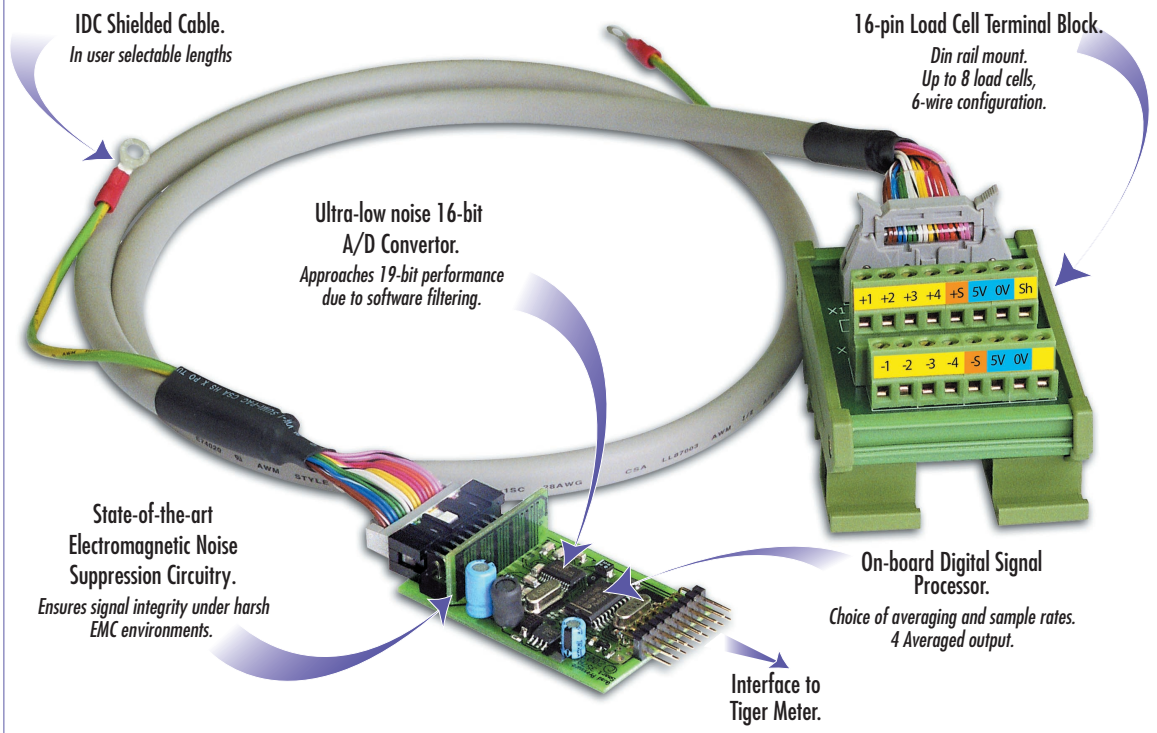
TEXMATE INC

Fits Tiger 320 Series

16-BIT SMART 4-CHANNEL LOAD CELL MODULE



The cost effective solution to monitoring up to eight load cells on four individual channels.

This input module and terminal block interface can receive multiple load cell inputs normally found on hoppers, tanks, bins, and silos and is ideally suited for level and inventory monitoring in the heavy weighing industry. With four averaged load cell inputs from the terminal block to a 16-bit A/D convertor in the input module, the ISS7 or ISS8 provides a diagnostic capability that allows damaged load cells to be quickly detected and repaired. In applications requiring weight measurement from different sources such as dry material handling, the input module can show how mass is distributed in a silo, or activate an alarm when wind loading exceeds a predetermined setting.

Input Module Order Code Suffix

ISS7 (50 Hz Rejection)

ISS8 (60 Hz Rejection)

Hardware Module Specifications	
Excitation	5 V DC, 130 mA maximum.
Input Range	Software selectable for sensors from 1 mV/V to 20 mV/V.
Input Channels	Quad, independent gains. Zero X-talk between channels each having 19-bit effective resolution.
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 nVp-p typical at 1 Hz output rate.
Signal Processing Rate	10 Hz maximum, 0.5 Hz minimum.

