14x Master Belt Scale Weigh Frame

Installation Manual

RICE LAKE WEIGHING SYSTEMS

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An ISO 9001 registered company

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1.0 Introduction

Belt scales measure a continuous mass flow, which is transported over a belt conveyor. A complete belt scale is composed of a weighframe, which contains one or more load cells, a speed sensor/pickup and the integrator electronics.

Not every application is suited for a belt scale; this has to be analyzed by a Rice Lake Weighing Systems specialist. To achieve the optimum result, the Master™ Belt Scale series has been developed for a number of applications and for every type of conveyor.

This manual can be viewed and downloaded from 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 Safety

Safety Signal Definitions:

DANGER ***Indicates an imminently hazardous situation that, if not avoided, will result in death or serious injury. Includes hazards that are exposed when guards are removed.***

WARNING ***Indicates a potentially hazardous situation that, if not avoided, could result in serious injury or death. Includes hazards that are exposed when guards are removed.***

CAUTION ***Indicates a potentially hazardous situation that, if not avoided, could result in minor or moderate injury.***

IMPORTANT ***Indicates information about procedures that, if not observed, could result in damage to equipment or corruption to and loss of data.***

General Safety

Do not operate or work on this equipment unless this manual has been read and all instructions are understood. Failure to follow the instructions or heed the warnings could result in injury or death. Contact any Rice Lake Weighing Systems dealer for replacement manuals.

WARNING

Failure to heed could result in serious injury or death.

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

Take all necessary safety precautions when installing the scale carriage including wearing safety shoes, protective eye wear, and using the proper tools.

Keep hands, feet and loose clothing away from moving parts.

Do not approach a running conveyor from underneath.

Do not bend over a running conveyor.

Do not allow minors (children) or inexperienced persons to operate this unit.

Do not operate without all shields and guards in place.

Do not jump on the scale.

Do not use for purposes other then weight taking.

Do not place fingers into slots or possible pinch points.

Do not use any load bearing component that is worn beyond 5% of the original dimension.

Do not use this product if any of the components are cracked.

Do not exceed the rated load limit of the unit.

Do not make alterations or modifications to the unit.

Do not remove or obscure warning labels.

Do not use near water.

1.2 Overview

The 14x Master Belt Scale Weigh Frame is designed for heavy duty applications in the process industry, where accuracy is required and the 14x Master Belt Scale Weigh Frame may be designed using two, three or four idlers depending on the application.

The dimensions are extracted from the construction of the existing, or to-be built, belt conveyor.

1.2.1 Theory of Operation

The material is carried by the belt and underlying rollers or idler stations. One or more of these idlers are mounted on the weighframe and are used to weigh the material going across the belt. The material carried on the belt is weighed and the belt speed is measured. Both values (belt load and belt speed) are calculated in an integration function. The integrator totals and calculates the mass flow. These values are displayed and transmitted through outputs or other forms of communication to a control system or network.

For the operation, refer to the manual of the electronics installed.

1.3 Selection Criteria

Load cell capacity is calculated based on the maximum belt load plus the dead load of the weigh frame and the weight of the rollers. Contact Rice Lake Weighing Systems technical support for assistance.

A minimum of 750 lb total load cell build is required for this example.

Net load = (conveyor capacity / belt speed) x idler spacing

Gross load = net load + (idler weight + belt weight + mounting hardware)

Example:

Net load = (1500 ton per hour / 400 feet per minute belt speed) x 4 foot spacing

Net load = (125 lb per foot) x 4 foot spacing

Net load = 500 lb

Gross load = 500 lb + (175 lb idler + 48 lb belt + 24 lb hardware)

Gross load = 747 lb

1.4 Calibration and Test Weight Device

Mounting points can be provided to apply static test weights. Test weights are used to test repeatability and the state of the belt scale after initial calibration. Consult with factory for the amount of static test weight for your application.

