



**Web-Tech Australia Pty Ltd**

## **Model WT1700 Weighfeeder**

### **Installation, Operation & Maintenance Manual**

**Web-Tech Australia Pty Ltd**

PO Box 4006

11 Electronics St

Eight Mile Plains QLD 4113

Ph: 61 7 3841 2844

Fax: 61 7 3841 0005

e-mail: [webtech@bigpond.com](mailto:webtech@bigpond.com)



# Web-Tech Australia Pty Ltd

## TABLE OF CONTENTS

Section	Description
1.	Introduction.
2.	Delivery & Unpacking.
3.	Mechanical & Electrical Installation.
4.	Weighfeeder Electronics
5.	Gearmotor Manual
6.	Variable Speed Drive Manual (if applicable)
7.	Drawings
8.	Calibration Sheets/Addendums

A	18/12/06	Issued for reference.	L.H.
Rev.	Date	Details	By

---

## INTRODUCTION

---

The Web-Tech 1700 series of weighfeeders consist of a range of medium to heavy duty belt weighfeeders capable of handling various products at throughput rates from 0.1 tph. to 40 tph.

The 1700 series can be ordered as an enclosed or open unit. Depending on the application, the belt will be either fitted with "Flexowall" belt edging or left flat. If the application requires flexowall, then the inlet chute will be split to facilitate the removal of the belt for service.

A wide variety of motor and gearbox assemblies can be applied to the 1700 series, shaft mounted right angle drive and helical inline chain driven being the most common. Those applications which require turn downs in excess of approximately 12:1 can be fitted with DC motors. Judicious use of motors, gearboxes and drive sprockets often allow the use of AC motors even where moderate turn downs may be required.

Inverters are not normally supplied by Web-Tech as our customers have a wide range of preferences. However, we can supply these devices if requested.

The weighing element is a single roll type, utilising a flexure arrangement and a shearbeam load cell. Normally, the load cell is rated for the expected maximum load +10 – 20% overload.

Speed sensing is provided by a digital encoder mounted on the non-driven pulley and sized to provide no more than 800 Hz to the electronic integrator when the belt is running at full speed.

Both the load cell and encoder are energised by the electronic integrator and field wiring terminates into junction boxes on the feeder stringers.

The electronic integrator has been designed to provide all the control signals required to run a weighfeeder. It requires 240VAC at 0.5A or 110 VAC at 1A to power it. Menu driven routines allow operators to enter variables, calibrate the feeder (zero and span) and control the P.I.D. loop output.

**Please read all sections of the manual before placing the weighfeeder into service.**

## DELIVERY/UNPACKING

---

Your weighfeeder has been crated for protection during transit. The electronic integrator is normally packed separately. Upon delivery, please ensure that all components have arrived and have not been subject to any form of damage.

### The basic components are:

- Weighfeeder complete with Gearmotor, Loadcell(s) and Belt Speed Sensor (Tacho)
- Masterweigh Integrator
- Masterweigh Enclosure
- Calibration Bar(s) or chain

### Optional:

- Speed Controller (A.C. Inverter or D.C. Controller)
- Remote instruments
- Spare Parts
- Scraper Conveyor

**If in doubt about any aspect of the delivery, contact:**

**Web-Tech Australia Pty Ltd  
11 Electronics Street  
Eight Mile Plains  
Brisbane Qld 4113  
Australia**

**Ph: 61 7 3841 2844  
Fax: 61 7 3841 0005**

### Unpacking:

1. If the crate shows signs of damage, report to carriers and Web-Tech. Remove the top and sides of the crate (if applicable).
2. Remove any small items of equipment also in the crate.
3. Lift the feeder clear of the crate using web slings or the lifting points provided. Care must be taken at this point to avoid damage to machine.
4. Carefully examine the feeder for signs of damage at this point. Look also for parts that may have worked loose during transit. Phone Web-Tech if in doubt.
5. Carefully locate weighfeeder into its operating position.

---

## INSTALLATION

---

1. After the weighfeeder has been placed into position, check the level of weighfeeder in all directions and pack under the mounting feet if necessary.

2. Do not "pull up" any gaps between mounting feet and support structure, as this may induce twisting into the weighfeeder frame. Always shim up any gaps. (Note: The feeder is a precision instrument and must not under any instances support any ancillary structures, inlet or discharge chutes).

3. Bolt up infeed and discharge connections. Use some form of sealant or rubber between flanges. Once again, make sure that no loads are transferred to any part of the feeder during this operation.

4. Protect conveyor belt if welding or oxy work is carried out in the area. Note if the loadcell is in place remove it before welding.

5. Remove covers from "ACCESS" side (if an enclosed model) of weightfeeder (opposite side to gearmotor).

6. Support the weight of the belt steering mechanism with one hand (Caution – the mechanism is heavy) and remove the steering mechanism transit pin. Gently lower the steering mechanism onto the belts. Keep the pin in a known location (eg. Inside the Masterweigh enclosure), as it is used during belt removal.

### 7. Check the following:

- a. All idler rolls are located correctly and are vertically aligned.
- b. All fasteners are tight.
- c. No foreign material is on the belt or in inlet chute.

**Procedures for Checking of Vertical Alignment and Rectification:**

(Note: The following procedure will have been carried out at the factory prior to shipment. However, settlement can occur and often does occur during shipment which will cause vertical alignment errors.)

### Refer to Drawing 1700-04.

(The feeder must be level before proceeding). Vertical alignment is critical if accurate and reproducible results are to be obtained. The following procedure must be used to check the vertical alignment.

1. Tie off two (using 30kg breaking strain fishing line) stringlines at the head and tail pulley either side of the belt, making sure that the lines traverse the weigh area. The head and tail pulleys will be lower than the carry rolls (the tail only about 1mm) as measured from the middle of the roll. The stringlines should be tied off very tight.

Note: If stringline is unavailable, use a 2-metre rule, edge onto the rolls for the above test.

2. Look along both lines for vertical height discrepancies (-0mm/+0.25mm) use the jacking screws provided to obtain the above tolerances.
3. Once the vertical alignment has been checked and verified, for all carry rolls, remove the line.

Note: The striker bar must be in contact with the loadcell prior to any alignment taking place.

**Now proceed to the wiring up of the system.**

---

## ELECTRONIC/ELECTRICAL INSTALLATION

---

### Wiring:

(Refer to Drawing Nos. WTMW1-01, LCJBOX-01 and TACH-01)

It should be noted that there are many wiring permutations that can be adopted. They are determined by the configuration of your system. Make sure the above drawings cover your particular configuration prior to proceeding.

Web-Tech mentions types of cable that can be used between certain components on its feeder in its drawings. We only mention these cables as references only.

If an inverter is used and Web-Tech supplied the unit, the wiring diagram will be found in the accompanying manual.

Note: Full consideration must be given to the relevant state/country wiring codes when installing medium and high voltage wiring.

Wiring between the Tachometer and the local junction box and between the loadcell and the local J-Box will have been done at the factory.

Before wiring up the feeder to the integrator, wire in the 240/110v to the power supply PCB, making sure the voltage switch is set to the correct voltage.

Now wire up both the loadcell and tachometer to the integrator. If the distance the wire has to run between the feeder and the integrator is in excess of 50 metres - consult the factory.

**DO NOT RUN THIS WIRING  
ALONGSIDE ANY CABLES CARRYING  
HIGH OR MEDIUM VOLTAGES. IF IN  
DOUBT - CONSULT THE FACTORY**

Masterweigh controls the feeders flow rate by adjusting the belt speed. This is done via a 4/20mA current loop, which should now be wired to the inverter.

**DO NOT POWER UP AT THIS POINT.**

**CHECK YOUR WIRING AGAIN.**

**NOW POWER UP.**

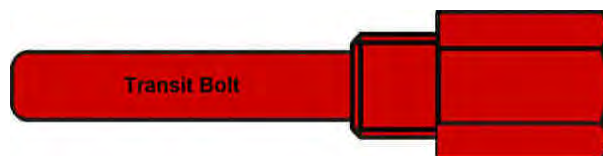
The weighfeeder is now ready for field commissioning.

The 1700 weigh feeder series is fitted with a dual/axis flexure style weigh frame. For servicing ease the load cell is fitted to the outside of a stringer.

To protect the loadcell during transportation a transit bolt has been fitted to the stringer. The pin screws into the stringer and engages with the weigh frame, thus, preventing load being applied to the loadcell. This bolt must be removed prior to running the feeder.

When removing the bolt make sure the frame does not drop onto the loadcell load wire.

The bolt and lock nut fitted to the stringer Acts as an overload stop and has been set at the factory.



---

## FIELD COMMISSIONING

---

### **Field Commissioning:**

Field Commissioning consists of the following steps:

1. Run the belt empty and check belt tracking.
2. Check tracking when belt is full.
3. Zero the feeder and calibrate against static calibration bars.
4. Check Calibration against material test.

#### **1. Belt Tracking (Empty):**

The weighfeeder has been run in the factory for approximately 8 hours prior to shipping. However, the weighfeeder should be run without material for approximately 4 hours to prove that the tracking is correct.

Set Masterweigh 1 PID output to manual and ramp up the P.I.D., 4/20mA output to 100%. (Menu 13).

Comprehensive details relating to the operation of Masterweigh can be found in the "Operation" section of this manual.

Note: If the belt runs in the wrong direction, stop the belt and swap over any two phases at the motor. "Be Careful": isolate, tag out etc.

Observe the belt running at 100% output. If the belt steering mechanism is working to track the belt (this is evident by noting if either of the two vertical rolls of the belt steering mechanism are constantly in contact with the belt), then apply some tension to the belt via the telescopes. (See Drawing 1700-01 and 1700-03 for details).

Make small adjustments and allow time (at least 10 revolutions) before making any further adjustments.

#### **DO NOT OVERTENSION THE BELT.**

The ideal tension is just sufficient to drive without slippage under load.

Tighten locknuts on take-ups when completed.

#### **2. Checking of Tracking (with belt full of material).**

It is essential that the belt tracking be checked when carrying material. It is normal that for some applications, the belt will track slightly different when empty to when carrying material.

If adjustment is required, adjust take-ups as per the previous "Belt Tracking (Empty)" instructions.

#### **3. Zeroing the Feeder**

The calibration of the weighfeeder has been carried out at the factory, however, it must be checked after installation.

A data sheet should have been supplied with the other documentation in this manual. This data sheet shows the value of the calibration weights, as well as the values that have been programmed into each of the Masterweigh menus.

Check all menus to see that the programmed information is as per the data sheets. If they agree, carry out zero and span calibration procedure as per the Masterweigh section in this manual. (Getting Started Zero and Getting Started Spanning/Calibration)

---

## FIELD COMMISSIONING (CONTD)

---

### 4. Material Test:

If possible, a material test should be carried out to confirm static calibration.

A material test involves weighing a known amount of material prior to or after passing over the weighfeeder, and comparing the results obtained from the weighfeeder.

The quantity of material required depends on the capacity. A "rule of thumb" value would be six (6) minutes running time at maximum capacity eg:

Capacity = 10 tph

Therefore  $\frac{10,000\text{kg}/60 \text{ mins}}{6 \text{ mins}} = 1000\text{kg}$

If a correction factor is required to the calibration after the material test is carried out, the static calibration bar(s) should have the same factor applied to their result ie; if calibration bar(s) were originally calculated as representing 75% of capacity and material tests proved that weighfeeder was weighing 2% light, then the calibration bar(s) actually represented 77% of capacity.

The target values for the "Fixed Weight Calibrate" menu of Masterweigh must be altered accordingly. The easiest method to apply the correction to the calibration bars is to place them on the feeder immediately after performing an empirical calibration, then starting a fixed weight calibration. At the end of the calibration, observe the "Accumulated Mass total:" and write it down, then PRESS ABORT. Now enter the observed mass total as the new Target Weight.

Refer to Masterweigh manual for details regarding material calibration under "Empirical Calibration".

---

# MAINTENANCE

---

## **Periodic Maintenance:**

The maintenance schedule varies depending on the application and environment that the weighfeeder operates in.

The following is a guide only and may be varied to suit conditions.

## **Daily Interval:**

- ◆ Check Belt Tracking
- ◆ Clean any material spillage/build up from around weighfeeder.

## **Monthly Interval:**

- ◆ Check oil level in gearbox
- ◆ Check condition of belt and repair any damage
- ◆ Remove any build up from around pulleys and idler rolls
- ◆ Check height weights of and condition of skirts on inlet chute and side skirts.
- ◆ Check belt has sufficient tension
- ◆ Grease all bearings including those on scraper conveyor (if supplied)
- ◆ Lubricate drive chain if sprocket drive belt type.
- ◆ Lubricate chain on scraper conveyor (if supplied)
- ◆ Check tightness of all fasteners
- ◆ Re-calibrate weighfeeder

## **Yearly Interval:**

- ◆ Check wear on all mechanical items, particularly inlet chute and shear gate.
- ◆ Drain and replace oil in gearbox(s) – (refer to SEW manual) check loadcell tare output

## **Belt Changing:**

## **Belt Removal**

(Refer to 1700-01) Two or three man job!

The 1700 series of weighfeeders are of a cantilevered design. That is, supports on the opposite side to the motor can be removed, without the system collapsing or being damaged. (If the correct procedures are adhered to).

This feature allows for easy belt changing.

After familiarising yourself with the layout of the feeder and the relevant terminology, follow the following procedures:

1. Set Masterweigh into the manual mode via Menu 13.

2. Close off the material feed and run the belt until it is completely empty.

## **NOW SWITCH OFF THE POWER AND TAG OUT**

3 If the feeder is an enclosed model, remove the doors from the access side, and remove the door support pillars. The support pillars are bolted at the top and bottom.

4. If your feeder is fitted with flexowall belt edging for material containment, then follow the following procedure: (If not, proceed to 4.)

Remove the lower portion of the split inlet chute, which is bolted to the upper section. The lower section should then be completely removed and stored.

5. Remove the carry side belt scraper.

6. Lift the belt steering mechanism and lock it into its transit position by passing the transit pin through the hole in the stringer and into the hole in the steering mechanism arm.

7. Slacken the telescopers right back to the minimum extension point.

# MAINTENANCE

---

---

## MAINTENANCE (CONT'D)

---

### **Belt Removal (Cont'd):**

8. Remove the belt skirts and if a flat belt is installed, slide the inlet chute skirts up.

9. Locate and remove the support structure on the opposite side of the feeder to the motor. This is achieved by removing the sealing plugs and accessing the fixing bolts that are inside the R.H.S. the bolts should be removed using a socket and extension bar.

10. At this point the support legs can be removed by gently tapping out using a soft mallet. The feeder will drop slightly to one side when the legs are removed.

11. Pull off the belt now, making sure that the bottom of the belt does not foul on the belt steering mechanism.

### **Belt Replacement:**

#### **CHECK THE NEW BELT FOR BELT TRAVEL ARROWS AND CORRECTLY ORIENTATE**

1. Using at least three people, offer the belt up to the pulleys.

Hint: If talcum powder is applied to the inside of the belt, it will act as a lubricant and assist belt installation over the pulleys.

2. Simultaneously rotate and push the belt until it is centred over the pulleys. Make sure that the bottom of the belt does not foul the belt steering mechanism.

3. Replace the legs using the removal procedure in reverse. **IF THE LEG WILL NOT FIT IN, OWING TO SAG, USE A PORTABLE JACK TO GENTLY LIFT UNTIL THE LEGS JUST FIT INTO PLACE.**

4. Fit the remainder of the ancillaries in reverse order to the disassembly procedure.

5. Refer to drawing 1700-01

The correct belt tension is achieved by alternately tensioning each telescoper until the aligning mark on the belt tensioning drive is aligned with the apex of the diamond on the side rail.

6. Finally, the procedures for belt tracking that were discussed earlier in the manual in the Field Commissioning section should be observed.

### **Gearbox Maintenance:**

Refer to SEW maintenance manual

---

## OPTIONAL EQUIPMENT

---

### **Speed Controller:**

Web-Tech weighfeeders may be supplied with either an A.C. or D.C. speed controller. The speed controller is used to either manually control the belt speed and therefore material throughput, or can be used in an "Automatic" mode whereby the speed of the belt is automatically adjusted by the Masterweigh controller to maintain a setpoint of material throughput.

A separate manual is supplied for the speed controller. Please follow the manufacturers' instruction regarding installation/set up.

### **Scraper Conveyor: (If Applicable)**

Scraper conveyors are optionally supplied on Web-Tech weighfeeders. The function of the scraper conveyor is to remove any accumulated material from the floor of the weighfeeder. The scraper conveyor has been run at the factory and should be ready for operation.

### **Electrical Connection:**

The scraper conveyor is driven by a 3-phase A.C. motor from an appropriate supply. The direction of the scraper conveyor should have the scraper blades drag material to the discharge end.

The motor should not be connected in parallel to the conveyor drive motor if an inverter is used in conjunction with the drive motor.

### **Mechanical Maintenance:**

#### **Daily Interval:**

- ◆ Check tracking of scraper conveyor chains
- ◆ Check condition of scraper blades

#### **Monthly Interval:**

- ◆ Check out level in gearbox
- ◆ Check chain tension
- ◆ Grease all bearings
- ◆ Lubricate chain/sprockets (use Dry Lubricants)

#### **Yearly Interval:**

- ◆ Drain & replace oil in gearbox (see SEW manual for type and quantity)
- ◆ Check all mechanical items for wear

### **Chain Tension: - (If Applicable)**

The scraper conveyor does not require much tension to operate correctly. Adjust take-ups so that scarper blades are horizontal, and apply approximately the same amount of force on the floor at both ends of the scraper blades.

### **Chain Tracking: (If Applicable)**

If the scraper chains are tracking to one side, and the sprocket teeth are continually in contact with the side links of the chains, track the chains by adjusting the take-ups in the same manner as tracking the conveyor belt.

---

## OPTIONAL EQUIPMENT (CONT'D)

---

### **Remote Instruments:**

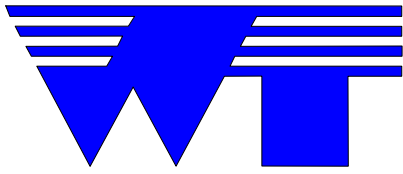
#### **Chart Recorder/Rate Meter:**

A Chart Recorder or Rate Meter may be supplied to record/indicate the rate of material passing over the weighfeeder. Either one of the instruments should be connected to the "Rate Output" channel (4-20mA) on Masterweigh. Multiple instruments can be connected Refer to the Masterweigh connection diagram/manual for connection details.

Refer to the manufacturers' instructions for installation procedure for Chart Recorder or Rate Meter.

Contact Web-Tech if spare pens/paper are required for the Chart Recorder.

Totaliser:-A Totaliser may be supplied to record the accumulated tonnage that has passed over the weighfeeder. The remote totaliser should be connected to the "Pulse Output" of the Masterweigh Integrator. Refer to the Masterweigh connection diagram/manual for connection details.



# OPERATION MANUAL

---

# Masterweigh Optimus

---

Web-Tech Australia Pty Ltd

---

**Head Office:**

11 Electronic Street  
EIGHT MILE PLAINS QLD 4113

Phone: (07) 3841 2844  
Fax : (07) 3841 0005

PO Box 4006  
EIGHT MILE PLAINS  
BRISBANE QLD 4113  
AUSTRALIA

---

---

## **Index.**

---

1.	General Description.	4.
2.	Specifications and On Site Requirements.	5 - 6.
3.	Enclosure Specifications	7.
4.	Theory of Operation.	8.
5.	Printed Circuit Board Description/Location.	9.
6.	Power and Field Wiring PCB.	10-11.
7.	Key Board Description.	12.
8.	Power Up.	13.
9.	Main Display MRMT Description.	14-15.
10.	Getting Started.	16.
11.	System Setup / <i>system configuration.</i>	17-20.
12.	System Setup / <i>display, time &amp; date.</i>	21-25.
13.	System Setup / PID Loop Control / <i>PID overview.</i>	26-27.
14.	System Setup / PID Loop Control / <i>setpoint origin.</i>	28-29.
15.	System Setup / PID Loop Control / <i>output control / status.</i>	30.
16.	System Setup / PID Loop Control / <i>pid parameters.</i>	31-34.
17.	System Setup / PID Loop Control / <i>pid loop tuning.</i>	35-36.
18.	System Setup / PID Loop Control / <i>pid mass rate filter.</i>	37-38.
19.	System Setup / PID Loop Control / <i>volumetric restart.</i>	39-40.
20.	System Setup / PID Loop Control / <i>reset integral.</i>	41.
21.	System Setup / PID Loop Control / <i>mass rate &amp; pid output trend.</i>	42.
22.	System Setup / Auto Zero Tracking / <i>overview.</i>	43.
	System Setup / Auto Zero Tracking / <i>enable : disable.</i>	44.
23.	System Setup / Auto Zero Tracking / <i>threshold.</i>	45-46.
24.	System Setup / Auto Zero Tracking / <i>delay.</i>	47.

---

## **Index.**

---

<b>25</b>	System Setup / Auto Zero Tracking / <i>period</i> .	<b>48.</b>
<b>26</b>	System Setup / Auto Zero Tracking / <i>current contribution</i> .	<b>49.</b>
<b>27</b>	System Setup / Rate Deadband .	<b>50.</b>
<b>28</b>	System Setup / Rate Display Filters.	<b>51.</b>
<b>29</b>	System Setup / Rate Display Filters / <i>time constant</i> .	<b>52.</b>
<b>30</b>	System Setup / Rate Display Filters / <i>fast track threshold</i> .	<b>53-54.</b>
<b>31</b>	System Setup / Save & Load Setup.	<b>55-56.</b>
<b>32</b>	System Setup / Chute Level Control.	<b>57-59.</b>
<b>33</b>	I/O (Input & Output) / Current Loop Inputs.	<b>60-67.</b>
<b>34</b>	I/O (Input & Output) / Current Loop Outputs.	<b>68-74.</b>
<b>35</b>	I/O (Input & Output) / Digital Inputs.	<b>75.</b>
<b>36</b>	I/O (Input & Output) / Digital Outputs	<b>76-82.</b>
<b>37</b>	I/O (Input & Output) / RS-232 Configuration.	<b>83-84.</b>
<b>38</b>	I/O (Input & Output) / RS-485 Configuration.	<b>85-86.</b>
<b>39</b>	Load Cell & Tachometer.	<b>87.</b>
<b>40</b>	Device Net.	<b>88.</b>
<b>41</b>	Theory of Operation/Steps in the Calibration Procedure.	<b>89-92.</b>
<b>42</b>	Calibration / Pulses per Revolution.	<b>93.</b>
<b>43</b>	Calibration / Manual Entry of belt revolutions & Zero Calibration	<b>94.</b>
<b>44</b>	Calibration / Auto Zero Tracking.	<b>95.</b>
<b>45</b>	Calibration / Target Weight.	<b>96.</b>
<b>46</b>	Calibration / Pulses per Revolution / <i>auto capture</i> .	<b>97-98.</b>
<b>47</b>	Calibration / Zero.	<b>99-100.</b>
<b>48</b>	Calibration / Span / <i>static weight test</i> .	<b>101-102.</b>
<b>49</b>	Calibration / Span / <i>empirical</i> .	<b>103-104.</b>

---

## **Index.**

---

<b>50</b>	MRMT Screen / Trend.	<b>105.</b>
<b>51</b>	MRMT Screen / Clear Total.	<b>106.</b>
<b>52</b>	MRMT Screen / Info Screen.	<b>107.</b>
<b>53</b>	Notes & Firmware Updates.	<b>108.</b>
<b>54</b>	Electrical / Electronic Notes / <i>digital outputs.</i>	<b>109.</b>
<b>55</b>	Electrical / Electronic Notes / <i>digital inputs.</i>	<b>110.</b>
<b>56</b>	<b>Inlet Boot hopper setup</b>	<b>111.</b>

---

# **Optimus.**

## **General Description.**

---

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

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

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

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

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

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

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

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

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

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

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

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

---

# **OPTIMUS OPERATIONAL MANUAL.**

## **Specifications and Site Requirements.**

---

### **Power Requirements.**

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

### **Main Board.**

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

### **User Interface.**

Support for up to 28 front panel keys.  
1/4 VGA (320 x 240 pixel) LCD screen support with digitally adjustable CCFL backlighting and screen contrast.  
Internal switch for locking of calibration settings (for weights & measures laws).

### **Loadcell Interface.**

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

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

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

---

# **OPTIMUS OPERATIONAL MANUAL.**

## **Specifications and Site Requirements.**

---

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

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

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

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

### **Options.**

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

### **Terminal PCB.**

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

### **Power Board.**

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

---

# **OPTIMUS OPERATIONAL MANUAL.**

## **Enclosure Specifications.**

---

### **Manufacturer.**

Hoffmann.

### **Application.**

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

### **Construction.**

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

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

Polyester mounting feet and stainless steel attachment screws.

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

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

Hinge and bail are corrosion resistant metal.

Knock out padlock provisions included in each latch.

### **Industry Standards.**

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

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

Enclosure flammability rating UL94-5V

CSA Type 4 and Type 12.

IEC 529 , **IP66**

---

# **OPTIMUS OPERATIONAL MANUAL.**

## **Theory of Operation.**

---

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

**Load Cell.**

**Weigh Zone / (weigh deck)**

**Tachometer / (Encoder).**

**Electronic Integrator.**

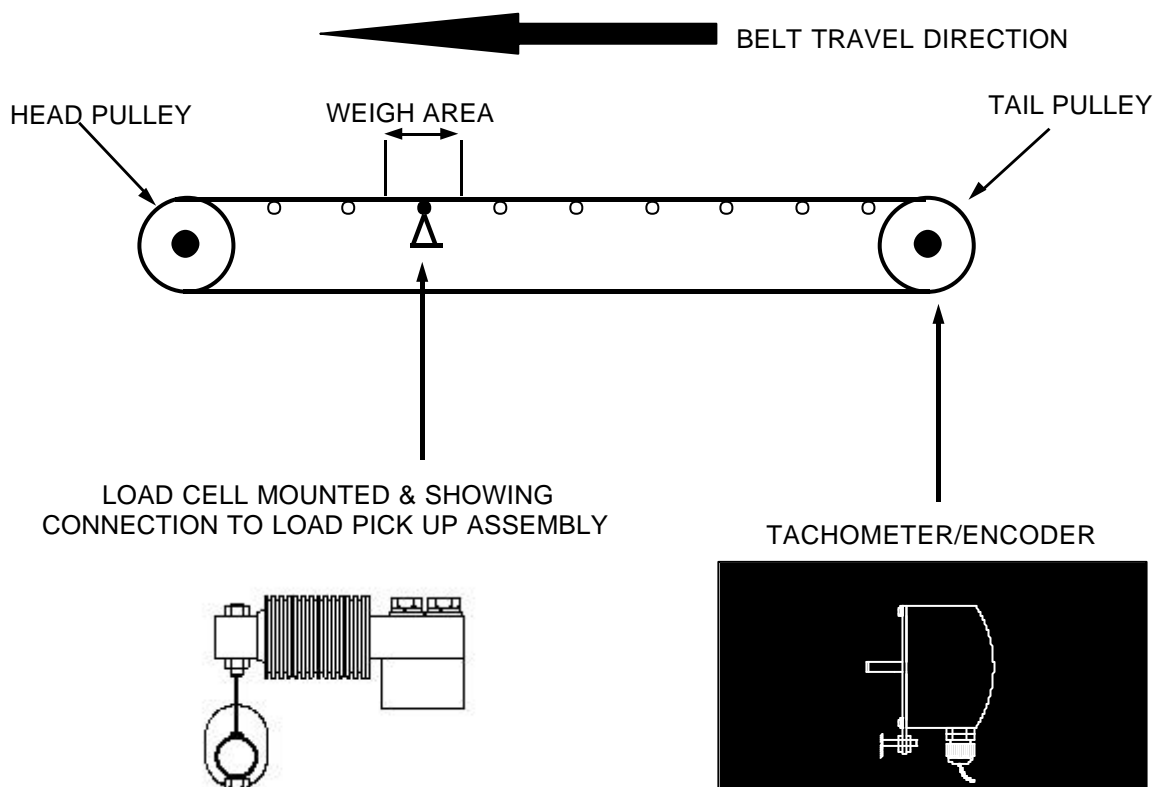
Optimus's primary roll is combine the weight of product carried by a conveyor belt and the speed of that belt and produce a variety of associated process control signals.

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

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

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

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



---

# **OPTIMUS OPERATIONAL MANUAL.**

## **Printed Circuit Board location.**

---

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

### **Main Processor PCB.**

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

### **Field Wiring PCB.**

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

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

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

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

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

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

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

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

# OPTIMUS OPERATIONAL MANUAL.

## Power & Field Wiring PCB.

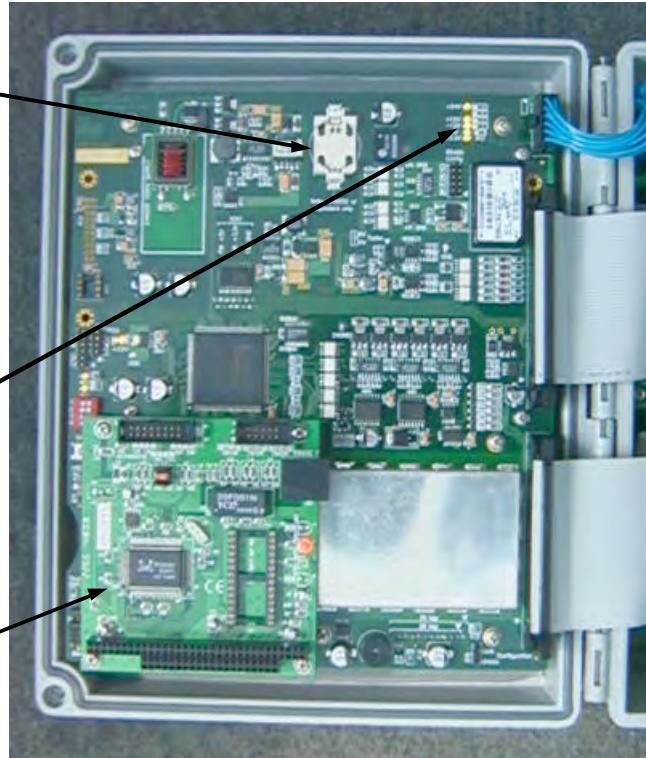
Battery Seiko Cr 2032 or equivalent. This battery is used to hold up the information stored in the screen "System Information" All operating variables are stored in non volatile memory, which does not require battery power.

### CPU PCB.

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

**+24V**  
**+12V**  
**-12v**  
**+5V**  
**+3.3V**

Optional communications card.  
TCP-IP, Profibus,  
DeviceNet



### Power & Terminal PCB.

Optional RS 232  
Output

Optional RS  
485 Output

Generally Analogue  
Inputs.

Generally Digital  
Inputs.

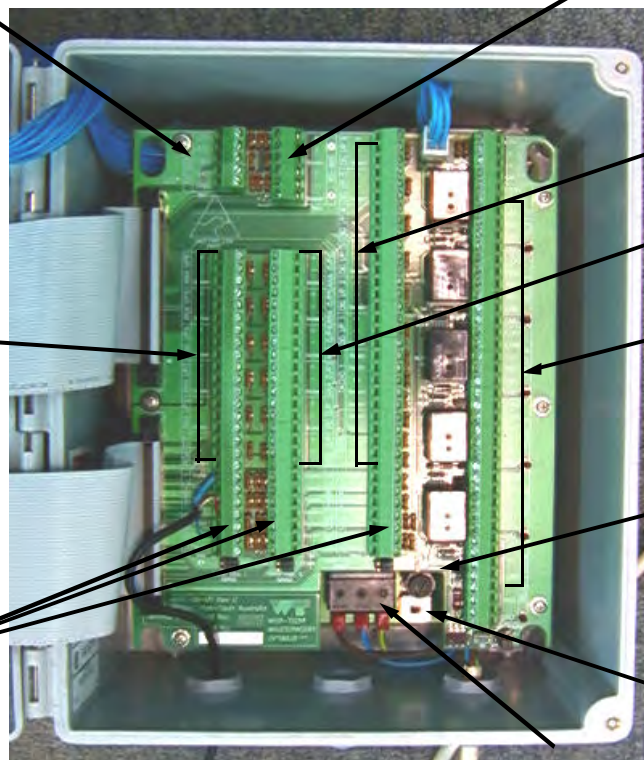
Generally analogue  
outputs.

Generally Relay I/O

Fuse

Load Cell Inputs  
Channel 1-3

Local On/Off Switch.  
Lower PCB.



Multi Voltage/Frequency  
Mains Input.  
Lower PCB.

# OPTIMUS OPERATIONAL MANUAL.

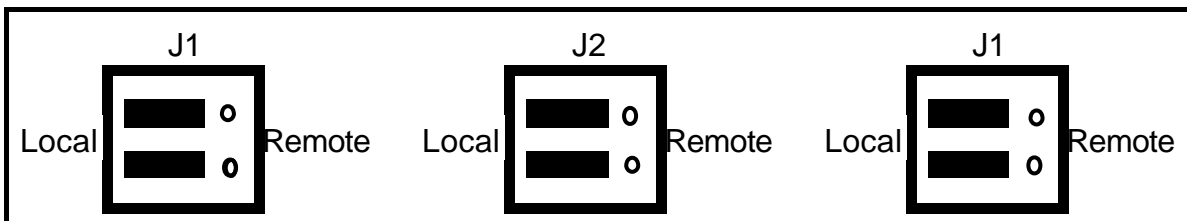
## Power & Field Wiring PCB.

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

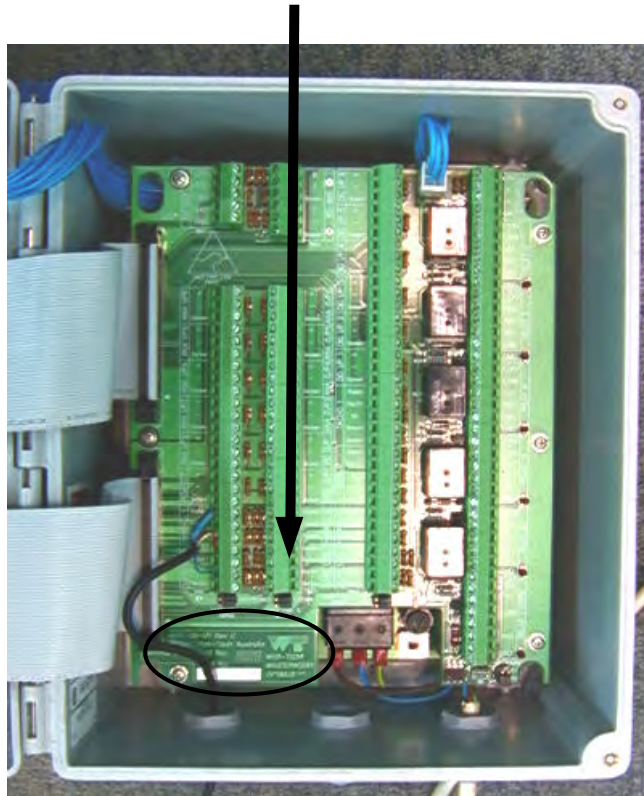
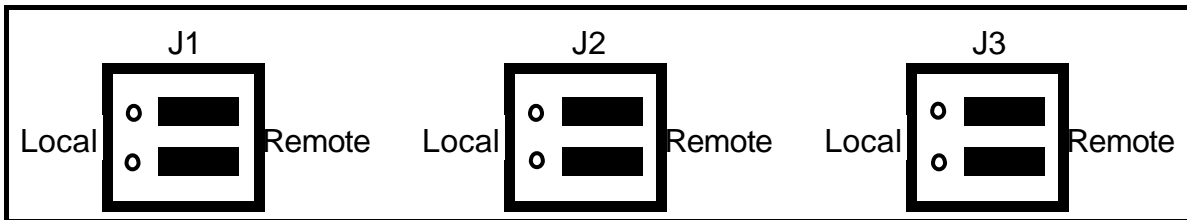
Belt weighing systems / weigh feeders usually do not employ more than one channel input.

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

No Sense Used

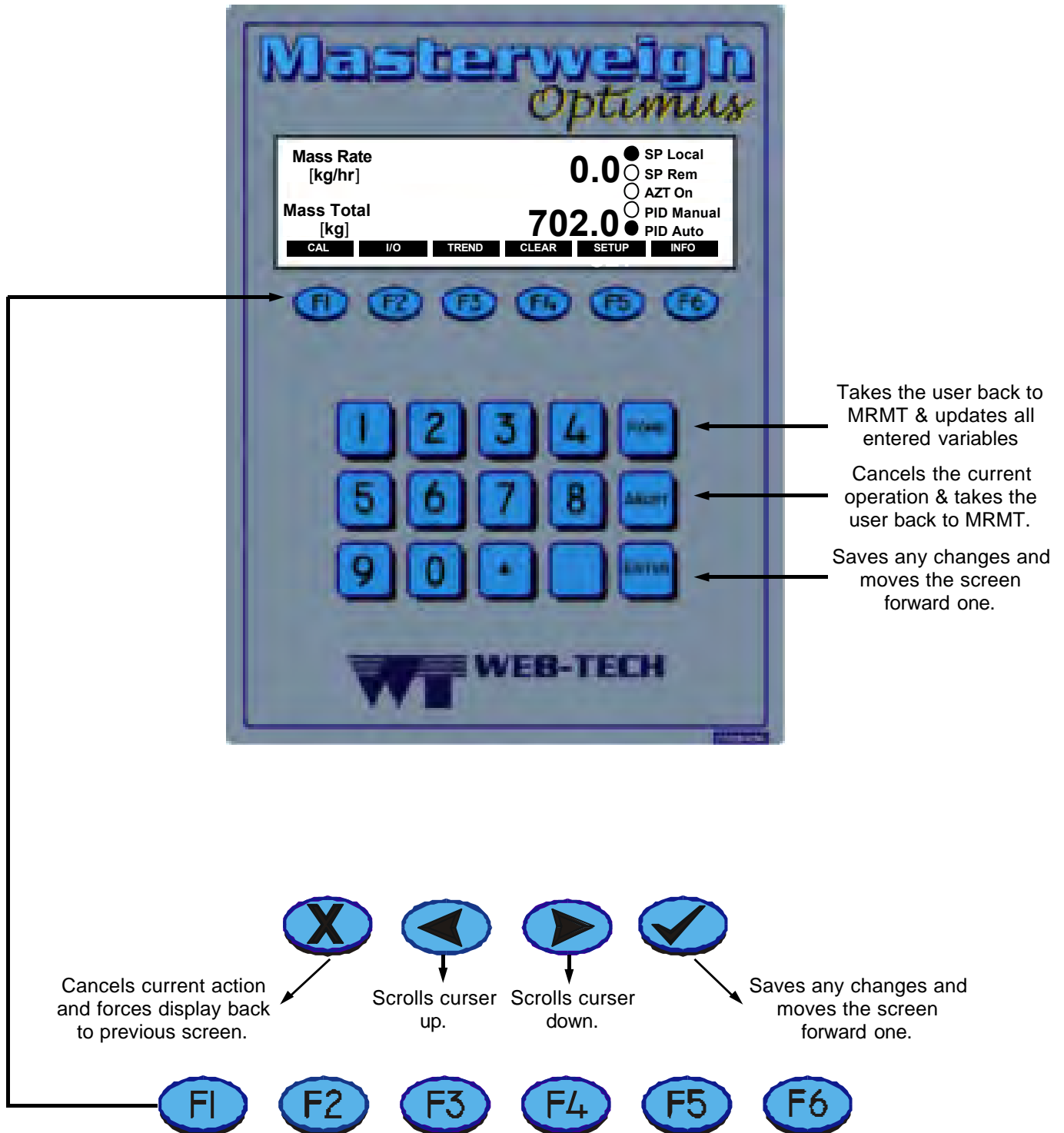


Sense Used



# OPTIMUS OPERATIONAL MANUAL.

## Keypad Description.



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

---

# OPTIMUS OPERATIONAL MANUAL.

## Power Up.

---

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

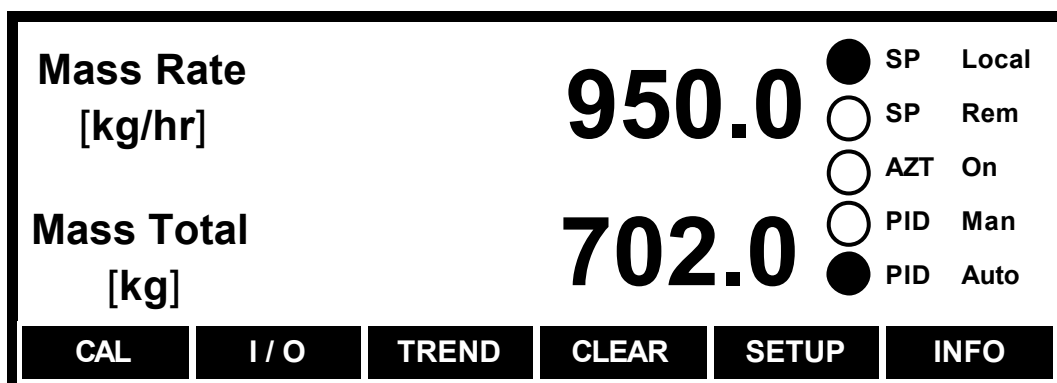
### Start Up Display



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

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

### Mass Rate Mass Total (MRMT) Display

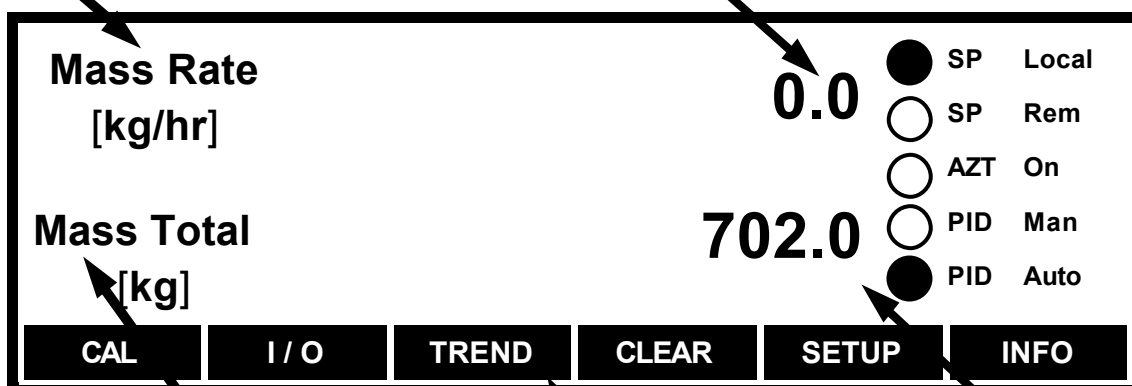


# OPTIMUS OPERATIONAL MANUAL.

## Main Display MRMT Description.

Displays Selected Mass Rate Units

Displays the instantaneous Mass Rate



Displays Selected Mass Total Units

Function Button Designators  
Allocates new function to key.

Displays Mass Total



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

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

**OPTIMUS OPERATIONAL MANUAL.**  
**Main Display MRMT Description.**

<b>Mass Rate</b> [kg/hr]	<b>0.0</b>	<input checked="" type="radio"/> SP Local
		<input type="radio"/> SP Rem
		<input type="radio"/> AZT On
<b>Mass Total</b> [kg]	<b>702.0</b>	<input type="radio"/> PID Man
		<input checked="" type="radio"/> PID Auto
<b>CAL</b>	<b>I / O</b>	<b>TREND</b>
<b>CLEAR</b>	<b>SETUP</b>	<b>INFO</b>

☒ 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.

---

# **OPTIMUS OPERATIONAL MANUAL.**

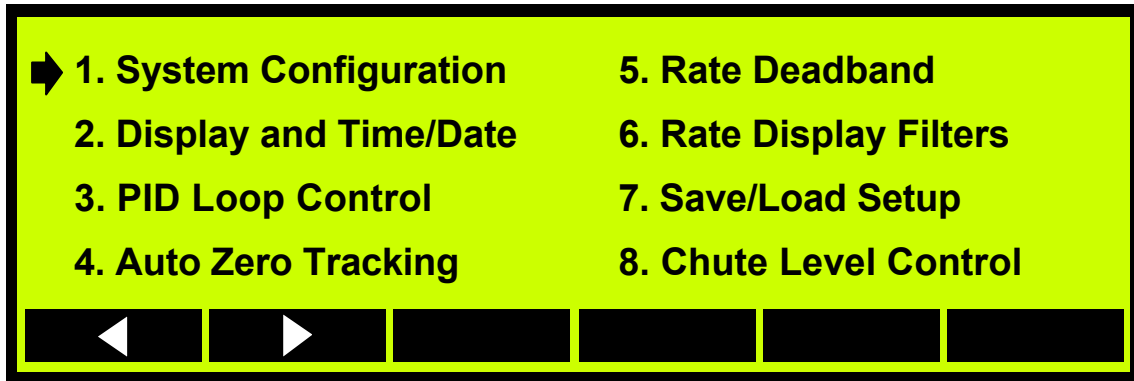
## **Setup / system configuration.**

---

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

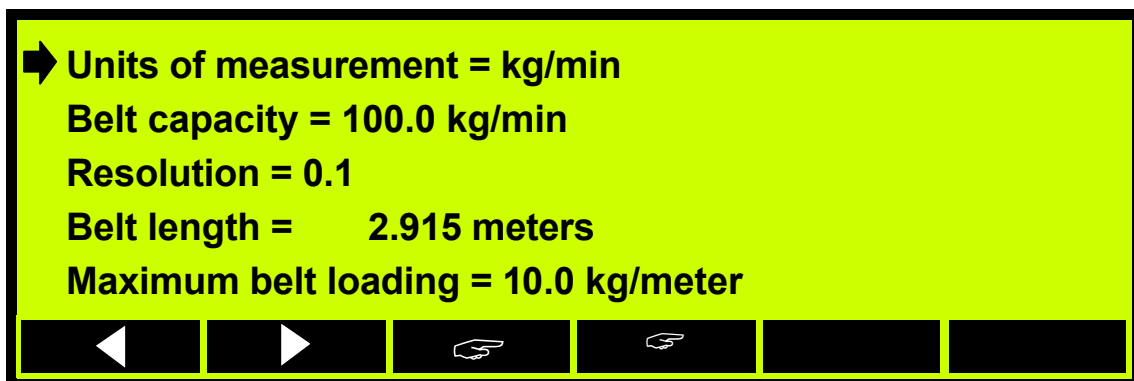
Prior to calibrating Optimus, the instrument must be configured to suit the application. Units selected and the input and output functions defined.

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



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

The display will change to that shown below.



