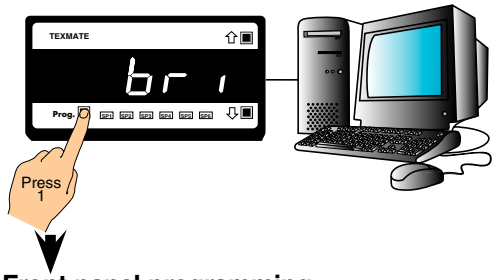
Tiger 320 Series PROGRAMMING CODE SHEET

Contents



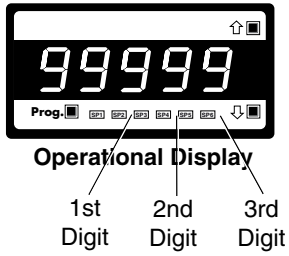
Front panel programming

This programming code sheet (PCS) is a quick reference document that allows you to quickly view the meter's programming codes.

When you become familiar with the meter and the programming code structure, the PCS can be used in place of the user manual.

Note:
All displays shown in this code sheet are for a 5-digit, 7-segment display. 6 or 8-digit and alphanumeric displays will be slightly different.

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.



The logic diagram on Page 4 shows the code structure of the Tiger 320 Series meter range. Also, the difference between the E and T version of the Tiger range is described. The diagrams on the following pages show the three-digit settings available for each code.

Programming via PC

Meter configuration utility program

With a serial output module installed, the meter can be fully configured through the **meter configuration utility program**. In addition to all application function settings, the configuration program also provides access to added features such as:

- Code blanking.
- Display text editing.
- Configuration data copying.
- Downloading macros to the meter.

Code blanking

Code blanking blanks out all function codes not required by the application. This means that specific procedures such as recalibration and setpoint reprogramming can be achieved in a few simple steps from the front panel buttons.

- To turn code blanking and macro settings OFF, carry out the **Code Blanking and Macro Check** on Page 3.

Display text editing

This function allows displayed text, such as setpoint titles, to be edited to suit your applications.

For example, a setpoint could be edited to read [TNK_Lo] for tank level low, or [brKoF] for brake off.

Configuration data copying

This function allows the current meter configuration settings to be copied and saved for later referral or for restoration.

Macros

Texmate has a growing library of macros to suit a wide range of standard customer applications. Macros can be installed in the meter, via the compiler or configuration program, and run automatically when the meter is powered up.

Tamper-proof settings

All Tiger 320 Series meters have tamper-proof lockout switches to prevent users' configuration settings from being inadvertently changed.

Code blanking is also used (via the PC) to blank out codes not used, making them operator tamper-proof, but leaving selected codes open for operator adjustment.

Note:
1. Use the P button to step through the codes of the Main or Setpoint Programming Mode.

2. To save a Main Programming Mode code setting and return directly to the operational display, press the P button and then the P buttons ↑ and at the same time.

2. To save a Setpoint Programming Mode code setting and return directly to the operational display, press the P button and then the P buttons ↑ and at the same time.

4. When configuring the three-digit code and setpoint settings, pressing the ↑ and ↓ buttons at the same time increases the display parameter in increments of 100 counts.

TEXMATE INC

Initial Setup Procedures

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 below.

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

Model and Software Code Version Check

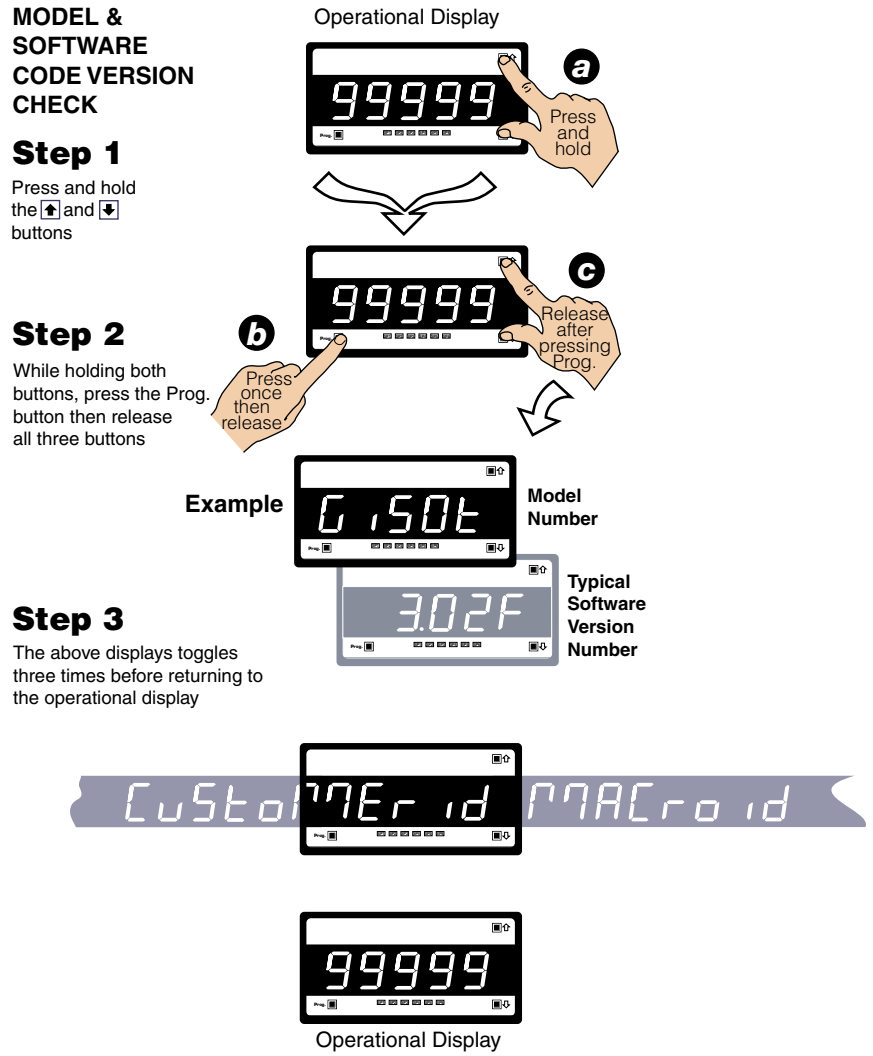
The meter model and software code version number can be checked at any time while in the operational display using the following procedure.

Programming Tip

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

START HERE

MODEL & SOFTWARE CODE VERSION CHECK



Code Blanking and Macro Check

Tiger 320 Series 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 Utility 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. Texmate has a growing library of macros to suit a wide range of standard customer applications.

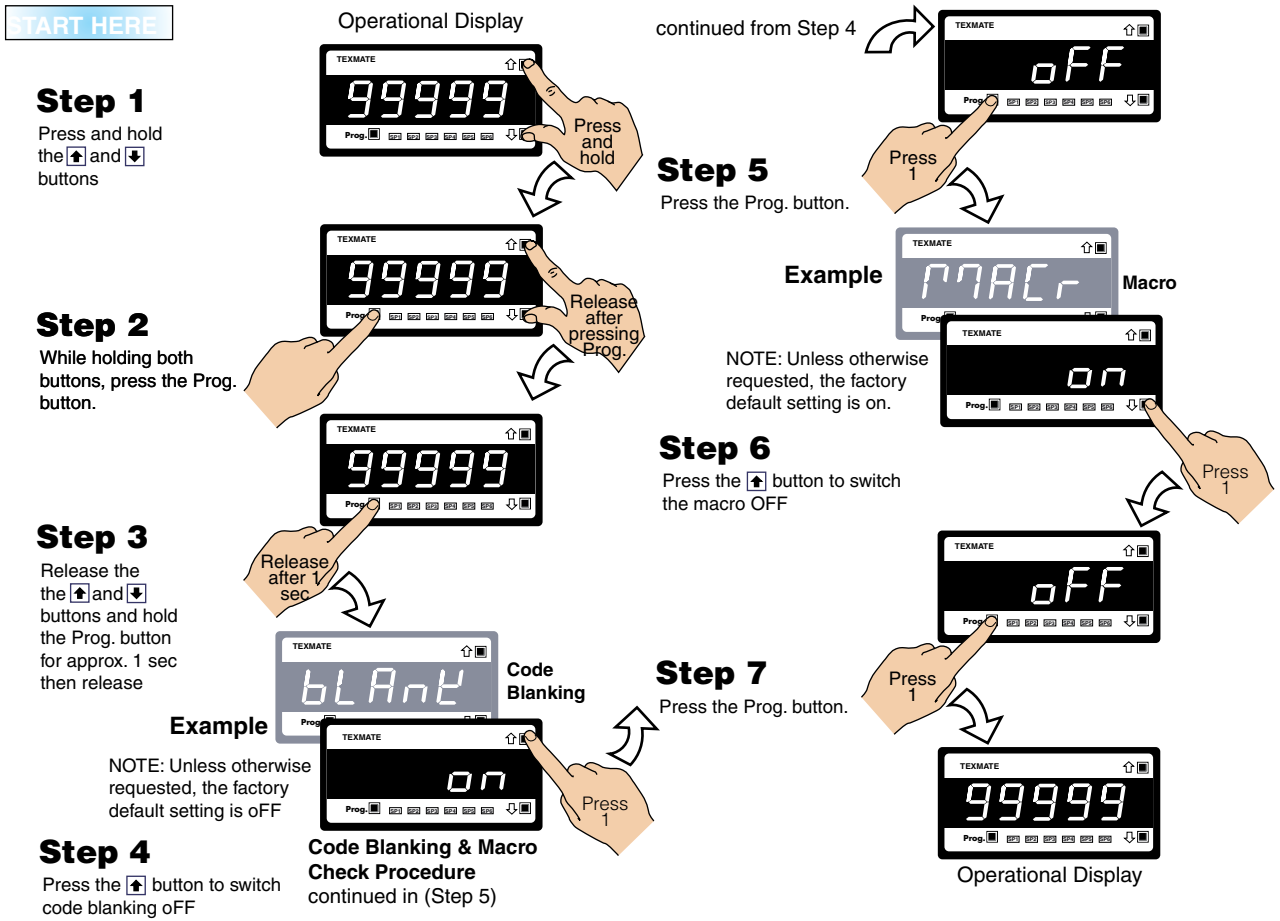
Macros can be installed in the meter at the factory during initial programming or by the customer at some later date. Macros are written and compiled using the Tiger Development System (TDS) compiler program, and loaded into the meter using either the compiler program or the configuration program.

