TuffSeal®

Light to Mid-Range Capacity Junction Box
JB4ES/JB4SS/JB4EP/JB4SP

Installation Manual

November 10, 2023

RICE LAKE WEIGHING SYSTEMS

PN 184803 Rev D

All information contained within this publication is, to the best of our knowledge, complete and accurate at the time of publication. Rice Lake Weighing Systems reserves the right to make changes to the technology, features, specifications and design of the equipment without notice.

The most current version of this publication, software, firmware and all other product updates can be found on our website:

www.ricelake.com

Revision History

This section tracks and describes the current and previous manual revisions for awareness of major updates and when the updates took place.

Revision	Date	Description
–	July 24, 2017	The TuffSeal manual, part number 91909, has been updated to 184803
A	January 29, 2020	Revision history established after Rev A
B	June 7, 2022	Added information on new mid-range junction box
C	September 15, 2023	Added information on board installation
D	November 10, 2023	Added diagrams in appendix

Table i. Revision Letter History

Contents

1.0 Introduction

The TuffSeal® series are excitation or signal trim junction boxes that can accommodate two, three or four load cells. Primarily used in floor and hopper scales, each model also has the capability to extend to more than four load cells using an excitation connector.

All models have a new Prevent® breather vent, which inhibits the buildup of pressure caused by sudden temperature or environmental changes. It must be changed every six months to a year, it does become dirty over time. When correctly installed and torqued to 10 lb/in, all models can withstand 900 PSI water pressure.

All terminals will function properly without modification. However, load cell output can be individually trimmed with potentiometers which is further explained in Section 4.0 on page 10 of this manual.

NOTE: The TuffSeal manual, part number 91909, has been updated to 184803 effective July 24, 2017.

Figure 1-1. Junction Boxes

Manuals and additional resources are available on the Rice Lake Weighing Systems website at **www.ricelake.com**

Warranty information can be found on the website at **www.ricelake.com/warranties**

1.1 Model Designations

The TuffSeal junction box comes in several different models including stainless steel for the small junction box and an FRP enclosure for the mid-range junction box. Some models are FM Approved.

Applications vary from use in floor scales to hoppers so selection can vary from a light to a mid-range capacity junction box.

1.2 Special Conditions of Use

WARNING: Electrostatic Charging Hazard – Clean junction box enclosure with a damp cloth only.

This equipment was examined and approved for connection to a single Indicator only.

2.0 Mounting Procedure

The TuffSeal junction boxes come in two sizes:

- 4-Channel small enclosure (JB4ES and JB4SS)
- 4-Channel mid-range FRP enclosure (JB4EP and JB4SP)

The junction boxes should be mounted in a location that is convenient for servicing and away from standing water. Mount the enclosure in a location that allows for the cable supplied, do not cut the cable.

IMPORTANT: Load cell output is temperature compensated for the supplied cable length. Altering the length can change the cell's signal output.

2.1 Small Junction Boxes (JB4ES and JB4SS)

Depending on the mounting surface, the JB4ES and JB4SS enclosure can be attached using two pan-head screws, bolts, or other suitable fasteners (not included).

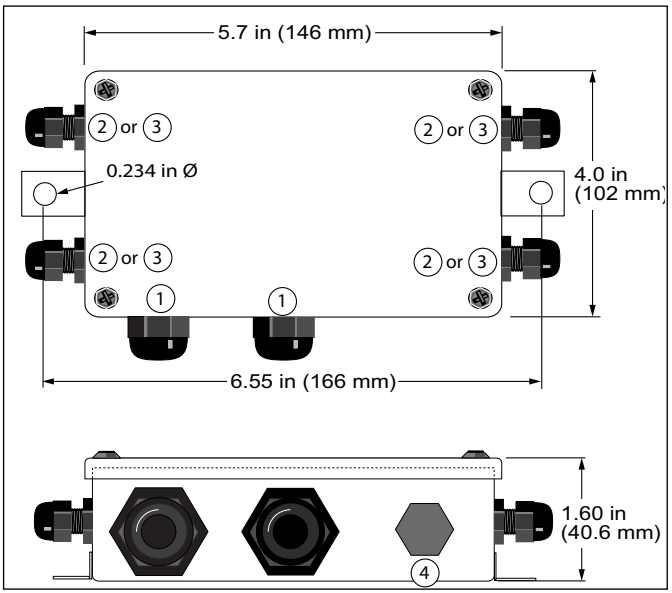


Figure 2-1. JB4ES and JB4SS Enclosure Dimensions

Item No.	Description	Qty
1	SL-11, PG-11 Cord Grips, Cable Diameter 0.197 - 0.394 in	2
2	SL-7, PG-9 Cord Grips, Cable Diameter 0.118 - 0.255 in	4
3	SL-7, PG-7 Cord Grips, Cable Diameter 0.138 - 0.315 in	4
4	Breather Vent	1

