



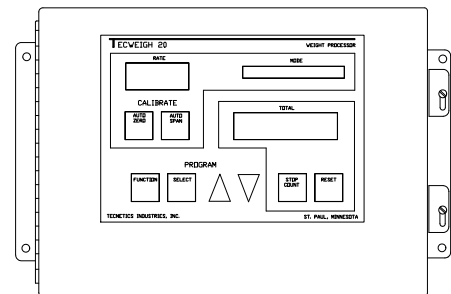
## OPERATION MANUAL

### **Conveyor Scales**

Model: WY10, WY10HD, WY15, WY20, WY25,  
HY15, HY25

### **Weight Processor**

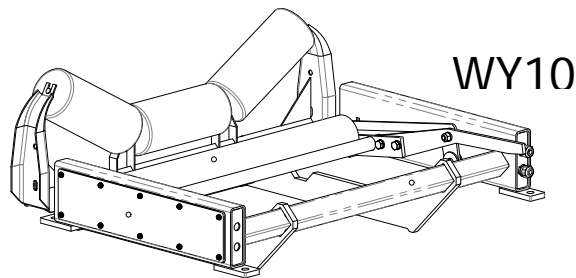
Tecweigh 20 (WP20) Weight Processor  
Firmware Version 8.XX  
MP400 main PCB



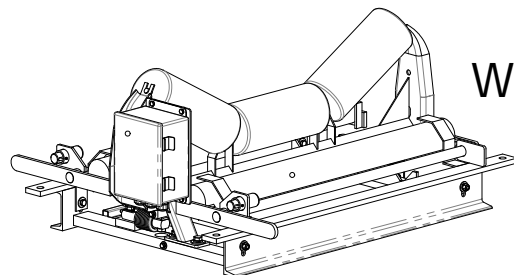
**Tecweigh 20  
(WP20)**

### **Signal Conditioner**

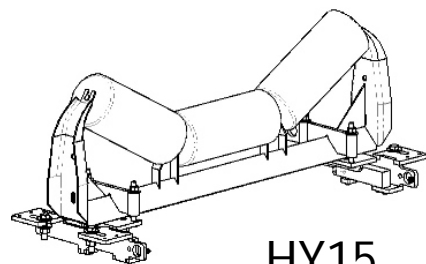
Model: SC300 (WY15, WY25, HY15, HY25)  
SC400 (WY10, WY10HD & WY20)



**WY10**



**WY15**



**HY15**

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# CHAPTER 1 - SAFETY



This symbol is intended to alert the user of the presence of uninsulated dangerous voltage within the product's enclosure that may be of sufficient magnitude to constitute a risk of electric shock.



This symbol is intended to alert the user to the presence of important operating and maintenance (servicing) instructions in the literature accompanying the product.

## 1.01 The Manual



**This entire manual should be read thoroughly to gain the proper knowledge of how the system works and how to operate it safely. Also be sure to read the safety instructions and warnings. Failure to heed these safety instructions and warnings could result in serious personal injury or death.**



## 1.02 Lifting Equipment

The scale includes a minimum of four mounting holes located in the four corners of the scale's main carriage. It is recommended that these holes be used when lifting the equipment. The use of a crane or forklift with a spreader bar is recommended. Use caution at all times when rigging, or hoisting scale carriages. Mishandling can cause damage and/or injury to personnel.

It is not recommended that the equipment be manually lifted, but if the equipment must be lifted manually a minimum of two people should lift the equipment. At no time should manual lifting or installation be attempted on conveyor scales designed for 48" or wider belts.



## 1.03 Transporting Equipment

Portable conveyor belts are a common location for scale installations. Use caution at all times when transporting, rigging, or hoisting scale carriages. Mishandling can cause damage and/or injury to personnel. Remove the calibration weights during transport to prevent damage to the scale and also to prevent the weights from falling.



## 1.04 Electrical Codes

**WARNING! – DANGER!** Follow all local electrical and safety codes as well as the National Electrical Code (NEC) and the Occupational Safety and Health Act (OSHA). Improper wiring or improper grounding could cause serious personal injury or death. Disconnect and lock out all power from the scale before servicing. Only authorized service technicians should have access to the inside of the electrical enclosures. This includes the signal conditioner enclosure on the scale and the WP20 processor enclosure. Even with the equipment's power disconnected, live voltage can be present inside the WP20's enclosure.



## **1.05 Hazardous Environments**

**WARNING!** The standard scale is not “explosion-proof”. The standard scale must not be operated in an environment where conditions exist that could cause an explosion of dust or gas. Specially built explosion proof scales, signal conditioner enclosures, and speed sensors are available from **Tecnetics** for hazardous environments.

## **1.06 Scale Over-Loading**

**WARNING!** Excessive loading on the scale could result in damage to the scale, conveyor, or cause injury to personnel. Information that applies to your specific application is available in Section 12 of this manual. An increase in maximum rate and/or a reduction of belt speed could result in overloading the scale. Additionally, increasing the idler center-to-center distance (refer to Section 7.02.5), which increases the loading on the weigh idler, can also result in overloading the scale.

## **1.07 Environment**

The equipment is designed to be operated in wet or dry environments, within a temperature range of 32-104 degrees Fahrenheit (0-40 degrees Celsius), and a relative humidity less than 80%. Although the equipment will operate outside this temperature range, the accuracy of the equipment might be affected. If the equipment is to be stored for an extended period of time, keep it in a cool dry area and do not expose the shipping crate or pallet to the weather unless care is taken to protect it from rain exposure.



## **1.08 Printed Circuit Board (PCB) Precautions**

Disconnect and lock out all power to the scale before servicing. When handling PCBs, always use a commercially available grounding wrist strap to prevent electrostatic discharge, which can destroy electronic components. Store unused PCBs in electrostatic protection bags made for that purpose.

## **1.09 Welding Precautions**



**Do not** do electrical welding on or near the scale carriage, electrical enclosures, load cells or LVDT's, or signal wiring. Electrical current passing through the PCBs will destroy them, as can electromagnetic radiation. If welding near the scale is absolutely necessary, place the ground clamp as close to the welding area as possible.

# CHAPTER 2 - INTRODUCTION

## 2.0 Tecnetics Industries, Inc. and Tecweigh.

Tecnetics Industries, Inc., is the legal name for Tecnetics. Tecweigh is the product brand name. They are frequently used interchangeably in this manual and within the company.



### 2.01 Contacting Tecnetics (Tecweigh) Industries, Inc.

When contacting Tecweigh service about a WP20 or signal conditioner (SC), please have the serial number and model number available. Their location and how they are identified is as follows:

Inside the enclosure on the printed circuit board (PCB) there are two hand printed numbers, a serial number and model number. The serial number identifies both who owns the unit and the date it was shipped. The model number indicates the design revision of the processor's components. Be sure to disconnect and lock out all power before opening any enclosures.

Examples of model numbers:

#### **MP400-00-00**

A 400 series MP (Main Processor) on its initial hardware version (-00) and initial firmware version (-00).

#### **SC300-02-01**

A 300 series SC (Signal Conditioner) on its second hardware version (-02) and first firmware version (-01).

### **Tecnetics (Tecweigh) Service Department contact information:**

Phone: 651-777-4780 (General number).

651-233-1946 (Service Department)

651-233-1976 (Parts)

FAX: 651-777-5582

Email: [svobodac@tecweigh.com](mailto:svobodac@tecweigh.com) (Service Department)

**Tecweigh** web site: [www.tecweigh.com](http://www.tecweigh.com)

### 2.02 Wording Conventions in this Manual

This manual uses two specific wording conventions to help identify the two most important components of the processor; the Parameter table and the faceplate KEYS.

First letter Capitalized

In this manual, a Parameter will always appear with its first letter Capitalized and will also be spelled as it appears in the processor's Parameter table. That is, if a Parameter is truncated in a processor display, it will also be truncated in the manual.

ALL CAPITALIZED

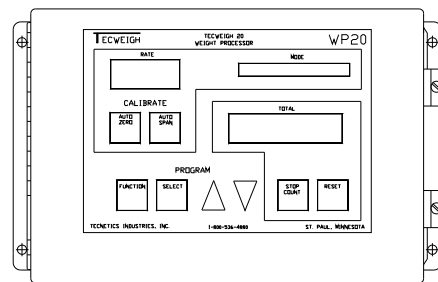
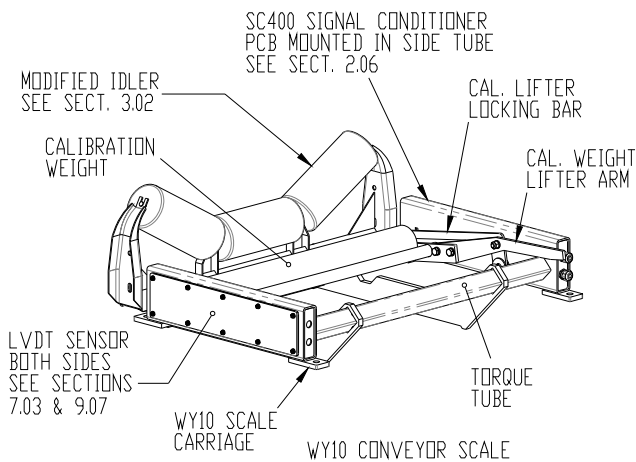
When referring to the pushbutton KEYS and other features on the face of the processor, all the letters are CAPITALIZED. Examples: AUTO ZERO, AUTO SPAN, or MODE window.

## 2.03 Basic Operation

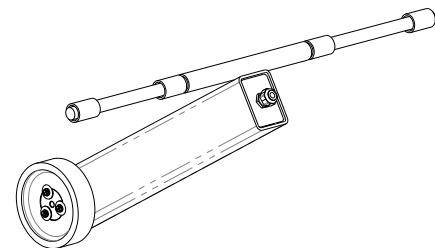
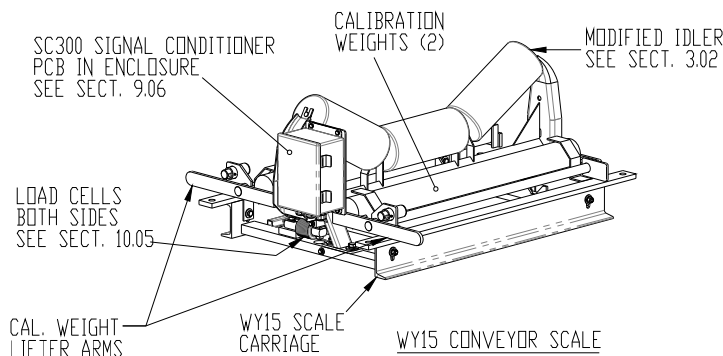


A conveyor scale's primary function is to continuously measure the material weight on the belt at any particular instant in time and then display the material flow RATE and TOTAL weight. The main components of the scale system are the scale carriage, the Tecweigh 20 Weight Processor (WP20), speed sensor, signal conditioner (SC), load cells or LVDT sensors, calibration weights with lifter arm(s), and the weigh idler.

The scale carriage mounts on the conveyor stringers and uses one or two of the conveyor's existing idlers depending on which **Tecweigh** scale model was purchased. Models WY10 and WY15 replaces one idler while the WY20 and WY25 replaces two idlers. The speed sensor wheel rides on the return side of the belt to indicate the speed the belt is moving. Load cells or LVDT sensors on the scale carriage measure the weight of material on the belt. The weight and speed signals are sent to the signal conditioner mounted on the scale carriage. These signals are electronically conditioned and then transmitted to the WP20 Weight Processor via RS485 serial communications. This conditioning function also allows the FC20 to be mounted remotely from the scale when necessary. The WP20 does all RATE, TOTAL, and belt speed calculations for display. It can also send that and additional information to remote devices.



WP20 PROCESSOR  
(ONE PER SCALE)



STANDARD SS12  
SPEED SENSOR WHEEL  
AND MOUNTING HARDWARE  
SEE SECT. 3.4



## **2.04 Conveyor Scales (WY10/WY10HD/WY15/WY20/WY25)**

A **Tecweigh** conveyor scale typically consists of a carriage, load cell(s) (or LVDT(s)) for sensing weight, a belt speed sensor, a signal conditioner, and a weight processor (FC20 or WP20). Most are also equipped with self storing calibration weight(s) and a mechanism for easy manipulation. Additional scale information is provided in chapter 3.

## **2.05 Modular Conveyor Scales (HY15 & HY25)**

A Tecweigh modular conveyor scale typically consists of a left and right module including load cell, a tail pulley speed sensor, a signal conditioner enclosure, and a weight processor (WP20, FC20, or WPLD). Specific modular scale information is provided in section 3.03.

## **2.06 Weigh Belt Feeders (WF10/WF14/WF16/WF18)**

A **Tecweigh** weigh belt feeder (WBF) is a complete weighing and conveying mechanism that consists of the head and tail pulleys, a drive motor, a belt tensioner, a belt speed sensor, the belt, one or more weighing idlers, and the material weight sensing load cells or LVDTs. A **Tecweigh** WBF is also normally equipped with a self storing calibration weight(s) and a mechanism for easy operation.

## **2.07 Signal Conditioner (SC)**

Material weight and belt speed signals are sent to the signal conditioner (SC) which is normally mounted on the scale carriage. The signal conditioner has two functions: first, it collects and electronically conditions the material weight and belt speed signals; and, secondly, it detects problems at the scale such as faulty weight or speed sensors. The weight, speed, and scale status information is continuously sent to the WP20 via the standard RS485 serial communications protocol.

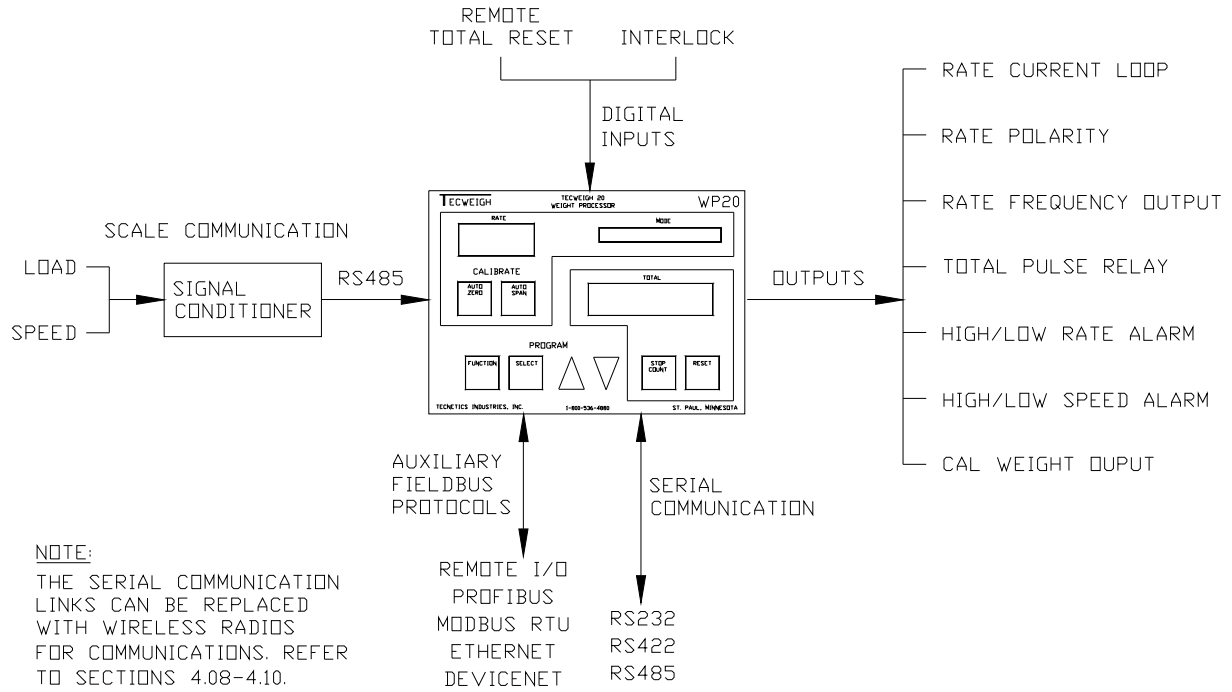
## **2.08 Tecweigh 20 (WP20)**

The WP20 is the microprocessor of the scale system. All settings are stored in the WP20 such as belt length, calibration weight, and desired I/O options. At the very basic level, it receives belt speed and material load data from the SC and displays the corresponding material RATE on the WP20's display. The WP20 accumulates a TOTAL of material weight that passes over the scale. While displaying the RATE and TOTAL, the WP20 also interprets status information from the SC and displays status messages when appropriate.

However, the WP20 can do much more than just display RATE, belt SPEED, TOTAL, and scale status. Various analog, relay, and serial inputs and outputs, allows control of the WP20's primary functions remotely using a PLC or other plant controller. Furthermore, up to sixteen WP20s can be daisy chained on one RS485 serial bus for full plant automation.

In addition, optional fieldbus communication cards are available for the WP20 processor. They are add on plug-in interface devices that allows the user to remotely initiate actions (like AUTO ZERO) and retrieve data (like RATE and TOTAL) using one of the five available protocols: Remote I/O, Profibus, Modbus RTU, Ethernet, and Device Net.

## 2.09 I/O Quick Reference Guide

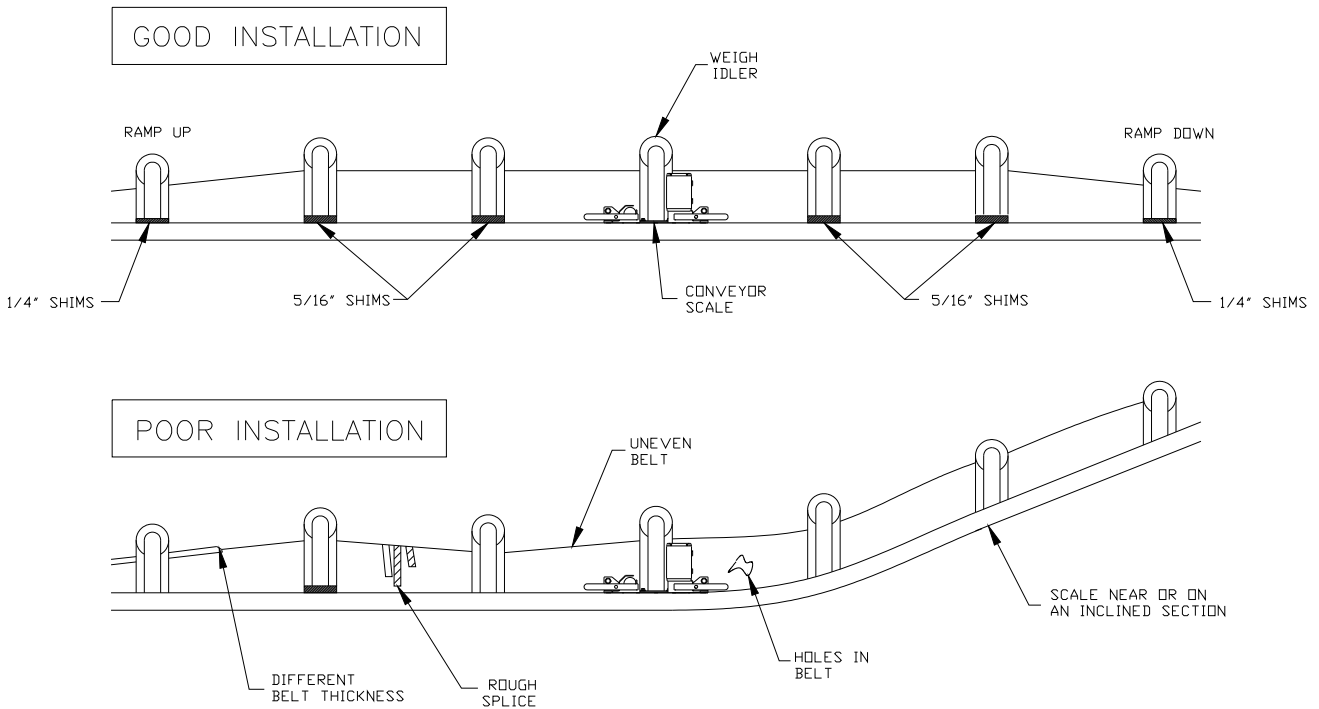


# CHAPTER 3 – SCALE INSTALLATION

## 3.01 Proper Installation, WY & HY Belt Scale Models



Proper scale installation is critical for high accuracy and repeatability. A properly mounted scale should be located on a rigid, horizontal conveyor. If the conveyor is at an incline, assure it is not so steep that material rolls back on itself causing it to be weighed twice. The belt and idlers should move smoothly and the scale should be mounted in an area free of extreme temperature, wind and vibration. The shimming and aligning of the idlers surrounding the scale is extremely critical, because the weigh area must be slightly raised above the other idlers as indicated below.



### **Avoid the following!**

- Badly worn belts and splices
- Joined belts with different thickness
- Poor belt training or alignment
- Wind, temperature, or vibration extremes
- Material build-up on belt, idlers or calibration weights
- Loosely mounted unstable conveyor
- Idlers with steep trough angles
- High belt tension
- Steep conveyors allowing material to roll back
- Belt skirting or other interference near scale

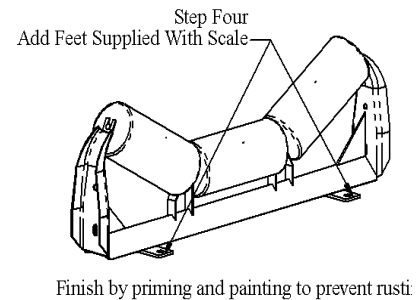
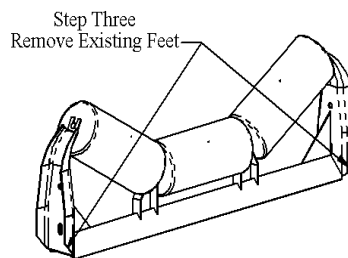
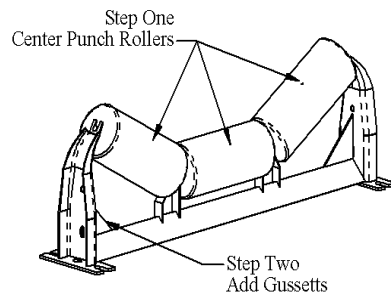


### 3.02 Idler Preparation, WY Models

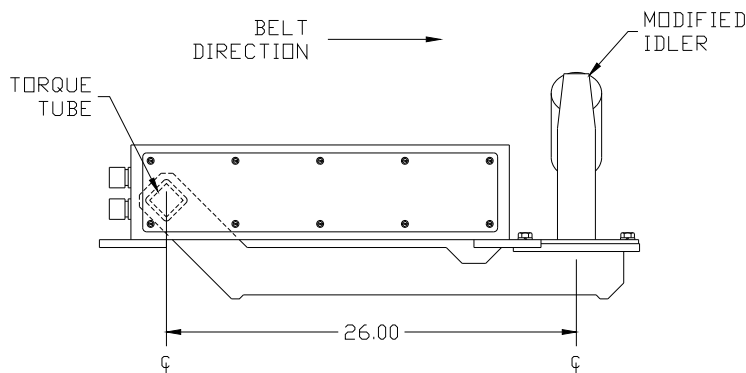
After finding a suitable location for the scale, reduce the conveyor belt tension. Raise the belt so it is supported at least one foot above the idler where the scale will be located and also one foot above the three idlers before and after the scale. Note, if you are installing a dual-idler scale (model WY20 or WY25), follow the same instructions as for the single-idler scale (model WY10 and WY15) and just repeat the instructions for both idlers. Short conveyors might only have two idlers on one or both sides of the scale, but this is not recommended because accuracy might suffer. If this should occur, consult the **Tecweigh** service department for advice (Section 2.01).

#### ***DO NOT WELD ON OR NEAR THE SCALE!!!***

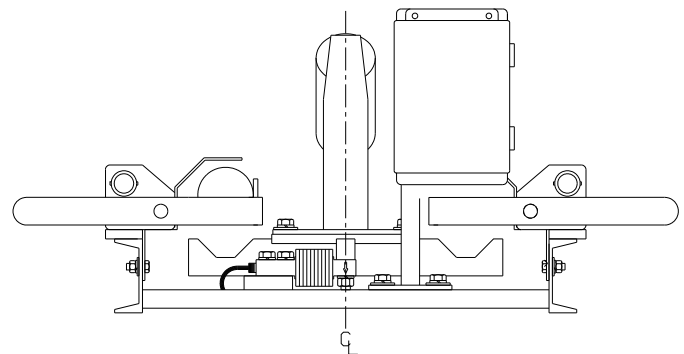
- 1) Mark the center of each roller on the scale idler, three idlers before the scale, and three after (see below).
- 2) Remove the idler where the scale will be located--this will be used as the weigh idler.
- 3) Remove the weigh idler's factory mounting pads.
- 4) Center the weigh idler on the unpainted scale mounting pads and mark the location on idler.
- 5) Remove the idler and the unpainted mounting pads from scale.
- 6) Weld the unpainted mounting pads to the idler at the previously marked locations.



With the weigh idler modification complete, mount the idler on the scale using the four ½” bolts provided. Center the idler on the scale as indicated below.



**WY10 Scale Carriage**



**WY15 Scale Carriage**

### 3.03 Scale Mounting, WY Models



Place the scale carriage with the modified idler on the conveyor stringers. Center and align the scale between the stringers and mark the location of the mounting holes. Alternatively, you can use the dimension drawings in Section 10 for marking hole locations, but using the scale as a template is preferred. Slide the scale out of the way and drill the four mounting holes. Place the scale over the holes, but do not tighten the bolts yet.

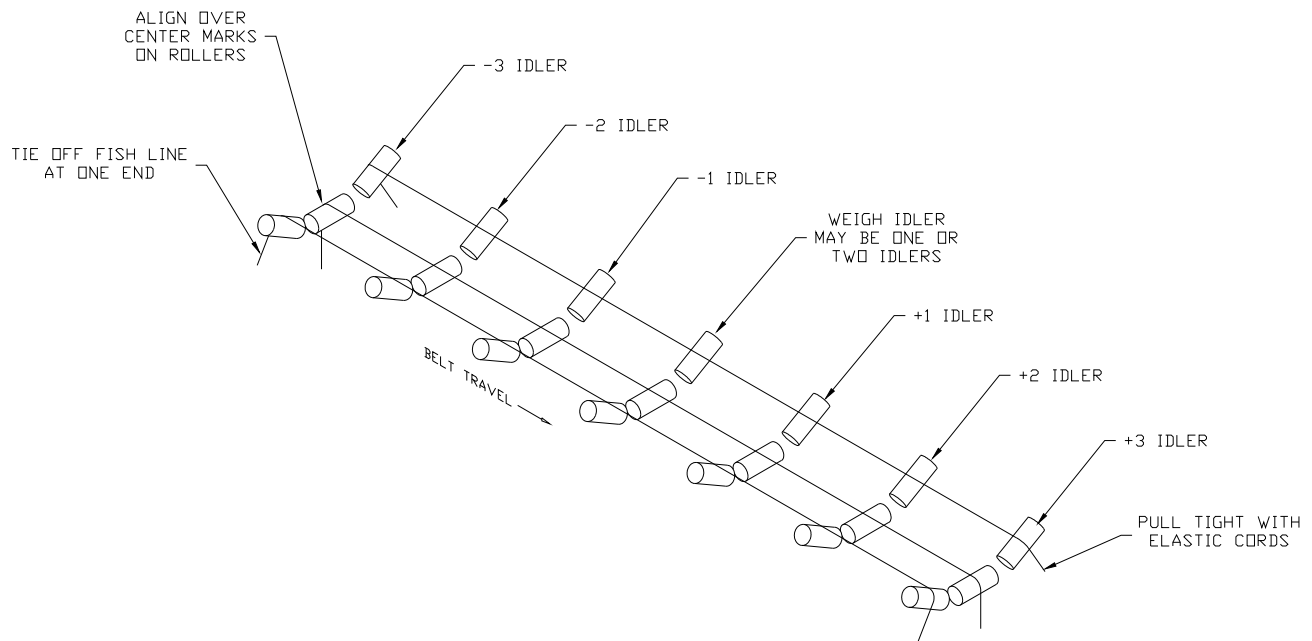
Now align the weigh idler with the three idlers on either side of the scale using the fish line and shims provided. Perform the instructions following and refer to the diagram below.

- 1) Loosen the three idlers before and after the scale.
- 1) Shim the +3 and -3 idlers up  $\frac{3}{8}$  of an inch, center them on the stringer, and re-tighten the bolts.
- 3) Stretch three fish lines across the idlers centered on the  $\pm 3$  roller center marks.
- 4) Use elastic cords to hold the fish line in place at each end.
- 5) Lower the calibration weight on the scale so the idler is at its normal running height.
- 6) Shim the scale feet leaving a  $\frac{1}{16}$  inch gap between weigh idler and fish line.
- 7) Use thin shims under the scale, if necessary, so it does not rock or pivot while laying flat.
- 8) Tighten the scale carriage bolts.
- 9) Shim and tighten the  $\pm 1$  and  $\pm 2$  idlers with a  $\frac{1}{16}$  inch gap between the fish line and the roller centers.



**The idler alignment is very important!** Before proceeding, verify that the fish line is exactly over the center marks on the rollers and there is exactly a  $\frac{1}{16}$  inch gap between all the rollers and fish line. Also verify that the idlers are exactly square with the stringers.

Remove  $\frac{1}{8}$  inches (leave  $\frac{1}{4}$  inch) of shim from the  $\pm 3$  idlers and tighten them down. Retension and align the belt so that it tracks in the center of the idlers. Make sure all of the rollers are turning freely and are securely bolted down.



