

## Associated Documents

The following documents must be read together with this supplement:

### Relevant Tiger 320 Series User Manual

The operator's manual provides general information on the relevant Tiger 320 Series meter.

### Tiger 320 Series Programming Code Sheet

The programming code sheet (NZ201) provides all meter programming codes including setpoint programming codes.

### Registers Supplement

The Registers Supplement (NZ209) provides a detailed list of all registers available for setpoint source activation and reset functions.

### Setpoint and Relays Supplement

The Setpoint and Relays Supplement (NZ201) provides detailed descriptions on all setpoint related topics.

### Advanced Calibration and On Demand Mode Supplement

The Advanced Calibration and On Demand Mode Supplement (NZ203) provides detailed descriptions on all calibration related and on-demand mode topics.

This document is designed to supplement the information on the Analog Output Module described in the Tiger 320 Series User Manuals.

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### 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.

## 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 User 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 all Tiger 320 Series literature:

### 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

# Technical Description

There are three analog output options available:

- **AIC** Single 0/4 to 20 mA.  AIC and AIV are mounted on the same board and are header selectable
- **AIV** Single 0 to 10 V DC.
- **ADV** Dual 0 to 10 V DC with common 0.

The analog output module is a programmable, isolated, 16-bit output that is scalable to any desired span within the full scale range of the controller. The single versions can be user configured for either 4-20 mA or 0-10 V DC or reverse using a selection header. The dual version can be user configured for 0-10 V DC or reverse. The selected analog output module version is mounted on the meter's output carrier board. See Figure 7.

The analog output can be programmed over:

- The full scale range of the meter and the selected input module.
- Any part within the full scale range of the selected input channel.
- Any part within the full scale range of the linearized input signal.
- The proportional band of the PID register.

The data source for the analog output can be selected from any processed meter input signal.

The span range of the analog output can be as small as 100 counts between the low and high analog output signal.

Once calibrated, the span range of the analog output can be easily changed (rescaled) without having to recalibrate the output. The low and high analog output signal values (mA or volts) follow the new span range.

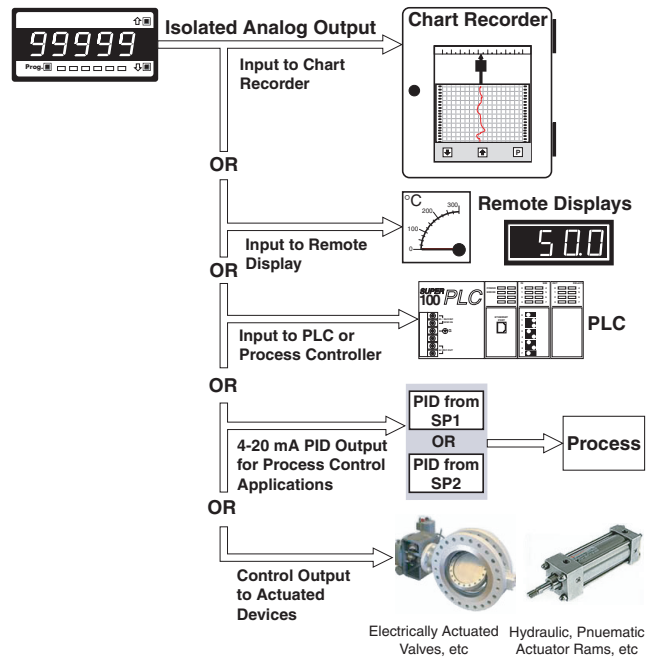


Figure 1 – Uses of Analog Output

## Technical Specifications

<b>Analog Output:</b>	AIC or AIV: Single isolated 0/4 to 20 mA (or reverse) or isolated 0 to 10 V DC (or reverse). Header Selectable.  ADV: Dual isolated 0 to 10 V DC (or reverse).
<b>Accuracy:</b>	0.02 % of full scale.
<b>Drift:</b>	Typical 50 ppm/°C.
<b>Resolution:</b>	16-bit 1/45000 counts equal to 0.4 $\mu$ A on current scale, 250 $\mu$ V on voltage scale.
<b>Compliance:</b>	500 $\Omega$ @20 mA.
<b>Update Rate:</b>	Typical 7 per second.

## Analog Output Functions

The analog output signal can be used for the following applications (see Figure 1):

- To drive remote process control instruments.
- As an isolated 4 to 20 mA/0 to 10 V DC signal for further control processing via a PLC.
- As a 4 to 20 mA PID output for process control applications (e.g. temperature control).
- As a manual loader output to manually control the operation of actuated plant equipment such as valves, dampers, hydraulic and pneumatic cylinders and slides.

## Input to PLC

The isolated analog output signal from the meter is fed into a PLC where it can be further processed.



## PID Output

The analog output signal can be used in PID process control applications. The PID control data is fed through the analog output directly to a process control system.


The PID data is sourced from the PID proportional band register, register 50 for SP1 and register 51 for SP2, in the Select Source Data menu of Code 1 (See Figure 2).

## Manual Loader Mode

In the manual loader mode, the meter is configured so that the display, in engineering units, accurately relates to the analog output.



The manual loader mode is used where precise and repeatable control is required from a digital display and manual control source. The front panel  and  buttons are used to control the analog output signal.

The manual loader mode can be configured to function in one of two ways:

- Directly displayed on the meter when the meter is in the operational display.
- Or as an on demand function of the meter activated by pressing the  button for 4 seconds.


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### *Direct Display Manual Loader Mode*

The meter can be configured in Code 1 to function exclusively as a manual loader using the meter's  and  buttons to adjust the analog output signal.

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### *On Demand Manual Loader Mode*

The manual loader mode can also be configured as an **on demand** function of the meter. It is activated by pressing the  button for 4 seconds after being configured in the calibration mode and Code 1.

When activated, the analog output signal is adjusted using the meter's  and  buttons.

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### *Upper and Lower Limits*

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.

## Meter Programming Codes

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The meter's programming codes are divided into two modes (see Figure 2):

- Main Programming Mode.
- Setpoint Programming Mode.

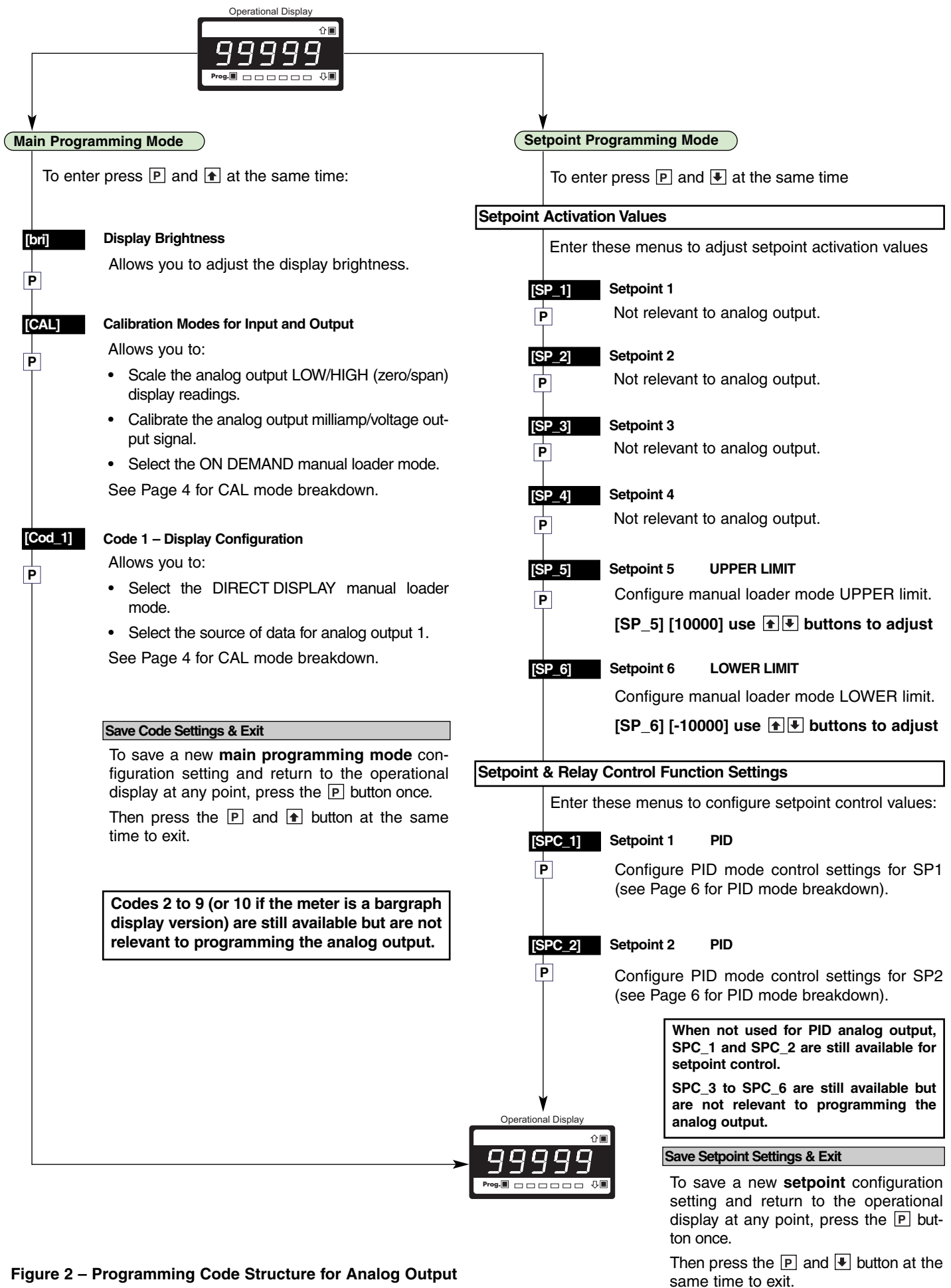
Each mode is accessible from the operational display. The meter is in the operational display when it is displaying a processed input signal.