Table 2-1. JB4ES and JB4SS Enclosures

2.2 Mid-Range Junction Boxes (JB4EP and JB4SP)

Depending on the mounting surface, the JB4EP and JB4SP enclosure can be attached using four pan-head screws, bolts or other suitable masonry fasteners.

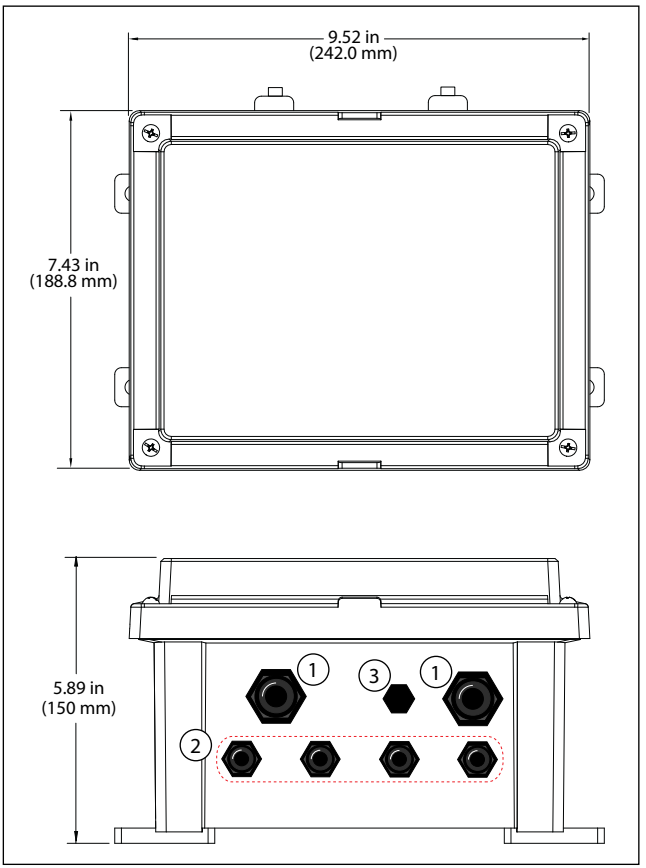


Figure 2-2. JB4EP and JP4SP Enclosure Dimensions

Item No.	Description	Qty
1	SL-11, PG-11 Cord Grips, Cable Diameter 0.197 - 0.394 in	2
2	SL-7, PG-9 Cord Grips, Cable Diameter 0.118 - 0.255 in	4
3	Breather Vent	1

Table 2-2. JB4EP and JB4SP Enclosures

3.0 Junction Box Wiring

All TuffSeal junction box models have been designed to connect and trim up to four load cells per board.

It is possible to use this box with other combinations. Use the expansion port on the main board, to connect multiple junction boxes in series to accommodate applications that have more than four load cells.