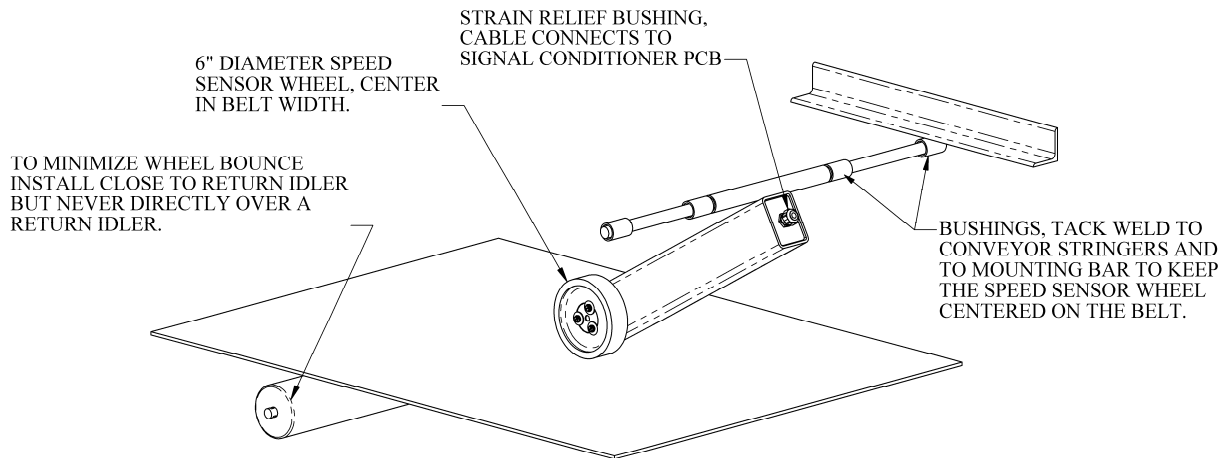
**IMPORTANT!!!** On the **WY15** and **WY20** scale models, remove the two safety plates on both ends of the idler mounting bar. These plates prevent overloading of the load cells during shipment. When using a portable conveyor, use the safety plates during transportation. Refer to the diagram in section 9.06.

### 3.04 Speed Sensor Installation, WY Models



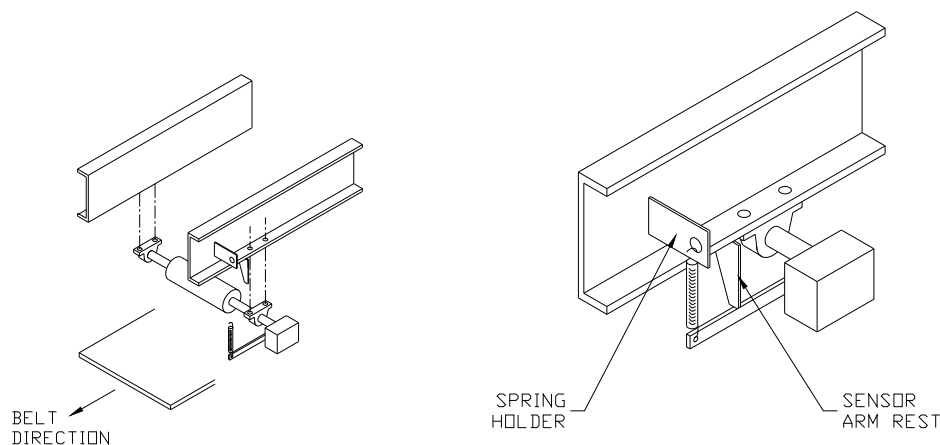
#### The standard SS12 speed sensors:

Mount the speed sensor assembly so that it is aligned exactly with the belt. If it is not straight, it might bounce and wear down the wheel or belt. Position the wheel so that it is at least 6 to 12 inches from a return idler.



#### The heavy duty SS11 speed sensor:

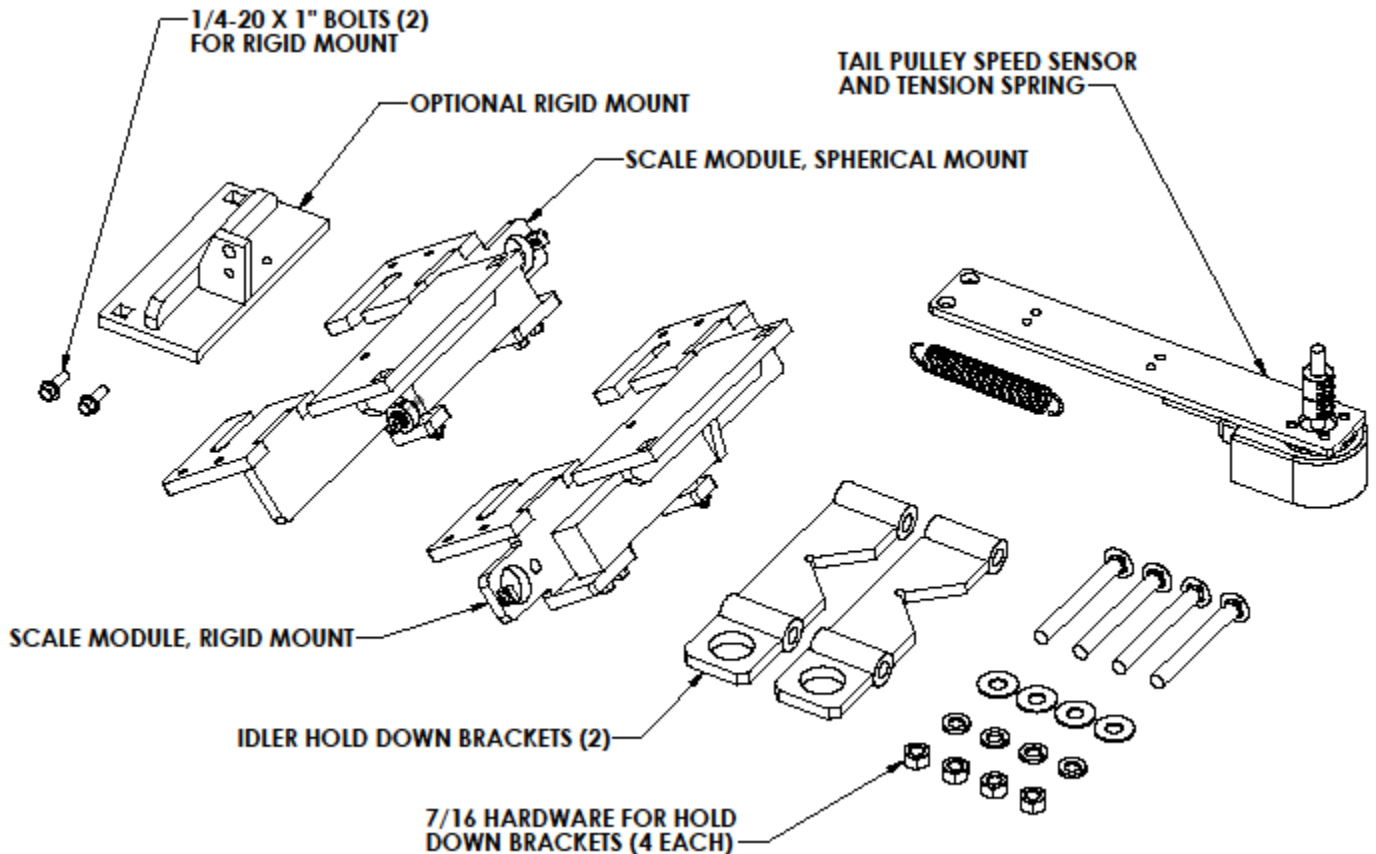
Since most brands and styles of conveyors are constructed differently, it's not possible to give specific installation instructions for the SS11 heavy duty speed sensor. However, four holes will need to be drilled for the bearing bolt holes. Also, one bracket will need to be formed and welded, on which to clip the spring, and a second bracket to hold the speed sensor arm horizontal.





### 3.05 Modular Scale Description, HY Models

The HY15 is different from our other scales in that it is a modular design. It does not have a single rigid frame that an idler can be mounted on before scale installation. Instead it is a left and right hand module that needs to be mounted on the conveyor structure and then the idler is mounted between the modules. An HY15 is supplied with the components shown below.



An HY15 scale can be mounted in series creating a dual idler scale, an HY25. An HY25 would include a second scale that would be identical to the first, but without the signal conditioner enclosure. See XXX for mechanical drawings of the HY15 and HY25.



### 3.06 Idler Preparation, HY Models

After finding a suitable location for the scale, reduce the conveyor belt tension. Raise the belt so it is supported at least one foot above the idler where the scale will be located and also one foot above the two idlers before and after the scale. Note, if you are installing a dual-idler scale (model HY25), follow the same instructions as for the single-idler scale (model HY15) and just repeat the instructions for both idlers.

***DO NOT WELD ON OR NEAR THE SCALE!!!***

- 1) Mark the center of each roller on the scale idler, two idlers before the scale, and two after (see below).
- 2) Remove the idler where the scale will be located--this will be used as the weigh idler.
- 3) Weld a reinforcement gusset in each corner of the weigh idler.
- 4) Remove the weigh idler's factory mounting pads.
- 5) Paint the weigh idler for corrosion prevention.



### 3.07 Scale Mounting, HY Models

The HY design utilized a asymmetric design in that the left and right mounts are slightly different. One side incorporates a rigid mount that bolts directly to the load cell. The other side uses a spherical rod end bearing to allow some flex in the mounting structure while minimizing drift and inaccuracies associated weak or flexing structures.

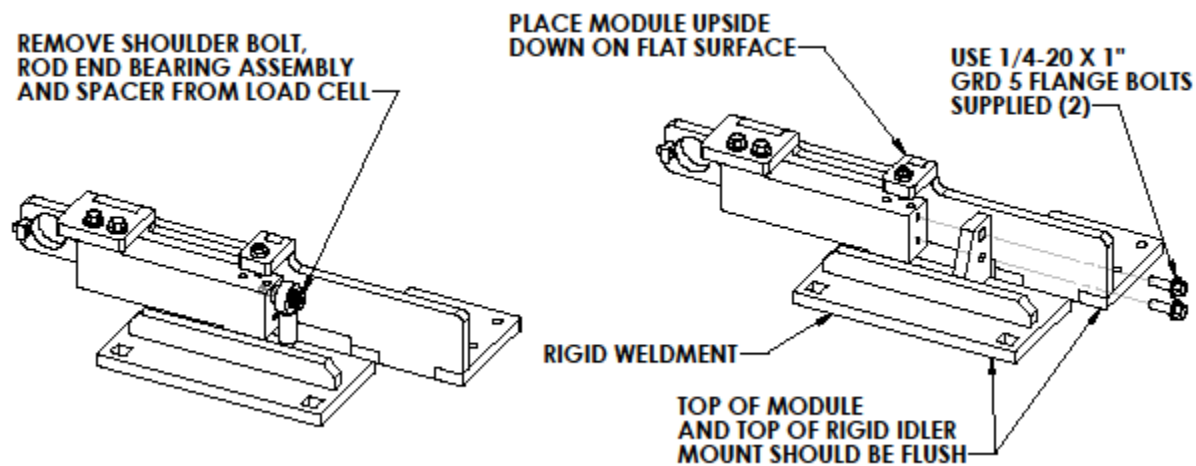
Although this benefit can be great in many applications it is not always the appropriate mount to be used. The following list highlights applications that won't benefit from the spherical bearing mount, and the symmetrical rigid mount that is also supplied should be used.

#### **The spherical bearing mount may be detrimental in these application**

- Applications with over 150lbs per foot of belt load. (500Kg per meter)
- Non-top mounted CEMA idlers.
- Flat carrier idlers or rollers.
- Belt speeds over 600 FPM.
- Belt widths over 48" (1200mm).

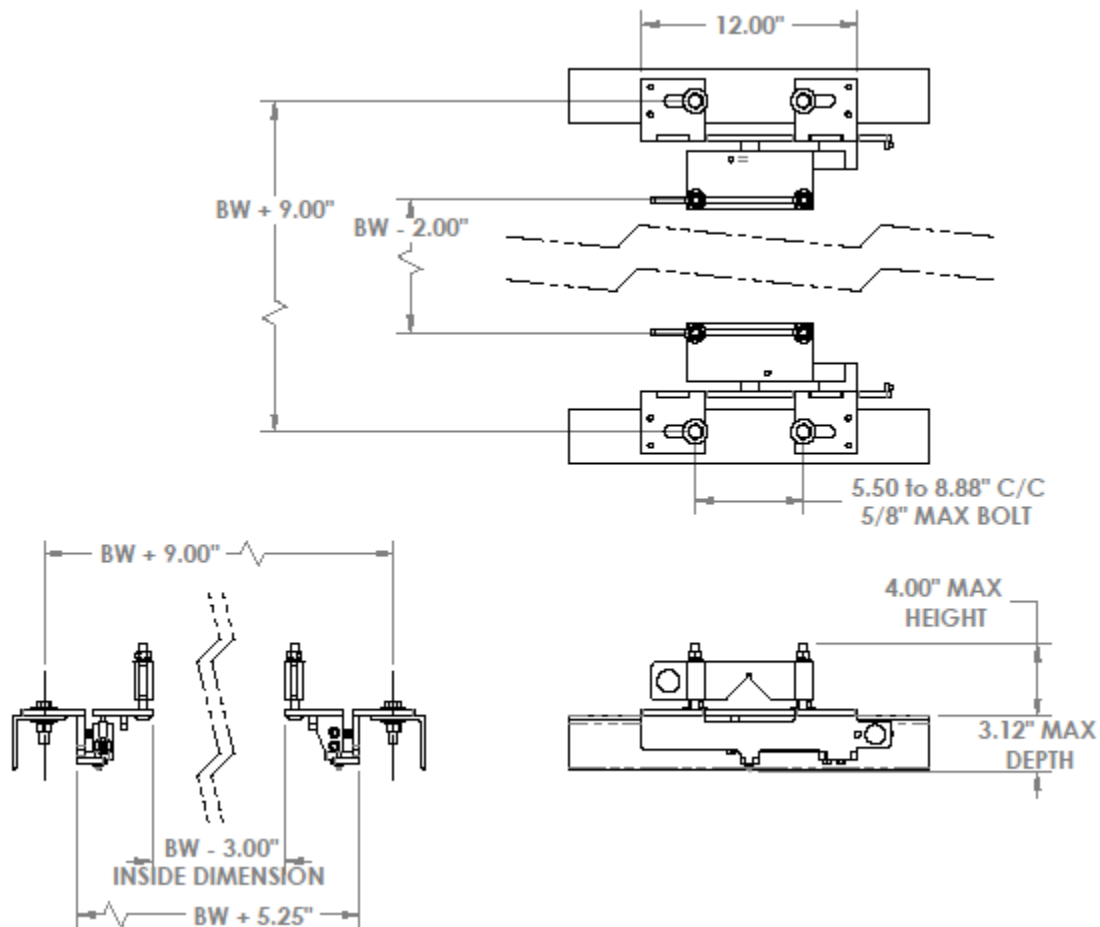
Consult our factory for unique applications. The HY15 modular scale is very adaptable.

If the application requires a symmetrical rigid mount simply remove the shoulder bolt from the rod end bearing to disassemble. Then use the two bolts supplied with the rigid mount to attach it to the end of the load cell. See below.



Because the HY modular scale is in two separate assemblies they need to be mounted parallel and square with each other. On a standard top mounted CEMA idler conveyor the left and right modules should bolt directly into the same mounting holes of the weighing idler.





Mount the modules directly across from each other using a square or common reference point. The mounts should also be centered between the closest idlers on either side of the weighing idler(s). Once centered and squared tighten down the mounting bolts for the left and right modules.

You can now place the modified idler on top of the mounting pads. Make sure the belt direction of the idler is correct. Assemble the idler hold down clamps with the carriage bolts and hardware supplied. Only finger tighten at this point. Loosen the mounting bolts on the end of the load cells with the rigid mount on them. Just enough to allow the mounting pad to settle and come into full contact with the inverted angle of the CEMA idler.

For HY25 dual idler installations repeat this process for the second idler.

Note that if the structure is truly flat and square the idler(s) that have now been mounted on the modular scale assemblies is approximately 1/8" higher than the adjacent idlers. This is not always the case but the following instructions are based on this assumption. Adjustments and shim size references may need to be different in your specific application.

Now align the weigh idler with the three idlers on either side of the scale using the fish line and shims provided. Perform the instructions following and refer to the diagram below.

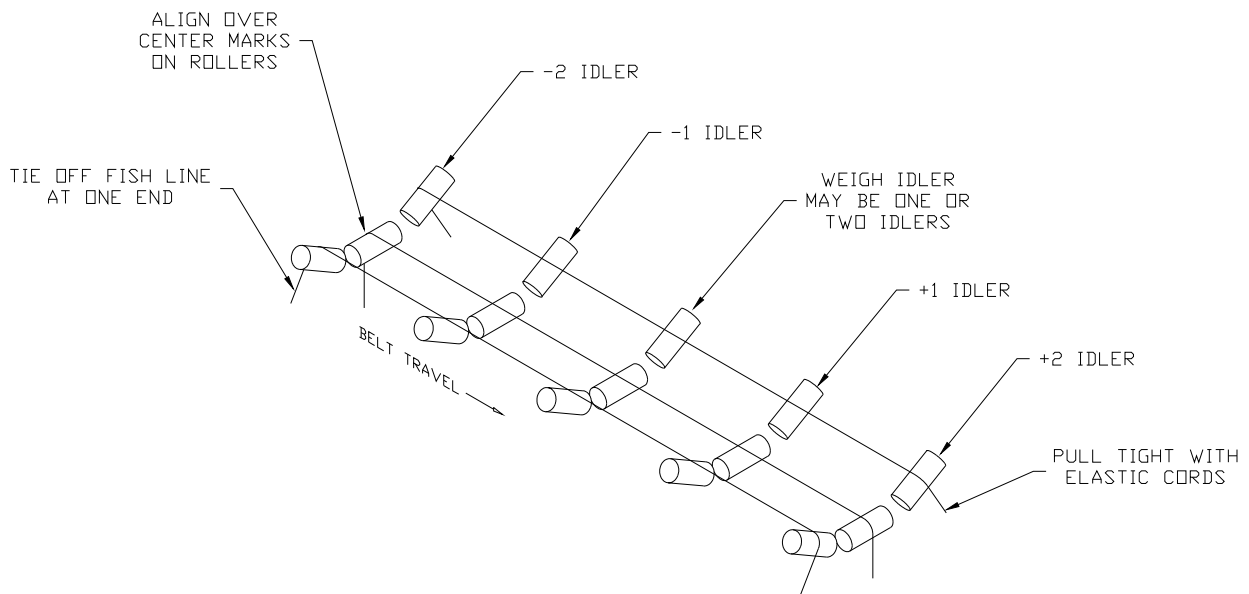
- 1) Loosen the two idlers before and after the scale.
- 2) Shim the +2 and -2 idlers up 3/16 of an inch, center them on the stringer, and re-tighten the bolts.
- 3) Stretch three fish lines across the idlers centered on the +/- 2 roller center marks.

- 4) Use elastic cords and/or weight to hold the fish line in place.
- 5) Measure with a shim the distance between the weigh idler and the fish line on the weigh idlers. It should be 1/16 inch gap between weigh idler and fish line.
- 6) If modification to the weighing idler height to attain 1/16" gap is necessary now would be the time to shim the HY15 modules or change the 3/16 shim on the +2 and -2 idlers.
- 7) Shim and tighten the +/- 1 idlers with a 1/16 inch gap between the fish line and the roller centers.
- 8) Drop the +2 and -2 idlers approximately 1/8" by removing shims.



**The idler alignment is very important!** Before proceeding, verify that the fish line is exactly over the center marks on the rollers and there is exactly a 1/16 inch gap between the fish line and the weighing idler(s) and adjacent idlers. Also verify that the idlers are exactly square with the stringers.

Remove 1/8 inches (leave 1/4 inch) of shim from the +/- 2 idlers and tighten them down. Retension and align the belt so that it tracks in the center of the idlers. Make sure all of the rollers are turning freely and are securely bolted down.



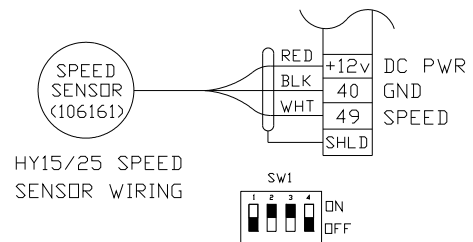
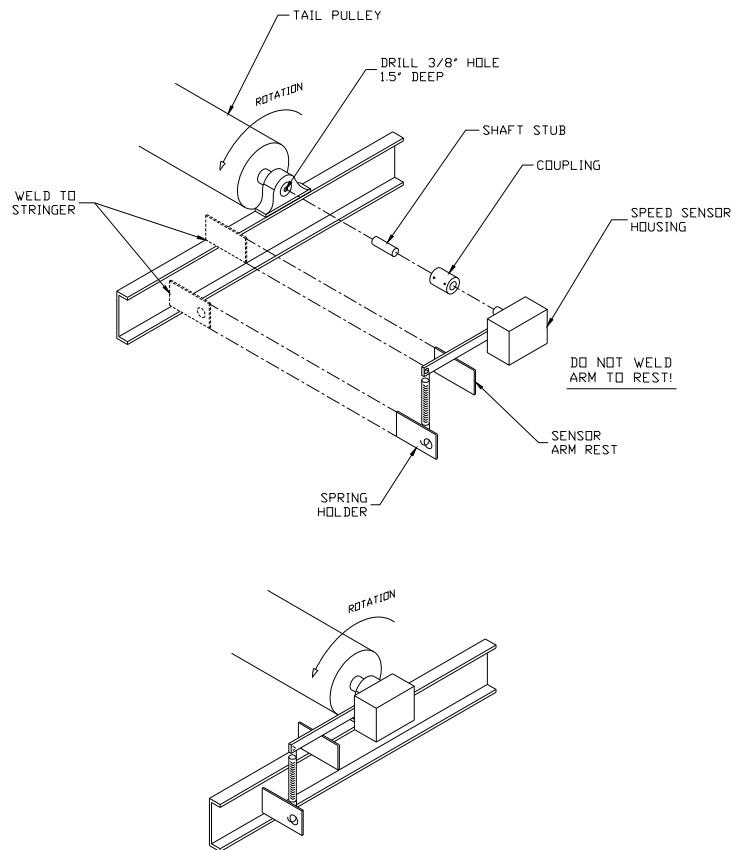
### 3.08 Speed Sensor Installation, HY Models

#### The HY15 and HY25 standard RL200 speed sensor:

Since most brands and styles of conveyors are shaped differently it is difficult to give specific installation instructions for the speed sensor. As indicated diagram below, you will need to drill a hole in the tail pulley shaft and insert a smaller shaft stub that the speed sensor will couple to. You will also need to form two brackets that are required to hold the speed sensor in place. The rotation of the tail pulley is critical for correct orientation of the speed sensor. The speed sensor should rotate in a way that it pushes against the sensor arm rest NOT pull on the spring.

- 1) Drill a 3/8" diameter hole exactly in the center of the tail pulley or any live shaft 1/2" deep.
- 2) Insert shaft stub and weld in place. Stub should protrude about 1" from the shaft face.
- 3) Hold the speed sensor up to the shaft to form an arm rest and spring holder.

- 4) Place the arm rest and spring holder in a suitable location and weld to the stringer.
- 5) Tighten the coupling onto the shaft stub.
- 6) Slide speed sensor shaft into the coupling and tighten.
- 7) Attach spring to speed sensor arm and spring holder.
- 8) Run conveyor. Speed sensor should have minimal amount of wobble.
- 9) Run required length of electrical cable to scale.

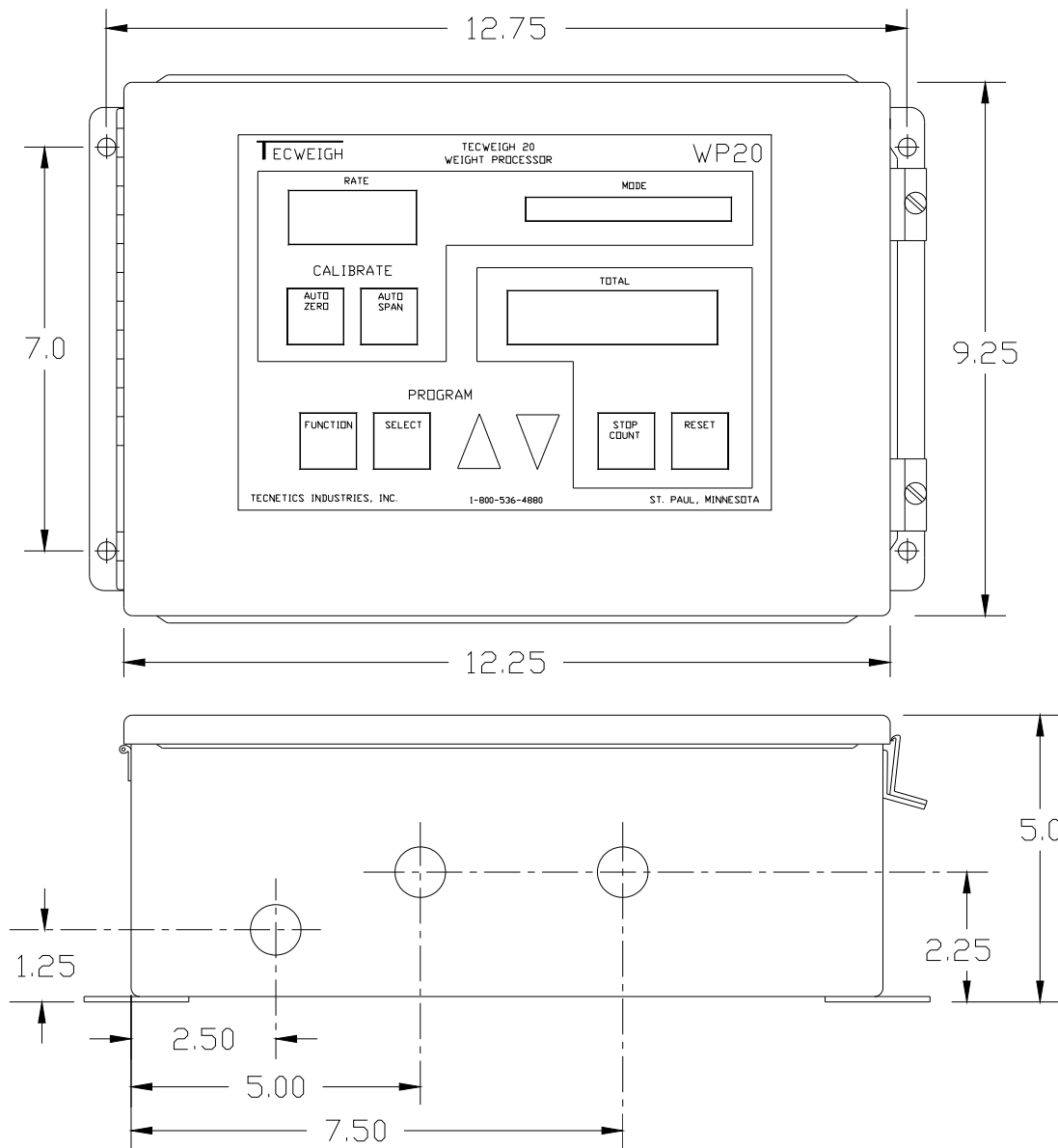


See Section 3.04 for other speed sensor options that might be included with the HY15 or HY25 scale.

### 3.09 Tecweigh 20 (WP20) Installation



Mount the WP20 in a reasonably clean area away from severe heat and isolated from vibration. Avoid areas of bright sunlight since the lighted displays may become difficult to read. Where outdoor installation is necessary, the WP20 should be mounted under a “roof” or “dog house” to provide rain and snow protection as well as shade. Be sure to allow room for the enclosure door to swing out. The WP20 can be located up to 4000 feet from the scale. For longer distances, however, one person will be required at the processor and one person at the scale (to lower the calibration weight when required and/or when calibrating the LVDT’s). Refer to the mounting dimensions in the figure below. Refer to Section 4.1 for WP20 wiring diagrams and information.



# CHAPTER 4 – SYSTEM WIRING

## 4.00 Wiring Precautions

The following is a list of important precautions that should be observed during field wiring.

- Wiring should be compliant with all applicable electrical codes.
- Input power must be 100 to 240 VAC, 47-63 HZ, 60 watts.
- Only apply input power after assuring all wiring is correct.
- The electrical power source must be of utility quality and specification.
- Never splice wires. Replace short wires with one continuous length.
- **Always** run power wiring and signal wiring in **separate** conduits.
- Ground shield wires at only one location, usually the WP20.
- To prevent possible shorts, tape all shielded wire ends and keep the wiring neat.
- Use properly sized water tight compression fittings on cables entering the enclosure.
- **Do not** connect any wires to terminals designated as unused.
- Pay particular attention to proper grounding as depicted in the wiring diagrams.

## 4.01 Tecweigh 20 (WP20) Wiring

If the equipment at hand has been custom built by **Tecweigh**, you will find an “as built” wiring diagram at the back of this manual. If it should happen to not be there, call the **Tecweigh** Service Department (Section 2.01) to obtain a copy. Refer to sections 4.02 to 4.07 for more typical field wiring diagrams. Some WP20 outputs can also be inter-connected with client supplied devices, such as a totalizer or recorder, consult the field wiring diagrams provided with those specific devices for further information. Section 6.02 defines the Parameter settings required to enable the features of the outputs used.



### *Scale to WP20 wiring*

Communications between the signal conditioner (SC) on the scale carriage and the WP20 is accomplished using the industry standard RS485 communications protocol. At both ends, terminal 10 is signal common, terminal 29 is 30 VDC power, and terminals 20 and 22 are A and B channels of the communications signal. Use 18 gauge, two twisted pair, shielded cable between the WP20 and the signal conditioner. Belden #1063A cable or equivalent is recommended (25 ft. is normally provided by **Tecweigh** on new installations, additional cable can be obtained through **Tecweigh**). If ordered direct from a Belden distributor, #1063A cable has a standard color code of black and white for each twisted pair; one pair marked “1” the other pair marked “2”. The two numbers are difficult to see in the field, so **Tecweigh** instead stocks #1063A cable with red/black and blue/yellow twisted pairs, which helps eliminate errors when field wiring the scale. **Tecweigh’s** field wiring diagram uses this color code, but if the #1063A is not ordered through **Tecweigh**, it will be the dual black and white pairs.

**IMPORTANT** – Regardless of the brand of the two twisted pairs cable used, it is very critical that one twisted pair be used for power (+DC & COM (also designated 29 and 10)) and the other twisted pair be used for communications (RS485 A & B (also designated 20 and 22)).



