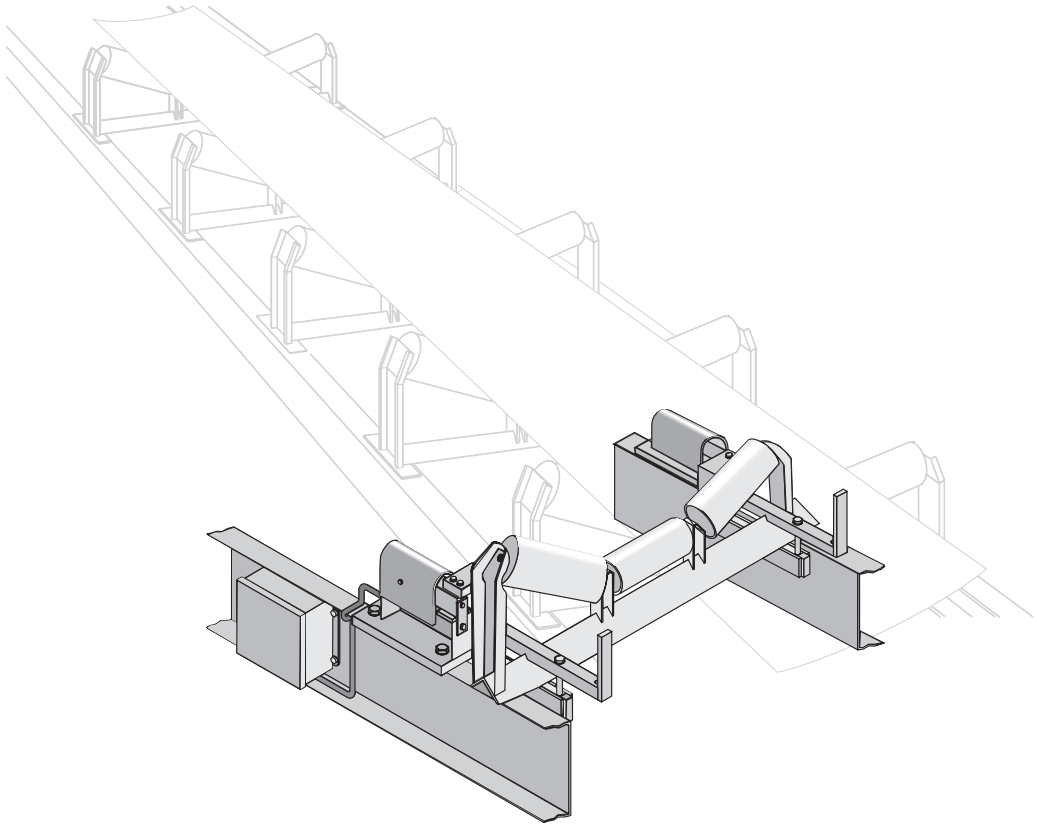
MILLTRONICS

MILLTRONICS UNIVERSAL SCALE

Instruction Manual PL-553 January 2001



UNIVERSAL SCALE

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Rev. 1.2

Safety Guidelines

Warning notices must be observed to ensure personal safety as well as that of others, and to protect the product and the connected equipment. These warning notices are accompanied by a clarification of the level of caution to be observed.

Qualified Personnel

This device/system may only be set up and operated in conjunction with this manual. Qualified personnel are only authorized to install and operate this equipment in accordance with established safety practices and standards.

Warning: This product can only function properly and safely if it is correctly transported, stored, installed, set up, operated, and maintained.

Note: Always use product in accordance with specifications.

Contact SMPI Technical Publications at the following address:

Technical Publications
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Table of Contents

About This Manual

This instruction manual covers the installation, operation and maintenance of the MUS (Milltronics Universal Scale) belt scale.

We strongly recommend that you read this manual before installing and starting up any component of the weighing system to which the MUS is being applied. Adhering to the installation and operating procedures ensures a quick, trouble-free installation and allows for the maximum accuracy and reliability of your weighing system.

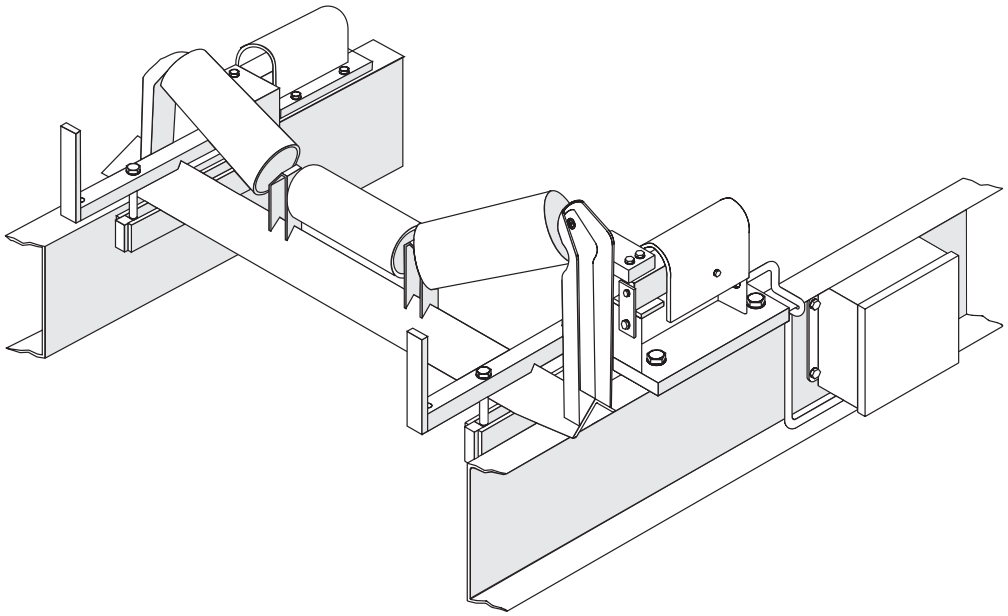
The MUS belt scale operates in conjunction with an integrator and optional speed sensor. Reading these associated instruction manuals is also recommended.

About the MUS

The MUS is a belt scale for mounting in a belt conveyor for continuous weighing of bulk solids.

The MUS belt scale consists of:

- a left and a right weigh beam, complete with one load cell each
- test weight(s)



The addition of an idler (supplied and installed by customer) completes the weighing assembly. The MUS load cells provide an electric signal, proportional to load, which is fed to the Milltronics integrator. Thus, weighing occurs without interrupting the process or affecting the process material.

Specifications

This section provides details on the standard duty and heavy duty MUS scales.

- Accuracy:
  - ± 0.5 to 1% of totalization over 3 to 1 operating range, application dependent
- Belt Width:
  - standard duty up to 42” CEMA width (up to 1000mm)
  - heavy duty 48” and up CEMA width (1200mm and up) (may also be used with narrower conveyors)
  - refer to the outline dimension section
- Belt Speed:
  - up to 3m/s (600 fpm)
- Capacity:
  - up to 5000 TPH at maximum belt speed
- Conveyor Incline:
  - ± 20° from horizontal, fixed incline
  - up to ± 30° with reduced accuracy
- Idler Profile:
  - flat to 35°
  - up to 45° with reduced accuracy
- Idler Diameter:
  - 2 to 7” (50 to 180mm)
- Idler Spacing:
  - 2.0 to 5.0 ft (0.6 to 1.5m)
- Load Cell:
  - excitation:
    - 10 V dc nominal
    - 15 V dc maximum
  - output:
    - 2 mV/V excitation at rated load cell capacity
  - non-linearity:
    - 0.02% of rated output
  - hysteresis:
    - 0.02% of rated output
  - non-repeatability:
    - 0.01% of rated output
  - capacity:
    - standard duty ranges: 20, 30, 50, 75, 100 kg (aluminum or stainless steel)
    - heavy duty ranges: 50, 100, 150, 200, 500 kg (aluminum only)
  - overload:
    - safe 150% of rated capacity ultimate 300% of rated capacity
  - temperature:
    - -40° to 65°C (-40° to 150°F) operating range
    - -10° to 40°C (15° to 105°F) compensated
  - mounting dimensions
    - see details for standard and heavy duty versions

Note:
Specifications are continued on the following page.

