Web-Tech Australia Pty Ltd

Model WT1200 (2000) Weighfeeder
With Optimus Integrator and Level Probes

Installation, Operation & Maintenance Manual

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SECTION 1 - INTRODUCTION

The Web-Tech model 1200 weighfeeders consist of a range of light to medium duty weighfeeders capable of handling various products. The model number extension eg. “300” denotes the belt width. Therefore a 1200-300 is a model 1200 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 1200mm.

The model WT1200 is available in either “open” or “enclosed” construction. Apart from the enclosure, the mechanical aspects are the same for both types. For open construction models, the weighfeeder may be supplied with an inlet chute with flange connection, or, with a “horseshoe” type inlet which consists of side and rear skirts. Enclosed construction models are supplied with internal inlet chutes. 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.

The weighfeeder dimensional layout and capacity have been determined by information supplied to Web-Tech at the product enquiry stage. Some 1200 weighfeeders may change in overall dimensions and/or supply of ancillaries to suit the operational requirements. Should your weighfeeder 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 weighfeeder 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.

Extended Models

The model WT1200 is also available in an extended length version. This model has inlet to discharge centres of 2000 mm and is designed to be used with materials that are difficult to handle. The extended version incorporates an extended inlet section fitted with three (3) level probes. The function of the level probes is to maintain a consistent level of material behind the inlet chute sheargate, regardless of the weighfeeder belt speed. It achieves this by increasing or decreasing the weighfeeder prefeeder speed, depending on which level probes are covered. A separate output is provided by the Optimus electronics to control the prefeeder speed.

The level probe(s) sensitivity must be adjusted to suit the material being conveyed, and the prefeeder output parameters adjusted to suit the response time of the prefeeder. The Optimus programming allows a setpoint (%) to be programmed for each level probe. For example, if the low level probe is the only probe “on”, the weighfeeder requires more material feed. A typical programmed value for the low level is 300%, which means that the prefeeder speeds up to provide three (3) times the weighfeeder setpoint requirement. This allows the material feed to catch up with the weighfeeder requirements. The high level probe is typically programmed for 50%, which means the material supply is reduced to half of the weighfeeder setpoint requirements when it is turned on. The combination of all three level probes continuously maintains the correct material level behind the sheargate.

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

SECTION 2 – DELIVERY & UNPACKING

Your weighfeeder has been crated for protection during transit. The weighfeeder electronics is 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.

The basic components are:

- Assembled weighfeeder c/w gearmotor, load cell(s) and belt speed sensor.
- Masterweigh/Optimus electronics.
- Calibration chain/weights.

Optional:

- Variable Speed Controller.
- Remote Instruments.
- Spare Parts.

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

Web-Tech Australia Pty Ltd
Ph: 61 7 3841 2844
Fax: 61 7 3841 0005
Email: webtech@bigpond.com

UNPACKING

1. Carefully open the crate.
2. The weighfeeder is held in place by bolts in the mounting feet.
3. Remove the bolts and lift the weighfeeder clear of the crate using web slings – **NOT CHAINS**.
4. Ensure no parts have come loose during transit.
5. Carefully transport the weighfeeder 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.
8. Proceed to Mechanical and Electrical installation sections.

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

SECTION 3 – MECHANICAL INSTALLATION

Refer to the general arrangement drawing at the rear of the manual.

OPEN CONSTRUCTION WITH INLET CHUTE MODEL

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

1. For high vibration areas the weighfeeder will be supplied with isolation blocks (loose supply). Locate these blocks and bolt them to the weighfeeder support feet.
2. Cover the weighfeeder if any metal cutting is to be performed. If any welding is to be carried out, remove the load cell from the weighfeeder.
3. 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.
4. 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 $\pm 1^0$.
5. 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 and variation in gap that may exist between the two flanges.
6. Carefully tighten the flange bolts so that the gasket is compressed and the gap is completely closed. **DO NOT OVERTIGHTEN THE CONNECTION BOLTS SO THAT THE FLANGE IS BENT**.
7. 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.
8. Locate and remove the gravity take-up transit bolt. The transit bolt head will have been painted red for easy identification. Refer to drawing "WT1200-021" for location. Carefully lower the gravity take-up roll down onto the return belt.
9. Refer to drawing "WT1200-031". This drawing will show that the load cell is fitted with an overload bolt. On belt widths up to 750mm, one load cell is used. On wider belt widths, two load cells are used (one per side). These bolts have been factory set and should not be altered. One each of these bolts there is a red transit nut. During transit, these nuts should be tightened upwards against the bottom of the load cell. Before operation these nuts should be lowered to the bottom of the overload bolts as shown on the drawing. **MAKE SURE THAT THE OVERLOAD BOLTS ARE NOT MOVED WHEN ADJUSTING THE TRANSIT NUTS.**
10. Before placing into operation, the alignment of the weigh bar should be checked. Referring to drawing "WT1200-031", 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 with respect to the approach and retreat bars to a tolerance of +0.25mm/-0.00mm. If the weigh bar requires adjustment, remove the plastic plug in the end of the weigh bar and adjust the grub screw. When finished replace the plastic plugs.
11. The mechanical installation is now complete; proceed to the electrical installation section.

OPEN CONSTRUCTION WITH "HORSESHOE" INLET MODEL

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

SECTION 3 – MECHANICAL INSTALLATION

1. For high vibration areas the weighfeeder will be supplied with isolation blocks (loose supply). Locate these blocks and bolt them to the weighfeeder support feet.
2. Cover the weighfeeder if any metal cutting is to be performed. If any welding is to be carried out, remove the load cell from the weighfeeder.
3. 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.
4. 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 $\pm 1^0$.
5. The use of the "horseshoe" style inlet allows for a chute, metering tube or a pre-feeder such as a vibratory feeder to be used. If using a chute or metering tube, ensure that the bottom of the chute/metering tube does not interfere with the belt.
6. If the bottom of the chute/metering tube is fitted with skirts, ensure that excessive load is not placed on the belt. The skirts should just be in contact with the belt.
7. If the weighfeeder is to be supplied with a pre-feeding device such as a vibratory feeder, ensure that material is not deposited too far along the weighfeeder so that it is deposited on the weigh area (refer to the drawing for location of the product limits).
8. Locate and remove the gravity take-up transit bolt. The transit bolt head will have been painted red for easy identification. Refer to drawing "WT1200-021" or location. Carefully lower the gravity take-up roll down onto the return belt.
9. Refer to drawing "WT1200-031". This drawing will show that the load cell is fitted with an overload bolt. On belt widths up to 750mm, one load cell is used. On wider belt widths, two load cells are used (one per side). These bolts have been factory set and should not be altered. One each of these bolts there is a red transit nut. During transit, these nuts should be tightened upwards against the bottom of the load cell. Before operation these nuts should be lowered to the bottom of the overload bolts as shown on the drawing. **MAKE SURE THAT THE OVERLOAD BOLTS ARE NOT MOVED WHEN ADJUSTING THE TRANSIT NUTS.**
10. Before placing into operation, the alignment of the weigh bar should be checked. Referring to drawing "WT1200-031", 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 with respect to the approach and retreat bars to a tolerance of +0.25mm/-0.00mm. If the weigh bar requires adjustment, remove the plastic plug in the end of the weigh bar and adjust the grub screw. When finished replace the plastic plugs.
11. The mechanical installation is now complete; proceed to the electrical installation section.

ENCLOSED CONSTRUCTION MODEL

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.

1. For high vibration areas the weighfeeder will be supplied with isolation blocks (loose supply). Locate these blocks and bolt them to the weighfeeder support feet.
2. Cover the weighfeeder if any metal cutting is to be performed. If any welding is to be carried out, remove the load cell from the weighfeeder.
3. Remove the side covers from the weighfeeder.
4. 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.
5. 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 $\pm 1^0$.

6. 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 and variation in gap that may exist between the two flanges.
7. Carefully tighten the flange bolts so that the gasket is compressed and the gap is completely closed. **DO NOT OVERTIGHTEN THE CONNECTION BOLTS SO THAT THE FLANGE IS BENT**.
8. 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.
9. Connect the outlet of the weighfeeder using the same method i.e. use a flexible gasket.
10. Locate and remove the gravity take-up transit bolt. The transit bolt head will have been painted red for easy identification. Refer to drawing "WT1200-021" or location. Carefully lower the gravity take-up roll down onto the return belt.
11. Refer to drawing "WT1200-031". This drawing will show that the load cell is fitted with an overload bolt. On belt widths up to 750mm, one load cell is used. On wider belt widths, two load cells are used (one per side). These bolts have been factory set and should not be altered. One each of these bolts there is a red transit nut. During transit, these nuts should be tightened upwards against the bottom of the load cell. Before operation these nuts should be lowered to the bottom of the overload bolts as shown on the drawing. **MAKE SURE THAT THE OVERLOAD BOLTS ARE NOT MOVED WHEN ADJUSTING THE TRANSIT NUTS.**
12. Before placing into operation, the alignment of the weigh bar should be checked. Referring to drawing "WT1200-031", 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 with respect to the approach and retreat bars to a tolerance of +0.25mm/-0.00mm. If the weigh bar requires adjustment, remove the plastic plug in the end of the weigh bar and adjust the grub screw. When finished replace the plastic plugs.
13. The mechanical installation is now complete; proceed to the electrical installation section.

SECTION 4 – ELECTRICAL INSTALLATION

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 gearmotor 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 supplied).
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).
7. 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.

WEIGHFEEDER ELECTRONICS

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

- "Masterweigh 1"
- "Masterweigh 5"
- "Optimus"

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

Enclosure Mounting

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

The enclosure should be located so that:

1. Is not in direct sunlight (install sunshield if located outdoors).
2. Is not subject to direct washdown.
3. Is not installed in close proximity to high power cables, variable speed drives or vibratory feeder controllers.
4. Not more than 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.

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.

Belt Speed Sensor – 3 core overall screened, Belden type 8723 or equivalent.

VSD/Motor – To suit the motor power installed.

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 drawing "SSJBOX" in the drawing section of the manual.

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/connection here. Please refer to the manufacturer's manuals in other sections of the manual.

START UP

Prior to turning on the equipment, or starting the weighfeeder, ensure the following has been done:

1. Double check all electrical connections are correct.
2. All mechanical installation has been completed and no tools have been left on the belt or in the inlet chute.
3. The rotation of the motor has been checked and wired correctly.

Start Up Steps

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

1. Turn on the electronics, and ensure it displays the Mass Rate, Mass Total (MRMT).
2. Start the weighfeeder. If using variable speed drive, set it in local and ramp the frequency up to 50Hz.
3. Ensure the belt is tracking centrally. If the belt is not tracking centrally, turn the weighfeeder off and check that the belt sitting correctly in the guides on the tracking system.
4. 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.
5. 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.

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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.

OPTIMUS OPERATIONAL MANUAL.
Specifications and Site Requirements.

Power Requirements.

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

Main Board.

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

User Interface.

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

Loadcell Interface.

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

Current loop input and output.

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

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.

OPTIMUS OPERATIONAL MANUAL.
Enclosure Specifications.

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**

OPTIMUS OPERATIONAL MANUAL.
Theory of Operation.

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

Load Cell.

Weigh Zone / (weigh deck)

Tachometer / (Encoder).

Electronic Integrator.

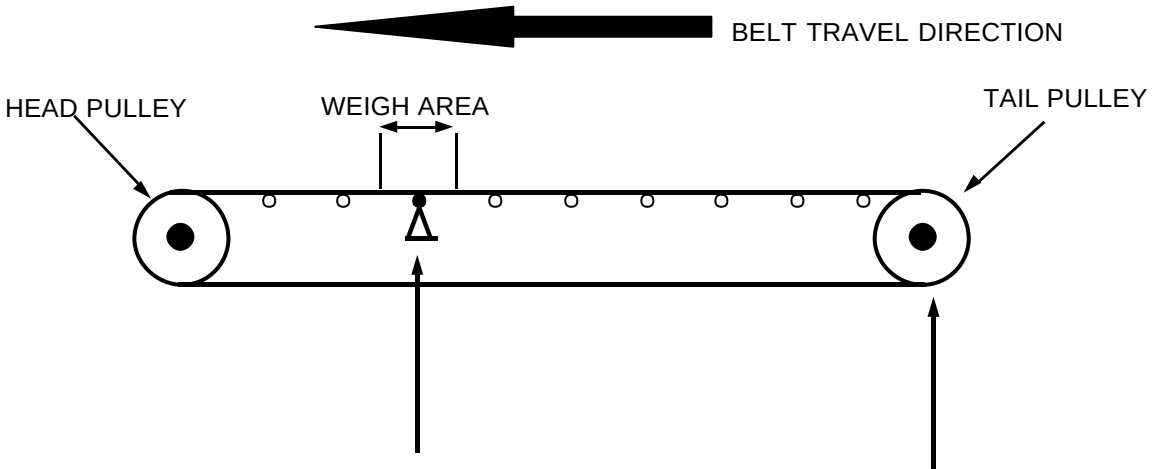
Optimus's primary roll is combine the weight of product carried by a conveyor belt and the speed of that belt and produce a variety of associated process control signals.

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

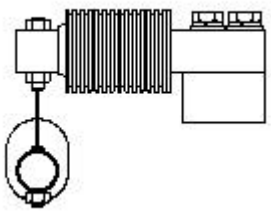
The tachometer/encoder is a device that is connected to a roll, that is contact with the belt and will rotate as the belt passes over it. The encoder shaft will then rotate and produce a series of pulses which Optimus uses to calculate the belt speed.

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

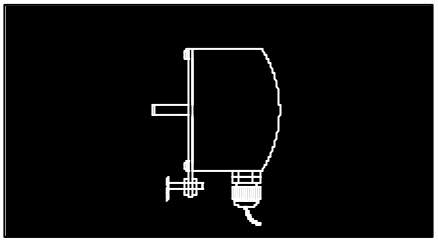
Optimus is a microprocessor based precision, high speed electronic integrator. The mV signal from the load cell is digitised by a precision, high resolution analogue to digital converter in Optimus and combined with the encoder output to produce an accurate MASS RATE. From this mass rate the total is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



LOAD CELL MOUNTED & SHOWING CONNECTION TO LOAD PICK UP ASSEMBLY



TACHOMETER/ENCODER



OPTIMUS OPERATIONAL MANUAL.
Printed Circuit Board location.

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

Main Processor PCB.

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

Field Wiring PCB.

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

Power PCB. (DANGER MAINS VOLTAGE MAY BE PRESENT)

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

Installer / Electrician Note.

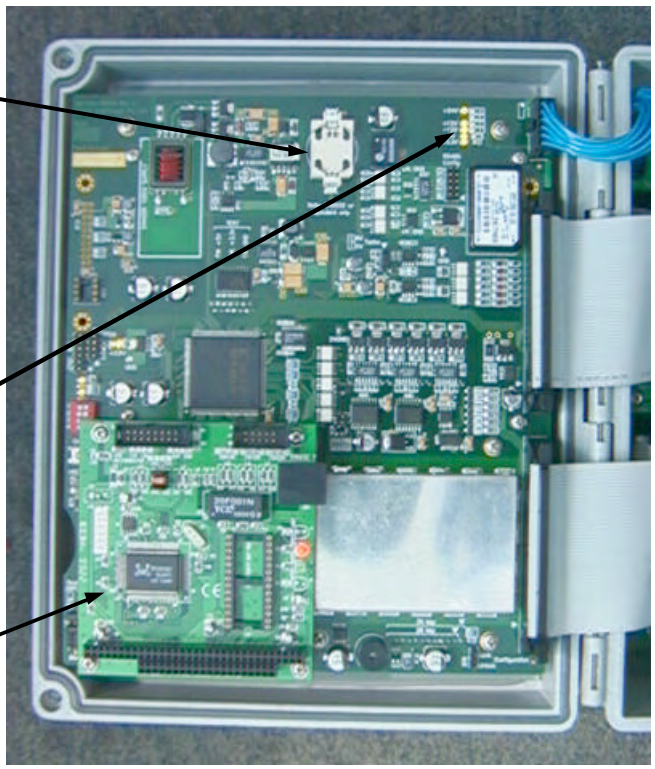
Care must be taken when cutting holes in the enclosure to provide cable access. It is recommended that the Power & Field Wiring PCB be removed prior cutting holes. Take note of cable entry with respect to PCB when re installed.
All cables should enter the enclosure via site approved cable glands.
The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

OPTIMUS OPERATIONAL MANUAL.

Power & Field Wiring PCB.

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

CPU PCB.



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

+24V

+12V

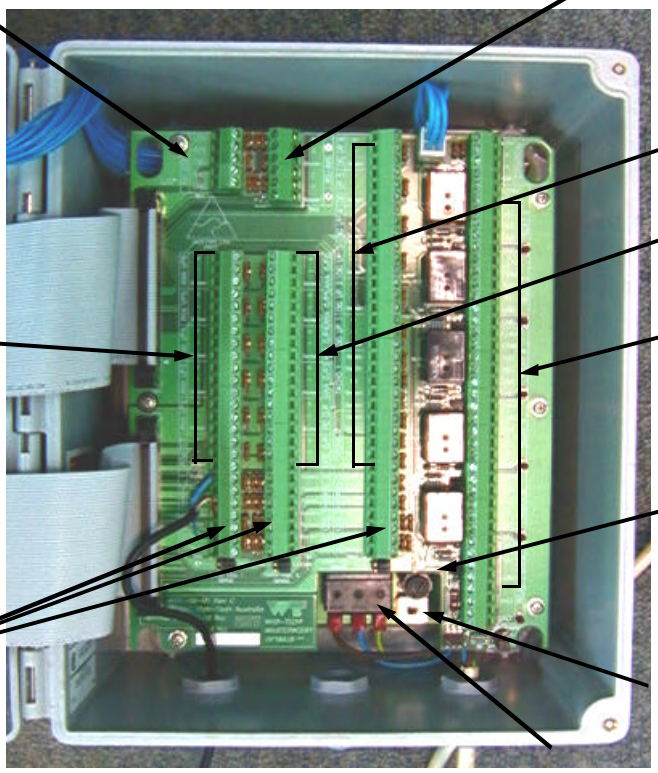
-12v

+5V

+3.3V

Optional communications card. TCP-IP, Profibus, DeviceNet

Power & Terminal PCB.



Optional RS 232 Output

Optional RS 485 Output

Generally 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.

OPTIMUS OPERATIONAL MANUAL.

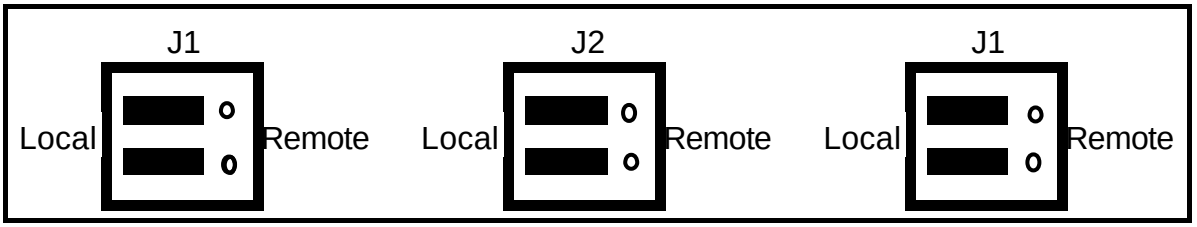
Power & Field Wiring PCB.

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.

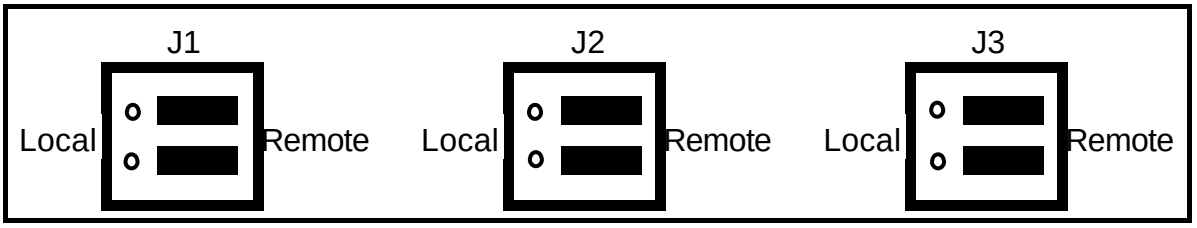
Belt weighing systems / weigh feeders usually do not employ more than one channel input.

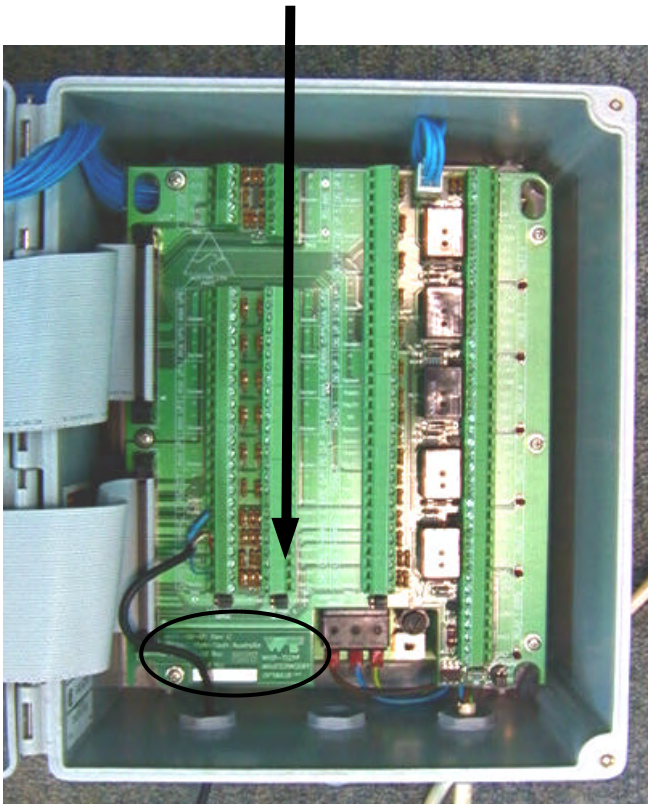
If the load cell cable runs are long, it is possible to have a voltage drop at the load cell. Optimus provides for the reading of the supply voltage at the load cell via the load cell sense wires (where fitted). If the sense wires are connected and the jumpers are set as shown below. Any voltage drop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

No Sense Used



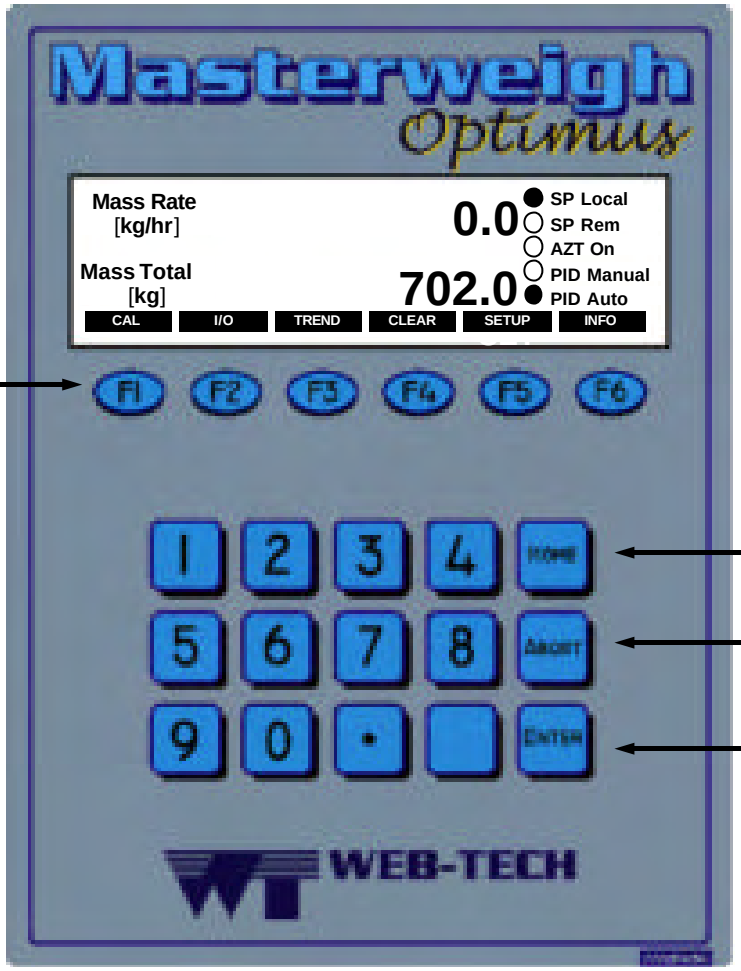
Sense Used





OPTIMUS OPERATIONAL MANUAL.

Keypad Description.



Takes the user back to MRMT & updates all entered variables

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

Saves any changes and moves the screen forward one.

Cancels current action and forces display back to previous screen.

Scrolls 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.

OPTIMUS OPERATIONAL MANUAL.

Power Up.

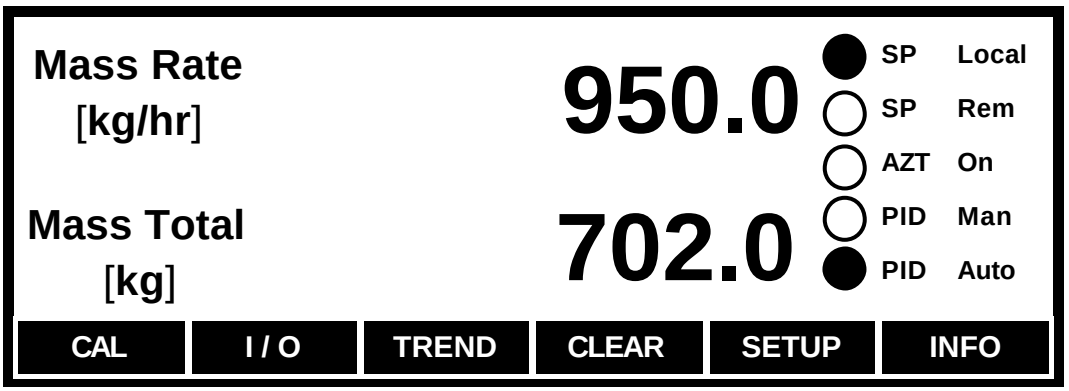
Once Optimus has been connected up as per the drawings in the rear of this manual and with reference to the chapter *Printed Circuit Board location.* The unit can be powered up, it should be noted that Optimus has a power supply that will accept most common supply voltages and frequencies, found around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

Start Up Display

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

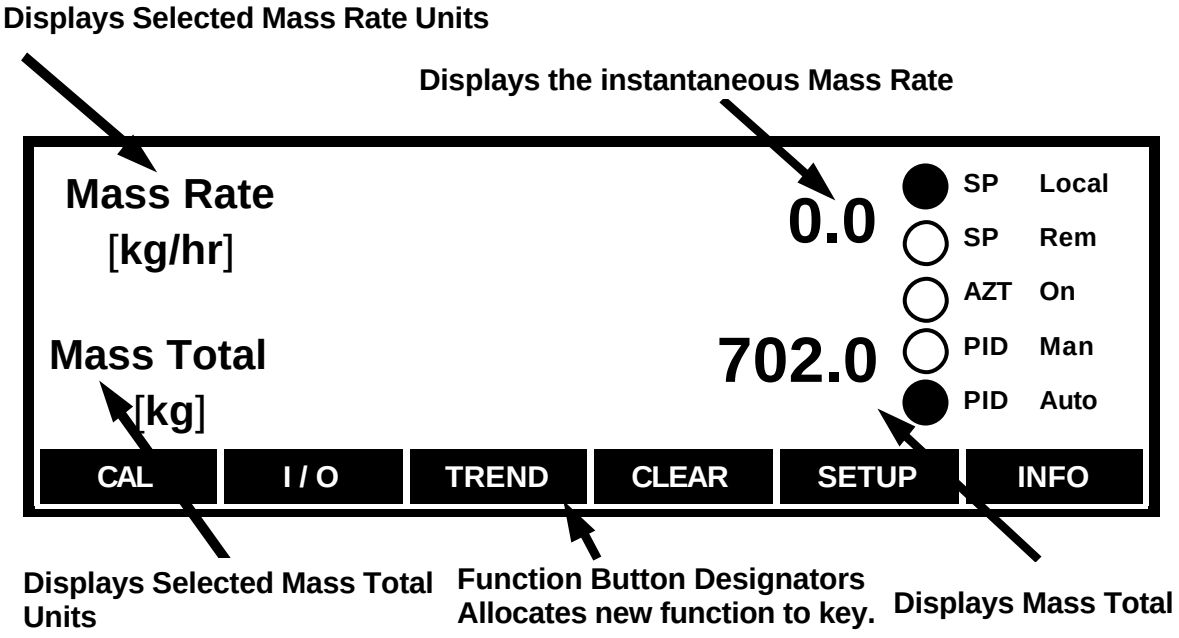
See over for detailed description of functions available from this screen.

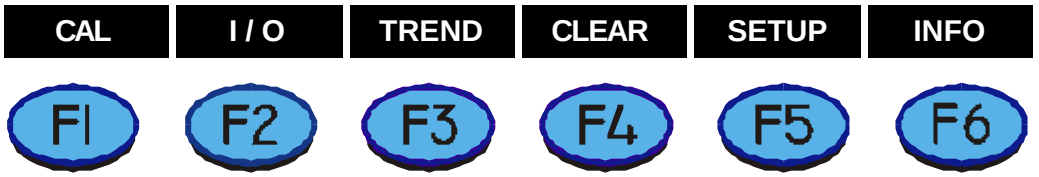
Mass Rate Mass Total (MRMT) Display



OPTIMUS OPERATIONAL MANUAL.

Main Display MRMT Description.





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.

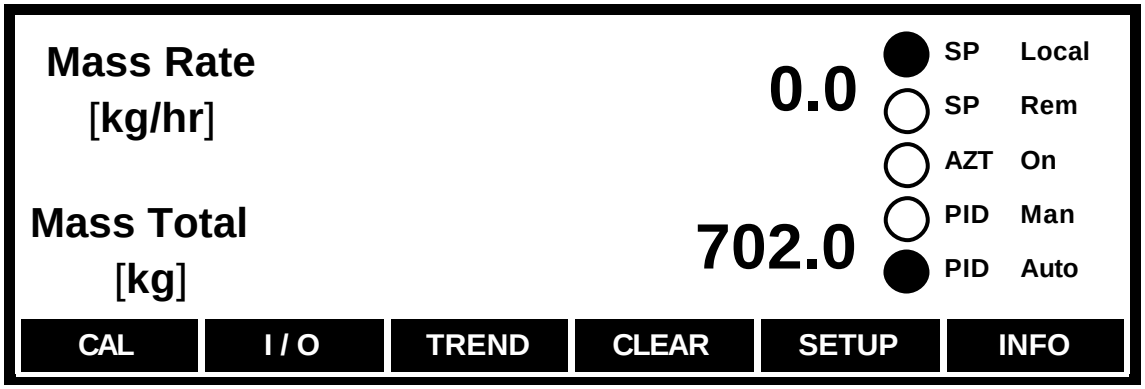
CLEAR. Pressing the clear F4 clears the local displays running total.

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.

OPTIMUS OPERATIONAL MANUAL.

Main Display MRMT Description.



● 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.

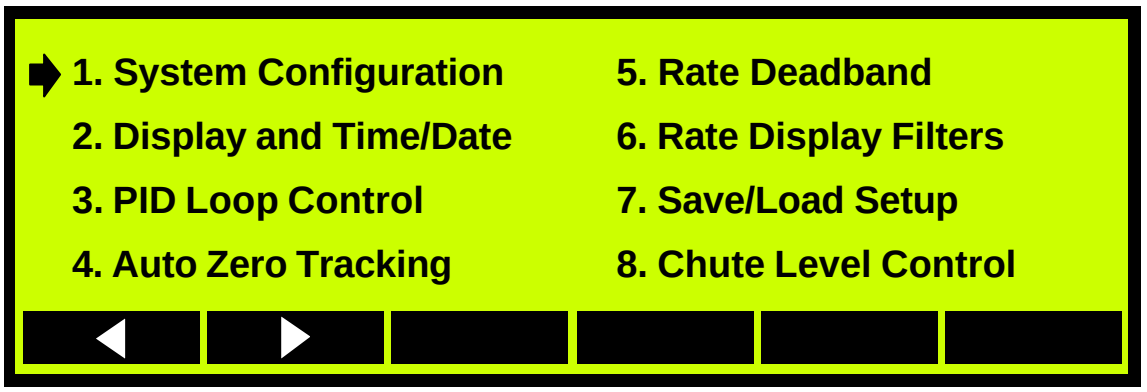
The **Calibration** procedure is required to force Optimus to convert the instrument's raw data (i. e. milli volts from the load cell/cells & tachometer frequency) into the physical units (i.e. Tons/ hour kg/hr and their corresponding totalised values).

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.

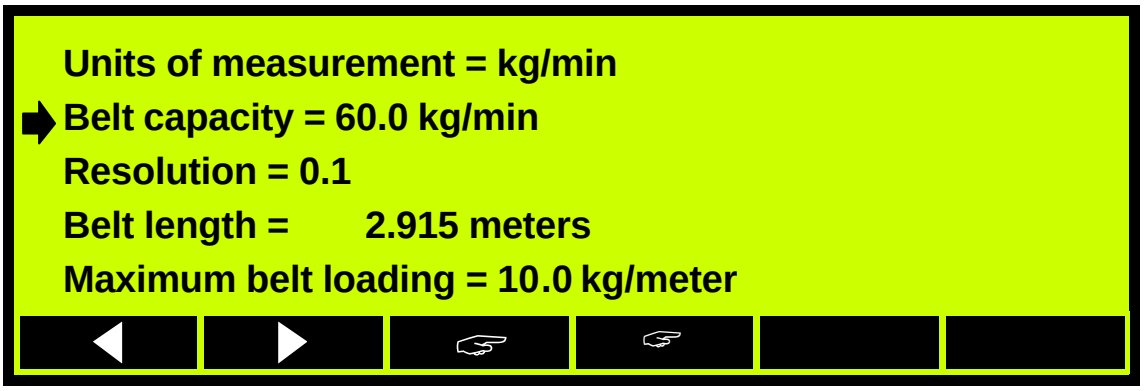
The following units are available :-

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.



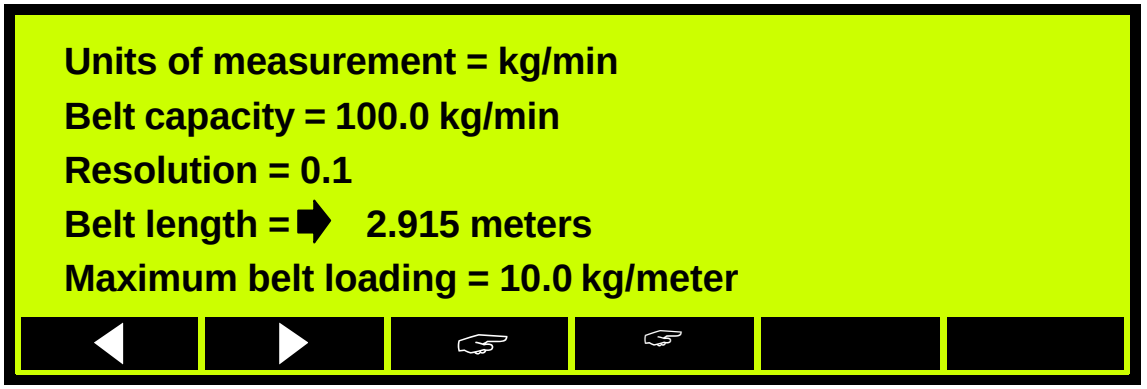
Press the "ENTER" key when the cursor is pointing at the "Belt capacity" and the screen will change to the Belt Capacity entry screen. Enter the feeders maximum capacity here. Press the tick key to force Optimus to read the entered value.

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

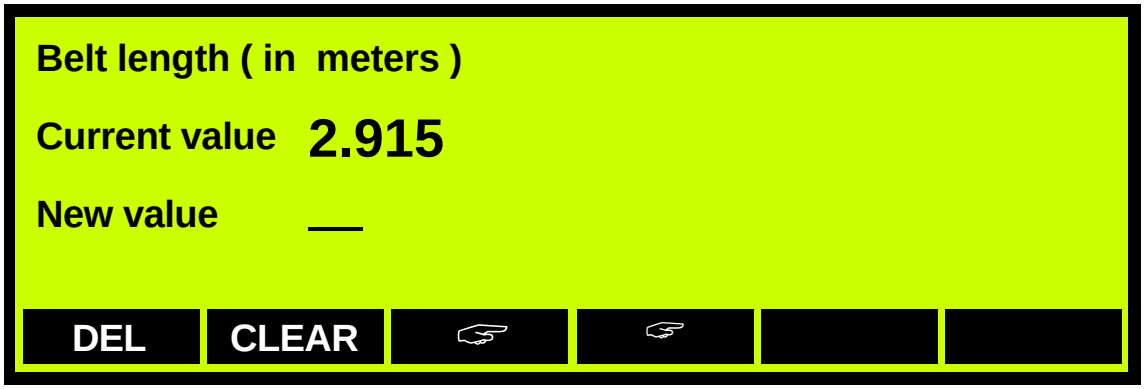
The resolution can be changed to one of the preset precision values. The values offered here are based on the capacity that was previously entered and can be accessed by pressing the "ENTER" key until the required value is found from the list. The value entered here will be reflected in the MRMT screen's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

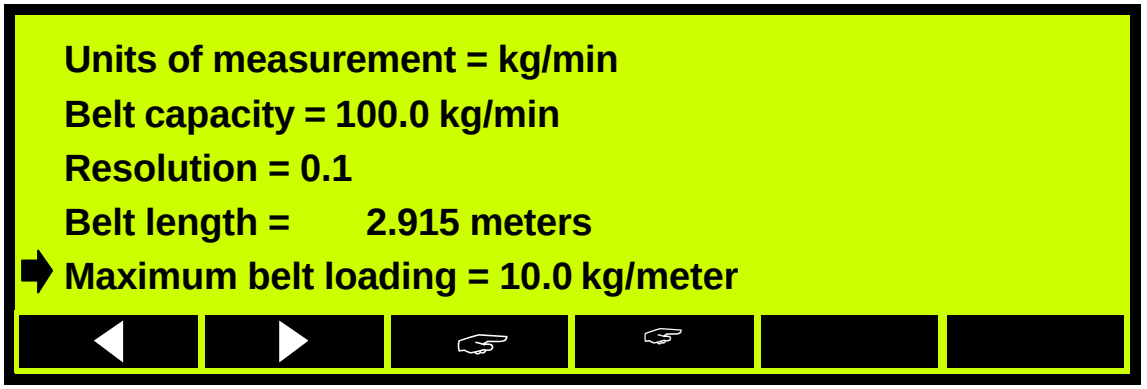


Belt Length Units.

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.

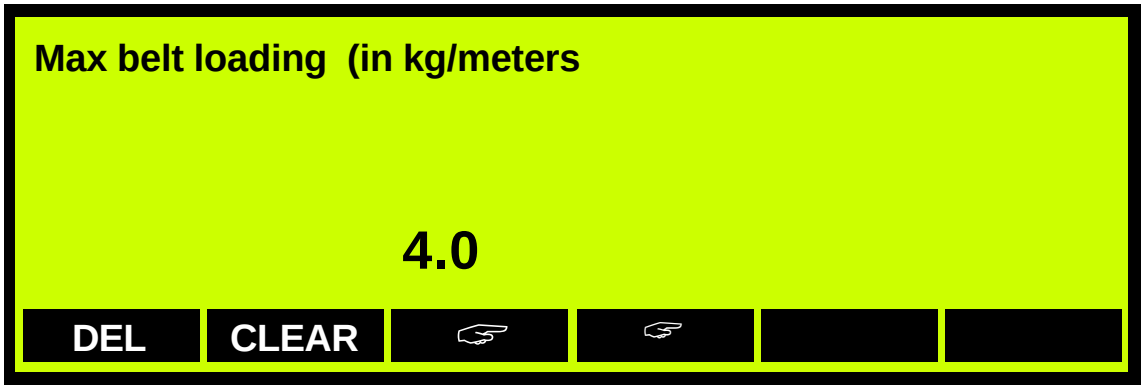
Maximum Belt Loading.

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)

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

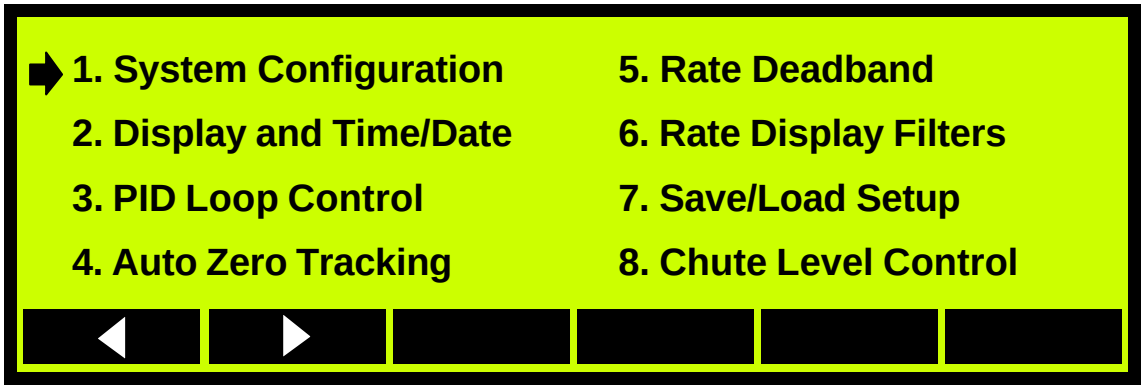
E.g.

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

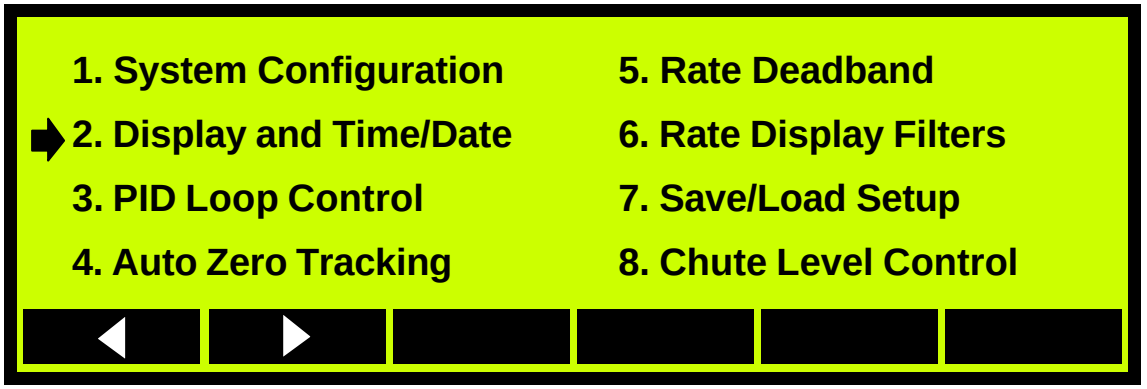
$$\text{Belt Loading} = \frac{60}{0.25 \times 60} \quad \underline{4}\text{ kg/metre} \quad \text{(enter this, into data entry screen).}$$

OPTIMUS OPERATIONAL MANUAL.
System Setup / *display, time & date.*

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.



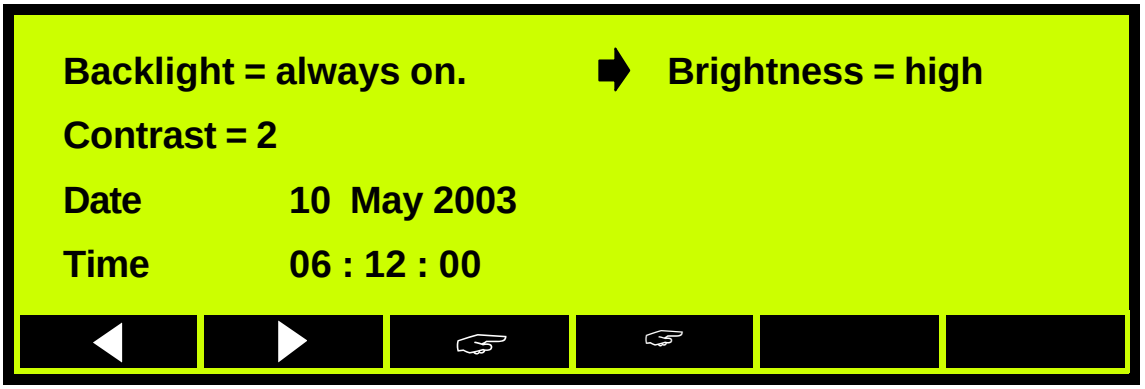
Press the "ENTER" key to access the display setup screen.

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

It should be noted that Optimus electronics 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 back 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 settings are used.

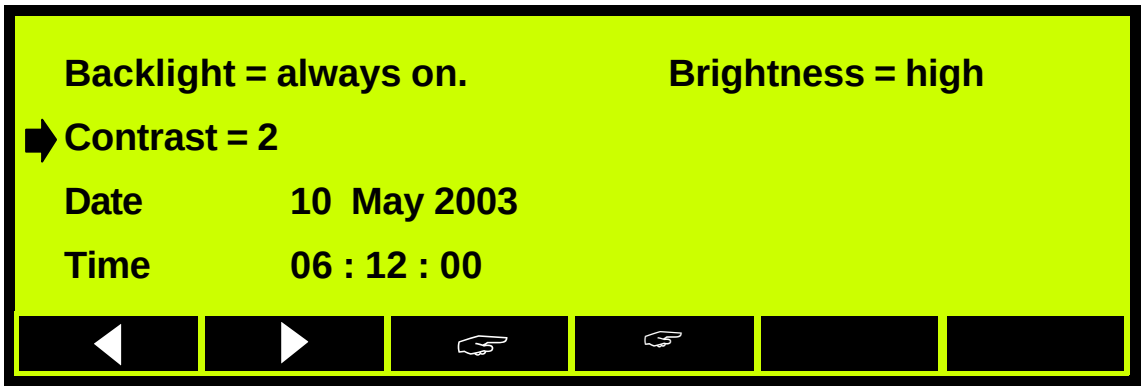
Brightness.

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.



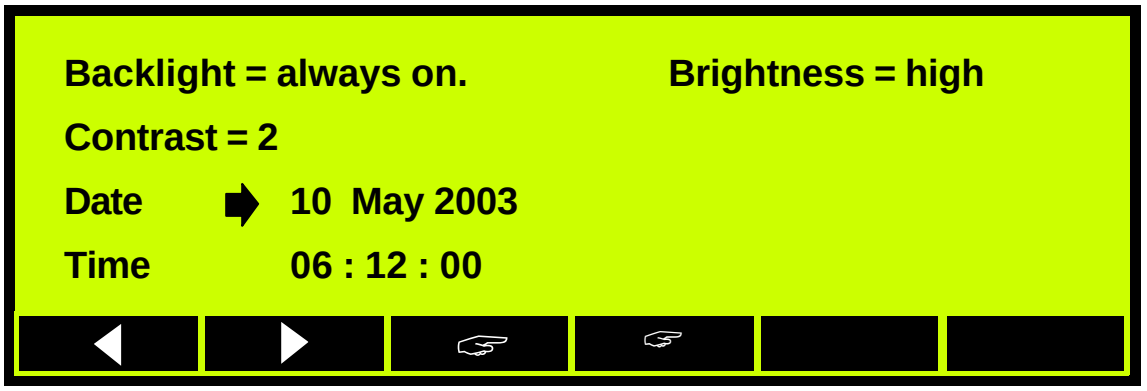
Contrast.

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.



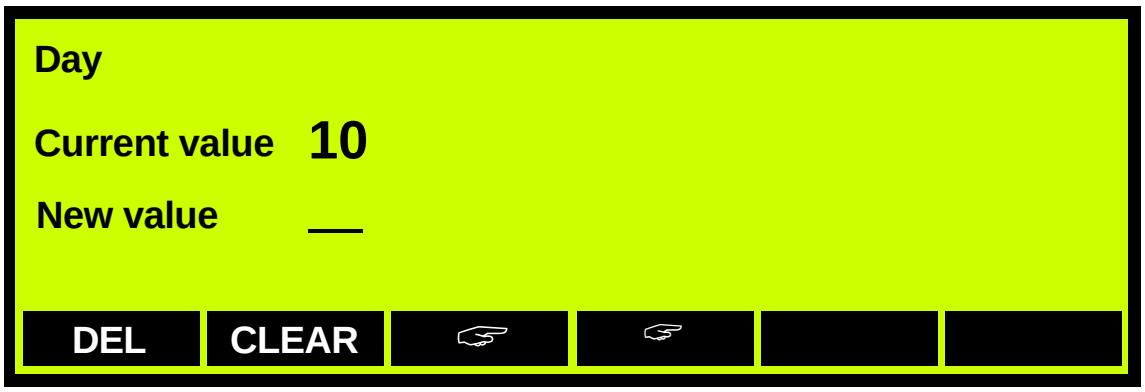
Date Entry.

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

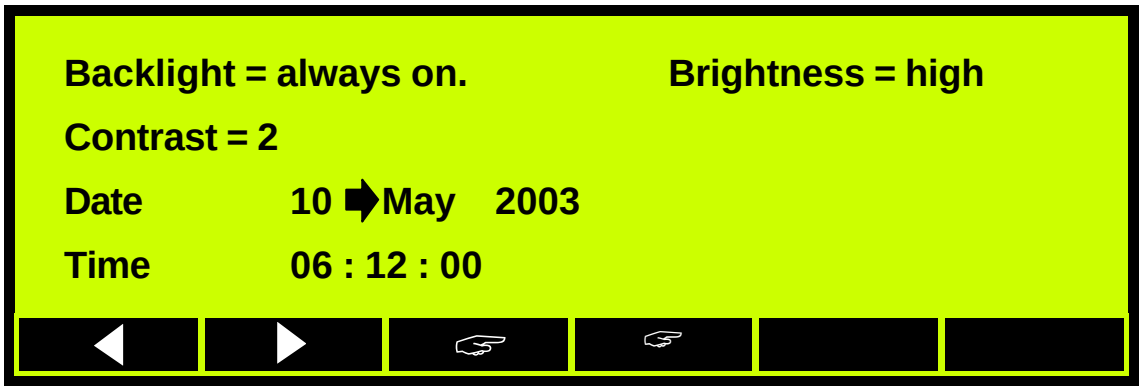


Press the "ENTER" key to access the Day setup screen.

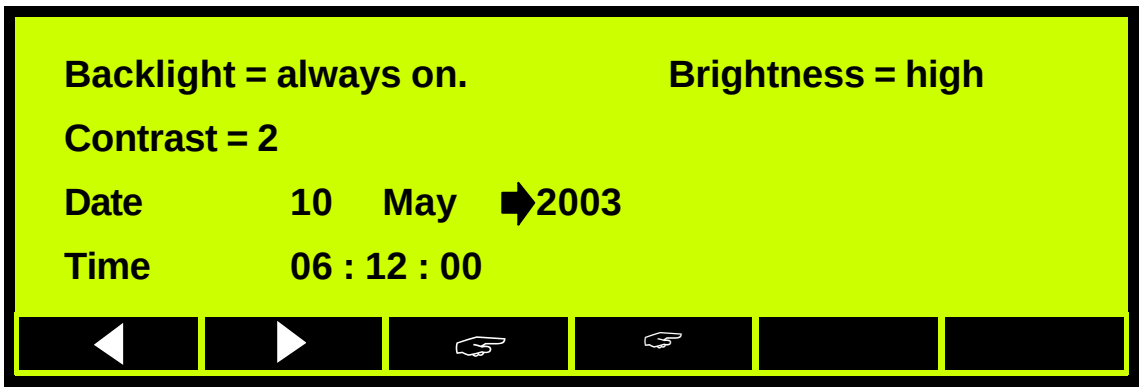
Press the "ENTER" key to access the Day entry screen.



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.

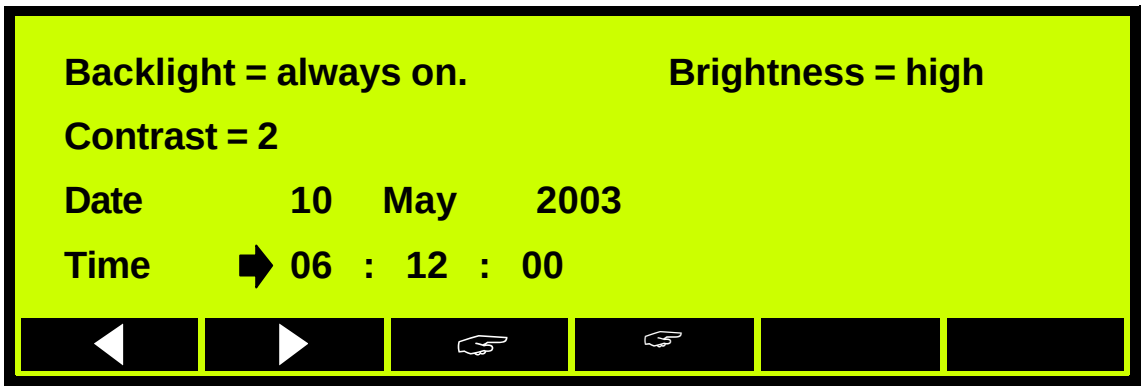


Select the month and scroll on to year entry position.

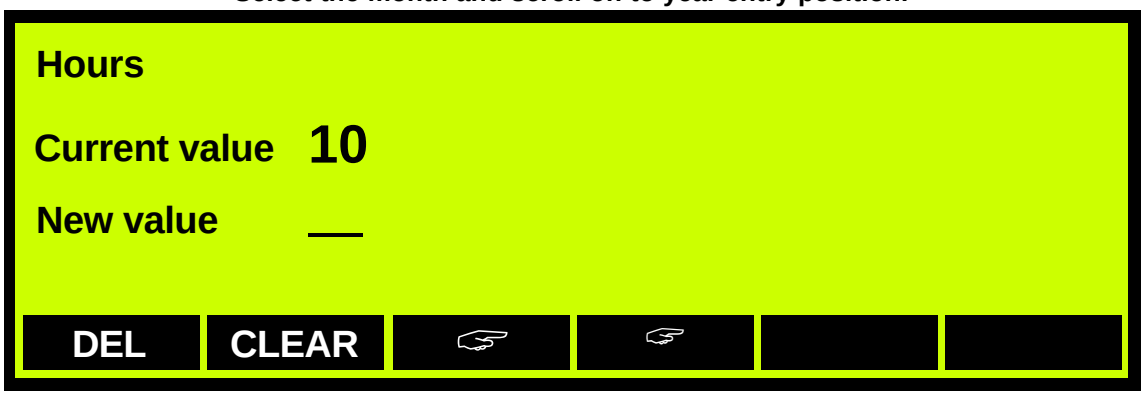


Press the "ENTER" key to access the data entry screen and enter the year. Press the tick key to lock in the year data and return to .

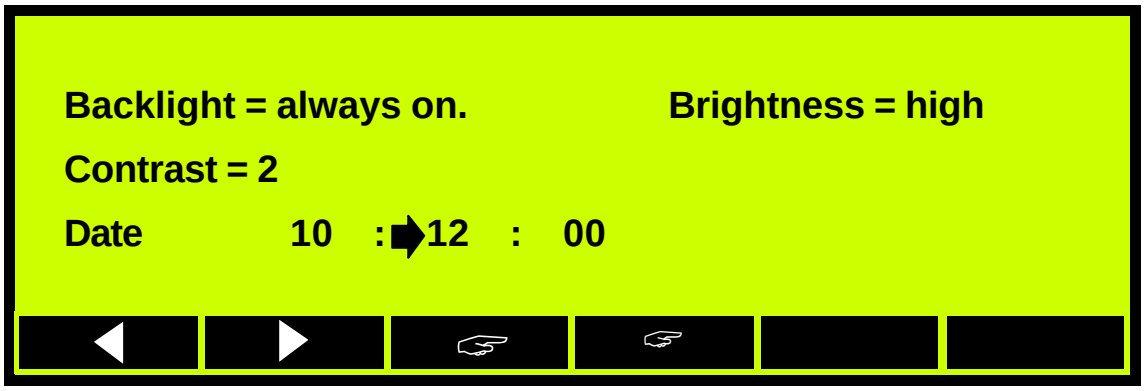
Scroll forward to the time (hour) entry position and press the "ENTER" key to access the hour entry screen.



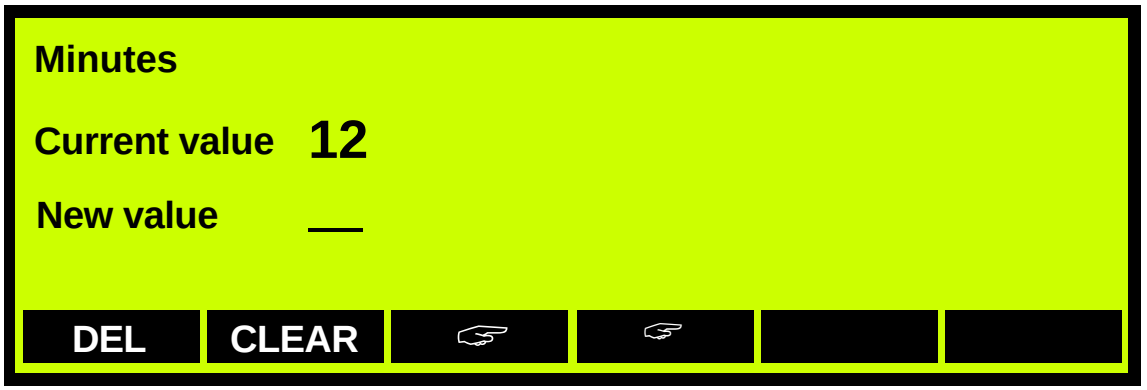
Select the month and scroll on to year entry position.



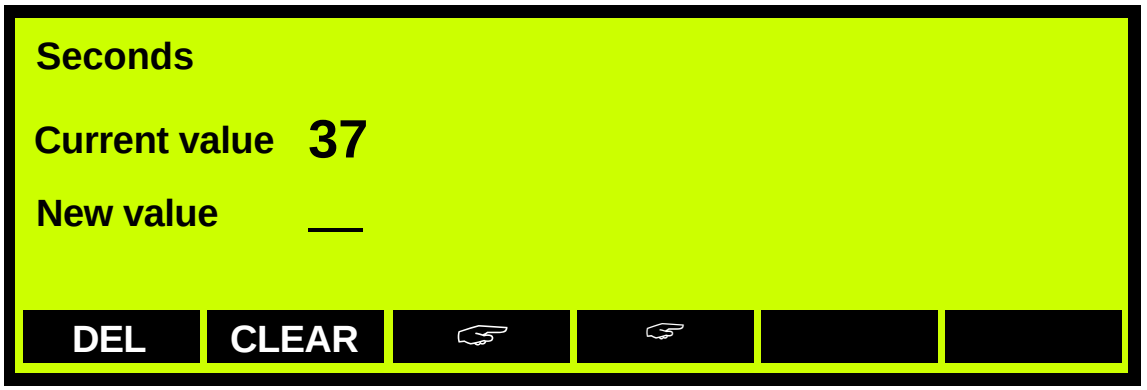
Enter the current hour (24 hour clock) format. Press the tick key to lock in the data. Scroll on to the minute entry point and press the "ENTER" key to access the minute entry screen



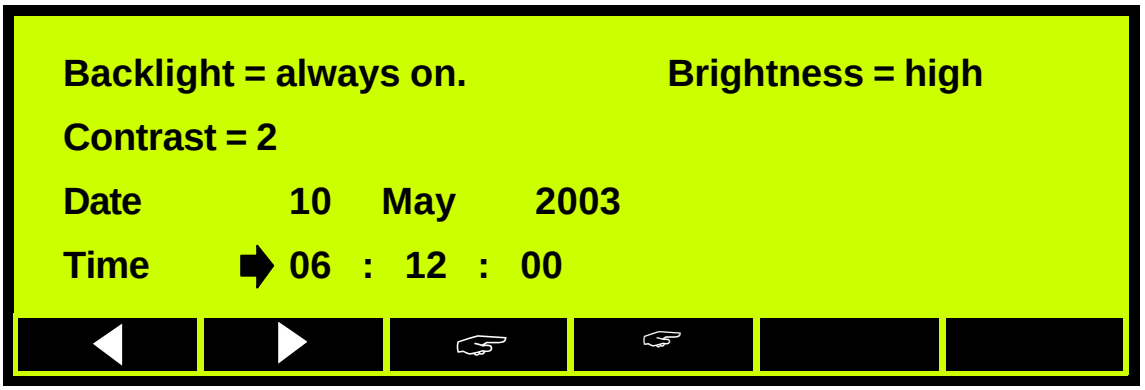
Enter the current minute and press the tick key to lock in the data and return to the time/ date entry screen.



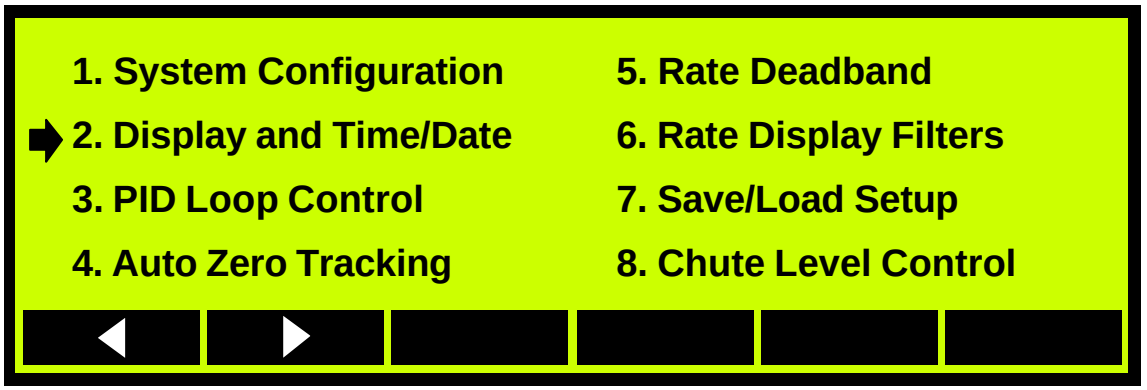
Enter the current seconds and press the tick key to lock in the data and return to the time/date entry screen.



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:

$$OP(t) = OS + FF \cdot SP(t) \cdot \frac{100}{PB}\left[E(t) + RR \cdot \int_0^t E(s)ds + K_D \frac{dE(t)}{dt}\right] \quad (1)$$

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

$$OP(t_k) = OS + FF \cdot SP(t_k) \cdot \frac{100}{PB}\left[E(t_k) + RR \cdot \sum_{i=0}^{k} E(t_i) \cdot \Delta t + K_D \frac{E(t_k) - E(t_{k-1})}{\Delta t}\right] \quad (2)$$

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 proportional band *PB*. Decreasing *PB* increases the contribution of the proportional term. Increasing *PB* decreases the contribution of the proportional term. *PB* is expressed in units of %. When *PB*=100%, the effective gain applied to the error term is 1.

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

Integral Gain.

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

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

Integral Lower Limit.

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

Derivative Gain.

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

Output Offset.

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

Feed Forward Gain.

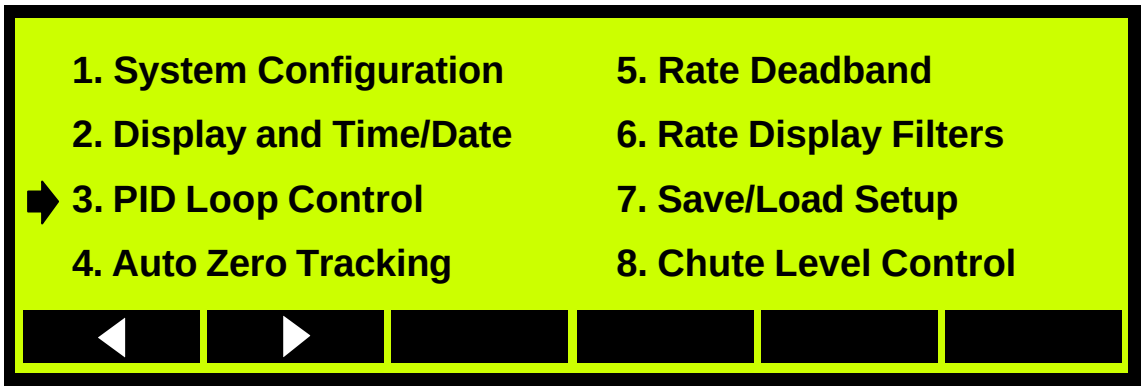
The feed-forward gain, *FF*, is defined as the percentage of the setpoint to add on to the control output, and has units of percent.

OPTIMUS OPERATIONAL MANUAL.

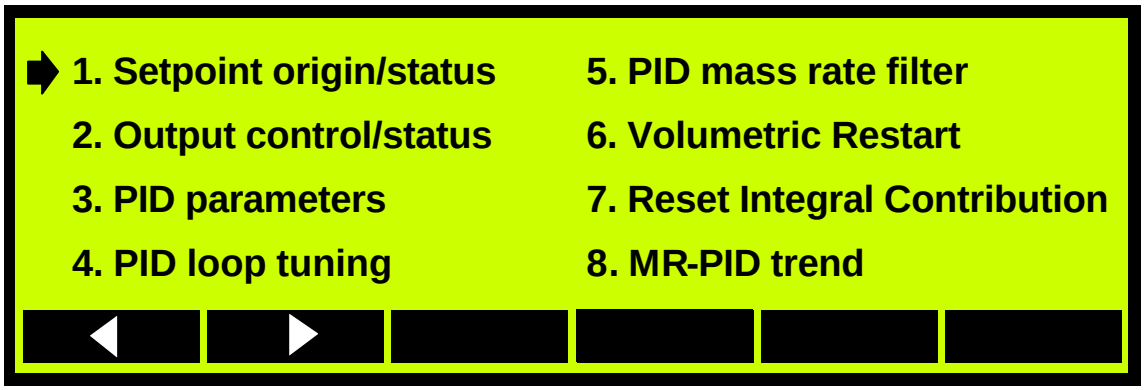
System Setup / PID Loop Control / setpoint origin.

PID Loop Control.

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



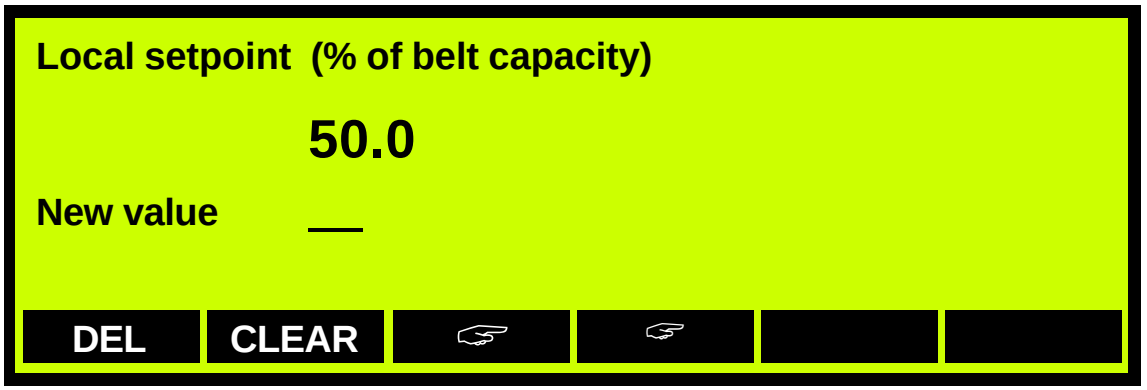
On selecting Menu 3 PID Loop Control the screen changes to that shown below.



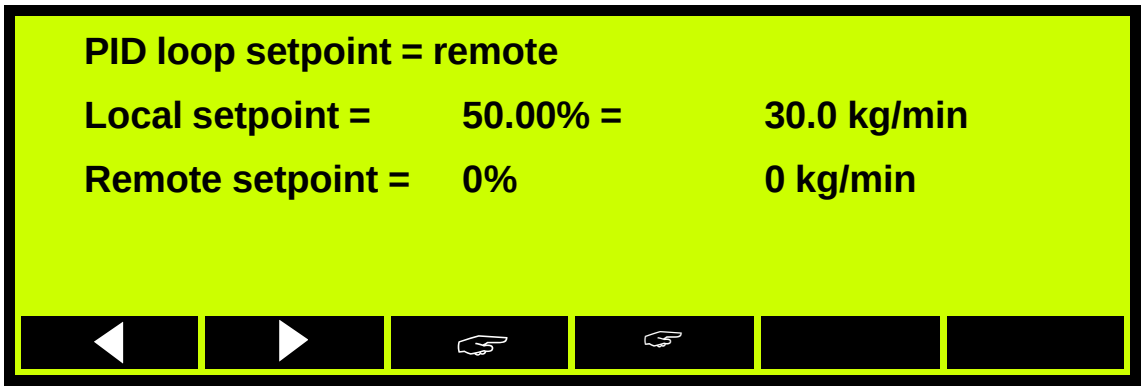
The "SETUP" (F3) key takes the user back to the main setup menu.

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

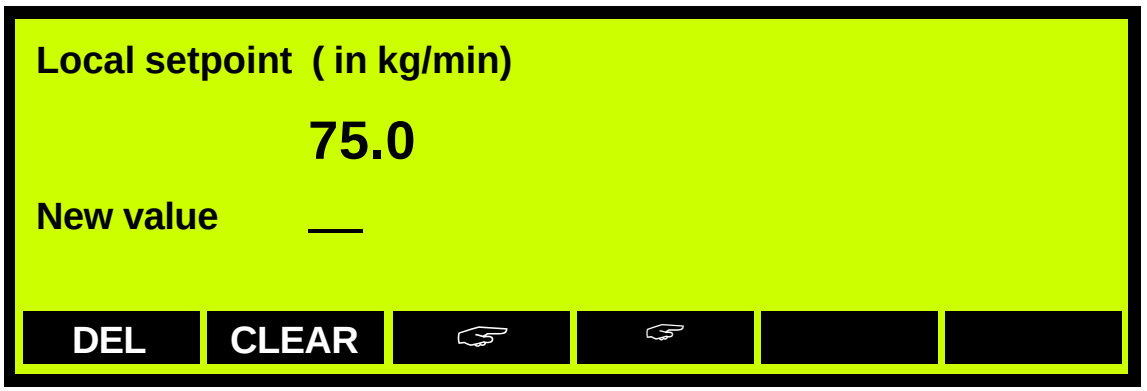
Use the "ENTER" key to access the data entry screen where the local setpoint can be adjusted as a %. Or an absolute mass rate.



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



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



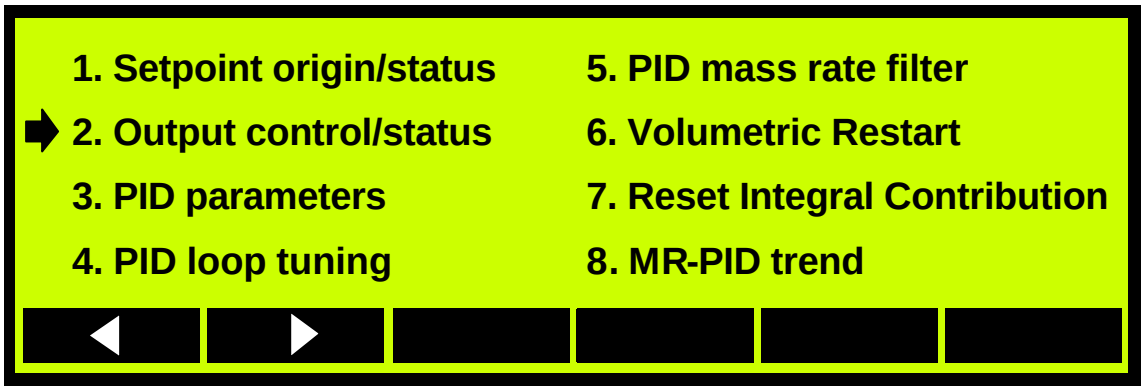
Press the tick key to lock in the data and return to the setup screen.

OPTIMUS OPERATIONAL MANUAL.

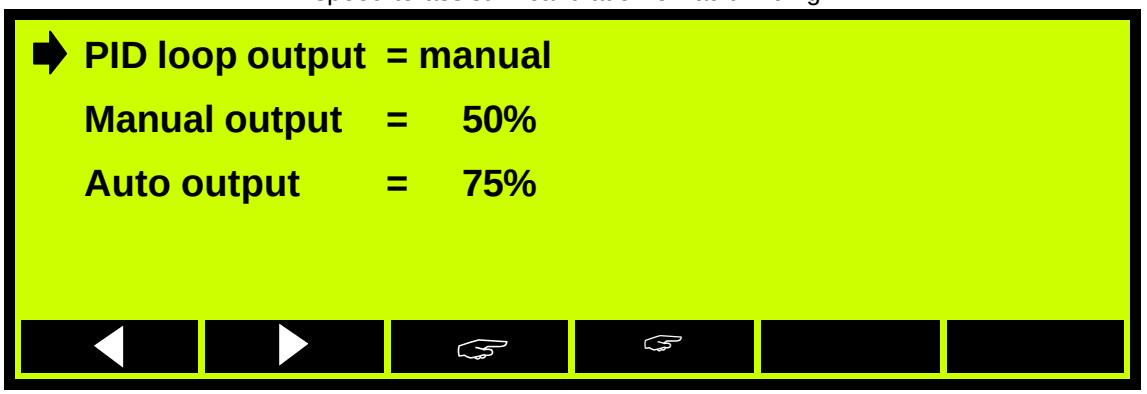
System Setup / PID Loop Control / Output control / status.

Output Control & Status.

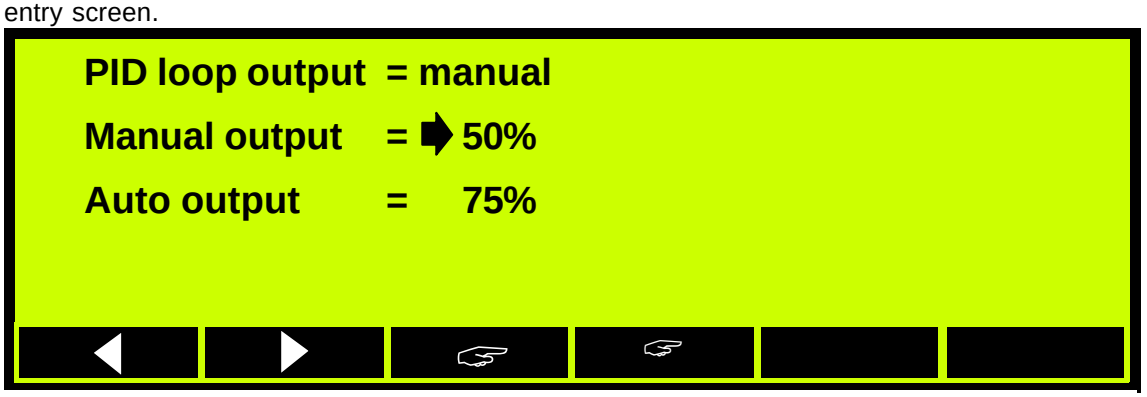
Optimus's analogue output whilst in the Automatic mode can be viewed from the menu shown below. When in the Manual mode the analogue output can be forced from the keypad.



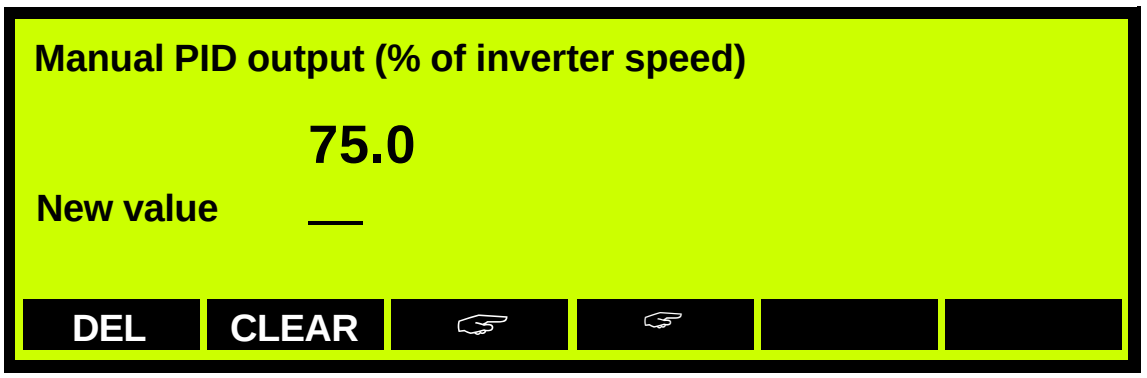
On selecting Menu 2 Output Control & Status screen changes to that shown below. The PID loop can be toggled between "manual" & "remote". This feature allows the user to set the belt speed to assist in calibration or fault finding.



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



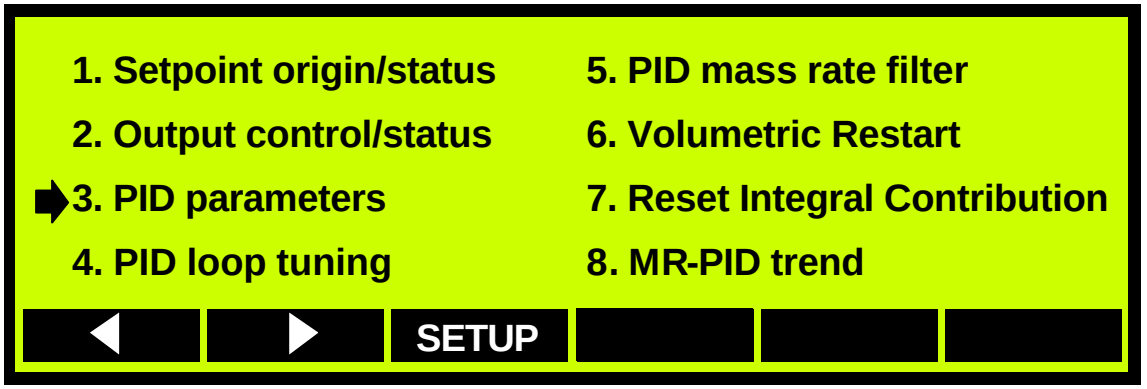
Pressing the "ENTER" key at this point brings up the inverter speed input screen. Press tick to lock in the entered data.



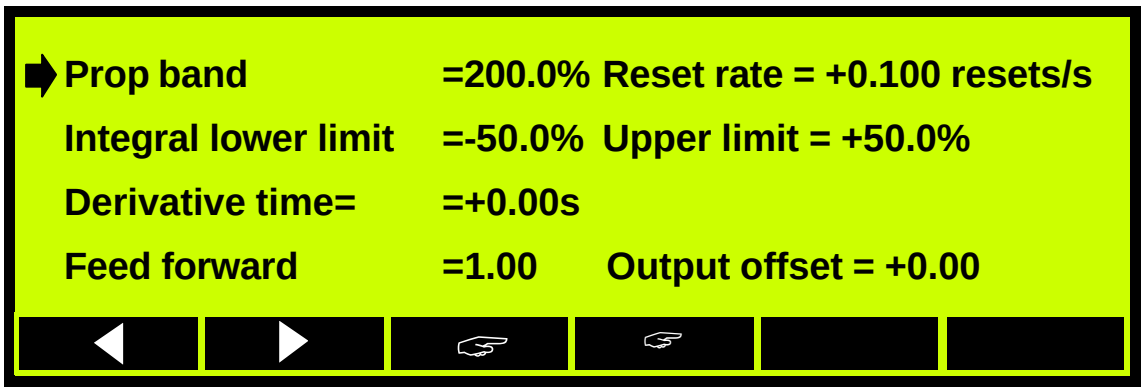
OPTIMUS OPERATIONAL MANUAL.
System Setup / PID Loop Control / pid parameters.