## **Relay Outputs**

Two configurable relays provide dry contact outputs for a remote totalizer, high/low RATE alarm, high/low speed alarm, or a calibration weight lifter interlock. The relay contacts are SPST and should not be used to control more than 250 VA. When a relay is used as a totalizing pulse relay, limit the frequency of operation to 6 pulses per second for reliable operation. Note that even though the relays are rated for up to 250 VA, it is highly recommended that electrical noise emitted from the relays be minimized to assure problem free operation of the processor. When possible, it is recommended that 24 VDC (10.4 amps max.) be used to drive external loads. When higher voltage loads need to be driven, it is recommended that an interposing relay be installed between the WP20 output relay and the load. Two variations of how to wire an interposing relay are shown in sections 4.12 & 13.

Refer to sections 6.02.27-40 for relay configuration parameters.



### **4-20 ma RATE current loop output**

The WP20 provides four 4-20 ma (or 0-20 ma) current loop outputs proportional to the RATE. The RATE current loop outputs can be used for driving chart recorders, displays, data loggers, and similar client provided devices. Use a single shielded twisted pair cable for the current loop wiring, Belden #8760 or its equivalent is recommended (it can be obtained through **Tecweigh**). Refer to Sections 6.02.19-23 for the configuration of these current outputs.

**WARNING:**     **THE CURRENT LOOP OUTPUT IS ACTIVE! THAT MEANS A DC VOLTAGE IS PRESENT AT THE TERMINALS. ENSURE THAT THE LOOP IS CONNECTED TO A PASSIVE LOAD (resistive only) OR DAMAGE WILL RESULT!**

In most systems applications, **current loop isolation is essential** to eliminate induced noise interference, and also to eliminate ground loops (when more than one load is in the loop.) The current loop outputs at the PCB are **non-isolated**. Consequently, the WP20 requires current loop (signal) isolators for loop isolation (these can be purchased through Tecnetics). Note that if more than one load is driven by a loop, for proper loop operation, all loads in the loop must be isolated except the last one. Proper shield grounding is also essential. The maximum load resistance that can be driven by any single current loop output is 750 ohms, with a maximum voltage of 18.5 Vdc. Refer to the figure in section 4.05 for an example of proper current loop wiring.

### **HFR output (HFR(4)-CM(10))**

The High Frequency Rate (HFR) output provides a square wave signal with a frequency equal to 10 times the calculated RATE. It can be used to drive remote RATE displays and other client provided devices that are capable of accepting this kind of frequency input signal. The minimum output frequency is 10 Hz and the HFR max current draw is 60 mA. Refer to Section 7.05.44 for information on the HFR Damping Parameter, and Section 9.04 for trouble shooting.

### **HFR Polarity output (POL(2)-CM(10))**

The HFR Polarity output outputs approximately 5 Vdc when the RATE is positive and approximately 0 Vdc when the RATE is **negative**. If the RATE is zero, 5 Vdc will still be present at the terminals. 5 Vdc will always be present at the terminals in Simulation mode.

## ***Serial ports***

For RS-232, two RJ-25 modular jack ports are available plus a selectable output (RS-232 or RS-422/485) at terminals 90-93. RS-422/RS-485 is available at terminals 90-93 only. All these ports are capable of sending and receiving data and also receiving commands. Refer to Section 4.03 for a wiring diagram and Section 9 for operational information.

### ***TOTAL remote reset (T1-CM)***

When terminal DI2 (T1) is momentarily shorted to terminal CM (10), the TOTAL display is reset to zero. See Section 4.03 for wiring. No other configuration is required.

### ***Remote Interlock (T3-CM)***

When terminal DI1 (T3) is continuously shorted to CM (10), the WP20 operates in its normal mode. When this connection is **removed**, the RATE goes to zero, all relays are de-energized, the HFR output goes to zero, and the RATE current (mA) output goes to its zero RATE setting (usually 0 or 4 mA). This interlock is used to remotely enable/disable the system. Jumper J23 shorts DI1 (T3) to CM (10) which effectively deactivates the interlock when not in use; remove the jumper to use the interlock feature.

## **4.02 Load Cell Wiring (WY15 & WY25)**

The **Tecweigh** “standard” color code for wiring strain gauge load cells has changed from time to time because of load cell availability. The following is a cross reference for the different load cell manufacturers that have been used and their color codes.

Load Cell Model	CI-LC22	SB1 or LC	CB6-XX-T
Signal -	red	white	white
Signal +	white	green	green
Excitation -	black	black	black
Excitation +	green	red	red

The SB1 and CB6 models are used on standard wiring diagrams in the manual.

**When installed, be certain the arrow on the load cell(s) is pointing down.**

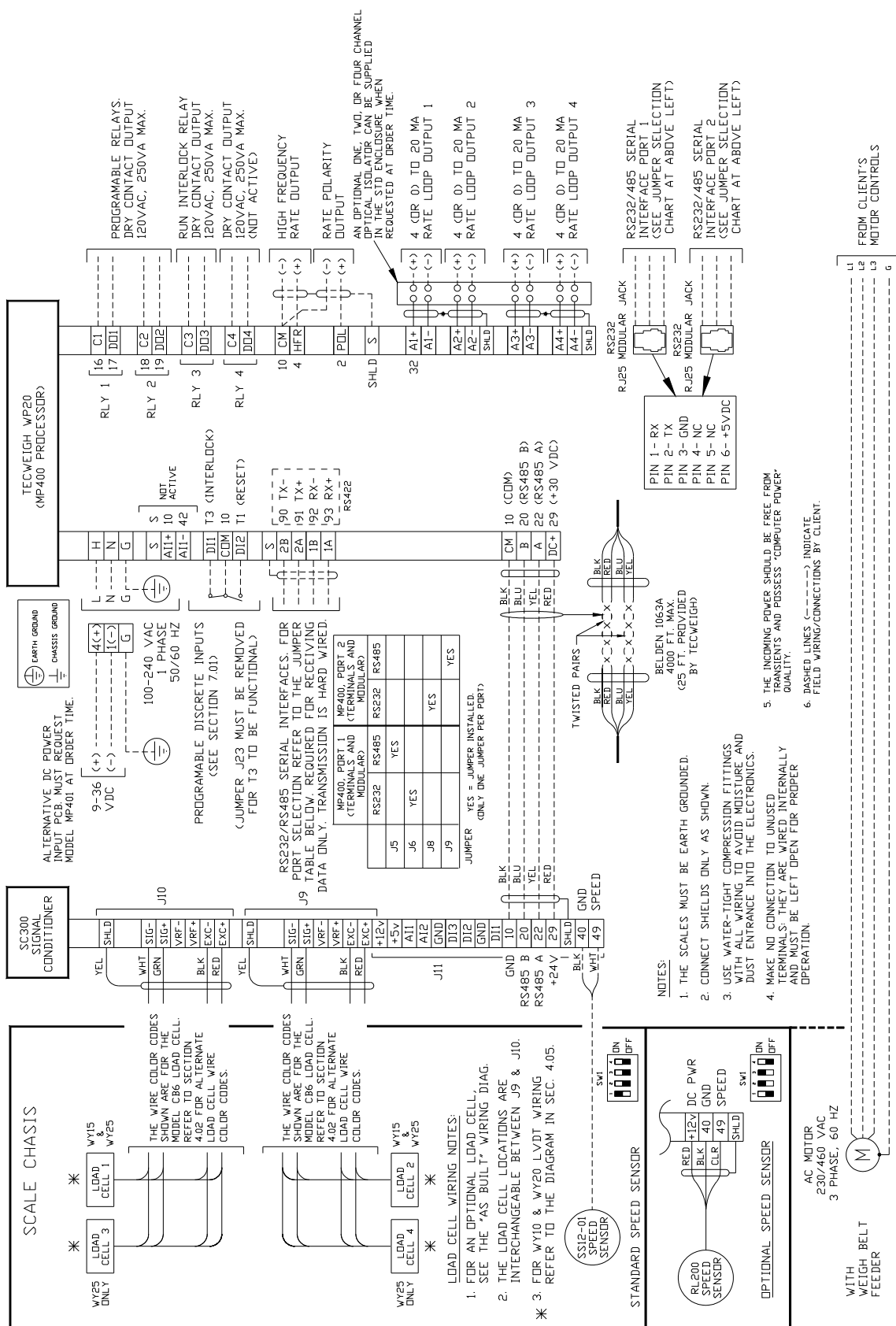
### **4.02.1 Load Cell Wiring (HY15 & HY25)**

Load Cell Model	SP4	C1-40
Signal -	red	red
Signal +	white	white
Excitation -	black	black
Excitation +	green	green
Vref (sense) -	blue	brown
Vref (sense) +	orange	blue
Shield	yellow	yellow

NOTE 1: Remove jumpers J7, and J8 from the SC300 PCB when using any six wire load cell.

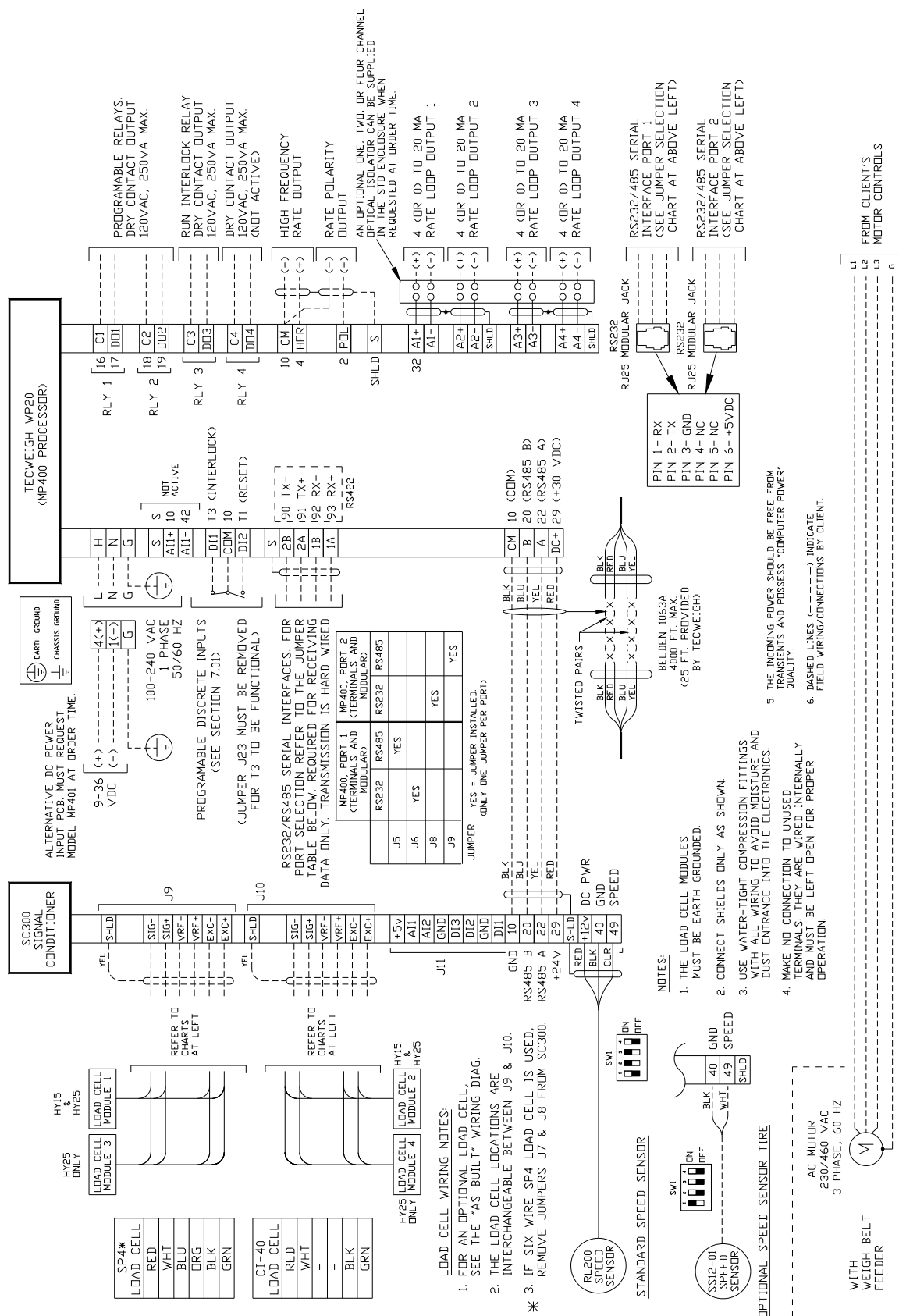
NOTE 2: All load cell cables have a shield that needs to be connected to the shield terminal.

### 4.03 WY15 and WY25 Scale Wiring (load cells)

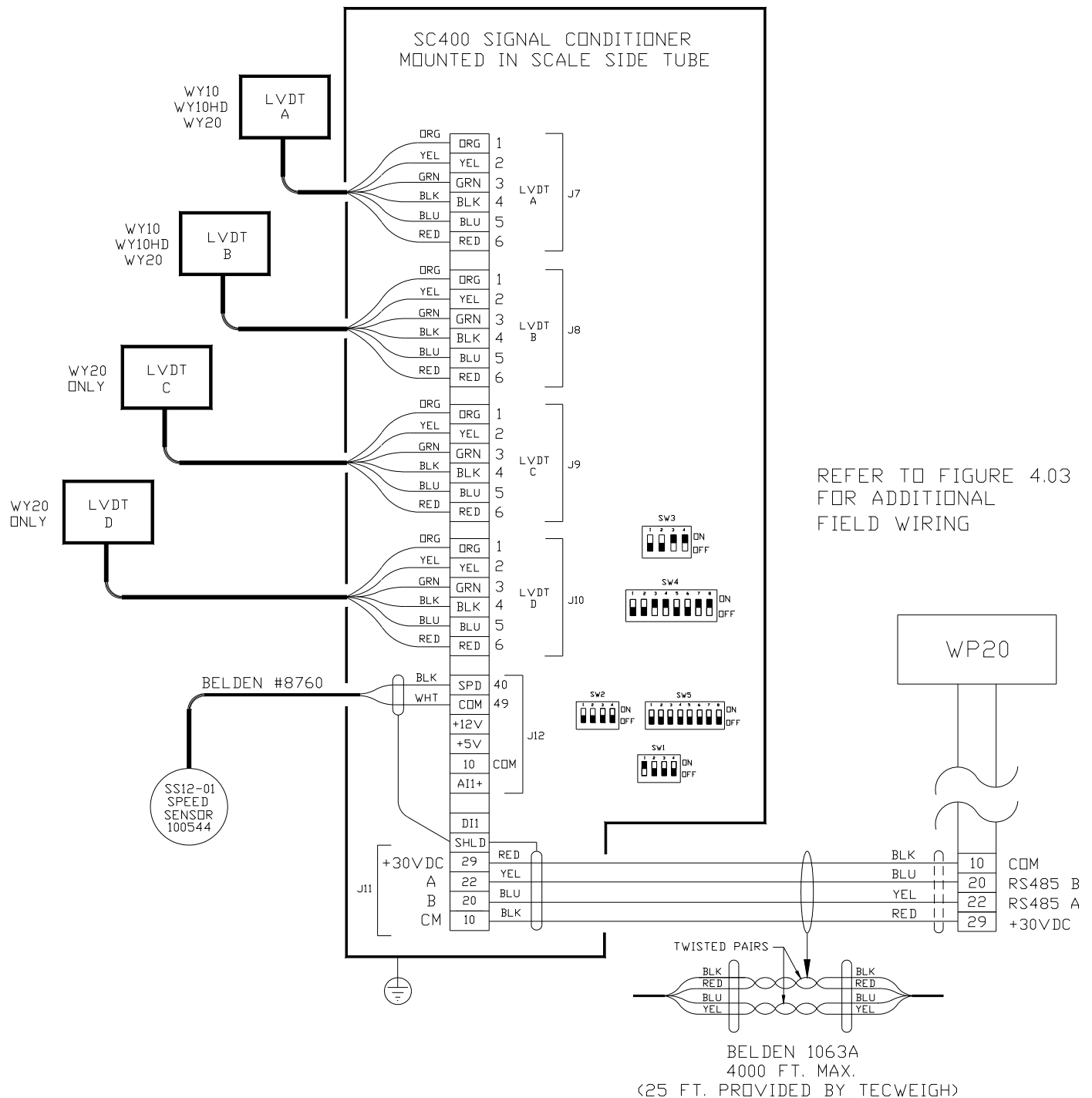




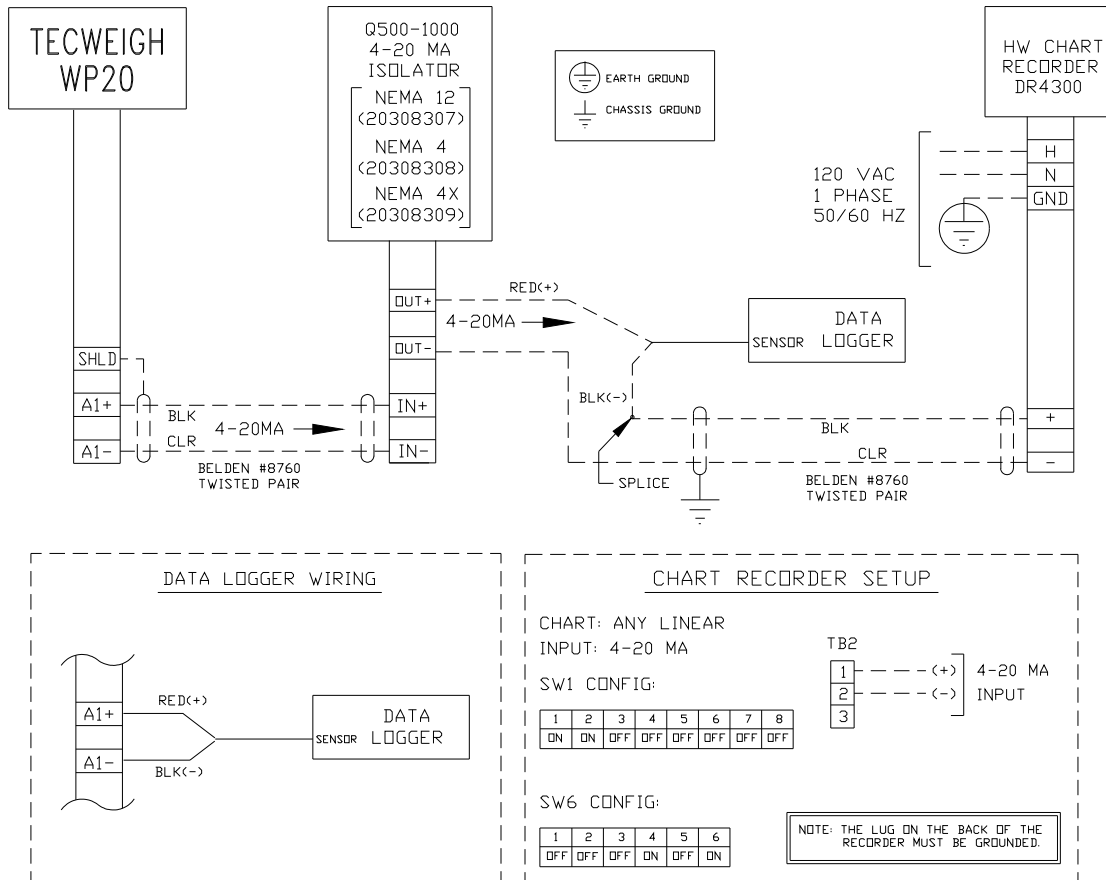
## 4.04 HY15 and HY25 Field Wiring



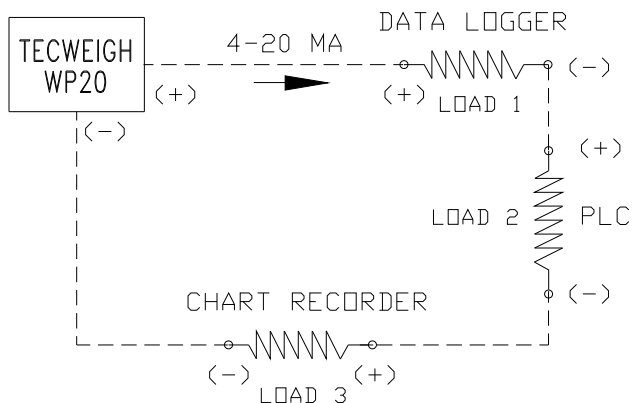
## 4.05 WY10, WY10HD and WY20 Scale Wiring (LVDTs).



## 4.06 Chart Recorder & Data Logger using the 4-20 ma output.



FIELD CONNECTIONS FOR A DATA LOGGER &/OR CHART RECORDER  
UTILIZING THE 4-20 MA RATE OUTPUT FROM THE FC20,  
WHEN THE RECORDING DEVICES USE A 4-20 MA INPUT.

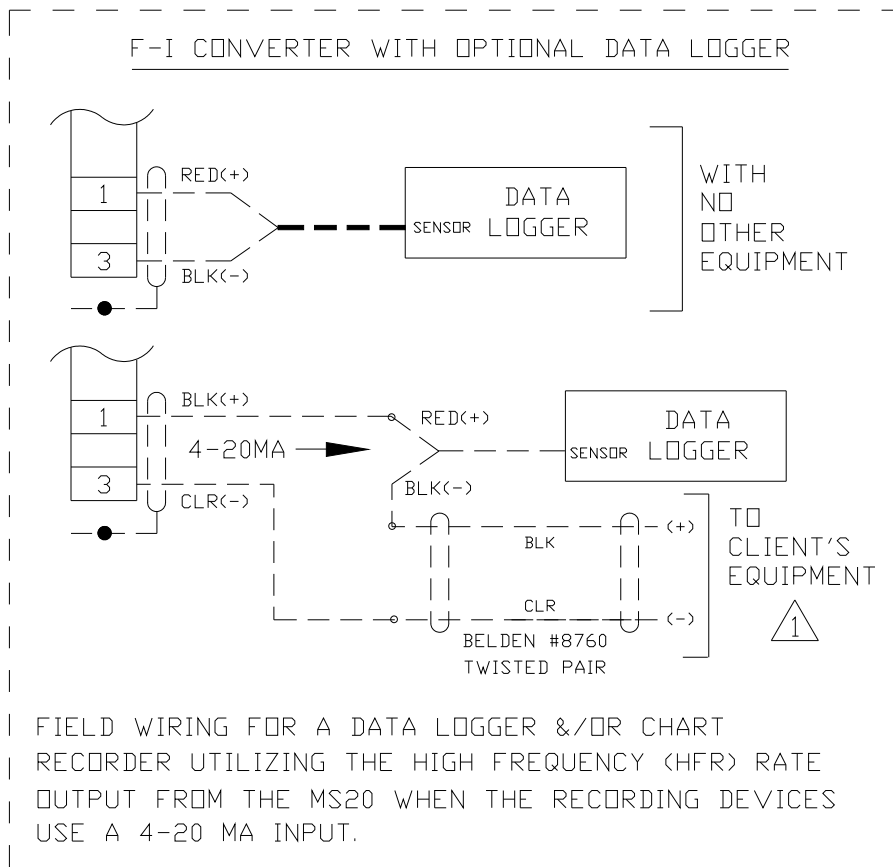
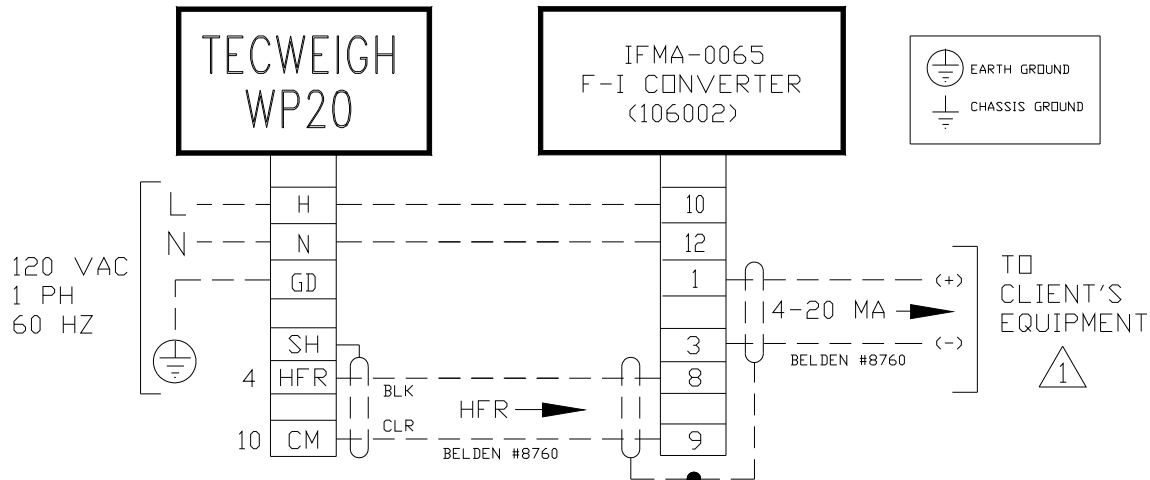


### IMPORTANT NOTES:

1. EVERY LOAD MUST BE ISOLATED, EXCEPT THE LAST ONE.
2. THE TOTAL LOAD RESISTANCE, LOAD 1 + LOAD 2 + LOAD 3, MUST BE LESS THAN APPROXIMATELY 750 OHMS.

TYPICAL WIRING FOR A 4-20 MA CURRENT  
LOOP WITH MULTIPLE LOAD DEVICES

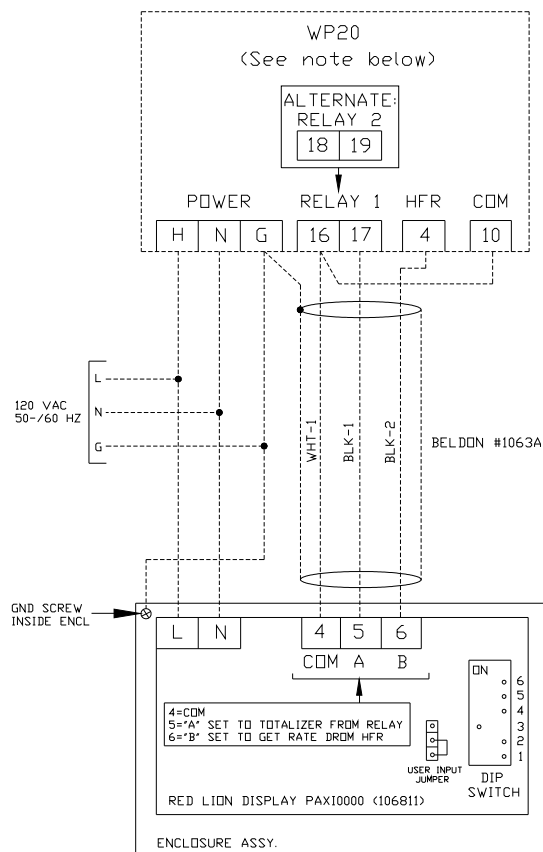
## 4.07 Chart Recorder & Data Logger using the HFR output.



NOTE:

1 REFER TO THE PREVIOUS FIGURE FOR WIRING OF MULTIPLE DEVICES ON A SINGLE 4-20 MA LOOP.

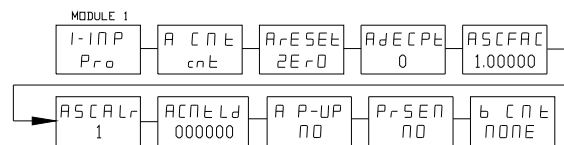
## 4.08 Remote Rate/Total Display.



### CHANNEL A: TOTALIZER:

- 1.) **IMPORTANT:** SET DIP SWITCH 3 TO "ON" (LOW FREQ) (MOVE THE SWITCH TO THE LEFT).
- 2.) GO TO CONFIGURATION "MODULE 1" IN THE PARAMETER MENU (PAR).

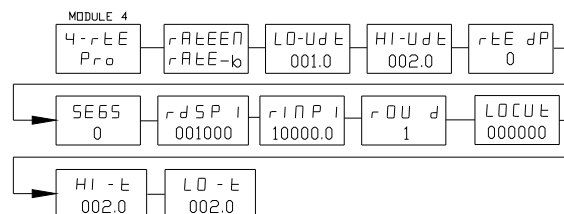
#### TYPICAL SETUP:



### CHANNEL B: RATE:

- 1.) GO TO CONFIGURATION "MODULE 4" IN THE PARAMETER MENU (PAR).

