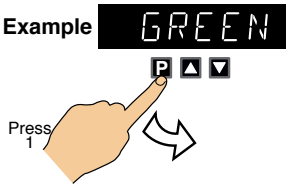
Step 4
Enter the Setup Bargraph Colors mode



Step 5
Select the color to be displayed for Color 1 (color below the lowest SP)



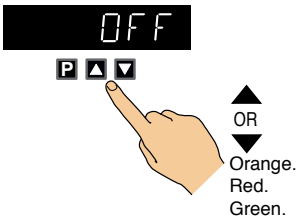
Step 6
Save Color 1 setting and enter Color 2



To Step 7

From Step 6

Step 7
Select the color to be displayed for Color 2 (color ABOVE lowest SP)

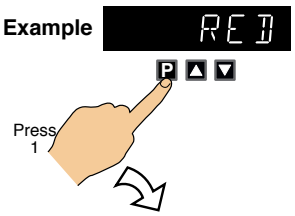


Step 8
Save Color 2 setting and enter Color 3 mode

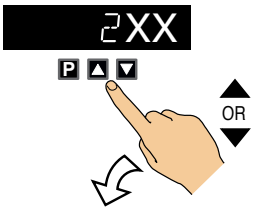
Note:
Only color settings relevant to selected setpoints need to be set. See Set Up Bargraph Colors for a description of colors and setpoints.

Repeat Steps 5 to 8 for all remaining color settings (Color 3 to Color 7)

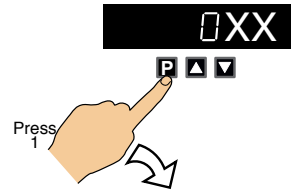
Step 9
Save the color setting for last color and return to Code 10 menu



Step 10
Set Code 10 back to [0XX]:
1st Digit = 0 No function
2nd Digit = X Not relevant
3rd Digit = X Not relevant



Step 11
Exit Code 10.
Return to the Operational Display



Operational Display

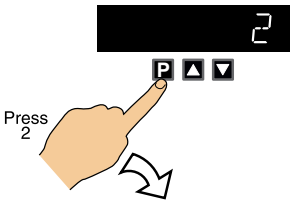
Scale Bargraph using Linear Scaling Procedure

CONFIGURE BARGRAPH LINEAR SCALING

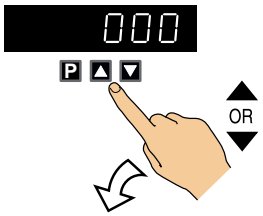
Operational Display

Step 1
Enter Brightness Mode

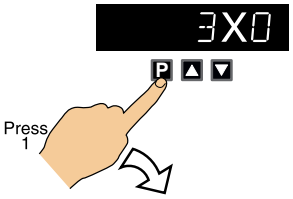
Step 2
Pass Brightness and Calibration Modes and enter Code 10



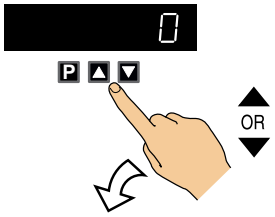
Step 3
Set Code 10 to [3X0]:
1st Digit = 3 Set Up Bar Scaling
2nd Digit = X Not relevant
3rd Digit = 0 Linear



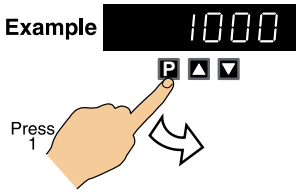
Step 4
Enter the bar low mode



Step 5
Adjust the display to the required bar low [BAR_LO] setting



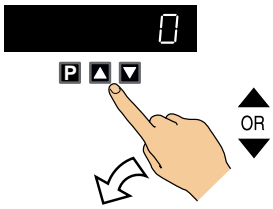
Step 6
Save [BAR_LO] setting and enter bar high mode



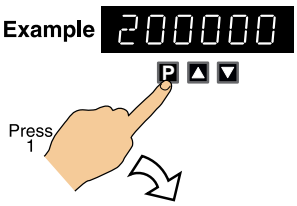
To Step 7

From Step 6

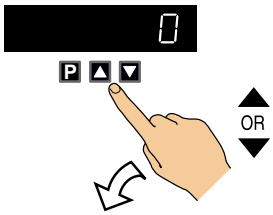
Step 7
Adjust the display to the required bar high [BAR_HI] setting



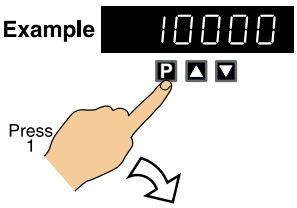
Step 8
Save [BAR_HI] setting and enter bar nominal mode



Step 9
Adjust the display to the required bar nominal [BAR_N] setting

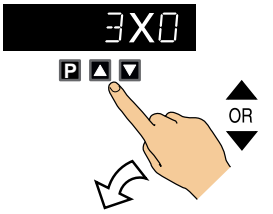


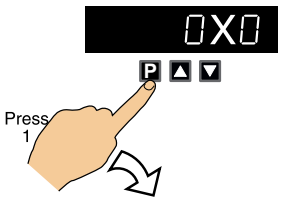
Step 10
Save the [BAR_N] setting and return to Code 10 menu



Step 11
Select bargraph display format and set Code 10 to [0X0]:
1st Digit = 0 No function
2nd Digit = X Select display format
3rd Digit = 0 Linear

0	**Setpoints on Bar**
1	Peak, valley on Bar
2	-
3	-
4	MIN/MAX with setpoints
5	-
6	-
7	Bar only (No setpoints on bar)





Step 12
Exit Code 10.
Return to the Operational Display

Operational Display

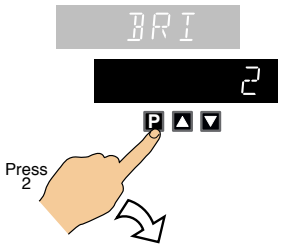
Scale Bargraph using Logarithmic Scaling Procedure

CONFIGURE BARGRAPH LOGARITHMIC SCALING

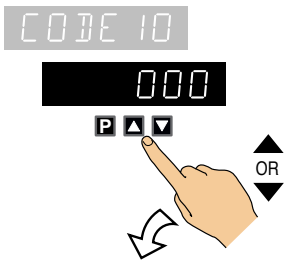
Step 1
Enter Brightness Mode

Operational Display

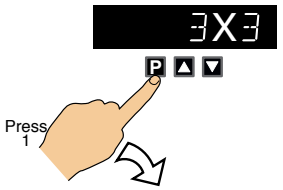
Step 2
Pass Brightness and Calibration Modes and enter Code 10



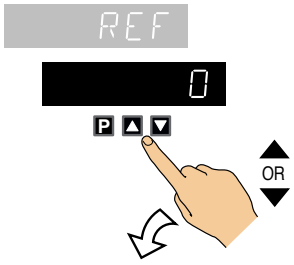
Step 3
Set Code 10 to [3X3]:
1st Digit = 3 Set Up Bar Scaling
2nd Digit = X Not relevant
3rd Digit = 3 Log – 10 Bar/Decade



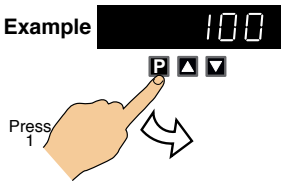
Step 4
Enter the reference [REF] mode



Step 5
Adjust the display to the required reference [REF] setting



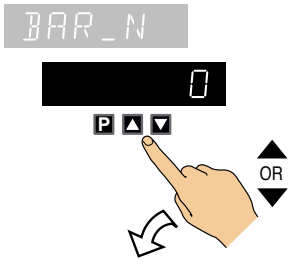
Step 6
Save [REF] setting and enter bar nominal mode



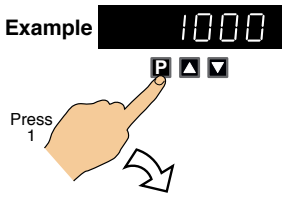
To Step 7

From Step 6

Step 7
Adjust the display to the required bar nominal [BAR_N] setting

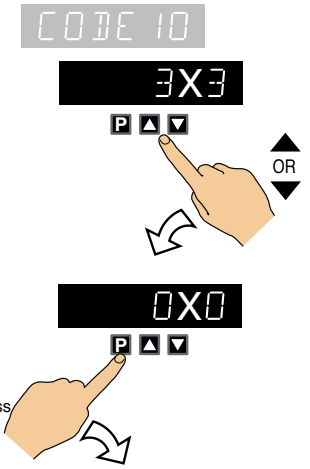


Step 8
Save [BAR_N] setting and return to Code 10



Step 9
Select bargraph display format and set Code 10 to [0X0]:
1st Digit = 0 No function
2nd Digit = X Select display format
3rd Digit = 3 Log-10 Bar

0	**Setpoints on Bar**
1	Peak, valley on Bar
2	-
3	-
4	MIN/MAX with setpoints
5	-
6	-
7	Bar only (No setpoints on bar)



Step 10
Exit Code 10.
Return to the Operational Display

Operational Display

All setpoint activation and control settings are selected and configured using the front panel buttons in the **setpoint programming mode**. Or, software configured via the **meter configuration utility program** if the meter is connected to a PC through the serial port. The meter has six software driven setpoints, independently configured to operate within the total span range of the meter and the selected input module.

Relay Output Modules

Five standard relay output module options provide a selection of relay configuration options.

The Electromechanical relay output modules support a combination of 4 A Form A and 7 A Form C relays. A solid state relay (SSR) output module supports 300 V, 210 mA DC SSRs. Another SSR output module supports 400 V, 140 mA AC / DC SSRs.

Setpoint Programming Mode

See the Setpoint Programming Mode Logic Diagram opposite.

The setpoint programming mode is entered by pressing the meter's P and ⬇ buttons at the same time.

Setpoint Activation Values

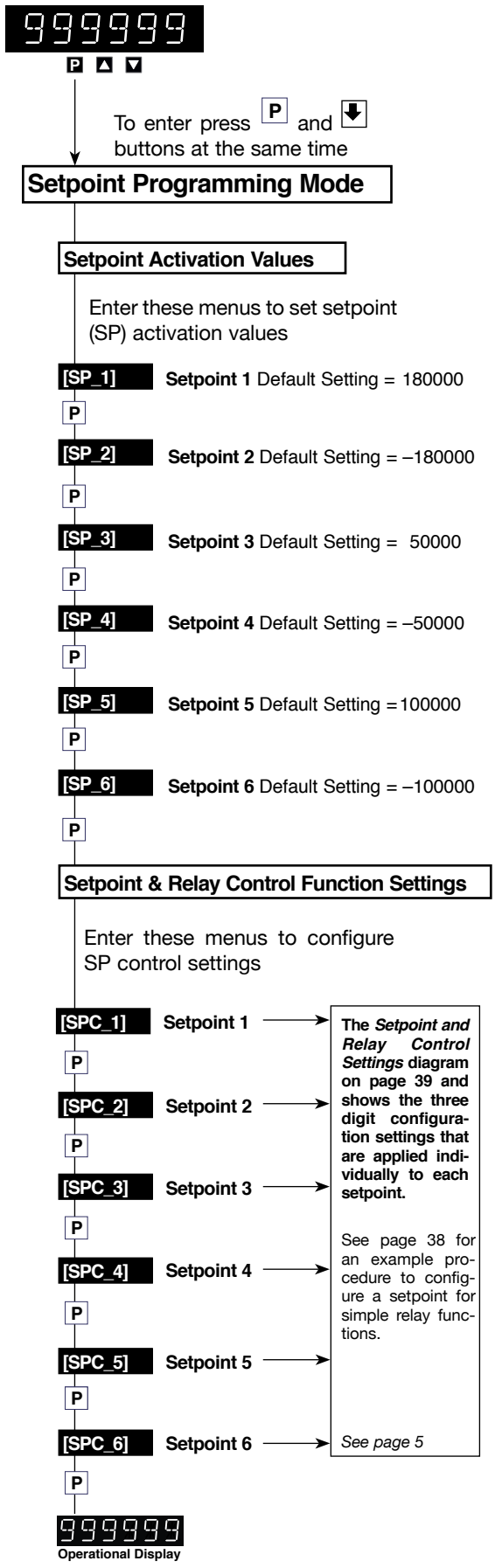
Each setpoint activation value is individually programmed. Setpoint activation values can be set within the total span range of the meter and the selected input module.

Setpoint and Relay Control Settings

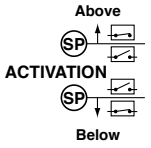
See the Setpoint and Relay Control Settings diagram on page 39 and page 40.

The control settings provide access to the following setpoint and relay functions for configuration using the meter's 1st, 2nd, and 3rd digits:

- **1st Digit** – Relay Energize Functions.
- **2nd Digit** – Setpoint Activation Source.
- **3rd Digit** – Setpoint Delay, Timer, and Reset and Trigger Functions.

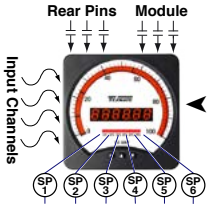


Setpoint Programming Mode Logic Diagram



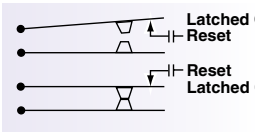
Relay Energize Functions

All setpoints activate at the setpoint value. All relays/setpoints are programmable to energize above or below the setpoint value.



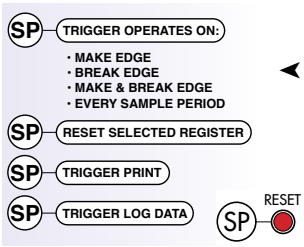
Setpoint Activation Source

Setpoints activate from any input channel, selected meter register, or external switched inputs (digital input pins).



Setpoint Latching

Setpoints can be programmed in relay latching modes.



Setpoint Reset & Trigger

Setpoints can be programmed to reset selected registers, or be manually reset. They can also trigger a data print or a data log.

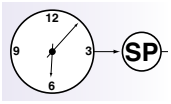
Setpoint Tracking

Setpoint tracking can be applied to setpoints configured in the hysteresis, deviation, or PID modes.

Display Flashing

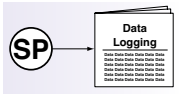
Display flashing can be applied to setpoints configured in the hysteresis or deviation modes.

Each setpoint can be programmed to make the display flash on and off while the setpoint is active, and keep it flashing until the setpoint de-activates.



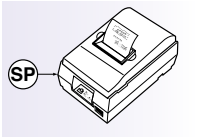
Real-time Clock Option

Any setpoint can be programmed to operate from the real-time clock option.



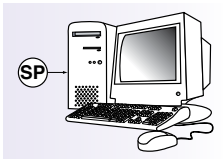
Data Logging

Any setpoint can be programmed to log data within the meter (up to 4000 samples).



Data Printing to Serial Printer

Any setpoint can be programmed to send data directly to a serial printer.

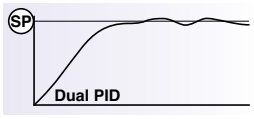


Data Printing to PC

Any setpoint can be programmed to send data directly to a connected PC.

Hysteresis or Deviation

Each relay can operate in a hysteresis or deviation mode.



PID Control Settings

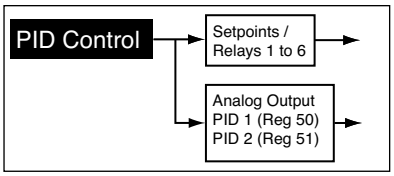
The PID (proportional, integral, derivative) control function provides exceptional control stability during control process applications. PID control is available from the following outputs:

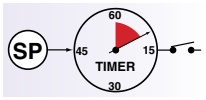
- Setpoint / relay output.
- Analog output.
- Relay and analog output at the same time.

PID control from the setpoint / relay output is available from SP1 and SP2 only.

There are two PID control outputs available via the analog output:

- PID1 – stored in register 50.
- PID2 – stored in register 51.





Timer Modes

Each setpoint can be programmed to operate the relay in one of the following seven resident timer modes:

Normal Mode Timer

Single actuation, delay-on-make (DOM) and delay-on-break (DOB).

Normally OFF/Pulsed ON Timers

Repeat ON Mode Timer – multiple actuation, programmable off- and on-time.

Pulse ON Mode Timer – single actuation, programmable DOM and maximum on-time.

1-Shot ON Mode Timer – single actuation, programmable DOM and minimum on-time.

Normally ON/Pulsed OFF Timers

Repeat OFF Mode Timer – multiple actuation, programmable off- and on-time.

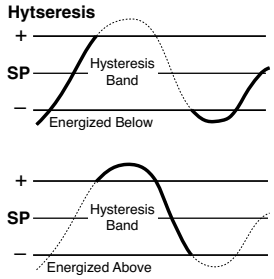
Pulse OFF Mode Timer – single actuation, programmable DOB and maximum off-time.

1-Shot OFF Mode Timer – single actuation, programmable DOB and minimum off-time.

Hysteresis or Deviation

Each setpoint can be individually prc relay in the hysteresis or deviation m startup inhibit.

Hysteresis (deadband) is the pro and below the setpoint value that how long the relay is energized or d can be programmed to energize the setpoint value.

