WT1200 – Weigh Belt Feeder

Operation and Installation Manual

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System Description

Your weigh feeder has been crated for protection during transit. The weigh feeder electronics are normally packed separately in secure cardboard packaging. Upon delivery, please inspect all packaging for signs of damage. Report any damage to both the Transport Company and Web-Tech.

Customer, Job Number:

Weigh Belt Feeder:	______	**Motor:**	______
Integrator:	______	**Speed Sensor:**	______
Variable Speed Drive:	______	**Load Cells:**	______
Belt:	______	**Ventilation:**	______
Calibration Weights:	______		
Remote Instruments:	______		
Spare Parts:	______		
Customer Requests:	______		

If in any doubt regarding any aspect of the delivery, contact:

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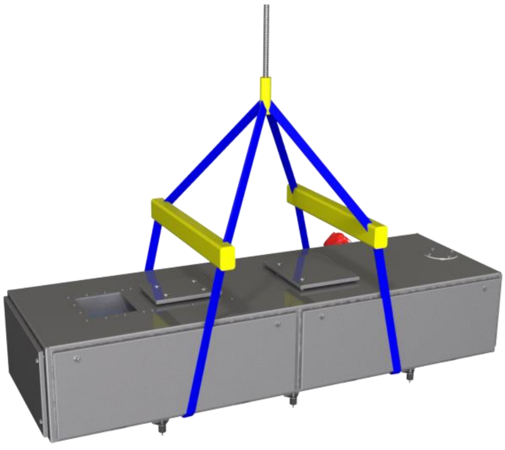
UNPACKING

1) Carefully open the crate.
2) The weigh feeder is held in place by bolts in the mounting feet.
3) Remove the bolts and lift the weigh feeder clear of the crate using web slings – **NOT CHAINS.**
4) Ensure no parts have come loose during transit.
5) Carefully transport the weigh feeder to point of installation.
6) Open the cardboard box containing the electronics. Remove the electronics and check box for any remaining items.
7) Check electronics enclosure for any obvious damage.
   Proceed to Mechanical and Electrical installation sections.



PLEASE READ ALL SECTIONS OF THE MANUAL BEFORE PLACING THE WEIGH FEEDER INTO SERVICE.

<u>IF UNSURE ASK</u>

Family Description

The Web-Tech model WT1200 series consists of a range of light to medium duty weigh feeders capable of handling various products. The model number extension .i.e. "300" denotes the belt width. Therefore a WT1200-300 is a model WT1200 with a belt width of 300mm. Web-Tech has selected a belt width based on the operating parameters supplied to us. Standard belt widths are 300mm, 450mm, 600mm, 750mm, 900mm and 1050mm.

The model WT1200 is available in either open construction, semi enclosed construction or fully enclosed construction. Apart from the enclosure, the mechanical aspects are the same for all types. For the open and semi enclosed models, the weigh feeder may be supplied with an inlet chute with connection flange, or with a 'horseshoe' type inlet which consists of side and rear skirts. Enclosed construction models are supplied with an internal inlet chute. The inlet chute flange may be bolted directly to the outlet of a bin, however it is not designed to support any loads. This may happen for example if the bin is supported by a structure that can deflect when fully loaded. If this is the case a flexible connection should be used. Severe belt damage can occur if the inlet chute is forced into contact with the belt because of inlet chute external loading.

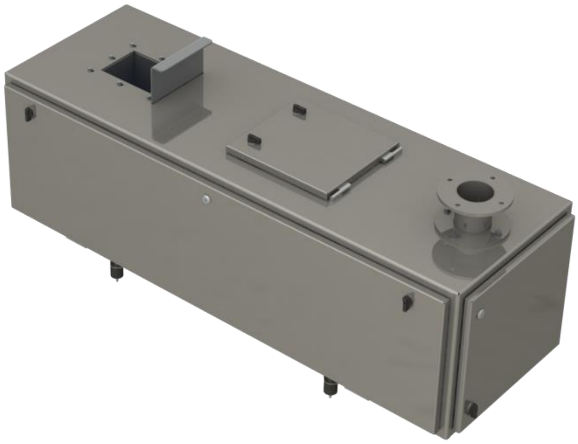
The weighfeeder dimensional layout and capacity have been determined by information supplied to Web-Tech at the product enquiry stage. Some WT1200 weigh feeders may change in overall dimensions and/or supply of ancillaries to suit the operational requirements. Should your weigh feeder vary from the standard design, an addendum will have been inserted in this manual to reflect the changes.

If there are any questions regarding any aspect of the weigh feeder design or installation, please do not hesitate in contacting Web-Tech for clarification before placing the weighfeeder into operation. The weighfeeder is generally programmed and calibrated in our factory prior to dispatch, however the weighfeeder will need to have the calibration re-checked after installation. The calibration sheets are located at the rear of this manual.

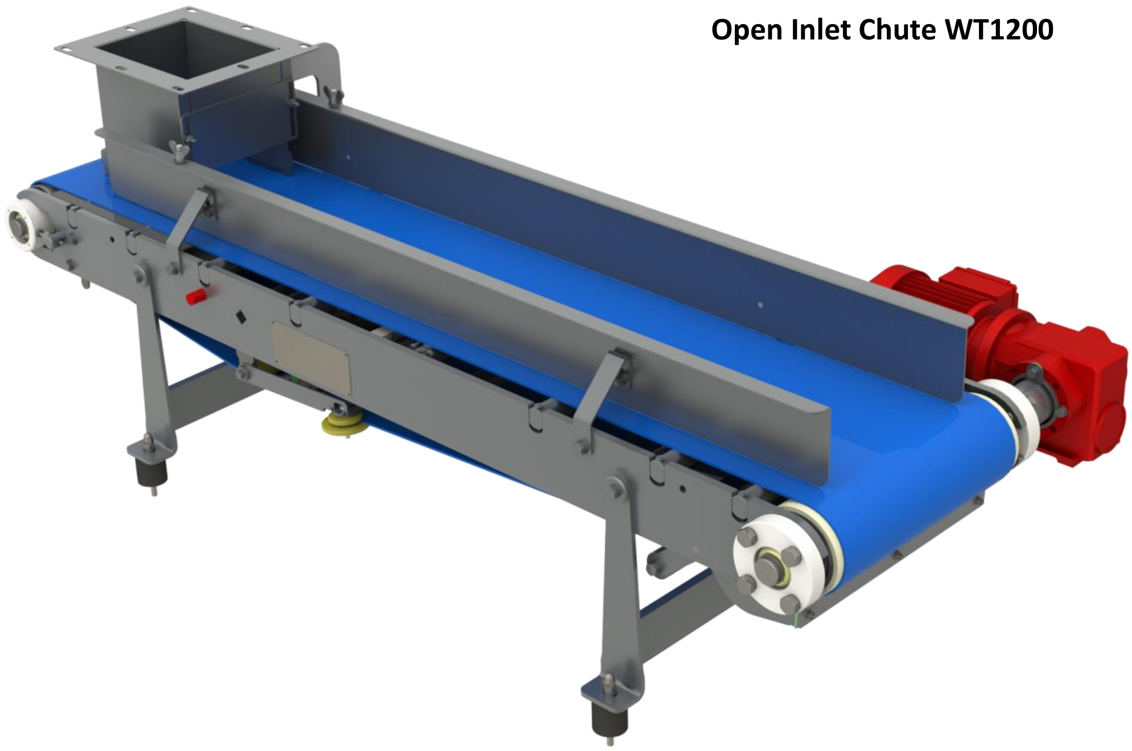
Open Horseshoe

Semi Enclosed Horseshoe

Fully Enclosed



Open Inlet Chute WT1200



The Model WT1200 series of open construction and semi-enclosed weigh feeders can be fitted with an inlet chute and shear gate arrangement, making the feeder suitable for use with a silo/ hopper.

The inlet chute dimensions are as shown in the accompanying drawing. Generally the inlet chute width is half the belt width. The shear gate settings are:

- Min 5mm.
- Max 120mm.

Web Tech will have designed the weighfeeder to operate with a prescribed shear gate height as there is a direct relationship with the weighfeeder capacity, belt speed, permitted motor turn down ratio and product lump size.

Lump Size
The shear gate must be set to 2.5 times the diameter of the max lump size.

Capacity
The shear gate height setting must allow sufficient product volume to pass at max belt speed.

Turn Down Ratio
Web Tech specifies a max turn down of 10:1 to avoid the use of a cooling fan. Forced fan cooling and servo motor options are available.

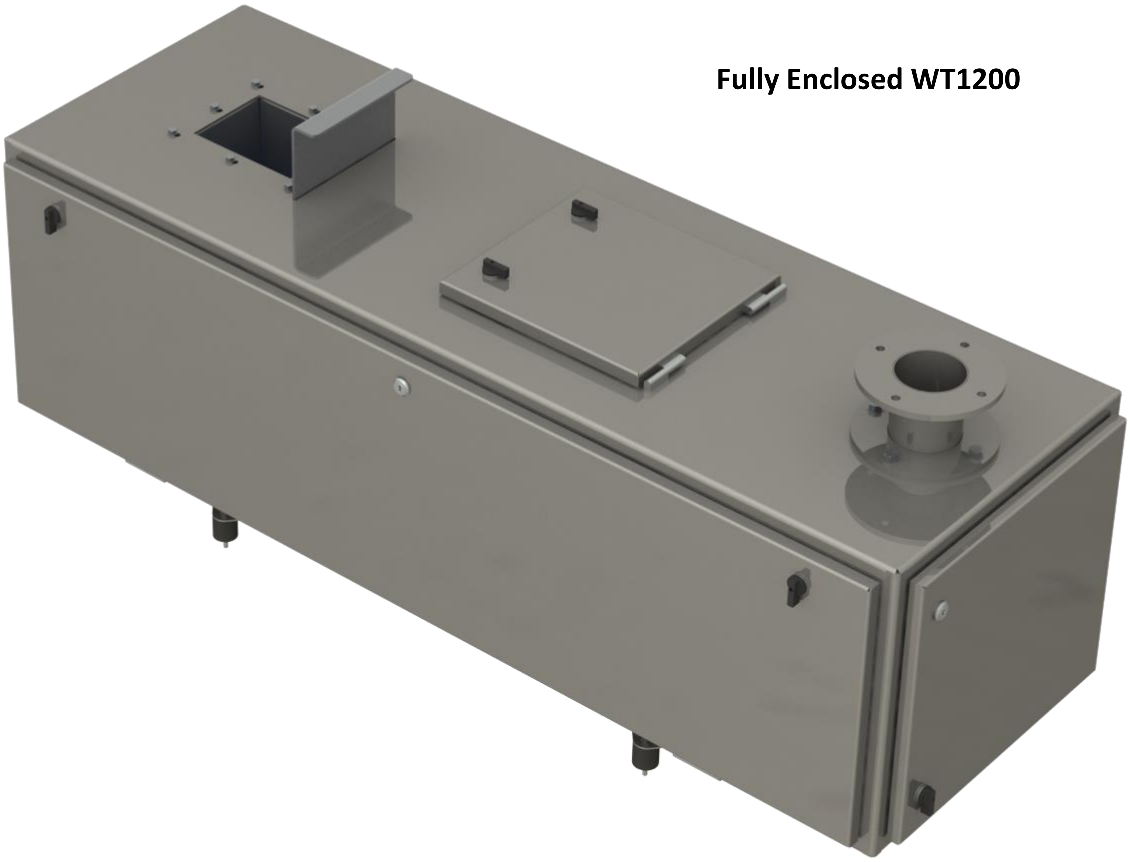
Belt Speed
Web Tech generally does not design the weigh feeder that requires a motor input frequency above 80Hz.

Open WT1200 with Horseshoe Inlet

The model WT1200 series of open construction and semi-enclosed weigh feeders can also be configured with a horseshoe style inlet arrangement. This has been designed with the food, tobacco and chemical industries in mind, as these industries often cannot or choose not to use pre-feed hoppers. The horseshoe style inlet allows the user to use conveyors, augers and vibratory feeders to supply product to the feeder. Depending on factors such as bulk density and lump size, this configuration will generally be manufactured with an impact plate positioned prior to the weigh area.

Without a shear gate, mass rate control is not as accurate owing to product bed depth variations caused by inconsistency of pre-feeding devices. Therefore if mass rate control is the primary function, careful attention must be paid to the pre-feed strategy.

Enclosed Construction (Dust Tight)



Fully Enclosed WT1200

Full enclosed WT1200 series weigh feeders have been designed for use with dusty or toxic products. An inlet chute and adjustable shear gate arrangement is used with this model.

The feeder is dust tight when installed correctly and an adjustable vent is built into the rear door which provides an air path through the feeder.

The inlet chute dimensions are as shown in the accompanying drawing. Generally the inlet chute width is half the belt width. The shear gate settings are:

- Min 5mm
- Max 120mm

Web Tech design the weigh feeder to operate with a prescribed shear gate height as there is a direct relationship with the weigh feeder capacity, belt speed, permitted motor turn down ratio and product lump size.

Open/Semi-Enclosed Construction – Inlet Chute Installation

The following is a summary of works required for the mechanical installation of an open or semi-enclosed construction model WT1200 weighfeeder which is supplied with an inlet chute.

For high vibration areas (client to advise at quotation time) the weighfeeder will be supplied with rubber vibration isolators (loose supply). Locate these isolators and bolt them to the weighfeeder support feet.

Cover the weighfeeder if any metal cutting is to be performed nearby as hot slag will melt the belt. If any welding is to be carried out in close proximity to the feeder, remove the load cell from the weighfeeder as stray electrical currents will damage the load cell.

****** Never Weld Anything To The Weigh Feeder ******

Locate the weighfeeder on the support structure ensuring correct alignment. The structure must be flat and sufficiently rigid to eliminate any deflection due to the weight of the weighfeeder and the product it's transporting. Level the weighfeeder by placing a spirit level across and along the weighfeeder belt/structure. Any vertical alignment should be compensated for by using shim material under the support structure or weighfeeder vibration isolators/mounting feet.

DO NOT "PULL UP" ANY GAPS BY USING THE MOUNTING BOLTS AS THIS MAY TWIST THE WEIGHFEEDER FRAME

The weighfeeder should be level in both directions to ±0.50°. This is an important requirement and a suitable spirit level or other device must be used in order to comply with this requirement.
If the weighfeeder is to be bolted directly to an overhead bin, a flexible gasket should be used between the bin and weighfeeder flanges. The thickness of the gasket should be sufficient to take-up any variation in gap that may exist between the two flanges. If in doubt ring Web Tech for advice. Carefully tighten the flange bolts so that the gasket is compressed and the gap is completely closed.

DO NOT OVER TIGHTEN THE CONNECTION BOLTS SO THAT THE FLANGE IS BENT

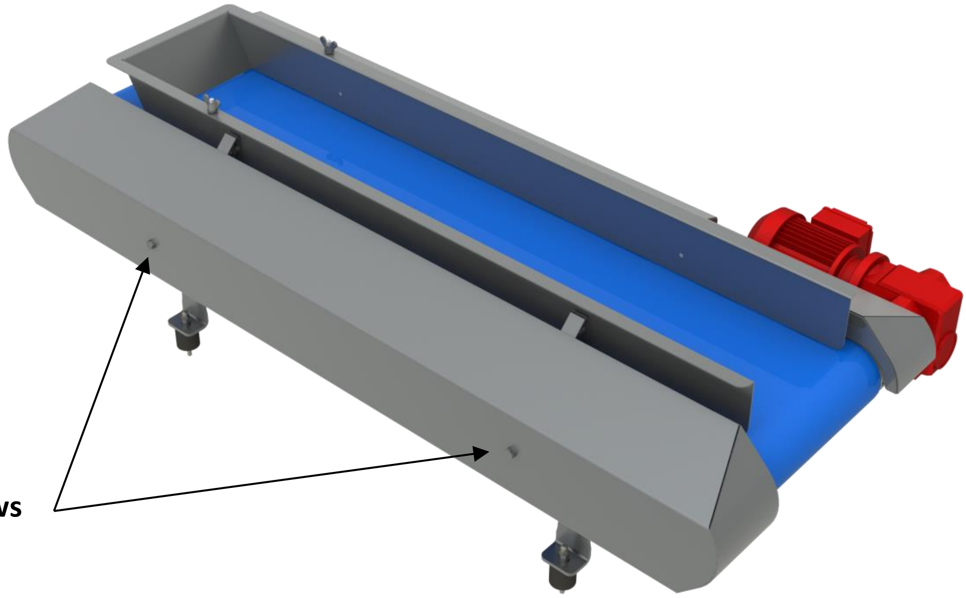
If a flexible connection is to be used, ensure that any excess in the flexible material does not create a ledge, or restrict the flow of material from the outlet of the bin.

REMOVING TRANSIT BOLTS

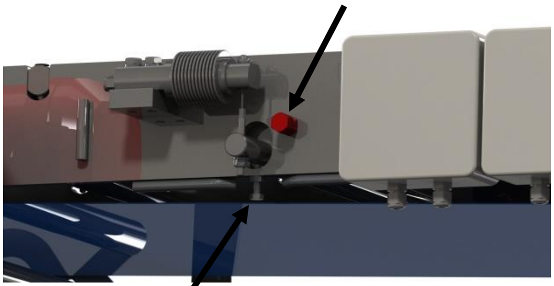
The weighfeeder has been fitted with a transit bolt to the gravity assisted belt tensioner and steering mechanism during transit to relieve belt tension. There may also be a transit bolt fitted to the weigh frame to protect the loadcell. These bolts must be removed prior to running the belt. Damage to the weighfeeder will occur if not removed. Locate and remove the gravity take-up transit bolt. The transit bolt head will have been painted red for easy identification. Note the transit bolts will be hidden by the guards fitted to the semi enclosed model. Remove the guard(s) to access the transit bolts. The guard(s) to be removed will depend on the orientation (left or right) of the weighfeeder. Please read all other Instructions located on the Weigh Feeder before placing into operation. If in doubt, please ring Web Tech for advice.

Transit Bolt

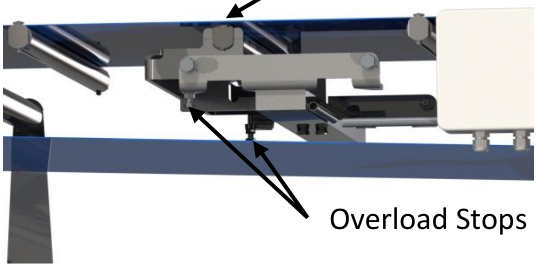
To gain access to the transit bolts, the guards must be removed. The guards are fitted to the weighfeeder by means of hex head screws, as shown below.



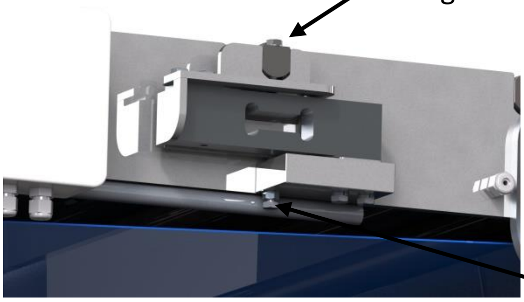
The load cell overload stop has been factory set and should not be interfered with. If the stop is accidently adjusted, then use the setting procedure detailed elsewhere to re-set.



<u>Flexure Weighframe Model</u>

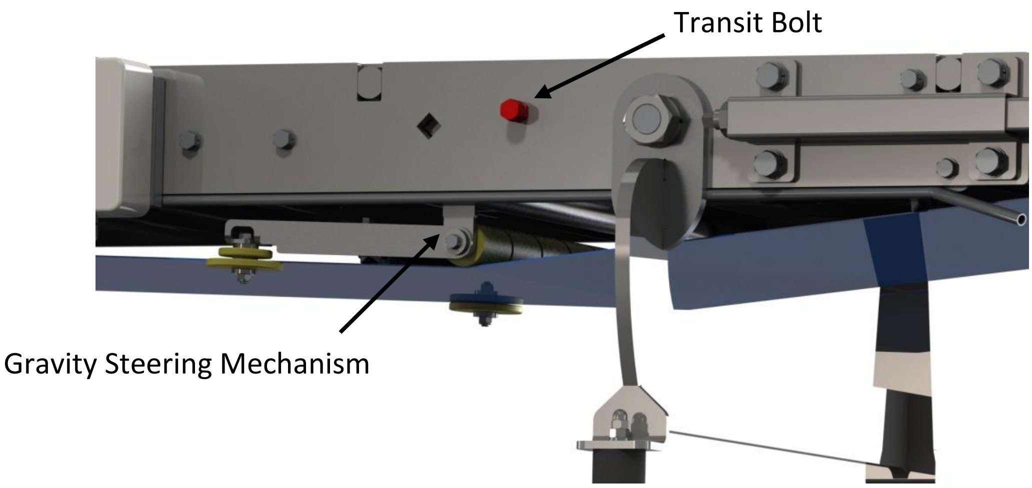


<u>Internal Single-Point Loadcell Model</u>
(Side rails not shown for clarity)



<u>External Dual Single-Point Loadcell Model</u>

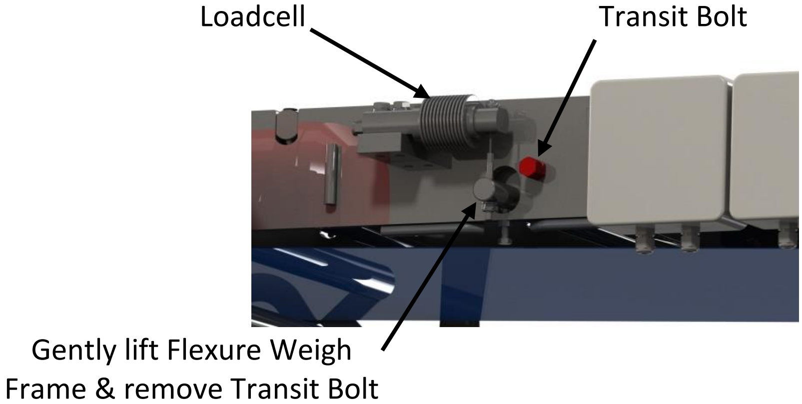
Gravity Steering Transit Bolt (all models)



Transit Bolt(s) Have Been Inserted to the Weigh Feeder to Prevent Damage During Transport

Leaving the Transit Bolt(s) in Place During Operation Will Damage the Weigh Feeder

Weigh Frame Transit Bolt (flexure weigh frame models only)



Before placing into operation, the alignment of the weigh bar should be checked once the transit bolt(s) have been removed.

DO NOT ADJUST: RING FACTORY FOR ADVICE

Locate the weigh bar position. Place a straight edge along each edge of the carry bars and check the height of the weigh bar. The weigh bar should be within a tolerance of +0.25mm/-0.00mm with respect to the approach and retreat bars. If the weigh bar requires adjustment, remove the dust caps on the end of the weigh bar and adjust the grub screw. When finished aligning replace the dust caps. The mechanical installation is now complete; proceed to the electrical installation section.

Open/Semi-Enclosed Construction – Horseshoe Inlet Installation

The following is a summary of works required for the mechanical installation of an open/semi-enclosed construction model WT1200 weighfeeder which is supplied with a "horseshoe style" inlet.

For high vibration areas (client to advise at quotation time) the weighfeeder will be supplied with rubber vibration isolators (loose supply). Locate these isolators and bolt them to the weighfeeder support feet.

Cover the weighfeeder if any metal cutting is to be performed nearby as hot slag will melt the belt. If any welding is to be carried out in close proximity to the feeder, remove the load cell from the weighfeeder as stray electrical currents will damage the load cell.

****** Never Weld Anything To The Weigh Feeder ******

Locate the weighfeeder on the support structure ensuring correct alignment. The structure must be flat and sufficiently rigid to eliminate any deflection due to the weight of the weighfeeder and the product it's transporting. Level the weighfeeder by placing a spirit level across and along the weighfeeder belt/structure. Any vertical alignment should be compensated for by using shim material under the support structure or weighfeeder vibration isolators/mounting feet.

DO NOT "PULL UP" ANY GAPS BY USING THE MOUNTING BOLTS AS THIS MAY TWIST THE WEIGHFEEDER FRAME

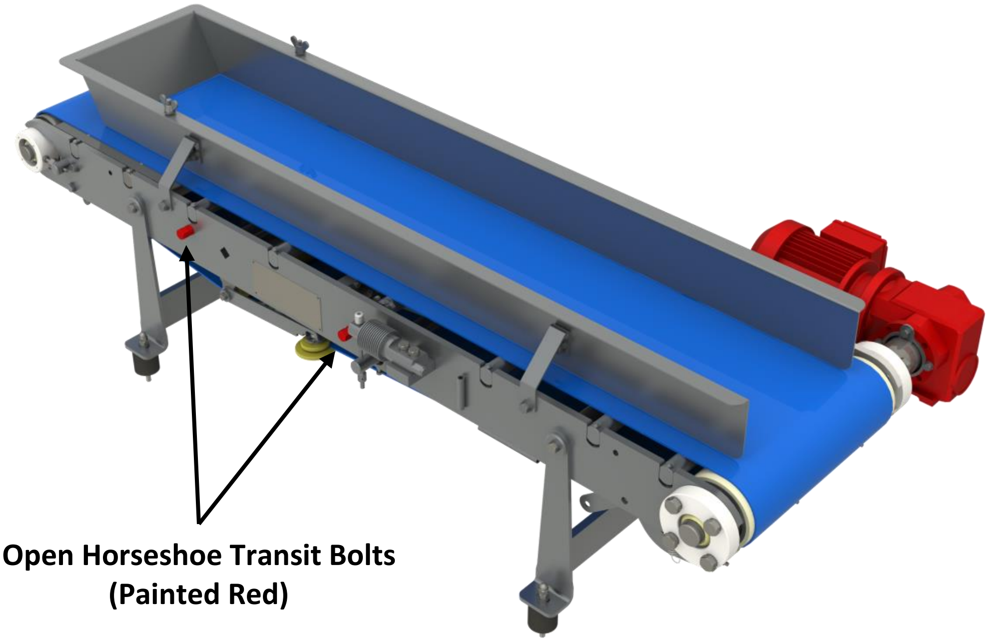
The weighfeeder should be level in both directions to ±0.50°. This is an important requirement and a suitable spirit level or other device must be used in order to comply with this requirement.
The use of the "horseshoe" style inlet allows for a conveyor, metering tube or a pre-feeder such as a vibratory feeder to be used. If the specification calls for a conveyor, metering tube, or vibratory feeder ensure that nothing is in contact with the belt.

If the bottom of the chute/metering tube is fitted with skirts, ensure that excessive load is not placed on the belt. Flexible skirts should just be in contact with the belt, rigid skirts MUST NOT be in contact with the belt.

If the weighfeeder is to be supplied with a pre-feeding device such as a vibratory feeder or conveyor, ensure that material is not deposited forward of the product impact zone (refer to the drawing for location of the product impact zone limits).

Locate and remove the transit bolts as instructed in the previous section. Note that an open construction weighfeeder does not have any guarding requiring to be removed. The transit bolt head will have been painted red for easy identification. Carefully lower the gravity take-up roll down onto the return belt.

Each load cell is fitted with an overload screw(s). On belt widths up to and including 600mm, one load cell is used. On wider belt widths, two load cells are used (one per side). These screw(s) have been factory set and should not be altered. Beside each of these screws there is a red transit bolt (flexure weigh frame models only). During transit, these transit bolt(s) are inserted to reduce any load on the load cell. Before operation carefully remove the transit bolt, if fitted, as described in the previous section.



Transit Bolt(s) Have Been Inserted to the Weigh Feeder to Prevent Damage During Transport

Leaving the Transit Bolt(s) in Place During Operation Will Damage the Weigh Feeder

The load cell overload stop has been factory set and should not be interfered with. If the stop is accidently adjusted, then use the setting procedure detailed elsewhere to re-set.

Before placing into operation, the alignment of the weigh bar should be checked.

DO NOT ADJUST: RING FACTORY FOR ADVICE

Locate the weigh bar position. Place a straight edge along each edge of the carry bars and check the height of the weigh bar. The weigh bar should be within a tolerance of +0.25mm/-0.00mm with respect to the approach and retreat bars. If the weigh bar requires adjustment, remove the dust caps on the end of the weigh bar and adjust the grub screw. When finished aligning replace the dust caps.

The mechanical installation is now complete; proceed to the electrical installation section.

Fully Enclosed Construction – Installation

The following is a summary of works required for the mechanical installation of an "enclosed" construction model WT1200 weighfeeder which is supplied with an internal inlet chute.

For high vibration areas (client to advise at quotation time) the weighfeeder will be supplied with rubber vibration isolators (loose supply). Locate these isolators and bolt them to the weighfeeder support feet.

Cover the weighfeeder if any metal cutting is to be performed nearby as hot slag will melt the belt. If any welding is to be carried out in close proximity to the feeder, remove the load cell from the weighfeeder as stray electrical currents will damage the load cell.

****** Never Weld Anything To The Weigh Feeder ******

Remove the side doors from the weighfeeder prior to proceeding. The doors are fitted with hinges allowing them to be slid off. Locate the weighfeeder on the support structure ensuring correct alignment. The structure must be sufficiently rigid to eliminate any deflection due to the weight of the weighfeeder and the product it's transporting. Level the weighfeeder by placing a spirit level across and along the weighfeeder belt/structure. Any vertical alignment should be compensated for by using shim material under the support structure or weighfeeder isolation blocks/mounting feet.

DO NOT "PULL UP" ANY GAPS BY USING THE MOUNTING BOLTS AS THIS MAY TWIST THE WEIGHFEEDER FRAME

The weighfeeder should be level in both directions to ±0.50°. If the weighfeeder is to be bolted directly to an overhead bin, a flexible gasket should be used between the bin and weighfeeder flanges. The thickness of the gasket should be sufficient to take-up any variation in gap that may exist between the two flanges. Carefully tighten the flange bolts so that the gasket is compressed and the gap is completely closed.

DO NOT OVER TIGHTEN THE CONNECTION BOLTS SO THAT THE FLANGE IS BENT

If a flexible connection is to be used, ensure that any excess in the flexible material does not create a ledge, or restrict the flow of material from the outlet of the bin.

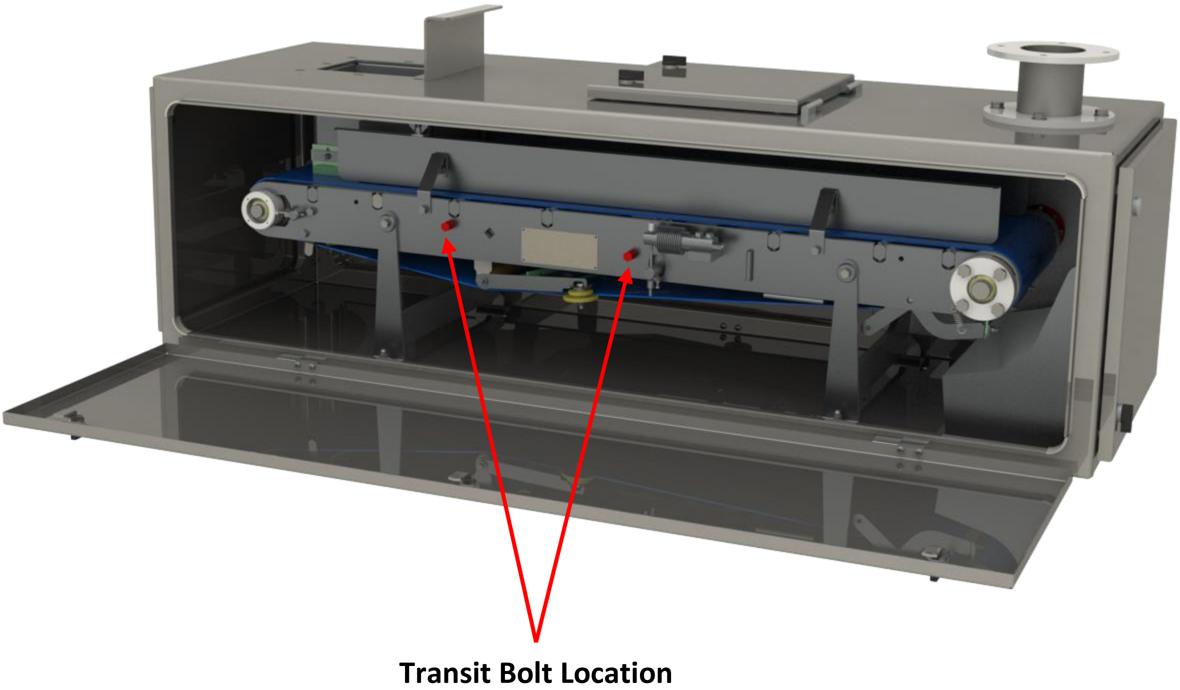
Connect the outlet of the weighfeeder using the same method i.e. use a flexible gasket.

Locate and remove the gravity take-up transit bolt as described in the previous sections. The transit bolt head will have been painted red for easy identification.

Each load cell is fitted with an overload screw(s). On belt widths up to and including 600mm, one load cell is used. On wider belt widths, two load cells are used (one per side). These screw(s) have been factory set and should not be altered. Beside each of these screws there is a red transit bolt (flexure weigh frame models only). During transit, these transit bolt(s) are inserted to reduce any load on the load cell. Before operation carefully remove the transit bolt, if fitted, as described in the previous section.

Before placing into operation, the alignment of the weigh bar should be checked. Locate the weigh bar position. Place a straight edge along each edge of the carry bars and check the height of the weigh bar. The weigh bar should be within a tolerance of +0.25mm/-0.00mm with respect to the approach and retreat bars. If the weigh bar requires adjustment, remove the dust caps on the end of the weigh bar and adjust the grub screw. When finished aligning replace the dust caps.

The mechanical installation is now complete; proceed to the electrical installation section.



Transit Bolt(s) Have Been Inserted to the Weigh Feeder to Prevent Damage During Transport

Leaving the Transit Bolt(s) In Place During Operation Will Damage The Weigh Feeder

Electrical connection diagrams for the weighfeeder electronics, load cell and belt speed sensor junction boxes are located in the drawing section of this manual. Electrical connection diagrams for the gear motor and variable speed drive (if applicable) are located in the appropriate manufacturer's manuals.

Electrical installation comprises the following work:

1) Install and connect weighfeeder electronics to mains supply.
2) Install and connect supply to weighfeeder motor (or via VSD if applicable).
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 and connect cable between weighfeeder electronics and variable speed drive (if supplied).
6) Install cable between weighfeeder electronics and PLC (if required).

Install earth strap to weighfeeder structure (refer G.A. drawing for location). The weighfeeder structure should be earthed to eliminate static build-up from the structure.

<u>Weigh Feeder Electronics</u>

The weighfeeder may be supplied with either of the following electronics models:

- Masterweigh 6
- Masterweigh 7
- Optimus
- Masterweigh Novus

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

The electronics enclosure is an IP66 reinforced fibre polyester enclosure, or optionally an IP66 stainless steel enclosure.

The enclosure should be located so that it:

- Is not in direct sunlight (install sunshield if located outdoors).
- Is not subject to direct wash down.
- Is not installed in close proximity to high power cables, variable speed drives or vibratory feeder controllers.
- Is not more than 100 metres from the weighfeeder. The closer the electronics can be located to the weighfeeder reduces the chances of electrical interference on the cables. It also makes it easier when carrying out calibrations and fault finding.

Novus Integrator in IP66 Enclosure

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 weighfeeder and electronics should be carried out so that these cables are not installed close to power cables. Any cable runs should not interfere with the “access” side of the weighfeeder which may interfere with belt removal.

Suggested cable type for each application is as follows:

- Load Cell - 4 core overall screened, Belden type 8723 or equivalent (2 Pairs individually Shielded, 22 AWG (7/0.25) Tinned Copper, Polypropylene Insulated, common 24 AWG (7/0.20) Tinned Copper Drain Wire, PVC Jacket).
- Belt Speed Sensor - 3 core overall screened, Belden type 8723 or equivalent.
- VSD/Motor - To suit the motor power installed. As the model WT1200 weighfeeder is supplied with a variety of motor/VSD combinations, it is beyond the scope of this manual to give installation/ instruction here. Please refer to the manufacturer’s manuals in other sections of the manual.

Ensure that all cable entries into the electronics enclosure and junction boxes use the correct size waterproof glands.

Cable Terminations

Load Cell junction box
Refer to drawing “LCJB” in the drawing section of the manual.

Speed sensor junction box
Refer to the appropriate drawing depending on the type of speed sensor supplied with the weighfeeder.

Startup

Prior to turning on the equipment and starting the weighfeeder, 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 or in the inlet chute.
- The rotation of the motor has been checked and wired correctly. Start Up Steps When starting up the system for the first time, follow these steps:
- Turn on the electronics, and ensure it displays the Mass Rate, Mass Total screen (MRMT).
- Start the weighfeeder. If using a variable speed drive, start it in local and ramp the frequency up to 50Hz.
- Ensure the belt is tracking centrally. If the belt is not tracking centrally, turn the weighfeeder off and check that the belt is sitting correctly in the guides on the tracking system. Belt tracking will have been done at the factory prior to shipment. If the belt is not tracking at this point in the installation procedure, check that the feet of the weighfeeder are vertical aligned and the feeder is square in all directions (+/- 0.5º). Do not start adjusting any part of the feeder until all relevant checks have been done. Please contact Web Tech if in doubt.
- 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. Refer to the calibration sheets at the rear of the manual and compare the factory programmed voltage (mV) to the existing value. It should be within ±0.5mV.
- 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 weighfeeder, refer to the calibration sheets at the rear of the manual and compare the factory programmed frequency (Hz) to the existing value. It should be within ±1Hz. If all readings appear correct, proceed to the Calibration section of the manual.

Electronic Integrator Commissioning / Calibration – Getting Started

The weighfeeder has been programmed and calibrated at the factory. However, due to changes that may have occurred during transit and installation, the weighfeeder calibration should be checked. Once initiated the calibrations are automatic and only require the pressing of acceptance keys.
The two basic calibration steps are the "Zero" calibration and the "Span" calibration.

Calibration Basic Notes

- All Masterweigh functions are performed over a specified number of belt revolutions. Which will have been pre-programmed into Masterweigh in the factory.
- Masterweigh interprets the number of belt revolutions as a number of pulses from the tachometer/encoder.
- The total number of pulses to be acquired by Masterweigh is based on the following:
  - Time duration minimum is 5 minutes.
  - The minimum number of belt revs is 1, however 5 or more is preferred.

Zero Calibration

The zero calibration is established by running the weighfeeder empty for the programmed number of belt revolutions and calculating the average load cell output during this period. The weighfeeder electronics will automatically calculate the zero value when the test has been initiated and completed. Refer to the electronics manual supplied with your WT1200 (Masterweigh 6, Masterweigh 7, Optimus or Masterweigh Novus) for the procedure. The weighfeeder must be able to be run empty during this test, with the number of belt revolutions programmed for its duration found on the calibration sheets at the end of this manual.

Span Calibration

The span calibration is generally carried out on a model WT1200 weighfeeder with the use of calibration chains. The calibration chains consist of one or more strands of roller chain attached to a restraining bracket. The size of the chain and number of strands has typically been calculated by Web Tech to simulate approximately 75% of the maximum feeder capacity. The calibration chains are placed on the belt and attached to the calibration chains restraining bracket via hooks. The weighfeeder is run and the test is carried out over the same number of belt revolutions as the zero tests. The result is compared to a target weight calculated by Web Tech at the time of factory commissioning. The procedure for carrying out the test can be found in the electronics manual. The target weight can be found on the calibration sheets in this manual.

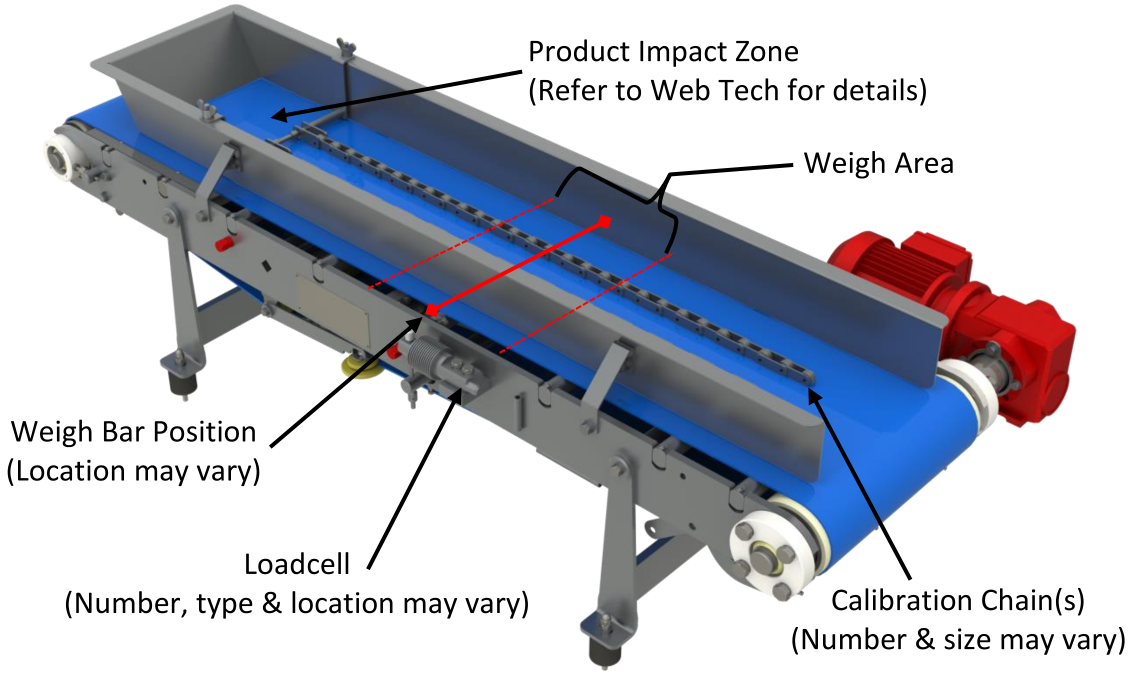
Material Test

We strongly suggest that a material test be carried out where possible. A material test involves weighing product on an accurate static scale prior to, or after it has passed over the weighfeeder. When carrying out a material test the following should be considered: The amount of material required for the tests must be proportional to the weighfeeder capacity. A rule of thumb quantity would be a minimum of 3 minutes of running time at maximum capacity (e.g. if the capacity is 10 tph, the amount of material would be 10 000 kg/60 x 3 = 500 kg). A smaller amount could be used, however it must be understood that the accuracy achievable may be diminished due to the resolution used. It must be guaranteed that all of the material used in the test has passed over the weighfeeder.

The material feed over the weighfeeder must be continuous, consistent & representative.

When the tests have been carried out any correction to the calibration can be carried out in the "Empirical Calibration" menu of the electronics (refer to the electronics manual section). Any changes to the calibration should be recorded on the calibration sheets for future reference.

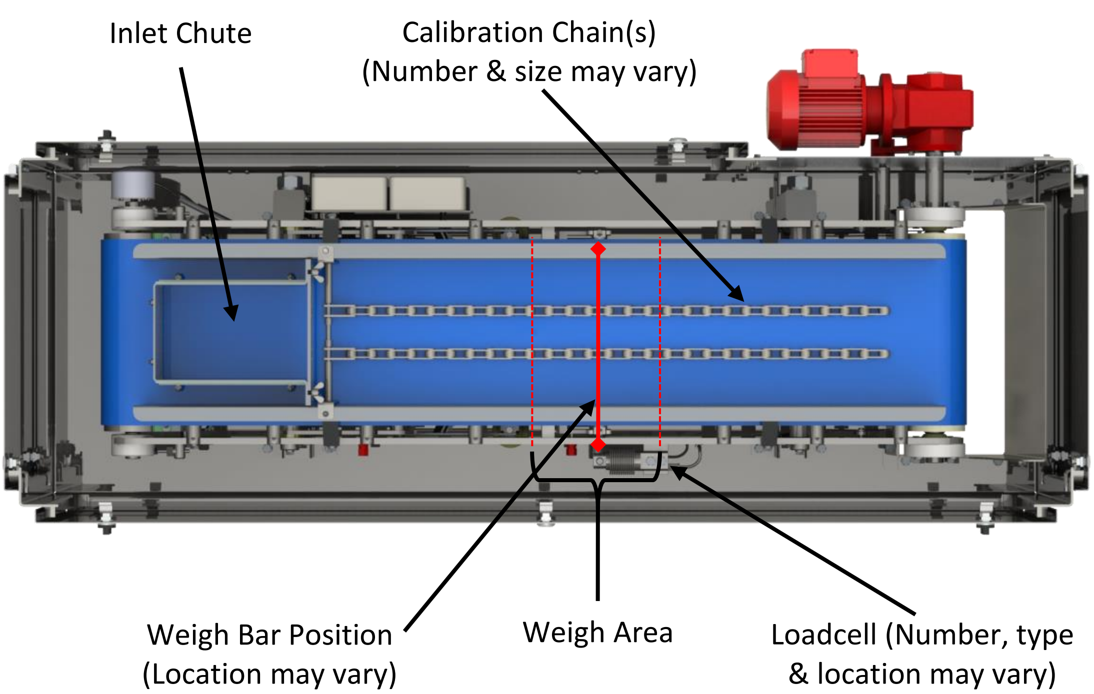
Typical Open Horseshoe Calibration Chain Position



Web Tech supply calibration chains with each feeder. The calibration chains are fitted as shown in these two pictures. Each weighfeeder will have calibration chains designed and manufactured specifically for the weighfeeder and its proposed duty. The number and total weight of the assembly is dependent on application.

After calibration is complete all components associated with the calibration chains must be removed from the feeder and stored in a suitable place. The chain must be kept clean and the rolls must be capable of rotating on the belt during a calibration check.

Typical Fully Enclosed Calibration Chain Position
(Enclosure top removed for clarity)



Mechanical Adjustments

The WT1200 series has eight areas that may require mechanical adjustment over the operating life of the feeder.

1) Load Cell Overload Protection
2) Belt Pre-Tensioning
3) Weigh Bar Height
4) Belt Carry Bar Heights
5) Belt Scraper(s) Carry Side Blade
6) Belt Scrapers Non Carry Side (Steering)
7) Belt Scrapers Non Carry Side (Plough)
8) Tail Pulley Scraper

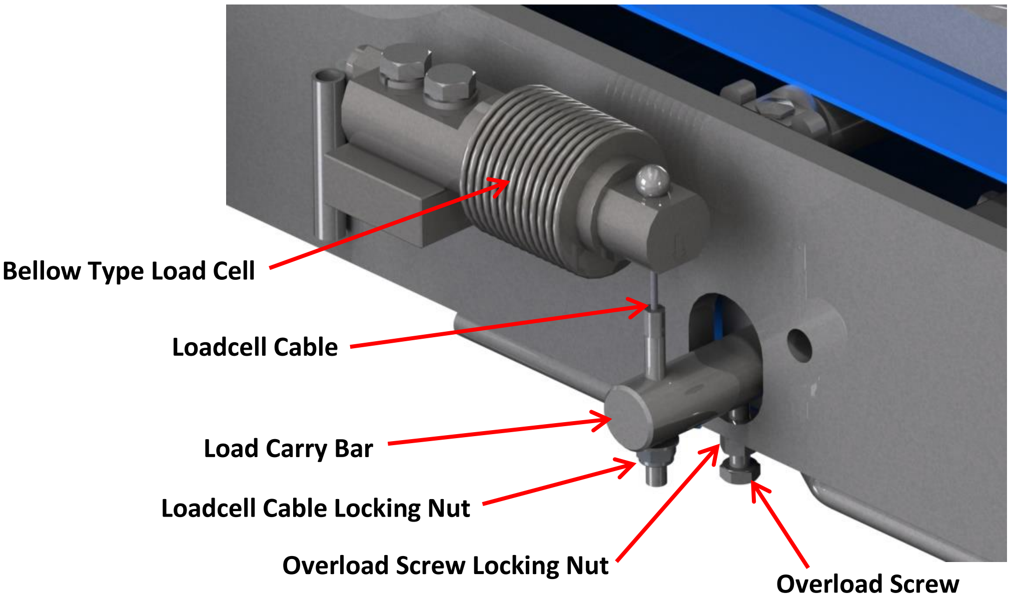
Mechanical Adjustments – Load Cell Overload Protection

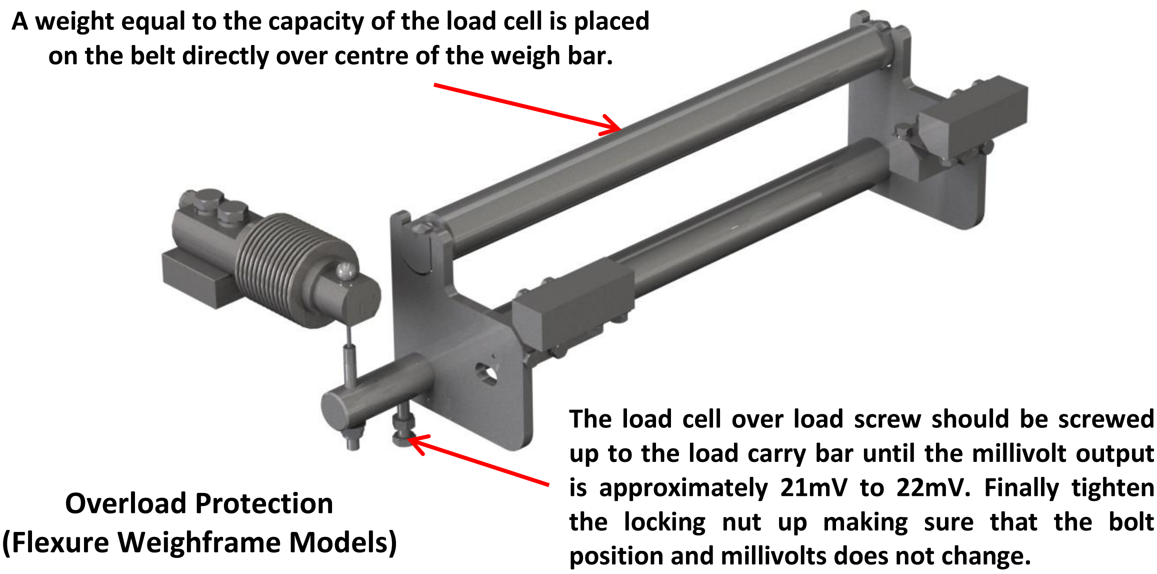
The WT1200 series weigh feeders typically use load cells in the range of 5kg - 20kg. Their capacity is a function of the duty. In an effort to prevent accidental load cell overloads, Web Tech have provided a mechanism which will arrest the load cell travel after a set point has been exceeded. The overload mechanism comprises a 6mm bolt and lock nut, which will normally be set in the factory.