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

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

The following units are available :-

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

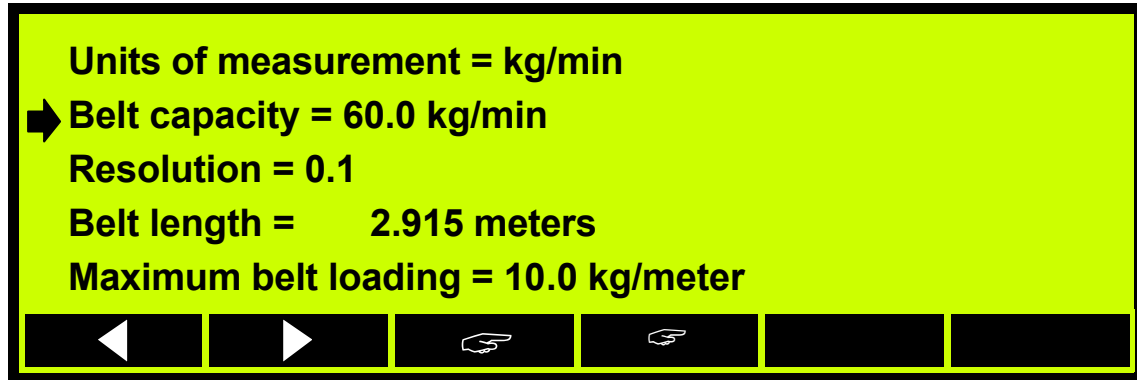
# OPTIMUS OPERATIONAL MANUAL.

## System Setup / system configuration.

### Belt Capacity.

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

This variable is used to scale the analogue outputs.



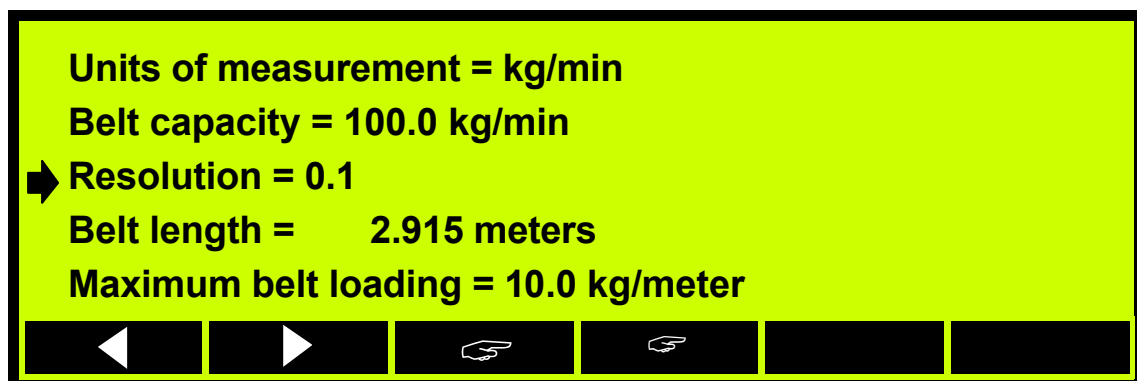
Units of measurement = kg/min  
➡ Belt capacity = 60.0 kg/min  
Resolution = 0.1  
Belt length = 2.915 meters  
Maximum belt loading = 10.0 kg/meter

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



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

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



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

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

---

# OPTIMUS OPERATIONAL MANUAL.

## System Setup / system configuration.

---

### Belt Length.

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

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

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

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

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

### Belt Length Units.

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

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

# OPTIMUS OPERATIONAL MANUAL.

## System Setup / system configuration.

### Maximum Belt Loading.

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

**Units of measurement = kg/min**

**Belt capacity = 100.0 kg/min**

**Resolution = 0.1**

**Belt length = 2.915 meters**

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

◀
▶
☞
☞

### Maximum Belt Loading 'Data Calculating'.

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

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

**4.0**

DEL
CLEAR
☞
☞

Use the following to calculate the Maximum Belt Loading.

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

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

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

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

E.g.

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

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

---

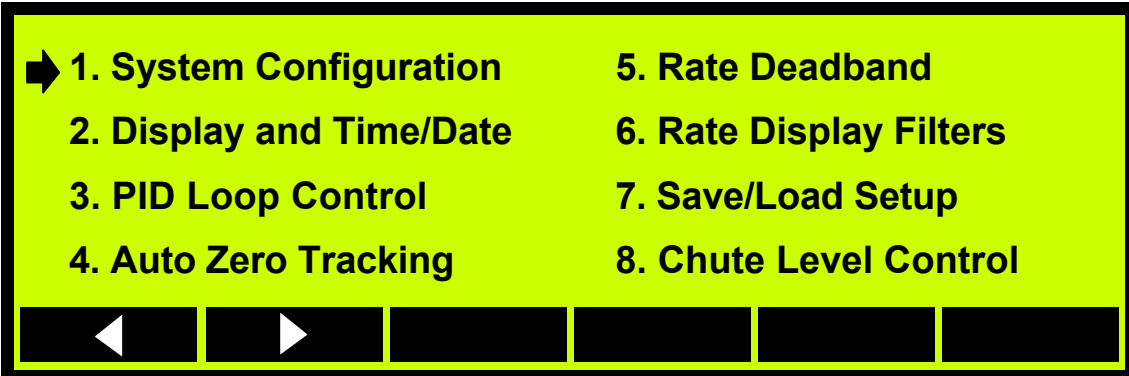
# OPTIMUS OPERATIONAL MANUAL.

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

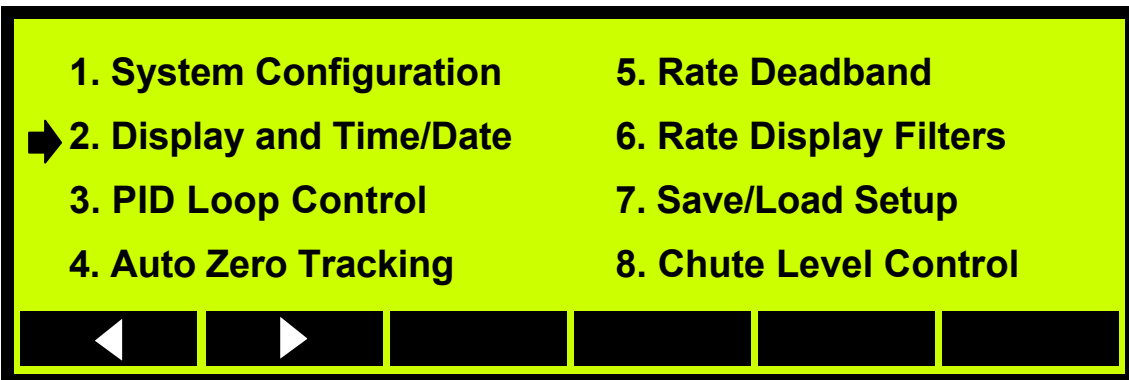
---

### 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.

# OPTIMUS OPERATIONAL MANUAL.

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

### Brightness.

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



### 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.

# **OPTIMUS OPERATIONAL MANUAL.**

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

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


**Day**


Current value **10**

New value **—**

DEL

CLEAR






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.


**Backlight = always on.** **Brightness = high**


**Contrast = 2**


Date **10**  **May** **2003**

Time **06 : 12 : 00**











Select the month and scroll on to year entry position.


**Backlight = always on.** **Brightness = high**


**Contrast = 2**


Date **10** **May**  **2003**

Time **06 : 12 : 00**









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 .

**Year**

Current value **2004**

New value **—**

DEL

CLEAR











# OPTIMUS OPERATIONAL MANUAL.

## System Setup / display, time & date.







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

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









Select the month and scroll on to year entry position.

Hours
Current value 10
New value —









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

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



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

Minutes
Current value 12
New value —



---

# **OPTIMUS OPERATIONAL MANUAL.**

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

---

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


**Seconds**


Current value **37**

New value **—**

DEL

CLEAR






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


Backlight = always on.                      Brightness = high


Contrast = 2


Date            10    May       2003

Time            ➡ 06 : 12 : 00









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

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





# OPTIMUS OPERATIONAL MANUAL.

## System Setup / PID Loop Control / overview.

### PID Parameters.

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

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

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

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

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

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

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

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

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

---

# **OPTIMUS OPERATIONAL MANUAL.**

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

---

### **Proportional Gain.**

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

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

### **Integral Gain.**

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

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

### **Integral Lower Limit.**

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

### **Derivative Gain.**

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

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

### **Output Offset.**

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

### **Feed Forward Gain.**

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

---

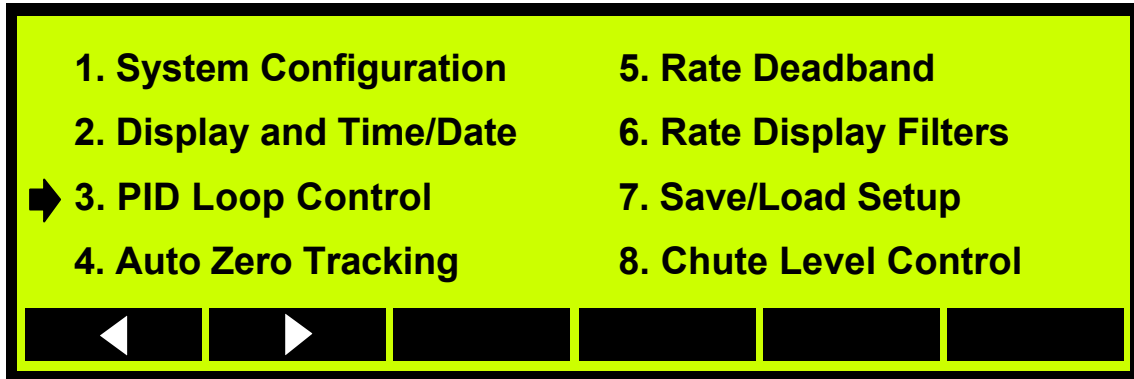
# OPTIMUS OPERATIONAL MANUAL.

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

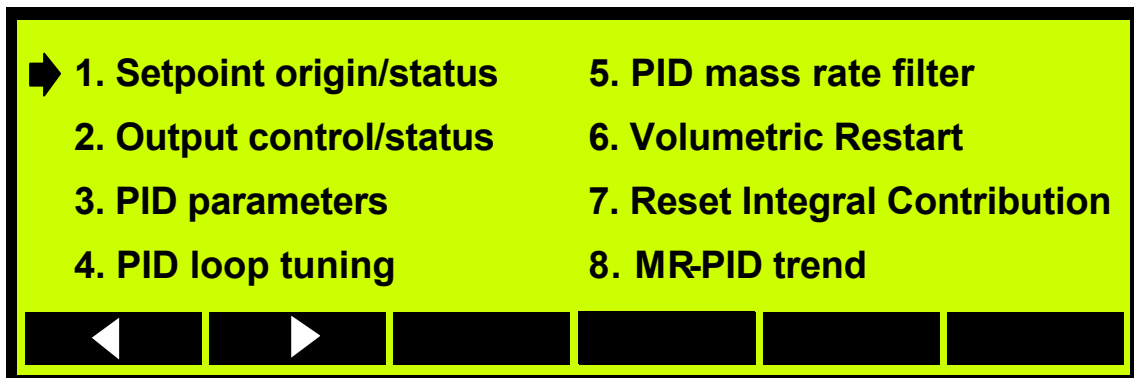
---

### PID Loop Control.

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



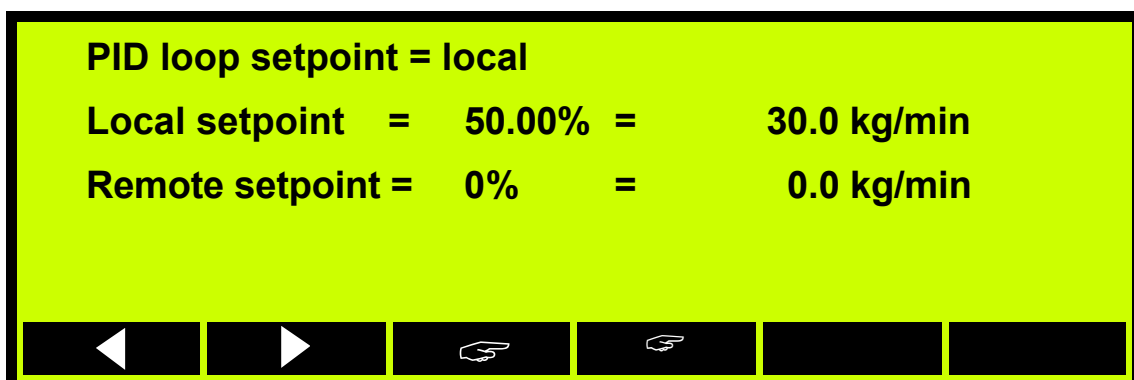
On selecting Menu 3 PID Loop Control the screen changes to that shown below.



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

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

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



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

---

## **OPTIMUS OPERATIONAL MANUAL.**



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

---

**Local setpoint (% of belt capacity)**

**50.0**





New value

**DEL****CLEAR**

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.

**PID loop setpoint = remote**

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





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

**Local setpoint ( in kg/min)**

**75.0**

New value

**DEL****CLEAR**

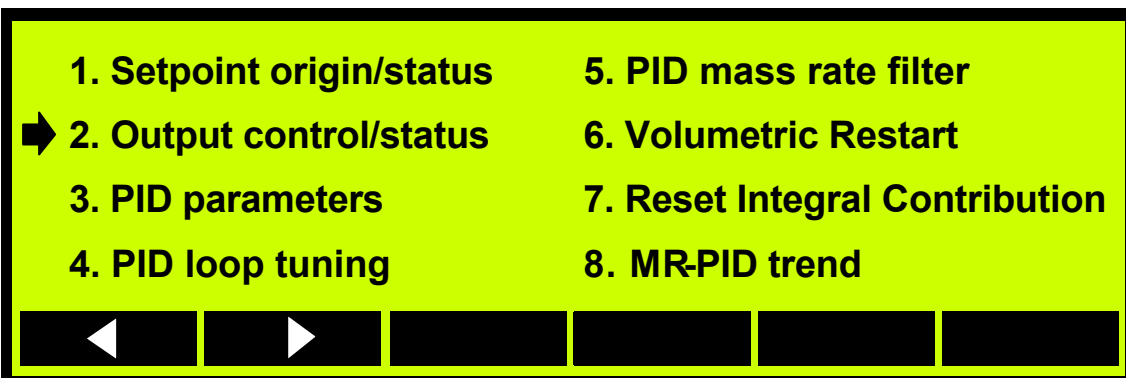
Press the tick key to lock in the data and return to the setup screen.

# OPTIMUS OPERATIONAL MANUAL.

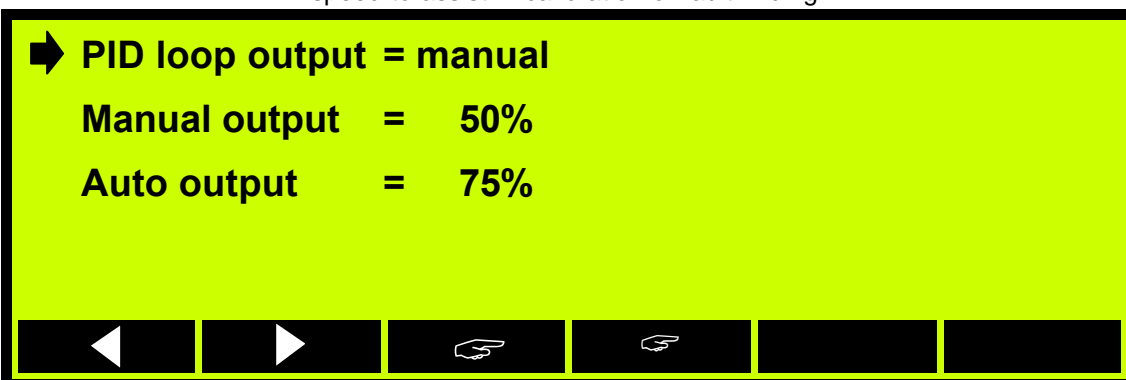
## System Setup / PID Loop Control / Output control / status.

### Output Control & Status.

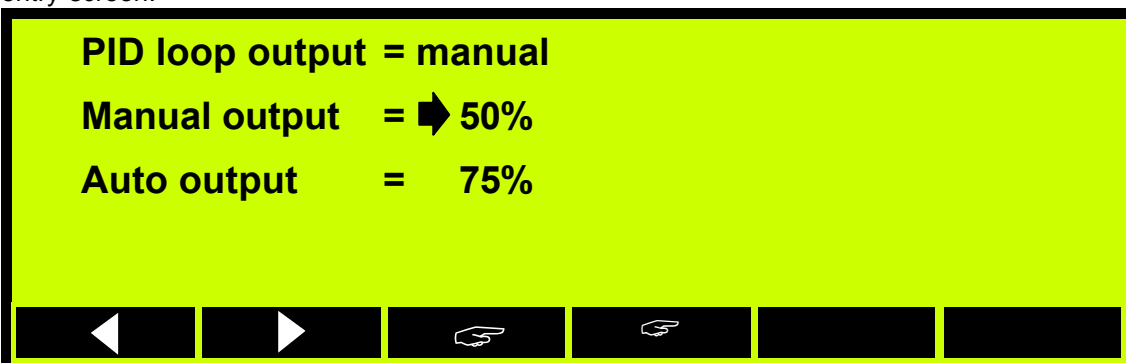
Optimus's analogue output whilst in the Automatic mode can be viewed from the menu shown below. When in the Manual mode the analogue output can be forced from the keypad.



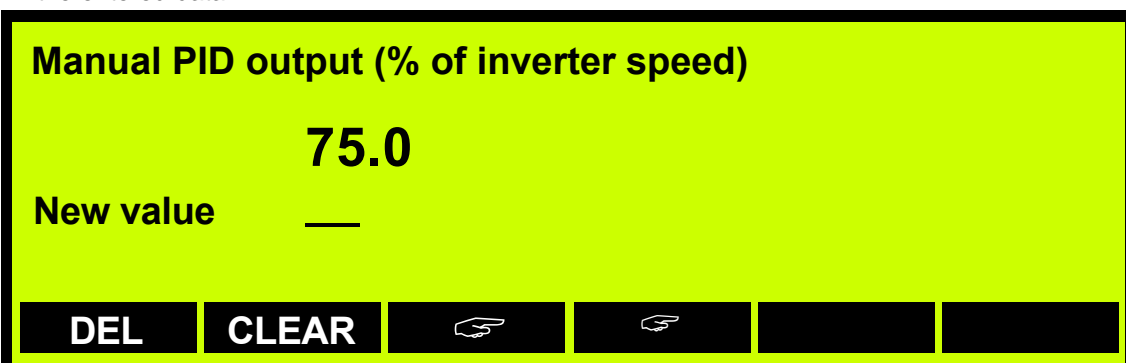
On selecting Menu 2 Output Control & Status screen changes to that shown below. The PID loop can be toggled between “manual” & “remote”. This feature allows the user to set the belt speed to assist in calibration or fault finding.



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



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



# OPTIMUS OPERATIONAL MANUAL.

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

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

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

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

◀	▶	SETUP			
---	---	-------	--	--	--

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

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

◀	▶	☞	☞		
---	---	---	---	--	--

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

DEL	CLEAR	☞	☞		
-----	-------	---	---	--	--

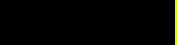
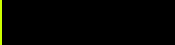




Enter the value required for the Proportional screen and press the Tick key to accept and return to the PID screen.

# **OPTIMUS OPERATIONAL MANUAL.**

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

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


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







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

**PID reset rate ( resets/sec)**

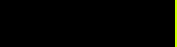
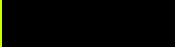




**+0.100**

New value 

**DEL** **CLEAR** 

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


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






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

**PID integral lower limit (%)**

**-50.0**

New value 

**DEL** **CLEAR** **+/-** 

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

---

# **OPTIMUS OPERATIONAL MANUAL.**

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

---

Use the scroll keys to access the Integral Lower Limit.

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

◀

▶

☞

☞

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

PID integral upper limit (%)

+50.0

New value —

DEL

CLEAR

☞

☞

+/-

Scroll to the Derivative using the scroll keys.

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

◀

▶

☞

☞

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

PID derivative time (secs)

+0.000

New value —

DEL

CLEAR

☞

☞




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

# **OPTIMUS OPERATIONAL MANUAL.**

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

Use the scroll keys to access the Feed forward term.

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







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

**PID feed forward factor**







1.000

New value —

**DEL** **CLEAR** 

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

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







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

**PID output offset term**

+0.000

New value —

**DEL** **CLEAR** 

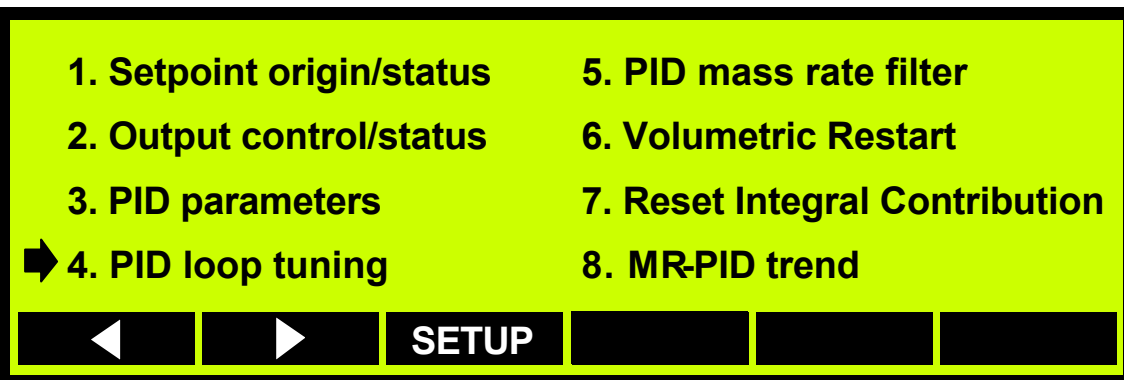
Press the tick key to lock in the data. The display will then return to the main PID setup screen

# OPTIMUS OPERATIONAL MANUAL.

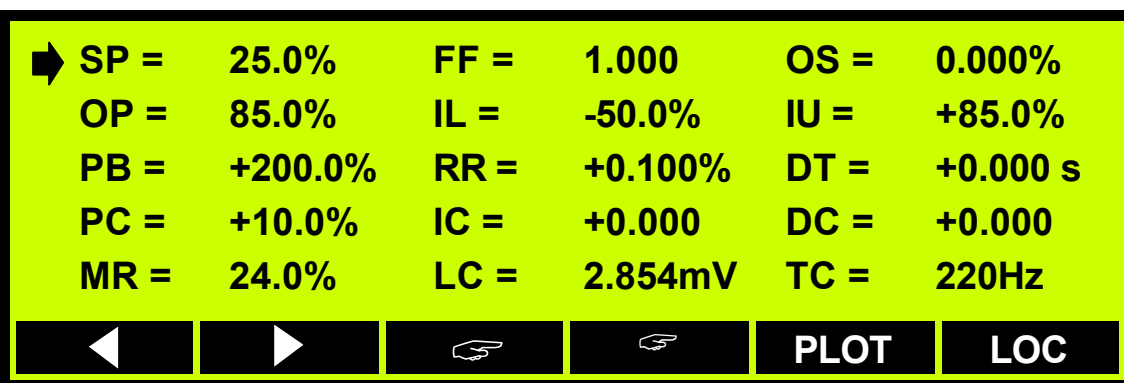
## System Setup / PID Loop Control / pid loop tuning.

### PID Loop Tuning.

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



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.

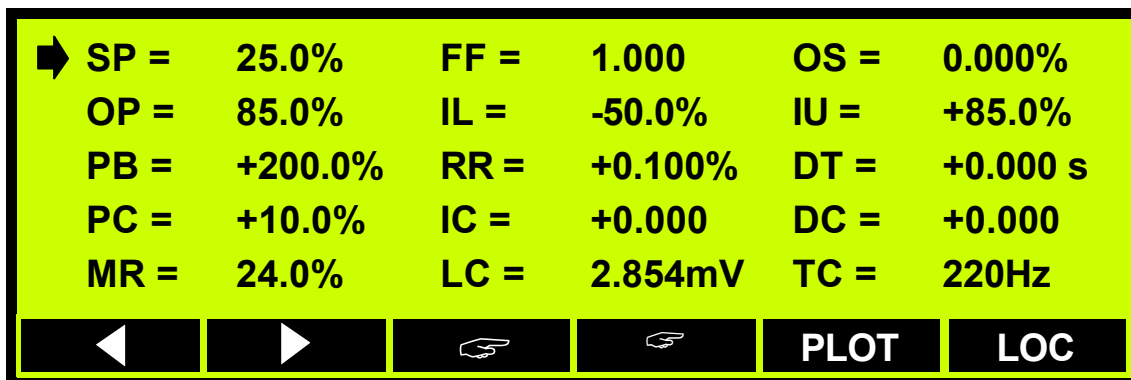
# OPTIMUS OPERATIONAL MANUAL.

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

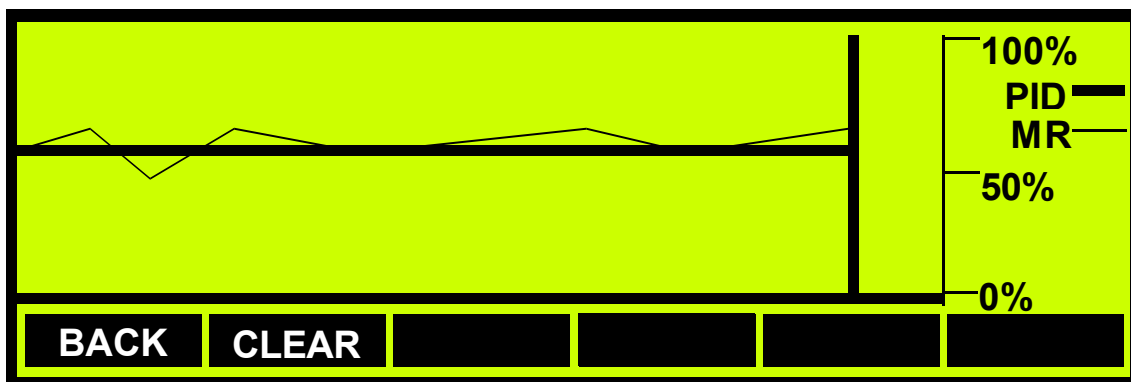
### PID Loop Tuning. (Continued)

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

**LOC (F6)** Pressing the LOCAL (F6) toggles Optimus between the setpoint being 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 judicious use of this feature the weighfeeder system can be restrained from reacting to anomalies in belt loading caused by irregular prefeed or lumpy feed.

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

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

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







**SETUP**

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

**PID mass rate filter enabled (fast track inactive)**

➡ Time constant = 3 s

Fast track threshold = 100%



**PID mass-rate filter time constant.**

**3**

New value -

**DEL****CLEAR**

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

---

## **OPTIMUS OPERATIONAL MANUAL.**

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

---

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

**PID mass rate filter enabled (fast track inactive)**

**Time constant = 3 s**

➡ **Fast track threshold = 100%**

◀

▶

☞

☜

The “Fast track threshold” data entry screen.

**PID mass-rate filter fast track threshold.**

**20**

**New value      -**

**DEL**

**CLEAR**

☞

☜

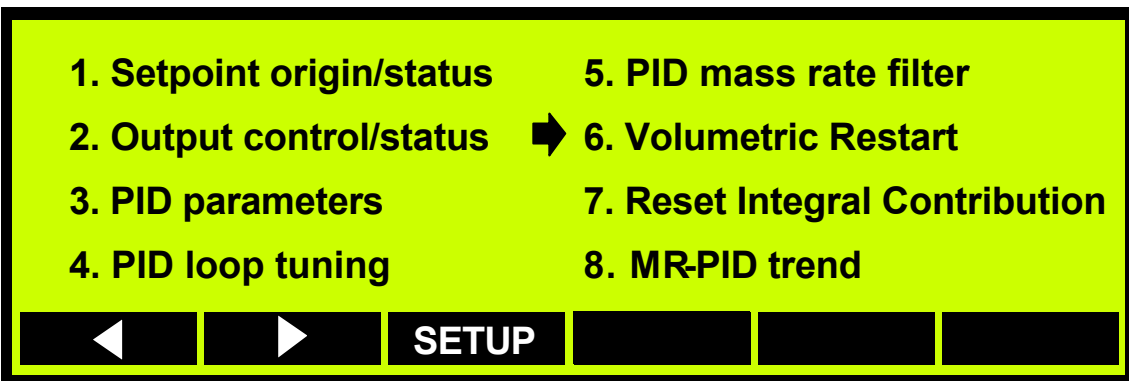
Enter the value required. Note a value of zero or 100% will render the “Fast track feature inoperable. Press the tick key to return to the main PID setup screen.

# OPTIMUS OPERATIONAL MANUAL.

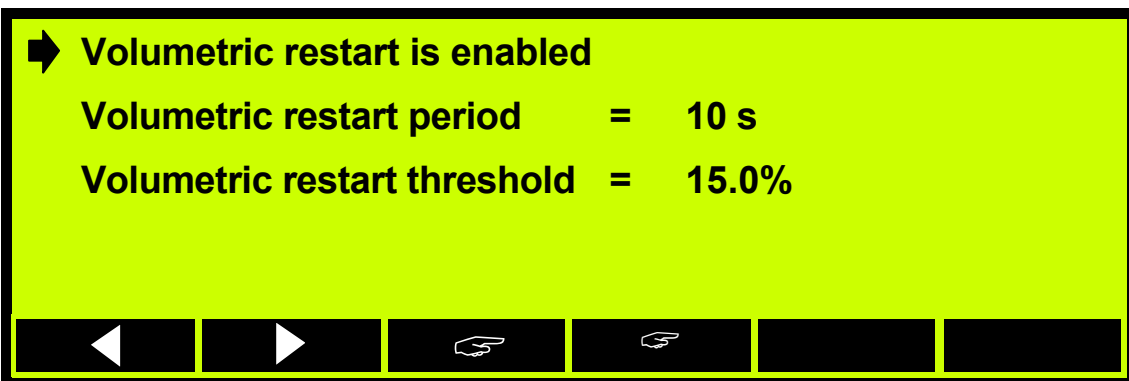
## System Setup / PID Loop Control / volumetric restart.

### Volumetric Restart.

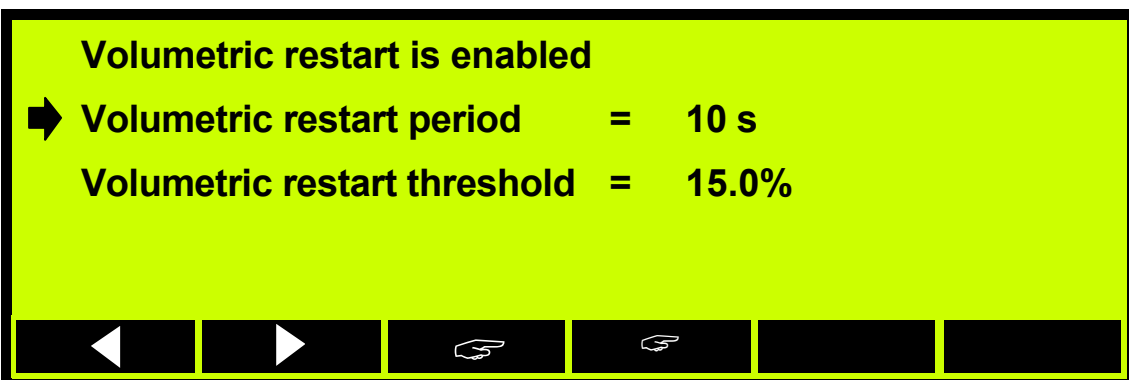
In applications where the weighfeeder is constantly stopping and starting. It is advantageous in terms of feeder control, to freeze the control algorithm when the feeder is halted by a supervisory system or operator. The Volumetric Restart feature allows the user to freeze the PID control action at the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



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



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



---

# **OPTIMUS OPERATIONAL MANUAL.**

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

---

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


**Volumetric restart period (in seconds)**


10

New value -

DEL

CLEAR







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


**Volumetric restart is enabled**


Volumetric restart period = 10 s

➡ Volumetric restart threshold = 15.0%









+

-

The “Volumetric restart threshold” acts in conjunction with the “Volumetric restart period”. It will override the volumetric restart period, if enabled and the mass rate is calculated as being within percentage set in this menu. This provides for a fast 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.

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

15.0

New value -

DEL

CLEAR





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

---

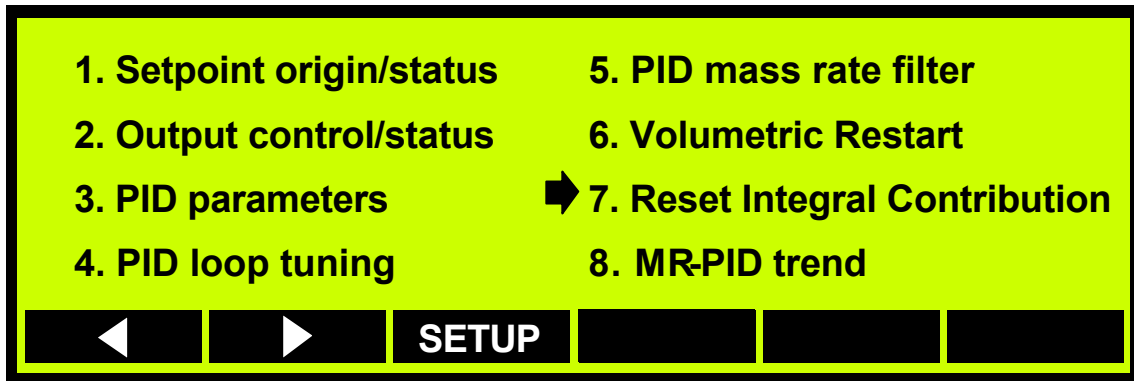
## **OPTIMUS OPERATIONAL MANUAL.**

### **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.

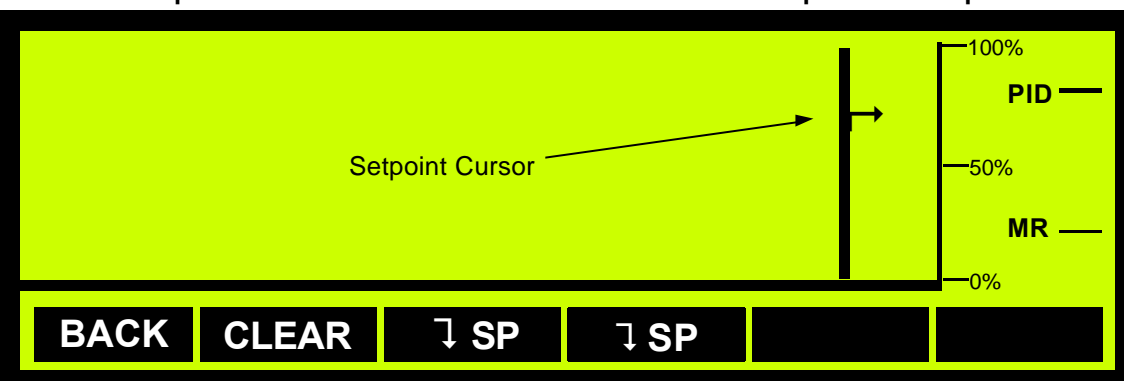
1. Setpoint origin/status	5. PID mass rate filter
2. Output control/status	6. Volumetric Restart
3. PID parameters	7. Reset Integral Contribution
4. PID loop tuning	➡ 8. MR-PID trend

◀

▶

SETUP

On selecting Menu 8 changes to that shown below. There are two traces, Mass Rate (MR) and PID output (PID). To exit this menu 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.

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

◀

▶

SETUP

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

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

◀

▶

---

## OPTIMUS OPERATIONAL MANUAL.

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

---

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

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

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

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

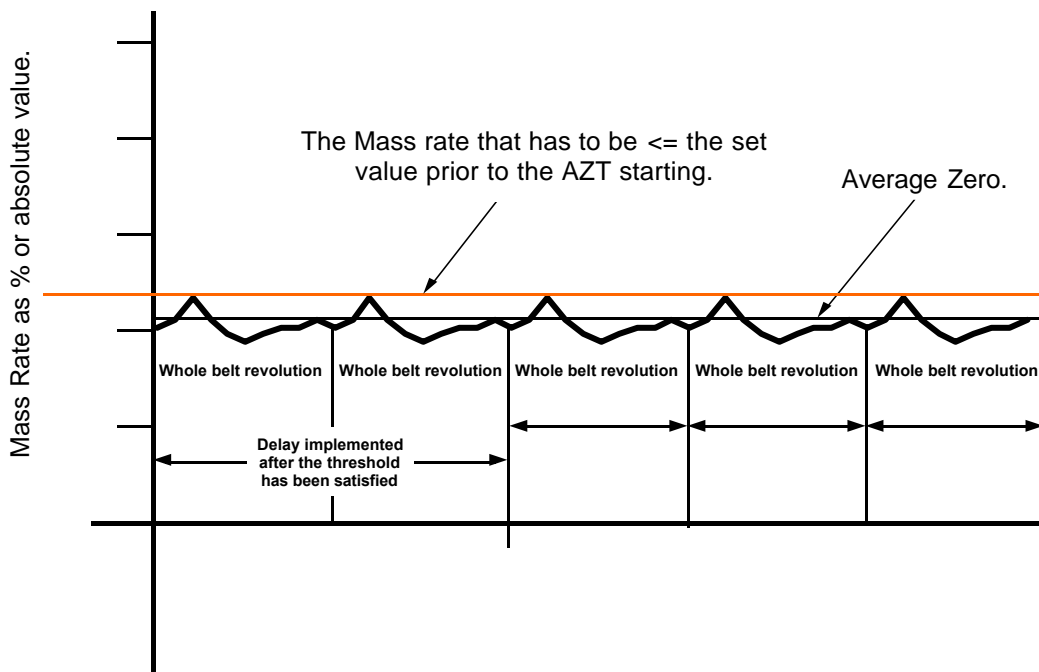
Continuous weighing systems are more complex and require more conditions to be satisfied prior to an AZ being performed. The function can be enabled or disabled by toggling the 'ENTER' key when the sect arrow is along side the field.

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 be performed over. A good knowledge of the process is necessary to enter a value here.

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

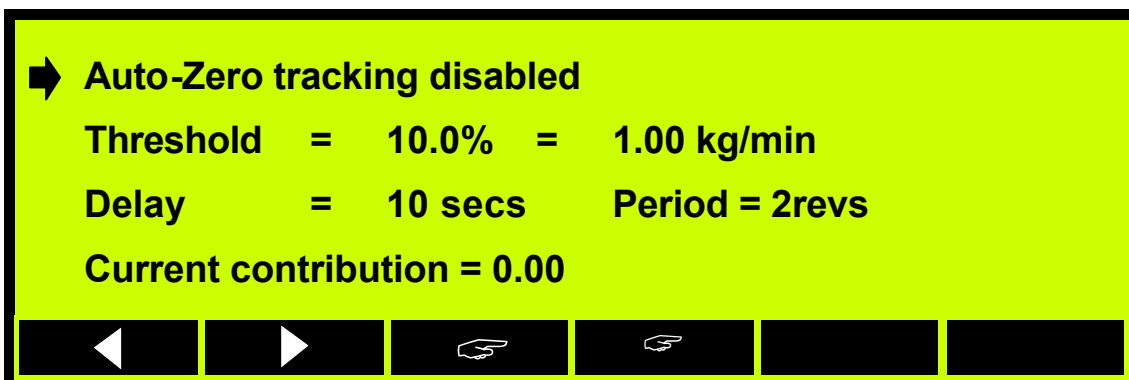
The value shown in the "Current Contribution" field displays the offset that Optimus has applied to the manual zero found during the manual zero process. It is reset after each manual zero has been performed.



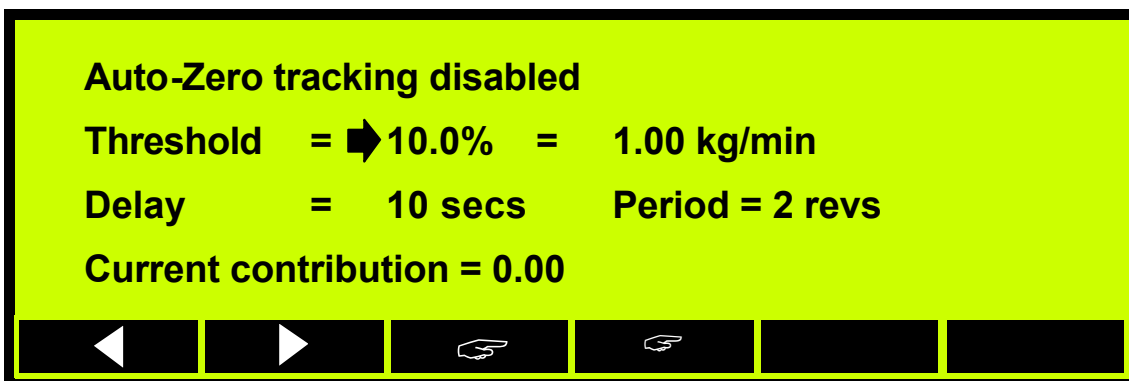
## OPTIMUS OPERATIONAL MANUAL.

### System Setup / Auto Zero Tracking.

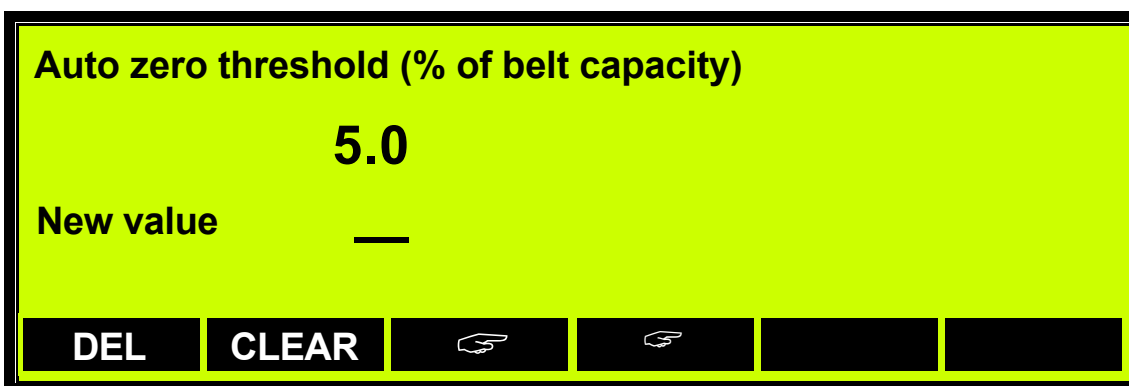
Toggling the “ENTER” key here will either enable or disable the Auto Zero Tracking function (AZT).



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

---

## OPTIMUS OPERATIONAL MANUAL.

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

---

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

➡ **Auto-Zero tracking disabled**

Threshold     =    10.0%     =    1.00 kg/min

Delay            =    10 secs       Period = 2revs

Current contribution = 0.00

◀

▶

☞

☞

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

Auto zero threshold ( in kg/min)

10.0

New value            —

DEL

CLEAR

☞

☞

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

---

## OPTIMUS OPERATIONAL MANUAL.

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

---

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

**Auto-Zero tracking disabled**

➡ **Threshold = 10.0% = 1.00 kg/min**

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

**Current contribution = 0.00**

◀▶👉👈

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

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

**10.0**

**New value**            

**DEL****CLEAR**👉👈

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.

**Auto-Zero tracking disabled**

Threshold = 10.0% = 1.00 kg/min

➡ Delay = 10 secs      Period = 2revs

Current contribution = 0.00

◀

▶

☞

☞

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

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

**10.0**

New value      —

DEL

CLEAR

☞

☞

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

---

## OPTIMUS OPERATIONAL MANUAL.

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

---

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

**Auto-Zero tracking disabled**

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

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

**Current contribution = 0.00**

◀▶☞☜

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

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

**5**

**New value        —**

**DEL****CLEAR**☞☜

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

---

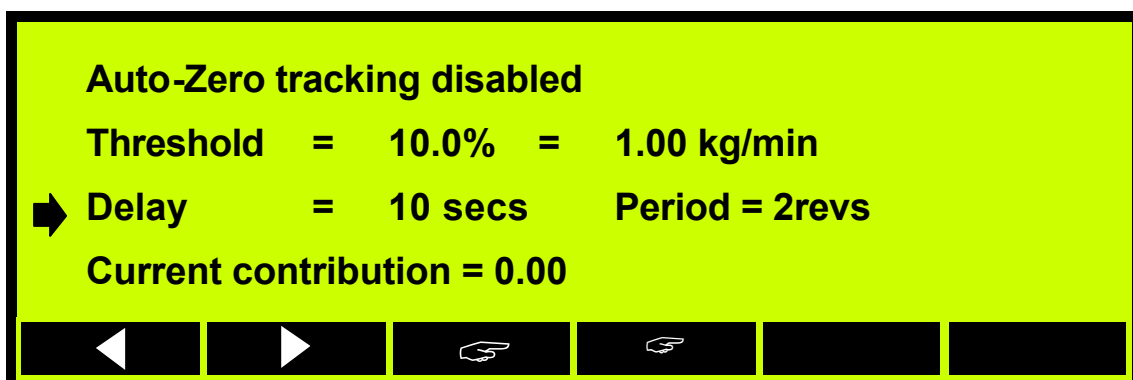
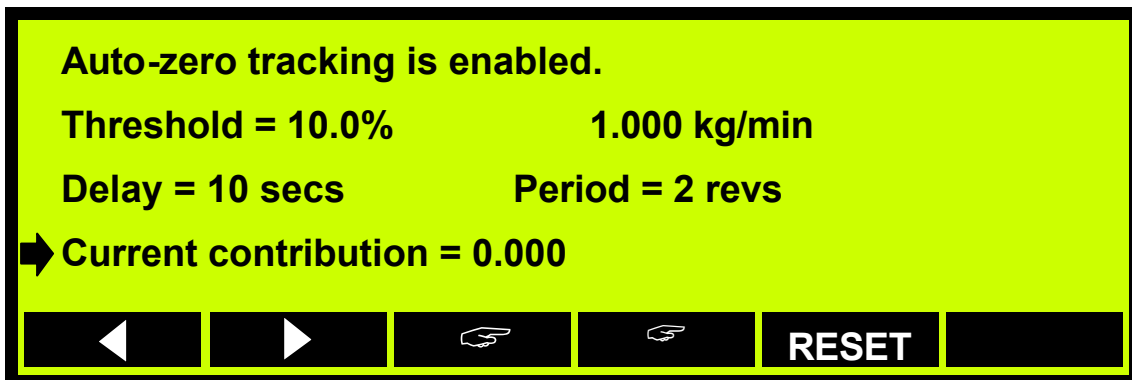
## OPTIMUS OPERATIONAL MANUAL.

