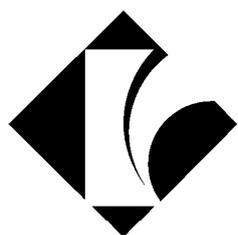


SMART WEIGHING SOLUTIONS



rinstrum

400 Series
K404 Truck Weighing
Digital Indicator
Reference Manual

RI00-623-100

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1. Introduction

1.1. Overview

This precision digital indicator uses the latest Sigma-Delta A/D technology to ensure fast and accurate weight readings. The setup and calibration of the instrument are digital, with a non-volatile security store for all setup parameters.

It may be operated from either a DC power source (12V_{DC} to 24V_{DC}) or AC power (optional 110 – 240 VAC). There is a soft power on/off function that retains memory of its state. Once an instrument is turned on it will automatically start up again if the external power is interrupted.

Optical communications is fitted standard and allows for a temporary isolated communications link to be established with a PC. Software upgrades, the use of computerised setup and calibration can then be done using a PC. Refer to Optical Communications page 14 for more information.



Figure 1: Weight Indicator

The instrument provides zero, tare, gross/net, truck and print on the fixed function keys and supports special functions (eg. printing, unit switching, etc.), via user definable function key and external inputs. Operator functions (clock, report etc) and editing functions are provided on the alpha/numeric key pad. It is equipped with an NVRAM store to ensure day-to-day operating settings (eg. ZERO, TARE, CLOCK, etc.) are retained when power is removed.

The RS-232 communications port can be used for printer driving, connection to a remote display or PC. The transmit only RS-485 communications port can be used for remote displays. There is a built-in clock for date-stamping printed outputs.

The instrument can support different software applications depending on the functionality required.

1.2. The Manuals Set

This manual is part of a set of manuals covering the setup and operation of the instrument. The set includes the following:

- **Reference Manual** - Contains detailed information on calibration and setup. This manual is intended for use by Scale Technicians who are installing the instrument.
- **Operator Manual** - Aimed at the operator of the instrument, and covers the day-to-day operation of the instrument.
- **Quick Start Manual** - Intended for Scale Technicians who are familiar with the instrument and simply need a quick reference to menu options and connection diagrams, etc.

1.3. Document Conventions

The following document conventions (typographical) are used throughout this Reference Manual.

Bold Text	Bold text denotes words and phrases to note.
<Key>	<p><Key> denotes a Keypad key.</p> <p>Note: In the Specifications section the < symbol means less than and the > symbol means greater than.</p>
^	This symbol denotes one space when describing serial output formats.
⊗	Items marked with ⊗ indicate that the setting is available only in Full Setup and is trade critical. When trade critical settings are changed the calibration counter is incremented.

Table 1: Document Conventions

2. Specifications

Performance	
Resolution	Up to 100,000 divisions, minimum of 0.25 μ V/division
Zero Cancellation	+/- 2.0mV/V
Span Adjustment	0.1mV/V to 3.0mV/V
Stability/Drift	Zero: < 0.1 μ V/ $^{\circ}$ C (+ 8ppm of deadload max) Span < 8 ppm/ $^{\circ}$ C, Linearity < 20ppm, Noise < 0.2 μ Vp-p
Excitation	7.4 volts for up to 16 x 350 or 32 x 700 ohm load cells (4-wire or 6-wire plus shield) Maximum total load cell resistance: 1,000 ohms
A/D Type	24bit Sigma Delta with \pm 8,388,608 internal counts
Operating Environment	Temperature: -10 to +50 $^{\circ}$ C ambient Humidity: <90% non-condensing Storage: -20 to +50 $^{\circ}$ C ambient ABS - IP65 when panel mounted or with rear boot Stainless Steel – IP66 when panel mounted or with rear boot
Digital	
Display	LCD with 4 alpha-numeric displays and LED backlighting: <ul style="list-style-type: none"> • Primary display: 6 x 28.4mm high digits with units and annunciators • 2nd display: 9 x 17.6 mm digits with units • 3rd display: 8 x 6. 1mm digits • 4th display: 4 x 7.6 mm digits
Setup and Calibration	Full digital with visual prompting in plain messages
Digital Filter	Sliding window average from 0.1 to 30.0 seconds
Zero Range	Adjustable from +/- 2% to +/- 20% of full capacity
Power Input	
Standard Power Input	12 to 24VDC (15 VA max) - ON/OFF key with memory feature
Variants	AC M4101 Input: 110/240VAC 50/60Hz Output: 12VDC 15VA
Features	
Optical Data Communications	Magnetically coupled optical communications support. Optional conversion cable connects directly to a standard RS-232 port.
Correction	10 point linearity correction
Serial Outputs	RS-232 serial port for remote display, network or printer supports. RS-485 transmit only for remote display Transmission rate: 1200, 2400, 4800, 9600, 19200 or 57600 baud
Assignable function key	Printing, unit switching, manual hold, and totalising
Battery Backed Clock Calendar	Battery life 10 years minimum
Approvals	FCC, CE, C-tick Check trade approvals

Table 2: Instrument specifications

3. Installation

3.1. Introduction

The following steps are required to set up the indicator.

- Inspect indicator to ensure good condition.
- Use connection diagrams to wire up load cell, power and auxiliary cables as required.
- Insert any accessory modules that are being used.
- Use the drill hole template provided for hole locations.
- Connect Power to indicator and press **<POWER>** key to turn the instrument On.
- Refer to the Setup Menus section on page 43 for information on configuring the instrument.
- To turn instrument OFF press and hold **<POWER>** key for three seconds (until display blanks).

3.2. General Warnings

- Indicator not to be subject to shock, excessive vibration or extremes of temperature (before or after installation).
- Inputs are protected against electrical interference, but excessive levels of electromagnetic radiation and RFI may affect the accuracy and stability.
- The instrument should be installed away from any sources of excessive electrical noise.
- The load cell cable is particularly sensitive to electrical noise and should be located well away from any power or switching circuits.
- For full EMC or for RFI immunity, termination of cable shields and correct earthing of the instrument is essential.

3.3. Electrical Safety

- For your protection all mains electrical hardware must be rated for environmental conditions of use.
- Pluggable equipment must be installed near an easily accessible power socket outlet.
- To avoid the possibility of electric shock or damage to the instrument, always switch off or isolate the instrument from the power supply before maintenance is carried out.

3.4. Cleaning

- To maintain the instrument, never use harsh abrasive cleaners or solvents. Wipe the instrument with a soft cloth **slightly** dampened with warm soapy water.

3.5. Panel Mount Template

The panel mount template is supplied with the instrument. It shows the location of the rectangular cut-out and the four mounting screws.

3.6. Cable Connections

All cable connections are made to the rear of the instrument using pluggable screw terminals. It is not necessary to tin the ends of the wires with solder or to add crimp ferrules to the wires, however, these techniques are compatible with the terminals.

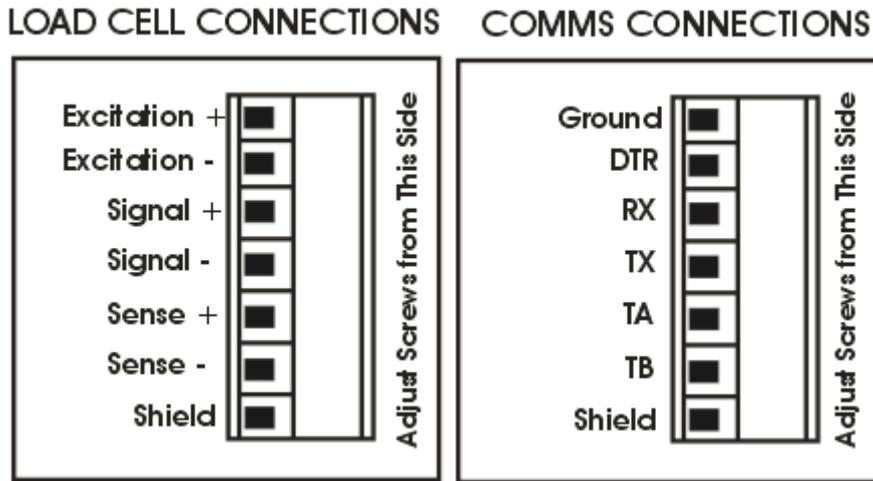


Figure 2: Cable Connections

3.7. DC Power (DC PWR + , DC PWR –)

The DC supply need not be regulated, provided that it is free of excessive electrical noise and sudden transients. The instrument can be operated from a high quality plug-pack as long as there is sufficient capacity to drive both it and the load cells.

3.8. Load Cell Connection

3.8.1. Load Cell Signals and Scale Build

Very low output scale bases may be used but may induce some instability in the weight readings when used with higher resolutions. Generally speaking, the higher the output, or the lower the number of divisions, the greater the display stability and accuracy.

The instrument can display the milliVolt-per-Volt reading which can be used to check scale base signal output levels. For more information, refer to Scale Test Display page 46.

The instrument may be connected for either 4-wire or 6-wire operation. Use 4-wire when external SENSE connections are not available.

3.8.2. 4-Wire Connection

The minimum connectivity requirements are the connection of four wires (i.e. \pm Excitation and \pm Signal). Internally the instrument has a precision analog switch that can be used to connect the Sense+ and Sense– lines directly to the Excitation+ and Excitation– lines.

Any addition to the load cell manufacturer's cable length using 4-wire connection is only recommended for short cable runs. Where long additions to cable lengths are needed, a 6-wire extension is required.

The BUILD:CABLE option must be set to **4-WIRE** to allow for 4-wire connection.

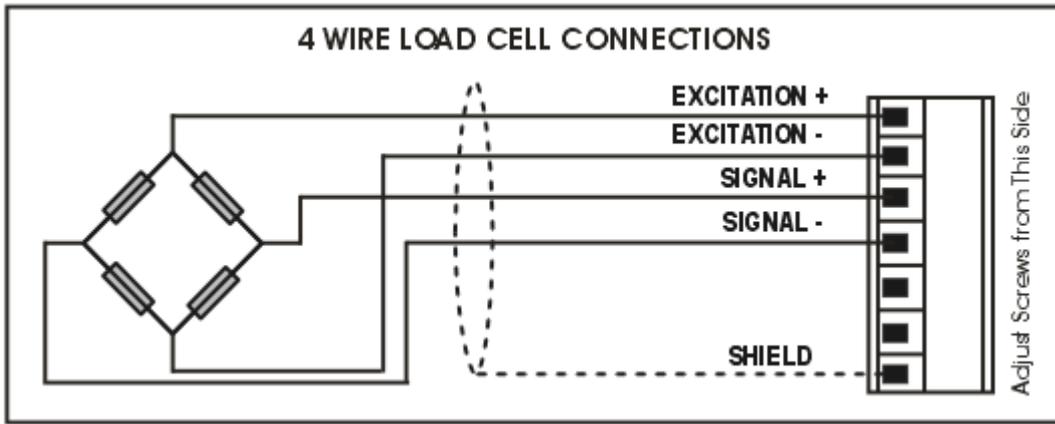


Figure 3: 4-Wire Connections

3.8.3. 6-Wire Connection

The excitation and signal lines are connected the same as for a 4-wire installation. The extra two wires (Sense + and –) should be connected to the Excitation + and – lines as close as possible to the load cell itself. Typically these connections are made in a load cell termination box.

The BUILD:CABLE option must be set to **6-WIRE** to allow for true 6-wire connection.

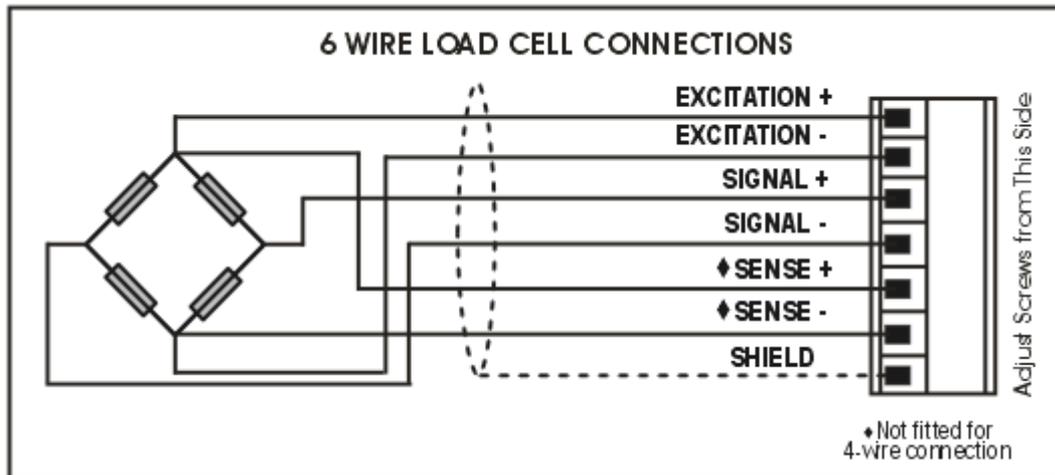


Figure 4: Loadcell Connections

3.9. Auxiliary Connections

This section provides diagrams to illustrate the communication connections.

3.9.1. RS-232 Serial

◆ Direct Personal Computer Link (RX, TX, GND)

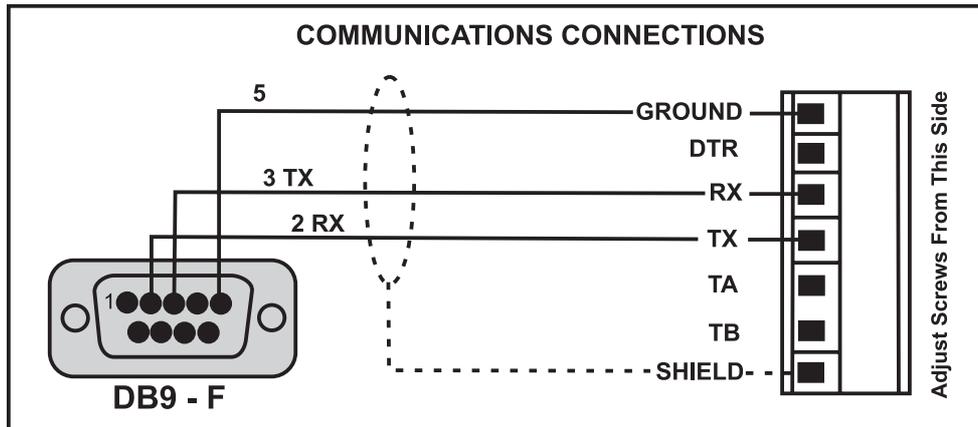


Figure 5: RS-232 - Instrument to PC using COM Port (DB9)

◆ Printer Connections (TX, DTR and GND)

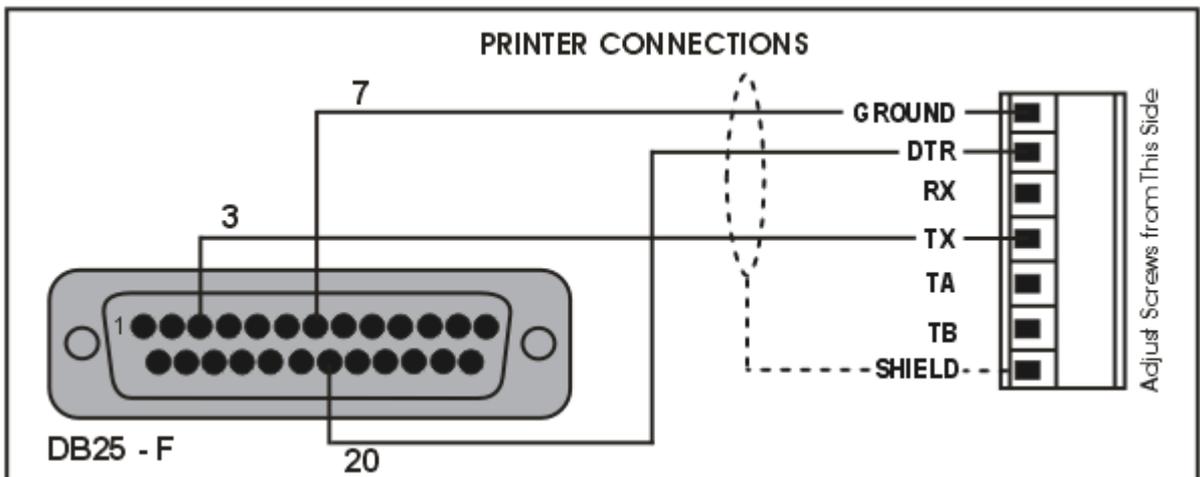


Figure 6: RS-232 – Instrument to Printer (DB25)

◆ Remote Display (TXD, GND)

Refer to documentation supplied with the Remote Display for connection details. Connect RX on the Remote Display with TX on the instrument and connect the RS232 GND signals together.

◆ Ring Networks: Multiple Instruments to PC (RXD, TXD, GND)

Instruments with software revision V2.31+ can be configured in a Ring Network via a M42xx module (software revision 1.01+). This feature is not available on the inbuilt serial port. This also requires an enhancement in the PC software.

The Short Ring Network layout (Figure 7) can be used in situations up to a total cable run length of about 150 m (500 ft) at 9600 baud in a clean EMC environment. If there are communications errors, or for longer cable runs, lower the baud rate to 4800 or 2400, and/or use the Long Ring Network in Figure 8, which uses a separate return path from the 'Last Instrument' to the PC.

For DB25 connections at the PC connector, refer to Figure 6.

When operating in a Ring Network, the Instruments must have:

- same serial port options, i.e., baud, parity, data bits, stop bits;
- unique addresses.

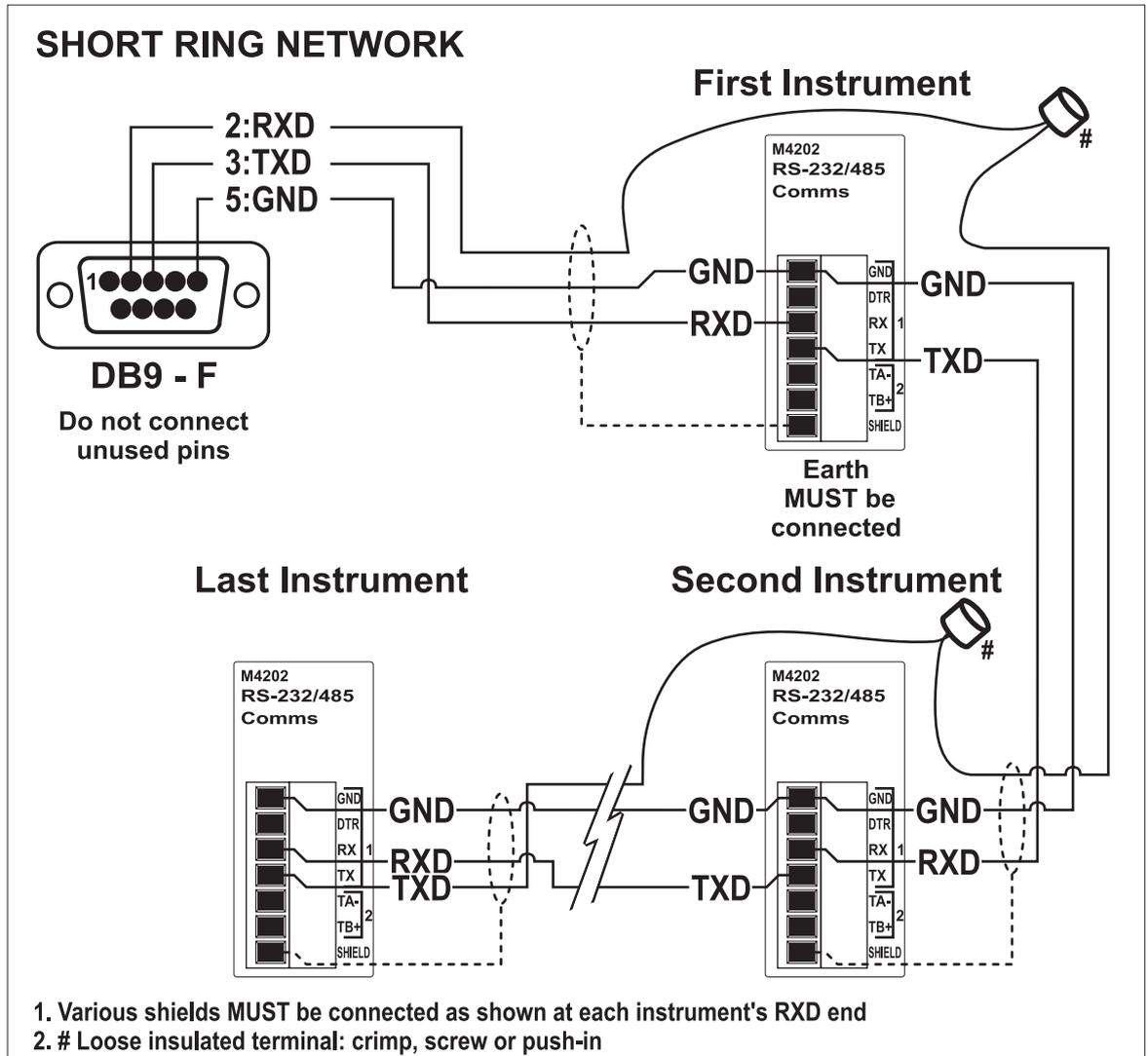


Figure 7: RS-232 Short Cable Runs (Ring Network using COM Port)

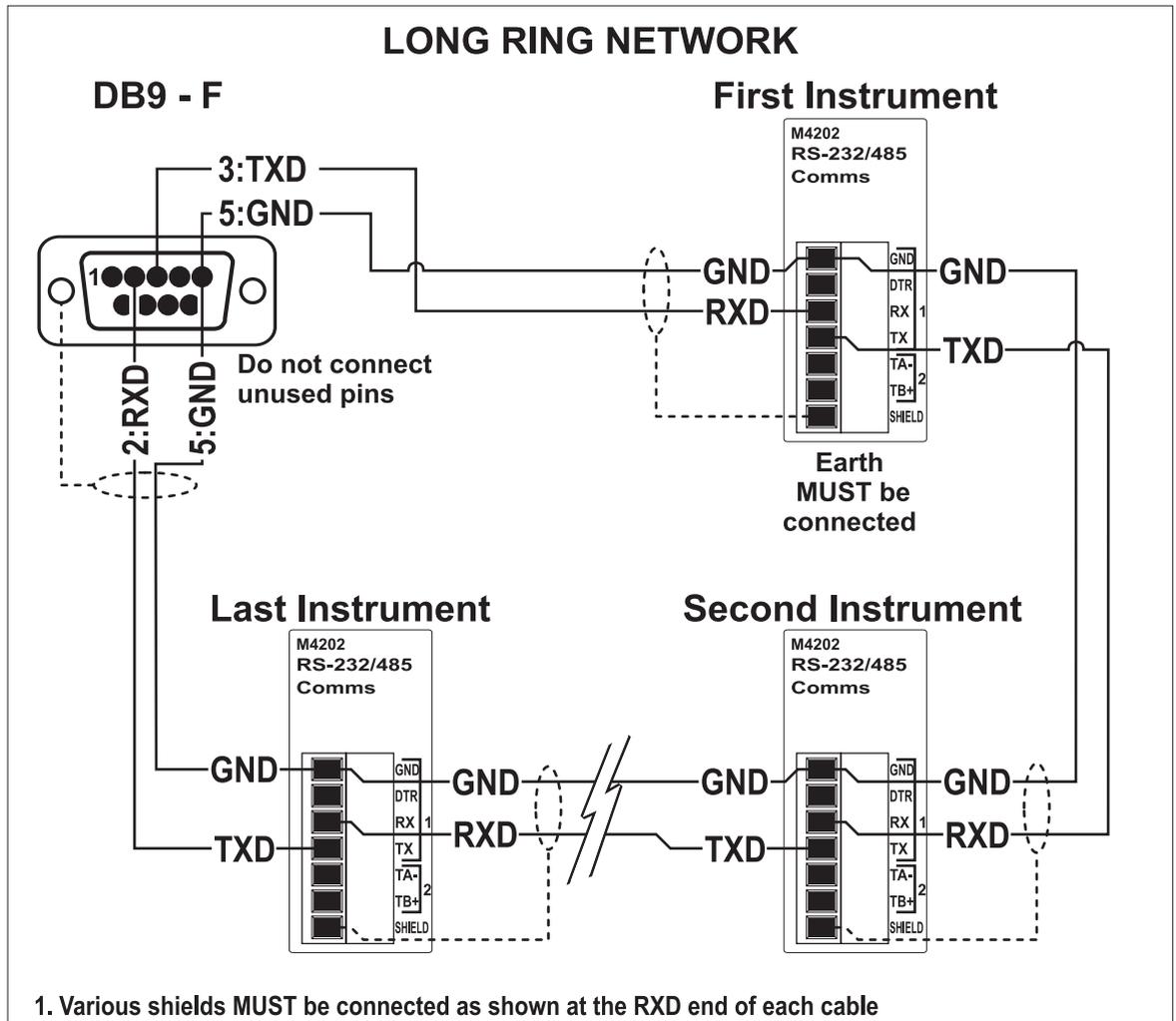


Figure 8: RS-232 Long Cable Runs (Ring Network using COM Port)

3.9.2. RS-485 Serial

◆ **Remote Display (TA, TB)**

RS485 is recommended for communicating over distances longer than a few metres. Connect TA to RA and TB to RB on the remote display.

3.10. Optical Communications

A temporary infrared communications link can be established between the instrument and a PC using an optional cable. This connection can be used to transfer setup and calibration information from a PC or to download software upgrades.

The PC end of the cable is a standard female DB9 RS232 connector. The instrument end of the cable attaches to the left side of the instrument display.

WARNING

The optical coupling head contains a strong magnet and should not be placed near any magnetic storage media (eg. credit cards, floppy disks etc.)

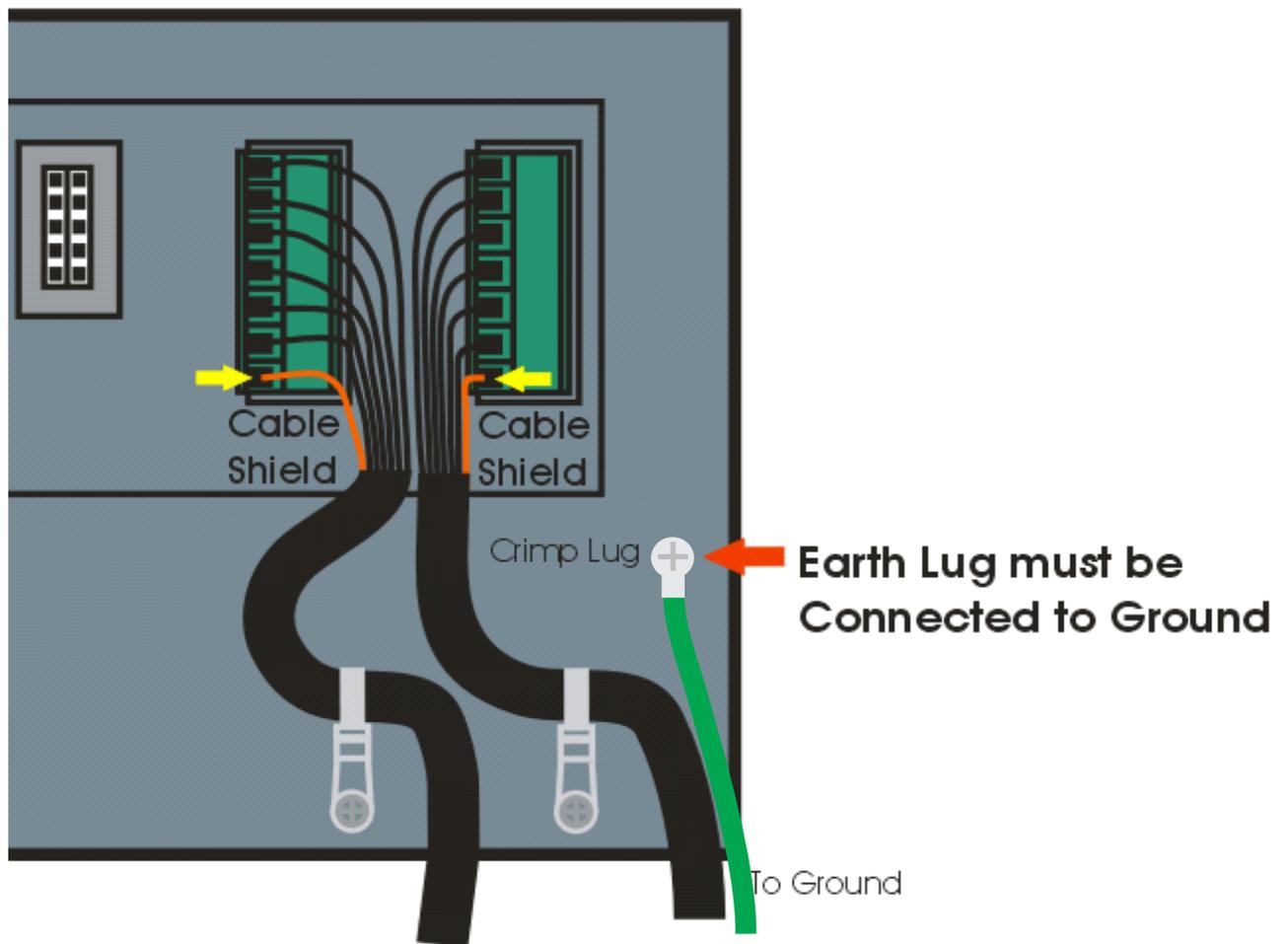


Figure 10: Cable Shield Connection

3.11.1. Cable Shield Connection and Earthing

- Care should be taken when connecting shields to maximise EMC or RFI immunity and minimise earth loops and cross-talk (interference) between instruments.
- For full EMC or for RFI immunity, termination of the cable shields to the connectors is very important. The earth lug of the instrument must be separately connected to ground potential via a reliable link.
- The AC power module directly connects the earth lug to the Earth Pin on the power supply. In installations where earth is available on the power cable, instrument earthing can be done with this connection.
- The instrument should only be connected to earth via a single reliable link to avoid earth loops.
- Where each instrument is separately earthed, interconnecting cable shields should be connected at one end only. This also applies to communications cable shields in Ring Networks, refer to Short Ring Network and Long Ring Network connections under Section 3.9.1 on page 12.
- **Caution:** Some load cells connect the cable shield directly to the load cell (and therefore the scale base). Connection of the load cell cable shield in this situation may be site specific.

3.12. Regulatory Sealing Requirements

To comply with regulatory sealing requirements for each instrument, (i.e. to ensure instruments are not accidentally or deliberately tampered with), it is important that proper sealing procedures be adhered to. Refer to Trade Label

A trade label showing scale and instrument information is usually required. This can be placed on the front of the instrument:

Figure 14: Trade label position.

3.13. Lead Seals

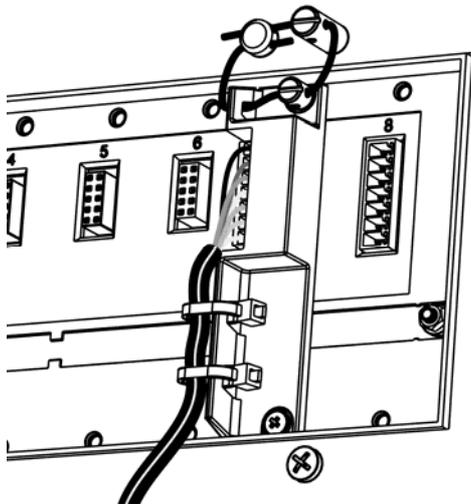


Figure 15: Lead seal on rear of instrument.