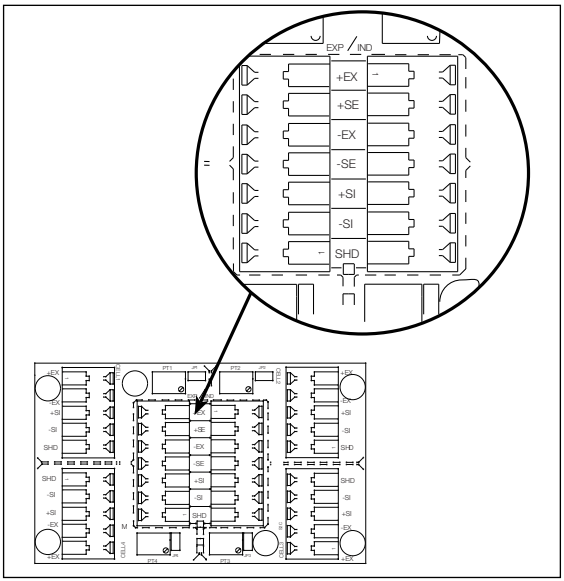


Figure 3-1. Expansion Port Wiring Location

1. Determine the wiring pattern to be used.
2. Route the load cell cables through the cord grips, do not tighten the grips.
3. Strip the wire insulation back 1/4 inch to expose the wire.
4. Push in and hold the quick-connect lever with a small screwdriver.
5. Insert the appropriate wire into the exposed wire opening.
6. Release the screwdriver to allow the spring-loaded gate to close and lock the wire in place.

NOTE: The spring-loaded terminals will accommodate 12-28 gauge wire.

3.1 Connect Indicator

The indicator terminal strip is used to connect the main cable to the indicator.

1. Determine the indicator's load cell input connections from the indicator manual.
2. Run a cable from the indicator terminal into the junction box through the cord grip.

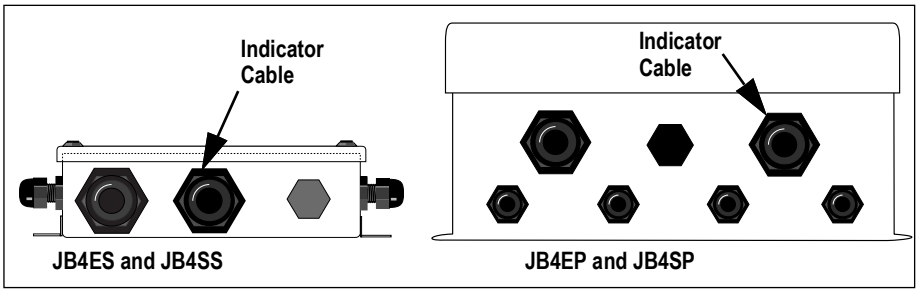


Figure 3-2. Indicator Cable Location

3. Strip the wire insulation back 1/4 inch to expose the wire.
4. Push in and hold the quick-connect lever with a small screwdriver.
5. Insert the appropriate wire into the exposed wire opening.
6. Release the screwdriver to allow the spring-loaded gate to close and lock the wire in place.

If cables could be exposed to water or other liquids, bend a short downward loop in all cables near the cord grips so any fluids draining down the cables will drip off before reaching the junction box.

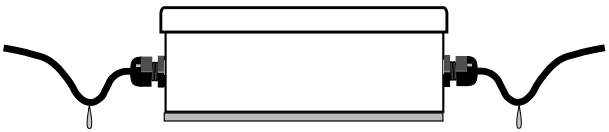


Figure 3-3. Drip Loop Cable

4.0 Trimming Procedure

Trimming is a process of equalizing the output from multiple individual load cells. If needed, load cell output can be individually trimmed with potentiometers.

If more than 5% of normal output needs to be trimmed to equalize output, check for other possible problems. When all errors except cell mismatch and cable extensions or reductions have been corrected, continue with the trimming.

4.1 Excitation Board Trimming (JB4ES and JB4EP)

Use the following steps to properly trim the JB4ES and JB4EP junction boxes.

1. Determine the number of load cells needed.
2. Remove the jumpers to enable trimming of each load cell in use.
3. Set all potentiometers fully clockwise to give maximum signal output from each load cell.

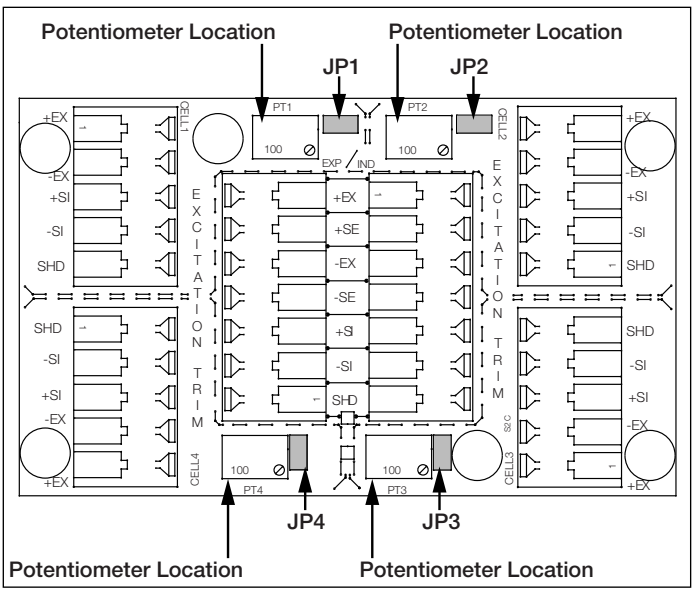


Figure 4-1. Excitation Main Board

4. Zero the indicator.
5. Place calibrated test weights over each load cell. The amount of test weights to be used depends on the scale configuration.