#### TYPICAL SETUP:

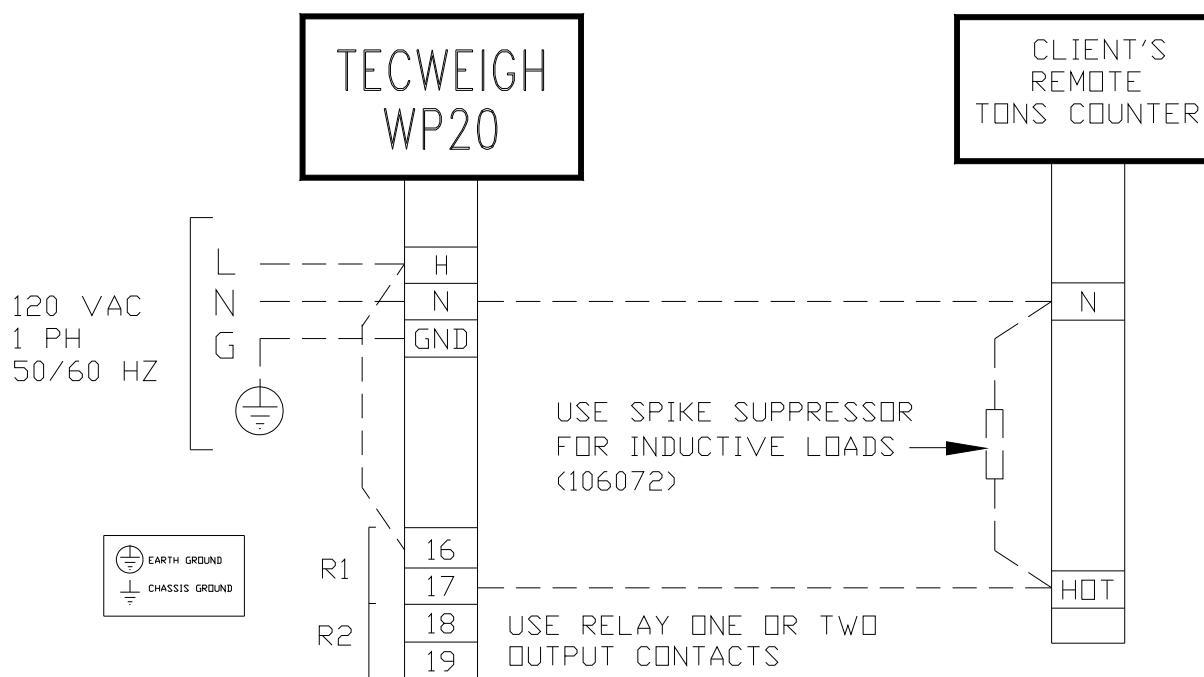


NOTE: CONFIGURE THE WP20 RELAY 1 PARAMETER AS:

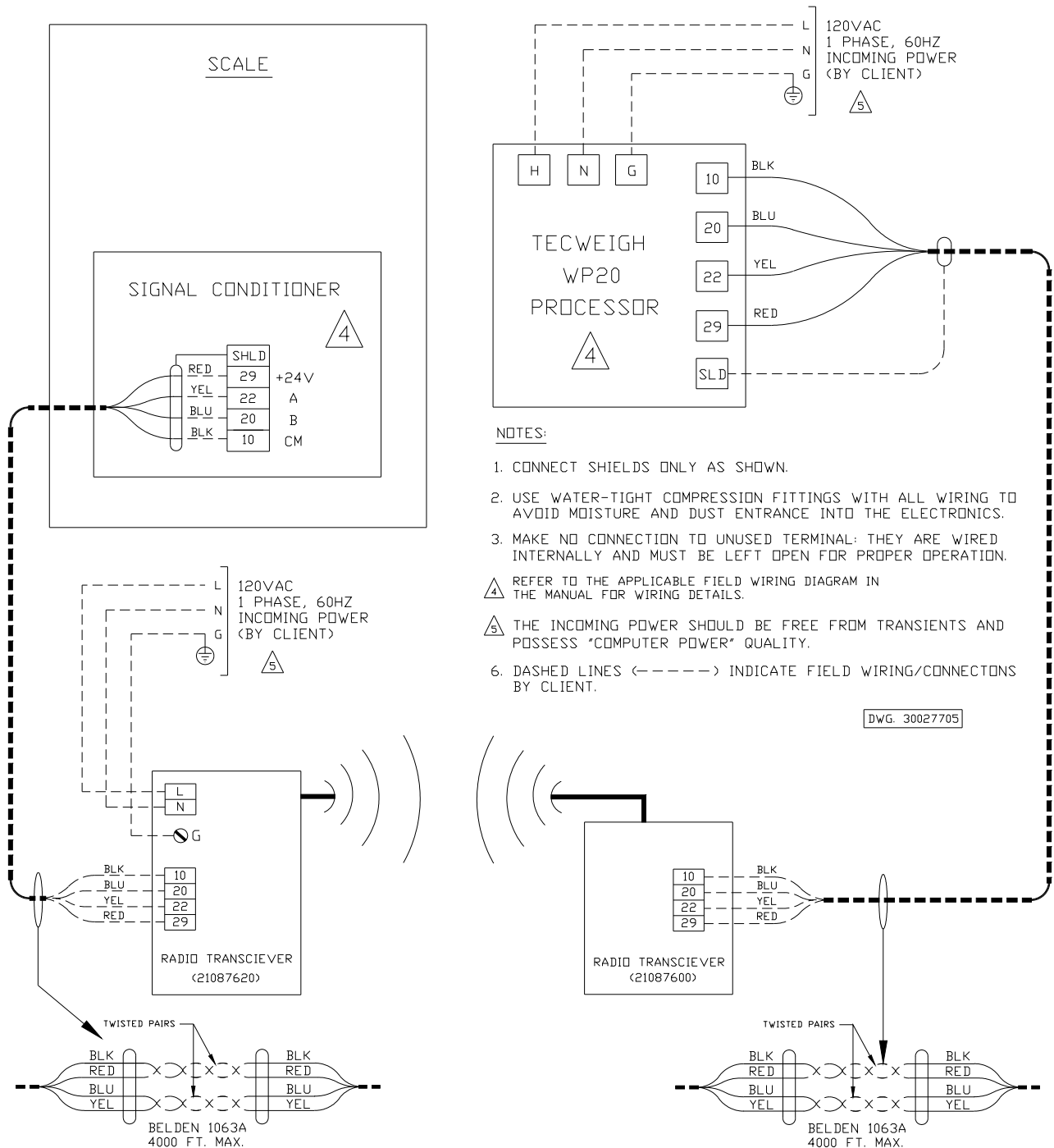
RLY 1 func: TPR  
 RLY 1 lgc: N.O.  
 RLY 1 pls: 0.10  
 RLY 1 TS: 1 (or as required)



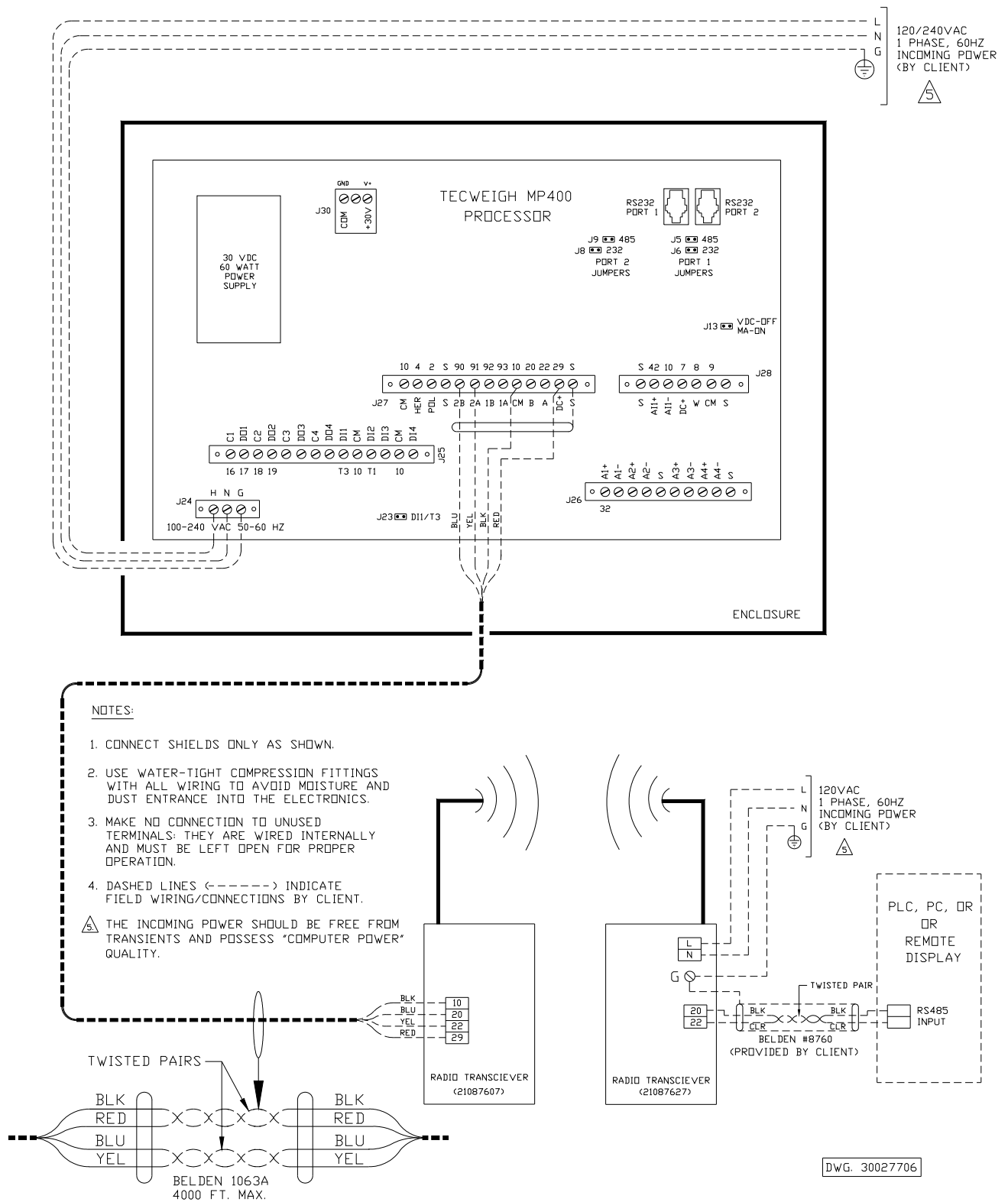
## 4.09 Remote Tons Counter.



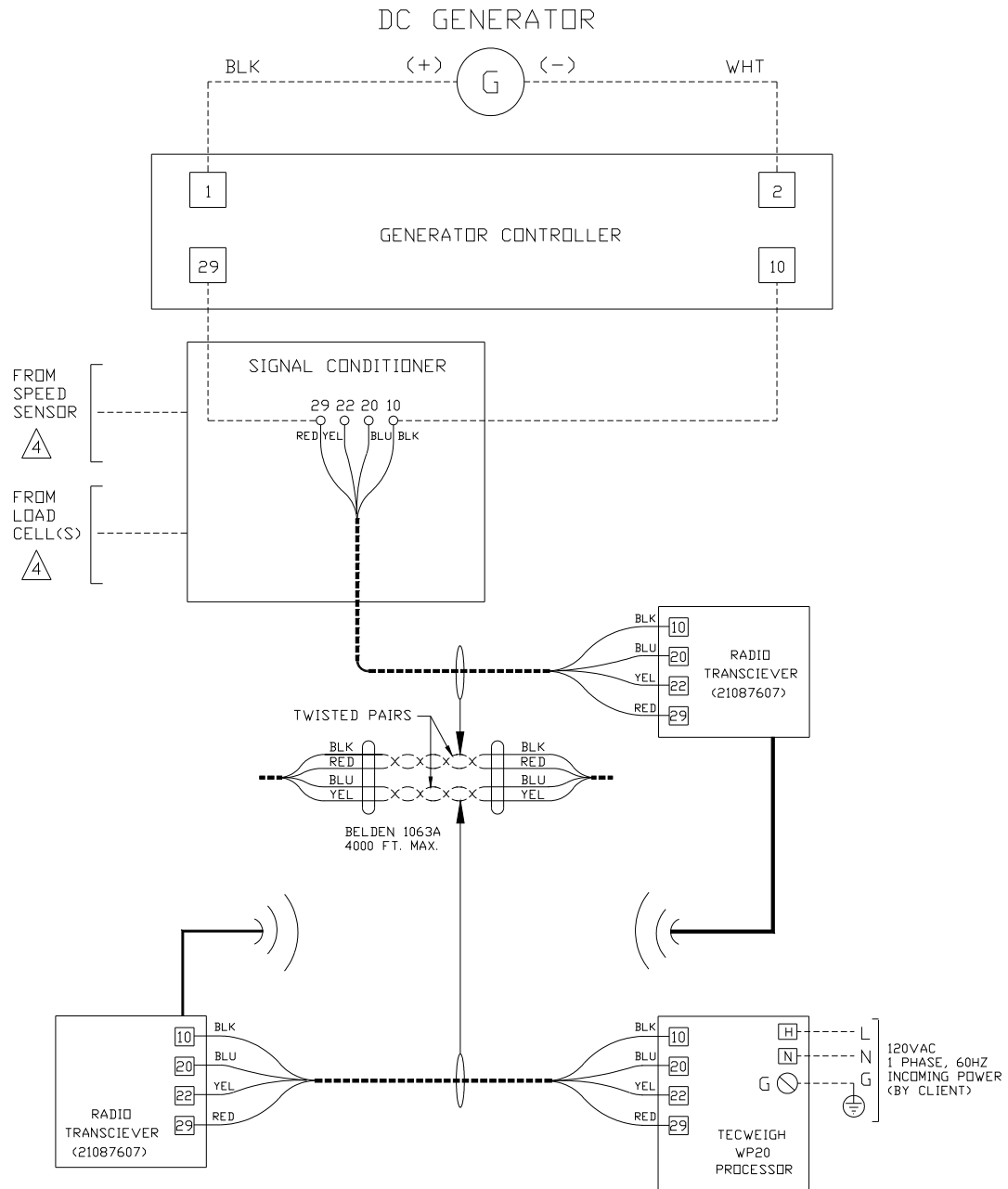
## 4.10 Radio Transceivers, Local Scale, Remote Processor.



## 4.11 Radio Transceivers, Local Processor, Remote PLC, PC, or Remote Display.

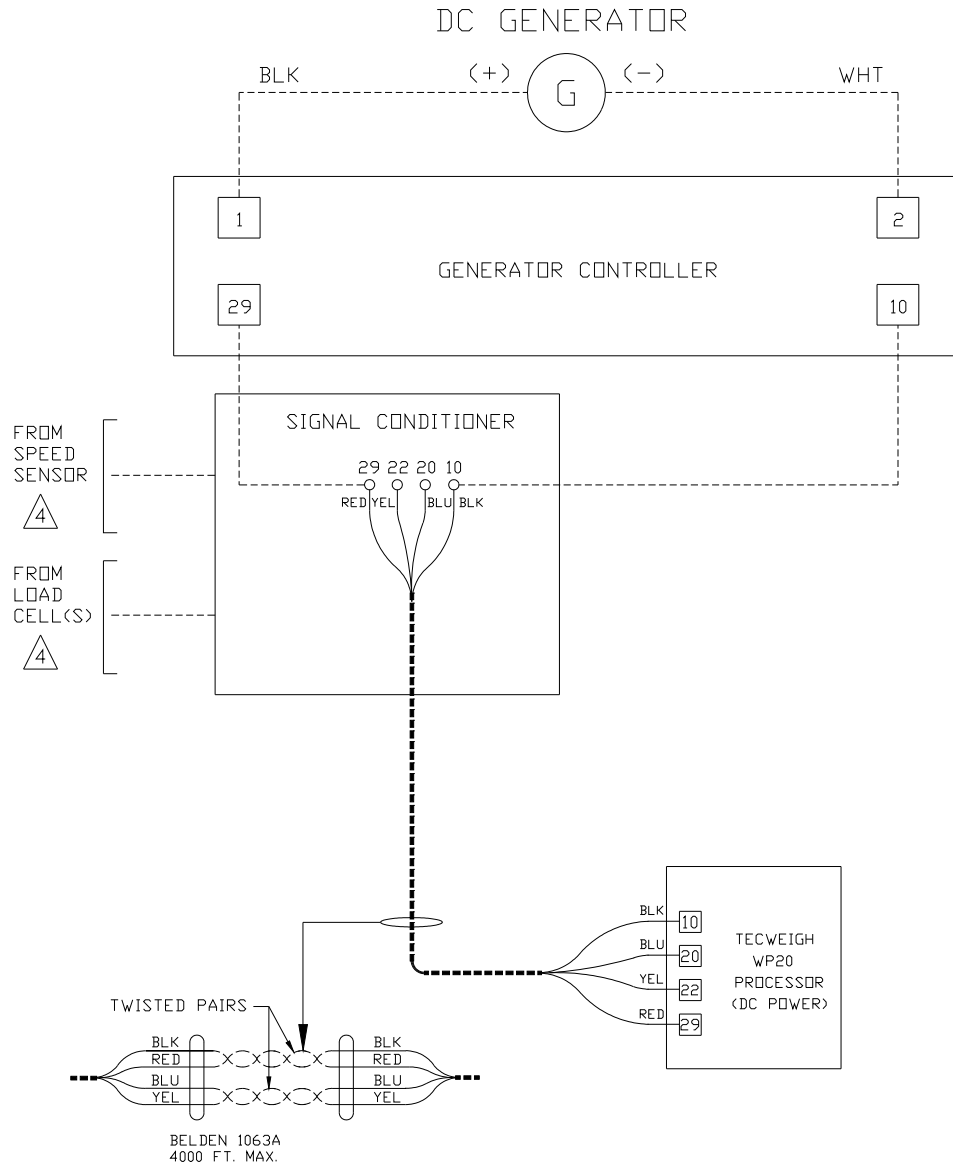


## 4.12 Radio Transceivers, Local DC Generator, Remote Processor.





### 4.13 Radio Transceivers, Local DC Generator and Processor.



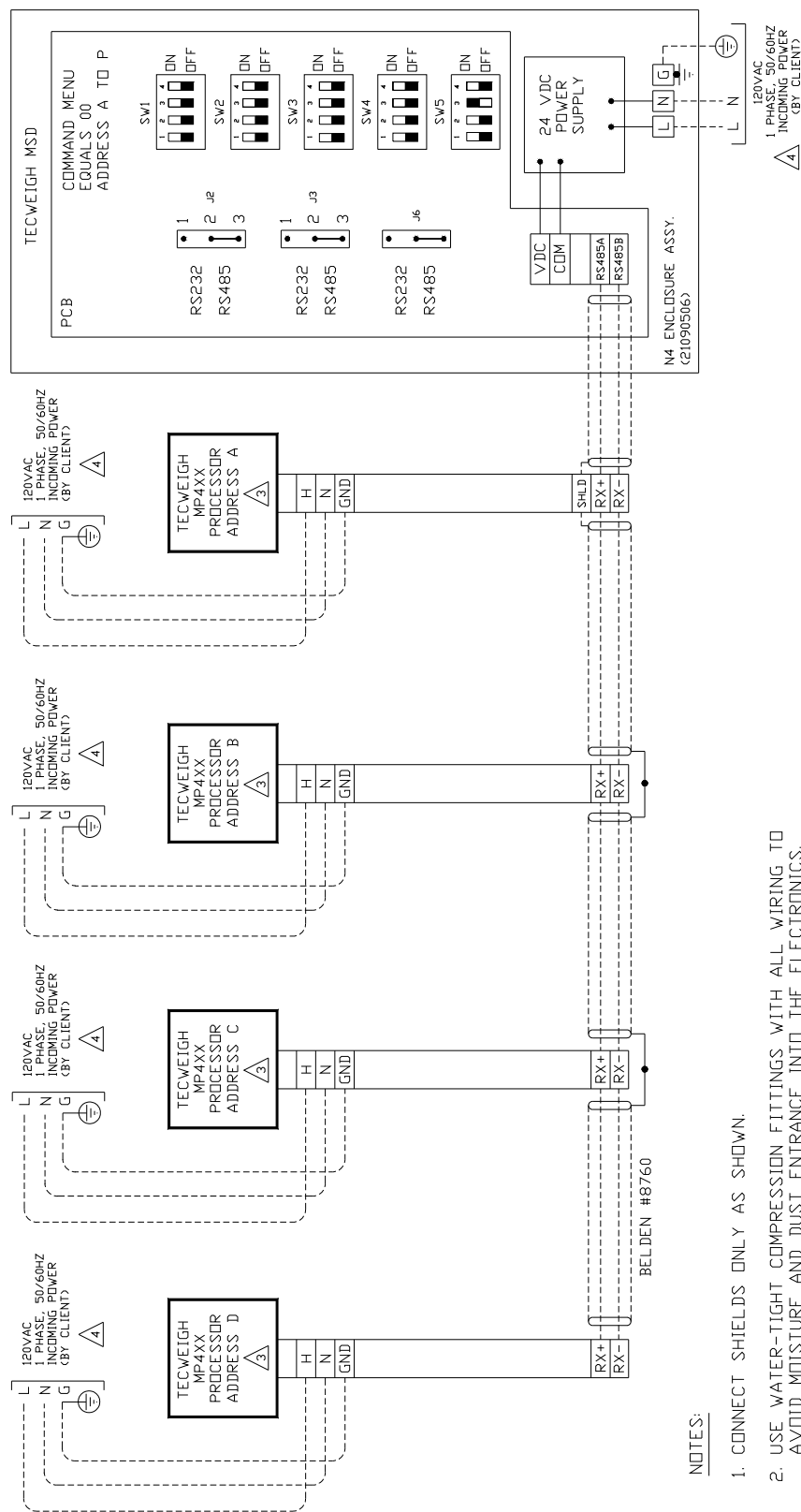
NOTES:

1. FOR PROPER OPERATION OF THE SYSEM, THE BATTERIES MUST BE IN THE CIRCUIT AT ALL TIMES. DO NOT REMOVE.
2. WITHOUT THE GENERATOR RUNNING, FULLY CHARGED BATTERIES WILL PROVIDE POWER FOR APPROXIMATELY 5 HOURS FOR INITIAL SET-UP AND MAINTENANCE.
3. TO MAINTAIN BATTERY LIFE, IT IS RECOMMENDED THAT EVERY 1 TO 2 MONTHS THE SCALE ELECTRONICS AND RADIO BE POWERED BY THE BATTERIES ONLY FOR A FEW HOURS.

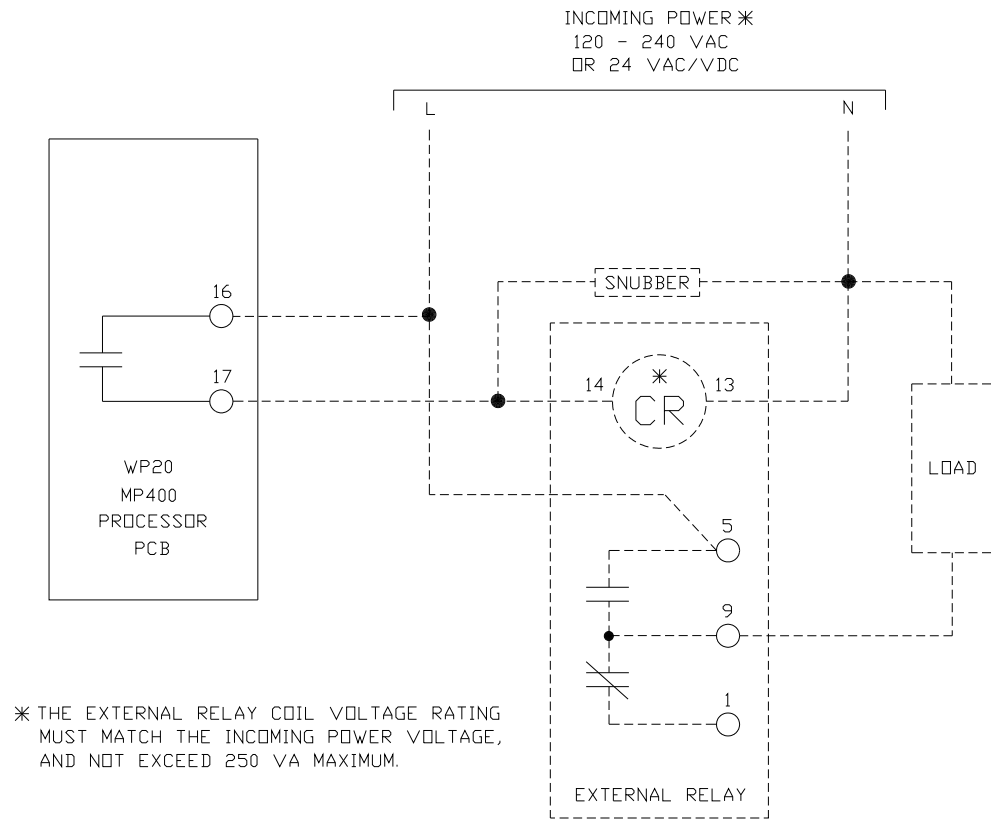
⚠ REFER TO THE DEDICATED FIELD WIRING DIAGRAM IN THE MANUAL FOR WIRING DETAILS.

DWG. 30027708

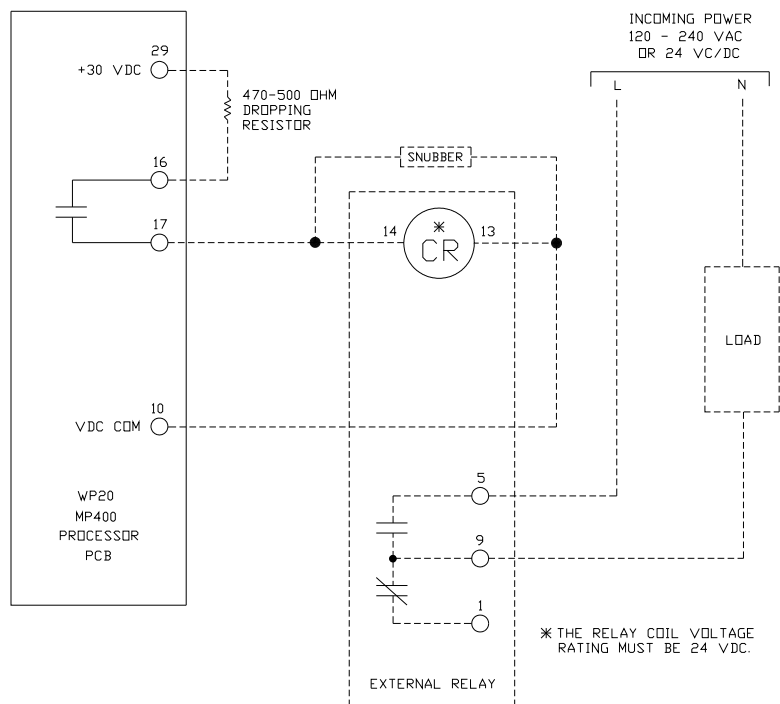
# 4.14 Multiple Processors to Tecweigh Multi-Scale Display (MSD).



## 4.15 Interposing Relay, External 120 vac Power.



## 4.16 Interposing Relay, Internal 30 vdc Power.

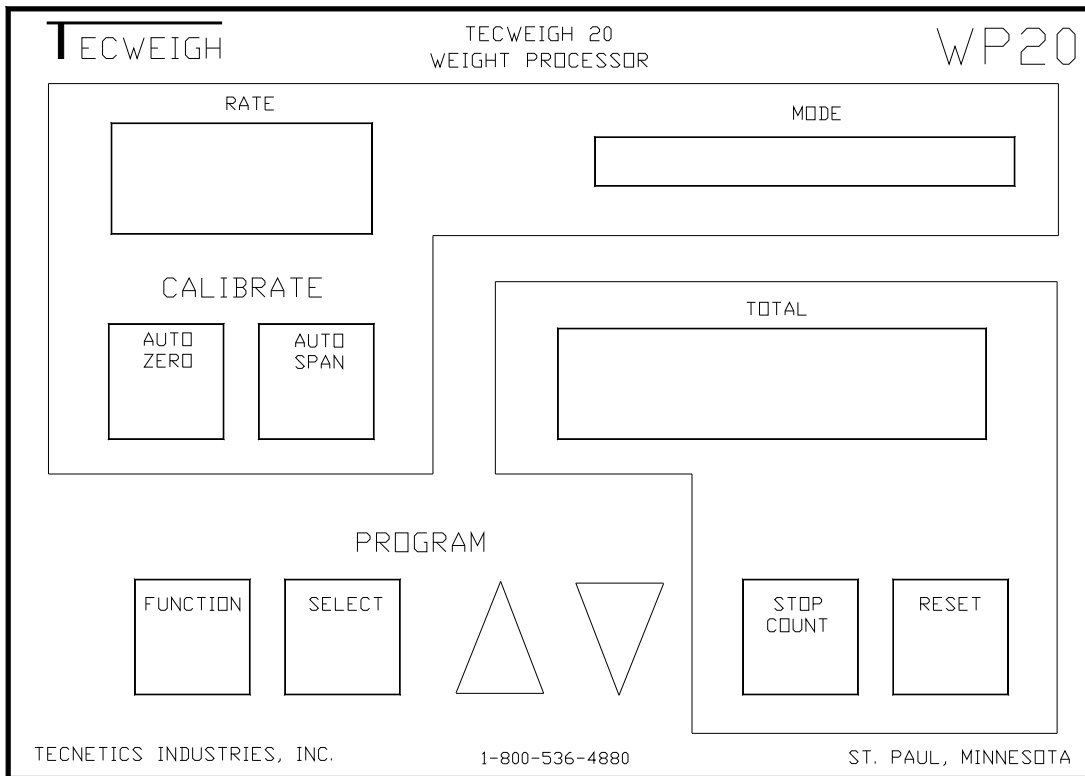


# CHAPTER 5 – USER INTERFACE



## 5.00 Display

At this point, the scale should be installed and the WP20 Weight Processor mounted and wired. Now power up the system. The display windows should light up with information. Since the WP20 has not yet been set up, disregard any error messages or incorrect values on the displays. The figure below shows the WP20 user interface front panel. There are three windows that display information, and eight pushbutton keys. The following describes the panel function.



## 5.01 Windows

**RATE window** - displays the material flow RATE over the belt scale.

**MODE window** - there are four different modes in which the WP20 can run. In each mode only certain information is displayed and only certain functions are available.

- 1) Run mode - displays the RATE units of measure, the BELT SPEED, and SCALE STATUS.
- 2) Program mode - displays the list of settings such as BELT SPEED, RELAY OPTIONS, etc.
- 3) Simulations mode - displays all Program Mode settings when running at a simulated RATE.
- 4) Bench Test mode - displays key functions and produces fixed outputs.

**TOTAL window** - Displays the TOTAL weight of material that has passed over the belt scale since the last time the TOTAL was reset to zero.



## 5.02 Calibration Pushbutton Keys

AUTO ZERO - Initially calibrates the scale to read zero when there is no material running on the belt. An Auto Zero calibration might also need to be done after setup to compensate for material build-up, change in belt tension, or other effects that cause a non-zero rate when the belt is empty. This is discussed in detail in Section 7.04. This key can be locked out, see Parameter 50.

AUTO SPAN - Calibrates the scale to a known weight using calibration weights or a calibration chain. This is discussed in detail in Section 7.04. This key can be locked out, see Parameter 51.



## 5.03 Totalizing Pushbutton Keys

STOP COUNT - Pauses Totaling while depressed during normal operation. Totaling pause will “latch” if the STOP COUNT key is held down for 5 seconds. To resume Totaling, momentarily press the STOP COUNT key a second time. The Parameter Table can be accessed while the totaling is paused and latched. This allows the operator to stop the Totaling; enter the Parameter Table to enter, for example, a P/P weight; exit the Parameter Table; and then resume Totaling. STOP COUNT can also be used during setup to momentarily see the belt SPEED in the MODE window when at the Speed Span Parameter. This key can be locked out, see Parameter 52.

RESET - Resets the TOTAL weight to zero. **Note that once reset, the previous value cannot be recovered.** This key can also be used to cancel an Auto Zero or Auto Span calibration. This key can be locked out, see Parameter 53.