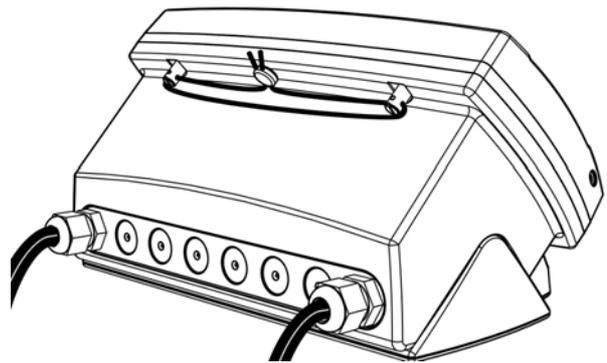


Figure 16: Lead Seal on boot

3.13.1. Destructible Sticker Seals

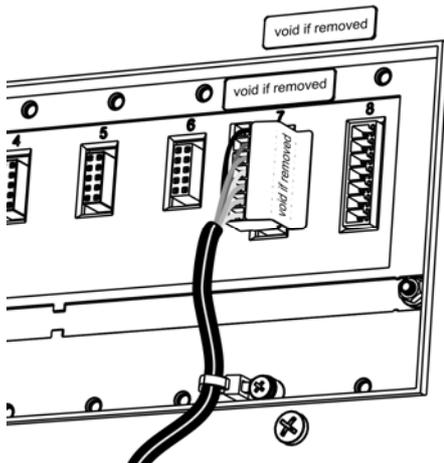


Figure 17: Destructible sticker seal on rear

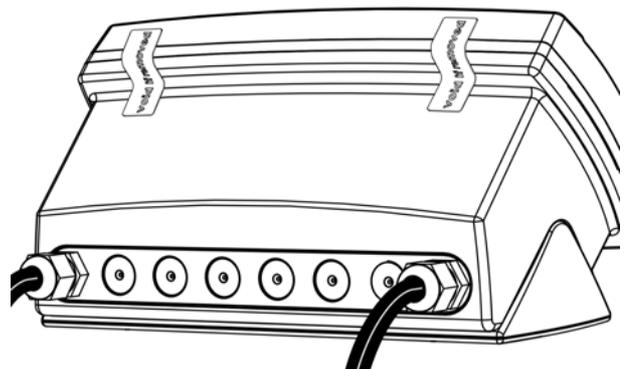


Figure 18: Destructible sticker seal on boot.

3.13.2. Electronic Seal

The value of the calibration counter should be written on the scale certification/sealing sticker. See page 41 calibration counter details.

page 96 for more information.

3.14. Accessory Module connection

Up to 4 accessory modules can be plugged into the rear of the instrument. There are many types of modules which can be used. These modules provide additional features such as:

- power supply options, e.g. mains power or batteries
- communications ports, e.g. Ethernet or RS485 networking
- digital inputs and digital outputs, e.g. external buttons or setpoint outputs
- expanded memory, e.g. DSD functionality.

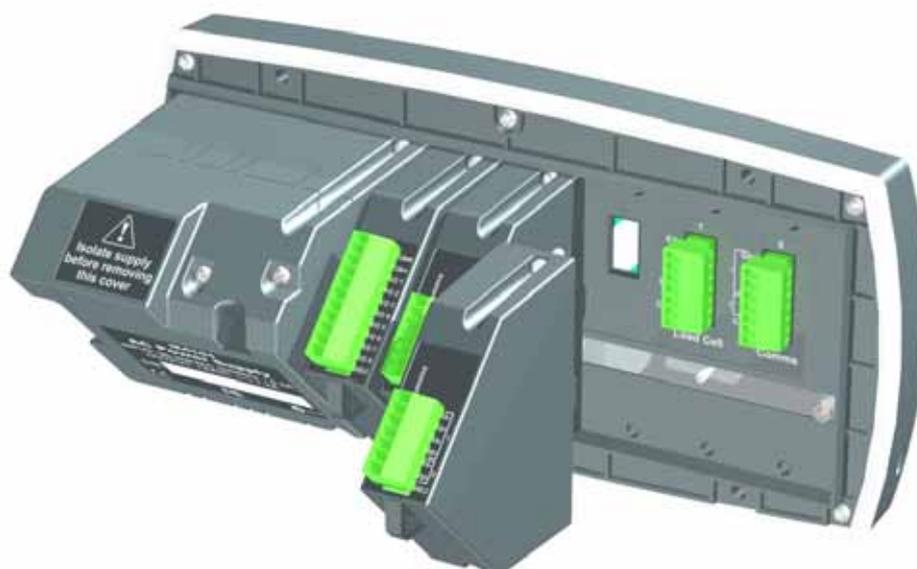
Caution: Instrument should be switched off before connecting or disconnecting accessory modules.

Each module will come with a manual which explains the features, installation and use of the module.

After connection, the module needs to be configured using the instrument setup menus. All hardware test functions and hardware options (such as serial baud rates or digital input debouncing) are in the H.WARE (hardware) menu described in section 0 page 46. Module resources (such as digital inputs or serial ports) are assigned in specific function menus. For example, the output used by a particular setpoint is set in the setpoint menu.

A summary of the module resource usage is available in the instrument setup menus. See ALLOC (Allocation Report) described in section 7.2.1 page 46.

Note: Power supply options can only be connected in the left position. Other modules can be connected in any position.



4. Setup Menus

Throughout the setup menus different data entry methods are used. Each method is described below.

4.1. Accessing Setup Menus

There are two methods to access the Setup area:

- The **Full Setup** method provides access to all functions in Setup, including legal for trade and calibration sensitive settings. Changes in Full Setup mode may result in the calibration counter being incremented. If an attempt is made to enter Full Setup using the incorrect passcode, the instrument will respond with the message **ENTRY DENIED**. Refer to Passcodes page 41 for more information.

Full Setup

There are 2 methods of accessing full setup:

1. Press and hold the **<POWER>** and **<F3>** keys together for two seconds, or



2. Press the setup button on the rear of the instrument.

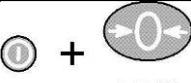
WARNING

All items in all menus will be enabled in **Full Setup**. Care should be taken to avoid inadvertently altering the Build or Calibration settings.

- **Safe Setup** restricts access to the Trade Critical settings. Changes made in this mode will not increment the calibration counter. In this manual, items marked with ⊗ indicate that the setting is trade critical. If an attempt is made to enter Safe Setup using the incorrect passcode, or if an attempt is made to alter a trade critical setting while in Safe Setup, the instrument will respond with the message **ENTRY DENIED**. Refer to Passcodes page 41 for more information.

Safe Setup

Press and hold both the **<POWER>** and **<ZERO>** keys together for two seconds.



4.1.1. Setup Display Prompts

When accessing **Full** or **Safe Setup** the instrument will beep twice and enter the Setup Menu. If a passcode has been configured, the **P.CODE** prompt will display and the correct passcode must be entered to continue. Refer to Passcodes page 41 for more information.

If access is granted the following is displayed:

FULL (SAFE) → SETUP → Software Version (eg. V1.0) → Serial Number
→ Calibration Counter (eg. C.00010).

(See Calibration Counter page 41 for more information)

4.2. Exiting Full or Safe Setup

To save settings, exit setup and return to the normal weighing mode use one of the following methods:

<p>Method 1: Press and hold both the <POWER> and <F3> keys together for two seconds.</p>

<p>Method 2: Press and hold both the <POWER> and <ZERO> keys together for two seconds.</p>

<p>Method 3: Press the <ZERO> key repeatedly. When End displays press <TARE>.</p>

<p>Method 4: Press the <POWER> key.</p>

The instrument will beep and then display the following:

Software Version (eg. V1.0) → Calibration Counter (eg. C.00010).

(See Calibration Counter page 41 for more information)

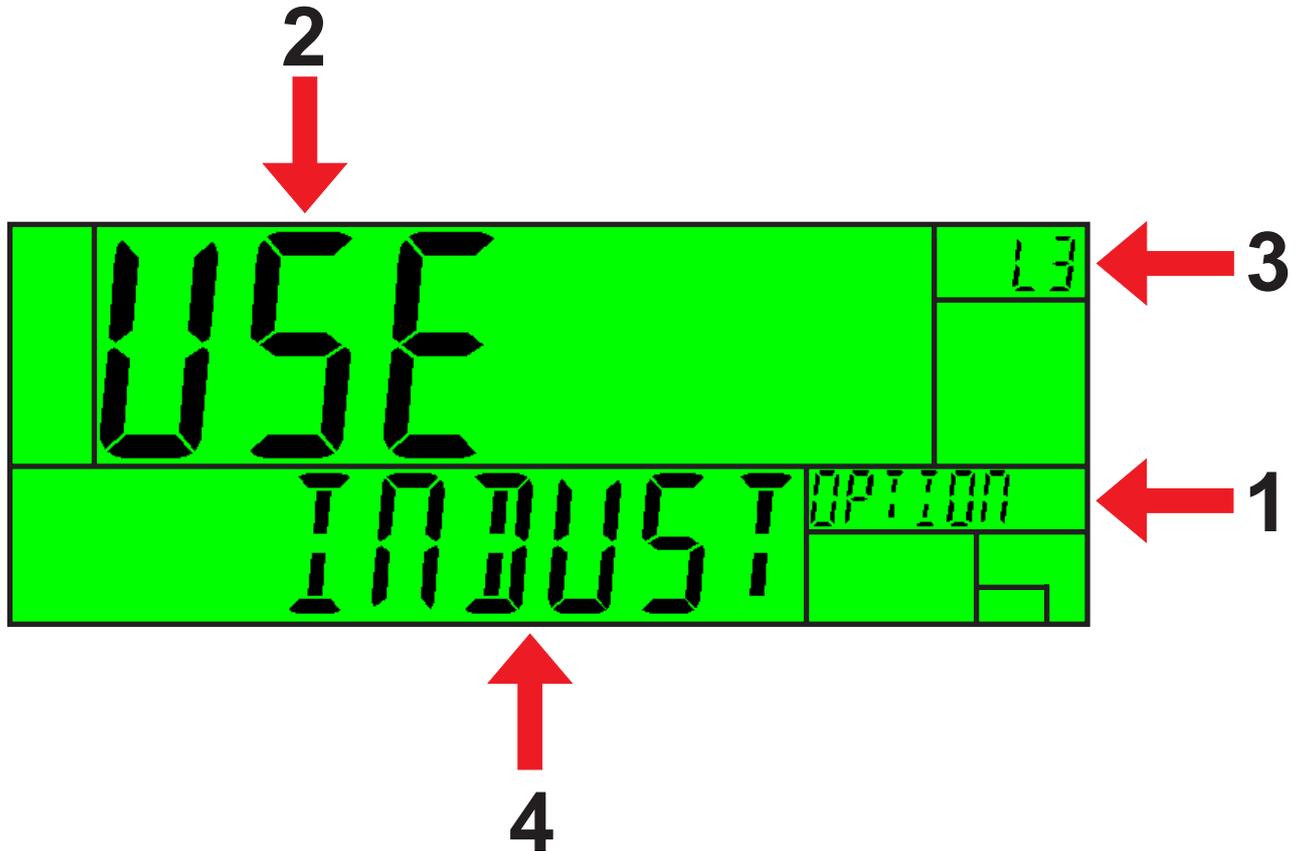
Warning: If the power is interrupted while in setup (i.e. by disconnecting the power cable), unsaved settings will be lost.

4.3. Menu Navigation

The setup menus are a normal menu tree structure. The current level is shown in the auxiliary display in the top right corner of the LCD.

Each level of the tree has its own key to step through the items in the menu. The 6 function keys correspond to the 6 menu levels with Zero for Level 1 through to F3 or level 6.

To access a lower level menu, use the key to the right of your current key. To return to the upper levels, use the keys to the left of your current key.



Code	Description
1	Parent Menu
2	Item Name
3	Menu Level
4	Item Data - If this is blank then the Item is a sub-menu.

4.4. Changing Data

Menu items containing data are shown along with their data (strings may show the first few characters only). This data can be changed by using the editing keys. When editing is finished, press the OK key to accept the new data. If the new data is unwanted, press the cancel key (Sometimes several presses are required). While editing, the type of data being edited is shown in the top right corner of the LCD.

4.5. Numeric Entry

Using the keypad, enter the desired number and press the OK key. Upper and lower limits are placed on some entries and an entry outside this range will cause the instrument to display dashes (i.e. - - - -).

Example: When in Setup follow the steps below to set Scale:Build:Capacity 1.

Press <ZERO> repeatedly to display the SCALE menu.
Press <TARE> repeatedly to display the BUILD menu.
Press <GROSS/NET> repeatedly to display the CAP1 item and the current setting (eg. 30.00kg).
Enter the new capacity using the keypad.
Press <OK>

4.6. Selections and Options

A selection entry requires the choice of a single option from a list.

Using the up and down arrows, select the desired option and press the OK key.

Example: When in Setup follow the steps below to set Scale:Build:Cable.

Press <ZERO> repeatedly to display the SCALE menu.
Press <TARE> repeatedly to display the BUILD menu.
Press <GROSS/NET> repeatedly to display the CABLE item and the current setting (eg. 4 WIRE).
Use the ↑ and ↓ keys to select the desired option from the list.
Press <OK>

4.7. Strings

There are 3 different methods of editing strings:

- Normal string editing (auxiliary display: STR)
- Numerical string editing (auxiliary display: S.NUM)
- ASCII string with character position (auxiliary display: S.ASC)

Use the <+/-> key to cycle between these options.

4.7.1. Normal String Editing

Normal string editing is most useful where strings are small and contain no lowercase or unprintable characters. The available characters are printed in orange on the keypad.

Special keys are:

- <OK>: Accept changes and finish.
- <Long press of cancel>: Cancel and exit without changes
- <Cancel>: Delete character
- <Up>, <Down>: Move cursor
- <Long press of down>: Delete string after cursor
- <+/->: Switch editing modes

4.7.2. Numerical String Editing

Numerical string editing is useful when entering strings containing only numbers. The available characters are the numbers and the decimal point.

Special keys are:

- <OK>: Accept changes and finish.
- <Long press of cancel>: Cancel and exit without changes
- <Cancel>: Delete character
- <Up>, <Down>: Move cursor
- <Long press of down>: Delete string after cursor
- <+/->: Switch editing modes

4.7.3. ASCII String Editing

ASCII string editing is useful where tokens or other unprintable characters are required. ASCII codes are entered as numbers. Print tokens are entered in this mode.

Special keys are:

- <OK>: Accept ASCII code/Accept changes and finish.
- <Long press of cancel>: Cancel and exit without changes
- <0> to <9>: Enter a new code
- <Cancel>: Delete character
- <Up>, <Down>: Move cursor
- <Long press of down>: Delete string after cursor
- <+/->: Switch editing modes

4.8. IP Addresses

An IP (internet protocol) address entry is used to enter the four decimal octets separated by a full stop that make up an IP address. IP addresses are entered in the form "xxx.xxx.xxx.xxx", for example "192.168.100.1".

Using the keypad, enter the desired IP address and press the OK key. Limits are placed on entries and an entry outside this range will cause the instrument to display dashes (i.e. - - - -).

5. Basic Operation

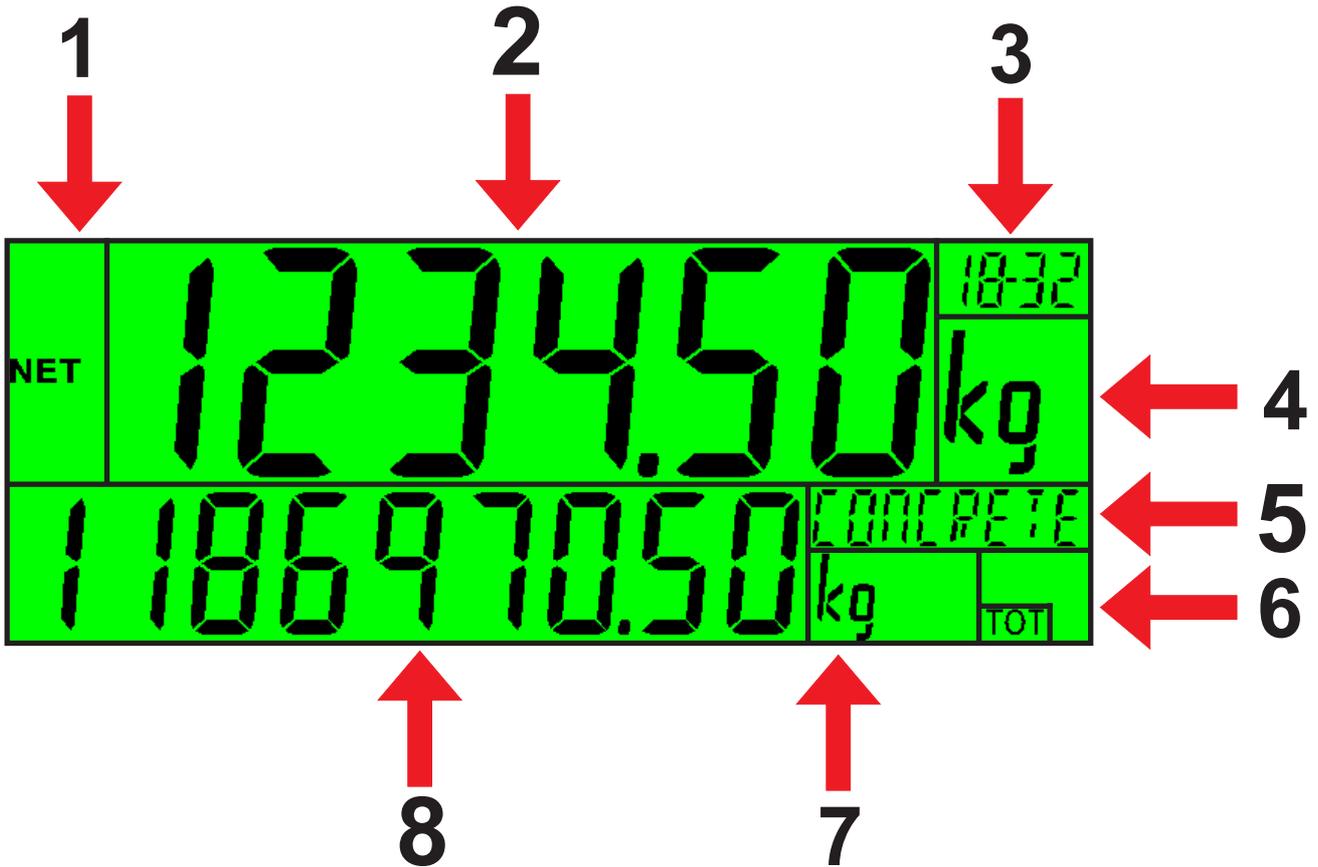
5.1. User Interface Display and Controls

5.1.1. Overview



Code	Description
1	Display
2	Numeric Keypad
3	Function Keys (user defined)
4	Function Keys (Fixed)
5	Power Key

5.1.2. Display

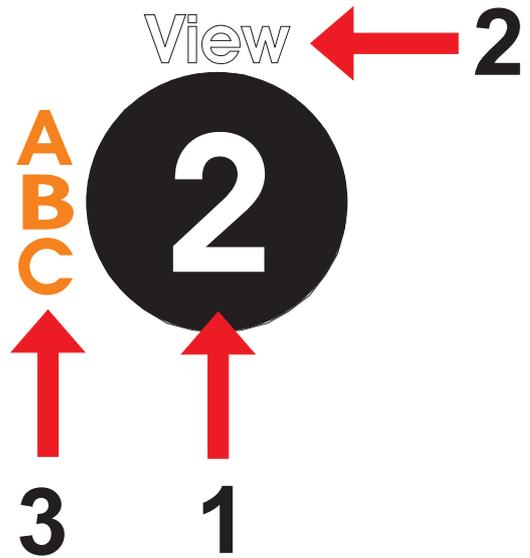


Code	Description
1	Primary Annunciators
2	Primary Display
3	Auxiliary Display
4	Primary Units
5	Secondary ID Eg Product Name = CONCRETE in example above.
6	Miscellaneous Annunciators
7	Secondary Units
8	Secondary Display

5.1.3. Primary Annunciators

Symbol	Name	Description
HOLD	HOLD	Visible when the displayed reading is held.
NET	NET	Visible when the displayed reading represents Net weight.
⇒0⇐	ZERO	Visible when the gross reading is within $\pm \frac{1}{4}$ of a division of true zero.
~	MOTION	Visible when the displayed reading is not stable.
┌	ZERO BAND	Visible when the displayed weight is within the zero 'dead' band setting.
⇐ ⇨	RANGE	Indicates current range (for dual range/interval).

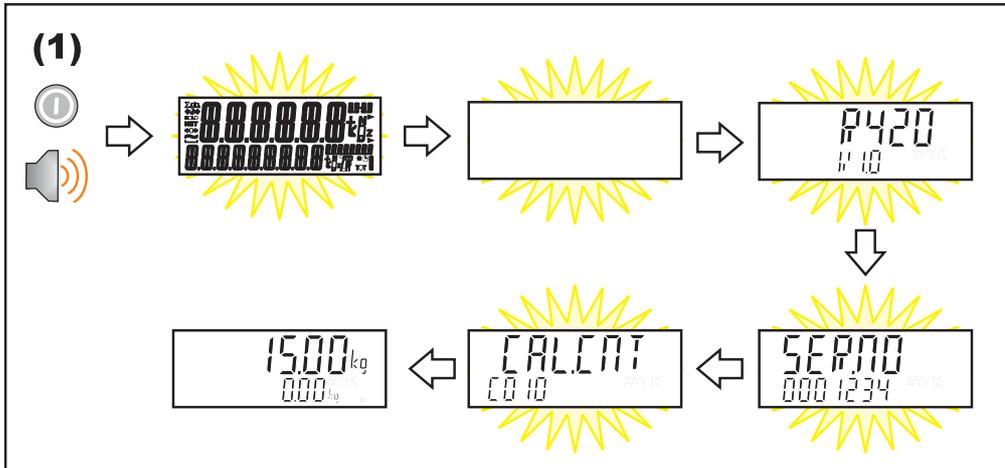
5.1.4. Keypad



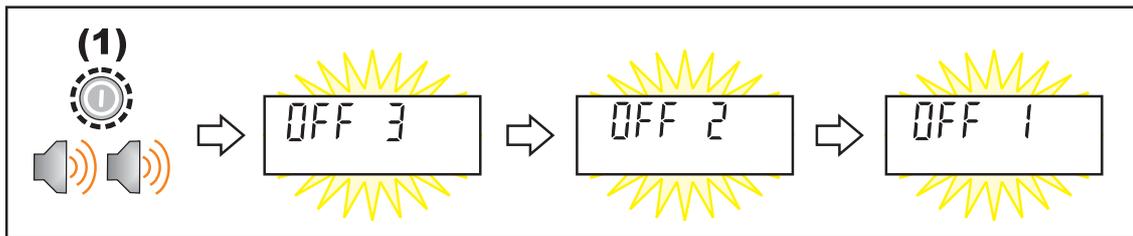
Code	Description	
1	Numeric Button	0-9
2	White Characters	Hold 2 seconds
3	Orange Characters	(Alpha and Symbols)
	Cancel	Undo last command; step backwards (including in setup menus).
	Up	Move cursor backwards; previous option
	Down	Move cursor forwards; next option
	OK	Accept this choice
	Decimal Point	Place decimal point
	+/-	Change to negative or positive number; Change Editing VIEW (eg ASCII vs string)

5.2. Operation Keys

5.2.1. Turn Instrument ON - Short press <Power>



5.2.2. Turn Instrument OFF - Long press <Power>



5.2.3. Additional Power Information

Power Key Locked: If the power key is locked, the Instrument cannot be turned off from the front keypad.

Automatic Operation: Instrument will operate whenever external power is available and will not need to be manually turned on again if the power is interrupted.

5.3. Zero Key



When an empty scale has drifted away from a true zero reading, this key is used to perform a zero adjustment on the scale display. The zero adjustment is stored when power is removed and is re-used when next powered up.

The amount of weight that may be cancelled by the <ZERO> key is limited by the Z.RANGE setting (7.3.2 OPTION (Scale options), p51).



5.4. Tare Key



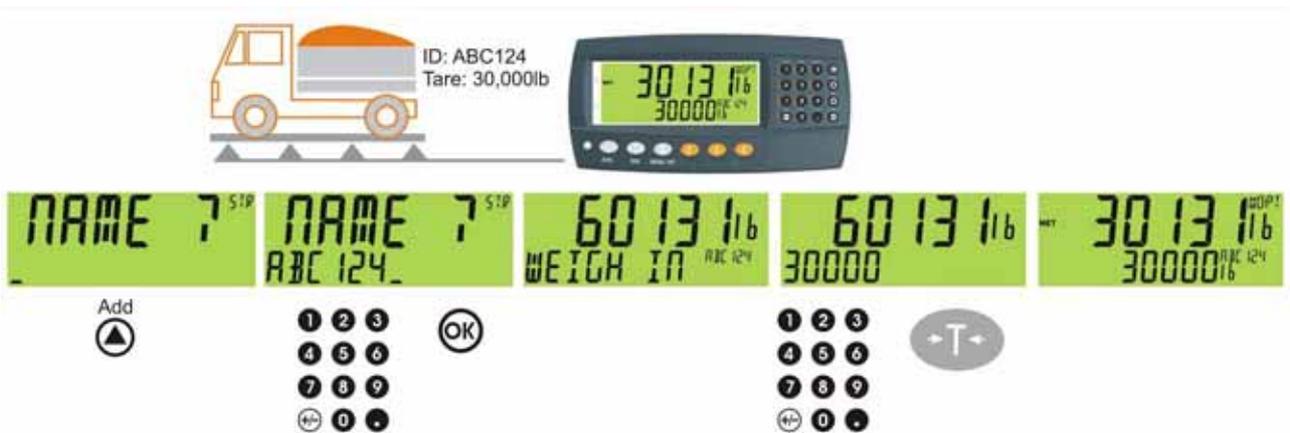
This key is used to temporarily set the scale to zero. The display will show the Net weight and the NET annunciator will be lit.

The weight tared is deducted from the allowable range of the scale, reducing the maximum weight that can be displayed.

Preset Tare: Preset Tare values are entered using the Numeric Keys followed by the TARE key. (E.g. to enter 1.5kg as a preset tare, press <1> <.> <5> <TARE>)

The tare adjustment is stored when power is removed and is re-used when next powered up.

5.4.1. Setting Preset Tare on a Permanent Truck ID



5.4.2. Setting Preset Tare on a Temporary Truck ID



5.4.3. Gross/Net Key



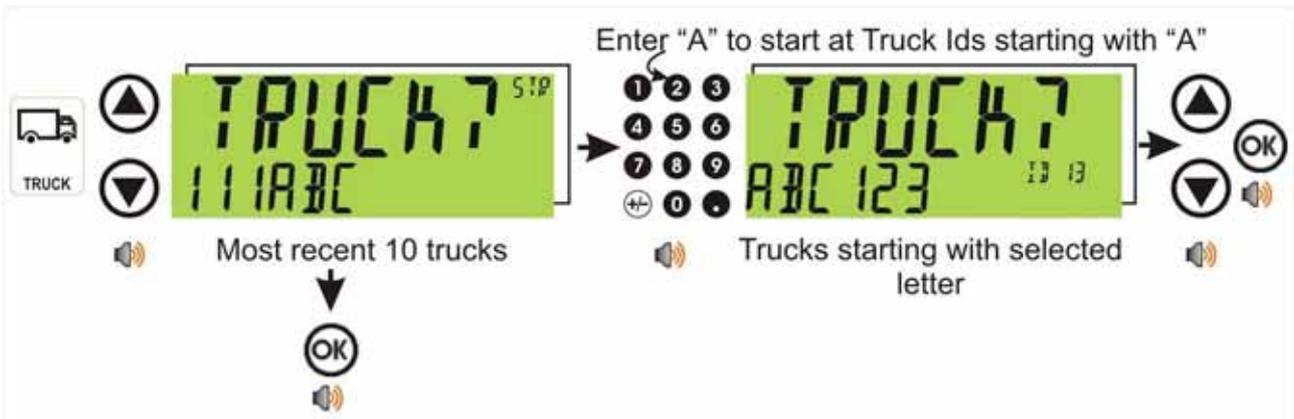
This key toggles the weight display between the Gross weight and the Net weight (provided that a Tare has previously been acquired using the <TARE> key).

If a preset Tare has been entered, the value of the preset Tare will be temporarily displayed when switching from Gross to Net display.

5.5. Up, Down, OK, Truck keys: Select/Deleting/Adding Truck IDs

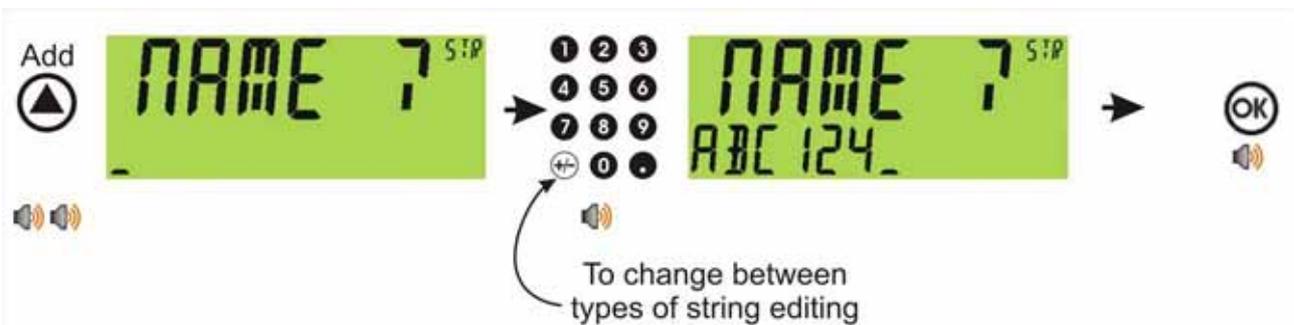
5.5.1. Select a Truck ID - Short Press of Up and Down keys

A short press of these keys will allow the user to select the desired truck from a list of the most recently used. The keypad can be used to enter the first letter of the truck name. The <UP> and <DOWN> keys will then step through the list of trucks starting with the entered letter.



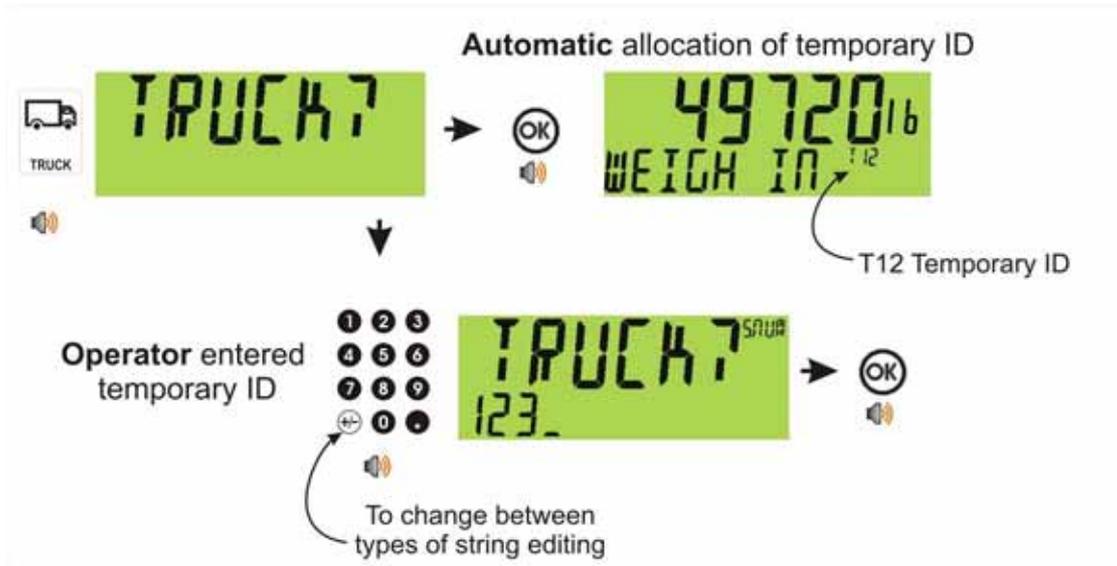
5.5.2. Add a Permanent Truck ID - Long Press of the Up Key (Add)

A long press of this key allows the user to create a new **permanent** truck. The name of the new truck must be specified.



