Associated Documents

The following documents must be read together with this supplement:

Relevant Tiger 320 Series User Manual

The user manual provides general information on the relevant Tiger 320 Series meter.

Tiger 320 Series Programming Code Sheet

The programming code sheet provides all meter programming codes including set-point programming codes.

Programming Tip

This document has been written using a DI-50 7-segment, 5-digit display meter. When programming meters with other display options, some display readings may vary to the diagrams shown.

Note

It is assumed that you are familiar with the Programming Conventions used throughout the range of Texmate Tiger 320 Series literature as described in the user manual.

This document is designed to supplement the information described in the Tiger 320 Series User Manual. It covers the meter's Linearizing Functions.

Contents

List of Figures

TEXMATE INC

General Notices & Tips

The range of Tiger 320 Series supplements contain three graphic symbols to aid you:

WARNING Symbol

The WARNING symbol is generic to all Tiger 320 Series documents and indicates that if the instruction is not heeded, the action may result in loss of life or serious injury.

NOTE Symbol

The NOTE symbol is generic to all Tiger 320 Series Operator's Manual supplements and indicates important or helpful information on the topic being discussed.

PROGRAMMING TIP Symbol

The programming tip symbol is generic to all Tiger 320 Series documents and indicates useful tips when programming the instrument.

Definitions

The following definitions are relevant to this document:

X

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.

Meter – Controller

The term meter, as used throughout this document, is a generic term for all Tiger 320 Series signal processors and controllers

Linearization Using 32 Flexible Points

Conventional meters measuring a nonlinear sensor output tend to be inaccurate as the intermediate readings are based on a straight line. Only the low and high readings are representative of the sensor output. *See Figure 1*.

To overcome this problem, intelligent meters have been developed that can linearize the sensor output curve into straight sections. This is done by plotting points on the curve that relate to known or calculated values relating to the input signal at that point.

The distance between each point becomes a straight line and provides a linear output with values closely relating to the actual curve. *See Figure 2*.

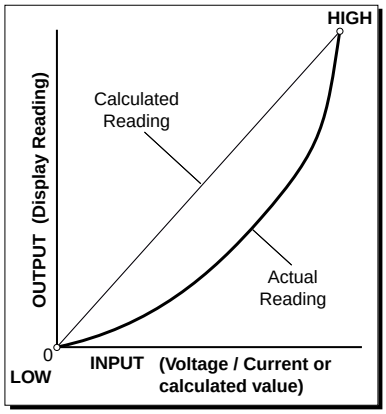


Figure 1 – Non-linearized Sensor Output

Being able to linearize a nonlinear sensor output with 20 points at fixed intervals has become standard in most instruments. Unfortunately, some sensor output curves do not follow an even curve line, resulting in inaccuracies over various areas of the curve.

Tiger 320 Series meters extend this principal by providing 32 flexible points. This means that each point can be individually plotted to suit the most non-linear sections of the sensor output curve, providing greater accuracy. *See Figure 3*.

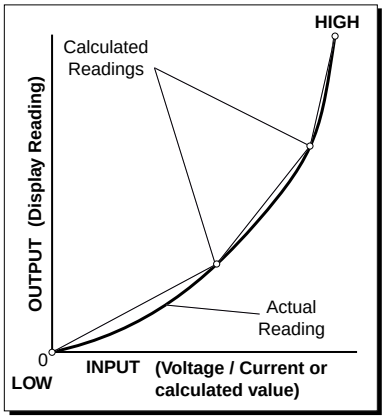


Figure 2 – Linearized Sensor Output

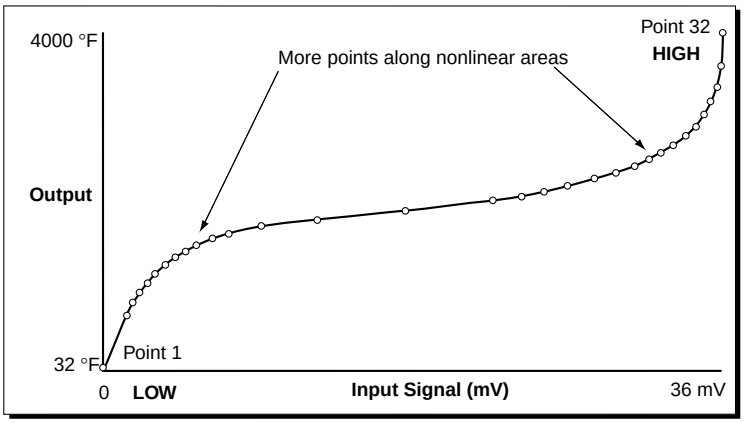


Figure 3 – Linearized Sensor Output Showing Flexible Points

Tiger 320 Series meters provide up to four independently programmable, flexible 32-point linearization tables, giving accurate results over the entire scaled range. Each linearization table can be assigned to more than one channel.

Memory Restrictions

The number of linearizing tables available depends on the amount of memory installed in the meter. A base meter with 4 kilobits of memory installed has a single table available (Linearization Table 1). For four tables to be available, the meter requires to have at least 32 kilobits of memory installed. The amount of memory installed in the meter is selected during ordering to suit the meter's application.

Table 1 lists the linearization tables available for a selected channel when the meter has either 4 kilobits or at least 32 kilobits of memory installed. It also lists the programming codes required to be set for selecting a specific table for a specific channel.

Table 1 Installed Meter Memory and Linearization Tables

Memory	Channel	Table	Selected in	Remarks
4 kilobits	1 2 3 4 RESULT	1 1 1 1 1	Code 3 [X1X] Code 4 [XX1] Code 5 [X1X] Code 6 [3XX] Code 7 [X6X]	With 4 kilobits of memory installed, only Table 1 is available for CH1, CH2, CH3, CH4 and RESULT.
32 kilobits	1	1 2 3 4 125-point	Code 3 [X1X] Code 3 [X2X] Code 3 [X3X] Code 3 [X4X] Code 3 [X5X]	With 32 kilobits of memory installed, Tables 1 to 4 are available for CH1. All four tables can be cascaded to form a 125-point flexible table. Tables 1 to 4 can be selected from the rear pins of the meter when one of a selected number of input modules is installed. 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].
	2	1 2 3 4 125-point Table select	Code 4 [XX1] Code 4 [XX2] Code 4 [XX3] Code 4 [XX4] Code 4 [XX5] Code 4 [XX6]	With 32 kilobits of memory installed, Tables 1 to 4 are available for CH2. All four tables can be cascaded to form a 125-point flexible table.
	3	3	Code 5 [3XX]	With 32 kilobits of memory installed, only Table 3 is available for CH3.
	4	4	Code 6 [3XX]	With 32 kilobits of memory installed, only Table 4 is available for CH4.
	RESULT	1 2 3 4 125-point Table select	Code 7 [X1X] Code 7 [X2X] Code 7 [X3X] Code 7 [X4X] Code 7 [X5X] Code 7 [X6X]	With 32 kilobits of memory installed, Tables 1 to 4 are available for RESULT. All four tables can be cascaded to form a 125-point flexible table. Tables 1 to 4 can be selected from the rear pins of the meter when one of a selected number of input modules is installed. 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].

Linearization Table Setup Modes

Note:
The rollover feature should not b
cause inaccurate results.

Linearizing Standard Temperature Sensors

The Tiger 320 Series meter software has been pre-configured with the following standard thermocouple and RTD linearization tables stored in memory for easy selection. As the defined reference data for the tables has been pre-configured and stored in the meter, the relevant table can be selected using standard meter linearization configuration procedures (*See Figure 4*):

- Thermocouple types: J / K / R / S / T / B / N.
- RTD 2 / 3 / 4-wire types: Resistance / 385 / 392 / 120 Ω / Cn 10 Ω.

To configure the meter to use a standard temperature sensor linearization table, see Application Example – Standard Temperature Sensors on Page 20.

Non-Preconfigured Linearization Tables

Non-preconfigured linearization tables require the linearization table reference data to be loaded into the selected table in the meter. *See Figure 4*.

Were the reference data to be loaded is known but not pre-configured into the meter, such as standard thermocouples, RTDs, and thermistors, it can be entered into the meter using the manual setup mode.

There are also sensors with **no** standard reference tables to use as linearization reference data, such as those sensing the level of vessels and tanks. The sensor output data can be either calculated and entered into the meter using the manual setup mode, or the sensor output fed directly into the meter at known stages up to 32 points using the auto setup mode.

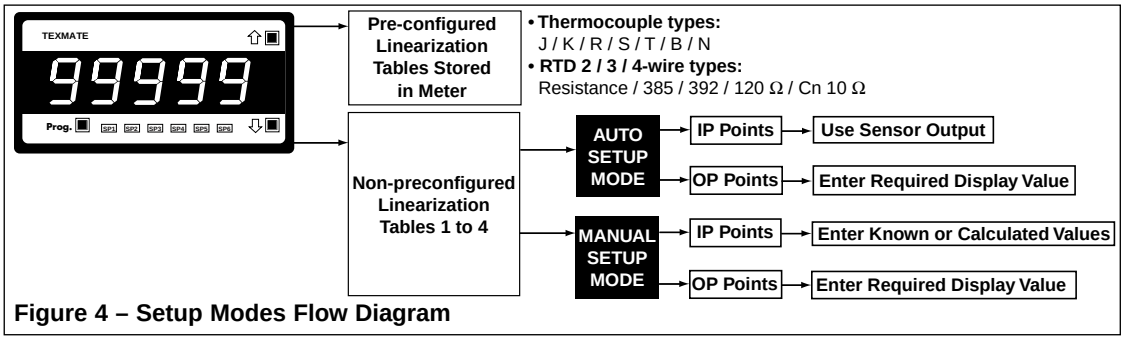


Figure 4 – Setup Modes Flow Diagram

Using Different Temperature Sensors at the Same Time

The meter can only operate with one **non-preconfigured** thermocouple linearization table selected at the same time. Along with a **non-preconfigured** thermocouple linearization table, a **standard pre-configured** thermocouple linearization table can also be selected, but only if each table is selected for different channels.

Linearizing Thermocouples

Thermocouple inputs other than J / K / R / S / T /B / N can be programmed into any channel, with temperature compensation for ambient changes, from the manufacturers' data tables in the manual setup mode, or directly from a calibrator using the auto setup mode.

Linearizing Thermistors

Thermistor inputs can be programmed into any channel from the manufacturers' data tables in the manual setup mode, or directly from a calibrator using the auto setup mode.

Linearizing RTDs

RTD inputs other than 385 / 392 / 120 / Cn 10 can be programmed into any channel from the manufacturers' data tables in the manual setup mode, or directly from a calibrator using the auto setup mode. Note, 100 Ω and 1000 Ω RTDs have the same linearization table, but require 100 or 1000 Ω RTD input modules installed in the meter respectively.

Linearization Setup Modes

Tiger 320 Series meters provide three modes to configure a linearization table:

be used with the setpoint reset feature as this could

- Auto Setup Mode.
- Manual Setup Mode.
- Initialize Mode.

Auto Setup Mode

The auto setup mode is used when the linearization curve from a sensor output is not known, but the sensor output can be used to load the reference data into the 32 points of the linearization table.

The correct input signal channel must be selected in the 3rd digit when configuring a linearization table using the auto setup mode.

The auto setup mode allows a sensor input to be directly applied to a linearization table in the meter over 32 points. The corresponding display reading for each selected point is then entered into the table. For each selected input, the meter uses the linearization table to store the sensor input to the meter, known as the input point (IP), and the corresponding display reading, known as the output point (OP).