To set the overload(s) follow the following procedure:

(It is assumed that the height of the carry bars, weigh bar and the loadcell cable are correctly set)

1) Whilst monitoring the millivolt output of the loadcell(s) on the electronic integrator, place a weight equal to the capacity of the load cell on the belt directly over the centre of the weigh bar. Ensure the millivolt output does not exceed 125% of the loadcell capacity (i.e. 25mV).
2) Release the overload screw locking nut and adjust the load cell overload screw until it just contacts the load carry bar, and adjust until the millivolt output is approximately 21mV to 22mV. Tighten the overload locking nut up against the bottom of the stringer whilst maintaining the millivolt output. Repeat for the opposite side if applicable. The over load stop mechanism has now been set up and the weight should be removed from the belt.
3) Check that a clear gap can be seen between the top of the overload screw and the load carry bar prior to proceeding.



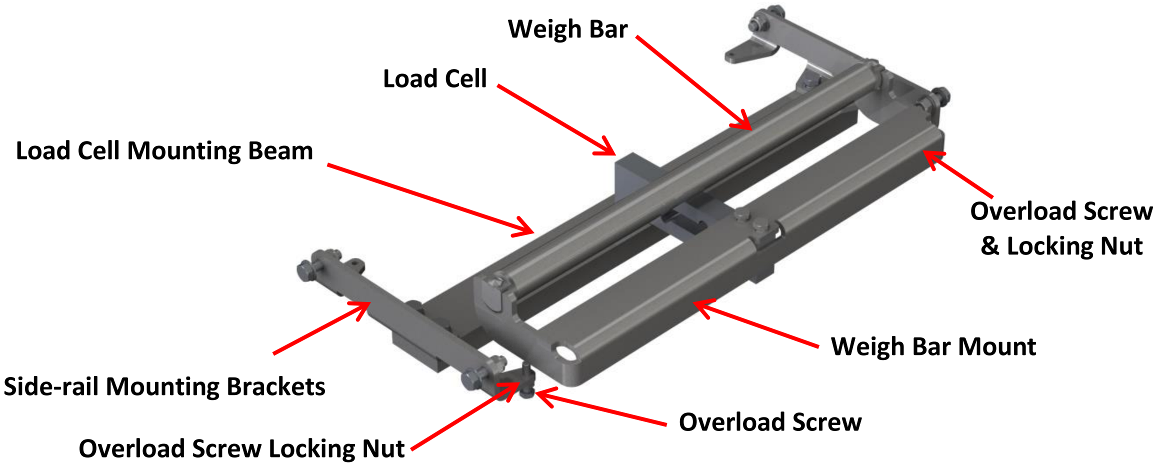


Overload Protection
(Flexure Weighframe Models)

Mechanical Adjustments – Load Cell Overload Protection

Where an internally mounted single point loadcell has been used, the procedure is similar to that previously mentioned, however there are two overload screws located just inside the each side rail in the weigh area. To set the overload(s) follow the following procedure:
(It is assumed that the height of the carry bars and weigh bar are correctly set)

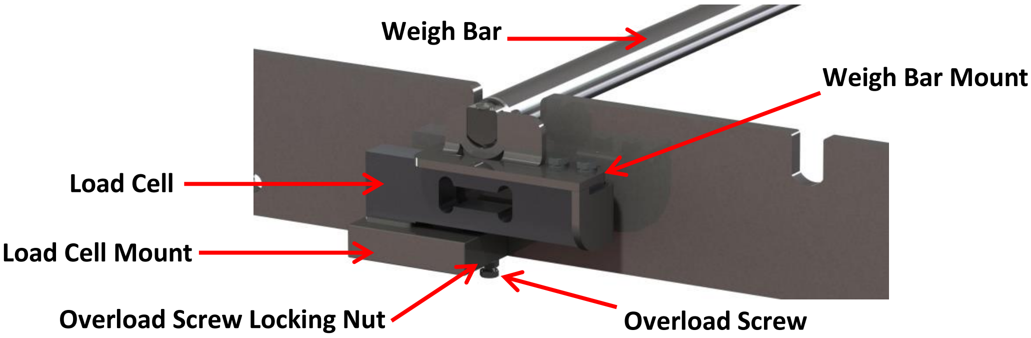
1) Whilst monitoring the millivolt output of the loadcells on the electronic integrator, place a weight equal to the capacity of the load cell on the belt directly over the centre of the weigh bar. Ensure the millivolt output does not exceed 125% of the loadcell capacity (i.e. 25mV).
2) Release the overload screw locking nuts and adjust the load cell overload screws until it just contacts the load carry bar, and adjust until the millivolt output is approximately 21mV to 22mV. Tighten the overload locking nut up against the bottom of the siderail mounting brackets whilst maintaining the millivolt output. Repeat for the opposite side. Move the weight to left and right hand side of the weigh bar to ensure both sides are set correctly.
3) Check that a clear gap can be seen between the top of the overload screw and the load carry bar prior to proceeding.



Overload Protection (Internal Single Point Loadcell Models)

Where externally mounted single point loadcells have been used, the overload screws are located under each loadcell mount and will have to be set individually. To set the overloads:
(It is assumed that the height of the carry bars and weigh bar are correctly set)

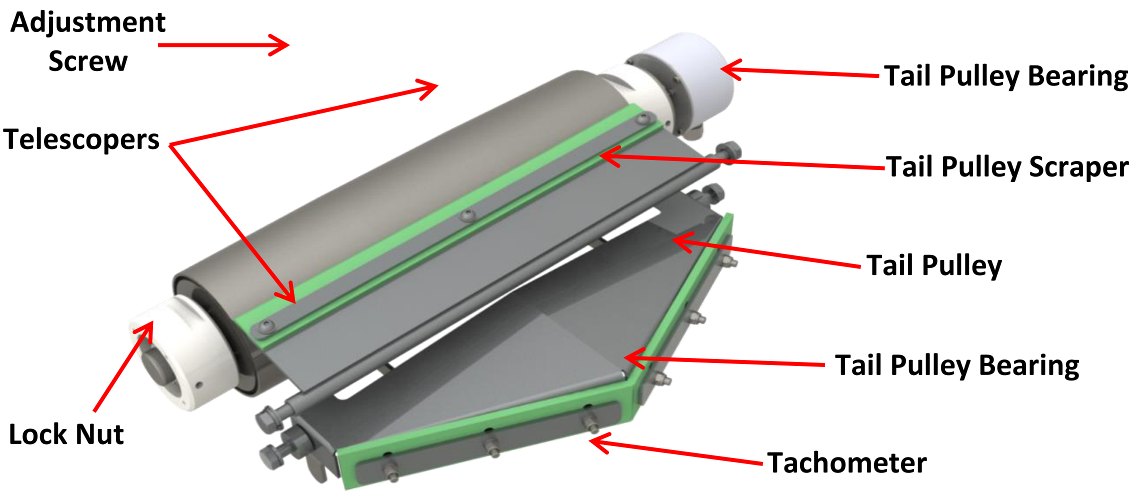
1) Whilst monitoring the millivolt output of the loadcells on the electronic integrator, place a weight equal to the capacity of the load cell on the belt directly over the centre of the weigh bar. Ensure the millivolt output does not exceed 125% of the loadcell capacity (i.e. 25mV).
2) Isolate one of the loadcells in the junction box and set the overload as per step 2 above. Isolate the other loadcell and repeat for the opposite side. Move the weight to left and right hand side of the weigh bar to ensure both sides are set correctly.
3) Check that a clear gap can be seen between the top of the overload screw and the load carry bar prior to proceeding.

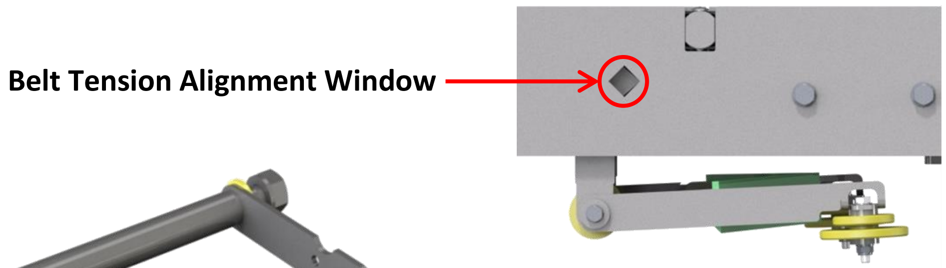


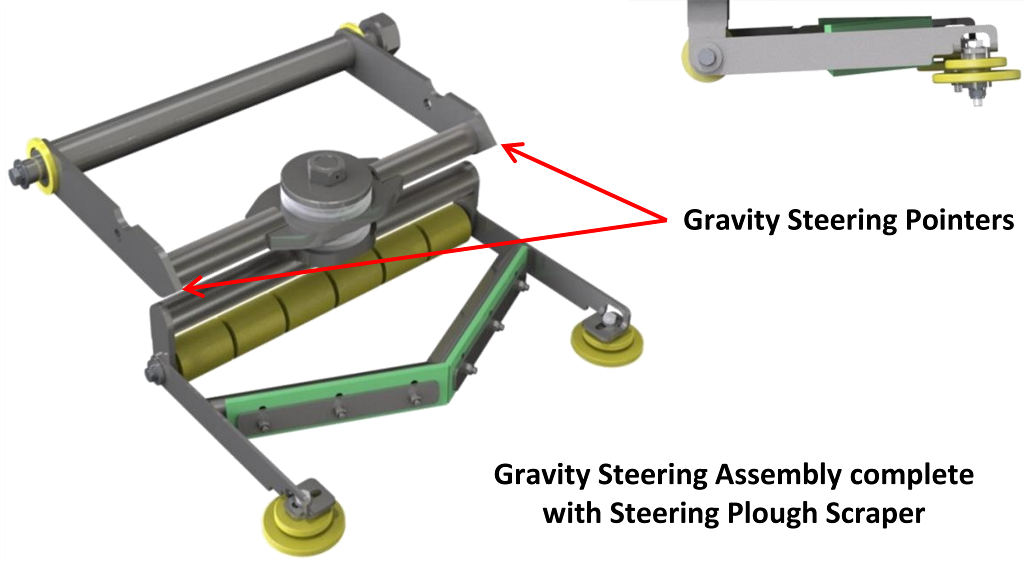
Overload Protection (External Single Point Loadcell Models)

Mechanical Adjustments – Belt Pre-Tensioning

It is important that weigh feeders are not subjected to varying belt tension during operation. The WT1200 series are fitted with a gravity assisted belt tensioning device to provide constant tension during normal operation, but are not designed to take up the large amount of slack required to make belt fitting and replacement easy. Therefore the WT1200 series of weigh feeders have been fitted with two telescope takeups. The tail pulley, tail pulley bearings, tachometer and tail pulley scraper are all attached to the telescopers and all move out from the weigh feeder when pre-tensioning the belt. The housing of the telescoper is bolted to the side rail of the weigh feeder and as the adjustment screw is turned the bearing plate with extend and retract from the housing. Please note the adjustment screw will not move out from the housing when rotated, only the bearing plate end. Both telescopers should be extended out from their housings by an equal amount, adjusting no more than 10mm on each side at one time, until they reach a nominal extension of 30mm (use a six inch rule to confirm). This distance may vary depending on belt length and pulley sizes. Final adjustments are made so the pointers on the Gravity Steering are aligned with the horizontal corners of the alignment window/diamond cut in the weigh feeder's side rails, and central tracking of the belt is maintained. Once final adjustments are made the telescope lock nuts are tightened. For more detail refer to the WT1200 Belt Replacement Guide.







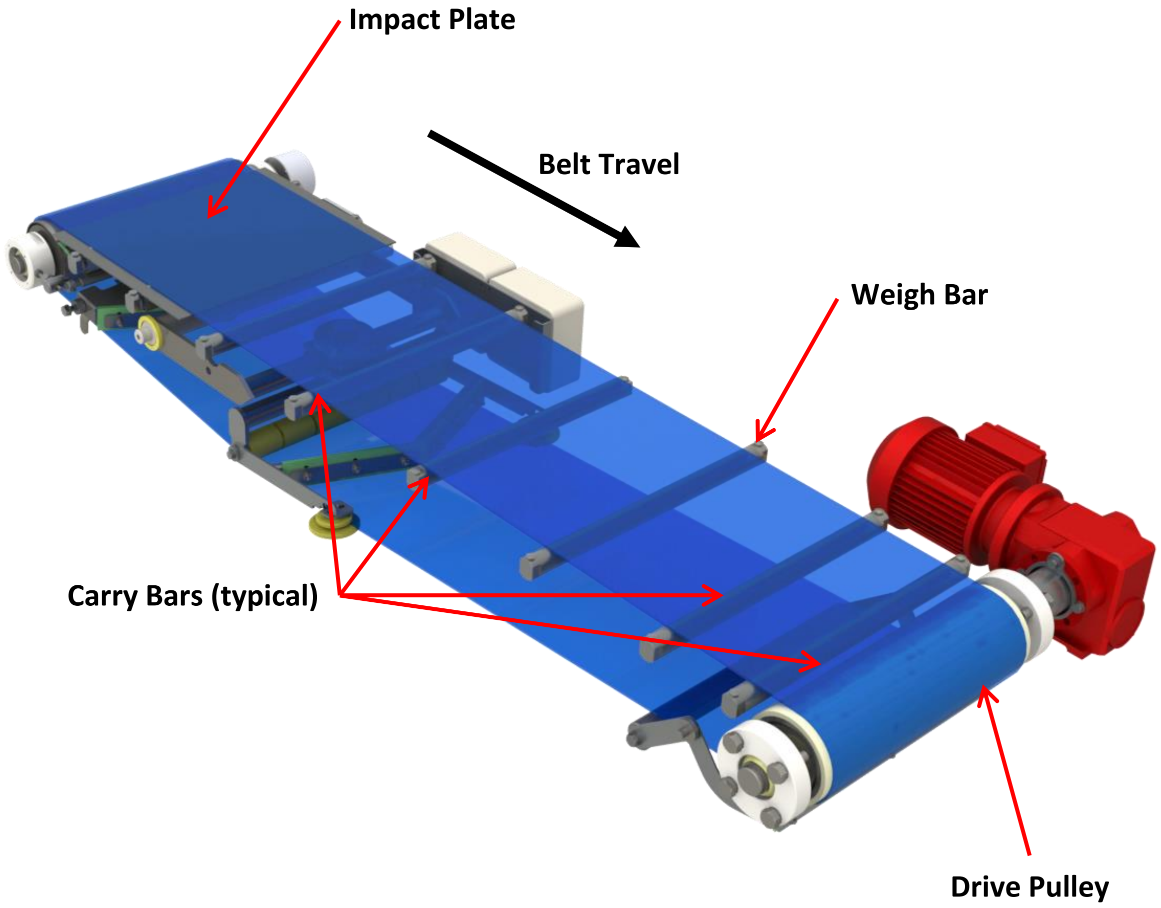
Gravity Steering Assembly complete
with Steering Plough Scraper

Mechanical Adjustments – Weigh Bar & Belt Carry Bar Heights

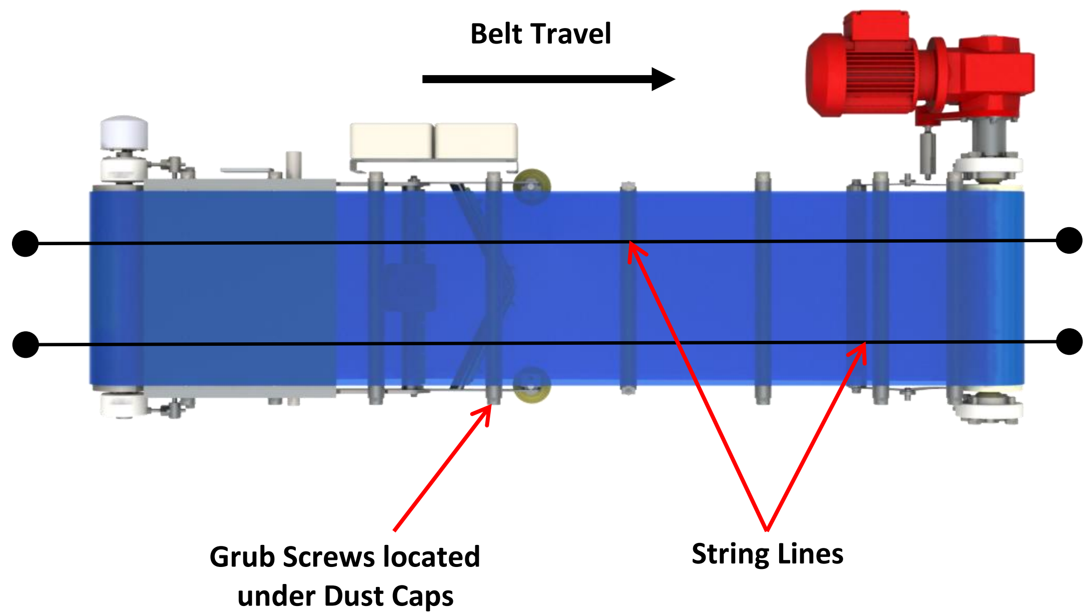
It is important that the belt path on the carry side of the weighfeeder be level. Each bar must be within 0.1mm vertically with all other carry bars, and also in line with the impact plate and drive pulley. Typically there will be two carry bars before the weigh bar, and two after (this may vary depending on the length and model of weighfeeder). The weigh bar must also be adjusted to the same precision as the carry bars if the weigh feeder is to return the accuracies specified. During transportation the weigh bar and carry bars may have settled. During commissioning, the commissioning technician will check the vertical alignment using a nylon string line with a breaking capacity of 120kg. If any bars are found not to meet our height specification they must be adjusted.

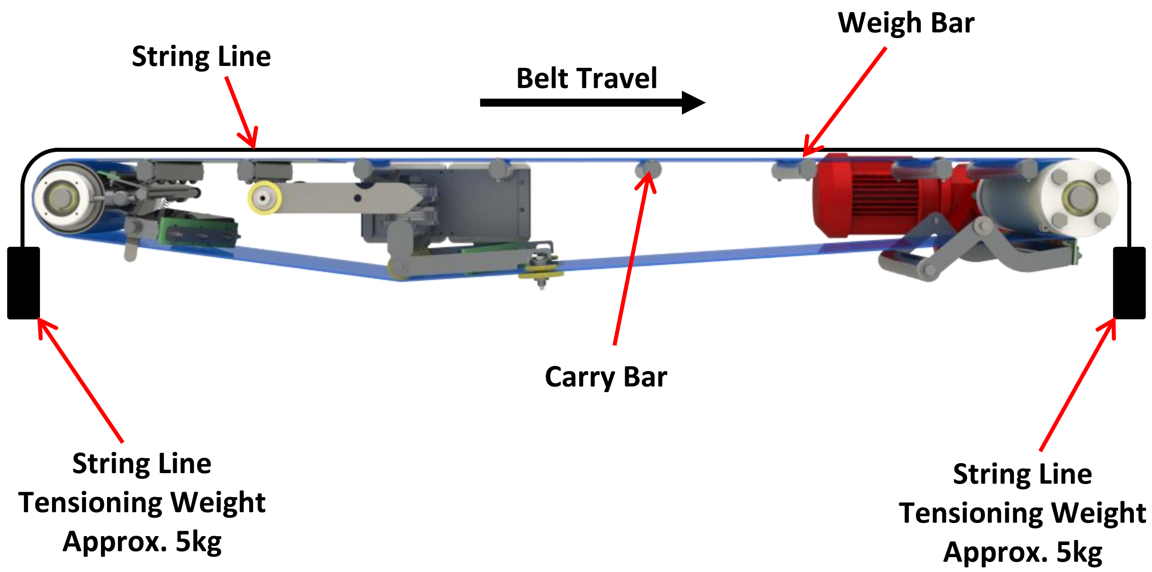
Adjustment is achieved by means of two grub screws located at either end of the bar. The grub screws can be located under a plastic or stainless dust cap which must be removed to gain access to the grub screws. When removing the dust caps on the weigh bar care must be taken not to damage the load cell. The 6mm grub screw will have been set in position using a thread locking liquid ("Loctite" or equivalent). The base of the screw will have been smeared with the compound so as to provide greater locking. It is therefore important that a correctly sized Allen Key be used (typically 3mm) if the grub screw is to be broken out without damaging the grub screw.

It is highly unlikely that adjustments in the order of +/- 0.5mm should be required. If this is found, check your methodology in assessing the bars relative heights.



Mechanical Adjustments – Weigh Bar & Belt Carry Bar Heights

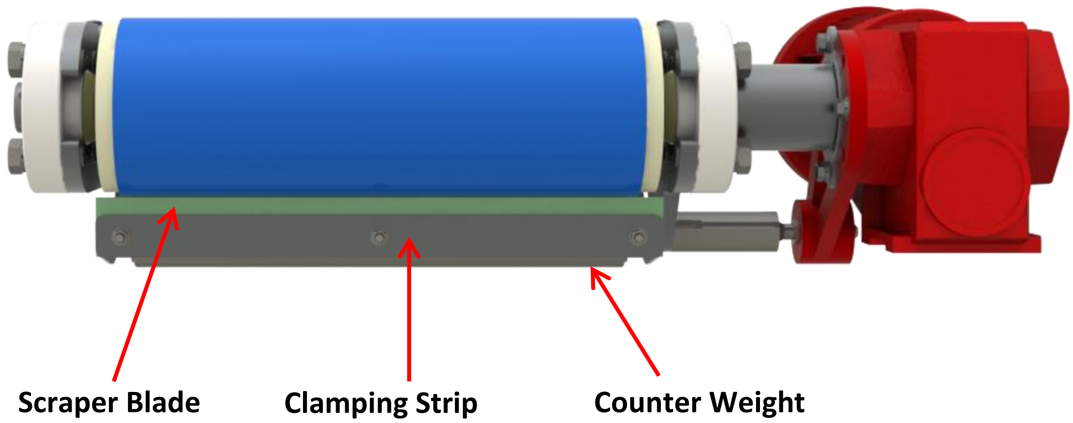


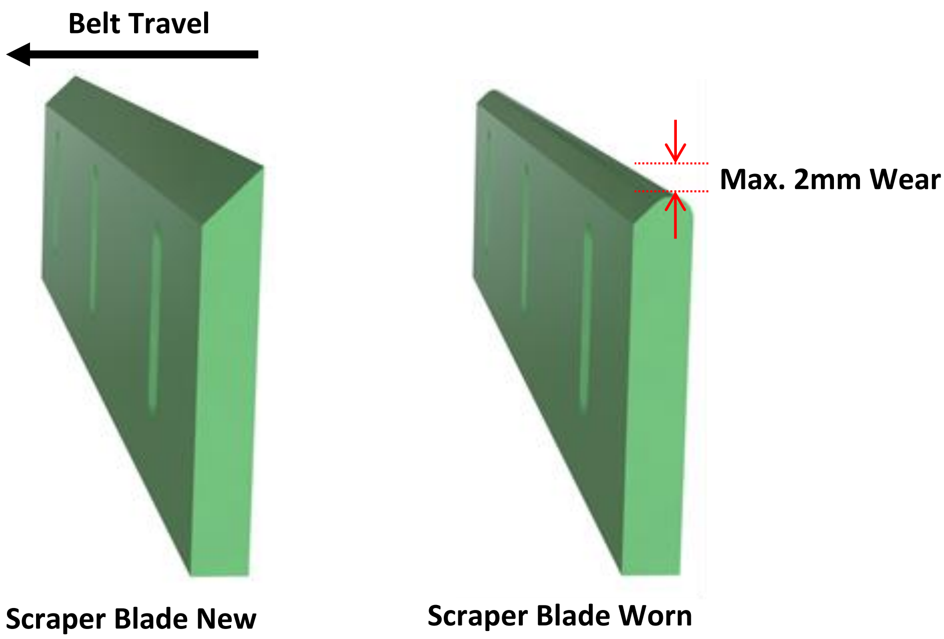


Mechanical Adjustments – Belt Scraper Carry Side Blade

The WT1200 weighfeeder is fitted with a carry side belt scraper. The scraper prevents the conveyed product from building up on the carry side, and dropping off along the return belt path or piling up against the rear of the inlet chute.

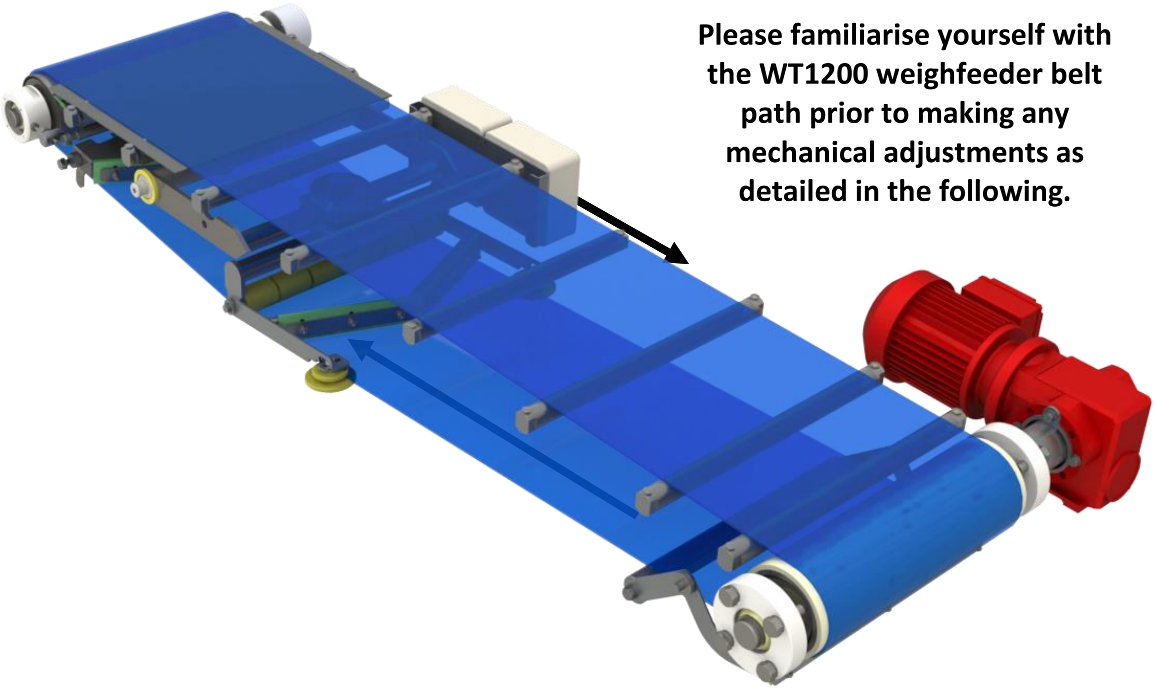
The scraper is manufactured from a pre lubricated material that is machined to form a scraper blade. It is important that the profile of the blade be maintained so that its cleaning properties are maintained. The blade is held in place by means of a backing plate and bolted clamping strip. Slots in the blade provide a means of adjustment along with the tension provided by a counterweight.

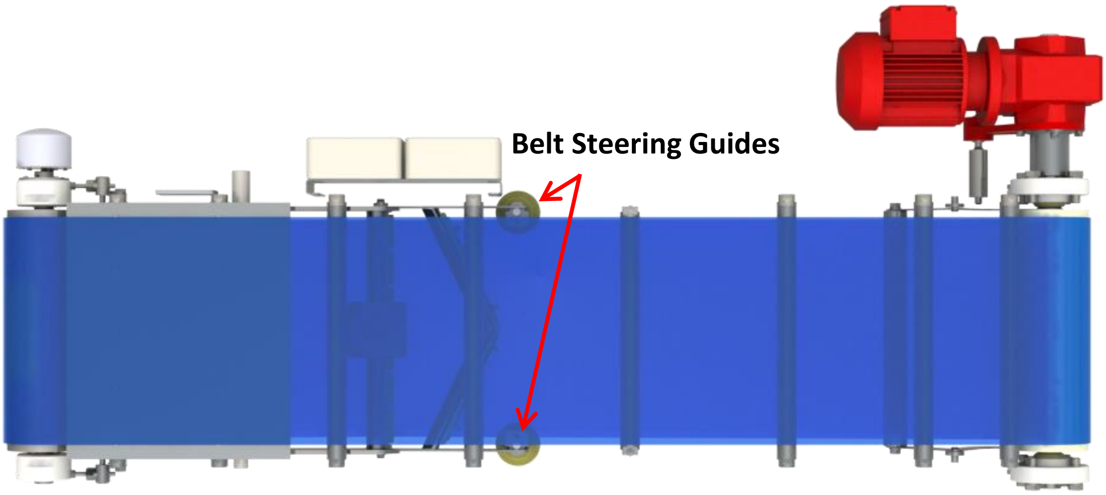


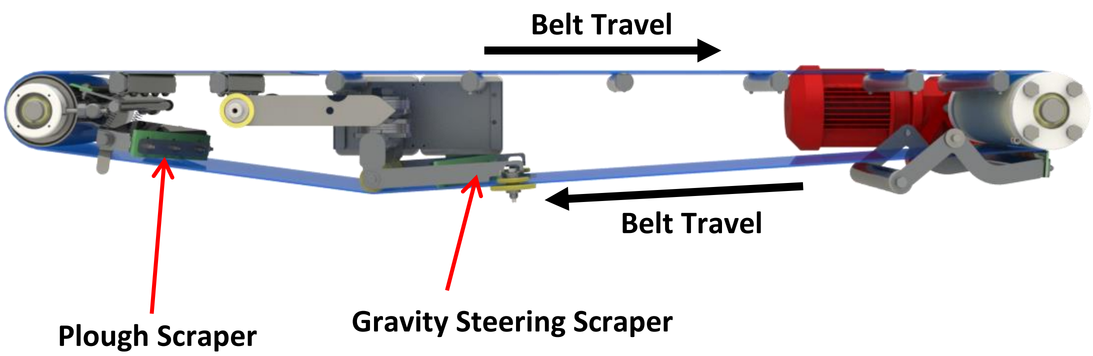


Mechanical Adjustments – Belt Paths

Please familiarise yourself with the WT1200 weighfeeder belt path prior to making any mechanical adjustments as detailed in the following.





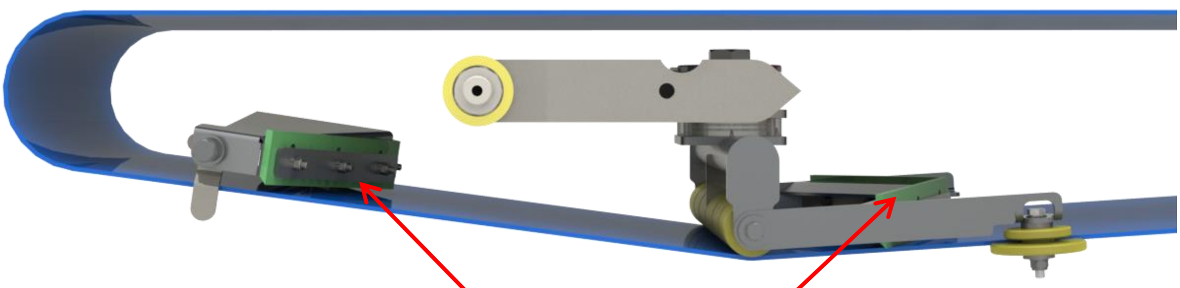


Mechanical Adjustments – Plough Scrapers

Belt length for the WT1200 series weigh feeder is typically 2920mm. Reliable belt tracking on short centred belts is quite difficult. Web-Tech achieves belt centring by taking care that the entire weighfeeder is built “square”. The tail pulley is crowned and the belt is tensioned by a gravity assisted mechanism that is fitted with active belt steering. Crowned pulleys have the greatest effect on belt tracking, however they introduce a lateral tension line along the belt which will affect the performance of the weighing mechanism. Web Tech only crown the tail pulley in an effort to minimise belt creasing, therefore it is important that this pulley be kept clean. The profile of the crowned pulley changes when contaminated, negating the effect of crowning.

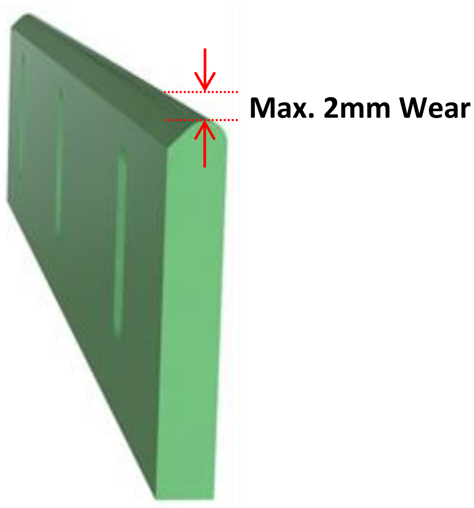
Three scrapers are used to keep the pulley surface clean. There are two plough style scrapers fitted to the non-carry side of the belt. One is fitted to the gravity steering device and the other is a stand-alone unit fitted to the rear of the weighfeeder just before the belt wraps around the tail pulley.

The scraper elements are subject to wear. For the weighfeeder to operate correctly and perform to the advertised specifications, both sides of the belt and critical components in the belt path must be kept clear of contaminants. Regular inspection of the scraper blade elements must be undertaken and the blades must be maintained to the specifications shown below. The blade elements can be machined a number of times prior to being replaced. Blade elements are manufactured from a pre-lubricated high density plastic compound and must not be replaced with blades manufactured from any other material.



Plough Scraper Locations

Scraper Blade New

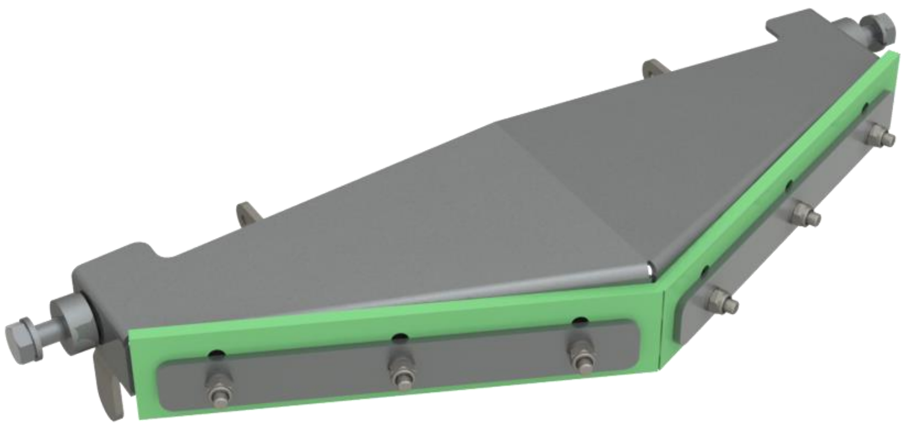


Scraper Blade Worn (Needs Replacing)

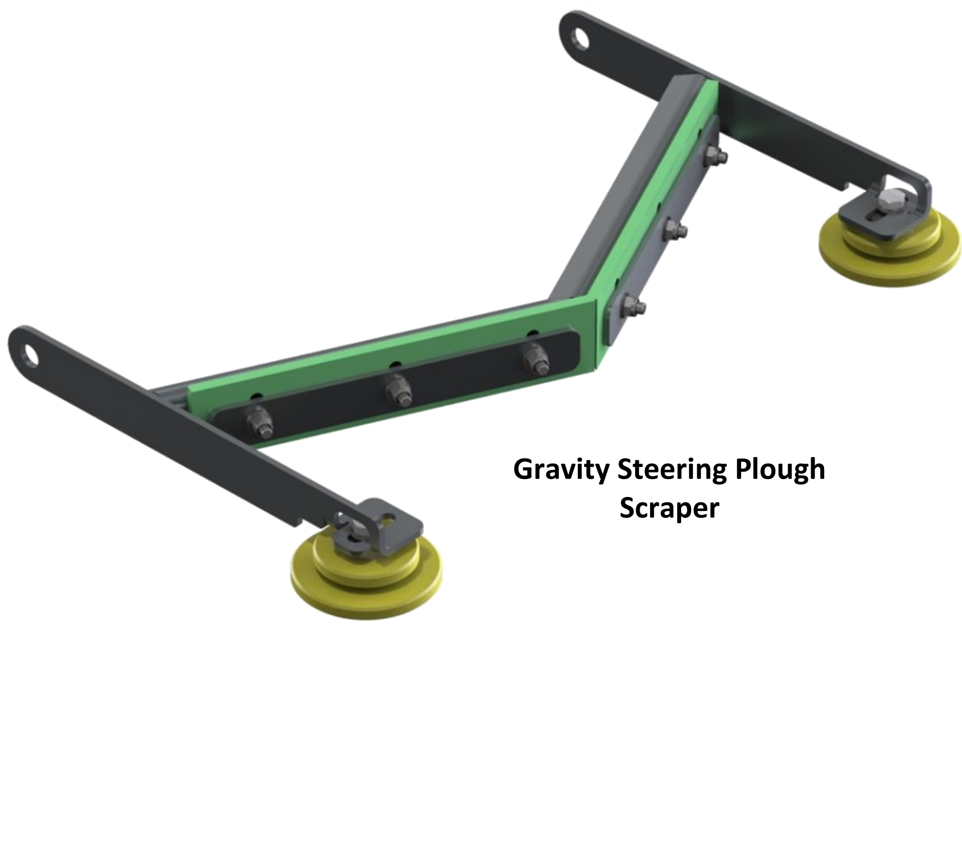
Mechanical Adjustments – Plough Scrapers

The plough scraper fitted to the gravity steering/tensioning device acts as a pre-scraper to the stand alone plough scraper, as well as keeping the gravity steering rolls clean. The plough is formed by two blades machined from a pre-lubricated material and held in place by means of a backing plate and clamping strips. Each blade can be adjusted by means of machined slots. When adjusting these blades care must be taken to ensure that the belts path is not distorted by adjusting the blade too deep into the belt. The profile of the scraper blade is important to provide an effective scraping mechanism. If the scraper blade does not meet the approximate dimensions as shown, it must be either machined or replaced.

The stand-alone plough scraper is formed by two machined blades fitted to a pressed steel/ stainless steel frame. As well as providing an attachment point for the scraper blades, the frame acts as a cover, protecting the belt from material removed from the pulley by the pulley scraper that is located directly above it. As with all the scraper blades used it is important that the profile of the blade be maintained by either machining or replacing.



Plough Belt Scraper

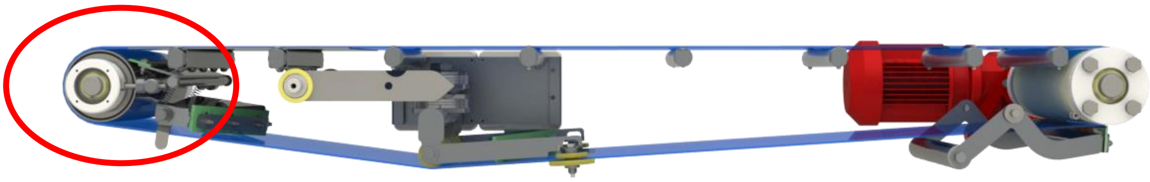


Gravity Steering Plough Scraper

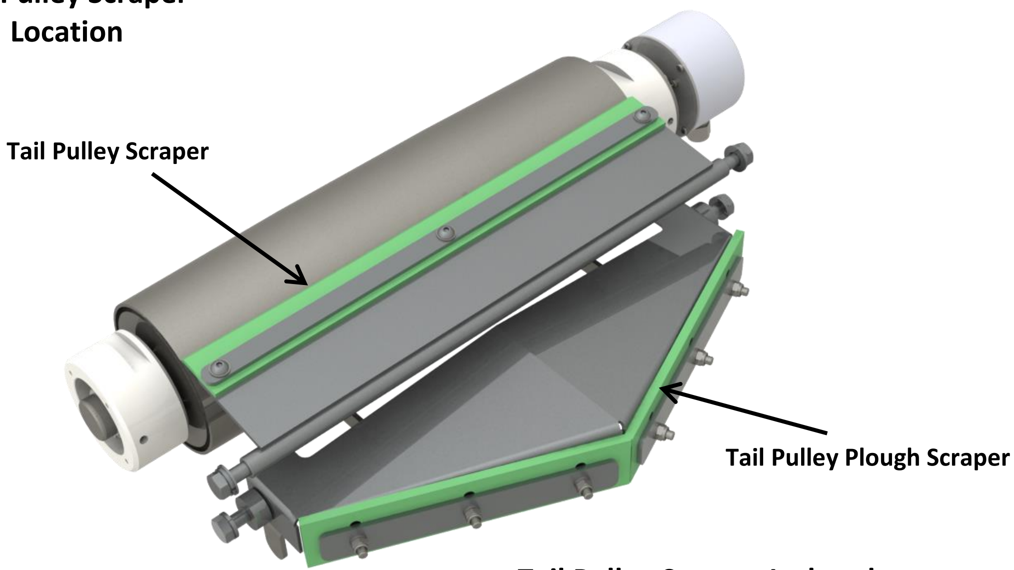
Mechanical Adjustments – Tail Pulley Scraper

As previously stated, the crowned tail pulley has the greatest effect on belt tracking. A build-up of material on this pulley will change its shape and negate the effects of crowning. Web Tech has incorporated a pulley scraper to assist in keeping the pulley free of any material build up on the pulley face. To assist in keeping the scraper in contact with the crowned face an additional weighted bar can be added. In older models springs have been fitted to the blade mounting hardware. The tension on those springs can be adjusted by means of a lever. To increase the tension the lever securing nut should be loosened, the lever can then be repositioned and locked in the new position.

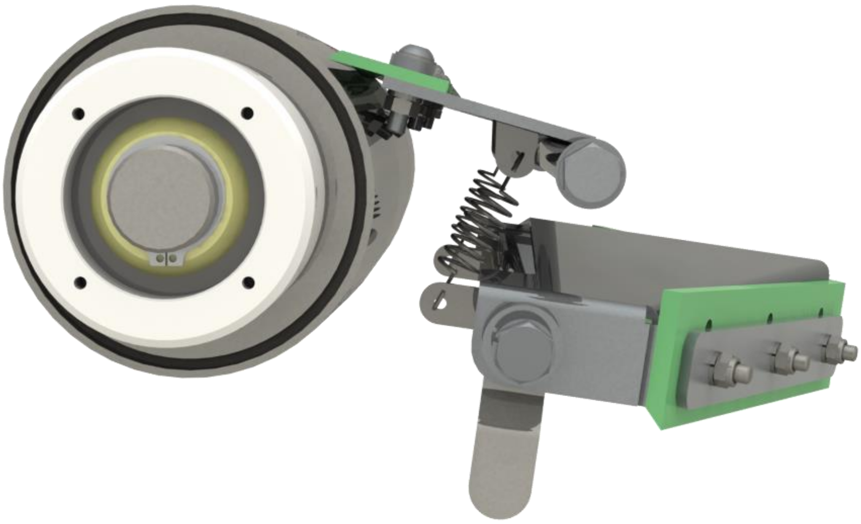
As with all the WT1200 Weigh Feeder scraper blade elements, the profile of the blade must be maintained if the scraper is to work as intended.



Tail Pulley Scraper Location



Tail Pulley Scraper Isolated

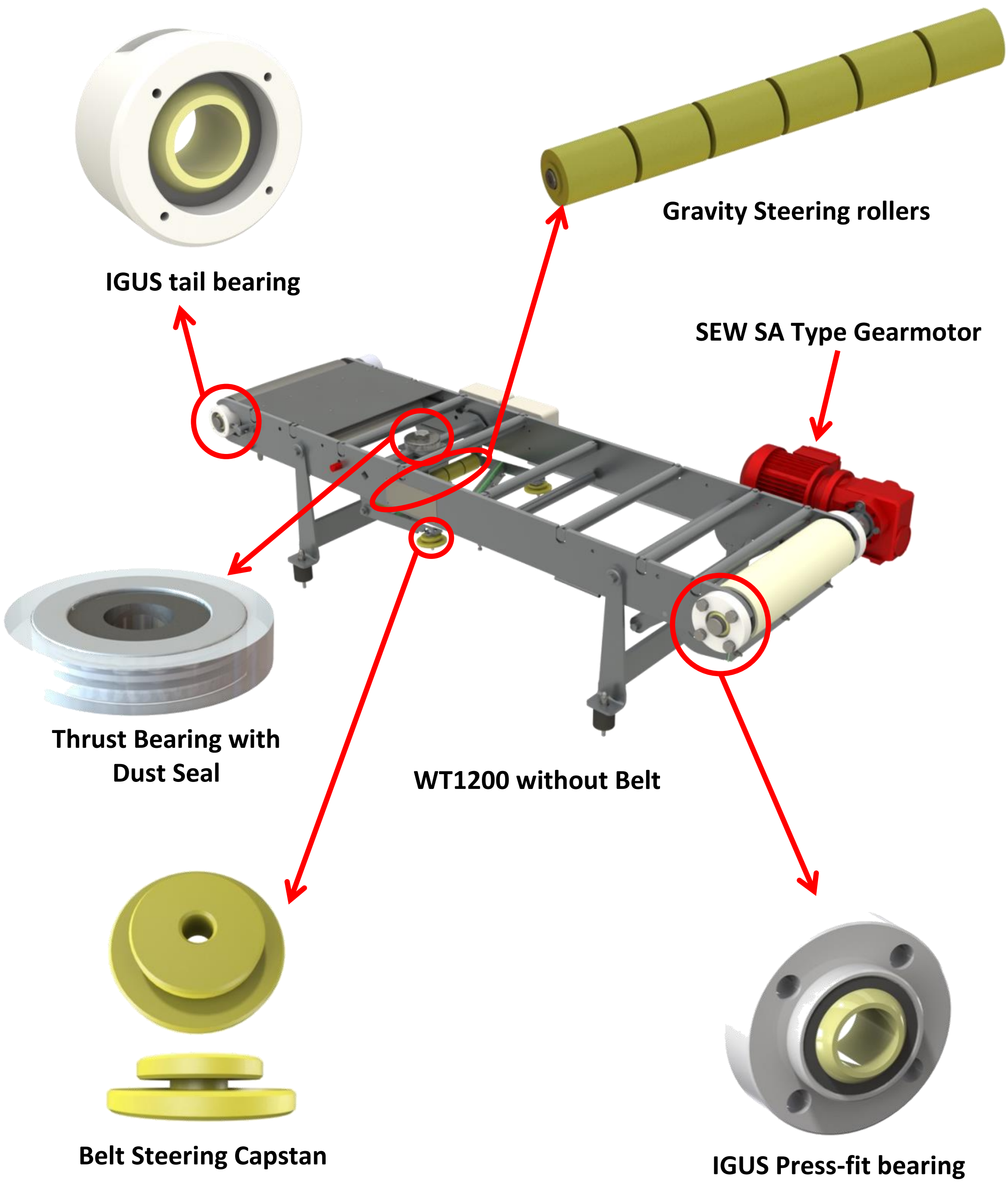


Tail Pulley Scraper Side View

Mechanical Lubrication

The WT1200 series of weigh feeders have been designed primarily for use in the food, snack food and chemical industries where the use of grease and oil may not be permitted. Where possible the bearings and rubbing surfaces have been designed using material that uses no or little oil and grease.

- Both pulleys are fitted with Igus polymer bearings that require no lubrication.
- The gravity steering rollers are manufactured from pre-lubricated materials that need no lubrication.
- The belt steering capstans are manufactured from pre-lubricated materials that need no lubrication.
- The belt steering pivoting bearings are factory packed with food grade grease.
- The motor gearbox is supplied with oil specified by the manufacturers. The manual for the motor and gear box can be found in the rear of this manual.



Electrical Motor

The motor supplied with the weighfeeder depends on the application. The WT1200 series of weigh feeders are generally used to control the mass rate of powders and food stuffs at a maximum of:

- 300mm Belt - $16m^3$
- 450mm Belt - $24m^3$
- 600mm Belt - $32m^3$
- 750mm Belt - $40m^3$
- 900mm Belt - $48m^3$

Based on max shear gate opening 100mm, shear gate width equal to half of belt width and maximum belt speed of 0.3m/S.

The torque required to extract the feed from the WT1200 series inlet chute is generally quite low. The most important factor when designing a weighfeeder is the belt speed. The belt speed is directly proportional to the shear gate height and inlet chute width.

When dealing with a lumpy product Web Tech sets the shear gate height greater than or equal to 2.5 times the maximum lump size. When dealing with powders, the shear gate height is usually set to suite the belt width, belt speed and the products angle of repose.

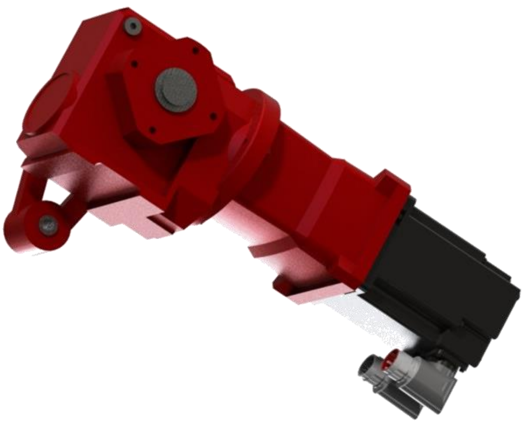
Web Tech attempts to design a weighfeeder so that the maximum rate is achievable at VSD outputs in the range of 50Hz to 60Hz, and the minimum VSD output of no less than 10Hz. Outputs of less than 10Hz may cause the motor to fail due to overheating. It is possible to fit an electric fan to the motor, however Web Tech prefers to avoid this by using a gearbox reduction that suits the application.

Very low belt speeds and large bed depths can also cause the product to “briquette” at the discharge point.

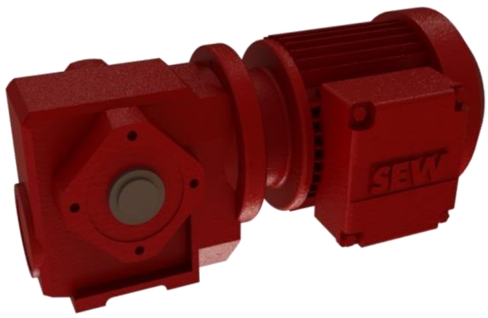
For applications in the food and snack food industries non-toxic food grade oil is available.

Motor gearbox information is covered in the manufacturer’s manual, which can be found in the rear of this manual.

The WT1200 range of weigh feeders incorporate shaft mounted motor gearbox arrangements. The pulley shaft, manufactured by Web Tech, will have been coated with an anti-seize grease supplied by the motor/gearbox manufacturer.



SEW Gearbox with Allen Bradley Servo Motor



SEW SA Type Gearmotor

OPERATION MANUAL

Masterweigh Optimus

Web-Tech Australia Pty Ltd

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PO Box 4006
EIGHT MILE PLAINS
BRISBANE QLD 4113
AUSTRALIA

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Optimus.
General Description.

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

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

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

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

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

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

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

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

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

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

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

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

Power Requirements.

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

Main Board.

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

User Interface.

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

Loadcell Interface.

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

Current loop input and output.

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

Serial Input/Output.

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

Initial Setup and debugging interface.

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

Options.

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

Terminal PCB.

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

Power Board.

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

Manufacturer.

Hoffmann.

Application.

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

Construction.

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

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

Polyester mounting feet and stainless steel attachment screws.

