MASTER 211 Belt Scale Weigh Frame Instruction Manual

Contents

Master™

MASTER 211 Belt Scale Weigh Frame

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Specifications

- **Model:** MasterTM 211
- **Product Type:** Belt Scale Weigh Frame
- **Installation Manual:** September 8, 2023
- **Part Number:** PN 165455 Rev A

Introduction

The MasterTM 211 Belt Scale Weigh Frame is a high-quality product designed for the accurate weighing of materials on a conveyor belt. This installation manual provides detailed instructions on how to install, calibrate, and maintain the belt scale weigh frame.

Overview

The MasterTM 211 Belt Scale Weigh Frame is a robust and reliable weighing system that ensures accurate measurement of materials on conveyor belts. It is suitable for various industries, including mining, construction, and agriculture.

Selection Criteria

Before installing the belt scale weigh frame, it is important to consider the following selection criteria:

- Belt width and speed range
- Material characteristics
- Weighing accuracy requirements
- Environmental conditions

Calibration and Test Weight Device

- To ensure accurate weighing, the belt scale weigh frame requires calibration using a test weight device. The calibration process is described in detail in section 2.3.3.

Installation

Mechanical Installation

- The weigh frame should be installed securely on the conveyor belt system. Follow the manufacturer's guidelines for proper installation. Ensure that the weigh frame is aligned with the belt and properly supported to avoid any misalignment or damage.

Installation Speed Pickup

- The speed pickup should be installed on the conveyor belt pulley or any suitable location to accurately measure the belt speed.
  Ensure that the speed pickup is securely mounted and aligned with the belt for accurate speed measurement.

Installation Junction Box

- The junction box should be installed near the weigh frame to facilitate electrical connections. Ensure that the junction box is properly sealed and protected from environmental factors such as dust and moisture.

Electrical Installation

- Use suitable cables for electrical connections between the weigh frame, speed pickup, and junction box. Follow the manufacturer's recommendations for cable types and ensure proper insulation and grounding to avoid any electrical interference or safety hazards.

Commissioning

- After the mechanical installation, perform necessary adjustments to ensure proper alignment and tension of the conveyor belt. Follow the manufacturer's instructions for mechanical adjustments.

Electronics Setup

- Connect the weigh frame, speed pickup, and junction box according to the provided wiring diagram. Ensure proper connections and check for any loose or damaged wires. Refer to the manufacturer's instructions for electronics setup.

Calibration

- Calibrate the belt scale weigh frame using a test weight device.
  Follow the step-by-step calibration procedure provided in the user manual. Adjust the calibration settings as necessary to achieve accurate weighing results.

Maintenance

- Perform regular maintenance tasks to ensure optimal performance of the belt scale weigh frame. This includes cleaning, inspection of cables and connections, lubrication of moving parts, and calibration verification.
- Refer to the maintenance schedule provided by the manufacturer.

List Parameters for Belt Scale

- Refer to the user manual for a list of parameters that can be configured for the belt scale weigh frame. These parameters include belt speed, calibration factors, output signals, and communication settings.

FAQ

Q: Where can I find the most current version of the user manual and product updates?

- **A:** The most current version of the user manual, software, firmware, and all other product updates can be found on our website at **www.ricelake.com.**

Revision History

This section tracks and describes manual revisions for awareness of major updates.

Revision	Date	Description
A	September 8, 2023	Revision history established; added lever ratio details

Table i. Revision Letter History

Introduction

- A belt scale measures a continuous mass flow, which is transported over a belt conveyor. A complete belt scale is composed of a weigh frame, which contains one or more load cells, a speed pickup, and the Integrator electronics (see drawing WBF-S0000).
- Not every application is suited for a belt scale, this has to be analyzed by a Rice Lake Weighing Systems specialist. A series of weighframes have been developed for many applications and for every type of conveyor, to achieve the optimum result.
- The Master BS211 Belt Scale System must be installed by qualified service technicians only, according to this manual.
- Manuals are available from Rice Lake Weighing Systems at **www.ricelake.com/imanuals**
- Warranty information is available at **www.ricelake.com/warranties**

Overview

- The weigh frame model BS211 is designed for heavier applications in the process industry, where good accuracy and/or legal approval is demanded.
- The dimensions are generated from the construction of the existing or built belt conveyor. Optionally this belt scale can be supplied with the approval according to the ATEX directive in the categories II2D or II3D.