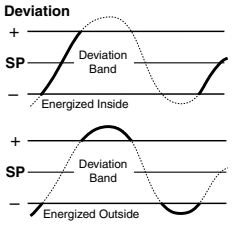


The hysteresis setting can be any value between 0 and 65535 counts. The number of counts selected act both positively and negatively on the setpoint, forming a hysteresis band around the setpoint.

For example, if the setpoint setting is 500 counts and the hysteresis setting is 10 counts, the hysteresis band around the setpoint setting is 20 counts, starting at 490 counts and ending at 510 counts.

Note:
If hysteresis is set with ZERO counts, the relay energizes AT or ABOVE the setpoint value.

Deviation (passband) is the programmable band around the setpoint in which the setpoint can be programmed to energize the relay inside or outside the deviation band.

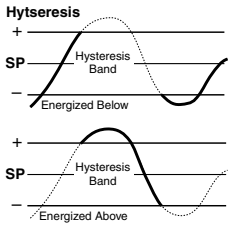


The deviation setting can be any value between 1 and 65535 counts. The number of counts selected act both positively and negatively on the setpoint, forming a deviation band around the setpoint.

For example, if the setpoint setting is 1000 counts and the deviation setting is 35 counts, the deviation band around the setpoint setting is 70 counts starting at 965 counts and ending at 1035 counts.

Initial Start-up Inhibit.

On power-on, start-up inhibit prevents the relay from energizing on the first setpoint activation cycle. Depending on how the meter has been programmed, initial start-up inhibit either functions during a falling input signal, or during a rising input signal.



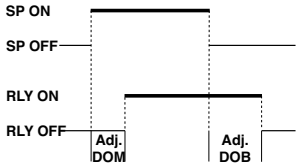
Relay Time Control Modes

The following time control mode settings can cover almost every relay timer application.

All setpoints can be individually programmed to operate a relay in one of the following time control modes above or below the setpoint value.

Normal Mode

This mode individually programs a relay's setpoint with delay-on-make (DOM) and delay-on-break (DOB) settings.

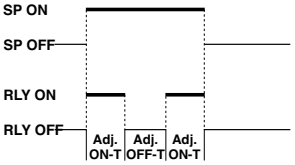


Normally OFF / Pulsed ON Modes

These are delay modes were the relay is **normally off** and **pulses on** when the setpoint activates.

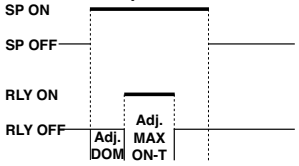
Repeat ON Mode

Multiple actuation, programmable **on** and **off time** settings.



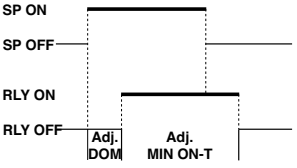
Pulse ON mode (Programmable ON-time)

Single actuation, programmable **DOM** and **on time** settings.



1-Shot ON mode (Programmable Minimum ON-time)

Single actuation, programmable **DOM** and **minimum on time** settings.

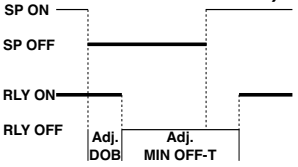


Normally ON / Pulsed OFF Modes

These are delay modes were the relay is **normally on** and **pulses off** when the setpoint activates.

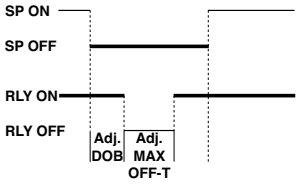
1-Shot OFF mode (Programmable Minimum OFF-time)

Single actuation, programmable **minimum off time** and **DOB** settings.



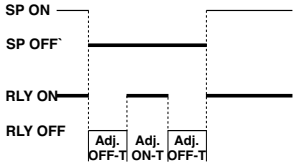
Pulse OFF mode (Programmable OFF-time)

Single actuation, programmable **off time** and **DOB**.



Repeat OFF Mode

Multiple actuation, programmable **off** and **on time** settings.



Each setpoint can be individually configured for basic to advanced operations in the following three levels. Each operational level is designed to provide only the required relevant setpoint and relay functions.

The modes at Level 2 and Level 3 can be set to OFF for each individual setpoint, ensuring that no other functions are programmed to influence the setup.

Level 1 Setpoint & Relay Basic Mode

This is an easily programmable mode for users who require the following basic setpoint and relay functions:

First Digit – Relay Energize Functions

Relays programmed to energize above or below the setpoint value.

Second Digit – SP Activation Source

Setpoints programmed to activate from selectable meter registers or one of six external switched inputs.

Third Digit – Setpoint Latching

Relays programmed with latching and manual reset options.

Level 2 Setpoint & Relay Intermediate Mode

Level 2 uses all Level 1 functions and is further extended by the following programmable modes. The functionality of the relay energize functions are extended by allowing the relays to be programmed with or without initial start-up inhibit.

Hysteresis, Deviation & PID Mode

This mode adds extra functionality to the basic mode by providing programmable hysteresis or deviation settings for all setpoints, or PID control from setpoints SP1 and SP2.

Timer Modes

These modes add even more functionality to the basic and intermediate mode by providing each setpoint with a choice of one of seven resident programmable timers.

Level 3 Setpoint & Relay Advanced Mode

Level 3 uses all Level 1 and Level 2 functions combined with reset and trigger functions to provide an extremely powerful advanced mode.

Level 3 enables you to program all setpoints individually for operations normally requiring sophisticated controllers.

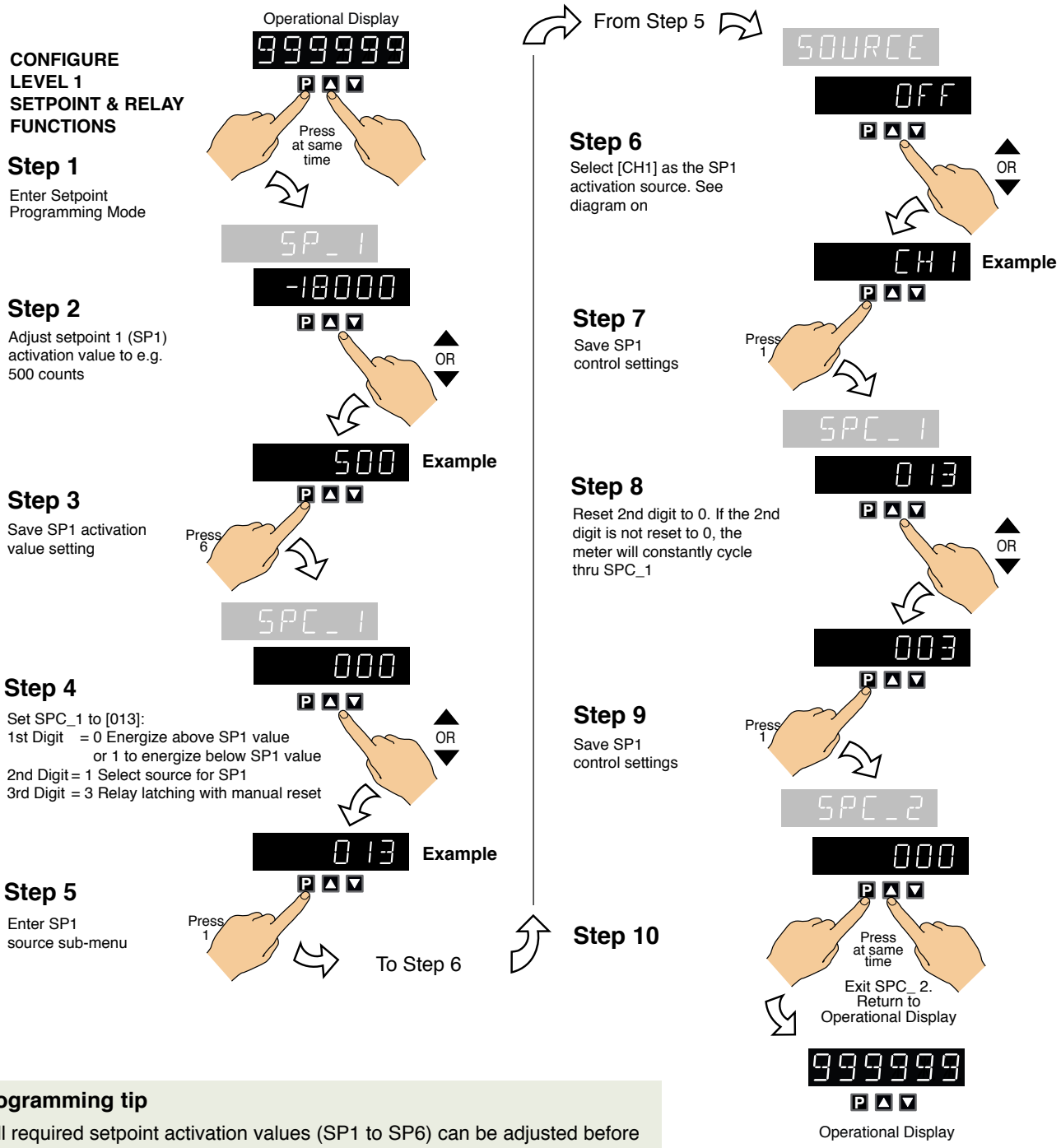
Level 1 - Basic Mode - Programming Procedures

Example Procedure:

The following procedure describes how to program setpoint 1 (SP1) for the following **Level 1** setpoint and relay functions:

- SP1 to activate from Channel 1 (CH1).
- Relay to energize above or below SP1 value.
- Relay to latch with manual relay reset.

See *Relay Supplement* for procedures to program all setpoint and relay operational levels (Level 1 to Level 3).



Programming tip

All required setpoint activation values (SP1 to SP6) can be adjusted before programming setpoint and relay control function settings. See *Setpoint Programming Mode Logic Diagram*.

Setpoint & Relay Control Settings Diagram

The diagram below and continued on page 40 shows the 1st, 2nd, and 3rd digit control settings for the setpoints and relays.

FIRST DIGIT
Relay Energize Function

0 Energized ABOVE setpoint value.

1 Energized BELOW setpoint value.

2 Energized ABOVE setpoint value with FALLING INPUT SIGNAL INITIAL START-UP INHIBIT.

3 Energized BELOW setpoint value with RISING INPUT SIGNAL INITIAL START-UP INHIBIT.

SECOND DIGIT
SP Activation Source

0 Activate Setpoint Source from Selected Register

1 Select Source for Setpoint

Note:
[X1X] is a register selection procedure only. To finish, reset to [X0X] to activate the selection, or reset to 2-7 as required for digital input selection.

2 Digital Input – Capture Pin
3 Digital Input – D1
4 Digital Input – D2
5 Digital Input – D3
6 HOLD Pin
7 LOCK Pin

THIRD DIGIT
SP Delay & Timing Functions

0 No Latching
1 Relay Latched
2 Manual Relay Reset
3 Relay Latched with Manual Relay Reset
4 Relay Latched Off

5 Hysteresis, Deviation & PID Mode → **See Set Up Hysteresis, Deviation & PID Mode Settings below**

6 Timer Modes:
- Normal Delay.
- Repeat ON.
- Pulse ON.
- 1-Shot ON.
- Repeat OFF.
- Pulse OFF.
- 1-Shot OFF.

→ **See page 40**

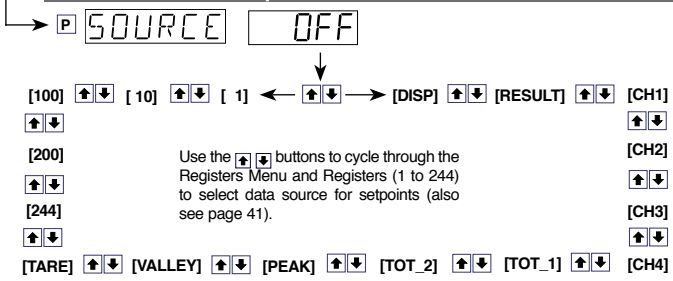
Note:
In PID mode, all Timer Modes on SP1 set in [XX6] are not functional.

7 Advanced Functions Mode:
- Reset Trigger.
- Reset Destination.
- Reset Mode.
- Reset Constant.
- Trigger Print from SP.
- Trigger Log from SP.
- Annunciator Flashing & SP Tracking.

Note:
[XX5], [XX6], and [XX7] are set up procedure settings only. To finish, reset to 0-4 as required for setpoint latching and relay reset modes.

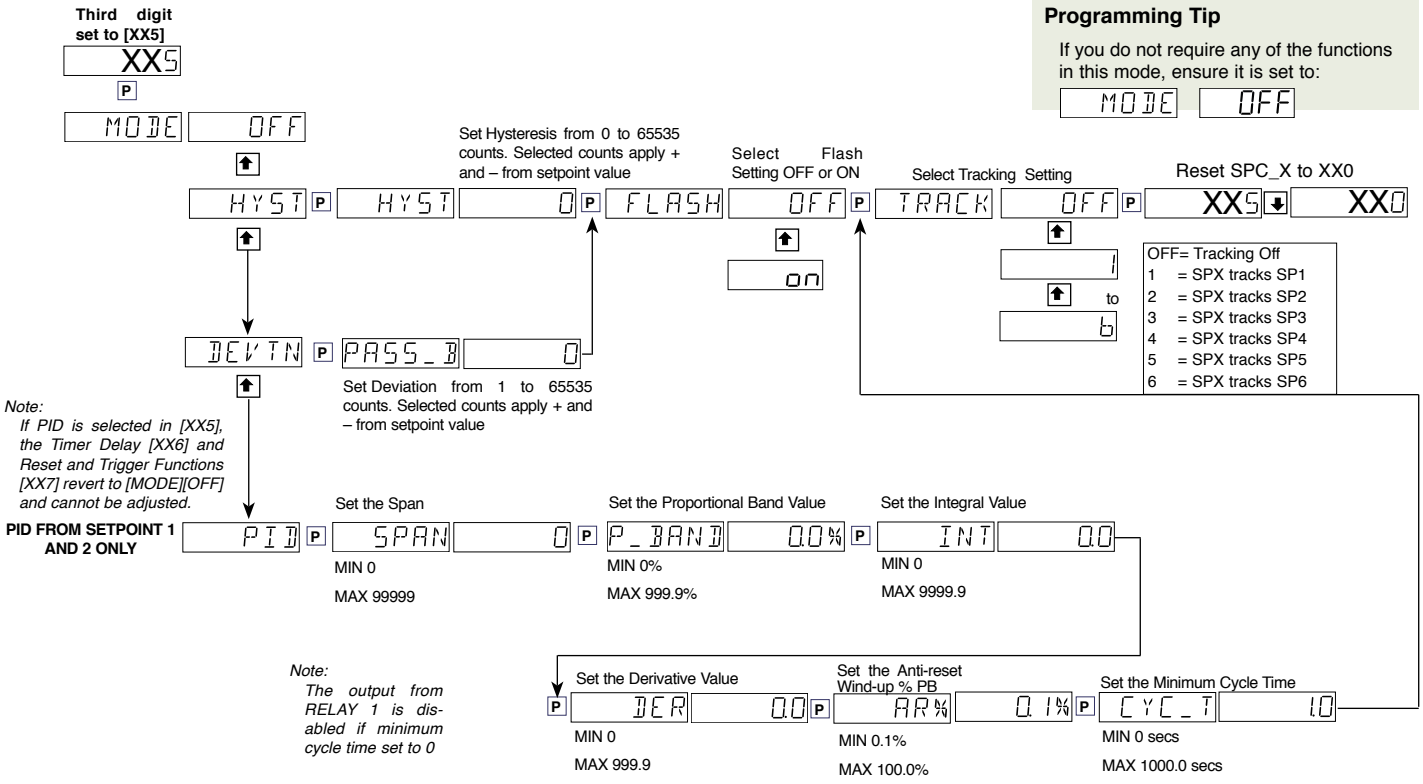
→ **See page 40**

Select Source for Setpoint Functions



Set Up Hysteresis, Deviation & PID Mode Settings

Third digit set to [XX5]



Set Hysteresis from 0 to 65535 counts. Selected counts apply + and – from setpoint value

Select Flash Setting OFF or ON

Select Tracking Setting

Reset SPC_X to XX0

OFF= Tracking Off
1 = SPX tracks SP1
2 = SPX tracks SP2
3 = SPX tracks SP3
4 = SPX tracks SP4
5 = SPX tracks SP5
6 = SPX tracks SP6

Set Deviation from 1 to 65535 counts. Selected counts apply + and – from setpoint value

Note:
If PID is selected in [XX5], the Timer Delay [XX6] and Reset and Trigger Functions [XX7] revert to [MODE][OFF] and cannot be adjusted.