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

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

Hinge and bail are corrosion resistant monel.

Knock out padlock provisions included in each latch.

Industry Standards.

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

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

Enclosure flammability rating UL94-5V

CSA Type 4 and Type 12.

IEC 529 , **IP66**

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

Load Cell.

Weigh Zone / (weigh deck)

Tachometer / (Encoder).

Electronic Integrator.

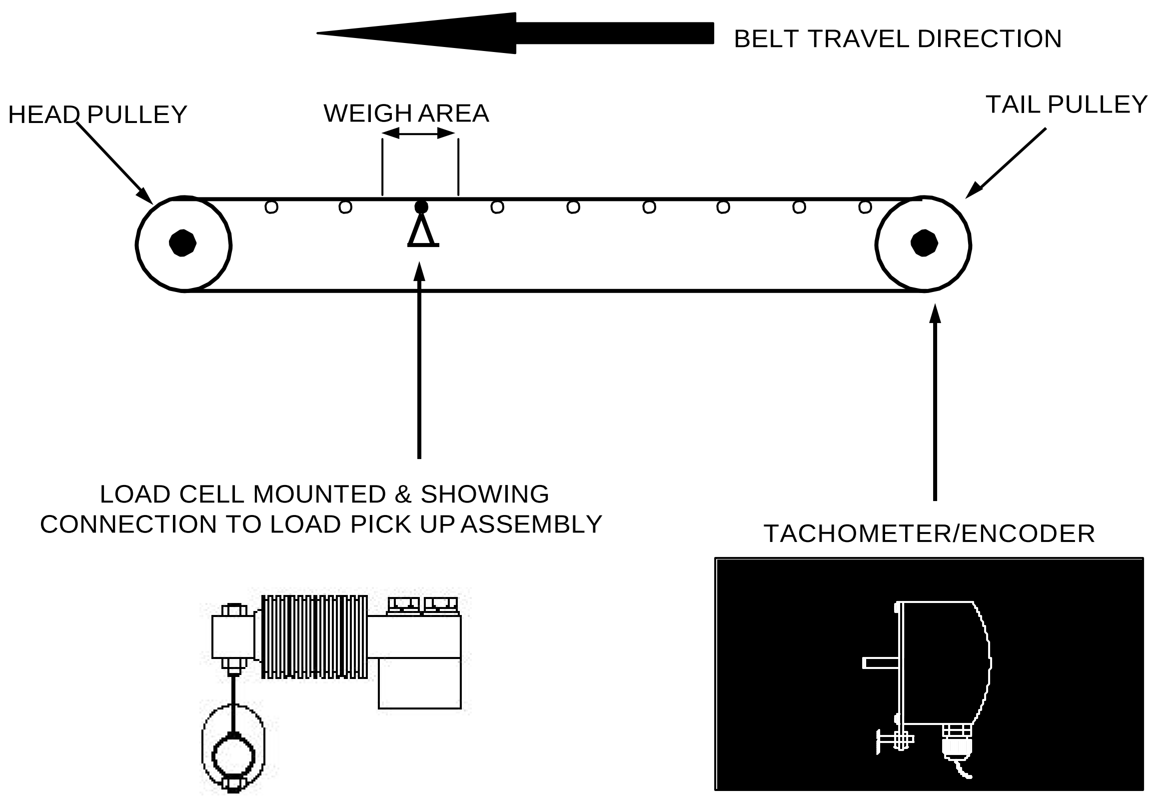
Optimus's primary roll is combine the weight of product carried by a conveyor belt and the speed of that belt and produce a variety of associated process control signals.

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

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

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

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



Printed Circuit Board location.

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

Main Processor PCB.

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

Field Wiring PCB.

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

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

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

Installer / Electrician Note.

Care must be taken when cutting holes in the enclosure to provide cable access. It is recommended that the Power & Field Wiring PCB be removed prior cutting holes. Take note of cable entry with respect to PCB when re installed.
All cables should enter the enclosure via site approved cable glands.
The entry of water into this enclosure will damage the electronics and void and warranty.

CPU PCB.

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

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

+24V

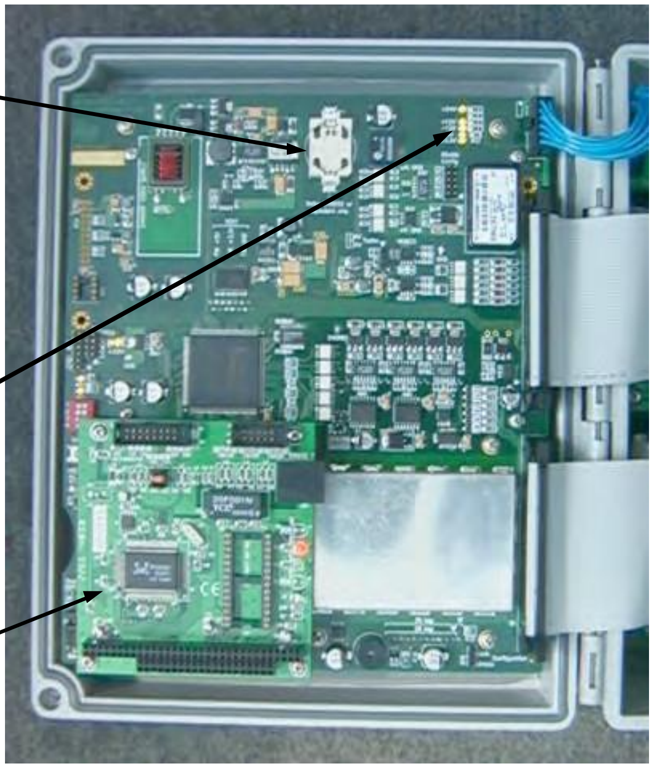
+12V

-12v

+5V

+3.3V

Optional communications card. TCP-IP, Profibus, DeviceNet



Power & Terminal PCB.

Optional RS 232 Output

Optional RS 485 Output

Generally Digital Inputs.

Generally analogue outputs.

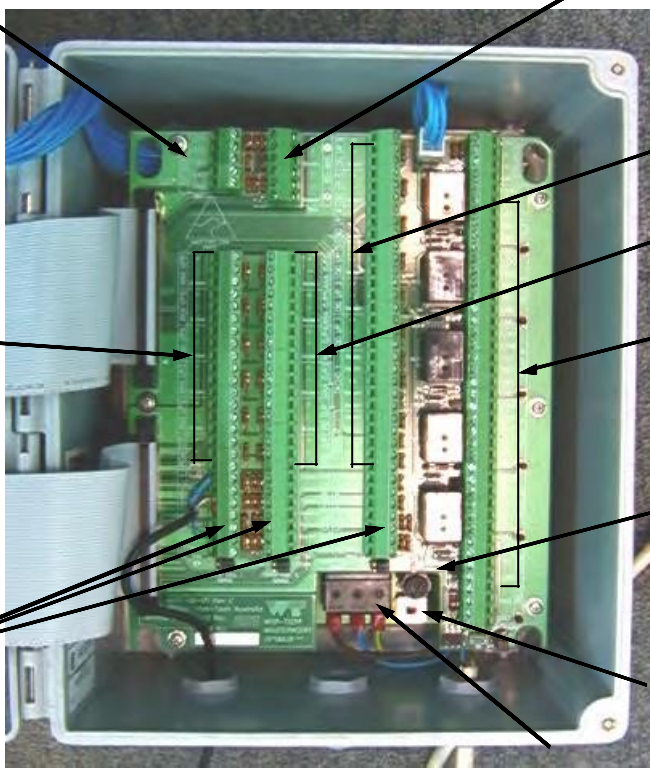
Generally Relay I/O

Generally Analogue Inputs.

Fuse

Load Cell Inputs Channel 1-3

Local On/Off Switch. Lower PCB.



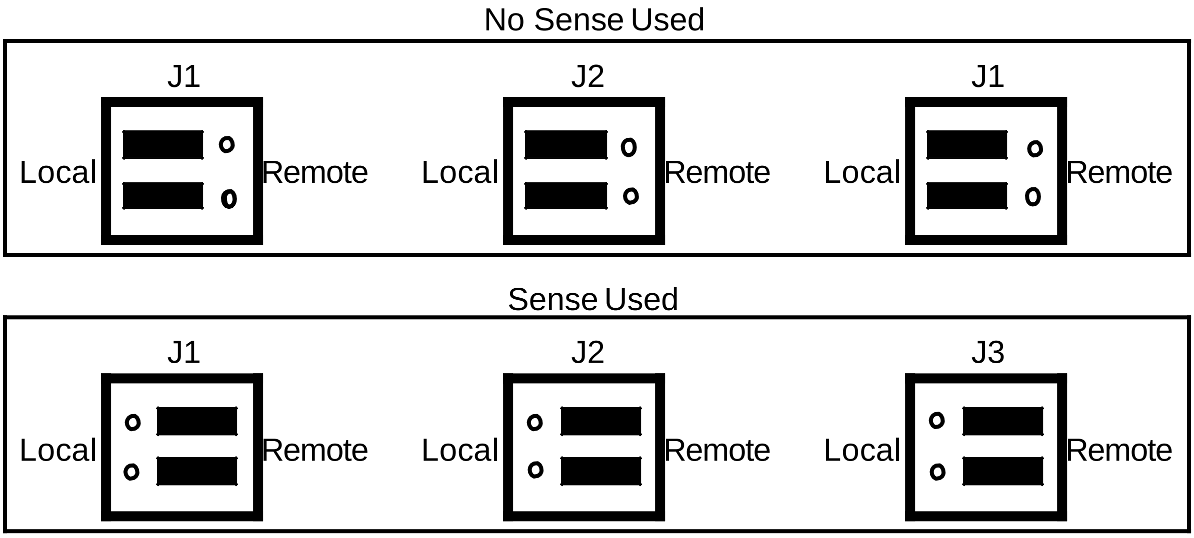
Multi Voltage/Frequency Mains Input. Lower PCB.

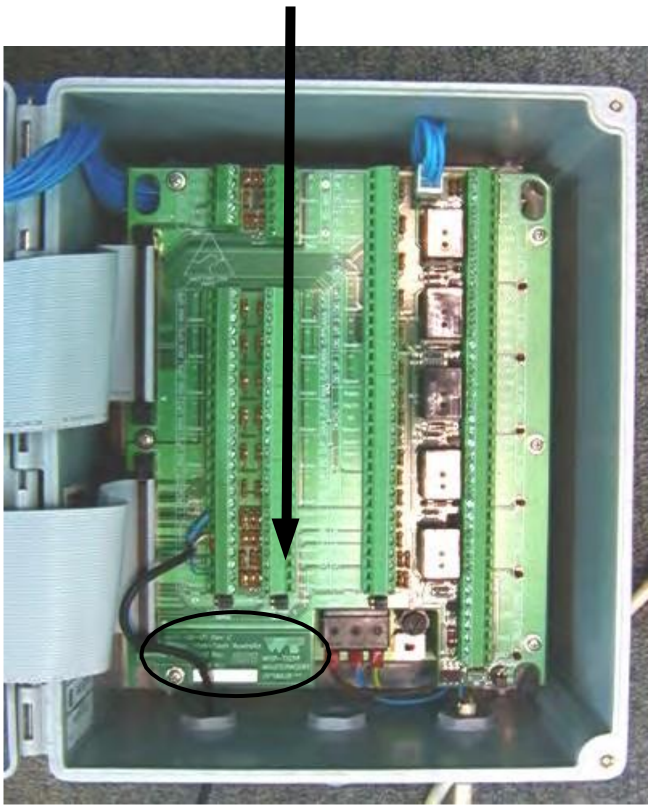
Power & Field Wiring PCB.

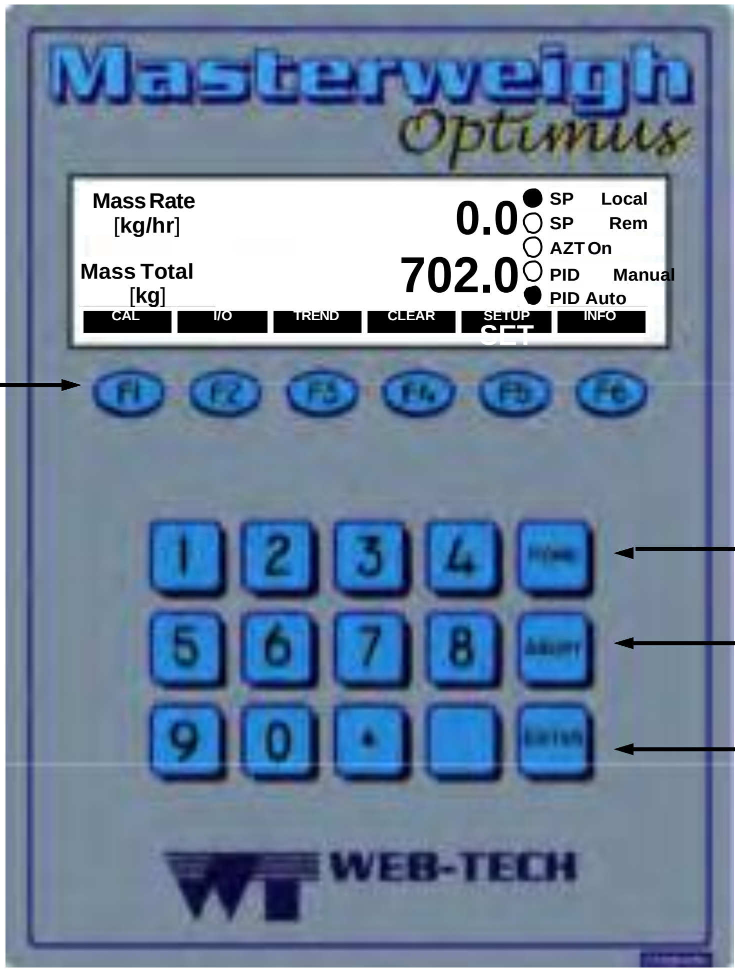
Optimus can power up to eight (8) individual load cells. (350O). Generally these load cells are paralled up, in marshalling boxes in the field. However some continuous weighing systems application require that individual load cells are digitally summed in Optimus. This allows special mathematical algorithms to be applied to the load cell signals prior to integration. On occasion Optimus may be required to read the out put of a load cell that is positioned up stream of the weigh area in order that product can be accurately pre fed onto the weigh belt.

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

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



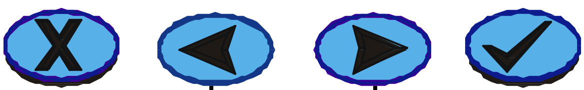




Takes the user back to MRMT & updates all entered variables

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

Saves any changes and moves the screen forward one.

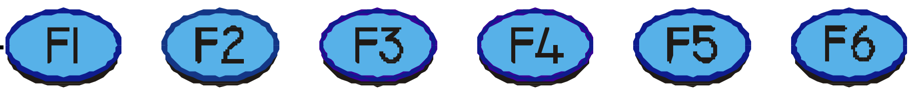


Cancels current action and forces display back to previous screen.

Scrolls curser up.

Scrolls curser down.

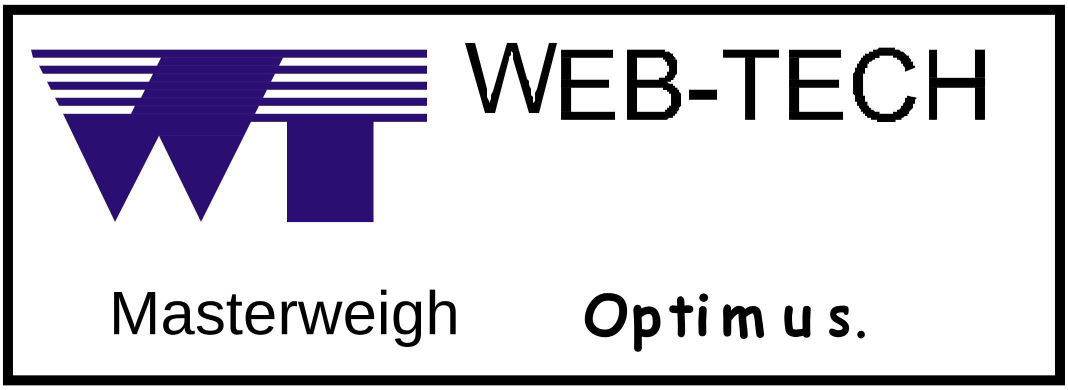
Saves any changes and moves the screen forward one.



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

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

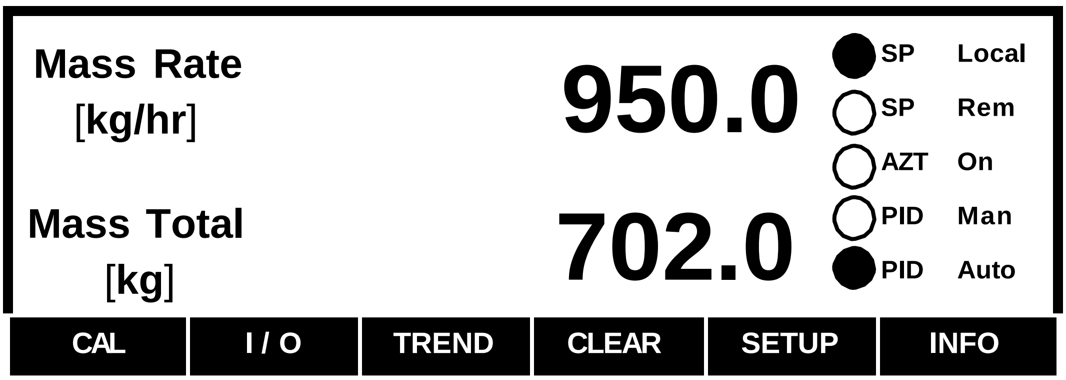
Start Up Display



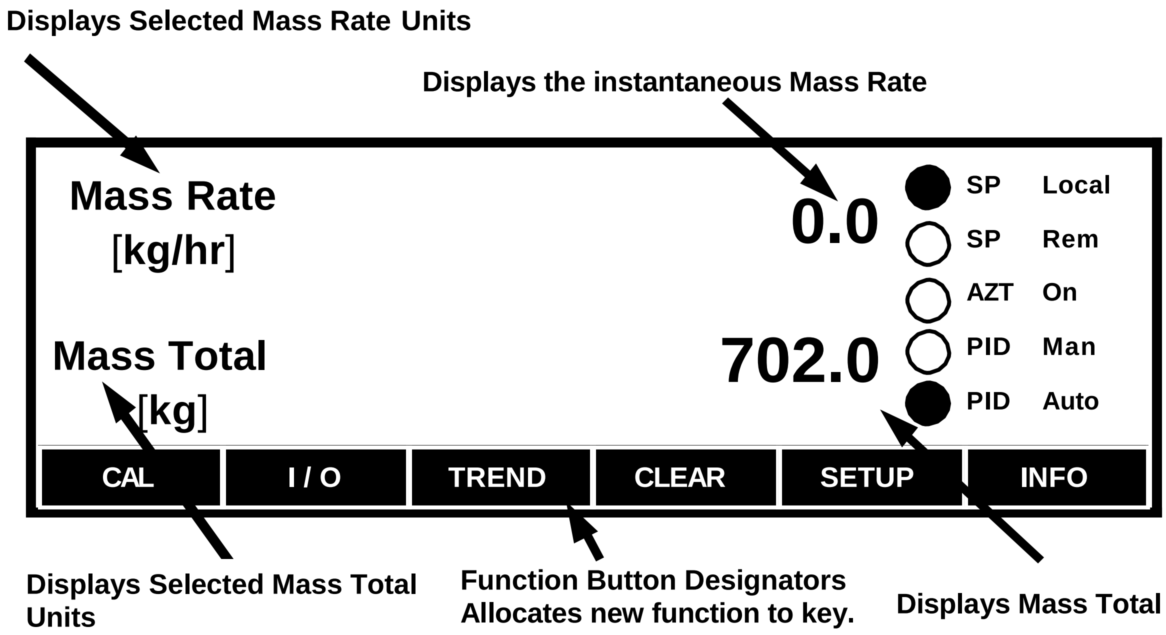
The screen shown below is the screen that should be displayed whilst Optimus Plus is running. We call this particular screen Mass Rate, Mass Total (**MRMT**) and is the default screen. Take time to make yourself familiar with the data that is available on this screen and how it interacts with the keypad.

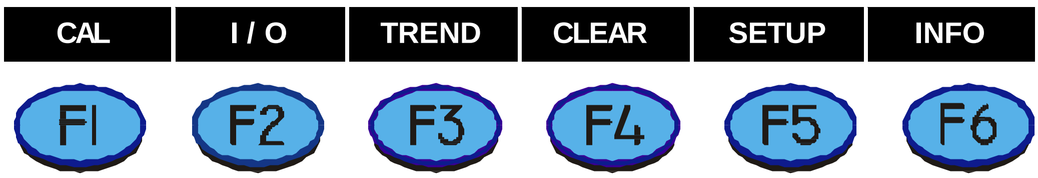
See over for detailed description of functions available from this screen.

Mass Rate Mass Total (MRMT) Display



OPTIMUS OPERATIONAL MANUAL.
Main Display MRMT Description.





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

CAL. Pressing the CAL F1 key takes the user to the screens that provide for calibrating Optimus.

I/O. Pressing the I/O F2 key takes the user to the screens that provide for configuring current loops in and out. The digital inputs and out puts. The RS 232 & 485 serial communications.
The load cell entry point provides a method of easily viewing the load cell and tachometers output.

TREND. Entering the Trend F3 screen provides the user with a 2 minute trend of the instantaneous mass rate and control over the setpoint.

CLEAR. Pressing the clear F4 clears the local displays running total.

SETUP. Pressing the Setup F5 key takes the user to the menus associated with configuring Optimus.

INFO. Activating the Info F6 displays the Information screen where details of Optimus software can be viewed.

Mass Rate [**kg/hr**]	**0.0**	● SP	Local
		○ SP	Rem
		○ AZT	On
Mass Total [**kg**]	**702.0**	○ PID	Man
		● PID	Auto

CAL	I / O	TREND	CLEAR	SETUP	INFO

● **ON**
○ **OFF**

When active, feeder setpoint is generated at the key…………………………	● **SP**	**Local**
When active, feeder setpoint is generated by an external device…………	○ **SP**	**Rem**
When active, the Auto Zero Tracking is operating…………………………	○ **AZT**	**On**
When active, the PID loop is Off and controlled through keyboard…………	○ **PID**	**Man**
When active, the PID loop is On & functioning under the control algorithm….	● **PID**	**Auto**

Discards changes made on current screen and moves back one screen.

The Tick key accepts the input data. Stores the data into a working memory and returns the cursor to the main menu if data was entered in a sub menu.

ABORT Gives the user the option to discard all configuration changes they have made. Pressing 'ABORT' again discards any changes and reverts to the MRMT screen. Pressing 'HOME' will save any configuration and reverts back to MRMT screen.

ENTER The 'ENTER' key is used to enter menu's and scroll through preset menu's.

HOME Gives the user the option to save all configuration changes they have made. Pressing 'HOME' again will save changes and revert to MRMT screen. Pressing 'ABORT' will discard any changes made and revert to MRMT screen.

OPTIMUS OPERATIONAL MANUAL.
Getting Started.

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

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

The procedure is as follows:-

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

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

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

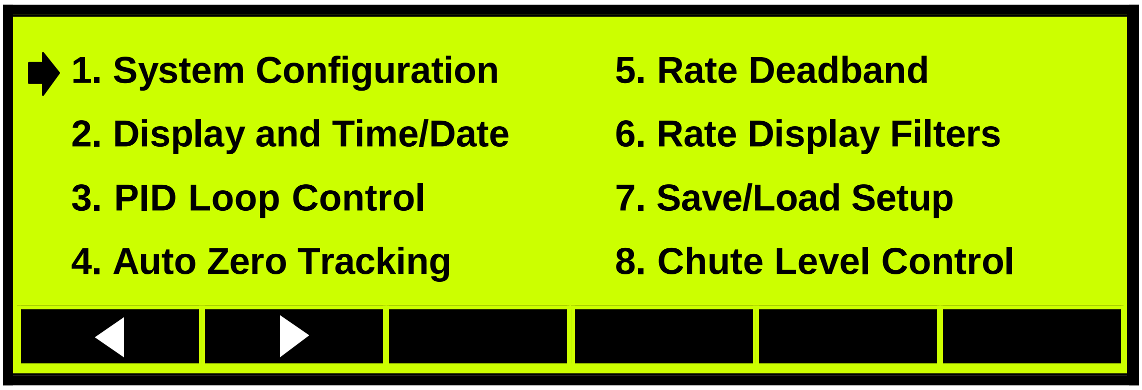
The **Calibration** procedure is required to force Optimus to convert the instrument's raw data (i.e. milli volts from the load cell/cells & tachometer frequency) into the physical units (i.e. Tons/hour kg/hr and their corresponding totalised values).

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

SETUP (Configuring Optimus).

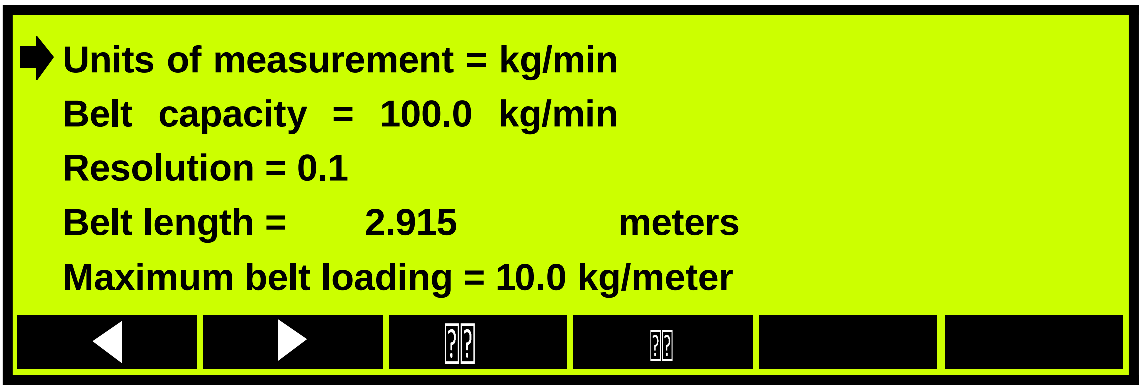
Prior to calibrating Optimus, the instrument must be configured to suit the application. Units selected and the input and output functions defined.

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



Select “System Configuration” by pushing the “ENTER” key.

The display will change to that shown below.



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

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

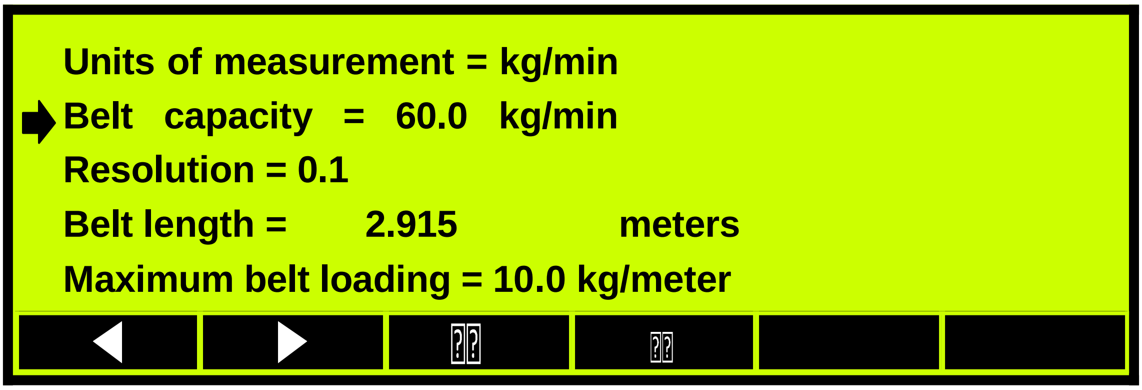
The following units are available :-

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

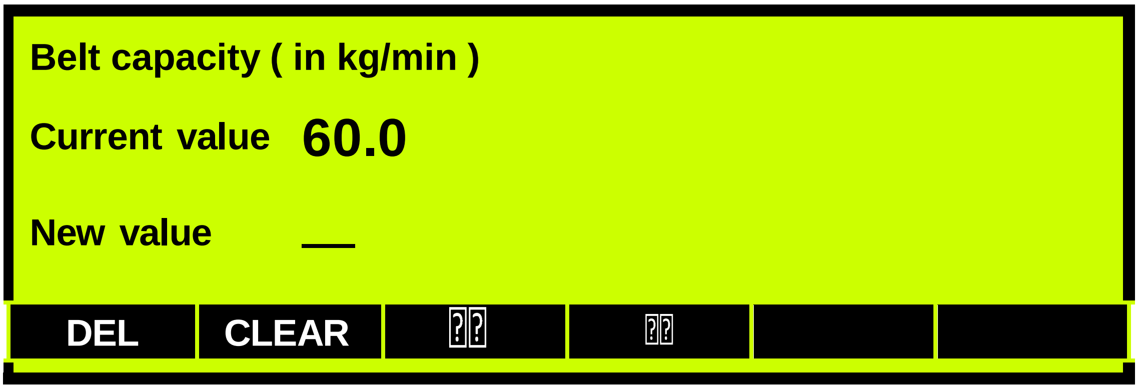
Belt Capacity.

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

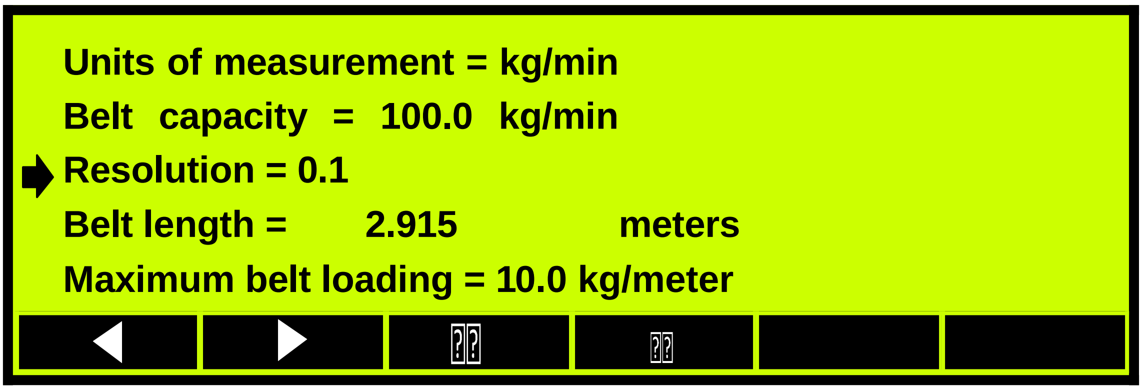
This variable is used to scale the analogue outputs.



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



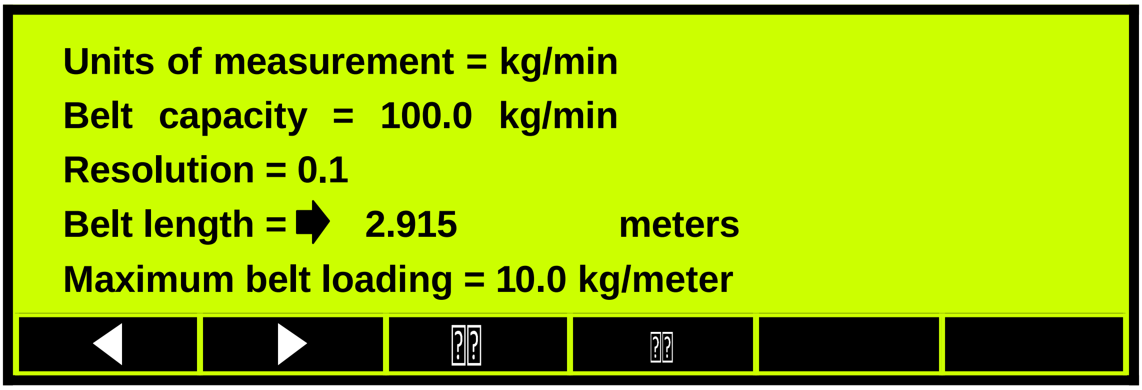
Using either the left or right arrow keys, go to the entry point for “**Resolution**”.



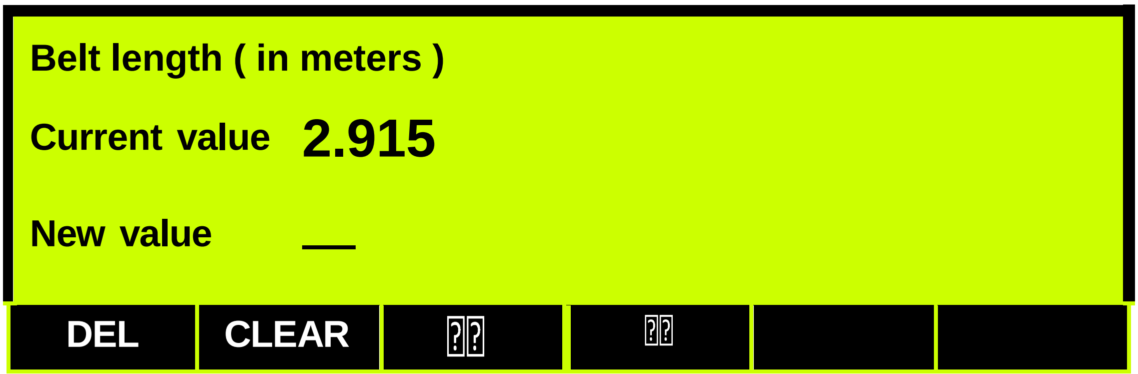
The resolution can be changed to one of the preset precision values. The values offered here are based on the capacity that was previously entered and can be accessed by pressing the “ENTER” key until the required value is found from the list. The value entered here will be reflected in the MRMT screen’s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

Belt Length.

Use the left or right arrow keys to move the cursor to the ‘Belt Length’ entry point. Optimus needs to accurately know the belt length in order to perform the Span and Zero routines.
Note :The belt length is not used by Optimus to calculate the Mass Rate and Mass Total. The belt length can be found in the design data sheet.

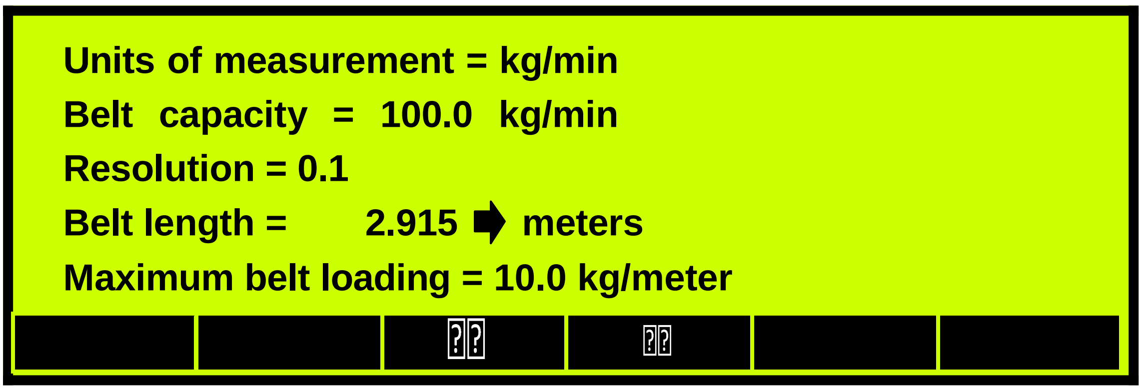


Press the ‘ENTER’ key to access the ‘Belt Length’ entry routine. Enter the belt length here and press the tick key to force Optimus to read in the value.



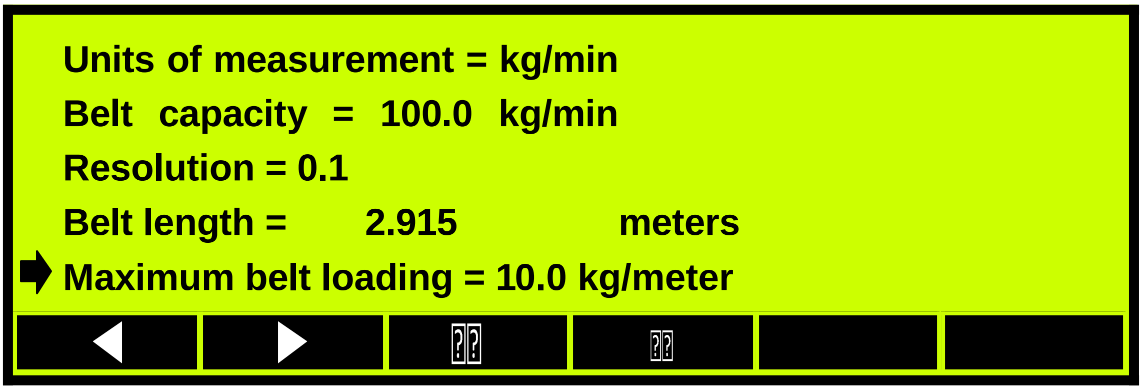
Belt Length Units.

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



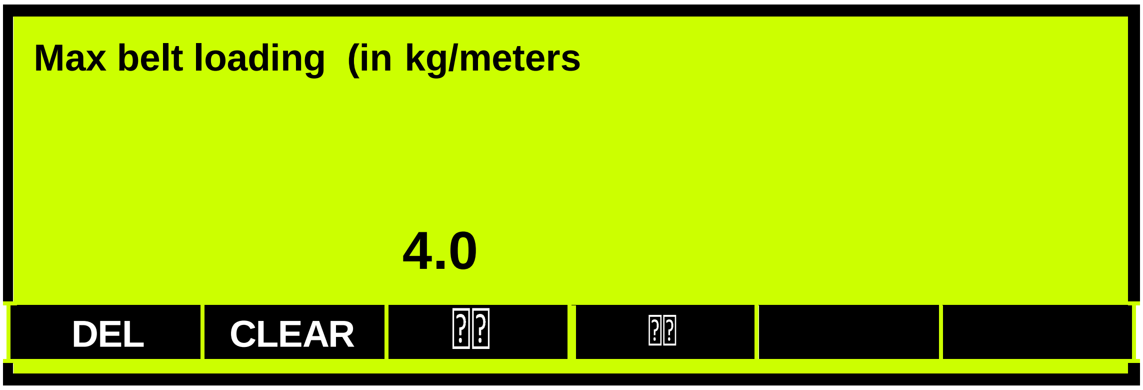
Maximum Belt Loading.

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



Maximum Belt Loading ‘Data Calculating’.

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



Use the following to calculate the Maximum Belt Loading.

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

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

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

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

E.g.

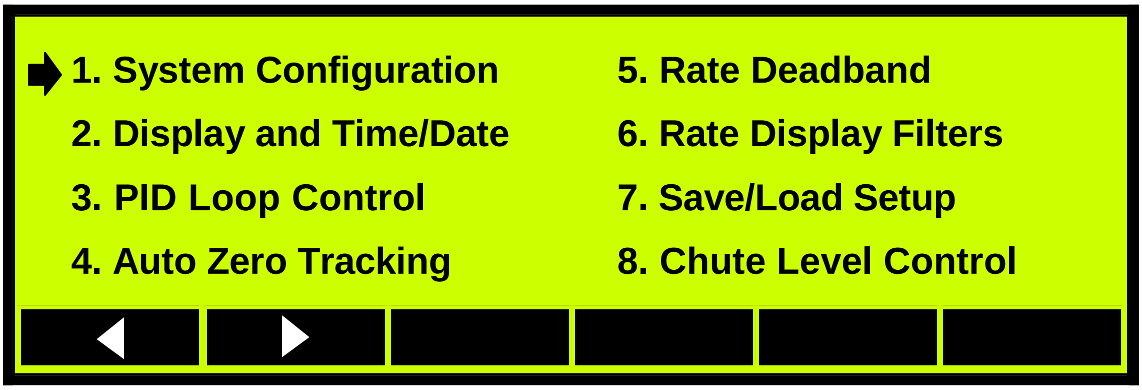
$$\frac{\text{Capacity} \quad 60\ \text{kg/minute}}{\text{Belt Speed.} \quad 0.25\text{m/S}}$$

$$\text{Belt Loading} = \frac{60}{0.25 \times 60} \qquad \underline{4}\ \text{kg/metre}$$

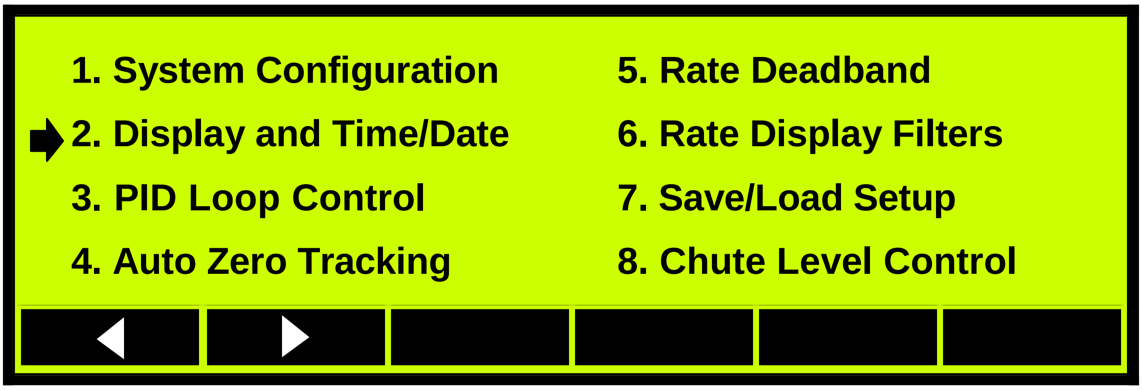
(enter this, into data entry screen).

Backlight.

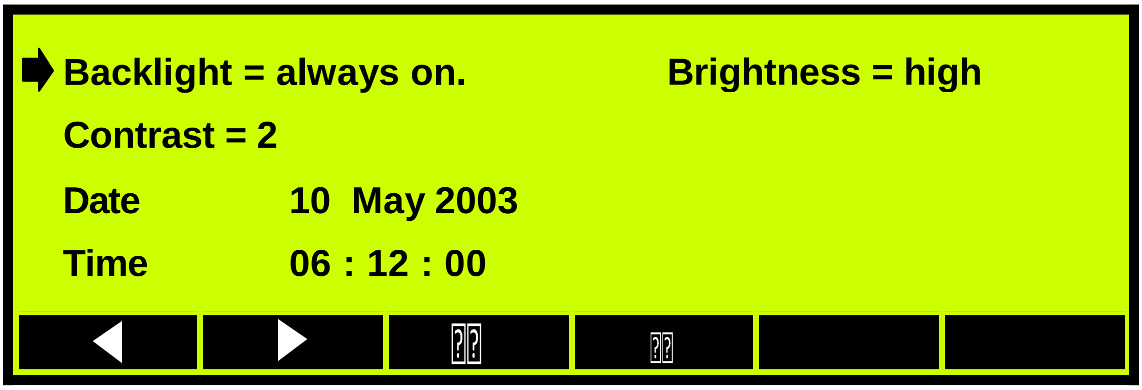
Optimus is supplied with a Liquid Crystal, Light Emitting Diode (LED) back lit screen. The use of back lighting is essential, if the screen is to be viewed in low light conditions. Use the scroll forward key to position the cursor along side the "Display and Time/Date screen entry point.



System Configuration Screen.



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

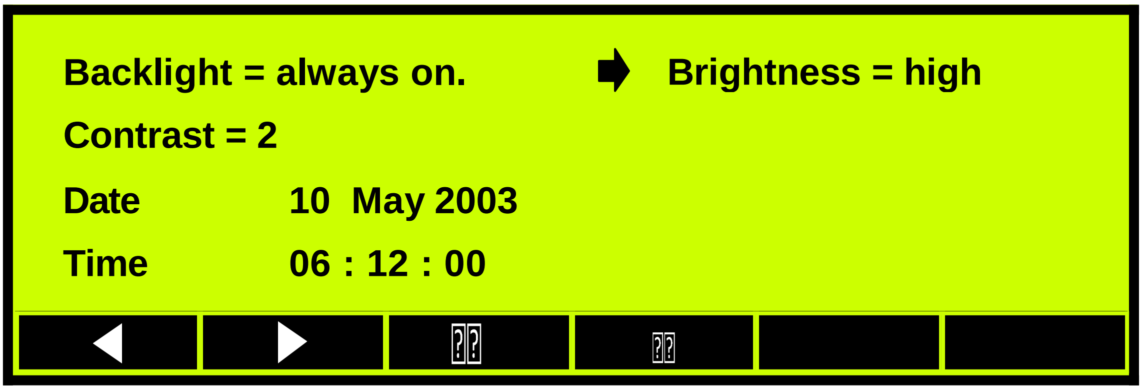


Use the "ENTER" key to scroll through the predefined list of timed / un -timed Backlight settings.
Always On; Off after 2 mins; Of f after 5 mins; Off after 10 mins; Off after 30 mins; Off after 60mins; Always off.

It should be noted that Optimus electronic s package has been fitted into a closed environment. The back light draws considerable power from the power supply. The longer the back light is on for any given brightness the greater the heat given off from the power supply module.
When the ambient temperatures are high Optimus may not be able to conduct this heat away as efficiently as required. We suggest that the ba ck light be set to "Off" after 2 or 5 minutes. The back light will re -activate on pressing any key if any of the timed off se t-tings are used.

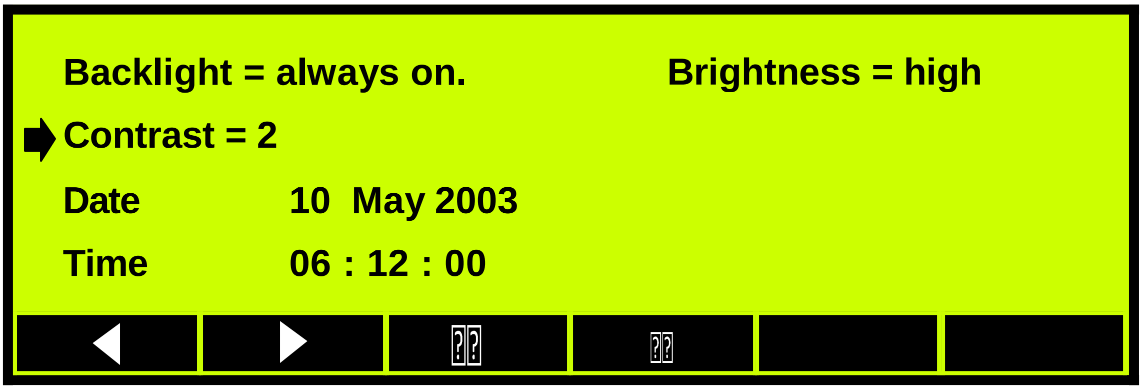
Brightness.

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



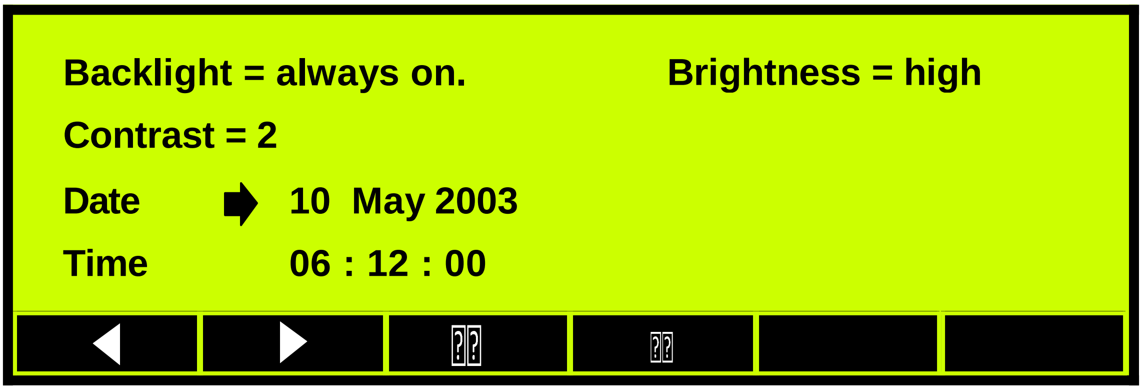
Contrast.

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



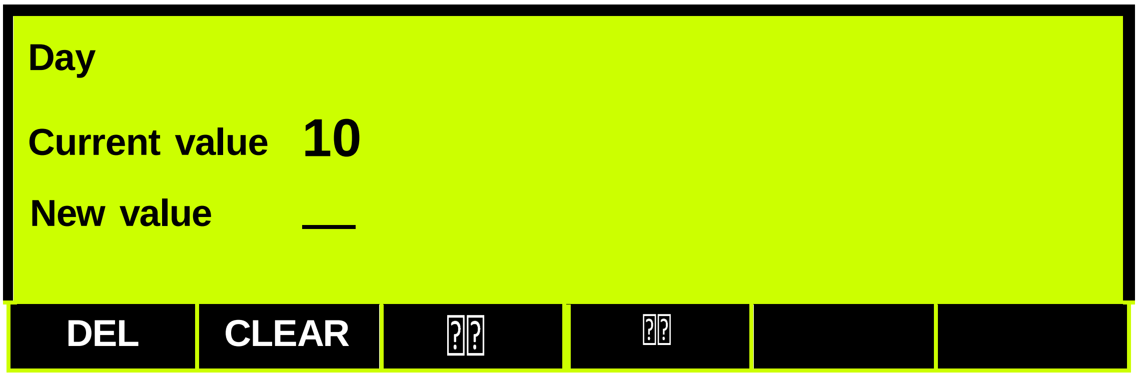
Date Entry.

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

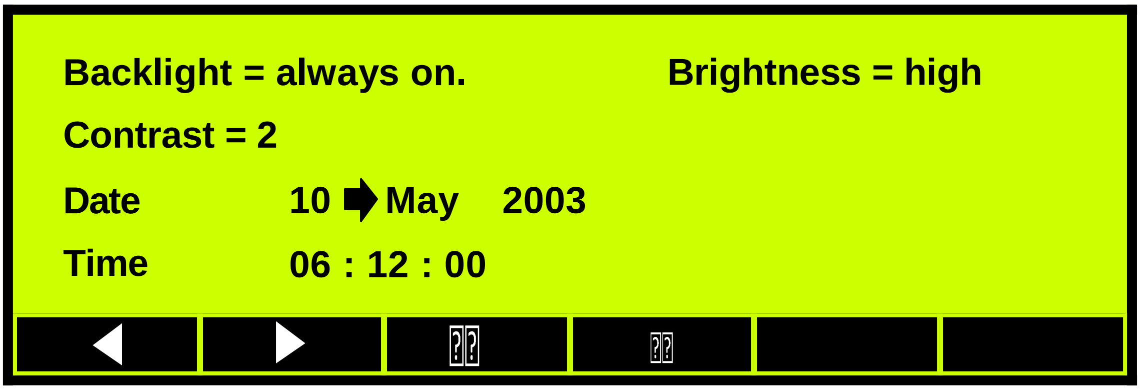


Press the "ENTER" key to access the Day setup screen.