NOTE: Refer to Handbook 44 Field Manual, published by NIST (National Institute of Standards and Technology, for weight recommendations. For a four cell platform, it's 25% of scale capacity is recommended.

6. Record the value displayed on the indicator once test weight is placed on each corner, directly over the load cell. Do not allow weight to overhang the sides.

7. Allow the scale to return to zero each time to check for friction or other mechanical problems.
8. Select the load cell with the lowest value as the reference load cell. This load cell will not be trimmed.
9. Place the same test load over one of the other load cells.
10. Use the corresponding potentiometer to trim the load cell equal to the reference load cell.
11. Repeat Steps 9 and 10 until all remaining load cells have been trimmed.
12. Once trimming is complete, check all loads cells again for repeatability. If necessary, repeat Steps 4 through 11.
13. Pull excess cable out of the enclosure.
14. Tighten the cord grip assemblies with a wrench. To be watertight, each cord grip must be tightened so the rubber sleeve begins to protrude from the hub.
15. Plug unused hubs to prevent moisture entry.
16. Place the supplied desiccant filter it in the junction box.
17. Replace the cover and tighten the screws in an alternating pattern to be certain the gasket is compressed equally in all locations.

IMPORTANT: See the Electronic Replacement Parts and Components catalog to order extra hole plugs if needed for Step 15.

Inspect the desiccant during normal service and change the desiccant as needed.

4.2 Signal Board Trimming Procedure (JB4SS and JB4SP)

Use the following steps to properly trim the JB4SS and JB4SP junction boxes.

1. Determine the number of load cells needed.
2. Ensure jumpers are in place to enable trimming the load cells. Remove jumpers for unused cells.
3. Set all potentiometers fully clockwise to give maximum signal output from each cell.

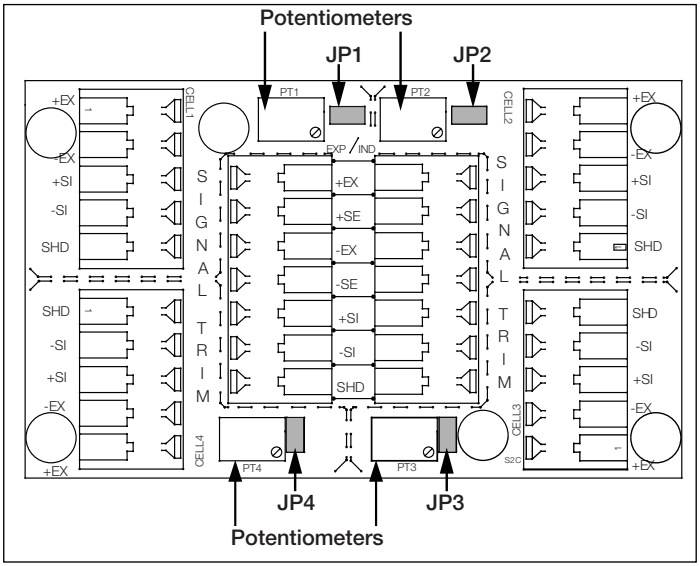


Figure 4-2. Signal Trim Main Board

4. Zero the indicator.
5. Place calibrated test weights over each load cell in turn. The amount of test weights to be used will depend on the scale configuration.

NOTE: Refer to Handbook 44 Field Manual, published by NIST (National Institute of Standards and Technology, for weight recommendations. For a four cell platform, it's 25% of scale capacity is recommended.

6. Record the value displayed on the indicator once test weight is placed on each corner, directly over the load cell. Do not allow weight to overhang the sides.
7. Allow the scale to return to zero each time to check for friction or other mechanical problems.
8. Select the load cell which has the lowest value as the reference point. This cell will not be trimmed.
9. Place the same test load over one of the other load cells.
10. Use the corresponding potentiometer to trim the load cell equal to the reference load cell.