Hazardous Locations:

- with the use of approved intrinsically safe barrier strips

Weight:

- standard duty up to 44 lb (22 lb/side), 20 kg (10 kg/side)
- heavy duty up to 64 lb (32 lb/side), 30 kg (15 kg/side)

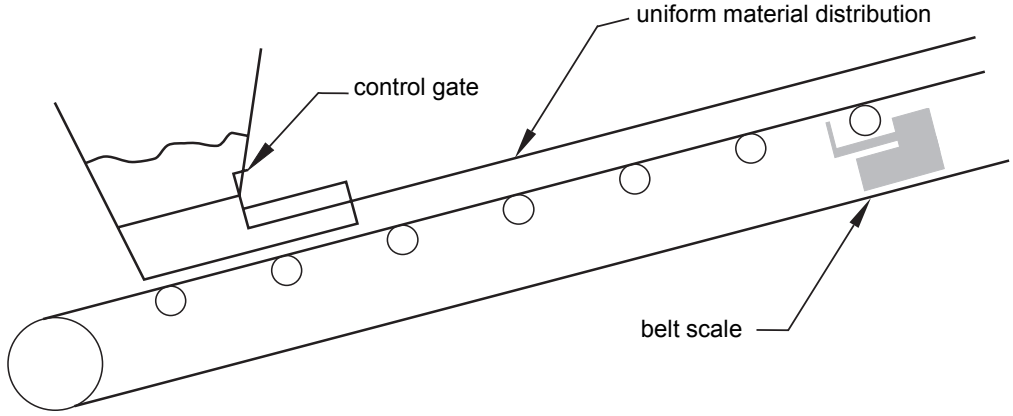
Interconnecting Wiring (to integrator):

- < 300’ (100m) 18 AWG 6 conductor shielded cable
- > 300’ (100m) to 1000’ (300m) 18 to 22 AWG 8 conductor shielded cable

Conveyor Considerations

The ideal placement of the Milltronics Universal Scale depends on the conveyor system. This section provides guidelines to determine MUS placement.

Control Gates



Recommendation
An attempt should be made to insure steady and uniform material loading to the belt at or near the same speed as the conveyor belt. The installation of a material feed control gate or similar device improves uniform flow of material.

Conveyor Belting

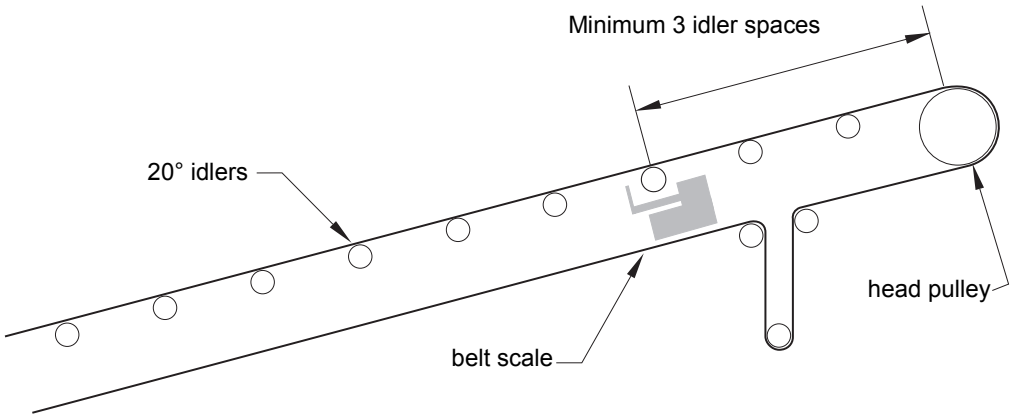
Variations in the number of belt plies, the cover thickness and the type and quantity of splices in a given belt cause considerable change in the weight per unit length of the belt. During the course of zero calibrations, belt scales average the weight of the belt over one complete circuit of the belt. Large deviations from the average adversely affect the zero calibrations.

Head Pulley

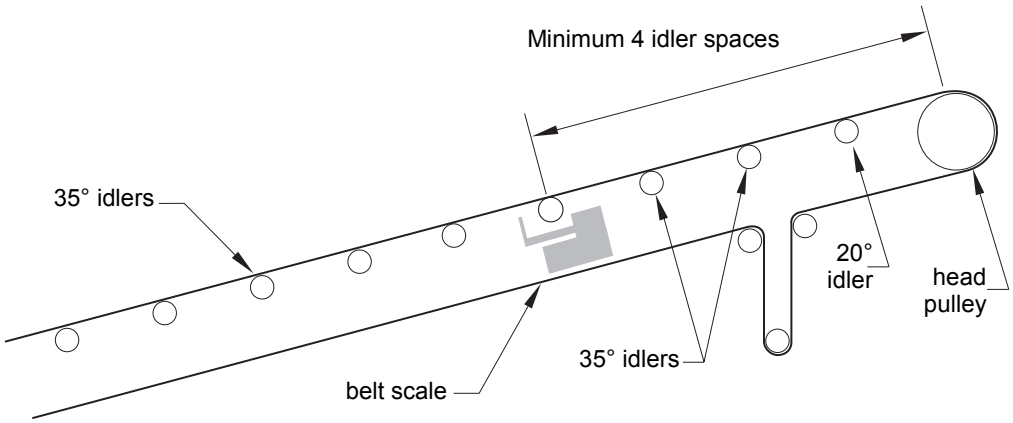
When installing a scale in a short conveyor, or when there is no other place to locate the scale except in the area near the head pulley, one should use caution. Since head pulleys are flat faced, and carrying idlers are generally troughed, the belt profile must change from troughed to flat in a short distance. To accommodate this, the conveyor manufacturer designs a built-in vertical displacement of the head pulley above the top of the center roll of the adjacent idler. To further ease this transition, idlers of decreasing trough angles are inserted between the head pulley and the normal run of idlers. If these measures are not taken, a considerable amount of stress is exerted on the belt edges and the idlers adjacent to the head pulley. The stress is transmitted to the scale.

Recommendations

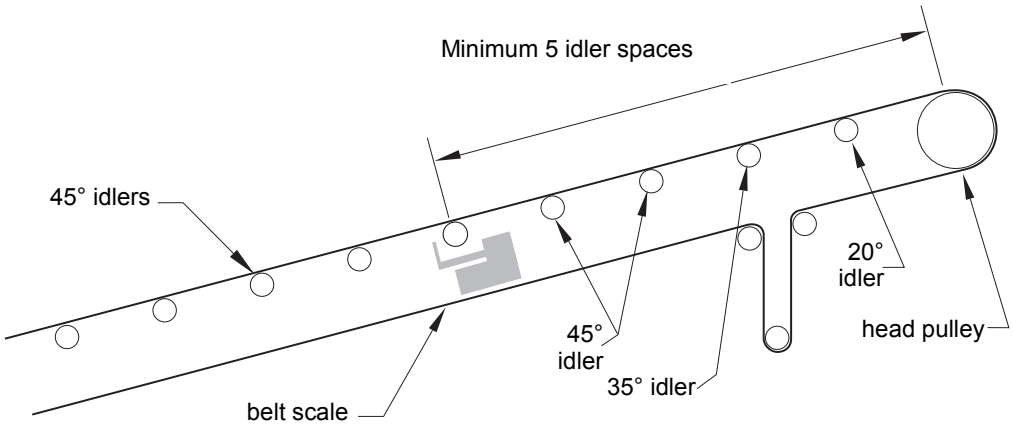
1. On conveyors with 20° trough idlers throughout, a minimum of two fixed 20° idlers must be located between the scale idler and the head pulley.



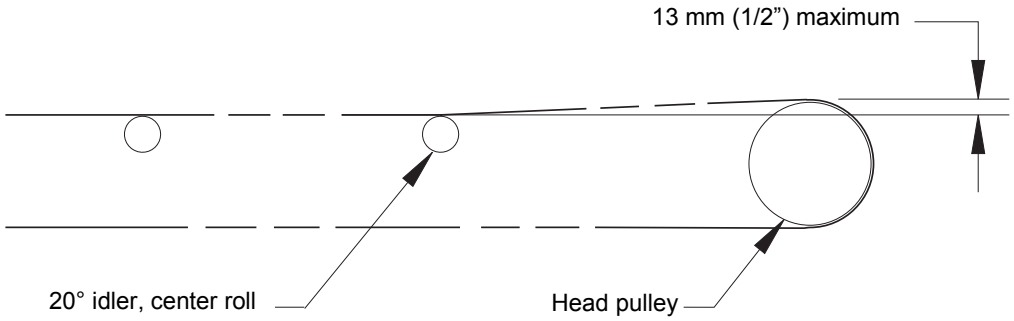
2. On conveyors with 35° trough idlers throughout, a minimum of two 35° and one 20° retreat idlers must be located between the scale and the head pulley.



