TEXMATE INC

Fits Tiger 320 Series

DUAL 3-WIRE POTENTIOMETER SMART MODULE

8-pin Input Connector.
Dual 3-wire pot inputs and +2.5 V excitation.

Ultra-low Noise 16-bit A/D Convertor.
Ratiometric operation on both inputs. Approaches 19-bit performance with additional software filtering.

Interface to Tiger Meter.

State-of-the-art Electromagnetic Noise Suppression Circuitry.
Ensures signal integrity under harsh EMC environments.

Crystal Controlled 50/60 Hz Noise Rejection option.

On-board Digital Signal Processor.
Optimized signal full scale and averaged output rate.
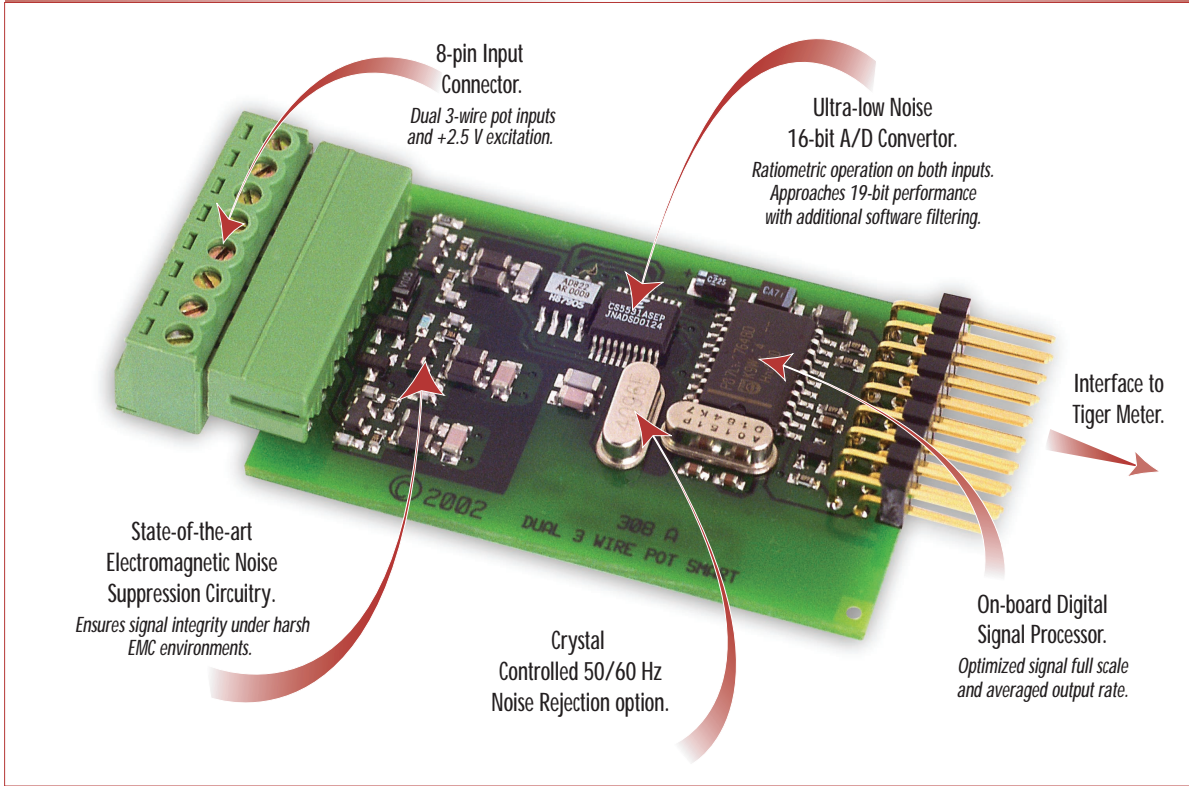
The interface solution for linear position transducers.

With dual inputs, the ISR3 and ISR4 can excite and perform ratiometric data conversion on two linear potentiometers. Combined with the Tiger 320 Series operating system, this smart module is the design answer for industrial and process control applications involving accurate and continuous linear displacement and/or rate-of-change measurements at up to 100 Hz averaged output rate.