## Main Programming Mode

The main programming mode is where the analog output is calibrated, the data source for the analog output selected, and the manual loader mode (direct display or on demand) selected.

## Setpoint Programming Mode

The setpoint programming mode is where the meter is configured for 4-20 mA or 0-10 V DC PID output on setpoints SP1 and SP2 and the manual loader mode upper and lower limits on setpoints SP5 and SP6 are set (see Figure 2).



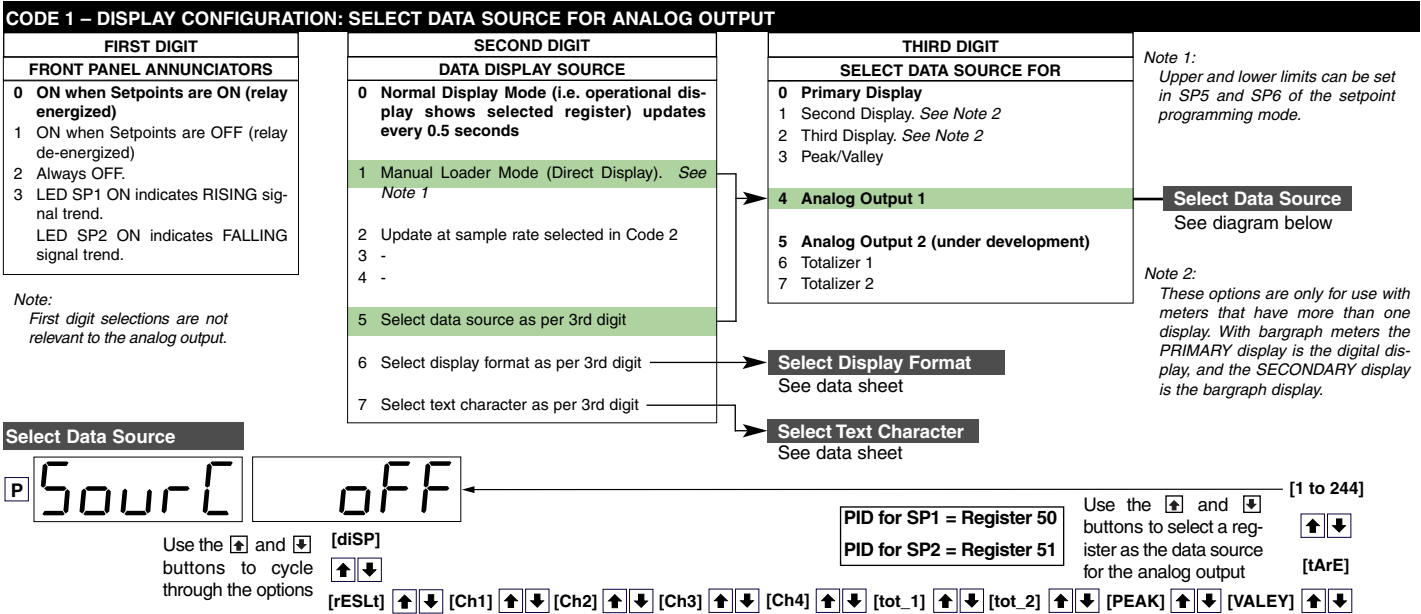
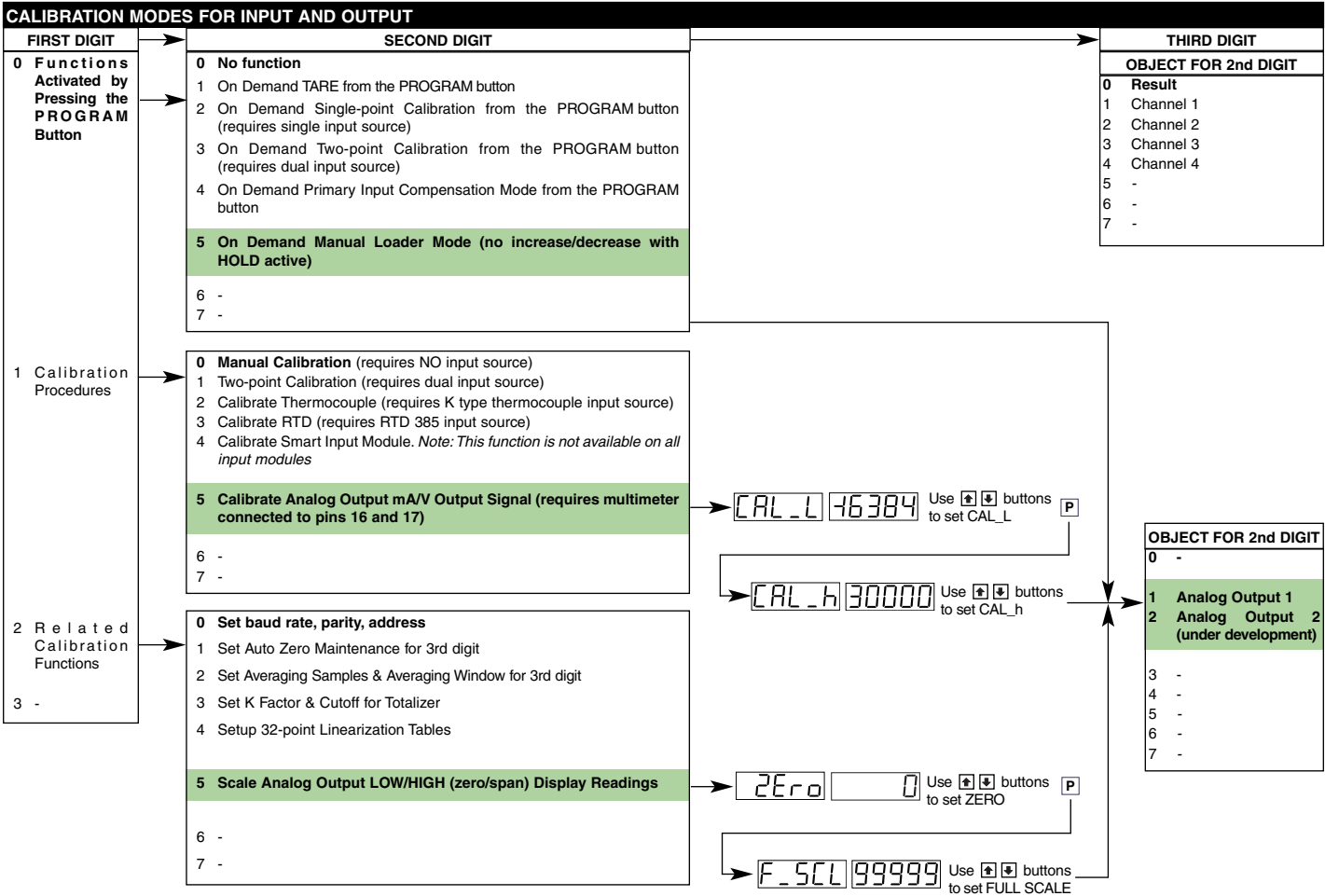
**Figure 2 – Programming Code Structure for Analog Output**

# Analog Output Configuration Programming Codes

The analog output is scaled and calibrated in the calibration mode of the meter's main programming mode. The meter is configured for specific analog output applications in the calibration mode and Code 1 of the the meter's main programming mode.

PID control via the analog output and analog output upper and lower limits are set in the set-point programming mode.

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



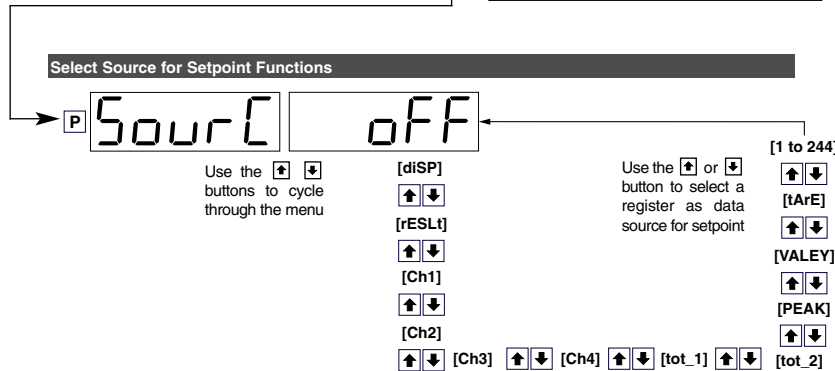
**SETPOINT PROGRAMMING MODE – SETPOINT CONTROL SETTINGS FOR PID ONLY**

FIRST DIGIT
<b>Relay Energize Function</b>
<b>0 Energized ABOVE setpoint value.</b>
1 Energized BELOW setpoint value.
2 Energized ABOVE setpoint value with FALLING INPUT SIGNAL INITIAL START-UP INHIBIT.
3 Energized BELOW setpoint value with RISING INPUT SIGNAL INITIAL START-UP INHIBIT.