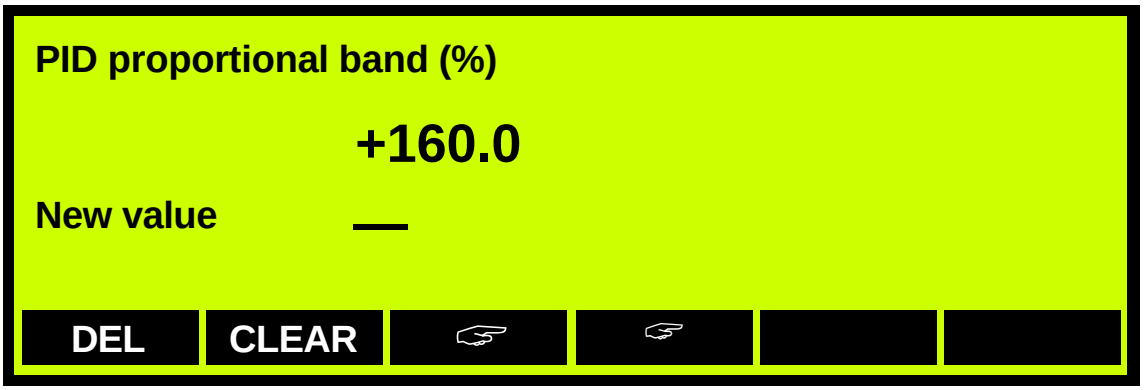
The screens and menu entry points associated with the "PID Parameters" allow suitably qualified personnel to load the PID algorithm with variables that best suit the operation of the feeder. It should be noted that a *good understanding of process control loops* is required for successful tuning of a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

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



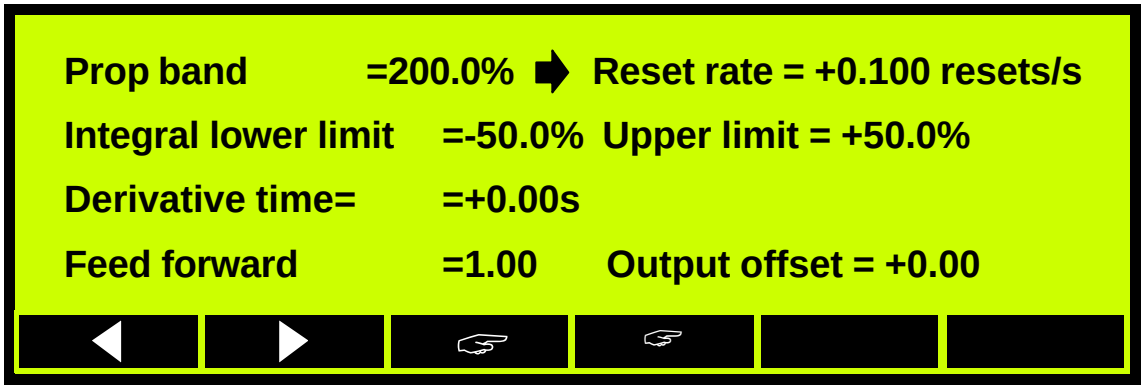
On selecting Menu 3, PID Parameters, the screen changes to that shown below.





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

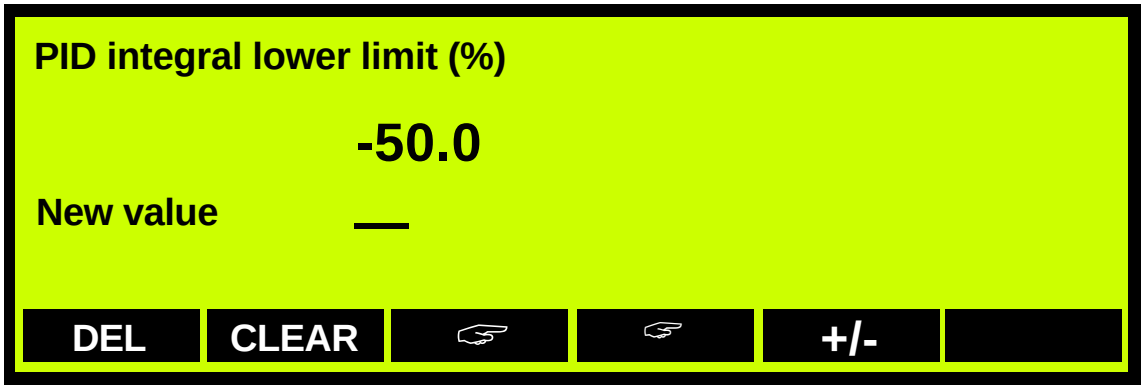
Use the scroll keys to access the Integral (reset rate) data entry point.



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

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

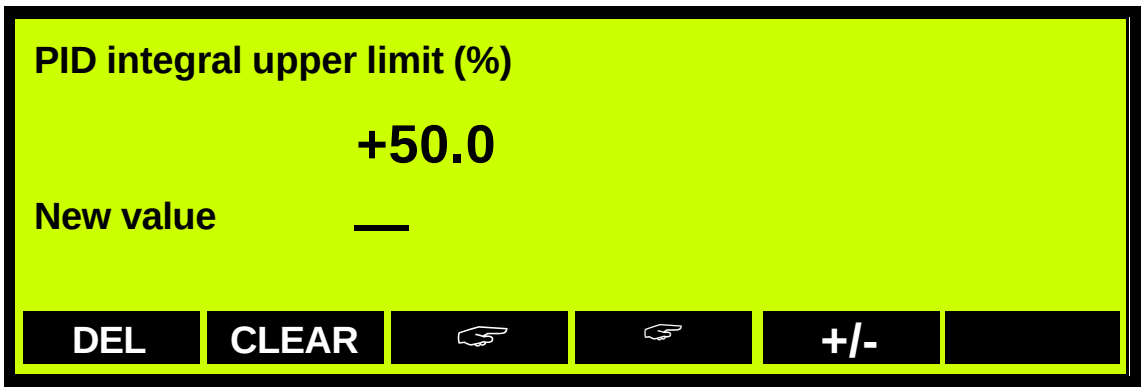
In many applications it is often beneficial if the PID integral is restrained. As the working “integral” can be either positive or minus value. The limits can be set in the following data entry screens. Note the F5 key is now configured as a sign entry key.



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

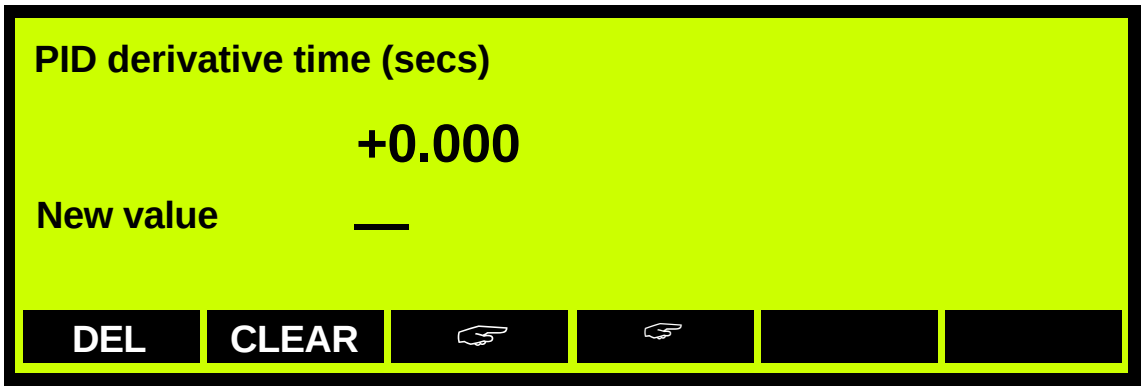
Use the scroll keys to access the Integral Lower Limit.

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



Scroll to the Derivative using the scroll keys.

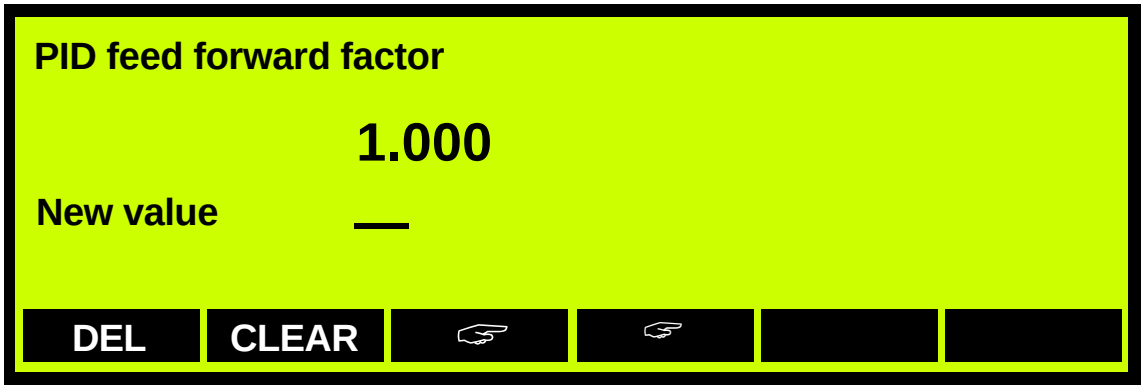
Use the "ENTER" key to gain access to the Derivative time data entry screen.



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

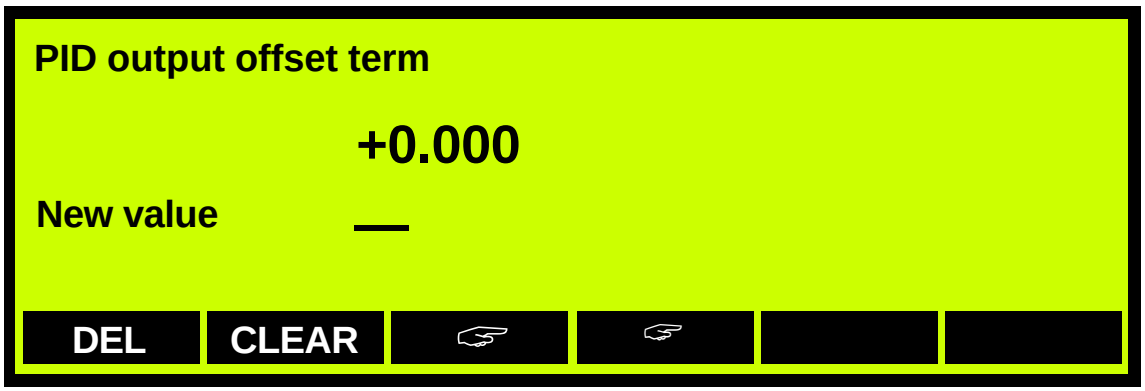
Use the scroll keys to access the Feed forward term.

Use the "ENTER" key to access the Feed Forward term.



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

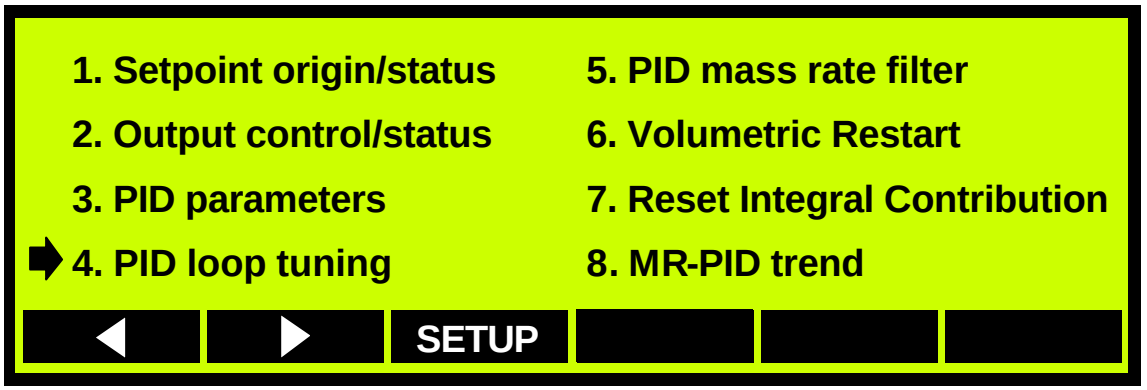
With the cursor pointing at the "Output offset" press the "ENTER" key to gain access to the data input screen.



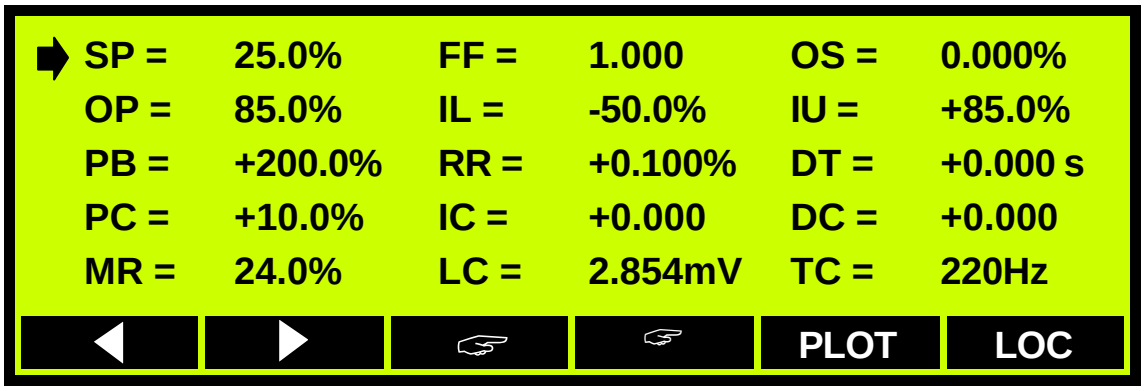
Press the tick key to lock in the data. The display will then return to the main PID setup screen

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 access.



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



PID Loop Tuning Screen.

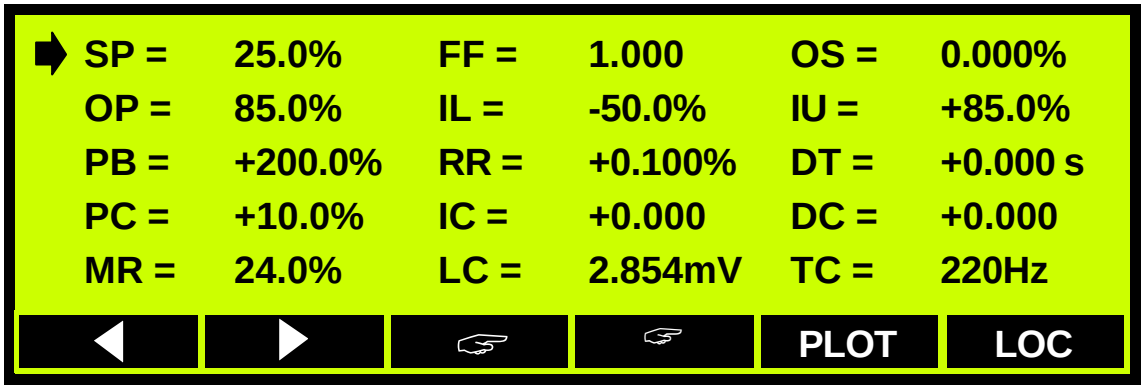
From this screen the user can tune the PID loop without having to change screens. All variables associated with the control loop are accessible from this screen as are the outputs from the load cell and tachometer. The cursor under control of the (F1 & F2) keys will take the user to all the changeable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

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

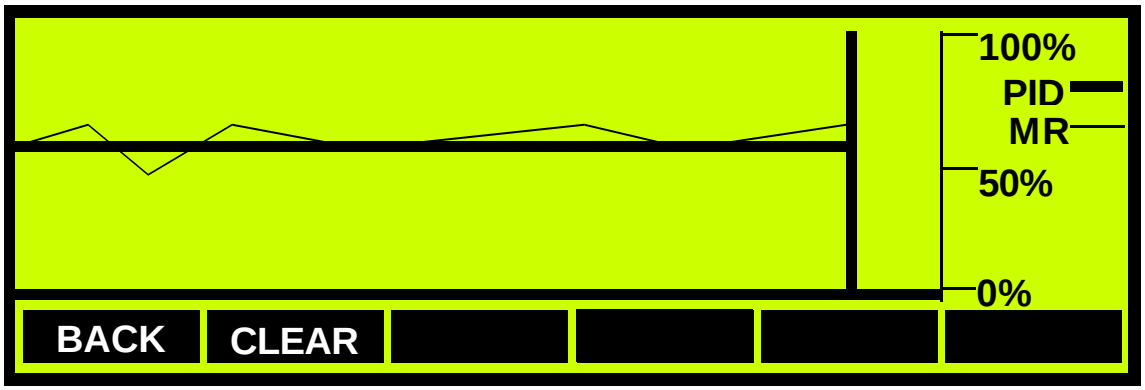
PID Loop Tuning. (Continued)

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.**



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



OPTIMUS OPERATIONAL MANUAL.

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

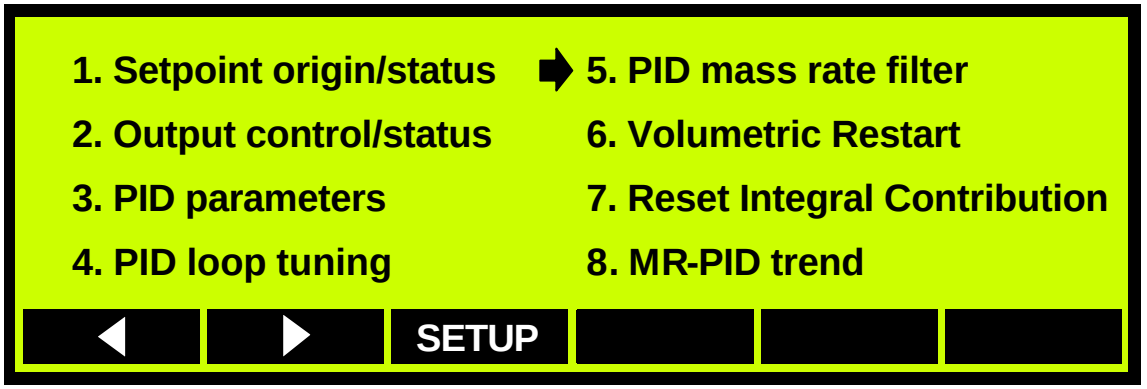
PID Mass Rate Filter.

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

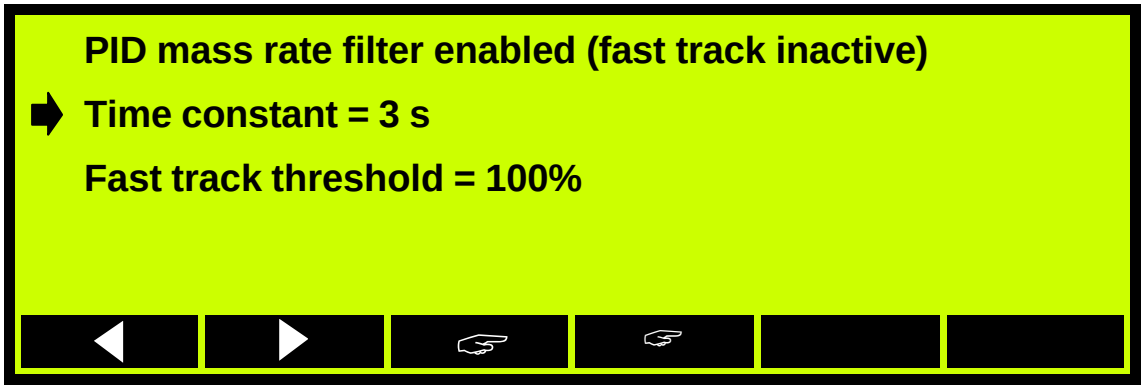
When active the fast-track filter multiplier restrains the PID analogue output from changing until the change exceeds the percentage set in the "Fast track threshold". By the judicial use of this feature the weighfeeder system can be restrained from reacting to anomalies in belt loading caused by irregular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

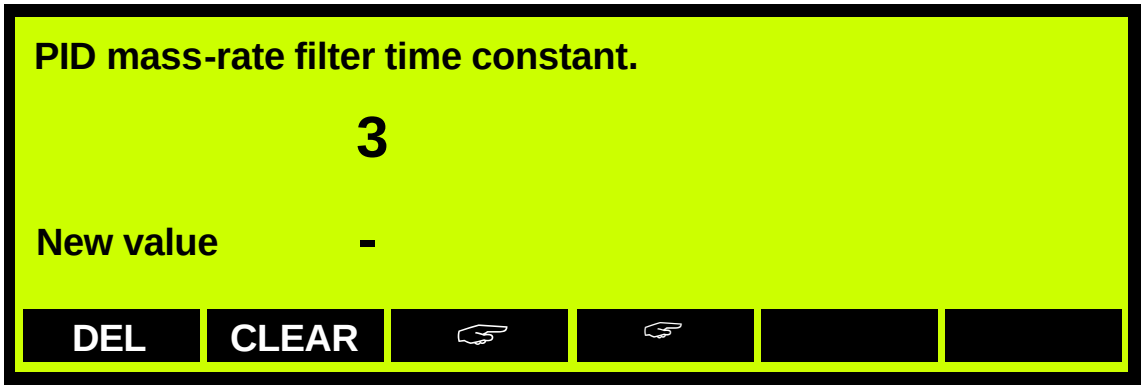
Note The Filter can be disabled (not running), enabled (running) and filter running without the fast track multiplier running.

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



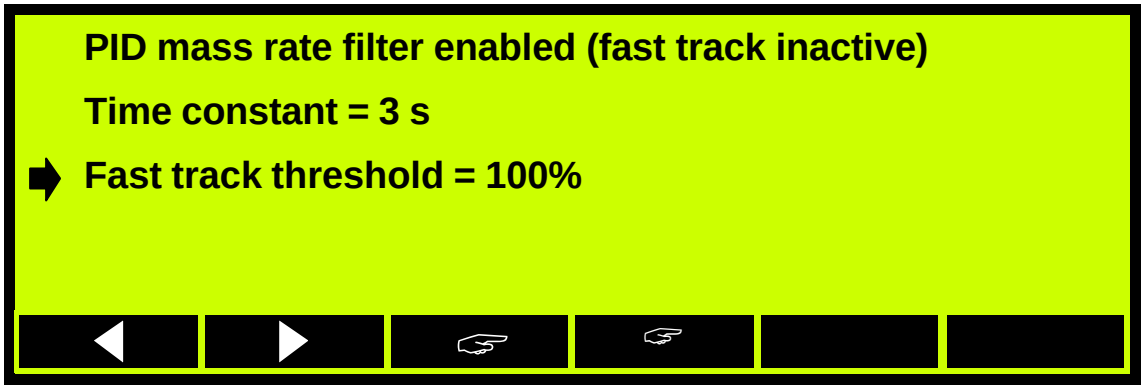
On selecting Menu 5 PID Mass Rate Filter the screen changes to that shown below. The "Time constant is entered by pressing the "ENTER" key.



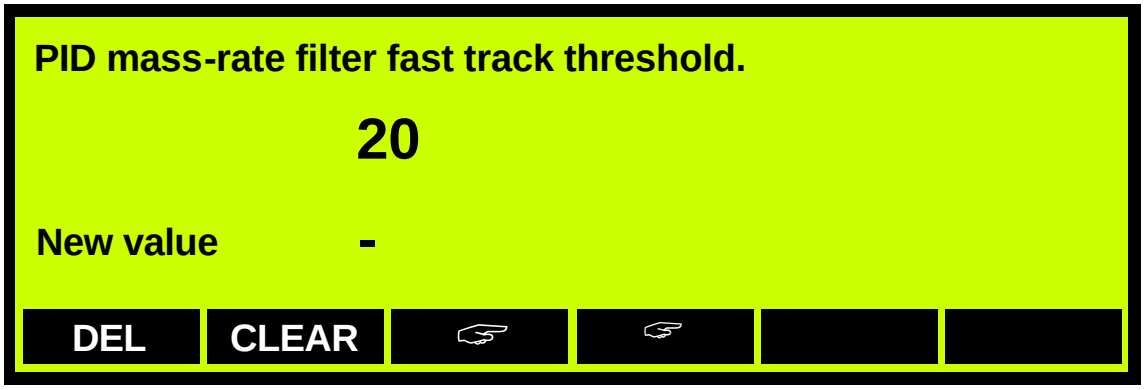


The value entered in the above data entry screen is locked in by pressing "ENTER"

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.



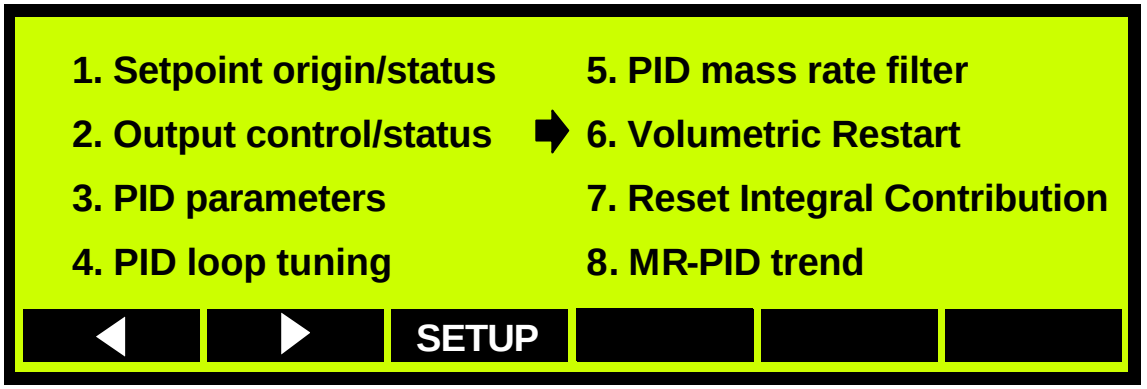
The "Fast track threshold" data entry screen.



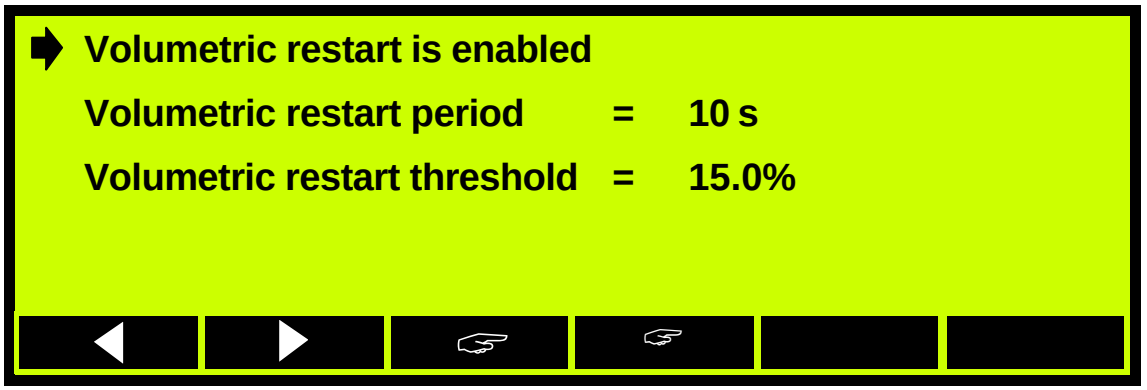
Enter the value required. Note a value of zero or 100% will render the "Fast track feature inoperable. Press the tick key to return to the main PID setup screen.

Volumetric Restart.

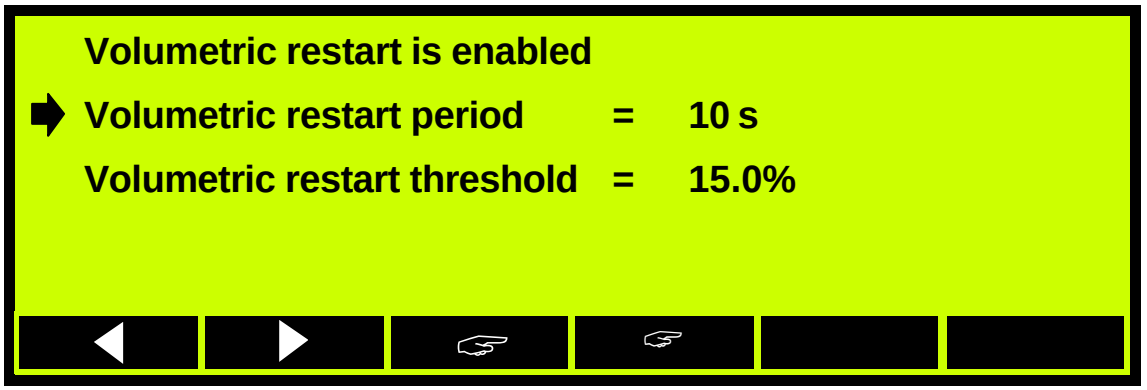
In applications where the weighfeeder is constantly stopping and starting. It is advantageous in terms of feeder control, to freeze the control algorithm when the feeder is halted by a supervisory system or operator. The Volumetric Restart feature allows the user to freeze the PID control action at the 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.



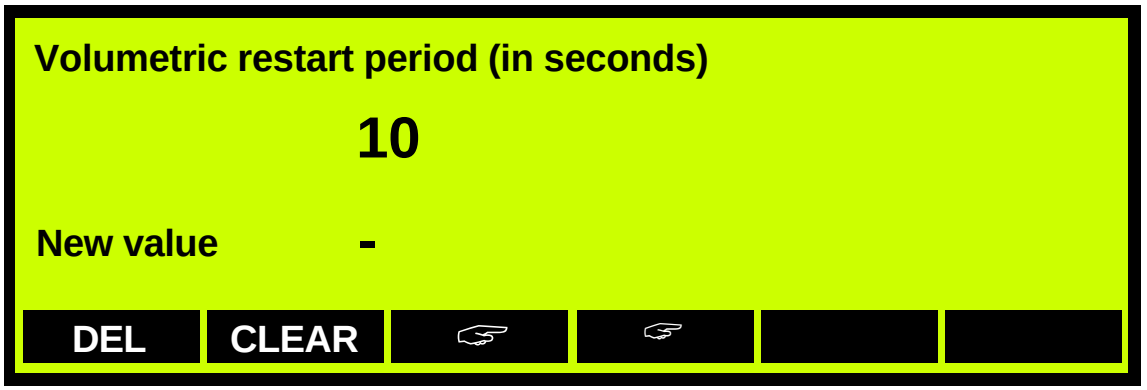
The "Volumetric restart" feature can be loaded with variables whether or not the feature is enabled or not. Scroll the selector arrow to the "Volumetric restart period and press "ENTER"



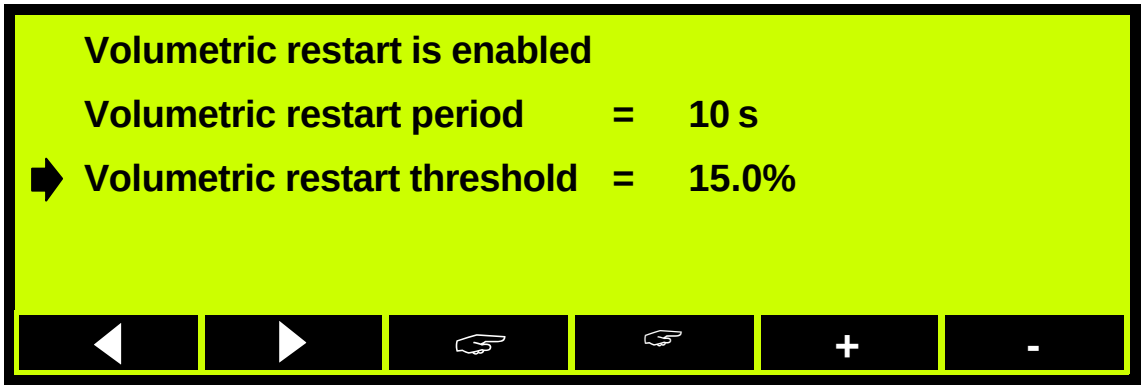
OPTIMUS OPERATIONAL MANUAL.

System Setup / PID Loop Control / volumetric restart.

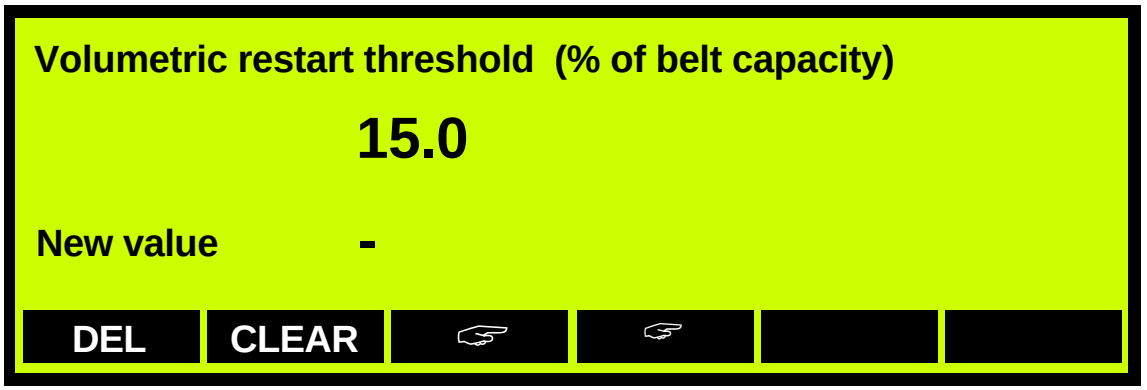
The value entered in the "Volumetric restart period" screen. Is the time period that Optimus will use to time out the freezing of the PID algorithm, prior to recalculating the new process variable and out putting the signal to the analogue PID output.



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.



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 response 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.



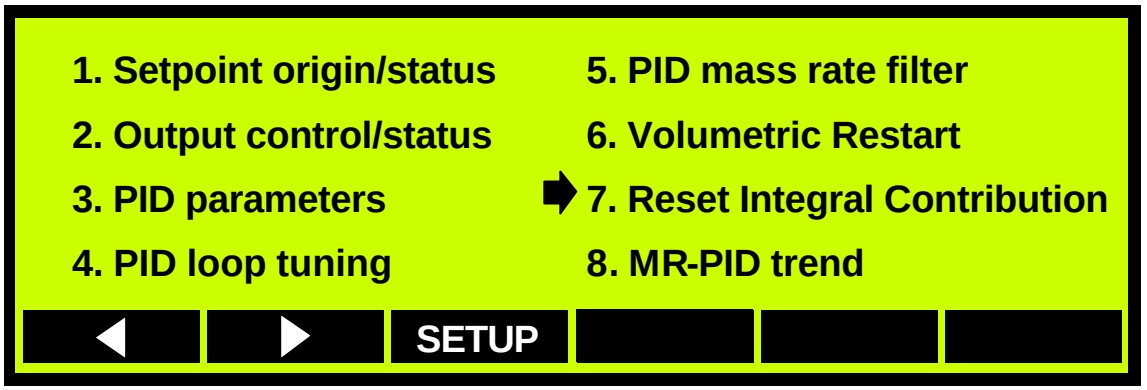
Press the "TICK" key to lock in the selected value.

OPTIMUS OPERATIONAL MANUAL.

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

Reset Integral Contribution.

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

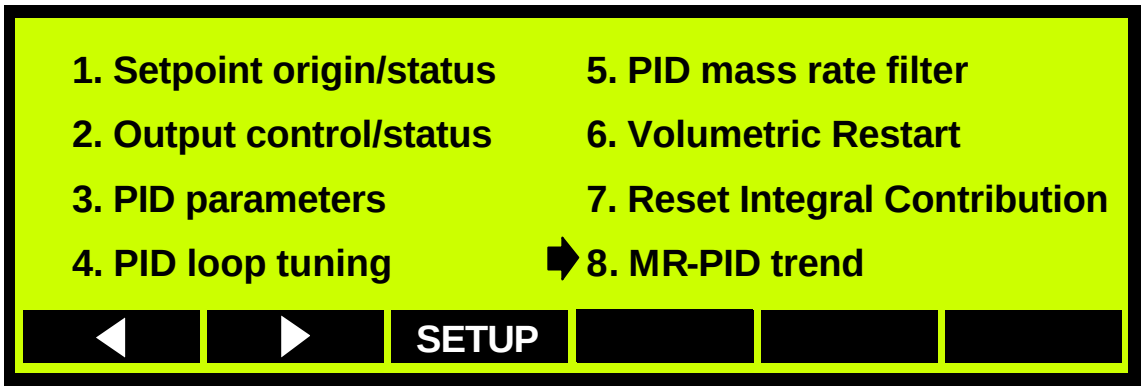


OPTIMUS OPERATIONAL MANUAL.

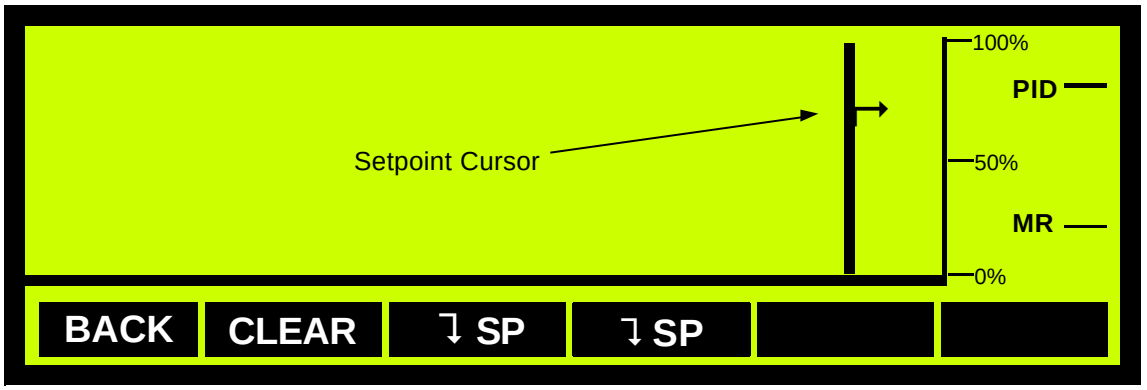
System Setup / PID Loop Control / mass rate & pid output trends.

Mass Rate / PID Trend.

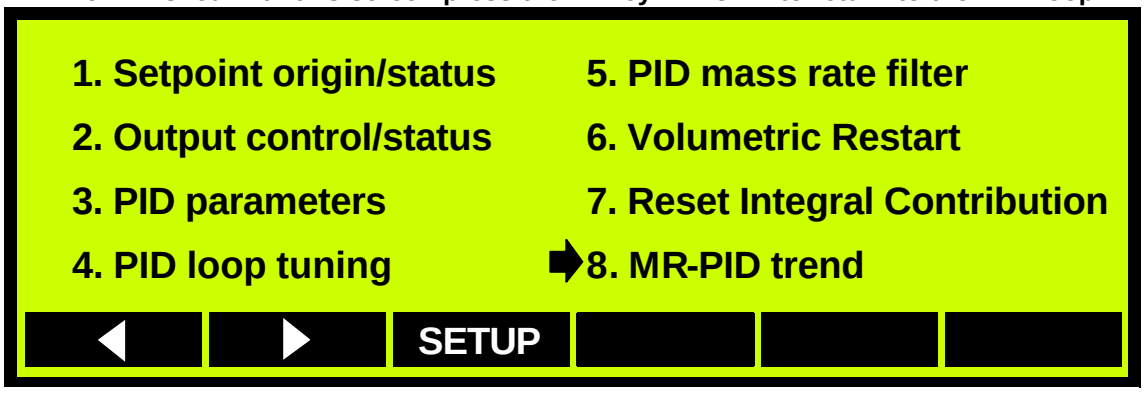
This screen allows the user to view the relationship between the mass rate and the control function output. With the selector arrow opposite the MR-PID trend press "ENTER" to access the trend screen.



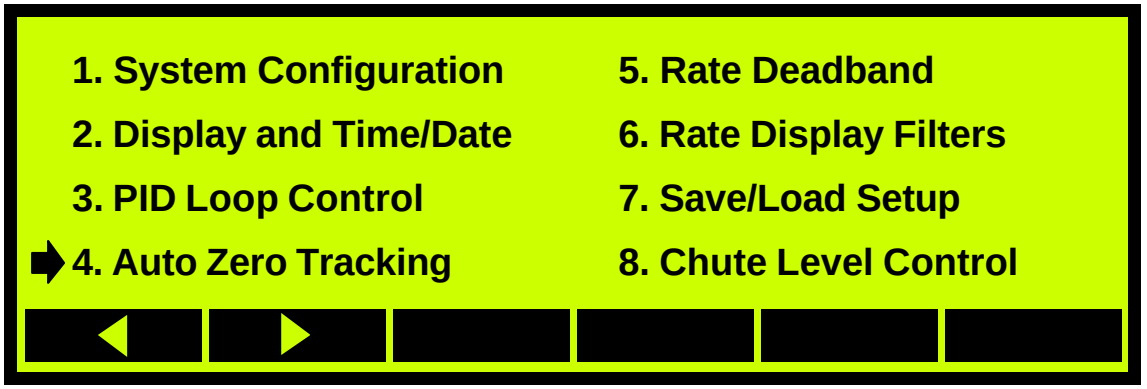
On selecting Menu 8 changes to that shown below. There are two traces, Mass Rate (MR) and PID output (PID). To exit this menu use the F1 key (BACK) to clear the trace use the F2 key (CLEAR). The F3 key (⇂ SP) reduces the setpoint, the F4 key (⇂ SP) increases the setpoint. The arrow attached to the vertical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



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



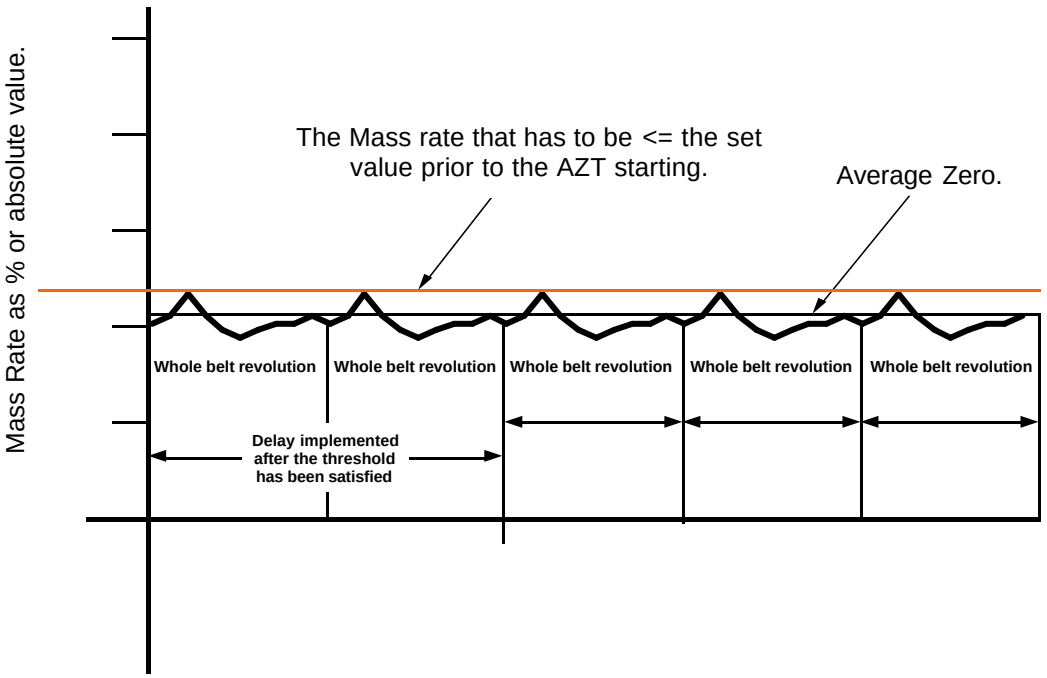
To return to the "SETUP" menu's press the F3 "SETUP key. Scroll the cursor on to Auto Zero Tracking (AZT). Prior to entering data in this menu read the AZT explanation on following page.



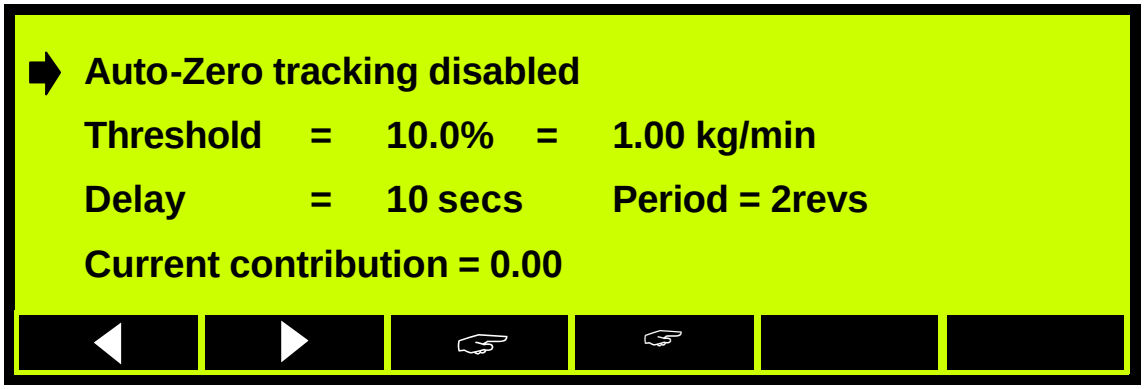
OPTIMUS OPERATIONAL MANUAL.
System Setup / Auto Zero Tracking / overview.

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

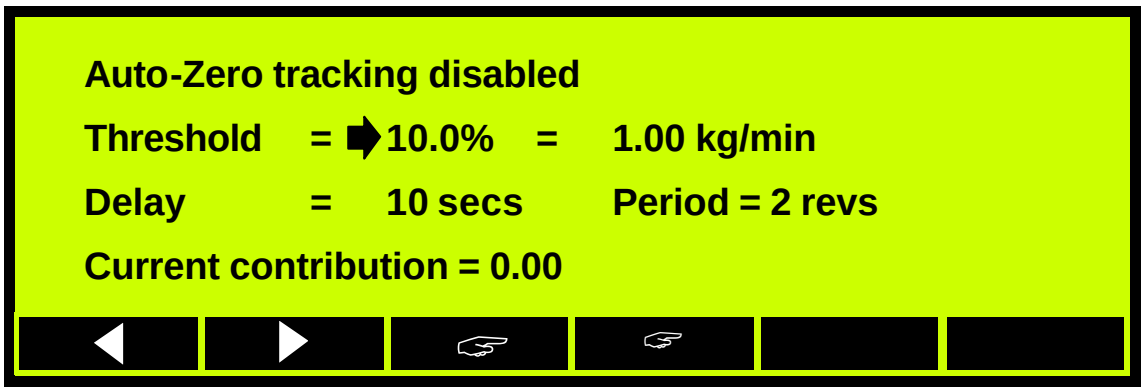
Auto Zero Tracking. (This function should be set up after the scale has be calibrated)
The weight of the weigh belt and the weigh area can change with time. The weight changes can be generally attributed to, wear and tear, product build upon the belt and product build up on the weigh area. If the scale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



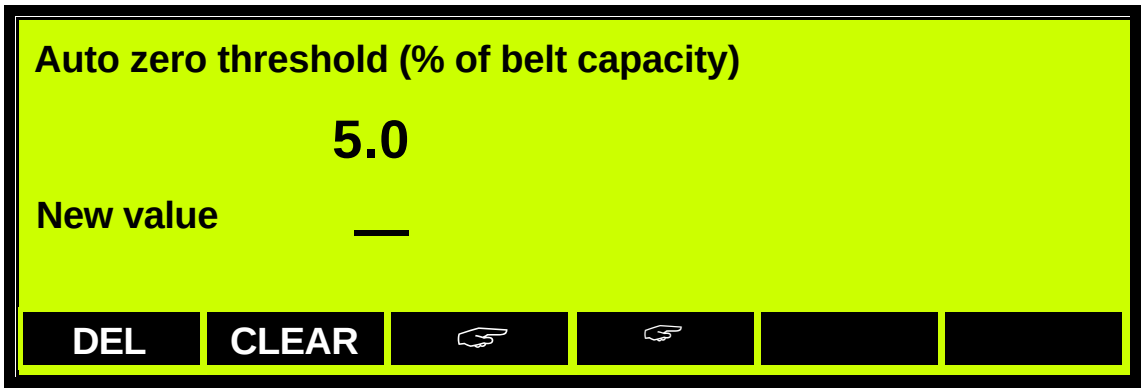
Toggling the "ENTER" key here will either enable or disable the Auto Zero Tracking function (AZT).



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 dead weight effect of the belt switches out the function before a full belt revolution can be completed. Use an input that means something to you and observe the process prior to setting up this screen.

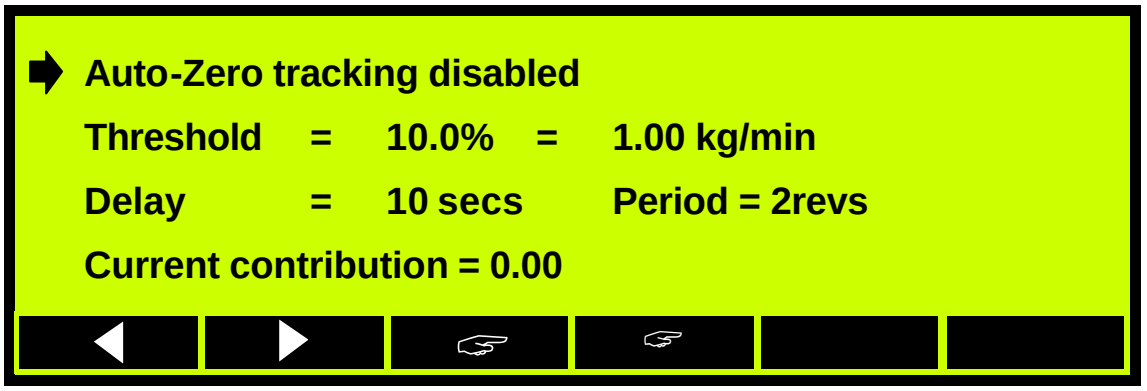


Press the "ENTER" key to adjust the AZT Threshold.

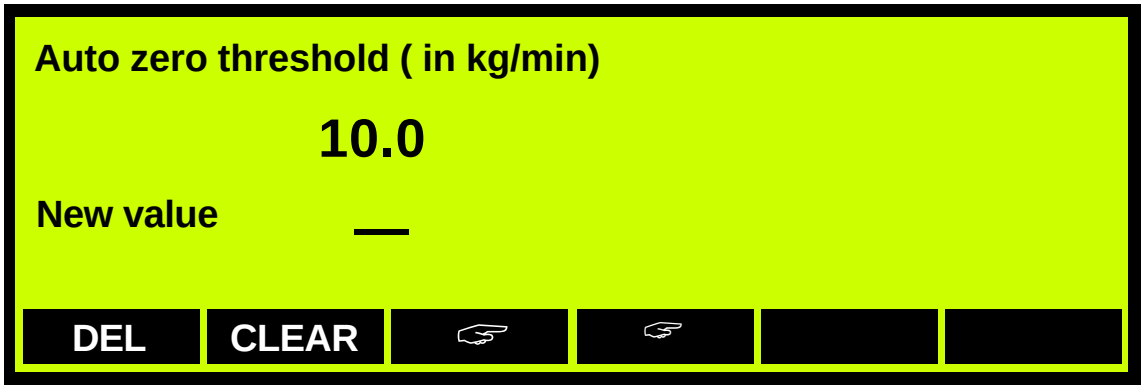


Press the tick key to lock in the new threshold level

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 units. Use the scroll keys to access the Threshold and press "ENTER" key to gain access to data entry screen for either % or units.

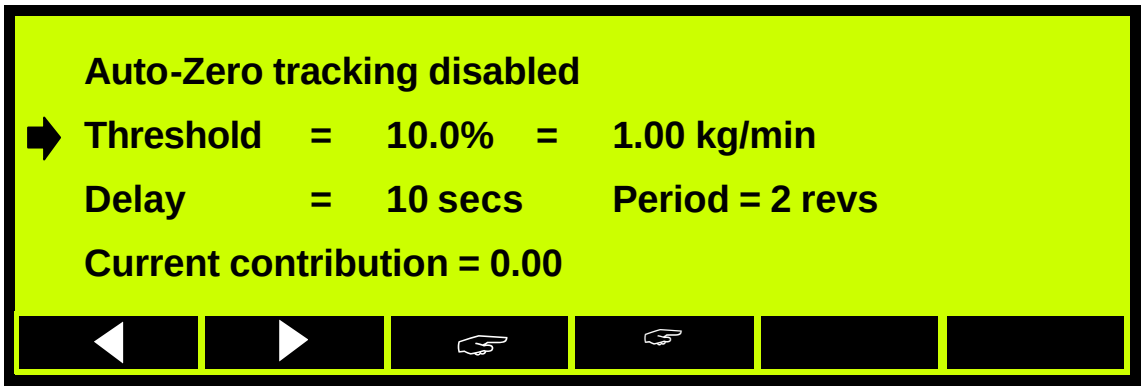


Pressing the "ENTER" key here will bring up the threshold percent data entry screen.

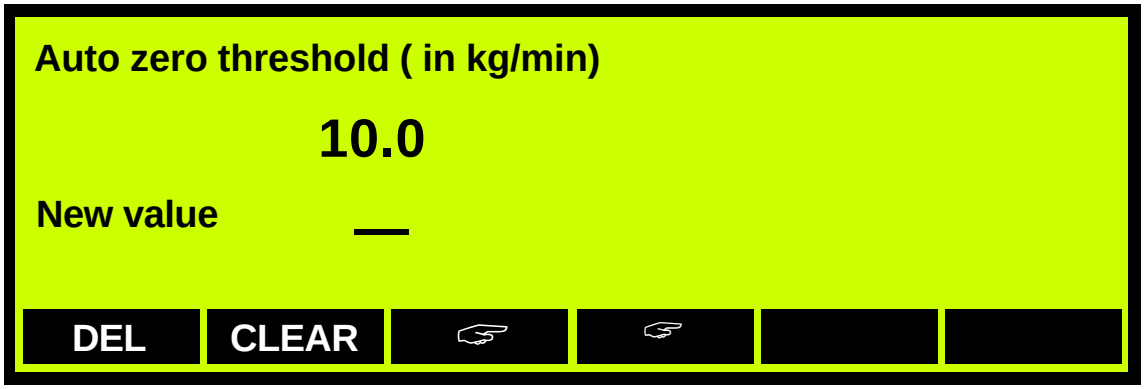


Press the tick key to accept and exit to the previous screen. Or the Cross key to exit to the previous screen

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.



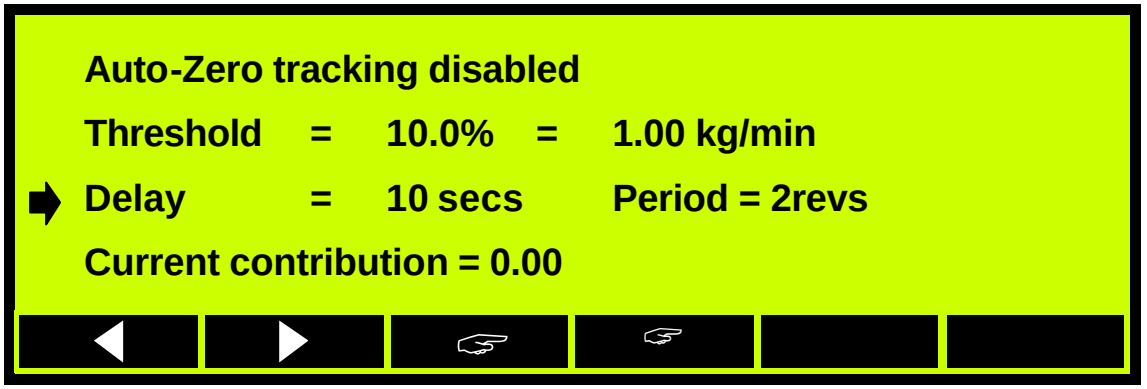
Pressing the "ENTER" key here will bring up the threshold percent data entry screen.



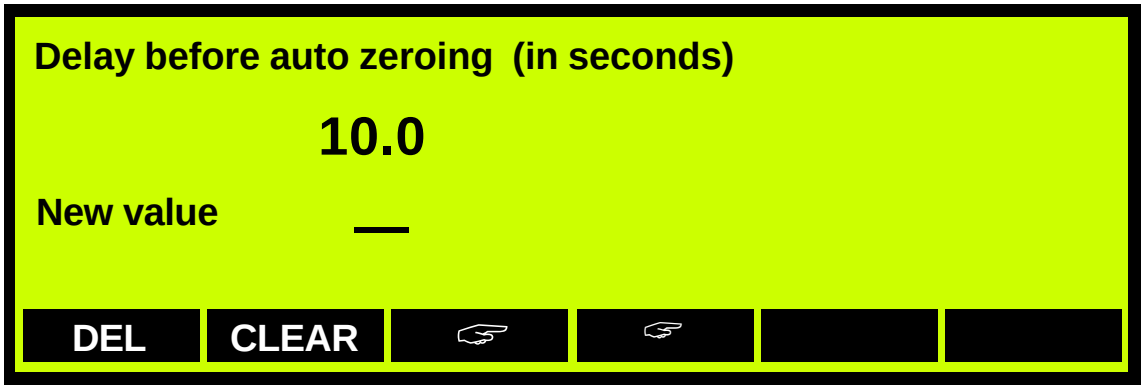
Press the tick key to accept and exit to the previous screen. Or the Cross key to exit to the previous screen.

OPTIMUS OPERATIONAL MANUAL.
System Setup / Auto Zero Tracking / delay.

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.

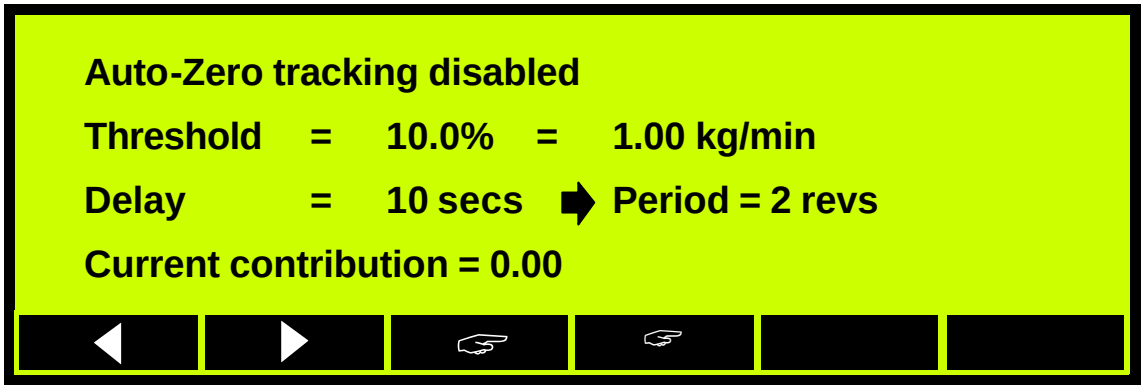


Press the "ENTER" key with the cursor opposite the delay to gain access to the delay data input screen.

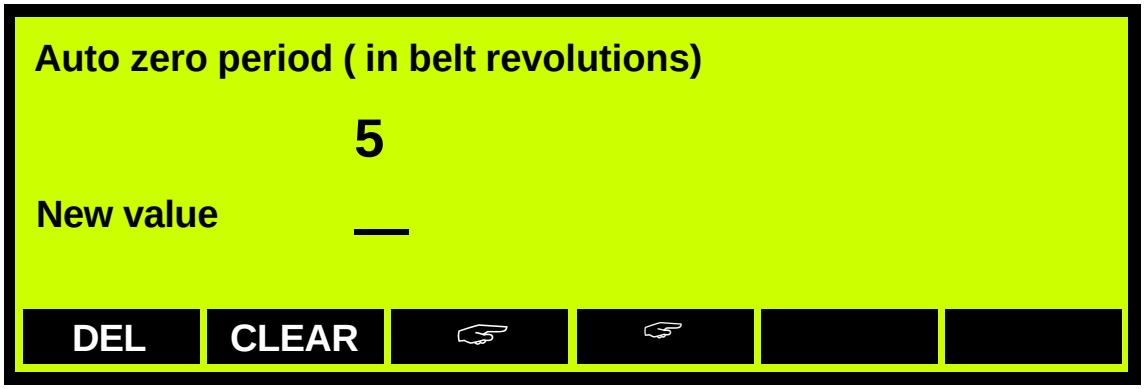


Press the tick key to accept the new value for the delay of the AZT feature

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



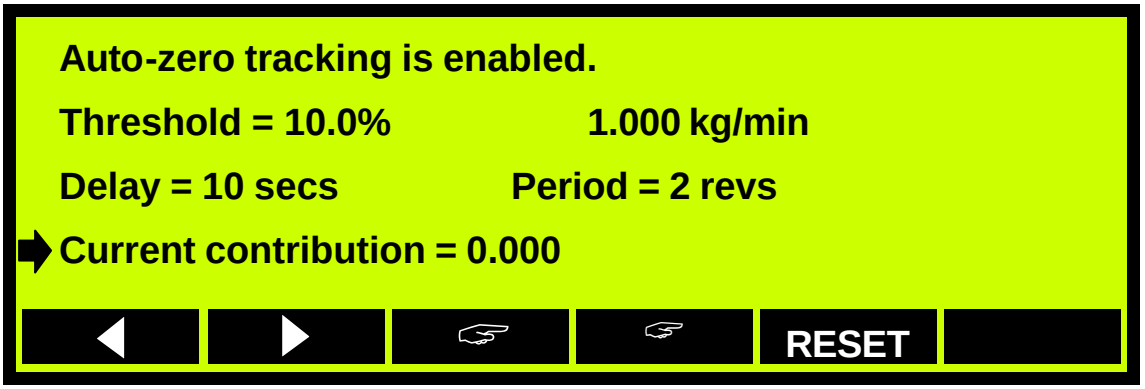
Press the tick key to accept and exit to the previous screen. Or the Cross key to exit to the previous screen

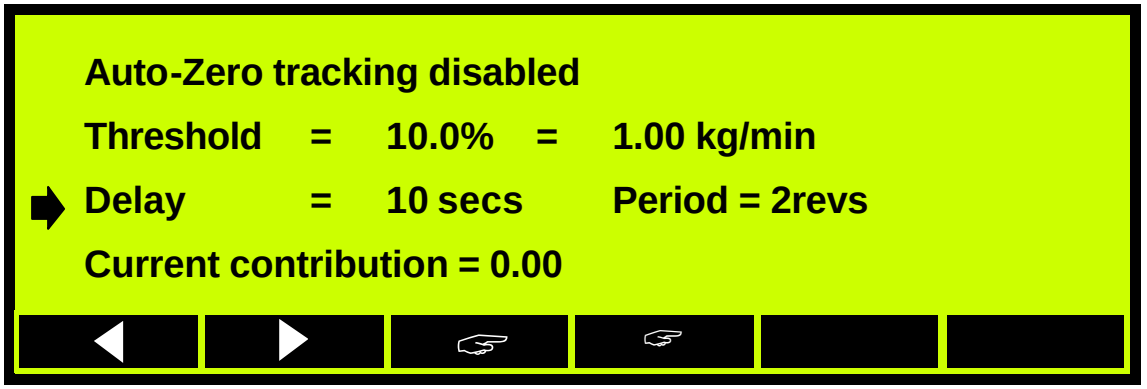
OPTIMUS OPERATIONAL MANUAL.

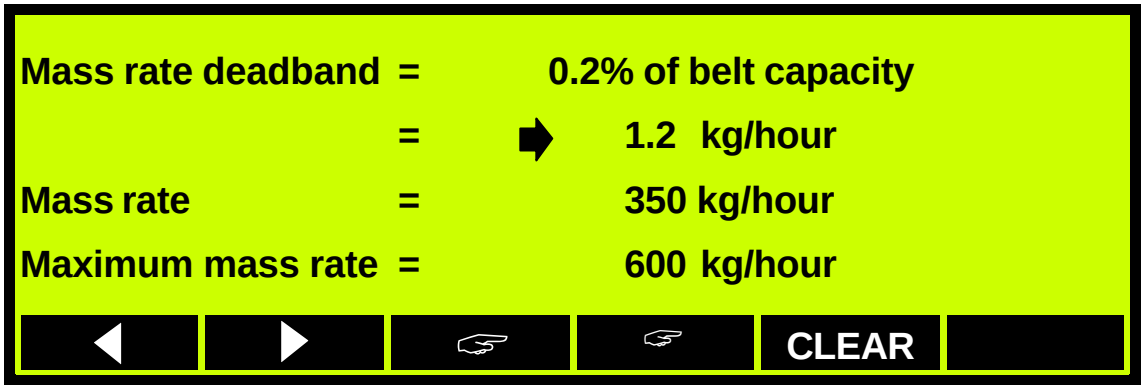
System Setup / Auto Zero Tracking / current contribution.

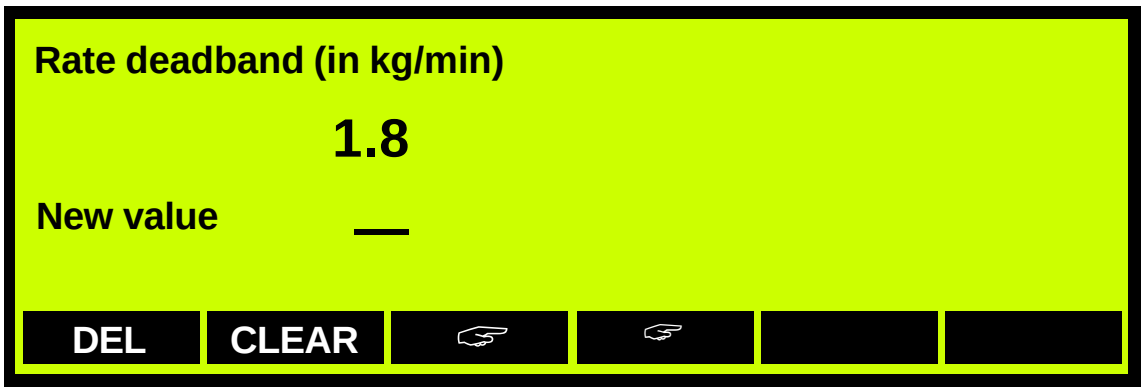
Over time the AZT contribution to the average zero may drift out of limits that can be termed normal. This value will be different for all systems and depends on the working environment, feeder design, product and belt wear. In order that the user can monitor performance of the AZT routine Optimus has been 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.

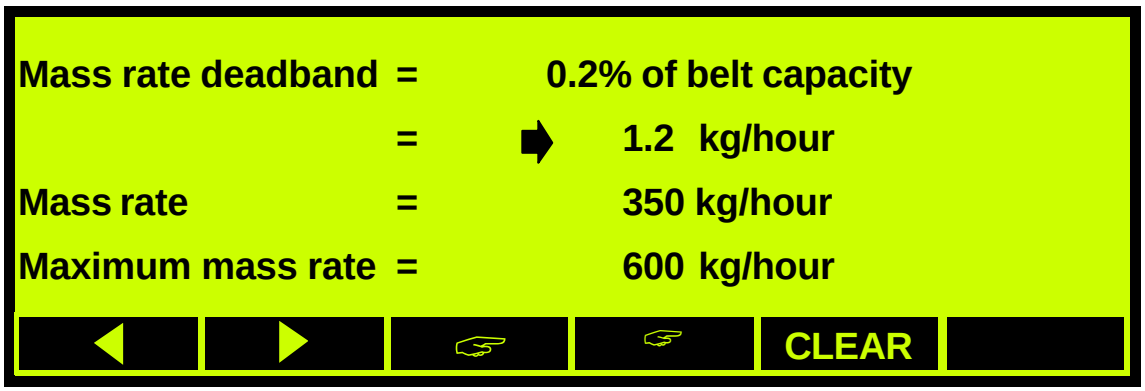
Press the "RESET" key (F5). To gain access to the AZT reset.

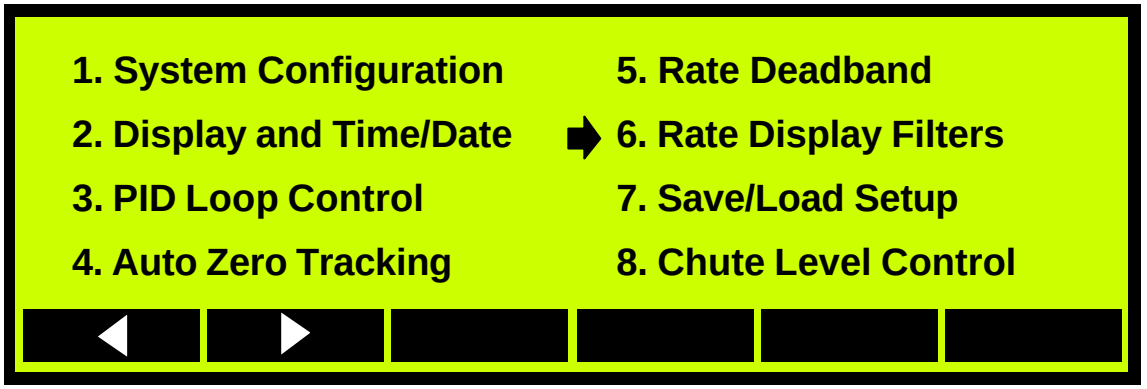


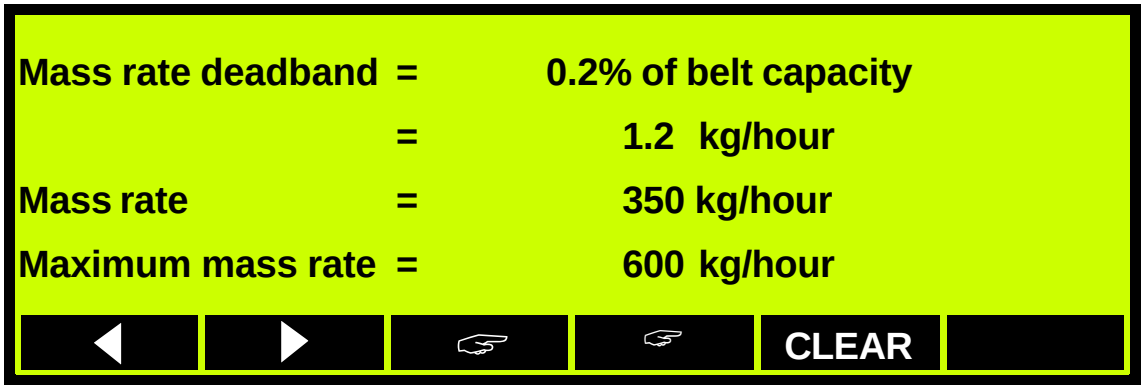


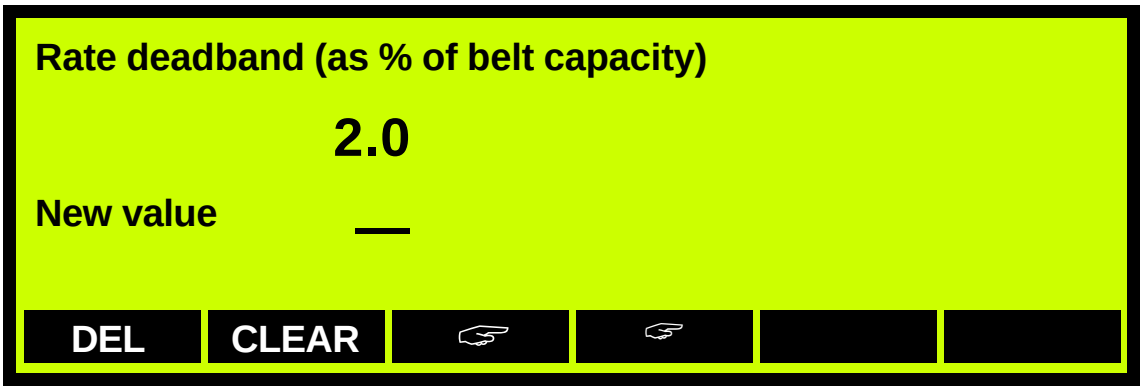

Mass rate deadband = 0.2% of belt capacity
= 1.2 kg/hour
Mass rate = 350 kg/hour
Maximum mass rate = 600 kg/hour
CLEAR


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

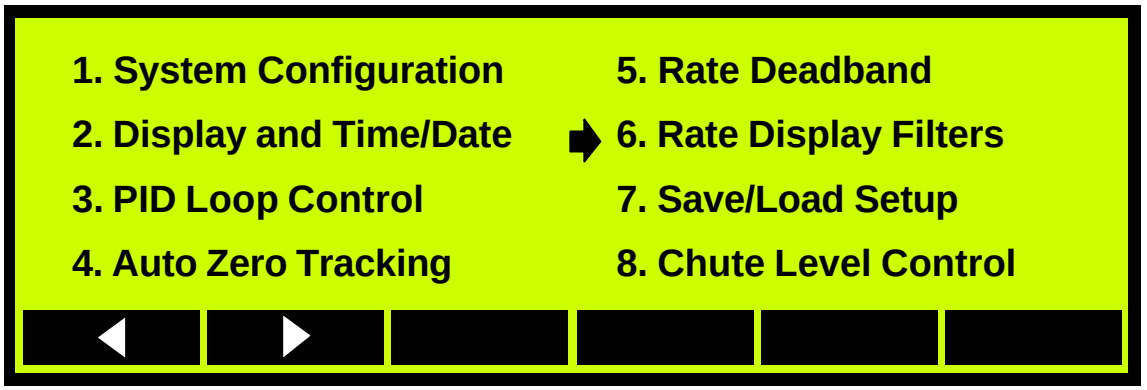

1. System Configuration
2. Display and Time/Date
3. PID Loop Control
4. Auto Zero Tracking
5. Rate Deadband
6. Rate Display Filters
7. Save/Load Setup
8. Chute Level Control


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

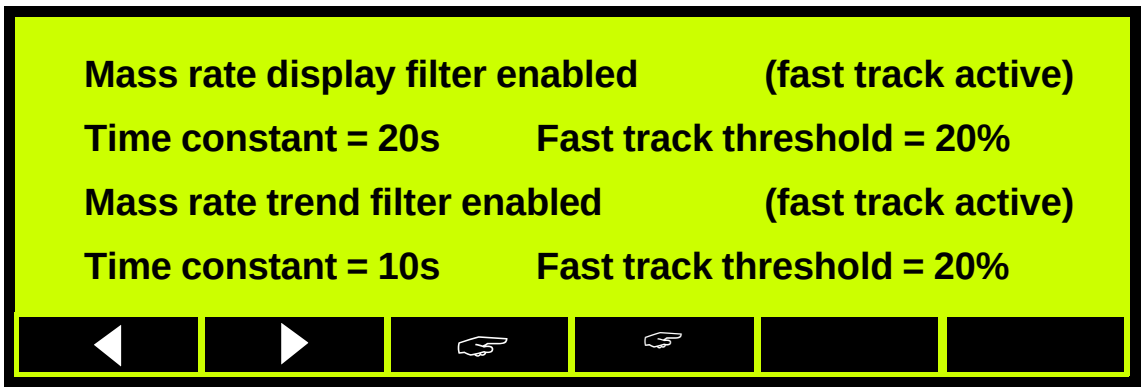

Rate deadband (as % of belt capacity)
2.0
New value
DEL
CLEAR

OPTIMUS OPERATIONAL MANUAL.
System Setup / Rate Display Filters / time constant.

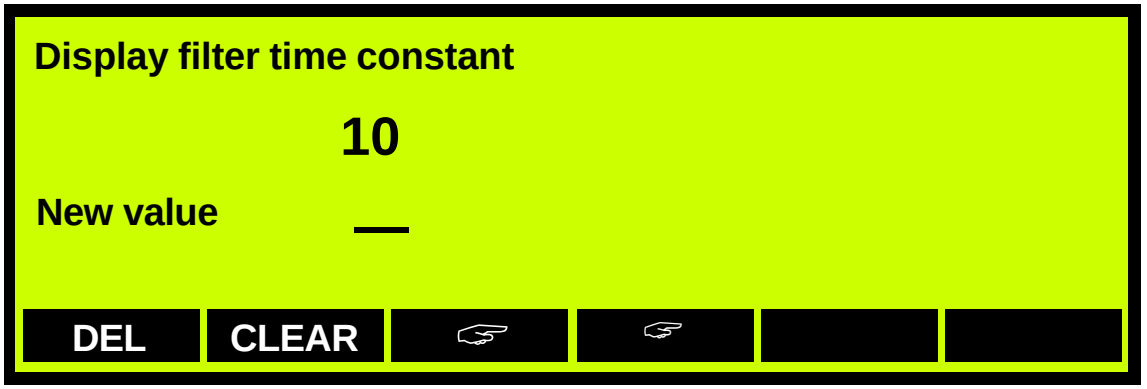
The analogue Mass Rate output signal can be filtered. Scroll to Rate Display Filter and press "ENTER" to show the menu for mass Rate Filtering.



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



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

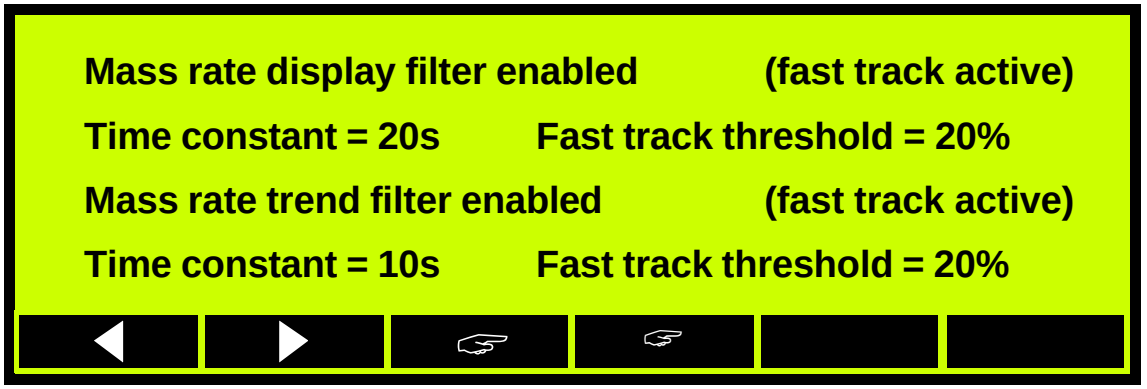


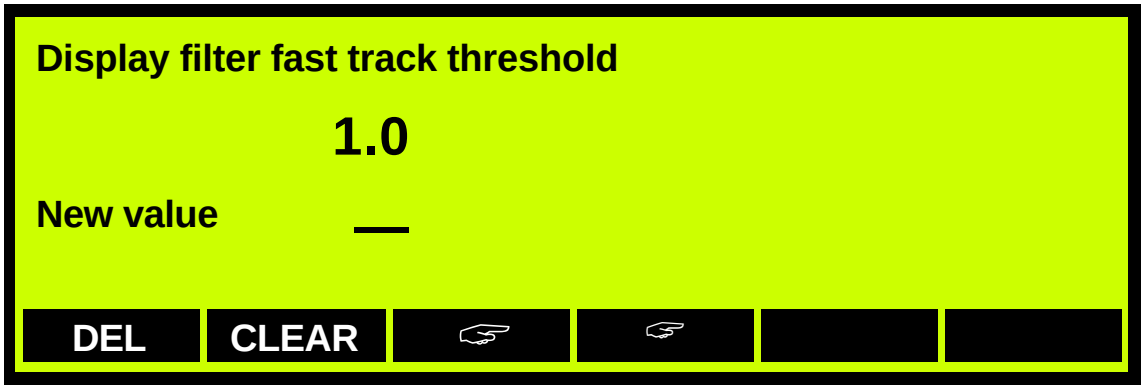
Enter the value required for the time constant in the above screen and press the Tick key to accept and return to the PID screen.

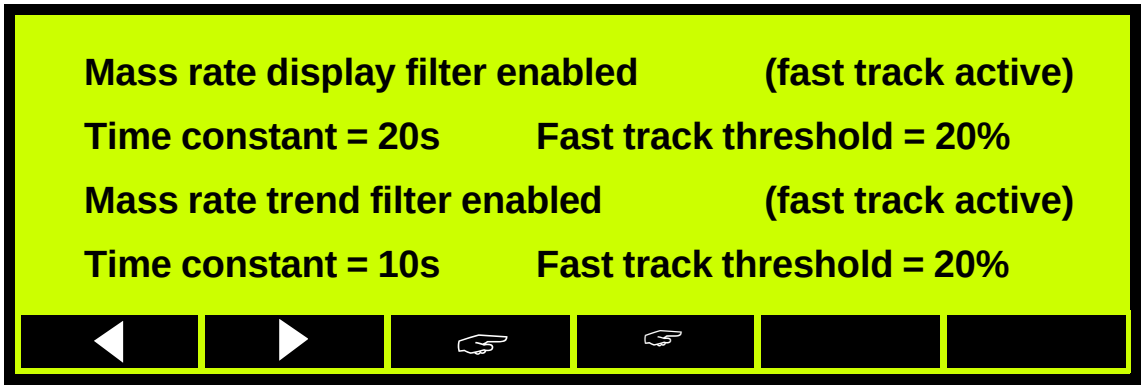
OPTIMUS OPERATIONAL MANUAL.
System Setup / Rate Display Filters / fast track threshold & time.

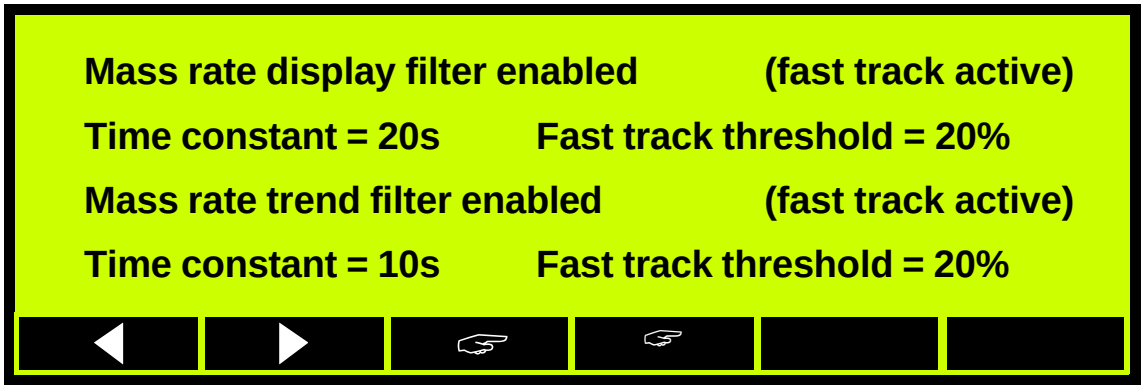
The Mass Rate Filter.

