



## **WTS2 Series II Belt Scale**

# **Installation and Operation Manual**

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# WTS2S2 – INSTALLATION AND OPERATION MANUAL

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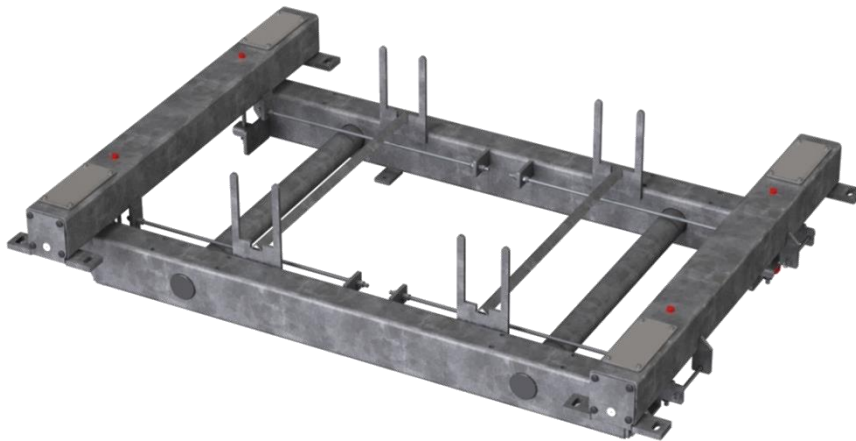
## *Introduction*

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The model “WTS2S2” belt scale is one of Web Tech’s “inventory” type conveyor belt scales, and is suitable for applications such as monitoring the flow of material onto stock piles and trucks. Accuracies in the order of  $\pm 0.5\%$  are achievable. The WTS2S2 conveyor belt scale is a heavy-duty two idler fully suspended weighframe particularly suitable for the mining industry. Incorporating four load cells, it is available to suit belt widths from 450mm to 2400mm. The weighframe can be supplied in either mild steel galvanised, or stainless steel construction. Standard idler spacing’s of 1000mm, 1200mm and 1500 mm are available.



**WTS2S2 In-situ in Conveyor  
1000mm Idler Spacing, 1000mm Belt Width**



**WTS2S2 Cal Bar**



**WTS2S2 In-Situ**

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# WTS2S2 – INSTALLATION AND OPERATION MANUAL

## *Web-Tech Belt Scale Range*

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Model	Description	Typical Applications	Accuracy
<b>E40</b>	Universal type scale, simplest installation, dual load cell.	Aggregate plants, Feeder control	$\pm, 1 - 5 \%$
<b>WTE11</b>	Single idler, single load cell process scale with mechanical tare, belt widths up to 1050 mm.	Aggregate plants, Timber plants, Gold ore plants	$\pm, 1 - 3 \%$
<b>WTE12</b>	Single idler, dual load cell process scale with mechanical tare, suitable for belt widths up to 1600 mm.	Aggregate plants, Timber plants, Gold ore plants	$\pm, 1 - 3 \%$
<b>WTE21</b>	Dual idler, single load cell process scale with mechanical tare, belt widths up to 1050 mm.	Aggregate plants, Timber plants, Gold ore plants	$\pm, 0.5 - 1 \%$
<b>WTE22</b>	Dual idler, dual load cell process scale with mechanical tare, suitable for belt widths up to 1600 mm.	Aggregate plants, Timber plants, Gold ore plants	$\pm, 0.5 - 1 \%$
<b>WTS1</b>	Single idler, dual load cell heavy duty suspended weighframe, suitable for belt widths from 450 to 2400 mm.	All mining applications	$\pm, 1 \%$
<b>WTS2</b>	Dual idler, dual load cell heavy duty suspended weighframe, suitable for belt widths from 450 to 2400 mm.	All mining applications	$\pm, 0.5 \%$
<b>WTS4</b>	Four idler, four load cell, fully suspended weighframe, suitable for belt widths up to 2400 mm.	High accuracy loadouts, Material transfers	$\pm, 0.25 - 0.5 \%$
<b>WTS6</b>	Six idler, four load cell, heavy duty suspended weighframe, suitable for belt widths up to 2400 mm, high belt tension areas.	High accuracy product transfers such as shiploaders	$\pm, 0.1 - 0.25 \%$
<b>WTS8</b>	Eight idler, four load cell, heavy duty suspended weighframe, suitable for belt widths up to 2400 mm, high belt tension areas.	High accuracy product transfers such as shiploaders	$\pm, 0.1 - 0.25 \%$

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# WTS2S2 – INSTALLATION AND OPERATION MANUAL

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## *Theory of Operation*

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Belt scales enable material to be weighed on a conveyor whilst in motion. A belt scale differs from a static weighing system, such as a bin weighing system, in that the belt scale is required to measure two variables. The first variable is the weight on the conveyor belt, and the second variable is the belt speed or belt travel. The weight of material on the conveyor belt is obtained by measuring the load on one or more idlers. This load can then be expressed in terms of kg/metre of belt. The belt speed or belt travel is measured by using a device which gives an output proportional to the belt speed or belt travel. The flow "rate" of material passing over the belt scale can be expressed as:

$$\text{Flow Rate} = \text{Weight ( Weighframe )} \times \text{Speed ( Belt Speed Sensor )}$$

$$\text{Total Weight} = \text{Weight ( Weighframe )} \times \text{Belt Travel ( Belt Speed Sensor )}$$

Belt scale manufacturers use either the belt speed (flow rate) or belt travel (total weight) methods depending on their design philosophy. Those that use the belt speed (flow rate) method use a high frequency speed sensor (up to 1 kHz), the output of which is proportional to the belt speed. The integrator primarily calculates the "rate" passing over the belt scale, from which the "total" is then derived. Those that use the belt travel (total weight) method generally use a low frequency speed sensor, which delivers a number of pulses per unit of belt length. The integration primarily calculates the "total" weight, from which the flow "rate" is then derived. Due to the availability of high-speed processors, most modern belt scales use the "rate" method as the basis for their electronic design. Whilst the mathematics used by the belt scale electronics may appear to be relatively simple, the tasks required of the electronics are more complex. Not only must the electronics be capable of receiving and processing the signals from the weighing mechanism and belt speed / travel device, it must also be capable of the following:

- Display Rate and Total readings
- Provide stable power supplies to the weighing and belt speed / travel elements
- Provide analogue and digital outputs for remote equipment
- Provide Automatic Zero and Span calibration facilities
- Provide serial communications for remote computers
- Carry out "Auto Zero" routines when the belt is empty
- Provide alarm functions
- Provide control functions
- Interface with the operator

The measurement of the weight on the conveyor belt and the belt speed / travel also present some physical problems which must be overcome. The accuracy of the weight measurement is dependent on a number of factors such as belt tension, belt construction, weighframe location, troughing angle and material loading. The degree of accuracy and ways of improving the accuracy are discussed in further detail in the following sections.



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## *Theory of Operation Weighframe*

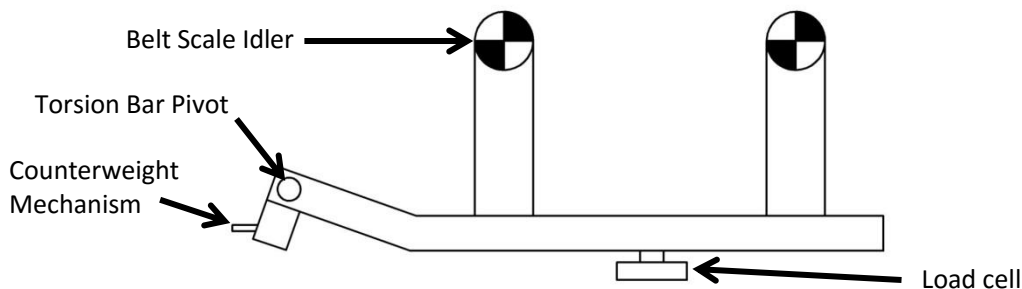
Belt Scales consist of four main components these being:

1. Weighframe and associated weigh idlers
2. Belt speed / travel sensor
3. Electronic Integrator
4. Calibration device

The function of the weighframe is to support the weigh idler(s) and conveyor belt, and to convert the weight of the material within the weigh area to an electrical signal, which can be processed by the electronics. Weighframes are varied in design, however the majority of the designs incorporate one or more transducers, most typically strain gauge load cells. The weighframe is usually self-contained, low profile, and designed to be installed within the limits of the conveyor structure. The number of idlers used is dependent upon the accuracy required, and the conveyor parameters. Various weighframe designs exist, each with their own perceived advantages. Most belt scale manufacturers use either a "pivoted" design or a "fully floating" design. With a pivoted design, one or more idlers are mounted on a frame, which is pivoted at one end by some form of fulcrum point. The fulcrum point is designed to be as frictionless as possible and to require as little maintenance as possible. Early pivot designs included knife edges and bearings or ball bearings, however due to the perceived maintenance problems, and the advent of transducers with very small amounts of movement, these were replaced with components such as torque tubes, flexures or rubber trunnions. The "fully floating" design comprises one or more idlers mounted on frame, which is in turn supported at each corner by a transducer. Horizontal and transverse restrainers limit the movement of the weighframe in any direction, except that perpendicular to the belt line. The advantages of both types of design are as follows:

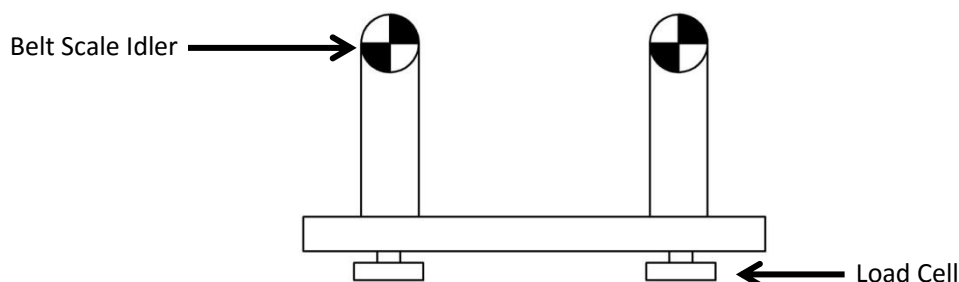
### **Pivoted Type Belt Scales**

- Requires less transducers
- Better sensitivity from the transducers. As the pivoted design can be counterweighted allowing the "deadweight" of the belt and idles to be removed.
- Less calibration weights required



### **Fully Floating Weighframe**

- Same design as used in high accuracy static weighing systems
- Do not use pivots, which could influence measurements
- Forces acting on weigh idlers act directly on transducers
- Calibration weights represent the same weight regardless of where they are placed on weighframe



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# WTS2S2 – INSTALLATION AND OPERATION MANUAL

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## *Theory of Operation Speed Sensor*

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As previously discussed, a sensor is supplied to provide a signal to the electronic integrator as to the actual belt speed or belt travel.

### **Belt Speed Sensor**

Belt speed sensors can be supplied in several arrangements. The most common method is for a "rotary" type sensor to be mounted in an enclosure and then to be connected to a "live" shaft pulley, usually the tail pulley. As the pulley rotates, the speed sensor shaft is also rotated, which in turn produces a pulse output. The frequency of the pulse output is proportional to the rotational speed of the pulley. Typical frequencies fall within the range of 100 - 1000 Hz. Belt speed sensors should not be connected to the drive pulley, as any slippage between the drive pulley and conveyor belt will not be measured. A second type of belt speed sensor involves mounting a sprocket at the end of a conveyor roll, and sensing its rotational speed with the use of a "Magnetic Pick-up". The magnetic pick-up counts the number of sprocket teeth that pass by a sensing element, and therefore produces a frequency proportional to the speed. This system is not normally used on applications where the conveyor rolls are subject to material build-up, as this will change the diameter of the roll and therefore the indicated belt speed. However on some applications where the idler rolls appear to be carrying build-up, closer inspection will show that the area of idler roll in contact with the belt remains clean. The advantages of using the idler roll / sprocket type of sensor is that they are relatively simple and robust, and can be situated close to the weighframe. When installed close to the weighframe, the belt speed being measured is the actual belt speed at the weighframe.

A third type of system still popular with some manufacturers / customers is the use of a pivoted "trailing" arm with a wheel in contact with the return belt. The wheel is attached to a rotary sensor similar to that used with the tail pulley method. The disadvantages of this method are:

The wheel is prone to bounce when a disturbance in the belt surface such as a splice passes under it. This will cause a variation in frequency output, and therefore the measured belt speed.

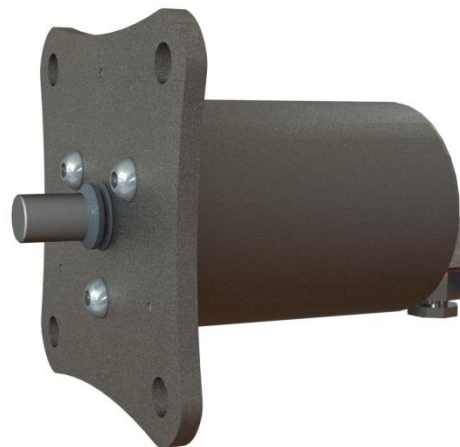
The wheel is usually mounted on the return belt adjacent to the weighframe. This can be a long distance away from the weighframe (by belt travel), and therefore the belt speed measured may not be the same belt speed at the weighframe.

### **Belt Travel Sensor**

A belt travel sensor usually consists of one or more "flags" welded to a pulley, usually the tail pulley, and a proximity probe. As the flags pass by the proximity probe they are counted, and this relates to the amount of conveyor belt that has passed around the pulley. The advantage of this type of system is that it is relatively simple and robust. However the disadvantage is that it is low frequency in output, and therefore the resolution can be coarse.



**PXT Speed Sensor**



**PXT Speed Sensor**

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# WTS2S2 – INSTALLATION AND OPERATION MANUAL

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## *Theory of Operation Integrator*

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The electronic integrator is designed to carry out the following basic functions:

- Provide supply voltages to weighframe transducers and belt speed / travel sensors
- Measure and integrate the instantaneous weight on weighframe and instantaneous belt speed / travel which calculates the mass rate and mass total passing over the conveyor respectively
- Provide analogue and digital outputs for remote equipment
- Provide facilities for calibration

The electronic integrator may also provide the following options:

- Provide P.I.D. control output
- Provide serial communications for remote computers
- Provide rate alarm outputs
- Provide batching facilities

Most modern integrators are microprocessor based with computing power similar to a personal computer. Each manufacturer engineers their own software, which incorporates their own design philosophies. Whilst all integrators may look similar at first glance, the methods used by the various manufacturers to achieve the end-result, can vary significantly. The current "state of the art" integrators are designed to make operation / calibration easier for site personnel, and great emphasis should be placed on the ease of use. Many sites will prefer the belt scale supplier to carry out routine maintenance and calibration, however in an emergency situation, there is nothing worse than having to wade through a manual, attempting to understand what a displayed code means.

### **Integrator Location**

The electronic integrator does not have to be located adjacent to the weighframe. Some customers may wish to mount the integrator in a nearby motor control centre or in a control room. Whilst this is possible the following points should be considered when selecting the location:

- The weighframe transducers produce very low voltage levels and therefore if long cables are used voltage drops may occur
- The longer the cable run, the greater the chance of picking up electrical noise on the cables
- Long distances between weighframe and integrator increases the time required when carrying out calibrations
- Is the proposed area classified as Dust Ignition Proof or Hazardous?

It is Web-Tech's belief that the best location for the integrator is adjacent to the weighframe where possible. The output signals can be used to provide information to remote equipment. The integrator should be mounted so that it is free from vibration, not subject to direct sunlight and rain. If installed outdoors it is suggested that rain / sun hoods are used. When selecting a belt scale system, the following integrator features should be investigated:

- Are the operation /calibration functions displayed / entered in plain English or in code form?
- Is the circuit design truly digital or does it require potentiometer adjustments in its setup?
- Are service and fault finding functions available?
- Does the integrator maintain its accuracy over a wide temperature range, typically 0 to 40oC
- Are the analogue and pulse outputs "isolated"?
- Is the integrator enclosure suitable for the environment?
- Does the system provide automatic zero and calibration facilities?
- Are the integrator outputs compatible with remote equipment?
- Is the integrator supplied with filters on the mains input?
- Can the integrator be easily serviced?

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# WTS2S2 – INSTALLATION AND OPERATION MANUAL

## *Theory of Operation Calibration*

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There are basically four methods that can be used to calibrate a belt scale system:

- Material Test
- Calibration Chain / Train
- Static Calibration Weights
- Electronic Simulation

### **Material Test**

A material test is the best form of test that can be done. The test involves collecting an amount of material that has passed over the belt scale, and weighing it on an accurate static weighing system such as a weighbridge or bin weighing system. Other methods of testing simulate material loading, however only a material test duplicates the actual operating conditions of the conveyor. With regard to the amount of material required for a test, a general rule of thumb is a test of 10 minutes duration. When considering the installation of a belt scale system, a method of diverting material from the process should be investigated. It is essential when carrying out a material test that it can be guaranteed that all of the material that has passed over the belt scale has been collected.

### **Calibration Chain / Train Test**

A calibration chain / train is a device that sits on the conveyor belt above the weighframe approach and retreat idlers. It is restrained in position whilst the conveyor is run, and simulates material loading. A calibration chain consists of a series of interconnected steel rolls, which is manufactured to represent approximately 80 % of the maximum belt loading. A calibration train is similar to a chain, except that it consists of a series of interconnected carriages, which can be loaded with weights to simulate various belt loadings. The disadvantages of calibration chains / trains are as follows:

- They are generally expensive, sometimes more expensive than the belt scale they are testing
- They require additional personnel to set up
- They have to be stored above the conveyor and therefore a storage structure has to be built
- They require maintenance

### **Static Weight Test**

Static weight tests are the most common form of testing carried out on Belt Scales. All belt scale manufacturers offer calibration weights as an option with the system, the weight and quantity sized to approximate 75 - 80 % of maximum belt loading. The calibration weights are applied directly to the weighframe, the belt is run, and material loading is simulated. This is the method Web-Tech generally uses to calibrate our belt scales. The advantages of this method are as follows:

- Can be applied by one person, and for high belt loadings, permanent weights that can be jacked on / off the weighframe can be installed
- If a material test can be initially carried out, they can be referenced to the material test results
- Repeatability tests are easy to carry out
- This is generally the cheapest method

The disadvantages of static calibration weights are as follows:

- They cannot exactly duplicate the running conditions of the conveyor
- They sit directly on the weighframe, and therefore do not duplicate the belt effects
- They tend to be lost

### **Electronic Simulation Test**

Electronic Simulation tests are carried out without the use of weights, material or chains. When the test is initiated, a "shunt" resistor is applied across the transducer input, which creates an offset. The value of the resistor is usually calculated to represent approximately 75 - 80 % of maximum belt loading. A test value is initially established at the time of commissioning, which can then be used to check the repeatability of the system. This method of testing does not obviously take into account the belt effects or conveyor running conditions. Web-Tech provides this method of testing as a standard feature, however we do not place great emphasis on its use.

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# WTS2S2 – INSTALLATION AND OPERATION MANUAL

## *Theory of Operation Conveyor Design*

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Conveyors are designed to transport material from one location to another, and not specifically for the benefit of a belt scale. A belt scale is often an afterthought, and therefore the conveyor design may be less than ideal for accurate and repeatable results. The following is a summary of recommended conveyor design.

### **Weighframe Location**

The weighframe should be located in a position where the belt tension and belt tension variations are minimal. Generally speaking this location is at the tail end of the conveyor at the loading point. However sufficient distance from the loading point should be provided to allow the material to be settled, and be travelling at the same velocity as the belt. Typically for most products, this is approximately 6 idler widths or from 6-9 metres.

### **Conveyor Inclination**

Ideally the conveyor would be horizontal to provide for more consistent belt tensions, however this is not generally practical. The conveyor inclination angle should not be so great as to allow the product to roll back. This will cause a positive error (some material will be weighed twice) from the belt scale.

### **Concave and Convex Curves**

Concave curves should be avoided where possible. The weighframe should be located as far away as possible from the tangent point of the curve, and no closer than 20 metres. Convex curves are less of a problem, however the weighframe should be located no closer than 6 metres from the tangent point of the curve.

### **Conveyor Take-up**

The conveyor should preferably be fitted with gravity take-up on the return belt. Gravity take-ups located on the tail pulley are acceptable, however less desirable. Screw take-ups on short conveyors (less than 15 metres) may be acceptable, however not preferred.

### **Belt Loading**

Belt loading should be uniform and consistent. Belts should be sized so that they are volumetrically 75 - 80 % full.

### **Belt Type**

The selected belt type should use the minimum number of plies possible. Additional plies add to the stiffness of the belt and therefore reduce the achievable accuracy. Steel cored belts are the least desirable due to the stiffness of these belts. Conveyor belts should be uniform in weight, with a minimum of splices. Metal clip fasteners should not be used.

### **Belt Tracking**

Belt tracking should be central to the idlers regardless of belt loading. Training idlers should not be used any closer than 5 idler spacings from the weighframe.

### **Conveyor Idlers**

It is more desirable to use idlers with shallow troughing angles. Idlers with 20° angle are better than 30° angle, and 30° is better than 35°. Idlers with 45° troughing angle can be used, however errors due to belt tension changes are more significant. The steepness of the troughing angle determines the planar moment of inertia of the belt, which determines how susceptible the Belt Scale is to belt tension variations and misalignment. Idlers on the weighframe, two approach and two retreat idlers should be:

- In-Line "Weigh Quality"
- Rolls should be machined concentric to provide 0.13 mm Total Indicated Runout
- Rolls to be balanced within 0.011 Nm
- Rolls to be fitted with some form of height adjustment

On some low accuracy applications, some of the above requirements may not be required.

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# WTS2S2 – INSTALLATION AND OPERATION MANUAL

## *Theory of Operation Conveyor Design*

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### **Idler Alignment**

The mechanical alignment of the weigh approach and retreat idlers is critical. The height misalignment in this area should be no greater than  $\pm 0.4$  mm. Mechanical misalignment of these idlers will cause the accuracy of the system to vary depending on belt tension variations. It is advisable to have the belt scale supplier assist in the mechanical installation.

### **Conveyor Stringers**

The conveyor stringers should be rigid, free from vibration and capable of supporting the load without deflection. The weighframe's and approach / retreat idlers should not be installed where joins in the stringers exist if this is not possible, stringers should be welded together using "fish" plates. The stringers should be suitably supported in the area of the weighframe / approach / retreat idlers so that the total deflection within the weigh area does not exceed 0.25 mm.

### **Environmental Protection**

Where the conveyor is exposed to the elements, errors may be induced by external influences such as wind. Errors equivalent to 30 tonnes per hour have been measured on large conveyors subject to high wind velocities. These errors can be minimised by installing guards, which protect the weighframe and 5 metres of conveyor in each direction. Where possible, supply the belt scale manufacturer with a detailed arrangement drawing of the proposed installation with as many parameters as known.



**WTS1S2 Belt Scale in Operation**

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# WTS2S2 – INSTALLATION AND OPERATION MANUAL

## *Theory of Operation Weighframe*

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Most belt scale manufacturers can supply a number of different model weighframes and electronic integrators. Some models may appear to duplicate each other in regard to accuracy specifications and general features. For example, two different model weighframes may be specified at an accuracy of  $\pm 0.5\%$ . However one model may be designed for medium duties with relatively light belt loadings and the other for heavy-duty applications with high belt loadings. When you examine the construction of the weighframe, will it stand up to the duty?

The accuracy of the system will be determined by the weighframe type, as the same model electronics will normally be used regardless of the accuracy requirements. More than one model electronics may be available, however this is generally because they offer various options. When specifying a desired accuracy for the belt scale system, the application should be investigated thoroughly. Like most equipment, the higher the accuracy specified the more expensive the system will be.

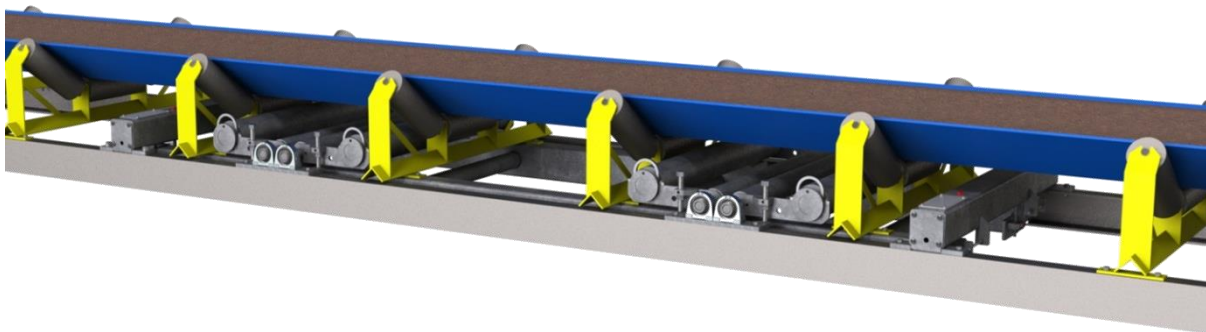
Belt scale accuracy depends on a number of factors such as belt tension, belt type, location and belt loadings. However they are usually categorised into one of three groups.

**SINGLE IDLER** Used for general purpose process scales, with typical accuracies in the order of 1% to 3%.

**DUAL IDLER** Used for inventory purpose scales with typical accuracies of 0.5%.

**MULTI IDLER** Used for high precision systems such as ship loaders and scales for payment purposes. Accuracies typically 0.25% or lower.

However in some applications it may be necessary to use a four idler weighframe to achieve 1% accuracy. On other applications, a single idler weighframe may achieve 0.5% accuracies. The belt scale supplier will require certain information regarding the application, which should be detailed on their "Application Data" sheets. It may be preferable to allow the supplier to review the data and advise what options are available in regard to the possible accuracy versus the costs, rather than specifying the accuracy.



**WTS4S2 in Operation**  
**4 Idler Precision Belt Scale**

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# WTS2S2 – INSTALLATION AND OPERATION MANUAL

## *Theory of Operation Weighframe*

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Many belt scale installations are ignored until a problem exists. Like all equipment a minimum of maintenance will assist in providing long-term reliability. For multiple installations at the one site it may be worth contracting the Belt Scale supplier to carry out the maintenance and regular calibrations. These visits can also be used to provide basic training for the site personnel in the event of an emergency breakdown situation. These site visits are normally scheduled at three monthly intervals.

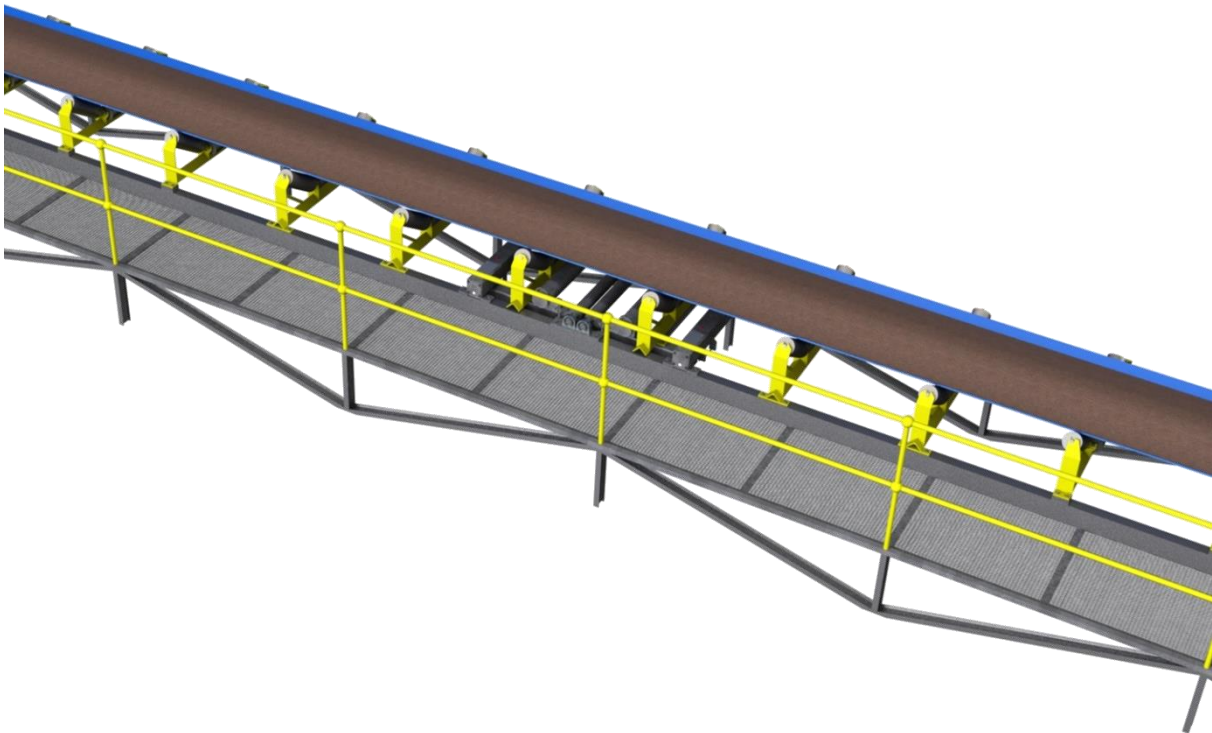
The following work should be carried out on a regular basis:

- Clean down of build-up on weighframe and removal of spillage
- Inspection and cleaning of idler rolls
- Zero calibrations
- Inspect belt tracking
- Inspect belt wear

The following work can be carried out less frequently:

- Span calibrations
- Check mechanical alignment
- Balance transducers (where necessary)
- Check cabling and junction boxes

Apart from the general housekeeping of the installation, the other important aspect that should be addressed is the record keeping for each installation. Most modern belt scale electronics store all data in battery backed or non-volatile memory, however in the case of catastrophic failure this data will probably be lost or not accessible. At these times it is essential that accurate records be available for reprogramming purposes. Accurate records also allow review of the belt scale performance and possible problems that may require attention.



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# WTS2S2 – INSTALLATION AND OPERATION MANUAL

## *Mechanical Installation*

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The mechanical installation of a WTS2 Series II belt scale comprises the following work:

- Lifting of conveyor belt in proposed weighframe location
- Installation of weighframe and support beams
- Installation of weigh idlers on weighframe
- Installation of approach and retreat idlers
- Aligning the height of the weigh, approach and retreat idlers

**Refer to drawings:**

**Calibration Bars**

**WTS2S200 & WTS2S210**

**In situ Calibration Weight**

**WTS2S211 & WTS2S212**

**In situ Calibration Weight Billet**

**WTS2S213 & WTS2S214**

### **Weighframe Location**

The weighframe location may have been previously nominated after discussions with Web-Tech. If not refer to the "Belt Scale Selection and Installation Guide" section of this manual for guidance, or contact Web-Tech to confirm the position.

**BEFORE CARRYING OUT ANY WORK ON THE CONVEYOR, ISOLATE THE CONVEYOR DRIVE AS REQUIRED.**

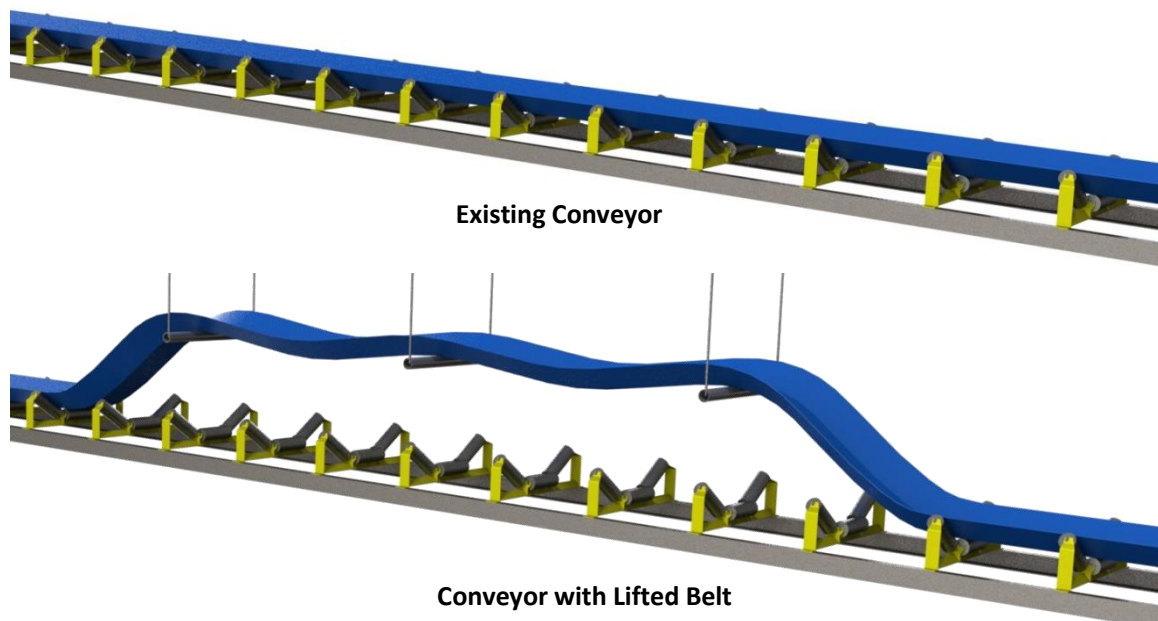
### **Lifting of Belt**

The conveyor belt (if fitted) will be required to be lifted off the idlers in the area of the installation. The belt should be lifted so that access is available for approximately 5 metres either side of the weighframe centre. The belt should be lifted approximately 600 mm above the idlers, and the belt should be lifted by means of placing pipe or timber under the belt, which will keep the belt flat. If the conveyor is fitted with a gravity take-up, it will be necessary to lift the take-up weight first. Ensure that the belt is supported securely before commencing any work.

### **Weighframe Installation**

The weighframe is robust in design, however care should be exercised when lifting and installing it into position. **The weighframe should be lifted with web slings, do not use chains.**

- 1) If standard idlers already exist, remove 6 sets from the conveyor.



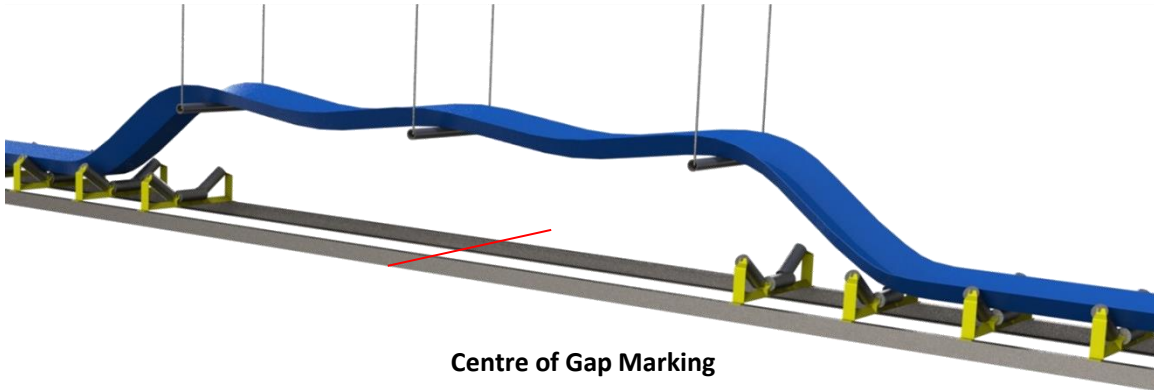
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# WTS2S2 – INSTALLATION AND OPERATION MANUAL

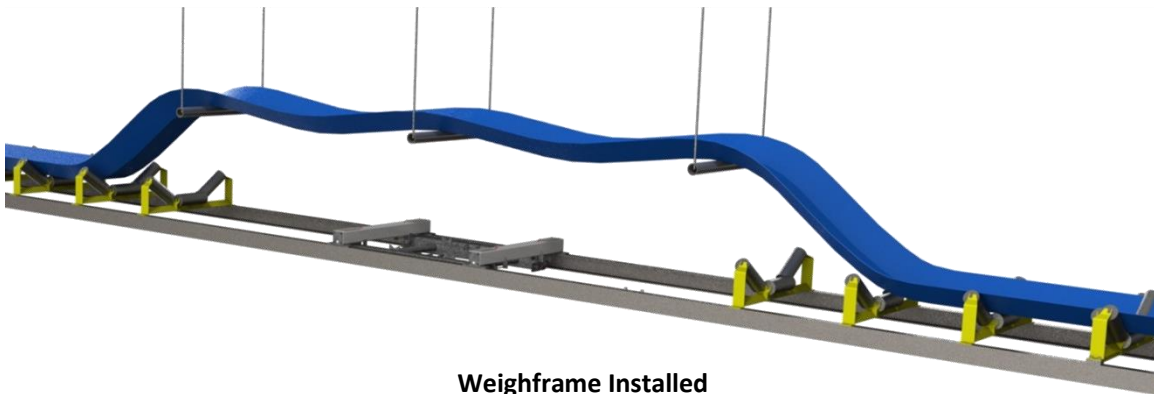
## *Mechanical Installation*

---

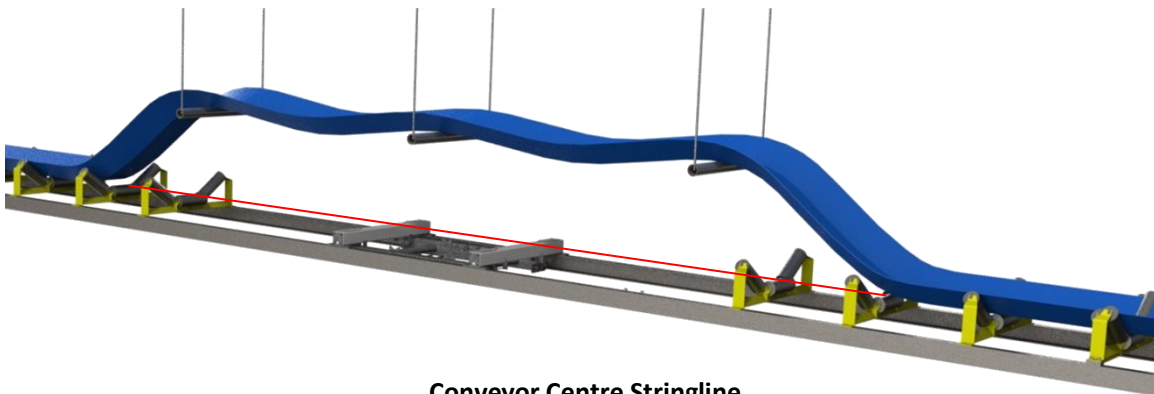
- 2) Mark out the centre of the space created, and this will be the centre of the weighframe.



- 3) Remove the weighframe from the packing crate.  
4) Lift the weighframe into the conveyor so that the weighframe mounting feet are sitting on the stringers. Position the weighframe so that the centre of the weighframe is in line with the previously marked out centre of the space.



- 5) Measure and mark the centre of the centre (horizontal) roll on the first of the existing idlers in each direction. Tie a stringline between these centre points.



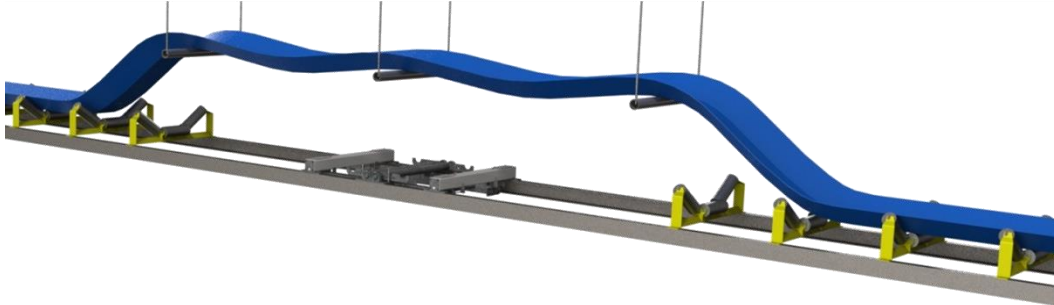
- 6) Measure and mark the centre of the weighframe crossbeams. Square the weighframe up so that the centre of the crossbeams are in line with the stringline.  
7) Mark out the position of the weighframe mounting holes on the conveyor stringers. Drill 18 mm holes, for M16 bolts. Install bolts, washers and nuts and tighten down. Ensure that spring washers are used.

# WTS2S2 – INSTALLATION AND OPERATION MANUAL

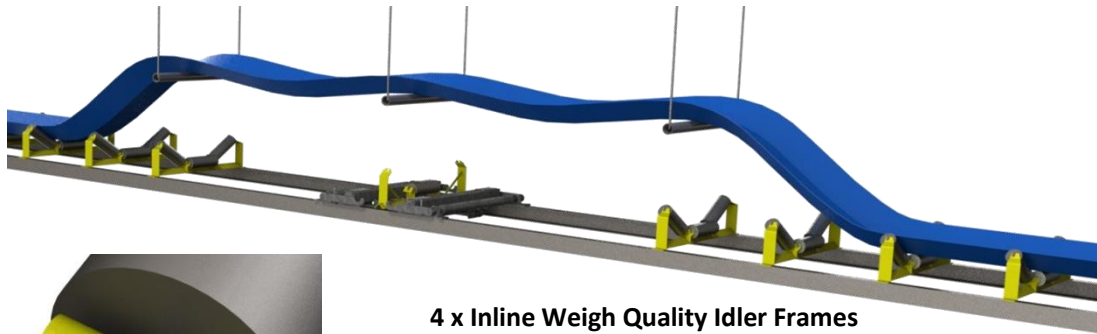
## *Mechanical Installation*

- 8) **If the belt scale being installed uses calibration bars ignore this step.**

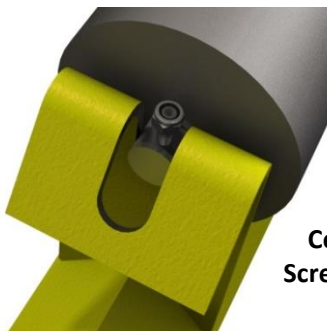
Web-Tech supplies a custom set of calibration weights for each belt scale. Install the calibration weight bearings as specified by Web-Tech. The actual weights will be installed later. It is important to bearings are aligned so that they enable to the calibration weights to make clean contact with the “V” blocks welded to the weighframe.



- 9) Locate one of the In-Line Weigh Quality idlers. Sit the idler frames across the weighframe on the idler mounting plates. Install centre rolls into the idler frames (wing rolls not required at this stage). Ensure that grub screws in roll shafts are not protruding from the bottom of the shaft. Measure and mark the centre of the centre roll face.



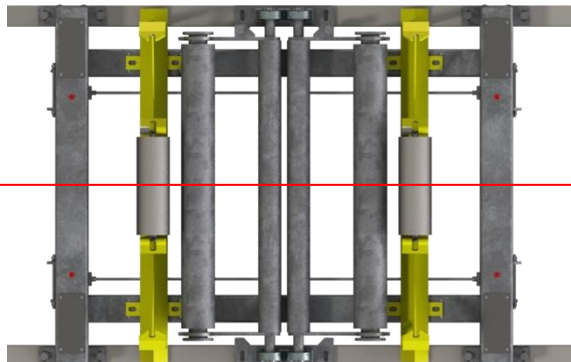
**4 x Inline Weigh Quality Idler Frames  
With Centre Roll Installed**



**Centre Roll Grub  
Screw and Nyloc Nut**

- 10) Position the idlers so that they are:

- In line with the stringline
- Are dimensionally laid out as shown on the installation drawing. When the idlers are positioned correctly, the idler base is to be welded to the mounting plates on the weighframe.



**NOTE: THE LOADCELLS ARE PREINSTALLED IN THE WEIGHFRAME AND COULD BE DAMAGED BY IMPROPER WELDING PRACTICES. ENSURE THAT WELDING EARTH STRAP IS CONNECTED AT THE POINT OF WELDING.**

# WTS2S2 – INSTALLATION AND OPERATION MANUAL

## *Mechanical Installation*

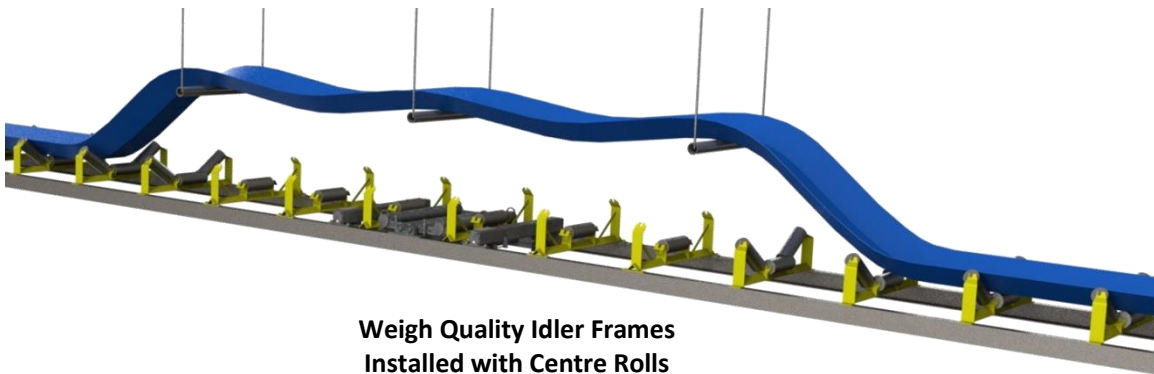
- 11) If the belt scale being installed uses calibration bars ignore this step.

Now that the idler frames have been welded into position the calibration weights can be installed. The bar type of calibration weights do not need to be installed at this time.



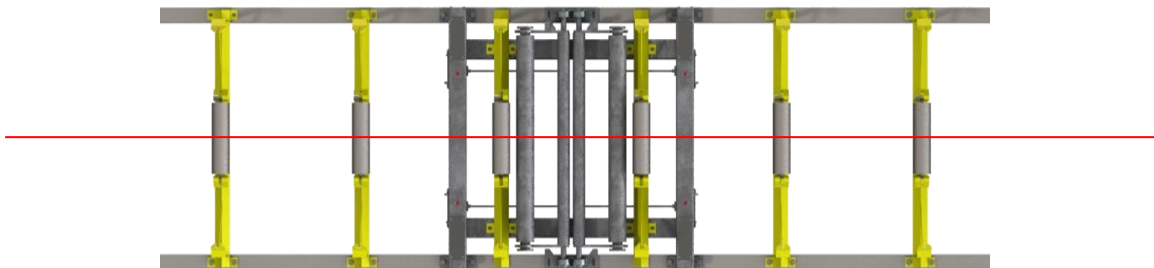
**Calibration Weights Installed  
onto the Calibration Weight Bearings**

- 12) Locate the remaining in-line weigh quality idlers, and sit frames across the conveyor stringers, with two sets upstream and two sets downstream of the weighframe. Install centre rolls in these frames. Measure and mark the centre of the centre roll face on these idlers.