SECOND DIGIT
<b>SP Activation Source</b>
<b>0 Activate Setpoint Source from Selected Register</b>
1 Select Source for Setpoint
<i>Note:</i> [X1X] is a register selection procedure only. To finish, reset to [X0X] to activate the selection, or reset to 2-7 as required for digital input selection.
2 Digital Input – Capture Pin
3 Digital Input – D1
4 Digital Input – D2
5 Digital Input – D3
6 HOLD Pin
7 LOCK Pin

THIRD DIGIT
<b>SP Delay &amp; Timing Functions</b>
<b>0 No Latching</b>
1 Relay Latched
2 Manual Relay Reset
3 Relay Latched with Manual Relay Reset
4 Relay Latched Off
<b>5 Hysteresis, Deviation &amp; PID Mode</b>
6 Timer Modes: • Normal Delay. • Repeat ON. • Pulse ON. • 1-Shot ON. • Repeat OFF. • Pulse OFF. • 1-Shot OFF.
<i>Note:</i> With PID active, all SP1 functions set in [XX6] are not functional.
7 Advanced Functions Mode: • Reset Trigger. • Reset Destination. • Reset Mode. • Reset Constant. • Trigger Print from SP. • Trigger Log from SP. • Annunciator Flashing & SP Tracking.
<i>Note:</i> [XX5], [XX6], and [XX7] are set up procedure settings only. To finish, reset to 0-4 as required for setpoint latching and relay reset modes.

See Set Up PID Mode Settings below



**Set Up PID Mode Settings**



**Programming Tip**

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

[Mode] [off]

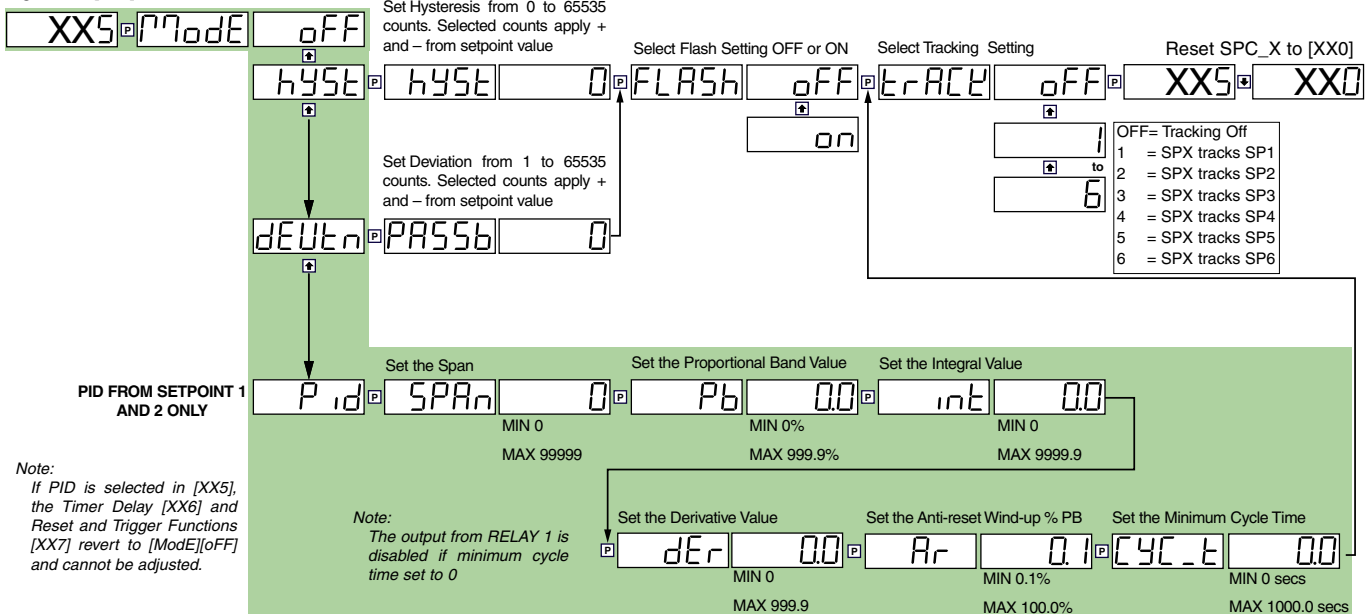
**Basic Level**

Select: Mode/OFF

**Intermediate or Advanced Level**

Select Hysteresis, Deviation or PID Mode and adjust to required setting.

SPC\_1 or SPC\_2, third digit set to [XX5]





## Configure the Output to Drive Remote Instruments or Controllers

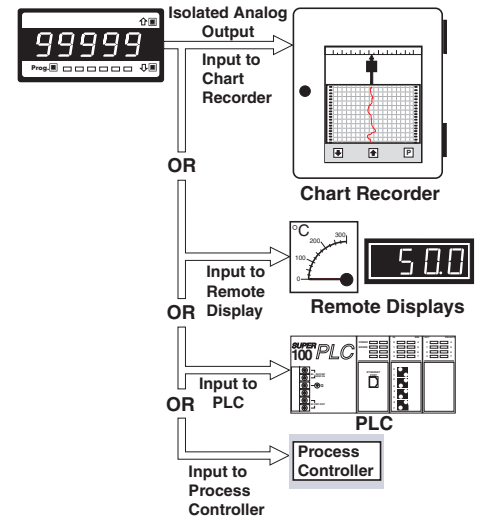
See Figure 3. The analog output is capable of driving almost any remote process instrument that displays a 4 to 20 mA or 0 to 10 V DC signal.

The analog output must be connected to the remote process instrument and configured in the following steps:

- 1) If AIV or AIC option installed, make sure the ANALOG OUTPUT SELECTION HEADER is correctly selected for the output signal type: volts or milliamps.  
*See Selection Header Positioning for details.*

- 2) For AIC or AIV option, connect a multimeter to pins 2 and 3 on Terminal 4. For ADV option, connect multimeter to pins 1 and 2 for Analog 2 and pins 2 and 3 for Analog 1.

- 3) Calibrate the analog output using the multimeter input.  
*See Analog Output Calibration Procedure for details.*



**Figure 3 – Analog Output to Remote Instruments**

### Remote Instruments:

- 4) Connect the remote process instrument to Terminal 4 (see Figure 7).
- 5) Select the source of data for the analog output in Code 1 of the meter's main programming mode.  
*See Select Data Source Procedure for details to configure the data source for the analog output to a remote instrument.*

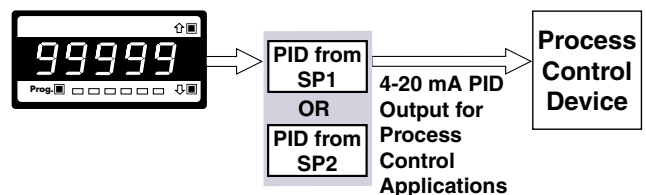
### PLC:

- 4) Connect the PLC to Terminal 4 (see Figure 7).
- 5) Select the source of data for the analog output in Code 1 of the meter's main programming mode.  
*See Select Data Source Procedure for details to configure the data source for the analog output to a PLC.*

## Configure for PID Output

The analog output signal can be used to feed PID control data from the meter to control process applications.

The analog output must be connected to the control device and configured in the following steps (see Figure 4):



**Figure 4 – PID via Analog Output**

- 1) If AIV or AIC option installed, make sure the ANALOG OUTPUT SELECTION HEADER is correctly selected for the output signal type: volts or milliamps.  
*See Selection Header Positioning for details.*

- 2) For AIC or AIV option, connect a multimeter to pins 2 and 3 on Terminal 4. For ADV option, connect multimeter to pins 1 and 2 for Analog 2 and pins 2 and 3 for Analog 1.

- 3) Calibrate the analog output using the multimeter input.  
*See Analog Output Calibration Procedure for details.*

- 4) Connect the process control device to Terminal 4 (see Figure 7).

- 5) Enter Code 1 of the meter's main programming mode:

- a) Set Code 1 to [X54]. This selects **analog output 1**.
- b) Select register 50 (SP1 PID output value) or register 51 (SP2 PID output value) as the source of data for the analog output signal of SP1 or SP2 as required.

*See Select Data Source Procedure for details to configure the PID as the source of data for the analog output signal of SP1 or SP2.*

- 6) Enter the setpoint programming mode and configure setpoint 1 or setpoint 2, or both for PID functions.

*See Setpoints and Relays Supplement for full details on the PID mode.*



## Direct Display Manual Loader Mode

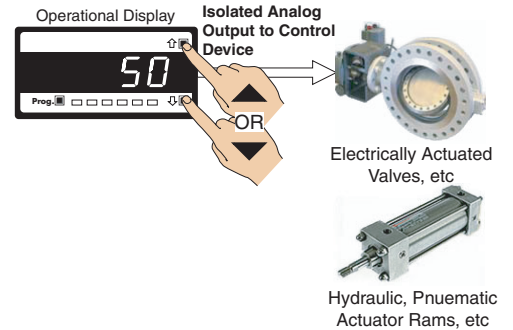
The meter can be configured to operate exclusively as a manual loader to control equipment while in the operational display.