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

---

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


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



---

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

---

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




Rate deadband (in kg/min)

1.8

New value

—



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



---

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

---

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



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



Rate deadband (as % of belt capacity)

**2.0**

New value

—



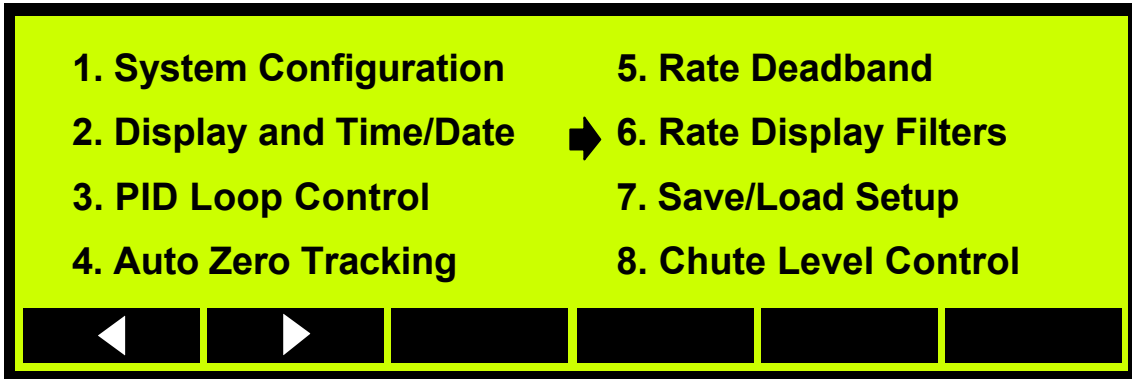
---

## OPTIMUS OPERATIONAL MANUAL.

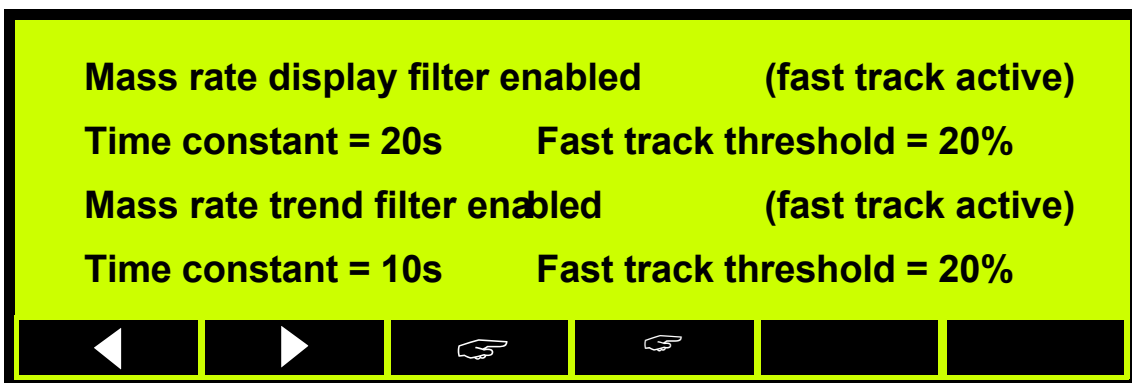
### System Setup / Rate Display Filters / time constant.

---

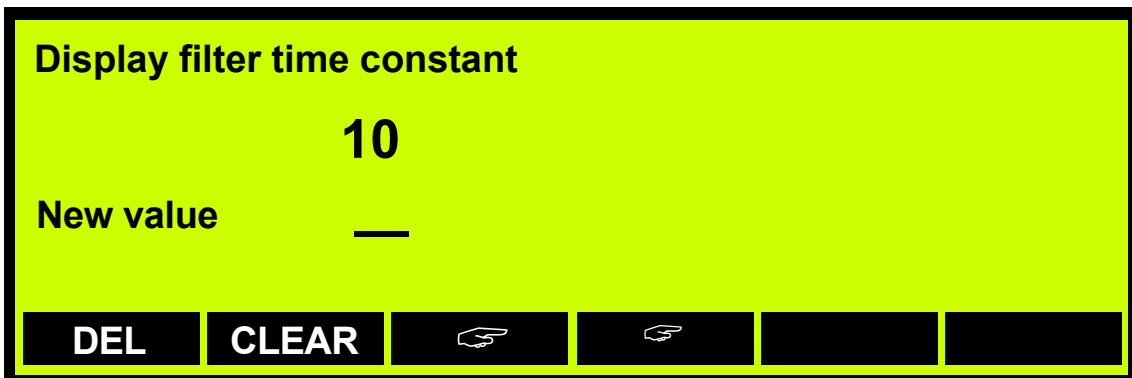
The analogue Mass Rate output signal can be filtered. Scroll to Rate Display Filter and press “ENTER” to show the menu for mass Rate Filtering.



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



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



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

## OPTIMUS OPERATIONAL MANUAL.

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

#### The Mass Rate Filter.

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

Mass rate display filter enabled (fast track active)

Time constant = 20s Fast track threshold = 20%

Mass rate trend filter enabled (fast track active)

Time constant = 10s Fast track threshold = 20%



Display filter fast track threshold

1.0

New value

—



Mass rate display filter enabled (fast track active)

Time constant = 20s Fast track threshold = 20%

Mass rate trend filter enabled (fast track active)

Time constant = 10s Fast track threshold = 20%



Trend filter time constant

5.0

New value

—



---

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

---

**Mass rate display filter enabled (fast track active)**

**Time constant = 20s Fast track threshold = 20%**

**Mass rate trend filter enabled (fast track active)**

**Time constant = 10s Fast track threshold = 20%**



**Trend filter fast track threshold**

**20**

**New value**

—



---

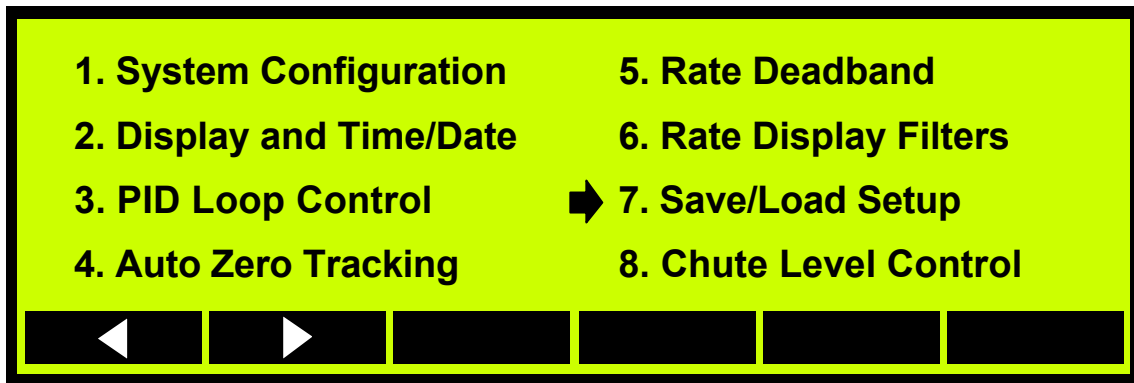
## OPTIMUS OPERATIONAL MANUAL.

### System Setup / Save / Load Setup.

---

#### Save/Load Setup.

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



Scroll on to save/load Setup.

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



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



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

---

## 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.

**Files on card**

➡ **File 00**      -----

-----

-----

-----

-----

-----

⏪ ⏩ **SAVE** **LOAD** **ERASE**

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

**Files on card**

➡ **File loaded**

**!**

**Press ENTER to proceed**

⏪ ⏩ **SAVE** **LOAD** **ERASE**

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

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

## OPTIMUS OPERATIONAL MANUAL.

### System Setup / Chute Level Control.

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

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



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

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

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



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

## OPTIMUS OPERATIONAL MANUAL.

### System Setup / Chute Level Control.

No probe chute output ratio (in %)

100.0

New value

—

DEL

CLEAR



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

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



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

Low probe chute output ratio (in %)

90.0

New value

—

DEL

CLEAR



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

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



---

## OPTIMUS OPERATIONAL MANUAL.

### System Setup / Chute Level Control.



---

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

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





**85.0**

New value

DEL	CLEAR				
-----	-------	---	---	--	--

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

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



					
---	---	---	---	--	--

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

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

**50.0**

New value

DEL	CLEAR				
-----	-------	---	---	--	--

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.

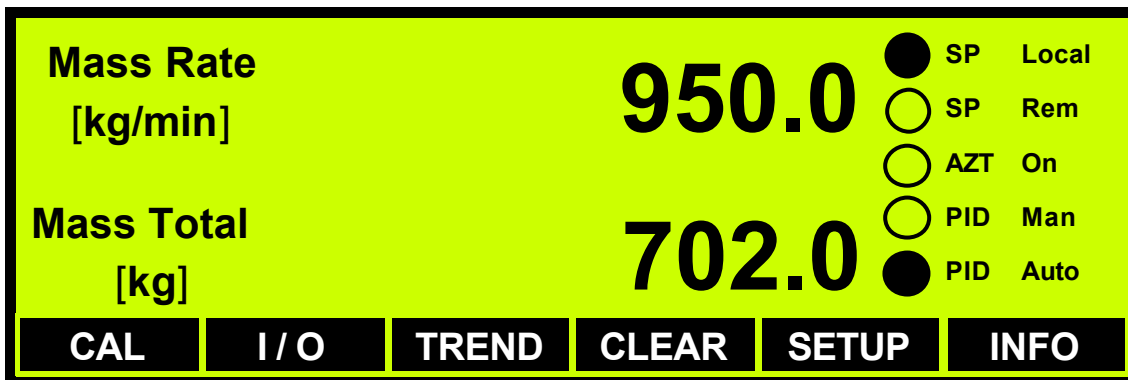
# OPTIMUS OPERATIONAL MANUAL.

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

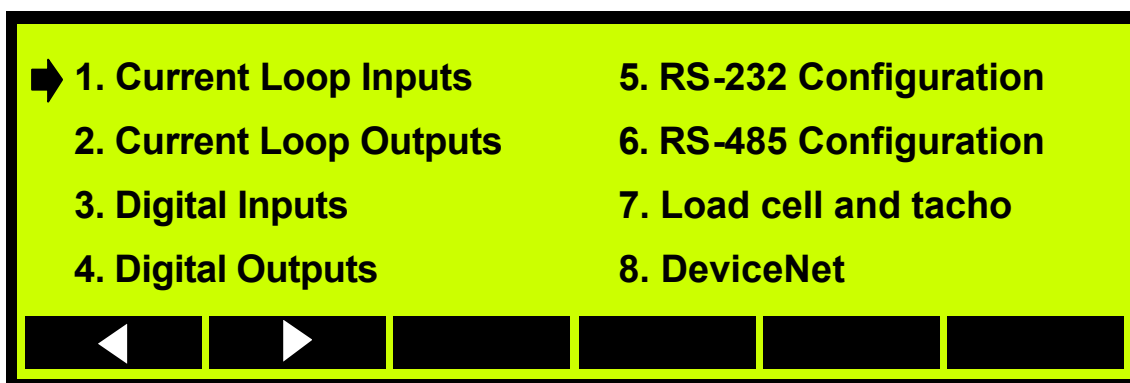
Optimus provides six for (6) analogue input circuits. One is reserved for the Remote Rate Input. The remaining five are re-assignable. Optimus's analogue inputs are current and can be configured to be one of the following.

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

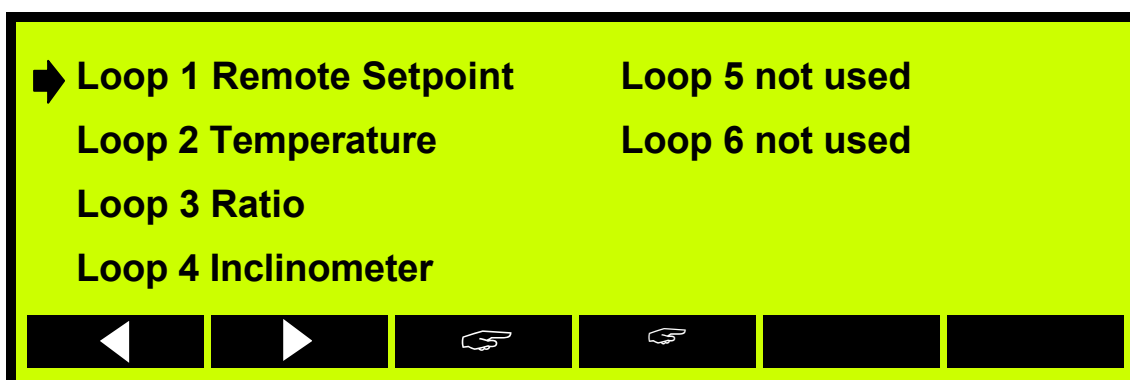
From the MRMT screen select the Input / Output ( I/O ) F2 key



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.



# **OPTIMUS OPERATIONAL MANUAL.**

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

### **Loop 1 Setup**

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

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

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

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

Scroll on to the “Parameters”

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

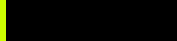
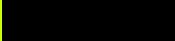




## OPTIMUS OPERATIONAL MANUAL.

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

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


**Loop input 1 remote setpoint parameters**

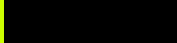
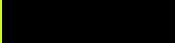


Master capacity	=	60 kg/minute
Slave %	=	100% of master
Input	=	60 kg/minute



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

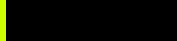
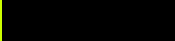




**100.0**

New value 

**DEL** **CLEAR** 


**Loop input 1 remote setpoint parameters**

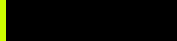
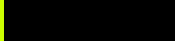


Master capacity	=	60 kg/minute
➡ Slave %	=	100% of master
Input	=	60 kg/minute



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

**100.0**

New value 







**DEL** **CLEAR** 

## OPTIMUS OPERATIONAL MANUAL.

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

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

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









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

Loop filter enabled (fast track active)

➡ Time constant = 5s

Fast track threshold = 15%



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

Input filter time constant

5.0

New value —

DEL

CLEAR









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

Loop filter enabled (fast track active)

Time constant = 5s

➡ Fast track threshold = 15%



## **OPTIMUS OPERATIONAL MANUAL.**

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

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

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

Time constant = 4s

➡ Fast track threshold = 15%

◀ ▶ ↩ ↪

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

**Input filter fast-track threshold**

15.0

New value —

DEL CLEAR ↩ ↪

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

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

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

◀ ▶ ↩ ↪

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

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

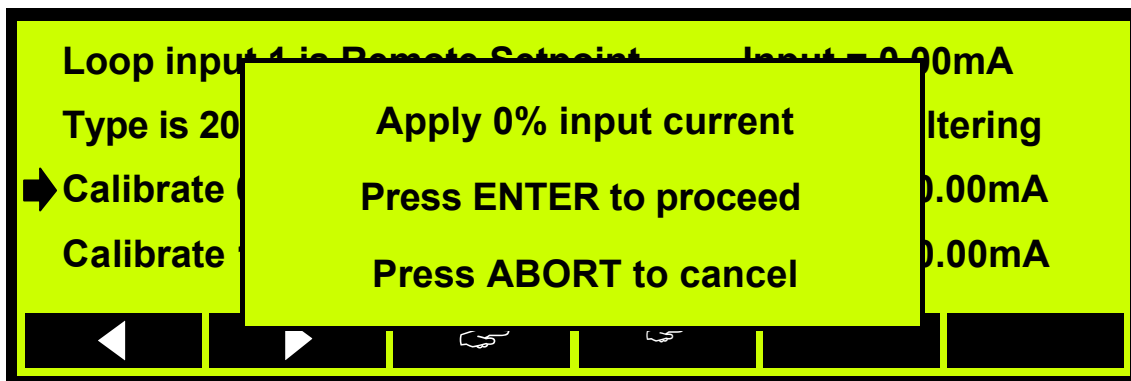
Type is 4-20 mA	Parameters	Filtering
➡ Calibrate 0%	Current 0%	20.00mA
Calibrate 100%	Current 100%	0.00mA

◀ ▶ ↩ ↪

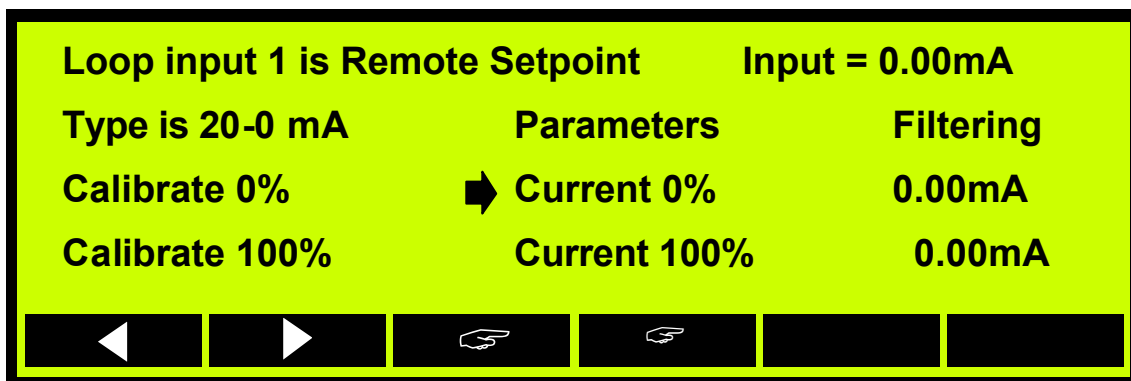
## OPTIMUS OPERATIONAL MANUAL.

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

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



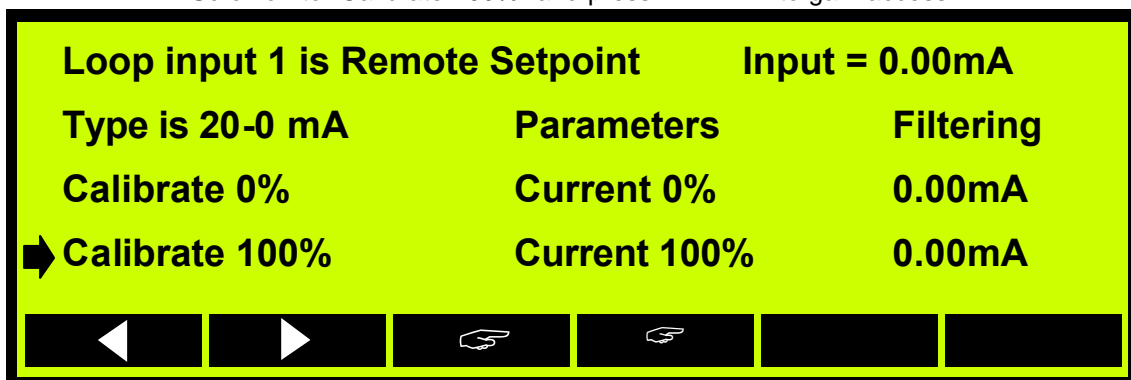
Scroll on to “Current 0%” . This input screen allows the user to enter the “zero” current as a percentage.



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



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



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

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

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

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

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

Apply 100% input current

Press ENTER to proceed

Press ABORT to cancel

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

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

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

100% current (in mA)	
0.00	
New value	
—	

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

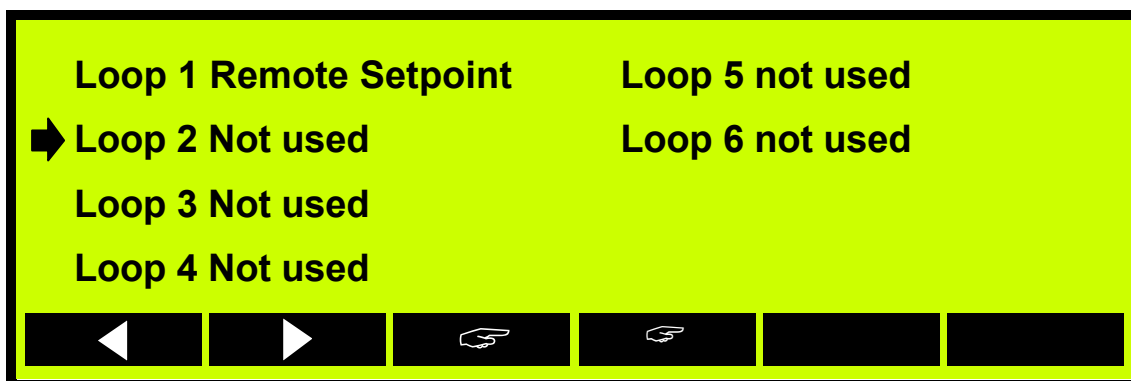
---

## **OPTIMUS OPERATIONAL MANUAL.**

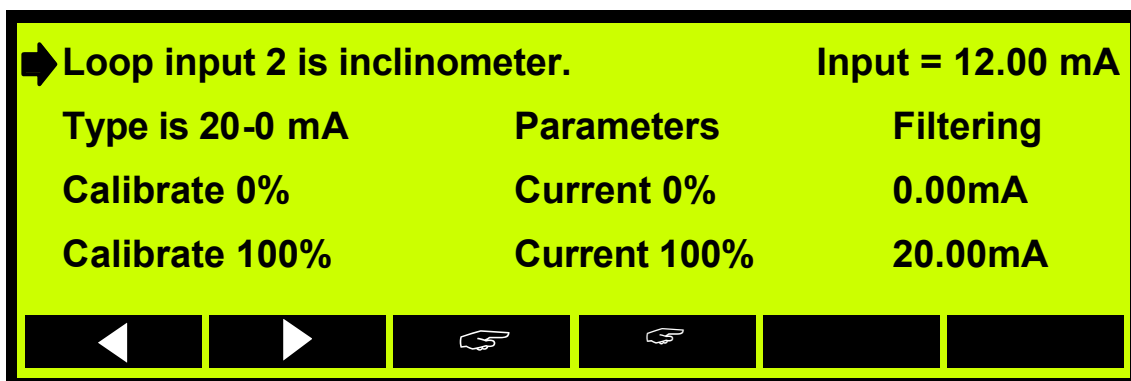
### **I/O (Input/Output) / Current Loop Inputs.**

---

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



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

---

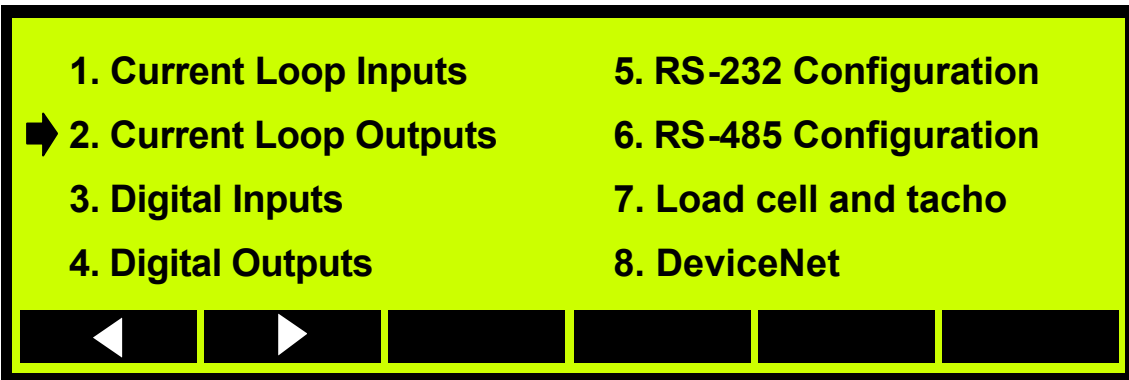
## OPTIMUS OPERATIONAL MANUAL.

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

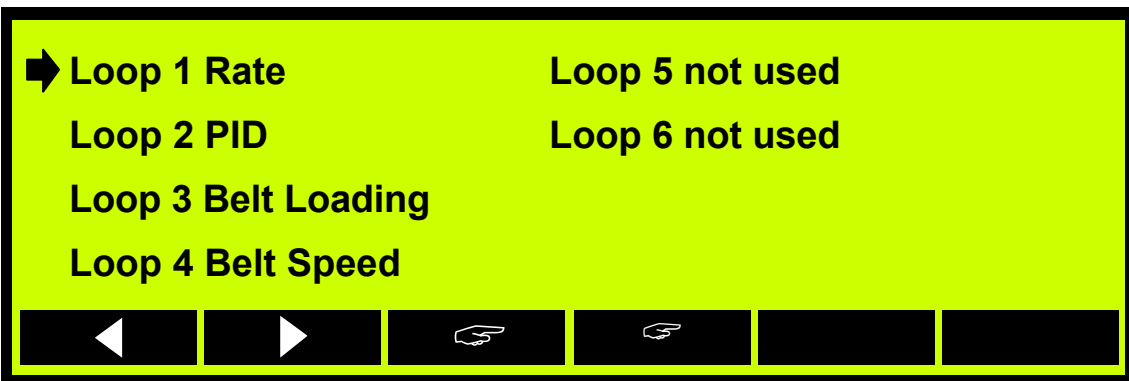
---

Optimus provides six (6) analogue output signals.

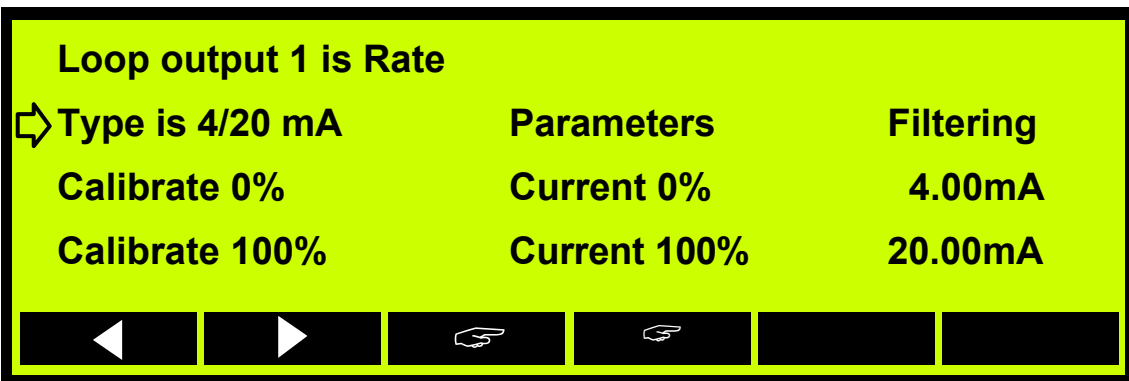
Channel 1 is pre-assigned to Mass Rate.  
Channel 2 is pre-assigned to PID Output.  
Channel 3 is assignable.  
Channel 4 is assignable.  
Channel 5 is assignable.  
Channel 6 is assignable.



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.


## **OPTIMUS OPERATIONAL MANUAL.**

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

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

**Loop output 1 is Rate**


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



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

**Loop output 1 is Rate**


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



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

**Loop output 1 is Rate**

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




Select the “Time constant” input screen.

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

➡ Time constant = 1s

Fast track threshold = 10%



---

## OPTIMUS OPERATIONAL MANUAL.

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

---

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

**Output filter time constant**

**5**

**New value**            







**DEL****CLEAR**

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

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

**Time constant = 5s**

➔ **Fast track threshold = 8%**







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

**Output filter fast-track threshold**

**8.0**

**New value**            

**DEL****CLEAR**

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

## **OPTIMUS OPERATIONAL MANUAL.**

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

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

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

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

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

**Output forced to 0%**  
**Press F1 to decrement**  
**Press F2 to increment**  
**Press ENTER to accept**

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.

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

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

---

## OPTIMUS OPERATIONAL MANUAL.

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



---

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

0% current (in mA)

4.0





New value      4.123

DELCLEAR

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

Loop output 1 is Rate

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



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

Loop output 1 is Rate

Type is 2





!      Output forced to 100%  
Press F1 to decrement  
Press F2 to increment  
Press ENTER to accept

Filtering

Calibrate

20.00mA

0.00mA



---

## OPTIMUS OPERATIONAL MANUAL.

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

---

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

**Loop output 1 is Rate**

<b>Type is 20-0 mA</b>	<b>Parameters</b>	<b>Filtering</b>
<b>Calibrate 0%</b>	<b>Current 0%</b>	<b>20.00mA</b>
<b>Calibrate 100%</b>	<b>➡ Current 100%</b>	<b>0.00mA</b>

◀

▶

☞

☞

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

**100% current**                      **(in mA)**

**20.00**

**New value**                      **20.456**

**DEL**

**CLEAR**

☞

☞

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

**Loop output 1 is Rate**

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

◀

▶

☞

☞

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.

---

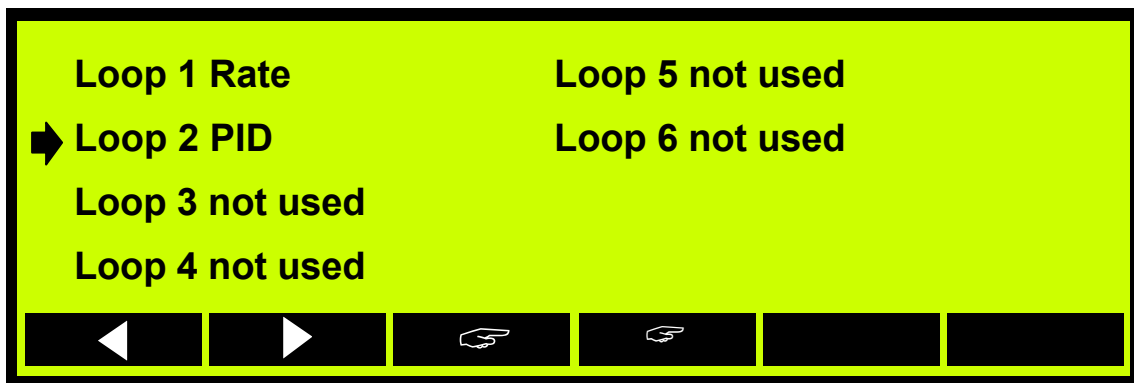
## **OPTIMUS OPERATIONAL MANUAL.**

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

---

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

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



# **OPTIMUS OPERATIONAL MANUAL.**

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

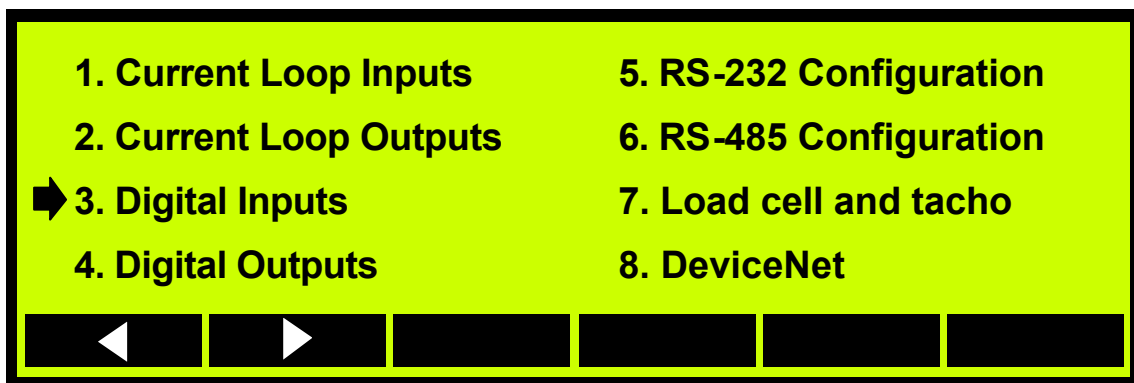
### **Digital Inputs.**

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

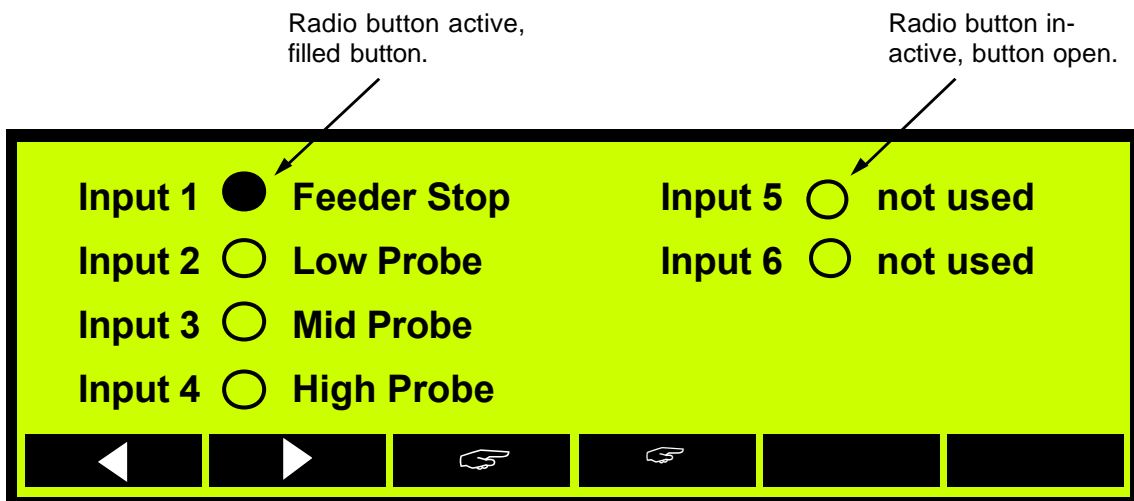
Each of the six digital inputs can be assigned a label. From the factory the labels are pre-assigned as follows:-

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.**

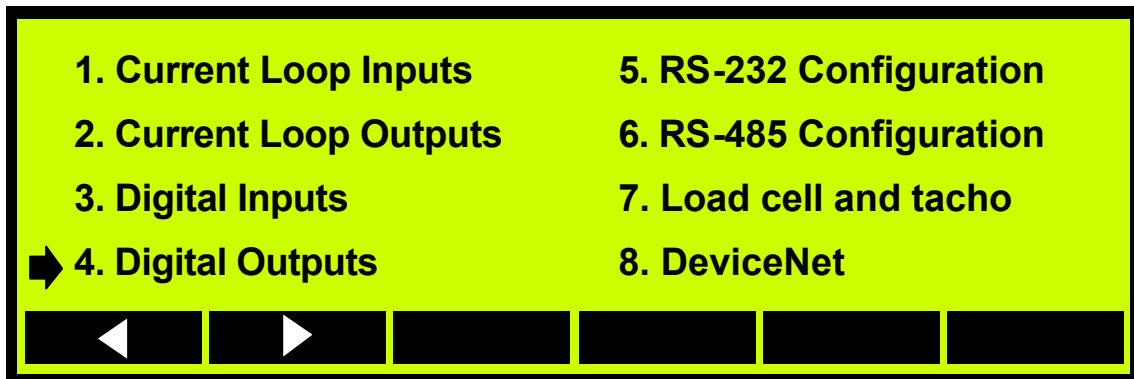
## **I/O (Input/Output) / Digital outputs.**

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.

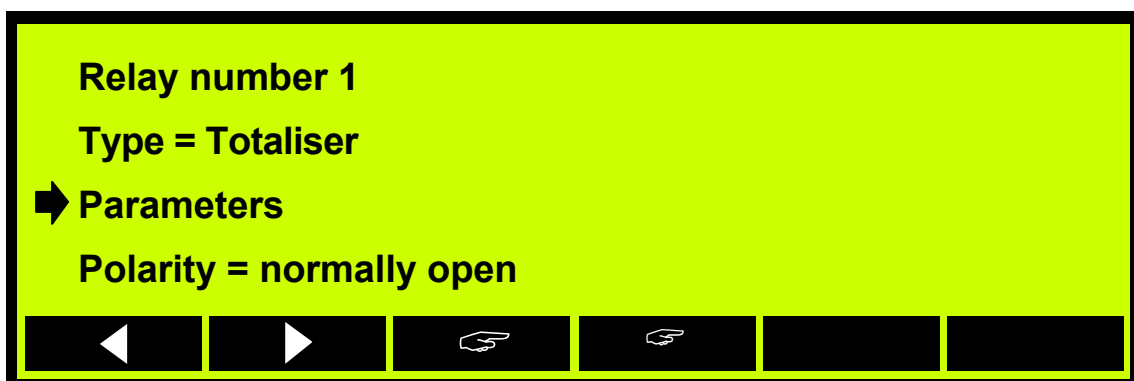
From the factory the labels are:-

- |   |                  |  |
|---|------------------|--|
| 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.

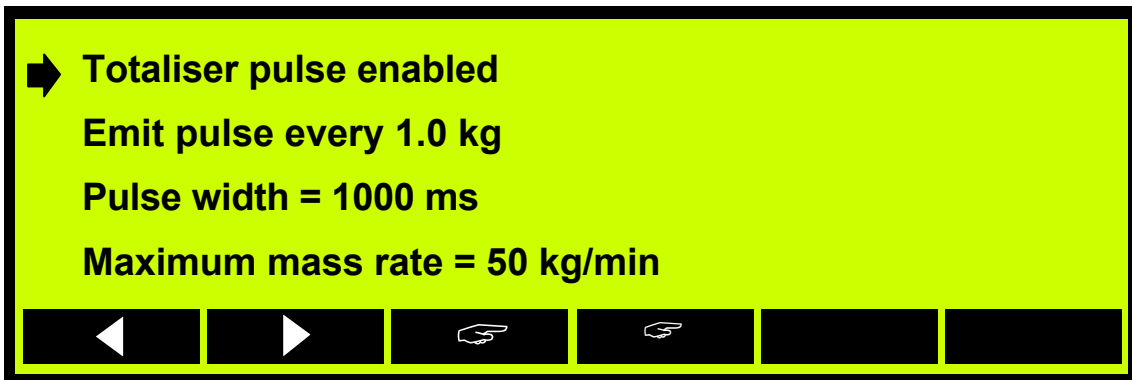


Scroll to "Digital Outputs" and press the "ENTER" key to access the output configuration screens. Relay 1 has been pre-assigned to the Totaliser. Relay 2 has been pre-assigned to the "System Healthy"



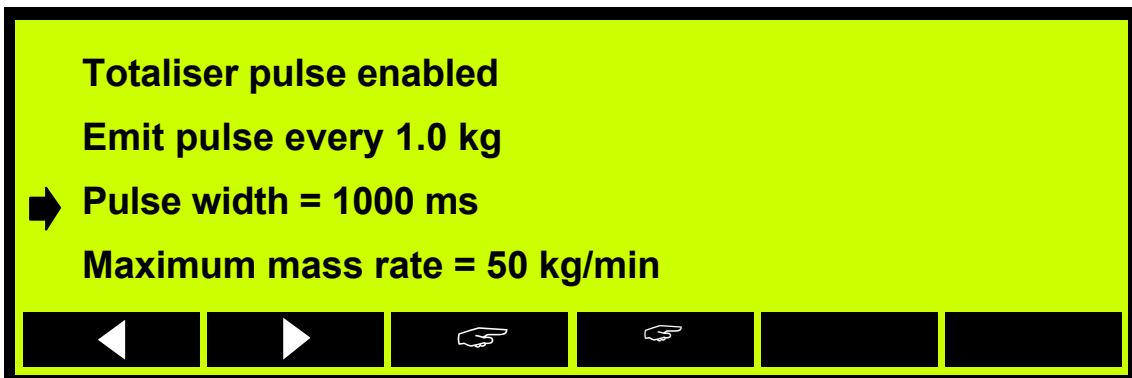
## **OPTIMUS OPERATIONAL MANUAL.** **I/O (Input/Output) / Digital outputs.**

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 result 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

## OPTIMUS OPERATIONAL MANUAL.

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

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

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



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

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



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

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



Scroll on to the parameters entry point.

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



Scroll on to the parameters entry point.

## **OPTIMUS OPERATIONAL MANUAL.**

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

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

**➡ Alarm is enabled**

Delay =

2 sec

Level =

110% of belt capacity

=

106 kg/min

◀

▶

☞

☞

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

**Alarm is enabled**

➡ Delay =

2 sec

Level =

110% of belt capacity

=

106 kg/min

◀

▶

☞

☞

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

**Alarm delay (in seconds)**

2

New value

—

DEL

CLEAR

☞

☞

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

**Alarm is enabled**

➡ Delay =

2 sec

Level =

110% of belt capacity

=

106 kg/min

◀

▶

☞

☞

## OPTIMUS OPERATIONAL MANUAL.

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

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

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

110

New value —

DEL

CLEAR

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

**Alarm is enabled**

➡

Delay = 2 sec

Level = 110% of belt capacity

= 106 kg/min

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

Relay 1 ☐ Totaliser

Relay 5 ☐ Speed Alarm

Relay 2 ☒ System Healthy

Relay 6 ☐ Load Cell Alarm

Relay 3 ☐ Rate Alarm

➡ Relay 4 ☐ Deviation Alarm

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

**Relay number 4**

Type = Deviation Alarm

➡ Parameters

Polarity = Energised outside band

## OPTIMUS OPERATIONAL MANUAL.

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

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

**➡ Alarm is enabled**

Delay

=

4 sec

Deviation

= +/-

5% of belt capacity

= +/-

3 kg/min

◀

▶

☞

☞

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

**Alarm is enabled**

**➡**

Delay

=

4 sec

Deviation

= +/-

5% of belt capacity

= +/-

3 kg/min

◀

▶

☞

☞

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

**Alarm delay (in seconds)**

Current value

4

New value

—

DEL

CLEAR

☞

☞

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

**Alarm is enabled**

**➡**

Delay

=

4 sec

Deviation

= +/-

5% of belt capacity

= +/-

3 kg/min

◀

▶

☞

☞

## OPTIMUS OPERATIONAL MANUAL.





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

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

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

**Current value**            **5**

**New value**                **6**

**DEL**   **CLEAR**            







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

**Alarm is enabled**

➔ **Delay**            =            **4 sec**

**Deviation**       = +/-       **6.0% of belt capacity**

                             = +/-       **4 kg/min**







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

**Relay number 4**

**Type**                        =            **Deviation Alarm**

**Parameters**

➔ **Polarity**                =            **Energised outside band**

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

**Relay 1** ☐ **Totaliser**                        **Relay 5** ☐ **Speed Alarm**

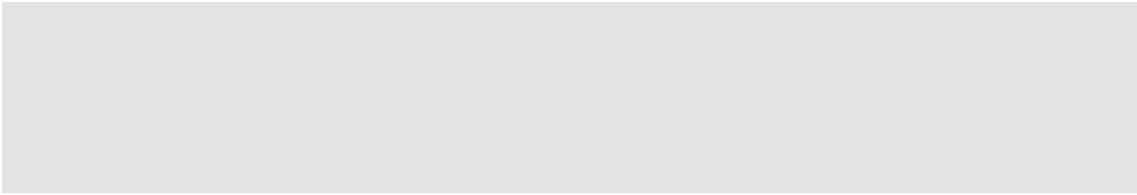
**Relay 2** ☒ **System Healthy**            **Relay 6** ☐ **Load Cell Alarm**

➔ **Relay 3** ☐ **Rate Alarm**





**Relay 4** ☐ **Deviation Alarm**




**OPTIMUS OPERATIONAL MANUAL.**  
**I/O (Input/Output) / RS-232 Configuration.**







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



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



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



**OPTIMUS OPERATIONAL MANUAL.**  
**I/O (Input/Output) / RS-232 Configuration.**

➡	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.

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

◀

▶

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

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

◀

▶

☞

☞

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

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

◀

▶

☞

☞

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

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

◀


▶

☞





☞

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

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

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

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

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

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

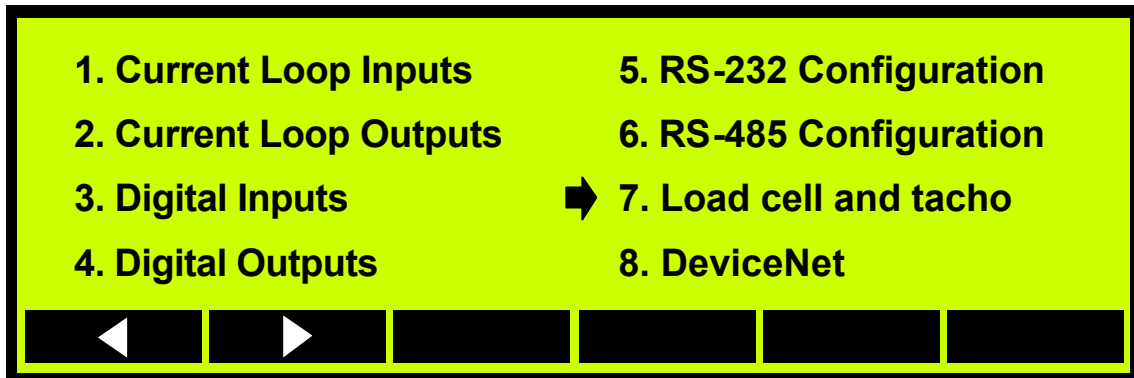
---

## **OPTIMUS OPERATIONAL MANUAL.**

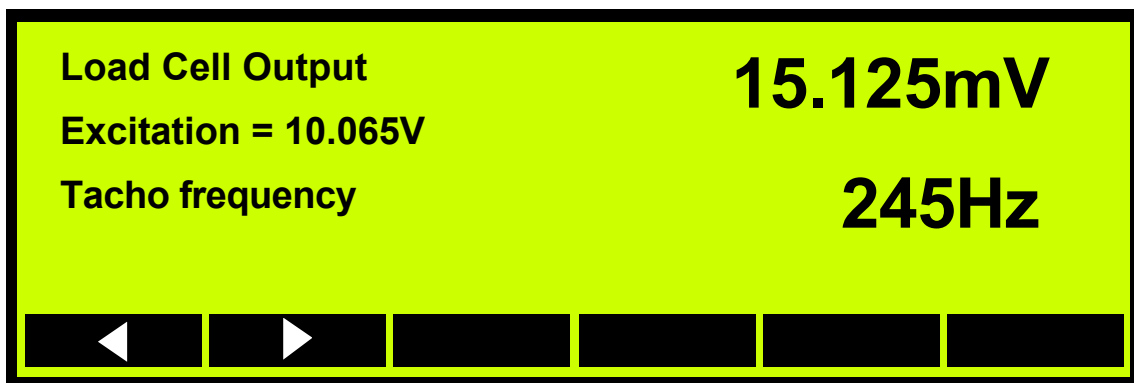
### **I/O (Input/Output) / Load Cell and Tachometer.**

---

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



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



---

## 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.

1. Current Loop Inputs	5. RS-232 Configuration
2. Current Loop Outputs	6. RS-485 Configuration
3. Digital Inputs	7. Load cell and tacho
4. Digital Outputs	➡ 8. DeviceNet
<div style="display: flex; justify-content: space-around;"><div style="width: 15%; text-align: center;">◀</div><div style="width: 15%; text-align: center;">▶</div><div style="width: 15%; text-align: center;">⏏</div><div style="width: 15%; text-align: center;">⏏</div><div style="width: 15%; text-align: center;">⏏</div><div style="width: 15%; text-align: center;">⏏</div></div>	

Press ENTER to access the DeviceNet setup screens.