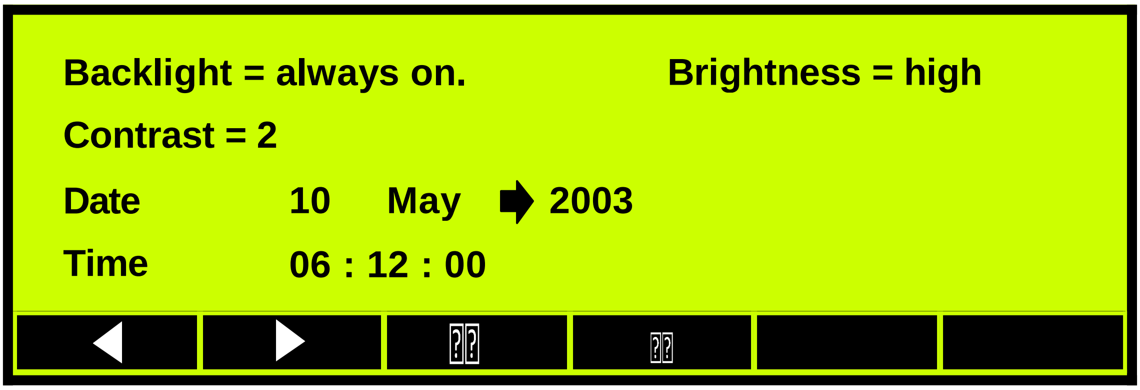
Press the "ENTER" key to access the Day entry screen.



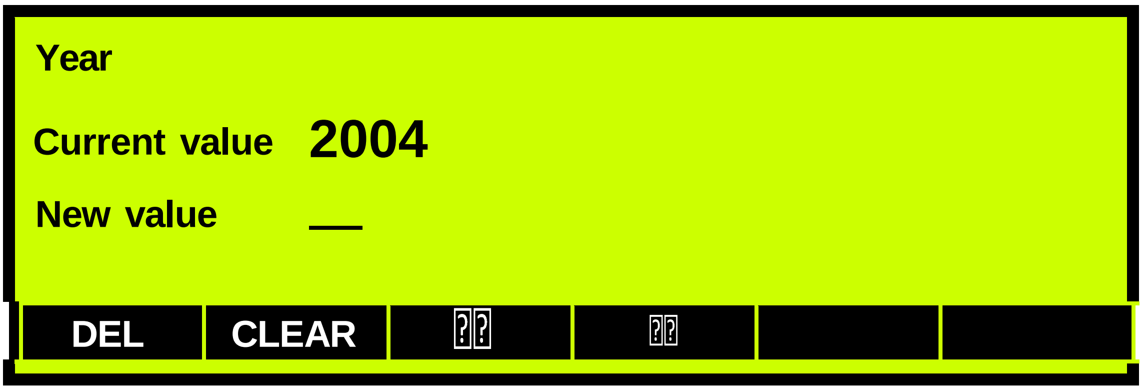
Press the "ENTER" or tick key to lock in the day. Forward scroll to the month entry point use the "ENTER" key to scroll through the month selection. Press the scroll forward to access the year entry screen.



Select the month and scroll on to year entry position.



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



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

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

Select the month and scroll on to year entry position.

Hours
Current value 10
New value __

DEL | CLEAR

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

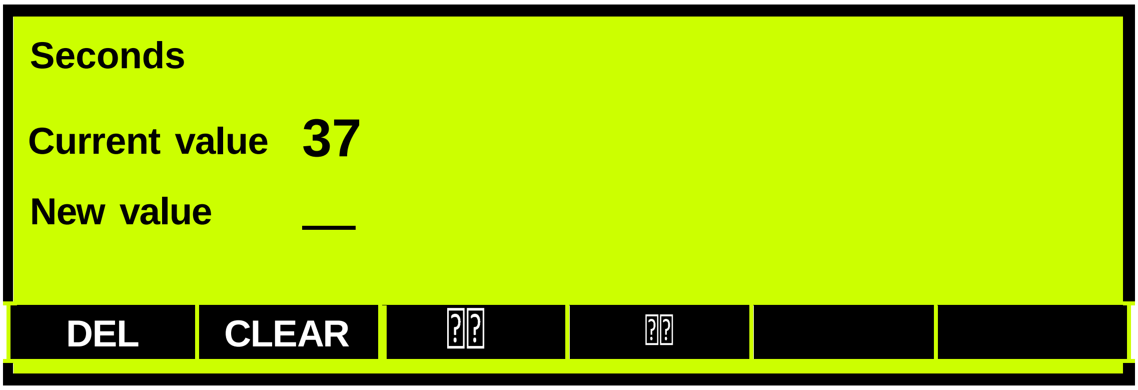
Backlight = always on. Brightness = high
Contrast = 2
Date 10 : 12 : 00

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

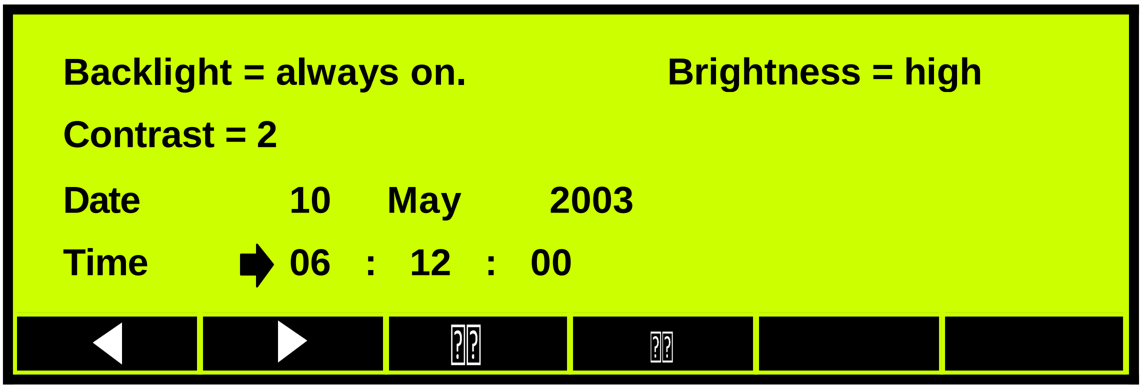
Minutes
Current value 12
New value __

DEL | CLEAR

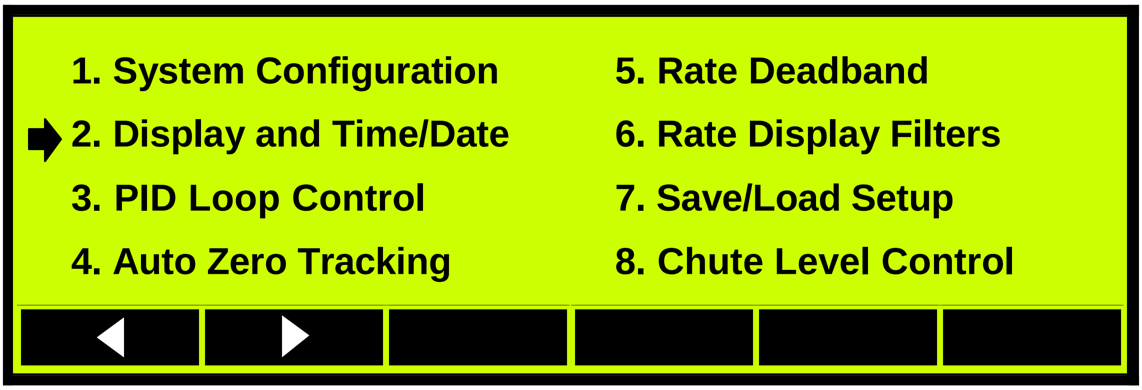
Enter the current seconds and press the tick key to lock in the data and return to the time/date entry screen.



Press "ENTER" or the tick key to return to the "SETUP" screen.



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



PID Parameters.

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

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

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

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

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

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

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

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

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

Proportional Gain.

The contribution of the proportional term to the PID output is determined by the propo r-tional band *PB*. Decreasing *PB* increases the contribution of the proportional term. I n-creasing *PB* decreases the contribution of the proportional term. *PB* is expressed in units of %. When *PB*=100%, the effective ga in applied to the error term is 1.

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

Integral Gain.

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

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

Integral Lower Limit.

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

Derivative Gain.

The contribution of the derivative term to the PID output is determined by the derivative gain K_D. The derivative gain has units of seconds. Increasing K_D increases the contr i-bution of the derivative error term. Decreasing K_D decreases the contribution of the d e-rivative error term.
Increasing K_D reduces the hunting and tendency to oscillate which results from d e-creasing *PB*. K_D does not act to correct offset error.

Output Offset.

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

Feed Forward Gain.

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

PID Loop Control.

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

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

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

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

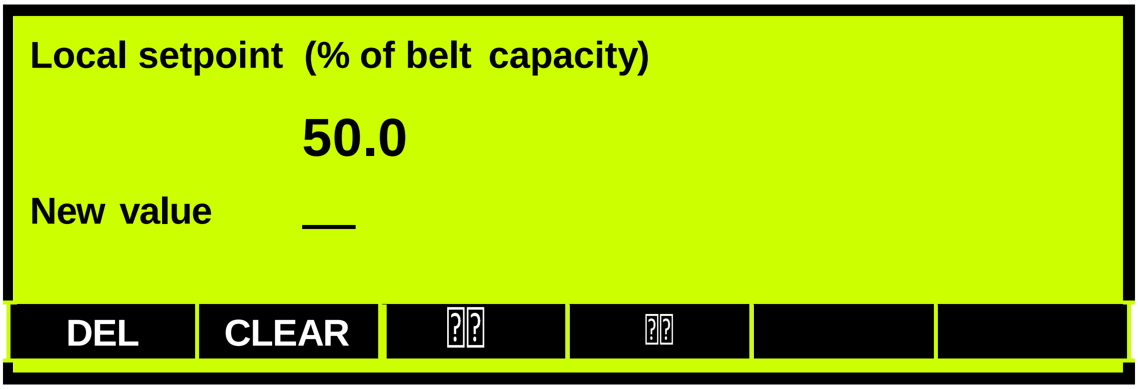
The "SETUP" (F3) key takes the user back to the main setup menu.

With the cursor positioned as shown, the setpoint source can be toggled between "LOCAL" & "REMOTE" using the "ENTER" key.
If Local is selected, the set point can be changed either by adjusting the percentage of set point as shown below. Or by scrolling rig ht and setting it as an absolute value. When in the local mode the remote setpoint (if any) is suppressed.

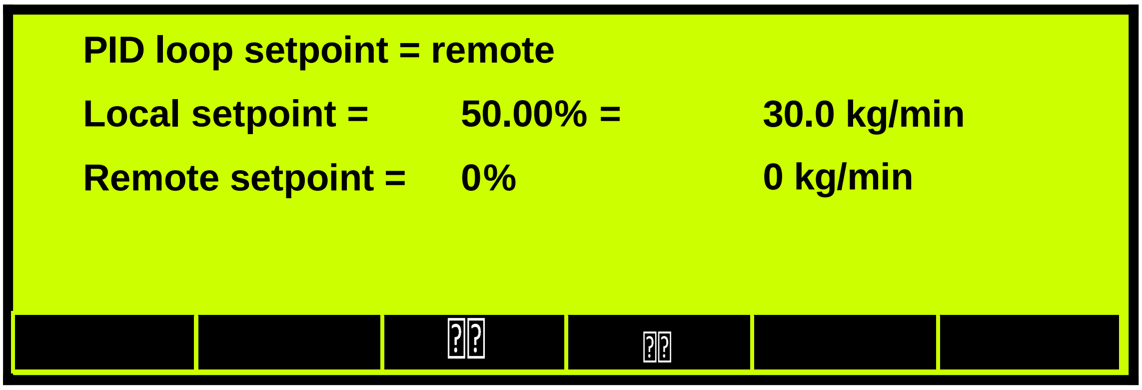
PID loop setpoint = local

Local setpoint	=	50.00%	=	30.0 kg/min
Remote setpoint	=	0%	=	0.0 kg/min

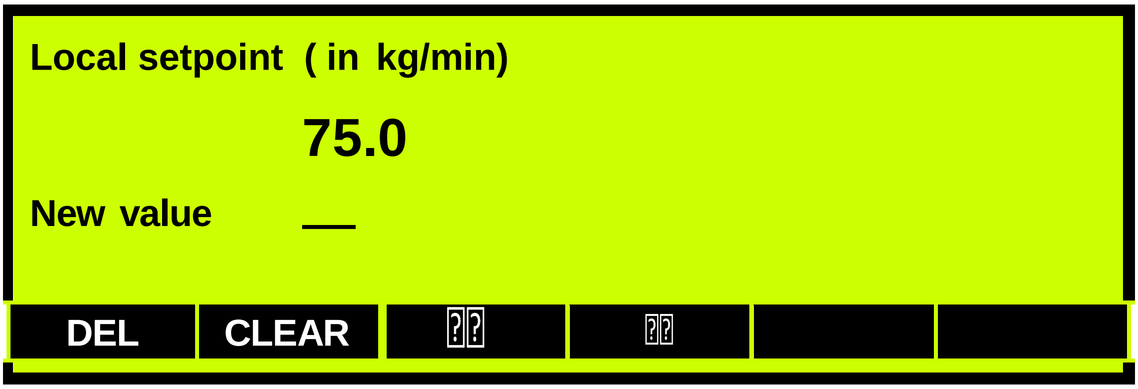
Use the "ENTER" key to access the data entry screen where the local setpoint can be adjusted as a %. Or an absolute mass rate.



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



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



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

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

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

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

➡ **PID loop output = manual**
Manual output = 50%
Auto output = 75%

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

PID loop output = manual
Manual output = ➡ 50%
Auto output = 75%

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

Manual PID output (% of inverter speed)

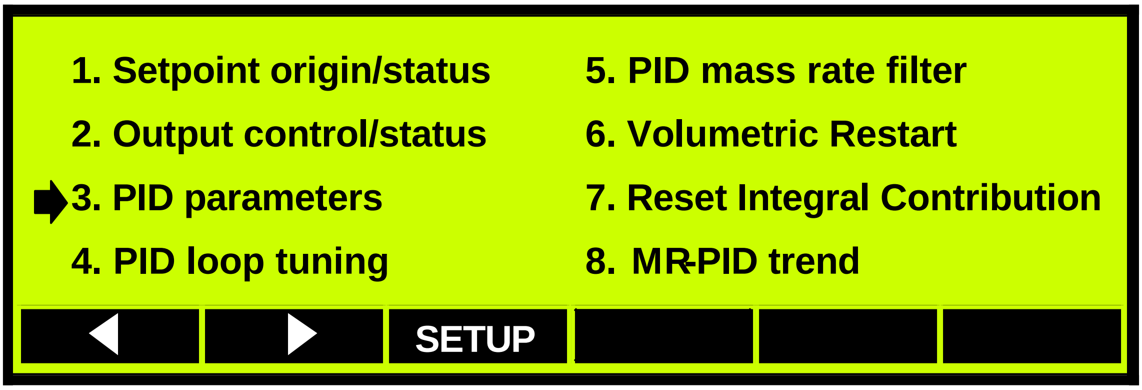
75.0

New value __

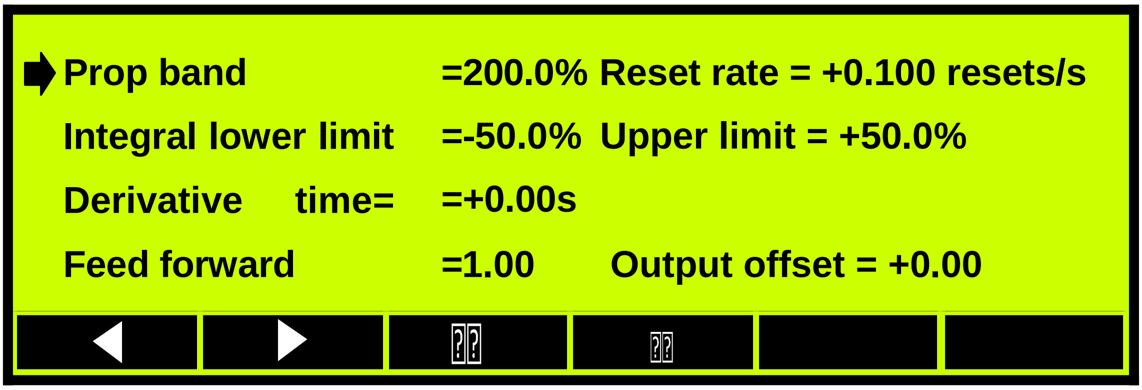
DEL **CLEAR**

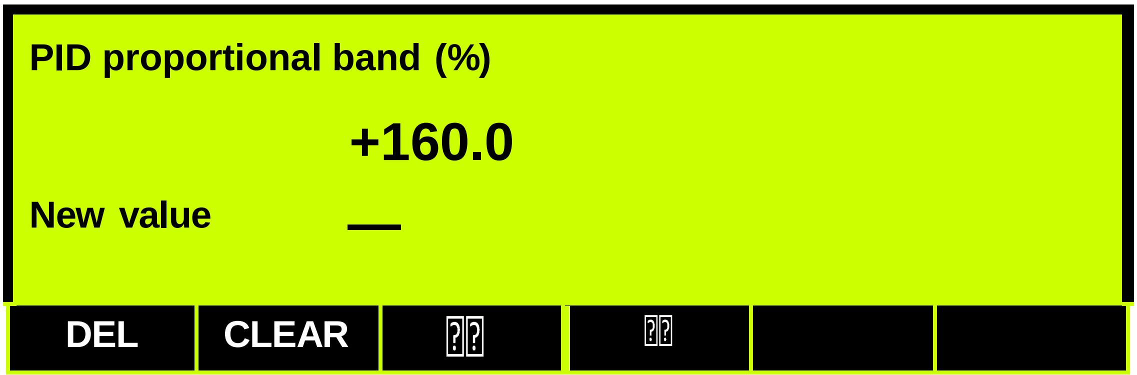
The screens and menu entry points associated with the "PID Parameters" allow suitably qualified personnel to load the PID algorithm with variables that best suit the operation of the feeder. It should be noted that a *good understanding of process control loops* is required for successful tuning of a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

Press the "ENTER" key to access the PID variable adjust screen.



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





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

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

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

◀	▶				

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

PID reset rate (resets/sec)

+0.100

New value _

DEL	CLEAR				

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

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

◀	▶				

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

PID integral lower limit (%)

-50.0

New value _

DEL	CLEAR			+/-	

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

Use the scroll keys to access the Integral Lower Limit.

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

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

PID integral upper limit (%)

+50.0

New value —

DEL | CLEAR | +/-

Scroll to the Derivative using the scroll keys.

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

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

PID derivative time (secs)

+0.000

New value —

DEL | CLEAR

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

Use the scroll keys to access the Feed forward term.

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

◀ ▶

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

PID feed forward factor

1.000

New value _

DEL CLEAR

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

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

◀ ▶

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

PID output offset term

+0.000

New value _

DEL CLEAR

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

PID Loop Tuning.

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

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

◀	▶	SETUP			

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

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

				PLOT	LOC

PID Loop Tuning Screen.

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

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

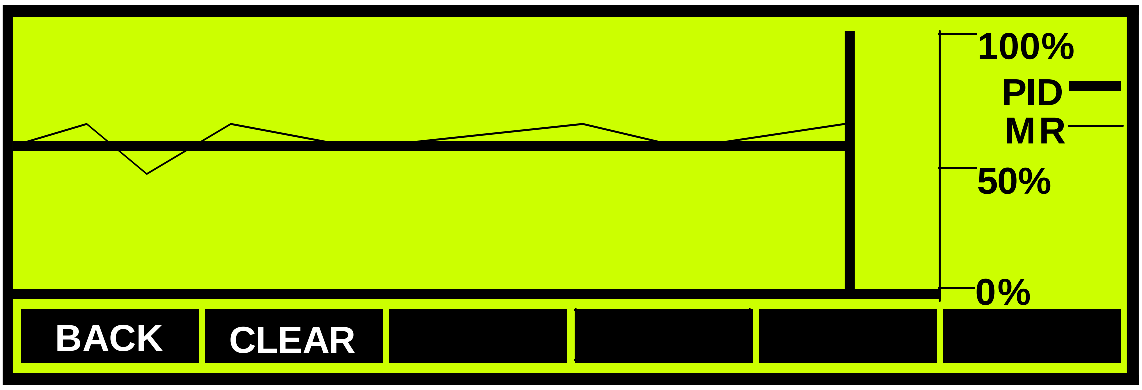
PID Loop Tuning. (Continued)

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

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

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

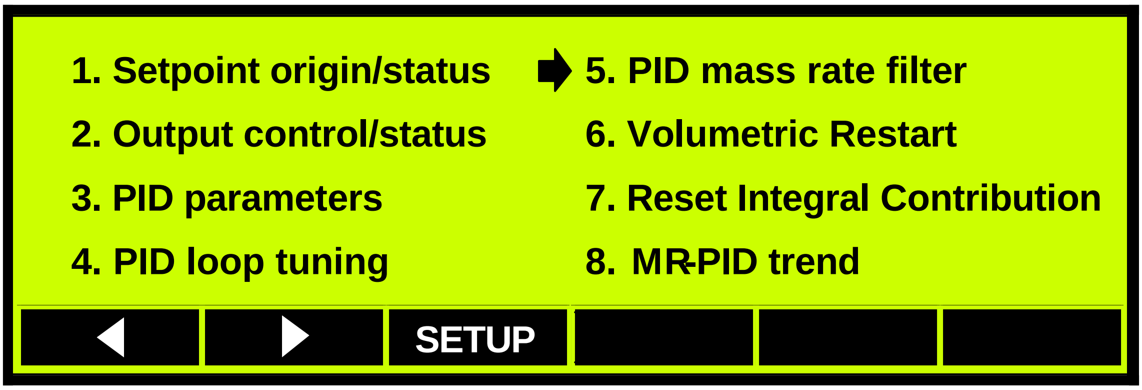
Select "PLOT" to go to the TREND screen where the set point can be ramped up and down and the feeder response viewed..



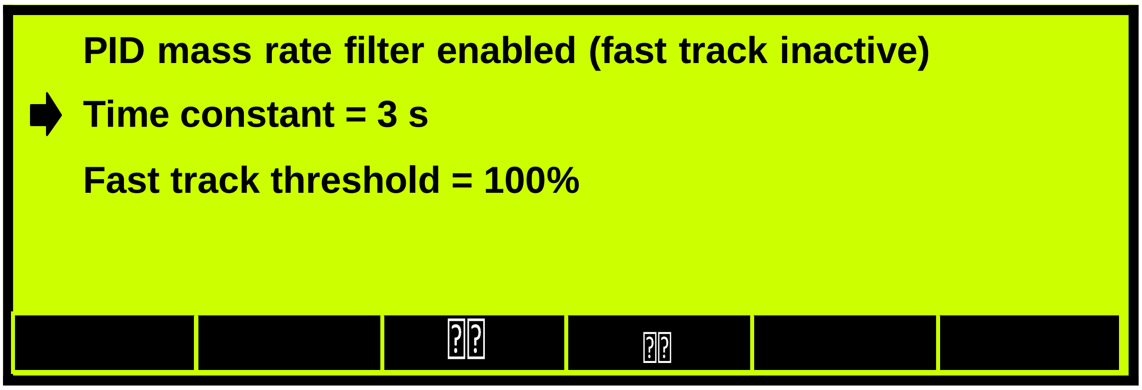
PID Mass Rate Filter.

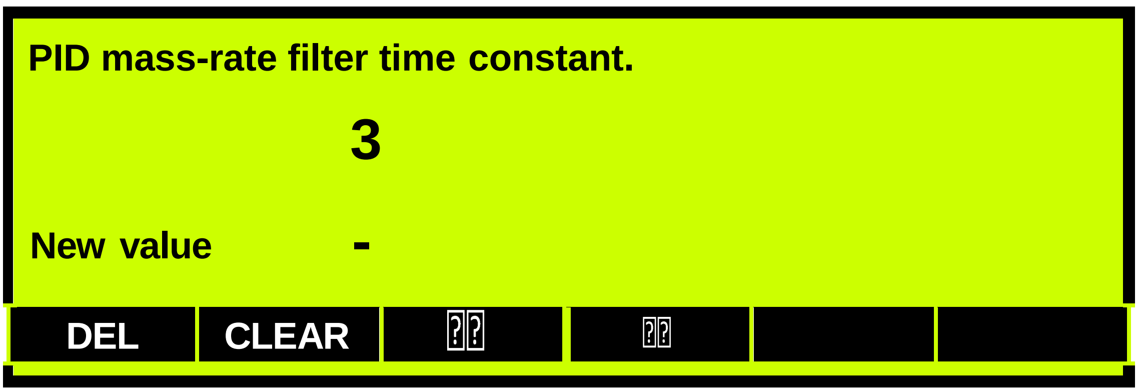
This filter is applied to the PID analogue output. The filter comprises a regular time average filter enhanced with a fast track multiplier. The level of filtering is specified by a constant which may be in the range of 1 second to 12 0 seconds. A time constant of 1 second is the equivalent to no filter being applied.
When active the fast-track filter multiplier restrains the PID analogue output from changing until the change exceeds the percentage set in the "Fast track threshold". By the judicial use of this feature the weighfeeder system can be restrained from reacting to anomalies in belt loading caused by i rregular prefeed or lumpy feed.

Note The Filter can be disabled (not running), enabled (running) and filter running without the fast track multiplier running.
Set the "Threshold" to between 1% & 99% to enable the fast track filter. Set the "Threshold" to 0% to disable the filter and 100% to disable fast track yet keep the standard filter running.



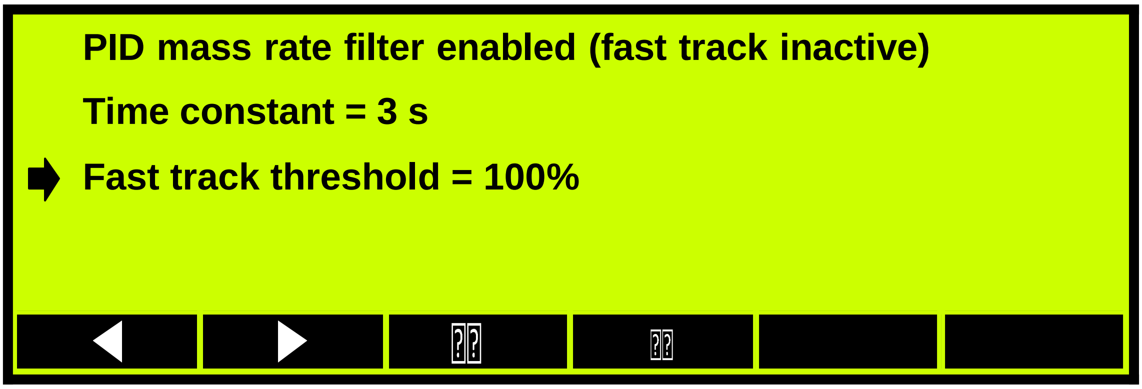
On selecting Menu 5 PID Mass Rate Filter the screen changes to that shown below. The "Time constant is entered by pressing the "ENTER" key.



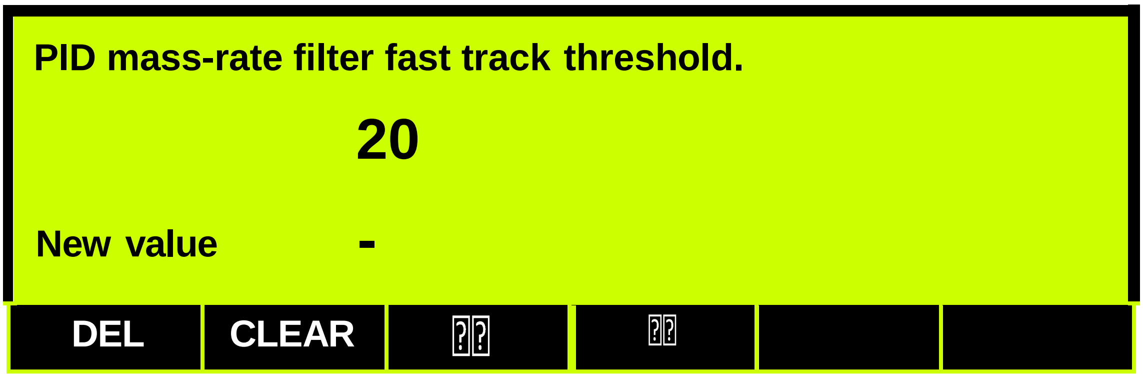


The value entered in the above data entry screen is locked in by pressing "ENTER"

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



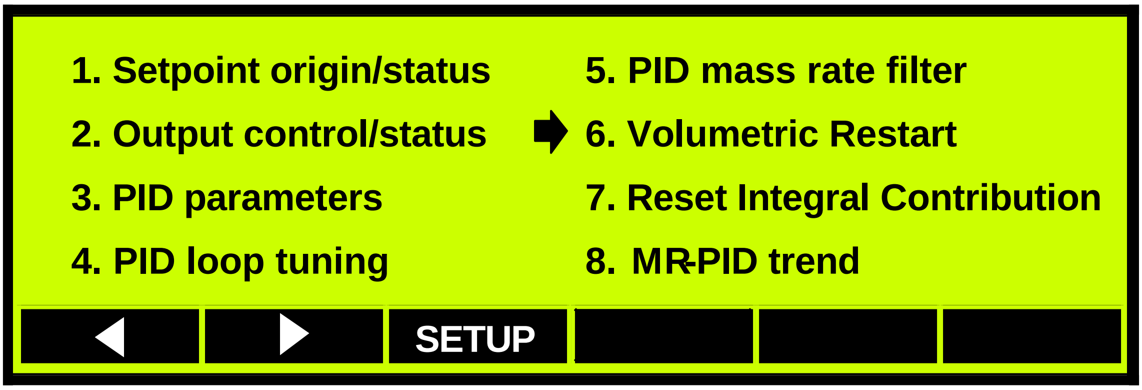
The "Fast track threshold" data entry screen.



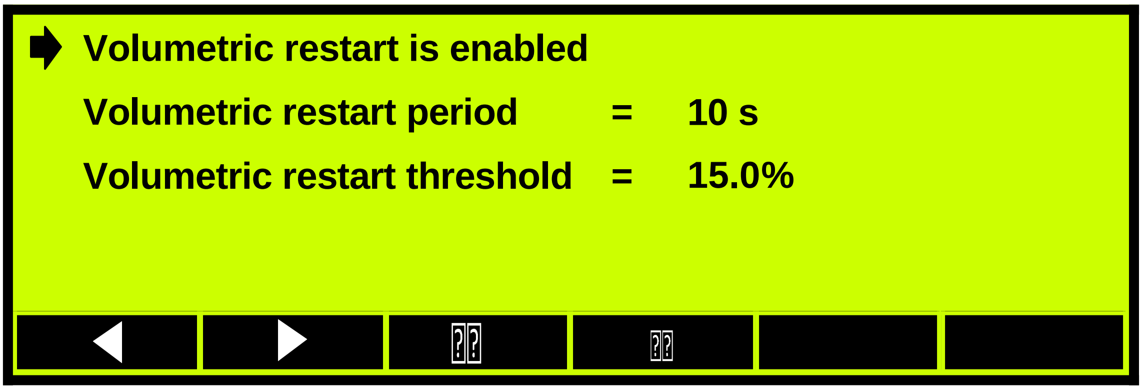
Enter the value required. Note a value of zero or 100% will render the "Fast track feature inoperable. Press the tick key to return to the main PID setup screen.

Volumetric Restart.

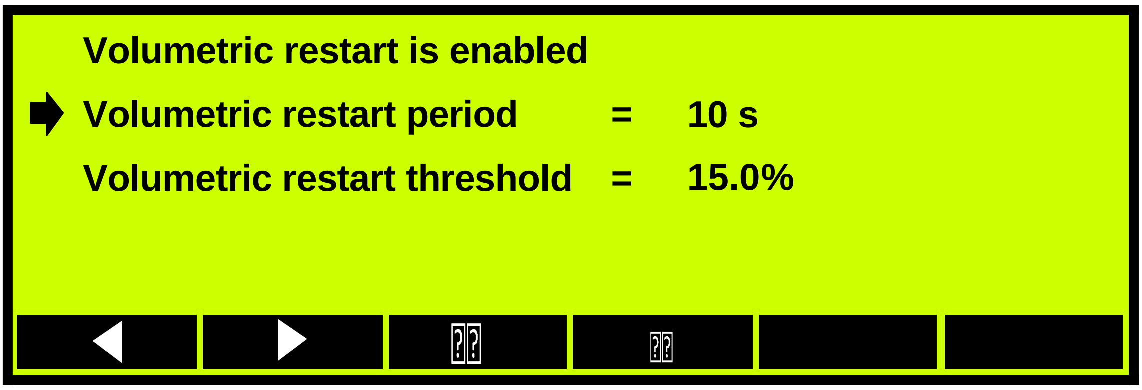
In applications where the weighfeeder is constantly stopping and starting. It is advantageous in terms of feeder control, to freeze the control algorithm when the feeder is halted by a supervisory system or operator. The Volumetric Restart feature allows the user to freeze the PID control action at the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



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



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



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

Volumetric restart period (in seconds)

10

New value -

DEL	CLEAR				

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

Volumetric restart is enabled

Volumetric restart period = 10 s

➧ Volumetric restart threshold = 15.0%

◀	▶			+	-

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

Volumetric restart threshold (% of belt capacity)

15.0

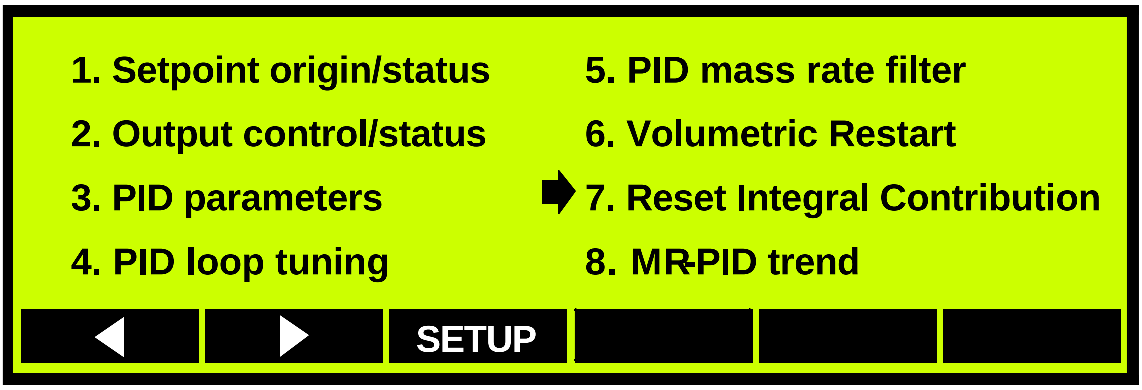
New value -

DEL	CLEAR				

Press the "TICK" key to lock in the selected value.

Reset Integral Contribution.

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



Mass Rate / PID Trend.

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

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

◀ | ▶ | SETUP

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

100%
PID
50%
MR
0%

BACK | CLEAR | ? SP | ? SP

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

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

◀ | ▶ | SETUP

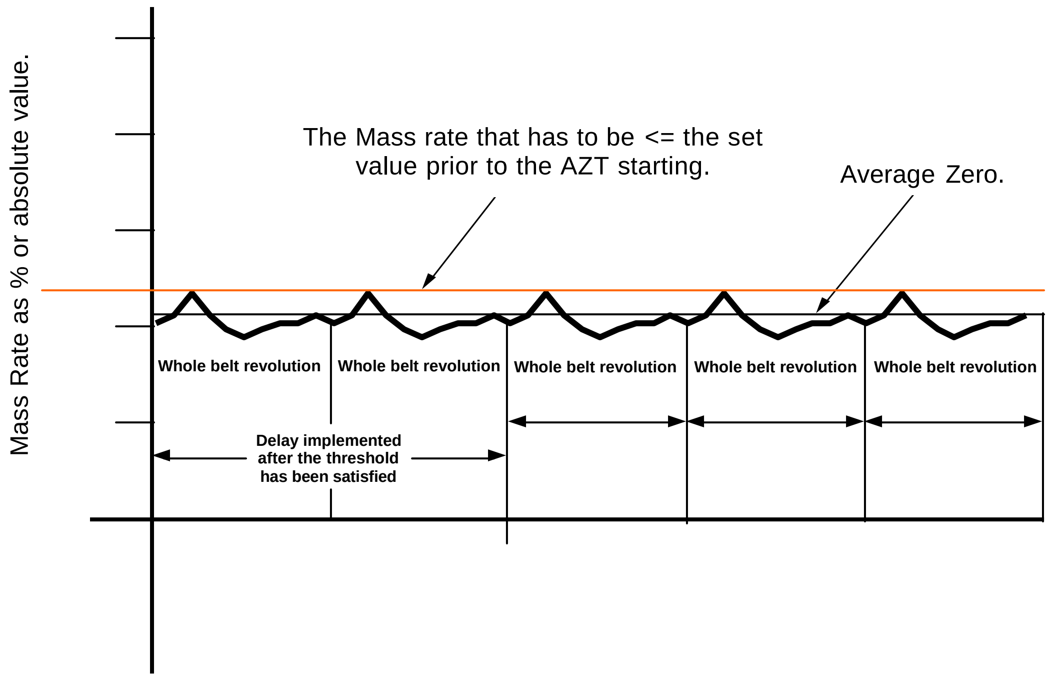
To return to the “SETUP” menu’s press the F3 “SETUP key. Scroll the cursor on to Auto Zero Tracking (AZT). Prior to entering data in this menu read the AZT explanation on following page.

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

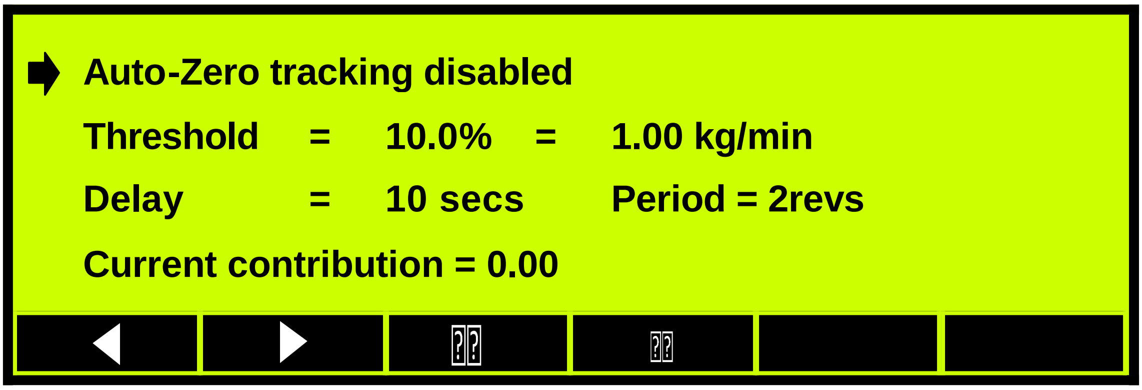
◀ | ▶

Prior to describing the use of the Auto Zero Tracking (AZT) function, the user should be familiar with certain terminology.
Manual Zero is the belt zeroing which is invoked by an operator. The function is automatic but has to be manually invoked. As distin ct from the AZT function which is performed automatically without user intervention.

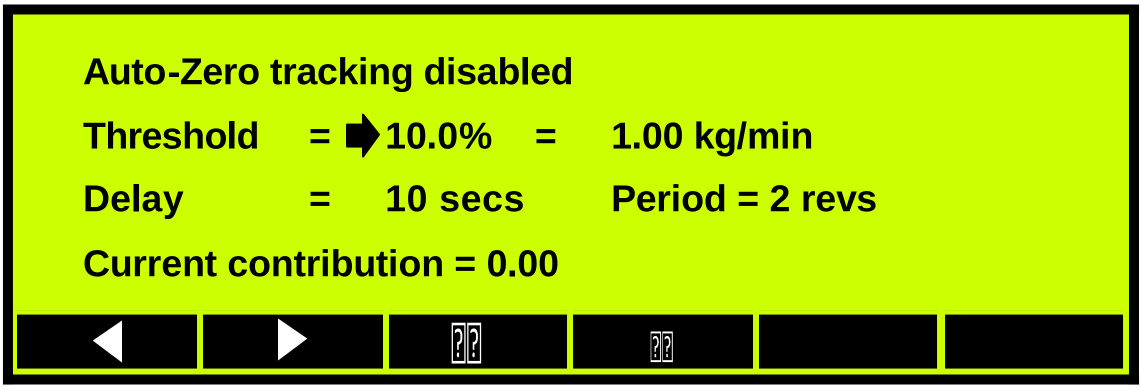
Auto Zero Tracking. (This function should be set up after the scale has be calibrated)
The weight of the weigh belt and the weigh area can change with time. The weight changes can be generally attributed to, wear and tear, product build upon the belt and product build up on the weigh area. If th e scale was a static system weighing in batches for instance, the scale could be automatically zeroed each time the previous loa d was removed. The action being triggered by the output of the load cell dropping to a pre - programmed value.
Continuous weighing systems are more complex and require more conditions to be satisfied prior to an AZ being performed. The function can be enabl ed or disabled by toggling the 'ENTER' key when the sect arrow is along side the field.
Optimus allows the user to select a load cell output below which the AZ function will be invoked (Threshold). It is important this load cell output is carefully selecte d. It can only be accurately selected after the system has been manually zeroed, calibrated and the mass rate observed over a minimum of one whole belt revolution. The Auto Zero Threshold level should be set to approximately 5% higher than the highest valu e displayed when the belt is running empty.
The delay value is provided so that the AZ function will only be invoked after the d elay has timed out. This function is used when the process is subject to constant no flow conditions. The period allows the use r to select the number of whole belt revolution that the zero will performed over. A good knowledge of the process is necessary to enter a value here.
E.g. If the no flow condition is available for a period of greater than one belt revolution but less tha n two belt revolution, use one revolution here and so on.
The value shown in the "Current Contribution" field display the offset that Optimus has applied to the manual zero found during the manual zero process. It is reset after each manual zero has been performed.



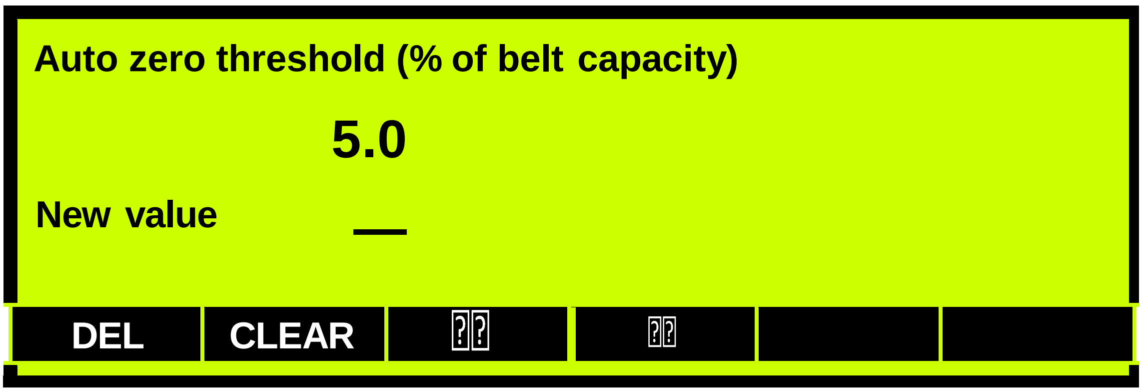
Toggling the "ENTER" key here will either enable or disable the Auto Zero Tracking function (AZT).



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



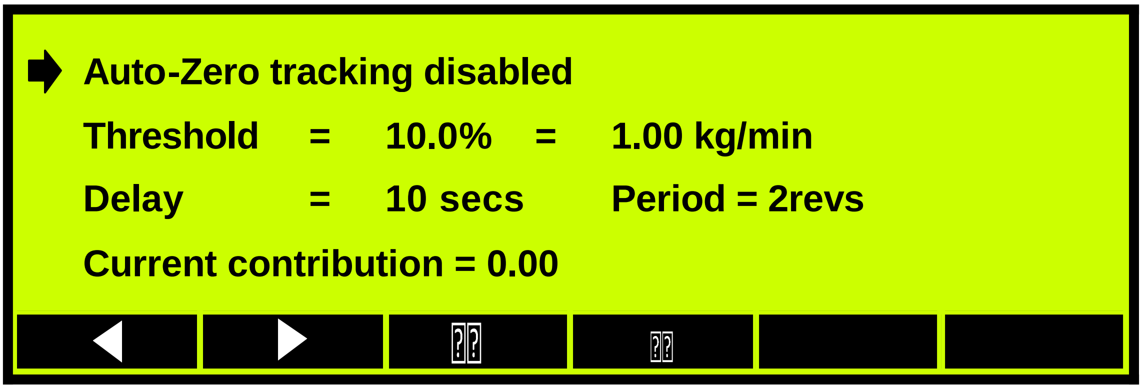
Press the "ENTER" key to adjust the AZT Threshold.



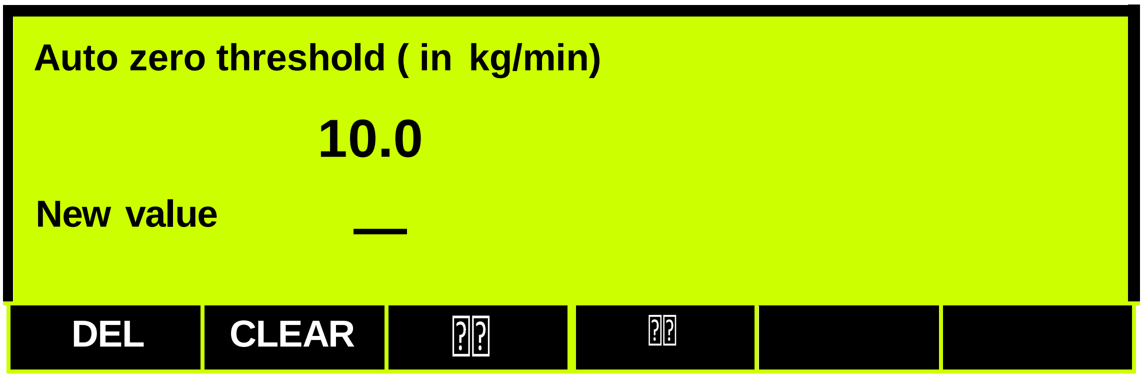
Press the tick key to lock in the new threshold level

System Setup / Auto Zero Tracking / threshold.

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



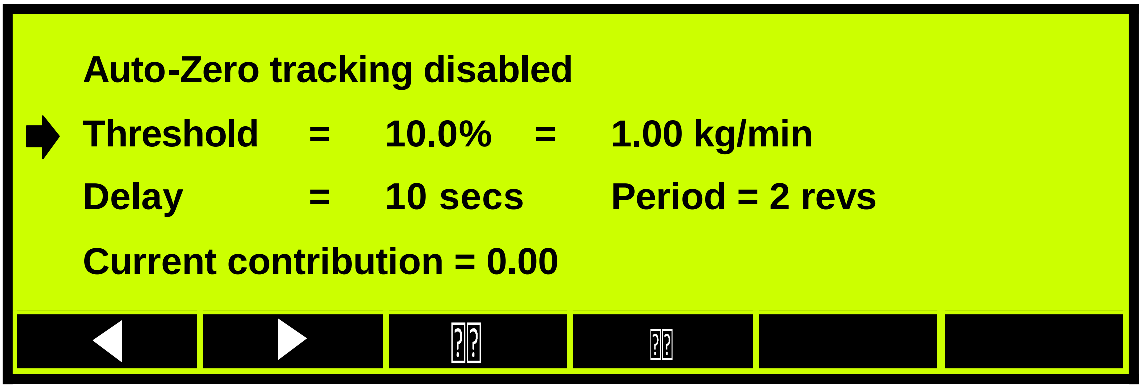
Pressing the "ENTER" key here will bring up the threshold percent data entry screen.



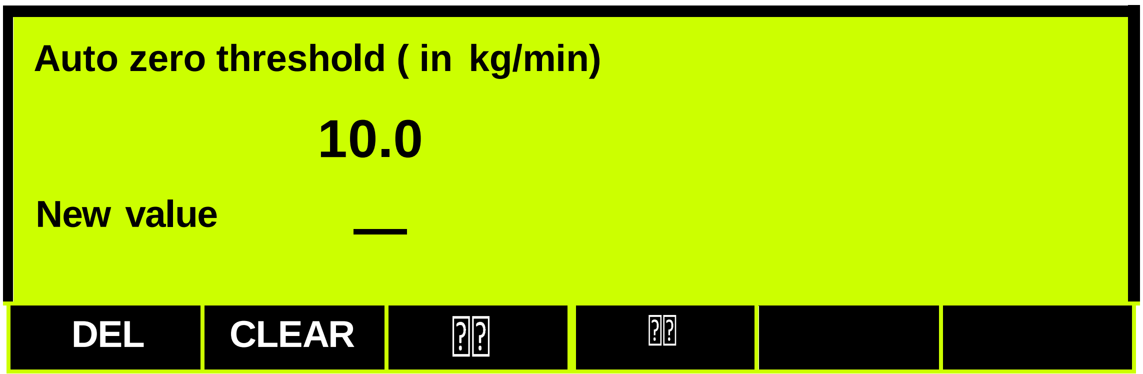
Press the tick key to accept and exit to the previous screen. Or the Cross key to exit to the previous screen

System Setup / Auto Zero Tracking / threshold.

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

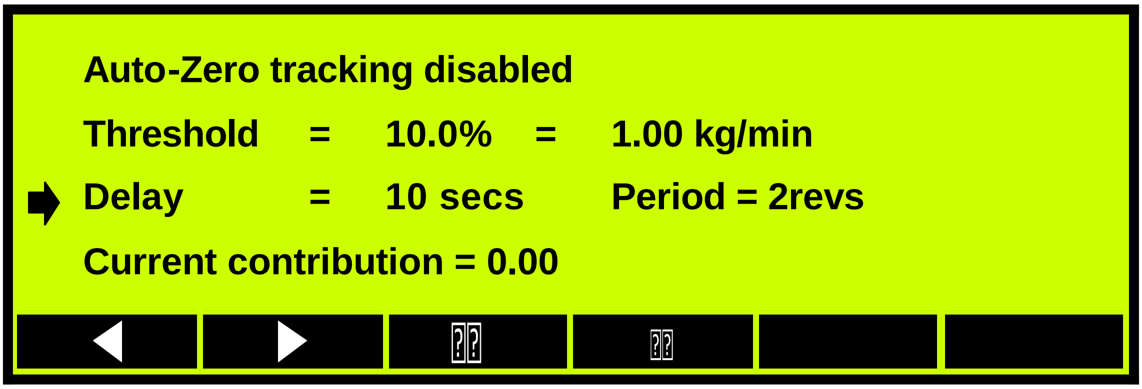


Pressing the "ENTER" key here will bring up the threshold percent data entry screen.