Software Module Features	
Output Rates	A choice of average response outputs, 0.5-10 Hz.
Gain Select	Choice of industry standards, 1-20 mV/V.
Frequency Select	50 Hz (ISS7) / 60 Hz (ISS8) noise rejection.

Some Relevant Tiger 320 Series Operating System Features
Auto Zero Maintenance.
Set TARE, Reset TARE.
Setpoint Timer Functions.
Setpoint Register Reset and Trigger Functions.
On-demand Calibration.
BASIC Compiler for PLC Functions.
32-Point Linearization.
Totalizator and Serial Printing.

ISS7/8 is a 4-channel smar t load cell input module that can pro vide excitation for a maximum of eight load cells. The input module can receive four independent sensor input signals through four channels from any combination of up to eight load cells .

Being a smar t input module means that it can perf orm the following pre-processing functions on the input signals of all four channels, prior to processing in the Tiger 320 meter:

- Select the line frequency for all four inputs.
- Select the signal range for all four inputs.
- Select the averaged output rate for all four inputs.

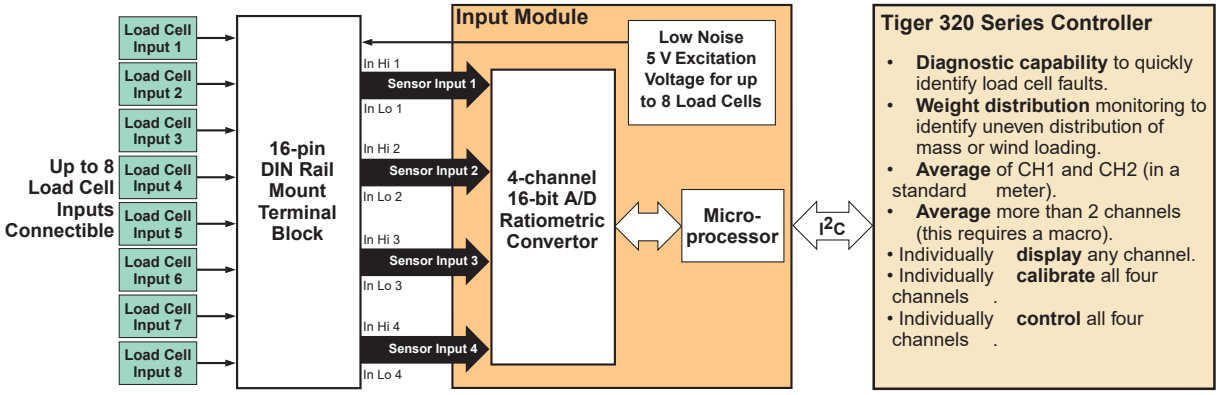


Figure 1 – Up to Eight Load Cell Sensor Inputs into Four Input Module Channels

The preferred method of connecting load cells to the ISS7/8 input module is via the DIN rail mount terminal block. Unlike simple junction bo xes that combine all load cell input signals into one sensor input prior to processing in a controller, the load cell terminal block can interface eight load cells into as many as four independent sensor groups. For example, sensor input 1 could have four load cells, sensor input 2 could ha ve two load cells, sensor input 3 could ha ve one load cell, and sensor input 4 could also ha ve one load cell. This provides four averaged signals for pre-processing via the four channels of the input module's 16-bit A/D con vertor and built-in microprocessor.

Diagnostic Capability

Having four independent inputs provides a diagnostic capability to quickly detect which sensor input is faulty. Using the meter 's vie w modes, all four input channel readings can be quic kly vie wed. This allows incorrectly installed, connected, or damaged load cells to be quickly identified and then repaired.