Theory of Operation

- The material is carried by the belt and the underlying rollers. One or more of these rollers is mounted on the weigh frame and is weighed. Therefore the amount of material lying on the belt is weighed. The belt speed is measured as well.
- Both values (belt load and belt speed) are calculated in an integration function in the electronics. These electronics totalize, calculate the mass flow, display these, and transfer them through outputs or any other way of communication to a control system or network.
- For the operation, we refer to the manual of the electronics installed.

Selection Criteria

- After choosing the belt scale model BS211, the dimensions are determined.
- The capacity of the load cells is calculated based on the maximum belt load, the dead load of the weigh frame, and the weigh roller.

Calibration and Test Weight Device

- The weigh frame can be provided with mounting points to apply test weights. This is to check accuracy after the initial calibration has been done. Then the reproducibility and the state of the belt scale can be determined.
- To determine absolute accuracy, it is necessary to do a test with the material. For this procedure, we refer to the manual of the electronics installed.

Safety 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. Contact any Rice Lake Weighing Systems dealer for replacement manuals.

WARNING

- Failure to heed may 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 eyewear, 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 than 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.

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 within the parameters designed for the system, the following precautions should be observed.
- **WARNING:** Take all necessary safety precautions when installing the scale carriage including wearing safety shoes, and protective eyewear, 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 fixed to the same side of the load cell (the weigh frame), where the welding is.
- When in doubt, remove the load cell(s).
- **IMPORTANT:** Follow the recommendations given when the application is checked.
- The 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 weight frame).
- The weigh frame must be mounted free of mechanical tension.
- No vibrations in the conveyor should be allowed to carry over to the weigh frame. If needed, these must be filtered.
- The belt must be of good quality and the weld must not influence the weighing. A good fit consists of more than one part and welds, the weight per meter must be constant 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 weigh frame (the weighing section) have to be adjustable in height. For short belt conveyors this can be reduced to one roller before and one roller after the weighframe.
- Every roller or idler station must be water leveled in cross direction on the frame carriers. A tolerance of +/- 0.5 mm is accepted, measured between the ends of the middle carrier roller.
- Rollers should not have a concentricity exceeding +/- 0.3 mm.
- It must be possible to mount a speed pickup on a non-driven drum or roller. We strongly recommend not using a measuring wheel.
- The inclination angle of the belt conveyor should not exceed 15º.
- Air flowing along should not have any effect on the weighing.
- A possible side guiding should not have any effect on the weighing.
- **ATEX:** If the system is placed in Zone 21 or Zone 22, it must be connected to Earth as indicated on the drawings.

Mechanical Installation

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

Installation Weighframe

- The design and the installation of the weigh frame depend on the type of conveyor. The weighframe is supplied in one part and it also must be mounted in one part, according to the specific drawing.
- **Use drawing BS211-M0200** or the specific project drawing.

1. Determine the location of the weighing roller station(s).
2. Determine from the heart of the weighing roller, the position of the load cell carriers and pivots. Point out the position of the holes and drill the holes Ø18 mm.
3. Mount the weigh frame.
4. Place the weighing roller station on the mounting plates and point out its location for welding.
5. Weld the plates to the weighing roller station, after taking them off the weighframe. Do not weld on the weighframe, to prevent damage to the load cell.
6. Adjust the rollers in the weighing section (three before, one on, and three after the weigh frame) against the rollers (or any other belt support) both before and after the weighing section.

Installation Speed Pickup

1. Mount the speed pickup, according to the drawing, at a (non-driven) tail drum or running roller.

Installation Junction Box

1. Mount the junction box near the weigh frame, not further than 0.5 meters from it. The cable glands must point downwards.