## 5.04 Program Pushbutton Keys

FUNCTION - When in Run Mode, momentarily press this key to toggle between the RATE units of measure and the belt SPEED in the MODE window. Press and hold for five seconds to switch to Program Mode. Program Mode permits access to the Parameter Table. The Parameter Table contains all the values that define a particular installation such as Units of Measure (Parameter 3), Belt Length (Parameter 8), etc. Once in Program Mode, press the FUNCTION key momentarily to move through the Parameter Table one Parameter at a time. Hold the down ARROW and press the FUNCTION key to move backward through the Parameter Table. Hold the FUNCTION key for five seconds to return to Run Mode. When toggling back and forth from Run Mode to Program Mode, you can tell if you are in Program Mode when the first message is "Simulation: OFF".

SELECT - When in Run Mode, press the SELECT key to display the current firmware version in the MODE window. When in Program Mode, the SELECT key activates a selected Parameter so its value can be changed. The selected Parameter will blink until unselected (press SELECT) or until another Parameter is selected by pressing the FUNCTION key.

UP/DOWN ARROWS – When a Parameter is selected to be edited in the Program Mode (press SELECT), the UP/DOWN arrows are used to change the value of that Parameter. Some parameters provide a list of options to choose from, while others require entering a number. The first selection of a list of selections for a particular Parameter will appear when the SELECT key is pressed and will blink. Use the UP/DOWN arrows to move through the list of items and press the FUNCTION key to accept the selected item. To enter a numerical value, press SELECT until the cursor moves over the digit you want to enter. Then press the UP/DOWN arrows to increase or decrease the value for that digit. Move to the next digit by pressing SELECT again. Press FUNCTION when finished editing the number. An additional use of the UP/DOWN arrows is to enter the Troubleshooting Mode. This Mode can be accessed by pressing the UP and DOWN arrows simultaneously for five seconds. This is discussed further in Section 9.05.

# CHAPTER 6 – PARAMETERS

## 6.01 The Parameter Table and Settings

The Parameter Table (Section 11.02) is a list of all the settings that are available to be applied to the specific application at hand. To enter the WP20's Parameter Table (Program Mode) from Run Mode, press and hold the FUNCTION key for five seconds, to return to Run Mode do the same. When in Program Mode press the FUNCTION key momentarily to scroll forward through the Parameters one by one. (To scroll backwards, also hold the down ARROW). In Program Mode, all the Parameters can be viewed and changed. Learn about each Parameter (Section 6) and enter the value that best meets the needs of the application at hand. The particular application will probably not require the re-setting of all Parameters. For reference, the Parameter Table in Section 11.02 also contains a record of all the Parameter values that were entered at the factory for this particular application. However, the factory values should not be relied on entirely! All specific Parameter values that are determined on site and used in the application should be written down in the Parameter Table for future reference. Finally, it is recommended that the scale be properly calibrated before enabling the optional outputs.

## 6.02 Parameter Definitions



**1) Simulation** – When in Simulation mode, the WP20 produces an artificial RATE, SPEED, and TOTAL. These values can be very useful when calibrating auxiliary equipment such as a chart recorder or a remote display. Note that the scales do **not** need to be connected for the Simulation mode to work. The selections are Simulation OFF or ON.

When ON, the Simulated values are:

SPEED = 376 feet per minute.

RATE = the value entered in the Sim Rate Parameter (Parameter #2 following).

TOTAL = the calculated and displayed value based on the Sim Rate (increments up).

When Simulation is set to ON, the pre-existing TOTAL value (display) is stored in memory and recalled and re-displayed when Simulation is set to Off.

**2) Sim Rate** - Sets the simulated RATE used when the Simulation Parameter is set to ON.

**3) Units** - Selects the desired units of measure for the RATE display. The TOTAL display will use the weight portion of the RATE units selected (pounds (KG) or tons (tonnes)). If English units are selected, all setup must be done using English units, similarly for metric units. Once set up, however, the RATE units can be changed at any time and the Cal Wt (or Cal Chain), Weigh Span, and Belt Length, units will be converted automatically. It is not recommended this be done frequently, however, because the error will increase.

<i>English Units</i>		<i>Metric Units</i>	
TONS/HR	tons per hour	TONNES/HR	tonnes per hour
TONS/MIN	tons per minute	TONNES/MIN	tonnes per minute
PPH x 1000	pounds per hour x 1000	KG/HR	kilograms per hour
LBS/HR	pounds per hour	KG/MIN	kilograms per minute
LBS/MIN	pounds per minute		

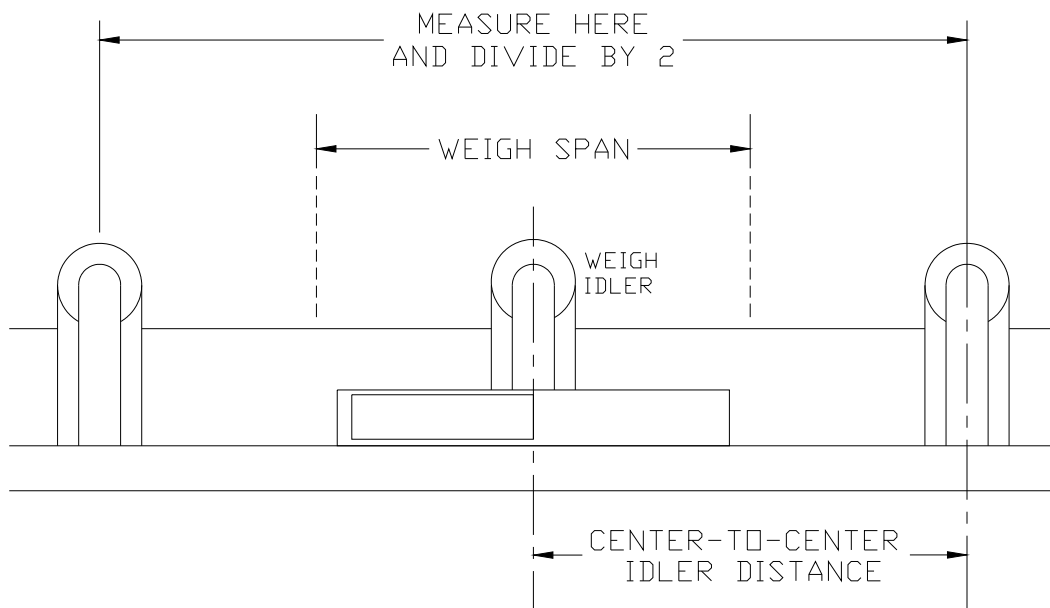
4) **Cal Factor** - The Calibration Factor accounts for physical differences between scale types. Select the appropriate value for the scale model at hand, or select 0.03 if a calibration chain will be used instead of the calibration weight supplied with the scale.

WY10	.27	WY20	.54
WY10HD	.54	WY25	.36
WY10SHD	.70	WF10	.27/.36 (See 11.02.4)
WY15	.36	WF18	.36
HY15	.36	HY25	.36

5) **Cal Wt** - Enter the exact value of the calibration weight. This value is stamped on the end of the calibration weight (in pounds) if you are using one from the factory. Enter the value in pounds when using English units or kilograms when using metric ( $KG = 0.453 \times LBS$ ). Set this Parameter to zero when using a calibration chain instead of the factory supplied calibration weight.

6) **Cal Chn** - Enter the weight per length of the calibration chain if one is being used in place of the factory supplied calibration weight. To determine this value, weigh the chain (in pounds or kilograms) and measure its length (in feet or meters). Be sure to use only English or Metric units. Then divide the weight by the length (weight/length) and enter the resultant value.

7) **Wgh Span** - The Weigh Span is the length of the belt directly over the scale. The weigh span equals the distance from the idler before the scale to the idler after divided by 2. The units are in inches if using English or in meters if using metric.



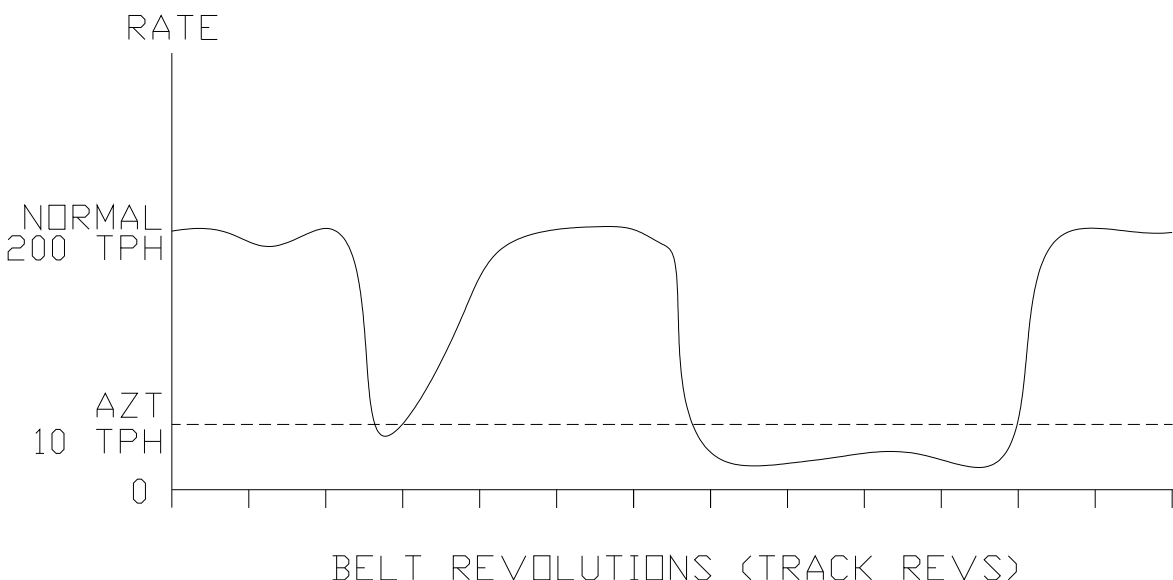
8) **Belt Len** - Enter the exact length of the **conveyor belt** in feet if using English or in meters if using metric. Important, do not enter the **conveyor length**! Enter the entire belt length as if it was cut and stretched out flat on a surface.

9) **P/P Wt** - The pre/post weight will be used for a material test calibration. Let it remain equal to zero if this is a first time setup. During calibration, material will be dispensed into a truck and then weighed on a stationary scale. The stationary scale weight will then be entered in

the P/P Wt parameter. The WP20 TOTAL and the stationary scale weight total will be compared and a tuning adjustment made. This test is discussed more in Chapter 7, Calibration.

**10) AZT +/-** - Auto Zero Tracking or AZT compensates for material build-up or other conditions that cause the RATE to fluctuate from zero even when the belt is empty. The AZT value is a RATE. When the actual RATE falls below the AZT RATE, the WP20 provides two options. The first option simply forces the displayed RATE to be zero (even though it may not be exactly zero) and totalizing stops. The second option actually performs an Auto Zero calibration when the RATE falls below the AZT RATE. Set AZT to zero to disable it, or set AZT to about 5% of the normal running RATE to enable the feature. If the running RATE is typically low, it is recommended that the AZT be left disabled (=0). **To avoid complications, leave AZT set to zero when first setting up the system.**

**11) Trck Revs** - Track revs is directly related to AZT. If Track Revs = 0, and AZT is enabled, the displayed RATE will be forced to zero when the actual RATE falls below AZT (option one). If Track Revs is not zero, the FC20 will show a RATE of zero and do an Auto Zero calibration if the RATE falls below AZT for longer than the number of belt revolutions in Track Revs (option two). Refer to the following graph. Assume the normal running rate is 200 tons per hour, AZT is set to 10 tons per hour, and Track Revs is set to two belt revolutions. When the RATE falls below AZT for less than two belt revolutions, as indicated by the first dip, the RATE display is forced to zero.



If the RATE falls below AZT for more than two belt revolutions, an Auto Zero is performed and what used to be about five tons per hour is now zero tons per hour. This can happen when material sticks to the belt, effectively making it heavier. To use this feature, enter a value for Track Revs that allows at least 5 minutes of tracking before the AUTO ZERO begins, to allow time for the conveyor belt to empty completely.

Note, when AZT is enabled, each time the RATE falls below the AZT Rate, the "zero tracking" message appears in the MODE display as a notice only. Pressing any key will remove the message, or it will disappear automatically when the RATE again rises above the AZT value.



**12) Zero Revs** - When AUTO ZERO is pressed, the WP20 will zero the scale. For this Parameter enter the number of belt revolutions to be used for an Auto Zero cycle. In general, the more time (more belt revolutions) allowed for an AUTO ZERO cycle, the more accurate it will be. While the Auto Zero cycle is being performed, the WP20 spends time “learning” about the belt splices and other inconsistencies in the system. Enter a value that allows at least two minutes of run time. AUTO ZERO is discussed further in the Calibration Section 7.04.

**13) Span Revs** - When AUTO SPAN is pressed, the WP20 will re-span the scale using the calibration weight(s) or a calibration chain. Enter the number of belt revolutions to be used for an AUTO SPAN cycle. In general, the more time (more belt revolutions) allowed for an AUTO SPAN cycle, the more accurate it will be. Enter a value that allows at least 2 minutes of run time. AUTO SPAN is discussed further in section 7.04.

**14) Rate DP** - Enter the desired decimal point position for the RATE window. Set to Ones when the maximum RATE will be greater than 100, set to Tens when the maximum RATE will be less than 100, and set to Hundreds when the maximum operating RATE will be less than 10. The decimal point positioning for various positions will appear as:

Ones	0000
Tens	000.0
Hundreds	00.00

If the RATE exceeds what will fit in the display, a series of dashes will appear in the RATE window and looks like ---- .

**15) Rate Damp** - Enter the damping factor for the RATE display. Damping makes the RATE display more stable so the numbers do not change faster than they can be read. The higher the Damping Factor the more stable the reading. RATE damping does not affect the TOTAL or the accuracy of the system. Note that the higher the damping, the slower the RATE display will update after changes occur in the actual RATE. A typical value for Rate Damp is 30. Set to zero to turn off damping.

**16) Speed DP** - Enter the decimal point position for the belt SPEED display. Set to Ones when the maximum belt SPEED will be greater than 100, set to Tens when the maximum belt SPEED will be less than 100, and set to Hundreds when the maximum belt SPEED will be less than 10. The decimal point positioning for various positions will appear as:

Ones	0000
Tens	00.0
Hundreds	0.00

If the SPEED exceeds what fits in the display, a series of dashes will appear in the SPEED window and looks like -----.

**17) Speed Damp** - Enter the Damping Factor for the belt SPEED display. Damping makes the SPEED display more stable so the numbers do not change faster than they can be read. The higher the Damping Factor the more stable the reading. SPEED damping does not affect the RATE, TOTAL, or the accuracy of the system. Note that the higher the damping, the slower the SPEED display will update after changes occur in the actual SPEED. A typical value for Rate Damp is 30. Set to zero to turn off damping.

**18) Speed Spn** - Speed Spn is used to calibrate the belt SPEED if the WP20 displayed SPEED does not equal the tested or calculated belt SPEED. Increase Speed Spn to increase the SPEED value or decrease it to decrease the SPEED value.

**19) mA Damp** - Enter the damping factor for the RATE current loop output if used. The damping factor smoothes the current signal. Like RATE and SPEED damping, current loop damping does not affect system accuracy. With high damping, however, the RATE current loop output signal will lag behind the actual RATE. A typical value for mA Damp is 30.

**20) Base mA** - Enter the RATE current loop output value desired when the RATE equals zero. Remote auxiliary devices such as a chart recorder or display will typically use 4 mA to represent zero RATE. The default value is 4 ma.

**21) Rate 20mA** - This Parameter sets the RATE that corresponds to a current output of 20 mA . This RATE should be a minimum of 10% higher than the maximum RATE expected. If the actual RATE were to exceed this Parameter's value, the current output will remain at 20 mA. For example, if the maximum RATE is 200 tons/hr, enter 220 for this Parameter.

**22) Rate LTrm:** - This Parameter allows fine tuning of the Base mA output Parameter. A milliamp range ammeter will need to be connected to the output terminals for this adjustment. Increase the number to increase the current and decrease the number to decrease the current.

**23) Rate HTrm:** - This Parameter allows fine tuning of the Rate 20mA Parameter. A milliamp range ammeter will need to be connected to the output terminals for this adjustment. Increase the number to increase the current and decrease the number to decrease the current.

**24) HFR Damp** - Enter the damping factor for the **High Frequency Rate (HFR)** output if used. The damping factor smoothes the HFR signal, but does not affect accuracy. With high damping, however, the HFR signal will lag behind the actual RATE. It is typical to set the HFR Damp setting the same as the Rate Damp setting (Section 6.02.24).

**25) Total DP** - Enter the desired decimal point position for the TOTAL window. Higher RATES make decimal positioning unnecessary, because the TOTAL will increment at one or more units at a time. The decimal point positioning for various positions will appear as:

Ones	00000000
Tens	000000.0
Hunds	00000.00
Thous	0000.000

If the TOTAL exceeds the display size, a series of dashes will appear in the TOTAL window and will look like ----- .

**26) Down Count** - This Parameter enables or disables down counting of the TOTAL display. When set to Down Count: NO, the totalizer will not count down (backwards) when the RATE display is indicating negative. When set to YES, the AZT Parameter must be set to 0000 for proper operation.

NO	disables down counting.
YES	enables down counting.

**27) RLY 1 Func** - Relay 1 can perform four different functions. Select the function desired.

TPR - Total Pulse Repeater, relay 1 is activated in increments of the TOTAL.

HLRA - High/Low Rate Alarm, relay 1 is activated when the RATE is outside a specified range.

HLSA - High/Low Speed Alarm, relay 1 is activated when the SPEED is outside a specified range.

SPAN - Auto Span output, relay 1 is activated during an Auto Span to lower or raise the calibration weight(s).

Note: the following six relay Parameters only appear when its above associated relay function is selected. All use the RLY 1 Lgc Parameter.

TPR uses RLY 1 Pls and TS.

HLRA and HLSA use RLY 1 Low, High, and Delay.

HLRA also uses RLY 1 Set pnt.

SPAN does not use any other Parameter.

**28) RLY 1 Lgc** – The relay’s “normal” state can either be de-energized (N.O.) or energized (N.C.) state.

N.O. – Normally open or de-energized state.

N.C. – Normally closed or energized state.

**29) RLY 1 Pls** - When TPR is selected, enter the duration of the relay pulse, in seconds, that drives the remote totalizer. The relay must be closed for at least 0.10 seconds, but the option exists for keeping it closed longer, as long as that does not conflict with the following RLY 1 TS Parameter (the relay cannot be closed longer than the time between pulses, because that would be the equivalent of a continuous on). Start with 0.10 seconds and increase the value if the remote totalizer does not respond to the shorter pulse.

**30) RLY 1 TS** - When TPR is selected, enter the frequency of the relay pulse or the "total scaling". For example, set RLY 1 TS to 1.00 to close the relay every 1 ton. Set to .01 to close the relay every .01 tons. If RLY 1 TS is set too small and the RATE is too high, there will not be enough time to open and close the relay. It is best to set it so the relay closes once every few seconds.

**31) RLY 1 Low** - When HLRA is selected, enter the lowest RATE allowed before the low RATE alarm relay is activated. When HLSA is selected, enter the lowest SPEED allowed before the low SPEED alarm relay is activated.

**32) RLY 1 High** - When HLRA is selected, enter the highest RATE allowed before the high RATE alarm relay is activated. When HLSA is selected, enter the highest SPEED allowed before the high SPEED alarm relay is activated.

**33) RLY 1 Delay** – When HLRA or HLSA are selected, enter the time delay, in seconds, that a high or low RATE or SPEED alarm condition can exist before the alarm relay activates. For example, setting the delay to 10 seconds will allow the rate to fall below RLY 1 Low for 10 seconds before the alarm is activated. The delay eliminates false or nuisance alarms when the RATE or SPEED momentarily go outside the preset boundaries.

**34) RLY 2 Func** - Relay 2 can perform four different functions. Select the function desired.

TPR - Total Pulse Repeater, relay 2 is activated in increments of the TOTAL.

HLRA - High/Low Rate Alarm, relay 2 is activated when the RATE is outside a specified range.

HLSA - High/Low Speed Alarm, relay 2 is activated when the SPEED is outside a specified range.

SPAN - Auto Span output, relay 2 is activated during an Auto Span to lower or raise the calibration weight.

Note: the following six relay Parameters only appear when its above associated relay function is selected. All use the RLY 2 Lgc Parameter.

TPR uses RLY 2 Pls and TS.

HLRA and HLSA use RLY 2 Low, High, and Delay.

HLRA also uses RLY 2 Set pnt.

SPAN does not use any other Parameter.

**35) RLY 2 Lgc** – The relay's "normal" state can either be de-energized (N.O.) or energized (N.C.) state.

N.O. – Normally open or de-energized state.

N.C. – Normally closed or energized state.

Note: the following Parameters will appear only when its associated relay function is selected.

TPR uses RLY 2 Pls and RLY 2 TS.

HLRA and HLSA use RLY 2 Low, High and Delay.

SPAN does not use any other Parameters.

**36) RLY 2 Pls** - When TPR is selected, enter the duration of the relay pulse, in seconds, that drives the remote totalizer. The relay must be closed for at least 0.10 seconds, but the option exists for keeping it closed longer, as long as that does not conflict with the following RLY 2 TS Parameter (the relay cannot be closed longer than the time between pulses, because that would be the equivalent of a continuous on). Start with 0.10 seconds and increase the value if the remote totalizer does not respond to the shorter pulse.

**37) RLY 2 TS** - When TPR is being used, enter the frequency of the relay pulse or the "total scaling". For example, set RLY 2 TS to 1.00 to close the relay every 1 ton. Set to .01 to close the relay every .01 tons. If RLY 2 TS is set too small and the rate is too high, there will not be enough time to open and close the relay. It is best to set it so the relay closes once every few seconds.

**38) RLY 2 Low** - When HLRA is being used, enter the lowest RATE allowed before the low RATE alarm relay is closed. When HLSA is being used, enter the lowest SPEED allowed before the low SPEED alarm relay is closed.

**39) RLY 2 High** - When HLRA is being used, enter the highest rate allowed before the high rate alarm relay is closed. When HLSA is being used, enter the highest speed allowed before the high speed alarm relay is closed.

**40) RLY 2 Delay** - When HLRA or HLSA are being used, enter the delay in seconds that an alarm condition can exist before the alarm relay closes. For example, setting the delay to 10 seconds will allow the RATE to fall below RLY 2 Low for 10 seconds before the alarm is activated. The delay prevents false or nuisance alarms when the RATE or SPEED only momentarily go outside the boundaries.

- 41) Station ID** - When using the WP20's serial communication features with multiple scales, each scale must have a unique Station ID (or address). Station ID's are designated A through P. Select a different station ID from A to P for each scale. Normally the WP20 is Station A.
- 42) Parity** - When using the WP20's serial communication features, select the same parity as the remotely connected communications device. The selections are None, Odd, or Even.
- 43) Baud Rate** - When using the WP20's serial communications features, select the same Baud Rate as the remotely connected communications device. The selections are: 300, 600, 1200, 2400, 4800, 9600, or 19200.
- 44) Command Menu** - The WP20 can send data to a remote device via the serial port, either automatically (every 1/10<sup>th</sup> second) or upon request (manually). If it's to be done automatically, the desired data must be pre-selected using the Command Menu listed in Section 8.02 (Commands 01 through 22). If a remote device will request that data be sent, the Command Menu must be set to 00 (manual). Refer to Section 8.03 for details on how to remotely request data from the WP20.
- 45) Protocol Menu** - When making a remote request for data from the WP20 via the serial port, there are two different **Tecweigh** Protocols that can be used. The selections are Tec Std and Tec Old. Tec Std provides more secure communications, and Tec Old provides historical commands for older processors. New users should use Tec Std, and older existing installations should use Tec Old. The request for data formats are the same for either protocol. Refer to Section 8.04 for further details.

## Field-bus Protocol Cards

The following four commands will only appear in the Parameter table if there is a field-bus protocol card installed in the Anybus header located next to the MP400 display board ribbon cable header. These individual and separately installed cards allow communications using the Modbus, Profibus, Ethernet, DeviceNet, or A-B Remote I/O communications protocols.

- 46) Data Type** - The numerical information within the field-bus protocol card will always be 32 bits of data, but is selectable between integer and floating point. The selections are:
- Long - 32 bit long integer.
  - Float - 32 bit floating point.
- 47) IP** - Used for the Field-bus interface card for identifying the processor's IP address.
- 48) IM** - Used for the field-bus interface card for identifying the processor's IP mask if utilized.
- 49) I/O Rack** - Used only for the A-B Remote I/O field-bus interface card for identifying the processor's memory utilization.
- 50) Lock Aut Zr** - Select YES to protect the AUTO ZERO key from unauthorized use.
- 51) Lock Aut Sp** - Select YES to protect the AUTO SPAN key from unauthorized use.
- 52) Lock Stp Ct** - Select YES to protect the STOP COUNT key from unauthorized use.

**53) Lock Reset** - Select YES to protect the RESET key from unauthorized use.

**54) Lock Code** - A Lock Code can be entered to prevent unauthorized personnel from entering any of the Parameter Menus. This feature, combined with the key locks above, give a high level of security to the WP20. When a Lock Code is entered, an ENTER LOCK CODE message appears in the MODE window, presenting an opportunity to enter the code. Once the Parameter menu has been accessed, all the menus can be entered without re-entering the code until the EXIT key is pressed. 00000 disables the Lock Code, which is also the default setting, and no buttons are then locked out

**55) ASC** - After the WP20 calculates the RATE, it multiplies that number by the ASC (Auto Span Correction) factor before displaying it in the RATE window. In an ideal setup, ASC would remain 1.000 which means that no correction is being made to the RATE. However, every system requires some tuning. After calibrating the scale (discussed in section 7) the ASC value can be increased or decreased manually to fine tune the displayed RATE, or you can do a material test (Section 7.05) and the proper ASC value will be computed automatically. For example, if the tested material weight ends up being 1.06 times the WP20 total, the ASC value will be changed to 1.06 times the previous ASC value. From that point on, the WP20 will calculate the RATE and then multiply it by the new ASC before displaying it. Note that the typical range of values for ASC should be between 0.900 and 1.100. If the system requires an ASC value outside this range, consult trouble shooting Section 9.04 (Scale is inaccurate section).

**56) Span Detect:** - During an AUTO SPAN, the processor waits for a change in the load cell signal before initiating the procedure. This Parameter represents that change in load cell signal that is a requirement to start the AUTO SPAN procedure. The factory setting should be adequate unless a calibration weight change is made in the field. As a reference, this Parameter entry should be approximately 70% of the total change in Load Counts between the calibration weight being up and down.

**57) Load Count** - For technical trouble shooting purposes, the WP20 can display raw counts from the weight sensors (load cells or LVDTs). The counts with the calibration weight up should be low, and the counts with the calibration weight down should be high. The raw counts with the calibration weight lifted, compared to the Zero Counts, indicates if the scale is in calibration. The low/high range varies from system to system, but it should be consistent from day to day for the same system. This value is mainly used when consulting with the **Tecweigh** Service Department (Section 2.01).

**58) Zero Counts:** - This Parameter is not editable. For technical trouble shooting purposes, this Parameter displays the Load Counts that the processor is using as a zero reference. This viewable Parameter is calculated during the Auto Zero procedure. It is mainly used when consulting with the **Tecweigh** Service Department (Section 2.01).

**59) Span Counts:** - This Parameter is not editable. For technical trouble shooting purposes, this Parameter displays the Load Counts that the processor is using as a span reference. This viewable Parameter is calculated during the Auto Span procedure. This value is mainly used when consulting with the **Tecweigh** Service Department (Section 2.01).

**60) Params** – The four following Parameter selections allow the user's Parameter Table to be saved to and retrieved from memory, thereby allowing its restoration if it is inadvertently erased or corrupted due to battery failure or an electrical spike. It also allows the retrieval of the default Parameter Table when necessary.

No Change - when selected, nothing will change.

Store Now - when selected, all the user's Parameters will be saved to memory (RAM) along with the last calibration data. This needs to be done whenever there is a change to any Parameter or calibration. Upon exiting the Program Mode, the MODE window will display "PARAMETERS SAVED".

Defaults - before proceeding refer to Section 9.09 for a detailed discussion of the defaulting procedure.

Get Users - when selected, all the user's Parameter values that were previously entered will be retrieved. Upon exiting Program Mode, the MODE window will display "MEMORY RESTORED".

It is highly recommended that once the system is calibrated and working properly and as desired, the user's Parameter Table be immediately saved to memory using the Store Now Parameter.

Note: if it's not possible to enter any Parameter, it usually means that the firmware has been corrupted and needs to be returned to **Tecweigh** to be "reflashed". Contact **Tecweigh** Service (Section 2.01) for assistance.

# CHAPTER 7 – CALIBRATION

## 7.01 Apply Power to the System



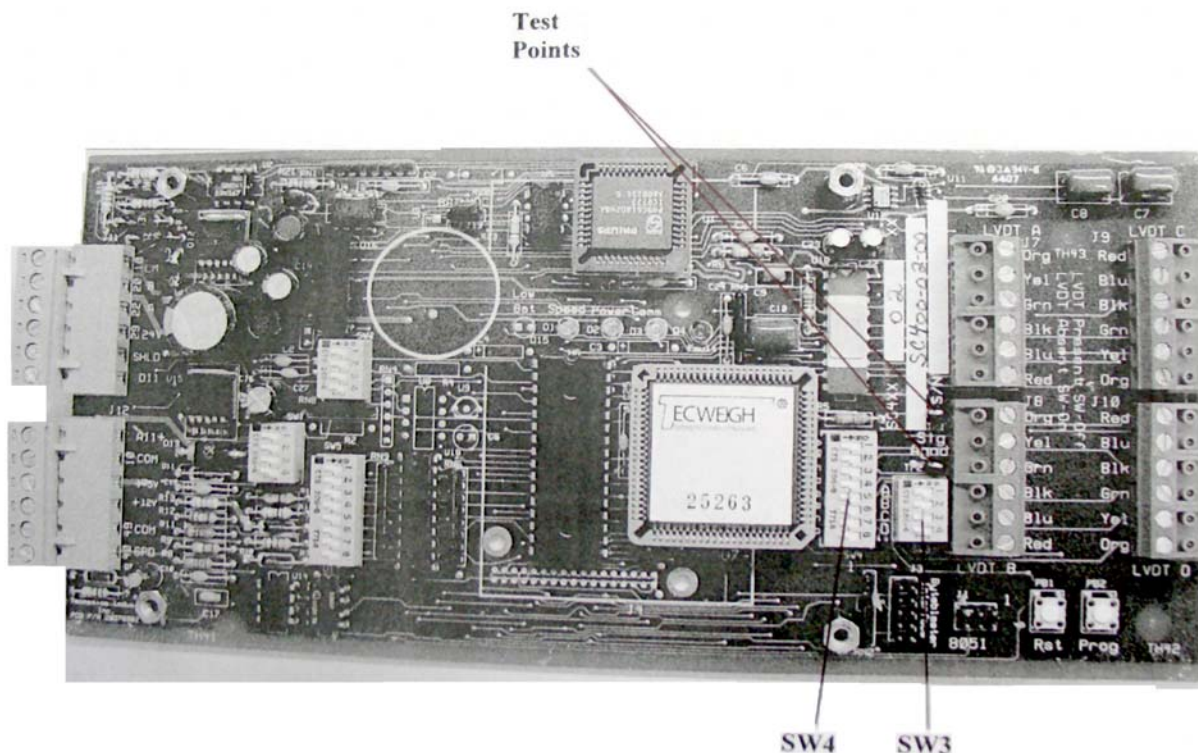
Assuming that all the entered Parameters are correct and all the equipment is installed properly, the scale must now be calibrated. Without calibration, the scale will only approximate the RATE. First, however, on scales with LVDT(s) (Linear Voltage Differential Transformer), a procedure needs to be performed to verify that the LVDTs are in alignment. Use one of the following two sections, depending upon whether the scale has a SC200 or SC400 signal conditioner, to verify (and re-align if necessary) the LVDT alignment.