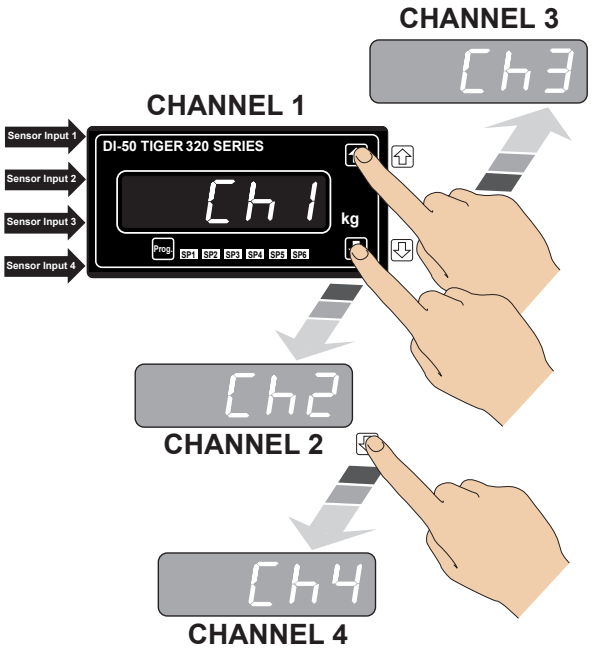


Figure 2 – Viewing all Four Channels

Weight Distribution Monitoring

Having four independent load cell inputs is also useful in the load distr ibution and wind loading areas of dr y mater ial handling. With individual inputs from each support on a silo, it is possible to detect uneven distribution of mass within the silo (See Figure 3). Wind loading is a potentially dangerous hazard with high silos , especially when empty. Setpoint alarms can be configured for each load cell to activ ate when the wind load exceeds a pre-set limit.

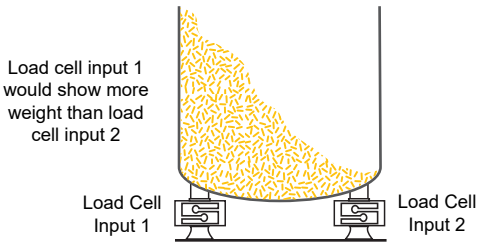


Figure 3 – Weight Distribution in Dry Material Silo

Component Layout

See
Connecting Load Cells to the Input Module
for connection details

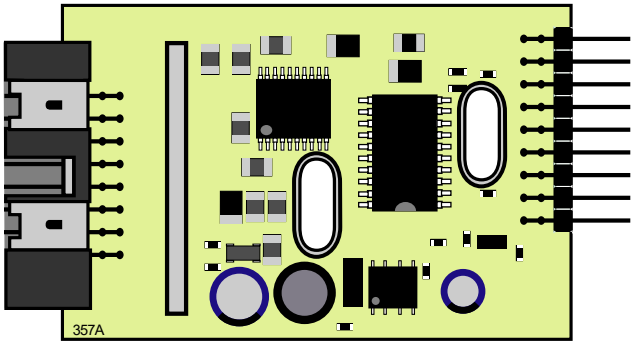


Figure 4 – ISS7/8 Input Module Component Layout

Connecting Load Cells to the Input Module

Connecting the load cells directly to the input module is an option, b ut means that a maxim um of only f our load cells can be connected and processed. In most cases connecting through the terminal b lock simplifies connections and allo ws for up to eight load cells to be connected (See Figure 5).

The e xternal pinouts betw een the input module and the ter minal b lock are sho wn in the tab le opposite:

Input Module Pin No.		Function	Junction Block Pin No.	Junction Block Label
1	Input 1	In Hi 1	15	+1
2		In Lo 1	16	–1
3	Input 2	In Hi 2	13	+2
4		In Lo 2	14	–2
5	Input 3	In Hi 3	11	+3
6		In Lo 3	12	–3
7	Input 4	In Hi 4	09	+4
8		In Lo 4	10	–4
9		+Sense	07	+S
10		–Sense	08	–S
11		+Exc	05	5 V
12		+Exc	06	5 V
13		–Exc	03	0 V
14		–Exc	04	0 V
15		Shield	01	Sh
16		n/c	02	–

The ± sense connections are connected b y jumper wires to the ± excitation connections at the terminal block to minimize lead wire error. This is particularly important with multiple load cell operation.