To determine absolute accuracy, it is necessary to do a test with material. For this procedure, refer to the manual of the electronics installed.

2.0 Installation

Installation procedures generally should be a combination of the end user's best engineering practices in compliance with local codes and the manufacturer's recommendations. To achieve maximum performance, the following precautions should be observed.

WARNING

Take all necessary safety precautions when installing the scale carriage including wearing safety shoes, protective eye wear and using the proper tools.

Always turn off the power supply before any connection is made or removed.

Before welding, the power supply must be off and the connectors removed.

The load cell is very sensitive to damage by welding. The welding ground clamp must be attached to the same side of the weighframe where welding. When in doubt, remove the load cell(s).

IMPORTANT

Follow the recommendations given when the application was checked.

Belt conveyor must be installed in a stable and rigid area, free from vibrations.

The construction of the belt frame must be stiff enough to prevent torsion or bending at the maximum load (including the weighframe).

The weighframe must be mounted free of mechanical tensions.

No vibrations in the conveyor should be allowed to carry over to the weighframe. If needed, these must be filtered.

The belt must be of good quality and a single splice. A vulcanized splice will provide the best accuracy. The weight per foot (meter) should be consistent over the whole length.

The belt must not track out of the center and no steering idler must be placed near the weighing area.

The belt support must not be provided with two part (v-shape) idler stations.

At least three idler stations before and three idler stations after the weighframe have to be adjustable in height. For short belt conveyors this can be reduced to one roller before and one roller after the weighframe.

String alignment should be used on all idlers in the scale system. If following the rule of three before and three after, seven idlers (including the weigh idler) should be checked during the alignment process.

Rollers should not have a concentricity exceeding +/- 0.012" (0.3 mm).

The speed sensor should be mounted on a non-driven roller or drum.

The inclination angle of the belt conveyor must not exceed 25º.

Proper covers may be required to prevent air flow from interfering with the belt scale.

Side guards and belt skirting should not be in contact with the weighing area of the belt scale.

2.1 Mechanical Installation

The mechanical installation of a belt scale consists of mounting the weighframe, the speed pickup and a junction box.

Note ***Belt has been removed for illustration purposes only.***

1. Determine the location for the weighing idler. This location should be at least five idlers after the load point of the conveyor and at least five idlers before the head pulley.
2. Measure the center-to-center distance of the idlers. Note this for placement of the weigh frame and idlers.

