WTS1 Series II Belt Scale

Operation and Installation Guide

Web Tech Australia Pty Ltd
PO Box 4006
11 Electronics St
Eight Mile Plains, QLD, 4113
Ph: 1800 777 906
Fax: 61 7 3841 0005
E-mail: info@web-tech.com.au

WTS1S2 – OPERATION AND INSTALLATION GUIDE

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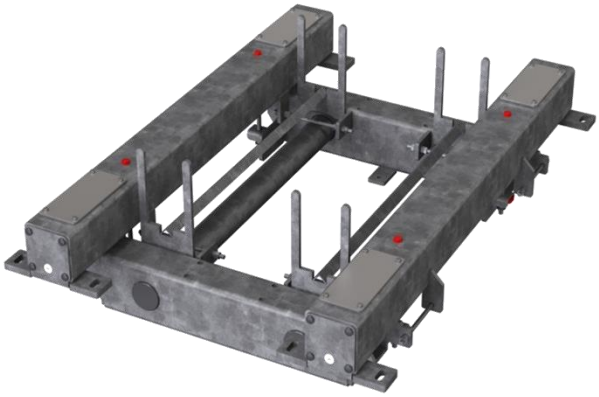
Introduction

The model “WTS1S2” belt scale is one of Web Tech AutoWeigh’s “process” type conveyor belt scales, and is suitable for applications most applications. Accuracies in the order of ±1% are achievable. The WTS1S2 conveyor belt scale is a heavy-duty one 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.



Model	Description	Typical Applications	Accuracy
E40	Universal type scale, simplest installation, dual load cell.	Aggregate plants, Feeder control	±, 1 – 5 %
WTE11	Single idler, single load cell process scale with mechanical tare, belt widths up to 1050 mm.	Aggregate plants, Timber plants, Gold ore plants	±, 1 – 3 %
WTE12	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	±, 1 – 3 %
WTE21	Dual idler, single load cell process scale with mechanical tare, belt widths up to 1050 mm.	Aggregate plants, Timber plants, Gold ore plants	±, 0.5 – 1 %
WTE22	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	±, 0.5 – 1 %
WTS1	Single idler, dual load cell heavy duty suspended weighframe, suitable for belt widths from 450 to 2400 mm.	All mining applications	±, 1 %
WTS2	Dual idler, dual load cell heavy duty suspended weighframe, suitable for belt widths from 450 to 2400 mm.	All mining applications	±, 0.5 %
WTS4	Four idler, four load cell, fully suspended weighframe, suitable for belt widths up to 2400 mm.	High accuracy loadouts, Material transfers	±, 0.25 – 0.5 %
WTS6	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	±, 0.1 – 0.25 %
WTS8	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	±, 0.1 – 0.25 %

Theory of Operation

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:

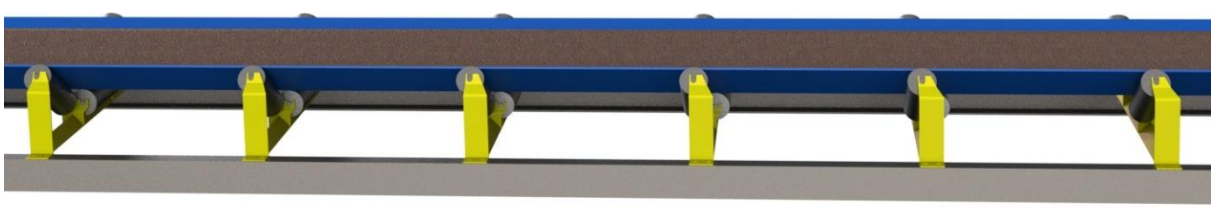
Flow Rate = Weight (Weighframe) × Speed (Belt Speed Sensor)

Total Weight = Weight (Weighframe) × 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.



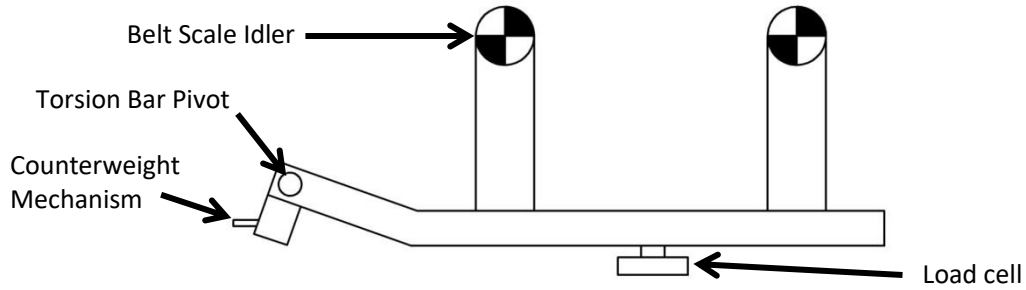
Belt Scales consist of four main components these being:

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 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:

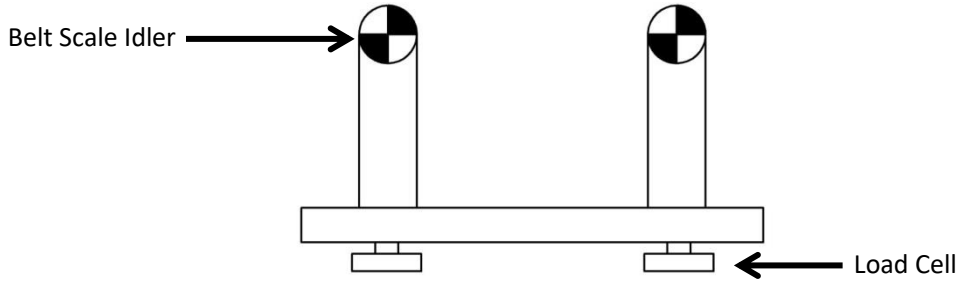
Pivoted Type Belt Scales

- 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



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:

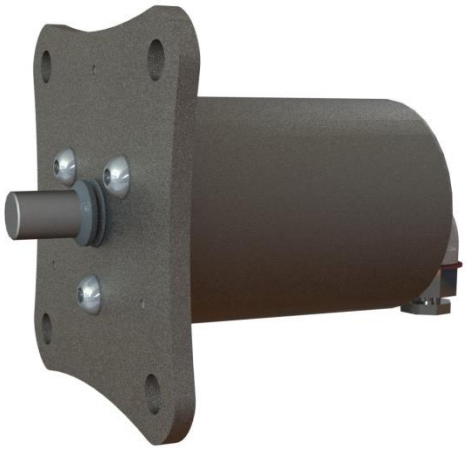
The wheel is prone to bounce when a disturbance in the belt surface such as a splice passes under it. This will cause a variation in frequency output, and therefore the measured belt speed.

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



WXT Speed Sensor

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?

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.

Theory of Operation – Conveyor Design

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 20o angle are better than 30o angle, and 30o is better than 35o. Idlers with 45o 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.

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 ± 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

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 ± 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?

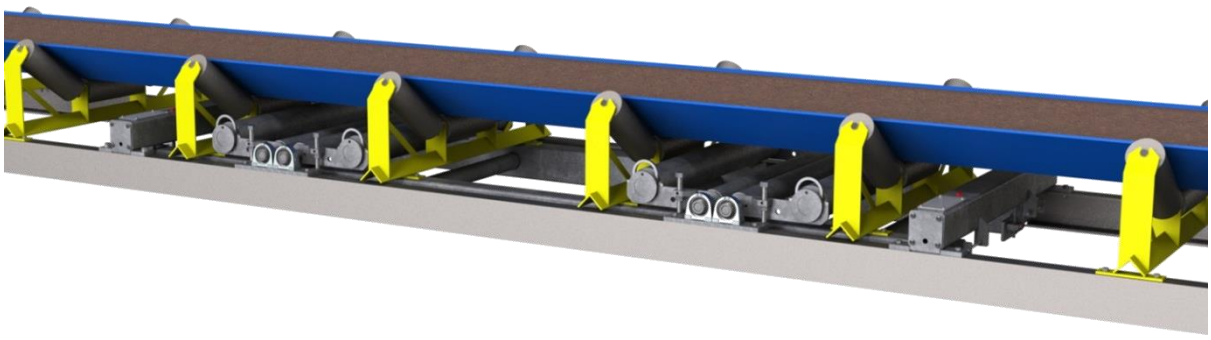
The accuracy of the system will be determined by the weighframe type, as the same model electronics will normally be used regardless of the accuracy requirements. More than one model electronics may be available, however this is generally because they offer various options. When specifying a desired 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

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.

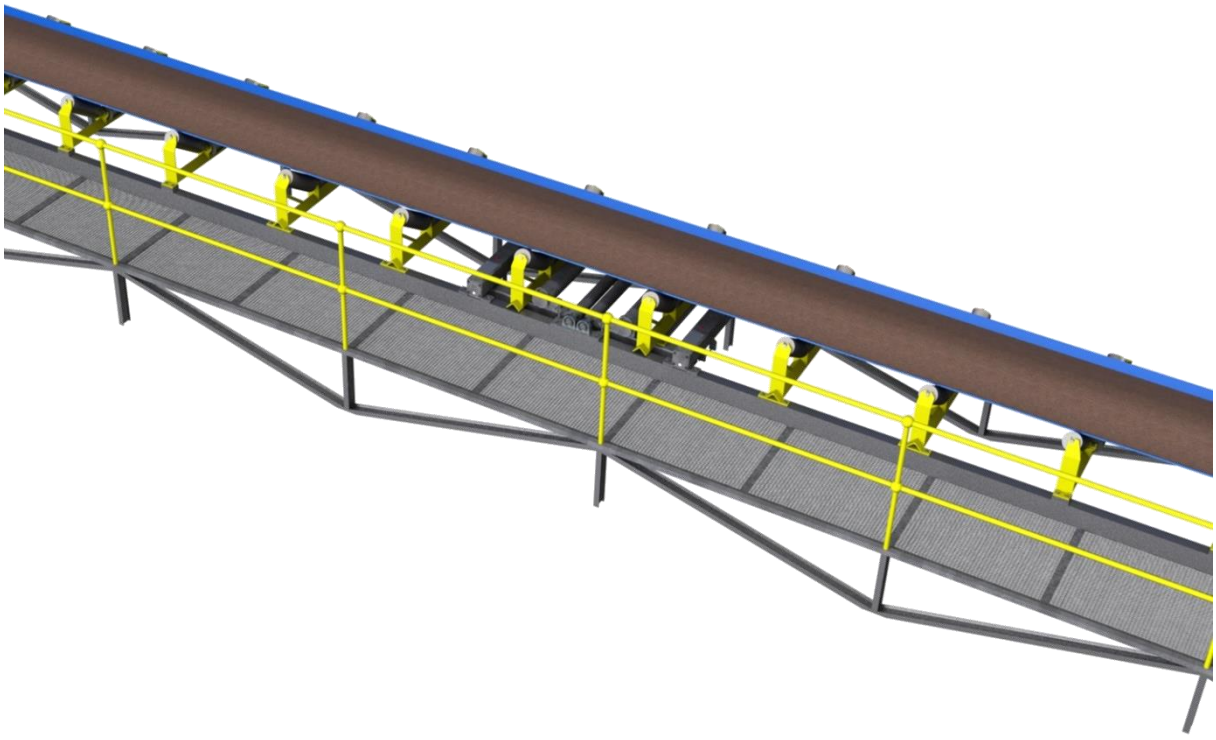
The following work should be carried out on a regular basis:

- 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.



The mechanical installation of a WTS1 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	**WTS1S200 & WTS1S210**
In situ Calibration Weight	**WTS1S211 & WTS1S212**
In situ Calibration Weight Billet	**WTS1S213 & WTS1S214**

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.

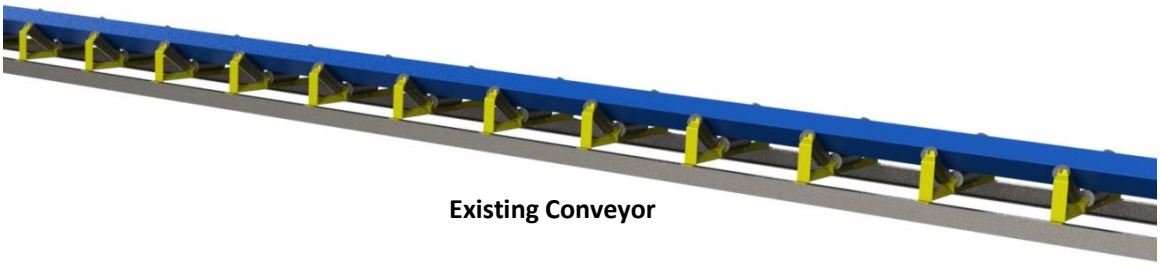
Lifting of Belt

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.

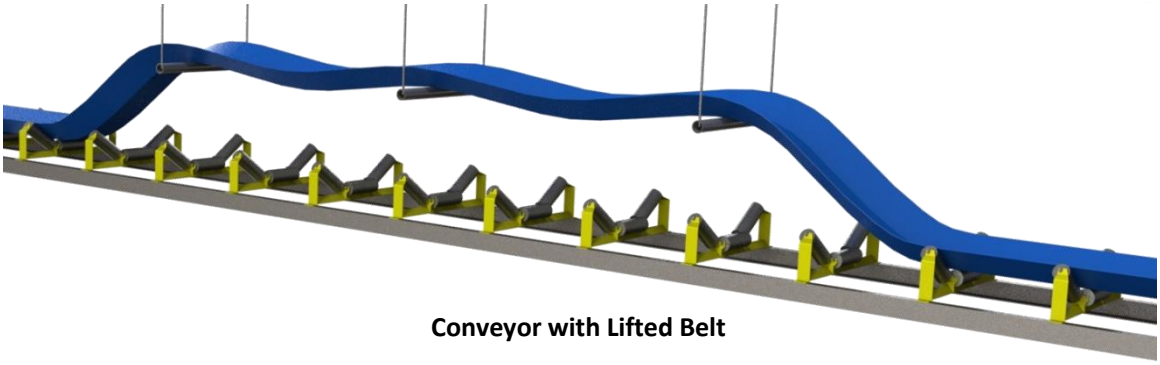
Weighframe Installation

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 5 sets from the conveyor.

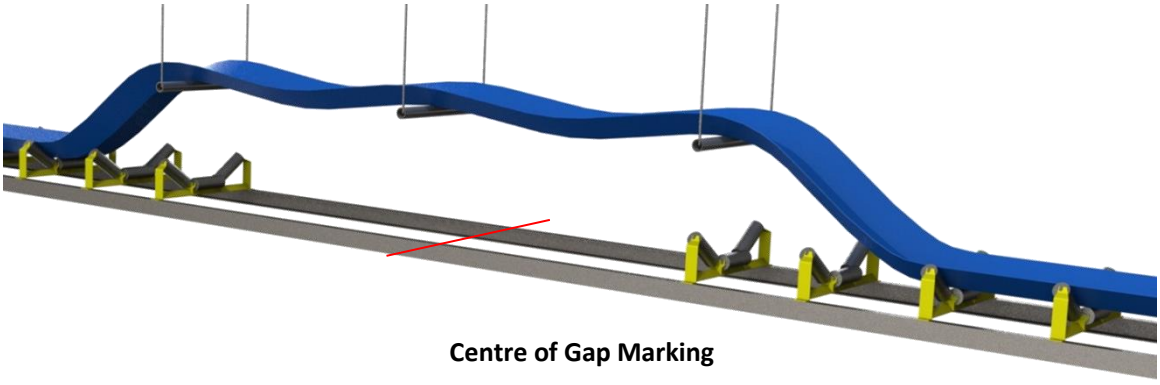


Existing Conveyor



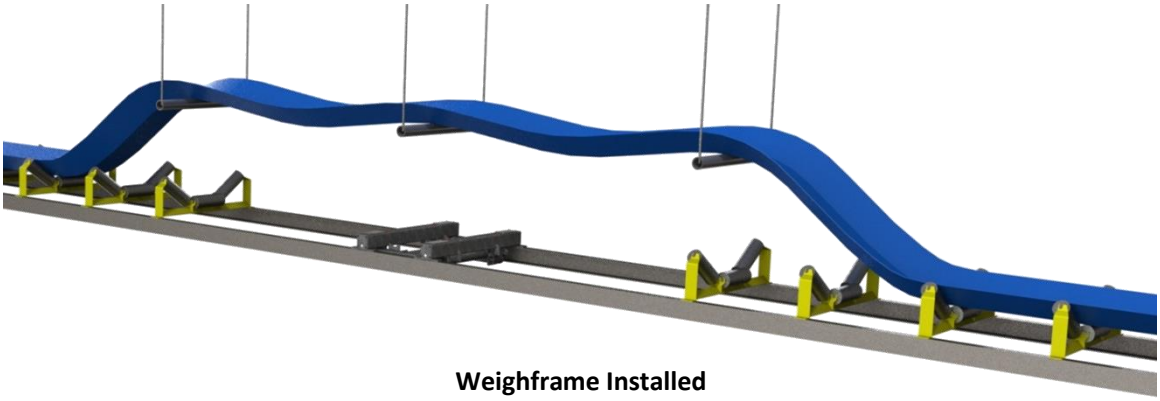
Conveyor with Lifted Belt

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



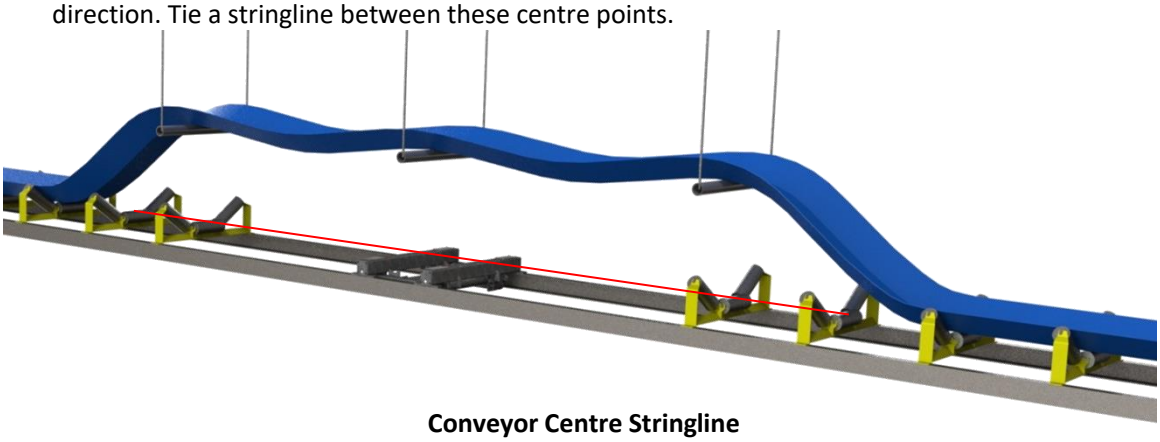
Centre of Gap Marking

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.



Weighframe Installed

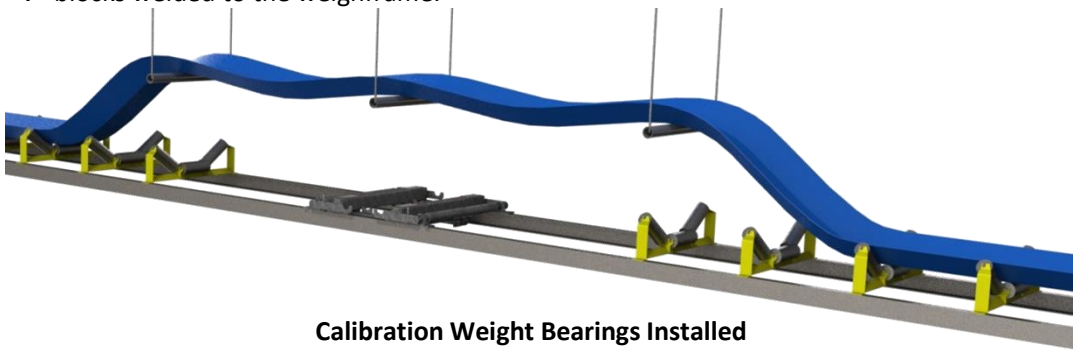
5) Measure and mark the centre of the centre (horizontal) roll on the first of the existing idlers in each direction. Tie a stringline between these centre points.



Conveyor Centre Stringline

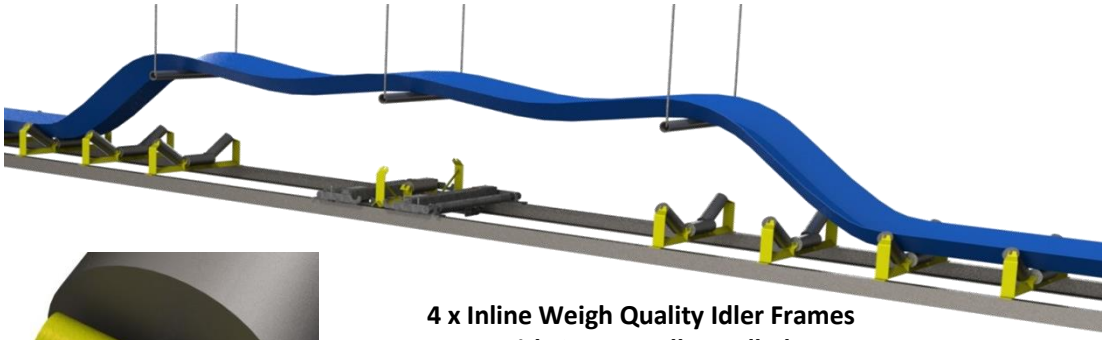
6) Measure and mark the centre of the weighframe crossbeams. Square the weighframe up so that the centre of the crossbeams are in line with the stringline.
7) Mark out the position of the weighframe mounting holes on the conveyor stringers. Drill 18 mm holes, for M16 bolts. Install bolts, washers and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

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.

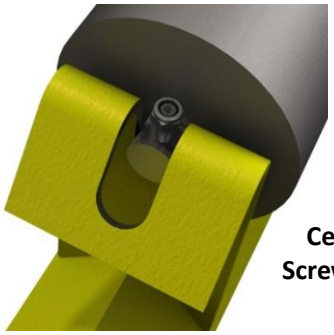


Calibration Weight Bearings Installed

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.

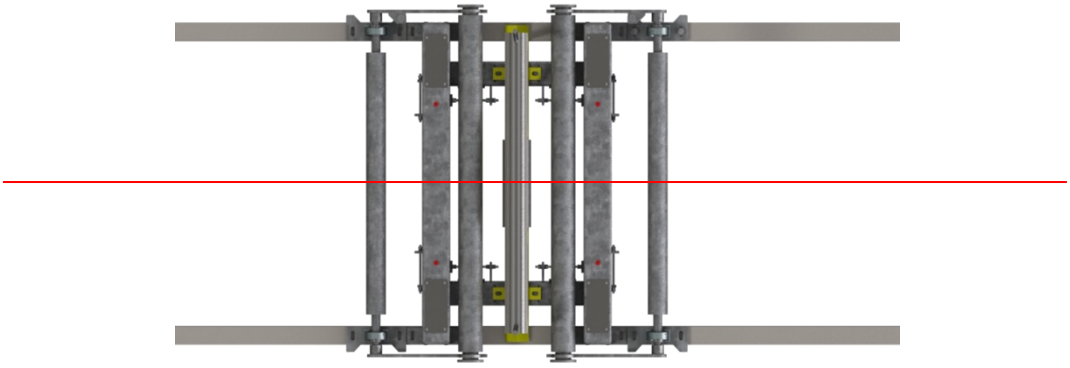


4 x Inline Weigh Quality Idler Frames
With Centre Roll Installed



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.

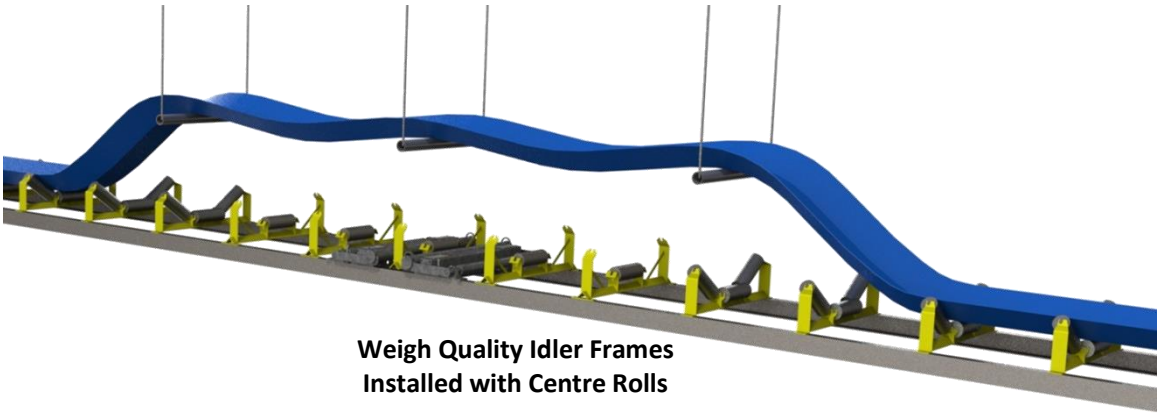


NOTE: THE LOADCELLS ARE PREINSTALLED IN THE WEIGHFRAME AND COULD BE DAMAGED BY IMPROPER WELDING PRACTICES. ENSURE THAT WELDING EARTH STRAP IS CONNECTED AT THE POINT OF WELDING.

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.

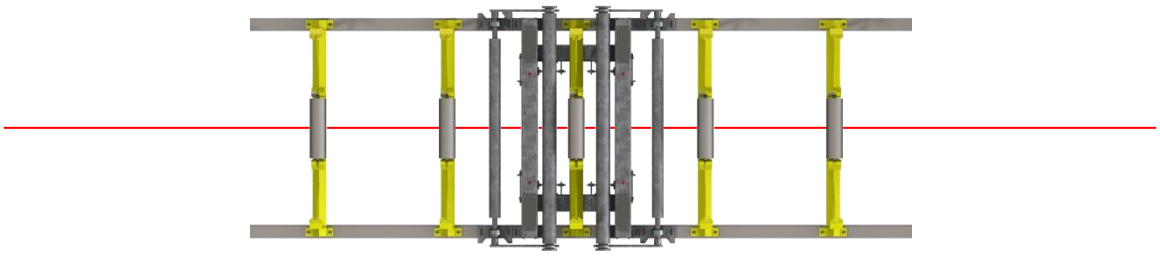
Calibration Weights Installed onto the Calibration Weight Bearings

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.



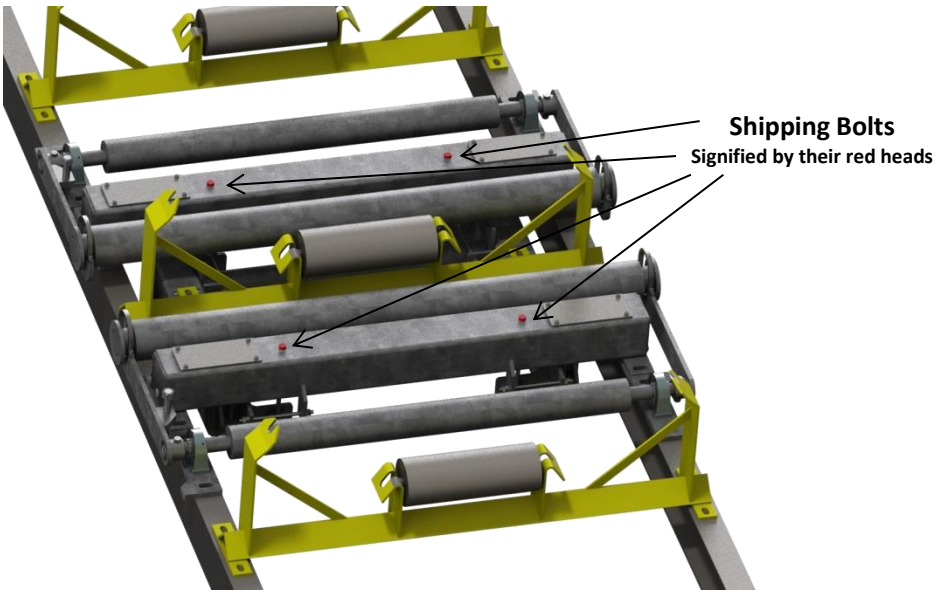
Weigh Quality Idler Frames Installed with Centre Rolls

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

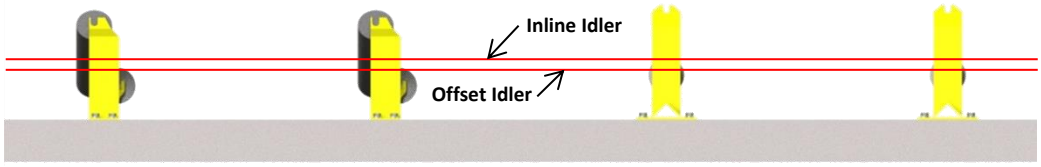


14) Mark out mounting holes on stringers and drill holes to suit the idler mounting feet. Install bolts, washers and nuts and tighten down. Ensure spring washers are used.
15) Re-check idler spacing and centres. Adjust if necessary.
16) Run a further two stringlines (30 lb fishing line) from the same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

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.

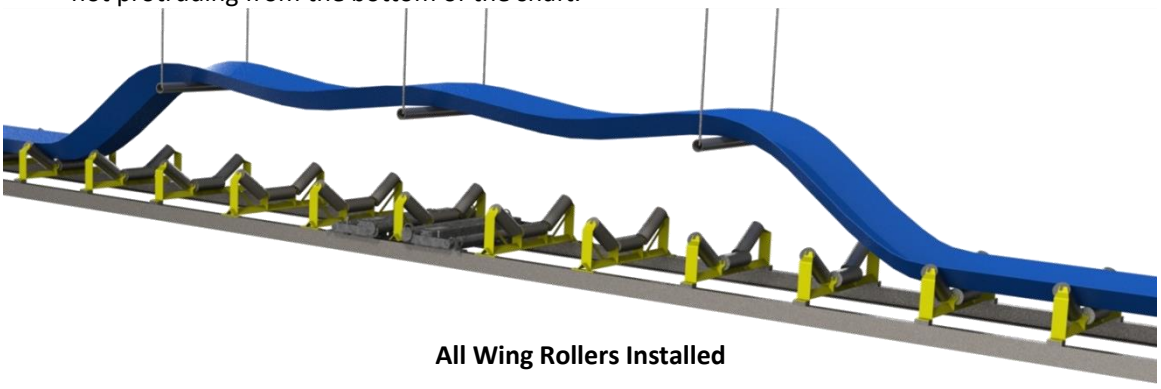


Offset Idlers vs Inline Idlers

Offset Idlers with Packer Plates vs Inline Idler

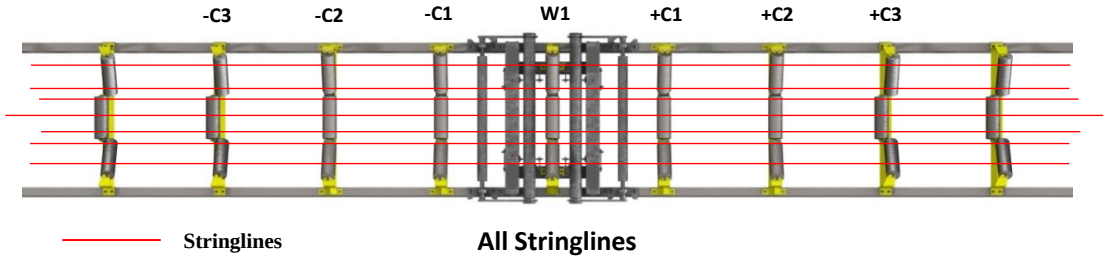
21) The two reference stringlines should be clear of the centre rolls in the other idler frames (+C1, W1 & -C1). If not, adjust the grub screws on +C2 and -C2 idlers by equal amounts until both stringlines are clear of all centre rolls. When this has been completed, ensure locknuts are tightened. Permissible 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.

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

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.

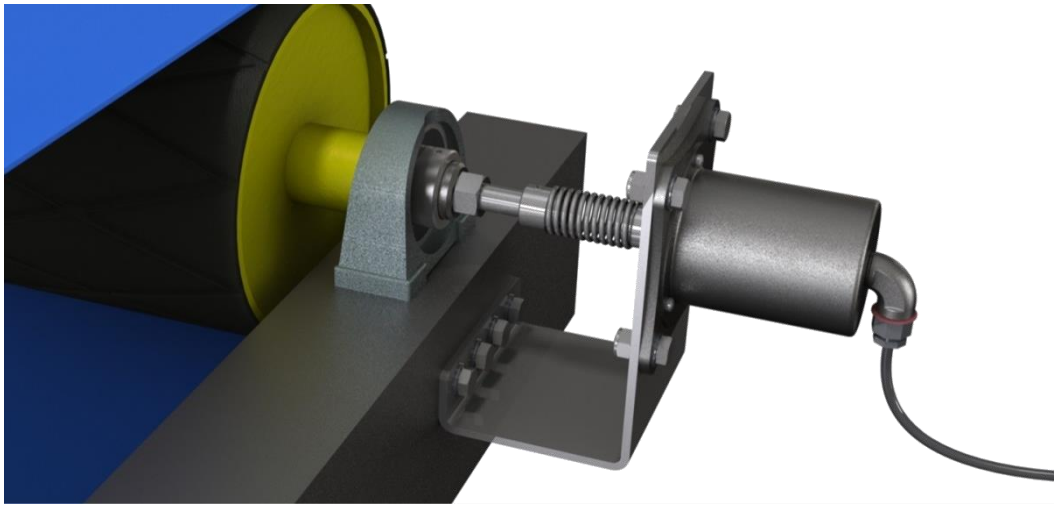
If using the spring coupling method (most common), the spring coupling alignment must be within 1 mm in all axes. If the coupling is not correctly aligned, it will eventually break. Provision must be made so that if the pulley position is changed, the encoder bracket can also be moved to maintain accurate alignment. See drawing "WTMW6" 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 "JB010015" (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

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.

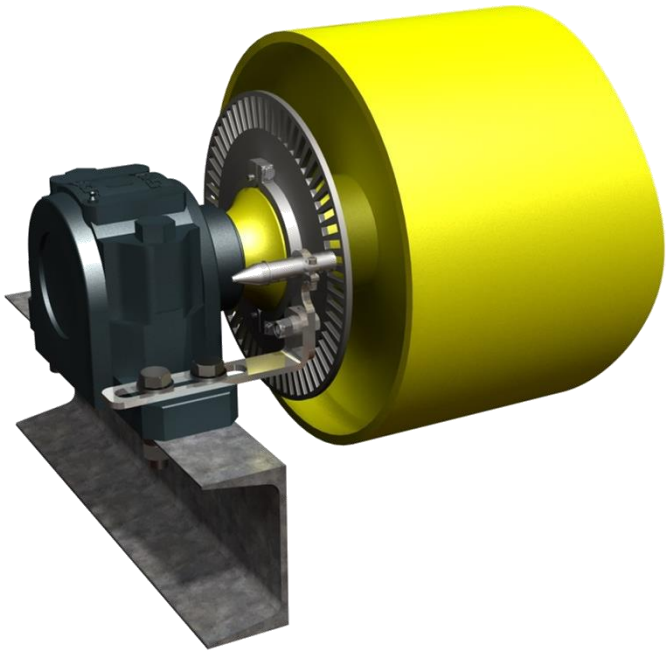
Electrical Installation

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

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

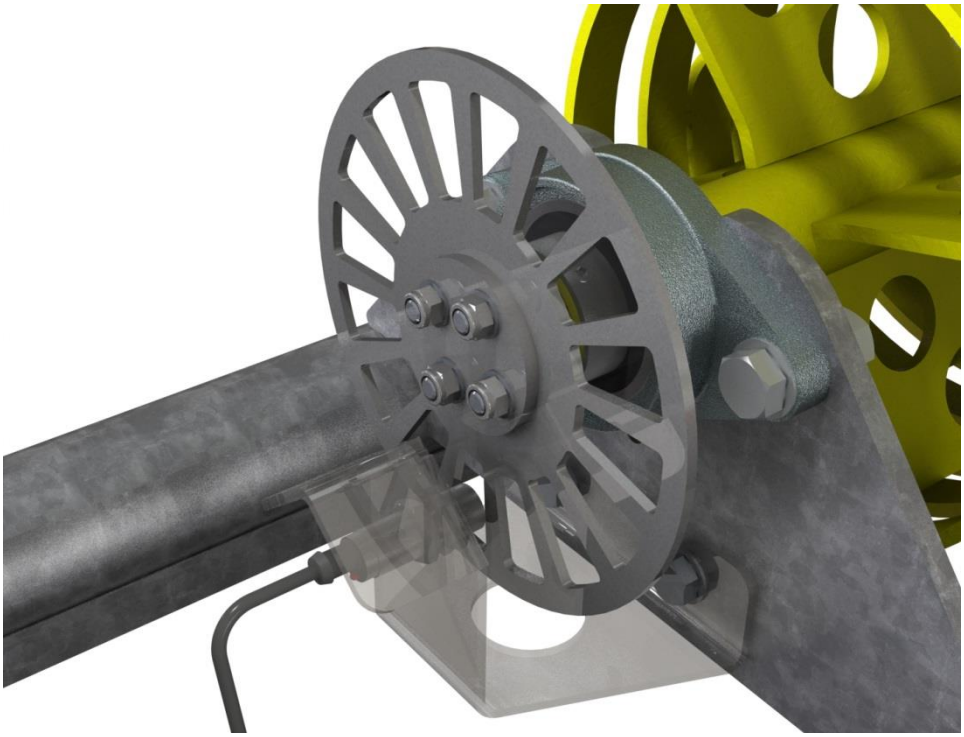
The proximity switch is provided with a three (3) core cable approximately two (2) metres long. Therefore the belt speed sensor junction box must be installed within its reach. The cable should be mechanically protected.

Refer to drawing "WTMW6-01-13" for termination details.

