

16-BIT SMART DC VOLTS INPUT MODULE

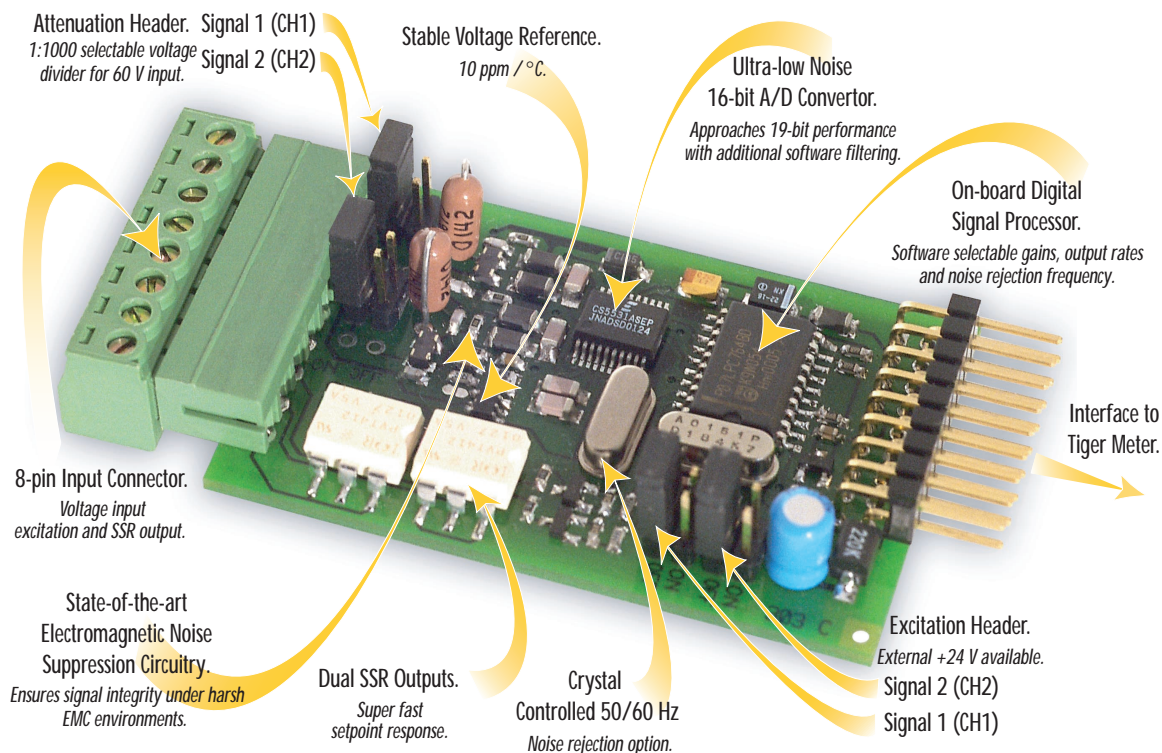
16-BIT SMART DC VOLTS

INPUTS

★ Smart Precision
DC Volts
High Speed
S.S.R. Output
High Accuracy

Amps DC
from Shunt

Resistance



The answer to accurate voltage measurements and switched relay outputs.

When faced with the task of supplying precise and stable voltage measurements over a large dynamic range, the automation engineer now has the solution at his fingertips. Combined with the Tiger 320 Series operating system, this module is the smart design solution for many and varied control applications.

Input Module
Order Code Suffix

ISD1 (50 Hz Rejection)

ISD2 (60 Hz Rejection)

ISD3 (50 Hz with SSRs)

ISD4 (60 Hz with SSRs)



Hardware Module Specifications

Input Channels	1 of 2 inputs available and chosen through software.
Input Range	Software selectable from ± 25 mV to ± 2 V for signal (1) and fixed ± 1 V for signal (2), ± 2.1 V common mode.
Attenuation Header	1: 1000 voltage divider on both inputs for ≤ 60 V with optional current shunt configuration.
Excitation Header	+ 24 V (50 mA) available to power external sensors.
Input Sensitivity	0.08 μ V / count maximum.
Zero Drift	± 40 nV / $^{\circ}$ C typical.
Span Drift	± 5 ppm / $^{\circ}$ C of full scale maximum.
Non-linearity	$\pm 0.003\%$ of full scale maximum.
Input Noise	160 nVp-p typical at 1 Hz output rate.
Signal processing Rate	50 Hz maximum, 1 Hz minimum.
Solid State Relays (SSR)	17 Ω , 140 mA (± 400 V breakdown).