This method is usually less accurate than the manual setup mode as the 32 points are normally programmed into the meter in equal divisions and do not concentrate on the most non-linear areas.

Manual Setup Mode

The manual setup mode relies on the points of the linearization curve being known, as with for example, a type C thermocouple. One of the four linearization tables is selected and the points of the linearization curve are programmed into the meter.

The manual setup mode allows the points of a sensor's output curve to be plotted using the known or calculated values. These values are then manually entered as the input points and stored in a selected linearization table in the meter. The output points are then entered as the corresponding display reading for each input point.

This is the most accurate method and reduces the amount of error as the sensor's output curve can be accurately calculated and the maximum number of points plotted in the most nonlinear areas.

Initialize Mode

All four linearization tables are programmed into the meter at the factory with a default straight line. Selecting the initialize mode [init] re-initializes a reconfigured linearization table back to the default settings. Select the table to be re-initialised, adding the correct date and serial number if applicable, and then press the PROGRAM button. Reset CAL to [000].

Linearization Table Input / Output Points

The input (IP) and output (OP) points of the linearization table are displayed as counts on the display. The position of the decimal point for the selected channel on the display is selected in the Display Format Mode in Code 1. There are 32 flexible points available on all four tables.

The output points can be higher or lower than each other. The input points must always begin from the lowest setting and progress to the highest setting. Each consecutive input point can be the same as or higher than the preceding output point. The next point cannot be lower than the preceding point.

Only enter the points required, starting at **input point 1** [iP1] / **output point 1** [oP1]. If less than 32 points are required, after the last required point is set press the PROGRAM button until [End?] appears on the display. This means that all remaining points are set to the last setting.

Cascading all Four Tables

By cascading all four tables (at least 32 kilobits of memory required), complex curves can be linearized to 125 points. Cascading each 32 point table means the **last point** on the **first table** must be set to the the same position as the **first point** on the **second table**. This process must be repeated on the second and third, and third and fourth tables until all four tables are joined.

Calibration

How the channel to be linearized is calibrated directly affects the accuracy of the linearization table when it is activated. The two-point calibration mode, using a LOW and HIGH input source, is normally the simplest and most accurate method of calibrating the input channel. The input channel should be calibrated over the range of the linearization table's low and high input settings.

For example, if calibrating channel 1 to linearize a type 44033 thermistor over the temperature range –40 °C to 99 °C, the applied LOW input signal would be 75790 ohms, and the applied HIGH input signal would be 157 ohms (as listed in manufacturers' data tables).

Thermocouples

A K type thermocouple reference is built into the meter and used to initially calibrate the selected channel prior to calibrating for the selected thermocouple type.

RTDs

A temperature simulator is required to provide a 32 °F reference for a type 385 RTD before the selected RTD can be calibrated.

Linearization Configuration Programming Codes

The meter's programming codes are divided into two modes (*See Figure 5*):

- Main Programming Mode.
- Setpoint Programming Mode.

Each mode is accessible from the operational display. The meter is in the operational display when it is displaying a processed input signal. All linearization settings are configured in the main programming mode.

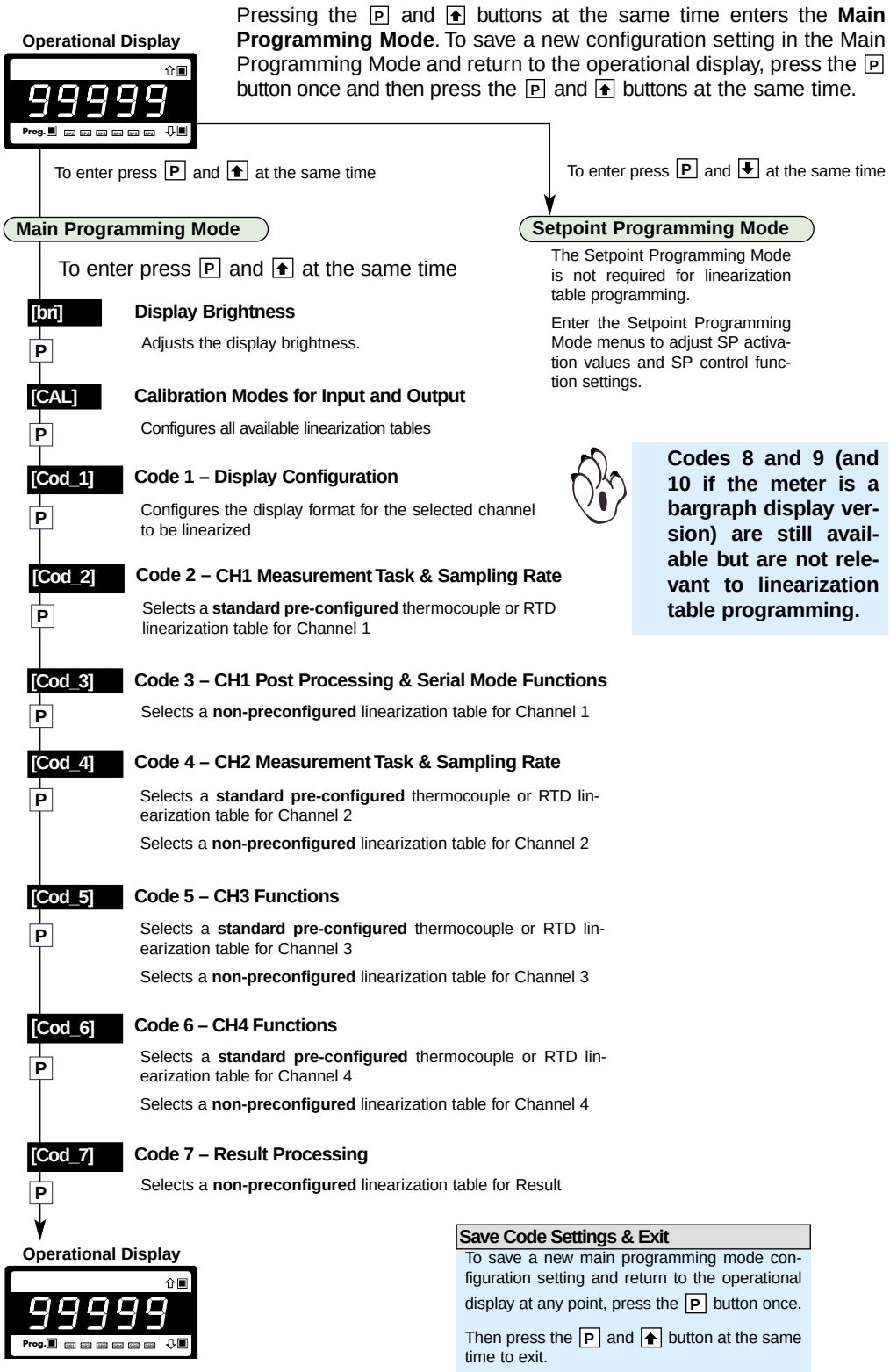


Figure 5 – Programming Code List

Linearization Table Settings

The Calibration Mode [CAL] [24X] is where all available linearization table settings are configured. Setting the **1st** digit to **2** selects Related Calibration Functions. Setting the **2nd** digit to **4** selects the Setup 32-point Linearization Tables mode. The 3rd digit selects the channel the linearization table is applied to. When configuring a linearization table in the auto mode, the correct input channel must be selected to ensure the input signal from the sensor is applied to the linearization table input points.

On entering the Setup 32-point Linearization Tables mode, configure the following settings:

- Select one of the three setup modes to configure the linearization tables.
- Select the table number.
- Set the date and serial number for the selected table.
- Configure the input and output points for the selected linearization table.

Setup Modes

For details on the manual, auto, and initialize setup modes, see Linearization Setup Modes on Page 5.

Linearization Table Identity

As a reference, the table number, the date, and a serial number can be entered before the linearization points in either the auto or manual setup mode.

Table Number

If the meter has the four table memory option, any table from 1 to 4 can be selected for configuration.

Date

A date displaying the year and week the linearization table was configured can be added to each table. *See Figure 6*.

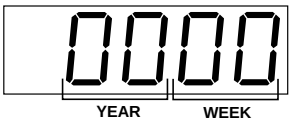
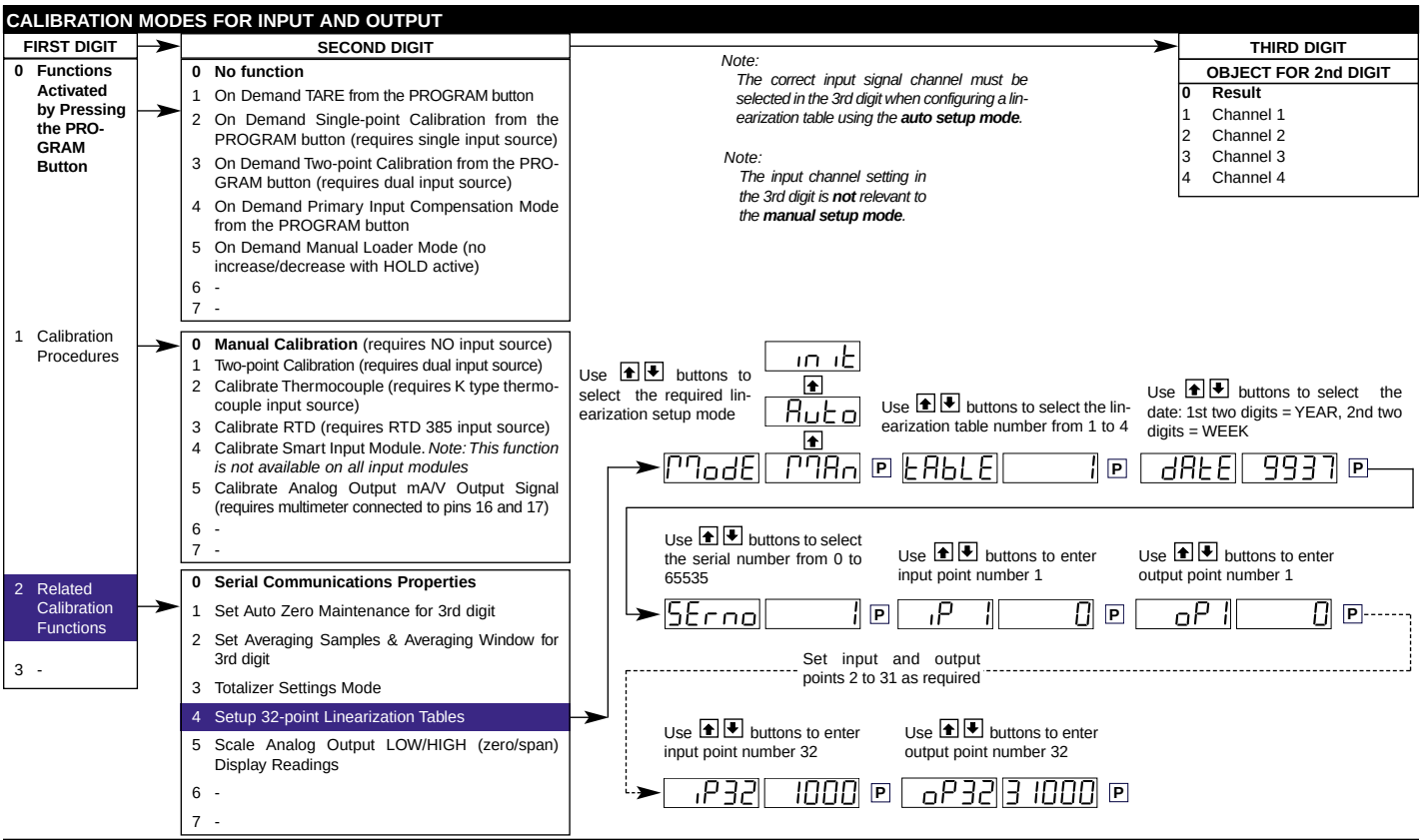


Figure 6 – Linearization Table Date Setup

Serial Number

A serial number using up to five digits from 0 to 65535 can be set for each table.