**Weigh Quality Idler Frames  
Installed with Centre Rolls**

- 13) Position the idlers so that they are:
- In line with the stringline
  - Are dimensionally laid out as shown on the installation drawing

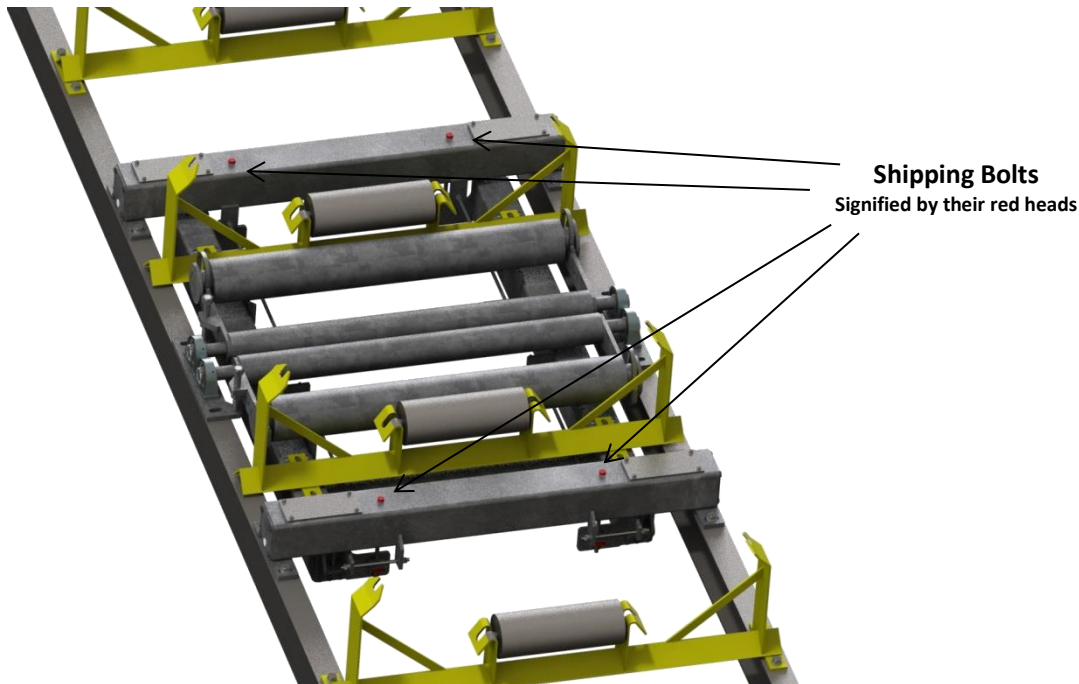


- 14) Mark out mounting holes on stringers and drill holes to suit the idler mounting feet. Install bolts, washers and nuts and tighten down. Ensure spring washers are used.
- 15) Re-check idler spacing and centres. Adjust if necessary.
- 16) Run a further two stringlines (30 lb fishing line) from the same existing idlers as the centre line was tied off to. The stringlines should be approximately 12 mm in from each edge of the roll.

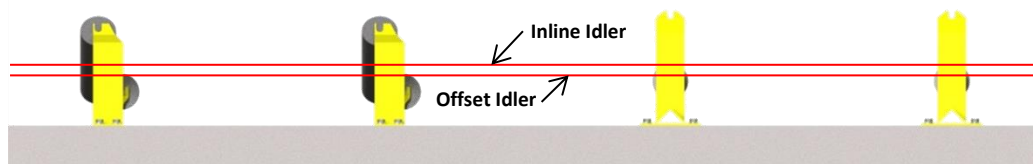
# WTS2S2 – INSTALLATION AND OPERATION MANUAL

## Mechanical Installation

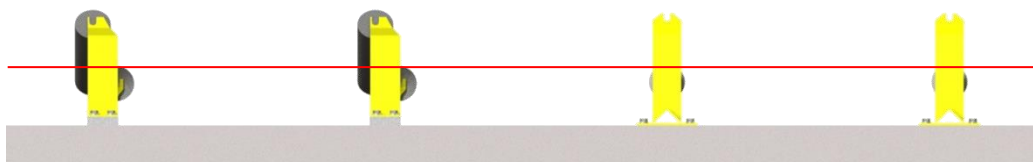
- 17) Carefully lower the weighframe shipping bolts so that the weighframe now sits on the load cells.



- 18) Go to the first in-line idler (shown as +C2). Place a spirit level across the top of the centre roll. Adjust the idler roll using the grub screws, so that it is level. If the amount of adjustment required is more than approximately 5 mm, it is better to use a packer under the idler mounting foot.
- 19) Go to the last in-line idler (shown as -C2) and level centre roll.
- 20) The in-line idlers should be higher than the existing offset idlers due to their design. The levelled centre rolls should already be in contact with the two stringlines at the edge of the rolls. The in-line idlers should never be lower than the standard existing idlers. If they are, they will require packers to be installed under all mounting feet.



Offset Idlers vs Inline Idlers



Offset Idlers with Packer Plates vs Inline Idler

- 21) The two reference stringlines should be clear of the centre rolls in the other idler frames (+C1, W1 & -C1). If not, adjust the grub screws on +C2 and -C2 idlers by equal amounts until both stringlines are clear of all centre rolls. When this has been completed, ensure locknuts are tightened. Permissible tolerance is +0.4, -0.0 mm.
- 22) Proceed to adjust the remaining centre rolls until they just touch the stringlines. Ensure all locknuts have been tightened after adjustment. After all rolls have been adjusted, recheck all rolls are still in contact with the stringlines.

# WTS2S2 – INSTALLATION AND OPERATION MANUAL

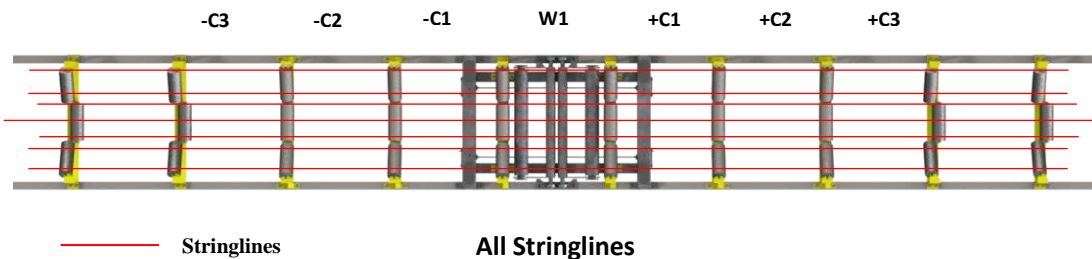
## *Mechanical Installation*

- 23) Locate the remaining idler rolls and install all wing rolls. Ensure that grub screws in roll shafts are not protruding from the bottom of the shaft.



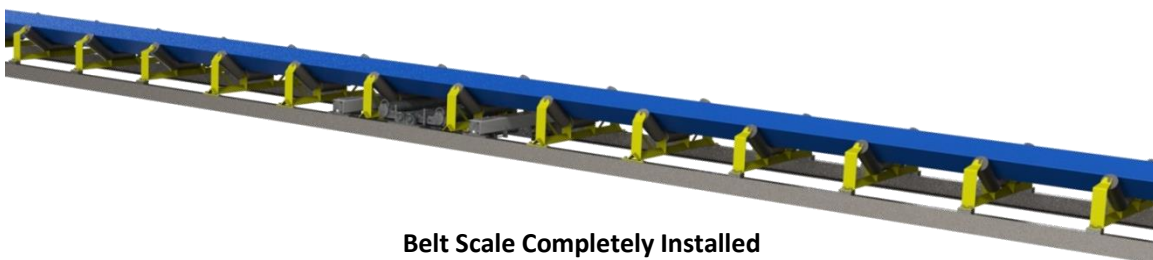
**All Wing Rollers Installed**

- 24) Run a further two string lines on both sides of wing rolls similar to the centre rolls.



**All Stringlines**

- 25) Starting on one side of wing rolls, the same procedure is required to be carried out as the centre rolls. Adjust the wing rolls on +C2 and - C2 idlers evenly so that they are clear of all remaining wing rolls.
- 26) Go through and adjust all rolls so that they are just touching the stringlines. When this has been completed, ensure that all locknuts are tightened. Permissible tolerance is +0.4, 0.0 mm.
- 27) Review all adjustments, and if satisfied, remove all stringlines.
- 28) Carefully lower the conveyor belt. Do not drop the belt onto the weighframe.



**Belt Scale Completely Installed**

---

# WTS2S2 – INSTALLATION AND OPERATION MANUAL

## *Electrical Installation – Encoder Speed Sensor*

---

### **Description**

The belt speed sensor supplied with the belt scale is a digital incremental encoder. It produces a square wave output, the frequency of which is proportional to the belt speed.

The encoder should be connected to a non-driven pulley i.e. not a drive pulley. This is because there could be some slippage between the drive pulley and the belt. The encoder is typically connected to the tail pulley or a “snub” pulley.

The encoder is available in the following models:

**100 PPR**

**200 PPR**

**500 PPR**

The model supplied for your application has been based on the belt speed, and pulley diameter information that was provided. For slower belts, an additional pulse multiplier board may be supplied. This board is located in the belt speed sensor junction box. It allows the pulses from the encoder to be multiplied X1, X2 or X4. The frequency range is typically 80 to 500 Hz.

### **Mechanical installation**

The installation of the encoder can be either by direct connection to the pulley shaft using a solid coupling, or on a separate bracket and spring coupling.

If using a solid coupling, the encoder must use a restraining arm, which is in contact with a fixed part of the conveyor. This will prevent the encoder from rotating with the pulley shaft.

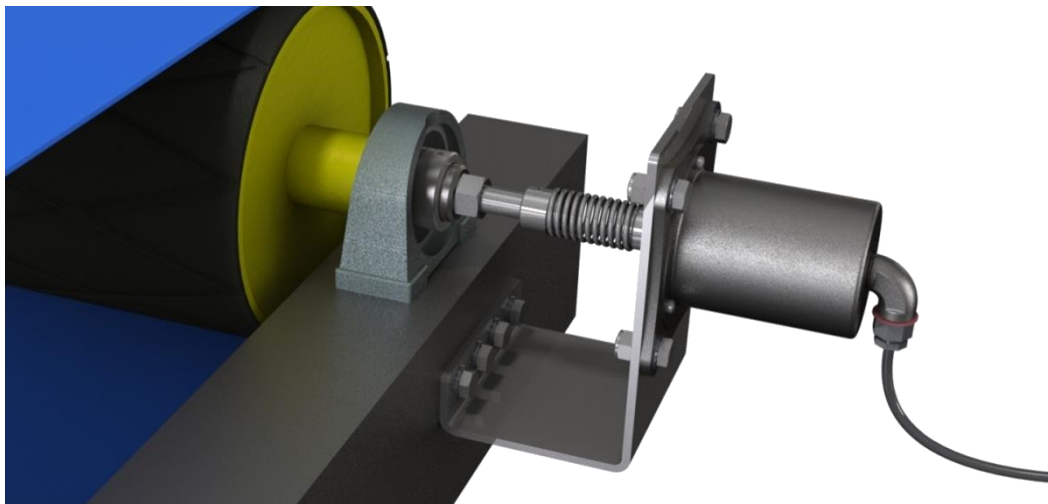
If using the spring coupling method (most common), the spring coupling alignment must be within 1 mm in all axes. If the coupling is not correctly aligned, it will eventually break. Provision must be made so that if the pulley position is changed, the encoder bracket can also be moved to maintain accurate alignment. See drawing “” in Appendix B to see typical installation arrangements.

### **Electrical Installation**

The encoder is provided with a three (3) core cable approximately 1 metre long. Therefore the belt speed sensor junction box must be installed within its reach. The cable should be mechanically protected. Refer to drawing “JB010017” (Appendix B) for termination details.

### **Part Number**

The part number(s) for the encoder include the PPR output of the encoder. The typical P/No. is “WXT-XXX” where “XXX” is the PPR. Therefore a 100 PPR encoder would have the P/No. “WXT-100”.



**WXT Encoder With Spring Coupling on Tail Pulley**

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# WTS2S2 – INSTALLATION AND OPERATION MANUAL

## *Electrical Installation – Magnetic Pickup Speed Sensor*

---

### **Description**

The belt speed sensor supplied with the belt scale is a stainless steel magnetic pick-up. It is not a proximity switch, and does not require a supply voltage. It produces a sinusoidal output, the frequency of which is proportional to the belt speed. The amplitude of the voltage output is proportional to the rotational speed of the idler roll/sprocket, and the proximity of the magnetic pick-up to the sprocket. A sprocket is also supplied with the sensor, which is installed on the end of an idler roll. If the sprocket has not been fitted by Web- Tech, it is extremely important that the sprocket be fitted centrally to the idler roll. We suggest that the sprocket be fitted, then rotated in a lathe to check its concentricity.

### **Mechanical installation**

The installation of the magnetic pick-up should be on an idler adjacent to the weighframe. The idler roll used should be the horizontal centre roll. The magnetic pick-up should be adjusted so that the sensor “nib” is 0.5 mm from the sprocket tooth. After adjustment and the locknut tightened, the idler roll should be rotated by hand to ensure that no teeth on the sprocket come into contact with the sensor nib.

### **Electrical Installation**

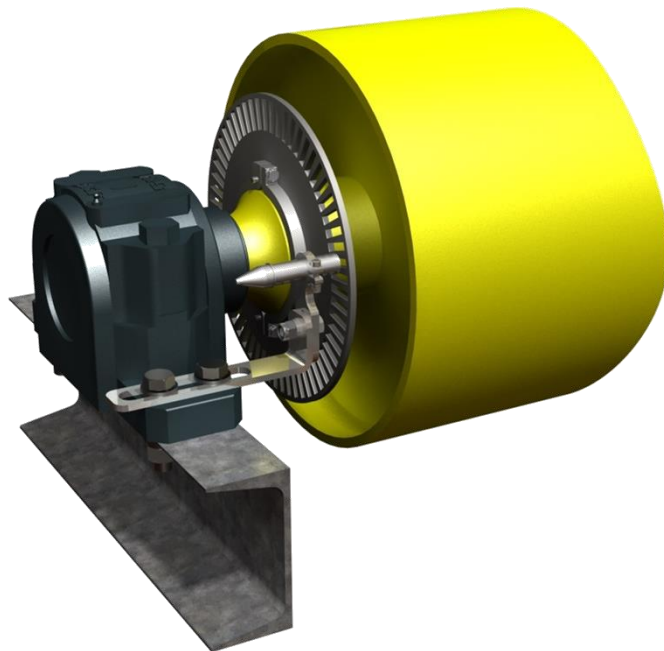
The magnetic pick-up is provided with a two (2) core cable approximately 2.5 metres long. Therefore the belt speed sensor junction box must be installed within its reach. The cable should be mechanically protected.

### **Part Number**

The P/No. for the magnetic pick-up is:

BS-013-01

BS-013-02



**Mag Pickup and Target Disk on Pulley**

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# WTS2S2 – INSTALLATION AND OPERATION MANUAL

## *Electrical Installation – Proximity Switch*

---

### **Description**

The belt speed sensor supplied with the belt scale is a proximity switch. It is used in conjunction with “flags” on a pulley, or specifically designed sprocket. It produces a square wave output, the frequency of which is proportional to the belt speed. A “pull-up” resistor is provided, which is installed in the belt speed sensor junction box. Sufficient flags must be installed so that the frequency output is not less than 10Hz at the slowest belt speed.

### **Mechanical installation**

The installation of the proximity switch should be typically 3 mm to 5 mm from the metal flags. The maximum sensing distance of the switch supplied is 15 mm. The minimum clearance between the face of the switch and any metal past the flags should be twice the sensing distance (30 mm). Ensure that the face of the proximity switch will not come in contact with any of the flags. After adjustment tighten any locknuts.

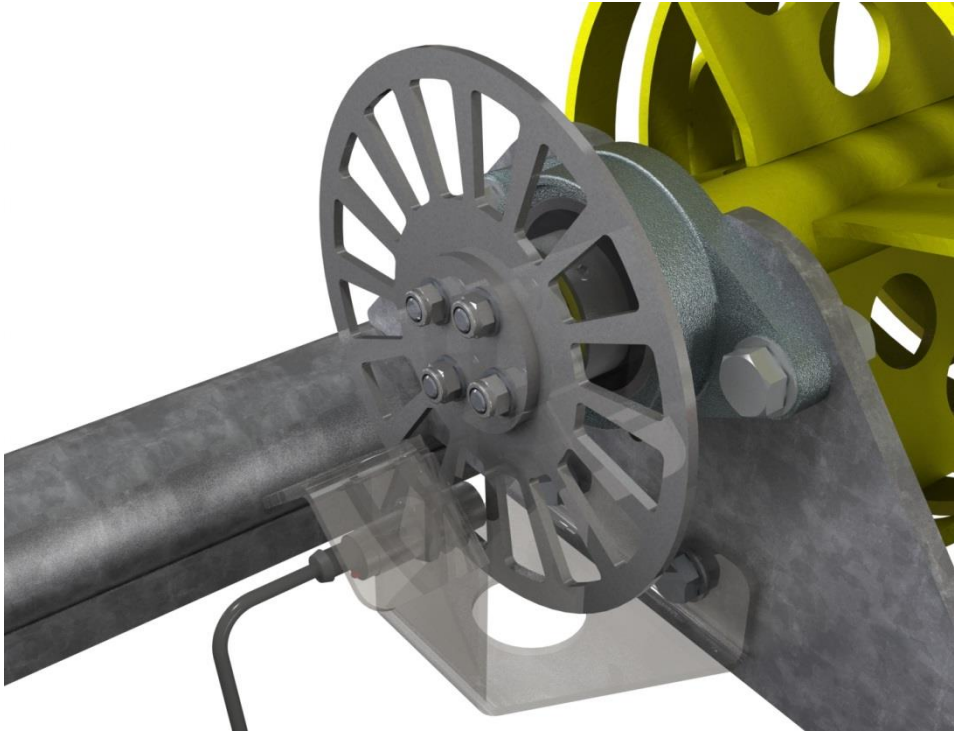
### **Electrical Installation**

The proximity switch is provided with a three (3) core cable approximately two (2) metres long. Therefore the belt speed sensor junction box must be installed within its reach. The cable should be mechanically protected.

### **Part Number**

The part number for the switch supplied is as follows:

BS-014-02



**Proximity Switch and Stainless Steel Target Disk Installed on Spiral Tail Pulley**

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# WTS2S2 – INSTALLATION AND OPERATION MANUAL

## *Electrical Installation – Integrator Optimus*

---

Electrical connection diagrams for the belt scale electronics, load cell and belt speed sensor junction boxes are located in Appendix B of this manual. Electrical installation comprises the following work:

- 1) Install and connect the “Optimus” integrator to mains supply (See “WFOPTIMUS03”, Appx. B).
- 2) Install and connect load cell wiring between weighframe and load cell.
- 3) Install and connect cable between load cell junction box and electronics.
- 4) Install and connect cable between belt speed sensor junction box and electronics.
- 5) Install cable between electronics and PLC (if required) for output signals.

### **Belt Scale Electronics**

The belt scale is supplied with the following model electronics:

The appropriate electrical connection drawing or the electronics supplied is located in the drawings section of the manual.

### **Enclosure Mounting**

The electronics enclosure is an IP66 RFP or stainless steel enclosure.

The enclosure should be located so that:

- 1) It is not in direct sunlight (install sunshield if located outdoors).
- 2) Is not subject to direct washdown.
- 3) Is not installed in close proximity to high power cables, variable speed drives or vibratory feeder controllers.
- 4) Not more than 5 metres from the weighframe. Having the electronics located close to the weighframe reduces the chances of electrical interference on the cables. It also makes it easier when carrying out calibrations and fault finding. The weighframe has been supplied with an integral 5 metre cable for connection to the electronics.

### **Cables**

All cables between the load cell/belt speed sensor junction boxes and the electronics should be proper screened instrumentation quality. As the signal levels from these devices are very low, any cable runs between the weighframe/speed sensor and electronics should be carried out so that these cables are not installed close to power cables.

Suggested cable type for each application is as follows:

Load Cell – 4 core overall screened, Belden type 8723 or equivalent.

Belt Speed Sensor – 3 core overall screened, Belden type 8770 or equivalent. Ensure that all cable entries into the electronics enclosure and junction boxes use the correct size waterproof glands.

### **Cable Terminations**

Load Cell junction box – Refer to drawing “LJBL-01” in Appendix B of this manual.

Speed sensor junction box – Refer to drawing “JB010017” in Appendix B of this manual.

### **Start Up**

Prior to turning on the equipment, or operating the belt scale, ensure the following has been done:

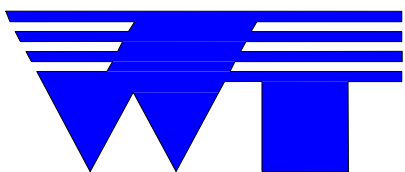
- Double check all electrical connections are correct.
- All mechanical installation has been completed and no tools have been left on the belt.

### **Start Up Steps**

When starting up the system for the first time, use the following steps:

- 1) Turn on the electronics, and ensure it displays the Mass Rate, Mass Total (MRMT).
- 2) Start the conveyor. If using variable speed drive, set it in local and ramp the frequency up to 50Hz.
- 3) The load cell output can be directly read from the electronics. Refer to the electronics manual for the appropriate menu for reading the load cell voltage.

The belt speed sensor output can be read directly from the electronics. Refer to the electronics manual for the appropriate menu for reading the belt speed sensor frequency output. Run the conveyor and ensure that there is a stable output from the speed sensor  $\pm 3$  Hz



# OPERATION MANUAL

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# Masterweigh Optimus

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Web-Tech Australia Pty Ltd

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BRISBANE QLD 4113  
AUSTRALIA

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# **Optimus.**

## **General Description.**

---

Optimus is a powerful, microprocessor based weighbelt integrator. By design it can be used in a "stand alone" mode or slaved to a PLC or other plant supervisory system. Communication between the plant controller and Optimus being effected by one of the following Profi-Bus®, Device-Net®, TCP-IP, 4/20 mA, a range of digital inputs and outputs and relays (clean contacts). When used in the stand alone mode, control of the weighbelt feeder and associated equipment, valves, slide gates and conveyors is performed by Optimus.

The electronics are housed in an IP67- NEMA 4 rated enclosure, suitable for use in most industrial environments. However it is advisable that the package be shielded from continuous sun light and running water. The use of high pressure hoses to wash down the enclosure is not recommended. The electronics can be accessed through the access door which can be either latched, unlatched and padlocked or the latches removed and screws closed.

The Central Processing Unit (CPU) printed circuit board (PCB) is a six layers and contains all the main electronic components. In the unlikely event and Optimus fails, field fault finding is made easy as CPU, PCB is easily changed.

The Terminal PCB has been made extra thick (3mm) to provide a mechanically secure platform for the angled connectors.

The Power PCB is fitted with an auto voltage and frequency select power supply that makes Optimus suitable for use in most countries in the world. A switch and fuse provide a suitably qualified technician with a convenient method of mains power isolation and fuse checking.

All functions are made available through the front interface keypad and a (240 x 64 dot) LED back lit display. Optimus uses "state of the art" electronic components and programming techniques. It has been designed to operate with the entire range of Web-Tech and other manufacturers weighbelt and conveyor belt scales.

At the heart of the controller is an eLAN 520, 32 bit microprocessor, running at 100MHz connected to a highly accurate and stable three channel analogue to digital converter (A/D converter). Optimus is supplied with a generous amount of 32 mbytes of SDRAM. This allows for future firmware expansion and customers specific custom software. Some of this storage is used for firmware, default variables and customer specific variables.

Should firmware upgrades be made available, Web-Tech will make the program available on Compact Flash modules, that simply plug into a socket on the CPU printed circuit board and automatically download the program. The Compact Flash module also serves as a storage device for the data logging feature incorporated in Optimus. The logged data can be sent back to Web-Tech for analyses should there be a problem with the system.

The analogue inputs from the load cells are channelled through a 24 bit analogue to digital converter specifically designed for use with load cells in an industrial environment.

Six auxiliary 12 (4096 values) bit analogue inputs, locally programmable as 4/20mA - 0/20mA - 0/25mA & 0/50mA. along with six digital outputs provide Optimus with the ability to monitor other processes associated with the feeder and process.

Five digital outputs provide voltage free contacts for use with PLC and SCADA systems.

One digital output (solid state switch) provides a means of indicating weight accumulation at low and high speed rates.

---

# **OPTIMUS OPERATIONAL MANUAL.**

## **Specifications and Site Requirements.**

---

### **Power Requirements.**

240V AC +/- 10% 50/60 Hz  
117V AC +/- 10% 50/60 Hz.  
2amps @ 240V  
4amps @ 117V

### **Main Board.**

AMD Elan SC520 microprocessor running at 100 MHz.  
8 Mb DRAM.  
1 Mb soldered-down flash memory (expandable up to 4 Mb).  
Compact Flash card type I or II header (supports any density CompactFlash cards).  
Socket for up to 1Mb Flash or PROM BIOS (can replace soldered down flash).  
Industry standard PC/104 expansion header with: 13 redirectable interrupts, 2 DMA channels and 8/16 bit I/O and memory interface.  
Watchdog timer  
Voltage supply brownout protection and reset generation.  
Industry standard JTAG boundary scan interface for board testing & debugging.  
High efficiency 3.3V and 2.5V on-board power supply for digital logic.

### **User Interface.**

Support for up to 28 front panel keys.  
¼ VGA (320 x 240 pixel) LCD screen support with digitally adjustable CCFL backlighting and screen contrast.  
Internal switch for locking of calibration settings (for weights & measures laws).

### **Loadcell Interface.**

Supports up to three independent loadcell channels.  
22 bit (4.2 million values) analogue to digital converter (ADC) on each channel.  
Temperature compensated / self calibrating ADC.  
Fourth order digital filter attenuates interference at the sampling frequency and its harmonics by 160dB, e.g. 50 & 60Hz sampling rate negates mains power interference.  
Sampling rate up to 1kHz (with slightly reduced effective resolution – 19 bits).  
Ultra stable loadcell drive circuitry capable of driving 8 loadcells in parallel.  
Loadcell interface is shielded in a metal can.

### **Current loop input and output.**

Supports up to 8 0-25mA inputs (circuit presents 200 ohm load).  
Supports up to 8 0-25mA outputs (drives up to 1k ohm load).  
Loop input sampling rate up to 200kHz.  
Loop output data rate up to 100kHz.  
12 bit (4096 values) ADC resolution on both inputs and outputs.  
Optically isolated from rest of circuit.

---

# **OPTIMUS OPERATIONAL MANUAL.**

## **Specifications and Site Requirements.**

---

### **Serial Input/Output.**

Optically isolated full/half duplex RS485 at up to 38400 baud.  
RS232 port with RTS/CTS handshaking signals at up to 115200 baud.  
Up to six optically isolated 24V digital inputs (PLC interface).  
Up to eight digital output lines to drive relays on wiring board  
12V relay activation supply to wiring board  
Dual channel tachometer inputs

### **Initial Setup and debugging interface.**

Four pole DIP configuration switch.  
Reset pushbutton.  
Four configurable LED status lights (Red).  
HDD (compact flash) activity LED (Red).  
Voltage rail monitor LEDs (Green).  
Current loop output monitor LEDs (Orange).  
Digital input monitor LEDs (Yellow).

### **Options.**

High volume (92dB @ 10cm) full bridge driver for an internal piezo speaker  
Battery backup for real-time clock and calendar – CR2032 coin cell.  
1.5 Mbaud IrDAtransceiver.  
Optically isolated half duplex RS485 at up to 38400 baud (for relay controller/expansion).  
Isolated, current limited 1.5W 12V supply for relay controller/expansion power.  
Temperature sensor - can be used for monitoring/alarms and for automatically changing the contrast of the LCD screen with ambient temperature variations.  
256 byte EEPROM for storing configuration and setup data.

### **Terminal PCB.**

5mm pitch screw terminations for all inputs, outputs and shields.  
Clear labelling for each connection on PCB.  
Support for up to eight relays for digital outputs (either 24V PLC type or 240V mains type) with 12V coil drive.  
Support for up to eight relays for digital outputs (either 24V PLC type or 240V mains type) with 12V coil drive.

### **Power Board.**

5mm pitch screw terminations for Active, Neutral & Earth.  
Universal voltage supply with no voltage selection required 85VAC to 285VAC, 50/60 Hz.  
Regulatory agency approvals on switch mode modules.  
Input filtering.  
Supplies +5V, +12V, -12V at 25W max total to main board.  
Supplies +24V at 25W max to main board.

---

# **OPTIMUS OPERATIONAL MANUAL.**

## **Enclosure Specifications.**

---

### **Manufacturer.**

Hoffmann.

### **Application.**

Designed for use as an instrumentation housing enclosure, for use in highly corrosive environments including oil refineries, coal mines, chemical processing plants, waste water treatment and marine installation, electroplating plants, agricultural environments and food or animal processing plants.

### **Construction.**

Moulded fibreglass polyester has outstanding chemical and temperature resistance and exhibits excellent weather-ability and physical properties.

Seamless foam-in-place gasket assures watertight and dust-tight seal.

Polyester mounting feet and stainless steel attachment screws.

Scratch-resistant GE LEXAN MARGARD® permanently bonded in place window.

Quick release latches with corrosion resistant polyester latches located in corners which provides unobstructed access to enclosure.

Hinge and bail are corrosion resistant monel.

Knock out padlock provisions included in each latch.

### **Industry Standards.**

NEMA / EEMAC (Type 4, Type 4X, Type 12 and Type 13).

UL 508 (Type 4, Type 4X, Type 12, and Type 13).

Enclosure flammability rating UL94-5V

CSA Type 4 and Type 12.

IEC 529 , **IP66**

---

# **OPTIMUS OPERATIONAL MANUAL.**

## **Theory of Operation.**

---

In general a weighbelt feeder consists of the following key components that are directly associated with the weighing function.

**Load Cell.**

**Weigh Zone / (weigh deck)**

**Tachometer / (Encoder).**

**Electronic Integrator.**

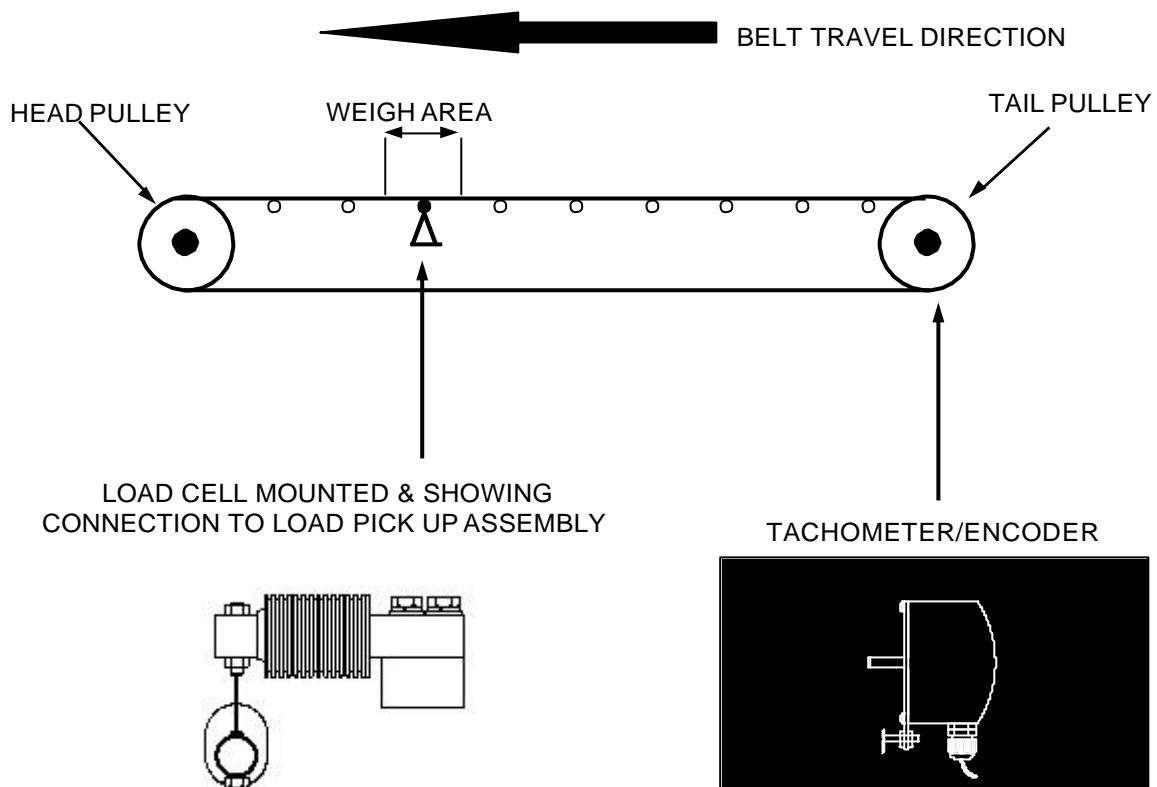
Optimus's primary roll is combine the weight of product carried by a conveyor belt and the speed of that belt and produce a variety of associated process control signals.

An electronic load cell is used sense the weight of product and an electronic encoder is used to provide a speed signal.

The tachometer/encoder is a device that is connected to a roll, that is contact with the belt and will rotate as the belt passes over it. The encoder shaft will then rotate and produce a series of pulses which Optimus uses to calculate the belt speed.

The load cell is situated in a position so that it able to sense the weight of the belt, product and the belt support. This position is generally referred to as the weigh area. The weight signal is usually in milli-volts and in the range of 0 mV to approximately +30 mV.

Optimus is a microprocessor based precision, high speed electronic integrator. The mV signal from the load cell is digitised by a precision, high resolution analogue to digital converter in Optimus and combined with the encoder output to produce an accurate MASS RATE. From this mass rate the total is computed as well as all other functions provided by Optimus.



---

# **OPTIMUS OPERATIONAL MANUAL.**

## ***Printed Circuit Board location.***

---

Optimus comprises three printed circuit boards (PCB). Main processor PCB, field wiring PCB and power PCB.

### **Main Processor PCB.**

The main processor PCB is located on the door of the enclosure. Generally there is no field wiring to be connected to this board. However if a communications package is to be used, wiring will be required to be connected to the PC 104 communications PCB. This PCB is piggy backed onto the main PCB.

### **Field Wiring PCB.**

This card is located in the main portion of the enclosure, below the main processor PCB (when the door is closed) and above the power PCB. This PCB will be loaded with connectors strips and relays that are required for the application. Any parts not loaded have been deliberately omitted. This PCB along with the power PCB has been designed to be easily removed for servicing, if required. This PCB is reasonably robust by design, it has been made from a thicker than normal fibreglass, under normal operating conditions a reasonable amount of torque can be applied to the terminal screws with out damage occurring, however damage will occur if too much force is applied.

As space within the enclosure is limited, all wiring should be neat and trimmed to suit. See drawing at the rear of this manual for field wiring details.

### **Power PCB.**      **(DANGER MAINS VOLTAGE MAY BE PRESENT)**

This PCB is located under the Field Wiring PCB. A cut out in the has been provided in the Field Wiring PCB so that access to can be provided to the main supply terminal strip, the fuse and local on/off switch.

### **Installer / Electrician Note.**

Care must be taken when cutting holes in the enclosure to provide cable access. It is recommended that the Power & Field Wiring PCB be removed prior cutting holes. Take note of cable entry with respect to PCB when re installed.

All cables should enter the enclosure via site approved cable glands.

The entry of water into this enclosure will damage the electronics and void and warranty.

# OPTIMUS OPERATIONAL MANUAL.

## Power & Field Wiring PCB.

Battery Seiko Cr 2032 or equivalent. This battery is used to hold up the information stored in the screen "System Information" All operating variables are stored in non volatile memory, which does not require battery power.

### CPU PCB.

The 5 yellow LED's when lit, show that the operating voltages required by Optimus and it's sub-assemblies are all healthy.

+24V  
+12V  
-12V  
+5V  
+3.3V

Optional communications card.  
TCP-IP, Profibus,  
DeviceNet



### Power & Terminal PCB.

Optional RS 232  
Output

Optional RS  
485 Output

Generally Analogue  
Inputs.

Generally Digital  
Inputs.

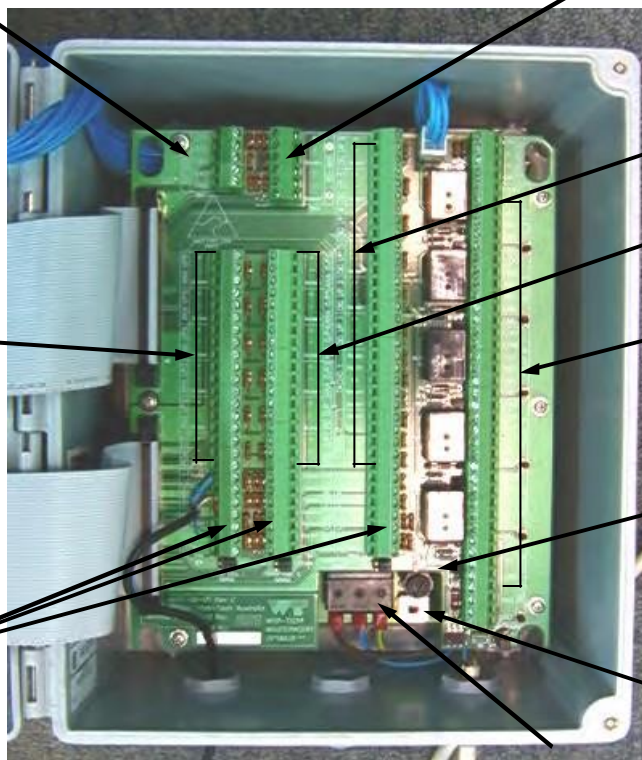
Generally analogue  
outputs.

Generally Relay I/O

Fuse

Load Cell Inputs  
Channel 1-3

Local On/Off Switch.  
Lower PCB.



Multi Voltage/Frequency  
Mains Input.  
Lower PCB.

# **OPTIMUS OPERATIONAL MANUAL.**

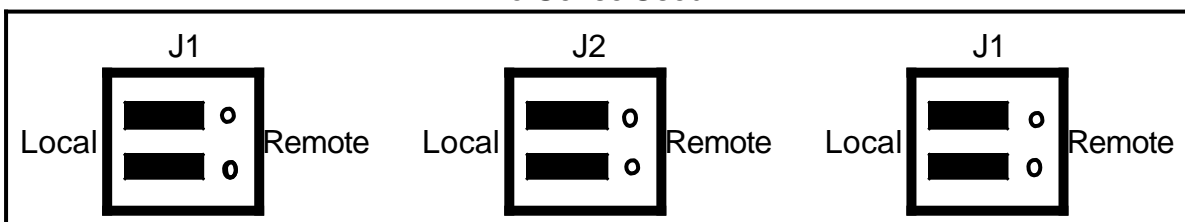
## **Power & Field Wiring PCB.**

Optimus can power up to eight (8) individual load cells. (3500). Generally these load cells are paralalled up, in marshalling boxes in the field. However some continuous weighing systems application require that individual load cells are digitally summed in Optimus. This allows special mathematical algorithms to be applied to the load cell signals prior to integration. On occasion Optimus may be required to read the out put of a load cell that is positioned up stream of the weigh area in order that product can be accurately pre fed onto the weigh belt.

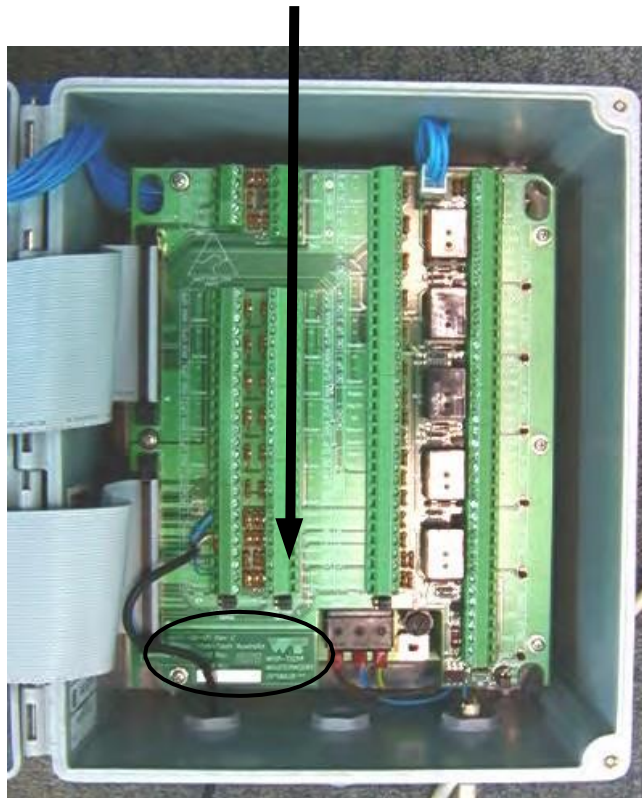
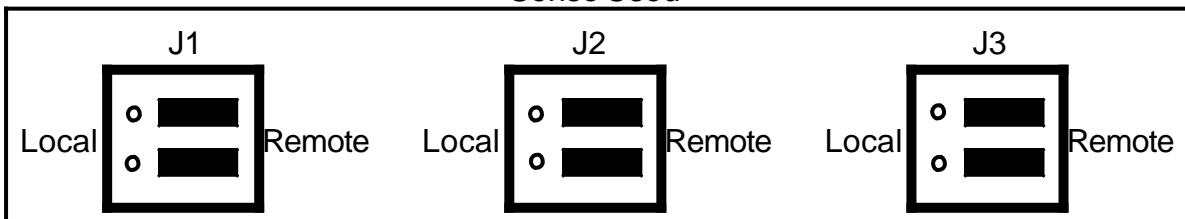
Belt weighing systems / weigh feeders usually do not employ more than one channel input.

If the load cell cable runs are long, it is possible to have a voltage drop at the load cell. Optimus provides for the reading of the supply voltage at the load cell via the load cell sense wires (where fitted). If the sense wires are connected and the jumpers are set as shown below. Any voltage drop will be corrected for.

No Sense Used

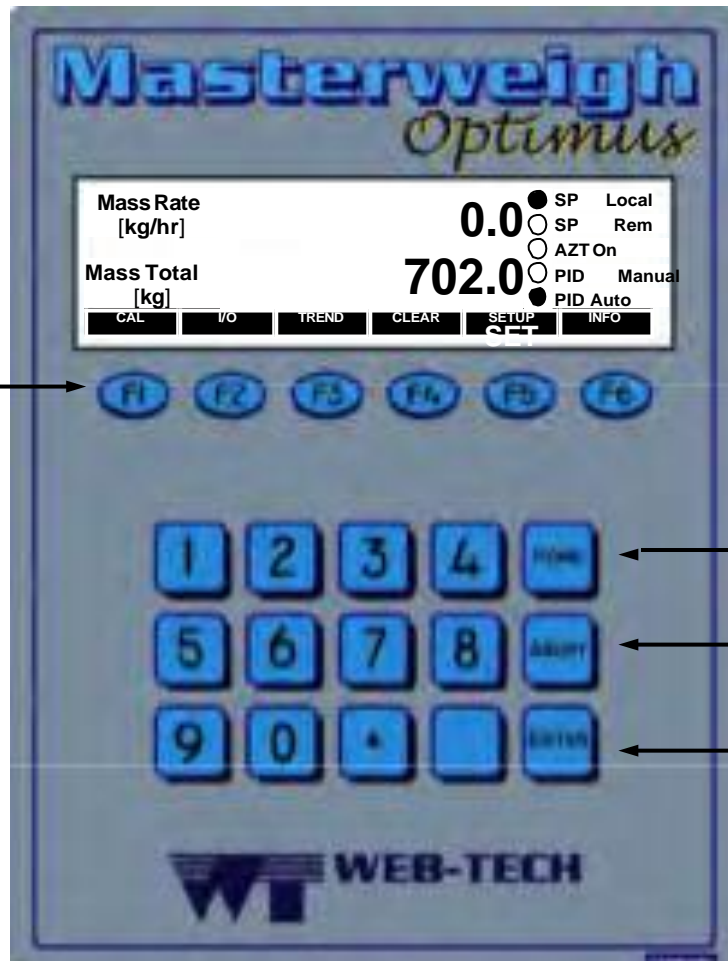


Sense Used



# OPTIMUS OPERATIONAL MANUAL.

## Keypad Description.



Takes the user back to MRMT & updates all entered variables

Cancels the current operation & takes the user back to MRMT.

Saves any changes and moves the screen forward one.

Cancels current action and forces display back to previous screen.

Scrolls cursor up.

Scrolls cursor down.

Saves any changes and moves the screen forward one.



The above function (f) keys are associated with the boxed message displayed directly above the f key.

---

# OPTIMUS OPERATIONAL MANUAL.

## Power Up.

---

Once Optimus has been connected up as per the drawings in the rear of this manual and with reference to the chapter *Printed Circuit Board location*. The unit can be powered up, it should be noted that Optimus has a power supply that will accept most common supply voltages and frequencies, found around the world. The unit has a local power switch located on the power PCB, this should now be moved to the on position. Optimus will now power up, load the operating software and perform a series of self diagnostic routines. During this time the Web-Tech logo will be displayed. Following a successful power up the screen display will change to the following.

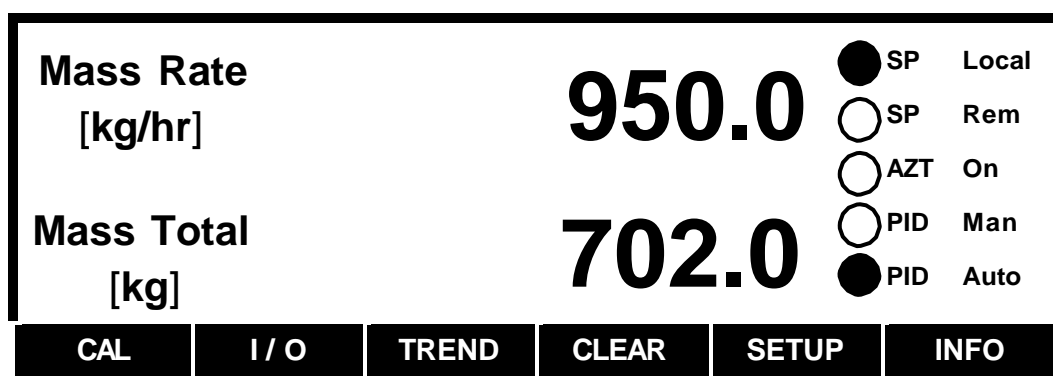
### Start Up Display



The screen shown below is the screen that should be displayed whilst Optimus Plus is running. We call this particular screen Mass Rate, Mass Total (**MRMT**) and is the default screen. Take time to make yourself familiar with the data that is available on this screen and how it interacts with the keypad.

*See over for detailed description of functions available from this screen.*

### Mass Rate Mass Total (MRMT) Display

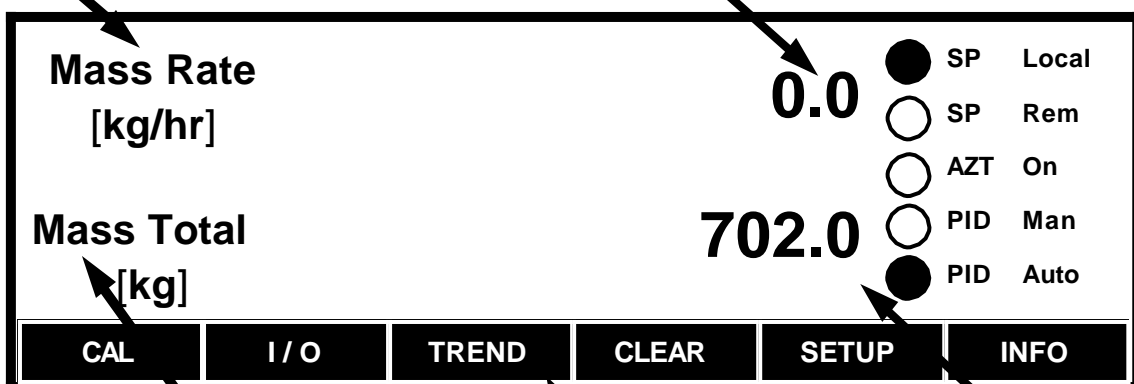


# OPTIMUS OPERATIONAL MANUAL.

## Main Display MRMT Description.

Displays Selected Mass Rate Units

Displays the instantaneous Mass Rate



Displays Selected Mass Total Units

Function Button Designators  
Allocates new function to key.

Displays Mass Total



The above function (f) keys are associated with the boxed message displayed in the display directly above the f key. Pressing any of these keys will take you to the associated functions.

- CAL.** Pressing the CAL F1 key takes the user to the screens that provide for calibrating Optimus.
- I/O.** Pressing the I/O F2 key takes the user to the screens that provide for configuring current loops in and out. The digital inputs and out puts. The RS 232 & 485 serial communications.  
The load cell entry point provides a method of easily viewing the load cell and tachometers output.
- TREND.** Entering the Trend F3 screen provides the user with a 2 minute trend of the instantaneous mass rate and control over the setpoint.
- CLEAR.** Pressing the clear F4 clears the local displays running total.
- SETUP.** Pressing the Setup F5 key takes the user to the menus associated with configuring Optimus.
- INFO.** Activating the Info F6 displays the Information screen where details of Optimus software can be viewed.