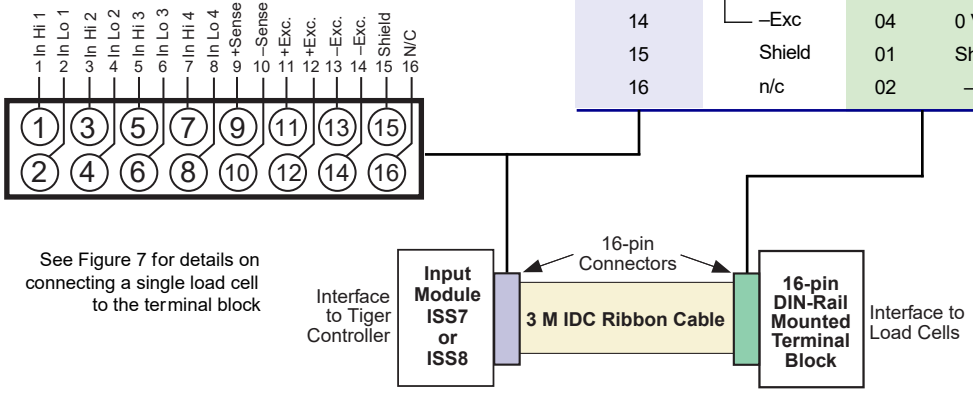


Figure 5 – Load Cell to Input Module Connections

Connection to the DIN rail mount terminal block and the input module is via a shielded 16-wire IDC cable available in user selectable lengths. For example, the Tiger 320 controller and input module could be sited about 5 meters from the load cells. In this case, the terminal block would be located close to the load cells and connected, by a 5 meter length of IDC cable, to the controller housed in an enclosure. Also, the controller could possibly be linked to a central control through a serial communications link (See Figure 6).

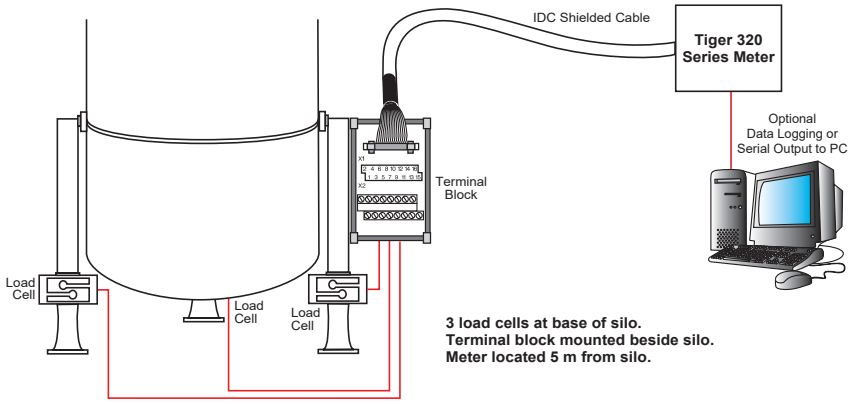


Figure 6 – Example of Three Load Cells Connected to the Meter via the Terminal Block

Alternatively, both the controller and the terminal block could be mounted on a DIN rail within an enclosure and connected using a standard short ribbon cable (See Figure 7).