Electrical Installation

- The wiring and connections between the weigh frame, speed pickup, and the electronics are shown in the applicable scheme, see Section 4.1 on page 13.
- The load cell is provided with a fixed cable; do not alter the length. An additional junction box with screw terminals is provided to extend the cable length.

Cable Types

Load cell

- • If the length is less than 60 meters, use a shielded 4-wire cable 0.75 mm².
- • If the length is more than 60 meters, use a shielded 6-wire cable 0.75 mm².

Speed pickup

- Use shielded 3-wire cable 0.75 mm².

Shielding

- The cable shielding must be connected to one side only. If connected to the instrument side, then preferably use the same ground as the power supply.

ATEX

- If the system is placed in Zone 21 or Zone 22, it must be connected to the ground as indicated on the drawings:
- If metal parts are mounted isolated (by paint, plastic, or rubber materials), then an earth strip or other form of grounding must be placed from the weighed part to the fixed part of the weigh frame.
- An earth strip must be placed from the fixed part of the weigh frame to the conveyor construction.
- The conveyor must be grounded to a central or local earth pin.
- The belt must be manufactured of an anti-static material.
- **NOTE:** If the weigh frame consists of two parts, earthing must be provided on both sides.
- Earth leads or any other form of grounding must never affect the weighing function.

Commissioning

- This part should be done by service engineers, who are trained and experienced on the subject.

Mechanical Adjustments

- This part is limited to the adjustment (free of mechanical tension) after the transportation security has been removed.
- If necessary, the load cell will be adjusted mechanically.

Electronics Setup

- Refer to the manual for the electronics installed.

Calibration

- Perform a test with the material.
- Let the installation run and totalize for at least 5 minutes. Collect the material during this period and compare the totalized value with a measurement on a static scale.
- If necessary, adjust the calibration parameter in the electronics.
- Refer to the manual for the electronics installed.

Maintenance

Regular maintenance is essential to prevent predictable errors or unnecessary out-of-orders. The supplier does not accept any responsibility for the consequences of maintenance that was not performed according to the recommendations in this section.

Maintenance

- **WARNING:** It is important to guarantee the safety of personnel during maintenance work and to ensure 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.

Periodical Maintenance

- To keep the belt scale in an optimum condition, it is important to do periodical maintenance.
- Check to ensure there is not a build-up of debris on the belt.
- Inspect the weigh frame for damaged areas and repair immediately to prevent rusting. The method of application and the specifications of the painting may be customer-specific and therefore have to be requested.
- 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.

List Parameters for Belt Scale

- Complete the information below. Remove this page and store it in a secure location.
- **CUSTOM** ——————————
- **ORDER NUMBER** ——————————
- **INSTALLATION** ——————————
- **REFERENCE**——————————-
- **TYPE WEIGH FRAME** ——————————
- **TYPE SPEED PICKUP**——————————-
- **TYPE ELECTRONICS**——————————-
- **DATE**——————————
- **FILLED IN BY**——————————

Parameter	Unit	Entered	Change
Nominal capacity (flow)	kg/hr		
Maximum capacity (flow)	kg/hr		
Minimum capacity (flow)	kg/hr		
Ratio weighframe			
Number of load cells			
Load cell capacity (per load cell)	kg		
Load cell sensitivity	mV/V		
Roller distance	mm		
Inclination angle belt conveyor	°		
Belt speed	m/s		
Speed pickup:			
Pulses per turn			
Diameter drum or running roller	mm		
Beltlength per belt turn	m		

Appendix

Installation and Wiring

Weigh frame Drawings

- WBF-S0000
- BS211-M0200

Junction Box Drawings

- **JBB-M0200**
- **JBL-ATEX** -M0200

Speed Pickup Drawings

- **SPU260-M0200**

Wiring Diagrams

- **BS211-E0299**

Declarations

CE-Declaration

- **Model** BS211
- **Serial number** 0

ATEX-Declaration

- **Zone** 21 22
- **Category** II2D IP65 T70oC II3D IP65 T70oC
- **Temperature TA=** -10oC / + 40oC

Total Load Cell Build Conversion

- **The 211** Belt Scale has a lever ratio which must be applied to the total load cell build for proper calibration.
- **Formula:** L / E = Lever Ratio
- **E =** effort distance from the center fulcrum
- **L =** load distance from the center fulcrum
- **Example:** 23.62 / 31.50 = 0.75 x 100 = 75%
- This reconciles the expected mV signal at the integrator with the actual mV signal experienced at the effort point of the lever.