Code 1 – Configuration Settings

Before configuring the meter for a linearization application, configure the display settings for the required channel in Code 1:

- Setpoint Annunciators.
- Display Update Rate.
- Select Data Source (for selected channel to be linearized).
- Set Display Format (last digit rounding, display units, and decimal point placement).
- Select last digit text character.

CODE 1 – DISPLAY CONFIGURATION: SELECT DATA SOURCE FOR SELECTED CHANNEL

FIRST DIGIT 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.

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

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 Data Source
See diagram below

Select Display Format
See diagram below

Select Text Character
See diagram o below

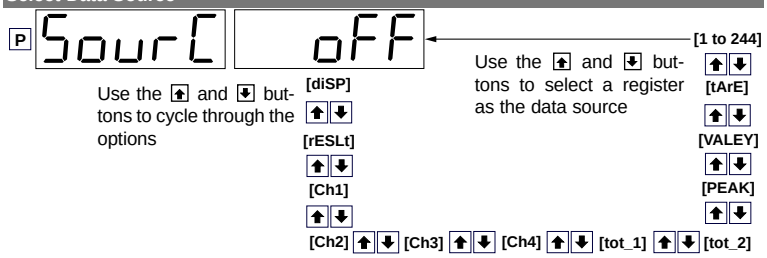
Note 1:

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.

Select Data Source



Display Format Mode

Program the three digits to the required display format mode

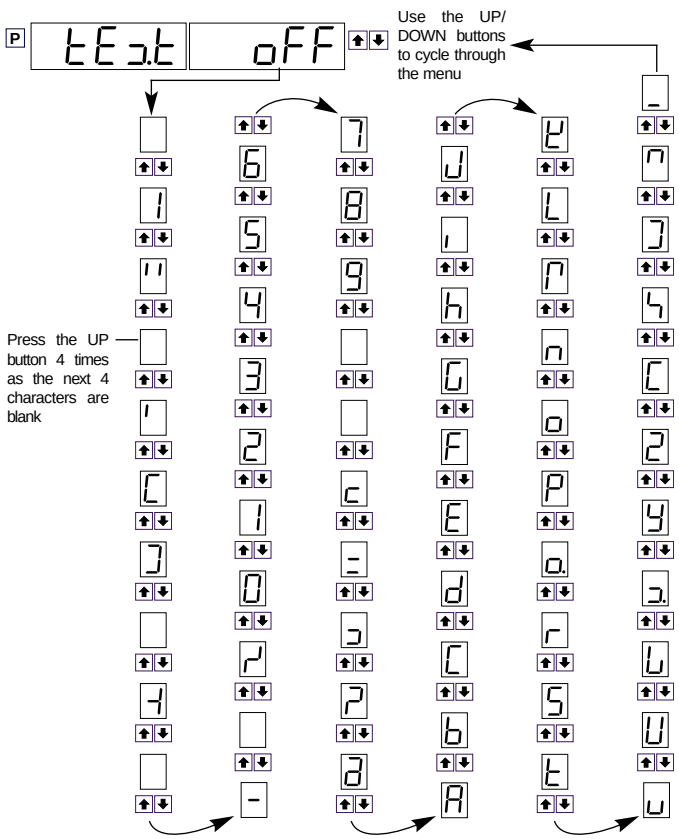
FIRST DIGIT LAST DIGIT ROUNDING
0 No rounding
1 Rounding by 2's
2 Rounding by 5's
3 Rounding by 10's

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 (6-digit version only)
2 X.XXXXX (6-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

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

Select Last Digit Text Character



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 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.*

Code 2 – Standard Thermocouple or RTD Linearization for CH1

To apply a **standard thermocouple or RTD** (pre-configured) linearization table to Channel 1, select the required table from the 2nd and 3rd digits in Code 2.

CODE 2 – CHANNEL 1 MEASUREMENT TASK AND SAMPLING RATE

FIRST DIGIT

ANALOG SAMPLE 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)
Counter or 10 millisecs Control Output Rate
See Example

3 Sample Rate: Typically 10 samples/second (50 Hz)
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 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 user defined 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 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 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 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 Sets Prescaler

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

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. *See Note 7.*

Note 7:
Only available with selected input modules.

Code 3 – Non-preconfigured Linearization for CH1

To apply a **non-preconfigured** linearization table to Channel 1, select the required table from the 2nd digit in Code 3.

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*	5 Devicenet Mode (requires Devicenet hardware module). *See Note 6*
	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 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 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 6:
These functions are not available on all models and in some cases require additional hardware.

Code 4 – Linearization for Channel 2

To apply a **standard thermocouple or RTD** (pre-configured) linearization table to Channel 2, select the required table from the 1st and 2nd digits in Code 4.

To apply a **non-preconfigured** linearization table to Channel 2, select the required table from the 3rd digit in Code 4.

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

FIRST DIGIT MEASUREMENT TASK	SECOND DIGIT FOR VOLTAGE & CURRENT	THIRD DIGIT 32-POINT LINEARIZATION FOR CH2
0 Voltage, Current	**0 Channel 2 Disabled**	**0 No user defined Linearization on CH2**
1 TC (type as per 2nd digit)	1 Direct (no post processing)	1 32-point Linearization on CH2 using Table 1
2 RTD (type as per 2nd digit)	2 Square Root of Channel 2	2 32-point Linearization on CH2 using Table 2. *See Note 5*
3 Second Digital Input Channel (type as per 2nd digit)	3 Inverse of Channel 2	3 32-point Linearization on CH2 using Table 3. *See Note 5*
	FOR THERMOCOUPLE	4 32-point Linearization on CH2 using Table 4. *See Note 5*
	0 Type J	5 125-point Linearization on CH2 (Tables 1 to 4 cascaded). *See Note 5*
	1 Type K	6 –
	2 Type R	7 –
	3 Type S	
	4 Type T	
	5 Type B	
	6 Type N	
	7 Select user defined table set up in CAL [24X]	
	FOR RTD TYPE (3-WIRE)	
	0 Resistance	
	1 RTD 385	
	2 RTD 392	
	3 RTD 120	
	4 Cn10	
	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_S 1	

Use ⬆ ⬇ buttons to set prescale values from 1 to 65535 counts

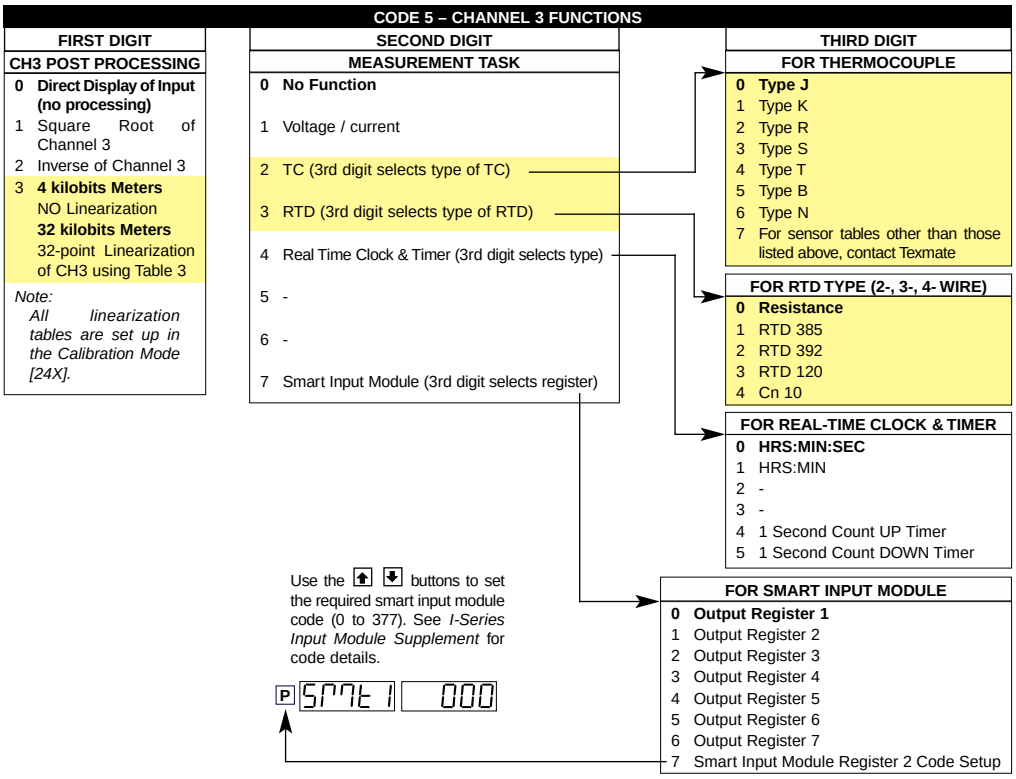
Note 5:
If only 4 kilobits of memory is installed, only Table 1 is available for:

- *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.*

Code 5 – Linearization for Channel 3

To apply a **standard thermocouple or RTD** (pre-configured) linearization table to Channel 3, select the required table from the 2nd and 3rd digits in Code 5.

To apply **non-preconfigured** linearization Table 3 to Channel 3 in a meter with more than 32 kilobits of memory, select 3 in the 1st digit in Code 5.



Code 6 – Linearization for Channel 4

To apply a **standard thermocouple or RTD** (pre-configured) linearization table to Channel 4, select the required table from the 2nd and 3rd digits in Code 6.

To apply a **non-preconfigured** linearization Table 4 to Channel 4 in a meter with more than 32 kilobits of memory, select **3** in the 1st digit 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 kilobits Meters**
  32-point Linearization of CH4 using Table 1
  32 kilobits Meters
  32-point Linearization of CH4 using Table 4

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

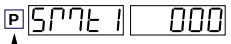
Note 7:
For future development.

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)

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



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 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 Second Count UP Timer
- 5 1 Second Count DOWN Timer

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

Code 7 – Linearization for Result of CH1 & CH2

To apply a **non-preconfigured** linearization table to the RESULT of CH1 and CH2, select the required table from the 2nd digit in Code 7.

CODE 7 – RESULT PROCESSING

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

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

Linearization Programming Sequence

The following programming sequence is a general guide describing the sequence of steps required to configure the meter with a non-preconfigured linearization table.

The first four steps can be applied to either the **manual** or **auto** setup modes. The only difference in the process is the way the input point data is applied in Step 3. Step 5 applies to standard pre-programmed temperature sensors only:

1 Initial Setup Procedures

Product Validation Checks

→ Carry out all product validation checks described in the Tiger 320 Series user manual.

For a set of product validation checks, see Product Validation Checks in the relevant Tiger 320 Series user manual.

CODE 1 – Configure the Display

→ Carry out all display configuration procedures for the relevant channel described in the Tiger 320 Series user manual.

For procedures to configure the relevant channel display, see Initial Setup Procedures in the relevant Tiger 320 Series user manual.

2 Calibrate the Input Signals

CALIBRATION MODE

→ Calibrate the relevant channel to suit the range of the linearization table and sensor input.