11. Repeat Steps 9 and 10 until all remaining load cells have been trimmed.
12. Once trimming is complete, check all loads cells again for repeatability. If necessary, repeat Steps 4 through 11.
13. Pull excess cable out of the enclosure.
14. Tighten the cord grip assemblies with a wrench. To be watertight, each cord grip must be tightened so the rubber sleeve begins to protrude from the hub.
15. Plug unused hubs to prevent moisture entry.
16. Place the supplied desiccant filter it in the junction box.
17. Replace the cover and tighten the screws in an alternating pattern to be certain the gasket is compressed equally in all locations.

IMPORTANT: See the Electronic Replacement Parts and Components catalog to order extra hole plugs if needed for Step 15.

Inspect the desiccant during normal service and change the desiccant as needed.

5.0 Board Installation

The 4 channel board is used in many Rice Lake Weighing systems products and is FM approved. Use this document when replacing the board in existing product.

WARNING: Some procedures described in this manual require work inside the product. These procedures are to be performed by qualified service personnel only.

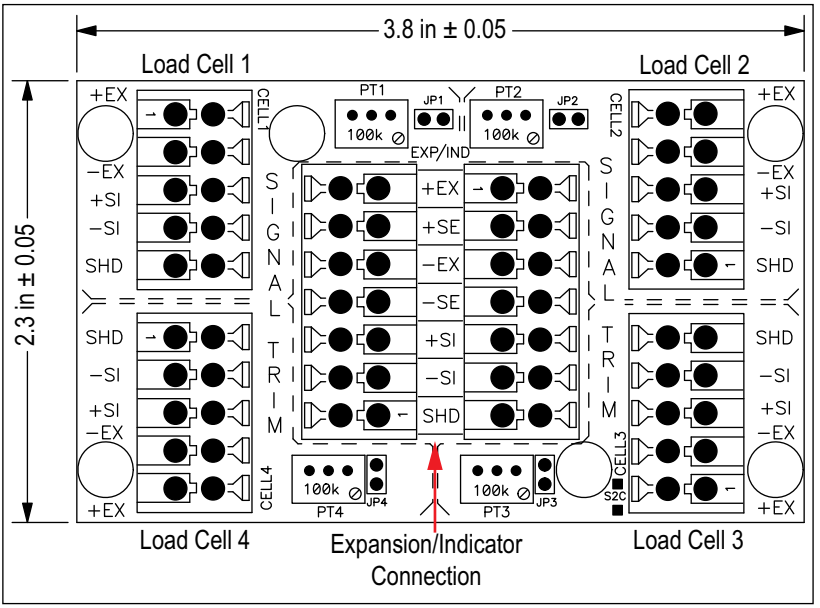


Figure 5-1. Junction Boxes

Installation

To replace the board in existing product, follow these steps:

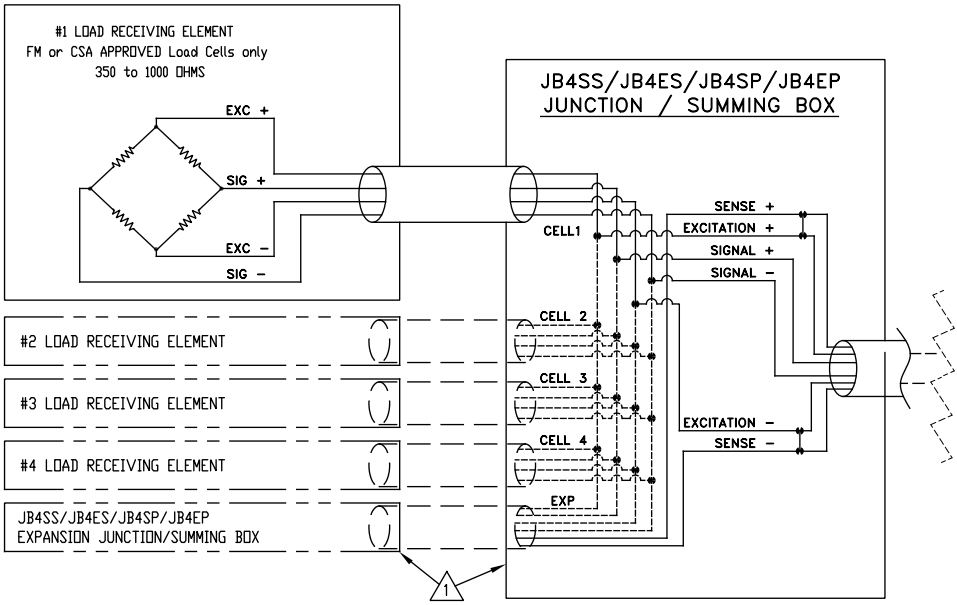
1. Open the product and locate the current 4-channel board.
2. Make a note of the wiring configuration of the current board.
3. Remove the wiring from the board.
4. Loosen mounting screws and remove the board from the product.
5. Install the new board and secure with mounting hardware.
6. Reinstall the wiring as noted in Step 2.
7. Close the product.