**Main Display MRMT Description.**

● ON  
○ OFF

??

# ABORT

**ENTER**

## HOME

CAD Computer I:/Manuals/Optimus-Belt

---

# **OPTIMUS OPERATIONAL MANUAL.**

## **Getting Started.**

---

Optimus is generally termed an integrator. It has been designed to work with most conveyor belt scales, weighfeeder's and various "in motion weighing mechanisms".

**Prior to operating Optimus it has to be setup and calibrated.**

**Web-Tech advise that these operations be performed by qualified technicians who have been trained in the operation of Optimus and the weighfeeder. Web-Tech can't warrant the accuracy and operation of our equipment if the system is incorrectly installed.**

The procedure is as follows:-

- 1      **Setup**
- 2      **Define the required I/O**
- 3      **Calibrate**
- 4      **Setup and tune the PID algorithm and control loop.**

The **Setup** procedure customises the electronics to suit your application.

**Defining the Input/Output** allocates relays analogue outputs etc to Optimus functions.

The **Calibration** procedure is required to force Optimus to convert the instrument's raw data (i.e. milli volts from the load cell/cells & tachometer frequency) into the physical units (i.e. Tons/hour kg/hr and their corresponding totalised values).

**Setting up the PID** is required so that the mathematical algorithm (PID) is loaded with variables that produce the required mass rate control response.

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# **OPTIMUS OPERATIONAL MANUAL.**

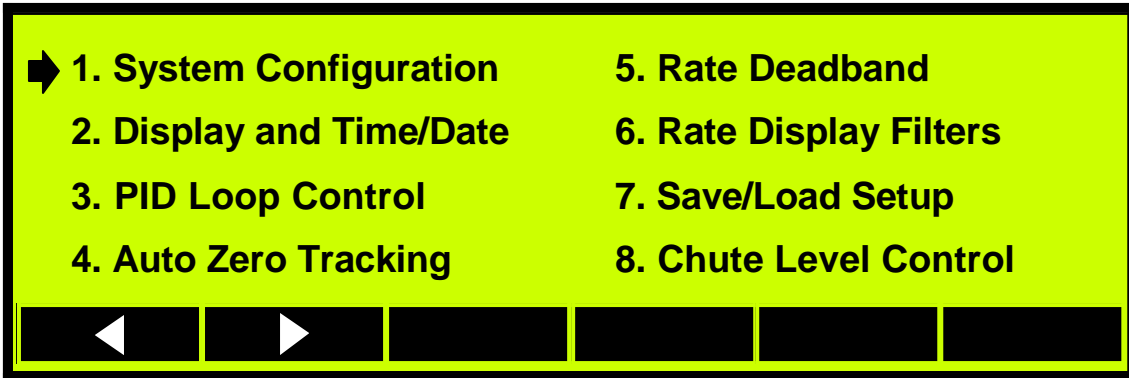
## **Setup / system configuration.**

---

### **SETUP (Configuring Optimus).**

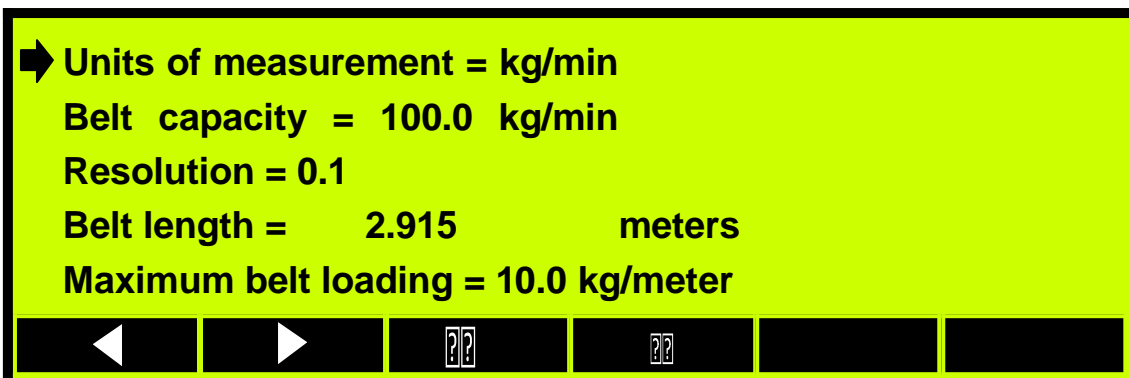
Prior to calibrating Optimus, the instrument must be configured to suit the application. Units selected and the input and output functions defined.

Following power up, Press SETUP (F5) key .The display will change to that shown below.  
SYSTEM CONFIGURATION SCREEN



Select "System Configuration" by pushing the "ENTER" key.

The display will change to that shown below.



The arrow shaped cursor will point to the **Units of Measurement.**

The units of measurement can be set by pushing the "ENTER" key. There are 7 sets of predefined units of mass rate. All of which can be accessed by pressing the "ENTER" key and scrolling through the list using the "ENTER" key.

The following units are available :-

Tonnes per hour.  
Kg per minute.  
Kg per hour.  
Pounds per minute.  
Pounds per hour.  
Tons per hour.

---

# **OPTIMUS OPERATIONAL MANUAL.**

## **System Setup / system configuration.**

---

### **Belt Capacity.**

Advance the cursor to belt capacity entry point by using the right or left arrow keys. Pressing the "ENTER" key here will display a dedicated input menu, where the max design capacity of the feeder, should be entered. This data can be found in the design data sheet supplied by Web Tech during the feeder/belt scale design phase. The value entered is captured by Optimus following the pressing of either the "ENTER" or tick F3 key.

**This variable is used to scale the analogue outputs.**

Units of measurement = kg/min					
➡ Belt capacity = 60.0 kg/min					
Resolution = 0.1					
Belt length = 2.915 meters					
Maximum belt loading = 10.0 kg/meter					
◀	▶	??	??		

Press the "ENTER" key when the cursor is pointing at the "Belt capacity" and the screen will change to the Belt Capacity entry screen. Enter the feeders maximum capacity here. Press the tick key to force Optimus to read the entered value.

Belt capacity ( in kg/min )					
Current value 60.0					
New value —					
DEL	CLEAR	??	??		

Using either the left or right arrow keys, go to the entry point for "Resolution".

Units of measurement = kg/min					
Belt capacity = 100.0 kg/min					
➡ Resolution = 0.1					
Belt length = 2.915 meters					
Maximum belt loading = 10.0 kg/meter					
◀	▶	??	??		

The resolution can be changed to one of the preset precision values. The values offered here are based on the capacity that was previously entered and can be accessed by pressing the "ENTER" key until the required value is found from the list. The value entered here will be reflected in the MRMT screen's precision.

---

# **OPTIMUS OPERATIONAL MANUAL.**

## **System Setup / system configuration.**

---

### **Belt Length.**

Use the left or right arrow keys to move the cursor to the 'Belt Length' entry point. Optimus needs to accurately know the belt length in order to perform the Span and Zero routines.

**Note :** The belt length is not used by Optimus to calculate the Mass Rate and Mass Total. The belt length can be found in the design data sheet.

Units of measurement = kg/min					
Belt capacity = 100.0 kg/min					
Resolution = 0.1					
Belt length = ➡ 2.915 meters					
Maximum belt loading = 10.0 kg/meter					
◀	▶	??	??		

Press the 'ENTER' key to access the 'Belt Length' entry routine. Enter the belt length here and press the tick key to force Optimus to read in the value.

Belt length ( in meters )					
Current value 2.915					
New value —					
DEL	CLEAR	??	??		

### **Belt Length Units.**

Use the left or right arrow keys to move the cursor to the 'Belt Length Units' entry point. Press the 'ENTER' key to scroll through the available units.

Units of measurement = kg/min					
Belt capacity = 100.0 kg/min					
Resolution = 0.1					
Belt length = 2.915 ➡ meters					
Maximum belt loading = 10.0 kg/meter					
		??	??		

# OPTIMUS OPERATIONAL MANUAL.

## System Setup / system configuration.

### Maximum Belt Loading.

This data entry point sets up an analogue output to reflect the instantaneous belt loading, if required. Generally Optimus will perform all the calculations required to successfully set up the instrument. However this requires user input and calculation. See below for calculation details. Use the left or right arrow keys to move the cursor to the 'Maximum Belt Loading' entry point. Press the 'ENTER' key to access the data entry screen. The data entered here has to be calculated by the user. See below.

**Units of measurement = kg/min**

**Belt capacity = 100.0 kg/min**

**Resolution = 0.1**

**Belt length = 2.915 meters**

➡ **Maximum belt loading = 10.0 kg/meter**

◀
▶
??
??

### Maximum Belt Loading 'Data Calculating'.

Optimus needs to know the maximum expected belt loading in the units shown in the screen below. So that the 20mA point can be scaled against the belt loading 4/20mA output signal.

**Max belt loading (in kg/meters)**

**4.0**

DEL
CLEAR
??
??

Use the following to calculate the Maximum Belt Loading.

From the conveyor design data document. Obtain the following :-

Maximum Belt Capacity. (units to be in those previously selected)

Belt Speed. (BS). (m/S)

$$\text{Belt Loading} = \frac{\text{Belt Capacity}}{\text{BS} \times \begin{matrix} \text{(Use 60 if mass rate is displayed in Units/minute)} \\ \text{(Use 3600 if mass rate is displayed in Units/hour)} \end{matrix}}$$

E.g.

Capacity	60 kg/minute
Belt Speed.	0.25m/S

$$\text{Belt Loading} = \frac{60}{0.25 \times 60} = 4 \text{ kg/metre} \quad \text{(enter this, into data entry screen).}$$

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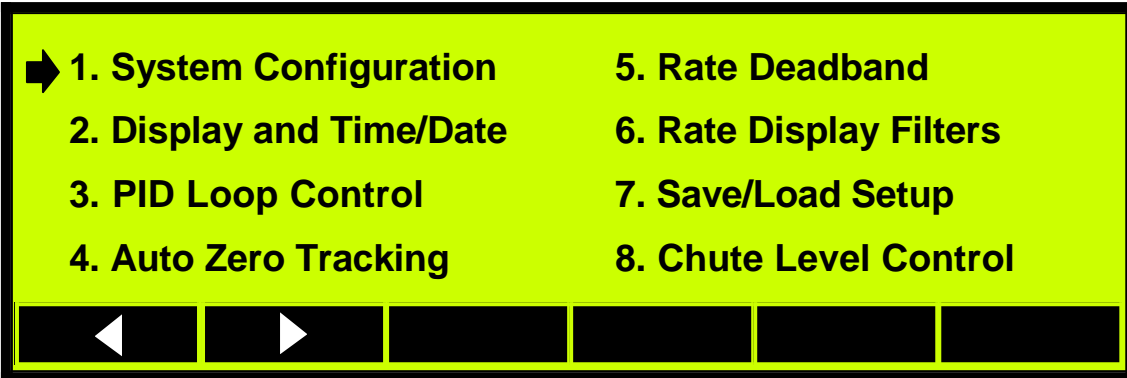
# **OPTIMUS OPERATIONAL MANUAL.**

## **System Setup / *display, time & date.***

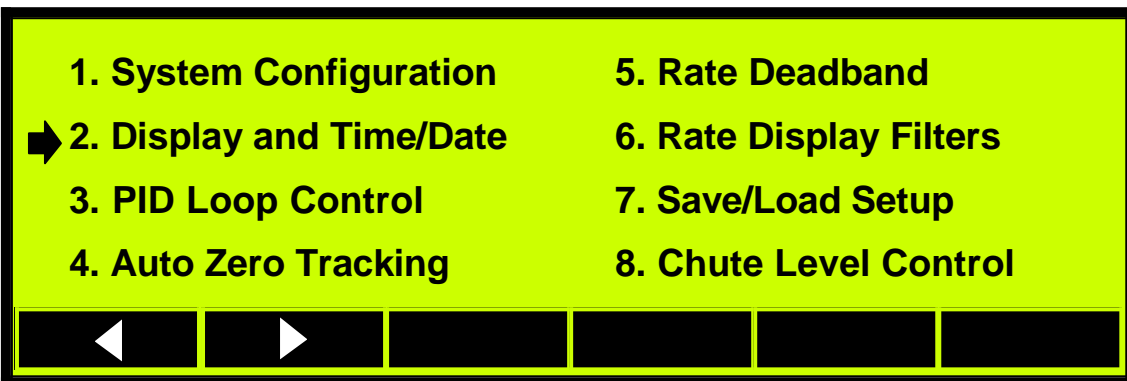
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### **Backlight.**

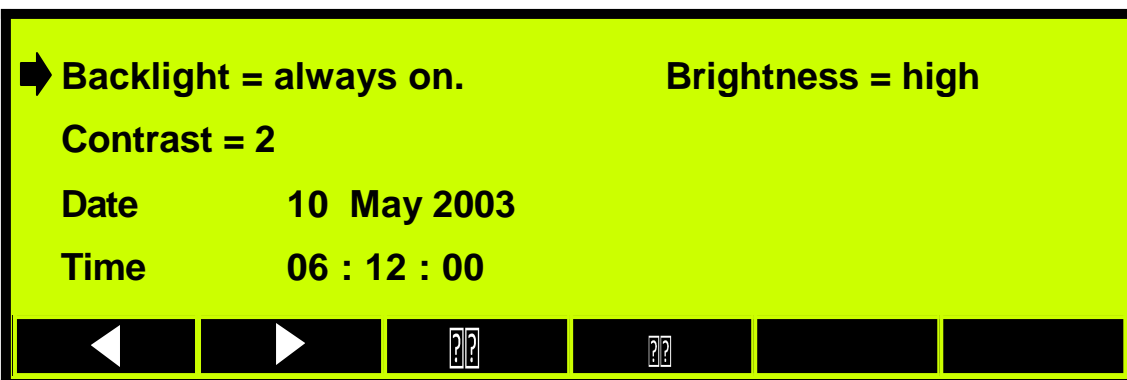
Optimus is supplied with a Liquid Crystal, Light Emitting Diode (LED) back lit screen. The use of back lighting is essential, if the screen is to be viewed in low light conditions. Use the scroll forward key to position the cursor along side the "Display and Time/Date screen entry point.



System Configuration Screen.



Press the "ENTER" key to access the display setup screen.



Use the "ENTER" key to scroll through the predefined list of timed / un -timed Backlight settings.

Always On; Off after 2 mins; Of f after 5 mins; Off after 10 mins; Off after 30 mins; Off after 60mins; Always off.

It should be noted that Optimus electronic s package has been fitted into a closed environment. The back light draws considerable power from the power supply. The longer the back light is on for any given brightness the greater the heat given off from the power supply module.

When the ambient temperatures are high Optimus may not be able to conduct this heat away as efficiently as required. We suggest that the ba ck light be set to "Off" after 2 or 5 minutes. The back light will re -activate on pressing any key if any of the timed off se t-tings are used.

---

# **OPTIMUS OPERATIONAL MANUAL.**

## **System Setup / *display, time & date.***

---

### **Brightness.**

Scroll to Brightness and select the value that best suites the working environment. Pressing the "ENTER" key here will toggle the selection of fixed values of display back-lighting.

Backlight = always on.	➡	Brightness = high
Contrast = 2		
Date	10	May 2003
Time	06 : 12 : 00	
◀	▶	??
		??

### **Contrast.**

LCD displays have a limited viewing angle. The angle can be adjusted up or down as required. To adjust the viewing angle scroll to Contrast input routine and use the "Enter" key to select the value that best suites the working environment and the position of the enclosure.

Backlight = always on.	Brightness = high
➡ Contrast = 2	
Date	10 May 2003
Time	06 : 12 : 00
◀	▶
??	??

### **Date Entry.**

The date and time, if required are entered using a standard format. Scroll the cursor down until it points to the data entry point for the day. Press "ENTER" to gain access to the data entry screen, enter the date. Press the ENTER or tick key to write date to memory and move on. Scroll onto the month entry point and use the "ENTER" to scroll through the months. Select the current month and move onto the year using the scroll right key. Press "ENTER" to gain access to the year entry. Type in either the whole year or just the last two digits of the year

Backlight = always on.	Brightness = high
Contrast = 2	
Date ➡	10 May 2003
Time	06 : 12 : 00
◀	▶
??	??

Press the "ENTER" key to access the Day setup screen.

# OPTIMUS OPERATIONAL MANUAL.

## System Setup / *display, time & date.*

Press the "ENTER" key to access the Day entry screen.

<b>Day</b>					
Current value <b>10</b>					
New value <b>—</b>					
<b>DEL</b>	<b>CLEAR</b>	??	??		

Press the "ENTER" or tick key to lock in the day. Forward scroll to the month entry point use the "ENTER" key to scroll through the month selection. Press the scroll forward to access the year entry screen.

<b>Backlight = always on.</b>			<b>Brightness = high</b>		
<b>Contrast = 2</b>					
<b>Date</b>	<b>10 ➡ May 2003</b>				
<b>Time</b>	<b>06 : 12 : 00</b>				
◀	▶	??	??		

Select the month and scroll on to year entry position.

<b>Backlight = always on.</b>			<b>Brightness = high</b>		
<b>Contrast = 2</b>					
<b>Date</b>	<b>10 May ➡ 2003</b>				
<b>Time</b>	<b>06 : 12 : 00</b>				
◀	▶	??	??		

Press the "ENTER" key to access the data entry screen and enter the year. Press the tick key to lock in the year data and return to .

<b>Year</b>					
Current value <b>2004</b>					
New value <b>—</b>					
<b>DEL</b>	<b>CLEAR</b>	??	??		

# OPTIMUS OPERATIONAL MANUAL.

## System Setup / display, time & date.

Scroll forward to the time (hour) entry position and press the “ENTER” key to access the hour entry screen.

Backlight = always on.	Brightness = high
Contrast = 2	
Date	10 May 2003
Time	06 : 12 : 00

◀	▶	??	??		
---	---	----	----	--	--

Select the month and scroll on to year entry position.

Hours
Current value 10
New value —

DEL	CLEAR	??	??		
-----	-------	----	----	--	--

Enter the current hour (24 hour clock) format. Press the tick key to lock in the data. Scroll on to the minute entry point and press the “ENTER” key to access the minute entry screen

Backlight = always on.	Brightness = high
Contrast = 2	
Date	10 : 12 : 00

◀	▶	??	??		
---	---	----	----	--	--

Enter the current minute and press the tick key to lock in the data and return to the time/date entry screen.

Minutes
Current value 12
New value —

DEL	CLEAR	??	??		
-----	-------	----	----	--	--

---

# **OPTIMUS OPERATIONAL MANUAL.**

## **System Setup / display, time & date.**

---

Enter the current seconds and press the tick key to lock in the data and return to the time/date entry screen.

<b>Seconds</b>					
Current value <b>37</b>					
New value      —					
<b>DEL</b>	<b>CLEAR</b>	??	??		

Press “ENTER” or the tick key to return to the “SETUP” screen.

<b>Backlight = always on.</b>			<b>Brightness = high</b>		
<b>Contrast = 2</b>					
<b>Date</b>	<b>10</b>	<b>May</b>	<b>2003</b>		
<b>Time</b>	➡ <b>06</b>	<b>:</b>	<b>12</b>	<b>:</b>	<b>00</b>
◀	▶	??	??		

Scroll on to the “PID Loop Control”. Read the following pages of this manual before proceeding.

<b>1. System Configuration</b>	<b>5. Rate Deadband</b>				
➡ <b>2. Display and Time/Date</b>	<b>6. Rate Display Filters</b>				
<b>3. PID Loop Control</b>	<b>7. Save/Load Setup</b>				
<b>4. Auto Zero Tracking</b>	<b>8. Chute Level Control</b>				
◀	▶				

# OPTIMUS OPERATIONAL MANUAL.

## System Setup / PID Loop Control / overview.

### PID Parameters.

Generally weighfeeders are used primarily to set and control the flow of bulk solids into a process. The flow control should be automatic, without user intervention. If the bulk density or flow characteristics change, the feeder must be able to correct the flow. The correction should be as smooth and quick as possible or to a predefined action. Weigh belt weighfeeders generally can only increase or decrease the belt speed in order to increase or decrease the mass rate. The speed control is usually done by a variable speed drive unit connected to the drive motor. By judicious use of the variables introduced into the Proportional, Integral, Derivative (PID) algorithm. An effective automatic control output to the variable motor speed controller can be produced. This manual does not cover the theory behind PID control or the methodology used in setting up the algorithm. It is assumed that the user is well versed in this area of industrial control. Generally the values preset in Optimus will provide reasonable control response, however tuning will improve the overall control action.

Optimus uses a PID algorithm modified to suit belt weighfeeders, to control the operation of the feeder in gravimetric mode.

Expressed in analogue form, the PID algorithm used by the Optimus is:

$$OP(t) = OS + FF + SP(t) + \frac{100}{PB} E(t) + RR \int_0^t E(s) ds + K_D \frac{dE(t)}{dt}$$

where  $E(t) = SP(t) - MR(t)$

and  $SP(t)$  is the setpoint,  $MR(t)$  is the mass rate,  $E(t)$  is the deviation,  $OP(t)$  is the PID output,  $OS$  is the output offset,  $FF$  is the feed-forward term,  $PB$  is the proportional band,  $RR$  is the reset rate,  $K_D$  is the derivative gain and  $t$  is time.

Equation (1) is expressed as a function of continuous time. The Optimus Plus implements this equation in discretized form:

$$\text{with } OP(t_k) = OS + FF + SP(t_k) + \frac{100}{PB} E(t_k) + RR \sum_{i=0}^k E(t_i) + K_D \frac{E(t_k) - E(t_{k-1})}{\Delta t}$$

where  $\Delta t$  is the sampling interval, and  $X(t_k)$  is the value of signal  $X(t)$  at the  $k$ -th sample time.

---

# **OPTIMUS OPERATIONAL MANUAL.**

## **System Setup / PID Loop Control / overview.**

---

### **Proportional Gain.**

The contribution of the proportional term to the PID output is determined by the proportional band  $PB$ . Decreasing  $PB$  increases the contribution of the proportional term. Increasing  $PB$  decreases the contribution of the proportional term.  $PB$  is expressed in units of %. When  $PB=100\%$ , the effective gain applied to the error term is 1.

Decreasing  $PB$  will result in faster response and reduce the error signal (so that the mass rate more closely matches the set point signal), but will simultaneously increase the system's tendency to overshoot, hunt and even oscillate.

### **Integral Gain.**

The contribution of the integral term to the PID output is determined by the reset rate  $RR$ . The reset rate has units of resets/sec. Increasing  $RR$  increases the contribution of the integral error term. Decreasing  $RR$  decreases the contribution of the integral error term.

Decreasing  $RR$  will cause the PID loop to reduce the offset error (the difference between the mass rate and the set point) to near zero. The smaller  $RR$ , the more rapidly the PID loop will reduce an offset error to zero. Decreasing  $RR$  to very small values will in-

### **Integral Lower Limit.**

The integral lower limit specifies the maximum negative value the integral term may reach. If the calculated integral term is less than the integral lower limit, it is replaced with the integral lower limit in computations of the PID output.

### **Derivative Gain.**

The contribution of the derivative term to the PID output is determined by the derivative gain  $K_D$ . The derivative gain has units of seconds. Increasing  $K_D$  increases the contribution of the derivative error term. Decreasing  $K_D$  decreases the contribution of the derivative error term.

Increasing  $K_D$  reduces the hunting and tendency to oscillate which results from decreasing  $PB$ .  $K_D$  does not act to correct offset error.

### **Output Offset.**

The output offset,  $OO$ , is defined as the percentage offset to add onto the control output, and has units of percent.

### **Feed Forward Gain.**

The feed-forward gain,  $FF$ , is defined as the percentage of the setpoint to add on to the control output, and has units of percent.

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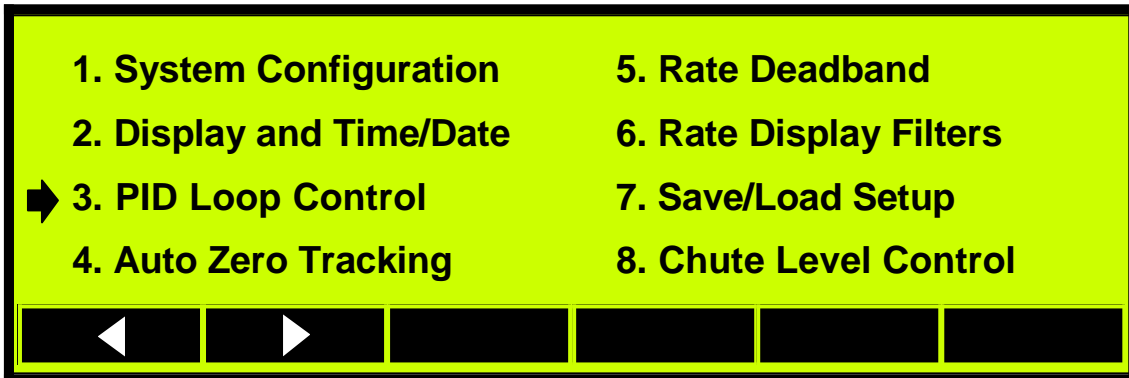
# **OPTIMUS OPERATIONAL MANUAL.**

## **System Setup / PID Loop Control / setpoint origin.**

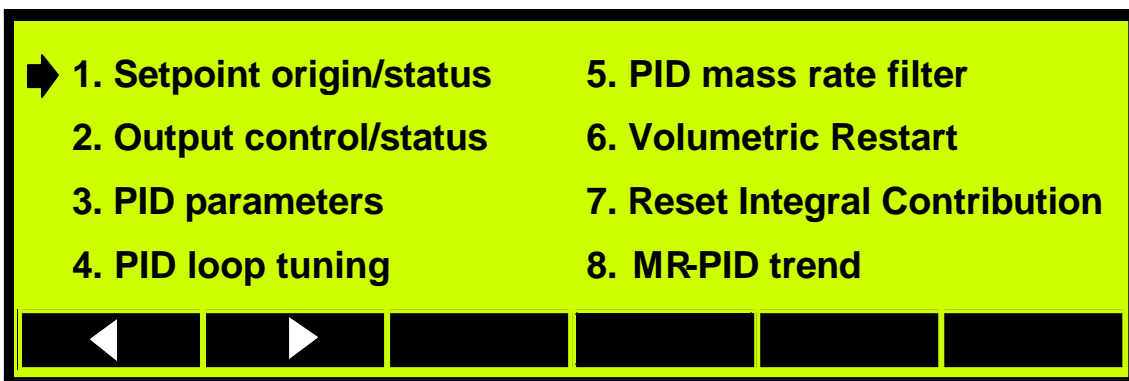
---

### **PID Loop Control.**

For Optimus to effectively control the feed rate of material travelling over the weigh area. A three term control algorithm is used (PID). This algorithm has to be loaded with variables that satisfy the process. Entering this menu provides data input screens, where variables for the PID algorithm can be entered, changed and monitored.



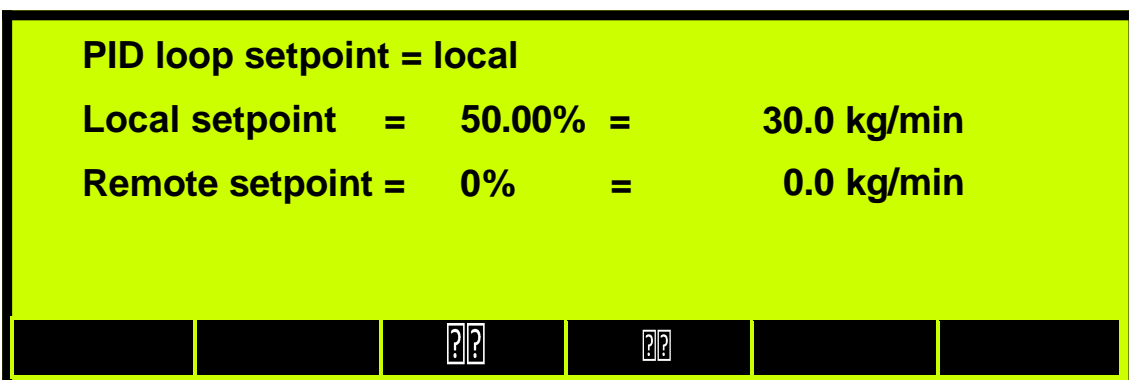
On selecting Menu 3 PID Loop Control the screen changes to that shown below.



The “SETUP” (F3) key takes the user back to the main setup menu.

With the cursor positioned as shown, the setpoint source can be toggled between “LOCAL” & “REMOTE” using the “ENTER” key.

If Local is selected, the set point can be changed either by adjusting the percentage of set point as shown below. Or by scrolling right and setting it as an absolute value. When in the local mode the remote setpoint (if any) is suppressed.



Use the “ENTER” key to access the data entry screen where the local setpoint can be adjusted as a %. Or an absolute mass rate.

---

## OPTIMUS OPERATIONAL MANUAL.

### System Setup / PID Loop Control / setpoint origin / status.

---

<b>Local setpoint (% of belt capacity)</b>					
<b>50.0</b>					
New value <u>      </u>					
<b>DEL</b>	<b>CLEAR</b>	??	??		

Use the tick key to accept the entered data.  
If setpoint data needs to be entered as an absolute mass rate scroll the cursor one more until the cursor is positioned as show below.

<b>PID loop setpoint = remote</b>					
Local setpoint =      50.00% =      30.0 kg/min					
Remote setpoint =    0%      0 kg/min					
		??	??		

From this point access the data entry screen and enter the mass rate required.

<b>Local setpoint ( in kg/min)</b>					
<b>75.0</b>					
New value <u>      </u>					
<b>DEL</b>	<b>CLEAR</b>	??	??		

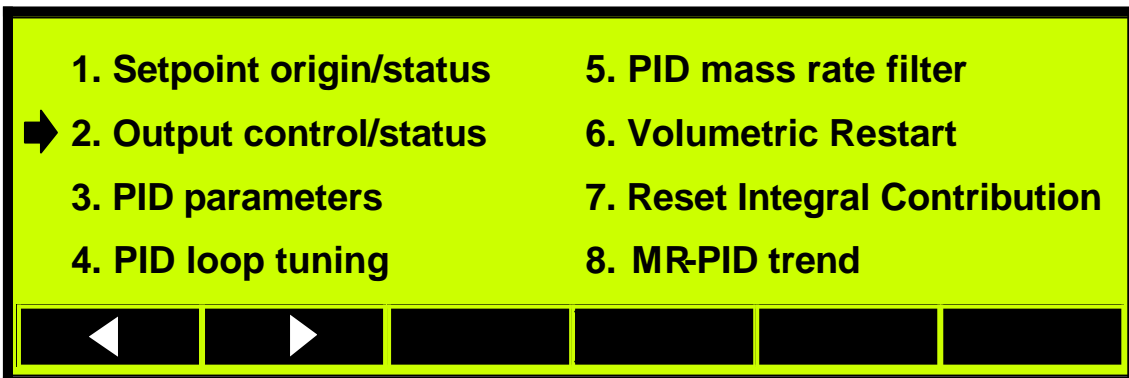
Press the tick key to lock in the data and return to the setup screen.

# **OPTIMUS OPERATIONAL MANUAL.**

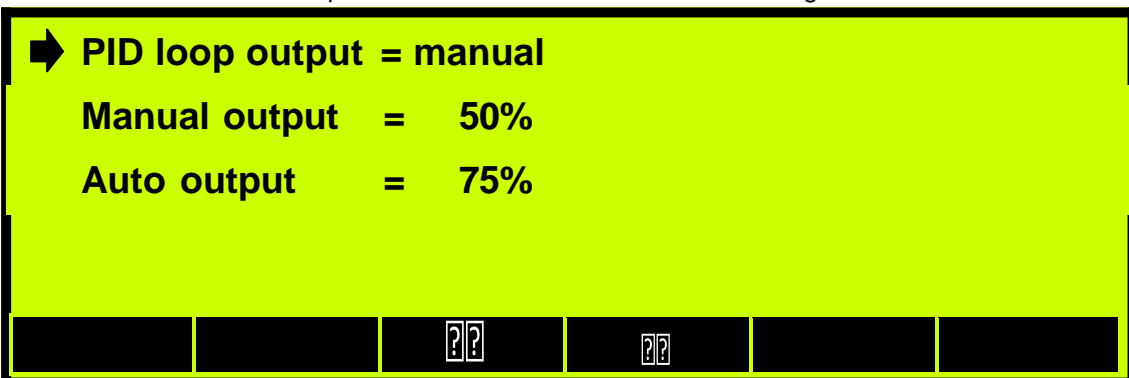
## **System Setup / PID Loop Control / Output control / status.**

### **Output Control & Status.**

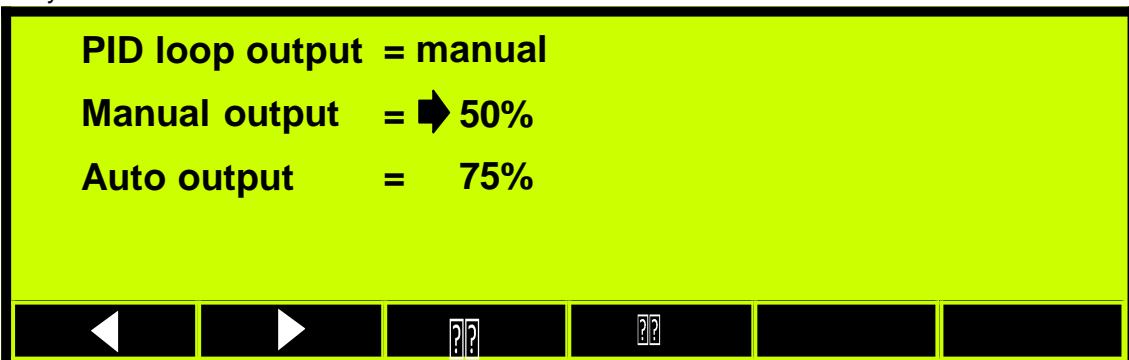
Optimus's analogue output whilst in the Automatic mode can be viewed from the menu shown below. When in the Manual mode the analogue output can be forced from the keypad.



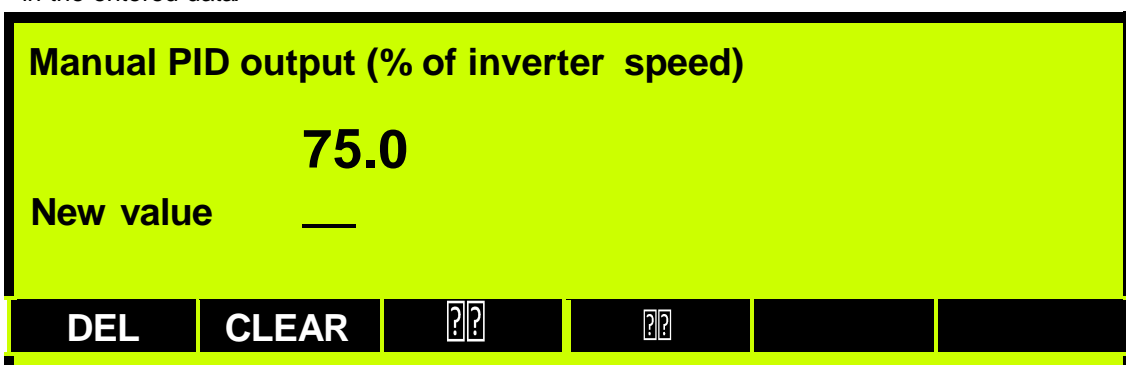
On selecting Menu 2 Output Control & Status screen changes to that shown below. The PID loop can be toggled between “manual” & “remote”. This feature allows the user to set the belt speed to assist in calibration or fault finding.



The PID loop output, when set to the manual mode will be forced to the value entered in this menu under manual as a percentage of inverter speed. . Press the scroll key to position the cursor along side either the entry point required and then press enter to gain access to the data entry screen.



Pressing the “ENTER” key at this point brings up the inverter speed input screen. Press tick to lock in the entered data.



---

# **OPTIMUS OPERATIONAL MANUAL.**

## **System Setup / PID Loop Control / pid parameters.**

---

The screens and menu entry points associated with the “PID Parameters” allow suitably qualified personnel to load the PID algorithm with variables that best suit the operation of the feeder. It should be noted that a good understanding of process control loops is required for successful tuning of a weighbelt feeder.

Press the “ENTER” key to access the PID variable adjust screen.

1. Setpoint origin/status	5. PID mass rate filter
2. Output control/status	6. Volumetric Restart
➡ 3. PID parameters	7. Reset Integral Contribution
4. PID loop tuning	8. MR-PID trend

◀	▶	SETUP			
---	---	-------	--	--	--

On selecting Menu 3, PID Parameters, the screen changes to that shown below.

➡ Prop band	=200.0%	Reset rate = +0.100 resets/s
Integral lower limit	=-50.0%	Upper limit = +50.0%
Derivative time=	=+0.00s	
Feed forward	=1.00	Output offset = +0.00

◀	▶	??	??		
---	---	----	----	--	--

PID proportional band (%)	
<b>+160.0</b>	
New value	—

DEL	CLEAR	??	??		
-----	-------	----	----	--	--

Enter the value required for the Proportional screen and press the Tick key to accept and return to the PID screen.

---

## OPTIMUS OPERATIONAL MANUAL.

### System Setup / PID Loop Control / pid parameters.

---

Use the scroll keys to access the Integral (reset rate) data entry point.

Prop band	=200.0%	➡	Reset rate = +0.100 resets/s
Integral lower limit	=-50.0%		Upper limit = +50.0%
Derivative time=	=+0.00s		
Feed forward	=1.00		Output offset = +0.00
<div style="display: flex; justify-content: space-around; border-top: 1px solid black; border-bottom: 1px solid black;"><div>◀</div><div>▶</div><div>??</div><div>??</div><div></div><div></div></div>			

Use the "ENTER" key to access "I" (reset rate) data entry screen.

<b>PID reset rate ( resets/sec)</b>					
<b>+0.100</b>					
New value      —					
<div style="display: flex; justify-content: space-around; border-top: 1px solid black; border-bottom: 1px solid black;"><div>DEL</div><div>CLEAR</div><div>??</div><div>??</div><div></div><div></div></div>					

Use the "ENTER" key to access the Integral Lower Limit data entry screen.

Prop band	=200.0%	➡	Reset rate = +0.100 resets/s
Integral lower limit	=-50.0%		Upper limit = +50.0%
Derivative time=	=+0.00s		
Feed forward	=1.00		Output offset = +0.00
<div style="display: flex; justify-content: space-around; border-top: 1px solid black; border-bottom: 1px solid black;"><div>◀</div><div>▶</div><div>??</div><div>??</div><div></div><div></div></div>			

In many applications it is often beneficial if the PID integral is restrained. As the working "integral" can be either positive or minus value. The limits can be set in the following data entry screens. Note the F5 key is now configured as a sign entry key.

<b>PID integral lower limit (%)</b>					
<b>-50.0</b>					
New value      —					
<div style="display: flex; justify-content: space-around; border-top: 1px solid black; border-bottom: 1px solid black;"><div>DEL</div><div>CLEAR</div><div>??</div><div>??</div><div>+/-</div><div></div></div>					

Use the Tick key to lock in the Integral Lower Limit.

---

## OPTIMUS OPERATIONAL MANUAL.

### System Setup / PID Loop Control / pid parameters.

---

Use the scroll keys to access the Integral Lower Limit.

Prop band	=200.0%	Reset rate = +0.100 resets/s	
Integral lower limit	=-50.0%	➡ Upper limit = +50.0%	
Derivative time=	=+0.00s		
Feed forward	=1.00	Output offset = +0.00	

◀▶????

Use the “ENTER” key to access the Integral Upper Limit data entry screen.

### PID integral upper limit (%)

## +50.0

New value      —

DELCLEAR????+/-

Scroll to the Derivative using the scroll keys.

Prop band	=200.0%	Reset rate = +0.100 resets/s	
Integral lower limit	=-50.0%	Upper limit = +50.0%	
➡ Derivative time=	=+0.00s		
Feed forward	=1.00	Output offset = +0.00	

◀▶????

Use the “ENTER” key to gain access to the Derivative time data entry screen.

### PID derivative time (secs)

## +0.000

New value      —

DELCLEAR????

Use the “ENTER” key to lock in the derivative time data and return to PID screen.

---

# **OPTIMUS OPERATIONAL MANUAL.**

## **System Setup / PID Loop Control / pid parameters.**

---

Use the scroll keys to access the Feed forward term.

Prop band	=200.0%	Reset rate = +0.100 resets/s
Integral lower limit	=-50.0%	Upper limit = +50.0%
Derivative time=	=+0.00s	
➡ Feed forward	=1.00	Output offset = +0.00

◀

▶

??

??

Use the “ENTER” key to access the Feed Forward term.

**PID feed forward factor**

1.000

New value —

DEL

CLEAR

??

??

Use the “ENTER” key to lock in the feed Forward term data and return to PID screen.

Prop band	=200.0%	Reset rate = +0.100 resets/s
Integral lower limit	=-50.0%	Upper limit = +50.0%
Derivative time=	=+0.00s	
Feed forward	=1.00	➡ Output offset = +0.00

◀

▶

??

??

With the cursor pointing at the “Output offset” press the “ENTER” key to gain access to the data input screen.

**PID output offset term**

+0.000

New value —

DEL

CLEAR

??

??

Press the tick key to lock in the data. The display will then return to the main PID setup screen

# OPTIMUS OPERATIONAL MANUAL.

## System Setup / PID Loop Control / pid loop tuning.

### PID Loop Tuning.

Following the loading of the PID algorithm with the required variables. Optimus provides the user with a convenient method of adjusting and viewing the PID algorithm. Scroll to the PID Loop Tuning menu and press the "ENTER" key to gain access.

1. Setpoint origin/status	5. PID mass rate filter
2. Output control/status	6. Volumetric Restart
3. PID parameters	7. Reset Integral Contribution
➡ 4. PID loop tuning	8. MR-PID trend

◀	▶	<b>SETUP</b>			
---	---	--------------	--	--	--

On selecting Menu 4 PID Loop Tuning the screen changes to that shown below.

➡ SP = 25.0%	FF = 1.000	OS = 0.000%
OP = 85.0%	IL = -50.0%	IU = +85.0%
PB = +200.0%	RR = +0.100%	DT = +0.000 s
PC = +10.0%	IC = +0.000	DC = +0.000
MR = 24.0%	LC = 2.854mV	TC = 220Hz

		??	??	<b>PLOT</b>	<b>LOC</b>
--	--	----	----	-------------	------------

### PID Loop Tuning Screen.

From this screen the user can tune the PID loop without having to change screens. All variables associated with the control loop are accessible from this screen as are the outputs from the load cell and tachometer. The cursor under control of the (F1 & F2) keys will take the user to all the changeable variables. All other data displayed is for viewing only.

1	SP	Set Point. (As a percentage of belt capacity).
2	FF	Feed Forward Term.
3	OS	PID Output Offset Term.
4	OP	PID Analogue Output.
5	IL	PID Integral Lower Limit.
6	IU	PID Integral Upper Limit.
7	PB	PID Proportional Term.
8	RR	PID Integral Term.
9	DT	PID Derivative Term.
10	PC	Proportional contribution.
11	IC	Integral contribution.
12	DC	derivative contribution.
13	LC	Load Cell output in milli-volts.
14	TC	Tachometer output in hertz.

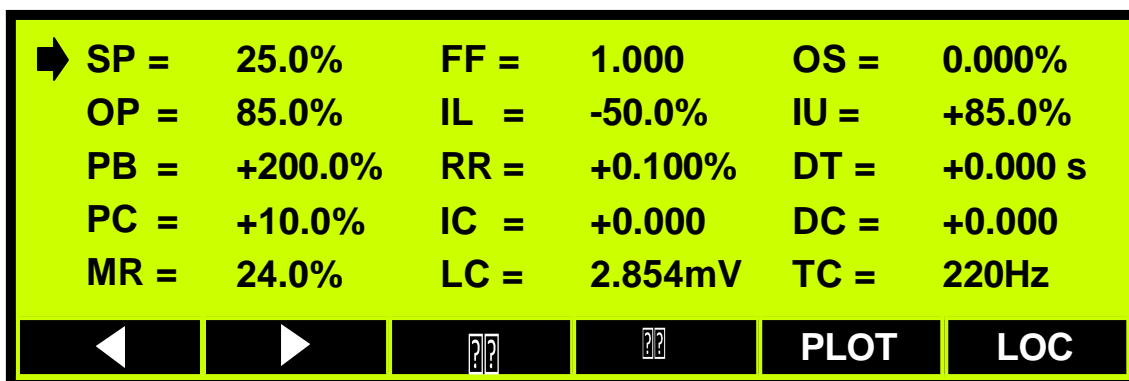
# **OPTIMUS OPERATIONAL MANUAL.**

## **System Setup / PID Loop Control / pid loop tuning.**

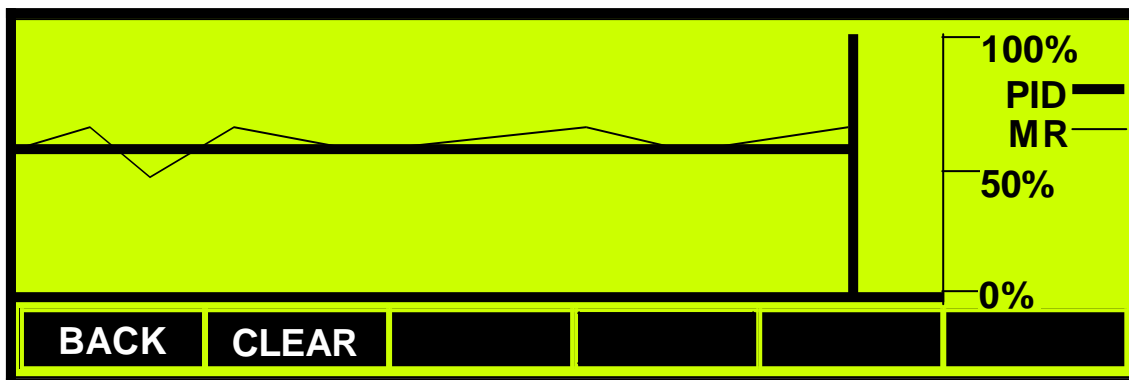
### **PID Loop Tuning.** (Continued)

**PLOT (F5)** Pressing the PLOT (F5) key provides the user with a plot screen the Mass Rate and PID out being plotted.

**LOC (F6)** Pressing the LOCAL (F6) toggles Optimus between the setpoint being set remotely or locally.



Select "PLOT" to go to the TREND screen where the set point can be ramped up and down and the feeder response viewed..



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# **OPTIMUS OPERATIONAL MANUAL.**

## **System Setup / PID Loop Control / pid mass rate filter.**

---

### **PID Mass Rate Filter.**

This filter is applied to the PID analogue output. The filter comprises a regular time average filter enhanced with a fast track multiplier. The level of filtering is specified by a constant which may be in the range of 1 second to 120 seconds. A time constant of 1 second is the equivalent to no filter being applied.

When active the fast-track filter multiplier restrains the PID analogue output from changing until the change exceeds the percentage set in the "Fast track threshold". By the judicious use of this feature the weighfeeder system can be restrained from reacting to anomalies in belt loading caused by irregular prefeed or lumpy feed.

**Note** The Filter can be disabled (not running), enabled (running) and filter running without the fast track multiplier running.

Set the "Threshold" to between 1% & 99% to enable the fast track filter. Set the "Threshold" to 0% to disable the filter and 100% to disable fast track yet keep the standard filter running.

1. Setpoint origin/status	➡ 5. PID mass rate filter
2. Output control/status	6. Volumetric Restart
3. PID parameters	7. Reset Integral Contribution
4. PID loop tuning	8. MR-PID trend

◀	▶	SETUP			
---	---	-------	--	--	--

On selecting Menu 5 PID Mass Rate Filter the screen changes to that shown below. The "Time constant is entered by pressing the "ENTER" key.