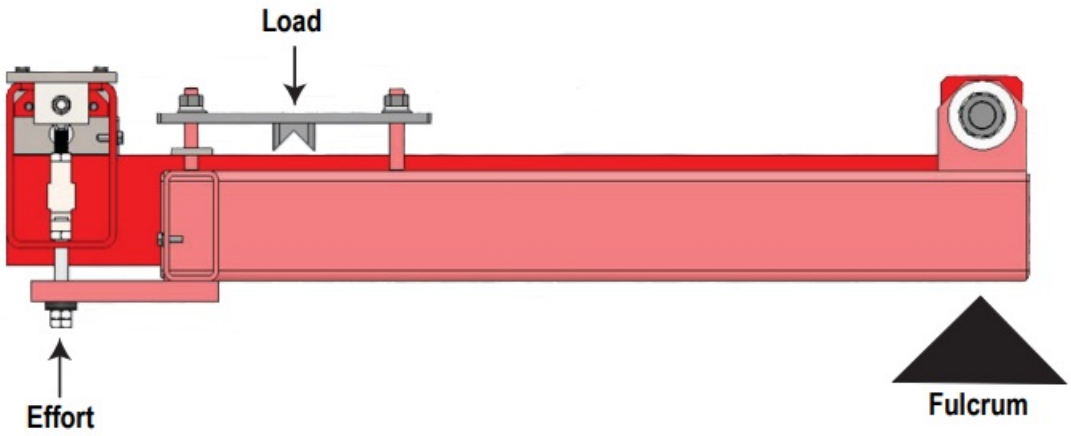

Figure 4-1. Belt Scale Lever Ratio

Specifications

Standard

- **Material** Weighframe Steel St.37 or Stainless Steel SS304 / 316
- **Rollers** Aluminum, Steel St.37 or SS304 / 316
- **Weight** Dependent on the belt width
- **Load** Cells 1 or 2 piece model B3G-9363 (SS/IP66/67)
- **Capacity** 50 to 2500 kg (each)
- **Power** supply 5-15 VDC (stabilized from electronics)
- **Signal** nominal 2 mV/V at 100% load
- **Junction** Box Model JBB (PC / IP65)

- **Speed** Pick-up Standard model SPU5020 (Alu / IP66)
- **Optional** model SPU5826 (SS / IP66)
- **Optional** model SPU2160N (Alu / IP64)
- **ATEX cat.** II2D or II3D
- **Load Cells** 1 or 2 piece model BM11-SHB (SS / IP66/68 / ATEX II2D T70°C)
- **Capacity** 50 to 200 kg (each) or 1 or 2-piece model BM8H-ACB (SS/IP66/68/ATEX II2d T70°C)
- **Capacity** 500 to 2000 kg (each)
- **Junction** box Model JBL-ATEX (ABS / IP65 / ATEX II2D IP6X T80°C)
- **Speed** Pick-up Std. model SPU5020 (Alu / IP66 / ATEX II3D IP6X T=120°C)
- **Opt.** model SPU5826 (SS / IP66 / ATEX II3D IP6X T=120°C)
- **Opt.** model SPU7030HSR (SS / IP66 / ATEX II2D T70°C)
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- The most current version of this publication, software, firmware, and all other product updates can be found on our website: www.ricelake.com

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Documents / Resources

	MASTER 211 Belt Scale Weigh Frame [pdf] Instruction Manual 211 Belt Scale Weigh Frame, 211, Belt Scale Weigh Frame, Scale Weigh Frame, Weigh Frame, Frame

References

- Rice Lake Weighing Systems

- Rice Lake Weighing Systems
- Training | Rice Lake Weighing Systems
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