PID FROM SETPOINT 1 AND 2 ONLY

Set the Span
MIN 0
MAX 99999

Set the Proportional Band Value
MIN 0%
MAX 999.9%

Set the Integral Value
MIN 0
MAX 9999.9

Note:
The output from RELAY 1 is disabled if minimum cycle time set to 0

Set the Derivative Value
MIN 0
MAX 999.9

Set the Anti-reset Wind-up % PB
MIN 0.1%
MAX 100.0%

Set the Minimum Cycle Time
MIN 0 secs
MAX 1000.0 secs

Programming Tip

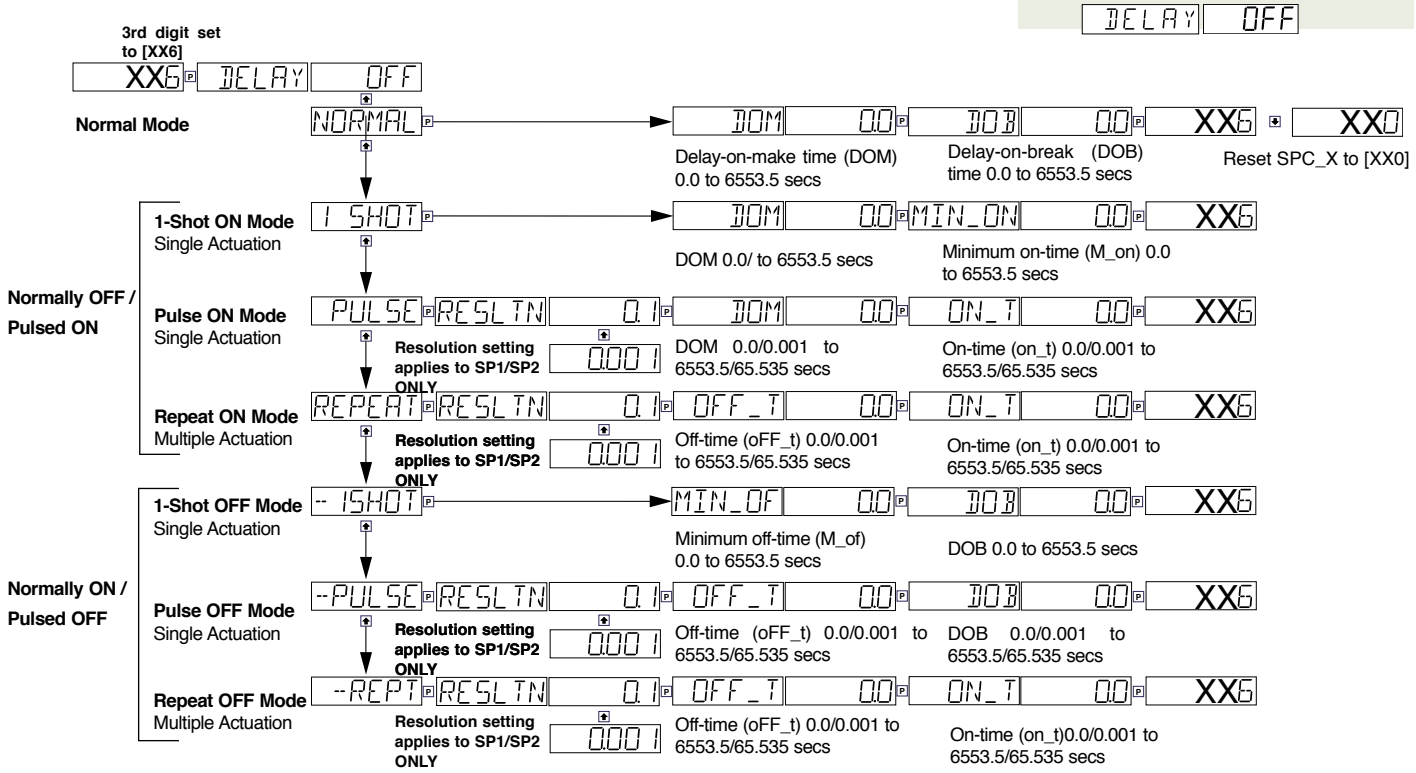
If you do not require any of the functions in this mode, ensure it is set to:

Set Up Timer Delay Settings

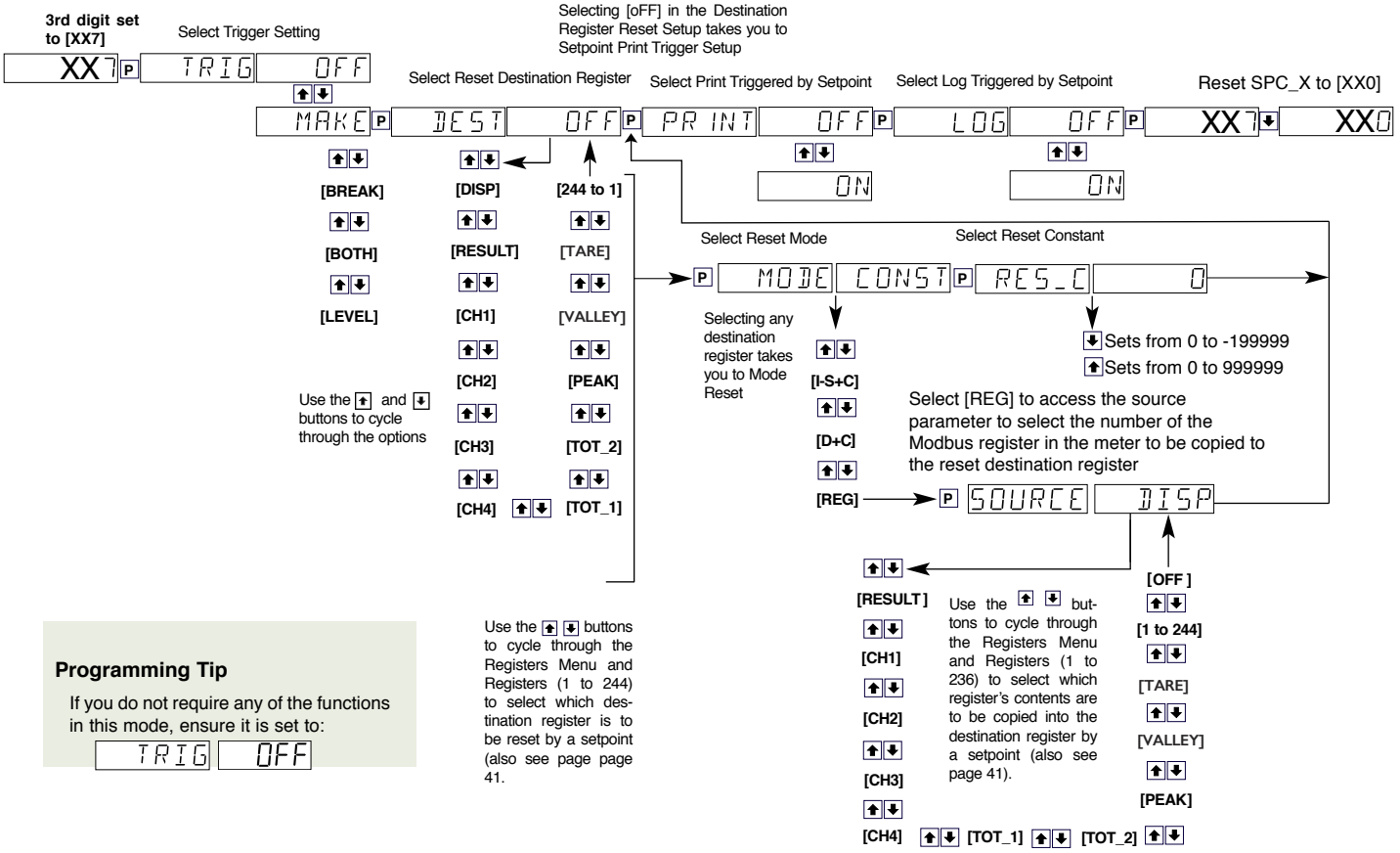
Programming Tip

If you do not require any of the functions in this mode, ensure it is set to:

DELAY OFF



Set Up Register Reset and Setpoint Trigger Functions



Programming Tip

If you do not require any of the functions in this mode, ensure it is set to:

TRIG OFF

The CI-B101D60A meter has 6,144 registers which are provided for use by the operating system and the powerful Custom Macro Programming system.

40 Manually Selectable Registers

Using the front panel buttons, there are 40 registers that may be selected for use within the following functions:

- [**CODE_1] - Display Configuration [X50]**. Selection of a register as the data source for displays, peak and valley, totalizers and analog outputs. (page 16)
- **Setpoint Control Settings [X1X]**. Selection of a register as the data source for a setpoint. (page 39)
- **Setpoint Control Settings [XX7]**. Selection of a destination register that is to be reset by a setpoint with the contents of a selected source register. (page 40)
- **Setpoint Control Settings [XX7]**. Select which register's contents are to be copied into the destination register by a setpoint. (page 40)

The 40 registers that can be selected as a data source, a reset source or a reset destination for the functions above are shown in the table on the right.

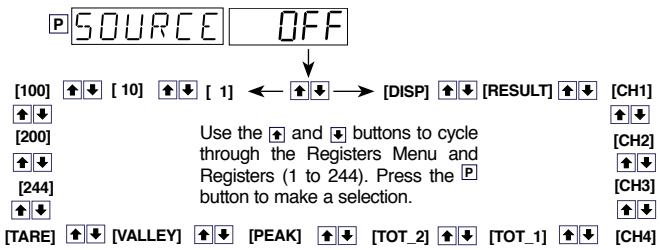
The table shows, in seven columns, the functions where these registers can be used.

Where a register is more likely to be used in a particular function, a closed circle ● is shown in the column. For those functions where a register is less likely to be used, an open circle ⌖ is shown.

No register number is shown for the first 11 functions, because these 11 functions are identified in the display menu for direct selection by their code names.

When cycling through the Registers Menu and then Registers 1 to 244, the numerical Register Set will increment through each decade in turn, from 1 to 0, while the button is held down. When [200] is reached, [OFF] or [TARE] will be displayed. To select a specific number set, the button should be released and pressed again each time the left most decade displays the desired number for that decade.

To quickly exit the numerical 1 to 244 Register Set, hold the ⇩ button down while cycling through the decades, and release it when [OFF] or [TARE] appears.



Registers that Should Not be Used

The following registers are contained within the selectable 1 to 244 Register Set, but they should not be selected because they are either reserved for future use, or for use by the operating system only:

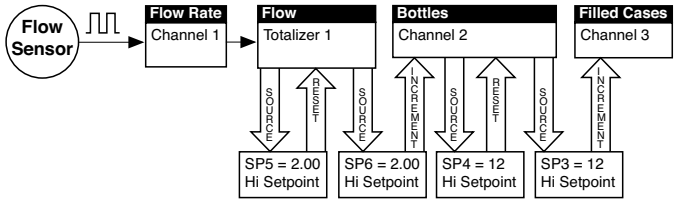
15, 38, 47-48, 52-53, 61-64, 123-128, 140-141, 234-236

Any selection of these Registers may cause a malfunction.

Register Functions	Register Numbers	Data Source for Displays	Data Source for Peak & Valley	Data Source for Analog Outputs 1 & 2	Data Source for Totalizers 1 & 2	Data Source for Setpoints	Reset Source	Reset Dest.
Display	-		●	●	●	●		
Result	-	●	●	●	●	●	●	●
CH1	-	●	●	●	●	●	●	●
CH2	-	●	●	●	●	●	●	●
CH3	-	●	●	●	●	●	●	●
CH4	-	●	●	●	●	●	●	●
Total	-	●	●	●		●	●	●
Total	-	●	●	●		●	●	●
Peak	-	⌖				●	⌖	●
Valley	-	⌖				●	⌖	●
Tare	-	⌖	⌖	⌖		⌖	⌖	●
PID Output 1	50	⌖	⌖	⌖		⌖		
PID Output 2	51	⌖	⌖	⌖		⌖		
Smart Result 1	54	⌖	⌖	⌖				⌖
Smart Result 2	55	⌖	⌖	⌖				⌖
Smart Result 3	56	⌖	⌖	⌖				⌖
Smart Result 4	57	⌖	⌖	⌖				⌖
Smart Result 5	58							⌖
Smart Result 6	59							⌖
Smart Result 7	60							⌖
Analog Output 1	83	⌖				⌖	⌖	⌖
Analog Output 2	84	⌖				⌖	⌖	⌖
Timer 1	95	⌖				⌖	⌖	⌖
Timer 2	96	⌖				⌖	⌖	⌖
Smart Reset Offset 1	121							●
Smart Reset Offset 2	122							●
Clock - Seconds	213					⌖		
Clock - Minutes	214					⌖		
Clock - Hours	215					⌖		
Clock - Days	216					⌖		
Clock - Date	217					⌖		
Clock - Month	218					⌖		
Clock - Year	219					⌖		
Setpoint Latch	221							●
Relay De-energize	222							●
Zero Offset - Result	227					⌖		
Zero Offset - CH1	228					⌖		
Zero Offset - CH2	229					⌖		
Zero Offset - CH3	230					⌖		
Zero Offset - CH4	231					⌖		

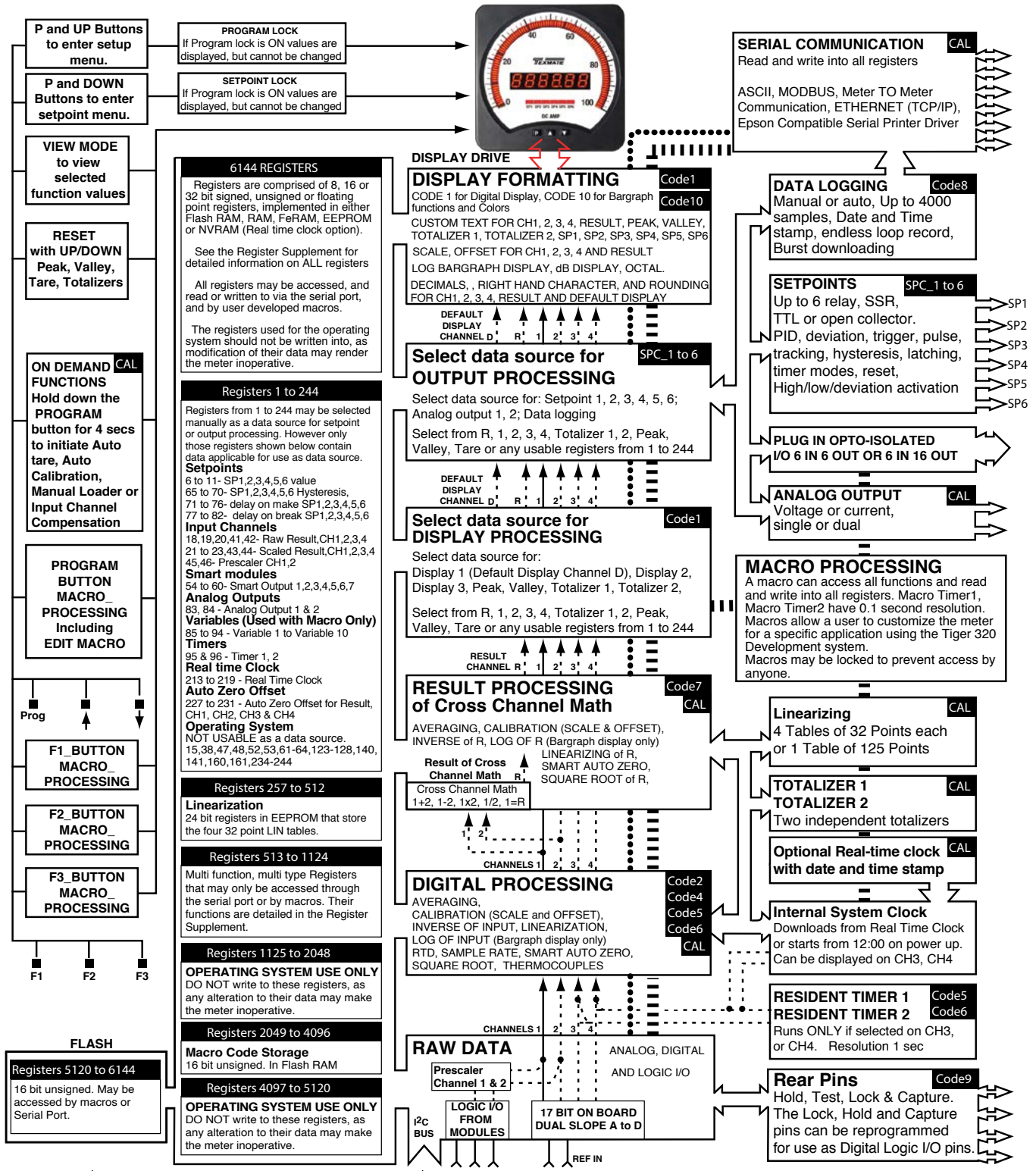
Resetting and Incrementing Using Setpoints

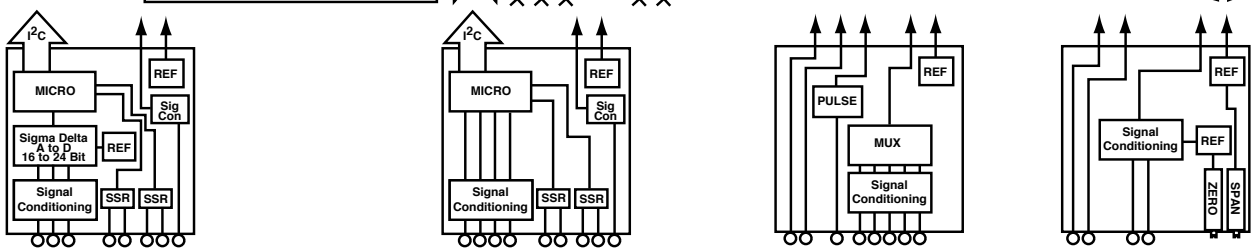
Setpoints may be used to reset and/or increment registers. In the example shown on the right, 2 liter soft drink bottles are being filled and packed 12 to a case. Using the setpoint reset and increment feature, the number of bottles and the total number of filled cases is easily calculated and displayed. Totalizer 1 counts from 0 to 2, resets, and repeats. CH 2 counts from 0 to 12, resets, and repeats.