The analog output must be connected to the control equipment and configured in the following steps:

- 1) If AIV or AIC option installed, make sure the ANALOG OUTPUT SELECTION HEADER is correctly selected for the output signal type: volts or milliamps. See *Selection Header Positioning* for details.
- 2) For AIC or AIV option, connect a multimeter to pins 2 and 3 on Terminal 4. For ADV option, connect multimeter to pins 1 and 2 for Analog 2 and pins 2 and 3 for Analog 1.
- 3) Scale and calibrate the analog output using the multimeter input. See *Analog Output Calibration Procedure* for details.
- 4) Connect the control equipment to Terminal 4 (see Figure 7).
- 5) Enter Code 1 of the meter's main programming mode:

- a) Set to [X54]. Select [DiSP] as the source of data for the **analog output**.
- b) Reset Code 1 to [X50]. Select [DiSP] as the source of data for the **primary display**.
- c) Reset Code 1 to [X14]. This selects *Manual Loader Mode (Direct Display)* for **Analog Output 1**.

See *Direct Display Manual Loader Mode Procedure* for details to configure the meter for direct display manual loader mode.



**Figure 5 – Direct Display Manual Loader Mode**

Return to the operational display. The meter is now configured for direct display manual loader mode. Pressing the UP or DOWN buttons increases or decreases the analog output.

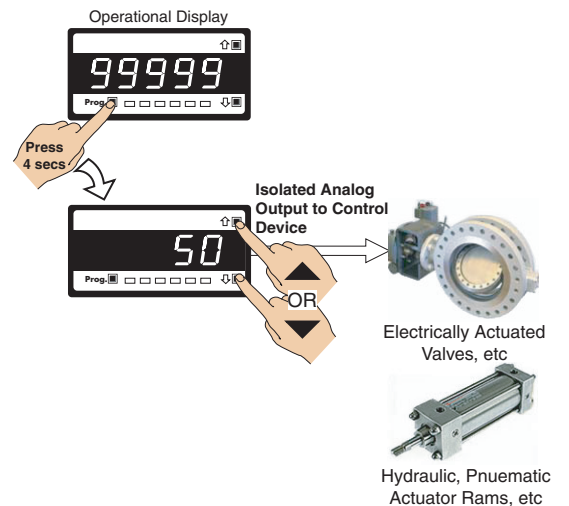
## On Demand Manual Loader Mode

The meter can be configured to operate on demand as a manual loader on control equipment. This leaves the meter free to perform normal control functions.

The analog output must be connected to the actuated plant equipment and configured in the following steps:

- 1) If AIV or AIC option installed, make sure the ANALOG OUTPUT SELECTION HEADER is correctly selected for the output signal type: volts or milliamps. See *Selection Header Positioning* for details.
- 2) For AIC or AIV option, connect a multimeter to pins 2 and 3 on Terminal 4. For ADV option, connect multimeter to pins 1 and 2 for Analog 2 and pins 2 and 3 for Analog 1.
- 3) Scale and calibrate the analog output using the multimeter input. See *Analog Output Calibration Procedure* for details.
- 4) Connect the control equipment to Terminal 4 (see Figure 7).
- 5) Enter Code 1 of the meter's main programming mode:

- a) Set to [X54]. Select [DiSP] as the source of data for the **analog output**.
- b) Reset Code 1 to [X50]. Select a channel (CH1 to CH4) as the source of data for the **primary display**.
- c) On leaving Code 1, set to [X10]. This selects manual loader mode on the primary display.



**Figure 6 – On Demand Manual Loader Mode**

6) Enter the calibration mode [CAL] of the meter's main programming mode and set the 2nd digit to [X5X] to select On Demand Manual Loader Mode. Select the same channel that you selected in Step 5 in the 3rd digit:

- [X51] = Analog Output 1.
- [X52] = Analog Output 2.

See *On demand Manual Loader Mode Procedure* for details to configure the meter for on demand manual loader mode.

To activate the on demand manual loader mode, press the PROGRAM button for 4 to 5 secs. The meter toggles between [Ch1] and the current display counts. Pressing the UP or DOWN buttons increases or decreases the analog output.

## Connector Pinouts & Component Layout

Pinout details for both single and dual analog output modules are shown in table TERMINAL 4 opposite and Figure 7 below.

In *Figure 7 – Exploded View of Meter Modular Boards*, all circuit boards are shown in an exploded assembly view of the meter without the meter case. All connector terminal numbers or names are identified. These are described in detail in the relevant Tiger user manual.

The analog output module is mounted on the component side of the output carrier board. The analog output selection header is easily repositioned by pulling the output carrier board from the meter case.

See *Selection Header Positioning* for further details.

TERMINAL 4	
Pin No.	Function
<b>AIC / AIV: Single Output</b>	
1	Not Connected
2	- Common
3	+ Analog 1
<b>ADV: Dual Output</b>	
1	+ Analog 2
2	- Common
3	+ Analog 1

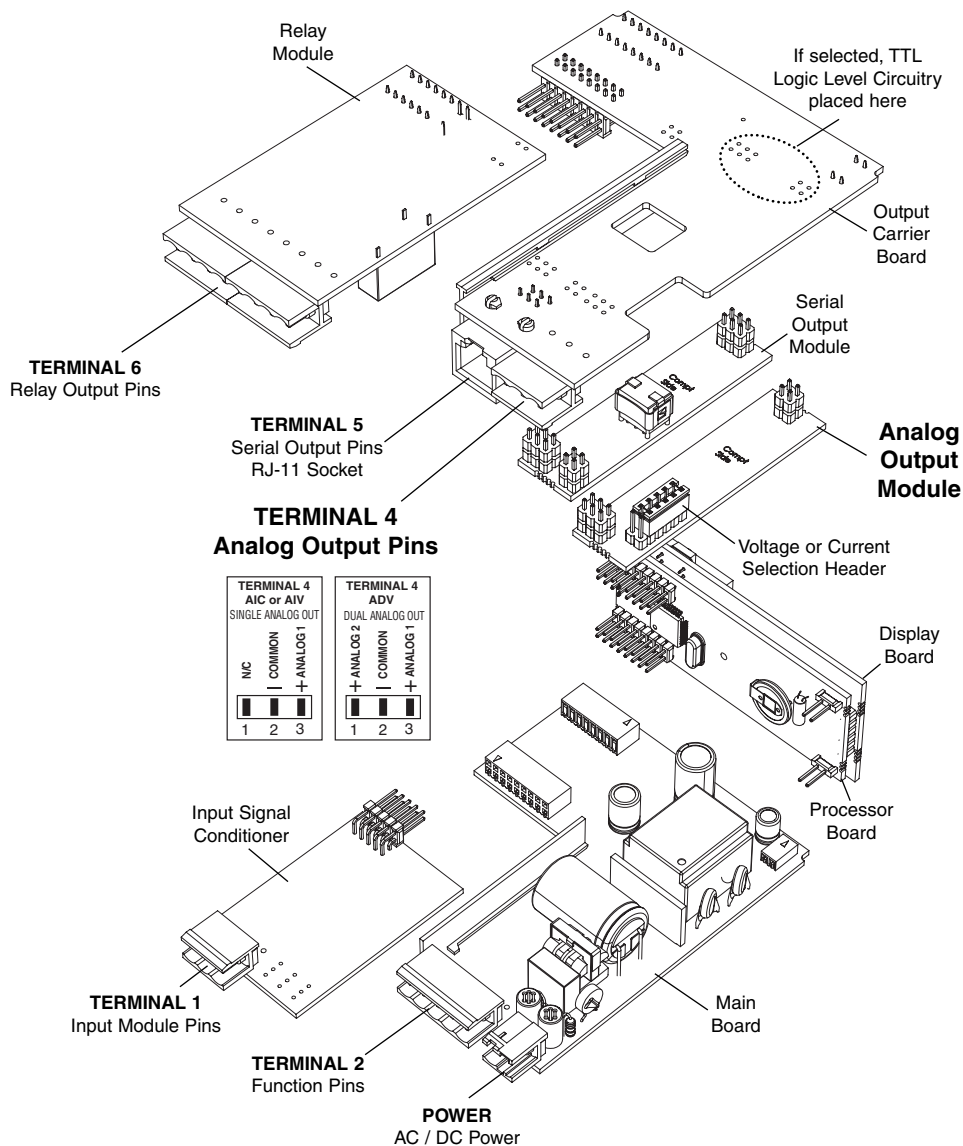


Figure 7 – Exploded View of Meter Modular Boards

# Selection Header Positioning

The analog output selection header can be positioned for current (0/4 to 20 mA) or voltage (0 to 10 V DC) output. To change the header selection, the output carrier board must be removed from the meter. See Figures 8 and 9.