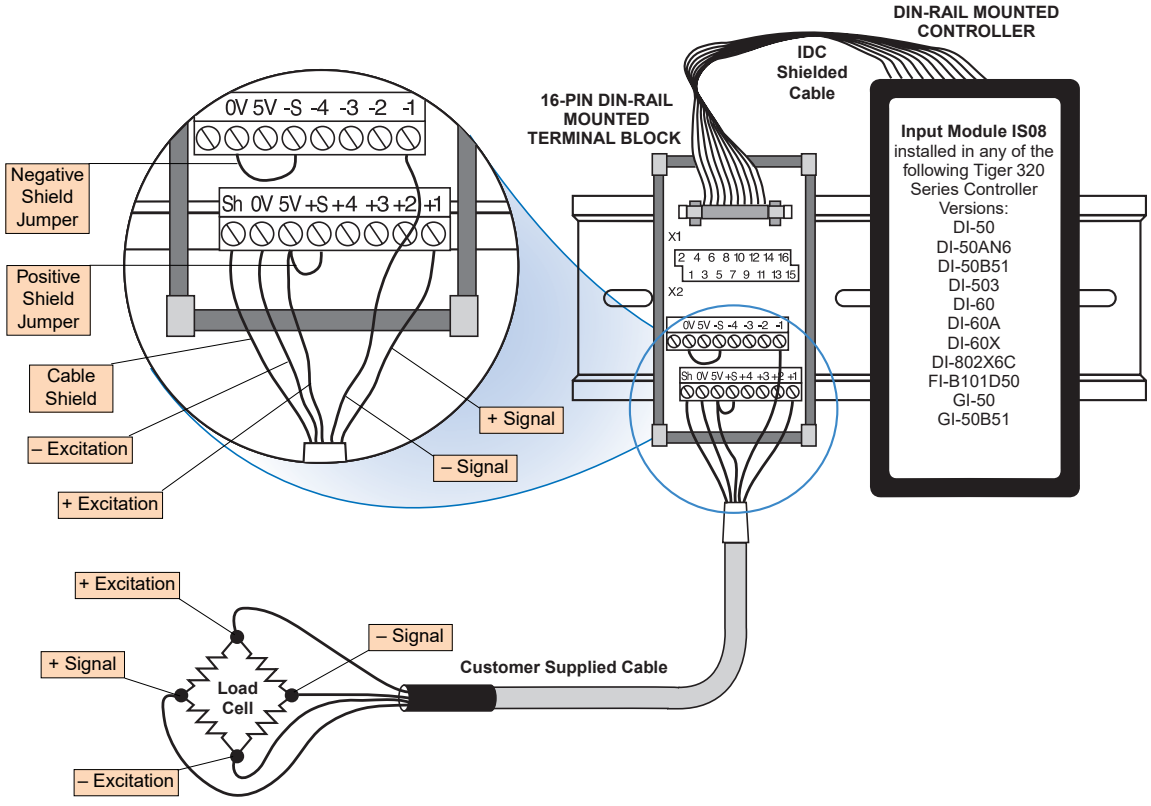


Figure 7 – Example of Single Load Cell Connected to the Meter via the Terminal Block

Smart Setup Registers

The meter uses three smar t setup registers to configure smar t input modules. ISS7 and ISS8 require **smart registers 1 and 2** to be set up.

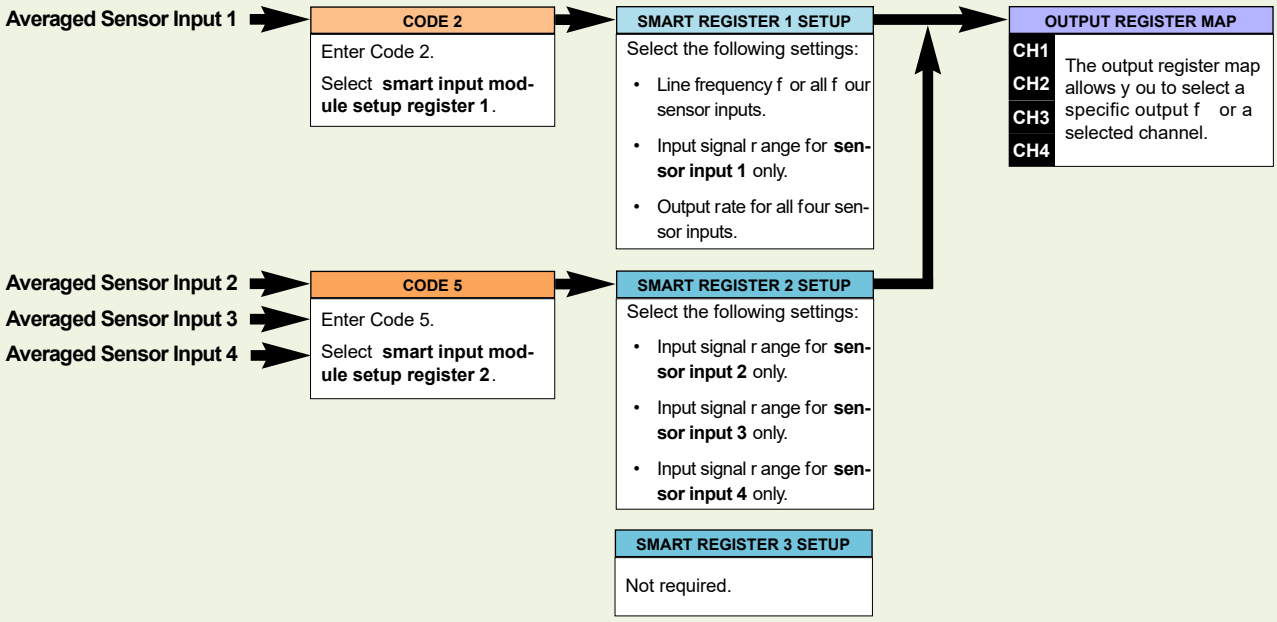
This input module produces four output registers, each being the averaged result of one or more input sensors . One of these registers can be transferred to CH1 via Code 2, the same or another register tr ansferred to CH2 via Code 4, the same or another register tr ansferred to CH3 via Code 5, and the same or another register tr ansferred to CH4 via Code 6.