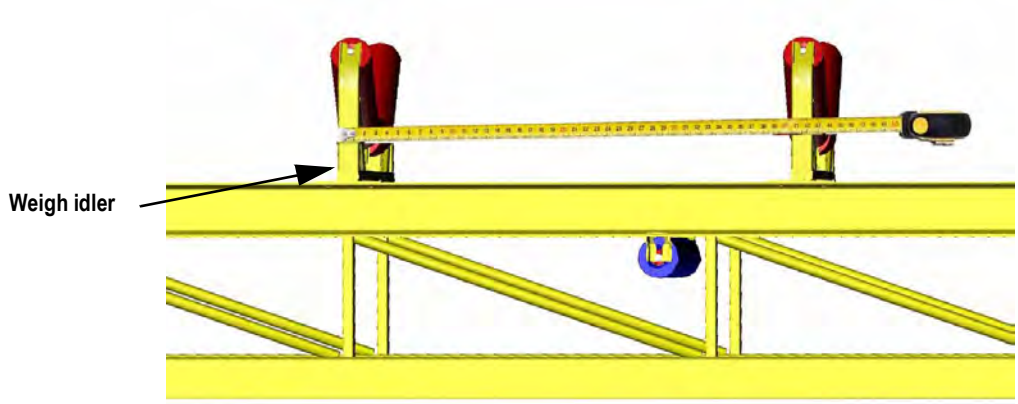

Figure 2-1. Measure Center-to-Center Distance of the Idlers

3. Remove the existing idler where weigh frame is to be located.

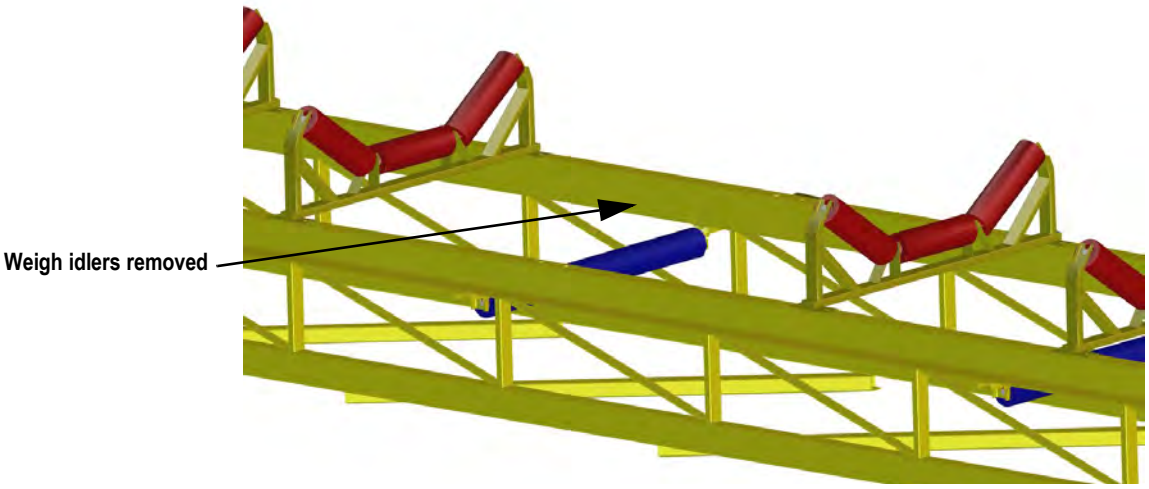

Figure 2-2. Remove Necessary Stationary Idlers for Weigh Frame Installation

IMPORTANT ***See print for exact clearances.***

4. Install weigh frame to conveyor.

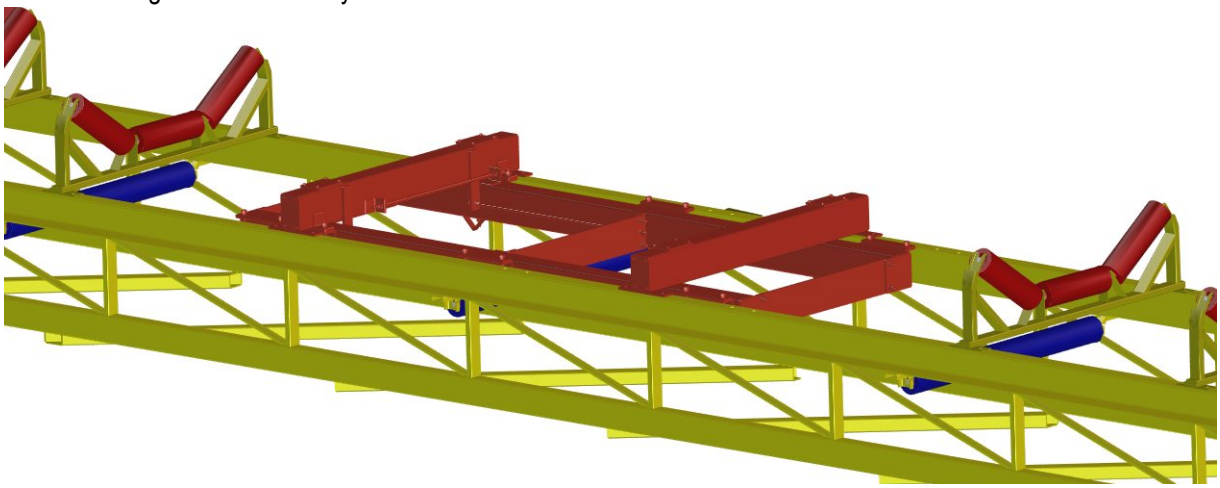

Figure 2-3. Add Weigh Frame Assembly to Conveyor

5. Remove shipping block from load bridge assembly (only if necessary for mounting purposes).