To reposition the analog output selection header, proceed as follows:

## STEP A Disconnect the Power Supply and Input/Output Connectors



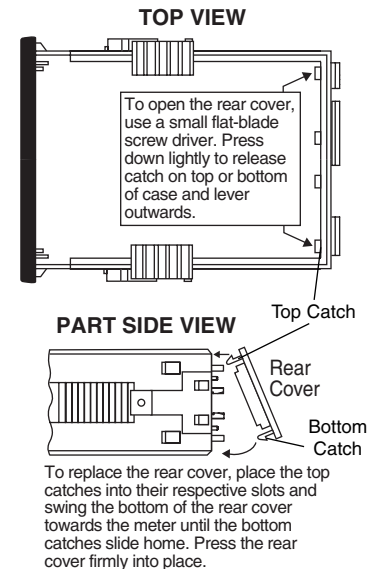
### WARNING

**AC and DC power supply voltages are hazardous. Make sure the power supply is isolated before disconnecting from the meter.**

- 1) Pull the AC power supply connector block from the AC power input pins.
- 2) Pull all other input and output connectors from their sockets.

## STEP B Remove the Rear Cover from the Meter

- 1) Using a small flat-blade screw driver, press down lightly to release the catch on the top of the case and lever outwards.
- 2) Repeat for the other top catch.
- 3) With both top catches free, pull the rear cover away from the meter.



**Figure 8 – Rear Cover Removal**

## STEP C Remove the Carrier Board

- 1) Pull the carrier board until it is free from the meter case.

## STEP D Select the Correct ANALOG OUTPUT SELECTION HEADER Setting

- 1) If not in the correct position, pull the header from its pins and reposition it to suit the analog output signal: VOLTAGE or CURRENT.

## STEP E Replace the Carrier Board

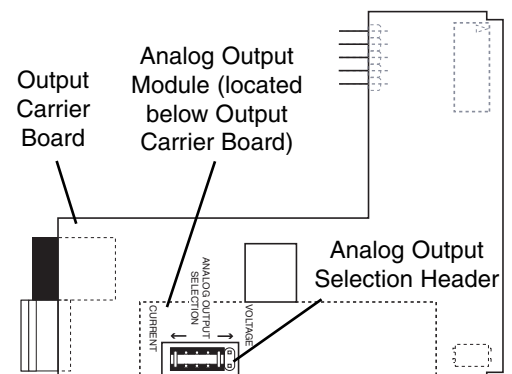
- 1) Gently push the carrier board back into the meter case, taking care to correctly align the board with the slots on the meter case.

## STEP F Replace the Rear Cover

- 1) Place the top catches into their respective slots and swing the bottom of the rear cover towards the meter until the bottom catches slide home.
- 2) Press the rear cover firmly into place.

## STEP G Reconnect the Power Supply and Input/Output Connectors

- 1) Ensure the power supply is still isolated.
- 2) Reconnect the AC power supply connector block to the AC power input pins.
- 3) Reconnect the input and output connectors.
- 4) Remove the isolation from the power supply.



**Figure 9 – Analog Output Selection Header Placement**

**The power and input signal should be restored and the meter should be in the operational display.**

# Analog Output Scaling & Calibration Procedure

Analog output calibration is a two-part procedure covering scaling and calibration. The scaling settings can be changed independently of the calibration settings and vice versa.

- 1) See Figure 9. Make sure the ANALOG OUTPUT SELECTION HEADER on the analog output module is set in the appropriate position: VOLTAGE or CURRENT.
- 2) See Figure 10. Connect a multimeter to the analog output connector at the rear of the meter (pin 16-positive, pin 17-negative).
- 3) Make sure the multimeter is set to read the appropriate signal type: volts or milliamps.

## Scaling Procedure

Scaling the analog output requires the zero [ZEro] and full scale [F\_SCL] parameters to be set.

Zero is the setting at which the analog output is required to be at its calibrated **low** output. Full scale is the setting at which the analog output is required to be at its calibrated **high** output.

There are no limits to the difference between the zero and full scale settings. The difference can be anywhere between 1 count and the entire display range of the meter.

## Calibration Procedure

Calibrating the analog output requires setting the [CAL\_L] and [CAL\_h] parameters. [CAL\_L] is used to set the calibrated **low** output, and [CAL\_h] is used to set the calibrated **high** output. The calibrated low and high outputs can be set anywhere between  $-0.3$  to  $+21$  mA for current or  $-0.3$  V to  $+10.5$  V for voltage.

## Example

In our example procedure, we describe how to calibrate a single analog output (Analog 1) for 4 to 20 mA over a scaled range of 50 to 3000 counts. With a display of 50 counts, the analog output must be 4.00 mA. With a display of 3000 counts, the analog output must be 20.00 mA.

Steps 1 to 8 describe how to set [ZEro] and [F\_SCL], and Steps 9 to 19 describe how to set [CAL\_L] and [CAL\_h].

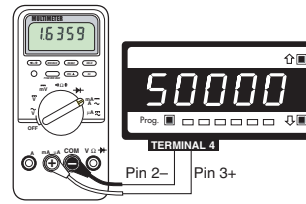


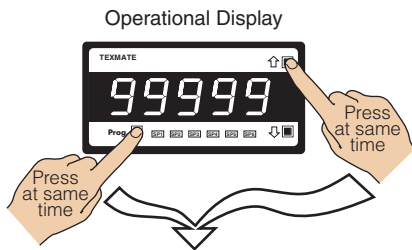
Figure 10 – Multimeter to Meter Connections

### START HERE

#### SCALING PROCEDURE

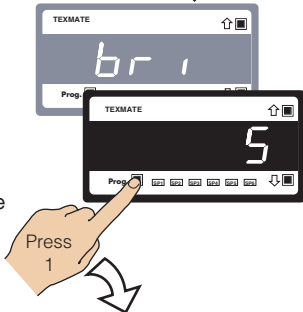
#### Step 1

Enter the Brightness Mode



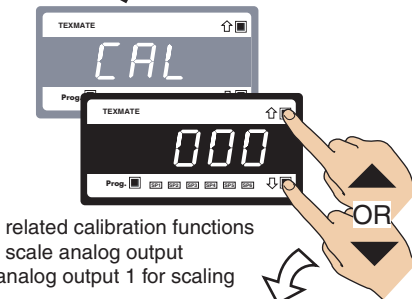
#### Step 2

Pass Brightness Mode and enter Calibration Mode



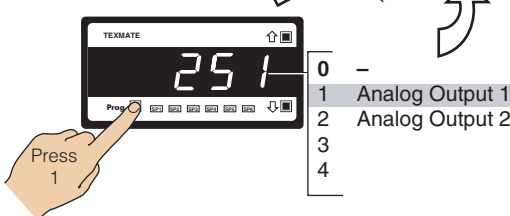
#### Step 3

Set CAL to [251]:  
 1st Digit = 2 Selects related calibration functions  
 2nd Digit = 5 Selects scale analog output  
 3rd Digit = 1 Select analog output 1 for scaling



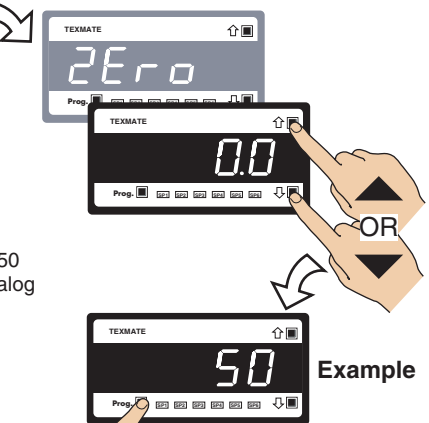
#### Step 4

Enter [ZEro] setting mode



#### Step 5

Adjust the display to 50 counts for the low analog output signal



#### Step 6

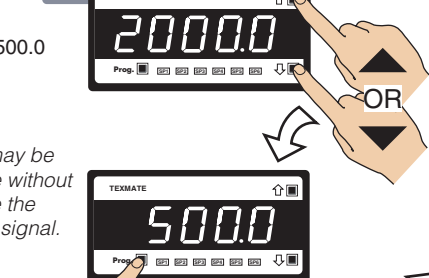
Enter the [F\_SCL] Setting mode



#### Step 7

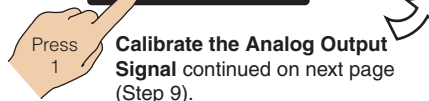
Adjust the display to 500.0 high analog output signal counts

Note:  
 The scale settings may be changed at any time without having to recalibrate the analog mA/V output signal.



#### Step 8

Save scale settings (zero and full scale). To return directly to the Operational Display, proceed to Step 17.