<b>PID mass rate filter enabled (fast track inactive)</b>					
➡ Time constant = 3 s					
Fast track threshold = 100%					

		??	??		
--	--	----	----	--	--

<b>PID mass-rate filter time constant.</b>					
<b>3</b>					
New value -					

DEL	CLEAR	??	??		
-----	-------	----	----	--	--

The value entered in the above data entry screen is locked in by pressing "ENTER"

---

## **OPTIMUS OPERATIONAL MANUAL.**

### **System Setup / PID Loop Control / pid mass rate filter.**

---

To adjust the “Fast track threshold” scroll the selector arrow to the “Fast track threshold entry point and press “ENTER”. The screen will change to the data entry screen.

<b>PID mass rate filter enabled (fast track inactive)</b>					
<b>Time constant = 3 s</b>					
<b>➡ Fast track threshold = 100%</b>					
◀	▶	??	??		

The “Fast track threshold” data entry screen.

<b>PID mass-rate filter fast track threshold.</b>					
<b>20</b>					
<b>New value          -</b>					
<b>DEL</b>	<b>CLEAR</b>	??	??		

Enter the value required. Note a value of zero or 100% will render the “Fast track feature inoperable. Press the tick key to return to the main PID setup screen.

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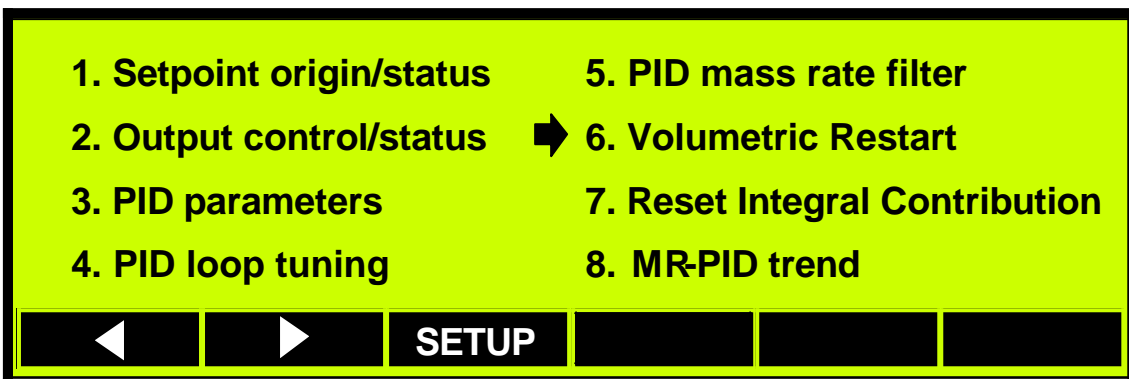
# **OPTIMUS OPERATIONAL MANUAL.**

## **System Setup / PID Loop Control / volumetric restart.**

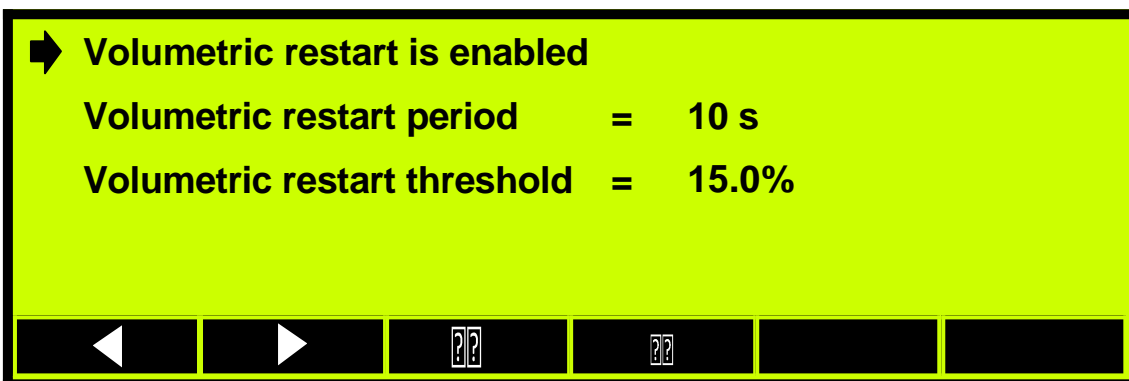
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### **Volumetric Restart.**

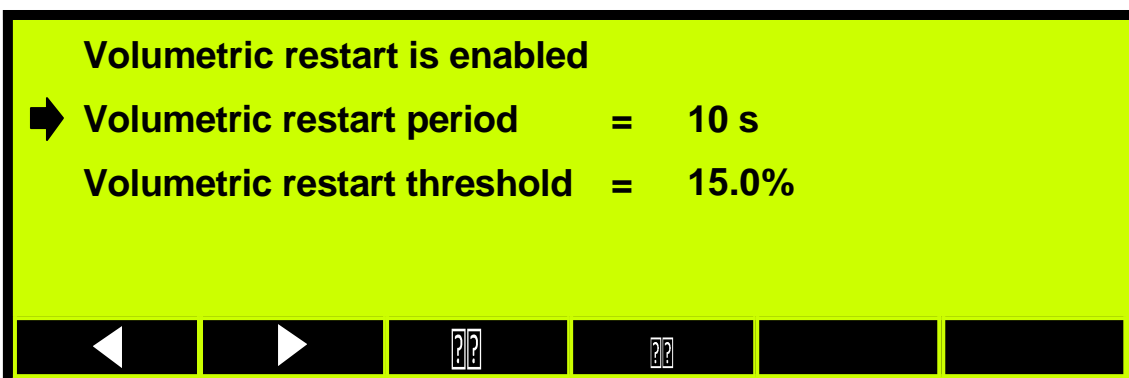
In applications where the weighfeeder is constantly stopping and starting. It is advantageous in terms of feeder control, to freeze the control algorithm when the feeder is halted by a supervisory system or operator. The Volumetric Restart feature allows the user to freeze the PID control action at the point when the stop is initiated and hold it for a predetermined time on restart. The hold time is variable and is combined with a mass rate threshold. The mass rate threshold allows the user to switch out the timed function when a selected mass rate is achieved.



On selecting Menu 6 Volumetric Restart the screen changes to that shown below. The “Volumetric restart” feature can be enabled or disabled by pressing the “ENTER” key when the selector arrow is in the position shown.



The “Volumetric restart” feature can be loaded with variables whether or not the feature is enabled or not. Scroll the selector arrow to the “Volumetric restart period and press “ENTER”



---

## OPTIMUS OPERATIONAL MANUAL.

### System Setup / PID Loop Control / volumetric restart.

---

The value entered in the “Volumetric restart period” screen. Is the time period that Optimus will use to time out the freezing of the PID algorithm, prior to recalculating the new process variable and out putting the signal to the analogue PID output.

**Volumetric restart period (in seconds)**

**10**

**New value**                      -

**DEL****CLEAR**????

Following the entry of the required delay, press the “ENTER” key to lock in the data. Scroll on the selector arrow to the “Volumetric restart threshold” and press “ENTER” to gain access.

**Volumetric restart is enabled**

**Volumetric restart period                      =      10 s**

➡ **Volumetric restart threshold                      =      15.0%**

◀▶????+-

The “Volumetric restart threshold” acts in conjunction with the “Volumetric restart period”. It will override the volumetric restart period, if enabled and the mass rate is calculated as being within percentage set in this menu. This provides for a fast re sponse from the PID algorithm should the mass rate come up to set point prior to the volumetric restart period timing out after a belt stoppage. The values in this menu should be entered after observing the system in normal field operation.

**Volumetric restart threshold (% of belt capacity)**

**15.0**

**New value**                      -

**DEL****CLEAR**????

Press the “TICK” key to lock in the selected value.

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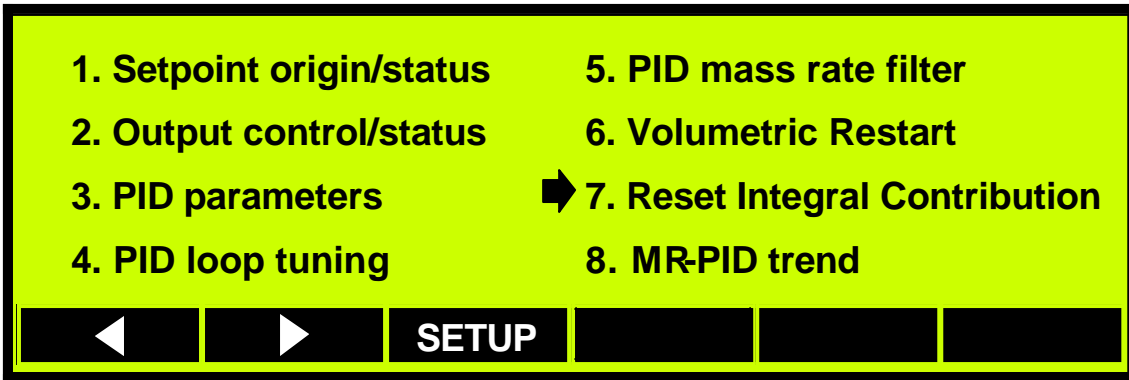
## **OPTIMUS OPERATIONAL MANUAL.**

### **System Setup / PID Loop Control / reset the integral contribution.**

---

#### **Reset Integral Contribution.**

When tuning a feeder it is often advantageous to be able to manually reset the integral contribution to the PID loop output. Pressing the “ENTER” key when the selector arrow is opposite the Reset Integral Contribution when force the integral to be reset.

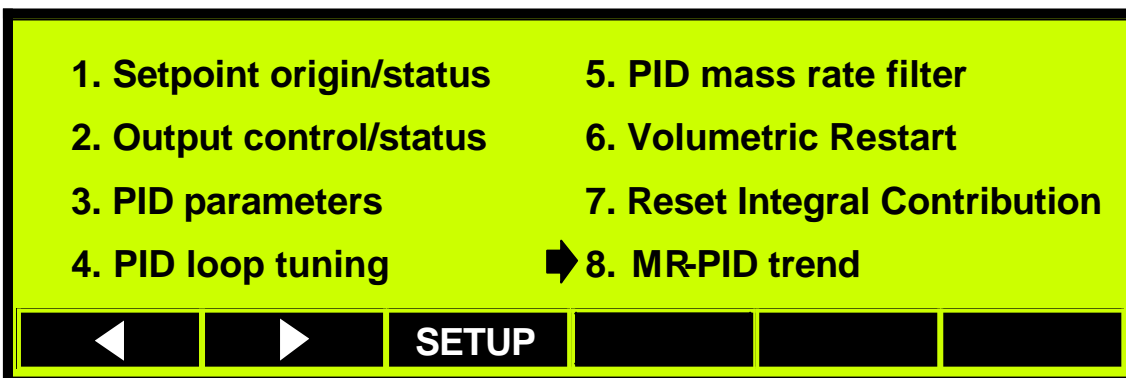


## OPTIMUS OPERATIONAL MANUAL.

### System Setup / PID Loop Control / mass rate & pid output trends.

#### Mass Rate / PID Trend.

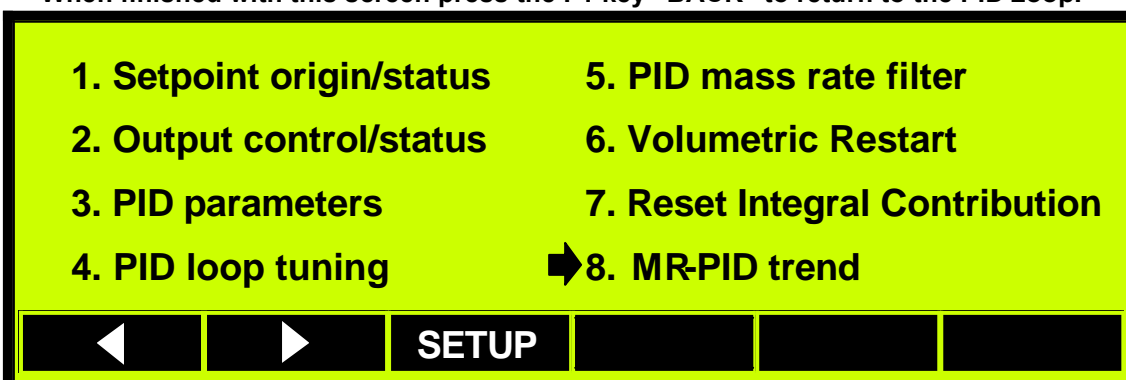
This screen allows the user to view the relationship between the mass rate and the control function output. With the selector arrow opposite the MR -PID trend press "ENTER" to access the trend screen.



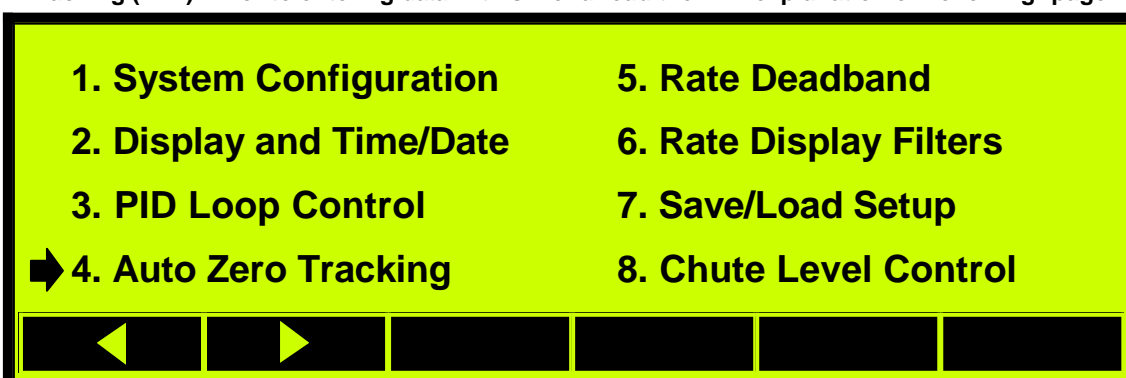
On selecting Menu 8 changes to that shown below. There are two traces, Mass Rate (MR) and PID output (PID). To exit this menu use the F1 key (BACK) to clear the trace use the F2 key (CLEAR). The F3 key (↓ SP) reduces the setpoint, the F4 key (↑ SP) increases the setpoint. The arrow attached to the vertical cursor depicts the set point.



When finished with this screen press the F1 key "BACK" to return to the PID Loop.



To return to the "SETUP" menu's press the F3 "SETUP key. Scroll the cursor on to Auto Zero Tracking (AZT). Prior to entering data in this menu read the AZT explanation on following page.



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## **OPTIMUS OPERATIONAL MANUAL.**

### **System Setup / Auto Zero Tracking / overview.**

---

Prior to describing the use of the Auto Zero Tracking (AZT) function, the user should be familiar with certain terminology.

Manual Zero is the belt zeroing which is invoked by an operator. The function is automatic but has to be manually invoked. As distinct from the AZT function which is performed automatically without user intervention.

**Auto Zero Tracking.** (This function should be set up after the scale has been calibrated)

The weight of the weigh belt and the weigh area can change with time. The weight changes can be generally attributed to, wear and tear, product build upon the belt and product build up on the weigh area. If the scale was a static system weighing in batches for instance, the scale could be automatically zeroed each time the previous load was removed. The action being triggered by the output of the load cell dropping to a pre-programmed value.

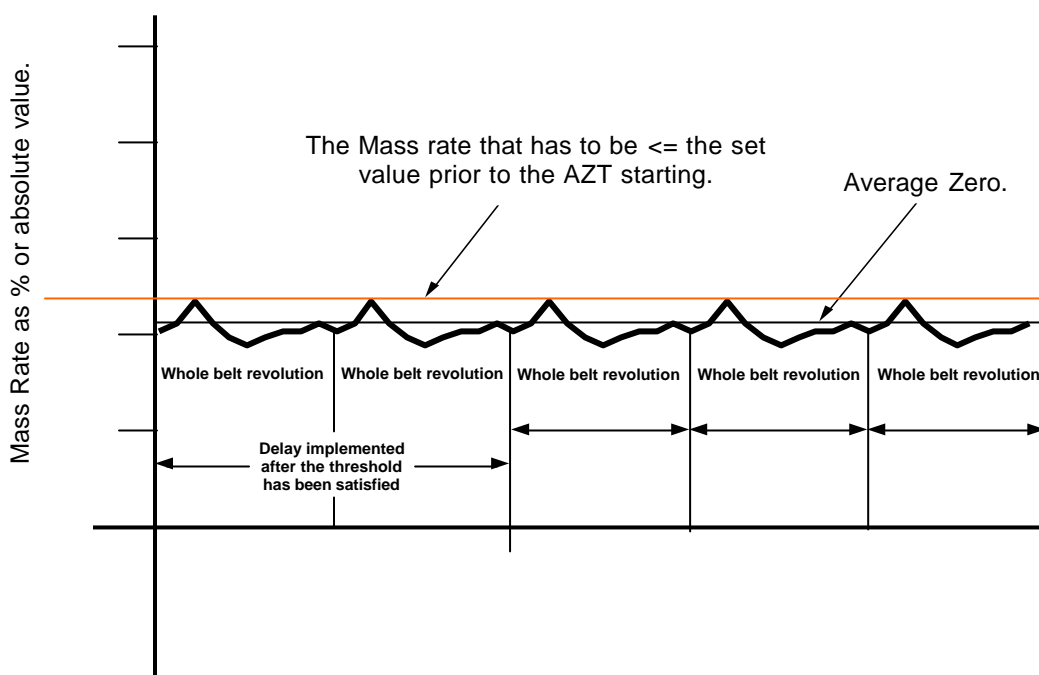
Continuous weighing systems are more complex and require more conditions to be satisfied prior to an AZ being performed. The function can be enabled or disabled by toggling the 'ENTER' key when the select arrow is along side the field.

Optimus allows the user to select a load cell output below which the AZ function will be invoked (Threshold). It is important this load cell output is carefully selected. It can only be accurately selected after the system has been manually zeroed, calibrated and the mass rate observed over a minimum of one whole belt revolution. The Auto Zero Threshold level should be set to approximately 5% higher than the highest value displayed when the belt is running empty.

The delay value is provided so that the AZ function will only be invoked after the delay has timed out. This function is used when the process is subject to constant no flow conditions. The period allows the user to select the number of whole belt revolution that the zero will be performed over. A good knowledge of the process is necessary to enter a value here.

E.g. If the no flow condition is available for a period of greater than one belt revolution but less than two belt revolution, use one revolution here and so on.

The value shown in the "Current Contribution" field displays the offset that Optimus has applied to the manual zero found during the manual zero process. It is reset after each manual zero has been performed.



## OPTIMUS OPERATIONAL MANUAL.

### System Setup / Auto Zero Tracking.

Toggling the “ENTER” key here will either enable or disable the Auto Zero Tracking function(AZT).

#### ➡ Auto-Zero tracking disabled

Threshold = 10.0% = 1.00 kg/min

Delay = 10 secs      Period = 2revs

Current contribution = 0.00



Use the scroll key to access the Threshold setting screen. The Threshold can be set as a percentage of the belt capacity or as a mass rate. The user should be aware of result of the AZT threshold being set too high or too low. If it is set too high Optimus could invoke the Auto zero routine and zero out the belt with material on it, or never completely perform an AZT because the dead weight effect of the belt switches out the function before a full belt revolution can be completed. Use an input that means something to you and observe the process prior to setting up this screen.

#### Auto-Zero tracking disabled

Threshold = ➡10.0% = 1.00 kg/min

Delay = 10 secs      Period = 2 revs

Current contribution = 0.00



Press the “ENTER” key to adjust the AZT Threshold.

#### Auto zero threshold (% of belt capacity)

5.0

New value

—



Press the tick key to lock in the new threshold level

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## OPTIMUS OPERATIONAL MANUAL.

### System Setup / Auto Zero Tracking / threshold.

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The Threshold is the point at which Optimus will perform an AZT assuming that the Delay period has been satisfied. The threshold can be set either as a % of the of maximum mass rate (as specified in the setup). Or as an absolute value, in the specified unit s. Use the scroll keys to access the Threshold and press “ENTER” key to gain access to data entry screen for either % or units.

➡ **Auto-Zero tracking disabled**

Threshold     =    10.0%     =    1.00 kg/min

Delay           =    10 secs       Period = 2revs

Current contribution = 0.00

◀▶????

Pressing the “ENTER” key here will bring up the threshold percent data entry screen.

**Auto zero threshold ( in kg/min)**

**10.0**

New value            —

DELCLEAR????

Press the tick key to accept and exit to the previous screen. Or the Cross key to exit to the previous screen

---

## OPTIMUS OPERATIONAL MANUAL.

### *System Setup / Auto Zero Tracking / threshold.*

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As with the previous screen the AZT threshold can be set by scrolling to the absolute value entry point as shown below. Pressing the “ENTER” key will gain access to the data entry field.

**Auto-Zero tracking disabled**

➡ **Threshold     =    10.0%     =    1.00 kg/min**

**Delay             =    10 secs       Period = 2 revs**

**Current contribution = 0.00**

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Pressing the “ENTER” key here will bring up the threshold percent data entry screen.

**Auto zero threshold ( in kg/min)**

**10.0**

**New value             —**

DEL

CLEAR

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Press the tick key to accept and exit to the previous screen. Or the Cross key to exit to the previous screen.

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## OPTIMUS OPERATIONAL MANUAL.

### System Setup / Auto Zero Tracking / delay.

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Some processes are cyclic and the belt can be running empty (below the threshold) the AZT will activate only to be halted when more material is presented to the belt. The delay allows the user who has a knowledge of the process to suppress the start of an AZT until the threshold has been active longer than any normal cyclic process.

**Auto-Zero tracking disabled**

Threshold    =    10.0%    =    1.00 kg/min

➡ Delay        =    10 secs      Period = 2revs

Current contribution = 0.00

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Press the “ENTER” key with the cursor opposite the delay to gain access to the delay data input screen.

**Delay before auto zeroing (in seconds)**

**10.0**

New value            —

DELCLEAR????

Press the tick key to accept the new value for the delay of the AZT feature

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## OPTIMUS OPERATIONAL MANUAL.

### System Setup / Auto Zero Tracking / period.

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A user initiated Zero will be performed over the number of belt revolutions that were defined during the calibration process. When a AZT is initiated the number of belt revolutions that the user wishes to have the AZT performed over can be more or less than the number defined in the calibration process. This is allowed in order that a zero can be completed within a “widow” of opportunity. A knowledge of the process is required prior to selecting the “PERIOD”. Scroll the cursor to the “PERIOD” data entry point and press “ENTER”.

**Auto-Zero tracking disabled**

**Threshold     =    10.0%    =    1.00 kg/min**

**Delay           =    10 secs    ➡ Period = 2 revs**

**Current contribution = 0.00**

◀▶????

Enter the number of belt revolutions that the AZT should use to update the current average zero

**Auto zero period ( in belt revolutions)**

**5**

**New value            —**

DELCLEAR????

Press the tick key to accept and exit to the previous screen. Or the Cross key to exit to the previous screen

---

## OPTIMUS OPERATIONAL MANUAL.

### System Setup / Auto Zero Tracking / current contribution.

---

Over time the AZT contribution to the average zero may drift out of limits that can be termed normal. This value will be different for all systems and depends on the working environment, feeder design, product and belt wear. In order that the user can monitor performance of the AZT routine Optimus has been provided with a viewing port, where the AZT calculated zero can be reviewed and reset. Note this value is automatically reset each time an operator initiated zero is performed.

Press the "RESET" key (F5). To gain access to the AZT reset.

**Auto-zero tracking is enabled.**

Threshold = 10.0%                      1.000 kg/min

Delay = 10 secs                      Period = 2 revs

➡ **Current contribution = 0.000**

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**RESET**

Auto-zero

Thresho

Delay = 1

➡ Current c

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**Set auto-zero offset to 0 mV?**

**Press ENTER to proceed**

**Press ABORT to skip**

◀

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**RESET**

**Auto-Zero tracking disabled**

Threshold = 10.0% = 1.00 kg/min

➡ Delay = 10 secs                      Period = 2 revs

Current contribution = 0.00

◀

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**OPTIMUS OPERATIONAL MANUAL.**  
**System Setup / Rate Deadband /.**

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Mass rate deadband = 0.2% of belt capacity  
= ➡ 1.2 kg/hour  
Mass rate = 350 kg/hour  
Maximum mass rate = 600 kg/hour

◀ ▶ ?? ?? CLEAR

Rate deadband (in kg/min)

1.8

New value —

DEL CLEAR ?? ??

Mass rate deadband = 0.2% of belt capacity  
= ➡ 1.2 kg/hour  
Mass rate = 350 kg/hour  
Maximum mass rate = 600 kg/hour

◀ ▶ ?? ?? CLEAR

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**OPTIMUS OPERATIONAL MANUAL.**  
**System Setup / Rate Display Filters.**

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- |                          |                           |
|--------------------------|---------------------------|
| 1. System Configuration  | 5. Rate Deadband          |
| 2. Display and Time/Date | ➡ 6. Rate Display Filters |
| 3. PID Loop Control      | 7. Save/Load Setup        |
| 4. Auto Zero Tracking    | 8. Chute Level Control    |



Mass rate deadband	=	0.2% of belt capacity
	=	1.2 kg/hour
Mass rate	=	350 kg/hour
Maximum mass rate	=	600 kg/hour



Rate deadband (as % of belt capacity)

2.0

New value

—



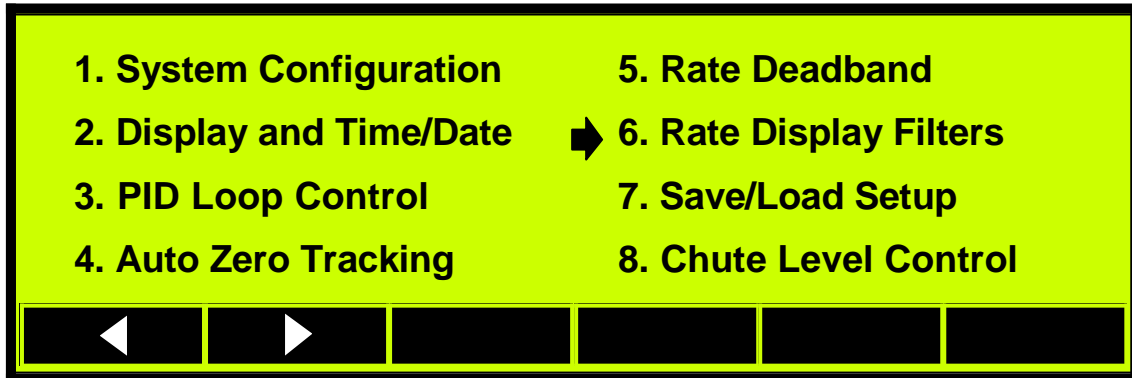
---

## OPTIMUS OPERATIONAL MANUAL.

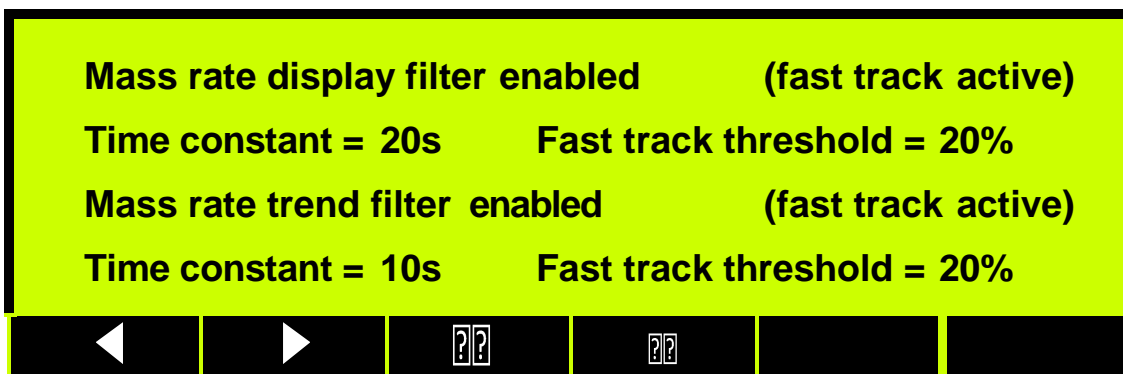
### System Setup / Rate Display Filters / time constant.

---

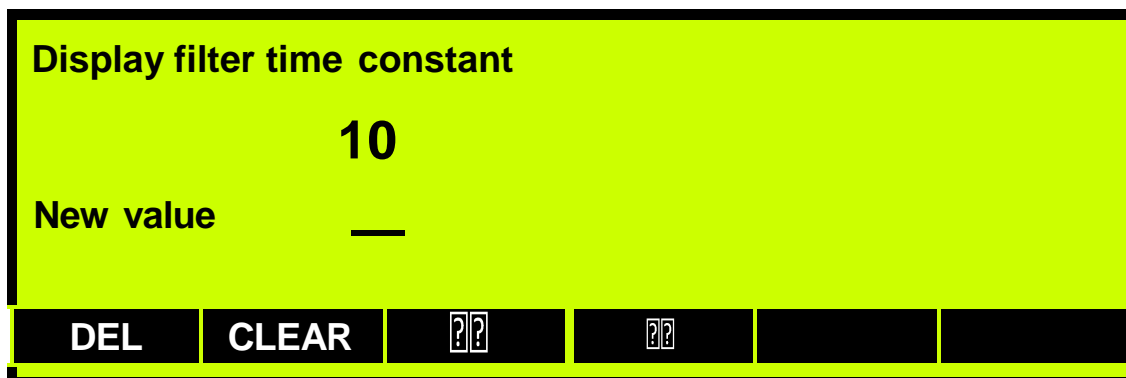
The analogue Mass Rate output signal can be filtered. Scroll to Rate Display Filter and press “ENTER” to show the menu for mass Rate Filtering.



Press the “ENTER” key to gain access to the Mass Rate Filter menu.



Press the “ENTER” key to gain access to the Mass Rate data entry screen.



Enter the value required for the time constant in the above screen and press the Tick key to accept and return to the PID screen.

# **OPTIMUS OPERATIONAL MANUAL.**

## **System Setup / Rate Display Filters / fast track threshold & time.**

### **The Mass Rate Filter.**

This feature allows the user to dampen the Mass Rate analogue output. Mass rate filter has fast tracking facility associated with it. The filter can be switched off by Setting the "Threshold" to 0% . If the filter is required without the fast track feature, set the "Threshold" to 100%.

Mass rate display filter enabled		(fast track active)			
Time constant = 20s	Fast track threshold = 20%				
Mass rate trend filter enabled		(fast track active)			
Time constant = 10s	Fast track threshold = 20%				
◀	▶	??	??		

Display filter fast track threshold					
1.0					
New value —					
DEL	CLEAR	??	??		

Mass rate display filter enabled		(fast track active)			
Time constant = 20s	Fast track threshold = 20%				
Mass rate trend filter enabled		(fast track active)			
Time constant = 10s	Fast track threshold = 20%				
◀	▶	??	??		

Trend filter time constant					
5.0					
New value —					
DEL	CLEAR	??	??		

---

## OPTIMUS OPERATIONAL MANUAL.

System Setup / Rate Display Filters time constant / fast track threshold.

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Mass rate display filter enabled (fast track active)

Time constant = 20s Fast track threshold = 20%

Mass rate trend filter enabled (fast track active)

Time constant = 10s Fast track threshold = 20%



Trend filter fast track threshold

20

New value

—



---

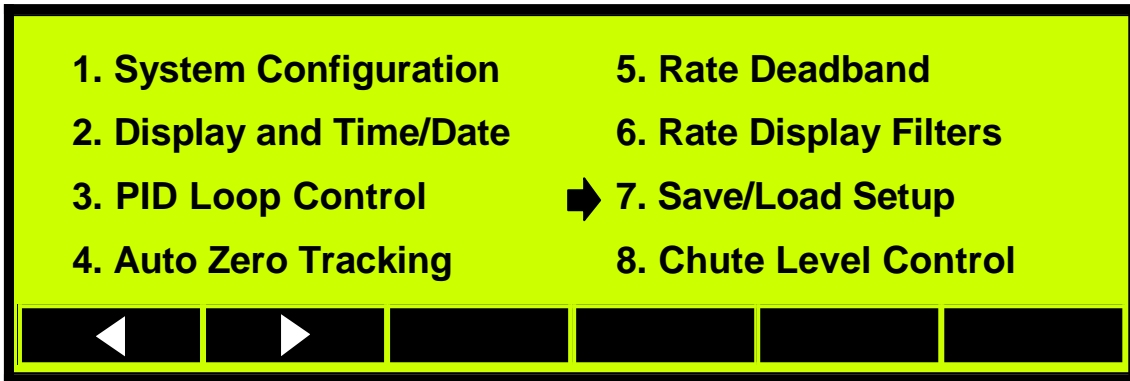
## OPTIMUS OPERATIONAL MANUAL.

### System Setup / Save / Load Setup.

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#### Save/Load Setup.

Optimus can be fitted with an optional compact "Flash Card" (32 MB). The card fits into a flash card carrier on the main pcb. The flash card is used to install software (firmware) updates and store Optimus setup and configuration data. The card can accept 8 setup and configuration data sets. This data can be used to setup Optimus quickly and accurately should the main pcb fail.



Scroll on to save/load Setup.

The screen will change to the one shown below. This screen shows the compact flash memory is empty (8 dotted lines). The cursor is positioned next to the first entry File 00. Press the F3 "SAVE" key to load flash card memory with the configuration and setup data.



Optimus will now save the data to the next available file. In this case File 00, there will be a small delay between pressing F3 "SAVE" and the screen shown below presenting.



Press "ENTER" to lock in the data to the compact flash memory.

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## **OPTIMUS OPERATIONAL MANUAL.**

### **System Setup / Save / Load Setup.**

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The card has been loaded with setup and configuration data, which can be used later or sent to Web-Tech for evaluation if there setup is a problem.

The screenshot shows a screen titled "Files on card". On the left, there is a list of files, with "File 00" at the top and four dashed lines below it. To the right of the list are four dashed lines. At the bottom of the screen is a row of six buttons: a left arrow, a right arrow, "SAVE", "LOAD", "ERASE", and an empty button.

To download previously stored data, select the file required by placing the cursor along side the file and press the F4 "LOAD" key.

The screenshot shows a screen titled "Files on card". A large rectangular box in the center contains a large exclamation mark on the left and the text "File loaded" at the top right, and "Press ENTER to proceed" at the bottom right. At the bottom of the screen is a row of six buttons: a left arrow, a right arrow, "SAVE", "LOAD", "ERASE", and an empty button.

When the screen indicates that the file has loaded press "ENTER" to update Optimus.


To Erase Files, select the file to erase by placing the cursor along side it. Then Press F5 "ERASE" it.

## OPTIMUS OPERATIONAL MANUAL.

### System Setup / Chute Level Control.

Some processes require that the weighfeeder be pre-fed by means other than a choked supply (overhead bin or silo). Generally a volumetric screw feeder is used. This type feeder is unable to control the rate at which product is supplied to a regular weighfeeder inlet chute. A standard weighfeeder inlet chute will have little volumetric capacity and therefore will be subject to the vagaries of the plant demand. As a weighfeeder can only adjust the feed rate by means of belt speed variation, any abnormal deviations from set point can result in over supply or under supply to the feeder. This will result in the weighfeeder being either being under supplied or over supplied and the feeder being able to supply a stable mass rate. By increasing the volume of the inlet chute in the horizontal sense and measuring the volume in the extended horizontal chute, Optimus can vary the speed of the pre-feed device. Web-tech manufacture feeder's that have an extended horizontal inlet chutes fitted with material sensing probes. These probes provide Optimus with a map of the volume of product in the inlet chute and therefore the ability to control the rate of product supply to the feeder. By setting up the following menu correctly, Optimus can provide a control signal to control the pre-feed device. Chute level control is an optional extra and is suitable for use with feeders manufactured with a custom designed material inlet chute.


1. System configuration	5. Rate Deadband
2. Display and Time/Date	6. Rate display Filters
3. PID Loop Control	7. Passwords
4. Auto Zero Tracking	➡ 8. Chute Level control.



Scroll to Chute Level Control, press ENTER to set up and modify the chute level control action. At this point assigned probes can be associated with a output speed function. Generally the weighfeeder will have been fitted with three probes prior to despatch. They are referred to as Low, Mid, High. The Low probe is the probe nearest the inlet chute, the High probe is the probe nearest to the shear gate on the feeder and the Mid probe is situated in between the High and Low. None refers to no probe active, all probes out of product. The Ratio refers to the percentage output from the assigned current loop on a activation of that probe.

In the following example with no probe active, the current loop driving the prefeed inverter will be driven to 20mA, 100% output. With just the Low probe active and the inlet chute approximately 1/3 full the current loop will be driven to 18.4 mA. When the Low & Mid probes are on the current loop output will be 16.0 mA and with all three probes on the output will be 12 mA.

Probe On		Ratio
➡ None	(No probe active.)	100.00%
Low	(Low probe active.)	90.00%
Mid	(Middle probe active.)	75.00%
High	(High probe active.)	50.00%



Pressing ENTER will provide the user with an input screen where each probe can be assigned with an output ratio function.

## OPTIMUS OPERATIONAL MANUAL.

### System Setup / Chute Level Control.

No probe chute output ratio (in %)

100.0

New value

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DEL

CLEAR

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Observe the process and assign a mA output to the assigned current loop that best satisfies the process requirement, when the chute has become empty. Press the tick key to lock in the data and return to the probe assignment screen.

Probe On	Ratio
None	100.00%
➡ Low	90.00%
Mid	85.00%
High	50.00%

Navigation buttons: Left arrow, Right arrow, ??, ??, and two empty buttons.

Scroll on to the “Low” probe and assign an output to the current loop.

Low probe chute output ratio (in %)

90.0

New value

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DEL

CLEAR

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Scroll on to the “Mid” probe and assign an output to the current loop.

Probe On	Ratio
None	100.00%
Low	90.00%
➡ Mid	75.00%
High	50.00%

Navigation buttons: Left arrow, Right arrow, ??, ??, and two empty buttons.

---

## OPTIMUS OPERATIONAL MANUAL.

### System Setup / Chute Level Control.

---

Assign a current output to the activation of the “Mid” probe.

**Mid probe chute output ratio (in %)**

**85.0**

New value            

DELCLEAR????

Press the tick key to lock in the data and move back to the probe assignment screen.

Probe On	Ratio
None	100.00%
Low	90.00%
Mid	75.00%
➡ High	50.00%

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Scroll on to the “High” probe current output assignment and press the “ENTER” key gain access to the data entry screen.

**High probe chute output ratio (in %)**

**50.0**

New value            

DELCLEAR????

Enter the current output required when the chute probe “High” is on and press the tick key to lock in the data and return to the probe assignment screen.

# OPTIMUS OPERATIONAL MANUAL.

## I/O (Input/Output) / Current Loop Inputs.

Optimus provides six for (6) analogue input circuits. One is reserved or the Remote Rate Input. The remaining five are re-assignable. Optimus's analogue inputs are current and can be configured to be one of the following.

4/20mA - 20/4mA - 0/20mA - 20/0mA - 5/25mA - 25/5mA - 0/25mA - 25/0

From the MRMT screen select the Input / Output ( I/O ) F2 key

<b>Mass Rate</b> [kg/min]	<b>950.0</b>	<input checked="" type="radio"/> SP Local
		<input type="radio"/> SP Rem
		<input type="radio"/> AZT On
<b>Mass Total</b> [kg]	<b>702.0</b>	<input type="radio"/> PID Man
		<input checked="" type="radio"/> PID Auto
<b>CAL</b>	<b>I/O</b>	<b>TREND</b>
<b>CLEAR</b>	<b>SETUP</b>	<b>INFO</b>

Press the “ENTER” key to gain access to the Current Loop Inputs.

➡ 1. Current Loop Inputs	5. RS-232 Configuration
2. Current Loop Outputs	6. RS-485 Configuration
3. Digital Inputs	7. Load cell and tacho
4. Digital Outputs	8. DeviceNet
<input type="button" value="◀"/>	<input type="button" value="▶"/>
<input type="button" value="⏮"/>	<input type="button" value="⏭"/>
<input type="button" value="⏪"/>	<input type="button" value="⏩"/>

Press the “ENTER” key to gain access to the Current Loop 1 Setup screens.

➡ Loop 1 Remote Setpoint	Loop 5 not used
Loop 2 Temperature	Loop 6 not used
Loop 3 Ratio	
Loop 4 Inclinometer	
<input type="button" value="◀"/>	<input type="button" value="▶"/>
<input type="button" value="??"/>	<input type="button" value="??"/>
<input type="button" value="⏮"/>	<input type="button" value="⏭"/>
<input type="button" value="⏪"/>	<input type="button" value="⏩"/>

---

## OPTIMUS OPERATIONAL MANUAL.

### I/O (Input/Output) / Current Loop Inputs.

---

#### Loop 1 Setup

Note Current Loop Input 1 is reserved for the remote Setpoint input. This is indicated by selection cursor changing from a filled cursor to an outline of a cursor. The Input display shows the current input signal.

Loop input 1 is Remote Setpoint		Input = 4.00mA
Type is 4-20 mA	Parameters	Filtering
Calibrate 0%	Current 0%	20.00mA
Calibrate 100%	Current 100%	0.00mA

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Use the scroll key to advance the cursor to “Type is” Press “ENTER” to gain access to the pre-defined input types. Scroll through the six types of current inputs until you find the one that suites the device that is generating the remote setpoint.

Loop input 1 is Remote Setpoint		Input = 0.00mA
➡ Type is 4-20 mA	Parameters	Filtering
Calibrate 0%	Current 0%	20.00mA
Calibrate 100%	Current 100%	0.00mA

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Scroll on to the “Parameters”

Loop input 1 is Remote Setpoint		Input = 0.00mA
Type is 20-0 mA	➡ Parameters	Filtering
Calibrate 0%	Current 0%	20.00mA
Calibrate 100%	Current 100%	0.00mA

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## OPTIMUS OPERATIONAL MANUAL.

### I/O (Input/Output) / Current Loop Inputs.

A number of Optimus units can, if required act as a stand alone ratio controllers. The units can be linked via their individual analogue input and output current loops and provide a master slave ratio control over the resultant output from a number of feeders. The following screen provides the user with the means to set up the feeder ratios. In the example below the feeder will produce 60 kg/min at 20mA.

**Loop input 1 remote setpoint parameters**

Master capacity	=	60 kg/minute
Slave %	=	100% of master
Input	=	60 kg/minute

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**Master capacity (in kg/min)**

**100.0**

New value

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DEL

CLEAR

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**Loop input 1 remote setpoint parameters**

Master capacity	=	60 kg/minute
➡ Slave %	=	100% of master
Input	=	60 kg/minute

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**Slave output (% of master capacity)**

**100.0**

New value

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DEL

CLEAR

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## OPTIMUS OPERATIONAL MANUAL.

### I/O (Input/Output) / Current Loop Inputs.

Use the scroll forward key to move the cursor on to the Filtering entry point.

Loop input 1 is Remote Setpoint		Input = 4.00mA
Type is 4-20 mA	Parameters	➡ Filtering
Calibrate 0%	Current 0%	20.00mA
Calibrate 100%	Current 100%	0.00mA

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Press the “ENTER” key to gain access to the current loop input filtering, reserved for remote setpoint (“REM SET” as shown on the connection pcb). Scroll on to “Time Constant”

Loop filter enabled (fast track active)

➡ Time constant = 5s

Fast track threshold = 15%

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Press “ENTER” to gain access to the data input screen.

Input filter time constant

5.0

New value —

DEL

CLEAR

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Enter the time filtering constant required and press the tick key to lock in the data and return to the loop filter setup screen. Press the scroll forward key to access the Fast Track Threshold.

Loop filter enabled (fast track active)

Time constant = 5s

➡ Fast track threshold = 15%

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## OPTIMUS OPERATIONAL MANUAL.

### I/O (Input/Output) / Current Loop Inputs.

The “Fast Track Threshold” can be activated by entering a value greater than zero into the screen. The “Fast Track Threshold” works by limiting the filter to working in a band that has been established around the current input. If the input current moves up or down by a value which exceeds the “Fast Track Threshold” the filter time constant will be switched out until a new threshold can be established.

**Loop filter enabled (fast track active)**  
Time constant = 4s  
➔ Fast track threshold = 15%

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Press the “ENTER” key to gain access to the “Fast Track Filter” data entry screen.

**Input filter fast-track threshold**  
  
15.0  
  
New value —

DEL

CLEAR

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Press the tick key to lock in the data and return to the loop filter setup screen.

**Loop input 1 is Remote Setpoint**      **Input = 4.00mA**

Type is 4-20 mA	Parameters	Filtering
➔ Calibrate 0%	Current 0%	20.00mA
Calibrate 100%	Current 100%	0.00mA

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All I/O supplied with Optimus is calibrated by the factory. However the current loop inputs may have to be field calibrated. Scroll on to the “Calibrate 0%” and press the “ENTER” key.

**Loop input 1 is Remote Setpoint**      **Input = 4.00mA**

Type is 4-20 mA	Parameters	Filtering
➔ Calibrate 0%	Current 0%	20.00mA
Calibrate 100%	Current 100%	0.00mA

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# OPTIMUS OPERATIONAL MANUAL.

## I/O (Input/Output) / Current Loop Inputs.

At this point the current sending device should be forced to send 4 mA. When the loop is set to 4 mA, pressing the "ENTER" key will signal Optimus to calibrate zero.

<b>Loop inp</b> <b>Type is 20</b> <b>Calibrate</b> <b>Calibrate</b>	<b>Apply 0% input current</b> <b>Press ENTER to proceed</b> <b>Press ABORT to cancel</b>	<b>00mA</b> <b>Filtering</b> <b>0.00mA</b> <b>0.00mA</b>
<div style="display: flex; justify-content: space-around;"> <span>◀</span> <span>▶</span> <span>??</span> <span>??</span> </div>		

Scroll on to "Current 0%". This input screen allows the user to enter the "zero" current as a percentage.

<b>Loop input 1 is Remote Setpoint</b>		<b>Input = 0.00mA</b>
<b>Type is 20-0 mA</b>	<b>Parameters</b>	<b>Filtering</b>
<b>Calibrate 0%</b>	<b>Current 0%</b>	<b>0.00mA</b>
<b>Calibrate 100%</b>	<b>Current 100%</b>	<b>0.00mA</b>
<div style="display: flex; justify-content: space-around;"> <span>◀</span> <span>▶</span> <span>??</span> <span>??</span> </div>		

Press the "ENTER" key to access the data entry screen. Using a DVM or other accurate current measuring device read the current flowing in the circuit when at 0 (4mA) and enter it into the screen.

<b>0% current (in mA)</b>					
<b>0.0</b>					
<b>New value</b>					
<div style="display: flex; justify-content: space-around;"> <span>DEL</span> <span>CLEAR</span> <span>??</span> <span>??</span> </div>					

Press the tick key to lock in the data and return to the "Current Loop Setup" screen.  
 Scroll on to "Calibrate 100%" and press "ENTER" to gain access.

<b>Loop input 1 is Remote Setpoint</b>		<b>Input = 0.00mA</b>
<b>Type is 20-0 mA</b>	<b>Parameters</b>	<b>Filtering</b>
<b>Calibrate 0%</b>	<b>Current 0%</b>	<b>0.00mA</b>
<b>Calibrate 100%</b>	<b>Current 100%</b>	<b>0.00mA</b>
<div style="display: flex; justify-content: space-around;"> <span>◀</span> <span>▶</span> <span>??</span> <span>??</span> </div>		

## OPTIMUS OPERATIONAL MANUAL.

### I/O (Input/Output) / Current Loop Inputs.

At this point the current loop should be forced to 20mA.

Loop input 1 is Remote Setpoint		Input = 20.00mA
Type is 20-0 mA	Parameters	Filtering
Calibrate 0%	Current 0%	0.00mA
➡ Calibrate 100%	Current 100%	20.00mA

◀

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When the current has been forced to 20mA. Press the "ENTER" key to calibrate the 20mA point

Loop inp	00mA
Type is 20	ltering
Calibrate	0.00mA
➡ Calibrate	20.00mA

Apply 100% input current  
Press ENTER to proceed  
Press ABORT to cancel

◀

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Press the tick key to the calibration constant and return to the current loop setup screen.