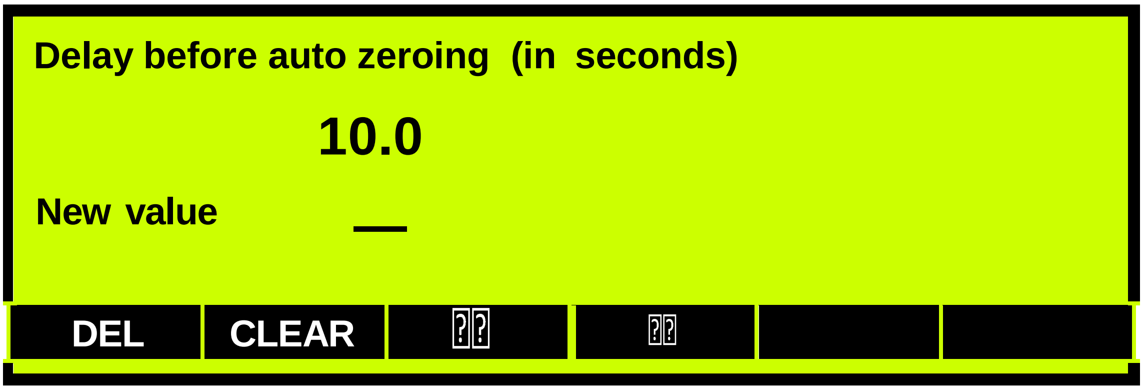


Press the tick key to accept and exit to the previous screen. Or the Cross key to exit to the previous screen.

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

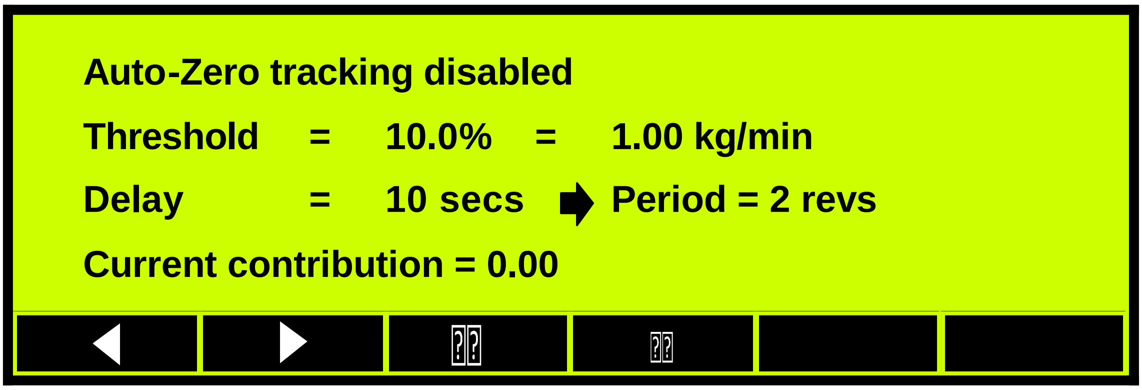


Press the “ENTER” key with the cursor opposite the delay to gain access to the delay data input screen.

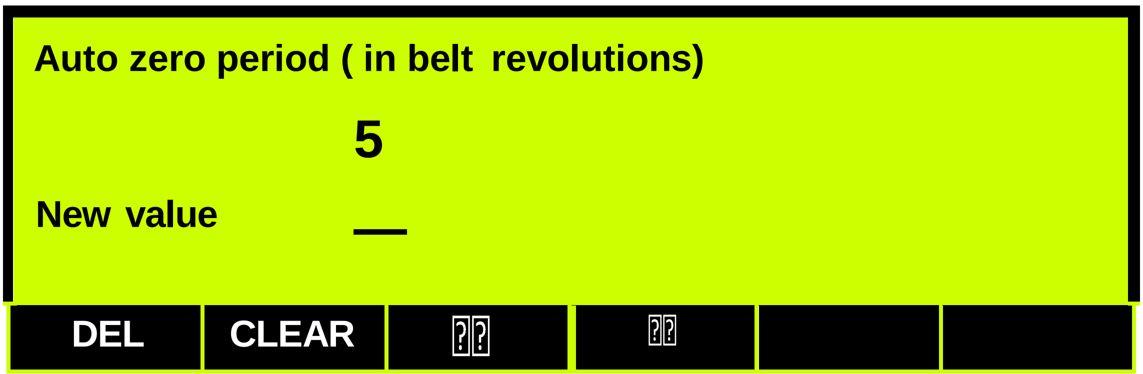


Press the tick key to accept the new value for the delay of the AZT feature

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



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

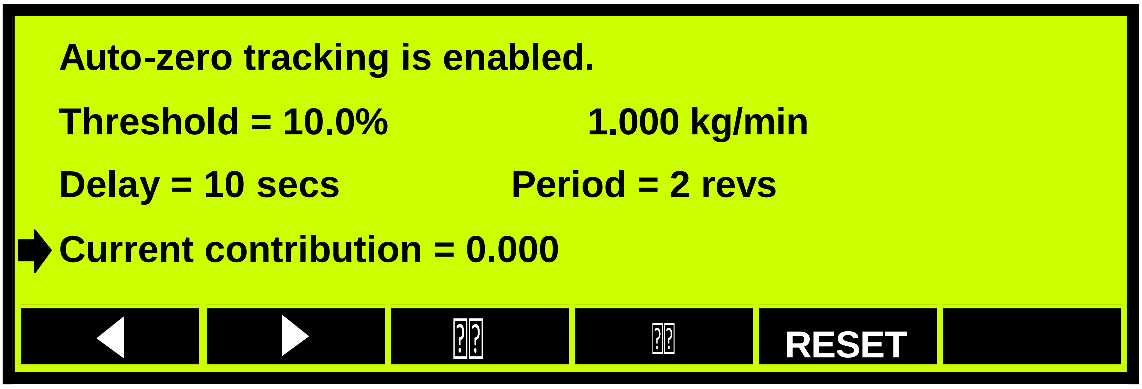


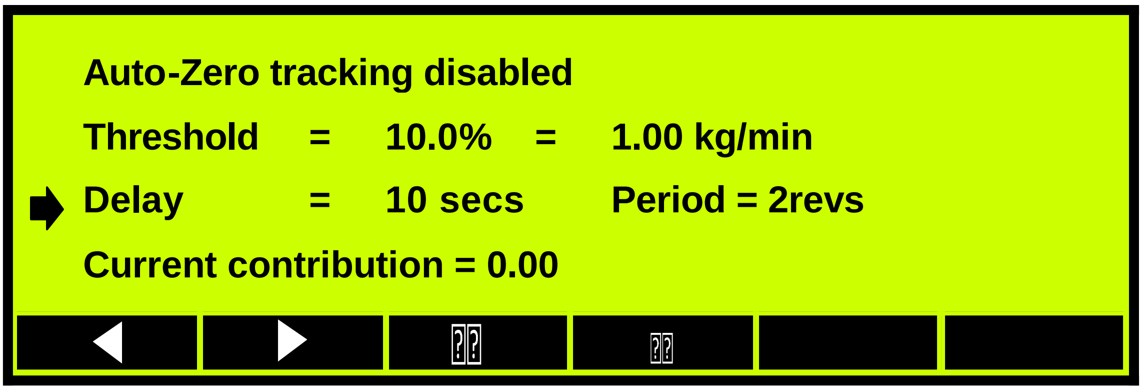
Press the tick key to accept and exit to the previous screen. Or the Cross key to exit to the previous screen

System Setup / Auto Zero Tracking / current contribution.

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

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





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

◀	▶			CLEAR	

Rate deadband (in kg/min)

1.8

New value _

DEL	CLEAR				

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

◀	▶			CLEAR	

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

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

CLEAR

Rate deadband (as % of belt capacity)

2.0

New value __

DEL CLEAR

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

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

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

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

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

Display filter time constant

10

New value __

DEL CLEAR

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

The Mass Rate Filter.

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

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

Display filter fast track threshold

1.0

New value __

DEL CLEAR

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

Trend filter time constant

5.0

New value __

DEL CLEAR

Mass rate display filter enabled (fast track active)

Time constant = 20s Fast track threshold = 20%

Mass rate trend filter enabled (fast track active)

Time constant = 10s Fast track threshold = 20%

◀	▶	??	??		

Trend filter fast track threshold

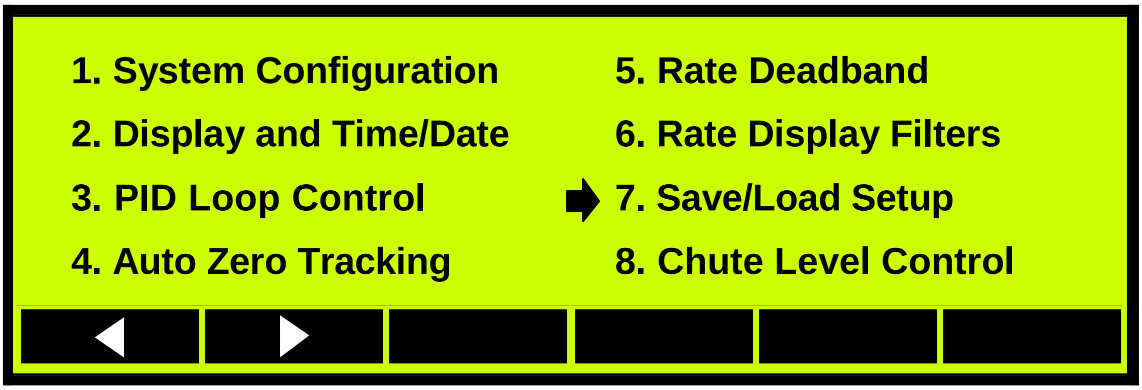
20

New value __

DEL	CLEAR	??	??		

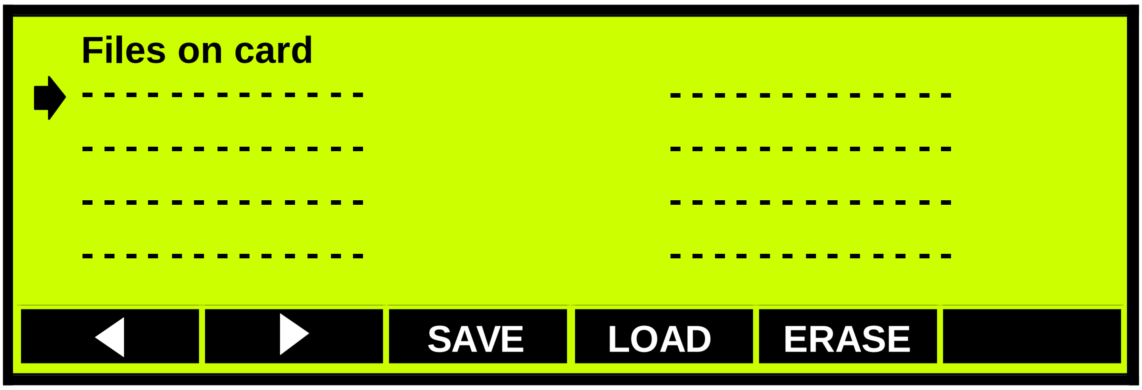
Save/Load Setup.

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



Scroll on to save/Load Setup.

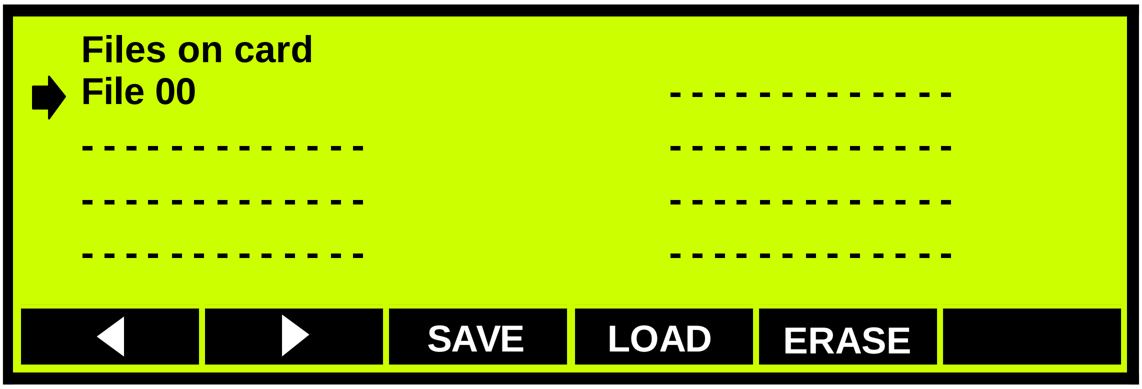
The screen will change to the one shown below. This screen shows the compact flash memory is empty (8 dotted lines). The cursor is positioned next to the first entry File 00. Press the F3 "SAVE" key to load flash card memory with the configuration and setup data.



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

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

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



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

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

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

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

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

Scroll to Chute Level Control, press ENTER to set up and modify the chute level control action. At this point assigned probes can be associated with a output speed function. Generally the weighfeeder will have been fitted with three probes prior to despatch. They are referred to as Low, Mid, High. The Low probe is the probe nearest the inlet chute, the High probe is the probe nearest to the shear gate on the feeder and the Mid probe is situated in between the High and Low. None refers to no probe active, all probes out of product. The Ratio refers to the percentage output from the assigned current loop on activation of that probe.
In the following example with no probe active, the current loop driving the prefeed invertor will be driven to 20mA, 100% output. With just the Low probe active and the inlet chute approximately 1/3 full the current loop will be driven to 18.4 mA. When the Low & Mid probes are on the current loop out put will be 16.0 mA and with all three probes on the out put will be 12 mA.

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

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

No probe chute output ratio (in %)

100.0

New value __

DEL	CLEAR				

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

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

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

Low probe chute output ratio (in %)

90.0

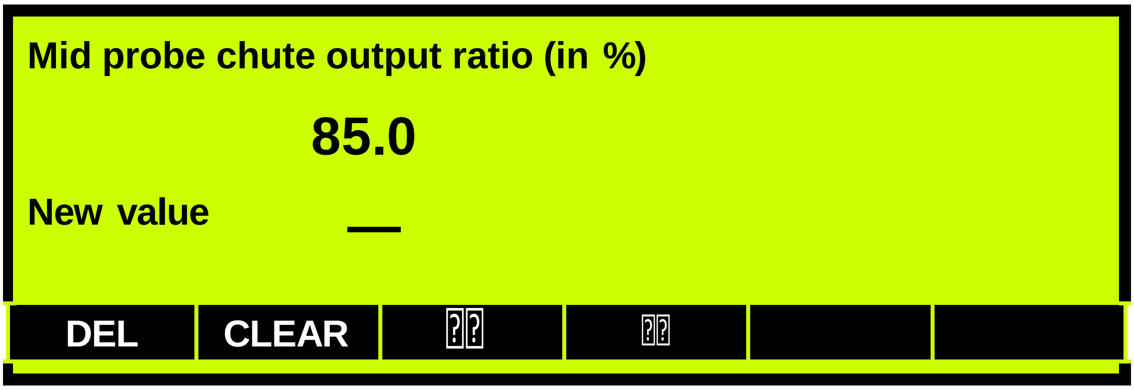
New value __

DEL	CLEAR				

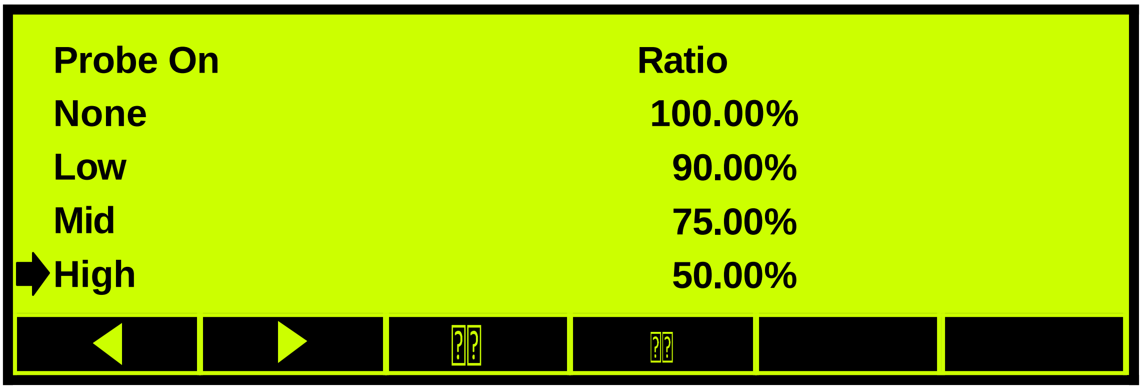
Scroll on to the "Mid" probe and assign an output to the current loop.

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

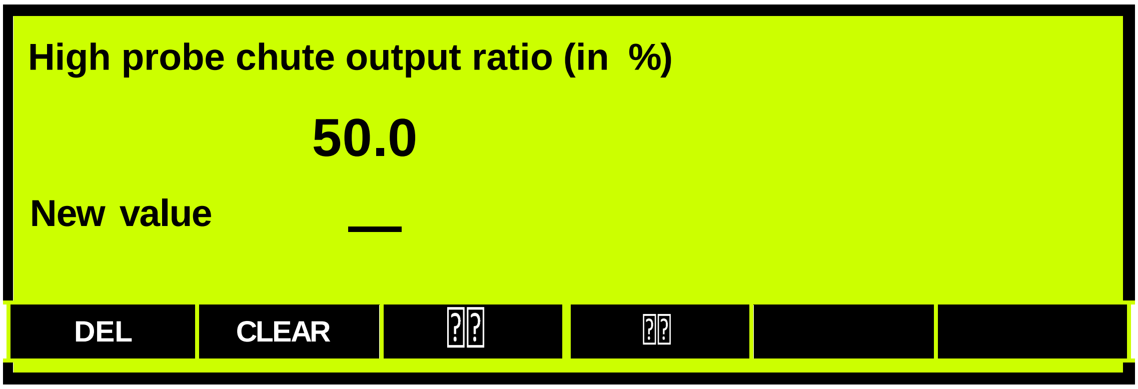
Assign a current output to the activation of the "Mid" probe.



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



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

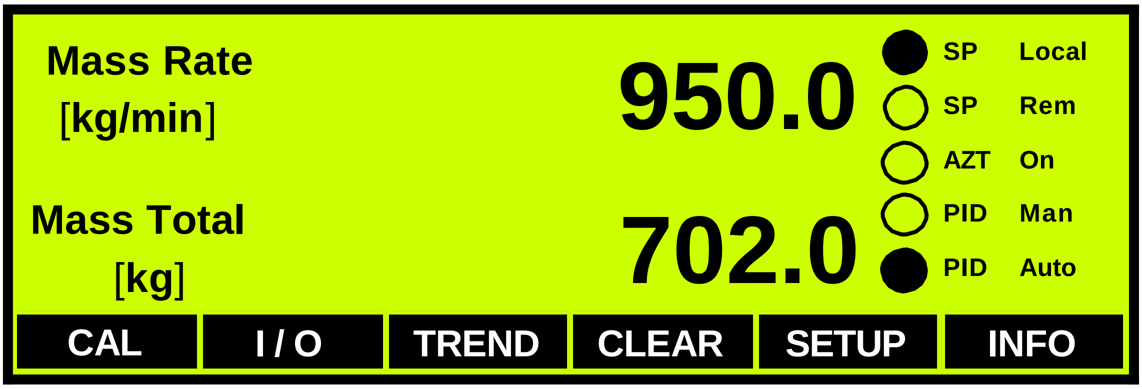


Enter the current output required when the chute probe "High" is on and press the tick key to lock in the data and return to the probe assignment screen.

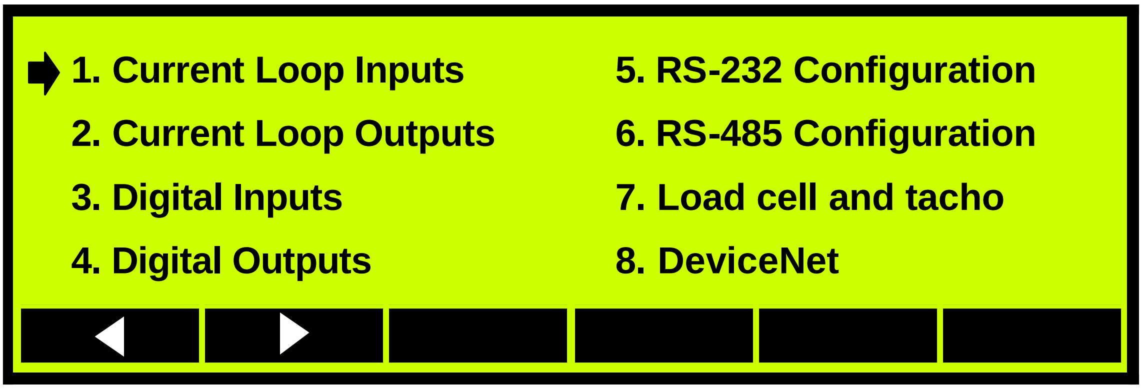
Optimus provides six for (6) analogue input circuits. One is reserved or the Remote Rate Input. The remaining five are re -assignable. Optimus's analogue inputs are current and can be configured to be one of the following.

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

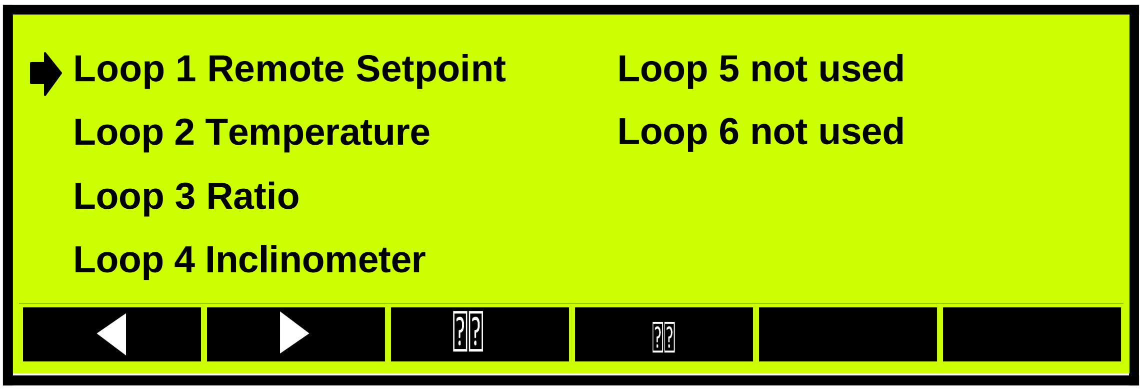
From the MRMT screen select the Input / Output (I/O) F2 key



Press the "ENTER" key to gain access to the Current Loop Inputs.

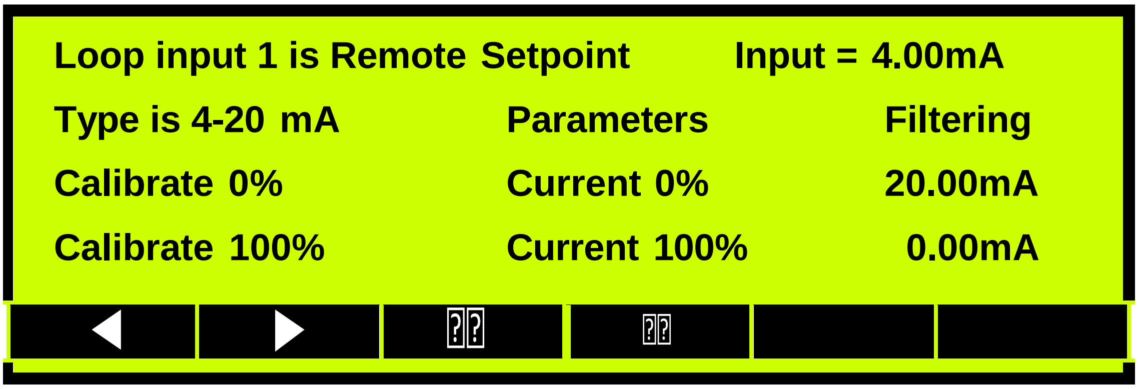


Press the "ENTER" key to gain access to the Current Loop 1 Setup screens.

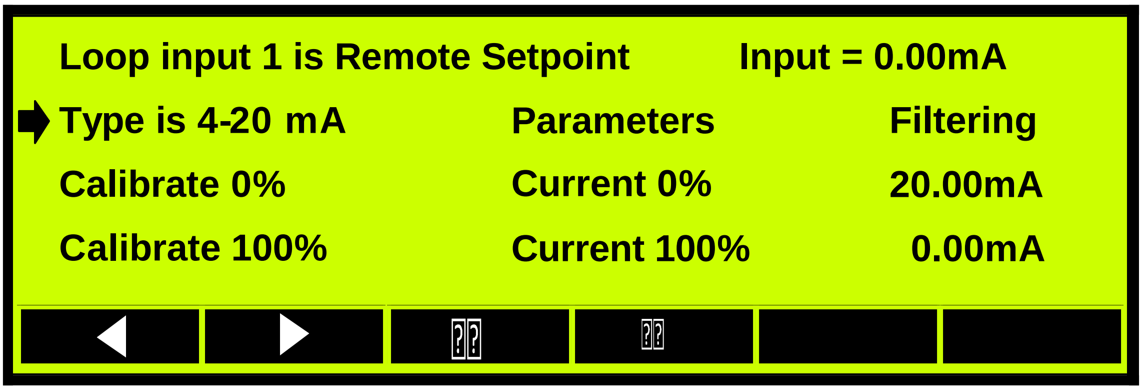


Loop 1 Setup

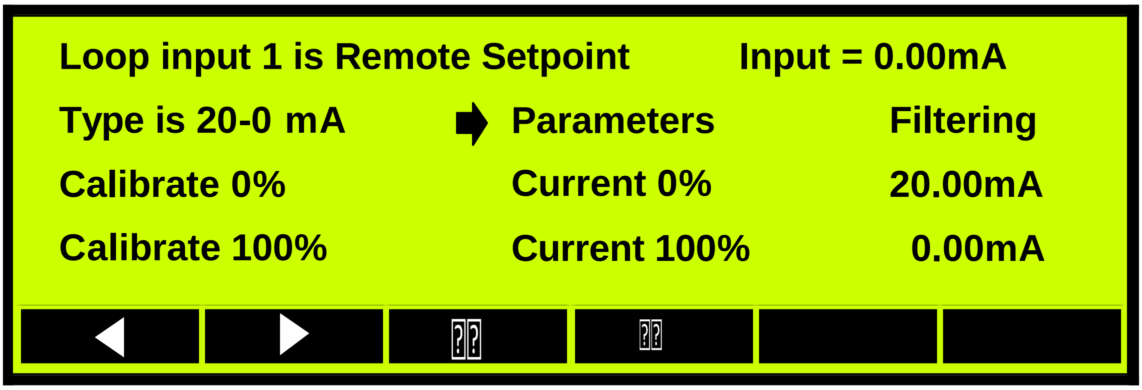
Note Current Loop Input 1 is reserved for the remote Setpoint input. This is indicated by selection cursor changing from a filled cursor to an outline of a cursor.
The Input display shows the current input signal.



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



Scroll on to the "Parameters"



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

Loop input 1 remote setpoint parameters

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

Master capacity (in kg/min)

100.0

New value __

DEL CLEAR

Loop input 1 remote setpoint parameters

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

Slave output (% of master capacity)

100.0

New value __

DEL CLEAR

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

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

◀ ▶

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

Loop filter enabled (fast track active)
➡ Time constant = 5s
Fast track threshold = 15%

Press "ENTER" to gain access to the data input screen.

Input filter time constant

5.0

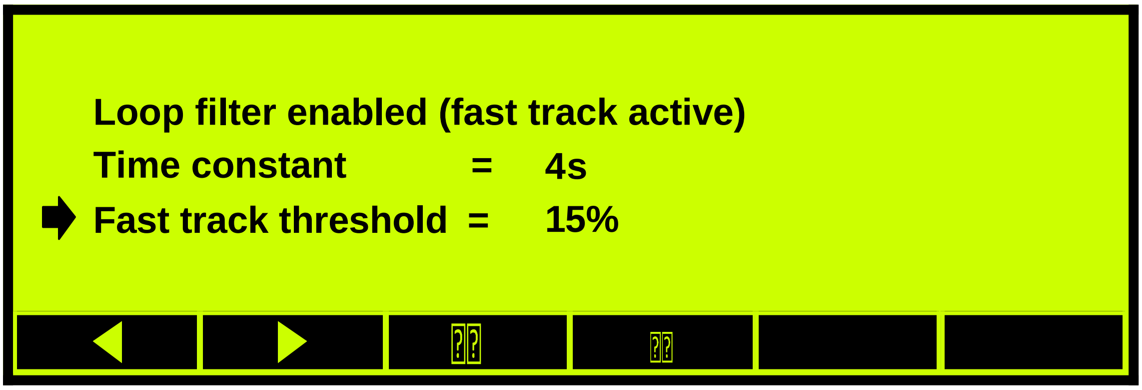
New value __

DEL CLEAR

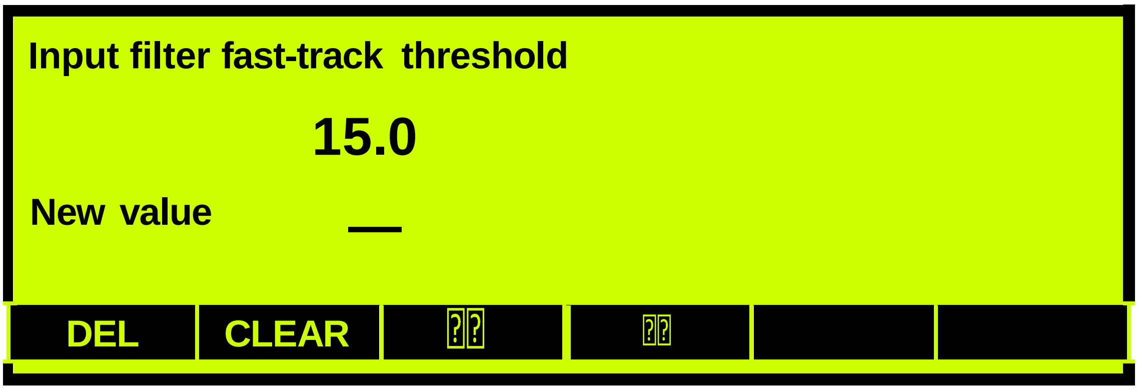
Enter the time filtering constant required and press the tick key to lock in the data and return to the loop filter setup screen. Press the scroll forward key to access the Fast Track Threshold.

Loop filter enabled (fast track active)
Time constant = 5s
➡ Fast track threshold = 15%

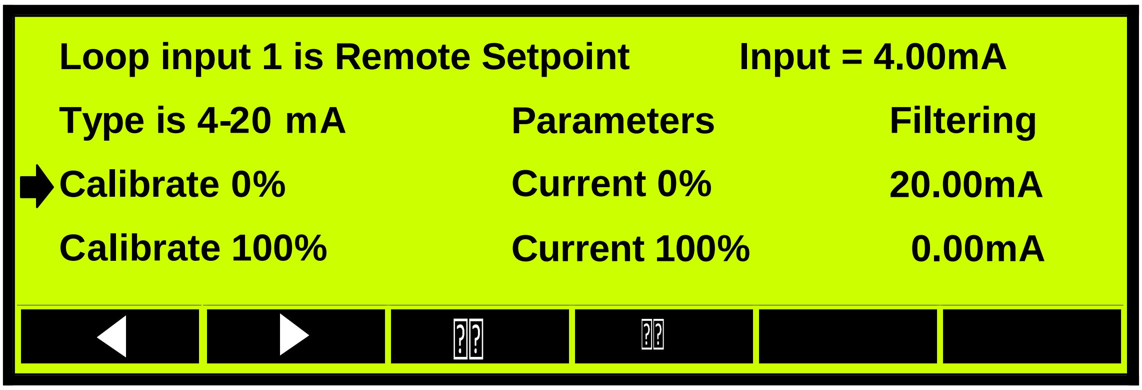
The “Fast Track Threshold” can be activated by entering a value greater than zero into the screen. The “Fast Track Threshold” works by limiting the filter to working in a band that has been established around the current input. If the input current moves up or down by a value which exceeds the “Fast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



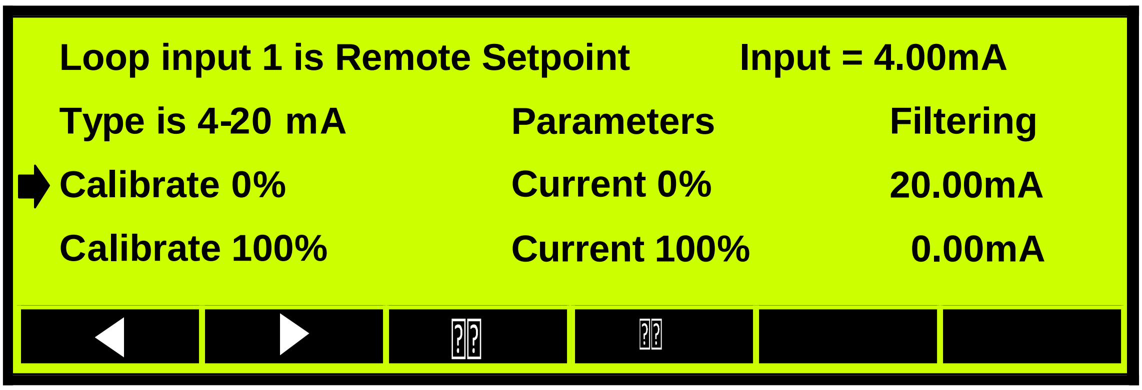
Press the “ENTER” key to gain access to the “Fast Track Filter” data entry screen.



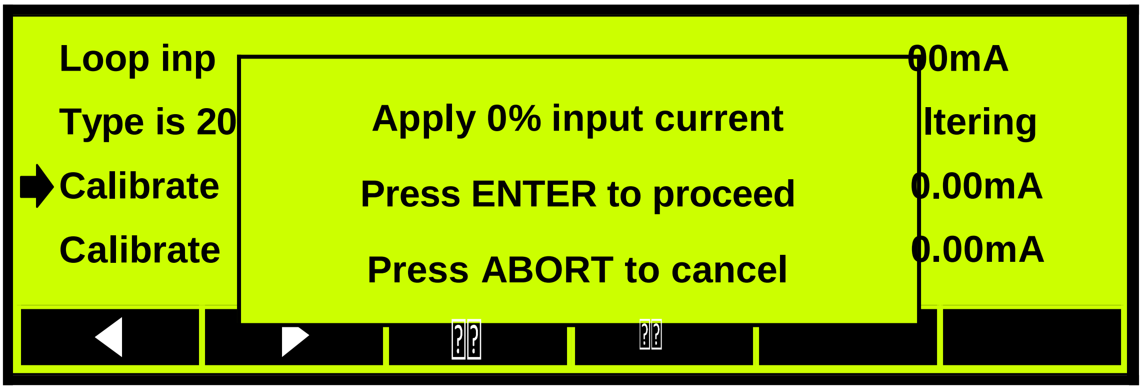
Press the tick key to lock in the data and return to the loop filter setup screen.



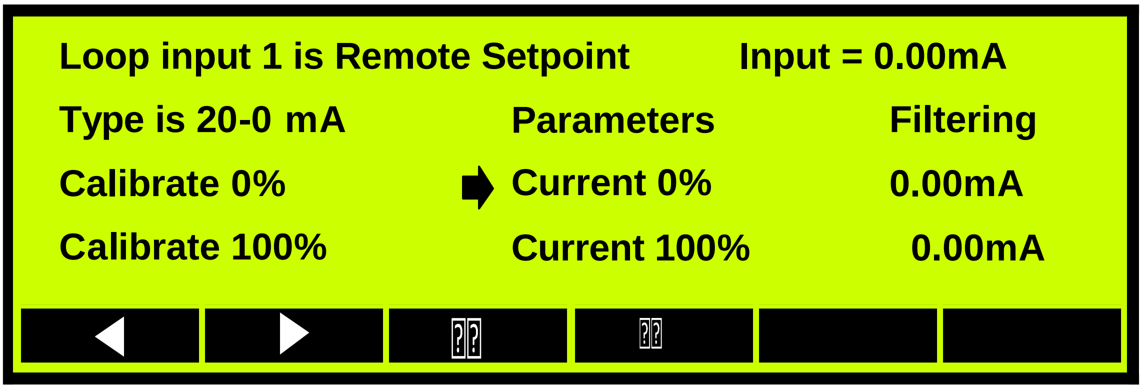
All I/O supplied with Optimus is calibrated by the factory. However the current loop inputs may have to be field calibrated. Scroll on to the “Calibrate 0%” and press the “ENTER” key.



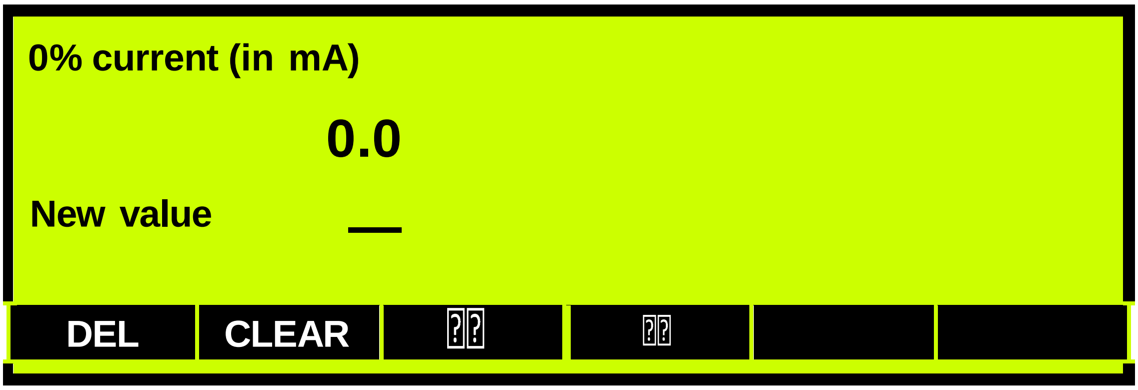
At this point the current sending device should be forced to send 4 mA. When the loop is set to 4 mA, pressing the “ENTER” key will signal Optimus to calibrate zero.



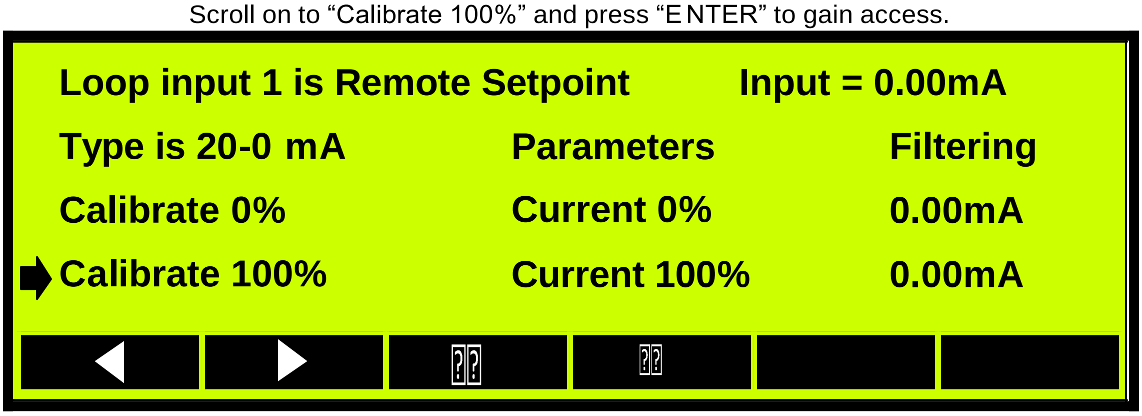
Scroll on to “Current 0%” . This input screen allows the user to enter the “zero” current as a percentage.



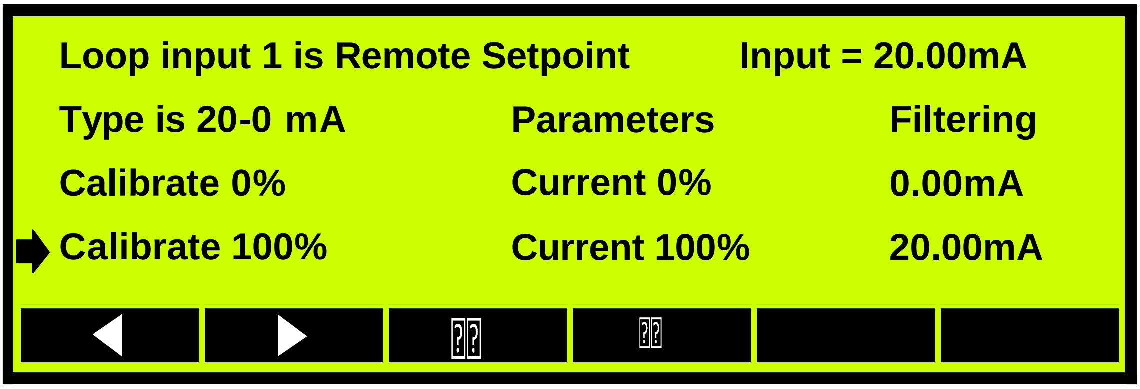
Press the “ENTER” key to access the data entry screen. Using a DVM or other accurate current measuring device read the current flowing in the circuit when at 0 (4mA) and enter it into the screen.



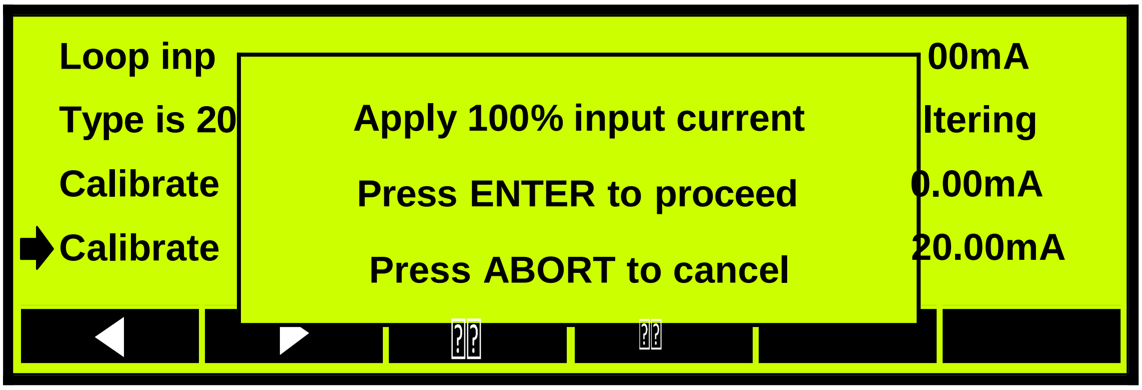
Press the tick key to lock in the data and return to the “Current Loop Setup” screen. Scroll on to “Calibrate 100%” and press “ENTER” to gain access.



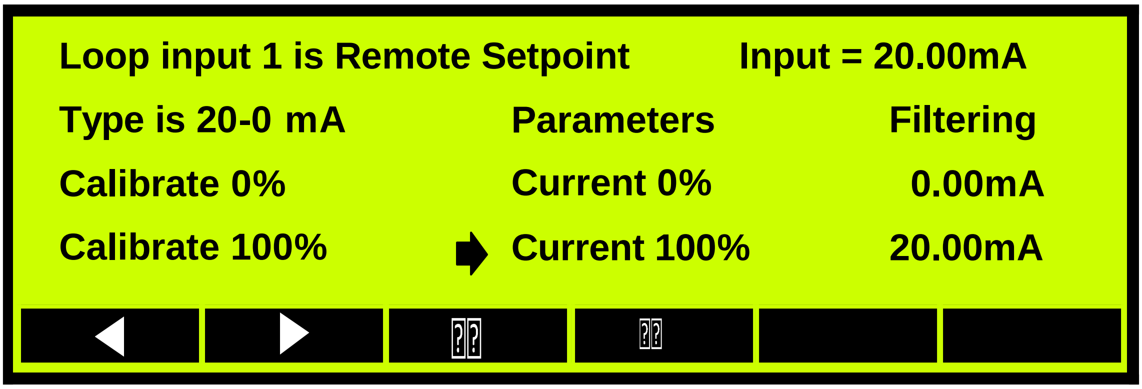
At this point the current loop should be forced to 20mA.



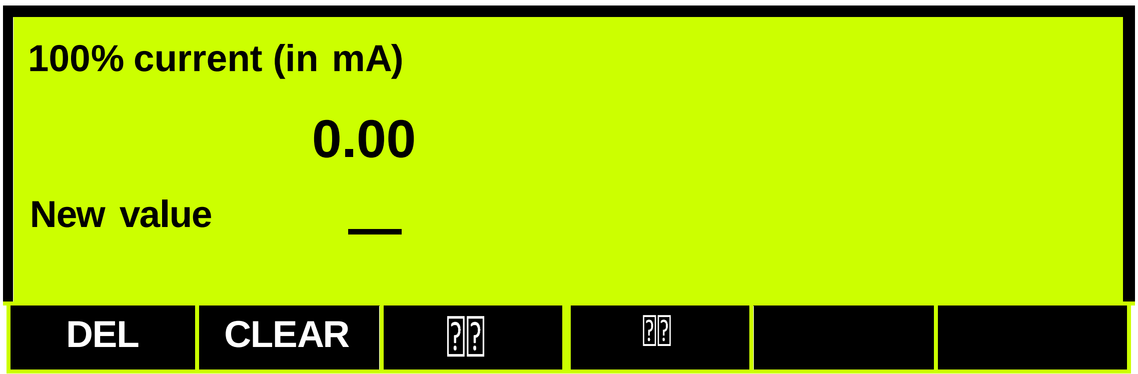
When the current has been forced to 20mA. Press the "ENTER" key to calibrate the 20mA point



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

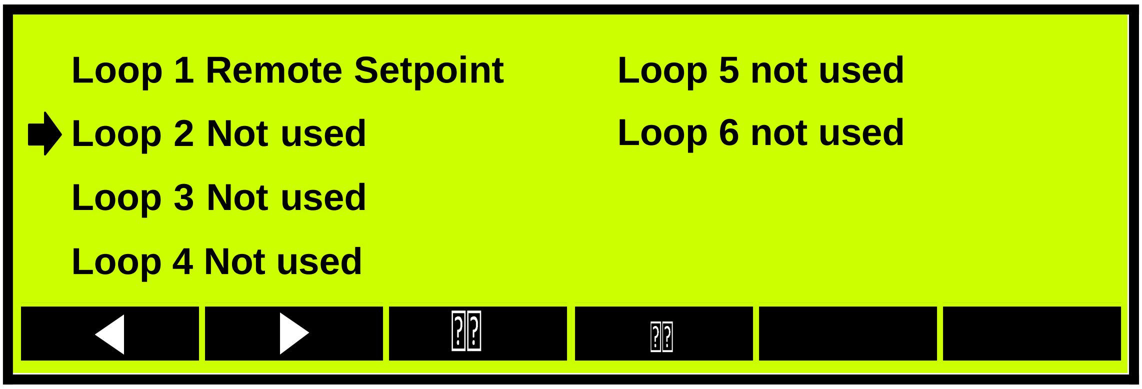


Scroll on to the "Current 100%". At this point the current flowing in the loop should be measured using an accurate DVM and the reading entered into the screen.

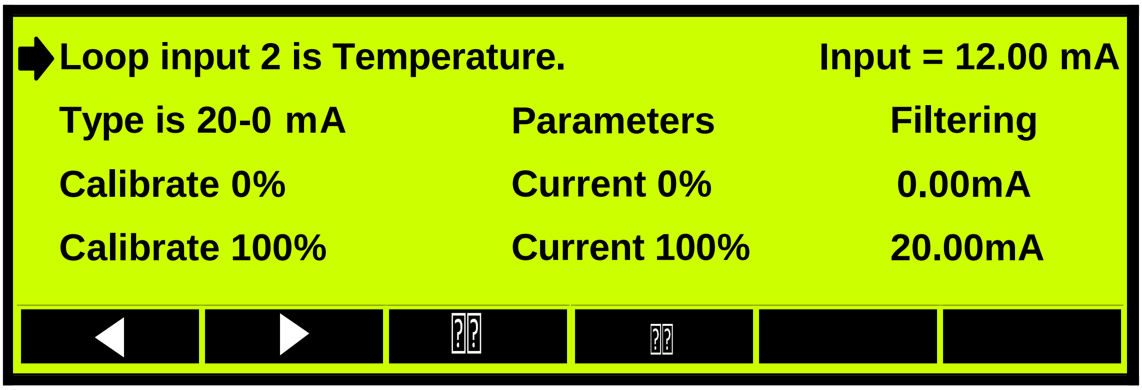


Pressing the "ENTER" key locks in the calibration constant and returns the user to the loop setup screen.

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



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



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

Optimus provides six (6) analogue output signals.

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

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

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

➡ Loop 1 Rate	Loop 5 not used
Loop 2 PID	Loop 6 not used
Loop 3 Belt Loading	
Loop 4 Belt Speed	

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

Loop output 1 is Rate		
Type is 4/20 mA	Parameters	Filtering
Calibrate 0%	Current 0%	4.00mA
Calibrate 100%	Current 100%	20.00mA

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

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

Loop output 1 is Rate			
➡ Type is 4/20 mA	Parameters		Filtering
Calibrate 0%	Current 0%	=	4.00 mA
Calibrate 100%	Current 100%	=	20.00 mA

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

Loop output 1 is Rate		
Type is 4/20 mA	Parameters	Filtering
Calibrate 0%	Current 0%	4.00mA
Calibrate 100%	Current 100%	20.00mA

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

Loop output 1 is Rate		
Type is 4/20 mA	Parameters	➡ Filtering
Calibrate 0%	Current 0%	4.00mA
Calibrate 100%	Current 100%	20.00mA

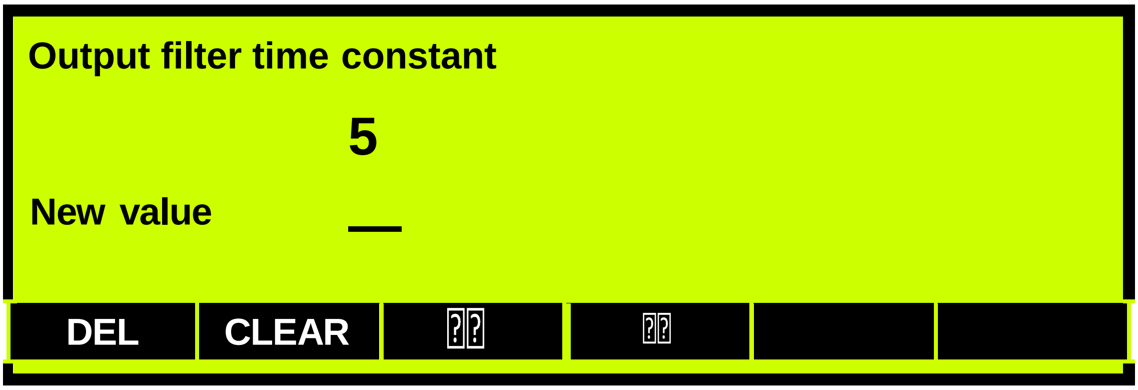
Select the "Time constant" input screen.