3. On conveyors with 45° trough idlers throughout, a minimum of two 45°, one 35° and one 20° retreat idlers must be located between the scale and the head pulley.



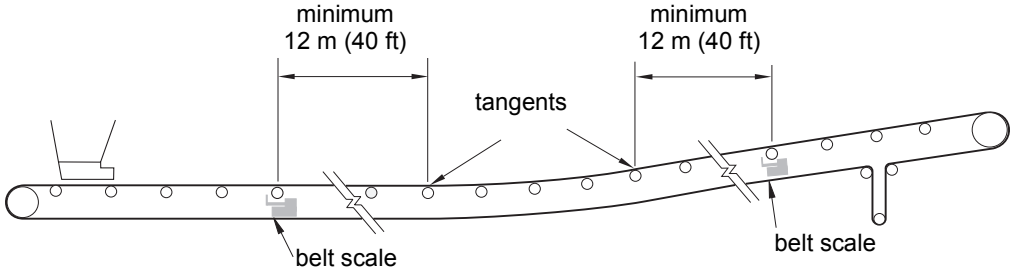
4. The vertical displacement of the head pulley relative to the adjacent retreat idler is normally in excess of that which is acceptable for belt scale installations. It is suggested that when locating the scale close to the head pulley, a maximum of 13mm (½") vertical displacement between the top of the head pulley and the top of the center roll of the adjacent roll be allowed.



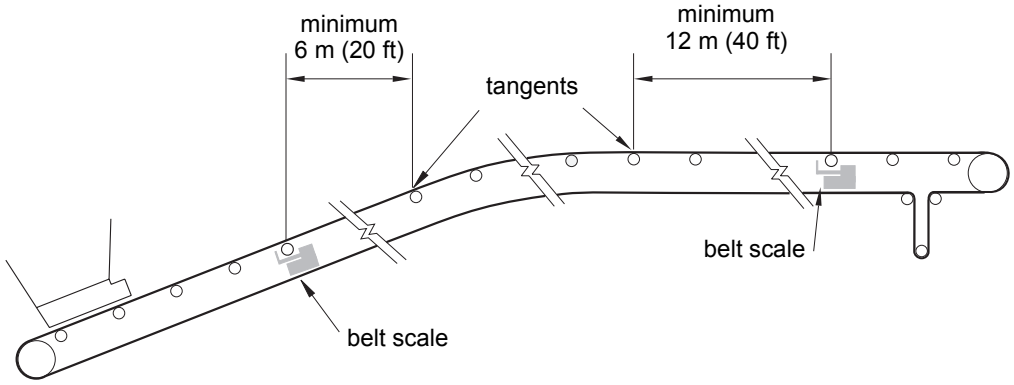
Conveyor Curvature

Vertical curvature (varied heights on one belt) is common in conveyor design, but creates difficulties for belt scales if not dealt with correctly. The curvature, whether concave (internal) or convex (external), disturbs the idler alignment, if the scale is installed in the area of curvature. The concave curve tends to lift the belt off of the idlers in the area of curvature as belt loading decreases, adversely affecting the zero calibration.

Concave



Convex



Recommendation
Avoid locating the scale within the tangents of scale curvature.

Belt Ploughs

The use of belt ploughs or any conveyor or material control device that changes the profile of the carrying belt in or near the scale area is not recommended. These devices have a detrimental effect on the belt scale idler alignment and usually create drag on the belt which the scale senses as a material force of load.

Recommendation
Do not install the scale within 9m (30ft) of belt ploughs or similar devices that contact the material or belt.

Stacker Conveyors

Any conveyor that is not a permanent structure, which varies in its incline, elevation or profile is not considered a good installation for an accurate belt scale. There are instances where a belt scale can be used effectively in a conveyor of this type, but this requires special consideration.

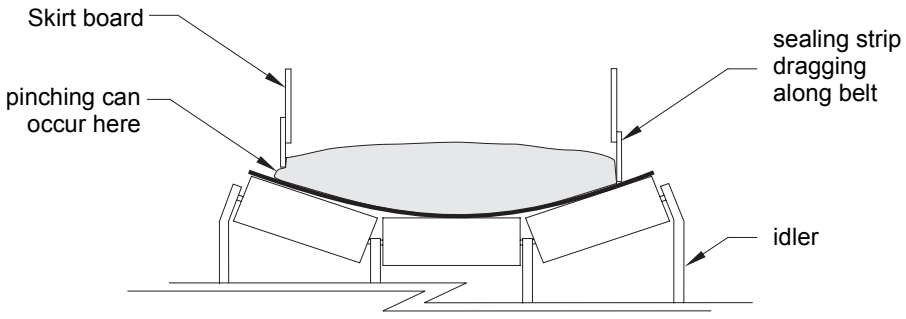
Conveyor Trippers

Not as common as a conveyor with vertical curvature, trippers can still be troublesome to scales.

Recommendation
On a conveyor with a tripper car, locate the scale under the recommendations for vertical curves, but with the tripper fully retracted.

Skirt Boards and Sealing Strips

In some applications it is necessary to extend the infeed skirt boards and sealing strips the full length of the conveyor. This can create problems in weighing accuracy due to the effects that the sealing strips exert when contacting the belt and indirectly upon the idlers, especially where pinching occurs. The situation adversely affects the zero calibrations.



Recommendation
If possible, remove skirting in scale area. If not, adjust skirting to ensure sealing strip does not put excess force on the belt or allow pinching of material.

Installation

Caution is required around the belt scale. Follow the installation procedure carefully and read the related materials.

Welding

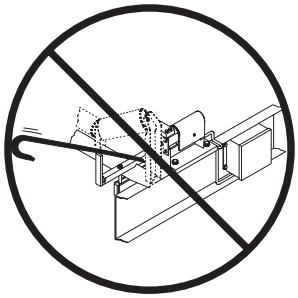
Extreme caution should be used when arc welding in the area of the belt scale. Be sure that welding current do not flow through the belt scale. Welding currents through the scale will damage the load cells.

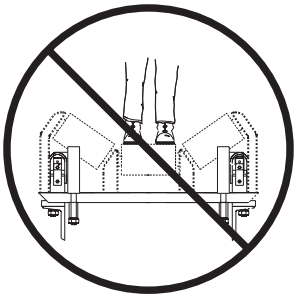
Load Cell Handling

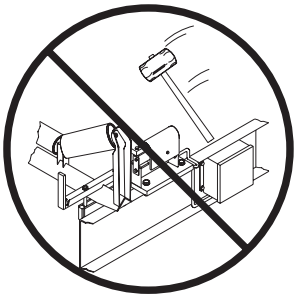
Load cells are sensitive electro-mechanical transducers and must be handled with care. They can tolerate very little mechanical deflection without damage.

Lift the scale by the mass blocks only.

Do not lift the scale by the idler or idler mounting brackets. Never subject the scale to sudden impacts or shocks.