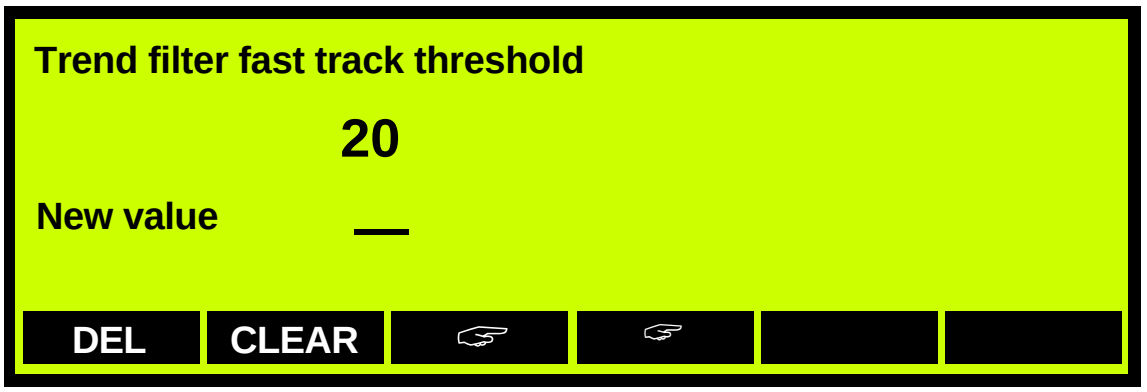
This feature allows the user to dampen the Mass Rate analogue output. Mass rate filter has fast tracking facility associated with it. The filter can be switched off by Setting the "Threshold" to 0% . If the filter is required without the fast track feature, set the "Threshold" to 100%.





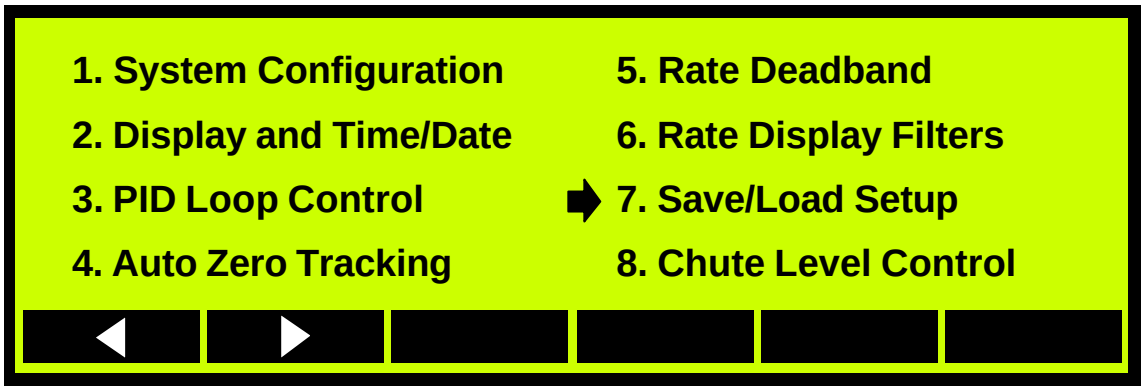



Mass rate display filter enabled (fast track active)
Time constant = 20s Fast track threshold = 20%
Mass rate trend filter enabled (fast track active)
Time constant = 10s Fast track threshold = 20%


Trend filter fast track threshold
20
New value
DEL
CLEAR

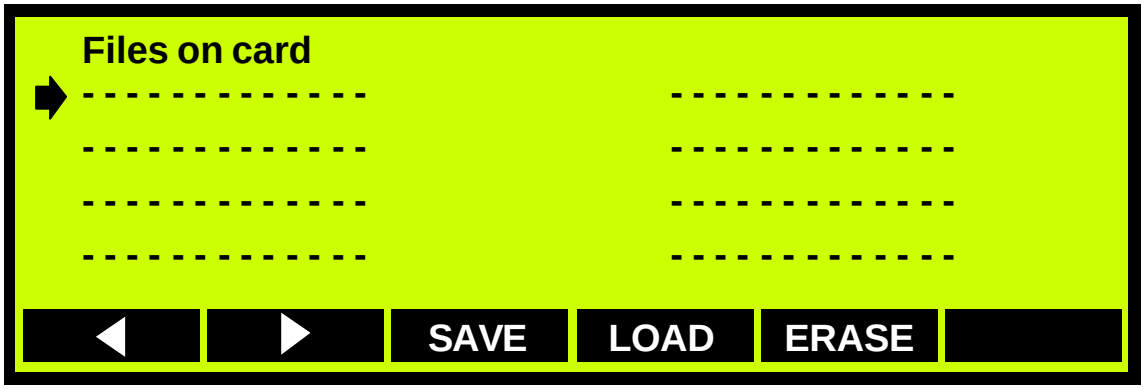
Save/Load Setup.

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 accurately should the main pcb fail.



Scroll on to save/Load Setup.

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

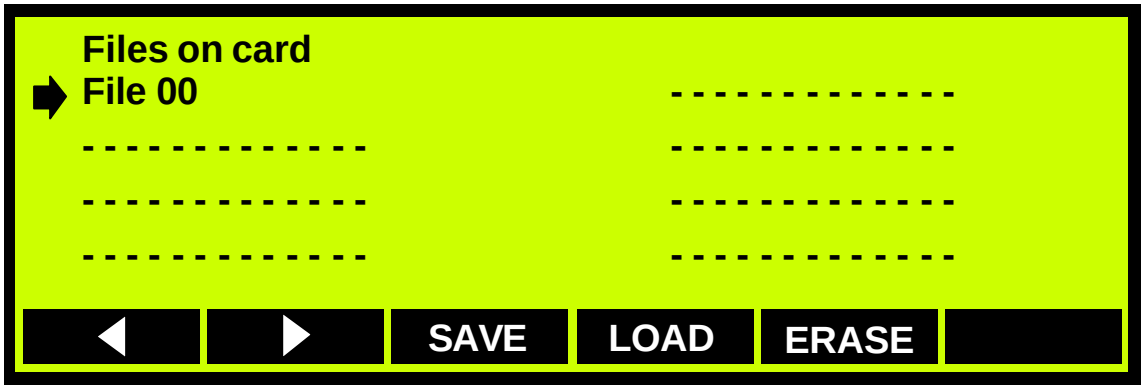


Optimus will now save the data to the next available file. In this case File 00, there will be a small delay between pressing F3 "SAVE" and the screen shown below presenting.

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

OPTIMUS OPERATIONAL MANUAL.
System Setup / Save / Load Setup.

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.



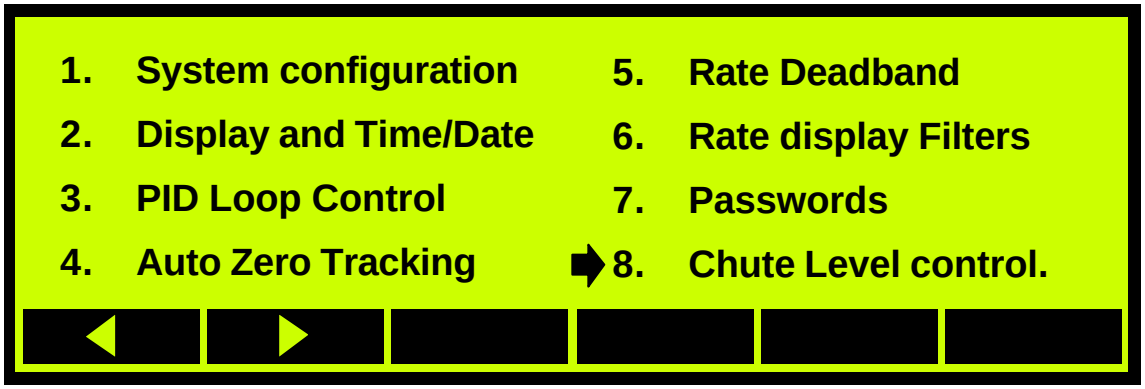
To down load previously stored data, select the file required by placing the cursor along side the file and press the F4 “LOAD” key.

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

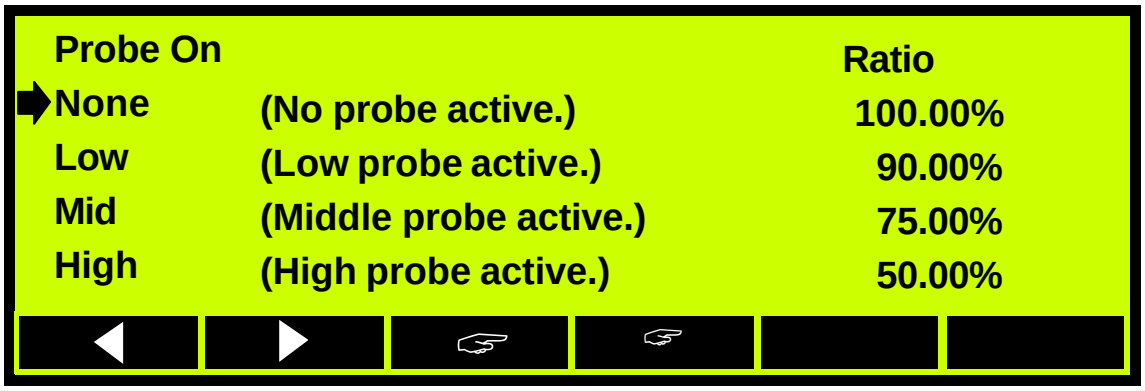
<u>To Erase Files</u>, select the file to erase by placing the cursor along side it. Then Press F5 “ERASE” it.

OPTIMUS OPERATIONAL MANUAL.
System Setup / Chute Level Control.

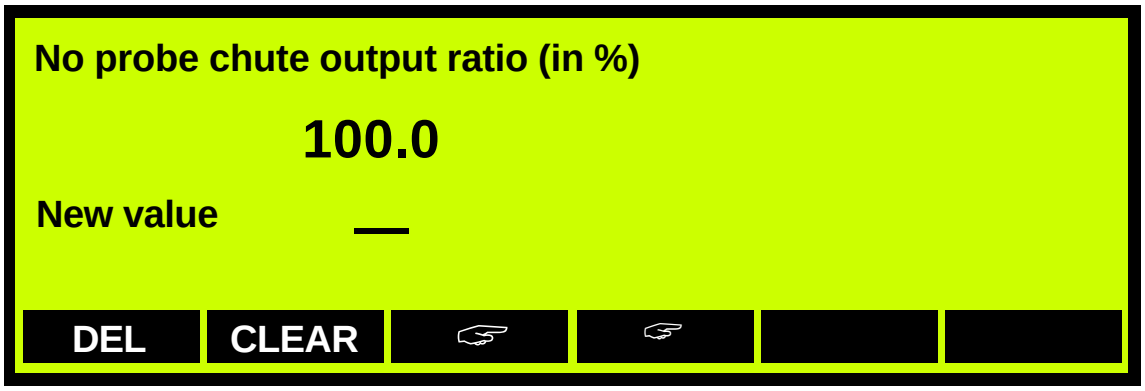
Some processes require that the weighfeeder be pre-fed by means other than a choked supply (overhead bin or silo). Generally a volumetric screw feeder is used. This type feeder is unable to control the rate at which product is supplied to a regular weighfeeder inlet chute. A standard weighfeeder inlet chute will have little volumetric capacity and therefore will be subject to the vagaries of the plant demand. As a weighfeeder can only adjust the feed rate by means of belt speed variation, any abnormal deviations from set-point can result in over supply or under supply to the feeder. This will result in the 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.



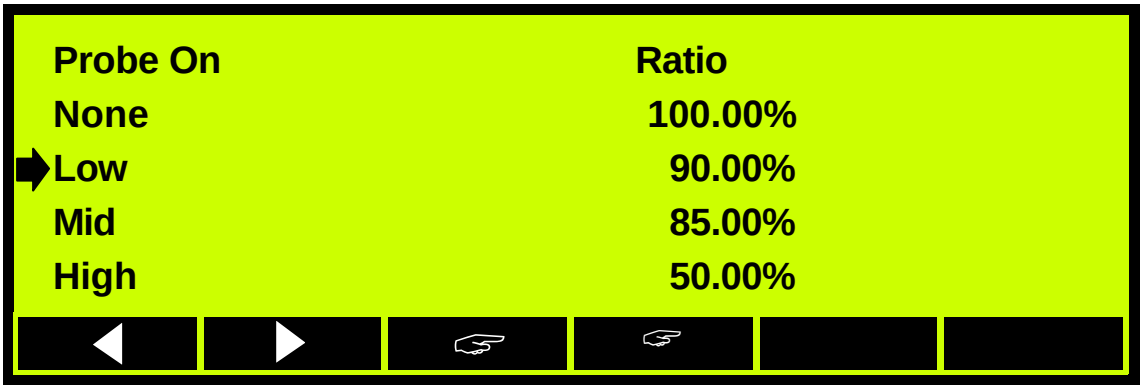
Scroll to Chute Level Control, press ENTER to set up and modify the chute level control action. At this point assigned probes can be associated with a output speed function. Generally the weighfeeder will have been fitted with three probes prior to despatch. They are referred to as Low, Mid, High. The 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 inverter will be driven to 20mA, 100% output. With just the Low probe active and the inlet chute approximately 1/3 full the current loop will be driven to 18.4 mA. When the Low & Mid probes are on the current loop out put will be 16.0 mA and with all three probes on the out put will be 12 mA.



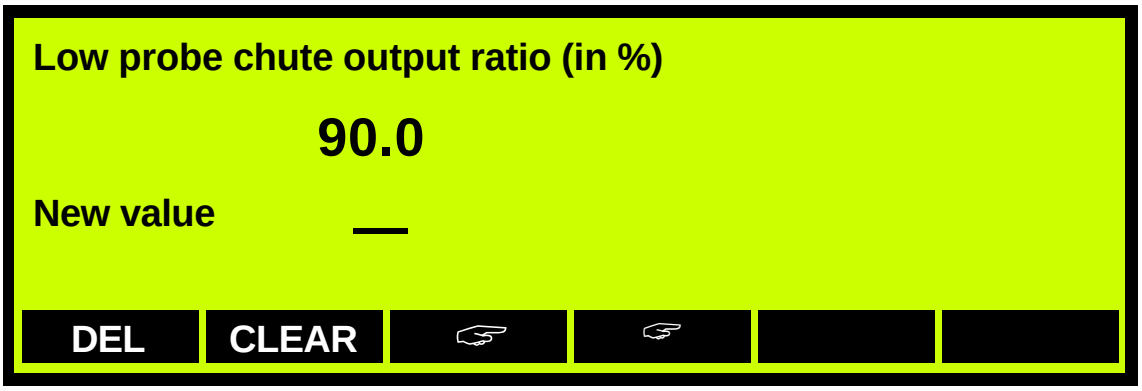
Pressing ENTER will provide the user with an input screen where each probe can be assigned with an output ratio function.



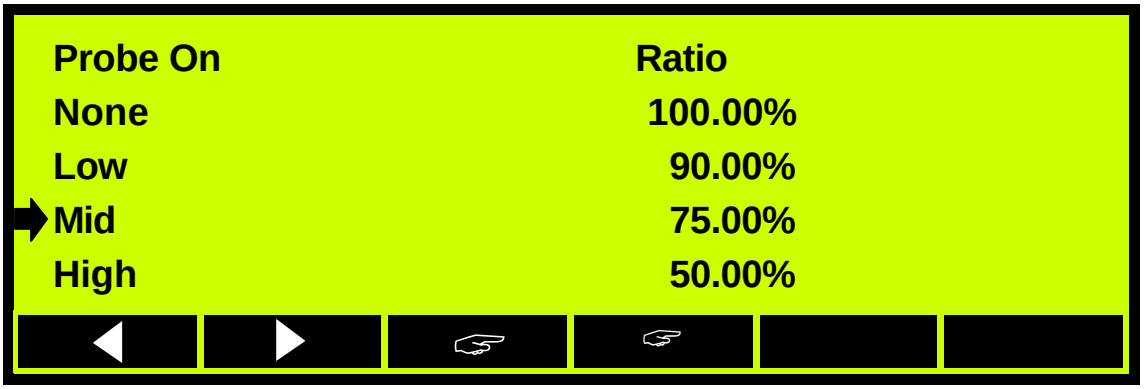
Observe the process and assign a mA output to the assigned current loop that best satisfies the process requirement, when the chute has become empty. Press the tick key to lock in the data and return to the probe assignment screen.



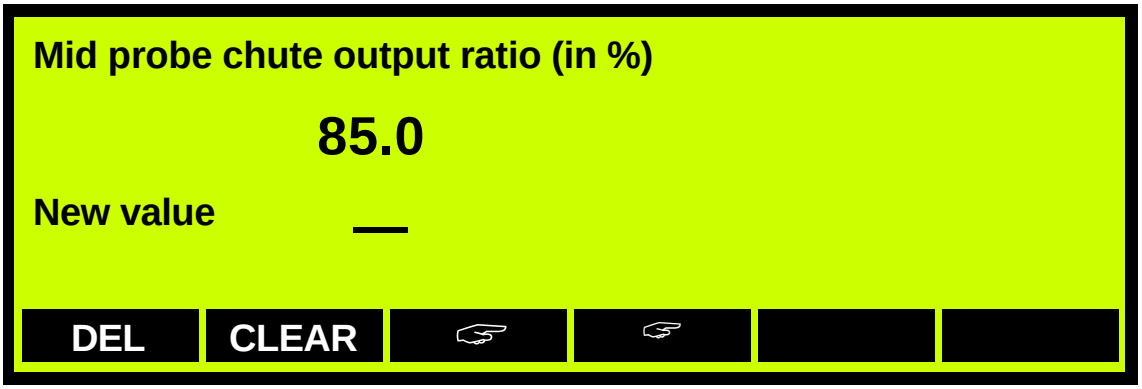
Scroll on to the "Low" probe and assign an output to the current loop.



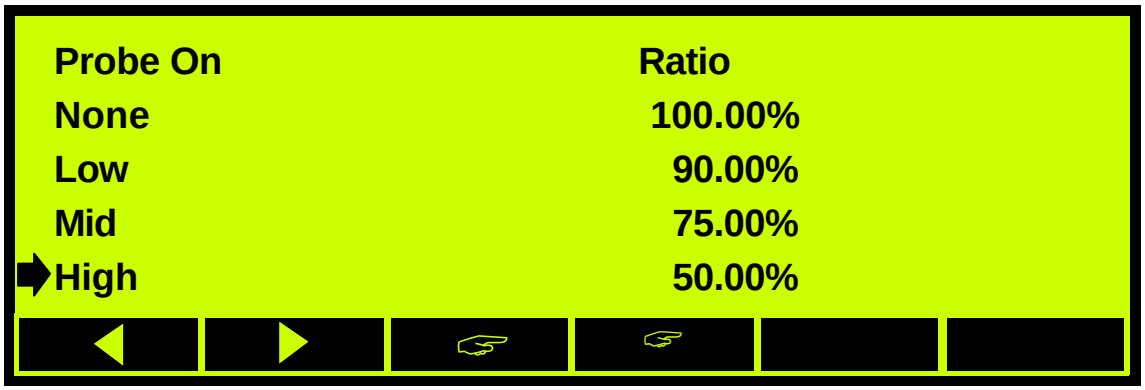
Scroll on to the "Mid" probe and assign an output to the current loop.



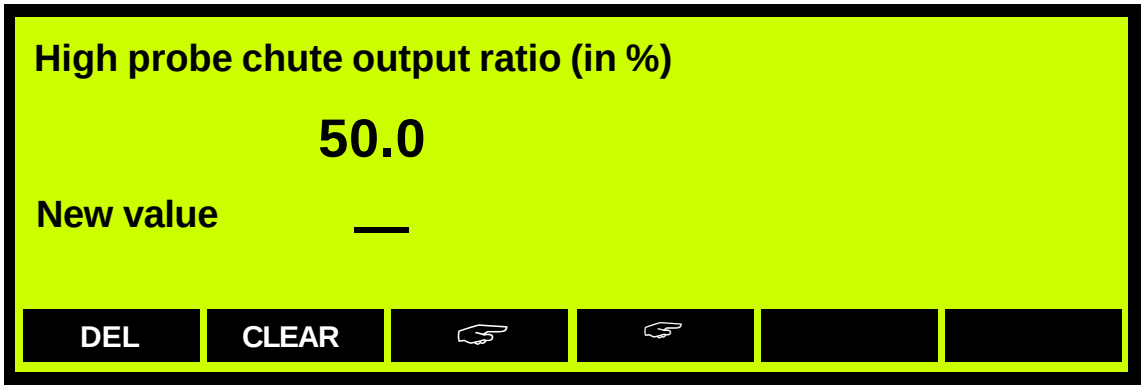
Assign a current output to the activation of the “Mid” probe.



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.



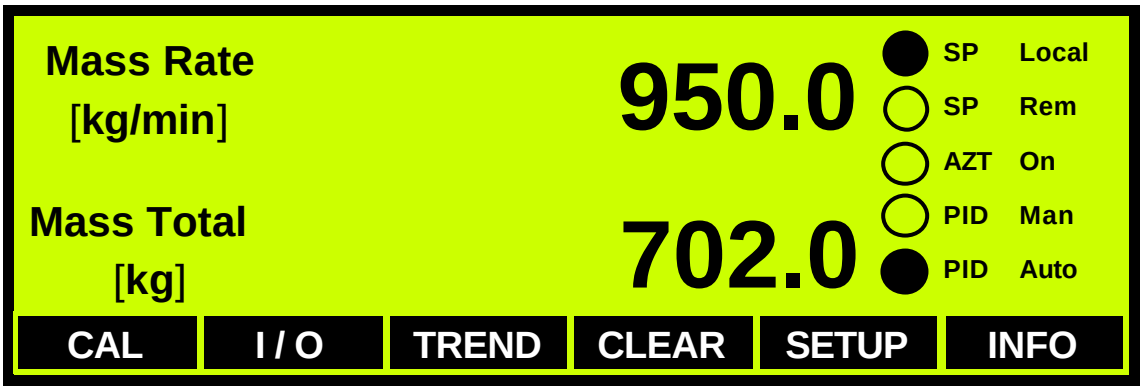
Enter the current output required when the chute probe “High” is on and press the tick key to lock in the data and return to the probe assignment screen.

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

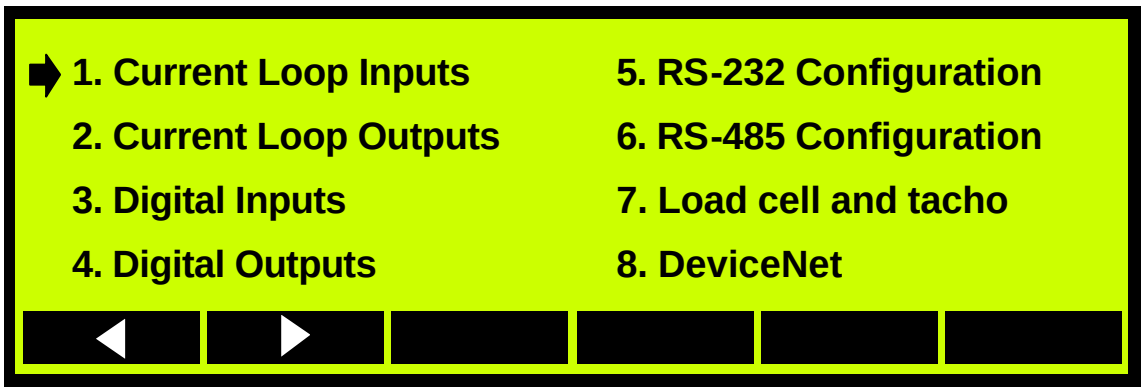
Optimus provides six for (6) analogue input circuits. One is reserved or the Remote Rate Input. The remaining five are re-assignable. Optimus's analogue inputs are current and can be configured to be one of the following.

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

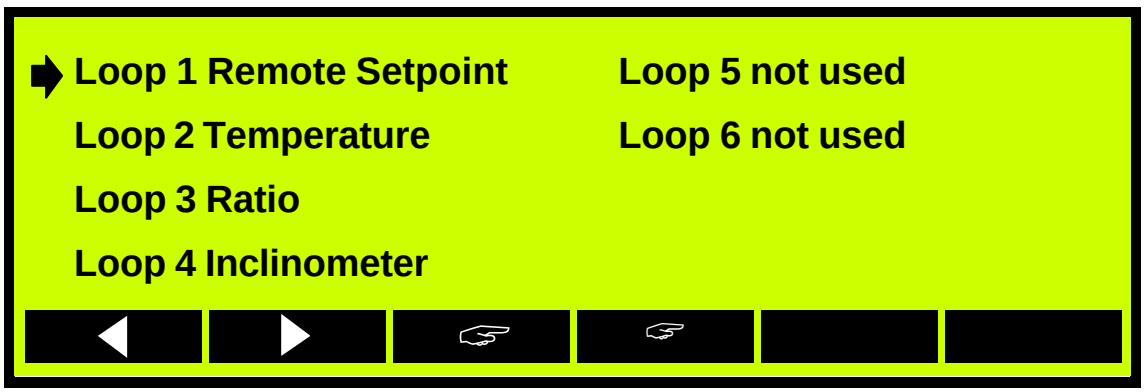
From the MRMT screen select the Input / Output (I/O) F2 key



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

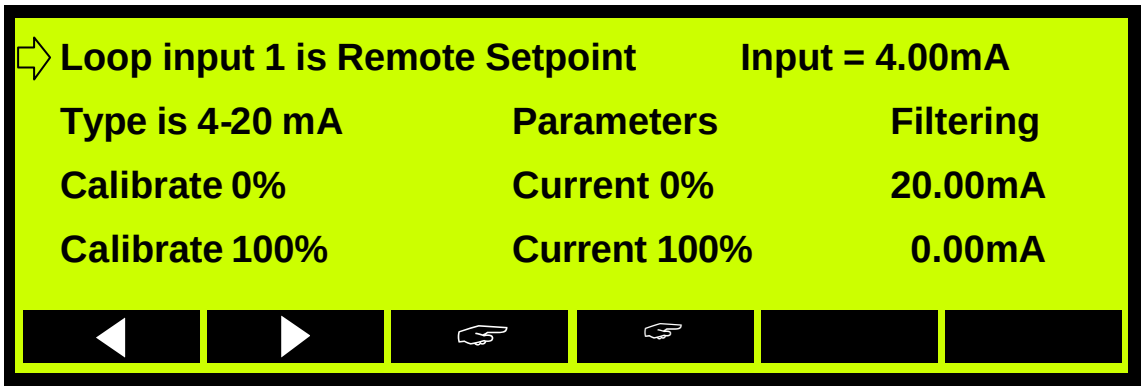


Press the "ENTER" key to gain access to the Current Loop 1 Setup screens.

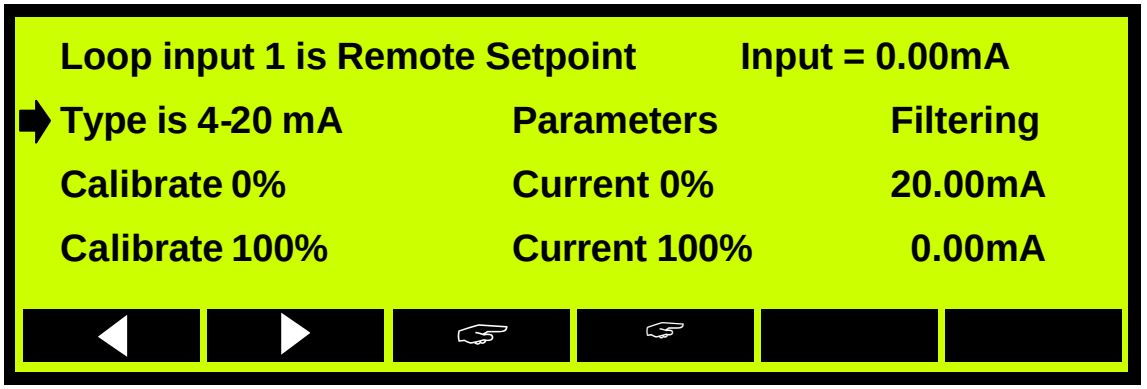


Loop 1 Setup

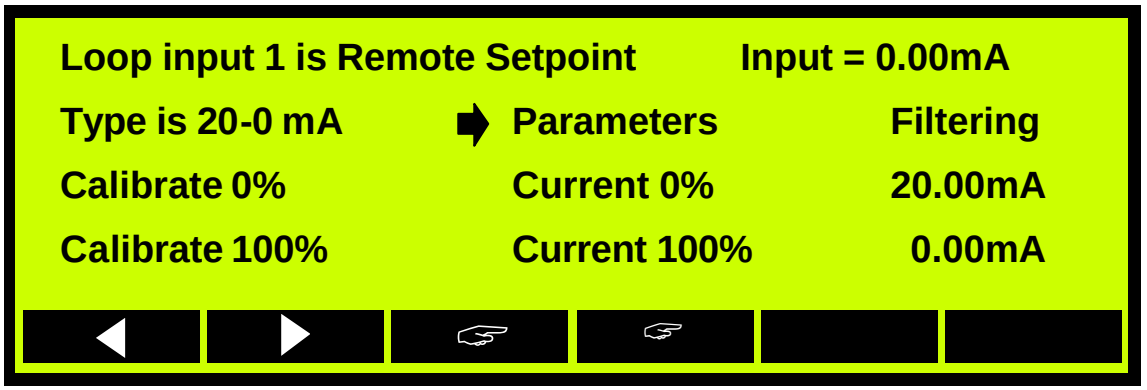
Note Current Loop Input 1 is reserved for the remote Setpoint input. This is indicated by selection cursor changing from a filled cursor to an outline of a cursor.
The Input display shows the current input signal.



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.

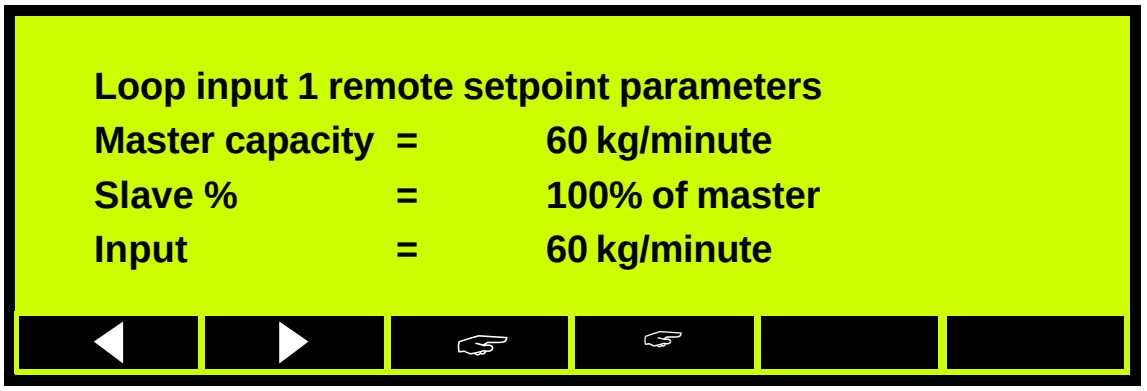


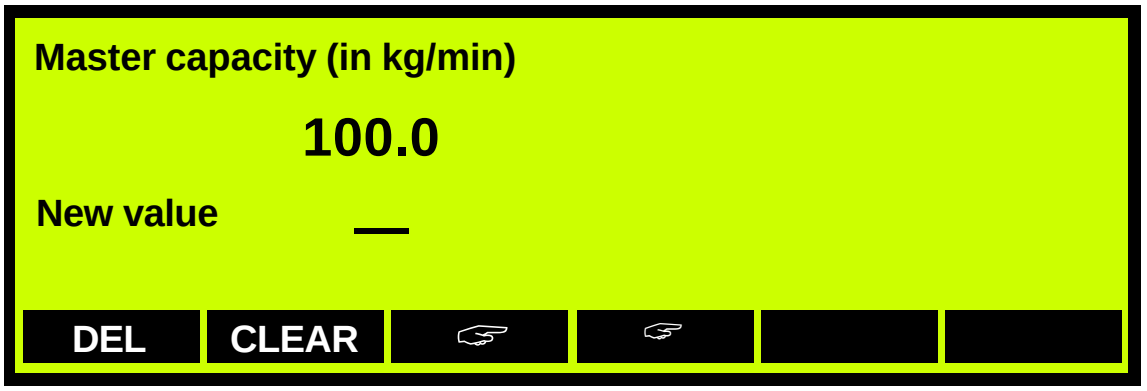
Scroll on to the "Parameters"

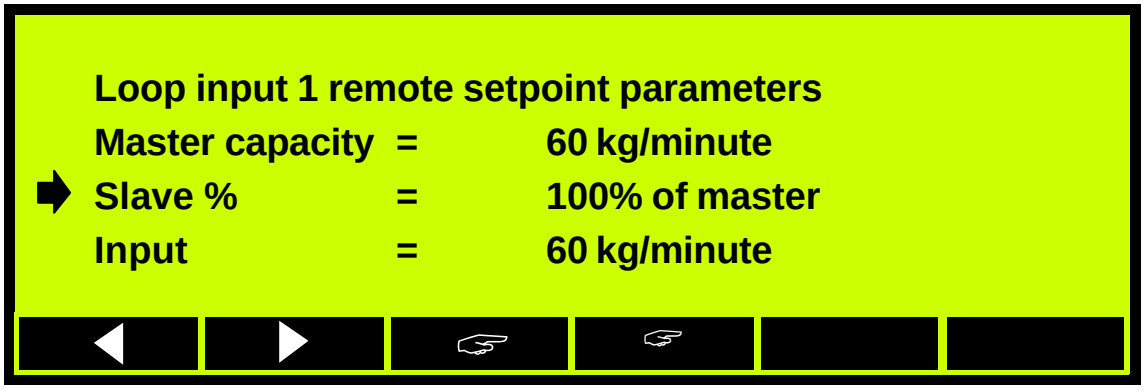


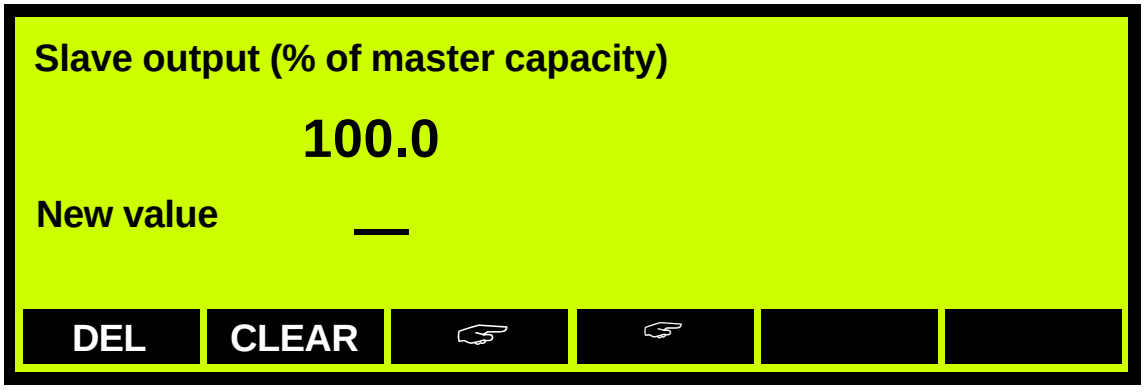
OPTIMUS OPERATIONAL MANUAL.
I/O (Input/Output) / *Current Loop Inputs.*

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

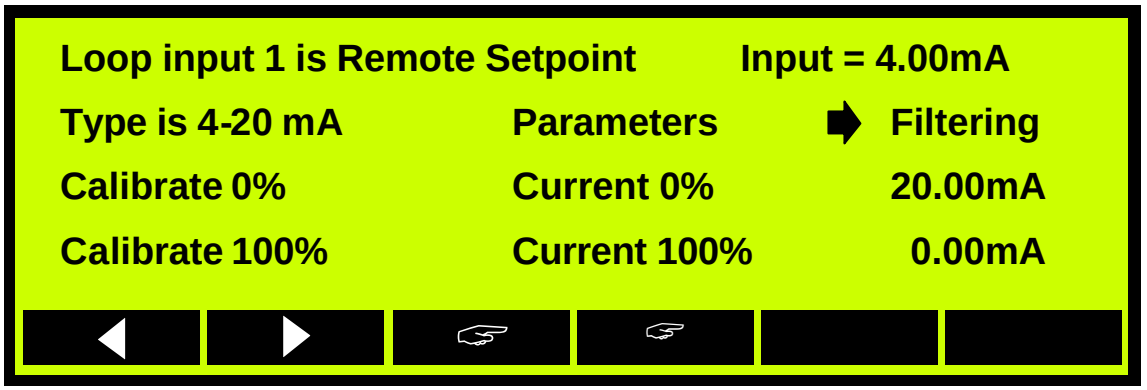




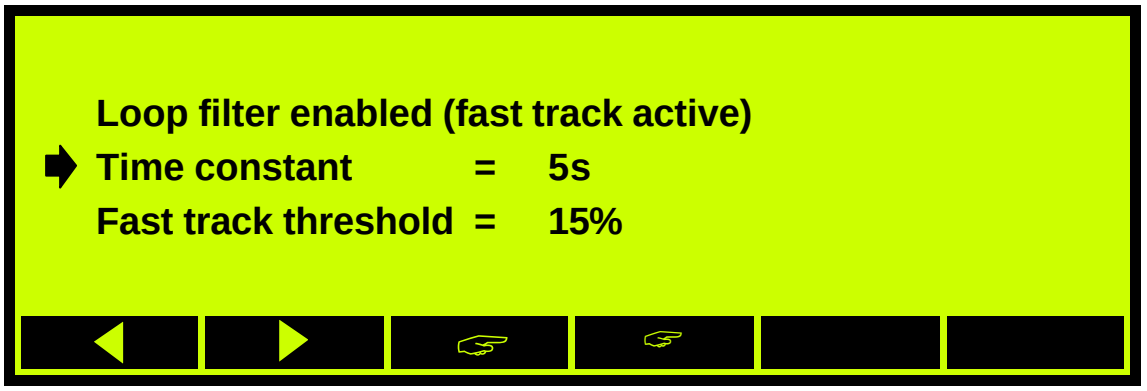




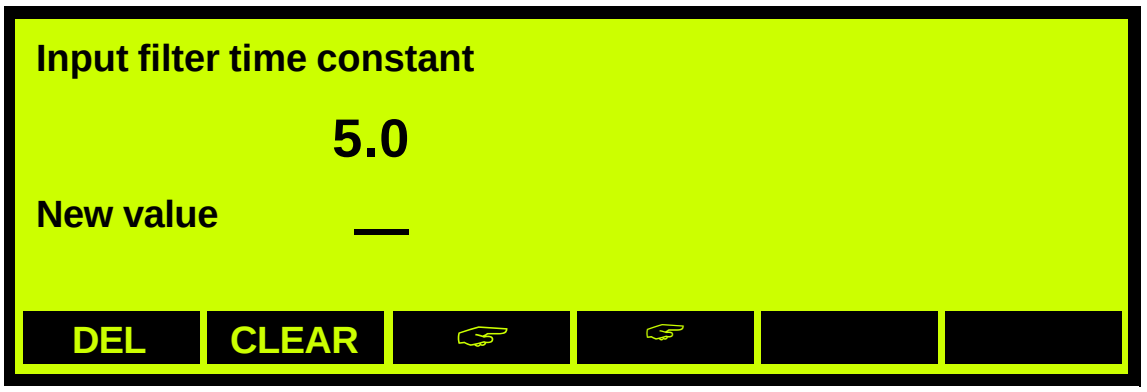
Use the scroll forward key to move the cursor on to the Filtering entry point.



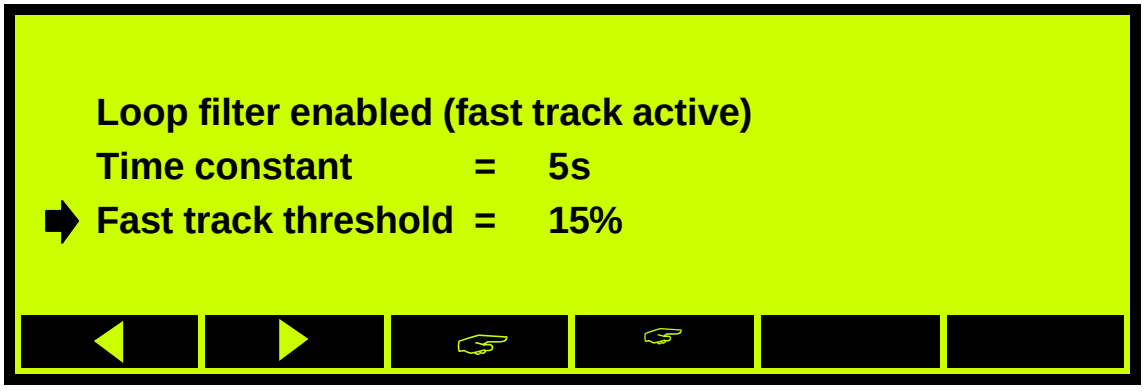
Press the "ENTER" key to gain access to the current loop input filtering, reserved for remote setpoint ("REM SET" as shown on the connection pcb). Scroll on to "Time Constant"



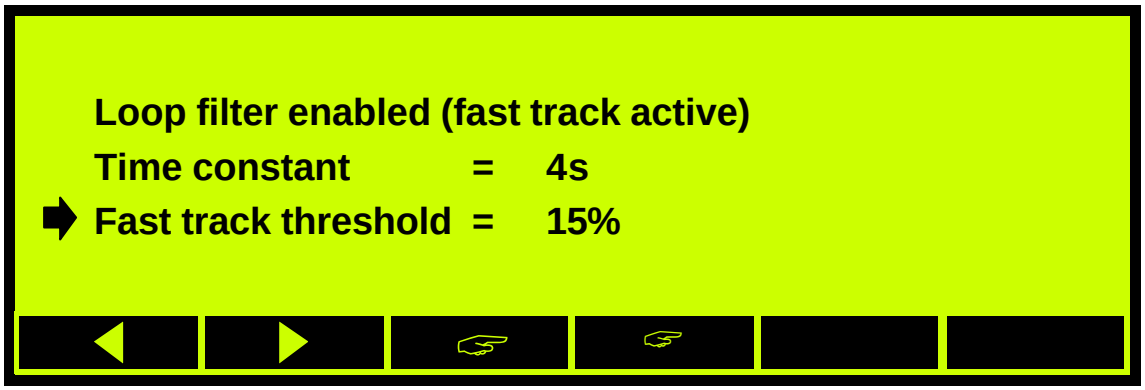
Press "ENTER" to gain access to the data input screen.



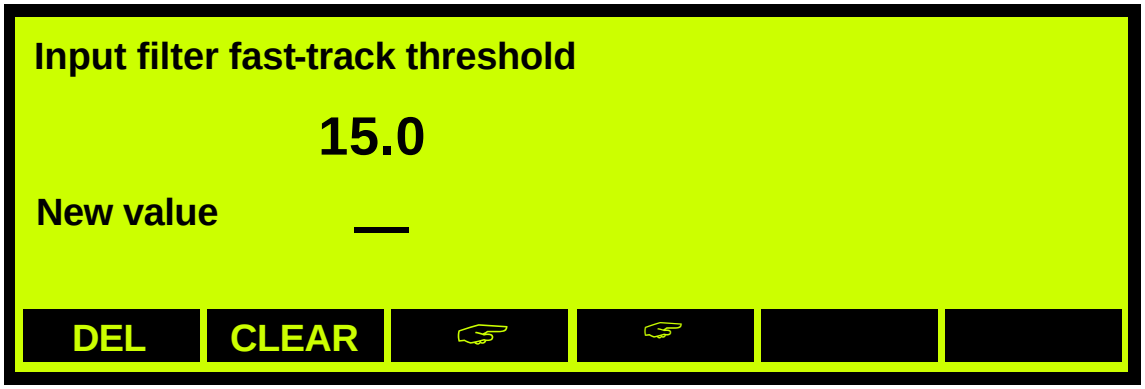
Enter the time filtering constant required and press the tick key to lock in the data and return to the loop filter setup screen. Press the scroll forward key to access the Fast Track Threshold.



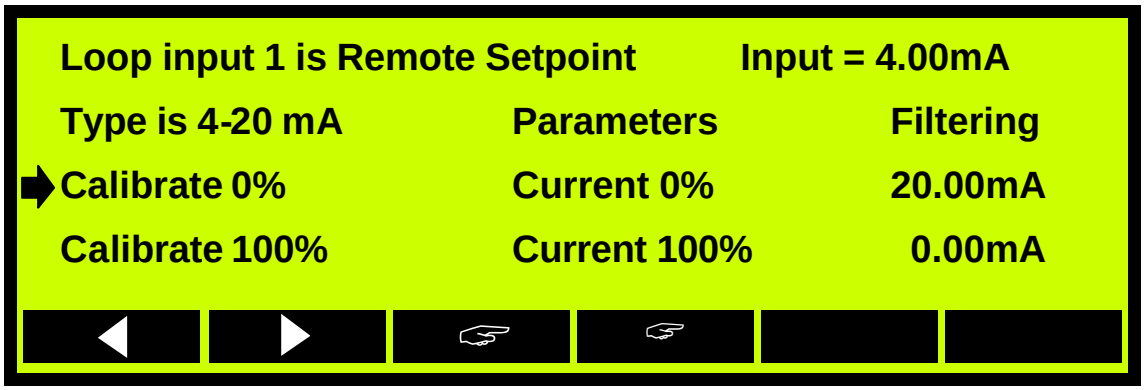
The “Fast Track Threshold” can be activated by entering a value greater than zero into the screen. The “Fast Track Threshold” works by limiting the filter to working in a band that has been established around the current input. If the input current moves up or down by a value which exceeds the “Fast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



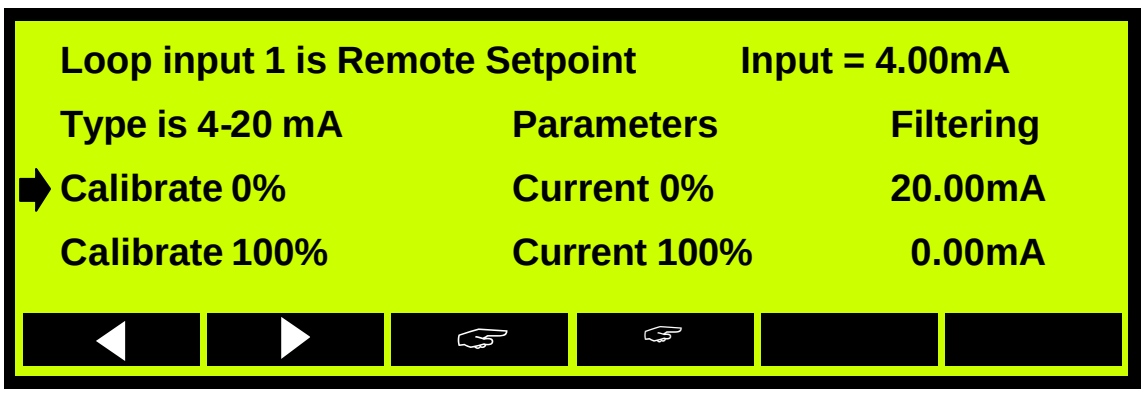
Press the “ENTER” key to gain access to the “Fast Track Filter” data entry screen.



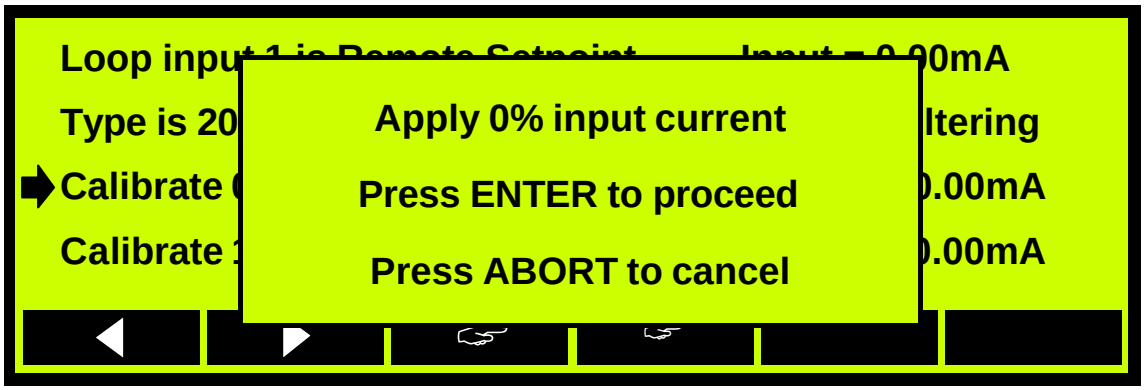
Press the tick key to lock in the data and return to the loop filter setup screen.



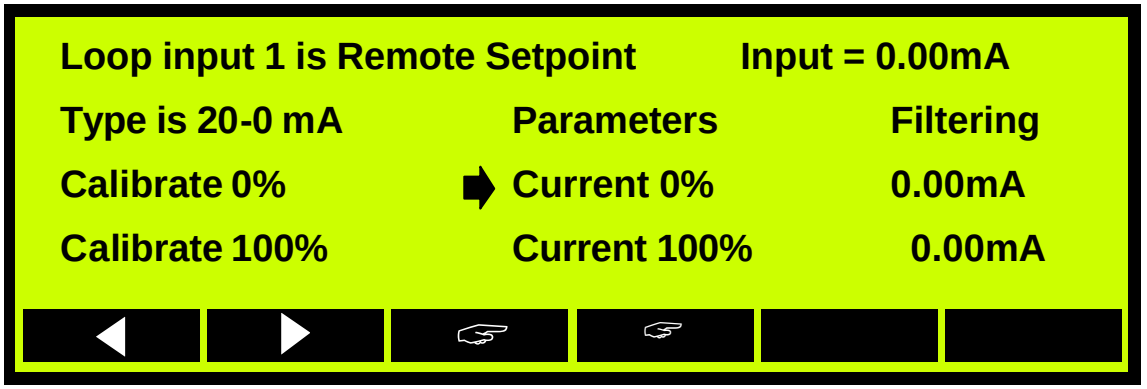
All I/O supplied with Optimus is calibrated by the factory. However the current loop inputs may have to be field calibrated. Scroll on to the “Calibrate 0%” and press the “ENTER” key.



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.

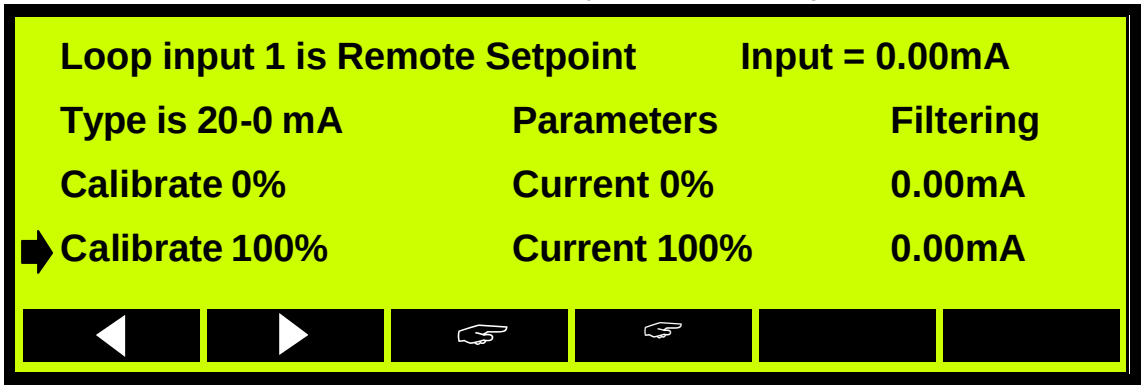


Scroll on to “Current 0%” . This input screen allows the user to enter the “zero” current as a percentage.

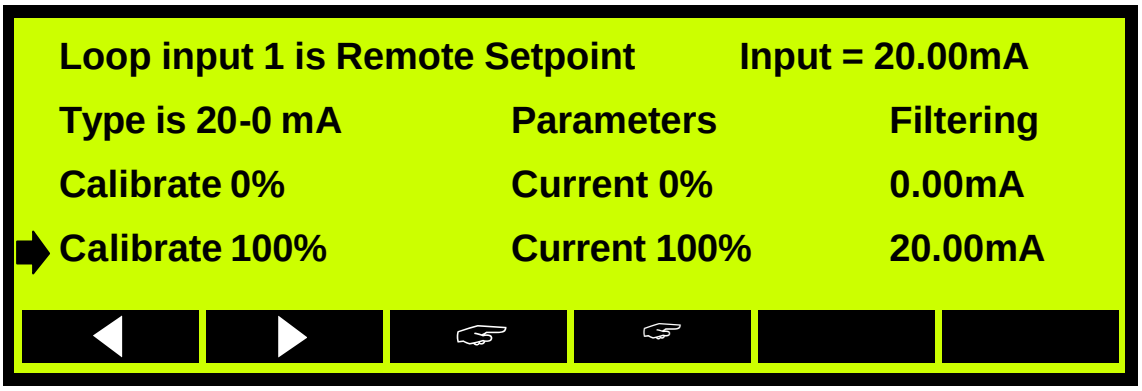


Press the “ENTER” key to access the data entry screen. Using a DVM or other accurate current measuring device read the current flowing in the circuit when at 0 (4mA) and enter it into the screen.

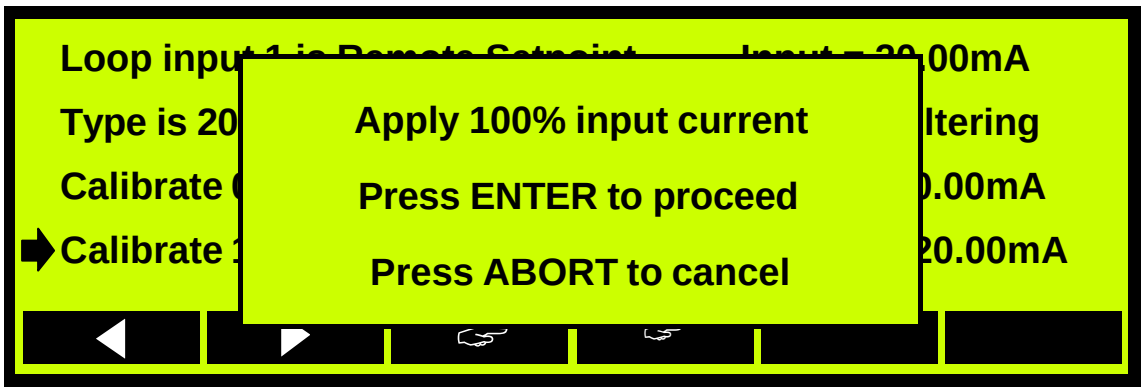
Press the tick key to lock in the data and return to the “Current Loop Setup” screen.
Scroll on to “Calibrate 100%” and press “E NTER” to gain access.



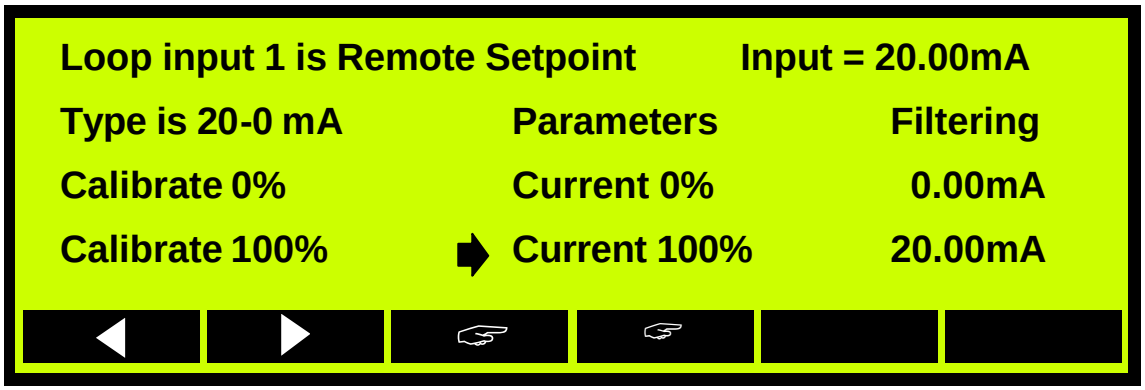
At this point the current loop should be forced to 20mA.



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



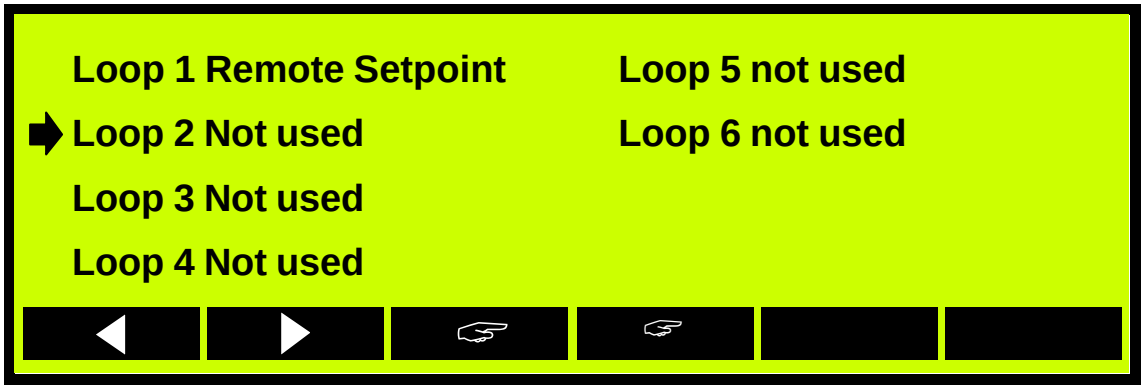
Press the tick key to the calibration constant and return to the current loop setup screen.



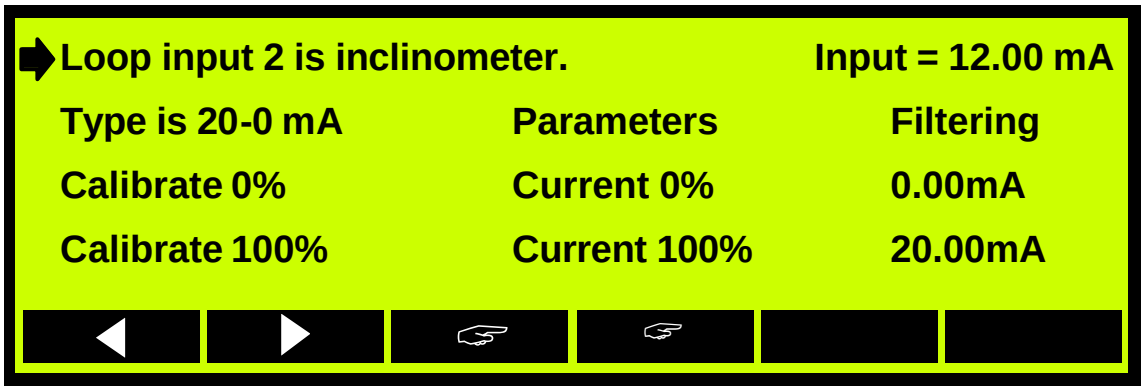
Scroll on to the “Current 100%”. At this point the current flowing in the loop should be measured using an accurate DVM and the reading entered into the screen.

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.

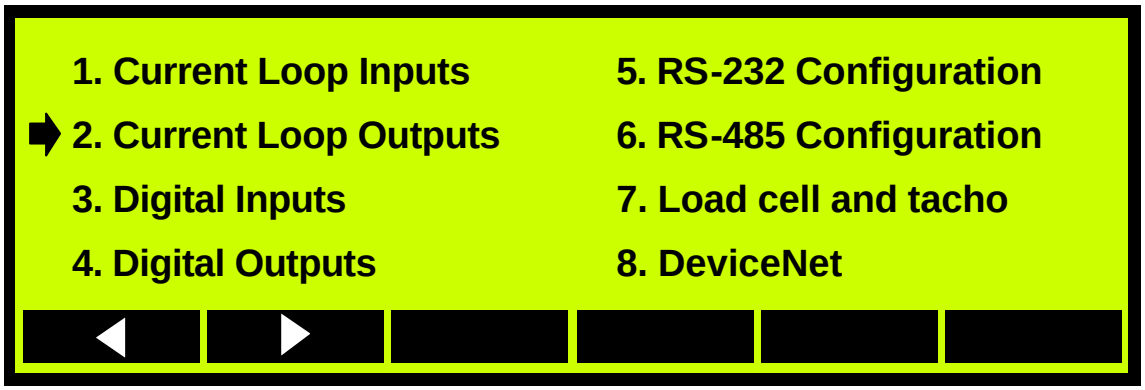


Press the tick key to lock in the data. Continue to set up the remainder of the current loop input as previously shown

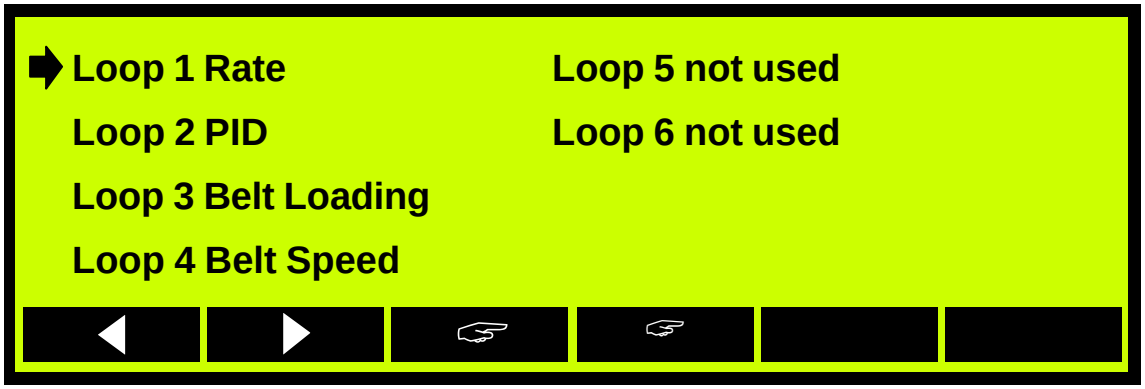
OPTIMUS OPERATIONAL MANUAL.
I/O (Input/Output) / *Current Loop Outputs.*

Optimus provides six (6) analogue output signals.

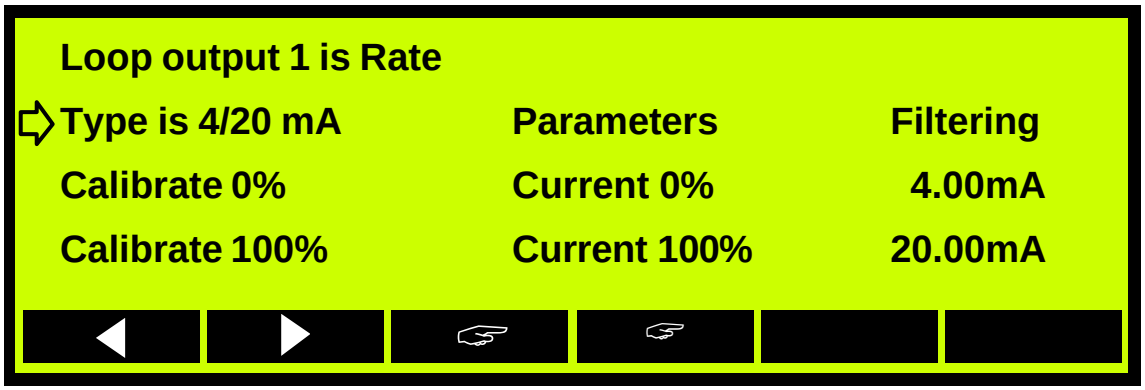
Channel 1 is pre-assigned to Mass Rate.
Channel 2 is pre-assigned to PID Output.
Channel 3 is assignable.
Channel 4 is assignable.
Channel 5 is assignable.
Channel 6 is assignable.



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

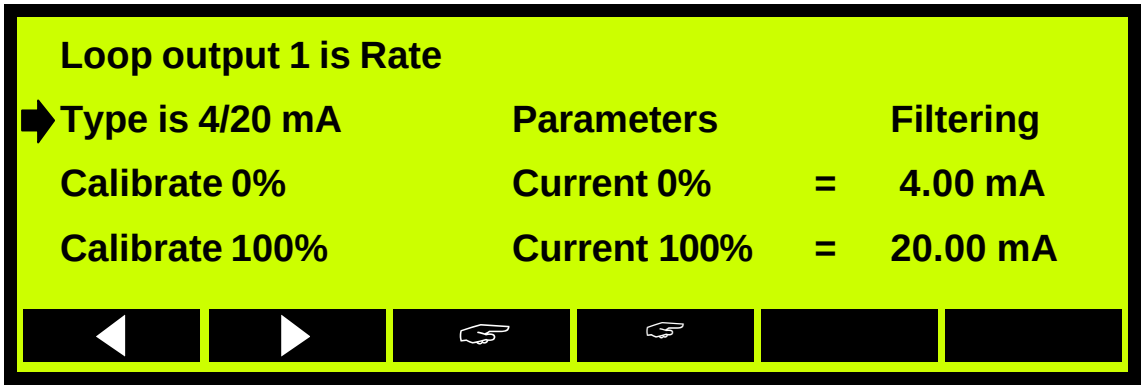


Loop one is permanently assigned to the Mass Rate. Press “ENTER” to access loop parameters.

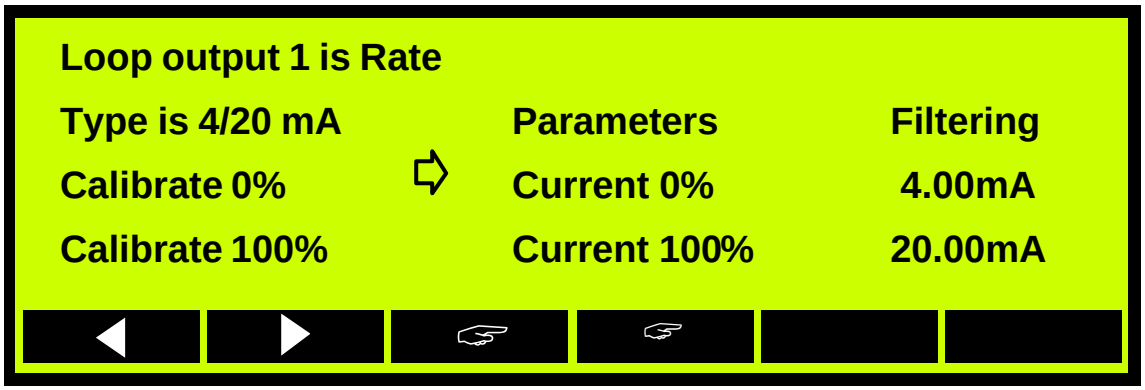


The de-highlighted cursor arrow as seen above indicates that associated parameter is inaccessible. Scroll on to the select type of analogue output.

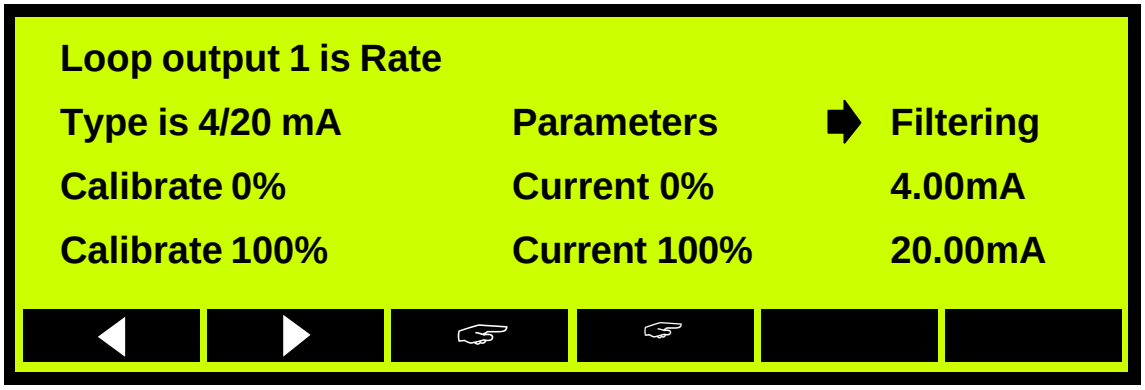
With the cursor pointing at the loop type press the **"ENTER"** key to change the loop to one of the pre-assigned. **(4-20mA : 20-4mA : 0-20mA : 20-0mA : 5-25mA : 25-5mA : 0-25mA : 25-0mA)**



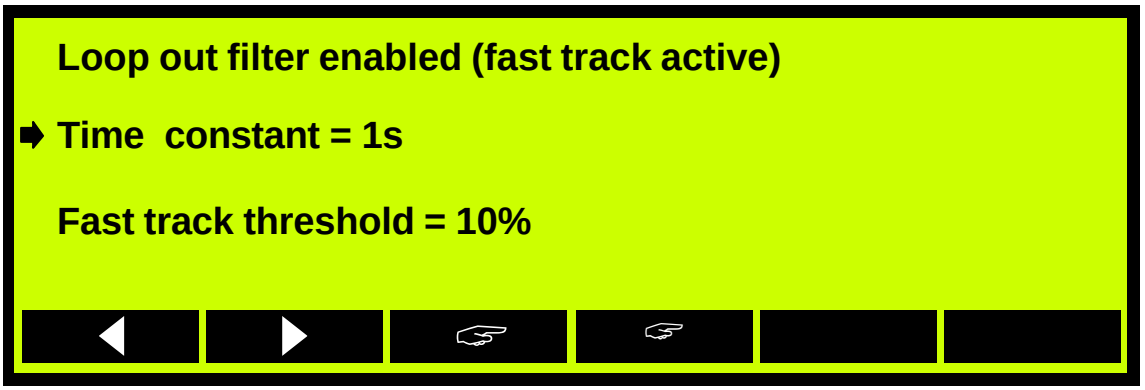
Scroll on to the parameters. Parameters are not editable and therefore the cursor is de-highlighted and the screen is unavailable.



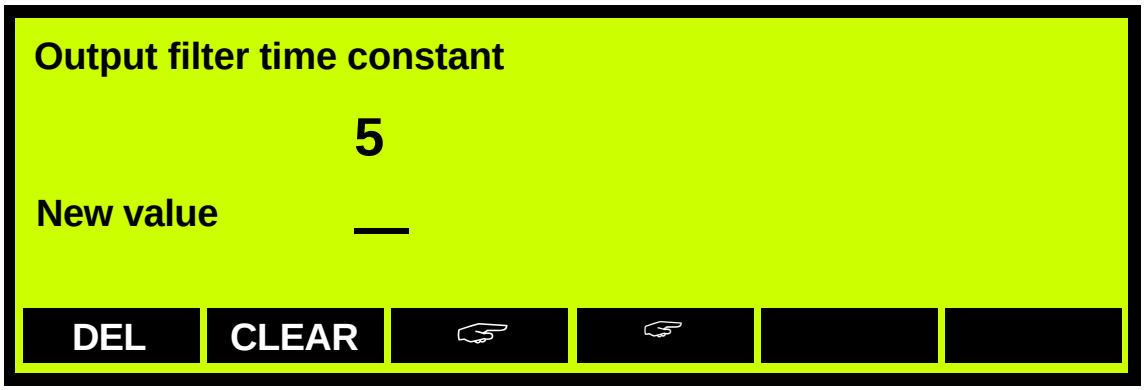
Scroll the cursor on to "Filtering where filters can be applied to the selected loop.



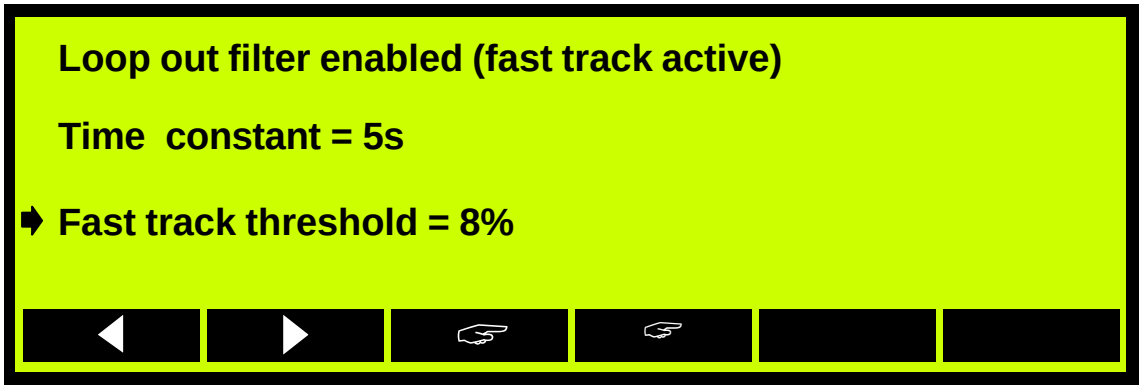
Select the "Time constant" input screen.



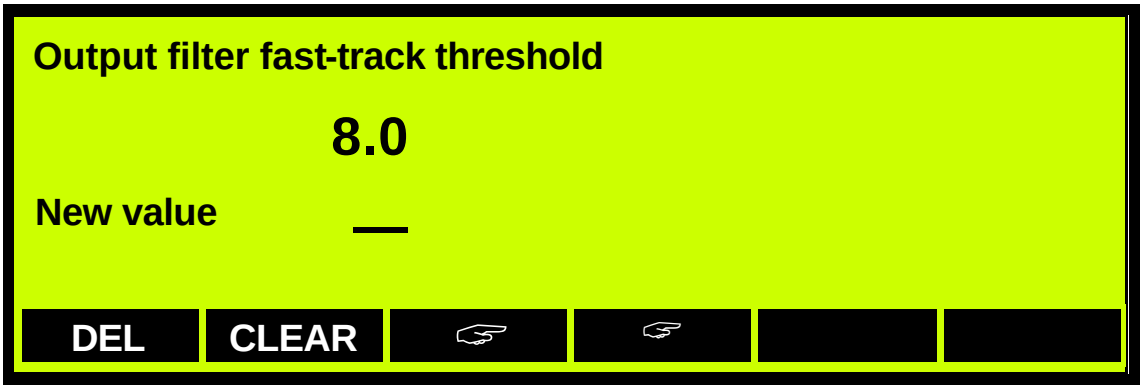
Enter the filter time constant required. The value entered here will generally have been selected after observing the process and the response of rate monitoring instrumentation.



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.



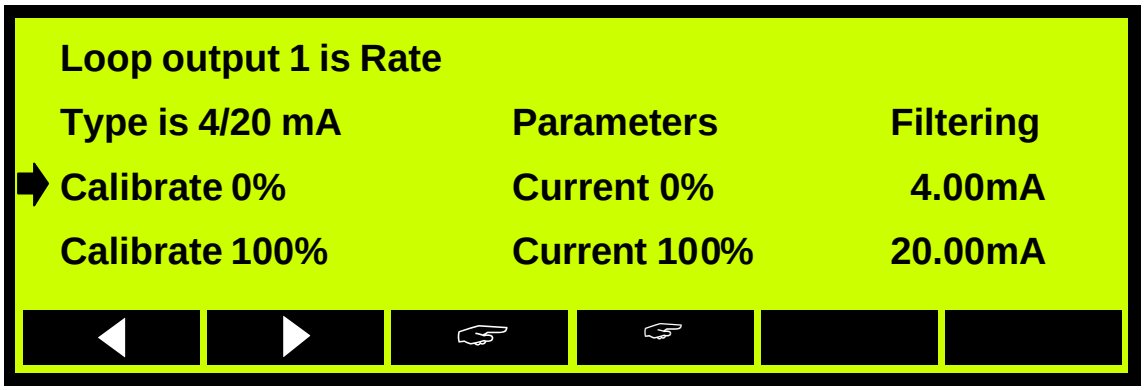
The “Fast Track Threshold” when active removes the time average filter from the current loop output, when the output current exceeds the “Fast Track Threshold” value.
Assume that the feeder has a capacity of 60 kg/min and the feeder is running at a steady rate of 30 kg/min. If the rate is increased to 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.



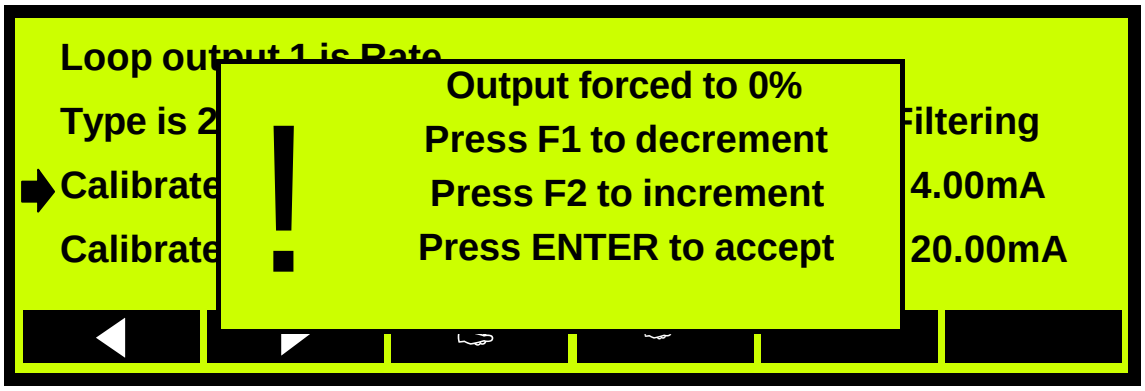
Enter the “Fast Track Threshold” value required and press the tick key to lock in the data and return to the current loop output setup screen.

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

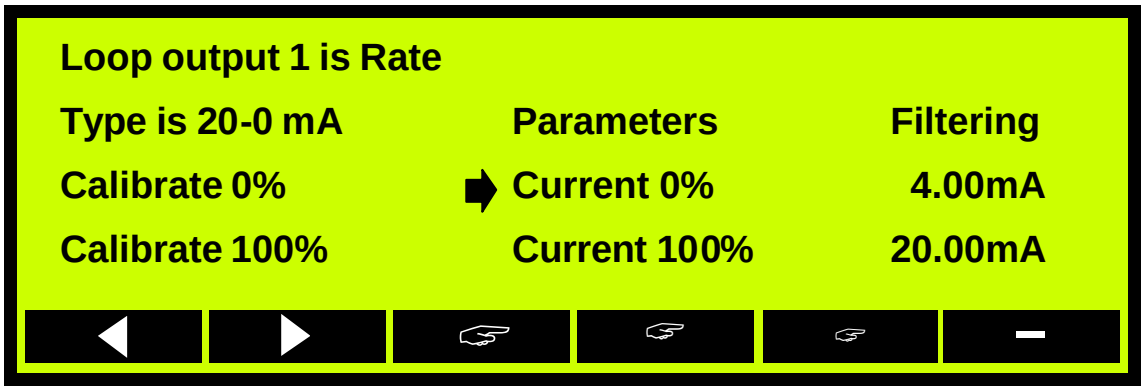
At the time of manufacture and testing all Optimus's input and output facilities are tested against our bench test equipment. Should it become necessary the output current loops can be calibrated. With the cursor opposite "Select calibrate 0%" press "ENTER" to select the "Calibrate 0%" screen.



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.

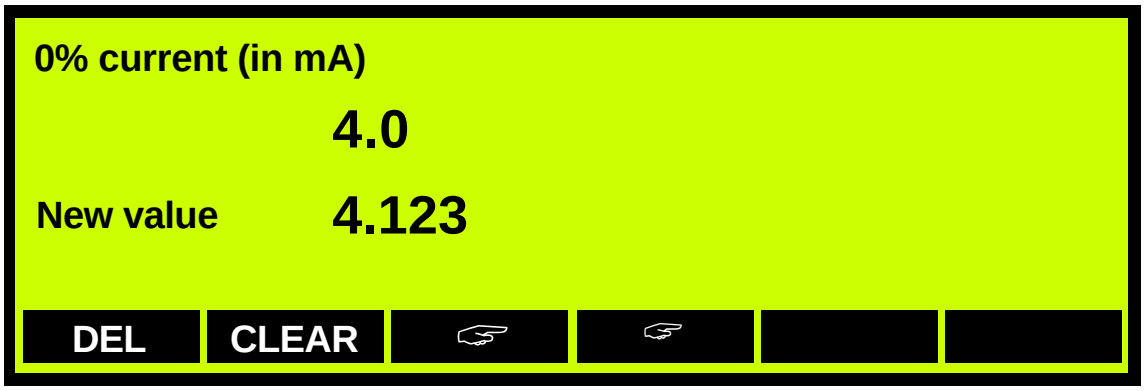


Following the completion of the test press the "ENTER" key to update the working memory and return to the loop parameters. Pushing the cursor's advance key will position the cursor along side the "Current 0%" Use the data entry screen associated with this screen to enter the absolute milliamp value required.