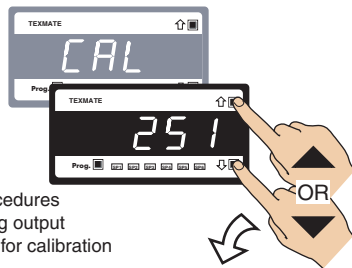
**Configure Analog Output Procedure**  
continued from bottom of previous page

**START HERE**

**CALIBRATION PROCEDURE**

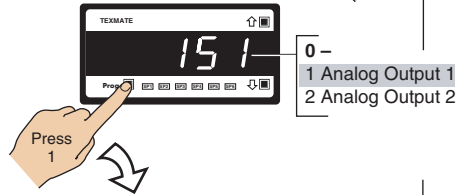
**Step 9**

Set CAL to [151]:  
1st Digit = 1 Selects calibration procedures  
2nd Digit = 5 Selects calibrate analog output  
3rd Digit = 1 Select analog output 1 for calibration



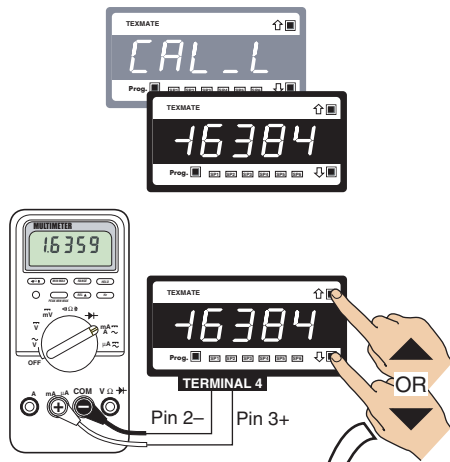
**Step 10**

Enter analog output LOW signal calibration mode



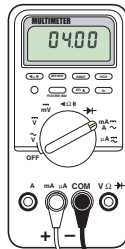
**Step 11**

Ensure the low analog output signal reading [CAL] on the multimeter display is 4.00 mA.

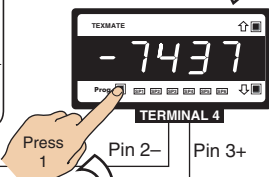


**Step 12**

If not correct, press the ↑ OR ↓ button on the Tiger meter until the reading on the multimeter display is correct.



Example



**Step 13**

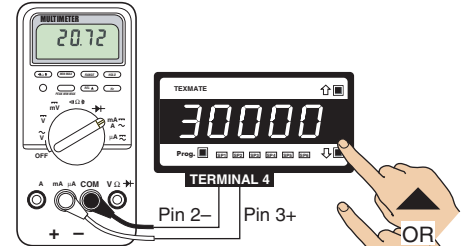
Save the low analog output signal setting. Enter analog output high signal calibration mode



To Step 14

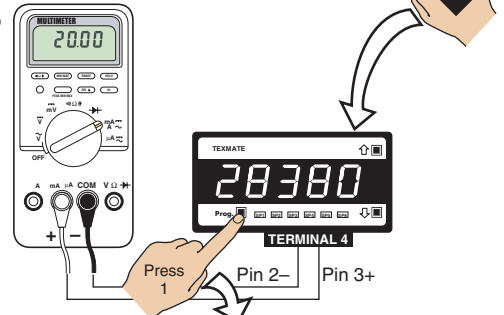
**Step 14**

Ensure the high analog output signal reading [CAL\_h] on the multimeter display is 20 mA.



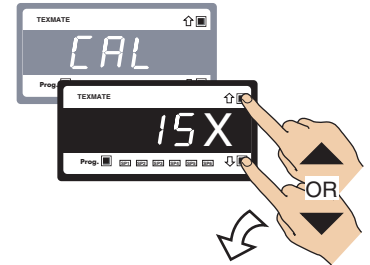
**Step 15**

If not 20 mA, press the ↑ OR ↓ button on the Tiger meter until the reading on the multimeter display is correct.



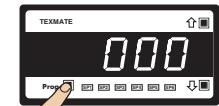
**Step 16**

Return to the calibration mode [CAL] menu



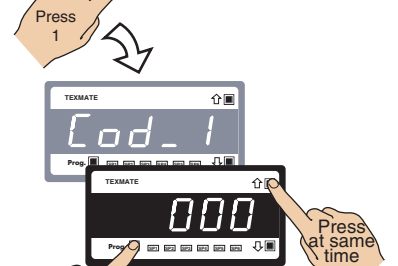
**Step 17**

Reset calibration mode setting to [000]



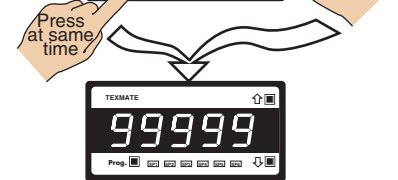
**Step 18**

Save calibration mode [000] setting and enter Code 1



**Step 19**

Exit Code 1 and return to the operational display



Operational Display

# Select Data Source Procedure



## Programming Tips

**Note for all Configuration Programming:** To enter the Main Programming Mode press the [P] and [↑] buttons at the same time. To exit and return to the operational display, press the [P] and [↓] buttons again at the same time. (See also note below at Step 9).

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

The following example procedure describes how to select the data source for the analog output selected in third digit in Code 1.

### Example Procedure:

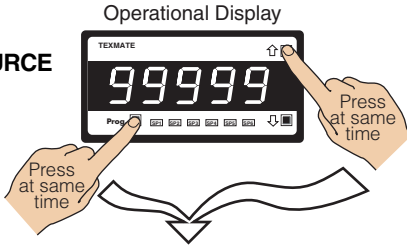
Configure Analog Output 1 with the display [diSP] as the data source by setting Code 1 to [X54]. See diagram below for data source selection options.

### START HERE

### SELECT DATA SOURCE PROCEDURE

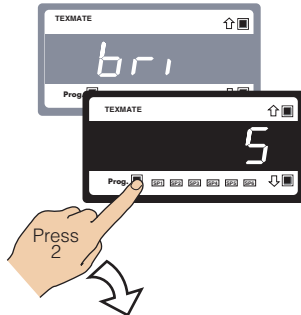
#### Step 1

Enter the Brightness Mode



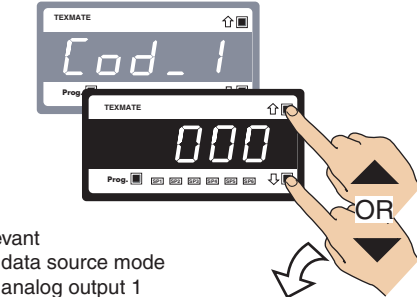
#### Step 2

Pass Brightness and Calibration Modes and enter Code 1



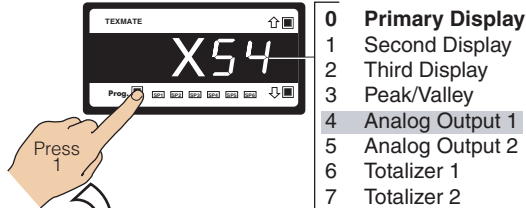
#### Step 3

Set Code 1 to [X54]:  
1st Digit = X Not relevant  
2nd Digit = 5 Selects data source mode  
3rd Digit = 4 Selects analog output 1



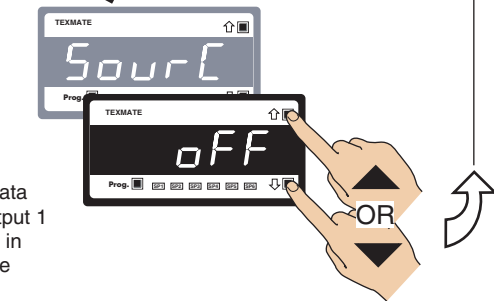
#### Step 4

Enter the Select Data Source menu.



#### Step 5

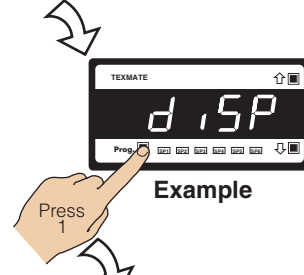
Select [diSP] as the Data Source for Analog Output 1 from the options listed in the Select Data Source diagram below.



From Step 5

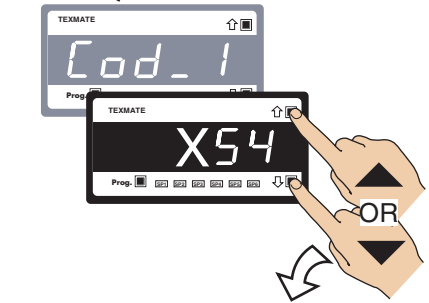
#### Step 6

Save the setting and re-enter Code 1



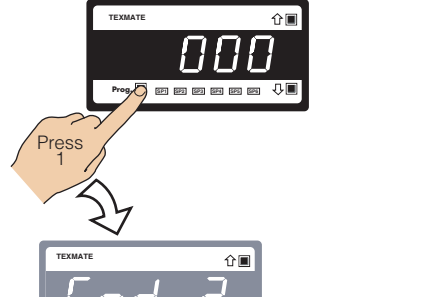
#### Step 7

Select [000] to leave Code 1



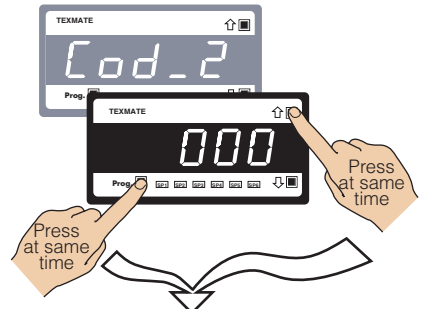
#### Step 8

Save the Data Source setting



#### Step 9

Exit Code 2. Return to the Operational Display



- 0 Primary Display
- 1 Second Display
- 2 Third Display
- 3 Peak/Valley
- 4 Analog Output 1
- 5 Analog Output 2
- 6 Totalizer 1
- 7 Totalizer 2

### Select Data Source

[P] SourC [P] off ← [1 to 244]

Use the [↑] and [↓] buttons to cycle through the options [diSP] [↑] [↓]

PID for SP1 = Register 50 Use the [↑] and [↓] buttons to select a register as the data source for the analog output [↑] [↓]

PID for SP2 = Register 51 [tArE]

[rESL1] [↑] [↓] [Ch1] [↑] [↓] [Ch2] [↑] [↓] [Ch3] [↑] [↓] [Ch4] [↑] [↓] [tot\_1] [↑] [↓] [tot\_2] [↑] [↓] [PEAK] [↑] [↓] [VALEY] [↑] [↓]



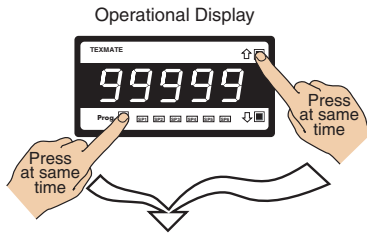
# Direct Display Manual Loader Mode Setup Procedure

The following procedure describes how to configure the meter to function as a **direct display manual loader** via the analog output in Code 1.