For a set of two-point calibration procedures, see Two-point Calibration Procedures on Page 21.

For a full set of calibration procedures, see Advanced Calibration & On Demand Mode Supplement (NZ203).

3 Configure the Linearization Tables

Enter the calibration mode by setting the three digits to [24X]:

- 1st Digit – Selects Related Calibration Functions.
- 2nd Digit – Selects Setup 32-point Linearization Tables.
- 3rd Digit – Selects the appropriate channel.

Note:
The correct input signal channel must be selected when configuring a linearization table using the auto setup mode.

CALIBRATION MODE [24X]

→ 1) Enter the calibration mode and set to [24X] to enter the Setup 32-point Linearization Tables mode.

→ 2) Select the applicable set up mode: auto, manual, initialize.

→ 3) Select the table number: 1, 2, 3, or 4.

→ 4) Set the date.

→ 5) Set the serial number.

→ 6) Enter the applicable input and output point data for all applicable points.

For a set of example linearization table configuration procedures for the manual setup mode, see Configure Linearization Settings Procedure for Manual Mode on Page 22.

For a set of example linearization table configuration procedures for the auto setup mode, see Configure Linearization Settings Procedure for Auto Mode on Page 24.

4 Apply a Linearization Table to a Channel

Example – Apply Linearization Table 1 to Channel 1

1) Enter Code 3 and set to [X1X].

For a set of example procedures applying Table 1 to Channel 1, see Apply a Linearization Table to a Channel Procedure on Page 26.

Note:
The procedure to apply a linearization table to a channel differs for each channel. See Apply a Linearization Table to a Channel Procedure on Page 26.

5 Apply a Standard Temperature Sensor to a Channel

Example – Apply an S Type Thermocouple to Channel 1

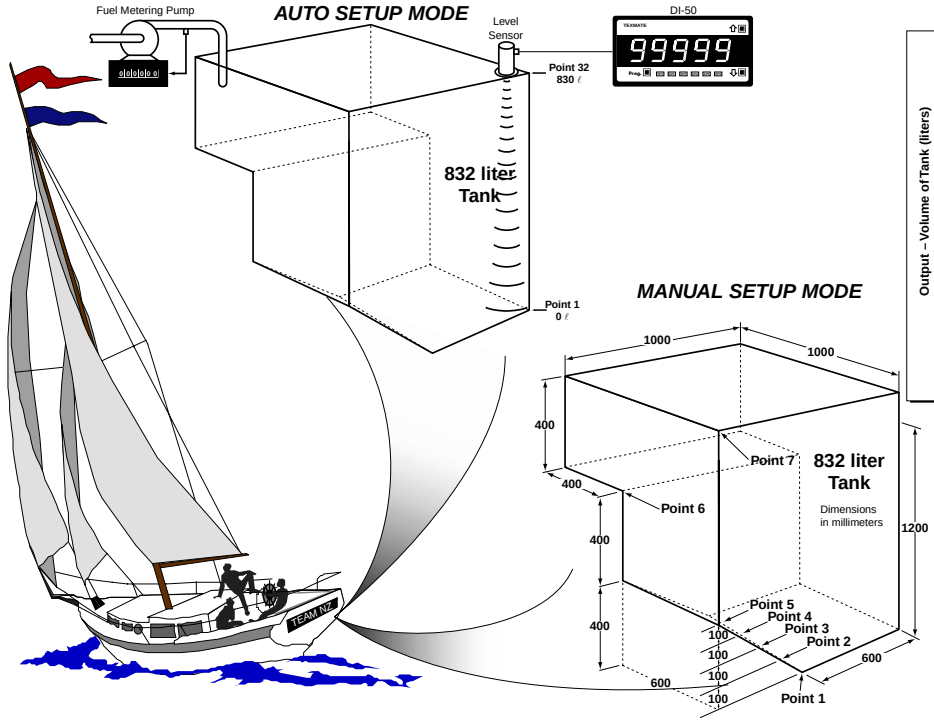
1) Ensure Channel 1 has been initially calibrated using the meter's K type thermocouple internal reference.
2) Ensure Channel 1 has been calibrated over the range of an S type thermocouple using a temperature simulator.
3) Enter Code 2 and set to [X13].

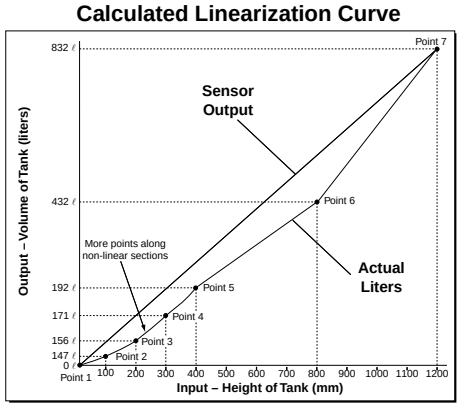
For an example, see Setting and Calibrating an S Type Thermocouple Procedure on Page 27.

Application Examples

Our customer has a yacht with an irregularly shaped fuel tank complete with mA or voltage output level sensor. The customer requires to linearize the output from the level sensor to provide greater accuracy when displaying the amount of fuel in the tank.

Texmate installed a Tiger 320 Series DI-50 meter and connected it to the level sensor. The meter is calibrated using the level sensor to provide an input related to the volume of the tank. This provides the meter span range for the linearization data points, resulting in the level sensor input displaying the volume of the tank in liters when the linearization table is loaded.





Manual Mode Calculated Points

Points on Curve	Input Points Height (mm)	Output Points Volume (liters)
1	0	0
2	100.0	147.0
3	200.0	156.0
4	300.0	171.0
5	400.0	192.0
6	800.0	432.0
7	1200.0	832.0

Figure 7 – Linearize Yacht Fuel Tank Application Example

Application Example – Manual Setup Mode

For the greatest accuracy, calculate the output curve of the level sensor using the dimensions of the tank (*See Figure 8*). This provides the volume of liquid in the tank at the critical points where the tank changes shape. The level sensor output curve can then be drawn using the calculated points.

From the output curve, decide where to place the required flexible points to reduce the error over the most non-linear sections of the curve. The points (seven in this example) are then manually entered into the linearization table in the meter using the manual setup mode.

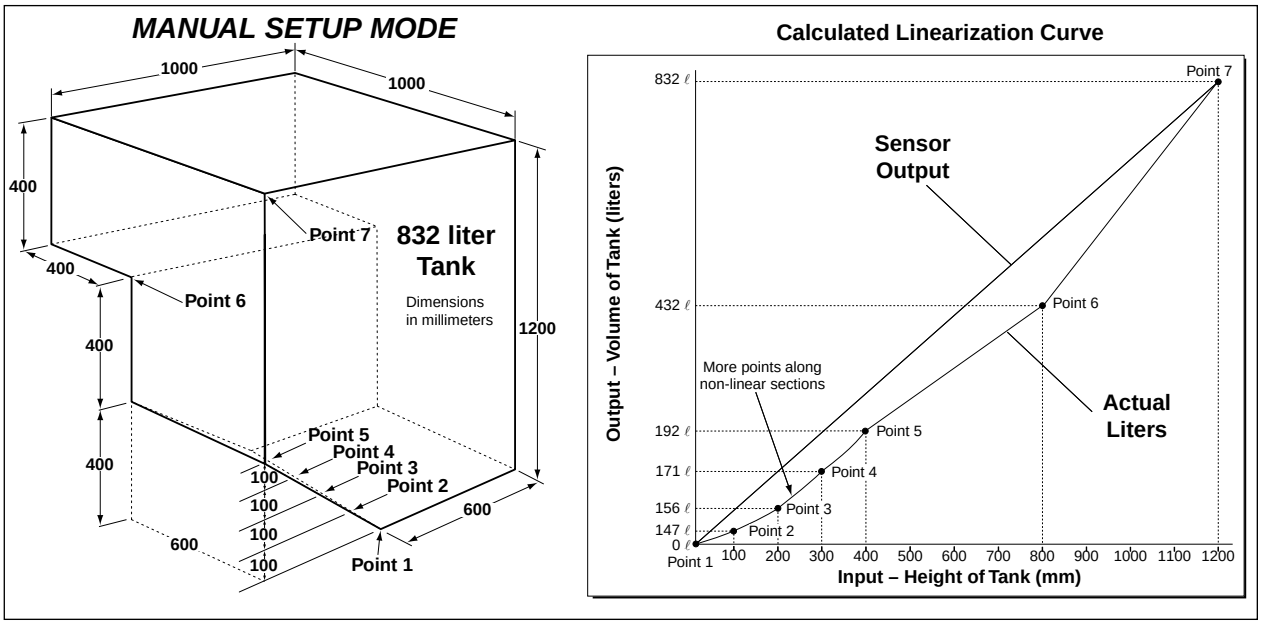


Figure 8 – Linearization of the Fuel Tank using the Manual Setup Mode

Table 2 lists the seven calculated input and output points required to linearize the output from the fuel tank level sensor. Note that the first five points have been positioned to cover the most non-linear section at the bottom of the tank.

Table 2 Manual Mode Calculated Points

Points on Curve	Input Points (Height in mm)	Output Points (Volume in liters)
1	0	0
2	100.0	35.7
3	200.0	76.4
4	300.0	122.2
5	400.0	173.1
6	800.0	436.0
7	1200.0	832.0

Application Example – Auto Setup Mode

In this example, the auto setup mode uses the output from the sensor at known increments of the tank's volume (*See Figure 9*).

The fuel tank is emptied and then filled in 32 steps of equal volume using a metering pump. At each step the output signal from the sensor is applied to the meter and stored in the linearization table (input point) along with the display setting (output point).

The following equipment and criteria are used to plot the level of the tank in 32 increments over the tank's total volume:

- Output from the level sensor connected to the meter.
- Total volume of the tank (832 liters).
- Meter calibrated to the level sensor output when the tank is empty and full.
- Pumping and metering device to fill the tank and measure the liquid.
- Display resolution configured to display tenths of a liter (0.1) in Code 1.

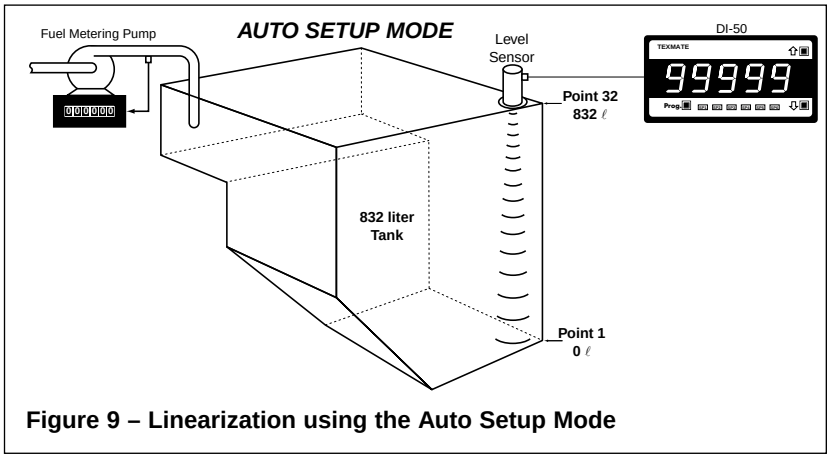


Figure 9 – Linearization using the Auto Setup Mode

Table 3 lists the 32 input and output points required to linearize the output from the fuel tank level sensor. Note that the first input/output point is at the bottom of the tank and is 0. The remaining 31 points are equal increments of 26 liters from the metering pump, bringing the total to 832 liters.