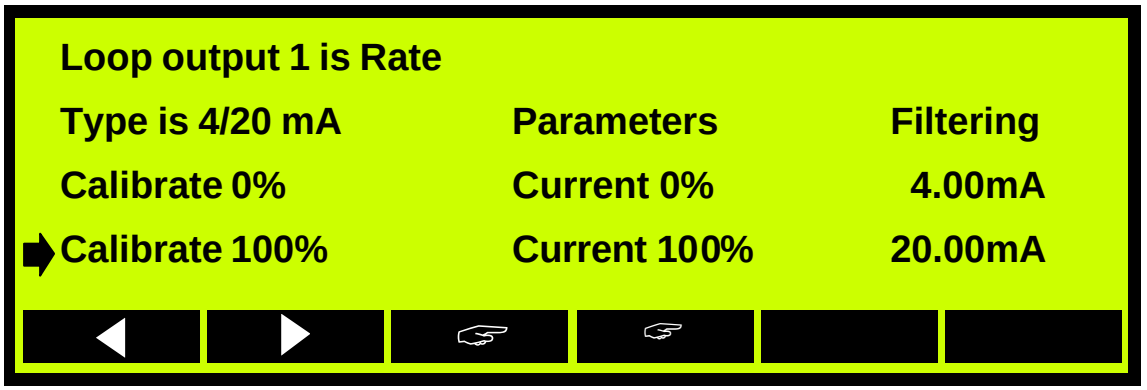


Press the "ENTER" key to access the data entry screen or the + or - key to vary the analogue output in 0.005 mA steps.

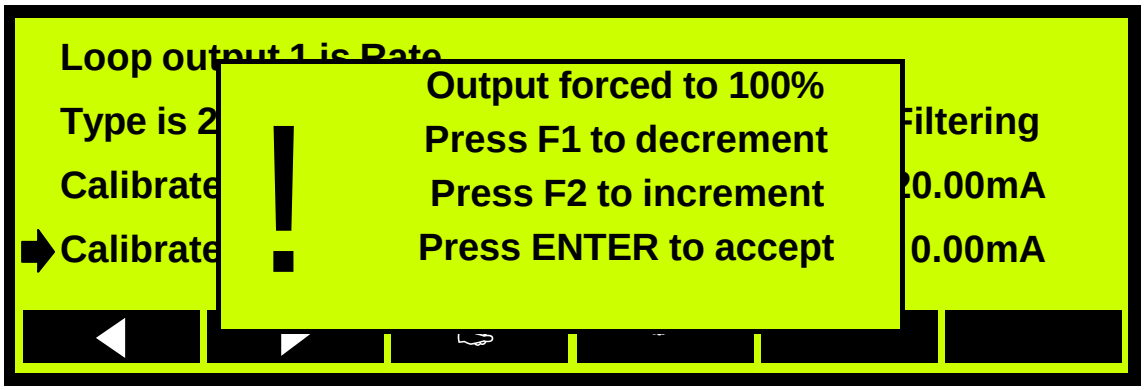
From this screen the absolute value for the required output can be entered rather than the predefined steps provided in previous menu's. Type in the value required and press the tick key to lock the data in. The data will only be locked in when the "HOME" key is pressed.



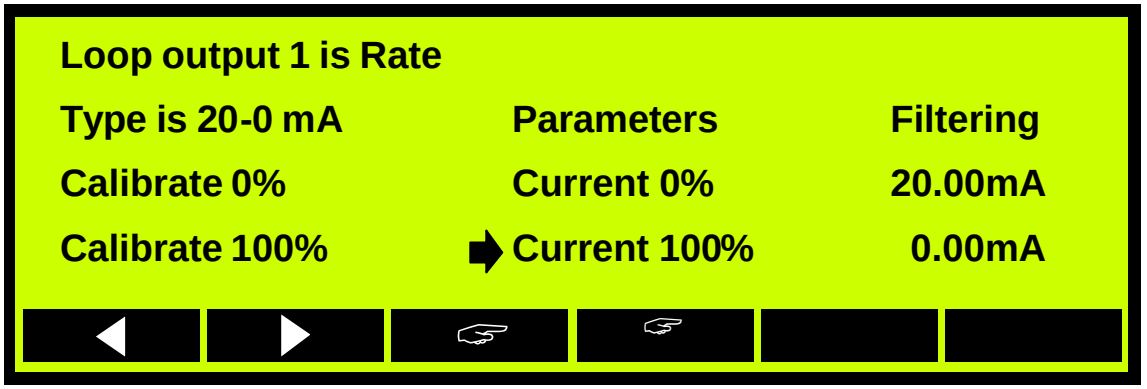
Press the tick key to lock in the data and scroll forward.



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.

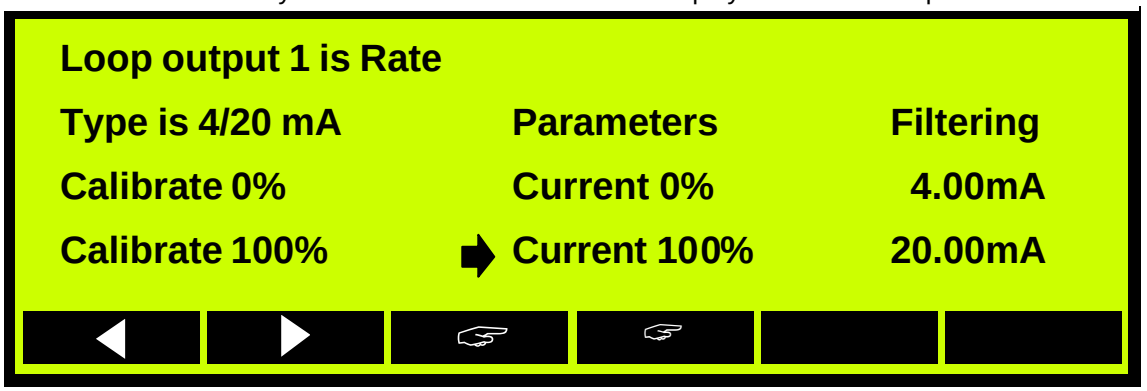


If the predefined steps do not suit the application requirements then use the screen shown below to adjust the top end using absolute units.



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

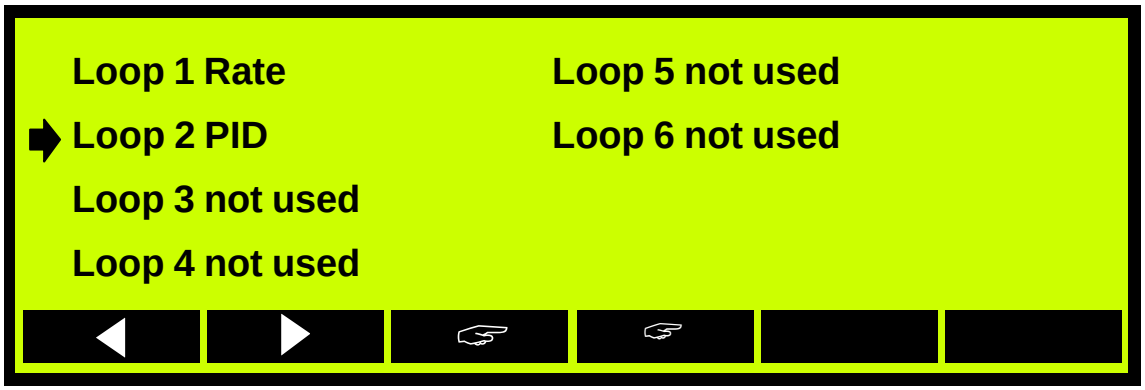
Use the tick key lock in the data and return the display to the rate setup screen.



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.



OPTIMUS OPERATIONAL MANUAL.
I/O (Input/Output) / *Digital Inputs.*

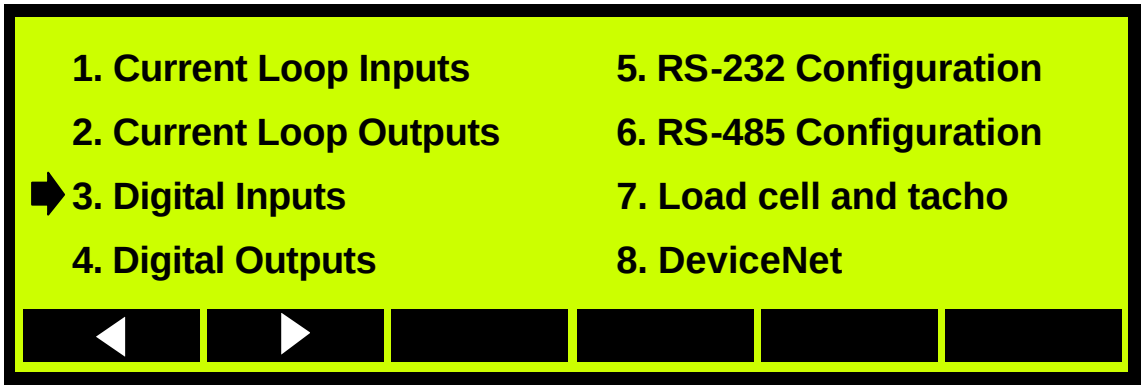
Digital Inputs.

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

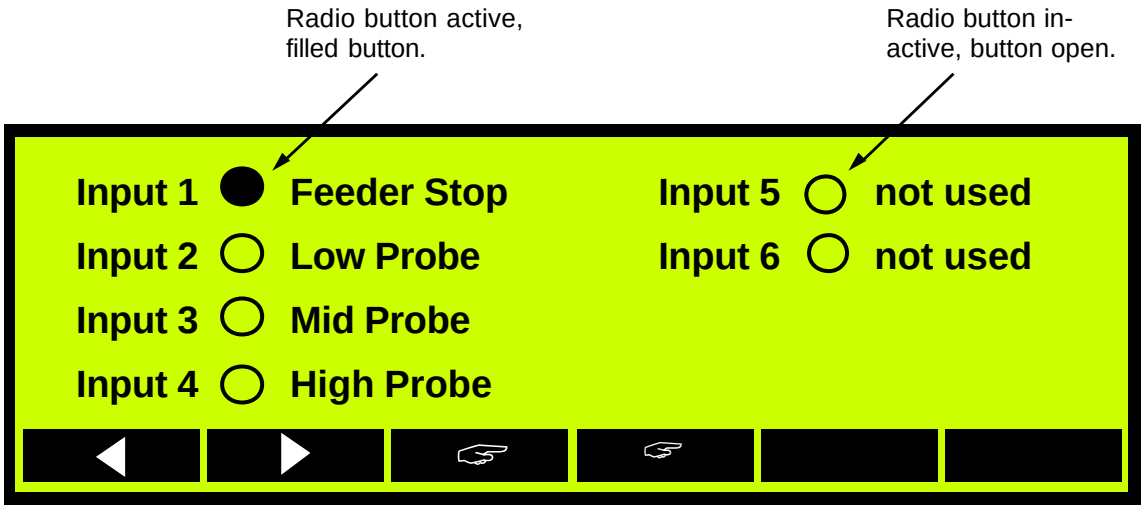
Each of the six digital inputs can be assigned a label. From the factory the labels are pre-assigned as follows:-

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

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



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



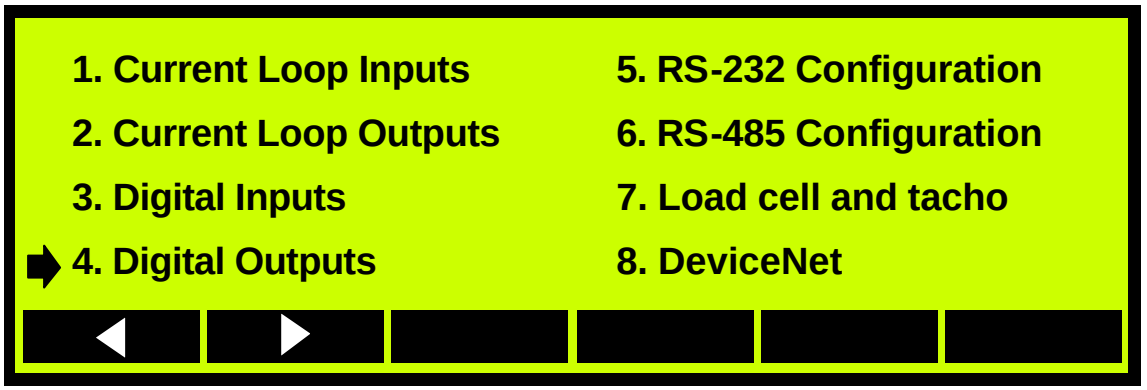
Use the “ENTER” key to assign the digital input with one of the pre-assigned labels. The radio buttons when filled indicate an active input. In the above screen digital Input 1 Feeder Stop is active.

OPTIMUS OPERATIONAL MANUAL.
I/O (Input/Output) / *Digital outputs.*

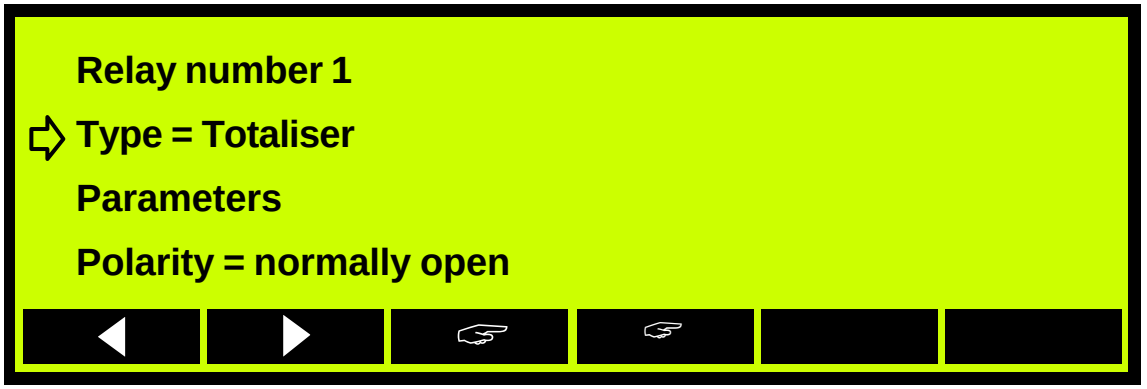
Optimus has been fitted with 6 digital outputs. Each of which has been pre-assigned a label. The labels are interchangeable. However output one and two are permanently assigned to the "Totaliser" and "System Healthy" function.
From the factory the labels are:-

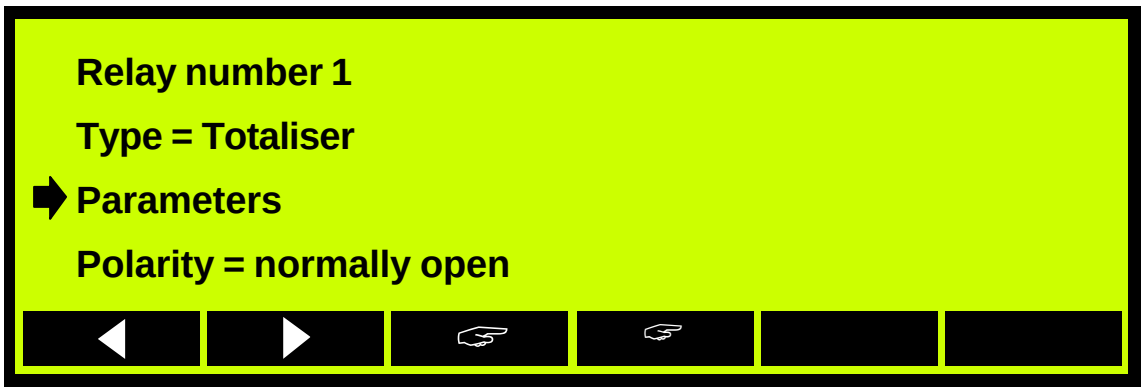
1	Totaliser.	(Activated on totaliser output.)
2	System Healthy	(Activated on electronic fault detected)
3	Load Cell Alarm.	(Activated on load cell output)
4	Deviation Alarm.	(Activated depending on mass flow)
5	Chute Alarm.	(Activated on inlet chute condition)
6	Rate Alarm.	(Activated on rate condition)

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

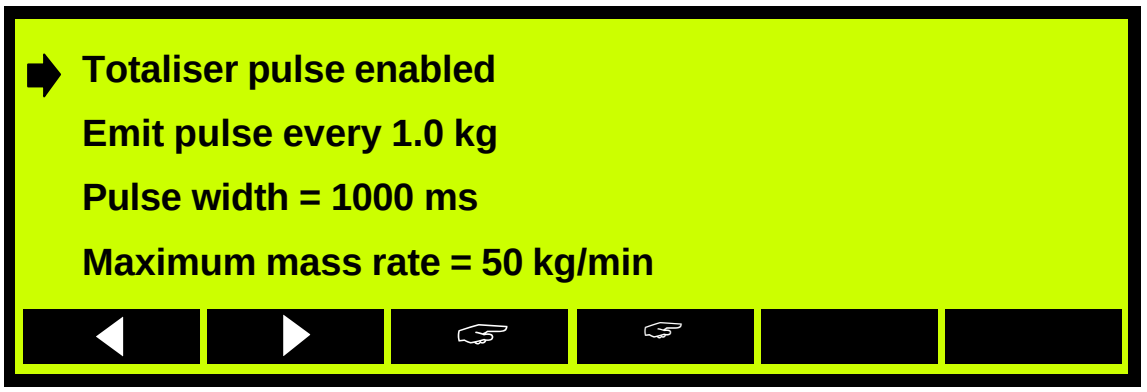


Scroll to "Digital Outputs" and press the "ENTER" key to access the output configuration screens. Relay 1 has been pre-assigned to the Totaliser. Relay 2 has been pre-assigned to the "System Healthy"



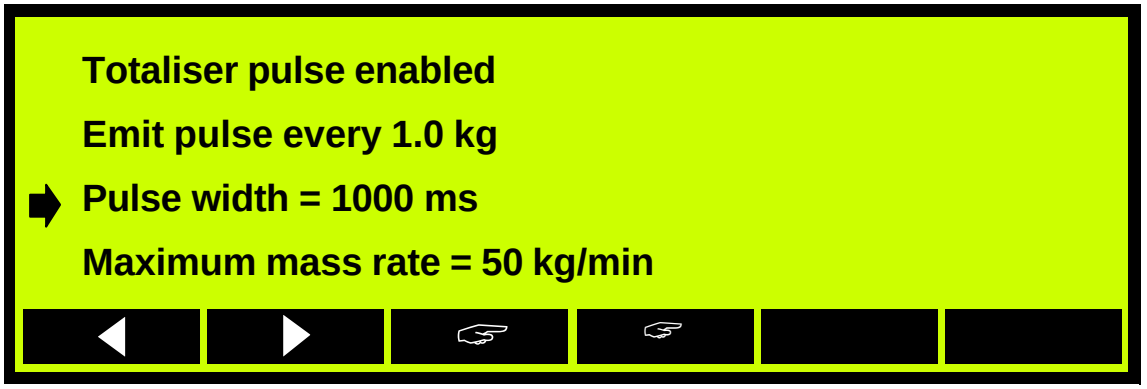


Press the “ENTER” key to enable or disable the Totaliser output function.



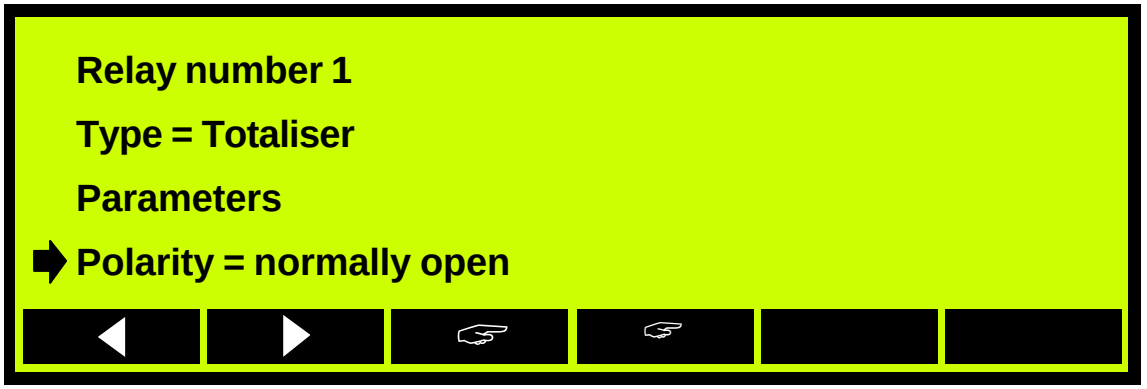
With the function enabled press the scroll forward down to “Emit pulse” function. There are preset output’s.

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”**



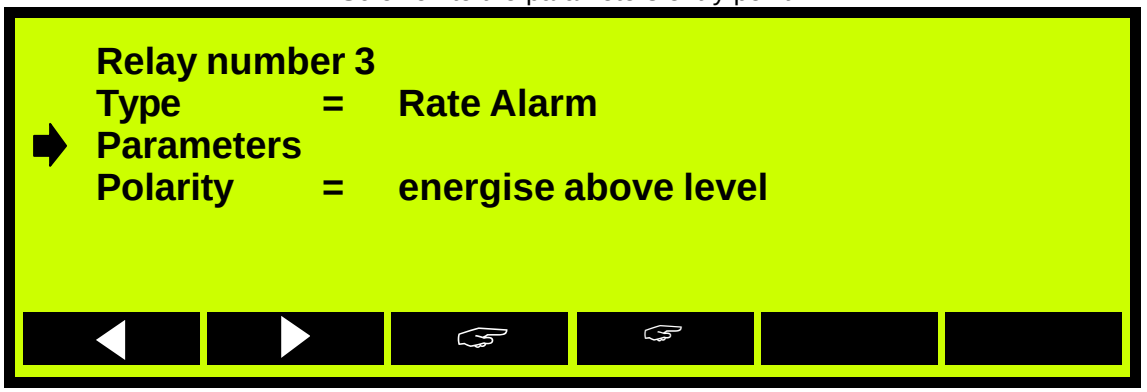
Use the scroll forward screen to access the relay output polarity. The “ENTER” key is used to set the polarity, use the setting that suites your application. Normally Open / Normally Closed

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.

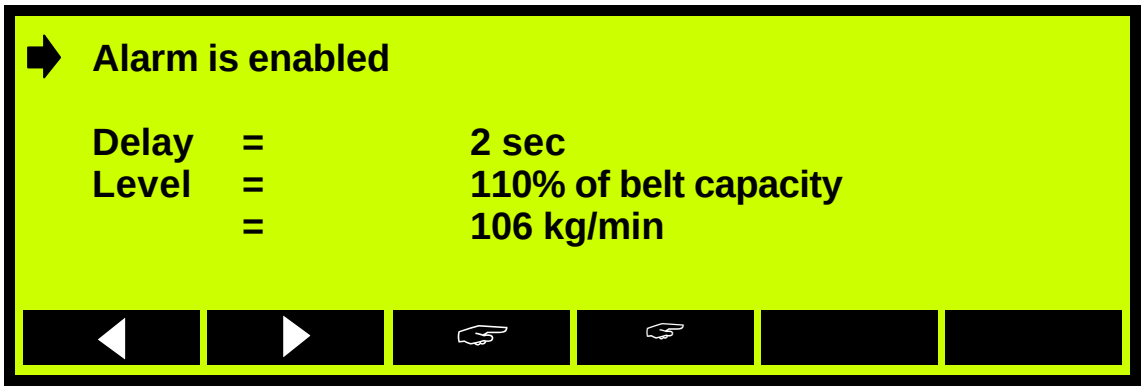
Scroll through the predefined labels to select the one that fits the application. Each label has different parameters associated with it. Scroll to Type and select Rate Alarm.

Scroll on to the parameters entry point.

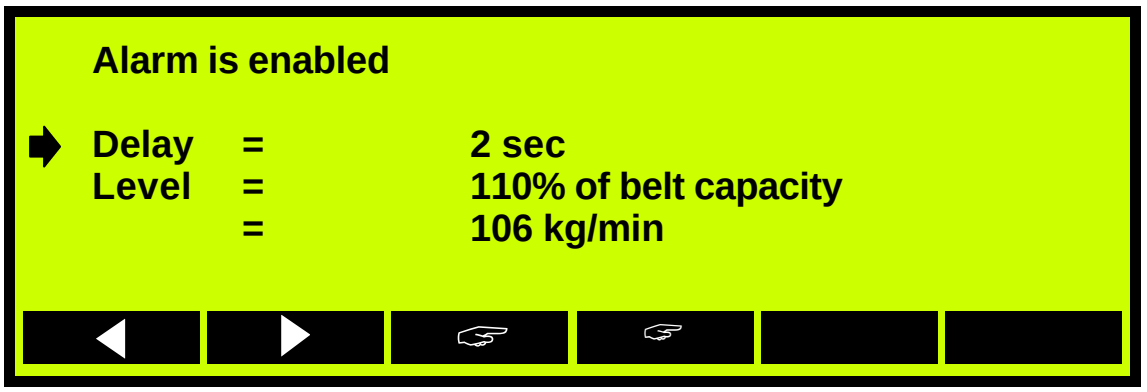


Scroll on to the parameters entry point.

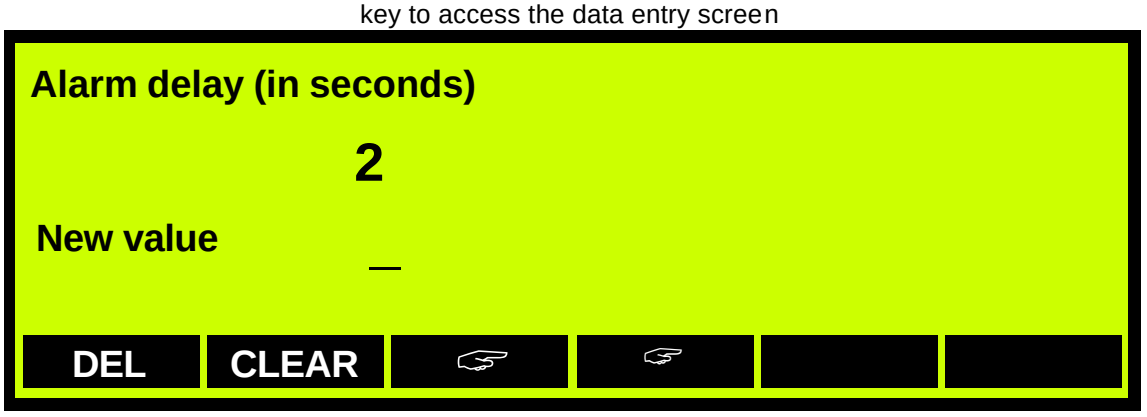
On entering the parameters screen. The function can be enabled or disabled using the "ENTER" key. Select enabled and scroll on to the delay set up.



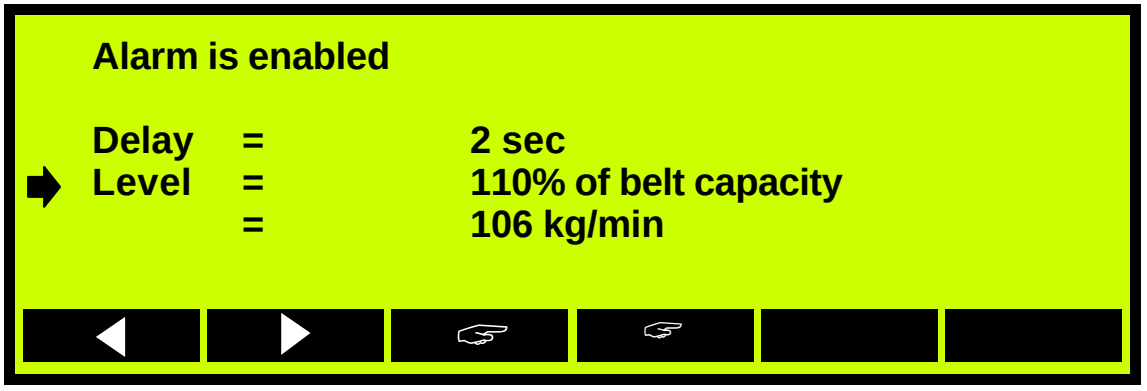
Observe the process and apply the filter time that best suites the application.



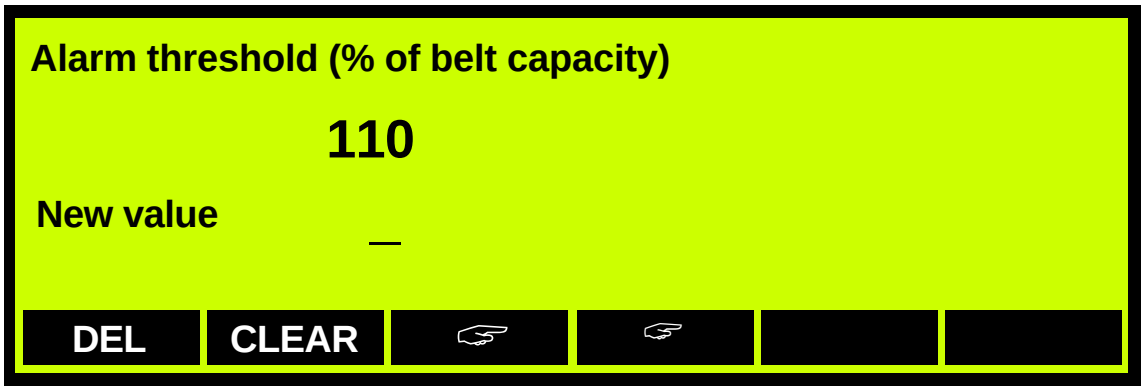
Observe the process and apply the filter time that best suites the application. Press "ENTER" key to access the data entry screen



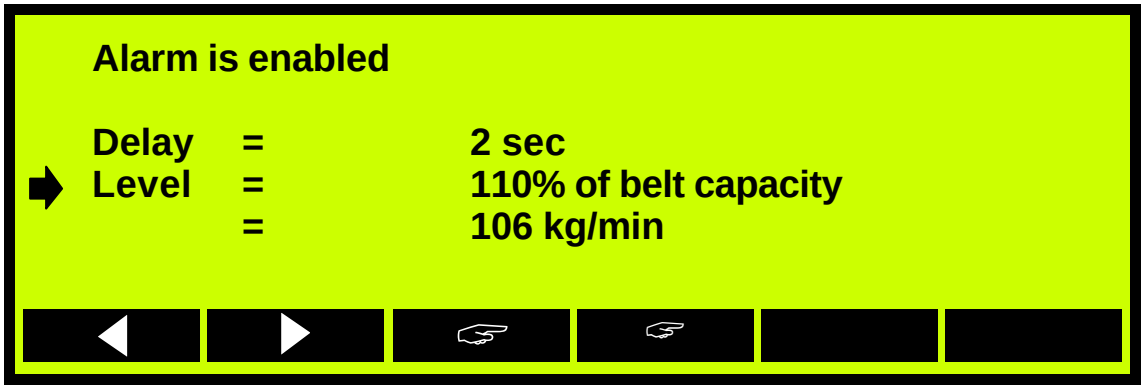
Type in the filter delay required and press the tick key to lock in the value. On returning to the parameters screen scroll on to the level.



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.

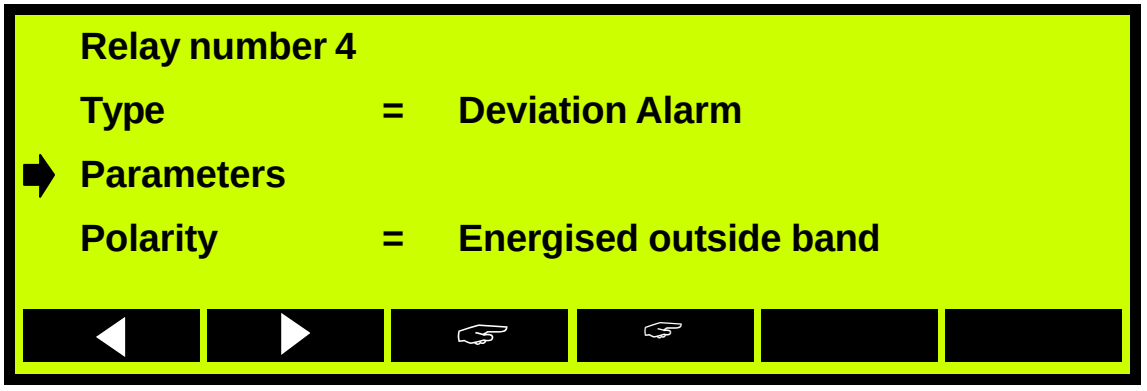


Use the tick key to lock in the entry and return to the parameters screen. Optimus will now calculate and display the mass rate level at which the relay will operate.

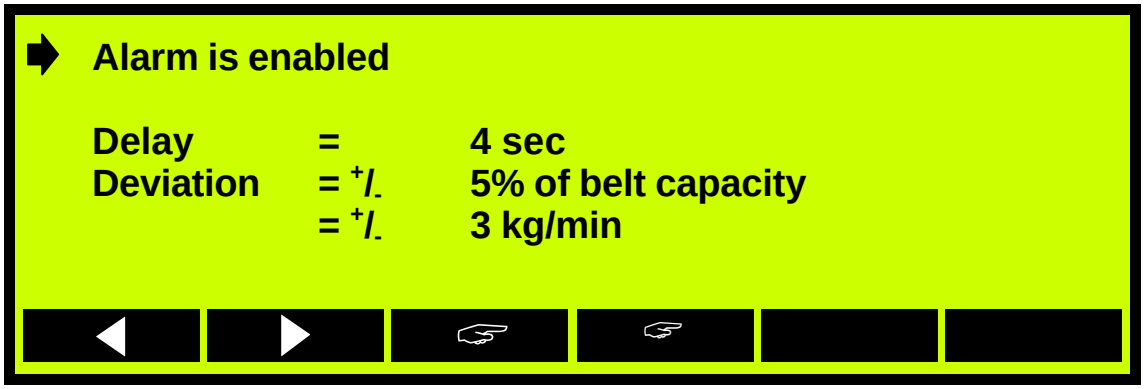


Use the tick key to lock in the parameters and return to the relay select screen. Scroll on to relay 4 and allocate it to "Deviation Alarm"

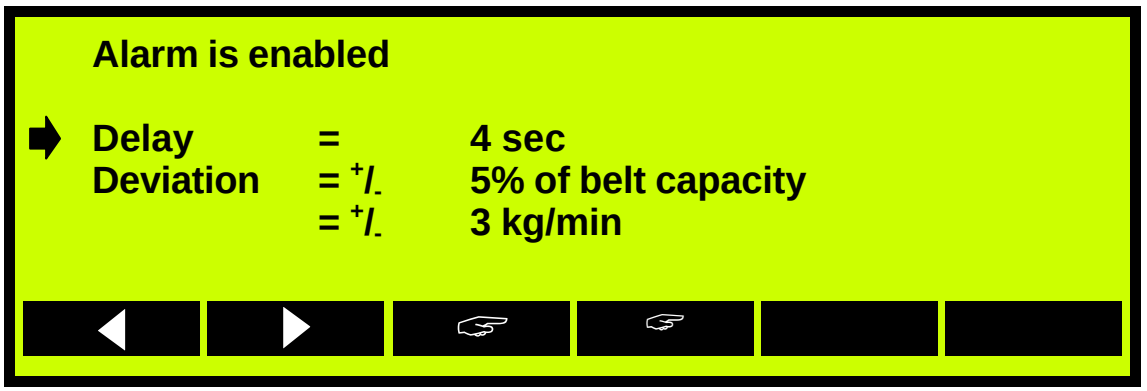
Use the "ENTER" key to scroll through relay allocation labels. Select Deviation Alarm, then scroll on to the "Parameters" screen select entry point.



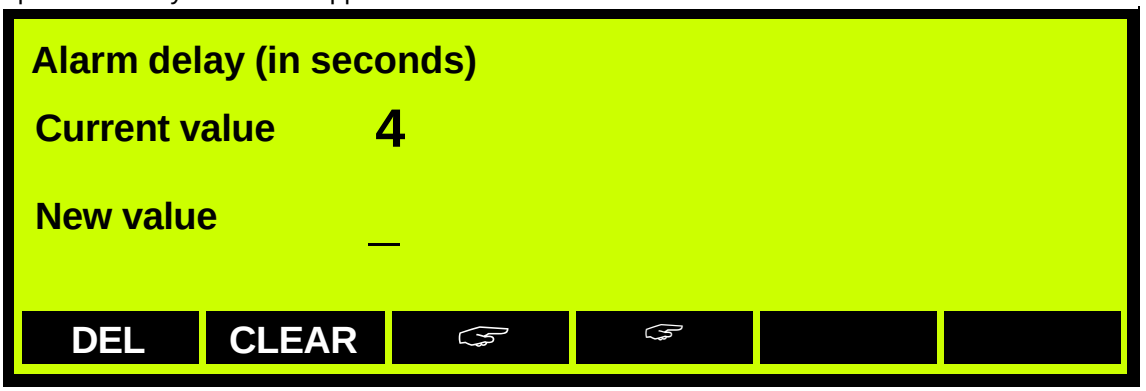
On entry to relay 4 parameters screen enable the alarm, using the “ENTER” key to select the enable label.



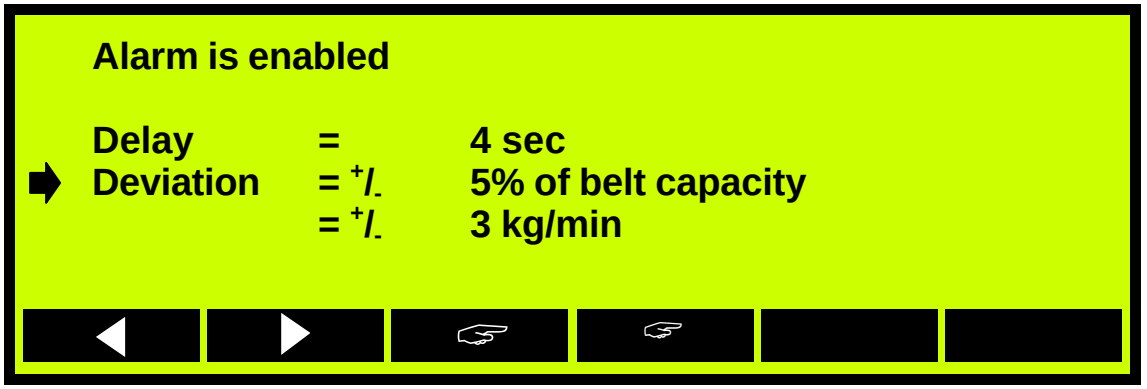
Scroll onto the delay before relay operation setting. Observe the process and select the operation delay to suit the application.



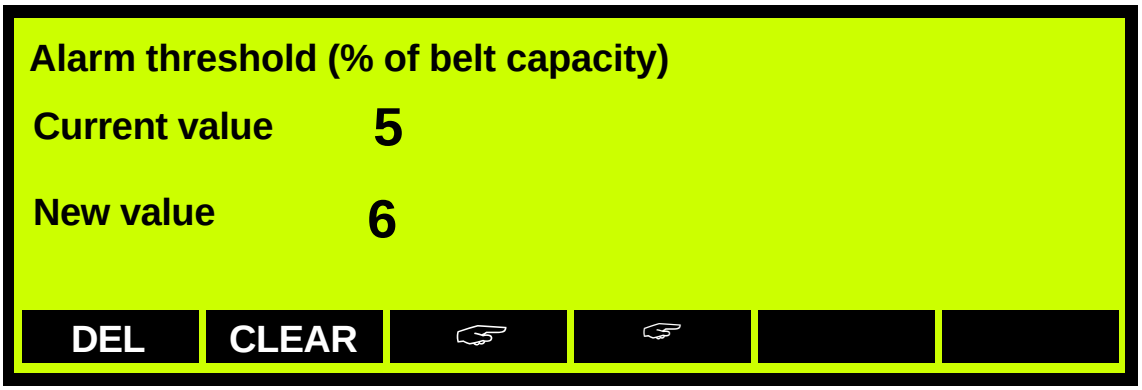
Scroll onto the delay before relay operation setting. Observe the process and select the operation delay to suit the application.



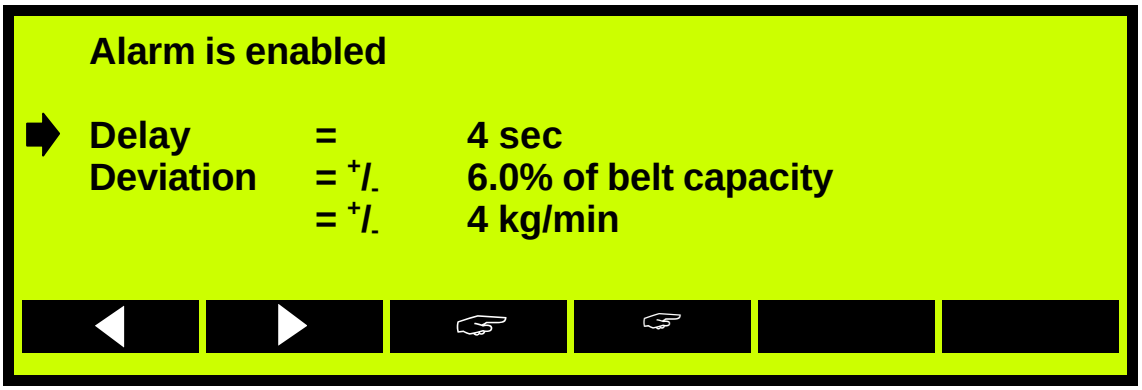
Scroll on to the deviation entry point and enter the screen.



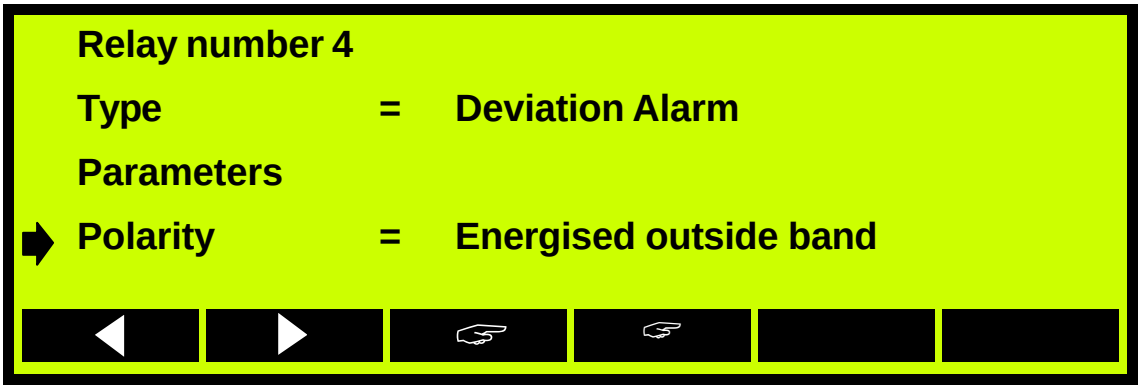
Enter the value that suites the application. Press the tick key to lock in the selected value.



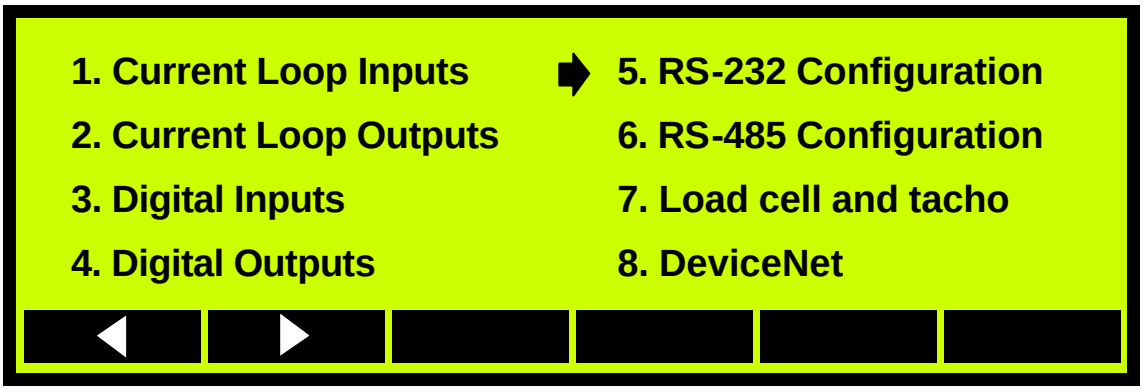
Following the entry of a deviation value, the display will return to the parameter entry screen. The deviation value will be shown and directly below this display, Optimus will display the mass rate deviation in the selected units.

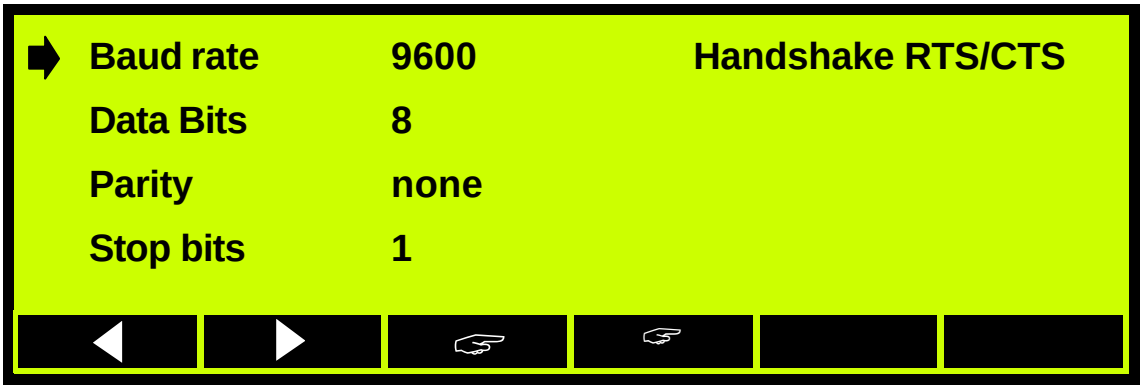


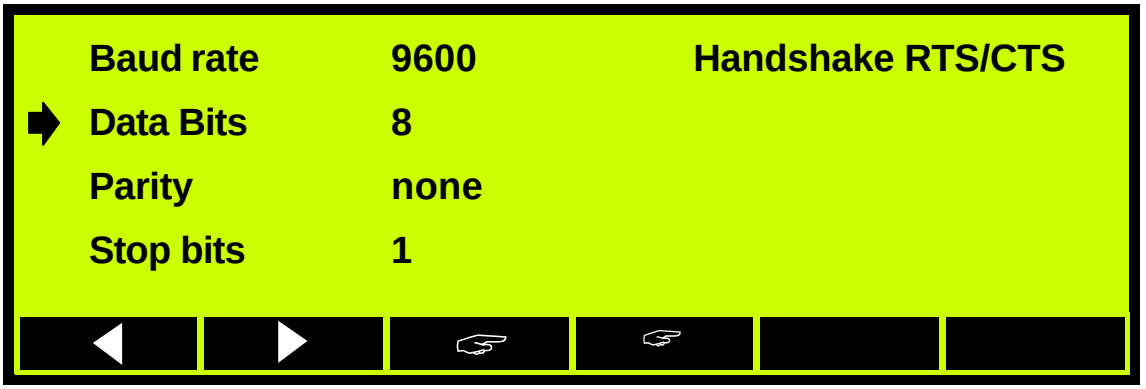
Press the tick key to return to relay Nº4 input screen. Scroll on to the polarity and set the polarity required. Use the “ENTER” key to select either Energised outside band or energise inside band.

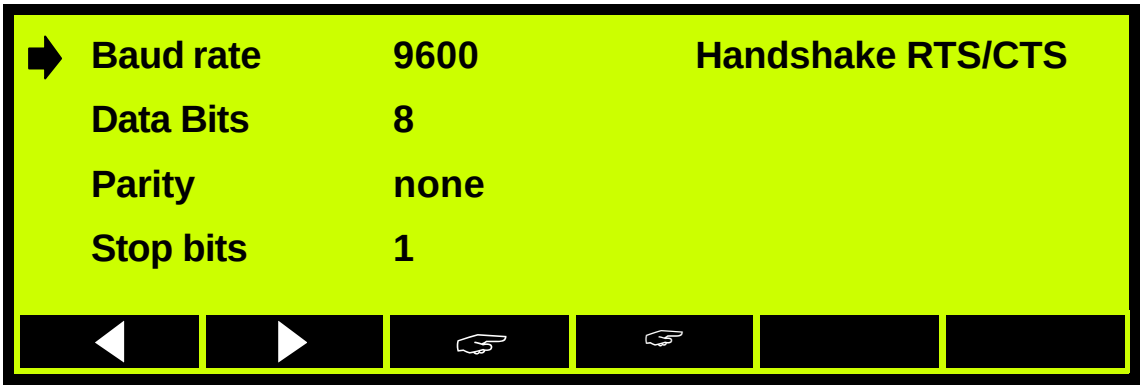


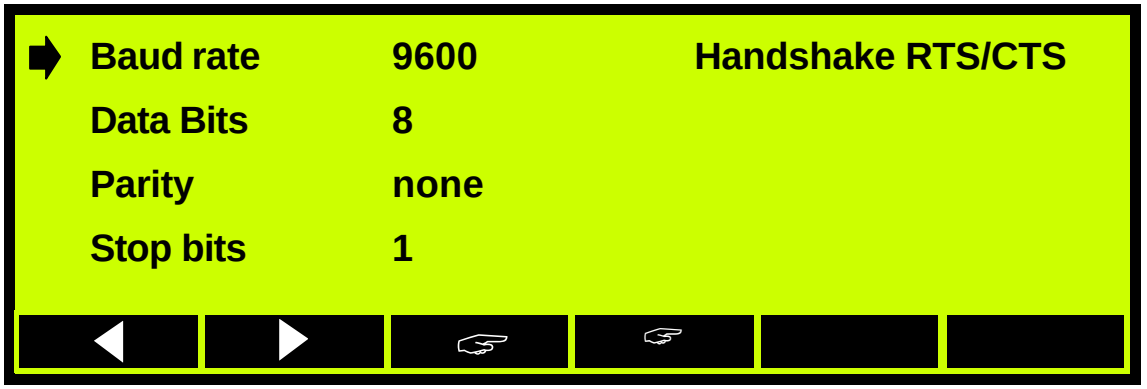
When done press the tick key to lock in the data and return to the main relay setup screen.

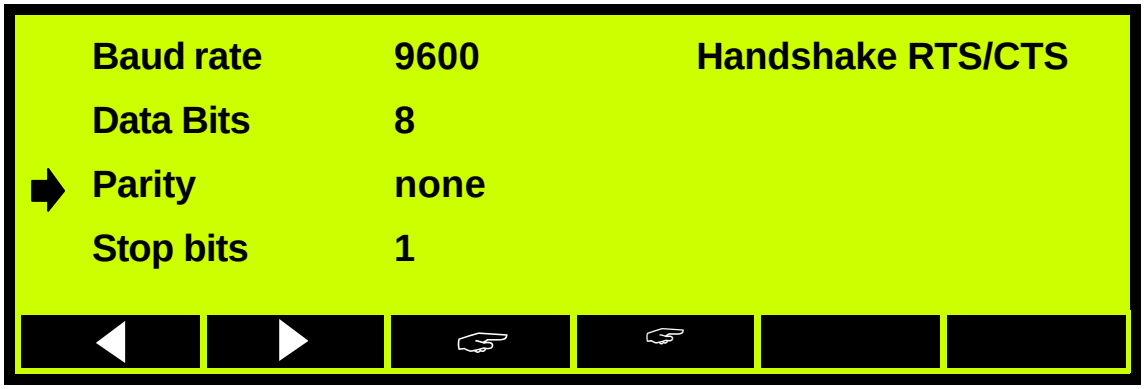

1. Current Loop Inputs
2. Current Loop Outputs
3. Digital Inputs
4. Digital Outputs
5. RS-232 Configuration
6. RS-485 Configuration
7. Load cell and tacho
8. DeviceNet


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

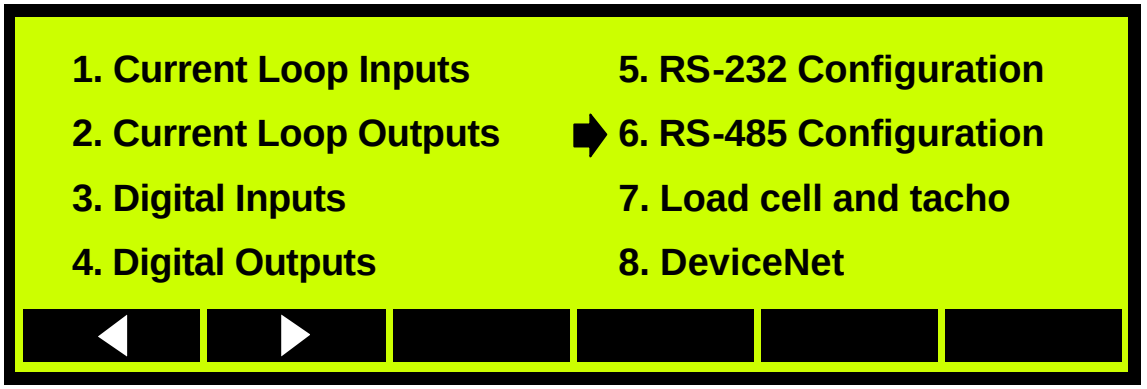

Baud rate 9600 Handshake RTS/CTS
Data Bits 8
Parity none
Stop bits 1


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

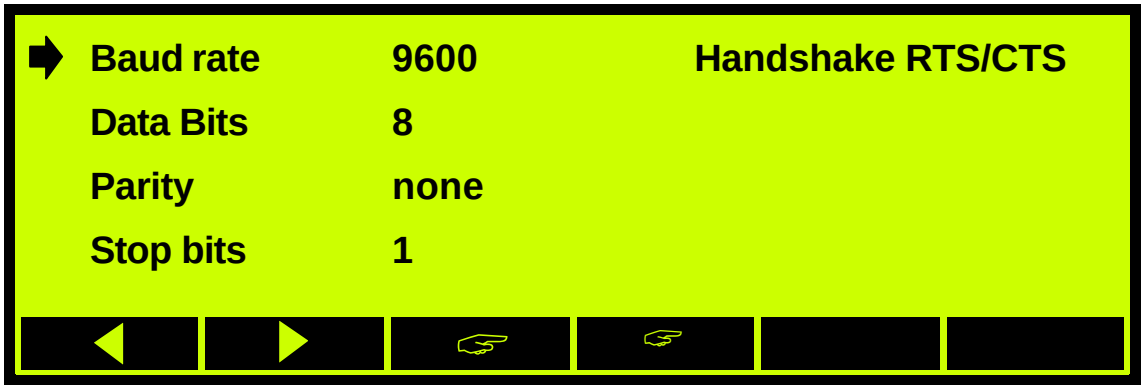

Baud rate 9600 Handshake RTS/CTS
Data Bits 8
Parity none
Stop bits 1

OPTIMUS OPERATIONAL MANUAL.
I/O (Input/Output) / *RS-485 Configuration.*

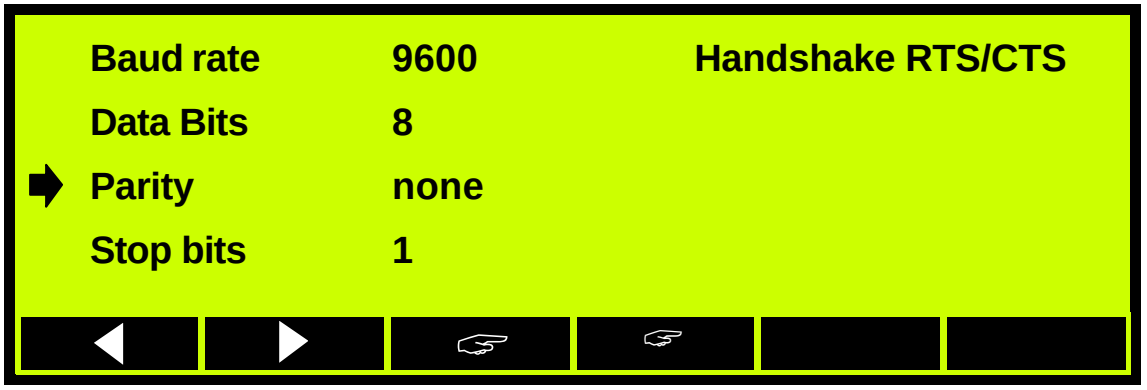
RS 485 is an optional output. Generally Web-Tech will supply special firmware to support the customers requirements. To set up the link scroll onto the “RS-485 Configuration” data entry point and press the “ENTER” key.



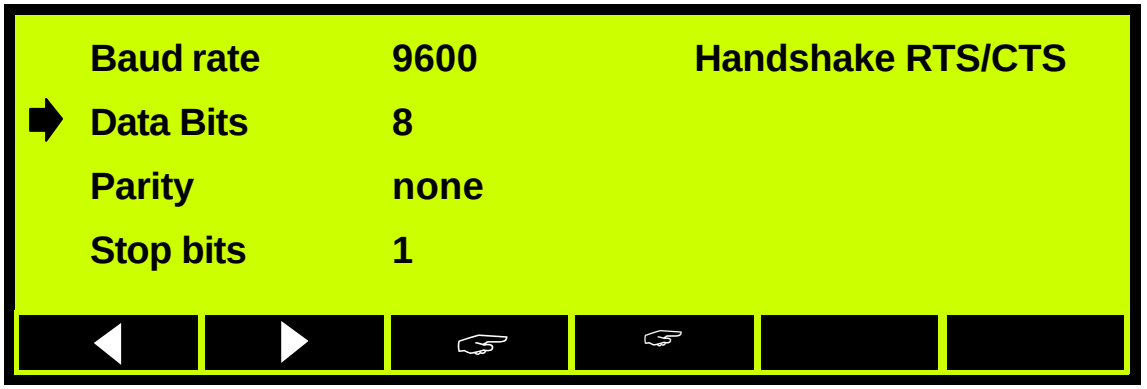
Press the “ENTER” key to select the required baud rate from pre-assigned values.



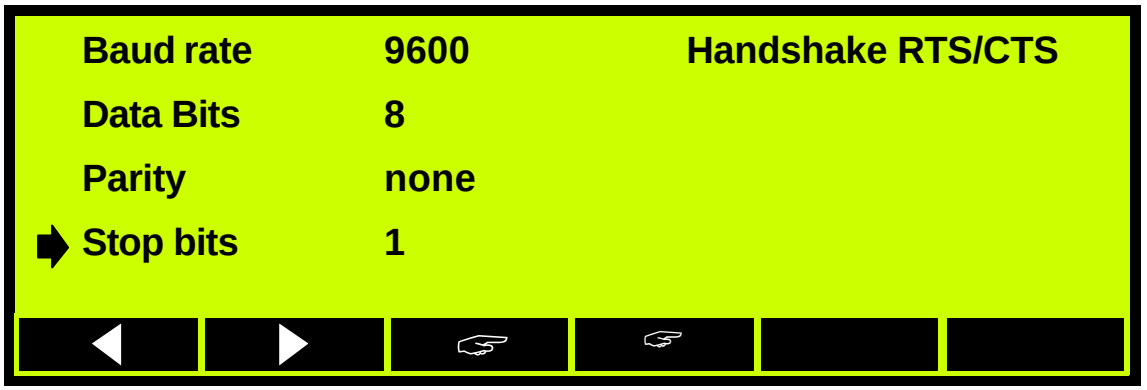
Scroll on to the “Data Bits” entry point and use the “ENTER” key to select the required data bits from the two values available. (7 & 8)



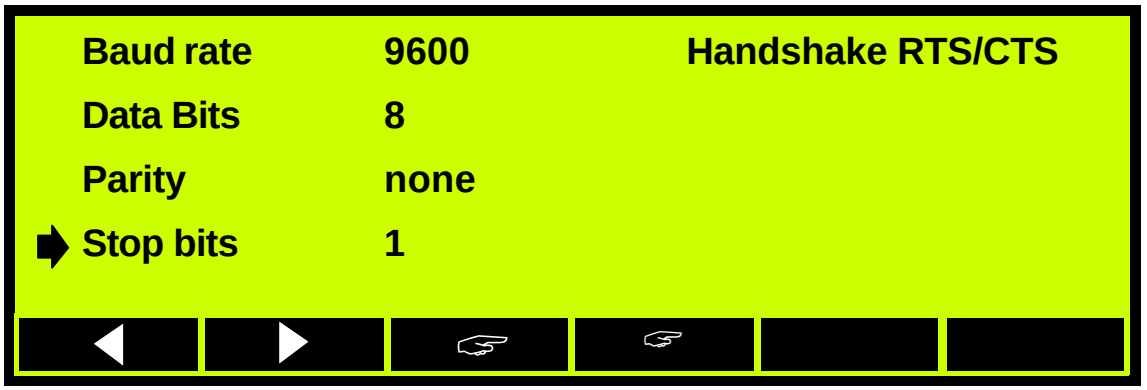
Scroll onto the “Parity” selection entry point and use the “ENTER” key to select either none or even.



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



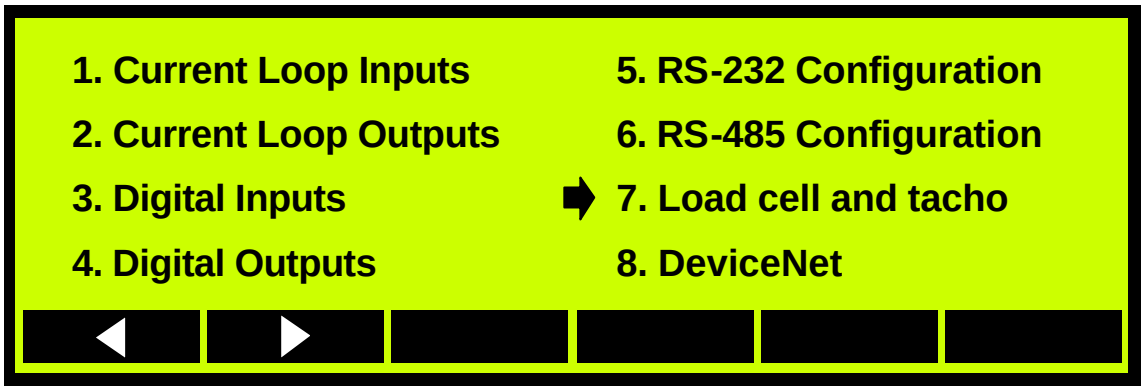
Scroll onto the “Handshake” setting entry point. Use the “ENTER” key to scroll between “full duplex or half duplex”.



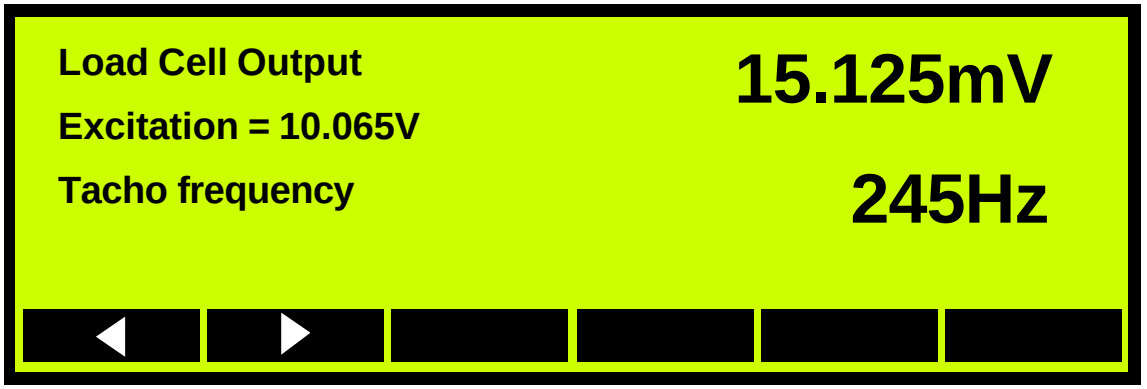
Following the completion of the setup for the RS-485 specification. Press the tick key to lock in the data and return to the main I/O screen selection.

OPTIMUS OPERATIONAL MANUAL.
I/O (Input/Output) / *Load Cell and Tachometer.*

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

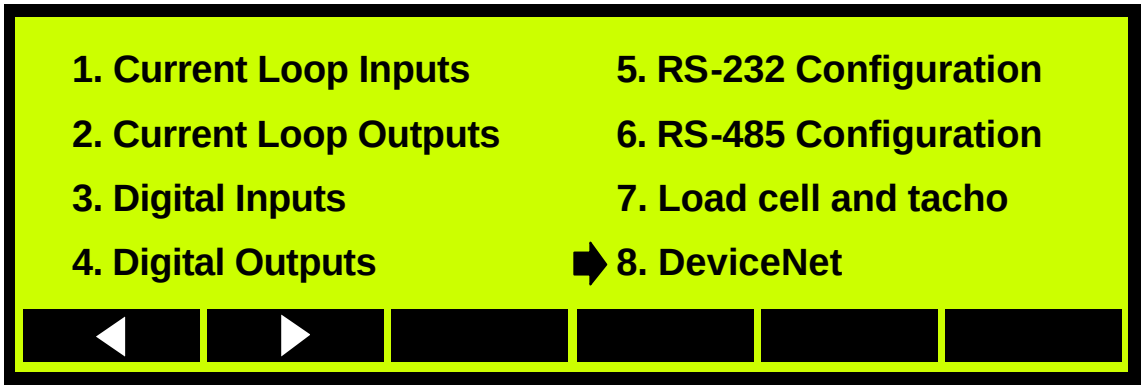


This screen is used as an aid in maintenance. The load cell output and input are shown along with the encoder. The data should be compared with that shown on the system data sheet shipped with the feeder.

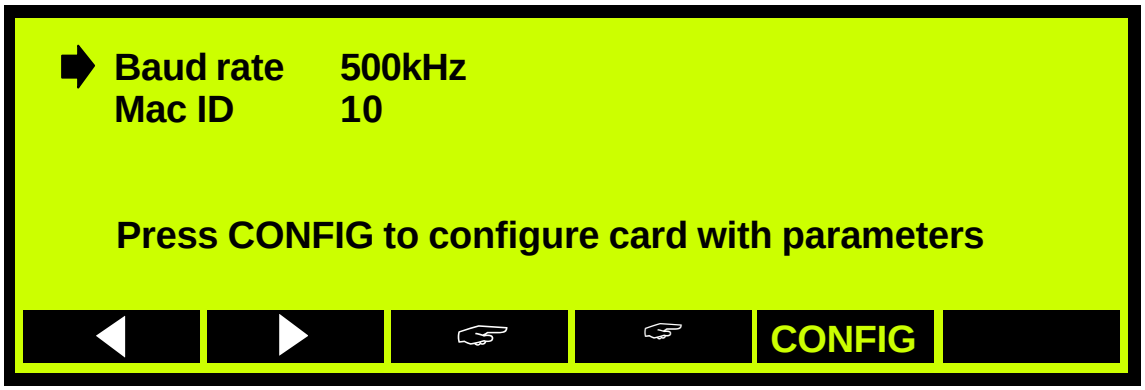


OPTIMUS OPERATIONAL MANUAL.
I/O (Input/Output) / *DeviceNet.*

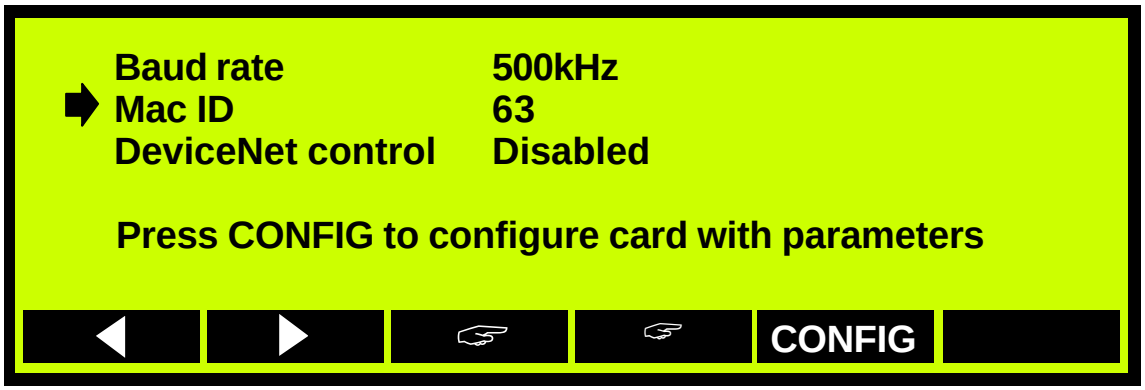
Device Net. **(Optional Supply)**
If Optimus has been supplied with a DeviceNet Card (optional extra) then the following data input screen is used to set up Optimus to communicate over the network. Prior to setting up Optimus to sit on your DeviceNet, network. It is assumed that the installer has a good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

OPTIMUS OPERATIONAL MANUAL.
Theory of Operation/ Steps in the Calibration Procedure.

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

Calibration of Optimus

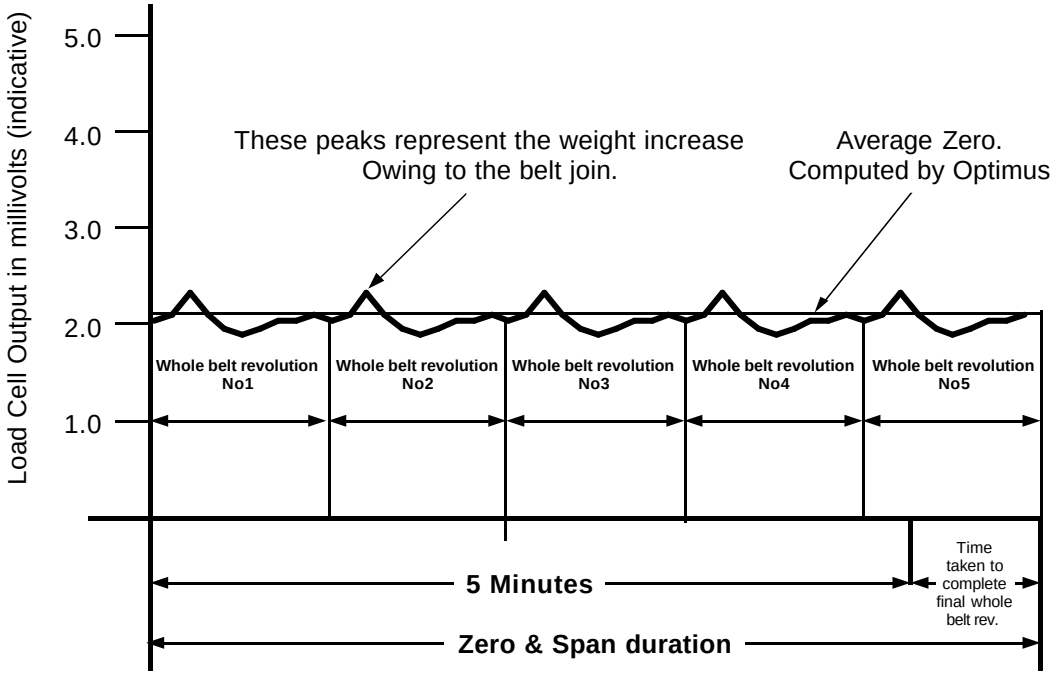
1) Enter the number of belt revolutions that Optimus will perform the “manual zero” & span over.
2) Perform a manual Zero
3) Apply roller Calibration Chain / Static Bar Weight and perform span.
4) On completion Optimus is calibrated.

OPTIMUS OPERATIONAL MANUAL.
Theory of Operation/ Steps in the Calibration Procedure.

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

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

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



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

OPTIMUS OPERATIONAL MANUAL.

Theory of Operation/ Steps in the Calibration Procedure.

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

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

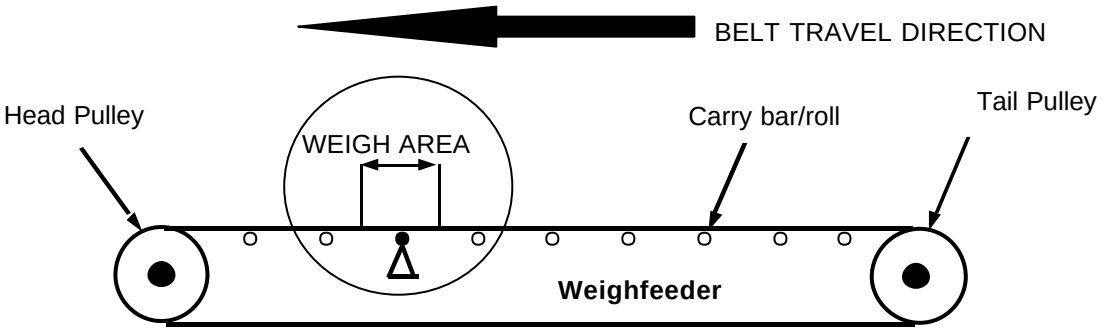
To successfully calibrate Optimus using a calibration roller chain or static weight. A target weight has to be calculated for the feeder. The method of calculating this target weight for both roller chain and static weight are shown below.

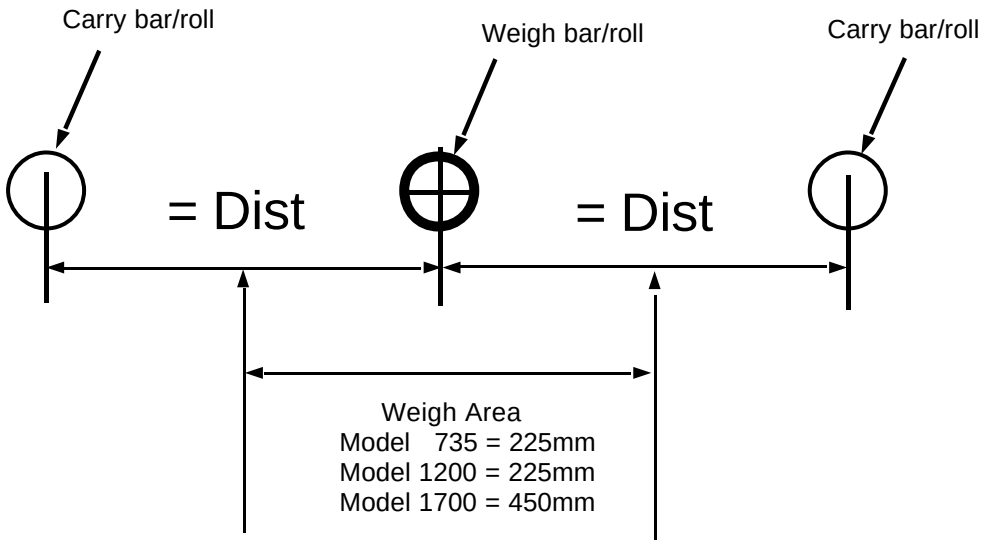
TARGET WEIGHT CALCULATION FOR WEIGHFEEDERS USING CALIBRATION CHAIN.

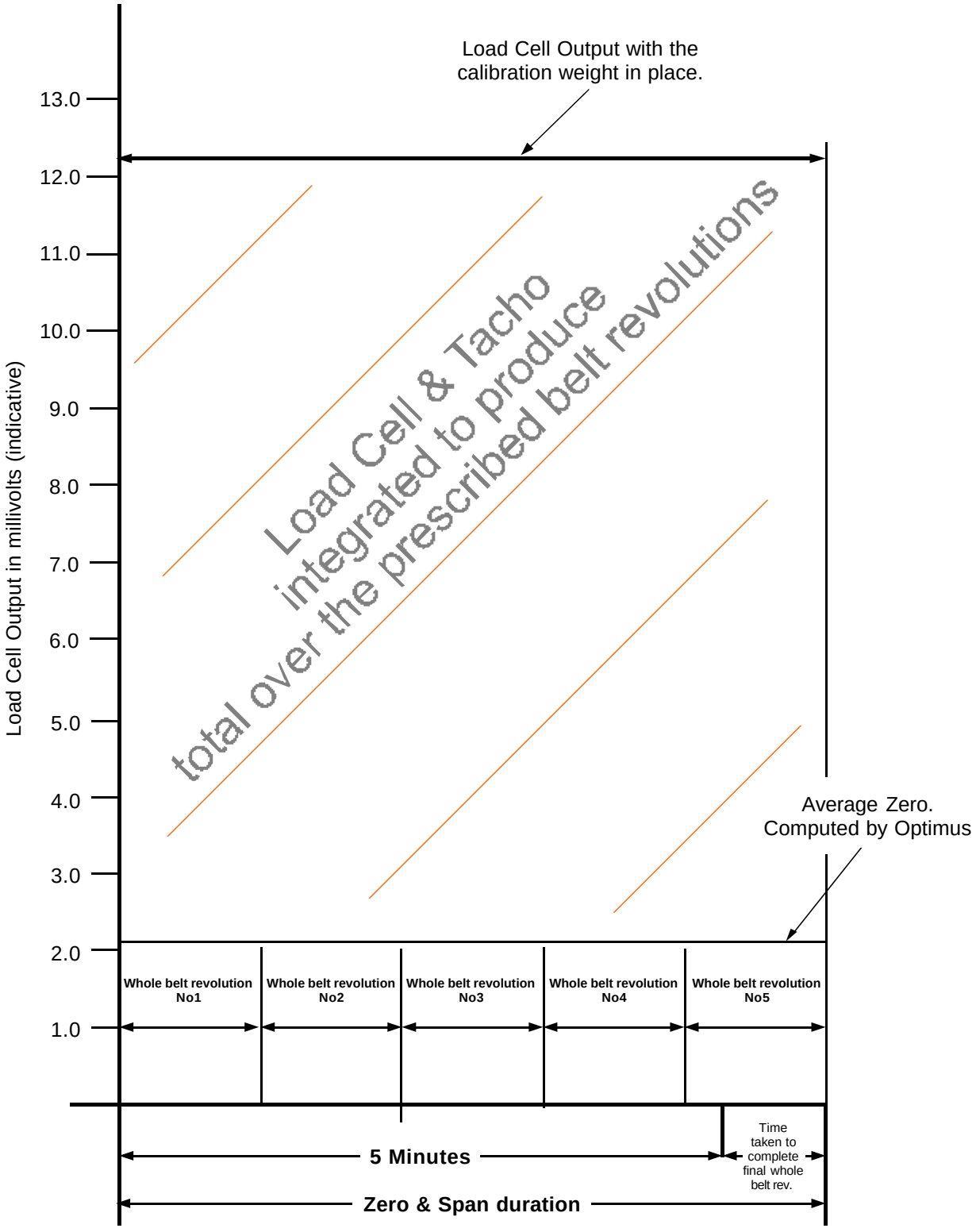
Chain weight (kg/m) X N° of Belt Revs X Belt length (m)

TARGET WEIGHT CALCULATION FOR WEIGHFEEDERS USING CALIBRATION WEIGHTS.

