MSI9002

BREAKOUT/SUMMING BOX

User Guide

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PUB.326-07-06

Table of Contents

Illustration Index

Index of Tables

Introduction

The MSI-9002 Breakout/Summing Box is an accessory to the MSI-9000 CellScale. It functions as a standard 4 in and 1 out Summing Box, but also has the unique ability to function as a 4 in and 2 out dual summing box. This allows two channels of the CellScale to access two pairs of summed load cells.

Terminals are provided to permit daisy-chaining of a second MSI-9002 module to allow access to more CellScale input channels. Each input is EMI filtered and transient protected.

The MSI-9002 has the high end feature of switches on each input allowing complete removal of summing sections for calibration, test and troubleshooting.

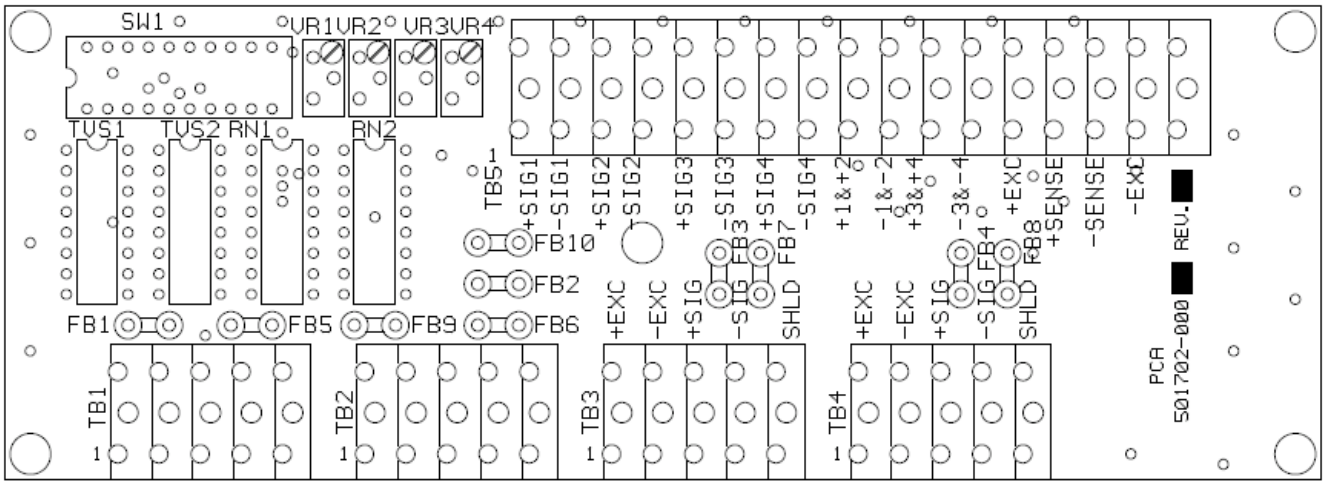

Illustration 1: Summing Box Circuit Board

Connecting Signal Input

Feed through connectors accommodate round cables with diameters from 4mm (0.16in) to 8mm (0.31in). The MSI-9002 has four inputs (TB1 thru TB4). Each input has +/- excitation, +/- signal, and shield. The following table shows the pinout:

Pin #	Signal
1	+ Excitation
2	- Excitation
3	+ Signal
4	- Signal
5	Shield

Table 1: Input Connections

The MSI-9002 can take 1 to 4 inputs at a single time in any combination. The important part of connecting devices to the MSI-9002 is what the desired output is. The output capabilities are described below.

Connecting Summed Output

The MSI-9002 outputs to other devices via TB5. The following table shows the pinout and the operation of each line

Pin #	Signal	Description
1	+ Signal 1	Positive signal output, channel 1 only
2	- Signal 1	Negative Signal output, channel 1 only
3	+ Signal 2	Positive signal output, channel 2 only
4	- Signal 2	Negative Signal output, channel 2 only
5	+ Signal 3	Positive signal output, channel 3 only
6	- Signal 3	Negative Signal output, channel 3 only
7	+ Signal 4	Positive signal output, channel 4 only
8	- Signal 4	Negative Signal output, channel 4 only
9	+ Signal 1 + 2	Positive signal output for the sum of channel 1 + 2
10	- Signal 1 + 2	Negative signal output for the sum of channel 1 + 2
11	+ Signal 3 + 4	Positive signal output for the sum of channel 3 + 4
12	- Signal 3 + 4	Negative signal output for the sum of channel 3 + 4
13	+ Excitation	Positive Excitation from the meter
14	+ Sense	Positive Sense from the meter
15	- Sense	Negative Sense from the meter
16	- Excitation	Negative Excitation from the meter
17	Shield	Shield from the meter interface cable

Table 2: Output Connections

Connecting to a CellScale

The MSI-9000 CellScale load cell connector has all the connections for two independent load cell inputs. When connecting an MSI-9002 to a CellScale, the summing box is typically connected as a single channel to the CellScale. The following diagram illustrates the CellScale Connector.