Smart register 1 allows you to select the following settings:

- A line frequency of 50 or 60 Hz f or all four sensor inputs.
- The input signal range for sensor input 1 only from 1, 2, 3, or 20 mV/V .
- And the output r ate for all f our sensor inputs from 0.5, 1, 5, or 10 Hz (Note: If more than one type of load cell is installed, the output rate selected must correspond to the load cell requir ing the fastest output rate).

Smart register 2 allows you to select the input signal r ange for sensor inputs 2, 3, and 4.

Smart Setup Register – Operational Flow Diagram



Programming Procedures

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

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

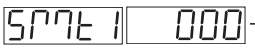
This setting enters the **smart register 1** code setup menu.

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 SENSOR 1
1 Averaged signal SENSOR 2
2 Averaged signal SENSOR 3
3 Averaged signal SENSOR 4
4 -
5 -
6 -
7 Smart input module register 1 code setup

3 Press the [P] button.



This menu pro vides settings unique to **smart register 1** of input module ISS7/8.

FIRST DIGIT – LINE FREQUENCY
0 60 Hz rejection
1 -
2 50 Hz rejection
3 -

SECOND DIGIT – SENSOR 1 INPUT mV/V (5 V Exc.)
0 1 mV/V
1 2 mV/V
2 3 mV/V
3 20 mV/V
4 -
5 -
6 -
7 -

THIRD DIGIT – OUTPUT RATE
0 0.5 Hz averaged
1 1 Hz averaged
2 5 Hz averaged
3 10 Hz averaged
4 -
5 -
6 -
7 -

Note the output register map is diff erent f or eac h smart input module.

4 Using the ⇧⇩ buttons, select the relevant **line frequency** rejection for all input sensors, the input range of **sensor 1**, and the **output rate** common to all sensor inputs.

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

6 Using the ⇧⇩ buttons, reset the 3rd digit in Code 2 to select an output register (sensor) from the output register map.

Note, **sensor 1** would normally be selected as the output register as this output is transferred to channel 1 in the meter.

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

7 Press the [P] button 3 times to enter Code 5. 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 SENSOR 1
1 Averaged signal SENSOR 2
2 Averaged signal SENSOR 3
3 Averaged signal SENSOR 4
4 -
5 -
6 -
7 Smart input module register 1 code setup

Note the output registers in the 3rd digit are specific to ISS7/8. 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
SENSOR 4 Input Range
0 1 kW
1 2 kW
2 3 kW
3 20 mV
4 -
5 -
6 -
7 -

SECOND DIGIT
SENSOR 3 Input Range
0 1 kW
1 2 kW
2 3 kW
3 20 mV
4 -
5 -
6 -
7 -

THIRD DIGIT
SENSOR 2 Input Range
0 1 kW
1 2 kW
2 3 kW
3 20 mV
4 -
5 -
6 -
7 -

9 Using the ⇧⇩ buttons, select the **sensor 4 input** from the 1st digit, select the **sensor 3 input** from the 2nd digit, and select the **sensor 2 input** 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.

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 prog ramming mode.

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

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

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

CH1 Cod_2 X7X →

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 R TD)
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 SENSOR 1
1 Averaged signal SENSOR 2
2 Averaged signal SENSOR 3
3 Averaged signal SENSOR 4
4 -
5 -
6 -
7 Smart input module register 1 code setup

16 If required enter Code 4 and select the required register map settings f or **sensor 2** in the 2nd digit.

Note, the 1st and 3rd digits must be set to 0.