Loop out filter enabled (fast track active)

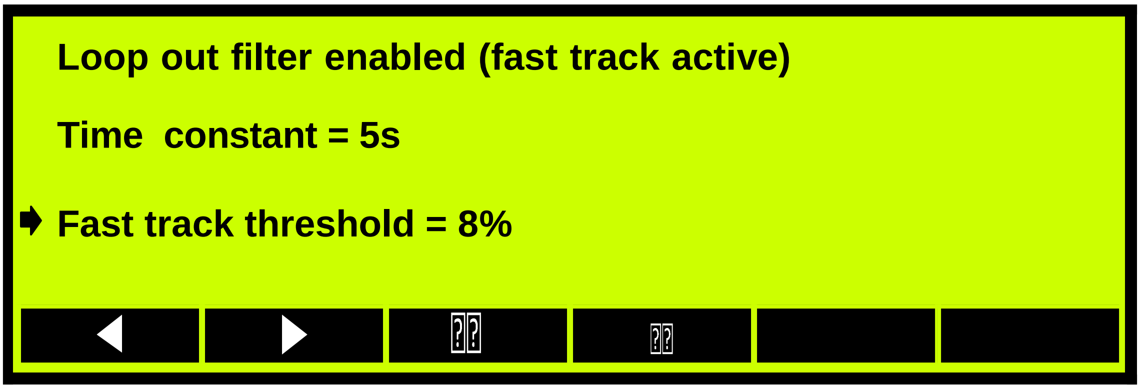
➡ Time constant = 1s

Fast track threshold = 10%

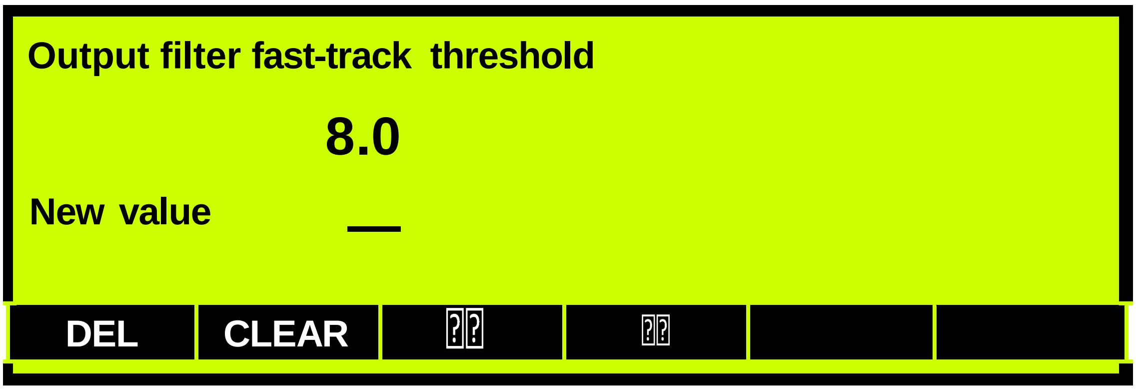
Enter the filter time constant required. The value entered here will generally have been selected after observing the process and the response of rate monitoring instrumentation.



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

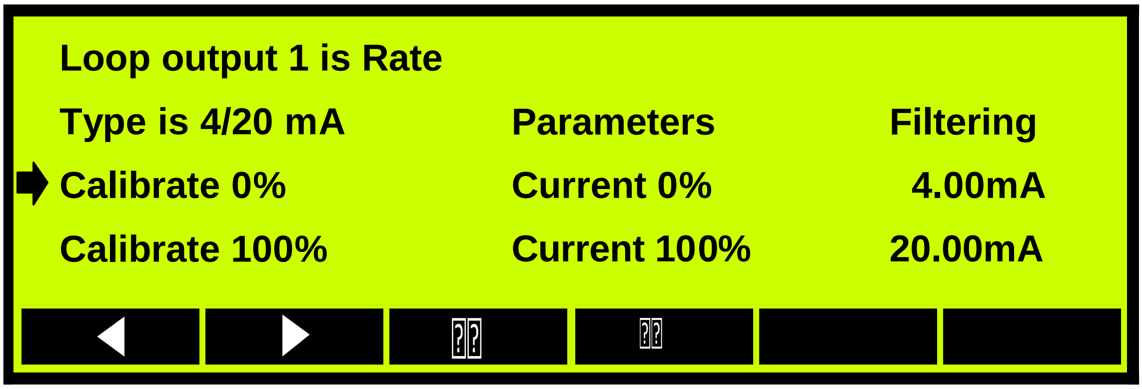


The "Fast Track Threshold" when active removes the time average filter from the current loop output, when the output current exceeds the "Fast Track Threshold" value.
Assume that the feeder has a capacity of 60 kg/min and the feeder is running at a steady rate of 30 kg/min. If the rate is increased to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

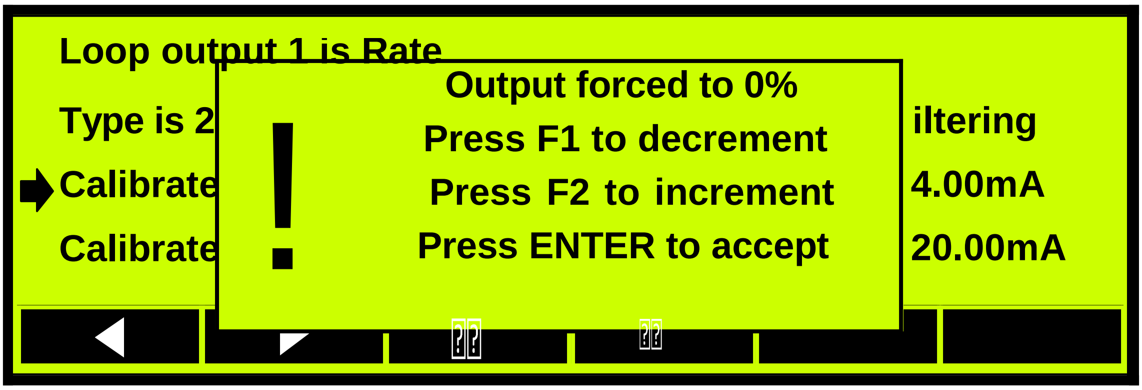


Enter the "Fast Track Threshold" value required and press the tick key to lock in the data and return to the current loop output setup screen.

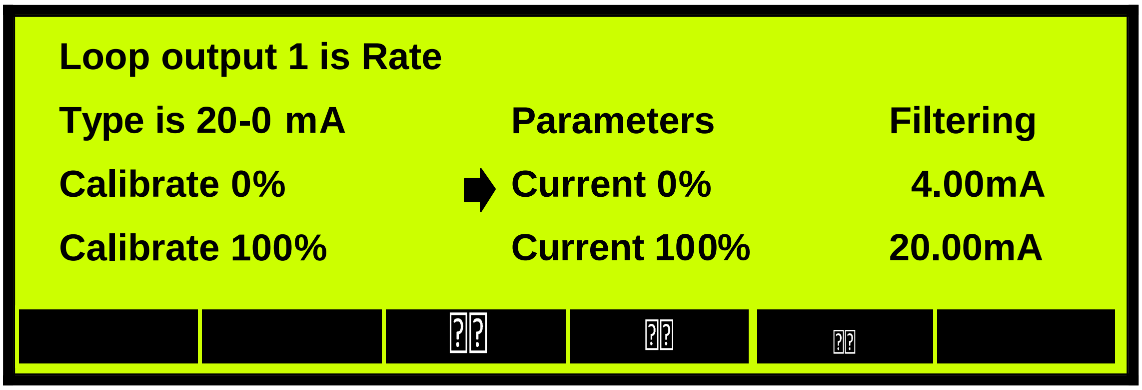
At the time of manufacture and testing all Optimus's input and output facilities are tested against our bench test equipment. Should it become necessary the output current loops can be calibrated. With the cursor opposite "Select calibrate 0%" press "ENTER" to select the "Calibrate 0%" screen.



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

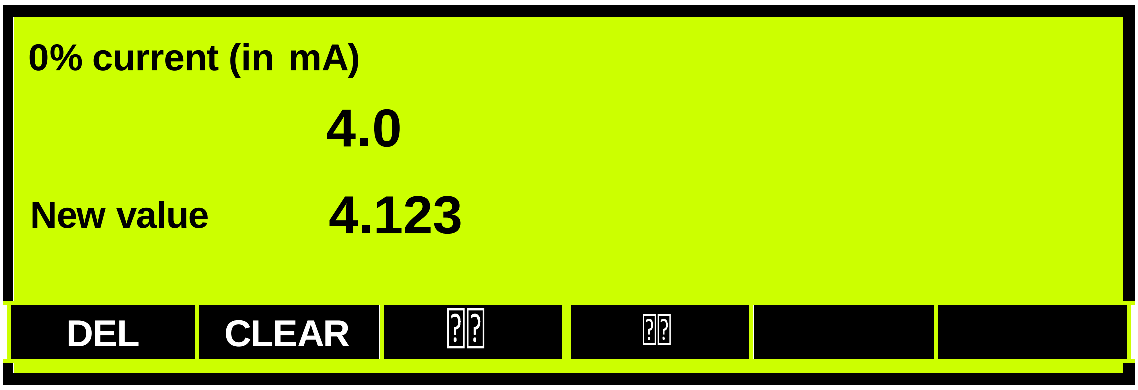


Following the completion of the test press the "ENTER" key to update the working memory and return to the loop parameters. Pushing the cursor's advance key will position the cursor along side the "Current 0%" Use the data entry screen associated with this screen to enter the absolute milliamp value required.

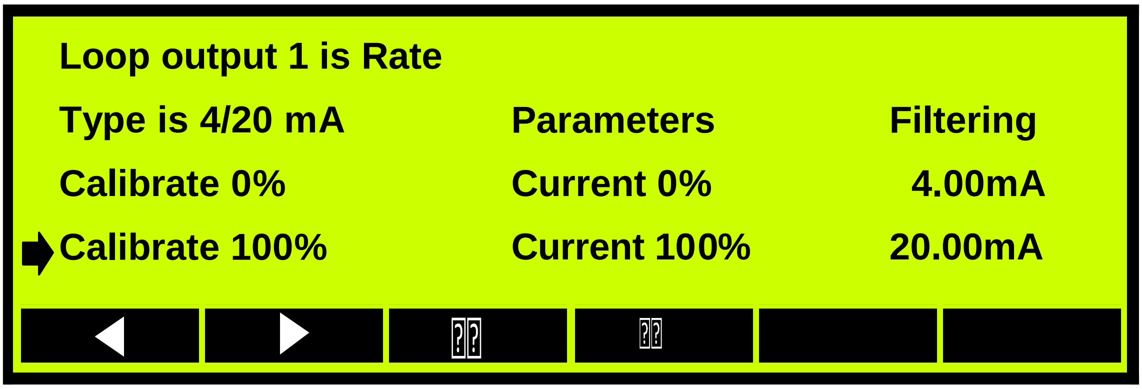


Press the "ENTER" key to access the data entry screen or the + or - key to vary the analogue output in 0.005 mA steps.

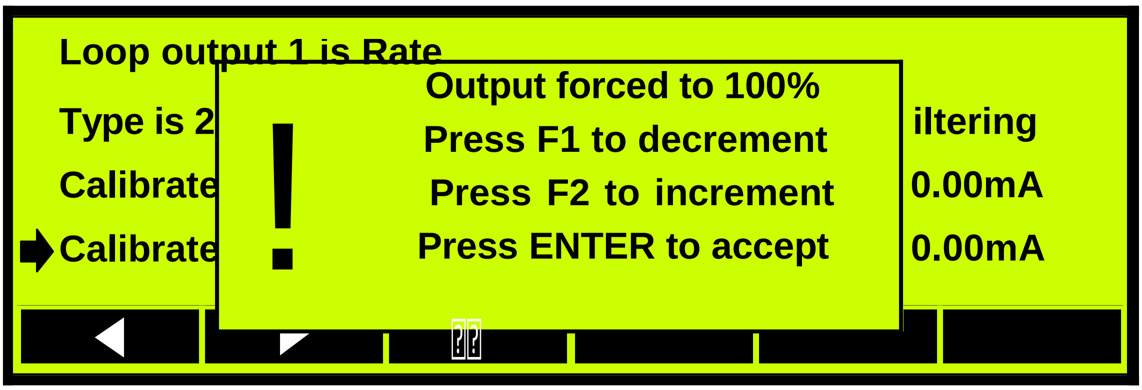
From this screen the absolute value for the required output can be entered rather than the predefined steps provided in previous menu's. Type in the value required and press the tick key to lock the data in. The data will only be locked in when the "HOME" key is pressed.



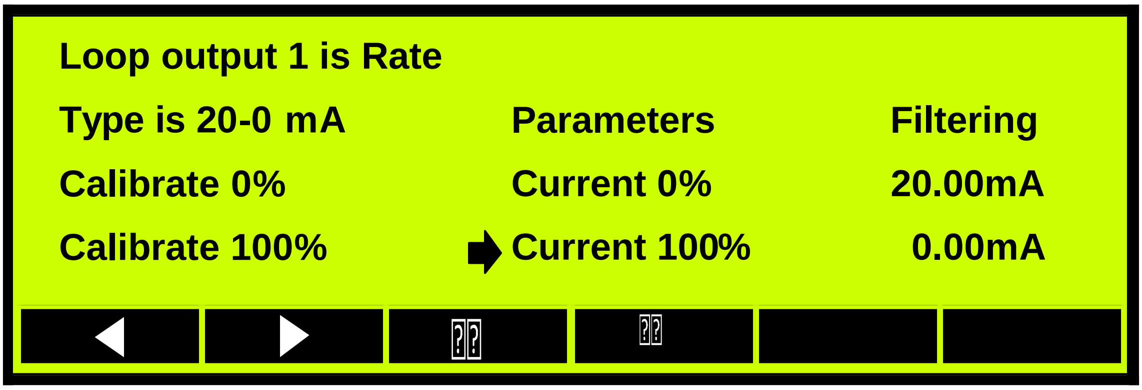
Press the tick key to lock in the data and scroll forward.



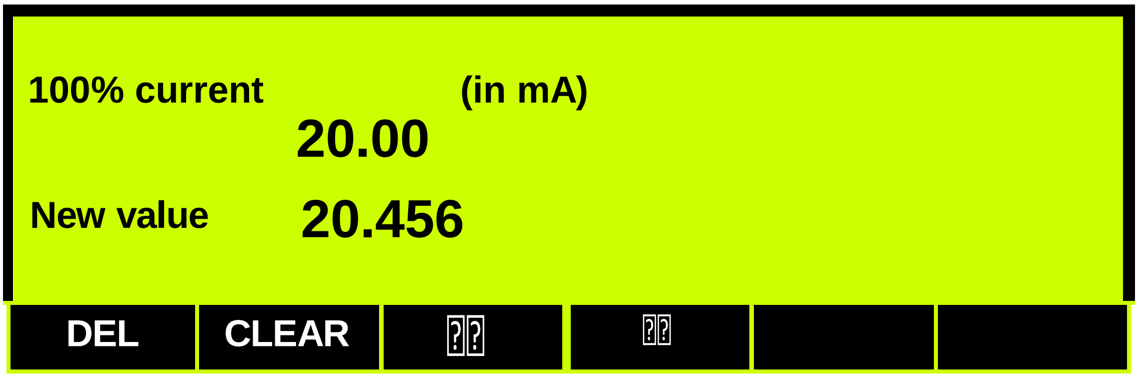
Following the setting of the low side of the current loop. Press the Scroll forward key to access the high end of the current loop. The procedure associated with incrementing and decrementing the output of the high end is the same as decrementing the low end.



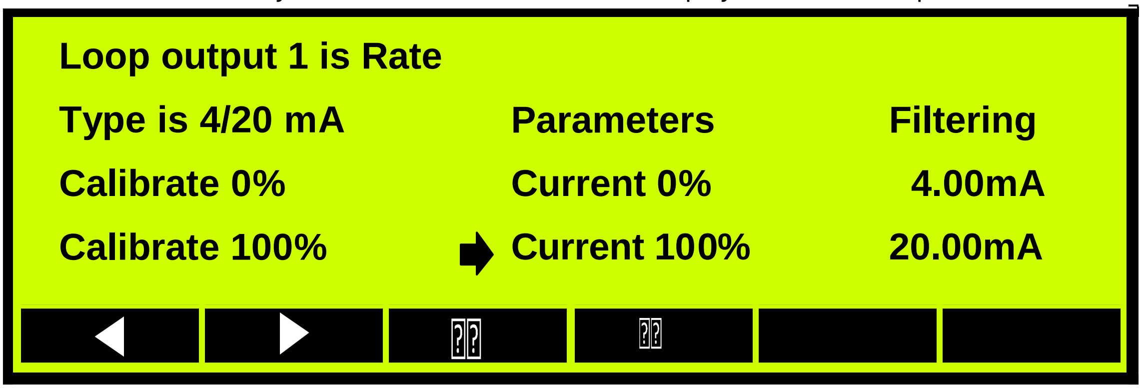
If the predefined steps do not suit the application requirements then use the screen shown below to adjust the top end using absolute units.



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



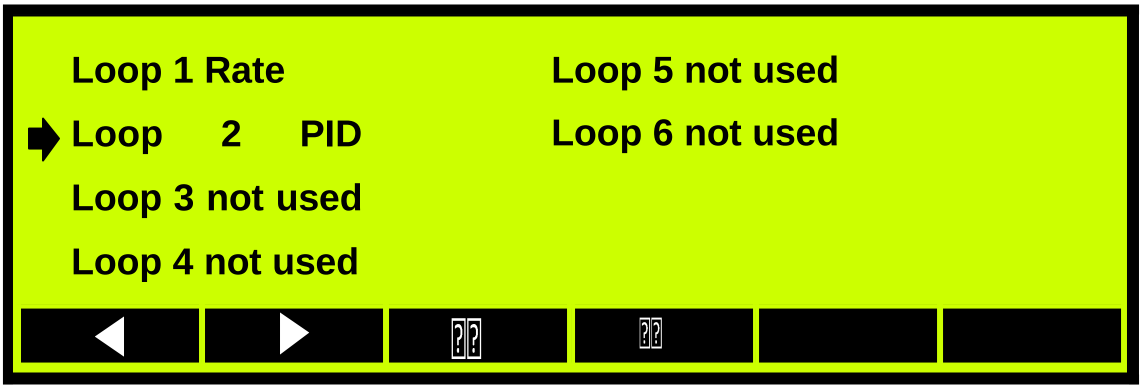
Use the tick key lock in the data and return the display to the rate setup screen.



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

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

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



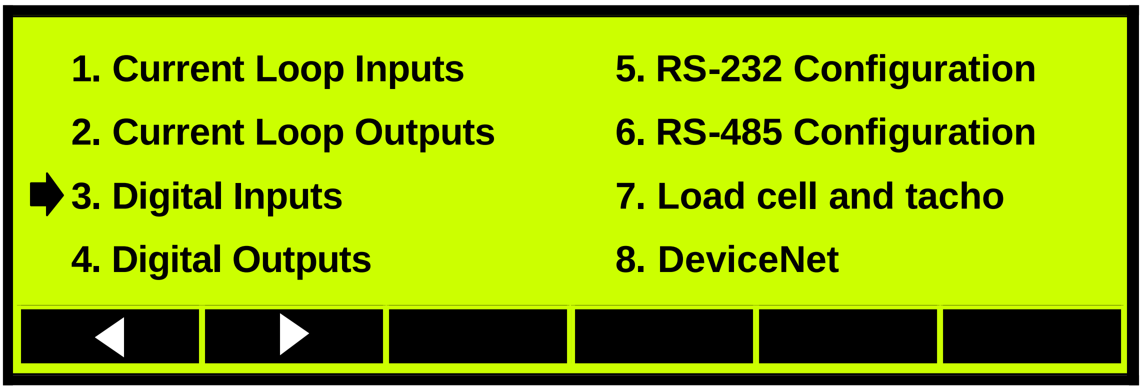
Digital Inputs.

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

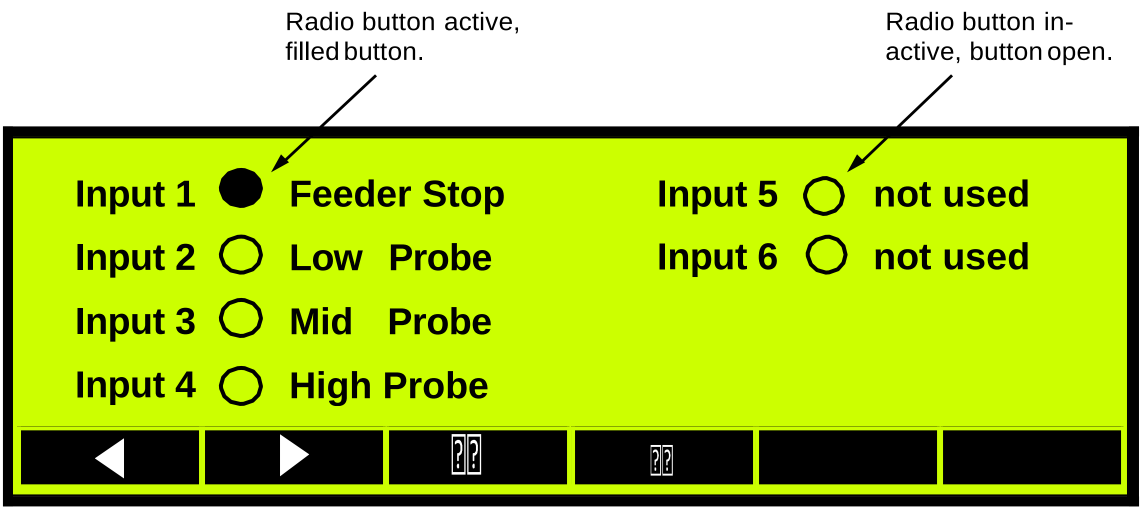
Each of the six digital inputs can be assigned a label. From the factory the labels are pre-assigned as follows:-

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

The interconnect PCB uses the notation “DIG IP1” / “DIG IP6”



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



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

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

From the factory the labels are:-

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

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

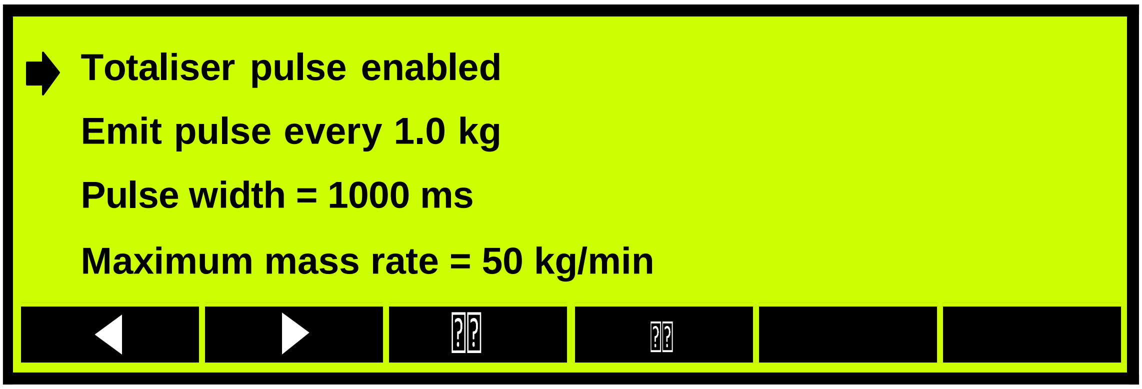
1. Current Loop Inputs **5. RS-232 Configuration**
2. Current Loop Outputs **6. RS-485 Configuration**
3. Digital Inputs **7. Load cell and tacho**
4. Digital Outputs **8. DeviceNet**

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

Relay number 1
Type = Totaliser
Parameters
Polarity = normally open

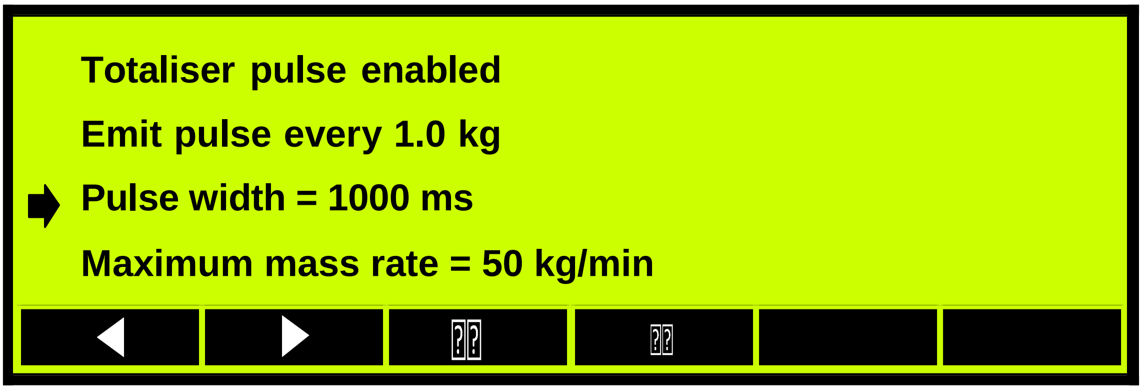
Relay number 1
Type = Totaliser
Parameters
Polarity = normally open

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



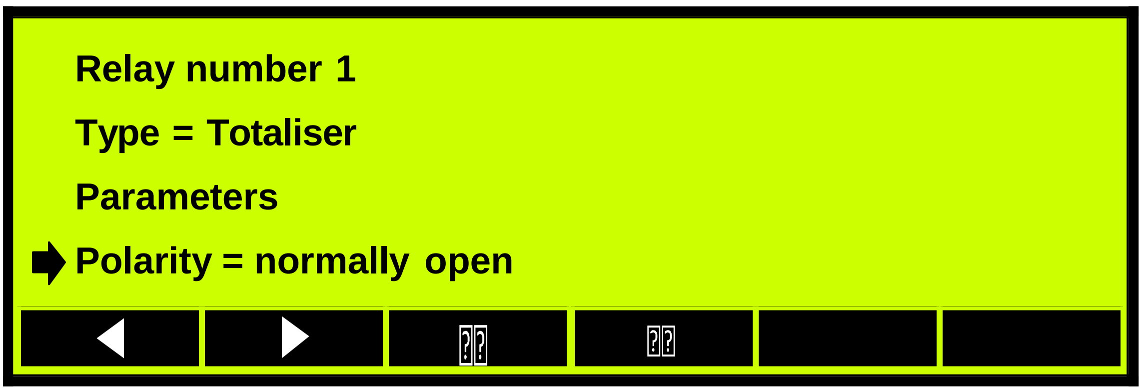
With the function enabled press the scroll forward down to “Emit pulse” function. There are preset output’s.

100
10
1
0.1
0.01
0.001



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

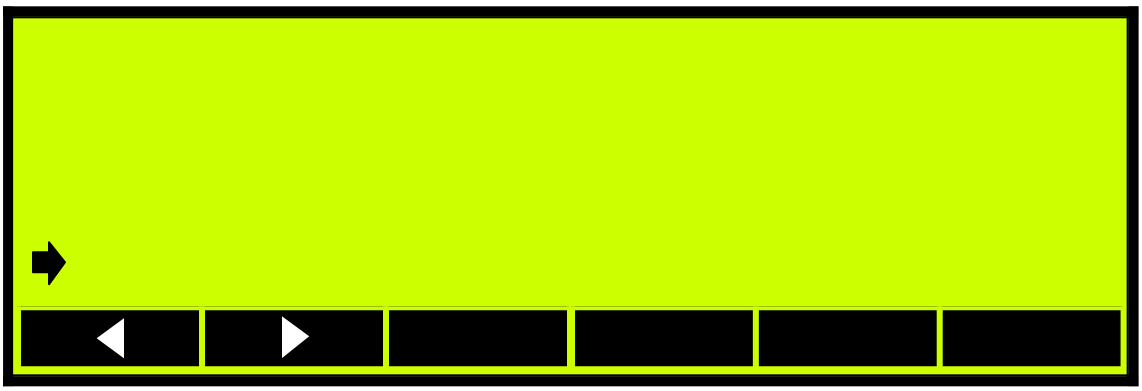
Consideration should be given to the response time of the receiver unit (PLC) and the ability of Optimus to output the signal in real time. During the configuration of the outputs Optimus will compute the maximum mass rate achievable for any configuration of Optimus. The reslt being shown on the line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



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

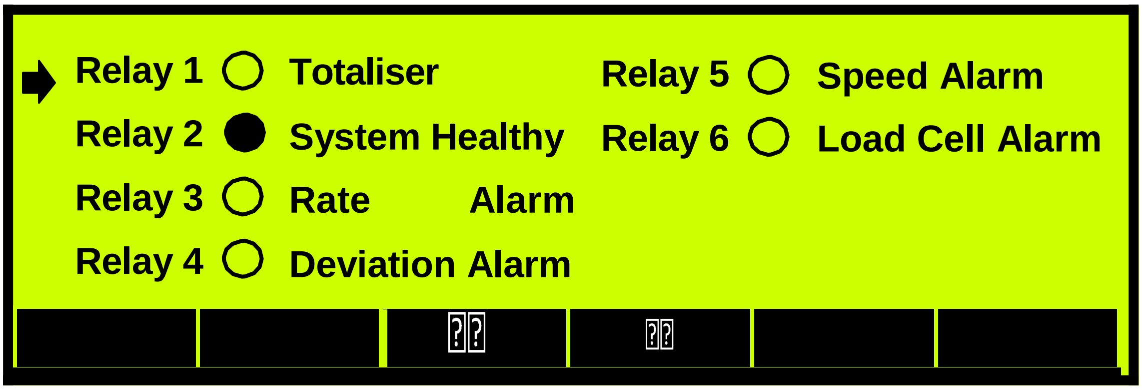
I/O (Input/Output) / *Digital outputs.*

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

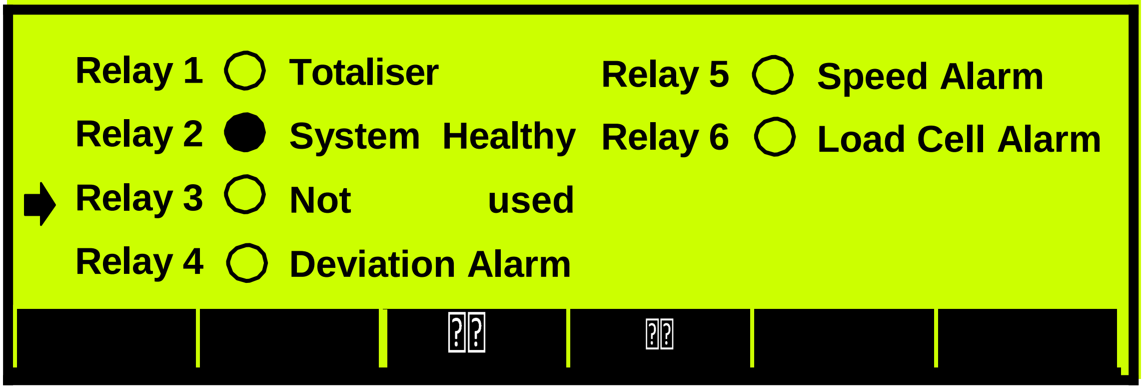


set the polarity, use the setting that suites your application. Normally Open / Normally Closed

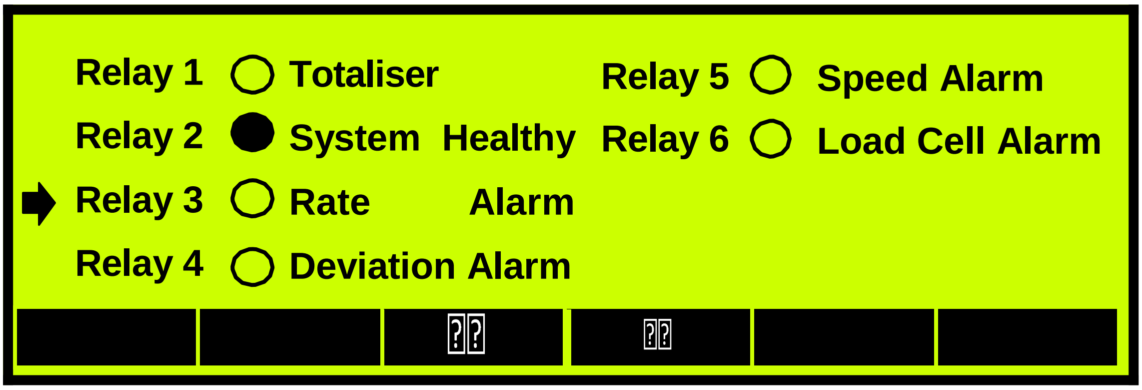
There is no access to this relay. It is energised on power up and is de-energised on power down or an electronic fault condition.



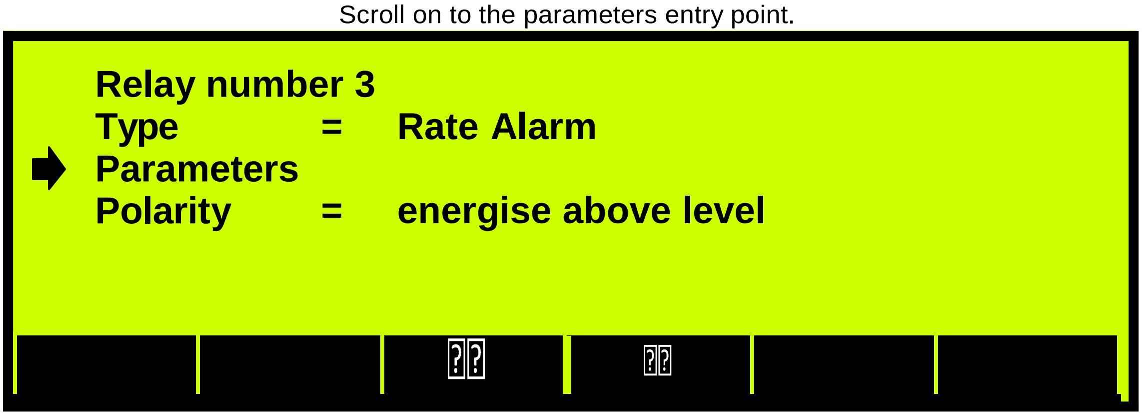
Relay’s Nº 3-6 can be configured against preset labels. Scroll to Relay Nº3 and press the “ENTER” key to enter the screens.



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



Scroll on to the parameters entry point.



Scroll on to the parameters entry point.

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

Alarm is enabled

Delay = 2 sec
Level = 110% of belt capacity
= 106 kg/min

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

Alarm is enabled

Delay = 2 sec
Level = 110% of belt capacity
= 106 kg/min

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

Alarm delay (in seconds)

2

New value _

DEL **CLEAR**

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

Alarm is enabled

Delay = 2 sec
Level = 110% of belt capacity
= 106 kg/min

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

Alarm threshold (% of belt capacity)

110

New value _

DEL | **CLEAR**

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

Alarm is enabled

Delay	**=**	**2 sec**
Level	**=**	**110% of belt capacity**
	=	**106 kg/min**

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

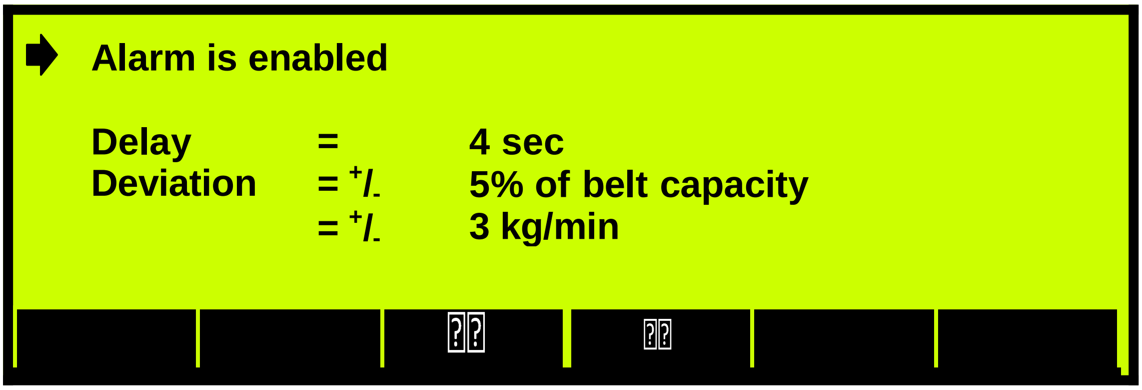
Relay 1 ○	**Totaliser**	**Relay 5** ○	**Speed Alarm**
Relay 2 ●	**System Healthy**	**Relay 6** ○	**Load Cell Alarm**
Relay 3 ○	**Rate Alarm**		
Relay 4 ○	**Deviation Alarm**		

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

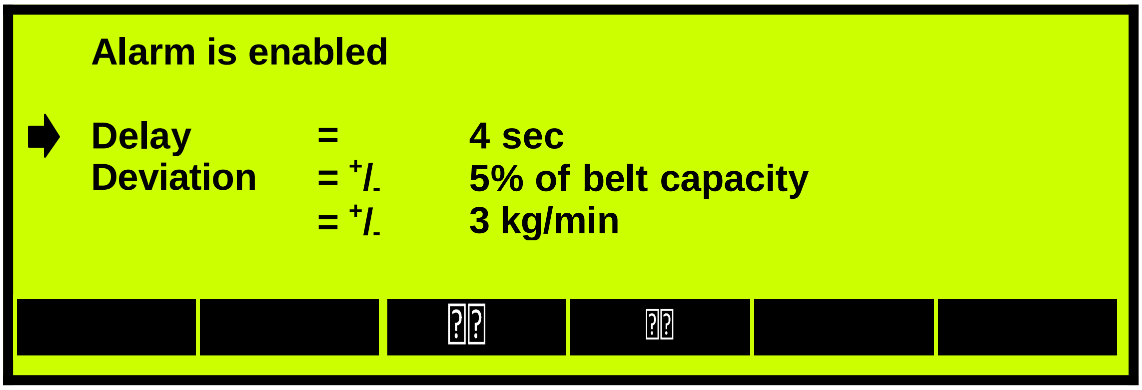
Relay number 4

Type	**=**	**Deviation Alarm**
Parameters		
Polarity	**=**	**Energised outside band**

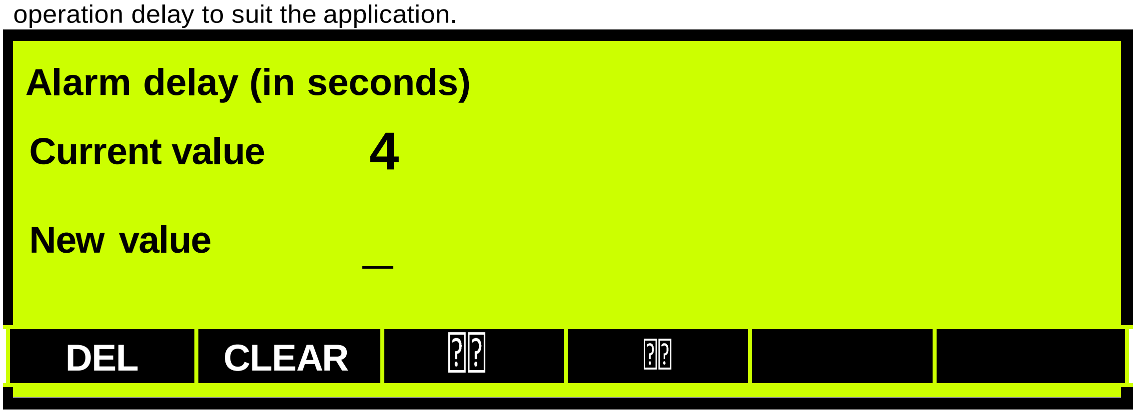
On entry to relay 4 parameters screen enable the alarm, using the “ENTER” key to select the enable label.



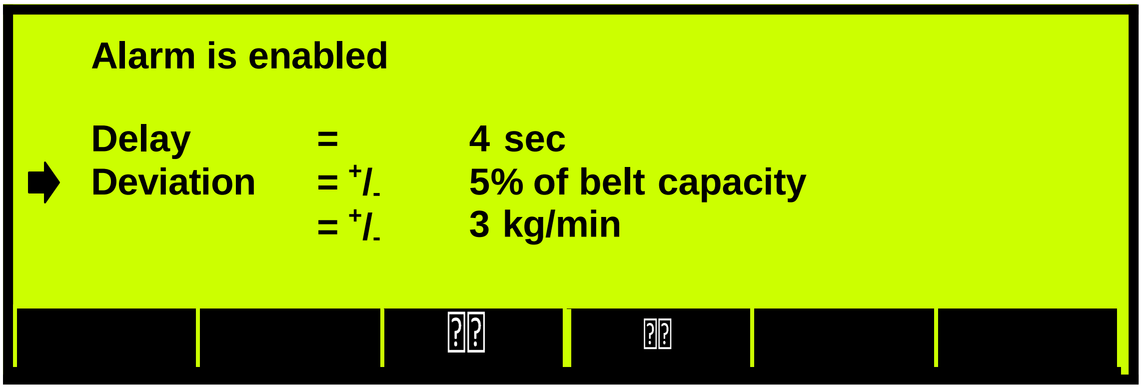
Scroll onto the delay before relay operation setting. Observe the process and select the operation delay to suit the application.



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



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



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

Alarm threshold (% of belt capacity)

Current value 5

New value 6

DEL	CLEAR				

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

Alarm is enabled

Delay	**=**	**4 sec**
Deviation	**= +/-**	**6.0% of belt capacity**
	= +/-	**4 kg/min**

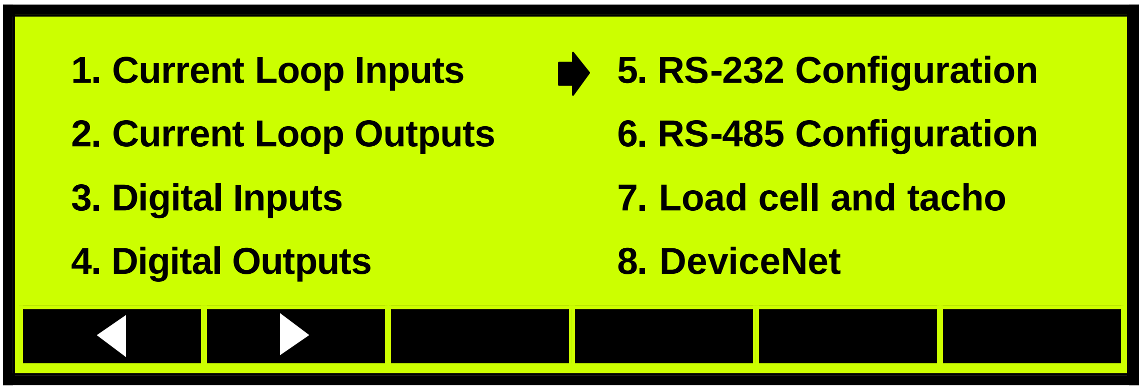
Press the tick key to return to relay Nº4 input screen. Scroll on to the polarity and set the polarity required. Use the "ENTER" key to select either Energised outside band or energise inside band.

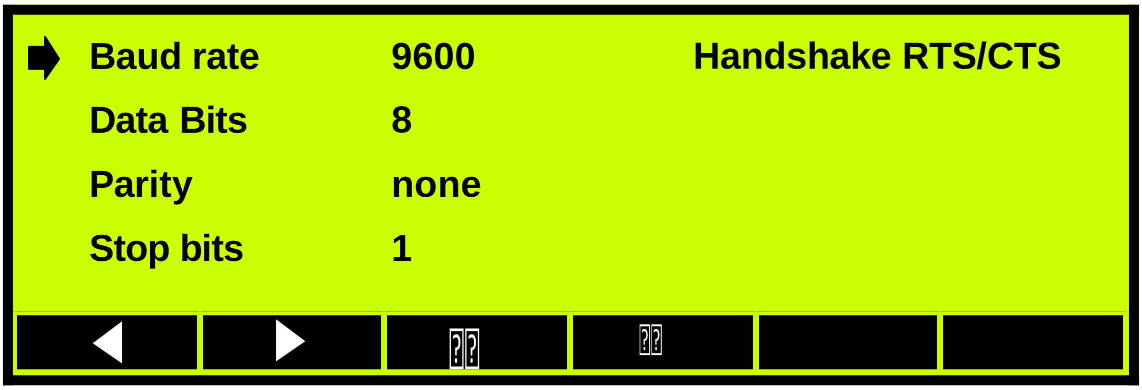
Relay number 4

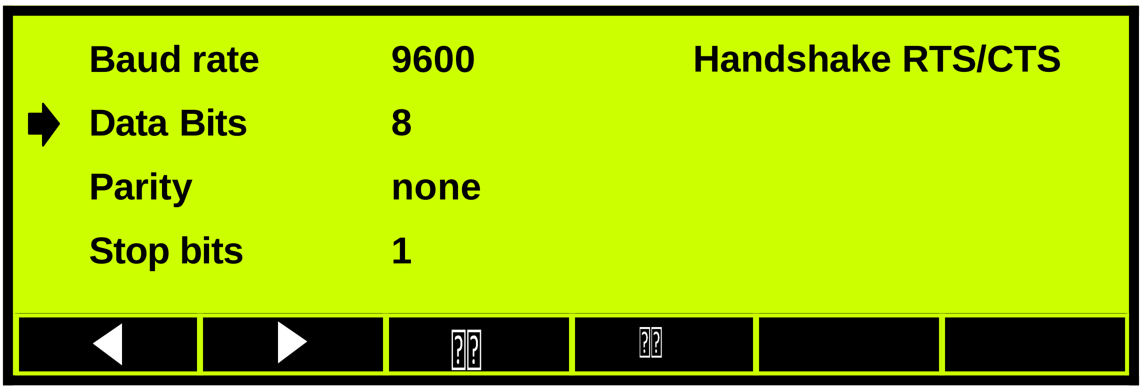
Type	**=**	**Deviation Alarm**
Parameters		
Polarity	**=**	**Energised outside band**

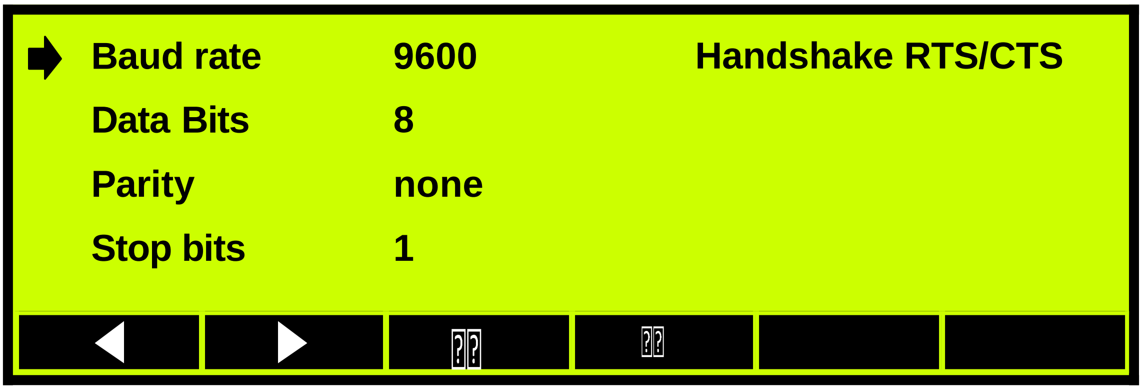
When done press the tick key to lock in the data and return to the main relay setup screen.