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

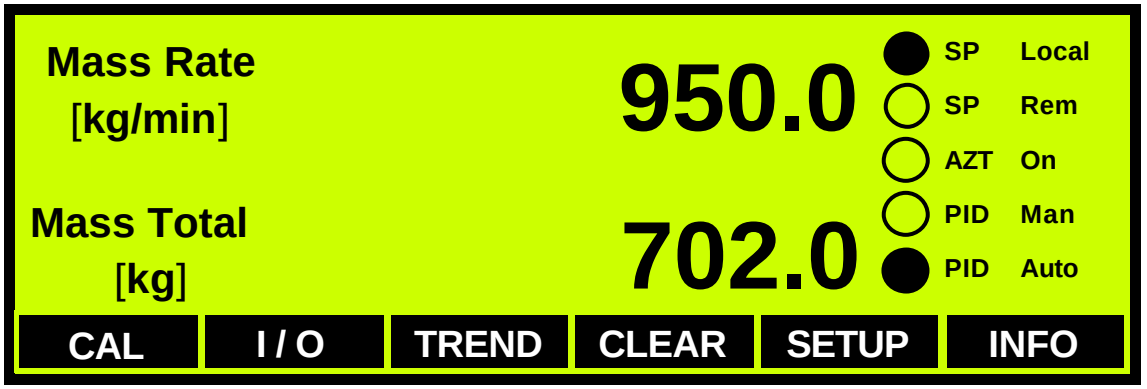




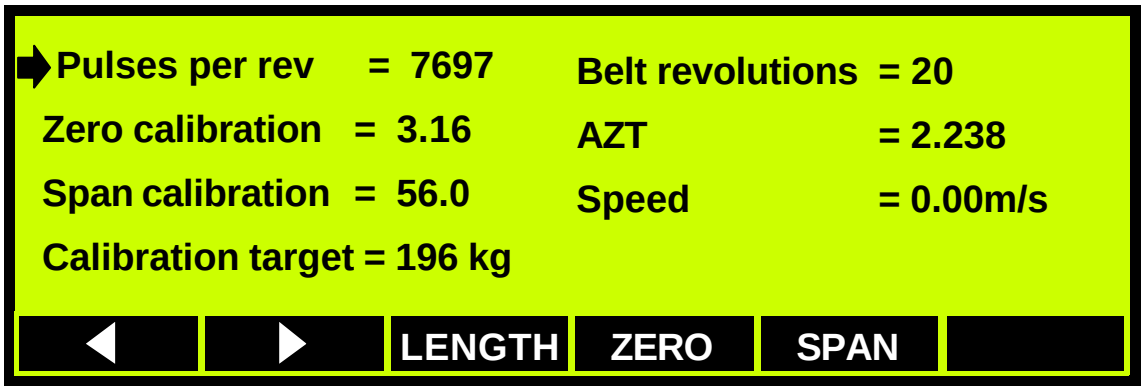

Load Cell Output with the calibration weight in place.
13.0
12.0
11.0
10.0
9.0
8.0
7.0
6.0
5.0
4.0
3.0
2.0
1.0
Load Cell Output in millivolts (indicative)
Load Cell & Tacho integrated to produce total over the prescribed belt revolutions
Average Zero. Computed by Optimus
Whole belt revolution No1
Whole 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

OPTIMUS OPERATIONAL MANUAL.
Calibration / *Pulses per Revolution.*

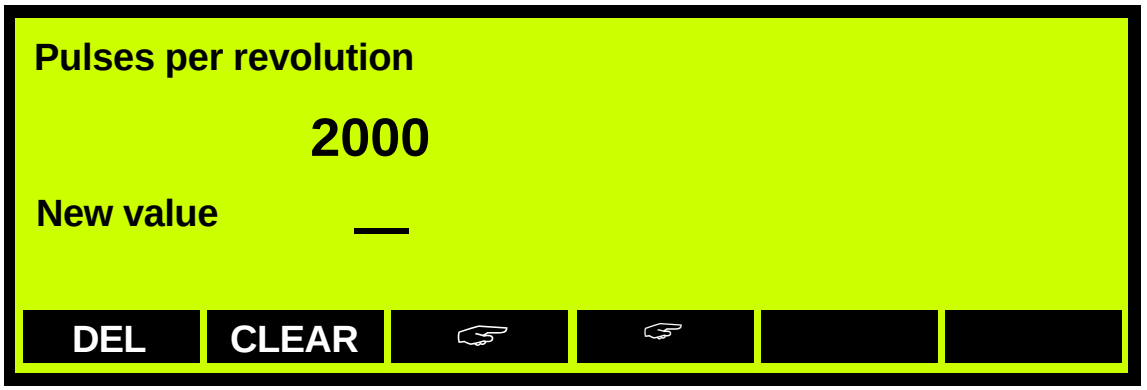
Prior to entering the pulses per revolution and the number of revolutions that the Zero and Span will be working over, (see Steps in the **"Calibration Procedure")** preceding this page and familiarise yourself with the concepts. Optimus provides two methods for acquiring the pulses per revolution. An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

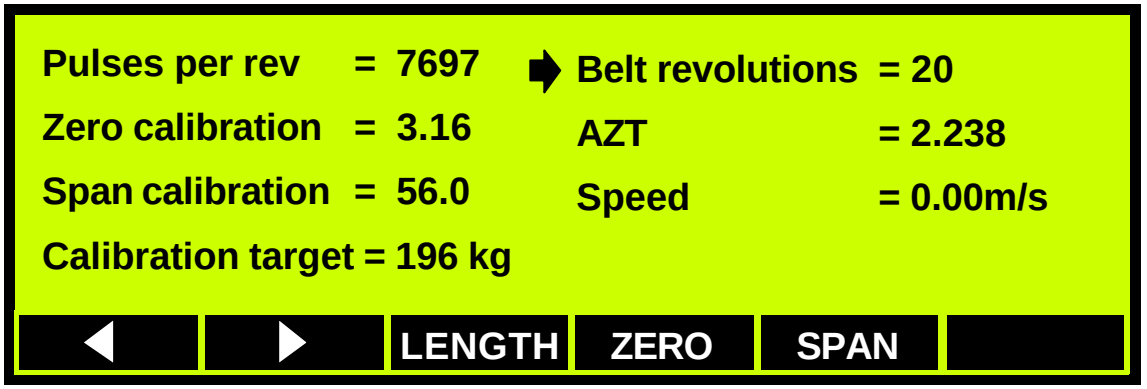


The data entered here must have come from a previous calibration.
Note Incorrect data entry here can invalidate previous calibration!

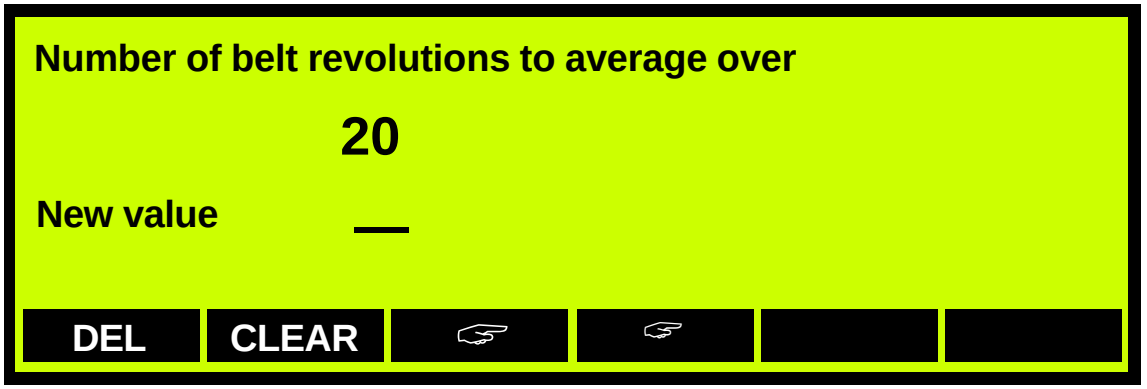
OPTIMUS OPERATIONAL MANUAL.

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

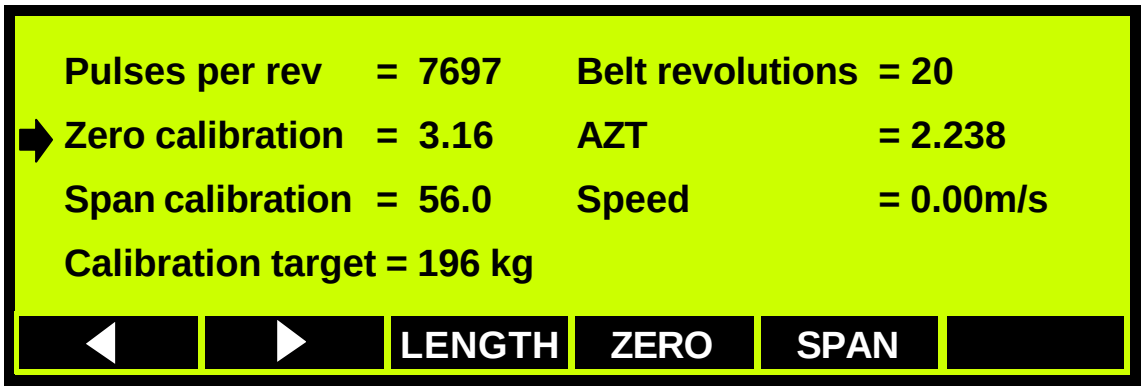
Scroll on to the manual belt revolution entry and enter the data entry screen by pressing the "ENTER" key.



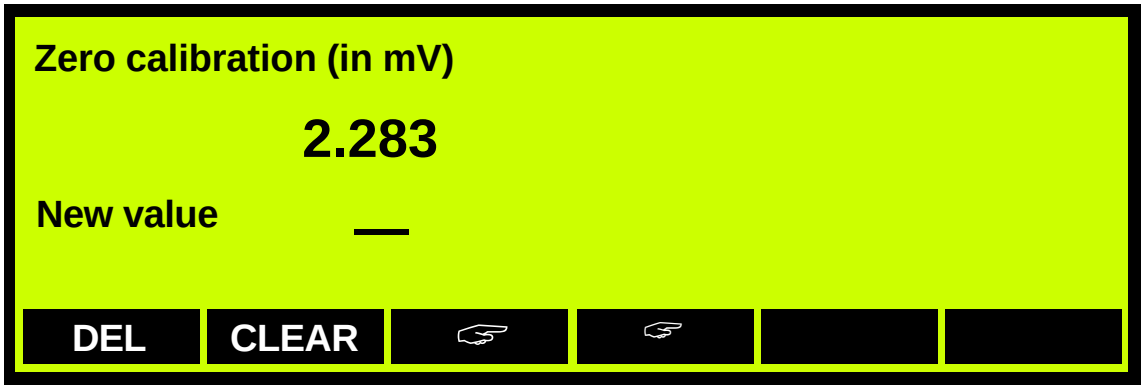
Press "ENTER" to access the manual data entry screen.



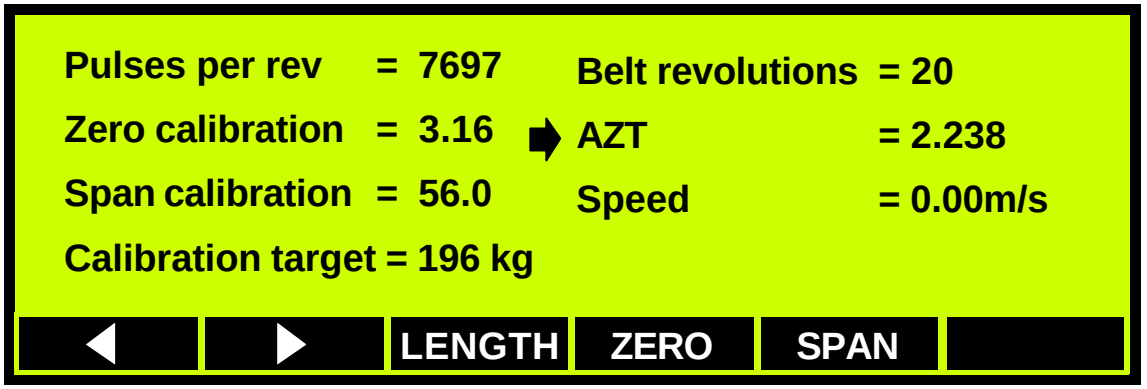
The data entered here must have come from a previous calibration.
Note Incorrect data entry here can invalidate previous calibration!

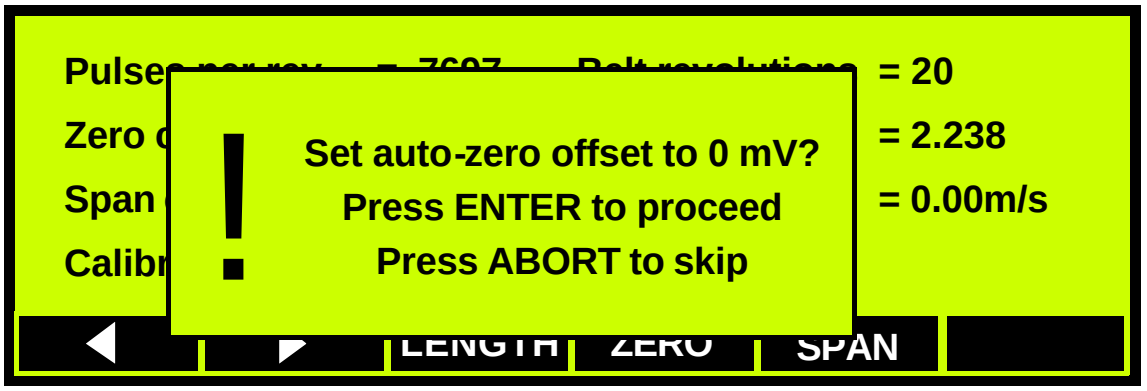


Scroll on to the Zero calibration entry and enter the data entry screen by pressing the "ENTER" key. Enter the average zero during the last automatic calibration or use previous data. If this is not available, perform an automatic calibration. This value can't be found any other way other than Optimus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

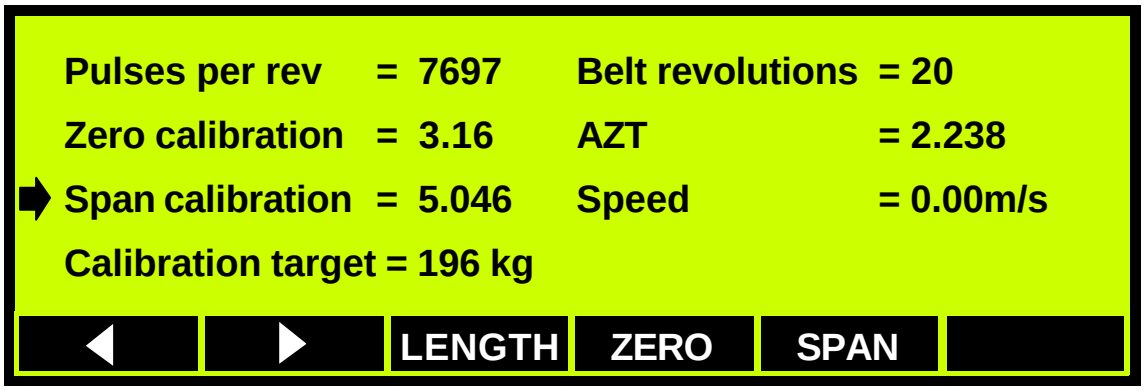


Scroll on to the AZT (Auto Zero Tracking) entry and enter the data entry screen by pressing the "ENTER" key.

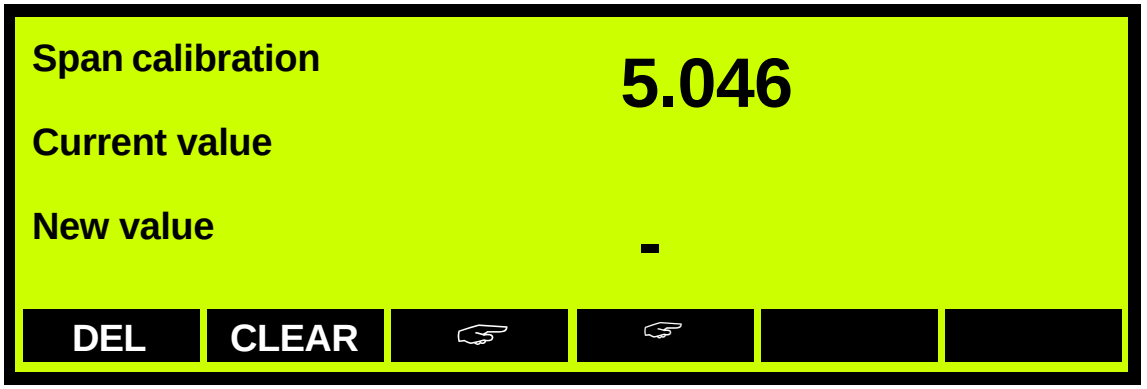




The data entered here must have come from a previous calibration.
Note Incorrect data entry here can invalidate previous calibration!

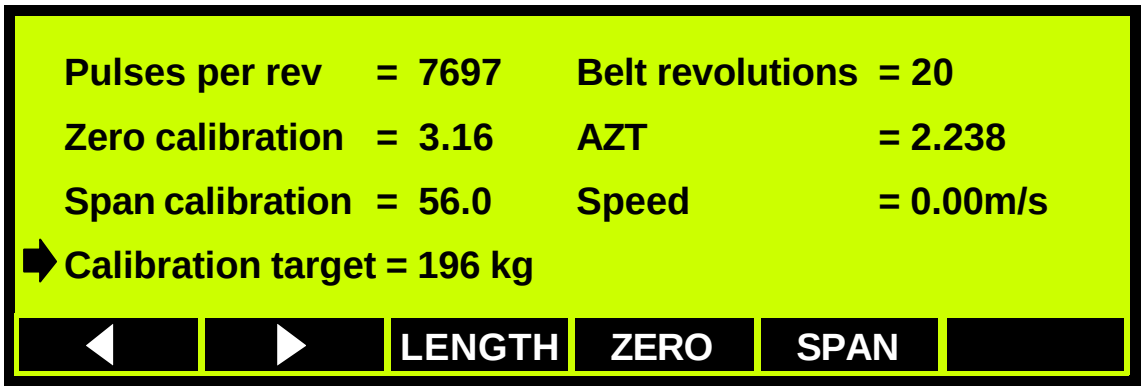


Scroll on to the span calibration entry point and press the "ENTER" key to enter the manual entry screen and routine.

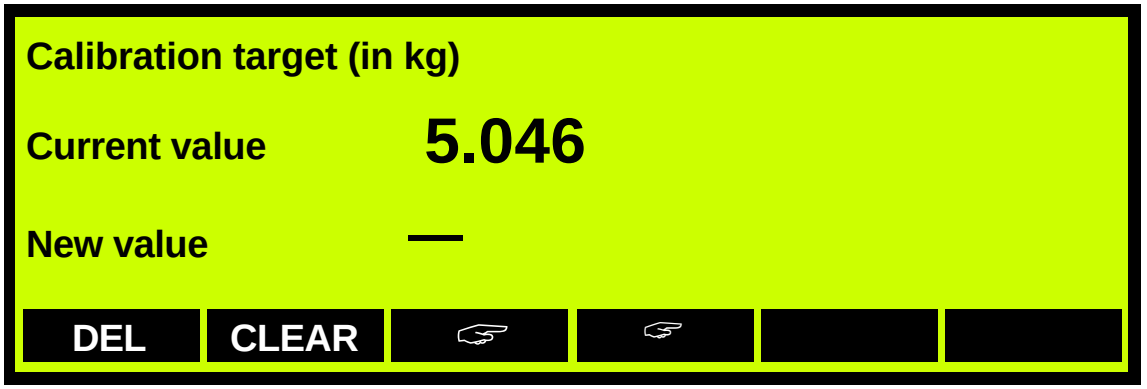


OPTIMUS OPERATIONAL MANUAL.
Calibration / *Target Weight.*

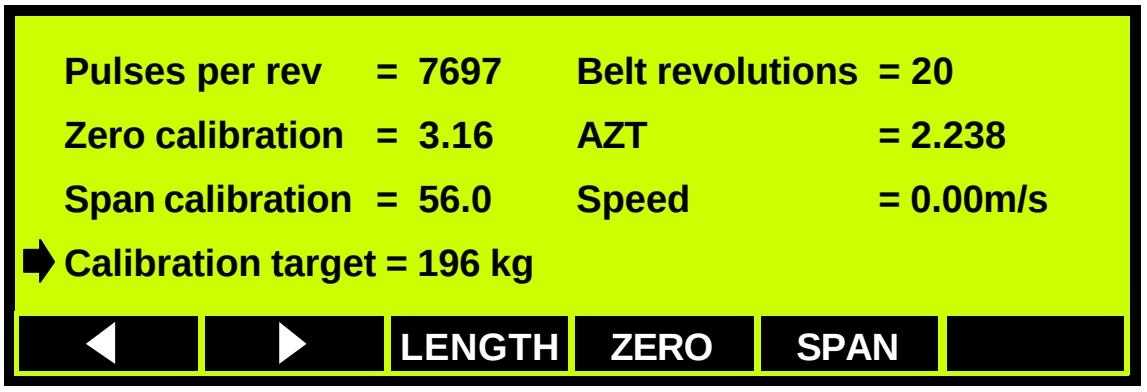
The calibration target weight should be entered here. Web-Tech will normally supply the target weight along with the static weights or calibration chain required to produce a target weight. The target weight is that weight that that Optimus should equate to when the belt is run over the prescribed number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



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



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

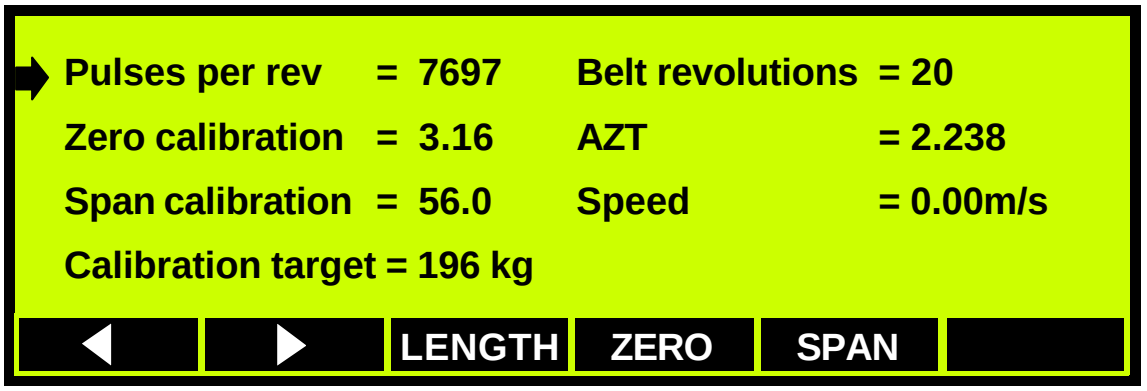


No access is provided to the speed display. As the belt speed is a derived variable.

Automatic Capture of Pulses per Revolution.

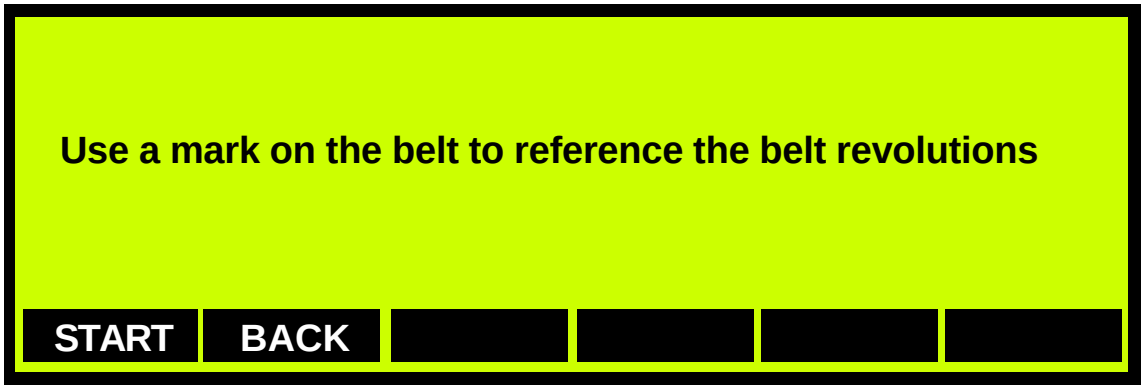
(Note Web-Tech will have done the following prior to delivery)

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

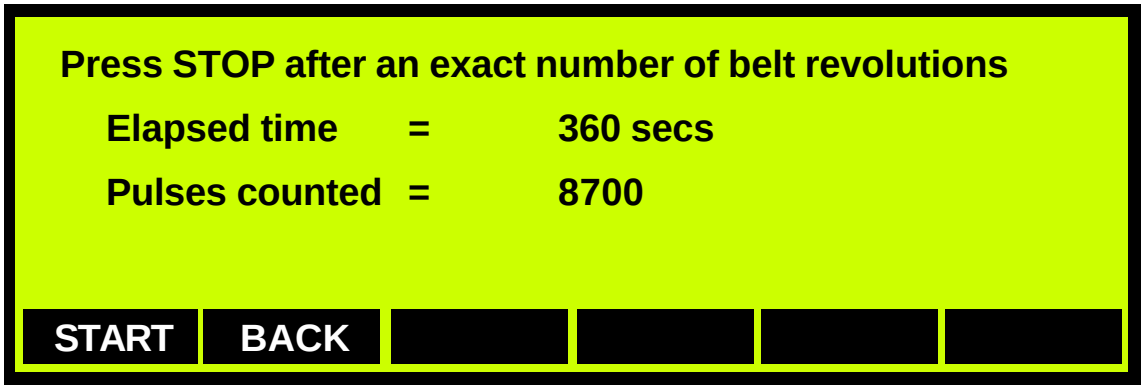


Press the “LENGTH” F3 key to go to the pulse acquisition routine. The screen will change to the one shown below.

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.

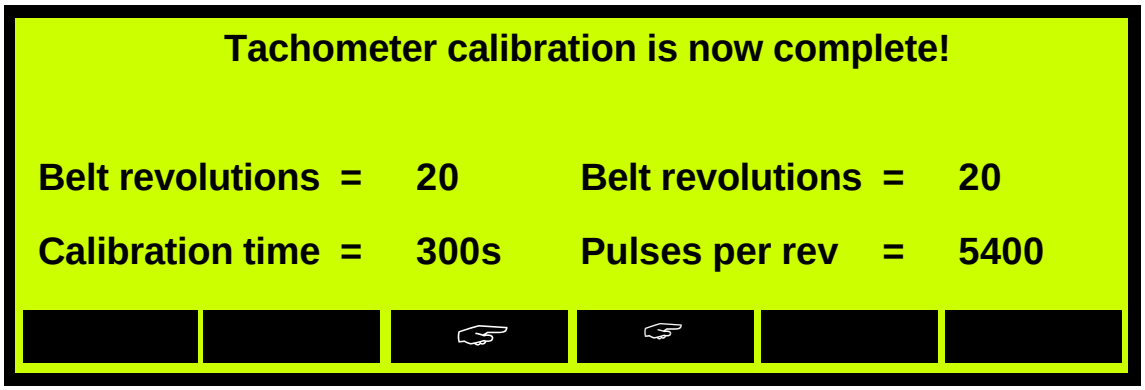


Press the “START” button, the F1 key, when the mark on the belt coincides with the stationary reference point. The display will change to the one shown below and Optimus will be capturing pulses. When the belt has travelled at least 5 belt revolutions with a minimum time of 5 minutes. Stop the count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

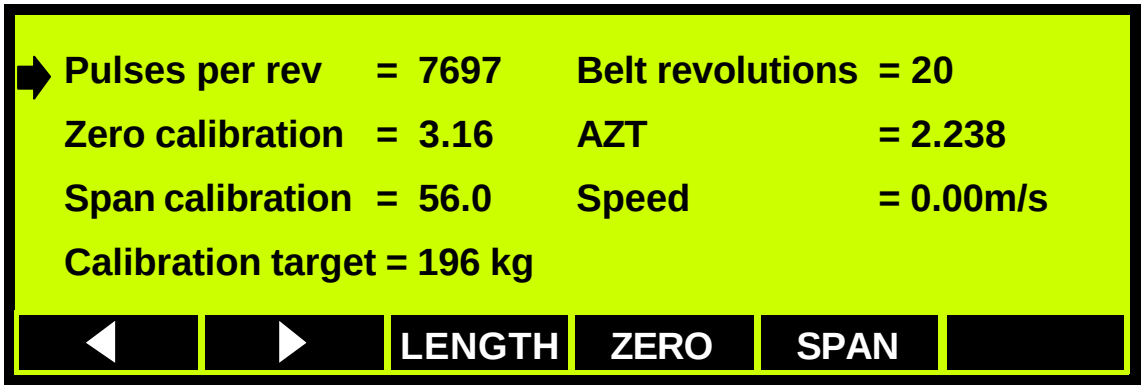


OPTIMUS OPERATIONAL MANUAL.
Calibration / *Pulses per Revolution / auto capture.*

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



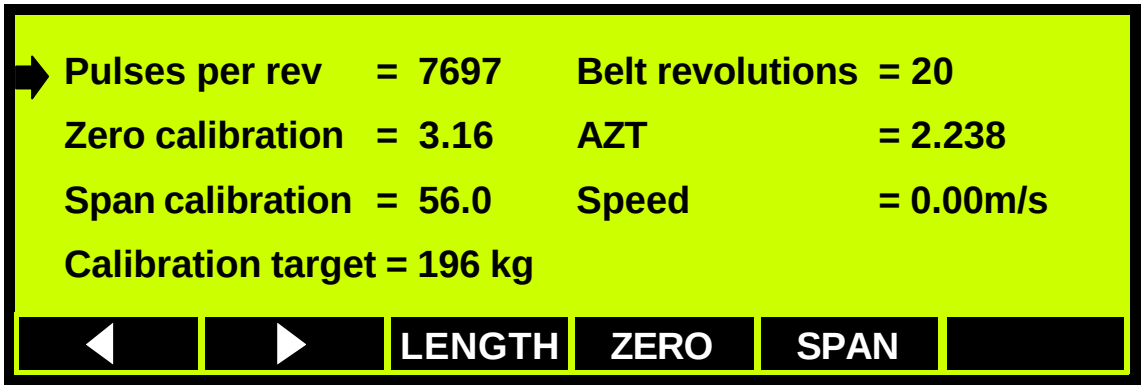
At this point the number of belt revolutions over which Optimus captured the pulses must be entered.
Note Only whole belt revolutions must be used and the exact number of revolutions must be entered. Press the tick key to proceed.



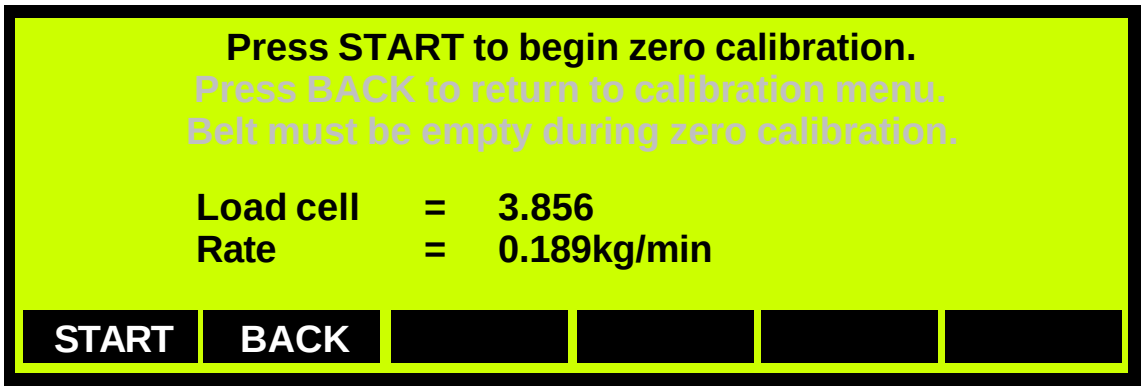
At this point Optimus has the data required in order to perform a “manual zero and span”

OPTIMUS OPERATIONAL MANUAL.
Calibration / *Zero.*

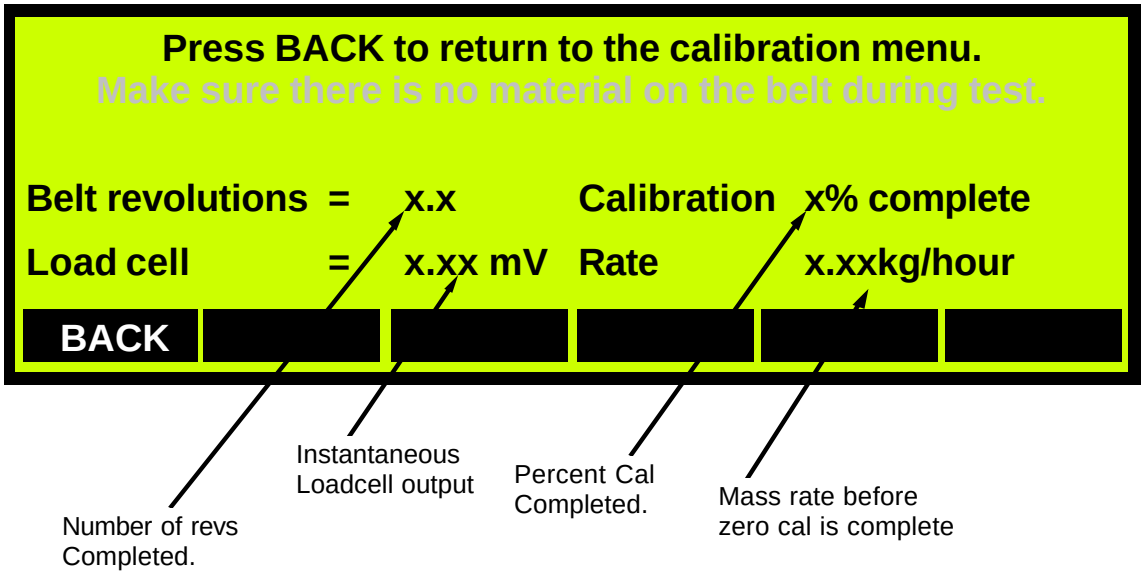
Calibration Zero
At this point pressing the F4 key located under the “LENGTH”, will take the user to the screen where the weigher can be readied for zeroing.



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.

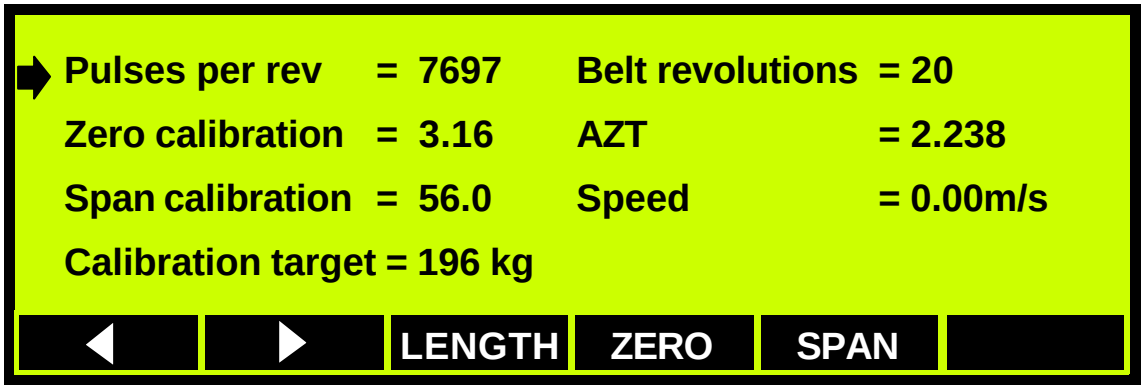


When the test is complete, at the end of the prescribed number of belt revolutions the display will stop updating.

OPTIMUS OPERATIONAL MANUAL.
Calibration / *Zero.*

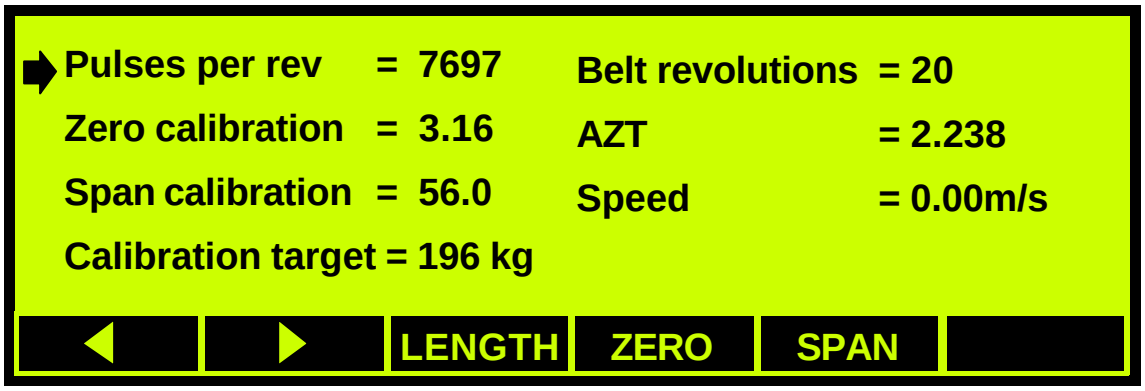
Following the completion of the zero test. The screen will change to the one shown below. The three top lines of text will be alternating. If for any reason the test was deemed to be invalid (material falling onto the belt during test etc) pressing the cross button will cancel the result.
On pressing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

CALIBRATION SCREEN.

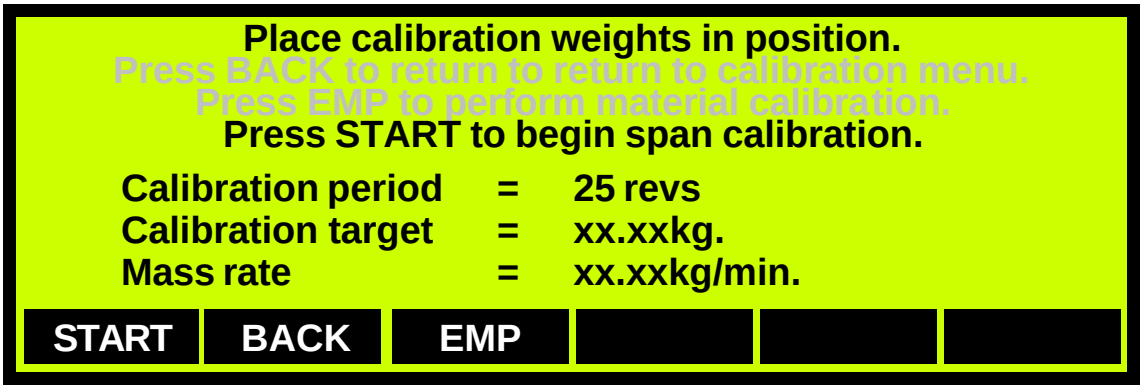


OPTIMUS OPERATIONAL MANUAL.
Calibration / *Span Static Weight Test.*

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



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



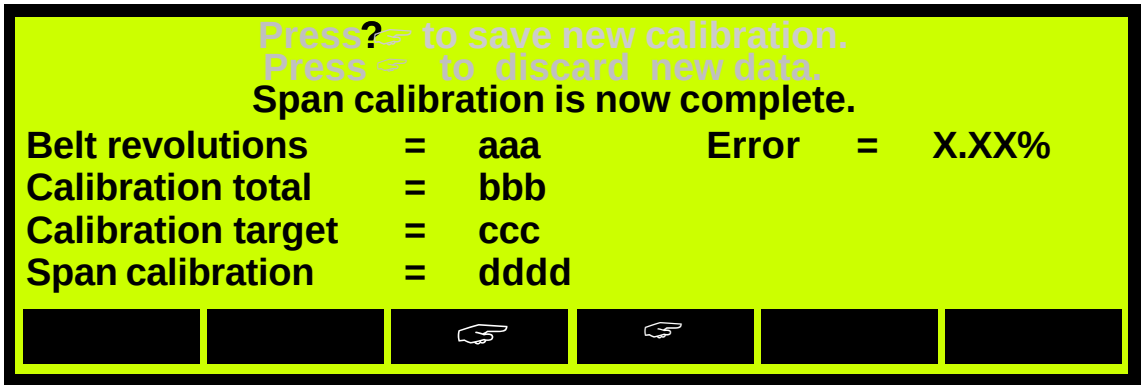
Press the "START" (F1) key to start the test, if the simulated load, (fixed weight / roller calibration chain), static weight test is to be performed.

The screen will change to the one shown below.

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

OPTIMUS OPERATIONAL MANUAL.
Calibration / *Span Static Weight Test.*

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



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.

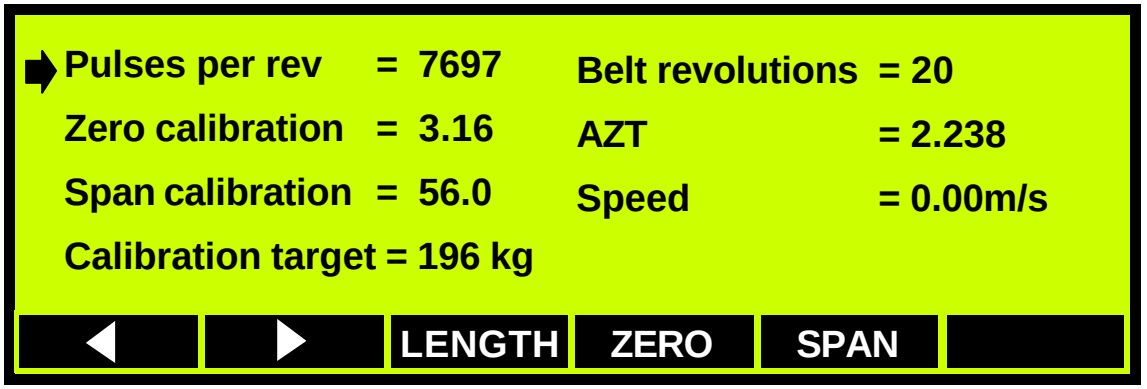
bbb = the totalised value of the static weight / roller calibration chain achieved during the test.

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.

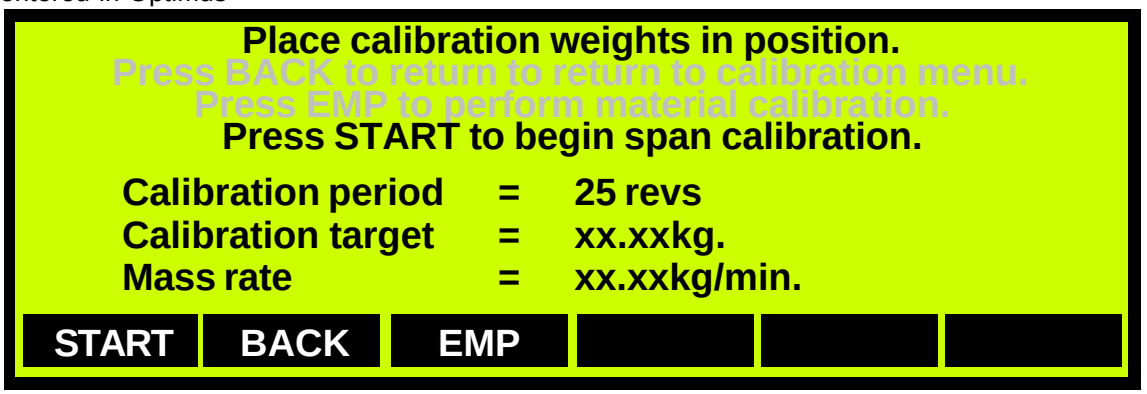
X.XXX% = the calculated percentage error between the target weight and achieved total from the test.

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.

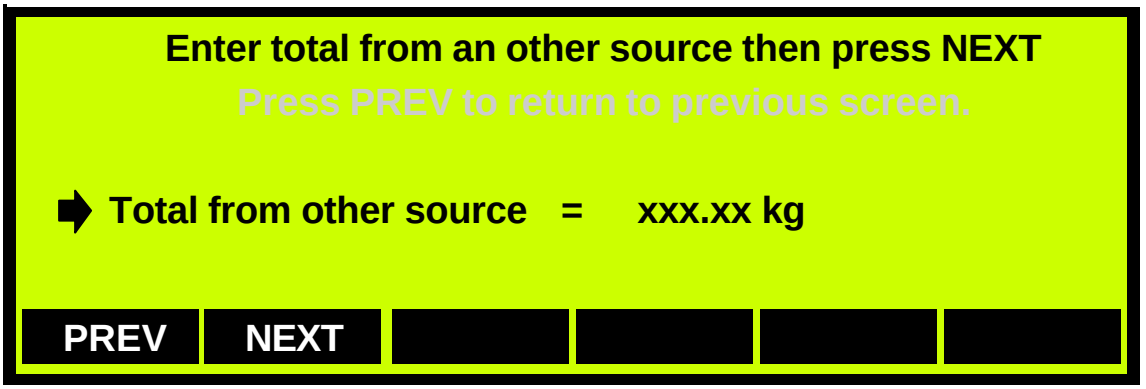


OPTIMUS OPERATIONAL MANUAL.
Calibration / *Span Empirical.*

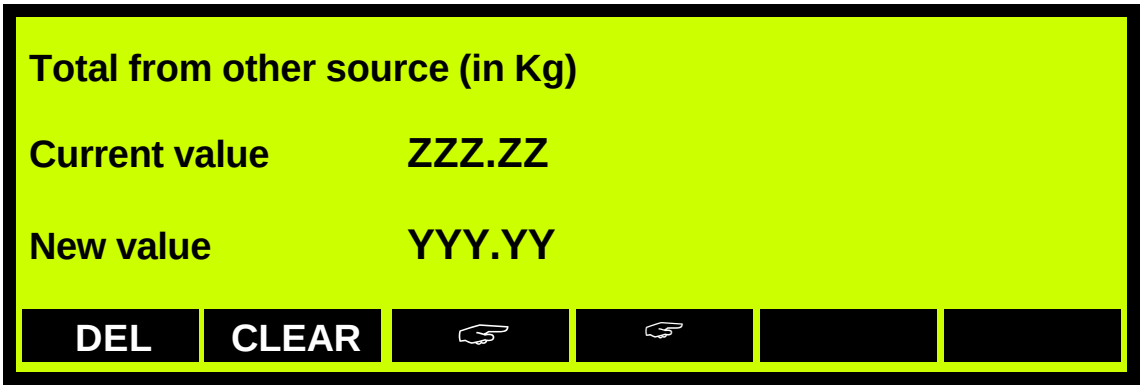
The “EMPIRICAL” span test allows the user to run material over the belt and adjust the span against the actual weight passed. The preferred methodology is to pass material over the belt and collect it for weighing on an accurate static scale. This weight “total from an other source” is entered in Optimus



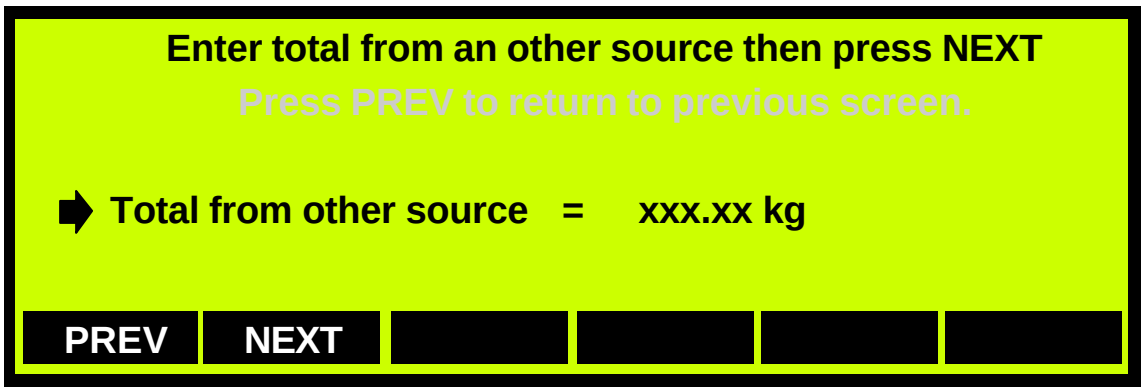
Press the F3 “EMP” key which will open the screen shown below.



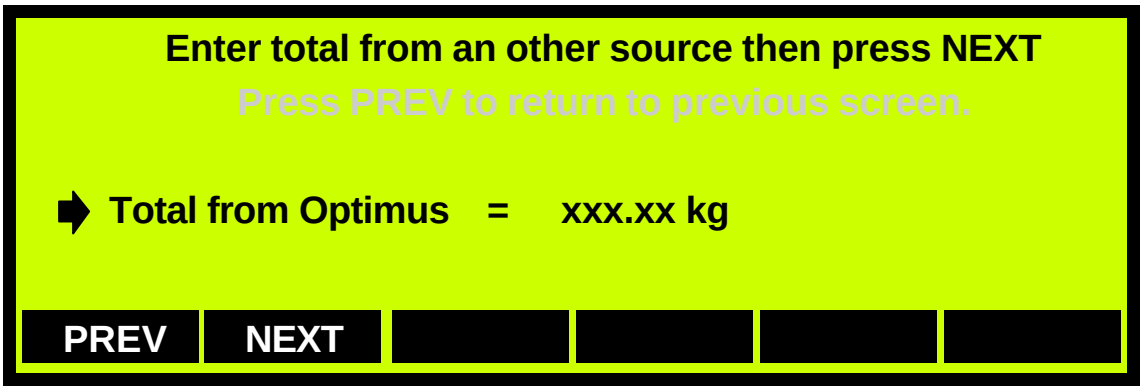
Press the “ENTER” key in the above screen to enter the data input screen.



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.

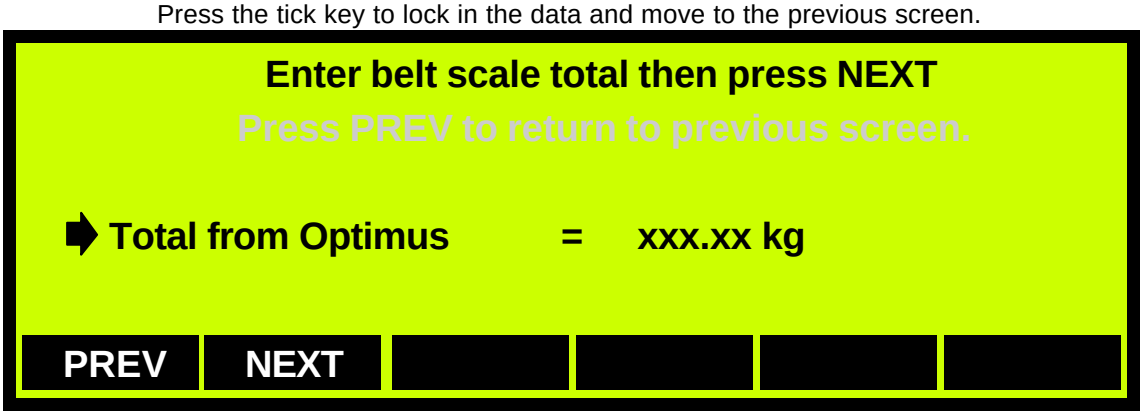


Press the “ENTER” key to go to the data entry screen where the total obtained by Optimus can be entered.



In the screen shown below enter the total obtained by Optimus

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

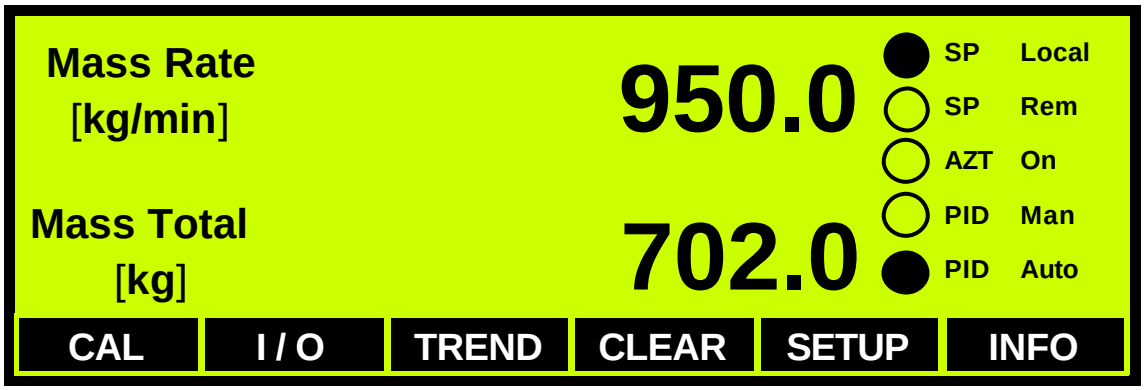


At this point a new span needs to be generated. Press the F2 “NEXT” key to generate the new span and move on to the screen shown below.

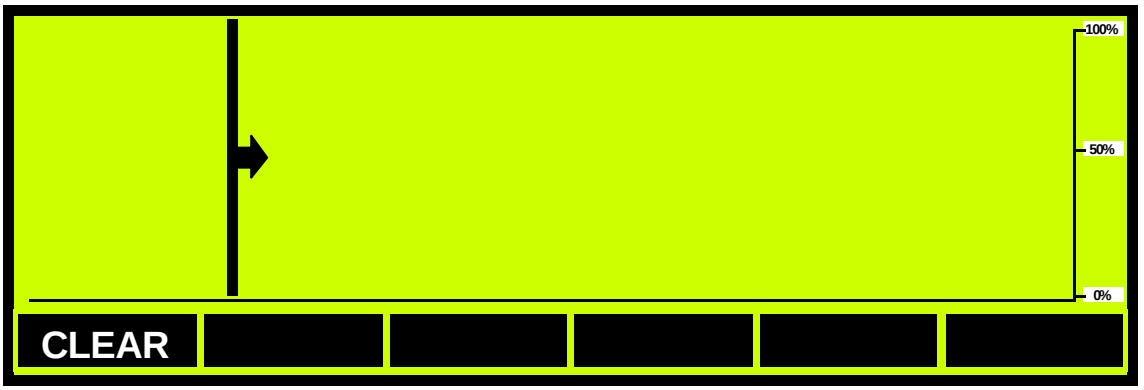
The above screen shows the new and old spans and allows for the acceptance or rejection of the data. On pressing the tick key Optimus goes back to the calibration screen. The EMPIRICAL span is now complete. Press the “HOME” key to transfer the data to working memory.

OPTIMUS OPERATIONAL MANUAL.
MRMT SCREEN / *Trend.*

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



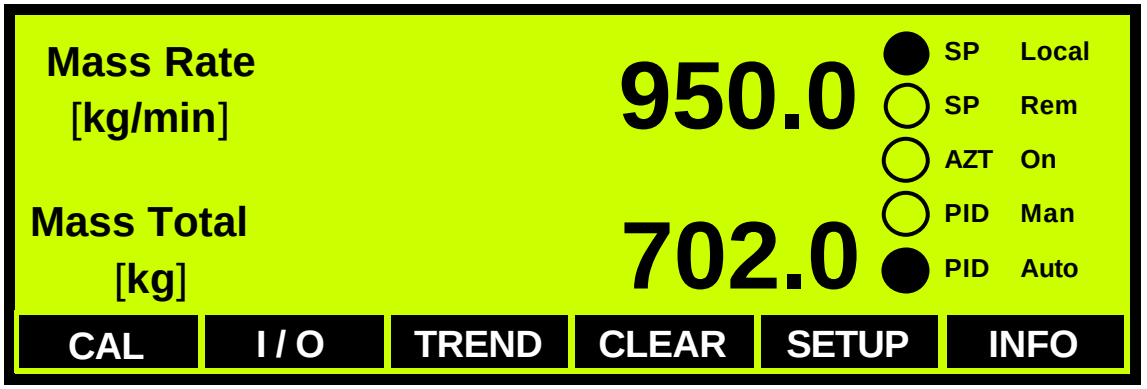
On entering the mass rate trend screen the last two minutes trend can be cleared by pressing the “CLEAR” (F1) key.



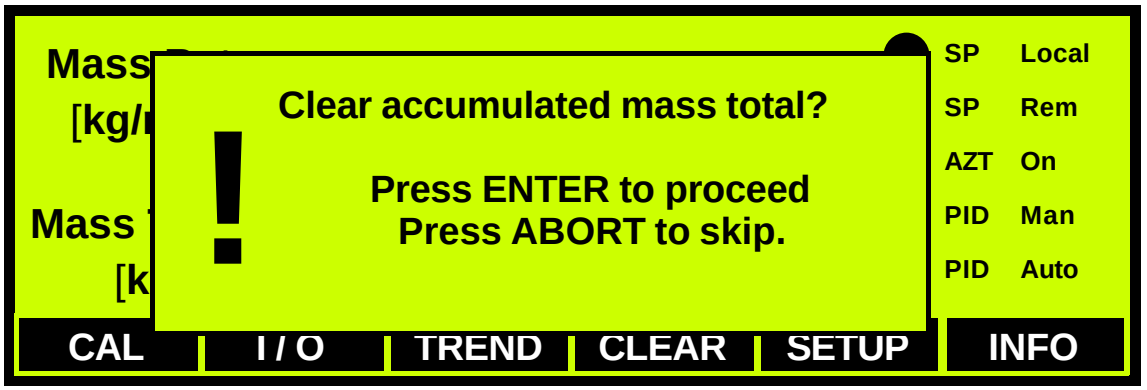
Pressing the “HOME” key will return Optimus to MRMT.

OPTIMUS OPERATIONAL MANUAL.
MRMT SCREEN / *Clear Total.*

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

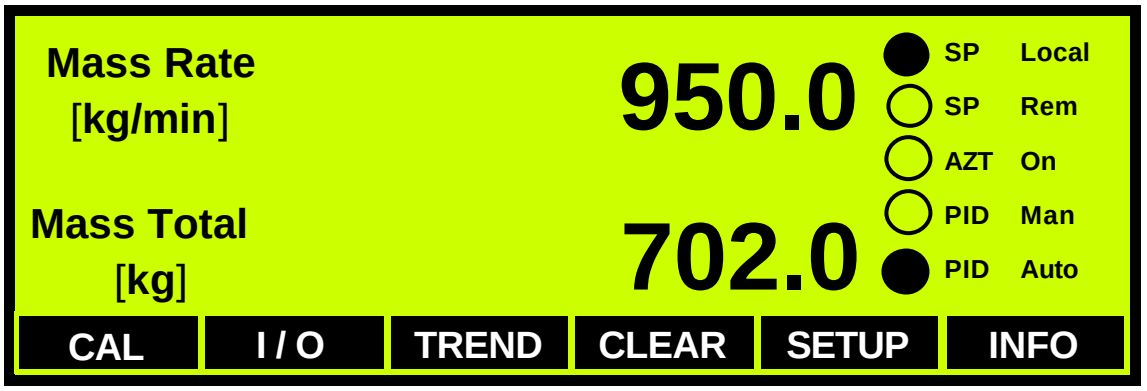


Prior to clearing the total Optimus will ask for confirmation, prior to acting on the clear command. Press “ENTER” to continue and clear the total. Or press the “ABORT” key if the total should not be cleared.

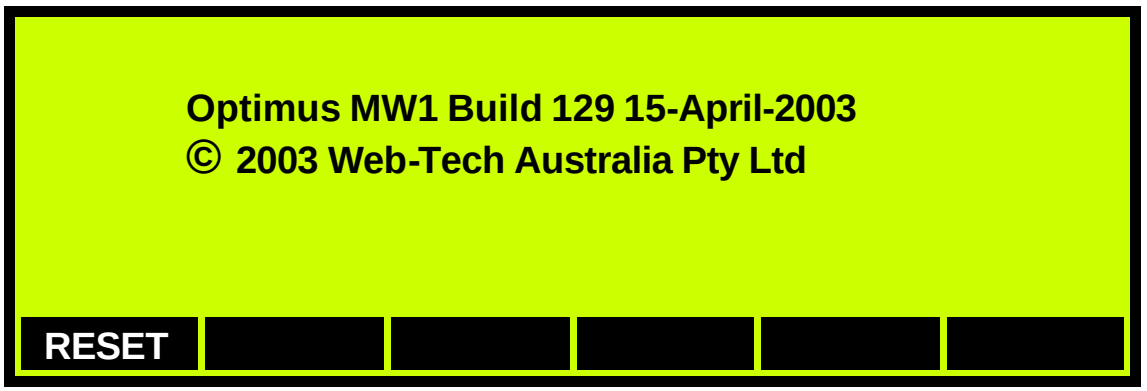


OPTIMUS OPERATIONAL MANUAL.
MRMT SCREEN / *Info Screen.*

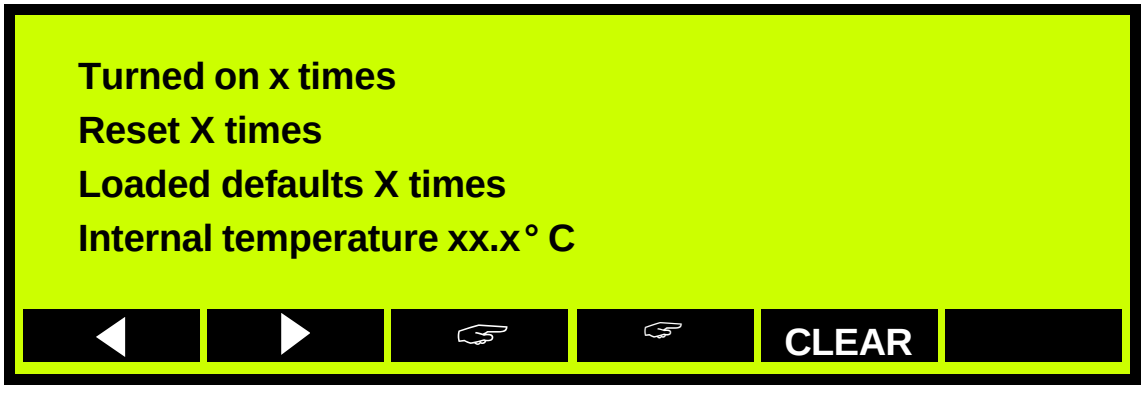
The Optimus firmware (operating software) is under constant review. As the firmware is upgraded it's build number is updated along with the date that it was completed. It may be necessary to view this data from time to time. Press the "INFO" (F6) key to access the information screen.



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



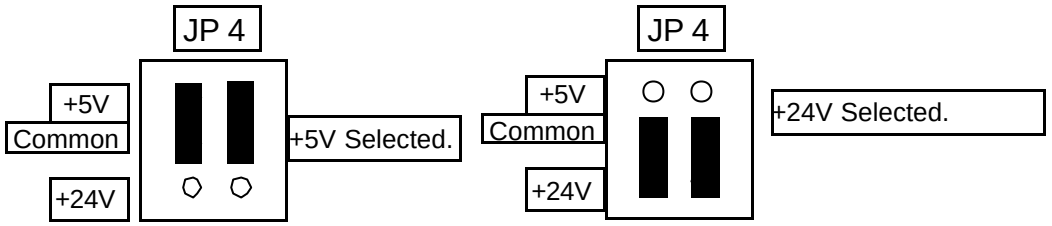
Pressing the "RESET" (F1) from this screen will bring up the following screen. This screen displays the number of times Optimus has had the power removed since the data was last cleared. This is a useful tool if a faulty power supply (mains power) is suspected.
The reset display the number of times the 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.

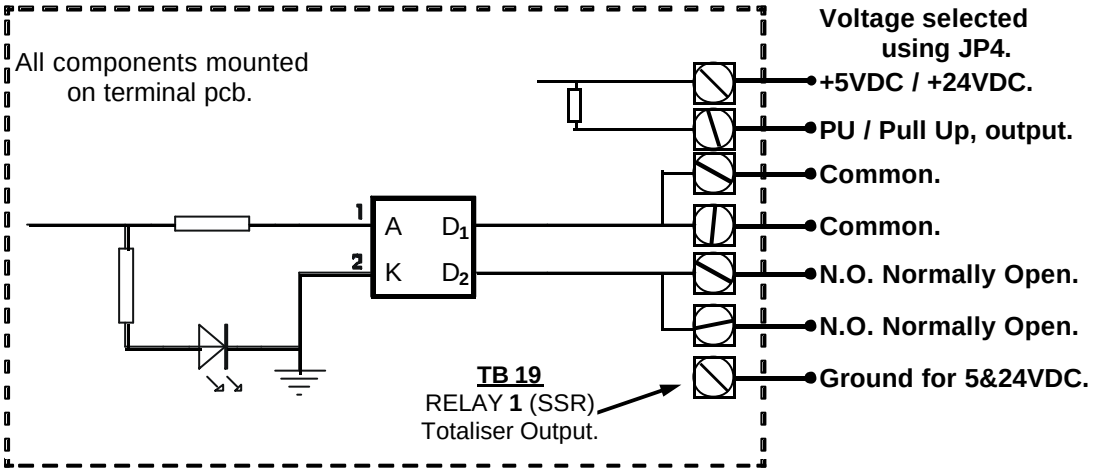


The internal temperature is not the ambient air temperature in the cabinet. It is the temperature at the core of the Central Processing Unit (CPU) / computer. The absolute max temp for this device is 55°C. Do not exceed this temperature. Move the enclosure to a cooler environment.

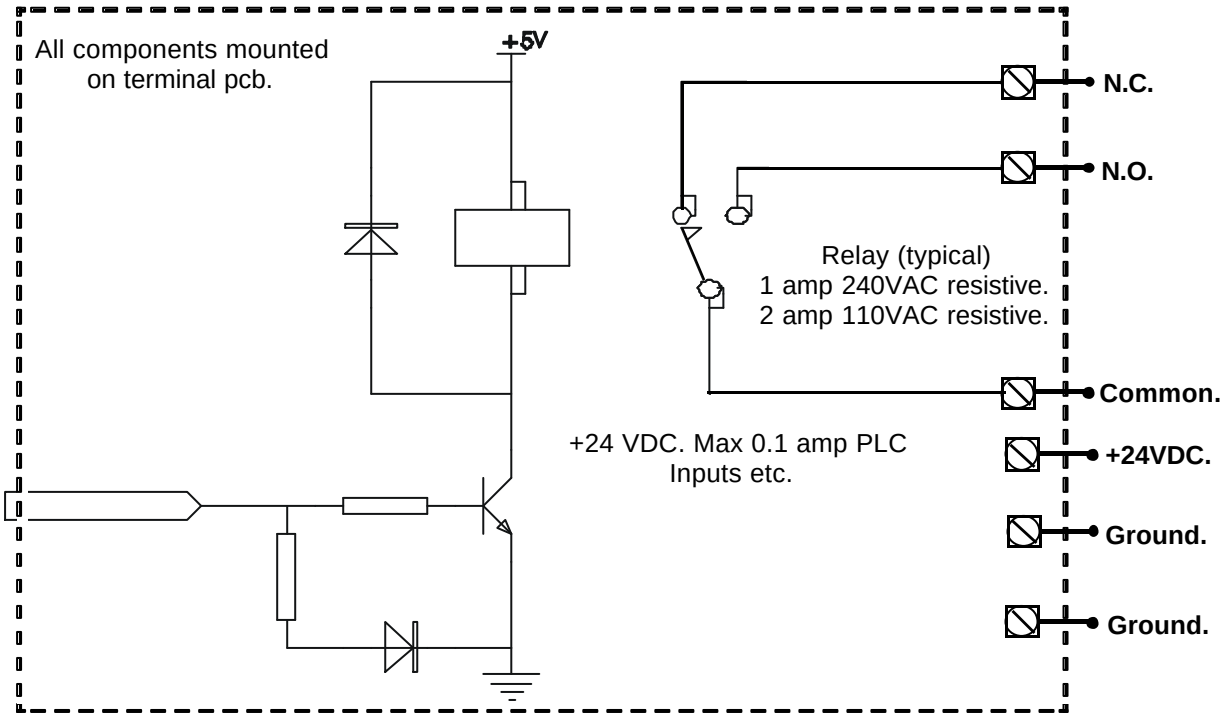
OPTIMUS OPERATIONAL MANUAL.
Electrical / Electronic Notes/ *digital outputs.*

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.





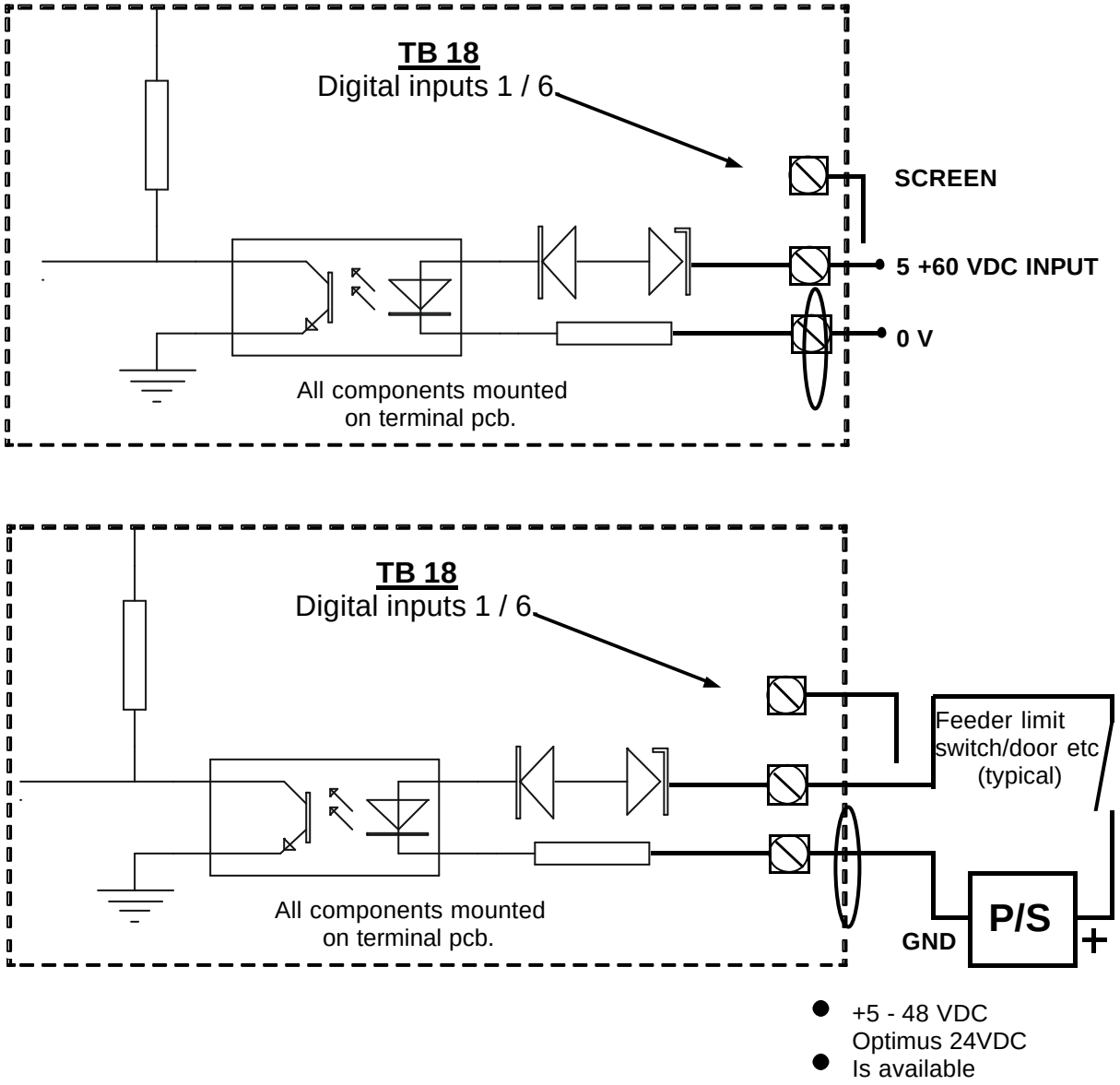
Electro-mechanical Relays. (RLY2 - 5)
Relays 2-6 are assigned via the keyboard (I/O / 4 Digital Outputs). When active the local red LED will illuminated.
The relays can be used as “clean contacts” or supplied with on board +24VDC. Link between +24V and COM. The return is to be terminated on GND.



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

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

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



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

SECTION 6 - CALIBRATION

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

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

Zero Calibration

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

Span Calibration

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

Material Test

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

1. The amount of material required for the test(s) must be proportional to the weighfeeder capacity. A rule of thumb quantity would be a minimum of 3 minutes of running time at maximum capacity e.g. if the capacity is 10 tph, the amount of material would be 10 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).

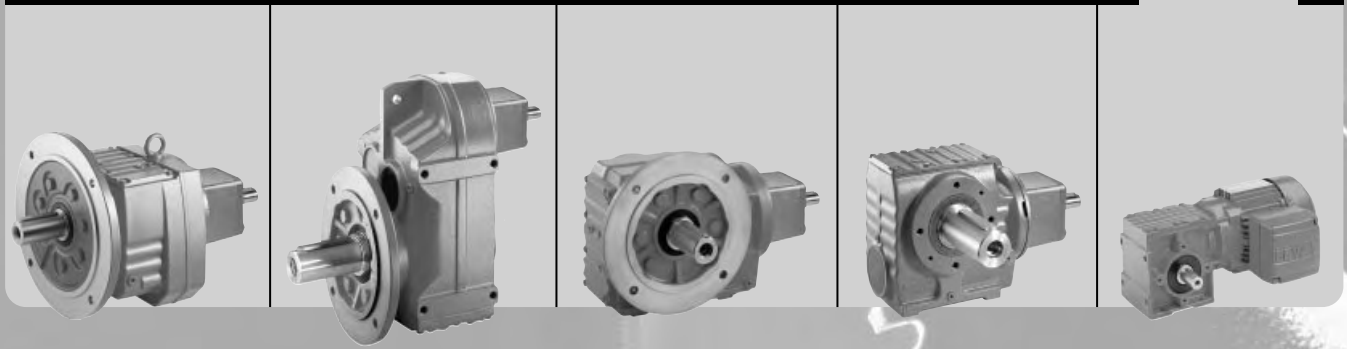
Any changes to the calibration should be recorded on the calibration sheets for future reference.

SEW EURODRIVE

Gear Units
R..7, F..7, K..7, S..7 Series, Spiroplan® W

Edition

05/2001



Operating Instructions

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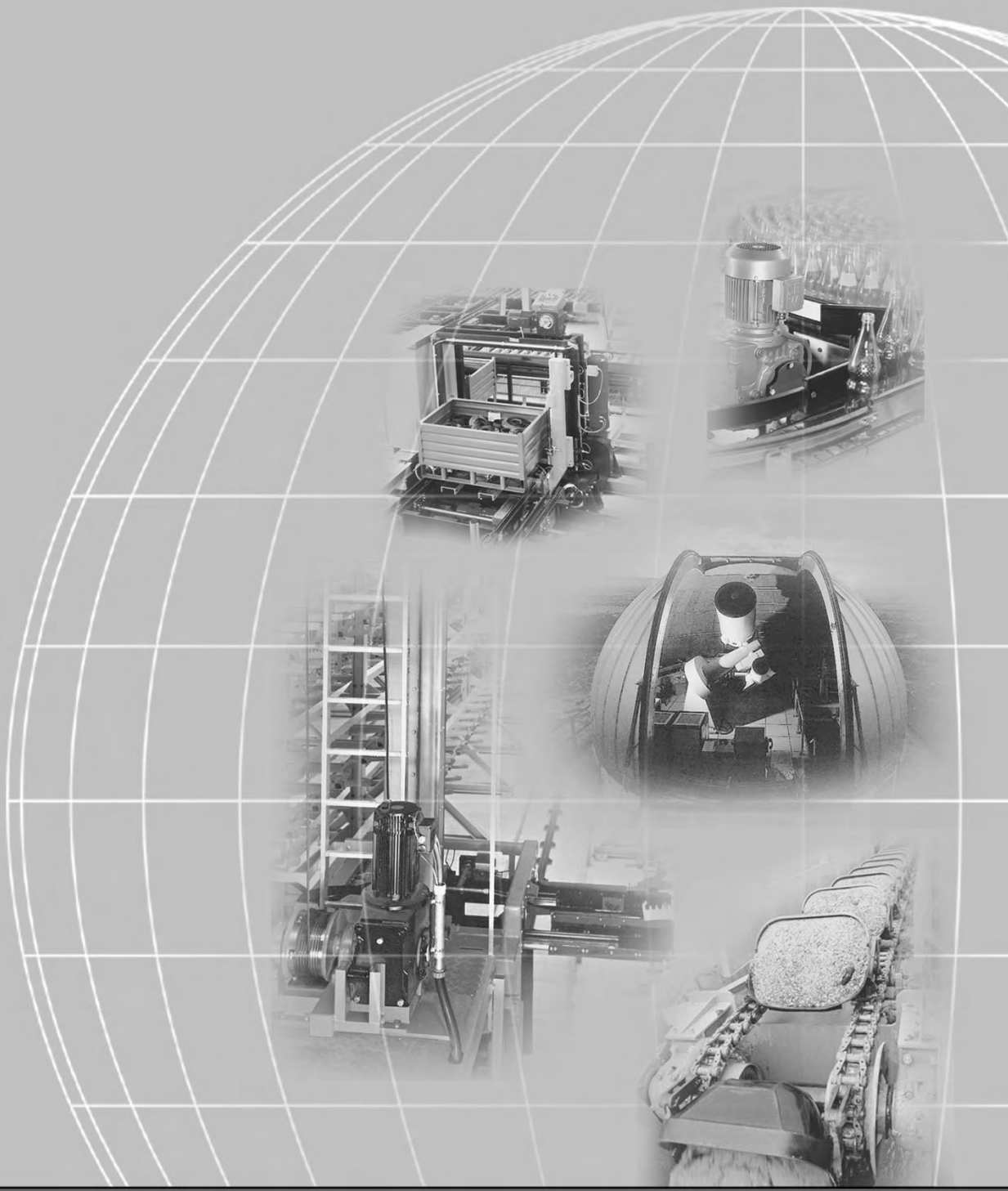
SEW
EURODRIVE



SEW-EURODRIVE

Contents

1 Important Notes

Safety and warning notes

Please note the safety and warning notes in this publication!

Electrical hazard
Could result in: death or severe injuries.

Imminent danger
Could result in: death or severe injuries.

Dangerous situation
Could result in: slight or minor injuries.

Damaging situation
Could result in: damage of drive and operating environment.

Operating hints and useful information.

Close adherence to the Operating Instructions is the prerequisite for fault-free operation and fulfillment of any rights to claim under guarantee. Please start reading the Operating Instructions prior to operating the drive!

Keep Operating Instructions in vicinity of unit since it contains important informtion on service procedures.

- **Adjust lubricant fill amount and position of breather valve when changing mounting position (see section "Lubricants" and "Mounting Positions").**
- **Please see notes in section "Setup" / "Setup of Gear Unit!"**

Disposal

(please observe the most current regulations):

- Dispose of housing parts, gears, shafts and anti-friction bearing of gear units as stell scrap. The same applies to gray cast iron parts unless there is separate collection service.
- Some worm gears are made of non-ferrous metals and must be disposed of accordingly.
- Collect waste oil and dispose according to local guidelines.

Changes to edition 04/2000 are indicated by gray bars in the margin

2 Safety Notes

Preliminary remarks

The following safety notes are principally concerned with the use of gear units.

If using **geared motors**, please also refer to the safety notes for motors in the corresponding operating instructions.

Please also take account of the supplementary safety notes in the individual chapters of these operating instructions.

General

During and after operation, geared motors and gear units have live and moving parts and their surfaces may be hot.

All work related to transport, putting into storage, setting up/mounting, connection, startup, maintenance and repair may only be carried out by qualified specialists in accordance with

- the corresponding detailed operating instructions booklet(s) and wiring diagrams
- the warning and safety signs on the gear unit/geared motor
- the specific regulations and requirements for the system and
- national/regional regulations governing safety and the prevention of accidents

Severe injuries and damage to property may result from

- incorrect use
- incorrect installation or operation
- removal of required protective covers or the housing when this is not permitted

Designated use

These geared motors/gear units are intended for industrial systems. They correspond to the applicable standards and regulations.

The technical data and the information about permitted conditions are to be found on the nameplate and in the documentation.

It is essential for all specified information to be observed!

Transportation / Storage

Inspect the delivered goods for any shipping damage as soon as you receive the delivery. Inform the shipping company immediately. It may be necessary to preclude startup.

Tighten installed transportation lugs firmly. They are only designed for the weight of the geared motor/gear unit; do not attach any additional loads.

The installed lifting eyebolts meet DIN 580. The loads and guidelines listed in the standard have to be observed. If there are two transportation or lifting eyebolts installed on the geared motor, you have to use both of them for transportation. The direction of the tensile force is not to exceed an angle of 45°to meet the guidelines set forth in DIN 580.

Use suitable, sufficiently rated handling equipment if necessary. Remove any transport fixtures prior to startup.

Setup / Installation	See notes in sections "Setup" and "Installation/Removal!"
Startup / Operation	Check whether the direction of rotation is correct in **decoupled** status (also listen out for unusual grinding noises as the shaft rotates). Secure the shaft keys for test mode without output elements. Do not render monitoring and protection equipment inoperative even for test mode. Switch off the geared motor if in doubt whenever changes occur in relation to standard operation (e.g. increased temperature, noise, vibration). Determine the cause; contact SEW if necessary.
Inspection / Maintenance	See notes in section "Inspection/Maintenance!"

3 Gear Unit Design

The following illustrations represent design principles. They are merely reference tools for the spare parts lists. Deviations according to gear unit size and design are possible!