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	
0 Sensor 2 Input Disabled	
1 Direct (no post processing)	
2 Square Root of Sensor 2 Input	
3 Inverse of Sensor 3 Input	
4 Output Register 1 (smart module)*	
5 Output Register 2 (smart module)*	
6 Output Register 3 (smart module)*	
7 Output Register 4 (smart module)*	

*Note:
*The logic f or **sensor 2** is not the same as sensor 1, sensor 3, or sensor 4. The 1st and 3rd digits m ust 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):*

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

17 If required enter Code 5 and select the required post processing settings f or **sensor 3** in the 1st digit and the required register map setting in the 3rd digit.

CH3 Cod_5 X7X →

FIRST DIGIT
SENSOR 3 INPUT POST PROCESSING
0 Direct Display of Input (no processing)
1 Square Root of Sensor 3 Input
2 Inverse of Sensor 3 Input
3 **Meters with 4 kB memory** NO Linearization **Meters with 32 kB memory** 32-point Linear ization of Sensor 3 Input using Table 3
Note: All linear ization tab les are set up in the Calibration Mode [24X].

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

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

18 If required enter Code 6 and select the required post processing settings f or **sensor 4** in the 1st digit and the required register map setting in the 3rd digit.

CH4 Cod_6 X7X →

FIRST DIGIT
SENSOR 4 INPUT POST PROCESSING
0 Direct Display of Input (no processing)
1 Square Root of Sensor 4 Input
2 Inverse of Sensor 4 Input
3 **Meters with 4 kB memory** NO Linearization **Meters with 32 kB memory** 32-point Linear ization of Sensor 4 Input using Table 4
Note: All linear ization tab les are set up in the Calibration Mode [24X].

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 requires to monitor the weight in a grain silo and also control dispensing the grain (See Figure 8).

Texmate installed an ISS7/8 input module connected to the load cells via a terminal block. Load cell sensors 2, 3, and 4 are installed below the silo legs and are used to monitor the silo weight. They are 20 tonne sensors with a 20 mV/V sensor signal. Load cell sensor 1 is used to control grain dispensing and is a 100 kg sensor with a 2 mV/V sensor signal.

All four load cells are configured with a 10 Hz output rate. This is necessary to keep up with the rate the grain is emptied from the silo.

1 Select 50 Hz input line frequency, with a 10 Hz averaged output rate for all sensors. Select a 2 mV/V sensor input for sensor 1:

In CODE 2 select X77 then press P button.

Display toggles between SMt1 000

Set SMt1 to 213

2 Select 20 mV/V voltage range for sensors 2, 3, and 4:

In CODE 5 reset to X77 then press P button.

Display toggles between SMt2 000

Set SMt2 to 333

3 Select sensor 1 as the dispensing weight for CH1:

In CODE 2 select X70

4 Select the silo leg sensor 2 load cell for CH2:

In CODE 4 select X50

5 Select the silo leg sensor 3 load cell for CH3:

In CODE 5 select X72

6 Select the silo leg sensor 4 load cell for CH4:

In CODE 6 select X73

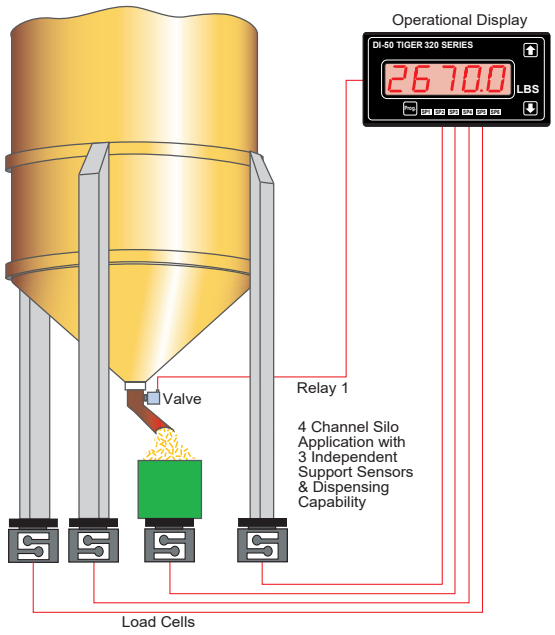


Figure 8 – Example 1: Monitoring Weight and Distribution

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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