➡	<b>Baud rate</b> 500kHz	
	<b>Mac ID</b> 10	
<b>Press CONFIG to configure card with parameters</b>		
<div style="display: flex; justify-content: space-around;"><div style="width: 15%; text-align: center;">◀</div><div style="width: 15%; text-align: center;">▶</div><div style="width: 15%; text-align: center;">⏏</div><div style="width: 15%; text-align: center;">⏏</div><div style="width: 15%; text-align: center; border: 2px solid black;"><b>CONFIG</b></div><div style="width: 15%; text-align: center;">⏏</div></div>		

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

➡	<b>Baud rate</b> 500kHz	
	<b>Mac ID</b> 63	
	<b>DeviceNet control</b> Disabled	
<b>Press CONFIG to configure card with parameters</b>		
<div style="display: flex; justify-content: space-around;"><div style="width: 15%; text-align: center;">◀</div><div style="width: 15%; text-align: center;">▶</div><div style="width: 15%; text-align: center;">⏏</div><div style="width: 15%; text-align: center;">⏏</div><div style="width: 15%; text-align: center; border: 2px solid black;"><b>CONFIG</b></div><div style="width: 15%; text-align: center;">⏏</div></div>		

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

---

# **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.**

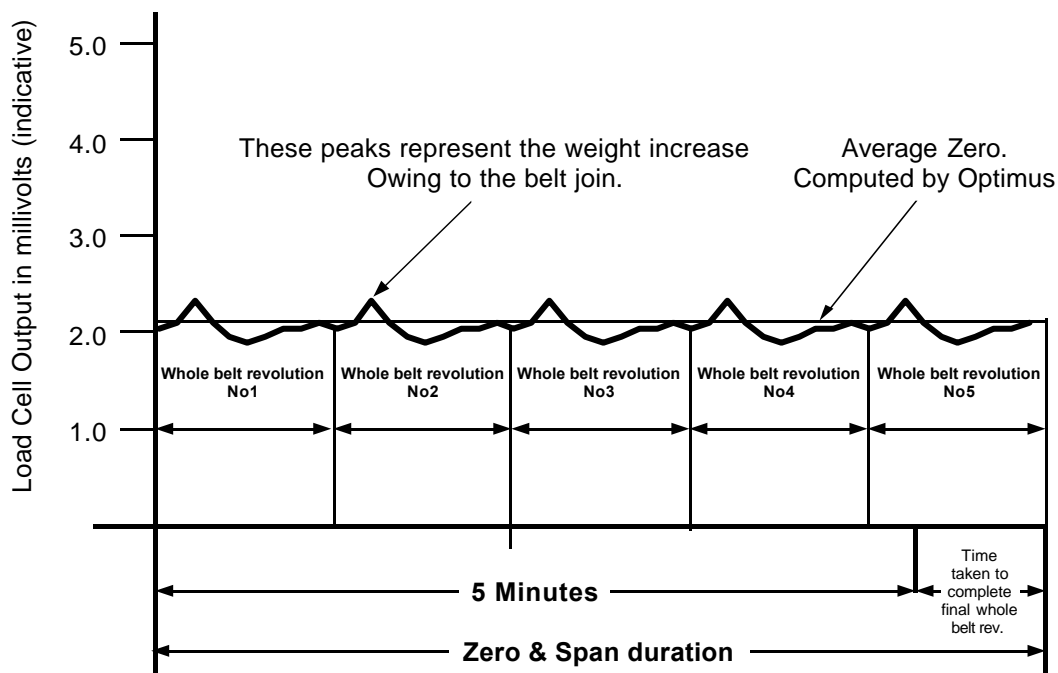
## ***Theory of Operation/ Steps in the Calibration Procedure.***

---

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.

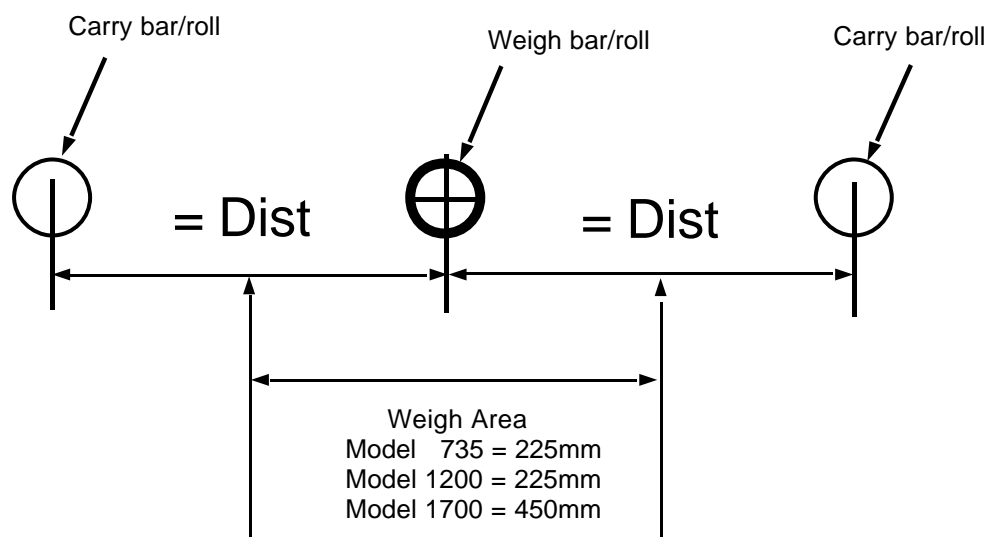
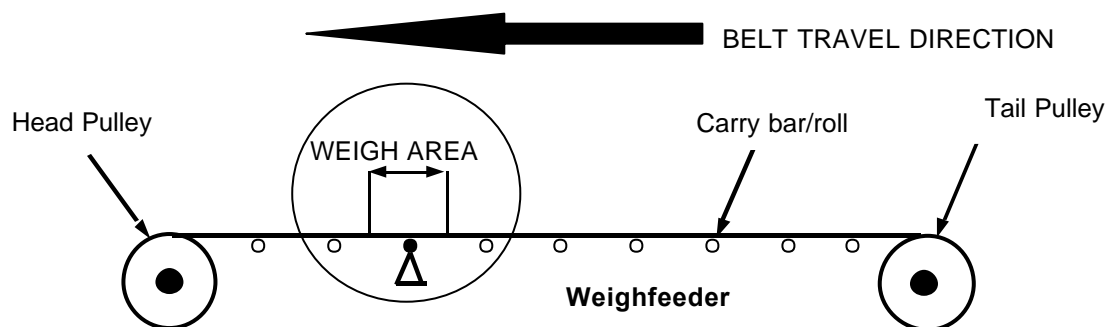
To successfully calibrate Optimus using a calibration roller chain or static weight. A target weight has to be calculated for the feeder. The method of calculating this target weight for both roller chain and static weight are shown below.

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

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

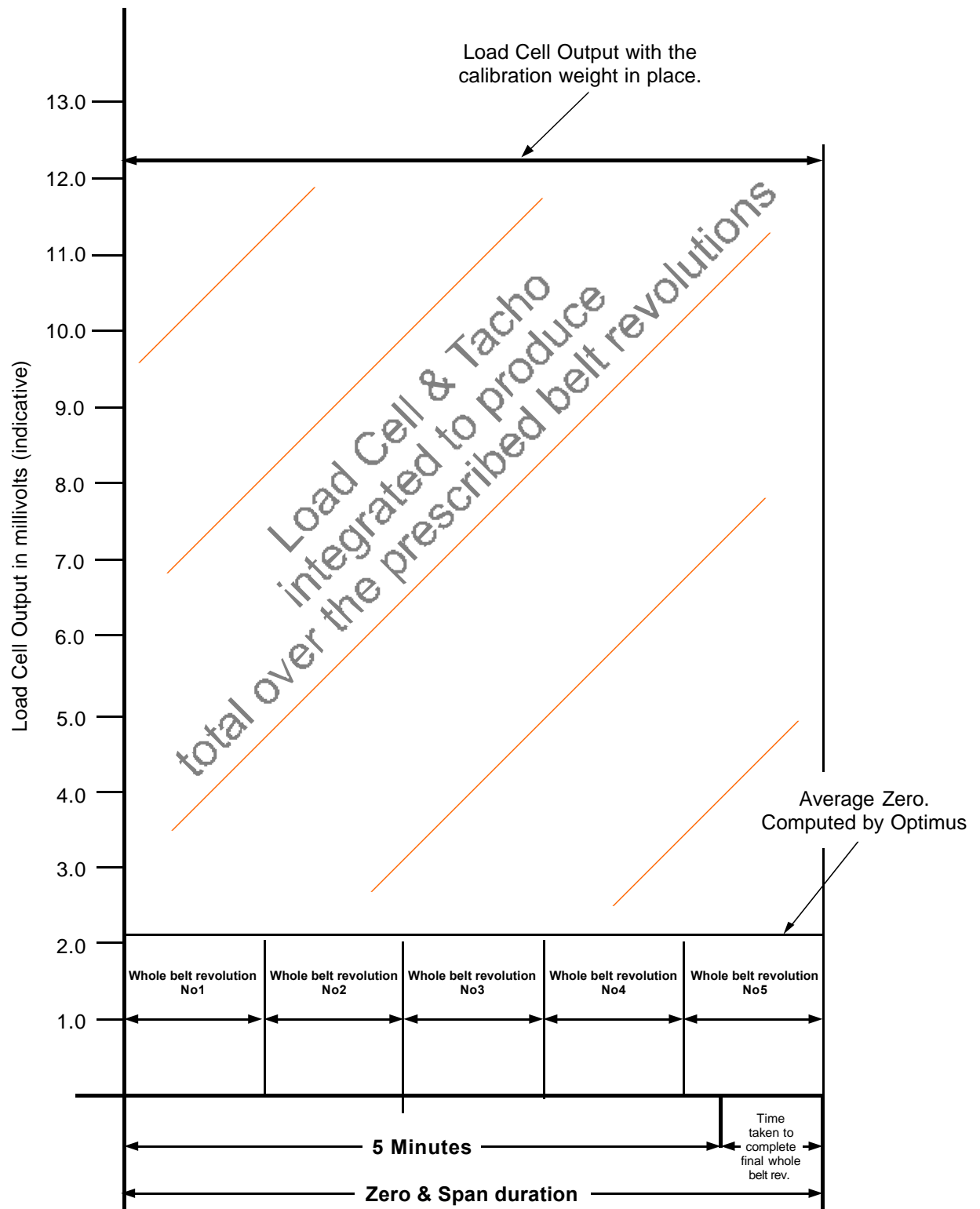
### TARGET WEIGHT CALCULATION FOR WEIGHFEEDERS USING CALIBRATION WEIGHTS.

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



# **OPTIMUS OPERATIONAL MANUAL.**

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



# OPTIMUS OPERATIONAL MANUAL.

## Calibration / Pulses per Revolution.

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

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

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

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

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

Pulses per revolution					
2000					
New value —					
DEL	CLEAR	⏏	⏏		

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

# OPTIMUS OPERATIONAL MANUAL.

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

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

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

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

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

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

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

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

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

# OPTIMUS OPERATIONAL MANUAL.

## Calibration / Auto-Zero Tracking.

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

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

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

**!** Set auto-zero offset to 0 mV?  
Press ENTER to proceed  
Press ABORT to skip

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

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

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

Span calibration	5.046				
Current value					
New value	-				
DEL	CLEAR				

# OPTIMUS OPERATIONAL MANUAL.

## Calibration / Target Weight.

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

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

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

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

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

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

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

---

# **OPTIMUS OPERATIONAL MANUAL.**

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

---

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

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

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

➔ **Pulses per rev = 7697      Belt revolutions = 20**

**Zero calibration = 3.16      AZT = 2.238**

**Span calibration = 56.0      Speed = 0.00m/s**

**Calibration target = 196 kg**

◀

▶

**LENGTH**

**ZERO**

**SPAN**

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

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

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

**START**

**BACK**

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

**Press STOP after an exact number of belt revolutions**

**Elapsed time = 360 secs**

**Pulses counted = 8700**

**START**

**BACK**

---

## **OPTIMUS OPERATIONAL MANUAL.**

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

---

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

**Tachometer calibration is now complete!**

<b>Belt revolutions = 20</b>	<b>Belt revolutions = 20</b>
<b>Calibration time = 300s</b>	<b>Pulses per rev = 5400</b>

➡

➡

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

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

➡ **Pulses per rev = 7697**

**Belt revolutions = 20**

**Zero calibration = 3.16**

**AZT = 2.238**

**Span calibration = 56.0**

**Speed = 0.00m/s**

**Calibration target = 196 kg**

◀

▶

LENGTH

ZERO

SPAN

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

# OPTIMUS OPERATIONAL MANUAL.

## Calibration / Zero.

### Calibration Zero

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

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

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

<b>Press START to begin zero calibration.</b>					
Press BACK to return to calibration menu.					
Belt must be empty during zero calibration.					
Load cell		=	3.856		
Rate		=	0.189kg/min		
START	BACK				

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

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

<b>Press BACK to return to the calibration menu.</b>					
Make sure there is no material on the belt during test.					
Belt revolutions	=	x.x	Calibration	x% complete	
Load cell	=	x.xx mV	Rate	x.xxkg/hour	
BACK					

Number of revs  
Completed.

Instantaneous  
Loadcell output

Percent Cal  
Completed.

Mass rate before  
zero cal is complete

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

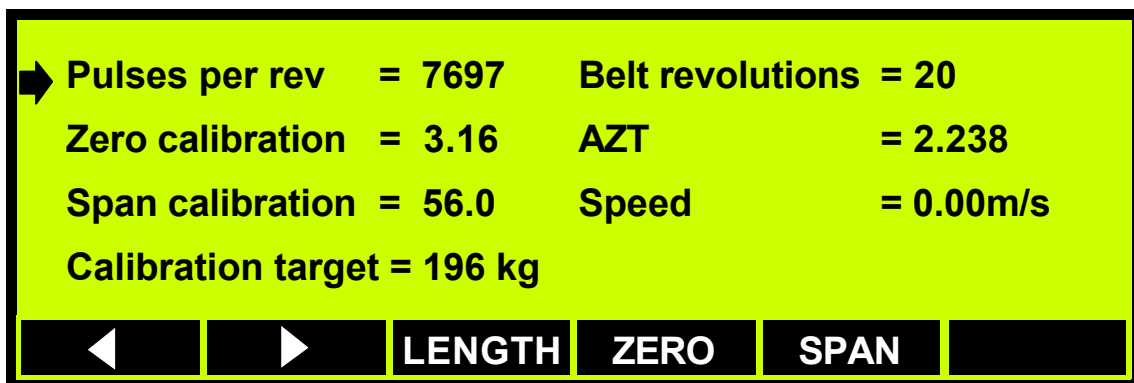
# OPTIMUS OPERATIONAL MANUAL.

## Calibration / Zero.

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

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

◀ ▶ LENGTH ZERO SPAN

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

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

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

START BACK EMP

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

The screen will change to the one shown below.

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

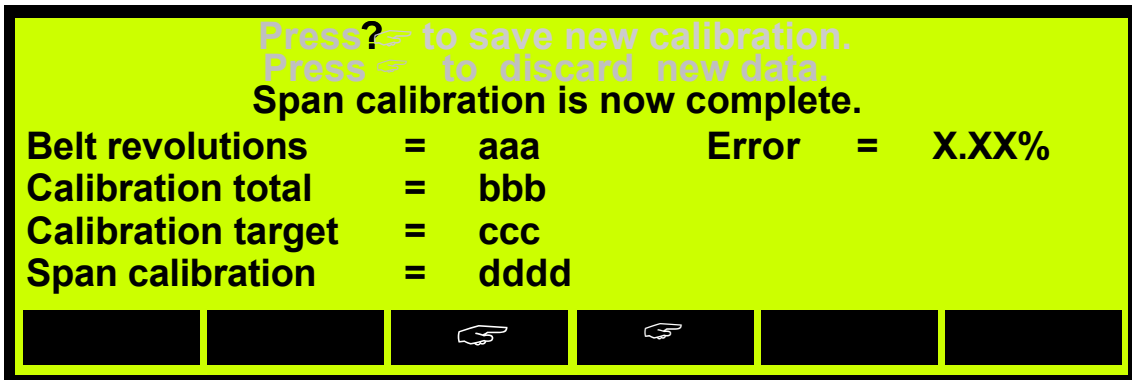
BACK

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

# OPTIMUS OPERATIONAL MANUAL.

## Calibration / Span Static Weight Test.

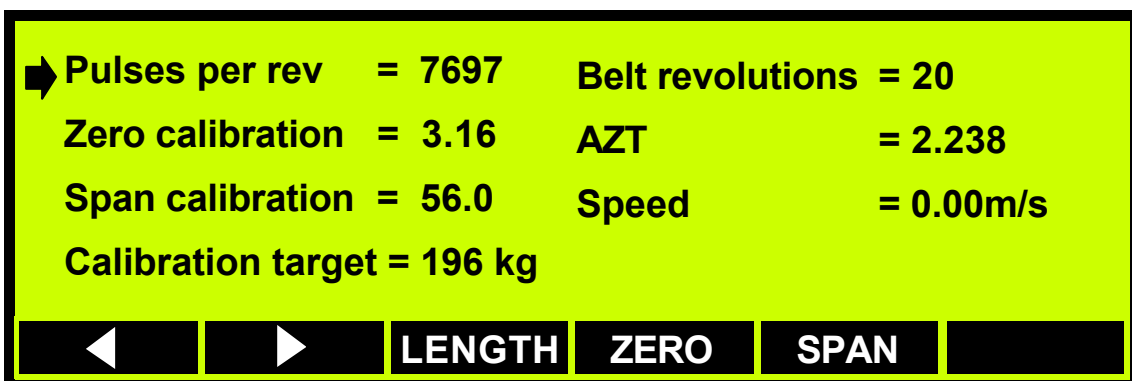
Following the completion of the span test the display will change to that shown below.



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

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

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

<b>START</b>	<b>BACK</b>	<b>EMP</b>			
--------------	-------------	------------	--	--	--

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

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

➡ **Total from other source = xxx.xx kg**

<b>PREV</b>	<b>NEXT</b>				
-------------	-------------	--	--	--	--

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

**Total from other source (in Kg)**

Current value **ZZZ.ZZ**

New value **YYY.YY**

<b>DEL</b>	<b>CLEAR</b>				
------------	--------------	---	---	--	--

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

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

➡ **Total from other source = xxx.xx kg**

<b>PREV</b>	<b>NEXT</b>				
-------------	-------------	--	--	--	--

# OPTIMUS OPERATIONAL MANUAL.

## Calibration / Span Empirical.

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

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

➡ Total from Optimus = xxx.xx kg

PREV	NEXT				
------	------	--	--	--	--

In the screen shown below enter the total obtained by Optimus

**Total from Optimus (in Kg)**

Current value      UU.UU

New value          VV.VV

DEL	CLEAR				
-----	-------	--	--	--	--

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

**Enter belt scale total then press NEXT**  
Press PREV to return to previous screen.

➡ Total from Optimus = xxx.xx kg

PREV	NEXT				
------	------	--	--	--	--

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

**Empirical span now complete !**

Press " " to save new calibration data.

Press " " to discard new calibration data.

Old span calibration = xx.xxx

New span calibration = yy.yyy

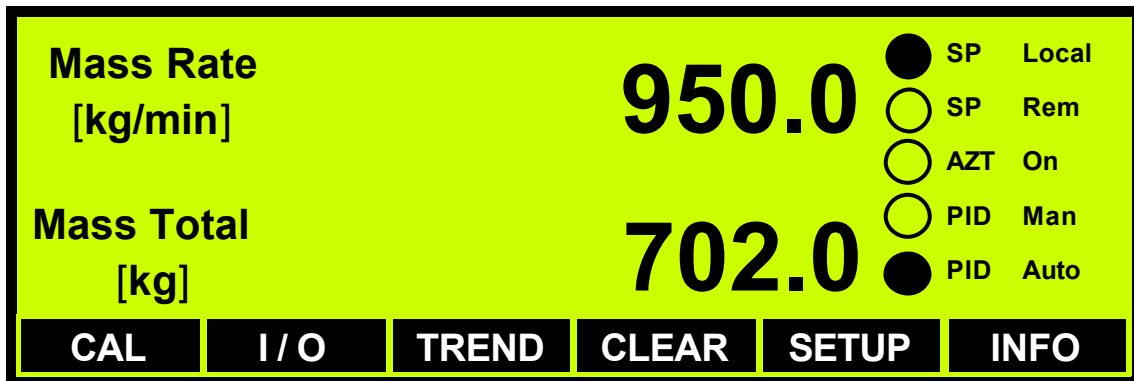
PREV					
------	--	--	--	--	--

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

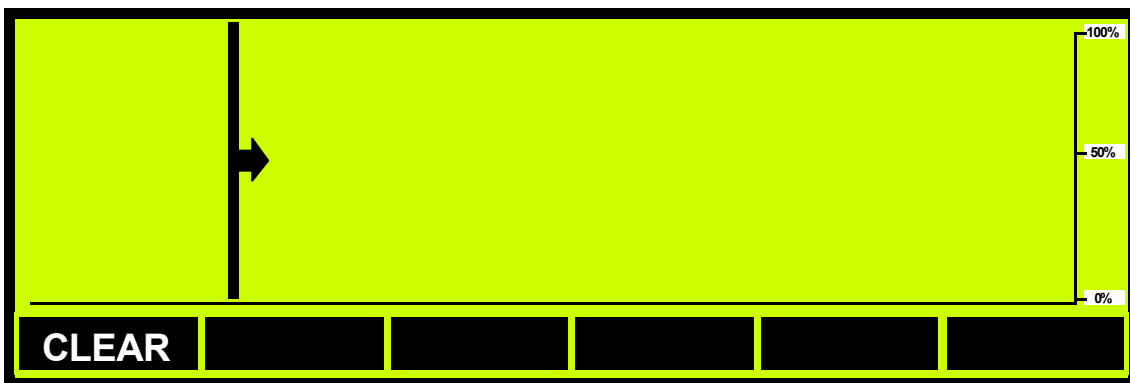
# OPTIMUS OPERATIONAL MANUAL.

## MRMT SCREEN / *Trend.*

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



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



Pressing the "HOME" key will return Optimus to MRMT.

---

## OPTIMUS OPERATIONAL MANUAL.

### MRMT SCREEN / *Clear Total.*

---

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

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

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

Mass	<div><div>!</div><div>Clear accumulated mass total?</div><div>Press ENTER to proceed</div><div>Press ABORT to skip.</div></div>	<input checked="" type="radio"/> SP Local			
[kg/		<input type="radio"/> SP Rem			
		<input type="radio"/> AZT On			
Mass		<input type="radio"/> PID Man			
[k		<input type="radio"/> PID Auto			
<b>CAL</b>	<b>I / O</b>	<b>TREND</b>	<b>CLEAR</b>	<b>SETUP</b>	<b>INFO</b>

# **OPTIMUS OPERATIONAL MANUAL.**

## **MRMT SCREEN / Info Screen.**

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

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

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

<b>Optimus MW1 Build 129 15-April-2003</b>					
<b>© 2003 Web-Tech Australia Pty Ltd</b>					
<b>RESET</b>					

Pressing the "RESET" (F1) from this screen will bring up the following screen. This screen displays the number of times Optimus has had the power removed since the data was last cleared. This is a useful tool if a faulty power supply (mains power) is suspected. The reset display the number of times the reset button on the main CPU pcb has been activated. Generally this button is used if the Optimus firmware has locked up, owing to a noise spike or other severe transients. Pressing the reset will restart the firmware and increment this counter.

If a "flash memory" card has been purchased and the firmware requires upgrading. The default variables that were established during the calibration and setup can be stored in the flash card and uploaded following the successful firmware upgrade.

<b>Turned on x times</b>					
<b>Reset X times</b>					
<b>Loaded defaults X times</b>					
<b>Internal temperature xx.x° C</b>					
				<b>CLEAR</b>	

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

---

# OPTIMUS OPERATIONAL MANUAL.

## Inlet Boot Hopper Setup

---

### Inlet Boot Hopper Setup

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

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

<b>Mass Rate</b> [kg/hr]	<b>0.0</b>	<input checked="" type="radio"/> SP Local
		<input type="radio"/> SP Rem
		<input type="radio"/> AZT On
<b>Mass Total</b> [kg]	<b>0.0</b>	<input type="radio"/> PID Man
		<input checked="" type="radio"/> PID Auto
<b>CAL</b>	<b>I / O</b>	<b>TREND</b>
<b>CLEAR</b>	<b>SETUP</b>	<b>INFO</b>

F5



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

Use the **F1 / F2** keys to advance the cursor to “**9 Inlet Boot Hopper**”. Press the “ENTER” key to gain access.



# OPTIMUS OPERATIONAL MANUAL.

## Inlet Boot Hopper Setup

- ➡ 9. Inlet Boot Hopper
- 10. Pre Feed Hopper
- 11. RS232 Output



Inlet Boot Hopper Setup		Filtering	
Weight	3.09 kg	Load Cell	21.730 mV
➡ Refill Start	1.000 kg	Refilling	0
Refill Stop	2.000 kg	Capacity	2.000 kg
Zero	7.594 mV	Span	0.219

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



**Inlet Boot hopper refill start (in kg)**

**1.000**

New value

DEL

CLEAR

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

# OPTIMUS OPERATIONAL MANUAL.

## Inlet Boot Hopper Setup

Inlet Boot Hopper Setup		Filtering	
Weight	3.09 kg	Load Cell	21.730 mV
Refill Start	1.000 kg	Refilling	0
➡ Refill Stop	2.000 kg	Capacity	2.000 kg
Zero	7.594 mV	Span	0.219

◀

▶

✓

✕

ZERO

SPAN

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



Inlet Boot hopper refill stop(in kg)

2.000


New value      —

DEL

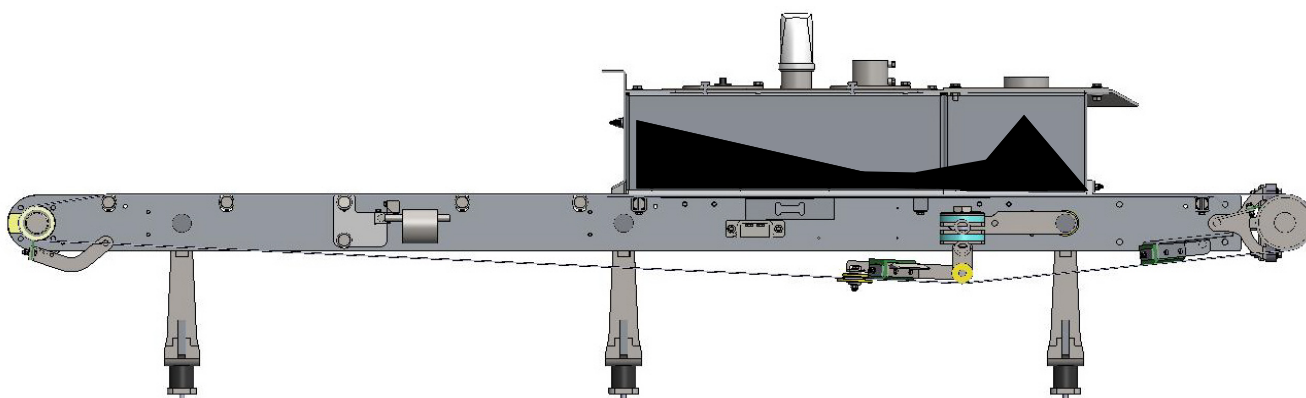
CLEAR

✓

✕

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

The material silhouette below shows a typical feed scenario.



# OPTIMUS OPERATIONAL MANUAL.

## Inlet Boot Hopper Setup

### Inlet Boot Hopper ZERO

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

Inlet Boot Hopper	<b>Perform hopper zero calibration?</b> Press ENTER to Proceed Press ABORT to skip !	Filtering
Setup		Load Cell
Weight		21.730 mV
3.09 kg		Refilling
		O
◀	▶	✓
		✗
		ZERO
		SPAN

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

### Inlet Boot Hopper SPAN

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

<b>Inlet Boot Hopper Setup</b>		<b>Filtering</b>	
Weight	3.09 kg	Load Cell	21.730 mV
Refill Start	1.000 kg	Refilling	O
Refill Stop	2.000 kg	Capacity	2.000 kg
Zero	7.594 mV	Span	0.219
◀	▶	✓	✗
		ZERO	SPAN

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

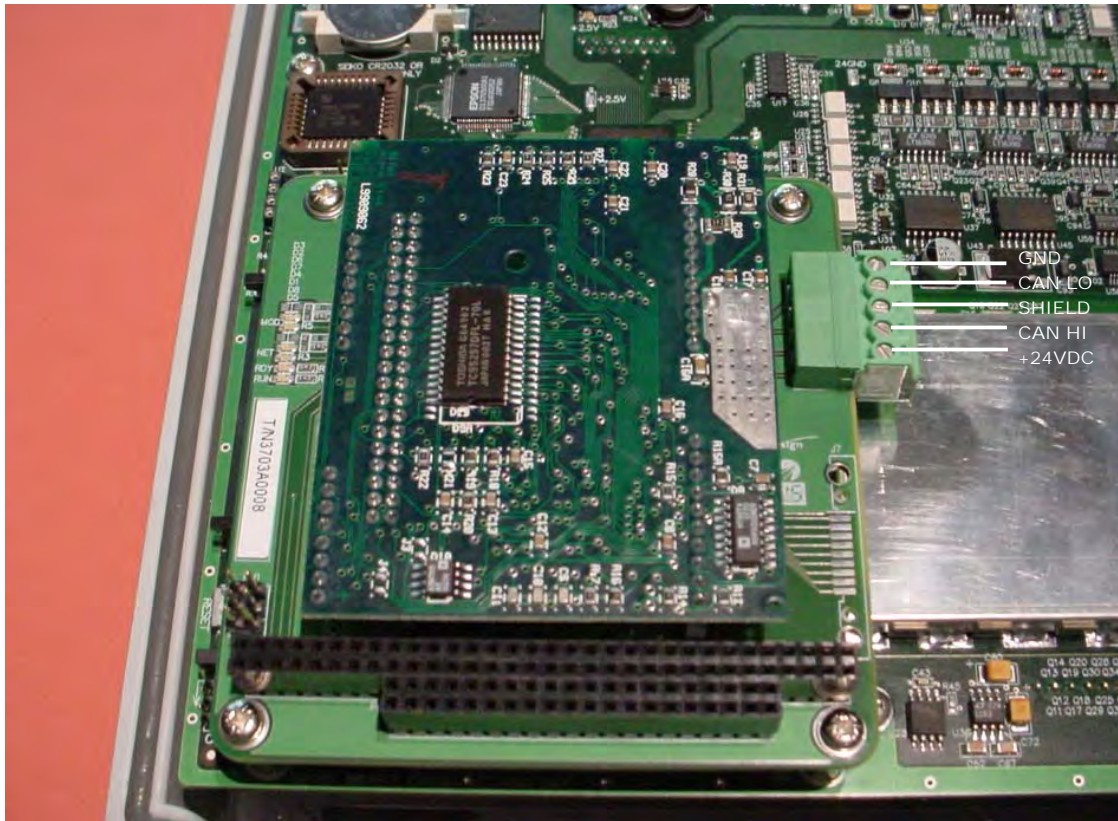
<b>Inlet Boot hopper calibration weight (in kg)</b>	
New value	—
DEL	CLEAR
✓	✗

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

Enter the weight of the calibration weight and press ENTER

## To install a PC/104 DeviceNet card in Optimus

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



2. Wire the 5-pin plug to the DeviceNet cable as shown.
3. You must ensure that 120 $\Omega$  0.5W termination resistors are installed between CAN HI and CAN LO at the two ends of the DeviceNet network. If the Optimus is the last device on the network, install the termination resistor directly into the plug.
4. Configure the DeviceNet MAC-ID and baud rate by entering screen 22 from the SETUP menu.
  - a. The MAC-ID can be set to any number between 1 and 63. Each device on the DeviceNet network must be assigned a unique MAC-ID.
  - b. The baud rate may be set to a speed of 125kHz, 250kHz or 500kHz. All devices on the DeviceNet network must be configured to used the same baud rate; the baud rate chosen will depend on cable length and quality.

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

---

# **OPTIMUS OPERATIONAL MANUAL.**

## **Notes/Firmware Updates.**

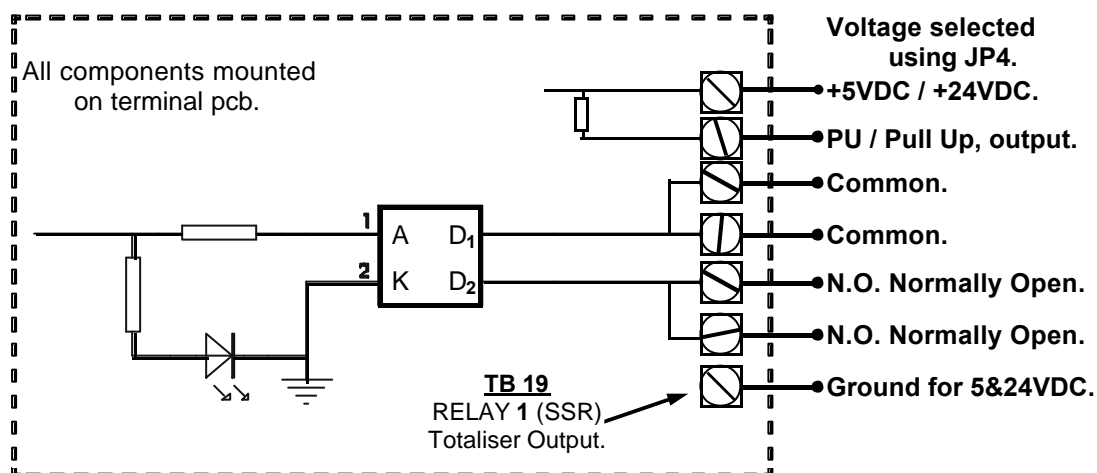
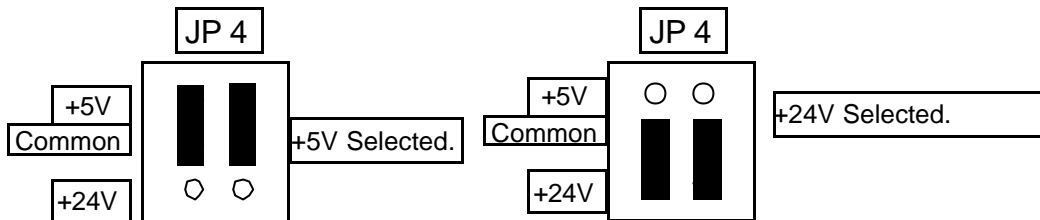
---

# OPTIMUS OPERATIONAL MANUAL.

## Electrical / Electronic Notes/ *digital outputs.*

### SSR Relay.

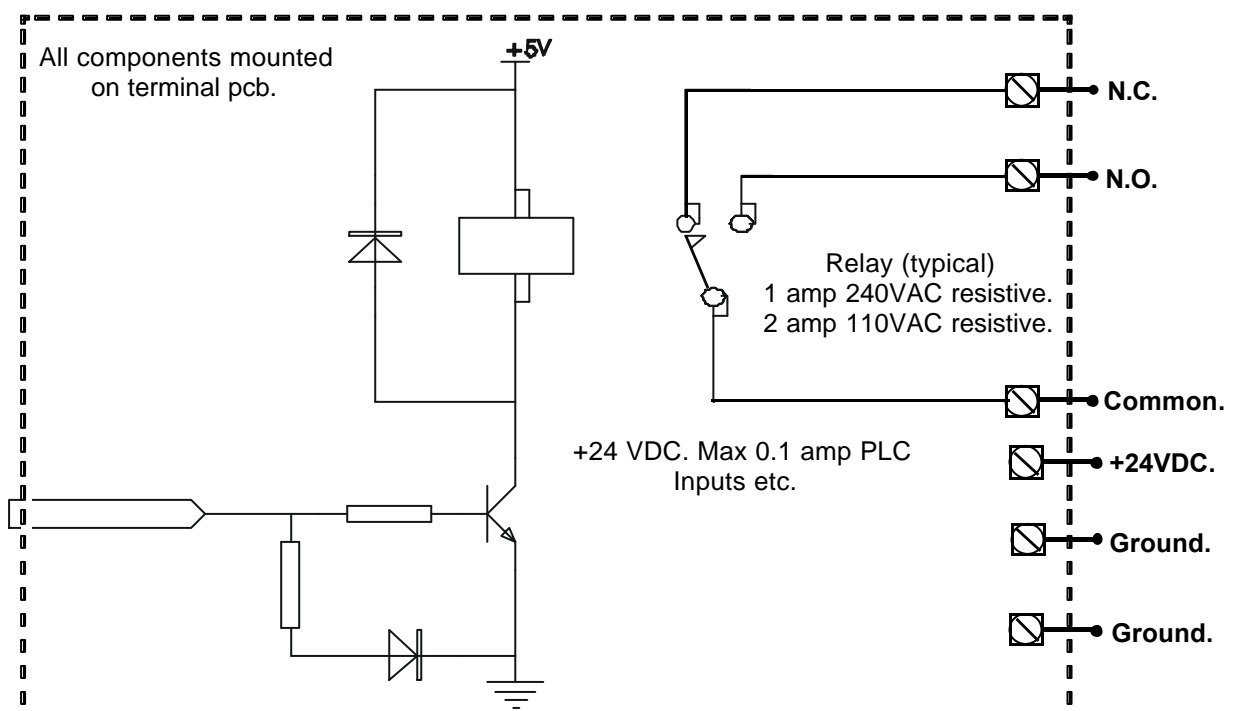
The Solid State Relay (SSR) is permanently assigned to the "Totaliser" output. The relay can be physically configured to output +5VDC / +24VDC. The voltage is selected by means of jumpers located at the bottom right hand corner of the "Terminal pcb (JP4)". The use of a solid state relay provides for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



### Electro-mechanical Relays. (RLY2 - 5)

Relays 2-6 are assigned via the keyboard (I/O / 4 Digital Outputs). When active the local red LED will illuminate.

The relays can be used as "clean contacts" or supplied with on board +24VDC. Link between +24V and COM. The return is to be terminated on GND.



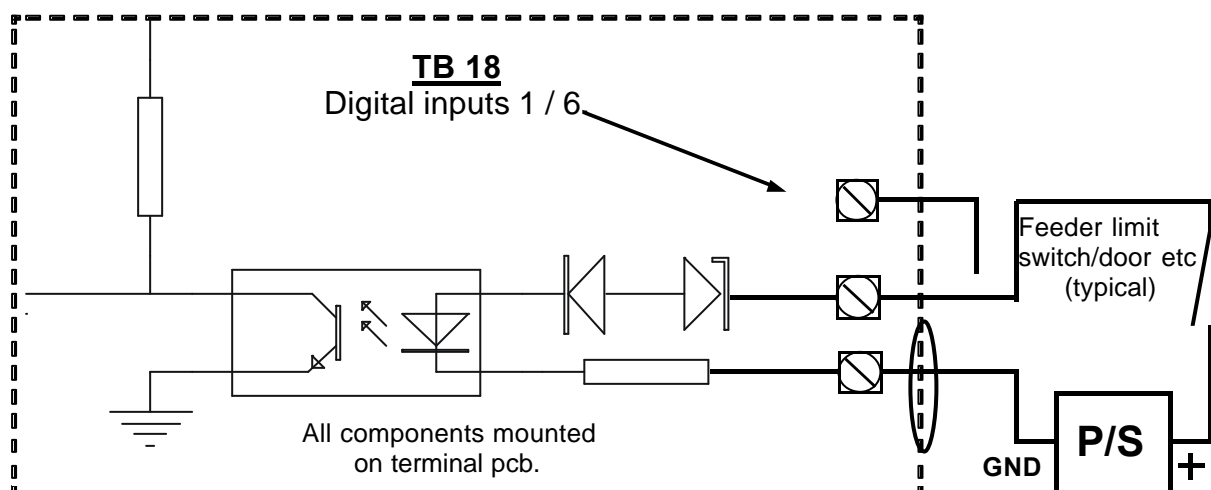
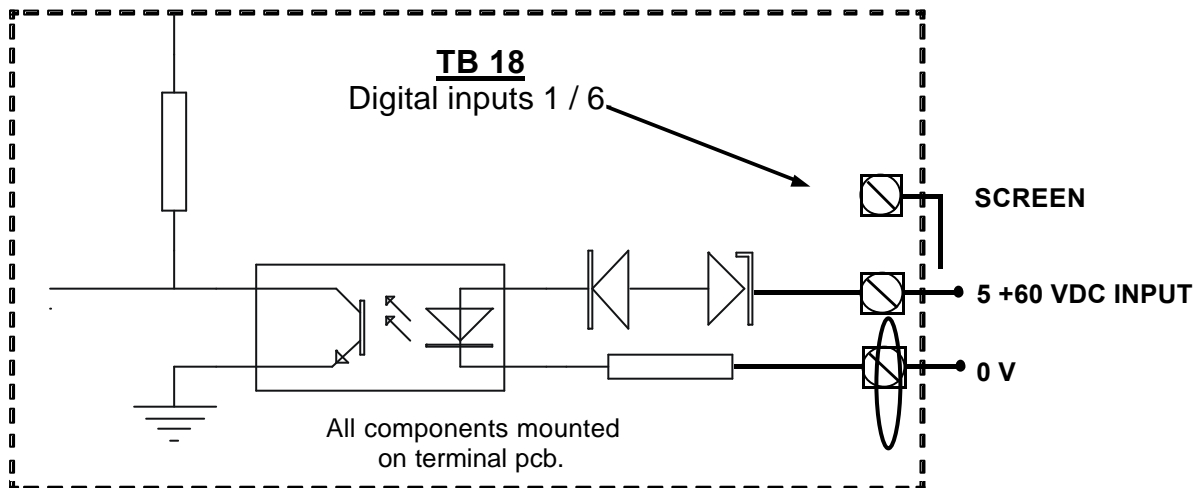
# OPTIMUS OPERATIONAL MANUAL.

## Electrical / Electronic Notes / digital inputs.

### Digital Inputs.

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

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



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

---

## SECTION 6 - CALIBRATION

---

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

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

### Zero Calibration

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

### Span Calibration

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

### Material Test

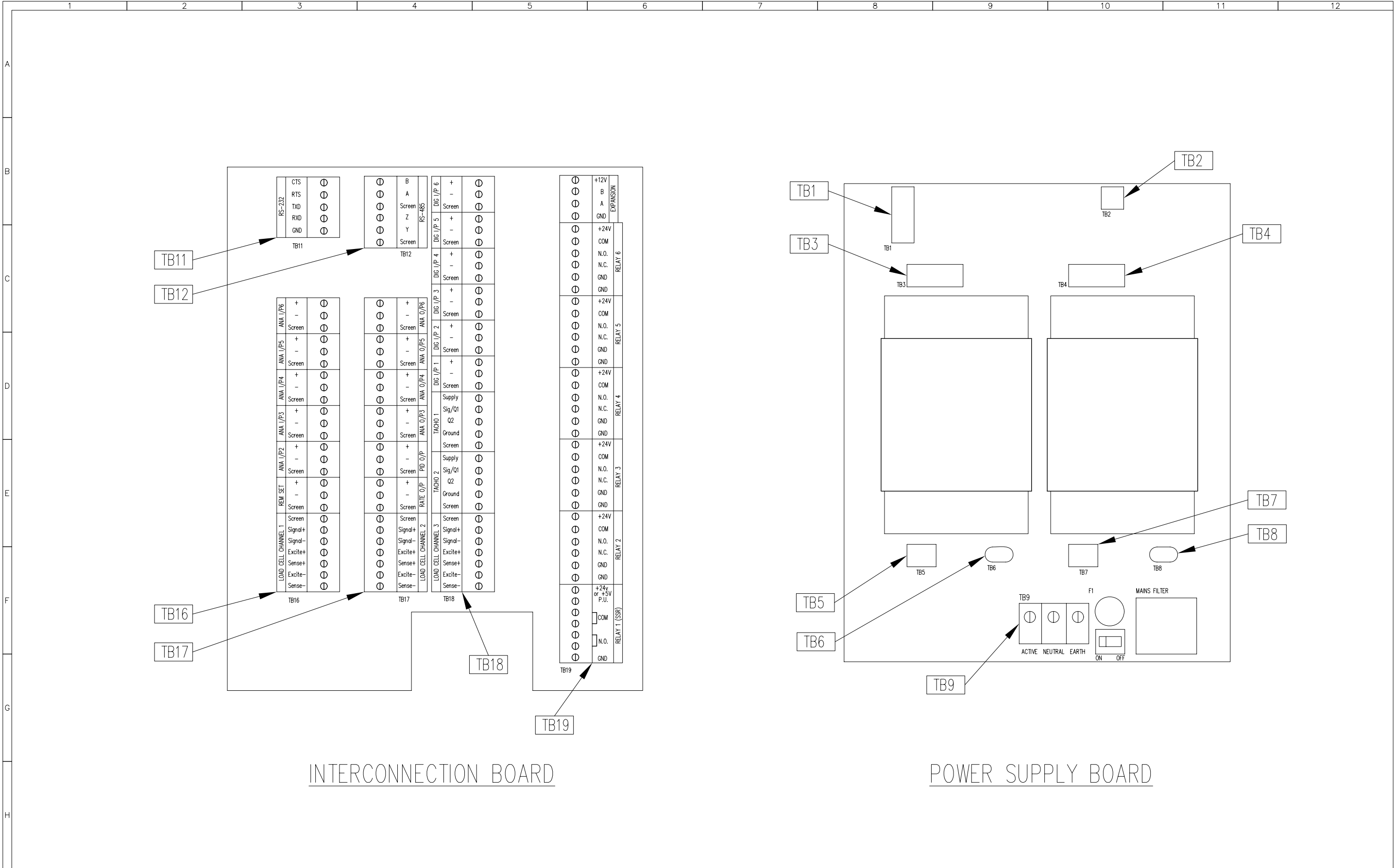
We strongly suggest that a material test be carried out where possible. A material test involves weighing product on an accurate static scale prior to, or after it has passed over the weighfeeder. When carrying out a material test, the following should be considered:

1. The amount of material required for the test(s) must be proportional to the weighfeeder capacity. A rule of thumb quantity would be a minimum of 3 minutes of running time at maximum capacity e.g. if the capacity is 10 tph, the amount of material would be  $10\,000\text{ kg}/60 \times 3 = 500\text{ kg}$ . A smaller amount could be used, however it must be understood that the accuracy achievable may be diminished due to the resolution used.
2. It must be guaranteed that all of the material used in the test is collected, or have passed over the weighfeeder.
3. The material feed over the weighfeeder must be continuous and consistent.