Input Module Order Code Suffix

ISR3 (50 Hz Rejection)
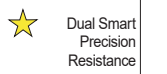
ISR4 (60 Hz Rejection)

INPUTS

⭐ Dual Smart Precision Resistance

Hardware Module Specifications	
A/D Convertor	Dual channel ultra-low noise 16-bit A/D
	with effective 19-bit resolution in post processing software.
Input Sensitivity	5 µV/count full scale maximum.
Zero Drift	± 40 nV/ °C typical.
Span Drift	± 5 ppm/ °C of full scale maximum.
Non-linearity	± 0.003% of full scale maximum.
Input Noise	30 µVp-p typical at 1 Hz output rate.
Potentiometer Inputs	Dual, separate + 2.5 V excitation (10 mA).
	ratiometric referenced to A/D.
Potentiometer Resistance	1 kilohm to 100 kilohm (typical).
Resolution	1:100,000 counts of full scale.

Software Module Features	
Output Rates	1-20 Hz, POT 1 and POT 2.
	50-100 Hz, POT 1 only.
Gain Select	Optimized for +2.5 Volt excitation.
Frequency Select	ISR3 50 Hz/ISR4 60 Hz noise rejection (Software selectable).

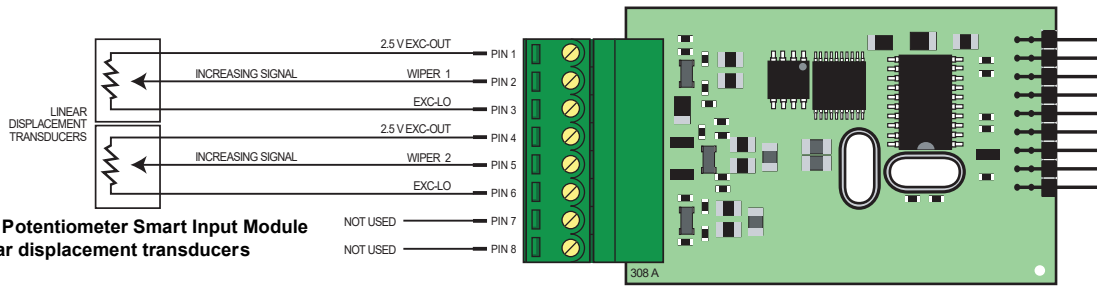| Some Relevant Tiger 320 Series Operating System Features |
| --- |
| Setpoint Timer Functions. |
| Setpoint Register Reset and Trigger Functions. |
| On-demand Calibration. |
| Macro Compiler for PLC Functions. |
| 32-Point Linearization. |
| Totalizer and Serial Printing. |

Resistance

Connector Pinouts

ISR3/ISR4 Dual 3-wire Potentiometer Smart Input Module connected to two linear displacement transducers
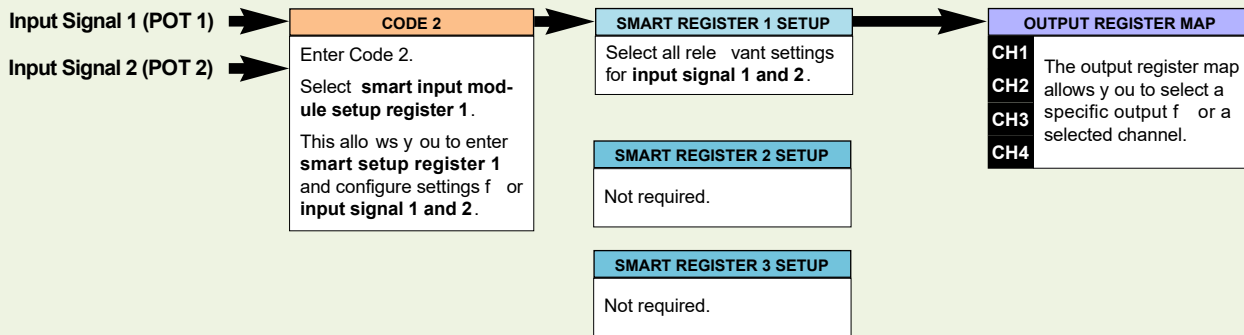
Smart Setup Registers

The meter has three **smart setup registers** to configure all smart input modules. The reference voltage and output rate for both input signals are configured in **smart register 1**.

Potentiometer signals, POT 1 and POT 2, are then individually software selected for a combination of two meter channels. Either signal can be selected for Channel 1 via Code 2, Channel 2 via Code 4, Channel 3 via Code 5, and Channel 4 via Code 6.

Note both signals cannot be selected for the same channel.

Smart Setup Register – Operational Flow Diagram

Input Signal 1 (POT 1) →

Input Signal 2 (POT 2) →

CODE 2

Enter Code 2.

Select **smart input module setup register 1**.

This allows you to enter **smart setup register 1** and configure settings for **input signal 1 and 2**.

→ **SMART REGISTER 1 SETUP**

Select all relevant settings for **input signal 1 and 2**.