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

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 "Novus" integrator to mains supply (See "NOVUS03", 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: Masterweigh Novus
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 drawings in Appendix B of this manual.
Speed sensor junction box – Refer to drawings 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.
4) 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 ±3 Hz

AutoWeigh

WEB TECH

Installation and Operation Manual

Web Tech Australia Pty Ltd
PO Box 4006
11 Electronics St
Eight Mile Plains, QLD, 4113
Ph: 1800 777 906
Fax: 61 7 3841 0005
E-mail: info@web-tech.com.au

NOVUS INSTALLATION AND OPERATION MANUAL

Contents

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Revisions

20/12/16	Revision A	Original Issue by A. Chen Edit: B.Robinson

NOVUS – INSTALLATION AND OPERATION MANUAL

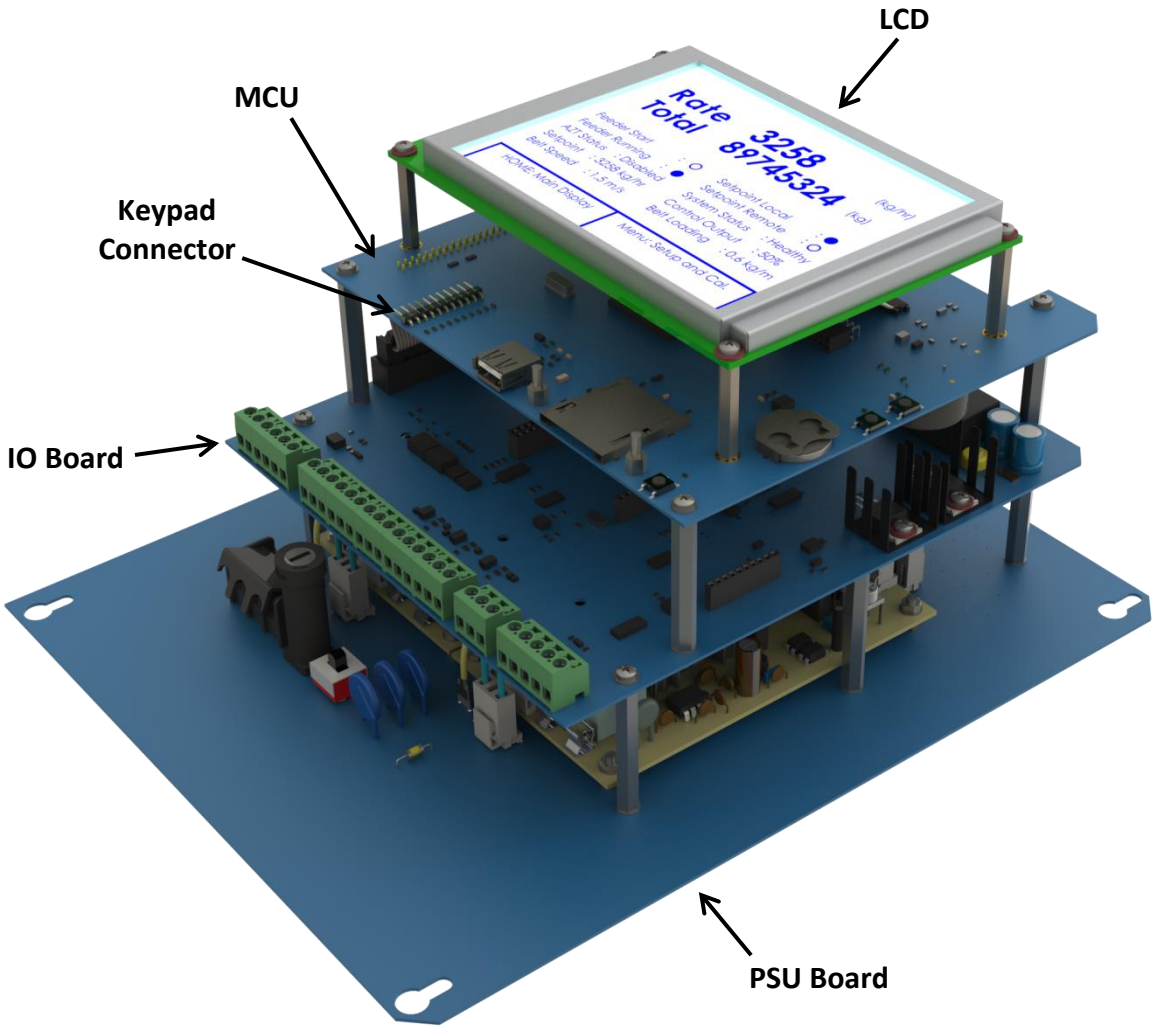
Introduction

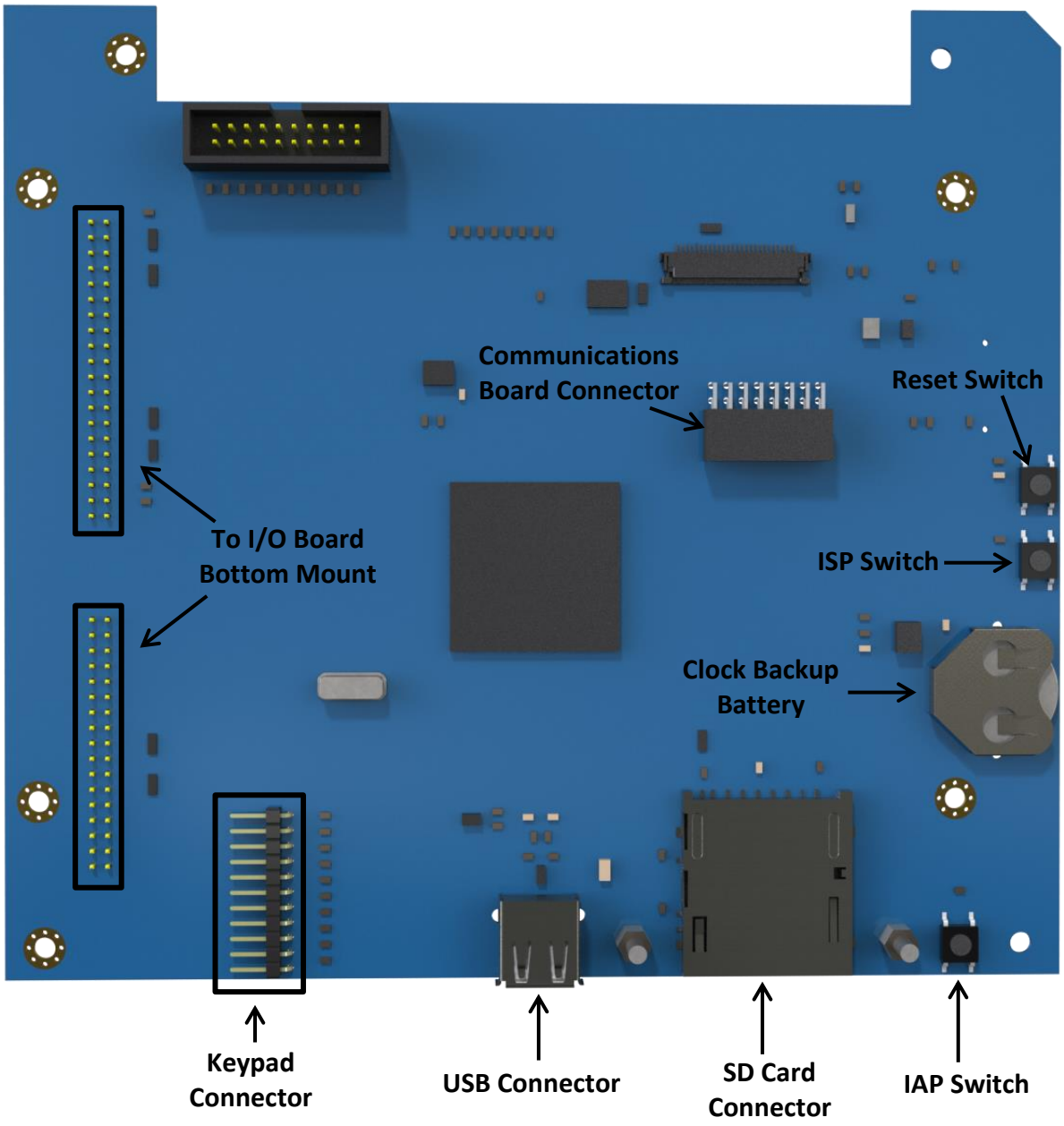
The Masterweigh Novus is a micro-controller based integrator to monitor beltscales or control weighfeeders. By design it can be used in "stand alone" mode or as a slave to a PLC and other industrial supervisory system. It is capable of maintaining and displaying the mass rate and the accumulated mass total on the graphical LCD. Communication between the plant controller and the Masterweigh Novus is done via Profibus, DeviceNet, Ethernet/IP, Modbus-TCP and analogue and digital inputs and outputs. The Masterweigh Novus uses a USB slot for firmware upgrades and a SD card to extract data from the unit.

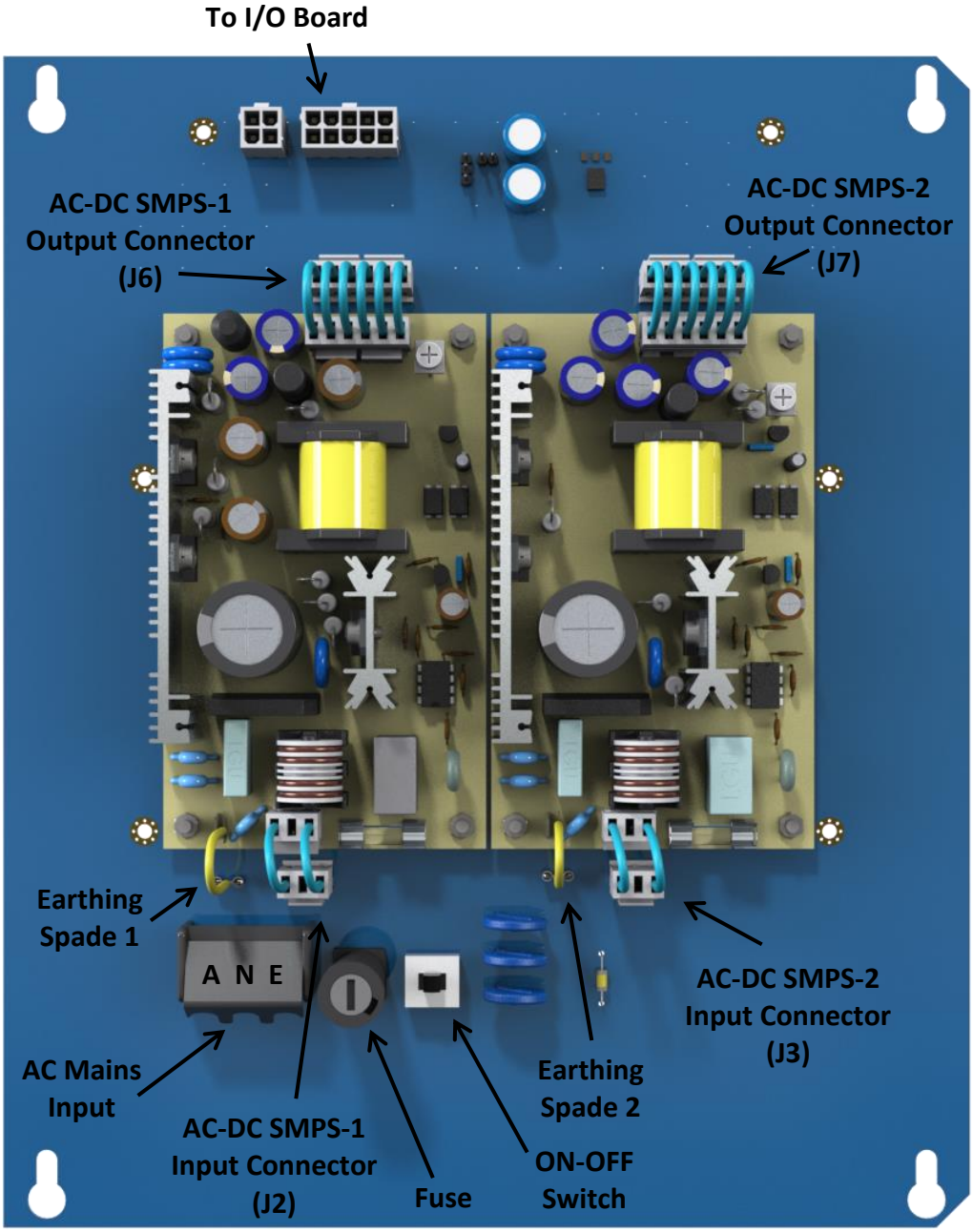
Introduction – Stack

The device consists of 3 boards.

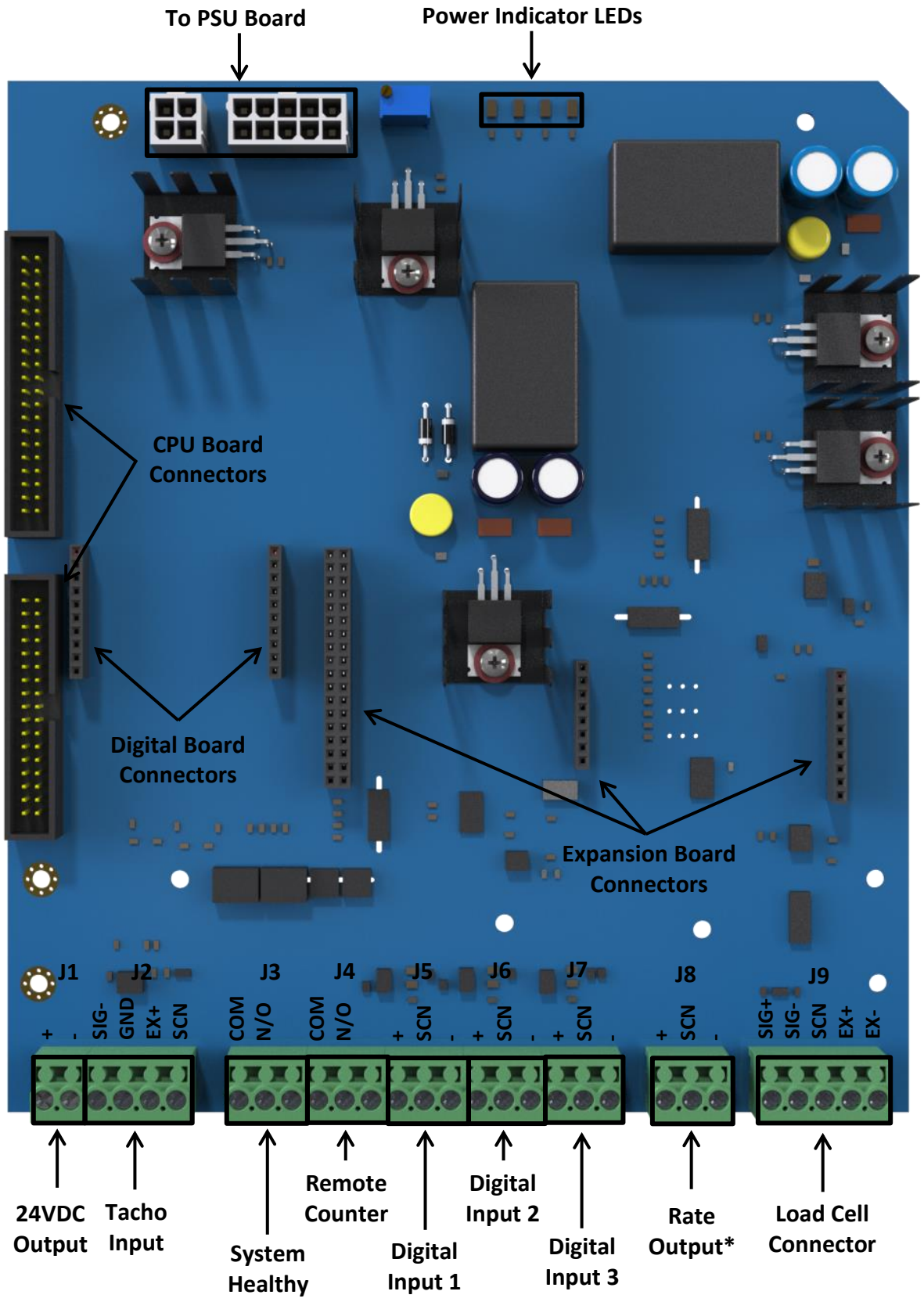
- Microcontroller (MCU) board.
- Power Supply (PSU) board.
- Intermediate (I/O) board.




Communications
Board Connector
Reset Switch
To I/O Board
Bottom Mount
ISP Switch
Clock Backup
Battery
Keypad
Connector
USB Connector
SD Card
Connector
IAP Switch



Connector	Connector Marking	Function
AC Mains Input	A	Active
	N	Neutral
	E	Earth


To PSU Board
Power Indicator LEDs
CPU Board Connectors
Digital Board Connectors
Expansion Board Connectors
J1
J2
J3
J4
J5
J6
J7
J8
J9
+ - SIG- GND EX+ SCN
COM N/O
COM N/O
+ SCN -
+ SCN -
+ SCN -
+ SCN -
SIG+ SIG- SCN EX+ EX-
24VDC Output
Tacho Input
System Healthy
Remote Counter
Digital Input 1
Digital Input 2
Digital Input 3
Rate Output*
Load Cell Connector

Connector	Connector Marking	Function
24VDC Output (J1)	+	+24VDC
	–	Ground
Tacho Input (J2)	SIG-	Speed Sensor (Tacho) Signal
	GND	Ground
	EX+	(Tacho) Excitation voltage +5~10V
	SCN	Shield
System Healthy (J3)	COM	Common
	N/O	Normally Open
Remote Counter (J4)	COM	Common
	N/O	Normally Open
Digital Input - 1 (J5)	+	Digital Input 1 +
	SCN	Shield
	–	Digital Input 1 –
Digital Input - 2 (J6)	+	Digital Input 2 +
	SCN	Shield
	–	Digital Input 2 –
Digital Input - 3 (J7)	+	Digital Input 3 +
	SCN	Shield
	–	Digital Input 3 –
Rate Output* (J8)	+	Rate Output
	SCN	Ground
	–	Rate Return
Load Cell (J9)	SIG+	Load cell Signal +
	SIG–	Load cell Signal –
	SCN	Shield
	EX+	Load cell Excitation +
	EX–	Load cell Excitation –

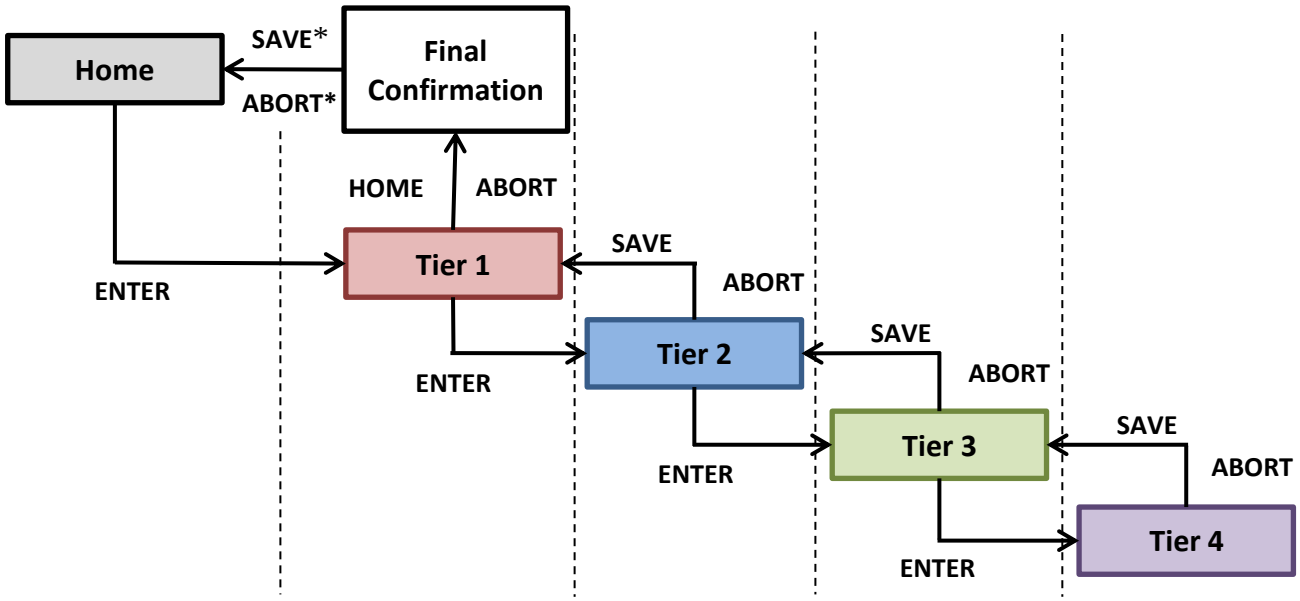
Note:
All current loop outputs are internally powered by Masterweigh Novus

User Interface

The Masterweigh Novus user interface utilizes a tier folder type structure to manoeuver through each section. There is a main screen (HOME) which will display the essential information for the user such as mass rate, mass total, setpoint, control output, belt speed and some digital signals. The HOME screen is also the default screen when Masterweigh Novus is initially powered up. The values on the HOME screen can only be viewed, they cannot be changed.

Changing settings or calibration can be done via the tiered menu structure under Setup and Calibration (Setup & Cal). Masterweigh Novus has implemented a 'sketch-pad' like system where changes performed to its settings and configurations will be written to a temporary location and will not be permanent until the user confirms the changes prior to returning to the HOME screen. If the user chooses to discard the changes prior to returning to main screen, then all the new changes will be lost and the unit will perform exactly as before.

The menu structure is designed using a tier sub-menu structure which also utilizes the 'sketch-pad' system. There are instances where there will be a sub-menu within a menu; if the user does not save the changes within the sub-menu and all subsequent higher tiered menus then the changes will be discarded.



SAVE: Exit via SAVE will store all changes to variables form the current and lower tiers into a temporary location. Any references to lower tier's variables with in the current tier will be to the changed values.

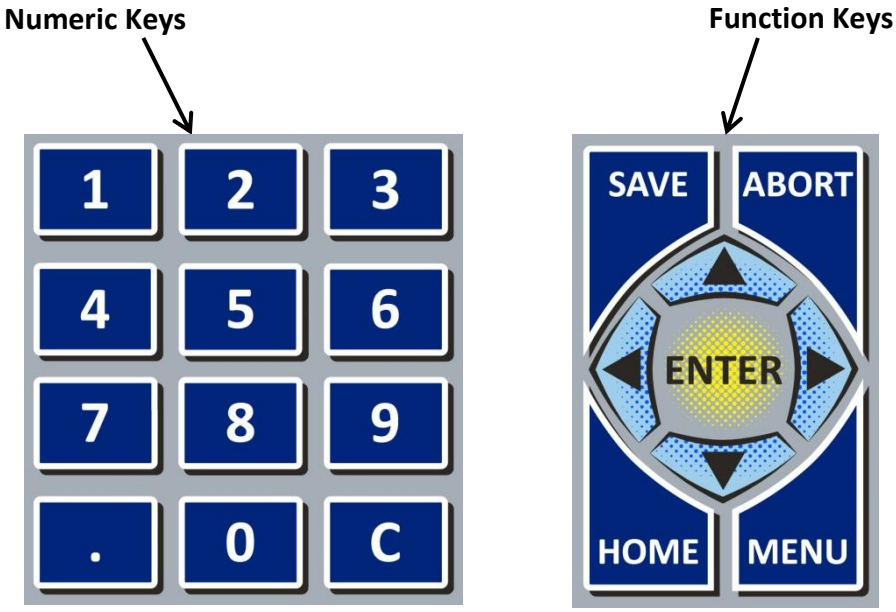
SAVE*: If the SAVE key is used to exit the Final Confirmation screen all changes will be saved to permanent memory.

ABORT: Exit via ABORT will discard all changes to variables from the current and lower tiers and revert them to previous values. Any references to lower tier's variables with in the current tier will be reverted to previous values.

ABORT*: If the ABORT key is used to exit the Final Confirmation screen all changes made will be discarded.

Masterweigh Novus Tiered Menu Structure

Changing values in the Masterweigh Novus requires the cursor to be on the variable which requires the change. To initiate the change, the user will have to press ENTER on the keypad which will remove the cursor; under this mode the user may be required to enter numbers or toggle through the pre-programmed options. Once the desired feature is entered or selected, the user will need to press the ENTER key again to re-engage the cursor. When the cursor is not present, the user will not be able to manoeuver between variables. The user must re-engage the cursor to navigate between two different variables.



Novus Keypad

Function Keys

Arrow Keys:

The arrow keys allow the user to manoeuver the on-screen cursor up and down to the desired function; while on some variables there are pre-programmed parameters which can be toggled using the left and right arrow keys.

Save Key:

The function of the SAVE key varies depending on each screen. These functions are displayed on the bottom row of each screen. Typically the SAVE key is used to SAVE a changed variable and proceed to the next page or return to the main menu.

Abort Key:

Similarly the ABORT key's function differ on each screen, their functions are displayed on the bottom left of each screen. Generally the ABORT key is used to discard a changed variable and return to the previous page or the main menu. The ABORT key will also allow the user to return to the HOME screen from any of the Setup & Calibration pages.

ENTER Key:

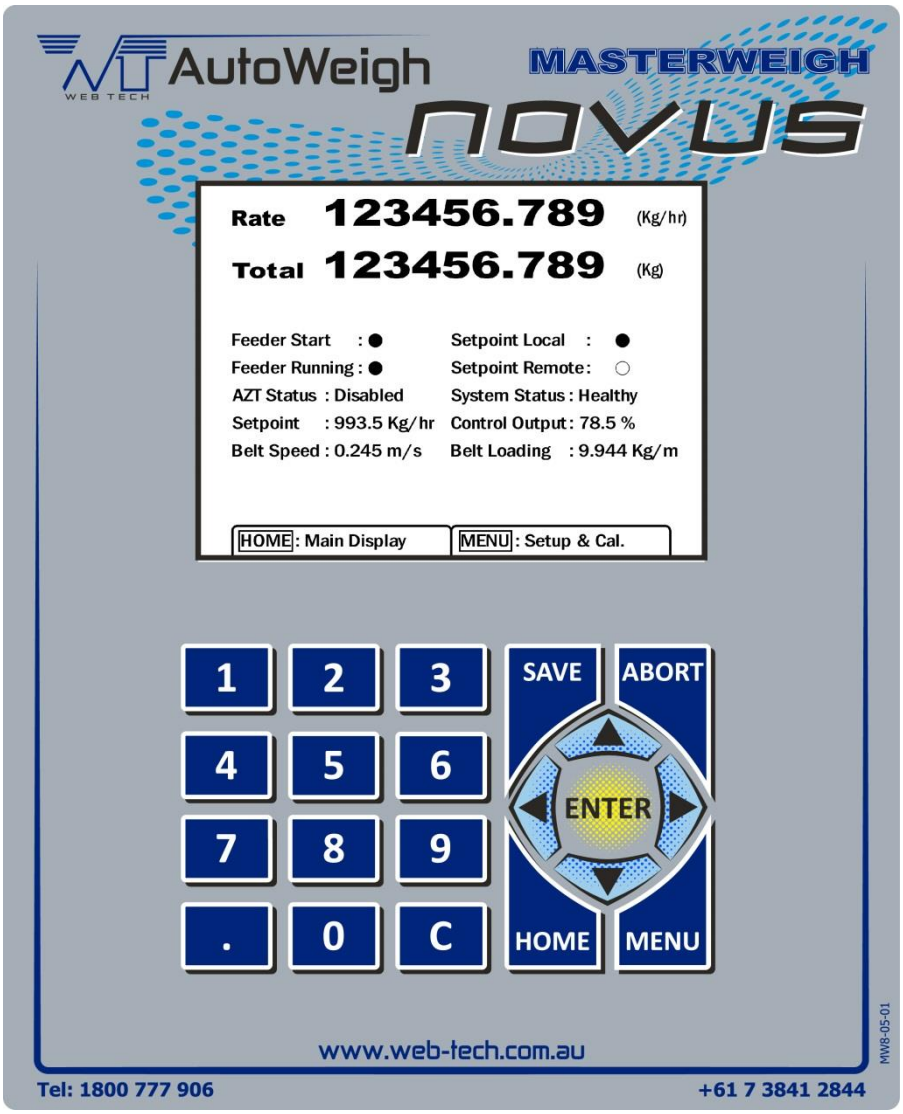
The ENTER key has several functions. As per the other keys, the ENTER key's function will be displayed at the bottom of the screen. Its main function is to select options or variables. Depending on the selected option of variable, the ENTER key will either enter the menu or engage an editable mode where the user can change the variable by using the numerical keypad or left and right arrow keys. The ENTER key can also be used to start and stop calibrations under specific menus.

Home & Menu Keys:

The HOME and MENU keys have more specific functions.

- The MENU key will be used on the HOME screen to access the menu structure, Setup and Calibration.
- Similarly when the user is in the menu structure, using the HOME key will return to the HOME screen. When the user is in any menu or sub-menu and requires to quickly return to the HOME screen, using the HOME key will discard any current process and try to return to HOME screen. If any other changes have been performed, a confirmation screen will prompt the user prior to returning to HOME screen.

Keypad

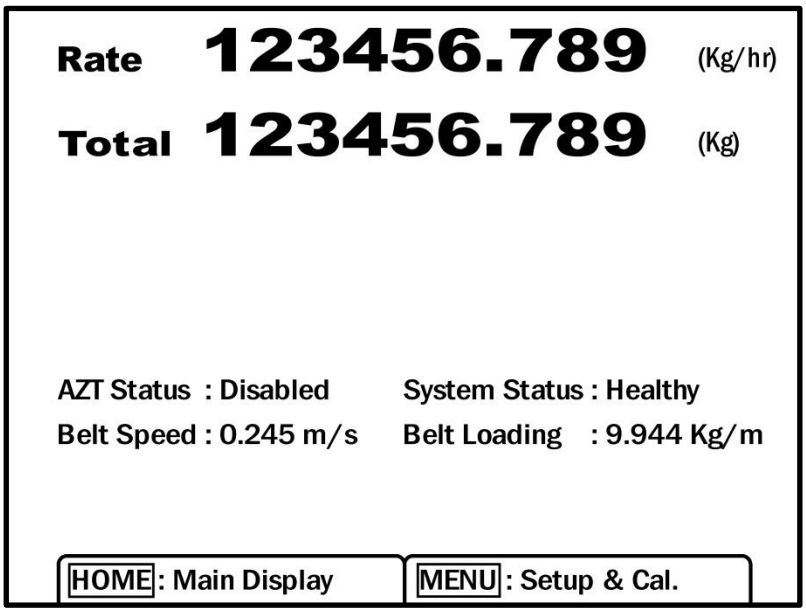


Novus Overlay – Keypad & Screen

KEY/S	FUNCTION
Numerical Keys (0-9)	• Entering numerical values • Selecting Options
Decimal Point (.)	• Entering numerical values
Clear (C)	• Clearing entered data • Reset mass total
Arrow Keys ▲ ▼ ◄ ►	• Moving the cursor (highlighted line) • Toggle through pre-programmed options/values
SAVE	• Confirmed and save any entered/changed data and return to previous screen
ABORT	• Discard any entered/changed data and return to previous screen
HOME	• Return to the HOME screen
MENU	• Access the Setup @ Cal page (menu page)
ENTER	• Start and stop calibrations

Home Screen (MRMT)

On successful start-up, the following screen will be displayed on the LCD. This is the HOME screen of the Masterweigh Novus. Under normal operating conditions, the HOME screen will be the default screen. Any changes performed in the menu structure will not be permanently implemented until the user has confirmed the change and returned to the HOME screen.



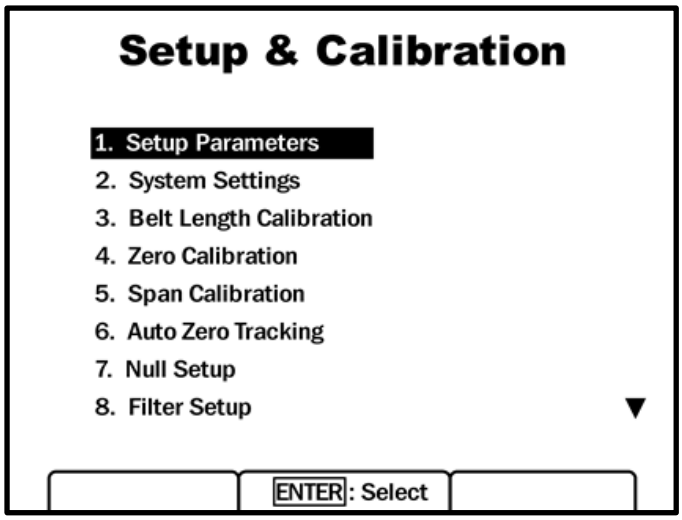
Beltscale Home Screen

On the HOME screen, the Masterweigh Novus displays real time updates of the unit's current status. These updates include:

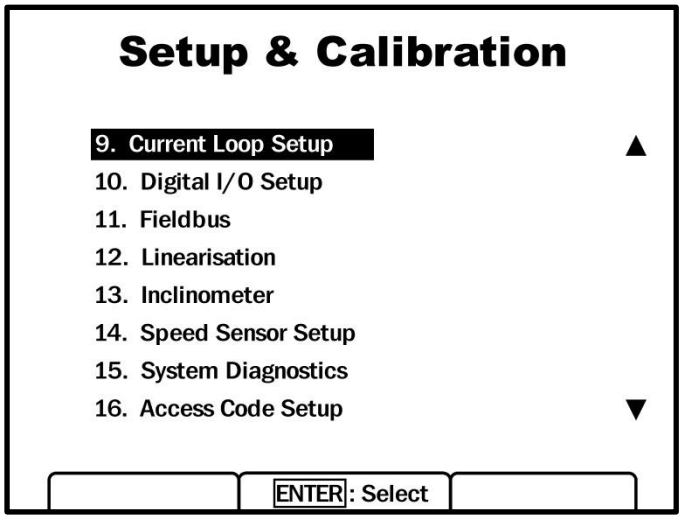
- Mass Rate
- Mass Total
- Auto Zero Tracking (AZT) Status
- System Healthy
- Belt Speed
- Belt Loading

These variables will automatically update in real-time to show the status and output of the feeder. At the bottom of the screen, it also shows the functions of the HOME and MENU keys. From the HOME screen, the MENU key will allow the user to enter the main menu, Setup & Calibration.

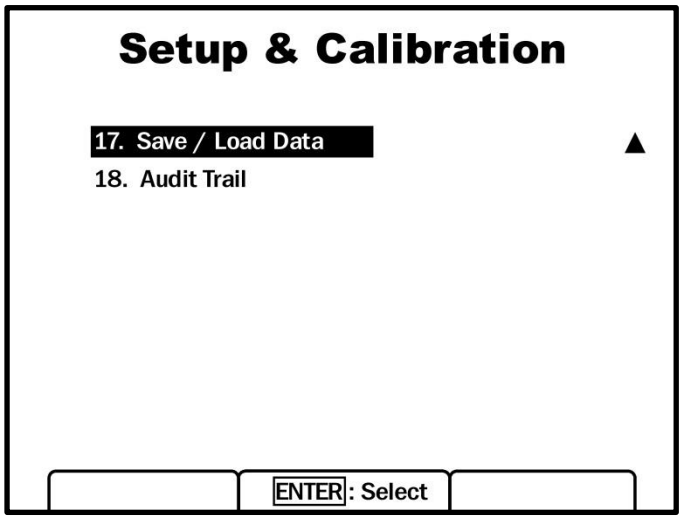
Setup & Calibration (Main Menu)



Setup & Calibration Page 1



Setup & Calibration Page 2



Setup & Calibration Page 3

The main menu, Setup & Calibration, can be accessed via the MENU key from the HOME screen. Setup & Calibration consists of 18 menus over 3 pages. Page 1 consists of the essential calibration menus which are necessary for the unit to operate correctly. Page 2 consists of communication options and diagnostics. Finally page 3 has additional functions which allow the user to interrogate the unit if any problem arises.

Upon pressing the MENU key, the screen will transition to the following screen, Setup & Calibration page 1.Once the LCD displays this screen above, the user may navigate through each menu using the UP and DOWN keys on the keypad. The cursor (highlighted line) will move up or down with each press of the keys. To change between the pages, the cursor must be on either the first or last line of each page. Depending on the direction of the keys entered, the page will change accordingly.

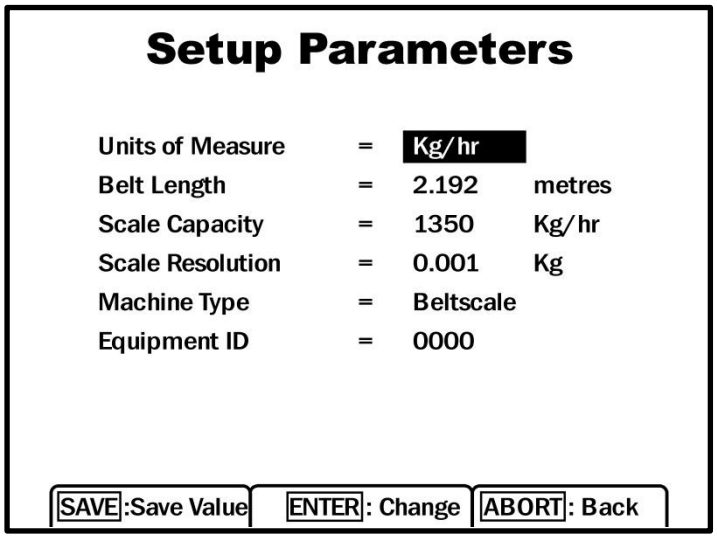
To enter a specific menu, the user must navigate the cursor to the desired option then press ENTER. The screen will then enter each respective menu that the user has chosen. To return to the previous page, HOME screen, the user can either press the HOME or ABORT key on the keypad. Every time when the user enters Setup and Calibration from the HOME screen, the unit copies over current settings to a temporary location as a 'sketch pad' scenario. When new changes are made, they take immediate effect; however these changes are not permanent and will be lost unless the user makes a final confirmation. To make final a confirmation on the changes, the user must return to the HOME screen. The Masterweigh Novus will automatically detect whether any changes have been made and will prompt the user with a confirmation warning.