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



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

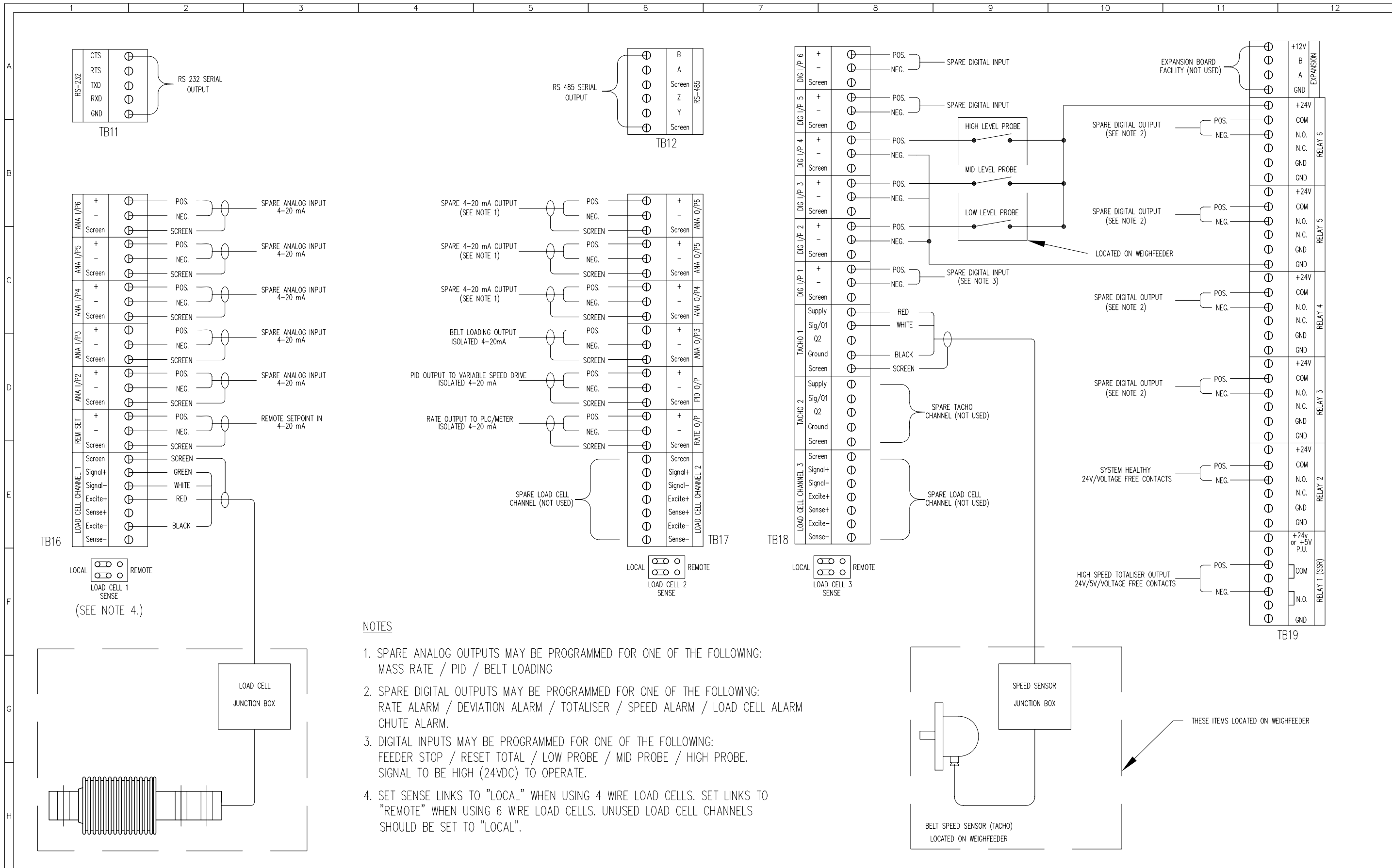




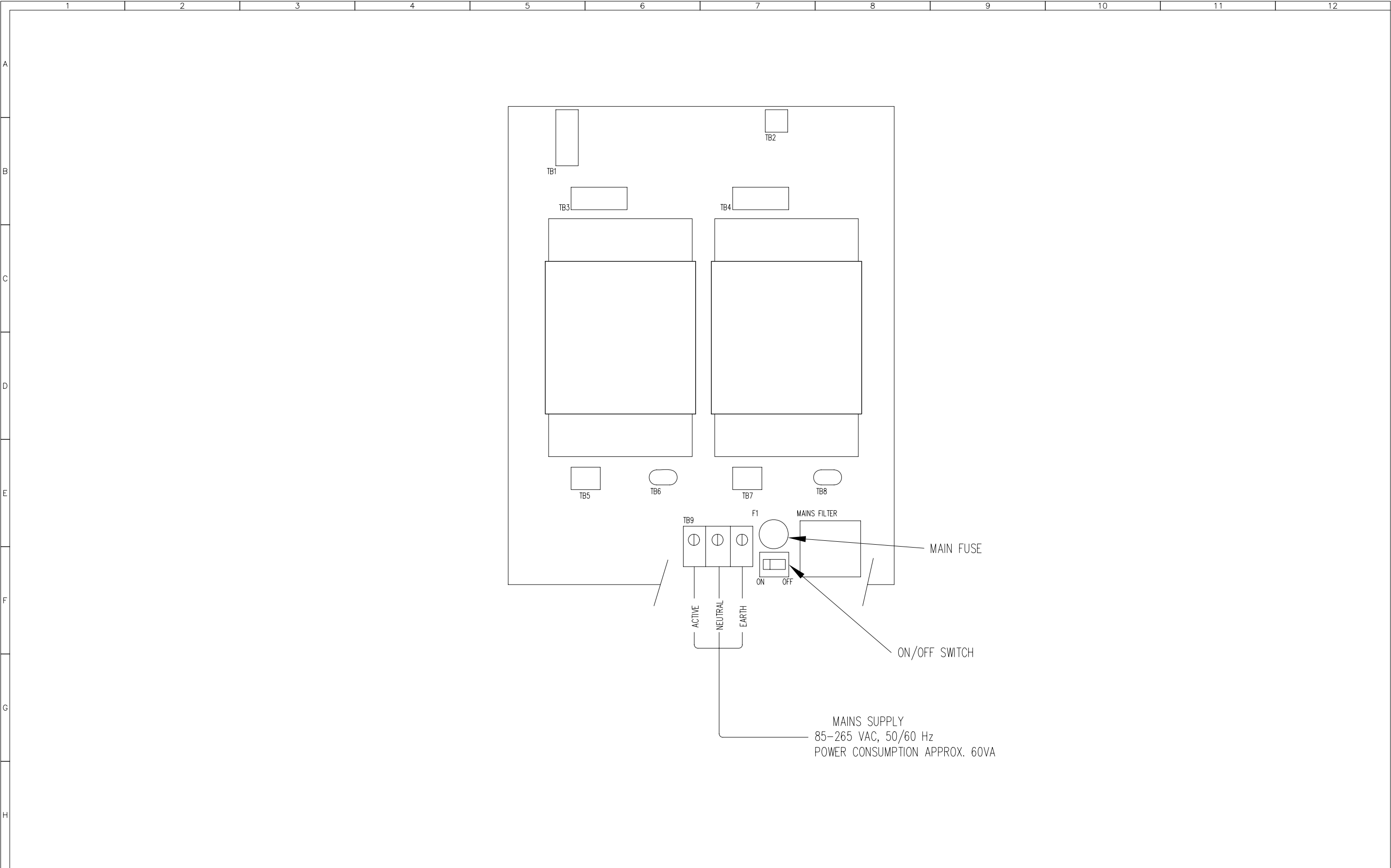
INTERCONNECTION BOARD


POWER SUPPLY BOARD

REVISIONS A: 15/6/06 ISSUED FOR REFERENCE	UNLESS OTHERWISE STATED UNTOLERANCED DIMENSIONS TO BE WITHIN THE LIMITS SHOWN					DRAWN	L.H.	 <b>WEB-TECH AUSTRALIA PTY. LTD.</b> A.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	SIZE	DRAWING No.	
						CHECKED	L.H.		A1	NUMBER	REV
						APPROVED	L.H.	WFOPTIMUS01		A	
	NOMINAL SIZE	UP TO 50	ABOVE 50 UP TO 150	ABOVE 150 UP TO 300	ABOVE 300 UP TO 1000	DATE APP'D	15/6/06	CUSTOMER			
	MACHINING	± 0.1	± 0.2	± 0.3	± 0.5	± 1.0	SCALE	N.T.S.	PROJECT		
								CAD FILE		WFOPTIMUS01	
FABRICATION	± 0.5	± 0.5	± 0.5	± 1.0	± 2.0		DO NOT SCALE IF IN DOUBT ASK	ALL DIMENSIONS IN MILLIMETRES UNLESS OTHERWISE SPECIFIED		This drawing and any information or descriptive matter set out hereon are the confidential and copyright property of WEB-TECH AUSTRALIA PTY. LTD. and must not be disclosed, loaned, copied or used for manufacturing / tendering or for any other purpose without their written permission.	
ASSEMBLIES	± 0.5	± 0.5	± 0.5	± 1.0	± 2.0						
TITLE								OPTIMUS INTERCONNECT & POWER BOARD TERMINATION LAYOUT- AC MAINS SUPPLY.			



REVISIONS A: 15/6/06 ISSUED FOR REFERENCE	UNLESS OTHERWISE STATED UNTOLERANCED DIMENSIONS TO BE WITHIN THE LIMITS SHOWN				DRAWN	L.H.	 <b>WEB-TECH AUSTRALIA PTY. LTD.</b> A.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	SIZE	DRAWING No.	
	NOMINAL SIZE	UP TO 50	ABOVE 50 UP TO 150	ABOVE 150 UP TO 300	ABOVE 300 UP TO 1000	ABOVE 1000		A1	NUMBER	REV.
	MACHINING	±0.1	±0.2	±0.3	±0.5	±1.0			WFOPTIMUS02LEVEL	A
	FABRICATION	±0.5	±0.5	±0.5	±1.0	±2.0			CUSTOMER	
APPROVED DATE APP'D 15/6/06 SCALE NTS DO NOT SCALE IF IN DOUBT ASK							<b>TITLE</b> OPTIMUS INTERCONNECTION BOARD – ELECTRICAL CONNECTION DIAGRAM FOR WEIGH BELT FEEDERS WITH CHUTE CONTROL LEVEL PROBES.			
ALL DIMENSIONS IN MILLIMETRES UNLESS OTHERWISE SPECIFIED							This drawing and any information or descriptive matter set out hereon are the confidential and copyright property of WEB-TECH AUSTRALIA PTY. LTD. and must not be disclosed, loaned, copied or used for manufacturing / tendering or for any other purpose without their written permission.			



REVISIONS	A: 15/6/06 ISSUED FOR REFERENCE	UNLESS OTHERWISE STATED UNTOLERANCED DIMENSIONS TO BE WITHIN THE LIMITS SHOWN					DRAWN	L.H.	 <b>WEB-TECH AUSTRALIA PTY. LTD.</b> A.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	SIZE	DRAWING No.			
		NOMINAL SIZE	UP TO 50	ABOVE 50 UP TO 150	ABOVE 150 UP TO 300	ABOVE 300 UP TO 1000	ABOVE 1000	CHECKED		L.H.	A1	NUMBER	WFOPTIMUS03	REV.
		MACHINING	± 0.1	± 0.2	± 0.3	± 0.5	± 1.0	APPROVED		L.H.	CUSTOMER			
		FABRICATION	± 0.5	± 0.5	± 0.5	± 1.0	± 2.0	DATE APP'D		15/6/06	PROJECT			
		ASSEMBLIES	± 0.5	± 0.5	± 0.5	± 1.0	± 2.0	SCALE		N.T.S.	CAD FILE WFOPTIMUS03			
		DO NOT SCALE IF IN DOUBT ASK								TITLE OPTIMUS POWER BOARD TERMINATION LAYOUT – AC MAINS SUPPLY.				
		ALL DIMENSIONS IN MILLIMETRES UNLESS OTHERWISE SPECIFIED								This drawing and any information or descriptive matter set out hereon are the confidential and copyright property of WEB-TECH AUSTRALIA PTY. LTD.® and must not be disclosed, loaned, copied or used for manufacturing / tendering or for any other purpose without their written permission.				

# 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 \_\_\_\_\_

Integral Lower Limit \_\_\_\_\_

Derivative Time \_\_\_\_\_

Feed Forward \_\_\_\_\_

Reset Rate \_\_\_\_\_

Integral Upper Limit \_\_\_\_\_

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 \_\_\_\_\_

Current Contribution \_\_\_\_\_

Period \_\_\_\_\_

### 5. Rate Deadband

Mass Rate Dead Band \_\_\_\_\_

Belt Capacity \_\_\_\_\_

### 6. Rate Display Filters

Mass Rate Display Filter \_\_\_\_\_

Time Constant \_\_\_\_\_

Mass Rate Trend Filter \_\_\_\_\_

Time Constant \_\_\_\_\_

Fast Track Threshold \_\_\_\_\_

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

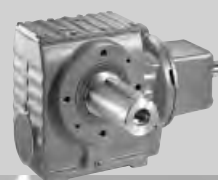
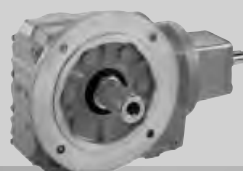
### **CALIBRATION CHAIN**

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

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

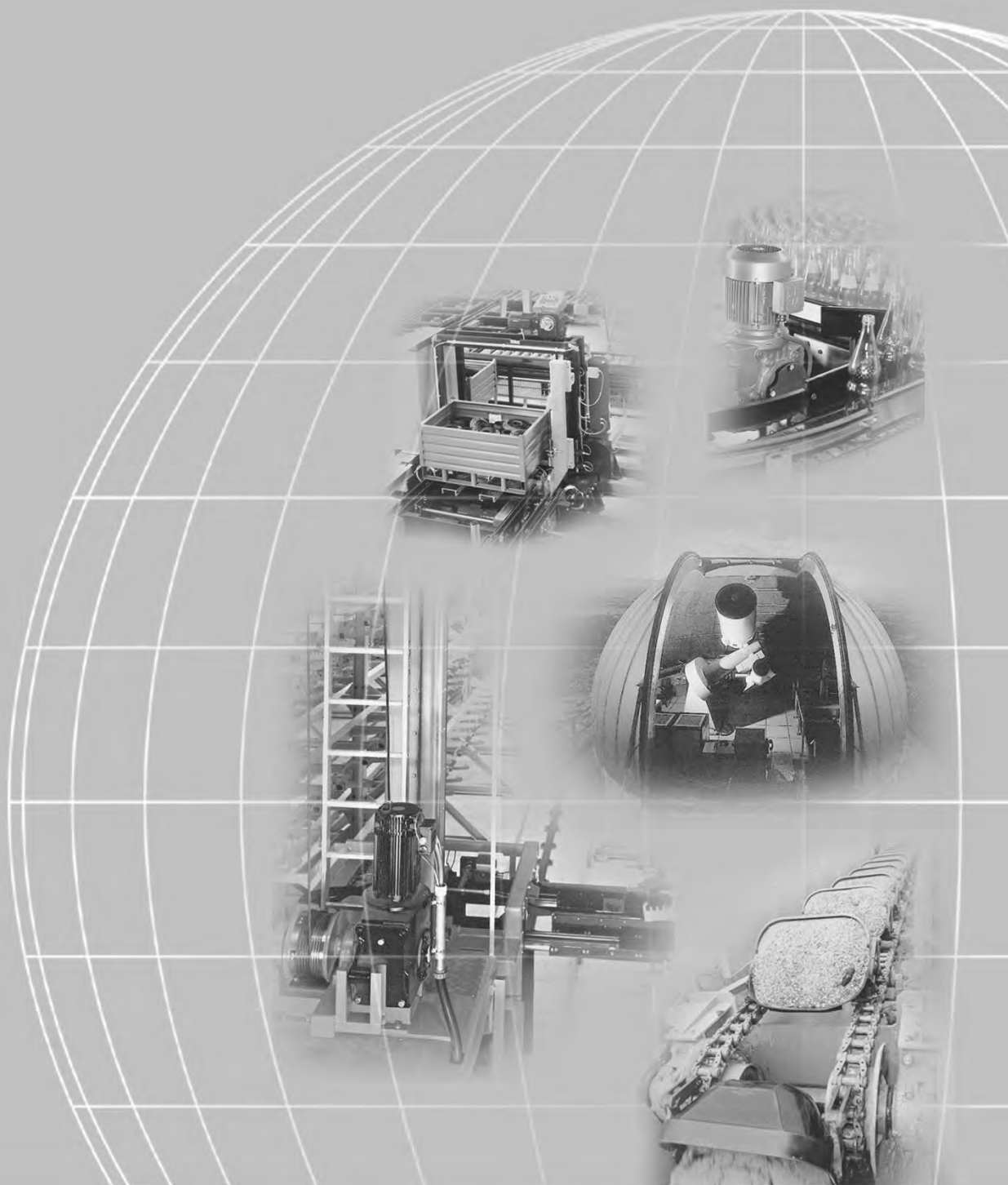
**Edition**

*05/2001*



**Operating Instructions**










**10503013 / EN**



**SEW-EURODRIVE**





	<b>1 Important Notes.....</b>	<b>4</b>
	<b>2 Safety Notes .....</b>	<b>5</b>
	<b>3 Gear Unit Design .....</b>	<b>7</b>
	3.1 Basic design of a helical gear unit .....	7
	3.2 Basic design of a parallel shaft helical gear unit .....	8
	3.3 Basic design of a helical-bevel gear unit.....	9
	3.4 Base design of a helical-worm gear unit .....	10
	3.5 Basic design of a Spiroplan® gear unit .....	11
	<b>4 Mechanical Installation.....</b>	<b>12</b>
	4.1 Required tools / material .....	12
	4.2 Before you begin.....	12
	4.3 Preliminary work .....	12
	4.4 Installing the gear unit.....	13
	4.5 Gear units with solid shaft.....	15
	4.6 Installation of torque arms for shaft-mounted gear units.....	17
	4.7 Installation/removal of shaft-mounted gear units with key or splines .....	19
	4.8 Installation/removal of shaft-mounted gear units with shrink disc.....	23
	4.9 Installation of the AM adapter coupling.....	25
	4.10 Installation of the AQ adapter coupling .....	27
	4.11 Installation on the AD input shaft assembly .....	28
	<b>5 Startup.....</b>	<b>30</b>
	5.1 Startup of helical-worm and Spiroplan® W gear units.....	30
	5.2 Startup of helical, parallel shaft helical and helical-bevel gear units .....	30
	<b>6 Troubleshooting.....</b>	<b>31</b>
	6.1 Gear unit problems .....	31
	<b>7 Inspection and Maintenance .....</b>	<b>32</b>
	7.1 Inspection and maintenance periods .....	32
	7.2 Lubricant replacement schedule .....	32
	7.3 Inspection/maintenance of gear units .....	33
	<b>8 Mounting Positions.....</b>	<b>34</b>
	8.1 General comments on mounting positions.....	34
	8.2 Legend for mounting position pages.....	36
	8.3 Mounting positions, helical gear units .....	37
	8.4 Mounting positions, parallel shaft helical gear units.....	42
	8.5 Mounting positions, helical-bevel gear units .....	45
	8.6 Mounting positions, helical-worm gear units .....	50
	<b>9 Lubricants.....</b>	<b>56</b>
	<b>Address List .....</b>	<b>62</b>



## 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 information 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 steel 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**

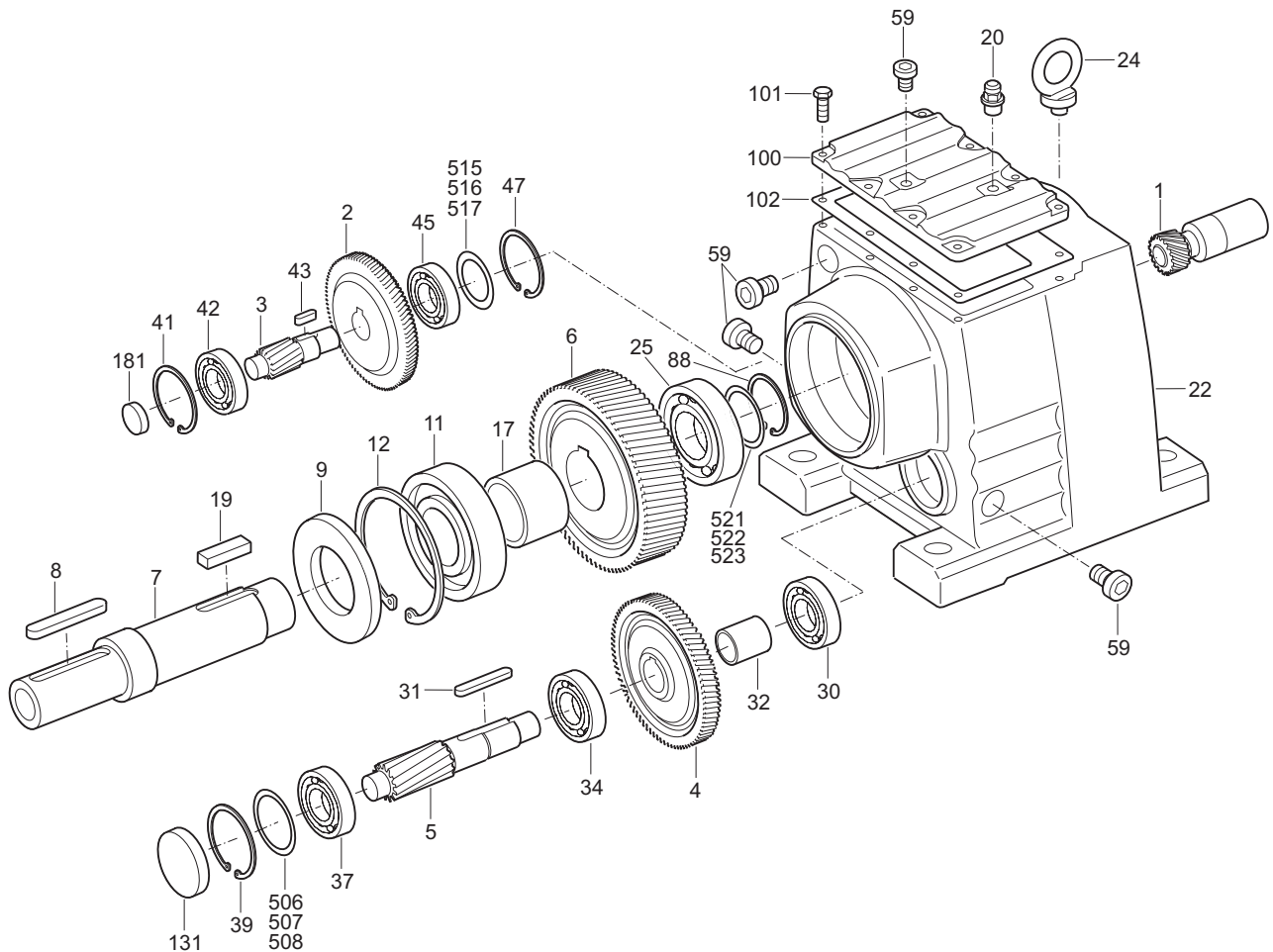
See notes in section "Inspection/Maintenance!"

### 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



03438AXX

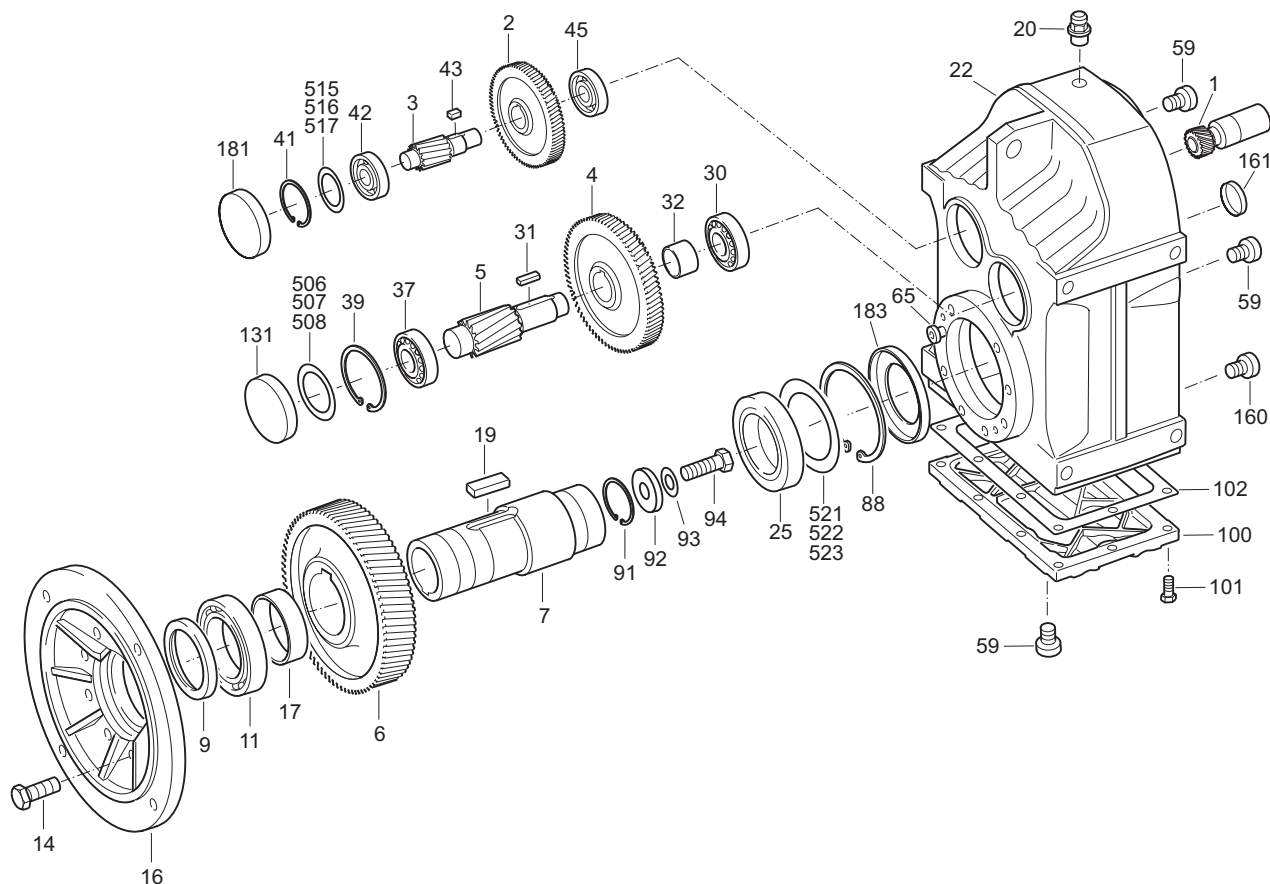
Fig. 1: Basic structure of helical gear units

#### 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



03469AXX

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

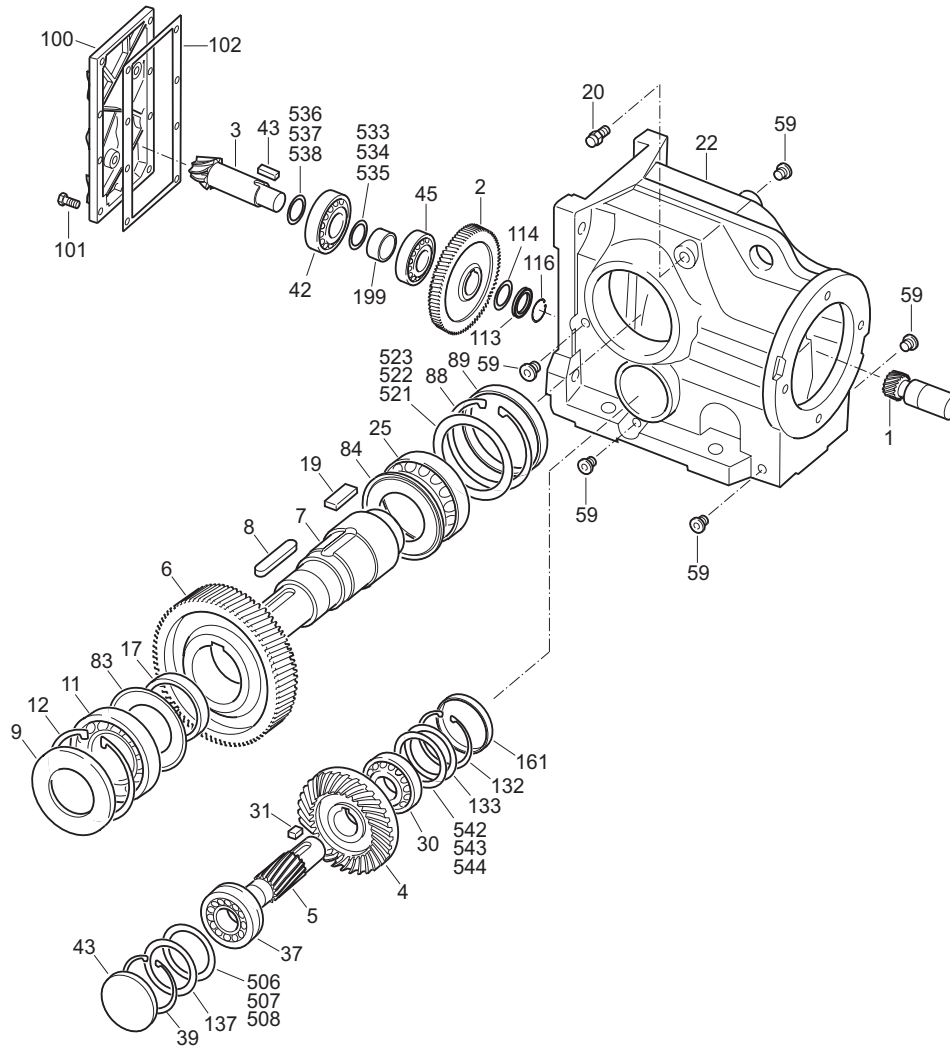


Fig.3: Basic design of a helical-bevel gear unit

03486AXX

#### 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

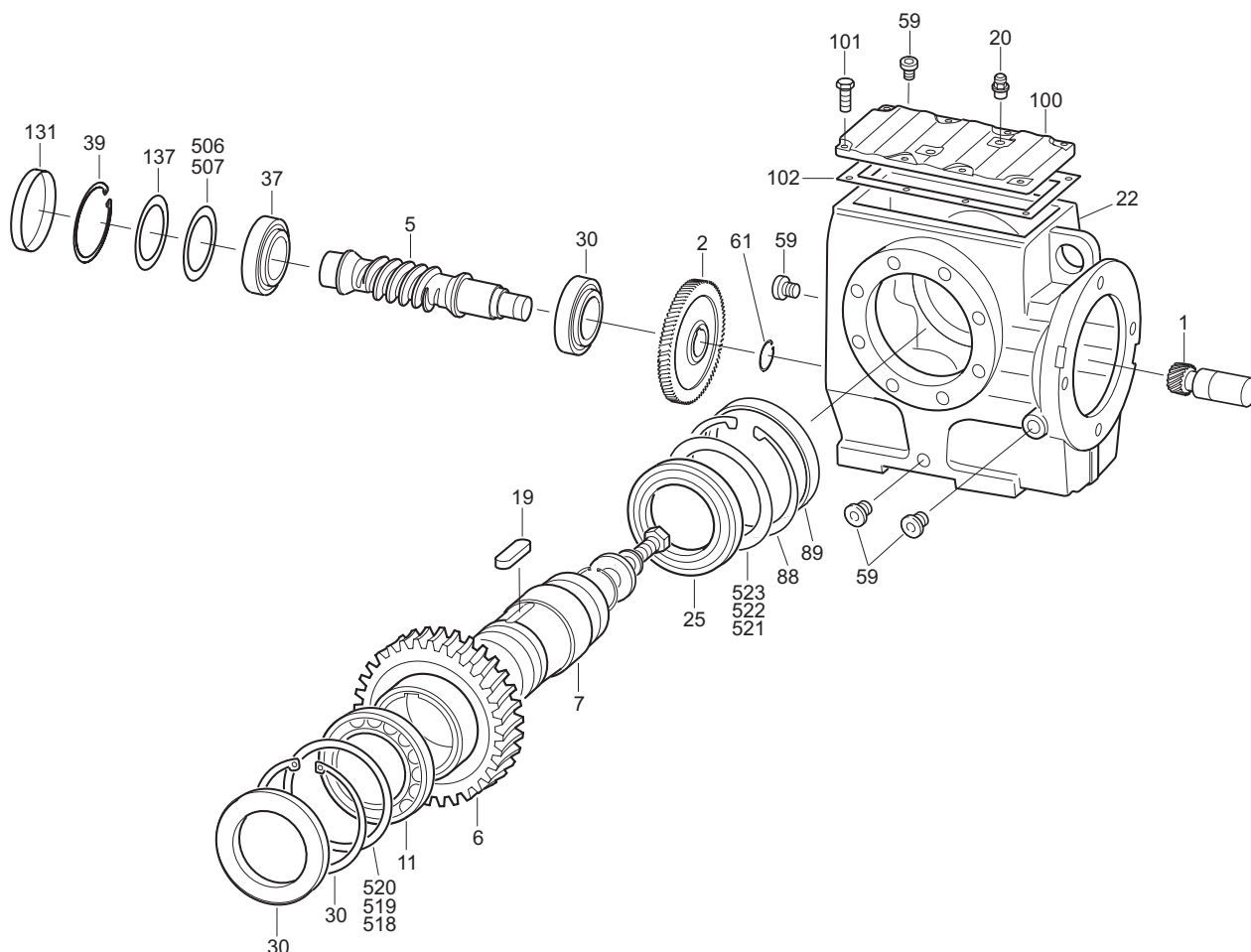


Fig. 4: Basic design of a helical-worm gear unit

03487AXX

#### 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

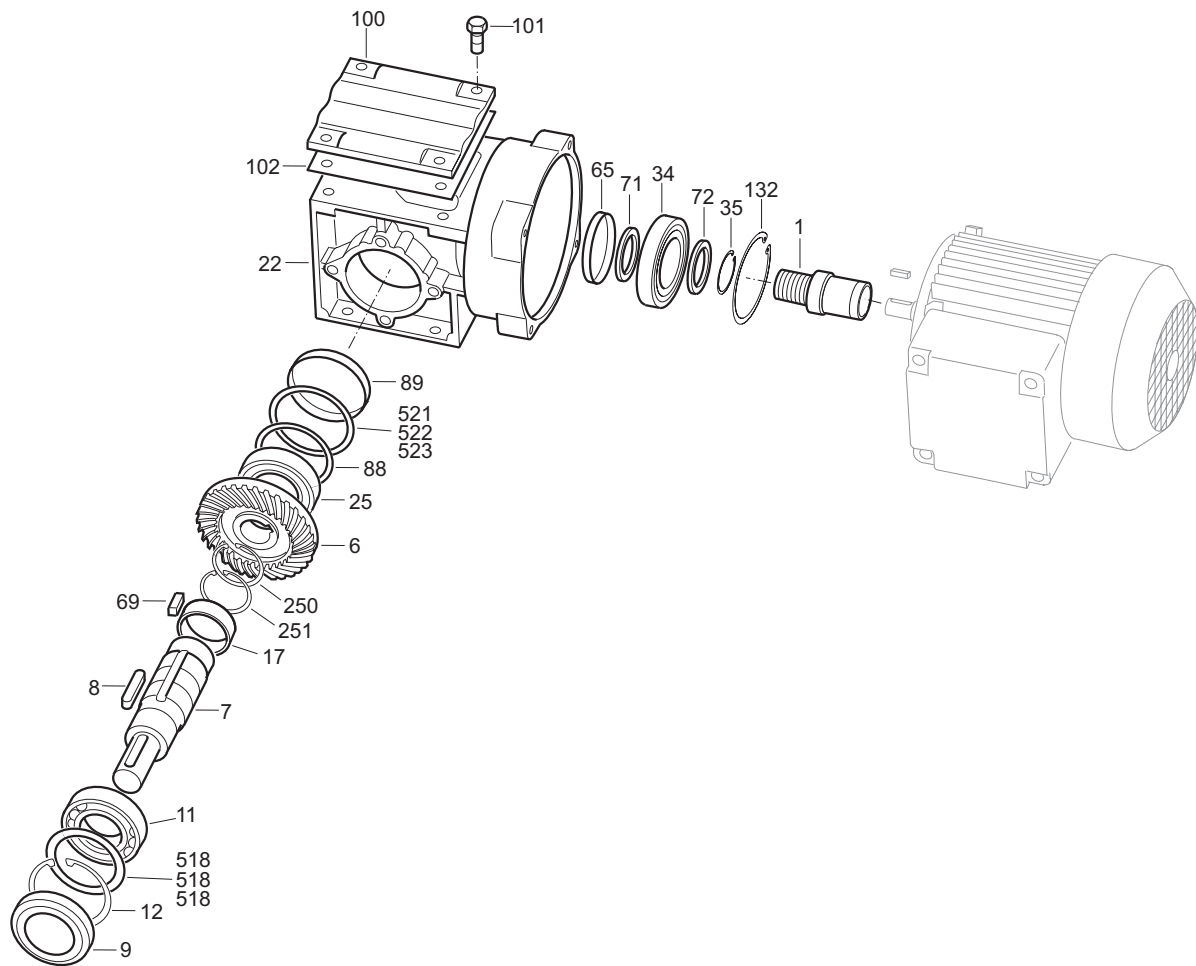


Fig. 5: Basic design of a SPIROPLAN® gear unit

03488AXX

#### 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<sup>®</sup> 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 <ul style="list-style-type: none"> <li>• ISO k6 for solid shafts with <math>\varnothing \leq 50</math> mm</li> <li>• ISO m6 for solid shafts with <math>\varnothing &gt; 50</math> mm</li> <li>• ISO H7 for hollow shafts</li> <li>• Center hole according to DIN 332, shape DR..</li> </ul>	Centering shoulder tolerance according to DIN 42948 <ul style="list-style-type: none"> <li>• ISO j6 with <math>b1 \leq 230</math> mm</li> <li>• ISO h6 with <math>b1 &gt; 230</math> mm</li> </ul>

### 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<sup>®</sup> W gear units:**  
no large external mass moments of inertia which could exert a retrodriving load on the gear unit  
[where  $h'$  (retrodriving) =  $2 - 1/\eta < 0.5$  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<sup>1</sup>, 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-Ø 120 mm
- RF47, R47F with flange-Ø 140 mm
- RF57, R57F with flange-Ø 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.

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.

*Installation in damp areas or in the open*

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:**

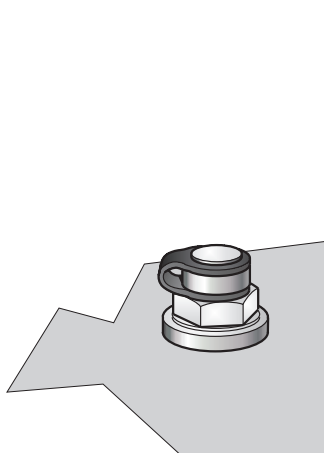
Gear units for long-term storage, in pivoting or inclined mounting positions are supplied with a screw plug installed in the provided vent hole. Prior to startup, the customer must replace screw plug at the highest location by the supplied breather valve.

- **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**.

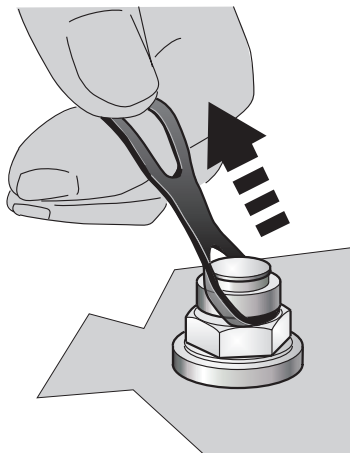
**Activating the breather valve**

**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!**

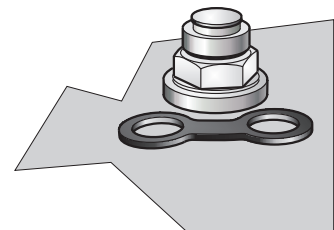
1. Breather valve with transport fixture
2. Remove transport fixture
3. Activate breather valve



02053BXX



02054BXX



02055BXX

**Painting the gear unit**

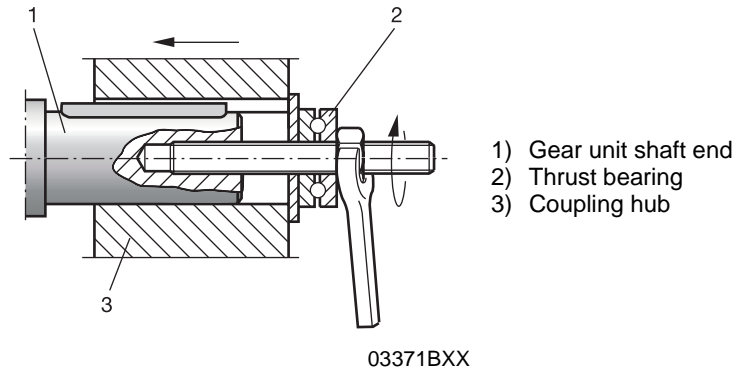
Cover breather valve and oil seals with protective tape prior to painting or partly repainting the drive. Remove adhesive strips when the paint job is finished.



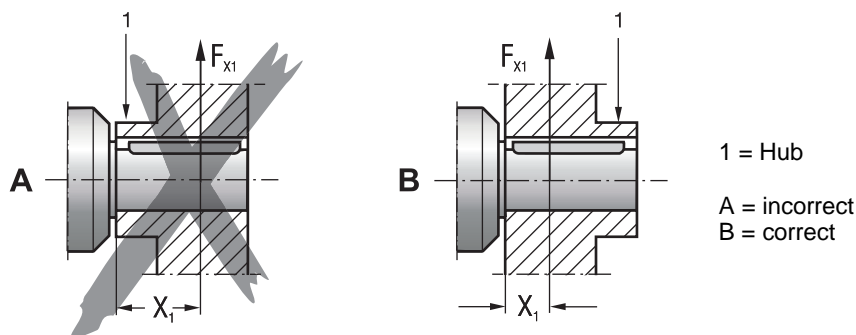
#### 4.5 Gear units with solid shaft

##### Installation of input and output elements

The following illustration is an example of a mounting 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.



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



03369BXX



- 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:

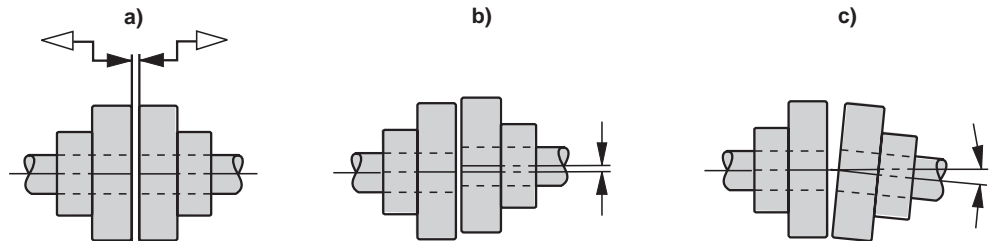
Assembly is easier if you first apply lubricant to the output element or heat it up briefly (to 80-100 °C).



### 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



03356AXX

Fig. 6: Distance and misalignment with coupling installation



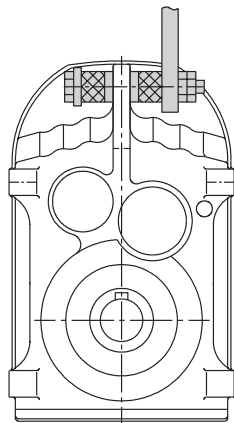
**Drive and output elements such as belt pulleys, couplings, etc. must be equipped with a touchguard!**



#### 4.6 Installation of torque arms for shaft-mounted gear units

Do not strain torque arms during installation!

**Parallel shaft  
helical gear units**

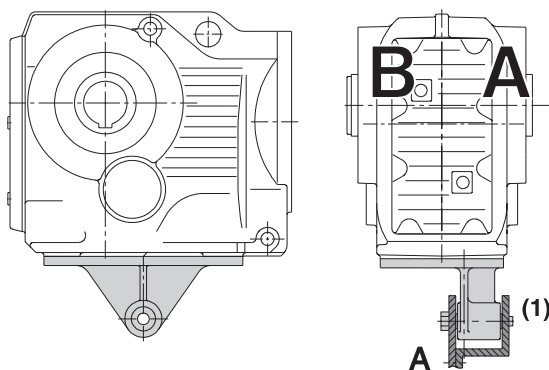


01029BXX

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



01030CXX

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


**Helical-worm  
gear units**

- Bushing with bearings on both ends → (1)

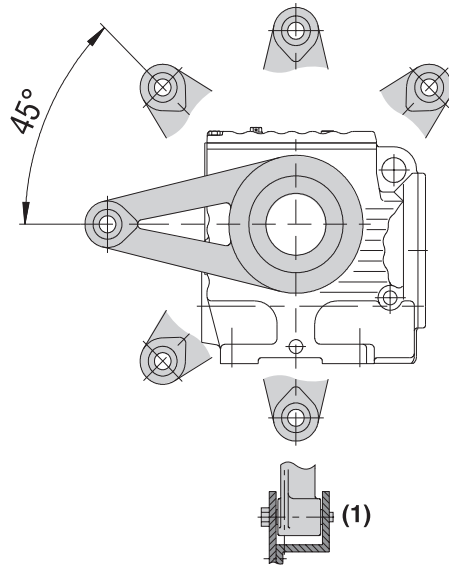


Fig. 9: Torque arm for helical-worm gear units

01031CXX

**SPIROPLAN®  
W gear units**

- Bushing with bearings on both ends → (1)

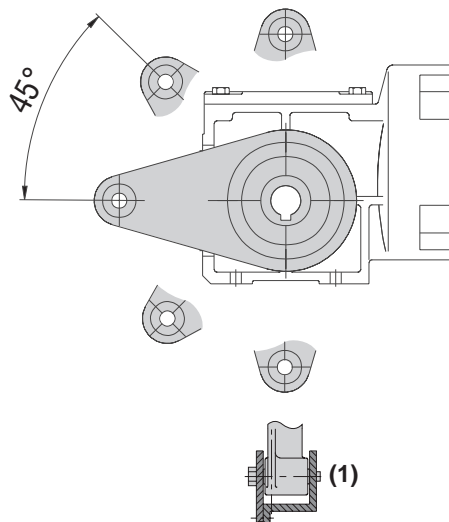


Fig. 10: Torque arm for SPIROPLAN® W gear units

02050CXX



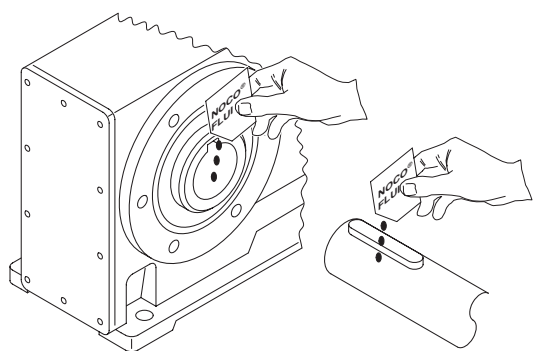
#### 4.7 Installation/removal of shaft-mounted gear units with key or splines



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

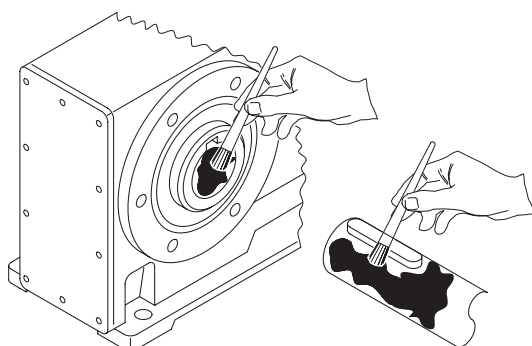
##### Installation notes

1. Apply NOCO<sup>®</sup> fluid



02042BXX

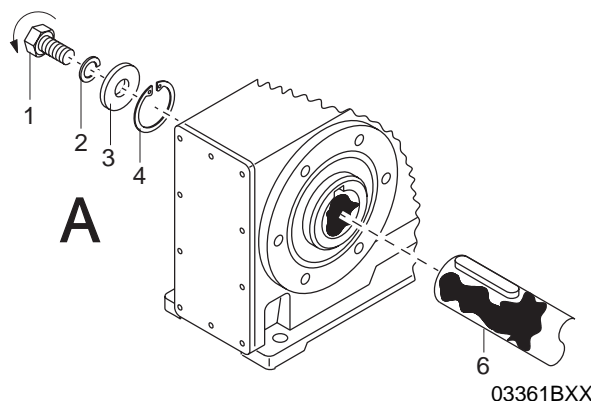
2. Distribute NOCO<sup>®</sup> fluid evenly



02043AXX

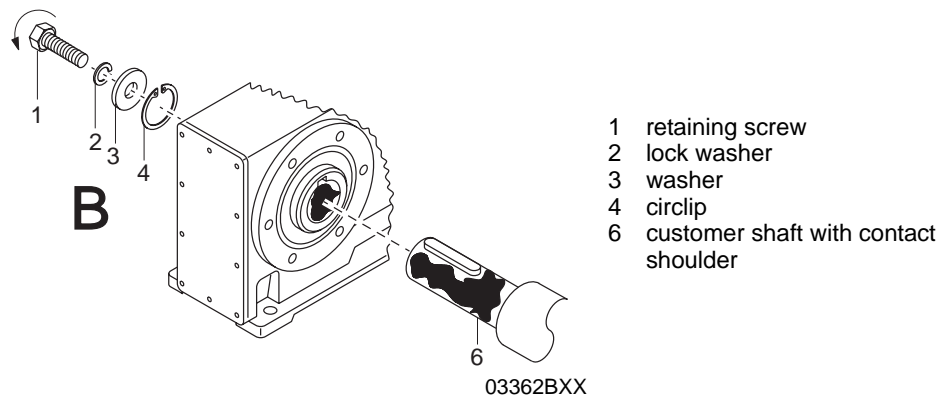
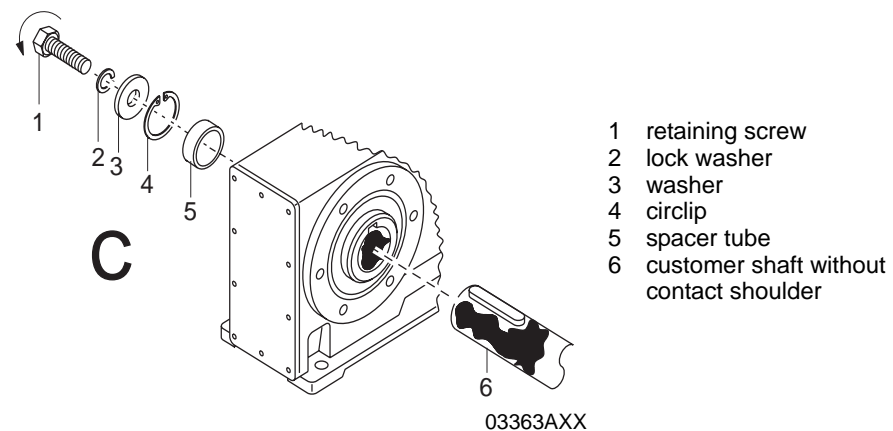
3. Install shaft and secure axially  
(installation will be made easier by using a mounting device)

##### 3A: Installation with standard components

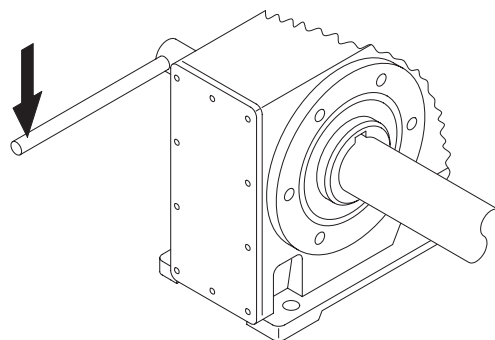


- 1 short retaining screw  
(standard components)
- 2 lock washer
- 3 washer
- 4 circlip
- 6 customer shaft

03361BXX

**3B: Installation with SEW installation/removal kit (→ page 22)**– Customer shaft **with** contact shoulder**3C: Installation with SEW installation/removal kit (→ page 22)**– 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

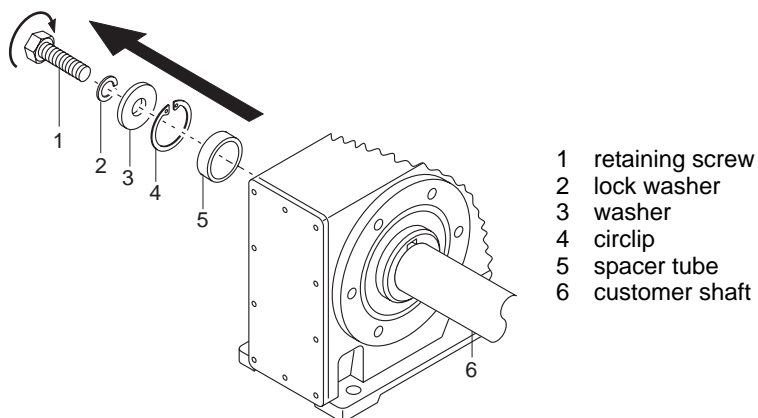
**Note:**

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)

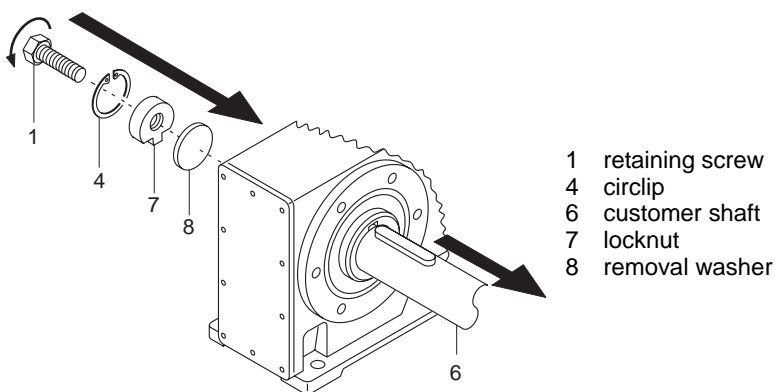
1. Loosen the retaining screw 1.
2. Remove parts 2 to 4 and the spacer tube 5, if installed.