USING SETPOINTS TO INCREMENT AND RESET REGISTERS

Block Diagram of the CI-B101D60A Structure





SMART MODULES WITH MULTICHANNEL INPUTS, AN ON-BOARD A TO D CONVERTER, MICROPROCESSOR, AND TWO SOLID STATE RELAY OUTPUTS

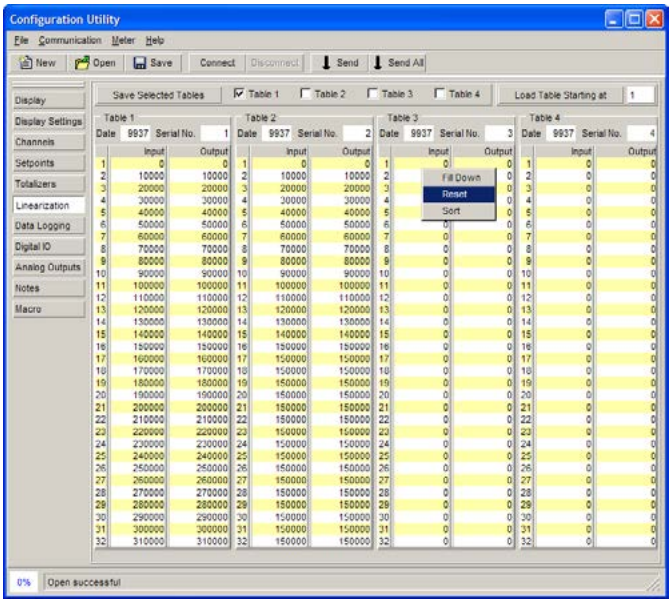
SMART MODULES WITH AN ON BOARD MICROPROCESSOR AND TWO SOLID STATE RELAY OUTPUTS WITH PULSE, OR QUADRATURE ENCODER INPUTS FOR COUNTING, FREQUENCY OR POSITION

MULTI-INPUT MODULES W/DIGITAL SCALING

SINGLE INPUT MODULES WITH ANALOG SCALING

12-30-02 4:00 PM

The Easiest and Fastest Way to Configure the CI-B101D60A

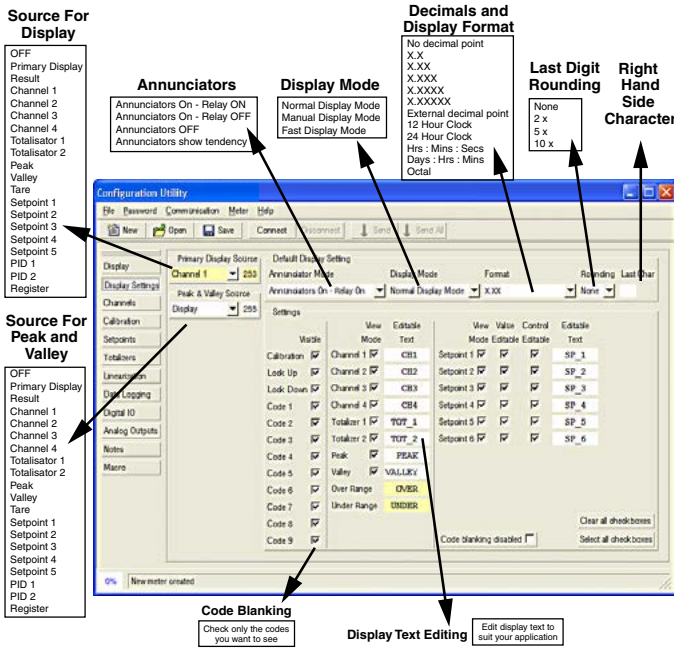


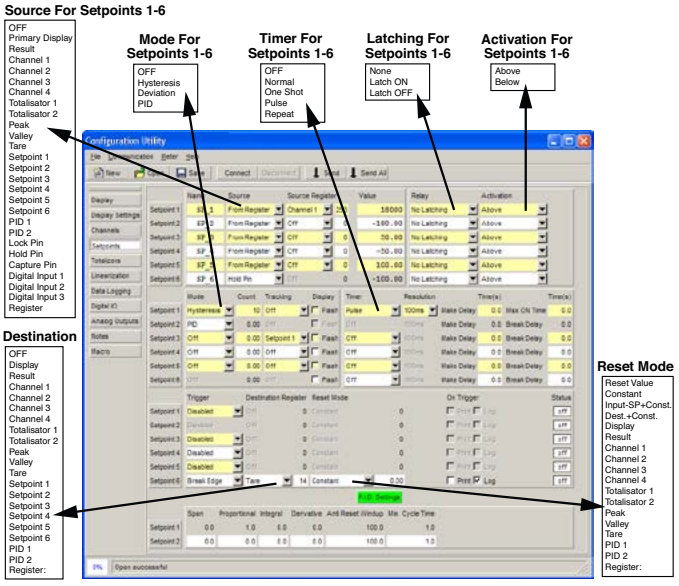
The diagrams and instructions provided in this user manual enable the CI-B101D60A meter to be configured manually using the front panel buttons. A system of Program Codes is used for this type of manual programming. These are explained in detail with diagrams and examples in this document

However, the CI-B101D60A meter can also be configured and programmed via the optional serial port using a PC and the Configuration Utility. The Configuration Utility clearly identifies all the programming options by their functions for direct on-screen selection. The Configuration Utility requires digital interface in the CI-B101D60A.

The CI-B101D60A Configuration Utility (which may be freely downloaded from www.weschler.com) is designed to simplify and speed up the configuration and programming of any CI-B101D60A. Pull down menus facilitate the selection of different options and the assignment of values.

The configuration utility enables the user to access some special capabilities of the CI-B101D60A which cannot be selected manually by the front panel buttons.





Code Blanking

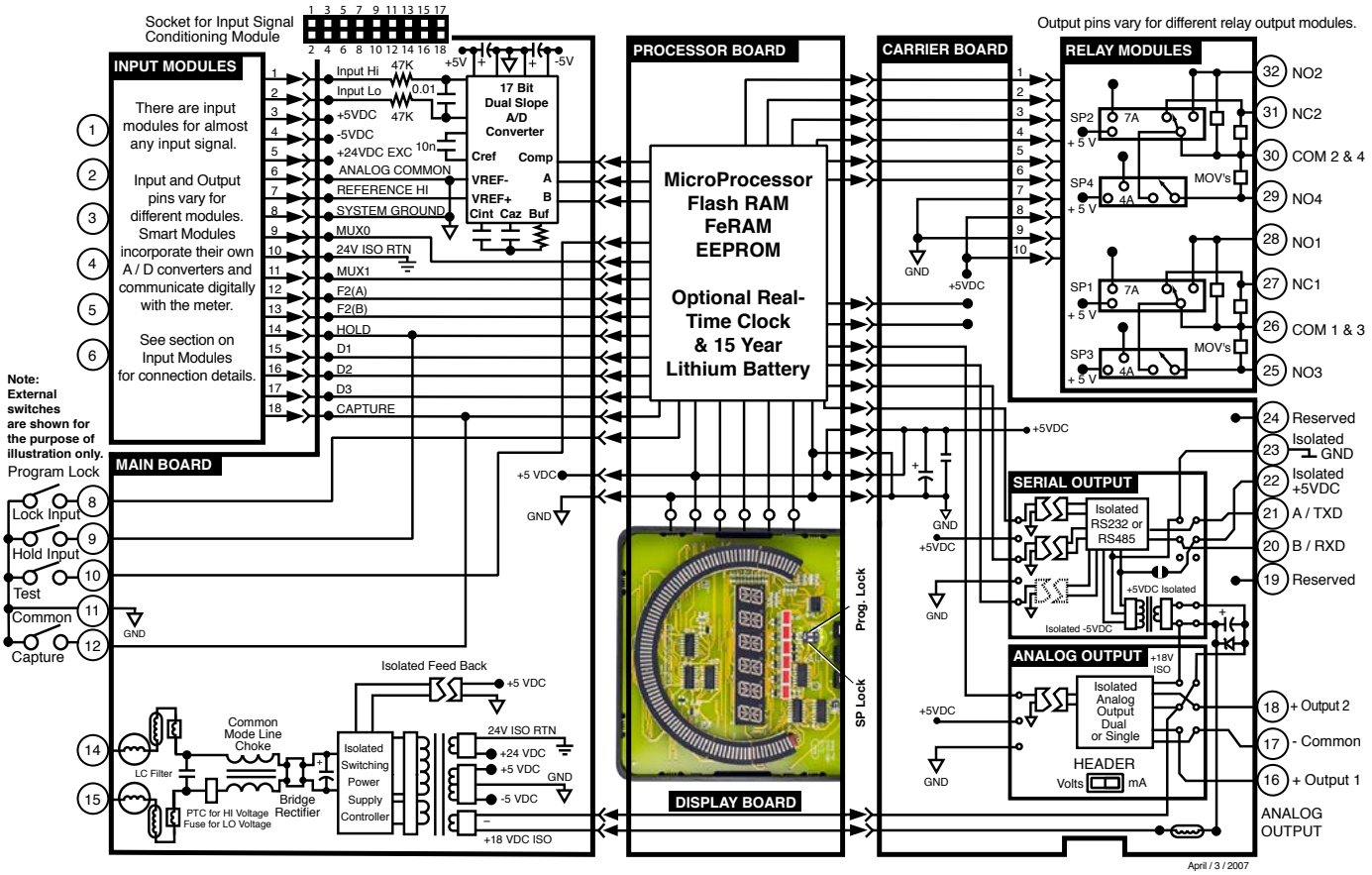
Display Text Editing

Easy Installation of Linearization Tables

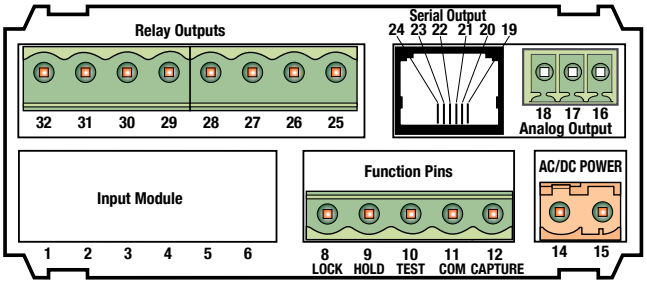
Easy Setpoint Configuration

Configuration Data Copying and Loading

Functional Diagram



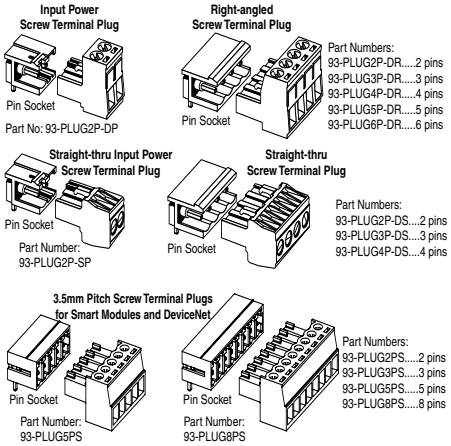
Connector Pinouts



Rear Panel Pinout Diagram

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

NOTE: The meter uses plug-in type screw terminal connectors for most input and output connections and an RJ-6 phone connector for the optional RS-232 or RS-485 serial outputs



Input Signal – Pins 1 to 6

See *Input Modules List* for connection details of all input modules. On most single input signal conditioners, usually Pin 1 is the signal high pin (Hi +) and Pin 3 is the signal low pin (Lo –).

Function Pins – Pins 8 to 15

Pin 8 – Program Lock. By connecting the PROGRAM LOCK pin to the COMMON pin (pin 11 on the main PCB), the PROGRAM LOCK pin allows the meter's programmed parameters to be viewed but not changed.

Pin 9 – Hold Reading. By connecting the HOLD READING pin to the COMMON pin (pin 11), the HOLD READING pin allows the meter's display to be frozen. However, A/D conversions continue and as soon as pin 9 is disconnected from pin 11 the updated reading is instantly displayed.

Pin 10 – Display Test and Reset. The DISPLAY TEST and RESET pin provides a test of the meter's display and resets the microprocessor when the DISPLAY TEST and RESET pin is connected to the COMMON pin (pin 11).

Pin 11 – Common. To activate the HOLD, TEST and RESET, or LOCKOUT pins from the rear of the meter, the respective pins have to be connected to the COMMON pin.

Pin 12 – Capture.

Pins 14/15 – AC/DC Power Input. These are the pins that supply power to the meter. See Power Supply for details of the standard and optional low voltage power supply.

Carrier Board Output Pins

Analog Outputs

Pin 16 – Positive (+) analog output 1
Pin 17 – Negative (–) Common
Pin 18 – Positive (+) analog output 2

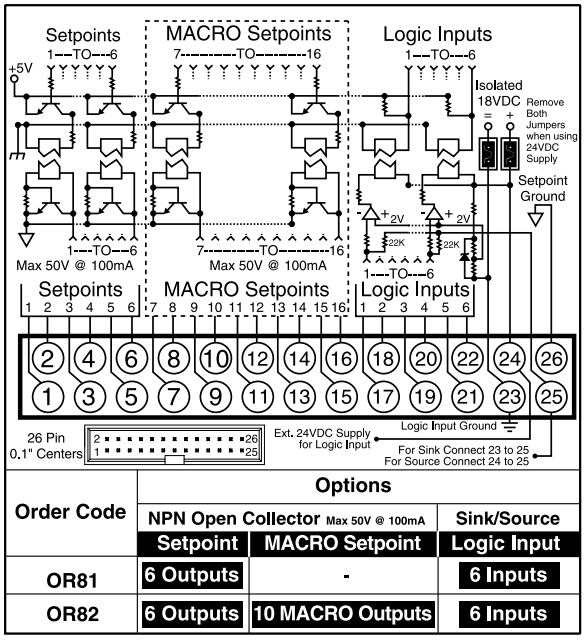
Serial Outputs RS-232 or RS-485

Pin No.	RS-232	RS-485
19	Reserved for future use	Reserved for future use
20	RXD. Received Serial	B (Low)
21	TXD. Transmitted Serial	A (High)
22	+5 VDC to power external converters	+5 VDC to power external converters
23	Isolated Ground	Isolated Ground
24	Reserved for future use	Reserved for future use

Ethernet – The Ethernet carrier board has the same analog output pins, with 10/100Base-T Ethernet (RJ-45 Socket).