If the confirmation warning screen does not appear prior to returning to the HOME screen, it means no changes have been performed or the change that was performed was the same as previously.

IMPORTANT:
If there was loss of power prior final confirmation, all changes in the current session will be lost.

1 – Setup Parameters

The Setup Parameters menu can be accessed via Setup & Calibration using the cursor. Alternatively in the Setup & Calibration page, if the user presses number 1 on the numerical keypad, it will access this menu automatically.



Novus Menu 1 – Setup Parameters

There are 5 programmable variables as shown above. To change the variables, navigate the cursor to the desired location and then press ENTER on the keypad. The cursor will disappear and engage an editable field where the user can enter numerical values or toggle through pre-programmed options. Press ENTER again to re-enable the cursor and navigate to the next location. Once changes have been performed, the user can temporarily save the changes on a 'sketch pad' by pressing the SAVE key. Alternatively if the user wishes to discard all the changes performed, pressing the ABORT key; this will discard all changes, revert the changes to previous values and return the screen to the Setup & Calibration page.

1.1 – Units of Measure

The Units of Measure variable allows the operator to select the engineering units to be used on the Masterweigh Novus. These engineering units will be used as the base unit throughout the entire Masterweigh Novus system*. The selectable units are pre-programmed and can be toggled through using the LEFT or RIGHT keys on the keypad:

Tonnes/hour	**Tonnes/hr (t/hr)**
Kilograms/hour	**kg/hr**
Kilograms/minute	**kg/min**
Tons/hour	**T/hr**
Pounds/hour	**lb/hr**
Pounds/minute	**lb/hr**

*Exceptions are the values within the chute control menu and belt loading

1.2 – Belt Length

The Belt Length variable sets a parameter for the Masterweigh Novus to calculate the belt speed and belt loading of the beltscale. The Belt Length variable should always be entered in either metres or feet (depending on the selected units of measure). To set the Belt Length, the user must navigate the cursor to the Belt Length location and then press ENTER to engage editable field. Use the numerical keypad to enter the length of belt in metres or feet and then press ENTER again to re-enable the cursor. Press SAVE to save the changes or proceed to the next variable.

1.3 – Scale Capacity

The Scale Capacity variable determines the maximum limit for the Rate output on 4-20mA current loop. This information is used to perform scaling calculations for when a 4-20mA rate current loop is used.

1.4 – Scale Resolution

The Scale Resolution can be changed to adjust the precision on the HOME screen. The resolution can be selected among several pre-programmed options listed below:

Scale Resolution	HOME Screen
100	1100
10	1110
1	1111
0.1	1111.1
0.01	1111.11
0.001	1111.111

Depending on the situation, the user will need to choose the appropriate scale resolution for their application.

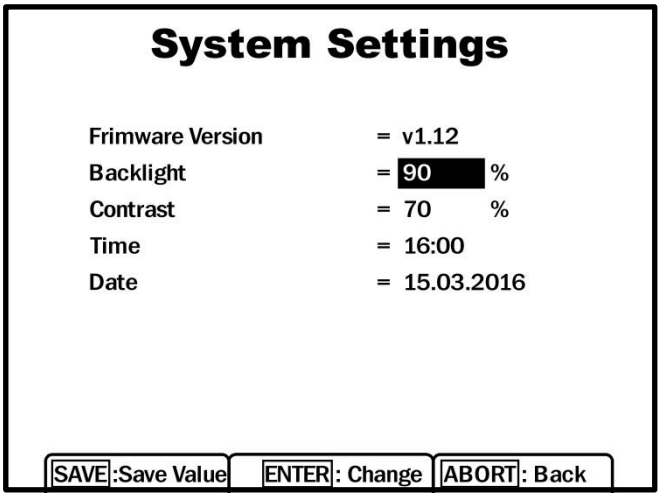
IMPORTANT:
It is important to note that Masterweigh Novus will automatically round the accumulated mass total to the selected scale resolution when it is changed during operation. Typically Scale Resolution should not be changed during an operation.

1.5 – Machine type

This field is not editable by the user. It is an indication in the mode of operation of Masterweigh Novus, beltscale should be shown. The normal cursor navigation will skip this line as it is not editable.

1.6 – Equipment ID

The Equipment ID variable has no functional purpose. Numerical values can be programmed by the user to distinguish a particular identification of the Masterweigh Novus for the user.



System Settings

The System Settings menu can be accessed by navigating the cursor to "2. System Settings" on the System Calibration page; alternatively the user can press 2 on the numerical keypad. System Settings have 4 adjustable settings, 2 of which control the screen while the other 2 control the on-board real time clock. The real time clock is used to maintain a clock which is used for Audit Trail.

All changes performed in this page will be stored in a temporary memory. To achieve permanent change, the user must return to the HOME screen via the Setup & Calibration page, where Masterweigh Novus will detect the change and prompt the user for final confirmation on the changes.

2.1 – Firmware Version

The Firmware Version is not an editable by the user. It is a default value assigned to each firmware update. It will be useful under diagnostic or fault finding conditions.

2.2 – Backlight

The Backlight variable controls the brightness of the LED backlight for the LCD screen. This can be changed between pre-programmed values ranging from 0% to 100% in the increments of 10%.

To change the brightness of the Backlight, the user must navigate the cursor to the backlight variable then press ENTER. This will engage an editable mode where the user is to use the LEFT and RIGHT keys on the keypad to toggle through the pre-programmed percentages. When the desired brightness is achieved, press ENTER again to re-engage the cursor and navigate to the next variable. The pre-set options are as follows

Backlight (Contrast)	0%
	10%
	20%
	30%
	40%
	50%
	60%
	70%
	80%
	90%
	100%

IMPORTANT:
The brighter the display, the more heat must be dissipated in the cabinet.

2.3 – Contrast

Similar to the backlight variable, the Contrast variable can be adjusted among pre-programmed options ranging from 0% to 100% with 10% increments.

2.4 – Time

The Time variable will be stored in the on-board real time clock so when the unit runs out of power, the clock will continue to function until the battery is depleted. It is used for logging actions performed on the machine in the Audit Trail menu.

To enter the time variable, it must be in 24hour format without the semi-colon. Masterweigh Novus will automatically insert the semi-colon once the cursor is re-engaged.

IMPORTANT:
It is important to add the zero in front of the hours which are in single digits.

2.5 – Date

The Date will be stored in conjunction with the time on the on-board real time clock. It is backed up by the same battery, thus it will continue to function until the battery is depleted. It is used for logging actions performed on the machine in the Audit Trail menu. The calendar in Masterweigh Novus is perpetual, it knows the days per month and leap years.

To enter the date variable, the cursor must be on the corresponding line before pressing and press ENTER to engage change parameter mode. To enter the date it must be in the DDMMYY format. When the correct date is inserted, press ENTER again to re-engage the cursor. Masterweigh Novus will automatically insert the dots between day, month and year.

IMPORTANT:
It is important that if it is a single digit day or month a zero must be put in place as a place holder.

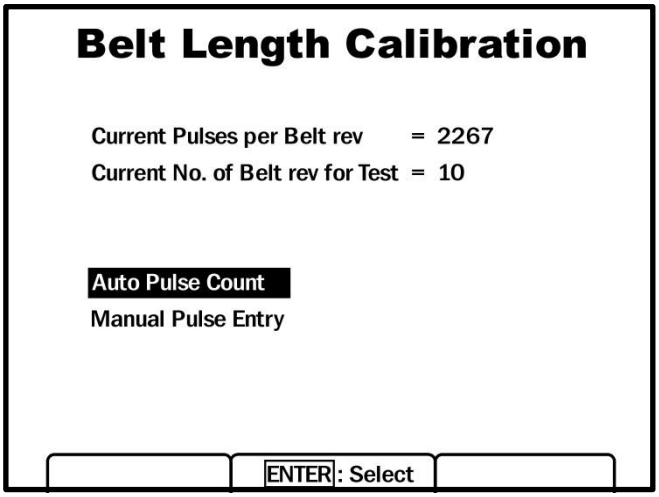
3 – Belt Length Calibration

The Belt Length Calibration menu can be accessed by navigating the cursor to “3. Belt Length Calibration” on the Setup & Calibration page; alternatively the user can press 3 on the numerical keypad. The Belt length calibration is the beginning of a 4 step process for a beltscale calibration.

The following describes how to synchonise the belt length in Masterweigh Novus with respect to the tachometer pulses. The Masterweigh Novus will use the accumulated number of tachometer pulses captured during this calibration to base all future Zero and Span calibrations. Pulse capture from the tachometer is automatic; however the user must start and stop the test manually. The user must start and stop the test at the exact same location on the belt, and they must keep track of the number of complete belt revolutions the belt has accomplished during the calibration. The recommened minimum calibration time is 5 minutes (300 seconds) and the calibration must be performed over a complete number of belt revolutions.

Pre-calibration work must be performed on the beltscale prior to starting the belt length calibration. With the belt stopped, the user will need to place a distinctive mark on the belt that can be easily seen as it runs at maximum speed. The mark ideally should be made using white spray paint; the painted line should be placed on the belt carry side (non-carry side) and the belt edge. For calibration purposes, it is advised that the variable speed drive (VSD) is set to the maximum speed designed for the beltscale.

Upon entering the Belt Length Calibration menu, Masterweigh Novus will display the calculated tachometer pulses per belt revolution and the number of belt revolutions per calibration procedure. The user can choose between two options, Auto Pulse Count or Manual Pulse Entry. At the bottom of the page, the functions of the SAVE, ENTER and ABORT keys are indicated accordingly. If any of the keys are not displayed, it means no functions have been assigned to that specific key and pressing it will perform no function.



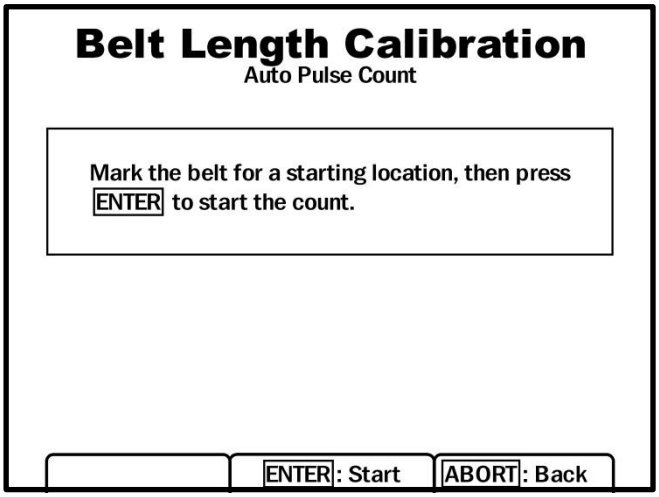
Belt Length Calibration Page 1

Auto Pulse Count allows Masterweigh Novus to automatically count the pulses when the user starts and stops the calibration with respect to the specific marks on the belt. However the unit will not count the complete belt revolutions that have completed over the calibration period, thus the user must keep note of this and be enter it at the end of the calibration.

Manual Pulse Entry allows the user to enter the pulses and number of revolutions via the numerical keypad. Typically these values can only be attained if an Auto Pulse Count has been performed previously before on the same beltscale; otherwise it is recommended that an Auto Pulse Count calibration should be performed.

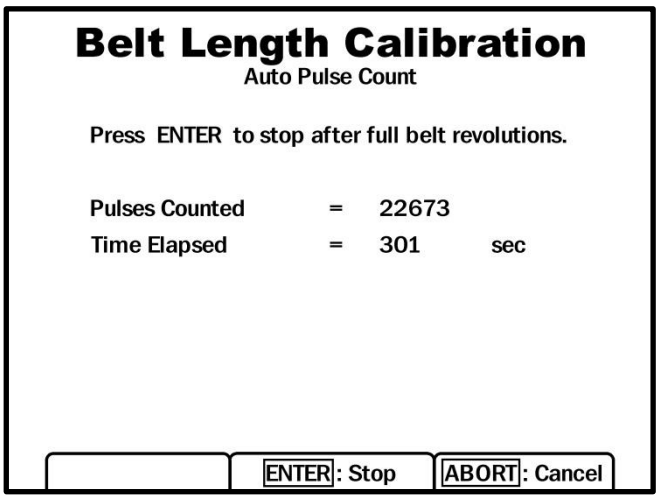
3.1 – Auto Pulse Count Calibration

If the user has chosen the Auto Pulse Count option in from Belt Length Calibration page 1, Masterweigh Novus will access the Auto Pulse Count screen and sequence of the program; this is shown by the sub-heading under Belt Length Calibration – Auto Pulse Count. The display will change to the following screen:



Belt Length Calibration Page 1

Masterweigh Novus will stay on this page until the calibration process is started by pressing the ENTER key on the keypad. To start the calibration process, the user needs to find a fixed referencing point on the beltscale with respect to the mark on the belt. The user will then need to start the calibration in cohesion to when the mark on the belt passes the referencing point on the Weighframe.
When the calibration has begun, the display will automatically change to the following screen:

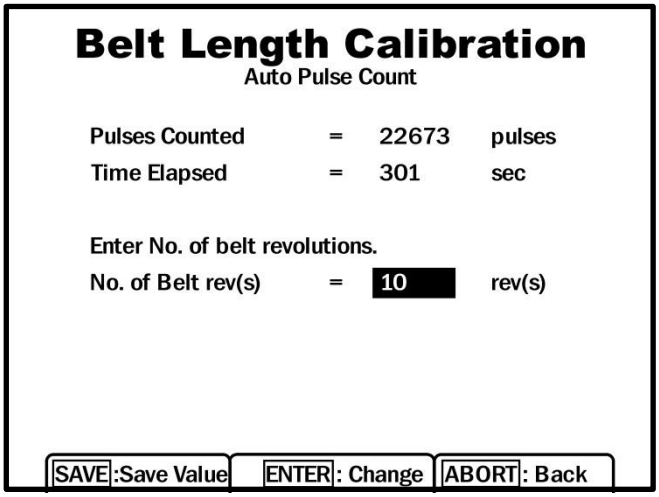


Belt Length Calibration Page 2

This screen shows the accumulated number of pulses from the tachometer and the amount of time elapsed since the start of the calibration process. The calibration period requires a recommended minimum of 5 minutes to the nearest complete belt revolution. After 5 minutes (300 sec) the calibration must be stopped, by pressing the enter key in cohesion to when the mark on the belt passes the reference point.

Note: If a single belt revolutions takes more than 4 minutes (at maximum speed), this test can be performed over one revolution.

Upon stopping the calibration, by pressing the ENTER key again, the Masterweigh Novus will prompt the user to enter the number of belt revolutions that were completed over the calibration period. This is shown in the following screen.

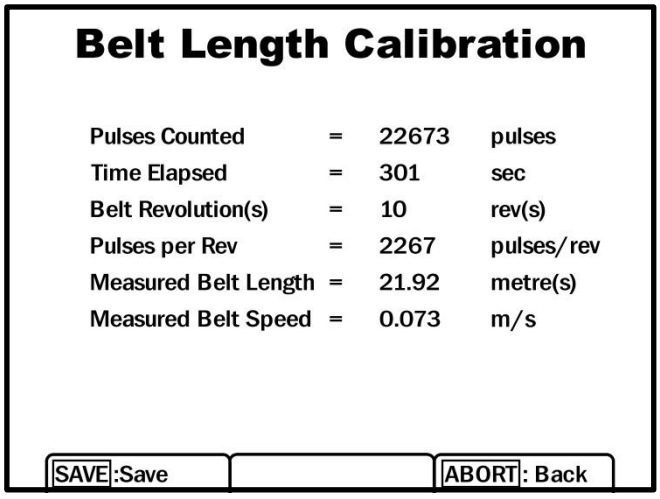


Belt Length Calibration Page 3

Once the number of belt revolution has been entered into the system, press SAVE to proceed to the summary page. Otherwise pressing ABORT on the keypad will return to the start of the Auto Pulse Count calibration without changing any data.

IMPORTANT:
It is important to note that if the user presses ABORT in Auto Pulse Count page 3, Masterweigh Novus will return to Auto Pulse Count page 1 instead. This means that all the accumulated pulse counted and time elapsed will be discarded and the whole calibration process will need to be restarted.

The Summary page is for display purpose only. This will display the number of pulse counted, belt revolutions and calculate a pulses per revolution value; there are no editable variables in this page. Pulses per Rev, Measured Belt Length and Measured Belt Speed are all calculated values generated by

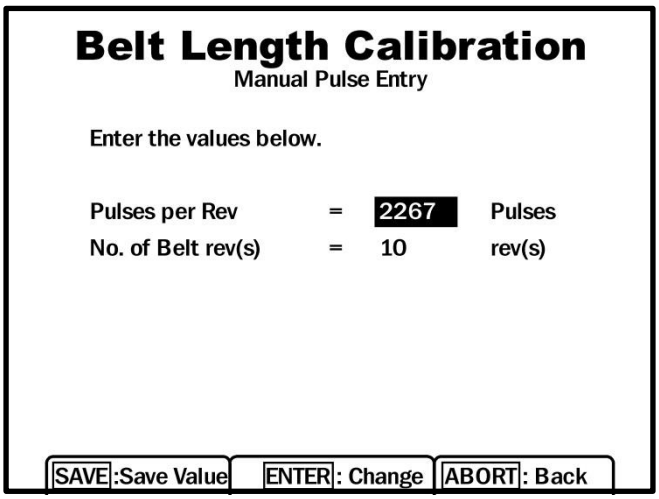


Belt Length Calibration Summary Page

Masterweigh Novus. Measured Belt Length and Speed values may be inaccurate if the correct Belt Length has not previously been entered. To save the calibration and proceed into the next step press SAVE key, this will save the variables into the temporary 'sketch pad' and return the screen to Setup and Calibration. It is recommended to record the variables displayed on the summary page onto the Web Tech Masterweigh Novus Calibration data sheet (see Appendix). It is recommended after returning to Setup & Calibration to return to HOME screen. This will prompt the final confirmation page which causes Masterweigh Novus to permanently store the new data into its system. This calibration routine will not be required again unless the belt length or tachometer is changed.

3.2 – Manual Pulse Entry Calibration

To manually enter pulses for belt length, select "Manual Pulse Entry" from Belt Length Calibration page 1. Masterweigh Novus will subsequently detect the option the user has selected and display the correct page on screen.



Belt Length Calibration Summary Page

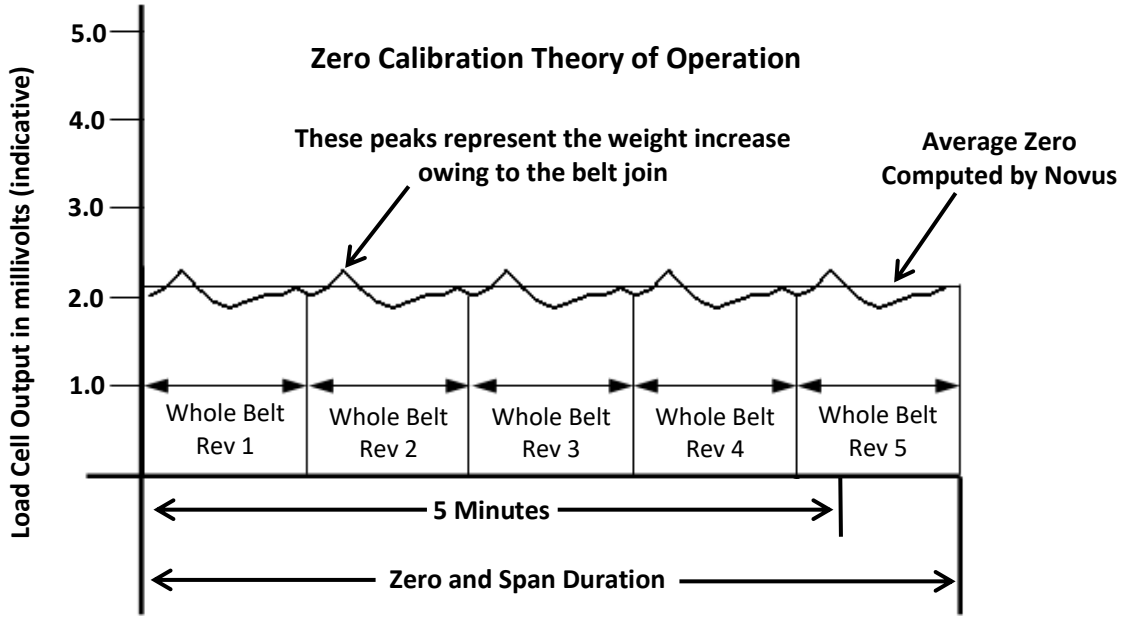
Here the user can manually enter two variables, pulses per revolution and number of complete belt revolutions. Both variables need to be entered before a correct calculation can be done.
To proceed to the summary page, the user will need to press SAVE key. This will save the new variables that have been entered and a summary will be calculated from the entered data.
To save the calibration, the user will need to press SAVE again in the summary page. This will store the newly entered data onto the 'sketch pad' until final confirmation. ABORT in the summary page will return the user to Manual Pulse Entry page. The additional calculated values will be discarded in the process.

NOTE: The pulses to be entered in Manual Pulse Entry should be attained with the same tachometer installed on the conveyor. If there is a change in tachometer, Auto Pulse Count is recommended to retain accuracy.

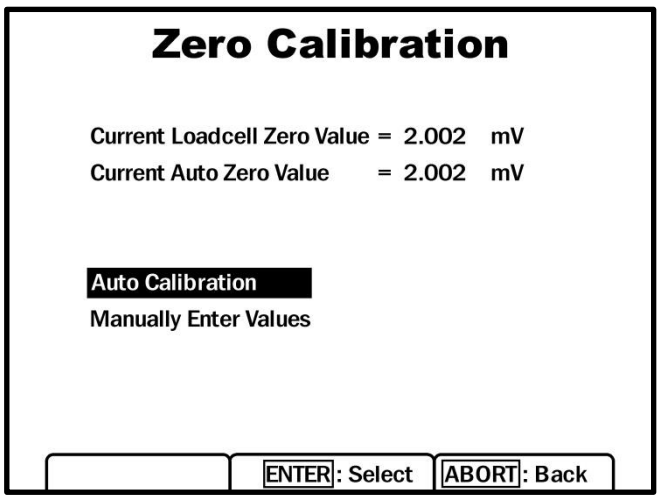
4 – Zero Calibration

The Zero Calibration is part 2 of the 4 stage process of calibrating the Masterweigh Novus to the associated beltscales. If the beltscale has not already been operating, it should be run at normal speed for at least fifteen minutes before commencing any calibrations, to allow the belt to achieve a normal running temperature & elasticity.

The Zero function will average the variation in load cell output caused by varying belt weight and beltscale distortion caused by temperature, build up or damage. The diagram shown below shows the theoretical output of a load cell over five belt revolutions. Note the effect of the belt join (large peaks). When Novus is commanded to perform the zero calibration it will use the number of stored pulses from the menu 2, in the diagram shown this equates to 5 belt revolutions. During the test Novus calculates the average load cell output and uses this value to as a zero point to signify no belt loading.



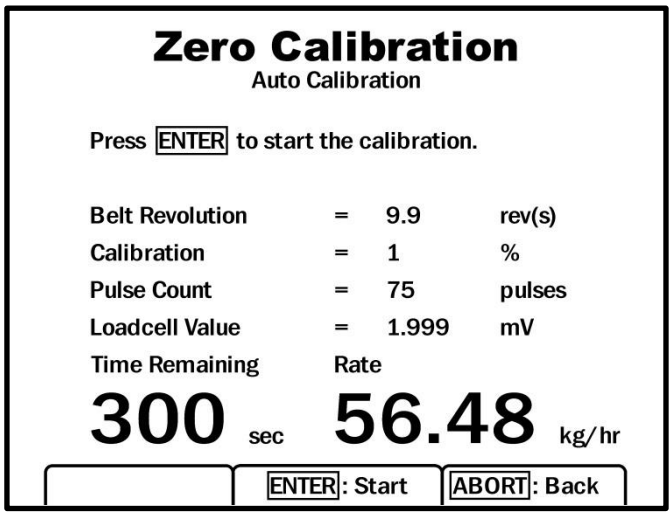
Novus can be zero calibrated using 2 different methods, automatic calibration and manual data entry. To enter the zero calibration sub menu, navigate to “4. Zero Calibrations” or alternatively press 4 on the numeric keypad.



Zero Calibration Page 1

4 – Zero Calibration

4.1 – Automatic Zero Calibration



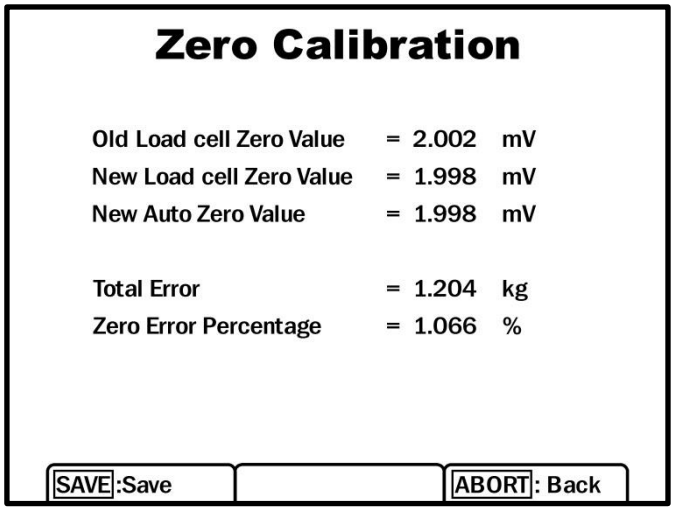
Zero Calibration – Auto Calibration

Automatic Calibration allows the Masterweigh Novus to perform the zero calibration in full automatic mode. Masterweigh Novus will utilize the data attained from Belt Length calibration and zero calibration the machine accordingly.

Once in Automatic Calibration, the user is required to start the calibration by pressing ENTER at any time. This will start the zero calibration process. The values displayed cannot be changed and are updated in real time.

Belt Revolution	This will count down from the number of belt revolutions entered in menu 2
Calibration	This is a value to indicate in percentage the progress of the calibration
Pulse Count	The accumulated number of pulses from the tachometer
Load Cell Value	The real time load cell reading in millivolts
Time Remaining	A calculated estimate in the amount of time before completion.
Rate	A real time rate output of the assumed mass rate during calibration.

To attain the best result, it is recommended that the user start the zero calibration at the same marked and referencing location as the belt length calibration. At any time during the calibration, to cancel the calibration press ABORT. This will discard any data accumulated during the calibration process and return to Zero Calibration page 1. When the zero calibration is completed, Masterweigh Novus will automatically display a summary page of the results attained from the zero calibration.



Zero Calibration Summary Page

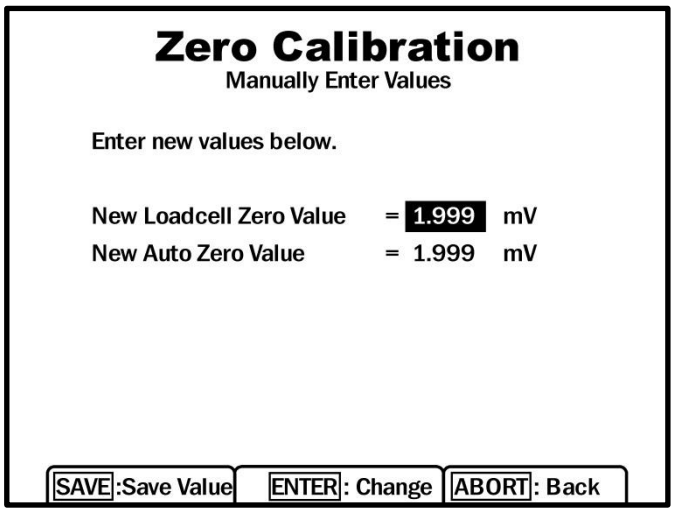
This is a display only page, values in this page cannot be changed. They are calculated from performing the zero calibration. To store the new zero value, press the SAVE key and it will be stored onto the 'sketch pad' until final confirmation. Pressing the ABORT key will discard the newly attained zero value and return to the Automatic Calibration page prior to the calibration process.

It is recommended to record the variables displayed on the summary page onto the Web Tech Masterweigh Novus Calibration data sheet (see Appendix).

IMPORTANT:
When a zero calibration is performed, it will automatically update the Auto Zero Value at the same time. Initially the new Auto Zero Value will be the same as the new Load cell Zero Value, but it may gain a new value if Auto Zero Tracking is enabled.

4.2 – Manual Zero Calibration

The load cell zero value is manually entered by the user through the Manually Enter Values option. To do this select “Manually Enter Values” from Zero Calibration page 1 using the cursor and press ENTER.



Manual Zero Calibration

Here the user can only edit the new load cell zero value variable. Once changed, the same entered value will be copied onto the new auto zero value variable.

To proceed to the summary page, press SAVE. From the summary page, press SAVE again to store the new values onto the temporary ‘sketch pad’. If the user wants to discard the newly entered values, pressing the ABORT key from the Manually Entered Values page and Masterweigh Novus will return to the Zero Calibration page.

5 – Span Calibration

Span Calibration is the third part of the 4 stage calibration process. The span calibration needs to be performed after a zero calibration as it utilizes the zero value as a referencing point. This process produces a span value which maps the load cell output to a known weight.

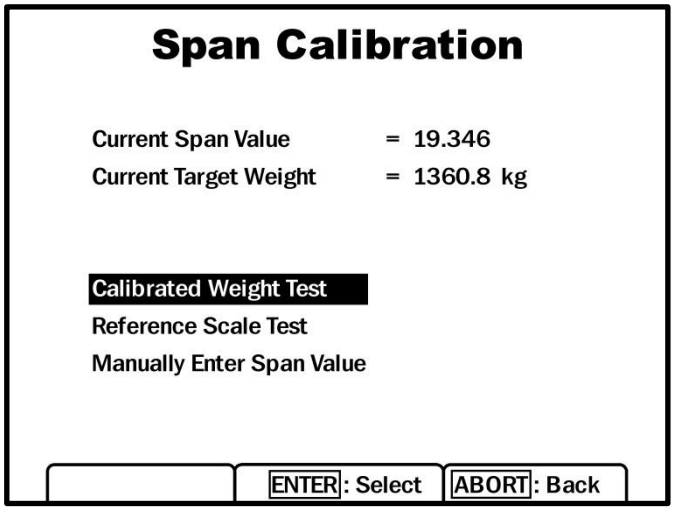
Generally with a Web Tech Autoweigh manufactured beltscale, a set of calibrations bars or insitu weights will be supplied with the beltscale. These calibration weights are designed with a specific weight output to simulate actual product loadings, as per the specifications given by the user.

After zero calibration is complete, the user must install the calibration bars onto the calibration forks or lower the insitu weights onto the beltscale. It is imperative that the calibration bars are evenly distributed among the forks, as uneven distribution will result in inaccurate load cell readings. Stop the belt and evenly distribute the calibration bars between the available forks and restart the belt again.

There are 3 methods of achieving a new span value, Calibrated Weight Test, Reference Scale test and Manually Enter Span Value. Calibrated Weight Test and Reference Scale Test can be achieved through a calibration procedure, while to manually enter span value the user must know the previous span value & relative error to calculate a new span value.

It is recommended that more than 1 span calibration is to be performed at one time. An average of 5 span calibrations will maximize the accuracy of the beltscale. Performing multiple span calibrations will reduce the possibility of erroneous results caused by external factors.

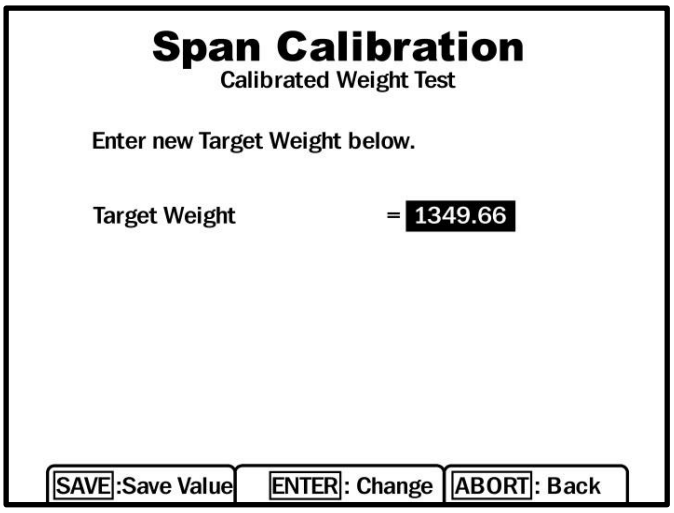
To enter the Span Calibration menu, navigate the cursor on Setup & Calibration page to “5. Span Calibration” and press ENTER; alternatively press 5 on the numerical keypad.



Span Calibration

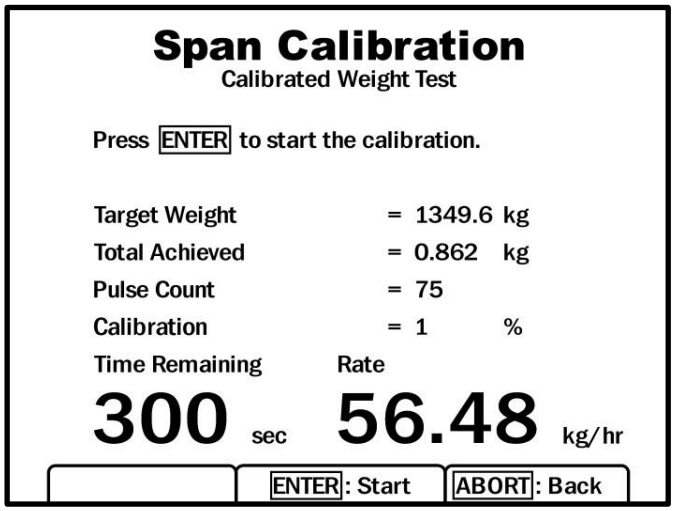
Upon entering the menu, Masterweigh Novus will display the current span value being used by the unit and the Target Weight used for the last Calibrated Weight Test. The Target Weight can be calculated using the Masterweigh Novus Calibration Datasheet (*see Appendix). The user then must choose the method of calibration and press ENTER to proceed.

5.1 – Calibrated Weigh Test



Calibrated Weigh Test Page 1

The Calibrated Weight Test is an automated procedure used in conjunction with the calibration bars (or weights) supplied by Web Tech Autoweigh. The Calibrated Weight Test sub-menu can be accessed by navigating the cursor to the option in Span Calibration page 1 and pressing ENTER. Here the Masterweigh Novus will ask the user for a Target Weight which the user can enter by pressing ENTER to engage an editable field. Using the numerical keys, insert the calculated Target Weight and press ENTER again to re-engage the cursor. To proceed to the next screen, press SAVE, pressing ABORT will return you to the previous page. Masterweigh Novus will now be prepared to proceed with the calibration when the user is ready. To start the process press ENTER and the automated system will calculate the length of calibration and also stop the calibration when completed. During calibration, Masterweigh Novus will calculate the following variables in real time to indicate the calibration's status.

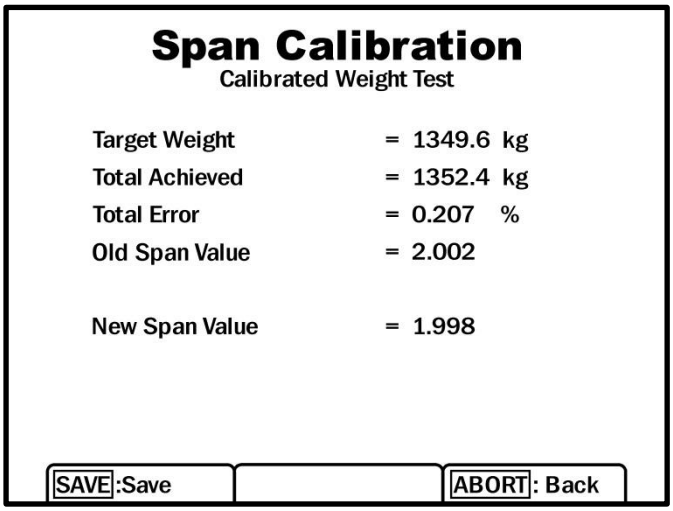


Calibrated Weigh Test Page 2

Target Weight	This will be the target weight the technician has programmed from the previous page.
Total Achieved	A real time accumulated weight during the calibration process.
Pulse Count	A real time accumulated count of the pulse from the tachometer.
Calibration	A percentage value of the calibration status.
Time Remaining	A real time indication of the remaining time (in seconds) for the calibration to be completed.
Rate	A real time mass rate output during the calibration process.

During calibration, if the user wishes to stop the calibration, pressing ABORT. This will return to user to the previous page and discard any accumulated data it has gathered during the calibration period.

When the calibration process is completed, the display will automatically change to the Summary page.



Calibrated Weigh Test summary Page

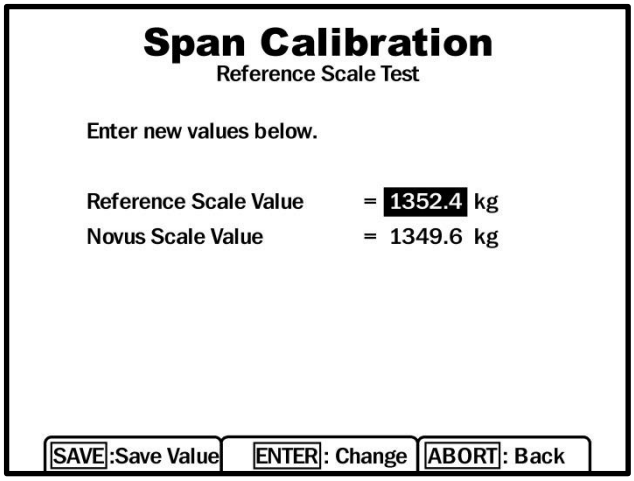
The Summary page has no editable variables, it is a display only page. It shows the Total Achieved weight that Masterweigh Novus believes it has accumulated during the calibration period, an error percentage with respect to the Target Weight, and the unit will automatically calculate the new Span value required to compensate for this error. If the user is satisfied with the results, press SAVE to store the new Span value to a temporary 'sketch pad' until final confirmation. Span Calibration is then complete. If the user is unsatisfied with the results, performing another span calibration is recommended. This can be done by saving the new span value and then re-enter the span calibration menu page and start over again. The more span calibrations performed the more accurate the span value will be. From the Summary page, the user can return to Calibrated Weight Test page 1 by pressing ABORT. However this would discard all the new calculated and accumulated data achieved during the calibration period.