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, Texmate program the meter in the code blanking OFF and macro ON (default) setting.

To turn the code blanking and macro settings from ON to OFF carry out the following procedure:

CODE BLANKING & MACRO CHECK PROCEDURE



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.

Tiger 320 Series Code Logic Diagram

To enter press the P and ↑ buttons at the same time

Operational Display

To enter press the P and ↓ buttons at the same time

Main Programming Mode

[bri] Display Brightness

P

Allows you to adjust the display brightness in a range of 8 settings. 0 being dull, 7 being bright.

[CAL] Calibration Modes for Input and Output

P

See Page 2 for code settings to calibrate the meter's input and output signals.

[Cod_1] Code 1 – Display Configuration

P

See Page 3 for code settings to configure the setpoint annunciators and other display functions.

[Cod_2] Code 2 – CH1 Measurement Task & Sampling Rate

P

See Page 4 for code settings to configure the CH1 measurement task and sampling rate.

[Cod_3] Code 3 – CH1 Post Processing & Serial Mode Functions

P

See Page 5 for code settings to configure CH1 post processing and serial mode functions.

[Cod_4] Code 4 – CH2 Measurement Task & 32-point Linearization

P

See Page 5 for code settings to configure the second channel (CH2) measurement task and 32-point linearization settings when using dual input signal conditioners.

[Cod_5] Code 5 – CH3 Functions

P

See Page 5 for code settings to configure the third channel (CH3) when using triple input signal conditioners.

[Cod_6] Code 6 – CH4 Functions

P

See Page 6 for code settings to configure the fourth channel (CH4) when using quad input signal conditioners.

[Cod_7] Code 7 – Result Processing

P

See Page 6 for code settings to configure the meter for processing the result of CH1 and CH2.

[Cod_8] Code 8 – Data Logging & Print Mode

P

See Page 6 for code settings to configure data logging and data printing using the meter.

[Cod_9] Code 9 – Functions for Digital Input Pins

P

See Page 6 for code settings to configure the meter for inputs from external sources through the digital input pins.

[Cod10] Code 10 – Bargraph Setup

P

See Page 7 for code settings to configure the meter's bargraph display.

P

Operational Display

Setpoint Programming Mode

Setpoint Activation Values Mode

Enter these menus to set setpoint (SP) activation values

[SP_1] Setpoint 1 Default setting = 18000

P

[SP_2] Setpoint 2 Default setting = –18000

P

[SP_3] Setpoint 3 Default setting = 5000

P

[SP_4] Setpoint 4 Default setting = –5000

P

[SP_5] Setpoint 5 Default setting = 10000

P

[SP_6] Setpoint 6 Default setting = –10000

P

Setpoint & Relay Control Settings Mode

Enter these menus to configure SP control settings

[SPC_1] Setpoint 1 →

P

[SPC_2] 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 Pages 8, 9, and 10 shows the three digit configuration settings that are applied individually to each setpoint.

Operational Display

E/T Versions of Tiger 320 Series Programmable Meter Controller

Tiger 320 Series Programmable Meter Controllers (PMCs) come in two versions: the economy E version, or the top-of-the-line T version.

The standard E version comes with 4 kilobits of EEPROM installed, whereas the standard T version comes with 32 kilobits of EEPROM Installed. Also, the T version can have a macro installed.

The standard 4-kilobit E version can be upgraded to 32 or to up to 1024 kilobits. The standard 32-kilobit T version can be upgraded to 1024 kilobits. The amount of EEPROM installed in the controller determines the range of functions it is capable of performing. The following table lists the functions that require specific amounts of memory.

Version	Memory (kilobits)	Functions	Remarks
E	4 (standard)	1 linearization table	Table 1 is available to be applied to channels 1 to 4 and result.
	32	4 linearization tables	Tables 1 to 4 are available to be applied to channels 1 and 2 and result. Table 3 can be applied to channel 3. Table 4 can be applied to channel 4. All four tables can be cascaded to form a single 125-point linearization table available to be applied to channels 1 and 2 and result.
	up to 1024	Data logging	With up to 1024 kilobits installed, the controller can perform data logging functions along with complete linearization functionality. With a real-time clock installed, date and time stamps can be included.
T	32 (standard)	4 linearization tables	As for E version with 32 kilobits installed.
		Macro programming	A macro can be programmed to suit a user's logic control application.
	up to 1024	Data logging	As for E version with up to 1024 kilobits installed, but with macro programming functionality available.

CALIBRATION MODE

This is the default 3rd digit box. If not pointing to another 3rd digit box, all 2nd digit settings should be regarded as pointing to here.

CALIBRATION MODES FOR INPUT AND OUTPUT

FIRST DIGIT	SECOND DIGIT
0 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 Two-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.*
1 Calibration Procedures	**0 Manual Calibration** (requires NO input source) 1 Two-point Calibration (requires dual input source) 2 Calibrate Thermocouple (requires K type thermocouple input source) 3 Calibrate RTD (requires RTD 385 input source) 4 - 5 Calibrate Analog Output mA/V (requires multimeter connected to pins 16 and 17) 6 - 7 -
2 Related Calibration Functions	**0 Serial Communications Properties** 1 Set Auto Zero Maintenance for 3rd digit 2 Set Averaging Samples & Averaging Window for 3rd digit 3 Totalizer Settings Mode 4 Setup 32-point Linearization Tables 5 Scale Analog Output LOW/HIGH Display Readings 6 - 7 -
3 -	

0 Functions Activated by Pressing the PROGRAM Button

- 1 On Demand TARE from the PROGRAM button → P Press the PROGRAM button for 4 secs to tare the selected channel
- 2 On Demand Single-point Calibration from the PROGRAM button (requires single input source) → P 4 secs SPAn 2500 Use buttons to set SPAN. For detailed calibration procedures, see *Calibration Procedures Supplement*
- 3 On Demand Two-point Calibration from the PROGRAM button (requires dual input source) → P 4 secs ZEro 0 Use buttons to set ZERO P SPAn 2500 Use buttons to set SPAN
- 4 On Demand Primary Input Compensation Mode from the PROGRAM button → P 4 secs Ch2 0 Use tion buttons to ADJUST primary input compensation value from –19999 to 99999
- 5 On Demand Manual Loader Mode (no increase / decrease with HOLD active) → P 4 secs Ch1 0 Use buttons to ADJUST analog output 1 or 2 value from –19999 to 99999 via the manual loader output

1 Calibration Procedures

- **0 Manual Calibration** (requires NO input source) → OFF_1 0 Use buttons to set OFFSET P SCA_1 00000 Use buttons to set SCALE
- 1 Two-point Calibration (requires dual input source) → ZEro 0 Use buttons to set ZERO P SPAn 2500 Use buttons to set SPAn
- 2 Calibrate Thermocouple (requires K type thermocouple input source) → inPut 0.0U P ZEro 32F P SPAn 2500F
- 3 Calibrate RTD (requires RTD 385 input source) → inPut 32.0F For detailed calibration procedures, see *Calibration Procedures Supplement*
- 4 -
- 5 Calibrate Analog Output mA/V (requires multimeter connected to pins 16 and 17) → CAL_L 16384 Use to set CAL_L P CAL_h 30000 Use buttons to set CAL_h
- 6 -
- 7 -