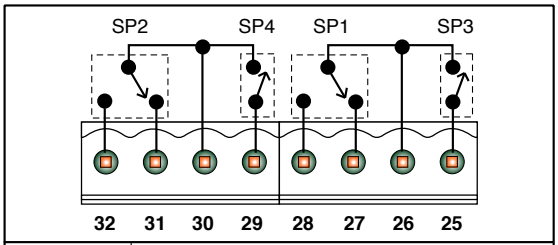
Relay and Logic I/O Modules

Opto Isolated I/0 Module for External Breakout Box with 6 Outputs & 6 Inputs, or 16 Outputs & 6 Inputs



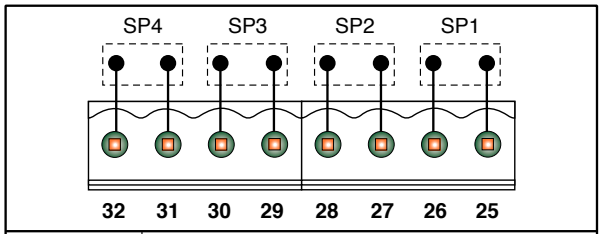
Order Code	Options		
	NPN Open Collector Max 50V @ 100mA		Sink/Source
	Setpoint	MACRO Setpoint	Logic Input
OR81	6 Outputs	-	6 Inputs
OR82	6 Outputs	10 MACRO Outputs	6 Inputs

Relay Modules with up to two 4A Form A Relays, and up to two 7A Form C Relays



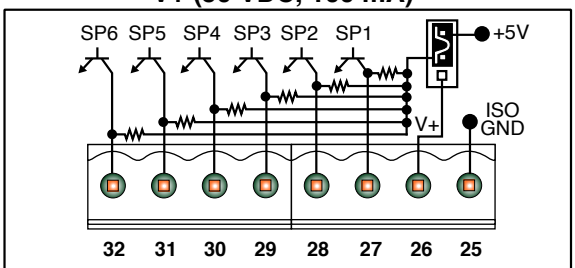
Order Code	Options			
	SP2	SP4	SP1	SP3
OR11	-	-	7A	-
OR12	7A	-	7A	-
OR23	7A	4A	7A	-
OR14	7A	4A	7A	4A
OR15	-	4A	7A	4A
OR16	-	4A	7A	-

Relay Modules with up to 4 Independent 300V SSR (210mA DC only)



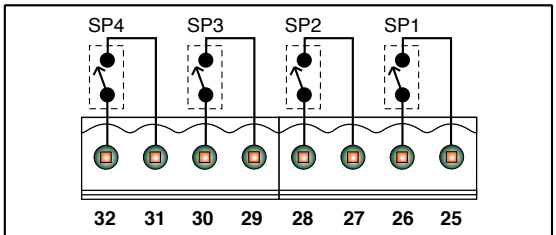
Order Code	Options			
	SP4	SP3	SP2	SP1
OR51	-	-	-	210mA
OR52	-	-	210mA	210mA
OR53	-	210mA	210mA	210mA
OR54	210mA	210mA	210mA	210mA

Open Collector / TTL / 5V Output(50mA) V+ (50 VDC, 100 mA)



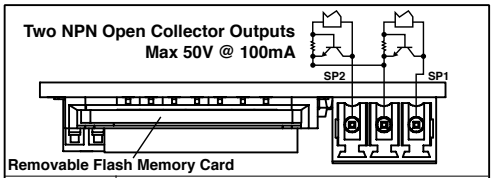
Order Code	Options					
	SP6	SP5	SP4	SP3	SP2	SP1
OR71	0 to 5V	0 to 5V	0 to 5V	0 to 5V	0 to 5V	0 to 5V
OR72	0 to V+	0 to V+	0 to V+	0 to V+	0 to V+	0 to V+

Relay Modules with up to four 4A Form A Relays

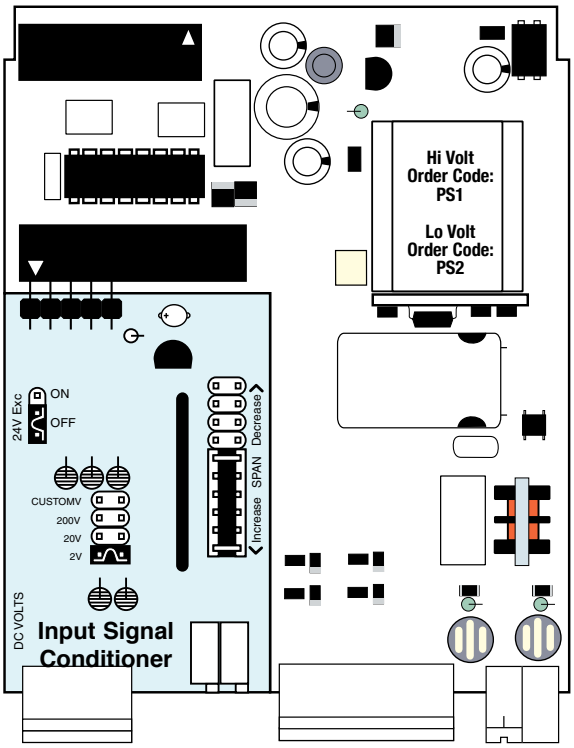


Order Code	Options			
	SP4	SP3	SP2	SP1
OR31	-	-	-	4A
OR32	-	-	4A	4A
OR33	-	4A	4A	4A
OR34	4	4A	4A	4A

Flash Card Memory Module

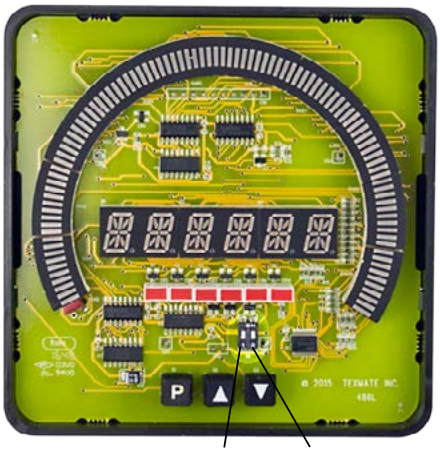


Order Code	Options
OR91	MODULE WITH 4 MEG MEMORY



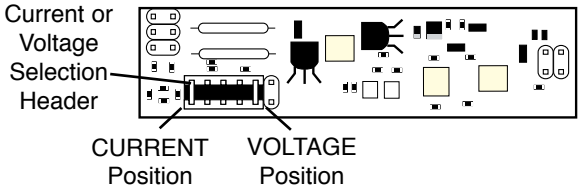
Main PCB*

*Shown with optional Input Signal Conditioning Module (Ordered Separately)

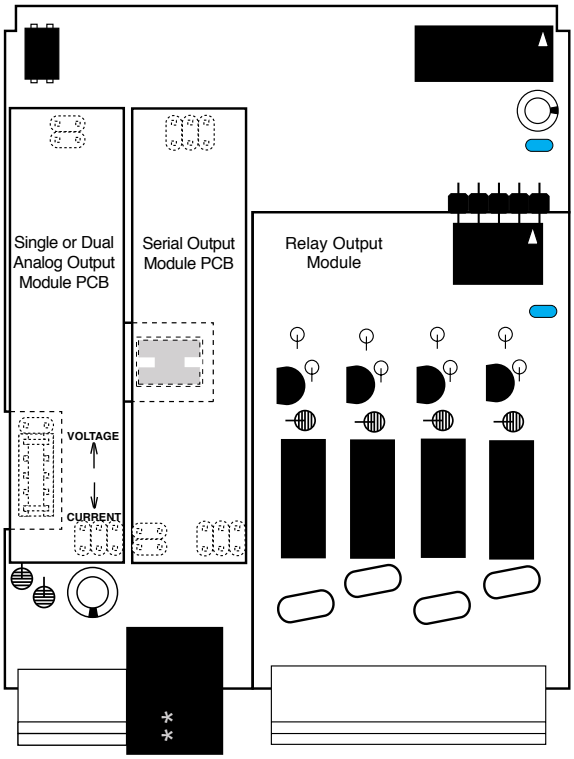


Display Board

Analog Output Module PCB



Available in Single (0~4-20mA or 0-10V) or Dual (0-10V & 0-10V)



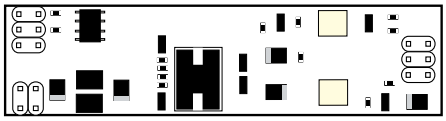
Standard Output Carrier Board*

*Shown with optional Analog Output Module, optional Relay Output Module and a Serial Output Module (RS-232, RS-485 or No Serial Output)

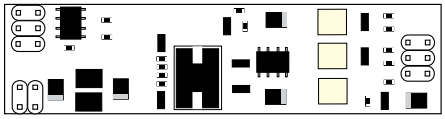
Ethernet Output Carrier Board**

**Is similar to the Standard Output Module Carrier Board, except that the RJ-6 socket is replaced with a 10/100Base-T RJ-45 Socket

Standard Serial Output Modules
RS-232 or RS-485



RS-232 Output Module PCB



RS-485 Output Module PCB

Input Signal Conditioning Modules - Single Channel

Many additional input modules are available and others are constantly being developed. Check with your local distributor or see Texmate's web site at: www.texmate.com for updated information. 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. Where appropriate, all the standard ranges are designed to be header selectable by the user, and our unique **SPAN ADJUST** Header facilitates **scaling to almost any required engineering unit**. See Input Module Component Glossary for more information.

Unless otherwise specified, we will ship all modules pre calibrated with factory preselected ranges and/or scaling 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.

Symbols Indicate Module Compatibility Within Meter Families		
TIGER Family LEOPARD Family LYNX Family	TIGER Family LEOPARD Family LYNX Family	TIGER Family LEOPARD Family LYNX Family
ALL MODELS	**SOME MODELS**	**MODEL SPECIFIC**

* TIGER IT03

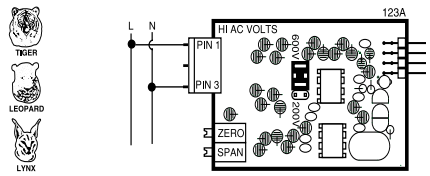
** LYNX FX-B101Q

***A module code shown below a compatibility symbol indicates another module is available, similar in function, which may be more suited for use with that family.**

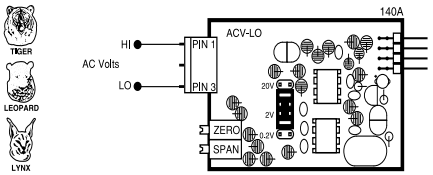
****Modules which are compatible are listed below the Model Specific Symbol.**

Indicates a SMART MODULE. Smart Modules incorporate their own microprocessor and A/D converter. They communicate digitally with the Tiger 320 Operating System. Some also have their own SSR outputs.

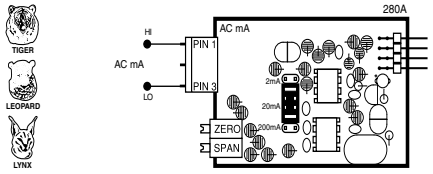
IA01: AC Volts Scaled RMS, 200/**300V** AC



IA02: AC Volts Scaled RMS, 200mV/**2V**/20V AC

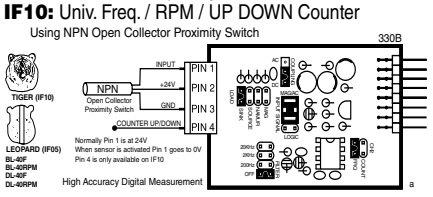


IA03: AC Milliamps Scaled RMS, 2/**20**/200mA AC

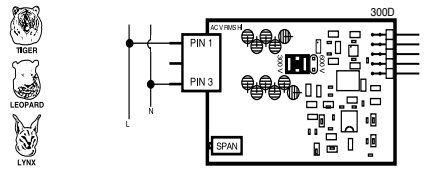


IF05: Universal Frequency / RPM
IF10: Univ. Freq. / RPM / UP DOWN Counter

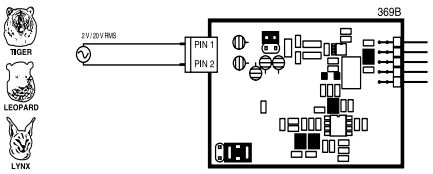
Using NPN Open Collector Proximity Switch



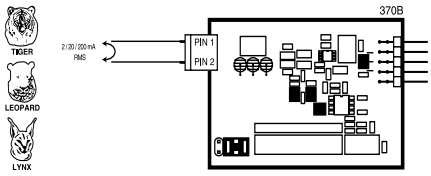
IA06: AC Volts True RMS, **300V AC**



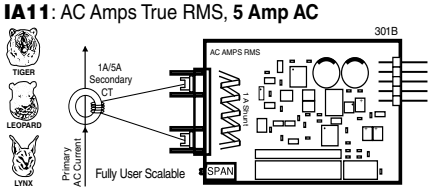
IA07: AC Volts True RMS, 200mV/**2V**/20V AC



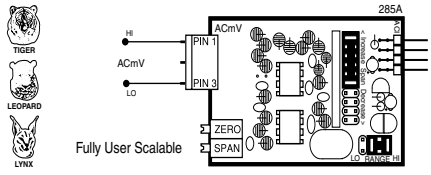
IA08: AC Milliamps True RMS, 2/**20**/200mA AC



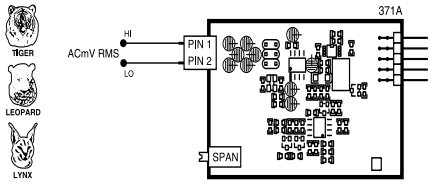
IA09: AC Amps True RMS, **1 Amp AC**
IA11: AC Amps True RMS, **5 Amp AC**



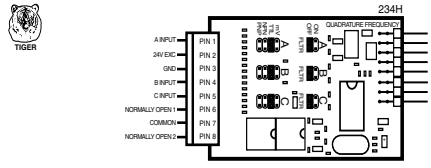
IA10: AC Millivolts, Scaled RMS, **100mV AC**



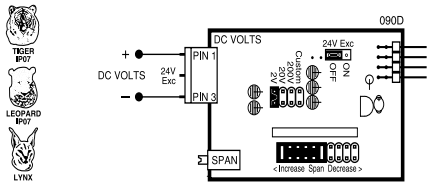
IA12: AC Millivolt RMS Sigma Delta



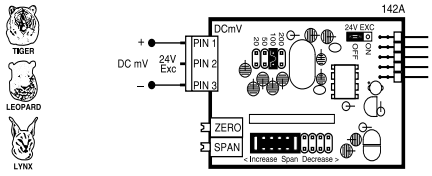
IC02: Quadrature Counter
IC03: Quadrature Counter w/dual SSRs



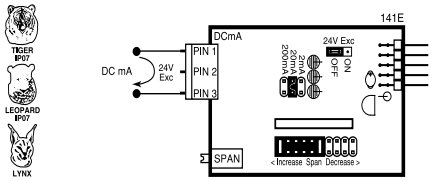
ID01: DC Volts, **2**/20/200V/Custom w/24V DC Exc



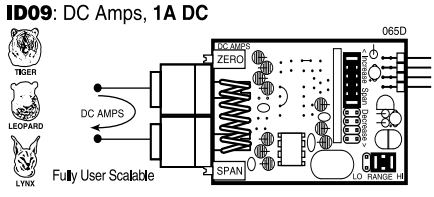
ID02: DC Millivolts, 20/50/**100**/200mV DC w/24V DC Exc



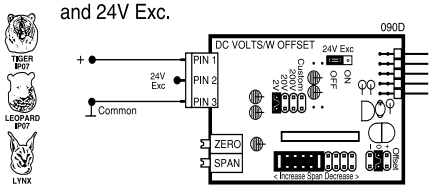
ID03: DC Milliamps, 2/**20**/200mA DC w/24V DC Exc



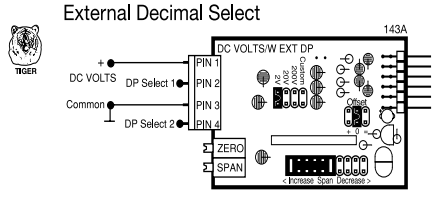
ID04: DC Amps, **5A DC**
ID09: DC Amps, **1A DC**



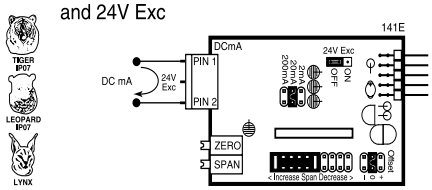
ID05: DC Volts **2**/20/200/Custom V DC with Offset and 24V Exc.



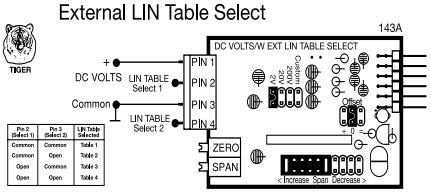
ID06: DC Volts 2/20/200/Custom V DC with External Decimal Select



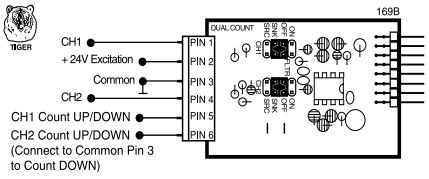
ID07: DC Milliamps, 2/**20**/200mA DC with Offset and 24V Exc



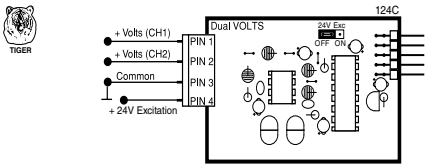
ID08: DC Volts, 2/20/200/Custom V DC with External LIN Table Select



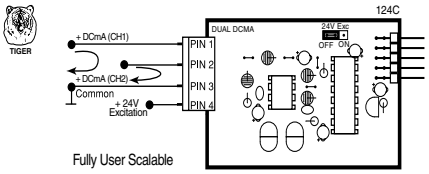
IDC1: Dual UP/DOWN Counter



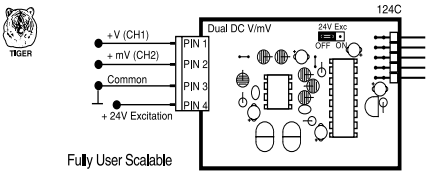
IDD1: Dual DC Volts, **2V DC**
IDD2: Dual DC Millivolts, **50mV DC**



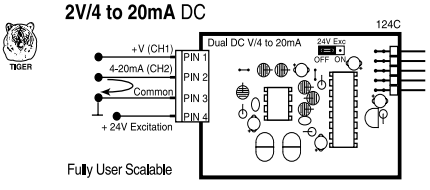
IDD3: Dual DC Milliamps, **2mA DC**



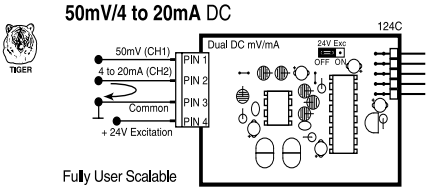
IDD4: Dual Input, DCV and DCmV **2V/50mV** DC



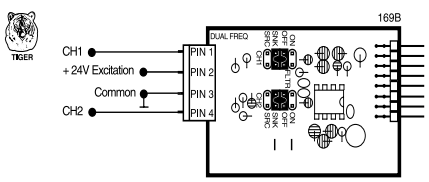
IDD5: Dual Input, DCV and 4 to 20mA **2V/4 to 20mA** DC