It is recommended to record the every Span Calibration summary page information onto the Masterweigh Novus Calibration datasheet (*see Appendix) every time a calibration is performed.

5.2 – Reference Scale Test

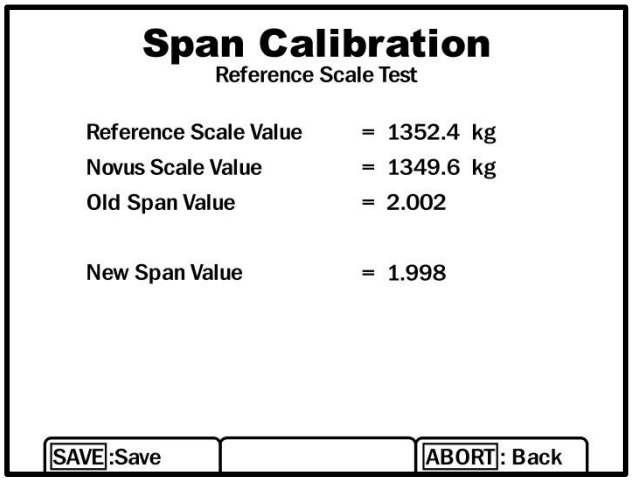
The Reference Scale Test (or Emperical Calibration, or Drop Test) is another method of calibration. This requires the user run a known quantity of material over the beltscale, then weigh the caught product and program the Masterweigh Novus' accumulated total and the weighed total into the system to produce a new span value.

It is recommended that a Reference Scale Test is performed during commissioning, after a Calibrated Weight Test is completed. This will further confirm and refine the span values that were achieved.
Preparation is necessary prior to performing a Reference Scale Test. The user needs to clear or take note of the mass total on the HOME screen. During the calibration period an accumulated mass total will appear on the Masterweigh Novus, this will be needed for the Reference Scale Test. The amount of material that has passed over the beltscale during the calibration must be accurately weighed on a separate stationary scale. This will be the reference for the Reference Scale Test.
To access Reference Scale Test, navigate the cursor in the Span Calibration page using the UP or DOWN key and press ENTER. The display will change to the following screen.



Span Calibration – Reference Scale Test

Here the user is required to enter both the weight attained from the reference scale and calculated mass total from Masterweigh Novus' HOME screen. The curser will be highlighting 'Reference Scale Value'. Press ENTER and use the numeric keys to input the actual weight of the product sample as weighed on the reference scale, then press ENTER again to re-engage the curser. Now manoeuvre the curser to 'Novus Scale Value'. Press ENTER and use the numeric keys to input the weight value that was accumulated during the test by Masterweigh Novus. Once both values have been entered press SAVE to proceed to the Summary page. To return to the previous page and discard all the values that were entered, press ABORT.



Span Calibration – Reference Scale Test – Summary Page

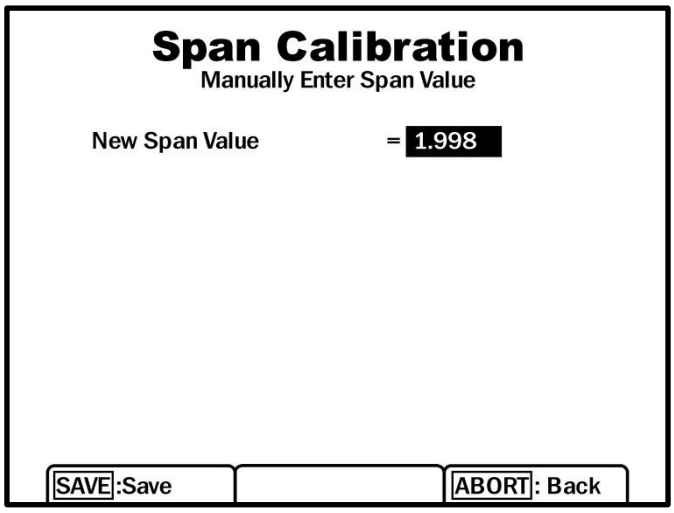
The Reference Scale Test Summary page will calculate a new span value according to the data that the user has provided in the previous page. It will also display the previous span value as reference. To update the span value accordingly, press SAVE and the data will be stored in the temporary 'sketch pad' until final confirmation and the display will return to Setup & Calibration.

ABORT will return to the previous page, Reference Scale Test page, where the user can re-enter the data again. However, by doing so, the newly calculated span value will be discarded and Masterweigh Novus will revert back to the previous span value.

5.3 – Manually Enter Span Value

Masterweigh Novus provides a method for the user to enter the span manually via Manually Enter Span Value. This allows the user to directly program the Span value from previous calculations and calibrations.

To do so, navigate the cursor on to Manually Enter Span Value on the Span Calibration page and press ENTER. The display will then change to the following screen:



Span Calibration – Manual Data Entry

Here the user may enter the span by pressing ENTER to engage editable field. Using the numerical keypad insert the span value and press ENTER again to re-engage the cursor. Press SAVE to store the new value into the temporary 'sketch pad' and return to Setup & Calibration. If the user chooses to ABORT from this page, any changes made to the span value will be discarded and the unit will continue to use the previous span value.

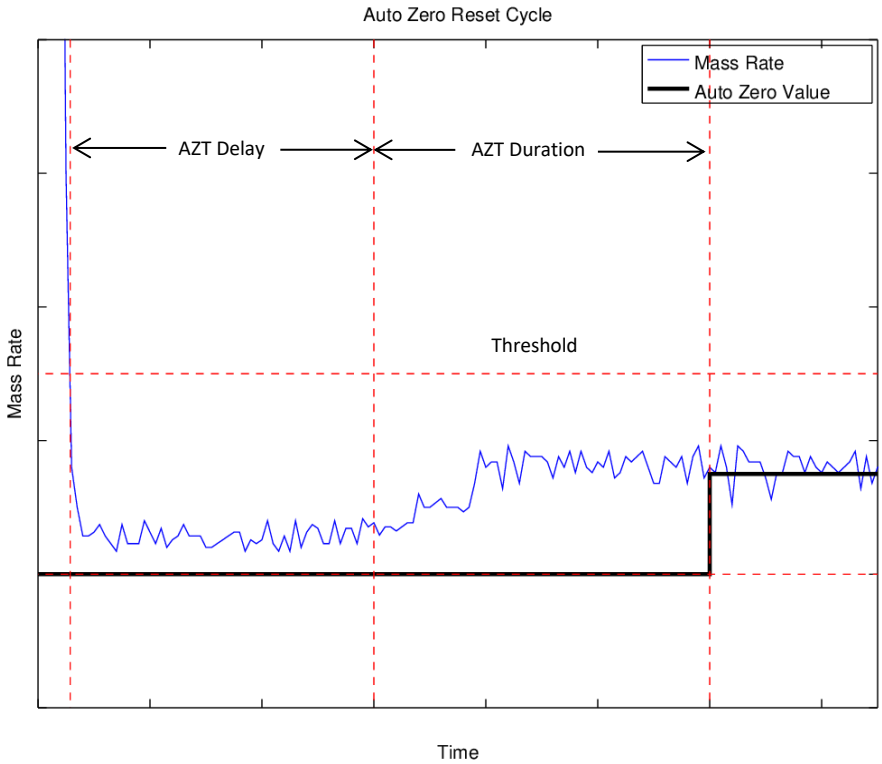
6 – Auto Zero Tracking

Prior to describing the use of the Auto Zero Tracking (AZT) function, the user should be familiar with certain terminology. The Zero Value is calculated when the user invokes a zero calibration via menu 3. During zero calibration, Masterweigh Novus sets the Auto Zero value to the same load cell zero value. The Auto Zero Value is what Masterweigh Novus actually uses as the weigher zero reference. Unlike the load cell zero value where it is only updated when the user performs a zero calibration, the Auto Zero Value will automatically update its value discretely as long as the AZT function is enabled and the programmed parameters are met. If the AZT function is disabled, the Auto Zero value will continue to be the same as the load cell zero value.

IMPORTANT:
This function should be setup only 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. Unlike a static scale which can be tared off after each load is removed, continuous weighing (by definition), does not frequently have the load removed. It is the function of Auto Zero Tracking to update the Auto Zero Value automatically whenever it senses that there is no load on the weigher.
The Auto Zero Tracking function by default is disabled. This feature when enabled allows the Masterweigh Novus to automatically update the Auto Zero value. When the AZT function is enabled, Masterweigh Novus will use the Auto Zero value as a referencing point, thus when the AZT updates the Auto Zero value, the Zero referencing point will change.

For AZT to update the Auto Zero value, it must fulfil a set of requirements programmed by the user. These requirements are Threshold, Delay and Duration. Only when all three requirements are fulfilled, the Auto Zero value will be updated. Masterweigh Novus will also limit the amount of Auto Zero adjustment to which can be set by the user. When the Auto Zero adjustments exceeds the set limit, Masterweigh Novus will no longer automatically update the Auto Zero value until either a zero calibration is performed, or alteration to the set limit is increased.



Auto Zero Tracking Reset Cycle

6 – Auto Zero Tracking

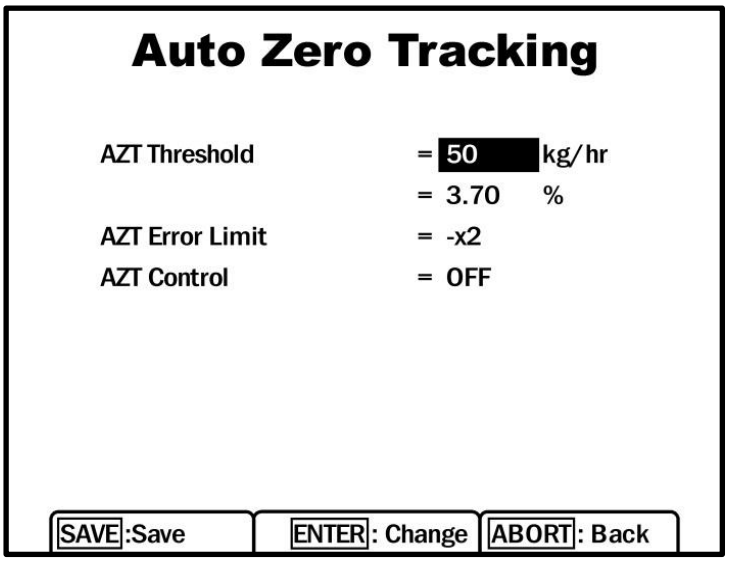
When the AZT function is enabled, the status of the AZT is displayed on the HOME screen. There are 3 different states for the AZT function, enabled, active and error. Enabled is triggered when the AZT function is enabled but the Masterweigh Novus has not begun updating the Auto Zero value. When the three requirements are fulfilled and the Auto Zero value is updated, the AZT status changes to active. Once the AZT status is in active mode, the Auto Zero value will continuously update until one of the three requirements are broken. If any of the three requirements are broken, then the AZT status will revert to enabled.

The error state is triggered when the mass rate has a significant negative value or when the AZT upper or lower limits have been exceeded. When the error state is triggered by the AZT upper or lower limits, the error state will not be reverted until the user manually performs a zero calibration or increases the limits in the AZT menu. When the AZT Error limit is triggered by an excessively negative rate, it can only be reverted by performing a manual zero calibration.

By default the AZT function is disabled; this is indicated by the AZT status on the HOME screen showing ‘Disabled’. Under disabled status, the AZT threshold and error limit is still monitoring the mass rate in the background; however the Auto Zero value will not be updated. During setup, the user will need to program an AZT threshold value and an AZT Error limit. When the mass rate of the beltscale is below the AZT threshold multiplied by the AZT Error limit, an error state will be triggered in the AZT status.

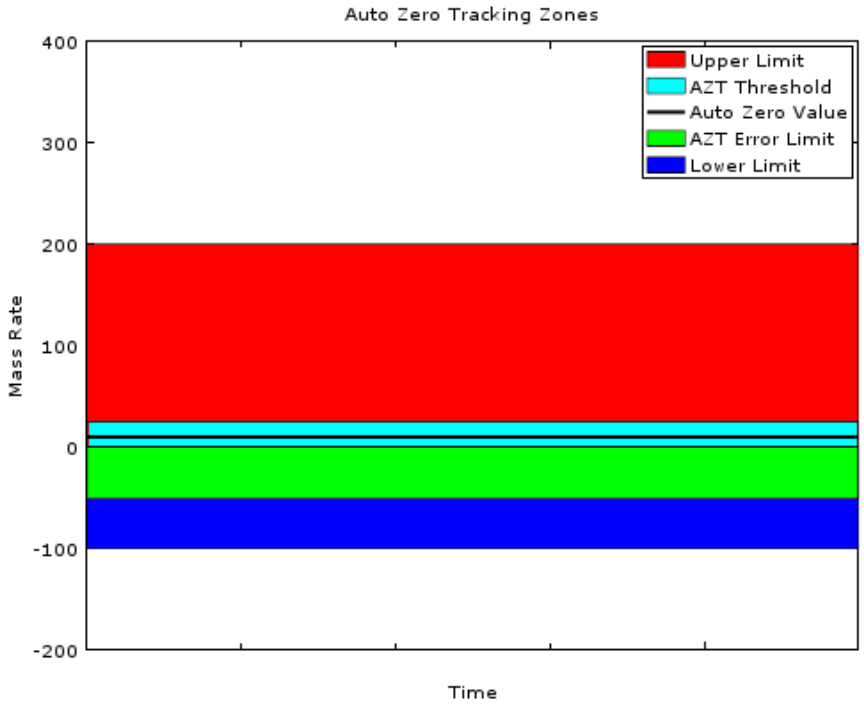
6.1 – AZT Control – Off

To access the Auto Zero Tracking menu, navigate the cursor on the Setup & Calibration page to '6. Auto Zero Tracking'; alternatively press 6 on the numerical keypad. By default, the AZT Control is set to OFF (or Disable) as shown in the following figure:



Auto Zero Tracking Control: Off

For the AZT status to operate correctly, the user needs to program AZT Threshold and AZT Error Limit regardless of the AZT control state.



Auto Zero Tracking Zones

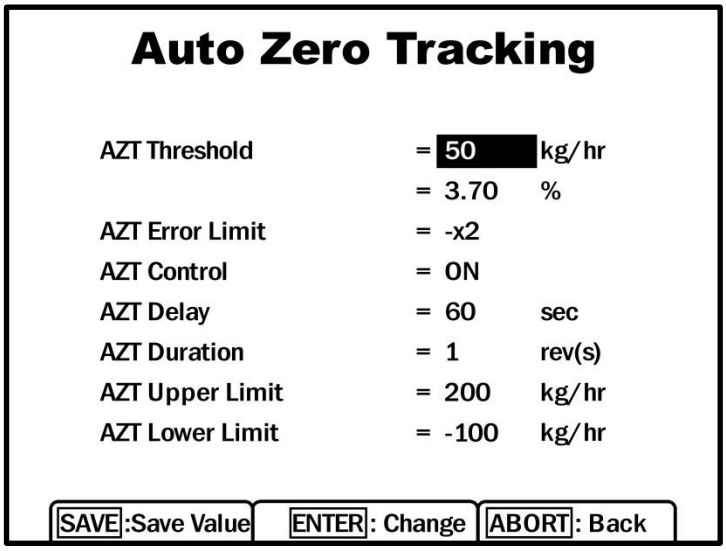
AZT Threshold AZT threshold is the first of three requirements that must be fulfilled to invoke the AZT function. The AZT threshold is a mass rate which the user programs into Masterweigh Novus where if the mass rate does not exceed AZT Threshold for a period of time, the beltscale will be considered 'empty'. The AZT Threshold can be programmed via 2 methods, entering a mass rate or a percentage of full capacity. Programming values to the mass rate will automatically calculate values to the percentage of full capacity, and vice versa. The Auto Zero Threshold level should be set to approximately 2% higher than the highest value displayed when the belt is running empty.

AZT Error Limit This is used to monitor and warn the user when the mass rate significantly drops to a negative value. The user can toggle between pre-programmed values of "–X2, –X3, –X4 and –X5".

AZT Control The control can be toggled between ON or OFF (Enabled or Disabled). Turning ON the Control will allow the AZT function to automatically update the Auto Zero value when the three requirements are fulfilled. When toggled to the ON position, Masterweigh Novus will also display remaining requirements for the user to program. If the AZT Control is OFF, only the mass rate will be monitored, but the Auto Zero value will not be updated.

When the user has programmed the AZT Threshold and Error Limit to save the values press SAVE and the values will be stored in a temporary 'sketch pad' until final confirmation; the display will return to Setup & Calibration. To discard the new values, press ABORT and the changed parameters will revert to previous values and the display returns to Setup & Calibration.

6.2 – AZT Control – On



Auto Zero Tracking Control: On

When the AZT Control is toggled to the ON setting, extra variables will appear for the user to program. The AZT Delay and AZT Duration are the second and third requirements to fulfil for the AZT function to update the Auto Zero value. AZT Upper and Lower limits are set to limit the amount of Auto Zero adjustment before an error state is flagged.
Once the AZT control is set to ON, navigate the cursor down using the UP and DOWN keys on the keypad.

AZT Delay The AZT Delay is measured in seconds and is the period of time the mass rate of must be below the AZT Threshold before the AZT Duration is invoked. During this period, if the mass rate exceeds the AZT Threshold, the AZT Delay timer will continuously reset until the AZT threshold requirement is fulfilled.

AZT Duration The AZT Duration is measured in belt revolutions. It is the number of revolutions the Masterweigh Novus will collect data for updating the Auto Zero value. At any time during this period, if the mass rate exceeds the AZT Threshold, the whole process is restarted.

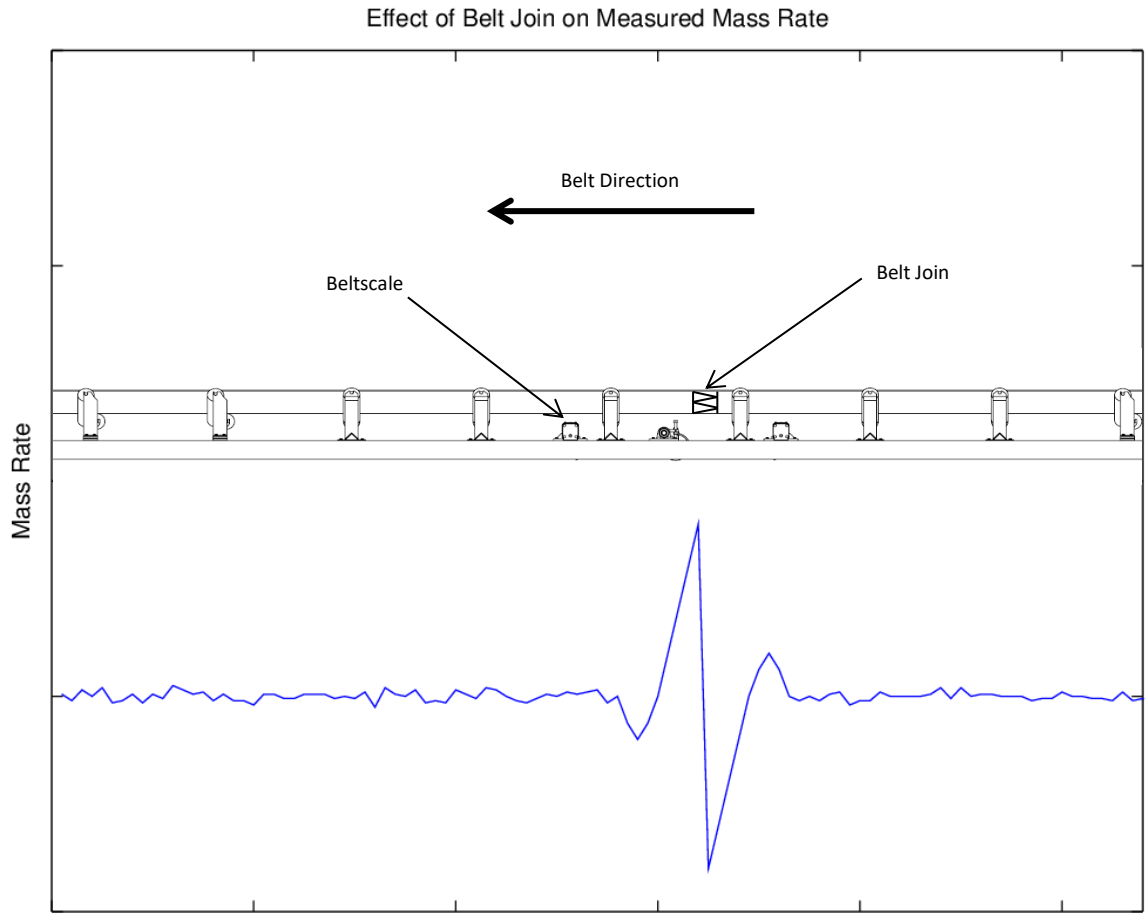
AZT Upper Limit This determines the maximum amount of positive Auto Zero value adjustment before an error state is triggered. Once the Auto Zero value adjustment has exceeded this limit, error state will be invoked on the HOME screen and cannot be cancelled until the user manually adjusts the AZT settings or performs a manual zero calibration.

AZT Lower Limit This determines the maximum amount of negative Auto Zero value adjustment before an error state is triggered. Once an Auto Zero value adjustment has exceeded this limit, an error state will be invoked on the HOME screen and cannot be cancelled until the user manually adjusts the AZT settings or performs a manual zero calibration.

Once programmed, the user can temporarily store the data by pressing SAVE; the data will be stored onto the 'sketch pad' and the display will return to Setup & Calibration. If the user wishes to discard all the changes performed, press ABORT. When discarded, if the user had just changed the AZT control from OFF to ON state, the discard action will revert the AZT control back to the OFF state.

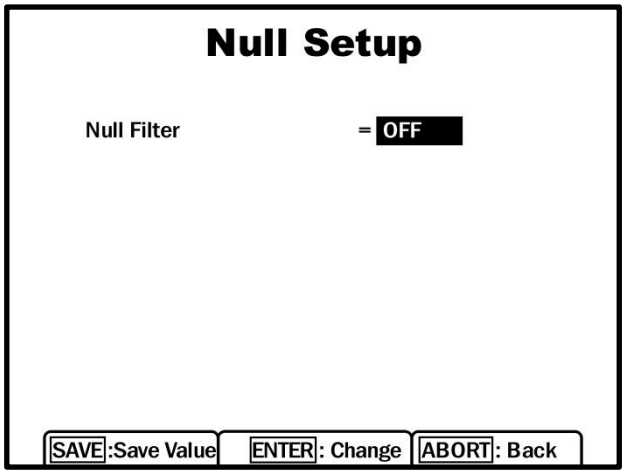
7 – Null Setup

The Null setup is the final step of the 4 stage calibration process. The null accounts for imperfections in the environment due to variables such as the belt joint, vibrations from other sources, belt damage, etc. When the beltscale is running empty, these factors will influence the mass rate and mass total that is being calculated by the Masterweigh Novus. To reduce this error, the null must be set up correctly.



Effect of Belt Join on Load Cell Output

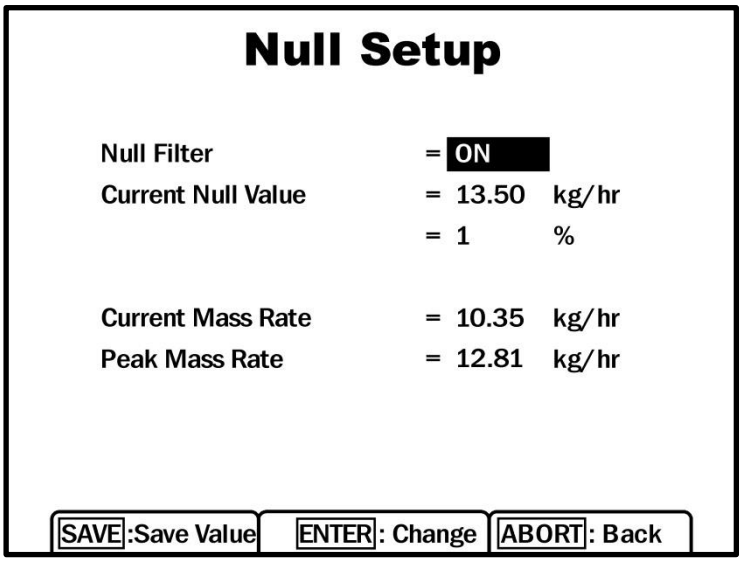
To access Null Setup, navigate the cursor on the Setup & Calibration screen down to "7. Null Setup" and press ENTER; alternatively press 7 on the numerical keypad. The display will change to the following screen:



Null Filter: Off

7 – Null Setup

By default, the null filter is turned off. When it is turned off, the null filter function will not be operating thus all the imperfections will be visible via the mass rate. To turn the filter on, press ENTER to enable an editable mode and toggle LEFT or RIGHT on the keypad to change to the ON position; press ENTER to re-enable the cursor. When the null filter is turned on, additional data needs to be programmed by navigating the cursor down.



Null Filter: On

Calibrating the null filter requires the beltscale to be running empty. Once the user has turned on the null filter, the conveyor should be left running empty at maximum speed for a period of time. Generally the length of time the conveyor should be running empty is determined by the calibration period. As the null filter is not automated, the time period can be judged by the user based on situation. During the null filter calibration period, the Masterweigh Novus looks for the maximum mass rate influenced by environmental factors. This peak mass rate is held under the "Peak Mass Rate" variable. The Peak Mass Rate automatically captures the highest mass rate during the calibration period and displays it on screen. It will be used later to program the Null Value. The Peak Mass Rate can be cleared any time during the calibration by navigating the cursor to its location and pressing ENTER to engage an editable mode. Press Clear on the keypad to reset the peak mass rate and press ENTER again to re-engage the cursor.

After the beltscale has been left running for the calibration period, Masterweigh Novus would have recorded a Peak Mass Rate value. This value will be used as a reference when the user is programming the Current Null Value. The Current Null Value is usually programmed to the nearest whole number above the recorded Peak Mass Rate. Programming the Current Null Value can be done via mass rate or a percentage of the capacity. If the user enters a mass rate, Masterweigh Novus will automatically calculate the corresponding percentage of capacity from the value and vice versa.

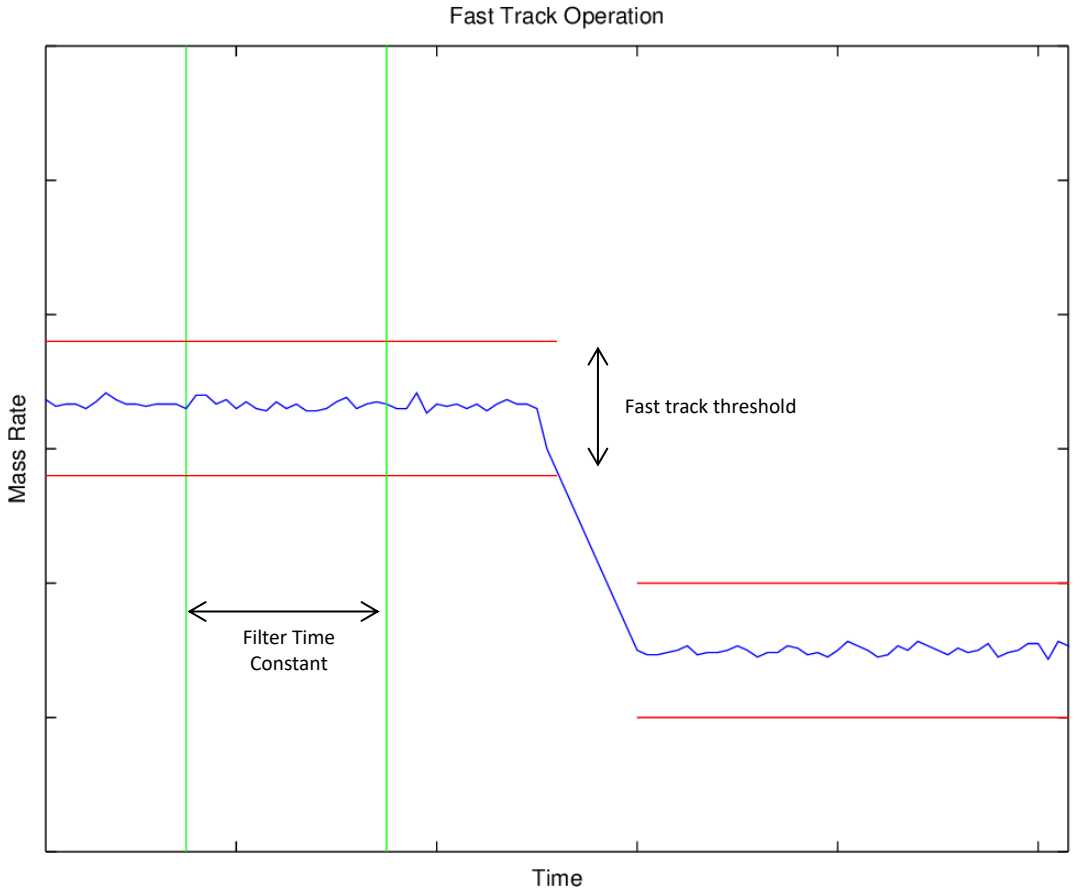
To store the changes, press SAVE on the keypad and the unit will store the data in a temporary 'sketch pad' until final confirmation. If the user chooses to ABORT, all entered data will be discarded and display will return to Setup & Calibration. Discarding the changes will also revert the null filter from ON to OFF if it was changed.

8 – Filter Setup

The Masterweigh Novus is equipped with a filter function to further refine the data for a smoother output. Each filter is constrained by a time constant and fast track threshold where both variables can be programmed by the user. There are 4 filters in total each are independent of each other, but some may affect the accuracy of another. Filters are as follows:

- Rate Display Filter
- Rate Output Filter
- Belt Speed Display Filter
- Speed Sensor Filter

The time constant can be adjusted by the user between 1 to 25 seconds and the Fast Track threshold can be set between 0 to 100%. The fast track setting defines a threshold percentage, where the filter time constant will be overridden if the raw mass rate value suddenly exceeds the threshold. The longer the time constant the more samples Masterweigh Novus will collect to produce an average output. The larger the fast track threshold, the slower the unit will react to sudden changes to the mass rate. The filters can be fully disabled by changing the fast track threshold to 0%; while at 100% fast track threshold means the filters is always on. When the fast track threshold is anywhere between 0 to 100%, it means filtering is only partially active to the programmed percentage. The fast track threshold allows the unit to react faster when there is a sudden spike in the mass rate. The higher the threshold value, the more filtering will be performed.



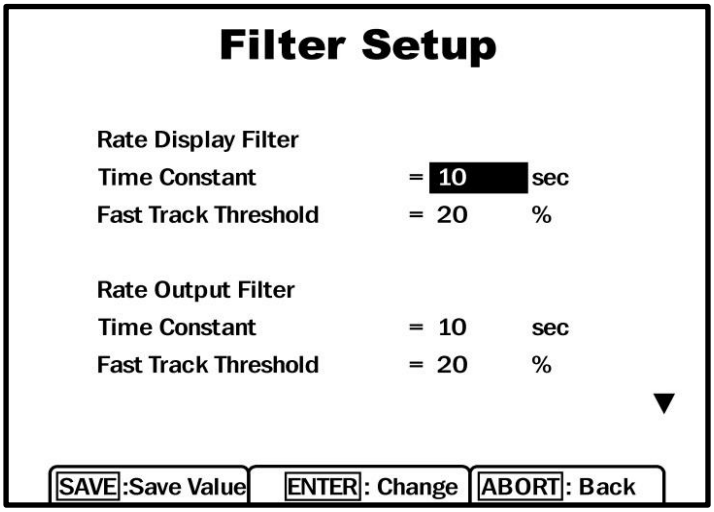
Fast Track in Operation

8 – Filter Setup

To navigate to each filter, use the UP and DOWN arrow key on the keypad, this will move the cursor through each option over 2 separate pages. Each page will have 2 independent filters to set up. To programming each variable, have the cursor at the desired location and press ENTER. This will enter an editable mode and you can then use the numerical keypad to enter the required settings (NOTE: integer numbers only). Press ENTER again to re-engage the cursor to navigate to the next variable. When all the variables have been programmed, press SAVE to store the settings from all 3 pages and return to Setup & Calibration. Press ABORT to discard changes from all 3 pages and return to Setup & Calibration. To discard changes from all 3 pages, and return to Setup & Calibration press ABORT.

IMPORTANT:
New filter changes will not be applied until final confirmation.

Rate Display Filter This will apply a filter around the Mass Rate displayed on the HOME screen

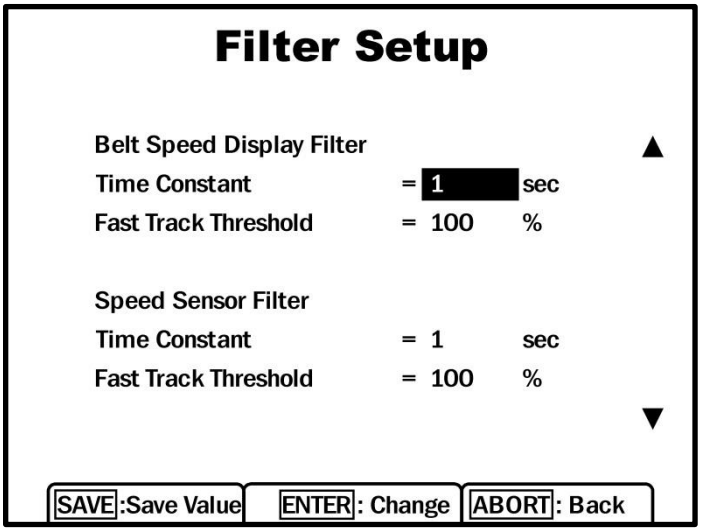


Filter Setup Page 1

only. This filter will not be applied when performing calibration procedures. The filter is also not applied to external output variables such as fieldbus communication.

Rate Output Filter This is a filter for the Rate current loop output. Adjustments made to the time constant and fast track threshold will only be applied to the 4-20mA Rate output. This filter is independent to the Rate Display filter.

It is recommended that the rate display filter and the rate output filter are set the same values as difference between both filters will cause discrepancies between the remote monitoring system and Masterweigh Novus.



Filter Setup Page 2

Navigating the cursor down will reach the second page of filter options.

Belt Speed Display Filter This is used to smooth the fluctuation of constantly changing belt speed on the HOME screen. This filter does not affect the output via the fieldbus communications or current loop outputs.

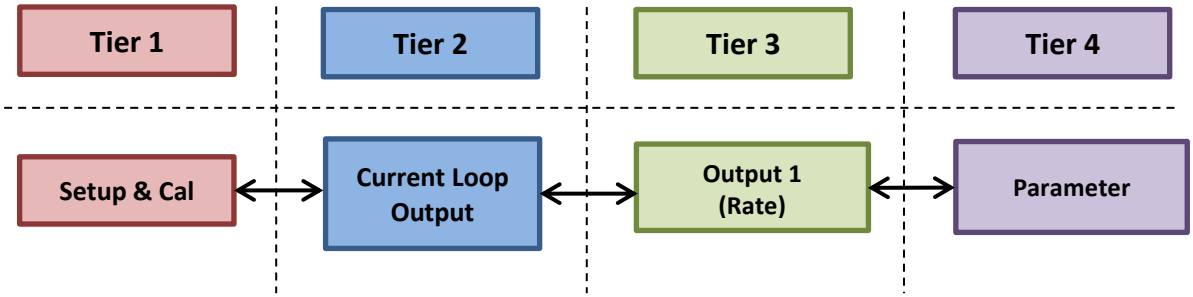
Speed Sensor Filter The speed sensor filter averages the fluctuation of the tachometer frequency due to environmental effects.

9 – Current Loop Setup

The Masterweigh Novus in beltscale mode contains one current loop output, Rate output. The current loop output is used to signal an external device (or PLC) the present mass rate that is displayed on the Masterweigh Novus. In the beltscale version of Masterweigh Novus, the current loop output cannot be programmed to perform other tasks, it is permanently set as Rate output.

To access Current Loop Setup, manoeuver the cursor to Setup & Calibration page 2 then to '9. Current Loop Setup' and press ENTER; alternatively press 9 on the numerical keypad. Within the Current Loop Setup menu, there is a sub-menu for output 1 which allows the user to calibrate the current loop for further accuracy. Accessing sub-menus is done by having the cursor on output 1 and pressing ENTER. The display will change to a sub-menu.

Storing the changes to each variable is in a tier format. To store changes within the sub-menus, the SAVE function must be used in subsequent menus up to Setup & Calibration. When an ABORT is initiated in higher tier menus, it will discard any changes made to the corresponding tier and below.

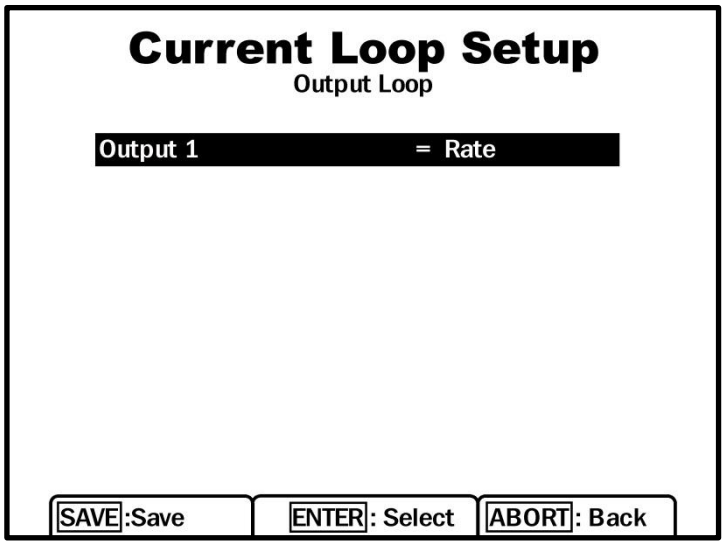


Current Loop Setup Menu Structure

For example, if changes were made within the 'Output Loop Calibration' page, the user must use the save function to exit from Output Loop to Current Loop Setup, then use the save function again from Current Loop Setup to Setup & Calibration.