2 Related Calibration Functions

- **0 Serial Communications Properties** → If Code 3 set to Master Mode [XX2] ONLY: P bitS 8 Use buttons to set to 7 or 8 bits. bAud 9600 Use buttons to set baud rate P PrtY oFF Use buttons to set parity P t_dLY 2 Use buttons to set time delay in milliseconds P Addr 1 Use buttons to set address from 1 to 255. Except ASCII Mode which uses message terminators: $ = minimum 50 ms delay, * = minimum 2 ms delay
- 1 Set Auto Zero Maintenance for 3rd digit → Auto zero capture band: AZ_C oFF Use buttons to set AZ_C from 1 to 254 counts. Auto zero motion: AZ_M 0 Use buttons to set AZ_M from 0 to 255 counts. Rate-of-change in counts/second: rMAn. Auto zero aperture window: AZ_A 0 Use buttons to set AZ_A from 0 to 65535 counts
- 2 Set Averaging Samples & Averaging Window for 3rd digit → AU_S oFF Use buttons to set averaging samples from 0 to 255 counts P AU_Wd oFF Use buttons to set averaging window from 0 to 65535 counts
- 3 Totalizer Settings Mode → inPut 10000 Use buttons to set input rate. Default setting 10,000 counts. P AFtEr 1 hr Use buttons to set time period P tot= 1 Use buttons to set total from 1-65535
- 4 Setup 32-point Linearization Tables → ModE rMAn Select the method of configuring the user defined linearization table: **manual** or **auto** setup mode. Then set the table number, date, and serial number before setting the linearization points. Or select [init] to re-initialize the default table settings. *Note: The input channel setting in the 3rd digit is **not** relevant to the **manual setup mode**.* *Note: The correct input signal channel must be selected in the 3rd digit when configuring a linearization table using the **auto setup mode**.*
- 5 Scale Analog Output LOW/HIGH Display Readings → ZEro 0 Use buttons to set LOW display reading [CAL_L] P F_SCL 99999 Use buttons to set HIGH display reading [CAL_h]
- 6 -
- 7 -

Use buttons to set CutoF from –19999 to 32767: CutoF 0 P r_oUr oFF Use buttons to set rollover to ON or OFF

OBJECT FOR 2nd DIGIT

THIRD DIGIT

0	**Result**
1	Channel 1
2	Channel 2
3	Channel 3
4	Channel 4

THIRD DIGIT

0	**-**
1	CH1
2	CH2
3	CH3

THIRD DIGIT

0	**-**
1	CH1
2	CH2
3	CH3
4	CH4

THIRD DIGIT

0	**-**
1	Analog Output 1
2	Analog Output 2

THIRD DIGIT

0	**-**
1	Total 1
2	Total 2

THIRD DIGIT

0	**-**
1	CH1
2	CH2
3	CH3
4	CH4

THIRD DIGIT

0	**-**
1	Analog Output 1
2	Analog Output 2

Converting °F to °C

1) Calibrate the meter to suit the temperature sensor input. Use K type thermocouple input for thermocouples. Use RTD 385 for RTDs.
2) To convert °F to °C enter the calibration mode and set [CAL] to [10X].
3) On a 5-digit meter set the scale factor to [0.5555] and the offset to [–178] counts.
4) On a 6-digit meter set the scale factor to [0.55555] and the offset to [–178] counts.

Ignore the decimal point on OFFSET settings

CODE 1

FIRST DIGIT

FRONT PANEL ANNUNCIATORS

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

SECOND DIGIT

CODE 1 – DISPLAY CONFIGURATION

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 controlled output 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*

THIRD DIGIT

SELECT DATA SOURCE FOR

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

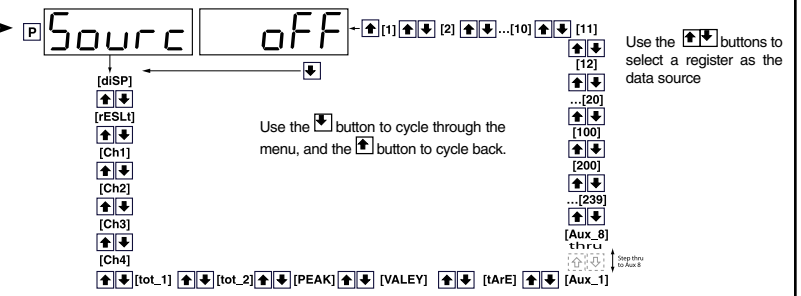
SELECT DISPLAY FORMAT FOR

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

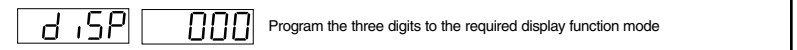
SELECT TEXT CHARACTER FOR

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

Select Data Source



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

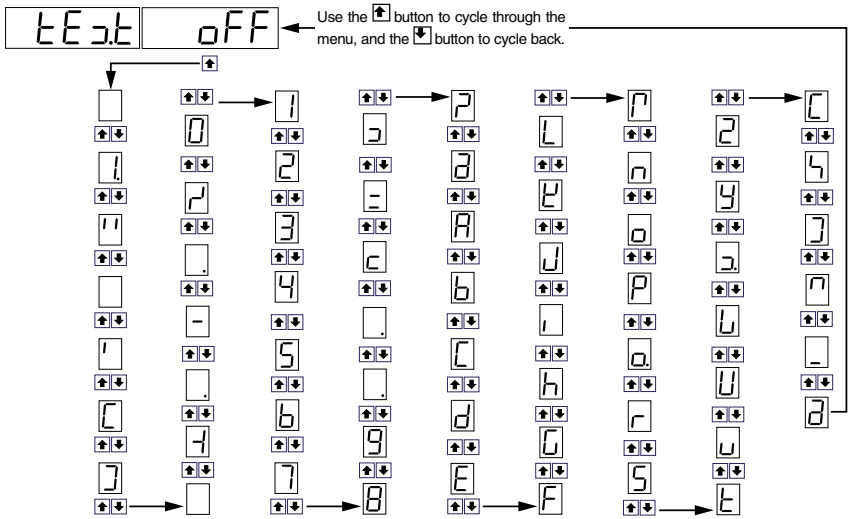
0 Decimal
1 24-hour clock mode
Hours: Minutes:Seconds (6-digit version only)
2 12-hour clock mode (12:30 am is displayed as 12:30A. 12:30 pm is displayed as 12:30P)
3 24-hour clock mode
Days: Hours:Minutes (6-digit version only)
4 -
5 -
6 -
7 Octal

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 (6 or 8-digit version only)
2 X.XXXXX (6 or 8-digit version only)
3 X.XXXX
4 X.XXX
5 X.XX
6 X.X
7 Decimal Point set from the rear (X.XXXXX to XXXXXX). *See Note 3.*
Also See Note 4

Select Last Digit Text Character



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).

Note 2:
These options are only for use with meters that have more than one display. With bargraph meters the PRIMARY display is the digital display, and the SECONDARY display is the bargraph display.

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.

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.

Note 7:
For future development.

CODE 2

CODE 2 – CHANNEL 1 MEASUREMENT TASK AND SAMPLING RATE

FIRST DIGIT – ANALOG SAMPLE AND OUTPUT RATE

0 Sample Rate:
Typically 10 samples/second (60 Hz)
Control Output Rate:
0.1 seconds
See Example

1 **Sample Rate**:
Typically 10 samples/second (50 Hz).
Control Output Rate:
0.1 seconds
See Example

2 **Sample Rate**:
Typically 10 samples/second (60 Hz)
Control Output Rate:
Counter or 10 millisecs Control Output Rate
See Example

3 **Sample Rate**:
Typically 10 samples/second (50 Hz)
Control Output Rate:
Counter or 10 millisecs Control Output Rate
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/Resistance 3-wire (3rd digit selects type of RTD)
3 RTD/Resistance 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 For sensor tables other than those listed above contact Texmate

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

0 Resistance
1 Pt 385 100 Ω RTD
2 Pt 392 100 Ω RTD
3 Zn 120 Ω RTD
4 Cu 10 Ω RTD

FREQUENCY RANGE SELECTION

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 Hz 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 SELECTION

0 99.999 s
1 9.9999 s
2 999.99 ms
3 99.999 ms

COUNTER/RESIDENT TIMER/CLOCK SELECTION

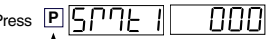
0 Counter input with 16-bit Pre-scaler
1 Setting of 16-bit Pre-scaler
2 Debounced Counter with Pre-scaler
3 Up/Down Counter with Pre-scaler
4 0.1 sec Timer with Pre-scaler
5 –
6 External 24-hour clock
7 Internal 24-hour clock

Use ↑ ↓ buttons to set prescale values

X61 Selects Prescaler

1 =	0.1 second
10 =	1 second
600 =	1 minute
3600 =	1 Hour***

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

Press P 

Use the ↑ ↓ buttons to set the required smart input module code (0 to 377). See I-Series Input Module Supplement for code details.

Note 7:
Only available with selected input modules.