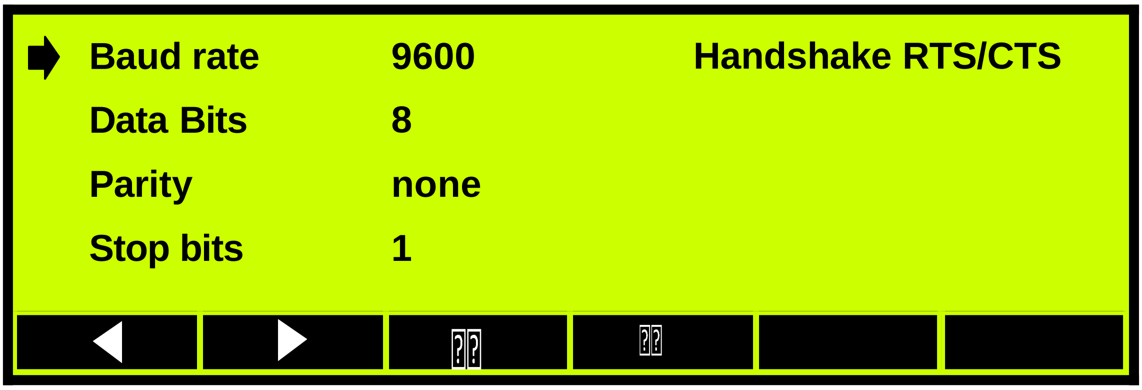
Relay 1	**Totaliser**	**Relay 5**	**Speed Alarm**
Relay 2	**System Healthy**	**Relay 6**	**Load Cell Alarm**
Relay 3	**Rate Alarm**		
Relay 4	**Deviation Alarm**		

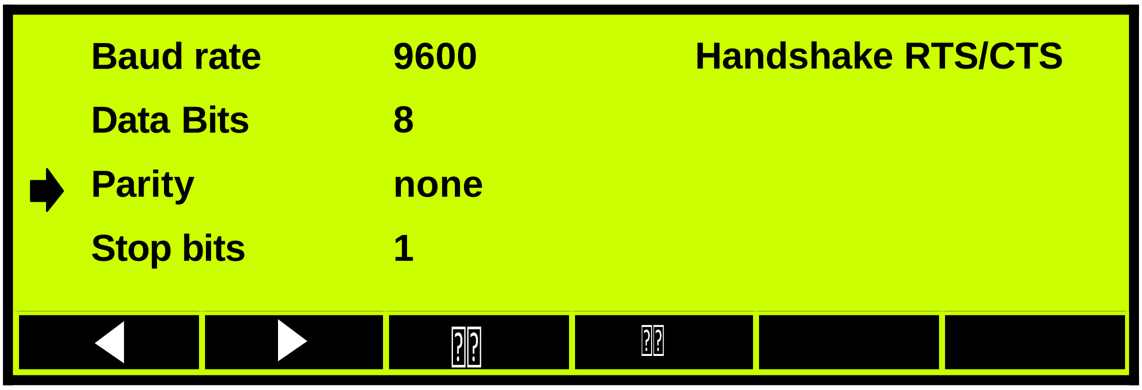

1. Current Loop Inputs
2. Current Loop Outputs
3. Digital Inputs
4. Digital Outputs
5. RS-232 Configuration
6. RS-485 Configuration
7. Load cell and tacho
8. DeviceNet


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

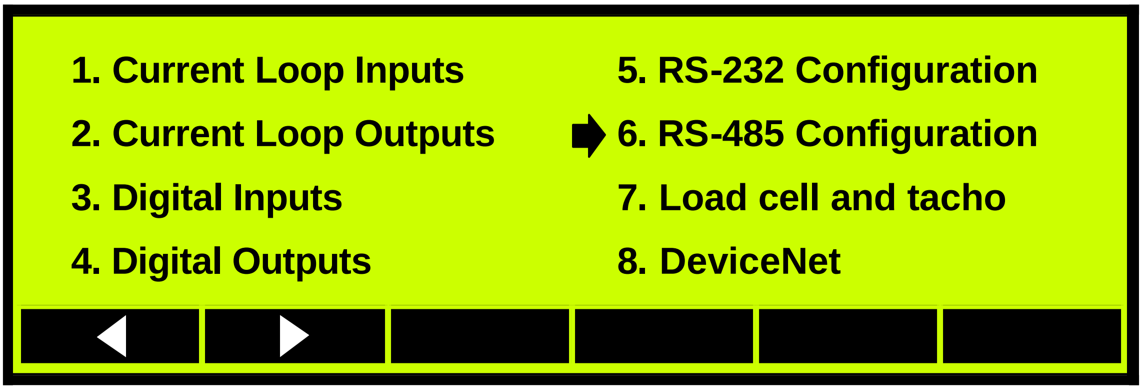

Baud rate 9600
Handshake RTS/CTS
Data Bits 8
Parity none
Stop bits 1


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

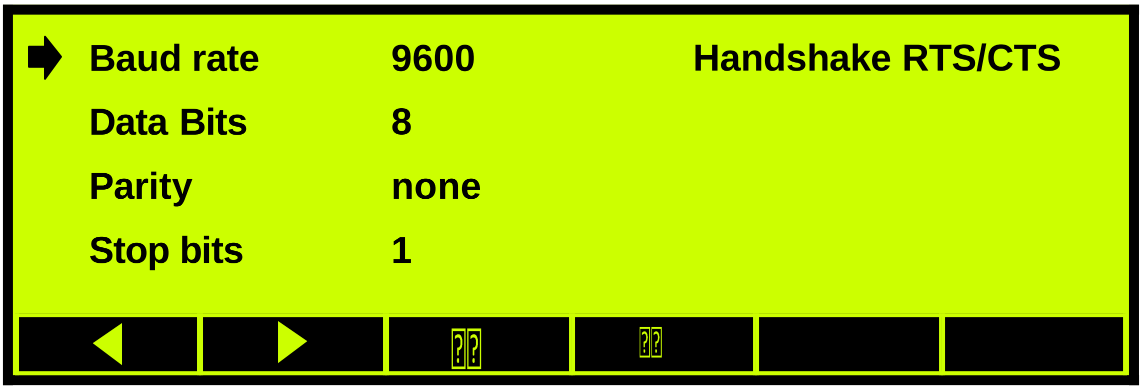

Baud rate
9600
Handshake RTS/CTS
Data Bits
8
Parity
none
Stop bits
1


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

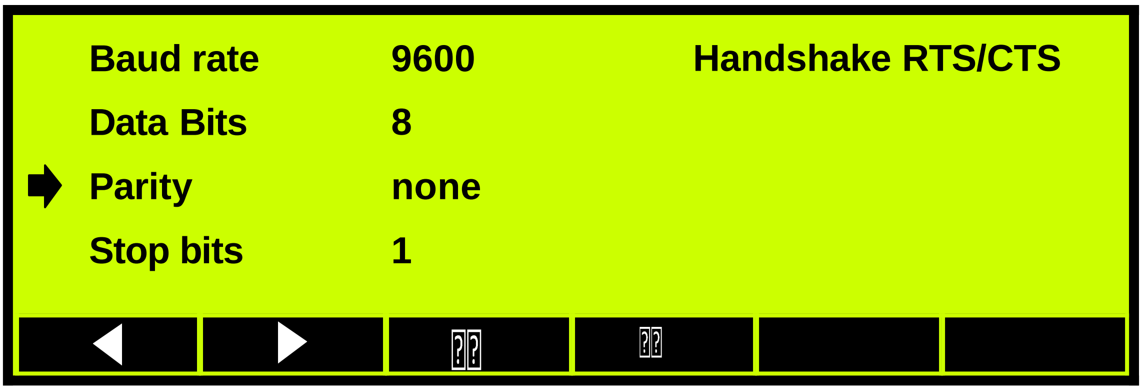
RS 485 is an optional output. Generally Web-Tech will supply special firmware to support the customers requirements. To set up the link scroll onto the “RS-485 Configuration” data entry point and press the “ENTER” key.



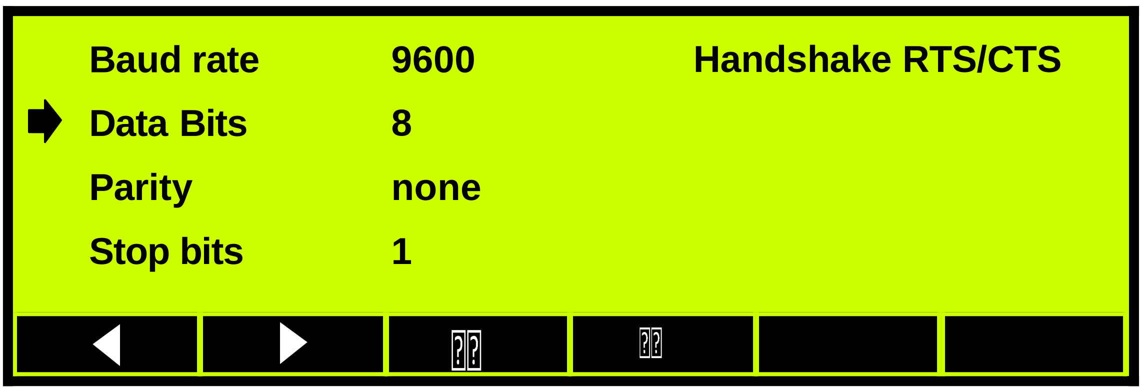
Press the “ENTER” key to select the required baud rate from pre-assigned values.



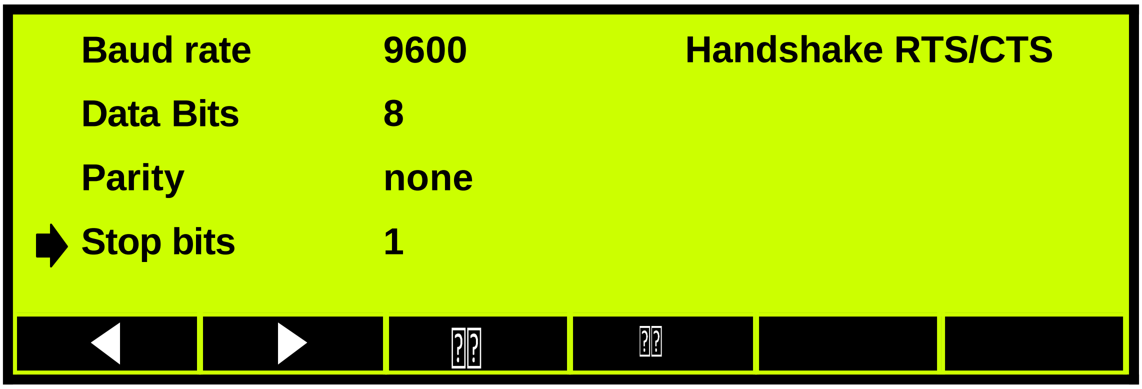
Scroll on to the “Data Bits” entry point and use the “ENTER” key to select the required data bits from the two values available. (7 & 8)



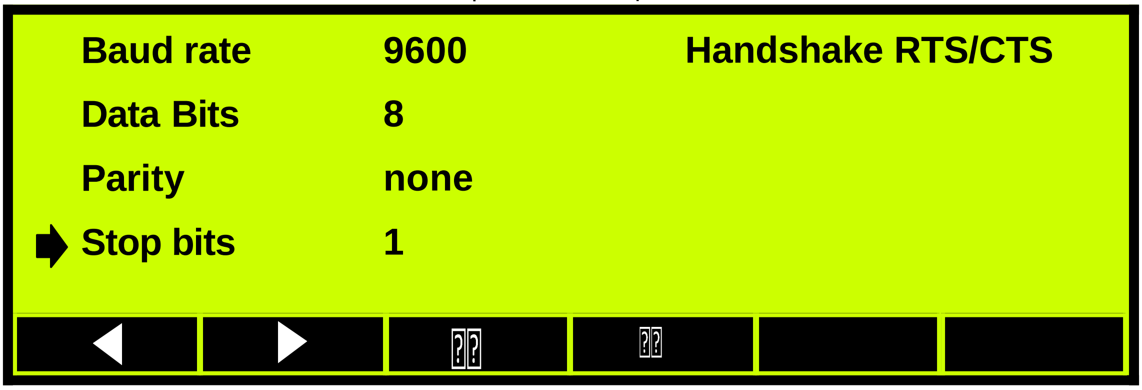
Scroll onto the “Parity” selection entry point and use the “ENTER” key to select either none or even.



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

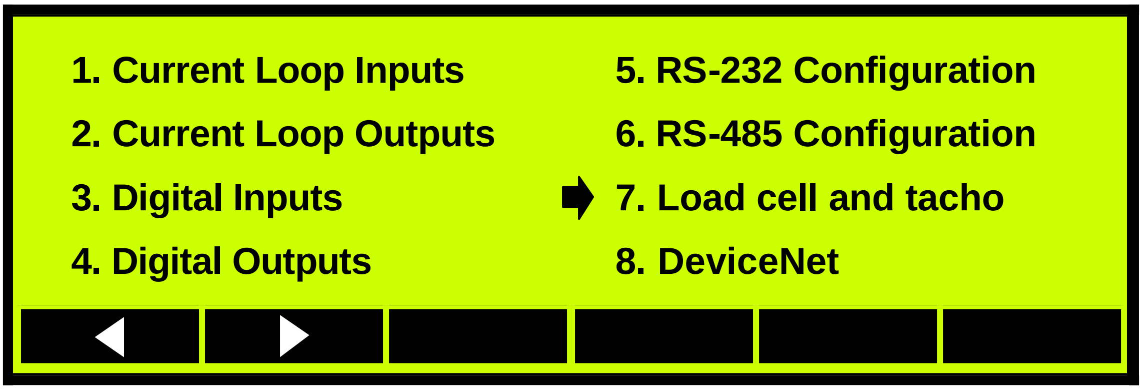


Scroll onto the “Handshake” setting entry point. Use the “ENTER” key to scroll between “full duplex or half duplex”.

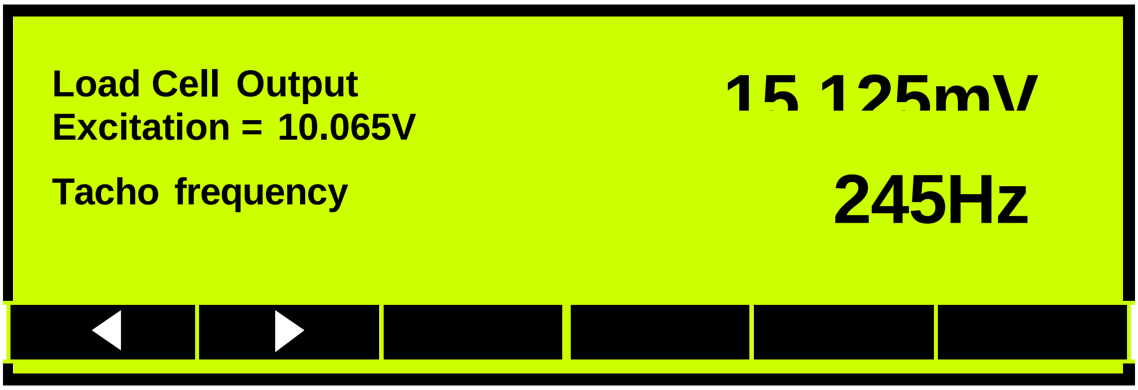


Following the completion of the setup for the RS-485 specification. Press the tick key to lock in the data and return to the main I/O screen selection.

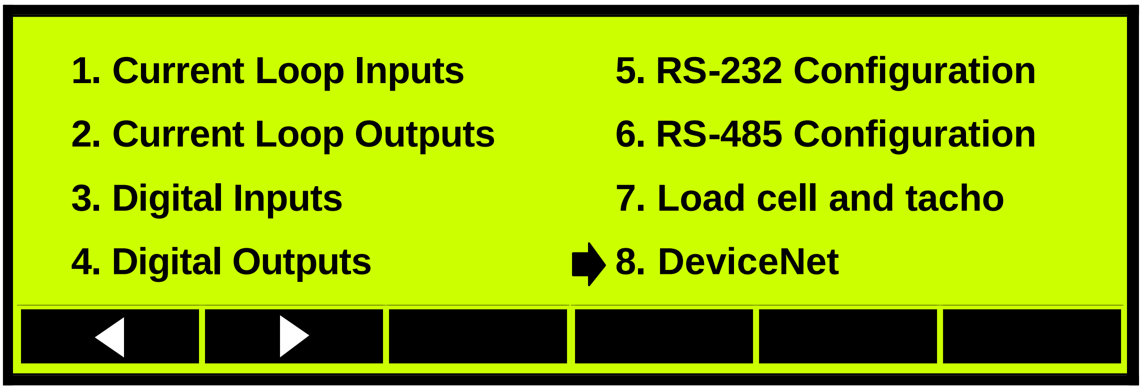
The “Load Cell and Tacho” screen allows the user to view the output of the load cell and tachometer/encoder. This screen is for viewing and there are no data entry points.



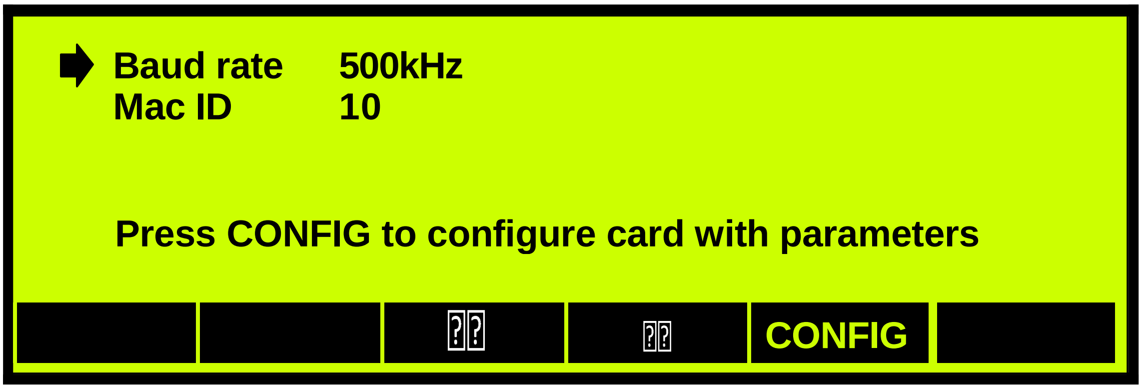
This screen is used as an aid in maintenance. The load cell output and input are shown along with the encoder. The data should be compared with that shown on the system data sheet shipped with the feeder.



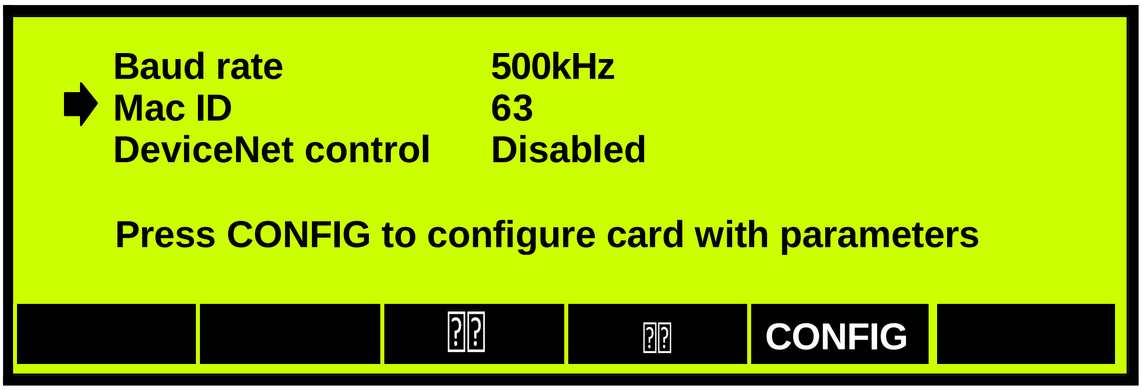
Device Net. **(Optional Supply)**
If Optimus has been supplied with a DeviceNet Card (optional extra) then the following data input screen is used to set up Optimus to communicate over the network. Prior to setting up Optimus to sit on your DeviceNet, network. It is assumed that the installer has a good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



Press ENTER to access the DeviceNet setup screens.



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



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

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

Calibration of Optimus

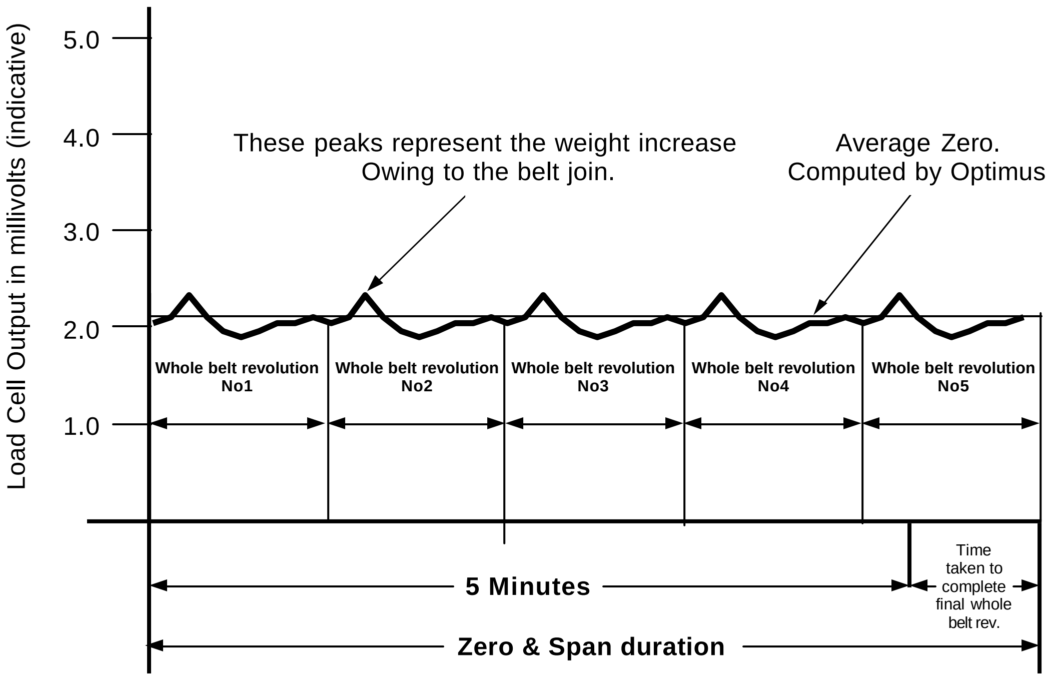
1) Enter the number of belt revolutions that Optimus will perform the "manual zero" & span over.
2) Perform a manual Zero
3) Apply roller Calibration Chain / Static Bar Weight and perform span.
4) On completion Optimus is calibrated.

Theory of Operation/ Steps in the Calibration Procedure.

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

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

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



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

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

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

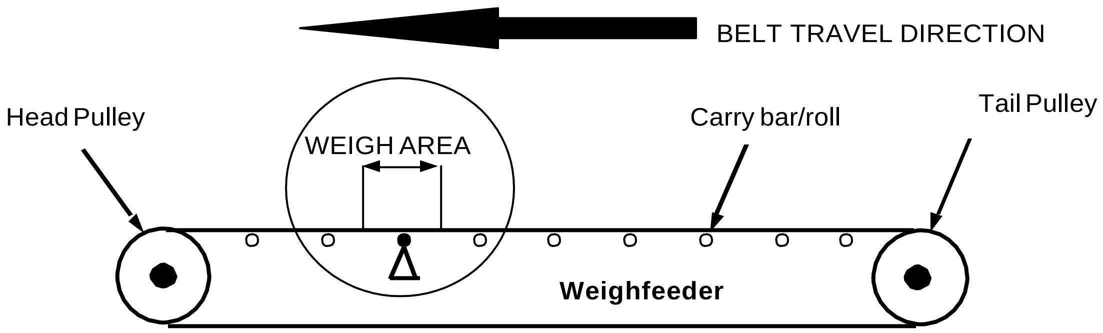
To successfully calibrate Optimus using a calibration roller chain or static weight. A target weight has to be calculated for the feeder. The method of calculating this target weight for both roller chain and static weight are shown below.

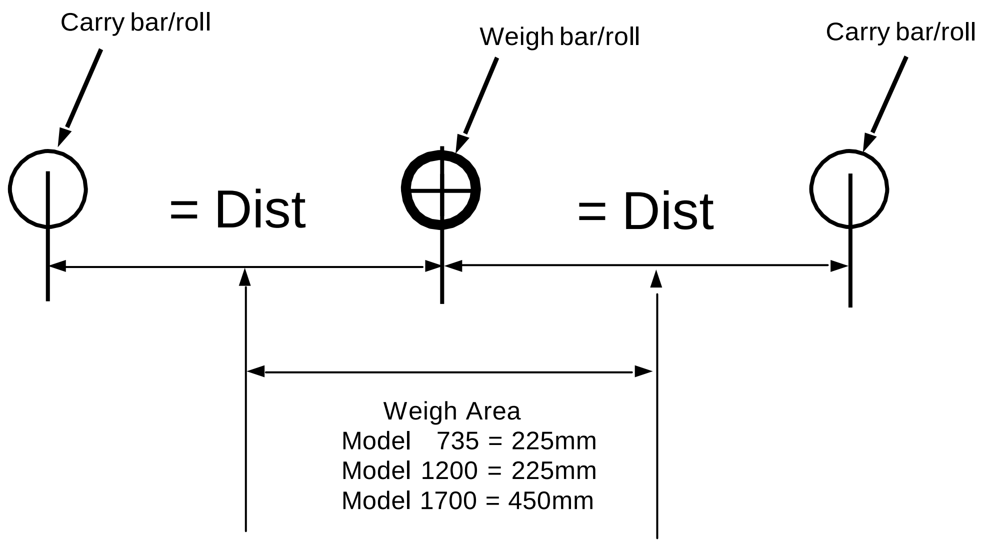
<u>TARGET WEIGHT CALCULATION FOR WEIGHFEEDERS USING CALIBRATION CHAIN.</u>

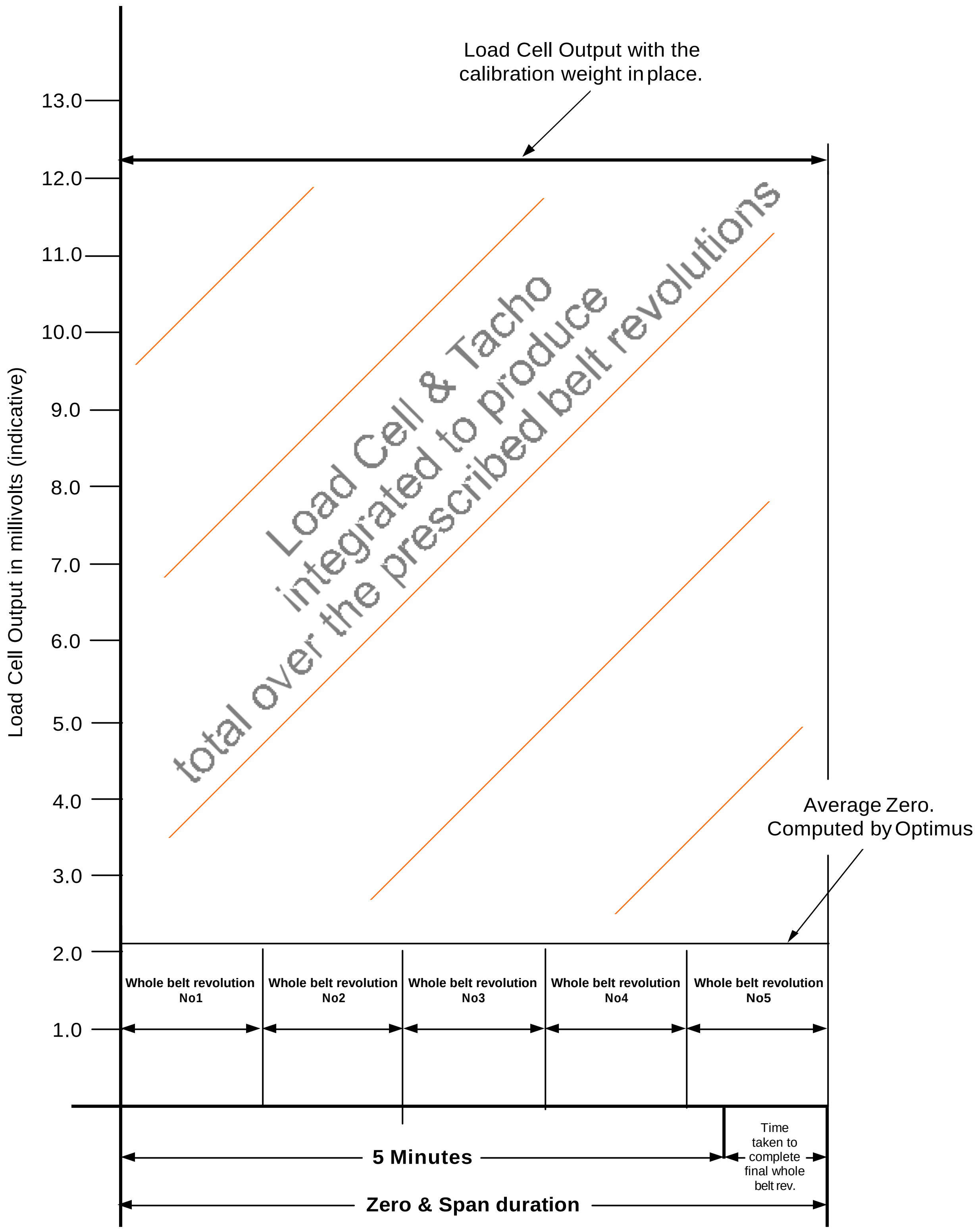
Chain weight (kg/m) X N^o of Belt Revs X Belt length (m)

<u>TARGET WEIGHT CALCULATION FOR WEIGHFEEDERS USING CALIBRATION WEIGHTS.</u>

Weigh area length (m) X weight (kg) X Belt Length (m) X N^o Belt Revolutions

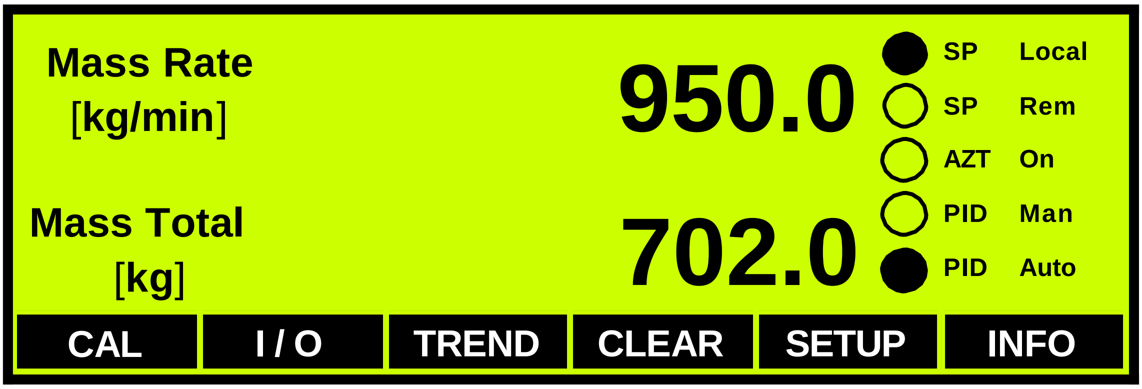




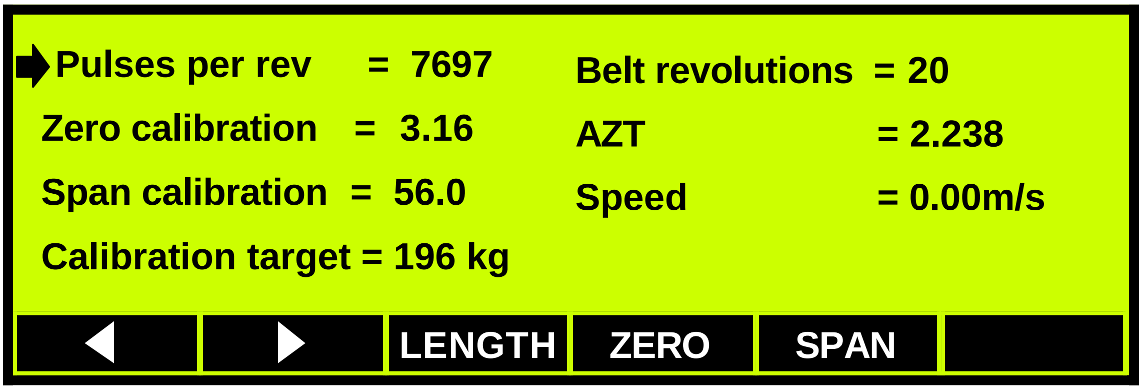


Load Cell Output with the calibration weight in place.
13.0
12.0
11.0
10.0
9.0
8.0
7.0
6.0
5.0
4.0
3.0
2.0
1.0
Load Cell Output in millivolts (indicative)
Load Cell & Tacho integrated to produce total over the prescribed belt revolutions
Average Zero. Computed by Optimus
Whole belt revolution No1
Whole belt revolution No2
Whole belt revolution No3
Whole belt revolution No4
Whole belt revolution No5
5 Minutes
Time taken to complete final whole belt rev.
Zero & Span duration

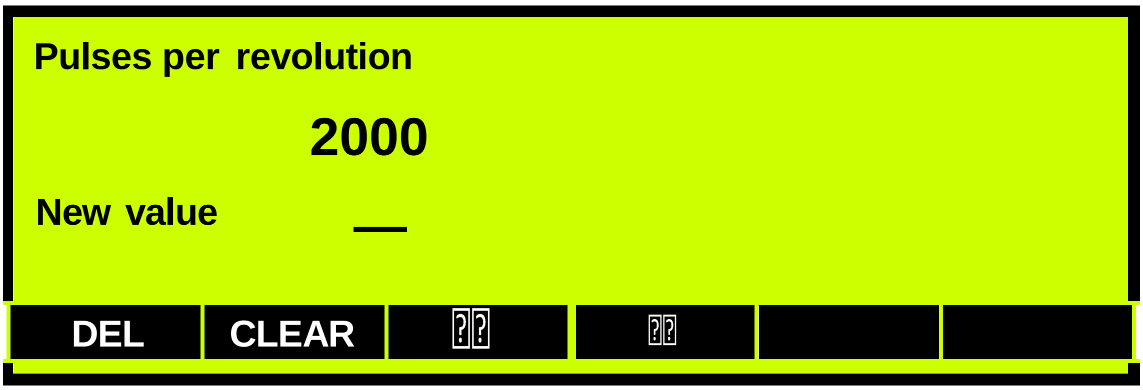
Prior to entering the pulses per revolution and the number of revolutions that the Zero and Span will be working over, (see Steps in the **"Calibration Procedure")** preceding this page and familiarise yourself with the concepts. Optimus provides two methods for acquiring the pulses per revolution. An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



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



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



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

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

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

◀ | ▶ | LENGTH | ZERO | SPAN

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

Number of belt revolutions to average over

20

New value __

DEL | CLEAR

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

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

◀ | ▶ | LENGTH | ZERO | SPAN

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

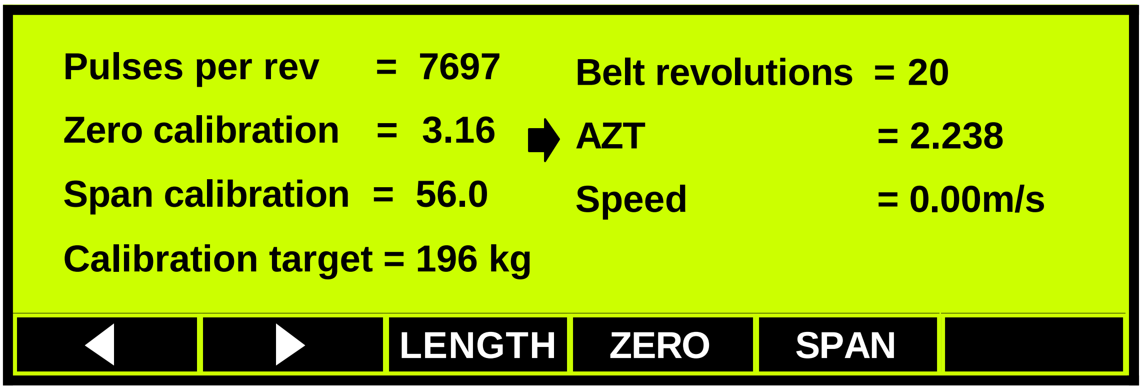
Zero calibration (in mV)

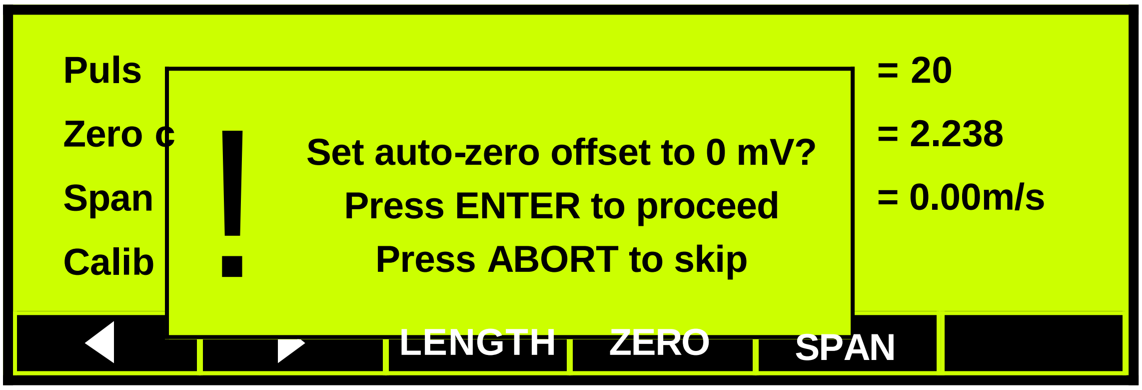
2.283

New value __

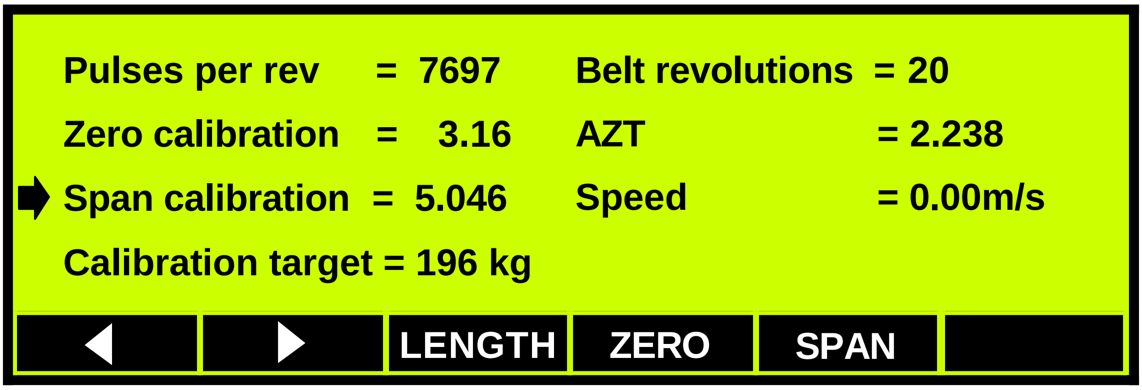
DEL | CLEAR

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





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



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

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

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

◀	▶	LENGTH	ZERO	SPAN	

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

Calibration target (in kg)

Current value **5.046**

New value —

DEL	CLEAR				

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

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

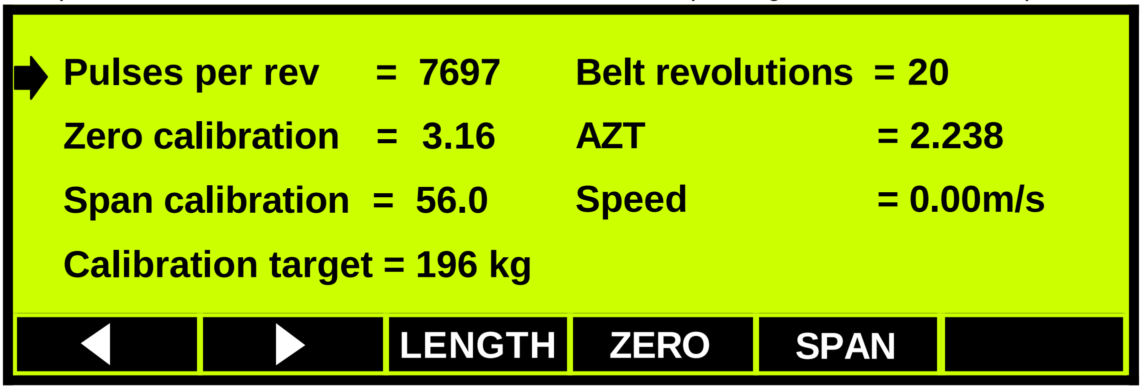
◀	▶	LENGTH	ZERO	SPAN	

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

Automatic Capture of Pulses per Revolution.

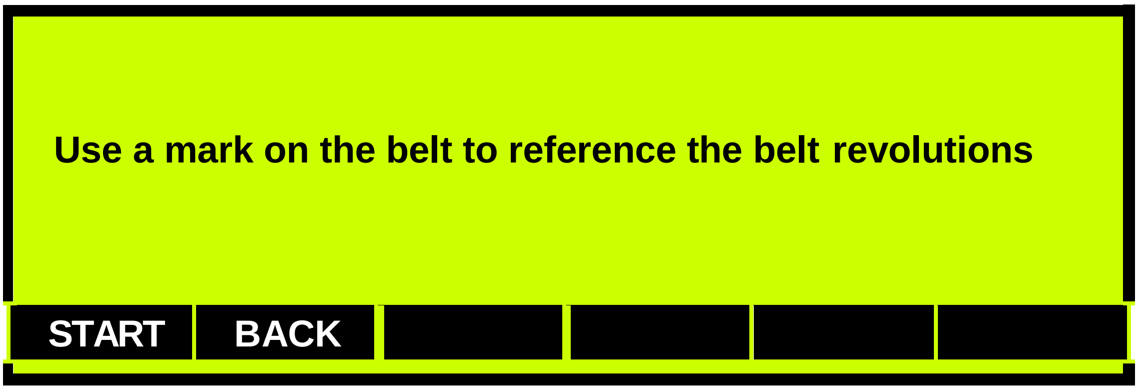
(Note Web-Tech will have done the following prior to delivery)

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

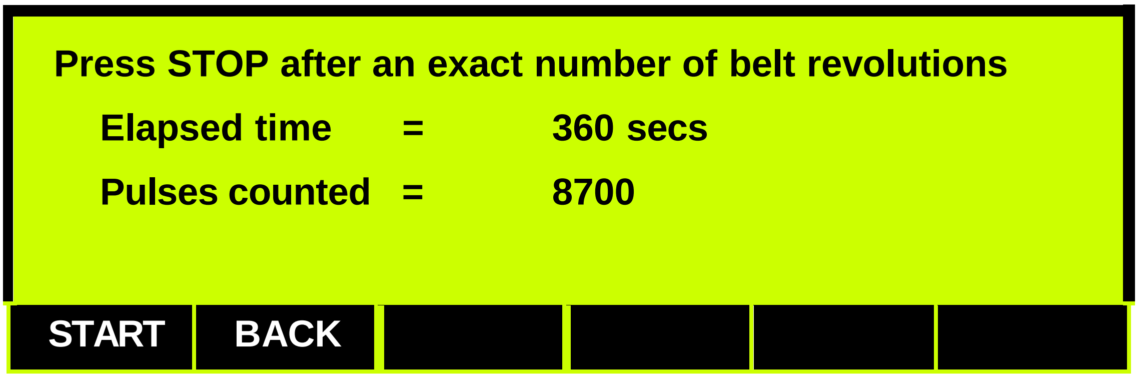


Press the “LENGTH” F3 key to go to the pulse acquisition routine. The screen will change to the one shown below.

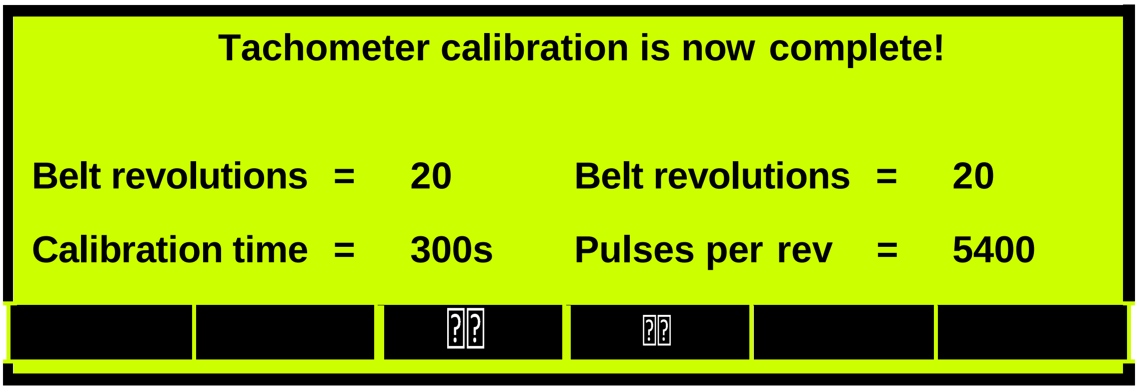
This calibration is carried out with the belt moving. The number of complete belt revolutions over a time period are counted by the operator, and the Optimus counts the pulses returned from the speed sensor device the number or belt revolutions being entered in an other screen. The screen below is a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



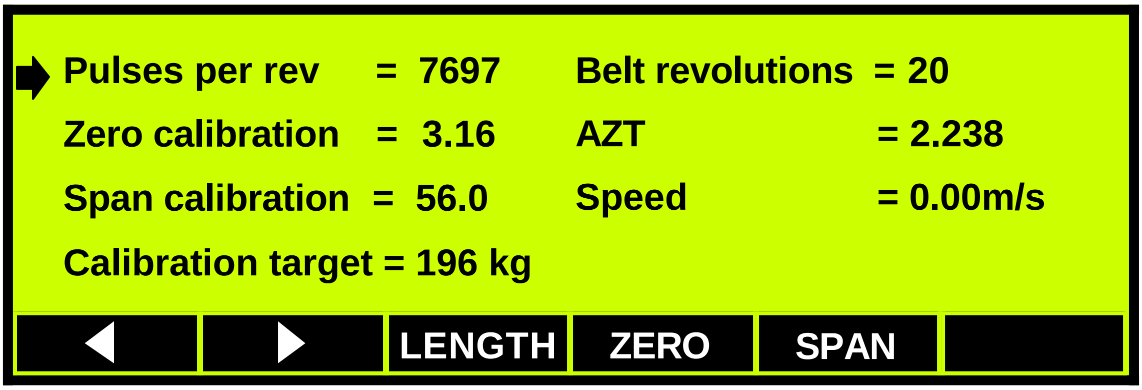
Press the “START” button, the F1 key, when the mark on the belt coincides with the stationary reference point. The display will change to the one shown below and Optimus will be capturing pulses. When the belt has travelled at least 5 belt revolutions with a minimum time of 5 minutes. Stop the count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



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



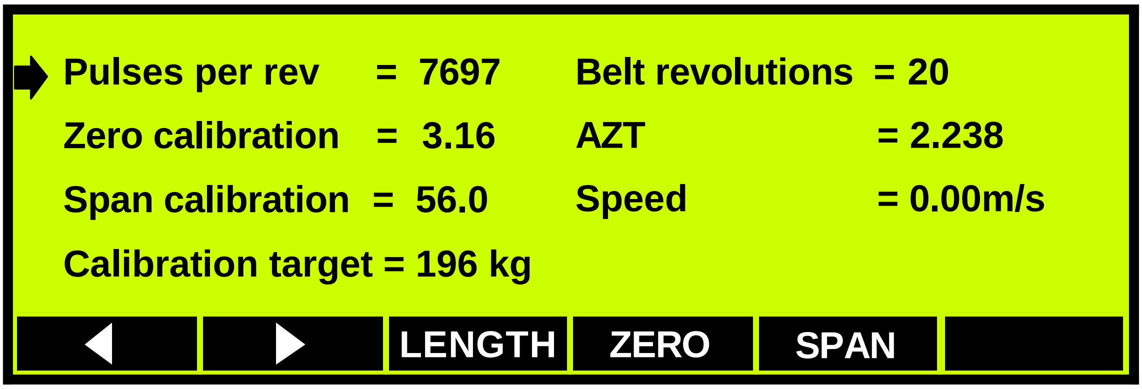
At this point the number of belt revolutions over which Optimus captured the pulses must be entered.
Note Only whole belt revolutions must be used and the exact number of revolutions must be entered. Press the tick key to proceed.



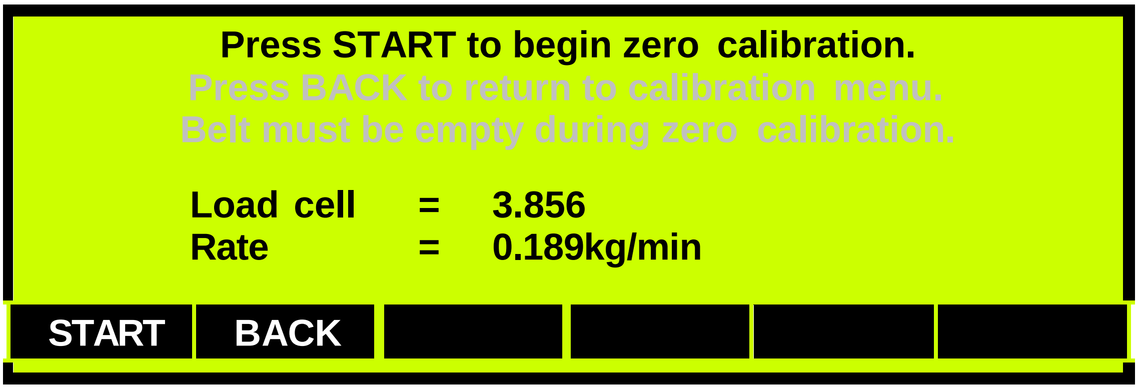
At this point Optimus has the data required in order to perform a "manual zero and span"

Calibration Zero

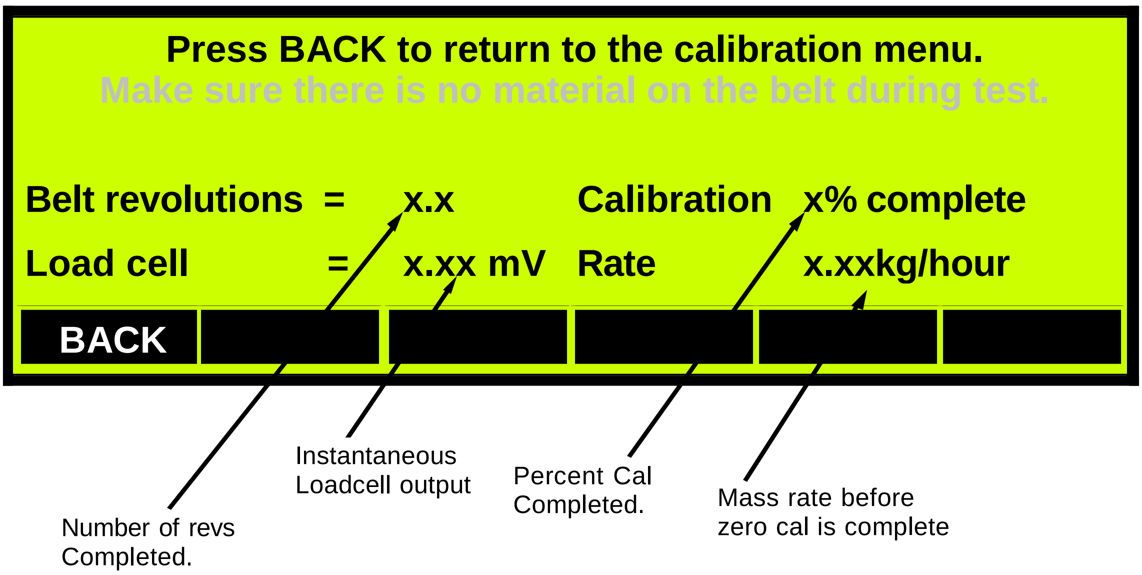
At this point pressing the F4 key located under the “LENGTH”, will take the user to the screen where the weigher can be readied for zeroing.



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

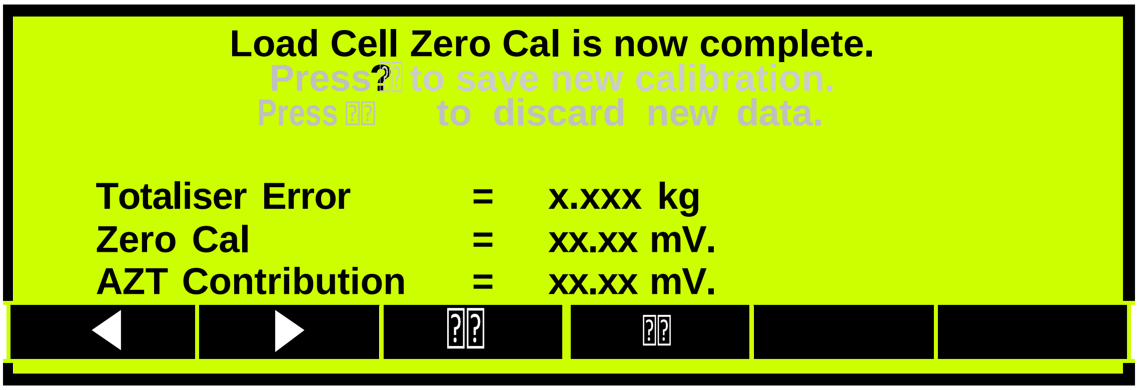


The zero function will not start until the F1 key located under the “START”
The Zero will now be calculated over the number of belt revolutions previously entered.
The Number of belt revolutions performed, the percentage of the test completed , the load cell output and calculated rate is displayed during the test.