Now turn on the conveyor, power up the WP20, make sure the belt is clean, and let the entire system run for at least half an hour (longer in colder environments) so it attains temperature stability. If the WP20 displays a "Scale Data Error", there's a communications problem between the scale (the signal conditioner) and the WP20. This problem must be corrected before continuing. Consult Section 9.08, "scale data error", for troubleshooting tips.

## 7.02 LVDT Alignment for Scales with a SC400 Signal Conditioner (WY10, WY10HD, WY20 scales Only)



The WY10 and WY10HD have two LVDTs, while the WY20 has four LVDTs. Alignment of the LVDTs is critical for scale accuracy. The LVDTs were aligned at the factory, but it must be verified that they are still in alignment after shipping and installation. Turn the belt off, leave the MS20 on and remove both side covers from the scale. On the SC400 PCB, DIP switches SW3 and SW4 are used in the alignment procedure (see the figure below). First verify that SW3 and SW4 are set to the positions shown on the first or second lines in the following chart depending on the particular scale at hand. Next, to verify proper alignment, connect a DC voltmeter across the test points (again see the figure). If the voltage is  $2.50 \pm 0.02$  VDC, the LVDTs are sufficiently aligned and move on to the next section, however, if the voltage is outside the stated range, continue as follows.





The LVDTs are aligned one at a time. The goal is to attain 2.50 +/- 0.02 VDC across the test points for each LVDT. First, set SW3 and SW4 to the positions shown in the chart at line three, “Aligning LVDT “A” Only”. Next, loosen the clamp screw slightly (see the following figure) to loosen the LVDT and slide the LVDT up or down until the voltmeter reading is 2.50 +/- 0.02 VDC. **DO NOT POUND ON THE LVDT!** Now do the same procedure for LVDT B (and then C and D for a WY20 scale). After the alignment is complete, the switches should be reset back to line one or two in the chart depending on the scale at hand.

SW3 and SW4, LVDT Selection and Alignment Switches												
	SW3				SW4							
	Pos 1	Pos 2	Pos 3	Pos 4	Pos 1	Pos 2	Pos 3	Pos 4	Pos 5	Pos 6	Pos 7	Pos 8
LVDT "A" and "B", WY10, WY10HD	OFF	OFF	ON	ON	OFF	OFF	ON	ON	OFF	OFF	ON	ON
LVDT "A" "B" "C" and "D", WY20	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF
Aligning LVDT "A" Only	OFF	ON	ON	ON	OFF	ON	ON	ON	OFF	ON	ON	ON
Aligning LVDT "B" Only	ON	OFF	ON	ON	ON	OFF	ON	ON	ON	OFF	ON	ON
Aligning LVDT "C" Only	ON	ON	OFF	ON	ON	ON	OFF	ON	ON	ON	OFF	ON
Aligning LVDT "D" Only	ON	ON	ON	OFF	ON	ON	ON	OFF	ON	ON	ON	OFF



## 7.03 Scale Calibration

Assuming all entered Parameters are correct, the scale is installed properly, and scales with LVDTs are in alignment, the scale can now be calibrated. Without calibration, the scale will only approximate the RATE. **Note that an AUTO ZERO must always be done before an AUTO SPAN.**



### 7.03.1 Auto Zero

AUTO ZERO is the first calibration step to perform. This is defined as the WP20 displaying zero RATE when the belt is empty. With the conveyor running, press and hold the AUTO ZERO button for five seconds. First, the message “HOLD TO ZERO” appears in the MODE window, then the message “AUTO ZERO WAIT”. The WP20 will now do an AUTO ZERO for as many belt revolutions as are specified in the Zero Revs Parameter (Section 6.02.12). A proper AUTO ZERO should take a minimum of two minutes to complete, because the WP20 must “learn” what an empty belt and zero-RATE “feels like”. When finished, the MODE window should revert back to Units of Measure (typically Tons/Hour), and the RATE should go to zero and remain there. An AUTO ZERO can be cancelled at any time by pressing RESET. If the message “AUTO ZERO ERROR” appears during an AUTO ZERO, refer to Section 9 for troubleshooting tips. Note that the RATE might wander above and below zero to some extent. After calibration is complete, refer to Section 6.02.10 for AZT settings to eliminate this “zero bounce”.



## 7.03.2 Auto Span

AUTO SPAN is the next calibration step to perform. This procedure calibrates the scale using a known weight, so the WP20 can accurately determine the material weight as it passes over the weigh idler. With the conveyor running, press and hold the AUTO SPAN button for five seconds. First, the message “HOLD TO SPAN” appears in the MODE window, then the message “LOWER CAL WEIGHT”. At this time lower the calibration weight(s). The AUTO SPAN procedure will begin when the calibration weight is sensed by the WP20. See Section 6.02.56 for information on the Span Detect Parameter. The display in the MODE window should then change to “AUTO SPAN WAIT”. A proper AUTO SPAN should take a minimum of two minutes to complete. If, after lowering the cal weight(s), the “AUTO SPAN WAIT” message does not appear, press and hold the AUTO SPAN button again for a few seconds. This action will override the previous attempt and manually start the AUTO SPAN.

When the AUTO SPAN is complete, the message “RAISE CAL WEIGHT” will appear. **Before raising the cal weight(s) allow the RATE settle to a steady value.** When the cal weight(s) are then raised, the RATE display should return to ZERO and the calibration is complete. Totalizing will not resume until the calibration weight is raised. An AUTO SPAN can be cancelled at any time by pressing RESET.

**Note 1:** An AUTO ZERO can be performed without doing another AUTO SPAN, so as to re-zero the belt due to zero drift. Zero drift can be caused by material build-up, variation of belt tension, or changes in the environment surrounding the scale.

**Note 2:** If the AUTO SPAN had to be started manually, the Span Detect Parameter (Section 6.02.56) needs to be changed so the next AUTO SPAN request proceeds to completion. Change this Parameter **after** the calibration has been completed. To determine the new Span Detect value, subtract the Zero Count (Section 6.02.58) from the Span Count (Section 6.02.59), and calculate 70% (multiply by 0.7) of the difference and enter it as the new Span Detect value.

Now that the calibration is complete, the scale needs to be checked for accuracy. The following calculated **value** (or very close to it) is what you should see in the RATE window:

$$\frac{(\text{?}) \quad (\text{?}) \quad (\text{total of one or both cal weights})}{\text{Cal Factor} \times \text{Belt Speed} \times \text{Cal Weight}} = \text{Rate (tons/hr.)}$$

(refer to the Parameter Table (Sec. 11.02)  
for known field data).

To verify the scale’s repeatability, lower the calibration weight(s) to see if the scale returns to the RATE that was displayed after performing the AUTO SPAN. Repeating this procedure several times will assure that the scale is performing properly.

### 7.03.2.1 Span Calibration for HY15 without calibration weight.

When using the standard model HY15 with 165 pound (75 KG) load cells, a calibration weight is not required. The WP20 comes pre-programmed to automatically calibrate that size load cell.

**IMPORTANT:** When a calibration weight is not used, Parameter 5, “Cal Wt”, needs to be changed from the default value of 120 to 0 (zero). This must be performed in the field.

Check the label on the load cells to see if they are rated at 165 pounds (75 KG). If it is found that the scale is not using 165 pound load cells, a calibration weight must be provided by the user, and it's weight entered in Parameter 5, Cal Wt.

AN AUTO ZERO MUST BE PERFORMED BEFORE AN AUTO SPAN! Make sure Parameter 5, Cal Wt, and Parameter 6, Cal Chain, are set to zero before spanning. Press and hold the AUTO SPAN button for five seconds. The MODE WINDOW should read, "hold to span", while it is being held. Release the button after the "hold to span" message disappears. The Auto Span cycle is now complete.

The HY15 scale is now spanned based on 330lbs (150Kg) of total load cell capacity with 2mv/v sensitivity. A live material test is now required to attain greater scale accuracy.

### **7.03.3 Material (Pre/Post) Test**

To attain a more precise scale measurement, a material (or pre/post) test must be performed as follows:

Make sure the calibration weight is raised. While in RUN Mode, press and hold the RESET key for five seconds to clear the TOTAL display. Weigh and record an empty truck or container on a certified scale and then run a load of material into it using the conveyor. Try to run at a typical running RATE and do not perform this test in the rain as the water weight will add to the material weight. The total load size should be about 10% of the normal running RATE. Example: normal RATE = 450 TPH, test load = 45 tons.

Now weigh the full truck or container and subtract the empty container weight leaving only the material weight. In Program Mode go to the P/P Wt Parameter (Section 6.02.9) and enter the test material weight. When Program Mode is exited, the WP20 will automatically compare the material test total to the total that it calculated and then modify the ASC Parameter (Section 6.02.55) accordingly. P/P Wt is automatically set to zero after the test is done.

The calculation is:

(Post) Actual Weight/(Pre) WP20 Scale Weight x ASC = New ASC.

If, after the material test, it is shown that the WP20 displayed RATE is not exactly correct, manually adjust the ASC Parameter up or down to compensate. Also, if an alternate method of calibration such as a calibration chain is being used, simply adjust the ASC parameter until the displayed RATE is correct.

Now that the system has been fully calibrated, it is important to save all the acquired information to the non-volatile RAM in the microprocessor. To do this, simply go to the Params Parameter (Section 6.02.60), select STORE NOW, and then exit the Parameter Table. Upon exiting, the Mode window will display "PARAMS SAVED". Every time a Parameter is changed or the scale is re-AUTO ZEROed, this same procedure must be done again to save a fresh copy of the Parameter Table and calibration information.



## **7.04 Running the System**

Now the system is ready to run. With the calibration weight(s) up, the RATE should be zero. Reset the TOTAL display by pressing and holding the RESET key for five seconds. Begin running material on the belt. The RATE should increase and the TOTAL should begin to increment. Press the FUNCTION key momentarily to toggle between the RATE units of measure and the present belt SPEED. Press and hold the STOP COUNT button to hold the present TOTAL then release it. Turn the belt off and the message ZERO BELT SPEED should be

displayed. Resume running material and the ZERO BELT SPEED message should disappear and the RATE units or SPEED display should reappear.

Refer to Section 9.01 for the definitions of any messages that appear in the MODE window. If the system is determined to be running properly, auxiliary equipment such as a recorder can now be added. Consult Section 4 for wiring information. Refer to Section 6.02 for configuration information to enable the WP20 to interface with auxiliary equipment. Consult Section 8 for complete instructions on using the Serial Communication features.

# CHAPTER 8 - SERIAL COMMUNICATIONS

## 8.01 Overview

The WP20's RS232C and RS485 serial communications interfaces allow remote computers and PLC's to access RATE, TOTAL, SPEED, and Status data, in addition to requesting basic calibration functions. The WP20 can be configured to send data either automatically (every 1/10 second fixed) or upon request (manually). If sending data automatically, only one unit can be used per serial link. The automatic mode is commonly used for sending Rate and/or Total to display devices. When requesting data manually, 16 units can be multi-dropped on one serial link and each unit is identified using capital letters A to P. The characters used are ASCII. Wire the serial communications per Section 4. Configure the Parameters per Section 6.02.41-45.

**Note:** When setting up serial communications the message "FRAMING ERROR" might appear in the MODE window. This indicates that a Parameter setting is incorrect. Assure that all serial communications related Parameters are correct for the system -- Station ID, Parity, Baud Rate, Command Menu, and Protocol (See Sections 6.02.41-45).

**Important:** The plant remote equipment must also be operating with the exact same serial communications settings (mutually compatible) for the system to operate properly.

## 8.02 Automatic Transmission

When a Command Menu Parameter (selected from the following table) other than 00 is entered into the WP20, it will send the selected data automatically every 1/10 second. For example, if the Command Menu is set to 04, the WP20 will transmit the RATE and TOTAL every 1/10 second.

Command Menu	Data Transmitted
00	(Used for manual data transmission only, see section 8.03)
01	RATE
02	TOTAL
03	SPEED
04	RATE, TOTAL
05	RATE, SPEED
06	Average RATE
07	Average SPEED
08	Average RATE, TOTAL
09	Average RATE, Average SPEED
10	Status
11	RATE, Status
12	TOTAL, Status
13	SPEED, Status
14	RATE, Status, TOTAL
15	RATE, Status, SPEED
16	Average RATE, Status
17	Average SPEED, Status
18	Average RATE, Status, TOTAL
19	Average RATE, Status, Average SPEED
20	Send RATE in FC20 set point mode. See FC20 manual.

Data sent from the WP20 in automatic (or manual) modes will be in the following format:

[Station ID] [Data Value(s)] [Carriage Return]

The station ID is a single ASCII character from A to P specifying the unit address.

When status is sent, it is a single ASCII character defined as follows:

P	Positive RATE (normal operation, positive rate)
N	Negative RATE
Z	AUTO ZERO in progress
T	Auto Tracking in progress
S	AUTO SPAN in progress
A	Alarm condition
E	Weight processor error (scale data error, etc.)
L	Low Battery

Example 1: Station K has a RATE of 450 and the Command Menu parameter is 01 (RATE):

[ Station ID ]	[ RATE ]	[ Carriage Return ]
K (one character)	0450 (four characters)	^M (one character)

Example 2: Station C has a SPEED of 375 and the Command Menu parameter is 03 (SPEED):

[ Station ID ]	[ SPEED ]	[ Carriage Return ]
C (one character)	0375(four characters)	^M (one character)

Example 3: Station A has a RATE of 103.8, the TOTAL is 399.75, and the Command Menu parameter is 14 (RATE, Status, TOTAL):

[ Station ID ]	[ RATE ]	Status	TOTAL	]
A (one character)	1038 (four characters)	P (one character)	00039975 (eight characters)	
[ Carriage Return ]				
^M (one character)				

### 8.03 Manual Transmission

If the Command Menu Parameter is set to 00 in the WP20, it will only send data after a request is made. The same data is available and is returned in the same format using ASCII characters as outlined in the above section for Automatic Transmission. The data request is sent in the format ([Station ID] [Command parameter] [Carriage Return]) and as defined below:

[Station ID]	A to P (one character)
[Command parameter]	(from the list in sec. 9.2, (01 to 19) (two characters)
[Carriage Return]	^M (one character)

Example: A request for RATE and TOTAL is sent to Station A:

[ Station ID ]	[ command parameter ]	[ Carriage Return ]
A (one character)	04 (two characters)	^M (one character)

Note that the WP20 has a 16 command input buffer.

## 8.04 Tecweigh Protocol

There are two different approaches that serial users can employ for the following Remote Calibration Section (8.05).

The Protocol Parameter (Section 6.02.45) permits two selections, they are TEC STD and TEC OLD. The differences between these two styles, detailed in section 8.05 below, gives the user more secure communications when set to TEC STD, and historical commands when set to TEC OLD. Users with existing installations should use the TEC OLD version to avoid programming changes, and new installations should use the new TEC STD version for a higher level of security to prevent false commands from being accepted by the WP20.

## 8.05 Remote Calibration (see preceding section 8.04)

There are four commands that can be sent to the WP20 for Remote Calibration. Note that no data is returned after calibration commands are sent. The characters are ASCII. Use the following format to send the WP20 Remote Calibration commands:

[Station ID] [Command] [Carriage Return].

### TEC STD

<u>Command</u>	<u>Action</u>
=R	Resets the TOTAL display
=Z	Starts an AUTO ZERO Cycle
=S	Starts an AUTO SPAN Cycle
=C	Cancels an AUTO ZERO or AUTO SPAN Cycle

Example: To start an AUTO SPAN cycle at Station G, send the following command:

[ Station ID ]	[ Command ]	[ Carriage Return ]
G (one character)	=S (two characters)	^M (one character)

### TEC OLD

<u>Command</u>	<u>Action</u>
30	Resets the TOTAL display
31	Starts an AUTO ZERO Cycle
32	Starts an AUTO SPAN Cycle
33	Cancels an AUTO ZERO or AUTO SPAN Cycle

Example: To start an AUTO SPAN cycle at Station G, send the following command:

[ Station ID ]	[ Command ]	[ Carriage Return ]
G (one character)	32 (two characters)	^M (one character)



Be careful not to send serial commands when there is someone working at that station. Serial communications should only be done after the station is completely set up, calibrated, and in Run Mode. Sending commands while in Program Mode could cause conflicts and corrupt data. The WP20 ignores commands that it does not recognize and only detects and acknowledges a framing error.

# CHAPTER 9 – TROUBLESHOOTING



## 9.01 Status Messages

Every time the WP20 is powered up it immediately performs two functions.

The first function is a scan to determine if an optional plug-in field-bus communications interface card is installed. The following message will be displayed:

***“SCANNING FOR BUSCARD”***

The second function is a test of the RAM memory “chip”, and then the flash memory “chip” that stores the backup “flash” Parameters. The word “chip” is a commonly used substitute word for Integrated Circuit (IC). RAM stands for **R**andom **A**ccess **M**emory, which is a type of memory that will lose its information when unpowered. Flash memory is a type of memory that will retain its information when unpowered. These tests are performed to assure that no information has been “scrambled”, lost, or corrupted. When the tests are complete, one of the following messages will appear in the MODE window:

***“SELF TEST – PASS”***

The memory is OK. No changes have occurred.

***“RAM BAD, FLASH RESTORE”***

The RAM memory is corrupt. The WP20 has restored the Parameter Table from flash memory.

***“RAM/FLASH BAD, DEFAULTS”***

Both the RAM and flash memory are corrupt. The WP20 has restored the Parameter Table from the default memory. (User determined Parameters will need to be re-entered. Refer to Sections 6 and 11).

The MODE window can display many different messages that either indicate a potential problem or convey status information. Some of them have already been discussed as needed throughout this manual. The following discussion expands on some of those messages and also includes messages that have not yet been discussed. The following discussion assumes that how to navigate through the menus and KEYPAD use is understood. Refer to Section 5 if not.

***“AUTO ZERO ERROR”***

***or***

***“AUTO SPAN ERROR”***

The AUTO ZERO and AUTO SPAN error messages indicate an abnormal condition during calibration. Press the RESET button to clear the message and perform another AUTO ZERO. After a successful AUTO ZERO has been done, do another AUTO SPAN.

Possible causes of the message:

- Rocks (or material) were jammed under the weigh idler.
- The cal weight was lowered for an AUTO ZERO, when it should have been raised.
- The cal weight was raised for an AUTO SPAN, when it should have been lowered.
- The conveyor had material running on it during calibration.
- The load cell(s) or LVDT(s) are damaged.
- The belt skirting was touching the weigh idler or the belt near the scale.
- The Parameters for Weigh Span, Cal Weight, etc. are incorrect.
- The Load Count Parameter does not increase when the calibration weight is lowered.



Additional explanations:

**An AUTO ZERO must be done before an AUTO SPAN!** If the Load Count Parameter (Section 6.02.57) does not meet the criteria given, then the load cell(s) or LVDT(s) might be damaged or there might be a problem with the signal conditioner. See Section 9.06 or 9.07 for load cell or LVDT testing and replacement. Note: if an AUTO ZERO or AUTO SPAN is started and then the belt is stopped, it will never complete the number of belt revolutions required. Press RESET and start over if the belt has been stopped.

***“AUTO ZERO (WAIT)”***

***or***

***“AUTO SPAN (WAIT)”***

These messages indicate that an AUTO ZERO or AUTO SPAN calibration is in progress. An AUTO ZERO or AUTO SPAN can be initiated manually, remotely through the serial port, or automatically by the AZT Parameter (Section 6.02.10). It will perform according to the Zero Revs Parameter (Section 6.02.12) and Span Revs Parameter (Section 6.02.13). The respective message will remain viewable until the corresponding cycle is completed or until the RESET button is pressed.

***“FRAMING ERROR”***

This message indicates a serial communications Parameter setting is incorrect when using the serial communications function. Assure that all serial communications related Parameters are correct for the system -- Station ID, Parity, Baud Rate, Command Menu, and Protocol (Sections 6.02.41-45). **Important: The plant remote equipment must also be operating with the exact same serial communications settings (mutually compatible) for the system to operate properly.**

***“INTERLOCK OPEN”***

Terminals T3 (DI1) and 10 (COM) is an interlock that must be electrically connected (closed) for normal WP20 operation. This is easily accomplished by installing a jumper on the pins at J23, which is located at the bottom center of the PCB. It can also be accomplished by installing a jumper wire across terminals T3 & 10. If the interlock is not shorted, the RATE, TOTAL, and all outputs are disabled. Verify that there is a jumper on J23 and also check the dedicated field wiring diagram (normally at the end of the manual) to determine if remote equipment is controlling the interlock circuit.

***“LOAD ERROR”***

WY15 and WY25 scales:

On WY15 (1 load cell) and WY25 (2 load cells) scales, this message indicates either a faulty load cell signal, or the weight on the load cell(s) exceeds their capacity. Check the Load Count Parameter (Section 6.02.57) and make sure the load counts increase when the calibration weight is lowered.

Other possible causes of the message are:

- The load cell(s) are installed with the arrow pointing up rather than down.
- A load cell is incorrectly wired to the terminals. Refer to the load cell wire color code.
- A load cell wire(s) is damaged or broken.
- A loose terminal strip(s) or terminal screw(s).
- A load cell is physically damaged.
- A load cell has been overstressed and permanently damaged.
- Material is jammed near the load cell.

Refer to Section 9.06 for load cell testing and replacement if required. Refer to Section 4.03 for wiring.

#### WY10 and WY20 scales:

For the WY10 (1 LVDT) and the WY20 (2 LVDTs) scales, this message indicates a faulty LVDT signal. Check the Load Count Parameter (Section 6.02.57) and make sure the load counts increase when the calibration weight is lowered.

Other possible causes of this message are:

- A LVDT is incorrectly wired to the terminals. Refer to the LVDT wire color code.
- A LVDT wire(s) is damaged or broken.
- A loose terminal strip(s) or terminal screw(s).
- A LVDT(s) is not properly aligned (Section 7.02 (SC200) or Section 7.03 (SC400)).
- A LVDT spring(s) is broken or off center
- A LVDT(s) center plunger is stuck
- A LVDT(s) has a pit in the surface of the deflection arm.

Refer to Section 9.07 for LVDT testing, and replacement if necessary. Refer to Section 4.04 for wiring.

#### ***“LOW POWER”***

This message indicates insufficient power to the signal conditioner. Possible causes of this message are:

- **AC** power to the WP20 is less than 100 VAC on the **AC** power version.
- **DC** power to the WP20 is less than 9 VDC on the **DC** power version.
- The WP20 (**AC** power version) is not producing +30 VDC across terminals 10 and 29.
- The WP20 (**DC** power version) is not producing +28 VDC across terminals 10 and 29.
- The cable between the WP20 and the signal conditioner is longer than 4000 feet.
- Attached devices, such as a chart recorder, are drawing more than 1 amp total.
- There is a break or short in the cable between the WP20 and the signal conditioner.

Refer to Sections 9.02 and 9.03 for more comprehensive electrical troubleshooting.

#### ***“SCALE DATA ERROR”***

This message indicates a communications problem between the WP20 and the scale (signal conditioner (SC)).

Possible causes of the message are:

- Terminals 20 and 22 are wired backwards (reverse wired).
- The WP20 (**AC** power version) is not producing +30 VDC across terminals 10 and 29.
- The WP20 (**DC** power version) is not producing +28 VDC across terminals 10 and 29.
- The cable distance between the WP20 and the SC is longer than 4000 feet.
- There is a break or short in the cable between the WP20 and the SC
- Either the processor or SC or both have been damaged by a power surge or lightening.

Refer to Sections 9.02 or 9.03 for more comprehensive electrical troubleshooting.

### ***"SELF TEST"***

This message always appears when power is first applied to the WP20. The WP20 performs a quick self-diagnostic routine and then the message disappears. This message might also appear if terminals are shorted or if there is excessive power use by attached auxiliary equipment. It also could appear if the WP20 power or communications wiring is too close to other devices or wiring (high voltage power wiring, high voltage motor wiring, 120 vac, etc.).

### ***"ZERO BELT SPEED"***

This message indicates that, 1) the belt is simply not moving, 2) the belt is moving, but a speed signal is not being generated, or, 3) the signal conditioner is defective. If the belt is moving, make sure the green LED labeled "speed" on the SC is blinking. Note that it might appear to be solid on if it is blinking rapidly. If it is not blinking, possible causes are a defective speed sensor or circuit, the signal conditioner has failed, or there is no DC power. If the message appears even when the belt is moving, check for the following adverse conditions:

- The speed sensor wheel is not turning freely, replace it if that condition exists.
- A broken or shorted cable from the speed sensor to the signal conditioner.
- Loose terminal connections.
- No +30 VDC power (+28 VDC on DC models) across terminals 29 (DC) and 10 (CM) on the signal conditioner..
- If power does exist, the speed signal is present, and the message persists, replace the signal conditioner..

### ***"-----"***

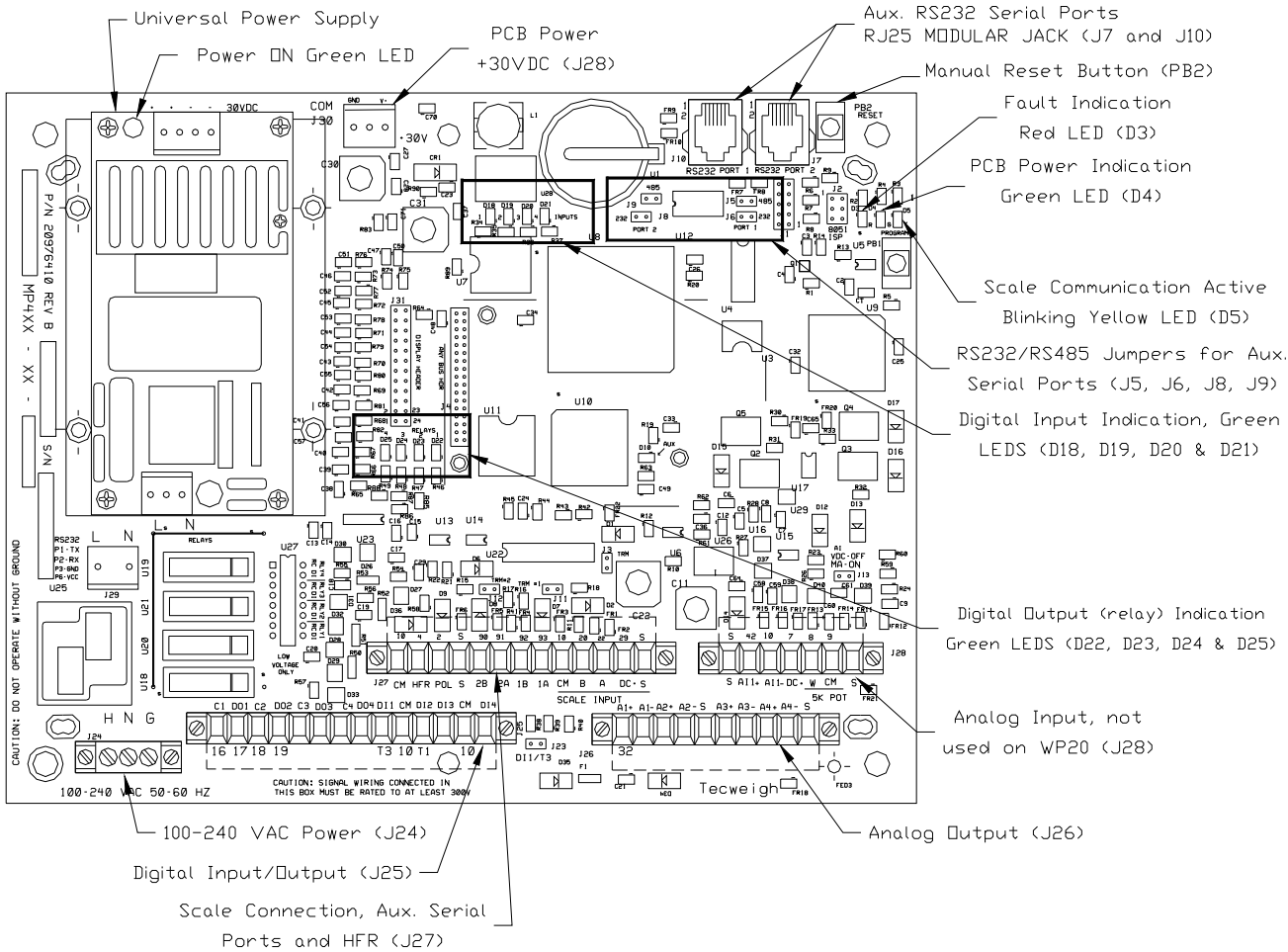
This message indicates that the RATE or TOTAL values are too large to fit the display, or the TOTAL is a negative number. Move the decimal position to the right using the Rate DP Parameter (Section 6.02.14) or the Total DP Parameter (Section 6.02.25). Also note that the TOTAL will need to be RESET when it reaches the upper limit.