Table 3	Auto Setup Mode Linearization Points						
Point	**Add liters**	**Total liters**	**Output Setting**	**Point**	**Add liters**	**Total liters**	**Output Setting**
1	**0**	0	0	**17**	26	442.0	4420
2	26	26.0	260	**18**	26	468.0	4680
3	26	52.0	520	**19**	26	494.0	4940
4	26	78.0	780	**20**	26	520.0	5200
5	26	104.0	1040	**21**	26	546.0	5460
6	26	130.0	1300	**22**	26	572.0	5720
7	26	156.0	1560	**23**	26	598.0	5980
8	26	182.0	1820	**24**	26	624.0	6240
9	26	208.0	2080	**25**	26	650.0	6500
10	26	260.0	2600	**26**	26	676.0	6760
11	26	286.0	2860	**27**	26	702.0	7020
12	26	312.0	3120	**28**	26	728.0	7280
13	26	338.0	3380	**29**	26	754.0	7540
14	26	364.0	3640	**30**	26	780.0	7800
15	26	390.0	3900	**31**	26	806.0	8060
16	26	416.0	4160	**32**	26	832.0	8320

Application Example – Manual Setup Mode

In this example, configure **Table 1** to linearize the input signal from the fuel tank sensor on **Channel 1** using the **manual setup mode**:

1 Select the Input Signal Type for Channel 1 in Code 2

Set Code 2 to [X0X]. This selects **Voltage, Current** as the input signal type for Channel 1.

For detailed measurement task procedures, see the relevant Tiger 320 Series user manual.

2 Calibrate Channel 1 in the Calibration Mode

Calibrate CH1 using the output from the level sensor:

- With the tank empty, program the [ZEro] setting to 0 counts.
- With the tank full, program the [SPAn] setting to 12,000 counts.

For a set of calibration procedures, see Two-point Calibration Procedure on Page 21.

3 Establish the Linearization Data Points for Table 1

- Using the total volume and critical measurements, calculate the volume of the tank at the critical points where the tank changes shape.
- Draw the linearization curve using the calculated points.
- Select the points required to ensure an accurate measurement of the tank (seven in this case), ensuring that the non-linear areas are sufficiently covered to minimize errors. *See Figure 8.*

4 Configure Linearization Table 1 for CH1 in the Calibration Mode

Set the Calibration Mode to [241]. Enter the Setup 32-point Linearization Tables mode.

- Select the manual set up mode.
- Select table 1.
- Set the date.
- Set the serial number.
- Enter the applicable input and output point data for all seven points.

For a set of example linearization table configuration procedures for the manual or auto setup modes, see Configure Linearization Settings Procedure on Page 22.

5 Apply Linearization Table 1 to CH1

Enter Code 3 and set to [X1X].

For an example procedure applying Table 1 to Channel 1, see Applying a Linearization Table to a Channel Procedure on Page 26.

6 Set Decimal Point for Channel 1 in Code 1

Enter Code 1 and set to [X61]. In the Display Format Mode, set the decimal point for display resolution to tenths (0.1).

For detailed Display Format Mode procedures, see the relevant Tiger 320 Series user manual.

Application Example – Auto Setup Mode

In this example, configure **Table 2** to linearize the input signal from the fuel tank sensor on **Channel 2** using the **auto setup mode**:

1 Select the Input Signal Type for Channel 2 in Code 4

Set Code 4 to [012].

- Setting the 1st digit to 0 selects Voltage, Current as the input signal type for Channel 2.
- Setting the 2nd digit to 1 selects direct reading of CH2 with no post processing done to the signal.
- Setting the 3rd digit to 2 selects Table 2 as the linearization curve for CH2 input signal.

For detailed measurement task procedures, see the relevant Tiger 320 Series user manual.

2 Calibrate Channel 2 in the Calibration Mode

Calibrate CH2 using the output from the level sensor:

- With the tank empty, program the [ZEro] setting to 0 counts.
- With the tank full, program the [SPAn] setting to 12,000 counts.

For a set of calibration procedures, see Two-point Calibration Procedure on Page 21.

3 Configure Linearization Table 2 for CH2 in the Calibration Mode

1) Empty the tank.
2) Enter the calibration mode and set to [242]. This selects CH2.
3) Enter the Setup 32-point Linearization Tables mode.
   - Select the **auto** setup mode.
   - Select table number **2**.
   - Set the date.
   - Set the serial number.
4) With the tank empty, set output point 1 [oP 1] to **00** (oP 1 = 0.0 counts on the display).
5) Press the PROGRAM button to save input point 1 setting and enter output point 1 setting.
6) Press the PROGRAM button to save output point 1 setting.
7) Using the metering pump, add 26 ℓ of liquid to the tank.
8) Adjust output point 2 [oP 2] to **260** (oP 2 = 26.0 counts on the display).
9) Add another 26 ℓ of liquid to the tank (total 52 ℓ).
10) Adjust output point 3 [oP 3] to **520** (oP 3 = 52.0 counts on the display).
11) Repeat Steps 6 to 8, adding 26 ℓ of liquid each time and increase the output point by 26 counts until all 32 points have been loaded.

For a set of example linearization table configuration procedures for the auto setup mode, see Configure Linearization Settings Procedure on Page 24.

4 Set Decimal Point for Channel 1 in Code 1

Enter Code 1 and set to [X61]. In the Display Format Mode, set the decimal point for display resolution to tenths (0.1).

For detailed Display Format Mode procedures, see the relevant Tiger 320 Series user manual.

Application Example – Standard Temperature Sensors

In this example, configure Channel 1 with an S type thermocouple:

1 Configure Channel 1 for K Type Thermocouple

Before calibration, configure the meter to accept a K type thermocouple input for CH1. Enter Code 2 and select [X11].

2 Initial Calibration using K Type Thermocouple

Carry out an initial calibration of CH1 using the internal K type thermocouple reference:

- Connect a temperature simulator to the input module terminal pins.
- Short the input at the input module terminal pins (normally pins 1 and 2, or 1 and 3).
- Select [CAL] [121]. The meter toggles between [inPut] and [0.0V]. This is the meter's internal reference. Press the PROGRAM button.

  At this point remove the short across the input module terminals.
- The meter toggles between [ZEro] and [32F]. Apply a 32 °F input and press the PROGRAM button.
- The meter toggles between [SPAn] and [2500F]. Apply a 2500 °F input and press the PROGRAM button.

3 Select S Type Thermocouple

Enter Code 2 and select the S type thermocouple for CH1 [X13].

4 Decide on Temperature Measurement System Required

Unless otherwise requested, all Texmate meters configured for temperature applications are calibrated in degrees Fahrenheit (°F). If required, the meter display can be converted to degrees Celsius (°C) using the offset and scale factor settings in the manual calibration mode [CAL] [10X].

5 Calibrate Thermocouple using Two-point Calibration

Enter the calibration mode again and calibrate CH1 for an S type thermocouple using the two-point calibration mode [121].

For a set of example procedures to apply an S Type Thermocouple to Channel 1, see Selecting and Calibrating an S Type Thermocouple Procedure on Page 26.

Two-point Calibration Procedure

Example Procedure

Calibrate CH1 using the two-point calibration procedure to display 0 counts when the fuel tank is empty and 12,000 counts (display resolution set to 0.0) when full.

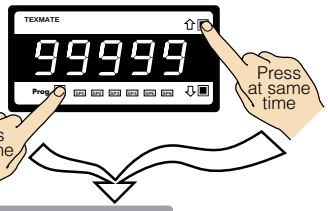
Apply the LOW input source to the meter when setting the **zero** value.

Apply the HIGH input source to the meter when setting the **span** value.

START HERE

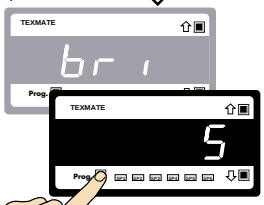
TWO-POINT CALIBRATION

Operational Display



Step 1

Enter Brightness Mode

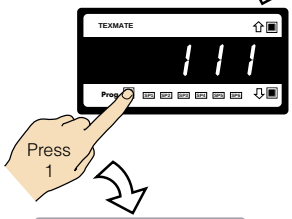


Step 2

Pass Brightness Mode and enter Calibration Mode

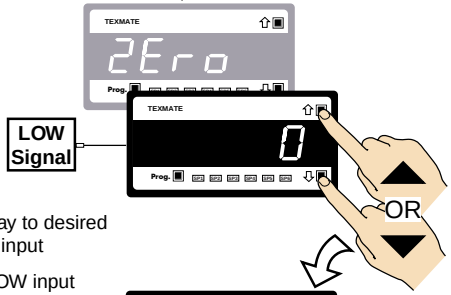
Step 3

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



Step 4

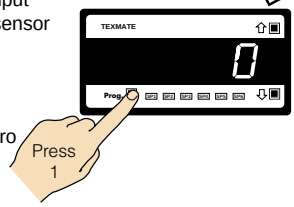
Enter the Zero Mode



Step 5

5.1. Adjust display to desired reading for zero input

5.2. Apply the LOW input signal from the level sensor (fuel tank EMPTY)

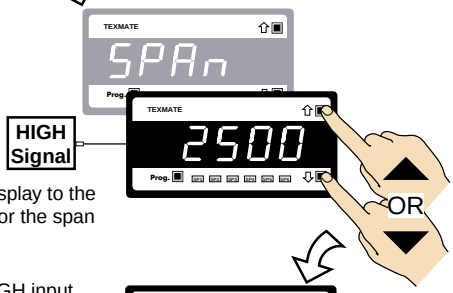


Step 6

Set the reading for zero load into the meter and enter the Span Mode

To Step 7

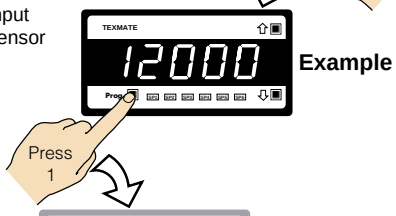
From Step 6



Step 7

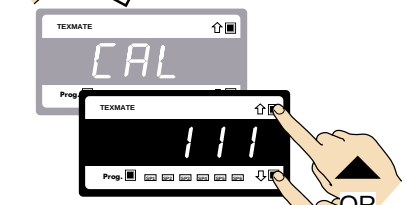
7.1. Adjust the display to the desired reading for the span input

7.2. Apply the HIGH input signal from the level sensor (fuel tank FULL)



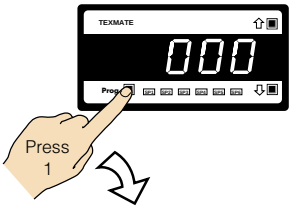
Step 8

Save zero and span settings and re-enter the Calibration Mode



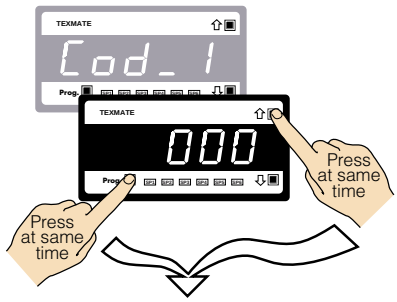
Step 9

Select the No Function Calibration Mode [000]