9 – Current Loop Setup

Upon entering the Current Loop Setup page, there is only one current loop output, Rate output, this is shown below:

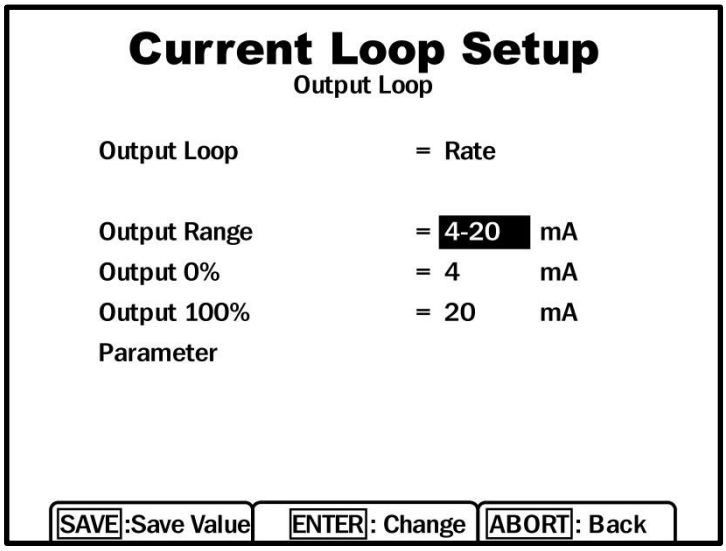


Current Loop Setup – Output

The Rate output is internally powered by the Masterweigh Novus, thus external power is unnecessary. Further refinement of the Rate output can be adjusted within the Rate output sub-menu, Output Loop – Calibration Page. To enter the sub-menu, ensure the cursor is on output 1 and then press ENTER.

9.1.1 – Output Loop – Calibration Page

Here in the Output loop – calibration page, the user is able to further adjust the current loop and refine the output to suit an external device. The sub-menu is shown below:



Output Loop Calibration Page

To change each option, navigate the cursor to the desired option and press ENTER. Dependent on the selected option, the method of adjustment will differ between using the numerical keypad or toggle through pre-programmed options via the LEFT or RIGHT keys. The following list describes each option.

Output Loop This is not an adjustable option. In beltscale mode, output 1 is permanently assigned as Rate output. Dependent on the selected Output Range, Masterweigh Novus will calibrate the range with respect to the programmed capacity in Setup Parameters.

Output Range This determines the operating range of the output current loop, 4-20mA or 0-24mA. These are pre-programmed options, thus the user may toggle through the options using the LEFT or RIGHT keys. When adjusting between 4-20mA and 0-24mA, this range will also automatically adjust the values of Input 0% and Input 100% if they are not within the selected Output Range.

Output 0% This allows further refinement to the representation of 0%. When there is a mismatch between the Masterweigh Novus output compared to external controllers, this feature allows Masterweigh Novus to operate in cohesion with the external controller. It cannot be programmed to be lower than the selected Output range. Lowest value is 0mA. This can be programmed via the numerical keypad.

Output 100% This allow further refinement to the representation of 100%. When there is a mismatch between the Masterweigh Novus' input compared to external controllers, this feature allows Masterweigh Novus to operate in cohesion with the external controller. It cannot be programmed to be higher than the selected Output range. Highest value is 24mA. This can be programmed via the numerical keypad.

Parameter This option allows access to the sub-menu within the calibration page. Currently no extra features have been implemented for this function.

To store changes within the sub-menus, the SAVE function must be used in subsequent menus up to Setup & Calibration. When an ABORT is initiated in higher tier menus, it will discard any changes made to the corresponding tier and below.

9.1.1.1 – Output Loop – Parameter: Rate

NO PARAMETER SUB-MENU HAS BEEN IMPLEMENTED FOR THIS FUNCTION

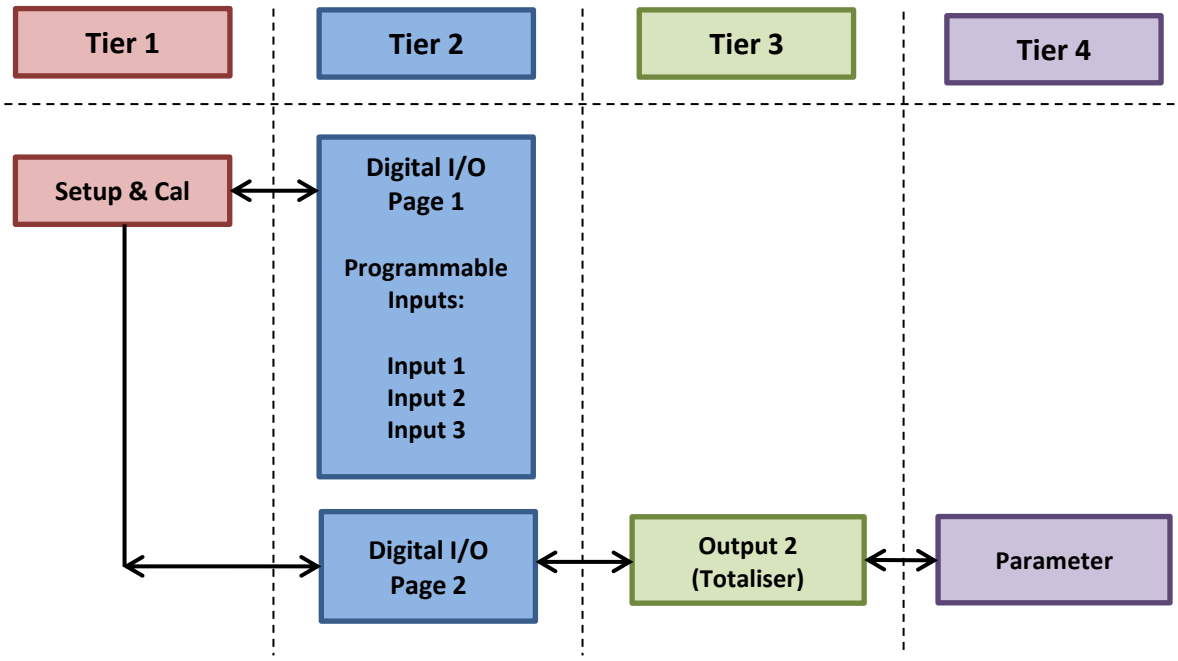
10 – Digital I/O Setup

The Masterweigh Novus has a total of 3 digital inputs and 2 digital outputs; all can be programmed or calibrated via the Digital I/O Setup menu. The Digital I/O Setup menu consists of two pages, digital input page 1 and subsequently digital output page 2. Each digital input channel can be programmed to perform a specific function, while the digital output channels are permanently set as System Healthy and Totalizer.

To access the Digital I/O Setup menu, manoeuver the cursor to Setup & Calibration page 2 then scroll to '10. Digital I/O Setup' and then press ENTER; alternatively press 10 on the numerical keypad. In the Digital I/O Setup menu there are two pages, transition between the pages by using the UP and DOWN arrow keys. Page 1 is for digital input signals only, while page 2 is for digital output signals only. In the digital output section, there are sub-menus which can be accessed by navigating the cursor to the desired digital output channel and press ENTER; the display will switch to the corresponding digital output channel sub-menu.

Each digital input can be assigned to perform a number of pre-programmed functions. When a function has been assigned to a specific digital input channel, it cannot be re-selected by any other input channels. This prevents a 'double up' of the same signals. The output channels have been permanently assigned to be System Healthy and Totalizer; they cannot be changed. There is a sub-menu for the totalizer output to make adjustments to the frequency and duration of the output. This is detailed in the section below (10.2.2 – Totalizer).

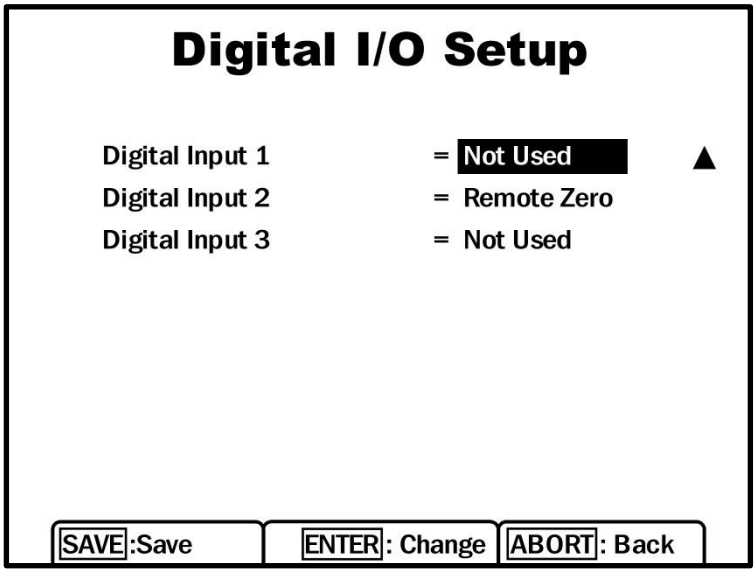
Digital I/O Setup menu is designed using a tier structure. To store data within the sub-menus the SAVE function must be applied to all subsequent menus above the lowest tier sub-menu until Setup & Calibration. If ABORT is applied to any of the higher tier sub-menus, all data up to the current tier will be discarded.



Digital I/O Setup Menu Structure

10.1 – Digital Input

There are a total of 3 digital input channels. All the digital inputs can be assigned pre-programmed functions to provide signal or feedback to the Masterweigh Novus. All digital inputs can be programmed in Digital I/O Setup page 1, shown below:



Digital I/O Setup page 1

To program the digital inputs, navigate the cursor to the desired digital input channel and press ENTER. Using the LEFT and RIGHT arrow keys, toggle through the pre-programmed functions, then press ENTER again to select the required function and re-engage the cursor. Once a function has been assigned to a digital input channel, it cannot be selected again on to a different input.

All the pre-programmed functions for the digital inputs are listed on the next page.

10.1.1 – Pre-Programmed Digital Input Functions

Feeder Start In beltscale mode, no feature has been assigned to this function.

Feeder Stop In beltscale mode, this function is not used.

Remote Zero A HIGH signal will reset the accumulated Mass Total on the HOME screen to zero; while a LOW signal will allow the mass total to continue accumulate. A continuous HIGH signal will stop the mass total from accumulating.

Probe High In beltscale mode, no feature has been assigned to this function.

Probe Mid In beltscale mode, no feature has been assigned to this function.

Probe Low In beltscale mode, no feature has been assigned to this function.

Speed Sensor No feature has been assigned to this function.

Not Used Default setting when no function is assigned to a digital input. Only this function can be set simultaneously on multiple digital inputs.

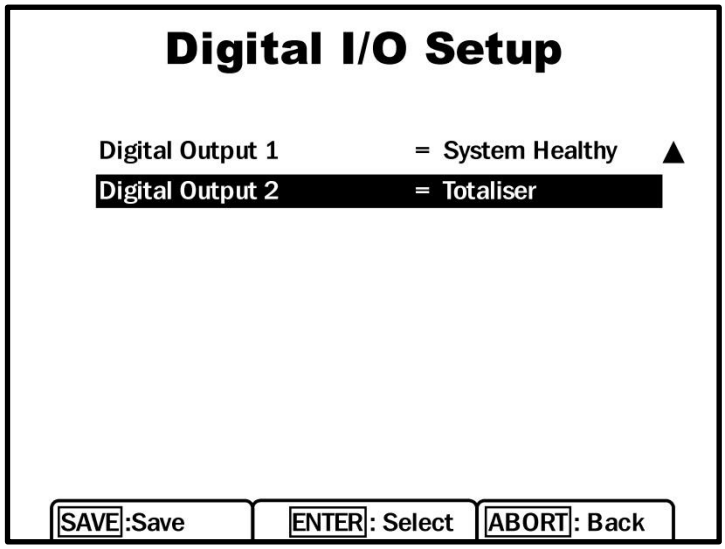
As changing digital input settings does not access sub-menus, to save the data, press SAVE to exit to Setup & Calibration page 2. Saving in the Digital I/O Setup page 1 will also save the data from Digital I/O Setup page 2 and vice versa; as they belong to the same tier. To discard the changes, press ABORT in Digital I/O Setup page 1 (or 2) and Masterweigh Novus will revert all changes and return to Setup & Calibration.

10.2 – Digital Output

Masterweigh Novus is equipped with 2 digital outputs. The 2 digital outputs have been permanently assigned with System Healthy and Totalizer respectively; they cannot be changed.

Mechanically, Masterweigh Novus' digital outputs are designed as 'dry contact relays'; the digital output channels cannot produce a voltage of their own. There are auxiliary 24VDC supplies on the Masterweigh Novus which can be wired in series to supply the voltage, if necessary. Digital output 1 and 2, system healthy and Totalizer respectively, are designed using solid state relays; hence they operate under normally open conditions.

Upon entering the Digital I/O Setup menu, navigate the cursor down until the display changes to page 2. Here the user can enter the sub-menu for digital output 2, Totalizer. Digital output 1, System Healthy has no adjustable variables thus the cursor as automatically skipped the option. Digital I/O Setup page 2, shown below:



Digital I/O Setup page 2

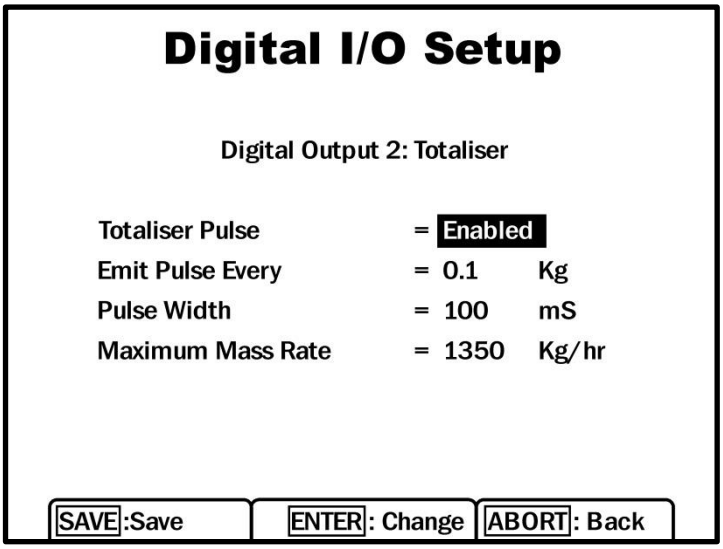
Here the cursor is automatically on digital output 2 since digital output 1 cannot be changed nor has any adjustment. Digital output 2 is permanently assigned as Totaliser, there is a sub-menu for the totalizer function and can be accessed by having the cursor on this option and pressing ENTER.

10.2.1 – System Healthy

The system healthy signal will continue to stay closed when the Masterweigh Novus is operating. The signal will change to open state when Masterweigh Novus is turned off. This cannot be changed by the user.

10.2.2 – Totaliser

The Totaliser is assigned to digital output 2, it cannot be changed. This signal will produce a pulse for every increment in the mass total. The frequency and resolution of each pulse can be calibrated under the Totaliser's sub-menu. The totalizer output also has a memory counter function. This feature allows the totaliser to continue to count even after the displayed mass total has stopped accumulating. This ensures that the remote counter will be accurate with respect to the Masterweigh Novus.
To enter the Totaliser's sub-menu, navigate the cursor to digital output 2 – Totaliser and press ENTER; the display will change to the following screen:



Digital I/O – Digital Output 2: Totaliser

Here the user can enable the output pulse, program the frequency of the pulse and the length of the pulse.

Totaliser Pulse Here the user can either enable or disable the pulse output feature. If enabled, digital output 2 will begin outputting pulses at the selected frequency. Toggle left or right using usual editing methods to change state.

Emit Pulse Every This option allows the user to adjust the frequency of the pulses. The ranges are, 0.001, 0.01, 0.1, 1, 10, 100. After pressing enter, toggle left or right using the usual editing methods to scroll through the list.

NOTE: Correct ranges should be chosen with respect to the operating mass rate. If a too small increment is selected, the totaliser will become inaccurate.

Pulse Width This allows the user to select the length of time the pulses are on and off. The selected pulse width should be within the operating ranges of the remote totaliser. Some remote totalisers have a minimum time of 200ms; this means if the selected pulse width is shorter than 200ms, then the pulse may not be recognized. The pulse width ranges are: 10, 20, 50, 100, 200, 300, 400, 500 and 1000mS. When a pulse width is chosen, the overall pulse time will be double the pulse width. The ON time and OFF time are the same duration.

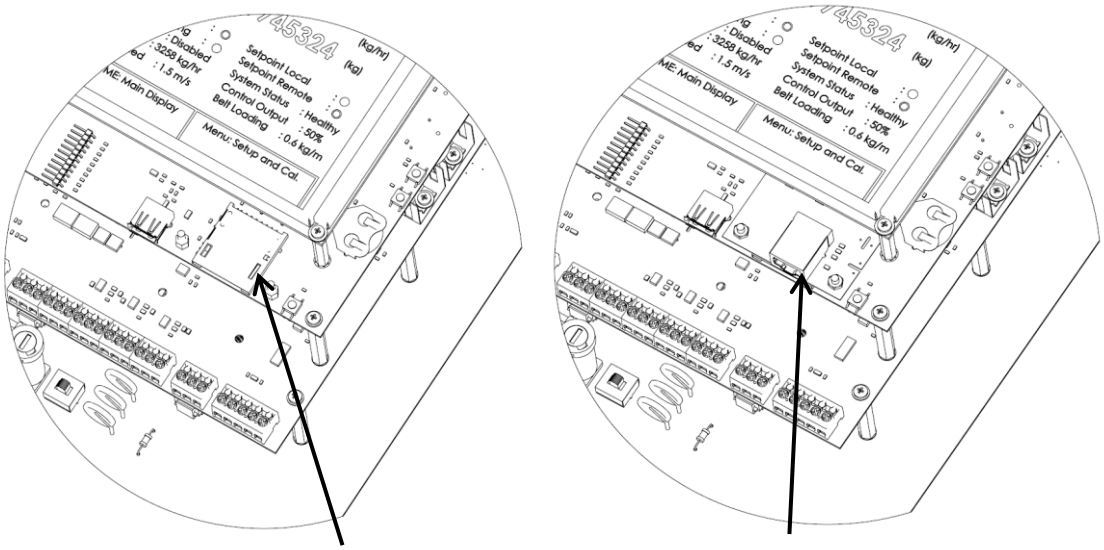
Maximum Mass Rate This cannot be edited. This 'locks and holds' the highest mass rate so the user can use it as reference to program appropriate settings for the totaliser.

To save the settings within Digital Output – Totaliser, the SAVE function must be used for all subsequent menus to Setup & Calibration. If ABORT is used in any of the higher tiered menus, it will discard all changes within the sub-menus and revert to previous settings.

11 – Field Bus Setup

The Masterweigh Novus has the ability to communicate via industrial protocols such as DeviceNet, Ethernet/IP, Modbus-TCP, Profibus and RS232. The fieldbus communication allows the user to extract more extensive information from the Masterweigh Novus, some of which some cannot be transmitted via digital or current loop input and output. A list of the fieldbus variables will be attached in Appendix C.

Each type of fieldbus communication protocol can be invoked by inserting an optional communication card onto the CPU board. When a communication card is in place, the Masterweigh Novus will detect the type of fieldbus communication and provide the corresponding menu.



Fieldbus Board Location **Installed Fieldbus Board**

Fieldbus Board Plug in Location

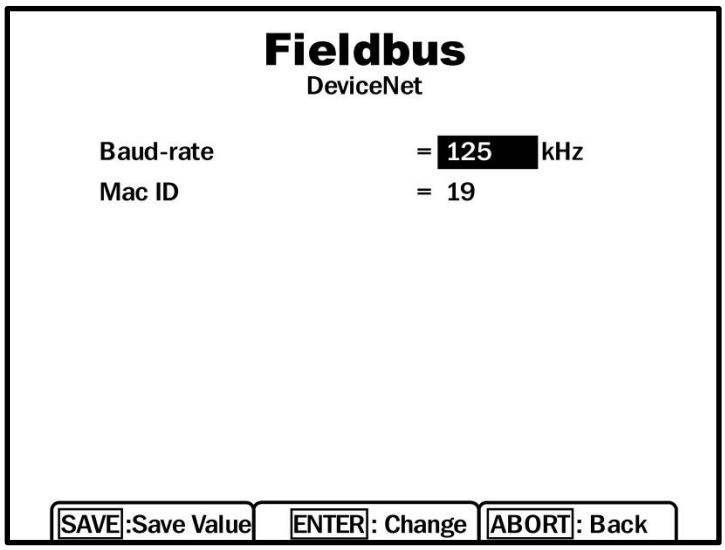
To access the Fieldbus Setup menu, navigate the cursor to Setup & Calibration page 2, then to '13. Fieldbus Setup' then press ENTER; alternatively press 13 on the numerical keypad. The Masterweigh Novus will automatically detect the type of fieldbus communication card that has been installed and display the corresponding page.

If no communication card has been installed, by default the type of communication is RS232.

NOTE: Sometimes the communication card may have become loose during transport, causing the Masterweigh Novus to be unable to recognise the installed communication card. If this happens, unplug and re-install the card again. Ensure all the pins have matched up with each other prior to powering the unit again. Mismatch in the pins may result in damaging the boards.

11.1 – DeviceNet

When the Fieldbus Setup menu has been selected from the Setup & Calibration page, Masterweigh Novus will detect the type of communication card installed. Assuming that the DeviceNet communication card has been installed correctly, the following screen will be displayed.



Fieldbus Setup – DeviceNet

Here, the user is required to set the Baud-rate and the MacID for this particular machine.

Baud-rate The Baud-rate is a particular frequency pre-set by the network. The user must choose the same baud-rate as the network for the Masterweigh Novus to communicate with the Master. The selectable baud rates are: 500, 250 and 125kHz.

To change the baud-rate, navigate the cursor to the Baud-rate variable, then press ENTER to engage an editable field. Use the LEFT and RIGHT keys to toggle through the pre-programmed options and press ENTER again to select the option and re-engage the cursor.

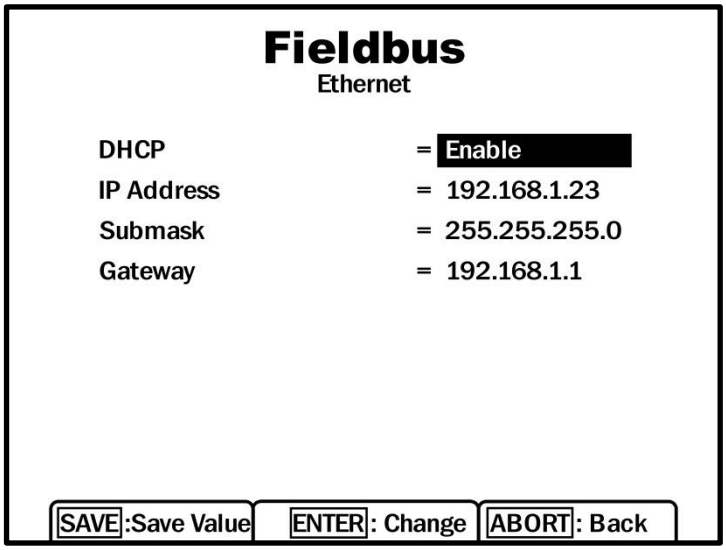
Mac ID The Mac ID is a number ranging between 0-63 which is usually assigned to the unit prior to installation. It is the unit's identification on the network.

To change the Mac ID, manoeuver the cursor to the Mac ID variable and press ENTER to engage an editable field. Use the numerical keypad to enter the assigned Mac ID and press ENTER again to re-engage the cursor.

To store and implement the new settings, press SAVE key and return to Setup & Calibration page 2. Once the change has been confirmed via the final warning page, the new settings will be implemented. Alternatively, press ABORT to discard all changes performed within the Fieldbus Setup menu.

11.2 – Ethernet/IP & Modbus TCP

The Ethernet/IP and Modbus-TCP communication protocols share the same optional communication card. To access Fieldbus Setup for Ethernet/IP or Modbus-TCP, the user must first install the communication card onto its holder located on the CPU board. The Masterweigh Novus will detect the installed communication card and display the according menu, shown below:



Fieldbus Setup – Ethernet/IP & Modbus TCP

Within this menu, the user will be able to setup the necessary settings for the slave (Masterweigh Novus) to communicate with the master (receiver) on the network.

DHCP The DHCP can be toggled between enabled and disabled settings. Having this option enabled, allows the Masterweigh Novus to automatically search and establish the IP address, Subnet mask and Gateway.
By default, the DHCP is set to disabled. When toggled to enabled, the user must SAVE and exit the menu structure for the unit to attain the IP address, Subnet mask and Gateway. Once attained, when the user re-enters the menu, these values will be displayed in their respective locations. Under enabled state, the user cannot change any of the other variables.

IP Address The IP Address can be manually set by the user or automatically attained when the DHCP option has been set to disable or enable respectively.
To manually set the IP Address variable, ensure that DHCP is set to disabled. Navigate the cursor to the IP Address option and press ENTER to engage an editable field. Here use the numerical keypad to enter the IP address. Masterweigh Novus will recognize when each “dot-decimal” has been entered and will automatically insert the “dot” when necessary. Once the IP address has been programmed, press ENTER again to re-engage the cursor.

Subnet mask The Subnet mask can be manually set by the user or automatically attained when the DHCP option has been set to disable or enable respectively.
To manually set the Subnet mask, ensure that the DHCP is set to disabled. Manoeuver the cursor to the Subnet mask variable and press ENTER to engage an editable field. Use the numerical keypad to enter the values; Masterweigh Novus will recognize the "dot-decimal" and will automatically insert the "dot" when necessary. Once the value has been entered, press ENTER again to re-engage the cursor.

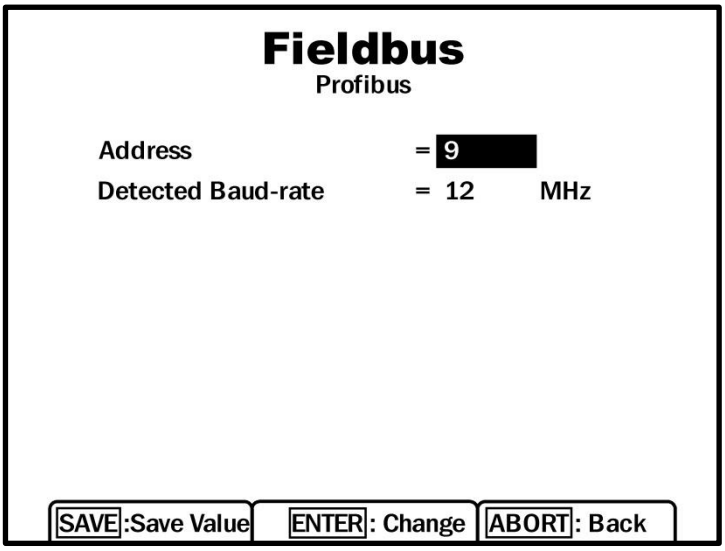
Gateway Similar to IP address and Subnet mask, the Gateway can be manually set by the user or automatically attained when the DHCP option is disabled or enabled respectively.
To manually set the Gateway, ensure that the DHCP is set to disabled, then manoeuvre the cursor to the Gateway variable and press ENTER. Using the numerical keypad, enter the "dot-decimal" values for the Gateway. Masterweigh Novus recognizes the "dot-decimal" values and will automatically insert the "dot" every 3 digits. Once the values are entered, press ENTER again to re-engage the cursor.

NOTE: All dot-decimal values must be entered in 3 digit format. For example to enter the number '1' the user must enter the value as '001'.

To store and implement the new settings, press the SAVE key to and return to Setup & Calibration page 2. Unlike other menu pages, changes will be implemented upon exiting the menu. To discard any changes, press ABORT to exit the Fieldbus Setup menu.

11.3 – Profibus

To access the Profibus communication protocol, the associating communication card must be installed onto the CPU board. Once the card is installed correctly, when entering the Fieldbus setup menu, Masterweigh Novus will automatically detect the chosen protocol and display the following screen:



Fieldbus Setup – Profibus

There are two options within this menu, Address and Detected Baud-rate. The user is required to program the Address, while the Detected Baud-rate is not an editable option.

Address The user is required to program a value between 0 and 126; this is to represent the identification of the Masterweigh Novus on the network.
To change the value, have the cursor on the Address variable, and press ENTER to engage an editable field. Using the numerical keypad, enter a value between 0 and 126 and press ENTER again to re-engage the cursor.

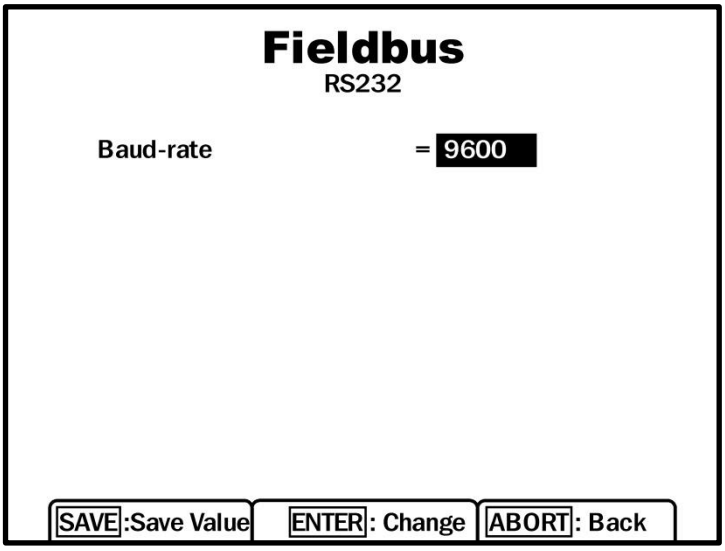
Detected Baud-rate The Detected Baud-rate is not an editable field, it will display a number which is set by the network. This is usually a whole number, i.e. 12MHz. This option can be used as an indication to whether the Masterweigh Novus has detected the Profibus network.
If the unit has failed to detect the network, the Detected Baud-rate is usually a random small number such as 0.0192MHz. Seeing this number indicates that the communication card has not found the network and may require further diagnosis.

To store and implement the new settings, press SAVE key and return to Setup & Calibration page 2. Unlike other menus, when the new settings are saved, it will be implemented immediately. Alternatively press ABORT to discard any changes and exit the Fieldbus Setup menu.

11.4 – RS232

RS232 is the default setting for fieldbus communication. If no communication cards have been installed, by default the RS232 Fieldbus Setup menu will appear if the menu is entered. To communicate via RS232, the corresponding communication card must be installed onto the card holder on the CPU board. Without this card, Masterweigh Novus cannot communicate via RS232.

Once installed correctly when the user enters the Fieldbus Setup menu, the following screen is displayed:



Fieldbus Setup – RS232

Here the user is able to change the baud-rate for the RS232 communication. Other settings cannot be changed and are listed below:

Baud-Rate The baud-rate can be toggled through the pre-programmed values of, 9600, 19200, 38400, 57600 and 115200. By default, the baud rate is set to 9600, however the user may change it by pressing ENTER to engage the editable field. By using the LEFT and RIGHT keys the user may toggle through the options. Then press ENTER again to select the required option and re-engage the cursor.

Parity None (not adjustable)

Data Bits 8 Bits (not adjustable)

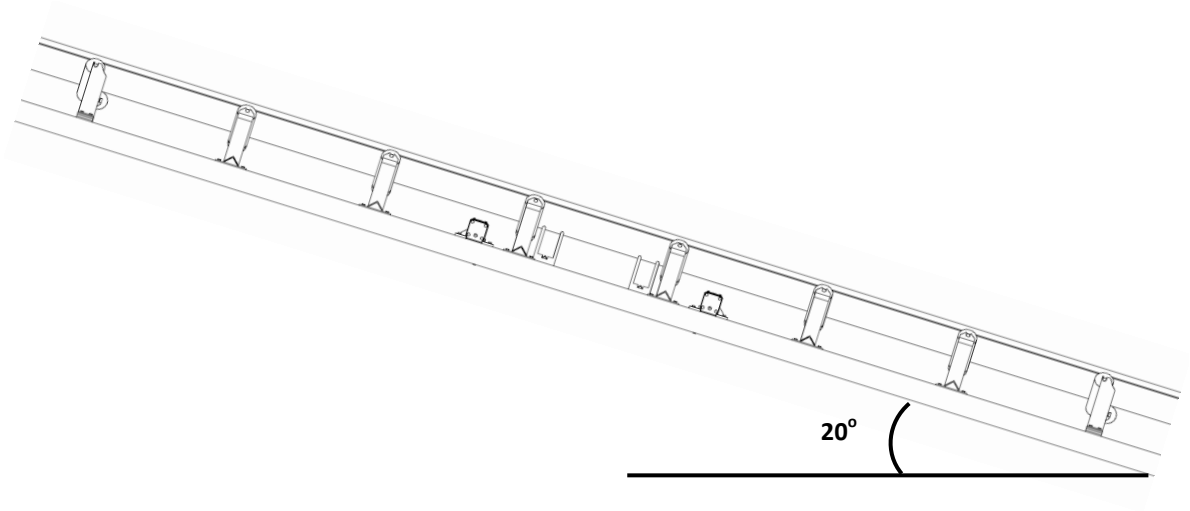
Stop Bits 1 Bit (not adjustable)

Hardware Flow Control None (not adjustable)

To store and implement the changes, press SAVE and return to Setup & Calibration. Alternatively press ABORT to discard and revert to previous settings and exit the menu.

LINEARISATION FUNCTION HAS NOT BEEN IMPLEMENTED

In some instances, when the beltscale is operating in a non-horizontal position, normal methods of calculating the mass rate cannot be applied. When the beltscale is mounted on a non-horizontal position, horizontal forces must be considered. The horizontal force will reduce the overall weight of the product passing over the load cell; thus producing an inaccurate mass rate.



Beltscale on Incline

The inclinometer feature on Masterweigh Novus is necessary to compensate for the horizontal forces induced on the product's weight. When activated, Masterweigh Novus will utilize an external inclinometer to indicate the angle of elevation and then automatically calculate the correct mass rate. The external inclinometer uses a current loop to feedback the angle of incline or decline of the beltscale. Thus to use the inclinometer feature, a current loop input channel needs to be assigned as "Inclinometer".

To access the Inclinometer Setup menu is done by navigating the cursor to Setup and Calibration page 2 and then to ‘13. Inclinometer Setup’; alternatively press 13 on the numerical keypad.

13 – Inclinometer

Here, the user is able to enable or disable the inclinometer function. By default the inclinometer function is set to disable. Prior to enabling the inclinometer function, a current loop input channel must be assigned to the 'inclinometer' function. Without setting a current loop output to the inclinometer function will fail to read accurate values.

To enable the function, navigate the cursor to the Function variable and press ENTER; then use the LEFT or RIGHT key to toggle between enable or disable. Press ENTER again to re-engage the cursor. When enabled, an extra variable will appear, "Angle". This is a non-adjustable variable. It displays the calculated angle from the external inclinometer feedback. When the inclinometer function is used in cohesion with a Web Tech approved inclinometer the Masterweigh Novus will be able to calculate the angles accordingly.

The suggested inclinometer needs to output values in 4-20mA with zero degrees being 12mA (50%). Any angle of elevation will result in a feedback of greater than 12mA while any angle of decline will result in a feedback of less than 12mA.

Once it is been confirmed that the displayed angle is the same as the angle of incline (or decline), the user must save the changes in order to implement the inclinometer feature in Masterweigh Novus. Press SAVE to store the changes and return to Setup & Calibration page 2. If ABORT function is invoked, all changes will revert to previous state and return to Setup & Calibration page 2.

When the user confirms all changes via the final confirmation, Masterweigh Novus will implement the inclinometer feature and automatically adjust all calculated mass rates to compensate for the non-horizontal beltscale. The displayed mass rate on the HOME screen will be the compensated mass rate. As mass rate is calculated in real time, if the angle is constantly changing, the mass rate will also compensate for each mass rate update.

14 – Speed Sensor Setup

The speed sensor, or tachometer provides a feedback signal for the Masterweigh Novus to calculate the speed of the belt. Dependent on the scenario, the location of the speed sensor can either be on the tail pulley, at the end of a winglet idler, on a spiral pulley or trailing arm. The pulses per revolution and frequency will be dependent on the type of sensors installed. Generally an optical speed sensor will produce a higher frequency than a proximity switch.

The Masterweigh Novus is designed to operate in conjunction with different types of speed sensors. These speed sensors include tachometers, magnetic pick-ups and proximity sensors. Depending on the situation different type of sensors will be installed, however the general operation will be the same.

In addition to the hardware speed sensors, Masterweigh Novus is capable of simulating its own frequency for instances where a hardware speed sensor cannot be installed. Frequencies can be manually adjusted to suit the user's situation.

14 – Speed Sensor Setup

Accessing the Speed Sensor Setup menu is done by navigating the cursor to Setup and Calibration page 2 and then to '14. Speed Sensor Setup'; alternatively press 14 on the numerical keypad. Upon entering the menu, the following screen will be displayed:

Speed Sensor Source This allows the user to choose the method of collecting the speed sensor data. It can be toggled between Hardware, Software and External Contacts (Ext-Con). Each option will be outlined in the following sections.

Frequency Dependent on the selected speed sensor source, the frequency option can either be programmed, or it is a display only variable. In Hardware mode, the frequency variable is not adjustable. In Software and Ext-Con mode, the user can navigate the cursor to this variable and manually set the frequency.

To save, press SAVE to store any changes into a temporary sketch-pad until final confirmation and return to Setup & Calibration page 2. If ABORT is invoked, all changes will be discarded and the screen returns to Setup & Calibration page2.