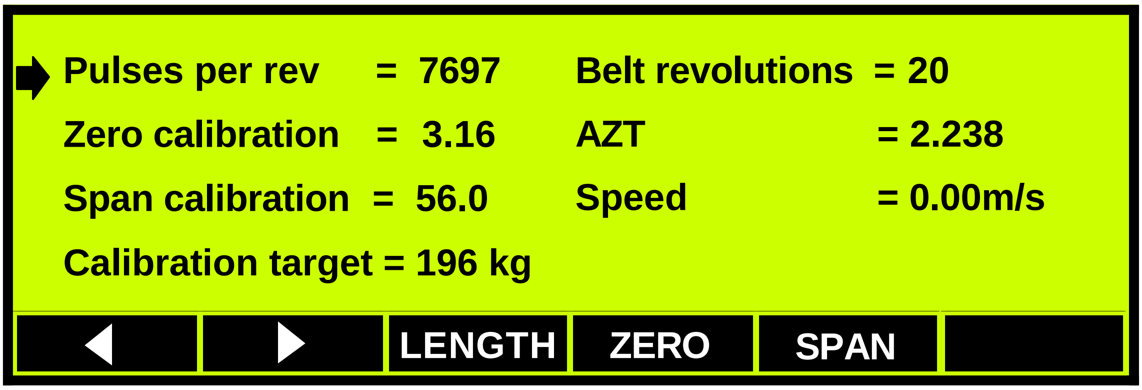


When the test is complete, at the end of the prescribed number of belt revolutions the display will stop updating.

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



CALIBRATION SCREEN.



Calibration / *Span Static Weight Test.*

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

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

◀ | ▶ | LENGTH | ZERO | SPAN |

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

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

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

START | BACK | EMP

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

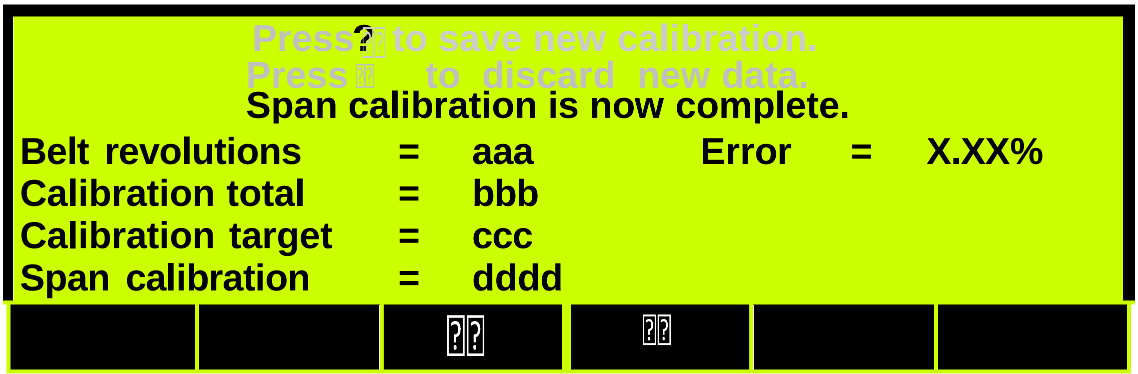
The screen will change to the one shown below.

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

BACK

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

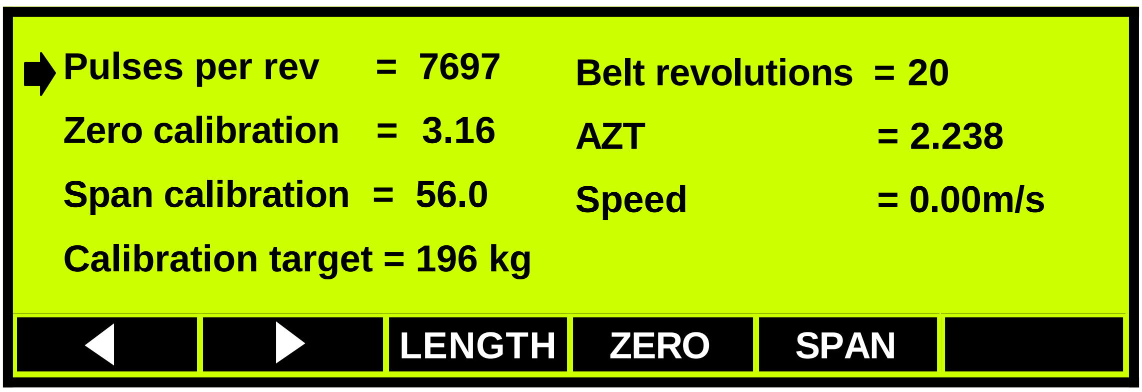
Following the completion of the span test the display will change to that shown below.



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

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

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



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

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

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

START	BACK	EMP			

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

Enter total from an other source then press NEXT
Press PREV to return to previous screen.

Total from other source = xxx.xx kg

PREV	NEXT				

Press the “ENTER” key in the above screen to enter the data input screen.

Total from other source (in Kg)

Current value	ZZZ.ZZ
New value	YYY.YY

DEL	CLEAR				

At this screen enter the weight that passed over the weigher and that was weighed on an accurate static weigher. (bench scale/weigh bridge etc). Press the tick key to proceed. Optimus will return to the screen shown below. Press the F2 “NEXT” key to go to the data entry point. Where the total obtained by Optimus is to be entered.

Enter total from an other source then press NEXT
Press PREV to return to previous screen.

Total from other source = xxx.xx kg

PREV	NEXT				

Press the "ENTER" key to go to the data entry screen where the total obtained by Optimus can be entered.

Enter total from an other source then press NEXT

Press PREV to return to previous screen.

Total from Optimus = xxx.xx kg

PREV	NEXT				

In the screen shown below enter the total obtained by Optimus

Total from Optimus (in Kg)

Current value UU.UU

New value VV.VV

DEL	CLEAR				

Press the tick key to lock in the data and move to the previous screen.

Enter belt scale total then press NEXT

Press PREV to return to previous screen.

Total from Optimus = xxx.xx kg

PREV	NEXT				

At this point a new span needs to be generated. Press the F2 "NEXT" key to generate the new span and move on to the screen shown below.

Empirical span now complete !

Press " " to save new calibration data.

Press " " to discard new calibration data.

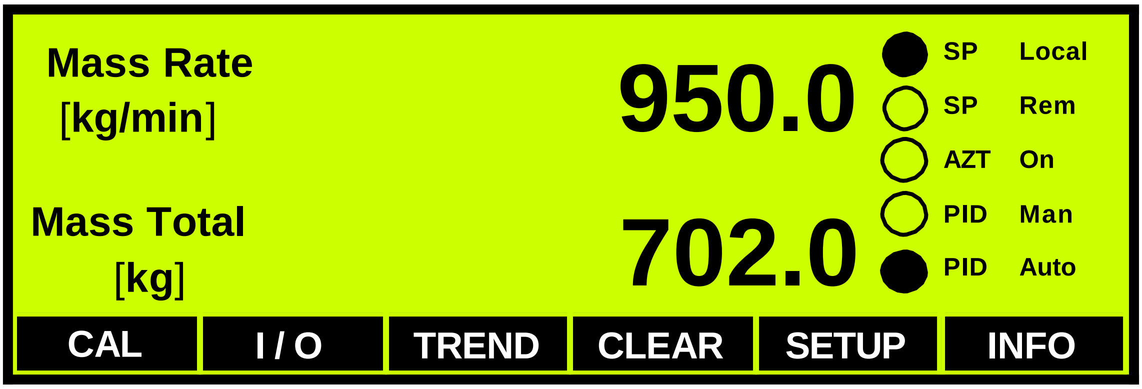
Old span calibration = xx.xxx

New span calibration = yy.yyy

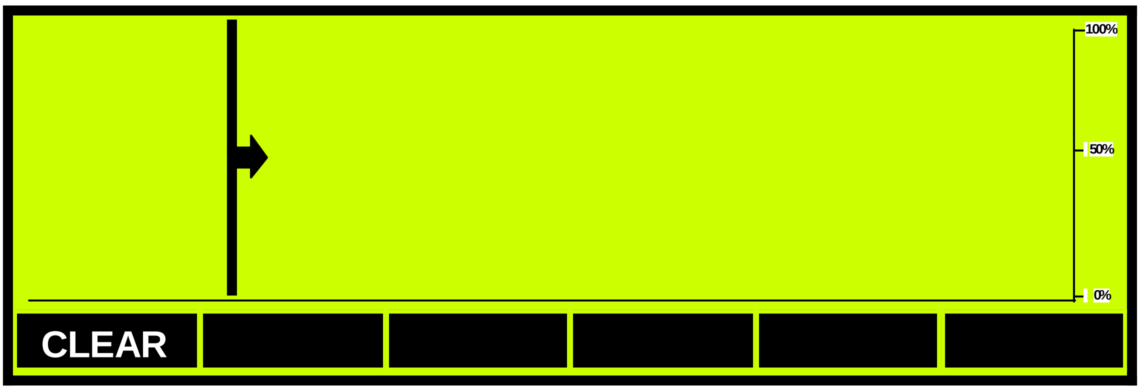
PREV					

The above screen shows the new and old spans and allows for the acceptance or rejection of the data. On pressing the tick key Optimus goes back to the calibration screen. The EMPIRICAL span is now complete. Press the "HOME" key to transfer the data to working memory.

Optimus provides the user with a graphical view of the mass rate for the last two minutes. To view the last two minutes of material flow press the “TREND” (F3) key to access the viewing

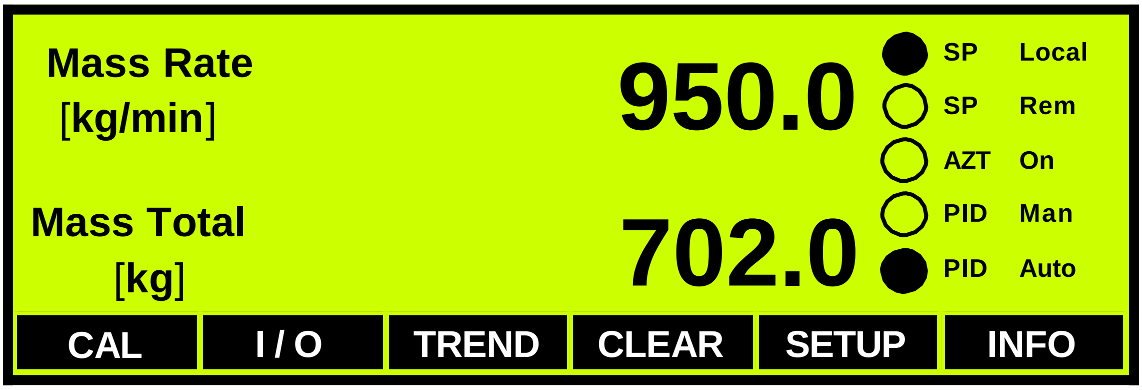


On entering the mass rate trend screen the last two minutes trend can be cleared by pressing the “CLEAR” (F1) key.

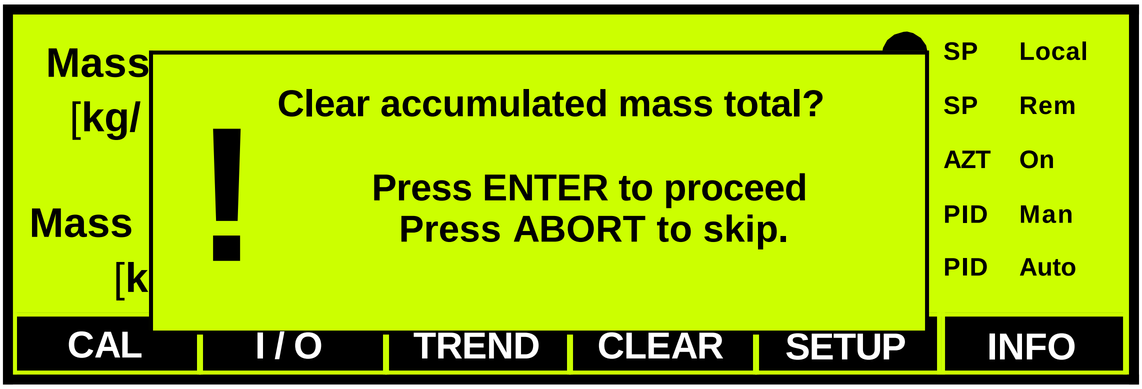


Pressing the “HOME” key will return Optimus to MRMT.

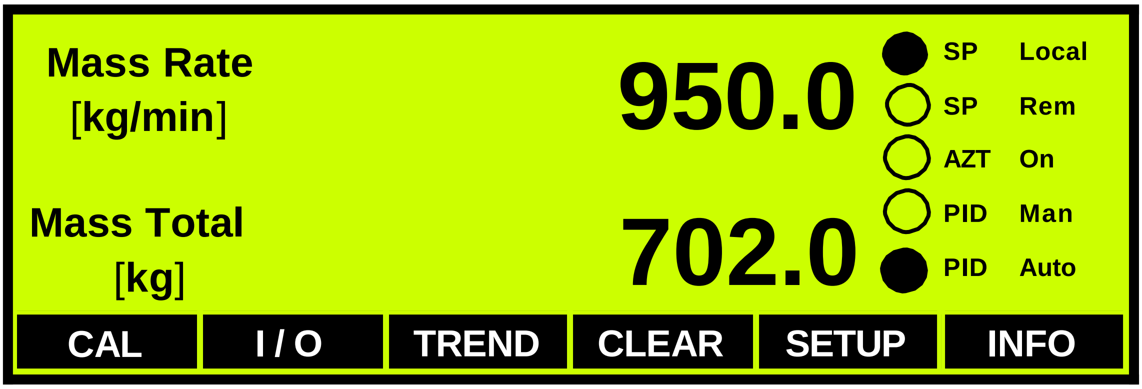
The running total can be reset by pressing the "CLEAR" (F4) key.



Prior to clearing the total Optimus will ask for confirmation, prior to acting on the clear command. Press "ENTER" to continue and clear the total. Or press the "ABORT" key if the total should not be cleared.

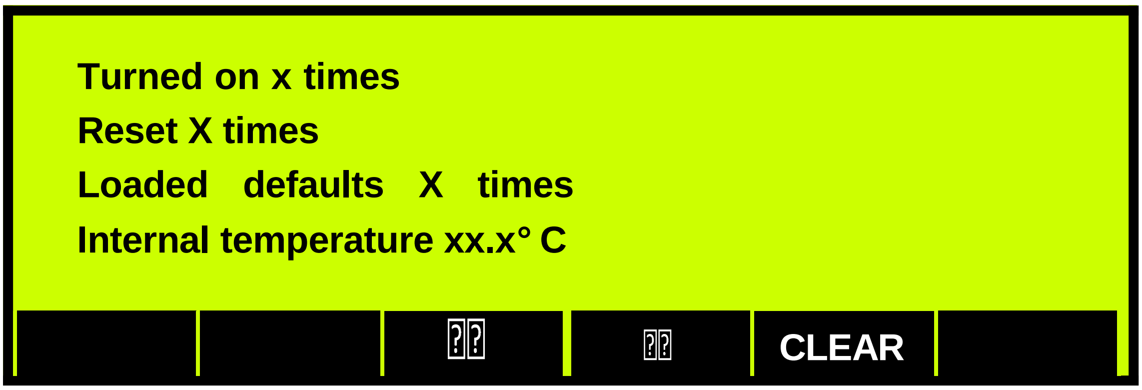


The Optimus firmware (operating software) is under constant review. As the firmware is upgraded it's build number is updated along with the date that it was completed. It may be necessary to view this data from time to time. Press the "INFO" (F6) key to access the information screen.



The screen bellow shows that the firmware release number was 125, dated 21 September 2003

Pressing the "RESET" (F1) from this screen will bring up the following screen. This screen displays the number of times Optimus has had the power removed since the data was last cleared. This is a useful tool if a faulty power supply (mains power) is suspected.
The reset display the number of times the reset button on the main CPU pcb has been activated. Generally this button is used if the Optimus firmware has locked up, owing to a noise spike or other severe transients. Pressing the reset will restart the firmware and increment this counter.
If a "flash memory" card has been purchased and the firmware requires upgrading. The default variables that were established during the calibration and setup can be stored in the flash card and uploaded following the successful firmware upgrade.

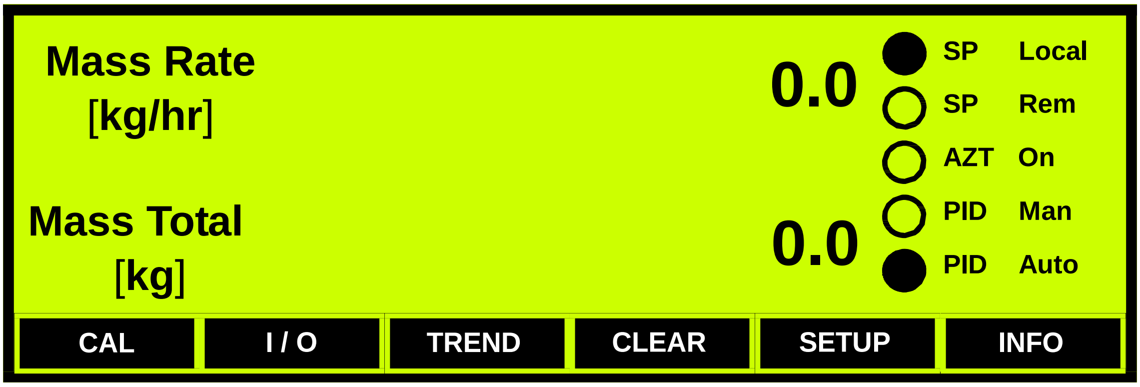


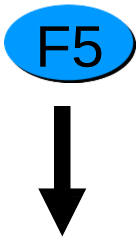
The internal temperature is not the ambient air temperature in the cabinet. It is the temperature at the core of the Central Processing Unit (CPU) / computer. The absolute max temp for this device is 55°C. Do not exceed this temperature. Move the enclosure to a cooler environment.

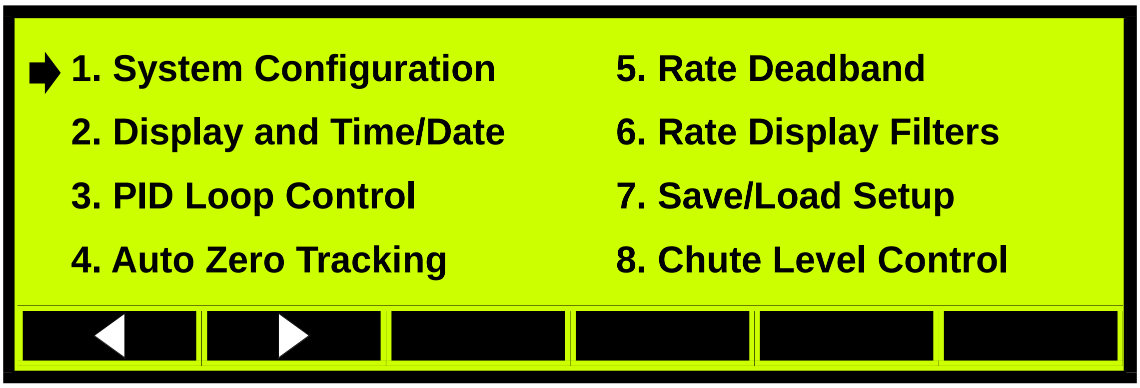
Inlet Boot Hopper Setup

The following steps will ensure you have setup the Inlet boot hopper correctly

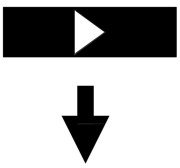
Following power up, Press SETUP (F5) key .The display will change to that shown below. The first entry to this portion of the menu structure will bring up the following screen. If no password has been selected, or the electronics is new, pressing the "ENTER" key will return the operator to MRMT screen where a subsequent entry to the Set Up menu will allow the user without a password to enter the menu structure.



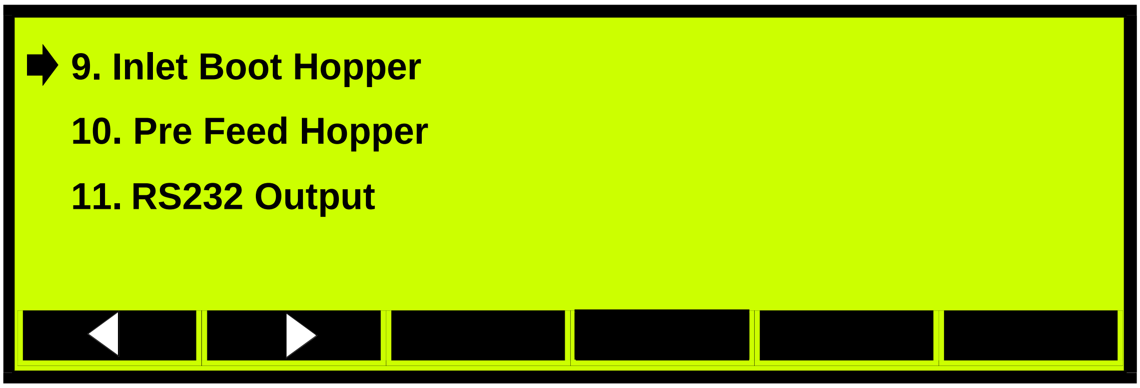


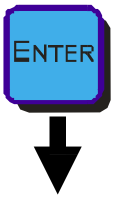


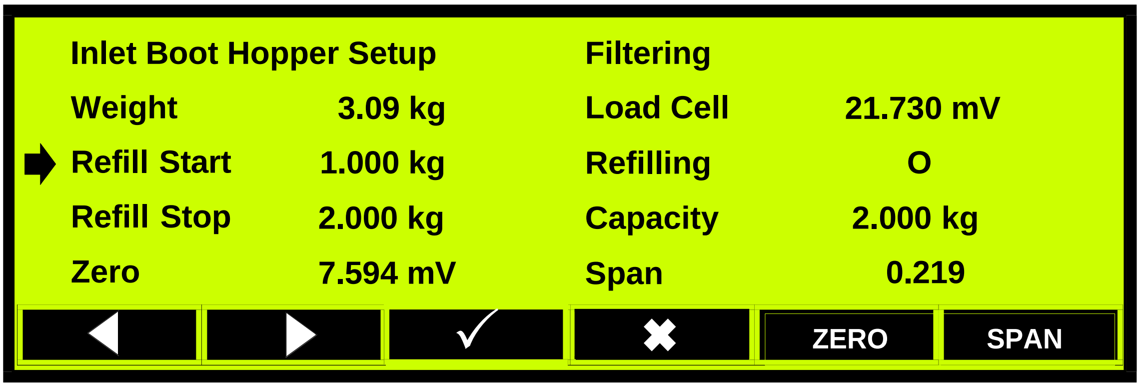
Use the **F1 / F2** keys to advance the curser to "**9 Inlet Boot Hopper**. Press the "ENTER" key to gain access.



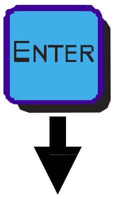
Inlet Boot Hopper Setup

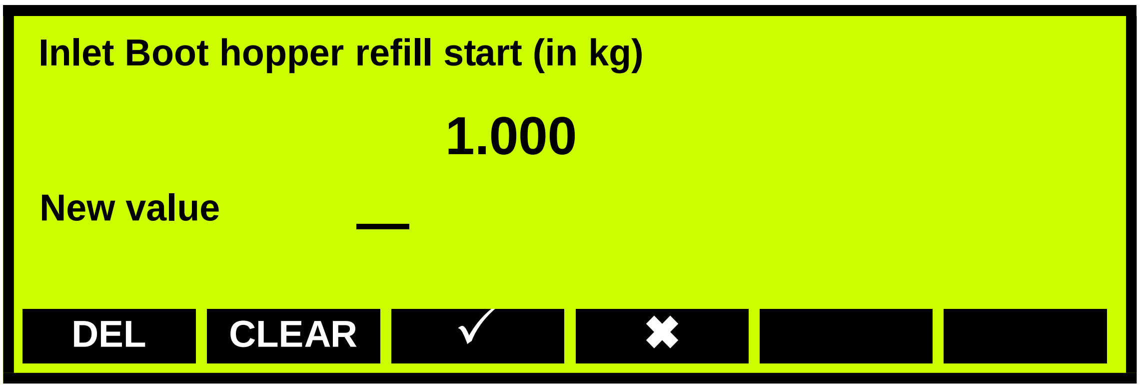




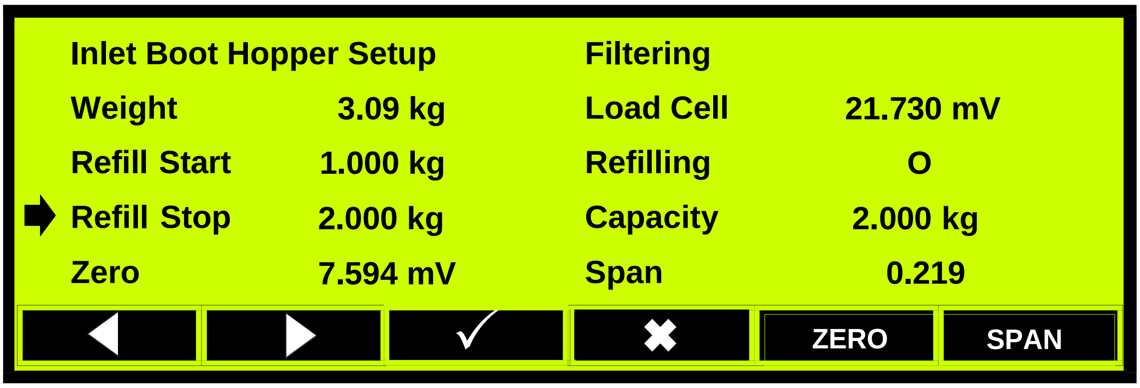


Use the **F1 / F2** keys to advance the curser to “Refill Start Press the “ENTER” key to gain access.

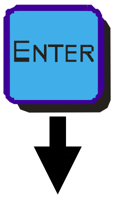


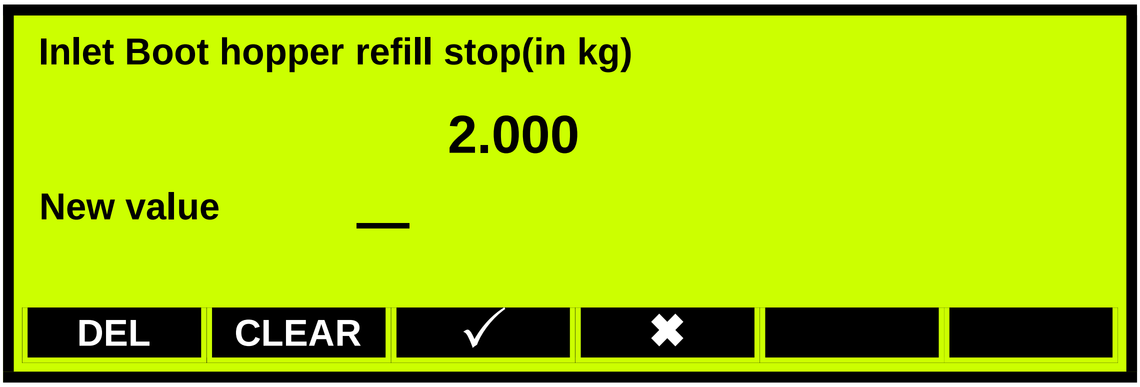


The Refill start value is the minimum value of material left in the inlet boot to sustain good flow behind the shear gate. Using the keypad the value can be changed Press  The value will change from application to application.



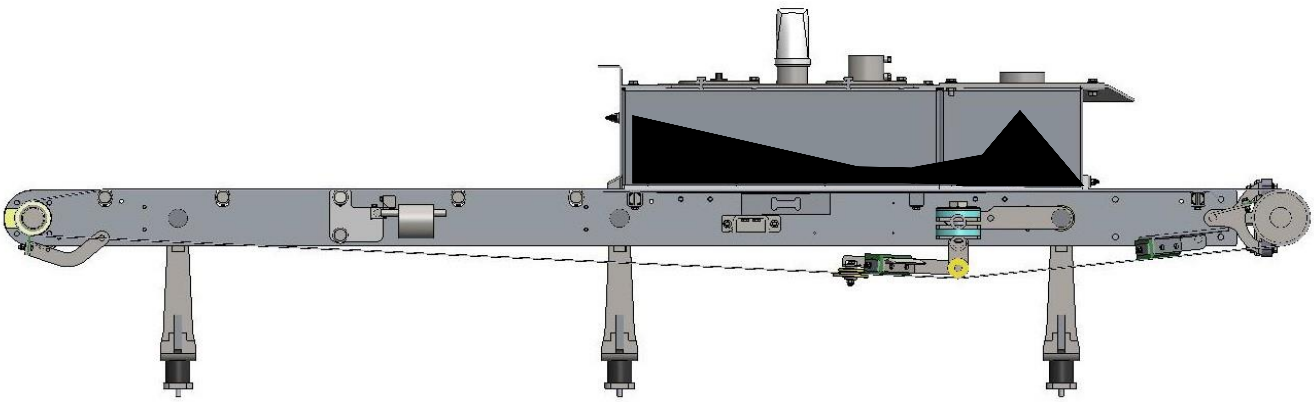
Use the **F1 / F2** keys to advance the curser to "Refill Stop. Press the "ENTER" key to gain access.





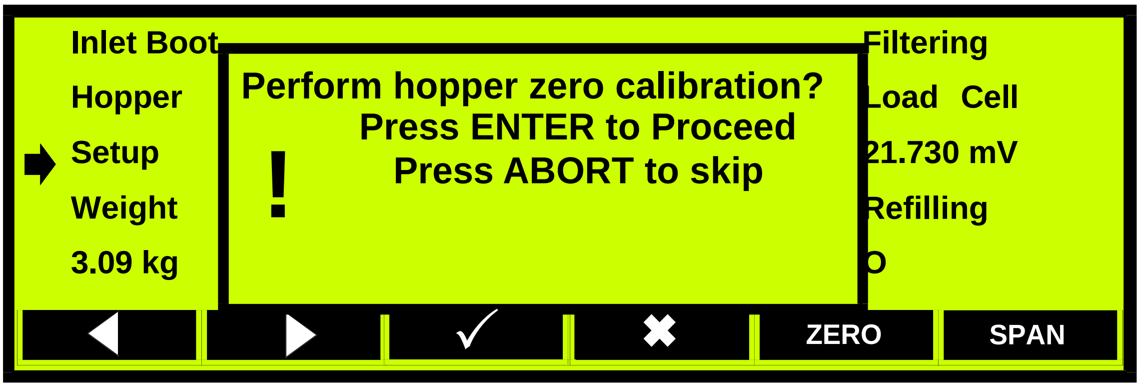
The Refill stop value is the maximum value of material left in the inlet boot to sustain good flow behind the shear gate. Using the keypad the value can be changed Press 
The value will change from application to application.

The material silhouette below shows a typical feed scenario.



Inlet Boot Hopper ZERO

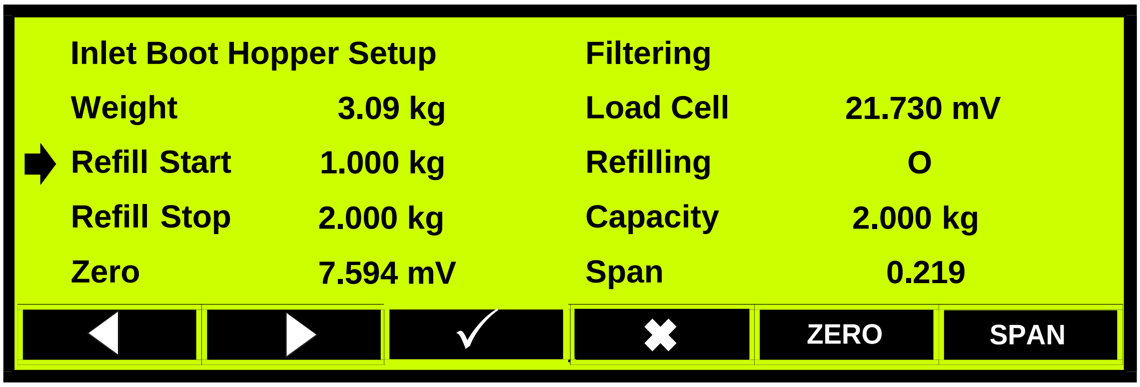
Before running a zero calibration ensure that the inlet boot hopper is empty and the calibration weight is removed.



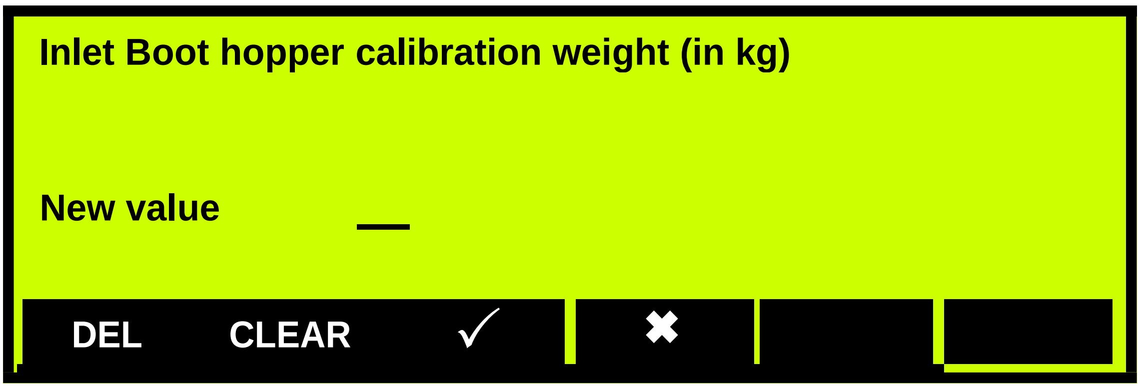
To run a zero calibration on the inlet boot hopper. Firstly depress the zero key
Press ENTER when all weights are removed or ABORT to skip
The 'Zero' mV value will update in the left column.

Inlet Boot Hopper SPAN

Before running a span calibration ensure you have a weight approx 75% of the total hopper capacity.



To run a SPAN calibration on the inlet boot hopper. Firstly depress the SPAN key

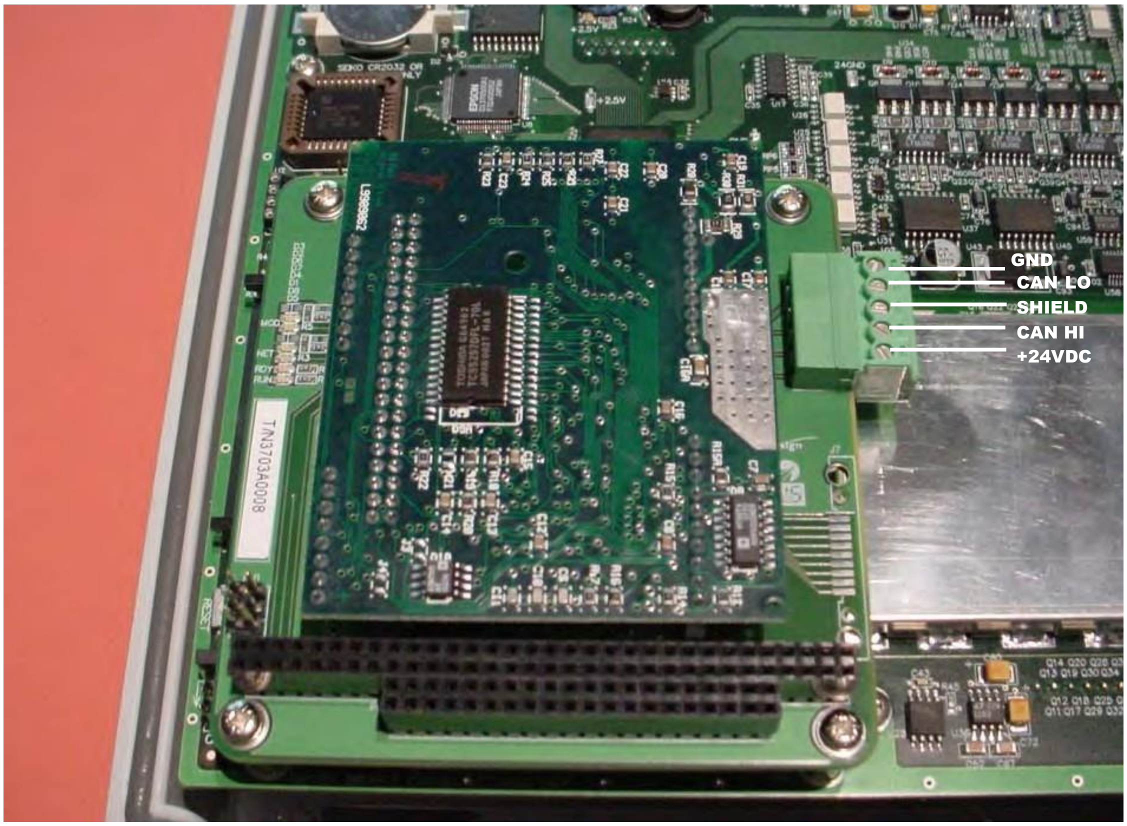


Place the calibration weight between the two arrows marked on the inlet boot.

Enter the weight of the calibration weight and press ENTER

To install a PC/104 DeviceNet card in Optimus

1. Install the DeviceNet module on the PC/104 stack. Use the four M3x6mm screws and washers provided to hold the card firmly on the stack.



2. Wire the 5-pin plug to the DeviceNet cable as shown.

3. You must ensure that 120Ω 0.5W termination resistors are installed between CAN HI and CAN LO at the two ends of the DeviceNet network. If the Optimus is the last device on the network, install the termination resistor directly into the plug.

4. Configure the DeviceNet MAC-ID and baud rate by entering screen 22 from the SETUP menu.

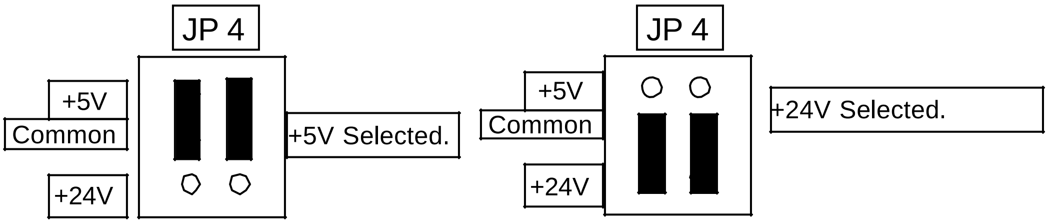
   a. The MAC-ID can be set to any number between 1 and 63. Each device on the DeviceNet network must be assigned a unique MAC-ID.

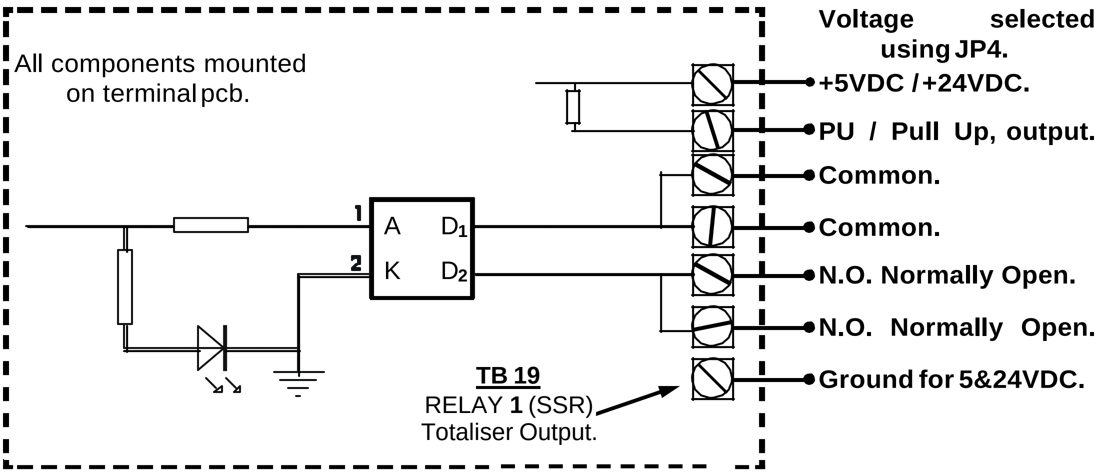
   b. The baud rate may be set to a speed of 125kHz, 250kHz or 500kHz. All devices on the DeviceNet network must be configured to used the same baud rate; the baud rate chosen will depend on cable length and quality.

   If you change either the MAC-ID or baud rate, *you must press the CONFIG button* in order to write your changes to the Optimus DeviceNet module. Pressing TICK or HOME will not save these settings. Once configured, the settings will be retained between powerups.

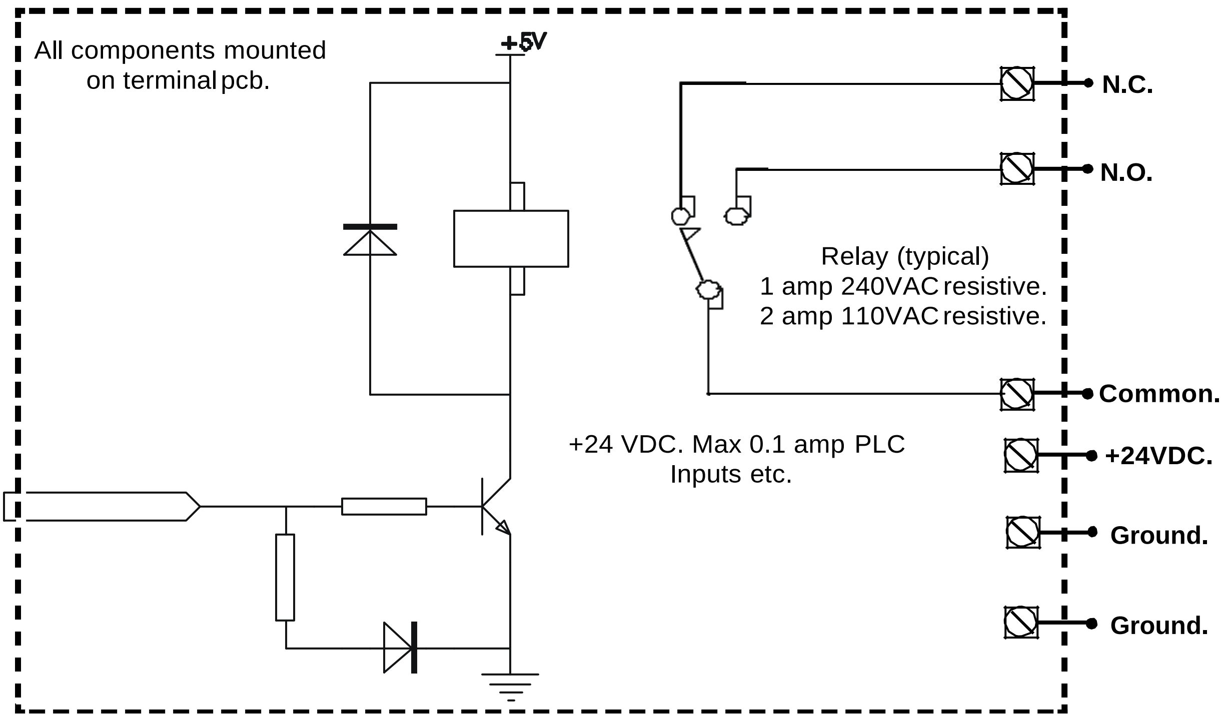
OPTIMUS OPERATIONAL MANUAL.
Electrical / Electronic Notes/ *digital outputs.*

SSR Relay.
The Solid State Relay (SSR) is permanently assigned to the "Totaliser" output. The relay can be physically configured to output +5VDC / +24VDC. The voltage is selected by means of jumpers located at the bottom right hand corner of the "Terminal pcb (JP4) . The use of a solid state relay provides for high frequency counts. However consideration should be given to the receivers ability to handle high frequency counts.



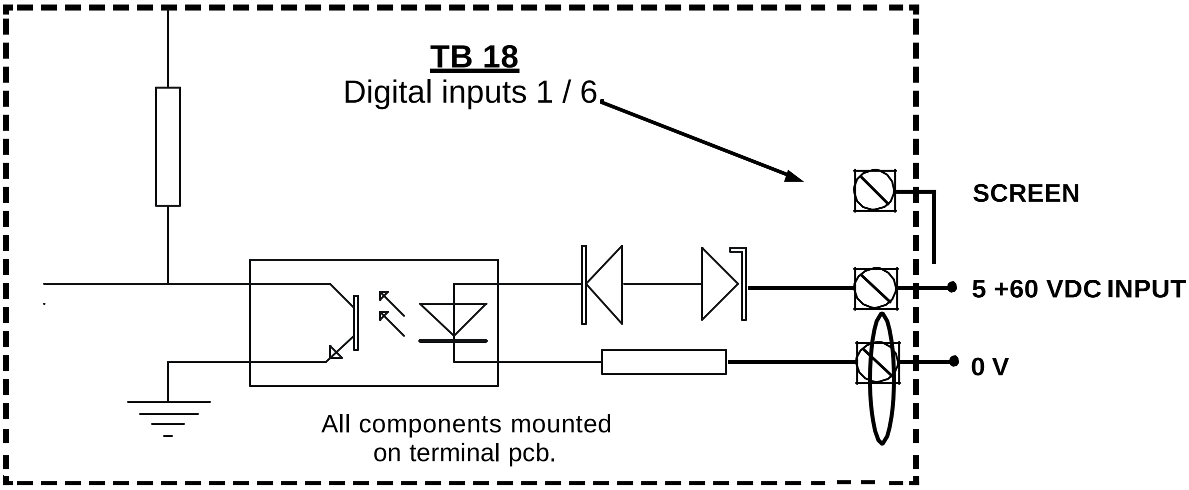


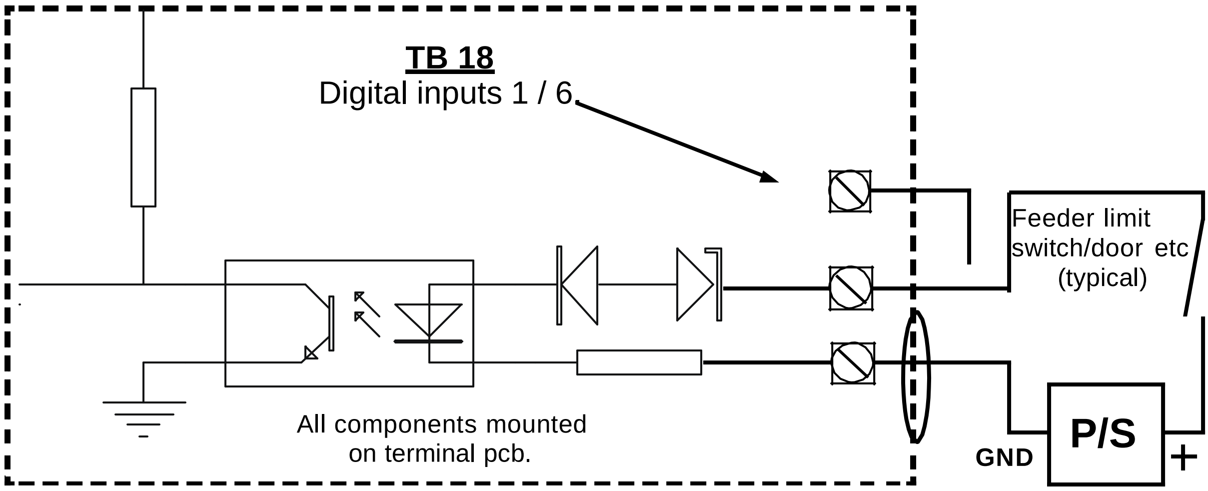
Electro-mechanical Relays. (RLY2 - 5)
Relays 2-6 are assigned via the keyboard (I/O / 4 Digital Outputs). When active the local red LED will illuminated.
The relays can be used as "clean contacts" or supplied with on board +24VDC. Link between +24V and COM. The return is to be terminated on GND.



Digital Inputs.
Optimus has 6 general purpose digital inputs. They can be assigned to a range of pre– assigned labels ((I/O) 3-Digital inputs). There electrical status can also be observed there also. The applied voltage should not exceed 60VDC and the minimum switching voltage is 5 VDC. These inputs are generally used for monitoring the status of the feeder.

The basic circuit along with an example of a typical connection is shown below.





- +5 - 48 VDC
  Optimus 24VDC
- Is available

SECTION 6 - CALIBRATION

The weighfeeder has been programmed and calibrated at the factory. However, due to changes that may have occurred during transit and installation, the weighfeeder calibration should be checked. The calibrations once initiated are automatic and only require the pressing of acceptance key(s).

The two basic calibration steps are the “Zero” calibration and the “Span” calibration.

Zero Calibration

The zero calibration is established by running the weighfeeder empty of a programmed number of belt revolutions and calculating the average load cell output during this period. The weighfeeder electronics will automatically calculate the zero value when the test has been initiated and completed. Refer to the electronics manual supplied with your WT1200 (Masterweigh 1/Masterweigh 5 or Optimus) for the section called “Load Zero Calibration” for the procedure. The weighfeeder must be able to be run empty during this test, and the number of belt revolutions programmed for its duration can be found on the calibration sheets at the end of this manual.

Span Calibration

The span calibration is generally carried out on a model WT1200 weighfeeder with the use of calibration “chains”. The calibration chain consists of one or more strands of roller chain attached to a restraining bracket. The size of the chain and number of strands has been calculated by us to simulate approximately 75% of the maximum capacity. The calibration chain is placed on the belt and attached to the inlet chute (or rear wall for horseshoe inlet). The weighfeeder is run and the test is carried out over the same number of belt revolutions as the zero test.
The result is compared to a value (Target Weight) calculated by us at the time of factory commissioning. The procedure for carrying out the test can be found in the “Fixed Weight Calibrate” menu of the electronics manual.
The “Target Weight” can be found on the calibration sheets in this manual.

Material Test

We strongly suggest that a material test be carried out where possible. A material test involves weighing product on an accurate static scale prior to, or after it has passed over the weighfeeder. When carrying out a material test, the following should be considered:

1. The amount of material required for the test(s) must be proportional to the weighfeeder capacity. A rule of thumb quantity would be a minimum of 3 minutes of running time at maximum capacity e.g. if the capacity is 10 tph, the amount of material would be 10 0000 kg/60 x 3 = 500 kg. A smaller amount could be used, however it must be understood that the accuracy achievable may be diminished due to the resolution used.
2. It must be guaranteed that all of the material used in the test is collected, or have passed over the weighfeeder.
3. The material feed over the weighfeeder must be continuous and consistent.

When the test(s) have been carried out any correction to the calibration can be carried out in the “Emperical Calibration” menu of the electronics (refer to the electronics manual section).

Any changes to the calibration should be recorded on the calibration sheets for future reference