- 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

03367AXX



### SEW installation/ removal kit

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

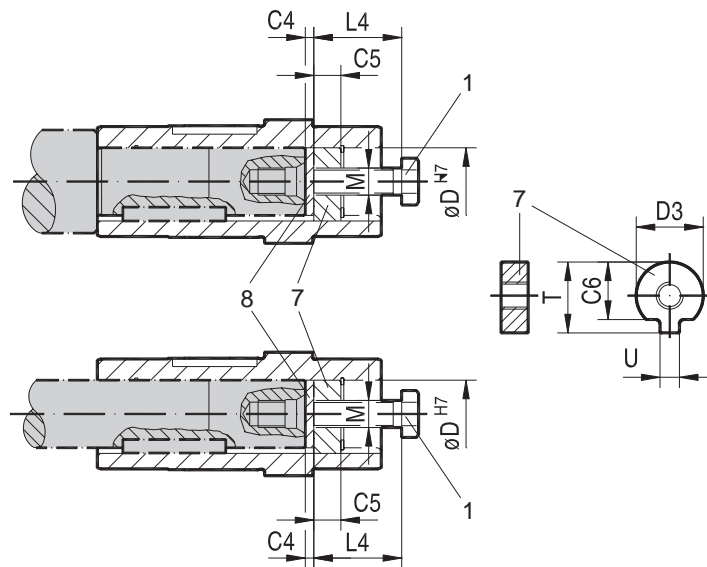


Fig. 11: SEW installation/removal kit

03394CXX

- 1 retaining screw
- 7 locknut for removal
- 8 removal washer

Type	D <sup>H7</sup> [mm]	M <sup>1)</sup>	C4 [mm]	C5 [mm]	C6 [mm]	U <sup>-0.5</sup> [mm]	T <sup>-0.5</sup> [mm]	D3 <sup>-0.5</sup> [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



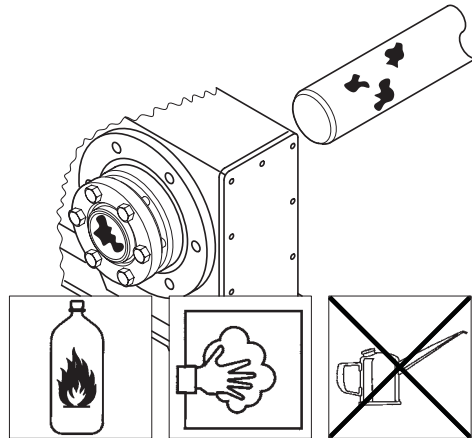
#### 4.8 Installation/removal of shaft-mounted gear units with shrink disc

**Installation notes**

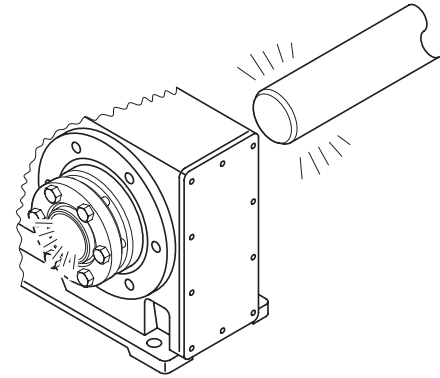
- Do not tighten locking screws unless shaft is installed - hollow shaft could be deformed!

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

2. Degreased hollow shaft/drive shaft



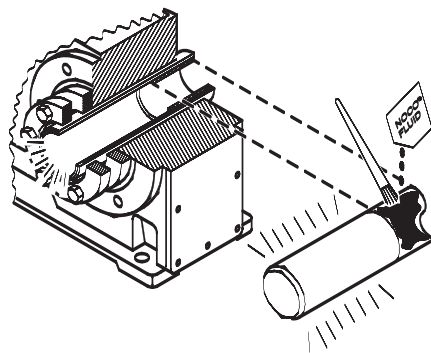
01815AXX



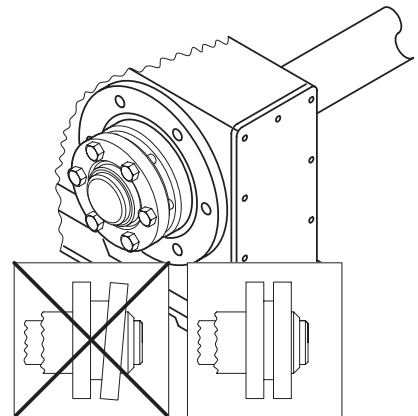
01816AXX

3. Apply NOCO® fluid in the bushing area onto the input shaft<sup>1)</sup>.

4. Install shaft, making sure that the locking collars of the shrink disc are evenly spaced<sup>2)</sup>.



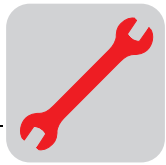
01817AXX



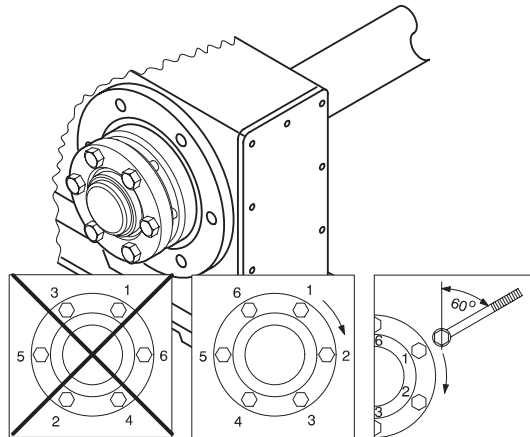
01818AXX



- 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.**
- After installation**, grease the outer surface of the hollow shaft in the shrink disc area to protect the shaft against corrosion.



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



01819AXX

Gear unit type			Screw	Nm	max. <sup>1)</sup>
FH27	SH37		M5	5	60°
KH37...77	FH37...77	SH47...77	M6	12	
KH87/97	FH87/97	SH87/97	M8	30	
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.



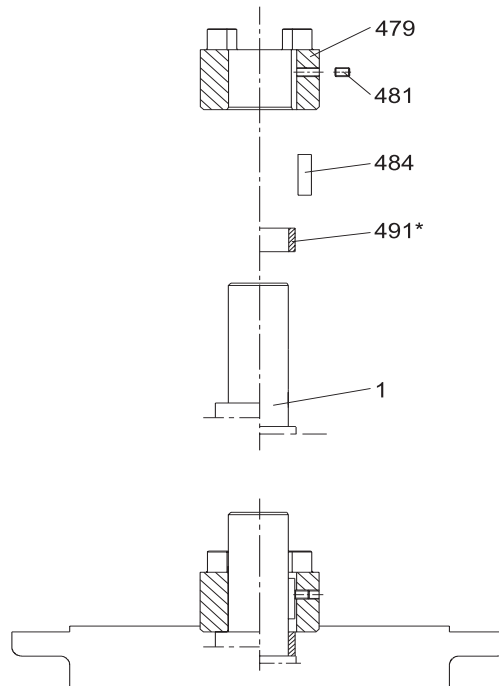
#### 4.9 Installation of the AM adapter coupling

**IEC adapters**

**AM63 - 225 /**

**NEMA adapters**

**AM56 - 365**



\* = NEMA adapters only  
1 = motor shaft

04469AXX

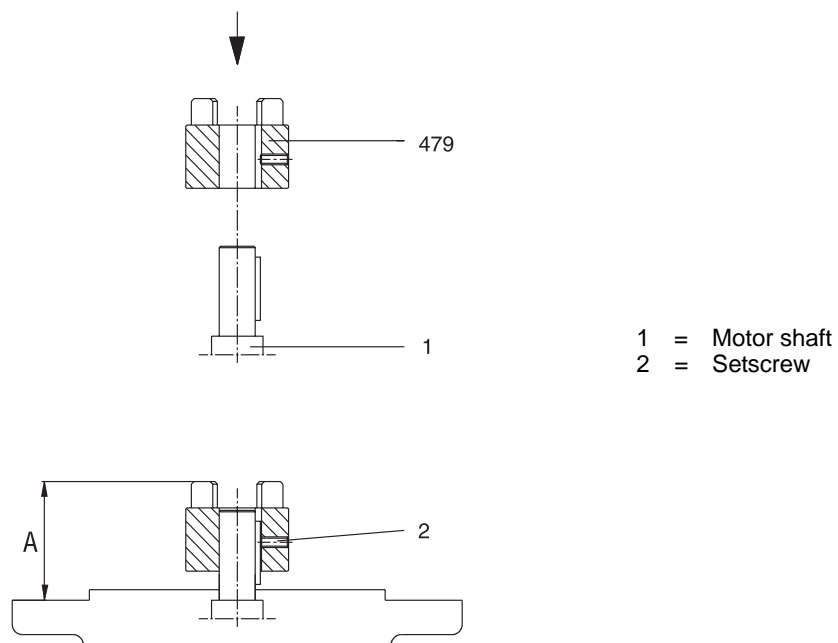
1. Clean motor shaft and flange surfaces of motor and adapter.
2. **IEC adapters:** Remove motor shaft key and replace with supplied key (484).  
**NEMA adapters:** Remove motor shaft key, slide spacer tube (491) on motor shaft and install supplied key (484).
3. Heat coupling half (479) to approx. 80 - 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<sup>®</sup> fluid on the motor shaft prior to installation of the coupling half to prevent contact corrosion.



**IEC adapters  
AM250/AM280**



02047CXX

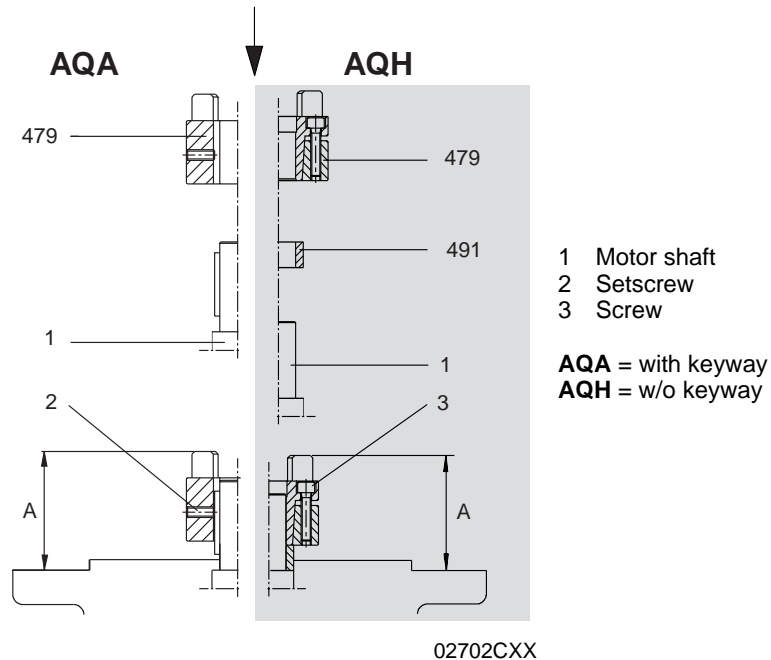
1. Clean motor shaft and flange surfaces of motor and adapter.
2. Remove motor shaft key and replace with supplied key (**size AM280 only**).
3. Heat coupling half (479) (to 80 °C - 100 °C) and slide on motor shaft (A = 139 mm).
4. Fasten coupling half with setscrew and check position (distance "A").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



Note: We recommend applying Noco<sup>®</sup> 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. 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 <sup>1)</sup>	Tightening torque TT <sup>1)</sup> [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)

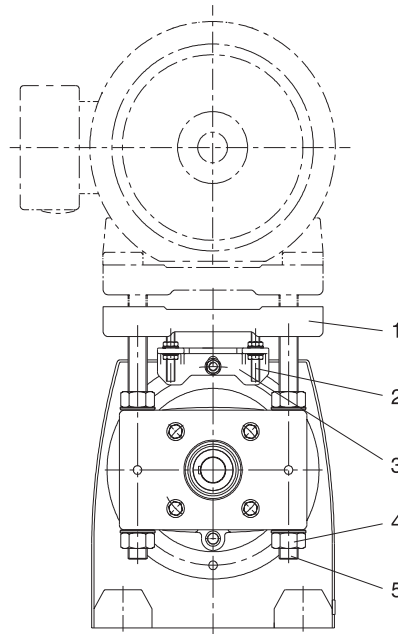


#### 4.11 Installation on the AD input shaft assembly

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



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

03519BXX

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:**

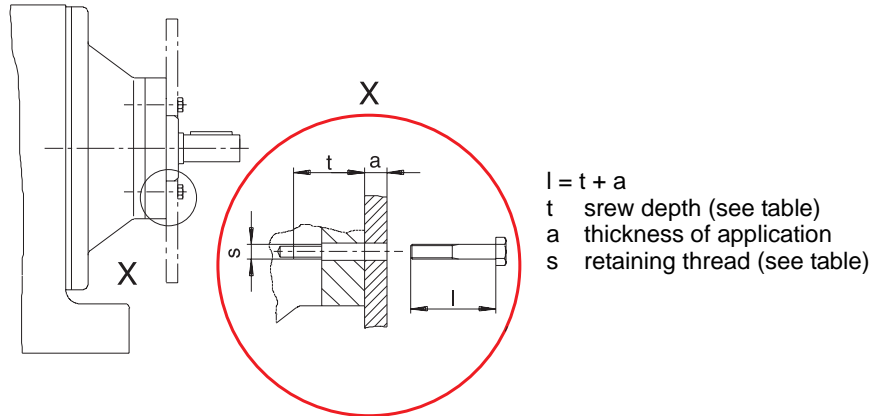
Loosen nuts and stud bolts before readjustment so that the stud bolts can be moved freely in the support axially. Tighten nuts after the final position has been accomplished. Do not adjust the motor mounting platform by using the support.



**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:



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	<ul style="list-style-type: none"> <li>Check oil (see Inspection and Maintenance)</li> <li>Stop the drive, call customer service</li> </ul>
Oil leaking <sup>1)</sup> <ul style="list-style-type: none"> <li>from the gear unit cover</li> <li>from the motor flange</li> <li>from motor oil seal</li> <li>from gear unit flange</li> <li>from the output end oil seal</li> </ul>	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



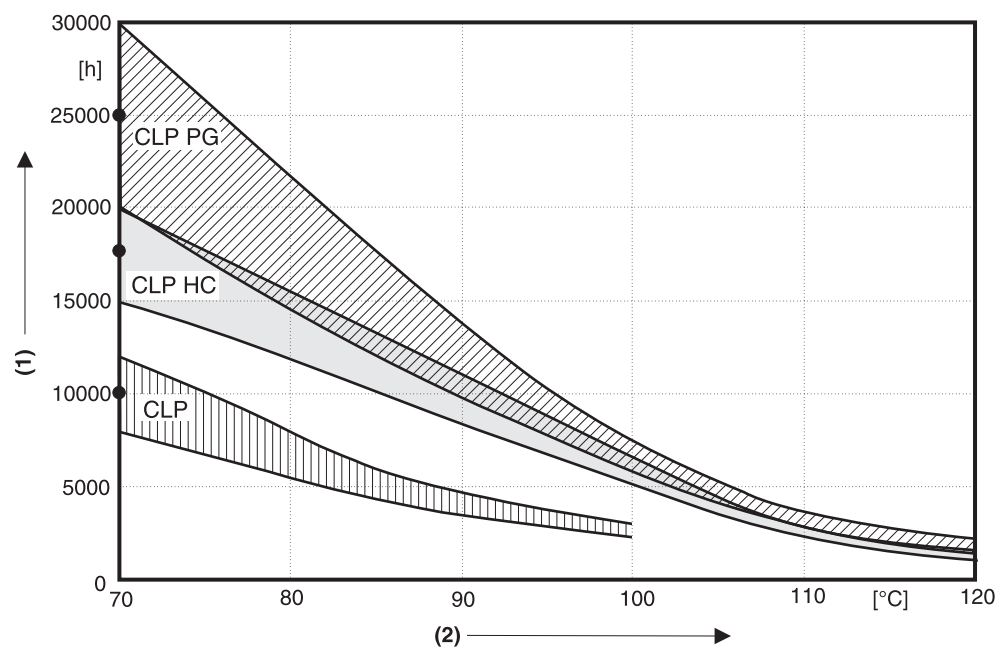
## 7 Inspection and Maintenance

### 7.1 Inspection and maintenance periods

Time period	What to do?
<ul style="list-style-type: none"> <li>every 3000 operating hours, at least every six months</li> </ul>	<ul style="list-style-type: none"> <li>Check oil</li> </ul>
<ul style="list-style-type: none"> <li>depending on operating conditions (see following illustration), at least every three years</li> </ul>	<ul style="list-style-type: none"> <li>Replace mineral oil</li> <li>Replace bearing grease</li> </ul>
<ul style="list-style-type: none"> <li>depending on operating conditions (see following illustration), at least every five years</li> </ul>	<ul style="list-style-type: none"> <li>Replace synthetic oil</li> <li>Replace bearing grease</li> </ul>
<ul style="list-style-type: none"> <li>R17, R27, F27 and Spiroplan® gear units are lubricated for life and do not require maintenance</li> </ul>	
<ul style="list-style-type: none"> <li>different (depending on external influences)</li> </ul>	<ul style="list-style-type: none"> <li>Touch up or replace surface/corrosion protection coat</li> </ul>

### 7.2 Lubricant replacement schedule

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



04640AXX

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).

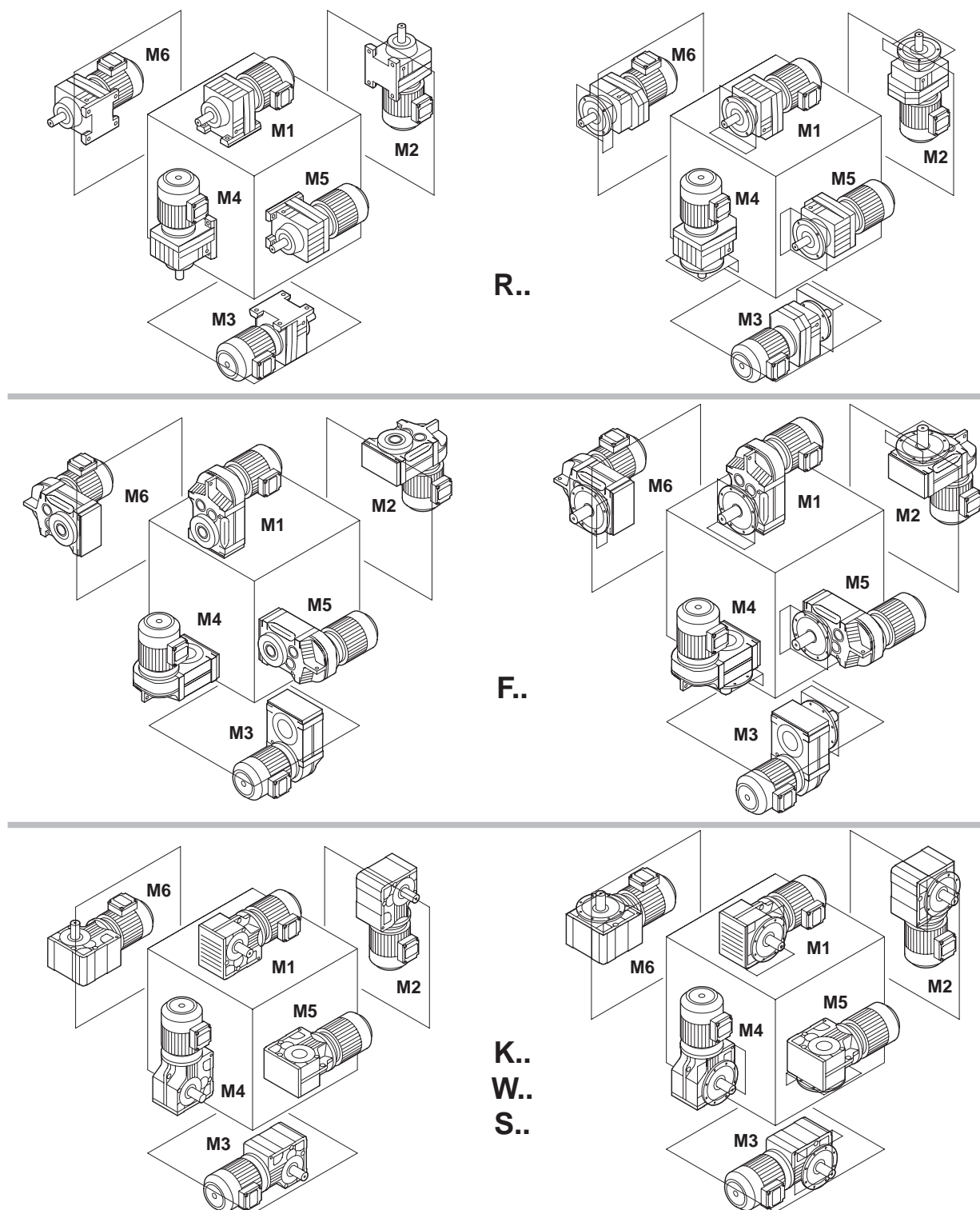


Fig. 13: Mounting positions M1 ... M6

03203AXX

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

04464AXX


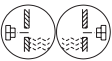

**Example**

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



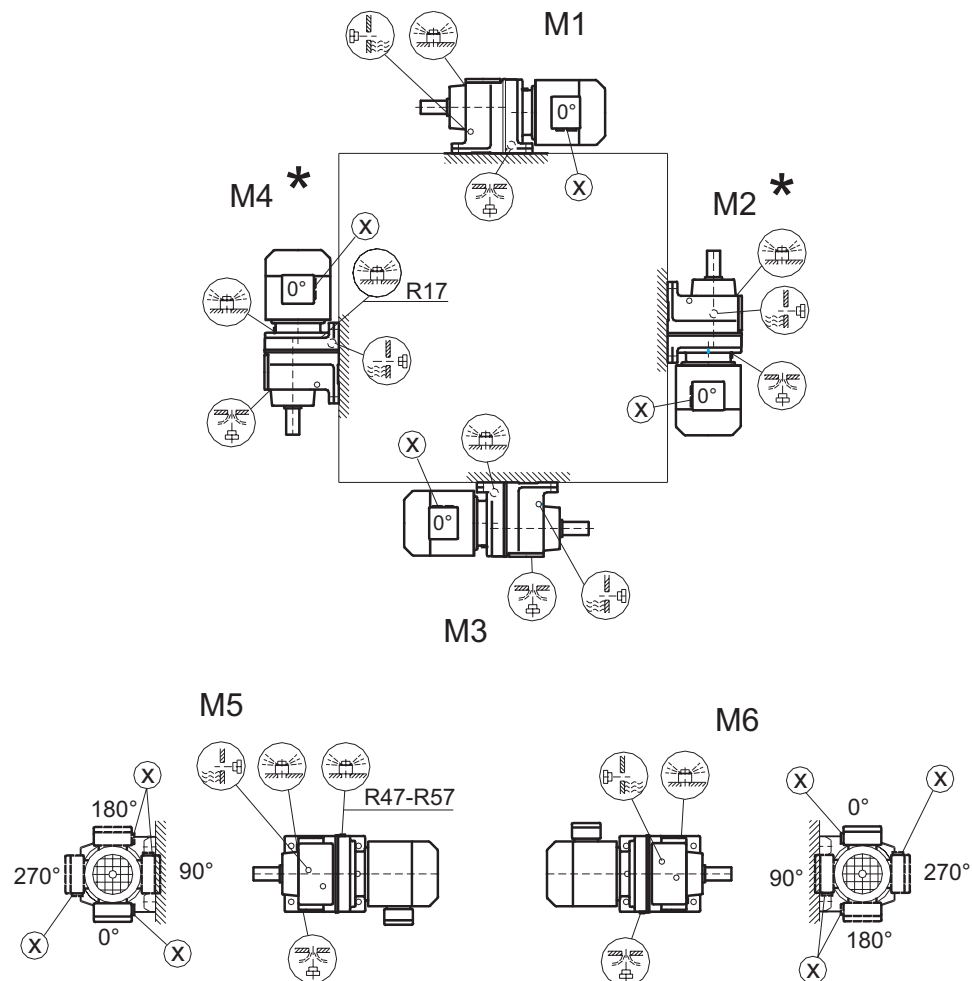
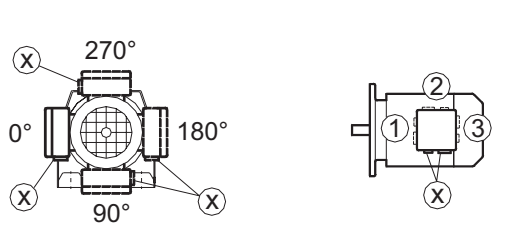
There is a possibility of increased churning losses with some mounting positions. Please contact SEW when dealing with the following combinations:

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

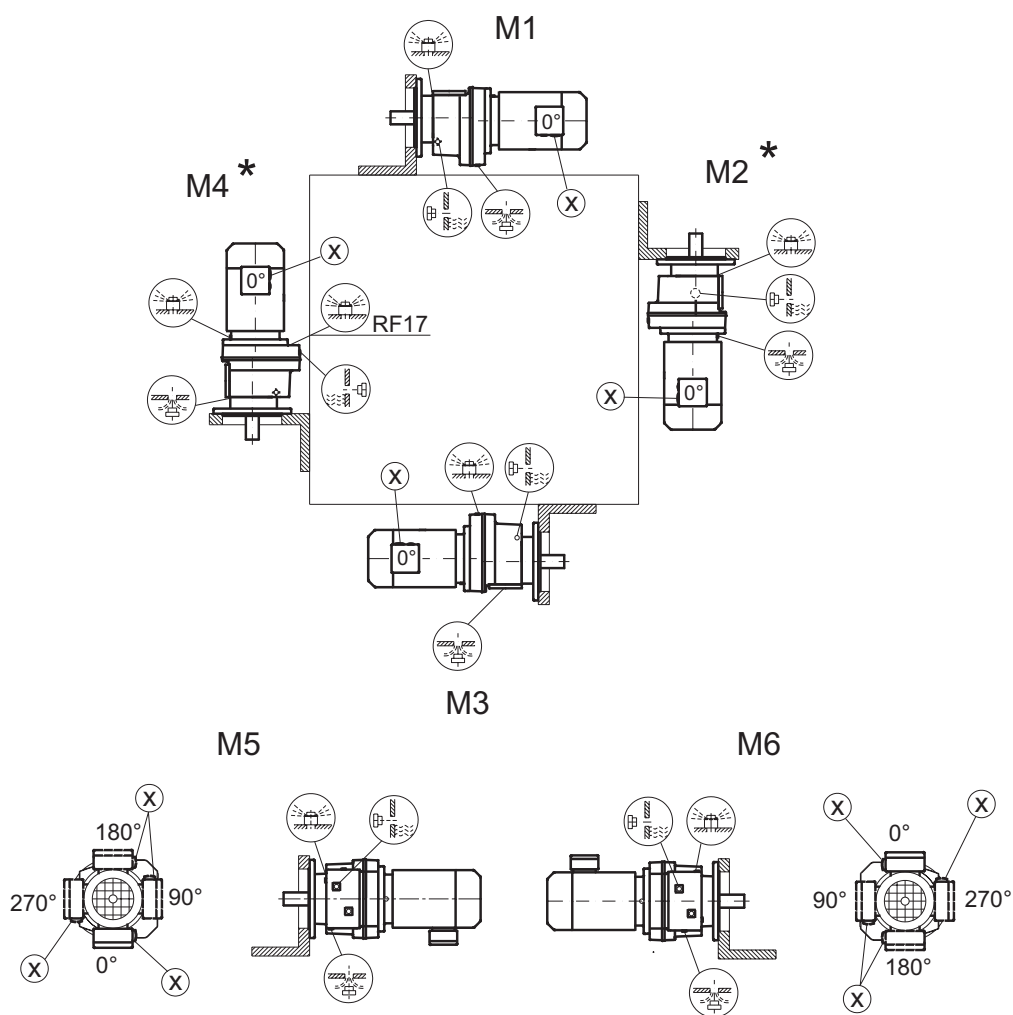
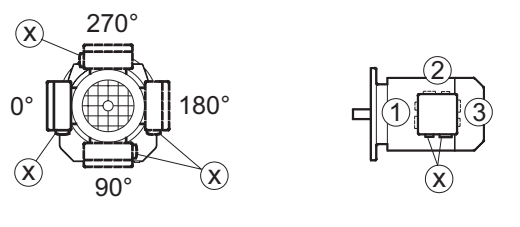


- |          |  |                |
|----------|--|----------------|
| R17, R27 |  | M1, M3, M5, M6 |
| R47, R57 |  | M5             |
| R17, R27 |  |                |

\* → page 36

RF17-RF167

04 041 100



RF17, RF27



M1, M3, M5, M6

RF47, RF57



M5

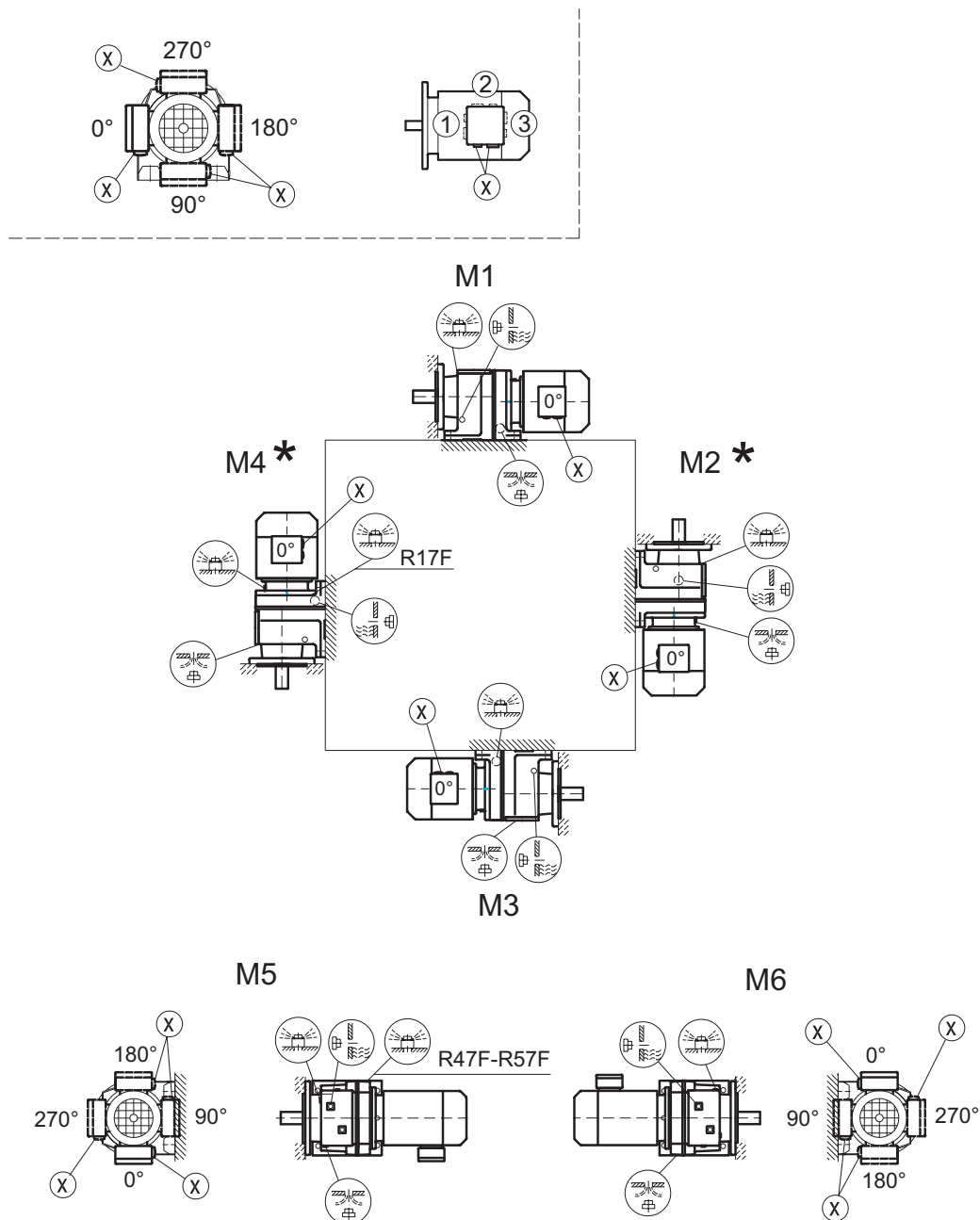
RF17, RF27



\* → page 36

R17F-R87F

04 042 100



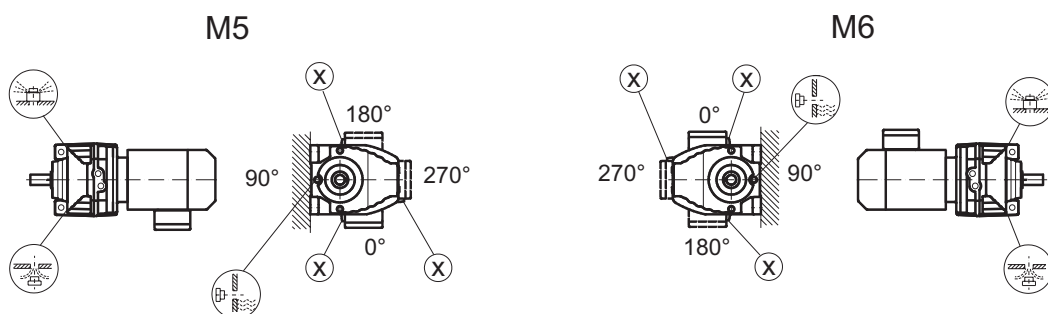
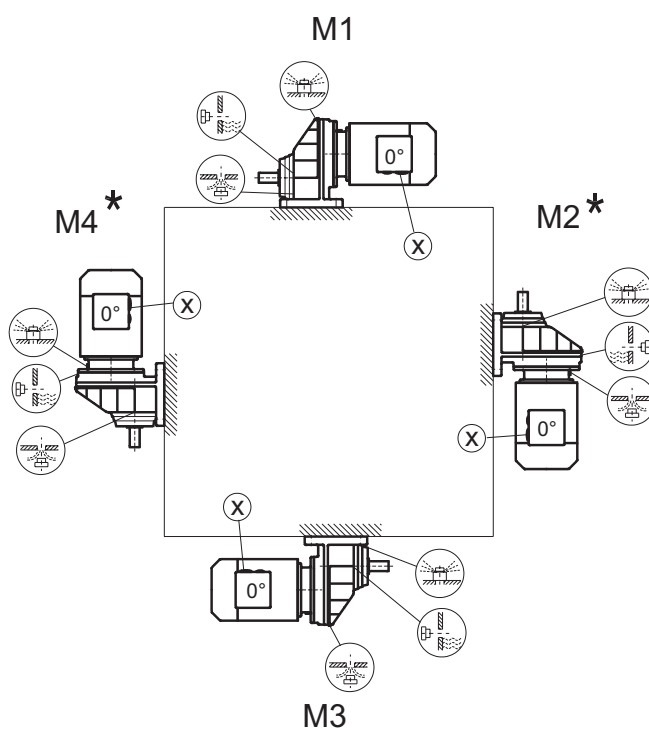
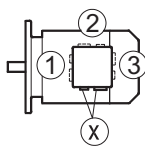
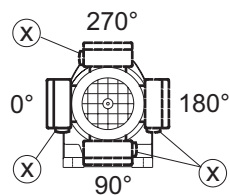
R17F, R27F		M1, M3, M5, M6
R47F, R57F		M5
R17F, R27F		

\* → page 36

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

RX57-RX107

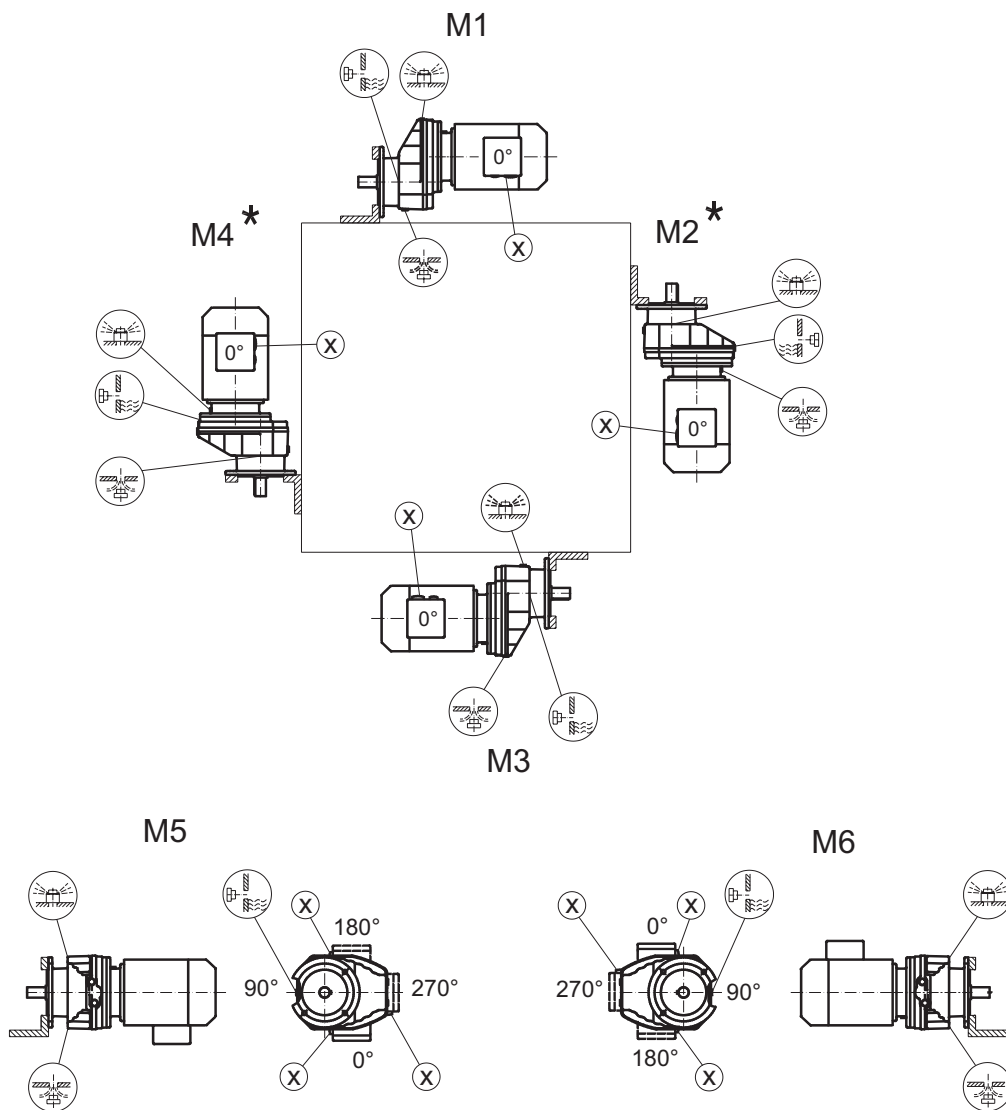
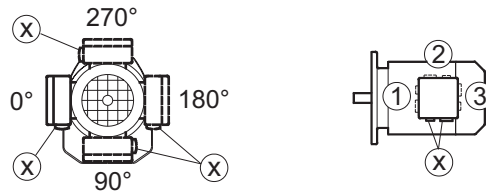
04 043 100