14 – Speed Sensor Setup

14.1 Hardware Source

Selecting the speed sensor source as hardware means that an external speed sensor has been installed on the belt scale. This could either be a tachometer, proximity sensor or magnetic pickup. The sensor will provide a feedback of the current speed of the belt and calculate the mass rate.

By default the speed sensor source has been set to hardware. However if it has been set to another setting, it can be changed back to hardware. This is done by manoeuvring the cursor to the speed sensor source variable and then pressing ENTER. Use the LEFT and RIGHT keys to toggle through the settings until hardware is displayed, then press ENTER again to re-engage the cursor.

When hardware source is selected, the frequency variable cannot be selected. This is because the frequency is generated by taking readings from the external speed sensor.

To save the changes, use the SAVE function to store all changes and return to Setup & Calibration page 2. Alternatively, to discard any changes press ABORT to revert all changes and return to Setup & Calibration page 2.

14.2 Software Source

The Masterweigh Novus has the ability to generate a signal to simulate the speed of the belt. This can be done by setting the speed sensor source to Software. Having the signal simulated means there is no need for an external speed sensor. However this means Masterweigh Novus will no longer have a feedback signal to the actual speed of the belt. If slippage is present on the beltscale it will not be detected and thus Masterweigh Novus may register an incorrect mass rate.

By default the speed sensor source is in hardware mode. This can be changed by navigating the cursor to the speed sensor source variable and then pressing ENTER; use the LEFT and RIGHT key to toggle through the settings until software is displayed. Press ENTER again to select the option and re-engage the cursor.

Having software source selected enables the user to manually set the frequency of the signal. To set the frequency, move the cursor to the frequency variable and then press ENTER. Use the numerical keypad to enter whole numbers and press ENTER again to re-engage the cursor. Masterweigh Novus will not use the programmed frequency and the pulse per revolution from belt length calibration to calculate the belt speed and mass rate.

To save the changes, use the SAVE function to store all changes onto a sketch-pad and return to Setup & Calibration page 2. Alternatively, to discard the changes, press ABORT to revert all changes and return to Setup & Calibration page 2.

14.3 External Contact (Ext-Con) Source

The External Contact option allows the user to manually program a simulated frequency, but also has the ability to turn the simulated frequency on or off. This feature ensures that no accidental accumulation will occur when the belt is running empty on a simulated frequency.
To change the state of the simulated frequency, the user must pull the input signal to ground via the speed sensor terminals, shown above. When the input signal is floating, not grounded, the simulated frequency is invoked and Masterweigh Novus will calculate the mass rate using the programmed frequency. When the user pulls the signal input to ground (ie, via a relay), then the simulated frequency will be set to zero thus simulating no belt movement and no mass rate.
By default the speed sensor source is set to hardware mode. It can be changed by moving the cursor to the speed sensor source variable and then press ENTER; use the LEFT and a RIGHT key to toggle through the settings until Ext-Con is displayed. Press ENTER again to reselect the option and re-engage the cursor.

Once Ext-Con has been selected, the user can manually program the frequency of the signal. This can be done by having the cursor on the frequency variable and pressing ENTER. Use the numerical keypad to enter whole numbers and press ENTER again to re-engage the cursor. Masterweigh Novus will use the programmed frequency and the pulses per revolution from belt length calibration to calculate the belt speed and mass rate.

To save the change, use the SAVE function to store all changes onto a sketch-pad and return to Setup & Calibration page 2. Alternatively, to discard the changes, press ABORT to revert all changes and return to Setup & Calibration page 2.

The System Diagnostics menu has no adjustable variables; it is a display only menu with real time update on each variable. This menu can be used for diagnosing the Masterweigh Novus' performance, cross checking variable outputs and isolating faults. Values displayed within the menu are raw, unfiltered values.

To access System Diagnostics, manoeuver the cursor to Setup and Calibration page 2, then to '15. System Diagnostics'; alternatively press 15 on the numerical keypad. Once loaded, the following screen will be displayed.

Mass Rate Unlike the mass rate displayed on the HOME screen, the value displayed here is unfiltered. It has the potential to show negative values in scenarios where the zero may have drifted over time. It is constantly updated in real time.

Load Cell Output This variable displays the raw ADC conversion value of the weigh deck load cell in millivolts. It is constantly updated in real time.

Speed Sensor Output Displays the frequency received from the external speed sensor. The value displayed here is rounded to the closest whole number.

Belt Speed This displays the calculated belt speed.

Rate Output This variable displays the calculated current for the current loop. It can be used as a reference if the user is calibrating an external current meter.

16 – Access Code Setup

The Masterweigh Novus has the ability to lock unauthorized users out of the Setup & Calibration menu using the Access Code feature. With the access code feature enabled, the user is required to enter a four digit code prior to gaining access to the Setup & Calibration menu. Failing to enter the correct code will deny the user access, and return to the HOME screen.

In setting up the access code, the user is able to program two different sets of access codes to distinguish between service and operator users. The operator user is only allowed to access the System Diagnostics page; while the service user has access to all other menus and ability to change settings. Depending on the entered access code, Masterweigh Novus will determine which set of menus should be displayed within Setup & Calibration.

16 – Access Code Setup

16.1 – Enabling Access Code

By default the access code feature is disabled. Hence when entering the Access Code menu, the above screen is displayed. When accessing this menu under different circumstances, please go to section 16.2 Disable Access Code. To access the Access Code Setup, navigate the cursor to Setup & Calibration page 2, then to '16. Access Code Setup'; alternatively press 16 on the numerical keypad. Upon entering the menu the following screen is displayed:

To enable the access code feature, press ENTER to engage an editable field. Use the LEFT or RIGHT key to toggle this to enable and press ENTER again to re-engage the cursor. If enable is selected, upon re-engaging the cursor, extra options will appear as shown below:

Here the user is required to program two different sets of access codes. Navigate the cursor to 'Enter new 4-digit code' under Service Access Code. Press ENTER to engage an editable field and use the numerical keypad to enter a 4 digit code. Once the code is entered, press ENTER again to re-engage the cursor. Move the cursor to the next line 'Re-Enter 4-digit Code' and re-enter the same access code again in this option.

Similar to the Service Access Code setup procedure above, repeat the same process for the Operator Access Code section. The code for Operator Access Code cannot be the same as Service Access Code and all codes must be 4 digits long. If the same code is programmed for both Service and Operator access code the following warning screen will be prompted.

During the re-entering of any codes, if it does not match up with the initial entered access code, Masterweigh Novus will prompt the user with the following warning:

Once all the correct codes have been entered, press SAVE to temporarily store and enable the Access Code feature on a 'sketch pad' until final confirmation. Alternatively, press ABORT to discard the whole process and return to previous setting.

16.2 – Disable Access Code

If the access code feature has been enabled, upon accessing the Access Code Setup menu, the following screen will be displayed:
When the access code feature has been enabled, in accessing the Access Code Setup menu, the Masterweigh Novus assumes that the user wishes to disable to the feature. Thus the above screen is displayed.

Disable the access code feature by navigating the cursor to each service and operator access code option and enter their respective codes via the usual editing procedure. Once both codes have been entered correctly, press SAVE to disable and return to Setup & Calibration page 2. If either of the entered access codes is incorrect, Masterweigh Novus will deny the user from disabling the feature and display the following warning:
Alternatively press ABORT to exit the menu without disabling the feature.

17 – Save and Load Data

Masterweigh Novus' Save and Load data feature allows the user to quickly switch and load parameters to a different Masterweigh Novus unit during a factory operation procedure. This feature allows the user to store all the settings as a configuration file on an SD card from an existing operating Masterweigh Novus and then load them onto a different Masterweigh Novus running the same firmware. When the new Masterweigh Novus is loaded up using the configuration file, it would perform exactly as per the old unit without the need of a calibration procedure.

To access Save & Load Data menu, manoeuver the cursor to Setup & Calibration page 3 and then select '17. Save & Load Data'; alternatively press 17 on the numerical keypad. Within the menu, the user can choose between saving settings onto an SD card by using the 'Save Parameter' option or loading settings onto the Masterweigh Novus from the SD card using the 'Load Previous Parameters' option.

17.1 – Save Parameters

To save parameters onto the SD card, insert a SD card into the card reader located on the CPU board. Once the card is installed, navigate the cursor onto the "Save Parameter" option and press ENTER. The following confirmation screen will appear:
Press ENTER again to save the current settings within the Masterweigh Novus unit onto the SD card, else press ABORT to return to the Save & Load Data menu selection page.
Data stored on the SD card can be read by other Masterweigh Novus units or on the PC to decipher the stored values. These files are saved in chronological order with respect to the number of files on the SD card. When saving the data, Masterweigh Novus will detect the last configuration file present on the SD card, and increment the number as the file name.

When trying to save the data without an SD card installed, Masterweigh Novus will detect the SD card being as absent and will prompt the user via the following warning screen:

17.2 – Load Parameters

Loading previous parameters, allows the user to quickly copy settings from a different Masterweigh Novus machine onto the current machine. It is important to note that the configuration file being loaded must be saved under the same firmware version. Loading a configuration file saved under a different firmware version may result in faulty software and incorrect measurements.

To load the parameters from the SD card, while in from the Save & Load Data menu, navigate the cursor to 'Load Previous Parameters' and press ENTER. The display will then change to the following screen:

Here the user is able to scroll through all the configuration files present on the SD card. The files will be ascending in chronological order, thus the most recent will be at the bottom. If there are more files present on the SD card than displayed on the on-screen list, scroll to the bottom to move onto the following page.

Once the cursor has been navigated to the desired configuration file, press ENTER to confirm the loading process. Masterweigh Novus will prompt the user for a file confirmation shown below:

When the settings have been loaded onto the Masterweigh Novus, the display will exit to the Save & Load Data menu. From here, press SAVE or ABORT to exit the menu and then HOME to return to the HOME screen.

18 – Audit Trail

The Audit Trail menu, allows the user to interrogate the Masterweigh Novus for when an irregular fault has occurred. The feature stores the time and date of when the unit starts up and records the values of the zero and span calibration. This feature ensures a paper-trail is left, and when any setting is changed in the machine, it is documented. This paper-trail can also be downloaded onto the SD card as a CSV (comma separated vector) file for easy viewing on a PC.

To view the audit trail on screen, navigate the cursor to Setup & Calibration page 3, then to '18. Audit Trail'; alternatively press 18 on the numerical keypad. The following screen will be displayed:
Here the user can choose between viewing the audit trail on screen or to download it onto the SD Card.

18.1 – View Audit Trail

To view the audit trail on screen, move the cursor to 'View Audit Trail' and press ENTER. The screen will then display the following:
The audit trail has a total of 13 pages. Each line represents an action recorded by the Masterweigh Novus'. Actions are recorded in descending chronological order; thus the latest action will be at the top of the list, while the older actions are pushed to the bottom of the list. The user may manoeuver between each page using the UP and DOWN arrow keys on the keypad.

As this is a view only menu, no changes can be performed on the list. Press ABORT to exit the sub-menu and return to the Audit Trail menu.

When all 13 pages of the audit trail have been filled, the list will start eliminating the oldest record. However this does not mean it is lost. When the user downloads the audit trail onto an SD card, those older records will still remain.

18.2 – Download Audit Trail

When seeking for older records which cannot be displayed in the 'View Audit Trail' menu, the user can download the whole Audit Trail onto an SD card to view on a PC.
To download the audit trail, under Audit Trail menu, move the cursor to 'Download Audit Trail'. If there is an SD card present in the card holder, the Masterweigh Novus will automatically download the whole audit trail file onto the SD card as a CSV file. This is shown below:
If an SD card is not present within the card holder during the download initiation, Masterweigh Novus will prompt the user with the following warning screen.
The warning screen will disappear after a few seconds and return the Audit Trail menu.

To erase an audit trail, the EEPROM must be erased. Erasing the EEPROM will erase all settings on the unit causing it to not function correctly unless calibrated. The EEPROM should not be erased unless there is a firmware upgrade.

Appendix D: Fieldbus Communications

The following list contains data transferred via the fieldbus communication. Data for all types of fieldbus communication are the same.

	Output
1	Mass Rate
2	Mass Total
3	Load Cell Value
4	Tacho Frequency
5	Belt Speed
6	Zero Value
7	Span Value
8	Belt Loading
9	System Healthy
10	PID Output
11	Inlet Boot Low Level
12	Inlet Boot Refill Percentage
13	Inlet Boot Refill
14	Auto Zero Tracking
	Input
15	Bus Control
16	Setpoint Input
17	Reset Mass Total

Glossary

Linearity
The quality of delivering identical sensitivity throughout the weighing capacity of a scale or balance.

Linearity Calibration
A method that minimizes deviation between actual and displayed weights within the weighing range of the scale. It utilizes three calibration points, one at zero, centre span and full span.

Linearity Test
A test that measures an instrument's ability to have consistent sensitivity throughout the weighing range.

Load Cell
A load cell is a transducer that is used to create an electrical signal whose magnitude is directly proportional to the force being measured.

Non-Linearity
The maximum deviation of the calibration curve from a straight line drawn between the no-load and rated load outputs, expressed as a percentage of the rated output and measured on increasing load only.

Non-Volatile Memory.
A computer storage medium whose contents do not change when the power is switched off, and are available when it is switched on again.

Overload Rating, "Safe"
The maximum load which can be applied without producing a permanent shift in performance characteristics(beyond those specified), expressed in percent of rated capacity.

Overload Rating, "Ultimate"
The maximum load which can be applied without producing a structural failure, expressed in percent of rated capacity.

Random-Access Memory (RAM)
A data storage device that can be accessed in any order, known as a read/write memory since information can be written into it and then read out by the microprocessor when needed. Contents are lost when the system is powered down.

Read-Only Memory (ROM)
A memory unit in which information or instructions are permanently stored for use by the machine, or for reference by the user. Stored data is read out non-destructively and no information can subsequently be written into the memory.

Repeatability
The maximum difference between load cell output readings for repeated loadings under identical conditions (loading and environmental); the ability of an instrument, system, or method to give identical performance or results in successive instances.

Sense
Compensates for the resistance changes in the copper wiring, by comparing the supplied excitation voltage to the applied excitation voltage at the load cell.

Setpoint
In a feedback control loop, the point which determines the desired value of the quantity being controlled.

Span
The difference between the highest and lowest values.

Glossary

Span Calibration
Utilizing two calibration points; one at zero and a choice of either half capacity or full capacity.

Stay Rods
Rods installed to rigidly restrain a vessel or other weighing system component in the horizontal position, with little effect on the system's accuracy when they are installed properly.

Strain Gauge
A device for detecting the strain that a certain force produces on a body. The gauge consists of one or more fine wires that are cemented to the surface under test, and the wires stretch or compress as the surface becomes strained, changing their resistance. Several strain gauges are used to make up a load cell.

Tare
The weight of an empty container or vehicle, or the allowance or deduction from gross weight made on account thereof (typically a compensating adjustment to a scale to return it to zero with the container on the scale).

Target Weight
This is a calculated weight that the weigher should display following a span test using a set of weights, placed on the weighframe for a given number of belt revolutions.

Watertight
An enclosure that is constructed in a manner that prevents moisture from entering it under specified test conditions.

Weatherproof
An enclosure that is constructed or protected in a manner that exposure to the weather will not interfere with the successful operation of the equipment it contains.

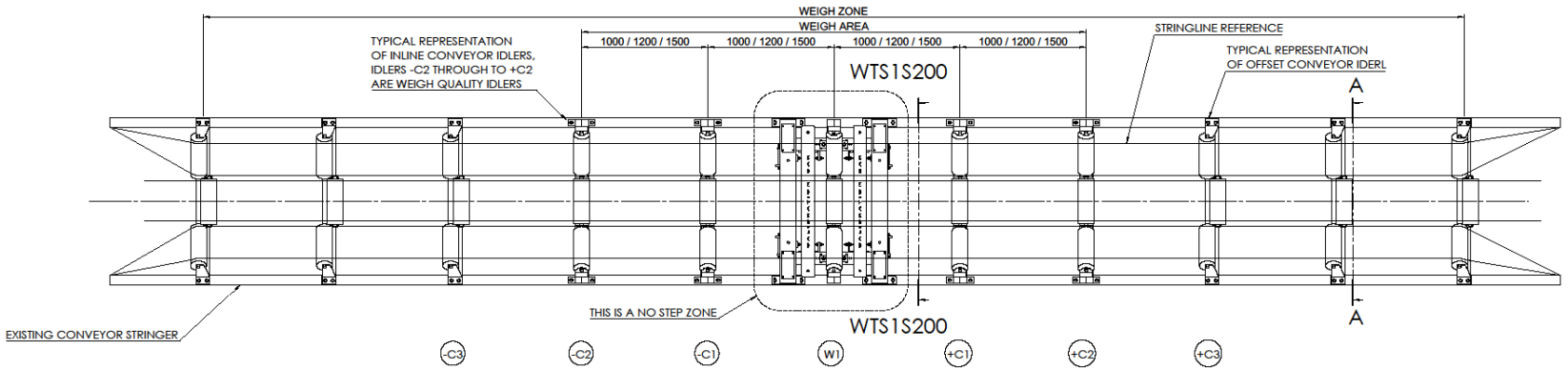
Weight
The amount of force or gravitational pull by which an object or body is attracted toward the center of the earth.

Zero Function
By performing the function in Menu 4, the scale display returns to zero.

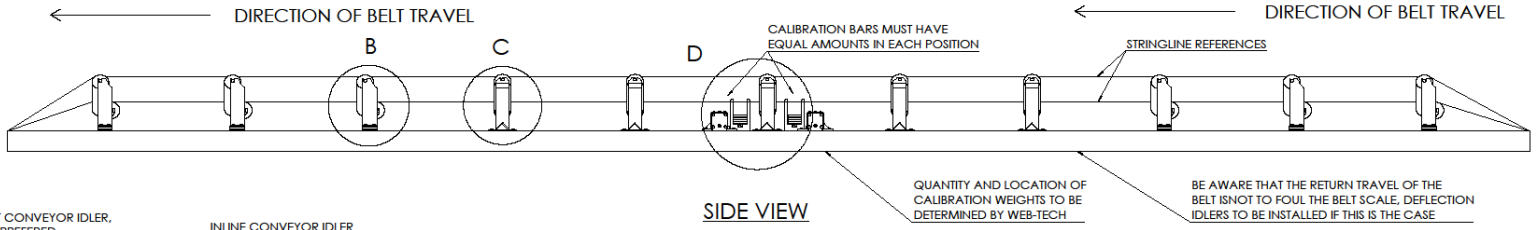
Zero-Track Band
Automatically zeroes off the scale within the specified range, and is most often used to zero off the buildup of water, ice, and snow on a scale.

WTS1S2 INSTALLATION AND OPERATION MANUAL

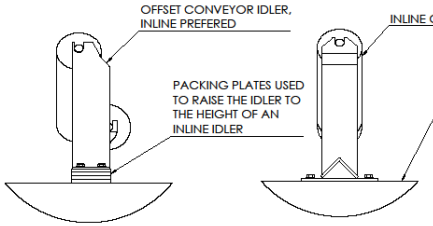
Appendix A – WTS1S2 General Arrangements



PLAN VIEW

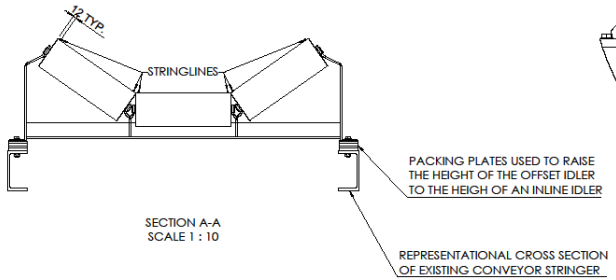


SIDE VIEW

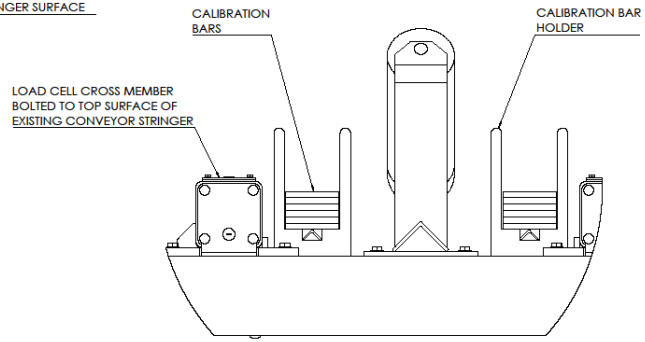


DETAIL B
SCALE 1 : 7.5

DETAIL C
SCALE 1 : 7.5



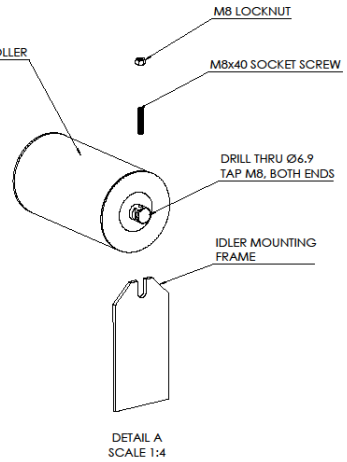
SECTION A-A
SCALE 1 : 10



DETAIL D
SCALE 1 : 5

NOTES

1. CONVEYOR IDLERS FROM +C2 THRU TO -C2 (WEIGH QUALITY, 5 OFF) MUST BE INLINE IDLERS, NOT OFFSET IDLERS
2. CONVEYOR IDLERS FROM +C3 THRU TO -C3 MUST BE MOUNTED AT RIGHT ANGLES TO THE DIRECTION OF BELT CENTRELINE, DIMENSIONS SHOWN BETWEEN IDLERS MUST BE MAINTAINED TO A TOLERANCE OF ±0.5mm
3. IGNORE THIS NOTE IF INLINE IDLERS ARE SOLEY USED GENERALLY IDLER HEIGHTS FOR OFFSET IDLERS IS LESS THAN THOSE FOR INLINE IDLERS. PACKERS MAY BE USED TO RAISE OFFSET IDLERS TO THE HEIGHT OF INLINE IDLERS. (REFER TO DETAIL B) AS A RULE, A 3.0mm GRADIENT PER METRE IS AN ALLOWABLE TOLERANCE HEIGHT BETWEEN ROLL HEIGHTS
4. ROLLS +C2 THRU TO -C2, INCLUDING W2 THRU TO W1 ARE TO BE DRILLED AND TAPPED M8, (15 ROLLS IN TOTAL). REFER DETAIL A.
5. PRIOR TO ALIGNING IDLERS, LOSSEN OFF THE TRANSIT / SHIPPING BOLTS AND REMOVE TRANSIT PACKERS, REFER TO DRAWING WTS1S200 FOR THEIR LOCATION
6. ALL ROLLS MUST BE ADJUSTED TO STRINGLINE REFERENCE TO A TOLERANCE OF ±0.4mm, -0.0mm. LEVEL CENTRE ROLLS ON +C2 AND -C2 IDLERS PRIOR TO ANY ADJUSTMENTS. ENSURE ALL LOCKING NUTS BE TIGHTENED AFTER ADJUSTMENTS ARE COMPLETED



DETAIL A
SCALE 1:4

REVISIONS

A- 04/11/08 ISSUED FOR APPROVAL

B- 03/06/16 B.ROBINSON CONVERTED TO SOLIDWORKS REARRANGED DRAWINGS

C- 16/01/17 B.ROBINSON CORRECTED DIRECTION OF BELT TRAVEL

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	T.BERNADE
CHECKED	
APPROVED	
DATE APP'D	
SCALE	1:20

DO NOT SCALE IF IN DOUBT ASK

WEB-TECH AUSTRALIA PTY. LTD.
A.C.N. 010 764 431
11 ELECTRONICS STREET EIGHT MILE PLAINS, QUEENSLAND, 4113, AUSTRALIA
P.O. BOX 4006 EIGHT MILE PLAINS, QUEENSLAND, 4113, AUSTRALIA
Phone +61-7-3841 2844 Fax +61-7-3841 0005

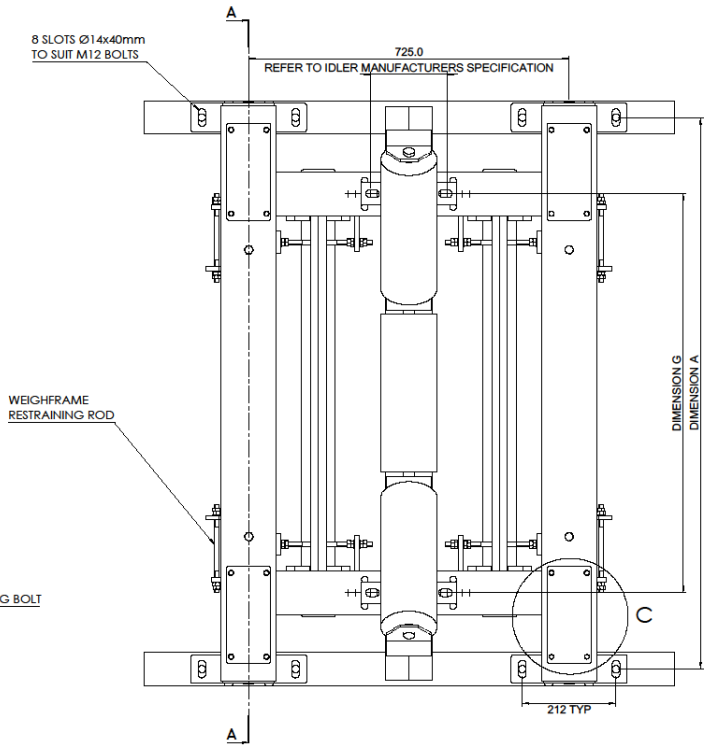
TITLE

MODEL WTS1 SERIES II FULLY FLOATING WEIGHFRAME INSTALLATION GENERAL ARRANGEMENT

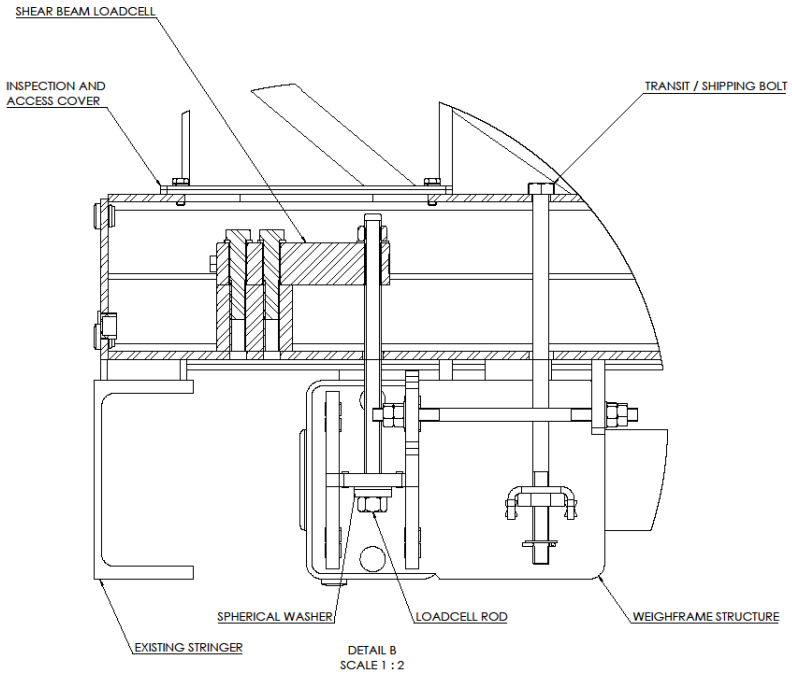
ALL DIMENSIONS IN MILLIMETRES UNLESS OTHERWISE SPECIFIED

SIZE	DRAWING No.	
A1	NUMBER WTS1S210	REV. C
	CUSTOMER	
	PROJECT	
	CAD FILE WTS1S210 - Installation General Arrangement	

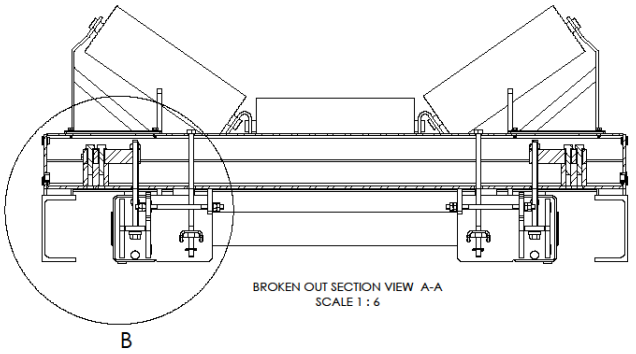
BELT WIDTH	A	G
500 mm	750mm	404mm
600 mm (24")	850mm	504mm
650 mm	900mm	554mm
750 mm (30")	1000mm	654mm
800 mm	1050mm	704mm
900 mm (36")	1150mm	804mm
1000 mm	1250mm	904mm
1050 mm (42")	1300mm	954mm
1200 mm (48")	1450mm	1104mm
1350 mm (54")	1650mm	1254mm
1400 mm	1700mm	1304mm
1500 mm (60")	1800mm	1404mm
1600 mm	2000mm	1504mm
1800 mm (72")	2200mm	1704mm
2000 mm	2400mm	1904mm
2200 mm	2600mm	2104mm



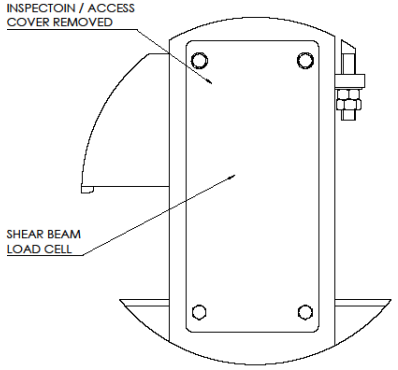
PLAN VIEW



DETAIL B
SCALE 1 : 2



BROKEN OUT SECTION VIEW A-A
SCALE 1 : 6



DETAIL C
SCALE 1 : 2

REVISIONS

A: 03/09/01 ISSUED FOR APPROVAL

B: 12/11/02 T.BERNADI
DIMENSIONS ADDED FOR WEIGH FRAME DEPTH
ECN: 0000

C: 12/11/02 K.WEBSTER
DIM G ADDED
ECN: 0000

D: 02/06/16 B.ROBINSON
CONVERTED TO SOLIDWORKS
DRAWING FORMAT ADDED
NOW 4 LOAD CELL CONFIG

UNLESS OTHERWISE STATED
UNTOLERANCED DIMENSIONS
TO BE WITHIN THE LIMITS SHOWN

NOMINAL SIZE	UP TO 30	ABOVE 30 UP TO 120	ABOVE 120 UP TO 500	ABOVE 500 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: T.BERNARDI
CHECKED:
APPROVED:
DATE APP'D:
SCALE: 1:6

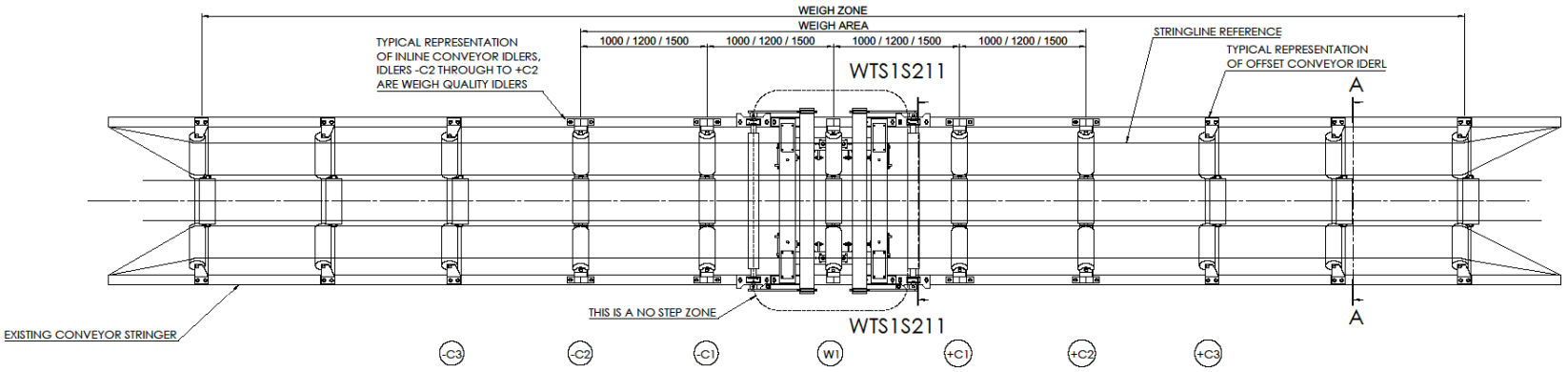
DO NOT SCALE
IF IN DOUBT
ASK.