5.5.3. Add a Temporary Truck ID – Truck Key

A short press of the Truck key allows you to enter a name followed by the <OK> key. If a name isn't specified a temporary one will be allocated in format T followed by a number (eg. T12). **As this is only a temporary Truck ID it will be automatically deleted at the end of the weigh out process.**



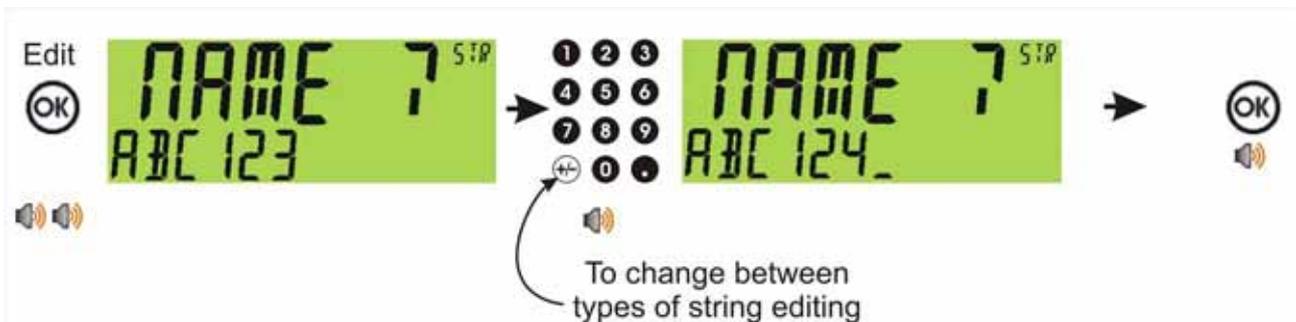
5.5.4. Delete a Truck ID - Long Press of the Down Key (Del)

A long press of this key allows the user to delete a truck. Trucks can only be deleted if the total weight is 0. Truck totals can be cleared using a long press of the 4 key (Total).

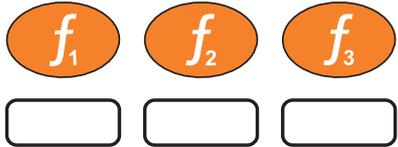


5.5.5. Edit a Truck ID - Long Press of the OK Key (Edit)

A long press of this key allows the user to change the name of a truck.



5.6. Function Keys

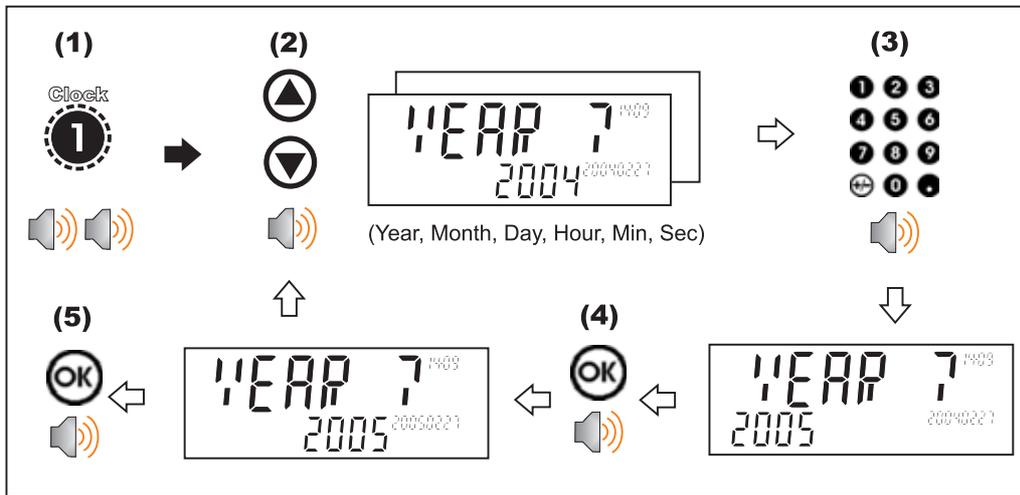


Functions are set in the FUNC menu, labels are provided that can be applied depending on what function is assigned.

- Function Key 1 is fixed to special function of Truck, the operation of this key has been discussed in the previous section.
- Function Key 2 is fixed to special function Print, this is used for the weigh in weigh out process.
- Function Key 3 can be assigned as required, refer to the Special Functions section for the operation of the various functions.

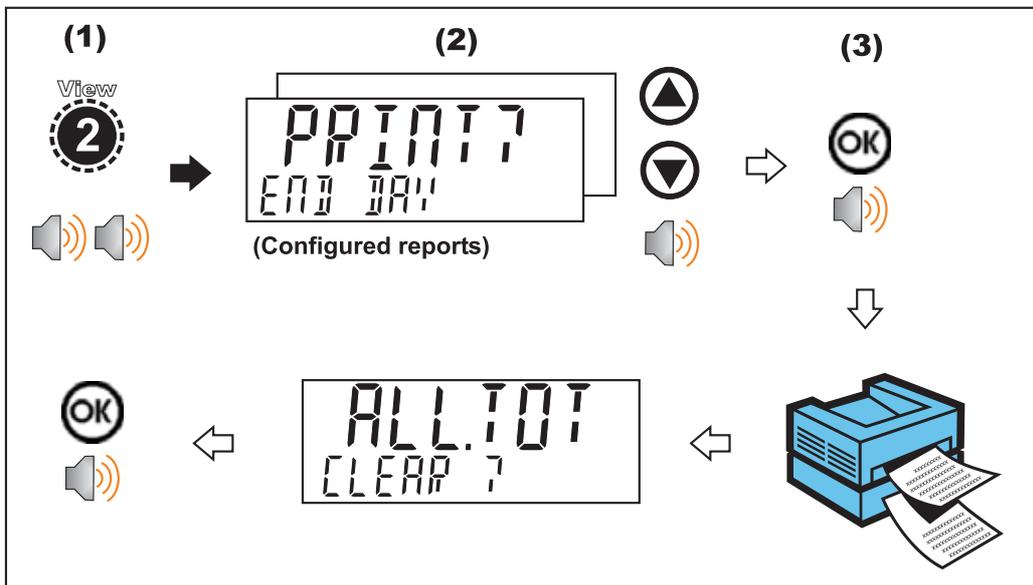
5.7. Clock

A long press of the 1 key (Clock) allows the system time and date to be viewed and changed



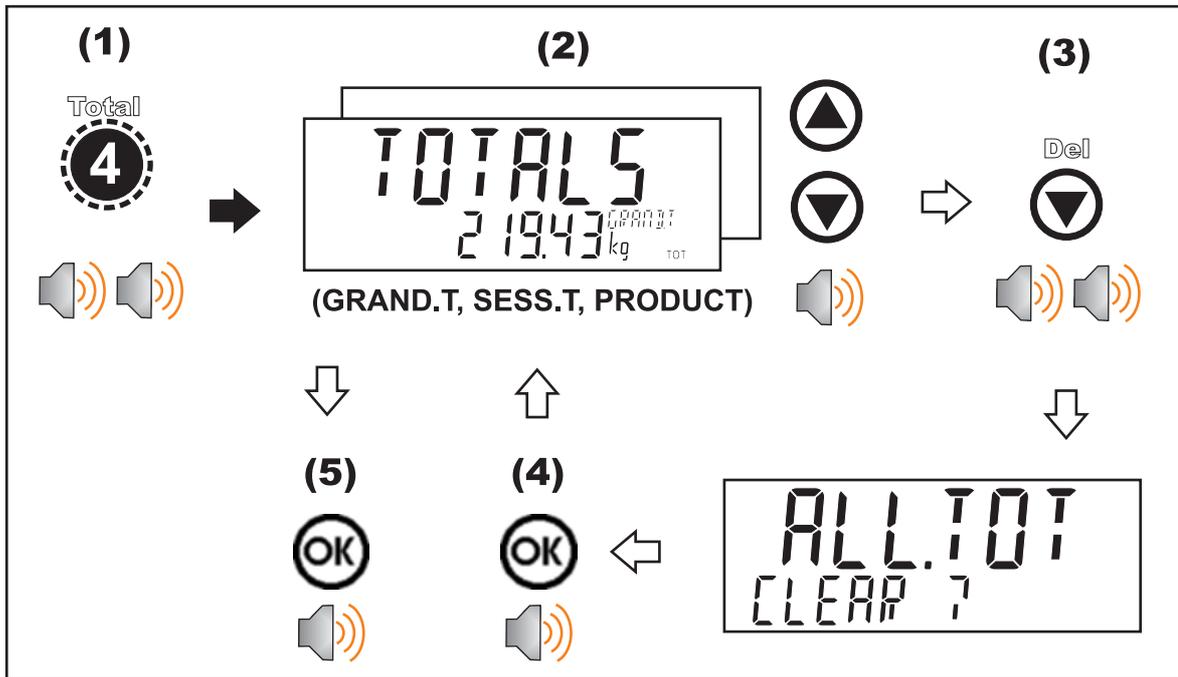
5.8. Report

A long press of the 3 key (Report) allows reports to be printed.



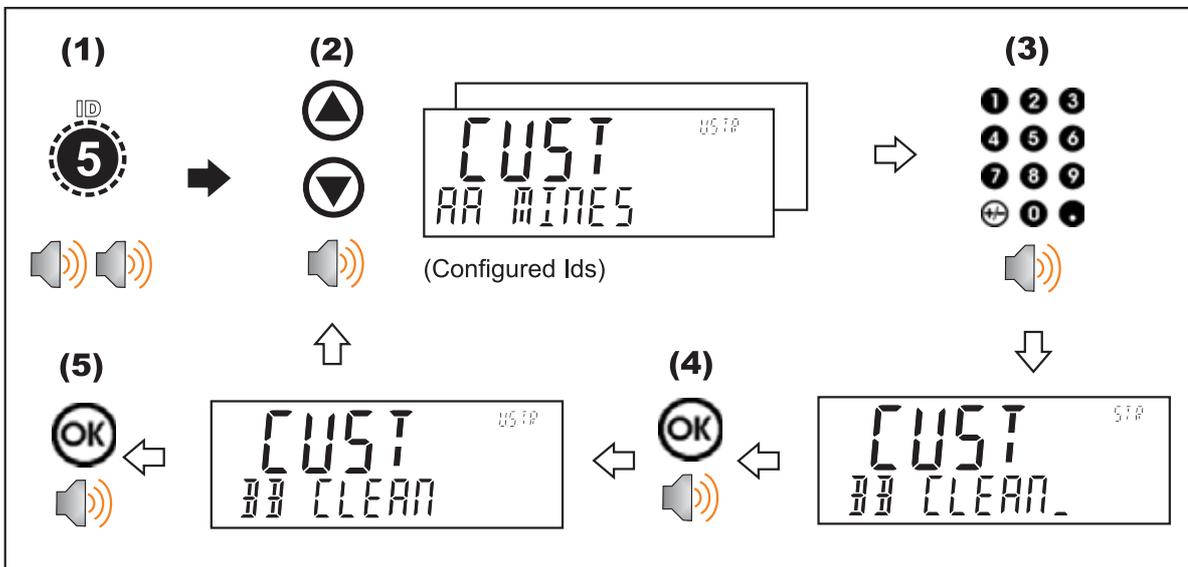
5.9. Total

A long press of the 4 key (Total) allows totals to be viewed and cleared.



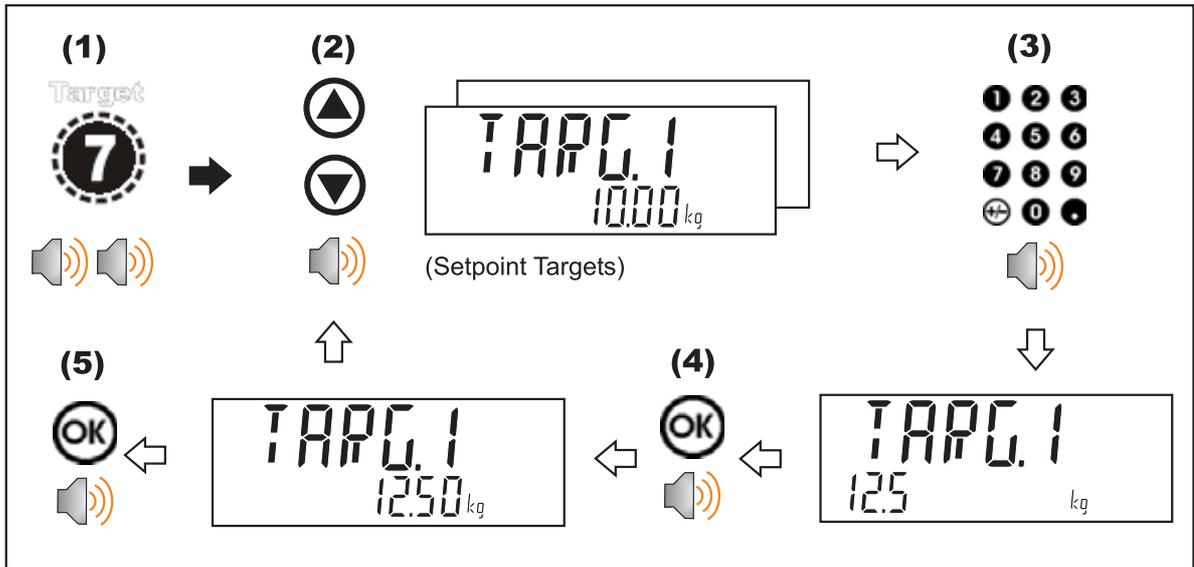
5.10. User ID

A long press of the 5 key (ID) allows User IDs to be viewed and cleared. The Settable Consecutive Print ID can also be viewed and edited, refer also to 11.2 Print ID page 81.



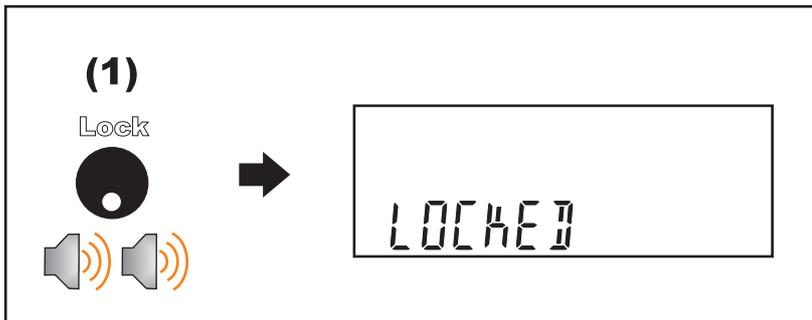
5.11. Target

A long press of the 7 key (Target) allows setpoint targets to be viewed and changed.



5.12. Lock

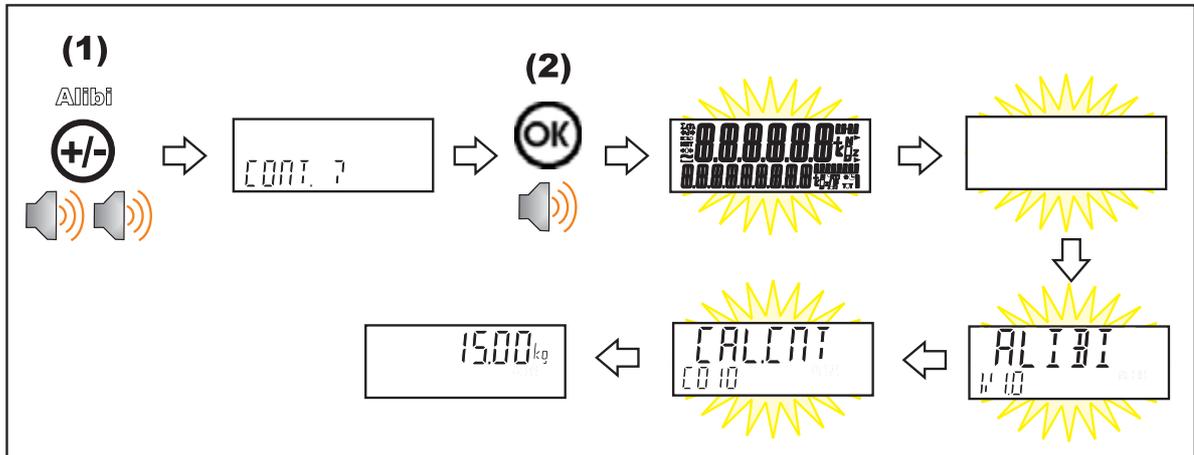
A long press of the . key (Lock) allows instrument to be locked. The instrument can be unlocked by entering the operator passcode when prompted.



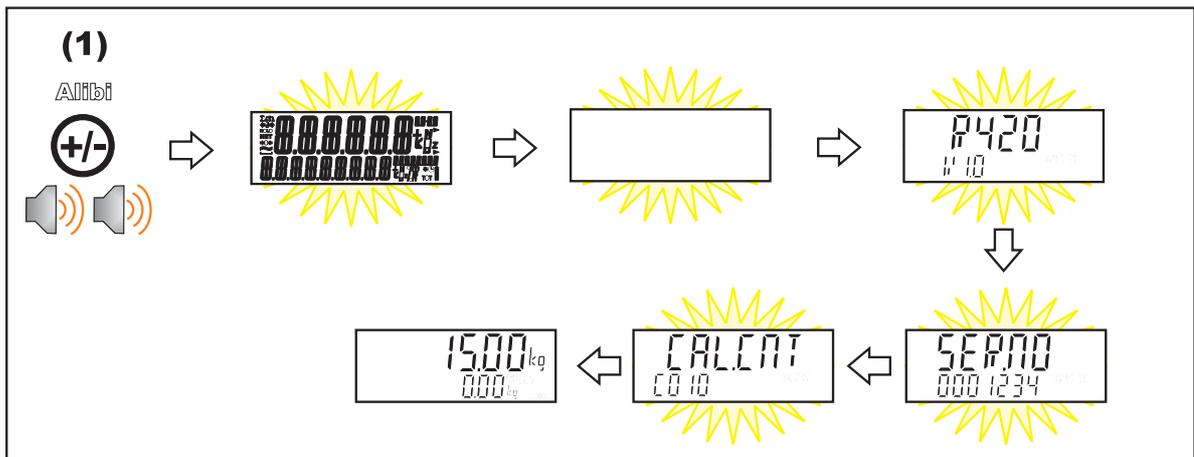
5.13. Alibi

A long press of the +/- key (Alibi) will switch the instrument to Alibi mode. Alibi mode is used to verify scale readings. To return from Alibi mode, long press the +/- key (Alibi) again.

5.13.1. Switching to Alibi Mode

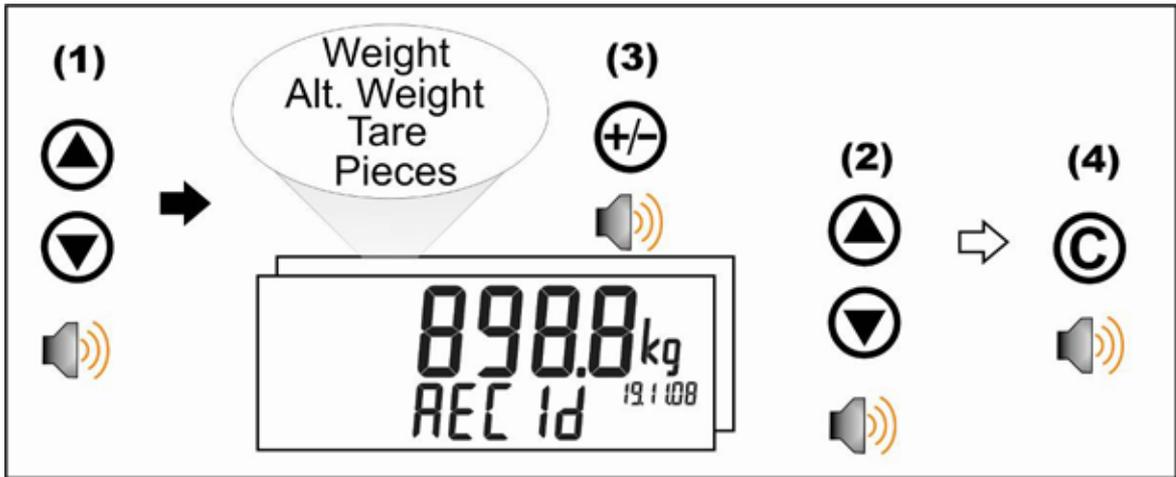


5.13.2. Returning from Alibi Mode



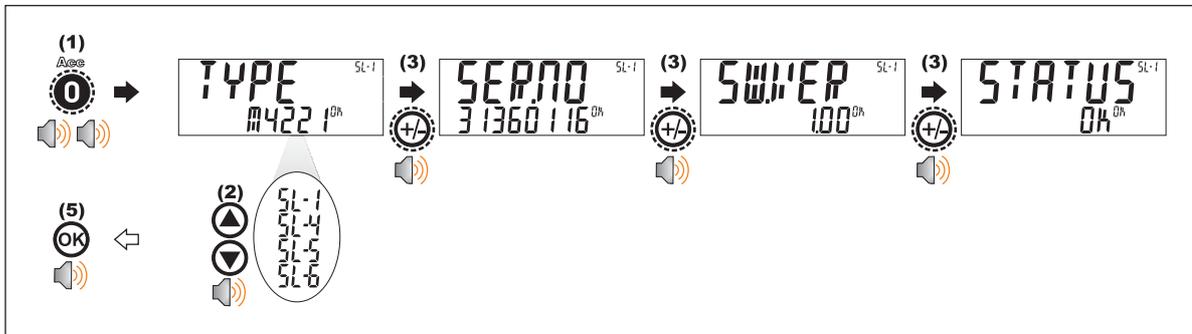
5.13.3. Viewing DSD records in Alibi mode

From Alibi mode you can view DSD records (when a DSD is fitted) by pressing the up arrow key to view the latest record, pressing the down arrow key to view the oldest record or by entering a number then pressing the OK key to view that specific record. Once viewing records you can use the +/- key to display the different information stored in the record, use the up arrow key to move onto the next record or use the down arrow key to move onto the previous record. Once you are finished viewing records you can return to Alibi mode by pressing the C key.

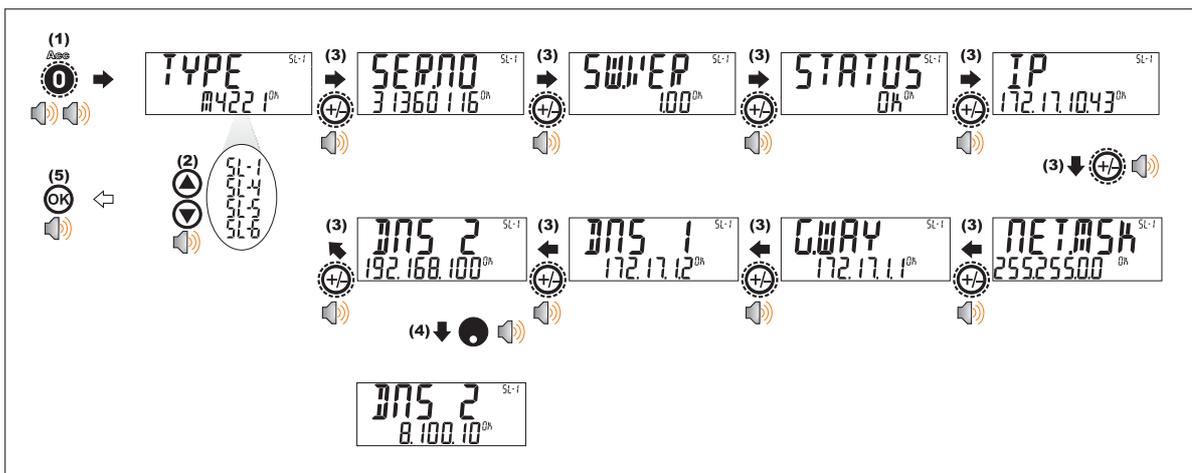


5.14. Acc

A long press of the 0 key (Acc) is used to view information about the attached accessory modules.



When a M4221 Ethernet module is attached, the current IP (Internet Protocol) settings can be viewed from the Acc menu. The "." key allows the second half of longer IP addresses to be displayed. In this example the DNS 2 IP address is 192.168.100.10.



5.15. Stability Considerations

Some functions (e.g. Tare and Zero) require a stable weight. These functions will wait for up to 10 seconds for stable weight. If a stable weight is not available 'MOTION ERROR' is displayed and the function is cancelled.

5.16. Truck Weighing

5.16.1. Weighing in

Once a Truck ID with no first weight or preset tare has been selected the indicator will move to weigh in mode. When the truck is on the scale you can either press the OK key to store the current weight as the first weight, press the print key to print the current weight and store it as the first weight or enter a preset tare to move directly to the weigh out step. If you have stored a first weight then the indicator will move back to normal mode weighing until a truck is selected.



The Cancel key <C> allows you to cancel out of the weigh in mode and return to normal mode without storing a first weight or preset-tare.

5.16.2. Weighing out with preset tare

Once a product with a preset tare is selected the indicator will move to weigh out with preset tare mode. When the truck is on the scale you can press the print key to add the current tare weight to totals and return to normal mode.



The Cancel key <C> or <OK> key allows you to cancel out of the weigh out mode and return to normal mode without adding any weight to totals.

5.16.3. Weighing out with first weight

Once a product with a stored first weight is selected the indicator will move to weigh out with first weight mode. When the truck is on the scale you can press the print key to add the current weight minus the first weight to totals, the first weight will be cleared when this happened and the indicator will return to normal mode.



The Cancel key <C> or <OK> key allows you to cancel out of the weigh out mode and return to normal mode without clearing the first weight or adding any weight to totals.

5.16.4. Print Current Weight of Truck



Print Format B



PRINT



→



Sam's Public Truck Scale

10/02/10 09:38:06

000000171 49729lb

TOTAL 49729lb

Thank You for your Business

Drive Carefully

5.16.5. Single Pass - Permanent Truck ID with Preset Tare

Stored Preset Tare



ID: 111ABC
Tare: 25,000lb



TRUCK?

TRUCK? ^{STP}

111ABC



TRUCK






NET 24726^{NET}lb

25000^{111ABC}lb

→



Print Format B

Sam's Public Truck Scale

10/02/10 09:39:32

TRUCK: 111ABC

SEQ: 000000174

GROSS: 49726lb

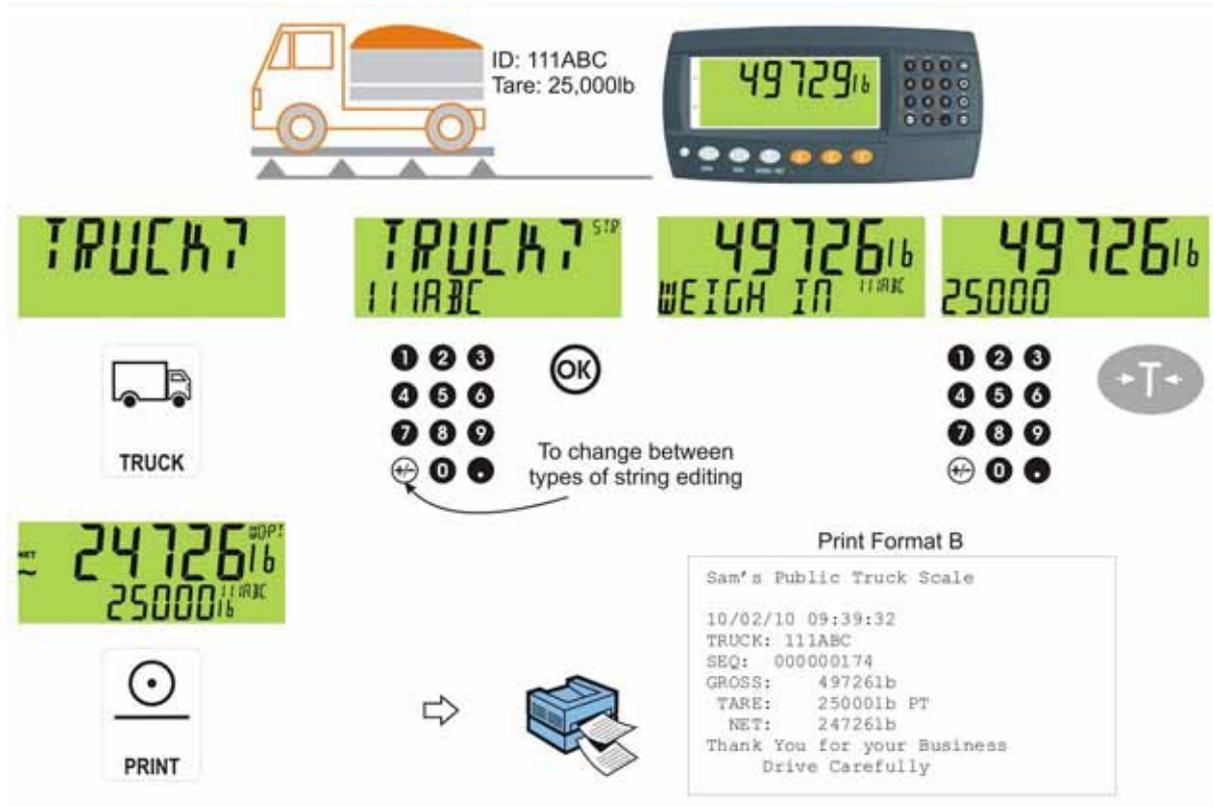
TARE: 25000lb PT

NET: 24726lb

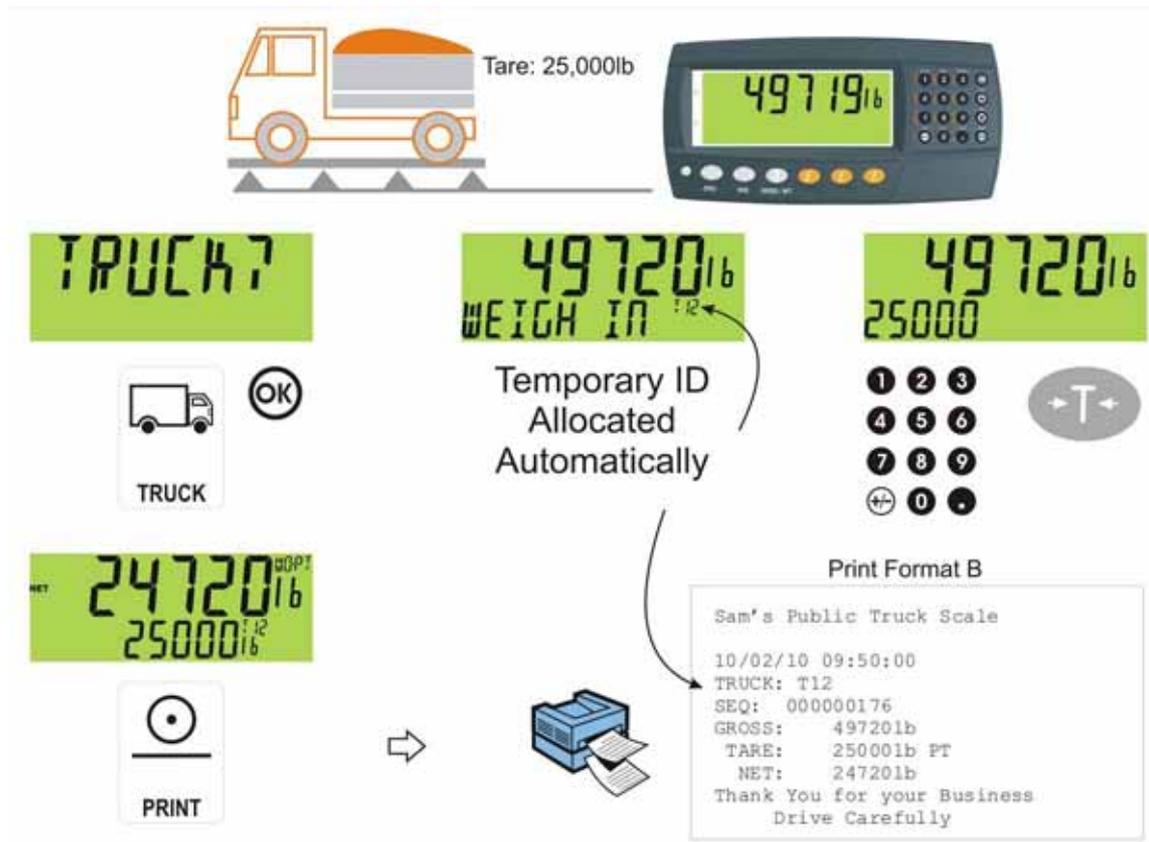
Thank You for your Business

Drive Carefully

5.16.6. Single Pass - Temporary ID (Operator Entered) with a Preset Tare



5.16.7. Single Pass – Automatic Temporary ID Allocated with a Preset Tare



5.16.8. Two Pass

The diagram illustrates a two-pass weighing process. In the first pass, the scale displays 30010lb. The truck icon shows ID: ABC123. The user presses the 'TRUCK' button. In the second pass, the scale displays 59679lb. The truck icon shows ID: ABC123. The user presses the 'PRINT' button. A keypad with arrow and number keys is also shown.