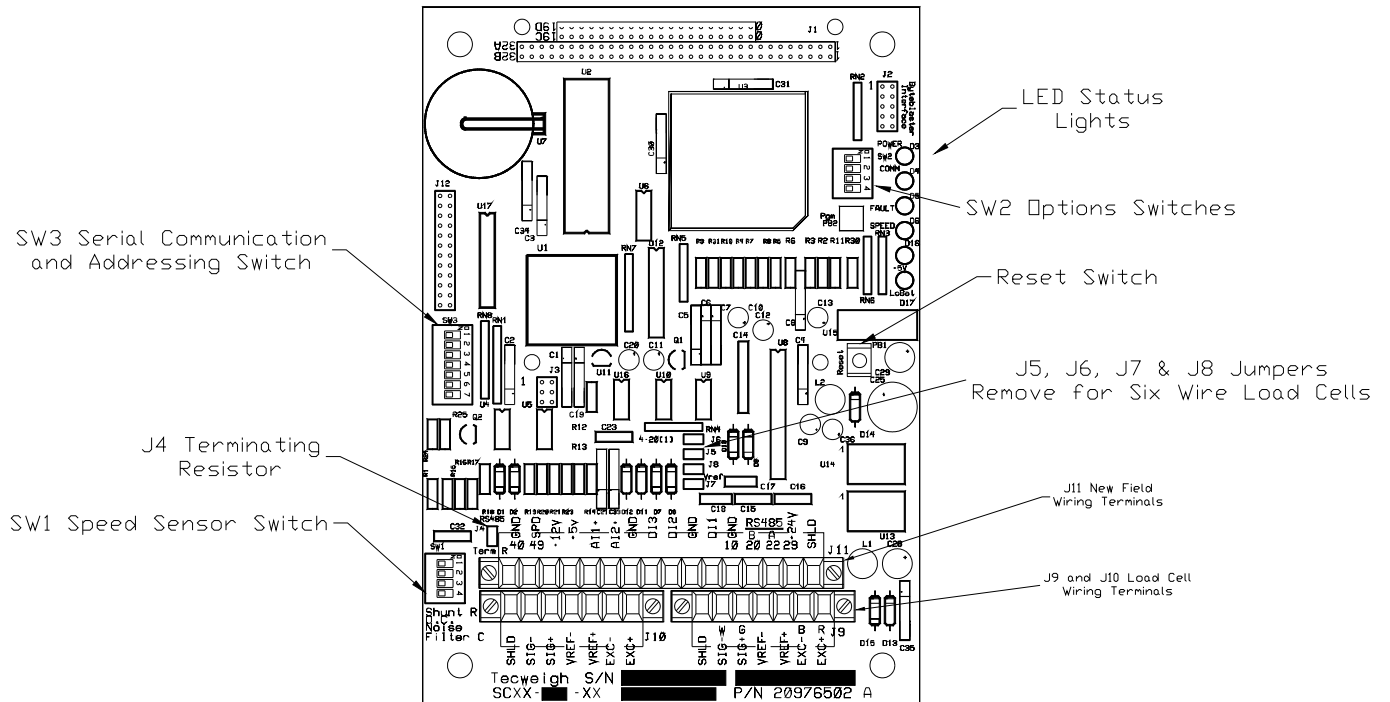
# 9.02 Electrical troubleshooting

This section provides methods of diagnosing lower level electrical problems. If this is a first time installation, verify that it is correctly wired and that all wires are secure in their terminals. For reference for the following paragraphs, the following three figures show the layout of the MP400 PCB and the SC300 and SC400 signal conditioner PCB's.

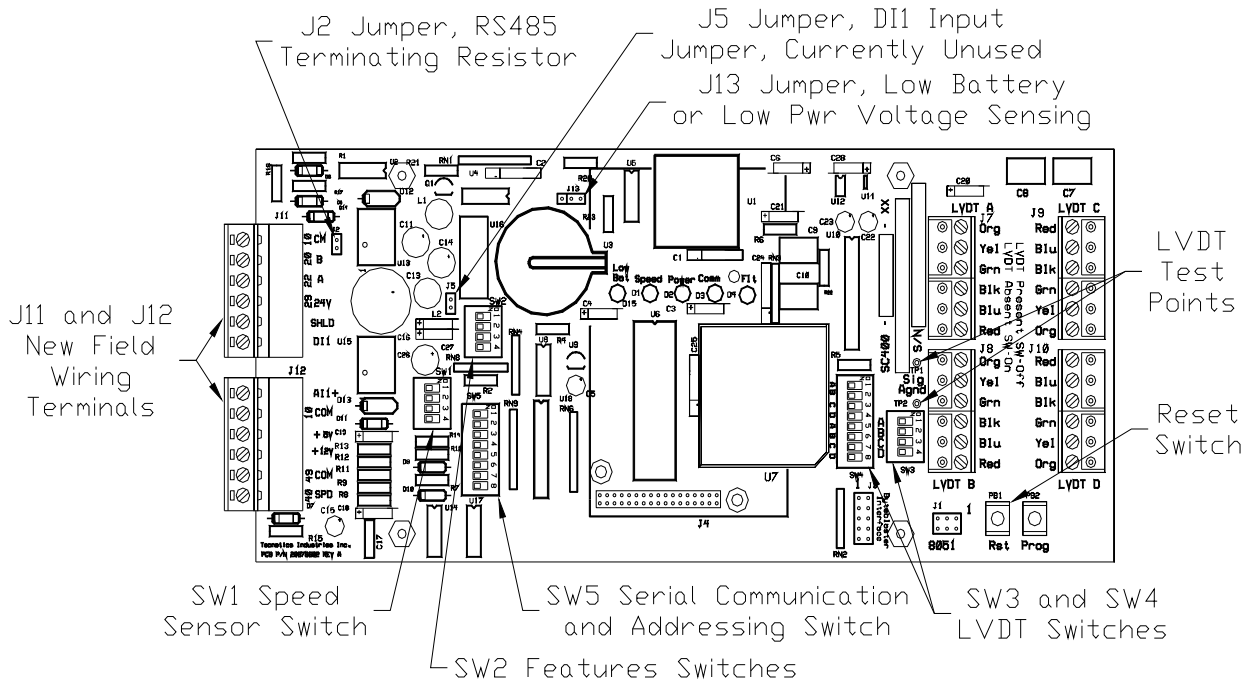
MP400 Main Processor PCB



**SC300 PCB  
(WY15 and WY25)**



**SC400 PCB  
(WY10 and WY20)**



### ***Display failure...***

There are two display failure scenarios: it does not light up at all, or it does light up but is acting abnormally.

If it does not light up at all, first observe the green and red **Light Emitting Diodes (LED)**s on the WP20 printed circuit board (PCB). The green LED indicates sufficient power to the PCB and the red LED indicates PCB failure. If the green LED is off or the red LED is on, verify that the DC power supply is working properly as follows: On PCB model MP400 the DC power supply converts the incoming 100-240 VAC to +30 VDC. Verify that the input voltage is at least 100 VAC and that there is +30 VDC at the power supply output (terminals 10 (-) and 29 (+)). Also verify that the ribbon cable between the PCB and the display is installed correctly and is intact

If the display lights up but portions of it appear vacant or flash uncontrollably, it is likely that the ribbon cable that connects the display board to the printed circuit board is damaged, or the display board itself is damaged.

If any of these conditions are found to exist, or the problem cannot be pinpointed, contact the **Tecweigh** Service Department (Section 2.01) for assistance.

### ***Scale communications failure...***

During normal operation a yellow LED on the WP20 printed circuit board (PCB) blinks every 1/5<sup>th</sup> second, indicating that communications with the SC300 or SC400 signal conditioner (SC) at the scale is normal. If the yellow LED is off, or if it only blinks sporadically, verify that there is +30 VDC across terminals 10 (-) and 29 (+) on the PCB. This is also the DC power for the SC at the scale.

If +30 VDC does not exist across those terminals, disconnect the incoming power and check for continuity across self resetting fuse F1 on the PCB. F1 is a tiny white rectangle located at the very bottom of the PCB and just right of center. If continuity does not exist, contact the **Tecweigh** Service Department (Section 2.01) for assistance.

If +30 VDC is present, next verify that there is also +30 VDC at the SC (terminals 10 (-) and 29 (+)), if not, replace the cable between the WP20 and the SC.

If +30 VDC does exist at the SC, check the LEDs on the SC. The green LED indicates sufficient power to the PCB, the red LED indicates insufficient power or PCB failure. As on the WP20 PCB, the yellow LED blinks every 1/5<sup>th</sup> second during normal operation on the SC's. If it is not blinking and +30 VDC exists, replacement of the SC is indicated. Contact the **Tecweigh** Service or Parts Departments (Section 2.01) for assistance.

### ***Other electrical problems...***

Electrical “noise” from external electrical equipment such as variable frequency drives (VFD)s and/or large motors can interfere with WP20 and signal conditioner (SC) operation. The following are things that can be done to help prevent this problem:

- Assure that the WP20 is on its own electrical circuit and verify that terminal G is **earth** grounded.
- Use dual twisted pair shielded cable from the WP20 to the SC. Belden #1063A is recommended (See section 4.01.1).
- Connect shield wires to the WP20 only, not to the SC.
- Do not mount the scale or the WP20 near equipment that is a source of electrical “noise”, or remove the “noise” source as much as is practical. This includes, but is not limited to, motors, VFDs, SCRs, and high voltage power electrical cabling.

- Do not run power or communication wires near equipment that is a source of electrical “noise”. This includes not only 240/480 VAC motor wires, but also 120 VAC wires.
- Always take static precautions when handling PCB’s (grounded wrist straps, static bags, etc.)(See Section 1.08).
- Never electrically weld near or on the scale or WP20, this can destroy the PCB’s, load cells, or LVDTs (See Section 1.09).
- Lightening storms can destroy PCBs. This can either be caused by electromagnetic radiation or voltage spikes generated in the power conductors. If after a lightening storm the WP20 fails to work, you might need to replace both the WP20 and SC PCBs. Contact the **Tecweigh** Service or Parts Departments (Section 2.01) to determine replacement part requirements. Note that lightening strike damage is not covered under the warranty.

### ***Speed sensor options...***

Low belt speed or high electrical “noise” environments might require using some of the SC300 or SC400 signal conditioner speed sensor options as defined below. Experiment with them one at a time to determine which combination results in the smoothest belt speed reading. Contact the **Tecweigh** Service Department (Section 2.01) for assistance if needed.

### **SW1**

Pos1--ShuntR-- when ON, a portion of the voltage produced by standard and heavy duty speed sensors is grounded out, which prevents damage caused by high speed belts. This switch must be ON unless a magnetic pickup, open collector, or TTL type speed sensor is used.

Pos2--O.C.--turn ON to add a pull-up resistor when using an open collector type speed sensor.

Pos3--Noise--when ON, lower level electrical “noise” is grounded out, but a stronger speed sensor signal is required.

Pos4--Filter--When ON, attempts are made to smooth the speed signal and ignore electrical “noise”.

### **SW2**

Pos1--when ON, the measured speed is multiplied times 10. Try using this option if the belt speed is less than 15 feet per minute. The scale must be recalibrated per section 7.04.

Pos2--when ON, a fixed simulated SPEED for trouble shooting is produced. The SPEED value displayed on the WP20 will equal 200 times the Speed Span Parameter (Section 6.02.18). Use this option to remove the speed sensor as a potential problem when troubleshooting.

Pos3--when ON, the resistance to false belt speeds due to vibration is increased. However, lower belt speeds (less than 20 feet per minute with the standard speed sensor) might not be detected.

Pos4—when ON, decreases the resolution of the load cell signal for backwards compatibility to WP20’s with the WP20-02B main processor board. Contact the **Tecweigh** Service Department (Section 2.01) for further details when using this option.

## 9.03 Operation Troubleshooting

If the system is electrically functional, but it does not seem to be calculating the correct RATE or TOTAL, first verify that all the Parameters are correct. Leaving Weigh Spn = 0 or Belt Len = 0 (Section 6.02.7 & 8), for example, will cause an erroneous calibration and the displayed RATE will be incorrect. The following are some other problems that might exist and possible solutions:

### ***RATE is unsteady...***

If there are large swings in the RATE during relatively constant material flow, several causes are possible. First, check the belt SPEED and make sure that it is constant, or at least does not deviate by more than about 1%. If the belt SPEED is not constant, consult Section 9.02 for speed sensor options. Second, turn off the belt and look at the Load Count Parameter (Section 6.02.57). Assure that the load counts are higher with the calibration weight down than with the cal weight up. Additionally, the load counts should not be negative and should remain relatively steady with the belt not running and no vibration. Replace the load cell(s) (Section 9.05) if the load counts are inconsistent. If the SPEED and load counts are steady, the RATE should also be steady unless the AUTO ZERO and AUTO SPAN procedures were not successful. Try doing an AUTO ZERO and AUTO SPAN again and be sure to do the AUTO ZERO first (Section 7.04). Other things to consider are the AZT setting and RATE damping. First try disabling the AZT function (Section 6.02.10), and then try increasing the Rate Damp Parameter (Section 6.02.14).

Ultimately the MS20 should calculate the Rate as follows:

$$\text{Rate(TPH)} = (\text{Cal Factor}) \times (\text{Scale Load (lbs)}) \times (\text{Belt Speed (fpm)}) / (\text{Weigh Span (in)})$$

Since the Cal Factor and Weigh Span do not change, the only possible problems with RATE will originate from the scale load and belt SPEED. By using the calibration weight to load the scale and by simulating the belt speed, the RATE should be steady. If the rate is still unsteady, it is most likely caused by vibration or excessive electrical “noise” (See Section 9.03, paragraph “other electrical problems”). Consult the **Tecweigh** Service Department (Section 2.01) if problems persist.

### ***Scale is inaccurate...***

It is important to understand that no conveyor scale is 100% accurate. Every detail from installation through calibration contributes to overall accuracy. A very good installation on a new conveyor in a noise and vibration free environment can attain an accuracy of +/- 0.5%. A poor installation on an older and much used portable conveyor might only attain +/- 3% accuracy. Based on that range of accuracy, estimate a realistic potential accuracy for the weighing system and then proceed with searching for sources of error. Try to eliminate as many undesirable conditions as possible. If it can be verified that the RATE is consistently high or low, for finer tuning adjust the ASC Parameter (Section 6.02.55) up or down accordingly.

The following are a number of potential problems that can contribute to scale inaccuracy:

- The scale and weigh idler(s) are not aligned properly (Chapter 3).
- The weigh idler rollers do not spin freely.
- The speed sensor does not spin freely.
- The scale is subject to high vibration near a crusher or screen.
- The scale is incline mounted causing material to roll back and be weighed twice.
- The load cells or LVDTs are damaged (Section 9.05-06).
- The conveyor belt has many splices, repairs and irregularities.
- High temperature fluctuations are causing scale, conveyor, and belt deformation.
- High winds are causing fluctuations in weighing.



- Rain water increases the weight after the scale weighs it and before the truck is weighed.
- There are incorrect or invalid Parameter settings (Chapter 6).
- There was material on the belt during calibration.
- The belt speed was not calibrated properly (Section 7.03).
- A material test was not performed (Section 7.04).
- Electrical interference is causing a false speed or load signal.

#### ***The Parameter values cannot be edited...***

After a power line voltage spike or a lightening strike nearby, the Parameter values can get scrambled/corrupted. An indication of this happening is when one of the digits of a Parameter cannot be changed. This kind of damage is not field repairable. Contact the **Tecweigh** Service Department (Section 2.01) for assistance.

#### ***Resetting the PCB...***

If after trying other troubleshooting techniques, the equipment still does not perform up to expectations, press the reset button **on the MP400 PCB**. The reset button is a small white button at the upper right corner of the PCB. Also refer to Section 9.02 for a picture of its location. This will check for corrupt data and also recover Parameters from memory if necessary. If this has no effect, try disconnecting the power completely and after a short time delay reconnecting it.

## **9.04 Auxiliary Outputs Troubleshooting**

#### ***Bench Test Mode...***

All of the WP20 auxiliary outputs can be tested for proper operation using the Bench Test Mode. While in Run Mode, press and hold both the UP and DOWN arrows for five seconds to enter the Bench Test Mode. Press both the UP and DOWN arrows momentarily to exit the Bench Test Mode. In Bench Test Mode, the following items are held constant:

- 1) The RATE is set to 1000.
- 2) The SPEED is set to 376.
- 3) The TOTAL is calculated from the RATE.
- 4) The Relays close and open every three seconds.
- 5) The RATE current loop is set to 20 mA.
- 6) The HFR output is set to 10,000 Hz.
- 7) The RATE polarity (POL) output goes high every three seconds.
- 8) Pressing each display button will give a description of its function.

#### ***Relay failure...***

For each relay on the MP400 printed circuit board (PCB), a green LED also exists. When a relay is energized, its LED will illuminate, and should illuminate whether a load is connected to the relay or not. The relays will also make a clicking sound as they are energized and de-energized. If a relay is found to be non-functional per the above, replace the PCB. The relays are not field replaceable. Contact the **Tecweigh** Service or Parts Department (Section 2.01) for assistance.

If the relays seem to work properly in Simulation mode, but do not work during normal operation, consider how realistic the relay Parameters settings are. Common errors are described as follows:

The most common error made when setting up the Total Pulse Repeater (TPR) function (Sections 6.02.27,34) is to request that the relay open and close too frequently (Sections 6.02.29-30,36-37). This can cause it to remain always open or always closed.

The most common error made when setting up the relays for High/Low RATE or High/Low SPEED Alarms (Section 6.02.27,34) is that the selected limits (Sections 6.02.31-32,38-39) are not realistic. This causes the alarm condition to never exist or to exist constantly. Also check the time delay before energization (Sections 6.02.33,40). The alarm condition must exist for at least the length of the delay time before the relay will be energized.

### ***RATE current loop outputs are non-functional...***

The WP20 has four 4(or 0) to 20 milli-amp outputs that act in unison and that are proportional to the RATE. If one or more outputs are non-functional, first place the WP20 in Bench Test Mode (see above) and then disconnect all loads and connect a milli-ammeter to the output. The milli-ammeter should display a value between 19 and 21 milli-amps (ma). If it displays a value other than that, the MP400 printed circuit board (PCB) is defective. It is not field repairable. Contact the **Tecweigh** Service or Parts Departments (Section 2.01) for assistance.

If the output(s) is verified to be 20 +/- 1 ma, further testing is required as follows:

The four RATE current loop outputs depend upon several Parameters including Base mA (Section 6.02.20) and Rate 20mA (Section 6.02.21). With the milli-ammeter still connected, place the WP20 in Simulation Mode (Section 6.02.01) and verify that these Parameters are correct as follows. First adjust the Simulated RATE to the value (usually 0 RATE) that corresponds to a 4 (or 0) ma output. Next, adjust the Base mA Parameter until approximately 4 (or 0) ma is displayed on the milli-ammeter. Now fine tune this value by adjusting the Rate LTrim Parameter (Section 6.02.22) until the milli-ammeter reads exactly 4.0 ma. Next, change the Simulated RATE to the value (usually xxx tons/hr) that corresponds to a 20 ma output. Now adjust the Rate at 20mA Parameter until approximately 20 ma is displayed on the milli-ammeter. Next, adjust the Rate HTrim Parameter (Section 6.02.23) until the milli-ammeter reads exactly 20ma. If it is not possible to perform these adjustments, the PCB is defective and needs to be replaced. It is not field repairable. Contact the **Tecweigh** Service or Parts Department (Section 2.01) for assistance.

If the above adjustments were successful, return to Run Mode and re-connect the load(s) with the milli-ammeter **in series** with the load(s). Under normal operation the output current displayed on the milli-ammeter should vary in proportion to the RATE from 4 (or 0) to 20 ma. If that does not happen, next verify that the remote devices in the current loop are “passive”, that is, they do not provide power to the loop. Remove or replace any that are found to be non-passive. If the output works properly with just the milli-ammeter connected, but fails with a passive load(s) connected, the load is probably too large. The maximum load permissible is approximately 750 ohms total. Try distributing the loads among the four current outputs. If it is a single load, a current to current amplifier will be required to drive the load.

Another possible problem that could arise is that the current output is functional, but one or more loads are not functional in a multi-load loop. This problem is usually caused by the loads not being isolated. Every load in the current loop needs to be isolated except the last one (See Section 4.05). Also refer to Section 4.01, “4-20 ma RATE current loop output”.

If all of the above fails to rectify the problem, the PCB is faulty. It is not field repairable. Contact the **Tecweigh** Service or Parts Department (Section 2.01) for assistance.

### ***HFR failure...***

The High Frequency RATE (HFR) output transmits a square wave signal at a frequency equal to 10 times the calculated RATE. The HFR output requires no calibration, however it does have its own damping factor (Section 6.02.24), as does the RATE display (Section 6.02.15), and the RATE analog output (Section 6.02.19). If these three damping factors are equal, then these three RATE values will be the same, however, if they are not equal, the three RATE values might not necessarily agree, they will lead or lag each other. When using serial communications (Section 8), Command Menu item 6, Average Rate, will also be included in this lead/lag scenario. Also refer to Section 4.01, "HFR output", for additional HFR information.

If the HFR output continues to be non-functional, replace the PCB. Contact the **Tecweigh** Service or Parts Departments (Section 2.01) for assistance.

### ***Other problems...***

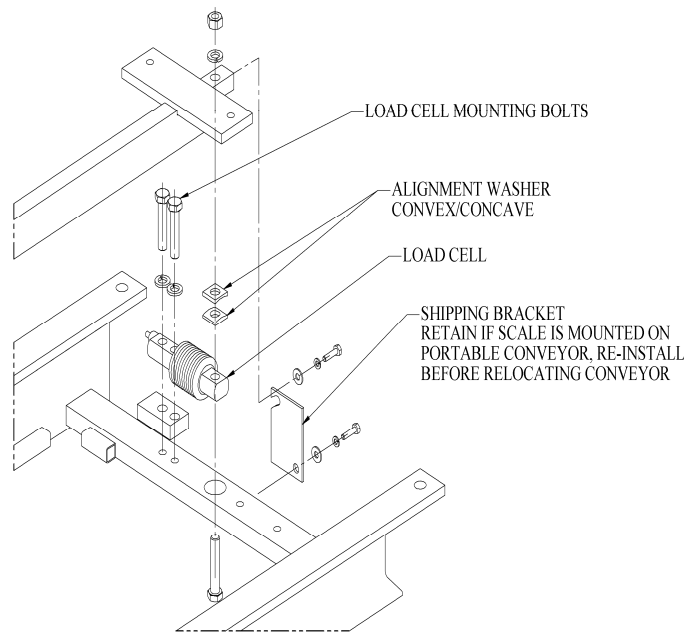
The outputs could become disabled or not operate as expected, 1) when the T3 Interlock is open (Section 4.01, "Remote Interlock), 2) during an Auto Zero or Auto Span, or, 3) while the unit is in Program Mode. If everything is correct and the system is operating normally, but a remote device is not, consult the supplier of that device, otherwise, contact the **Tecweigh** Service Department (Section 2.01) for assistance.

## **9.05 Load Cell Testing / Replacement**

The following explains how to test a load cell(s). First stop the conveyor and disconnect power from the WP20. Then disconnect the green connector from the SC300 signal conditioner (SC) that the load cell wires are connected to. If more than one load cell is connected to the green connector, to get an accurate reading, the wires of the load cell to be tested will have to be removed from the connector. Next, using an ohmmeter, verify the following resistance values. If even one resistance value varies by more than +/- 10%, replace the load cell.

Model	CI-LC22	SB1 or LC	CB6-XX-T	SP4	CI42
Red-Black	310 Ohms	350 Ohms	400 Ohms		
Red-Green	290 Ohms	280 Ohms	290 Ohms		
Red-White	360 Ohms	280 Ohms	290 Ohms		
Black-White	290 Ohms	280 Ohms	290 Ohms		
Black-Green	390 Ohms	280 Ohms	290 Ohms		
Green-White	290 Ohms	350 Ohms	350 Ohms		

If it is necessary to replace a load cell, be sure to re-assemble the new load cell exactly the same way it was disassembled. Take special note of the swivel washers. The contoured faces of these washers fit together and the flat faces are on top and bottom. The safety latch is only used during transportation and installation. It should not be in place during normal use. Refer to the following figure.



## 9.06 LVDT Testing and Replacement

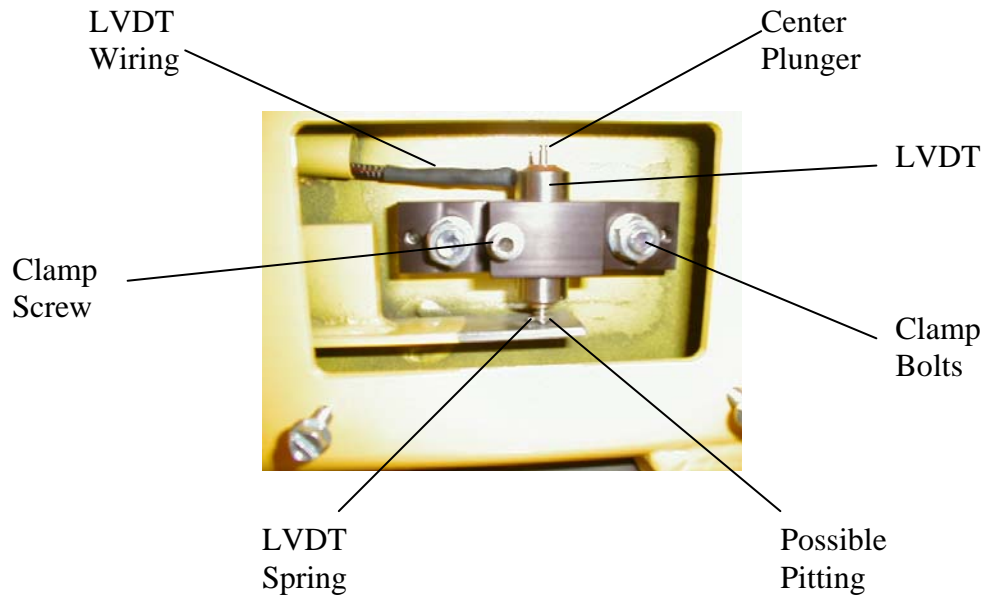
The following explains how to test and replace a LVDT(s). First stop the conveyor and disconnect power from the WP20. Then remove the side cover on the scale carriage to allow access to the SC400 signal conditioner (SC). Next, disconnect the green connector from the SC that the LVDT wires are connected to. If more than one LVDT is connected to the green connector, to get an accurate reading, the wires of the LVDT to be tested must be removed from the connector. Then, using an ohmmeter, verify the following resistance values. If even one resistance value varies by more than +/- 20 %, replace that LVDT.

ORG - YEL = 70  $\Omega$

GRN - BLK = 100  $\Omega$

BLU - RED = 100  $\Omega$

If replacement of a defective LVDT is necessary, use the following instructions. Refer to the following figure. First remove the LVDT wiring from the green connector. Then remove the two bolts from the LVDT clamp. Next, remove the LVDT assembly from the carriage. Now loosen the clamp screw and slide the LVDT out of the clamp. Install the new LVDT in approximately the same position, and assemble in reverse order. Re-wire it to the green connector, being careful to keep the wiring away from the deflection arm. The new LVDT(s) must be aligned (Section 7.02) and the scale re-calibrated (Section 7.03) after a LVDT has been replaced.



## 9.07 “scale data error” Trouble Shooting Procedure

The “scale data error” message indicates a communications problem between the **Tecweigh** WP20 and the scale’s signal conditioner (SC). The following is a list of processors and SC’s that apply.

Processors:

MP400, MP300, MP200, WP20-02B, WP20-02A, WP20-02.

Signal conditioners:

SC400 (lvdt’s), SC300 (load cells), SC200 (lvdt’s), SC100 (load cells), ET20-04B (lvdt’s), ET20-04A (lvdt’s), ET20-04 (lvdt’s), ET20-07 (load cells).

If a lightening strike is a possibility, first visually inspect both the WP20 and SC printed circuit boards (PCB) for physical damage. If damage is evident, **both** boards should be returned to **Tecweigh** for servicing. Contact the **Tecweigh** Service or Parts Departments (Section 2.01) for further instructions.

If no physical damage is evident, the next step is to check several DC voltages at terminals on the PCBs. First disconnect from the **WP20 PCB** the four wires (or the plug-in connector) that connect the WP20 to the SC. Next, measure the voltages between the following terminals on the WP20 PCB. The indicated voltages are what should be present at the terminals. Terminal 10 (CM) is common (-).

10 to 20 -----	2.4 +/- 0.2 vdc.
10 to 22 -----	2.4 +/- 0.2 vdc
10 to 29 (MP400 ac version) -----	30.0 vdc
10 to 29 (MP400 dc version) -----	28.0 vdc
10 to 29 (older PCBs) -----	24.5 vdc

If the voltages are not correct, the WP20 PCB is defective. If this occurs, **both** the WP20 and SC PCBs should be returned to **Tecweigh** for servicing. Contact the **Tecweigh** Service or Parts Departments (Section 2.01) for further instructions.

If the voltages are correct, reconnect the four wires (or the plug-in connector) at the WP20 PCB and disconnect the same four wires (or plug-in connector) from the SC PCB. Now measure the

same voltages as before, but **at the wire ends**, using the wire colors for terminal identification. If the voltages are not correct, the cable is defective. Contact the **Tecweigh** Service or Parts Departments (Section 2.01) for a replacement.

If the voltages are correct, reconnect the four wires (or the plug-in connector) to the SC PCB, and measure the same voltages at the SC PCB **terminals**.

If the voltages are not correct, the SC PCB is defective. If this occurs, **both** the WP20 and SC PCBs should be returned for servicing. Contact the **Tecweigh** Service or Parts Departments (Section 2.01) for further instructions.

## **9.08 The Default Parameter (setting all Parameters to their default values)**

If the WP20 does not respond to any commands and the firmware appears to be “scrambled” or corrupt, re-setting the Parameter Table to its default values can be tried. The Default Parameter only applies to the **Tecweigh** MP200, MP300, and MP400 processors. This procedure should only be done when the WP20 processor will not respond to any other commands

**IMPORTANT NOTE: Before you default the processor, make sure that all current user determined Parameters (recorded in the Parameter Table, Section 11.02, column 5) are available, so they can be replaced in the WP20 processor after defaulting.**

To perform the default procedure, hold the FUNCTION key in for 5 seconds. When the “Simulation OFF” message appears, that is verification that the Parameter Table has been accessed. Now hold in the DOWN ARROW key and simultaneously press the FUNCTION key once. The message. “Params NO CHANGE” will appear. Now press the SELECT key once. The message “NO CHANGE” will flash. Press the UP ARROW key twice and the flashing “DEFAULTS” message appears. Press the SELECT key and it will stop flashing. Now hold in the FUNCTION key for 5 seconds. The message “Simulation OFF” immediately appears and then the message “defaults restored” will appear momentarily.