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 1** Code Setup. *See Note 7.*

CODES 3 to 5

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

FIRST DIGIT

CHANNEL 1 POST PROCESSING

- **0 Direct Display of Input (no processing)**
- 1 Square Root of Channel 1
- 2 Inverse of Channel 1
- 3 –

Note 5:
If only 4 kilobits of memory is installed, only Table 1 is available for:

- *CH1 in Code 3, 2nd digit.*
- *CH2 in Code 4, 3rd digit.*
- *CH3 in Code 5, 1st digit.*
- *CH4 in Code 6, 1st digit.*
- *RESULT in Code 7, 2nd digit.*

SECOND DIGIT

32-POINT LINEARIZATION FOR CHANNEL 1

- **0 No Linearization on CH1**
- 1 32-point Linearization on CH1 using Table 1
- 2 32-point Linearization on CH1 using Table 2. *See Note 5*
- 3 32-point Linearization on CH1 using Table 3. *See Note 5*
- 4 32-point Linearization on CH1 using Table 4. *See Note 5*
- 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].

THIRD DIGIT

SERIAL MODE

- **0 ASCII Mode**
- 1 Modbus Mode
- 2 Master mode (used to customize print mode protocols via macro)
- 3 Print Mode
- 4 Ethernet Mode. *See Note 6*
- 5 Devicenet Mode (requires Devicenet hardware module). *See Note 6*

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

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 kilobits Meters**
  NO Linearization
  32 kilobits Meters
  32-point Linearization of CH3 using Table 3

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

CODE 5 – CHANNEL 3 FUNCTIONS

SECOND DIGIT

MEASUREMENT TASK

- **0 Ch 3 Disabled**
- 1 Voltage, current
- 2 TC (3rd digit selects type of TC)
- 3 RTD/Resistance (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 For sensor tables other than those listed above contact Texmate

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

- **0 Resistance**
- 1 Pt 385 100 Ω RTD
- 2 Pt 392 100 Ω RTD
- 3 Zn 120 Ω RTD
- 4 Cu 10 Ω RTD

FOR REAL-TIME CLOCK & TIMER

- **0 HRS:MIN:SEC**
- 1 HRS:MIN
- 2 -
- 3 -
- 4 1 Second Count UP Timer
- 5 1 Second 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

Note:
The function of the output register selected varies according to the input module installed.

Press P SMRt2 000

Use the ⇧⇩ buttons to set the required smart input module code (0 to 377). See I-Series Input Module Supplement for code details.

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

MEASUREMENT TASK

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

FOR THERMOCOUPLE

- **0 Type J**
- 1 Type K
- 2 Type R
- 3 Type S
- 4 Type T
- 5 Type B
- 6 Type N
- 7 For sensor tables other than those listed above contact Texmate

FOR RTD TYPE (3-WIRE)

- **0 Resistance**
- 1 Pt 385 100 Ω RTD
- 2 Pt 392 100 Ω RTD
- 3 Zn 120 Ω RTD
- 4 Cu 10 Ω RTD

DIGITAL INPUT

- **0 Frequency - 99.999 Hz range from 0.001 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

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:*
Selecting 040 to 070 in the 2nd digit of Code 4 selects one of the following settings in the installed smart input module's output register map:

2nd Digit	Input module's output register map
4 selects	0
5 selects	1
6 selects	2
7 selects	3

Note:
The register map is different for each smart input module. See installed input module data sheet for specific smart register 1 function map.

PrE_S 1

Use ⇧⇩ buttons to set prescale values

X61 Selects Prescaler

1 =	0.1 second
10 =	1 second
600 =	1 minute
3600 =	1 Hour***

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

CODES 6 to 9

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 kilobits Meters** NO Linearization **32 kilobits 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/Resistance (3rd digit selects type of RTD).
4 Real Time Clock and 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 For sensor tables other than those listed above contact Texmate

FOR RTD TYPE (2-, 3-, 4- WIRE)
0 Resistance
1 Pt 385 100 Ω RTD
2 Pt 392 100 Ω RTD
3 Zn 120 Ω RTD
4 Cu 10 Ω RTD

FOR REAL-TIME CLOCK & TIMER
0 HRS:MIN:SEC
1 HRS:MIN
2 -
3 -
4 1 Second Count UP Timer
5 1 Second 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, display shows SMt3 000

Note: The function of the output register selected varies according to the input module installed.

Use the ↑↓ buttons to set the required smart input module code (0 to 377). See I-Series Input Module Supplement for code details.

Note 5: If only 4 kilobits of memory is installed, only Table 1 is available for:

- *CH1 in Code 3, 2nd digit.*
- *CH2 in Code 4, 3rd digit.*
- *CH3 in Code 5, 1st digit.*
- *CH4 in Code 6, 1st digit.*
- *RESULT in Code 7, 2nd digit.*

Note 7: For future development.

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

DISPLAY TEST PIN
0 Display test only
1 Reset Counter Channel 1 and total 2 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

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 Clear Tare
6 Set Tare
7 Unlatch (de-energize) all Setpoints

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

CODE 7 – RESULT PROCESSING

RESULT PROCESSING
0 Direct Display of Result as per processing performed in 2nd and 3rd digits
1 Square Root of Result
2 Inverse of Result
3 -

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 –

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 CH2/10 000
6 Result = (CH1 x 20 000)/CH2
7 Result = CH1

CODE 10

Note:
Code 10 is only available with bar-graph versions of the meter.

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

FIRST DIGIT

BARGRAPH DISPLAY SETTINGS

0 No Function

1 Disable Overrange Flashing

2 Set up Colors

3 Set up Bar Scaling

SECOND DIGIT

CODE 10 – BARGRAPH SETUP

BARGRAPH DISPLAY FORMAT

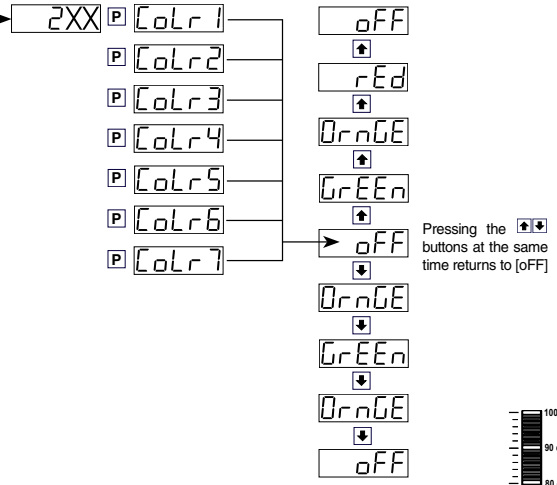
0 Setpoints on Bar
1 Peak, Valley on Bar
2 -
3 -
4 Min/Max with setpoints (low end of bar = VALLEY, high end of bar = PEAK)
5 -
6 -
7 Bar Only (no setpoints on the bar)

THIRD DIGIT

BARGRAPH TYPE

0 Linear
1 Via linearization Table 1
2 –
3 Log – 10 Bar/Decade
4 Log – 20 Bar/Decade
5 Log – 25 Bar/Decade
6 Log – 33 Bar/Decade
7 Log – 50 Bar/Decade

Set Up Bargraph Colors

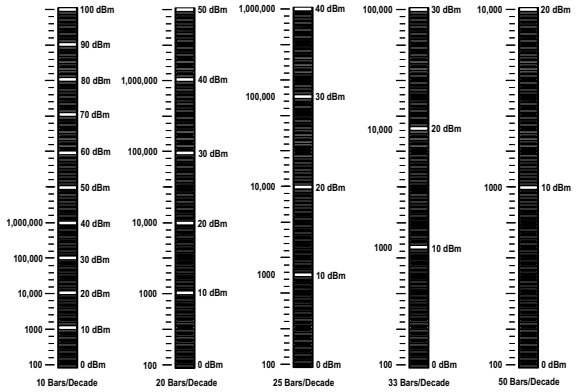


Pressing the ⬆⬇ buttons at the same time returns to [oFF]

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.

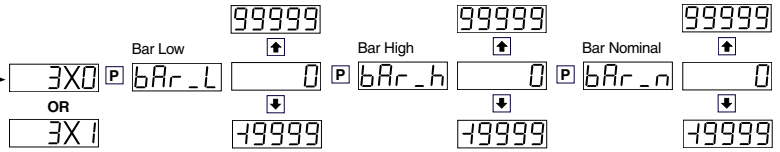
If all six setpoints are used the colors are set as follows:

Color 1	Color BELOW lowest setpoint This is the bargraph color before it reaches a setpoint.
Color 2	Color ABOVE lowest setpoint
Color 3	Color ABOVE next highest setpoint
Color 4	Color ABOVE next highest setpoint
Color 5	Color ABOVE next highest setpoint
Color 6	Color ABOVE next highest setpoint
Color 7	Color ABOVE highest setpoint



Example of Bars per Decade

Set Up Scaling for Linear Bargraph



Bar Nominal

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.