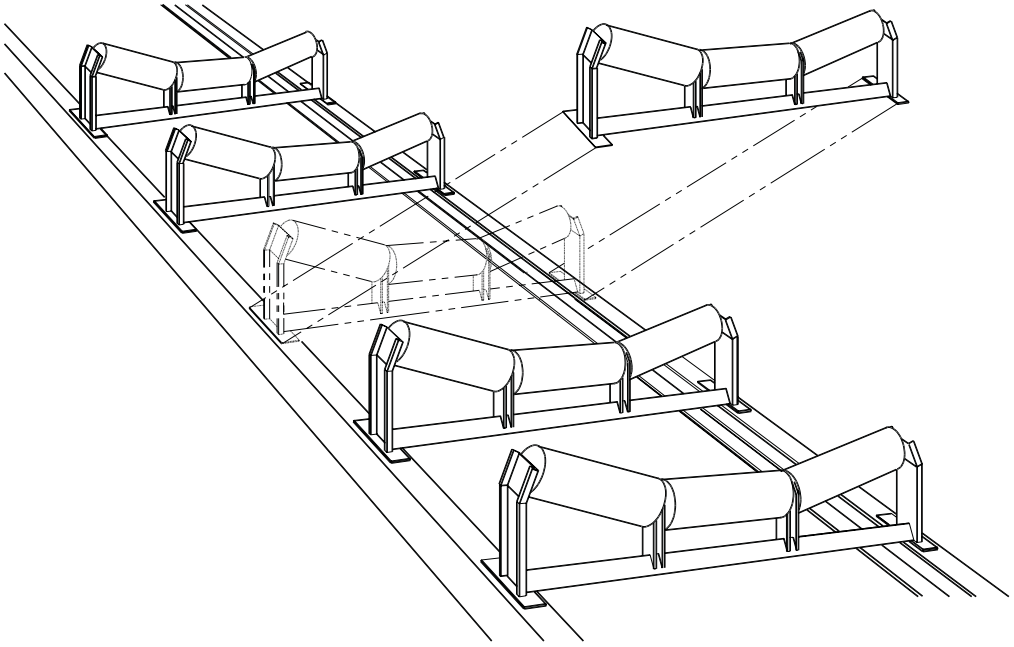




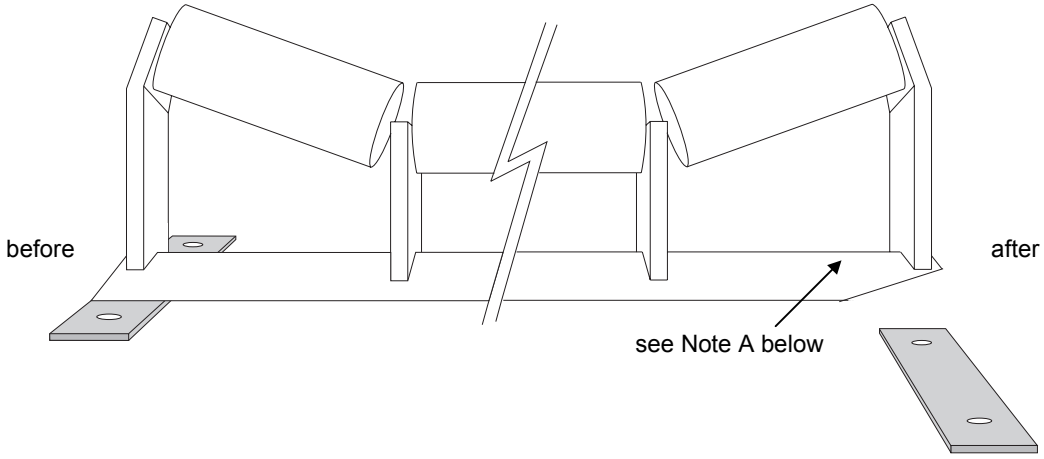


Installation Procedure

1. Remove the idler at the chosen location on the conveyor.



2. Remove the idler foot plates and cut the spine as shown.

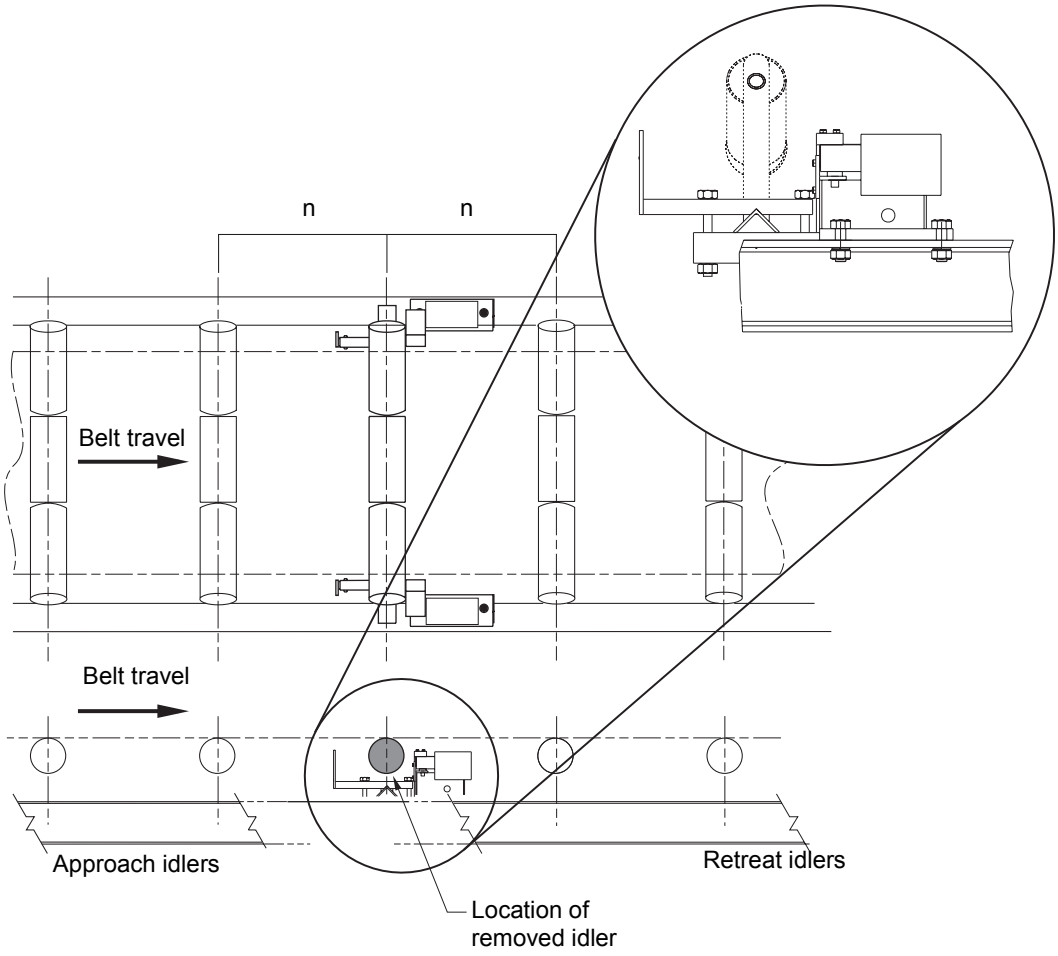


Notes:

A. Cut idler support as shown to allow clearance when the load is applied.
B. Maximum allowable idler spine for fitting to an MUS is:
   Angled spine: 75mm (3”)
   Channel spine: 100mm (4”)

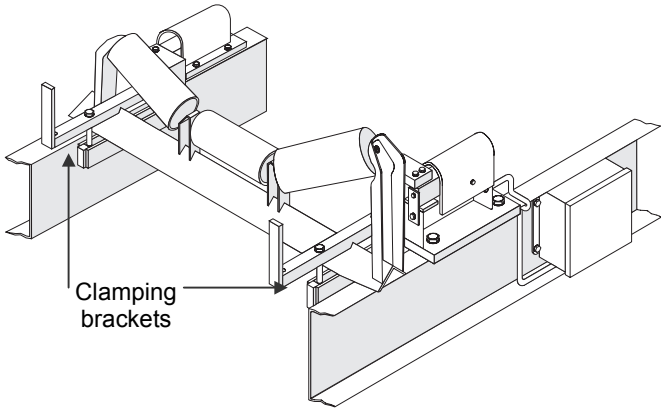
3. Position the weigh beams so that the center of the scale idler is centered between the adjacent approach and retreat idlers.

   Ensure that the scale is centered and square to the stringers.