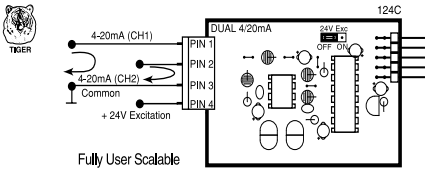
IDD6: Dual Input, DC mV and 4 to 20mA **50mV/4 to 20mA** DC



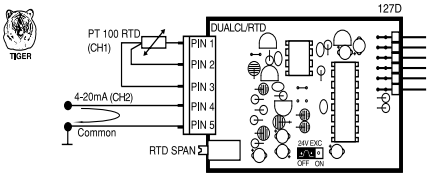
IDF2: Dual Frequency



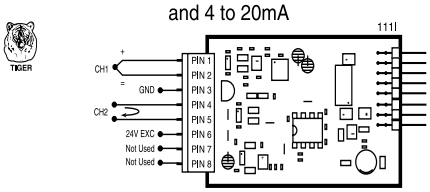
IDP1: Dual Process Loop, **4-20mA**



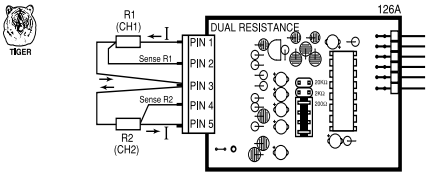
IDP2: Dual Input, **3-wire RTD** and **4-20mA**



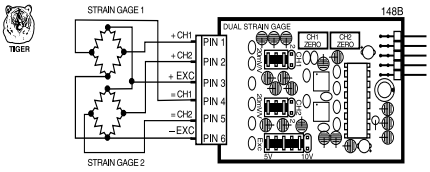
IDP3: Dual Input- Thermocouple (J/**K**/R/S/T/B/N) and 4 to 20mA



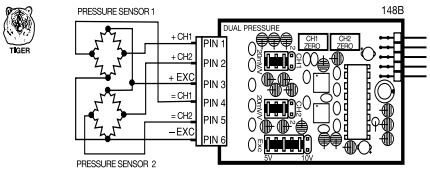
IDR1: Dual Resistance Input, 0.2/**2**/20KΩ



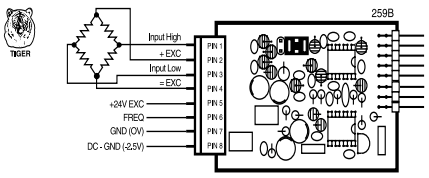
IDS1: Dual Strain Gage Input, **4 wire 2mV/V**, 20mV/V



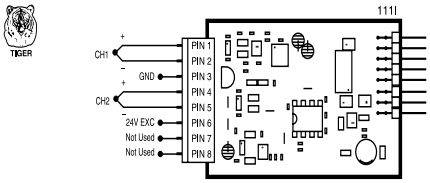
IDS2: Dual Pressure Input, 4 wire 2mV/V, 20mV/V



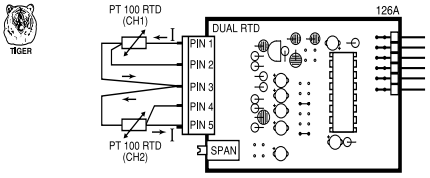
IDS3: Dual Input, Strain Gage and Frequency



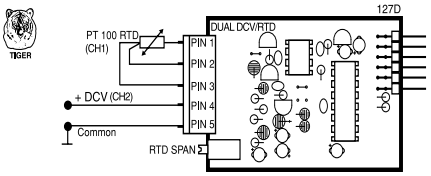
IDT1: Dual Thermocouple (J/**K**/R/S/T/B/N)



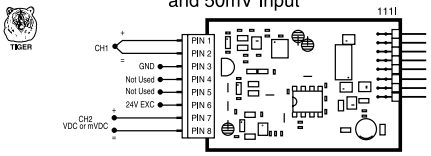
IDT2: Dual RTD Input, 2/3-wire, **100Ω Pt**



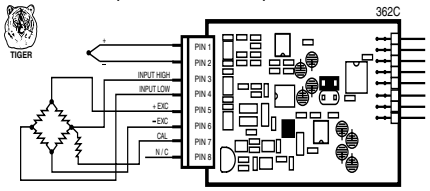
IDT3: Dual Input, **3-wire RTD** and **DCV**



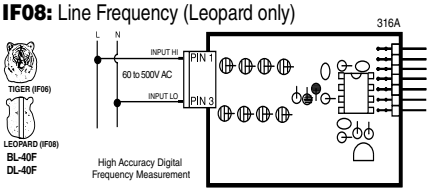
IDT4: Dual Input- Thermocouple (J/**K**/R/S/T/B/N) and 2VDC Input
IDT5: Dual Input- Thermocouple (J/**K**/R/S/T/B/N) and 50mV Input



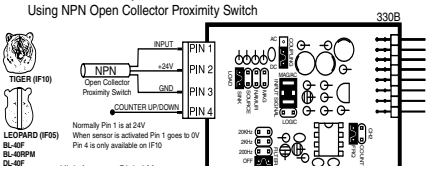
IDT6: Dual Input - Thermocouple and Load Cell



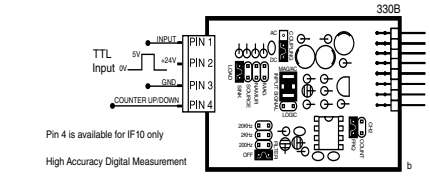
IF06: Line Frequency (Tiger only)
IF08: Line Frequency (Leopard only)



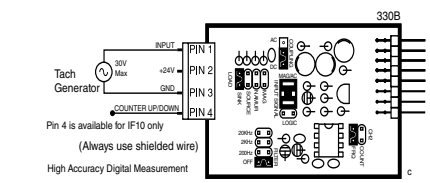
IF05: Universal Frequency / RPM
IF10: Univ. Freq. / RPM / UP DOWN Counter
Using NPN Open Collector Proximity Switch



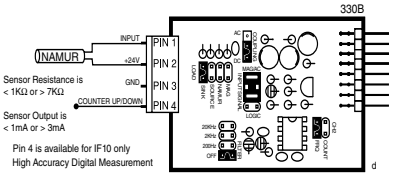
TTL Input Connected to **IF05** and **IF10**



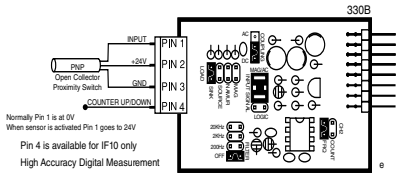
Tach Generator Connected to **IF05** and **IF10**



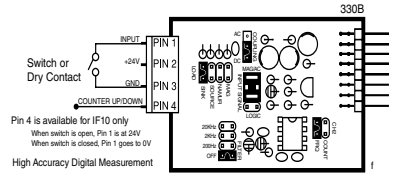
NAMUR Sensor Connected to **IF05** and **IF10**



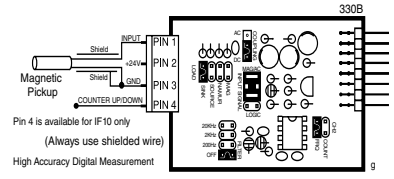
PNP Open Coll. Prox. Switch Conn. to **IF05** and **IF10**



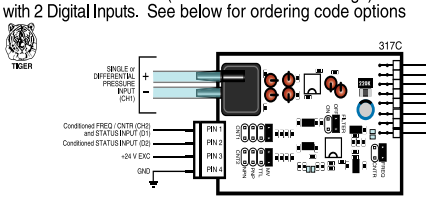
Switch or Dry Contact Connected to **IF05** and **IF10**



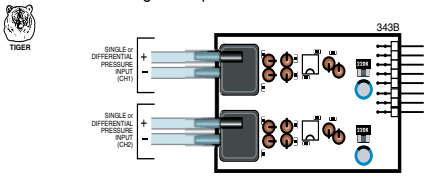
Magnetic Pickup Connected to **IF05** and **IF10**



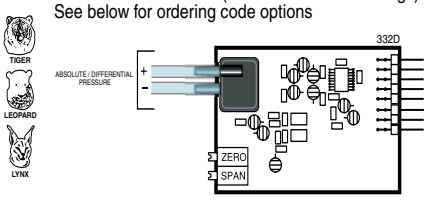
IGYX: Direct Pressure (Absolute or Differential/Gage) with 2 Digital Inputs. See below for ordering code options



IGYY: Dual Direct Pressure (Absolute or Differential/Gage) see below for ordering code options



IGYZ: Universal Direct Pressure (Absolute or Differential/Gage) See below for ordering code options



Direct Pressure (IGYX, IGYY & IGYZ) Ordering Code Options

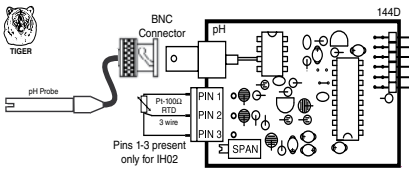
I G

For Single Channel IGYX with two digital inputs, the last digit of order code is always X.

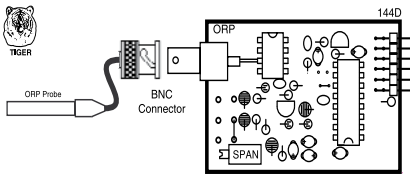
For Universal Direct Pressure IGYZ, the last digit of order code is always Z.

Sensor Range	CH1 Order Code	CH2 Order Code
1 psi Absolute	A	A
1 psi Differential	B	B
5 psi Absolute	C	C
5 psi Differential	D	D
15 psi Absolute	E	E
15 psi Differential	F	F
30 psi Absolute	G	G
30 psi Differential	H	H
100 psi Absolute	J	J
100 psi Differential	K	K

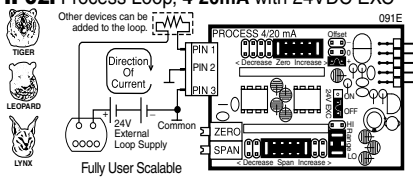
IH01: pH
IH02: pH with Automatic Temperature Compensation



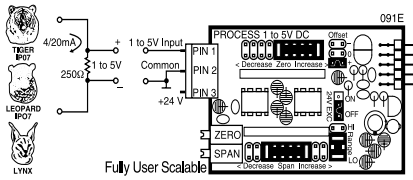
IOR1: ORP (Oxidation Reduction Potential)



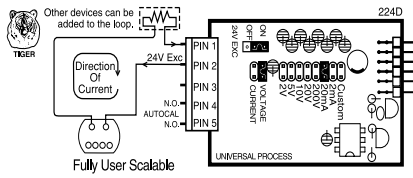
IP01: Process Loop, **4-20mA**
IP02: Process Loop, **4-20mA** with 24VDC EXC



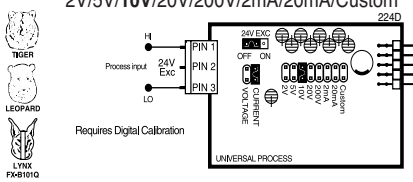
IP03: Process Input, **1-5V DC** with Offset, 24V Exc



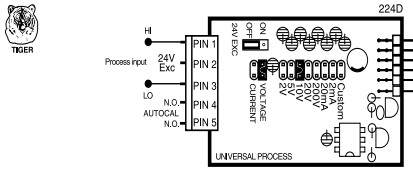
IP06: Process Loop, 4-20mA w/24VDC Exc and Autocal



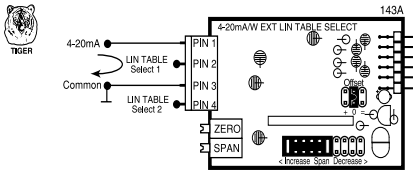
IP07: Universal Process Input
2V/5V/**10V**/20V/200V/2mA/20mA/Custom



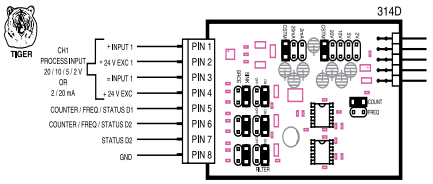
IP08: Universal Process Input with Autocal
2V/5V/**10V**/20V/200V/2mA/20mA/Custom



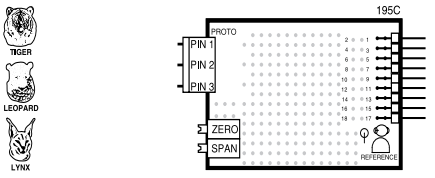
IP09: 4-20mA with External LIN Table Select



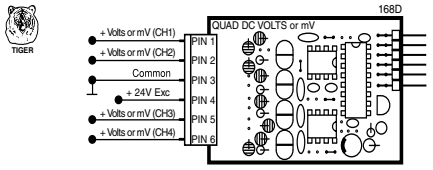
IP10: Process + 3 Digital Inputs



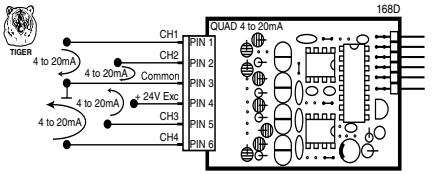
IPT1: Prototype Board for Custom Design



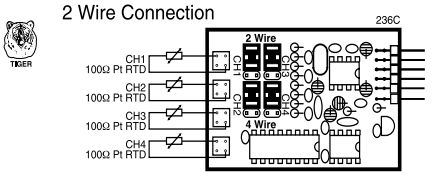
IQD1: Quad DC Volts, **2V DC**
IQD2: Quad DC mV, **50mV DC**



IQP1: Quad 4 to 20mA

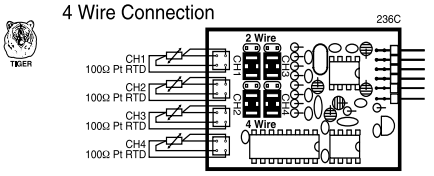


IQT2: Quad RTD Platinum 100Ω RTD 2 Wire Connection



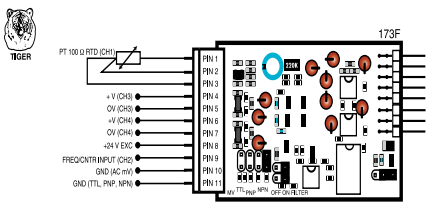
All four RTDs **must** be connected for the meter to work.

IQT4: Quad RTD Platinum 100Ω RTD 4 Wire Connection

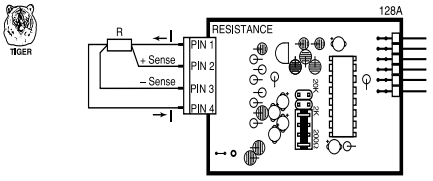


All four RTDs **must** be connected for the meter to work.

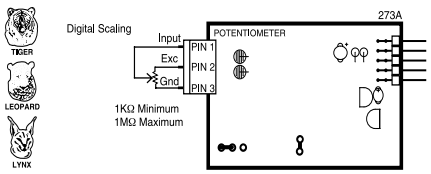
IQT5: Quad RTD / V / V / FREQ



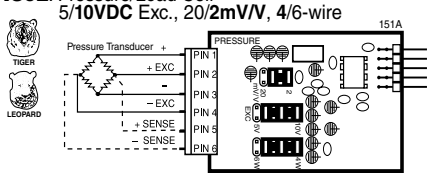
IR01: Resistance, 2/**3**/4-Wire, 200Ω/**2K**Ω/20KΩ



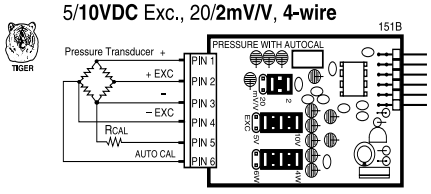
IR03: Linear Potentiometer 1KΩ min



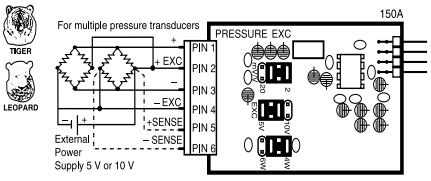
IS01: Strain Gage 5/**10VDC** Exc., 20/**2mV/V**, **4**/6-wire
IS02: Pressure/Load Cell
5/**10VDC** Exc., 20/**2mV/V**, **4**/6-wire



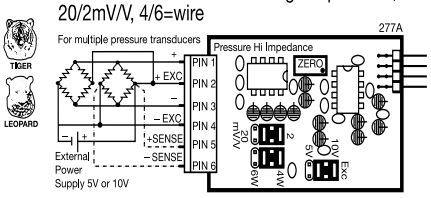
IS03: Pressure/Load Cell with AutoCal
5/**10VDC** Exc., 20/**2mV/V**, **4-wire**



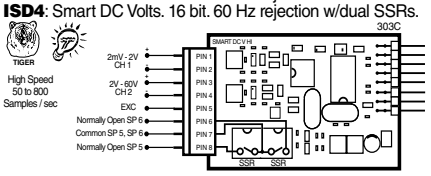
IS04: Pressure/Load Cell Ext Exc., 20/**2mV/V**, **4**/6=wire



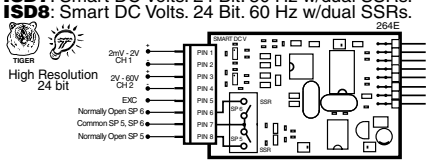
IS07: Pressure/Load Cell Ext Exc. High Impedance, 20/2mV/V, 4/6=wire



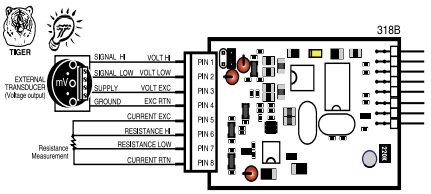
ISD1: Smart DC Volts. 16 bit. Optimized for 50 Hz rejection.
ISD2: Smart DC Volts. 16 bit. Optimized for 60 Hz rejection.
ISD3: Smart DC Volts. 16 bit. 50 Hz rejection w/dual SSRs.
ISD4: Smart DC Volts. 16 bit. 60 Hz rejection w/dual SSRs.