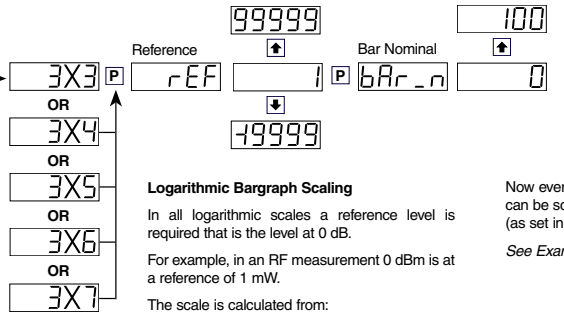
Setting bar nominal to the midpoint between bar low and bar high makes the bargraph behave like a typical center zero bargraph. This means the bargraph lights up at the center of the bar and moves either up or down the bar depending on the displayed signal.

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.

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.

Set Up Scaling for Logarithmic Bargraph



Reference. This is the number of counts displayed for a 0 dB reference.

Bar Nominal. See Bar Nominal description above.

Logarithmic Bargraph Scaling

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 counts and 1 W = 100,000 counts

Then the reference for 0 dBm would be set to 100 counts:

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

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).

See Example of Bars per Decade diagram opposite.

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

SETPOINT PROGRAMMING MODE – SPC_1 to SPC_6

Setpoint Setup Sequence

Follow These Steps

The following procedures are written for SP1, all other setpoints are configured in a similar manner.

1) Press the P and ⬇ buttons at the same time. This enters the setpoint programming mode. The display toggles between [SP_1] and [18000].

   This is SP1 of the **Setpoint Activation Values Mode**. Use the ⬆ and ⬇ buttons to set SP1 or the P button to move to the required setpoint.

2) After all required setpoint **activation values** have been set, press the P button until [SPC_1] appears. This is the **Setpoint & Relay Control Settings Mode**.

   SPC_1 is the **setpoint and relay control settings** programming menu for SP1. Set the three digits according to the codes in the *Setpoint and Relay Control Function Settings* opposite in the following order:

   Third Digit – Setpoint Delay Mode

   Set to [XX5] and program the hysteresis, deviation, or PID functions as required for SP1.

   Reset back to [XX0].

   Third Digit – Setpoint Timer Mode

   Set to [XX6] and program the timer mode functions as required for SP1.

   Reset back to [XX0].

   Third Digit – Setpoint Reset & Trigger Functions

   Set to [XX7] and program the reset and trigger functions as required for SP1.

   Reset back to [XX0].

   Second Digit – Setpoint Activation Source Mode

   Set to [X1X] to select the setpoint activation source for SP1 from any channel or selected register shown above. Reset back to [X0X].

   If the SP source is from an external digital input, set to one of either [X2X] to [X7X] to select the setpoint activation source from one of six digital inputs (2 to 7). *See *Note at 2nd digit.*

   First Digit – Relay Energize Mode

   Select the relay energize mode for SP1 from 0 to 3.

   Third Digit – Relay Latching & Manual Reset Functions

   Program the third digit setpoint relay latching and manual reset functions between 0 to 4 as required.

3) Press the P button to move to move to [SPC_2].

4) Repeat Step 2 for all required setpoints.

SETPOINT AND RELAY CONTROL FUNCTION SETTINGS

FIRST DIGIT – Relay Energize Function

0 Energizes ABOVE setpoint value

HYSTERESIS selected – relay energizes AT OR ABOVE setpoint value plus hysteresis counts. De-energizes BELOW setpoint value minus hysteresis counts.

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

DEVIATION selected – relay energizes INSIDE deviation band (setpoint ± deviation counts). De-energizes OUTSIDE deviation band (setpoint ± deviation counts).
PID selected – controls ABOVE setpoint value.

1 Energizes BELOW setpoint value

HYSTERESIS selected – relay energizes BELOW setpoint value minus hysteresis counts. De-energizes AT OR ABOVE setpoint value plus hysteresis counts.

Note:
If hysteresis set with ZERO counts, relay energizes BELOW the setpoint value.

DEVIATION selected – relay energized OUTSIDE deviation band (setpoint ± deviation counts). De-energized INSIDE deviation band (setpoint ± deviation counts).
PID selected – controls BELOW setpoint value.

2 Energizes AT OR ABOVE setpoint value with FALLING INPUT SIGNAL INITIAL START-UP INHIBIT

HYSTERESIS selected – relay energizes AT OR ABOVE setpoint value plus hysteresis counts with FALLING INPUT SIGNAL INITIAL START-UP INHIBIT. De-energizes BELOW setpoint value minus hysteresis counts with FALLING INPUT SIGNAL INITIAL START-UP INHIBIT.

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

DEVIATION selected – relay energizes INSIDE deviation band (setpoint ± deviation counts) with FALLING INPUT SIGNAL INITIAL START-UP INHIBIT. De-energizes OUTSIDE deviation band (setpoint ± deviation counts) with FALLING INPUT SIGNAL INITIAL START-UP INHIBIT.
PID selected – controls ABOVE setpoint value.

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

HYSTERESIS selected – relay energizes BELOW setpoint value plus hysteresis counts with RISING INPUT SIGNAL INITIAL START-UP INHIBIT. De-energizes BELOW setpoint value minus hysteresis counts with RISING INPUT SIGNAL INITIAL START-UP INHIBIT.

Note:
If hysteresis set with ZERO counts, relay energizes BELOW the setpoint value.

DEVIATION selected – relay energizes OUTSIDE deviation band (setpoint ± deviation counts) with RISING INPUT SIGNAL INITIAL START-UP INHIBIT. De-energizes INSIDE deviation band (setpoint ± deviation counts) with RISING INPUT SIGNAL INITIAL START-UP INHIBIT.
PID selected – controls BELOW setpoint value.

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 (selected input modules)
4 Digital Input – D2 (selected input modules)
5 Digital Input – D3 (selected input modules)
6 HOLD Pin
7 LOCK Pin

**Note:*
If the setpoint source is set to [oFF] or a digital input, the setpoint activation value will have no effect and will not be displayed.

THIRD DIGIT – SP Functions

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

5 Hysteresis, Deviation & PID Mode (includes SP Tracking) → Go to Page 12

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

→ Go to Page 12

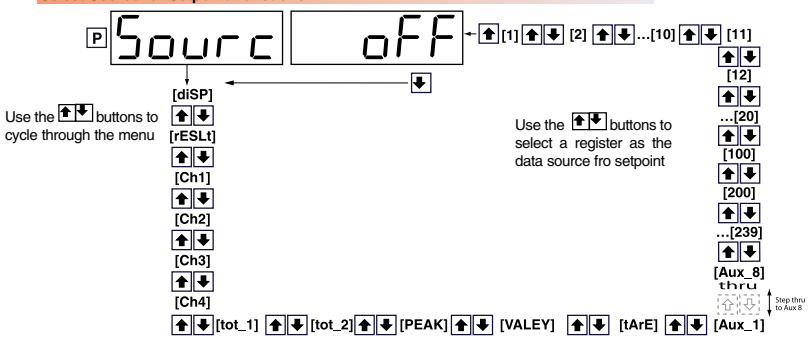
Note:
In PID Mode, all Timer Modes on SP1 set in [XX6] are not functional.

7 Advanced Functions Mode:
- OFF.
- Reset Trigger.
- Reset Destination.
- Reset Mode.
- Reset Constant.
- Trigger Print from SP.
- Trigger Log from SP.