Print Format B

```

Sam's Public Truck Scale
10/02/10 09:38:45
TRUCK: ABC123
SEQ: 000000173
WEIGH IN: 30010lb
WEIGH OUT: 59679lb
NET WEIGHT: 29669lb
Thank You for your Business
Drive Carefully
    
```

5.16.9. Two Pass – Automatic Temporary ID Allocated

The diagram illustrates a two-pass weighing process with an automatic temporary ID. In the first pass, the scale displays 30032lb. The truck icon shows ID: T2. The user presses the 'TRUCK' button. In the second pass, the scale displays 60115lb. The truck icon shows ID: T2. The user presses the 'PRINT' button. A keypad with arrow and number keys is also shown.

Print Format B

```

Sam's Public Truck Scale
10/02/10 09:38:45
TRUCK: T2
SEQ: 000000173
WEIGH IN: 30032lb
WEIGH OUT: 60115lb
NET WEIGHT: 30083lb
Thank You for your Business
Drive Carefully
    
```

6. Configuration

6.1. General Setup Information

Configuration and calibration can be performed entirely from the front panel, using the digital setup facility. When **Full Setup** is used, all menu items are accessible and care must be taken to ensure no accidental changes are made to calibration and trade settings. In addition, there is also **Safe Setup** that provides restricted access. This setup method ensures that only settings that are not calibration or trade sensitive can be changed.

Full and Safe Setup can be passcode protected to prevent unauthorised or accidental tampering.

6.2. Correct Loadcell Selection

It is important to ensure the signal strength from the connected loadcells is sufficiently high to match the capability of the instrument, especially when configuring a trade certified site.

The trade approved capability of the instrument is quoted as a maximum number of divisions with a minimum signal strength per division in micro-volts.

To illustrate the process consider the following example:

Example

Four 2,500kg 2.0mV/V load cells are used in an application requiring a 5,000kg full scale, with weight displayed in 5kg increments.

Calculating the total number of divisions:	Total Number of Divisions = $\frac{\text{Fullscale}}{\text{Count-by}} = \frac{5000\text{kg}}{5\text{kg}} = 1000\text{divisions}$
Calculating the full scale load cell signal:	Fullscale signal = $\frac{\text{Fullscale}}{\text{Load Cell Capacity}} \times \text{Loadcell signal (at capacity)}$ $= \frac{5000\text{kg}}{10000\text{kg}} \times 2.0\text{mV/V} = 1.0\text{mV/V}$
Calculating the absolute signal voltage:	Absolute Signal Voltage = Excitation Voltage x Fullscale Signal $= 7.4\text{V} \times 1.0\text{mV/V} = 7.4 \text{ mV}$
Calculating the signal resolution:	Signal Resolution = $\frac{\text{Absolute Signal Voltage}}{\text{Number of graduations}} = \frac{7.4\text{mV}}{1000 \text{ divisions}}$ $= 0.0074\text{mV/division} = 7.4\text{uV/division}$

6.3. Filtering Techniques

There is a trade off between noise filtering and the step-response time of the system. The step-response is defined as the time between placing a weight on the scale and the correct stable weight reading being displayed. This does not affect the number of readings per second that are taken. It simply defines the amount of time that is required to determine a final weight reading.

The **FILTER** setting in the instrument setup shows the amount of time over which the averaging is taken. Increasing the averaging time will result in a more stable reading but will extend the time it takes the instrument to settle to a final reading.

6.4. Industrial vs Trade Modes

The instrument may be operated in Industrial or Trade modes. These modes restrict certain aspects of the operation of the instrument to ensure compliance with trade certified standards.

The following table lists the operation differences for each of these modes.

Element	Industrial	Trade
Underload	-105% of Fullscale	-1% or -2% of Fullscale depending on zero range setting
Overload	105% of Fullscale	Fullscale + 9 divisions
Tare	No restrictions	Tare values must be > 0
Test Modes	Unlimited time allowed	Limited to five seconds

Table 3: Industrial vs trade modes

6.5. Calibration Counter

Within Setup there are a number of critical steps that can affect the calibration and/or legal for trade performance of the instrument. If any of these steps are altered, the trade certification of the scale could be voided.

The instrument provides built-in calibration counter(s) to monitor the number of times the critical steps are altered. The value of a counter is stored within the instrument and can only be reset at the factory. Each time a critical step is altered, the counter will increase by one. Whenever the instrument is powered up, or setup mode is entered/exited, the current value in the counter is displayed briefly (eg. C00010).

The value of the counter is written on the tamperproof trade label on the front of the indicator for trade-certified applications and functions as an electronic seal. If any legal for trade settings are changed on the instrument, the current value of the calibration counter will be different from the recorded value and the seal is broken. In this manual, items marked with ⊗ indicate that the setting is legal for trade critical settings.

6.6. Passcodes

The instrument has three levels of passcode to provide security for instrument functions, calibration and general configuration.

- Full Setup Passcode
- Safe Setup Passcode
- Operator Passcode

The Full Setup passcode can also be used to access Safe Setup and Operator functions.

Instrument settings that are accessed by the communications are protected by the same passcodes.

6.6.1. Full Setup Passcode

Setting a passcode for Full Setup restricts access to Full Setup.

6.6.2. Safe Setup Passcode

Setting a passcode for Safe Setup restricts access to Safe Setup functions. In addition, front panel functions can be configured to prompt for a Safe Setup passcode before operating. Refer to 7.1.4 KEY.LOC (Key Function Access Control) on page 44 for more information.

6.6.3. Operator Passcode

The operator passcode is used to protect access to instrument functions available from the front panel keypad. Refer to 7.1.4 KEY.LOC (Key Function Access Control) on page 44 for more information on how to add security to operator functions.

The operator generally needs to enter the Operator Passcode only once to gain access to multiple functions. To lock the instrument again press the '.' key for two seconds (LOCK function).

6.6.4. Setup Lock-Out

If an attempt is made to enter Full or Safe Setup using an incorrect passcode, the instrument will respond with the message **ENTRY DENIED** and then the user will be returned to normal operating mode.

No more than three failed attempts can be made to access Full/Safe Setup before the instrument blocks access completely. The instrument must be turned off and on again before further attempts can be made.

7. Setup Menus

7.1. GEN.OPT (General options)

7.1.1. LANG (Operator language)

Path	Description
GEN.OPT L LANG	Sets the operator language. NB: Setup menus are fixed in English.
LANG Values <OPT>	
<ul style="list-style-type: none"> • English (Default) • German • Dutch • French • Polish • Italian • Spanish 	

7.1.2. DATE.F (Date format)

Path	Description
GEN.OPT L DATE.F	Sets the date format
DATE.F Values <OPT>	
<ul style="list-style-type: none"> • DD.MM.YY (Default) • DD.MM.YYYY • MM.DD.YY • MM.DD.YYYY • YY.MM.DD • YYYY.MM.DD 	

7.1.3. PCODE (Security passcodes)

Path	Description
GEN.OPT L PCODE L SAFE.PC L FULL.PC (*) L OP.PC	Sets the instrument passcodes. The 3 levels of passcode are: <ul style="list-style-type: none"> • Full passcode (FULL.PC): Controls access to full setup menus. All settings (including trade critical settings) can be altered from full setup. The full passcode will also give access to safe or operator functions. • Safe passcode (SAFE.PC): Controls access to safe setup menus. No trade critical settings can be altered from safe setup. The safe passcode will also give access to operator functions. • Operator passcode (OP.PC): Controls access to various operator functions.
(*) Available in FULL SETUP only	
PCODE Values <NUM>	
0 .. 999999 Default: 0	
NB: A passcode value of 0 deactivates the passcode.	

7.1.4. KEY.LOC (Key Function Access Control)

Path	Description
GEN.OPT L KEY.LOC L P(*) L ZERO L TARE L GR_NT L F1 L F2 L F3 L CLOCK L REPORT L TOTAL L ID L TARGET L ACC L PR.MOD L PR.SEL L NUM.PAD L ALIBI	Access to each of the operator functions can be configured separately. The options are: AVAIL: function always available OPER.PC: requires a valid Operator Passcode SAFE.PC: requires a valid Safe Passcode LOCKED: function never available Functions protected with a 'Safe' passcode prompt for the passcode every time. Entering the Operator Passcode unlocks all operator protected functions so the operator is not continually prompted for the passcode. In order to lock the instrument again press the '.' key for two seconds (function 'Lock').
KEY.LOC Values <OPT>	
<ul style="list-style-type: none"> • AVAIL (Default) • OPER.PC • SAFE.PC • LOCKED (*) AVAIL & LOCKED only are available for POWER.	

7.1.5. DISP (Display options)

Path	Description
GEN.OPT L DISP L B.LIGHT L FREQ L AUX.DSP	These settings control the operation of the display. B.LIGHT (Backlight operation) can be set on or off. FREQ (Display update frequency) sets how often the display is updated AUX.DSP (Auxiliary Display) can be set to OFF or TIME to show the current instrument time.
B.LIGHT Values <OPT>	
ON (Default), OFF	
FREQ Values <OPT>	
10Hz (Default), 5Hz, 3.3Hz, 2Hz, 1Hz	
AUX.DSP Values <OPT>	
OFF (Default), TIME	

7.1.6. ID.NAME (User Defined Strings)

Path	Description
GEN.OPT L ID.NAME L NAME.1 L NAME.2 L NAME.3	<p>There are three User Strings available to the operator when the '5' key is pressed for 2 seconds (function 'ID').</p> <p>NAME.1, NAME.2 and NAME.3 specify the actual prompts displayed for the operator. The values that the operator enters are used for printing and other application functions.</p> <p>(E.g. to allow the operator to enter a customer ID, NAME.1 could be set to 'CUST'.)</p> <p>To remove a User String from the operator menu give it an empty name.</p>
Values <STR>	
<i>Maximum 6 characters.</i>	

7.1.7. POWER (Power options)

Path	Description						
GEN.OPT L POWER L AUT.OFF L START	<p>AUT.OFF (Auto-off delay)</p> <p>Sets the automatic power off setting. The instrument will switch off after set minutes of inactivity. NEVER disables the auto power off feature.</p>						
AUT.OFF Values <OPT>							
<table border="0"> <tr> <td>• NEVER (Default)</td> <td>• 5 min</td> </tr> <tr> <td>• 1 min</td> <td>• 10 min</td> </tr> <tr> <td></td> <td>• 60 min</td> </tr> </table>	• NEVER (Default)	• 5 min	• 1 min	• 10 min		• 60 min	<p>START (Pause at Start-up)</p> <p>If ON the START function forces the instrument to pause on power up and prompt the operator to continue. This ensures that restarting the instrument does not go unnoticed.</p>
• NEVER (Default)	• 5 min						
• 1 min	• 10 min						
	• 60 min						
START Values <OPT>							
OFF (Default), ON							

7.1.8. USR.DEF (Set all non-calibration settings to defaults)

Path	Description
GEN.OPT L USER.DEF	<p>Sets all general instrument settings to defaults.</p> <p>This will not affect settings in the SCALE menu which includes all calibration and configuration settings.</p>
Values	
DEFAULT? <OK> CONFIRM? <OK>	

7.2. H.WARE (Hardware Configuration & Test)

7.2.1. ALLOC (Allocation Report)

Path	Description
H.WARE L ALLOC	<p>Check hardware allocation.</p> <p>Displays the function of each item of hardware. Items of hardware include serial ports, function keys, inputs and outputs.</p> <p>Use the UP and DOWN arrows to step through the hardware.</p> <p>Use the +/- key to step through the available information for each item of hardware.</p> <p>Errors: If a single item of hardware has been assigned to 2 or more functions, an error message is shown. "CHECK" is used if it is possible that the setup is OK. "CLASH" is shown if it is likely a setup error.</p>

7.2.2. LC.HW

Path	Description
H.WARE L LC.HW L MVV L OL.CNT L OL.CLR	<p>MVV View Loadcell mV/V reading.</p> <p>OL.CNT (Overload count) Shows the number of times the instrument has been overloaded or underloaded by at least 50% of fullscale.</p> <p>OL.CLR (Overload clear) Clear the overload counter.</p>

7.2.3. SER1.HW, SER2.HW

Path	Description
H.WARE	BAUD (Baud Rate)
L SER1.HW	Sets the baud rate for the port.
L BAUD	
L PARITY	PARITY
L DATA	Sets the parity for the port.
L STOP	
L DTR	DATA (Data bits)
L TERM	Sets the number of data bits for the port.
L SER2.HW	STOP (Stop bits)
L BAUD	Sets the number of stop bits for the port.
L PARITY	
L DATA	DTR (DTR usage)
L STOP	Use the DTR line with RS232 printing.
L DTR	
L TERM	TERM (Termination Resistors)
L RING	Use termination resistors with RS485.
BAUD Values <OPT>	RING (Ring network)
1200, _2400_, _4800_, _9600_ (Default), _19200_, _57600	Enable ring network. Only available on SER2 and requires M42xx software version 1.01+.
PARITY Values <OPT>	
NONE (Default), EVEN, ODD	
DATA Values <OPT>	
8 (Default), _7_	
STOP Values <OPT>	
1 (Default), _2_	
DTR Values <OPT>	
OFF (Default), ON	
TERM Values <OPT>	
OFF (Default), ON	
RING Values <OPT>	
OFF (Default), ON	

7.2.4. ETH.HW

Path	Description
H.WARE L ETH.HW L DHCP L IP L NET.MSK L G.WAY L DNS.1 L DNS.2	<p>DHCP (Dynamic Host Configuration Protocol)</p> <p>Enables or disables the use of DHCP to configure the IP settings of the M4221 Ethernet module. To use this option requires a DHCP server on the network.</p> <p>IP (Internet Protocol Address)</p> <p>Sets the IP address for the M4221 Ethernet module.</p> <p>NET.MSK (Network Mask)</p> <p>Sets the network mask the M4221. This defines the proportion of the IP address bits that reside on the M4221's subnet.</p> <p>G.WAY (Default Gateway)</p> <p>Sets the default gateway for the M4221. This is the server through which traffic destined for hosts beyond the M4221's subnet is routed.</p> <p>DNS.1 (Primary Domain Name Server)</p> <p>Sets the primary domain name server for the M4221. If not required use 0.0.0.0.</p> <p>DNS.2 (Secondary Domain Name Server)</p> <p>Sets the secondary domain name server for the M4221. If not required use 0.0.0.0.</p>
DHCP Values <OPT>	
ON ^(Default) , OFF	
Note: IP, NET.MSK, G.WAY, DNS.1, DNS.2 settings are not available when DHCP is ON.	

7.2.5. ETH.DEF (Set the M4221 Ethernet module to defaults)

Path	Description
H.WARE L ETH.HW L ETH.DEF	<p>Sets all settings stored within the M4221 Ethernet module to defaults.</p> <p>This will not affect any instrument settings.</p>
Values	
DEFAULT? <OK> CONFIRM? <OK>	

7.2.6. IO.HW

Path	Description
H.WARE L IO.HW L FRC.OUT L TST.IN L DB.1.8 L DBNC.1 : L DBNC.8 L DB.9.16 L DBNC.9 : L DBNC.16 L DB.17.24 L DBNC.17 : L DBNC.24 L DB.25.32 L DBNC.25 : L DBNC.32	<p>FRC.OUT (Force Outputs)</p> <p>Use this when testing and fault finding to force the IO on and off. Use the UP and DOWN keys to select the output. Use the +/- key to switch the output on and off.</p> <p>TST.IN (Test Inputs)</p> <p>Use this when testing and fault finding to check the status of IO when used as inputs. Inputs are listed for each module in order of lowest to highest IO number. '1' means the input is active, '0' means the input is inactive. Use the UP and DOWN keys to select the module to view.</p> <p>DBNC (Debounce)</p> <p>This sets the amount of debouncing for inputs. It is set in milliseconds [ms].</p>
DBNC Values <NUM>	
1..250 ms Default: 50 ms	

7.2.7. DSD.HW

Path	Description
H.WARE L DSD.HW L AUTO.C L DSD.STR	<p>AUTO.C (Auto Clear)</p> <p>Sets whether the DSD will automatically write over the oldest records when it becomes full.</p> <p>DSD.STR (DSD String)</p> <p>Custom string to be stored along with the traceable data when the DSD is written. This accepts all print tokens.</p>
AUTO.C Values <OPT>	
OFF, ON (Default)	
DSD.STR Values <STR>	
Maximum 20 characters.	

7.3. SCALE (Loadcell options and calibration)

7.3.1. BUILD (Scale parameters)

Path	Description
SCALE L BUILD L TYPE ^(⊗) L CABLE ^(⊗) L DP ^(⊗) L CAP1 ^(⊗) L E1 ^(⊗) L CAP2 ^(*⊗) L E2 ^(*⊗) L UNITS ^(⊗) L HI.RES ^(⊗)	Scale Base configuration settings: TYPE: Range type. Options are: <ul style="list-style-type: none"> • SINGLE : Single range • DUAL.I: Dual interval • DUAL.R: Dual range CABLE: 6-wire or 4-wire cable termination: <ul style="list-style-type: none"> • 6-wire: SENSE lines are connected to the instrument. • 4-wire: Internal connection between Excitation and SENSE lines is active. DP: Set the decimal point position. CAP1: Sets the fullscale capacity for the scale. If using multiple interval/range, this sets the fullscale capacity of the lowest range/interval. E1: Sets the count-by (or resolution) of the scale. If using multiple interval/range, this sets the count-by (or resolution) of the lowest range/interval. CAP2: If using multiple interval/range, this sets the fullscale capacity of the highest range/interval. E2: If using multiple interval/range, this sets the count-by (or resolution) of the highest range/interval. UNITS: Sets the weighing units. NB: For Options: <ul style="list-style-type: none"> • None: Units are left blank. • ARROW.U: Use the top arrow. Units will be printed onto the instrument in the correct location. HI.RES: Sets the scale to high resolution (x10) mode. ⊗: This item is trade critical and will affect the calibration counter(s) if changed.
TYPE Values ^(⊗) <OPT>	
SINGLE ^(Default) DUAL.I , DUAL.R	
CABLE Values ^(⊗) <OPT>	
6 WIRE ^(Default) , 4 WIRE	
DP Values ^(⊗) <OPT>	
000000 ^(Default) 000.000 00000.0 00.0000 0000.00 0.00000	
CAP1 & CAP2 Values ^(⊗) <NUM>	
100 ..999999 <i>Default: 3000</i> NB: Numbers above assume no decimal point.	
E1 & E2 Values ^(⊗) <OPT>	
1 ^(Default) 20 2 50 5 100 10	
UNITS Values ^(⊗) <OPT>	
None kg ^(Default) g lb Oz t N ARROW U	
HI.RES Values ^(⊗) <OPT>	
OFF ^(Default) , ON	

7.3.2. OPTION (Scale options)

Path	Description
SCALE L OPTION L USE [⊗] L FILTER [⊗] L MOTION [⊗] L Z.RANGE [⊗] L Z.TRACK [⊗] L Z.INIT [⊗] L Z.BAND [⊗] L EXT.EX [⊗] L R.ENTRY L TOT.OPT	USE (Trade Use): This setting affects the operation of trade functions. Options are: <ul style="list-style-type: none"> • INDUST: Industrial (no standard) • OIML: OIML trade mode • NTEP: NTEP trade mode FILTER : Set the number of seconds of digital filtering. MOTION : Sets the motion detection sensitivity. This setting is given as x d – y t where weight change of more than x divisions in y seconds will trigger motion. Z.RANGE (Range of Zero): Sets the range over which the indicator can zero the scale. Options are in % of fullscale. Z.TRAC (Zero Tracking): Sets the rate of automatic zero tracking. Z.INIT (Zero on Startup): Enables the zero-on-start-up feature. When enabled, a zero will be performed as part of the instrument start-up procedure. Z.BAND (Zero Deadband): Sets the weight range around zero which will be considered zero for application purposes. EXT.EX (External Excitation): If using an external supply for loadcell excitation this setting enables additional background calibration services. Under normal conditions this feature is not required. R.ENTRY (Rear Entry): Full access via the rear setup button only. This option is only available when the rear setup button has been used to access the menu system TOT.OPT (Totalising Option): Type of weight used with totalising. Gross or net weight should be used if gross and net weights cannot be added into a single total.
USE Values [⊗] <OPT> INDUST ^(Default) , OIML, NTEP	
FILTER Values [⊗] <NUM> 0.01s..30.00s <i>Default: 1.0s</i>	
MOTION Values [⊗] <OPT> OFF, 0.5d – 1.0t ^(Default) 1.0d – 1.0t 2.0d – 1.0t 5.0d – 1.0t 0.5d – 0.5t	1.0d – 0.5t 2.0d – 0.5t 5.0d – 0.5t 0.5d – 0.2t 1.0d – 0.2t 2.0d – 0.2t 5.0d – 0.2t
Z.RANGE Values [⊗] <OPT> -2 .. 2 ^(Default) , -1 .. 3, -10 .. 10, -20 .. 20	
Z.TRACK Values [⊗] <OPT> Off ^(Default) , Slow, Fast	
Z.INIT Values [⊗] <OPT> Off ^(Default) , On	
Z.BAND Values [⊗] <NUM> 0 – fullscale <i>Default: 0</i>	
EXT.EX Values [⊗] <OPT> Off ^(Default) , On	
R.ENTRY Values <OPT> Off ^(Default) , On	
TOT.OPT Values <OPT> Disp ^(Default) , Gross, Net	
	⊗: This item is trade critical and will affect the calibration counter(s) if changed.

7.3.3. CAL (Scale calibration)

Path	Description
SCALE	Calibrate Scale
L CAL	ZERO : Perform a zero calibration.
L ZERO ^(⊗)	SPAN : Perform a span calibration. A zero calibration should be done before doing a span calibration.
L SPAN ^(⊗)	ED.LIN : Add or Modify linearization points.
L ED.LIN ^(⊗)	CLR.LIN : Clear unwanted linearization points.
L CLR.LIN ^(⊗)	DIR.ZER (Direct mV/V Zero Calibration): Enter signal strength (in mV/V) of zero calibration directly.
L DIR.ZERO ^(⊗)	DIR.SPN (direct mV/V span Calibration): Enter the signal strength (in mV/V) of fullscale directly. No test weights required.
L DIR.SPN ^(⊗)	DEF.CAL (Default Calibration): Restore instrument to default factory calibration and reset all items in the SCALE menu to defaults.
L DEF.CAL ^(⊗)	

⊗: This item is trade critical and will affect the calibration counter(s) if changed.

7.3.4. QA (QA alarm)

Path	Description
SCALE:	Configure the quality assurance feature.
L QA	If active the instrument displays a 'QA DUE' warning after the date limit has expired.
L QA.OPT ^(⊗)	QA.OPT : Turn QA feature on or off.
L QA.YEAR ^(⊗)	QA.YEAR, QA.MONTH, QA.DAY : Enter QA expiry date.
L QA.MONTH ^(⊗)	
L QA.DAY ^(⊗)	
QA.OPT Values ^(⊗) <OPT>	
Off ^(Default) , On	
QA.DATE Values ^(⊗) <NUM>	
2000-01-01 To 2099-12-31	⊗: This item is trade critical and will affect the calibration counter(s) if changed.

7.4. FUNC (Special functions)

The instrument supports up to eight special functions. Enter the number of special functions to use and configure each one according to the function type required. Most functions need only to be associated with a key or input to function but some have additional configuration settings as detailed below.

7.4.1. NUM (Number of special functions)

Path	Description
FUNC L NUM	Sets the number of special functions.
NUM Values <OPT>	
-1-.. -8-	

7.4.2. SFn: TYPE (Function Types)

Path	Description
FUNC L SF _n L TYPE	Sets the function type. Options are:
TYPE Values <OPT>	
<ul style="list-style-type: none"> • NONE (Default) • PRINT • SINGLE • TEST • UNITS • HOLD • REM.KEY • BLANK • REPORT • HI.RES • SC.EXIT • TRUCK 	<ul style="list-style-type: none"> • PRINT: Trigger a print out • SINGLE: Trigger a single serial weight transmission • TEST: Display test • UNITS: Unit switching, lb/kg or Custom • HOLD: Manual hold • REM.KEY: Remote Key operation • BLANK: Blanking input • REPORT: Print a report • HI.RES: High Resolution mode toggle • SC.EXIT: Trigger scale exit setpoint • TRUCK: Truck select

7.4.3. SFn: KEY (Function Key / Remote Input)

Path	Description
FUNC L SFn L KEY	Select front panel key or external input to trigger the special function. All functions that respond to input events have a KEY setting.
KEY Values <OPT>	F1 and F2 are permanently assigned to Truck and Print functions and cannot be reassigned.
None (Default), F1 .. F3 IO1 .. IO32	

7.4.4. SFn: PRINT (Printing Functions)

Path	Description
FUNC L SFn L TYPE : PRINT L KEY L PRT.OUT L TOTAL L CLR.ASK L AUTO L IL.TYPE L I.LOCK	Configuration of the PRINT Special Function. KEY: Select PRINT key using front function key or external input. PRT.OUT (PRINT OUT): Selects the printout to print. Printouts are configured in the PRINT menu. TOTAL: Sets whether the print key affects the product totals. Options are:
KEY Values <OPT>	<ul style="list-style-type: none"> • ADD: Add to totals • UNDO: Undo last add to totals • CLR.ALL: Clear all totals • CLR.SESS: Clear session total
None (Default), F1 .. F3, IO1 .. IO32	
PRT.OUT Values <OPT>	CLR.ASK (Prompt for Clear): Sets whether the operator is prompted to confirm the totals clear. AUTO (Automatic printing): Sets whether printing occurs automatically.
None (Default), PRINT.1 .. PRINT.2	
TOTAL Values <OPT>	IL.TYPE (Interlock Type): Sets the type of printing interlock to be used. Options are:
NONE (Default) UNDO ADD CLR.ALL CLR.SESS	
CLR.ASK Values <OPT>	<ul style="list-style-type: none"> • MOTION: Printing is enabled every time the scale becomes stable. • I.LOCK: Printing is enabled when the weight is stable after a weight movement larger than the interlock weight. • RET.Z: Printing is enabled after the scale has returned to zero and is stable at a reading other than zero.
NO (Default), YES	
AUTO Values <OPT>	I.LOCK (Interlock): Sets the interlock weight.
NO (Default), YES	
IL.TYPE Values <OPT>	
NONE (Default) MOTION I.LOCK RET.Z	
I.LOCK Values <NUM>	
0 .. Fullscale	

7.4.5. SFn: SINGLE (Single Serial Output Functions)

Path	Description
FUNC L SF _n L TYPE : SINGLE L KEY L AUT.OUT	Single serial outputs are similar to printing but do not support any interlocking or totalising functions. KEY: Function key or external input to use. AUT.OUT: Choose which Auto Output Serial service to trigger. The Auto Output TYPE should be set to SINGLE.
KEY Values <OPT>	
None ^(Default) , F1 .. F3, IO1 .. IO32	
AUT.OUT Values <OPT>	
AUTO.1 ^(Default) , AUTO.2	

7.4.6. SFn: BLANK (Blanking Functions)

Path	Description
FUNC L SF _n L TYPE : BLANK L KEY L BLANK	Blanking functions enable the detection of external inputs to be used to block instrument operation by blanking the screen and blocking key functions. Typical applications are for tilt sensing. KEY: External input to use.
KEY Values <OPT>	BLANK: Set display blanking style. Options are: <ul style="list-style-type: none"> • DASH: Fill instrument display with '-' characters. • BLANK: completely blank instrument display.
None ^(Default) , F1 .. F3, IO1 .. IO32	
BLANK Values <OPT>	
DASH ^(Default) , BLANK	

7.4.7. SFn: UNITS (Unit Switching Functions)

Path	Description
FUNC L SFn L TYPE : UNITS L KEY L MODE L UNIT (*) L U.STR (*)	Unit Switching enables the display and printing of alternative units to those used for the primary calibration of the instrument. KEY: Select key or external input to use. MODE: Sets the unit switching mode. Options are: <ul style="list-style-type: none"> kg/lb (default): The instrument will convert kilograms to pounds or pounds to kilograms (depending on the primary unit). CUSTOM: The instrument will convert primary units to a custom unit defined by an entered conversion factor.
KEY Values <OPT>	
None (Default), F1 .. F3, IO1 .. IO32	
MODE Values <OPT>	
<ul style="list-style-type: none"> kg/lb (Default) CUSTOM 	UNIT (Alternative Unit Annunciator): Set the symbols to use for alternative units on the instrument display. Options are: <ul style="list-style-type: none"> N: Useful for Newtons of Force. ARROW.U: Upper unit arrow P: useful for Pints. L: lower case 'l' for litres. ARROW.L: Lower unit arrow
UNIT Values <OPT>	
<ul style="list-style-type: none"> NONE (Default) N ARROW U P L ARROW L 	U.STR (Unit String): Four character alternative units string. Used in printing alternative units.
U.STR Values <STR>	
4 character string	

7.4.8. SFn: HOLD

Path	Description
FUNC L SFn L TYPE : HOLD L KEY	The hold key/input implements a manual hold. KEY: Select key or external input to use.
KEY Values <OPT>	
None (Default), F1 .. F3, IO1 .. IO32	

7.4.9. SFn: REM.KEY (Remote Key Functions)

Path	Description
FUNC L SFn L TYPE : REM.KEY L KEY L FUNC	Remote key functions allow external inputs to be used to trigger instrument key functions. The external 'keys' operate even if the instrument keys are locked and never require Operator or Setup passcodes to be entered.
KEY Values <OPT>	KEY: External input to use.
None ^(Default) , IO1 .. IO32	FUNC: Choose key function.
FUNC Values <OPT>	
NONE ^(Default) , ZERO, TARE, GR/NET, 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, +/-, .., CANCEL, UP, DOWN, OK	

7.4.10. SFn: REPORT (Report Printing Functions)

Path	Description
FUNC L SFn L TYPE : REPORT L KEY L PRT.OUT L CLR.TOT	Configuration of the PRINT Special Function. KEY: Select PRINT key using front function key or external input. PRT.OUT (PRINT OUT): Selects the printout to print. Printouts are configured in the PRINT menu. CLR.TOTAL: Sets whether the print key affects the product totals.
KEY Values <OPT>	Options are:
None ^(Default) , F1 .. F3, IO1 .. IO32	<ul style="list-style-type: none"> • NO: Add to totals • ASK: Undo last add to totals • CLEAR: Clear all totals
PRT.OUT Values <OPT>	
None ^(Default) , PRINT.1 .. PRINT.2	
CLR.TOTAL Values <OPT>	
NO ^(Default) , ASK, CLEAR	

7.4.11. SFn: HI.RES (High Resolution)

Path	Description
FUNC L SFn L TYPE : HI.RES L KEY	Key/input to toggle to high resolution mode. KEY: Select key or external input to use.
KEY Values <OPT>	
None ^(Default) , F1 .. F3, IO1 .. IO32	

7.4.12. SFn: SC.EXIT (Scale Exit)

Path	Description
FUNC L SF n LTYPE : SC.EXIT L KEY	Key/input to trigger scale exit (SC.EXIT) setpoint. KEY: Select key or external input to use.
KEY Values <OPT>	
None ^(Default) , F1 .. F3, IO1 .. IO32	

7.4.13. SFn: TRUCK (Truck selection)

Path	Description
FUNC L SF n LTYPE : TRUCK L KEY	This function is assigned to f1 but is also available for external keys Key/input to select truck.
KEY Values <OPT>	KEY: Select key or external input to use.
None ^(Default) , F1 .. F3, IO1 .. IO32	

7.5. SER.NET

Path	Description
L SER.NET L ADDR L NUM L NET.n L TYPE L SERIAL L RESP	Configure the serial networking support. ADDR (Address): Address of instrument (1..31). NUM : sets the number of networks TYPE : Type of Network Protocol: <ul style="list-style-type: none"> • NONE: Disable networking • Protocol B: See Network Communications page 72. • SIMPLE: See Network Communications page 72. • BARCODE: Use a barcode reader for truck selection. SERIAL : Serial Port to use. RESP : Respond to simple protocol commands with OK.
ADDR Values <NUM>	
1..31	
NUM Values <OPT>	
-1- (Default) .. -2-	
TYPE Values <OPT>	
NONE (Default), PROTOCOL.B, SIMPLE, BARCODE	
SERIAL Values <OPT>	
SER1A ^(Default) , SER2A, SER3A	
RESP Values <OPT>	
NONE (Default), OK	

7.6. SER.AUT (Automatic transmit)

7.6.1. NUM (Number of Automatic Transmissions)

Path	Description
SER.AUT L NUM	Sets the number of special automatic outputs
Values <OPT>	
-1- (Default) .. -2-	

7.6.2. AUTO.n (Automatic Output Configuration)

Path	Description
SER.AUT L AUTO.n L TYPE L SERIAL L FORMAT L SOURCE L EV.AUTO(*)	These settings are the same for AUTO.1 and AUTO.2
TYPE Values <OPT>	
NONE (Default) SINGLE AUTO.LO	AUTO.HI AUT.TRC
SERIAL Values <OPT>	
SER1A (Default), SER1B, SER2A, SER2B, SER3A, SER3B	
FORMAT Values <OPT>	
FMT.A (Default) FMT.B FMT.C FMT.D	FMT.E FMT.F FMT.REG FMT.TRC CUSTOM
SOURCE Values <OPT>	
GROSS (Default), NET GR.or.NT	
EV.AUTO Values <STR>	
Token String (*) Only used with CUSTOM format.	