Refer to the product manual for additional information.

Special Conditions of Use

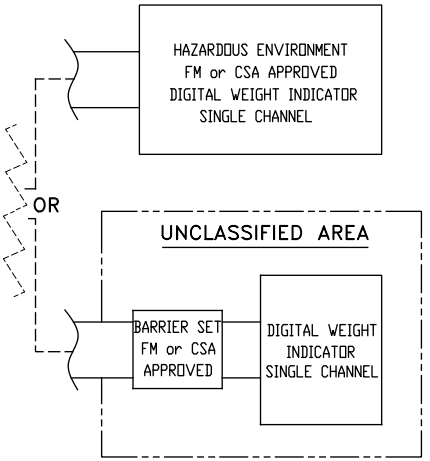
- Clean the product enclosure with a damp cloth only - Electrostatic Charging Hazard.
- This equipment was examined and approved for connection to a single Indicator only.

6.0 Appendix



NOTE:

1. A MAXIMUM OF TWO JUNCTION/SUMMING BOXES OF THE SAME MODEL MAY BE INTERCONNECTED AS SHOWN.
2. THE JUNCTION / SUMMING BOX IS A "SIMPLE APPARATUS, PASS THROUGH DEVICE.
3. THE JUNCTION BOX ENTITY PARAMETERS: Vmax, Imax, AND Pi ARE THE MAXIMUM LEVELS WHICH MAY BE SUPPLIED FROM THE INDICATOR.
4. THE JUNCTION / SUMMING BOX WAS APPROVED FOR CONNECTION TO A SINGLE INDICATOR ONLY.
5. SEE THE SPECIFIC CONTROL DRAWING FOR LOAD CELL INSTALLATION INFORMATION.
6. SEE THE SPECIFIC CONTROL DRAWING FOR WEIGHING INDICATOR INSTALLATION INFORMATION.
7. ONLY FM AND CSA HAZARDOUS APPROVED WEIGHING INDICATORS, BARRIERS, AND LOAD CELLS (WITH PROPER ENTITY PARAMETERS) MAY BE USED WITH THIS JUNCTION / SUMMING BOX.