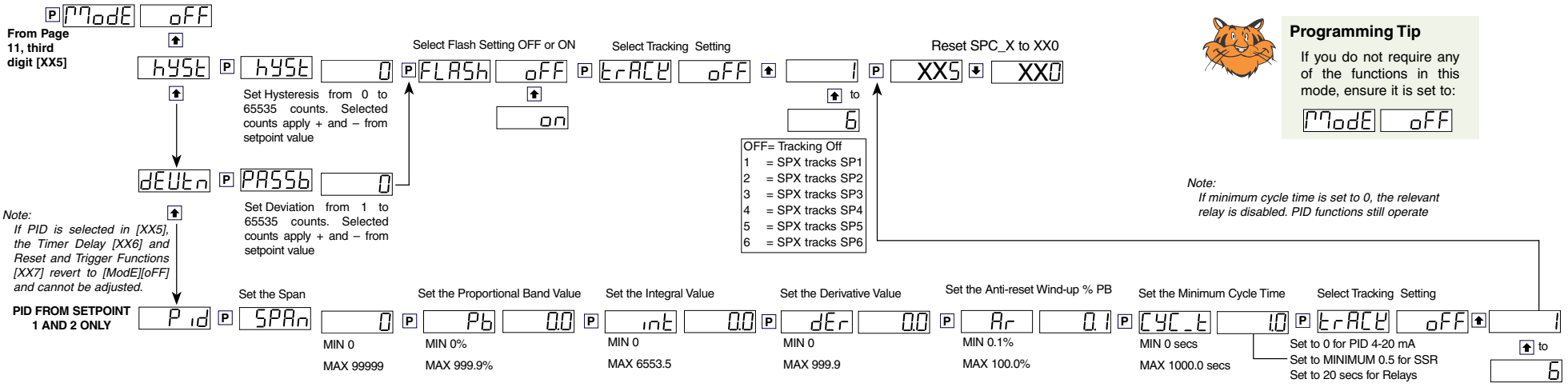
→ Go to Page 13

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

Select Source for Setpoint Functions



Set Up Hysteresis, Deviation & PID Mode Settings



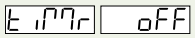
Programming Tip

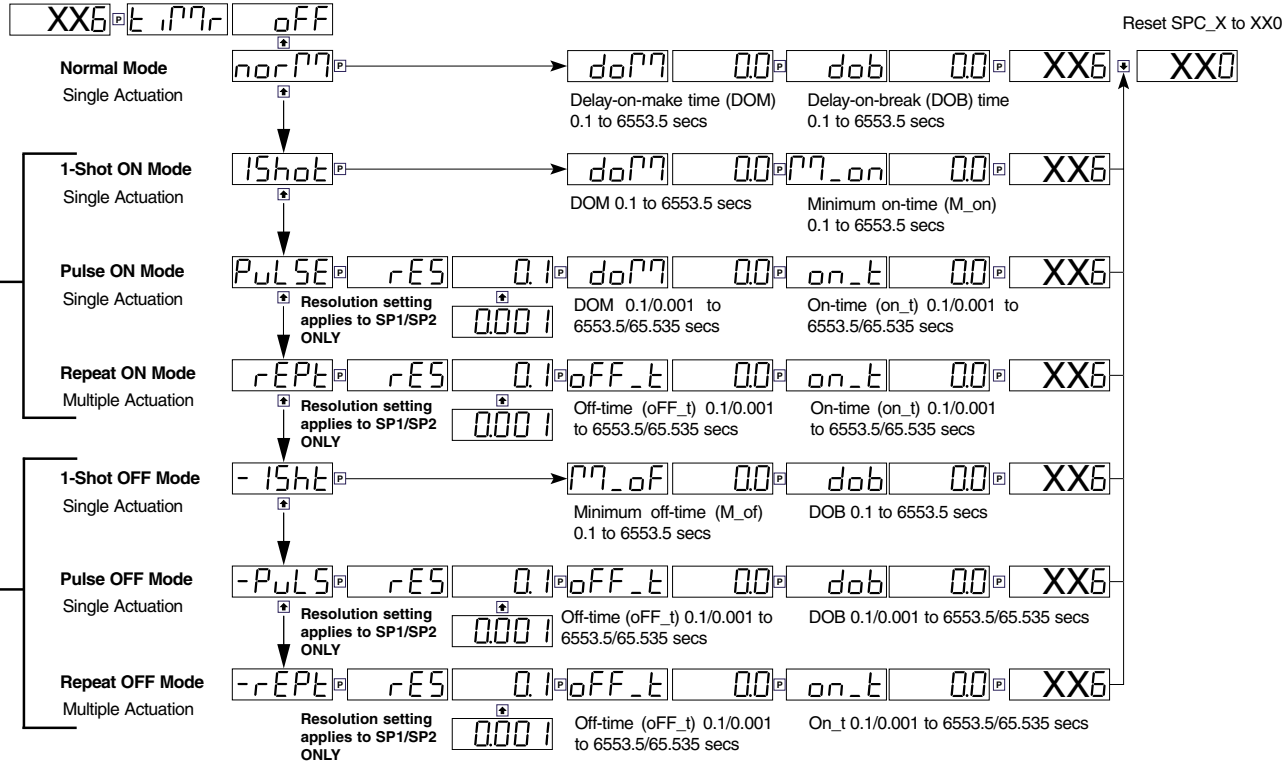
If you do not require any of the functions in this mode, ensure it is set to:

Set Up Timer Delay Settings

Programming Tip

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





Normally OFF/Pulsed ON Modes

These are time control modes were the relay is **normally OFF (de-energizes)** and **pulses ON (energizes)** when the setpoint activates.

Normally ON/Pulsed OFF Modes

These are time control modes were the relay is **normally ON (energizes)** and **pulses OFF (de-energizes)** when the setpoint activates.

Programming Tip

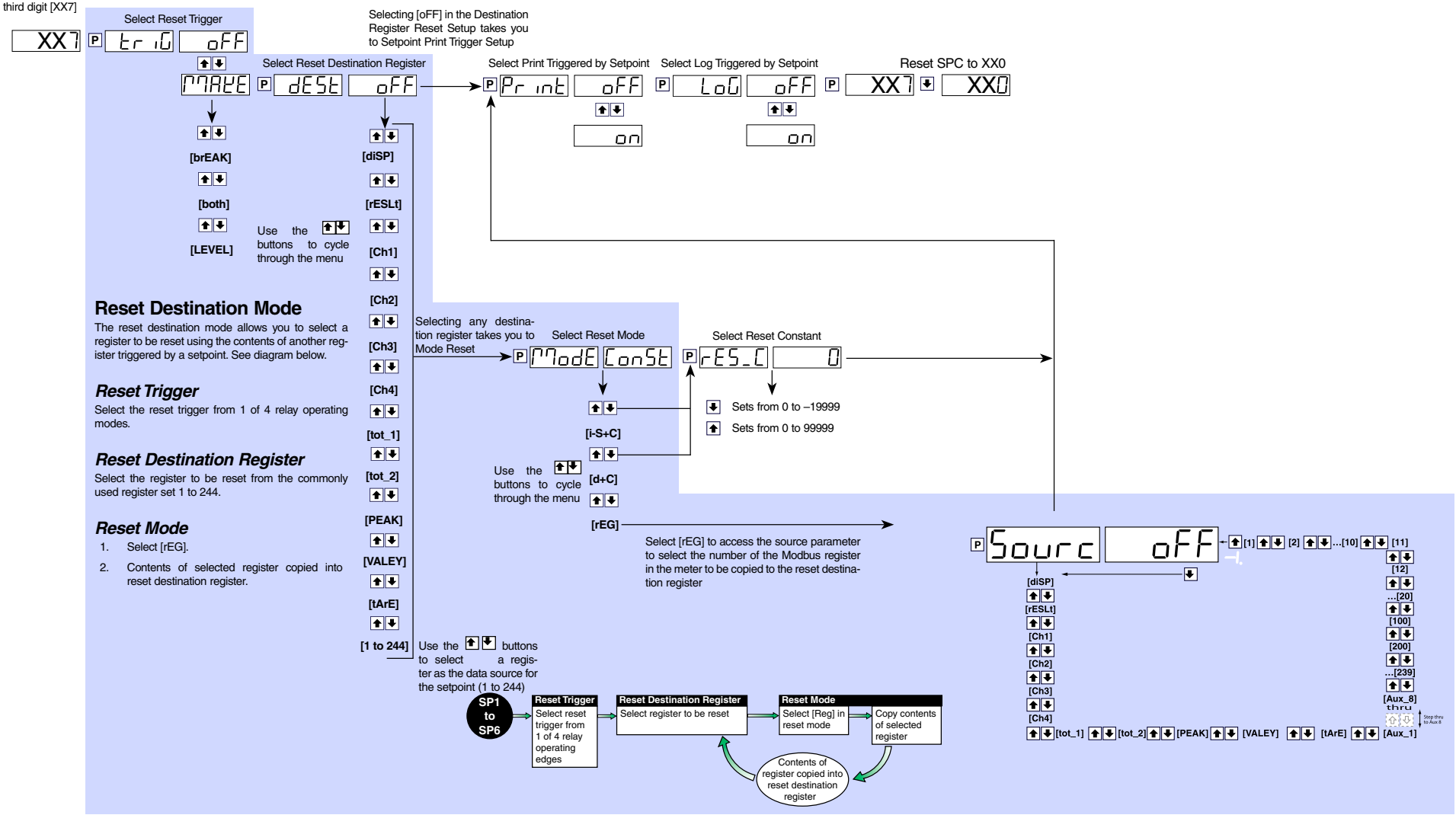
If you do not require any of the functions in this mode, ensure it is set to:

tr iG oFF

Programming Tip

This mode can not be accessed if SPC_1 or SPC_2 is in the PID mode.

From Page 11 third digit [XX7]



Reset Destination Mode

The reset destination mode allows you to select a register to be reset using the contents of another register triggered by a setpoint. See diagram below.

Reset Trigger

Select the reset trigger from 1 of 4 relay operating modes.

Reset Destination Register

Select the register to be reset from the commonly used register set 1 to 244.

Reset Mode

1. Select [rEG].
2. Contents of selected register copied into reset destination register.

Detailed Descriptions of Setpoint Functions

1st Digit in Setpoint Programming Mode

Following is a detailed description of the options available on the 1st digit of the setpoint programming mode [SPC] settings listed on Page 11.