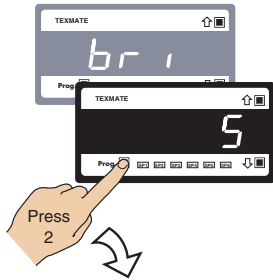
Also see *Select Data Source diagram on Page 14.*

**START HERE**

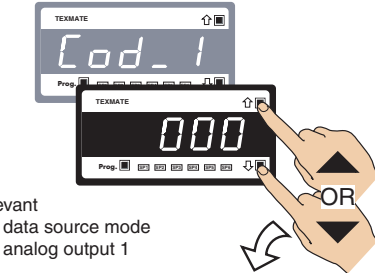
**Step 1**  
Enter the Brightness Mode



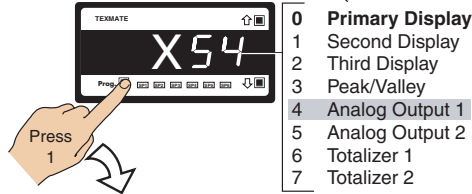
**Step 2**  
Pass Brightness and Calibration modes and enter Code 1



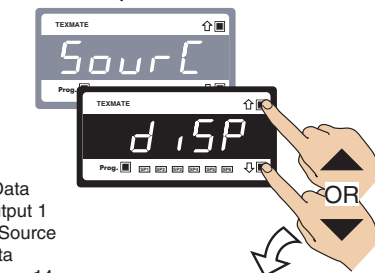
**Step 3**  
Set Code 1 to [X54]  
1st Digit = X Not relevant  
2nd Digit = 5 Selects data source mode  
3rd Digit = 4 Selects analog output 1



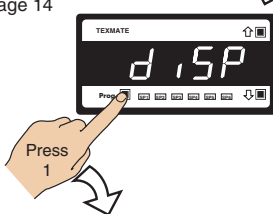
**Step 4**



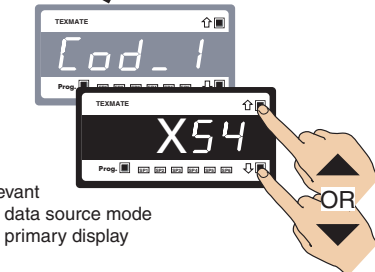
**Step 5**  
Select [diSP] as the Data Source for Analog Output 1 from the Select Data Source menu. See Select Data Source diagram on Page 14 for options.



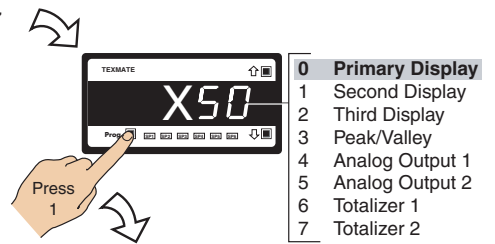
**Step 6**  
Save the data source setting and re-enter Code 1.



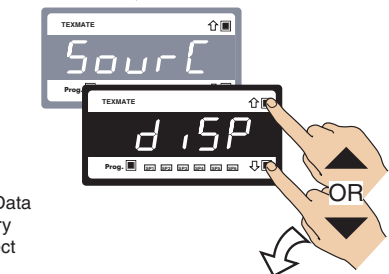
**Step 7**  
Set Code 1 to [X50]  
1st Digit = X Not relevant  
2nd Digit = 5 Selects data source mode  
3rd Digit = 0 Selects primary display



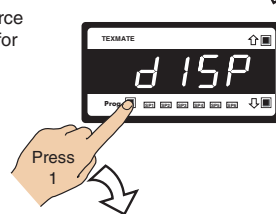
**Step 8**  
Enter the Data Source menu.



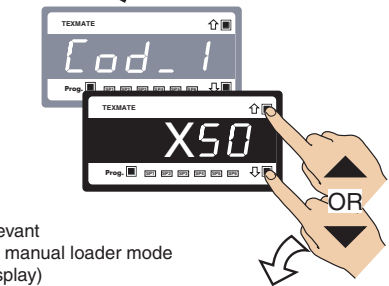
**Step 9**  
Select [diSP] as the Data Source for the Primary Display from the Select Data Source menu. See Select Data Source diagram on Page 14 for options.



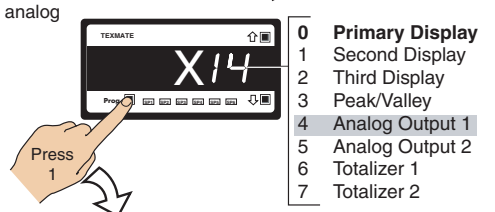
**Step 10**  
Save the Data Source settings and re-enter Code 1.



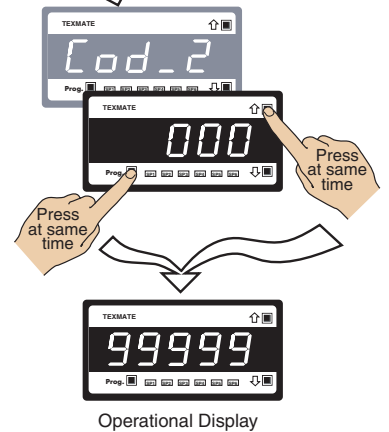
**Step 11**  
Set Code 1 to [X14]  
1st Digit = X Not relevant  
2nd Digit = 1 Selects manual loader mode (direct display)  
3rd Digit = 4 Selects analog output 1



**Step 12**  
Save the Code 1 settings



**Step 13**  
Exit Code 2 and return to the operational display





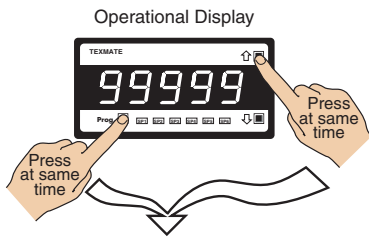
# On Demand Manual Loader Mode Setup Procedure

The following procedure describes how to configure the meter to function as an **on demand manual loader** via the analog output in the calibration mode.

Also see *Select Data Source diagram on Page 14.*

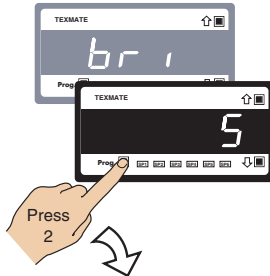
## Step 1

Enter the Brightness Mode



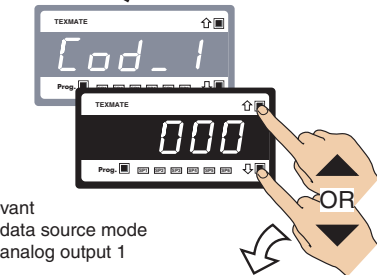
## Step 2

Pass Brightness and Calibration modes and enter Code 1



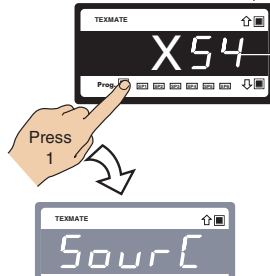
## Step 3

Set Code 1 to [X54]  
1st Digit = X Not relevant  
2nd Digit = 5 Selects data source mode  
3rd Digit = 4 Selects analog output 1



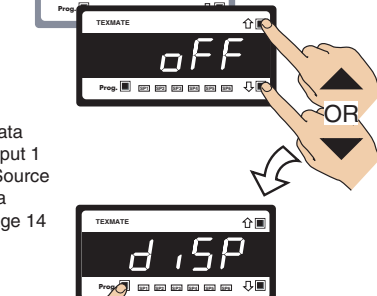
## Step 4

Enter the Select Data Source menu.



## Step 5

Select [diSP] as the Data Source for Analog Output 1 from the Select Data Source menu. See Select Data Source diagram on Page 14 for options.