Step 10

Save Calibration Mode [000] setting and enter Code 1



Step 11

Exit Code 1 and return to operational display

Operational Display

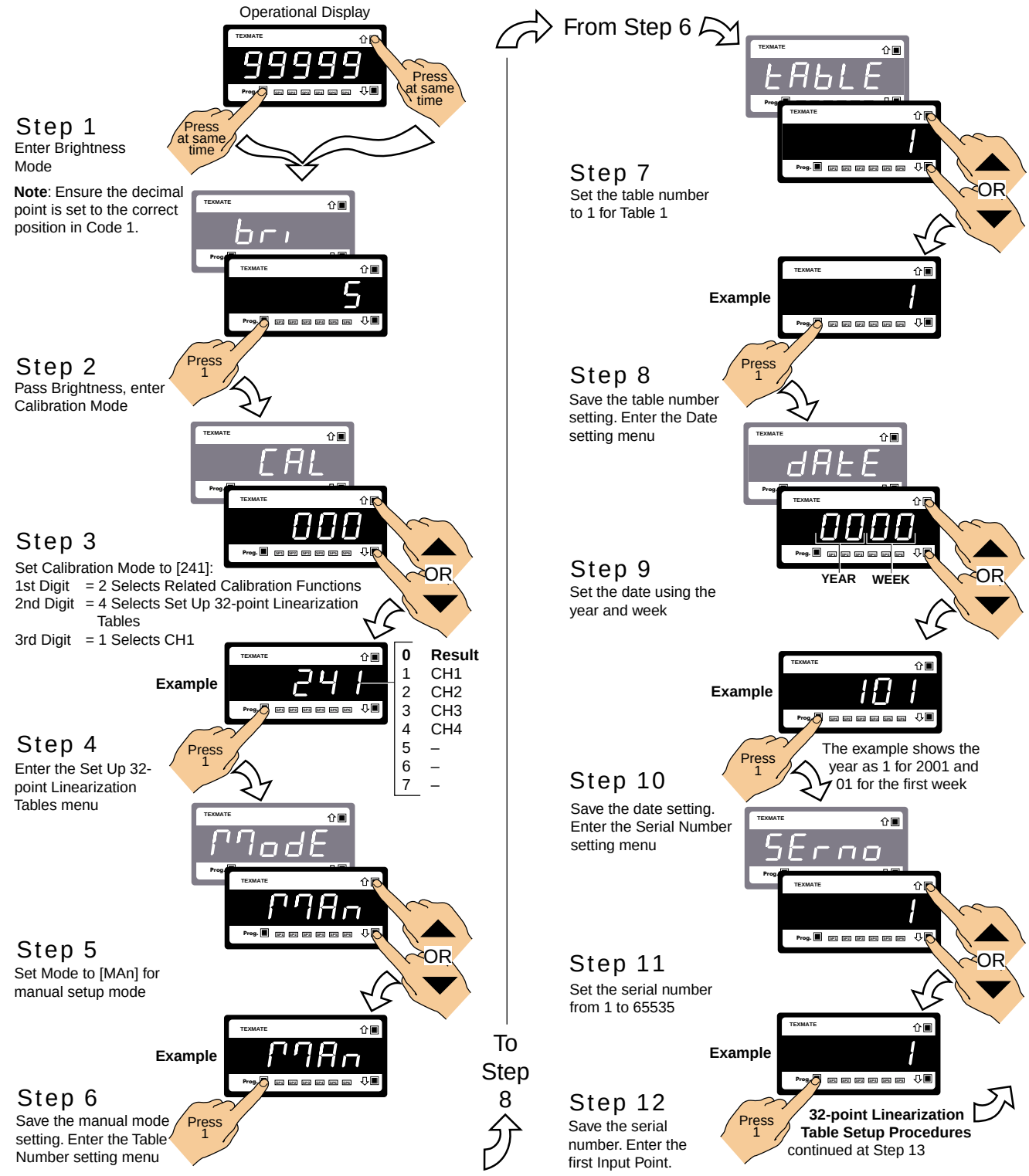
END HERE

Configure Linearization Table Settings Procedure for Manual Mode

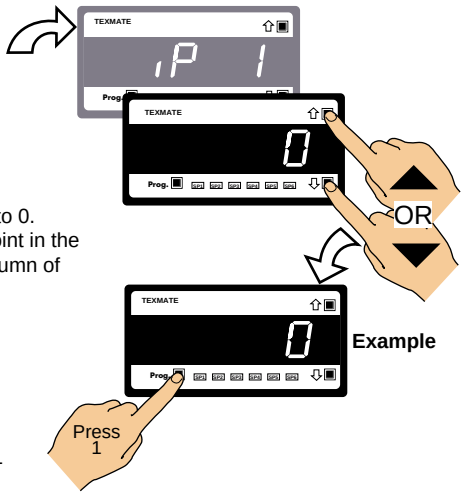
Example Procedure

Configure Linearization Table 1 for Channel 1 using the Manual Setup Mode.

START HERE **CONFIGURE LINEARIZATION TABLE SETTINGS PROCEDURE – Manual Mode**

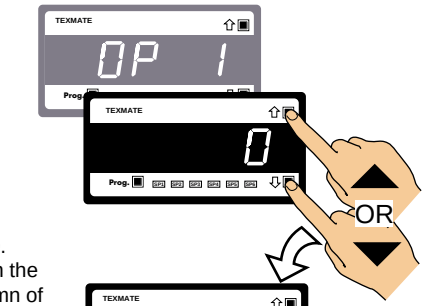


continued from Step 12

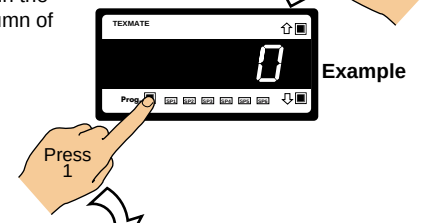


Step 13
Set input point 1 to 0. This is the first point in the Input (Height) column of Table 2

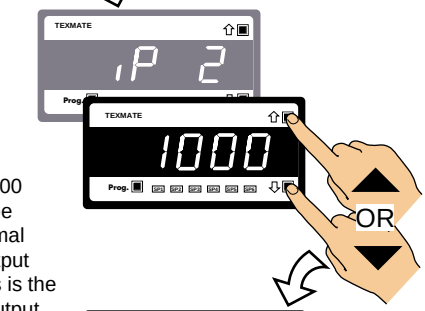
Step 14
Save input point 1



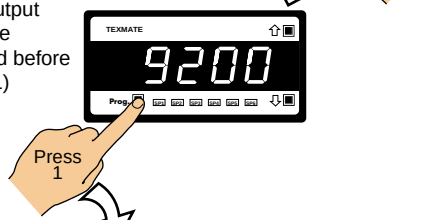
Step 15
Set output point 1 to 0. This is the first point in the Output (Volume) column of Table 2



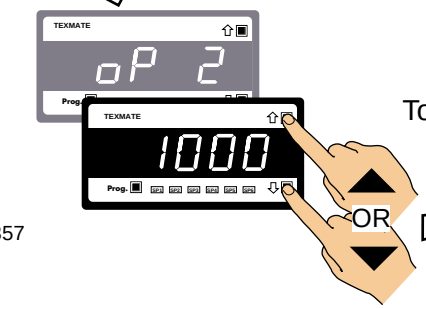
Step 16
Save output point 1. Enter Input Point 2 setting menu.



Step 17
Set input point 2 to 9200 (An extra 0 needs to be added to ensure decimal point placement in output point 2 is correct (This is the second point in the Output column of Table 2). The decimal point is placed before the last digit in Code 1)



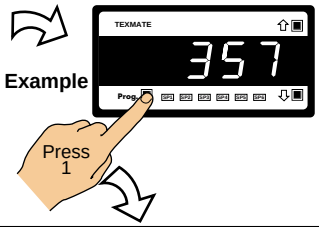
Step 18
Save input point 2. Enter Output Point 2 setting menu



Step 19
Set output point 2 to 357

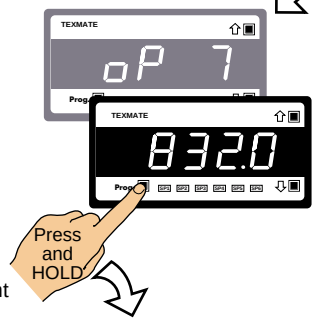
To Step 20

From Step 19

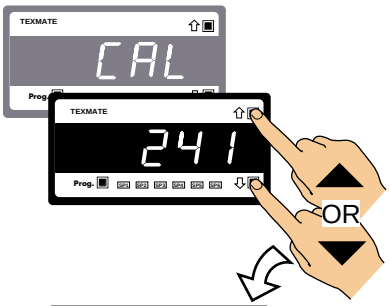


Step 20
Save output point 2. Enter Input Point 3 setting menu

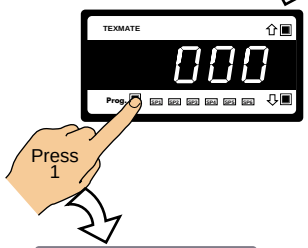
Step 21
Set the remaining five input and output points in Table 2 (IP/OP 3 to 7) by following the same procedure as Steps 16 to 19.



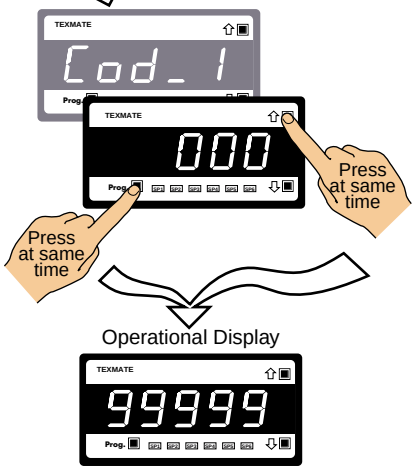
Step 22
After setting output point 7, press and HOLD the Prog. button until the meter displays [End ?] then [CAL] [241]



Step 23
Reset the Calibration Mode to [000]