WEB-TECH AUSTRALIA PTY. LTD.
A.C.N. 010 744 451
11 ELECTRONICS STREET EIGHT MILE PLAINS, QUEENSLAND, 4113, AUSTRALIA
P.O. BOX 4006 EIGHT MILE PLAINS, QUEENSLAND, 4113, AUSTRALIA
Phone +61-7-3841 3844 Fax +61-7-3841 3888

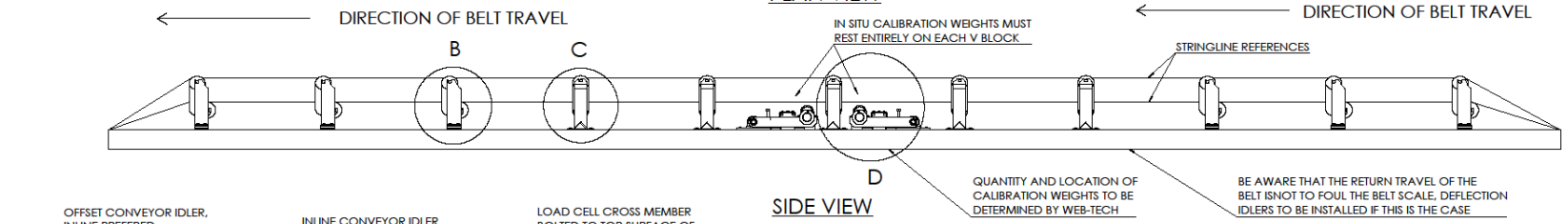
TITLE
MODEL WTS1 SERIES II
FULLY FLOATING WEIGHFRAME WITH CALIBRATION BARS
INSTALLATION GENERAL ARRANGEMENT

ALL DIMENSIONS IN MILLIMETRES
UNLESS OTHERWISE SPECIFIED

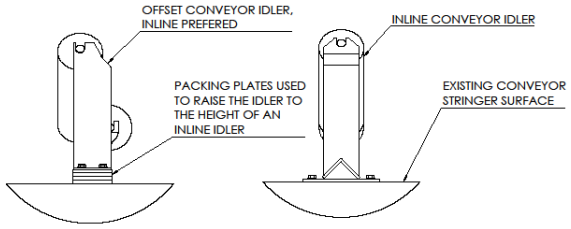
SIZE: A1
DRAWING No.
NUMBER: WTS1S200
REV.: D
CUSTOMER
PROJECT
CAD FILE: WTS1S200d - Model WTS1S2 Fully Floating Weighframe General Arrangement



PLAN VIEW

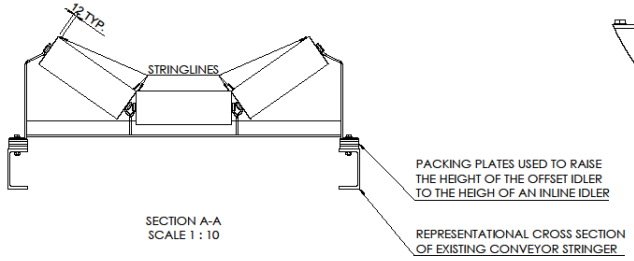


SIDE VIEW

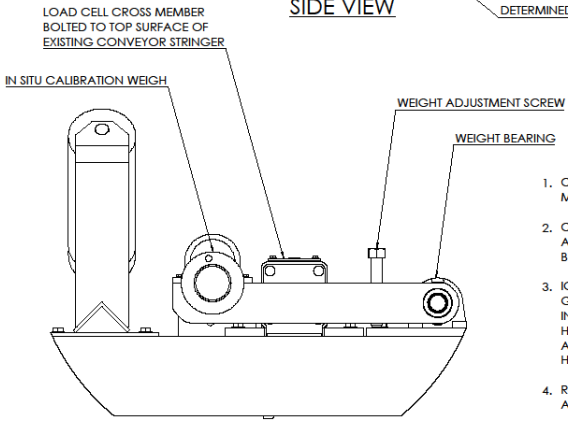


DETAIL B
SCALE 1 : 7.5

DETAIL C
SCALE 1 : 7.5



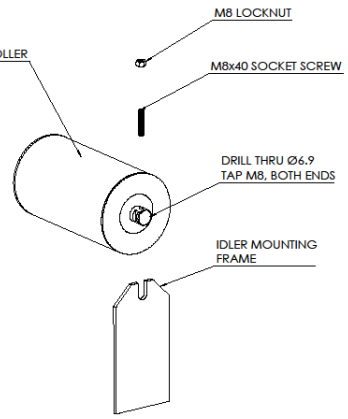
SECTION A-A
SCALE 1 : 10



DETAIL D
SCALE 1 : 5

NOTES

1. CONVEYOR IDLERS FROM +C2 THRU TO -C2 (WEIGH QUALITY, 5 OFF) MUST BE INLINE IDLERS, NOT OFFSET IDLERS
2. CONVEYOR IDLERS FROM +C3 THRU TO -C3 MUST BE MOUNTED AT RIGHT ANGLES TO THE DIRECTION OF BELT CENTRELINE, DIMENSIONS SHOWN BETWEEN IDLERS MUST BE MAINTAINED TO A TOLERANCE OF ±0.5mm
3. IGNORE THIS NOTE IF INLINE IDLERS ARE SOLEY USED GENERALLY IDLER HEIGHTS FOR OFFSET IDLERS IS LESS THAN THOSE FOR INLINE IDLERS. PACKERS MAY BE USED TO RAISE OFFSET IDLERS TO THE HEIGHT OF INLINE IDLERS. (REFER TO DETAIL B) AS A RULE, A 3.0mm GRADIENT PER METRE IS AN ALLOWABLE TOLERANCE HEIGHT BETWEEN ROLL HEIGHTS
4. ROLLS +C2 THRU TO -C2, INCLUDING W2 THRU TO W1 ARE TO BE DRILLED AND TAPPED M8, (15 ROLLS IN TOTAL). REFER DETAIL A.
5. PRIOR TO ALIGNING IDLERS, LOSSEN OFF THE TRANSIT / SHIPPING BOLTS AND REMOVE TRANSIT PACKERS, REFER TO DRAWING WTS1S200 FOR THEIR LOCATION
6. ALL ROLLS MUST BE ADJUSTED TO STRINGLINE REFERENCE TO A TOLERANCE OF ±0.4mm, -0.0mm. LEVEL CENTRE ROLLS ON +C2 AND -C2 IDLERS PRIOR TO ANY ADJUSTMENTS. ENSURE ALL LOCKING NUTS BE TIGHTENED AFTER ADJUSTMENTS ARE COMPLETED



DETAIL A
SCALE 1:4

REVISIONS

A:- 08/06/16 B.ROBINSON
ISSUED FOR APPROVAL

B:- 16/01/16 B.ROBINSON
CORRECTED THE DIRECTION OF BELT TRAVEL

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 500	ABOVE 500 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	B.ROBINSON
CHECKED	
APPROVED	
DATE APP'D	
SCALE	1:20
	DO NOT SCALE IF IN DOUBT ASK

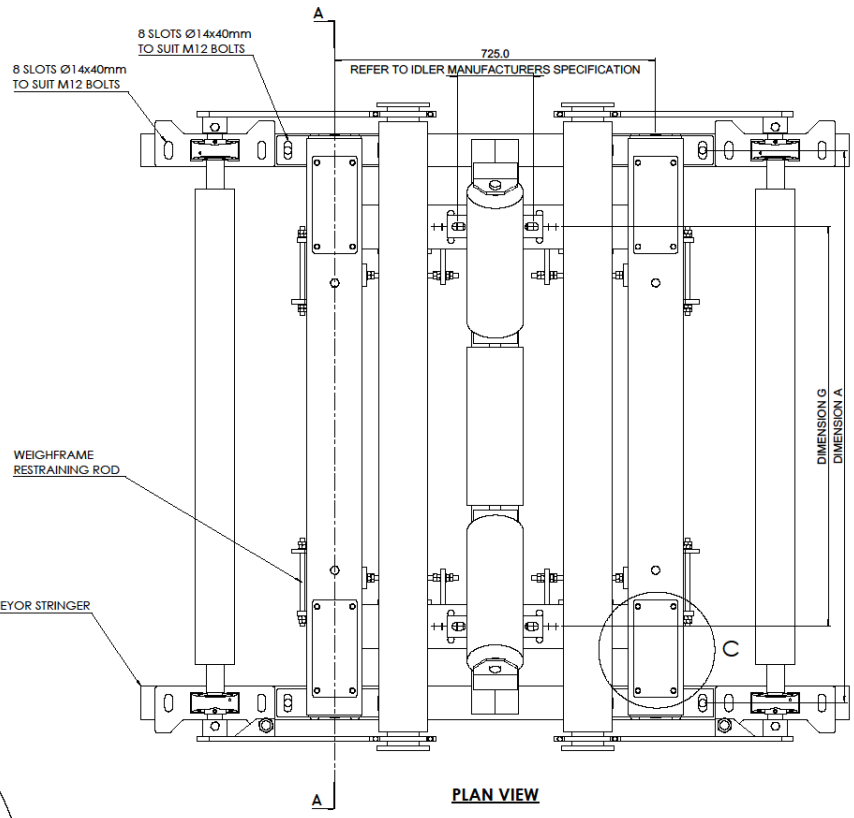
WEB-TECH AUSTRALIA PTY. LTD.
A.C.N. 010 764 431
11 ELECTRONICS STREET EIGHT MILE PLAINS, QUEENSLAND, 4113, AUSTRALIA
P.O. BOX 4006 EIGHT MILE PLAINS, QUEENSLAND, 4113, AUSTRALIA
Phone +61-7-3841 2844 Fax +61-7-3841 0005

TITLE
MODEL WTS1 SERIES II
FULLY FLOATING WEIGHFRAME WITH IN SITU CALIBRATION WEIGHTS
INSTALLATION GENERAL ARRANGEMENT

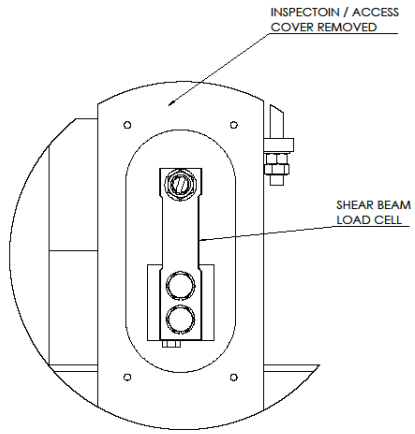
ALL DIMENSIONS IN MILLIMETRES UNLESS OTHERWISE SPECIFIED

SIZE	DRAWING No.	
A1	NUMBER WTS1S212	REV. B
	CUSTOMER	
	PROJECT	
	CAD FILE WTS1S212b - Installation General Arrangement	

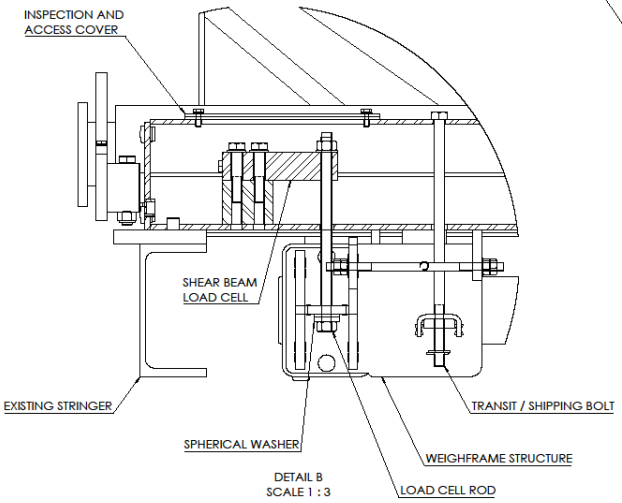
BELT WIDTH	A	G
500 mm	750mm	404mm
600 mm (24")	850mm	504mm
650 mm	900mm	554mm
750 mm (30")	1000mm	654mm
800 mm	1050mm	704mm
900 mm (36")	1150mm	804mm
1000 mm	1250mm	904mm
1050 mm (42")	1300mm	954mm
1200 mm (48")	1450mm	1104mm
1350 mm (54")	1650mm	1254mm
1400 mm	1700mm	1304mm
1500 mm (60")	1800mm	1404mm
1600 mm	2000mm	1504mm
1800 mm (72")	2200mm	1704mm
2000 mm	2400mm	1904mm
2200 mm	2600mm	2104mm



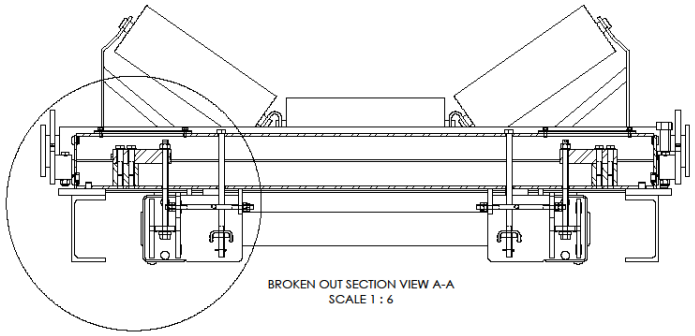
PLAN VIEW



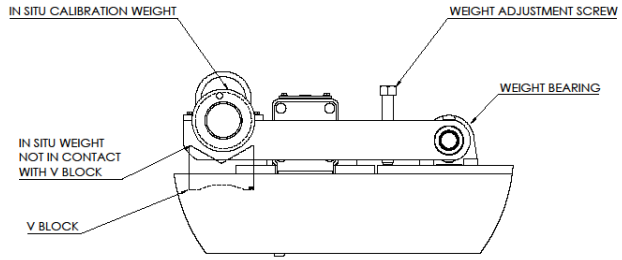
DETAIL C
SCALE 1 : 2



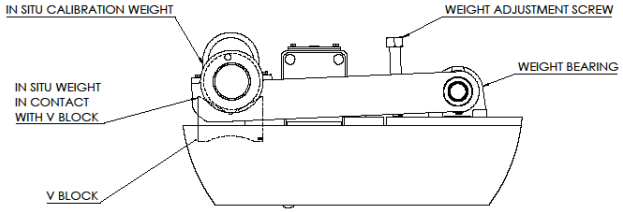
DETAIL B
SCALE 1 : 3



BROKEN OUT SECTION VIEW A-A
SCALE 1 : 6



DETAIL D
IN SITU WEIGHTS SHOWN IN BELT SCALE OPERATION MODE
SCALE 1 : 5



DETAIL E
IN SITU WEIGHTS SHOWN IN BELT SCALE CALIBRATION MODE
SCALE 1 : 5

REVISIONS
A : 08/06/2016 B.ROBINSON
ISSUED FOR APPROVAL

UNLESS OTHERWISE STATED
UNTOLERANCED DIMENSIONS
TO BE WITHIN THE LIMITS SHOWN

NOMINAL SIZE	UP TO 30	ABOVE 30 UP TO 120	ABOVE 120 UP TO 315	ABOVE 315 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: B.ROBINSON
CHECKED:
APPROVED:
DATE APP'D:
SCALE: 1:6

DO NOT SCALE
IF IN DOUBT
ASK

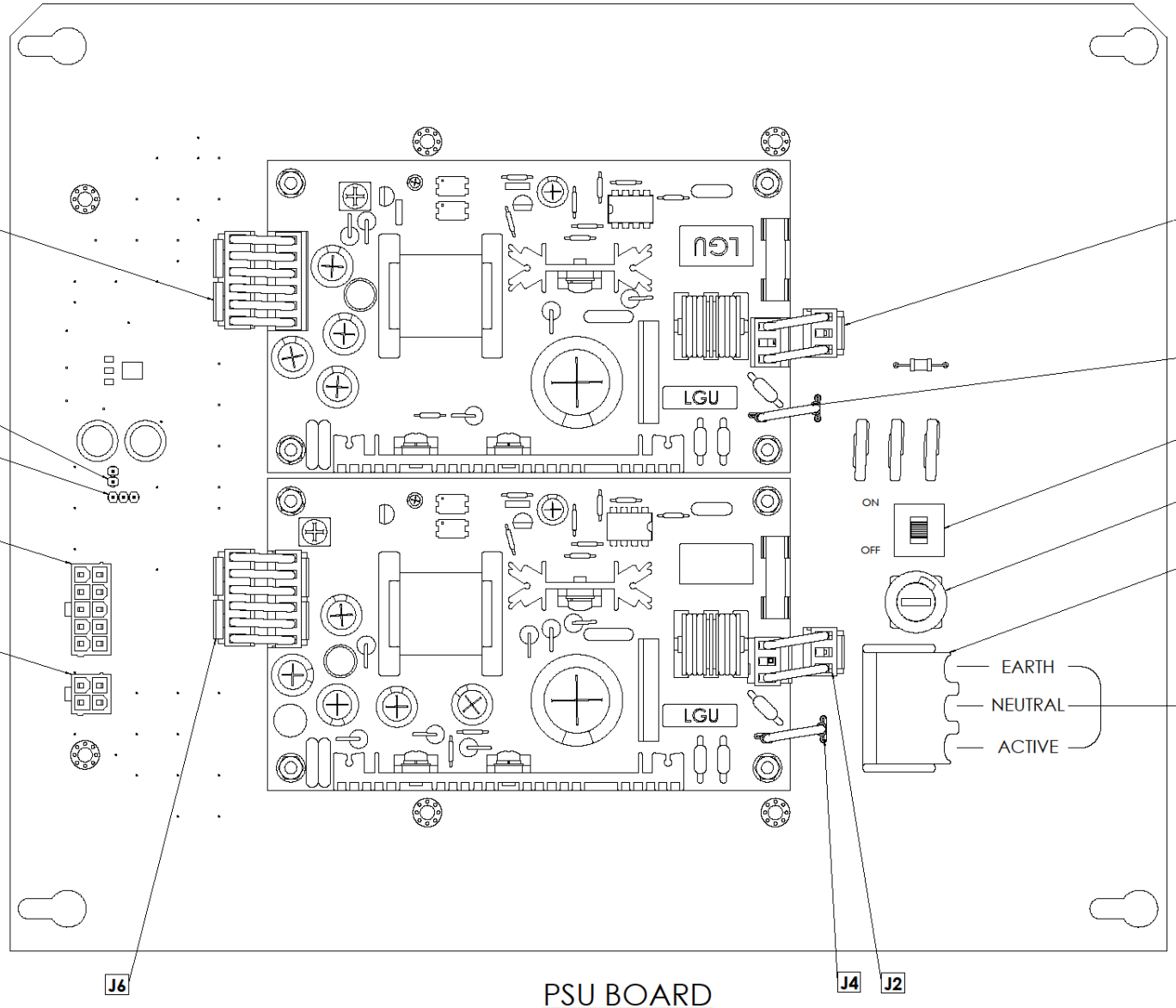
WEB-TECH AUSTRALIA PTY. LTD.
A.C.N. 010 764 431
11 ELECTRONICS STREET EIGHT MILE PLAINS, QUEENSLAND, 4113, AUSTRALIA
P.O. BOX 4006 EIGHT MILE PLAINS, QUEENSLAND, 4113, AUSTRALIA
Phone +61-7-3841 2844 Fax +61-7-3841 0005

TITLE
MODEL WTS1 SERIES II
FULLY FLOATING WEIGHFRAME WITH INSITU CALIBRATION WEIGHTS
INSTALLATION GENERAL ARRANGEMENT

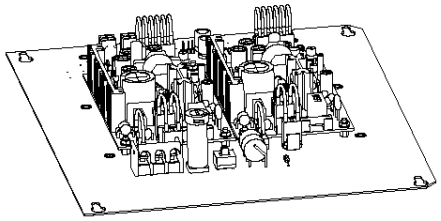
ALL DIMENSIONS IN MILLIMETRES
UNLESS OTHERWISE SPECIFIED

SIZE: A1
DRAWING No.
NUMBER: WTS1S211
REV.: A
CUSTOMER
PROJECT
CAD FILE
WTS1S211a - Model WTS1S21 Fully Floating Weighframe General Arrangement Insitu

Appendix B – Wiring Diagrams



PSU BOARD



PSU BOARD 3D VIEW

NAME	DESCRIPTION
F1	MAIN FUSE
SW1	PCB POWER SWITCH
J1	MAINS POWER SUPPLY INPUT
J2	ACTIVE / NEUTRAL TO SWITCHING POWER SUPPLY
J3	ACTIVE / NEUTRAL TO SWITCHING POWER SUPPLY
J4	EARTH TO SWITCHING POWER SUPPLY
J5	EARTH TO SWITCHING POWER SUPPLY
J6	SWITCHING TRANSFORMER OUTPUT
J7	SWITCHING TRANSFORMER OUTPUT
J8	PCB POWER INTERCONNECT SOCKET
J9	PCB POWER INTERCONNECT SOCKET
LK1	*24VDC POWER SUPPLY USE ONLY
LK2	*24VDC POWER SUPPLY USE ONLY

REVISIONS

A:	20/05/16 ORIGINAL ISSUE	B.ROBINSON
B:	03/06/16 ADDED LEGEND ADDED 3D VIEW ADDED LK0 FIXED LEADERS	B.ROBINSON
C:	01/12/16 CHANGED DRAWING MODEL	B.ROBINSON
D:	07/12/16 REMOVED NOVUS POWER CONSUMPTION	B.ROBINSON

UNLESS OTHERWISE STATED
UNTOLERANCED DIMENSIONS
TO BE WITHIN THE LIMITS SHOWN

NOMINAL SIZE	UP TO 30	ABOVE 30 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	BRETT ROBINSON
CHECKED	
APPROVED	
DATE APP'D	
SCALE	1.8:1

DO NOT SCALE
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ASK

ALL DIMENSIONS IN MILLIMETERS
UNLESS OTHERWISE SPECIFIED

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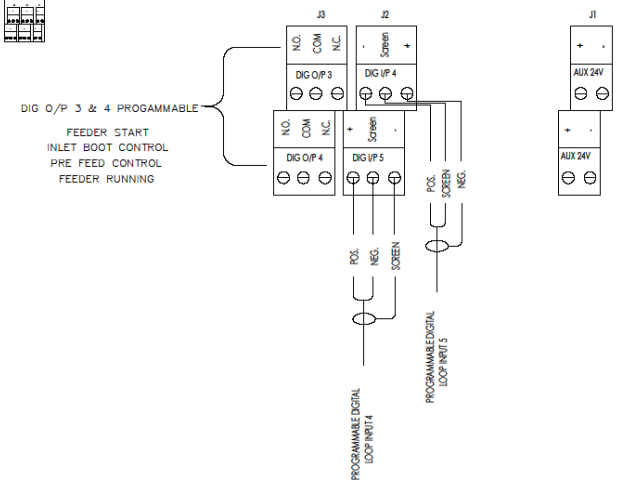
Phone +61-7-3841 3544 Fax +61-7-3841 3500

TITLE: NOVUS POWER BOARD TERMINATION LAYOUT

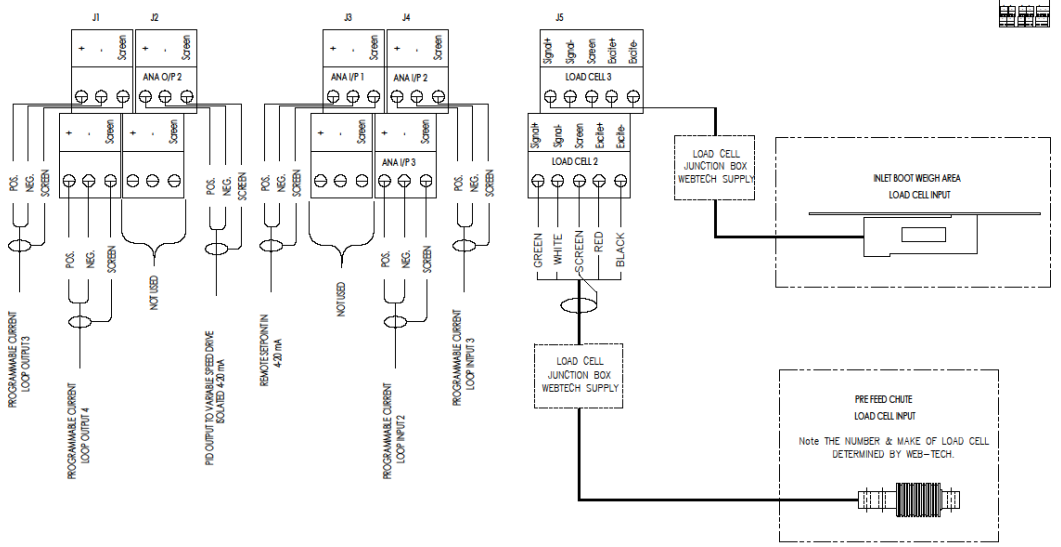
WEB-TECH

SIZE	A1
DRAWING No.	
NUMBER	NOVUS03
REV.	D
CUSTOMER	
PROJECT	
CAD FILE	NOVUS03d - Novus PSU Board

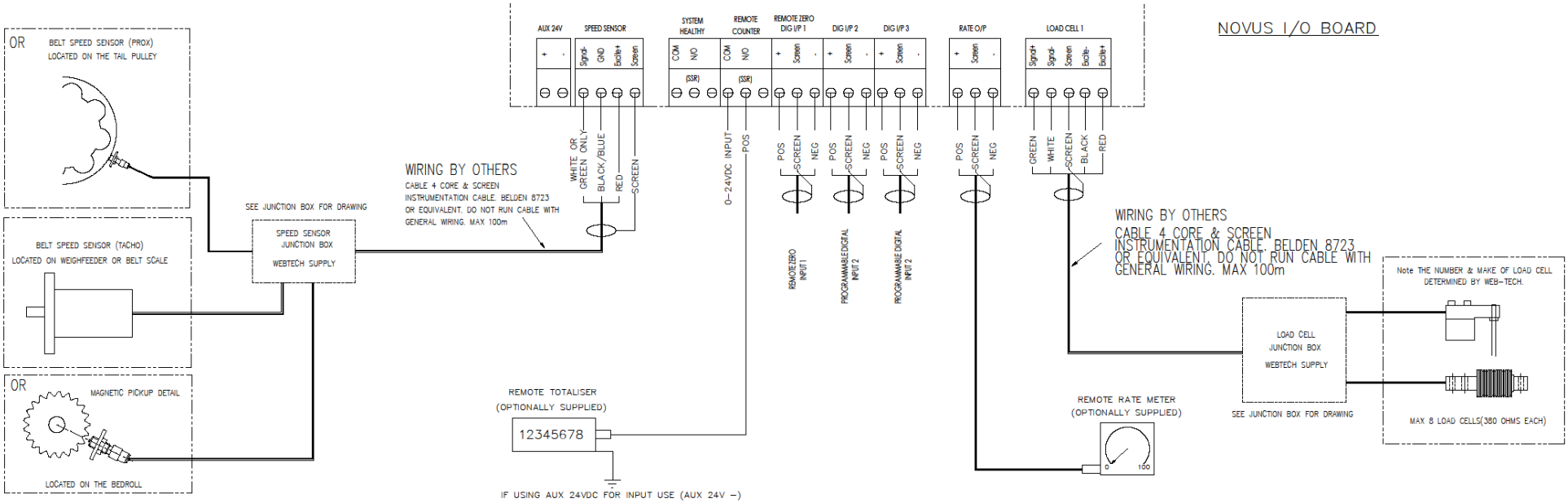
NOVUS DIGITAL PLUG IN BOARD



NOVUS ANALOGUE PLUG IN BOARD



NOVUS I/O BOARD



REVISIONS
A: 15/4/06 ISSUED FOR REFERENCE
REVISION 1: 13/01/2015 BY: JAMES ROGER - EDITED DIGITAL PLUG IN BOARD - SWAPPED REMOTE COUNTER & SYSTEM HEALTHY ON I/O BOARD - SWAPPED PRE FEED & INLET BOOT LOAD CELL POSITIONS
C: 19/08/16 B.ROBINSON UPDATED LABELS ACCORDING TO LATEST VERSION OF HOWIS
D: 30/11/16 B.ROBINSON REMOVED PROBES FOR LOAD INPUTS ADDED DIGITAL WIRE LABELS

UNLESS OTHERWISE STATED UNTOLERANCED DIMENSIONS TO BE WITHIN THE LIMITS SHOWN

NOMINAL SIZE	UP TO 90	ABOVE 90 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	LH
CHECKED	
APPROVED	
DATE APP'D	
SCALE	

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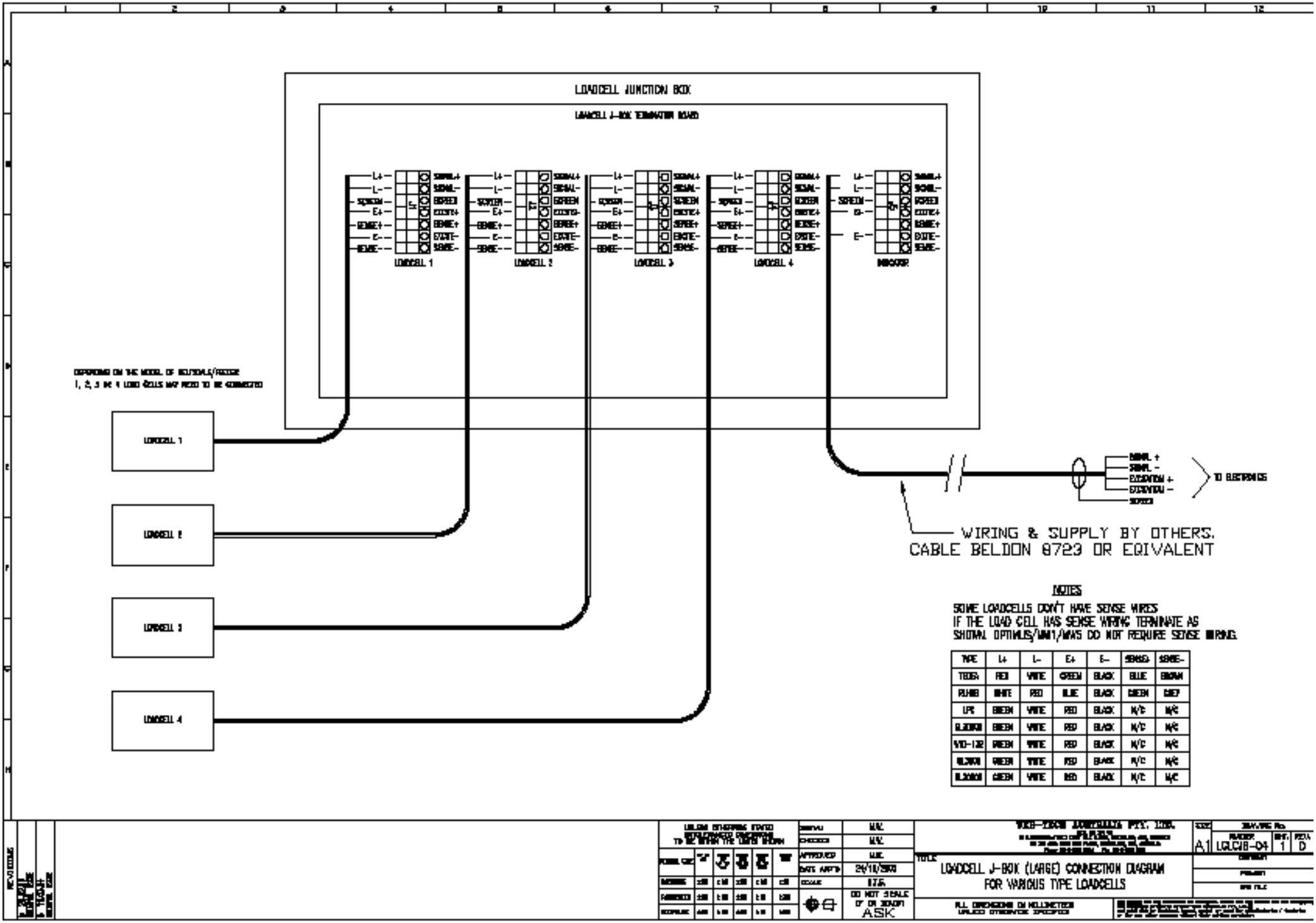
P.O. BOX 4006 EIGHT MILE PLAINS, QUEENSLAND, 4113, AUSTRALIA
Phone +61-7-3841 2844 Fax +61-7-3841 0305

TITLE: NOVUS I/O AND PLUG IN BOARD TERMINATION LAYOUT

ALL DIMENSIONS IN MILLIMETRES UNLESS OTHERWISE SPECIFIED

SIZE	DRAWING No.	
A1	NUMBER 089-06-02	REV. D
	CUSTOMER	
	PROJECT	
	CAD FILE W:\OPTIMA\DOS	



NOTES

SOME LOADCELLS DON'T HAVE SENSE WIRES
IF THE LOAD CELL HAS SENSE WIRING TERMINATE AS
SHOWN. OPTIMUS/MM1/MM5 DO NOT REQUIRE SENSE WIRING.

TYPE	L+	L-	E+	E-	SENSE+	SENSE-
TEDEA	RED	WHITE	GREEN	BLACK	BLUE	BROWN
RUHBE	WHITE	RED	BLUE	BLACK	GREEN	GREY
LPC	GREEN	WHITE	RED	BLACK	N/C	N/C
BLH/HBM	GREEN	WHITE	RED	BLACK	N/C	N/C
VHD-132	GREEN	WHITE	RED	BLACK	N/C	N/C
BLH/HBM	GREEN	WHITE	RED	BLACK	N/C	N/C
BLH/HBM	GREEN	WHITE	RED	BLACK	N/C	N/C

REVISIONS								

UNLESS OTHERWISE STATED DIMENSIONS ARE IN MILLIMETRES TO BE WITHIN THE LIMITS SHOWN

DRAWN					M.K.
CHECKED					M.K.
APPROVED					M.K.
DATE APP'D					24/10/03
SCALE					N.T.S.
					DO NOT SCALE OF OR 3DCAD ASK

WEB-TECH AUSTRALIA PTY. LTD.

SIZE A1

DRAWING No. LQJC18-04 SHT. 1 REV. D

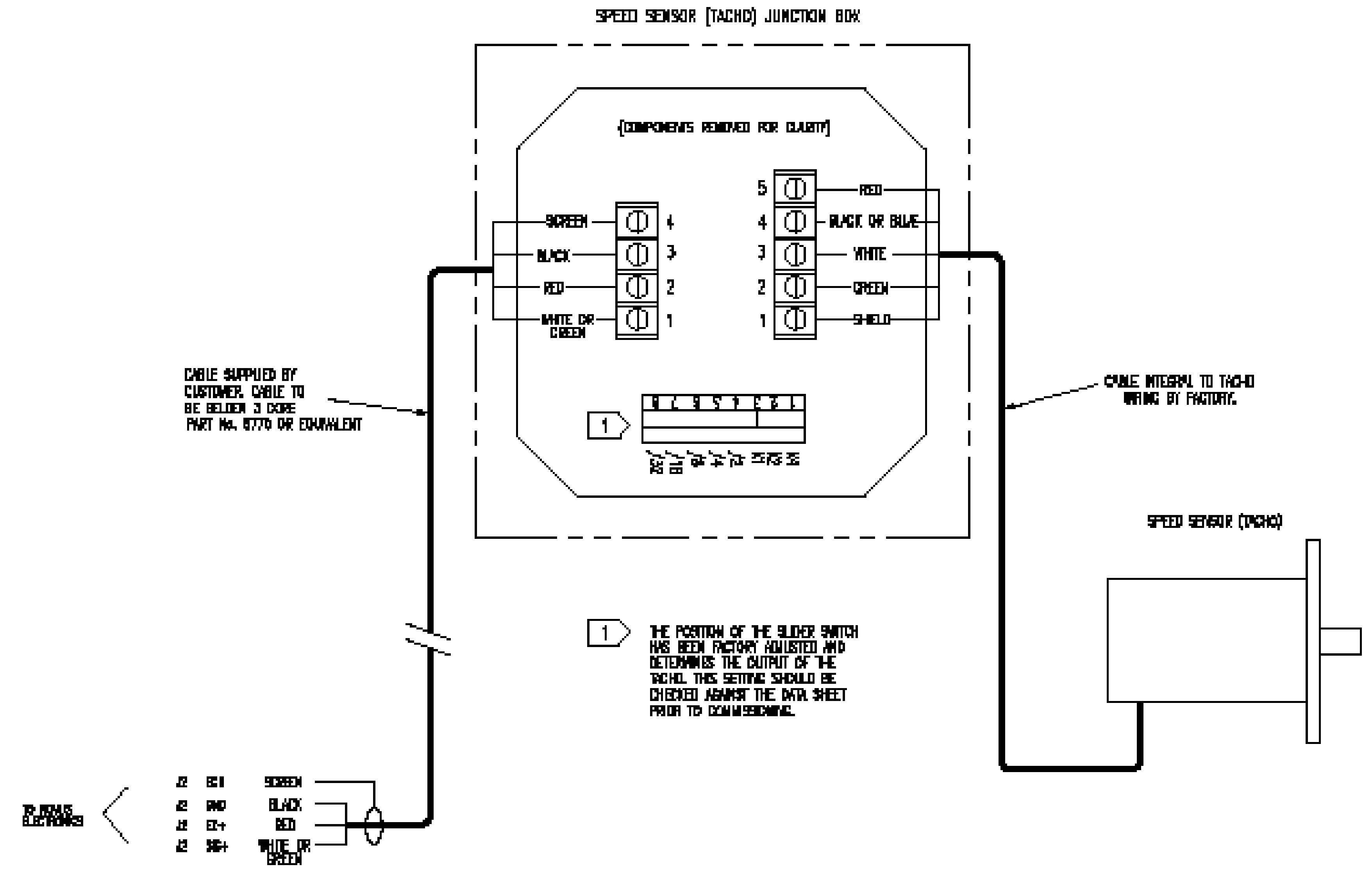
TITLE: LOADCELL J-BOX (LARGE) CONNECTION DIAGRAM FOR VARIOUS TYPE LOADCELLS

COMPANY

PROJECT

DRW FILE

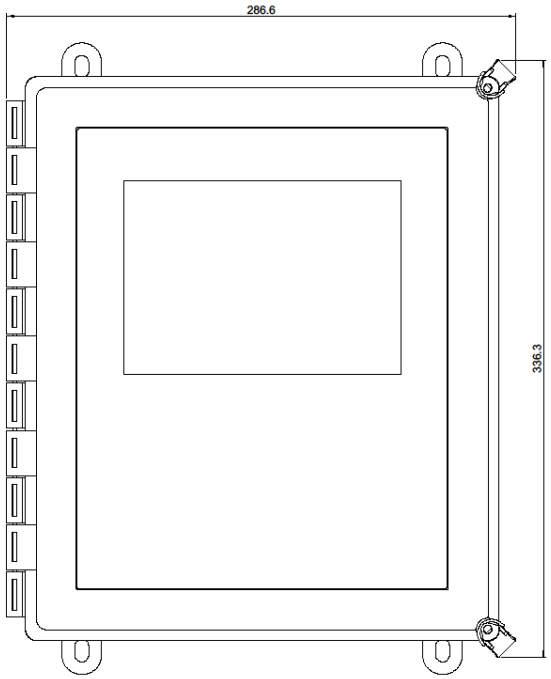
ALL DIMENSIONS IN MILLIMETRES UNLESS OTHERWISE SPECIFIED



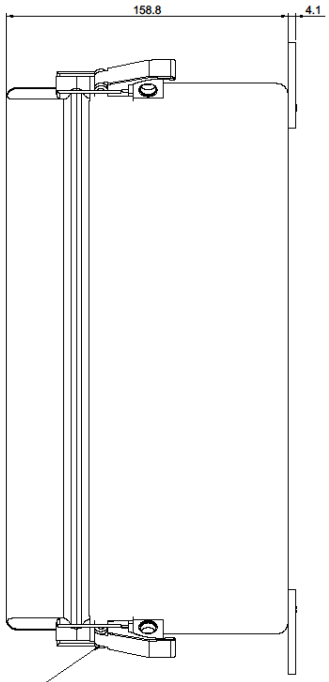
WXT TYPE TACHO JUNCTION BOX WIRING (WITH MULTIPLICATION), & CONNECTIONS TO NOVUS INTEGRATOR

A1 | JB010022 | A

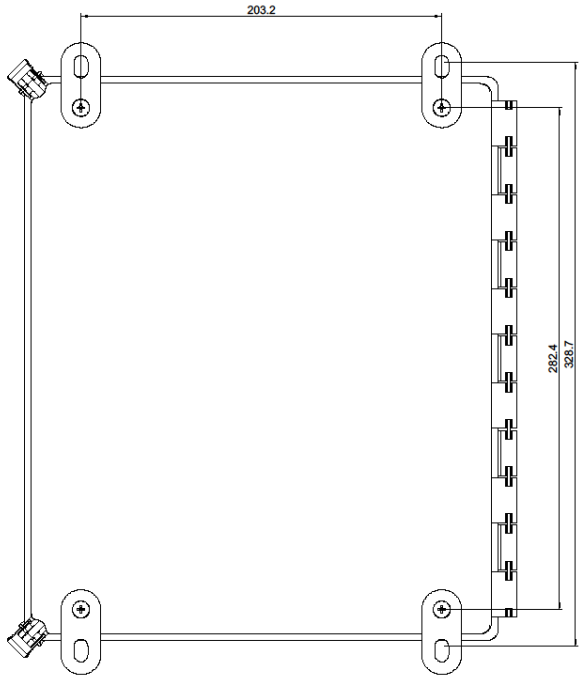
DO NOT SCALE IF IN DOUBT ASK



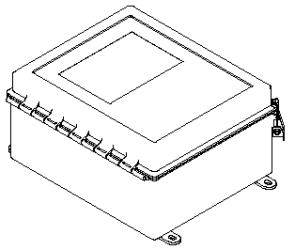
FRONT VIEW



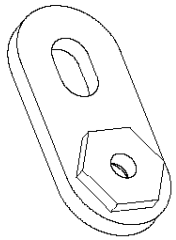
SIDE VIEW



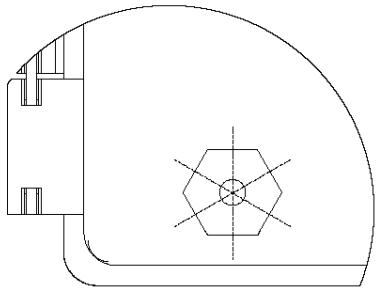
REAR VIEW



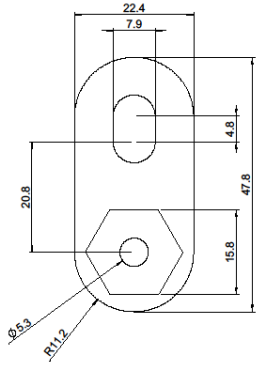
ISOMETRIC VIEW
SCALE 1:4



FOOT ISOMETRIC VIEW
SCALE 2:1



DETAIL A
SCALE 2:1



FOOT FRONT VIEW
SCALE 2:1

IP66, IEC 60529

REVISIONS

A: 24/06/16 B.ROBINSON
ORIGINAL ISSUE

B: 04/07/16 B.ROBINSON
ADDED DRILLING HOLES DIMS

UNLESS OTHERWISE STATED
UNTOLERANCED DIMENSIONS
TO BE WITHIN THE LIMITS SHOWN

NOMINAL SIZE	UP TO 10	ABOVE 10 UP TO 100	ABOVE 100 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	B.ROBINSON
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APPROVED	
DATE APP'D	
SCALE	1:2