TYPE: Sets the transmission rate. Options are:

- SINGLE: A SINGLE function key is used to trigger a single transmission. Rate is determined by external input.
- AUTO.LO: Transmit at 10Hz
- AUTO.HI: Transmit at 25Hz frequency
- AUT.TRC: Sends a message for every traceable weight

SERIAL: Select Serial port to use.

FORMAT: Set data format. See page 79.

- FMT.TRC to provide a tally roll printer log.

SOURCE: Sets the weight data to send:

- GROSS: Gross weight
- Net: Net weight
- Gr.or.Nt: Gross or net weight

EV.AUTO: Token string to define data format for CUSTOM transmissions.

7.7. PRINT (Printouts)

7.7.1. NUM (Number of printouts)

Path	Description
PRINT L NUM	Sets the number of printouts.
Values <OPT>	
1 (Default) .. _2_	

7.7.2. HEADER (Print header)

Path	Description
PRINT L HEADER	Sets the print docket header.
Values <STR>	
String	

7.7.3. FOOTER (Print footer)

Path	Description
PRINT L FOOTER	Sets the print docket footer.
Values <STR>	
String	

7.7.4. PAGE (Print page options)

Path	Description
PRINT L PAGE L WIDTH L HEIGHT L PG.END	Page settings configure the height and width of the paper and what to do at the bottom of a page.
WIDTH Values <NUM>	WIDTH: Sets the page width. A setting of zero disables page width checking.
0 .. 250 Default: 0	HEIGHT: Sets the page height. A setting of zero disables page height checking.
HEIGHT Values <NUM>	PG.END (Page End String): Sets the string to print at page end. This option allows a cut character, form feed, etc, to be added every page.
0 .. 250 Default: 0	
PG.END Values <STR>	
Token String	

7.7.5. SPACE (Print blank space options)

Path	Description
PRINT L SPACE L TOP L LEFT L BOTTOM	Space controls the amount of white space to leave around the printout. TOP: Sets the number of blank lines to add at the top of each page. LEFT: Sets the number of spaces to add at the beginning of each line. BOTTOM: Sets the number of blank lines to add to the bottom of each page.
Values <NUM>	
0 .. 10 <i>Default: 0</i>	

7.7.6. PRINT.n ... (Printout options)

Path	Description
PRINT L PRINT.n L TYPE L FORMAT L SERIAL L NAME L CUSTOM (*) L PRN.KEY L EV.D.NEW L EV.D.END L EV.WI L EV.WO.1 L EV.WO.2 L EV.D.WO or L REP.ST L REP.PR L REP.END	Each printout has its own format settings. TYPE: Sets the printout type. Options are: <ul style="list-style-type: none"> • NONE (default) • DOCKET • REPORT FORMAT: Sets the printout format. SERIAL: Select Serial port to use. NAME (Printout Name): Report printouts are available by name to the operator. CUSTOM: For custom printing, each type of printout uses event strings as follows: <p>DOCKET: DOC.PRN (Docket Print) controls the format of each transaction on the docket. EV.D.NEW (Event Docket New) defines the start of the docket. EV.D.END (Event Docket End) defines the end of the docket (Normal mode only). EV.WI (Event Weigh In) defines what is printed when weighing in. EV.WO.1 (Event Weigh Out 1) defines what is printed when weighing out with Preset Tare. EV.WO.2 (Event Weigh Out 2) defines what is printed when weighing out with first weight. EV.D.WO (Event Docket Weigh Out) defines the end of docket when weighing out.</p> REPORT: REP.ST (Report Start) defines start of report. REP.PR (Report Product) controls the information printed for each product. REP.END (Report End) defines the end of the report.
TYPE Values <OPT>	
<ul style="list-style-type: none"> • NONE (Default) • DOCKET • REPORT 	
FORMAT Values <OPT>	
FMT.A (Default), FMT.B CUSTOM	
SERIAL Values <OPT>	
SER1A (Default), SER2A, SER3A	
NAME Values <STR>	
6 character String	
CUSTOM Values <STR>	
(*) Active token strings depend on the TYPE setting	

7.8. SETP (Setpoints)

7.8.1. NUM (Number of setpoints)

Path	Description
SETP L NUM	Sets the number of special setpoints
Values <OPT>	
<u>1</u> ... <u>8</u> (Default)	

7.8.2. SETP1 ... SETP8 (Setpoint options)

Path	Description				
SETP L SETP _n L TYPE L OUTPUT L LOGIC L ALARM L SOURCE (*) L HYS(**) L MASK(***) L DLY.ON(***) L HLD.OFF(***) L RDY.TIM(****)	<p>Configure the operation of each setpoint.</p> <p>TYPE determines the function of the setpoint. Options are:</p> <ul style="list-style-type: none"> NONE : Always inactive ON: Always active OVER: active if weight over target UNDER: active of weight under target COZ: active if Centre of Zero ZERO: active if weight is zero NET: active if net weight selected MOTION: active if weight unstable ERROR: active if error conditions detected LGC.AND: active if inputs match the bits set in the mask exactly LGC.OR: active if any inputs match the bits set in the mask LGC.XOR: active if only one input matches the bits set in the mask SC.REDY: active when scale is stable and in the zero band for more than the time set in RDY.TIM SC.EXIT: active when outside of zero band and a print has occurred, or can be triggered by SC.EXIT special function <p>OUTPUT specifies which IO to use or the setpoint output.</p> <p>LOGIC: Logic HIGH forces the output to follow the setpoint activity. Logic LOW forces the output to the reverse of the setpoint activity.</p>				
TYPE Values <OPT>					
<ul style="list-style-type: none"> NONE (Default) ON OVER UNDER COZ ZERO NET MOTION ERROR LGC.AND LGC.OR LGC.XOR SC.REDY SC.EXIT 					
OUTPUT Values <OPT>					
NONE (Default), IO1 .. IO32					
LOGIC Values <OPT>					
HIGH (Default), LOW					
ALARM Values <OPT>					
<table border="1"> <tr> <td>NONE (Default)</td> <td>DOUBLE</td> </tr> <tr> <td>SINGLE</td> <td>FLASH</td> </tr> </table>		NONE (Default)	DOUBLE	SINGLE	FLASH
NONE (Default)		DOUBLE			
SINGLE	FLASH				
SOURCE Values <OPT>					

<ul style="list-style-type: none"> • GROSS (Default) • NET • GR.or.NT • ALT.GR • ALT.NET • ALT.G.or.N <p>(*)NB: Only for OVER, UNDER and ZERO setpoints.</p>	<p>ALARM: Alarms are triggered when the setpoint is active. Options are: NONE: no alarm SINGLE: single BEEP DOUBLE: double BEEP FLASH: flash display</p> <p>SOURCE: Select which weight values the setpoint checks against the target weight. Options are: GROSS: Gross weight always NET: Net weight always GR.or.NT: Gross or Net depending on which one is displayed. ALT.GR: Alternate Gross weight always ALT.NET: Alternate Net weight always ALT.G.or.N: Alternate Gross or Net depending on which one is displayed</p> <p>HYS: Hysteresis defines the amount of weight required for an active setpoint to become inactive again. A value of 0 still allows for 0.5 graduations of hysteresis.</p> <p>MASK: a 24 bit number that is used by the logic setpoints to match IO1..IO24</p> <p>DLY.ON: Delay for logic setpoints before setpoint becomes active.</p> <p>HLD.OFF: Delay for logic setpoints before setpoint becomes inactive.</p> <p>RDY.TIM: the time that the scale must be in the zero band and stable before the SC.REDY setpoint will become active</p>
<p>HYS Values <NUM></p> <p>0 to 999999 <i>Default: 0</i></p> <p>(**) NB: Only for OVER, and UNDER setpoints.</p>	
<p>MASK Values <NUM></p> <p>0 to 16777215 <i>Default 0</i> (***) NB: Only for LGC.AND, LGC.OR and LGC.XOR setpoints</p>	
<p>DLY.ON Values <NUM></p> <p>0.00 to 10.00s <i>Default 0s</i> (***) NB: Only for LGC.AND, LGC.OR and LGC.XOR setpoints</p>	
<p>HLD.OFF Values <NUM></p> <p>0.00 to 10.00s <i>Default 0s</i> (***) NB: Only for LGC.AND, LGC.OR and LGC.XOR setpoints</p>	
<p>RDY.TIM Values <NUM></p> <p>0.000 to 60.000 s <i>Default: 0.000</i></p> <p>(****) NB: Only for SC.REDY setpoints.</p>	

7.9. End (Save and exit)

8. Calibration

The calibration of the indicator is fully digital. The calibration results are stored in permanent memory for use each time the instrument is powered up.

Note: Some of the digital setup steps can affect calibration. The SCALE:BUILD and SCALE:OPTION settings MUST be configured before calibration is attempted.

To perform a calibration, when in Full Setup select the **SCALE:CAL** menu.

The calibration programme will automatically prevent the instrument from being calibrated into an application outside of its specification. If an attempt is made to calibrate outside of the permitted range, an error message will display and the calibration will be abandoned. Refer to Calibration Errors page 71.

Note: It should not be assumed that just because the instrument has successfully calibrated a scale, that the scale is correct for trade use. Always check the scale build against the approval specification.

8.1. Performing a Digital Calibration with Test Weights

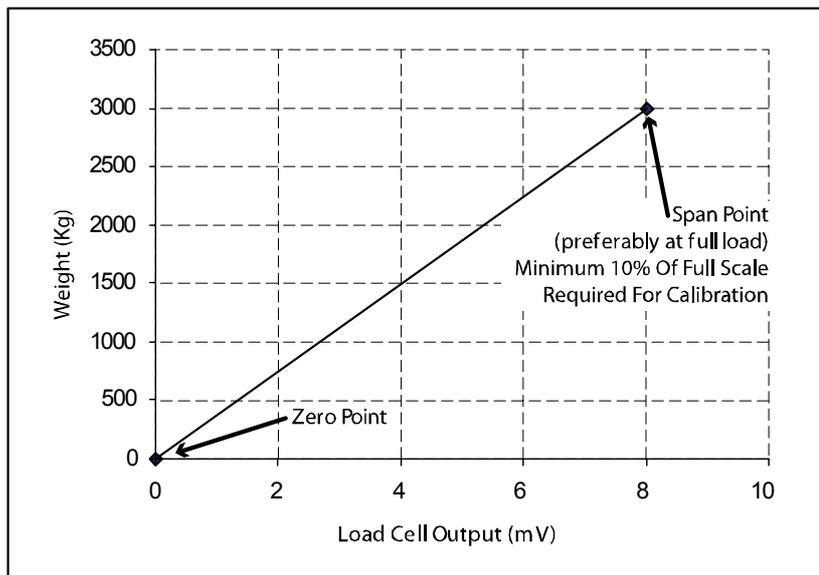


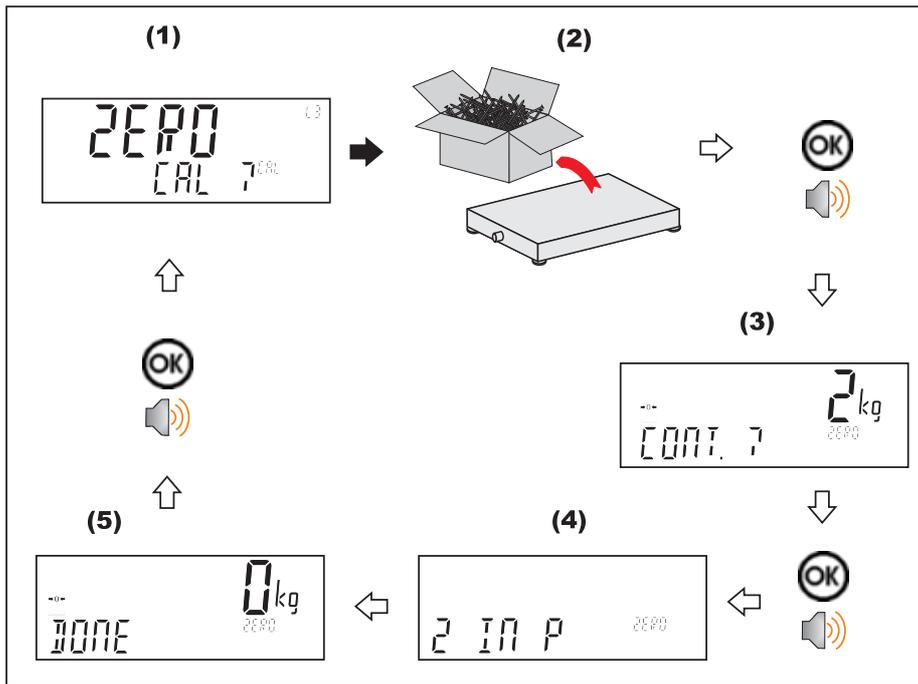
Figure 11: Chart - Zero and Span Points to Interpolate Weight from Load Cell

The Zero setting (SCALE:CAL:ZERO) specifies a gross zero point for the scale. The Span setting (SCALE:CAL:SPAN) specifies a second point (**preferably close to full scale**) used to convert the A/D readings into weighing units (eg. kg). The Tilt calibration (SCALE:CAL:TILT K491 only) compensates for errors due to inclination. It is important that an initial ZERO calibration is performed before any SPAN calibrations. TILT calibration (K491 only) must only be performed after both ZERO and SPAN calibrations are complete. The chart shown here demonstrates how the zero and span points are used to interpolate a weight reading from the load cell reading.

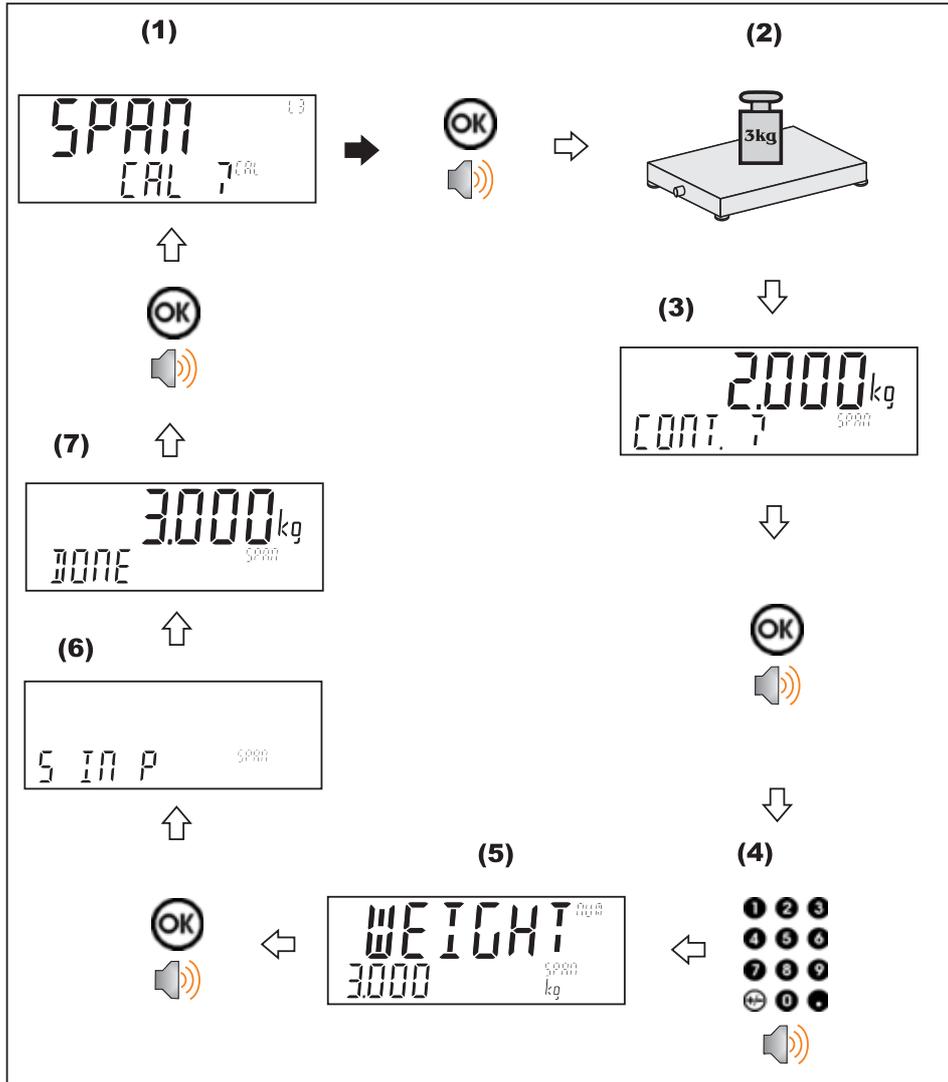
Notes:

1. Calibration points (Zero, Span and Linearisation) must be spaced by at least 2% of Full scale from each other.
2. First span point must be 10% of full scale or greater for successful calibration.

8.1.1. ZERO (Zero Calibration Routine)



8.1.2. SPAN (Span Calibration Routine)



8.2. Performing a Calibration with Direct mV/V Entry

In applications where test weights are not easily available, it is possible to calibrate the instrument directly by entering the mV/V signal strength at Zero and Span. The Direct Zero setting (SCALE:CAL:DIR.ZER) specifies a gross zero point for the scale. The Direct Span setting (SCALE:CAL:DIR.SPN) specifies the mV/V signal strength corresponding to an applied mass. This calibration technique is not compatible with linearisation. Clearly the accuracy of this type of calibration is limited to the accuracy of the direct mV/V data.

8.2.1. DIR.ZER (Direct Zero Calibration Entry)

Press the <OK> key to start. The display will show the current weight.
Press the <OK> key. Change the mV/V setting to the correct value for Zero and press the <OK> key. DONE will be displayed along with the weight to allow the reading to be checked.
Press the <OK> to leave the zero routine.

8.2.2. DIR.SPN (Direct Span Calibration Entry)

Press the <OK> key to start. The display will show the current weight.
Press the <OK> key. Change the weight to the correct value and press the <OK> key.
Change the mV/V setting to the correct value and press the <OK> key. DONE will be displayed along with the weight to allow the reading to be checked.
Press the <OK> to leave the zero routine.

8.3. Using Linearisation

Linearisation is used to approximate the weight output to a non-linear scale. The chart below shows a non-linear characteristic for the load cell output. From the chart, it can be seen that the trace with no linearisation applied is a poor approximation to the real characteristic. By applying one or more linearisation points, more accurate weight readings can be achieved.

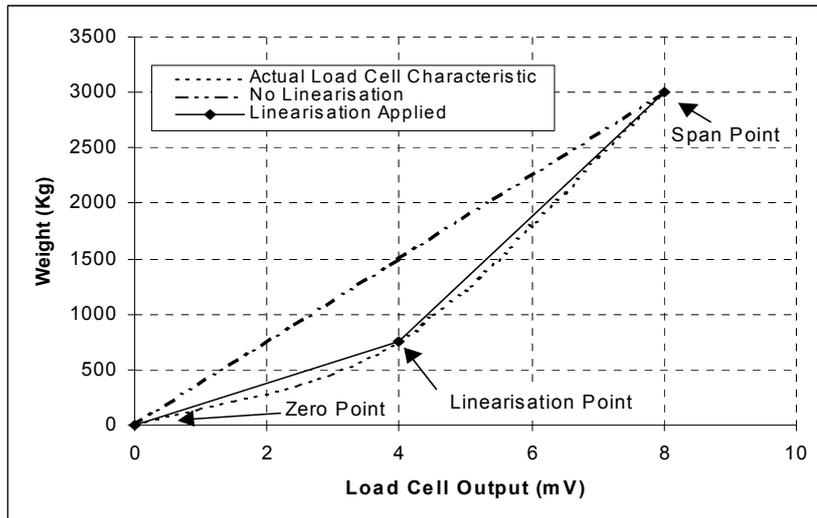
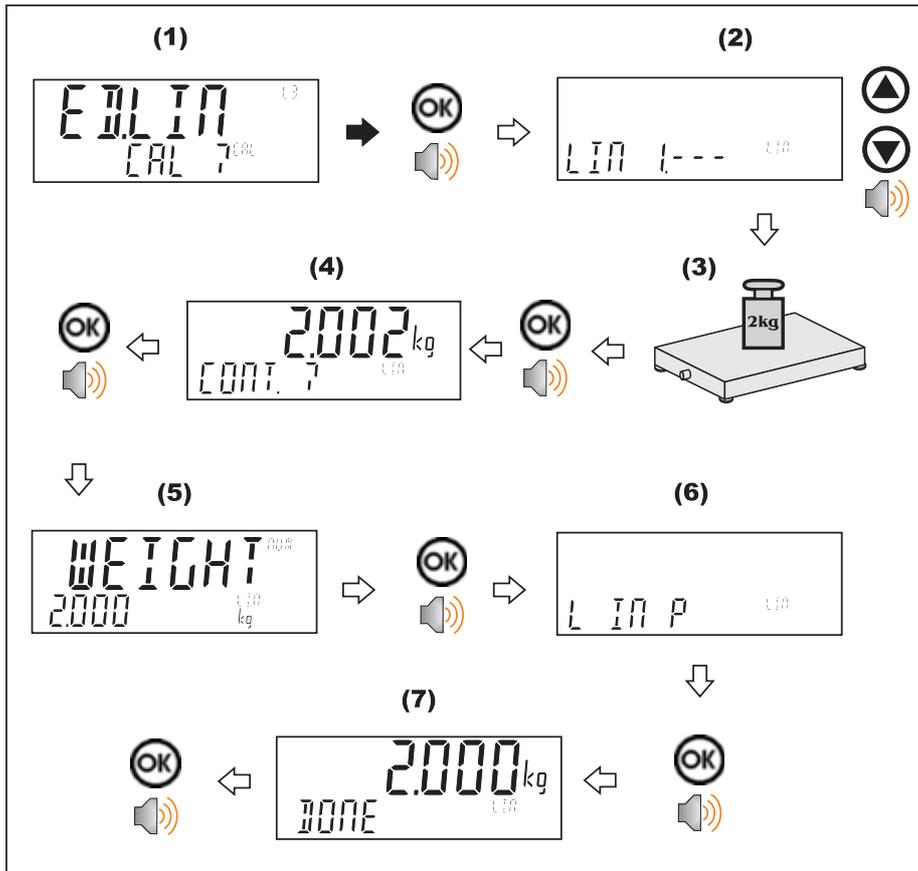


Figure 12: Chart - Non-Linear Characteristic for Load Cell Output

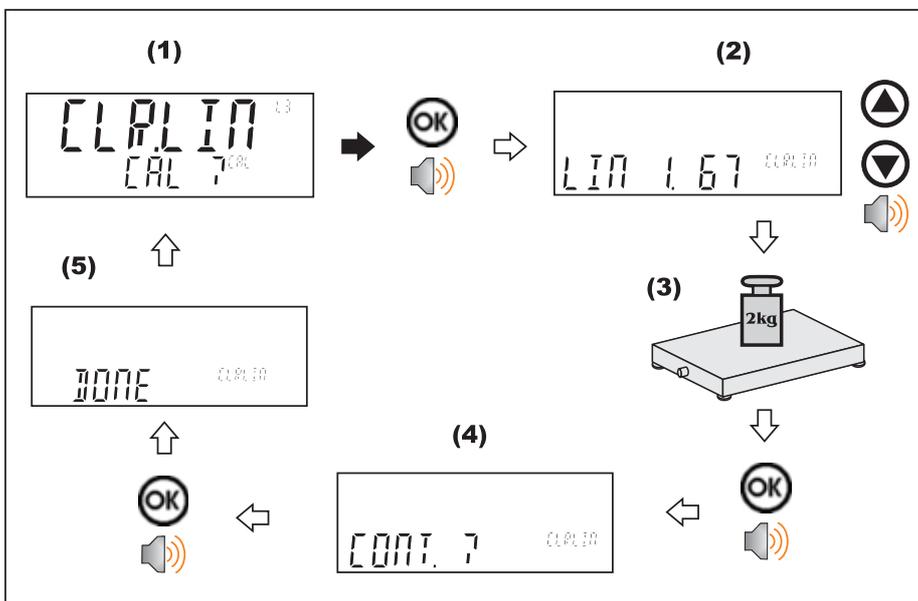
To perform a linearisation, a calibration of the zero and full scale span points must have been performed. Both the zero and full scale calibration points are used in the linearisation of the scale base. These two points are assumed to be accurately set and thus have no linearisation error.

A maximum of ten linearisation points can be set independently between zero and full scale. Unused or unwanted points may also be cleared. The maximum correction that can be applied using a linearisation point is + / - 2%.

8.3.1. ED.LIN (Edit Linearisation Points)



8.3.2. CLR.LIN (Clear Linearisation)



8.4. Calibration Errors

Following are a list of the possible error messages that may be displayed to warn of failed or incorrect calibration:

Error	Description	Resolution
(FAILED) (BAND)	An attempt has been made to calibrate with a weight or signal which is not in the valid range.	Check weights and retry.
(FAILED) (ERROR)	An attempt has been made to calibrate while the scale signal is not valid.	Check loadcell connection and the 4-wire/6-wire setting.
(FAILED) (TIMEOUT)	For an unknown reason, the calibration was unable to complete.	Retry.
(FAILED) (RES)	An attempt has been made to calibrate the scale to a resolution which is too high for the instrument.	Check weights and retry.
(FAILED) (TOO CLOSE)	An attempt has been made to add a linearisation point too close to zero, span or another linearisation point.	Check weights and retry.

Table 4: Calibration errors

9. Network Communications

9.1. Introduction

The RS-232, RS-485 and the optical communications can be used for networking.

Warning: The calibration counter is incremented when the calibration related settings are changed. This means that calibration via a serial port cannot be carried out without affecting the certification of a trade installation.

Serial communications parameters like BAUD, PARITY, etc for the RS232 or RS485 serial ports are setup in the HDWARE menu.

The Optical Communications port is fixed to operate at 9600 baud, no parity, 8 data bits and 1 stop bit. The optical communications cable must be used.

9.2. Network Protocol B

The network protocol uses ASCII characters with a single master POLL / RESPONSE message structure. All information and services are provided by registers each of which has its own register address.

9.2.1. Basic Message Format

The basic message format is as follows:

ADDR	CMD	REG	:DATA	↵
-------------	------------	------------	--------------	---

ADDR

ADDR is a two character hexadecimal field corresponding with the following:

ADDR	Field Name	Description
80 _H	Response	'0' for messages sent from the master (POLL). '1' for messages received from an instrument (RESPONSE)
40 _H	Error	Set to indicate that the data in this message is an error code and not a normal response.
20 _H	Reply Required	Set by the master to indicate that a reply to this message is required by any slave that it is addressed to. If not set, the slave should silently perform the command.
00 _H .. 1F _H	Indicator Address	Valid instrument addresses are 01 _H to 1F _H (1 .. 31). 00 _H is the broadcast address. All slaves must process broadcast commands. When replying to broadcasts, slaves reply with their own address in this field.

CMD is a two character hexadecimal field:

CMD	Command	Description
05 _H	Read Literal	Read register contents in a 'human readable' format
11 _H	Read Final	Read register contents in a hexadecimal data format
16 _H	Read Final (Decimal)	Same as Read Final except numbers are decimal.
12 _H	Write Final	Write the DATA field to the register.
17 _H	Write Final (Decimal)	Same as Write Final except numbers are decimal.
10 _H	Execute	Execute function defined by the register using parameters supplied in the DATA field.

REG	is a four character hexadecimal field that defines the address of the Register specified in the message. See Appendix 3: Communications Registers page 102 for a list of registers used by the instrument. The viewer software will show the register address for each setting in the menu structure when they are accessed.
: DATA	carries the information for the message. Some messages require no DATA (eg Read Commands) so the field is optional. When a DATA field is used a ':' (COLON) character is used to separate the header (ADDR CMD REG) and DATA information.
↵	is the message termination (CR LF or “;”).

Note: The hexadecimal codes are combined in the fields described above when multiple options are active at the same time. For example an error response message from instrument address 5 would have an ADDR code of C5_H (80_H + 40_H + 05_H).

9.2.2. Termination

Message termination is possible in two ways.

- For normal communications that do not involve checksums use either a CRLF (ASCII 13, ASCII 10) as a terminator or a semicolon (;' ASCII). There is no start-of-message delimiter.
- To use a checksum the message is framed as:

SOH <Message> CRC EOT

SOH	ASCII 01
CRC	a 4 character hexadecimal field comprising the 16 bit CRC checksum. The CRC uses the 16 bit CCITT polynomial calculation and includes only the contents of the <Message> section of the transmission.
EOT	ASCII 04

9.2.3. Error Handling

If a command cannot be processed, the indicator returns an error. The ERROR bit in the ADDR field is set and the DATA field contains the Error Code as follows:

Error	DATA	Description
Unknown Error	C000 _H	Error is of unknown type
Not Implemented Error	A000 _H	Feature not implemented on this device
Access Denied	9000 _H	Passcode required to access this register
Data Under Range	8800 _H	Data too low for this register
Data Over Range	8400 _H	Data too high for this register
Illegal Value	8200 _H	Data not compatible with this register
Illegal Operation	8100 _H	CMD field unknown
Bad parameter	8040 _H	Parameter not valid for this execute register
Menu in Use	8020 _H	Cannot modify register values while SETUP menus are active
Viewer Mode required	8010 _H	Advanced operation chosen which requires the instrument to be in viewer mode.
Checksum required	8008 _H	A checksum is required for the chosen command.

Table 5: Network error codes

9.2.4. Ring Network Enhancement

Instruments with software revision V2.31+ can be configured in a Ring Network via a M42xx module (software revision 1.01+). This requires the central computer to send additional framing characters, 'Echo-On' (= <DC2> =ASCII 12 H) and 'Echo-Off' (= <DC4> =ASCII 14 H) around each command. Below is an example Ring Network command and response:

```
<DC2>20110150:<CR><LF>
<DC4>
```

```
<DC2>20110150:<CR><LF>
81110150:07/01/2030 17-29<CR><LF>
82110150:07/01/2030 17-30<CR><LF>
<DC4>
```

9.2.5. Calibrating an instrument over a network

An instrument can be calibrated over a network using the network protocol. The registers relating to calibration are listed in Appendix 3: Communications Registers page 102 and marked with the symbol “*”. Note that changing the calibration of an instrument via the network will increment the calibration counters and void the scale certification.

These registers are protected by the full access passcode if it is being used. In this case, the Enter Full Passcode register is necessary in the process of calibration. If the rear button is used to access the menus normally, then a long press of the rear button will enter a mode that permits calibration via the network.

9.3. Network Protocol SIMPLE

The simple network protocol allows the indicator to respond to common simple ASCII key press commands and enable the indicator to be used in legacy systems.

The response setting (RESP) defines if there is any response sent to successful commands. A setting of OK will send OK<CR> on successful receipt of command or ??<CR> if the command is not understood.

Function	Simple commands
Zero Key	Z<CR> %z \FAh KZERO<CR>
Tare Key	T<CR> %t \F4h KTARE<CR>
Gross/Net Key	%s \F3h KGROSSNET<CR>
To Gross	G<CR> 0%s KGROSS<CR>
To Net	N<CR> 1%s KNET<CR>
Print Key	%p \F0h KPRINT<CR>
Single	P<CR> W<CR> \05h \95h \96h S<CR>

0..9 Keys	0, 1, 2, 3, 4, 5, 6, 7, 8, 9, . K0, K1 .. K9, KDOT<CR>
OK Key	%e \E5h \0Dh KENTER<CR>
Cancel Key	\1Bh

9.4. Network Protocol BARCODE

The barcode network protocol allows a barcode scanner to be connected to the instrument to select the Truck ID. The command is in the form of:

aaaaaaaaCRLF

where aaaaaaaaa is the name of the Trick ID.