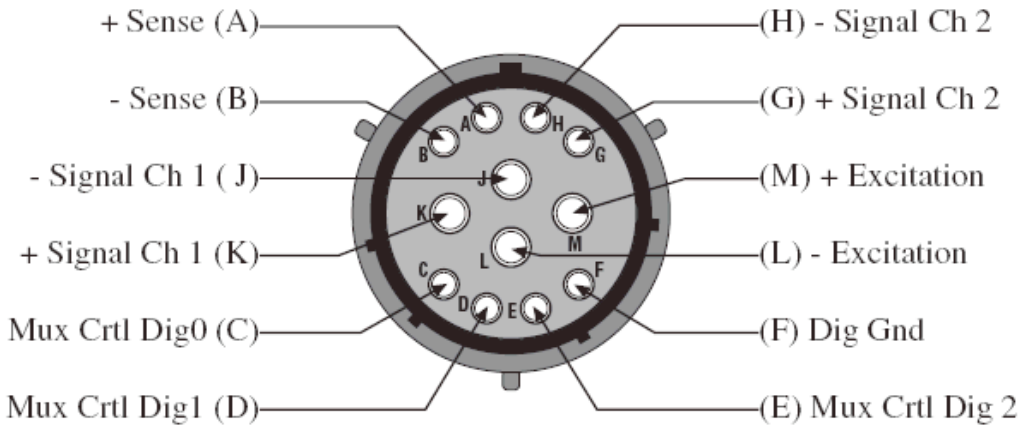

Illustration 2: MSI-9000 Load Cell Connector

When connecting two MSI-9002 boxes to a single MSI-9000 CellScale connector, the excitation voltage is shared among both devices (hence the larger solder cups on the connector). Then the two returning +/- signal lines are connected to Ch1 and Ch2. This entails a 'Y' cable from the MSI-9000 to the devices. Also note that the sense lines can be used when connecting to two MSI-9002 boxes. However, only one can be connected and the 'Y' cable going to each MSI-9002 must be the same length and ideally exposed to the same ambient conditions.

501802 Cable

To connect a single MSI-9002 to a CellScale, the ideal cable to use is MSI #501802. This cable has all the conductors for both channels, and sense lines. Please reference the following diagram for wiring a 501802 cable to an MSI-9002.

Wire Color	Function	TB5 Pin
Blue	+ Sense	14
Brown	- Sense	15
White/Gray	Dig 0	N/C
White/Orange	Dig 1	N/C
Gray	Dig 2	N/C
Orange	Ground	N/C
Green/White	+ Sig2	11
White/Black	- Sig2	12
White	- Sig1	10
Green	+ Sig1	9
Black	- Exc	16
Red	+ Exc	13
Drain	Shield	17

Table 3: 501802 Cable

The 501802 cable plugs directly into an MSI-9000. Note that the Dig0-2 and Ground connections are not used. These lines are used for wiring to the MSI-9008 Multiplexer.

Summing Modes

The MSI-9002 Summing box is capable of producing output for each individual load cell, the sum of channels 1 and 2, the sum of 3 and 4, and the sum of all four inputs. The summing mode depends on the switch settings for SW1, and what output connections are hooked up.

Individual signal outputs

Each individual signal output is available for the four inputs via TB5. To use the individual output, ensure the signals are not loaded from the other channels by leaving all switch positions open on SW1. These outputs are intended for calibration, testing and troubleshooting of individual input channels.

Summed 1 + 2, single output

To sum the inputs 1 + 2, SW1 positions one and two must be closed and position 5 must be open. Positions three and four are irrelevant.

Summed 3 + 4, single output

To sum the inputs 3 + 4, SW1 positions three and four must be closed and position five must be open. Positions one and two are irrelevant.

Summed 1 + 2 and 3 + 4, dual output

The MSI-9002 can output only the sum of 1 + 2 on TB5 pins 9 + 10, while simultaneously outputing the sum of 3 + 4 on TB5 pins 11 + 12. The following diagram illustrates this setup.

