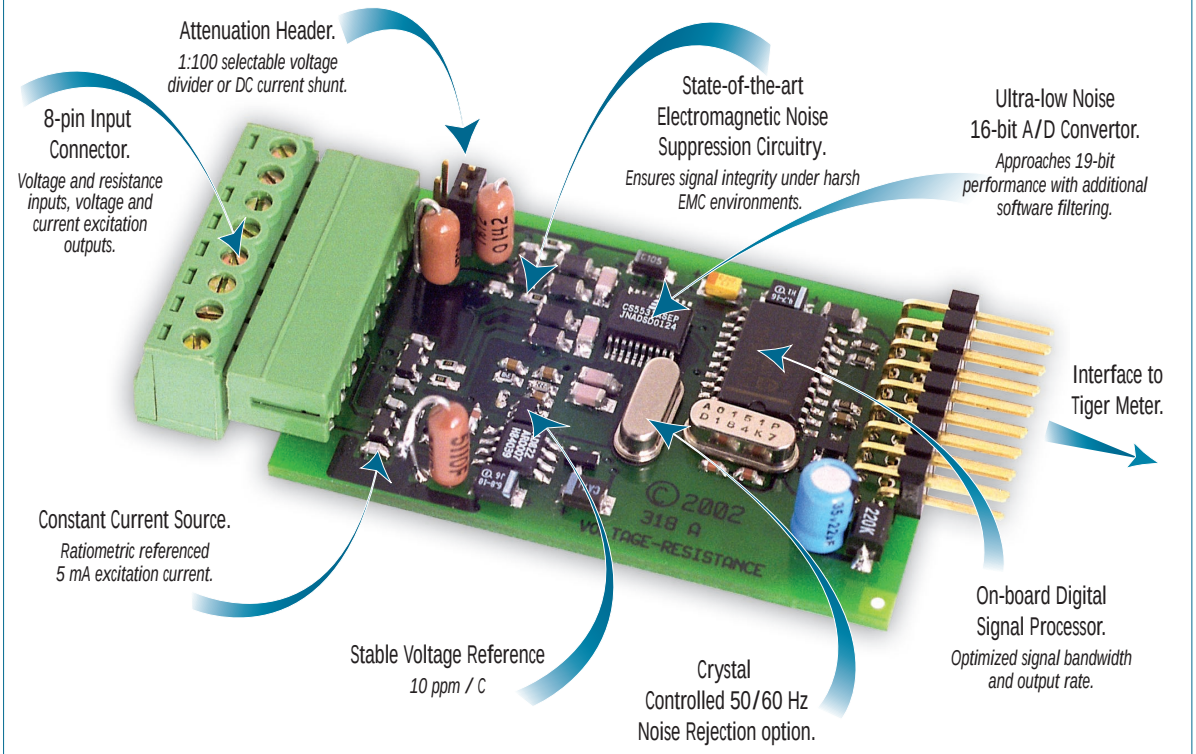
TEXMATE INC

Fits Tiger 320 Series

VOLTAGE & RESISTANCE SMART MODULE



The smart answer to precise resistance & voltage measurement

Initially designed to measure copper winding resistance to within fractions of an ohm and the surface temperature using an infrared sensor. When coupled with the Tiger 320 Series operating system this module, and its on-board current and voltage excitation outputs, satisfy OEMs wishing to accurately measure a range of resistance and voltage / current signals.

Input Module Order Code Suffix

ISD9 (50/60 Hz)

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	0.08 µV/count 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	160 µVp-p typical at 1 Hz output rate.
Voltage Reference	+ 2.5 V, 10 ppm.
Voltage Input	Selection of ranges ± 25 mV to ± 2 V, 2.1 V common mode.
Attenuation Header	1:100 voltage ÷ for voltage inputs ≤ 60 V or
	optional mA current shunt configuration.
Excitation Voltage	+ 24 V (50 mA) to drive external sensors.
Resistance Input	Designed to measure voltage drop across small resistances
	(typically ~10 Ω), +3 V common mode.
Resistance Resolution	1 mΩ (10 Ω load resistor).
Excitation current	5 mA constant current source to drive external resistor.
	Ratiometrically referenced to A/D for precision
	low-drift resistance measurement.