9.4.1. Protocol B Examples

	Description
<p>Read Gross Weight (Read Final)</p> <p>COMMAND: 20110026↵</p> <p>RESPONSE: 81110026:00000064↵</p>	<p>COMMAND: Read Gross Weight (Register 0026): ADDR = 20_H: Reply required from any instrument CMD = 11_H : Read Final REG = 0026_H : Gross Weight</p> <p>RESPONSE: Response is from instrument #1 which currently has a Gross weight of 64_H = 100 kg.</p>
<p>Read Gross Weight (Read Literal)</p> <p>COMMAND: 20050026↵</p> <p>RESPONSE: 81050026: 100 kg G↵</p>	<p>COMMAND: Read Gross Weight (Register 0026_H): ADDR = 20_H: Reply required from any instrument CMD = 05_H : Read Literal REG = 0026_H : Gross Weight</p> <p>RESPONSE: Same response from instrument #1 but in literal format.</p>
<p>Set Print Header (Write Final, Execute)</p> <p>COMMAND A: 2112A381:Hello There↵</p> <p>RESPONSE A: C112A381:9000↵</p> <p>COMMAND B: 2112001A:4D2↵</p> <p>RESPONSE B: 8112001A:0000↵</p> <p>COMMAND C: 2112A381:Hello There↵</p> <p>RESPONSE C: 8112A381:0000↵</p> <p>COMMAND D: 21100010↵</p> <p>RESPONSE D: 81100010:0000↵</p>	<p>COMMAND A: Write Print Header String (Register A381_H) ADDR = 21_H: Reply required from instrument #1 CMD = 12_H : Write Final REG = A381_H : Print Header String DATA = 'Hello There'</p> <p>RESPONSE A: Instrument #1 reports "ERROR: Access Denied". (Writing to this register requires a passcode)</p> <p>COMMAND B: Enter SAFE SETUP Passcode (Register 1A_H) ADDR = 21_H: Reply required from instrument #1 CMD = 12_H : Write Final REG = 1A_H : Enter SAFE PASSCODE DATA = 4D2_H (passcode is 1234)</p> <p>RESPONSE B: Instrument #1 reports Passcode Accepted</p> <p>COMMAND C: (resend COMMAND A).</p> <p>RESPONSE C: Instrument #1 reports "Command Successful".</p> <p>COMMAND D: Save Settings (Register 10_H) ADDR = 21_H: Reply required from instrument #1 CMD = 10_H : Execute REG = 10_H : Save Settings</p> <p>RESPONSE D: Instrument #1 reports "Command Successful".</p>

Trigger Zero Button Press (Write Final)	Description
<p>COMMAND A: 21120008:0B↵</p> <p>RESPONSE A: 81120008:0000↵</p> <p>COMMAND B: 21120008:8E↵</p> <p>RESPONSE B: 81120008:0000↵</p>	<p>COMMAND A: Send down the Zero button key code.</p> <p>RESPONSE A: Instrument #1 reports "Command Successful".</p> <p>COMMAND B: Do a long press of the F1 key.</p> <p>RESPONSE B: Instrument #1 reports "Command Successful".</p>
<p>Streaming (Write Final, Read Final, Execute)</p> <p>COMMAND A: 21120042:06↵</p> <p>RESPONSE A: 81120042:0000↵</p> <p>COMMAND B: 21120043:11↵</p> <p>RESPONSE B: 81120043:0000↵</p> <p>COMMAND C: 21110040↵</p> <p>RESPONSE C: 81110040:000005DB000 00009↵</p> <p>COMMAND D: 21120041:03↵</p> <p>RESPONSE D: 81120041:0000↵</p> <p>COMMAND E: 21100040:1↵</p> <p>RESPONSE E: 81100040:00000000↵ 81110040:000005DB000 00009↵ 81110040:000005DB000 00009↵</p> <p>COMMAND G: 21100040:0↵</p> <p>RESPONSE G: 81100040:00000000↵</p>	<p>COMMAND A: Setup to read the displayed weight.</p> <p>RESPONSE A: Instrument #1 reports "Command Successful".</p> <p>COMMAND B: Setup to read the IO status.</p> <p>RESPONSE B: Instrument #1 reports "Command Successful".</p> <p>COMMAND C: Read the combined data.</p> <p>RESPONSE C: Data is concatenated. It is 8 hexadecimal digits each.</p> <p>COMMAND D: Set streaming to 3Hz.</p> <p>RESPONSE D: Instrument #1 reports "Command Successful".</p> <p>COMMAND E: Start the automatic streaming.</p> <p>RESPONSE E: Instrument #1 reports "Command Successful" followed by streamed data at 3Hz.</p> <p>COMMAND G: Stop the automatic streaming.</p> <p>RESPONSE G: Instrument #1 reports "Command Successful".</p>

10. Automatic Weight Output

10.1. Overview

The automatic output is normally used to drive remote displays, a dedicated computer, or PLC communications. It is configured using the **SER.AUT** menu. The RS-232 or the RS-485 port can be used.

The rate of transmission is set by the TYPE setting. AUTO.LO and AUTO.HI send unsolicited messages at 10Hz and 25Hz respectively. SINGLE only sends messages when a SINGLE input is received from an external input. This enables external systems like PLCs to synchronise the AUTO output to their requirements. AUT.TRC sends a message for every traceable weight and is usually combined with FMT.TRC to provide a tally roll printer log.

10.2. Auto Weight Format String

The weight format string may be set to the following formats:

Format	Description
FMT.A	<STX> <SIGN> <WEIGHT(7)> <STATUS> <ETX>
FMT.B	<STX> <S0> <SIGN> <WEIGHT(7)> <UNITS(3)> <ETX>
FMT.C	<STX> <SIGN> <WEIGHT(7)> <S1> <S2> <S3> <S4> <UNITS(3)> <ETX>
FMT.D	<STX> <SIGN> <WEIGHT(7)> <ETX>
FMT.E	<STX> <SIGN> <WEIGHT(7)> <S5> <UNITS(3)> <MODE(4)> <ETX>
FMT.F	<STX> <POL> <WEIGHT(7)> <S6> <S7> <S8> <CR> <LF>
FMT.REG	ADDR CMD REG : DATA
FMT.TRC	CONSEC SP DATE SP TIME SP TRACE <CR><LF>
CUSTOM	As per contents of the EV.AUTO token string.

Where

- **STX**: Start of transmission character (ASCII 02).
- **ETX**: End of transmission character (ASCII 03).
- **SIGN**: The sign of the weight reading (space for positive, dash (-) for negative).
- **WEIGHT(7)**: A seven character string containing the current weight including the decimal point. If there is no decimal point, then the first character is a space. Leading zero blanking applies.
- **S0**: Provides information on the weight reading. The characters G/N/U/O/M/E represent Gross / Net / Underload / Overload / Motion / Error, respectively.
- **UNITS(3)**: A three character string, the first character being a space, followed by the actual units (eg. ^kg or ^^t). If the weight reading is not stable, the unit string is sent as ^^.
- **S1**: Displays G/N/U/O/E representing Gross / Net / Underload / Overload / Error, respectively.
- **S2**: Displays M/^ representing Motion / Stable, respectively.
- **S3**: Displays Z/^ representing centre of Zero / Non-Zero, respectively.
- **S4**: Displays - representing single range.
- **S5**: Displays “/”m”/”c” representing Stable / Motion / Overload or Underload
- **Mode**: Displays “_g_” or “_n_” for gross or net weight.
- **POL**: The sign of the weight reading (+ for positive, - for negative)
- **S6**: A single character for units, displays L for pounds, K for Kg, T for ton, G for gram
- **S7**: Displays G/N representing Gross / Net, respectively.
- **S8**: Displays O/M/I representing over/underload / Motion / Error, respectively.
- **‘ADDR CMD REG : DATA’**: This is the same format as the response from a READ FINAL network command. The SOURCE setting selects which register is selected.
- **SP**: Space character, “ “

- **CONSEC:** Consecutive print ID
- **DATE, TIME:** Date and time.
- **TRACE:** Traceable displayed weight.

11. Printing

11.1. Overview

The instrument can have up to two (2) printouts. There are two (2) types of printout:

- **DOCKET:** Docket printouts are comprised typically of the output of a number of print events. There is a start section that includes header information, followed by a number of transactions and finally the end of the docket including sub-total information etc.
- **REPORT:** Reports are used to print stored accumulation data for each product.

There are two different standard formats (Format A and B) for each printout type defined in the instrument. The format of these printouts is shown in the following sections.

For custom printing each print event has an associated token string which includes literal ASCII text along with special token characters that are expanded at the time of printing to fields like weight, time and date.

11.2. Print ID

A unique Consecutive Print ID appears on record printouts. It cannot be cleared and increments for every traceable weight reading. Additionally a Settable Consecutive Print ID is available through custom printing. It can be viewed and edited through the operator interface User ID key (long press key 5).

11.3. Docket printouts

11.3.1. Docket Formats

Each standard format (A or B) will vary automatically depending on the operational scenario – for example where a truck is being weighed (normal mode) there is a single line for the weight, the case where there is preset tare being used the docket format will automatically adjust for this and use Gross, Tare, Net.

Format	Example
FMT.A Normal mode	Sams Public Truck Scale 10/02/10 09:31:39 000000164 150.0kg TOTAL: 150.0kg Thank You for your Business Drive Carefully
FMT.A Preset Tare	10/02/10 09:35:36 000000167 123ABC GROSS: 150.0kg TARE: 65.0kg PT NET: 85.0kg Thank You for your Business Drive Carefully
FMT.A Two Pass weigh in	Sams Public Truck Scale 06/01/10 16:47:07 000000003 T1 WEIGH IN:

Weigh out	960kg 06/01/10 16:47:50 000000004 T1 WEIGH IN: 960kg WEIGH OUT: 1440kg NET WEIGHT: 480kg Thank You for your Business Drive Carefully
FMT.B Two Pass weigh in Weigh out	Sams Public Truck Scale 06/01/10 16:49:57 TRUCK: T1 SEQ: 000000005 WEIGH IN: 960kg 06/01/10 16:50:28 TRUCK: T1 SEQ: 000000006 WEIGH IN: 960kg WEIGH OUT: 1440kg NET WEIGHT: 480kg Thank You for your Business Drive Carefully
CUSTOM	EV.D.NEW PRN.KEY EV.WI EV.WO.1 EV.WO.2 EV.D.WO EV.D.END

11.3.2. Custom Docket Events

Custom Docket Events and associated operator actions:

Action	Event	Event Description
Print Key	EV.D.NEW	Event Docket New - controls the first part of the docket that is printed along with the first transaction.
	PRN.KEY	Event Print - controls the format of each transaction in normal mode on the docket.
	EV.WI	Event Weigh In – controls the format of each weigh in transaction on the docket.
	EV.WO.1	Event Weigh Out 1 – controls the format of each weigh out with Preset Tare transaction on the docket.
	EV.WO.2	Event Weigh Out 2 – controls the format of each weigh out with first weight transaction on the docket.
	EV.D.WO	Event Docket Weigh Out – controls the format of the end of the docket when weighing out.
Long Press Print Key	EV.D.END	Event Docket End - controls the format of the end of the docket in normal mode including printing sub-totals etc.

11.4. Report printouts

Format	Example
FMT.A	06/01/10 16:54:37 Grand Total T2 480kg T3 690kg Total 1170kg
FMT.B	06/01/10 16:55:29 Grand Total T2 480kg, T3 690kg, Total 1170kg
CUSTOM	REP.ST REP.PR REP.END

Custom Report Events and associated operator actions:

Action	Event	Event Description
Press Report Key	REP.ST	Report Start - defines the start of the report.
	REP.PR	Report Product **- defines what is printed for each product
Change Product	REP.END	Report End - defines the end of the report.

** Note: REP.PR is for per Truck ID printing in the report and is not an event triggered by changing the Truck ID. If there is anything in the REP.PR then it will be printed for all Truck IDs that have a total when the report is printed.

11.5. Custom Printing

A print docket is built up from multiple print passes. Each of the print passes is defined by a specific configuration string. Print passes are triggered by operator events – these include short and long press of the Print key and actions like changing products.

The content of the configuration string for each event includes direct text (the word “Weight” to be placed near the current weight for example) and control characters called ‘Tokens’. Tokens are used to specify where the instrument data fields are to be inserted.

Tokens are characters outside the normal printable range. Each token character is represented by a three character escape sequence consisting of a ‘\’ followed by two hex characters or by a three digit decimal ASCII number. When entering tokens via the instrument keys the decimal ASCII code is used. When entering tokens using the viewer software the escape sequence is used.

Examples of tokens:

- \D7 (ASCII 215) = current displayed weight
- \BF (ASCII 191) = date
- \C0 (ASCII 192) = time

A simple custom format string might be:

'Weight: \D7\C1'

To produce Weight: 30.0kg ^ when the print key is pressed.

Events are triggered by short and long press of the Print key and changing products as listed as listed in the tables for each type.

Below are some examples of dockets and reports and their associated custom print strings.

Docket Example Print Outs	Custom Print Strings
<p>Sams Public Truck Scale</p> <p>06/01/10 16:47:07 000000003 T1 WEIGH IN: 960kg</p> <p>06/01/10 16:47:50 000000004 T1 WEIGH IN: 960kg WEIGH OUT: 1440kg NET WEIGHT: 480kg</p> <p>Thank You for your Business Drive Carefully</p>	<p>PRN.KEY: \BF \C0 \C5 \BA\E9,\C1</p> <p>EV.D.NEW: \C3\C6\C1\ EV.D.END: \B8\C1Total: \DD\C1\C7\C1\C4</p> <p>EV.WI: \BF \C0 \C5 \BA\D7 WEIGH IN: \E9\C1</p> <p>EV.WO.1: \BF \C0 \C5 \BA\D7 \C1GROSS: \BB\D8\C1 TARE: \BA\E1 PT\C1 NET: \9B\E9\C1</p> <p>EV.WO.2: \BF \C0 \C5 \BA\D7\C1 WEIGH IN: \EF\C1 WEIGH OUT: \BB\D8\C1 NET WEIGHT: \9B\BA\E9\C1</p> <p>EV.D.WO: \C7\C1\C4</p>
<p>Sams Public Truck Scale</p> <p>06/01/10 16:49:57 TRUCK: T1 SEQ: 000000005 WEIGH IN: 960kg</p> <p>06/01/10 16:50:28 TRUCK: T1 SEQ: 000000006 WEIGH IN: 960kg WEIGH OUT: 1440kg NET WEIGHT: 480kg</p> <p>Thank You for your Business Drive Carefully</p>	<p>PRN.KEY: \BF \C0\C1\C5\BA \E9\C1</p> <p>EV.D.NEW: \C3\C6\C1</p> <p>EV.D.END: \B8 TOTAL \DD\C1\C7\C1\C4</p> <p>EV.WI: \BF \C0\C1TRUCK: \BA\D7\C1SEQ: \C5\C1 WEIGH IN: \E9\C1\C1</p> <p>EV.WO.1: \C1\BF \C0\C1TRUCK: \BA\D7\C1SEQ: \C5\C1GROSS: \BB\D8\C1 TARE: \BA\E1 PT\C1 NET: \9B\E9\C1</p> <p>EV.WO.2: \C1\BF \C0\C1TRUCK: \BA\D7\C1SEQ: \C5\C1 WEIGH IN: \EF\C1 WEIGH OUT: \BB\D8\C1NET WEIGHT: \9B\BA\E9\C1</p> <p>EV.D.WO: \C7\C1\C4</p>

Report Example Print Outs	Custom Print Strings
06/01/10 16:54:37 Grand Total T2 480kg T3 690kg Total 1170kg	REP.ST: \C3\BF \C0\C1Grand Total\C1 REP.PR: \BA\D7 \D9\C1 REP.END: Total \B8\D9\C1\C4
06/01/10 16:55:29 Grand Total T2 480kg, T3 690kg, Total 1170kg	REP.ST: \C3\BF \C0\C1Grand Total\C1 REP.PR: \BA\D7 \D9, REP.END: \C1Total \B8\D9\C1\C4

11.5.1. Page Tokens

The page number token must be used prior to the required token in the custom print string. For example the token D7 is used in both Page 0 and Page 4 and has different meanings.

Custom Print String: \BE\D7

Code	Token	
190	(BE _H)	Page 0: Current Weight
215	(D7 _H)	Displayed reading (gross or net)

Custom Print String: \BA\D7

Code	Token	
186	(BA _H)	Page 4: Current Product
215	(D7 _H)	Product name

Refer to Table 9: Print tokens: pages on page 98 for the list of codes for the tables and the various table are defined in section 15.3 Tokens page 98.

12. Special Functions

12.1. Introduction



The instrument has 3 special function keys on the front panel, the K404 uses F1 as the Truck key and F2 as a Print key. These functions are also available for external keys. Function key 3 and external keys can be configured to any of the key functions detailed below.



<FUNCTION> Each primary function has an associated overlay sticker (supplied) that should be applied to the function key to label the function. Ensure the keypad is clean and dry before affixing the sticker. Refer to Cleaning page 9 for more information.

12.2. TRUCK

A short press of the truck button will allow you to enter a name or use the arrow keys to select an existing product or enter a name for a new temporary product, refer to 5.5 Up, Down, OK, Truck keys: Select/Deleting/Adding Truck IDs page 29.

12.3. PRINT

A print key can be used to trigger any of the configured printouts, noting that it will also trigger the weigh in and weigh out events. It can also add to totals or undo the last add. When docket printing, a long press ends the docket.

◆ Short press

The diagram illustrates the short press function. It shows a truck on a scale, a digital scale display showing '49729lb', a 'PRINT' button with a speaker icon, and a printed receipt titled 'Print Format B'.

Print Format B

```

Sam's Public Truck Scale

10/02/10 09:38:06
000000171                49729lb
                TOTAL        49729lb

Thank You for your Business
Drive Carefully
  
```

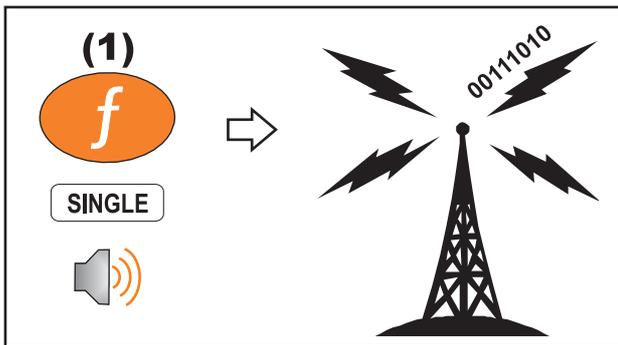
12.4. Special Functions for F3 and external keys

12.4.1. NONE

When set to **NONE** the special function key is not used during normal operation. This is the default setting.

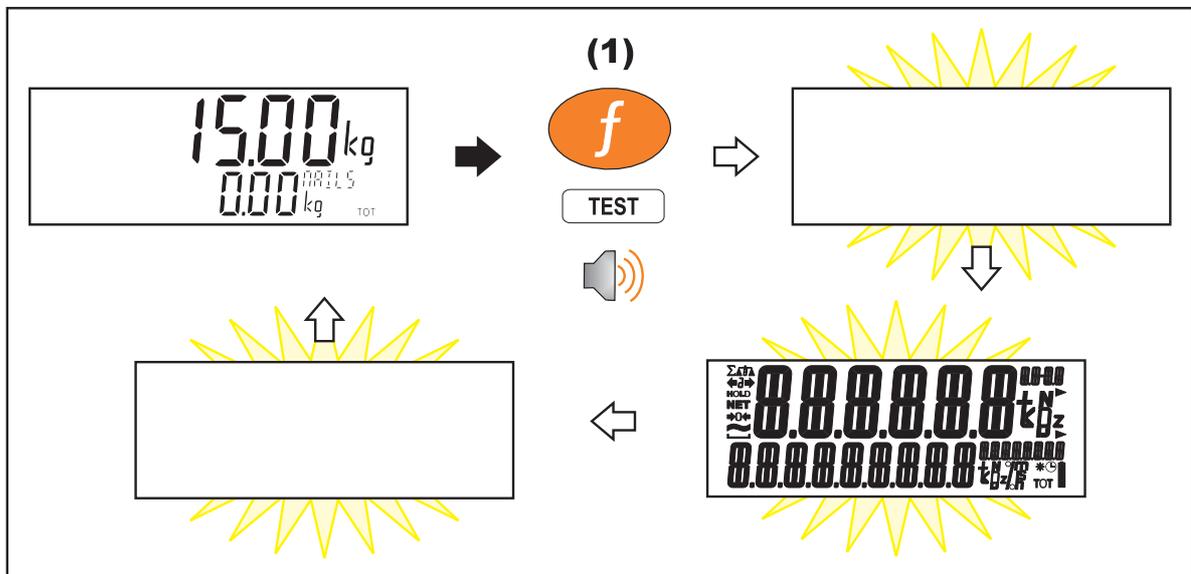
12.4.2. SINGLE

A single key is a manual trigger for the serial automatic transmit. A single automatic transmit string is sent when this key is pressed. This may be useful where a continual stream of serial data is not wanted.



12.4.3. TEST

A test key is used to start a display test.

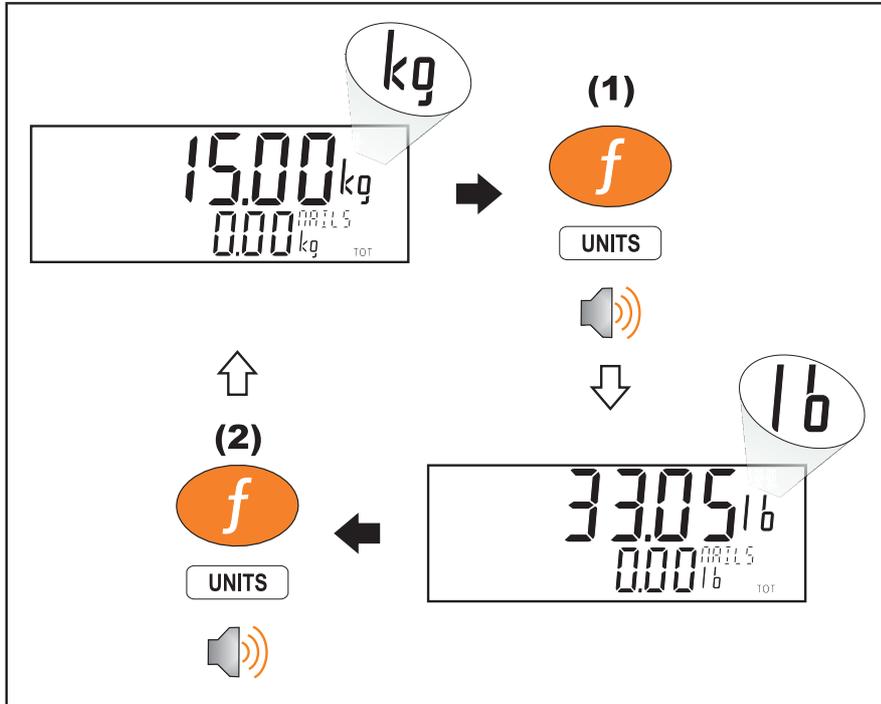


12.4.4. UNITS

The units key is used to convert primary (calibrated) units to alternative units.

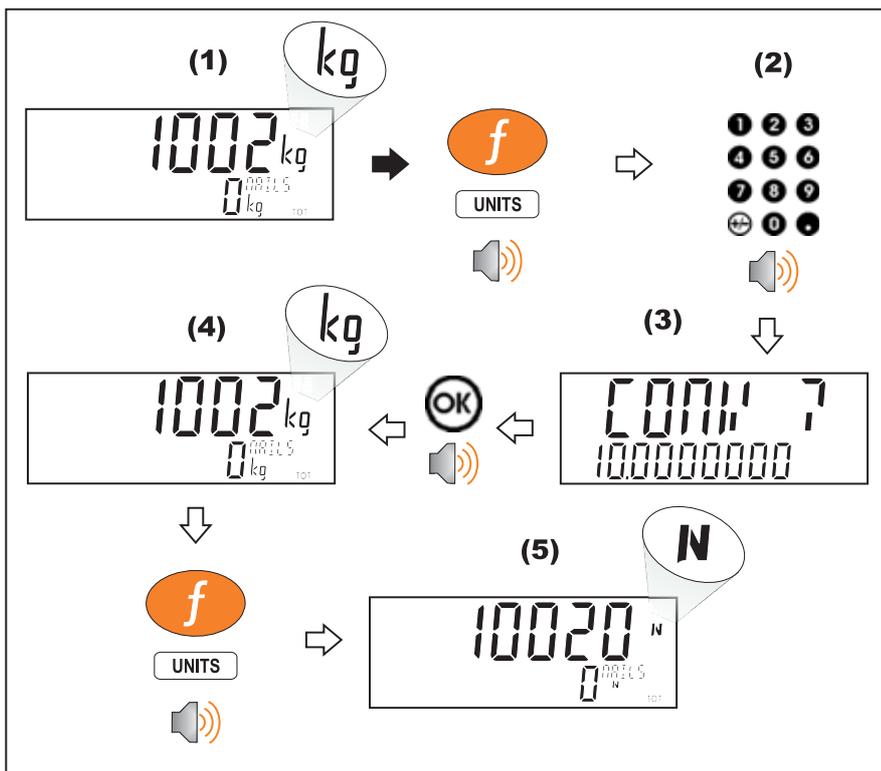
◆ **Short press**

A short press switches between primary and alternative units.



◆ **Long press**

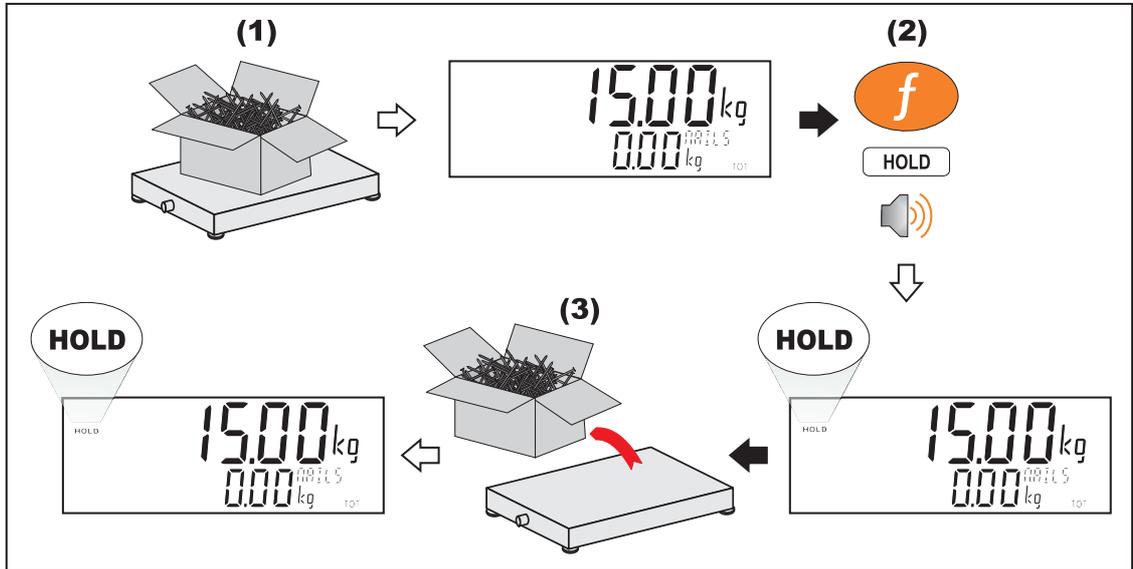
A long press allows the units conversion factor to be entered. If lb/kg switching is chosen, this will be unavailable.



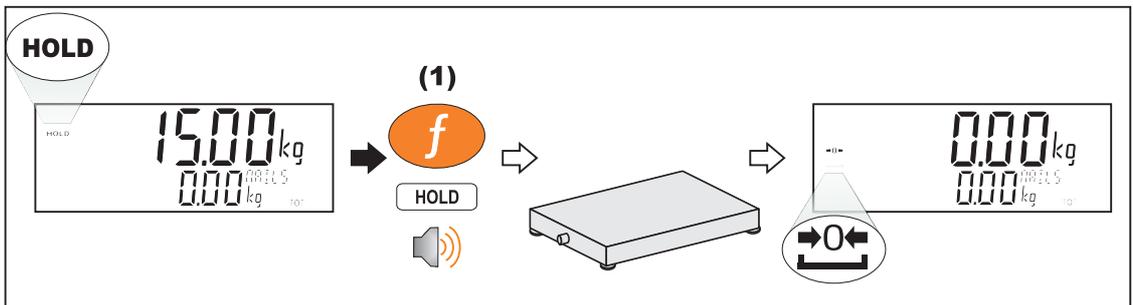
12.4.5. HOLD

A hold key performs a manual hold. Pressing the hold key again will cancel the hold.

◆ Hold



◆ Release

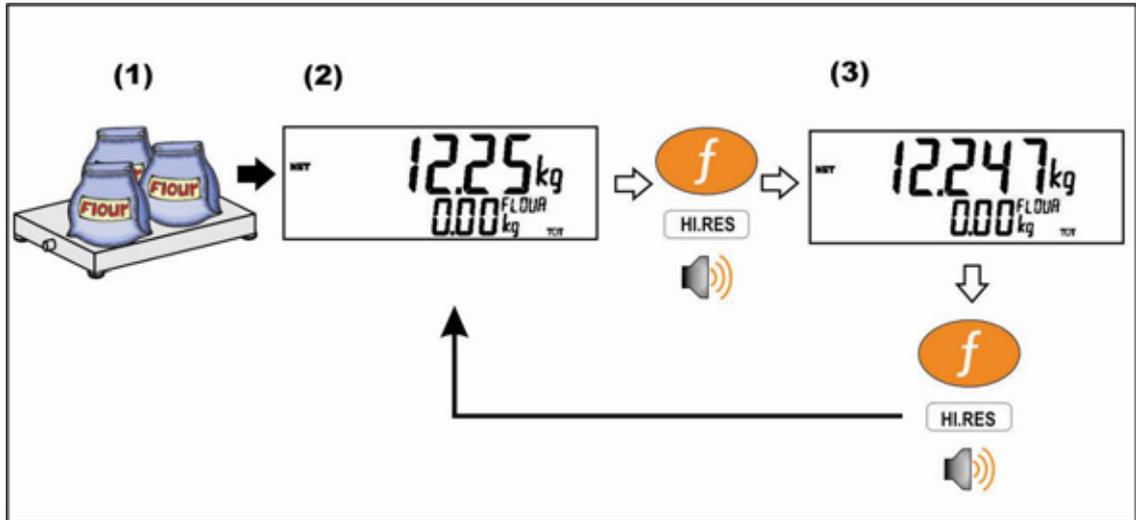


12.4.6. HI.RES

A short press of the high resolution button will enable or disable high resolution mode. If the instrument is in trade mode the high resolution mode will be restored to its original state after five seconds.

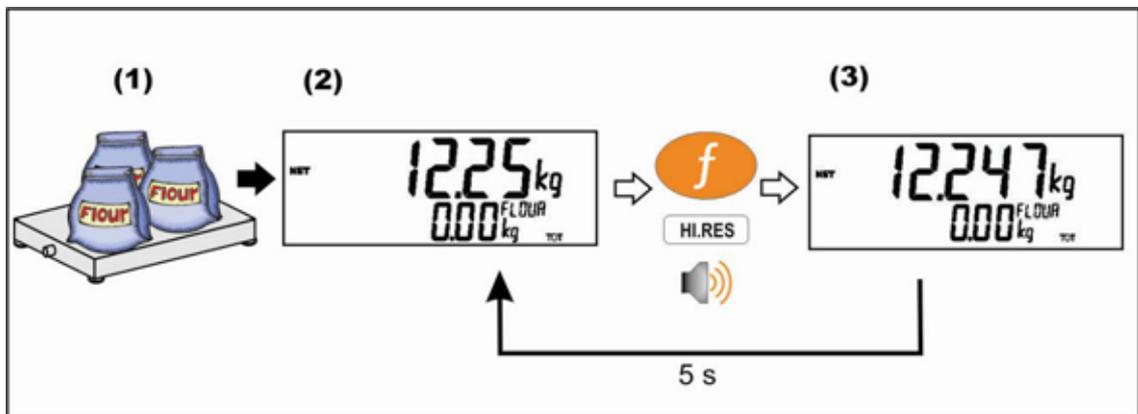
◆ **Short press – Industrial Mode**

Display high resolution reading, until function key pressed again.