Loop input 1 is Remote Setpoint		Input = 20.00mA
Type is 20-0 mA	Parameters	Filtering
Calibrate 0%	Current 0%	0.00mA
Calibrate 100%	➡ Current 100%	20.00mA

◀

▶

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Scroll on to the "Current 100%". At this point the current flowing in the loop should be measured using an accurate DVM and the reading entered into the screen.

100% current (in mA)	
0.00	
New value	—

DEL

CLEAR

??

??

Pressing the "ENTER" key locks in the calibration constant and returns the user to the loop setup screen.

## **OPTIMUS OPERATIONAL MANUAL.**

### **I/O (Input/Output) / Current Loop Inputs.**

The remaining 5 analogue input circuits are setup as Loop 1 Remote Setpoint. However the remaining loops can be assigned to pre-assigned labels. Scroll forward to loop 2 and press "ENTER" to gain access to the setup screen for "Loop 2"

<b>Loop 1 Remote Setpoint</b>	<b>Loop 5 not used</b>
<b>➡ Loop 2 Not used</b>	<b>Loop 6 not used</b>
<b>Loop 3 Not used</b>	
<b>Loop 4 Not used</b>	

◀	▶	??	??		
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On entering the "Loop 2" setup screen press "ENTER" key to gain access to the range of pre-assigned labels. Inclinator, Temperature, Ratio.

<b>➡ Loop input 2 is Temperature.</b>	<b>Input = 12.00 mA</b>	
<b>Type is 20-0 mA</b>	<b>Parameters</b>	<b>Filtering</b>
<b>Calibrate 0%</b>	<b>Current 0%</b>	<b>0.00mA</b>
<b>Calibrate 100%</b>	<b>Current 100%</b>	<b>20.00mA</b>

◀	▶	??	??		
---	---	----	----	--	--

Press the tick key to lock in the data. Continue to set up the remainder of the current loop input as previously shown

---

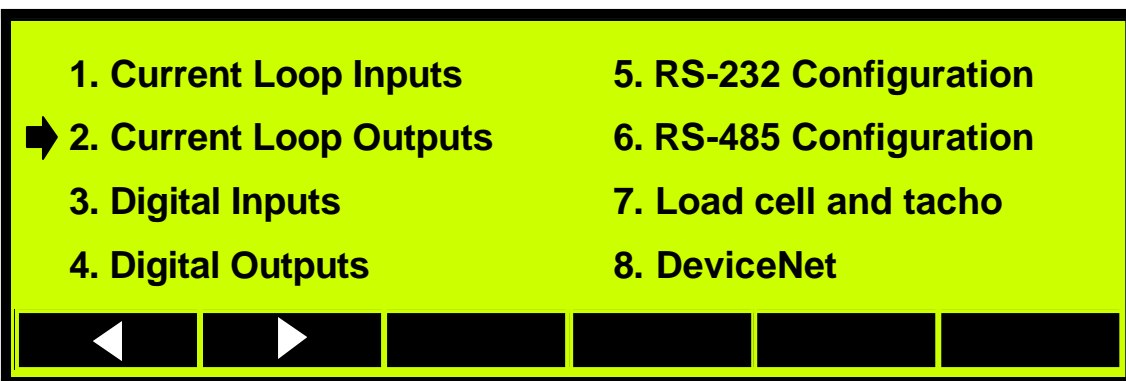
## OPTIMUS OPERATIONAL MANUAL.

### I/O (Input/Output) / Current Loop Outputs.

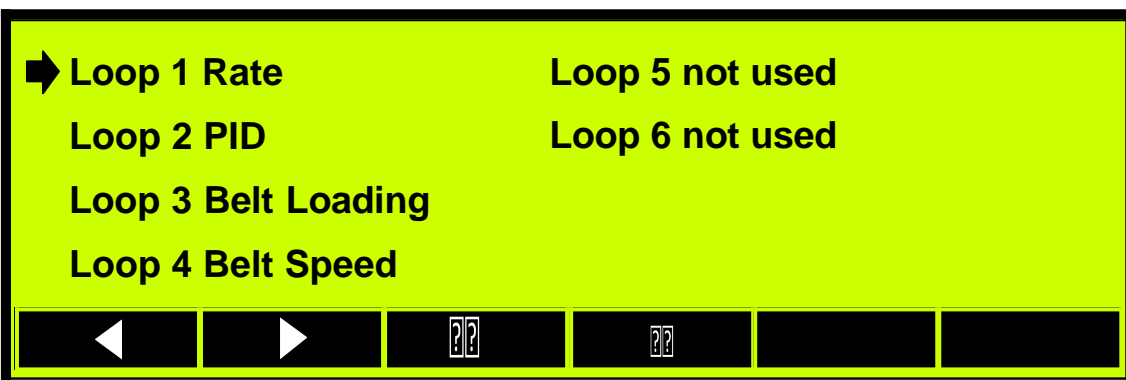
---

Optimus provides six (6) analogue output signals.

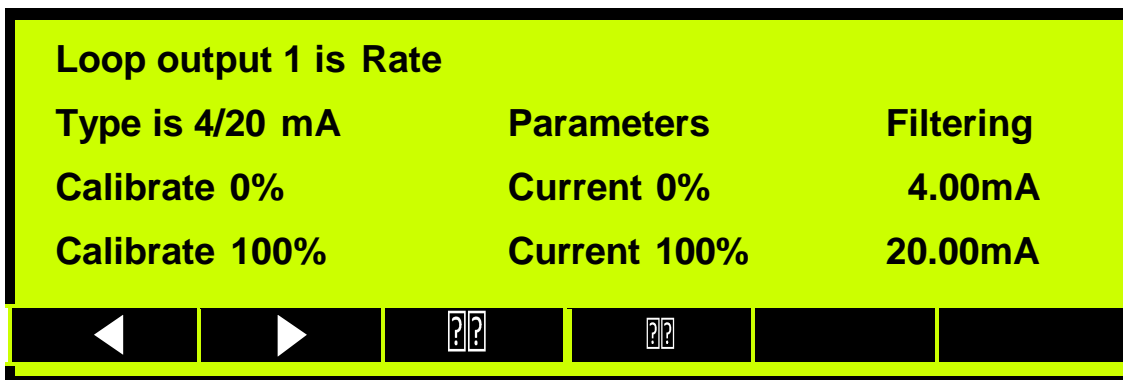
Channel 1 is pre -assigned to Mass Rate.  
Channel 2 is pre -assigned to PID Output.  
Channel 3 is assignable.  
Channel 4 is assignable.  
Channel 5 is assignable.  
Channel 6 is assignable.



To begin assigning current output loops position the cursor along side Current Loop Outputs.



Loop one is permanently assigned to the Mass Rate. Press "ENTER" to access loop parameters.



The de-highlighted cursor arrow as seen above indicates that associated parameter is inaccessible. Scroll on to the select type of analogue output.

**OPTIMUS OPERATIONAL MANUAL.**  
**I/O (Input/Output) / Current Loop Outputs.**

With the cursor pointing at the loop type press the “ENTER” key to change the loop to one of the pre-assigned. (4-20mA : 20-4mA : 0-20mA : 20-0mA : 5-25mA : 25-5mA : 0-25mA : 25-0mA)

**Loop output 1 is Rate**

➡ Type is 4/20 mA	Parameters	Filtering
Calibrate 0%	Current 0%	= 4.00 mA
Calibrate 100%	Current 100%	= 20.00 mA

◀ ▶ ?? ??

Scroll on to the parameters. Parameters are not editable and therefore the cursor is de-highlighted and the screen is unavailable.

**Loop output 1 is Rate**

Type is 4/20 mA	Parameters	Filtering
Calibrate 0%	Current 0%	4.00mA
Calibrate 100%	Current 100%	20.00mA

◀ ▶ ?? ??

Scroll the cursor on to “Filtering where filters can be applied to the selected loop.

**Loop output 1 is Rate**

Type is 4/20 mA	Parameters	➡ Filtering
Calibrate 0%	Current 0%	4.00mA
Calibrate 100%	Current 100%	20.00mA

◀ ▶ ?? ??

Select the “Time constant” input screen.

**Loop out filter enabled (fast track active)**

➡ Time constant = 1s

Fast track threshold = 10%

◀ ▶ ?? ??

## **OPTIMUS OPERATIONAL MANUAL.**

### **I/O (Input/Output) / Current Loop Outputs.**

Enter the filter time constant required. The value entered here will generally have been selected after observing the process and the response of rate monitoring instrumentation.

**Output filter time constant**

5

New value —

DEL

CLEAR

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Press the tick key to lock in the data and return to the main filter parameter selection screen. Scroll forward to the “Fast Track Threshold” entry point and press the “ENTER” key to gain access.

**Loop out filter enabled (fast track active)**

Time constant = 5s

➔ Fast track threshold = 8%

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The “Fast Track Threshold” when active removes the time average filter from the current loop output, when the output current exceeds the “Fast Track Threshold” value. Assume that the feeder has a capacity of 60 kg/min and the feeder is running at a steady rate of 30 kg/min. If the rate is increased to 45 kg/min. The Mass Rate current output will exceed the 8% threshold. ( 8% of 60 kg/min = 4.8 kg/min) The filter on the current loop output will be cancelled and the output will immediately rise to 16 mA. (45 kg/min). When Optimus receives two consecutive readings that fall within 10% of each other, the “Fast Track Threshold” will be switched on again.

**Output filter fast-track threshold**

8.0

New value —

DEL

CLEAR

??

??

Enter the “Fast Track Threshold” value required and press the tick key to lock in the data and return to the current loop output setup screen.

---

## OPTIMUS OPERATIONAL MANUAL.

### I/O (Input/Output) / Current Loop Outputs.

---

At the time of manufacture and testing all Optimus's input and output facilities are tested against our bench test equipment. Should it become necessary the output current loops can be calibrated. With the cursor opposite "Select calibrate 0%" press "ENTER" to select the "Calibrate 0%" screen.

<b>Loop output 1 is Rate</b>		
<b>Type is 4/20 mA</b>	<b>Parameters</b>	<b>Filtering</b>
➡ <b>Calibrate 0%</b>	<b>Current 0%</b>	<b>4.00mA</b>
<b>Calibrate 100%</b>	<b>Current 100%</b>	<b>20.00mA</b>
◀	▶	??

With suitable test equipment connected across the loop output terminals. Use either the F1 or F2 keys to increase or decrease the output of the circuit until the desired output is achieved. The output will increment or decrement by 0.006 mA per key stroke.

<b>Loop output 1 is Rate</b>		
<b>Type is 20-0 mA</b>	<b>Output forced to 0%</b>	<b>Filtering</b>
➡ <b>Calibrate 0%</b>	<b>Press F1 to decrement</b>	<b>4.00mA</b>
<b>Calibrate 100%</b>	<b>Press F2 to increment</b>	<b>20.00mA</b>
<b>Press ENTER to accept</b>		
◀	▶	??

Following the completion of the test press the "ENTER" key to update the working memory and return to the loop parameters. Pushing the cursor's advance key will position the cursor alongside the "Current 0%" Use the data entry screen associated with this screen to enter the absolute milliamp value required.

<b>Loop output 1 is Rate</b>		
<b>Type is 20-0 mA</b>	<b>Parameters</b>	<b>Filtering</b>
<b>Calibrate 0%</b>	➡ <b>Current 0%</b>	<b>4.00mA</b>
<b>Calibrate 100%</b>	<b>Current 100%</b>	<b>20.00mA</b>
??	??	??

Press the "ENTER" key to access the data entry screen or the + or - key to vary the analogue output in 0.005 mA steps.

**OPTIMUS OPERATIONAL MANUAL.**  
**I/O (Input/Output) / Current Loop Outputs.**

From this screen the absolute value for the required output can be entered rather than the predefined steps provided in previous menu's. Type in the value required and press the tick key to lock the data in. The data will only be locked in when the "HOME" key is pressed.

0% current (in mA)

4.0

New value

4.123

DEL

CLEAR

??

??

Press the tick key to lock in the data and scroll forward.

Loop output 1 is Rate

Type is 4/20 mA

Parameters

Filtering

Calibrate 0%

Current 0%

4.00mA

➡ Calibrate 100%

Current 100%

20.00mA

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Following the setting of the low side of the current loop. Press the Scroll forward key to access the high end of the current loop. The procedure associated with incrementing and decrementing the output of the high end is the same as decrementing the low end.

Loop output 1 is Rate

Type is 2

Calibrate

➡ Calibrate

Output forced to 100%

Press F1 to decrement

Press F2 to increment

Press ENTER to accept

Filtering

0.00mA

0.00mA

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## **OPTIMUS OPERATIONAL MANUAL.**

### **I/O (Input/Output) / Current Loop Outputs.**

If the predefined steps do not suit the application requirements then use the screen shown below to adjust the top end using absolute units.

**Loop output 1 is Rate**

Type is 20-0 mA	Parameters	Filtering
Calibrate 0%	Current 0%	20.00mA
Calibrate 100%	➡ Current 100%	0.00mA

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Press the "ENTER" key to access the data entry screen and typing the required value.

**100% current (in mA)**

**20.00**

**New value 20.456**

DEL

CLEAR

??

??

Use the tick key lock in the data and return the display to the rate setup screen.

**Loop output 1 is Rate**

Type is 4/20 mA	Parameters	Filtering
Calibrate 0%	Current 0%	4.00mA
Calibrate 100%	➡ Current 100%	20.00mA

◀

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Following the setting up of the **Rate** Loop parameters the **PID** Loop parameters can be set up. Only the Rate signal and PID out puts are permanently assigned to Rate O/P & PID O/P as marked on the connection pcb (Analogue Outputs 1 & 2 ). The PID loop and the non pre-assigned loops are set up in the same manner as the rate. Press the tick key to go to the Loop Select screen.

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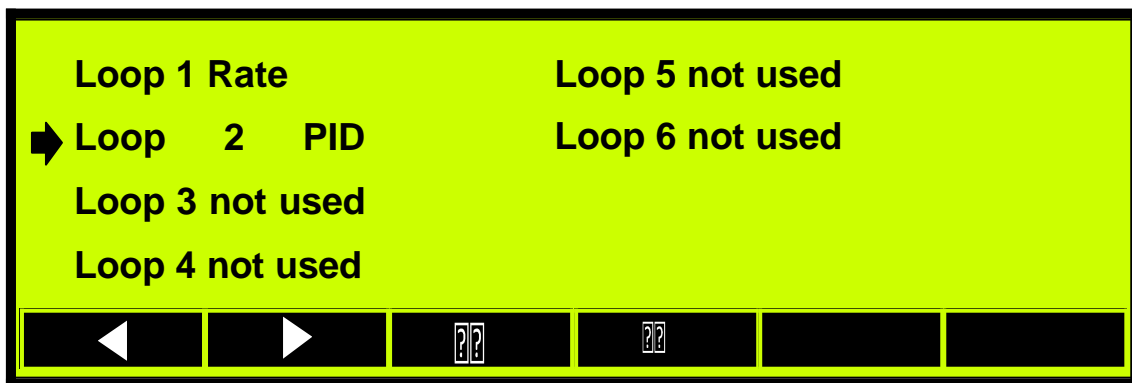
## **OPTIMUS OPERATIONAL MANUAL.**

### **I/O (Input/Output) / *Current Loop Outputs.***

---

All the remaining current loops are setup in the same way as the Rate. Use the scroll keys to access the loops. Loops 3, 4, 5, & 6 can be assigned from 8 pre-assigned labels.

Mass Rate.  
PID.  
Belt Speed.  
Belt Loading.  
Chute PID.  
Hopper Weight.  
Ratio Out.  
Manual.



# OPTIMUS OPERATIONAL MANUAL.

## I/O (Input/Output) / Digital Inputs.

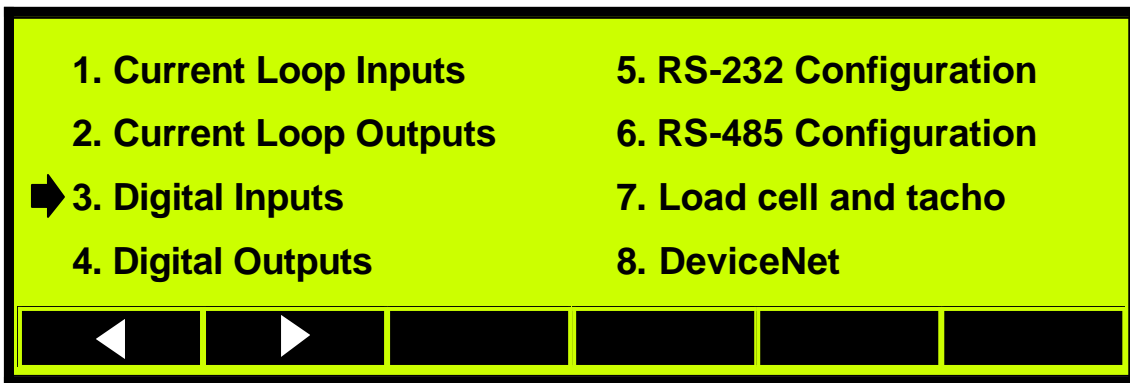
### Digital Inputs.

Optimus has 6 digital inputs. Each of which can be assigned to a pre-assigned label. The digital inputs have a working voltage of 12-60 VDC. The primary function of these inputs is route weighfeeder status to the optional data network. eg Optional belt drift switch. Generally these inputs are used in conjunction with an optional field bus systems. (Device-Net, Profi-Bus, or Either-Net).

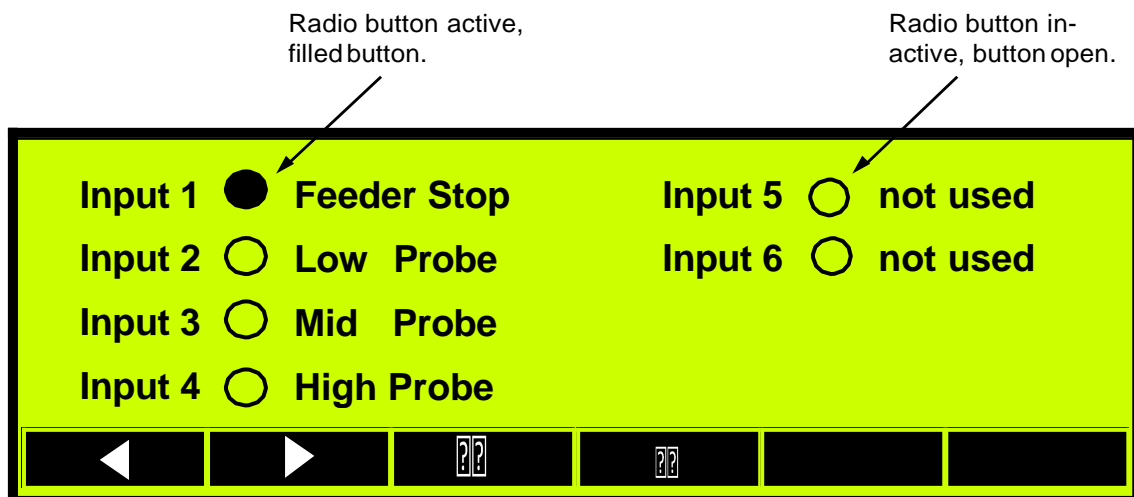
Each of the six digital inputs can be assigned a label. From the factory the labels are pre-assigned as follows:-

Input 1	Feeder Stop
Input 2	Reset Total
Input 3	Low Probe
Input 4	Mid Probe
Input 5	High Probe
Input 6	Not Used.

The interconnect PCB uses the notation "DIG IP1" / "DIG IP6"



The digital Inputs can be assigned names, from a built in pre assigned selection.



Use the "ENTER" key to assign the digital input with one of the pre-assigned labels. The radio buttons when filled indicate an active input. In the above screen digital Input 1 Feeder Stop is active.

# **OPTIMUS OPERATIONAL MANUAL.**

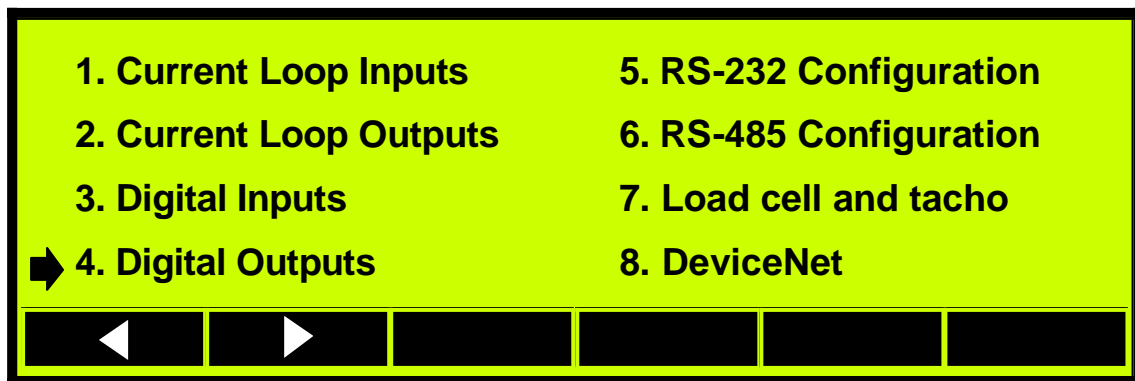
## **I/O (Input/Output) / Digital outputs.**

Optimus has been fitted with 6 digital outputs. Each of which has been pre-assigned a label. The labels are interchangeable. However output one and two are permanently assigned to the "Totaliser" and "System Healthy" function.

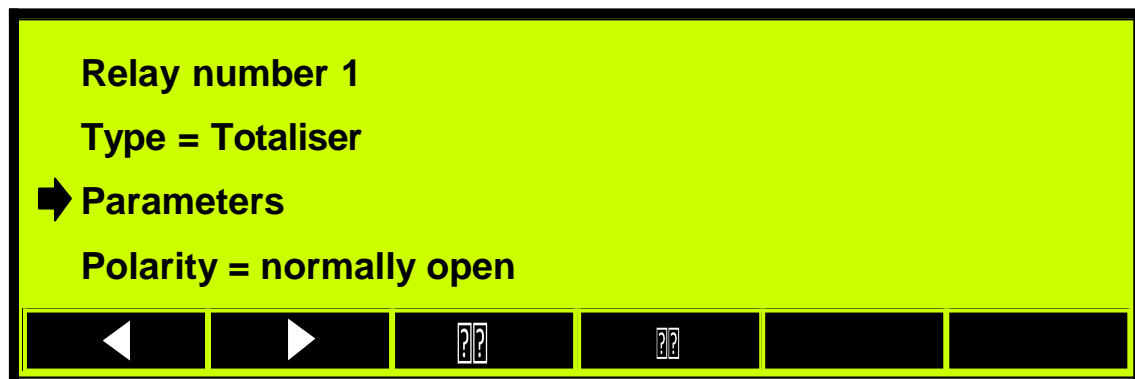
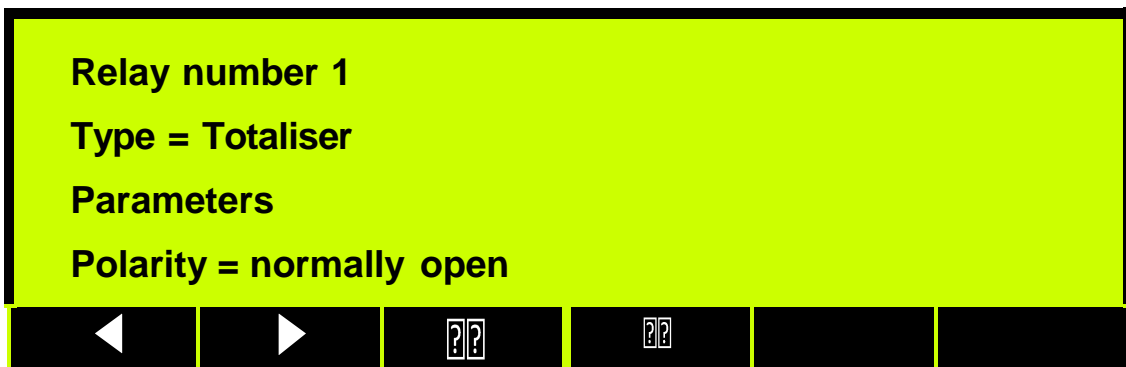
From the factory the labels are:-

- |   |                  |  |
|---|------------------|--|
| 1 | Totaliser.       | (Activated on totaliser output.)         |
| 2 | System Healthy   | (Activated on electronic fault detected) |
| 3 | Load Cell Alarm. | (Activated on load cell output)          |
| 4 | Deviation Alarm. | (Activated depending on mass flow)       |
| 5 | Chute Alarm.     | (Activated on inlet chute condition)     |
| 6 | Rate Alarm.      | (Activated on rate condition)            |

These outputs must be configured as follows prior to correct operation.



Scroll to "Digital Outputs" and press the "ENTER" key to access the output configuration screens. Relay 1 has been pre-assigned to the Totaliser. Relay 2 has been pre-assigned to the "System Healthy"



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## **OPTIMUS OPERATIONAL MANUAL.**

### **I/O (Input/Output) / Digital outputs.**

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Press the "ENTER" key to enable or disable the Totaliser output function.

➡ **Totaliser pulse enabled**

**Emit pulse every 1.0 kg**

**Pulse width = 1000 ms**

**Maximum mass rate = 50 kg/min**

Navigation buttons: Left arrow, Right arrow, Enter (??), Exit (??), and two empty buttons.

With the function enabled press the scroll forward down to "Emit pulse" function. There are preset output's.

100  
10  
1  
0.1  
0.01  
0.001

**Totaliser pulse enabled**

**Emit pulse every 1.0 kg**

➡ **Pulse width = 1000 ms**

**Maximum mass rate = 50 kg/min**

Navigation buttons: Left arrow, Right arrow, Enter (??), Exit (??), and two empty buttons.

Scroll on to the "Pulse Width" selection screen to access the preset pulse widths. There are 10 pulse widths to choose from 100m/S - 1000m/S. Choose the pulse width that best suites the application.

Consideration should be given to the response time of the receiver unit (PLC) and the ability of Optimus to output the signal in real time. During the configuration of the outputs Optimus will compute the maximum mass rate achievable for any configuration of Optimus. The result being shown on the line "**Maximum mass rate = XXXX kg/min**"

**Relay number 1**

**Type = Totaliser**

**Parameters**

➡ **Polarity = normally open**

Navigation buttons: Left arrow, Right arrow, Enter (??), Exit (??), and two empty buttons.

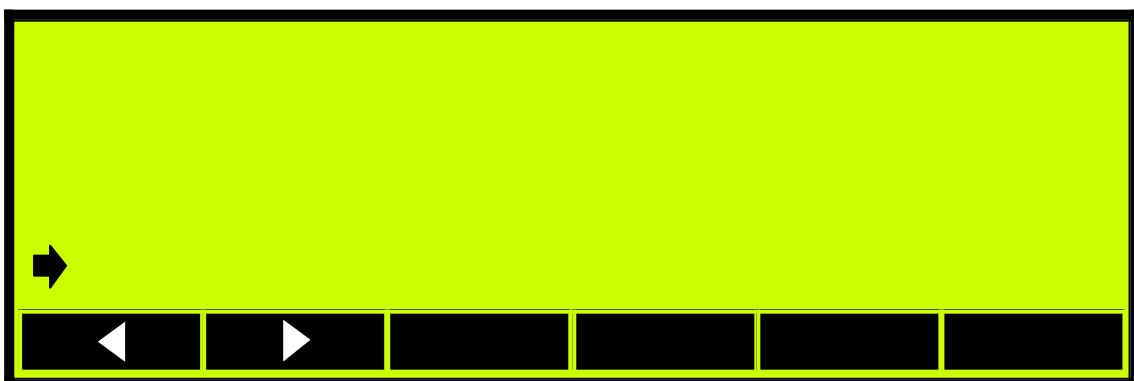
set the polarity, use the setting that suites your application. Normally Open / Normally Closed

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## **OPTIMUS OPERATIONAL MANUAL.**

### **I/O (Input/Output) / *Digital outputs.***

Use the scroll forward screen to access the relay output polarity. The "ENTER" key is used to



set the polarity, use the setting that suites your application. Normally Open / Normally Closed

## OPTIMUS OPERATIONAL MANUAL.

### I/O (Input/Output) / Digital outputs.

There is no access to this relay. It is energised on power up and is de-energised on power down or an electronic fault condition.

➡ Relay 1 ☐ Totaliser                      Relay 5 ☐ Speed Alarm  
Relay 2 ☒ System Healthy      Relay 6 ☐ Load Cell Alarm  
Relay 3 ☐ Rate              Alarm  
Relay 4 ☐ Deviation Alarm

		??	??		
--	--	----	----	--	--

Relay's N°3-6 can be configured against preset labels. Scroll to Relay N°3 and press the "ENTER" key to enter the screens.

Relay 1 ☐ Totaliser                      Relay 5 ☐ Speed Alarm  
Relay 2 ☒ System Healthy      Relay 6 ☐ Load Cell Alarm  
➡ Relay 3 ☐ Not              used  
Relay 4 ☐ Deviation Alarm

		??	??		
--	--	----	----	--	--

Scroll through the predefined labels to select the one that fits the application. Each label has different parameters associated with it. Scroll to Type and select Rate Alarm.

Relay 1 ☐ Totaliser                      Relay 5 ☐ Speed Alarm  
Relay 2 ☒ System Healthy      Relay 6 ☐ Load Cell Alarm  
➡ Relay 3 ☐ Rate              Alarm  
Relay 4 ☐ Deviation Alarm

		??	??		
--	--	----	----	--	--

Scroll on to the parameters entry point.

Relay number 3  
➡ Type              =      Rate Alarm  
Parameters  
Polarity              =      energise above level

		??	??		
--	--	----	----	--	--

Scroll on to the parameters entry point.

## OPTIMUS OPERATIONAL MANUAL.

### I/O (Input/Output) / Digital outputs.

On entering the parameters screen. The function can be enabled or disabled using the "ENTER" key. Select enabled and scroll on to the delay set up.

**➡ Alarm is enabled**

Delay = 2 sec

Level = 110% of belt capacity

= 106 kg/min

??

??

Observe the process and apply the filter time that best suites the application.

**Alarm is enabled**

➡ Delay = 2 sec

Level = 110% of belt capacity

= 106 kg/min

??

??

Observe the process and apply the filter time that best suites the application. Press "ENTER" key to access the data entry screen

**Alarm delay (in seconds)**

**2**

**New value** —

DEL

CLEAR

??

??

Type in the filter delay required and press the tick key to lock in the value. On returning to the parameters screen scroll on to the level.

**Alarm is enabled**

➡ Delay = 2 sec

Level = 110% of belt capacity

= 106 kg/min

??

??

## OPTIMUS OPERATIONAL MANUAL.

### I/O (Input/Output) / Digital outputs.

On entering the parameters screen. The function can be enabled or disabled using the "ENTER" key. Select enabled and scroll on to the delay set up.

**Alarm threshold (% of belt capacity)**

**110**

New value —

**DEL CLEAR** **??** **??**

Use the tick key to lock in the entry and return to the parameters screen. Optimus will now calculate and display the mass rate level at which the relay will operate.

**Alarm is enabled**

**Delay = 2 sec**

**➡ Level = 110% of belt capacity**

**= 106 kg/min**

**??** **??**

Use the tick key to lock in the parameters and return to the relay select screen. Scroll on to relay 4 and allocate it to "Deviation Alarm"

**Relay 1 ☐ Totaliser**

**Relay 2 ☒ System Healthy**

**Relay 3 ☐ Rate Alarm**

**➡ Relay 4 ☐ Deviation Alarm**

**Relay 5 ☐ Speed Alarm**

**Relay 6 ☐ Load Cell Alarm**

**??** **??**

Use the "ENTER" key to scroll through relay allocation labels. Select Deviation Alarm, then scroll on to the "Parameters" screen select entry point.

**Relay number 4**

**Type = Deviation Alarm**

**➡ Parameters**

**Polarity = Energised outside band**

**??** **??**

## OPTIMUS OPERATIONAL MANUAL.

### I/O (Input/Output) / Digital outputs.

On entry to relay 4 parameters screen enable the alarm, using the "ENTER" key to select the enable label.

**➡ Alarm is enabled**

Delay

=

4 sec

Deviation

= +/-

5% of belt capacity

= +/-

3 kg/min

??

??

Scroll onto the delay before relay operation setting. Observe the process and select the operation delay to suit the application.

**Alarm is enabled**

**➡**

Delay

=

4 sec

Deviation

= +/-

5% of belt capacity

= +/-

3 kg/min

??

??

Scroll onto the delay before relay operation setting. Observe the process and select the operation delay to suit the application.

**Alarm delay (in seconds)**

Current value

4

New value

—

DEL

CLEAR

??

??

Scroll on to the deviation entry point and enter the screen.

**Alarm is enabled**

**➡**

Delay

=

4 sec

Deviation

= +/-

5% of belt capacity

= +/-

3 kg/min

??

??

## OPTIMUS OPERATIONAL MANUAL.

### I/O (Input/Output) / Digital outputs.

Enter the value that suites the application. Press the tick key to lock in the selected value.

<b>Alarm threshold (% of belt capacity)</b>					
<b>Current value</b>		<b>5</b>			
<b>New value</b>		<b>6</b>			
<b>DEL</b>	<b>CLEAR</b>	<b>??</b>	<b>??</b>		

Following the entry of a deviation value, the display will return to the parameter entry screen. The deviation value will be shown and directly below this display, Optimus will display the mass rate deviation in the selected units.

<b>Alarm is enabled</b>					
➔	<b>Delay</b>	<b>=</b>	<b>4 sec</b>		
	<b>Deviation</b>	<b>= +/-</b>	<b>6.0% of belt capacity</b>		
		<b>= +/-</b>	<b>4 kg/min</b>		
		<b>??</b>	<b>??</b>		

Press the tick key to return to relay N°4 input screen. Scroll on to the polarity and set the polarity required. Use the "ENTER" key to select either Energised outside band or energise inside band.

<b>Relay number 4</b>					
<b>Type</b>		<b>=</b>	<b>Deviation Alarm</b>		
<b>Parameters</b>					
➔	<b>Polarity</b>	<b>=</b>	<b>Energised outside band</b>		
		<b>??</b>	<b>??</b>		

When done press the tick key to lock in the data and return to the main relay setup screen.

<b>Relay 1</b>	<input type="radio"/>	<b>Totaliser</b>	<b>Relay 5</b>	<input type="radio"/>	<b>Speed Alarm</b>
<b>Relay 2</b>	<input checked="" type="radio"/>	<b>System Healthy</b>	<b>Relay 6</b>	<input type="radio"/>	<b>Load Cell Alarm</b>
➔ <b>Relay 3</b>	<input type="radio"/>	<b>Rate Alarm</b>			
<b>Relay 4</b>	<input type="radio"/>	<b>Deviation Alarm</b>			
		<b>??</b>	<b>??</b>		

---

## OPTIMUS OPERATIONAL MANUAL.

### I/O (Input/Output) / RS-232 Configuration.

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- |                         |   |                         |
|-------------------------|---|-------------------------|
| 1. Current Loop Inputs  | ➡ | 5. RS-232 Configuration |
| 2. Current Loop Outputs |   | 6. RS-485 Configuration |
| 3. Digital Inputs       |   | 7. Load cell and tacho  |
| 4. Digital Outputs      |   | 8. DeviceNet            |



➡	Baud rate	9600	Handshake RTS/CTS
	Data Bits	8	
	Parity	none	
	Stop bits	1	



	Baud rate	9600	Handshake RTS/CTS
➡	Data Bits	8	
	Parity	none	
	Stop bits	1	



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## OPTIMUS OPERATIONAL MANUAL.

### I/O (Input/Output) / RS-232 Configuration.

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➡	Baud rate	9600	Handshake RTS/CTS		
	Data Bits	8			
	Parity	none			
	Stop bits	1			
		◀	▶	??	??

➡	Baud rate	9600	Handshake RTS/CTS		
	Data Bits	8			
	Parity	none			
	Stop bits	1			
		◀	▶	??	??

	Baud rate	9600	Handshake RTS/CTS		
	Data Bits	8			
➡	Parity	none			
	Stop bits	1			
		◀	▶	??	??

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## OPTIMUS OPERATIONAL MANUAL.

### I/O (Input/Output) / RS-485 Configuration.

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RS 485 is an optional output. Generally Web-Tech will supply special firmware to support the customers requirements. To set up the link scroll onto the "RS-485 Configuration" data entry point and press the "ENTER" key.

<b>1. Current Loop Inputs</b>	<b>5. RS-232 Configuration</b>
<b>2. Current Loop Outputs</b>	<b>➡ 6. RS-485 Configuration</b>
<b>3. Digital Inputs</b>	<b>7. Load cell and tacho</b>
<b>4. Digital Outputs</b>	<b>8. DeviceNet</b>

◀

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Press the "ENTER" key to select the required baud rate from pre-assigned values.

<b>➡ Baud rate</b>	<b>9600</b>	<b>Handshake RTS/CTS</b>
<b>Data Bits</b>	<b>8</b>	
<b>Parity</b>	<b>none</b>	
<b>Stop bits</b>	<b>1</b>	

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Scroll on to the "Data Bits" entry point and use the "ENTER" key to select the required data bits from the two values available. (7 & 8)

<b>Baud rate</b>	<b>9600</b>	<b>Handshake RTS/CTS</b>
<b>Data Bits</b>	<b>8</b>	
<b>➡ Parity</b>	<b>none</b>	
<b>Stop bits</b>	<b>1</b>	

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Scroll onto the "Parity" selection entry point and use the "ENTER" key to select either none or even.

<b>Baud rate</b>	<b>9600</b>	<b>Handshake RTS/CTS</b>
<b>➡ Data Bits</b>	<b>8</b>	
<b>Parity</b>	<b>none</b>	
<b>Stop bits</b>	<b>1</b>	

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## OPTIMUS OPERATIONAL MANUAL.

### I/O (Input/Output) / RS-485 Configuration.

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Use the "ENTER" key to select either 1 or 2 stop bits.

<b>Baud rate</b>	<b>9600</b>	<b>Handshake RTS/CTS</b>
<b>Data Bits</b>	<b>8</b>	
<b>Parity</b>	<b>none</b>	
<b>➡ Stop bits</b>	<b>1</b>	

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Scroll onto the "Handshake" setting entry point. Use the "ENTER" key to scroll between "full duplex or half duplex".

<b>Baud rate</b>	<b>9600</b>	<b>Handshake RTS/CTS</b>
<b>Data Bits</b>	<b>8</b>	
<b>Parity</b>	<b>none</b>	
<b>➡ Stop bits</b>	<b>1</b>	

◀

▶

??

??

Following the completion of the setup for the RS-485 specification. Press the tick key to lock in the data and return to the main I/O screen selection.

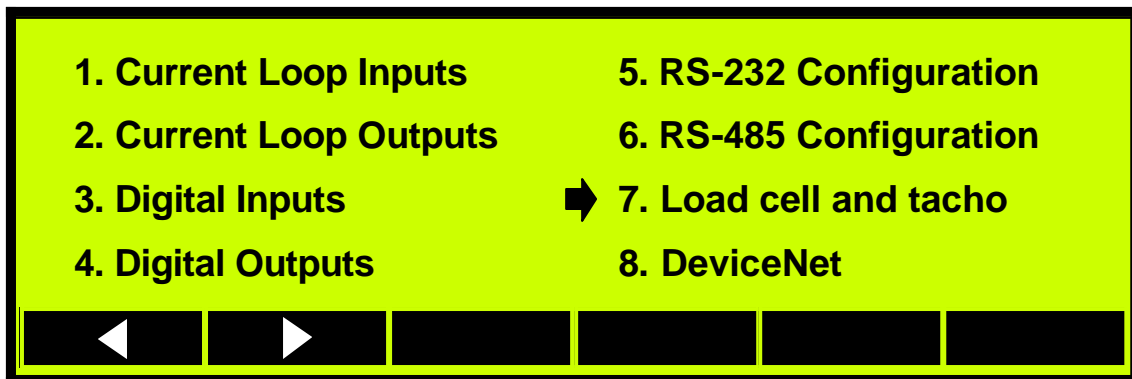
---

## **OPTIMUS OPERATIONAL MANUAL.**

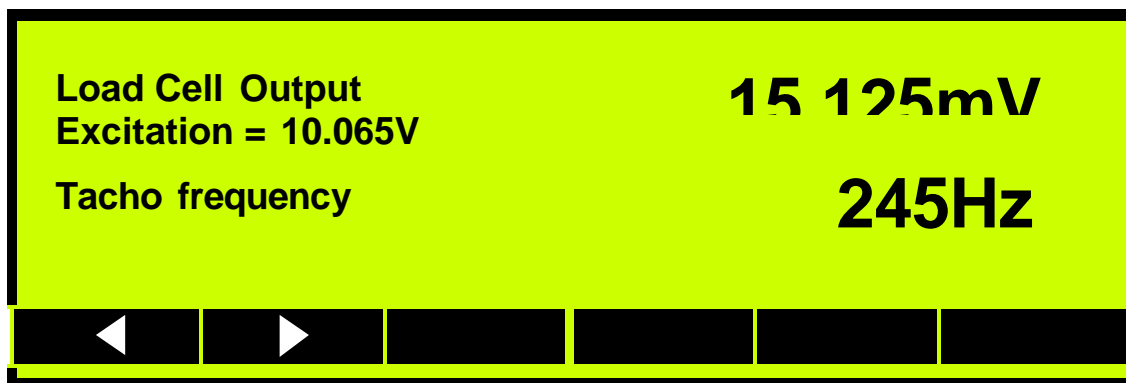
### **I/O (Input/Output) / Load Cell and Tachometer.**

---

The "Load Cell and Tacho" screen allows the user to view the output of the load cell and tachometer/encoder. This screen is for viewing and there are no data entry points.



This screen is used as an aid in maintenance. The load cell output and input are shown along with the encoder. The data should be compared with that shown on the system data sheet shipped with the feeder.



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## OPTIMUS OPERATIONAL MANUAL.

### I/O (Input/Output) / DeviceNet.

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#### Device Net. (Optional Supply)

If Optimus has been supplied with a DeviceNet Card (optional extra) then the following data input screen is used to set up Optimus to communicate over the network. Prior to setting up Optimus to sit on your DeviceNet, network. It is assumed that the installer has a good working knowledge of the DeviceNet protocol and the physical structure of the network.

1. Current Loop Inputs	5. RS-232 Configuration
2. Current Loop Outputs	6. RS-485 Configuration
3. Digital Inputs	7. Load cell and tachometer
4. Digital Outputs	➡ 8. DeviceNet
<div style="display: flex; justify-content: space-around;"><div style="border: 1px solid black; width: 40px; height: 30px; display: flex; align-items: center; justify-content: center;">◀</div><div style="border: 1px solid black; width: 40px; height: 30px; display: flex; align-items: center; justify-content: center;">▶</div><div style="border: 1px solid black; width: 40px; height: 30px; display: flex; align-items: center; justify-content: center;"> </div><div style="border: 1px solid black; width: 40px; height: 30px; display: flex; align-items: center; justify-content: center;"> </div><div style="border: 1px solid black; width: 40px; height: 30px; display: flex; align-items: center; justify-content: center;"> </div><div style="border: 1px solid black; width: 40px; height: 30px; display: flex; align-items: center; justify-content: center;"> </div></div>	

Press ENTER to access the DeviceNet setup screens.

➡	Baud rate	500kHz
	Mac ID	10
Press CONFIG to configure card with parameters		
<div style="display: flex; justify-content: space-around;"><div style="border: 1px solid black; width: 40px; height: 30px; display: flex; align-items: center; justify-content: center;"> </div><div style="border: 1px solid black; width: 40px; height: 30px; display: flex; align-items: center; justify-content: center;"> </div><div style="border: 1px solid black; width: 40px; height: 30px; display: flex; align-items: center; justify-content: center;">??</div><div style="border: 1px solid black; width: 40px; height: 30px; display: flex; align-items: center; justify-content: center;">??</div><div style="border: 1px solid black; width: 40px; height: 30px; display: flex; align-items: center; justify-content: center;">CONFIG</div><div style="border: 1px solid black; width: 40px; height: 30px; display: flex; align-items: center; justify-content: center;"> </div></div>		

Pressing the ENTER key will toggle the baud rate between 125 kHz / 250 kHz / 500 kHz  
Pressing the either of the two direction arrows will allow the user to select a Mac ID.

➡	Baud rate	500kHz
	Mac ID	63
	DeviceNet control	Disabled
Press CONFIG to configure card with parameters		
<div style="display: flex; justify-content: space-around;"><div style="border: 1px solid black; width: 40px; height: 30px; display: flex; align-items: center; justify-content: center;"> </div><div style="border: 1px solid black; width: 40px; height: 30px; display: flex; align-items: center; justify-content: center;"> </div><div style="border: 1px solid black; width: 40px; height: 30px; display: flex; align-items: center; justify-content: center;">??</div><div style="border: 1px solid black; width: 40px; height: 30px; display: flex; align-items: center; justify-content: center;">??</div><div style="border: 1px solid black; width: 40px; height: 30px; display: flex; align-items: center; justify-content: center;">CONFIG</div><div style="border: 1px solid black; width: 40px; height: 30px; display: flex; align-items: center; justify-content: center;"> </div></div>		

A DeviceNet network may have up to 64 (0-63) Media Access Control Identifiers or Mac IDs (node addresses). Each node can support an infinite number of I/O. The user should assign an ID that suits the plant network. The ID can be typed directly into the screen. Pressing the tick key locks in the ID selection. Optimus is shipped with a default Mac ID of 63.

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# **OPTIMUS OPERATIONAL MANUAL.**

## **Theory of Operation/ Steps in the Calibration Procedure.**

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*Prior to calibrating Optimus it is suggested that the (I/O & Setup) procedures be completed.*

### **Calibration of Optimus**

- 1) Enter the number of belt revolutions that Optimus will perform the “manual zero” & span over.
- 2) Perform a manual Zero
- 3) Apply roller Calibration Chain / Static Bar Weight and perform span.
- 4) On completion Optimus is calibrated.

---

## **OPTIMUS OPERATIONAL MANUAL.**

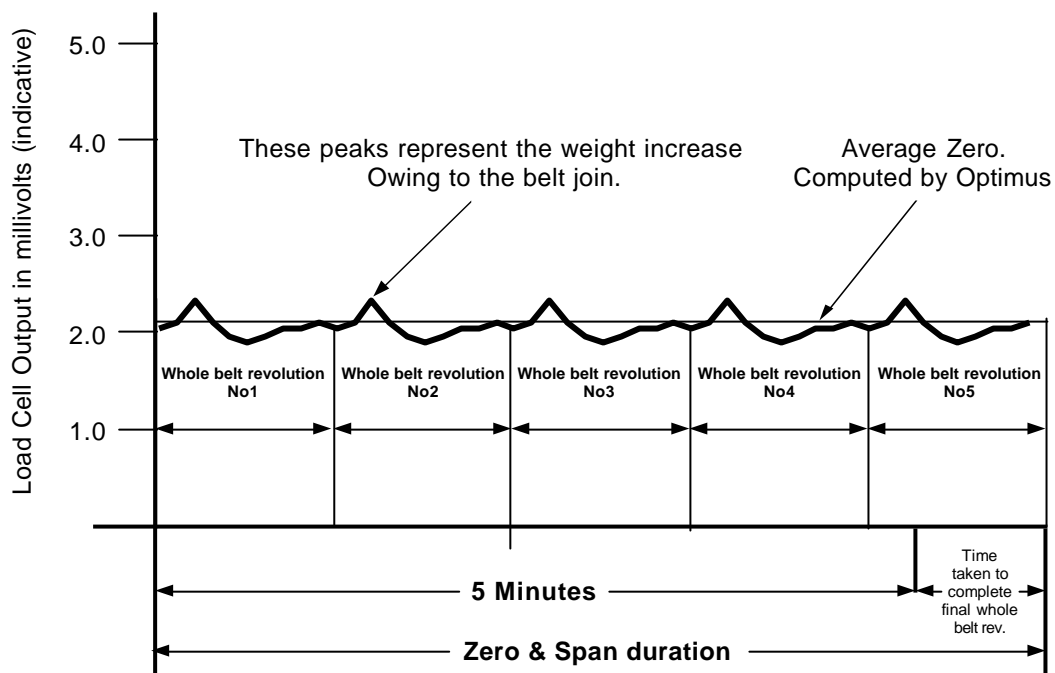
### **Theory of Operation/ Steps in the Calibration Procedure.**

---

When calibrating a continuous weighing system it should be remembered that the procedure must always be conducted over whole belt revolutions and that the same number of belt revolutions are always used when performing a zero (operator initiated) or span. To make sure the Zero and Span calibration functions are performed over whole belt revolutions, it is necessary at the time of commissioning to enter the number of revolutions that the procedures require. Generally Web-Tech will enter this data into Optimus for you. However some systems may need to be set up in the field by our customers, the following procedures describe what needs to be taken into consideration before entering the belt revolutions. Generally Web-Tech recommend that the following guide be used for selecting the belt revolutions.