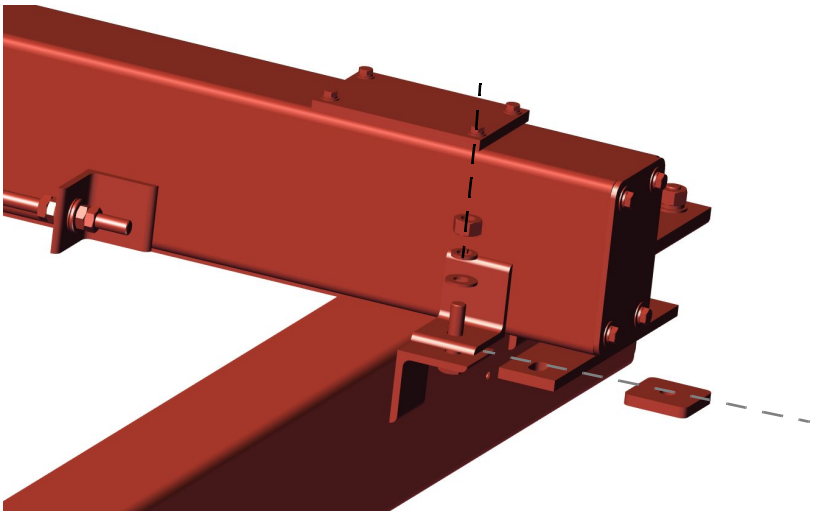

Figure 2-4. Remove Shipping Tab

6. Modify the idler station by removing the mounting feet from each end of the idler frame using a cutting torch or grinder.

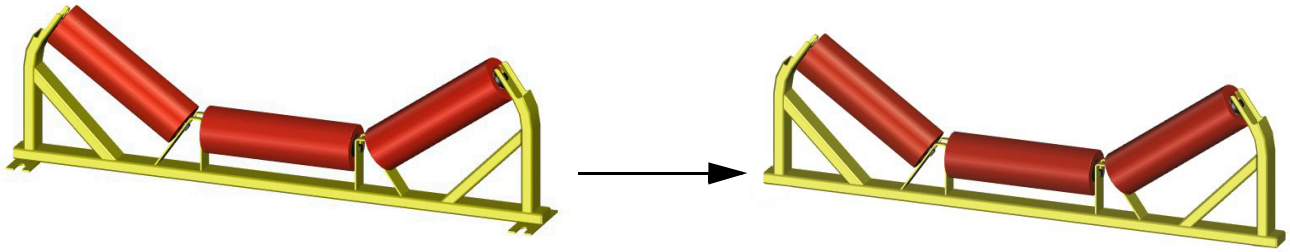

Figure 2-5. Modify Idler Station

Note ***For illustration purposes only. A different modification may be required.***

7. Drill out hole locations to accommodate bridge mounting bolts, secure weldment with four 1/2 inch bolts (not provided with 14x). Ensure they do not interfere with any idlers or live sections of the weigh frame.