3.1 Basic design of a helical gear unit

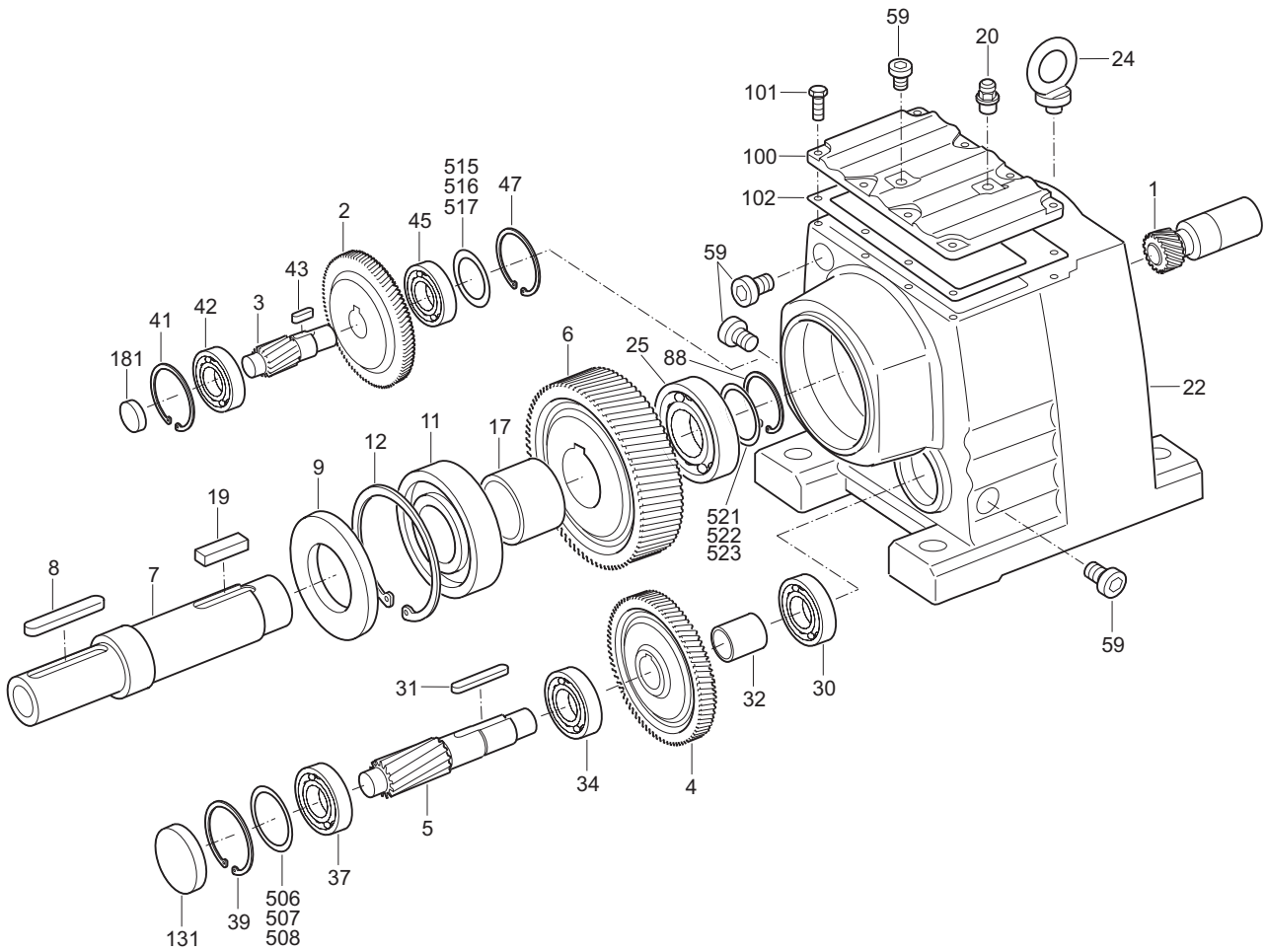


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Fig.1: Basic structure of helical gear units

Legend

1	Pinion	19	Key	42	Deep groove ball bearing	507	Shim
2	Gear	20	Breather valve	43	Key	508	Shim
3	Pinion shaft	22	Gear unit housing	45	Deep groove ball bearing	515	Shim
4	Gear	24	Lifting eyebolt	47	Circlip	516	Shim
5	Pinion shaft	25	Cylinder ball bearing	59	Screw plug	517	Shim
6	Gear	30	Deep groove ball bearing	88	Circlip	521	Shim
7	Output shaft	31	Key	100	Cover	522	Shim
8	Key	32	Spacer tube	101	Hex head screw	523	Shim
9	Oil seal	34	Cylinder ball bearing	102	Gasket		
11	Deep groove ball bearing	37	Deep groove ball bearing	131	Cap		
12	Circlip	39	Circlip	181	Cap		
17	Spacer tube	41	Circlip	506	Shim		

3.2 Basic design of a parallel shaft helical gear unit

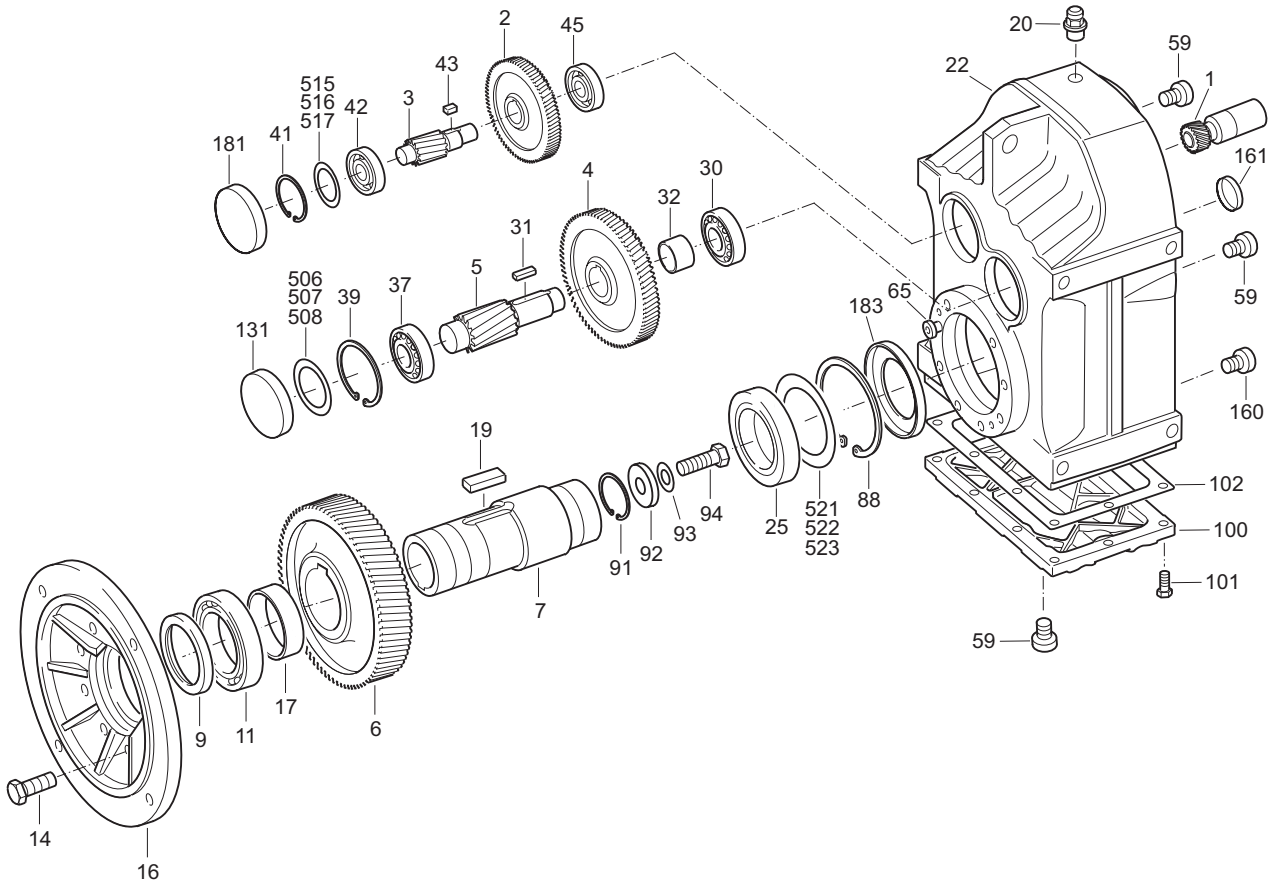

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Fig. 2: Basic design of a parallel shaft helical gear unit

Legend

1	Pinion	22	Gear unit housing	91	Circlip	184	Oil seal
2	Gear	25	Deep groove ball bearing	92	Disc	506	Shim
3	Pinion shaft	30	Tapered roller bearing	93	Lock washer	507	Shim
4	Gear	31	Lockwasher	94	Hex head screw	508	Shim
5	Pinion shaft	32	Spacer tube	100	Cover	515	Shim
6	Gear	37	Tapered roller bearing	101	Hex head screw	516	Shim
7	Hollow shaft	39	Circlip	102	Gasket	517	Shim
9	Oil seal	41	Circlip	131	Cap	521	Shim
11	Deep groove ball bearing	42	Deep groove ball bearing	160	Plug	522	Shim
14	Hex head screw	43	Key	161	Cap	523	Shim
16	Output flange	45	Deep groove ball bearing	165	Plug		
17	Spacer tube	59	Screw plug	168	Protection cap		
19	Key	81	O-ring	181	Cap		
20	Breather valve	88	Circlip	183	Oil seal		

3.3 Basic design of a helical-bevel gear unit

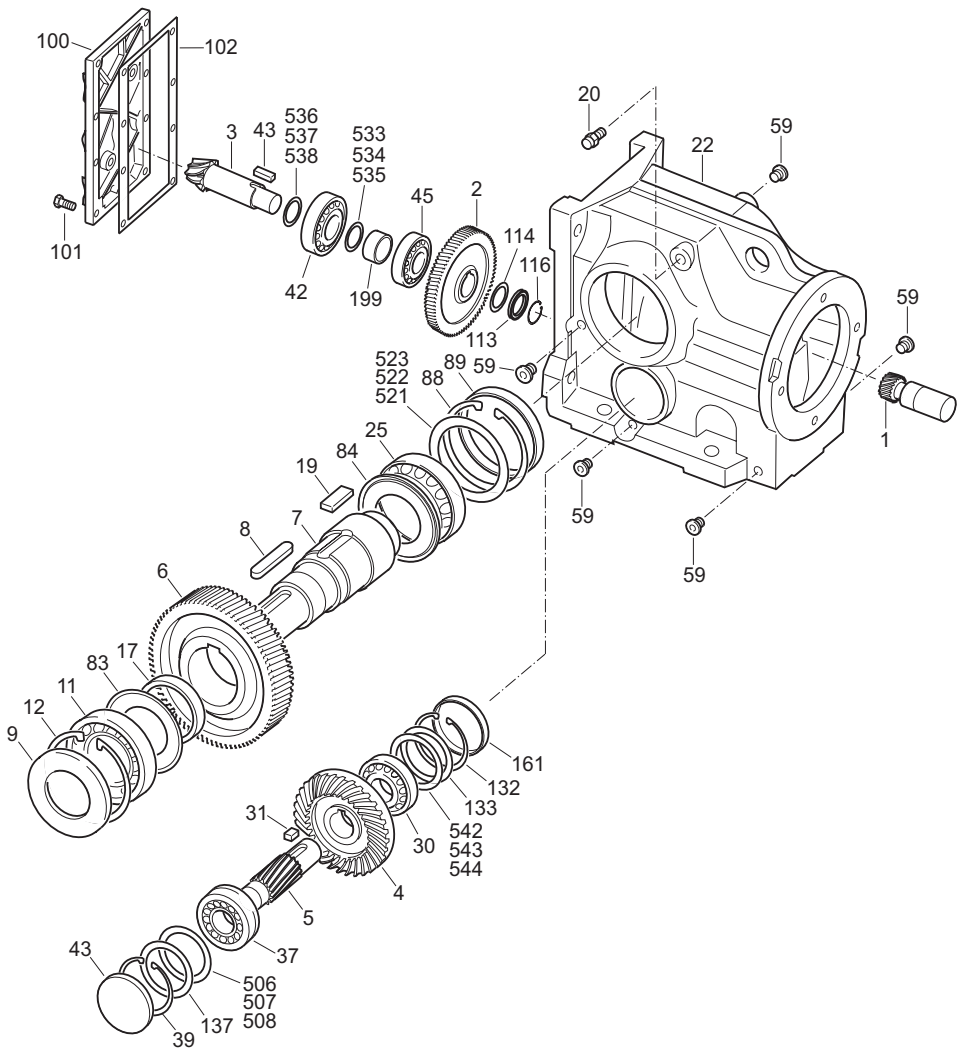

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Fig.3: Basic design of a helical-bevel gear unit

Legend

1 Pinion	25 Tapered roller bearing	102 Adhesive and sealant	523 Shim
2 Gear	30 Tapered roller bearing	113 Wing nut	533 Shim
3 Pinion shaft	31 Key	114 Locking plate	534 Shim
4 Gear	37 Tapered roller bearing	116 Thread retention	535 Shim
5 Pinion shaft	39 Circlip	119 Spacer tube	536 Shim
6 Gear	42 Tapered roller bearing	131 Cap	537 Shim
7 Output shaft	43 Key	132 Circlip	538 Shim
8 Key	45 Tapered roller bearing	133 Spacer	542 Shim
9 Oil seal	59 Screw plug	137 Spacer	543 Shim
11 Tapered roller bearing	83 Nilos ring	161 Cap	544 Shim
12 Circlip	84 Nilos ring	506 Shim	
17 Spacer tube	88 Circlip	507 Shim	
19 Key	89 Cap	508 Shim	
20 Breather valve	100 Gear unit cover	521 Shim	
22 Gear unit housing	101 Hex head screw	522 Shim	

3.4 Base design of a helical-worm gear unit

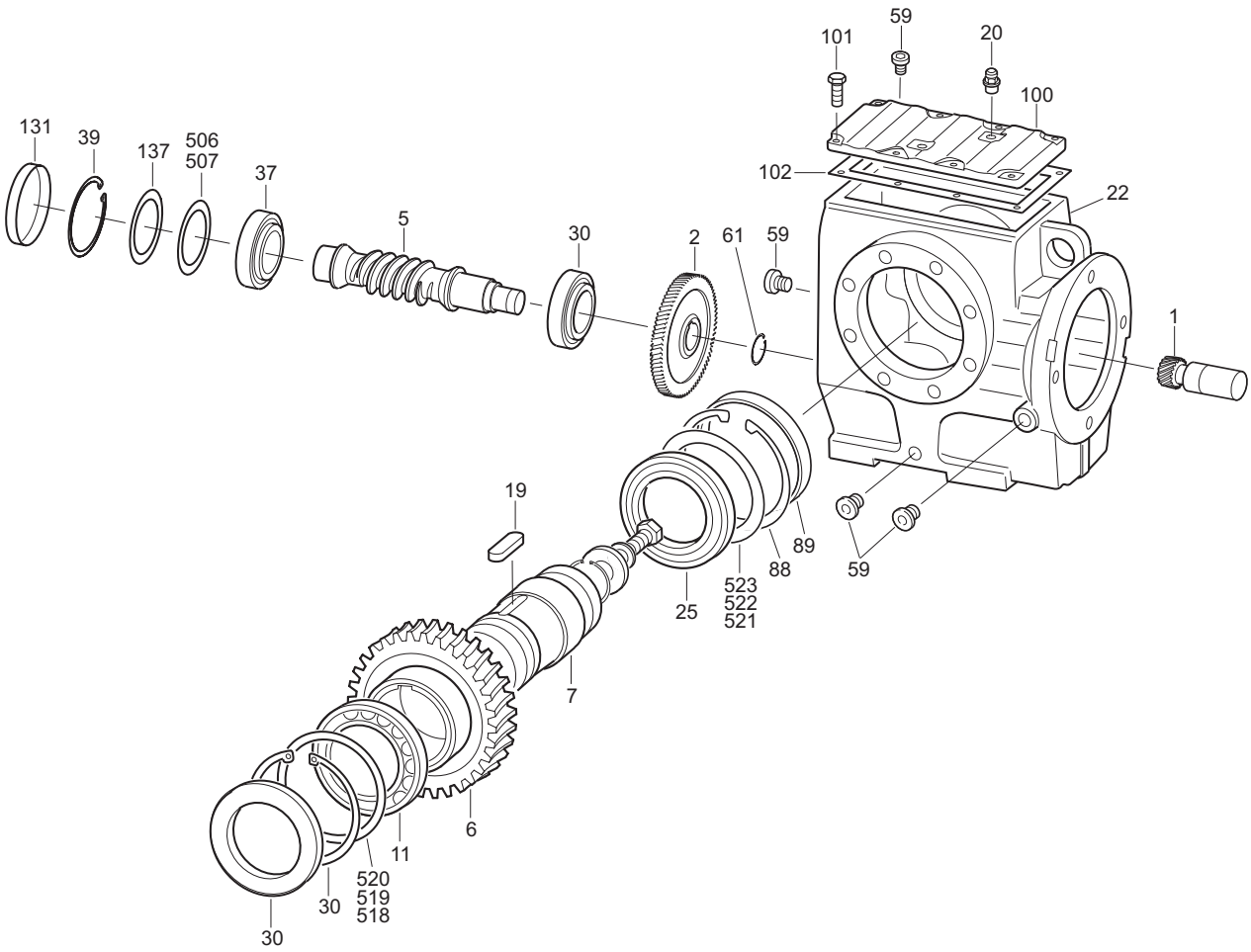

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Fig. 4: Basic design of a helical-worm gear unit

Legend

1	Pinion	19	Key	61	Circlip	507	Shim
2	Gear	20	Breather valve	88	Circlip	518	Shim
5	Worm	22	Gear unit housing	89	Cap	519	Shim
6	Worm gear	25	Tapered roller bearing	100	Gear unit housing	520	Shim
7	Output shaft	30	Tapered roller bearing	101	Hex head screw	521	Shim
9	Oil seal	37	Tapered roller bearing	131	Cap	522	Shim
11	Tapered roller bearing	39	Circlip	137	Spacer	523	Shim
12	Circlip	59	Screw plug	506	Shim		

3.5 Basic design of a SPIROPLAN® gear unit

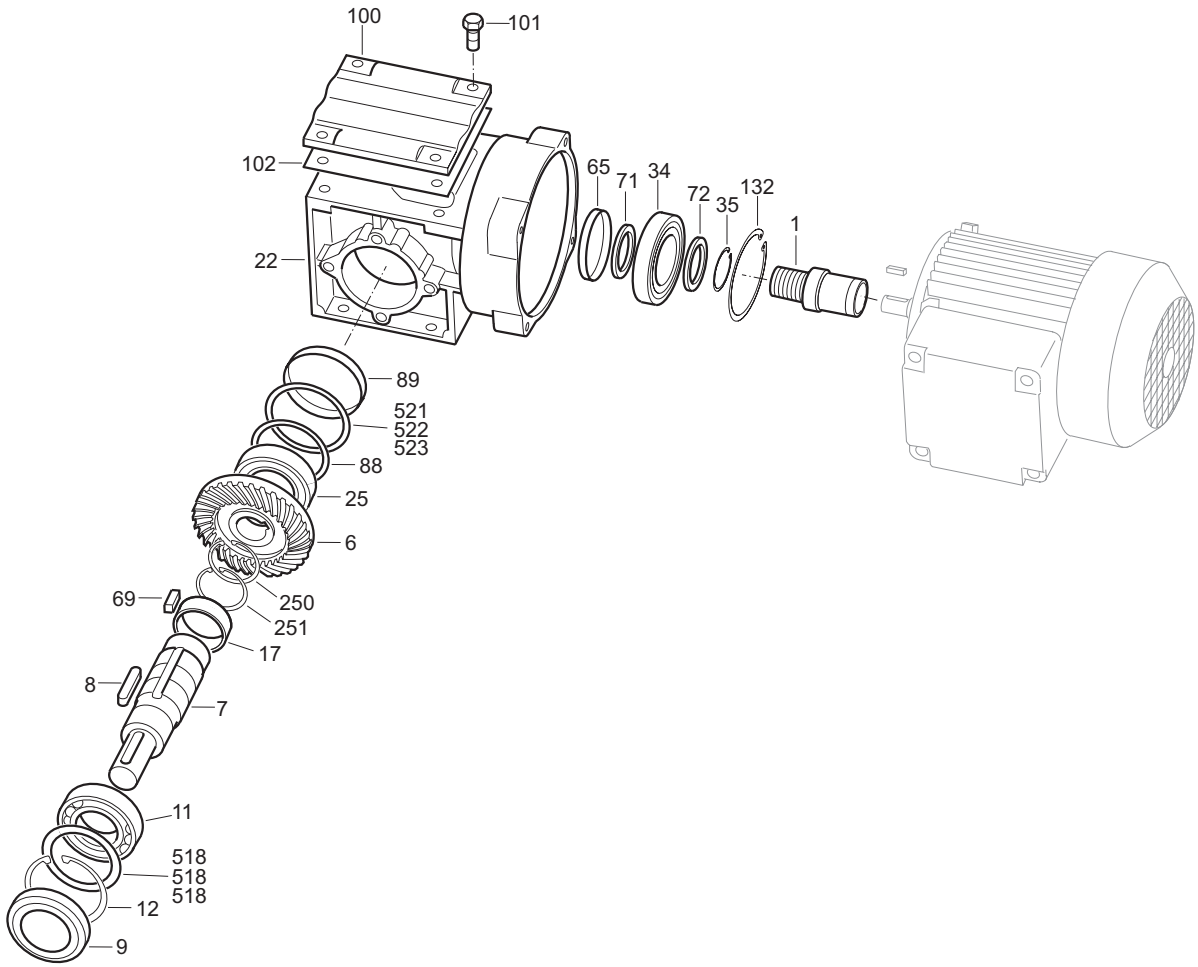


Fig. 5: Basic design of a SPIROPLAN® gear unit

Legend

1	Pinion	19	Key	88	Circlip	251	Circlip
6	Gear	22	Gear unit housing	89	Cap	518	Shim
7	Output shaft	25	Deep groove ball bearing	100	Gear unit cover	519	Shim
8	Key	34	Deep groove ball bearing	101	Hex head screw	520	Shim
9	Oil seals	35	Circlip	102	Gasket	521	Shim
11	Deep groove ball bearing	65	Oil seal	132	Circlip	522	Shim
12	Circlip	71	Spacer	183	Oil ring	523	Shim
17	Spacer tube	72	Spacer	250	Circlip		

4 Mechanical Installation

4.1 Required tools / material

- Set of spanners
- Torque wrench (for shrink discs, AQ motor adapter, input shaft assembly with centering shoulder)
- Mounting device
- Shims and distance rings, if necessary
- Fastening devices for input and output elements
- Lubricant (e.g. NOCO® fluid)
- Agent for securing screws, e.g. Loctite 243 (for input shaft assembly with centering shoulder)

Mounting tolerances

Shaft end	Flanges
Diameter tolerance according to DIN 748 • ISO k6 for solid shafts with ∅ ≤ 50 mm • ISO m6 for solid shafts with ∅ > 50 mm • ISO H7 for hollow shafts • Center hole according to DIN 332, shape DR..	Centering shoulder tolerance according to DIN 42948 • ISO j6 with b1 ≤ 230 mm • ISO h6 with b1> 230 mm

4.2 Before you begin

The drive may only be installed if

- the entries on the name plate of the drive match the mains power supply,
- the drive is undamaged (no damage caused by transport or storage) and
- it is certain that the following requirements have been fulfilled:

- **with standard gear units:**
  ambient temperature according to lubricant table in section lubricants (see standard), no oil, acid, gas, vapors, radiation, etc.
- **with special versions:**
  drive configured in accordance with the ambient conditions
- **with helical worm/Spiroplan® W gear units:**
  no large external mass moments of inertia which could exert a retrodriving load on the gear unit
  [where h' (retrodriving) = 2 – 1/η < 0.5 self-locking]

4.3 Preliminary work

The output shafts and flange surfaces must be thoroughly cleaned of anti-corrosion agents, contamination or such like (use a commercially available solvent). Do not let the solvent come into contact with the sealing lips of the oil seals – material damage!

Long-term storage of gear units

Gear units of the "extended storage" type have

- a mineral oil fill (CLP) or synthetic oil fill (CLPHC) suitable for the mounting position so the unit is ready to run. However, you should still check the oil level prior to startup (see section "Inspection/Maintenance" / "Inspection/Maintenance work").
- a higher oil level with synthetic oil CLP PG). Correct the oil level prior to startup (see section "Inspection/Maintenance" / "Inspection/Maintenance work").

4.4 Installing the gear unit

The gear unit or geared motor must be mounted/installed in the specified mounting position on a level[1], vibration-absorbing and torsionally rigid support structure (Spiroplan® gear units are not dependent on mounting position). Do not tighten housing legs and mounting flanges against each other and pay attention to the approved overhung and axial loads

Use only bolts of 8.8 quality for installation of the geared motors

Use bolts of **10.9 quality** for fastening of flanges to transmit the rated torques listed in the catalog for the following helical geared motors in flange design (RF..) and in foot/flange version (R..F):

- RF37, R37F with flange-∅ 120 mm
- RF47, R47F with flange-∅ 140 mm
- RF57, R57F with flange-∅ 160 mm

Oil check screws, drain screws and breather valves have to be freely accessible!

At this point of assembly, please check that the oil filling is as prescribed for the mounting position (see "Lubricants" / "Lubricant fill levels" or data on nameplate). **In case of mounting position change, adjust lubricant filling quantities accordingly.**

Please consult our service department, if the mounting position for K gear units is changed to M5 or M6 or within these mounting positions.

Please consult our service department, if the mounting position of S units in sizes S47 ... S97 is to be changed to mounting position M2.

Use plastic inserts (2 – 3 mm thick) if there is a risk of electrochemical corrosion between the gear unit and the driven machine (connection between different metals such as cast iron and high-grade steel)! Also fit the bolts with plastic washers! Ground the housing additionally – use the grounding bolts on the motor.

Installation in damp areas or in the open

Gear units are supplied in corrosion-resistant versions for use in damp areas or in the open air. Any damage to the paintwork (e.g. on the breather valve) must be repaired.

1. Maximum permitted flatness error for flange mounting (approximate values with reference to DIN ISO 1101): with → flange 120...600 mm max. error 0.2...0.5 mm

Gear unit venting

No ventilation is required for R17, R27 and F27 gear units in mounting positions M1, M3, M5 and M6 as well as Spiroplan® W gear units.

All other gear units are delivered by SEW ready for the mounting position with the breather valve and transport fixture fitted.

Exceptions:

Gear units for long-term storage, in pivoting or inclined mounting positions are supplied with a screw plug installed in the provided vent hole. Prior to startup, the customer must replace screw plug at the highest location by the supplied breather valve.

- **With geared motors** for long-term storage, pivoting or inclined mounting positions, the supplied breather valve is located in the **motor terminal box**.
- **With gear head units** that have to be vented on the input side, the breather valve is supplied in a plastic bag.
- **No** breather valve will be supplied **for gear units in enclosed design**.

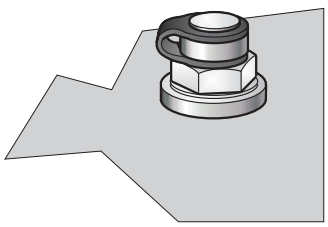
Activating the breather valve

Usually the breather valve is activated in the plant. Should this not be the case, the transport fixture must be removed from the breather valve prior to the startup of the gear unit!

1. Breather valve with transport fixture

2. Remove transport fixture

3. Activate breather valve



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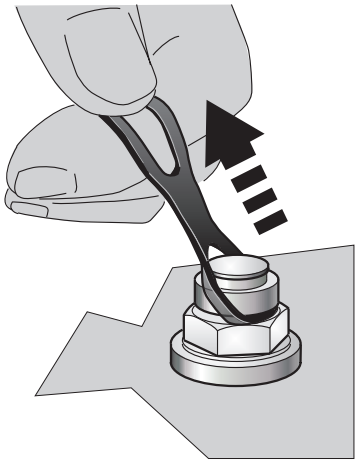

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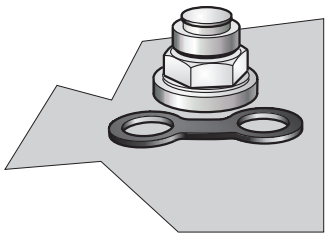

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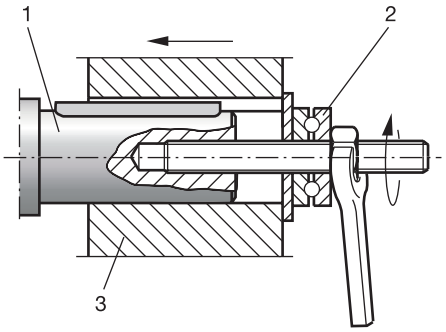
Painting the gear unit

Cover breather valve and oil seals with protective tape prior to painting or partly re-painting the drive. Remove adhesive strips when the paint job is finished.

4.5 Gear units with solid shaft

Installation of input and output elements

The following illustration is an example of a moutning device for mounting couplings or hubs onto gear unit or motor shaft ends. It may be possible to dispense with the thrust bearing on the mounting device.



1) Gear unit shaft end
2) Thrust bearing
3) Coupling hub

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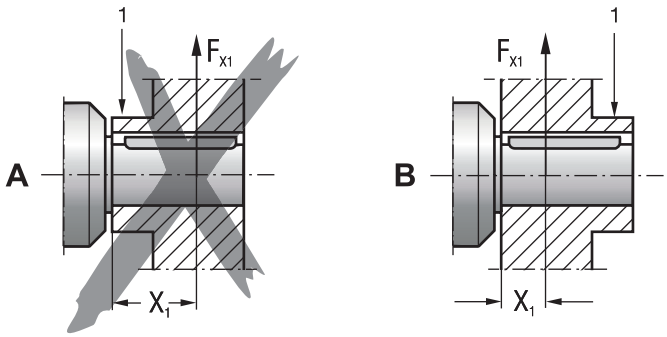
The following illustration displays the correct mounting arrangment **B** of a gear wheel or sprocket to prevent excessively high overhung loads.



1 = Hub

A = incorrect
B = correct

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- Only use a mounting device (see Fig. 1) for installing input and output elements. Use the center bore and the thread on the shaft end for positioning purposes.
- **Never drive belt pulleys, couplings, pinions, etc. onto the shaft end by hitting them with a hammer (damage to bearings, housing and the shaft!).**
- **In the case of belt pulleys, make sure the belt is tensioned correctly (in accordance with the manufacturer's instructions).**
- Power transmission elements should be balanced after fitting and must not give rise to any impermissible radial or axial forces (see Fig. 2 / permitted values see the "Geared Motors" catalog).

Note:

Assembly is easier if you first apply lubricant to the output element or heat it up briefly (to 80-100 °C).

Installation of couplings

Harmonize the following factors according to the manufacturer's recommendation when installing couplings:

a) maximum and minimum distance

b) axial misalignment

c) angular misalignment

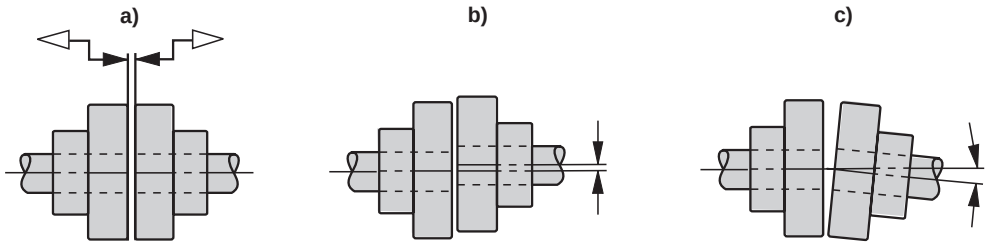

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Fig. 6: Distance and misalignment with coupling installation

Drive and output elements auch as belt pulleys, couplings, etc. must be equipped with a touchguard!

4.6 Installation of torque arms for shaft-mounted gear units

Do not strain torque arms during installation!

Parallel shaft helical gear units

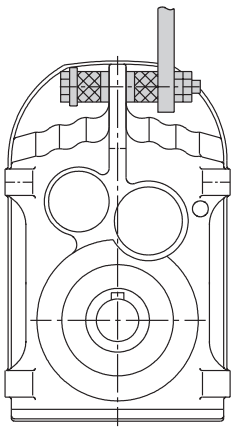

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Fig. 7: Torque arm for parallel shaft gear units

Helical-bevel gear units

- Bushing with bearings on both ends → (1)
- Install connection end B as a mirror image of A

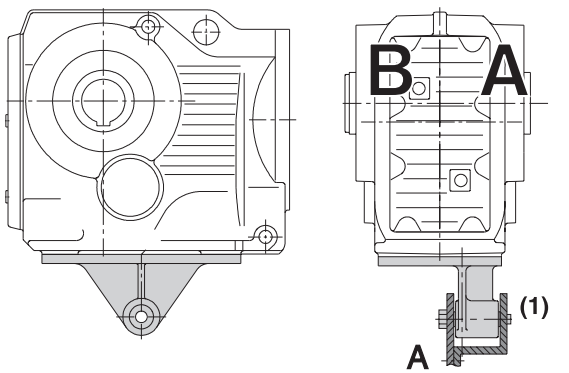

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Fig. 8: Torque arm for helical-bevel gear units

Helical-worm gear units

- Bushing with bearings on both ends → (1)

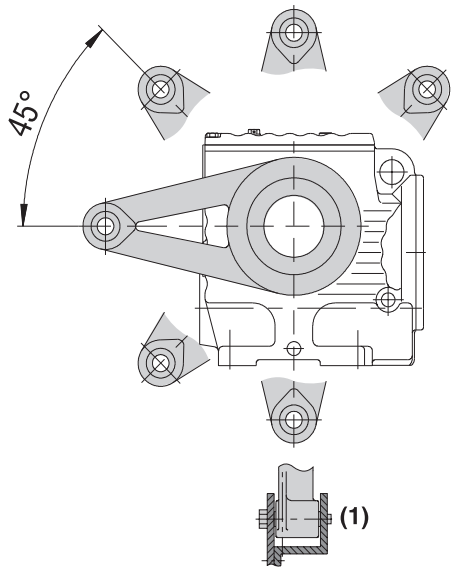

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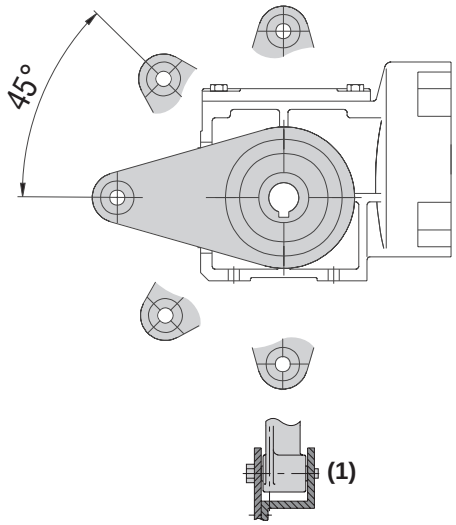
Fig. 9: Torque arm for helical-worm gear units

SPIROPLAN® W gear units

- Bushing with bearings on both ends → (1)



02050CXX

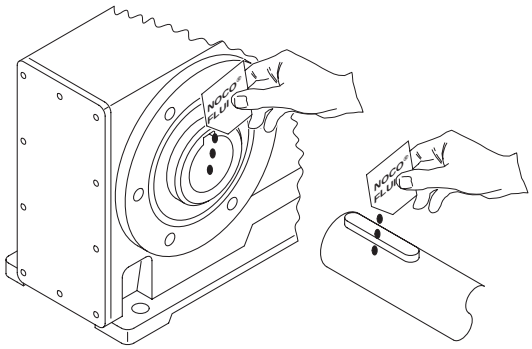
Fig. 10: Torque arm for SPIROPLAN® W gear units

4.7 Installation/removal of shaft-mounted gear units with key or splines

Note the construction notes in the Geared Motors catalog when designing the customer shaft!

Installation notes

1. Apply NOCO® fluid



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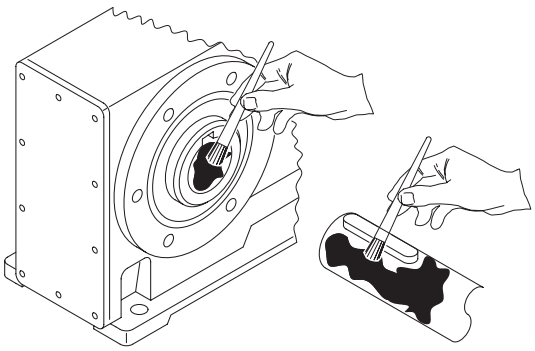
2. Distribute NOCO® fluid evenly



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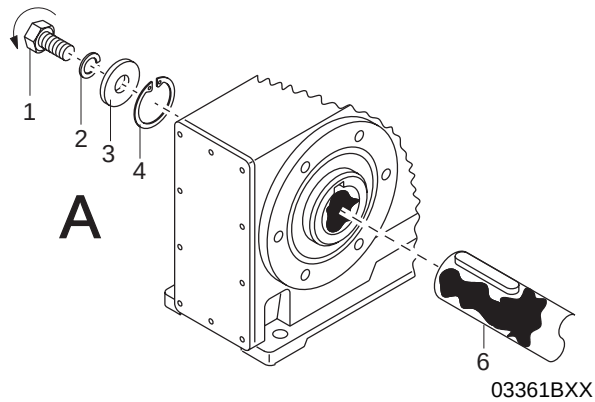
3. Install shaft and secure axially

   (installation will be made easier by using a mounting device)

   3A: Installation with standard components



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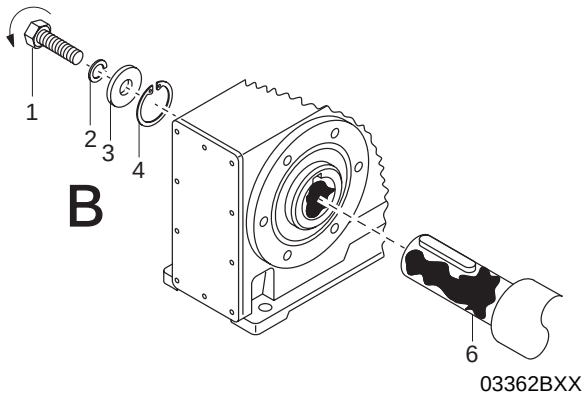
1 short retaining screw (standard components)
2 lock washer
3 washer
4 circlip
6 customer shaft

3B: Installation with SEW installation/removal kit (→ page 22)

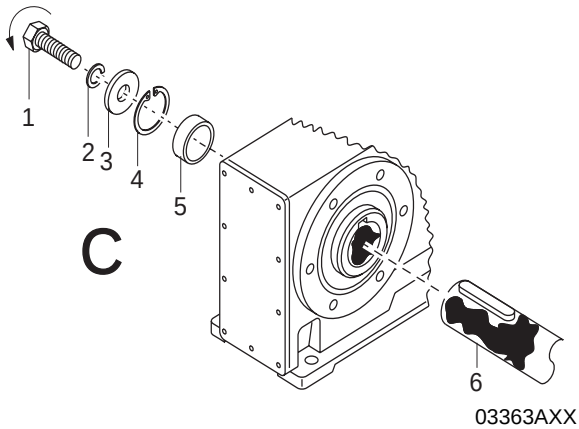
– Customer shaft **with** contact shoulder



1 retaining screw
2 lock washer
3 washer
4 circlip
6 customer shaft with contact shoulder

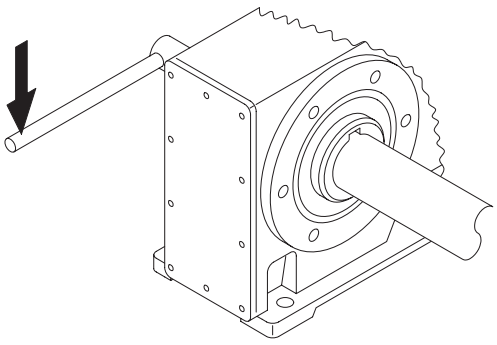
3C: Installation with SEW installation/removal kit (→ page 22)

– Customer shaft **without** contact shoulder



1 retaining screw
2 lock washer
3 washer
4 circlip
5 spacer tube
6 customer shaft without contact shoulder

4. Tighten retaining screw with corresponding torque (see table).



Screw	Torque [Nm]
M5	5
M6	8
M10/12	20
M16	40
M30	80
M24	200

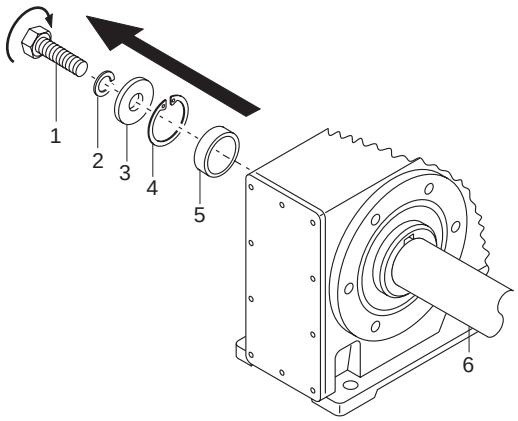
Note:

We recommend you also loosen the customer shaft between the two contact surfaces to prevent contact corrosion!

Removal notes

The description applies only to gear units that were installed with the SWE mounting/ removal kit (→ page 22) (see previous description, points 3B or 3C)

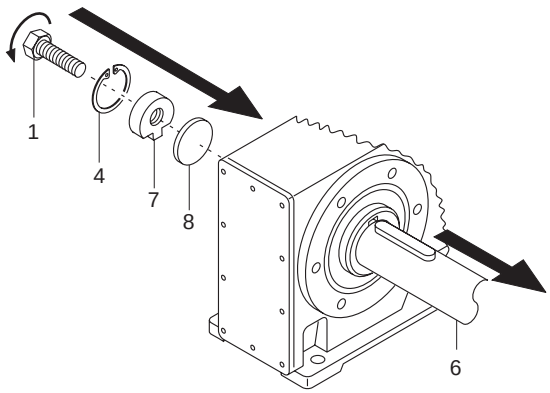
1. Loosen the retaining screw 1.
2. Remove parts 2 to 4 and the spacer tube 5, if installed.



1 retaining screw
2 lock washer
3 washer
4 circlip
5 spacer tube
6 customer shaft

03366AXX

3. Install the removal washer 8 and the locknut 7 from the SEW installation/removal kit between customer shaft 6 and circlip 4.
4. Reinstall the circlip 4.
5. Reinstall the retaining screw 1. You can now remove the gear unit from the shaft by tightening the screw.



1 retaining screw
4 circlip
6 customer shaft
7 locknut
8 removal washer

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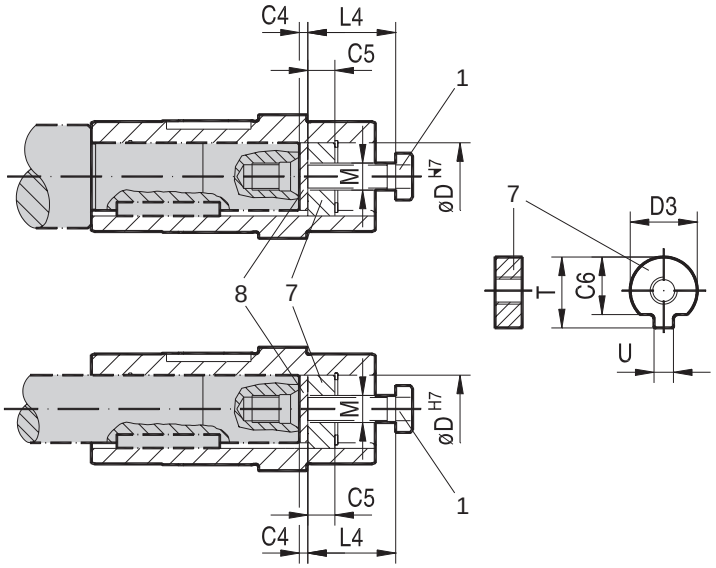
SEW installation/ removal kit

The SEW installation/removal kit is available with the indicated part number.



03394CXX

Fig. 11: SEW installation/removal kit

1 retaining screw
7 locknut for removal
8 removal washer

Type	D^{H7} [mm]	$M^{1)}$	C4 [mm]	C5 [mm]	C6 [mm]	$U^{-0.5}$ [mm]	$T^{-0.5}$ [mm]	$D3^{-0.5}$ [mm]	L4 [mm]	Part number installation/ removal kit
WA..10	16	M5	5	5	12	4.5	18	15.7	50	643 712 5
WA..20	18	M6	5	6	13.5	5.5	20.5	17.7	25	643 682 X
WA..20, WA..30, SA..37	20	M6	5	6	15.5	5.5	22.5	19.7	25	643 683 8
FA..27, SA..47	25	M10	5	10	20	7.5	28	24.7	35	643 684 6
FA..37, KA..37, SA..47, SA..57	30	M10	5	10	25	7.5	33	29.7	35	643 685 4
FA..47, KA..47, SA..57	35	M12	5	12	29	9.5	38	34.7	45	643 686 2
FA..57, KA..57, FA..67, KA..67, SA..67	40	M16	5	12	34	11.5	41.9	39.7	50	643 687 0
SA..67	45	M16	5	12	38.5	13.5	48.5	44.7	50	643 688 9
FA..77, KA..77, SA..77	50	M16	5	12	43.5	13.5	53.5	49.7	50	643 689 7
FA..87, KA..87, SA..77, SA..87	60	M20	5	16	56	17.5	64	59.7	60	643 690 0
FA..97, KA..97, SA..87, SA..97	70	M20	5	16	65.5	19.5	74.5	69.7	60	643 691 9
FA..107, KA..107, SA..97	90	M24	5	20	80	24.5	95	89.7	70	643 692 7
FA..127, KA..127	100	M24	5	20	89	27.5	106	99.7	70	643 693 5
FA..157, KA..157	120	M24	5	20	107	31	127	119.7	70	643 694 3

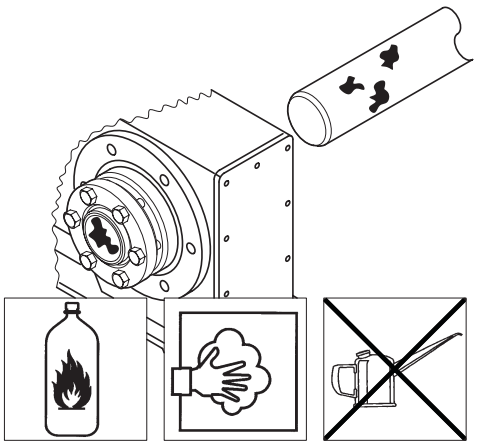
1) retaining screw

4.8 Installation/removal of shaft-mounted gear units with shrink disc

Installation notes

- Do not tighten locking screws unless shaft is installed - hollow shaft could be deformed!

1. Thoroughly remove grease from hollow shaft bore and drive shaft.



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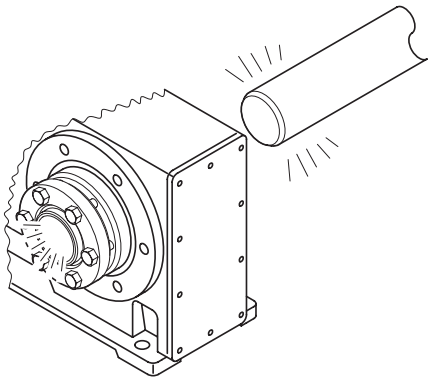
2. Degreased hollow shaft/drive shaft



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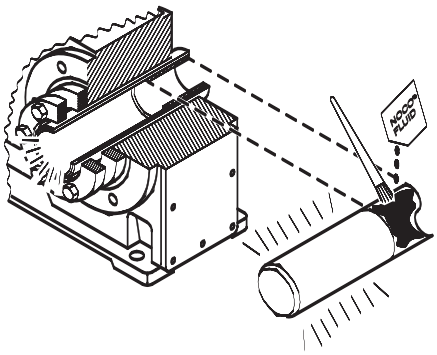
3. Apply NOCO® fluid in the bushing area onto the input shaft[1)].



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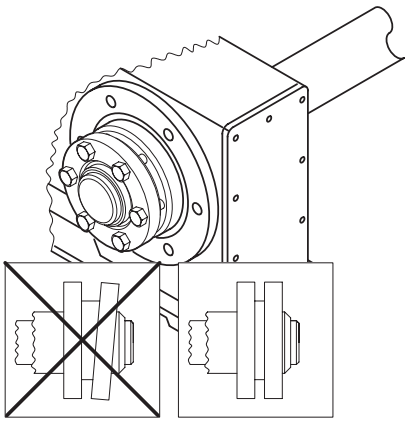
4. Install shaft, making sure that the locking collars of the shrink disc are evenly spaced[2)].



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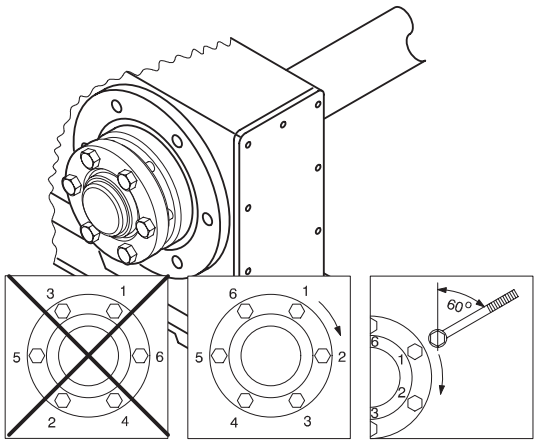
STOP

1) **The clamping area of the shrink disc must always be kept free from grease! Therefore, never apply NOCO® fluid directly onto the bushing, since the paste can enter the clamping area of the shrink disc when installing the input shaft.**

2) **After installation,** grease the outer surface of the hollow shaft in the shrink disc area to protect the shaft against corrision.

5. Tighten the locking screws by working round several times from one crew to the next (not diagonally). See table for tightening torques.



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Gear unit type			Screw	Nm	◁ max.[1)]
	FH27	SH37	M5	5	
KH37...77	FH37...77	SH47...77	M6	12	
KH87/97	FH87/97	SH87/97	M8	30	60°
KH107	FH107		M10	59	
KH127/157	FH127		M12	100	

1) maximum tightening angle per cycle

Notes on removal of shrink disc

1. Unscrew the locking screws evenly one after the other. To avoid tilting and jamming of the locking collars, each locking screw may only be unscrewed by about one quarter turn in the initial cycle. Do not fully unscrew the locking screws!
2. Remove the shaft or pull the hub off the shaft (it is necessary to remove any rust which may have formed between the hub and the end of the shaft).
3. Pull the shrink disc off the hub..

Caution!

There is a risk of injuries if the shrink disc is not removed correctly!

Cleaning and lubricating the shrink disc

There is no need to take apart and re-grease disassembled shrink discs before they are screwed back on.

The shrink disc only needs to be cleaned and re-greased if it is contaminated.

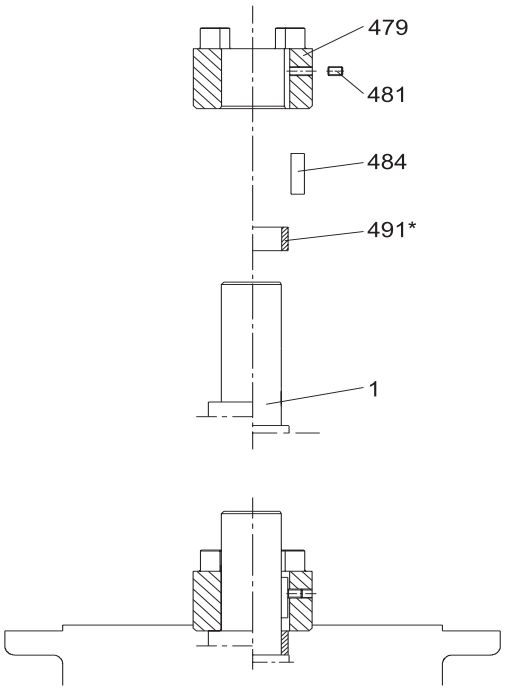
Use one of the following solid lubricants for the tapered surfaces.

Lubricant (Mo S2)	Available as
Molykote 321 (lube coat)	spray
Molykote Spray (powder spray)	spray
Molykote G Rapid	spray or paste
Aemasol MO 19P	spray or paste
AemasolDIO-sétral 57 N (lube coat)	spray

Grease the locking screws with a multipurpose grease such as Molykote BR 2 or similar.

4.9 Installation of the AM adapter coupling

IEC adapters
AM63 - 225 /
NEMA adapters
AM56 - 365



* = NEMA adapters only
1 = motor shaft

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1. Clean motor shaft and flange surfaces of motor and adapter.
2. **IEC adapters:** Remove motor shaft key and replace with supplied key (484).

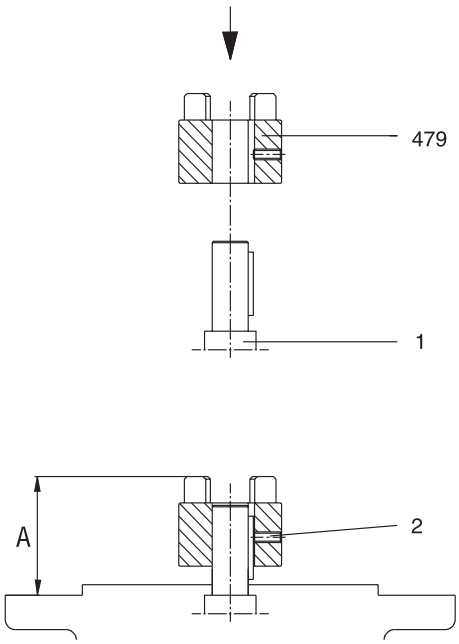
   NEMA adapters: Remove motor shaft key, slide spacer tube (491) on motor shaft and install supplied key (484).
3. Heat coupling half (479) to approx. 80 - 100°C; slide coupling half on motor shaft.

   IEC adapters: until rest on motor shaft shoulder.

   NEMA adapters: until rest on spacer tube.
4. Secure key and coupling half with setscrew (481) on motor shaft .
5. Mount motor to adapter; the gearing of the coupling half and the geared adapter shaft must enmesh.

Note: We recommend applying Noco® fluid on the motor shaft prior to installation of the coupling half to prevent contact corrosion.

IEC adapters
AM250/AM280



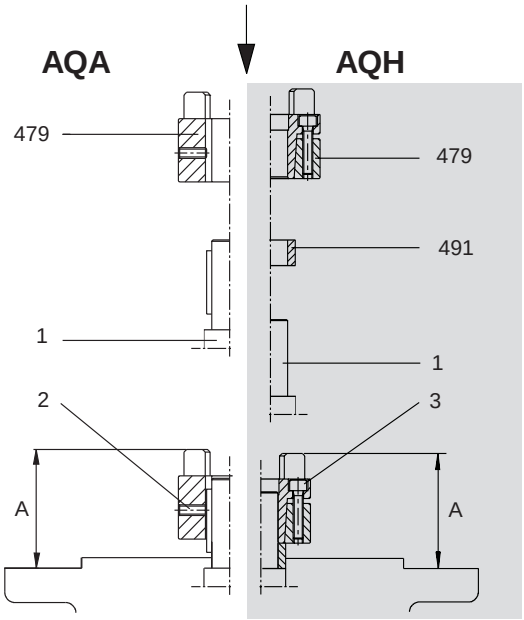
1 = Motor shaft
2 = Setscrew

02047CXX

1. Clean motor shaft and flange surfaces of motor and adapter.
2. Remove motor shaft key and replace with supplied key **(size AM280 only)**.
3. Heat coupling half (479) (to 80 °C - 100 °C) and slide on motor shaft (A = 139 mm).
4. Fasten coupling half with setscrew and check position (distance "A").
5. Mount motor on adapter; the gearing of the coupling half and the geared adapter shaft must enmesh.

Note: We recommend applying Noco® fluid on the motor shaft prior to installation of the coupling half to prevent contact corrosion.

4.10 Installation of the AQ adapter coupling



1 Motor shaft
2 Setscrew
3 Screw

AQA = with keyway
AQH = w/o keyway

02702CXX

1. Clean motor shaft and flange surfaces of motor and adapter.
2. **AQH design:** Slide spacer tube (491) on motor shaft.
3. **AQH design:** Loosen screws of coupling half (479) and conical connection.
4. Heat coupling half (80° C - 100° C) and slide on motor shaft.

   AQH design: until rest on spacer tube (491).

   AQA design: until distance "A" (see table)
5. **AQH design:** Fasten screws of coupling half evenly by working round several times in sequence until all screws have been tightened to the TT tightening torque.

   AQA design: Secure coupling half with setscrew.
6. Check position of coupling half (distance "A" see table).

   Mount motor to adapter; the jaws of both coupling halves must enmesh. The insertion force required to join the coupling halves. The insertion force required to join the coupling halves is suspended after final assembly thereby causing danger of axial load on the adjacent bearing.

Setting dimensions, tightening torques

Type	Coupling size	Distance "A" [mm]	Bolts DIN 912[1)]	Tightening torque TT[1)] [Nm]
AQA /AQH 80 /1/2/3	19/24	44.5	M4	3
AQA /AQH 100 /1/2		39		
AQA /AQH 100 /3/4		53		
AQA /AQH 115 /1/2		62		
AQA /AQH 115 /3	24/28	62	M5	6
AQA /AQH 140 /1/2		62		
AQA /AQH 140 /3	28/38	74.5	M5	6
AQA /AQH 190 /1/2		76.5		
AQA /AQH 190 /3	38/45	100	M6	10

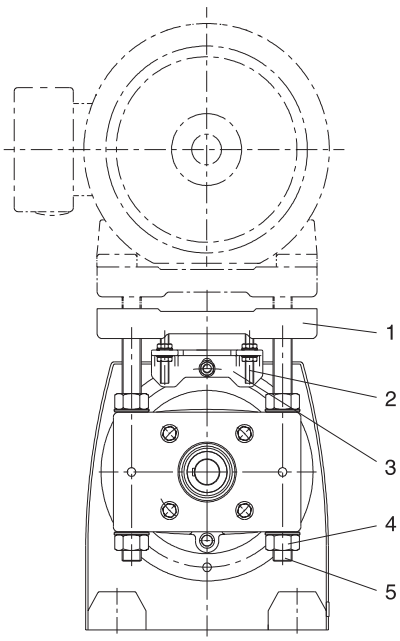
1) in versions without keyway only (AQH)

4.11 Installation on the AD input shaft assembly

See section "Installation of input and output shafts" for installation of input elements.

Version with motor mounting platform AD../P

Installation of motor and adjustment of motor mounting platform



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1 Motor mounting platform
2 Setscrew (AD6/P / AD7/P only)
3 Support (AD6/P / AD7/P only)
4 Nut
5 Threaded column

1. Adjust motor mounting platform to required mounting position by evenly tightening the adjusting nuts. For the lowest possible adjustment position of helical gear units, remove eyebolts/transport lugs if there are any; touch up any damage to protective coating.
2. Align motor on motor mounting plate (shaft extensions must be aligned) and secure it.
3. Mount drive elements onto input shaft extension and install motor shaft, align these to each other; correct motor position where necessary.
4. Install traction mechanisms (V-belts, chains, ...) and tighten by evenly adjusting the motor mounting plate. The motor mounting plate and columns must not be tightened against each other.
5. Secure threaded columns with the nuts not used for adjustment purposes.

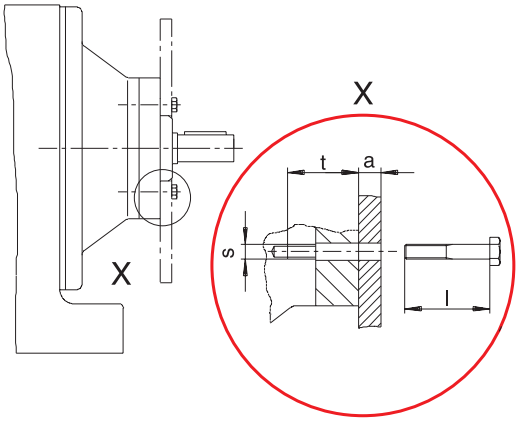
AD6/P and AD7/P only:

Loosen nuts and stud bolts before readjustment so that the stud bolts can be moved freely in the support axially. Tighten nuts after the final position has been accomplished. Do not adjust the motor mounting platform by using the support.

AD../ZR design with centering shoulder

Installing components on the input shaft assembly with centering shoulder

1. The bolts must be available in the correct length to fasten the installed components. The length of the new bolts results from:



l = t + a
t srew depth (see table)
a thickness of application
s retaining thread (see table)

02725CXX

The calculated screw length must be rounded down to the next smallest standard length.

2. Remove retaining screw from centering shoulder.
3. Clean contact surface and centering shoulder.
4. Clean the threads of the new screws and apply an adhesive agent (e.g. Loctite 243) to the first turns on the screw.
5. Set component onto centering shoulder and fasten retaining screws with indicated tightening torque T_t (see table).

Type	Depth of screw t	Retaining thread s	Tightening torque T_A [Nm]
AD2/ZR	25.5	M8	25
AD3/ZR	31.5	M10	48
AD4/ZR	36	M12	86
AD5/ZR	44	M12	86
AD6/ZR	48.5	M16	210
AD7/ZR	49	M20	410
AD8/ZR	42	M12	86

AD../RS version with backstop

Check the direction of rotation prior to installation or startup. In case of the wrong direction of rotation, please consult our technical department.

The backstop is maintenance-free and does not require any additional maintenance work.

5 Startup

5.1 Startup of helical-worm and Spiroplan® W gear units

Note: The direction of rotation for the output shaft has been changed from CW to CCW for helical-worm gear units S..7 series compared to the S..2 series. Switch two motor feeder cables to change the direction of rotation.

Running-in period

Spiroplan® and helical-worm gear units require a running-in period of at least 24 hours before reaching their maximum efficiency. A separate running-in period is required for each direction of rotation if the gear unit is operated in both directions of rotation. The table displays the average power reduction during the running-in period.

No. of starts	Helical-worm		Spiroplan®	
	power reduction	i range	power reduction	i range
1 start	approx. 12%	app. 50...280	approx. 15%	approx. 40...75
2 starts	approx. 6%	app. 20...75	approx. 10%	approx. 20...30
3 starts	approx. 3%	app. 20...90	approx. 8%	approx. 15
4 starts	-	-	approx. 8%	approx. 10
5 starts	approx. 3%	app. 6...25	approx. 5%	approx. 8
6 starts	approx. 2%	app. 7...25	-	-

5.2 Startup of helical, parallel shaft helical and helical-bevel gear units

There are no special startup notes that have to be observed for helical gear units, parallel shaft helical gear units and helical-bevel gear units, if the gear units have been mounted according to the section "Mechanical Installation."

6 Troubleshooting

6.1 Gear unit problems

Problem	Possible cause	Remedy
Unusual, regular running noise	A Meshing/grinding noise: bearing damage B Knocking noise: irregularity in the gearing	A Check oil (see Inspection and Maintenance), replace bearing B Call customer service
Unusual, irregular running noise	Foreign bodies in the oil	• Check oil (see Inspection and Maintenance) • Stop the drive, call customer service
Oil leaking [1)] • from the gear unit cover • from the motor flange • from motor oil seal • from gear unit flange • from the output end oil seal	A Defective rubber gasket on gear unit cover B Defective gasket C Gear unit not vented	A Retighten screws on gear unit cover and observe gear unit. Oil still leaking: Call customer service B Call customer service C Vent the gear unit (see Mounting Positions)
Oil leaking from the breather valve	A Too much oil B Drive installed in incorrect mounting position C Frequent cold starts (oil foaming) and / or high oil level	A Correct oil level (see Inspection and Maintenance) B Fit the breather valve correctly (see Mounting Positions) and adjust oil level (see Lubricants)
Output shaft is not rotating although the motor is running or the input shaft is rotating	Shaft hub connection interrupted in the gear unit	Send in gear unit/geared motor for repair

1) It is normal for small amounts of oil/grease to leak out of the oil seal during the running-in period (24 hour running time) (also see DIN 3761).

Please have the following information available if you require assistance of our customer service:
- Nameplate data (complete)
- Type and extent of problem
- Time and circumstances of problem
- Possible cause

7 Inspection and Maintenance

7.1 Inspection and maintenance periods

Time period	What to do?
• every 3000 operating hours, at least every six months	• Check oil
• depending on operating conditions (see following illustration), at least every three years	• Replace mineral oil
	• Replace bearing grease
• depending on operating conditions (see following illustration), at least every five years	• Replace synthetic oil
	• Replace bearing grease
• R17, R27, F27 and Spiroplan® gear units are lubricated for life and do not require maintenance	
• different (depending on external influences)	• Touch up or replace surface/corrosion protection coat

7.2 Lubricant replacement schedule

Change oil more often in special version and under more demanding/aggressive ambient conditions!

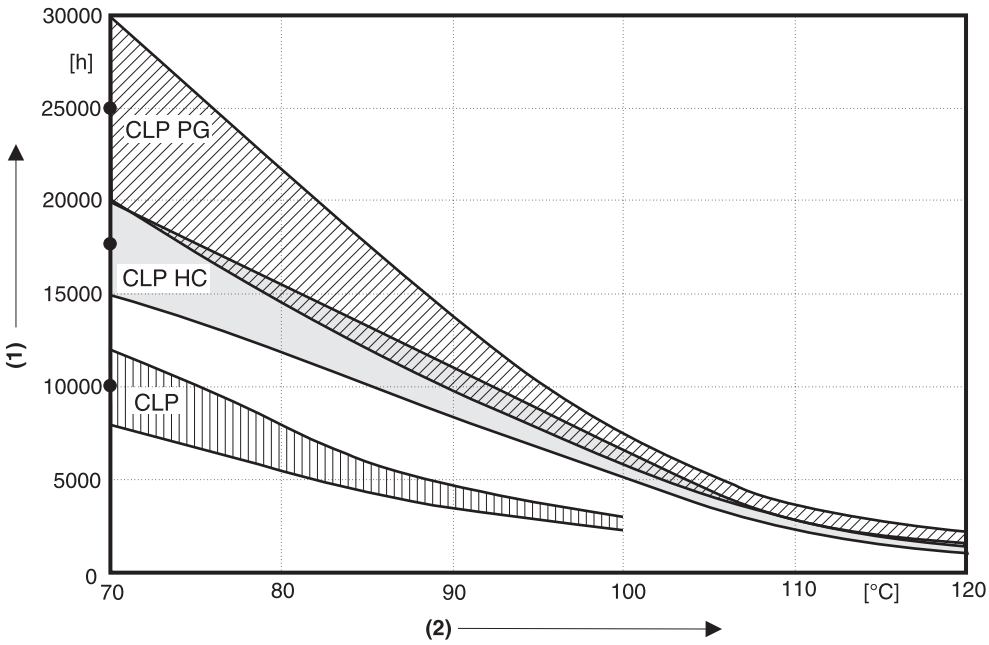


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Fig. 12: Replacement schedule for standard gear units operating under normal ambient conditions.

(1) Operating hours
(2) Oil bath steady-state temperature
• Average value depending on oil type at 70° C

7.3 Inspection/maintenance of gear units

Do not mix synthetic lubricants with each other nor with mineral lubricants!

Mineral oil is the standard lubricant.

The position of the oil level plug, oil drain plug and the breather valve is dependent on the mounting position.

Checking the oil level

1. **De-energize the drive and secure against unintentional switch-on!**

   Wait until the gear unit has cooled down – Danger of burns!
2. See section "Setup of gear unit" for change in mounting position!
3. For gear units with oil level plug: remove oil level plug, check fill level and correct if necessary, install oil level plug

Check oil

1. **De-energize the drive and secure against unintentional switch-on!**

   Wait until gear unit has cooled down - Danger of burns!
2. Remove some oil from the oil drain plug
3. Check oil consistency
   - viscosity
   - if the oil is visibly contaminated, it is recommended to change it sooner than recommended by the maintenance intervals listed under the heading "Inspection and maintenance periods" on page 32
4. For gear units with an oil level plug: remove oil level plug, check oil fill level and correct if necessary, install oil level plug

Changing the oil

Only change the oil when the gear unit is at operating temperature.

1. **De-energize the drive and secure against unintentional switch-on!**
   Wait until the gear unit has cooled down – Danger of burns!
   Note: **Gear unit must still be warm, otherwise the high viscosity of excessively cold oil will make it harder to drain the oil correctly.**
2. Place a container underneath the oil drain plug
3. Remove oil level plug, breather plug/valve and oil drain plug
4. Drain oil completely
5. Install oil drain plug
6. Fill new oil of the same type through the breather hole, otherwise consult our service department
   – amount in accordance with the mounting position (see section "Lubricant fill levels") on the nameplate
   – check at the oil level plug
7. Install oil level plug
8. Install breather plug/valve

8 Mounting Positions

8.1 General comments on mounting positions

Mounting position designation

SEW has six mounting positions M1 ... M6 for gear units (see illustration).

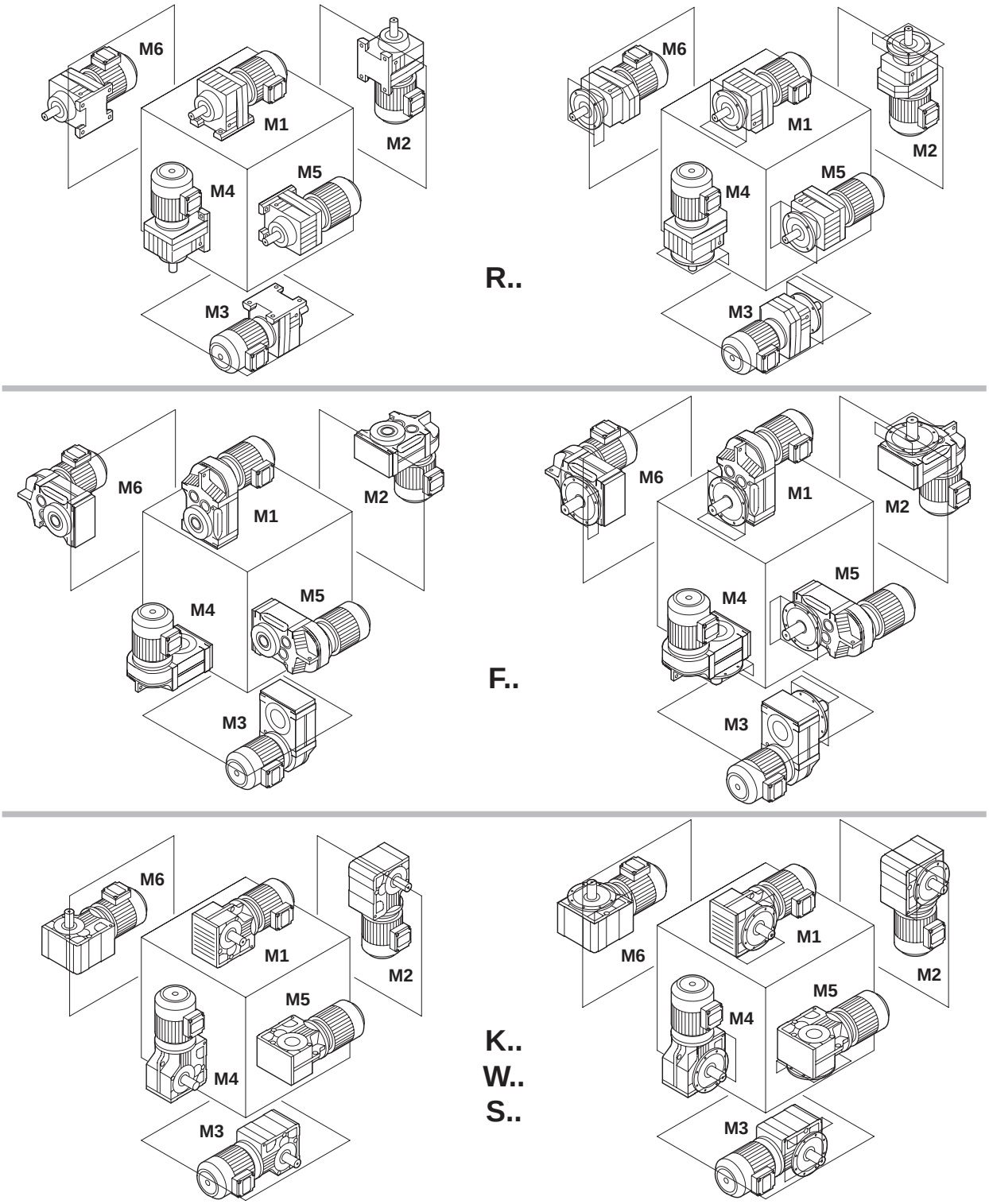


Fig. 13: Mounting positions M1 ... M6

Comparison old/new

The following table indicates in which way the old SEW mounting position designations are integrated into the new system:

	M1	M2	M3	M4	M5	M6
R, RX	B3	V6	B8	V5	B6	B7
R..F	B35	V36	B85	V15	B65	B75
RF, RXF	B5	V3	B5II	V1	B5I	B5III
F FA..B FH..B FV..B	B6	V6	B6II	V5	B3 B8	B3I B8I
FF	B5	V3	B5II	V1	B5I	B5III
FA FHF FVF FH FAZ FV FHZ FAF FVZ	H1	H6	H2	H5	H4	H3
K KA..B KH..B KV..B	B3 B6I	B6 B8I	B8	B3I B6II	V5 V5I	V6 V6I
K/KH 166/167 186/187	B3 B5/I			B3I B5/II	V1/	V1/I
KF	B5I B3/B5I	B5 B65	B5III B8/B5III	B5II B6/B5II	V1 V15	V1I V6/V1I
KA KHF KVF KH KAZ KV KHZ KAF KVZ	H1	H4	H2	H3	H5	H6
S	B3 B6I B8II (S37)	B6 B8I	B8 B3II	B3I B6II	V5 V5I	V6 V6I V5II (S37)
SF	B5I	B5	B5III	B5II	V1	V1I
SA SH SAF SHF SAZ SHZ	H1	H4	H2	H3	H5	H6

04464AXX

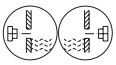
Example

A KA77B helical-bevel gear unit with the old mounting position B3I or B6II, is now referred to with mounting position designation M4.

8.2 Legend for mounting position pages

Used symbols

The following table contains all symbols used in the mounting position pages as well as their meaning:

Symbol	Meaning
	Breather valve
	Oil level check plug
	Oil drain plug

Churning losses

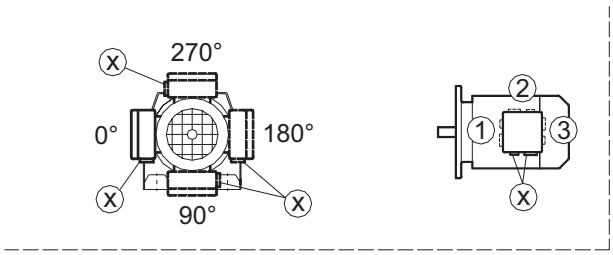
There is a possibility of increased churning losses with some mounting positions. Please contact SEW when dealing with the following combinations:

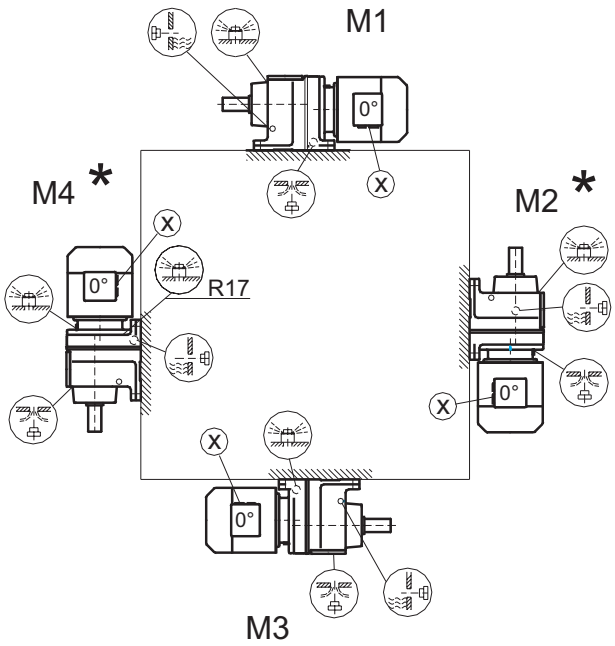
Mounting position	Gear unit type	Gear unit size	Input speed [1/min]
M2, M4	R	97 ... 107	> 2500
		> 107	>1500
M2, M3, M4, M5, M6	F	97 ... 107	> 2500
		> 107	> 1500
	K	77 ... 107	> 2500
		> 107	> 1500
	S	77 ... 97	> 2500

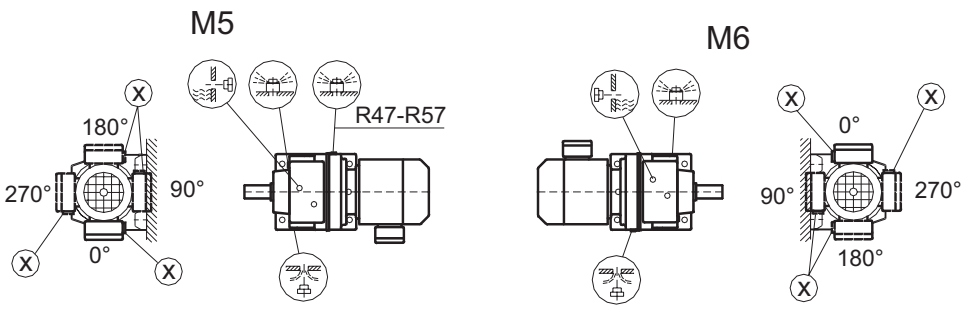
8.3 Mounting positions, helical gear units

R17-R167

04 040 100





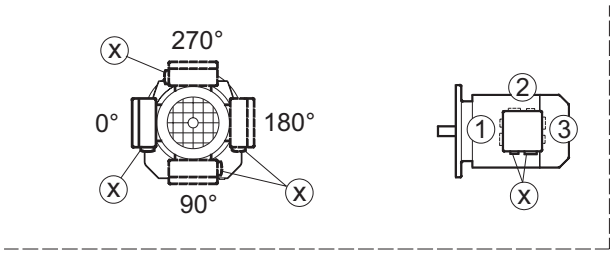


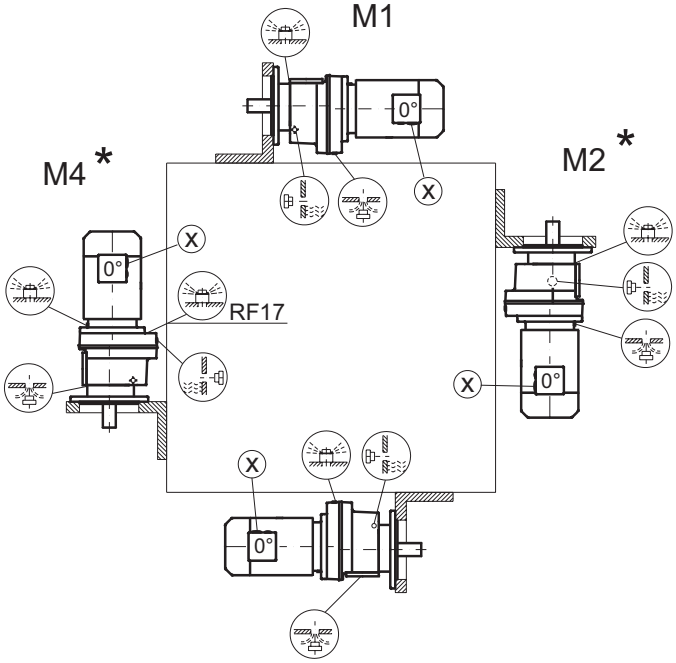
R17, R27		M1, M3 , M5 , M6
R47, R57		M5
R17, R27		

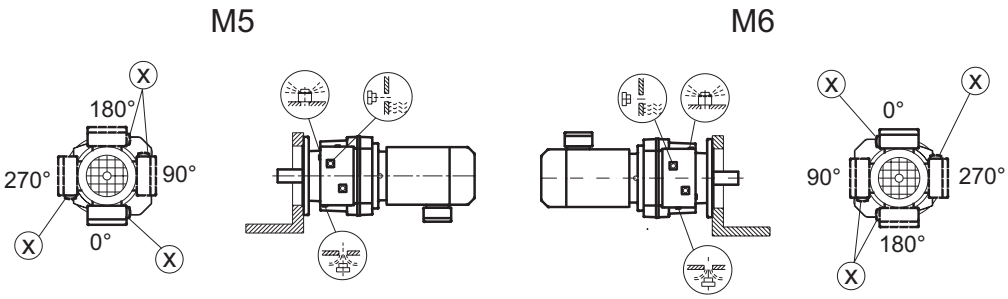
* → page 36

RF17-RF167

04 041 100





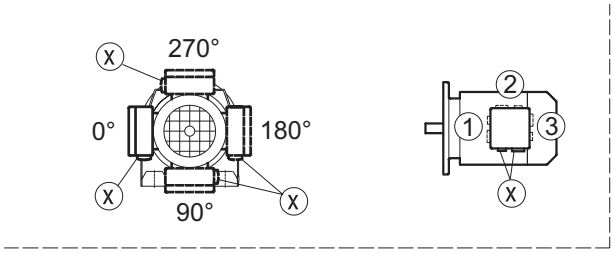


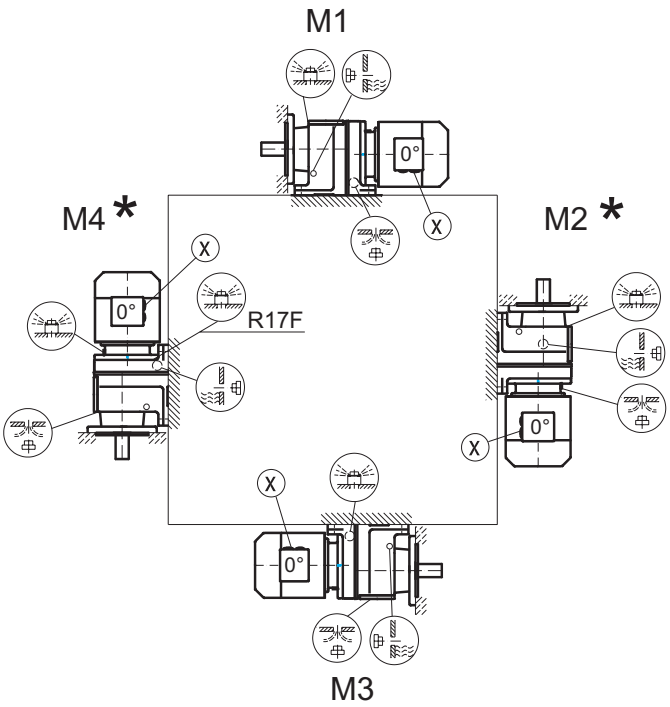
RF17, RF27		M1, M3 , M5 , M6
RF47, RF57		M5
RF17, RF27		

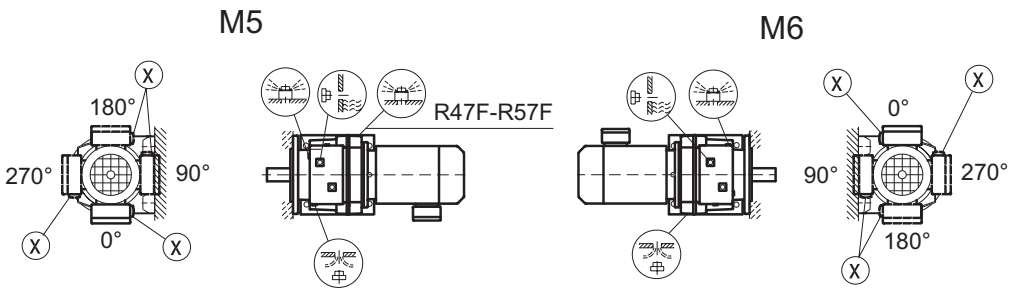
* → page 36

R17F-R87F

04 042 100







R17F, R27F M1, M3 , M5 , M6

R47F, R57F M5

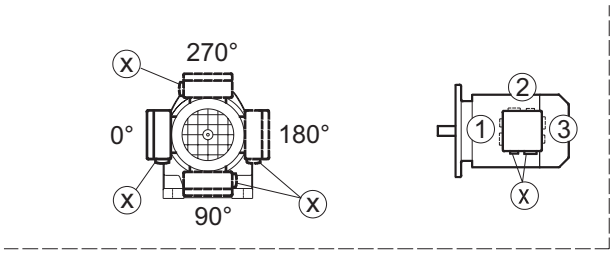
R17F, R27F

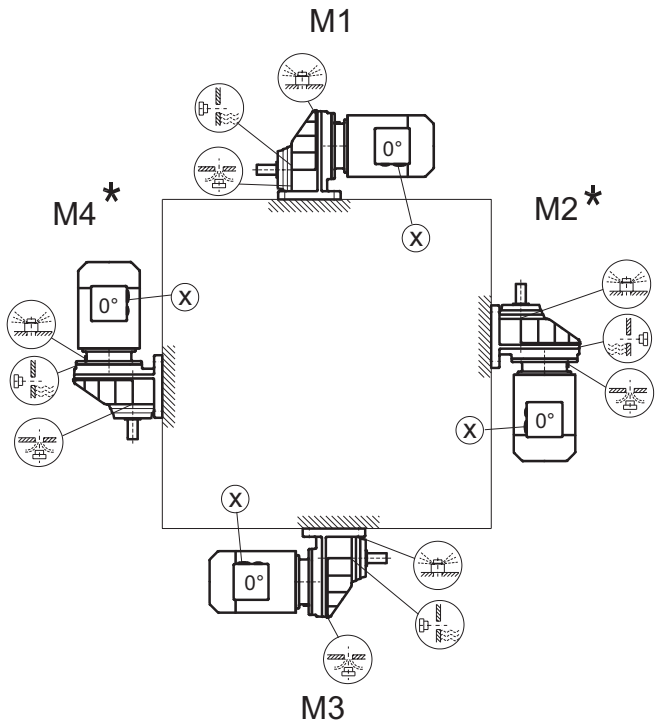
* → page 36

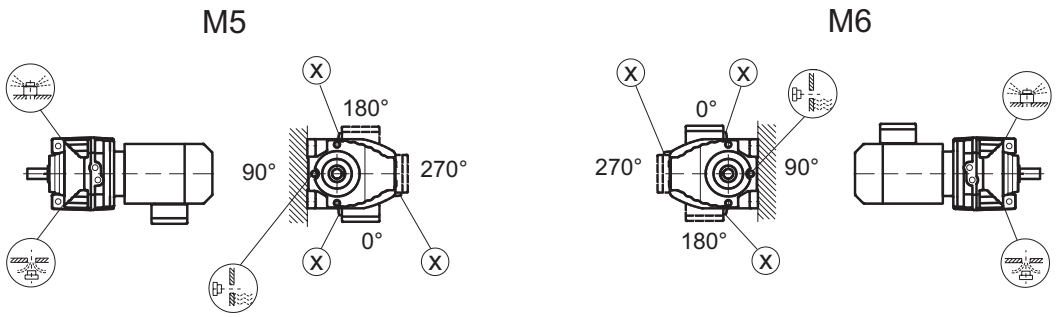
Caution: Note the notes in the "Geared Motors" catalog, section "Project Planning Gear Units/Overhung and axial loads."