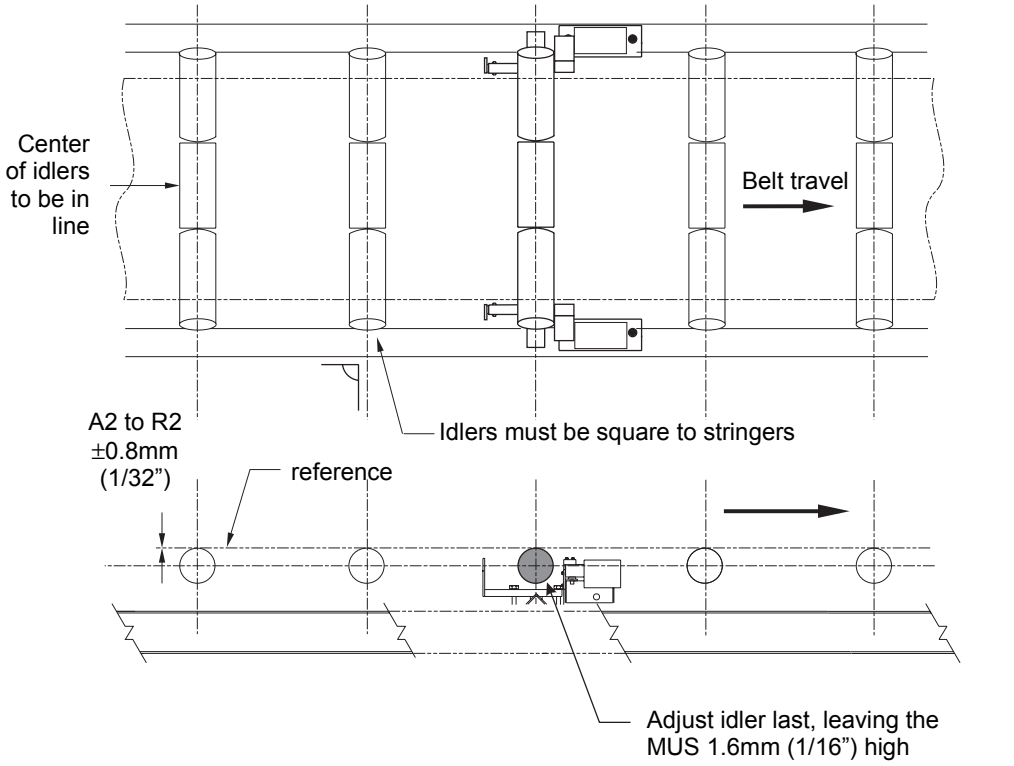
4. Mark the position and make new mounting holes suited for M12 (½") bolts. Refer to the Outline Dimensions.

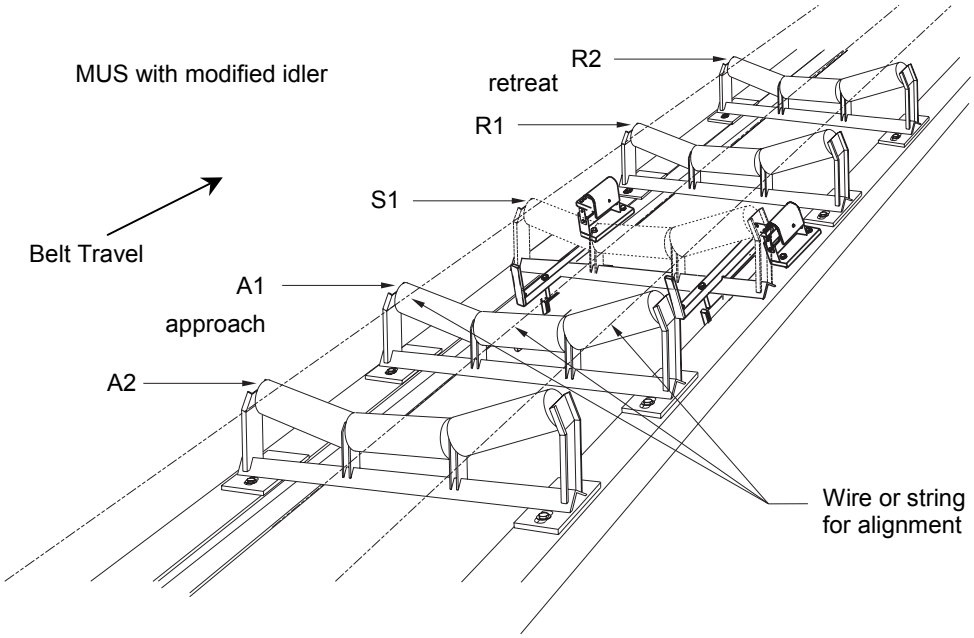
5. Place the scale on the conveyor stringers with the arrows on the mass blocks pointing in the direction of belt travel (retreat idlers) and mount the modified idler onto the scale using the clamping bracket.



6. The idlers in the weighing area (A2 through R2) must be aligned to and square to the stringers, and levelled to a common reference such as a string or wire (refer to subsequent figures). Ensure that the reference is taut (no sagging). If necessary, shim these idlers to be in line with the reference.

Alignment and levelling are important parts of the installation procedure and have a direct effect on scale performance. Proper care and attention is recommended.





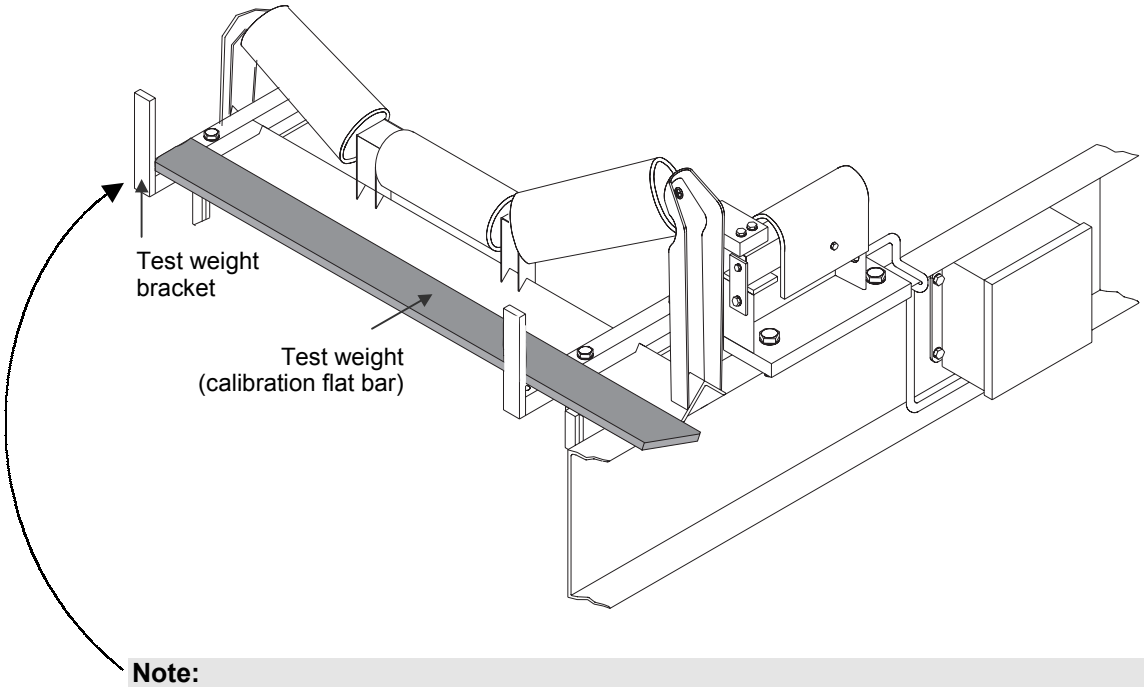
Calibration

After the MUS, the speed sensor and the integrator have been properly installed and wired, calibration of the weighing system must be done in conjunction with the integrator. Refer to the integrator instruction manual for programming and calibration. The calibration is initially done using the supplied test weight. Material tests are recommended to achieve the greatest accuracy.

Balancing

For applications where the conveyor loading does not repeat in location across the width of the belt, such as side to side loading, electronic balancing of the two load cells is recommended. This procedure is done during the start-up phase, but should be redone if either load cell is reinstalled or replaced. Refer to the associated integrator manual for details on completing the balancing procedure.

When balancing load cells, apply the test weight flat bar(s) to the extreme sides (side A and B), as required, while supported by the two test weight support arms. Reverse position of bar to balance second load cell.



Note:
Position the test weight flush with the sides of the brackets when balancing load cells. Reverse position of bar to balance other load cell.

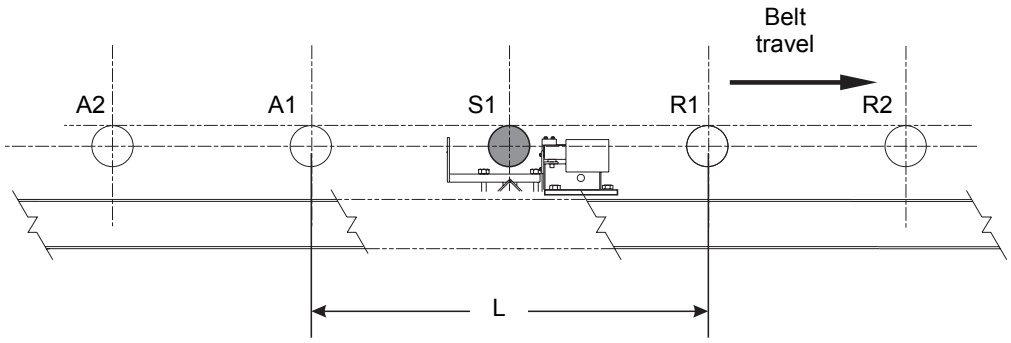
Test Load

The test load value is required for calibration of the integrator. The calculated value is entered into the associated programming parameter of the integrator, in kilograms per meter or pounds per foot.