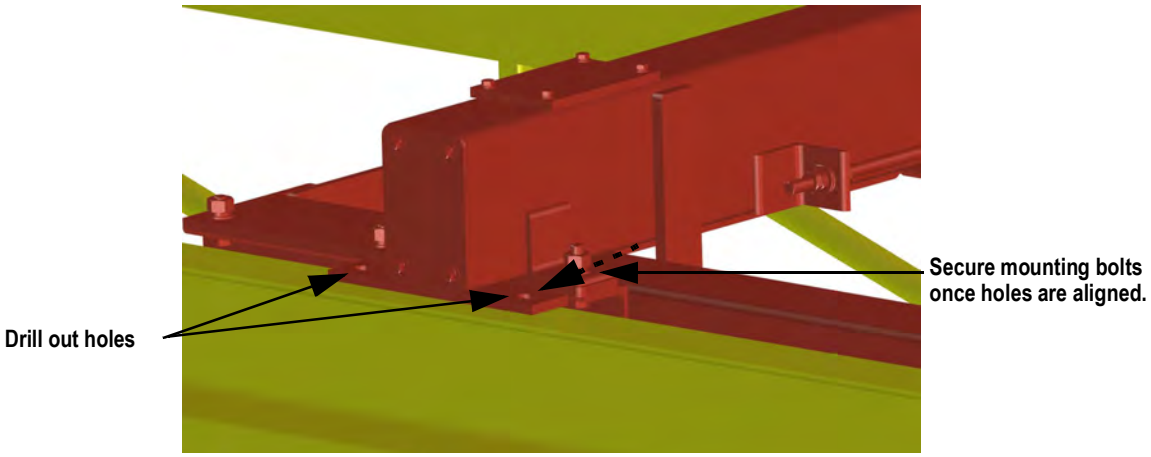

Figure 2-6. Use Bolts to Position Weldment

8. Run strings on the conveyor (three before the scale and three past the scale) and shim the idlers to the same plane.

Figure 2-7. Run Strings to Same Plane

9. Mount junction box in appropriate location.
10. Wire load cells according to the load cell data sheets and junction box manual.
11. Terminate home run cable at the junction box Adjust overload stops, see Section 4.2 on page 11.
12. Calibrate the 14x using the calibration procedure for the applicable integrator.

2.2 Electrical Installation

The wiring and connections between the weighframe, speed pickup and the electronics are shown in the applicable scheme. See Section 4.2 on page 11.

The load cell is provided with a fixed cable; do not alter the length. If necessary, use an additional junction box with screw terminals to extend the cable length.

2.2.1 Cable Types

Load cell

If the length is more than 197 feet (60 meters), use shielded 6 wire cable 20 AWG gauge (0.5 mm²).

Speed pickup

Use shielded 3 wire cable 20 AWG gauge (0.5 mm²).

Shielding

Cable shielding must be connected to one side only. If connected to the instrument side, then it is preferred to use the same ground as the power supply.

2.3 Commissioning

Commissioning should be performed by service engineers who are trained and experienced with the subject.

2.3.1 Mechanical Adjustments

Mechanical adjustments must be made to ensure the scale is free of any tension. If necessary, the load cell can be adjusted.

3.0 Maintenance

Regular maintenance is essential to prevent errors or unnecessary down time. The supplier does not accept any responsibility for the consequences of not performing the maintenance recommended in this section.

3.1 Maintenance

WARNING

It is important to guarantee the safety of personnel during maintenance work and to assure no accidents will happen. Before any work on electrical systems is started, be sure to remove the main power supply.

The conveyor must be shut off before any work on the conveyor is started. Any goods on the conveyor must be removed first. No unauthorized persons are allowed in the conveyor's working area.

3.1.1 Periodical Maintenance

To keep the belt scale in optimal condition, it is important to perform periodical maintenance.