The Zero and Span functions work at their optimum, when the process takes 5 minutes or longer, or a minimum of 5 belt revolutions are used. We therefore recommend that the belt speed be set to the normal operating speed. (Set the inverter to 50 Hz if variable speed is used) Count the belt revolutions that occur within a 5 minute period and if the belt is part way through a whole belt revolution include this revolution. If the number of belt revolution do not add to 5 then wait and use 5 belt revolutions. These revolutions will be used by Optimus, when ever a Zero or Span is carried out. The number or revolutions entered here should also be used when an empirical test be performed.

**Note:** A stop watch is required to execute the following procedure.



The diagram above shows the load cell output over 5 belt revolutions. Optimus computes the average zero over the 5 belt revolutions. This format also provides a convenient bases for computing the span. Note that the 5 minute period occurred during the 5th belt revolution and therefore the timed period has been extended by the remainder of the belt revolution. When a manual Zero is initiated, Optimus gathers load cell data points (one every 5mS ) over the number of belt revolutions selected. At the completion of the assigned belt revolutions Optimus will compute the average zero.

# **OPTIMUS OPERATIONAL MANUAL.**

## **Theory of Operation/ Steps in the Calibration Procedure.**

Following the zero computation, Optimus will require calibrating. If Web-tech has supplied the mechanical components of the package, a calibration weight or calibration chain will have been provided. The calibration weight/chain will have been sized to suit the application. Generally the calibration device will have been sized to between 30% & 70% of the maximum mass rate that the feeder was designed for.

Optimus allows for three methods of calibrating. Roller chain with various numbers of strands, anchored over the belt and weigh area during calibration. Static weights in the form of flat or round bar fitted to the weigh deck, under the belt. Or Empirical, where product passing over the feeder is compared with an accurate 'static scale'. A method of calibration will have been selected by Web-Tech technical staff that best suits the application.

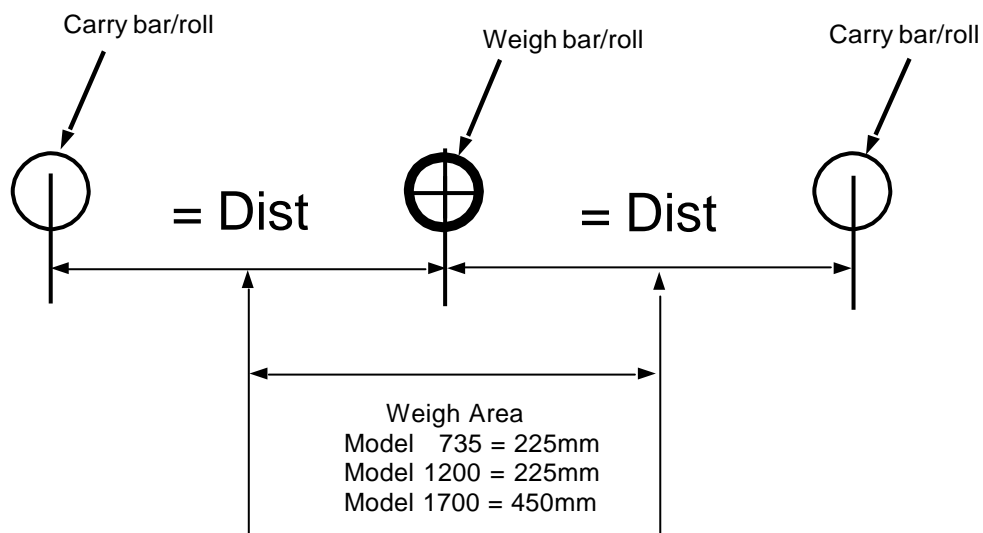
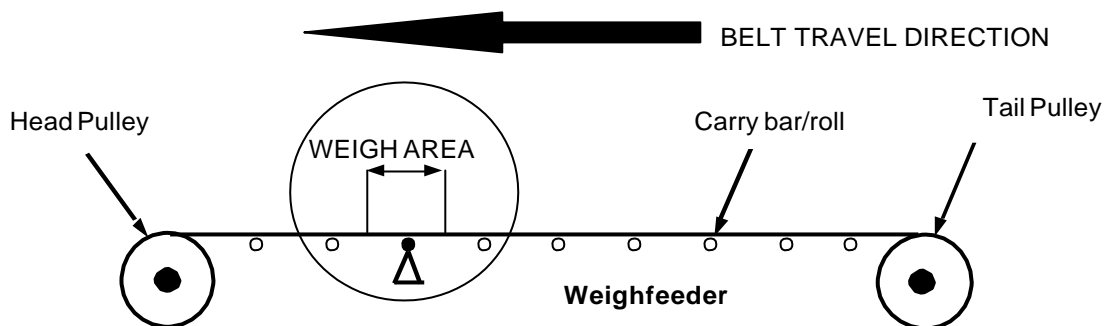
To successfully calibrate Optimus using a calibration roller chain or static weight. A target weight has to be calculated for the feeder. The method of calculating this target weight for both roller chain and static weight are shown below.

### TARGET WEIGHT CALCULATION FOR WEIGHFEEDERS USING CALIBRATION CHAIN.

$$\text{Chain weight (kg/m)} \times \text{N}^{\circ} \text{ of Belt Revs} \times \text{Belt length (m)}$$

### TARGET WEIGHT CALCULATION FOR WEIGHFEEDERS USING CALIBRATION WEIGHTS.

$$\text{Weigh area length (m)} \times \text{weight (kg)} \times \text{Belt Length (m)} \times \text{N}^{\circ} \text{ Belt Revolutions}$$

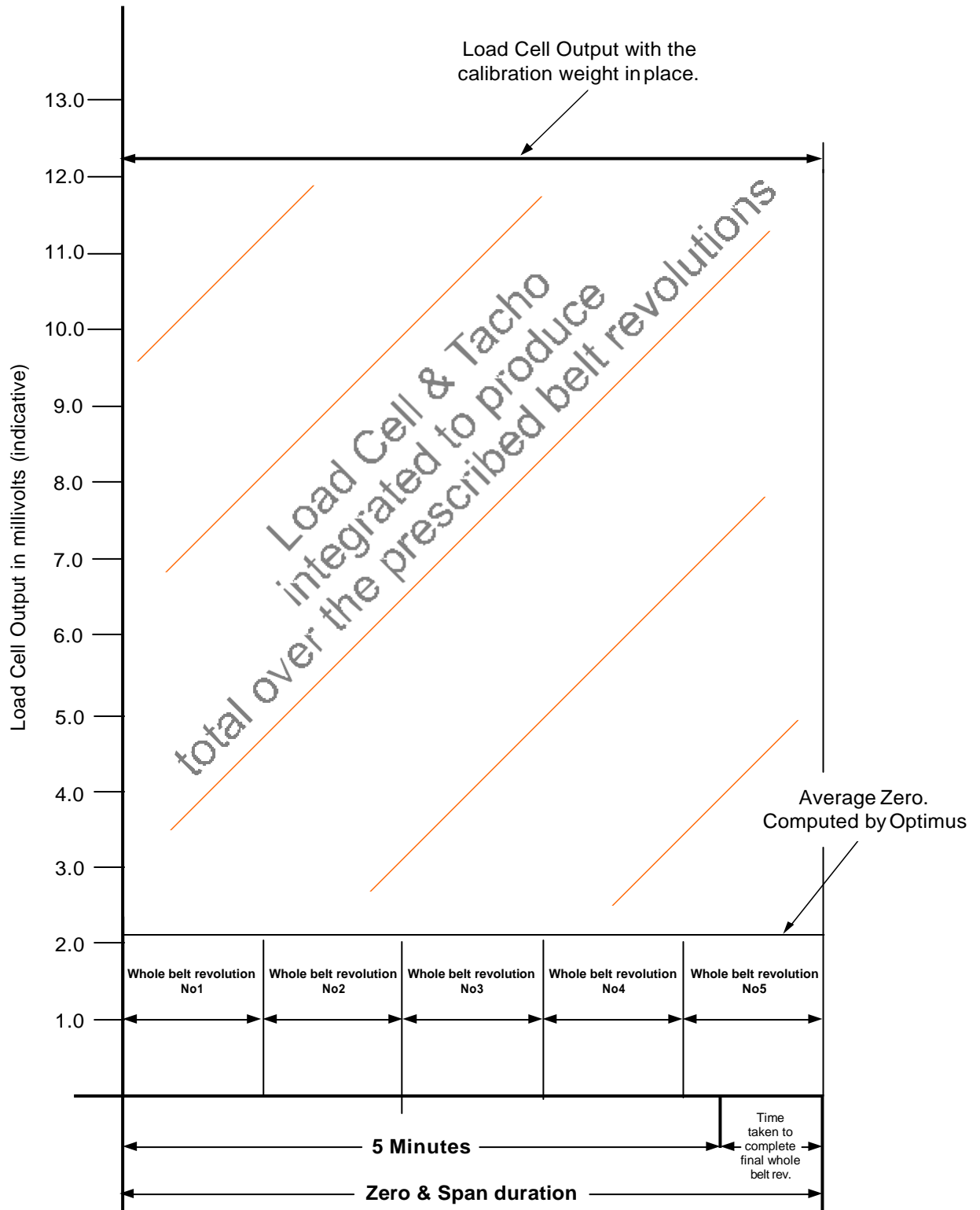


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# **OPTIMUS OPERATIONAL MANUAL.**

## **Theory of Operation/ Steps in the Calibration Procedure.**

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# OPTIMUS OPERATIONAL MANUAL.

## Calibration / Pulses per Revolution.

Prior to entering the pulses per revolution and the number of revolutions that the Zero and Span will be working over, (see Steps in the “**Calibration Procedure**”) preceding this page and familiarise yourself with the concepts. Optimus provides two methods for acquiring the pulses per revolution. An **automatic** method and a **manual** method. The automatic method should be used where possible. To proceed press the CAL key (F1)

Mass Rate [kg/min]	950.0	<input checked="" type="radio"/> SP Local			
		<input type="radio"/> SP Rem			
		<input type="radio"/> AZT On			
Mass Total [kg]	702.0	<input type="radio"/> PID Man			
		<input checked="" type="radio"/> PID Auto			
CAL	I/O	TREND	CLEAR	SETUP	INFO

The **manual** procedure for entering the pulses per revolution, has been provided, to provide flexibility that technicians may require when changing electronic parts. Or should the memory become corrupted and the main pcb needs replacing. If the user has maintained the calibration records associated with Optimus, the manual data entry provides a quick method of bring the replacement part on line. Press the CAL button (F1) and the screen will change to the one shown below. Scroll the cursor to the “Pulses per rev” and press the “ENTER” key to access the data input screen. The pulses per revolution can now be entered. Press the tick key to lock in the data and move the cursor on.

➡ Pulses per rev = 7697	Belt revolutions = 20				
Zero calibration = 3.16	AZT = 2.238				
Span calibration = 56.0	Speed = 0.00m/s				
Calibration target = 196 kg					
◀	▶	LENGTH	ZERO	SPAN	

Press ENTER to gain access to the screen where pulses per revolution can be entered.

Pulses per revolution					
2000					
New value —					
DEL	CLEAR	??	??		

The data entered here must have come from a previous calibration.  
Note Incorrect data entry here can invalidate previous calibration!

# **OPTIMUS OPERATIONAL MANUAL.**

## **Calibration / Manual Entry of belt revolutions & Zero Calibration.**

Scroll on to the manual belt revolution entry and enter the data entry screen by pressing the "ENTER" key.

Pulses per rev	= 7697	➡	Belt revolutions	= 20
Zero calibration	= 3.16	AZT	= 2.238	
Span calibration	= 56.0	Speed	= 0.00m/s	
Calibration target = 196 kg				
◀	▶	LENGTH	ZERO	SPAN

Press "ENTER" to access the manual data entry screen.

Number of belt revolutions to average over				
20				
New value —				
DEL	CLEAR	??	??	

The data entered here must have come from a previous calibration.  
Note Incorrect data entry here can invalidate previous calibration!

Pulses per rev	= 7697	Belt revolutions	= 20
➡ Zero calibration	= 3.16	AZT	= 2.238
Span calibration	= 56.0	Speed	= 0.00m/s
Calibration target = 196 kg			
◀	▶	LENGTH	ZERO
SPAN			

Scroll on to the Zero calibration entry and enter the data entry screen by pressing the "ENTER" key. Enter the average zero during the last automatic calibration or use previous data. If this is not available, perform an automatic calibration. This value can't be found any other way other than Optimus computing it.

Zero calibration (in mV)				
2.283				
New value —				
DEL	CLEAR	??	??	

# **OPTIMUS OPERATIONAL MANUAL.**

## **Calibration / Auto-Zero Tracking.**

Scroll on to the AZT (Auto Zero Tracking) entry and enter the data entry screen by pressing the "ENTER" key.

Pulses per rev	= 7697	Belt revolutions	= 20
Zero calibration	= 3.16	AZT	= 2.238
Span calibration	= 56.0	Speed	= 0.00m/s
Calibration target = 196 kg			

◀	▶	LENGTH	ZERO	SPAN	
---	---	--------	------	------	--

Puls	= 20
Zero c	= 2.238
Span	= 0.00m/s
Calib	

**!**

Set auto-zero offset to 0 mV?

Press ENTER to proceed

Press ABORT to skip

◀	▶	LENGTH	ZERO	SPAN	
---	---	--------	------	------	--

The data entered here must have come from a previous calibration.  
Note Incorrect data entry here can invalidate previous calibration!

Pulses per rev	= 7697	Belt revolutions	= 20
Zero calibration	= 3.16	AZT	= 2.238
▶ Span calibration	= 5.046	Speed	= 0.00m/s
Calibration target = 196 kg			

◀	▶	LENGTH	ZERO	SPAN	
---	---	--------	------	------	--

Scroll on to the span calibration entry point and press the "ENTER" key to enter the manual entry screen and routine.

Span calibration	5 046
Current value	
New value	-

DEL	CLEAR	??	??		
-----	-------	----	----	--	--

# OPTIMUS OPERATIONAL MANUAL.

## Calibration / Target Weight.

The calibration target weight should be entered here. Web-Tech will normally supply the target weight along with the static weights or calibration chain required to produce a target weight. The target weight is that weight that that Optimus should equate to when the belt is run over the prescribed number of belt revolution with either a static weight or calibration chain. See “*Theory of Operation/ Steps in the Calibration Procedure.*”

Pulses per rev	= 7697	Belt revolutions	= 20		
Zero calibration	= 3.16	AZT	= 2.238		
Span calibration	= 56.0	Speed	= 0.00m/s		
➡ Calibration target = 196 kg					
◀	▶	LENGTH	ZERO	SPAN	

To enter the target weight modify screen, press the “ENTER” key when the selector arrow is along side the entry point.

Calibration target (in kg)					
Current value	5.046				
New value	—				
DEL	CLEAR	??	??		

At this point enter the new target weight and press the tick key to lock in the value.

Pulses per rev	= 7697	Belt revolutions	= 20		
Zero calibration	= 3.16	AZT	= 2.238		
Span calibration	= 56.0	Speed	= 0.00m/s		
➡ Calibration target = 196 kg					
◀	▶	LENGTH	ZERO	SPAN	

No access is provided to the speed display. As the belt speed is a derived variable.

# **OPTIMUS OPERATIONAL MANUAL.**

## **Calibration / Pulses per Revolution / auto capture.**

### **Automatic Capture of Pulses per Revolution.**

(Note Web-Tech will have done the following prior to delivery)

At this point the user who is calibrating the system should identify or make a easy to see mark on the belt. The mark in conjunction with a fixed reference point on the weigher will be used as a visual aid in determining the point where Optimus will be commanded to start counting pulses. This pulses come from the encoder/tachometer. The mark passing the static reference point

➔ Pulses per rev	= 7697	Belt revolutions	= 20
Zero calibration	= 3.16	AZT	= 2.238
Span calibration	= 56.0	Speed	= 0.00m/s
Calibration target = 196 kg			

◀	▶	LENGTH	ZERO	SPAN	
---	---	--------	------	------	--

Press the "LENGTH" F3 key to go to the pulse acquisition routine. The screen will change to the one shown below.

This calibration is carried out with the belt moving. The number of complete belt revolutions over a time period are counted by the operator, and the Optimus counts the pulses returned from the speed sensor device the number or belt revolutions being entered in an other screen. The screen below is a pause screen allowing the operator to ready before starting the routine.

Use a mark on the belt to reference the belt revolutions					
--	--	--	--	--	--

START	BACK				
-------	------	--	--	--	--

Press the "START" button, the F1 key, when the mark on the belt coincides with the stationary reference point. The display will change to the one shown below and Optimus will be capturing pulses. When the belt has travelled at least 5 belt revolutions with a minimum time of 5 minutes. Stop the count when the mark on the belt coincides with the static reference.

Press STOP after an exact number of belt revolutions					
Elapsed time	=	360 secs			
Pulses counted	=	8700			

START	BACK				
-------	------	--	--	--	--

---

## **OPTIMUS OPERATIONAL MANUAL.**

### **Calibration / Pulses per Revolution / auto capture.**

---

After using the STOP key (F1) the screen will change to the one shown below. The screen shows all the relevant data relating to the pulse input and provides the link to the entry Pressing the "ENTER"

<b>Tachometer calibration is now complete!</b>					
<b>Belt revolutions = 20</b>		<b>Belt revolutions = 20</b>			
<b>Calibration time = 300s</b>		<b>Pulses per rev = 5400</b>			
		??	??		

At this point the number of belt revolutions over which Optimus captured the pulses must be entered.

Note Only whole belt revolutions must be used and the exact number of revolutions must be entered. Press the tick key to proceed.

<b>➡ Pulses per rev = 7697      Belt revolutions = 20</b>					
<b>Zero calibration = 3.16      AZT = 2.238</b>					
<b>Span calibration = 56.0      Speed = 0.00m/s</b>					
<b>Calibration target = 196 kg</b>					
◀	▶	<b>LENGTH</b>	<b>ZERO</b>	<b>SPAN</b>	

At this point Optimus has the data required in order to perform a "manual zero and span"

# OPTIMUS OPERATIONAL MANUAL.

## Calibration / Zero.

### Calibration Zero

At this point pressing the F4 key located under the "LENGTH", will take the user to the screen where the weigher can be readied for zeroing.

➔ **Pulses per rev = 7697**      **Belt revolutions = 20**  
**Zero calibration = 3.16**      **AZT = 2.238**  
**Span calibration = 56.0**      **Speed = 0.00m/s**  
**Calibration target = 196 kg**

◀	▶	LENGTH	ZERO	SPAN	
---	---	--------	------	------	--

Enter the "Zero" screen by pressing the "ZERO" (F4) button.

**Press START to begin zero calibration.**  
**Press BACK to return to calibration menu.**  
**Belt must be empty during zero calibration.**

**Load cell = 3.856**  
**Rate = 0.189kg/min**

START	BACK				
-------	------	--	--	--	--

The zero function will not start until the F1 key located under the "START"

The Zero will now be calculated over the number of belt revolutions previously entered.  
The Number of belt revolutions performed, the percentage of the test completed, the load cell output and calculated rate is displayed during the test.

**Press BACK to return to the calibration menu.**  
**Make sure there is no material on the belt during test.**

**Belt revolutions = x.x**      **Calibration x% complete**  
**Load cell = x.xx mV**      **Rate x.xxkg/hour**

BACK					
------	--	--	--	--	--

Number of revs Completed.

Instantaneous Loadcell output

Percent Cal Completed.

Mass rate before zero cal is complete

When the test is complete, at the end of the prescribed number of belt revolutions the display will stop updating.

# OPTIMUS OPERATIONAL MANUAL.

## Calibration / Zero.

Following the completion of the zero test. The screen will change to the one shown below. The three top lines of text will be alternating. If for any reason the test was deemed to be invalid (material falling onto the belt during test etc) pressing the cross button will cancel the result. On pressing the tick key thee alternating. If for any reason the test was deemed to be invalid (material falling onto the belt during test etc) pressing the cross button will cancel the result.

**Load Cell Zero Cal is now complete.**  
Press **??** to save new calibration.  
Press **??** to discard new data.

<b>Totaliser Error</b>	<b>=</b>	<b>x.xxx kg</b>
<b>Zero Cal</b>	<b>=</b>	<b>xx.xx mV.</b>
<b>AZT Contribution</b>	<b>=</b>	<b>xx.xx mV.</b>

◀

▶

??

??

CALIBRATION SCREEN.

➡

<b>Pulses per rev</b>	<b>= 7697</b>	<b>Belt revolutions</b>	<b>= 20</b>
<b>Zero calibration</b>	<b>= 3.16</b>	<b>AZT</b>	<b>= 2.238</b>
<b>Span calibration</b>	<b>= 56.0</b>	<b>Speed</b>	<b>= 0.00m/s</b>
<b>Calibration target = 196 kg</b>			

◀

▶

**LENGTH**

**ZERO**

**SPAN**

# **OPTIMUS OPERATIONAL MANUAL.**

## **Calibration / Span Static Weight Test.**

Enter the "SPAN" screen by pressing the "ZERO" (F5) button.

➡ Pulses per rev = 7697      Belt revolutions = 20  
Zero calibration = 3.16      AZT = 2.238  
Span calibration = 56.0      Speed = 0.00m/s  
Calibration target = 196 kg

◀	▶	LENGTH	ZERO	SPAN	
---	---	--------	------	------	--

The screen will change the one shown below. The test will not start until the "START" (F1) key has been pressed. Prior to starting the test the belt must be running and the weight positioned on the weigher. At this point Optimus provides for two methods of spanning. An empirical method or simulated load (fixed weight or calibration chain). Select either by pressing the "START" (F1) key for fixed weight or "EMP" for empirical. The following explains simulated load, (fixed weight / roller calibration chain).

**Place calibration weights in position.**  
Press BACK to return to return to calibration menu.  
Press EMP to perform material calibration.  
Press START to begin span calibration.

Calibration period = 25 revs  
Calibration target = xx.xxkg.  
Mass rate = xx.xxkg/min.

START

BACK

EMP

Press the "START" (F1) key to start the test, if the simulated load, (fixed weight / roller calibration chain), static weight test is to be performed.

The screen will change to the one shown below.

Calibration rate = xx.xx kg/min  
Belt revolutions = x.x      x% complete  
Calibration total = x.xx kg  
Calibration target = xx.xx kg

BACK

The screen displays the current mass rate, the number of belt revolutions completed, the % of the test completed. The total achieved in real time and the total that the test should achieve (Target Weight). On completion of the test Optimus will change the screen.

# **OPTIMUS OPERATIONAL MANUAL.**

## **Calibration / Span Static Weight Test.**

Following the completion of the span test the display will change to that shown below.

Press **?** to save new calibration.  
Press **?** to discard new data.  
**Span calibration is now complete.**

<b>Belt revolutions</b>	<b>=</b>	<b>aaa</b>	<b>Error</b>	<b>=</b>	<b>X.XX%</b>
<b>Calibration total</b>	<b>=</b>	<b>bbb</b>			
<b>Calibration target</b>	<b>=</b>	<b>ccc</b>			
<b>Span calibration</b>	<b>=</b>	<b>dddd</b>			

		<b>??</b>	<b>??</b>		
--	--	-----------	-----------	--	--

At this screen the calibration can be cancelled by pressing the cross key. Or accepted by pressing the tick key.

- aaa = the number of revolutions the test was performed over. (Which must be the number of revolutions entered in the calibration screen.
- bbb = the totalised value of the static weight / roller calibration chain achieved during the test.
- ccc = the target weight as entered in the first screen of the calibration set up. (usually supplied by Web-Tech).
- dddd = the change in span calibration.
- X.XXX% = the calculated percentage error between the target weight and achieved total from the test.

Following the completion of the test the result and the acceptance of the test by pressing the tick key the screen will return to the calibration screen.

<b>➡ Pulses per rev</b>	<b>= 7697</b>	<b>Belt revolutions</b>	<b>= 20</b>
<b>Zero calibration</b>	<b>= 3.16</b>	<b>AZT</b>	<b>= 2.238</b>
<b>Span calibration</b>	<b>= 56.0</b>	<b>Speed</b>	<b>= 0.00m/s</b>
<b>Calibration target</b>	<b>= 196 kg</b>		

<b>◀</b>	<b>▶</b>	<b>LENGTH</b>	<b>ZERO</b>	<b>SPAN</b>	
----------	----------	---------------	-------------	-------------	--

# **OPTIMUS OPERATIONAL MANUAL.**

## **Calibration / Span Empirical.**

The "EMPIRICAL" span test allows the user to run material over the belt and adjust the span against the actual weight passed. The preferred methodology is to pass material over the belt and collect it for weighing on an accurate static scale. This weight "total from an other source" is entered in Optimus

**Place calibration weights in position.**  
**Press BACK to return to return to calibration menu.**  
**Press EMP to perform material calibration.**  
**Press START to begin span calibration.**

Calibration period = 25 revs  
Calibration target = xx.xxkg.  
Mass rate = xx.xxkg/min.

START	BACK	EMP			
-------	------	-----	--	--	--

Press the F3 "EMP" key which will open the screen shown below.

**Enter total from an other source then press NEXT**  
**Press PREV to return to previous screen.**

➡ Total from other source = xxx.xx kg

PREV	NEXT				
------	------	--	--	--	--

Press the "ENTER" key in the above screen to enter the data input screen.

**Total from other source (in Kg)**

Current value ZZZ.ZZ  
New value YYY.YY

DEL	CLEAR	??	??		
-----	-------	----	----	--	--

At this screen enter the weight that passed over the weigher and that was weighed on an accurate static weigher. (bench scale/weigh bridge etc). Press the tick key to proceed. Optimus will return to the screen shown below. Press the F2 "NEXT" key to go to the data entry point.

Where the total obtained by Optimus is to be entered.

**Enter total from an other source then press NEXT**  
**Press PREV to return to previous screen.**

➡ Total from other source = xxx.xx kg

PREV	NEXT				
------	------	--	--	--	--

# OPTIMUS OPERATIONAL MANUAL.

## Calibration / *Span Empirical.*

Press the “ENTER” key to go to the data entry screen where the total obtained by Optimus can be entered.

**Enter total from an other source then press NEXT**  
Press PREV to return to previous screen.

➡ Total from Optimus = xxx.xx kg

PREV	NEXT				
------	------	--	--	--	--

In the screen shown below enter the total obtained by Optimus

**Total from Optimus (in Kg)**

Current value      UU.UU

New value          VV.VV

DEL	CLEAR	??	??		
-----	-------	----	----	--	--

Press the tick key to lock in the data and move to the previous screen.

**Enter belt scale total then press NEXT**  
Press PREV to return to previous screen.

➡ Total from Optimus = xxx.xx kg

PREV	NEXT				
------	------	--	--	--	--

At this point a new span needs to be generated. Press the F2 “NEXT” key to generate the new span and move on to the screen shown below.

**Empirical span now complete !**

Press “” to save new calibration data.

Press “” to discard new calibration data.

Old span calibration = xx.xxx

New span calibration = yy.yyy??

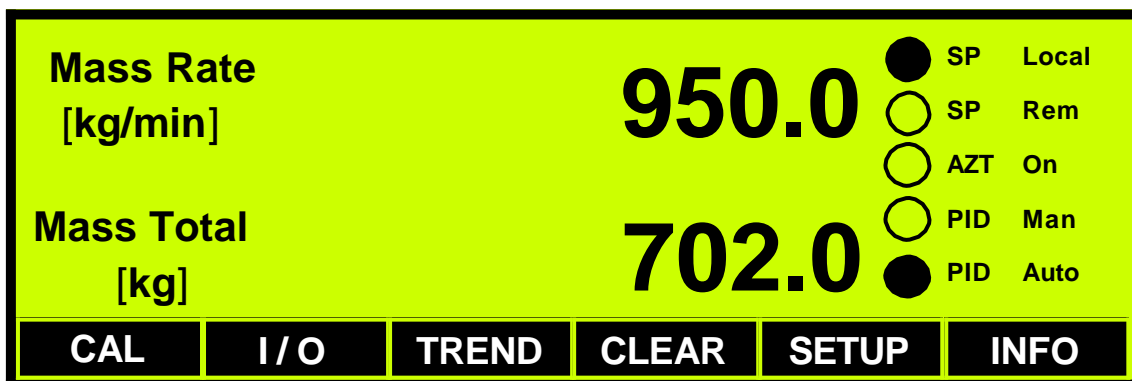
PREV		??	??		
------	--	----	----	--	--

The above screen shows the new and old spans and allows for the acceptance or rejection of the data. On pressing the tick key Optimus goes back to the calibration screen. The EMPIRICAL span is now complete. Press the “HOME” key to transfer the data to working memory.

# OPTIMUS OPERATIONAL MANUAL.

## MRMT SCREEN / *Trend.*

Optimus provides the user with a graphical view of the mass rate for the last two minutes. To view the last two minutes of material flow press the "TREND" (F3) key to access the viewing



On entering the mass rate trend screen the last two minutes trend can be cleared by pressing the "CLEAR" (F1) key.



Pressing the "HOME" key will return Optimus to MRMT.

**OPTIMUS OPERATIONAL MANUAL.**  
**MRMT SCREEN / *Clear Total.***

The running total can be reset by pressing the “CLEAR” (F4) key.

Mass Rate	950.0	<input checked="" type="radio"/> SP	Local		
[kg/min]		<input type="radio"/> SP	Rem		
		<input type="radio"/> AZT	On		
Mass Total	702.0	<input type="radio"/> PID	Man		
[kg]		<input checked="" type="radio"/> PID	Auto		
CAL	I / O	TREND	CLEAR	SETUP	INFO

Prior to clearing the total Optimus will ask for confirmation, prior to acting on the clear command. Press “ENTER” to continue and clear the total. Or press the “ABORT” key if the total should not be cleared.

Mass	<div><div>!</div><div>Clear accumulated mass total?  Press ENTER to proceed Press ABORT to skip.</div></div>	<input checked="" type="radio"/> SP	Local		
[kg/		<input type="radio"/> SP	Rem		
		<input type="radio"/> AZT	On		
Mass		<input type="radio"/> PID	Man		
[k		<input type="radio"/> PID	Auto		
CAL	I / O	TREND	CLEAR	SETUP	INFO

# **OPTIMUS OPERATIONAL MANUAL.**

## **MRMT SCREEN / Info Screen.**

The Optimus firmware (operating software) is under constant review. As the firmware is upgraded it's build number is updated along with the date that it was completed. It may be necessary to view this data from time to time. Press the "INFO" (F6) key to access the information screen.

<b>Mass Rate</b> [kg/min]	<b>950.0</b>	<input checked="" type="radio"/> SP Local			
		<input type="radio"/> SP Rem			
		<input type="radio"/> AZT On			
<b>Mass Total</b> [kg]	<b>702.0</b>	<input type="radio"/> PID Man			
		<input checked="" type="radio"/> PID Auto			
<b>CAL</b>	<b>I/O</b>	<b>TREND</b>	<b>CLEAR</b>	<b>SETUP</b>	<b>INFO</b>

The screen bellow shows that the firmware release number was 125, dated 21 September 2003

<b>Optimus MW1 Build 129 15-April-2003</b> <b>© 2003 Web-Tech Australia Pty Ltd</b>
--

Pressing the "RESET" (F1) from this screen will bring up the following screen. This screen displays the number of times Optimus has had the power removed since the data was last cleared. This is a useful tool if a faulty power supply (mains power) is suspected. The reset display the number of times the reset button on the main CPU pcb has been activated. Generally this button is used if the Optimus firmware has locked up, owing to a noise spike or other severe transients. Pressing the reset will restart the firmware and increment this counter.

If a "flash memory" card has been purchased and the firmware requires upgrading. The default variables that were established during the calibration and setup can be stored in the flash card and uploaded following the successful firmware upgrade.

<b>Turned on x times</b>		
<b>Reset X times</b>		
<b>Loaded defaults X times</b>		
<b>Internal temperature xx.x° C</b>		
<b>??</b>	<b>??</b>	<b>CLEAR</b>

The internal temperature is not the ambient air temperature in the cabinet. It is the temperature at the core of the Central Processing Unit (CPU) / computer. The absolute max temp for this device is 55°C. Do not exceed this temperature. Move the enclosure to a cooler environment.

# OPTIMUS OPERATIONAL MANUAL.

## Inlet Boot Hopper Setup

### Inlet Boot Hopper Setup

The following steps will ensure you have setup the Inlet boot hopper correctly

Following power up, Press SETUP (F5) key .The display will change to that shown below. The first entry to this portion of the menu structure will bring up the following screen. If no password has been selected, or the electronics is new, pressing the “ENTER” key will return the operator to MRMT screen where a subsequent entry to the Set Up menu will allow the user without a password to enter the menustructure.

<b>Mass Rate</b> [kg/hr]	<b>0.0</b>	<input checked="" type="radio"/> SP Local
		<input type="radio"/> SP Rem
		<input type="radio"/> AZT On
<b>Mass Total</b> [kg]	<b>0.0</b>	<input type="radio"/> PID Man
		<input checked="" type="radio"/> PID Auto
<b>CAL</b>	<b>I / O</b>	<b>TREND</b>
<b>CLEAR</b>	<b>SETUP</b>	<b>INFO</b>

F5



➡ 1. System Configuration	5. Rate Deadband
2. Display and Time/Date	6. Rate Display Filters
3. PID Loop Control	7. Save/Load Setup
4. Auto Zero Tracking	8. Chute Level Control

Use the **F1 / F2** keys to advance the cursor to “**9 Inlet Boot Hopper**”. Press the “ENTER” key to gain access.



# OPTIMUS OPERATIONAL MANUAL.

## Inlet Boot Hopper Setup

- ➡ 9. Inlet Boot Hopper
- 10. Pre Feed Hopper
- 11. RS232 Output



Inlet Boot Hopper Setup		Filtering	
Weight	3.09 kg	Load Cell	21.730 mV
➡ Refill Start	1.000 kg	Refilling	0
Refill Stop	2.000 kg	Capacity	2.000 kg
Zero	7.594 mV	Span	0.219


Use the **F1 / F2** keys to advance the cursor to "Refill Start" Press the "ENTER" key to gain access.



**Inlet Boot hopper refill start (in kg)**

**1.000**

New value

The Refill start value is the minimum value of material left in the inlet boot to sustain good flow behind the shear gate. Using the keypad the value can be changed Press  The value will change from application to application.

# OPTIMUS OPERATIONAL MANUAL.

## Inlet Boot Hopper Setup

Inlet Boot Hopper Setup		Filtering	
Weight	3.09 kg	Load Cell	21.730 mV
Refill Start	1.000 kg	Refilling	0
➡ Refill Stop	2.000 kg	Capacity	2.000 kg
Zero	7.594 mV	Span	0.219


◀	▶	✓	✗	ZERO	SPAN
---	---	---	---	------	------

Use the **F1 / F2** keys to advance the cursor to "Refill Stop". Press the "ENTER" key to gain access.

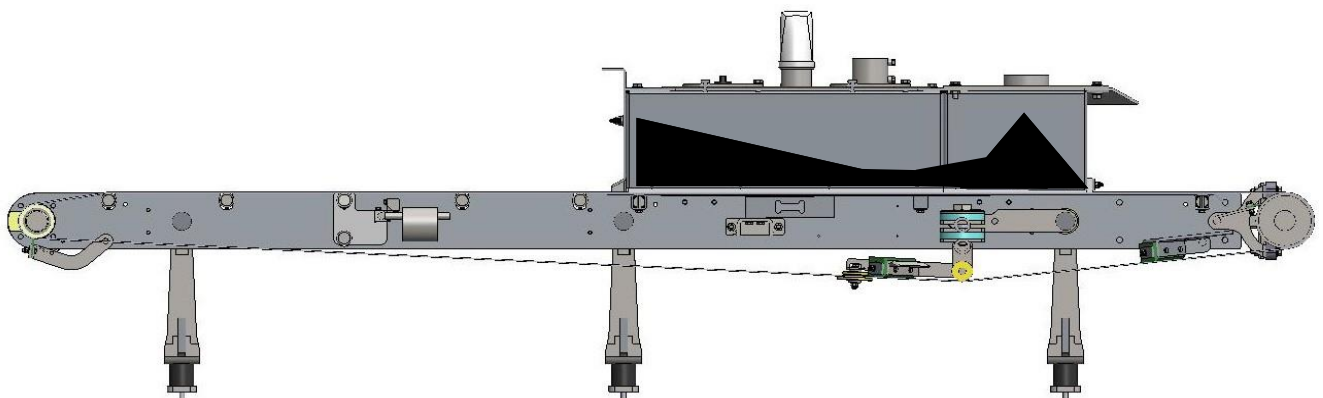


Inlet Boot hopper refill stop(in kg)					
2.000					
New value      —					

DEL	CLEAR	✓	✗		
-----	-------	---	---	--	--

The Refill stop value is the maximum value of material left in the inlet boot to sustain good flow behind the shear gate. Using the keypad the value can be changed Press  The value will change from application to application.

The material silhouette below shows a typical feed scenario.



# OPTIMUS OPERATIONAL MANUAL.

## Inlet Boot Hopper Setup

### Inlet Boot Hopper ZERO

Before running a zero calibration ensure that the inlet boot hopper is empty and the calibration weight is removed.

Inlet Boot Hopper Setup Weight 3.09 kg	<b>Perform hopper zero calibration?</b> <b>Press ENTER to Proceed</b> <b>Press ABORT to skip</b> <b>!</b>	Filtering Load Cell 21.730 mV Refilling O
◀	▶	✓
	✗	ZERO
		SPAN

To run a zero calibration on the inlet boot hopper. Firstly depress the **zero** key  
Press ENTER when all weights are removed or ABORT to skip  
The 'Zero' mV value will update in the left column.

### Inlet Boot Hopper SPAN

Before running a span calibration ensure you have a weight approx 75% of the total hopper capacity.

<b>Inlet Boot Hopper Setup</b>		<b>Filtering</b>	
Weight	3.09 kg	Load Cell	21.730 mV
➡ Refill Start	1.000 kg	Refilling	O
Refill Stop	2.000 kg	Capacity	2.000 kg
Zero	7.594 mV	Span	0.219
◀	▶	✓	✗
		ZERO	SPAN

To run a SPAN calibration on the inlet boot hopper. Firstly depress the **SPAN** key

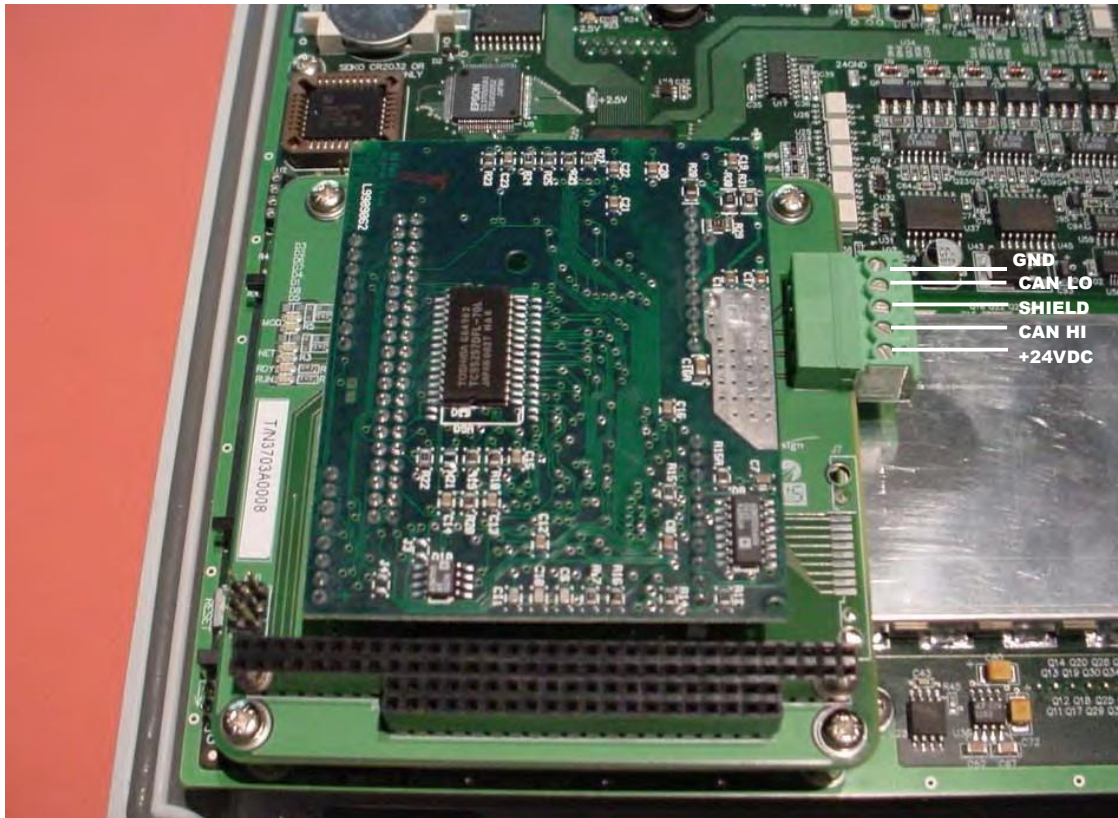
<b>Inlet Boot hopper calibration weight (in kg)</b>	
New value	—
DEL	CLEAR
✓	✗

Place the calibration weight between the two arrows marked on the inlet boot.

Enter the weight of the calibration weight and press ENTER

## To install a PC/104 DeviceNet card in Optimus

1. Install the DeviceNet module on the PC/104 stack. Use the four M3x6mm screws and washers provided to hold the card firmly on the stack.



2. Wire the 5-pin plug to the DeviceNet cable as shown.
3. You must ensure that 120 $\Omega$  0.5W termination resistors are installed between CAN HI and CAN LO at the two ends of the DeviceNet network. If the Optimus is the last device on the network, install the termination resistor directly into the plug.
4. Configure the DeviceNet MAC-ID and baud rate by entering screen 22 from the SETUP menu.
  - a. The MAC-ID can be set to any number between 1 and 63. Each device on the DeviceNet network must be assigned a unique MAC-ID.
  - b. The baud rate may be set to a speed of 125kHz, 250kHz or 500kHz. All devices on the DeviceNet network must be configured to used the same baud rate; the baud rate chosen will depend on cable length and quality.

If you change either the MAC-ID or baud rate, *you must press the CONFIG button* in order to write your changes to the Optimus DeviceNet module. Pressing TICK or HOME will not save these settings. Once configured, the settings will be retained between powerups.

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# **OPTIMUS OPERATIONAL MANUAL.**

***Notes/Firmware Updates.***

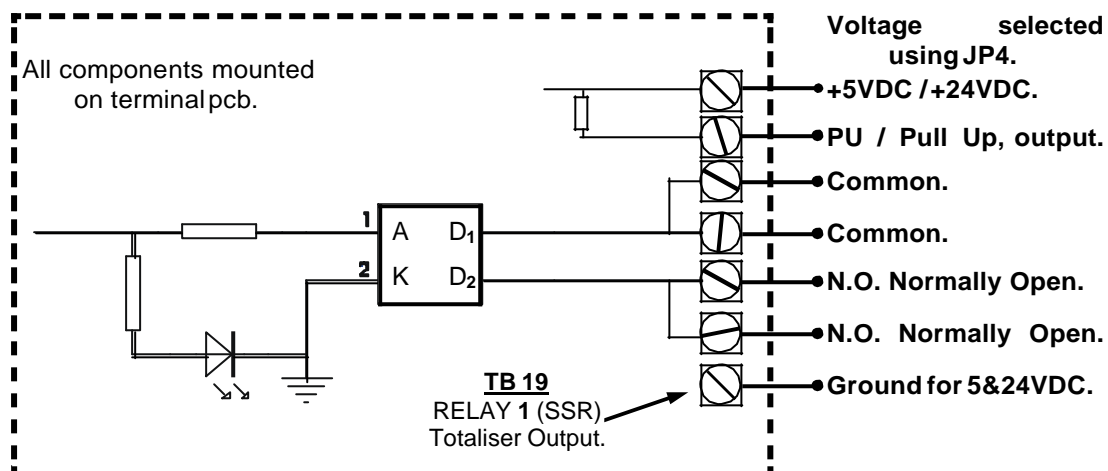
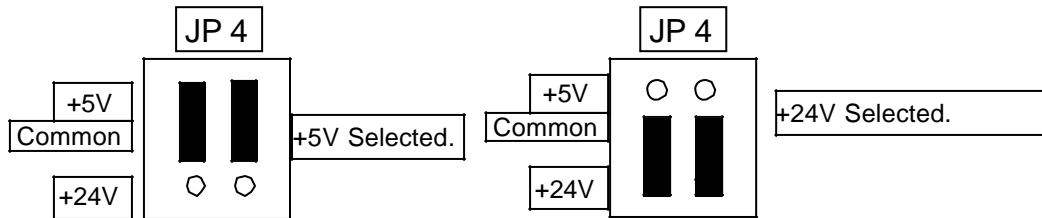
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# OPTIMUS OPERATIONAL MANUAL.

## Electrical / Electronic Notes/ *digital outputs.*

### SSR Relay.

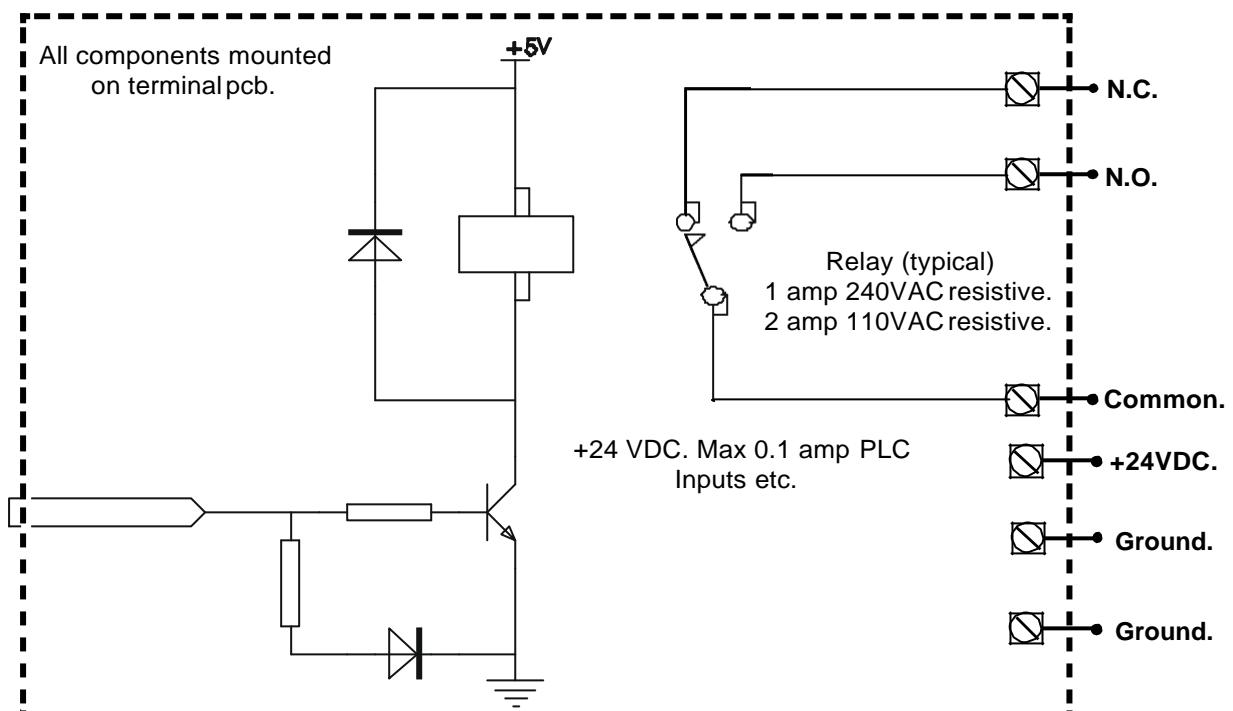
The Solid State Relay (SSR) is permanently assigned to the "Totaliser" output. The relay can be physically configured to output +5VDC / +24VDC. The voltage is selected by means of jumpers located at the bottom right hand corner of the "Terminal pcb (JP4)". The use of a solid state relay provides for high frequency counts. However consideration should be given to the receivers ability to handle high frequency counts.