The test load value is calculated as follows:

$$\text{Test load} = \frac{\text{test weight}}{\text{idler spacing}} \quad \frac{\text{kg}}{\text{m}} \text{ or } \frac{\text{lb}}{\text{ft}}$$

Where: idler spacing = L/2 [minimum 0.6 m (2.0 ft)]



Final Calibration

Once the installation and load cell balancing are completed, the belt can be released and be allowed to ride normally on the conveyor. The belt speed sensor should be installed as described in its instruction manual and the speed sensor and belt scale should be interconnected with the belt scale integrator as shown in its instruction manual and the system interconnection diagram.

Program the belt scale integrator as suggested in its instruction manual and with parameters suitable for the application. With programming complete, the system is ready for calibration.

A zero calibration can be performed after sufficient running of the conveyor allows the belt to limber up and take its natural formation. A zero calibration is performed in accordance to the belt scale integrator instruction manual with the conveyor running empty.

Zero

Perform the zero calibration as described in the Calibration section of the integrator manual.

After the completion of the zero calibration, a span calibration, as described in the belt scale integrator instruction manual, can be performed with the supplied test weight applied. Be sure to stop the conveyor when applying and removing the test weight.

Span

1. The span reference (test load) is simulated using the supplied test weight (calibration flat bar).
2. Place the test weight onto the test weight bracket with equal length over both ends.
3. Perform the span calibration as described in the Calibration section of the integrator instruction manual.

After completing the span calibration, remove the test weight and store it.

With a successful zero and span calibration, and with the test weight no longer applied to the belt scale, the MUS belt scale system is ready for operation. Ensure that the belt scale integrator is left in the run mode.

Material Test

To achieve accuracy with respect to absolute values, perform material tests. Refer to the associated integrator manual.

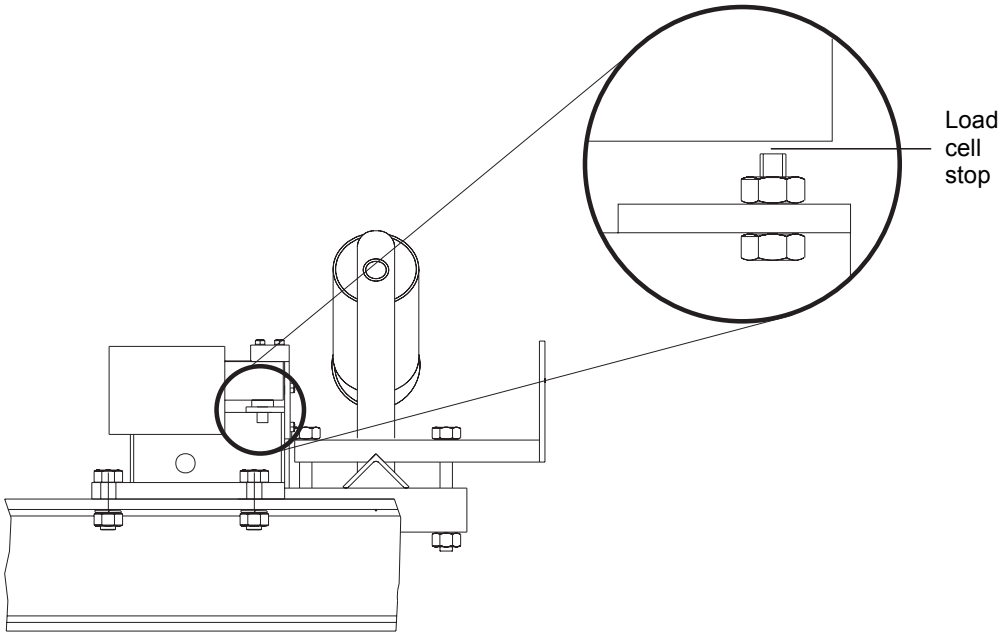
Re-Rating

If the rate, speed or idler spacing is changed from the original design, you may need to reprogram the integrator. Please contact your regional Milltronics service office.

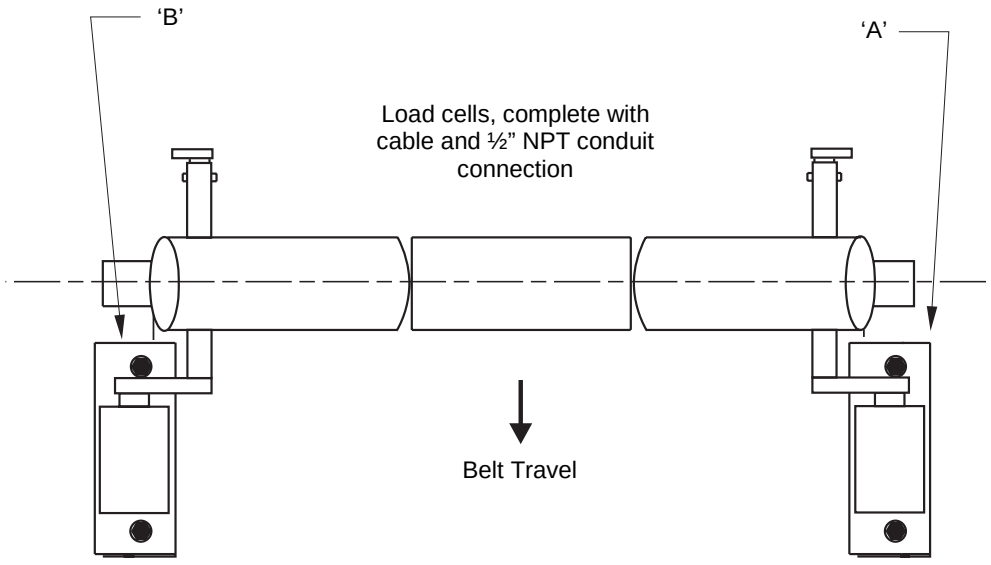
Maintenance

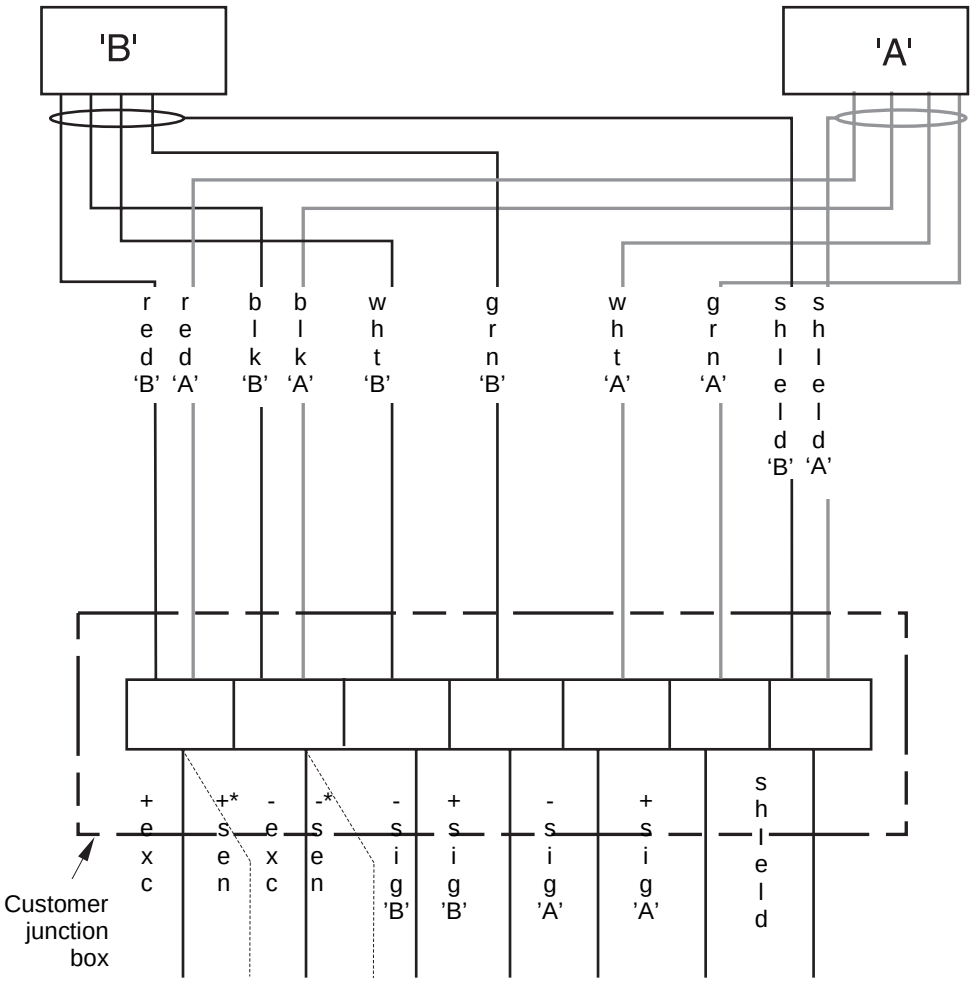
The MUS is virtually a maintenance-free device.