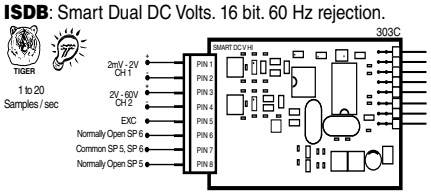
ISD5: Smart DC Volts. 24 Bit. 50 Hz rejection.
ISD6: Smart DC Volts. 24 Bit. 60 Hz rejection.
ISD7: Smart DC Volts. 24 Bit. 50 Hz w/dual SSRs.
ISD8: Smart DC Volts. 24 Bit. 60 Hz w/dual SSRs.



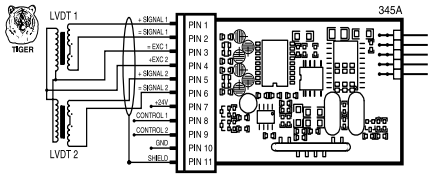
ISD9: Smart Voltage and Resistance Input



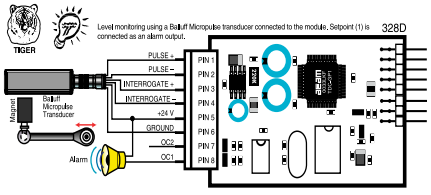
ISDA: Smart Dual DC Volts. 16 bit. 50 Hz rejection.
ISDB: Smart Dual DC Volts. 16 bit. 60 Hz rejection.



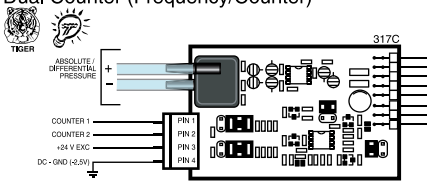
ISL1: Smart Dual LVDT. 50 Hz
ISL2: Smart Dual LVDT. 60 Hz



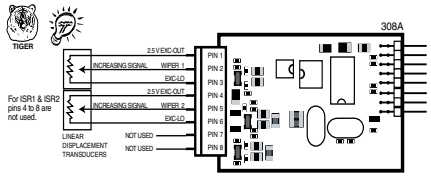
ISM1: Smart Magnetostrictive Input



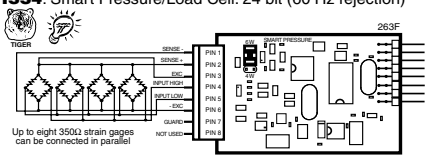
ISP1: Smart Triple Input, Pressure Direct and Dual Counter (Frequency/Counter)



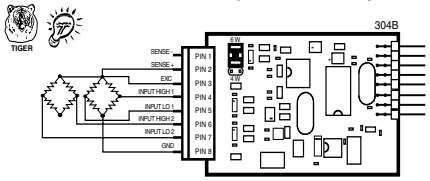
ISR1: Smart Single 3-Wire Potentiometer. 50 Hz
ISR2: Smart Single 3-Wire Potentiometer. 60 Hz
ISR3: Smart Dual 3-Wire Potentiometer. 50 Hz
ISR4: Smart Dual 3-Wire Potentiometer. 60 Hz



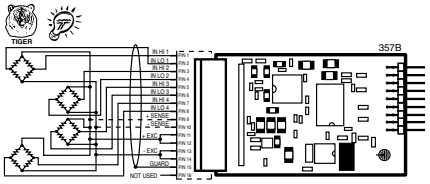
ISS1: Smart Pressure/Load Cell. 16 bit (50 Hz rejection)
ISS2: Smart Pressure/Load Cell. 16 bit (60 Hz rejection)
ISS3: Smart Pressure/Load Cell. 24 bit (50 Hz rejection)
ISS4: Smart Pressure/Load Cell. 24 bit (60 Hz rejection)



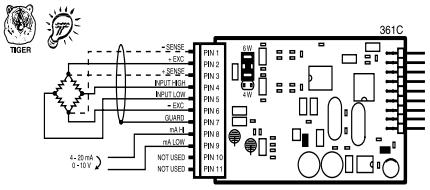
ISS5: Dual Smart Pressure. 16 bit. Optimized for 50 Hz rejection.
ISS6: Dual Smart Pressure. 16 bit. Optimized for 60 Hz rejection.



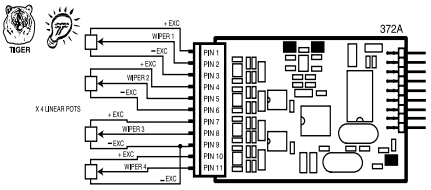
ISS7: Smart Quad Pressure/Load Cell. 16 bit. 50 Hz
ISS8: Smart Quad Pressure/Load Cell. 16 bit. 60 Hz



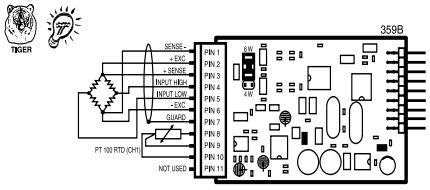
ISS9: Smart Dual Input, LC and Process (4-20mA)



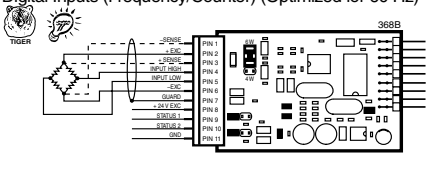
ISSA: Smart Quad Potentiometer/Resistance



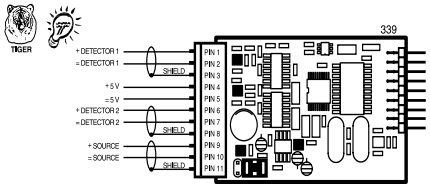
ISSB: Smart Dual Input, Load Cell and RTD



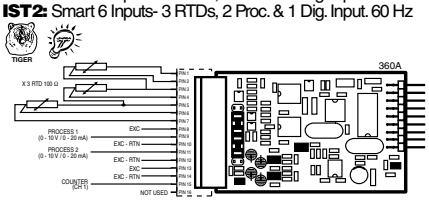
ISSC: Smart Triple Input, 16 bit, Load Cell and two Digital Inputs (Frequency/Counter) (Optimized for 50 Hz)
ISSD: Smart Triple Input, 16 bit, Load Cell and two Digital Inputs (Frequency/Counter) (Optimized for 60 Hz)



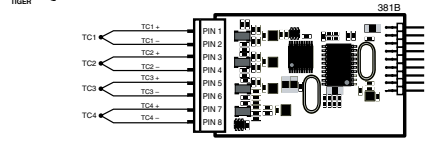
ISSE: Smart Dual Photo Diode Input



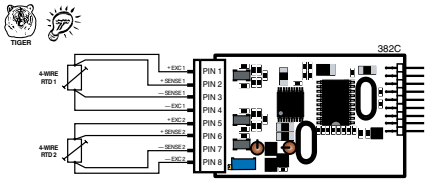
IST1: Smart 6 Inputs- 3 RTDs, 2 Proc. & 1 Dig. Input. 50 Hz
IST2: Smart 6 Inputs- 3 RTDs, 2 Proc. & 1 Dig. Input. 60 Hz



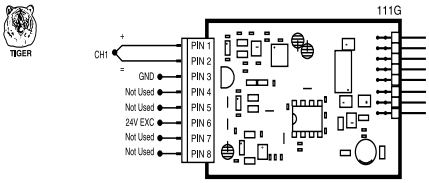
IST3: Smart Quad Thermocouple. 50 Hz
IST4: Smart Quad Thermocouple. 60 Hz



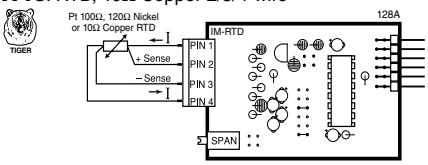
IST5: Smart Dual RTD with 0.01˚ Res. 50 Hz
IST6: Smart Dual RTD with 0.01˚ Res. 60 Hz



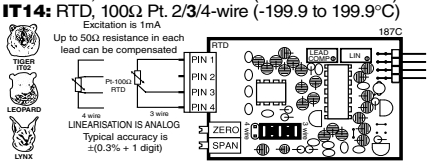
IT01: Thermocouple (J/**K**/R/S/T/B/N)



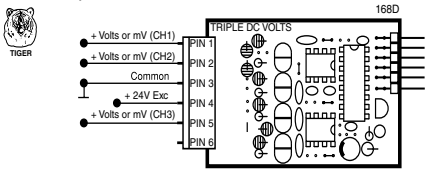
IT02: RTD, 100Ω Pt. 2.3.4-wire
IT12: RTD, 120Ω Nickel 2/**3**/4-wire
IT13: RTD, 10Ω Copper 2/**3**/4-wire



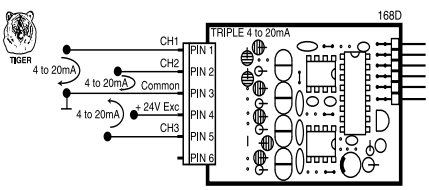
IT03: RTD, 100Ω Pt. 2/**3**/4-wire (-200 to 800°C)
IT04: RTD, 100Ω Pt. 2/**3**/4-wire (-200 to 1470°F)
IT05: RTD, 100Ω Pt. 2/**3**/4-wire (-199.9 to 199.9°F)
IT14: RTD, 100Ω Pt. 2/**3**/4-wire (-199.9 to 199.9°C)



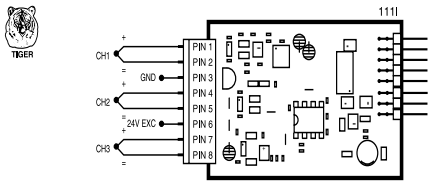
ITD1: Triple DC Volts, **2V DC**
ITD2: Triple DC mV, **50mV DC**



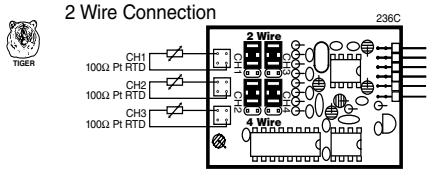
ITP1: Triple 4 to 20mA



ITT1: Triple Thermocouple (J/**K**/R/S/T/B/N)

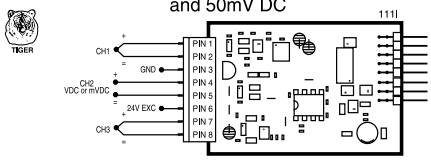


ITT2: Triple RTD Platinum 100Ω RTD
2 Wire Connection

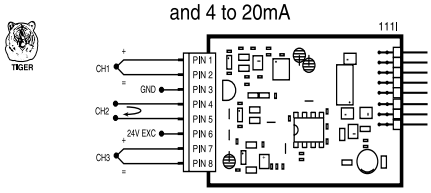


All three RTDs **must** be connected for the meter to work.

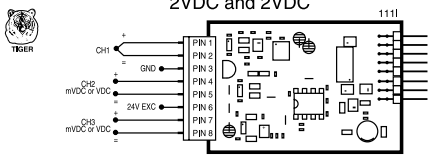
ITT3: Triple Input- T/C, T/C (J/**K**/R/S/T/B/N) and 2VDC Input
ITT5: Triple Input- T/C, T/C (J/**K**/R/S/T/B/N) and 50mV DC



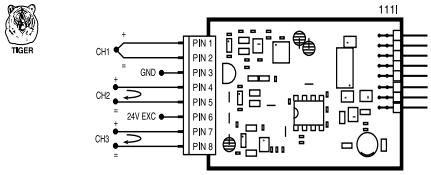
ITT4: Triple Input- T/C, T/C (J/**K**/R/S/T/B/N) and 4 to 20mA



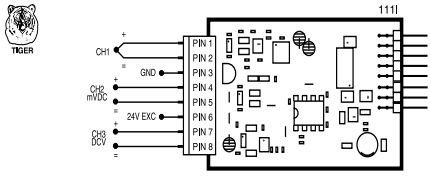
ITT6: Triple Input- T/C (J/**K**/R/S/T/B/N), 50mV DC and 50mV DC
ITT7: Triple Input- T/C (J/**K**/R/S/T/B/N), 2VDC and 2VDC



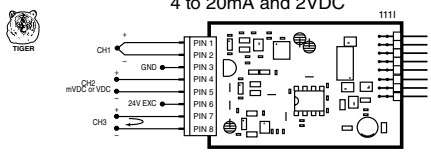
ITT8: Triple Input- T/C (J/**K**/R/S/T/B/N), 4 to 20mA and 4 to 20mA



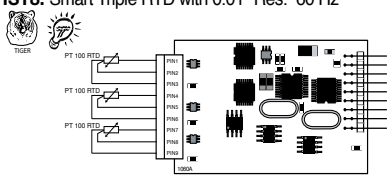
ITT9: Triple Input- T/C (J/**K**/R/S/T/B/N), DCV and 50mV DC



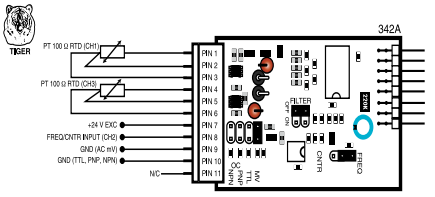
ITTA: Triple Input- T/C (J/**K**/R/S/T/B/N), 4 to 20mA and 50mV DC
ITTB: Triple Input- T/C (J/**K**/R/S/T/B/N), 4 to 20mA and 2VDC



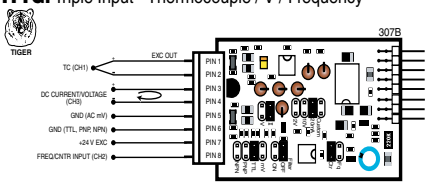
IST7: Smart Triple RTD with 0.01˚ Res. 50 Hz
IST8: Smart Triple RTD with 0.01˚ Res. 60 Hz



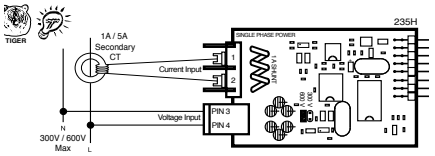
ITTE: Triple Input- RTD / RTD / FREQ



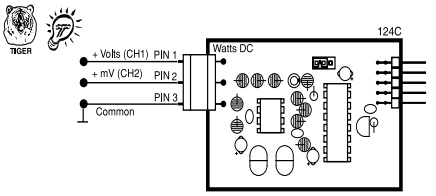
ITTF: Triple Input - Thermocouple / 4-20mA / Frequency
ITTG: Triple Input - Thermocouple / V / Frequency



IW01: Single Phase Power, **300V**/1A
IW02: Single Phase Power, **300V**/5A

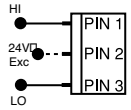


IW03: DC-Watts, **10V/50mV DC**



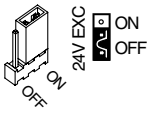
INPUT MODULE COMPONENT GLOSSARY

Modules without zero and span adjustments are scaled and calibrated using the internal software functions of each individual meter.



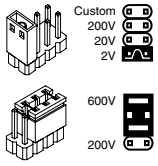
Input and Output Pins

On most modules Pin 1 is the Signal High input and Pin 3 is the Signal Low input. Typically Pin 2 is used for Excitation Voltage output.



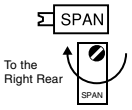
24 V DC Output for 4-20 mA Header

On some modules this header enables a 24 V DC 25 mA (max) Excitation/Auxiliary output to be connected to Pin 2 that can power most 4-20 mA transmitters.



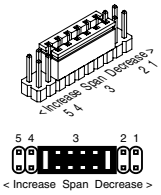
INPUT RANGE Headers

Range values are marked on the PCB. Typically two to eight positions are provided, which are selected with either a single or multiple jumper clip. When provided, a custom range position is only functional when the option has been factory installed.



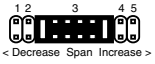
SPAN Potentiometer (Pot)

If provided, the 15 turn SPAN pot is always on the right side (as viewed from the rear of the meter). Typical adjustment is 20% of the input signal range.

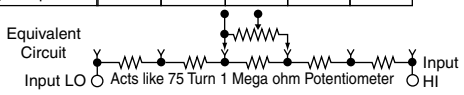


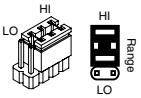
SPAN ADJUST Header

This unique five-position header expands the adjustment range of the SPAN pot into five equal 20% steps, across 100% of the input Signal Span. Any input Signal Span can then be precisely scaled down to provide any required Display span from full scale to the smallest viewable unit.