→ **OUTPUT REGISTER MAP**

CH1	The output register map allows you to select a specific output for a selected channel.
CH2	
CH3	
CH4	

SMART REGISTER 2 SETUP

Not required.

SMART REGISTER 3 SETUP

Not required.

Programming Procedures

The following programming procedures cover all the steps required to configure smart input module ISR3 and ISR4. Steps **1** to **5** describe how to select the **line frequency rejection** and the **output rate** through smart register 1.

Steps **7** to **12** describe how to select the output registers for Channels 1, 2, 3, or 4 as required.

1 Press the [P] and [↑] buttons at the same time to enter the main programming mode.

2 Press the [P] button three times to enter Code 2. Set Code 2 to [X77].

Note the output register map is different for each smart input module.

`Cod_2    X77`

This setting enters the **smart register 1** code setup menu.

FIRST DIGIT	SECOND DIGIT	THIRD DIGIT
TIGER PROCESSING RATE	**MEASUREMENT TASK**	**OUTPUT REGISTER MAP**
0 10 Hz	**0 Voltage, Current**	**0 Averaged POT 1**
1 10 Hz	1 TC (3rd digit selects type of TC)	1 Averaged POT 2
2 100 Hz	2 RTD 3-wire (3rd digit selects type of RTD)	2 Rate-of-change POT 1
3 100 Hz	3 RTD 2- or 4-wire (3rd digit selects type of RTD)	3 Rate-of-change POT 2
	4 Frequency	4 -
	5 Period	5 -
	6 Counter	6 -
	7 Smart Input Module	**7 Smart input module register 1 code setup**

3 Press the [P] button.

`SMt1    000`

This menu provides settings unique to **smart register 1** of the ISR3 and ISR4 input module.

FIRST DIGIT	SECOND DIGIT	THIRD DIGIT
REFERENCE VOLTAGE	**Not Relevant**	**OUTPUT RATE**
0 -		**0 1 Hz averaged**
1 60 Hz rejection (ISR3 default setting)		1 5 Hz averaged
2 -		2 10 Hz averaged
3 50Hz rejection (ISR4 default setting)		3 20 Hz averaged
		4 50 Hz averaged*
	POT 1 only, POT 2 is inactive.	5 100 Hz averaged*
		6 -
		7 -

4 Using the ⬆⬇ buttons, select the **line frequency rejection** and the **output rate common to both input signals**.

Note, POT 1 has two high speed output rates that are **not** available to POT 2.

5 Press the P button. The display returns to [Cod_2] [X77]. `[Cod_2    X77]`

6 Using the ⬇ button, reset the 3rd digit to zero [X70] to leave the smart register 1 menu.

Note, leaving the 3rd digit as 7 means the display constantly cycles between [Cod_2] and [SMt1].

Select a Channel   Select the output register for the required channels

7 Press the P and ⬆ button at the same time again to re-enter the main programming mode,

then press the P button three times to enter Code 2.

8 To select **channel 1**, set Code 2 to [X7X]. Select the required processing rate for **CH1** in the 1st digit and the required output register map settings in the 3rd digit.

CH1 `[Cod_2    X7X]`

FIRST DIGIT
TIGER PROCESSING RATE
0 10 Hz
1 10 Hz
2 100 Hz
3 100 Hz

Note the output register map is different for each smart input module type.

THIRD DIGIT
OUTPUT REGISTER MAP
0 **Averaged POT 1**
1 Averaged POT 2
2 Rate-of-change POT 1
3 Rate-of-change POT 2
4 -
5 -
6 -
7 Smart input module **register 1** code setup

9 To select **channel 2**, set Code 4 to [0X0]. Select the required output register map settings for **CH2** in the 2nd digit.

CH2 `[Cod_4    0X0]`

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

SECOND DIGIT			
FOR VOLTAGE & CURRENT		*Note:	
0 **Channel 2 Disabled**		*The logic for CH2 is not the same as CH1, CH3, or CH4. The 1st and 3rd digits must both be set to 0. Selecting 040 to 070 in the 2nd digit of Code 4 directly selects one of the following settings in the output register map (3rd digit):*	
1 Direct (no post processing)			
2 Square Root of Channel 2			
3 Inverse of Channel 2			
4 Output Register 1 (smart module)*		**2nd Digit**	**Output Register Map**
5 Output Register 2 (smart module)*		4 selects	0 **Averaged POT 1**
6 Output Register 3 (smart module)*		5 selects	1 Averaged POT 2
7 Output Register 4 (smart module)*		6 selects	2 Rate-of-change POT 1
		7 selects	3 Rate-of-change POT 2

10 To select **channel 3**, enter Code 5 and select the required output register map settings for **CH3** in the 3rd digit.