◆ **Short press – Trade Mode**

Display high resolution reading for five (5) seconds, then return to original state.



12.4.7. SC.EXIT

A short press of the scale exit button will trigger the scale exit setpoint if the weight is outside of the zero band.

13. Setpoints

13.1. Overview

The K404 software supports up to 8 separate set points. Each set point is independently configured for a particular function and can be associated with a particular Output Driver. The set point can be configured to flash the instrument display or sound a buzzer as well as driving a physical output.

A set point target is set by the operator using the Target Key on the front panel or via Viewer using the Operator Menu. Refer to 5.11 Target page 33 for button operation.

13.2. Outputs

The instrument supports 32 input/output control points. The application software uses these control points to decide what the control functions are and the accessory modules respond according to their specific hardware.

Setpointing requires the use of outputs so it is important to select IO control points that have associated hardware output drivers that suit your application.

13.3. Common Settings

There are a number of settings that are common to all setpoint types. These are as follows:

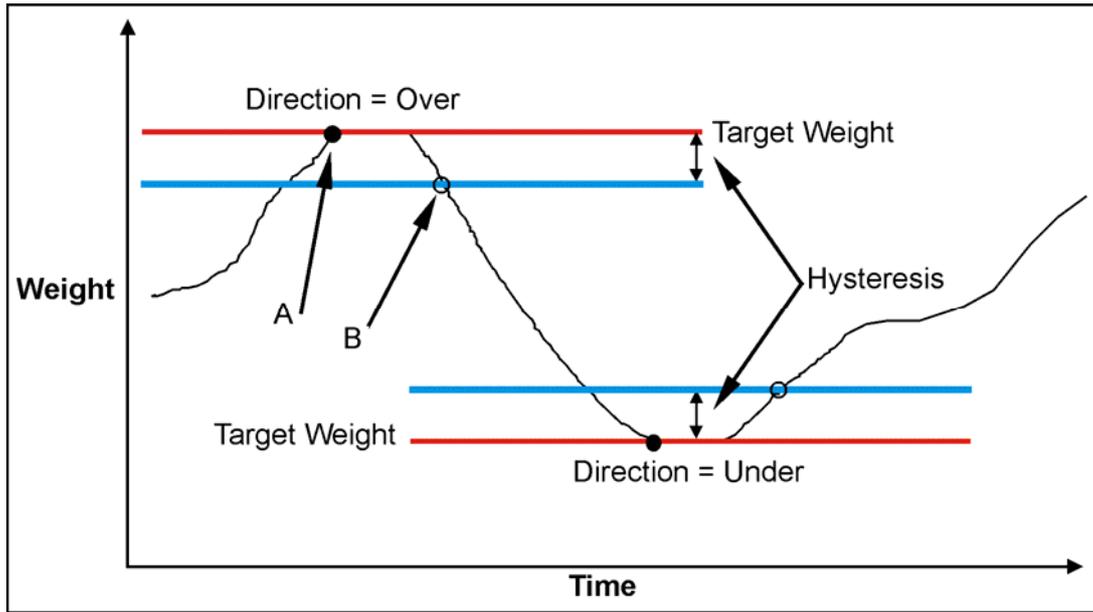
- **OUTPUT:** Select which IO control point to use. Options are NONE, IO1..IO32. NONE is useful if the setpoint is only being used trigger an alarm.
- **LOGIC:** This setting determines whether the output is normally on or normally off. Logic HIGH means the output follows the activity of the setpoint and is on when the setpoint conditions are met. Logic LOW reverses the operation of the output.

For example: Consider a Center-of-Zero status setpoint. This type of setpoint is active when the Centre-of-Zero annunciator is lit. With logic HIGH an output would turn on whenever the Centre-of-Zero annunciator was lit. With logic LOW the output would turn off when the Centre-of-Zero annunciator is lit and remain on otherwise.

Note that the outputs revert to the off state when the instrument SETUP menus are active.

- **ALARM:** Select what alarm response is triggered when the setpoint is active. SINGLE sounds a single beep every two seconds, DOUBLE sounds a double beep every two seconds and FLASH flashes the instrument display. Note that the Alarm conditions are not influenced by the LOGIC setting, i.e. they follow the activity of the setpoint regardless of the physical state of the output.

13.4. Weigh in (OVER) Setpoints and Weigh Out (UNDER) Setpoints



LOGIC	Point A	Point B
HIGH	ON	OFF
LOW	OFF	ON

Figure 13: OVER versus UNDER setpoints.

13.4.1. Additional Settings

In addition to the common settings the following settings control the operation of the OVER and UNDER setpoints

- **SOURCE:** Select the weight source for the setpoint to use.
 - Options are:
 - GROSS uses gross weight only
 - NET uses net weight only
 - 'GR or NT' uses either gross or net depending on which is currently displayed.
 - ALT.GR uses alternate gross weight only
 - ALT.NET uses alternate net weight only
 - ALT.G or N uses either alternate gross of alternate net depending on which is currently displayed.
- **Hysteresis (HYS):** This setting determines the change in weight required for an active setpoint to become inactive again. A value of zero still leaves 0.5 graduations of hysteresis.

13.5. Status Based Setpoint Types

The following setpoint types are all based on the status of the instrument.

- **NONE**: Setpoint is always inactive.
- **ON**: Setpoint is always active. This type of setpoint is useful to show that the instrument is running.
- **Centre of Zero (COZ)**: Setpoint is active when COZ annunciator is lit.
- **ZERO**: Setpoint is active when the weight is within the Zero Band setting.
 - **SOURCE**: The ZERO setpoint also has a SOURCE setting to determine if the zero condition is based on the gross or net reading. The GR.or.NT option uses the currently selected weight (gross or net).
- **NET**: Setpoint is active when the NET annunciator is lit.
- **MOTION**: Setpoint is active when the MOTION annunciator is lit.
- **ERROR**: Setpoint is active when the instrument detects any error condition signified by the display of Exxxxx on the primary display.

13.6. Logic Setpoint Types

The following setpoint types are all based on the status of the inputs and the mask.

- **AND (LGC.AND)**: Setpoint is active when all inputs in the mask are on.
- **OR (LGC.OR)**: Setpoint is active when any inputs in the mask are on.
- **XOR (LGC.XOR)**: Setpoint is active when only one input in the mask is on.

MASK: A 24 bit number that is use to match IO1-IO24 for the logic setpoints.

DLY.ON: delay before setpoint becomes active.

HLD.OFF: delay before setpoint becomes inactive.

13.7. Scale Entry/Exit Setpoint Types

The following setpoint types are all based on the status of the indicator.

- **Scale Ready (SC.REDY)**: Setpoint is active when in the zero band and stable for longer than the time set in RDY.TIM.
- **Scale Exit (SC.EXIT)**: Setpoint is active when outside of the zero band and either a print has occurred or the scale exit (SC.EXIT) special function has been triggered.

Ready Time (RDY.TIM): Time in seconds that the scale must be stable in the zero band before the scale is ready.

14. Appendix 1: Dimensions

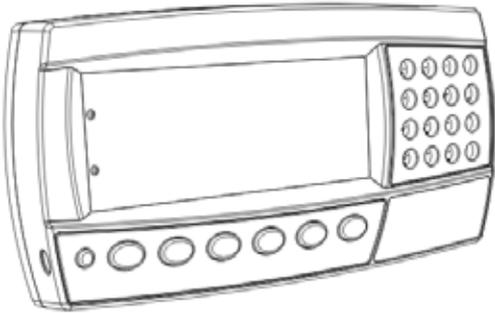
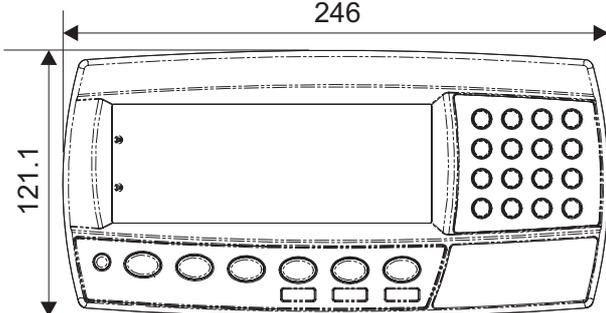
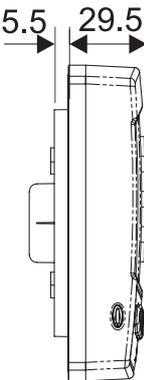
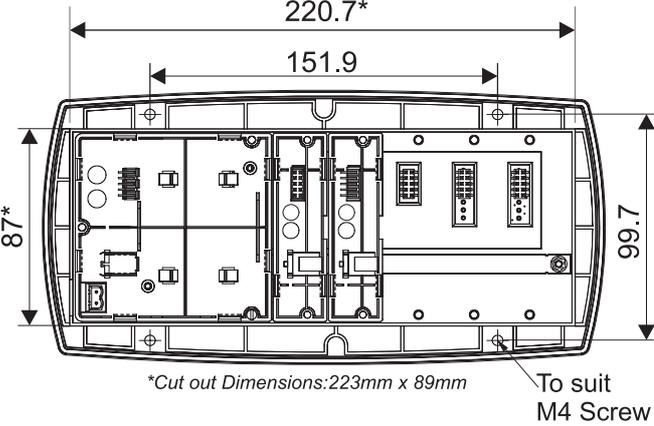
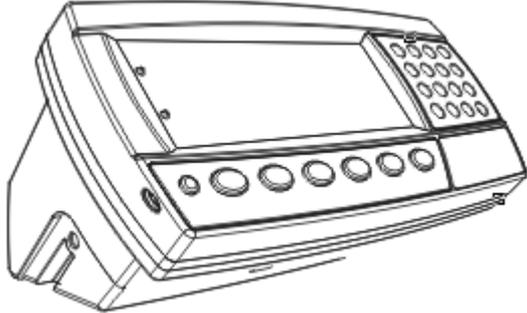
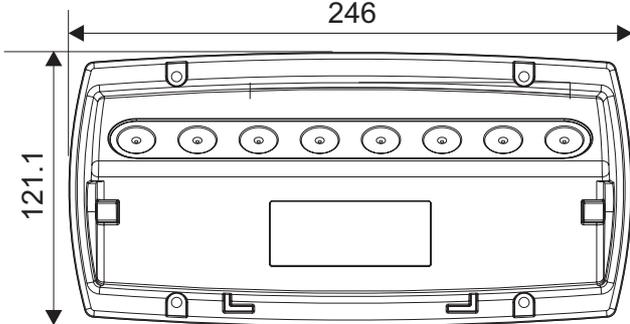
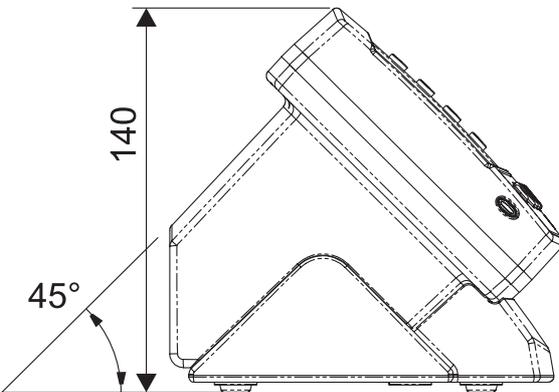
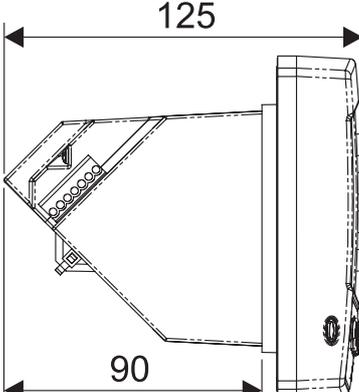
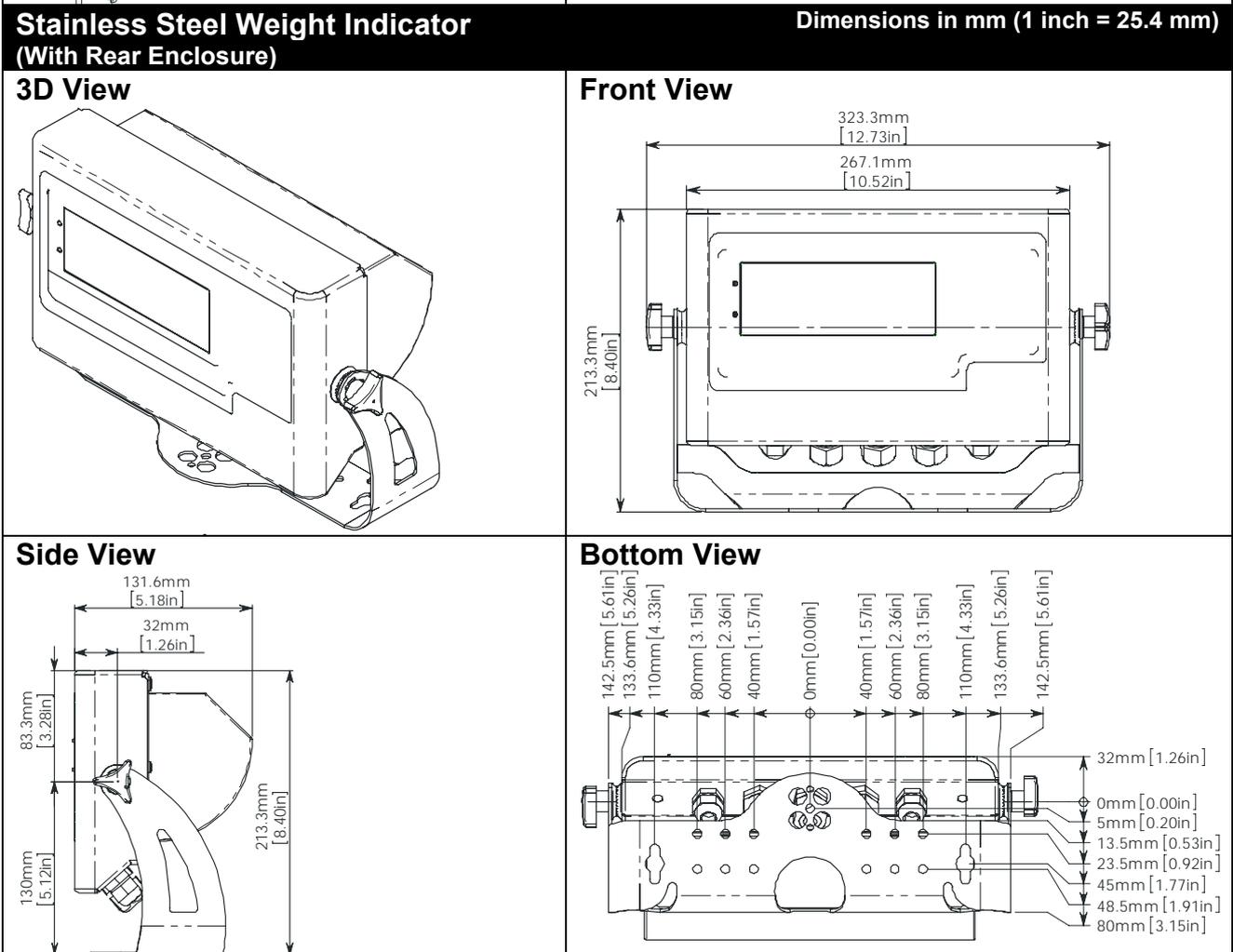
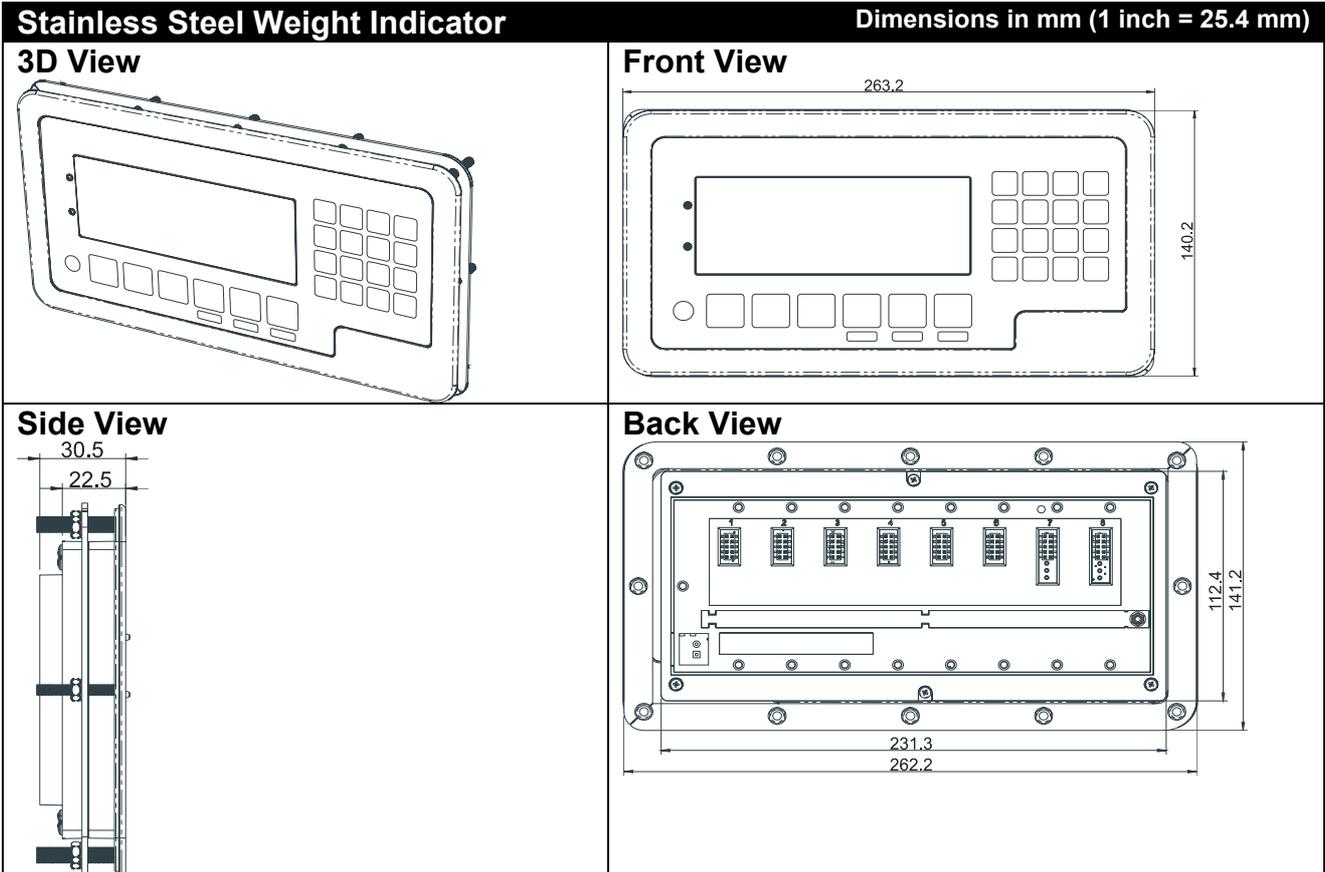
Weight Indicator		Dimensions in mm (1 inch = 25.4 mm)	
3D View 	Front View 	Side View 	Back View 
Weight Indicator (With Rear Enclosure)		Dimensions in mm (1 inch = 25.4 mm)	
3D View 	Back View 	Side View With Boot and Stand 	Side View 

Table 6: Dimensions



14.1. Trade Label

A trade label showing scale and instrument information is usually required. This can be placed on the front of the instrument:

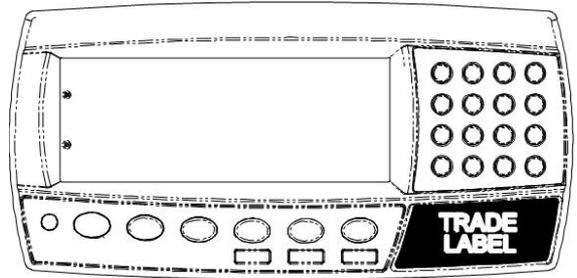


Figure 14: Trade label position.

14.2. Lead Seals

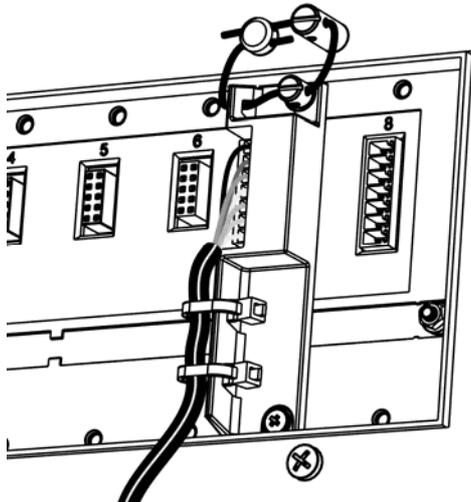


Figure 15: Lead seal on rear of instrument.

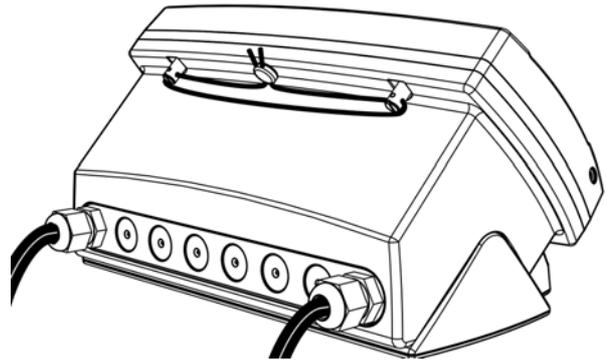


Figure 16: Lead Seal on boot

14.2.1. Destructible Sticker Seals

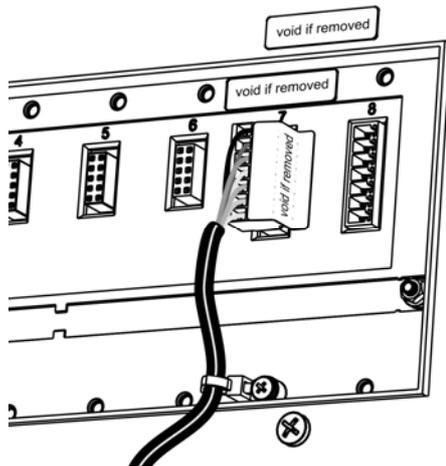


Figure 17: Destructible sticker seal on rear

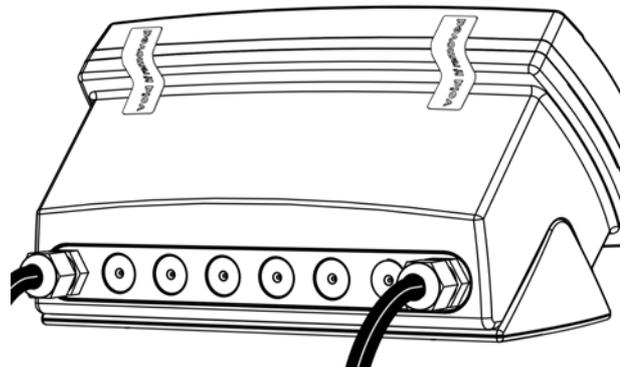


Figure 18: Destructible sticker seal on boot.

14.2.2. Electronic Seal

The value of the calibration counter should be written on the scale certification/sealing sticker. See page 41 calibration counter details.

15. Appendix 2: Print and Automatic Transmission Tokens

15.1. ASCII codes

Code	Char	Code	Ch	Code	Ch	Code	Ch	Code	Ch
000 (0)	NULL	026 (1A _H)	SUB	052 (34 _H)	'4'	078 (4E _H)	'N'	104 (68 _H)	'h'
001 (01 _H)	SOH	027 (1B _H)	ESC	053 (35 _H)	'5'	079 (4F _H)	'O'	105 (69 _H)	'i'
002 (02 _H)	STX	028 (1C _H)	FS	054 (36 _H)	'6'	080 (50 _H)	'P'	106 (6A _H)	'j'
003 (03 _H)	ETX	029 (1D _H)	GS	055 (37 _H)	'7'	081 (51 _H)	'Q'	107 (6B _H)	'k'
004 (04 _H)	EOT	030 (1E _H)	RS	056 (38 _H)	'8'	082 (52 _H)	'R'	108 (6C _H)	'l'
005 (05 _H)	ENQ	031 (1F _H)	US	057 (39 _H)	'9'	083 (53 _H)	'S'	109 (6D _H)	'm'
006 (06 _H)	ACK	032 (20 _H)	' '	058 (3A _H)	':'	084 (54 _H)	'T'	110 (6E _H)	'n'
007 (07 _H)	BEL	033 (21 _H)	'!	059 (3B _H)	','	085 (55 _H)	'U'	111 (6F _H)	'o'
008 (08 _H)	BS	034 (22 _H)	'"	060 (3C _H)	'<'	086 (56 _H)	'V'	112 (70 _H)	'p'
009 (09 _H)	HT	035 (23 _H)	'#'	061 (3D _H)	'='	087 (57 _H)	'W'	113 (71 _H)	'q'
010 (0A _H)	LF	036 (24 _H)	'\$'	062 (3E _H)	'>'	088 (58 _H)	'X'	114 (72 _H)	'r'
011 (0B _H)	VT	037 (25 _H)	'%'	063 (3F _H)	'?'	089 (59 _H)	'Y'	115 (73 _H)	's'
012 (0C _H)	FF	038 (26 _H)	'&'	064 (40 _H)	'@'	090 (5A _H)	'Z'	116 (74 _H)	't'
013 (0D _H)	CR	039 (27 _H)	'''	065 (41 _H)	'A'	091 (5B _H)	'['	117 (75 _H)	'u'
014 (0E _H)	SO	040 (28 _H)	'('	066 (42 _H)	'B'	092 (5C _H)	'\'	118 (76 _H)	'v'
015 (0F _H)	SI	041 (29 _H)	')'	067 (43 _H)	'C'	093 (5D _H)	']'	119 (77 _H)	'w'
016 (10 _H)	DLE	042 (2A _H)	'*'	068 (44 _H)	'D'	094 (5E _H)	'^'	120 (78 _H)	'x'
017 (11 _H)	DC1	043 (2B _H)	'+'	069 (45 _H)	'E'	095 (5F _H)	'_'	121 (79 _H)	'y'
018 (12 _H)	DC2	044 (2C _H)	','	070 (46 _H)	'F'	096 (60 _H)	''	122 (7A _H)	'z'
019 (13 _H)	DC3	045 (2D _H)	'-'	071 (47 _H)	'G'	097 (61 _H)	'a'	123 (7B _H)	'{'
020 (14 _H)	DC4	046 (2E _H)	','	072 (48 _H)	'H'	098 (62 _H)	'b'	124 (7C _H)	' '
021 (15 _H)	NAK	047 (2F _H)	','	073 (49 _H)	'I'	099 (63 _H)	'c'	125 (7D _H)	'}'
022 (16 _H)	SYN	048 (30 _H)	'O'	074 (4A _H)	'J'	100 (64 _H)	'd'	126 (7E _H)	'~'
023 (17 _H)	ETB	049 (31 _H)	'1'	075 (4B _H)	'K'	101 (65 _H)	'e'	127 (7F _H)	DEL
024 (18 _H)	CAN	050 (32 _H)	'2'	076 (4C _H)	'L'	102 (66 _H)	'f'		
025 (19 _H)	EM	051 (33 _H)	'3'	077 (4D _H)	'M'	103 (67 _H)	'g'		

Table 7: ASCII Table

(*) Use ASCII 128 to implement a literal NULL character in a custom string. ASCII 0 is used to define the end of the string.

15.2. Use of Characters in the Extended ASCII table

To use characters in the extended ASCII table, 026 (1A_H) should be used - it will allow the next character in a custom print string to be sent directly.

Example:

\1A\84 would be ä

15.3. Tokens

Tokens are special ASCII characters outside the normal printing range. These characters are used to specify where instrument data fields like 'Current Weight' are to be inserted into custom format strings.

15.3.1. Non-paged generic tokens

Code	Token
128 (80 _H)	ASCII NULL (send an ASCII 00H character)
191 (BF _H)	Date
192 (C0 _H)	Time (24H format)
193 (C1 _H)	Newline
194 (C2 _H)	Left spaces
195 (C3 _H)	Top blank lines
196 (C4 _H)	Bottom blank lines
197 (C5 _H)	Unique consecutive print ID
198 (C6 _H)	Header
199 (C7 _H)	Footer
200 (C8 _H)	Page end string
201 (C9 _H)	User String Data 1
202 (CA _H)	User String Data 2
203 (CB _H)	User String Data 3
206 (CE _H)	User String Name 1
207 (CF _H)	User String Name 2
208 (D0 _H)	User String Name 3
211 (D3 _H)	Time (12H format)
213 (D5 _H)	Settable consecutive print ID
214 (D6 _H)	Reset to 1 the settable consecutive print ID

Table 8: Print tokens: generic

15.3.2. Page tokens

As there is too much data to represent as individual tokens so the tokens are divided up into pages. A page token is used to define the page for all subsequent tokens.

Code	Token
190 (BE _H)	Page 0: Current Weight
189 (BD _H)	Page 1: Held Weight
188 (BC _H)	Page 2: Held or Current Weight
187 (BB _H)	Page 3: Traceable Weight
186 (BA _H)	Page 4: Current Product
185 (B9 _H)	Page 5: Session Total
184 (B8 _H)	Page 6: Grand Total
183 (B7 _H)	Page 7: Register Data
182 (B6 _H)	Page 8: Miscellaneous weight data

Table 9: Print tokens: pages

15.3.3. Page 0, 1, 2, 3, 7 tokens: Weight Information

These pages hold weight information. The same codes are used for each page.

Code	Token	
215 (D7 _H)	Displayed reading (gross or net)	
216 (D8 _H)	Gross reading	
217 (D9 _H)	Net reading	
219 (DB _H)	Alternative displayed reading (gross or net)	
220 (DC _H)	Alternative gross reading	
221 (DD _H)	Alternative net reading	
222 (DE _H)	mV/V value	
223 (DF _H)	Absolute gross peak reading	
224 (E0 _H)	Preset tare value	
225 (E1 _H)	Tare value (tare or preset tare)	
226 (E2 _H)	Tare label (T or PT)	
227 (E3 _H)	Unit ID	page 0 only
	Tracable weight date	Page 3 only
	Register Header	Page 7 only
228 (E4 _H)	Ticket end	page 0 only
	Tracable weight time	Page 3 only
	Register Footer	Page 7 only
229 (E5 _H)	Status 0: Error, Overload, Underload, Motion, Net, Gross (Uses last weight sent)	page 0 only
230 (E6 _H)	Status 1: Error, Overload, Underload, Net, Gross (Uses last weight sent)	page 0 only
231 (E7 _H)	Status 2: Motion , ‘ ‘	page 0 only
232 (E8 _H)	Status 3: Centre of Zero , ‘ ‘	page 0 only
233 (E9 _H)	Status 4: - , Range 1 , Range 2 (Uses last weight sent)	page 0 only
234 (EA _H)	Status 5: C , Motion , ‘ ‘	page 0 only
235 (EB _H)	Status 6: N Net , G Gross (Uses last weight sent)	page 0 only
236 (EC _H)	Status 7: Error, Overload, Underload, Motion, Net, Gross (Uses automatic transmission reading)	page 0 only
237 (ED _H)	Automatic transmit reading	page 0 only
238 (EE _H)	Automatic transmit start characters	page 0 only
239 (EF _H)	Automatic transmit end characters	page 0 only
240 (F0 _H)	Weight units	page 0 only
241 (F1 _H)	Displayed string (primary display)	page 0 only
242 (F2 _H)	Displayed unit (primary display)	page 0 only
243 (F3 _H)	Auto Transmit FMT.REG header	page 0 only
244 (F4 _H)	Auto Transmit FMT.REG weight	page 0 only
245 (F5 _H)	Auto Transmit FMT.REG status	page 0 only
246 (F6 _H)	Auto Transmit FMT.REG footer	page 0 only
247 (F7 _H)	Alternative Tare value	page 0 only
248 (F8 _H)	Status 8: Overload, Underload, In range	page 0 only
249 (F9 _H)	Status 9: Motion, Stable	page 0 only
250 (FA _H)	Status 10: OL over/underload, US unstable, ST stable	page 0 only
251 (FB _H)	Status 11: Gross, Net	page 0 only
252 (FC _H)	IO status	page 0 only
253 (FD _H)	Setpoint status	page 0 only

Table 10: Print tokens: weight information

15.3.4. Page 4, 5, 6 tokens: Product Information:

These pages hold product information where:

Code	Token
215 (D7 _H)	Product name
216 (D8 _H)	Barcode
217 (D9 _H)	Total weight
218 (DA _H)	Total alternative weight
220 (DC _H)	Number of adds
221 (DD _H)	Total docket weight
222 (DE _H)	Total docket alternative weight
224 (E0 _H)	Number of docket adds
225 (E1 _H)	Preset tare
229 (E5 _H)	Alternative weight conversion
233 (E9 _H)	Last weight added
234 (EA _H)	Last alternative weight added
235 (EB _H)	Last pieces added
236 (EC _H)	Clear docket totals
237 (ED _H)	Reset last product add
238 (EE _H)	Clear totals on all products
239 (EF _H)	First Weight

Table 11: Print tokens: product information

15.3.5. Page 8 tokens: Miscellaneous weight data

These tokens hold weight/alternate weight information depending on which is being displayed.