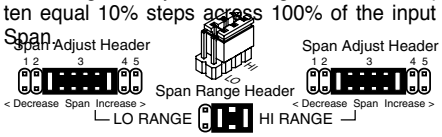
SPAN Adjust Header position	1	2	3	4	5
SPAN Pot %	20%	20%	20%	20%	20%
Signal Span %	20%	40%	60%	80%	100%



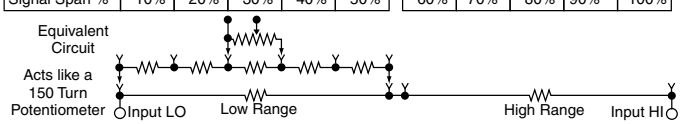


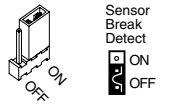
SPAN RANGE Header

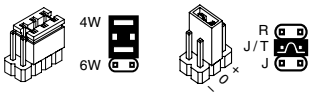
When this header is provided it works in conjunction with the SPAN ADJUST Header by splitting its adjustment range into a Hi and a Lo range. This has the effect of dividing the adjustment range of the SPAN pot into ten equal 10% steps across 100% of the input Signal Span.



SPAN Adjust Header position	1	2	3	4	5	1	2	3	4	5
SPAN Pot %	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%
Signal Span %	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%

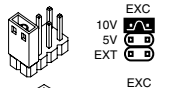


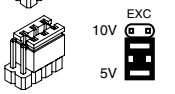




Function Select Headers

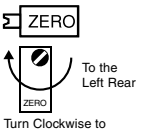
On some modules various functions such as Amps and Volts, 4 wire and 6 wire, or cold junction compensation are selected by header positions that are marked on the PCB.





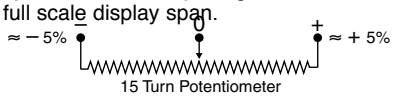
Excitation Output Select Headers

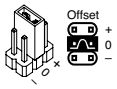
When excitation outputs are provided, they are typically 5 V DC max 30 mA, 10 V DC max 30 mA (300Ω or higher resistance) or external supply. They are selected by either a single or multiple jumper clip.



ZERO Potentiometer (Pot)

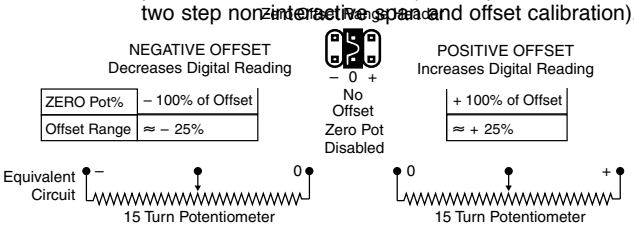
If provided, the ZERO pot is always to the left of the SPAN pot (as viewed from the rear of the meter). Typically it enables the input signal to be offset ±5% of the full scale display span.





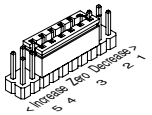
ZERO OFFSET RANGE Header

When provided, this three position header increases the ZERO pot's capability to offset the input signal, by ±25% of the full scale display span. For example a Negative offset enables a 1 to 5 V input to display 0 to full scale. The user can select negative offset, positive offset, or no offset (ZERO pot disabled for two step non-interactive span and offset calibration).



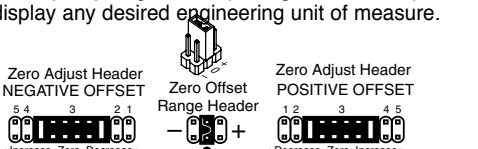
ZERO Pot%	− 100% of Offset
Offset Range	≈ − 25%

+ 100% of Offset
≈ + 25%



ZERO ADJUST Header

When this header is provided, it works in conjunction with the ZERO OFFSET RANGE Header, and expands the ZERO pot's offset capability into five equal negative steps or five equal positive steps. This enables virtually any degree of input signal offset required to display any desired engineering unit of measure.



ZERO Adjust Header Position	5	4	3	2	1	1	2	3	4	5
ZERO Pot Span	6400	6400	6400	6400	6400	6400	6400	6400	6400	6400
Offset Range	-25200 to -31600	-18900 to -25300	-12600 to -19000	-6300 to -12700	0 to -6400	0 to +6400	+6300 to +12700	+12600 to +19000	+18900 to +25300	+25200 to +31600

CALIBRATE position, Zero Pot disengaged (no offset applied)

Installation

1. Install and wire meter per local applicable codes/regulations, the particular application, and good installation practices.

2. Install meter in a location that does not exceed the maximum operating temperature and that provides good air circulation.

3. Separate input/output leads from power lines to protect the meter from external noise. Input/output leads should be routed as far away as possible from contactors, control relays, transformers and other noisy components. Shielding cables for input/output leads is recommended with shield connection to earth ground near the meter preferred.

4. A circuit breaker or disconnect switch is required to disconnect power to the meter. The breaker/switch should be in close proximity to the meter and marked as the disconnecting device for the meter or meter circuit. The circuit breaker or wall switch must be rated for the applied voltage (e.g., 120VAC or 240VAC) and current appropriate for the electrical application (e.g., 15A or 20A).

5. See *Case Dimensions section* for panel cutout information.

6. See *Connector Pinouts section* for wiring.

7. Use 28-12 AWG wiring, minimum 90˚C (HH) temperature rating. Strip wire approximately 0.3 in. (7-8 mm).

8. Recommended torque on all terminal plug screws is 4.5 lb-in (0.51 N-m).

9. Do not exceed Form C 7A or Form A 4A for the CI Model.

Display

Digital Display: 14-segment, 0.43" (10.9 mm) LEDs.

Display Color: Red (std). Green or Super-Bright Red (optional).

Digital Display Range: -199999 to 999999

Bargraph Display:101 segment red, green or tricolor LED
Bar: . . . . . 7.25" length, 235° arc, ±60° viewing angle

Update Rate: 3 to 10 times per second

Display Dimming: 8 brightness levels. Front Panel selectable

Scrolling Display Text Messaging: Full alphanumeric, 14-segment text characters supported on T Version with macros.

Polarity: Assumed positive. Displays - negative

Decimal Point: Front panel, user selectable to five positions.

Annunciators: 6 red LEDs on front panel; one per setpoint.

Overrange Indication: OVER

Underrange Indication: UNDER

Front Panel Controls: PROGRAM, UP and DOWN.

Operating System (Tiger 320)

Processor: 32 bit with floating point maths (18.4 MHz).

Flash Memory: 64k, 4k for use by custom macros.

RAM: 1.25k and FeRAM 4k.

EEPROM: E Version 4k standard, T Version 32k standard. Memory upgrades available to 32k for LIN Tables and 1MB for Data Logging and custom macros.

Registers: 6144 registers comprised of 8, 16 or 32 bit signed, unsigned or floating point registers, implemented in a combination of RAM, FeRAM, Flash and EEPROM.

Internal communication BUS: 32 bit I^2C BUS

Real Time Clock (option): Year: Month: Date: Hour: Minute: Second with 15 yr Lithium battery backup.

Configuration: Supports Front Panel Programming Codes and a PC-based Configuration Utility Program, which may be downloaded free from our website. T Version also supports custom macros.

Development System for Custom Macros

The Tiger 320 Macro Development System, which may be downloaded free from our website, can be used to create powerful macro software that allows Tiger 320 T Versions to be easily customized to suit any proprietary OEM application.

Installed Application Software Includes

Counter Functions: Two built-in counters. UP counters, DOWN counters, UP/DOWN counters and high speed quadrature counters.

Data Logging: Logging with a date/time stamp, initiated at timed intervals, by activation of a setpoint, or manually. Data stored in internal 1MB EEPROM or in a removable 4 to 128M Flash Card Memory Module. Endless loop recording is supported.

Input Compensation: Provides compensation to the primary input channel (CH1) via channels 2, 3 or 4.

Linearization: 4 selectable 32 point or one 125 point flexible linearization tables are provided.

Logic I/O: 28 Macro programmable I/O ports supported.

Manual Loader: Front panel adjustable, 4 to 20mA or 0 to 10V isolated analog output.

Math Functions: Cross channel math functions to calculate the sum, difference, ratio or the product of two inputs.

On Demand Functions: Tare, compensation and calibration.

Peak and Valley: The meter can retain peak and valley (min/max) information and recall this on the front panel.

Remote Setpoint Input: Remote setpoint input via channel 2.

Serial Output Protocols: Selectable communication modes include ASCII, Modbus (RTU), Master Mode (for meter to meter communication) and an Epson compatible printer driver. An Ethernet optional output carrier board is also supported.

Setpoint Functions: Six super smart setpoints with fully configurable hysteresis, on and off delays, one shot, pulse and repeat timers, latching, dual PID, setpoint tracking, resetting of registers, initiating of logging and printing.

Signal Conditioning Functions: Averaging, smart filter, rounding, square root,auto zero maintenance.

Timer: Timer functions supported in either time-up, time-down, or real-time clock modes.

Totalizer: Two totalizers for running total and batch totals of a process signal that can be accumulated over time.

Inputs

Inputs Available: More than 140 single, dual, triple and quad input signal conditioners available covering all types of analog, digital and mixed input signals.

Accuracy: Tiger 320 PMCs enable the user to establish any degree of system accuracy required. Built-in compensation and linearization functions enable system accuracies of the order of ±0.0001% of reading for analog inputs. Stop -Start time resolution from ±1sec to ±0.7nsec. Digital input and pulse counts ±1 count.

Input Accuracy: . . . Varies by function & module
DCV (24 bit) . . . . . ±(0.01% of reading + 2 counts)
DCV, DCA . . . . . ±(0.03% of reading + 2 counts)
ACV, ACA . . . . . ±(0.07% of reading + 5 counts)
Temperature . . . . . ±(0.05% of reading + 3 counts)
Direct Pressure . . . ±(1.0% of range + 3 counts)

Frequency/RPM . . ±(0.01% of reading + 2 counts)
Strain/Load (24 bit) ±(0.02% of reading + 3 counts)
Process . . . . . ±(0.03% of reading + 2 counts)
Resistance/Pots . . ±(0.05% of reading + 2 counts)
Input Characteristics:
DCmV, DCV . . . . . >500kΩ input resistance
ACmV, ACV. . . . . ≥1MΩ input resistance
DCmA, ACmA. . . . 2V burden at full scale
DCA, ACA . . . . . <130mV burden at full scale
Line frequency . . . 4MΩ input resistance

A/D Convertors: A Dual Slope, bipolar 17 bit A/D is provided as standard on the main board. SMART modules can have 24 bit or 16 bit Delta-Sigma A/D convertors that utilize the internal I^2C BUS.

Temperature Coefficient: Typically 30ppm/˚C. Compensation can be utilized to achieve system temperature coefficients of 1ppm.

Warm Up Time: Up to 10 minutes, depending on input module.

Conversion Rate: Typically 10 samples per second. However, SMART input modules are available that can convert at 60, 240, 480 or 960 samples per second.

Control Output Rate: Can be selected for 100msec or 10msec. Some SMART modules have SSR outputs that react within 1.2msec.

Excitation Voltage: Depends on input module selected. Typically, 5V, 10V or 24VDC is provided.

Outputs

Two Optional Plug-in Carrier Boards: Provide three different serial outputs or no serial output, support single or dual analog outputs, and accept any one of seven different plug-in I/O modules.

1. **Standard Carrier Board:** Is available without a serial output, or with either an isolated RS-232 or an isolated RS-485 (RJ-6 socket).
2. **Ethernet Carrier Board:** 10/100Base-T Ethernet (RJ-45 socket).

Two Isolated Analog Output Options: Mounted on any carrier board.

1. **Single Analog Output:** Fully scalable from 4 to 20mA or 0 to 20mA (or reverse) and selectable for 0 to 10VDC (or reverse).
2. **Dual Analog Output:** Fully scalable from 0 to 10VDC (or reverse).

Analog Output Specifications: Accuracy: 0.02% FS. Resolution: 16-bit Delta-Sigma D/A provides 0.4μA on current scaling, 250μV on voltage scaling. Compliance: 500Ω maximum for current output. 500Ω minimum for voltage output. Update Rate: Typical 7 per second. Step Response: Typical 6msec to a display change. Scalable: From 1 count to full scale.

Seven I/O Modules: Plug into any carrier board from rear.

1. **Four Relay Module:** Available in six combinations from one relay up to a total of two 7A Form C Relays* and two 4A Form A Relays**.
2. **Four Relay Module:** Available with one to four 4A Form A Relays**.

   ***Form C Relay Specifications:** 7A 240VAC~1/2 HP, 7A 24VDC. Isolation 3000V. UL and CSA listed.

   ****Form A Relay Specifications:** 4A 240VAC, 4A 24VDC. Isolation 3000V. UL and CSA listed.
3. **Four Solid State Relay (SSR) Module:** Available with one to four independent (210mA DC only) SSRs (300V max).
4. **Six Output 5VDC / TTL or Open Collector:** Available with 0 to 5VDC (50 mA) or 0 to V+ (50VDC, 100 mA).
5. **Opto Isolated I/O Module:** Available in either 6 Outputs & 6 Inputs, or 16 Outputs and 6 Inputs. For connection to an external breakout box.
6. **Flash Card Memory Module:** Available with 8 or 16 MB memory.

Power Supplies

Auto sensing AC/DC (DC to 400Hz) hi volts std, low volts optional.

PS1 (standard):85-265VAC / 95-300VDC @ 2W nominal

PS2 (optional):15-48VAC / 15-72 VDC @ 2W nominal

Environmental (See Rear page for IP-65 & NEMA-4 options)

Operating Temperature: 0 to 50 ˚C (32 ˚F to 122 ˚F).

Storage Temperature: -20 ˚C to 70 ˚C (-4 ˚F to 158 ˚F).

Relative Humidity:95% (non-condensing) at 40 ˚C (104 ˚F).

Mechanical (See Rear page for more details)

Case Dimensions: 110x110mm (4.33" x 4.33") Bezel:4.0"

Case Material: 94V-0 UL rated self-extinguishing polycarbonate.

Weight: 11.5 oz (0.79 lbs), 14 oz (0.96 lbs) when packed.

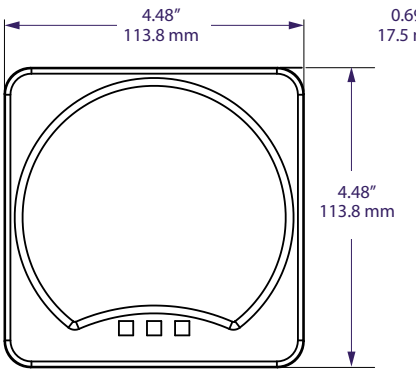
Certifications and Listings

CE: As per EN-61000-3/4/6 and EN-61010-1.

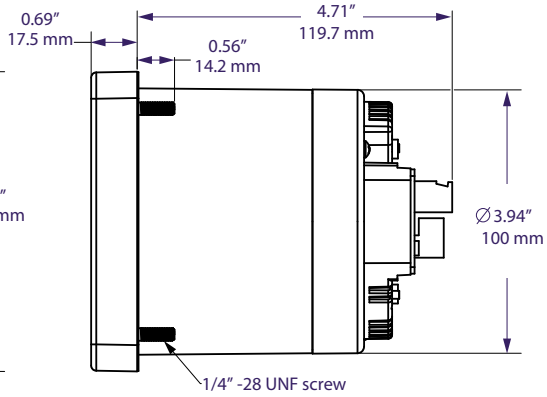
UL: E469078

Case Dimensions

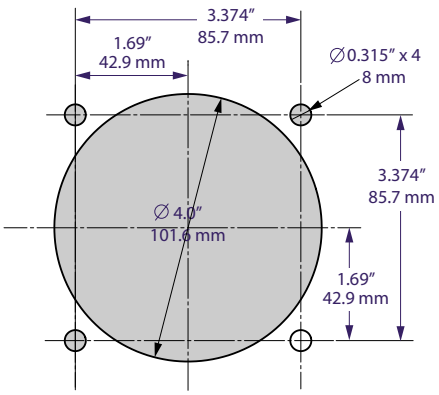
Front View



Side View



Panel Cut Out



WARRANTY

Texmate warrants that its proDXcts 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 proDXcts 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 proDXct which has been either repaired or replaced by Texmate.

USER'S RESPONSIBILITY

We are pleased to offer suggestions on the use of our various proDXcts either by way of printed matter or through direct contact with our sales/application engineering staff. However, since we have no control over the use of our proDXcts once they are shipped, NO WARRANTY WHETHER OF MERCHANTABILITY, FITNESS FOR PURPOSE, OR OTHERWISE is made beyond the repair, replacement, or refund of purchase price at the sole discretion of Texmate. Users shall determine the suitability of the proDXct for the intended application before using, and the users assume all risk and liability whatsoever in connection therewith, regardless of any of our suggestions or statements as to application or construction. In no event shall Texmate's liability, in law or otherwise, be in excess of the purchase price of the proDXct.

Texmate cannot assume responsibility for any circuitry described. No circuit patent or software licenses are implied. Texmate reserves the right to change circuitry, operating software, specifications, and prices without notice at any time.

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For product details visit www.texmate.com

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