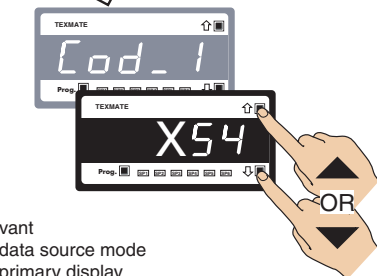
## Step 6

Exit the Select Data Source menu



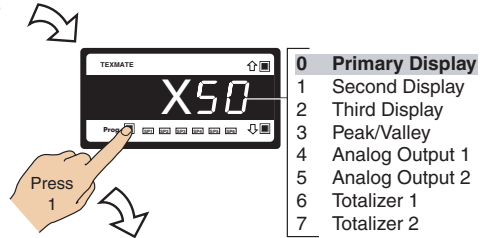
## Step 7

Set Code 1 to [X50]  
1st Digit = X Not relevant  
2nd Digit = 5 Selects data source mode  
3rd Digit = 0 Selects primary display



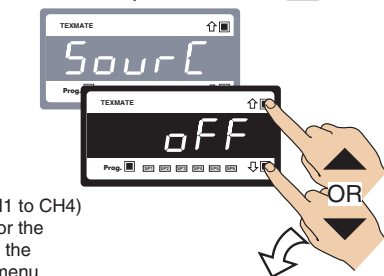
## Step 8

Re-enter the Select Data Source menu.



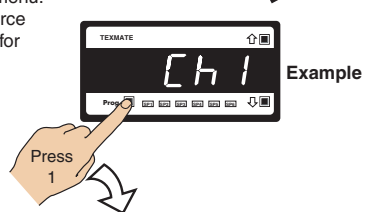
## Step 9

Select a channel (CH1 to CH4) as the Data Source for the Primary Display from the Select Data Source menu. See Select Data Source diagram on Page 14 for options.



## Step 10

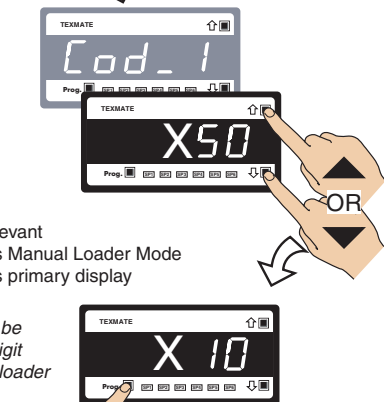
Exit the Select Data Source menu



## Step 11

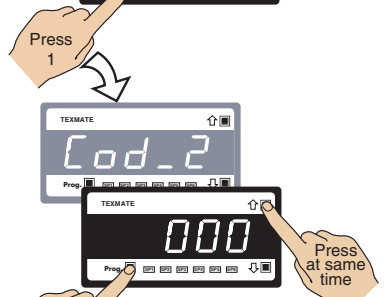
Set Code 1 to [X10]  
1st Digit = X Not relevant  
2nd Digit = 1 Selects Manual Loader Mode  
3rd Digit = 0 Selects primary display

*Note:*  
Manual Loader must be selected in the 2nd digit [X10] for the manual loader to operate.



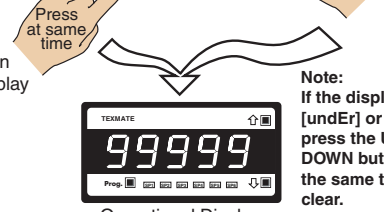
## Step 12

Save the settings



## Step 13

Exit Code 2 and return to the operational display



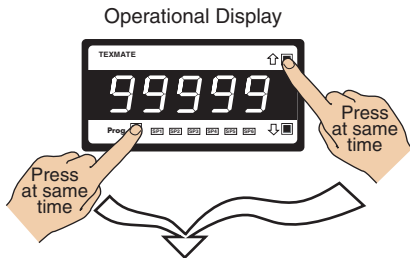
*Note:*  
If the display says [undEr] or [oVER], press the UP and DOWN buttons at the same time to clear.

## Step 14

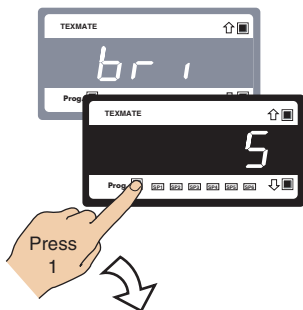
**ON DEMAND MANUAL LOADER MODE Setup Procedure**  
continued on next page

**ON DEMAND MANUAL  
LOADER MODE Procedure**  
continued from bottom of previous page

**Step 14**  
Enter the  
Brightness  
Mode

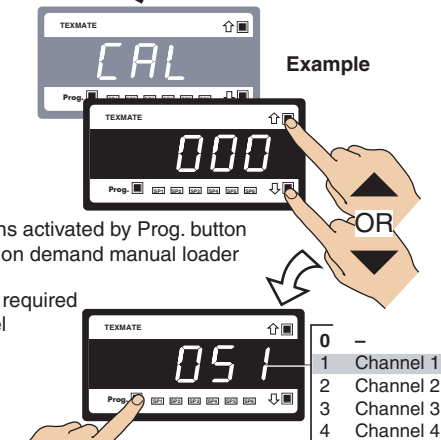


**Step 15**  
Pass Brightness  
and enter  
Calibration  
Mode

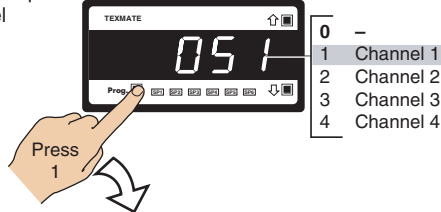


**Step 16**

Set Code 1 to [051]:  
1st Digit = 0 Functions activated by Prog. button  
2nd Digit = 5 Selects on demand manual loader mode  
3rd Digit = 1 Selects required channel

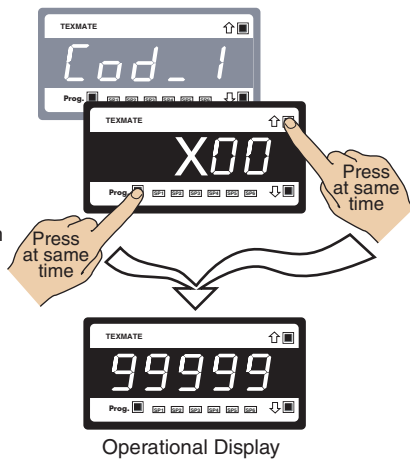


**Step 17**  
Save the settings



**Step 18**

Exit Code 1 and return  
to the operational  
display



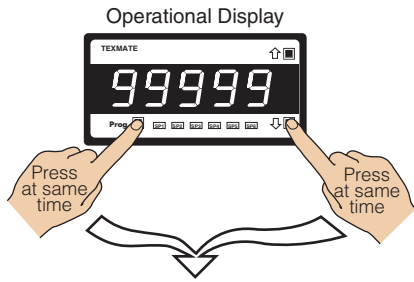
**NOTE**

Setpoints SP5 and SP6 provide upper and lower limits and should be set to the meter's calibrated span range. We suggest that these are used to limit your manual adjustment range.

# Configure Manual Loader Mode Upper/Lower Limits Procedure

The following example procedure describes how to set upper and lower limits for the manual loader mode. This is done using the setpoint activation values of setpoints SP5 and SP6 of the setpoint programming mode.

**Step 1**  
Enter Setpoint Activation Values Mode



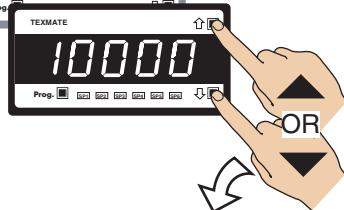
Setpoint Activation Values Mode



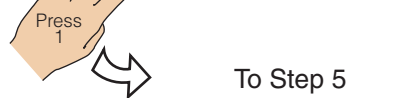
**Step 2**  
Pass SP1 to SP4 and enter SP5



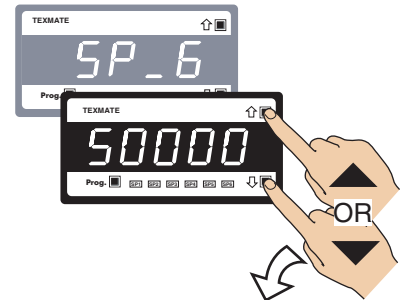
**Step 3**  
Set SP5 to the UPPER limit



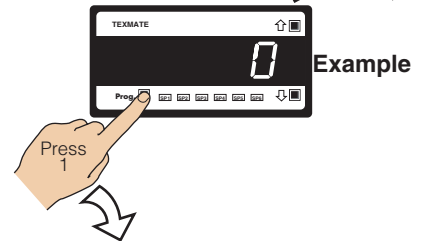
**Step 4**  
Save UPPER limit and enter SP6



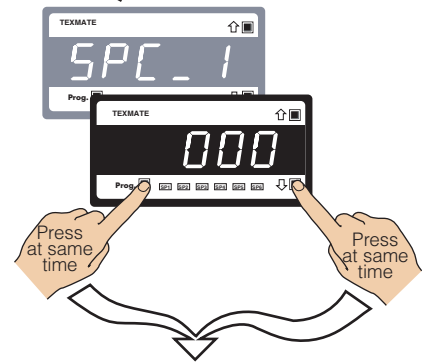
**Step 5**  
Set SP6 to the LOWER limit



**Step 6**  
Save LOWER limit and enter SPC\_1



**Step 7**  
Exit the Setpoint Activation Values Mode and return to the Operational Display



Operational Display

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