- Ensure there is not a build up of debris on the belt
- Inspect the weighframe for damaged areas and repair as necessary
- Regularly perform an Auto Zero and a weight check with certified test weights to determine if the belt scale weighs correctly. For this procedure, refer to the manual of the electronics installed

3.2 Dimensional Drawings

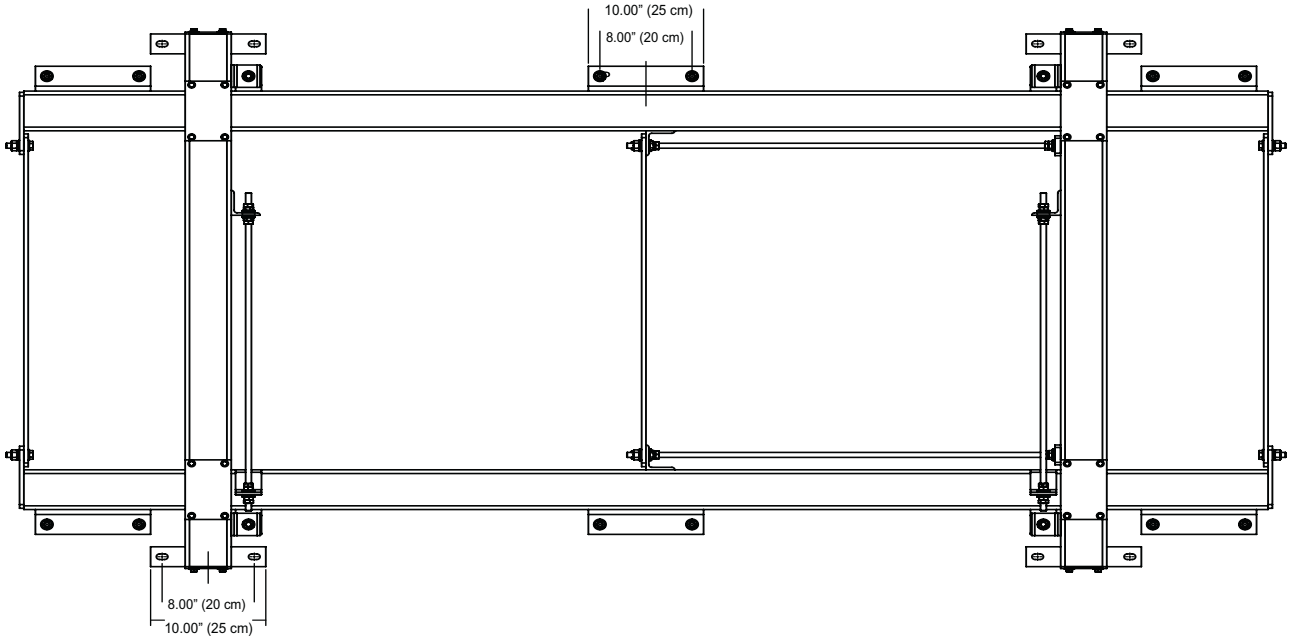

Figure 3-1. 14x Dimensions

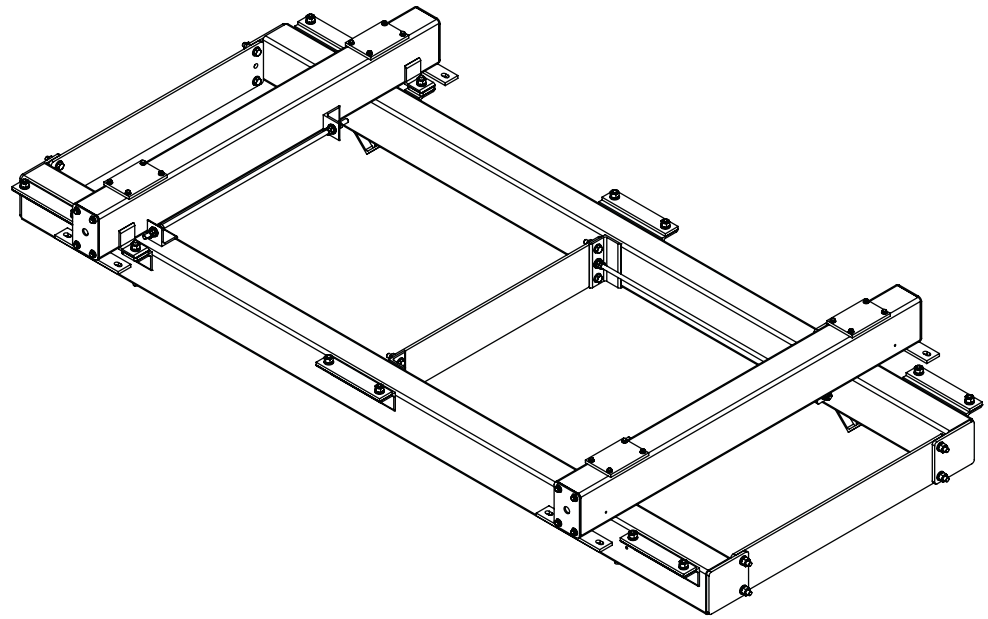

Figure 3-2. 14x Assembly View

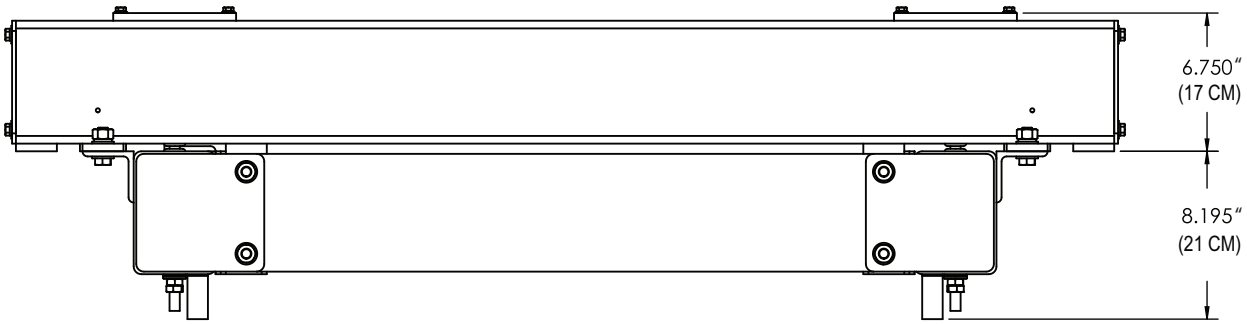

Figure 3-3. 14x Side View

3.3 List Parameters for Belt Scale

Complete the information below for your records.

CUSTOMER _____

ORDER NUMBER _____

INSTALLATION _____

REFERENCE _____

TYPE WEIGHFRAME _____

TYPE SPEED PICKUP _____

TYPE ELECTRONICS _____

_____

DATE _____

FILLED IN BY _____

Parameter	Unit	Entered	Change
Nominal capacity (flow)	lb/hr (kg/hr)		
Maximum capacity (flow)	lb/hr (kg/hr)		
Minimum capacity (flow)	lb/hr (kg/hr)		
Ratio weighframe			
Number of load cells			
Loadcell capacity (per loadcell)	lb (kg)		
Loadcell sensitivity	mV/V		
Idler spacing	in (mm)		
Belt angle of incline	°		
Belt speed	ft/s (m/s)		
Speed pickup:			
Pulses per revolution			
Non-driven drum	in (mm)		
Total belt length	ft (m)		

4.0 Appendix

4.1 Specifications

Standard

Weighframe Material	Powder coated mild steel or Stainless Steel SS304 / 316
Weight	Approximately 104 lb (47 kg) not including the idler
Load Cells	4 S-Beam (stainless steel IP67) capacity 2.5K - 5 Klb
	Power supply 5-15 VDC (stabilized from electronics)
	Signal nominal 3 mV/V at 100% load

4.2 Total Load Cell Build Conversion

The 14x has a summed total of four load cells. See Table 4-1.

Individual Load Cell Capacity	Imperial	Metric
2,500 lb	10,000 lb	4,536 kg
5,000 lb	20,000 lb	9,072 kg

Table 4-1. Total Load Cell Build Conversion

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