In dusty or granular applications, periodically check the load cell stops for material build up. Remove any build up in the mechanism to insure that the load cell maintains free movement.



MUS Wiring



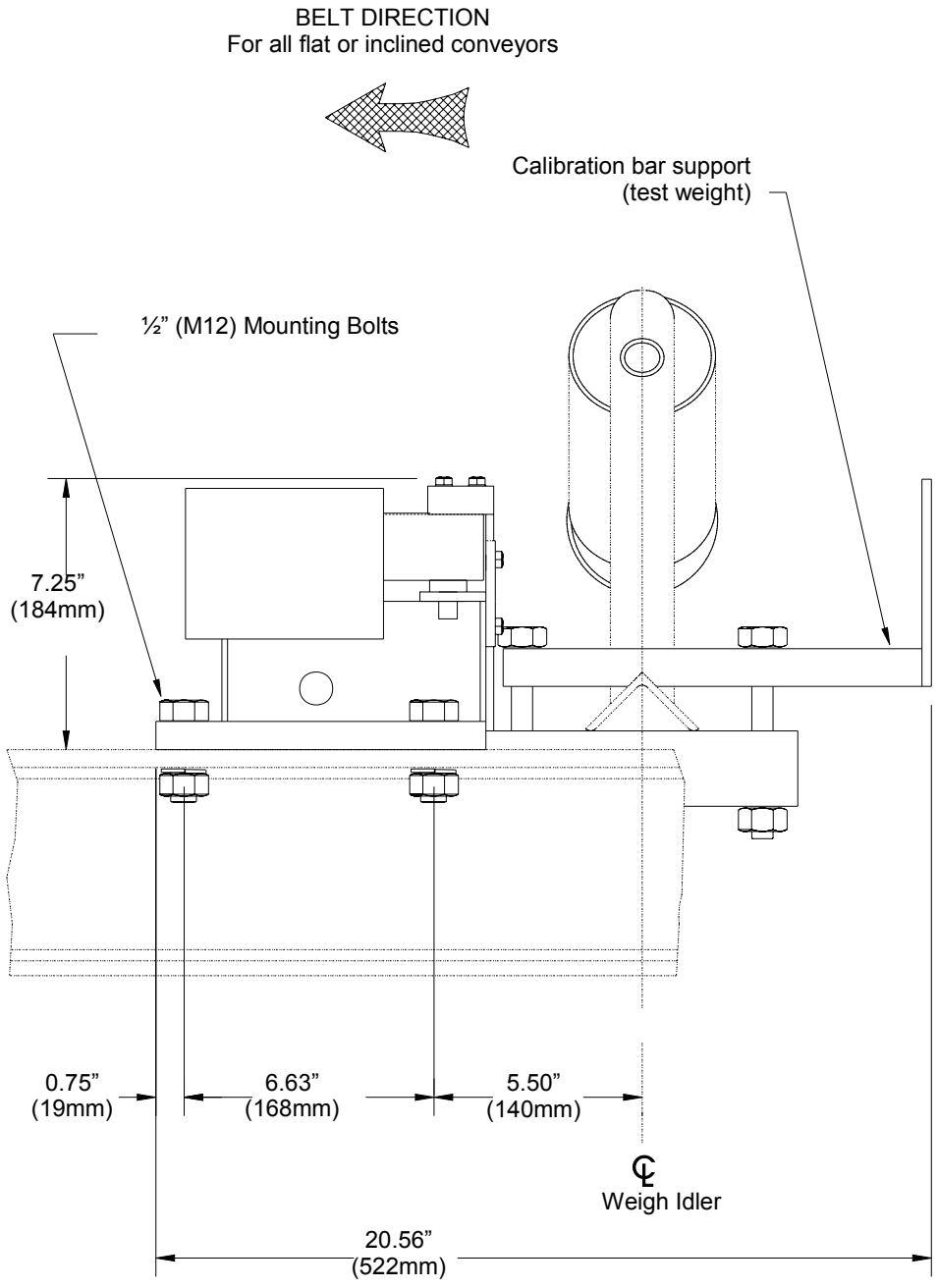


* Sense lines required on cable runs greater than 500ft.

Outline dimensions — Standard Duty

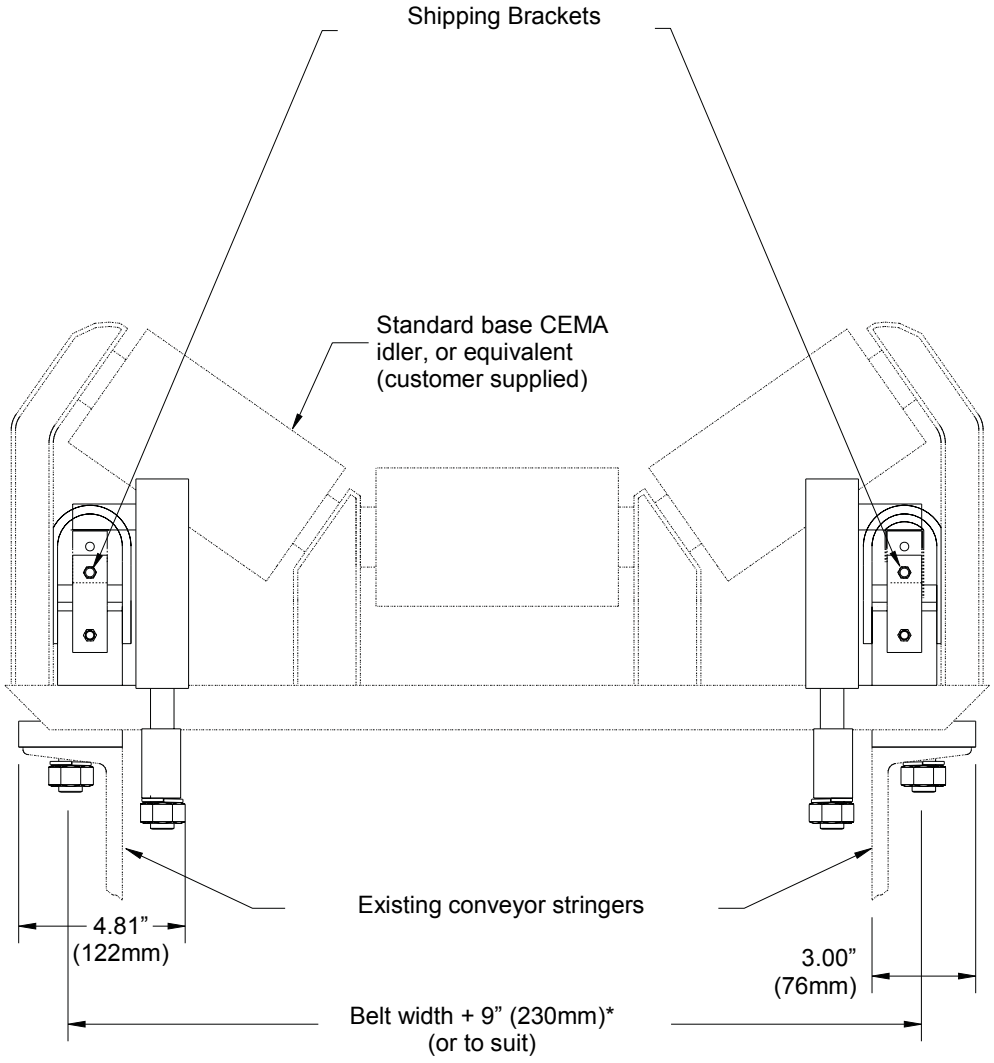
Standard duty: 18” to 42” (450mm to 1000mm)
maximum weight: 20 kg (44 lb), 10 kg (22 lb) / side

Side View



Note:
(2) approach and (2) retreat idlers should be aligned with the weigh idler to within +1/32” (0.8) to -0” (0). Call Milltronics or their representative with any questions.