Step 24
Exit the Calibration Mode



Step 25
Exit Code 1. Return to Operational Display

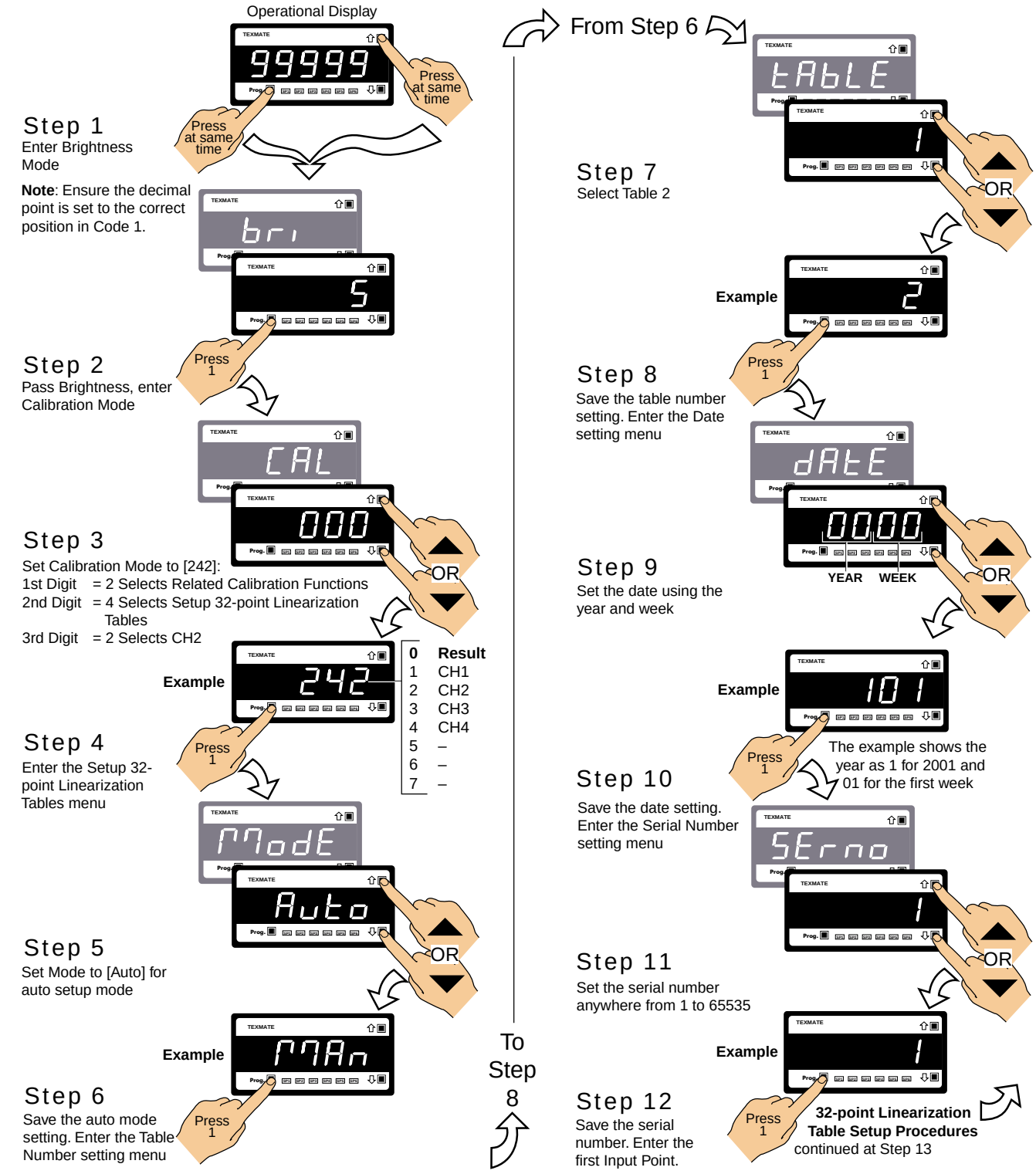
END HERE

Configure Linearization Table Settings Procedure for Auto Mode

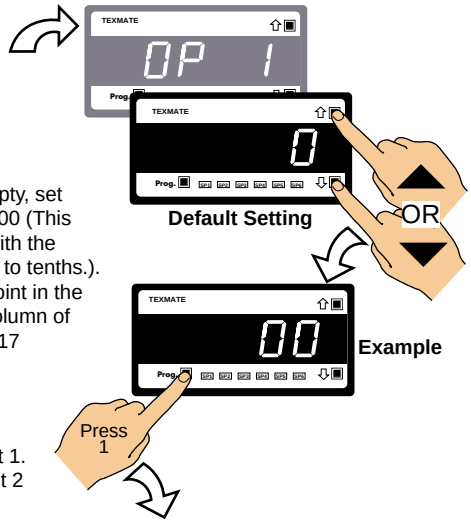
Example Procedure

Configure Linearization Table 2 for Channel 2 using the Auto Setup Mode.

START HERE **CONFIGURE LINEARIZATION TABLE SETTINGS PROCEDURE – Auto Mode**



continued from Step 12

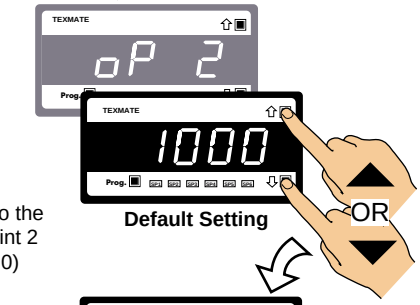


Step 13

With the tank empty, set output point 1 to 00 (This displays as 0.0 with the decimal point set to tenths.). This is the first point in the Output Setting column of Table 3 on Page 17

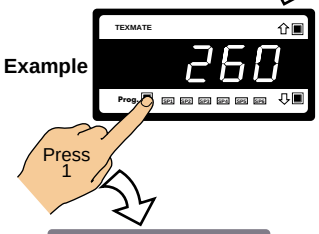
Step 14

Save output point 1. Enter output point 2 setting menu



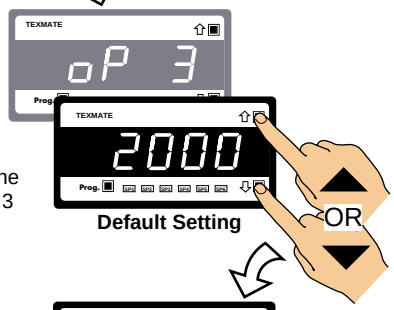
Step 15

Add 26 liters of liquid to the tank and set output point 2 to 260 (displays as 26.0)



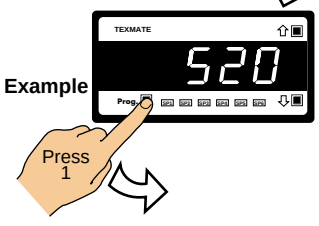
Step 16

Save output point 2. Enter output point 3 setting menu



Step 17

Add 26 liters of liquid to the tank and set output point 3 to 520 (displays as 52.0)



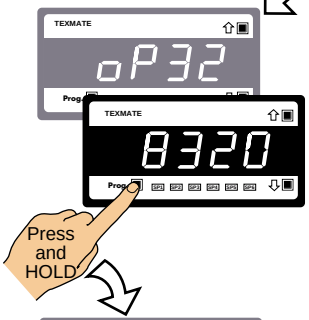
Step 18

Save output point 3. Enter output point 4 setting menu

From Step 18

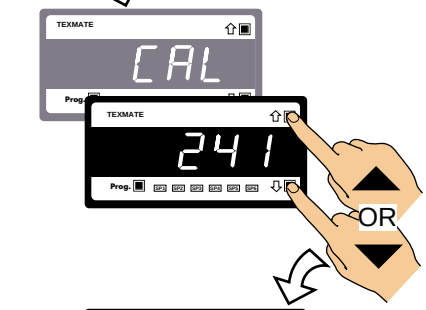
Step 19

Set the remaining 29 output points in Table 2 (OP 4 to OP 32) following the same procedure as Steps 13 to 16, adding 26 liters of liquid before entering each output point, and increasing the output point by 260 counts.



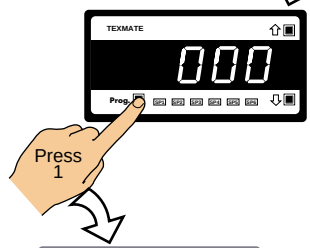
Step 20

Save output point 32. Enter the Calibration Mode



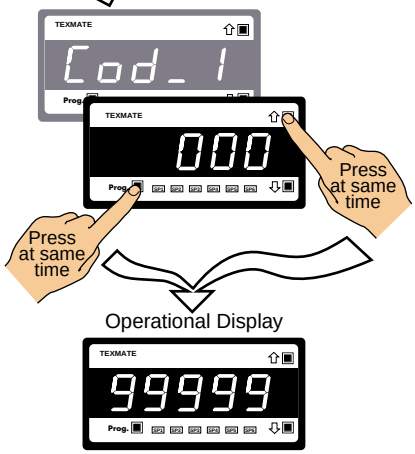
Step 21

Reset the Calibration Mode to [000]



Step 22

Exit the Calibration Mode



Step 23

Exit Code 1. Return to Operational Display

To Step 19

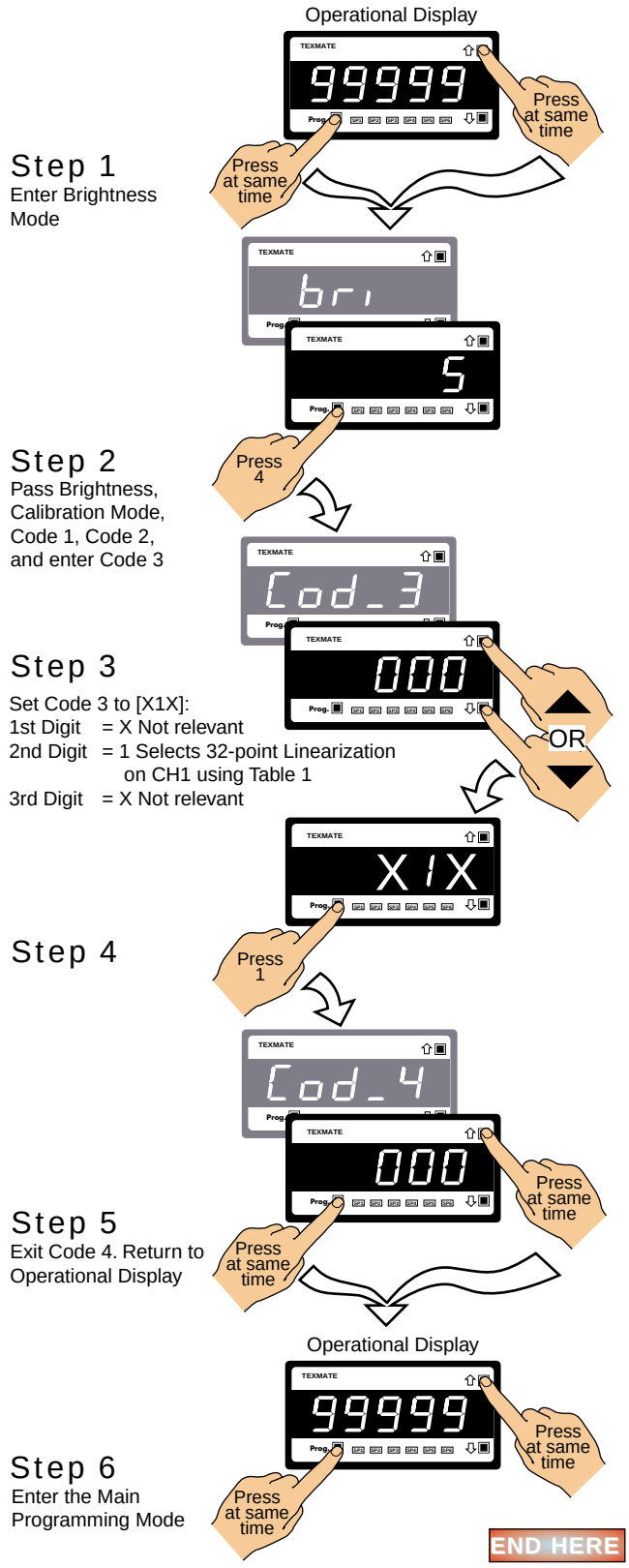
END HERE

Apply a Linearization Table to a Channel Procedure

Example Procedure

The following example describes how to apply Linearization Table 1 to channel 1. This procedure can be adapted to apply any available linearization table to an available channel.

START HERE **APPLY A LINEARIZATION TABLE TO A CHANNEL**



Channel 2

To select one of four linearization tables for channel 2, enter Code 4 and select the linearization table in the 3rd digit.

Channel 3

To select linearization Table 1 for channel 3, enter Code 5 and select 7 in the 3rd digit.

Channel 4

To select linearization Table 1 for channel 4, enter Code 6 and select 7 in the 3rd digit.

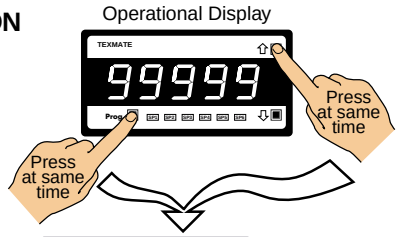
Selecting and Calibrating an S Type Thermocouple Procedure

Example Procedure

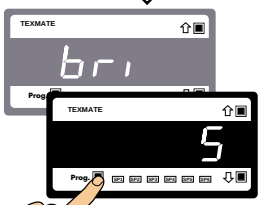
The following example describes how to select and calibrate an S type thermocouple. This procedure can be adapted to apply any available pre-configured temperature sensor to an available channel.