### Electro-mechanical Relays. (RLY2 - 5)

Relays 2-6 are assigned via the keyboard (I/O / 4 Digital Outputs). When active the local red LED will illuminate.

The relays can be used as "clean contacts" or supplied with on board +24VDC. Link between +24V and COM. The return is to be terminated on GND.



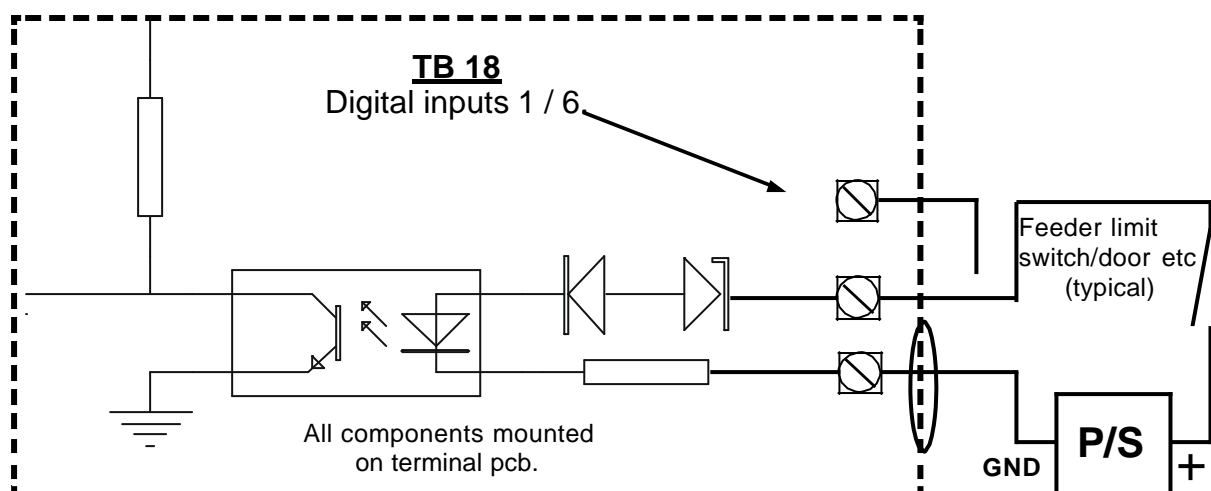
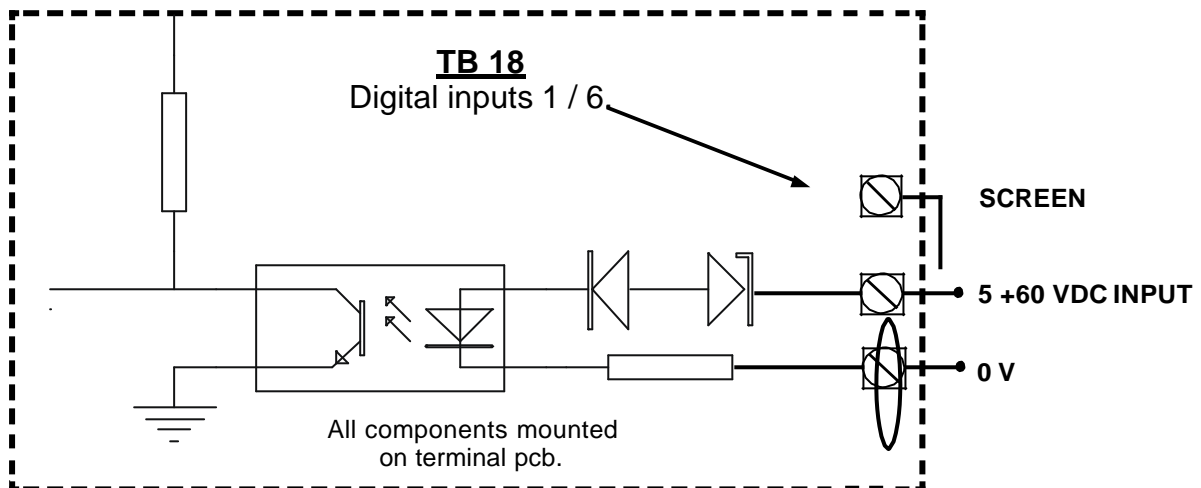
# **OPTIMUS OPERATIONAL MANUAL.**

## **Electrical / Electronic Notes /digital inputs.**

### **Digital Inputs.**

Optimus has 6 general purpose digital inputs. They can be assigned to a range of pre- assigned labels ((I/O) 3-Digital inputs). There electrical status can also be observed there also. The applied voltage should not exceed 60VDC and the minimum switching voltage is 5 VDC. These inputs are generally used for monitoring the status of the feeder.

The basic circuit along with an example of a typical connection is shown below.



- +5 - 48 VDC  
Optimus 24VDC
- Is available

---

## SECTION 6 - CALIBRATION

---

The weighfeeder has been programmed and calibrated at the factory. However, due to changes that may have occurred during transit and installation, the weighfeeder calibration should be checked. The calibrations once initiated are automatic and only require the pressing of acceptance key(s).

The two basic calibration steps are the "Zero" calibration and the "Span" calibration.

### Zero Calibration

The zero calibration is established by running the weighfeeder empty of a programmed number of belt revolutions and calculating the average load cell output during this period. The weighfeeder electronics will automatically calculate the zero value when the test has been initiated and completed. Refer to the electronics manual supplied with your WT1200 (Masterweigh 1/Masterweigh 5 or Optimus) for the section called "Load Zero Calibration" for the procedure. The weighfeeder must be able to be run empty during this test, and the number of belt revolutions programmed for its duration can be found on the calibration sheets at the end of this manual.

### Span Calibration

The span calibration is generally carried out on a model WT1200 weighfeeder with the use of calibration "chains". The calibration chain consists of one or more strands of roller chain attached to a restraining bracket. The size of the chain and number of strands has been calculated by us to simulate approximately 75% of the maximum capacity. The calibration chain is placed on the belt and attached to the inlet chute (or rear wall for horseshoe inlet). The weighfeeder is run and the test is carried out over the same number of belt revolutions as the zero test.

The result is compared to a value (Target Weight) calculated by us at the time of factory commissioning. The procedure for carrying out the test can be found in the "Fixed Weight Calibrate" menu of the electronics manual.

The "Target Weight" can be found on the calibration sheets in this manual.

### Material Test

We strongly suggest that a material test be carried out where possible. A material test involves weighing product on an accurate static scale prior to, or after it has passed over the weighfeeder. When carrying out a material test, the following should be considered:

1. The amount of material required for the test(s) must be proportional to the weighfeeder capacity. A rule of thumb quantity would be a minimum of 3 minutes of running time at maximum capacity e.g. if the capacity is 10 tph, the amount of material would be  $10\,000\text{ kg}/60 \times 3 = 500\text{ kg}$ . A smaller amount could be used, however it must be understood that the accuracy achievable may be diminished due to the resolution used.
2. It must be guaranteed that all of the material used in the test is collected, or have passed over the weighfeeder.
3. The material feed over the weighfeeder must be continuous and consistent.

When the test(s) have been carried out any correction to the calibration can be carried out in the "Emperical Calibration" menu of the electronics (refer to the electronics manual section).

Any changes to the calibration should be recorded on the calibration sheets for future reference

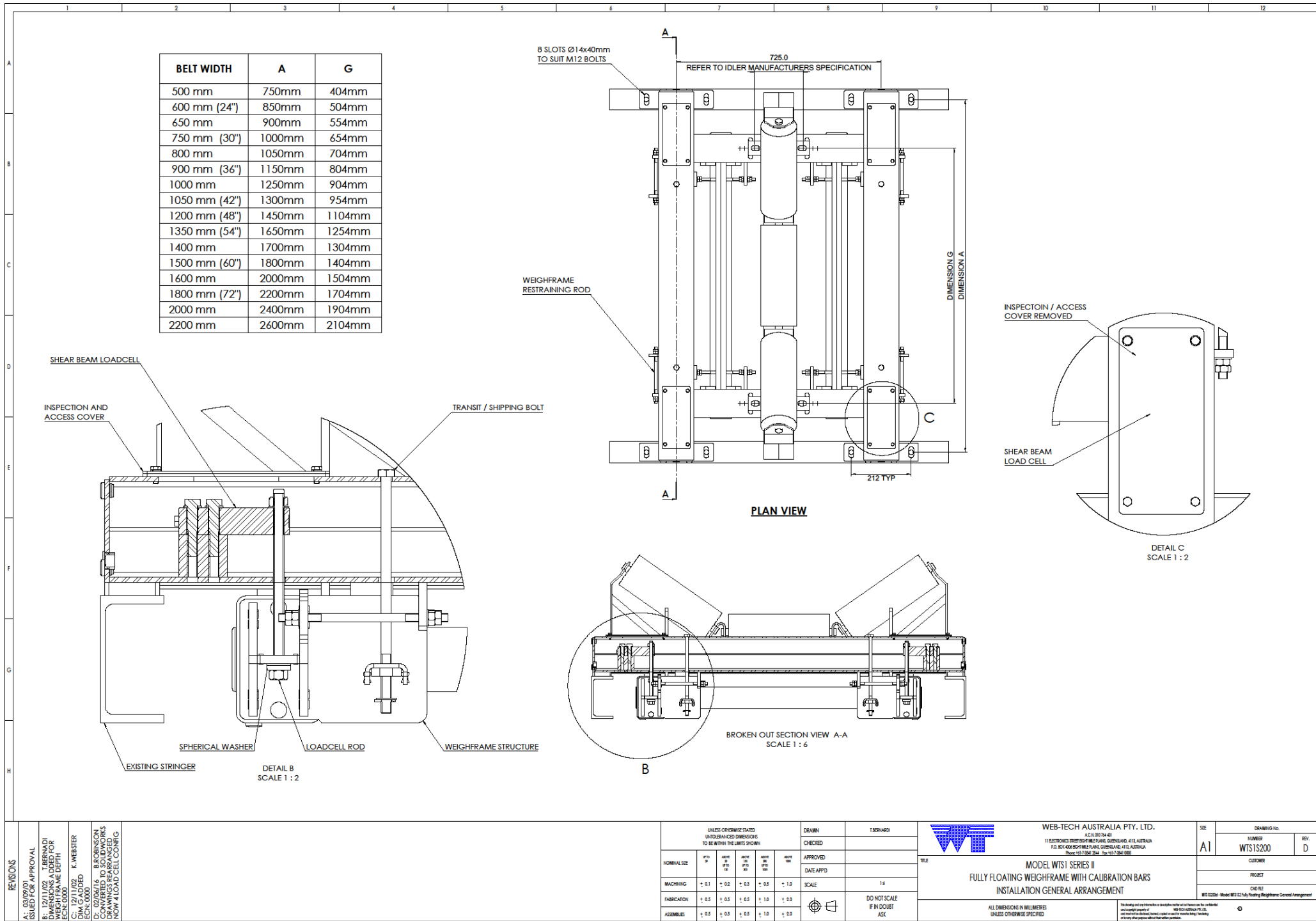
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# OPTIMUS – INSTALLATION AND OPERATION GUIDE

## *Appendix A – WTS2S2 General Arrangements*

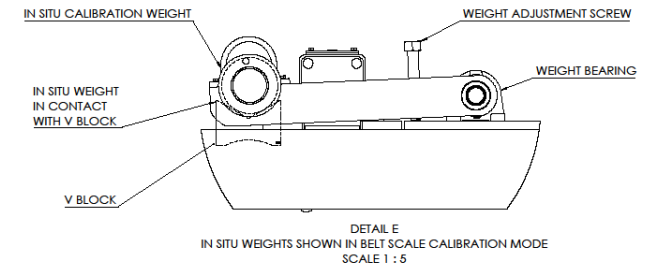
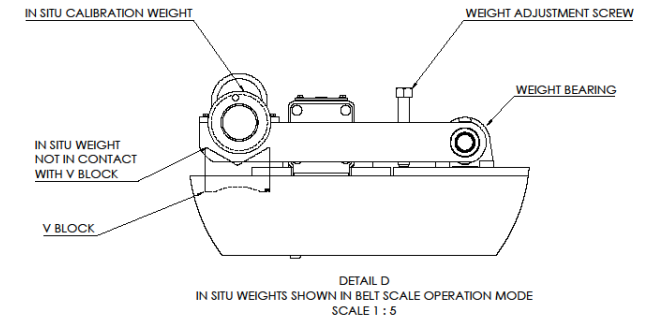
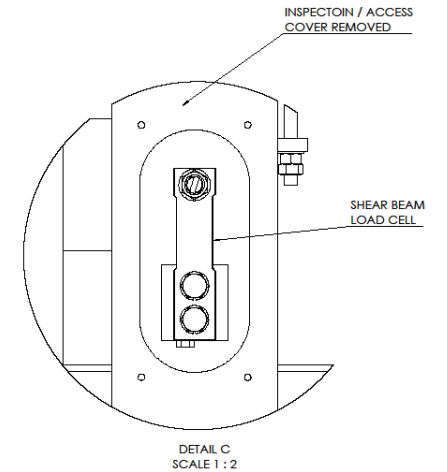
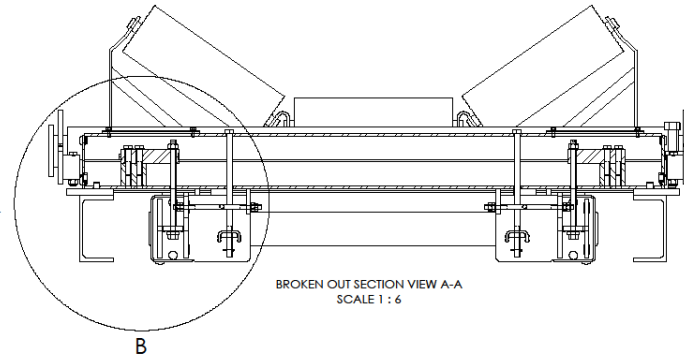
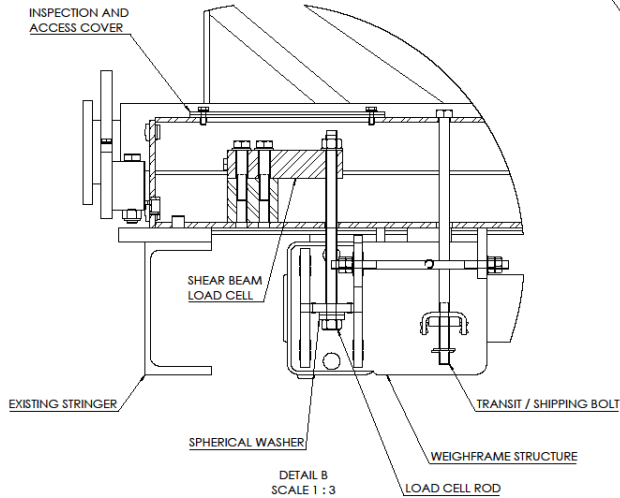
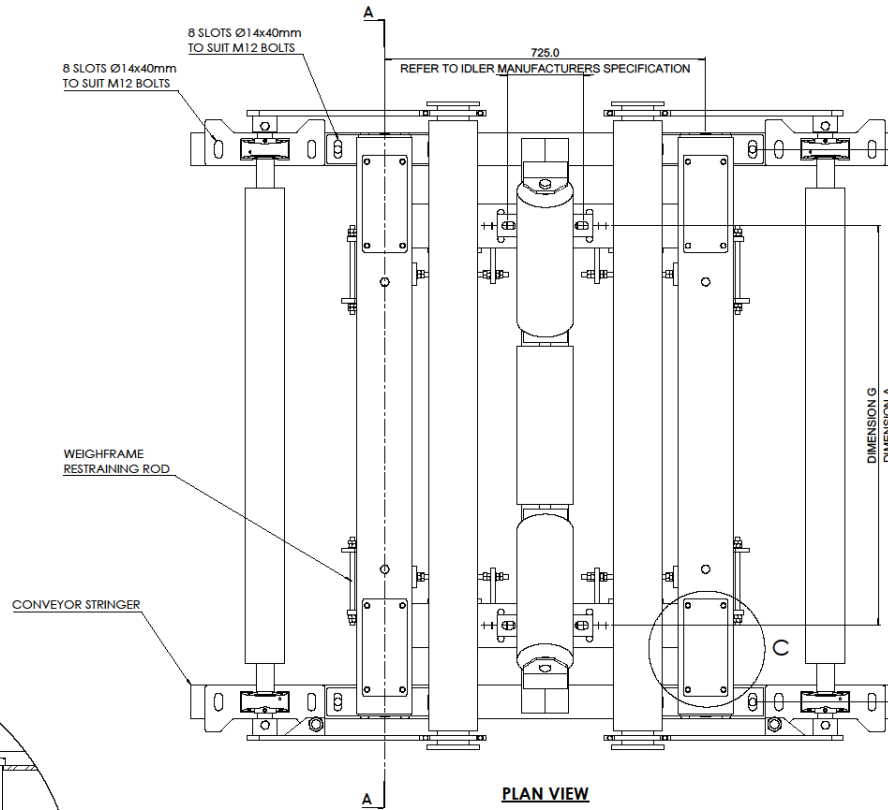
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BELT WIDTH	A	G
500 mm	750mm	404mm
600 mm (24")	850mm	504mm
650 mm	900mm	554mm
750 mm (30")	1000mm	654mm
800 mm	1050mm	704mm
900 mm (36")	1150mm	804mm
1000 mm	1250mm	904mm
1050 mm (42")	1300mm	954mm
1200 mm (48")	1450mm	1104mm
1350 mm (54")	1650mm	1254mm
1400 mm	1700mm	1304mm
1500 mm (60")	1800mm	1404mm
1600 mm	2000mm	1504mm
1800 mm (72")	2200mm	1704mm
2000 mm	2400mm	1904mm
2200 mm	2600mm	2104mm



REVISIONS  
A: 08/04/2016 - B. ROBINSON  
ISSUED FOR APPROVAL

UNLESS OTHERWISE STATED UNTOUCHED DIMENSIONS TO BE WITHIN THE LIMITS SHOWN					
HORIZONTAL SIZE	± 0.1	± 0.2	± 0.3	± 0.5	± 1.0
MACHINING	± 0.1	± 0.2	± 0.3	± 0.5	± 1.0
FABRICATION	± 0.5	± 0.5	± 0.5	± 1.0	± 2.0
ASSEMBLY	± 0.5	± 0.5	± 0.5	± 1.0	± 2.0

DRAWN	B. ROBINSON
CHECKED	
APPROVED	
DATE APPD	
SCALE	1:5
DO NOT SCALE IF IN DOUBT ASK	

WEB-TECH AUSTRALIA PTY. LTD. A.C.N. 100 764 401 11 ELECTRONIC STREET SOUTH MILE PARK, QUEENSLAND 4111 AUSTRALIA Phone 181 238 67 284 Fax 181 238 67 285		SIZE	A1
MODEL WTS1 SERIES II FULLY FLOATING WEIGHFRAME WITH INSITU CALIBRATION WEIGHTS INSTALLATION GENERAL ARRANGEMENT		DRAWING NO.	WTS1S211
ALL DIMENSIONS IN MILLIMETRES UNLESS OTHERWISE SPECIFIED		NUMBER	WTS1S211
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		PROJECT	
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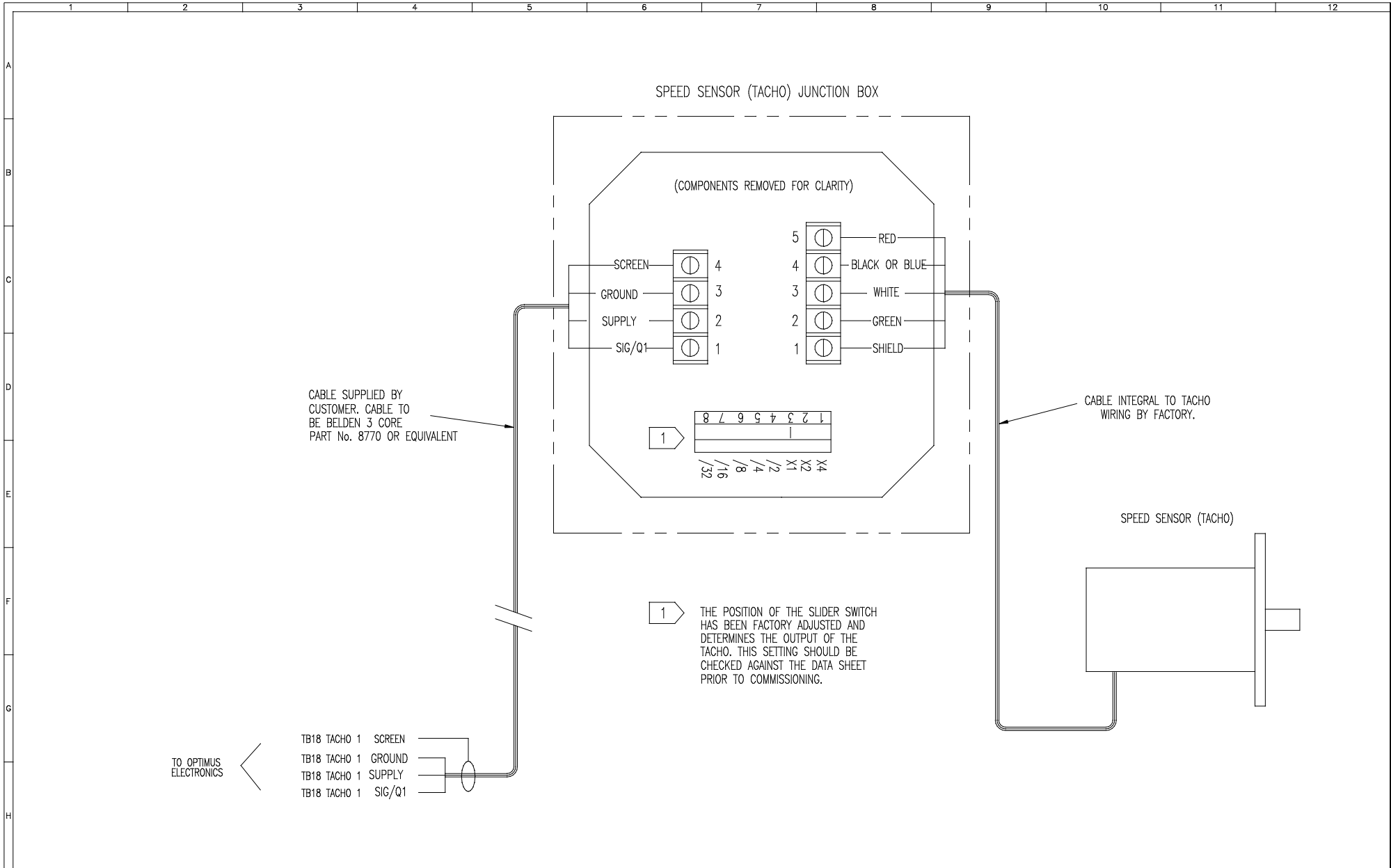
REVISIONS	ISSUED FOR APPROVAL
DATE	08/04/2016
BY	B. ROBINSON
FOR	ISSUED FOR APPROVAL

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# WTS2S2 INSTALLATION AND OPERATION MANUAL

## *Appendix B – Wiring Diagrams*

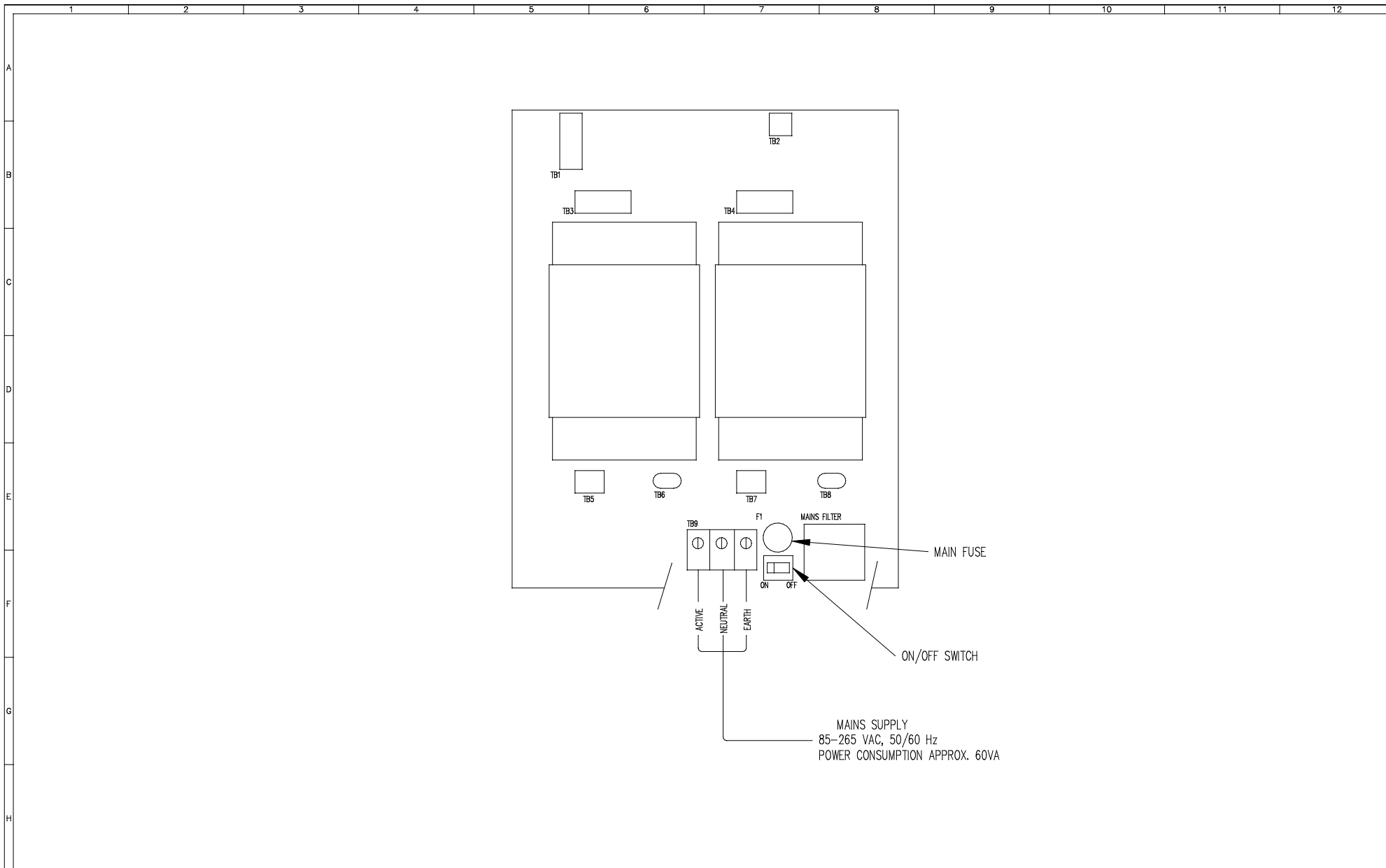
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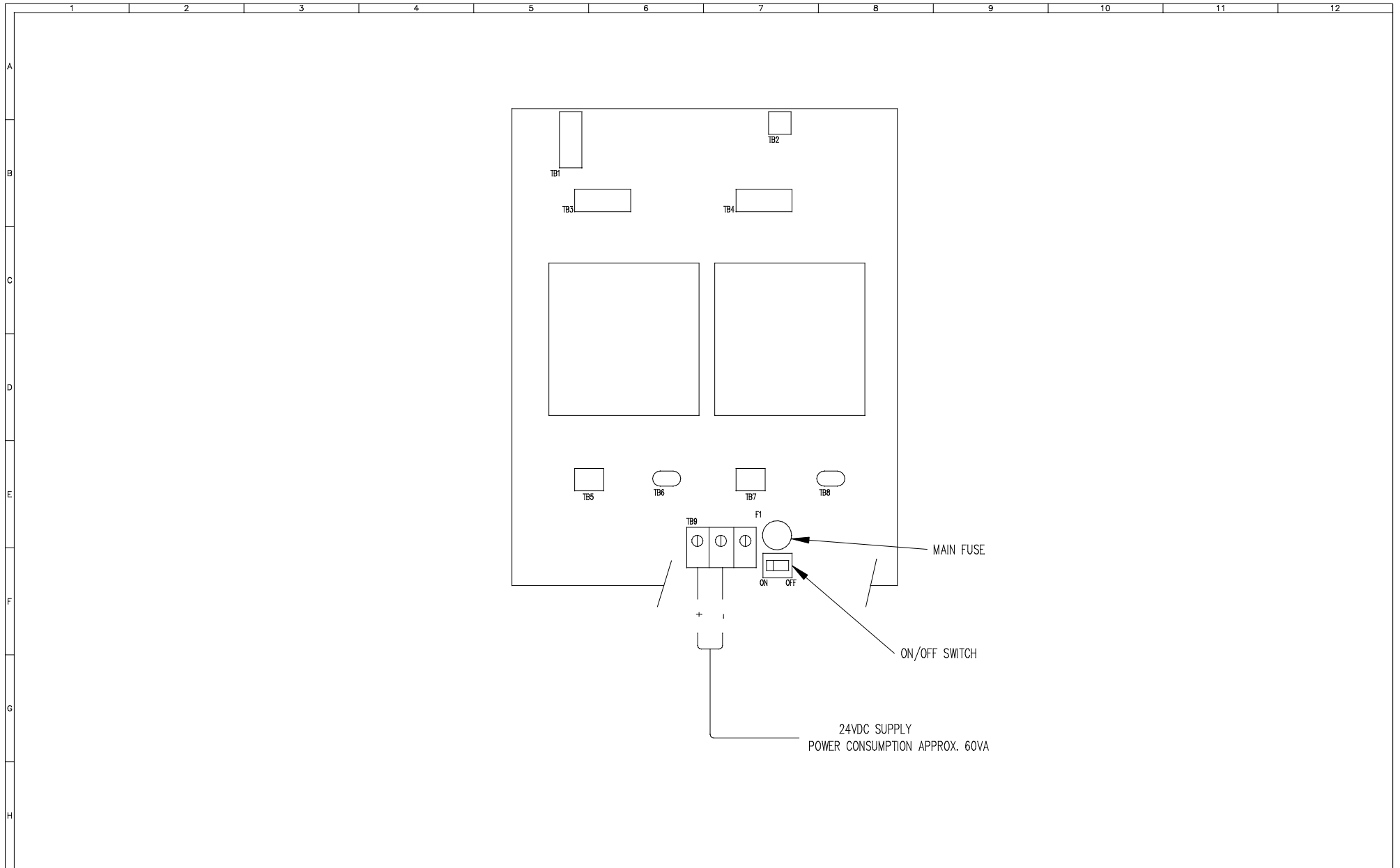
REVISIONS A 22/3/04 Original Issue	DRAWN	K.T.WEBSTER	<b>WEB-TECH AUSTRALIA PTY. LTD.</b> 11 ELECTRONICS STREET EIGHT MILE PLAINS, QUEENSLAND, 4113, AUSTRALIA P.O. BOX 4008 EIGHT MILE PLAINS, QUEENSLAND, 4113, AUSTRALIA Phone +61-7-3841 2844 Fax +61-7-3841 0005	SIZE	DRAWING No.	
	CHECKED	K.T.WEBSTER		A1	NUMBER	REV.
	APPROVED	K.T.WEBSTER			JB010017	A
	DATE APP'D	22/3/04			CUSTOMER	
	SCALE	N.T.S.	<b>WXT TYPE TACHO JUNCTION BOX</b> <b>WIRING (WITH MULTIPLICATION), &amp;</b> <b>CONNECTIONS TO OPTIMUS INTEGRATOR</b> ALL DIMENSIONS IN MILLIMETRES UNLESS OTHERWISE SPECIFIED		PROJECT	
	DO NOT SCALE IF IN DOUBT	ASK			CAD FILE	
					JB010017	
					<small>This drawing and any information or descriptive matter will not however be the confidential and copyright property of WEB-TECH AUSTRALIA PTY. LTD. and shall not be disclosed, copied, altered or used for manufacturing / tendering or for any other purpose without their written permission.</small>	




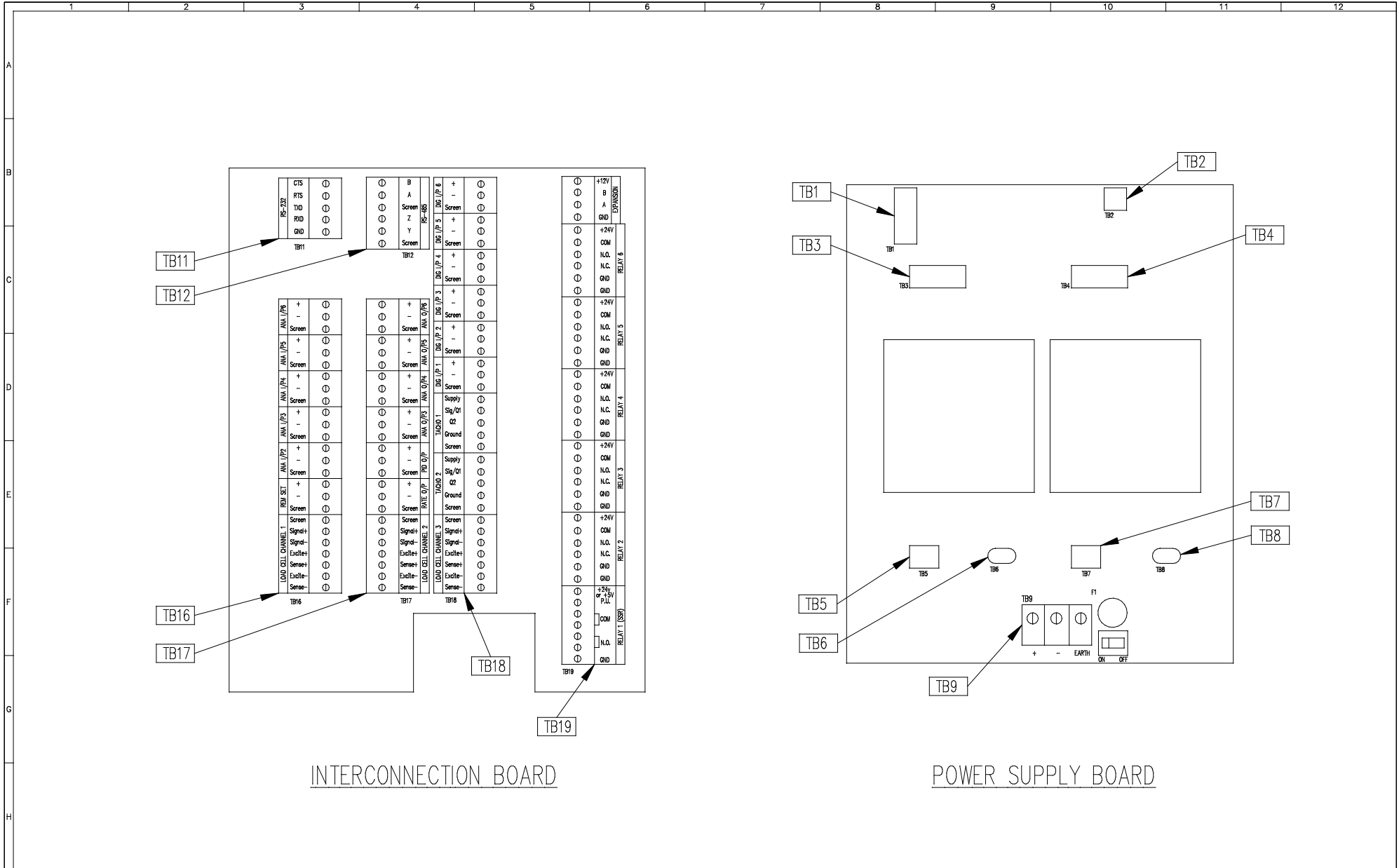





A-15/6/06 ISSUED FOR REFERENCE	UNLESS OTHERWISE STATED UNTOLERANCED DIMENSIONS TO BE WITHIN THE LIMITS SHOWN					DRAWN	L.H.	 <b>WEB-TECH AUSTRALIA PTY. LTD.</b> ACMA 010 784 411 11 ELECTRONICS STREET EIGHT MILE PLAINS, QUEENSLAND, 4113, AUSTRALIA P.O. BOX 4008 EIGHT MILE PLAINS, QUEENSLAND, 4113, AUSTRALIA Phone +61-7-3811 2844 Fax +61-7-3811 0005	SIZE	DRAWING No.	
	NOMINAL SIZE	UP TO 50	ABOVE 50 UP TO 100	ABOVE 100 UP TO 300	ABOVE 300 UP TO 1000	CHECKED	L.H.		A1	NUMBER	REV.
	MACHINING	± 0.1	± 0.2	± 0.3	± 0.5	APPROVED	L.H.			WFOPTIMUS03	A
	FABRICATION	± 0.5	± 0.5	± 0.5	± 1.0	DATE APP'D	15/6/06			CUSTOMER	
	ASSEMBLIES	± 0.5	± 0.5	± 0.5	± 1.0	SCALE	N.T.S.	TITLE		CAD FILE	
							DO NOT SCALE IF IN DOUBT ASK	OPTIMUS POWER BOARD TERMINATION LAYOUT - AC MAINS SUPPLY.		WFOPTIMUS03	
								ALL DIMENSIONS IN MILLIMETRES UNLESS OTHERWISE SPECIFIED		This drawing and any information or descriptive matter not set herein are the sanctities and copyright property of WEB-TECH AUSTRALIA PTY. LTD. and must not be disclosed, loaned, copied or used for manufacturing / tendering or for any other purpose without their written permission.	



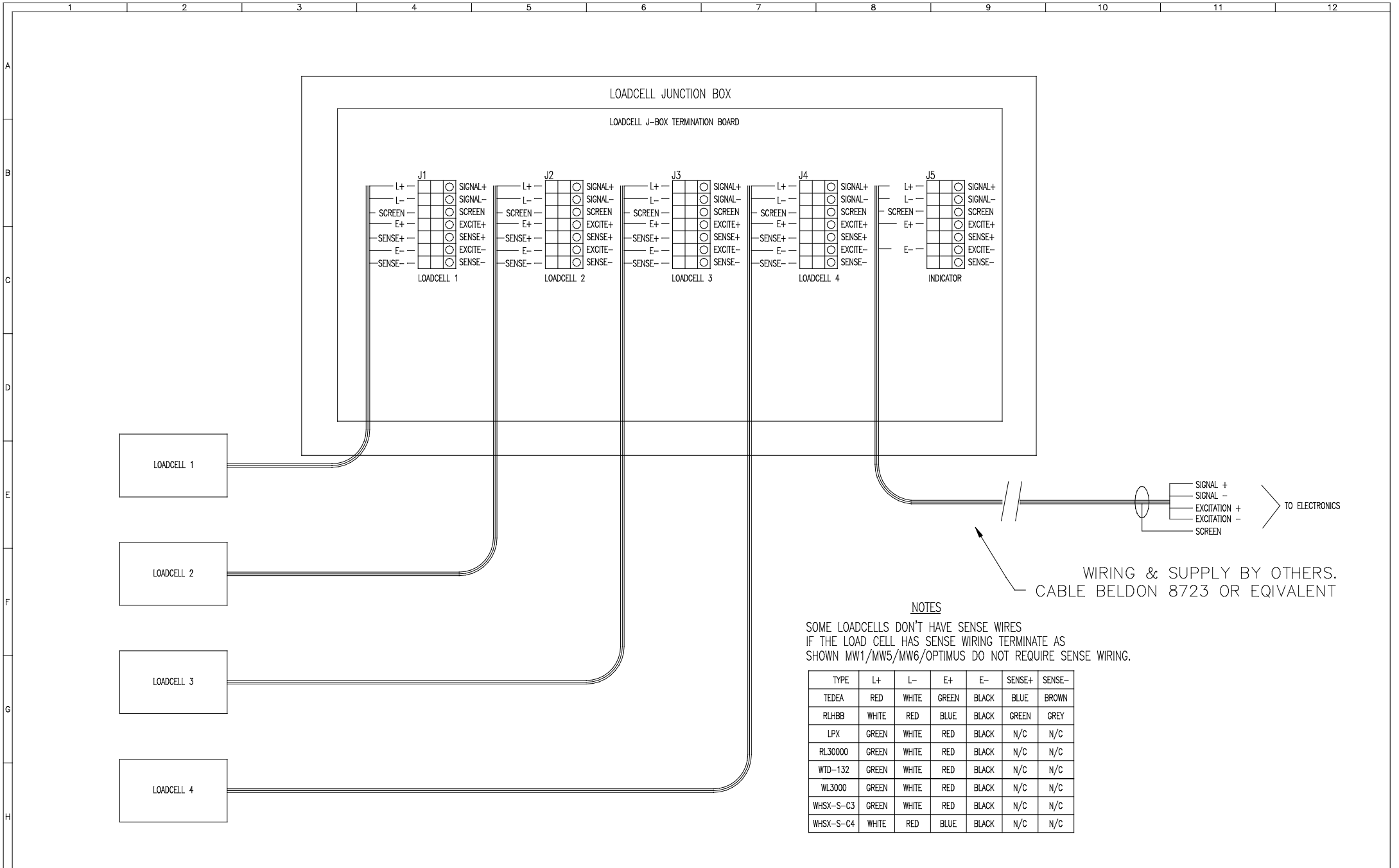
REVISIONS A: 15/6/06 ISSUED FOR REFERENCE	UNLESS OTHERWISE STATED UNTOLERANCED DIMENSIONS TO BE WITHIN THE LIMITS SHOWN				DRAWN	L.H.	 <b>WEB-TECH AUSTRALIA PTY. LTD.</b> A/CN 805/784 431 11 ELECTRONICS STREET EIGHT MILE PLAINS, QUEENSLAND, 4113, AUSTRALIA P.O. BOX 4008 EIGHT MILE PLAINS, QUEENSLAND, 4113, AUSTRALIA Phone +61-7-3841 2844 Fax +61-7-3841 0009	SIZE	DRAWING No.	
	NOMINAL SIZE	UP TO 50	ABOVE 50 UP TO 100	ABOVE 100 UP TO 300	APPROVED			A1	NUMBER	REV.
	MACHINING	± 0.1	± 0.2	± 0.3	± 0.5	± 1.0			WFOPTIMUS05	A
	FABRICATION	± 0.5	± 0.5	± 0.5	± 1.0	± 2.0			CUSTOMER	
DO NOT SCALE IF IN DOUBT ASK							PROJECT			
ALL DIMENSIONS IN MILLIMETRES UNLESS OTHERWISE SPECIFIED							CAD FILE WFOPTIMUS05			



REVISIONS  A: 15/6/06 ISSUED FOR REFERENCE	UNLESS OTHERWISE STATED UNTOLERANCED DIMENSIONS TO BE WITHIN THE LIMITS SHOWN					DRAWN	L.H.	 <div>WEB-TECH AUSTRALIA PTY. LTD. A/CN. 010/764 431 11 ELECTRONICS STREET LIGHT BULBS, GREENLAND, 4113, AUSTRALIA P.O. BOX 4008 EIGHT MILE PLAINS, GREENLAND, 4113, AUSTRALIA Phone +61-7-3611 2644 Fax +61-7-3611 0005</div>	SIZE	DRAWING No.		REV.  A
	NOMINAL SIZE	UP TO 50	ABOVE 50 UP TO 100	ABOVE 100 UP TO 300	ABOVE 300 UP TO 1000	CHECKED	L.H.		A1	NUMBER WFOPTIMUS04		
		APPROVED					L.H.		CUSTOMER			
		DATE APP'D					15/6/06		PROJECT			
		MACHINING					± 0.1 ± 0.2 ± 0.3 ± 0.5 ± 1.0		SCALE	N.T.S.	CAD FILE WFOPTIMUS04	
		FABRICATION					± 0.5 ± 0.5 ± 0.5 ± 1.0 ± 2.0		DO NOT SCALE IF IN DOUBT ASK			
ASSEMBLIES					± 0.5 ± 0.5 ± 0.5 ± 1.0 ± 2.0							
ALL DIMENSIONS IN MILLIMETRES UNLESS OTHERWISE SPECIFIED						This drawing and any information or description neither set out nor have any the confidential and copyright property of WEB-TECH AUSTRALIA PTY. LTD. and must not be disclosed, copied or used for manufacturing / servicing or for any other purpose without their written permission.						



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A/CN. 010 784 431  
11 ELECTRONICS STREET DONT MEE PLAINS QUEENSLAND, 4113, AUSTRALIA  
P.O. BOX 4008 EIGHT MILE PLAINS, QUEENSLAND, 4113, AUSTRALIA  
Phone +61-7-3801 2844 Fax +61-7-3801 0055



NOTES  
SOME LOADCELLS DON'T HAVE SENSE WIRES  
IF THE LOAD CELL HAS SENSE WIRING TERMINATE AS  
SHOWN MW1/MW5/MW6/OPTIMUS DO NOT REQUIRE SENSE WIRING.

TYPE	L+	L-	E+	E-	SENSE+	SENSE-
TEDEA	RED	WHITE	GREEN	BLACK	BLUE	BROWN
RLHBB	WHITE	RED	BLUE	BLACK	GREEN	GREY
LPX	GREEN	WHITE	RED	BLACK	N/C	N/C
RL30000	GREEN	WHITE	RED	BLACK	N/C	N/C
WTD-132	GREEN	WHITE	RED	BLACK	N/C	N/C
WL3000	GREEN	WHITE	RED	BLACK	N/C	N/C
WHSX-S-C3	GREEN	WHITE	RED	BLACK	N/C	N/C
WHSX-S-C4	WHITE	RED	BLUE	BLACK	N/C	N/C

REVISING

A. 29.07.96  
ORIGINAL ISSUE

B. 19.03.04  
ORIGINAL ISSUE

C. 24.08.10  
ADDED LOAD CELLS

UNLESS OTHERWISE STATED  
UNTOLERANCED DIMENSIONS  
TO BE WITHIN THE LIMITS SHOWN

NOMINAL SIZE	UP TO 50	ABOVE 50 UP TO 150	ABOVE 150 UP TO 300	ABOVE 300 UP TO 1000	ABOVE 1000
MACHINING	± 0.1	± 0.2	± 0.3	± 0.5	± 1.0
FABRICATION	± 0.5	± 0.5	± 0.5	± 1.0	± 2.0
ASSEMBLIES	± 0.5	± 0.5	± 0.5	± 1.0	± 2.0

DRAWN

CHECKED

DATE APP'D

SCALE

DO NOT SCALE  
IF IN DOUBT  
ASK

M.W.

M.W.

24/10/2003

N.T.S.

WEB-TECH AUSTRALIA PTY. LTD.

11 ELECTRONICS STREET EIGHT MILE PLAINS, QUEENSLAND, 4103, AUSTRALIA  
P.O. BOX 4086 EIGHT MILE PLAINS, QUEENSLAND, 4103, AUSTRALIA  
Phone 461-7-3841 2844 Fax 461-7-3841 2855

SIZE

DRAWING No.