FIRST DIGIT Relay Energize Function
0 Energizes ABOVE setpoint value **HYSTERESIS selected –** relay energizes AT OR ABOVE setpoint value plus hysteresis counts. De-energizes BELOW setpoint value minus hysteresis counts. *Note:* *If hysteresis set with ZERO counts, relay energizes AT OR ABOVE the setpoint value.* **DEVIATION selected –** relay energizes INSIDE deviation band (setpoint ± deviation counts). De-energizes OUTSIDE deviation band (setpoint ± deviation counts). **PID selected –** controls ABOVE setpoint value.
1 Energizes BELOW setpoint value **HYSTERESIS selected –** relay energizes BELOW setpoint value minus hysteresis counts. De-energizes AT OR ABOVE setpoint value plus hysteresis counts. *Note:* *If hysteresis set with ZERO counts, relay energizes BELOW the setpoint value.* **DEVIATION selected –** relay energized OUTSIDE deviation band (setpoint ± deviation counts). De-energized INSIDE deviation band (setpoint ± deviation counts). **PID selected –** controls BELOW setpoint value.
2 Energizes AT OR ABOVE setpoint value with FALLING INPUT SIGNAL INITIAL START-UP INHIBIT **HYSTERESIS selected –** relay energizes AT OR ABOVE setpoint value plus hysteresis counts with FALLING INPUT SIGNAL INITIAL START-UP INHIBIT. De-energizes BELOW setpoint value minus hysteresis counts with FALLING INPUT SIGNAL INITIAL START-UP INHIBIT. *Note:* *If hysteresis set with ZERO counts, relay energizes AT OR ABOVE the setpoint value.* **DEVIATION selected –** relay energizes INSIDE deviation band (setpoint ± deviation counts) with FALLING INPUT SIGNAL INITIAL START-UP INHIBIT. De-energizes OUTSIDE deviation band (setpoint ± deviation counts) with FALLING INPUT SIGNAL INITIAL START-UP INHIBIT. **PID selected –** controls ABOVE setpoint value.
3 Energizes BELOW setpoint value with RISING INPUT SIGNAL INITIAL START-UP INHIBIT **HYSTERESIS selected –** relay energizes BELOW setpoint value plus hysteresis counts with RISING INPUT SIGNAL INITIAL START-UP INHIBIT. De-energizes BELOW setpoint value minus hysteresis counts with RISING INPUT SIGNAL INITIAL START-UP INHIBIT. *Note:* *If hysteresis set with ZERO counts, relay energizes BELOW the setpoint value.* **DEVIATION selected –** relay energizes OUTSIDE deviation band (setpoint ± deviation counts) with RISING INPUT SIGNAL INITIAL START-UP INHIBIT. De-energizes INSIDE deviation band (setpoint ± deviation counts) with RISING INPUT SIGNAL INITIAL START-UP INHIBIT. **PID selected –** controls BELOW setpoint value.

Explanation Of Setpoint Trigger and Reset Functions

The setpoint trigger and reset functions are available on all 6 setpoints. The various parameters of these functions are described as follows.

Trigger Type

The trigger parameter gives the option of selecting which edge of the relay operation the reset function, print function, and data logging function should activate on. It can be set to either:

- **Off** – Disables all trigger functions
- **Make** – operates on the make edge only.
- **Break** – operates on the break edge only.
- **Both** – operates on both make and break edges.
- **Level** – operates after every sample period if relay is ON.

Reset Destination

The reset destination parameter defines the target register in the meter that is to be modified in some way when the reset trigger conditions for this relay are met. Any Modbus register number from 1 to 255 can be selected as a reset destination. If the [DEST] parameter is set to [OFF], the reset function is disabled and the Reset Mode and Reset Constant/Source selection are not displayed during setup. The setup sequence jumps straight to the Print parameter.

Reset Mode

The reset mode parameter defines what type of reset effect is required. The following different options are available.

Const – This mode stores a user defined constant into the selected destination register. In most cases this number will be zero but it can be any number.

I-S+C – This mode stores the current input value **I**, defined by the setpoint source, minus the setpoint value **S** plus a user defined constant **C**. It would normally be used with a counting or totalizing application where the amount of setpoint overshoot needs to be retained after the reset function. The constant value would normally be zero but could be used to provide an offset if required.

D+C – This mode adds the user defined constant **C** to the current value in the selected reset destination register **D**. It can be used to increment or decrement a register by any amount.

Reg – This mode copies the contents of a user selectable register into the reset destination register (see Reset Constant to select the source register).

It can be used to capture data on an event and store it in an unused channel for display or analog output, etc.

Reset Constant

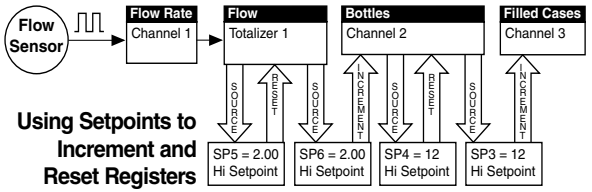
This parameter defines the constant value to be used in the **Const**, **I-S+C**, **D+C** modes as previously explained. Its default value is zero. This parameter is not available if **Reg** is selected as the reset mode.

Source (only available in Reg mode)

If the reset mode is set to **Reg** then the source parameter allows you to select the number of the Modbus register in the meter to be copied to the reset destination register.

Resetting and Incrementing Using Setpoints

Setpoints may be used to reset and/or increment registers. In the example shown opposite, 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. CH2 counts from 0 to 12, resets, and repeats.



Using Setpoints to Increment and Reset Registers

Customer Code Settings – Main Programming Mode

CALIBRATION MODE [CAL]

1st DIGIT	2nd DIGIT	3rd DIGIT	SUB-SETTINGS

ON DEMAND FUNCTIONS

		AFFECTS									
			01X								
			02X	SPAN		INPUT					
			03X	ZERO		INPUT		SPAN		INPUT	
			04X	CHANNEL							
			05X	CHANNEL							

1st DIGIT	2nd DIGIT	3rd DIGIT	SUB-SETTINGS

CALIBRATION PROCEDURES

Manual Calibration

			100	OFFSET		SCALE	
			101	OFFSET		SCALE	
			102	OFFSET		SCALE	
			103	OFFSET		SCALE	
			104	OFFSET		SCALE	

Two-point Calibration

			110	ZERO		INPUT		SPAN
			111	ZERO		INPUT		SPAN
			112	ZERO		INPUT		SPAN
			113	ZERO		INPUT		SPAN
			114	ZERO		INPUT		SPAN

Calibrate Thermocouple

			121	ZERO		INPUT	32°F	SPAN
			122	ZERO		INPUT	32°F	SPAN
			123	ZERO		INPUT	32°F	SPAN

Calibrate Analog Output

			151	CAL LOW		OUTPUT	
			152	CAL LOW		OUTPUT	

CALIBRATION MODE [CAL] Continued

1st DIGIT	2nd DIGIT	3rd DIGIT	SUB-SETTINGS

RELATED CALIBRATION FUNCTIONS

Serial Output

			200	BAUD		PARITY		ADDRESS		TIME DELAY	

Auto Zero Maintenance

			210	AZ CAPTURE		AZ MOTION		AZ APERTURE	
			211	AZ CAPTURE		AZ MOTION		AZ APERTURE	
			212	AZ CAPTURE		AZ MOTION		AZ APERTURE	
			213	AZ CAPTURE		AZ MOTION		AZ APERTURE	
			214	AZ CAPTURE		AZ MOTION		AZ APERTURE	

Averaging Samples & Averaging Window

			220	AVERAGE SAMPLES		AVERAGE WINDOW	
			221	AVERAGE SAMPLES		AVERAGE WINDOW	
			222	AVERAGE SAMPLES		AVERAGE WINDOW	
			223	AVERAGE SAMPLES		AVERAGE WINDOW	
			224	AVERAGE SAMPLES		AVERAGE WINDOW	

K Factor & Totalizer Cutoff

			231	SCALE FACTOR		CUTOFF	
			232	SCALE FACTOR		CUTOFF	

32-point Linearization Tables

			240	MODE	
			241	MODE	
			242	MODE	
			243	MODE	
			244	MODE	

Scale Analog Output

			251	ZERO		FULL SCALE	
			252	ZERO		FULL SCALE	

CODE 1

1st DIGIT	2nd DIGIT	3rd DIGIT	SUB-SETTINGS
			X50 SOURCE
			X51 SOURCE
			X52 SOURCE
			X53 SOURCE
			X54 SOURCE
			X55 SOURCE
			X56 SOURCE
			X57 SOURCE
			X60 DISPLAY
			X61 DISPLAY
			X62 DISPLAY
			X63 DISPLAY
			X64 DISPLAY
			X65 DISPLAY
			X66 DISPLAY
			X67 DISPLAY
			X70 CHARACTER
			X71 CHARACTER
			X72 CHARACTER
			X73 CHARACTER
			X74 CHARACTER
			X75 CHARACTER
			X76 CHARACTER
			X77 CHARACTER