RX57-RX107

04 043 100



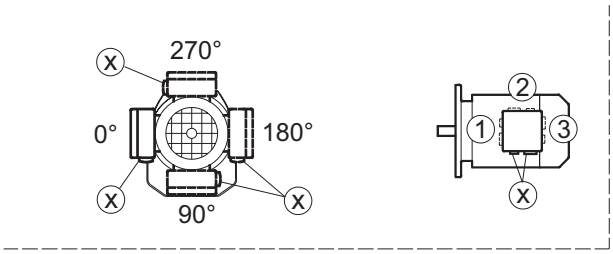


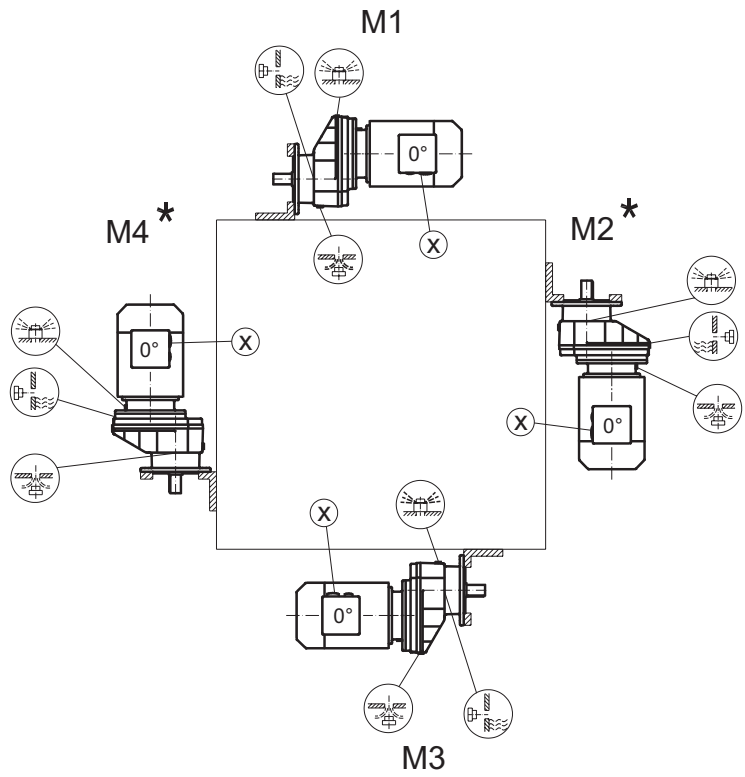


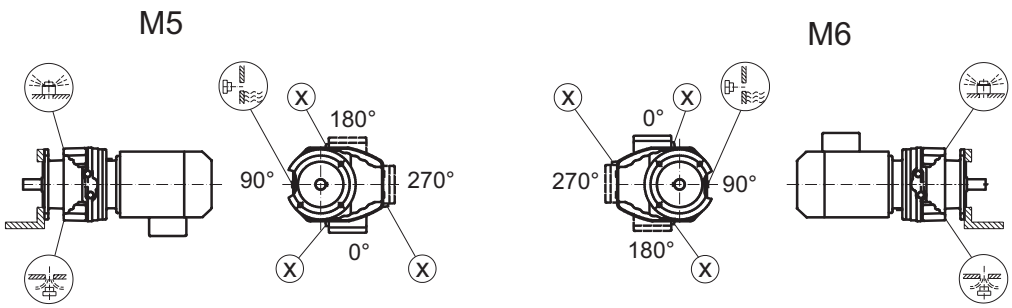
* → page 36

RXF57-RXF107

04 044 100





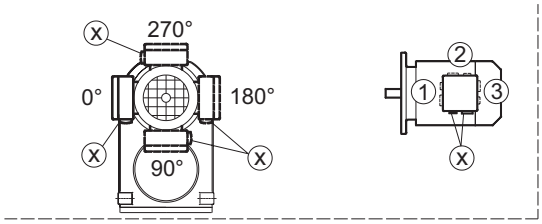


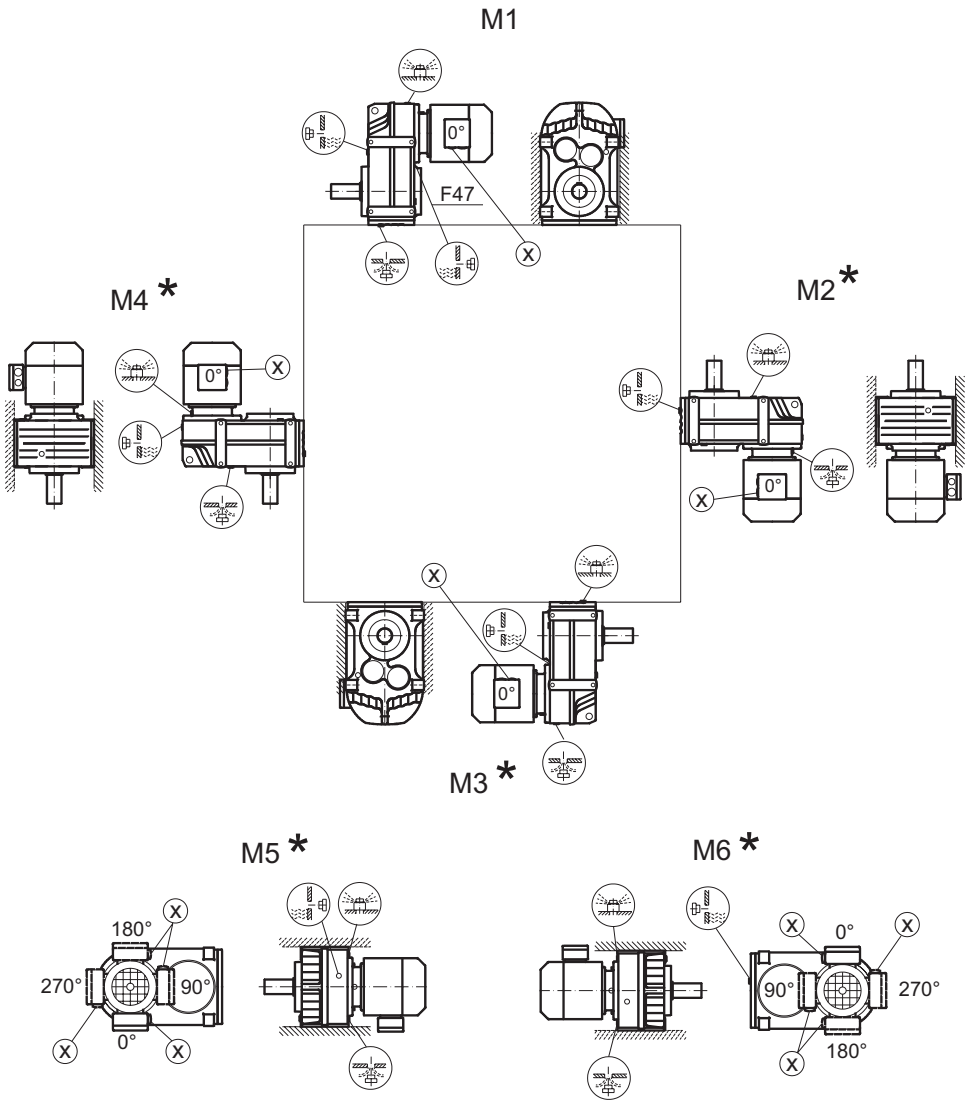
* → page 36

8.4 Mounting positions, parallel shaft helical gear units

F/FA..B/FH27B-157B, FV27B-107B

42 042 100





F..27 M1, M3, M5, M6

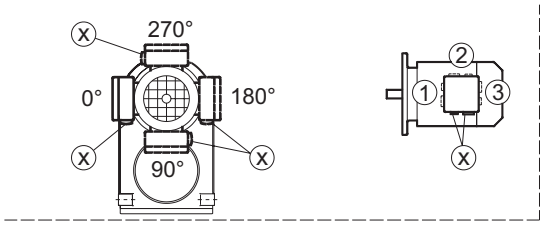
F..27 M1 - M6

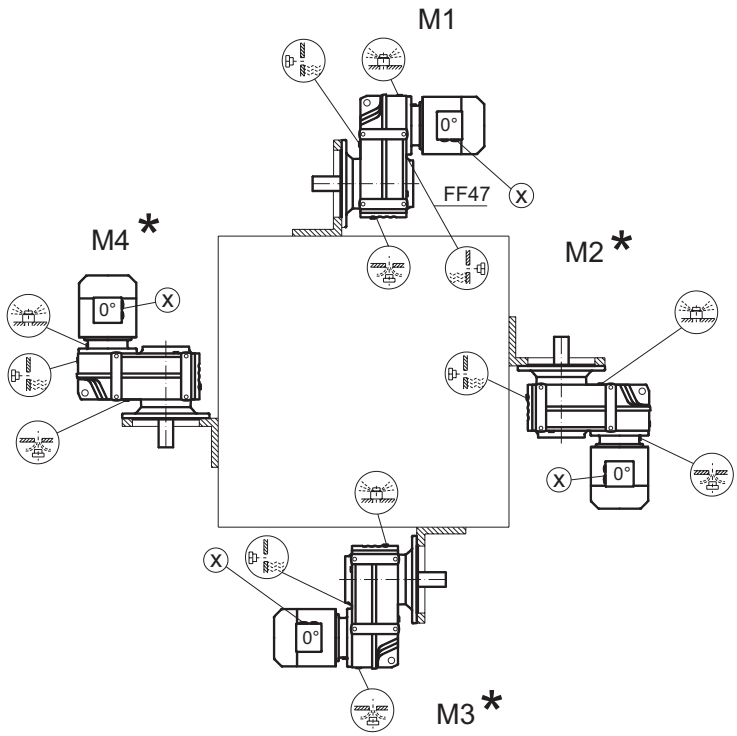
F..27 M1, M3, M5, M6

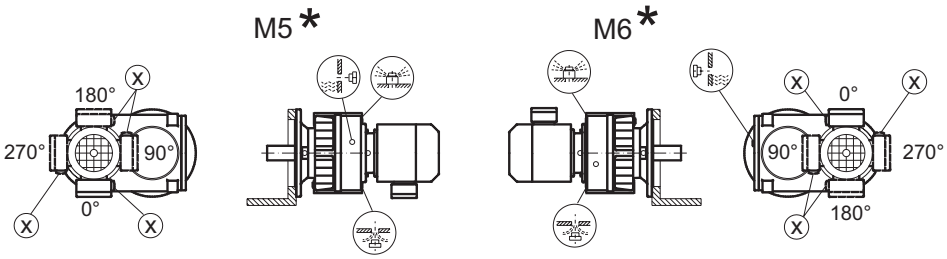
* → page 36

FF/FAF/FHF/FAZ/FHZ27-157, FVF/FVZ27-107

42 043 100







F..27  M1, M3, M5, M6

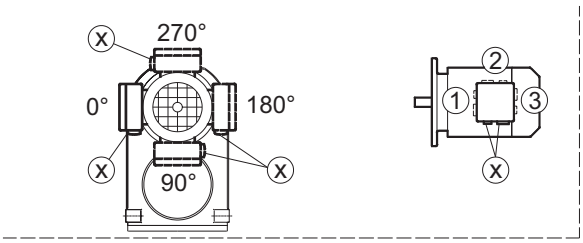
F..27  M1 - M6

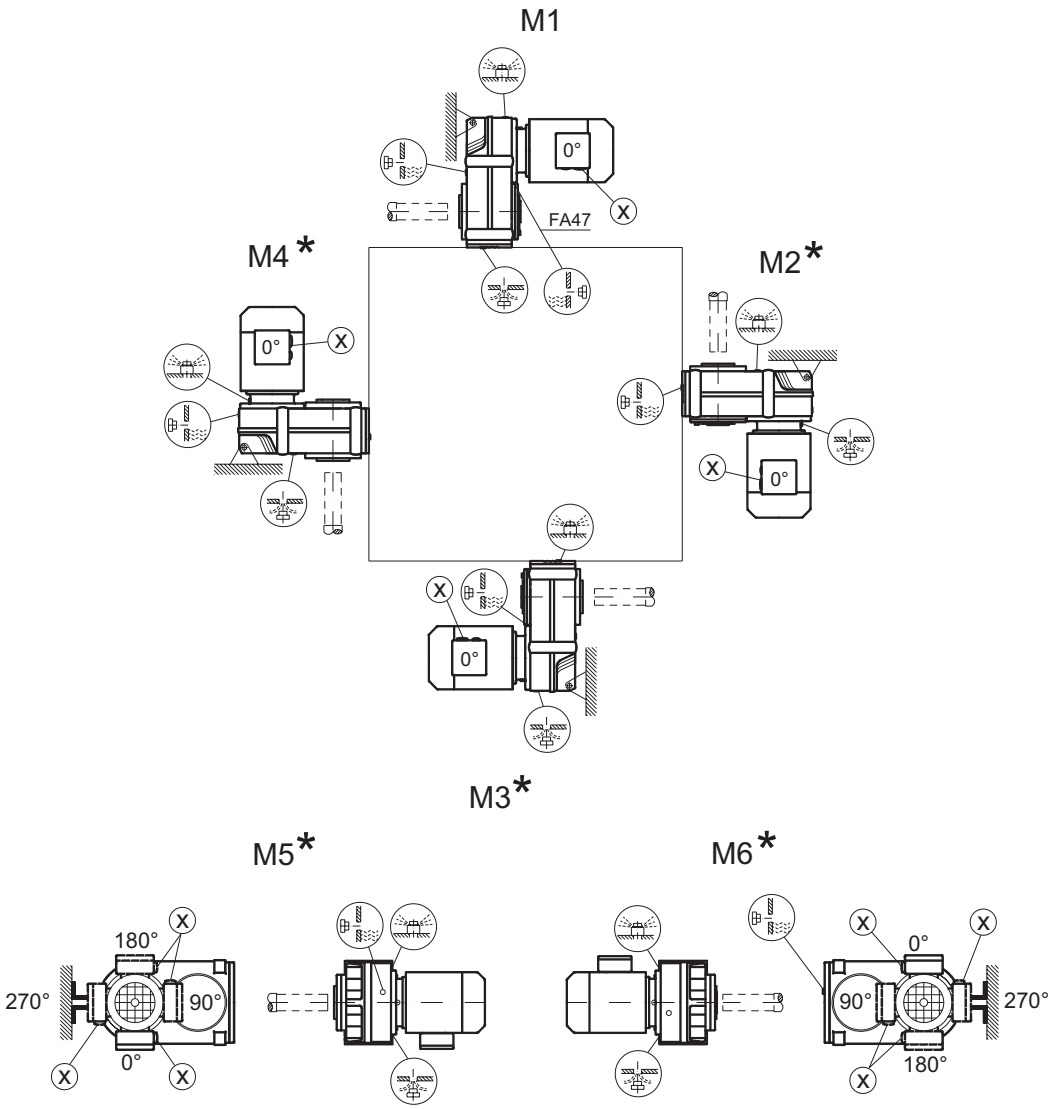
F..27  M1, M3, M5, M6

* → page 36

FA/FH27-157, FV27-107

42 044 100





F..27 M1, M3, M5, M6

F..27 M1 - M6

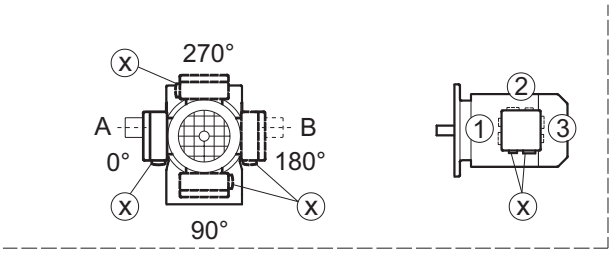
F..27 M1, M3, M5, M6

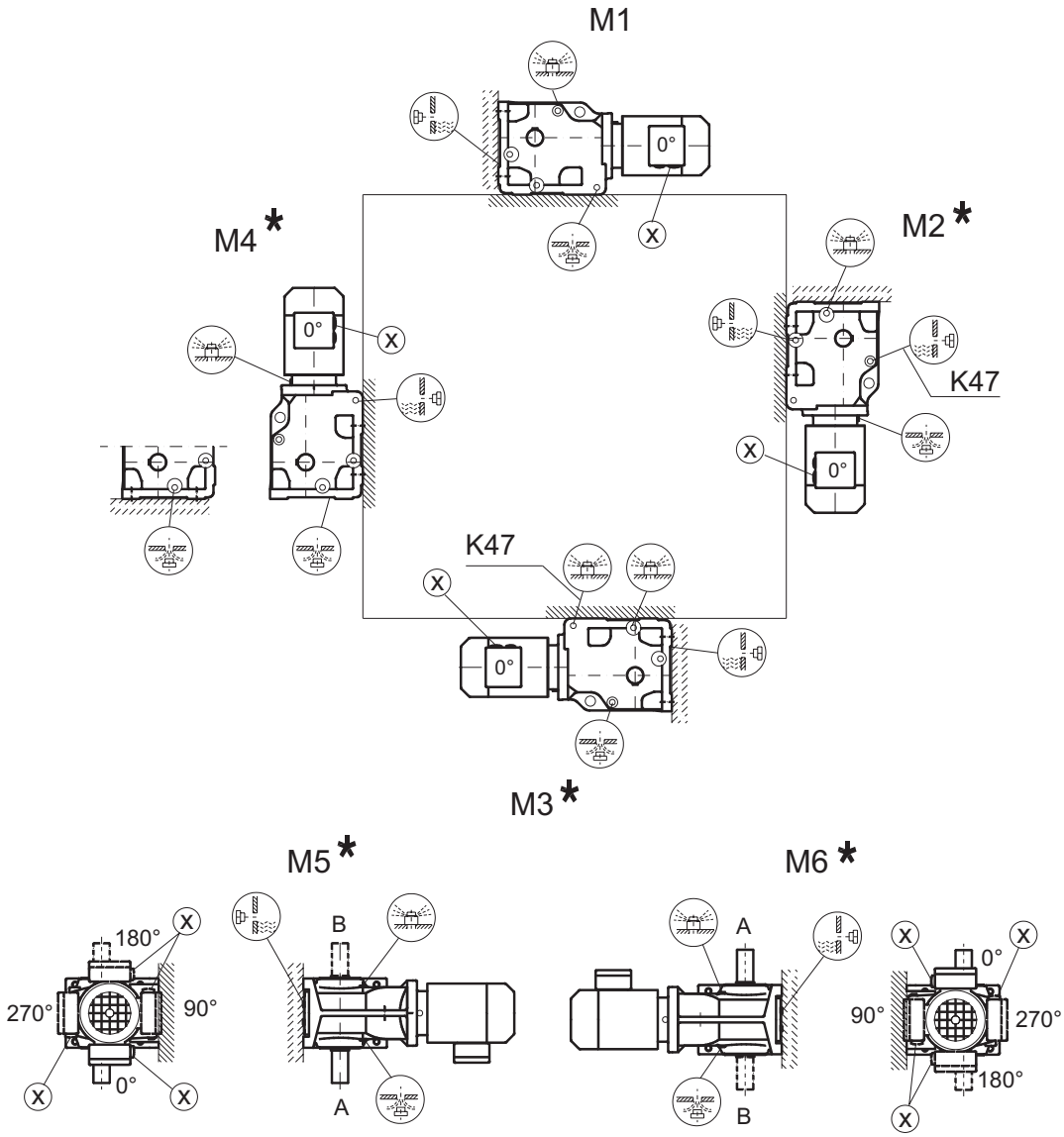
* → page 36

8.5 Mounting positions, helical-bevel gear units

K/KA..B/KH37B-157B, KV37B-107B

34 025 100



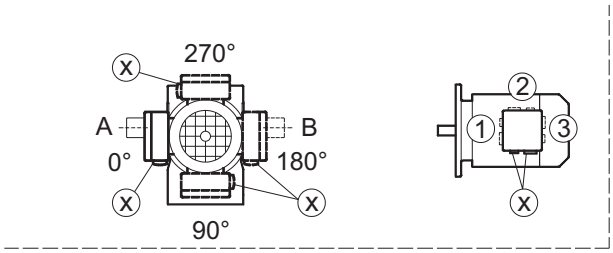


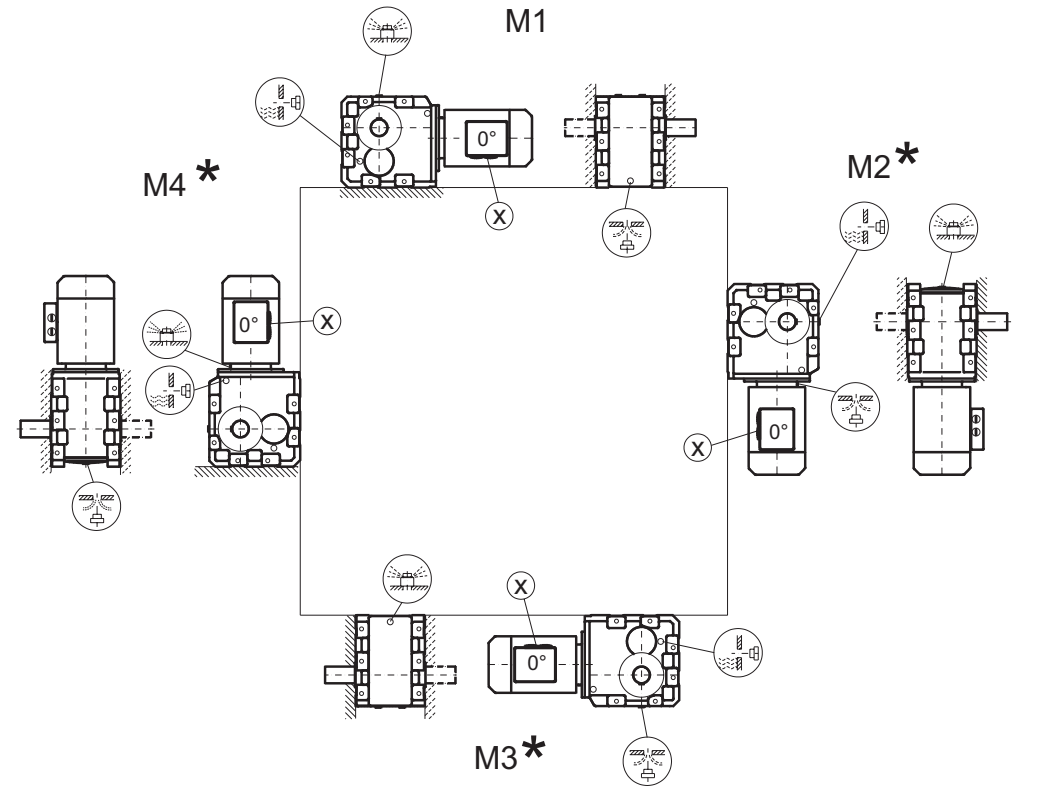
* → page 36

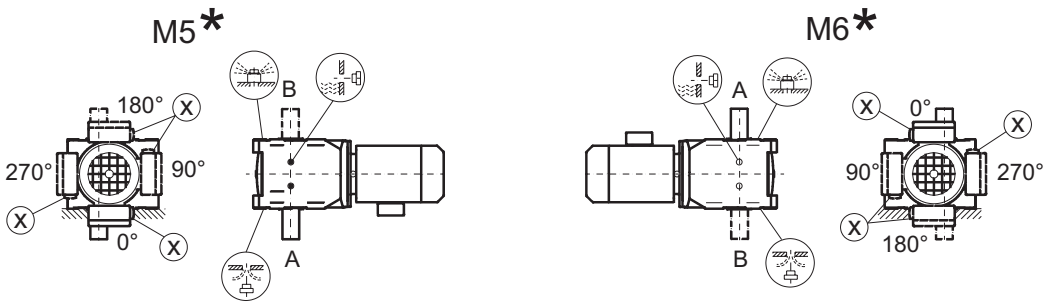
Caution: Note the ⓘ notes in the "Geared Motors" catalog, section "Project Planning Gear Units/Overhung and axial loads."

K167-187, KH167B-187B

34 026 100





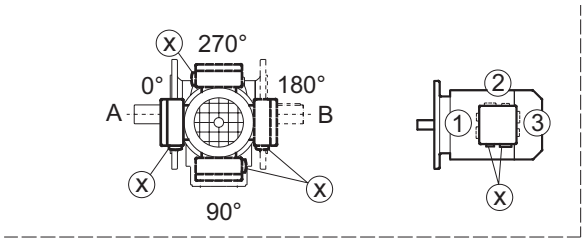


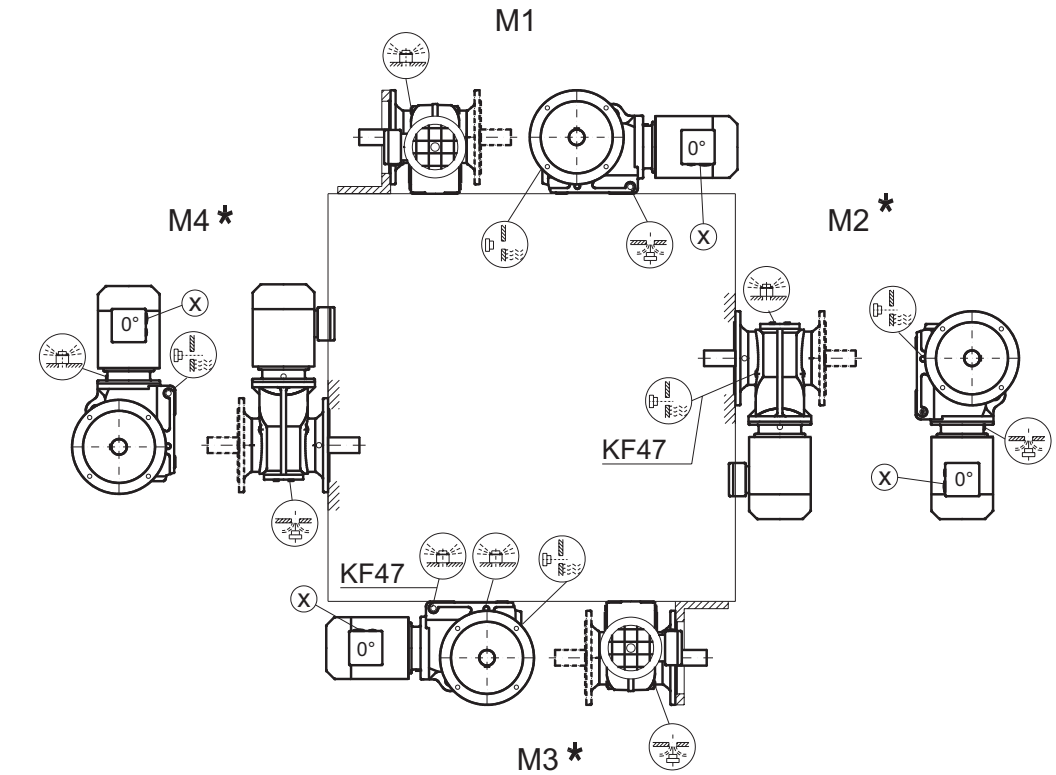
* → page 36

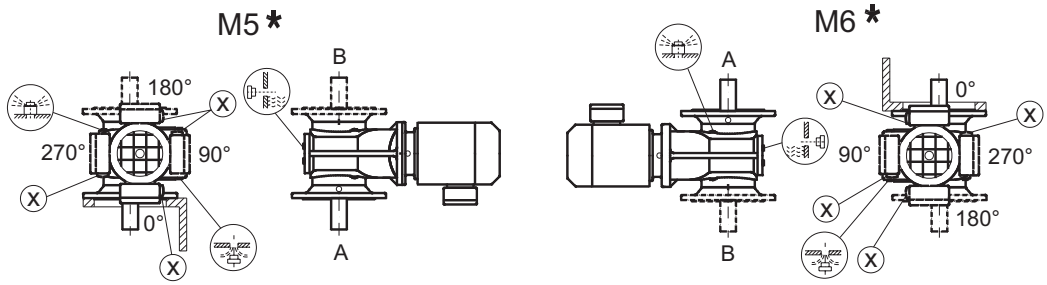
Caution: Note the ⓘ notes in the "Geared Motors" catalog, section "Project Planning Gear Units/Overhung and axial loads."

KF/KAF/KHF/KAZ/KHZ37-157, KVF/KVZ37-107

34 027 100



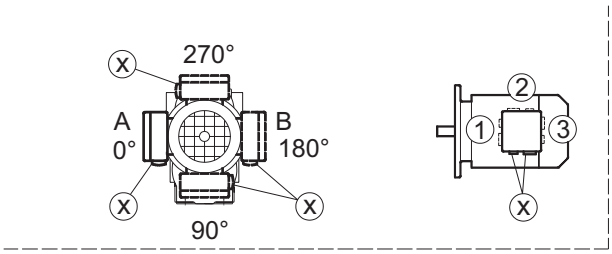


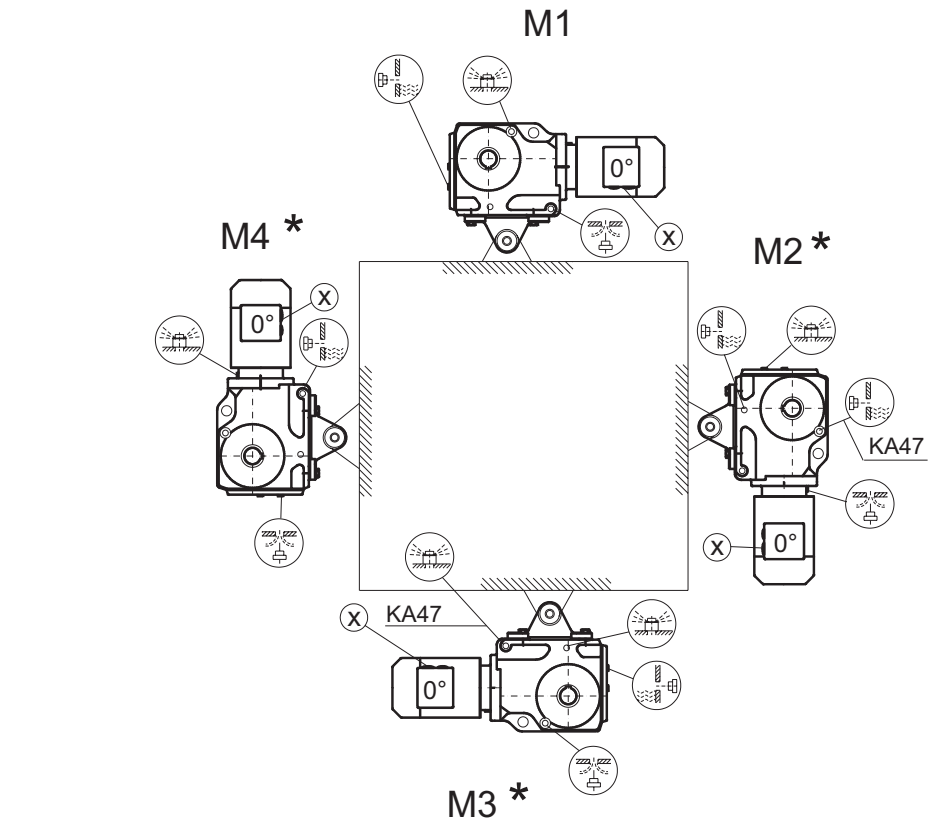


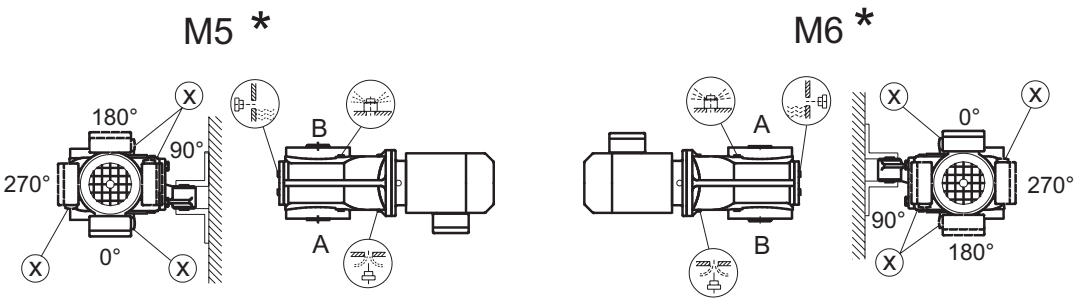
* → page 36

KA/KH37-157, KV37-107

39 025 100



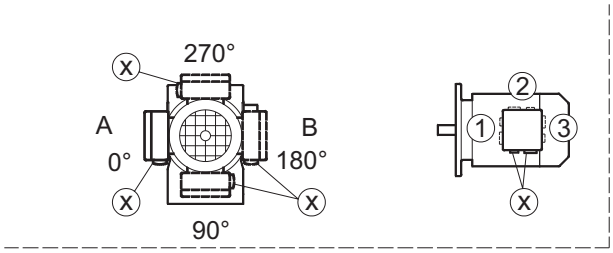


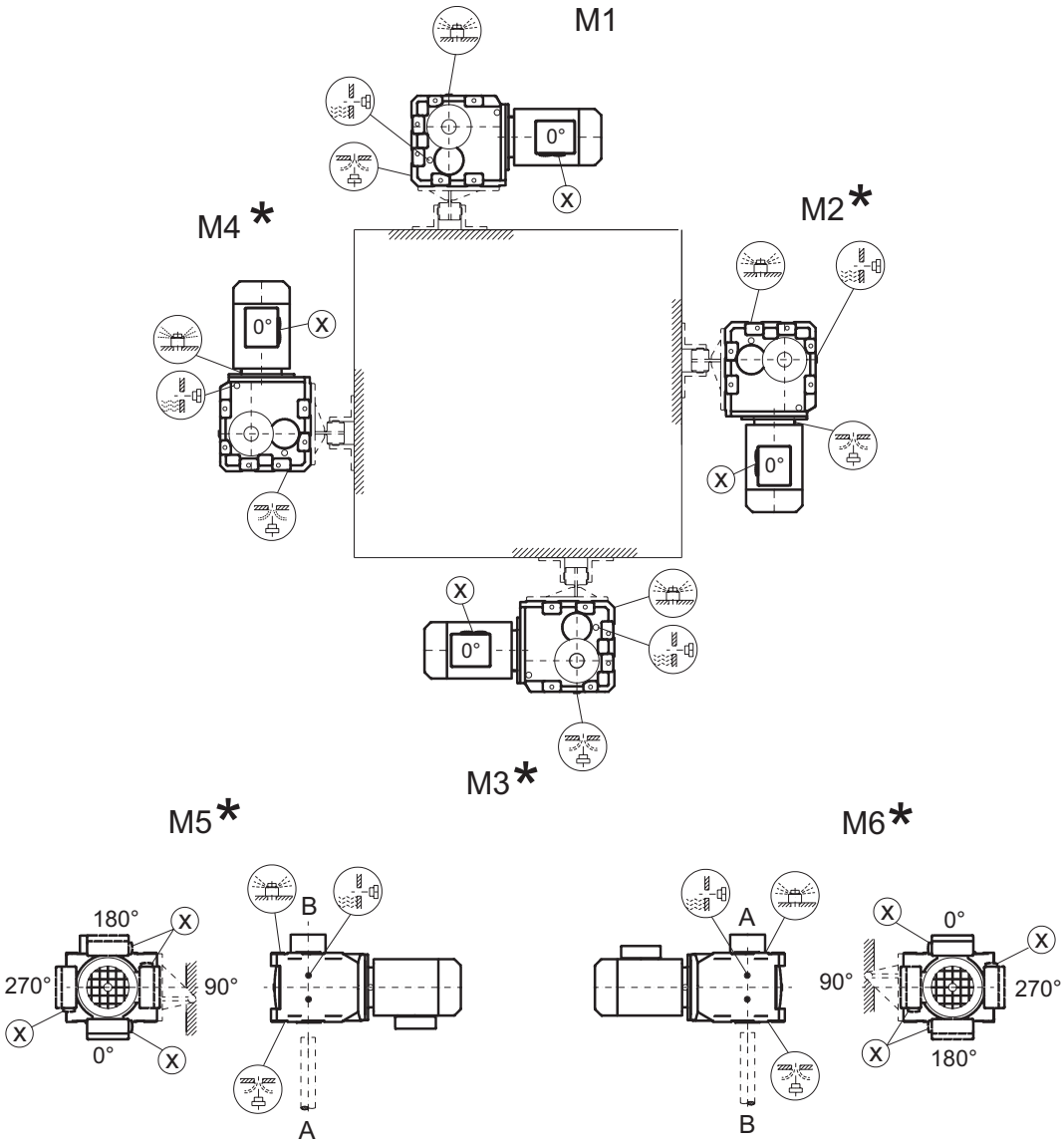


* → page 36

KH167-187

39 026 100



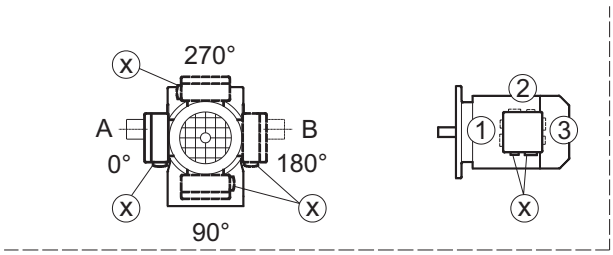


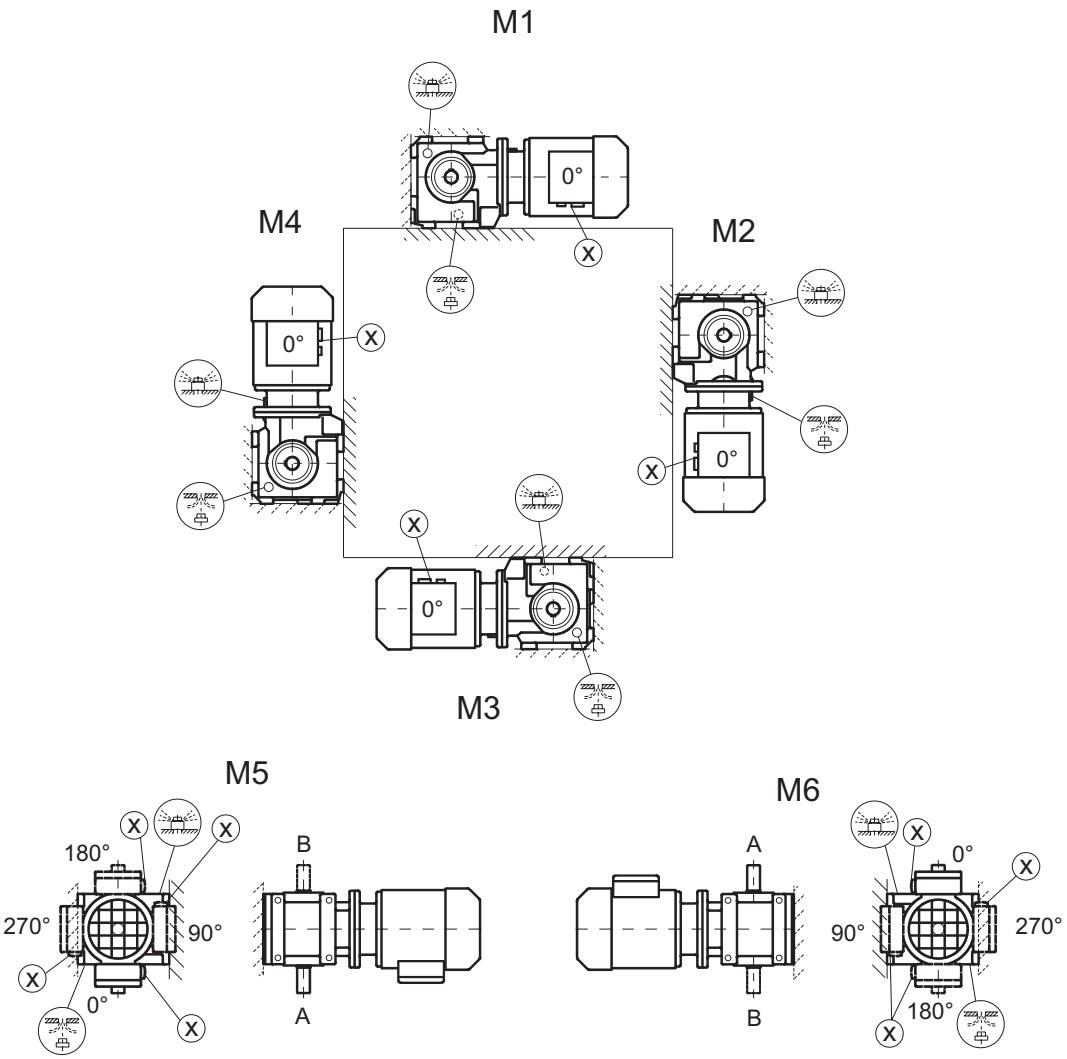
* → page 36

8.6 Mounting positions, helical-worm gear units

S37

05 025 100

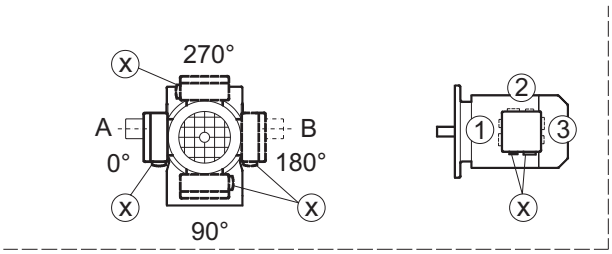


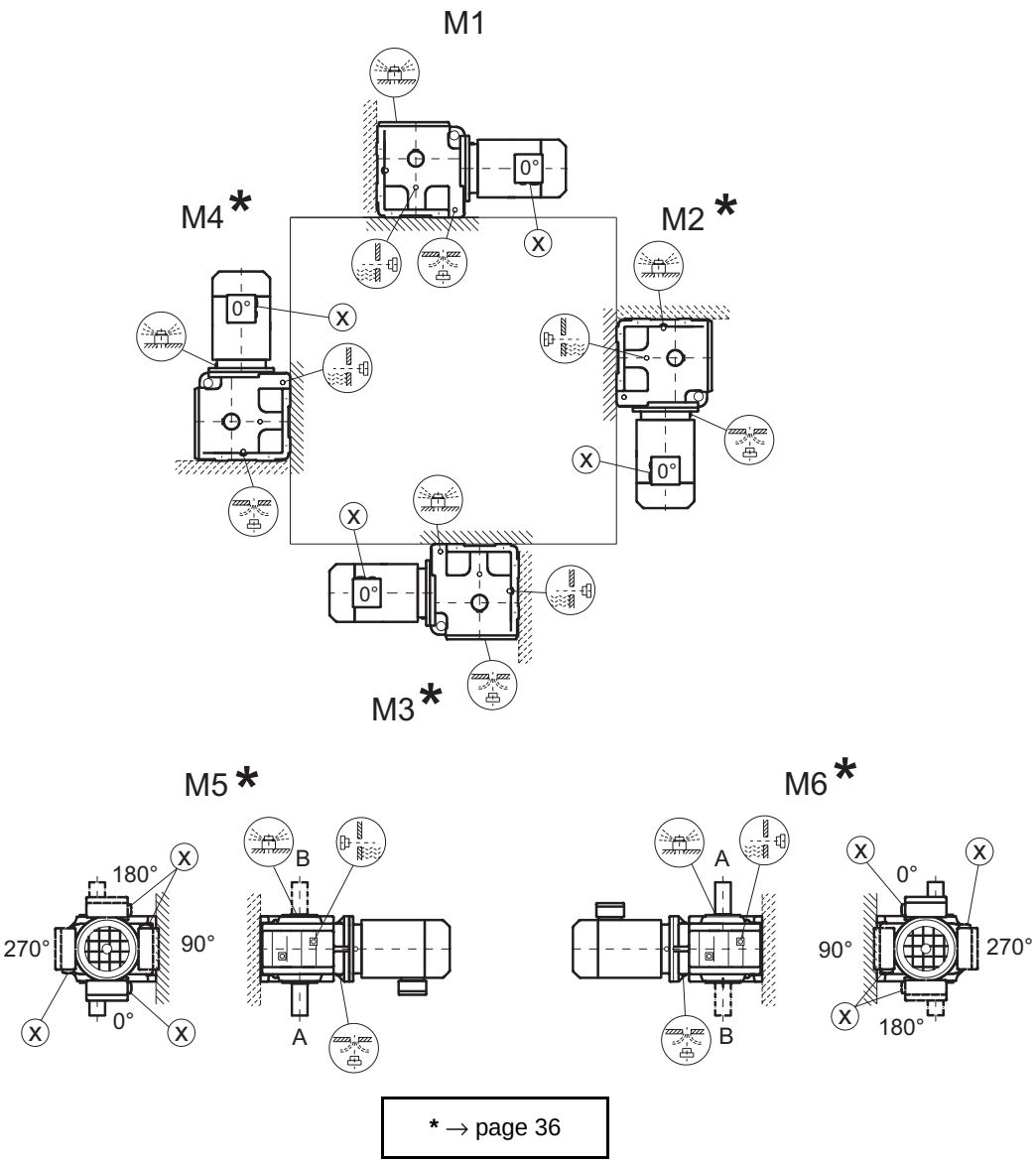


Caution: Note the notes in the "Geared Motors" catalog, section "Project Planning Gear Units/Overhung and axial loads."

S47-S97

05 026 100



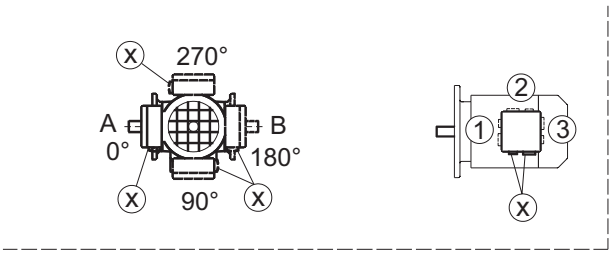


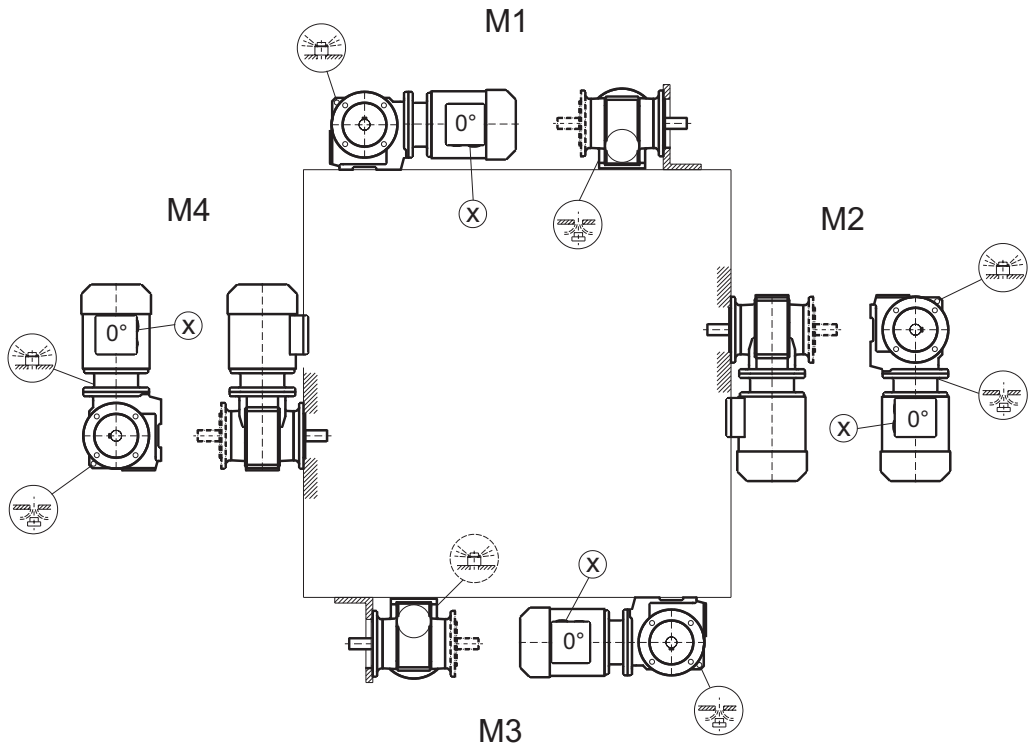
* → page 36

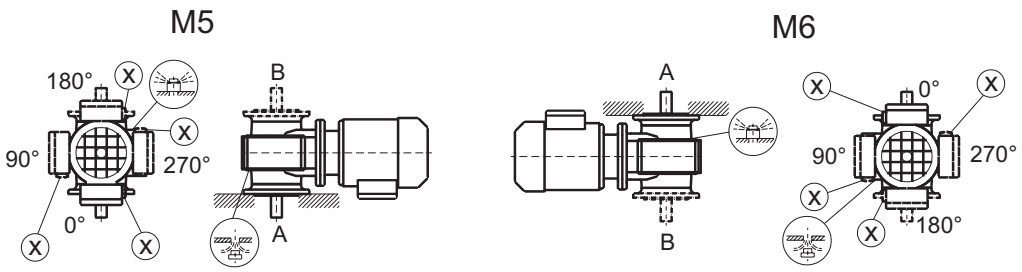
Caution: Note the ⓘ notes in the "Geared Motors" catalog, section "Project Planning Gear Units/Overhung and axial loads."

SF/SAF/SHF37

05 027 100

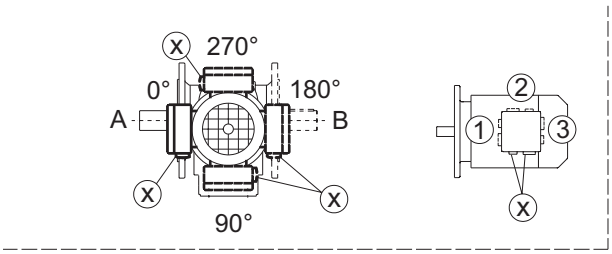


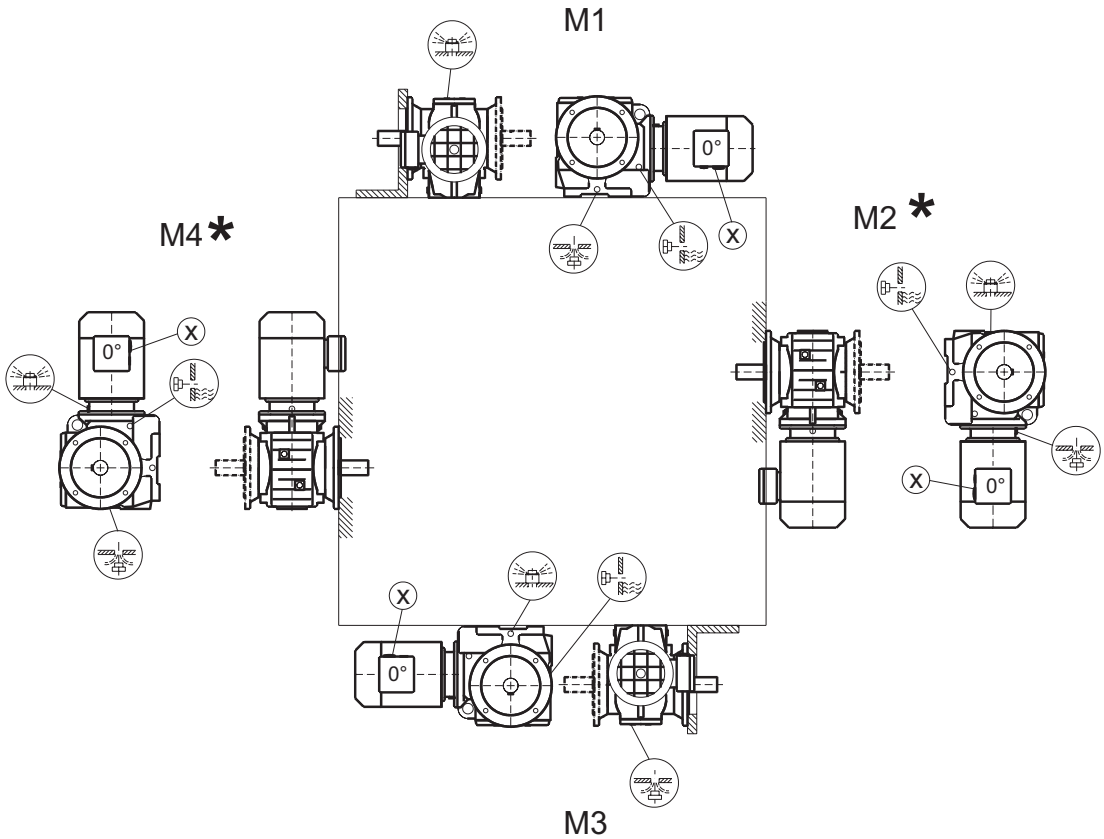


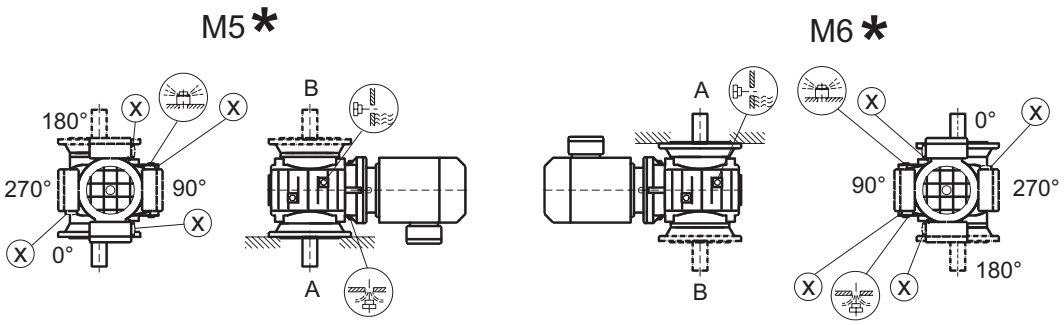


SF/SAF/SHF/SAZ/SHZ47-97

05 028 100







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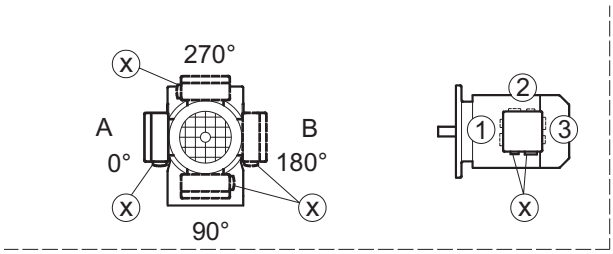
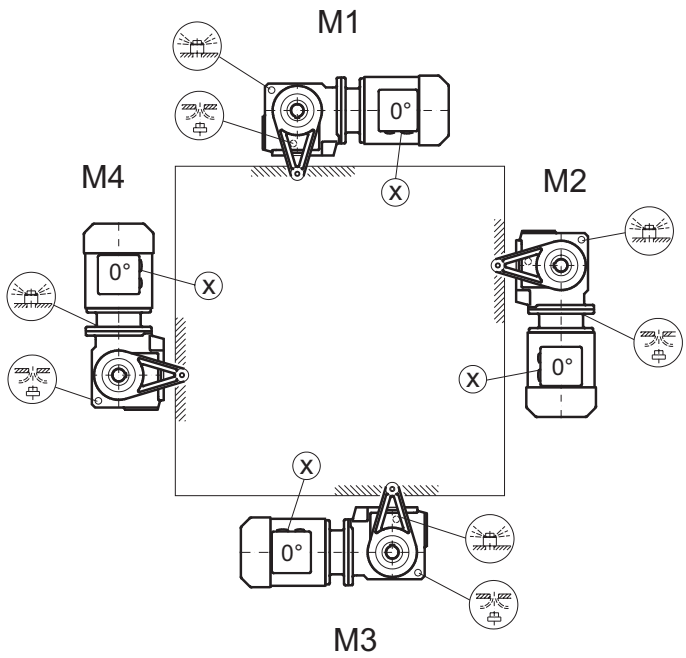
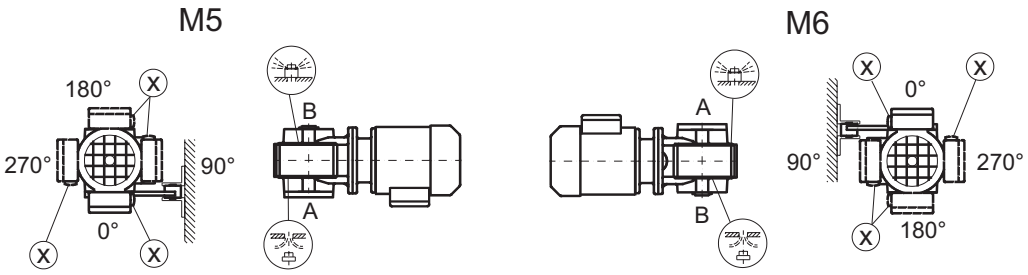
SA/SH37

28 020 100







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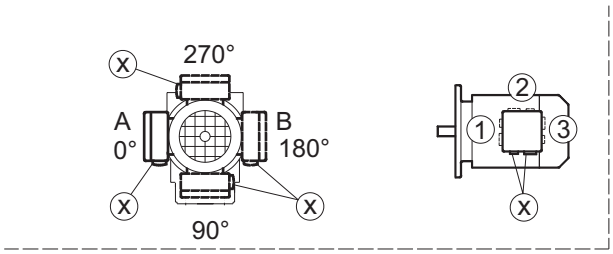

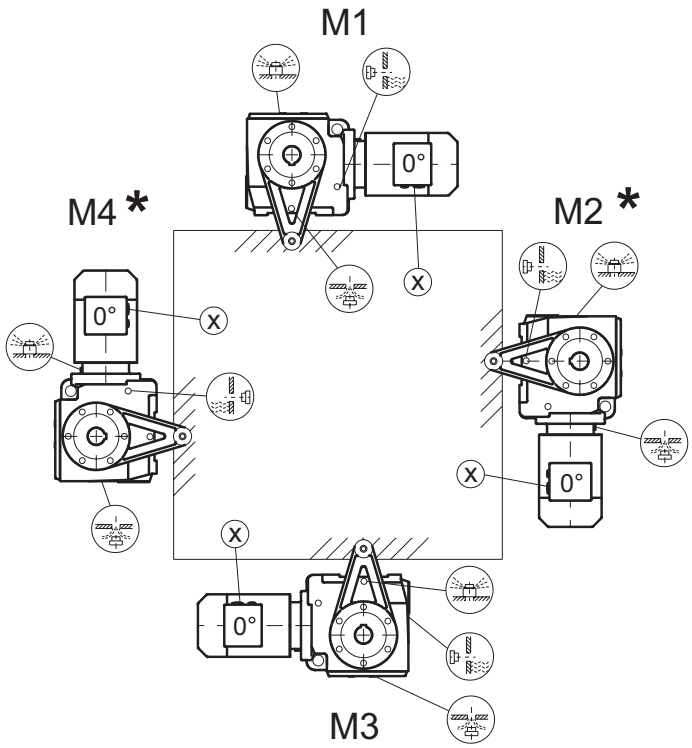

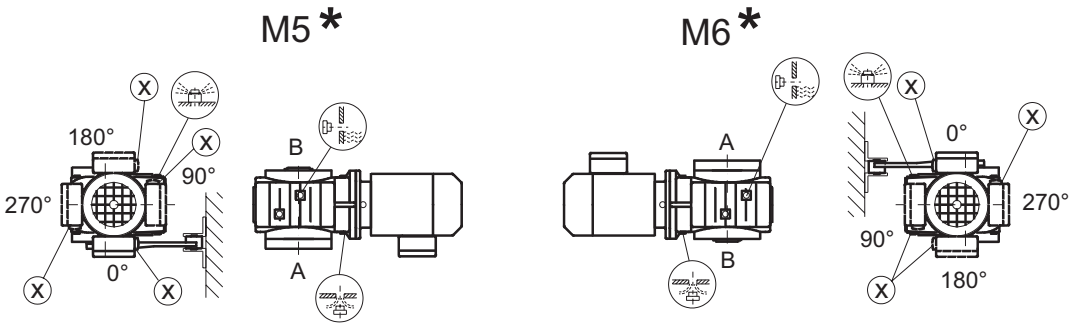

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9 Lubricants

General

SEW supplies the drives filled with a lubricant appropriate for the specific gear unit and mounting position. The decisive factor is the indicated mounting position (M1...M6, → section "Mounting positions and important order information") when ordering the drive. The lubricant fill amounts for subsequent changes in the mounting position will have to be adjusted for the specific mounting position (→ Lubricant fill quantities).

Lubricant table

The lubricant table for SEW drives on the following page is a list of all approved lubricants for SEW drives. Please note the following legend for the lubricant table.

Legend for lubricant table

Abbreviations, meaning of shading and notes:

CLP	= Mineral oil
CLP PG	= Polyglykol (W gear unit, meeting USDA-H1standard)
CLP HC	= Synthetic hydrocarbons
E	= Diester oil (water pollution class WGK 1)
HCE	= Synthetic hydrocarbons + diester oil (USDA - H1 approval)
HLP	= Hydraulic oil
	= Synthetic lubricant (= anti-friction bearing grease on synthetic base)
	= Mineral lubricant (= anti-friction bearing grease on mineral base)
1)	Helical-worm gear unit with PG oil: Please consult SEW
2)	Special lubricant for Spiroplan® gear units only
3)	Recommendation: Select SEW $f_B \geq 1.2$
4)	Note critical starting performance at low temperatures!
5)	Low-viscosity grease
6)	Ambient temperature
	Lubricant for the food industry
	Biological oil (lubricant for agricultural, forestry and water industry)

Anti-friction bearing greases

The anti-friction bearings in SEW gear units and motors will be filled with the following greases at the factory. SEW recommends to change the grease when replacing the oil in anti-friction bearings with grease filling.

	Ambient temperature	Manufacturer	Type
Gear unit anti-friction bearing	-30°C ... +60°C	Mobil	Mobilux EP 2
	-40°C ... +80°C	Mobil	Mobiltemp SHC 100
Motor anti-friction bearing	-25°C ... +80°C	Esso	Unirex N3
	-25°C ... +60°C	Shell	Alvania R3
	+80°C ... +100°C	Klüber	Barrierta L55/2
	-45°C ... -25°C	Shell	Aero Shell Grease 16
Special greases for gear unit anti-friction bearings:			
	-30°C ... +40°C	Aral	Aral Eural Grease EP 2
	-20°C ... +40°C	Aral Klüber	Aral Aralub BAB EP 2 Klüberbio M32-82

You need the following grease amounts:

- For fast-running bearings (motor and gear unit input side): Fill one third of the hollow spaces between the actual roller bodies with grease.
- For slow-running bearings (in gear unit and gear unit output side): Fill two thirds of the spaces between the actual roller bodies with grease.

	6) °C	DIN (ISO)	ISO,NLGI	Mobil®	Shell	Klüber Lubrication	Aral	BP	Tribol	Texaco	Optimol	Fuchs
R... K...(HK...) F...	Standard -10 +40	CLP(CC)	VG 220	Mobilgear 630	Shell Omala 220	Klüberoil GEM 1-220	Aral Degol BG 220	BP Energol GR-XP 220	Tribol 1100/220	Meropa 220	Optigear BM 220	Renolin CLP 220
	-25 +80	CLP PG	VG 220	Mobil Glygolyle 30	Shell Tivela WB	Klübersynth GH 6-220	Aral Degol GS 220	BP Enersyn SG-XP 220	Tribol 800/220	Synlube CLP 220	Optiflex A 220	
	4) -40 +80	CLP HC	VG 220	Mobilgear SHC 630	Shell Omala 220 HD	Klübersynth EG 4-220	Aral Degol PAS 220		Tribol 1510/220	Pinnacle EP 220	Optigear Synthetic A 220	Renolin Unisyn CLP 220
	4) -40 +40		VG 150	Mobil SHC 629		Klübersynth EG 4-150				Pinnacle EP 150		
	-20 +25	CLP (CC)	VG 150 VG 100	Mobilgear 629	Shell Omala 100	Klüberoil GEM 1-150	Aral Degol BG 100	BP Energol GR-XP 100	Tribol 1100/100	Meropa 150	Optigear BM 100	Renolin CLP 150
	-30 +10	HLP (HM)	VG 68-46 VG 32	Mobil D.T.E. 15M	Shell Tellus T 32	Klüberoil GEM 1-68	Aral Degol BG 46		Tribol 1100/68	Rando EP Ashless 46	Optigear 32	Renolin B 46 HVI
	4) -40 +10	CLP HC	VG 32	Mobil SHC 624		Klüber-Summit HySyn FG-32				Cetus PAO 46		
	4) -40 -20	HLP (HM)	VG 22 VG 15	Mobil D.T.E. 11M	Shell Tellus T 15	Isoflex MT 30 ROT		BP Energol HLP-HM 10		Rando HDZ 15		
S...(HS...)	Standard 0 +40	CLP (CC)	VG 680	Mobilgear 636	Shell Omala 680	Klüberoil GEM 1-680	Aral Degol BG 680	BP Energol GR-XP 680	Tribol 1100/680	Meropa 680	Optigear BM 680	Renolin CLP 680
	-20 +60	CLP PG	VG 680 1)	Mobil Glygoyle HE 680		Klübersynth GH 6-680		BP Enersyn SG-XP 680	Tribol 800/680	Synlube CLP 680		
	4) -30 +80	CLP HC	VG 460	Mobil SHC 634	Shell Omala 460 HD	Klübersynth EG 4-460				Pinnacle EP 460		
	4) -40 +10		VG 150	Mobil SHC 629		Klübersynth EG 4-150				Pinnacle EP 150		
	-20 +10	CLP (CC) HLP (HM)	VG 150 VG 100	Mobil D.T.E. 18M	Shell Omala 100	Klüberoil GEM 1-150	Aral Degol BG 100	BP Energol GR-XP 100	Tribol 1100/100	Meropa 100	Optigear BM 100	Renolin CLP 150
	-25 +20	CLP PG	VG 220 1)	Mobil Glygoyle 30		Klübersynth GH 6-220			Tribol 800/220	Synlube CLP 220	Optiflex A 220	
	4) -40 0	CLP HC	VG 32	Mobil SHC 624		Klüber-Summit HySyn FG-32				Cetus PAO 46		
R...,K...(HK...), F...,S...(HS...)	4) -30 +40	HCE	VG 460		Shell Cassida Fluid GL 460	Klüberoil 4UH1-460	Aral Eural Gear 460				Optileb GT 460	
	-20 +40	E	VG 460			Klüberbio CA2-460	Aral Degol BAB 460				Optisynt BS 460	
W...(HW...)	Standard -20 +40	SEW PG	VG 460 2)			Klüber SEW HT-460-5						
	4) -40 +10	API GL5	SAE 75W90 (~VG 100)	Mobilube SHC 75 W90-LS								
	-20 +40	CLP PG	VG 460 3)			Klübersynth UH1 6-460						
R32 R302	-25 +60	DIN 51 818 5)	00	Glygoyle Grease 00	Shell Tivela Compound A	Klübersynth GE 46-1200				Multifak 6833 EP 00		
	Standard -15 +40		000 - 0	Mobilux EP 004	Shell Alvania GL 00		Aralub MFL 00	BP Energrease LS-EP 00		Multifak EP 000	Longtime PD 00	Renolin SF 7 - 041

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Lubricant fill quantities

The indicated fill quantities are **recommended values**. The specific values vary depending on number of stages and ratio. Pay close attention to the **oil level plug to serve as indicator for the correct amount of oil**.

The following tables list the recommended values for the lubricant fill quantities in reference to mounting positions M1...M6.

Helical (R-) gear units

Gear units R.., R..F	Fill quantity in liters					
	M1[1)]	M2[1)]	M3	M4	M5	M6
R17/R17F	0.25	0.6	0.35	0.6	0.35	0.35
R27/R27F	0.25/0.4	0.7	0.4	0.7	0.4	0.4
R37/R37F	0.3/1	0.9	1	1.1	0.8	1
R47/R47F	0.7/1.5	1.6	1.5	1.7	1.5	1.5
R57/R57F	0.8/1.7	1.9	1.7	2.1	1.7	1.7
R67/R67F	1.1/2.3	2.6/3.5	2.8	3.2	1.8	2
R77/R77F	1.2 / 3	3.8 / 4.3	3.6	4.3	2.5	3.4
R87/R87F	2.3 / 6	6.7 / 8.4	7.2	7.7	6.3	6.5
R97	4.6/9.8	11.7/14	11.7	13.4	11.3	11.7
R107	6/13.7	16.3	16.9	19.2	13.2	15.9
R137	10/25	28	29.5	31.5	25	25
R147	15.4/40	46.5	48	52	39.5	41
R167	27/70	82	78	88	66	69
Gear units RF..	**Fill quantity in liters**					
	M1[1)]	**M2[1)]**	**M3**	**M4**	**M5**	**M6**
RF17	0.25	0.6	0.35	0.6	0.35	0.35
RF27	0.25/0.4	0.7	0.4	0.7	0.4	0.4
RF37	0.4/1	0.9	1	1.1	0.8	1
RF47	0.7/1.5	1.6	1.5	1.7	1.5	1.5
RF/RM57	0.8/1.7	1.8	1.7	2	1.7	1.7
RF/RM67	1.2/2.5	2.7/3.6	2.7	3.1	1.9	2.1
RF/RM77	1.2 / 2.6	3.8/4.1	3.3	4.1	2.4	3
RF/RM87	2.4 / 6	6.8/7.9	7.1	7.7	6.3	6.4
RF/RM97	5.1/10.2	11.9/14	11.2	14	11.2	11.8
RF/RM107	6.3/14.9	15.9	17	19.2	13.1	15.9
RF/RM137	9.5/25	27	29	32.5	25	25
RF/RM147	16.4/42	47	48	52	42	42
RF/RM167	26/70	82	78	88	65	71

1) The larger gear unit in multi-stage gear units must be filled with the larger oil quantity.

Gear units RX..	Fill quantity in liters					
	M1	M2	M3	M4	M5	M6
RX57	0.6	0.8	1.3	1.3	0.9	0.9
RX67	0.8	0.8	1.7	1.9	1.1	1.1
RX77	1.1	1.5	2.6	2.7	1.6	1.6
RX87	1.7	2.5	4.8	4.8	2.9	2.9
RX97	2.1	3.4	7.4	7	4.8	4.8
RX107	3.9	5.6	11.6	11.9	7.7	7.7
Gear units RXF..	**Fill quantity in liters**					
	M1	**M2**	**M3**	**M4**	**M5**	**M6**
RXF57	0.5	0.8	1.1	1.1	0.7	0.7
RXF67	0.7	0.8	1.5	1.7	1	1
RXF77	0.9	1.5	2.4	2.5	1.6	1.6
RXF87	1.6	2.5	4.9	4.7	2.9	2.9
RXF97	2.1	3.6	7.1	7	4.8	4.8
RXF107	3.1	5.9	11.2	10.5	7.2	7.2

Parallel shaft helical (F-) gear units

F.., FA..B, FH..B, FV..B:

Gear units	Fill quantity in liters					
	M1	M2	M3	M4	M5	M6
F..27	0.6	0.8	0.7	0.7	0.6	0.6
F..37	1	1.2	0.7	1.2	1	1.1
F..47	1.5	1.8	1.1	1.9	1.5	1.7
F..57	2.6	3.7	2.1	3.5	2.8	2.9
F..67	2.7	3.8	1.9	3.8	2.9	3.2
F..77	5	7.3	4.3	8	6	6.3
F..87	10	13.0	7.7	13.8	10.8	11
F..97	18.5	22.5	12.6	25.2	18.5	20
F..107	24.5	32	19.5	37.5	27	27
F..127	40.5	55	34	61	46.5	47
F..157	69	104	63	105	86	78

FF..:

Gear units	Fill quantity in liters					
	M1	M2	M3	M4	M5	M6
FF27	0.6	0.8	0.7	0.7	0.6	0.6
FF37	1	1.2	0.7	1.3	1	1.1
FF47	1.6	1.9	1.1	1.9	1.5	1.7
FF57	2.8	3.8	2.1	3.7	2.9	3
FF67	2.7	3.8	1.9	3.8	2.9	3.2
FF77	5.1	7.3	4.3	8.1	6	6.3
FF87	10.3	13.2	7.8	14.1	11	11.2
FF97	19	22.5	12.6	25.5	18.9	20.5
FF107	25.5	32	19.5	38.5	27.5	28
FF127	41.5	56	34	63	46.5	49
FF157	72	105	64	106	87	79

FA.., FH.., FV.., FAF.., FHF.., FVF.., FAZ.., FHZ.., FVZ..:

Gear units	Fill quantity in liters					
	M1	M2	M3	M4	M5	M6
F..27	0.6	0.8	0.7	0.7	0.6	0.6
F..37	1	1.2	0.7	1.2	1	1.1
F..47	1.5	1.8	1.1	1.9	1.5	1.7
F..57	2.7	3.8	2.1	3.6	2.9	3
F..67	2.7	3.8	1.9	3.8	2.9	3.2
F..77	5	7.3	4.3	8	6	6.3
F..87	10	13.0	7.7	13.8	10.8	11
F..97	18.5	22.5	12.6	25.0	18.5	20
F..107	24.5	32	19.5	37.5	27	27
F..127	39	55	34	61	45	46.5
F..157	68	103	62	104	85	77

Helical-bevel (K-) gear units

K.., KA..B, KH..B, KV..B:

Gear units	Fill quantity in liters					
	M1	M2	M3	M4	M5	M6
K..37	0.5	1	1	1.3	1	1
K..47	0.8	1.3	1.5	2	1.6	1.6
K..57	1.2	2.3	2.5	3	2.6	2.4
K..67	1.1	2.4	2.6	3.4	2.6	2.6
K..77	2.2	4.1	4.4	5.9	4.2	4.4
K..87	3.7	8	8.7	10.9	7.8	8
K..97	7	14	15.7	20	15.7	15.5
K..107	10	21	25.5	33.5	24	24
K..127	21	41.5	44	54	40	41
K..157	31	62	65	90	58	62
K..167	35	100	100	125	85	85
K..187	60	170	170	205	130	130

KF..:

Gear units	Fill quantity in liters					
	M1	M2	M3	M4	M5	M6
KF37	0.5	1.1	1.1	1.5	1	1
KF47	0.8	1.3	1.7	2.2	1.6	1.6
KF57	1.3	2.3	2.7	3	2.9	2.7
KF67	1.1	2.4	2.8	3.6	2.7	2.7
KF77	2.1	4.1	4.4	6	4.5	4.5
KF87	3.7	8.2	9	11.9	8.4	8.4
KF97	7	14.7	17.3	21.5	15.7	16.5
KF107	10	22	26	35	25	25
KF127	21	41.5	46	55	41	41
KF157	31	66	69	92	62	62

KA.., KH.., KV.., KAF.., KHF.., KVF.., KAZ.., KHZ.., KVZ..:

Gear units	Fill quantity in liters					
	M1	M2	M3	M4	M5	M6
K..37	0.5	1	1	1.4	1	1
K..47	0.8	1.3	1.6	2.1	1.6	1.6
K..57	1.3	2.3	2.7	3	2.9	2.7
K..67	1.1	2.4	2.7	3.6	2.6	2.6
K..77	2.1	4.1	4.6	6	4.4	4.4
K..87	3.7	8.2	8.8	11.1	8	8
K..97	7	14.7	15.7	20	15.7	15.7
K..107	10	20.5	24	32	24	24
K..127	21	41.5	43	52	40	40
K..157	31	66	67	87	62	62
KH167	35	100	100	125	85	85
KH187	60	170	170	205	130	130

Spiroplan® (W-) gear units

The Spiroplan® gear units always have the same fill quantity, independent of the mounting position:

Gear units	Mounting position independent fill quantity in liters
W..10	0.16
W..20	0.26
W..30	0.5

Helical-worm (S-) gear units

S..:

Gear units	Fill quantity in liters					
	M1	M2	M3[1)]	M4	M5	M6
S37	0.25	0.4	0.5	0.6	0.4	0.4
S47	0.35	0.8	0.7/0.9	1.1	0.8	0.8
S57	0.5	1.2	1/1.2	1.5	1.3	1.3
S67	1	2.0	2.2/3.1	3.2	2.6	2.6
S77	1.9	4.2	3.7/5.4	6	4.4	4.4
S87	3.3	8.1	6.9/10.4	12	8.4	8.4
S97	6.8	15	13.4/18	22.5	17	17

1) The larger gear unit in multi-stage gear units must be filled with the larger oil quantity.

SF..:

Gear units	Fill quantity in liters					
	M1	M2	M3[1)]	M4	M5	M6
SF37	0.25	0.4	0.5	0.6	0.4	0.4
SF47	0.4	0.9	0.9/1.1	1.2	1.0	1
SF57	0.5	1.2	1/1.5	1.6	1.4	1.4
SF67	1	2.2	2.3/3	3.2	2.7	2.7
SF77	1.9	4.1	3.9/5.8	6.5	4.9	4.9
SF87	3.8	8	7.1/10.1	12	9.1	9.1
SF97	7.4	15	13.8/18.8	23.6	18	18

1) The larger gear unit in multi-stage gear units must be filled with the larger oil quantity.