START HERE

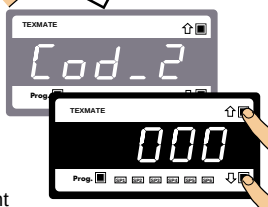
INITIAL CALIBRATION USING K TYPE THERMOCOUPLE



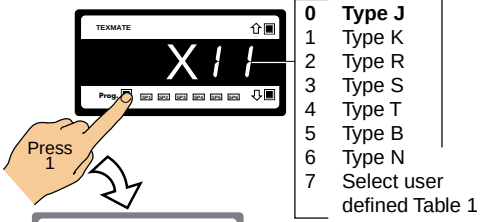
Step 1
Enter Brightness Mode



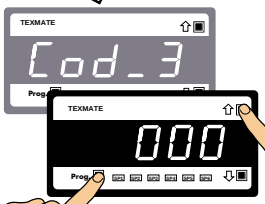
Step 2
Pass Brightness, Calibration Mode, Code 1, and enter Code 2



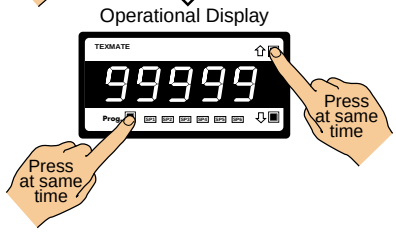
Step 3
Set Code 2 to [X11]:
1st Digit = X Not relevant
2nd Digit = 1 Selects thermocouple
3rd Digit = 1 Selects K type thermocouple



Step 4



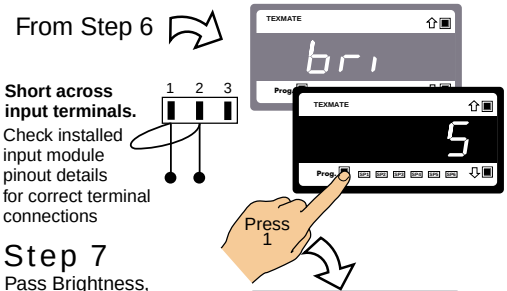
Step 5
Exit Code 3. Return to Operational Display



Step 6
Enter the Main Programming Mode

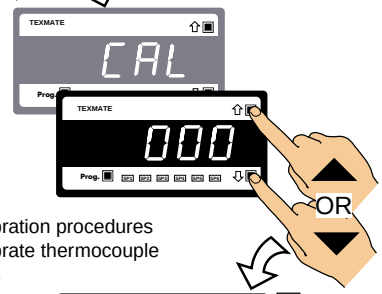
To Step 7

From Step 6

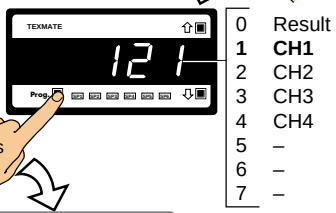


Short across input terminals.
Check installed input module pinout details for correct terminal connections

Step 7
Pass Brightness, and enter Calibration Mode

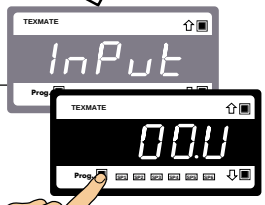


Step 8
Set CAL to [121]:
1st Digit = 1 Selects calibration procedures
2nd Digit = 2 Selects calibrate thermocouple
3rd Digit = 1 Selects CH1

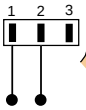


Step 9
Enter the 0.0 V internal refererence menu

0.0 V Reference Signal

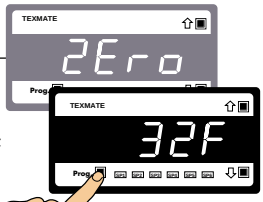


Step 10
Save the 0.0 V refererence setting and enter the ZERO input signal setting menu



Remove short from terminals

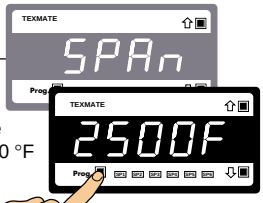
32 °F Signal



Using the temperature simulator, apply a 32 °F signal to the meter

Step 11
Save the ZERO input signal setting and enter the SPAN input signal setting menu

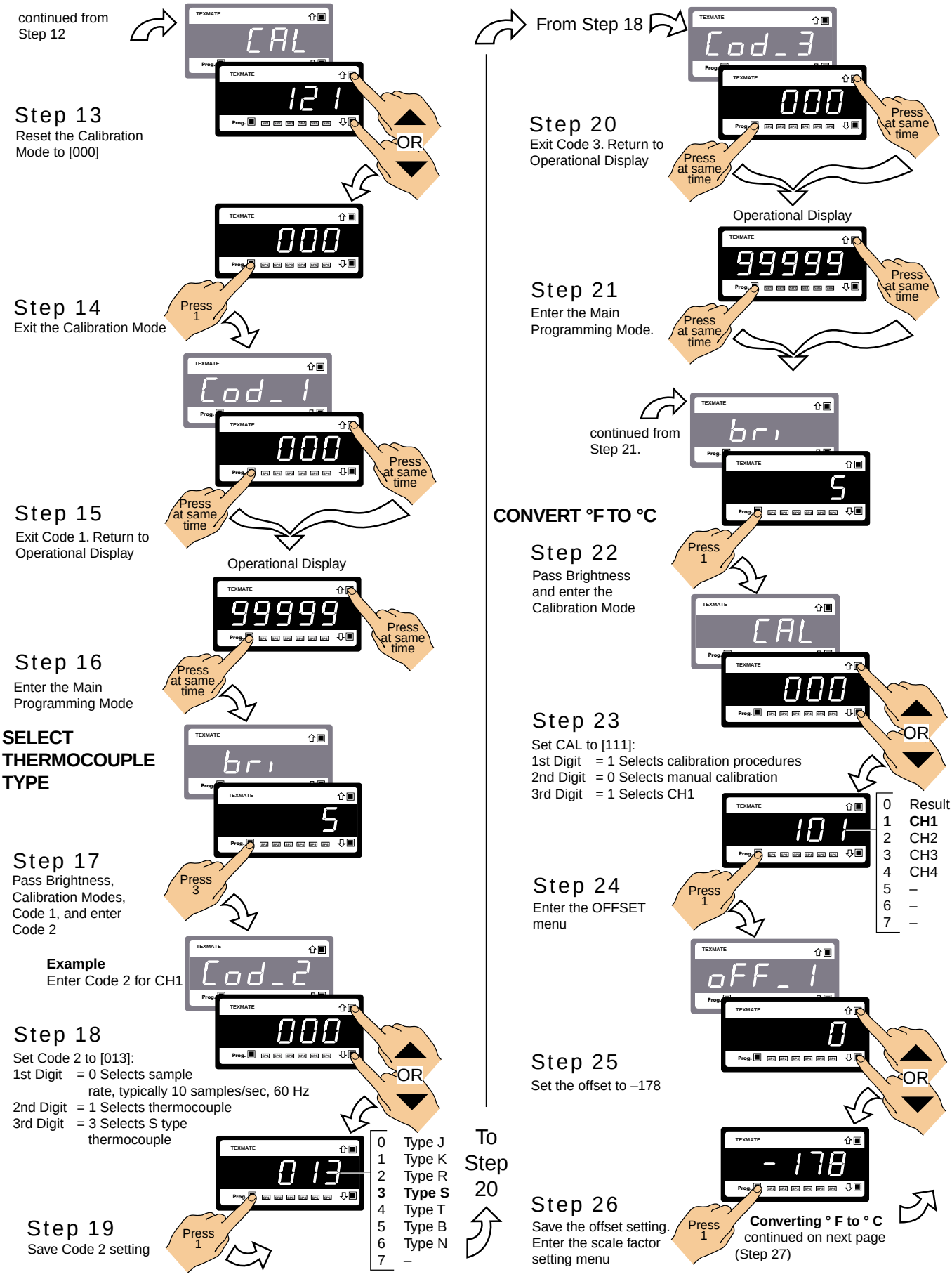
2500 °F Signal



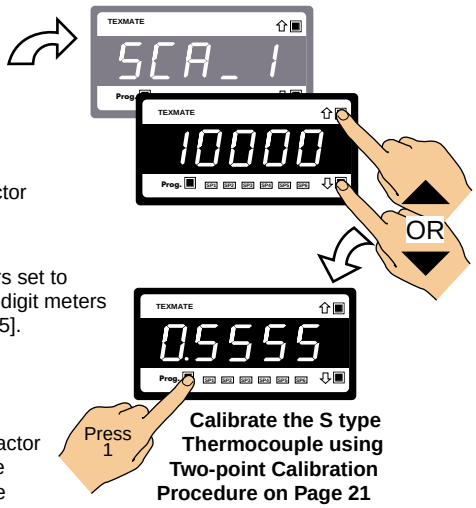
Using the temperature simulator, apply a 2500 °F signal to the meter

Step 12
Save the SPAN input signal setting and return to the calibration mode

Initial Calibration Procedure using K Type Thermocouple
continued on next page (Step 13)


continued from Step 12
CAL
121
OR
Step 13
Reset the Calibration Mode to [000]
000
Press 1
Step 14
Exit the Calibration Mode
Cod_1
000
Press at same time
Press at same time
Step 15
Exit Code 1. Return to Operational Display
Operational Display
99999
Press at same time
Press at same time
Step 16
Enter the Main Programming Mode
SELECT THERMOCOUPLE TYPE
bri
5
Press 3
Step 17
Pass Brightness, Calibration Modes, Code 1, and enter Code 2
Example
Enter Code 2 for CH1
Cod_2
000
OR
Step 18
Set Code 2 to [013]:
1st Digit = 0 Selects sample rate, typically 10 samples/sec, 60 Hz
2nd Digit = 1 Selects thermocouple
3rd Digit = 3 Selects S type thermocouple
013
0 Type J
1 Type K
2 Type R
3 Type S
4 Type T
5 Type B
6 Type N
7 –
Press 1
Step 19
Save Code 2 setting
To Step 20
From Step 18
Cod_3
000
Press at same time
Press at same time
Step 20
Exit Code 3. Return to Operational Display
Operational Display
99999
Press at same time
Press at same time
Step 21
Enter the Main Programming Mode.
continued from Step 21.
bri
5
Press 1
CONVERT °F TO °C
Step 22
Pass Brightness and enter the Calibration Mode
CAL
000
OR
Step 23
Set CAL to [111]:
1st Digit = 1 Selects calibration procedures
2nd Digit = 0 Selects manual calibration
3rd Digit = 1 Selects CH1
101
0 Result
1 CH1
2 CH2
3 CH3
4 CH4
5 –
6 –
7 –
Press 1
Step 24
Enter the OFFSET menu
oFF_1
0
OR
Step 25
Set the offset to –178
-178
Press 1
Step 26
Save the offset setting. Enter the scale factor setting menu
Converting ° F to ° C
continued on next page
(Step 27)

continued from
Step 26



Step 27

Set the scale factor to [0.5555]

Note:
For 6-digit meters set to [0.55555] and 8-digit meters set to [0.5555555].

Step 28

Save the scale factor setting. Enter the Calibration Mode

Calibrate the S type Thermocouple using Two-point Calibration Procedure on Page 21

END HERE

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