CODE 2

1st DIGIT	2nd DIGIT	3rd DIGIT	PRESCALER

CODE 3

1st DIGIT	2nd DIGIT	3rd DIGIT

CODE 4

1st DIGIT	2nd DIGIT	3rd DIGIT	PRESCALER

CODE 5

1st DIGIT	2nd DIGIT	3rd DIGIT	SMART INPUT MODULE SETTINGS

CODE 6

1st DIGIT	2nd DIGIT	3rd DIGIT	SMART INPUT MODULE SETTINGS

CODE 7

1st DIGIT	2nd DIGIT	3rd DIGIT

CODE 8

1st DIGIT	2nd DIGIT	3rd DIGIT

CODE 9

1st DIGIT	2nd DIGIT	3rd DIGIT

CODE 10

1st DIGIT	2nd DIGIT	3rd DIGIT

BARGRAPH COLORS

2XX	COLOR 1	
	COLOR 2	
	COLOR 3	
	COLOR 4	
	COLOR 5	
	COLOR 6	
	COLOR 7	

SCALING FOR LINEAR BARGRAPH

3X0	BAR LOW		BAR HIGH	
3X1	BAR LOW		BAR HIGH	

BAR NOMINAL	
BAR NOMINAL	

SCALING FOR LOGARITHMIC BARGRAPH

3X3	REFERENCE		BAR NOMINAL	
3X4	REFERENCE		BAR NOMINAL	
3X5	REFERENCE		BAR NOMINAL	
3X6	REFERENCE		BAR NOMINAL	
3X7	REFERENCE		BAR NOMINAL	

Customer Code Settings – Setpoint Programming Mode

SP ACTIVATION VALUES

SETPOINT	VALUE
SP1	
SP2	
SP3	
SP4	
SP5	
SP6	

SETPOINT & RELAY CONTROL SETTINGS MODE SPC_1 TO SPC_6

SELECT DATA SOURCE			DELAY MODE SETTINGS													
SPC_1	_ 1 _		SPC_1	_ _ 5	HYSTERESIS		ANNUNCIATOR FLASHING		SP TRACKING		DEVIATION		ANNUNCIATOR FLASHING		SP TRACKING	
SPC_2	_ 1 _		SPC_2	_ _ 5	HYSTERESIS		ANNUNCIATOR FLASHING		SP TRACKING		DEVIATION		ANNUNCIATOR FLASHING		SP TRACKING	
SPC_3	_ 1 _		SPC_3	_ _ 5	HYSTERESIS		ANNUNCIATOR FLASHING		SP TRACKING		DEVIATION		ANNUNCIATOR FLASHING		SP TRACKING	
SPC_4	_ 1 _		SPC_4	_ _ 5	HYSTERESIS		ANNUNCIATOR FLASHING		SP TRACKING		DEVIATION		ANNUNCIATOR FLASHING		SP TRACKING	
SPC_5	_ 1 _		SPC_5	_ _ 5	HYSTERESIS		ANNUNCIATOR FLASHING		SP TRACKING		DEVIATION		ANNUNCIATOR FLASHING		SP TRACKING	
SPC_6	_ 1 _		SPC_6	_ _ 5	HYSTERESIS		ANNUNCIATOR FLASHING		SP TRACKING		DEVIATION		ANNUNCIATOR FLASHING		SP TRACKING	

SETPOINT FINAL SETTINGS

	1st DIGIT	2nd DIGIT	3rd DIGIT
SPC_1			
SPC_2			
SPC_3			
SPC_4			
SPC_5			
SPC_6			

PID CONTROL SETTINGS

SPC_1	_ _ 5	SPAN		PB		INT		DER		ARW		MCT		SP TRACKING	
SPC_2	_ _ 5	SPAN		PB		INT		DER		ARW		MCT		SP TRACKING	
SPC_3	_ _ 5	SPAN		PB		INT		DER		ARW		MCT		SP TRACKING	
SPC_4	_ _ 5	SPAN		PB		INT		DER		ARW		MCT		SP TRACKING	
SPC_5	_ _ 5	SPAN		PB		INT		DER		ARW		MCT		SP TRACKING	
SPC_6	_ _ 5	SPAN		PB		INT		DER		ARW		MCT		SP TRACKING	

TIMER MODE SETTINGS

SPC SETTING		NORMAL	NORMALLY OFF / PULSED ON MODES						NORMALLY ON / PULSED OFF MODES					
			REPEAT ON		PULSE ON		1-SHOT ON		1-SHOT OFF		PULSE OFF		REPEAT OFF	
SPC_1	_ _ 6	DOM	Resolution	OFF T	Resolution	DOM	DOM		M OFF		Resolution	OFF T	Resolution	OFF T
		DOB		ON T		ON_T	M ON		DOB			DOB		ON T
SPC_2	_ _ 6	DOM	Resolution	OFF T	Resolution	DOM	DOM		M OFF		Resolution	OFF T	Resolution	OFF T
		DOB		ON T		ON T	M ON		DOB			DOB		ON T
SPC_3	_ _ 6	DOM	Resolution	OFF T	Resolution	DOM	DOM		M OFF		Resolution	OFF T	Resolution	OFF T
		DOB		ON T		ON T	M ON		DOB			DOB		ON T
SPC_4	_ _ 6	DOM	Resolution	OFF T	Resolution	DOM	DOM		M OFF		Resolution	OFF T	Resolution	OFF T
		DOB		ON T		ON T	M ON		DOB			DOB		ON T
SPC_5	_ _ 6	DOM	Resolution	OFF T	Resolution	DOM	DOM		M OFF		Resolution	OFF T	Resolution	OFF T
		DOB		ON T		ON T	M ON		DOB			DOB		ON T
SPC_6	_ _ 6	DOM	Resolution	OFF T	Resolution	DOM	DOM		M OFF		Resolution	OFF T	Resolution	OFF T
		DOB		ON T		ON T	M ON		DOB			DOB		ON T

REGISTER RESET & TRIGGER FUNCTIONS SETTINGS

SPC_1	_ _ 7	[triG]		[dESt]		[ModE]		[rES_C]		[SourC]		[Print]		[LoG]	
SPC_2	_ _ 7	[triG]		[dESt]		[ModE]		[rES_C]		[SourC]		[Print]		[LoG]	
SPC_3	_ _ 7	[triG]		[dESt]		[ModE]		[rES_C]		[SourC]		[Print]		[LoG]	
SPC_4	_ _ 7	[triG]		[dESt]		[ModE]		[rES_C]		[SourC]		[Print]		[LoG]	
SPC_5	_ _ 7	[triG]		[dESt]		[ModE]		[rES_C]		[SourC]		[Print]		[LoG]	
SPC_6	_ _ 7	[triG]		[dESt]		[ModE]		[rES_C]		[SourC]		[Print]		[LoG]	

Commonly Used Registers

A Tiger 320 Series 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.
- **Setpoint Control Settings [X1X]**. Selection of a register as the data source for a setpoint.
- **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.
- **Setpoint Control Settings [XX7]**. Select which register's contents are to be copied into the destination register by a setpoint.

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.

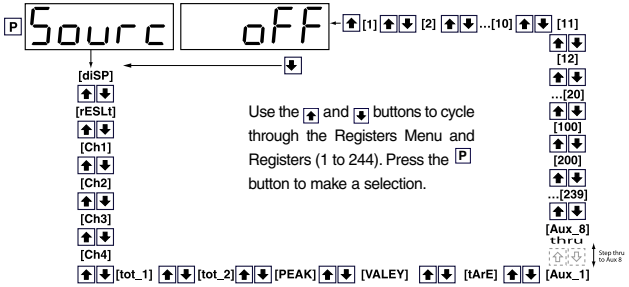
The table shows, in seven columns, the functions where these registers can be used.

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:

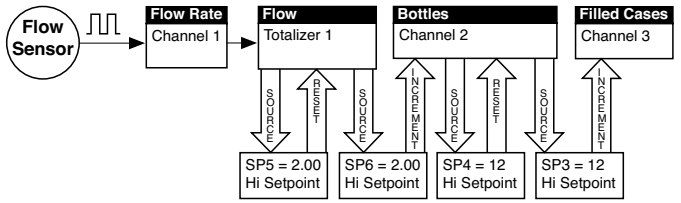
15, 38, 47-48, 52-53, 61-64, 123-128, 140-141, 234-244

Any selection of these Registers may cause a malfunction.

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.

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 [diSP]	-		●	●	●	●		
Result [rESLt]	-	●	●	●	●	●	●	●
CH1 [Ch1]	-	●	●	●	●	●	●	●
CH2 [Ch2]	-	●	●	●	●	●	●	●
CH3 [Ch3]	-	●	●	●	●	●	●	●
CH4 [Ch4]	-	●	●	●	●	●	●	●
Total 1 [tot_1]	-	●	●	●		●	●	●
Total 2 [tot_2]	-	●	●	●		●	●	●
Peak [PEAK]	-	○				●	○	●
Valley [VALEY]	-	○				●	○	●
Tare [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					○		



USING SETPOINTS TO INCREMENT AND RESET REGISTERS

User Notes

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