SA.., SH.., SAF.., SHF.., SAZ.., SHZ..:

Gear units	Fill quantity in liters					
	M1	M2	M3[1)]	M4	M5	M6
S..37	0.25	0.4	0.5	0.6	0.4	0.4
S..47	0.4	0.8	0.7/0.9	1.1	0.8	0.8
S..57	0.5	1.1	1/1.5	1.6	1.2	1.2
S..67	1	2	1.8/2.6	2.9	2.5	2.5
S..77	1.8	3.9	3.6/5	5.9	4.5	4.5
S..87	3.8	7.4	6/8.7	11.2	8	8
S..97	7	14	11.4/16	21	15.7	15.7

1) The larger gear unit in multi-stage gear units must be filled with the larger oil quantity.

Addresses

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Headquarters **Production** **Sales** **Service**	**Bruchsal**	SEW-EURODRIVE GmbH & Co Ernst-Blickle-Straße 42 D-76646 Bruchsal P.O. Box Postfach 3023 · D-76642 Bruchsal	Tel. (0 72 51) 75-0 Fax (0 72 51) 75-19 70 http://www.SEW-EURODRIVE.de sew@sew-eurodrive.de
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	Meerane (near Zwickau)	SEW-EURODRIVE GmbH & Co Dänkritzer Weg 1 D-08393 Meerane	Tel. (0 37 64) 76 06-0 Fax (0 37 64) 76 06-30
	Additional addresses for service in Germany provided on request!		
France			
Production **Sales** **Service**	**Haguenau**	SEW-USOCOME SAS 48-54, route de Soufflenheim B. P. 185 F-67506 Haguenau Cedex	Tel. 03 88 73 67 00 Fax 03 88 73 66 00 http://www.usocome.com sew@usocome.com
Assembly **Sales** **Service**	**Bordeaux**	SEW-USOCOME SAS Parc d'activités de Magellan 62, avenue de Magellan - B. P. 182 F-33607 Pessac Cedex	Tel. 05 57 26 39 00 Fax 05 57 26 39 09
	Lyon	SEW-USOCOME SAS Parc d'Affaires Roosevelt Rue Jacques Tati F-69120 Vaulx en Velin	Tel. 04 72 15 37 00 Fax 04 72 15 37 15
	Paris	SEW-USOCOME SAS Zone industrielle 2, rue Denis Papin F-77390 Verneuil l'Etang	Tel. 01 64 42 40 80 Fax 01 64 42 40 88
	Additional addresses for service in France provided on request!		
Argentina			
Assembly **Sales** **Service**	**Buenos Aires**	SEW EURODRIVE ARGENTINA S.A. Centro Industrial Garin, Lote 35 Ruta Panamericana Km 37,5 1619 Garin	Tel. (3327) 45 72 84 Fax (3327) 45 72 21 sewar@sew-eurodrive.com.ar
Australia			
Assembly **Sales** **Service**	**Melbourne**	SEW-EURODRIVE PTY. LTD. 27 Beverage Drive Tullamarine, Victoria 3043	Tel. (03) 99 33 10 00 Fax (03) 99 33 10 03
	Sydney	SEW-EURODRIVE PTY. LTD. 9, Sleigh Place, Wetherill Park New South Wales, 2164	Tel. (02) 97 25 99 00 Fax (02) 97 25 99 05
Austria			
Assembly **Sales** **Service**	**Wien**	SEW-EURODRIVE Ges.m.b.H. Richard-Strauss-Strasse 24 A-1230 Wien	Tel. (01) 6 17 55 00-0 Fax (01) 6 17 55 00-30 sew@sew-eurodrive.at

Belgium			
Assembly **Sales** **Service**	**Brüssel**	CARON-VECTOR S.A. Avenue Eiffel 5 B-1300 Wavre	Tel. (010) 23 13 11 Fax (010) 2313 36 http://www.caron-vector.be info@caron-vector.be
Brazil			
Production **Sales** **Service**	**Sao Paulo**	SEW DO BRASIL Motores-Redutores Ltda. Rodovia Presidente Dutra, km 208 CEP 07210-000 - Guarulhos - SP	Tel. (011) 64 60-64 33 Fax (011) 64 80 33 28 sew@sew.com.br
	Additional addresses for service in Brazil provided on request!		
Bulgaria			
Sales	**Sofia**	BEVER-DRIVE GMBH Bogdanovetz Str.1 BG-1606 Sofia	Tel. (92) 9 53 25 65 Fax (92) 9 54 93 45 bever@mbox.infotel.bg
Canada			
Assembly **Sales** **Service**	**Toronto**	SEW-EURODRIVE CO. OF CANADA LTD. 210 Walker Drive Bramalea, Ontario L6T3W1	Tel. (905) 7 91-15 53 Fax (905) 7 91-29 99
	Vancouver	SEW-EURODRIVE CO. OF CANADA LTD. 7188 Honeyman Street Delta. B.C. V4G 1 E2	Tel. (604) 9 46-55 35 Fax (604) 946-2513
	Montreal	SEW-EURODRIVE CO. OF CANADA LTD. 2555 Rue Leger Street LaSalle, Quebec H8N 2V9	Tel. (514) 3 67-11 24 Fax (514) 3 67-36 77
	Additional addresses for service in Canada provided on request!		
Chile			
Assembly **Sales** **Service**	**Santiago de Chile**	SEW-EURODRIVE CHILE Motores-Reductores LTDA. Panamericana Norte No 9261 Casilla 23 - Correo Quilicura RCH-Santiago de Chile	Tel. (02) 6 23 82 03+6 23 81 63 Fax (02) 6 23 81 79
China			
Production **Assembly** **Sales** **Service**	**Tianjin**	SEW-EURODRIVE (Tianjin) Co., Ltd. No. 46, 7th Avenue, TEDA Tianjin 300457	Tel. (022) 25 32 26 12 Fax (022) 25 32 26 11
Colombia			
Assembly **Sales** **Service**	**Bogotá**	SEW-EURODRIVE COLOMBIA LTDA. Calle 22 No. 132-60 Bodega 6, Manzana B Santafé de Bogotá	Tel. (0571) 5 47 50 50 Fax (0571) 5 47 50 44 sewcol@andinet.com
Croatia			
Sales **Service**	**Zagreb**	KOMPEKS d. o. o. PIT Erdödy 4 II HR 10 000 Zagreb	Tel. +385 14 61 31 58 Fax +385 14 61 31 58
Czech Republic			
Sales	**Praha**	SEW-EURODRIVE S.R.O. Business Centrum Praha Luná 591 16000 Praha 6	Tel. 02/20 12 12 34 + 20 12 12 36 Fax 02/20 12 12 37 sew@sew-eurodrive.cz
Denmark			
Assembly **Sales** **Service**	**Kopenhagen**	SEW-EURODRIVEA/S Geminivej 28-30, P.O. Box 100 DK-2670 Greve	Tel. 4395 8500 Fax 4395 8509 http://www.sew-eurodrive.dk sew@sew-eurodrive.dk
Estonia			
Sales	**Tallin**	ALAS-KUUL AS Paldiski mnt.125 EE 0006 Tallin	Tel. 6 59 32 30 Fax 6 59 32 31

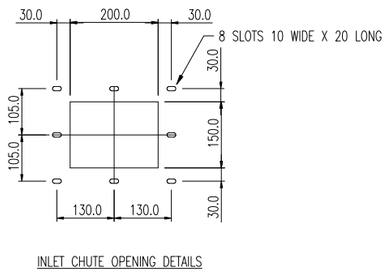
Finland			
Assembly **Sales** **Service**	**Lahti**	SEW-EURODRIVE OY Vesimäentie 4 FIN-15860 Hollola 2	Tel. (3) 589 300 Fax (3) 780 6211
Great Britain			
Assembly **Sales** **Service**	**Normanton**	SEW-EURODRIVE Ltd. Beckbridge Industrial Estate P.O. Box No.1 GB-Normanton, West- Yorkshire WF6 1QR	Tel. 19 24 89 38 55 Fax 19 24 89 37 02
Greece			
Sales **Service**	**Athen**	Christ. Boznos & Son S.A. 12, Mavromichali Street P.O. Box 80136, GR-18545 Piraeus	Tel. 14 22 51 34 Fax 14 22 51 59 Boznos@otenet.gr
Hong Kong			
Assembly **Sales** **Service**	**Hong Kong**	SEW-EURODRIVE LTD. Unit No. 801-806, 8th Floor Hong Leong Industrial Complex No. 4, Wang Kwong Road Kowloon, Hong Kong	Tel. 2-7 96 04 77 + 79 60 46 54Fax 2-7 95-91 29sew@sewhk.com
Hungary			
Sales **Service**	**Budapest**	SEW-EURODRIVE Kft. H-1037 Budapest Kunigunda u. 18	Tel. +36 1 437 06 58 Fax +36 1 437 06 50
India			
Assembly **Sales** **Service**	**Baroda**	SEW-EURODRIVE India Pvt. Ltd. Plot No. 4, Gidc Por Ramangamdi · Baroda - 391 243 Gujarat	Tel. 0 265-83 10 86 Fax 0 265-83 10 87 sew.baroda@gecsl.com
Ireland			
Sales **Service**	**Dublin**	Alperton Engineering Ltd. 48 Moyle Road Dublin Industrial Estate Glasnevin, Dublin 11	Tel. (01) 8 30 62 77 Fax (01) 8 30 64 58
Italy			
Assembly **Sales** **Service**	**Milano**	SEW-EURODRIVE di R. Blickle & Co.s.a.s. Via Bernini,14 I-20020 Solaro (Milano)	Tel. (02) 96 98 01 Fax (02) 96 79 97 81
Japan			
Assembly **Sales** **Service**	**Toyoda-cho**	SEW-EURODRIVE JAPAN CO., LTD 250-1, Shimoman-no, Toyoda-cho, Iwata gun Shizuoka prefecture, P.O. Box 438-0818	Tel. (0 53 83) 7 3811-13 Fax (0 53 83) 7 3814
Korea			
Assembly **Sales** **Service**	**Ansan-City**	SEW-EURODRIVE KOREA CO., LTD. B 601-4, Banweol Industrial Estate Unit 1048-4, Shingil-Dong Ansan 425-120	Tel. (031) 4 92-80 51 Fax (031) 4 92-80 56
Luxembourg			
Assembly **Sales** **Service**	**Brüssel**	CARON-VECTOR S.A. Avenue Eiffel 5 B-1300 Wavre	Tel. (010) 23 13 11 Fax (010) 2313 36 http://www.caron-vector.be info@caron-vector.be
Macedonia			
Sales	**Skopje**	SGS-Skopje / Macedonia "Teodosij Sinactaski" 6691000 Skopje / Macedonia	Tel. (0991) 38 43 90 Fax (0991) 38 43 90
Malaysia			
Assembly **Sales** **Service**	**Johore**	SEW-EURODRIVE SDN BHD No. 95, Jalan Seroja 39, Taman Johor Jaya 81000 Johor Bahru, Johor West Malaysia	Tel. (07) 3 54 57 07 + 3 54 94 09 Fax (07) 3 5414 04

Netherlands			
Assembly **Sales** **Service**	**Rotterdam**	VECTOR Aandrijftechniek B.V. Industrieweg 175 NL-3044 AS Rotterdam Postbus 10085 NL-3004 AB Rotterdam	Tel. +31 10 44 63 700 Fax +31 10 41 55 552 http://www.vector.nu info@vector.nu
New Zealand			
Assembly **Sales** **Service**	**Auckland**	SEW-EURODRIVE NEW ZEALAND LTD. P.O. Box 58-428 82 Greenmount drive East Tamaki Auckland	Tel. 0064-9-2 74 56 27 Fax 0064-9-2 74 01 65 sales@sew-eurodrive.co.nz
	Christchurch	SEW-EURODRIVE NEW ZEALAND LTD. 10 Settlers Crescent, Ferrymead Christchurch	Tel. (09) 3 84 62 51 Fax (09) 3 84 64 55 sales@sew-eurodrive.co.nz
Norway			
Assembly **Sales** **Service**	**Moss**	SEW-EURODRIVE A/S Solgaard skog 71 N-1599 Moss	Tel. (69) 2410 20 Fax (69) 2410 40 sew@sew-eurodrive.no
Peru			
Assembly **Sales** **Service**	**Lima**	SEW DEL PERU MOTORES REDUCTORES S.A.C. Los Calderos # 120-124 Urbanizacion Industrial Vulcano, ATE, Lima	Tel. (511) 349-52 80 Fax (511) 349-30 02 sewperu@terra.com.pe
Poland			
Sales	**Lodz**	SEW-EURODRIVE Polska Sp.z.o.o. ul. Pojezierska 63 91-338 Lodz	Tel. (042) 6 16 22 00 Fax (042) 6 16 22 10 sew@sew-eurodrive.pl
Portugal			
Assembly **Sales** **Service**	**Coimbra**	SEW-EURODRIVE, LDA. Apartado 15 P-3050-901 Mealhada	Tel. (0231) 20 96 70 Fax (0231) 20 36 85 infosew@sew-eurodrive.pt
Romania			
Sales **Service**	**Bucuresti**	Sialco Trading SRL str. Madrid nr.4 71222 Bucuresti	Tel. (01) 2 30 13 28 Fax (01) 2 30 71 70 sialco@mediasat.ro
Russia			
Sales	**St. Petersburg**	ZAO SEW-EURODRIVE P.O. Box 193 193015 St. Petersburg	Tel. (812) 3 26 09 41 + 5 35 04 30 Fax (812) 5 35 22 87 sewrus@post.spbnit.ru
Singapore			
Assembly **Sales** **Service**		SEW-EURODRIVE PTE. LTD. No 9, Tuas Drive 2 Jurong Industrial Estate Singapore 638644	Tel. 8 62 17 01-705 Fax 8 61 28 27 Telex 38 659
Slovenia			
Sales **Service**	**Celje**	Pakman - Pogonska Tehnika d.o.o. UI. XIV. divizije 14 SLO – 3000 Celje	Tel. 00386 3 490 83 20 Fax 00386 3 490 83 21 pakman@siol.net

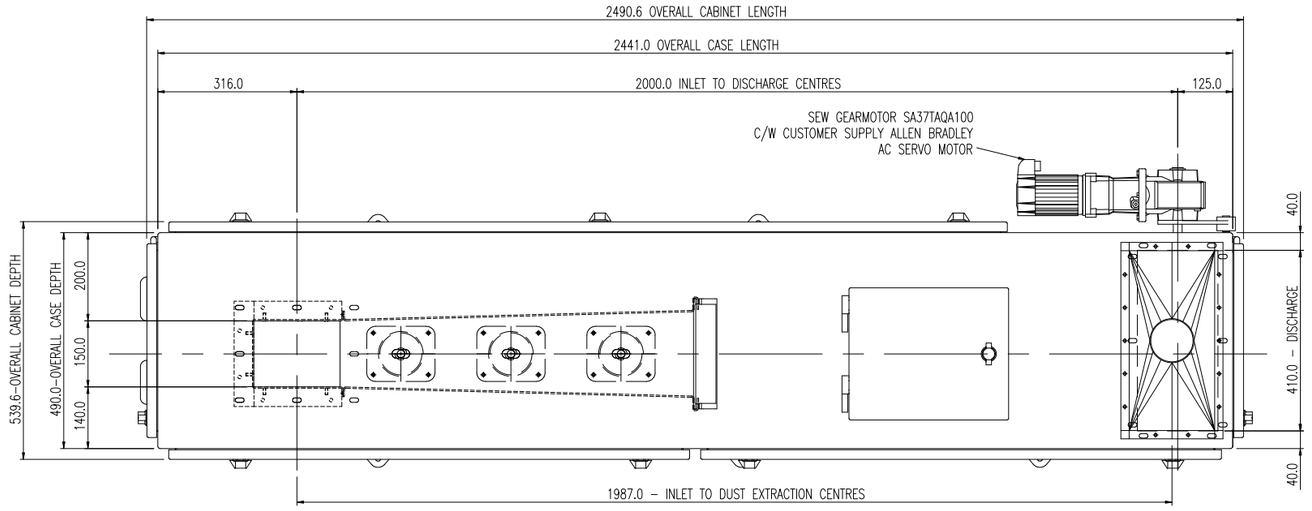
South Africa			
Assembly **Sales** **Service**	**Johannesburg**	SEW-EURODRIVE (PROPRIETARY) LIMITED Eurodrive House Cnr. Adcock Ingram and Aerodrome Roads Aeroton Ext. 2 Johannesburg 2013 P.O.Box 90004 Bertsham 2013	Tel. + 27 11 248 70 00 Fax +27 11 494 23 11
	Capetown	SEW-EURODRIVE (PROPRIETARY) LIMITED Rainbow Park Cnr. Racecourse & Omuramba Road Montague Gardens Cape Town P.O.Box 36556 Chempet 7442 Cape Town	Tel. +27 21 552 98 20 Fax +27 21 552 98 30 Telex 576 062
	Durban	SEW-EURODRIVE (PROPRIETARY) LIMITED 2 Monaceo Place Pinetown Durban P.O. Box 10433, Ashwood 3605	Tel. +27 31 700 34 51 Fax +27 31 700 38 47
Spain			
Assembly **Sales** **Service**	**Bilbao**	SEW-EURODRIVE ESPAÑA, S.L. Parque Tecnológico, Edificio, 302 E-48170 Zamudio (Vizcaya)	Tel. 9 44 31 84 70 Fax 9 44 31 84 71 sew.spain@sew-eurodrive.es
Sweden			
Assembly **Sales** **Service**	**Jönköping**	SEW-EURODRIVE AB Gnejsvägen 6-8 S-55303 Jönköping Box 3100 S-55003 Jönköping	Tel. (036) 34 42 00 Fax (036) 34 42 80 www.sew-eurodrive.se
Switzerland			
Assembly **Sales** **Service**	**Basel**	Alfred Imhof A.G. Jurastrasse 10 CH-4142 Münchenstein bei Basel	Tel. (061) 4 17 17 17 Fax (061) 4 17 17 00 http://www.imhof-sew.ch info@imhof-sew.ch
Thailand			
Assembly **Sales** **Service**	**Chon Buri**	SEW-EURODRIVE (Thailand) Ltd. Bangpakong Industrial Park 2 700/456, Moo.7, Tambol Donhuaroh Muang District Chon Buri 20000	Tel. 0066-38 21 40 22 Fax 0066-38 21 45 31
Turkey			
Assembly **Sales** **Service**	**Istanbul**	SEW-EURODRIVE Hareket Sistemleri San. ve Tic. Ltd. Sti Bagdat Cad. Koruma Cikmazi No. 3 TR-81540 Maltepe ISTANBUL	Tel. (0216) 4 41 91 63 + 4 41 91 64 + 3 83 80 14 + 3 83 80 15 Fax (0216) 3 05 58 67 seweurodrive@superonline.com.tr
USA			
Production **Assembly** **Sales** **Service**	**Greenville**	SEW-EURODRIVE INC. 1295 Old Spartanburg Highway P.O. Box 518 Lyman, S.C. 29365	Tel. (864) 4 39 75 37 Fax Sales (864) 439-78 30 Fax Manuf. (864) 4 39-99 48 Fax Ass. (864) 4 39-05 66 Telex 805 550
Assembly **Sales** **Service**	**San Francisco**	SEW-EURODRIVE INC. 30599 San Antonio St. Hayward, California 94544-7101	Tel. (510) 4 87-35 60 Fax (510) 4 87-63 81
	Philadelphia/PA	SEW-EURODRIVE INC. Pureland Ind. Complex 200 High Hill Road, P.O. Box 481 Bridgeport, New Jersey 08014	Tel. (856) 4 67-22 77 Fax (856) 8 45-31 79
	Dayton	SEW-EURODRIVE INC. 2001 West Main Street Troy, Ohio 45373	Tel. (9 37) 3 35-00 36 Fax (9 37) 4 40-37 99
	Dallas	SEW-EURODRIVE INC. 3950 Platinum Way Dallas, Texas 75237	Tel. (214) 3 30-48 24 Fax (214) 3 30-47 24

USA			
	Additional addresses for service in the USA provided on request!		
Venezuela			
Assembly **Sales** **Service**	**Valencia**	SEW-EURODRIVE Venezuela S.A. Av. Norte Sur No. 3, Galpon 84-319 Zona Industrial Municipal Norte Valencia	Tel. +58 (241) 8 32 98 04 Fax +58 (241) 8 38 62 75 sewventas@cantr.net sewfinanzas@cantr.net

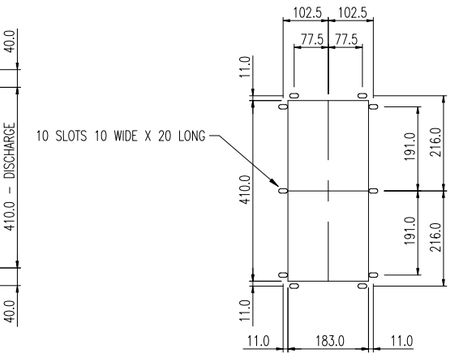
SEW-EURODRIVE GmbH & Co · P.O. Box 3023 · D-76642 Bruchsal/Germany · Phone +49-7251-75-0
Fax +49-7251-75-1970 · http://www.sew-eurodrive.com · sew@sew-eurodrive.com



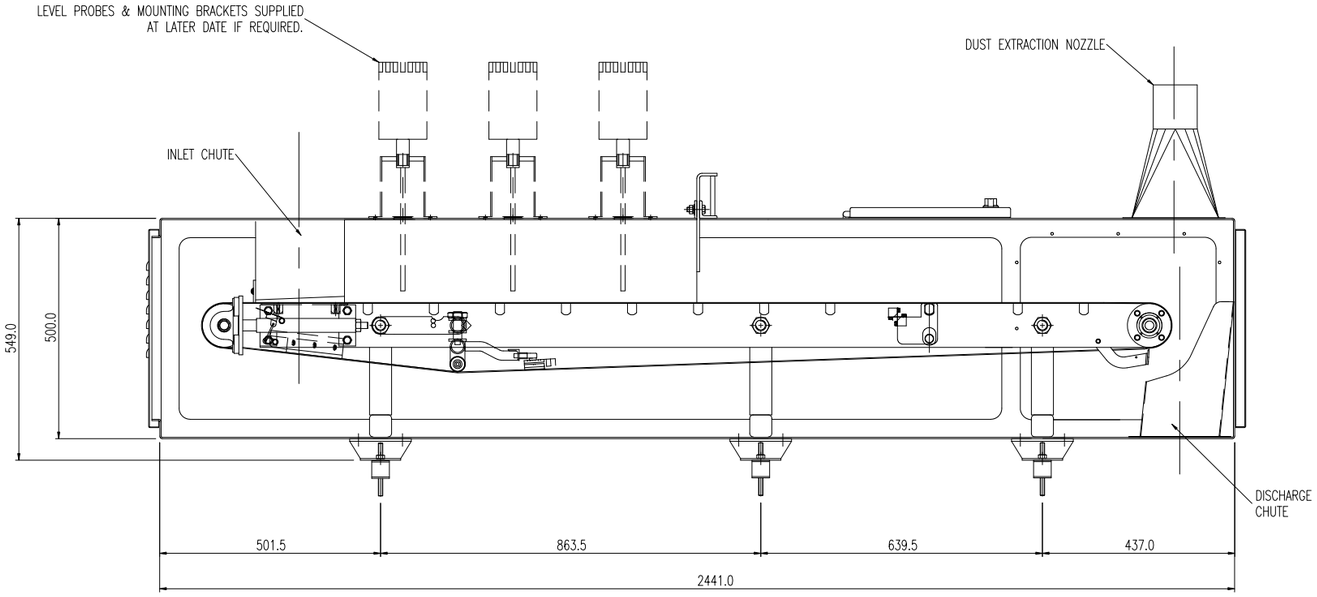
INLET CHUTE OPENING DETAILS



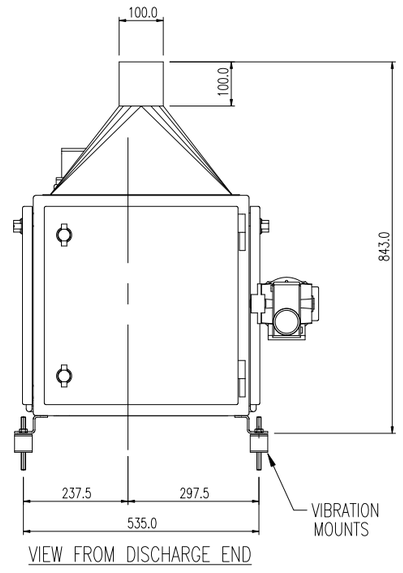
PLAN



DISCHARGE CHUTE CUTOUT



ELEVATION



VIEW FROM DISCHARGE END

REVISIONS

A:	21/10/03	T.BERNARDI
	ORIGINAL ISSUE	
B:	24/10/03	T.BERNARDI
	DUST EXTRACTION NOZZLE AND DOOR VENTS ADDED TO VIEWS	
	ECN: 0000	
C:	31/10/03	T.BERNARDI
	IMPACT PLATE & NUMBER OF CROSS BAR REVISED	
	ECN: 0000	
D:	05/11/03	T.BERNARDI
	GEARMOTOR DETAILS ADDED	
	ECN: 0000	
E:	06/11/03	T.BERNARDI
	TELESCOPER UNIT NOW IS A 6 INCH TAKEUP MODEL	
	ECN: 0000	
F:	24/11/03	T.BERNARDI
	INLET & DISCHARGE DETAILS ADDED	
	ECN: 0000	
G:	28/11/03	T.BERNARDI
	DRIVE MOTOR NOW VISUALLY CORRECT MOUNTING FOOT DIMENSION AT G7 CORRECTED	
	ECN: 0000	
H:	09/12/03	T.BERNARDI
	DISCHARGE CHUTE RELOCATED TO AS BUILT DIMENSIONS	
	ECN: 0000	
J	10/12/03	BB
	DUST EXTRACTION DIMS ADDED	
	DIMENSIONS ADDED	
	ECN: 0000	

UNLESS OTHERWISE STATED UNTOLERANCED DIMENSIONS TO BE WITHIN THE LIMITS SHOWN

NOMINAL SIZE	UP TO 50	ABOVE 50 UP TO 150	ABOVE 150 UP TO 300	ABOVE 300 UP TO 1000	ABOVE 1000
MACHINING	± 0.1	± 0.2	± 0.3	± 0.5	± 1.0
FABRICATION	± 0.5	± 0.5	± 0.5	± 1.0	± 2.0
ASSEMBLIES	± 0.5	± 0.5	± 0.5	± 1.0	± 2.0

DRAWN	TONY BERNARDI
CHECKED	–
APPROVED	–
DATE APP'D	–
SCALE	1:7.5

DO NOT SCALE IF IN DOUBT ASK

ALL DIMENSIONS IN MILLIMETRES UNLESS OTHERWISE SPECIFIED

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

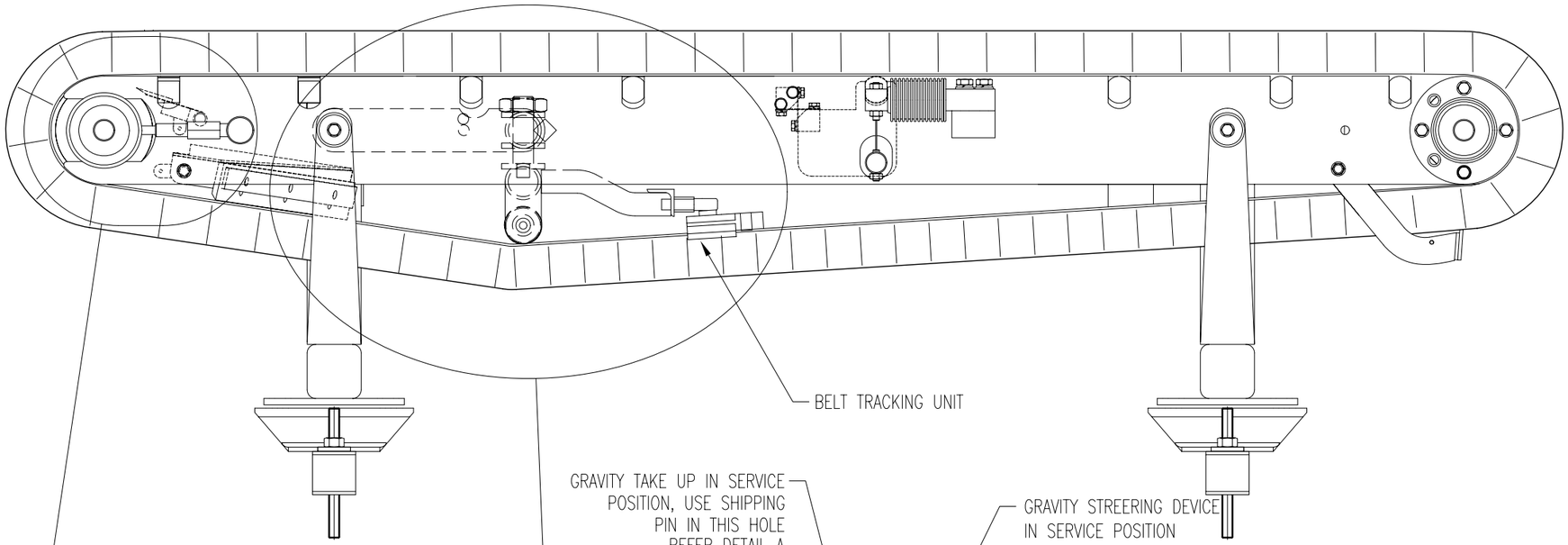
TITLE WT2000 ENCLOSED WEIGH BELT FEEDER
BW = 300 I–D = 2000
GENERAL ARRANGEMENT

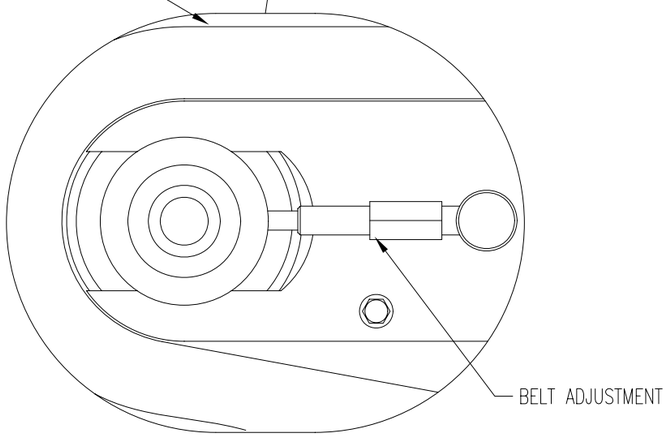
SIZE	DRAWING No.	
A1	NUMBER 30710001	REV. J

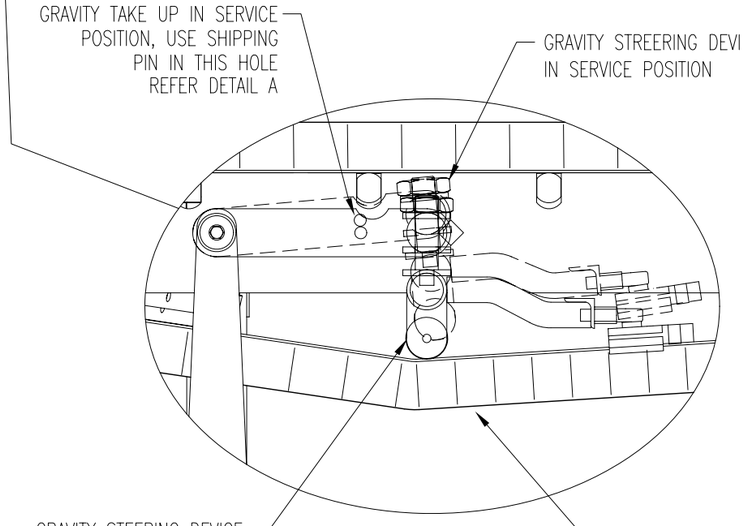
CUSTOMER
BORAL PLASTERBOARD

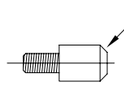
PROJECT

CAD FILE
30710001









DETAIL A

THREADED SHIPPING PIN
RETAIN FOR FUTURE
MAINTENANCE WORK

** NOTE **

THREADED SHIPPING PINS USED TO HOLD THE GRAVITY TAKE UP MECHANISM IN PLACE DURING TRANSIT. THIS PIN MUST BE RELEASED ONLY WHEN THE BELT IS IN PLACE, CARE MUST BE TAKEN WHEN RELEASING THIS PIN AS THE TAKE UP MECHANISM IS VERY HEAVY. SUPPORT THE ROLLER PRIOR TO RELEASING THE ROLL SO AS TO AVOID IT FALLING ON TO THE BASE OF THE FEEDER.

REVISIONS

A: 24/5/95 ORIGINAL ISSUE

DRAWN	T.B.
CHECKED	L.H.
APPROVED	L.H.
DATE APP'D	–
SCALE	N.T.S.
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A.C.N. 010 764 431
11 ELECTRONICS STREET EIGHT MILE PLAINS, QUEENSLAND, 4113, AUSTRALIA
P.O. BOX 4006 EIGHT MILE PLAINS, QUEENSLAND, 4113, AUSTRALIA
Phone +61-7-3841 2844 Fax +61-7-3841 0005

TITLE
MODEL WT1200 WEIGHFEEDER
GRAVITY TAKE-UP SHIPPING BOLT.

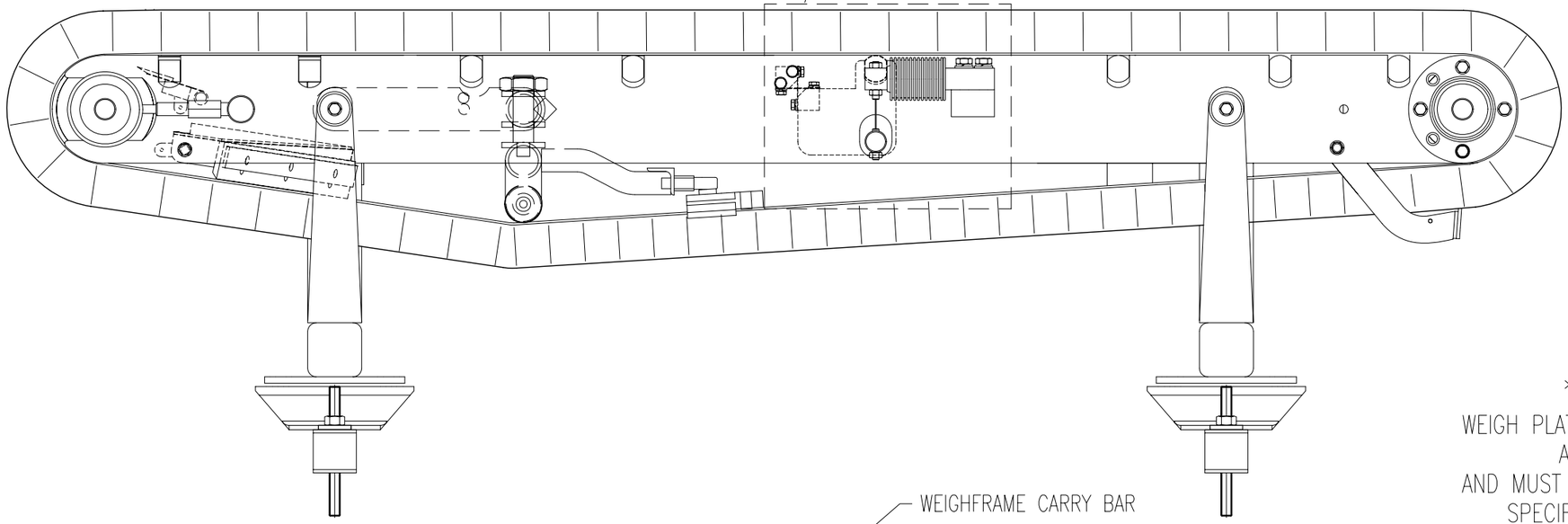
ALL DIMENSIONS IN MILLIMETRES UNLESS OTHERWISE SPECIFIED

SIZE	DRAWING No.	REV.
A1	WT1200-021	A

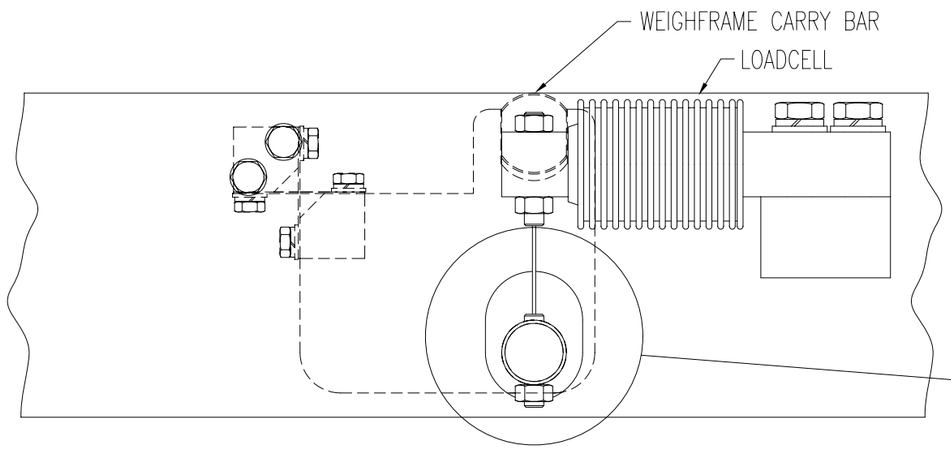
CUSTOMER

PROJECT

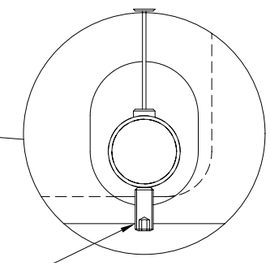
CAD FILE
WT1200-021



** NOTE **
WEIGH PLATFORM POSITION & HEIGHT
ARE FACTORY SET
AND MUST NOT BE ALTERED WITHOUT
SPECIFIC INSTRUCTION FROM
AUTHORISED WEBTECH PERSONNEL



WEIGHFRAME SIDE ELEVATION
SHOWING WEIGH PLATFORM IN
OPERATING POSITION



OVERLOAD PROTECTION BOLT GRUB SCREW,
FACTORY PRESET, DO NOT ALTER

OVERLOAD PROTECTION BOLT
OPERATING POSITION

REVISIONS
A: 24/5/95 ORIGINAL ISSUE

DRAWN	T.B.
CHECKED	L.H.
APPROVED	L.H.
DATE APP'D	–
SCALE	N.T.S.
	DO NOT SCALE IF IN DOUBT ASK

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P.O. BOX 4006 EIGHT MILE PLAINS, QUEENSLAND, 4113, AUSTRALIA
Phone +61-7-3841 2844 Fax +61-7-3841 0005

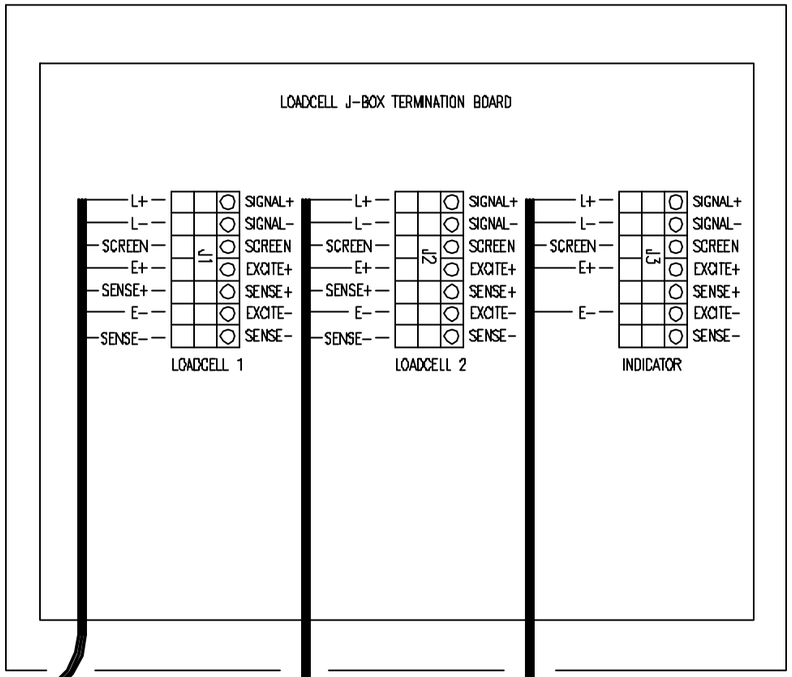
TITLE
MODEL WT1200 WEIGHFEEDER
LOAD CELL OVERLOAD BOLT.

SIZE	DRAWING No.	REV.
A1	NUMBER WT1200–031	A

CUSTOMER
PROJECT
CAD FILE
WT1200-031

ALL DIMENSIONS IN MILLIMETRES
UNLESS OTHERWISE SPECIFIED

LOADCELL JUNCTION BOX MOUNTED ON FEEDER



DEPENDING ON THE MODEL OF BELTSCALE/FEEDER
1 OR 2 LOAD CELLS MAY NEED TO BE CONNECTED

LOADCELL 1

WIRING FROM BELTSCALE/FEEDER TO LOCAL JBOX

LOADCELL 2

BELDON 8732 OR EQUIVALENT.
SUPPLY & WIRING BY OTHERS.

SIGNAL +
SIGNAL -
EXCITATION +
EXCITATION -
SCREEN

TO ELECTRONICS

NOTES

NOTES

SOME LOADCELLS DON'T HAVE SENSE WIRES
IF THE LOAD CELL HAS SENSE WIRING TERMINATE AS
SHOWN MW1/MW5/OPTIMUS DO NOT REQUIRE SENSE WIRING.

TYPE	L+	L-	E+	E-	SENSE+	SENSE-
TEDEA	RED	WHITE	GREEN	BLACK	BLUE	BROWN
RLHBB	WHITE	RED	BLUE	BLACK	GREEN	GREY
LPX	GREEN	WHITE	RED	BLACK	N/C	N/C
RL3000	GREEN	WHITE	RED	BLACK	N/C	N/C
WTD-132	GREEN	WHITE	RED	BLACK	N/C	N/C
WL3000	GREEN	WHITE	RED	BLACK	N/C	N/C

REVISIONS

A 29.02.96 ORIGINAL ISSUE

UNLESS OTHERWISE STATED
UNTOLERANCED DIMENSIONS
TO BE WITHIN THE LIMITS SHOWN

NOMINAL SIZE	UP TO 90	ABOVE 90 UP TO 150	ABOVE 150 UP TO 300	ABOVE 300 UP TO 1000	ABOVE 1000
MACHINING	±0.1	±0.2	±0.3	±0.5	±1.0
FABRICATION	±0.5	±1.5	±0.5	±1.0	±2.0
ASSEMBLIES	±0.5	±1.5	±0.5	±1.0	±2.0

DRAWN	M.W.
CHECKED	M.W.
APPROVED	N.W.
DATE APP'D	18/06/2003
SCALE	N.T.S.

DO NOT SCALE
IF IN DOUBT
ASK

ALL DIMENSIONS IN MILLIMETRES
UNLESS OTHERWISE SPECIFIED

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TITLE
LOADCELL JUNCTION BOX CONNECTION DIAGRAM

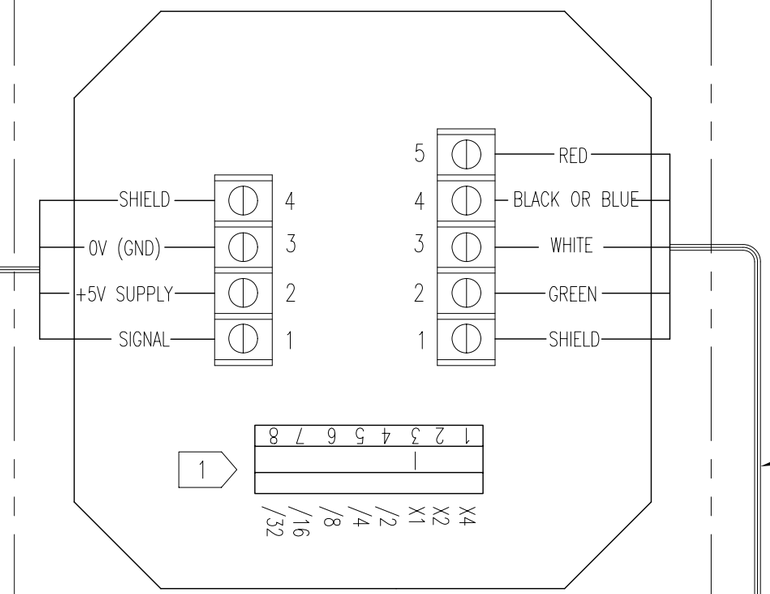
SIZE	DRAWING No.		
	NUMBER	SHT.	REV.
A1	SMLCJB-02	1	B

CONTRACT

PROJECT

CAD FILE

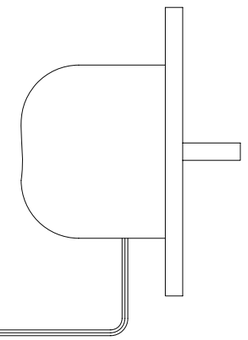
SPEED SENSOR (TACHO) JUNCTION BOX



CABLE SUPPLIED BY CUSTOMER. CABLE TO BE BELDEN 3 CORE PART No. 8770 OR EQUIVALENT

CABLE INTEGRAL TO TACHO

SPEED SENSOR (TACHO)



1 THE POSITION OF THE SLIDER SWITCH HAS BEEN FACTORY ADJUSTED AND DETERMINES THE OUTPUT OF THE TACHO. THIS SETTING SHOULD BE CHECKED AGAINST THE DATA SHEET PRIOR TO COMMISSIONING.

TO OPTIMUS ELECTRONICS

"TACHO1 – SCREEN"	SCREEN
"TACHO1–GROUND"	0V (GND)
"TACHO1–SUPPLY"	+5V SUPPLY
"TACHO1–SIG/Q1"	SIGNAL

REVISIONS

A: 18/7/06 ORIGINAL ISSUE

DRAWN	L.HARTLEY
CHECKED	L.HARTLEY
APPROVED	L.HARTLEY
DATE APP'D	18/7/06
SCALE	N.T.S
	DO NOT SCALE IF IN DOUBT ASK

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SIZE	DRAWING No.	
A1	NUMBER JB010022	REV. A

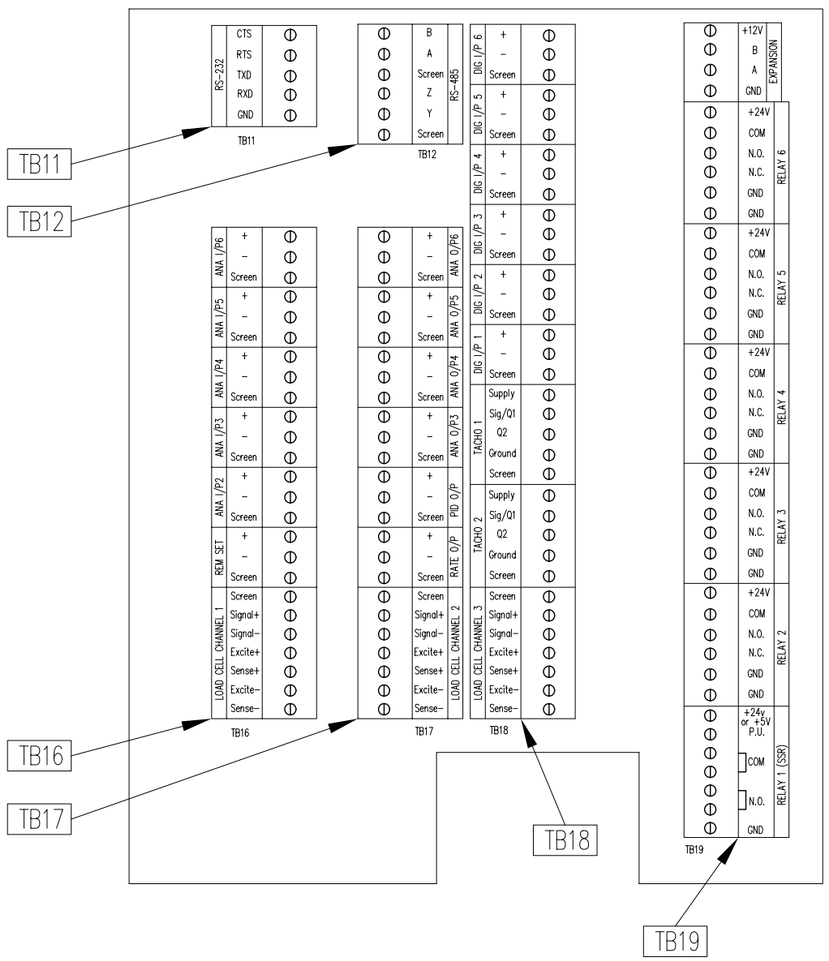
TITLE: TACHO (CUP TYPE) JUNCTION BOX WIRING (WITH MULTIPLICATION), & CONNECTIONS TO OPTIMUS INTEGRATOR

CUSTOMER

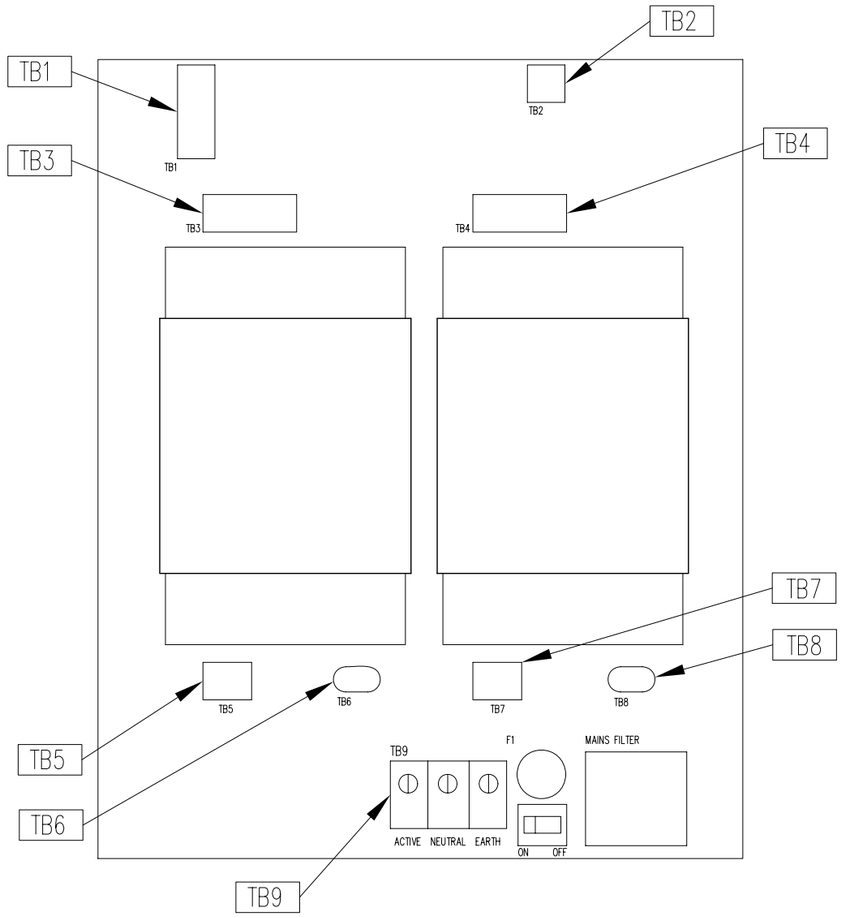
PROJECT

CAD FILE JB010022

ALL DIMENSIONS IN MILLIMETRES UNLESS OTHERWISE SPECIFIED



INTERCONNECTION BOARD



POWER SUPPLY BOARD

REVISIONS	
A:	15/6/06
	ISSUED FOR REFERENCE

UNLESS OTHERWISE STATED UNTOLERANCED DIMENSIONS TO BE WITHIN THE LIMITS SHOWN					
NOMINAL SIZE	UP TO 50	ABOVE 50 UP TO 150	ABOVE 150 UP TO 300	ABOVE 300 UP TO 1000	ABOVE 1000
MACHINING	± 0.1	± 0.2	± 0.3	± 0.5	± 1.0
FABRICATION	± 0.5	± 0.5	± 0.5	± 1.0	± 2.0
ASSEMBLIES	± 0.5	± 0.5	± 0.5	± 1.0	± 2.0

DRAWN	L.H.
CHECKED	L.H.
APPROVED	L.H.
DATE APP'D	15/6/06
SCALE	N.T.S.
	DO NOT SCALE IF IN DOUBT ASK

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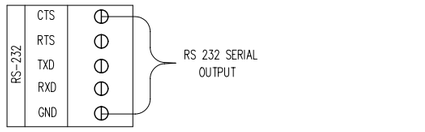
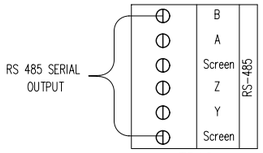
TITLE: OPTIMUS INTERCONNECT & POWER BOARD TERMINATION LAYOUT- AC MAINS SUPPLY.

ALL DIMENSIONS IN MILLIMETRES UNLESS OTHERWISE SPECIFIED

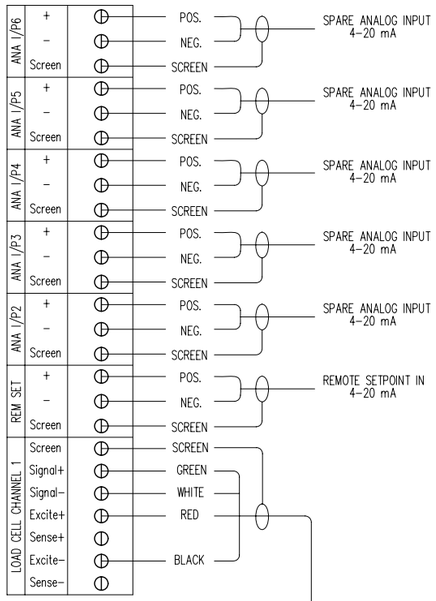
SIZE	DRAWING No.	
A1	NUMBER WFOPTIMUS01	REV. A
	CUSTOMER	
	PROJECT	
	CAD FILE WFOPTIMUS01	



TB11

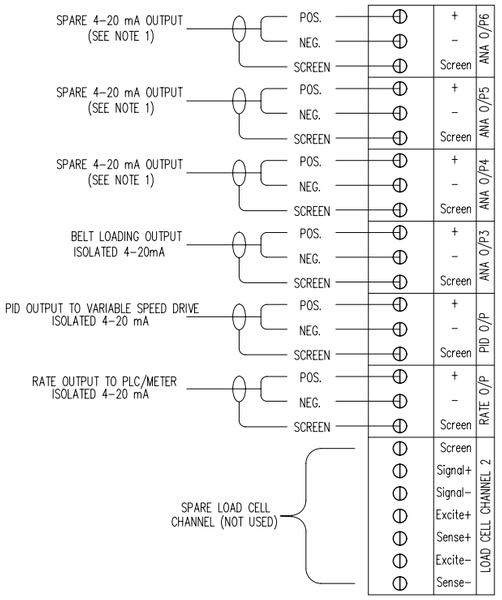


TB12

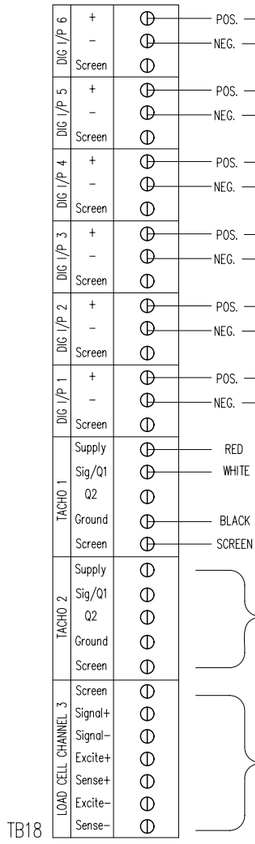


TB16

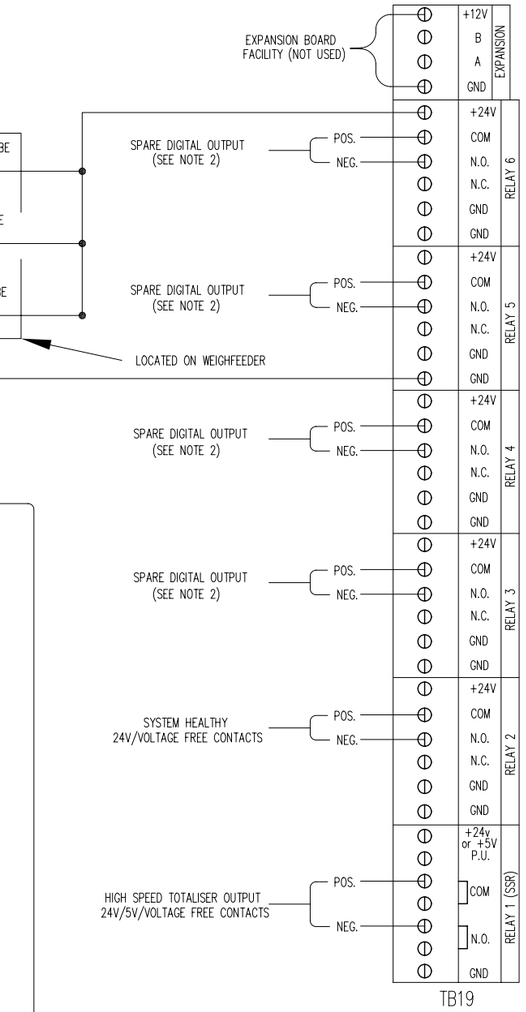
(SEE NOTE 4.)



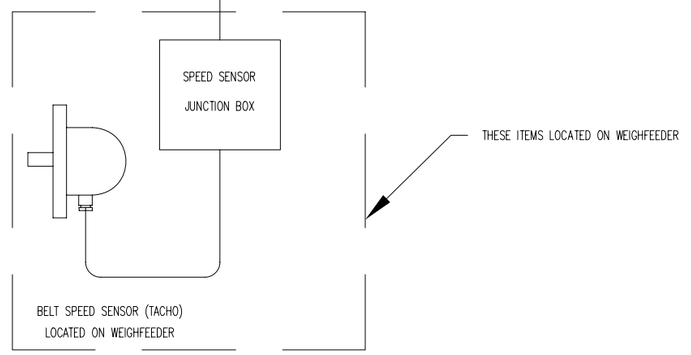
TB17



TB18



TB19



NOTES

1. SPARE ANALOG OUTPUTS MAY BE PROGRAMMED FOR ONE OF THE FOLLOWING: MASS RATE / PID / BELT LOADING
2. SPARE DIGITAL OUTPUTS MAY BE PROGRAMMED FOR ONE OF THE FOLLOWING: RATE ALARM / DEVIATION ALARM / TOTALISER / SPEED ALARM / LOAD CELL ALARM CHUTE ALARM.
3. DIGITAL INPUTS MAY BE PROGRAMMED FOR ONE OF THE FOLLOWING: FEEDER STOP / RESET TOTAL / LOW PROBE / MID PROBE / HIGH PROBE. SIGNAL TO BE HIGH (24VDC) TO OPERATE.
4. SET SENSE LINKS TO "LOCAL" WHEN USING 4 WIRE LOAD CELLS. SET LINKS TO "REMOTE" WHEN USING 6 WIRE LOAD CELLS. UNUSED LOAD CELL CHANNELS SHOULD BE SET TO "LOCAL".

REVISIONS

A: 15/6/06 ISSUED FOR REFERENCE

UNLESS OTHERWISE STATED UNTOLERANCED DIMENSIONS TO BE WITHIN THE LIMITS SHOWN

NOMINAL SIZE	UP TO 50	ABOVE 50 UP TO 150	ABOVE 150 UP TO 300	ABOVE 300 UP TO 1000	ABOVE 1000
MACHINING	± 0.1	± 0.2	± 0.3	± 0.5	± 1.0
FABRICATION	± 0.5	± 0.5	± 0.5	± 1.0	± 2.0
ASSEMBLIES	± 0.5	± 0.5	± 0.5	± 1.0	± 2.0

DRAWN	L.H.
CHECKED	L.H.
APPROVED	L.H.
DATE APP'D	15/6/06
SCALE	NTS
	DO NOT SCALE IF IN DOUBT ASK

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TITLE OPTIMUS INTERCONNECTION BOARD – ELECTRICAL CONNECTION DIAGRAM FOR WEIGH BELT FEEDERS WITH CHUTE CONTROL LEVEL PROBES.

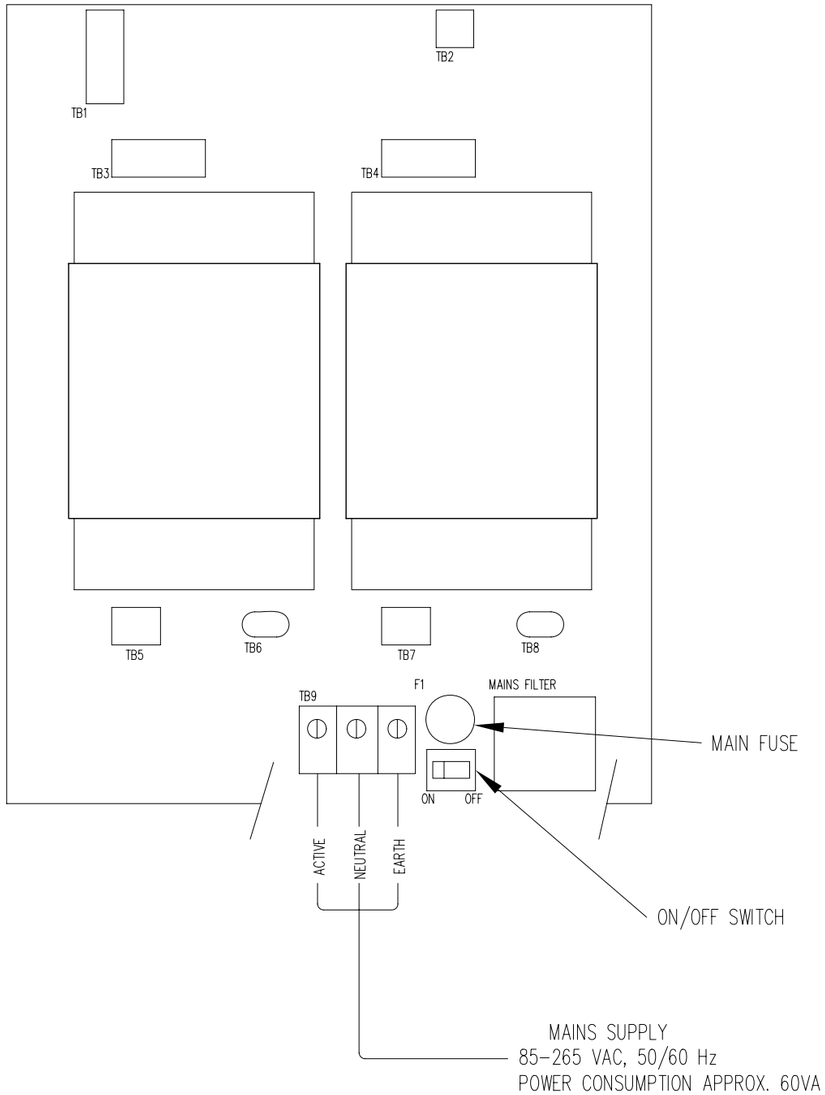
ALL DIMENSIONS IN MILLIMETRES UNLESS OTHERWISE SPECIFIED

SIZE	DRAWING No. NUMBER	REV.
A1	WFOPTIMUS02LEVEL	A

CUSTOMER

PROJECT

CAD FILE WFOPTIMUS02LEVEL



REVISIONS	
A: 15/6/06	ISSUED FOR REFERENCE

UNLESS OTHERWISE STATED UNTOLERANCED DIMENSIONS TO BE WITHIN THE LIMITS SHOWN

NOMINAL SIZE	UP TO 50	ABOVE 50 UP TO 150	ABOVE 150 UP TO 300	ABOVE 300 UP TO 1000	ABOVE 1000
MACHINING	± 0.1	± 0.2	± 0.3	± 0.5	± 1.0
FABRICATION	± 0.5	± 0.5	± 0.5	± 1.0	± 2.0
ASSEMBLIES	± 0.5	± 0.5	± 0.5	± 1.0	± 2.0

DRAWN	L.H.
CHECKED	L.H.
APPROVED	L.H.
DATE APP'D	15/6/06
SCALE	N.T.S.

DO NOT SCALE IF IN DOUBT ASK

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TITLE
OPTIMUS POWER BOARD TERMINATION LAYOUT – AC MAINS SUPPLY.

ALL DIMENSIONS IN MILLIMETRES UNLESS OTHERWISE SPECIFIED

SIZE	DRAWING No.	
	NUMBER	REV.
A1	WFOPTIMUS03	A

CUSTOMER

PROJECT

CAD FILE
WFOPTIMUS03

OPTIMUS CALIBRATION DATA

Customer : _____ Conveyor Designation : _____

Material : _____ Model : _____ Date : _____

Load Cell: _____ Tacho : _____ Data By : _____

Serial No: _____ Software Build : _____ Contract No : _____

SETUP MENU

1. System Configuration		Units of Measurement:			
		Belt Capacity			
		Resolution			
		Belt Length			
		Maximum Loading		kg/m	
2. Time & Date		Backlight			
		Brightness			
		Contrast			
		Date			
		Time			
3. PID Parameters	**1**	**Setpoint Origin / Status**			
	2	**Output Status**			
	3	**PID Parameters**			
		Prop Band		Reset Rate	
		Integral Lower Limit		Integral Upper Limit	
		Derivative Time			
		Feed Forward		Output Offset	
	5	**PID Mass Rate Filter**			
		Time Constant			
		Fast Track Threshold			
	6	**Volumetric Restart**			
		Restart Period			
		Restart Threshold			
4. Auto ZeroTracking		Auto Zero Tracking			
		Threshold			
		Delay		Period	
		Current Contribution			
5. Rate Deadband		Mass Rate Dead Band		Belt Capacity	
6. Rate Display Filters		Mass Rate Display Filter			
		Time Constant		Fast Track Threshold	
		Mass Rate Trend Filter			
		Time Constant		Fast Track Threshold	
8. Chute Level Control		None			
		Low			
		Mid			
		High			

OPTIMUS CALIBRATION DATA

I.O MENU

1. Current Loop Inputs

Loop 1 _____
Type is _____
Parameters
Master Capacity _____
Slave _____
Filtering
Loop Filter _____
Time Constant _____
Fast Track Threshold _____

Loop 2 _____
Loop 3 _____
Loop 4 _____
Loop 5 _____
Loop 6 _____
Loop 7 _____

2. Current Loop Outputs

Loop 1 _____
Type is _____
Filtering
Time Constant _____
Fast Track Threshold _____

Loop 2 _____
Type is _____
Filtering
Time Constant _____
Fast Track Threshold _____

3. Digital Inputs

Digital Input 1 _____
Digital Input 2 _____
Digital Input 3 _____

Digital Input 4 _____
Digital Input 5 _____
Digital Input 6 _____

4. Digital Outputs

Digital output 1 _____
Digital Output 2 _____
Digital output 3 _____
Emit Pulse Every _____
Pulse Width _____
Polarity _____
Digital output 4 _____
Digital output 5 _____
Digital output 6 _____

7. Load Cell & Tacho

Load Cell (No Load) _____
Load Cell (With Chains) _____
Tacho Freq @ 60Hz _____

CALIBRATION MENU

1. Calibration

Pulses Per Rev _____
Zero Calibration _____
Span Calibration _____
Calibration Target _____

Belt Revolutions _____
AZT _____
AZT (As found) _____
Belt Speed _____

WEB-TECH WEIGHFEEDER DESIGN DATA SHEET

CLIENT : **DATE :** _____

DESIGNATION : **MODEL** _____

CALIBRATION METHOD : BAR(S) / CHAIN

CALIBRATION BAR(S)

1. CALIBRATION BAR QTY AND TOTAL WEIGHT _____ = _____
2. IDLER PITCH _____
3. TOTAL WEIGH AREA _____ **metres**
4. EQUIVALENT LOADING/M WITH CAL BAR(S) (Item 1 x 1/Item 3) = _____
5. BELT SPEED _____ **m/s**
6. SIMULATED MASS RATE (Item 4 x Item 5 x 3600) = _____ **kg/hr**
7. BELT LENGTH _____ **metres**
8. No. OF BELT REVOLUTIONS FOR TEST _____
9. **TARGET WEIGHT (Item 4 x Item 7 x Item 8) =** _____ **kgs**

CALIBRATION CHAIN

1. WEIGHT OF CALIBRATION CHAIN PER STRAND _____ **kg/m**
2. No. OF STRANDS _____
3. TOTAL WEIGHT OF CALIBRATION CHAIN (Item 1 x Item 2) _____ **kg/m**
4. BELT LENGTH _____ **m**
5. No. OF BELT REVOLUTIONS FOR TEST _____
4. **TARGET WEIGHT (Item 3 x Item 4 x Item 5) =** _____ **kgs**

OPTIMUS CALIBRATION DATA

Customer : **Boral Plasterboard** Conveyor Designation :

Material : **Vermiculite** Model : **WT2000-600** **S/N W331** Date : **30/05/2008**

Load Cell: **WHBX-10Kg** Tacho : **PXT500** Multiplier: **x2** Data By : **MW**

CPU S/N **T/N6053A0041**

Serial No: **PB169/C169** Software Build : **151** Contract No : **3071/2**

SETUP MENU

1. System Configuration		Units of Measurement:	**t/hr**		
		Belt Capacity	**2.0 t/hr**		
		Resolution	**0.01**		
		Belt Length	**4.550 m**		
		Maximum Loading	**10** kg/m		
2. Time & Date		Backlight	**5min**		
		Brightness	**highest**		
		Contrast	**3**		
		Date	**30/05/2008**		
		Time	**11:46:08**		
3. PID Parameters	**1**	**Setpoint Origin / Status**	**remote**		
	2	**Output Status**	**59.00%**		
	3	**PID Parameters**			
		Prop Band	**142.00%**	Reset Rate	**0.005 resets/sec**
		Integral Lower Limit	**-50.00%**	Integral Upper Limit	**50.00%**
		Derivative Time	**0.000**		
		Feed Forward	**1.000**	Output Offset	**0.000**
	5	**PID Mass Rate Filter**	**enabled**		
		Time Constant	**1s**		
		Fast Track Threshold	**100%**		
	6	**Volumetric Restart**	**enabled**		
		Restart Period	**10s**		
		Restart Threshold	**15.00%**		
4. Auto ZeroTracking		Auto Zero Tracking	**disabled**		
		Threshold	**15.00%**	**=**	**0.30 Tonnes**
		Delay	**70 sec**	Period	**5 rev**
		Current Contribution	**0.000**		
5. Rate Deadband		Mass Rate Dead Band	**7.50%**	% of Belt Capacity	**0.15 t/hr**
6. Rate Display Filters		Mass Rate Display Filter	**enabled**		
		Time Constant	**20 sec**	Fast Track Threshold	**20%**
		Mass Rate Trend Filter	**enabled**		
		Time Constant	**10 sec**	Fast Track Threshold	**20%**
8. Chute Level Control		**Probe ON**	**Ratio**		
		None	**150.00%**		
		Low	**115.00%**		
		Mid	**85.00%**		
		High	**50.00%**		

OPTIMUS CALIBRATION DATA

I.O MENU

1. Current Loop Inputs

Loop 1	**Remote Setpoint**	Loop 2	**not used**
Type is	**4-20mA**	Loop 3	**not used**
Parameters		Loop 4	**not used**
Master Capacity	**2.0 tonnes/hr**	Loop 5	**not used**
Slave	**100.00%**	Loop 6	**not used**
Filtering			
Loop Filter	**enabled**		
Time Constant	**1s**		
Fast Track Threshold	**50%**		

1. Current Loop Outputs

Loop 1	**Rate**	Loop 2	**PID**
Type is	**4-20mA**	Type is	**4-20mA**
Filtering		**Filtering**	
Time Constant	**2s**	Time Constant	**5s**
Fast Track Threshold	**50%**	Fast Track Threshold	**0%**

2. Digital Inputs

Digital Input 1	**not used**	Digital Input 4	**not used**
Digital Input 2	**not used**	Digital Input 5	**not used**
Digital Input 3	**not used**	Digital Input 6	**not used**

3. Digital Outputs

Digital output 1	**Totaliser**	**0.01 tonnes**	**100ms**
Digital Output 2	**System healthy**		
Digital output 3	**Totaliser**		
Emit Pulse Every		**0.1 tonnes**	
Pulse Width		**100 ms**	
Polarity		**N/C**	
Digital output 4	**not used**		
Digital output 5	**not used**		
Digital output 6	**not used**		

7. Load Cell & Tacho

Load Cell (No Load)	**4.904 mV**	
Load Cell (With Chains)	**6.461 mV**	x1 Chains
Tacho Freq @ 50Hz	**223 Hz**	
Mass Rate with chains	**0.902 t/hr**	

CALIBRATION MENU

1. Calibration

Pulses Per Rev	**14307**	Belt Revolutions	**5**
Zero Calibration	**4.976**	AZT	**4.976**
Span Calibration	**0.0105**	Belt Speed	**0.07 m/s**
Calibration Target	**0.080 Tonnes**		

WEB-TECH WEIGHFEEDER DESIGN DATA SHEET

CLIENT: **Boral Plasterboard** **DATE :** **30/05/2008**

DESIGNATION : **Vermiculite** **MODEL :** **WT2000-600**

CALIBRATION METHOD : **Chains**

CALIBRATION BAR(S)

1. CALIBRATION BAR QTY AND TOTAL WEIGHT = **kg**
2. IDLER PITCH
3. TOTAL WEIGH AREA **metres**
4. EQUIVALENT LOADING/m WITH CAL BAR(S) (Item 1 / Item 3) = **kg/m**
5. BELT SPEED **m/s**
6. SIMULATED MASS RATE (Item 4 x Item 5 x 3600) = **kg/hr**
7. BELT LENGTH **metres**
8. No. OF BELT REVOLUTIONS FOR TEST
9. **TARGET WEIGHT (Item 4 x Item 7 x Item 8) =**
10. **TARGET WEIGHT after material tests =**

CALIBRATION CHAIN

1. WEIGHT OF CALIBRATION CHAIN PER STRAND **3.52** **kg/m**
2. No. OF STRANDS **1**
3. TOTAL WEIGHT OF CALIBRATION CHAIN (Item 1 x Item 2) **3.52** **kg/m**
4. BELT LENGTH **4.550** **m**
5. No. OF BELT REVOLUTIONS FOR TEST **5**
6. **TARGET WEIGHT (Item 3 x Item 4 x Item 5) =** **80.080** **kg** **0.080** **tonnes**
7. **TARGET WEIGHT after material tests =**

SETTINGS

1. SHEARGATE OPENING (@ CENTRE) mm
2. MIN. FREQUENCY ON VVVF DRIVE Hz
2. MAX. FREQUENCY ON VVVF DRIVE Hz

OPTIMUS CALIBRATION DATA

Customer : **Boral Plasterboard** Conveyor Designation :

Material : **Flyash** Model : **WT2000-600** **S/N W332** Date : **2/06/2008**

Load Cell: **WHBX-10Kg** Tacho : **PXT500** Multiplier: **x2** Data By : **MW**

CPU S/N **T/N6053A0036**

Serial No: **PB172/C172** Software Build : **151** Contract No : **3071/2**

SETUP MENU

1. System Configuration		Units of Measurement:	**t/hr**		
		Belt Capacity	**2.0 t/hr**		
		Resolution	**0.01**		
		Belt Length	**4.550 m**		
		Maximum Loading	**10** kg/m		
2. Time & Date		Backlight	**5min**		
		Brightness	**highest**		
		Contrast	**3**		
		Date	**2/06/2008**		
		Time	**11:18:57**		
3. PID Parameters	**1**	**Setpoint Origin / Status**	**remote**		
	2	**Output Status**	**59.00%**		
	3	**PID Parameters**			
		Prop Band	**142.00%**	Reset Rate	**0.005 resets/sec**
		Integral Lower Limit	**-50.00%**	Integral Upper Limit	**50.00%**
		Derivative Time	**0.000**		
		Feed Forward	**1.000**	Output Offset	**0.000**
	5	**PID Mass Rate Filter**	**enabled**		
		Time Constant	**1s**		
		Fast Track Threshold	**100%**		
	6	**Volumetric Restart**	**enabled**		
		Restart Period	**10s**		
		Restart Threshold	**15.00%**		
4. Auto ZeroTracking		Auto Zero Tracking	**disabled**		
		Threshold	**15.00%**	**=**	**0.30 Tonnes**
		Delay	**70 sec**	Period	**5 rev**
		Current Contribution	**0.000**		
5. Rate Deadband		Mass Rate Dead Band	**12.50%**	% of Belt Capacity	**0.25 t/hr**
6. Rate Display Filters		Mass Rate Display Filter	**enabled**		
		Time Constant	**20 sec**	Fast Track Threshold	**20%**
		Mass Rate Trend Filter	**enabled**		
		Time Constant	**10 sec**	Fast Track Threshold	**20%**
8. Chute Level Control		**Probe ON**	**Ratio**		
		None	**150.00%**		
		Low	**115.00%**		
		Mid	**85.00%**		
		High	**50.00%**		

OPTIMUS CALIBRATION DATA

I.O MENU

1. Current Loop Inputs

Loop 1	**Remote Setpoint**	Loop 2	**not used**
Type is	**4-20mA**	Loop 3	**not used**
Parameters		Loop 4	**not used**
Master Capacity	**2.0 tonnes/hr**	Loop 5	**not used**
Slave	**100.00%**	Loop 6	**not used**
Filtering			
Loop Filter	**enabled**		
Time Constant	**1s**		
Fast Track Threshold	**50%**		

1. Current Loop Outputs

Loop 1	**Rate**	Loop 2	**PID**
Type is	**4-20mA**	Type is	**4-20mA**
Filtering		**Filtering**	
Time Constant	**2s**	Time Constant	**5s**
Fast Track Threshold	**50%**	Fast Track Threshold	**0%**

2. Digital Inputs

Digital Input 1	**not used**	Digital Input 4	**not used**
Digital Input 2	**not used**	Digital Input 5	**not used**
Digital Input 3	**not used**	Digital Input 6	**not used**

3. Digital Outputs

Digital output 1	**Totaliser**	**0.01 tonnes**	**100ms**
Digital Output 2	**System healthy**		
Digital output 3	**Totaliser**		
Emit Pulse Every		**0.1 tonnes**	
Pulse Width		**100 ms**	
Polarity		**N/C**	
Digital output 4	**not used**		
Digital output 5	**not used**		
Digital output 6	**not used**		

7. Load Cell & Tacho

Load Cell (No Load)	**5.065 mV**	
Load Cell (With Chains)	**7.91 mV**	x2 Chains
Tacho Freq @ 50Hz	**223 Hz**	
Mass Rate with chains	**1.80 t/hr**	

CALIBRATION MENU

1. Calibration

Pulses Per Rev	**14318**	Belt Revolutions	**5**
Zero Calibration	**5.087**	AZT	**5.087**
Span Calibration	**0.0104**	Belt Speed	**0.07 m/s**
Calibration Target	**0.1602**		

WEB-TECH WEIGHFEEDER DESIGN DATA SHEET

CLIENT: **Boral Plasterboard** **DATE :** **2/06/2008**

DESIGNATION : **Flyash** **MODEL :** **WT2000-600**

CALIBRATION METHOD : **Chains**

CALIBRATION BAR(S)

1. CALIBRATION BAR QTY AND TOTAL WEIGHT _____ = _____ **kg**
2. IDLER PITCH _____
3. TOTAL WEIGH AREA _____ **metres**
4. EQUIVALENT LOADING/m WITH CAL BAR(S) (Item 1 / Item 3) = _____ **kg/m**
5. BELT SPEED _____ **m/s**
6. SIMULATED MASS RATE (Item 4 x Item 5 x 3600) = _____ **kg/hr**
7. BELT LENGTH _____ **metres**
8. No. OF BELT REVOLUTIONS FOR TEST _____
9. **TARGET WEIGHT (Item 4 x Item 7 x Item 8) =** _____
10. **TARGET WEIGHT after material tests** = _____

CALIBRATION CHAIN

1. WEIGHT OF CALIBRATION CHAIN PER STRAND **3.52** **kg/m**
2. No. OF STRANDS **2**
3. TOTAL WEIGHT OF CALIBRATION CHAIN (Item 1 x Item 2) **7.04** **kg/m**
4. BELT LENGTH **4.550** **m**
5. No. OF BELT REVOLUTIONS FOR TEST **5**
6. **TARGET WEIGHT (Item 3 x Item 4 x Item 5) =** **160.160** **kg** **0.1602** **tonnes**
7. **TARGET WEIGHT after material tests** =

SETTINGS

1. SHEARGATE OPENING (@ CENTRE) _____ mm
2. MIN. FREQUENCY ON VVVF DRIVE _____ Hz
2. MAX. FREQUENCY ON VVVF DRIVE _____ Hz