Software Module Features	
Output Rates	A choice of average response outputs, 1-20 Hz.
Gain Select	7 voltage ranges to optimize signal resolution.
Frequency Select	50 / 60 Hz noise rejection. Software selectable.

VOLTAGE & RESISTANCE SMART

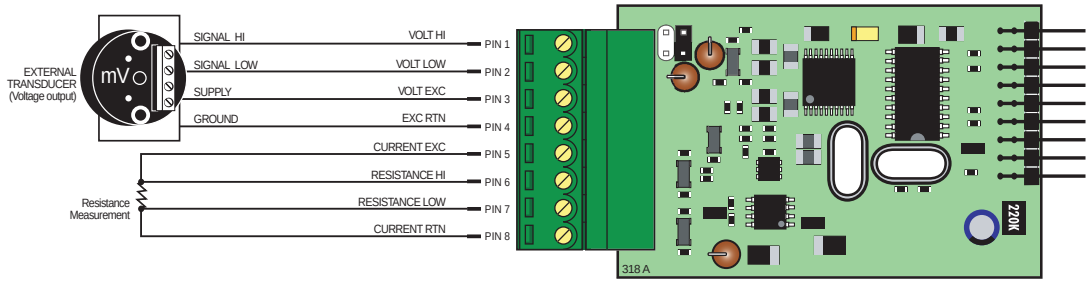
INPUTS

★ Dual Smart 16-bit Precision

Volts DC

Resistance

Connector Pinouts



Smart Setup Registers

The meter has **three smart setup registers** to configure all smart input modules.

ISD9 requires **smart registers 1 and 2** to be configured. Because this is a dual input module, measuring voltage and resistance, independent sensor inputs can be software selected for Tiger 320 Series meter channels 1, 2, 3, and 4. This module produces **two output registers.** One of these registers can be transferred to Channel 1 via Code 2, the same or another register to Channel 2 via Code 4, the same or another register to Channel 3 via Code 5, and the same or another register to Channel 4 via Code 6.

Smart Setup Register – Operational Flow Diagram

Input Signal 1 →

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**.

→ **SMART REGISTER 1 SETUP**

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

→ **OUTPUT REGISTER MAP**

CH1 CH2 CH3 CH4

The output register map allows you to select a specific output for a selected channel.

Input Signal 2 →

CODE 5

Enter Code 5.

Select **smart input module setup register 2**.

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

→ **SMART REGISTER 2 SETUP**

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

SMART REGISTER 3 SETUP

Not required.

Programming Procedures

The following programming procedures cover all the steps required to configure smart input module ISD9. Steps 1 to 5 describe how to select the line frequency rejection, the voltage range, and the averaged output rate through **smart setup register 1**.

Steps **6** to **9** describe how to select the resistance range through **smart setup register 2**.

Steps **10** to **19** describe how to select the **output register** 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 twice to enter Code 2 for **input signal 1** configuration settings. Set Code 2 to [X77].

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

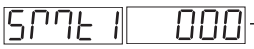
FIRST DIGIT – TIGER PROCESSING RATE
0 10 Hz
1 10 Hz
2 100 Hz
3 100 Hz

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 – OUTPUT REGISTER MAP
0 Averaged Signal 1
1 Averaged Signal 2
2 -
3 -
4 -
5 -
6 -
7 Smart input module **register 1** code setup

3 Press the [P] button.

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



This menu provides settings unique to **smart register 1** of the ISD9 input module.

FIRST DIGIT – REFERENCE VOLTAGE
0 -
1 60 Hz rejection
2 -
3 50 Hz rejection

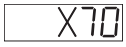
SECOND DIGIT – SIGNAL 1 VOLTAGE RANGE
0 ±2 V
1 ±1 V
2 ±500 mV
3 ±250 mV
4 ±100 mV
5 ±50 mV
6 ±25 mV
7 -

THIRD DIGIT – OUTPUT RATE
0 1 Hz averaged
1 5 Hz averaged
2 10 Hz averaged
3 20 Hz averaged
4 -
5 -
6 -
7 -

Note:
When the input signal is greater than 2 V the 1:100 attenuation header is set to ON.
For signals up to 10 V select the ±100 mV range for best resolution.
For signals larger than 10 V select ±1 V range.

4 Using the ⇧⇩ buttons, select the relevant line **frequency rejection** and **voltage range** for input signal 1, and the **output rate** common to both **signal 1** and **signal 2**.