NUMBER

SHT.

REV.

A1

1

C

TITLE

LOADCELL J-BOX (LARGE) CONNECTION DIAGRAM  
FOR VARIOUS TYPE LOADCELLS

ALL DIMENSIONS IN MILLIMETRES  
UNLESS OTHERWISE SPECIFIED

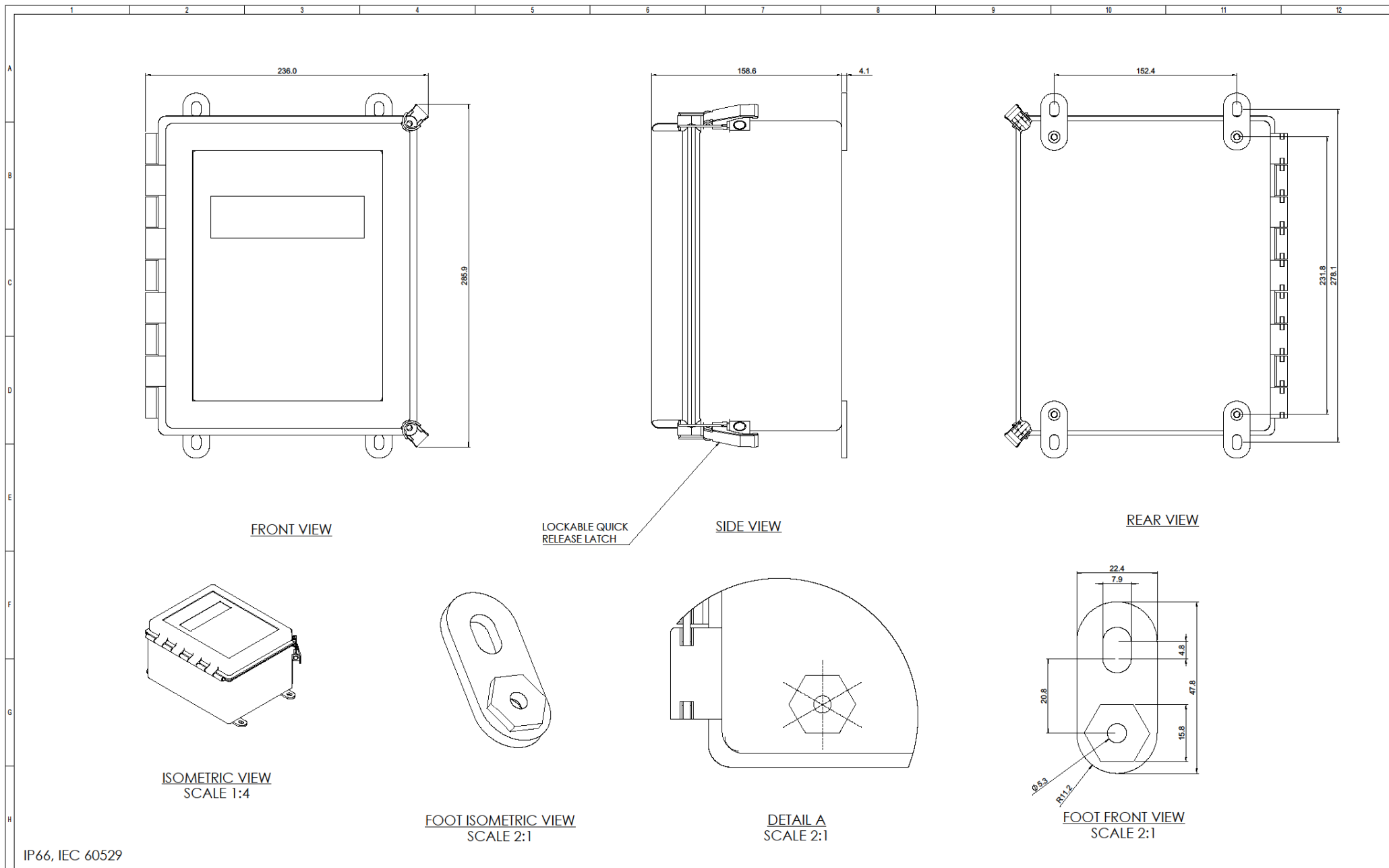
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# **WTS2S2 – INSTALLATION AND OPERATION MANUAL**

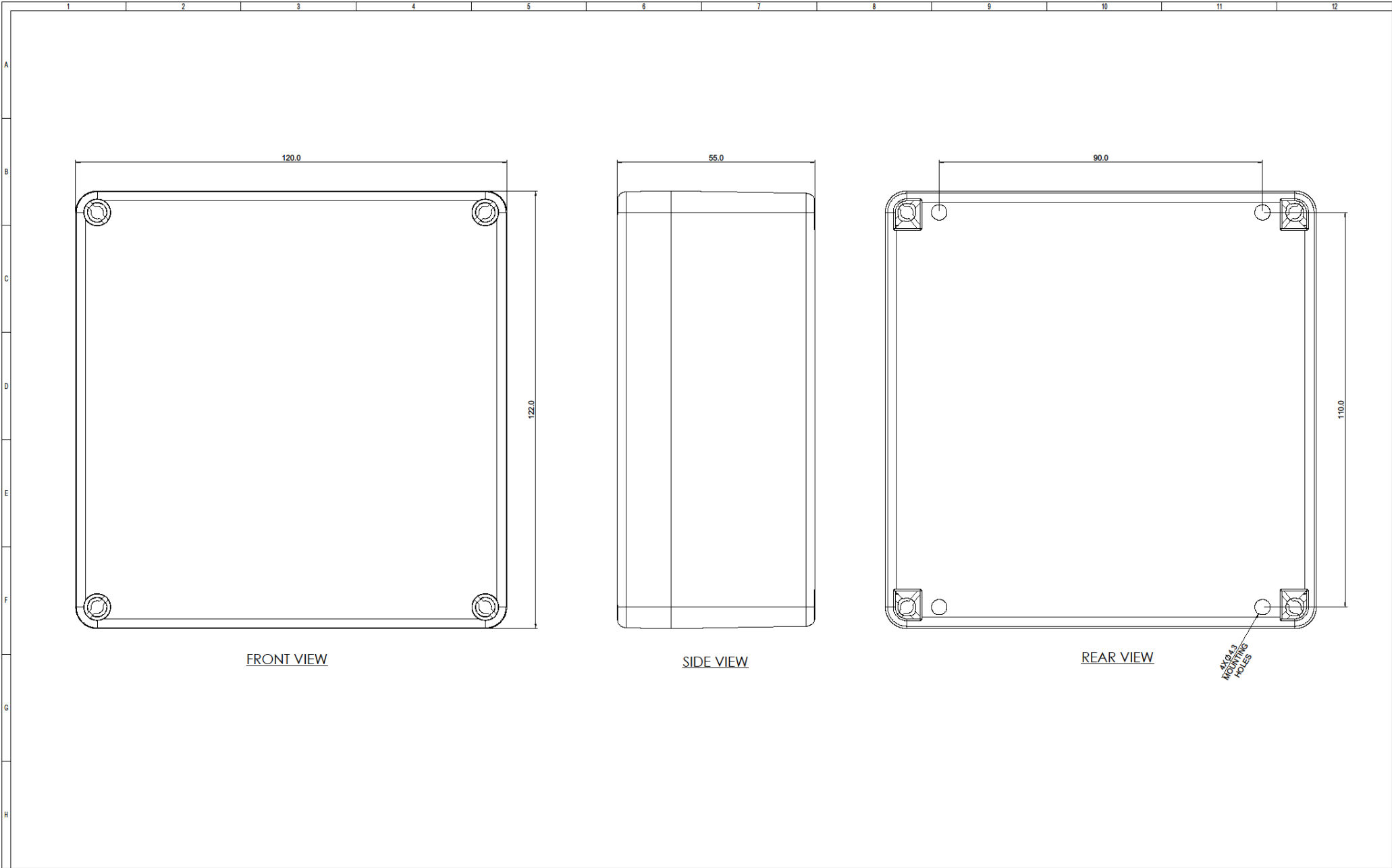
## ***Appendix C – Electrical Enclosure GAs***


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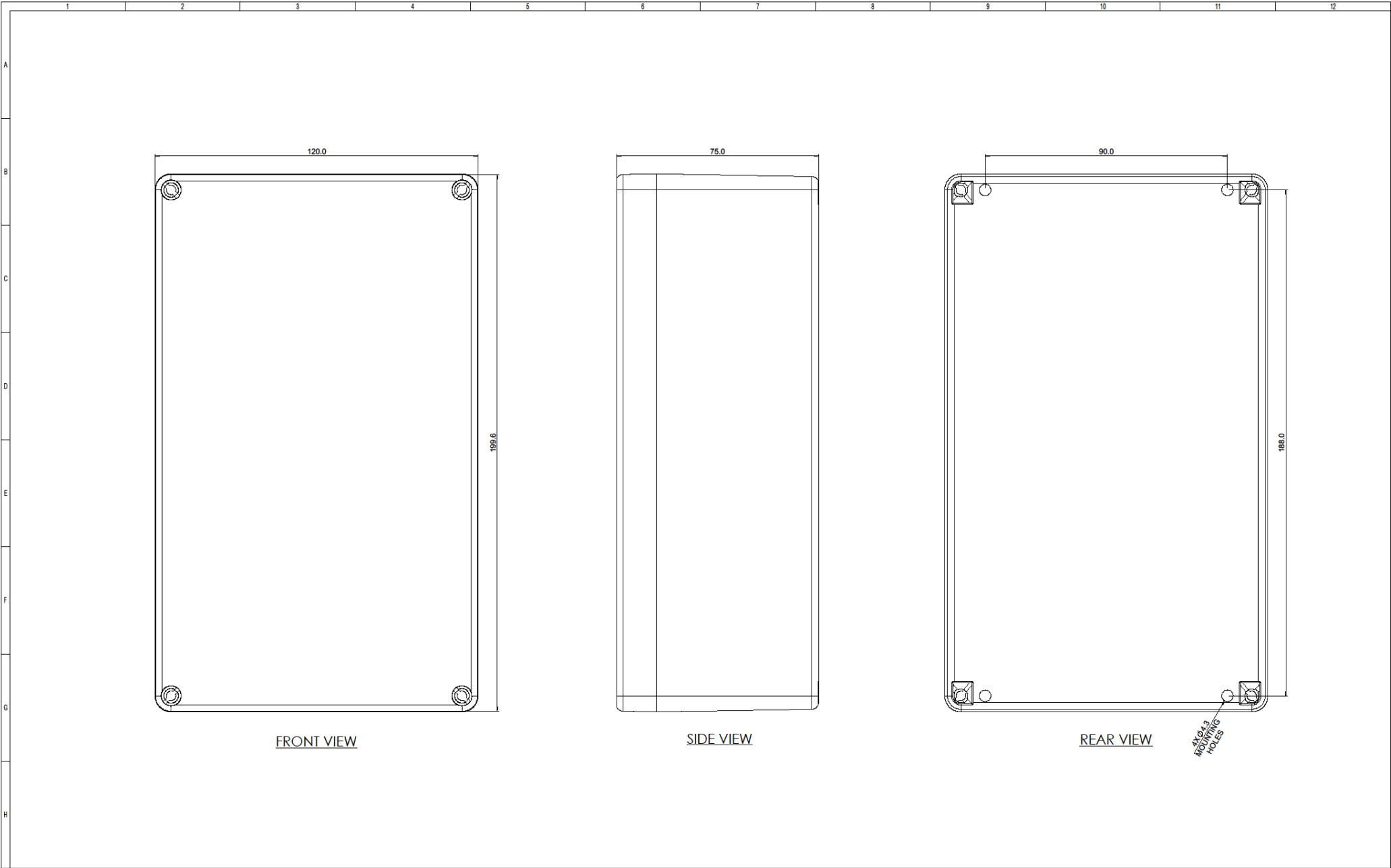




IP66, IEC 60529

REVISIONS	A1: 05/08/16 B. ROBINSON ORIGINAL ISSUE	UNLESS OTHERWISE STATED UNTOLERANCED DIMENSIONS TO BE WITHIN THE LIMITS SHOWN					DRAWN	B. ROBINSON	 WEB-TECH AUSTRALIA PTY. LTD. A/CAL 010 764 431 11 ELECTRONICS STREET (SHOP 14) CALABURRA, QUEENSLAND, 4116, AUSTRALIA P.O. BOX 4008 (SHOP 14) WILEY PARK, QUEENSLAND, 4116, AUSTRALIA Phone +61 7 5461 3344 Fax +61 7 5461 0886	SIZE	DRAWING No.	
		NOMINAL SIZE	1 0.1	1 0.2	1 0.3	1 0.5	1 1.0	CHECKED		A1	NUMBER	REV.
		MACHINING	1 0.1	1 0.2	1 0.3	1 0.5	1 1.0	APPROVED		CUSTOMER		
		FABRICATION	1 0.5	1 0.5	1 0.5	1 1.0	1 2.0	DATE APPD.		PROJECT		
		ASSEMBLY	1 0.5	1 0.5	1 0.5	1 1.0	1 2.0	SCALE		DWG FILE		
					DO NOT SCALE IF IN DOUBT ASK		1:2		TITLE	MWX OPTIMUS ENCLOSURE TYPICAL DIMENSIONS IP66, IEC 60529		
									ALL DIMENSIONS IN MILLIMETRES UNLESS OTHERWISE SPECIFIED			
									This drawing and any information or knowledge contained herein are the confidential and proprietary property of Web-Tech Australia Pty. Ltd. and shall remain confidential, and shall not be disclosed, copied, reproduced or otherwise made available to any third party without the prior written permission of Web-Tech Australia Pty. Ltd.			



REVISIONS A: 07/07/16 B.ROBINSON ORIGINAL ISSUE	UNLESS OTHERWISE STATED UNTOLERANCED DIMENSIONS TO BE WITHIN THE LIMITS SHOWN					DRAWN B.ROBINSON	 WEB-TECH AUSTRALIA PTY. LTD. ACIA 010 76 41 11 ELECTRONICS STREET SOUTH WILKES PLAINS, QUEENSLAND, 4113, AUSTRALIA P.O. BOX 4008 SOUTH WILKES PLAINS, QUEENSLAND, 4113, AUSTRALIA Phone 4672 5847/5848 Fax 4672 5841/5885	SIZE A1	DRAWING No. NUMBER LGLCJB-03GA	REV. A	
	NOMINAL SIZE	UP TO Ø4	Ø4.2 Ø4.5 Ø5	Ø5.5 Ø6 Ø6.5	Ø7 Ø7.5 Ø8	Ø8.5 Ø9 Ø9.5		APPROVED	CUSTOMER		
	MACHINING	± 0.1	± 0.2	± 0.3	± 0.5	± 1.0		DATE APPO	PROJECT		
	FABRICATION	± 0.5	± 0.5	± 0.5	± 1.0	± 2.0		SCALE	C/D FILE LGLCJB-03Ga		
	ASSEMBLY	± 0.5	± 0.5	± 0.5	± 1.0	± 2.0		DO NOT SCALE IF IN DOUBT ASK	ALL DIMENSIONS IN MILLIMETRES UNLESS OTHERWISE SPECIFIED		
								The design and any fabrication or assembly work will conform with the standards and specifications of AS/NZS 1546:2000 and AS/NZS 1547:2000 and shall conform to the requirements of the relevant Australian Standards and the relevant Australian Standards for the relevant product.			



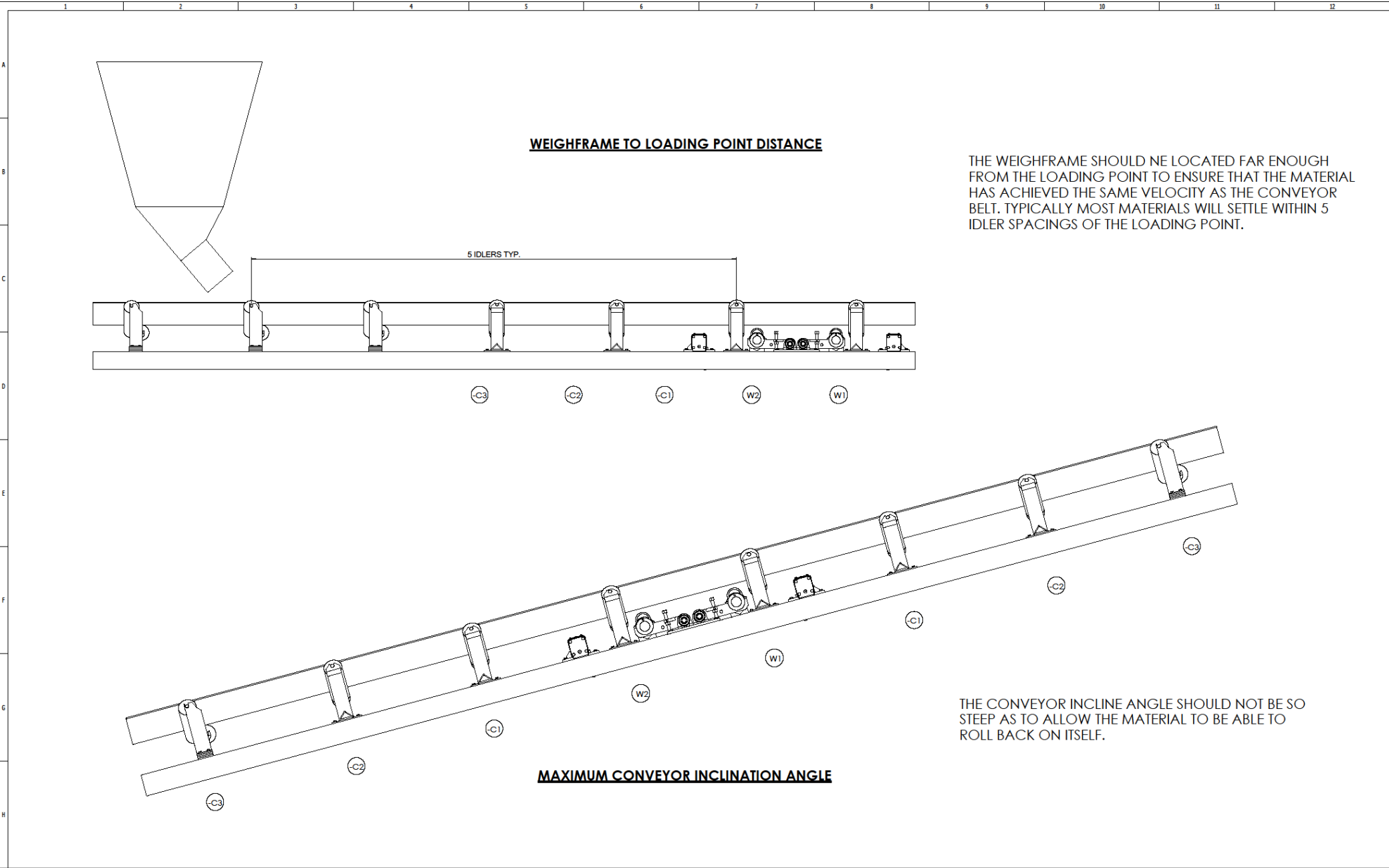
REVISIONS A1: 07/07/14 B. ROBINSON ORIGINAL ISSUE	UNLESS OTHERWISE STATED TO BE WITHIN THE UNITS SHOWN					DRAWN	B. ROBINSON		 <div>WEB-TECH AUSTRALIA PTY. LTD. A/CN 910 784 401 11 ELECTRONICS STREET, DOFT HILL PLAINS, QUEENSLAND, 4113, AUSTRALIA P.O. BOX 4088, DOFT HILL PLAINS, QUEENSLAND, 4113, AUSTRALIA Phone: 08 53 386 284 Fax: 08 53 386 1886</div>	SIZE	DRAWING No.				
	NOMINAL SIZE	UP TO 16	MORE 16 TO 25	MORE 25 TO 50	MORE 50 TO 100	APPROVED				A1	NUMBER	REV.			
	MACHINING	± 0.1	± 0.2	± 0.3	± 0.5	± 1.0	DATE APP'D				CUSTOMER				
	FABRICATION	± 0.5	± 0.5	± 0.5	± 1.0	± 2.0	SCALE	1:1			PROJECT				
	ASSEMBLIES	± 0.5	± 0.5	± 0.5	± 1.0	± 2.0		DO NOT SCALE IF IN DOUBT ASK		C/D FILE LGLCJB.dwg					
	4 LOAD CELL JUNCTION BOX GENERAL ARRANGEMENT									PROJECT					
	ALL DIMENSIONS IN MILLIMETRES UNLESS OTHERWISE SPECIFIED									The design and construction of this product is the responsibility of the manufacturer. The manufacturer shall be responsible for the design and construction of the product. The manufacturer shall be responsible for the design and construction of the product.					



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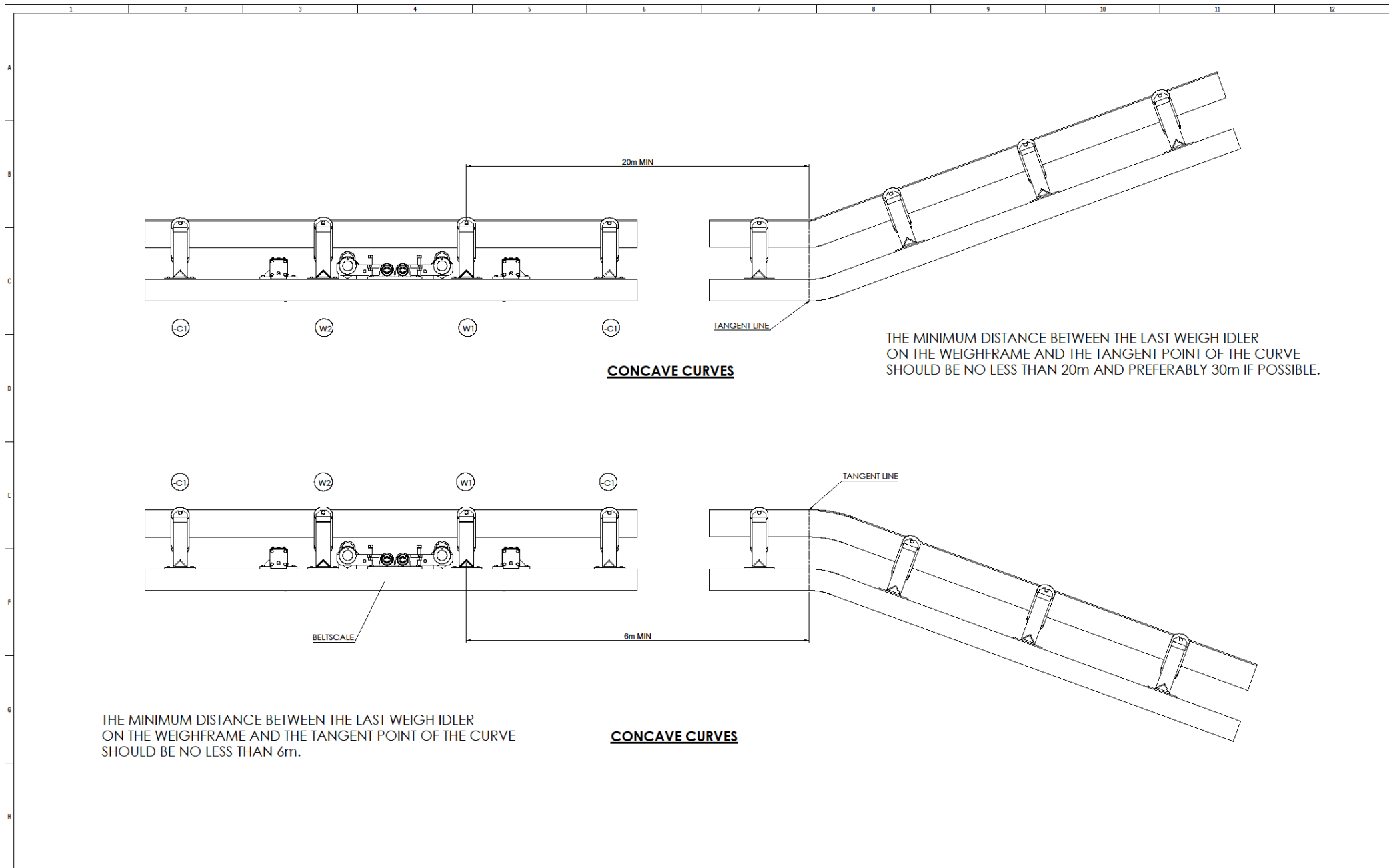
# WTS2S2 – INSTALLATION AND OPERATION MANUAL



## *Appendix D – Belt Scale Positioning Guide*

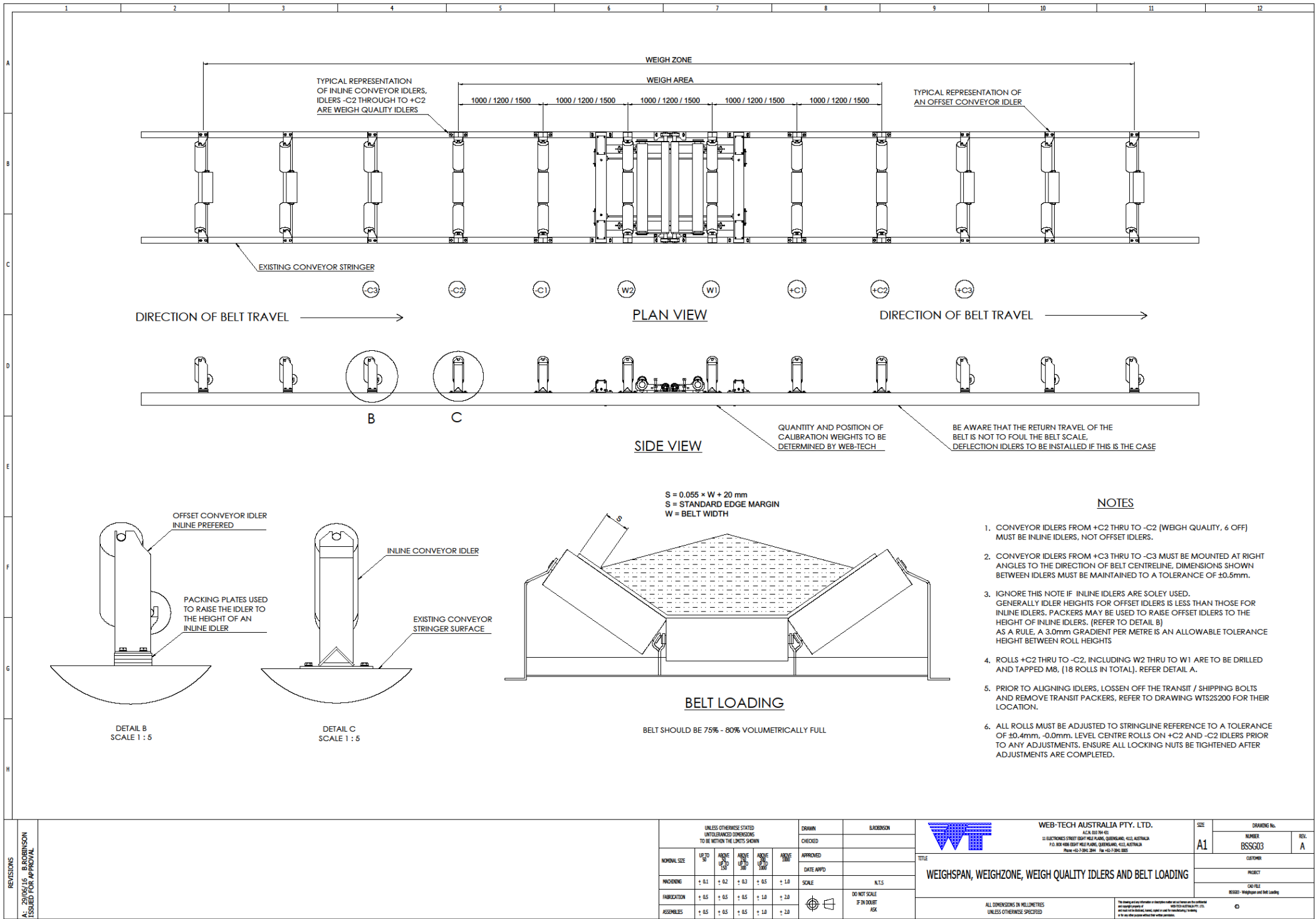
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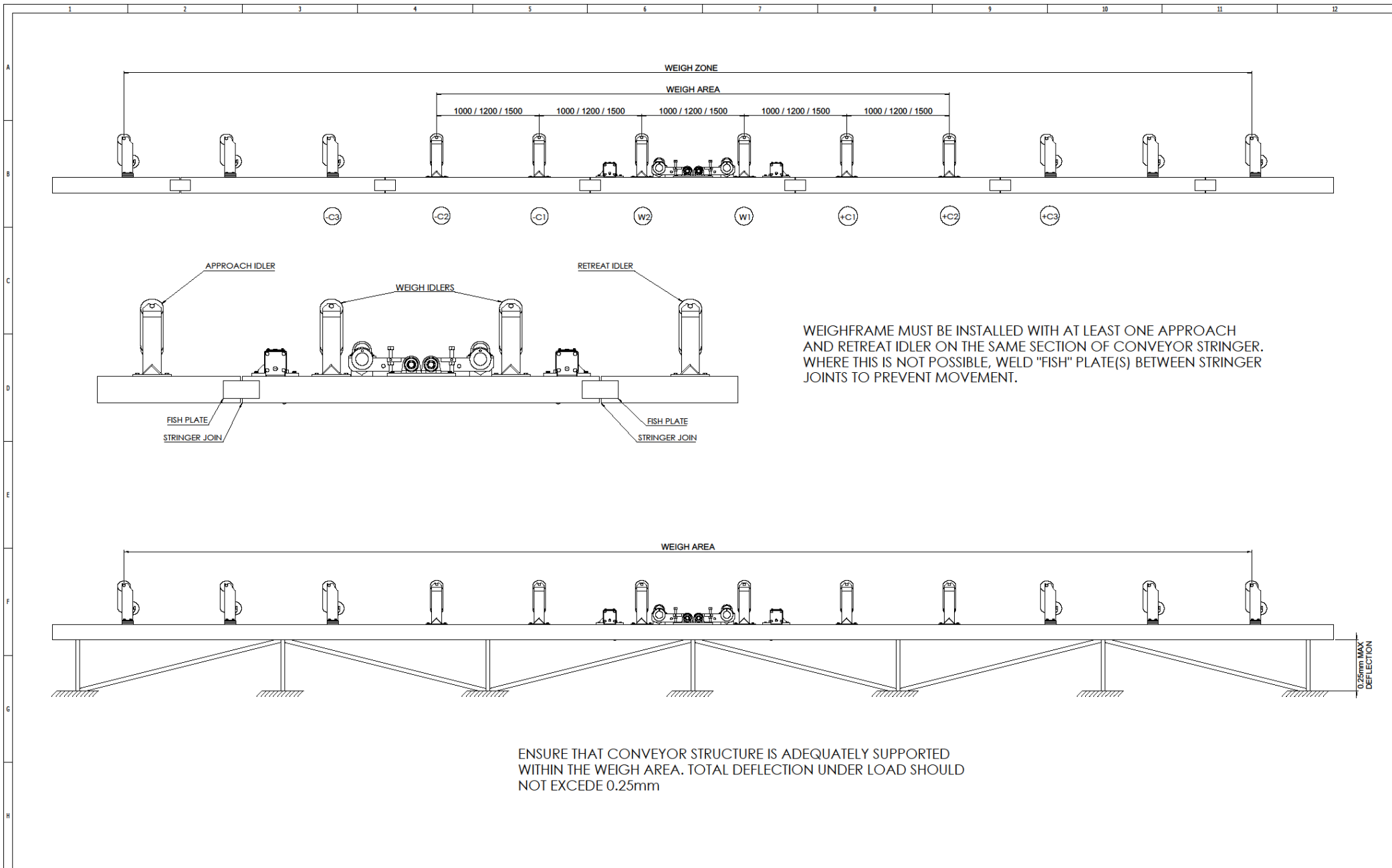


REVISIONS  A - 20/06/16 - B.ROBINSON ISSUED FOR APPROVAL	UNLESS OTHERWISE STATED UNTOLERANCED DIMENSIONS TO BE WITHIN THE LIMITS SHOWN				DRAWN	B.ROBINSON		 WEB-TECH AUSTRALIA PTY. LTD. 11 ELECTRONICS STREET (OPPOSITE HILL PLAINS, QUEENSLAND, 4111 AUSTRALIA P.O. BOX 4088 (OPPOSITE HILL PLAINS, QUEENSLAND, 4111 AUSTRALIA Phone +61 (0) 7 3861 2841 Fax +61 (0) 7 3861 2855	SIZE	DRAWING No.	
	NOMINAL SIZE	UP TO 50	ABOVE 50 TO 100	ABOVE 100 TO 200	ABOVE 200 TO 300	APPROVED	CHECKED		A1	NUMBER	REV.
						DATE APPD			BSSG01	A	
						SCALE				CUSTOMER	
	WORKING	± 0.1 ± 0.2 ± 0.3 ± 0.5 ± 1.0								PROJECT	
	FABRICATION	± 0.5 ± 0.5 ± 0.5 ± 1.0 ± 2.0								CAD FILE	
	ASSEMBLY	± 0.5 ± 0.5 ± 0.5 ± 1.0 ± 2.0								ISSUED - Loading Distance Plan Submittal	
						DO NOT SCALE IF IN DOUBT ASK					
ALL DIMENSIONS IN MILLIMETRES UNLESS OTHERWISE SPECIFIED									©		

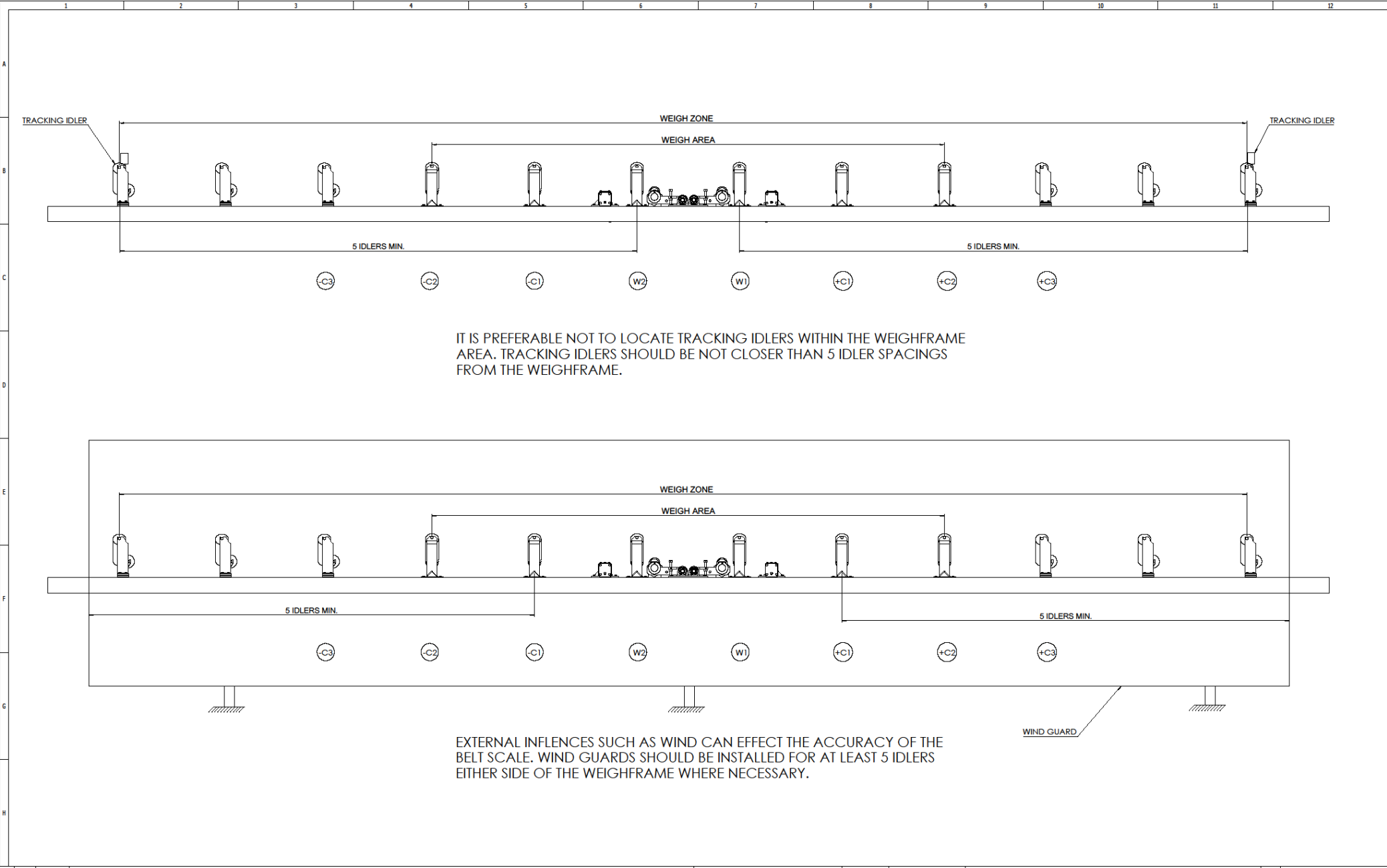



REVISIONS A: 30/06/16 B.ROBINSON ISSUED FOR APPROVAL	UNLESS OTHERWISE STATED UNTOLERANCED DIMENSIONS TO BE WITHIN THE LIMITS SHOWN						DRAWN B.ROBINSON		 WEB-TECH AUSTRALIA PTY. LTD. A/CN 602 304 401 11 ELECTRONICS STREET (OFFICE) MELBOURNE, QUEENSLAND, 4111 AUSTRALIA P.O. BOX 4008 (OFFICE) MELBOURNE, QUEENSLAND, 4111 AUSTRALIA Phone: +61-7-3841 2841 Fax: +61-7-3841 2855	SIZE A1	DRAWING No.		REV. A
	APPROVED						CHECKED				TITLE  BELTSCALE PLACEMENT CONCAVE CURVES, CONVEX CURVES	NUMBER BSSG02	
	DATE APD						SCALE					CUSTOMER	
	DO NOT SCALE IF IN DOUBT ASK						N.T.S.					PROJECT	
	ALL DIMENSIONS IN MILLIMETRES UNLESS OTHERWISE SPECIFIED											©	





<b>REVISIONS</b> A: 30/06/16 B.ROBINSON ISSUED FOR APPROVAL B: 22/07/16 B.ROBINSON ADDED OTHER WEIGH IDLER AND APPROACH IDLERS REMOVED WTS252 LABEL	UNLESS OTHERWISE STATED UNTOLERANCED DIMENSIONS TO BE WITHIN THE LIMITS SHOWN					DRAWN CHECKED APPROVED DATE APP'D SCALE DO NOT SCALE IF IN DOUBT ASK	DRAWING No. NUMBER PROJECT CUST FILE BSSG04 CONVEYOR STIFFENING	SIZE A1	REV. B
	NOMINAL SIZE	UP TO 30	ABOVE UP TO 150	ABOVE UP TO 300	ABOVE 300				
	MACHINING	± 0.1	± 0.2	± 0.3	± 0.5	± 1.0			
	FABRICATION	± 0.5	± 0.5	± 0.5	± 1.0	± 2.0			
	ASSEMBLY	± 0.5	± 0.5	± 0.5	± 1.0	± 2.0			
<b>WEB-TECH AUSTRALIA PTY. LTD.</b> ACMA 500 784 400 11 ELECTRONICS STREET (SUITE 100) MELBOURNE, QUEENSLAND, 4001, AUSTRALIA P.O. BOX 4008 (SUITE 100) MELBOURNE, QUEENSLAND, 4001, AUSTRALIA Phone +61-3-9463 2844 Fax +61-3-9463 2855							<b>CONVEYOR STIFFENING</b>		
ALL DIMENSIONS IN MILLIMETRES UNLESS OTHERWISE SPECIFIED							<small>The design and any fabrication or installation shall not be undertaken without the written approval of the design engineer. All work shall be done in accordance with the relevant standards and specifications. The design engineer shall be responsible for the design and any fabrication or installation shall be done in accordance with the relevant standards and specifications.</small>		



REVISIONS	A: 20/06/16 B. ROBINSON ISSUED FOR APPROVAL	UNLESS OTHERWISE STATED UNTOLERANCED DIMENSIONS TO BE WITHIN THE LIMITS SHOWN					DRAWN	B. ROBINSON	 WEB-TECH AUSTRALIA PTY. LTD. 11 ELECTRONICS STREET, SEFTON HILL PLAINS, QUEENSLAND, 4111, AUSTRALIA P.O. BOX 908, SEFTON HILL PLAINS, QUEENSLAND, 4111, AUSTRALIA Phone: +61 (0) 7 5961 2841 Fax: +61 (0) 7 5961 2852	SIZE	DRAWING No.	
	A: 22/07/16 B. ROBINSON ADDED TRACKING IDLER AND WIND GUARDS AND CHANGED UNIT POSITION	MINORIAL SIZE	UP TO 50	ABOVE 50 TO 100	ABOVE 100 TO 200	ABOVE 200 TO 500	CHECKED			A1	NUMBER	REV.
		MACHINING	± 0.1	± 0.2	± 0.3	± 0.5	± 1.0	APPROVED			BSSG05	B
		FABRICATION	± 0.5	± 0.5	± 0.5	± 1.0	± 2.0	DATE APPD			CUSTOMER	
		ASSEMBLY	± 0.5	± 0.5	± 0.5	± 1.0	± 2.0	SCALE	N.T.S.		PROJECT	
								DO NOT SCALE	9" IN DIAMET		DATE FILED	
											BSSG05 - Tracking Idlers and Wind Guards	
											©	

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# WTS2S2 – INSTALLATION AND OPERATION MANUAL

## Appendix E – Optimus Datasheets

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### WEB-TECH WEIGHFEEDER DESIGN DATA SHEET

CLIENT : \_\_\_\_\_ DATE : \_\_\_\_\_

DESIGNATION : \_\_\_\_\_ MODEL \_\_\_\_\_

CALIBRATION METHOD : BAR(S) / CHAIN

#### CALIBRATION BAR(S)

1. CALIBRATION BAR QTY AND TOTAL WEIGHT \_\_\_\_\_ =
2. IDLER PITCH \_\_\_\_\_
3. TOTAL WEIGH AREA \_\_\_\_\_ metres
4. EQUIVALENT LOADING/M WITH CAL BAR(S) (Item 1 x 1/Item 3) = \_\_\_\_\_
5. BELT SPEED \_\_\_\_\_ m/s
6. SIMULATED MASS RATE (Item 4 x Item 5 x 3600 ) = \_\_\_\_\_ kg/hr
7. BELT LENGTH \_\_\_\_\_ metres
8. No. OF BELT REVOLUTIONS FOR TEST \_\_\_\_\_
9. TARGET WEIGHT ( Item 4 x Item 7 x Item 8 ) = \_\_\_\_\_ kgs

#### CALIBRATION CHAIN

1. WEIGHT OF CALIBRATION CHAIN PER STRAND \_\_\_\_\_ kg/m
2. No. OF STRANDS \_\_\_\_\_
3. TOTAL WEIGHT OF CALIBRATION CHAIN (Item 1 x Item 2 ) \_\_\_\_\_ kg/m
4. BELT LENGTH \_\_\_\_\_ m
5. No. OF BELT REVOLUTIONS FOR TEST \_\_\_\_\_
4. TARGET WEIGHT ( Item 3 x Item 4 x Item 5 ) = \_\_\_\_\_ kgs

# OPTIMUS CALIBRATION DATA

Customer : \_\_\_\_\_ Conveyor Designation : \_\_\_\_\_

Material : \_\_\_\_\_ Model : \_\_\_\_\_ Date : \_\_\_\_\_

Load Cell: \_\_\_\_\_ Tacho : \_\_\_\_\_ Data By : \_\_\_\_\_

Serial No: \_\_\_\_\_ Software Build : \_\_\_\_\_ Contract No : \_\_\_\_\_

## SETUP MENU

<b>1. System Configuration</b>		Units of Measurement: _____	
		Belt Capacity _____	
		Resolution _____	
		Belt Length _____	
		Maximum Loading _____	kg/m
<b>2. Time &amp; Date</b>		Backlight _____	
		Brightness _____	
		Contrast _____	
		Date _____	
		Time _____	
<b>3. PID Parameters</b>	<b>1 Setpoint Origin / Status</b>	_____	
	<b>2 Output Status</b>	_____	
	<b>3 PID Parameters</b>		
	Prop Band _____	Reset Rate _____	
	Integral Lower Limit _____	Integral Upper Limit _____	
	Derivative Time _____		
	Feed Forward _____	Output Offset _____	
	<b>5 PID Mass Rate Filter</b>		
	Time Constant _____		
	Fast Track Threshold _____		
	<b>6 Volumetric Restart</b>		
	Restart Period _____		
	Restart Threshold _____		
<b>4. Auto ZeroTracking</b>		Auto Zero Tracking _____	
		Threshold _____	
		Delay _____	Period _____
		Current Contribution _____	
<b>5. Rate Deadband</b>		Mass Rate Dead Band _____	Belt Capacity _____
<b>6. Rate Display Filters</b>		Mass Rate Display Filter _____	
		Time Constant _____	Fast Track Threshold _____
		Mass Rate Trend Filter _____	
		Time Constant _____	Fast Track Threshold _____
<b>8. Chute Level Control</b>		None _____	
		Low _____	
		Mid _____	
		High _____	

# OPTIMUS CALIBRATION DATA

## I.O MENU

### 1. Current Loop Inputs

Loop 1 \_\_\_\_\_

Type is \_\_\_\_\_

#### Parameters

Master Capacity \_\_\_\_\_

Slave \_\_\_\_\_

#### Filtering

Loop Filter \_\_\_\_\_

Time Constant \_\_\_\_\_

Fast Track Threshold \_\_\_\_\_

Loop 2 \_\_\_\_\_

Loop 3 \_\_\_\_\_

Loop 4 \_\_\_\_\_

Loop 5 \_\_\_\_\_

Loop 6 \_\_\_\_\_

Loop 7 \_\_\_\_\_

### 2. Current Loop Outputs

Loop 1 \_\_\_\_\_

Type is \_\_\_\_\_

#### Filtering

Time Constant \_\_\_\_\_

Fast Track Threshold \_\_\_\_\_

Loop 2 \_\_\_\_\_

Type is \_\_\_\_\_

#### Filtering

Time Constant \_\_\_\_\_

Fast Track Threshold \_\_\_\_\_

### 3. Digital Inputs

Digital Input 1 \_\_\_\_\_

Digital Input 2 \_\_\_\_\_

Digital Input 3 \_\_\_\_\_

Digital Input 4 \_\_\_\_\_

Digital Input 5 \_\_\_\_\_

Digital Input 6 \_\_\_\_\_

### 4. Digital Outputs

Digital output 1 \_\_\_\_\_

Digital Output 2 \_\_\_\_\_

Digital output 3 \_\_\_\_\_

Emit Pulse Every \_\_\_\_\_

Pulse Width \_\_\_\_\_

Polarity \_\_\_\_\_

Digital output 4 \_\_\_\_\_

Digital output 5 \_\_\_\_\_

Digital output 6 \_\_\_\_\_

### 7. Load Cell & Tacho

Load Cell (No Load) \_\_\_\_\_

Load Cell (With Chains) \_\_\_\_\_

Tacho Freq @ 60Hz \_\_\_\_\_

## CALIBRATION MENU

### 1. Calibration

Pulses Per Rev \_\_\_\_\_

Zero Calibration \_\_\_\_\_

Calibration \_\_\_\_\_

Calibration Target\_ \_\_\_\_\_

Belt Revolutions \_\_\_\_\_

AZT Span \_\_\_\_\_

AZT (As found) \_\_\_\_\_

Belt Speed \_\_\_\_\_