CH3 `[Cod_5    X7X]`

FIRST DIGIT
CH3 POST PROCESSING
0 **Direct Display of Input (no processing)**
1 Square Root of Channel 3
2 Inverse of Channel 3
3 **Meters with 4 kB memory** NO Linearization **Meters with 32 kB memory** 32-point Linearization of CH3 using Table 3
Note: *All linearization tables are set up in the Calibration Mode [24X].*

Note the output register map is different for each smart input module type.

THIRD DIGIT
OUTPUT REGISTER MAP
0 **Averaged POT 1**
1 Averaged POT 2
2 Rate-of-change POT 1
3 Rate-of-change POT 2
4 -
5 -
6 -
7 Smart input module **register 1** code setup

11 To select **channel 4**, enter Code 6 and select the required output register map settings for **CH4** in the 3rd digit.

CH4 `[Cod_6    X7X]`

Press the P button to save the settings.

FIRST DIGIT
CH4 POST PROCESSING
0 **Direct Display of Input (no processing)**
1 Square Root of Channel 4
2 Inverse of Channel 4
3 **Meters with 4 kB memory** NO Linearization **Meters with 32 kB memory** 32-point Linearization of CH4 using Table 4
Note: *All linearization tables are set up in the Calibration Mode [24X].*

Note the output register map is different for each smart input module type.

THIRD DIGIT
OUTPUT REGISTER MAP
0 **Averaged POT 1**
1 Averaged POT 2
2 Rate-of-change POT 1
3 Rate-of-change POT 2
4 -
5 -
6 -
7 Smart input module **register 1** code setup

12 Press the P and ⬆ buttons at the same time to return to the operational display.

Calibrate the required channels

13 Steps 4 and 5 of the Example Setup Procedure describe how to calibrate channel 1 and channel 2 to display the x (CH1) and y (CH2) axes. Steps 6 and 7 describe how to set the resolution for CH1 and CH2.

Example Setup Procedure

A milling machine bed has servo operation on the x and y axes. Linear displacement potentiometers 1 and 2 provide positional information in the x and y directions respectively, and feedback for automatic machine operations at up to 15 Hz response. The maximum bed travel in the x axis is 500 mm and the y axis is 300.5 mm. The required resolution is 0.1 mm.

A Tiger 320 Series 2-display meter with an ISR3 dual 3-wire potentiometer smart input module installed shows the milling bed position. The meter also allows the operator to zero the x, y co-ordinates, establish setpoints for machining operations, and many other linear translation operations.

1 **Select 50 Hz frequency rejection and a 20 Hz averaged output rate :**

In `CODE 2` select `X77` then press the `P` button.

Display toggles between `SMt1` `000`

Set `SMt1` to `3X3`

2 **Select channel 1 for the x axis to read the averaged POT 1 output:**

In `CODE 2` reset to `X70` then press the `P` button.

3 **Select channel 2 for the y axis to read the averaged POT 2 output:**

In `CODE 4` reset to `050` then press the `P` button.

4 **Calibrate channel 1 for the x axis:**

In `CAL` mode select `111` then press the `P` button.
Display toggles between `Zero` `0`

Position the machine bed in the x axis **zero** position, then press the `P` button.
Display toggles between `SPan` `2500`

Use the ⬆ ⬇ buttons to set the span to `5000`

Position the machine bed in the x axis **span** position of 500 mm, then press the `P` button.

5 **Calibrate channel 2 for the y axis:**

In `CAL` mode select `112` then press the `P` button.
Display toggles between `Zero` `0`

Position the machine bed in the y axis **zero** position, then press the `P` button.

Display toggles between `SPan` `2500`

Use the ⬆ ⬇ buttons to set the span to `3005`

Position the machine bed in the x axis **span** position of 300.5 mm, then press the `P` button.

6 **Set the resolution for CH1 to display 0.1 mm:**

In `CODE 1` select `X61` then press `P` button.
Display toggles between `diSP` `000`

Set `diSP` to `X06`

Reset the 2nd digit of Code 1 to either 0, 1, or 2. This allows you to leave this mode.

Press the `P` button then the `P` and ⬆ button to return to the operational display.

7 **Repeat Step 6 for CH2, setting Code 1 to X62.**

Customer Configuration Settings:

		1st Digit	2nd Digit	3rd Digit
	`SMt1`	____	____	____
CH1	`Cod_2`	____	7	____
CH2	`Cod_4`	0	____	0
CH3	`Cod_5`	____	7	____
CH4	`Cod_6`	____	7	____

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