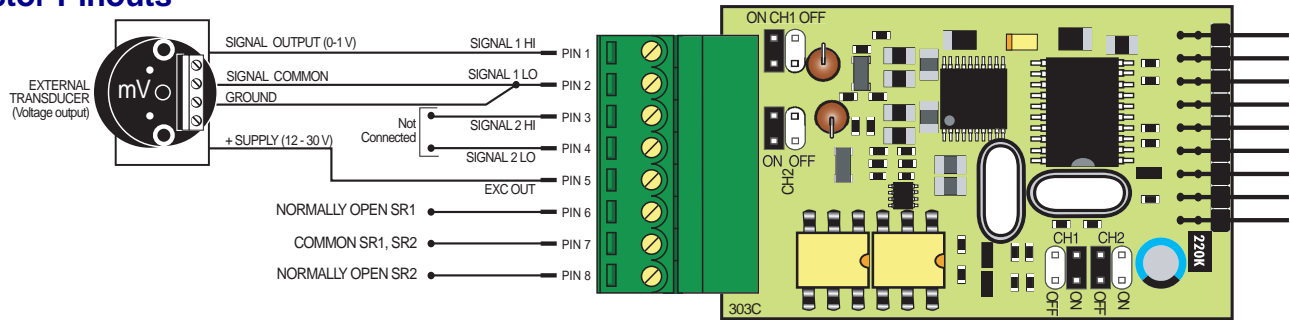
Software Module Features

Output Rates	A choice of average response outputs, 1-50 Hz.
Gain Select	A choice of 7 voltage ranges from ± 25 mV to ± 2 V.
Frequency Select	50 / 60 Hz noise rejection (Software selectable).
Setpoint Switching	High speed (>1 ms) SSR outputs under setpoint control.

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.

Connector Pinouts



The diagram shows an external transducer requiring external excitation wired to input module ISD3 or ISD4 through signal 1.

A signal <2 V requires the **signal 1 (CH1) attenuation header** to be set to the ON position.

The external supply requires **signal 1 (CH1) excitation header** to be set to the ON position.

Smart Setup Registers

The meter uses three smart setup registers to configure all smart input modules. Input modules ISD1 and ISD2 require **smart register 1** to be set up, while input modules ISD3 and ISD4 require **smart register 1** and **smart register 2** to be set up. All four modules are single input signal modules with the choice of two channels. ISD3 and ISD4 also has two solid state relay (SSR) outputs driven by SP5 and SP6 control. SSR1 is controlled by SP5 and SSR2 is controlled by SP6.

Programming Procedures

The following programming procedures cover all the steps required to configure ISD1 to ISD4. Steps 1 to 5 describe how to select the **line frequency rejection**, the **voltage range and input signal**, and the **output rate** through **smart register 1**.

Steps 6 to 9 describe how to select the SSR (SR1 and SR2) output mode for SP5 and SP6 control through **smart register 2**. Steps 10 onwards describe how to select the output register for channels 1, 2, 3, and 4 as required.

Note, as ISD1 and ISD2 do not have SSRs, **smart register 2** is **not** programmed.

ISD1 is factory software set to **50 Hz** rejection.

ISD2 is factory software set to **60 Hz** rejection.

ISD3 is factory software set to **50 Hz** rejection with two 140 mA SSRs.

ISD4 is factory software set to **60 Hz** rejection with two 140 mA SSRs.



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].

Cod_2 [X77]

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

Note:

The 1st digit setting is not relevant to this step. 0 is the default setting.

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 or 2
1 Rapid response signal 1 or 2*
2 Peak signal 1 or 2*
3 Valley signal 1 or 2*
4 Capture signal 1 or 2**
5 Rate of change of signal 1 or 2
6 -
7 Smart input module register 1 code setup

3 Press the **P** button.

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

* Signal output at the A/D sampling rate.

** Hardwire initiated from meter capture pin.



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

SP7E 1 [000]

2nd digit settings 0 to 6 allows you to select input signal 1 with a range of full scale voltage settings from -25 mV (setting 6) to -2 V (setting 0).

Setting 7 allows you to select input signal 2 with a -1 V full scale setting.

Both input signals can accept < 60 V utilizing the on-board 1:1000 attenuation header or even be configured for a current shunt.

FIRST DIGIT
LINE FREQ. REJECTION
0 -
1 60 Hz rejection (ISD2/ISD4 default setting)
2 -
3 50 Hz rejection (ISD1/ISD3 default setting)

SECOND DIGIT
FULL SCALE SIGNAL
0 Signal 1: ± 2.0 V
1 Signal 1: ± 1 V
2 Signal 1: ± 500 mV
3 Signal 1: ± 250 mV
4 Signal 1: ± 100 mV
5 Signal 1: ± 50 mV
6 Signal 1: ± 25 mV
7 Signal 2: ± 1 V

THIRD DIGIT
OUTPUT RATE
0 1 Hz averaged: 50/60 Hz rapid response
1 10 Hz averaged: 50/60 Hz rapid response
2 10 Hz averaged: 800/960 Hz rapid response
3 50/60 Hz averaged: 800/960 Hz rapid response
4 50/60 Hz averaged: 400/480 Hz rapid response
5 50/60 Hz averaged: 200/240 Hz rapid response
6 -
7 -

4 Using the **↑** **↓** buttons, select the relevant **line frequency rejection**, **input signal** and **range**, and the **output rate** settings.