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

7 Press the P button three times to enter Code 5 for **input signal 2** configuration settings. Set Code 5 to [X77].

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].

SECOND DIGIT
MEASUREMENT TASK
0 No function
1 Voltage, current
2 TC
3 RTD
4 Real time clock & timer
5 -
6 -
7 Smart input module

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

Note the output registers in the 3rd digit are specific to ISD9. These registers vary for each different smart input module.

8 Press the P button.

This setting enters the **smart register 2** code setup menu.

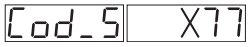
FIRST DIGIT
Not Relevant

SECOND DIGIT
Not Relevant

THIRD DIGIT
RESISTANCE RANGE
0 400 Ω (±2 V)
1 200 Ω (±1 V)
2 100 Ω (±50 mV)
3 50 Ω (±25 mV)
4 20 Ω (±100 mV)
5 10 Ω (±50 mV)
6 5 Ω (±25 mV)
7 -

9 Using the ⇧⇩ buttons, select the **resistance** setting for **smart register 2** from the 3rd digit.

10 Press the P button to save the settings.

The display toggles between [Cod_5] and [X77]. 

11 Using the ⇩ button, reset the 3rd digit to 0 to leave the smart register 2 menu.

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

Note resistance values based on 5 mA current excitation. For example, a 10 Ω resistor has a 50 mV input voltage.

Select a Channel

Select the output register for the required channels

13 Press the P and ⇧ button at the same time again to re-enter the main programming mode.

14 Press the P button three times to enter Code 2.

15 Set Code 2 to [X7X]. Select the required processing rate for **CH1** in the 1st digit and the required output register map setting in the 3rd digit.

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

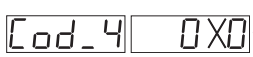
CH1 

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

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
OUTPUT REGISTER MAP
0 Averaged Signal 1
1 Averaged Signal 2
2 -
3 -
4 -
5 -
6 -
7 Smart input module **register 1** code setup

16 If required enter Code 4 and select the required output register map settings for **CH2** in the 2nd digit. Note, the 1st digit must be set to 0.

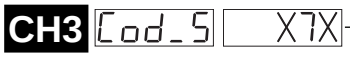
CH2 

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

2nd Digit	Output Register Map
4 selects	**0 Averaged Signal 1**
5 selects	1 Averaged Signal 2
6 selects	2 -
7 selects	3 -

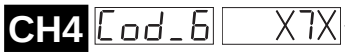
17 If required enter Code 5 and select the required post processing settings for **CH3** in the 1st digit and the required output register map setting in the 3rd digit.



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].

THIRD DIGIT
OUTPUT REGISTER MAP
0 Averaged Signal 1
1 Averaged Signal 2
2 -
3 -
4 -
5 -
6 -
7 Smart input module register 1 code setup

18 If required enter Code 6 and select the required post processing settings for **CH4** in the 1st digit and the required output register map setting in the 3rd digit.



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.

Press the [P] button to save the settings.

19 Press the [P] and [↑] buttons at the same time to return to the operational display.

Example Setup Procedure

Our customer wishes to calculate the resistive temperature coefficient for a copper coil winding. An infrared sensor with a nominal 0-10 V (0-1000°C) output is used and typical coil resistance at 25 °C is 10 Ω.

1 **Select 50 Hz input line frequency, with a 5 Hz averaged output rate for both signals. Select voltage range ±100 mV for the infrared sensor assuming 1:100 signal attenuation.**

In [CODE 2] select [X77] then press [P] button.

Display toggles between [SMt1] [000]

Set [SMt1] to [341]

2 **Select 10 Ω resistance range for the resistance input (equivalent to 50 mV signal @ 5 mA excitation):**

In [CODE 5] reset to [X77] then press [P] button.

Display toggles between [SMt2] [000]

Set [SMt2] to [XX1]

3 **Select the infrared sensor for CH1:**

In [CODE 2] select [X70]

4 **Select the coil winding resistance for CH3:**

In [CODE 5] select [X71]

Customer Configuration Settings:

	1st Digit	2nd Digit	3rd Digit
SMt 1			
SMt2			
CH1 Cod_2		7	
CH2 Cod_4	0		0
CH3 Cod_5		7	
CH4 Cod_6		7	

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