Code	Token
215 (D7 _H)	Displayed reading (gross or net)
216 (D8 _H)	Gross reading
217 (D9 _H)	Net reading
218 (DA _H)	Tare value (tare or preset tare)
219 (DB _H)	Status 12: weight units: Kg, Lb , ‘ ‘
220 (DC _H)	Status 13: Gross, Net
221 (DD _H)	Status 14: Overload/underload, Motion , ‘ ‘
222 (DE _H)	Piece reading
223 (DF _H)	Counting piece weight

Table 12: Print tokens: weight information

15.3.6. Format tokens

Format tokens define the behaviour of all subsequent tokens in a string.

Code	Format Tokens
149 (95 _H)	5 character weight string, decrementing to 3 with wrapping (5,4,3,5...)
150 (96 _H)	6 character weight string
151 (97 _H)	7 character weight string
152 (98 _H)	8 character weight string
153 (99 _H)	9 character weight string
154 (9A _H)	10 character weight string
155 (9B _H)	No sign characters
156 (9C _H)	Sign is ' ' for positive and '-' for negative
157 (9D _H)	Sign is '0' for positive and '-' for negative
158 (9E _H)	Sign is '+' for positive and '-' for negative
159 (9F _H)	No decimal point
160 (A0 _H)	Decimal point is '.'
161 (A1 _H)	Decimal point is ','
162 (A2 _H)	Weight sent without leading characters
163 (A3 _H)	Weight sent with ' ' for leading characters
164 (A4 _H)	Weight sent with '0' for leading characters
165 (A5 _H)	Show weight on error
166 (A6 _H)	Show dashes instead of weight on error
167 (A7 _H)	Show spaces instead of weight on error
168 (A8 _H)	Use uppercase status characters
169 (A9 _H)	Use lowercase status characters
170 (AA _H)	Hide units
171 (AB _H)	Show decimal point even if it is at the end of a number
172 (AC _H)	Turn page and line tracking off
173 (AD _H)	Toggle space between weight and units
174 (AE _H)	Increment the length or print IDs with wrapping from 6 to 9
175 (AF _H)	Don't show weight
176 (B0 _H)	Include trucks with first weight set in report

Table 13: Print tokens: formatting

Printouts have default format tokens of line and page tracking are enabled and:

Weight	Time
<ul style="list-style-type: none"> • 8 character weight string • Decimal point symbol is '.' • Leading characters are spaces • Weight is sent on error • Positive sign is space, negative sign is '-' • Weights are displayed with units • Status characters are uppercase 	<ul style="list-style-type: none"> • Date separator is '/' • Time separator is ':' • Date format is the format configured in the setup menu • Time is 24 hour

The Format token must be used before the token that requires the formatting. For example where the current weight is 10kg and a formatted with no units is needed:

\BE\AA\D7 would be 10

Whereas if the AA is used after the D7 it has no effect.

\BE\D7\AA would be 10kg

16. Appendix 3: Communications Registers

Name	Address	Type	Description																					
Software Model	0003 _H	String	Returns software loaded (eg K404)																					
Software Version	0004 _H	String	Returns software version (eg V2.0)																					
Serial Number	0005 _H	Number	Returns instrument serial number																					
Key buffer entry	0008 _H	Number	<p>Adds a key to the key buffer. The short press key codes are shown below. For long presses, set the most significant bit to 1.</p> <p>Key codes are:</p> <table style="width: 100%; border: none;"> <tr> <td style="width: 33%;">00_H: 0</td> <td style="width: 33%;">0E_H: F1</td> <td style="width: 33%;">15_H: DOWN</td> </tr> <tr> <td>:</td> <td>0F_H: F2</td> <td>16_H: OK</td> </tr> <tr> <td>09_H: 9</td> <td>10_H: F3</td> <td>17_H: SETUP</td> </tr> <tr> <td>0A_H: Power</td> <td>11_H: +/-</td> <td>20_H: IO1</td> </tr> <tr> <td>0B_H: Zero</td> <td>12_H: DP</td> <td>:</td> </tr> <tr> <td>0C_H: Tare</td> <td>13_H: CANCEL</td> <td>3F_H: IO32</td> </tr> <tr> <td>0D_H: G/N</td> <td>14_H: UP</td> <td></td> </tr> </table>	00 _H : 0	0E _H : F1	15 _H : DOWN	:	0F _H : F2	16 _H : OK	09 _H : 9	10 _H : F3	17 _H : SETUP	0A _H : Power	11 _H : +/-	20 _H : IO1	0B _H : Zero	12 _H : DP	:	0C _H : Tare	13 _H : CANCEL	3F _H : IO32	0D _H : G/N	14 _H : UP	
00 _H : 0	0E _H : F1	15 _H : DOWN																						
:	0F _H : F2	16 _H : OK																						
09 _H : 9	10 _H : F3	17 _H : SETUP																						
0A _H : Power	11 _H : +/-	20 _H : IO1																						
0B _H : Zero	12 _H : DP	:																						
0C _H : Tare	13 _H : CANCEL	3F _H : IO32																						
0D _H : G/N	14 _H : UP																							
Secondary Display Left	000E _H	String	Write to this register to display data on left side of Secondary Display. Note: The display must be in Top mode.																					
Secondary Display Right	000F _H	String	Write to this register to display data on left side of Secondary Display. Note: The display must be in Top mode.																					
Save Settings	0010 _H	Execute	Execute function with no parameters saves any FULL or SAFE setup changes. Operator changes are saved automatically																					
Enter Full Passcode	0019 _H	Number	<p>Write a Passcode to this register to unlock settings protected by a FULL Passcode</p> <p>If a full passcode has been set, this must be done before any registers (which require a full passcode) are accessed.</p> <p>Example: Sent (passcode 1):20120019; Response: 81120019:0000</p>																					
Enter Safe Passcode	001A _H	Number	Write a Passcode to this register to unlock settings protected by a SAFE Passcode																					
ADC Sample Number	0020 _H	Number	Read current sample number since last power on. (32 bit)																					
System Status *	0021 _H	Number	<p>This register can be read to obtain the status of the instrument.</p> <p>32 status bits sent as 8 hex chars, where:</p> <p>00020000_H: Overload 00010000_H: Underload 00008000_H: Error (see System Error) 00004000_H: SETUP menus active</p>																					

Name	Address	Type	Description	
			00002000 _H : Calibration in progress 00001000 _H : Motion 00000800 _H : Centre of Zero 00000400 _H : Zero 00000200 _H : Net For calibration, bit 13 (00002000 _H) is high when a calibration is taking place. Example: Send (status):20110021; Response (not calibrating): 81110021:00008400 Or Response (calibrating): 81110021:0000A400	
System Error	0022 _H	Number	Diagnostic Errors	
Absolute mV/V	0023 _H	Number	Absolute mV/V reading where 10000 = 1.0mV/V	
Unused	0024 _H	Number		
Gross/Net Weight	0025 _H	Number	These registers return weight data. Read Final: 8 character Hexadecimal number. Example: 00000064 for 100 kg Read Literal: Formatted string including decimal point units and Gross/Net indication. Example: " 10.0 kg N"	
Gross Weight	0026 _H	Number		
Net Weight	0027 _H	Number		
Tare Weight	0028 _H	Number		
Peak Hold	0029 _H	Number		
Manual Hold	002A _H	Number		
Grand Total	002B _H	Number		
Alternate Units Gross	002C _H	Number		
Raw ADC counts	002D _H	Number		2,560,000 = 1.0mV/V
Alternate Units Net	002E _H	Number		as above
System Fullscale	002F _H	Number	Fullscale weight of the instrument.	
Traceable weight available flag	0030 _H	Number	0: No traceable weights since start up 1: Traceable weight data is valid	
Traceable ID	0031 _H	Number	The unique ID for the traceable weight.	
Traceable weight	0032 _H	Number	Traceable weight in primary units	
Traceable weight (alt)	0033 _H	Number	Traceable weight in alternate units	
Traceable tare weight	0035 _H	Number	Tare weight valid during traceable weight.	
Traceable PT flag	0036 _H	Number	0: no preset tare 1: preset tare	
Traceable date: year	0037 _H	Number	Date and time that the traceable was acquired.	
Traceable date: month	0038 _H	Number		
Traceable date: day	0039 _H	Number		
Traceable date: hour	003A _H	Number		
Traceable date: minute	003B _H	Number		
Traceable date: second	003C _H	Number		

Name	Address	Type	Description
Stream Data	0040 _H	Block	Returns a block of data which is selected in Stream Register 1 .. 5. Use a read command to read a single set of data. Use an execute command (with a parameter of 1) to switch on automatic transmission
Stream Mode	0041 _H	Option	0: Manual - read 'Stream Data' register 1: Auto sync - Data is sent whenever new readings are available. 2: Auto 10Hz – Data is sent at 10Hz 3: Auto 3Hz – Data is sent at 3Hz 4: Auto 1Hz – Data is sent at 1Hz
Stream Register 1..5	0042 _H .. 0046 _H	Option	1..16 selects registers from ADC Sample (0020 _H) to System Fullscale (002F _H). 17 is IO Status (0051 _H)
Print Token String	004C _H	String	Sends a string to the configured printer port. The string can contain print tokens.
Reply Token String	004D _H	String	Same as 004C _H except that the completed string is returned to the sender.
Reply registers	004E _H	String	Get the value of multiple number registers in a single read. The register IDs are listed in hexadecimal. All numbers are returned as 32 bit. Example: To get the net and tare weights, send "2012004E:00270028;"
Reply Stream ID	004F _H		Same as register 004E _H except that stream IDs are used. Example: To get the first 3 items of stream data, send "2012004F:010203;"
IO Status	0051 _H	Number	32 bits of IO status sent as 8 hex chars
Settable Consecutive Print ID	007A _H	Number	The settable consecutive print ID.
User ID strings 1 .. 3	0090 _H .. 0092 _H	String	These strings are also accessed via the ID function on the keypad.
The following registers relate to calibration (marked with *).			
Calibration weight *	0100 _H	Number	This register is used to set the calibration weight for span and linearity calibrations. Weights are sent in decimal or hexadecimal (depending on command used). They must be in displayed weight without decimal point or units. Example: • 10.00kg → 1000 → 3E8H • 1000kg → 1000 → 3E8H

Name	Address	Type	Description
			<ul style="list-style-type: none"> • 0.1000t → 1000 → 3E8H Example: Sent (10.00kg): 20120100:3E8 Response(ok): 81120100:0000
Zero calibration *	0102 _H	Execute	This register is used to perform a zero calibration in the same way as the zero calibration via the menus. The display will change to indicate that a zero calibration is taking place. Example: Sent (calibrate): 20100102 Response (ok): 81110102:00000000 Send (status?): 20110021 Response (calibrating): 81110021:0000A400 Send (status?): 20110021 Response (calibrating): 81110021:0000A400 Send (status?): 20110021 Response (not calibrating): 81110021:00008400
Span calibration *	0103 _H	Execute	This register is used to perform a span calibration in the same way as the span calibration via the menus. The display will change to indicate that a span calibration is taking place. The calibration weight must be entered before a span is executed using register 0100H. Example: Sent (1000kg cal weight): 20120100:3E8 Response(ok): 81120100:0000 Sent (calibrate): 20100103 Response (ok): 81110103:00000000 Send (status?): 20110021 Response (calibrating): 81110021:0000A400 Send (status?): 20110021 Response (calibrating): 81110021:0000A400 Send (status?): 20110021 Response (not calibrating): 81110021:00008400
Linearity calibration *	0104 _H	Execute	This register is used to perform linearity compensation. Up to 10 linearity points can be used [numbered 0 .. 9]. The calibration weight must be entered, using register 0100H, before doing a linearity calibration. The display will change to show that a linearisation is taking place. The linearisation point number is sent as a parameter [numbered 0 .. 9]. Example: Sent (5000kg cal weight): 20120100:1388 Response(ok): 81120100:0000 Sent (calibrate 1st point): 20100104:0

Name	Address	Type	Description
			Response (ok): 81100103:00000000 Send (status?): 20110021 Response (calibrating): 81110021:0000A400 Send (status?): 20110021 Response (calibrating): 81110021:0000A400 Send (status?): 20110021 Response (not calibrating): 81110021:00008400
Clear Linearity *	0105 _H	Execute	This register clears a previously entered linearisation calibration. There are 10 linearisation points [numbered 0 .. 9] which can be cleared separately. The linearisation point to clear is sent as a parameter. Example: Sent (Clear 1st point): 20100105:0 Response (ok): 81100105:00000000
Direct zero calibration*	0106 _H	Execute	This register is used to perform a direct zero calibration in the same way as the direct zero calibration via the menus. A direct zero calibration is very fast and the display may not change in the same way as a zero calibration. The mV/V value is sent as a parameter. It is sent as mV/V x 10000. Example: <ul style="list-style-type: none"> • 0.5mV/V → 5000 → 1388H • 1.0mV/V → 10000 → 2710H • 2.5mV/V → 25000 → 61A8H Example: Sent (0.5mV/V): 20100106:1388 Response(ok): 81100106:00000000
Direct span calibration*	0107 _H	Execute	This register is used to perform a direct span calibration in the same way as the direct span calibration via the menus. A direct span calibration is very fast and the display may not change in the same way as a span calibration. The mV/V value OF FULLSCALE is sent as a parameter. It is sent as mV/V x 10000. E.g: <ul style="list-style-type: none"> • 0.5mV/V → 5000 → 1388H • 1.0mV/V → 10000 → 2710H • 2.5mV/V → 25000 → 61A8H Example use: Sent (1.0mV/V): 20100107:2710 Response(ok): 81100106:00000000
Current Time/Date	0150 _H	String	Read this register to get instrument date/time settings (eg 10/12/2005 18:30:10). (Can be SAFE Passcode protected)
Date Format	0151 _H	Option	Write 0 for MMDDYYYY or 1 for DDMMYYYY
Day	0152 _H	Number	Read/Write current day (1..31)

Name	Address	Type	Description
Month	0153 _H	Number	Read/Write current month(1..12)
Year	0154 _H	Number	Read/Write current year (2000..2099)
Hour	0155 _H	Number	Read/Write current hour (0..23)
Minute	0156 _H	Number	Read/Write current minute (0..59)
Second	0157 _H	Number	Read/Write current second (0..59)
Session Total Weight	0210 _H	Number	Session total information
Session Total Alt Wgt	0211 _H		
Session Total Pieces	0212 _H		
Session Total Num	0213 _H		
Grand Total Weight	0220 _H	Number	Grand total information
Grand Total Alt Wgt	0221 _H		
Grand Total Pieces	0222 _H		
Grand Total Num	0223 _H		
The following registers relate to the DSD.			
Auto clear DSD	8290 _H	Option	Auto write over oldest records when full (0..1)
Read DSD Record	8291 _H	Execute	Reads requested DSD record
Read Next DSD Record	8292 _H	Execute	Reads next DSD record
Read Prev. DSD Record	8293 _H	Execute	Reads Previous DSD record
Read Oldest Record	8294 _H	Execute	Reads Oldest DSD record
Read Newest Record	8295 _H	Execute	Reads Newest DSD record
Clear DSD	8296 _H	Execute	Clears all records on DSD
The Active Product is the product shown on the instrument display. It is the product which is currently active in the instrument.			
Change Active Product using Product number	B000 _H	Number	Write number to change the active product. Read to find out active product number.
Clear all Totals	B002 _H	Execute	Execute to clear All Totals
Clear Session Totals	B003 _H	Execute	Execute to clear Session Totals only
Clear Docket Totals	B004 _H	Execute	Execute to clear printing Docket Totals only
Change Active Product using Product Name	B006 _H	String	Write name to change the active product. Read to find out name of active product.
All changes to product information are made to the selected product. This product is selected via the comms and is used for network commands only. It may be different to the active product in the instrument.			
Select product by name	B00F _H	String	Write name to select product, read to find out selected product name.
Select product by number	B010 _H	Number	Write number to select product, read to find out selected product number.
The following registers all work with the Selected Product.			
Delete	B011 _H	Execute	Execute with no parameters to delete the selected product. This can be done only if the product total is zero.
Re-name	B012 _H	String	Write to change name of selected product.
Name	B013 _H	String	Read selected product name.

Name	Address	Type	Description
Preset Tare	B015 _H	Number	Read/Write Preset Tare
Alternate Unit Conversion Factor	B019 _H	Number	Read/Write Conversion Factor. 1000000 = 1.0
First Weight	B01A _H	Number	Read/Write First Weight
Permanent Flag	B01B _H	Number	Read/Write Permanent Flag
Target 1 .. Target 8	B080 _H .. B087 _H	Number	Setpoint targets for the Selected Product
Total Weight Total Alternate Wgt Total Num	B102 _H B103 _H B105 _H	Number	Product total information
Total Docket Weight Total Docket Alt Wgt Total Docket Num	B180 _H B181 _H B183 _H	Number	Product docket total information

Note: The viewer software will show the register address for each setting in the menu structure when they are accessed. Note that register addresses are not guaranteed to remain the same between software types and versions.

17. Appendix 4: Setup Menu Quick Reference

Note: ⊗ Read-only Safe Setup. Changing this setting **will increment** the Calibration Counter.

1 Read-only Safe Setup. Changing this setting **will not increment** the Calibration Counter.

L1	L2	L3	L4	Item	
GEN.OPT	LANG			Operator language	
	DATE.F			Date Format	
	P.CODE	SAFE.PC			Safe setup passcode
		FULL.PC			Full setup passcode
		OP.PC			Operator passcode
	KEY.LOC	P			Power key lock
		ZERO, TARE, GR.NET			Fixed Function Keys
		F1,F2,F3			Programmable Function Keys
		CLOCK, REPORT etc			Operator Functions
	DISP	B.LIGHT			Backlight operation
		FREQ			Display update frequency
		AUX.DSP			Auxiliary display function
	ID.NAME	NAME.1 .. NAME.3		Names for the three User ID strings	
	POWER	AUT.OFF			Auto-off
START			Pause on Start-Up		
USR.DEF				User defaults (all items except scale menu items)	
H.WARE	ALLOC			Check hardware allocation and use	
	LC.HW	MVV		mV/V test	
		OL.CNT			Overload count
		OL.CLR			Clear overload count
	SER1.HW, SER2.HW	BAUD, PARITY, etc		Settings for serial port 1 (SER1.HW) and the optional serial port 2 (SER2.HW).	
	ETH.HW	DHCP, IP, G.WAY		IP Configuration settings for the M4221 Ethernet module	
		ETH.DEF		Reset the M4221 Ethernet module to defaults	
	IO.HW	FRC.OUT		Force outputs test	
		TST.IN		Check inputs test	
		DB.1.8 - DB.25.32	DBNC.1. DBNC.32		Debounce settings for inputs
	DSD.HW	AUTO.C		Automatically overwrite oldest records when DSD full	
DSD.STR		Custom string to store with DSD records			
SCALE	BUILD	TYPE		Range type	
		CABLE		6-WIRE or 4-WIRE	
		DP		Decimal Point position	
		CAP1		Capacity of Scale / Range 1 / Interval 1	
		E1		Resolution of Scale / Range 1 / Interval 1	
		CAP2		Capacity of Scale / Range 2 / Interval 2	
		E2		Resolution of Scale / Range 2 / Interval 2	
		UNITS		Scale Units	
		HI.RES		x10 Expanded mode	
		OPTION	USE		Trade Use
	FILTER		Averaging		
	MOTION		Motion Detection		
	Z.RANGE		Range of Zero (%)		
	Z.TRACK		Zero Tracking		
	Z.INIT		Zero on Startup		
	Z.BAND		Band of Zero		
	EXT.EX		External excitation		
	R.ENTRY		Full access via rear button only		
	TOT.OPT		Weight type for totalising		
	CAL	ZERO		Calibrate Zero	
		SPAN		Calibrate Span	
		ED.LIN		Set Linearisation	
		CLR.LIN		Clear Linearisation	
		DIR.ZER		Direct mV/V Zero Calibration	
		DIR.SPN		Direct mV/V Span Calibration	
		DEF.CAL		Default Calibration (all scale settings to defaults)	
	QA	QA.OPT		QA Enable	
		QA.YEAR, QA.MONTH		QA Expiry Date	
		QA.DAY			
	FUNC	NUM		Number of special functions	
		SF1 – SF8	TYPE		Type
			KEY		Key assignment
			PRT.OUT		Print: printout
TOTAL			Print: totalising		

L1	L2	L3	L4	Item
		CLR.ASK		Print: Confirm clear
		AUTO		Print: Automatic
		IL.TYPE		Print: Interlock type
		I.LOCK		Print: Interlock
		MODE		Units: Mode
		UNIT		Units: Alternative unit
		U.STR		Units: Alternative unit string
		AUT.OUT		Single: Auto Output to use
		BLANK		Blank: Blanking function
		FUNC		Remote Key: Function to trigger
		CLR.TOT		Report print clear totals
SER.NET	ADDR			Network address
	NUM			Number of networks
	NET.1 – NET.n	TYPE		Protocol type
		SERIAL		Serial port
		RESP		Respond to simple commands
SER.AUT	NUM			Number of Serial outputs
	AUTO.1 – AUTO.n	TYPE		Frequency
		SERIAL		Serial port
		FORMAT		Format
		SOURCE		Weight type
		EV.AUTO		Custom format string
PRINT	NUM			Number of printouts
	HEADER			Header
	FOOTER			Footer
	PAGE	WIDTH		Page width
		HEIGHT		Page Height
		PG.END		Page End String
	SPACE	TOP		Blank lines at the top
		LEFT		Blank characters on the left
		BOTTOM		Blank lines at the bottom
	PRINT.1 – PRINT.n	TYPE		Printout type
		FORMAT		Format
		SERIAL		Serial port
		NAME		Name
		CUSTOM	DOC.PRN	Custom string for docket printout
			EV.D.NEW	Custom string for new docket
			EV.D.END	Custom string for end of docket (normal mode)
			EV.WI	Custom string for weigh in
			EV.WO.1	Custom string for weigh out with PT
			EV.WO.2	Custom string for weigh out with first weight
			EV.D.WO	Custom string for end of docket when weighing out
			REP.ST	Custom string for start of report
			REP.PR	Custom string for each product in a report
			REP.END	Custom string for end of report
SETP	NUM			Number of Setpoints
	SETP1 .. SETP8	TYPE		Type of setpoint
		OUTPUT		Output to use
		LOGIC		Active High or Active Low logic control
		ALARM		Setpoint Alarm
		SOURCE		Weight type
		HYS		Hysteresis
		MASK		Logic setpoint mask
		DLY.ON		Logic setpoint delay on
		HLD.OFF		Logic setpoint hold off
		RDY.TIM		Scale ready setpoint wait time
End	End			Save and Close

Table 12: Menus

18. Appendix 5: Error Messages

18.1. Overview

A number of error messages may be displayed to warn of operation outside of the acceptable limits. These messages may appear on either the primary or the secondary display. Short messages (XXXXXX) will appear as a single message. Longer messages (XXXXXX) (YYYYYY) will appear on the display in two parts, first the (XXXXXX) part, then the (YYYYYY) part.

18.2. Weighing Errors

These messages show status messages or errors that may occur during normal weighing operation.

Error	Description	Resolution
(U.LOAD)	The weight is below the minimum allowable weight reading.	Increase the weight or decrease the minimum allowable weight reading.
(O.LOAD)	The weight is above the maximum allowable weight reading. Warning - overloading may damage mechanical scale elements.	Check the condition of load cell connections. Check for damaged load cell.
(ERROR) (RANGE)	The weight reading is beyond the limit set for Zero operation. The operation of the <ZERO> key is limited in the setup during installation. The indicator cannot be Zeroed at this weight.	Increase the Zero Range (Z.RANGE) or use the <TARE> key instead.
(ERROR) (MOTION)	Scale motion has prevented a <ZERO> or <TARE> operation from occurring on command.	Try the operation again once the scale is stable.
(ERROR) (ADC)	An error with the ADC has prevented a <ZERO> or <TARE> operation from occurring	Ensure loadcell cabling is correct.

Table 13: Errors: weighing

18.3. Setup Errors

These messages show status messages or errors that may occur during the instrument setup. See section 8.4 for calibration errors.

Error	Description	Resolution
(ENTRY) (DENIED)	When accessing setup, more than three attempts have been made with the incorrect passcode.	Turn the instrument off. When the instrument is turned back on, enter the correct passcode to access setup.
(WR DENIED) (RD DENIED)	The instrument may be in Safe Setup and an item that needs Full Setup has been selected for editing.	Access Full Setup to access this item.

Table 14: Errors: setup

18.4. Diagnostic Errors

The instrument continually monitors the condition of the internal circuits. Any faults or out-of-tolerance conditions are shown on the display as an **E** type error message.

In the table below the following terms are used:

- **Check:** This item can be checked on site by service personnel.
- **Return for Service:** The instrument must be returned for factory service.

Error	Description	Resolution
(E0001)	The power supply voltage is too low.	Check supply
(E0002)	The power supply voltage is too high.	Check scale / cables
(E0004)	Positive sense voltage out of range.	Check scale connections and SCALE:BUILD:CABLE setting.
(E0008)	Negative sense voltage out of range.	Check scale connections and SCALE:BUILD:CABLE setting.
(E0010)	Temperature is outside of allowable limits	Check location
(E0020)	Module Error	Replace Module
(E0200)	The calibration information has been lost.	Re-calibrate
(E0400)	The factory information has been lost.	Return for Service
(E0800)	Application settings have been set to defaults.	Check and re-enter application settings
(E2000)	ADC Out of Range Error. This may be caused from a broken load cell cable.	Check BUILD:CABLE setting. Check load cell cable, wiring, etc.
(E4000)	The runtime information has been lost.	Check Zero and tare settings.

Table 15: Errors: diagnostic

The **E** type error messages are additive. For example if instrument is running off batteries and the temperature drops, the battery voltage may be too low. The resulting error messages will be **E 0011** (0001 + 0010). The numbers add in hexadecimal as follows:

1 - 2 - 3 - 4 - 5 - 6 - 7 - 8 - 9 - A - B - C - D - E - F
 (For example, 2 + 4 = 6, or 4 + 8 = C)

19. Appendix 6: M4221 Ethernet Module

19.1. Overview

The M4221 Ethernet module provides IP (internet protocol) connectivity to the indicator. The information in this appendix only applies to indicators fitted with this module.

19.2. Network Configuration

After installing the module, and connecting it to the network it is necessary to configure the network settings for the module. These settings may be automatically configured from your network via DHCP (Dynamic Host Configuration Protocol), or may need to be set manually. Contact your network administrator for settings appropriate to your network. The DHCP setting, IP address, network mask, default gateway and DNS servers are configured from the indicator via the ETH.HW menu (Section 7.2.4 on page 48). Additionally a host name & DHCP client ID may be optionally configured from the Module web page.

19.3. Viewing the Current Configuration

The Acc menu provides access to the current IP configuration of the module. Refer to Section 5.14 on page 35.

19.4. Services

The M4221 provides a number of services via the network, including a configuration web page and two TCP ports providing access to the indicators' serial ports SER.3A and SER.3B.

19.4.1. TCP Sockets

SER.3A can be accessed via TCP port 2222 on the module. This port allows only one simultaneous connection as it is bi-directional

SER.3B can be accessed via TCP port 2223 on the module. This port allows up to 10 simultaneous connections, as it is transmit only (data is sent from the indicator to the PC).

As with other serial modules, it is necessary to configure a function (networking, printing or auto-outputs) on the indicator to communicate via SER.3A or SER.3B.

The Viewer software can be used to test the connection to the indicator. This requires Viewer version 1.44+. Select a TCP connection from the connection settings dialog, and enter the indicator IP address or hostname. The TCP port should be set to 2222.

19.4.2. Web Interface

There is a Web page provided by the module. This can be accessed by determining the IP address from the Acc menu, and then entering the following into your web browser: `http://<module_ip_address>/`. The default username for the module web page is "admin", and the default password is "PASS".

20. Appendix 7: M4501 DSD Module

20.1. Overview

The M4501 DSD module provides alibi memory along with custom string support. The information in this appendix applies only to indicators fitted with this module.

20.2. Writing records

A record will be stored in the DSD whenever a traceable weight is generated, A traceable weight is only generated when a print of type RECORD or DOCKET occurs, and only for TOTAL values of NONE or ADD. For more information on print setup see sections 7.7 PRINT (Printouts) on page 61 and 11 Printing on page 81. The DSD will also be written when a print occurs in alibi mode.

If a custom string is set then it will be stored along with the traceable weight. The custom string accepts all print tokens. For more information on the custom string and auto clear settings see section 7.2.7 DSD.HW on page 49.

20.3. Reading records

The records can be viewed in alibi mode or read through the communications interface. For more information on viewing DSD records in alibi mode see section 5.13 Alibi on page 34. View400 can be used to retrieve the records from the instrument or you can manually send communications commands to the instrument. For a list of registers relating to reading DSD record via the comms interface see section 16 Appendix 3: Communications Registers on page 102.

The reply to a DSD record read command will look like the following example:

```
81108295:1,2009/08/04,11:12:24, 2000,kg,GROSS, 0,kg,TARE,
4410,lb,13,p
```

This response is comma separated and contains the following data:

Response header: record ID, date, time, weight, units, gross/net, tare weight, tare units, tare/P.tare., alternate weight, alternate units, piece count, piece units, custom string

If the custom string DSD.STR: \BA\D7,\C9 is set then the reply will be:

```
81108295:2,2009/08/04,12:12:08, 950,kg,NET, 50,kg,P.TARE, 2095,lb, 6,p
,FLOUR ,AA MINES
```

See section 15.3 Tokens on page 98 for information on the print tokens used in the above example.

21. Glossary

21.1. Glossary of Terms

Term	Definition
Count-by	The smallest change in weight units that the display can show. See also Resolution.
Division	A single graduation.
EEPROM	Electrically Erasable Programmable Read-Only Memory
EMC	Electro-Magnetic Compatibility Regulation
FIR	Finite Impulse Response
Full Scale	The maximum gross weight allowed on the scale. This is used to detect overload and underload conditions, etc.
Graduations	The maximum number of display steps between zero gross load and full capacity gross load. It is equal to the full scale divided by the resolution.
LED	Light Emitting Diode
NTEP	National Type Evaluation Program
OIML	International Organization of Legal Metrology
PLC	Programmable Logic Controller
Range	Total change in weight between zero gross load and full capacity gross load (i.e. the nominated total capacity of the scale). It is always given in displayed weight units.
Resolution	The smallest change in weight units that the display can show. See also Count-by.
RFI	Radio Frequency Interference
Ring Network	A network of up to 31 Instruments connected to a central computer
Optical Communications Cable	Opto-isolated infrared communications cable which uses a magnetically coupled head to attach to the front of the instrument
RS-232	Standard for communications hardware layers.
Step-Response	The step-response is the time between placing a weight on the scale and the correct weight reading being displayed.
Transients	A temporary voltage oscillation or spike caused by a sudden change of load (or other external influence).
Units	The actual units of measurement (kilograms, tonnes, pounds, etc.).

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