5 Press the **P** button.

This takes you back to the Code 2 menu.

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].

X70

- 7 Press the three times to enter Code 5. Set Code 5 to [X77].

Cod_5 X77

- 8 Press the button.
- This setting enters the **smart register 2** code setup menu.

FIRST DIGIT	SECOND DIGIT	THIRD DIGIT
CH3 POST PROCESSING	MEASUREMENT TASK	OUTPUT REGISTER MAP
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	0 No function 1 Voltage, current 2 TC 3 RTD 4 Real time clock & timer 5 - 6 - 7 Smart input module	0 Averaged signal 1 or 2 1 Rapid response signal 1 or 2* 2 Valley signal 1 or 2* 3 Peak signal 1 or 2* 4 Capture signal 1 or 2** 5 Rate of change of signal 1 or 2 6 - 7 Smart input module register 1 code setup

SP7t2 000

This menu provides smart relay settings unique to input module ISD3 and ISD4 only.

Select the required smart relay output mode and source of data for setpoints SP5 and SP6.

FIRST DIGIT	SECOND DIGIT	THIRD DIGIT
SMART RELAY OUTPUT MODE	SP6 SOURCE	SP5 SOURCE
0 SR1 & SR2 NC 1 SR1 NO, SR2 NC 2 SR1 NC, SR2 NO 3 SR1 & SR2 NO	0 Averaged signal 1 or 2 1 Rapid response signal 1 or 2* 2 Valley signal 1 or 2* 3 Peak signal 1 or 2* 4 Capture signal 1 or 2** 5 Rate of change of signal 1 or 2 6 - 7 -	0 Averaged signal 1 or 2 1 Rapid response signal 1 or 2* 2 Valley signal 1 or 2* 3 Peak signal 1 or 2* 4 Capture signal 1 or 2** 5 Rate of change of signal 1 or 2 6 - 7 -

Note:
 SP5 controls SR1.
 SP6 controls SR2.

- 9 Press the button to save the settings.
- The display toggles between [Cod_5] and [X77].

* Signal output at the A/D sampling rate.
 ** Hardwire initiated from meter Capture pin.

- 10 Using the buttons, reset the 3rd digit to 0 to leave the smart register 2 menu.

- 11 Press the and buttons at the same time to return to the operational display.

Note:

Reset of Peak, Valley, and Capture Signals
 Reset of peak/valley/capture signals options are:

- If peak/valley/capture signals are stored in CH1, CH2, CH3, or CH4, a macro can reset CH1 by resetting register 253, CH2 by resetting register 252, CH3 by resetting register 251, and CH4 by resetting register 250.
- As for Step 1, but using the LOCK pin to reset.
- As for Step 1, but only applying to CH1 using the HOLD pin to reset.
- As for Step 1, but using SPC1 to reset CH1, SPC3 to reset CH3, and SPC4 to reset CH4.

Select a Channel Select the output register for the required channels

- 12 Press the and button at the same time again to re-enter the main programming mode, then press the button three times to enter Code 2.

- 13 Set Code 2 to [X7X]. Select the required processing rate for **CH1** in the 1st digit and the required 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.

* Signal output at the A/D sampling rate.
 ** Hardwire initiated from meter Capture pin.

THIRD DIGIT
OUTPUT REGISTER MAP
0 Averaged signal 1 Rapid response signal* 2 Peak signal* 3 Valley signal* 4 Capture signal** 5 Rate of change of signal 6 - 7 Smart input module register 1 code setup

- 14 Set Code 4 to [0X0]. Select the required 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	<i>*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 output register map (3rd digit):</i>	
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)*	2nd Digit	Output Register Map
5 Output Register 2 (smart module)*	4 selects	0 Averaged signal
6 Output Register 3 (smart module)*	5 selects	1 Rapid response signal*
	6 selects	2 Peak signal*
7 Output Register 4 (smart module)*	7 selects	3 Valley signal*

- 15 If required enter Code 5 and select the required 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].	

THIRD DIGIT	
OUTPUT REGISTER MAP	
0	Averaged signal
1	Rapid response signal*
2	Peak signal*
3	Valley signal*
4	Capture signal**
5	Rate of change of signal
6	-
7	Smart input module register 1 code setup

- 16 If required enter Code 6 and select the required register map settings for **CH4** in the 3rd digit.

CH4 Cod_6 X7X

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.

* Signal output at the A/D sampling rate.

** Hardwire initiated from meter Capture pin.

- 17 Press the **P** button to save the settings.

- 18 Press the **P** and **↑** buttons at the same time to return to the operational display.

Customer Configuration Settings:

1st Digit	2nd Digit	3rd Digit
5	7	1
5	7	2

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

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