Front View



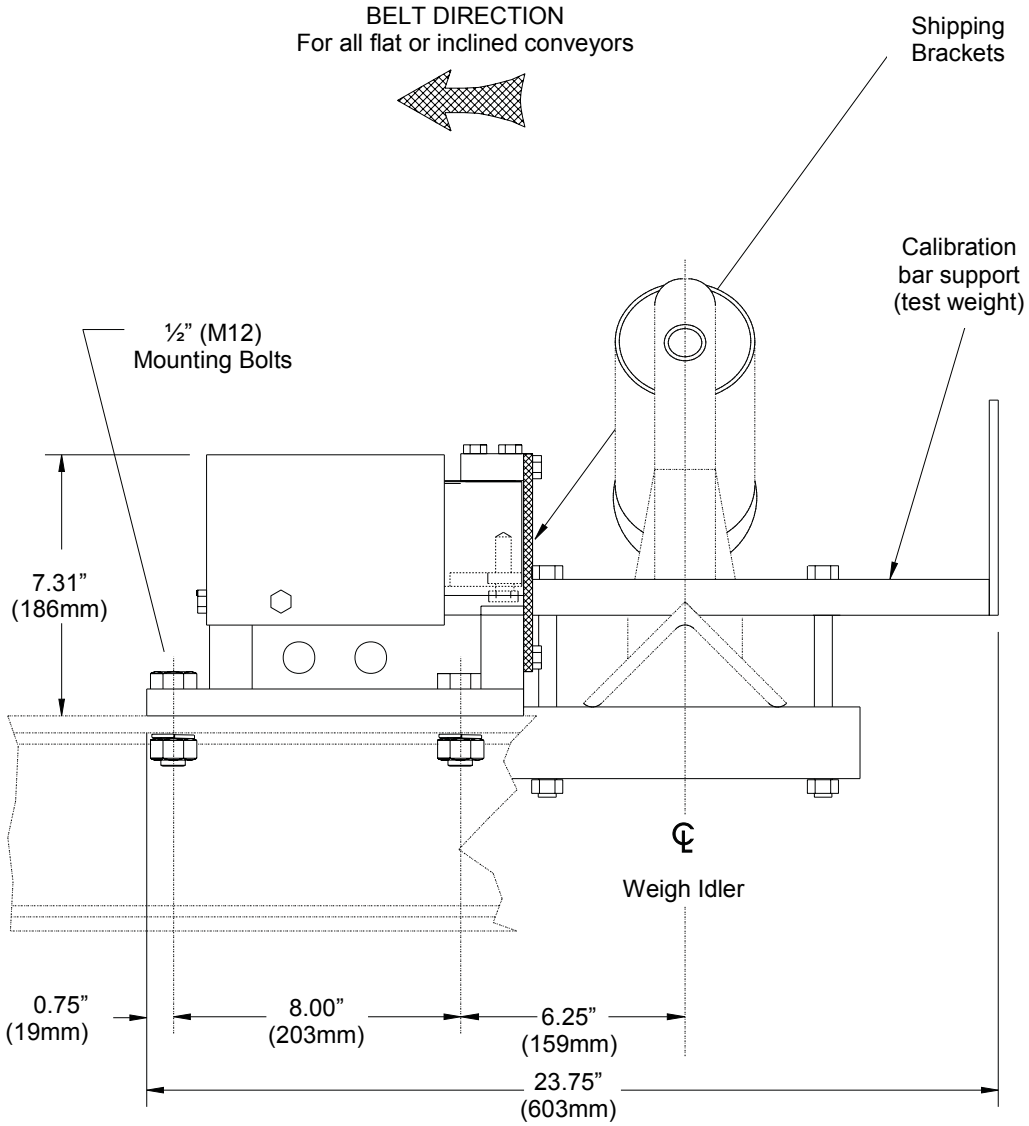
* based on CEMA sizes

Outline dimensions — Heavy Duty

Heavy Duty: 48” to 84” (1200mm to 2000mm) although can be applied to narrower conveyors

maximum weight: 30 kg (64 lb), 15 kg (32 lb) / side

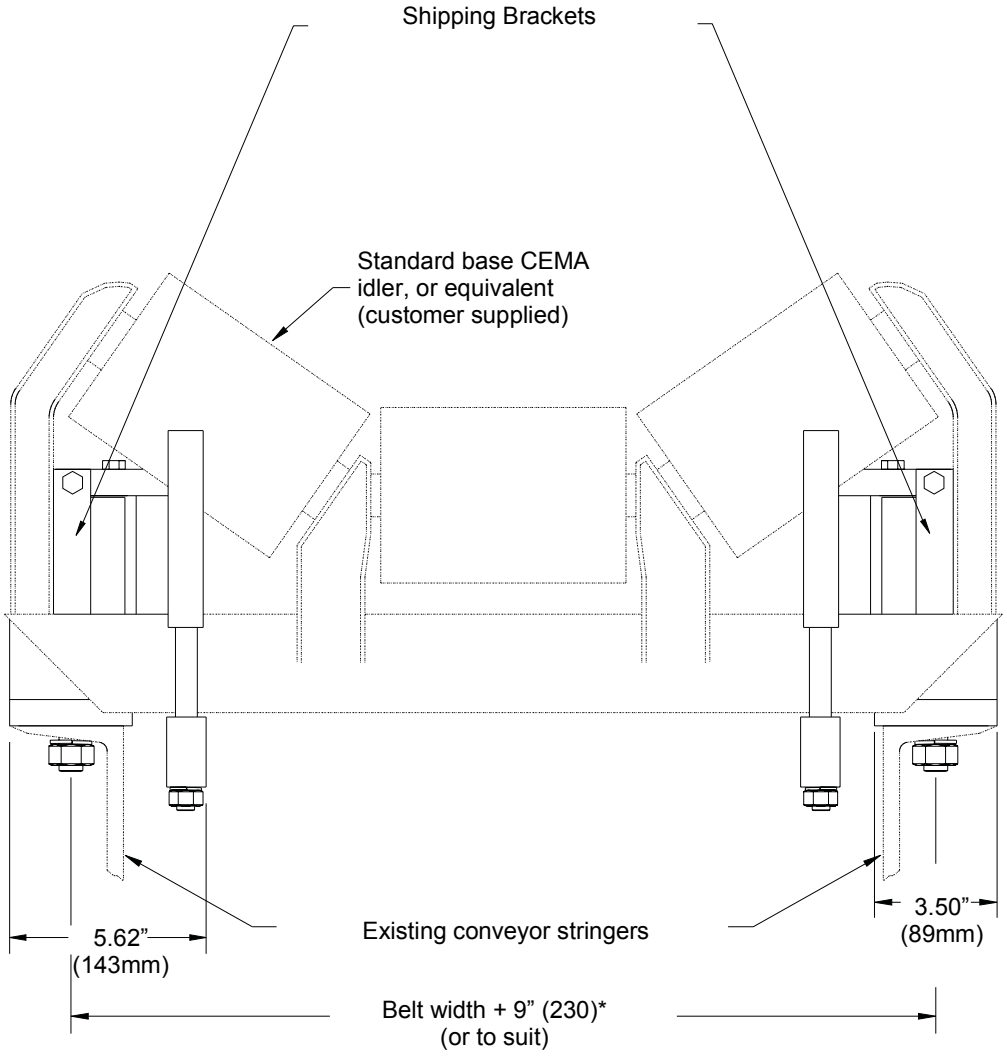
Side View



Notes:

- (2) approach and (2) retreat idlers should be aligned with the weigh idler to within +1/32” (0.8) to -0” (0). Call Milltronics or their representative with any questions.
- Dimensions in inches, ( ) indicates dimensions in millimeters

Front View



* based on CEMA sizes

Index

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