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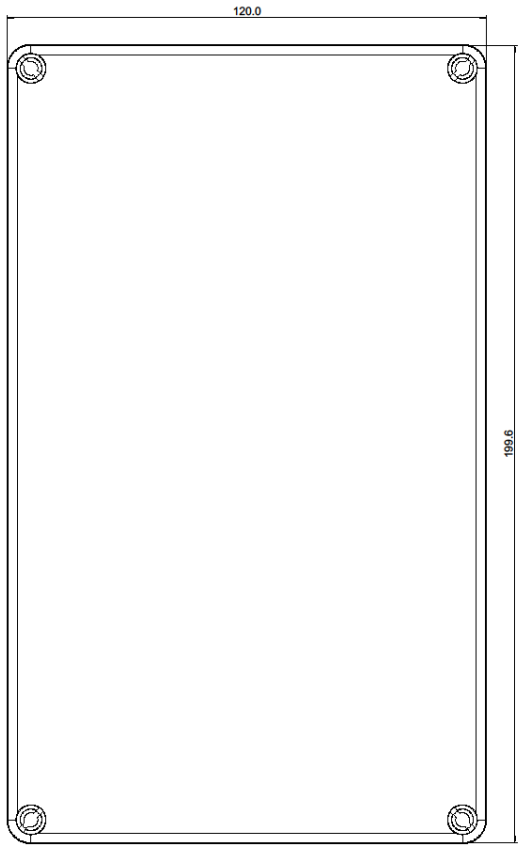
Phone +61-7-3841 2844 Fax +61-7-3841 0006

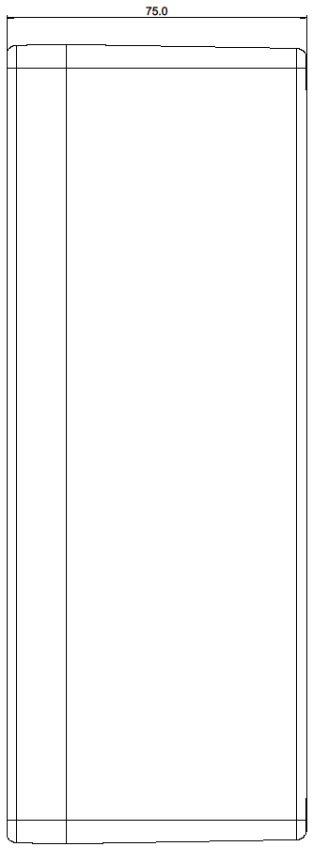
TITLE
NOVUS ENCLOSURE TYPICAL DIMENSIONS
IP66, IEC 60529

ALL DIMENSIONS IN MILLIMETRES
UNLESS OTHERWISE SPECIFIED

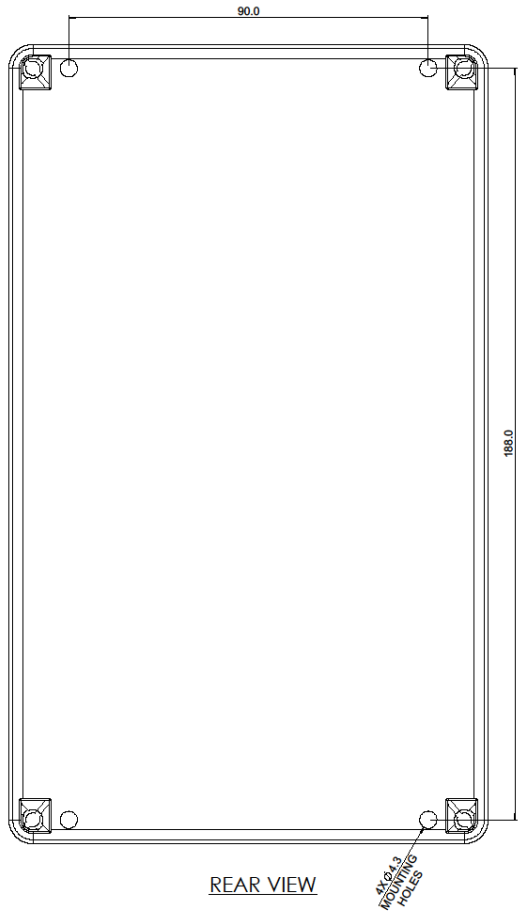
SIZE	DRAWING No.	
A1	NUMBER NOVUS51	REV. A
	CUSTOMER	
	PROJECT	
	CAD FILE NOVUS51b - Hoffman Enclosure - 12x10x6 - Layout	



FRONT VIEW



SIDE VIEW



REAR VIEW

REVISIONS

A: 07/07/16 B.ROBINSON
ORIGINAL ISSUE

UNLESS OTHERWISE STATED UNTOLERANCED DIMENSIONS TO BE WITHIN THE LIMITS SHOWN					
NOMINAL SIZE	UP TO 30	ABOVE 30 UP TO 100	ABOVE 100 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	B.ROBINSON
CHECKED	
APPROVED	
DATE APP'D	
SCALE	1.5:1

DO NOT SCALE
IF IN DOUBT
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Phone +61-7-3841 3944 Fax +61-7-3841 0006

TITLE

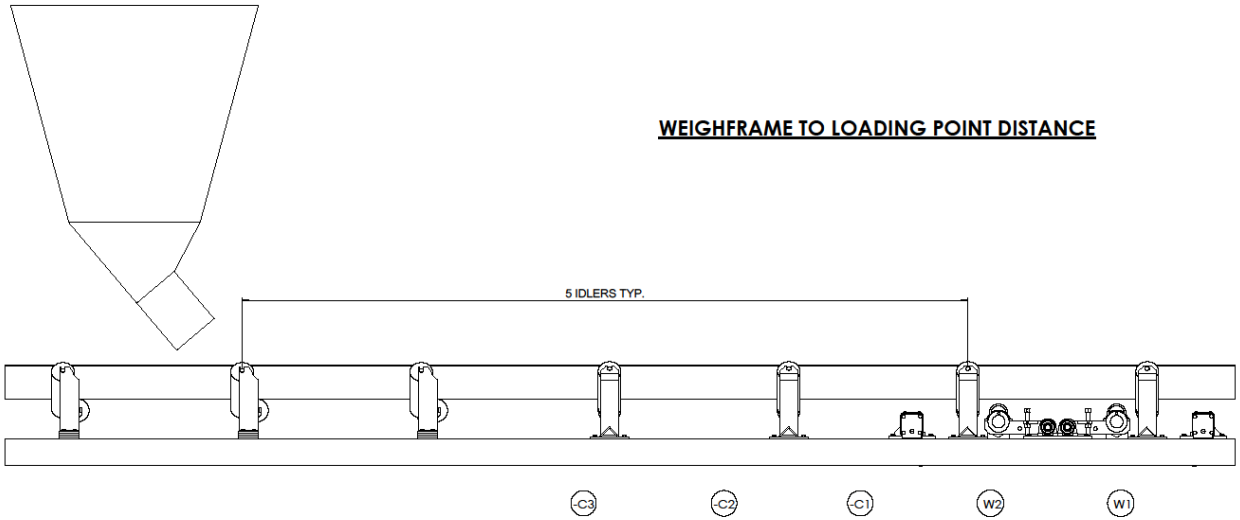
4 LOAD CELL JUNCTION BOX GENERAL ARRANGEMENT

ALL DIMENSIONS IN MILLIMETRES
UNLESS OTHERWISE SPECIFIED

SIZE	DRAWING No.	
A1	NUMBER: LGLCJB-04GA	REV.: A
	CUSTOMER	
	PROJECT	
	CAD FILE: LGLCJB-04GAa	

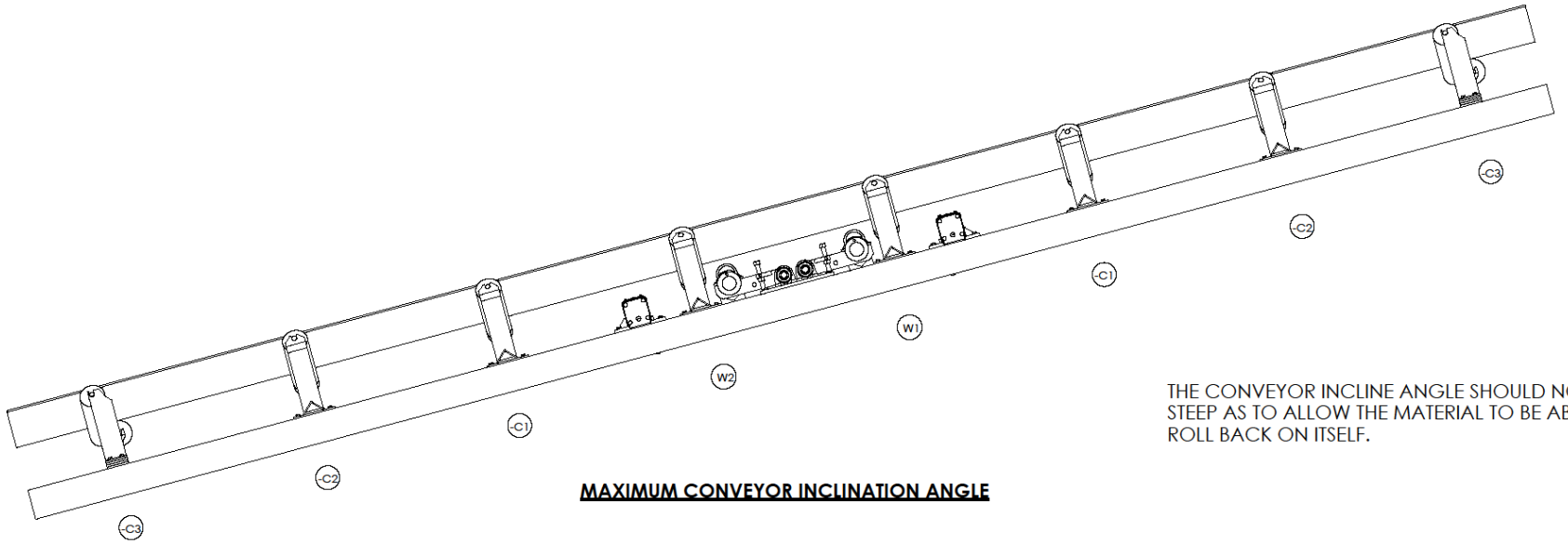
Appendix D – Belt Scale Positioning Guide

WEIGHFRAME TO LOADING POINT DISTANCE



THE WEIGHFRAME SHOULD NE LOCATED FAR ENOUGH FROM THE LOADING POINT TO ENSURE THAT THE MATERIAL HAS ACHIEVED THE SAME VELOCITY AS THE CONVEYOR BELT. TYPICALLY MOST MATERIALS WILL SETTLE WITHIN 5 IDLER SPACINGS OF THE LOADING POINT.

MAXIMUM CONVEYOR INCLINATION ANGLE



THE CONVEYOR INCLINE ANGLE SHOULD NOT BE SO STEEP AS TO ALLOW THE MATERIAL TO BE ABLE TO ROLL BACK ON ITSELF.

REVISIONS

A: 30/06/16 B.ROBINSON ISSUED FOR APPROVAL

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	B.ROBINSON
CHECKED	
APPROVED	
DATE APP'D	
SCALE	N.T.S

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P.O. BOX 4006 EIGHT MILE PLAINS, QUEENSLAND, 4113, AUSTRALIA
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TITLE

CONVEYOR LOADING DISTANCE
MAXIMUM CONVEYOR INCLINATION

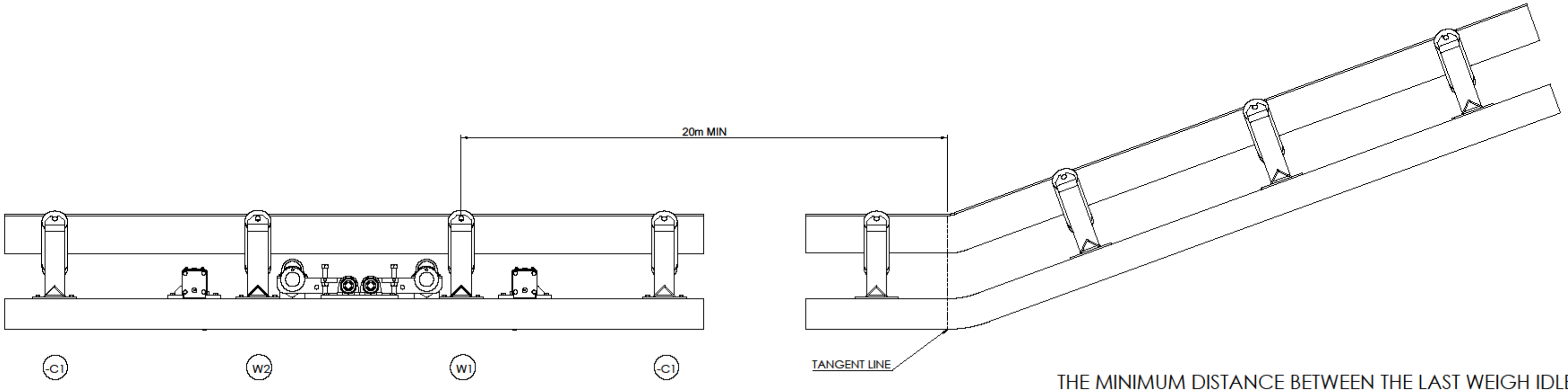
SIZE	DRAWING No.	
A1	NUMBER BSSG01	REV. A

CUSTOMER

PROJECT

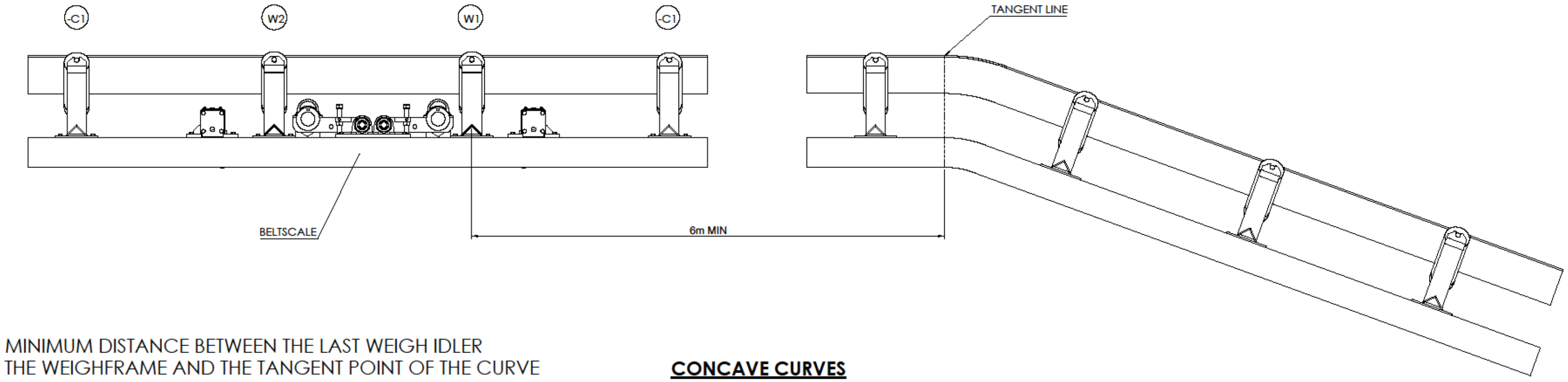
CAD FILE
BSSG01 – Loading Distance Max Inclination

ALL DIMENSIONS IN MILLIMETRES UNLESS OTHERWISE SPECIFIED



THE MINIMUM DISTANCE BETWEEN THE LAST WEIGH IDLER ON THE WEIGHFRAME AND THE TANGENT POINT OF THE CURVE SHOULD BE NO LESS THAN 20m AND PREFERABLY 30m IF POSSIBLE.

CONCAVE CURVES



THE MINIMUM DISTANCE BETWEEN THE LAST WEIGH IDLER ON THE WEIGHFRAME AND THE TANGENT POINT OF THE CURVE SHOULD BE NO LESS THAN 6m.

CONCAVE CURVES

REVISIONS
A: 30/06/16 B.ROBINSON ISSUED FOR APPROVAL

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	B.ROBINSON
CHECKED	
APPROVED	
DATE APP'D	
SCALE	N.T.S
	DO NOT SCALE IF IN DOUBT ASK

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Phone +61-7-3841 2844 Fax +61-7-3841 0005

TITLE
BELTSCALE PLACEMENT
CONCAVE CURVES, CONVEX CURVES

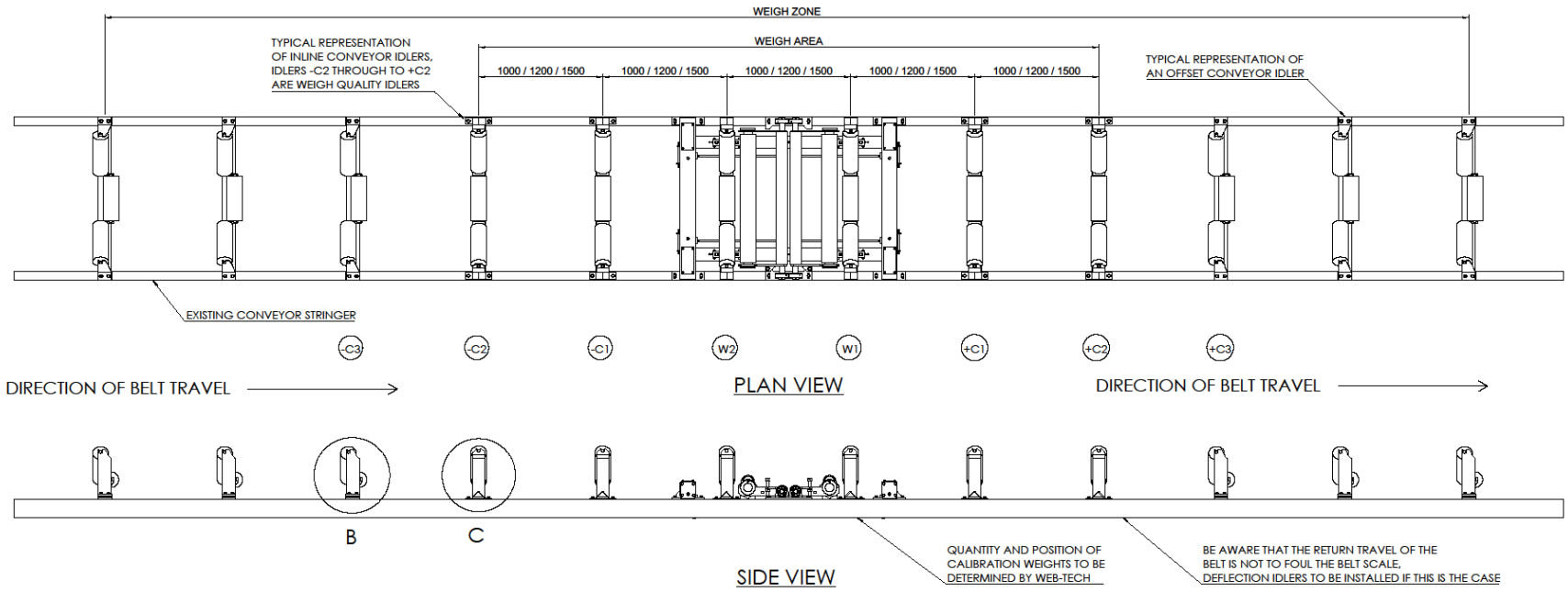
ALL DIMENSIONS IN MILLIMETRES UNLESS OTHERWISE SPECIFIED

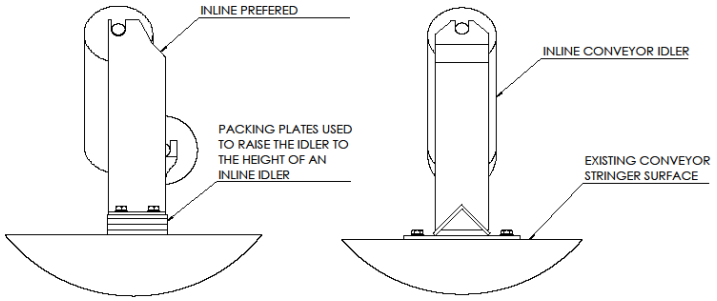
SIZE A1 | DRAWING No. NUMBER BSSG02 | REV. A

CUSTOMER

PROJECT

CAD FILE
BSSG02 - Concave Curve Convex Curves

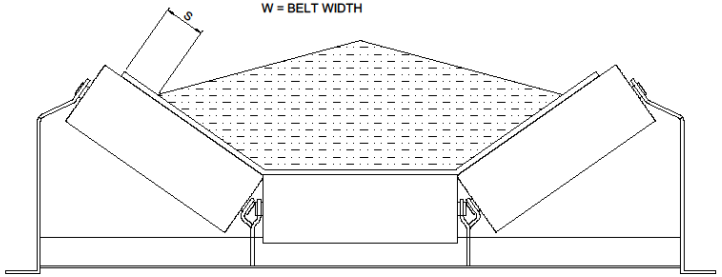




DETAIL B
SCALE 1 : 5

DETAIL C
SCALE 1 : 5

S = 0.055 × W + 20 mm
S = STANDARD EDGE MARGIN
W = BELT WIDTH



BELT LOADING

BELT SHOULD BE 75% - 80% VOLUMETRICALLY FULL

NOTES

1. CONVEYOR IDLERS FROM +C2 THRU TO -C2 (WEIGH QUALITY, 6 OFF) MUST BE INLINE IDLERS, NOT OFFSET IDLERS.
2. CONVEYOR IDLERS FROM +C3 THRU TO -C3 MUST BE MOUNTED AT RIGHT ANGLES TO THE DIRECTION OF BELT CENTRELINE, DIMENSIONS SHOWN BETWEEN IDLERS MUST BE MAINTAINED TO A TOLERANCE OF ±0.5mm.
3. IGNORE THIS NOTE IF INLINE IDLERS ARE SOLEY USED. GENERALLY IDLER HEIGHTS FOR OFFSET IDLERS IS LESS THAN THOSE FOR INLINE IDLERS. PACKERS MAY BE USED TO RAISE OFFSET IDLERS TO THE HEIGHT OF INLINE IDLERS. (REFER TO DETAIL B) AS A RULE, A 3.0mm GRADIENT PER METRE IS AN ALLOWABLE TOLERANCE HEIGHT BETWEEN ROLL HEIGHTS
4. ROLLS +C2 THRU TO -C2, INCLUDING W2 THRU TO W1 ARE TO BE DRILLED AND TAPPED M8, (18 ROLLS IN TOTAL). REFER DETAIL A.
5. PRIOR TO ALIGNING IDLERS, LOSSEN OFF THE TRANSIT / SHIPPING BOLTS AND REMOVE TRANSIT PACKERS, REFER TO DRAWING WTS2S200 FOR THEIR LOCATION.
6. ALL ROLLS MUST BE ADJUSTED TO STRINGLINE REFERENCE TO A TOLERANCE OF ±0.4mm, -0.0mm. LEVEL CENTRE ROLLS ON +C2 AND -C2 IDLERS PRIOR TO ANY ADJUSTMENTS. ENSURE ALL LOCKING NUTS BE TIGHTENED AFTER ADJUSTMENTS ARE COMPLETED.

REVISIONS
A: 29/06/16 B.ROBINSON ISSUED FOR APPROVAL

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	B.ROBINSON
CHECKED	
APPROVED	
DATE APP'D	
SCALE	N.T.S

DO NOT SCALE IF IN DOUBT ASK

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11 ELECTRONICS STREET EIGHT MILE PLAINS, QUEENSLAND, 4113, AUSTRALIA
P.O. BOX 4006 EIGHT MILE PLAINS, QUEENSLAND, 4113, AUSTRALIA
Phone +61-7-3841 2844 Fax +61-7-3841 0885

TITLE
WEIGHSPAN, WEIGHZONE, WEIGH QUALITY IDLERS AND BELT LOADING

SIZE A1

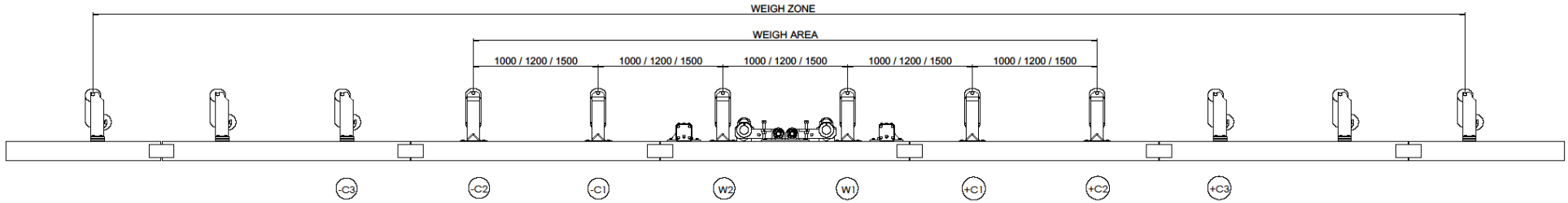
DRAWING No.
NUMBER BSSG03
REV. A

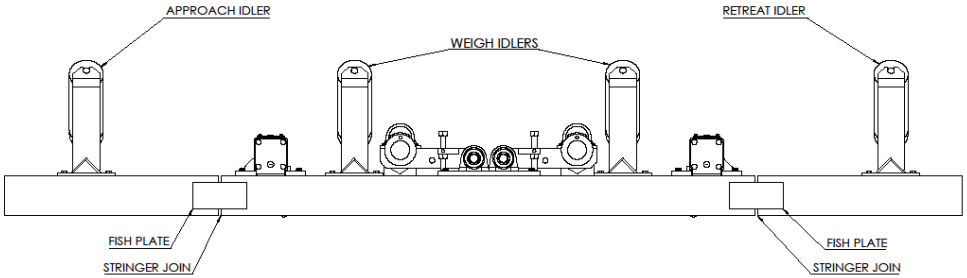
CUSTOMER

PROJECT

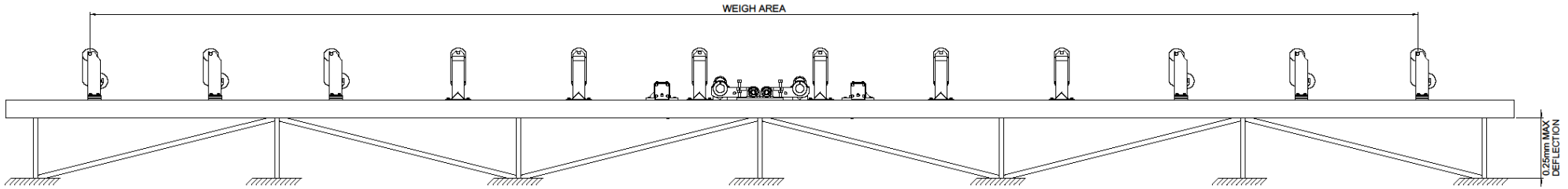
CAD FILE
BSSG03 - Weighspan and Belt Loading

ALL DIMENSIONS IN MILLIMETRES UNLESS OTHERWISE SPECIFIED





WEIGHFRAME MUST BE INSTALLED WITH AT LEAST ONE APPROACH AND RETREAT IDLER ON THE SAME SECTION OF CONVEYOR STRINGER. WHERE THIS IS NOT POSSIBLE, WELD "FISH" PLATE(S) BETWEEN STRINGER JOINTS TO PREVENT MOVEMENT.



ENSURE THAT CONVEYOR STRUCTURE IS ADEQUATELY SUPPORTED WITHIN THE WEIGH AREA. TOTAL DEFLECTION UNDER LOAD SHOULD NOT EXCEDE 0.25mm

REVISIONS

A:- 30/06/16 B.ROBINSON ISSUED FOR APPROVAL

B:- 22/07/16 B.ROBINSON ADDED OTHER WEIGH IDLER NUMBERS REMOVED WTS252 LABEL

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: B.ROBINSON
CHECKED:
APPROVED:
DATE APP'D:
SCALE: N.T.S

DO NOT SCALE IF IN DOUBT ASK

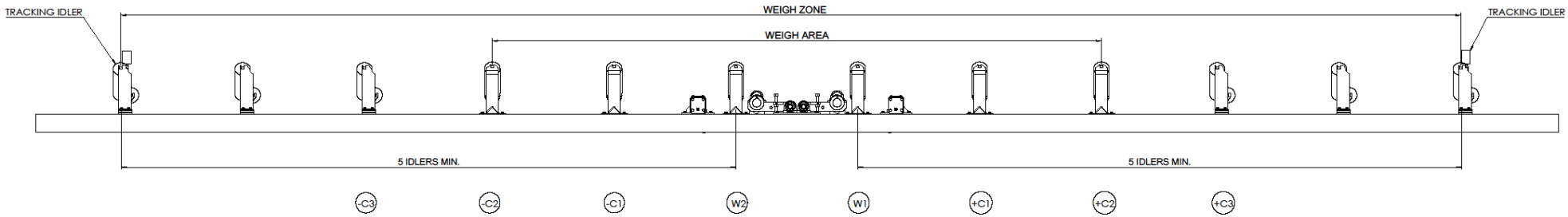
ALL DIMENSIONS IN MILLIMETRES UNLESS OTHERWISE SPECIFIED

WEB-TECH AUSTRALIA PTY. LTD.
A.C.N. 010 764 431
11 ELECTRONICS STREET EIGHT MILE PLAINS, QUEENSLAND, 4113, AUSTRALIA
P.O. BOX 4006 EIGHT MILE PLAINS, QUEENSLAND, 4113, AUSTRALIA
Phone +61-7-3841 2844 Fax +61-7-3841 0065

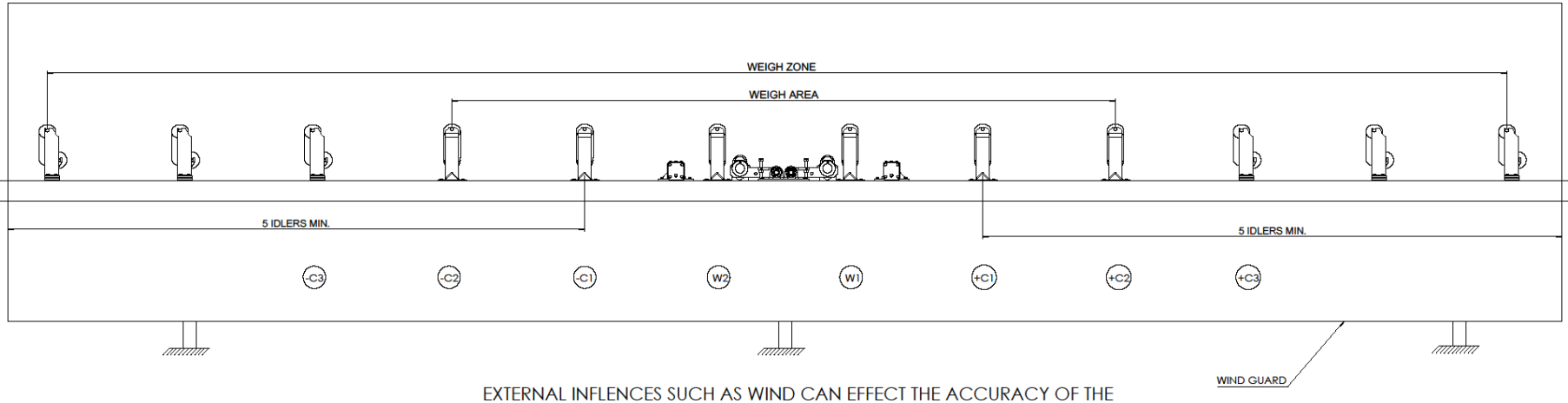
SIZE: A1
DRAWING No.
NUMBER: BSSG04
REV.: B

TITLE: CONVEYOR STIFFENING

CUSTOMER:
PROJECT:
CAD FILE: BSSG04b - Conveyor Stiffening



IT IS PREFERABLE NOT TO LOCATE TRACKING IDLERS WITHIN THE WEIGHFRAME AREA. TRACKING IDLERS SHOULD BE NOT CLOSER THAN 5 IDLER SPACINGS FROM THE WEIGHFRAME.



EXTERNAL INFLENCES SUCH AS WIND CAN EFFECT THE ACCURACY OF THE BELT SCALE. WIND GUARDS SHOULD BE INSTALLED FOR AT LEAST 5 IDLERS EITHER SIDE OF THE WEIGHFRAME WHERE NECESSARY.

REVISIONS

A: 30/06/16 B.ROBINSON
ISSUED FOR APPROVAL

A: 22/07/16 B.ROBINSON
ADDED TRACKING IDLER AND WIND GUARD LABELS
CHANGED DIM POSITION

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: B.ROBINSON
CHECKED:
APPROVED:
DATE APP'D:
SCALE: N.T.S

DO NOT SCALE
IF IN DOUBT
ASK

ALL DIMENSIONS IN MILLIMETRES
UNLESS OTHERWISE SPECIFIED

WEB-TECH AUSTRALIA PTY. LTD.
A.C.N. 010 794 455
11 ELECTRONICS STREET EIGHT MILE PLAINS, QUEENSLAND, 4113, AUSTRALIA
P.O. BOX 4306 EIGHT MILE PLAINS, QUEENSLAND, 4113, AUSTRALIA
Phone: +61-7-3841 2844 Fax: +61-7-3841 0005

TITLE: TRACKING IDLERS AND WIND GUARDS

SIZE: A1

DRAWING No.
NUMBER: BSSG05
REV.: B

CUSTOMER:
PROJECT:
CAD FILE: BSSG05R - Training Idlers and wind Guards

NOVUS CALIBRATION DATASHEET

Customer : _____ Conveyor Designation : _____

Material : _____ Model : _____ Date : _____

Load Cell: _____ Tacho : _____ Data By : _____

Serial No: _____ Contract No : _____

1 Setup Parameters

Units of Measure	
Belt Length	
Scale Capacity	
Scale Resolution	
Machine Type	
Equipment ID	

2 System Settings

Firmware Version		
Backlight		%
Contrast		%
Time		
Date		

3 Belt Length Calibration

Pulses Counted		Pulses
Time Elapsed		sec
Number of Revolutions		Rev(s)
Pulses per Rev		PPR

4 Zero Calibration

OLD load cell Zero		mV
NEW load cell Zero		mV
NEW Auto Zero Value		mV
Total Error		
Error Percentage		%

5 Span Calibration

Target Weight	
Total Achieved	
Total Error	
OLD Span Value	
NEW Span Value	

Weight of calibration chains per strand		kg/m
No. of Strands		
Total weight of calibration chain		kg/m
Belth Length		m
No. of Belt Revolutions		
TARGET WEIGHT		
TARGET WEIGHT after material tests		

6 Auto Zero Tracking

AZT Threshold	
AZT Error Limit	
AZT Control	ON / OFF
AZT Delay	
AZT Duration	
AZT Upper Limit	
AZT Lower Limit	

7 Null Filter Setup

Null Filter	ON / OFF
Current Null Value	

8 Filter Setup

Rate Display

Time Constant _____ s

Fast Track Threshold _____ %

Rate Output

Time Constant _____ s

Fast Track Threshold _____ %

pg1

Belt Speed

Time Constant _____ s

Fast Track Threshold _____ %

Speed Sensor

Time Constant _____ s

Fast Track Threshold _____ %

pg2

PID Input

Time Constant _____ s

Fast Track Threshold _____ %

PID Output

Time Constant _____ s

Fast Track Threshold _____ %

pg3

9 Current Loop Setup

Input

Input 1 Setpoint

Master Capacity _____

Slave % _____ %

Input _____

Input 3 _____

Input 2 _____

pg1

Output

Output 1 Rate

Output 2 PID

Output 3 _____

Parameters _____

Output 4 _____

Parameters _____

pg2

10 Digital I/O Setup

Input

Input 1 _____
Input 2 _____
Input 3 _____
Input 4 _____
Input 5 _____

pg1

Output

Output 1 System Healthy
Output 2 Totalizer

Totalizer Pulse Enable / Disable
Emit Pulse Every _____
Pulse Width _____ ms
Maximum Rate _____

Output 3 _____

Polarity N.O. / N.C.

Output 4 _____

Polarity N.O. / N.C.

pg1

11 PID Setup

Setpoint

Setpoint Source Local / Remote
Setpoint _____

PID Control

PID Control Automatic / Manual
PID _____ %

PID Parameters

(PB) **Proportional Band** _____ %
(RR) **Integral** _____ s
(IL) **Integral Low Limit** _____ %
(IH) **Integral High Limit** _____ %
(DT) **Derivative Time** _____ s
(FF) **Feed Forward** _____
(OS) **Output Offset** _____

Volumetric Restart

Volumetric Restart Active / Inactive
Restart Period _____ s

12 Chute Control

Inlet Boot Hopper

Capacity _____ kg
Zero Value _____ mV
Span Value _____
Sensor Type Load Cell / Probe

pg1

Load Cell - Output Control: Analogue

Refill Start _____ kg
Low/Mid _____ kg
Mid/High _____ kg
Refill Stop _____ kg

pg2

Load Cell - Output Control: Digital

Refill Start _____ kg
Refill Stop _____ kg

pg2

Load Cell - Output Control: Linear

Refill Start _____ kg
Refill Stop _____ kg

pg2

Probe - Output Control: Analogue

None _____ kg
Low _____ kg
Mid _____ kg
High _____ kg

pg2

Prefeed Hopper

Refill Start _____ kg
Refill Stop _____ kg
Capacity _____ kg
Zero Value _____ mV
Span Value _____

13	**Fieldbus**		
	Ethernet		
		DHCP	
		IP Address	. . .
		Subnet Mask	. . .
		Gateway	. . .
	DeviceNet		
		Baud-Rate	
		MAC ID	
	Profibus		
		Node Address	
		Detect Baud-Rate	
	RS232		
		Baud-Rate	
14	**Speed Sensor**		
		Sensor Source	Hardware
		Frequency	Hz
16	**Access Code Setup**		
		Operator Code	
		Service Code	