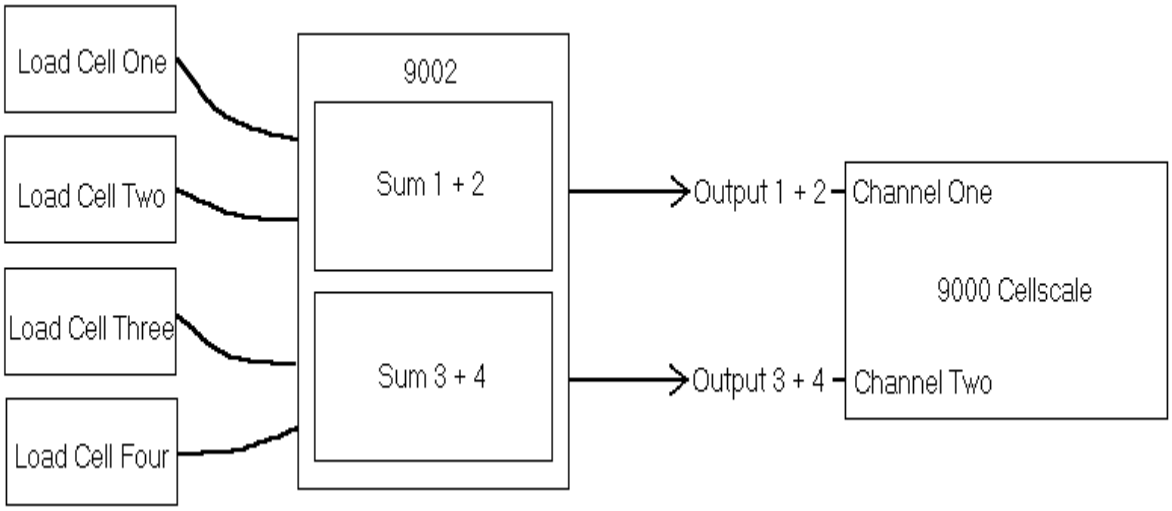

Illustration 3: Dual Channel Diagram

The dual output from the summing box is designed for inputing into the dual channels of a CellScale. This setup shares excitation between the two load cells.

Summed 1 + 2 + 3 + 4

To sum all four input channels, all five switch positions must be closed on SW1. The output signal can be taken from TB5. The lines for 1 + 2 or 3 + 4 can be used, both have the same output. The following table illustrates the basic connections for outputing the sum of all four load cells.

Signal	Color	TB5 pin
+Exc	Red	13
-Exc	Black	16
+Sig	Green	9 or 11
-Sig	White	10 or 12

Table 4: Summed Output Connections

Trimming Signal Output

The four potentiometers (VR1 thru VR4) are used to trim the four inputs (TB1 thru TB4) respectively. Trimming is required in order to balance the output of each load cell to be summed. Trimming typically involves turning all potentiometers fully clockwise so the load cell output is maximum. Then while monitoring the output (typically raw counts on the MSI-9000 terminal or other meter), trim the output of the load cells to match.

Appendix A – Box Dimensions

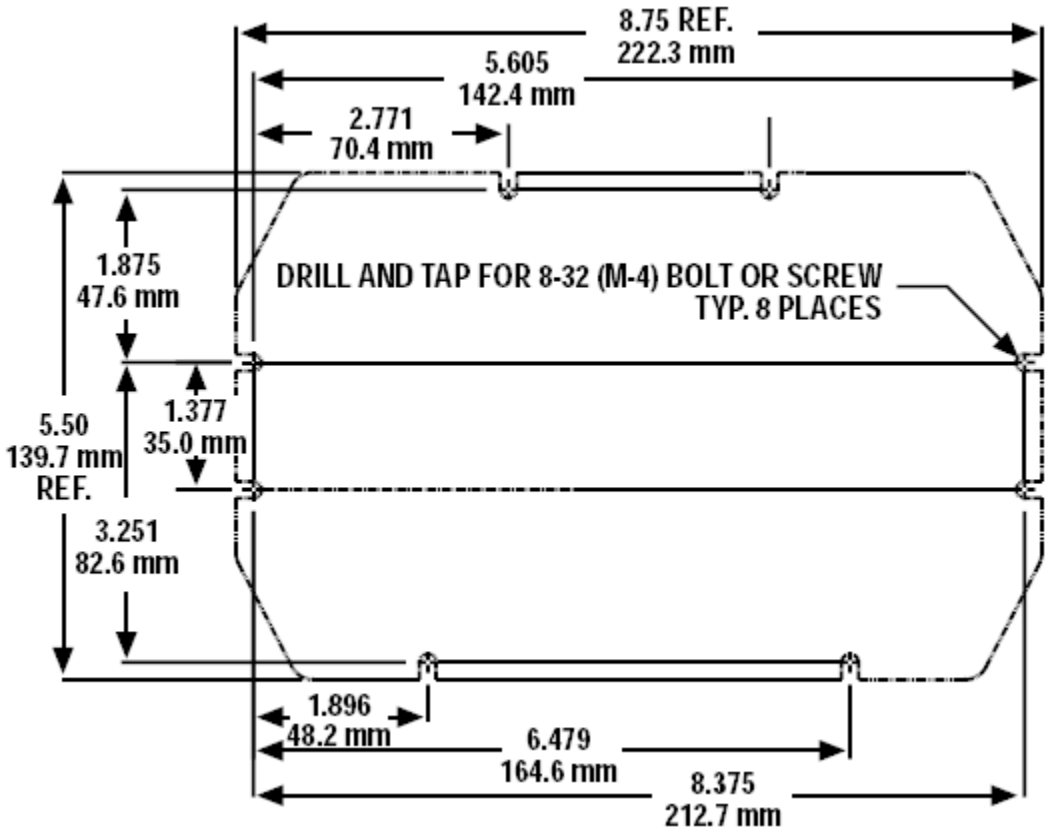

Illustration 4: Box Dimensions

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