\* → page 36

**RXF57-RXF107**

**04 044 100**

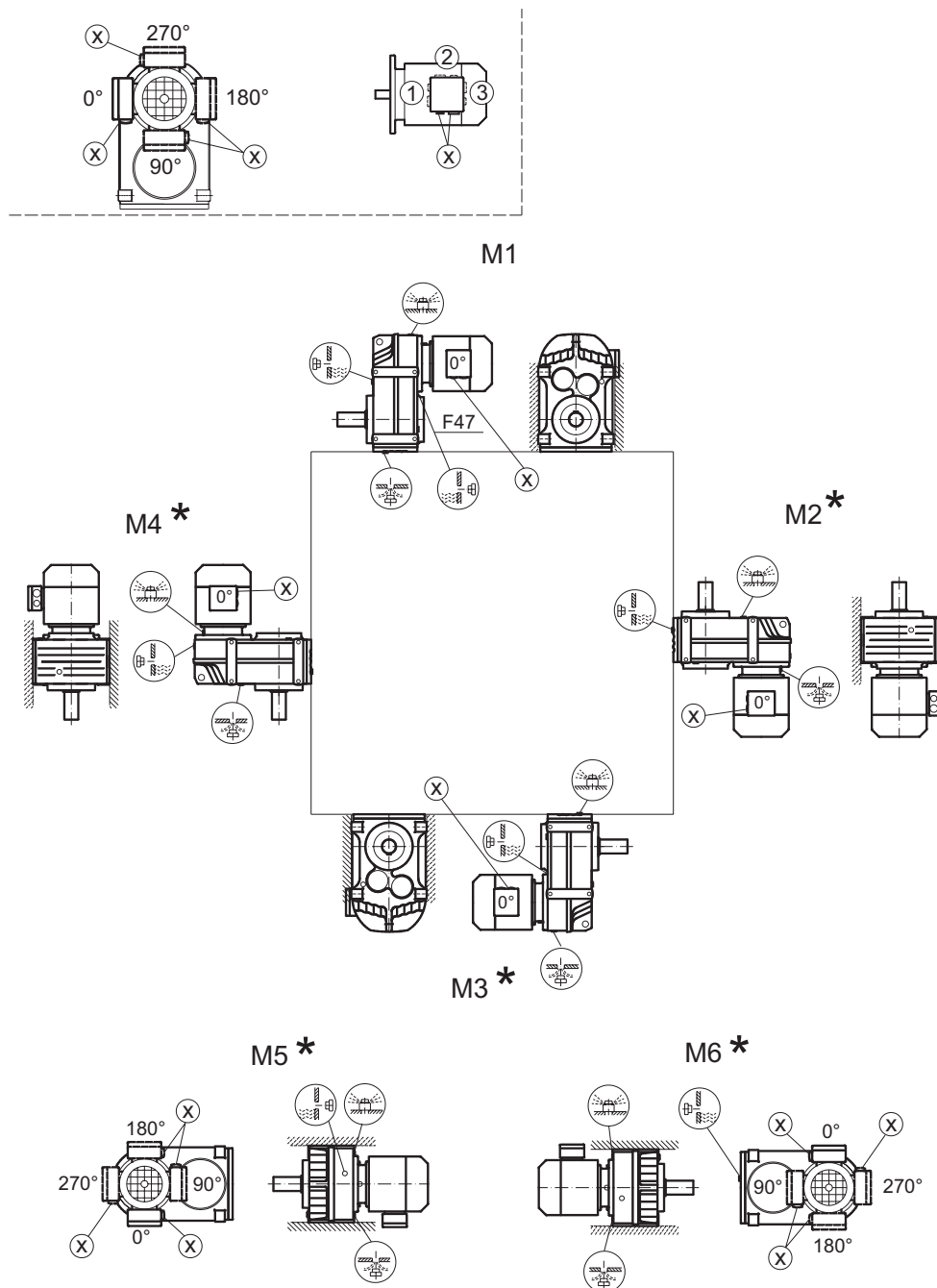


\* → page 36

### 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

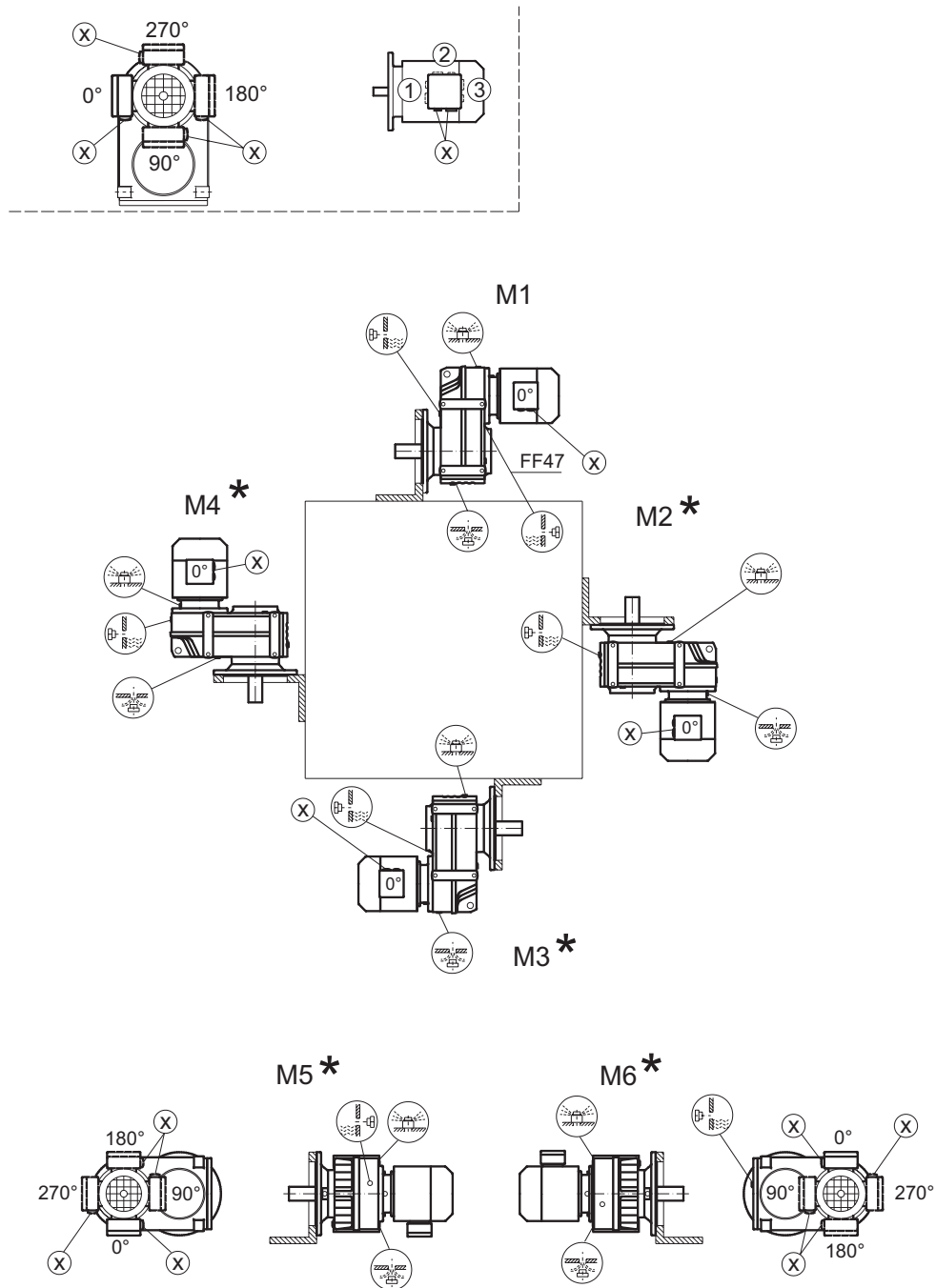
F..27 M1 - M6


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

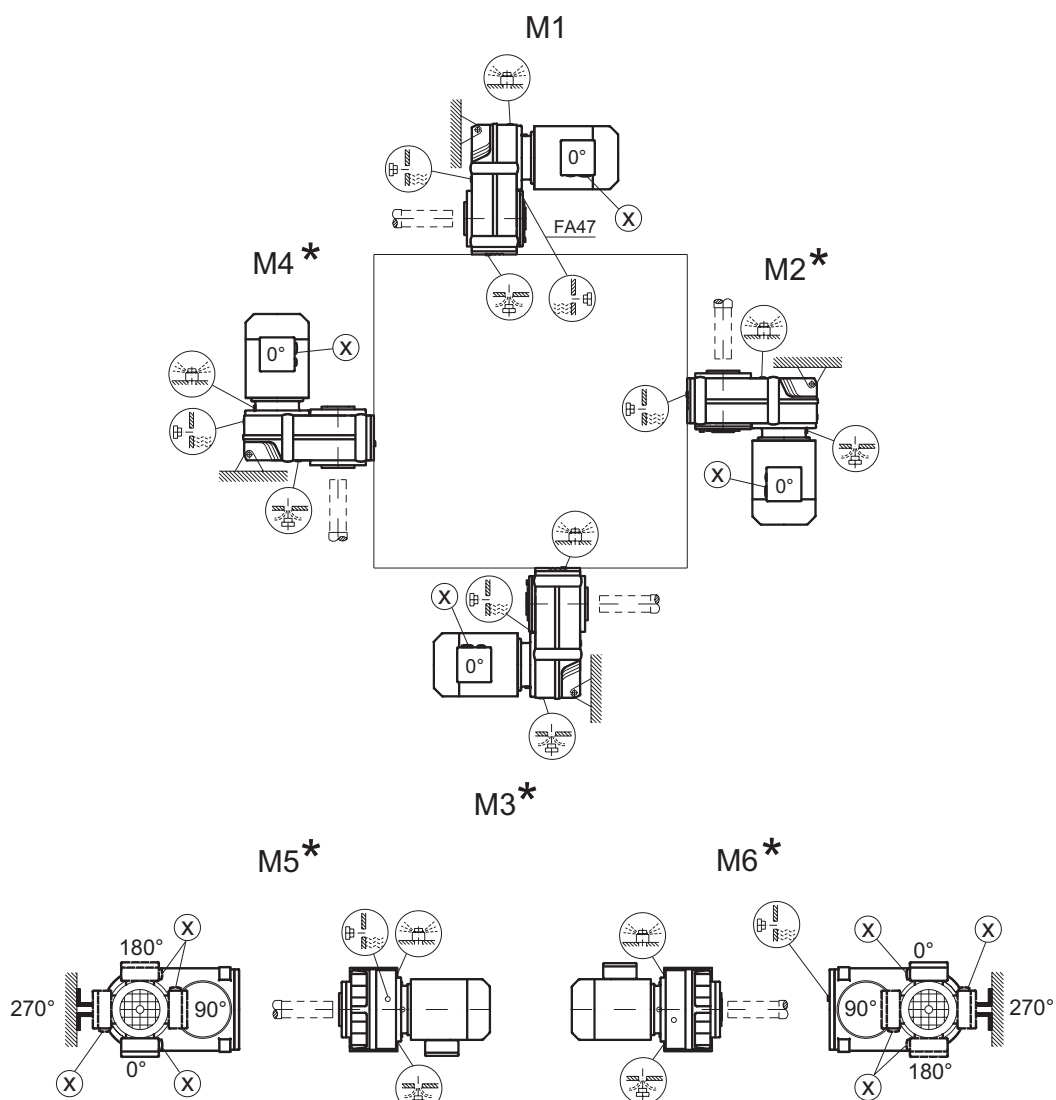
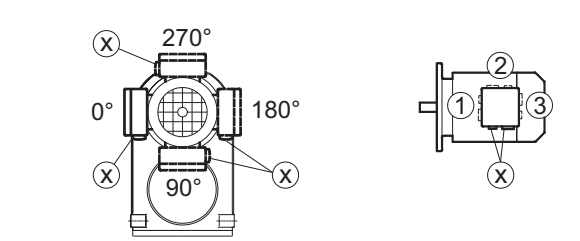

F..27  M1 - M6

F..27  M1, M3, M5, M6

\* → page 36

FA/FH27-157, FV27-107

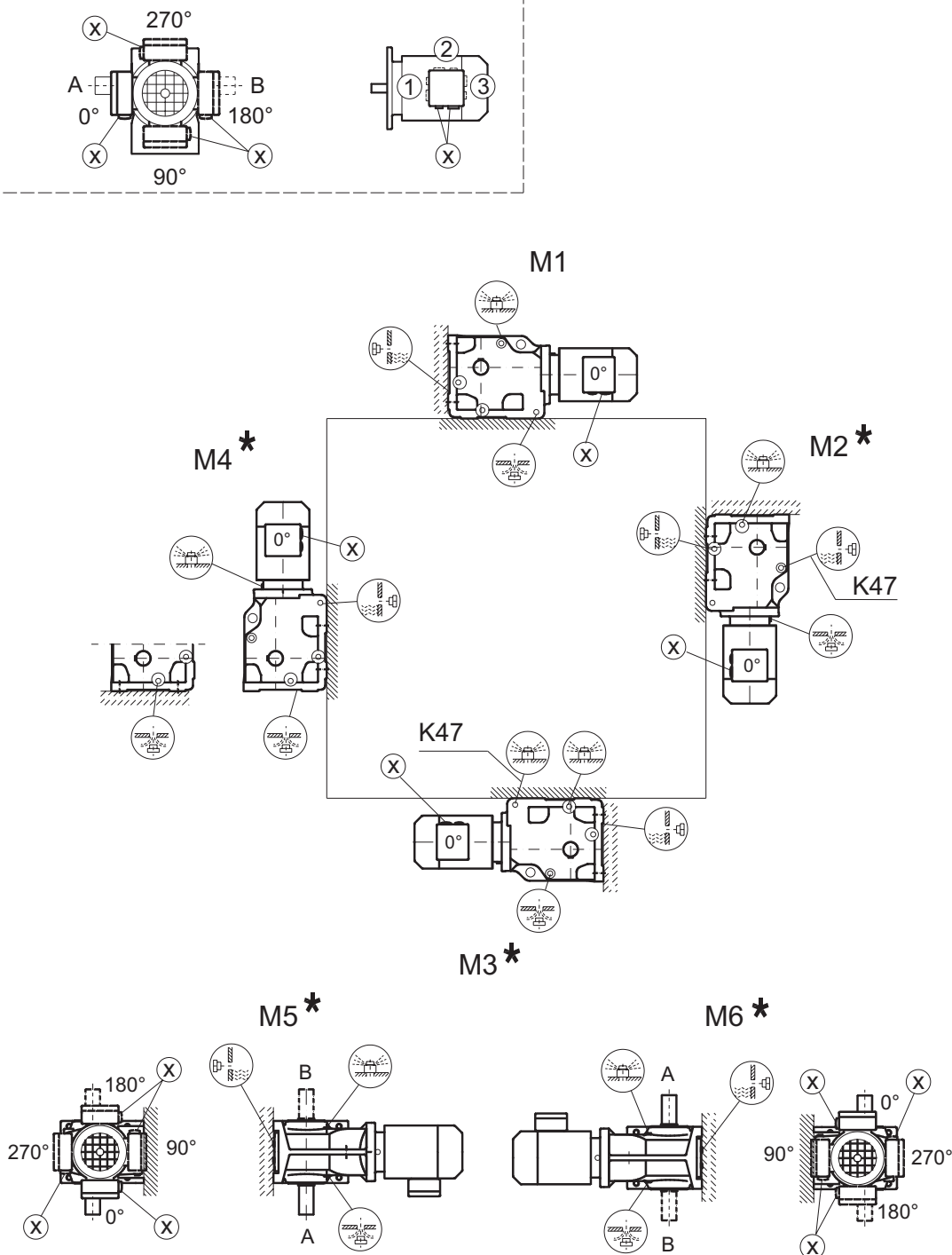
42 044 100

F..27  M1, M3, M5, M6F..27  M1 - M6F..27  M1, M3, M5, M6


\* → page 36

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

**34 025 100**

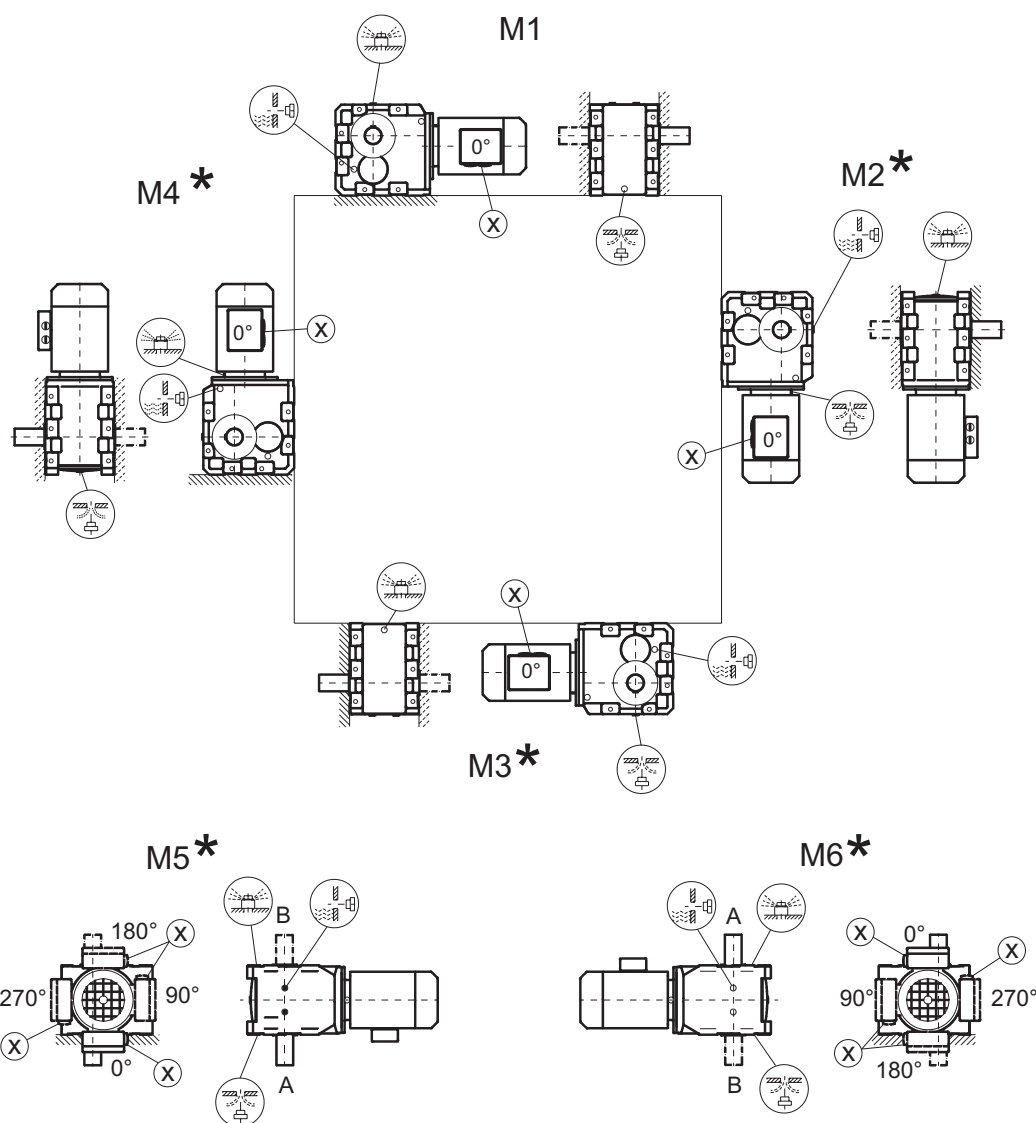
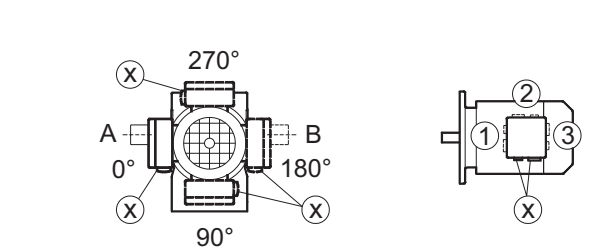


\* → page 36

**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

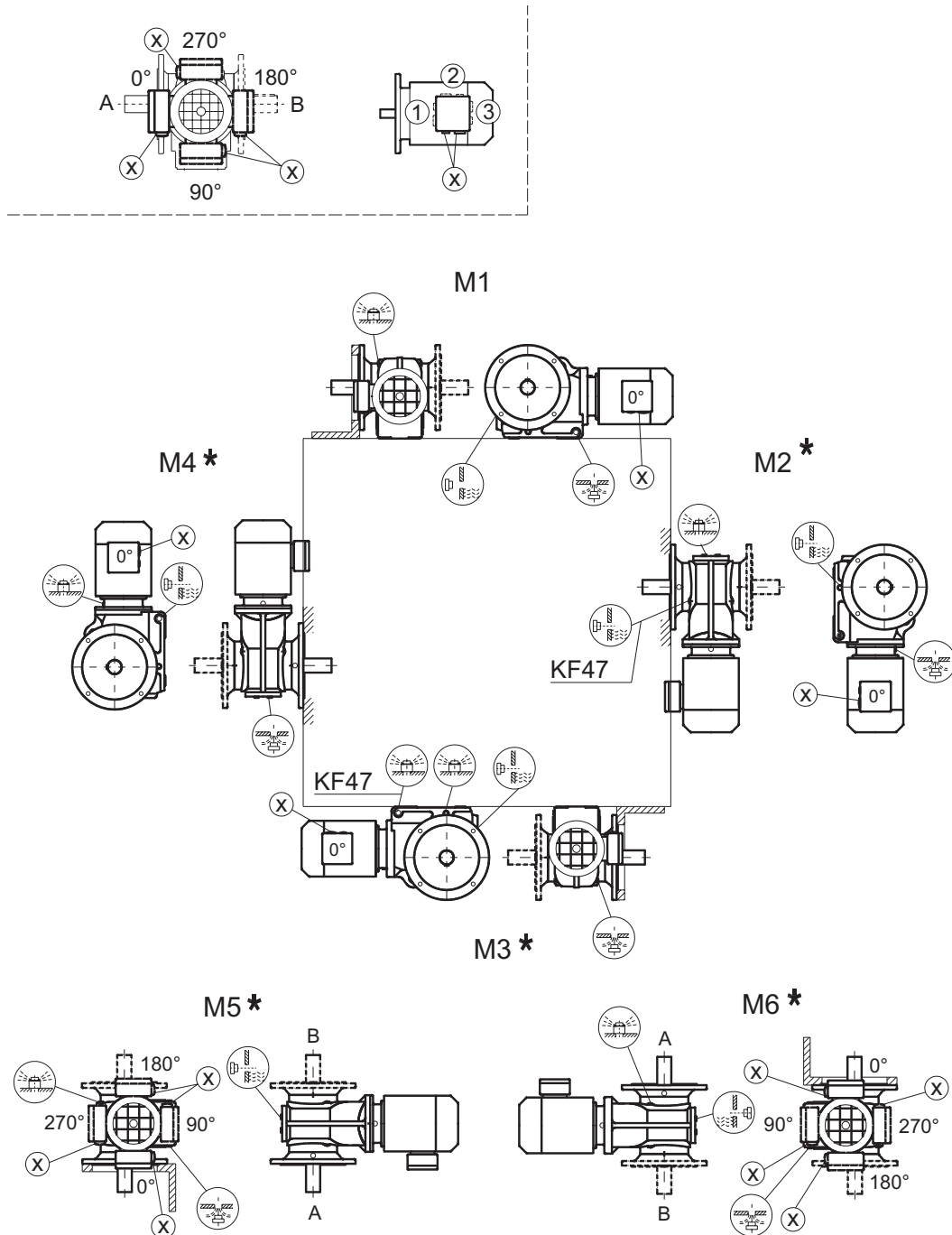


\* → page 36

**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

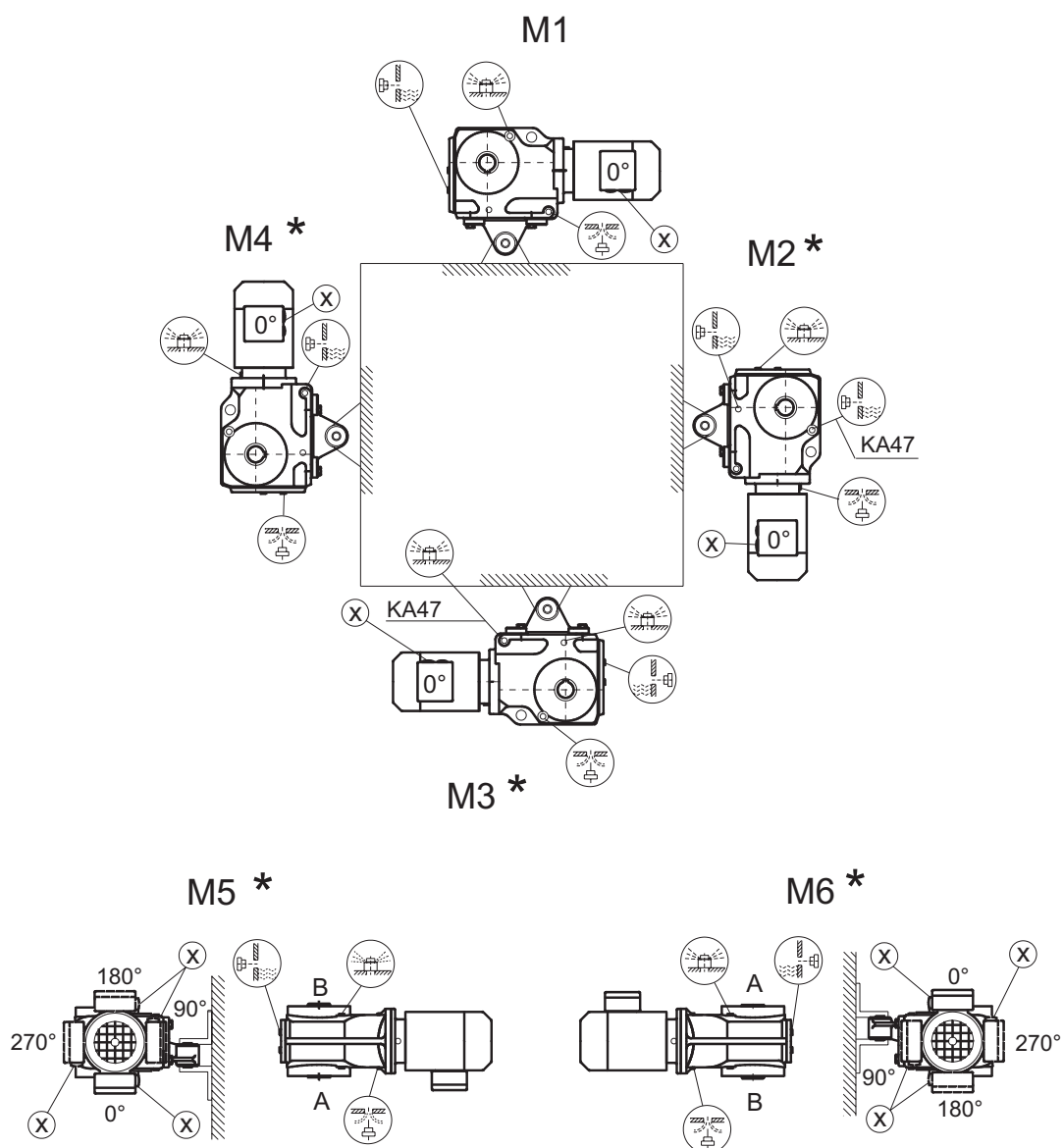
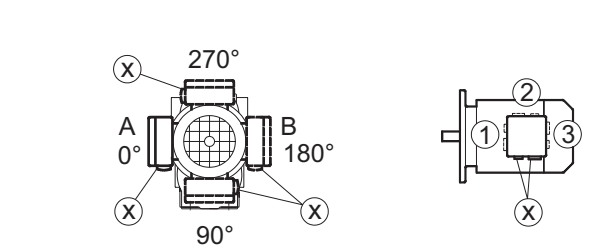
34 027 100



\* → page 36

KA/KH37-157, KV37-107

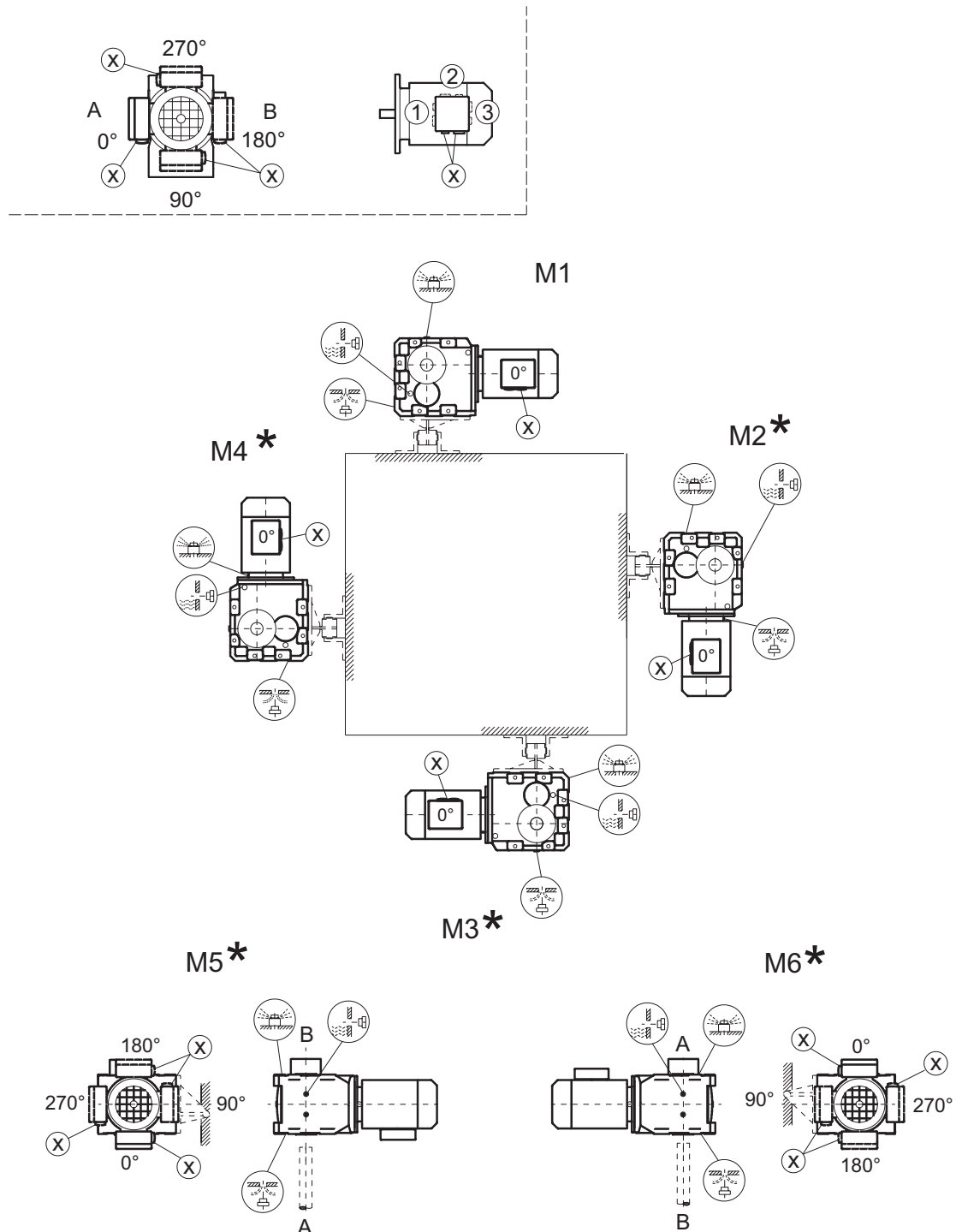
39 025 100



\* → page 36

***KH167-187***

**39 026 100**

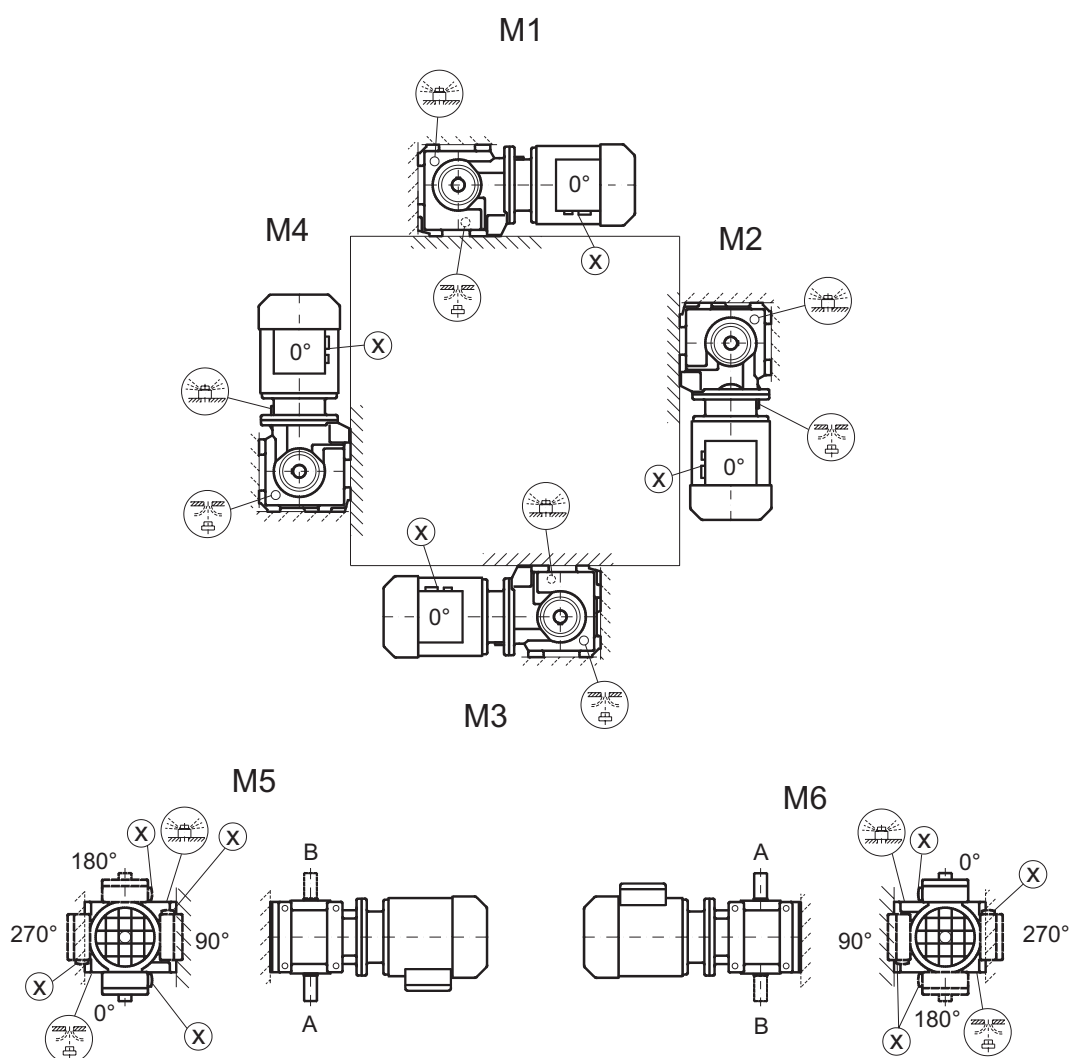
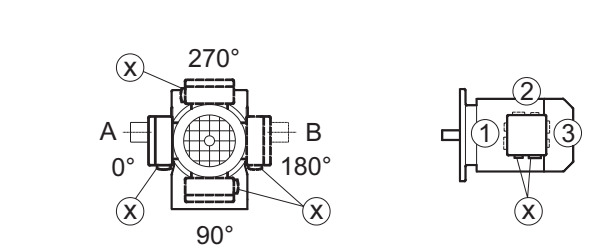



\* → page 36

## 8.6 Mounting positions, helical-worm gear units

S37

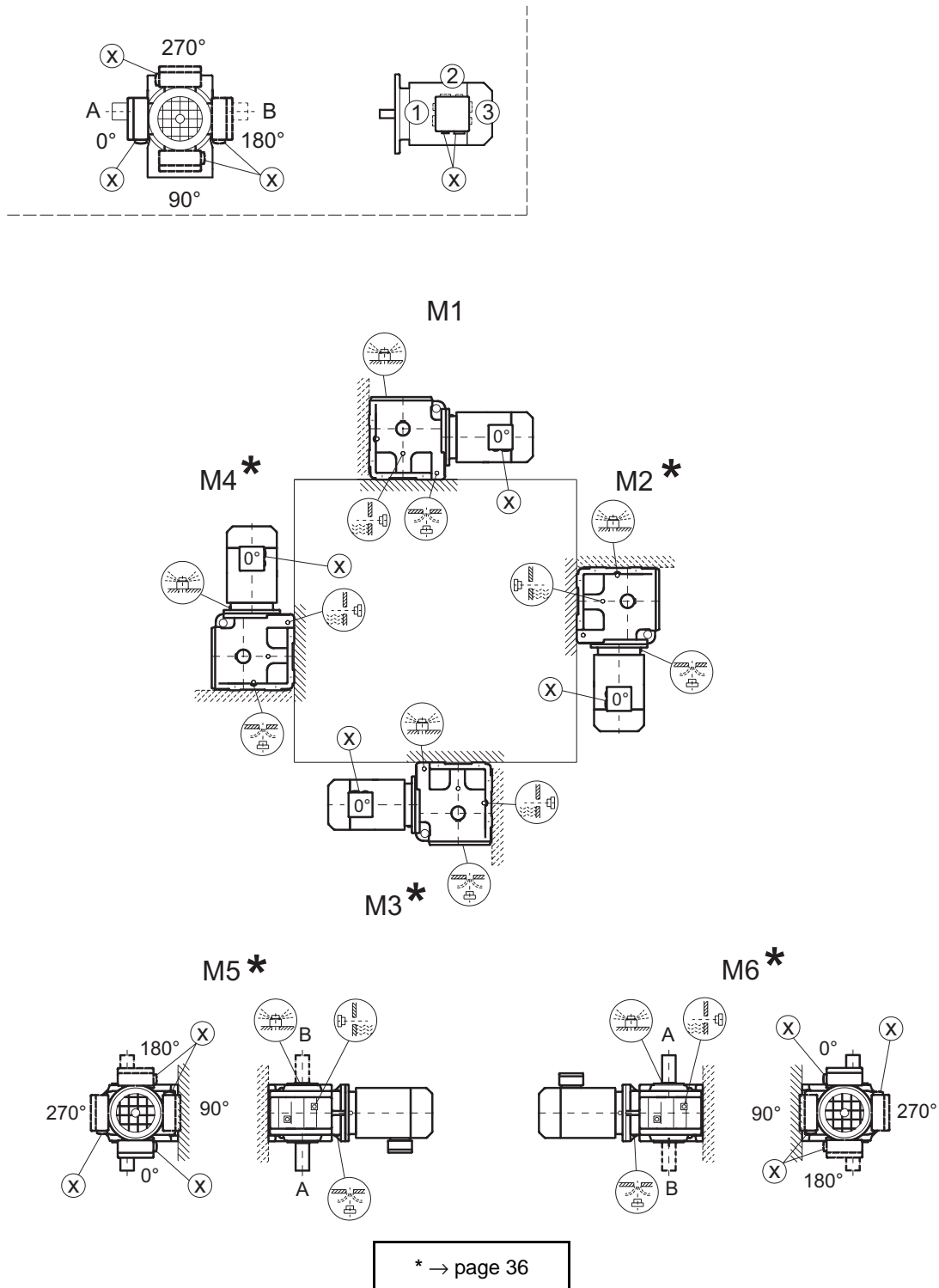
05 025 100




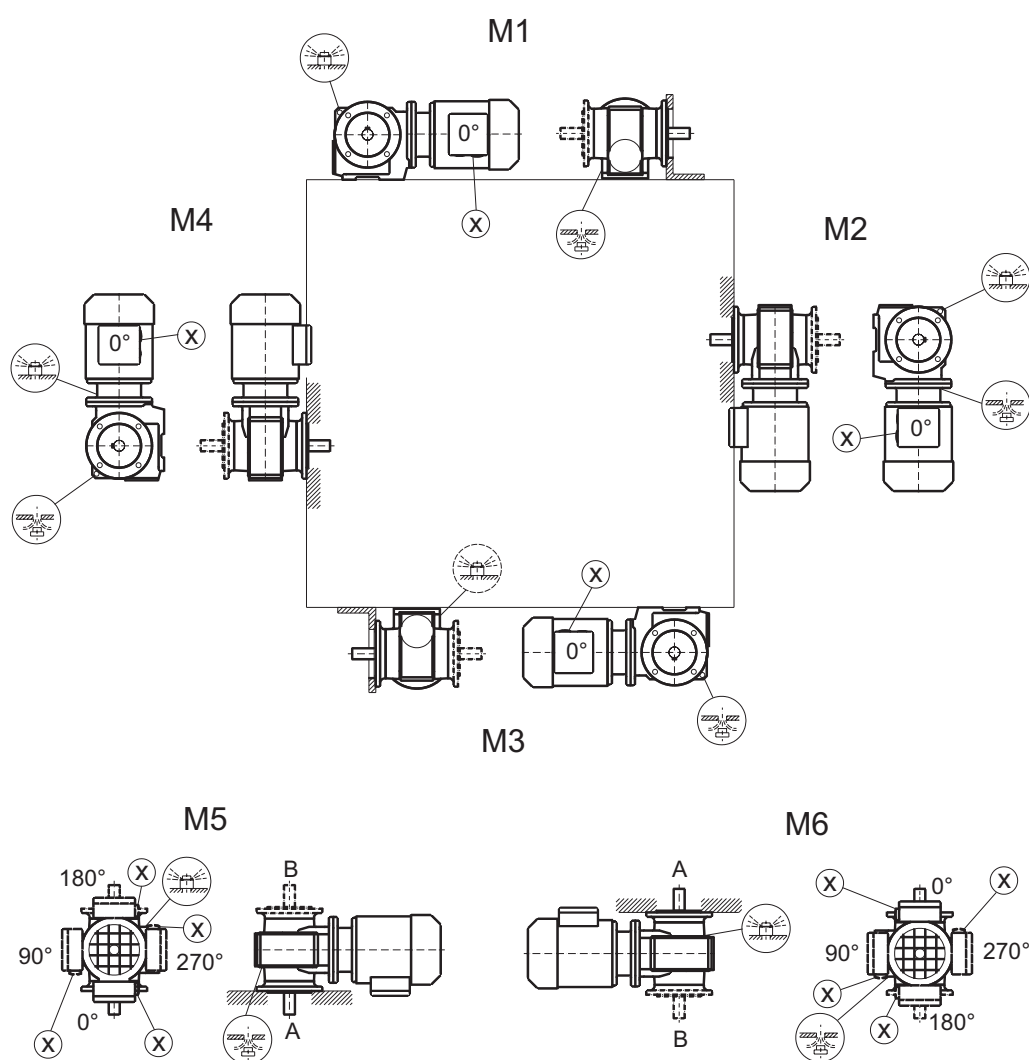
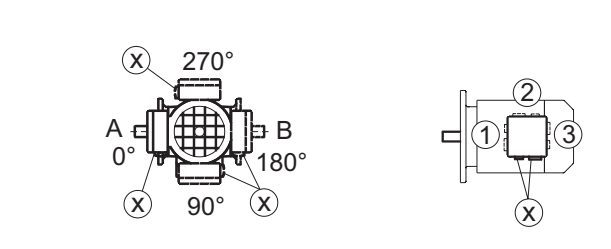
**Caution:** Note the  notes in the "Geared Motors" catalog, section "Project Planning Gear Units/Overhung and axial loads."

S47-S97

05 026 100

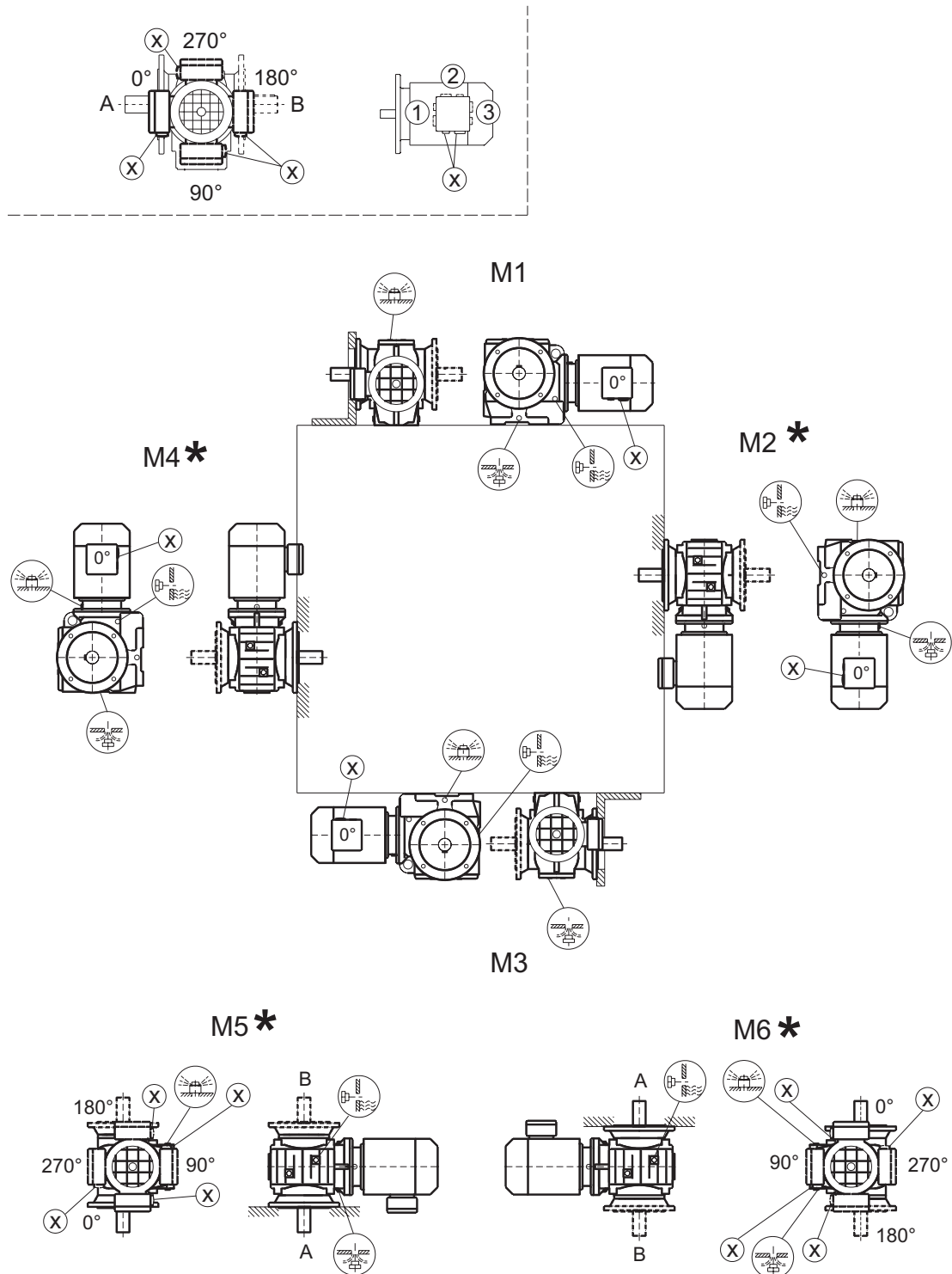


**Caution:** Note the  notes in the "Geared Motors" catalog, section "Project Planning Gear Units/Overhung and axial loads."