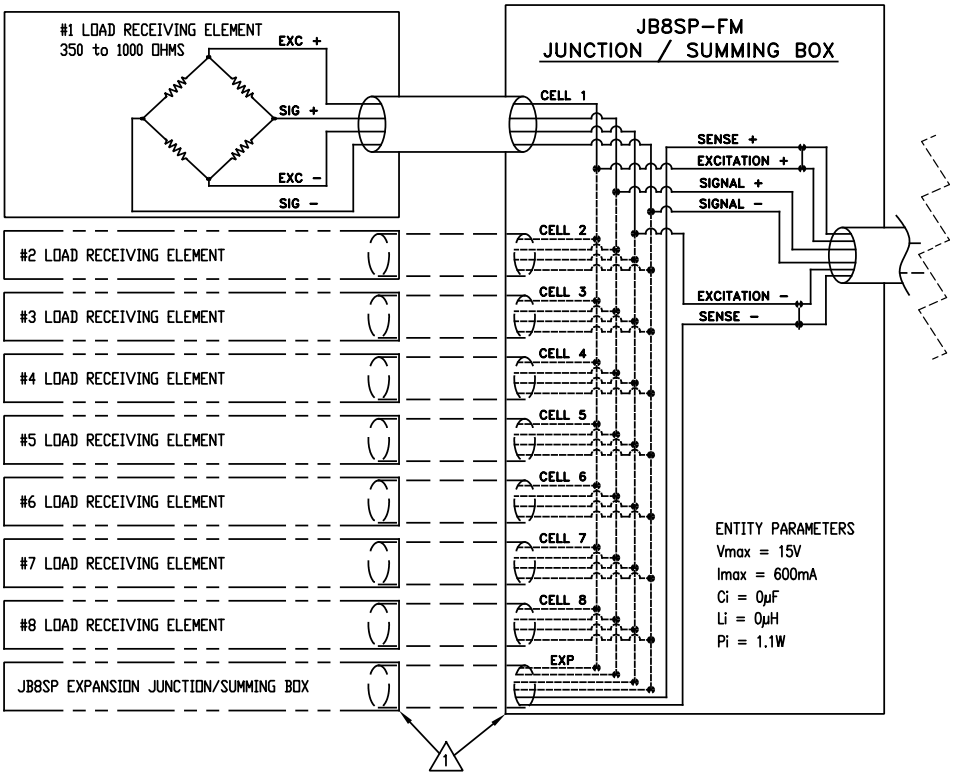


HAZARDOUS AREA

CLASS I, DIVISION 1, GROUP A, B, C, D
CLASS II, DIVISION 1, GROUP E, F, G
CLASS III, DIVISION 1 & 2
T4, Ta = 50°C

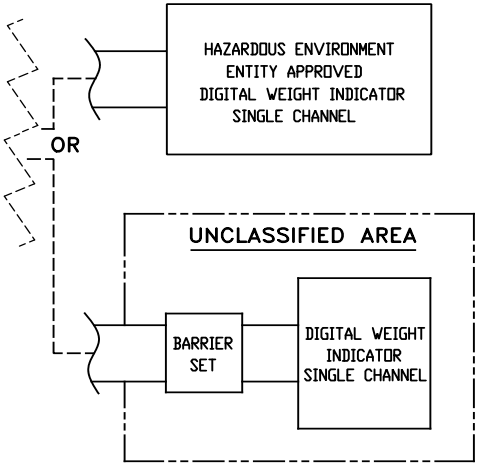
ENTITY PARAMETERS

± Excitation	± Sense	± Signal
Vmax = 17V	Vmax = 17V	Vmax = 10V
Imax = 442mA	Imax = 19mA	Imax = 41mA
Ci = 0µF	Ci = 0µF	Ci = 0µF
Li = 0µH	Li = 0µH	Li = 0µH
Pi = 1.88W	Pi = 0.081W	Pi = 0.103W



NOTE:

1. A MAXIMUM OF TWO JUNCTION/SUMMING BOXES OF THE SAME MODEL MAY BE INTERCONNECTED AS SHOWN.
2. THE JUNCTION / SUMMING BOX IS A "SIMPLE APPARATUS, PASS THROUGH DEVICE.
3. THE JUNCTION BOX ENTITY PARAMETERS: Vmax, Imax, AND Pi ARE THE MAXIMUM LEVELS WHICH MAY BE SUPPLIED FROM THE INDICATOR.
4. THE JUNCTION / SUMMING BOX WAS APPROVED FOR CONNECTION TO A SINGLE INDICATOR ONLY.
5. SEE THE SPECIFIC CONTROL DRAWING FOR LOAD CELL INSTALLATION INFORMATION.
6. SEE THE SPECIFIC CONTROL DRAWING FOR WEIGHING INDICATOR INSTALLATION INFORMATION.
7. ONLY FM AND CSA HAZARDOUS APPROVED WEIGHING INDICATORS, BARRIERS, AND LOAD CELLS (WITH PROPER ENTITY PARAMETERS) MAY BE USED WITH THIS JUNCTION / SUMMING BOX.



HAZARDOUS AREA

CLASS I, DIVISION 1, GROUP A, B, C, D
CLASS II, DIVISION 1, GROUP E, F, G
CLASS III, DIVISION 1 & 2
CLASS I, II, III, DIVISION 2 G: ABCDEFG
T4, Ta = 50°C

230 W. Coleman St. • Rice Lake, WI 54868 • USA USA: 800-472-6703 • International: +1-715-234-9171