The processor has now been reset to its default values.

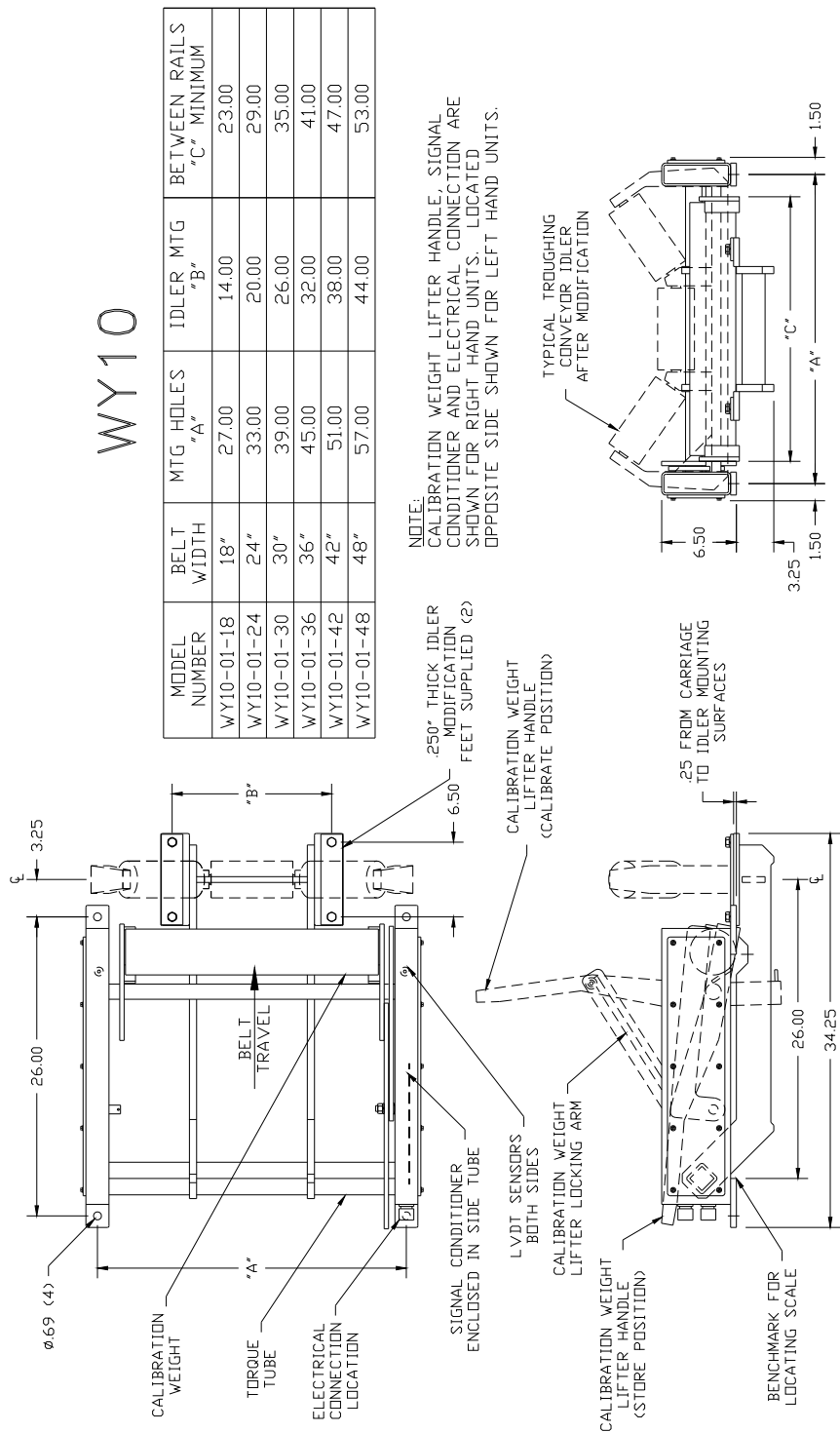
If the above default procedure **did** work, you will need to re-enter the previously saved Parameters into the processor. Refer to Chapter 6.

If the above default procedure **did not** work, a “hard boot” can be tried. This is done by removing the button battery from the board. Also remove any external power. Let it sit for about one minute so all the capacitors discharge. This will clear the onboard RAM memory. After the time has elapsed, replace the battery and re-apply power. The display \*\*\*\*\* should appear for a few seconds, and then move on to the general display. If this procedure works, the previously saved parameters will need to re-entered into the processor. Refer to Chapter 6.

If **neither** of the above procedures worked, another Default procedure can be tried, but most likely the processor is defective and needs to be returned for servicing. Contact the **Tecweigh** Service or Parts Department (Section 2.01) for assistance.

# CHAPTER 10 – DIMENSIONS

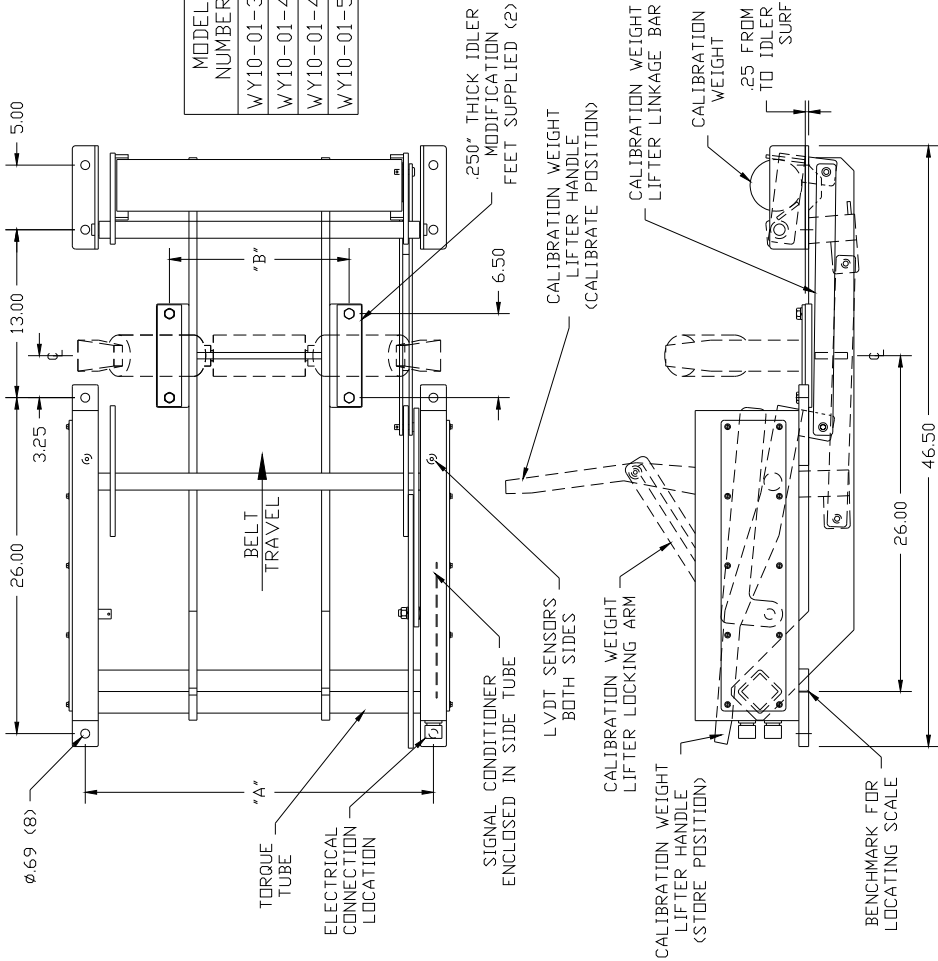
## 10.01 WY10 Dimensions



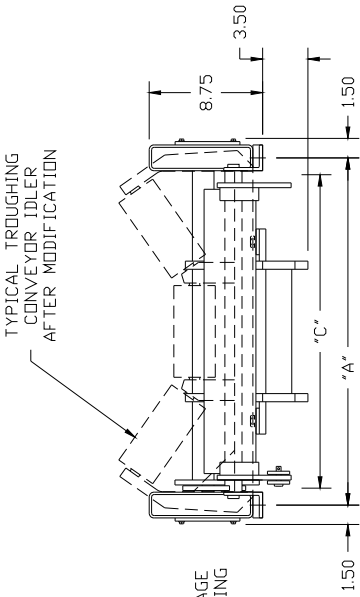
10.02      WY10-HD (Heavy Duty) Dimensions

WY10-HD

MODEL NUMBER	BELT WIDTH	MTG HOLES "A"	IDLER MTG "B"	BETWEEN RAILS "C" MINIMUM
WY10-01-36 HD	36"	45.00	32.00	42.50
WY10-01-42 HD	42"	51.00	38.00	48.50
WY10-01-48 HD	48"	57.00	44.00	54.50
WY10-01-54 HD	54"	63.00	50.00	60.50



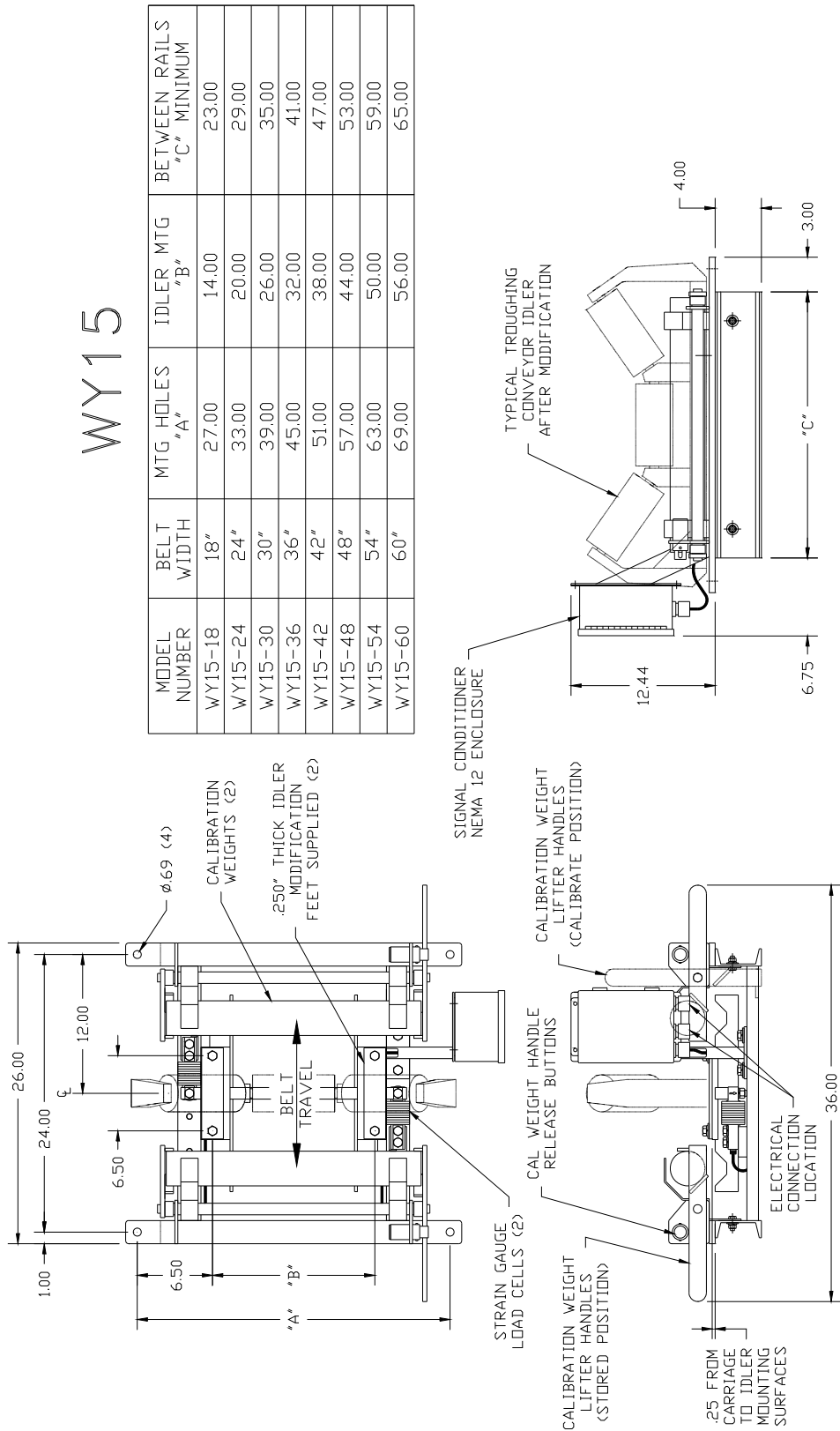
NOTE:  
CALIBRATION WEIGHT LIFTER HANDLE, LINKAGE BAR, SIGNAL CONDITIONER AND ELECTRICAL CONNECTION ARE SHOWN FOR RIGHT HAND UNITS. LOCATED OPPOSITE SIDE SHOWN FOR LEFT HAND UNITS.





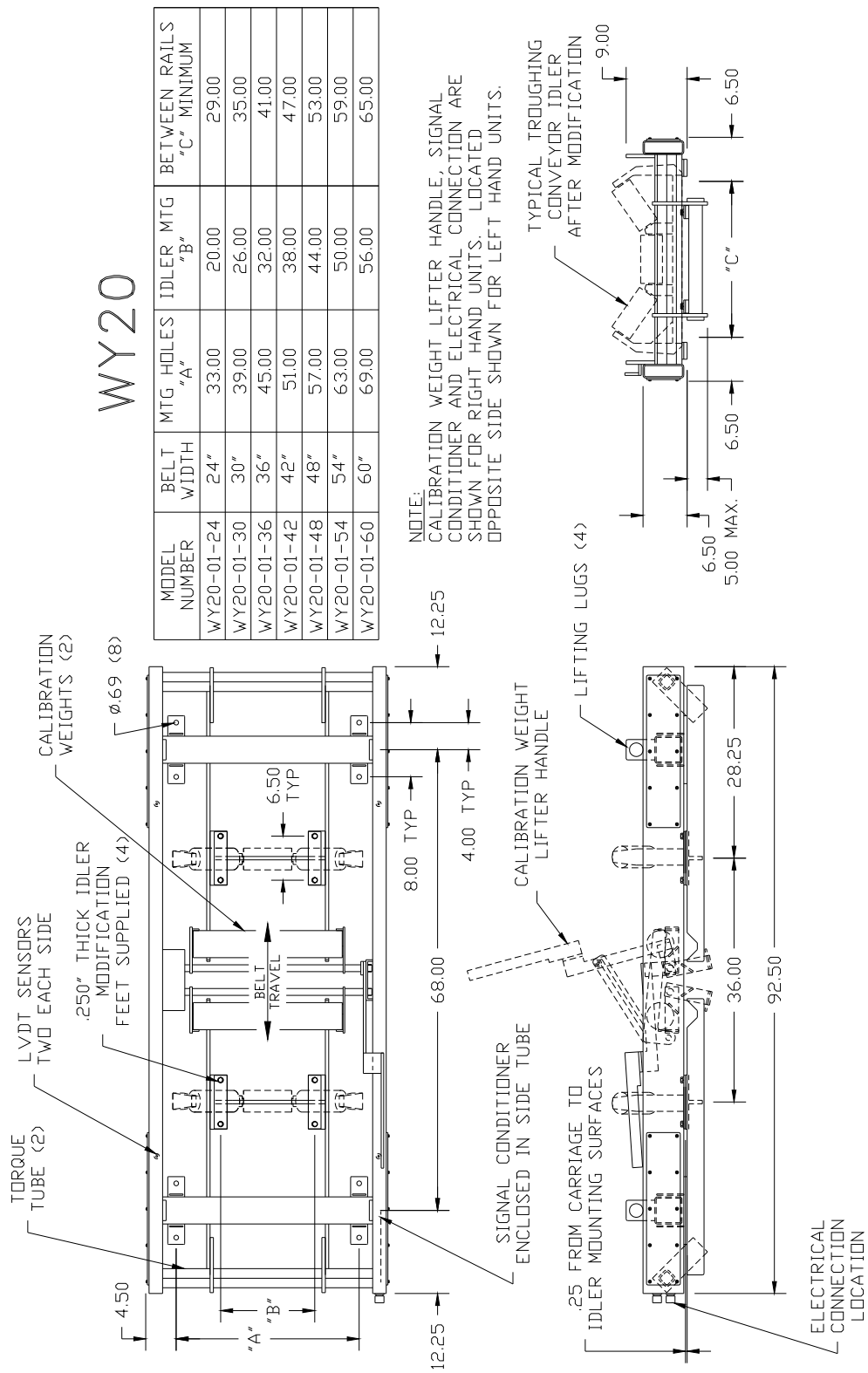
10.03

WY15 Dimensions



10.04

WY20 Dimensions

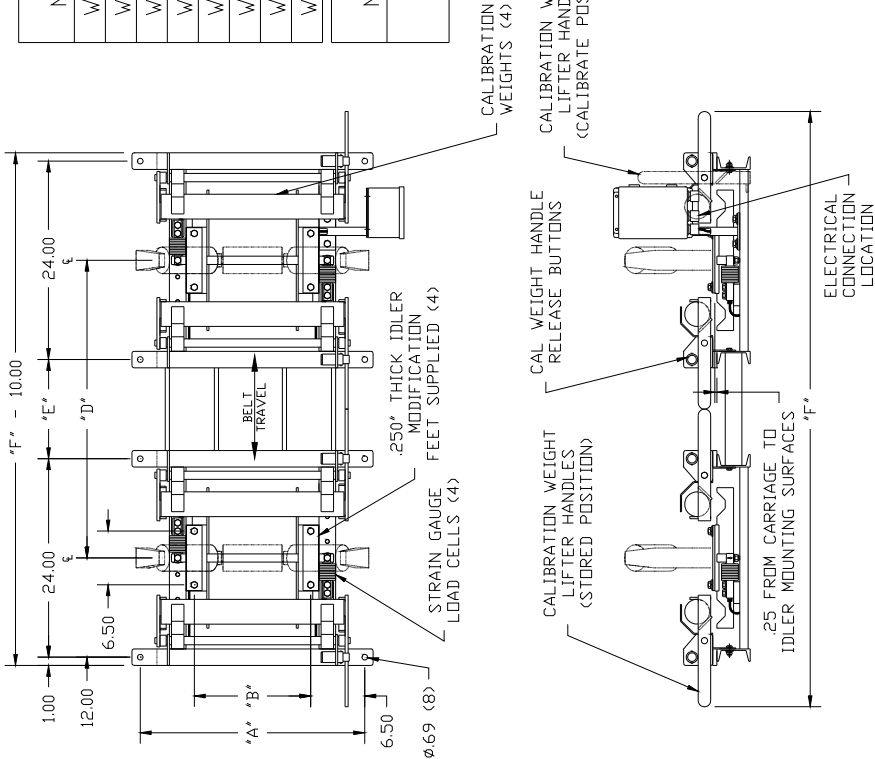


10.05

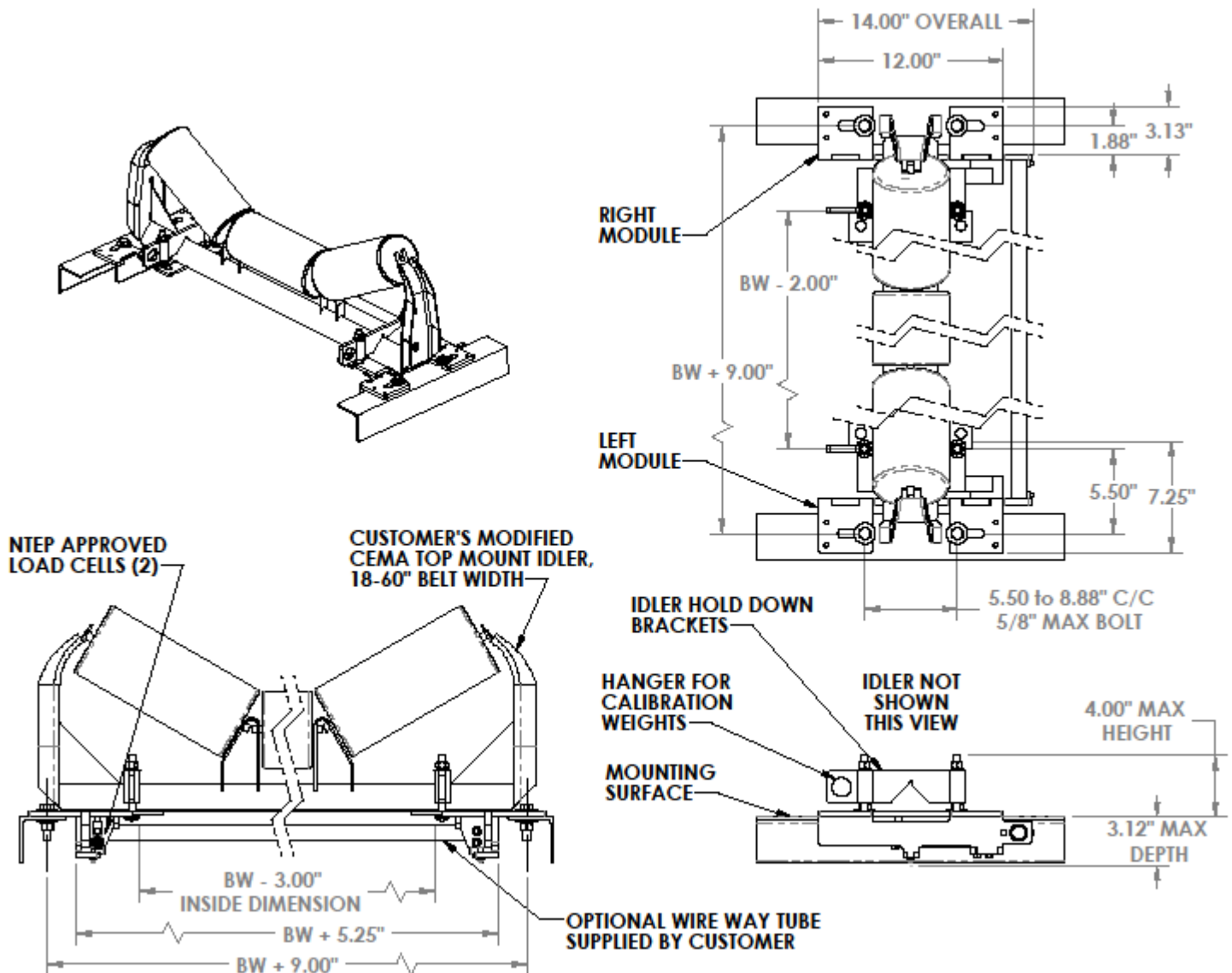
WY25 Dimensions

WY25

MODEL NUMBER	BELT WIDTH	MTG HOLES "A"	IDLER MTG "B"	BETWEEN RAILS "C" MINIMUM
WY25-18	18"	27.00	14.00	23.00
WY25-24	24"	33.00	20.00	29.00
WY25-30	30"	39.00	26.00	35.00
WY25-36	36"	45.00	32.00	41.00
WY25-42	42"	51.00	38.00	47.00
WY25-48	48"	57.00	44.00	53.00
WY25-54	54"	63.00	50.00	59.00
WY25-60	60"	69.00	56.00	65.00
MODEL NUMBER	BELT WIDTH	IDLER SPACING "D"	MTG HOLES "E"	OVERALL LENGTH "F"
ALL	ALL	36.00	12.00	72.00
		48.00	24.00	84.00



## 10.06 HY15 and 25 Dimensions



## 11.01 Factory Setup Sheet

Date Shipped: \_\_\_\_\_, Set-up by: \_\_\_\_\_

WP20 milliamp output set at : \_\_\_\_\_

[illegible]

## 11.02

## PARAMETER TABLE

Parameter		Parameter Description	Default Setting	Factory Setting	Field Setting
1	Simulation	An artificial RATE for calibrating other equipment	OFF		
2	Sim Rate	Artificial RATE shown when Simulation is ON	0000		
3	Units	Selects unit of measure	Tons/Hr		
4	Cal Factor	Calibration value for a given scale type	0.36		
5	Cal Wt	Calibration weight value (lbs. kg)	120.00		
6	Cal Chn	Calibration chain (lbs/ft, kg/m)	0000.0		
7	Wgh Span	Weigh span length (in, m)	048.00		
8	Blt Len	Belt length (ft, m)	0105.0		
9	P/P Wt	Material test weight	000000		
10	AZT +/-	Auto Zero tracking rate	00000		
11	Trck Revs	Number of belt revolutions used by AZT	00.0		
12	Zero Revs	Number of belt revolutions used by Auto Zero	02.0		
13	Span Revs	Number of belt revolutions used by Auto Span	02.0		
14	Rate DP	Rate display decimal point setting	ONES		
15	Rate Damp	Rate display damping factor	015		
16	Speed DP	Speed display decimal point setting	ONES		
17	Speed Damp	Speed display damping factor	15		
18	Speed Spn	Speed calibration span	1.8800		
19	mA Damp	Current output damping factor	15		
20	Base mA	Current output at rate of zero	4.0		
21	Rate 20mA	Rate at 20 ma current output	1000		
22	Rate LTrm	Trims the low mA rate output	150		
23	Rate HTrm	Trims the high mA rate output	050		
24	HFR Damp	High Frequency Rate output damping factor	15		
25	Total DP	Total display decimal point setting	ONES		
26	Down Count	Will allow neg RATE to deduct from TOTAL when YES	NO		
27	RLY 1 Func	Relay 1 output function	TPR		
28	RLY 1 Lgc	Relay 1 logic state, N.O. or N.C.	N.O.		
29	RLY 1 Pls	Relay 1 pulse duration (seconds)	1.00		
30	RLY 1 TS	Relay 1 totalizer state	000000		
31	RLY 1 Low	Relay 1 low rate alarm setpoint	00010		
32	RLY 1 High	Relay 1 high rate alarm setpoint	01000		
33	RLY 1 Delay	Relay 1 delay before alarm output (seconds)	10		
34	RLY 2 Func	Relay 2 output function	TPR		
35	RLY 2 Lgc	Relay 2 logic state, N.O. or N.C.	N.O.		
36	RLY 2 Pls	Relay 2 pulse duration (seconds)	1.00		
37	RLY 2 TS	Relay 2 totalizer state	000000		
38	RLY 2 Low	Relay 2 low rate alarm setpoint.	00010		
39	RLY 2 High	Relay 2 high rate alarm setpoint	1000		
40	RLY 2 Delay	Relay 2 delay before alarm output (seconds)	10		
41	Station ID	WP20 serial interface station ID character	A		
42	Parity	Serial port parity type	NONE		
43	Baud Rate	Serial port baud rate	9600		
44	Command Menu	Serial port transmitter menu	00		
45	Protocol	Selects Serial Command protocol	TEC STD		
46	Data Type	Field-buss data type Long Integer or Float (32 bit)	LONG		
47	IP	Field buss IP address	000.000.000.000		
48	IM	Field buss IP mask	000.000.000.000		
49	I/O Rack	Field buss Rack size for Remote I/O protocol only	I/2 Rack		
50	Lock Aut Zr	Lock or unlocks the AUTO ZERO button	NO		
51	Lock Aut Sp	Locks or unlocks the AURO SPAN button	NO		
52	Lock Stp Ct	Locks or unlocks the STOP COUNT button	NO		
53	Lock Reset	Locks or unlocks the RESET button	NO		
54	Lock Code	Security passcode	00000		
55	ASC	Auto Span Correction factor	1.0000		
56	Span Detct	Change in load counts required to initiate AUTO SPAN	00050		
57	Load Count	Live load counts	View only		
58	Zero Count	Average load count defined during AUTO ZERO	1000		
59	Span Count	Average load count defined during AUTO SPAN	2000		
60	Params	Parameter/Flash memory options	NO CHANGE		

## - CHAPTER 12 – WARRANTY AND SERVICE POLICIES



### WARRANTY & SERVICE POLICY

#### CONVEYOR SCALES & WEIGH BELT FEEDERS

##### Statement of Limited Warranty – Tecnetics Industries, Inc.

**Tecnetics Industries, Inc.**, Warrants this equipment against faulty components or factory defects, for a period of five (5) years beginning on the date of shipment/invoice. (Speed sensors and load cells) shall have a warranty of one (1) year. During the warranty period, any defect will be repaired or replaced without charge, providing that the equipment is returned, pre-paid and undamaged to **TECNETICS'** factory. When on site repair or replacement is required, a **Tecnetics** authorized distributor or technician can be hired to diagnose and make necessary repairs. **The Warranty will cover affected parts, but excludes travel and labor expenses.**

##### Terms and Conditions of Limited Warranty

Accuracy of the device may be limited by poor installation, faulty or improper conveyor equipment on which the scale is to be placed, or improper calibration methods. Warranty is therefore limited to those installations having the approval of **TECNETICS** or an authorized **TECNETICS REPRESENTATIVE**. This exclusive warranty is limited to the original user, and no other express or implied warranties shall apply. Excluded from the warranty are normal wear and tear, removal or installation of warranty parts, freight, physical abuse, or buyer caused damage including, but not limited to, such things as overloading of the system, change in belt speed, or damage resulting from over-voltage, lightning, or water entry.

**WARRANTY IS EXCLUSIVE AND IN LIEU OF ALL OTHER EXPRESS AND IMPLIED WARRANTIES WHATSOEVER, INCLUDING, BUT NOT LIMITED TO, IMPLIED WARRANTIES OR MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE.**

**Tecnetics Industries, Inc.**, shall not be liable for damage to equipment, property or person due to improper installation or through attempts to utilize the goods under conditions that exceed the designated capabilities. It is the user's responsibility to determine the suitability of the equipment to his needs. Various State and Local agencies may require certain certification procedures relative to the use of this equipment. **Tecnetics** makes no assurance that this device fulfills those criteria beyond this warranty based on data sheets received from the buyer. **Tecnetics Industries, Inc.** specifically disclaims any consequential liability arising from the use of this product; maximum liability is limited to the original purchase price.