**SF/SAF/SHF37****05 027 100**

SF/SAF/SHF/SAZ/SHZ47-97

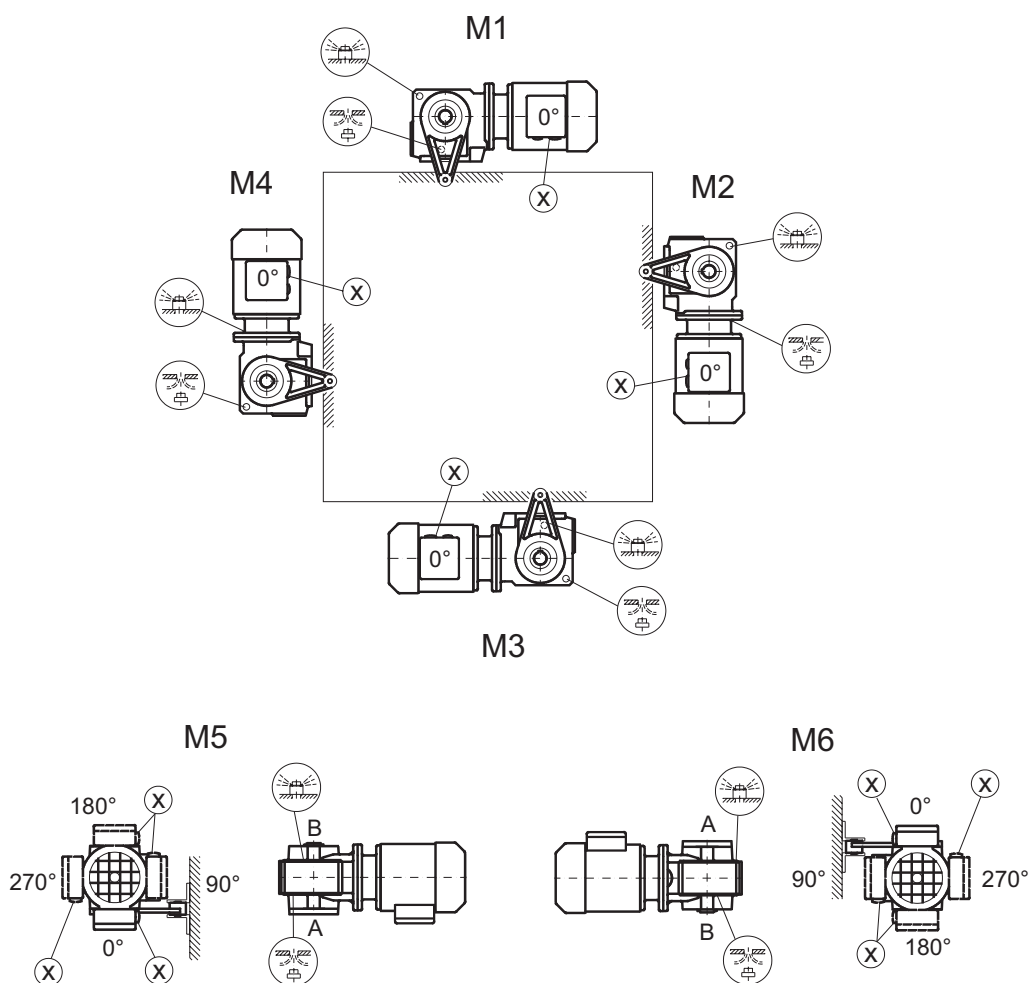
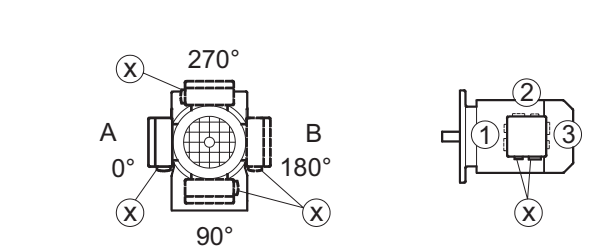
05 028 100



\* → page 36

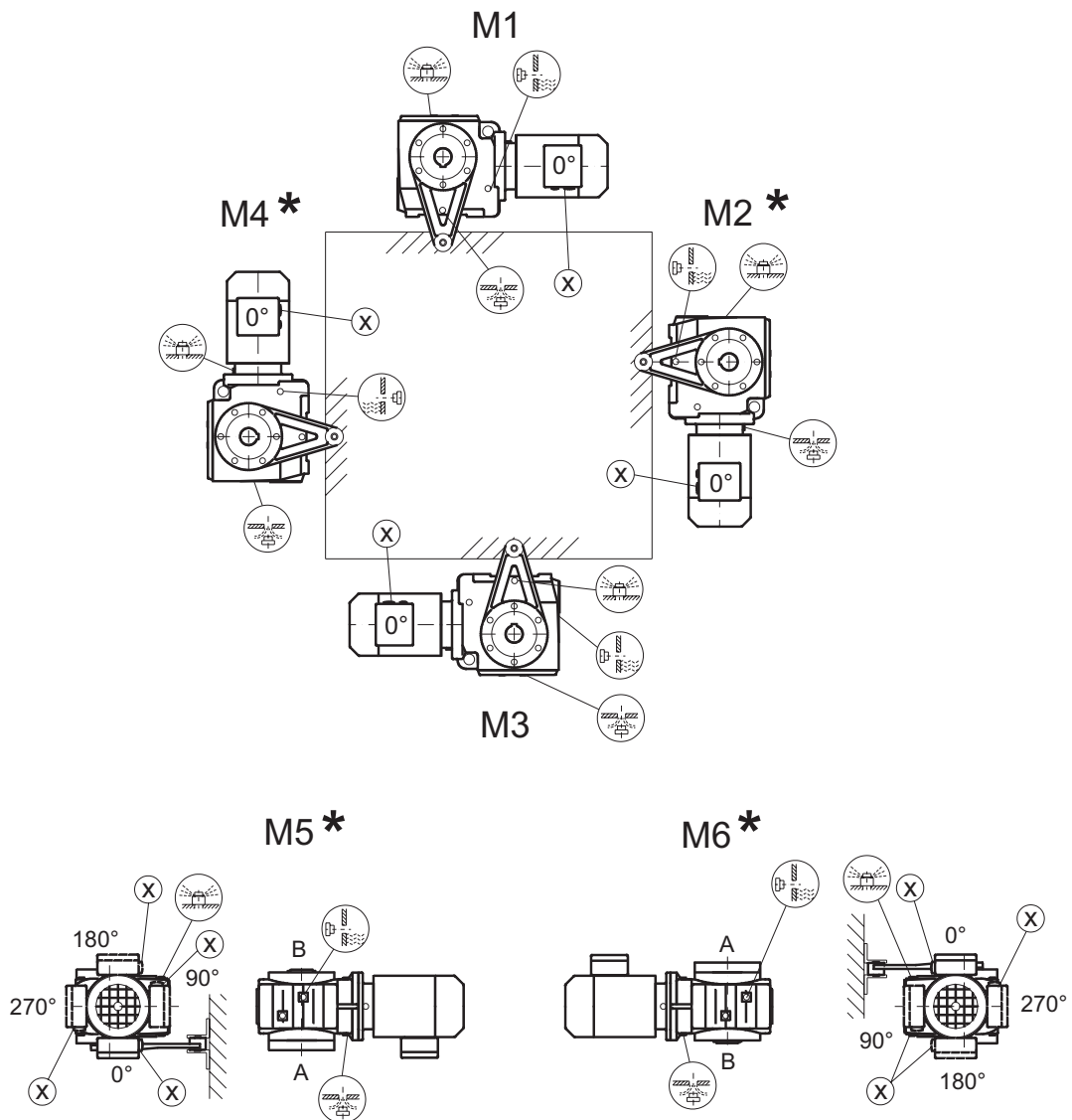
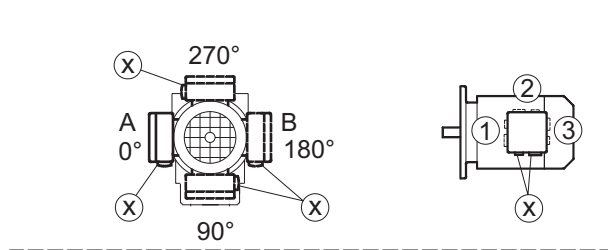
SA/SH37

28 020 100



SA/SH47-97

28 021 100



\* → page 36



## 9 Lubricants

### General

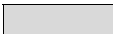
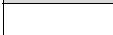


SEW supplies the drives filled with a lubricant appropriate for the specific gear unit and mounting position. The decisive factor is the indicated mounting position (M1...M6, → section "Mounting positions and important order information") when ordering the drive. The lubricant fill amounts for subsequent 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-H1 standard)
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.



Table of lubricants

01 805 692

	6) °C -50 0 +50 +100 Standard -10 +40	DIN (ISO) Oil	ISO, NLGI	Mobil®	Shell	KLÜBER LUBRICATION	ARAL	BP	Tribol	TEACO	Optimal	FUCHS
R...		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
K... (HK...)		CLP PG	VG 220	Mobil Glygoyle 30	Shell Tivela WB	Klüberoil GH 6-220	Aral Degol GS 220	BP Energol SG-XP 220	Tribol 800/220	Synlube CLP 220	Optiflex A 220	
F...		CLP HC	VG 220	Mobilgear SHC 630	Shell Omala 220 HD	Klüberoil EG 4-220	Aral Degol PAS 220		Tribol 1510/220	Pinnacle EP 220	Optigear Synthetic A 220	Renolin Unisyn CLP 220
	4) -25		VG 150	Mobil SHC 629		Klüberoil EG 4-150				Pinnacle EP 150		
	4) -40		VG 150	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
		HLP (HM)	VG 68-46	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	CLP HC	VG 32	Mobil SHC 624		Klüber-Summit HySyn FG-32				Cetus PAO 46		
	4) -40	HLP (HM)	VG 22	Mobil D.T.E. 11M	Shell Tellus T 15	Isotex MT 30 ROT		BP Energol HLP-HM 10		Rando HDZ 15		
		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
S... (HS...)		CLP PG	VG 680 <sup>1)</sup>	Mobil Glygoyle HE 680		Klüberoil GH 6-680		BP Energol SG-XP 680	Tribol 800/680	Synlube CLP 680		
	4) -20		VG 460	Mobil SHC 634	Shell Omala 460 HD	Klüberoil EG 4-460				Pinnacle EP 460		
	4) -40		VG 150	Mobil SHC 629		Klüberoil EG 4-150				Pinnacle EP 150		
		CLP (CC)	VG 150	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
		HLP (HM)	VG 100			Klüberoil GH 6-220			Tribol 800/220	Synlube CLP 220	Optiflex A 220	
	4) -25	CLP PG	VG 220 <sup>1)</sup>	Mobil Glygoyle 30		Klüber-Summit HySyn FG-32				Cetus PAO 46		
	4) -40	CLP HC	VG 32	Mobil SHC 624		Klüber-Summit HySyn FG-32						
R..., K... (HK...), F..., S... (HS...)		HCE	VG 460		Shell Cassida Fluid GL 460	Klüberoil 4UH1-460	Aral Eural Gear 460				Optileb GT 460	
		E	VG 460			Klüberoil CA2-460	Aral Degol BAB 460				Optisyn BS 460	
W... (HW...)		SEW PG	VG 460 <sup>2)</sup>			Klüber SEW HT-460-5						
	4) -30		SAE 75W90 (~VG 100)	Mobilube SHC 75 W90-LS								
	4) -40	API GL5	VG 460 <sup>3)</sup>			Klüberoil UH1 6-460						
		CLP PG	00	Glygoyle Grease 00	Shell Tivela Compound A	Klüberoil GE 46-1200				Multifak 6833 EP 00		
R32 R302		DIN 51 818 <sup>5)</sup>	000 - 0	Mobilux EP 004	Shell Alvania GL 00		Aralub MFL 00	BP Energol LS-EP 00		Multifak EP 000	Longtime PD 00	Renolin SF 7 - 041

50258AXX



### 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 <sup>1)</sup>	M2 <sup>1)</sup>	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 <sup>1)</sup>	M2 <sup>1)</sup>	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 heli-  
cal (F-) gear units

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

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

FF..:

Gear units	Fill quantity in liters					
	M1	M2	M3	M4	M5	M6
<b>FF27</b>	0.6	0.8	0.7	0.7	0.6	0.6
<b>FF37</b>	1	1.2	0.7	1.3	1	1.1
<b>FF47</b>	1.6	1.9	1.1	1.9	1.5	1.7
<b>FF57</b>	2.8	3.8	2.1	3.7	2.9	3
<b>FF67</b>	2.7	3.8	1.9	3.8	2.9	3.2
<b>FF77</b>	5.1	7.3	4.3	8.1	6	6.3
<b>FF87</b>	10.3	13.2	7.8	14.1	11	11.2
<b>FF97</b>	19	22.5	12.6	25.5	18.9	20.5
<b>FF107</b>	25.5	32	19.5	38.5	27.5	28
<b>FF127</b>	41.5	56	34	63	46.5	49
<b>FF157</b>	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
<b>F..27</b>	0.6	0.8	0.7	0.7	0.6	0.6
<b>F..37</b>	1	1.2	0.7	1.2	1	1.1
<b>F..47</b>	1.5	1.8	1.1	1.9	1.5	1.7
<b>F..57</b>	2.7	3.8	2.1	3.6	2.9	3
<b>F..67</b>	2.7	3.8	1.9	3.8	2.9	3.2
<b>F..77</b>	5	7.3	4.3	8	6	6.3
<b>F..87</b>	10	13.0	7.7	13.8	10.8	11
<b>F..97</b>	18.5	22.5	12.6	25.0	18.5	20
<b>F..107</b>	24.5	32	19.5	37.5	27	27
<b>F..127</b>	39	55	34	61	45	46.5
<b>F..157</b>	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 <sup>1)</sup>	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 <sup>1)</sup>	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 <sup>1)</sup>	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

Germany			
<b>Headquarters Production Sales Service</b>	<b>Bruchsal</b>	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 <a href="http://www.SEW-EURODRIVE.de">http://www.SEW-EURODRIVE.de</a> <a href="mailto:sew@sew-eurodrive.de">sew@sew-eurodrive.de</a>
	<b>Graben</b>	SEW-EURODRIVE GmbH & Co Ernst-Blickle-Straße 1 D-76676 Graben-Neudorf P.O. Box Postfach 1220 · D-76671 Graben-Neudorf	Tel. (0 72 51) 75-0 Fax (0 72 51) 75-29 70 Telex 7 822 276
	<b>Garbsen</b> (near Hannover)	SEW-EURODRIVE GmbH & Co Alte Ricklinger Straße 40-42 D-30823 Garbsen P.O. Box Postfach 110453 · D-30804 Garbsen	Tel. (0 51 37) 87 98-30 Fax (0 51 37) 87 98-55
	<b>Kirchheim</b> (near München)	SEW-EURODRIVE GmbH & Co Domagkstraße 5 D-85551 Kirchheim	Tel. (0 89) 90 95 52-10 Fax (0 89) 90 95 52-50
<b>Assembly Service</b>	<b>Langenfeld</b> (near Düsseldorf)	SEW-EURODRIVE GmbH & Co Siemensstraße 1 D-40764 Langenfeld	Tel. (0 21 73) 85 07-30 Fax (0 21 73) 85 07-55
	<b>Meerane</b> (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		
<b>Production Sales Service</b>	<b>Hagenau</b>	SEW-USOCOME SAS 48-54, route de Soufflenheim B. P. 185 F-67506 Hagenau Cedex	Tel. 03 88 73 67 00 Fax 03 88 73 66 00 <a href="http://www.usocome.com">http://www.usocome.com</a> <a href="mailto:sew@usocome.com">sew@usocome.com</a>
	<b>Bordeaux</b>	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
	<b>Lyon</b>	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
	<b>Paris</b>	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			
<b>Assembly Sales Service</b>	<b>Buenos Aires</b>	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 <a href="mailto:sewar@sew-eurodrive.com.ar">sewar@sew-eurodrive.com.ar</a>
Australia			
<b>Assembly Sales Service</b>	<b>Melbourne</b>	SEW-EURODRIVE PTY. LTD. 27 Beverage Drive Tullamarine, Victoria 3043	Tel. (03) 99 33 10 00 Fax (03) 99 33 10 03
	<b>Sydney</b>	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			
<b>Assembly Sales Service</b>	<b>Wien</b>	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 <a href="mailto:sew@sew-eurodrive.at">sew@sew-eurodrive.at</a>



<b>Belgium</b>			
<b>Assembly Sales Service</b>	<b>Brüssel</b>	CARON-VECTOR S.A. Avenue Eiffel 5 B-1300 Wavre	Tel. (010) 23 13 11 Fax (010) 2313 36 <a href="http://www.caron-vector.be">http://www.caron-vector.be</a> <a href="mailto:info@caron-vector.be">info@caron-vector.be</a>
<b>Brazil</b>			
<b>Production Sales Service</b>	<b>Sao Paulo</b>	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 <a href="mailto:sew@sew.com.br">sew@sew.com.br</a>
Additional addresses for service in Brazil provided on request!			
<b>Bulgaria</b>			
<b>Sales</b>	<b>Sofia</b>	BEVER-DRIVE GMBH Bogdanovetz Str.1 BG-1606 Sofia	Tel. (92) 9 53 25 65 Fax (92) 9 54 93 45 <a href="mailto:bever@mbox.infotel.bg">bever@mbox.infotel.bg</a>
<b>Canada</b>			
<b>Assembly Sales Service</b>	<b>Toronto</b>	SEW-EURODRIVE CO. OF CANADA LTD. 210 Walker Drive Bramalea, Ontario L6T3W1	Tel. (905) 7 91-15 53 Fax (905) 7 91-29 99
	<b>Vancouver</b>	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
	<b>Montreal</b>	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!			
<b>Chile</b>			
<b>Assembly Sales Service</b>	<b>Santiago de Chile</b>	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
<b>China</b>			
<b>Production Assembly Sales Service</b>	<b>Tianjin</b>	SEW-EURODRIVE (Tianjin) Co., Ltd. No. 46, 7th Avenue, TEDA Tianjin 300457	Tel. (022) 25 32 26 12 Fax (022) 25 32 26 11
<b>Colombia</b>			
<b>Assembly Sales Service</b>	<b>Bogotá</b>	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 <a href="mailto:sewcol@andinet.com">sewcol@andinet.com</a>
<b>Croatia</b>			
<b>Sales Service</b>	<b>Zagreb</b>	KOMPEKS d. o. o. PIT Erdödy 4 II HR 10 000 Zagreb	Tel. +385 14 61 31 58 Fax +385 14 61 31 58
<b>Czech Republic</b>			
<b>Sales</b>	<b>Praha</b>	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 <a href="mailto:sew@sew-eurodrive.cz">sew@sew-eurodrive.cz</a>
<b>Denmark</b>			
<b>Assembly Sales Service</b>	<b>Kopenhagen</b>	SEW-EURODRIVEA/S Geminivej 28-30, P.O. Box 100 DK-2670 Greve	Tel. 4395 8500 Fax 4395 8509 <a href="http://www.sew-eurodrive.dk">http://www.sew-eurodrive.dk</a> <a href="mailto:sew@sew-eurodrive.dk">sew@sew-eurodrive.dk</a>
<b>Estonia</b>			
<b>Sales</b>	<b>Tallin</b>	ALAS-KUUL AS Paldiski mnt.125 EE 0006 Tallin	Tel. 6 59 32 30 Fax 6 59 32 31



## Address list

<b>Finland</b>			
<b>Assembly Sales Service</b>	<b>Lahti</b>	SEW-EURODRIVE OY Vesimäentie 4 FIN-15860 Hollola 2	Tel. (3) 589 300 Fax (3) 780 6211
<b>Great Britain</b>			
<b>Assembly Sales Service</b>	<b>Normanton</b>	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
<b>Greece</b>			
<b>Sales Service</b>	<b>Athen</b>	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
<b>Hong Kong</b>			
<b>Assembly Sales Service</b>	<b>Hong Kong</b>	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 54 Fax 2-7 95-91 29sew@sewhk.com
<b>Hungary</b>			
<b>Sales Service</b>	<b>Budapest</b>	SEW-EURODRIVE Kft. H-1037 Budapest Kunigunda u. 18	Tel. +36 1 437 06 58 Fax +36 1 437 06 50
<b>India</b>			
<b>Assembly Sales Service</b>	<b>Baroda</b>	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@gecs.com
<b>Ireland</b>			
<b>Sales Service</b>	<b>Dublin</b>	Alpert Engineering Ltd. 48 Moyle Road Dublin Industrial Estate Glasnevin, Dublin 11	Tel. (01) 8 30 62 77 Fax (01) 8 30 64 58
<b>Italy</b>			
<b>Assembly Sales Service</b>	<b>Milano</b>	SEW-EURODRIVE di R. Blicke & Co.s.a.s. Via Bernini,14 I-20020 Solaro (Milano)	Tel. (02) 96 98 01 Fax (02) 96 79 97 81
<b>Japan</b>			
<b>Assembly Sales Service</b>	<b>Toyoda-cho</b>	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
<b>Korea</b>			
<b>Assembly Sales Service</b>	<b>Ansan-City</b>	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
<b>Luxembourg</b>			
<b>Assembly Sales Service</b>	<b>Brüssel</b>	CARON-VECTOR S.A. Avenue Eiffel 5 B-1300 Wavre	Tel. (010) 23 13 11 Fax (010) 2313 36 <a href="http://www.caron-vector.be">http://www.caron-vector.be</a> info@caron-vector.be
<b>Macedonia</b>			
<b>Sales</b>	<b>Skopje</b>	SGS-Skopje / Macedonia "Teodosij Sinactski" 6691000 Skopje / Macedonia	Tel. (0991) 38 43 90 Fax (0991) 38 43 90
<b>Malaysia</b>			
<b>Assembly Sales Service</b>	<b>Johore</b>	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



<b>Netherlands</b>			
<b>Assembly Sales Service</b>	<b>Rotterdam</b>	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 <a href="http://www.vector.nu">http://www.vector.nu</a> <a href="mailto:info@vector.nu">info@vector.nu</a>
<b>New Zealand</b>			
<b>Assembly Sales Service</b>	<b>Auckland</b>	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 <a href="mailto:sales@sew-eurodrive.co.nz">sales@sew-eurodrive.co.nz</a>
	<b>Christchurch</b>	SEW-EURODRIVE NEW ZEALAND LTD. 10 Settlers Crescent, Ferrymead Christchurch	Tel. (09) 3 84 62 51 Fax (09) 3 84 64 55 <a href="mailto:sales@sew-eurodrive.co.nz">sales@sew-eurodrive.co.nz</a>
<b>Norway</b>			
<b>Assembly Sales Service</b>	<b>Moss</b>	SEW-EURODRIVE A/S Solgaard skog 71 N-1599 Moss	Tel. (69) 2410 20 Fax (69) 2410 40 <a href="mailto:sew@sew-eurodrive.no">sew@sew-eurodrive.no</a>
<b>Peru</b>			
<b>Assembly Sales Service</b>	<b>Lima</b>	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 <a href="mailto:sewperu@terra.com.pe">sewperu@terra.com.pe</a>
<b>Poland</b>			
<b>Sales</b>	<b>Lodz</b>	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 <a href="mailto:sew@sew-eurodrive.pl">sew@sew-eurodrive.pl</a>
<b>Portugal</b>			
<b>Assembly Sales Service</b>	<b>Coimbra</b>	SEW-EURODRIVE, LDA. Apartado 15 P-3050-901 Mealhada	Tel. (0231) 20 96 70 Fax (0231) 20 36 85 <a href="mailto:infosew@sew-eurodrive.pt">infosew@sew-eurodrive.pt</a>
<b>Romania</b>			
<b>Sales Service</b>	<b>Bucuresti</b>	Sialco Trading SRL str. Madrid nr.4 71222 Bucuresti	Tel. (01) 2 30 13 28 Fax (01) 2 30 71 70 <a href="mailto:sialco@mediasat.ro">sialco@mediasat.ro</a>
<b>Russia</b>			
<b>Sales</b>	<b>St. Petersburg</b>	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 <a href="mailto:sewrus@post.spbnet.ru">sewrus@post.spbnet.ru</a>
<b>Singapore</b>			
<b>Assembly Sales Service</b>		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
<b>Slovenia</b>			
<b>Sales Service</b>	<b>Celje</b>	Pakman - Pogonska Tehnika d.o.o. Ul. XIV. divizije 14 SLO – 3000 Celje	Tel. 00386 3 490 83 20 Fax 00386 3 490 83 21 <a href="mailto:pakman@siol.net">pakman@siol.net</a>



## Address list

South Africa			
Assembly Sales Service	<b>Johannesburg</b>	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
	<b>Capetown</b>	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
	<b>Durban</b>	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	<b>Bilbao</b>	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	<b>Jönköping</b>	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	<b>Basel</b>	Alfred Imhof A.G. Jurastrasse 10 CH-4142 Münchenstein bei Basel	Tel. (061) 4 17 17 17 Fax (061) 4 17 17 00 <a href="http://www.imhof-sew.ch">http://www.imhof-sew.ch</a> info@imhof-sew.ch
Thailand			
Assembly Sales Service	<b>Chon Buri</b>	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	<b>Istanbul</b>	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	<b>Greenville</b>	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	<b>San Francisco</b>	SEW-EURODRIVE INC. 30599 San Antonio St. Hayward, California 94544-7101	Tel. (510) 4 87-35 60 Fax (510) 4 87-63 81
	<b>Philadelphia/PA</b>	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
	<b>Dayton</b>	SEW-EURODRIVE INC. 2001 West Main Street Troy, Ohio 45373	Tel. (9 37) 3 35-00 36 Fax (9 37) 4 40-37 99
	<b>Dallas</b>	SEW-EURODRIVE INC. 3950 Platinum Way Dallas, Texas 75237	Tel. (214) 3 30-48 24 Fax (214) 3 30-47 24

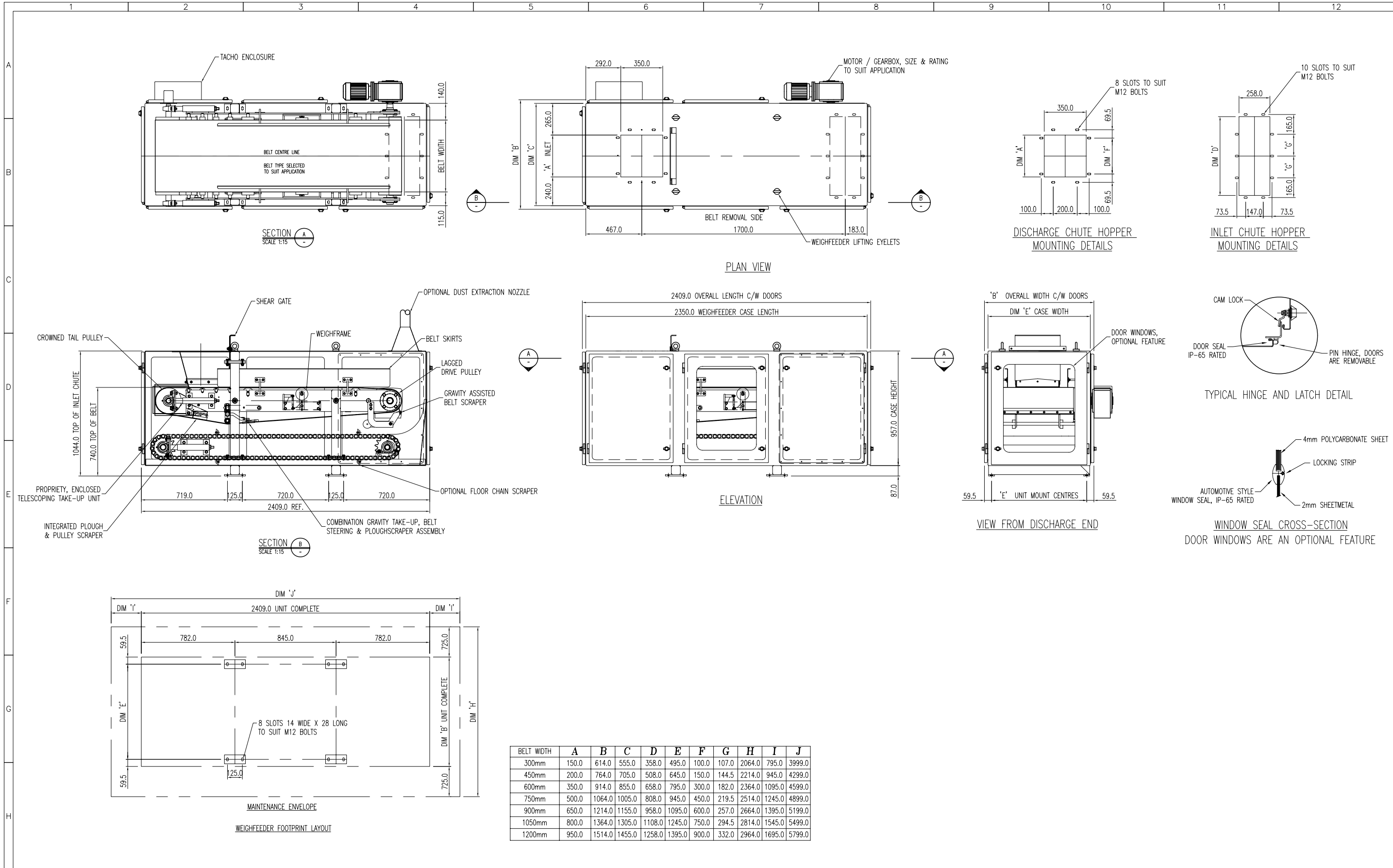




USA			
Additional addresses for service in the USA provided on request!			
Venezuela			
<b>Assembly Sales Service</b>	<b>Valencia</b>	SEW-EURODRIVE Venezuela S.A. Av. Norte Sur No. 3, Galpon 84-319 Zona Industrial Municipal Norte Valencia	Tel. +58 (241) 8 32 98 04 Fax +58 (241) 8 38 62 75 sewventas@cantr.net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

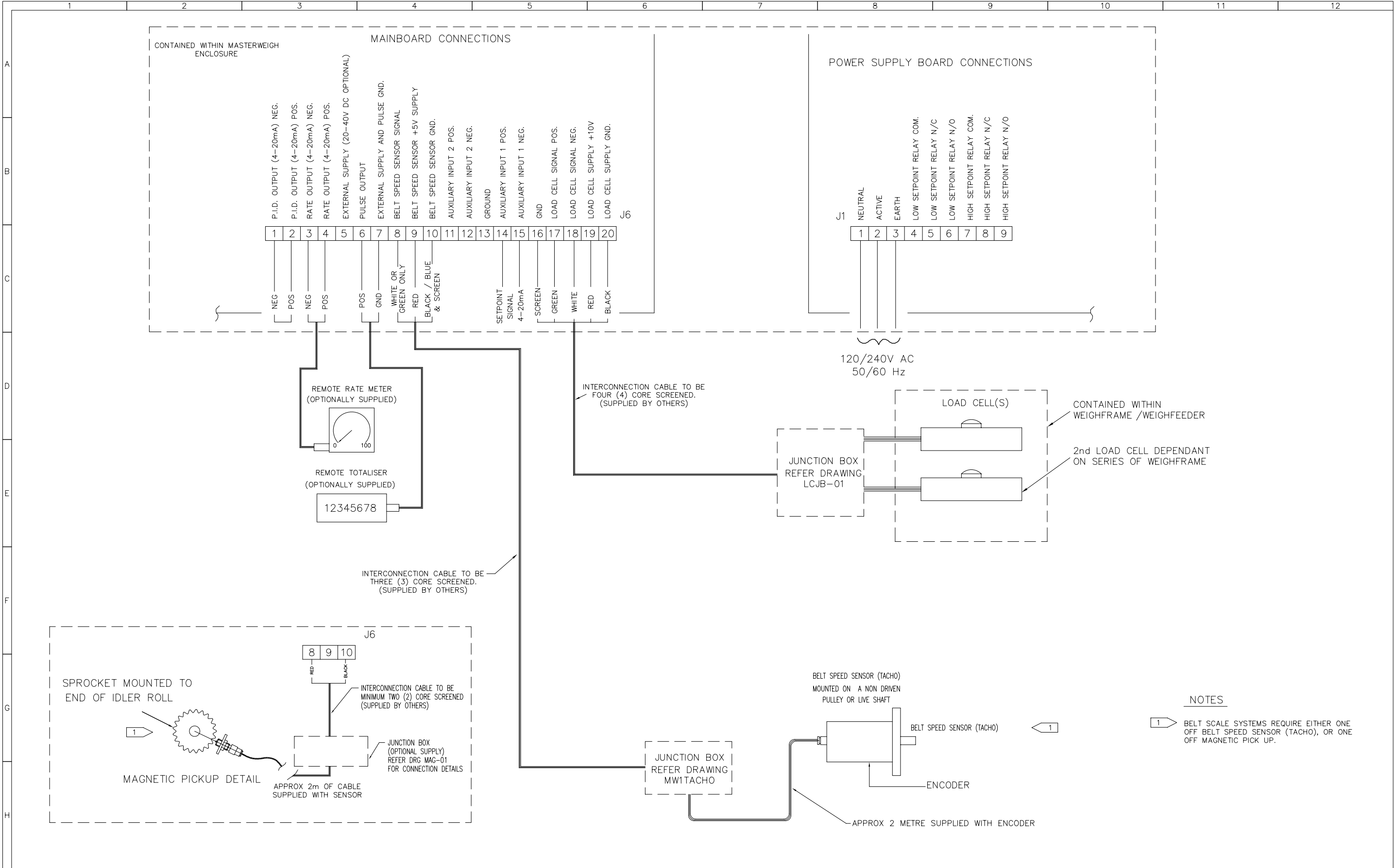
SEW-EURODRIVE GmbH & Co · P.O. Box 3023 · D-76642 Bruchsal/Germany · Phone +49-7251-75-0  
Fax +49-7251-75-1970 · <http://www.sew-eurodrive.com> · [sew@sew-eurodrive.com](mailto:sew@sew-eurodrive.com)


**SEW**  
**EURODRIVE**

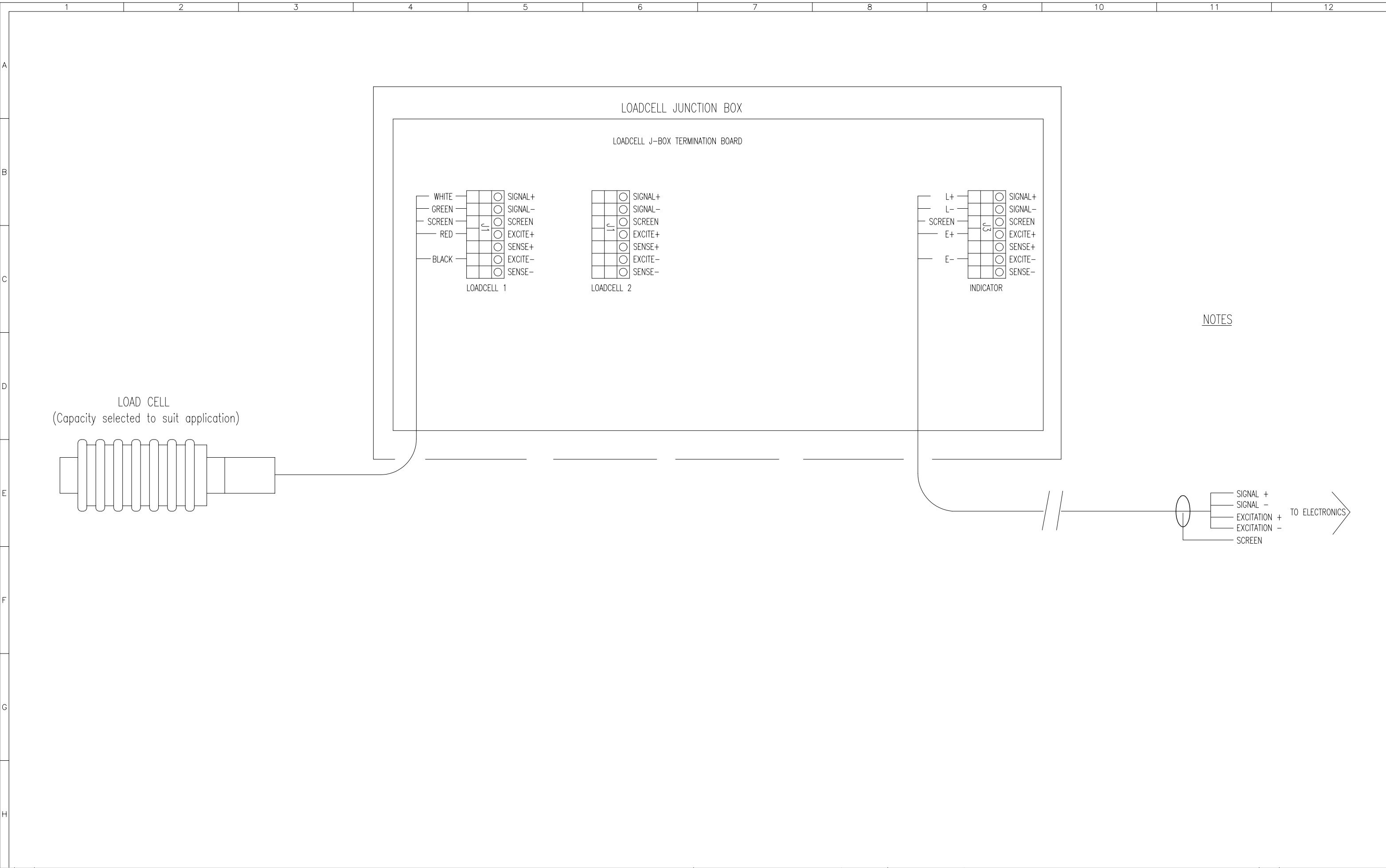




REVISIONS  A: 29/07/99 ORIGINAL ISSUE 0000	DRAWN	TONY BERNARDI	 <b>WEB-TECH AUSTRALIA PTY. LTD.</b> A.C.N. 010 764 431 11 ELECTRONICS STREET EIGHT MILE PLAINS, QUEENSLAND, 4113, AUSTRALIA P.O. BOX 4006 EIGHT MILE PLAINS, QUEENSLAND, 4113, AUSTRALIA Phone +61-7-3841 2844 Fax +61-7-3841 0005	SIZE	DRAWING No.	
	CHECKED	-		A1	NUMBER	REV.
	APPROVED	-			17000008	
	DATE APP'D	-			CUSTOMER	
	SCALE	1:10			PROJECT	
	 DO NOT SCALE IF IN DOUBT ASK		TITLE		CAD FILE	
			WT1700 ENCLOSED WEIGHFEEDER C/W OPTIONAL CHAIN SCRAPER GENERAL ARRANGEMENT		17000008	
			ALL DIMENSIONS IN MILLIMETRES UNLESS OTHERWISE SPECIFIED		This drawing and any information or descriptive matter set out hereon are the confidential and copyright property of WEB-TECH AUSTRALIA PTY. LTD.® and must not be disclosed, loaned, copied or used for manufacturing / tendering or for any other purpose without their written permission.	



REVISIONS	A. 09/01/97 ORIGINAL ISSUE	CERTIFICATION		UNLESS OTHERWISE STATED UNTOLERANCED DIMENSIONS TO BE WITHIN THE LIMITS SHOWN		DRAWN	T.BERNARDI	 <b>WEB-TECH AUSTRALIA PTY. LTD.</b> 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	SIZE	DRAWING No.		
	B. 10/03/97 WIRING COLOURS ALTERED	WEB-TECH AUSTRALIA PTY. LTD. CUSTOMER No.:		NOMINAL SIZE	UP TO 50 UP TO 150 UP TO 300 UP TO 1000	APPROVED			A1	NUMBER	SHT.	REV.
	C. 11/07/97 TACHO DRAWING No. ALTERED	CUSTOMER ORDER No.:		MACHINING	± 0.1 ± 0.2 ± 0.3 ± 0.5 ± 1.0	DATE APP'D				WTMW1	01	C
	ECON: 0000	WEB-TECH AUSTRALIA PTY. LTD.		FABRICATION	± 0.5 ± 0.5 ± 0.5 ± 1.0 ± 2.0	SCALE			CONTRACT			
	ECON: 0000	CERTIFIED BY: DATE //		ASSEMBLIES	± 0.5 ± 0.5 ± 0.5 ± 1.0 ± 2.0				PROJECT			
		CUSTOMER APPROVAL DATE //							CAD FILE WT05001C			
						DO NOT SCALE IF IN DOUBT ASK			TITLE			
ELECTRICAL CONNECTION DIAGRAM FOR BELT SCALE SYSTEMS INCOMP MASTERWEIGH 1												
ALL DIMENSIONS IN MILLIMETRES UNLESS OTHERWISE SPECIFIED												
This drawing and any information or descriptive matter set out herein are the confidential and copyright property of WEB-TECH AUSTRALIA PTY. LTD. (®) and must not be disclosed, loaned, copied or used for manufacturing / tendering or for any other purpose without their written permission.												



NOTES

REVISIONS

A- 21/11/05  
ORIGINAL ISSUE

UNLESS OTHERWISE STATED UNTOLERANCED DIMENSIONS TO BE WITHIN THE LIMITS SHOWN						DRAWN	L.H.
						CHECKED	L.H.
NOMINAL SIZE	UP TO 50	ABOVE 50 UP TO 150	ABOVE 150 UP TO 300	ABOVE 300 UP TO 1000	ABOVE 1000	APPROVED	L.H.
						DATE APP'D	21/11/05
MACHINING	± 0.1	± 0.2	± 0.3	± 0.5	± 1.0	SCALE	N.T.S.
FABRICATION	± 0.5	± 0.5	± 0.5	± 1.0	± 2.0		DO NOT SCALE IF IN DOUBT ASK
ASSEMBLIES	± 0.5	± 0.5	± 0.5	± 1.0	± 2.0		

WEB-TECH AUSTRALIA PTY. LTD.  
ACN: 000 764 431  
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

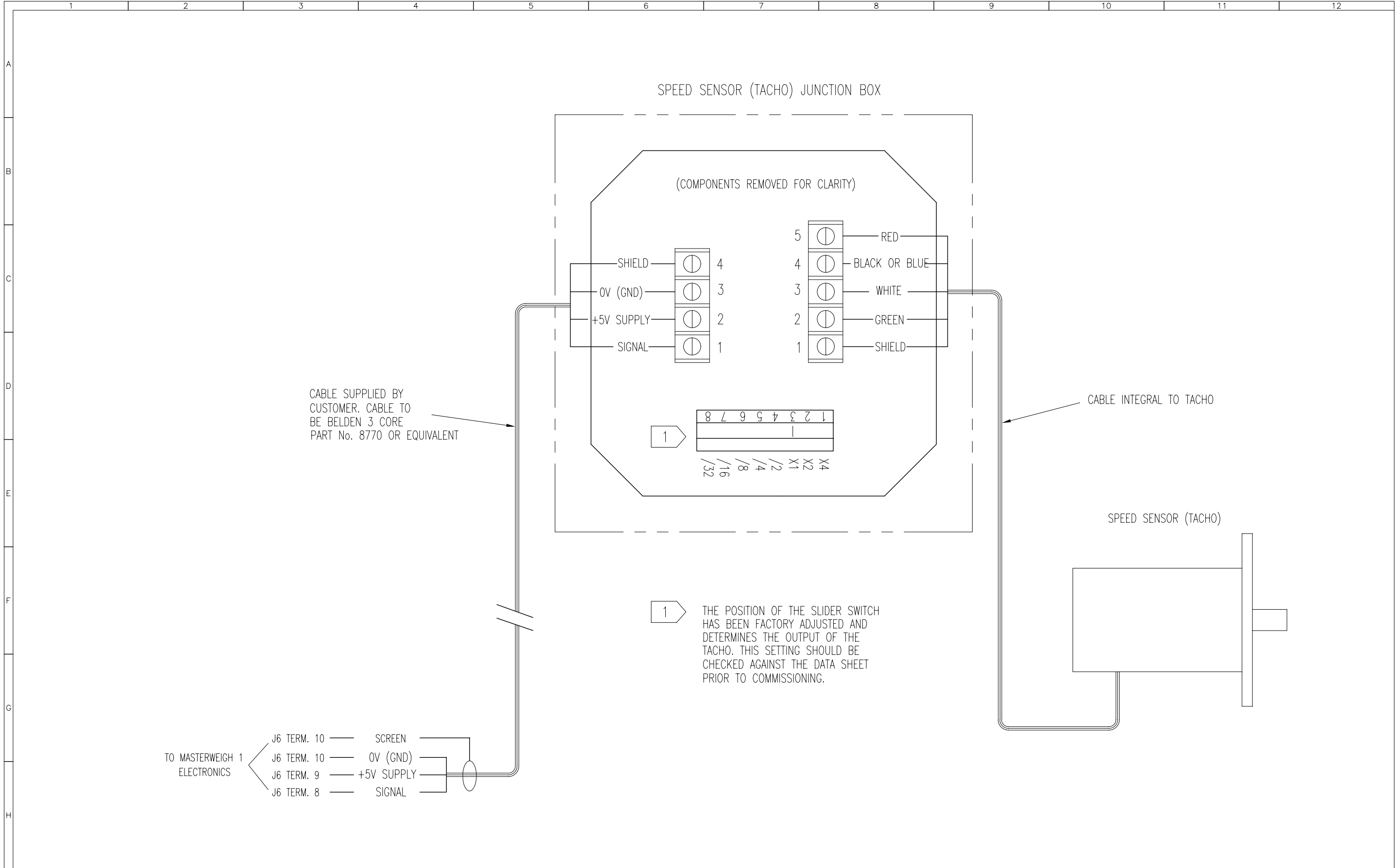
TITLE



MODEL WT735/1200/1700 WEIGHFEEDER  
LOAD CELL JUNCTION BOX CONNECTION DIAGRAM.

ALL DIMENSIONS IN MILLIMETRES  
UNLESS OTHERWISE SPECIFIED

This drawing and any information or descriptive matter set out hereon are the confidential and copyright property of WEB-TECH AUSTRALIA PTY. LTD. © and must not be disclosed, loaned, copied or used for manufacturing / tendering or for any other purpose without their written permission.

SIZE	DRAWING No.		
A1	NUMBER	SHT.	REV.
	LCJBOX	1	A
	CONTRACT		
	PROJECT		
CAD FILE			



REVISIONS	A. 20/10/98 ORIGINAL ISSUE	DRAWN	L.HARTLEY	 <b>WEB-TECH AUSTRALIA PTY. LTD.</b> 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	SIZE	DRAWING No.	
		CHECKED	L.HARTLEY		A1	NUMBER	REV.
		APPROVED	L.HARTLEY			JB010011	
		DATE APP'D	20/10/98			CUSTOMER	
		SCALE	N.T.S			PROJECT	
				DO NOT SCALE IF IN DOUBT ASK	TACHO (S/S) JUNCTION BOX WIRING (WITH MULTIPLICATION), & CONNECTIONS TO MASTERWEIGH 1 INTEGRATOR		CAD FILE JB010011
				ALL DIMENSIONS IN MILLIMETRES UNLESS OTHERWISE SPECIFIED		This drawing and any information or descriptive matter set out herein are the confidential and copyright property of WEB-TECH AUSTRALIA PTY. LTD. (A) and must not be disclosed, loaned, copied or used for manufacturing / tendering or for any other purpose without their written permission.	

## WEB-TECH AUSTRALIA PTY LTD

Customer : \_\_\_\_\_ Conveyor Designation : \_\_\_\_\_

Material : \_\_\_\_\_ Model : \_\_\_\_\_ Date : \_\_\_\_\_

Load Cell Type : \_\_\_\_\_ Tacho : \_\_\_\_\_ Data By : \_\_\_\_\_

MW S/No : \_\_\_\_\_ Software Version : \_\_\_\_\_ Contract No : \_\_\_\_\_

Order No. \_\_\_\_\_

MENU	FUNCTION	MASTERWEIGH 1 SETTINGS
1	Parameter Setup	Capacity : _____ Increments Size: _____ Zero Reference : _____ mV Precision Reference : _____ mV Pulse Width: _____ ms
2	Pulses per Belt Revolution	Programmed Pulses per Belt Revolution : _____ No. of Belt Revs : _____
3	Zero Calibration	Zero Calibration : _____ mV AutoZero Tracking : _____ mV
4	Fixed Weight Calibrate	Span : _____ Target Weight : <b>#REF!</b> kgs
5	Emperical Span	Emperical Span : _____
6	Null Level	Null Level : _____
7	Auto Zero Tracking	Auto Zero Level : _____ Auto Zero Period : _____ Delay Time : _____ sec
8	Loadcell Input	Dynamic (No Load) : _____ mV Dynamic (with weights) : _____ mV
9	Tacho Frequency	Tacho Frequency : _____ Hz @ _____ Hz on VF Drive (if appl.)
10	High Alarm Setpoint	High Alarm Level : _____ Alarm Delay : _____ sec
11	Low Alarm Setpoint	Low Alarm Level : _____ Alarm Delay : _____ sec
12	Parameter Print	NOT USED
13	Auto/Manual Control of PID	Auto / Manual
14	PID Parameters	Current Setpoint : _____ Proportional Term : _____ Integral Term : _____ Integral Lower Limit : _____ Integral Upper Limit : _____ Differential Term : _____ O/P Offset Term : _____ Feed Forw. Term: _____
15	Remote Setpoint Mode	_____
16	Remote Setpoint	_____
17	Filter Constants	Display Time Constant : _____ secs Rate O/P Time Constant : _____ secs Cascade Time Constant : _____ secs PID I/P Time Constant : _____ secs PID O/P Time Constant : _____ secs
18	Displayed Units	_____
19	Belt Speed Indication	Indicated Belt Speed : _____ m/sec @ _____ Hz on VF Drive (if appl.) Current Belt Length : _____ metres

## 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

## **ADDENDUM**

---

The following addenda are applicable to the equipment supplied for this contract.